The right choice for the ultimate yield!

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### **Programmable Logic Control**

## Smart I/O Module

### Smart I/O Series

### **User Manual**

Profibus-DP DeviceNet Rnet Modbus Ethernet RAPIEnet



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

1

• Keep this manual within easy reach for quick reference.

LSELECTRIC

#### Before using the product ...

For your safety and effective operation, please read the safety instructions thoroughly before using the product.

- Safety Instructions should always be observed in order to prevent accident or risk with the safe and proper use the product.
- ► Instructions are divided into "Warning" and "Caution", and the meaning of the terms is as follows.

**Warning** This symbol indicates the possibility of serious injury or death if some applicable instruction is violated.

### 

This symbol indicates the possibility of severe or slight injury, and property damages if some applicable instruction is violated.

Moreover, even classified events under its caution category may develop into serious accidents relying on situations. Therefore we strongly advise users to observe all precautions properly just like warnings.

► The marks displayed on the product and in the user's manual have the following meanings.

 $\underline{/!}$  Be careful! Danger may be expected.

4 Be careful! Electric shock may occur.

The user's manual even after read shall be kept available and accessible to any user of the product.

### **Safety Instructions for Design Process**

### 

- Design the analog input / output signal or pulse input / output line at least 100mm away from high voltage line or power line so that it is not affected by noise or magnetic field change. It may cause malfunction due to noise.
- If there is a lot of vibration in the installation environment, take measures to prevent direct vibration from being applied to the PLC. It may cause electric shock, fire or malfunction.
- If metallic dust is present in the installation environment, take measures to prevent

metallic dust from entering the product. It may cause electric shock, fire or malfunction.

### **Safety Instructions on Installation Process**

- Use PLC only in the environment specified in PLC manual or general standard of datasheet. If not, electric shock, fire, abnormal operation of the product may be caused.
- Before install or remove the module, be sure PLC power is off. If not, electric shock or damage on the product may be caused.
- Be sure that every module is securely attached after adding a module or an extension connector. If the product is installed loosely or incorrectly, abnormal operation, error or dropping may be caused. In addition, contact failures under poor cable installation will be causing malfunctions as well.
- Make sure that the I/O connector is securely fastened. It may cause wrong input or output.

### Safety Instructions for Wiring Process

### **Warning**

Prior to wiring works, make sure that every power is turned off. If not, electric shock or damage on the product may be caused.

### ✓ Caution

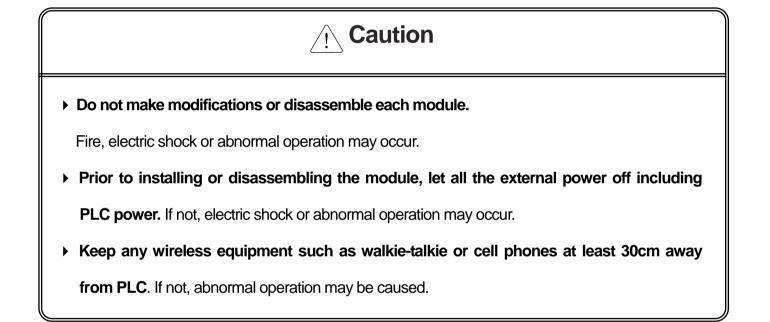
- Check rated voltages and terminal arrangements in each product prior to its wiring process. Applying incorrect voltages other than rated voltages and misarrangement among terminals may cause fire or malfunctions.
- Secure terminal screws tightly applying with specified torque. If the screws get loose, short circuit, fire or abnormal operation may be caused. Securing screws too tightly will cause damages to the module or malfunctions, short circuit, and dropping.
- Be sure to earth to the ground using Class 3 wires for PE terminals which is exclusively used for PLC. If the terminals not grounded correctly, abnormal operation or electric shock may be caused.
- Don't let any foreign materials such as wiring waste inside the module while wiring, which may cause fire, damage on the product or abnormal operation.

### **Safety Instructions for Test-Operation and Maintenance**

### 

- Don't touch the terminal when powered. Electric shock or abnormal operation may occur.
- > Prior to cleaning or tightening the terminal screws, let all the external power off including

PLC power. If not, electric shock or abnormal operation may occur.



### Safety Instructions for Waste Disposal

 $\underline{?}$  Caution

> Product or battery waste shall be processed as industrial waste. The waste may discharge

toxic materials or explode itself.

# **Revision History**

Version	Date	Revised Contents	Page
V 1.0	'02.04	* First Edition	-
V 1.1	'03.07	* TR 0.5A Source Output module (16, 32 and hybrid) added	-
V 1.2	'03.12	* TR 0.5A Sink Output module (32, hybrid) added	-
V 1.3	'04.06	* TR 0.5A Sink Output module (16) added	-
V 1.4	'05.07	* Analog input/output module (A/D 8 ch, D/A 4 ch) added	9-1 ~ 9-26
V1.5	'07.05	<ul> <li>* Smart I/O Dnet function (Quick/Dummy mode) added</li> <li>* XG-PD setting contents revised</li> <li>* Extension type Smart I/O Pnet/Dnet adapter (XPL/XDL-BSSA) contents revised</li> </ul>	1-4 ~ 1-8, 2-2 4-18 ~ 4-19 6-22,6-32 ~ 6-46
V1.6	'08.11	<ul> <li>* Smart I/O Rnet function (Latch/Clear) added</li> <li>* Extension type Smart I/O Rnet adapter (XRL-BSSA) added</li> <li>* XGR added</li> <li>* Address of headquarter changed</li> </ul>	1-9,3-7 1-10, 2-28, 3-12 1-2,1-12
V1.7	'09.06	* Extension type Smart I/O Enet adapter (XEL-BSSA/BSSB) contents revised	2-30, 2-35~2-36, 3-13~3-14, 10-1 ~ 10-29 A-7~A-11, A-27~A-32
V1.8	'10.05	<ul> <li>* Extension type Smart I/O module added</li> <li>* Communication module specification error modified</li> <li>* Parameter setting method of extension type Smart I/O (Pnet/Dnet/Rnet) adapter added</li> </ul>	Ch2.2.1, Ch2.6.5~2.6.6 Ch2.7.2~2.7.3 Ch5.4,Ch6.4, Ch7.4 A.3~A.5
V1.9	'10.10	<ul> <li>* Extension type Analog I/O module added (XBE-DC16B, XBE-RY08B)</li> <li>* XEL-BSSA Notes revised</li> <li>* XEL-BSSB periodic communication parameter setting method added</li> </ul>	1-6, 1-8, 1-10, 1-12, 2-2
V2.0	'12.08	* Page number and contents error revised in index	Page : 10-5, 11-9 ~ 11-11 11-15 ~ 11-17 Contents : CH13.
V2.1	'12.11	<ul> <li>* Extension type Smart I/O module added</li> <li>- XBF-AD04C / DV04C / DC04C / AD08A</li> <li>* Parameter setting method of extension type added</li> </ul>	Ch10(Enet), APPENDIX (XEL-BSSA/B)
V2.2	'13.12	<ul> <li>* Extension type Smart I/O module added</li> <li>- XBF-AD04C / DV04C / DC04C</li> <li>* Parameter setting method of extension type added</li> <li>* Domain of homepage changed</li> </ul>	Ch5(Pnet), APPENDIX (XPL-BSSA) -

V2.3	'14.02	<ul> <li>* Parameter setting method of extension type added</li> <li>- XBF-AD04C / DV04C / DC04C</li> <li>* Parameter setting method of extension type changed</li> </ul>	Ch7(Rnet), APPENDIX (XRL-BSSA)
V2.4	'15.11	* Communication module specification error modified	APPENDIX (XEL-BSSB)
V2.5	'15.12	* Snet stand-alone removable type module added	1-11
V2.6	'16.04	* Smart I/O RAPIEnet module added	Ch11(RAPIEnet)
V2.7	'20.05	* Format and contents modification according to the change of company name (LSIS $\rightarrow$ LS ELECTRIC)	-
V2.8	'20.11	<ul> <li>* External dimension of RAPIEnet added</li> <li>* Profibus-DP integration (Analog module)</li> <li>* Typo correction</li> </ul>	-
V2.9	'21.01	Rnet communication cable specifications updated	2-35
V3.0	'22.08	Homepage address changed	-
V3.1	'22.10	XGI CPU model available Smart I/O added Minimum distance specification between nodes added	1.3.3 9-2,10-2

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#### Chapter 1 Overview

#### 1.1 How to use the User's Manual

This User's Manual provides the information such as product specification, performance and operation method needed to use PLC System composed of Smart I/O module.

The User's Manual is composed of as follows.

CHAP.1 Overview

Describes the configuration of the user's manual, product characteristics and terminology. CHAP.2 Product Specification Describes common specification of each product used for Smart I/O series. CHAP.3 System Configuration Describes the kinds of product available for Smart I/O series and system configuration method. CHAP.4 Communication Programming Describes common communication program operating method to act Smart I/O module. CHAP.5 Profibus-DP Communication Describes basic communication method of Profibus-DP (Pnet) communication module. CHAP.6 DeviceNet Communication Describes basic communication method of DeviceNet (Dnet) communication module. CHAP.7 Rnet Communication Describes basic communication method of FIELDBUS (RNET) communication module. CHAP.8 Modbus Communication Describes basic communication method of Modbus (Snet) communication module. CHAP.9 Ethernet communication Describes basic communication method of Ethernet (Enet) communication module. CHAP.10 RAPIEnet communication Describes basic communication method of RAPIEnet communication module. CHAP.11 Installation and Wiring Describes installation and wiring method, and notices to make sure of the reliability of PLC system. CHAP.12 Maintenance and Repair Describes check list and method to run PLC system normally for a long term. CHAP.13 Trouble Shooting

Describes various errors to be occurred while using the system and the action to solve the problem. Appendix

Here describes the product terminology and external dimension for system installation.

If you want to write programs, refer to the following manuals.

- GLOFA PLC Instruction manual
- GLOFA PLC GMWIN user manual
- GLOFA PLC GM3/4 user manual
- GLOFA PLC GM6 user manual
- MASTER-K Instruction
- MASTER-K 200S/300S user manual
- KGLWIN user manual
- XG5000 user manual
- XGK Instruction manual
- XGI/XGR Instruction manual
- XGK CPU manual
- XGI/XGR CPU manual
- XGT Dnet I/F module user manual
- XGT Pnet I/F module user manual
- XGT Cnet I/F module user manual
- XGT Rnet I/F module user manual
- XGT Enet I/F module user manual
- XGT Ethernet/IP I/F module user manual
- XGT RAPIEnet I/F module user manual

When you make system of GLOFA-GM/MASTER-K and Smart I/O module, consider the followings. The following is CPU or software version for operating the module.

- GLOFA PLC GMWIN program Tool: upper Ver.4.03
- GLOFA GMR CPU : more than Ver. 2.2
- GLOFA GM1/2 CPU : more than Ver. 3.2
- GLOFA GM3 CPU : more than Ver. 2.7
- GLOFA GM6 CPU : more than Ver. 2.1
- MASTER-K PLC KGLWIN programming Tool : more than Ver. 3.41
- MASTER-K K1000S CPU : more than Ver. 3.2
- MASTER-K K300S CPU : more than Ver. 3.4
- MASTER-K K200S CPU : more than Ver. 2.4
- Frame Editor : more than Ver. 2.01

#### Remark

1) This manual is written for GMWIN V4.04, KGLWIN V3.6, Frame editor V2.01 and XG5000 V4.0.

#### 1.2 Characteristics of Smart I/O

The characteristics of Smart I/O series is as follows.

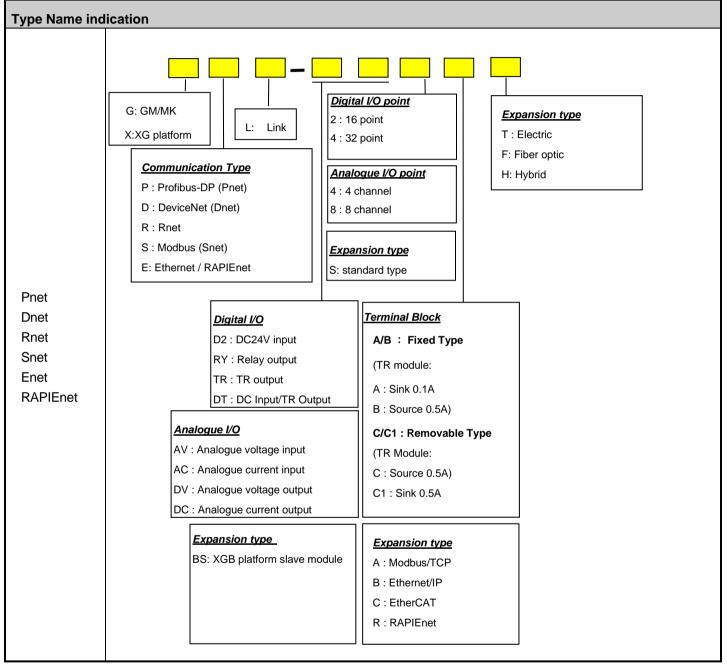
(1) Product design based on International Electrotechnical Commission (IEC 61131) (GLOFA series in common)

- Easy support to programming device
- Standard language (IEC 61131-3) provided (IL / LD / SFC)
- (2) Open network by selecting international standard communication protocol.
- (3) Available to communicate with remote master module independently without power module/CPU module.
- (4) Available to set maximum 32 ~ 126 stations.
  - Pnet : 32~126 stations (Including Repeater)
  - Dnet : 64 stations
  - Rnet : 32~64 stations (Including Repeater)
  - RAPIEnet : 64 stations
  - Snet : 32 stations
- (5) Enables to save the cost for installation and maintenance.
- (6) Various system configuration and simple maintenance and repair.
- (7) Easy to change the system.
- (8) Compatible with other maker's product.
  - Available to connect Smart I/O to other maker's master.
- (9) Easy to set the system as the station address setting by hardware is available.
- (10) Simple communication programming.
  - Using the GMWIN/KGLWIN High-speed link parameter
  - But for Modbus (Snet), using function block(GMWIN, XGLWIN) or P2P(XG5000)
- (11) Supports various I/O.
- (12) Supports various OPEN type communication method. (RAPIEnet, Rnet is only for LS products.)
  - Pnet, Dnet, Snet, Enet
- (13) Easy to configure system and use
  - Block type: Packaged by one unit including CPU, I/O and communication function.
  - Expansion type: it is available to configure communication or I/O diversely.
- (14) Provides the online network status detection function.
  - Available to know the remote module status through high speed link monitor.
  - In case of XGT system (RAPIEnet, Pnet, Dnet), it is available to check more diverse module instantly.
- (15) Supports high speed communication.
- (16) Flexible communication relation is available as the speed shall be set automatically according to the speed of master.
  - Pnet, Dnet etc.

#### **1.3 Product Configuration of Smart I/O**

#### 1.3.1 Type Name Indication

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#### 1.3.2 Module Specifications

### 1) Pnet

#### (1) Block type

Classificati on	Type name		Specification				
		GPL-TR2A	DC24V, TR output 16 points (Source 0.1A)	EOL			
		GPL-TR2A1	DC24V, TR output 16 points (Sink 0.5A)	EOL			
	<b>Fired</b>	GPL-TR2B	DC24V, TR output 16 points (Source 0.5A)	EOL			
	Fixed	GPL-TR4A	DC24V, TR output 32 points (Sink 0.1A)	EOL			
		GPL-TR4A1	DC24V, TR output 32 points (Sink 0.5A)	EOL			
TR output		GPL-TR4B	DC24V, TR output 32 points (Source 0.5A)	EOL			
		GPL-TR2C	DC24V, TR output 16 points (Source 0.5A)				
	Domovable	GPL-TR2C1	DC24V, TR output 16 points (Sink 0.5A)				
	Removable	GPL-TR4C	DC24V, TR output 32 points (Source 0.5A)				
		GPL-TR4C1	DC24V, TR output 32 points (Sink 0.5A)				
	Fixed	GPL-DT4A	DC24V, DC input 16 points /TR output 16 points (Sink 0.1A)				
		GPL-DT4A1	DC24V, DC input 16 points /TR output 16 points (Sink 0.5A)	EOL			
Hybrid		GPL-DT4B	DC24V, DC input 16 points /TR output 16 points (Source 0.5A)	EOL			
	Removable	GPL-DT4C	DC24V, DC input 16 points /TR output 16 points (Source 0.5A)				
		GPL-DT4C1	DC24V, DC input 16 points /TR output 16 points (Sink 0.5A)				
Relay	Fixed	GPL-RY2A	DC24V(Rating), Relay output 16 points	EOL			
output	Removable	GPL-RY2C	DC24V(Rating), Relay output 16 points				
	Tive	GPL-D22A	DC24V(Rating), DC input 16 points	EOL			
DC innut	Fixed	GPL-D24A	A DC24V(Rating), DC input 32 points				
DC input	Demovable	GPL-D22C	DC24V(Rating), DC input 16 points				
	Removable	GPL-D24C	DC24V(Rating), DC input 32 points				
Analog		GPL-AV8C	Analog voltage input, 8 channels				
input	Removable	GPL-AC8C	Analog current input, 8 channels				
Analog	Dama al la	GPL-DV4C	Analog voltage output, 4 channels				
output	Removable	GPL-DC4C	Analog current output, 4 channels				

#### (2) Expansion type

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XBE-DC08ADC24V input module 8 points (Source/Sink type)XBE-DC16A/BDC24V input module 16 points (Sink/Source type)XBE-DC32ADC24V input 32 pointsXBE-RY08A/BRelay output module 8 pointsXBE-RY16ARelay output module 16 pointsXBE-TN08ATR output module 8 points (Sink type)XBE-TN16ATR output module 16 points (Sink type)XBE-TN32ATR output module 32 points (Sink type)XBE-TP08ATR output module 32 points (Sink type)XBE-TP08ATR output module 8 points (Source type)XBE-TP16ATR output module 16 points (Source type)		Note			
Expansion type	Insion typeXPL-BSSAPnet I/F Expansion typeXBE-DC08ADC24V input module 8 points (Source/Sink type)XBE-DC16A/BDC24V input module 16 points (Sink/Source type)XBE-DC32ADC24V input 32 pointsXBE-RY08A/BRelay output module 8 pointsXBE-RY16ARelay output module 16 pointsXBE-TN08ATR output module 8 points (Sink type)XBE-TN16ATR output module 16 points (Sink type)XBE-TN32ATR output module 16 points (Sink type)XBE-TP08ATR output module 32 points (Sink type)XBE-TP16ATR output module 8 points (Source type)XBE-TP16ATR output module 16 points (Source type)XBE-TP32ATR output module 16 points (Source type)				
Expansion type Modular I/O	XBE-DC08A	DC24V input module 8 points (Source/Sink type)			
	XBE-DC16A/B	DC24V input module 16 points (Sink/Source type)			
	XBE-DC32A	DC24V input 32 points			
	XBE-RY08A/B	Relay output module 8 points			
	XBE-RY16A	Relay output module 16 points			
Modular I/O	XBE-TN08A	TR output module 8 points (Sink type)			
	XBE-TN16A	TR output module 16 points (Sink type)			
	XBE-TN32A	TR output module 32 points (Sink type)			
	XBE-TP08A	TR output module 8 points (Source type)			
	XBE-TP16A	TR output module 16 points (Source type)			
	XBE-TP32A	TR output module 32 points (Source type)			
	XBE-DR16A	DC24V 8 points input/Relay 8 points output module			
	XBF-AD04A	Current/Voltage input 4 channels			
	XBF-DV04A	Voltage output 4 channels			
	XBF-DC04A	Current output 4 channels			
	XBF-RD04A	RTD input 4 channels			
Modular special	XBF-TC04S	Thermocouple input 4 channels(insulated)			
meddiai opeciai	XBF-AH04A	Analog input 2 channels/output 2 channels			
	XBF-AD08A	Analog input 8 channels			
	XBF-AD04C	Current/Voltage input 4 channels			
	XBF-DV04C	Voltage output 4 channels			
	XBF-DC04C	Current output 4 channels			

#### 2) Dnet

#### (1) Block type

Classifi cation	Type name		Specification				
		GDL-TR2A	DC24V, TR output 16 points (Sink 0.1A)	EOL			
		GDL-TR2A1	DC24V, TR output 16 points (Sink 0.5A)	EOL			
	Fixed	GDL-TR2B	DC24V, TR output 16 points (Source 0.5A)	EOL			
	Fixed	GDL-TR4A	DC24V, TR output 32 points (Sink 0.1A)	EOL			
TR		GDL-TR4A1	DC24V, TR output 32 points (Sink 0.5A)	EOL			
output		GDL-TR4B	DC24V, TR output 32 points (Source 0.5A)	EOL			
		GDL-TR2C	DC24V, TR output 16 points (Source 0.5A)				
	Removable	GDL-TR2C1	DC24V, TR output 16 points (Sink 0.5A)				
		GDL-TR4C	DC24V, TR output 32 points (Source 0.5A)				
		GDL-TR4C1	DC24V, TR output 32 points (Sink 0.5A)				
	Fixed	GDL-DT4A	DC24V, DC input 16 points /TR output 16 points (Sink 0.1A)	EOL			
		GDL-DT4A1	DC24V, DC input 16 points /TR output 16 points (Sink 0.5A)	EOL			
Hybrid		GDL-DT4B	DC24V, DC input 16 points /TR output 16 points (Source 0.5A)	EOL			
	Removable	GDL-DT4C	DC24V, DC input 16 points /TR output 16 points (Source 0.5A)				
	Removable	GDL-DT4C1	DC24V, DC input 16 points /TR output 16 points (Sink 0.5A)				
Relay Fixed C		GDL-RY2A	DC24V(Rating), Relay output 16 points	EOL			
output	Removable	GDL-RY2C	DC24V(Rating), Relay output 16 points				
	<b>E</b> ise d	GDL-D22A	DC24V(Rating), DC input 16 points	EOL			
DC	Fixed	GDL-D24A	DC24V(Rating), DC input 32 points	EOL			
input	Removable	GDL-D22C	DC24V(Rating), DC input 16 points				
	Removable	GDL-D24C	DC24V(Rating), DC input 32 points				

#### (2) Expansion type

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When using expansion	type, you	ı can	change	connection	method	from	Connector	connection	method	to
Terminal connection met	hod by us	ng Sma	art Link.							

Classification	Type name	Specification	Note
Expansion type	XDL-BSSA	Dnet I/F expansion type	
	XBE-DC08A	DC24V input module 8 points (Source/Sink type)	
	XBE-DC16A/B	DC24V input module 16 points (Sink/Source type)	
	XBE-DC32A	DC24V input 32 points	
	XBE-RY08A/B	Relay output module 8 points	
	XBE-RY16A	Relay output module 16 points	
Modular I/O	XBE-TN08A	TR output module 8 points (Sink type)	
	XBE-TN16A	TR output module 16 points (Sink type)	
	XBE-TN32A	TR output module 32 points (Sink type)	
	XBE-TP08A	TR output module 8 points (Source type)	
	XBE-TP16A	TR output module 16 points (Source type)	
	XBE-TP32A	TR output module 32 points (Source type)	
	XBE-DR16A	DC24V 8 points input/Relay 8 points output module	
	XBF-AD04A	Current/Voltage input 4 channels	
	XBF-DV04A	Voltage output 4 channels	
Modular	XBF-DC04A	Current output 4 channels	
special	XBF-RD04A	RTD input 4 channels	
	XBF-TC04S	Thermocouple input 4 channels(insulated)	
	XBF-AH04A	Analog input 2 channels/output 2 channels	

\* Types of Smart Link are as follows.

Smart Link is used to change connection method from Connector connection method to Terminal connection method

Class	ification	Type name	Description				
Terminal Board	Manufacture Construction	SLP-T40P	Change connection method from connector to terminal (For 40 pins)				
Relay Board	Minimum Contraction	SLP-RY4A	Change output and connection method from TR output (NPN type), Connector to Relay output, Terminal. (For 40 pins)				
Connection	Q	SLT-C101-XBE	Length 1m, plastic hood type, for 40 pins				
cable		SLP-C101-XBE	Length 1m, Built-in relay SLP type only				

#### 3) Rnet

#### (1) Block type

	Classification		Type name	Specification	Note
		TR	GRL-TR2A	DC24V, TR output 16 points (Sink 01.A)	EOL
		output	GRL-TR4A	DC24V, TR output 32 points (Sink 0.1A)	EOL
9 pin		Hybrid	GRL-DT4A	DC24V, DC input 16/TR output 16 (Sink 0.1A)	EOL
connector	Fixed	Relay output	GRL-RY2A	DC24V(Rating), Relay output	EOL
		DC	GRL-D22A	DC24V(Rating), DC input 16 points	EOL
		Input	GRL-D24A	DC24V(Rating), DC input 32 points	EOL
		TR	GRL-TR2A(N)	DC24V, TR output 16 points (Sink 0.1A)	EOL
		Output	GRL-TR4A(N)	DC24V, TR output 32 points (Sink 0.1A)	EOL
		Hybrid	GRL-DT4A(N)	DC24V, DC input 16/TR output 16 (Sink 0.1A)	EOL
	Fixed	Relay output	GRL-RY2A(N)	DC24V(Rating), relay output 16	EOL
		DC	GRL-D22A(N)	DC24V(Rating), DC input 16	EOL
		Input	GRL-D24A(N)	DC24V(Rating), DC input 32	EOL
			GRL-TR2C1	DC24V, TR output 16 (Sink 0.5A)	
5 pin connector		TR	GRL-TR2C	DC24V, TR output 16 (Source 0.5A)	
CONNECTOR		Output	GRL-TR4C1	DC24V, TR output 32 (Sink 0.5A)	
			GRL-TR4C	DC24V, TR output 32 (Source 0.5A)	
	Removable	Hybrid	GRL-DT4C1	DC24V, DC input 16/TR output 16 (Sink 0.5A)	
	Removable	пурпа	GRL-DT4C	DC24V, DC input 16/TR output 16 (Source 0.5A)	
		Relay output	GRL-RY2C	DC24V(Rating), Relay output 16	
		DC	GRL-D22C	DC24V(Rating), DC input 16	
		Input	GRL-D24C	DC24V(Rating), DC input 32	

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\* In case of Smart I/O Rnet Removable type Combo module, selection between Latch/Clear is available.

#### (2) Expansion type

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Classification	Type name	Specification	Note
Expansion type	XRL-BSSA	Rnet I/F expansion type	
	XBE-DC08A	DC24V input module 8 points (Source/Sink type)	
	XBE-DC16A	DC24V input module 16 points (Sink/Source type)	
	XBE-DC32A	DC24V input 32 points	
	XBE-RY08A/B	Relay output module 8 points	
	XBE-RY16A	Relay output module 16 points	
Modular I/O	XBE-TN08A	TR output module 8 points (Sink type)	
	XBE-TN16A	TR output module 16 points (Sink type)	
	XBE-TN32A	TR output module 32 points (Sink type)	
	XBE-TP08A	TR output module 8 points (Source type)	
	XBE-TP16A	TR output module 16 points (Source type)	
	XBE-TP32A	TR output module 32 points (Source type)	
	XBE-DR16A	DC24V 8 points input/Relay 8 points output module	
	XBF-AD04A	Current/Voltage input 4 channels	
	XBF-DV04A	Voltage output 4 channels	
	XBF-DC04A	Current output 4 channels	
	XBF-RD04A	RTD input 4 channels	
Modular special	XBF-TC04S	Thermocouple input 4 channels(insulated)	
Modulal Special	XBF-AH04A	Analog input 2 channels/output 2 channels	
	XBF-AD08A	Analog input 8 channels	
	XBF-AD04C	Current/Voltage input 4 channels	
	XBF-DV04C	Voltage output 4 channels	
	XBF-DC04C	Current output 4 channels	

#### 4) Snet

#### (1) Block type

Classification	Туре	name	Specification	Note
		GSL-TR2A	DC24V, TR output 16 (Sink 0.1A)	EOL
TR output		GSL-TR4A	DC24V, TR output 32 (Sink 0.1A)	EOL
Hybrid	<b>F</b> ired	GSL-DT4A	DC24V, DC input 16/TR output 16 (Sink 0.1A)	EOL
Relay output	Fixed	GSL-RY2A	DC24V(Rating), Relay output 16	EOL
		GSL-D22A	DC24V(Rating), DC input 16	EOL
DC input		GSL-D24A	DC24V(Rating), DC input 32	EOL
	Removable	GSL-TR2C	DC24V, TR output 16 (Source 0.5A)	
TD		GSL-TR2C1	DC24V, TR output16 (Sink 0.5A)	
TR output		GSL-TR4C	DC24V, TR output 32 (Source 0.5A)	
		GSL-TR4C1	DC24V, TR output 32 (Sink 0.5A)	
		ovable GSL-DT4C DC24V, DC input 16/TR output 16 (Source 0.5A)		
Hybrid		GSL-DT4C1	DC24V, DC input 16/TR output 16 (Sink 0.5A)	
Relay output		GSL-RY2C DC24V(Rating), Relay output 16		
		GSL-D22C	DC24V(Rating), DC input 16	
DC input		GSL-D24C	DC24V(Rating), DC input 32	

### 5) Enet

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#### (1) Expansion type

Classification	Type name	Specification	Note
Expansion type	XEL-BSSA	Enet I/F expansion type (Modbus/TCP)	
	XEL-BSSB	Enet I/F expansion type (Ethernet/IP)	
	XBE-DC08A	DC24V input module 8 points (Source/Sink type)	
	XBE-DC16A	DC24V input module 16 points (Sink/Source type)	
	XBE-DC32A	DC24V input 32 points	
	XBE-RY08A/B	Relay output module 8 points	
	XBE-RY16A	Relay output module 16 points	
Modular I/O	XBE-TN08A	TR output module 8 points (Sink type)	
	XBE-TN16A	TR output module 16 points (Sink type)	
	XBE-TN32A	TR output module 32 points (Sink type)	
	XBE-TP08A	TR output module 8 points (Source type)	
	XBE-TP16A	TR output module 16 points (Source type)	
	XBE-TP32A	TR output module 32 points (Source type)	
	XBE-DR16A	DC24V 8 points input/Relay 8 points output module	
	XBF-AD04A	Current/Voltage input 4 channels	
	XBF-DV04A	Voltage output 4 channels	
	XBF-DC04A	Current output 4 channels	
	XBF-RD04A	RTD input 4 channels	
Modular	XBF-TC04S	Thermocouple input 4 channels(insulated)	
special	XBF-AH04A	Analog input 2 channels/output 2 channels	
	XBF-AD08A	Analog input 8 channels	
	XBF-AD04C	Current/Voltage input 4 channels	
	XBF-DV04C	Voltage output 4 channels	
	XBF-DC04C	Current output 4 channels	

#### 6) RAPIEnet

#### (1) Block type

Classification	Type name	Specification	Note
TR output	GEL-TR4C1	DC24V, TR output 32 (Sink 0.5A)	
Hybrid	GEL-DT4C1	DC24V, DC input 16/TR output 16 (Sink 0.5A)	
Relay output	GEL-RY2C	DC24V(Rating), Relay output 16	
DC input	GEL-D24C	DC24V(Rating), DC input 32	
Analog input	GEL-AV8C	Analog voltage input, 8 channels	
Analog input	GEL-AC8C	Analog current input, 8 channels	
Analog output	GEL-DV4C	Analog voltage output, 4 channels	
Analog output	GEL-DC4C	Analog current output, 4 channels	

#### 1.3.3 Compatibility list according to Smart I/O module version

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The following table indicates compatible list of O/S Version between each CPU and master module to use Smart I/O series. Before applying the system , refer to the following list. In case of XGK/XGI/XGB, all versions are available.

Classification	Classification			Note	
Classification		Type O/S Version		NOLE	
	GM3	GM3-CPUA	Version 2.5 or later		
	GM4	GM4-CPUA/B/C	Version 2.6 or later		
	GM6	GM6-CPUA/B/C	Version 1.9 or later		
CPU	GM7	G7M Series	Version 1.6 or later		
CFU	K1000S	K7P-30AS	Version 3.1 or later		
	K300S	K4P-15AS	Version 3.1 or later		
	K200S	K3P-03AS/BS/CS	Version 2.2 or later		
	K80S K7M Series		Version 1.6 or later		
	GMWIN		Version 3.6 or later		
PADT	KGLWIN		Version 3.3 or later		
	XG5000		Version 4.07 or later		
	Pnet	G3/4/6L-PUEA/B	Version 1.0 or later		
	Dnet	G4/6L-DUEA	Version 1.2 or later		
Communication Master	Rnet	G3/4/6/7L-RUEA	Version 1.0 or later		
	Modbus	G3/4/6L-CUEA	Version 2.0 or later	can be used as built- in at GM7/K80S	
	RAPIEnet	XGL-EIMT/F/H	Version 3.0 or later		

\* Smart I/O Snet can be used by using Cnet module at GM3/4/6, K1000S/300S/200S and can be used as built-in at GM7/K80S

#### The following table indicates available Smart I/O master module for each CPU

Oleasif		Available Smart I/O m	aster mod	ule			Nete
Classif	cation	CPU	Pnet	Dnet	Rnet	Snet	Note
	GM3	GM3-CPUA	0	-	0	0	
	GM4	GM4-CPUA/B/C	$\bigcirc$	0	0	0	
	GM6	GM6-CPUA/B/C	0	0	0	0	
	GM7	G7M Series	-	-	0	0	
	K1000S	K7P-30AS	0	-	0	0	
	K300S	K4P-15AS	0	0	0	0	
	K200S	K3P-03AS/BS/CS	0	0	0	0	
	K80S	K7M Series	-	-	0	0	
CPU		XGK-CPUH/CPUS	0	0	0	0	
	XGK	XGK-CPUA/CPUE	0	0	0	0	
		XGK-CPUU	0	0	0	0	
		XGI-CPUH/CPUS	0	0	0	0	
	XGI	XGI-CPUE	0	0	0	0	
		XGI-CPUU/D	0	0	0	0	
	VOD	XGR-CPUH/T	0	0	0	0	Noto1)
	XGR	XGR-CPUH/F	0	0	0	0	Note1)
	XGB	XGB-XBMS	-	-	-	$\bigcirc$	

Note 1) In case of XGR system, master communication module can be installed on extension base.

### 1.4 Notice in Using

When installing this device, notice the followings for the reliability and safety.

Category	Classification	Contents
Temperature	Condition	<ul> <li>When installing this device, maintain the temperature between 0~55 °C</li> <li>Do not exposure it to direct light.</li> </ul>
	Measure	• When temperature is too high, install pan, air-conditioner and when temperature is too low, install suitable device.
	Condition	<ul><li>No condensing allowed.</li><li>Install something in the control panel for protection from the water and dust.</li></ul>
Condensing	Measure	• Due to the frequent On/Off, condensing may occur. In this case, turn on the device at the night
	Condition	Install it in the place where impact and vibration don't occur
Shock	Measure	• When impact and vibration is severe, install anti-vibration rubber so that vibration and impact doesn't affect the device.
	Condition	Install in the place where there is not corrosive gas.
Gas	Measure	• When corrosive gas enters, plan air-purification measure in the control panel.
	Condition	Install in the place where electro-magnetic wave is not severe.
EMC Environment	Measure	<ul> <li>In case of wiring, set the precise route.</li> <li>Check the shield of control panel</li> <li>For light, use glow lamp and avoid fluorescent lamp</li> <li>When installing power module, ground the device at standard electric potential</li> </ul>

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#### **Chapter 2 Product Specification**

#### **2.1 General Specification**

The General Specification of Smart I/O series is as follows.

No	Items			Specifi	cation			References
1	Operating temperature	0 ~ 55 °C	0 ~ 55 °C					-
2	Storage temperature	–25 ~ +70 °C						-
3	Operating humidity	5 ~ 95%RH, no (	dew					-
4	Storage humidity	5 ~ 95%RH, no	dew					-
		h	n case of Int	ermittent vib	ration		-	-
		Frequency	Ad	cceleration	Amplitu	ıde	Times	
		$5 \leq f < 8.4H$		-	3.5mr	n	-	
5	Vibration	$8.4 \leq f \leq 150$		8m/s²{1G}	-		X, Y, Z	
				ntinuous vib			10 times	IEC6 1131-2
		$\frac{\text{Frequency}}{5 \leq f < 8.4H}$		celeration	Amplitu 1.75m		each direction	
		$3 \le 1 < 0.41$ 8.4 $\le$ f $\le$ 150					-	
6	shocks	<ul> <li>Application time</li> </ul>	<ul> <li>max. impact acceleration : 147 m/s²{15G}</li> <li>Application time : 11ms</li> <li>pulse wave type : semi-sine wave pulse (3 times each direction X, Y, Z)</li> </ul>					IEC 61131-2
		Square wave impulse noise			DC: ± 900 V			LS ELECTRIC Standard
		Electrostatic discharging	Ũ	lkV (contact βkV (aerial di	discharging) scharging)			IEC 61131-2, IEC 61000-4-2
7	Noise	Radiant electromagneti c field noise	80 ~ 1000	MHz, 10 V	//m			IEC 61131-2, IEC 61000-4-2
		Fast Transient / Bust NoiseClassific ationPower moduleDigital I/O (below 24V) (more than 24V)Digital I/O (below 24V) Analog I/O Communication Interface		ow 24V) log I/O nmunication face	IEC 61131-2 IEC 61000-4-4			
8	Ambient conditions	Voltage         2kV         1kV         0.25kV           No corrosive gas, no dust					-	
9	operating altitude	Less than 2,000m					-	
10	Pollution degree	Less than 2					-	
11	Cooling method	Natural air-condi	tioning					-

#### Notes

1) IEC (International Electro-technical 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 that 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.

#### 2.2 Power Specification

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**2.2.1 Performance specification** Here describes the Power Specification of Smart I/O 1) <u>Block</u> type

Вюсктуре					
	Specification				
Category	Pnet, Rnet, Modbus, Dnet, RAPIEnet				
Input voltage	DC 24V (Tolerance range: DC 20.4V ~ 28.8V)				
Input current	0.5A (+24 VDC)				
Inrush current	40A lower: (24 VDC Input)				
Power indication	When Power is on, LED ON				
Cable specification	1.5 ~ 2.5mm <sup>2</sup> (AWG 16 ~ 22)				
Fastening torque	12kg · cm				

#### 2) Expansion type

Category	Specification
	Pnet, Dnet, Rnet, Enet
Input voltage/current	DC24V/0.55A (allowed range:DC19.2V ~ 28.8V)
	In case of Dnet, it is available to operate in 11V.
Output voltage/current	5V (± 20%) / less than 1.5A
Inrush current	Max 10A
Power indication	When power is On, LED ON

\* In order to protect power supplier, use the max. 4A fuse-equipped power supplier.

Expansion module		Type name	Consumption current (mA)	Available Smart I/O	
	lanut	XBE-DC08A	30		
	Input	XBE-DC16A/B	40		
	module	XBE-DC32A	50		
		XBE-RY08A/B	240		
		XBE-RY16A	420		
I/O		XBE-TN08A	40	Dast Dast Dast Frist	
module	Output	XBE-TN16A	60	Dnet, Rnet, Pnet, Enet	
	module	XBE-TN32A	120		
		XBE-TP08A	40		
		XBE-TP16A	50		
		XBE-TP32A	80		
	I/O module	XBE-DR16A	250		
		XBF-AD04A	120		
		XBF-DC04A	110		
		XBF-DV04A	110	Dnet, Rnet, Pnet, Enet	
		XBF-RD04A	100		
Specie		XBF-TC04S	100		
Specia	al module	XBF-AH04A	120	Rnet,Pnet,Enet	
		XBF-AD08A	105	Rnet,Pnet,Enet	
		XBF-AD04C	105	Rnet,Pnet,Enet	
		XBF-DV04C	75	Rnet,Pnet,Enet	
		XBF-DC04C	75	Rnet,Pnet,Enet	

Consumption current of I/O module available to equip is as follows.

#### Remark

1) Precautions when installing the I/O module of the expansion type module

Since the maximum current that can be supported by Pnet, Dnet, Rnet Expansion type module is 1.5A, the input/output module should be configured within maximum 1.5A

### 2.3 Digital Input Module Specification

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### 2.3.1 DC16 points stand-alone type input module (Source/Sink)

	Type name	DC Input Module		
Specification				
Input point		16 points		
Insulation method		Photo-coupler insulation		
Rated input voltage		DC24V		
Rated input current		7 mA(fixed), 5mA(removable)		
Voltage range		DC20.4 ~ 28.8V (ripple rate : within 5%)		
Max. simultaneous inp	ut point	100% (16 points/1COM) simultaneously ON		
ON voltage / ON curre	nt	More than DC19V / more than 3.5 mA		
OFF voltage / OFF cu	rrent	Less than DC6V / less than 1.5 mA		
Input resistance		Approx. 3.3 k $\Omega$ (fixed), 4.7 k $\Omega$ (removable)		
Response time	$Off \rightarrow On$	Less than 3 ms		
	$\text{On} \to \text{Off}$	Less than 3 ms		
Common method		16 points / COM (Sink/Source Type)		
Internal consumption of	current	Less than 70mA		
Operation indication		LED ON when input ON		
External connection m	ethod	Terminal unit connector (M3 X 6 screws)		
Weight		Less than 160g/190g (D22A: Fixed /D22C: Removable)		
Circuit Configuration				
Photo- Coupler circuit R COM1				

### 2.3.2 DC32 point stand-alone type input module (Source/Sink)

Input point       32 points         Insulation method       Photo-coupler insulation         Rated input voltage       DC24/         Rated input voltage       7 mA(fixed), 5mA(removable)         Use voltage range       DC20.4 ~ 28.8V (ripple rate : within 5%)         Max. simultaneous input point       100% (16 points/1COM) simultaneously ON         ON voltage / OPF current       Less than 1.5 mA         Input resistance       Approx. 3.3 kQ(fixed), 4.7 kQ(removable)         Response time       Off > On         On -> Off       Less than 3 ms         Common method       16 points / COM (Source/Sink type)         Internal consumption current       Less than 3 ms         Common method       16 points / COM (Source/Sink type)         Internal consumption current       Less than 3 ms         Common method       16 points / COM (Source/Sink type)         Internal connection method       Terminal unit connector (M3 X 6 sorews)         Weight       Less than 240g/270g (D24A: Fixed / D24C: Removable)         Circuit	Type name Specification		DC Input Module		
Rated input voltage     DC24V       Rated input voltage     7 mA(fixed), 5mA(removable)       Use voltage range     DC20.4 ~ 28.8V (ripple rate : within 5%)       Max, simultaneous input point     100% (16 points/1COM) simultaneously ON       ON voltage / ON current     More than DC19V / more than 3.5 mA       OFF voltage / OFF current     Less than DC6V / less than 1.5 mA       Input resistance     Approx. 3.3 kΩ(fixed), 4.7 kΩ(removable)       Response time     Off -> On       On -> Off     Less than 3 ms       Common method     16 points / COM (Source/Sink type)       Internal consumption current     Less than 300 mA       Operation indication     LED ON when input ON       External connection method     Terminal unit connector (M3 X 6 screws)       Weight     Less than 240g/270g (D24A: Fixed / D24C: Removable)	Input point		32 points		
Rated input voltage       7 mA(fixed), 5mA(removable)         Use voltage range       DC20.4 - 28.8V (ripple rate : within 5%)         Max. simultaneous input point       100% (16 points/1COM) simultaneously ON         ON voltage / ON current       More than DC19V / more than 3.5 mA         OFF voltage / OFF current       Less than DC6V / less than 1.5 mA         Input resistance       Approx. 3.3 kQ(fixed), 4.7 kQ(removable)         Response time       Off -> On         On - > Off       Less than 3 ms         Common method       16 points / COM (Source/Sink type)         Internal consumption current       Less than 300 mA         Operation indication       LED ON when input ON         External connection method       Terminal unit connector (M3 X 6 screws)         Weight       Less than 240g/270g (D24A: Fixed / D24C: Removable)         Concoupler         OCSV         Phote-coupler       Use of the phote-coupler         Operation indication       Less than 240g/270g (D24A: Fixed / D24C: Removable)         Circuit         Phote-coupler       Use of the phote-coupler         Unner       Phote-coupler       Use of the phote-coupler         Unner       Phote-coupler       Use of the phote-coupler         United in the phote-coupler <td>Insulation method</td> <td></td> <td>Photo-coupler insulation</td>	Insulation method		Photo-coupler insulation		
Use voltage range     DC20.4 - 28.8V (ripple rate : within 5% )       Max. simultaneous input point     100% (16 points/1COM) simultaneously ON       ON voltage / ON current     More than DC19V / more than 3.5 mA       OFF voltage / OFF current     Less than DC6V / less than 1.5 mA       Input resistance     Approx. 3.3 kQ(fixed), 4.7 kQ(removable)       Response time     Off -> On       On - Off     Less than 3 ms       Common method     16 points / COM (Source/Sink type)       Internal consumption current     Less than 300 mA       Operation indication     LED ON when input ON       External connection method     Terminal unit connector (M3 X 6 screws)       Weight     Less than 240g/270g (D24A: Fixed / D24C: Removable)	Rated input voltage		DC24V		
Max. simultaneous input point       100% (16 points/1COM) simultaneously ON         ON voltage / ON current       More than DC19V / more than 3.5 mA         OFF voltage / OFF current       Less than DC6V / less than 1.5 mA         Input resistance       Approx. 3.3 kΩ(fixed), 4.7 kΩ(removable)         Response time       Off -> On       Less than 3 ms         Common method       16 points / COM (Source/Sink type)         Internal consumption current       Less than 300 mA         Operation indication       LED ON when input ON         External connection method       Terminal unit connector (M3 X 6 screws)         Weight       Less than 240g/270g (D24A: Fixed / D24C: Removable)         Circuit	Rated input voltage		7 mA(fixed), 5mA(removable)		
ON voltage / ON current     More than DC19V / more than 3.5 mA       OFF voltage / OFF current     Less than DC6V / less than 1.5 mA       Input resistance     Approx. 3.3 kΩ(fixed), 4.7 kΩ(removable)       Response time     Off -> On       On -> Off     Less than 3 ms       Common method     16 points / COM (Source/Sink type)       Internal consumption current     Less than 300 mA       Operation indication     LED ON when input ON       External connection method     Terminal unit connector (M3 X 6 screws)       Weight     Less than 240g/270g (D24A: Fixed / D24C: Removable)	Use voltage range		DC20.4 ~ 28.8V (ripple rate : within 5% )		
OFF voltage / OFF current       Less than DC6V / less than 1.5 mA         Input resistance       Approx. 3.3 kΩ(fixed), 4.7 kΩ(removable)         Response time       Off -> On       Less than 3 ms         Common method       16 points / COM (Source/Sink type)         Internal consumption current       Less than 300 mA         Operation indication       LED ON when input ON         External connection method       Terminal unit connector (M3 X 6 screws)         Weight       Less than 240g/270g (D24A: Fixed / D24C: Removable)         Off -> On         Circuit         Photo-coupler       Uff R         Circuit       Operation       Less than 240g/270g (D24A: Fixed / D24C: Removable)	Max. simultaneous in	put point	100% (16 points/1COM) simultaneously ON		
$\begin{tabular}{ c c c c c c } \hline Inner & Approx. 3.3 kQ(fixed), 4.7 kQ(removable) & Inner & Less than 3 ms & Ins & Inner & I$	ON voltage / ON curr	ent	More than DC19V / more than 3.5 mA		
Off -> On       Less than 3 ms         On -> Off       Less than 3 ms         Common method       16 points / COM (Source/Sink type)         Internal consumption current       Less than 300 mA         Operation indication       LED ON when input ON         External connection method       Terminal unit connector (M3 X 6 screws)         Weight       Less than 240g/270g (D24A: Fixed / D24C: Removable)         Circuit	OFF voltage / OFF c	urrent	Less than DC6V / less than 1.5 mA		
Response time     On - > Off     Less than 3 ms       Common method     16 points / COM (Source/Sink type)       Internal consumption current     Less than 300 mA       Operation indication     LED ON when input ON       External connection method     Terminal unit connector (M3 X 6 screws)       Weight     Less than 240g/270g (D24A: Fixed / D24C: Removable)	Input resistance		Approx. 3.3 k $\Omega$ (fixed), 4.7 k $\Omega$ (removable)		
Common method     16 points / COM (Source/Sink type)       Internal consumption current     Less than 3 00 mA       Operation indication     LED ON when input ON       External connection method     Terminal unit connector (M3 X 6 screws)       Weight     Less than 240g/270g (D24A: Fixed / D24C: Removable)	Descriptions	Off -> On	Less than 3 ms		
Internal consumption current     Less than 300 mA       Operation indication     LED ON when input ON       External connection method     Terminal unit connector (M3 X 6 screws)       Weight     Less than 240g/270g (D24A: Fixed / D24C: Removable)	Response time	On - > Off	Less than 3 ms		
Operation indication     LED ON when input ON       External connection method     Terminal unit connector (M3 X 6 screws)       Weight     Less than 240g/270g (D24A: Fixed / D24C: Removable)         Circuit         Photo-coupler         Photo-coupler         Photo-coupler         Photo-coupler         Photo-coupler         Photo-coupler         Photo-coupler         Photo-coupler         Photo-coupler	Common method		16 points / COM (Source/Sink type)		
External connection method       Terminal unit connector (M3 X 6 screws)         Weight       Less than 240g/270g (D24A: Fixed / D24C: Removable)         Circuit       Image: Circuit         Proto-coupler       Proto-coupler         Verget       Composition         Inner       Proto-coupler         Proto-coupler       Verget         Inner       Proto-coupler         Verget       Verget	Internal consumption	current	Less than 300 mA		
Weight Less than 240g/270g (D24A: Fixed / D24C: Removable)	Operation indication		LED ON when input ON		
Circuit	External connection	method	Terminal unit connector (M3 X 6 screws)		
DC5V Photo-coupler Photo-coupler Circuit Photo-coupler Photo-coupler Photo-coupler Circuit Photo-coupler Circuit Photo-coupler Circuit Photo-coupler Circuit Circuit Circuit	Weight		Less than 240g/270g (D24A: Fixed / D24C: Removable)		
	DC5V Photo-coupler Photo-coupler Circuit Photo-coupler Circuit Photo-coupler Circuit Photo-coupler Circuit Photo-coupler Circuit Circuit Circuit				
	L		<u>'</u>		

Type name		DC Input Module				
Specification		XBE-DC08A				
Input point		8 point				
Insulation meth	od	Photo-coupler insulation				
Rated input vol	tage	DC24V				
Rated input vol	tage	About 4 mA				
Use voltage rar	nge	DC20.4~28.8V (ripple rate less	s than 5%)			
ON voltage / O	N current	More than DC19V / more than	<b>3</b> mA			
OFF voltage / 0	OFF current	Less than DC6V / less than 1	mA			
Input resistance	9	Approx. 5.6 <sup>k</sup> Ω				
Response	$\text{Off} \to \text{On}$	1/3/5/10/20/70/100 ms(setting a		rameter) init	tial value: 3 ms	
time	$\text{On} \to \text{Off}$	1/3/3/10/20/10/100 mg (setting a				
Insulation press	ure	AC560Vrms / 3Cycle (altitude	2000m)			
Insulation resiste	or	With insulation resistor meter more than 10 $M_{\Omega}$				
Common metho	d	8point / COM				
Suitable wire siz	e	Stranded wire 0.3~0.75 $^{\rm mt}$ (external size less than 2.8 $^{\rm mm}$ )				
Internal consum	ption current	30 $^{\text{mA}}$ (When all input point is (	s On)			
Operation indica	tion	LED On when input is On				
External connec	tion method	9 pin terminal connector				
Weight		52g				
	Circuit co	onfiguration	No.	Point	Туре	
			TB1	0		
		0 0	TB2	1	TB1	
	Photo	- coupler	TB3	2	TB2	
	R []		TB4	3		
			TB5	4	TB4	
	5	Inner	TB6	5	тв6	
твэ Сом				6	TB7	
				7		
	reminarino.		TB9	СОМ	TB9	

# 2.3.3 DC 8 point modular type input module (Source/Sink)

# 2.3.4 DC 16 point modular type input module (Sink/Source)

	Type name	DC input module				
Specification		XBE-DC16A			XBE-DC16B	
Input point		16point	16point			
Insulation metho	bd	Photo-coupler insulation	n			
Rated input volta	age	DC24V			DC12V, DC24V	
Rated input curr	ent	About 4 mA			About 4mA, 8 mA	
Usage voltage r	ange	DC20.4~28.8V (ripple rate less than 5%	b)		DC9.5~30V (ripple rate less than 5%)	
On voltage / On	current	More than DC19V / mo	ore than	<b>3</b> mA	More than DC9V / more than 3mA	
Off voltage / Off	current	Less than DC6V / less	than 1 m	ıΑ	Less than DC5V / less than 1mA	
Input resistance		About 5.6 <sup>kΩ</sup>			About 2.7 <sup>k</sup> Ω	
Response	$\text{Off} \to \text{On}$		<b>11</b>			
time	$\text{On} \to \text{Off}$	1/3/5/10/20/70/100 IIIs(	setting v		U parameter) initial value:3 ms	
Insulation press	ure	AC560Vrms / 3Cycle (a	altitude 2	2000m)	)	
Insulation resist	or	With insulation resistor	meter n	nore th	an 10 MΩ	
Common metho	d	16 point / COM				
Suitable wire siz	e	Stranded wire 0.3~0.75 m <sup>*</sup> (external less than 2.8 mm)				
Inner consumpti	on current	40 mA (When input point is On)				
Operating indication		LED is On when input is On				
External connec	tion method	8 pin terminal unit connector + 10 pin terminal unit connector				
Weight		53g				
	Circuit configu	ration	No.	Point	type	
	Photo-o R R S Connector No.	soupler	TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB7         TB8         TB9         TB10	0 1 2 3 4 5 6 7 8 9 4 8 9 4 8 9 4 8 9 4 8 0 0 8 C 0 0 E F COM		

## 2.3.5 DC 32 point modular type input module (Source/Sink)

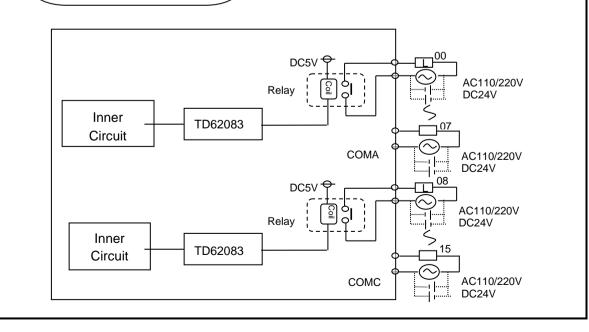
One sitis stime	Type name						Module	
Specification 32point					Х	BE-DC	J32A	
Insulation metho	d	Photo-coupler insulat	lion					
Rated input volta		DC24V						
Rated input curre	-	About 4 mA						
Usage voltage ra		DC20.4~28.8V (ripple	a rata le	se thar	5%)			
Input derating	lige	Refer to the following						
On voltage / On	current	More than DC19V / n			am			
Off voltage / Off								
Input resistance	current	Less than DC6V / Le About 5.6 kΩ	ss than	<b>1</b> MA				
· · ·	$Off \rightarrow On$							
Response time	$On \rightarrow Off$	1/3/5/10/20/70/100 ms	(setting	with CI	PU para	ameter)	) initial value:3 <sup>ms</sup>	
Insulation pressu		AC560Vrms / 3Cycle	(altitud	a 2000	m)			
Insulation resisto		With resistor meter m						
Common method		32 point / COM			-			
Suitable wire size		0.3 mm <sup>2</sup>						
-	Inner consumption current 50 mA (When input )		oint is C	)n)				
Operation indica			LED flicker when input is On					
External connect		40 pin connector						
weight		60g						
	Circuit configura	-	No.	Point	No.	Point		
		1	B20	00	A20	10	type	
		♥         ♥	B19	01	A19	11		
	┶┘───╄╶╇		B18	02	A18	12		
S	R □ [♥	★ [;	B17 B16	03 04	A17 A16	13		
	_ ⊆ <sup>₽</sup> ♦	Inner circuit	B10	04	A10	14 15	B19 A19 B18 A18	
			B14	06	A14	16	B17 B1 A17	
DC24V			B13	07	A13	17	B16 A16 B15 A15	
Connector		B12	08	A12	18	B14 A14		
		B11	09	A11	19	B13 A13 B12 A12		
Input derating diagram		B10	0A	A10	1A	B11 A11 B10 A10		
100			B09	0B	A09	1B	B09 <b>a</b> A09	
90			B08	00	A08	1C	B08 4 408 B07 4 4 A08	
80			B07	0D	A07	1D	B06 A06	
		B06 B05	0E 0F	A06 A05	1E 1F	B05 A05 B04 A04		
60		B05 B04	NC	A05 A04	NC			
40			B04	NC	A04	NC	B01 A02 A01	
0	10 20 30 Tamp	0 40 55 ℃	B02	COM	A02	COM	1	
	Temp.		B01	COM	A01	COM	1	

## 2.4 Digital Output Module Specification

## 2.4.1 16 point relay output block type module

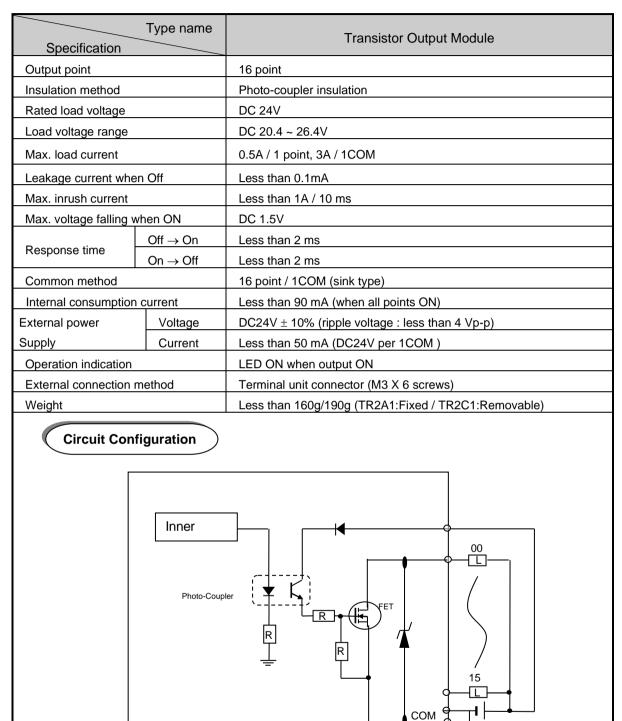
Type name Specification		Relay Output Module			
Output point		16 points			
Insulation meth	nod	Relay insulation			
	Max. rated load	3A 250VAC, 3A 30VDC			
Dating	Max. rated power	750VA, 90W			
Rating (Resistive	Max. rated load voltage	250VAC, 110VDC			
Load)	Max. rated load current	5A			
Max. open/clos	e frequency	1,200 times / hr			
Surge killer		None			
	Mechanical	2X10 <sup>7</sup>			
Life	Electrical (20cpm base)	10 <sup>5</sup>			
Response	$Off \rightarrow On$	Less than 10 ms			
time	$On \rightarrow Off$	Less than 12 ms			
Common methe	od	8 points / COM			
Internal consumption current		Less than 325mA (when all points ON)			
Operation indication		LED ON when output ON			
External conne	ction method	Terminal unit connector (M3 X 6 screws)			
Weight		Less than 300g/330g (RY2A: fixed / RY2C:removable)			

Circuit Configuration



Specification	Type name	Transistor Output Module		
Output point		16 points		
Insulation method		Photo-coupler insulation		
Rated load voltage		DC 24V		
Load voltage range		DC 20.4 ~ 26.4V		
Max. load current		0.1A / 1point, 2A / 1COM		
Leakage current wher	n OFF	Less than 0.1mA		
Max. inrush current		Less than 0.4A/10ms		
Max. voltage falling w	hen ON	DC 1.5V		
	$\text{Off} \to \text{On}$	Less than 2 ms		
Response time	$\text{On} \to \text{Off}$	Less than 2 ms		
Common method		16 points / 1COM		
Internal consumption	current	Less than 80 mA (when all points ON)		
External power	Voltage	DC24V $\pm$ 10% (ripple voltage : less than 4 Vp-p)		
Supply	current	Less than 50 mA (DC24V per 1COM )		
Operation indication		LED ON when output ON		
External connection m	nethod	Terminal unit connector (M3 X 6 screws)		
Weight		Less than 160g (fixed type)		
	Photo coupler			

# 2.4.2 16 point transistor block type output module (0.1 Sink)



DC24V

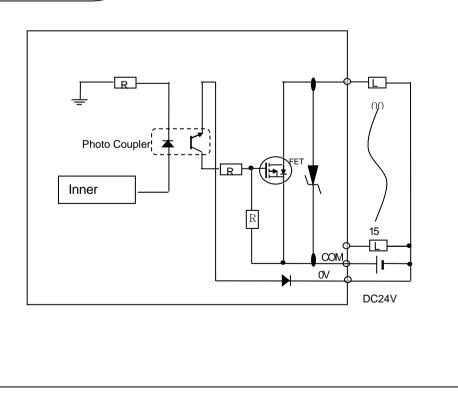
## 2.4.3 16 point transistor block type output module (0.5A Sink)

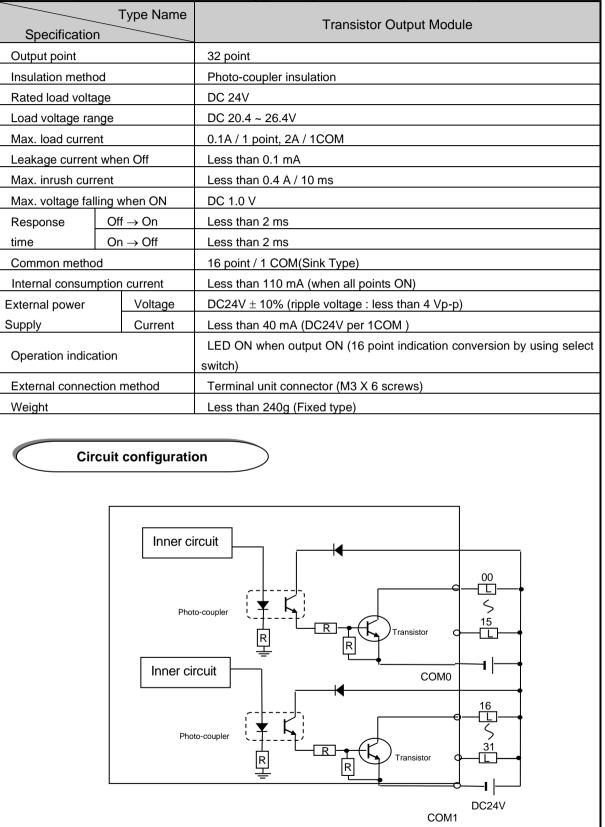
Type name Specification		Transistor Output Module		
Output point		16 point		
Insulation method		Photo-coupler insulation		
Rated load voltage		DC 24V		
Load voltage range		DC 20.4 ~ 26.4V		
Max. load current		0.5A / 1 point, 3A / 1COM		
Leakage current when Off		Less than 0.1mA		
Max. inrush current		Less than 1A / 10 ms		
Max. voltage falling when ON		DC 1.5V		
	$Off\toOn$	Less than 2 ms		
Response time	$\text{On} \to \text{Off}$	Less than 2 ms		
Common method		16point / 1COM (sink type)		
Internal consumption	current	Less than 90 mA (when all points ON)		
External power	Voltage	DC24V $\pm$ 10% (ripple voltage : less than 4 Vp-p)		
Supply Current		Less than 50 mA (DC24V per 1COM )		
Operation indication		LED ON when output ON		
External connection method		Terminal unit connector (M3 X 6 screws)		
Weight		Less than 161g/191g (TR2A1:Fixed / TR2C1:Removable)		

# 2.4.4 16 point transistor block type output module (0.5A Source)

# Circuit Configuration

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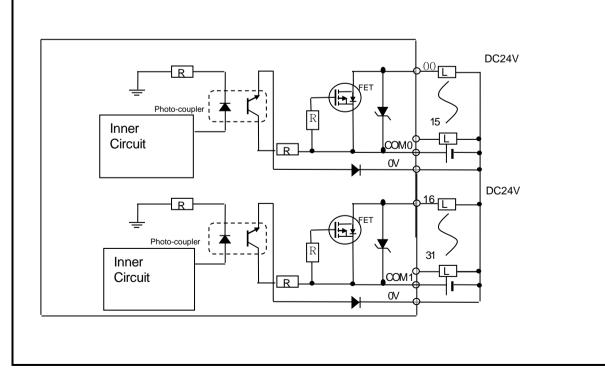
# 2.4.5 32 point Transistor block type output module (0.1 A Sink)

Type Name Specification		Transistor Output Module		
Output point		32 point		
Insulation method		Photo-coupler insulation		
Rated load voltage	)	DC 24V		
Load voltage range	Э	DC 20.4 ~ 26.4V		
Max. load current		0.5A / 1point, 3A / 1COM		
Leakage current w	hen Off	Less than 0.1 mA		
Max. inrush curren	t	Less than 1A / 10 ms		
Max. voltage falling when ON		DC 1.0 V		
	$\text{Off} \to \text{On}$	Less than 2 ms		
Response time	$\text{On} \to \text{Off}$	Less than 2 ms		
Common method		16 point / 1 COM (Sink Type)		
Internal consumpti	on current	Less than 270 mA (when all points ON)		
External power	Voltage	DC24V $\pm$ 10% (ripple voltage : less than 4 Vp-p)		
Supply Current		Less than 40 mA (DC24V per 1COM )		
Operation indication		LED ON when output ON (16 point indication conversion by using select switch)		
External connection method		Terminal unit connector (M3 X 6 screws)		
Weight		Less than 240g/290g (TR4B:fixed / TR4C: removable)		

# 2.4.6 32 point transistor block type output module (0.5A Source)

# Circuit configuration

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# 2.4.7 32 Transistor block type output Module (0.5A Sink)

	Type Name	Transistor Output Module		
Specification Output point		32 point		
Insulation method		Photo-coupler insulation		
Rated load voltage		DC 24V		
Range of load voltage		DC 20.4 ~ 26.4V		
Max. load current		0.5A / 1point, 3A / 1COM		
Leakage current when	Off	Less than 0.1 mA		
Max. inrush current		Less than 1A / 10 ms		
Max. voltage falling wh	nen ON	DC 1.0 V		
	$Off \rightarrow On$	Less than 2 ms		
Response time	$\text{On} \to \text{Off}$	Less than 2 ms		
Common method		16 point / 1 COM (Sink Type)		
Internal consumption cu	urrent	Less than 270 mA (when all points ON)		
External power	Voltage	DC24V $\pm$ 10% (ripple voltage : less than 4 Vp-p)		
Supply	Current	Less than 40 mA (DC24V per 1COM )		
Operation indication		LED ON when output ON		
Operation indication		(16 point indication conversion by using select switch)		
External connection m	ethod	Terminal unit connector (M3 X 6 screws)		
Weight		Less than 240g/290g (TR4A1:Fixed / TR4C1:Removable)		
	Configuration			

# 2.4.8 8 point relay modular type output module

Type name Relay Ou					ule			
Specificati	on	XBE-RY08A						
Output point		8 point						
Insulation me	ethod	Relay insulation	n					
Rated load v	oltage / current	DC24V 2A(resi	stor load) / AC220V 2	A(COSΨ =	1), 5A/COM	1		
Min. load vol	tage / current	DC5V/1 mA						
Max. load vo	ltage	AC250V, DC12	25V					
Leakage curr	rent when OFF	0.1 mA (AC220)	V, 60 <sup>H</sup> z)					
Max. open/cl	ose frequency	More than 3,60	0 times / hr					
Surge killer		None						
	Mechanical	More than 2X1	07					
		Rated load volt	age / current more that	an 100,000				
Life	Electrical	AC200V / 1.5A	, AC240V / 1A (COSY	ť = 0.7) mo	re than 100,	000		
	Electrical	AC200V / 1A, A	AC240V / 0.5A (COSY	ľ = 0.35) m	ore than 100	0,000		
		DC24V / 1A, D	C100V / 0.1A (L / R =	7 ms) more	than 100,00	00		
Response	$\text{Off} \to \text{On}$	Less than 10 m	3					
time	$\text{On} \to \text{Off}$	Less than 12 ms						
Common me	thod	8 point / COM						
Suitable wire	size	Stranded wire 0.3~0.75 mm <sup>*</sup> (external radius less than 2.8 mm)						
Internal cons	umption current	230 mA (When	230 mA (When output point On)					
Operation inc	dication	LED On when output is On						
External con	nection method	9 pin terminal connector						
Weight		80g						
	Circui	t configuration		No.	Point	Shape		
			]	TB1	0			
DC5V <del>Q</del>				TB2	1			
	)			TB3	2	TB1		
				TB4	3	TB2		
Inner circuit				TB5	4	TB3		
		° <b>I</b>	$ $ $\langle$ $ $	TB6	5			
	]			TB7	6	твб		
				TB8	7	TB7		
			Terminal No.	TB9	СОМ	ТВ9		

# 2.4.9 8 point relay modular type output module (B type)

Type name Rela			Output Module			
Specification						
Output point Insulation me Rated load v Min. load vol Max. load vo Leakage cur Max. open/cl Surge killer Life Response time Common me Suitable wire Internal cons	ethod roltage / current itage / current ltage rent when OFF lose frequency Mechanical Electrical Off $\rightarrow$ On On $\rightarrow$ Off ethod e size sumption current	1 pointRelay insulationDC24V 2A(resistor load) / AC220V 2A(COS $\Psi$ = 1), 2A/COMDC5V / 1 mAAC250V, DC125V0.1 mA (AC220V, 60 Hz)More than 3,600 times / hrNoneMore than 2X10 <sup>7</sup> Rated load voltage / current more than 100,000AC200V / 1.5A, AC240V / 1A (COS $\Psi$ = 0.7) more than 100,000AC200V / 1A, AC240V / 0.5A (COS $\Psi$ = 0.35) more than 100,000DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) more than 100,000Less than 10 msLess than 12 ms1 point / COMStranded wire 0.3~0.75 mm² (external radius less than 2.8 mm)				
External con	Operation indicationLED On when output is OnExternal connection method9 pin terminal connector x 2ea					
Weight	Circui	81g t configuration	No.	Point	Shape	
	nner ircuit	TB1 TB1 TB2 C TB2 C TB7 TB7 TB8 TB8 TB8 TB8 Terminal no.	TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB9         TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB7         TB8         TB7	0 COM0 1 COM1 2 COM2 3 COM2 3 COM3 NC 4 COM4 5 COM4 5 COM5 6 COM5 6 COM6 7 COM7 NC	TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB9         TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB9         TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB9         TB1         TB2         TB3         TB4         TB5         TB6         TB7         TB8         TB9	

# 2.4.10 16 point relay modular type output module

	Type name	Rela	y Output Mo	odule		
Specificati	on	XBE-RY16A				
Output point		16 points				
Insulation me	ethod	Relay insulation				
Rated load v	oltage / current	DC24V 2A(resistor load) / AC220	DV 2A(COS¥	′ = 1), 5A/CC	M	
Min. load vol	tage / current	DC5V / 1 mA				
Max. load vo	Itage	AC250V, DC125V				
Leakage cur	rent when OFF	0.1 mA (AC220V, 60 Hz)				
Max. open/cl	ose frequency	More than 3,600 times / hr				
Surge killer		None				
	Mechanical	More than 2X10 <sup>7</sup>				
		Rated load voltage / current more	than 1X10⁵			
Life		AC200V / 1.5A, AC240V / 1A (CC	9SΨ = 0.7) m	ore than 100	,000	
	Electrical	AC200V / 1A, AC240V / 0.5A (CC	9SΨ = 0.35) r	more than 10	0,000	
		DC24V / 1A, DC100V / 0.1A (L / F	R = 7 ms) mor	e than 100,0	00	
Response	$\text{Off} \to \text{On}$	Less than 10 ms				
time	$On \rightarrow Off$	Less than12 ms				
Common me	thod	8 point / COM				
Suitable wire	size	Stranded wire 0.3~0.75 mm <sup>*</sup> (external radius less than 2.8 mm)				
Internal cons	umption current	440 <sup>mA</sup> (When output point On)				
Operation inc	dication	LED On when output is On				
	nection method	9 pin terminal connector x 2ea				
Weight		130g				
	Circuit	configuration	No.	Point	Shape	
			TB1	0	TB1 [마]]	
			TB2	1	TB2	
	DC5V		TB3	2	ТВЗ С	
	)		TB4 TB5	3	TB4 [ - 기 TB5 [ - 기	
			TB5	5	TB5	
l Inn	er <b>k</b>		TB7	6	TB7	
circ		<u> </u>	TB8	7	ТВ8	
		TB8	TB9	СОМ	TB9	
			TB1	8	TB1	
			TB2	9	TB2	
L Terminal No.			TB3	А	TB3	
		i erminar ino.	TB4	В	TB4	
			TB5	С		
			TB6	D		
			TB7	E		
			TB8	F	ТВ9	
			TB9	COM		

2.4.11 8 point Transistor Modular typ	be Output Module (0.5 A Sink)
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Type name Transist			stor output	module			
Specificatio	on	XBE-TN08A					
Output point	8point						
Insulation meth	Photo-coupler insulation						
Rated load vol	tage						
Load voltage ra	ange	DC 10.2 ~ 26.4V					
Max. load curre	ent	0.5A / 1point					
Leakage curre	nt when Off	Less than 0.1 mA					
Max. inrush cu	rrent	Less than 4A / 10 ms					
Max. voltage d	rop when On	Less than DC 0.4V					
Surge killer		Zenner diode					
Response	$\text{Off} \to \text{On}$	Less than 1 ms					
time	$\text{On} \to \text{Off}$	Less than 1 $ms$ (rated load, resist	stor load)				
Common meth	od	8point / COM					
Suitable wire s	ize	Stranded wire 0.3~0.75 mm <sup>*</sup> (external radius less than 2.8 mm)					
Internal consur	mption current	240 mA (When output point is On)					
External	Voltage	DC12V, DC24V $\pm$ 10% (Ripple voltage less than 4 Vp-p)					
supply power	Current	Less than 10 <sup>mA</sup> (When connecting DC24V)					
Operation indic	cation	LED On when output is On					
External conne	ection method	10 pin terminal connector					
Weight		70g					
	Circuit co	onfiguration	No.	Point	Shape		
			TB01	0			
	1		TB02	1			
			TB03	2	- ТВ01 СД ТВ02 СД		
			TB04	3	твоз 🖳		
Inner	T T		TB05	4	тво4 СЛ тво5 СЛ		
Circuit			TB06	5	твоб		
тво9			TB07	6	твот 📮		
тв 10				7	твов 🖳 твор 🖃		
		DC12/24V	TB08 TB09	DC12	тв10		
		L Terminal No.	TB10	/24V COM			
				00111			

2.4.12 16 point Transistor Modular type	e Output Module (0.5 A Sink)
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	Type name	Transistor output module				
Specification X				4		
Output point 16 point						
Insulation metho	od	Photo-coupler insulation				
Rated load volta	ige	DC12V, DC24V				
Load voltage rar	nge	DC 10.2 ~ 26.4V				
Max. load currer	nt	0.5A / 1 point, 2A / 1COM				
Leakage current	t when Off	Less than 0.1 <sup>mA</sup>				
Max. inrush curr	ent	Less than 4A / 10 ms				
Max. voltage dro	op when On	Less than DC 0.4V				
Surge killer		Zenner diode				
Response time	$\text{Off} \to \text{On}$	Less than 1 ms				
	$On \rightarrow Off$	Less than 1 ms (rated load, resis	stor load)			
Common metho		16point / COM				
Suitable wire siz		Stranded wire 0.3~0.75 mm <sup>2</sup> (exte		less than	2.8 <sup>mm</sup> )	
Internal consum	T	50 MA (When output point is On)				
External						
supply power	Current	Less than 10 <sup>mA</sup> (when connecting DC24V)				
Operation indica		LED On when output is On				
External connec	tion method	8 pin terminal connector + 10 pin terminal connector				
Weight		50g				
	Circuit co	nfiguration	No.	Point	Shape	
			TB01	0	тво1	
			TB02	1	тво2 🖂	
	V		TB03	2	твоз 🗔	
		TB01	TB04	3	тво4 📼	
			TB05	4	тво5 🗳	
	$\neg \neg \neg \neg$	┤╘┱╋╴╴│   )   │	TB06	5	тво6 🗳	
Inner		5   (	TB07	6	твот 🛄	
circuit			TB08	7	твов 🛄	
	<b>-</b>		TB01	8	тво1	
		ТВ09	TB02	9		
	·		TB03	А		
		TB10	TB04	В	TB03	
		DC12/24V	TB05	С		
		Terminal No.	TB06	D	TB05	
			TB07	E	TB06	
		TB08	F	TB08		
				DC12	твоя	
			TB09	/24V	тв10	
			TB10	COM		

# 2.4.13 32 point Transistor Modular type Output Module (0.2 A Sink)

Ty	/pe name	Tra	ansisto	r output	modu	le		
Specification		XBE-TN32A						
Output point		32 point						
Insulation method		Photo-coupler insulation						
Rated load voltage		DC12V, DC24V						
Load voltage range		DC 10.2 ~ 26.4V						
Max. load current		0.2A / 1point, 2A / 1COM						
Leakage current wh	en Off	Less than 0.1 mA						
Max. inrush current		Less than 0.7A / 10 ms						
Max. voltage drop w	/hen On	Less than DC 0.4V						
Surge killer		Zenner diode						
Response time	$\text{Off} \to \text{On}$	Less than 1 ms						
	$\text{On} \to \text{Off}$	Less than 1 ms(Rated load	, resisto	r load)				
Common method		32 point / COM						
Suitable wire size		0.3 mm²						
Internal consumptio	n current	80 mA (When output point	is On)					
External supply	Voltage	DC12V, DC24V $\pm$ 10% (R	pple vo	ltage les	s than 4	4 Vp-p)		
power	Current	Less than 20 mA (When connecting DC24V)						
Operation indication	1	LED On when output is On						
External connection	method	40 pin connector						
Weight		60g						
	Circuit configura	ation	No.	point	No.	point	Shape	
			B20	00	A20	10		
			B19	01	A19	11		
↔ DC5V			B18	02	A18	12	┟┟╞╡╢	
	_	B20	B17	03	A17	13		A20
l	ر الح		B16	04	A16	14		A19 A18
	╷┌──िि┤॑╪┓ᢤ		B15	05	A15	15		A17
Inner	T S	]   (	B14	06	A14	16	B16	A16 A15
circuit		A05	B13	07	A13	17		A14
			B12	08	A12	18		A13
		B01.B02	B11	09	A11	19		A12 A11
			B10	0A	A10	1A		A10
		A01, A02	B09	0B	A09	1B		A09 A08
		DC12/24V	B08	0C	A08	1C		A07
		Terminal No.	B07	0D	A07	1D	B05	A06 A05
			B06 B05	0E 0F	A06 A05	1E 1F		A04 A03
			B05 B04	NC	A03	NC	во2 月 Ħ	A03 A02
			B04	NC	A04	NC		A01
			B03	DC12	A03			
			B01	/24V	A01	COM		
				L		I		

# 2.5 Digital I/O Combo Module Specification

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# 2.5.1 32 point I/O combo module (DC 16/TR16 point)

$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	I/O combo module						
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$							
InstrationProto-coupler instrationInstrationInstrationRated input voltageDC 24VRated load voltageDC24VRated input current7 mA(fixed) 5mA(removable)Rated load current $0.1A/1$ point $2A/1COM$ Range of load voltageDC 20.4-26.4V (ripple rate: less than 5%)Range of load voltageDC 20.4-26Max. synchronous input point100% On synchronouslyLeakage current when OffLess than 0On voltage/On current100% On synchronouslyLeakage current when OffLess than 0Off voltage/Off currentLess than DC6V / 1.5mASurge killerNoneInput resistanceAbout 3.3 kΩResponse timeOff $\rightarrow$ On On $\rightarrow$ OffLess than 2 Max. voltage falling when ONDC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ON onOperation indicationLED ON when onExternal supply consumption currentLess than 294mAUES than 240g (Fixed type)Inner circuit $400$ Less than 240g (Fixed type)							
Rated input current7 mA(fixed) 5mA(removable)Rated load current0.1A/1 point 2A/1COMRange of load voltageDC 20.4-26.4V (ripple rate: less than 5%)Range of load voltageDC 20.4-26Max. synchronous inputDC 20.4-26.4V (ripple rate: less than 5%)Range of load voltageDC 20.4-26Max. synchronous input100% On synchronouslyLeakage current when OffLess than 0On voltage/On currentMore than DC19V / 3.0mAMax. inrush currentLess than 0Off voltage/Off currentLess than DC6V / 1.5mASurge killerNoneInput resistanceAbout 3.3 kΩResponse On → OffCommon methodDC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ONOperation indicationLED ON whon onExternal supply consumption currentLess than 294mALess than 240g (Fixed type)Inner circuitInner circuit00	ler						
Kated input current5mA(removable)Rated ioad current2A/1COMRange of load voltageDC 20.4-26.4V (ripple rate: less than 5%)Range of load voltageDC 20.4-26Max. synchronous input100% On synchronouslyLeakage current when OffLess than 0On voltage/On currentMore than DC19V / 3.0mAMax. inrush currentLess than 0Off voltage/Off currentLess than DC6V / 1.5mASurge killerNoneInput resistanceAbout 3.3 kΩResponse On $\rightarrow$ OffOff $\rightarrow$ On Less than 3 msOff $\rightarrow$ On On $\rightarrow$ OffLess than 2 DC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ON onOperation indicationLED ON who onExternal supply consumption currentLess than 294mAUess than 240g (Fixed type)00							
Range of load voltage(ripple rate: less than 5%)Range of load voltageDC 20.4-26Max. synchronous input100% On synchronouslyLeakage current when OffLess than 0On voltage/On currentMore than DC19V / 3.0mAMax. inrush currentLess than 0Off voltage/Off currentLess than DC6V / 1.5mASurge killerNoneInput resistanceAbout 3.3 kΩResponse Off $\rightarrow$ OnOff $\rightarrow$ On Less than 2NoneResponse timeOff $\rightarrow$ OnLess than 3 msMax. voltage falling when ON $\rightarrow$ OffDC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ON OnOperation indicationLED ON who onExternal supply consumption currentLess than 294mAUess than 240g (Fixed type)Circuit configurationInner circuitIcs than 240g (Fixed type)Inner circuit00	[,						
point       synchronously       Off       Less than 0         On voltage/On current       More than DC19V / 3.0mA       Max. inrush current       Less than 0         Off voltage/Off current       Less than DC6V / 1.5mA       Surge killer       None         Input resistance       About 3.3 kΩ       Response       Off → On       Less than 2         Response       Off→On       Less than 3 ms       Imme       On → Off       Less than 2         Response       Off→On       Less than 3 ms       Max. voltage falling when ON       DC 1.0 V         Common method       16 point/COM (Source/Sink type)       Common method       16 point / 10 type)         Operation indication       LED ON when input ON       Operation indication       LED ON whon on         External supply consumption current       Less than 294mA       Less than 240g (Fixed type)         Circuit configuration         Inner circuit       00	5.4V						
On voltage/On current3.0mAMax. inrush currentLess than 0Off voltage/Off currentLess than DC6V / 1.5mASurge killerNoneInput resistanceAbout 3.3 kΩResponse timeOff $\rightarrow$ OnLess than 2 On $\rightarrow$ OffOff $\rightarrow$ OnLess than 2 Less than 2 Max. voltage falling when ONOff $\rightarrow$ OnLess than 2 DC 1.0 VResponse timeOn $\rightarrow$ OffLess than 3 msMax. voltage falling when ONDC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ONOperation indicationLED ON who onExternal supply consumption currentTerminal unit connector (M3 X 6 screws)LED ON who onExternal connection methodLess than 294mAVeightLess than 240g (Fixed type)OnCircuit configurationInner circuit00	.1mA						
$\begin{tabular}{ c c c c c c } \hline Input resistance & About 3.3 k\Omega & Response & Off $\rightarrow$ On & Less than 2 time & On $\rightarrow$ Off & Less than 3 ms & time & On $\rightarrow$ Off & Less than 2 time & On $\rightarrow$ Off & Less than 2 ms & Max. voltage falling when $DC$ 1.0 V & Common method & 16 point/COM & Common method & 16 point / 10 (Source/Sink type) & Common method & 16 point / 10 type) & Operation indication & LED ON when input ON & Operation indication & LED ON when input ON & Operation indication & LED ON when input ON & Operation indication & LED ON when input ON & Operation indication & LED ON when input ON & Operation indication & LED ON when input ON & Operation indication & LED ON when input ON & Operation indication & LED ON when input ON & Operation indication & Less than 294mA & Weight & Less than 240g (Fixed type) & \hline $	.4A/10ms						
Response timeOff $\rightarrow$ On On $\rightarrow$ OffLess than 3 msIterative timeOn $\rightarrow$ OffLess than 2 Less than 2 Max. voltage falling when ONDC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ON Operation indicationOperation indicationLED ON who onExternal supply consumption currentTerminal unit connector (M3 X 6 screws)LED ON who onExternal connection methodLess than 294mAWeightLess than 240g (Fixed type)On - OffigurationInner circuit00							
Response timeOn $\rightarrow$ OffLess than 3 msMax. voltage falling when ONDC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ON OnOperation indicationLED ON when onExternal supply consumption currentTerminal unit connector (M3 X 6 screws)External connection methodLess than 294mAWeightLess than 240g (Fixed type)One circuit	ms						
timeOn $\rightarrow$ OffLess than 3 msMax. voltage falling when ONDC 1.0 VCommon method16 point/COM (Source/Sink type)Common method16 point / 10 type)Operation indicationLED ON when input ONOperation indicationLED ON who onExternal supply consumption currentTerminal unit connector (M3 X 6 screws)LED ON who onExternal connection methodLess than 294mAWeightLess than 240g (Fixed type)Circuit configurationInner circuit00	ms						
Common method       (Source/Sink type)       Common method       type)         Operation indication       LED ON when input ON       Operation indication       LED ON whon method         External supply consumption current       Terminal unit connector (M3 X 6 screws)       External connection method       Less than 294mA         Weight       Less than 240g (Fixed type)       Circuit configuration       00							
Operation indication     LED ON when input ON     Operation indication     on       External supply consumption current     Terminal unit connector (M3 X 6 screws)     Image: Consumption current     Image: Consumption current       External connection method     Less than 294mA     Image: Consumption current     Image: Consumption current       Weight     Less than 294mA     Image: Consumption current     Image: Consumption current       Circuit configuration     Image: Consumption current     Image: Consumption current     Image: Consumption current	Υ.						
Consumption current     Terminal unit connector (M3 X 8 screws)       External connection method     Less than 294mA       Weight     Less than 240g (Fixed type)       Circuit configuration       Inner circuit	ien output						
Weight Less than 240g (Fixed type)	Terminal unit connector (M3 X 6 screws)						
Circuit configuration	Less than 294mA						
Inner circuit	Less than 240g (Fixed type)						

COM1

··|ŀ DC24

# 2.5.2 32 point I/O combo module (DC16/TR16 point)

time $On \rightarrow Off$ Less than 3 ms Max. falling voltage when On DC 1.0 V Common method 16 point/COM (Sink/Source Common method 16 point / 1COM (Sink type) Operation indication LED On when input On Operation indication LED On when input On External connection method Terminal unit connector (M3 X 6 screws) External supply Less than 294mA Weight Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type) Circuit configuration $If (Intermediate intermediate i$	I/O combined module									
Insulation method         Photo-coupler insulation         Insulation method         Photo-coupler insulation           Rated input voltage         DC 24V         Rated load voltage         DC 24V           Rated input current         7mA(fixed), 5mA(removable)         Max. load current         0.5A/1 point, 3A/1COM           Range of load voltage         DC 20.4-26.4V         Range of load voltage         DC 20.4-26.4V           Max.         synchronous         100% On synchronously         Leakage current when off         DC 20.4-26.4V           Max.         synchronous         100% On synchronously         Leakage current when off         Less than 0.1mA           On voltage/On current         More than DC19V / 3.0mA         Max. inrush current         Less than 1.1mA           On voltage/Of current         More than DC50V 1.5mA         Surge killer         None           Imput resistance         About 3.3 kΩ         Response         Off → On         Less than 3 ms         Max. failing         voltage         DC 1.0 V           Common method         16         point/COM (Sink/Source type)         Common method         16         point / 1COM (Sink/type)           Operation indication         LED On when input On         Operation indication         LED On when input On           External connection         Terminal unit connector (M			Input	Output (TR 0.5A Source)						
Rated input current         DC 24V         Rated load voltage         DC 24V           Rated input current         7mA(fixed), 5mA(removable)         Max. load current         0.5A/1 point, 3A/1COM           Range of load voltage         DC 20.4-26.4V (Ripple rate: Less than 5%)         Range of load voltage         DC 20.4-26.4V           Max.         synchronous         100% On synchronously         Leakage current when Off         Less than 0.1mA           On voltage/Off current         More than DC19V / 3.0mA         Max. inrush current         Less than 1.1/10ms           Off voltage/Off current         More than DC6V/1.5mA         Surge killer         None           Input resistance         About 3.3 kΩ         Response         Off → On         Less than 2 ms           0ff → On         Less than 3 ms         Max. falling voltage         DC 1.0 V           Common method         16 point/COM (Sink/Source type)         Common method         16 point/ 1COM (Sink type)           Operation indication         LED On when input On         Operation indication         LED On when input On           External supply consumption current         Less than 294mA         External supply         Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)           Preter coupler           Imput resiriatio coupler <td <="" colspan="4" td=""><td>Input point</td><td></td><td>16 points</td><td>Output point</td><td></td><td>16 points</td></td>	<td>Input point</td> <td></td> <td>16 points</td> <td>Output point</td> <td></td> <td>16 points</td>				Input point		16 points	Output point		16 points
Rated input current       7mA(fixed), 5mA(removable)       Max. load current       0.5A/1 point, 3A/1COM         Range of load voltage       DC20.4–26.4V (Ripple rate: Less than 5%)       Range of load voltage       DC 20.4–26.4V         Max.       synchronous       100% On synchronously off       Leakage current when on voltage/Off current       Less than 0.1mA         On voltage/Of current       More than DC6V/1.5mA       Surge killer       None         Input resistance       About 3.3 kΩ       Response       Off→On         Response       Off→On       Less than 3 ms       Max. failing       voltage         On → Off       Less than 3 ms       Max. failing       voltage       DC 1.0 V         Common method       16 point/COM (Sink/Source type)       Common method       16 point/ 1COM (Sink type)       Do = 0ff         Operation indication       LED On when input On       Operation indication       LED On when input On       External supply         consumption current       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)       Circuit configuration         Veight       Les than 240g/290g (DT4B:Fixed type/DT4C: Removable type)       DC 24V         Proto coupler       V       V       V       V         Immer circuit       Proto coupler       V       V       V       V </td <td colspan="2"></td> <td>Photo-coupler insulation</td> <td>Insulation m</td> <td>ethod</td> <td>Photo-coupler insulation</td>			Photo-coupler insulation	Insulation m	ethod	Photo-coupler insulation				
Range of load voltage       DC20.4-26.4V (Ripple rate: Less than 5%)       Range of load voltage       DC 20.4-26.4V         Max.       synchronous       100% On synchronously       Leakage current when Off       Less than 0.1mA         On voltage/On current       More than DC19V/3.0mA       Max. inrush current       Less than 1A/10ms         Off voltage/Off current       More than DC6V/1.5mA       Surge killer       None         Input resistance       About 3.3 kΩ       Response       Off→On       Less than 2 ms         Itime       Of → Off       Less than 3 ms       Max. falling voltage when On       DC 1.0 V         Common method       16 point/COM (SinK/Source type)       Common method       16 point/1COM (Sink/Spe)       De 1.0 V         Operation indication       LED On when input On       Operation indication       LED On when input On       De atom         External connection method       Les than 294mA       Les than 240g/290g (DT4B:Fixed type/DT4C: Removable type)       DC24V         On UP officient coupler         Veight       Les than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Officient coupler         On Officient coupler         UP of the coupler         Officient coupler         Officient couple	Rated inpu	t voltage	DC 24V	Rated load v	voltage	DC 24V				
Range of load voltage       Range of load voltage       DC 20.4–26.4V         Max. synchronous input point       100% On synchronously       Leakage current when Off       Leas than 0.1mA         On oldage/On current       More than DC19V / 3.0mA       Max. inrush current       Less than 1.4/10ms         Off voltage/Off current       More than DC6V/ 1.5mA       Surge killer       None         Input resistance       About 3.3 kΩ       Response       Off→O       Less than 3 ms         0n → Off       Less than 3 ms       Max. falling       voltage         0n→ off       Less than 3 ms       Max. falling       voltage         0n → Off       Less than 3 ms       Max. falling       voltage         0n→ off       Less than 1 ms       Max. falling       voltage         Common method       16 point/COM (Sink/Source type)       Common method       16 point / 1COM (Sink type)         Operation indication       LED On when input On       Operation indication       LED On when input On         External supply consumption current       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)       Circuit configuration         Fhote coupler         Immericut time         Immericut time         On bit tist time <td <="" colspan="4" td=""><td>Rated inpu</td><td>t current</td><td>7mA(fixed), 5mA(removable)</td><td>Max. load cu</td><td>urrent</td><td>0.5A/1 point, 3A/1COM</td></td>	<td>Rated inpu</td> <td>t current</td> <td>7mA(fixed), 5mA(removable)</td> <td>Max. load cu</td> <td>urrent</td> <td>0.5A/1 point, 3A/1COM</td>				Rated inpu	t current	7mA(fixed), 5mA(removable)	Max. load cu	urrent	0.5A/1 point, 3A/1COM
input point       100% On synchronously       Off       Less than 0.1mA         On voltage/On current       More than DC19V / 3.0mA       Max. inrush current       Less than 1A/10ms         Off voltage/Off current       More than DC6V/ 1.5mA       Surge killer       None         Input resistance       About 3.3 kΩ       Response       Off → On       Less than 2 ms         imme       On → Off       Less than 3 ms       Max. falling       voltage       DC 1.0 V         Common method       16       point/COM (Sink/Source type)       Common method       16 point/1COM (Sink/Source type)       Den → Off       Less than 2 ms         Detation indication       LED On when input On       Operation indication       LED On when input On       Den → Off       Less than 294mA         Veight       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)       Ccave       Off → On       Ccave         On → Off is than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Circuit configuration         Terminal unit connector (M3 X 6 screws)         External supply         Circuit configuration         On → Off is than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         On → Off is than 240g/290g (DT4B:Fixed type/DT4C: Removable type) <td>Range of lo</td> <td>oad voltage</td> <td></td> <td>Range of loa</td> <td>ad voltage</td> <td>DC 20.4~26.4V</td>	Range of lo	oad voltage		Range of loa	ad voltage	DC 20.4~26.4V				
		•	100% On synchronously	-	rrent when	Less than 0.1mA				
$\begin{tabular}{ c c c c c } \hline Interference & About 3.3 k\Omega & Response & Off $\rightarrow$ On & Less than 2 ms & Imme & On $\rightarrow$ Off & Less than 3 ms & Imme & On $\rightarrow$ Off & Less than 2 ms & On $\rightarrow$ Off & Less than 3 ms & Max. falling voltage & DC 1.0 V & Men On & I6 point/COM (Sink/Source type) & Common method & I6 point/COM (Sink/Source type) & Common method & I6 point/COM (Sink/Source type) & Common method & LED On when input On & Operation indication & LED On when input On & Operation indication & LED On when input On & Operation indication & LED On when input On & Operation indication & LED On when input On & Operation indication & LED On when input On & Operation indication & LED On when input On & Terminal unit connector (M3 X 6 screws) & Less than 294mA & Veight & Less than 294mA & Veight & Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type) & \hline \hline Circuit configuration & If the point of t$	On voltage	On current	More than DC19V / 3.0mA	Max. inrush	current	Less than 1A/10ms				
Response       Off $\rightarrow$ On       Less than 3 ms       time       On $\rightarrow$ Off       Less than 2 ms         Imme       On $\rightarrow$ Off       Less than 3 ms       Max. failing voltage       DC 1.0 V         Common method       16 point/COM (Sink/Source       Common method       16 point / 1COM (Sink/Surce)         Operation indication       LED On when input On       Operation indication       LED On when input On         External connection       Terminal unit connector (M3 X 6 screws)         External supply consumption current       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Circuit configuration         Veight       Les than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Circuit configuration         Immer       Upper U	Off voltage	/Off current	More than DC6V/ 1.5mA	Surge killer		None				
Response time       Off $\rightarrow$ On       Less than 3 ms       On $\rightarrow$ Off       Less than 2 ms         Immediate       On $\rightarrow$ Off       Less than 3 ms       Max. falling voltage when On       DC 1.0 V         Common method       16 point/COM (Sink/Source type)       Common method       16 point / 1COM (Sink type)         Operation indication       LED On when input On       Operation indication       LED On when input On         External connection method       Terminal unit connector (M3 X 6 screws)       Estenal supply       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Circuit configuration         Weight       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Operation indication         Use the coupler of the	Input resist	tance	About 3.3 kΩ	Response	$Off \rightarrow On$	Less than 2 ms				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			Less than 3 ms	time	$On \rightarrow Off$	Less than 2 ms				
Common method       type)       Common method       (Sink type)         Operation indication       LED On when input On       Operation indication       LED On when input On         External connection method       Terminal unit connector (M3 X 6 screws)       External supply       Less than 294mA         Consumption current       Less than 294mA       Circuit configuration       Circuit configuration         Weight       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)       Circuit configuration         Circuit configuration       Immer circuit       Immer circuit       Cox         Photo coupler       Immer circuit       Immer circuit       Immer circuit       Immer circuit	time	$\text{On} \rightarrow \text{Off}$	Less than 3 ms		g voltage	DC 1.0 V				
External connection method       Terminal unit connector (M3 X 6 screws)         External supply consumption current       Less than 294mA         Weight       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Circuit configuration         Image: Photo coupler image:	Common n	nethod		Common method						
method       Terminal unit connector (M3 X 6 screws)         External supply       Less than 294mA         Weight       Less than 240g/290g (DT4B:Fixed type/DT4C: Removable type)         Circuit configuration         Image: Photo coupler         Photo coupler       Use that the photo coupler         Photo coupler       Use the photo coupler         Image: Photo coupler       Image: Photo coupler         Image: Photo coupler <t< td=""><td>Operation i</td><td>indication</td><td>LED On when input On</td><td>LED On when input On</td></t<>	Operation i	indication	LED On when input On	LED On when input On						
Consumption current     Less than 294mA       Weight     Les than 240g/290g (DT4B:Fixed type/DT4C: Removable type)       Circuit configuration       Image: Photo coupler       Ima	method		Terminal unit connector (M3 X 6 screws)							
Circuit configuration			Less than 294mA							
Photo coupler Photo coupler Ph	Weight		Les than 240g/290g (DT4B:Fi	xed type/DT4C	: Removable	e type)				
1)(224)						DC24V				

nethod voltage current ad voltage	Input 16 point Photo-coupler insulation DC 24V 7mA(fixed), 5mA(removable) DC20.4~26.4V (ripple rate: less than 5%)	Output po Insulation Rated load Max. load Range	int method d voltage	TR 0.5A Sink) 16 point Photo-coupler insulation DC24V	
c voltage current ad voltage	Photo-coupler insulation DC 24V 7mA(fixed), 5mA(removable) DC20.4~26.4V	Insulation Rated load Max. load	method d voltage	Photo-coupler insulation	
c voltage current ad voltage	DC 24V 7mA(fixed), 5mA(removable) DC20.4~26.4V	Rated load Max. load	d voltage		
ad voltage	7mA(fixed), 5mA(removable) DC20.4~26.4V	Max. load		DC24V	
ad voltage	DC20.4~26.4V		current		
-		Range	ounone	0.5A/1 point, 3A/1COM	
/nchronous		voltage	of load	DC 20.4~26.4V	
Max.         synchronous           input point         100%         On synchronously			current	Less than 0.1mA	
On current	More than DC19V/ 3.0mA	Max. inrus	sh current	Less than 1A/10ms	
Off current	Less than DC6V/ 1.5mA	Surge kille	er	None	
ance	About4.7 kΩ	Response	$Off \rightarrow On$	Less than 2 ms	
$Off \rightarrow On$	Less than 3 ms	time	$On \rightarrow Off$	Less than 2 ms	
ResponseOn $\rightarrow$ OffLess than 3 mstimeOn $\rightarrow$ OffLess than 3 ms			ng voltage	DC 1.0 V	
ethod	16 point /COM (Sink/Source type)	Common type		16 Point / 1COM (Sink type)	
ndication	LED On when input on	Operation indication LED On when output On			
External connection method Terminal unit connector (M3 X 6 screws)					
External supply consumption current Less than 294mA					
	Less than 240g/290g (DT4A1:	Fixed type/D	T4C1: Remo	ovable type)	
Weight Less than 240g/290g (DT4A1:Fixed type/DT4C1: Removable type)					
	Off current ance $Off \rightarrow On$ $On \rightarrow Off$ ethod adication connection supply current Circuit con	Off current       Less than DC6V/ 1.5mA         ance       About4.7 kΩ         Off → On       Less than 3 ms         On → Off       Less than 3 ms         ethod       16 point /COM (Sink/Source type)         indication       LED On when input on         connection       Terminal unit connector (M3 X         supply       Less than 294mA         current       Less than 240g/290g (DT4A1:         Circuit configuration       Photo-coupler         Photo-coupler       R         Photo-coupler       R	Off currentLess than DC6V/ 1.5mASurge killeanceAbout4.7 kΩResponseOff $\rightarrow$ OnLess than 3 msImmeOn $\rightarrow$ OffLess than 3 msMax. falling when Onethod16 point /COM (Sink/Source type)Common forethod16 point /COM (Sink/Source type)Common forethod16 point /COM (Sink/Source type)Common forethod16 point /COM (Sink/Source type)Common forethod16 point /COM (Sink/Source type)Common forethodLED On when input on tonnectionOperationcurrentLess than 294mACurrentLess than 240g/290g (DT4A1:Fixed type/DCircuit configurationPhoto-couplerPhoto-couplerFFT R RPhoto-couplerPhoto-couplerFFT R R R	Off current       Less than DC6V/ 1.5mA       Surge killer         ance       About4.7 kΩ       Response       Off → On         Off→O       Less than 3 ms       time       On → Off         On → Off       Less than 3 ms       Max. falling voltage when On         ethod       16 point /COM (Sink/Source type)       Common type         odication       LED On when input on       Operation indication         connection       Terminal unit connector (M3 X 6 screws)         supply       Less than 240g/290g (DT4A1:Fixed type/DT4C1: Remote the type)         Current       Less than 240g/290g (DT4A1:Fixed type/DT4C1: Remote the type)         Photo-coupler       Photo-coupler         Photo-coupler       Inner         Photo-coupler       Construction	

# 2.6 Modular type analogue module specification

2.6.1 Modular type analogue output module

## (1) XBF-DV04A / XBF-DC0A

Category		Specification					
	Jalego	у	XBF-DV04A	XBF-DC04A	XBF-DC04B		
		Туре	Voltage	Current	Current		
	Range		DC 0 ~ 10V (Load resistor: more than 2 kΩ )	DC 4 ~ 20mA DC 0 ~ 20mA (Load resistor: less than 510 Ω)	DC 0 ~ 1.2mA (Load resistance: 510Ω or less)		
Analogue		Unsigned value	0 ~ 4,000	0 ~ 4,000	0 ~ 4,000		
output	Range	Signed value	-2,000 ~ 2,000	-2,000 ~ 2,000	-2,000 ~ 2,000		
	Kange	Precise value	0 ~ 1,000	400 ~ 2,000/0 ~ 2,000	0 ~ 1,200		
			ercentile value 0 ~ 1,000 0 ~ 1,000 0		0 ~ 1,000		
Max. resolution		ution	2.5 mV (1/4,000)	5 <sup>µA</sup> (1/4,000)	0.3 µA(1/4,000)		
Precision		n	More than ± 0.5%				
Max co	nversio	n speed	1 ms/channel				
Absolu	ite Max	. output	DC ±15V DC +25 mA				
Outpu	ıt chanı	nel No.	4 channel				
Insulation method		ethod	Photo-coupler insulation between output terminal and PLC power (non- insulation between channels)				
Connection terminal		erminal	11point terminal				
		Inner (DC 5V)	110 mA	110 mA			
Consum-p curren		External (DC 21.6 ~26.4V)	70 mA	120	) mA		
	Weigh	t	64 g	70	0 g		

## (2) XBF-DV04C/ XBF-DC04C

Items			Performance specification		
	nem	5	XBF-DV04C XBF-DC04C		
	Chann	els	4 channels		
		Туре	Voltage	Current	
Analog output range	Range		DC 1 ~ 5VDC 4 ~DC 0 ~ 5VDC 0 ~DC 0 ~ 10VDC 0 ~DC -10 ~ 10V(Load(Load resistance: 1 kQ or more)Output ranges are set in user program of channel.		
		Туре	16 bit binary da	ta (Data : 14Bit)	
		Unsigned value		6,000	
		Signed value	-8,000	~ 8,000	
Digital input	Range		1,000 ~ 5,000 (1 ~ 5V) 0 ~ 5,000 (0 ~ 5V) 0 ~ 10,000 (0 ~ 10V) -10,000 ~ 10,000 (±10V)	4,000 ~ 20,000 (4 ~ 20 mÅ) 0 ~ 20,000 (0 ~ 20 mÅ)	
		Percentile value	0 ~ 10,000		
			1/16,000		
Max. resolution		lution	0.250 mV (1 ~ 5V) 0.3125 mV (0 ~ 5V) 0.625 mV (0 ~ 10V) 1.250 mV (±10V)	0.1uA (4~20mA) 1.25uA (0~20mA)	
	Accura	ICV	±0.2% or less (When ambient tem		
N		-	$\pm 0.3\%$ or less (When ambient temperature is 0 ~ 55°C)		
Max. conversion speed		-	1 ms/ channel Setting of channel output status (Select one among previous, Min, Max value) Setting of interpolation method (Linear interpolation, S-type interpolation)		
Insulation method		nethod	Photo-coupler insulation between output terminal and PLC power (no insulation between channels)		
Terminal connected		nnected	11 point terminal		
F	Power Supply		DC 24V		
	Weigł		68g	69g	
Consumed Internal (DC 5V) current External (DC 24V)			70mA 160mA		

Γ

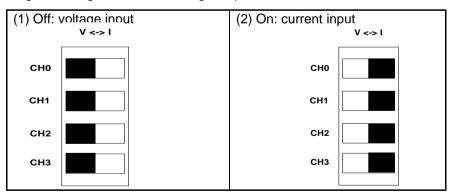
#### 2.6.2 Modular type analogue input module

#### (1) XBF-AD04A

	Specification						
Category	XBF-AD04A						
Analogue input	C	DC 0 $\sim$ 10 V (Input resistance: 1 M $\Omega$ min.) DC 4 $\sim$ 20 mA , DC 0 $\sim$ 20 mA (Input resistance 250 $\Omega$ )					
Analogue input range selection	• • •	<ul> <li>Analogue input range selection is done at the SyCon software after setting external switch.</li> <li>Each input range can be set according to the channel.</li> </ul>					
	Analogue input 0~10 Digital output				4 ~ 20 mA	0 ~ 20 mA	
Digital output	Unsigned	value			0 ~ 4,000		
	Signed value			-2,000 ~ 2,000			
	Precise va	alue	0 ~ 1,000		400 ~ 2,000	0 ~ 2,000	
	Percentile value		0 ~ 1,000				
	Analogue input range			Resolution (1/4,000)			
Max. resolution	0 ~ 10 V			2.5 mV			
Max. resolution	4 ~ 20 mA			- 5 μΑ			
	0 ~ 20 mA			5 µA			
Precision	Less than ±0.5%						
Max. conversion speed	1.5 ms/channel						
Absolute max input	voltage : ±15 V, current : ±30 mA						
Analogue input point	4channel/1module						
Insulation method	Photo-coupler insulation between output terminal and PLC power (non-insulation between channels						
Connection terminal	11point terminal						
	Power input range	DC21.6V ~	- DC26.4V				
External power supply	Consumption current	120 mA					
Weight	67g						

#### Voltage/current selection switch

▶ switch for selecting the voltage/current of analogue input



#### Remark

1) In the A/D conversion module, offset/gain value about each analogue input range is set in the factory. It is not available to change it by user

2) Modular type Smart I/O Dnet expansion type

The default value of parameter is 0x0000000 (This value is effective when off status. In the voltage mode you should change parameter.)

 $\rightarrow$  All channel (Enable), input (DC 0~10 V), analogue input range ( 0 ~ 4,000 )

## 2) XBF-AD08A

	Item	าร	Performance specification		
Nur	mber of	channels	8 cha	innels	
	Туре		Voltage Current		
			DC 1 ~ 5V	DC 4 ~ 20mA	
Analog			DC 0 ~ 5V	DC 0 ~ 20mA	
input		Range	DC 0 ~ 10V	(Input resistance: 250 $\Omega$ )	
input		Kange	(Input resistance: 1 $M\Omega$ min)		
			Current input or Voltage input car	n be selected through the external	
			voltage/current switch.		
		Туре	12 bit bir	nary data	
		Unsigned value	0 ~ 4	4,000	
		Signed value	-2,000	~ 2,000	
Digital			100 ~ 500 (1 ~ 5V)	400 ~ 2,000 (4 ~ 20 mA)	
output	Range	Precise value	0 ~ 500 (0 ~ 5V)	0 ~ 2,000 (0 ~ 20 mA)	
			0 ~ 1,000 (0 ~ 10V)		
		Percentile	0 ~ 1,000		
		value			
			1/4,000		
N	/lax. res	olution	1.25 <sup>mV</sup> (1 ~ 5V, 0 ~ 5V)	5 #A (4 ~ 20 mA, 0 ~ 20 mA)	
			2.5 mV (0 ~ 10V)		
	Accur	acy	±0.5% or less		
Max.	conver	sion speed	1.5 ms/ channel		
Abs	solute m	nax. input	DC ±15V	DC ±25 mA	
	I	Filter	Digital filter(4 ~ 64,000 ms)		
			Time average (4~16,000 ms)		
Addition funct	tion /	Average	Count average (2~64,000times)		
Addition runo			Moving average (2~100ea)		
	[	Detection alarm		1~5V, DC 4~20 mA)	
Inc	sulation	method	Photo-coupler insulation between inpu		
			PLC power (No insulation between cha	*	
	Connection terminal		11 point terminal block		
Consumption		Internal (DC 5V)	105mA		
current		External (DC 24V)	85mA		
	Weig		81g		
Mo	dule inp	out power	DC 20.4~28.8V		

#### (3) XBF-AD04C

Items		S	Performance	specification	
Number of channels		channels	4 channels		
	Туре		Voltage	Current	
Analog			DC 1 $\sim$ 5V DC 0 $\sim$ 5V DC 0 $\sim$ 10V DC -10 $\sim$ 10V (Input resistance: 1 MQ min)	DC 4 ~ 20mA DC 0 ~ 20mA (Input resistance: 250 Ω)	
input		Range	<ul> <li>Current input or Voltage input can be wiring setting.</li> <li>► In voltage mode, use V+ and COM In current mode, short V+ and COM and COM terminal.</li> </ul>	In voltage mode, use V+ and COM terminal for the channel. In current mode, short V+ and COM terminal and then use I+	
		Туре	-	ta (Data : 14Bit)	
		Unsigned value		6,000	
		Signed value		~ 8,000	
Digital output	Range	Precise value	1,000 ~ 5,000 (1 ~ 5V) 0 ~ 5,000 (0 ~ 5V) 0 ~ 10,000 (0 ~ 10V) -10,000 ~ 10,000 (±10V)	4,000 ~ 20,000 (4 ~ 20 mA) 0 ~ 20,000 (0 ~ 20 mA)	
		Percentile value	0 ~ 10,000		
		ł	1/16,000		
	Max. res	blution	0.250 mV (1 ~ 5V) 0.3125 mV (0 ~ 5V) 0.625 mV (0 ~ 10V) 1.250 mV (±10V)	1.0 <sup>µA</sup> (4 ~ 20 <sup>mA</sup> ) 1.25 <sup>µA</sup> (0 ~ 20 <sup>mA</sup> )	
	Accur	acy	±0.2% or less (When ambient temperature 25°C) ±0.3% or less (When ambient temperature 0 ~ 55°C)		
Max	. convers	sion speed	1 ms/ channel		
Ab	solute m	ax. input	DC ±15V	DC ±30 mA	
	F	filter		4 ~ 64,000 ms)	
	A	Verage		(2~16,000 ms) (2~64,000times)	
Addition fund		Detection alarm	Disconnection(DC 1~5V, DC 4~20 <sup>mA</sup> )		
Audition fund		lold last value	When input signal exceeds the effective range, holds the last effective value.		
	A	Alarm function	When input signal exceeds the effective range, relevant flag turns on.		
Insulation method		method	Photo-coupler insulation between input terminal and PLC power (No insulation between channels)		
Co	Connection terminal			erminal block	
Consumption Internal (DC 5V)		Internal (DC 5V)	105mA		
current			100mA		
	Weight		72g		
M	Module input power		DC 20.	4~28.8V	

Category		Specification	
		XBF-RD04A	
No. of input ch	annel	4 channels	
Input sensor	PT100	JIS C1604-1997	
type	JPT100	JIS C1604-1981 , KS C1603-1991	
Input Tem.	PT100	-200 ~ 600°C	
range	JPT100	-200 ~ 600°C	
Digital output	PT100	-2,000 ~ 6,000	
	JPT100	-2,000 ~ 6,000	
Precision	Room temp. (25°C)	Less than ±0.3%	
Precision	All range (0~55°C)	Less than ±0.5%	
Conversion sp	eed	40ms / channel	
Insulation	Between channel	Non-insulation	
method	Terminal – PLC power	r Insulation (Photo-Coupler)	
Terminal unit		15point terminal	
I/O occupation	point	Fixed type: 64point	
Sensor wire m	ethod	3 line	
Max. mount No.		4	
Consumption	Inner DC5V	100mA	
current	external DC24V	900mA	
weight		63g	

## 2.6.3 Modular type RTD sensor module (XBF-RD04A)

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# Remark

The default value of the extension Smart I/O Dnet expansion type parameter is 0x0000000F.  $\rightarrow$  all channel (Enable), Tem. Unit (Celsius), Input sensor type ( PT100 )

# 2.6.4 Thermocouple input module (XBF-TC04S)

Category			Specification
No. of input channel			4 channels
	Input senso	r type	Thermocouple K / J / T / R type JIS C1602-1995
		К	-200.0℃ ~ 1300.0℃
_	-	J	-200.0℃ ~ 1200.0℃
Temp. range		Т	-200.0℃ ~ 400.0℃
		R	0.0℃ ~ 1700.0℃
	-	Temp. unit	To one decimal place – Note1) K, J, T type: 0.1℃, R type: 0.5℃
Digital output		Scaling	Unsigned scaling (0 ~ 65535)
	(Use	r range setting)	Signed scaling (-32768 ~ 32767)
	Norm	al temp. (25℃)	Within ±0.2% – Note2)
Precision		np. coefficient ating temp. range)	±100 ppm/°C
(	Conversion :	speed	50ms / channel
	Method	Terminal – internal circuit	Photo coupler insulation
		Terminal – Power	DC/DC converter insulation
Insulation		Between channels	Photo MOS relay insulation
	Withstanding voltage		400 V AC, 50/60 Hz, 1minute, Leakage current 10 <sup>mA</sup> or less
	Insi	ulation resistor	500 V DC, 10 MΩ or above
Reference		Automatic compens	ation by RJC sensor (Thermistor)
contact point compensation	Compensation amount		±1.0℃
	Warming-up time		15 min or above
Terminal block			11-point terminal
Occupation points		points	64 points
Ma	Max installation count		4
Consumption			100 mA
current		ernal DC24V	100 mA
	Weight	t	63g

## 2.6.5 Analog I/O module (XBF-AH04A)

(1) Performance of input part

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Category			Input performance specification		
No. of input channel			2 channels		
	Ту	уре	Voltage	Current	
			DC 1 ~ 5V	DC 4 ~ 20 mA	
Analog			DC 0 ~ 5V	DC 0 ~ 20 mA	
input	Ra	inge	DC 0 ~ 10V	(Input resistor 250 Ω)	
range		inge	(Input resistor: 1 MΩ or above)		
			Input range can be set per cha		
			setting I/O parameter, voltage/cu	Irrent selector switch	
	Ту	ype	12 bit binary data		
	Range	Unsigned value	0 ~ 4,000		
Digital		Singed value	-2,000 ~ 2,000		
output		Range Precise	Precise	100 ~ 500 (DC 1 ~ 5V)	400 ~ 2,000 (DC 4 ~ 20 mA)
		value	0 ~ 500 (DC 0 ~ 5V) 0 ~ 1,000 (DC 0 ~ 10V)	0 ~ 2,000 (DC 0 ~ 20 mA)	
		Percentile value	0 ~ 1,000		
			1/4,000		
Max. resolution			1.25 mV (DC 1~5V, 0~5V)	5 µA (DC4~20 mA, 0~20 mA)	
			2.5 mV (DC 0~10V)		
Precision			±0.5% or less		
Max. co	onversion	speed	1ms/channel		
Absol	ute max.	input	DC ±15V	DC ±25 mA	

#### (2) Performance of output part

Category			Output performance specification	
No. of output channel			2 channels	
	Туре		Voltage	Current
			DC 1 ~ 5V	DC 4 ~ 20 mA
Analog			DC 0 ~ 5V	DC 0 ~ 20 mA
output	P	ange	DC 0 ~ 10V	(Load resistor 510 $\Omega$ or less)
range		ange	(Load resistor: 2kΩ or above)	
				nel by user program or after
			setting I/O parameter, voltage	/current selector switch
		Гуре	12 bit binary data	
	Range	Unsigned	0 ~ 4,000	
		value	.,	
Digital		Signed value	-2,000 ~ 2,000	
input		Range Precise value	100 ~ 500 (DC 1 ~ 5V)	400 ~ 2,000 (DC 4 ~ 20 mA)
			0 ~ 500 (DC 0 ~ 5V)	0 ~ 2,000 (DC 0 ~ 20 mA)
			0 ~ 1,000 (DC 0 ~ 10V)	
		Percentile value	0 ~ 1,000	
			1/4,000	
Max. resolution			1.25 mV (DC 1~5V, 0~5V)	5 µA (DC4~20 mA, 0~20 mA)
			2.5 mV (DC 0~10V)	
	Precisio	า	±0.5% or less	
Max.	conversio	n speed	1ms/channel	
Abso	lute max.	output	DC ±15V	DC 25 mA

## 2.7 Communication Cable Specification

## 2.7.1 Profibus-DP cable specification

## (1) Cable specification

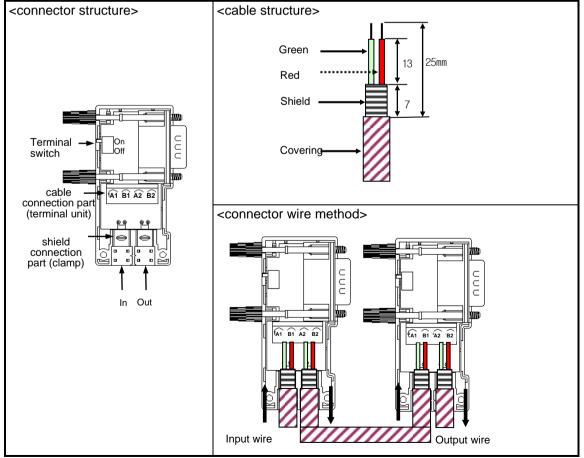
Classification	Conte	ents	
Cable	<ul> <li>BELDEN cable:: Product name : 3077F, 3079A</li> <li>Tomas cable : Product name : Profibus-DP UNITRONIC-BUS L2/FIP/BUS</li> </ul>		
AWG	22		
Туре	BC (Bare copper)		
Insulation	PE (Polyethylene)		
Insulation intensity	0.035 (inch)		
Shield	Aluminum Foil-Polyester Tape /Braid Shield		
Capacity	8500 pF/ft		
Characteristic impedance	150 Ω		
Core No.	2 Core		

#### (2) Connector's structure and connector wire method

A) input wire: green line is connected to A1, red line is connected to B1.

- B) output wire: green line is connected to A2, red line is connected to B2.
- C) Shield is connected to connector's clamp.

D) When installing the connector in terminal, install cable at the A1.B1.



#### 2.7.2 DeviceNet Cable Specification

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#### Cable Specification

	Type name			Cable	class	Cable structure	
	Type name			Thick	Thin		
M	aker			Belo	den		
Ca	able a	ppearan	се	Roi	und		
	ax. al ower)	lowed cu	rrent	8A	ЗA	$\sim$	
		lowed cu unication		5A	1.7A		
E>	kterna	l radius		12.2mm	7.1mm		
Co	ore No	Э.		5	5		
	1	Insulation covering	-	Gray	Gray	2	
	2	Middle	covering	Mylar	<sup>-</sup> tape	(3) -	
Cable	3	Copper-film covered shield		shi	eld		
ö			Blue	CANL	CANL		
	<b>(4)</b>	Signal	White	CANH	CANH		
	4	cable	Red	24V	24V		
			Black	24G	24G		

#### Cable Signal Name

Smart I/O Dnet I/F module cable have 5 cores as follows. It is composed of Twist pair cable for DC 24V power supply, Twist pair cable for signal cable, shield Trunk/Drop cable etc. and both Thick and Thin cable are available for Trunk/Drop line.

Cable color	Signal name	Description
While	CAN_H	Signal cable
Blue	CAN_L	Signal cable
Bare	Drain	Shielded cable
Black	V-	Power cable
Red	V+	Power cable

#### Max. transmission distance by Cable types

	Max. distance		
Transmission speed	Thick cable	Thin cable	
125kbps	500m	100m	
250kbps	250m	100m	
500kbps	100m	100m	

## 2.7.3 Rnet Cable Specification

#### (1) Cable specifications

- For fixed system

Designations	Туре А	Туре В
Impedance	135~160Ω(freq. 3~20MHz)	100~130Ω(freq. > 100kHz)
Capacity	< 30 pF/m	< 60 pF/m
Resistance	< 110 Ω	-
Conductor Area	> 0.34 mm <sup>2</sup> (22 AWG)	> 0.22 mm <sup>2</sup> (24 AWG)

#### - For moving system

Designations	CAN Bus Drag Chain, UL (1x2x0.34mm²)	Structure
Manufacturer	Helukable	
Cable type	twisted pair	Conductor
Conductor resistance	$56\Omega/km$ (normal temperature)	Insulated
Insulated resistance	5,000 MQ/km or more	
Capacitance	40 pF/m or less(1 kHz)	
Characteristic impedance	120Ω±15% (10 ₩z)	
Number of cores	2 Core	

(2) Cable connection a) Connection with Smart I/O / GOL-RR8T 5-pin

Rnet Master	Smart I/O / GOL-RR8T	Wiring
TRX1+/TRX2+	TRX+	
TRX1-/TRX2-	TRX-	
SG	Colorless (SG)	IRV2-

#### Note

1) Use the repeater module for branching Rnet network.

2) There are two types of Rnet communication cable but, type A is recommended to use for new installation.

please contact to the cable maker for model names corresponding to type A and type B

## 2.7.4 Snet Cable Specification

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In case of Snet communication using RS-422 channel, it is required to use Twist pair cable for RS-422 considering communication distance and communication speed. The table below shows the specification of recommended cable. In case of using other cables, it is required to use the cable suitable for the following characteristics.

Twist Pair Cable Specification

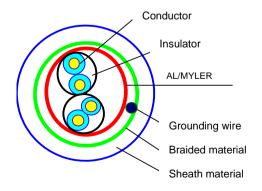
1) Electric Characteristic

Test Items	Unit	Characteristics	Test Condition
Conductor resistance	Ω/km	Less than 59	Normal temp.
Voltage-resistance(DC)	V/1min	500V 1 min resist	In air
Insulation resistance	MΩ-km	More than 1,000	Normal temp.
Capacitance Pf/M		Less than 45	1kHz
Characteristics impedance Ω		120 ± 12	10MHz

2) Appearance Characteristic

Items			Single Wire
	No. of core wire	Pair	2
Conductor	Spec. AWG		22
	Composition NO./mm		1/0.643
	Outside diameter	Mm	0.643
Insulator	Thickness	Mm	0.59
	Outside diameter	Mm	1.94

\* Structure Diagram



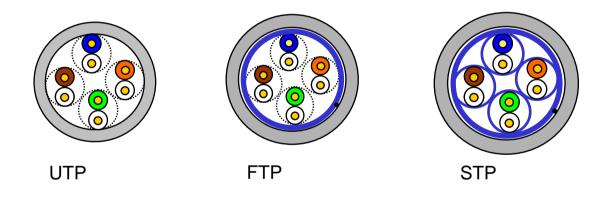
## 2.7.5 Enet Cable Specification

## 1) UTP cable

- UTP cable is classified into 2 types based on the following criteria.
- ① Shield: classified into 3 (UTP, FTP, STP)
- Frequency band used: classified into 7 (Cat.1~7)

#### 2) Type of cables (shield)

Classification	Details	Purpose
UTP (or U.UTP)	Unshielded cable. High speed data transmission.	Max. 200MHz Phonetic+Data+Low grade of video signal
FTP (or S.UTP)	Shielded cable core only.	Max.100MHz Electronic impediment (EMI) and electric stability considered Phonetic+Data+Low grade of video signal
STP (or S.STP)	Double-shielded cable. Shielded core and Individually shielded Pair cable	Max. 500MHz Phonetic+Data+Video signal Substitute for 75Ω coaxial cable



#### Notes

1) UTP : Unshielded Twisted Paired Copper Cable

FTP : (Overall) Foiled Twisted Paired Copper Cable

STP : (Overall) Shielded(and Shielded Individually Pair)Twisted Paired Copper Cable

#### 2) Patch Cable(or Patch Cord)

Conductor composed of stranded cable instead of solid conductor may be used to increase the flexibility of UTP 4-pair cable. And surface specification and materials used is Un-coated AWG 24 (7/0203A).

In other words, the diameter of a single cable is 0.203mm, and this cable is of 1+6 structure as standardized with annealed copper cable.

Classification	Frequency used (MHz)	Transmission Speed (Mbps)	Purpose
Category 1	Phonetic Frequency	1	Phone network (2-Pair)
Category 2	4	4	Multi-Pair communication cable
Category 3	16	16	Phone network + Computer network
Category 4	20	20	<ol> <li>Computer network transmission speed Up</li> <li>Low-loss communication cable</li> </ol>
Category 5 and Enhanced Category 5	100	100	<ol> <li>Digital Phone network + Computer network</li> <li>Low-loss, broadband cable</li> </ol>

## 3) Classification based on frequency used

#### Notes

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1) Presently classified items are Category 3, 5, En-Cat.5 and Cat.6 inside and outside of the country, where Category 4 has been replaced by Category 5 and Category 7 is being under development all over the world as STP structure.

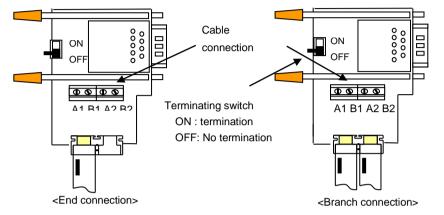
## 4) Example (CTP-LAN5) of Category 5 twisted-pair cable (UTP)

Item	Unit		Value
Conductor resistance(Max)	Ω/km		93.5
Insulation resistance(Min)	MΩ·km		2,500
Voltage endurance	V/min		AC 500
Characteristic impedance	Ω(1~100MHz)		100 ± 15
	-ID /4 00-m	10MHz	6.5
Attenuation	dB/100m or less	16MHz	8.2
		20MHz	9.3
	ID /4 00	10MHz	47
Near-end crosstalk	dB/100m	16MHz	44
Attenuation	or less	20MHz	42

## 2.8 Terminating

## 2.8.1 Profibus-DP Terminating

Connection Connector



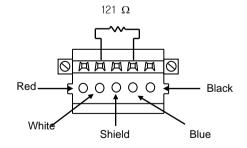
#### 2.8.2 DeviceNet Terminating

#### Connection connector

<b>.</b>	Cable connection method		
Classification	Simplex communication connector	Duplex communication connector	
Form			

#### • Terminal resistance

- 121 $\Omega$ , 1%, 1/4W resistance should be added.
- Connected to CAN\_H of connector and CAN\_L signal cable



#### Remark

 Terminal resistance should be added to both end of trunk line of network and in case of composing by device port tab, it is required to install terminal resistance on both ends of tab. In case that terminal resistance is omitted, the normal communication is not available.

#### 2.8.3 Rnet Terminating

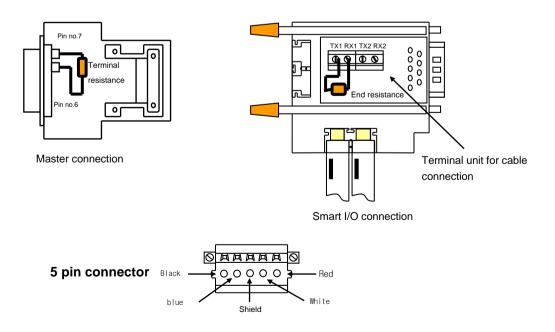
Signal cable for electric network connection for Smart I/O Rnet uses no.6 and 7 from connector pin of Rnet master module and no.8 and 9 of Smart I/O module.

No.6 signal of master module Is connected to no.8 signal cable of Smart I/O module and no.7 signal is connected to no.9 signal cable respectively.

As each connector body is connected to other module by shield cable which plays the role to bypass the external noise, the connector bodies of both side should be connected by shield cable and the body of cable connector is not allowed to contact to high voltage and high current cables.

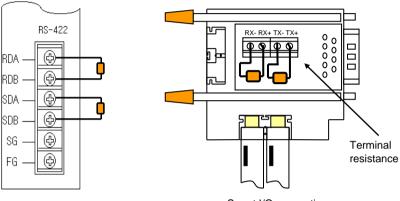
When soldering the shield cable to 9 pin connector body, it is required to heat the connector body with soldering iron sufficiently for strict and non-removable soldering. In case of soldering, use the suitable amount of solder as too much solder adding makes the assembly of connector case difficult.

- Resistance value :  $110\Omega$ , 1/2W
- Connection pin no.
  - Master connection section : Pin no.6, 7
  - Smart I/O connection section
    - 1) 9 pin connector : TX1 and RX1 or TX2 and RX2
    - 2) 5 pin connector : TRX1 + and TRX1- or TRX2+ and TRX2-
- Terminal resistance as fittings(110 $\Omega$ , 1/2W) should be added on both ends of network.
- Connector case and end resistance are not allowed to contact each other.



## 2.8.4 Snet Terminating

In case of communicating through RS-422 channel, it should be required to connect the terminal resistance from outside. In case of long distance communication, terminal resistance plays the role to prevent the signal distortion caused by reflection wave of cable and is required to connect the resistance (1/2W) same as characteristic impedance value to the end of network. In case of using the recommended cable, please connect  $120\Omega$  terminal resistance to both end of cable. In case of using other cables except the recommended cable, it is required to connect the 1/2W resistance same as the characteristic impedance value of using cable to both sides of cable.



Master connection

Smart I/O connection

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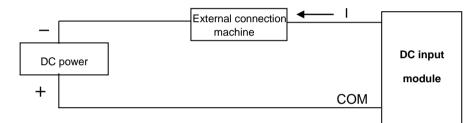
#### **Chapter 3 System Configuration**

Smart I/O series are equipped with various product suitable for system configuration as various communication models and I/O module. This chapter describes the method of system configuration and characteristics.

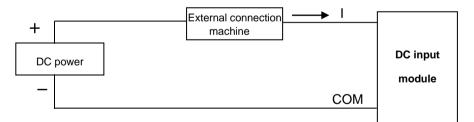
#### 3.1 Notices in Selecting Module

Here describes the notices in selecting digital I/O module which is used for Remote I/O.

- Digital input types contain the current sink input and current source input. In case of DC input module, as the wiring method of external input power is different according to such input types, make sure of selecting the input module considering the spec. of input connection machine. Remote I/O is available for source/sink in common. The wiring method per type is as follows.
- (1) How to connect the sink type external connection machine to the source type DC input module.



- External connection machine is located between DC power and (-) terminal of DC input module terminal.
- Thus, when inputting ON, the current flows from DC input module terminal to external connection machine.
- (2) How to connect the source type external connection machine to the sink type DC input module.



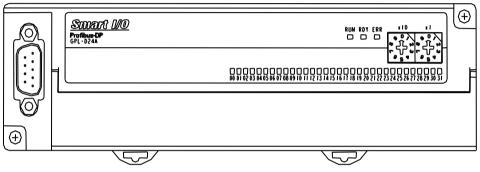
- External connection machine is located between DC power and (+) terminal of DC input module terminal.
- Thus, when inputting ON, the current flows from external connection machine to DC input module terminal.
- 2) In case that the open/close frequency is high or it is used to open/close the conductive load, please use transistor output module as Relay output module may reduce the life.

#### 3.2 Names of Each Part

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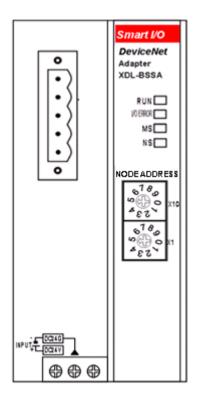
## 3.2.1 Basic System Configuration

Smart I/O series contain all 2 kinds of module configuration. According to network configuration that the user wants, it is available to install the system simple and effectively by the combination of the following models. The best advantage of Smart I/O series is the simple system configuration and the easy connection with other maker's machine as this is oriented to the open type network (except for Rnet).



Example of Smart I/O Series (Block type)

Example of Smart I/O Series (Expansion type)



Available modules for network of Smart I/O series (I/O module)

I/O configuration available point		16 points or 32 points
	Profibus-DP Communication module	<ul> <li>GPL-TR2A/TR2B/TR2C/TR2A1/TR2C1</li> <li>GPL-TR4A/TR4B/TR4C/TR4A1/TR4C1</li> <li>GPL-D22A/D22C,GPL-D24A/D24C,</li> <li>GPL-RY2A/RY2C</li> <li>GPL-DT4A/DT4B/DT4C/DT4A1/DT4C1</li> <li>GPL-DV4C</li> <li>GPL-DC4C</li> <li>GPL-AV8C</li> <li>GPL-AC8C</li> <li>XPL-BSSA</li> </ul>
	DeviceNet Communication module	<ul> <li>GDL-TR2A(N)/TR2B/TR2C/TR2A1/TR2C1 GDL-TR4A(N)/TR4B/TR4C/TR4A1/TR4C1</li> <li>GDL-D22A(N)/D22C,GDL-D24A(N)/D24C,</li> <li>GDL-RY2A(N)/RY2C</li> <li>GDL-DT4A(N)/DT4B/DT4C/DT4A1/DT4C1</li> <li>XDL-BSSA</li> </ul>
Block type	Rnet Communication module	<ul> <li>GRL-TR2A(N)/TR2C1/TR2C/TR4A/TR4C1/TR4C</li> <li>GRL-RY2A(N)/RY2C</li> <li>GRL-D22A(N)/D22C/D24A/D24C</li> <li>GRL-DT4A(N)/DT4C1/DT4C</li> <li>XRL-BSSA</li> </ul>
	Snet Communication module	<ul> <li>GSL-TR2A/TR2C1/TR2C/TR4A/TR4C1/TR4C</li> <li>GSL-RY2A/RY2C</li> <li>GSL-D22A/D22C/D24AD24C</li> <li>GSL-DT4A/DT4C/DT4C1</li> </ul>
	Enet Communication module	• XEL-BSSA/BSSB
	RAPIEnet Communication module	<ul> <li>GEL-TR4C1</li> <li>GEL-RY2C</li> <li>GEL-D24C</li> <li>GEL-DT4C1</li> <li>GEL-DV4C</li> <li>GEL-DC4C</li> <li>GEL-AV8C</li> <li>GEL-AC8C</li> </ul>

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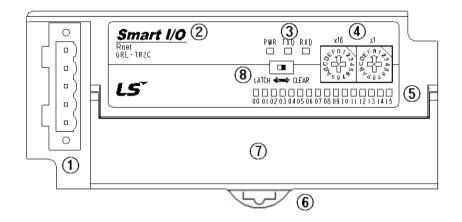
## 3.2.2 Names of Each Part of Smart I/O series

1) Pnet, Rnet, Snet, Dnet series

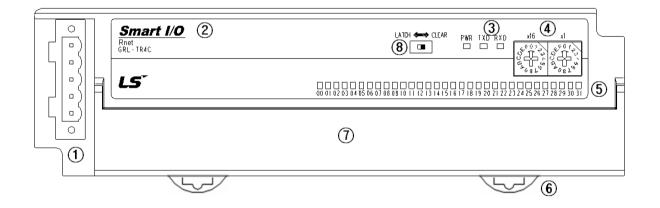
Profibus-DP, Rnet, Modbus communication module have all the same forms, and their characteristics are as follows.

In case of I/O 16 points

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In case of I/O 32 points,



## (1) Pnet module

No.	ltem		Description		
1	Connection connector		Connector for communication connection with master/remote unit <ul> <li>9 pin connector</li> </ul>		
2	Smart I/O type name indication		<ul> <li>Describes Profibus-DP block type name.</li> <li>GPL-D22A/D22C : DC input 16 points</li> <li>GPL-D24A/D24C : DC input 32 points</li> <li>GPL-TR2A/TR2B/TR2C/TR2A1/TR2C1 : TR output 16</li> <li>GPL-TR4A/TR4B/TR4C/TR4A1/TR4C1 : TR output 32</li> <li>GPL-RY2A/RY2C : Relay output 16 points</li> <li>GPL-DT4A/DT4B/DT4C/DT4A1/DT4C1 : DC input 16/ TR output 16 combo</li> </ul>		
		RUN LED	It describes the status of power to be supplied to the system. <ul> <li>On : in case of normal power supply</li> <li>Off : in case of abnormal power supply</li> </ul>		
3	Communi- cation status indication	RDY	<ul> <li>Digital I/O module</li> <li>ON : when communication module is working normally.</li> <li>Analog I/O module</li> <li>ON : when communication module is working normally.</li> <li>OFF : when communication module is working abnormally.</li> <li>Flicker : when communication module detects errors.</li> </ul>		
	LED		Critical error     200ms       Setting error of current input     0.5s       range     0.00000000000000000000000000000000000		
			* When setting input range of mode designation switch to on/on GPL-AC8C, An error occurs, so readjust the input range		
	ERR     LED     • ON : when communication module is cut off.		• ON : when communication module is cut off.		
4	self station no setting switch		The switch to set the node station no. • Digital I/O module : 0~99 • Analog I/O module : 0~126		
(5)	I/O LED		It describes the contact status of I/O terminal.		
6	Hook for DIN rail attachment		Hook for DIN rail attachment		
7	Terminal block		Terminal block layout for I/O wiring     * Refer to Art.3.3.		

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## (2) Rnet module

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No.	Item		Description			
1	Connection connector		Connector for communication connection with master/remote unit <ul> <li>9 pin connector</li> </ul>			
			Describes Rnet mod	ule type name.		
				9 pin connector	5 pin D-sub connector	
			DC input 16	GRL-D22A	GRL-D22A(N)/D22C	
	Smart I/O typ	o namo	DC input 32	GRL-D24A	GRL-D24A(N)/D24C	
2	indication	e name	TR output 16	GRL-TR2A	GRL-TR2A(N)/TR2C1/TR2C	
	maioation		TR output 32	GRL-TR4A	GRL-TR4A(N)/TR4C1/TR4C	
			Relay output 16	GRL-RY2A	GRL-RY2A(N)/RY2C	
			DC input 16 /TR output 16 combo	GRL-DT4A	GRL-DT4A(N)/DT4C1/DT4C	
	PWR LED		It describes the status of power to be supplied to the system. <ul> <li>On : in case of normal power supply</li> <li>Off : in case of abnormal power supply</li> </ul>			
3	Communi- cation status indication	TX LED	It describes the transmission status of communication module. <ul> <li>On : when communication module is transmitting</li> <li>OFF : when communication module is not transmitting</li> </ul>			
	LED		It describes the receiving status of communication module. • On : when communication module is receiving. • Off : when communication module has no receiving or the error is detected.			
4	self station no setting switch		The switch to set the 0~63.	node station no. of	its own station. Available to set from	
(5)	I/O LED		Describes the contact status of I/O terminal.			
6	Hook for DIN rail attachment		Hook for DIN rail attachment			
7	Terminal block		Terminal block layout for I/O wiring.     * Refer to Art. 3.3.			
8	Mode designatio	on switch		<ul> <li>Latch : when communication module is abnormal transmitting ,keep output value.</li> <li>Clear : when communication module is abnormal transmitting ,clear output value(0).</li> </ul>		

#### Notes

Only GRL-TR2C/TR2C1/TR4C/TR4C1/DT4C/DT4C1/RY2C modules have Latch /Cleat function.

## (3) Snet module

No.	Item		Description
1	Connection connector		Connector for communication connection with master/remote unit <ul> <li>9 pin connector</li> </ul>
2	Smart I/O type name indication		<ul> <li>Describes Modbus module type name.</li> <li>GSL-D22A/D22C : DC input 16</li> <li>GSL-D24A/D24C : DC input 32</li> <li>GSL-TR2A/TR2C1/TR2C : TR output 16</li> <li>GSL-TR4A/TR4C1/TR4C : TR output 32</li> <li>GSL-RY2A/RY2C: Relay output 16</li> <li>GSL-DT4A/DT4C1/DT4C : DC input 16</li> <li>/TR output 16 combo</li> </ul>
3	PWR LED Communi- cation status indication LED		It describes the status of power to be supplied to the system. <ul> <li>On : in case of normal power supply</li> <li>Off : in case of abnormal power supply</li> </ul> It describes the transmission status of communication module. <ul> <li>Blink : when communication module is transmitting</li> </ul>
		RX LED	It describes the receiving status of communication module. <ul> <li>Blink : when communication module is receiving.</li> <li>Off : when communication module has no receiving</li> </ul>
4	self station no setting switch		The switch to set the node station no. of its own station. Available to set from 0~31.
5	I/O LED		It describes the contact status of I/O terminal.
6	Hook for DIN rail attachment		Hook for DIN rail attachment
7	Terminal block		Terminal block layout for I/O wiring     * Refer to Art. 3.3.

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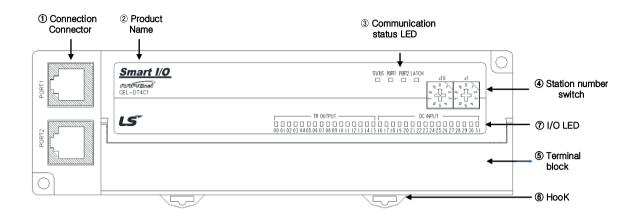
## (4) DeviceNet module

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No.	Item		Description
1	Connection connector		Connector for communication connection with master/remote unit <ul> <li>5 pin OPEN type connector</li> </ul>
2	Smart I/O type name indication		<ul> <li>Describes DeviceNet module type name.</li> <li>GDL-D22A/D22C : DC input 16</li> <li>GDL-D24A/D24C : DC input 32</li> <li>GDL-TR2A/TR2C1/TR2C : TR output 16</li> <li>GDL-TR4A/TR4C1/TR4C : TR output 32</li> <li>GDL-RY2A/RY2C: Relay output 16</li> <li>GDL-DT4A/DT4C1/DT4C : DC input 16</li> <li>/TR output 16 combo</li> </ul>
	PWR LED		It describes the status of power to be supplied to the system. <ul> <li>On : in case of normal power supply</li> <li>Off : in case of abnormal power supply</li> </ul>
3	3 Communi- cation status indication LED	MS LED	It describes interface status of communication module. <ul> <li>Green On: Normal completion of module initialization and device status</li> <li>Green Blink: Communication waiting status after completion of initialization</li> <li>Red On: Module hardware error</li> <li>Off: Interface error</li> </ul>
		NS LED	It describes network status of communication module. <ul> <li>Green On: Device is operating and "online" status</li> <li>Green Blink: Network offline status</li> <li>Red On: Duplex station address error or "Bus Off" stats</li> <li>Red Blink: module network is removed</li> </ul>
4	self station no setting switch		The switch to set the node station no. of its own station. Available to set from 0~63.
5	I/O LED		It describes the contact status of I/O terminal.
6	Hook for DIN rail attachment		Hook for DIN rail attachment
7	Terminal block	K	Terminal block layout for I/O wiring     * Refer to Art. 3.3.

#### (5) RAPIEnet module

Describes the shape and role of Smart I/O RAPIEnet



#### Describes the Name and Purpose of each Smart I/O RAPIEnet

No.	Name	Purpose	
1	Connection connector	Connect Master/remote module for communication	
	Connection connector	-RJ-45 Connector 2ports	
		GEL- D24C : DC input 32 points	
		GEL- TR4C1 : TR output 32 points	
2	Smart I/O type name	GEL- RY2C : Relay output 16 points	
2	indication	GEL- DT4C1 : DC input 16points/ TR output 16points	
		GEL-AC8C/AV8C : 8 channel analog current/voltage input	
		GEL-DC4C/DV4C : 4channel analog current/voltage output	
2	Communication status		
3	indication LED	Communication status (See LED operating characteristics)	
		1. Switch for setting own node station No. from 0 to 63	
		X10 : 10 digit indication	
		X1 : 1 digit indication	
	Switch for setting	2. When station number is set by 90 or above, this module will operate as a	
4	station number	special purpose.	
		1) 90, 91: O/S download mode *Note1)	
		2) 92~94: Self-Test mode	
		3) 96~99: Communication status LED check mode	
5	Terminal block	Terminal block array for I/O wiring * refer to the Ch.3.3	
6	HOOK for DIN rail	HOOK for DIN rail	
7	I/O LED	Indicates the points status of I/O terminal block	

Note1) In case of O/S download mode, the user is prohibited any setting..

The colors and roles of each LED are as follows.

STATUS	PORT1	PORT2	LATCH	
			-	

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Classifica tion	Color	Operation Status		Reference	
		On	Normal	Normal status	
	Green	Flicker	Normal	Self-diagnosis normal service	Station number Switch: 92
			Error	Heartbeat Error occurred, Network disconnected	
STATUS		On	Error	Self-diagnosis service error	Station number Switch: 92
	Red		Normal	Boot mode operation	
			Error	Duplicated station address	See Remark
		Flicker	Error	Parameter setting error, Initialization error, Frame error	
	Green		Normal	Network link is successfully configured through port 1	
PORT1		Off	Stand-by	Network disconnected	
	Red	Flicker	Normal	Communication on Port1	
Green		On	Normal	Network link is successfully configured through port 2	
PORT2		Off	Stand-by	Network disconnected	
	Red	Flicker	Normal	Communication on Port2	
LATCH <sup>*Note</sup>	Crear	On	On Latch When emergency *Note1) Hold output state		
2)	Green	Off Clear When emergency Clear output data			

\*Note1) When emergency status: The data of Master module is not received within given time due to network problems.

\*Note2) LATCH: Latch functions are shown only for output module (GEL-TR4C1/DT4C1/RY2C).

#### Remarks

When duplicated Station address is occurred, please refer to the following operating conditions.

1. In case that the power of Smart I/O RAPIEnet modules turns on at the same time in duplicated network configuration.

- STATUS LED: Red Flicker

- Data Output:

Classification	Data status	Reference
Input module No data transmission		
Output module	No data output	

2. When station address of added Smart I/O is duplicated with existing module.

## 1) When the heartbeat of master module is set (Normally operated module)

#### (1) STATUS LED

Classification		STATUS LED(Red)	Reference	
Green		Off	-	
STATUS	Red	On	When duplicated station address is internally monitored, LED status is changed from flicker to ON.	

#### (2) Input/ Output Data

Classification	Data status	Reference
Input module	No data transmission	
Output module	Emergency output data output	Clear default value

2) When the heartbeat of master module is set (Newly added module in a network)(1) STATUS LED: Red flicker

(2) Data Output:

Classification	Data status	Reference
Input module	No data transmission	
Output module	No data output	

3) When the heartbeat of master module is not set (Normally operated module)(1) STATUS LED: Red flicker

(2) Data Output:

Classification	Data status	Reference
Input module	No data transmission	
Output module	Maintain previous output value	

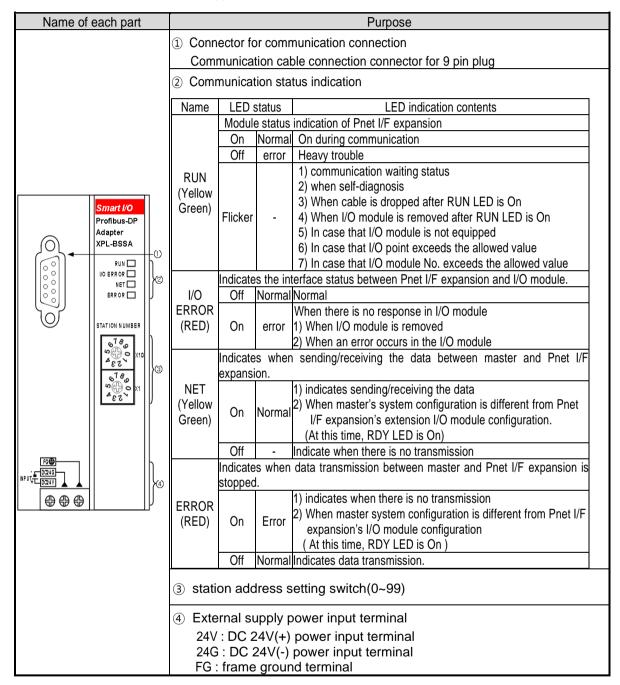
4) When the heartbeat of master module is set (Newly added module in a network)(1) STATUS LED: Red flicker

(2) Data Output:

Classification	Data status	Reference	
Input module	No data transmission		
Output module	No data output		

2) Expansion type Smart I/O adapter module (Pnet, Dnet, Rnet, Enet)

(1) Form of Pnet module (Expansion type) and name of each part



Name of each part		Name		purpose			
		Connection connector		Conneo module		communication connection between master and remote	
				5 pin open type connector			
F	2		Name	Color	status	Contents	
				Vallaur	Power	status of Dnet expansion	
			RUN	Yellow	On	Normal module operating power supply status	
				Green	Off	Critical error	
					Interfac	e status between Dnet expansion and I/O module	
			Ю			In case that there is no response in the I/O module.	
			ERROR	RED	On	1) When I/O module is removed	
						2) When error occurs in the I/O module	
Smart I/O					Off	I/O module normal status	
o DeviceNet					Dnet ex	cpansion's module status	
Adapter Adapter 1 XDL-BSSA				Yellow	On	Normal completion of module initialization and device status	
		င့		Green	Flicker	Communication waiting status after completion of initialization	
		mm	MS			(waits checking the duplicated station address)	
		iuni				Error status of module hardware	
		cat				1) When exceeding the allowed range of I/O module	
		Communication status LED	RED	On	2) When I/O module is removed		
5 0 x10		sta				3) When error occurs in the I/O module	
482		tus			Nation	4) When exceeding the I/O allowed point	
6 <sup>78</sup> 9 600 0 11		E			Networ	k status between master and Dnet expansion	
1534		0			On	Device is operating and "online" status (normal communication status between master and slave	
					On	module)	
						Device is not "online" status.	
ION +				Yellow		1) Not completion of checking the duplicated station	
				Green	Off	address.	
			NS			2) Not supporting the module power	
						(At this time, MS is also Off)	
					Flicker	Device is operating, It is already "online" status but	
6						network is not connected.	
۲					On	<ol> <li>Duplex station address error</li> <li>Network is "Bus Off" stats</li> </ol>	
				RED		Dovies is "Time Out" status	
					Flicker	(module network is removed)	
	9	Self station address setting switch		Switch	for settir	ng self station address (setting range of 0~63)	
F	4			• No. 1	pin(On)	: O/S download mode	
	-	Modo	witch			: Quick mode	
		Mode switch		* Quick	mode:	reduces the initial communication connection time	

Download

terminal unit

Power terminal

(5)

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(when supplying master module, it can be done within Max. 1.5s)

• Terminal unit for downloading the O/S

• External supply power input terminal (not use)

(2) Form of Dnet module (Expansion type) and name of each part

Name of each part No		Name		purpose
	1	Connection connector		Connector for communication connection between master and remote module • 5 pin open type connector
			Name	status Contents
$\left[\begin{array}{c} 1 \\ TRX1+ \\ TRX1- \\ SG \\ TRX2+ \\ TRX2- \\ O \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	2	Communication status LED	RUN IO ERROR TX/RX LATCH	Power status of Rnet expansion         On       Normal module operating power supply status         Off       Heavy trouble         1)       Ready status         2)       Self diagnosis         3)       Cable is removed after RUN LED is on         Flicker       4)       I/O module is removed after RUN LED is on.         5)       I/O module is not installed         6)       I/O points exceed the limit         7)       The number of I/O module exceeds the limit         Interface status between Rnet expansion and I/O module         2)       I/O module is removed         3)       Error occurs in I/O module         0n       2)       I/O module is normal         Now sending/receiving data to master       Flicker         Flicker       Now sending data         Off       Now there's no data transmission         Indicates data output mode in case of communication error         On       Operate as latch mode         Off       Operate as clear mode
	<u>з</u> а		ation ss setting	Switch for setting self station address (setting range of 0~63)
	4	switch Power unit		<ul> <li>Input terminal of external power supply 24V: DC 24V(+) power input terminal 24G: DC 24V GND terminal</li> </ul>
	(5)	Cover		Remove when setting mode switch
	6	Mode switch		Sets data output mode in case of communication error

## (3) Form of Rnet module (Expansion type) and name of each part

### Remark

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1. How to set mode switch

1) Eliminate cover(5).

- 2) When mode switch 6 is on (in left side), it is set as Clear mode.
- 3) When mode switch 6 is off (in right side), it is set as Latch mode.

2. Output value according to mode switch

- 1) Latch mode: In case of communication error, holds present value
- 2) Clear mode: In case of communication error, set output value as '0'
- 3. Mode switch should be set when power is off.

	Name of ea	ach part		No.	N	ame			purpose					
				1		nection nector	RJ-45 2P	ort						
					C	Name	Color	Status	Contents					
					omr		Yellow	Indicate	s operating status of expansion module					
			1,		nun	RUN	Green	On	Power on and CPU normal					
	10/100BASE-TX	Smart I/O Modbus/TCP			cati		Oreen	Off	Power off and CPU abnormal					
		Adapter XEL-BSSA			ons			Interface	e status between IO module and					
					statu	I/O		expansi	on					
(	DK   E	RUN UO ERROR CONTACT	2		Communication status LED		RED	-	When IO module is removed					
	PORT		2	R	R	R	R	R	R				On	When error occurs in IO module
			5	3						Off	IO module normal			
		DDRE	IP ADDRESS					Yellow	Indicate	s transmitting data to master module				
		S S						тх	Green	Flicker	Transmitting the data			
		4 i ⊢						Oreen	Off	There is no transmission				
	FC@					RX	Yellow	Indicate	s receiving data from master module					
							RX 1	Green	Flicker	Receiving data				
							Croon	Off	There is no reception					
	4 • • • • • • • • • • • • • • • • • • •		3	IP add plate	ress	Writes do	wn IP add	Iress of module						
			-	4	Power block	terminal	24V: D	C 24V(+)	external power supply power input terminal ID terminal					

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## (4) ) Form of Enet module (Expansion type) and name of each part (a) XEL-BSSA

# (b) XEL-BSSB

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Name of each part	No.	Ν	ame		purpose	
	1		nection nector	RJ-45 2P	ort	
		S	Name	Color	Status	Contents
		nmc			Indica	tes operating status of adapter module
		nuni	RUN	RUN	On	Power on and CPU normal
		cati			Off	Power off and CPU abnormal
_		Communication status LED			Interfa	ce status between IO module and adapter
Smart I/O		statu				When IO module is removed
10/100BASE-TX EtherNet/IP		IS LE		10	On	When there is no response from IO module
XEL-BSSB		Ü	ERROR	ERROR	•	When communication module is removed
						during communication
					Off	IO module normal status
	0					tes module status
	2		MS	Green	On	Normal
ADDRES					Flicker	When device setting is not complete
				RED	0	(In case of Input Only, Normal)
					On	When non-restorable error occurs
					Flicker	When abnormal setting or restorable error occurs
					Indica	tes network status
				Yellow	On	When there is at least one connection with
<b>④ ● ● ● · · ·</b>			NS	Green		device
						There is no connection with device
				RED	On	Duplicated IP address is detected
					Flicker	Time-out with more than one device occurs
	(3)	IP add plate	ress	Writes do	wn IP a	ddress of module
	(4)	Power block	terminal	24V: D	C 24V(+	or external power supply ) power input terminal GND terminal

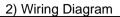
## 3.3 I/O Wiring Diagram of Communication Module

## 3.3.1 External connection diagram of Smart I/O module

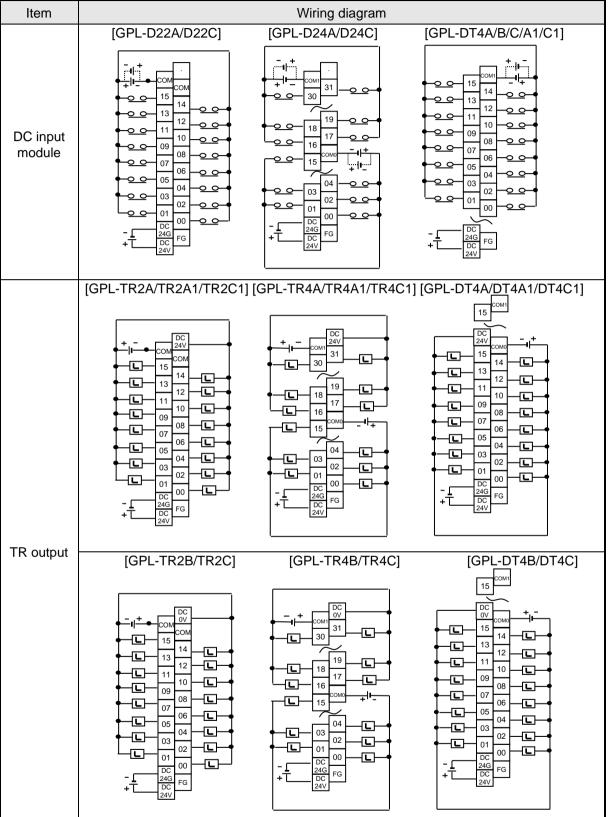
## 1) Profibus-DP module

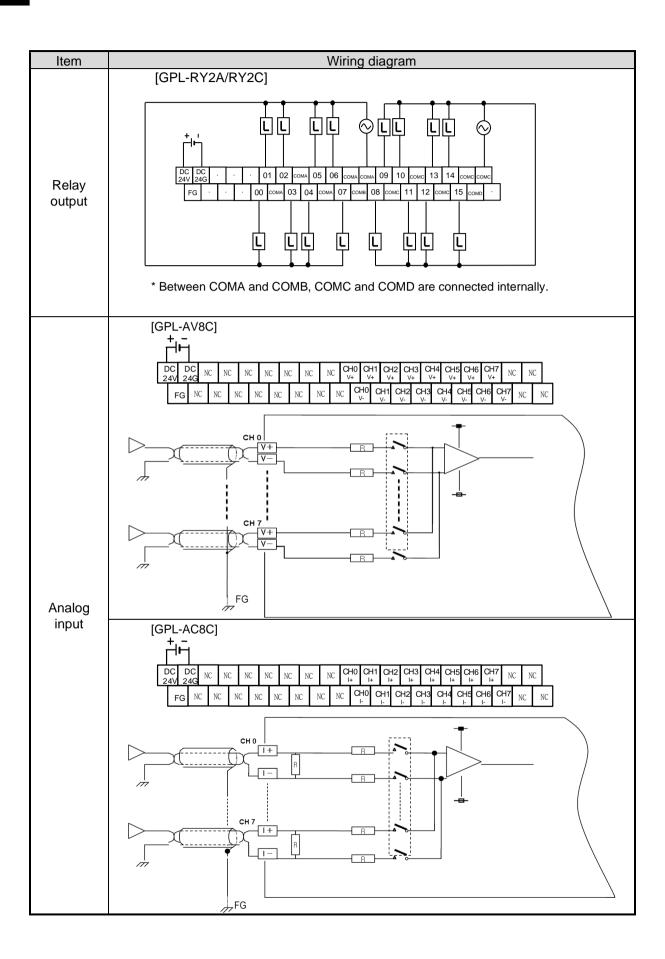
(1) Terminal block configuration

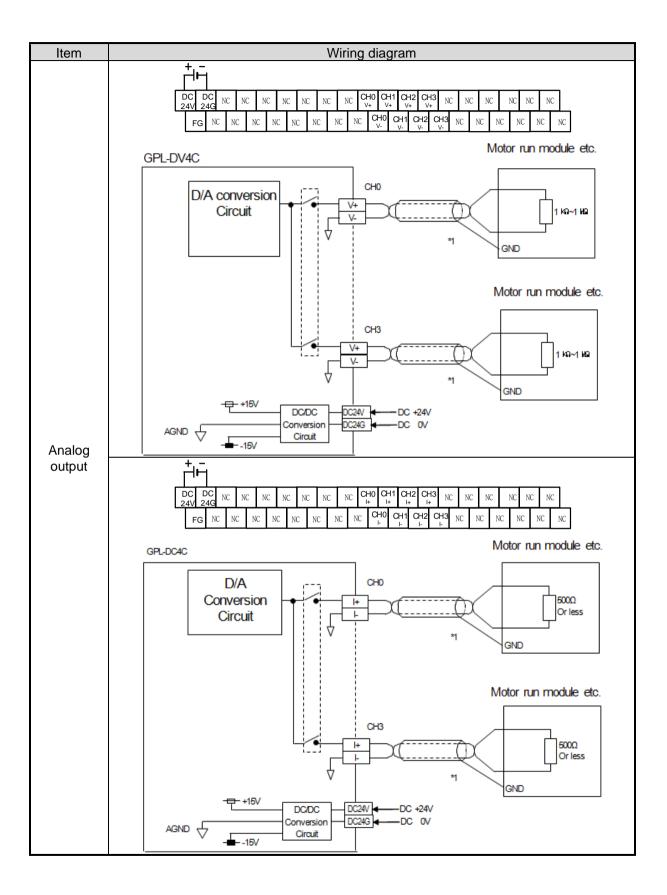
	nal block	Contact and Power Input
	0 ~ 15	Input contact terminal (GPL-D22A)
GPL-D22A	0 ~ 31	Input contact terminal (GPL-D24A)
GPL-D22C	COM	Common terminal (16 points COM)(GPL-D22A)
/	COM0/COM1	Common terminal (16 points COM)(GPL-D24A)
GPL-D24A	FG	FG terminal
GPL-D24C	DC 24V	DC 24V(+) power input terminal
	DC 24G	DC 24V(-) power input terminal
GPL-DT4A	0 ~ 15/0 ~ 15	I/O contact terminal
GPL-DT4A GPL-DT4B	COM0/COM1	Common terminal (16 points COM)
GPL-DT4C	FG	FG terminal
GPL-DT4A1 GPL-DT4C1	DC 24V	DC 24V(+) power input terminal
01201401	DC 24G	DC 24V(-) power input terminal
	0 ~ 15	Output contact terminal (GPL-TR2A)
GPL-TR2A/B/C GPL-TR2A1	0 ~ 31	Output contact terminal (GPL-TR4A)
GPL-TR2C1	COM	Common terminal (16 points COM)(GPL-TR2A)
	COM0/COM1	Common terminal (16 points COM)(GPL-TR4A)
GPL-TR4A/B/C GPL-TR4A1	FG	FG terminal
GPL-TR4C1	24V	DC 24V(+) power input terminal
	24G	DC 24V(-) power input terminal
	0 ~ 15	Output contact terminal
GPL-RY2A	COMA~COMD	Common terminal (8 points COM)
GPL-R12A GPL-RY2C	FG	FG terminal
	DC 24V	DC 24V(+) power input terminal
	DC 24G	DC 24V(-) power input terminal
	CH0~7 V+/I+	CH0~7 V+/I+ input terminal
GPL-AV8C	CH0~7 V-/I-	CH0~7 V-/I- input terminal
GPL-AC8C	FG	FG terminal
GPL-DV4C	DC24V	DC 24V(+) power input terminal
GPL-DC4C	DC24G	DC 24V(-) power input terminal
	N.C	N.C



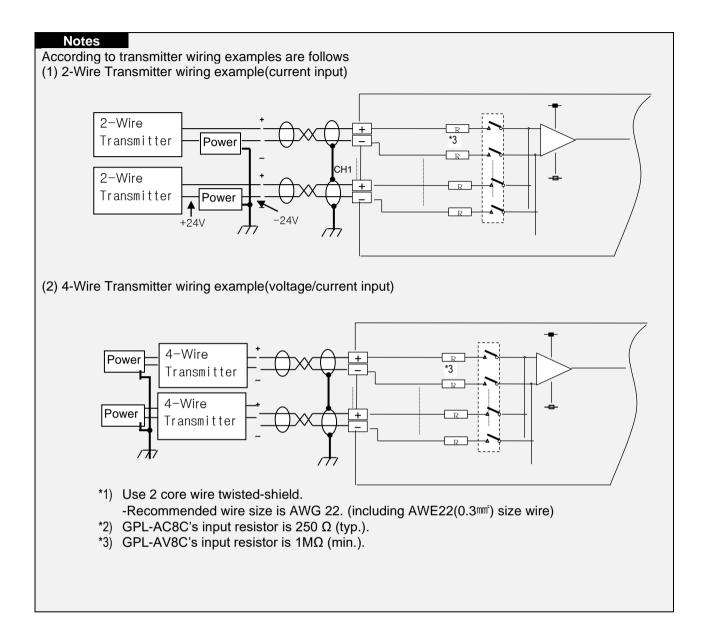
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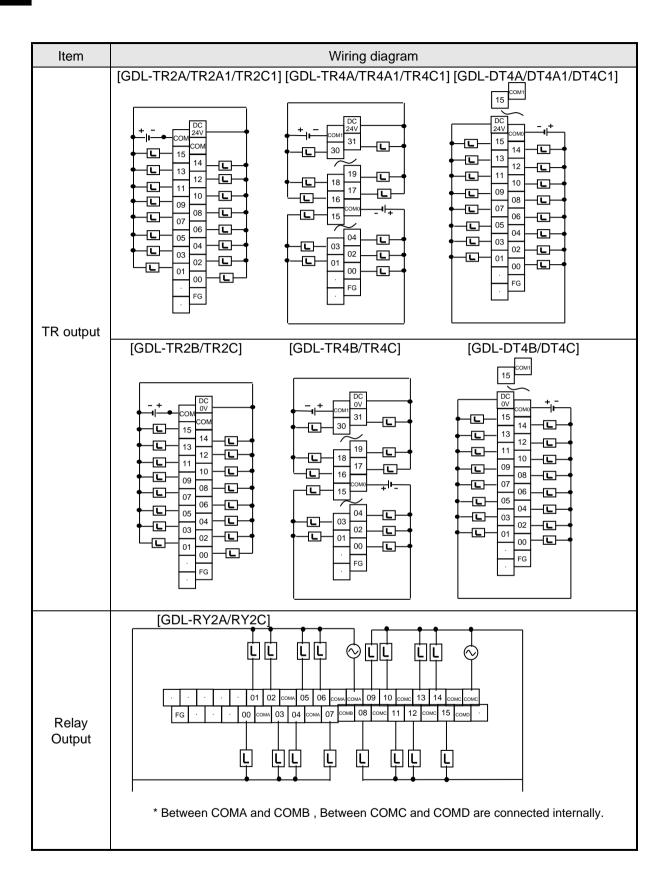
### 2) DeviceNet module

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(1) Terminal block configuration

Termina	al block	Contact and Power Input
	0 ~ 15	Input contact terminal(16 points)
GDL-D22A/C	0 ~ 31	Input contact terminal(32 points)
/	СОМ	Common terminal(16 points COM) (16 points)
GDL-D24A/C	COM0/COM1	Common terminal(16 points COM) (32 points))
	FG	FG terminal
	0 ~ 15/0 ~ 15	I/O contact terminal
GDL-DT4A/B/C GDL-DT4A1/C1	COM0/COM1	Common terminal(16 points COM)
	FG	FG terminal
	0 ~ 15	Output contact terminal(16 points)
GDL-TR2A/B/C GDL-TR2A1/C1	0 ~ 31	Output contact terminal(32 points)
	СОМ	Common terminal(16 points COM) (16 points)
GDL-TR4A/B/C GDL-TR4A1/C1	COM0/COM1	Common terminal(16 points COM) (32 points)
	FG	FG terminal
	0 ~ 15	Output contact terminal
GDL-RY2A GDL-RY2C	COMA~COMD	Common terminal(8 points COM)
0000	FG	FG terminal

#### (2) Wiring diagram Wiring diagram Item [GDL-D22A/D22C] [GDL-D24A/D24C] [GDL-DT4A/B/C/A1/C1] Ja. 15 CON 31 14 15 30 13 14 12 13 11 12 19 10 <u>o c</u> 18 11 09 17 10 DC input 0 0 08 0 0 16 09 07 08 module o c 06 ON 0 0 15 07 ÷11----05 06 <u>o o</u> 04 00 05 03 04 ) C 04 03 02 03 02 $^{\circ}$ 01 0 02 0 c o c 01 00 01 C 00 0 <u>o c</u> 00 0 C FG FG G



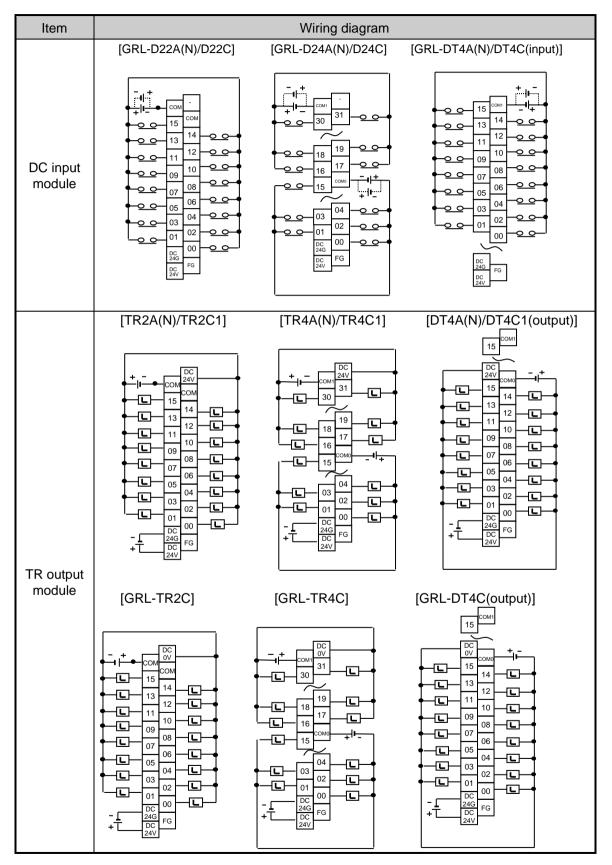
# 3) Rnet module

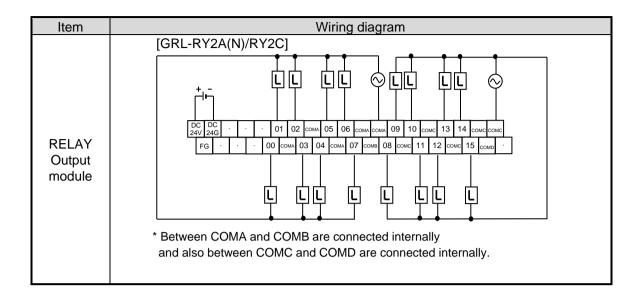
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(1) Terminal block configuration

Terminal block		Contact and Power Input		
	0 ~ 15	Input contact terminal (GRL-D22A)		
	0 ~ 31	Input contact terminal (GRL-D24A)		
	СОМ	Common terminal (16 points COM)(GRL-D22A)		
GRL-D22A/D24A GRL-D22C/D24C	COM0/COM1	Common terminal (16 points COM)(GRL-D24A)		
	FG	FG terminal		
	DC 24V	DC 24V(+) power input terminal		
	DC 24G	DC 24V(-) power input terminal		
	0 ~ 15/0 ~ 15	I/O contact terminal		
	COM0/COM1	Common terminal (16 points COM)		
GRL-DT4A GRL-DT4C1	FG	FG terminal		
	DC 24V	DC 24V(+) power input terminal		
	DC 24G	DC 24V(-) power input terminal		
	0 ~ 15	Output contact terminal (GRL-TR2A)		
	0 ~ 31	Output contact terminal (GRL-TR4A)		
	СОМ	Common terminal (16 points COM)(GRL-TR2A)		
GRL-TR2A/TR4A GRL-TR2C1/TR4C1	COM0/COM1	Common terminal (16 points COM)(GRL-TR4A)		
	FG	FG terminal		
	24V	DC 24V(+) power input terminal		
	24G	DC 24V(-) power input terminal		
	0 ~ 15	Output contact terminal		
	COMA~COMD	Common terminal (8 points COM)		
GRL-RY2A/RY2C	FG	FG terminal		
	DC 24V	DC 24V(+) power input terminal		
	DC 24G	DC 24V(-) power input terminal		

#### (2) Wiring diagram





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## 4) Snet module

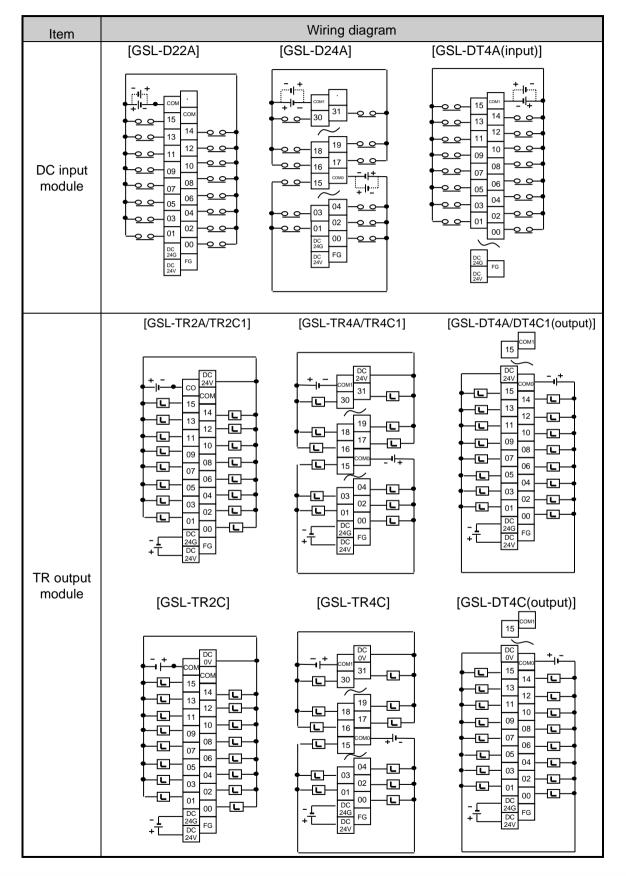
(1) Terminal block configuration

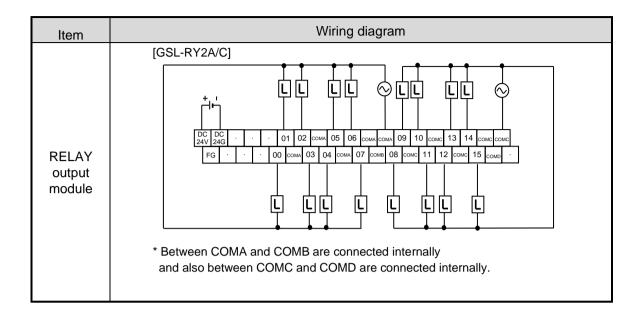
Termina	l block	Contact and Power Input		
	0 ~ 15	Input contact terminal(GSL-D22A)		
	0 ~ 31	Input contact terminal(GSL-D24A)		
	СОМ	Common input(16 points COM)(GSL-D22A)		
GSL-D22A/D24A GSL-D22C/D24C	COM0/COM1	Common input(16 points COM)(GSL-D24A)		
001-0220/0240	FG	FG terminal		
	DC 24V	DC 24V(+) power input terminal		
	DC 24G	DC 24V(-) power input terminal		
	0 ~ 15/0 ~ 15	I/O contact terminal		
	COM0/COM1	Common terminal(16 points COM)		
GSL-DT4A GSL-DT4C1	FG	FG terminal		
002 01401	DC 24V	DC 24V(+) power input terminal		
	DC 24G	DC 24V(-) power input terminal		
	0 ~ 15	Output contact terminal(GSL-TR2A)		
	0 ~ 31	Output contact terminal(GSL-TR4A)		
	СОМ	Common terminal(16 points COM)(GSL-TR2A)		
GSL-TR2A/TR4A GSL-TR2C1/TR4C1	COM0/COM1	Common terminal(16 points COM)(GSL-TR4A)		
001-11/201/11/401	FG	FG terminal		
	24V	DC 24V(+) power input terminal		
	24G	DC 24V(-) power input terminal		
	0 ~ 15	Output contact terminal		
	COMA~COMD	Common terminal(8 points COM)		
GSL-RY2A/RY2C	FG	FG terminal		
	DC 24V	DC 24V(+) power input terminal		
	DC 24G	DC 24V(-) power input terminal		

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(2) Wiring diagram

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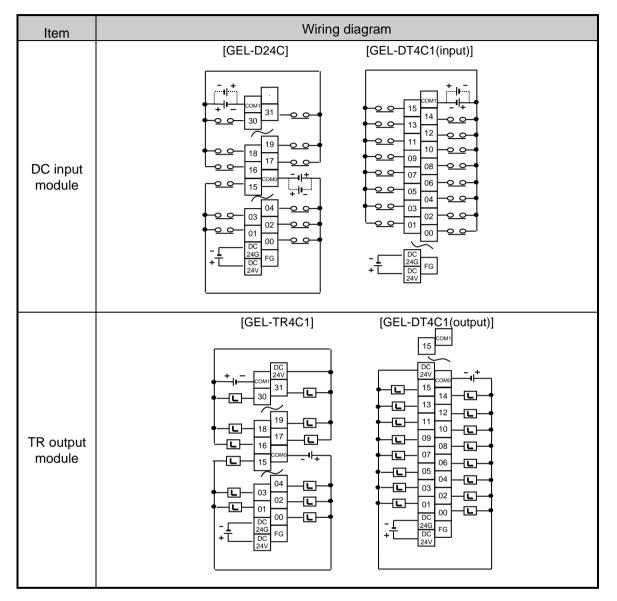
## 5) RAPIEnet module

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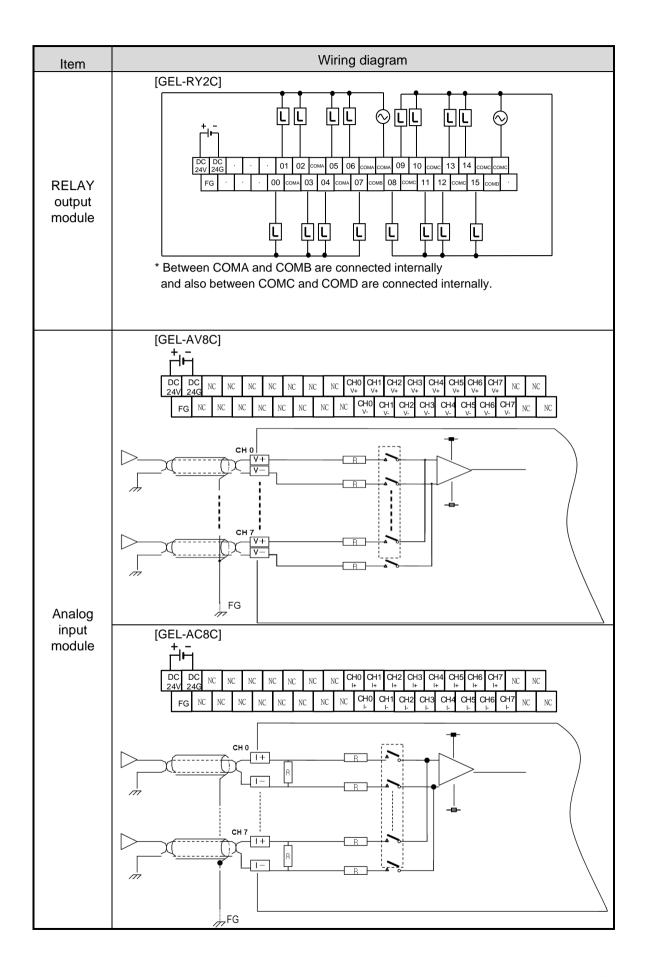
(1) Terminal block configuration

Termina	I block	Contact and Power Input	
	0 ~ 31	Input contact terminal(GSL-D24A)	
	COM0/COM1	Common input(16 points COM)(32points)	
GEL-D24C	FG	FG terminal	
	DC 24V	DC 24V(+) power input terminal	
	DC 24G	DC 24V(-) power input terminal	
	0 ~ 15/0 ~ 15	I/O contact terminal	
	COM0/COM1	Common terminal(16 points COM)	
GEL-DT4C1	FG	FG terminal	
	DC 24V	DC 24V(+) power input terminal	
	DC 24G	DC 24V(-) power input terminal	
	0 ~ 15	Output contact terminal(16points)	
	0 ~ 31	Output contact terminal(32points)	
	COM	Common terminal(16 points COM)(16points)	
GEL-TR4C1	COM0/COM1	Common terminal(16 points COM)(32points)	
	FG	FG terminal	
	24V	DC 24V(+) power input terminal	
	24G	DC 24V(-) power input terminal	
	0 ~ 15	Output contact terminal	
	COMA~COMD	Common terminal(8 points COM)	
GEL-RY2C	FG	FG terminal	
	DC 24V	DC 24V(+) power input terminal	
	DC 24G	DC 24V(-) power input terminal	
	CH 0~7 V+/I+	CH 0~7 V+/I+ input terminal	
GEL-AV8C	CH 0~7 V-/I-	CH 0~7 V-/I- input terminal	
GEL-AC8C GEL-DV4C	DC 24V	DC 24V(+) power input terminal	
GEL-DC4C	DC24G	DC 24V(-) power input terminal	
	N.C	N.C	

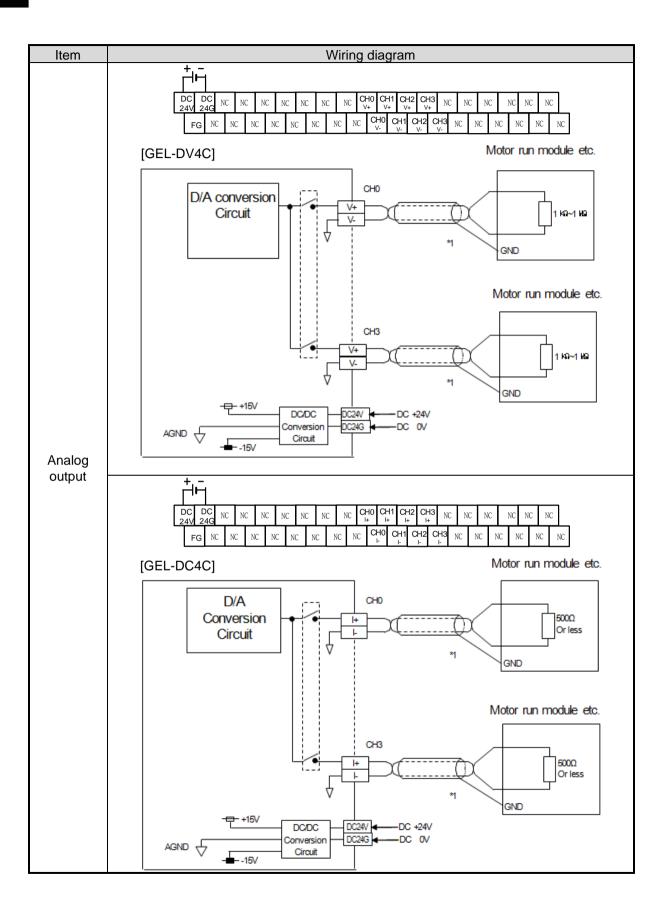
(2) Wiring diagram

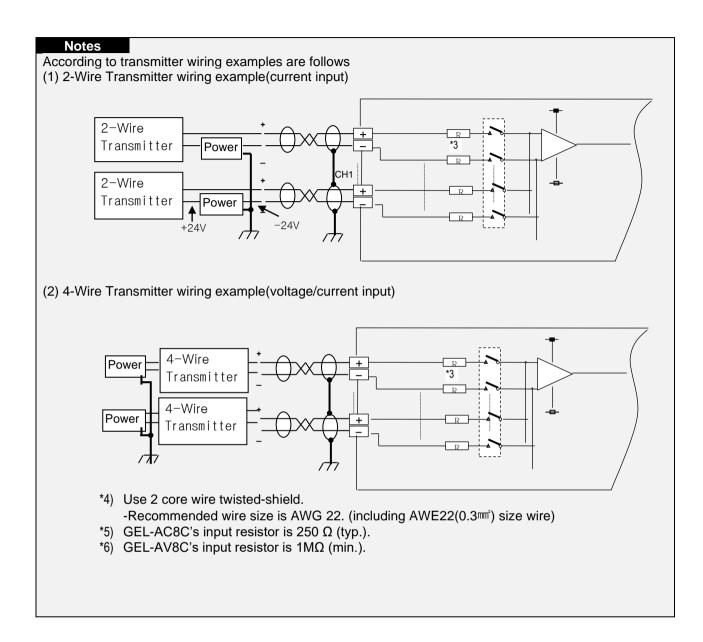


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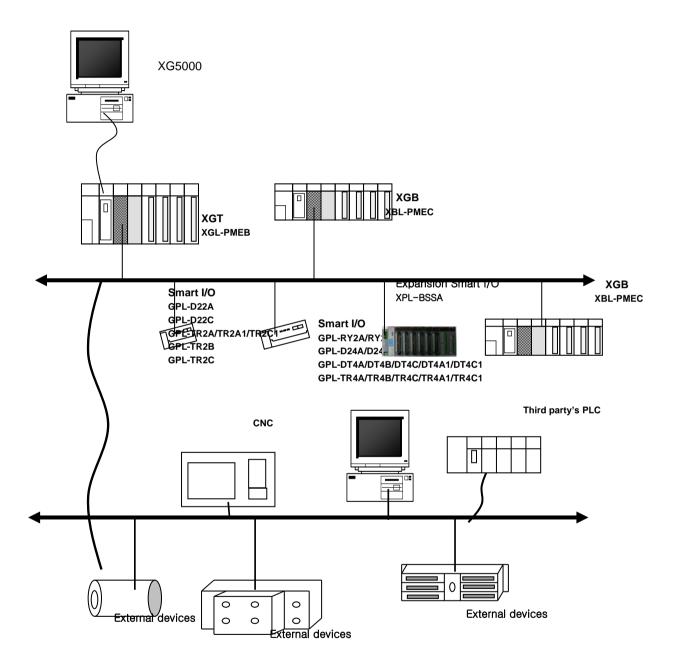




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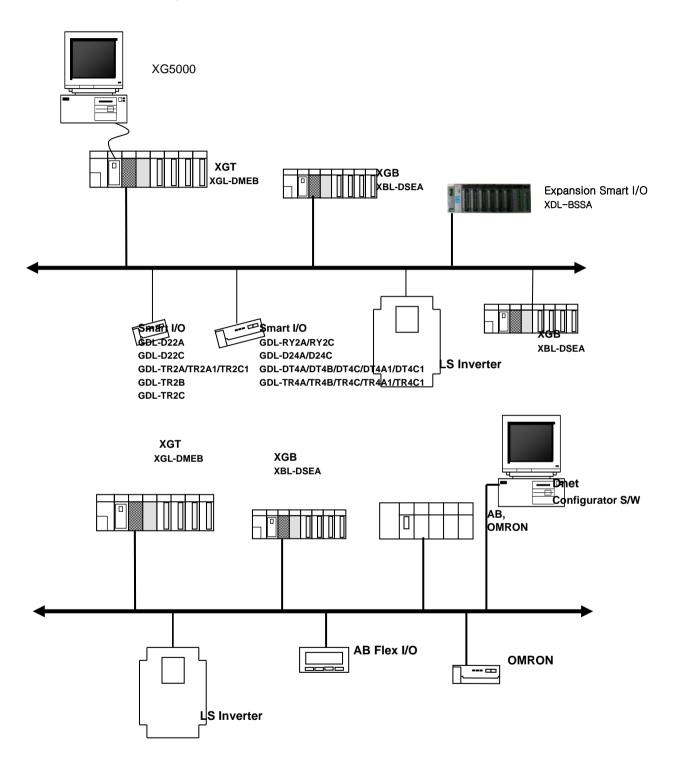
# 3.4 Examples of System Configuration

## 3.4.1 Profibus-DP System

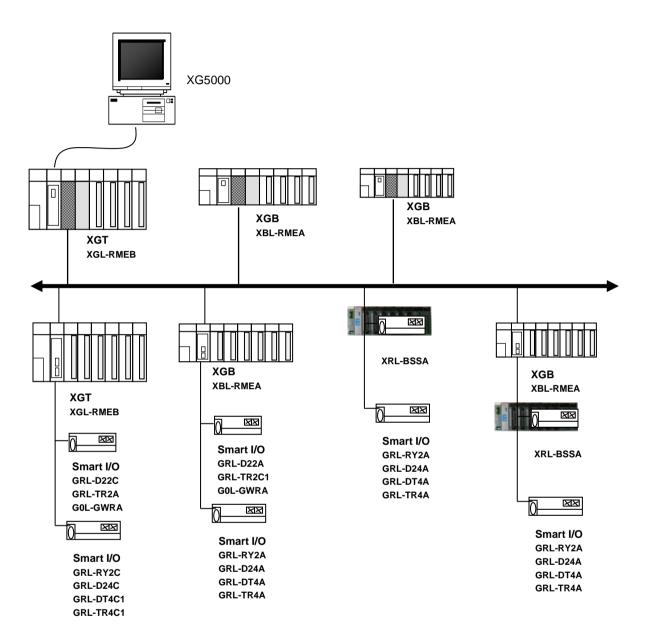


# 3.4.2 DeviceNet System

Γ



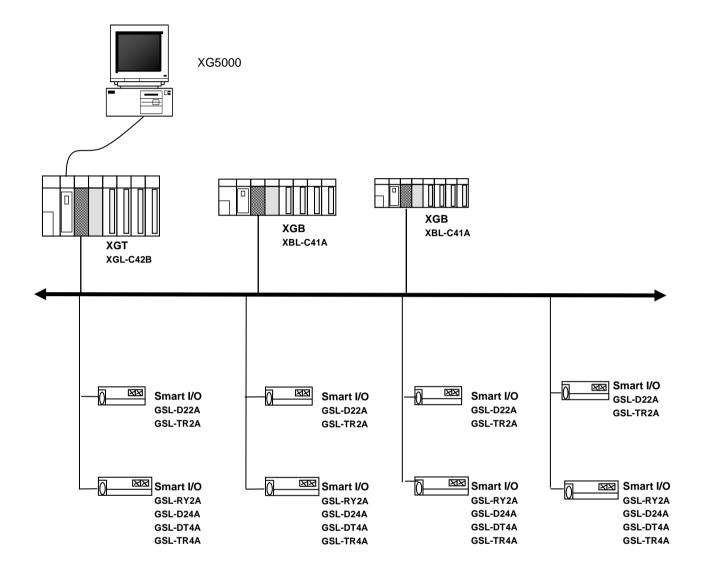
# 3.4.3 Rnet System



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# 3.4.4 Snet System

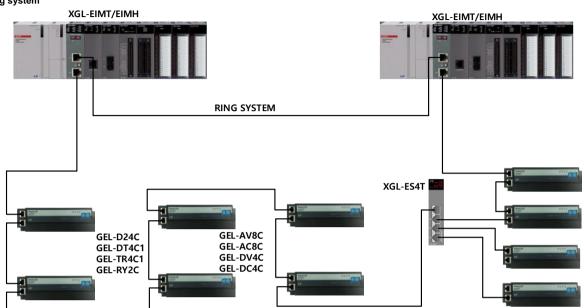
Γ



# 3.4.5 RAPIEnet System

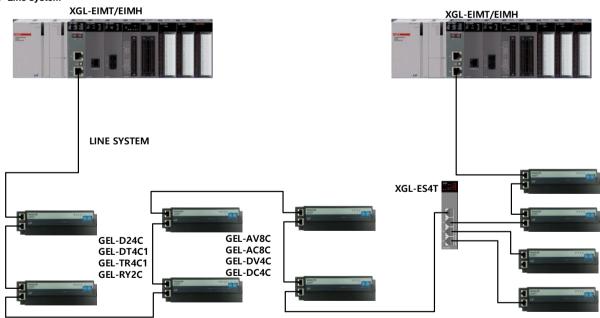
Smart I/O RAPIEnet's system are classified Ring and Line configurations.

1) Ring system



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2) Line system



Г

### **Chapter 4 Communication Programming**

### 4.1 Overview

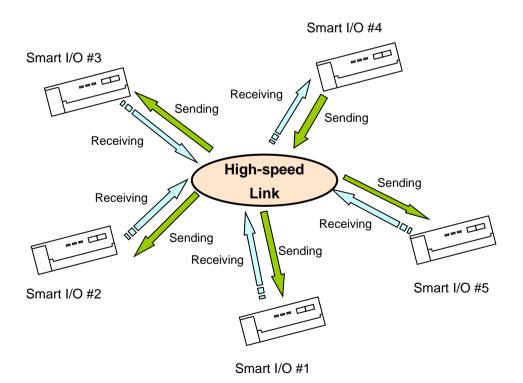
There are two kinds of Programming methods in using the Smart I/O series. For further information, please refer to the user's manual related to "Master module".

### 4.1.1 High-speed Link

*High-speed Link* is used when other station's data or information is periodically exchanged at every specific time. By referring to the changing data of its own station or other station periodically, it enables to utilize the data to the system effectively and communicates by setting the simple parameter.

The setting method for GLOFA series is to designate its own area and the area of other station to send or receive and data size, station no. in GMWIN parameter setting (for MASTER-K, in KGLWIN parameter setting) and then carry out communication. Data size is at least 1 word (16 points) for communication and Rnet communication is available up to 3,840 words. The communication period is available to set max. 20ms up to 10 sec according to the communication contents.

As it is available to communicate with other station by simple parameter setting, it is easy to use this program and the High-speed process of internal data enables to process lots of data at the same time periodically.



## 4.1.2 Function Block (GLOFA-GM) / Instruction (MASTER-K)

*High-speed Link* is periodic communication, but communication by *Function Block*/Instruction is the service to communicate when the specific event to communicate with other station occurs. In case that the error occurs in other station which results in sending this content to other other station or when specific contact is entered to communicate, it is available to use *Function Block*/Instruction.

The program method is written by designating Enable condition, communication module installed module position, station no., data area of its own station and the area of other station using *Function Block* per type made by GMWIN program mode for GLOFA series (by KGLWIN program mode for MASTER-K series) in advance and Instruction.

Data size to communicate in *High-speed Link* is word (16 points) unit but in GLOFA Function Block, it is available to communicate with each other station per data type such as Bit, Byte, and Word etc. and in MASTER-K, also by Word unit.

### Difference between High-speed Link operation and the operation by Function Block/Instruction

Contents	High-speed Link	Function Block/Instruction
Basic unit of TX/RX data	1word (16 points)	GLOFA : available per data type (Bit, Byte, Word etc.) MASTER-K: supports only Word type.
Communica- tion period	20ms(per scan) ~ 10sec	Performs whenever Enable condition of communication program starts.
Operation method	Parameter setting→Download to PLC→ <i>High-speed Link</i> Enable→run	GLOFA : Compile→ Download to PLC→Run MASTER-K : Download to PLC→Run
Control by CPU operation mode key	High-speed Link is performed regardless of the CPU satates (RUN, STOP, PAUSE)	Performs the operation following to the key condition of CPU module.

### Remark

- 1) *High-speed Link* service is used only for Profibus-DP, DeviceNet, Rnet, RAPIEnet series from Smart I/O series. Configuration tool to operate the corresponding module is provided separately.
- 2) Function Block service is used for Modbus communication programming and for further information. Refer to the user's manual.

## 4.2 High-speed Link

## 4.2.1 Overview

*High-speed Link* is a communication sevice which transmits data by setting parameter (TX/RX size, period of TX/RX, area of TX/RX and storage).

## - Setting High-speed Link block:

- (1) In case that there are several areas for sending/receiving, it is available to set max.64 block (32 for seinding, 32 for receiving) respectively.
- (2) Available to set 60 words per block.
- (3) Available to use 3,840 words for max. link point. (Dnet: 2,046 words)

### - TRX period setting function:

As the user can set sending/receiving period per each block, it is available to set the sending/receiving period from 20ms (every scan) to 10 sec. dividing into the area which needs especially rapid sending/receiving and the area not needed.

### - TRX area setting:

It is available to set sending/receiving area per data block according to setting I/O address.

### - High-speed Link information provision function:

By providing the user with *High-speed Link* information by the user keyword, it enables to build reliable communication system easily.

Classification		Max. communication point (word)	Max. sending point (word)	Max. block no.	Max. point per block (word)	Remark
	G3/4/6/7L- RUEA	3,840	1,920	64(0-63)	60	Rnet I/F Module
Smart	G3/4/6L- PUEA/PUEB	1,792	1,792	64(0-63)	60	Pnet I/F Module
I/O series	G4/6L-DUEA	128	128	64(0-63)	60	Dnet I/F Module
	XGL-EIMT/H	12,800	12,800	64(0-63)	200	RAPIEnet I/F Module

#### Maximum High-speed Link points according to device type (master standard)

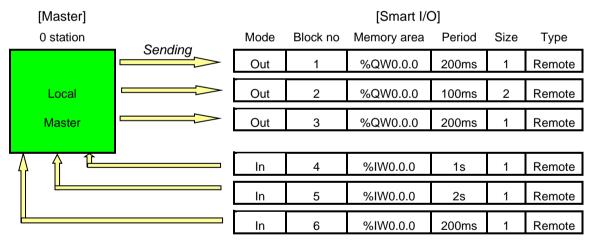
# 4.2.2 High-speed Link TRX Data Processing

TRX data processing in High-speed Link can be described as follows.

Ex) This is an example to send/receive data from local master (0 station) to Smart I/O station. This is a map to send/receive data from/to the corresponding remote station when output module is allocated by 1, 2, 3 station respectively and input module is set as 4, 5, 6 station. The address, sending/receiving period, data size of Smart I/O station is as follows.

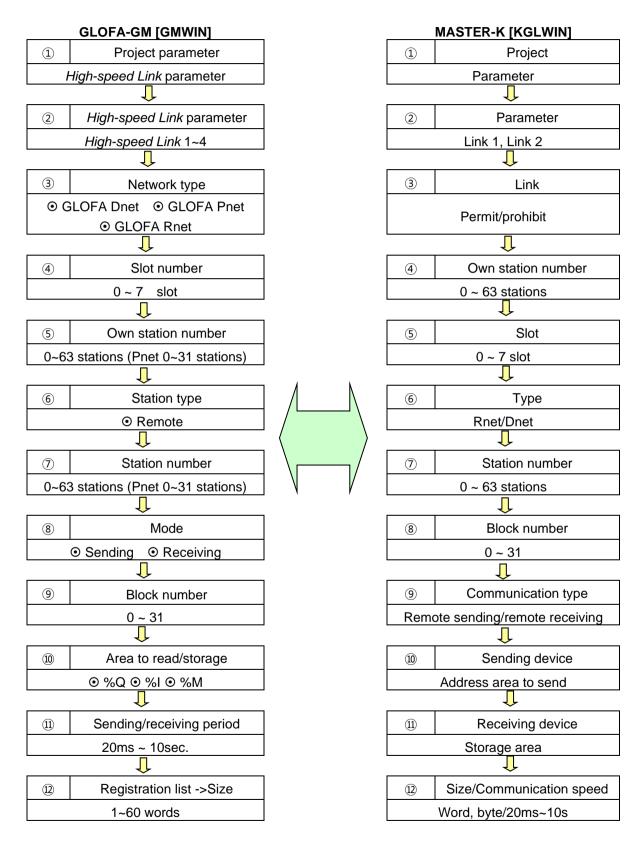
*High-speed Link* parameters have 32 blocks no. for sending and 32 blocks no. for receiving to send/receive the data. Also, Block no. can be assigned and used from 0 to 63 for sending/receiving. Generally, when sending the data, the sender is required to determine data to read and block number to send without designating the no. of other stations. But in case it is set by the remote (for example: Smart I/O series), the user is required to determine the station no. of Remote station (node) and block no. to send, and data sending/receiving mode for the remote station.

The following is an example of sending/receiving parameter setting for Smart I/O series that is composed of input modules and output modules. This sends/receives the data from master that tries to access Smart I/O module to each remote station. The block no. data address, communication period, and data size of the corresponding module from local GMWIN or KGLWIN shall be set in *High-speed Link* parameter. In this case, you should pay attention that the block no. should be different regardless of I/O module in order to send/receive the desired data.



Receiving

# 4.2.3 Operation Order by High-speed Link



# 4.2.4 GMWIN's Setting of High-speed Link Parameter

*High-speed Link* parameter selects link parameter from GMWIN project menu and sets the corresponding item. The setting order and the function per item are shown as follows.

### (1) High-speed Link Project Setting

If selecting *High-speed Link* parameter from GMWIN project basic screen below, it shows the *High-speed Link* parameter basic screen and the user can select the corresponding item.

GMWIN Project Basic Screen	
🍙 GMWIN for Windows – c:₩gmwin3,61e₩source₩def0000,prj	_ O ×
<u>P</u> roject P <u>r</u> ogram <u>E</u> dit <u>T</u> oolbox <u>C</u> ompile <u>O</u> nline <u>D</u> ebug <u>W</u> indow <u>H</u> elp	
twgmwin3,61e₩source₩noname00,src	
Row 0	
Row 1	
Row 2	
Row 3	
Row 4	
Row 5	
ter c:₩gmwin3.61e₩source₩def0000.prj	
COMMENTS for DIRECT VARIABLES ==> Ø variables declared	
PARAMETERS	
- I/O PARAMETERS	
INCLUDED LIBRARIES	
Arranges the windows as horizontal nonoverlapping tile Offline	Edit

#### (2) Link Parameter Selection

(a) Setting method: select parameter-*High-speed Link* parameter from project screen.

GMWIN High-speed Link Parameter

Hi	gh Speed Link Parameter		×
	High Speed Link 1	Close	
	High Speed Link 2	Help	
	High Speed Link 3		
	High Speed Link 4		

(b) Setting function: GMWIN *High-speed Link* 1~4 items means max.installation no. of communication module by master PLC CPU type.

LSELECTRIC 4-6

1) If communication model used is only one, select *High-speed Link* 1.

2) One High-speed Link parameter is available to set only for one communication module.

## (3) Link Parameter Setting

If selecting the corresponding parameter from parameter setting basic screen, *High-speed Link* parameter setting window will appear and when setting the parameter first, the initial value will be indicated as below.

n Speed L - Link Set-					
	ork Type:	GLOFA	Fnet		
Slot:	0	Self Statio	n No: 0		
					Edit
Entry List	1				
Num	Туре	Class	From Area	To Area	Size
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15					
		De	lete Co	ру	Edit
				Close	Help

Parameter setting initial screen is composed of two items such as "Link set' and "Entry list", and the setting methods per each item and its function are as follows.

#### (a) Link Setting

Link setting is the item to set the basic articles of communication module to carry out High-speed Link.

High Speed1Link Set	×
Network Type	
GLOFA Fnet	ок
C GLOFA Mnet	Cancel
C GLOFA Enet	Help
C GLOFA Fdnet Network	
O GLOFA Fdnet Cable	
C GLOFA Dnet	
C GLOFA Pnet	
C GLOFA FEnet	
C GLOFA FDEnet	
C GLOFA Rnet	
Slot Num 0 💌 Self-stat Num 0	

Network type: this is to set the type of communication module and select according to the installed communication module model type.

- Slot number: set one of 0 ~7 for slot number that communication module is installed to (the right side of CPU module is "0" slot).
- Self-station number: enter its own station no. that is set on the front side station no. switch of communication module. It is available to set 0~63 by decimal number. Self station number is unique number to distinguish communication module in the same network system, so don't use duplicated station number. (Station num. '0' in Profibus-DP is reserved (can not be used). Refer to Chap.5)
- (b) Entry List Setting

Entry list is the area to register the actual sending/receiving data information. Set the registration no. from '0' of registration list area first and place the cursor on the desired position of number to set and double click or select 'Edit ...' button on the bottom of the screen to set the corresponding contents in the *High-speed Link* item modification screen.

High S	peed1Link I	Dtem Edit		×
Station T C Local	]	Station No	Mode Send Receive	Block No
Area From				Send Period
То	⊙ %MVV	⊙ %IW ⊖ %IW	с %аw  0	Size
			OK Cancel	Help

Example of sending parameter setting screen

High-speed Link item modification screen

Hig	h Spe	eed Li	ink 1						×
ſ	- Link	<set-< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th>_</th></set-<>							_
	1	Vetwo	rk Type:	GLOFA Fnet	:				
	9	Slot:	0	Self Station N	o: 0				
								Edit	
[	Entr	y List		Individual parame	eter registr	ation no.(	set by	<u>′ 0~63)</u>	
	Nuŋ	$\checkmark$	Туре	Class	From Area	i To Ar	rea	Size	
	0	Loca	10.Bend0	D(200ms)	%MVV0			4 🔺	]
	2		L <b>→</b> M	leans SEND block (	)			↓ I	
	3 4	<b>♦</b> 1/10-2	ns I OCA	L 0 station	Ļ		Size		]
	5 6	mca	113 200/1	Sending ar	ea setting	address	send	ding data	
	7 8					Ļ			
	9 10			No save a	area as it is	s sending	parar	neter	
	11			(set in red	ceiving par	amter)			
	12 13								
	14 15							-	1
					1				-
				Delete		Сору		Edit	
L							_		
						Close		Help	
									_

- Entry List Num: a serial no. indicating the order registered. Available to set 64 no.(from 0~63). Not related to the order of sending/receiving.
- Station type: this is the item to determine the type of other station to receive/send. Select remote type to communicate with Smart I/O.
- Station no. : in case that other station to communicate is local type, it is required to set the self station no. for sending and other station no. for receiving while in case of remote type, set other station no. all for sending/receiving. Thus, it is required to set the remote station no. when sending/receiving as Smart I/O series because it does not have parameter setting function in the remote station itself.
- •Mode: this is the item to determine whether or not to send/receive data of the corresponding block. When receiving, select 'receive". The number of sending/receiving block is available to set max. 32 and if setting more than 32, the parameter error occurs and the normal communication does not work.
- Block no. : this is the parameter to send/receive lots of data of various area, from one station and distinguish the data of various block, form each other. Generally, the station no. and block no. set by sending station is transmitted together with sending data and if the receiving station wants to receive this data, it is required to receive it as the corresponding block no. sent by sending station. The block no. of sending/receiving for one station is available to set max. 32 and it is not allowed to set the same block no. for the same station no. For remote station, it is set differently regardless of sending/receiving.
- Area: after selecting data area to send/receive, enter the address direct and set the area.

**Remote sending:** read any data of the self station (designate one from %MW, %IW, %QW within the area to read) and designate which area of remote station is sent to (%QW is only available to designate in the storage area. Remote sending data is available to send in the remote output side.)

**Remote receiving:** read any area of other remote station not the own station (%IW is only available to designate in the storage area. It is available to read the remote input data) and designate position of the own station to save from %MW, %IW, %QW. As memory map is different according to CPU models, please

refer to memory map described on the corresponding maual.

The flowing shows the setting available area according to station type.

Setting Area according to Station type

Remark

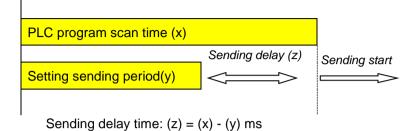
Remarks		Sending			Receiving			
		%IW	%QW	%MW	%IW	%QW	%MW	
Remote	Area to read	0	0	0	0	х	Х	
	Storage area	х	0	Х	0	0	0	

O: setting available X: setting not available

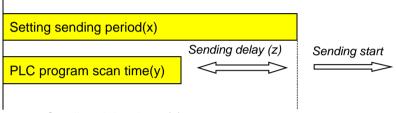
1) The address	of Smart I/C	) series is	allocated	as %	IW0.0.0	~ %IW0.0.1	in	case	of
input and %O	W0 0 0 ~ %C	)\//0 0 1 in	case of ou	tout					

- Size: data size to send/receive unit is 1 word (16 points).
- Sending/Receiving period: *High-speed Link* is the service to carry out the sending/receiving by the parameter set by the user at the point that PLC program ends. Thus, when PLC program scan time is short within several ms, communication module begins to transmit the data according to every program scan which result in increasing the communication amount and reducing the effectiveness of overall communication system. Thus, to prevent this, the user can set the sending/receiving period from min. 20ms to max. 10sec. If not setting, it shall be set as basic value of 200ms automatically. Sending/Receiving period means the sending period in case that the corresponding block is set as 'sending' and the data receiving check period of the corresponding block in case that it is set as 'receiving'. If PLC program scan time is longer than the setting sending period, it shall be sent at the point that PLC program scan ends and the sending period becomes to be equal to PLC program scan time.

Data Sending Delay Time (PLC program scan time > sending period)



Data Sending Delay Time (PLC program scan time < sending period)



Sending delay time: (z) = 0 ms

## Remark

1) When setting the receiving period, the user can check if it is set as the value greater than the period of the corresponding block set by other station to receive normally.

### (4) High-speed Link operation

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When *High-speed Link* parameter setting is completed, execute 'make' from compile menu of GMWIN and then write parameter with PLC CPU. After that, if starting the *High-speed Link* service, *High-speed Link* service by parameter setting will begin. The start order of *High-speed Link* is as follows.

Parameter Write

Write	×							
Range								
C Basic Parameter	lasic Parameter							
O I/O Parameter								
C HS Link Parameter	IS Link Parameter							
C Redundancy Parameter	Redundancy Parameter							
C Communication Parameter	Communication Parameter							
C Program								
🔽 Upload Program								
Parameter and Program								
🔽 Upload Program								
O Upload Program								
OK Cancel	Help							

After saving *High-speed Link* parameter written by the user in GMWIN project file and connecting to PLC through 'online connect' of GMWIN basic menu, select 'write' and the window 'write' appears as above. If you select '*High-speed Link* parameter' or 'parameter and program' from the above menu and download the selected parameter, the corresponding contents shall be downloaded.

In this case, Link Enable which is *High-speed Link* start information shall be OFF. Therefore User has to click on the appropriate item of *High-speed Link* in link Enable setting.

# (5) High-speed Link start

Se	t Link Enable			×
	H-S Link 1	E H	-S Link 2	
	F H-S Link 3	□ H	-S Link 4	
	Ok	Cancel	Help	

After 'parameter write', *High-speed Link* maintains all 'stop' but after the user sets Link Enable, *High-speed Link* runs.

'Set Link Enable' is available only for PLC stop mode. And if 'set *High-speed Link* Enable' starts, *High-speed Link* runs regardless of PLC action mode. Also, parameter and link enable information shall be preserved by having battery backup in PLC CPU even when power is off.

Relation of PLC mode and High-speed Link

Classification	Parameter download	Set Link enable	High-speed Link action	Remarks
PLC RUN	Х	Х	0	
PLC STOP	0	0	0	High-speed Link
PLC PAUSE	Х	Х	0	Only if allowed Act
PLC DEBUG	Х	Х	0	ACI

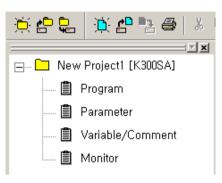
# 4.2.5 KGLWIN Link Parameter Setting

In case of KGLWIN, its function is the same as that of GMWIN and its operating method and setting is also the same. Select 'Link' from KGLWIN project menu and program it.

## (1) High-speed Link project setting

If selecting 'Link' from Project menu, High-speed Link parameter basic screen will appear.

KGLWIN Project Basic Screen



### (2) Link parameter selection

(a) Setting method: select 'parameter'-'link' from project screen.

KGLWIN Parameter menu

Basic Interrupt I/O Lin	k1 Link2 Link3 Link4	
Li *** - ***	Timer Boundary 100 msec T: 000 - 191	Computer communication Station Number :
M: **** - ****	10 msec T: 192 - 255	Baud Rate : 🗾 💌
100 msec T: 144 - 191	Watchdog Time: 20 + 10msec	C Master
10 msec T: 240 - 255	Blown Fuse	🗖 Read Slave PLC State

- (b) Setting function: KGLWIN link 1~4 means max. Installation No. of communication module according to master PLC CPU types.
  - 1) If using one communication module, select link 1.
  - 2) Only one *High-speed Link* parameter is available to set for one communication module.

### (3) Link initial setting

KGLWIN contains all general contents necessary for communication setting in link items, and the setting method is the same as that of GMWIN.

	JEVVIN Falain	eter Setting		6611			
Basic	Interrupt I/O	Link1	Link2	Link3 Lin	k4		
Link:	Disabli 🚽 🛛 Self Sta	ation No: 🛛 💌	Base: 0	🔹 Slot: 🛛 📼	Type: Fnet	•	
No	Station Unit	Type 1	Fx Device	Rx Devi	ce Size	Block No	Period
U							
1							
2							
Ă							
5							
6							
17							
8							

KGLWIN Parameter Setting Initial Screen

Parameter setting initial screen is composed of two items such as 'Link setting' and 'Entry list'. The setting method and function per each item is as follows.

#### (a) Link

Link is the Enable condition to carry out *High-speed Link* of the setting parameter.

Permit: High-speed Link is ON Prohibit: High-speed Link is OFF

### (b) Self Station no.

Enter its own station no. that is set on the station no. switch of communication module front side. It is available to set 0~63 by decimal number. Self station number is a unique number to distinguish communication module in the same network system, so don't use duplicated station number.

(c) Slot

Set the slot no. that the desired communication module to set is installed by selecting one from the range of '0'~'7'.

### (d) Type

Designate master communication type to communicate with Smart I/O module.

Rnet: Fieldbus communication module Pnet: Profibus-DP communication module Dnet: DeviceNet communication module

### (4) Link Setting Details

This is KGLWIN link item modication menu. If the user set the sending/receiving with the device to communicate actually, the parameter setting is completed.

Edit Link		×
Station No: Tx Device: P000 Rx Device: P000 Block No: O V Size: 1 Module Type: Remote Out V Period: 200 msec V	OK Cancel	

(a) Station no.

Sets the station No. of other station (remote station) to communicate with Smart I/O station.

(b) Block no.

This is the parameter to be set to send/receive lots of data of various area from master and distinguish the data of various block forms from each other. For remote station, it is set differently regardless of sending/receiving.

(c) Communication type

This designates the communication method that master will carry out. Also, distinguishes the communication type for local station and remote station.

Local sending: sets data sending between local stations Local receiving: sets data receiving between local stations Remote sending: sets data sending to remote station (Smart I/O) Remote receiving: sets data receiving from remote station (Smart I/O)

### (d) Tx device/Rx device

This means the area of sending/receiving and for setting, please refer to the table as below.

Classification	Mode	Setting available area	Remarks
Remote	Тx	P, M, L, K, F, D, T, C all area	Sending area of its own station
output	Rx	P area	Receiving area of remote station
Remote	Тx	P area	Sending area of remote station
input	Rx	P, M, L, K, D, T, C area	Receiving area of its own station

(e) Size

Sets the size of sending/receiving data and the basic unit is **Word.** (But, in case of **DeviceNet**, basic unit is **Byte**.)

### (f) Communication period

*High-speed Link* is the service to carry out the sending/receiving by the parameter set by the user at the point that PLC program ends. Thus, when PLC program scan time is short within several ms, communication module begins to transmit the data according to every program scan which results in increasing the communication amount and reducing the effectiveness of overall communication system. Thus, to prevent this, the user can set the sending/receiving period from min. 20ms to max. 10sec.

### (5) High-speed Link operation

*High-speed Link* in KGLWIN is performed automatically with the program download according to communication setting.

# 4.2.6 XG5000's Link Parameter Setting

High-speed Link is a parameter setting method to set device region and date size easily to communicate between CPU module and Communication module (Master module and Slave module) by using XG5000. (1) Dnet/Pnet High-speed Link Contents

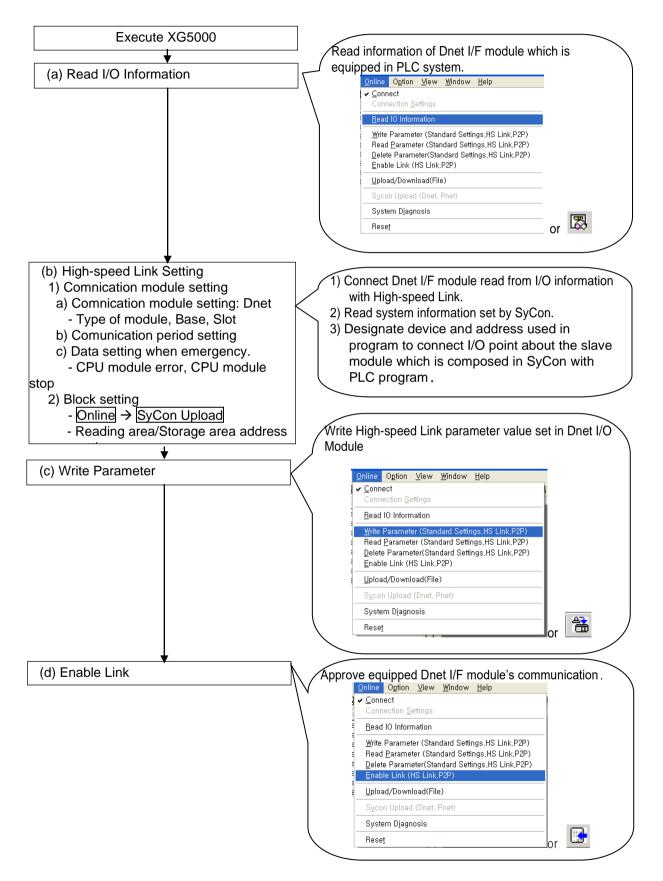
	ntents	High-speed Link				
001	licilits	Module	Module Sellecting Diret			
	Comunication	Type			Sellecting Pnet	
	module setting	Base No.				
	g	Slot No.		) ~ 11, Setting rage differ acco		
	Communication period setting (Period Type)		ong 20ms	, 50ms, 100ms, 200ms, 500m		
			Latch	Maintain previous output sta	atus.	
	Output data	CPU Error	Clear	Clear all output.		
	setting when		Latch	Maintain previous output sta	atus.	
Comunication	emergency	CPU Stop	Clear	Clear all output.		
module	Mode *1	Sending: Deliver data from Master module to Slave module. Receiving: Deliver data from Slave module to Master module.				
setting	Station No. *1	, v		Range: 0 ~ 63)		
	Comunication type					
	Reading area (Master module	Address Sending device's first device Available device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR			Z, L, N, D, R, ZR	
	$\rightarrow$	Size*1 Indicate I/O point into Byte.				
	Slave module)	(Byte)	- Conside	er less than 8 bit I/O module a	is 1 Byte	
	Storage area	Address		ng device's first device		
	(Slave module			e device: P, M, K, F, T, C, U,		
	$\rightarrow$	Size <sup>*1</sup>		Slave module's I/O poont ino	•	
	Master module)	(Byte)		er less than 8 bit I/O module a	is 1 Byte	
PLC c	connection	CPU module's RS-232C or USB port				
Contro	Control condition		Control is available regardless of location (RUN, STOP) of RUN module switch of CPU module.			
Max. comm	nunication point	-		nt, Receiving 28,672 point eac	ch 3584 byte	
Max.	Block No.	63 (setting	, ,	1		
	int per block	255 Byte (	(2,040 poii	nt) (Setting range 1 ~ 255)		
High-speed	High-speed link setting No.		Max. 12			

# Notice

- \*1: 1) The above category is not set in XG5000.
  - 2) This data is uploaded value from XG5000 which is set in SyCon.
  - 3) Set according to the following sequence.
    - First: Set parameter by SyCon → download Second: XG5000 →I/O Information Reading → SyCon Upload → High-speed Link parameter setting → parameter download → High-speed Link approval
  - If you follow the wrong sequence, it may cause change of setting value.
- ▶ When you change High-speed Link contents, you should download parameter again. ▶ It is available to set and use only one High-speed Link per one communication module.
- Written parameter (basic, High-speed Link, P2P) is stored in CPU module. When changing CPU module, download backup parameter set in XG5000 and write it to new CPU module.

### (2) How to use XG5000

How to use XG5000 for Dnet I/F Module is as follows.



# 4.2.7 High-speed Link communication status flag information (GM/MK)

## (1) High-speed Link information function

To confirm the reliability of data read from other station through *High-speed Link*, it provides the user with the method to confirm the *High-speed Link* service as *High-speed Link* flag information. It has individual information such as HS\_STATE, TRX\_STATE, DEVICE\_MODE, ERROR that informs the communication status per 64 registration items in the flag of run-link, link-trouble and parameter that informs the overall status of *High-speed Link*. The user can utilize the above information by combining with *High-speed Link* sending/receiving data as keyword type when writing the program in case of emergency or maintenance.

Classification	Run-link	Link-trouble LINK_ TROUBLE	Sending/ receiving status TRX_MODE	Action mode DEV_MODE	Error DEV_ERROR	High-speed Link status HS_STATE
Information type	Overall information	Overall information	Individual information	Individual information	Individual information	Individual information
Keyword name (□=HS link no. 1,2,3,4 )	_HSORLINK	_HSOLTRBL	_HS⊡TRX[n] (n=individual parameter no.0~63)	_HS□MOD[n] (n=individual parameter no. 0~63 )	_HS⊟ERR[n] (n=individual parameter no. 0~63 )	_HS⊡STATE[n] (n=individual parameter no. 0~63 )
Data type	BIT	BIT	<b>BIT-ARRAY</b>	<b>BIT-ARRAY</b>	<b>BIT-ARRAY</b>	<b>BIT-ARRAY</b>
Monitoring	Available	Avaiable	Available	Available	Available	Available
Program	Available	Avaiable	Available	Available	Available	Available

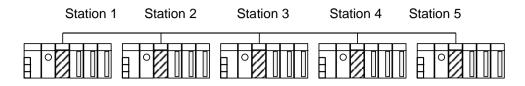
### High-speed Link information

## (1) Run-Link (\_HS□RLINK)

This is the overall inform set by the user. Once 'ON', it maintains 'ON' until link enable is 'OFF' and if the followin ation that shows whether or not *High-speed Link* is running normally by the parameterg condition is given, it shall be 'ON'.

- ① when link enable is 'ON'.
- 2 when parameter registration list setting is set normally all.
- ③ when sending/receiving all data that corresponds with parameter registration list within the setting period.
- 4 when all other station status set in the parameter is 'RUN' and at the same time there is no error.

### **RUN-LINK ON condition**



(a) High-speed Link system configuration

Station 1	Station 2	Station 3	Station 4	Station 5
Sending: 2words	Sending: 2words	Sending: 2words	Sending: 2words	Sending: 2words
Receiving: 2words	Receiving: 2words	Receiving: 2words	5	<u> </u>
(station 2)	(station 1)	(station 1)		
Receiving: 2words	Receiving: 2words	Receiving: 2words		
(station 3)	(station 4)	(station 5)		

(b) Examples of *High-speed Link* parameter setting for each station

The figure shows *High-speed Link* system configuration to explain RUN-LINK ON condition. In case that 5 communication modules are connected by network as shown (a) of the figure and carry out *High-speed Link* as the content of parameter of figure (b), RUN-LINK ON condition of Station 1 is as follows.

- ① when in the self station (station 1), Enable Link is 'ON',
- 2 when the self station (station 1) is RUN status,
- (3) when the self station (station 1) is not the error status,
- ④ when the sending parameter data set in the self station (station 1) is sent properly for the sending period,
- (5) when the data receiving from station 2,3 is received properly for the receiving period,
- (6) when the action mode of other station (station 2, 3) to send the data to the self station (station 1) is RUN mode and not the error status and it is communicated properly for the sending/receiving period,
- ⑦ when in the other station (station 2,3) of the self station (station 1), the action mode of other other station (station 4,5) set in the parameter is RUN mode and not the error status and it is communicated properly for the sending/receiving mode.

If the above 7 items are satisfied, RUN-LINK of station 1 shall be ON. If using RUN-LINK contact associated with program in the system where PLC of various stations performs interlocking through *High-speed Link*, it is available to carry out the mutual monitoring of sending/receiving data and the reliable communication. But, once RUN-LINK contact is 'ON', it maintains 'ON' status until Enable Link becomes 'OFF'. Thus when monitoring the abnormal status such as communication error, it is required to use link trouble information contact together as follows.

### (2) Link-Trouble (\_HS□LTRBL)

When RUN-LINK violates the condition of RUN-LINK ON in the status that RUN-LINK is ON, LINK-TROUBLE

shall be 'ON' and if recovered, it shall be 'OFF'.

(3) Sending/Receiving status (\_TRXDSTATE[0..63])

When the parameter action that is set in the individual parameter registration no.(0~63) respectively and is carried out properly in accordance with sending/receiving period, the corresponding bit shall be 'ON' and if not carried out, it shall be 'OFF'.

(4) Action mode (\_HSDMODE[0..63])

It describes the parameter action mode information that is set in the individual parameter registration no.(0~63). If the station set in the registration item is RUN mode, the corresponding bit shall be 'ON' and in case of STOP/PAUSE/DEBUG mode, it shall be 'OFF'.

(5) Error (\_HSDERR[0..63])

It describes the parameter error information that is set in the individual parameter registration no.(0~63). The error indicates generally the status that the PLC does not carry out the user program normally. If it is 'OFF', this means that the PLC of other station works normally, and if 'ON', this means that the other station is in the abnormal status.

### (6) High-speed Link status (\_HSDSTATE[0..63])

It describes the general information for registration list by collecting all individual information per item. That is, if the sending/receiving status of the corresponding list is normal and the action mode is RUN and there is no error, it shall be 'ON' and if violating the above condition, it shall be 'OFF'.

### Remark

Among the keywords used in (1)~(6) items

 $\Box$ : : describes *High-speed Link* no.(1,2,3,4) used when setting the parameter.

(if the installed communication module is one, High-speed Link 1 shall be used.)

[0...63] : describes individual parameter registration no.

(check the communication status of each parameter that is in the registration no.0~63.)

### Remark

1) In case of Profibus-DP module, it has other *High-speed Link* flag. For further information, please refer to '5.3.12 *High-speed Link* information in GMWIN'.

# 4.2.8 High-speed Link comunication status flag information (XGT)

Comun	Comunication Flag List corresponding to High-speed Link Number High-speed Link No.1~12.					
No.	Keyword	Туре	Contents	Contents Explanation		
L000000	_HS1_RLINK		All stations of High- speed Link No.1 are normal.	<ul> <li>It indicates normal status of all stations which operate according to parameter set in the High-speed Link.</li> <li>If the following condition is met, It would be turned On.</li> <li>1. All stations set in parameter are RUN mode and there is no Error.</li> <li>2. All data blocks set in parameter operate properly.</li> <li>3. When parameter of each station in parameter communicates normally, after Run_Link is On, Run_Link maintains On contiuosly unless quitted by disable.</li> </ul>		
L000001	_HS1_LTRBL	Bit	Indicates abnormal After _HS1RLINK ON	<ul> <li>When _HSmRLINK Flag is On, if station set in parameter and communication status is same as the followings, this flag is truned On.</li> <li>1. Station set in parameter is not RUN mode.</li> <li>2. Station set in parameter has Error.</li> <li>3. Comunication status of data block set in parameter is not proper. If above condition is met, Link_Troble set On. If condition is normal, Link_Troble set Off.</li> </ul>		
L000020 ~ L00009F	_HS1_STATE[k] (k=000~127)	Bit Array	Indicates High-speed Parameter No.1 Kth Block's total status	It indicates total status about each data block set in parameter. HS1STATE[k]=HS1MOD[k]&_HS1TRX[k]&(~_HSmERR[k])		
L000100 ~ L00017F	_HS1_MOD[k] (k=000~127)	Bit Array	Run Mode of High-speed Parameter No.1 Kth Block	It indicates operation mode of station set in Kth block of parameter.		
L000180 ~ L00025F	_HS1_TRX[k] (k=000~127)	Bit Array	Indicates normal Comunication status whith High-speed Parameter No.1 Kth Block	It indicates whether communication status of parameter's Kth data block operates normally or not according to setting.		
L000260 ~ L00033F	_HS1_ERR[k] (k=000~127)		Error Mode of High- speed Parameter No.1 Kth Block	It indicates whether communication status of parameter's Kth data block has error or not.		
L000340 ~ L00041F	_HS1_SETBLOC K[k]	Bit Array	Indicates setting of High-speed Parameter No.1 Kth Block	It indicates whether Kth data block of parameter is set or not.		

\* In case of Dnet and Pnet, Kth block indicates slave's station number.

# Notice

High-speed Link Number	L Region Address Number	Refernce
2	L000500~L00099F	When [Table 1]'s High-speed Link is 1, other Flag address number is as follows
3	L001000~L00149F	
4	L001500~L00199F	according to simple calculation.
5	L002000~L00249F	*Calculation: L region address number = L000000 + 500 X (High-speed Link
6	L002500~L00299F	Number-1)
7	L003000~L00349F	In the case of using the High-speed Link Flag for the program and mornitoring,
8	L003500~L00399F	use Flag Map registered in the XG5000.
9	L004000~L00449F	
10	L004500~L00499F	
11	L005000~L00549F	

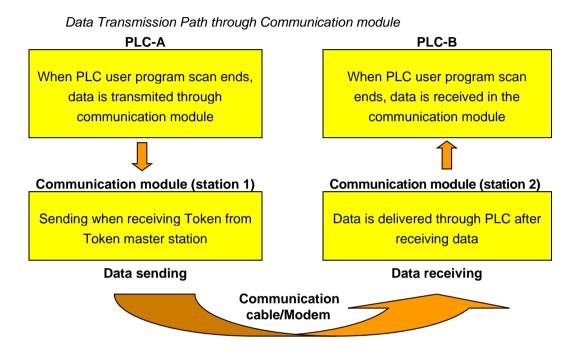
K indicates information about 128 Blocks from Block No.000 to 127 through 8 word (Each word consist of 16 block.). For example, mode information (\_HS1MOD) has information about block 0 ~15 in the L00010. (16~31, 3 2~47,48~63, 64~79, 80~95, 96~111, 112~127 in the L00011, L00012, L00013, L00014, L00015, L00016, L00017)

# 4.2.9 High-speed Link Speed Calculation

## (1) Overview

*High-speed Link* data transmission speed can be determined by various factors.

Data transmission from one communication station to another communication station shall be performed through the following path.



As shown on the abvoe figure, there are 3 kinds of path to send data to other station through communication module and the sum of time to take for each path determines the sending time.

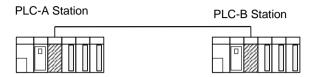
The table below describes the major path of data transmission and the factor that influences the transmission time per path.

Path	Time factor
PLC CPU(A)> communication module (station 1)	PLC-A program scan time
Communication module (station 1)>	Communication scan time +
Communication module (station 2)	Communication O/S scan time
Communication module (station 2)> PLC CPU(B)	PLC-B program scan time

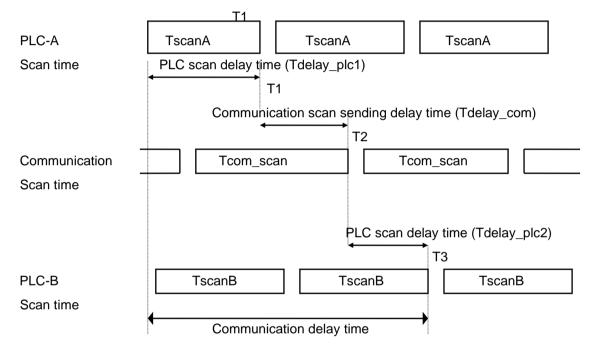
As data delivery between PLC CPU and communication module is executed at the point when the user program of PLC ends, program scan time shall be the major factor of data transmission. Program scan time monitor can know the current program scan time

And as data sending/receiving is carried out after obtaining the Token from communication module which allocates tokens so that communication module sends its own data, this time also is included in the communication delay time.

The following figure shows PLC program scan time and the sending point according to communication scan time.



Relation of PLC scan time and Communication scan time



From the above figure, total communication delay time is T1+T2+T3.

As above, communication delay time shall be determined by various variables such as total no. of communication station, program size and O/S scan time of communication module. As these variables are difficult to calculate its value, we recommend the example of simple *High-speed Link* communication speed as follows.

### (2) High-speed Link speed calculation method

*High-speed Link* speed shall be calculated with maximum time to take to send one block data from PLC-A to PLC-B by using the above figure as an example. As communication delay time is different according to the no. of overall communication station and program size, we divide into two cases such as complicated system that the sending data no. more than 10 communication station exceeds total 512 bytes and the simple system less than 512 bytes. It calculates *High-speed Link* speed as follows.

### (a) Simple system

In the system that total communication station is below 10 stations and total sending data size is less than 512 bytes, you can calculate *High-speed Link* speed by using the following formula.

St = P\_scanA + C\_scan + P\_scanB ------ [formula 4-1] St = High-speed Link max. Transmission time P\_scanA = PLC A max. Program scan time C\_scan = max. Communication module scan time P\_scanB = PLC B max. Program scan time

Each item shall be determined as follows.

 C\_scan = THT × Sn ------ [formula 4-2] THT = Token Hold Time: Token use time per one station Sn = Total Station Number: Total communication station number
 Token Hold Time (THT)= Fnet: 8 ms

## (b) Complicated system.

In the system that total communication station is more than 10 station and total sending data size is more than 512 bytes, you can calculate *High-speed Link* speed by using the following formula.

St = Et ×To ×Ntx + Mf ------ [formula 4-3]

Et = Effective Tx Ratio (Effective transmission Ratio) To = Octet time (1 byte sending time) Ntx = Total Tx number Mf = Margin Factor Each item shall be determined as follows.

- ①Et = Sn ×Nf ------ [formula 4-4]
  - Sn = Total communication station number
  - Nf = network factor and constant number value according to the communication system characteristic. In Fnet system, it is 1.5.
- 2 To = Octet Time. The time to take to transmit one byte data to the serial data.

- Fnet : 8 #s

- ③ Ntx = total sending data number including Function Block/Instruction number and it is determined according to Fnet system as follows.
  - Fnet : sum of High-speed Link sending byte number + Variable F/B(Instruction) number ×256
- ④ Mf = margin value for the factors not described like the above formula such as O/S scan time of communication module. Fnet is set as the following value.

- Fnet : 16 ms

## **4.3 Function Block**

### 4.3.1 Overview

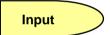
Function Block is the function to write or read the specific data of the self station or the specific variable data in the specific area or specific variable area of other station when the regular event occurs, and it can be used diversely according to the purpose.

Program of Smart I/O series using the Function Block is limited all in Modbus Snet. For further information, please refer to 'Chapter 8 Modbus Communication'.

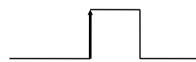
## **4.3.2 Start of GMWIN Function Block**

When programming by using Function Block, please refer to the following. Function Block carries out the variable setting by input section and output section. For the setting method, please refer to the corresponding Function Block.

It describes based on GLOFA GM7 Function Block.



REQ



This is used as the start condition of mode bus Function Block and it starts at the rising edge from '0' to '1'. Once started, Function Block is not influenced until receiving the response from other station. After setting NDR or ERR bit, it shall be reset in next scan.

### SLV\_ADDR:

This sets the remote station number to communicate by performing this Function Block. .

### FUNC:

This enters modbus function code. For further information, please refer to 'Chapter 8 Modbus Communiction'.

### ADDRH:

This designates the starting address and middle/high address from the starting address to read in remote station.

#### ADDRL:

This designates the low address from the starting address to read in remote station.

#### NUMH:

This designates the high address of data size to read from starting address in remote station.

### NUML:

This designates the low address of data size to read from starting address in remote station.



### NDR:

After *Function Block* starting, if data receiving is OK, it shall be 'ON'. When the corresponding scan ends, it shall be 'OFF'. If using this bit as other *Function Block* input condition, it is available for carrying out the reliable communication.

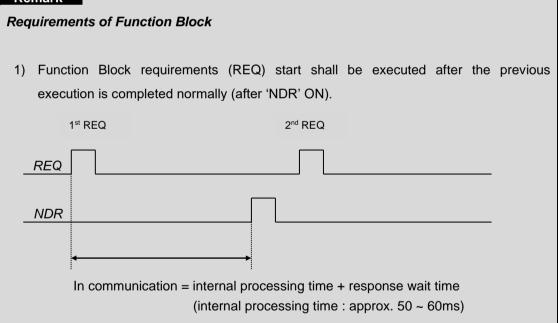
### ERR:

After *Function Block* starting, if on error occurs, it shall be 'ON' and maintains 'ON' until the next *Function Block* starts again and then 'OFF'. If on error occurs, it is not available to receive data.

### STATUS:

It describes the detailed code value for the error when on error occurs after starting *Function Block* and maintains the value until the next *Function Block* starts again and then 'OFF'.

### Remark



# 4.4 Execution of KGLWIN Instruction

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MASTER-K Instruction executes the programming by using KGLWIN Modbus Instruction. Please refer to the Instruction execution method and available address area. (Refer to Chapter 8.4.2 MASTER-K series (Modbus communication))

# **Chapter 5 Profibus-DP Communication**

## 5.1 Overview

Profibus is an open type field bus that the manufacturer selects independently to apply and manufacture (Vendorindependence). Also, It is used widely for processing automation. DP among them is the most frequently used Communication profile and the network suitable for FA environment of Field Level and also is suitable for masterslave communication between master automation machine and distribution slave I/O machine. It is designed to install with low cost and is the most suitable item to replace the existing system such as 4~20mA or Hart system together with 24V parallel signal transmission to the production automation system.

Smart I/O module communication supports Profibus-DP through GM3/4/6 master module. (G3L-PUEA/ G3L-PUEB/G4L-PUEA/ G4L-PUEB/G6L-PUEA/ G6L-PUEB/XGL-PMEA/B/C) For further information for Profibus-DP, please refer to 'Profibus Association's homepage'. (http://profibus.com)

# **5.2 Communication Specification**

## 5.2.1 Master specification

Classification	G3/4/6L-PUEA	G3/4/6L-PUEB	XGL-PMEA/B/C
Module type	Master		
Network type	Profibus-DP		
Standard	EN 50170 / DIN 19245		
Media access	Logical Token Ring		
Communication method	RS-485 (Electric)		
Topology	Bus		
Modulation method	NRZ		
Communication cable	Shielded Twisted Pair		
Communication distance	1,200 m (9.6k ~187kbps)		
	400 m (500kbps)		
	200 m (1.5 Mbps)		
	100 m (3M ~ 12Mbps)		
Max. Node/network	126 Stations		
Max. Node/segment	32 Stations		
Max. I/O data	1 Kbyte	7 Kbytes	6 Kbytes
Communication parameter	Parameter setting by using GMWIN High-speed Link parameter and SyCon		
setting	or nConfigurator		
Configuration tool	nConfigurator(XGL-PMEB/C), SyCon		
Configuration port	RS-232C configuration port supported (Except XGL-PMEB)		

## 5.2.2 Slave specification 1) Block type

Γ

Category	Specification				
Module Type	Slave				
Standard	EN 50170 / DIN 19245				
Interface	RS-485 (Electric)				
Medium access	POLL				
Encoding method	NRZ				
Cable	Shielded Twisted Pair				
	1200m (9.6K ~187Kbps)				
O and the sting of the second	400m (500 Kbps)				
Communication distance	200m (1.5 Mbps)				
	100m (3M ~ 12Mbps)				
Max. node	126 stations				
Max. node (per segment)	32 stations				
Max. I/O data	244 Byte				

### 2) Expansion type

Cate	egory		Specification				
Star	ndard	EN50170 / DIN 19245					
Inte	rface			RS-485			
Mediun	n access			Polling			
Тор	ology			Bus			
Encodin	g method			NRZ			
Communica	tion interface		Sink	mode, Freeze m	node		
Communica				Auto baud rate			
	er/Slave			slave			
Ca	able	Shielded Twiste	ed Pair				
Communication	Speed (Kbps)	9.6	19.2	93.75	187.5	500	
speed and	Distance (m)	1200	1200	1200	1000	400	
distance	Speed (Kbps)	1500	3000	6000	12000	-	
uistance	Distance (m)	200	100	100	100	-	
Max.	node	100 station (setting range: 0 ~ 99)					
Max. modular type	e I/O equipment No.	8					
Max. digit	al I/O point	512 point (input Max. 256 point/output max. 256 point)					
Max. analog l	/O channel No.	32 channels (input Max. 16 channels/output Max. 16 channels) (analog module occupy digital 64 point)					
	Rated input voltage/current	DC 24V/ 0.55A					
input	Power range	DC19.2 ~ 28.8\	/				
power	Output voltage/current	5V(±20%) / 1.5A					
	Insulation	Non-insulation, communication part insulation					
<b>Basic specification</b>	Weight (g)	100					

### 5.3 Basic Performance

### 5.3.1 Overview

Profibus-DP Master module is available to set as the following function.

- (1) Supports only High-speed Link communication.
- (2) Uses parameter setting in GMWIN/KGLWIN/XG5000 and Configuration Tool (LS ELECTRIC provided tool: SyCon, nConfigurator).
- (3) Sets only sending/receiving area from GMWIN/KGLWIN/XG5000 high-speed link parameter setting.
- (4) Sending/receiving data shall be saved continuously from the setting area and sent. (this is similar to the continued MAP of MASTER-K.)
- (5) Uses SyCon to set sending/receiving number and slave area per slave station and uses Configuration Port to download as master module.
- (6) Sending/receiving number is available up to 512bytes/3,584bytes respectively according to the type of Daughter board.
- (7) Sending/receiving number per slave station is set as byte unit. (set in SyCon) Communication begins through GMWIN/KGLWIN/XG5000 High-speed Link enable set.

### 5.3.2 Operation by High-speed Link

- If Master module is the product of LS ELECTRIC (G3/4/6L-PUEA/PUEB, XGL-PMEA), it configures Profibus Network using SyCon.
- (2) It downloads Profibus Network Configuration as master module.
- (3) It sets High-speed Link parameter of master in GMWIN and downloads it.
- (4) It performs High-speed Link enable set.
- (5) If using other maker's product as Master, configure Profibus Network using Configuration Tool of the corresponding product.

### Note

1) If using XGL-PMEB/C, it is required to use nConfigurator for the network configuration. The manual of nConfigurator can be downloaded from http://www.ls-electric.com

### 5.3.3 SyCon

Γ

If using master module provided by LS ELECTRIC (G3/4/6L-PUEA/PUEB, XGL-PMEA), it is required to configure Profibus Network using SyCon and download the information to the corresponding master module. As Profibus Network Configuration Tool is different from each master module, if using LS ELECTRIC master module (G3/4/6L-PUEA/PUEB,XGL-PMEA), it is required to use only SyCon.

SyCon execu	tion			
<b>a.</b>	SyCon System Configurator	•	٥	SyCon Help
			8	SyCon Readme
		1	1	SyCon UnInstall
			÷	SyCon

If there is no project using before executing SyCon, the initial screen same as the above figure will appear and if you are preparing the project, the latest project will be open.

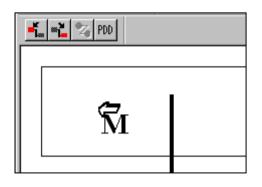
Initial screen			
🚰 SyCon - [Unnamed1]			
🚡 <u>F</u> ile <u>E</u> dit <u>V</u> iew <u>I</u> nsert <u>O</u> nline	<u>S</u> ettings <u>T</u> ools <u>W</u> indow	<u>H</u> elp	_ B ×
ta a pod			
, For Help, press F1		PROFIBUS	Config Mode

### 5.3.4 Insertion of Master Module

Select from the left top tool bar and click the proper point of left top from the window below.

Tool bar





If Insert Master window is open as the above figure, select **COM-DPM/PKV20-DPM** if the using master module is **G3/4/6L-PUEA** and click Add button in the middle. If using master module is **G3/4/6L-PUEB**, select **COM-PB/PKV20-PB** and click Add button in the middle. If using master module is **XGL-PMEA**, select **COM-C-DPM** and click Add button in the middle part. Confirm Station address and if necessary, it is available to change Description. If pressing OK button, master module shall be inserted.

Insert Master			×
Available master CIF50-PB CIF60-PB CIFPS1-DPM CIFPS1-PMS COM-PB / PKX Other FMS dev PKV30-PB PKV40-PB	▲ KV20-DPM /20-PB	Add >>       COM-DPM / PKV20-DPM         Add All >>       Com-DPM / PKV20-DPM         <<< Remove All          <<< Remove	<u>O</u> K <u>C</u> ancel
Vendor name Ident number GSD file name	Hilscher GmbH 0x7506 HIL_7506,GSD	Station address 1 Description Master1	

Master Insert

Inserted master module

Γ

🚰 SyCon - [Unnamed1]	_ 🗆 ×
🚡 Eile Edit View Insert Online Settings Tools Window Help	_ 8 ×
K - 2 700	
Master1	
Station address 1	
DP Master COM-DPM / PKV20-DPM	
For Help, press F1 PROFIBUS Config Mode	

### 5.3.5 Master Module Setting

If you click the right side of mouse on the inserted master module and select "Master Settings..." from the appeared popup window, the following window will be open. Select "Controlled release of the communication by the application program" from "Parameter to user interface", "Little Endian (LSB-MSB)" from "Storage format (word module)" and select "Buffered, host controlled" from "Handshake of the process data" in order.

Master Settings		2
User program monitoring	nmunication by the device nmunication by the application program	QK Cancel

### 5.3.6 Insertion of Slave

Similar to master, select from left top tool bar and click master bottom, and Insert Slave window will appear as below.

Slave inse	rt			
Insert Slave				×
Slave Filter Vendor All Slave type All	<u>×</u>	Master	COM-DPM / PKV20-DPM	 <u>O</u> K Cancel
Available slaves		Selected	i slaves	
CIF30-DPS / CIF CIF50-DPS CIF60-DPS CIF90-DPS COM-DPS ETOS OptForPro GPL-TR24	Add All >	e All	32A	
Vendor name Ident number GSD file name GSD Revision	LG Industrial System Co., Ltd. 0xFFFF GPLTR2A,GSD Version 1,001	Station a Descript	, ,	

If using GPL-TR2A, select "GPL-TR2A" from the left side "Available slaves" and click "Add" button in the middle part. If there are several masters, select one from the right side "Master" and confirm "Station address" and "Description", and then click "OK" button.

# Remark If there is no slave to use in the slave list (Available slaves) of insert slave window, copy "GSD file" which is the original self-information supplied by the module manufacturer, from the directory below. Then, try SyCon again and insert slave. Image: SyCon matrix of the proof of the pr

### 5.3.7 Slave Configuration

Γ

Click the inserted slave icon with the right button of mouse and select "Slave configuration" from the appeared popup window. (or double-click the left button of mouse on the slave icon.)

### Slave Configuration

Slave Configuration									X
General Device GLOFA GM Description Slave2	7			Station	n addre:	ss	2		<u>OK</u> Cancel
<ul> <li>Activate device in actual</li> <li>Enable watchdog control</li> <li>Max, length of in-/output data</li> <li>Max, length of input data</li> <li>Max, length of output data</li> <li>Max, number of modules</li> </ul>	ol -		Length ( Length (	LG of in-/outp of input da of output d	lta lata	iSD 6 2 4 2	Byte Byte	- Assig Statio Mast	Parameter Data Provide the set of the set
Module           1         byte output (0x20)           2         byte output (0x21)           3         byte output (0x22)           4         byte output (0x23)           8         byte output (0x27)           10         byte output (0x29)	Inputs	Outputs 1 Byte 2 Byte 3 Byte 4 Byte 8 Byte 10 Byte		Identifier 0x20 0x21 0x22 0x23 0x23 0x27 0x29			▲ 	Actua Statio	COM-DPM / PKV20-DPI
Slot     Idx     Module       1     1     2     byte input (0x11)       2     1     4     byte output (0x23)	Symbol Module1 Module2	I IB	I Addr.    0 2	QB	0 Addr.	O Len. 4			<u>Append Module</u> <u>Remove Module</u> Insert Module Predefined <u>M</u> odules Symbolic Names

List box in the List box in the middle part shows all available modules. If you select the module having the necessary point and click "Append Module" button on the right bottom, it shall be inserted to the list box below. In this case, it is required to insert input module first and then insert output module in the bottom. And the numbers of available module are 2.

### 5.3.8 Bus Parameter Setting

Bus Parameter Setting

<u>S</u> ettings	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp	
Device	e <u>A</u> ssign	Ctrl+B		
<u>B</u> us P	aramete	r		

Bus parameter setting is the setting about Profibus-DP network. Select "Settings/Bus Parameter..." from the menu. Optimize field contains "Standard" and "user definition" setting. Speed setting (Baud rate) contains 9.6kbps ~ 12Mbps setting. Basically, Baud rate is set as 1.5Mbps and Optimize is set as 'standard'.

Bus Paramet	er				
	Bus Parameter				×
	Baud rate Optimize	1500 standard	kBits/s	<b>.</b>	<u>OK</u> <u>C</u> ancel <u>E</u> dit

## Communication speed is related to transmission distance. When using 12Mbps, you should use the connector only for 12Mbps and exclusive cable. When using 12Mbps, min. Distance between stations shall be set as more than 1m. When using 12Mbps, if the communication is cut off (especially, the station far from master), search the proper end resistance value and set it random.

### **5.3.9 Device Allocation**

Γ

It is required to download the prepared configuration to the master module. In this case, click the left button of mouse and select master module icon to set which device to use. Select "Setting/Device Assignment..." from the menu.

Device Allocation

<u>S</u> ettings	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp		
Device	e <u>A</u> ssign	Ctrl+B			
<u>B</u> us Parameter					

**Driver Selection** 

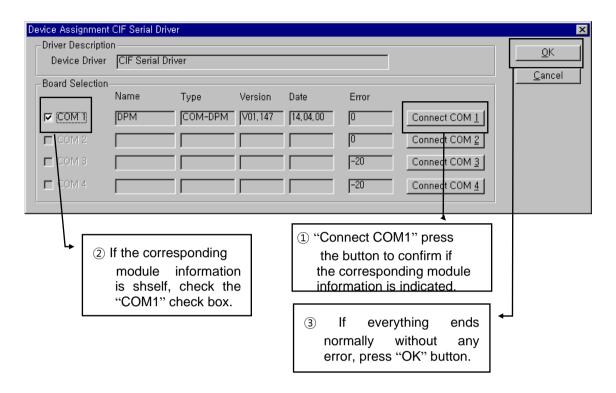
Driver select		×
CIF TCP/IP Dr CIF Device Driv CIF Senal Driv	ver	<u>O</u> K <u>C</u> ancel
Vendor Version Date Functions	Hilscher GmbH V1,002 13,10,1999 5	

If driver selection window is open, select "CIF Serial Driver".

### Remark

1) Driver to be provided by G3/4/6-PUEA/B, XGL-PMEA type master module is only RS-232C port. Thus, "CIF TCP/IP Driver", "CIF Device Driver" is not available.

Driver Selection of CIF Serial Driver



This connects PC serial port and Configuration Port of Profibus-DP master module. Also it applies the power of master module. Press "connect COM1" or other button according to PC serial port and confirm if the corresponding module is selected. On the figure, "Version" and "Date" may have different value. If there is no error, check the check box of the left side and click "OK" button.

### Remark

- 1) When pressing "Connect COM1" button, if the module information does not appear normally and the error occurs, check the connection of cable for configuration and the cable condition first.
- 2) If Cable is OK, it means that module must be poor. In this case, contact the customer service center.

### 5.3.10 Configuration Download

Г

If you select "Online/Download" from the menu, 'Download' begins to run. In this case, all LED shall be OFF and only "READY" LED shall be blinking. After downloading, all LED show its function. If you carry out 'Download' in the status that the communication between the current master and slave is open, the warning window with the message **"if the download is done during the bus operation, the communication between the master and the slaves is stopped."** will appear. After confirming if there is a problem by communication cutoff, click "Yes(Y)" button and 'Download' will run normally.

Configuration download

<u>O</u> nline	<u>S</u> ettings	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp
<u>D</u> ow	nload		C	trl+D
Start	Debug Mo	ode		

### Download processing window

4		
	سمر د د د د د د د د د د د د د د د د د د د	
Data base	Unnamed1	
Length of data base	1700	
Error	0	

### Warning message



### 5.3.11 High-speed Link Parameter Setting in GMWIN

In the previous article, we explained the method to set Configuration and the method to download this to the master module. **High-speed Link parameter setting should be done after downloading Configuration** and High-speed Link parameter selects link parameter from GMWIN project screen and sets the corresponding items and the setting order. Its functions per item are as follows.

(1) High-speed Link parameter setting in GMWIN

Open High-speed Link parameter from Project basic screen and enter into the High-speed Link parameter setting menu.

High-speed Link parameter basic screen

High Speed Link Parameter	×
High Speed Link 1	Close
High Speed Link 2	Help
High Speed Link 3	
High Speed Link 4	

High-speed Link item of the above figure means the maximum Installation number of communication module according to PLC CPU type. High-speed Link button available for setting is active 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 only one High-speed Link parameter is available to set for one communication module.

### Max. Installation number per GLOFA-GM CPU model

Classification	Available communication module	Max. installation number	Remarks
GM3-CPUA	G3L-PUEA, G3L-PUEB	4	If combined with other
GM4-CPUA/B	G4L-PUEA, G4L-PUEB	2 (A type) / 4 (B type)	communication module
GM6-CPUA/B/C	G6L-PUEA, G6L-PUEB	2	using HS link, installation
XGK/I-CPU	XGL-PMEA	12	number shall be limited.

### (2) Link parameter setting

If you select the corresponding parameter from parameter setting basic screen, the High-speed Link parameter setting initial screen will appear as shown in the following figure.

### Parameter setting initial screen

Γ

Link Set	t	GLOFA	Fnet		
Slot:	0	Self Statio	in No: 0	[	Edit
Entry Lis	st			<u>_</u>	
Num	Туре	Class	From Area	To Area	Size
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15					
		De	lete Co	ру	Edit
				Close	Help

Parameter setting initial screen is composed of two items such as 'link set' and 'Entry list'. The setting method per each item and its function are as follows.

1) High-speed Link setting

High-speed Link setting is the item to set the basic items of the desired communication module to set. Select 'modify' button of link setting and set module type, slot no. the self station no. from High-speed Link setting screen respectively.

High-speed Link set screen

High Speed1Link Set	×
Network Type	ок
C GLOFA Fnet	
O GLOFA Mnet	Cancel
GLOFA Enet	Help
C GLOFA Fdnet Network	
C GLOFA Ednet Cable	
C GLOFA Dnet	
<ul> <li>GLOFA Pnet</li> </ul>	
C GLOFA FEnet	
GLOFA FDEnet	
C GLOFA Rnet	
Slot Num 🛛 💌 Self-stat Num 🗇	

- Network Type: It sets the installed communication module type and GLOFA Pnet should be set.
- Slot Num: It sets the position that the communication module to set is installed. (0 ~ 7 slot).
  - Self-station Num: The master module shall be set in SyCon and the slave module shall be set by rotary switch. It is not available to change here.
- 2) Entry List setting

Registration list is the area to register the sending/receiving information of actual data after link setting, it is required to set in the registration no.'0' of Entry list area, and the major setting items are shown on the top of registration list menu. Select (or double-click) the corresponding list from High-speed Link setting screen and the user can set the corresponding item from High-speed Link item modification window as shown on the figure below.

High-speed Link	item modificatio	n screen	
High Speed Link Ite	em Edit		X
- Area			_
		Address Size(Byte)	
Receive area 💿 %	MW C %QW	100 0	
Transmitarea 💿 🗞	MW C %IW C %QW	200 32	
OF	Cancel	Help	

The following shows the screen after setting the sending/receiving parameter. Double-click the corresponding registration no. to modify the parameter.

Sending/Receiving parameter setting completion screen (example)

Network Type:	GLOFA	Pnet		
Slot: 0	Self Statio	in No:		
				Edit
Entry List				
Num Type	Class	From Area	To Area	Size

The function of each registration item is as follows.

- Area: When sending, set the area to read the data to send and set the storage area of the received data when receiving.
- Size: This means the data size to send/receive and the unit is 1 byte, and it is available to set total sending/receiving as 1Kbyte for G3/4/6L-PUEA and 7Kbytes for G3/4/6L-PUEB.

### Remark

- 1) The size of sending/receiving area is total I/O contact number made in SyCon.
- The order of programming is carried out as G4L-PUEA 1 and GPL-TR2A (16 points), GPL-TR4A (32 points), GPL-D22A (16 points) and when setting the sending area as %MW0, the receiving area as %MW100,
  - Sending area : %MW0
  - Receiving area : %MW100
    - Size of sending area : 6 bytes (total output contact number)
  - Size of receiving area : 2 bytes (total input contact number)

And,

- %MW0 data -> GPL-TR2A output
- %MW1 ~ %MW2 data -> GPL-TR4A output
- GPL-D22A input -> %MW100 saving
- **3)** The setting order programmed in SyCon has the priority when sending/receiving the data than station no. and cable connection.

### 5.3.12 High-speed Link Information in GMWIN

(1) High-speed Link information function

High-speed Link service provides the user with the method to confirm High-speed Link service status to confirm the reliability of the data read from other station through High-speed Link as High-speed Link information because this is data exchange between more than 2 communication stations.

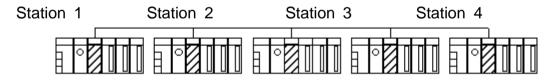
That is, the communication module provides the user with the high link information every regular time by collecting all data received until then about whether the High-speed Link action is done by the parameter set by the user or not. The High-speed Link information contains the overall information such as RUN-LINK (\_PHSxRLINK), LINK-TROUBLE (\_PHSxLTRBL) that provides the user with overall information of communication network and the individual information such as \_PHSxSTATE that informs the communication status per slave station. The user can use the above information as keyword type when preparing the program and monitor the High-speed Link status by using the High-speed Link information monitor function. When operating several PLC using High-speed Link, it is required to confirm the reliability of the sending/receiving data using the High-speed Link information such as RUN-LINK, LINK-TROUBLE etc.

### 1) Run-Link (\_PHSxRLINK)

This is the overall information that shows whether or not High-speed Link is running normally by the parameter set by the user. Once 'ON', it maintains 'ON' until link enabe is 'OFF' and if the following condition is given, it shall be 'ON'.

- ① When 'Link Enable' is 'ON'.
- ② When parameter registration list setting is set normally all.
- ③ When sending/receiving all data that corresponds with parameter registration list within the setting period.
- ④ When all other station status set in the parameter is 'RUN' and at the same time there is no error.

High-speed Link system configuration



Example of High-speed Link parameter setting of each station

Station 1	Station 2	Station 3	Station 4	Station 5
sending:2 words	sending:2words	sending:2words		
receiving: 2words	receiving:2words	receiving:2words		
(station 2)	(station 1)	(station 1)	sending:2words	sending:2words
receiving:2words	receiving:2words	receiving:2words		
(station 3)	(station 4)	(station 5)		

The figure shows High-speed Link system configuration to explain RUN-LINK ON condition. In case that 5 communication modules are connected by network as shown on the above figure and carry out High-speed Link as the content of parameter, RUN-LINK ON condition of Station 1 is as follows.

- 1) When in the self station (station 1), Link-Enable is 'ON',
- 2 When the self station (station 1) is RUN status,
- ③ When the self station (station 1) is not the error status,
- ④ When the sending parameter data set in the self station (station 1) is sent properly,
- (5) When the data receiving from station 2, 3 is received properly,
- 6 When the action mode of other station (station 2, 3) to send the data to the self station (station 1) is RUN mode, not the error status and it is communicated properly,
- ⑦ When in the other station (station 2, 3) of the self station (station 1), the action mode of other station (station 4, 5) set in the parameter is RUN mode and not the error status and it is communicated properly.

If the above 7 items are satisfied, RUN-LINK of station 1 shall be ON. If using RUN-LINK contact associated with program in the system where PLC of various stations perform interlocking through High-speed Link, it is available to carry out the mutual monitoring of sending/receiving data and the reliable communication. But, once RUN-LINK contact is 'ON', it maintains 'ON' status until Link-Enable becomes 'OFF'. Thus when monitoring the abnormal status such as on communication error, it is required to use 'LINK-TROUBLE' information contact together as follows.

2) LINK-TROUBLE (\_PHSxLTRBL x=High-speed Link no.(1~2))

This is the overall information indicating whether the High-speed Link is running normally by the parameter set by the user. When RUN-LINK violates the condition of RUN-LINK ON in the status that RUN-LINK is ON, LINK-TROUBLE shall be 'ON' and if recovered, it shall be 'OFF'.

3) High-speed Link status (\_PHSxSTATE[0..127] x=the salve station no. (0~127))

This is the individual information indicating the action status of the slave station and this is available to indicate max. 127 stations High-speed Link status same as max. slave station number. That is, if the sending/receiving status of the corresponding list is normal and the action mode is RUN and there is no error, it shall be 'ON and if violating the above condition, it shall be 'OFF'.

(2) High-speed Link information monitoring

High-speed Link information enables to monitor using the monitoring function after GMWIN online connecting. There are two kinds of method to monitor : the method to select 'variable monitor' from monitor menu and the method by link parameter monitor.

1) Variable monitor

The variable monitor is the function to monitor by using GMWIN flag monitor function and selecting the necessary item. If you select 'variable monitor' from online monitor item, the variable registration screen will appear as below. Select the flag and register by selecting directly the High-speed Link information flag from variable, flag list screen one by one. In this case, as PHSxSTATE[n] is Array type flag, the user should select the array no. directly and the array no. means the slave station no. Also, 'x' means the High-speed Link no. and it has the range 1~4 for GM3 PLC CPU, the range 1~2 for GM4 PLC CPU, and the range 1 for GM6 PLC CPU. If you register the variable in the figure below and select 'close', the monitor screen will appear and if you press 'start' from tool box shown on the right side separately, it begins to monitor.

High-speed Link information variable registration screen

ags			2
Flag Name : PHS	31LTRBL		ОК
_ON	BOOL	All time ON 🔺	Cancel
_P_BCK_ER	BOOL	Program er	
_PADT_CNF	BYTE	PADT conn	Help
_PHS1LTRBL	BOOL	Abnormal i	Tielp
_PHS1RLINK	BOOL	HS RUN_L	
_PHS1STATE	ARRAY[128] of BOOL	General co	
_PHS2LTRBL	BOOL	Abnormal ii	
_PHS2RLINK	BOOL	HS RUN_L	
_PHS2STATE	ARRAY[128] of BOOL	General co 🔤	
_PNET1_G_CLEAR	BOOL	Clear outpu	
PNET1_G_CMD	BYTE	Global com	
PNET1_G_FREEZE	BOOL	Freeze inpu💌	
		) i i i i i i i i i i i i i i i i i i i	

High-speed Link information monitor screen (Variable registration)

System Flag 👘	_PHS1LTRBL	0
System Flag	_PHS1RLINK	0
System Flag	_PHS1STATE[0]	0
System Flag	PHS2LTRBL	0
System Flag	PHS2RLINK	0
System Flag	PHS2STATE[0]	0

### 2) Link parameter monitor

If you select 'link parameter' item from monitor menu of GMWIN online connection, 'Select Link Parameter' screen will appear as shown on the figure below. If the user selects the desired item from parameter number set by himself and verify it, the High-speed Link parameter monitor screen will be open and the setting registration list will be monitored and indicated on the screen.

Link parameter selection screen

Select Link Parameter		×
Select FIS Link1 HS Link2 HS Link3 HS Link4	OK Cancel	

Link parameter monitor indicates the general information such as RUN-LINK, LINK-TROUBLE on the right top and the individual information for mode (action mode), communication (sending/receiving status), error with registration list no.

### High-speed Link parameter monitor screen

Run_	Link:()	Link_Trouble:()					
No	Туре	Class	From Area To Area	Size Mode	Trx	Error	
8	%MW100	8	%MW200 32	0	0	0	
1				0	0	0	
2				0	0	0	
3				0	0	0	
4				0	0	0	

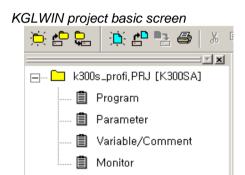
If selecting the High-speed Link information monitor as shown on the above figure, the High-speed Link parameter and information set by the user will be monitored together. And it is available to monitor the High-speed Link status with I/O data as the individual information setting value is monitored together.

### 5.3.13 High-speed Link Parameter Setting in KGLWIN

Profibus-DP master for MASTER-K also uses SyCon for the Configuration setting and the setting method is the same as that of GLOFA-GM. In case of MASTER-K, it should be required to set the High-speed Link parameter after downloading the Configuration to the master module and the High-speed Link parameter selects the parameter from KGLWIN project screen and set the corresponding item. The setting order and the function per item are as follows.

(1) High-speed Link parameter setting in KGLWIN

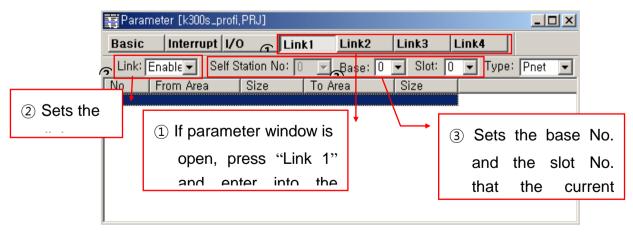
If selecting 'parameter' from the following project basic screen, the High-speed Link parameter basic screen will appear and you can select the corresponding item.



- (2) High-speed Link parameter selection
  - 1) Setting method

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

Parameter setting basic screen



The High-speed Link item tab of the above figure means max. installation number of communication module according to PLC CPU type. The High-speed Link button as much as the available setting number shall be active and in this case, the High-speed Link no. is not related to the installed slot no. and the slot no. shall be set in the individual parameter setting screen and only one High-speed Link parameter is available to set for one communication module.

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

### Max. Installation number per MASTER-K CPU model

Classification	Available communication module	Max. installation number	Remarks
K1000S CPU	G3L-PUEA, G3L-PUEB	4	
K300S CPU	G4L-PUEA, G4L-PUEB	2 /4 (Above version 3.0)	-
K200S CPU	G6L-PUEA, G6L-PUEB	2	

\* If combined with other communication module using the High-speed Link, the installation number shall be limited.

- Link: This is the item to allow the High-speed Link and the initial value is prohibited and it is required to set 'enable' to execute the High-speed Link.
  - Self station no. : Master module is set in SyCon and the slave module is set as rotary switch. It is not available to change here.
- Base: It sets the base position that the communication module to set is installed.
- Slot: It sets the position that the communication module to set is installed. (0 ~ 7 slot).
- Type: It sets the type of the installed communication module and sets the Pnet.

### (3) Parameter setting and modification

If you double-click the corresponding parameter from the parameter setting basic screen as shown on the figure below, the High-speed Link parameter setting screen will appear.

<b>D</b>		· . · · · · /	
Parameter	setting	initiai	screen

Edit Parameter	×
Area From : D0000 (P,M,L,K,T,C,D,S Area)	Size[Byte]:
To : D0000 (P,M,L,K,T,C,D,S Area)	Size[Byte]: 0
	OK Cancel

• Area: When sending, set the area to read the data to send and set the storage area of the received data

when receiving.

• Size: This means the data size to send/receive and the unit is 1 byte and it is available to set total sending/receiving as 1Kbytes for G3/4/6L-PUEA and 7Kbytes for G3/4/6L-PUEB.

### Remark

- 1) The size of sending/receiving area is the total I/O contact number made in SyCon.
- 2) The order of setting is carried out as G4L-PUEA 1 and GPL-TR2A(16 points), GPL-TR4A(32 points), GPL-D22A(16 points) and when setting sending area as P000, the receiving area as P010,
  - (1) Sending area : P000
  - (2) Receiving area : P010
  - (3) Size of sending area : 6 bytes(total output contact number)
  - (4) Size of receiving area : 2 bytes(total input contact number),

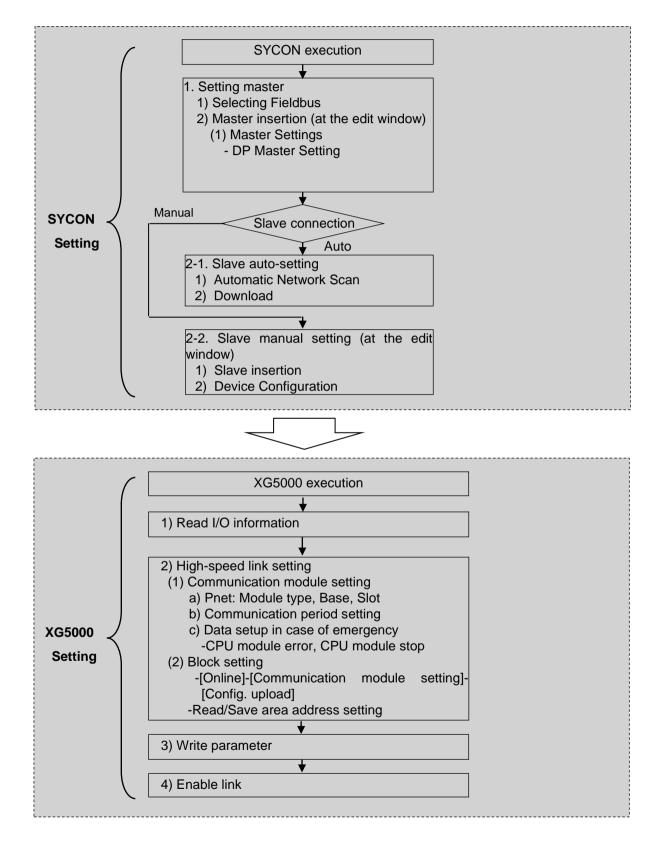
And,

- (5) P000 data -> GPL-TR2A output
- (6) P001~P002 data -> GPL-TR4A output
- (7) GPL-D22A input -> P010 saving.
- 3) The setting order programmed in SyCon has the priority when sending/receiving the data than station no. and cable connection.

### 5.3.14 High Speed Link Parameter setting in the XG5000

Set SyCon first and set XG5000.

If SyCon is not set or system is not configured normally, you can't communicate.



### 5.4 Analog I/O module Parameter Setting

### 5.4.1 XPL-BSSA Analog I/O module Parameter Setting

Contents Module type Parameter setting Remark I/O type I/O range 0 0~10V 0~4,000 Initial value 1 0~20mA 0~4,000 2 4~20mA 0~4,000 3 0~10V -2,000~2,000 XBF-AD04A 4 0~20mA -2,000~2,000 5 4~20mA -2,000~2,000 6 0~10V 0~1,000 0~1,000 7 0~20mA 8 4~20mA 0~1,000 0 0~10V 0~4,000 Initial value XBF-DV04A 1 0~10V 0~1,000 2 0~10V -2,000~2,000 4~20mA 0 ~ 4,000 Initial value 0 0 ~ 4,000 1 0~20mA 2 4~20mA 0 ~ 1,000 0~1,000 3 0~20mA XBF-DC04A 4 4~20mA -2,000~2,000 5 0~20mA -2,000~2,000 6 4~20mA Precise value 0~20mA Precise value 7 Initial value 0 pt100 Celsius jpt100 Celsius 1 XBF-RD04A 2 Fahrenheit pt100 3 jpt100 Fahrenheit Initial value 0 Κ 1 J Celsius 2 Т 3 R XBF-TC04S 4 Κ 5 J Fahrenheit 6 Т 7 R 0~4,000 Initial value 0 -2,000~2,000 1 1~5V 2 Precise value<sup>noe1)</sup> 3 0~1000 4 0~4,000 5 -2,000~2,000 XBF-AH04A, 0~5V XBF-AD08A 6 Precise value 7 0~1000 8 0~4,000 9 -2,000~2,000 0~10V 10 Precise value 11 0~1000

Madulatura	Denementaria	С	Demende		
Module type	Parameter setting	I/O type	I/O range	Remark	
	12		0~4,000		
	13	1 00 m	-2,000~2,000		
	14	4~20mA	Precise value		
XBF-AH04A,	15		0~1000		
XBF-AD08A	16		0~4,000		
	17	0.001	-2,000~2,000		
	18	0~20mA	Precise value		
	19		0~1000		
	0		0~16,000	Initial value	
	1		-8,000~8,000		
	2	4~20mA	Precise value		
	3		0~10,000		
	4		0~16,000		
	5		-8,000~8,000		
	6	0~20mA	Precise value		
	7		0~10,000		
	8		0~16,000		
XBF-AD04C	9	1~5V	-8,000~8,000		
	10		Precise value		
	10		0~10,000		
	12		0~16,000		
	13	0~5V	-8,000~8,000		
	13		Precise value		
	15		0~10,000		
	16		0~16,000		
	17		-8,000~8,000		
	18	0~10V	Precise value		
	19		0~10,000		
	20		0~16,000		
	20	-10~10V	-8,000~8,000		
	21				
	22		Precise value		
	0		0~10,000		
			0~16,000	Initial value	
	1 2	1~5V	-8,000~8,000		
			Precise value		
	3		0~10,000		
	4		0~16,000		
	5	0~5V	-8,000~8,000		
	6		Precise value		
XBF-DV04C	7		0~10,000		
	8		0~16,000		
	9	0~10V	-8,000~8,000		
	10		Precise value		
	11		0~10,000		
	12		0~16,000		
	13	-10~10V	-8,000~8,000		
	14		Precise value		
	15		0~10,000		

Г

Module type	Parameter	Cor	ntents	Remark
	setting	I/O type	I/O range	Remark
	0		0~16,000	Initial value
	1	4~20 <sup>mA</sup>	-8,000~8,000	
	2		Precise value	
XBF-DC04C	3		0~10,000	
ABF-DC04C	4		0~16,000	
	5	<b>0~20</b> mA	-8,000~8,000	
	6	0~20	Precise value	
	7		0~10,000	

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### 5.4.2 How to set XPL-BSSA analog I/O module parameter

How to set the analog parameter of XPL-BSSA is classified into two methods according to master module type. (Setting at Sycon and Setting at nConfigurator). For G4L-PUEC and XGK-PMEB/C, nConfigurator is used. And for other modules, Sycon is used for parameter setting

### (1) Setting at SYCON

a) Double click XPL-BSSA as below

(Con.EXE - [MASTER.pb] File Edit View Insert Online Settings	Taola Window Hala	
File Edit View Insert Online Settings	Tools Window Help	
** 2 PDD		
0000 800	Master0 Station address DP Master	0 COM-C-DPM
STOP RESERVED	Slave1 Station address DP Slave	1 XPL-BSSA

b) Click the [Parameter Data] at [Slave Configuration]

ave Config	uration								
General Device Descript	XPI	L-BSSA				Station addres	s	1	
Activ Enat Max, leng Max, leng Max, leng	vate device ble watchd th of in-/ou th of input th of outpur iber of mod	in actual og control utput data data t data	64 32	ration Byte Byte Byte	Length Length	e XPLBSSA, of in-/output data of input data of output data r of modules		Byte	Cancel Parameter Data DPVI Settings Assigned master Station address 0 Master0
Digital Digital Digital Digital	Input 1by In/Output Input 2by Input 4by Output 11	yte t 1byte yte yte byte	Inputs 1 Byte 2 Byte 4 Byte		In/Out 1 Byte	Identifier 0x10 0x30 0x11 0x13 0x20 0x21		*	0 / COM-C-DPM       Actual slave       Station address 1       Slave1       1 / XPL-BSSA
Slot Idx	Module	Symbol	Type	I Addr.	I Len.	Type 0 Addr. 0	Len.		Append Module <u>R</u> emove Module     Insert Module     Predefined <u>Modules</u> Symbolic Names

c) Set a parameter per each slot at parameter data. For parameter input, double click the slot. At this time, parameter input value is decimal number

Jesc	ription All Parameter Da	ta in hex description	<u>0</u> K
Byte	Description	Value	<ul> <li>Cancel</li> </ul>
0	1 parameter data byte	0x00	
1	2 parameter data byte	0x00	
2	3 parameter data byte 1 na	ameter data byte	Parameter Data
3	4 parameter data byte		
4	5 parameter data byte Da	a type Unsigned8 OK	<u> </u>
5	E parameter data bute	a type Unsigned8 OK	Module
6	7 parameter data bute	Capcal	
7	8 parameter data byte	n value 0 (dec) Cancer	
	Ma	x value 255 (dec) Hex	
		ue 🔟 dec	_

d) After parameter setting is complete, download to a master module1) In case network is not set

After executing [SYCON]-[Online]-[Download], complete through high-speed link parameter setting of XG5000.

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2) In case of changing a parameter while network setting is completed Complete through [SYCON]-[Online]-[Start Communication]

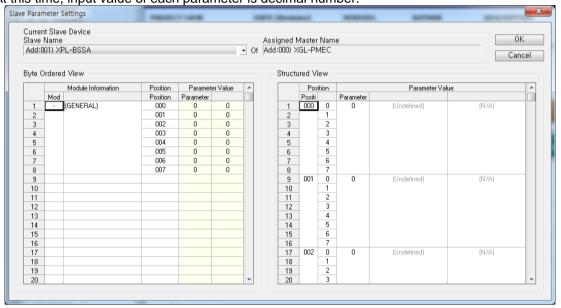
### (2) Setting at nConfigurator

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Click XPL-BSSA and then click [Configuration]-[Parameter settings] in menu.

PROJECT NAME Config1	DATE (Revision) 2015/12/11 16:12:14	VERSION 001.000.000	AUTHOR	DESCRIPTION
NO. OF DEVICES 001 Master(s), 001 Slave(s)	LEGEND MASTER SLAVE	e 🔹 owner 🕕	ACTIV. CDeACT	riv. 🔔 wdog_on 🎄 wdog_off
	000 👘		Master0	
012	. 🔔 001 💷 :	XPL-BSSA	Slave1	In:00 Out00

a) Click a [Parameter Data] at [Slave Configuration] Set a parameter per each slot at Parameter Value. For parameter input, click Decimal and input a parameter. At this time, input value of each parameter is decimal number.



### Note

- Caution in setting an analog parameter

(1) Each parameter setting is necessary for each analog module.

(2) If you don't set any parameter, module operates with initial parameter value.

(3) The parameter is sent from master to slave.

- ▶ Slave keeps previous value while cable is connected, regardless of power on/off.
- ▶ If you restart the power while cable is not connected, module operated with initial value.

### 5.5 Program example

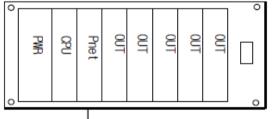
### 5.5.1 GLOFA-GM series

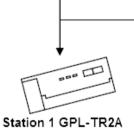
1) Program example - Communication between G4L-PUEA and Smart I/O Pnet modules

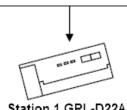
The basic configuration and setting value is as follows

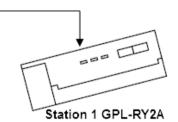
	Se	etting category	C	Contents			
		Master	Master setting G4L-PUEA S		SYCON		
		Bas	Base no. 0		0		
	Master	Slo	Slot no.		0		
	IVIASIEI	Statio	on no.	0		SYCON	
		Communication speed		1	.5Mbps	SYCON	
		HSL	setting	Us	se HSL 1	GMWIN	
Quatam		Slave selection			GPL-TR2A, GPL-D22A, GPL- RY2A		
System	Slave	GPL-TR2A	Station no.		1		
configuration		Output 16 points	Read area	Device	%MW0	GMWIN	
				Size	2	GIVIVVIN	
		ave GPL-D22A - Input 16 points	Station no.		2		
			Save area	Device	%QW0.2.0	GMWIN	
		input to points	Save alea	Size	2	GIVIVIIN	
		GPL-RY2A	Station no.		3		
		Output 16 points	Read area	Device	%MW1	GMWIN	
			Reau alea	Size	2	GIVIVIIN	
		Master settir	ng	Modificatio	n of default value	SYCON	
Etc.		Device Assignr	nent	Setting com	munication port of PC	SYCON	

### - System configuration









N	lenu setting: [File]	[New]
Step	Category	Screen formation and setting contens
1-1	Make a new file	SyCon.EXE - [MASTER.pb]         File       Edit       View       Insert       Online       Settings       To         New       Ctrl+N       Open       Ctrl+O       Close       New file writing
1-2	Select PROFIBUS	Select fieldbus
1-3	Master setting	Recall master setting window [Insert]-[Master] or Sycon.EXE - [MASTER.pb] File Edit View Insert Online Settings Tools Window Help
1-4	Master insertion	Master type selection: COM-DPM / PKV20-DPM
1-5	Station no setting	Station no. setting: 0         Insert Master         Available masters       OK         COM-C-DPM       Add >>         COM-C-DPM       Add >>         COM-DPM / PKV20-DPM       Cancel         COM-PB / PKV20-PB       Add >>         Add All >>       <
1-6	Master setting completion	SyCon.EXE - [Unnamed1.pb]  File Edit View Insert Online Settings Tools Window Help  Insert Slave  Master O  Station address 0  DP Master COM-DPM / PKV20-DPM

[SYCON 1st step] Master and station no. setting

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[SYCON 2nd step] Setting of slave and station number

Menu selection: [Instert] - [Slave] Category Screen formation and setting contents Step Recall master setting window. [Insert]-[Slave] or 造 SyCon.EXE - [Unnamed1.pb] D 🗃 🖬 📩 💡 🐔 📲 🏹 PDD Master0 2-1 Slave setting Station address DP Master 0 COM-DPM / PKV20-DPM 1step: Slave Filter (classification according to vendor) X Insert Slave -Slave Filter Vendor LS Industrial Systems Co., L -Master 0 / COM-C-DPM • Slave type [ All • <u>C</u>ancel Available slaves Selected slaves <u>A</u>dd >> GPL GPL GPL XPI ມC4( .-DV4C -BS5 A<u>d</u>d All >> << Remove All << <u>R</u>emove LS Industrial Systems Co., Ltd, Vendor name Station address Ident number GSD file name 0×09F8 Description GPL-AC8C, GSD GSD Revision 1,0 2-2 Slave selection 2step: Available Device (select system configuration slave) Insert Slave X -Slave Filter Vendor Master 0 / COM-C-DPM --Slave type All <u>C</u>ancel • Available slaves Selected slaves <u>A</u>dd >> GPL-D22A GPL-D22A/C GPL-D24A GPL-D24A/C GPL-D14A/B/C GPL-RY2A GPL-RY2A/C GPL-RY2A/C GPL-RY2A/C GPL-TB2A/B/C A<u>d</u>d All >> << Remove All << <u>R</u>emove Vendor name LG Industrial Systems Co,, Ltd, Station address Ident number GSD file name 0xFFFF GPL\_D22A,GSD Description GSD Revision 2.0

Step	Category	Screen configuration and setting contents	
2-3	Station address setting	Station Address (Set slave no. of system configuration)         Insert Slave         Vendor       All         Slave Filter       Master         Vendor       All         Slave type       All         Available slaves       Selected slaves         GPL-D24A/C       Add >>         GPL-D44C       Add >>         GPL-D44C       Add All >>         GPL-D44C       GPL-TR2A         GPL-D44C       C         GPL-D44C       C         GPL-D44C       C         GPL-TR2A       C         GPL       C	×
2-4	Completion of slave setting	Sycon.EXE - [Unnamed1.pb]         File Edit View Insert Online Settings Tools Window Help         Image: Station address       0         Image: Station address       1         Image: Station address       1         Image: Station address       2         Image: Station address       2         Image: Station address       2         Image: Station address       2         Image: Station address       3         Image: Station<	

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[SYCON 3rd step] Serial port selection: It is same with RS-232C's wiring used in CPU module. Please use that cable. Menu selection: [Settings] – [Device Assignment]

Step	Category	Screen configuration and setting contents	
		Serial port	
3-1		Device Assignment CIF Serial Driver	
		Driver Description	
		Device Driver: CIF Serial Driver	
		Board Selection Cancel	
	Setting window	Name Type Version Date Error	
0.	for serial port	COM 1:51 Connect COM 1	
		COM 2: 0 Connect COM 2	
		COM 3: -20 Connect COM 3	
		COM <u>4</u> : Connect COM <u>4</u>	
		[Connect COM] In activated port among COM 1~4, error value is indicated as	
		[0]	
		Device Assignment CIF Serial Driver	
		Driver Description OK	
		Device Driver: CIF Serial Driver Cancel	
		Board Selection	
3-2	Port research	Name Type Version Date Error	
		COM 23         DPM         COMCADPN         V01.204         21.11.05         0         Connect COM 2	
		COM <u>3</u> :	
		COM 4: Connect COM 4	
		Marking activated port and select [OK]	

[SYCON 4th step] Download

Menu selection: [OnLine] - [Download]

### Note

- Set the size of read and save area in GMWIN same as in SYCON. When select the Smart I/O module in SYCON, size of each module's read and save area are set automatically. (You can check it in the Slave setting window)
- 2) Set as sequence of G4L-PUEA, GPL-TR2A(16points), GPL-D22A(16points), GPL-RY2A(16points) and set the read area as %MW0, save area as %MW100.
- (1) Read area: %MW0
- (2) Save area: %QW0.2.0
- (3) Size of read area: 4 bytes (whole number of output points)
- (4) Size of save area: 2 bytes(whole number of input points)
- (5) %MW0 data -> GPL-TR2A
- (6) %MW1 data -> GPL-RY2A
- (7) Input of GPL-D22A -> %QW0.2.0

3) Either GMWIN program and SYCON setting can be set first.

### [GMWIN 1<sup>st</sup> step] Programming

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Step	Category	Screen configuration and setting contents
1-1	Programming	gmmin - (:%gmmin 4##source#ist#moname00.src !)         Image: Decision Program         Image: Decision Prog

[GMWIN 2<sup>nd</sup> step] High speed link setting in master module

Step	Category	Screen configuration and setting contents
2-1	High speed link setting (1)	grade       Grade <td< td=""></td<>
2-2	High speed link setting (2)	Project Program Bat Were Comple Online Debug Took Window Help         High Steed Unkl         High Steed Unkl         Bater Steed Unkl

Step	Category	Screen configuration and setting contents
3-1	Transmit/Receiv earea setting (1)	Inth set       GLOFAPnet         Stot:       0         Set station No:       Edit.         High Speed Link Item Edit       High Speed Link Item Edit         No.       Receive area:       % SAW         Stot:       0       Set station No:         Edit.       Edit.       Keevee area:         No.       Receive area:       % SAW         Stot:       0       Set station No:         Edit.       Edit.       Keevee         Visit       Stot:       0         Detete.       Edit.       Close         Help       OK       Cancel         Help       Double click the part of No.1 in [High speed link 1] window
3-2	Transmit/Receiv earea setting (2)	High Speed Link Item Edit         Mode         C Send         C Receive         Area         Address       Size(Byte)         Receive area:       %MW         %MW       %QW         0K       Cancel         Help         - Receive area:       %QW0.2.0, 2bytes         - Transmit area:       %MW0, 4bytes

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[GMWIN 3rd step] Slave parameter setting

### 5.5.2 Mater-K series

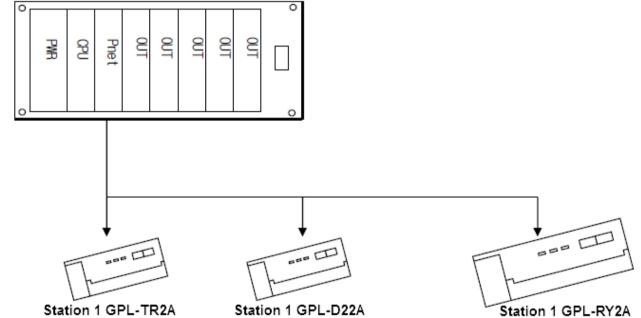
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1) Program example – Communication between G4L-PUEA and Smart I/O Pnet modules

The basic configuration and setting value is as follows

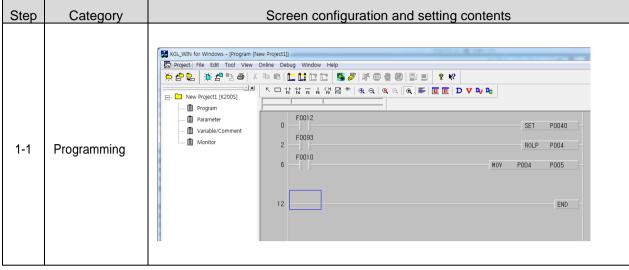
	Se	etting category	C	Setting Program		
		Master	<sup>•</sup> setting	G4	IL-PUEA	SYCON
		Bas	e no.		0	KGLWIN
	Master	Slo	t no.		0	KGLWIN
	Master	Statio	on no.		0	SYCON
		Communic	ation speed	1	.5Mbps	SYCON
		HSL	setting	Us	se HSL 1	KGLWIN
Sustan		Slave selection		GPL-TR2A, GPL-D22A, GPL- RY2A		SYCON
System	Slave	GPL-TR2A Output 16 points	Station no.	1		SYCON
configuration			Read area	Device	P0004	KGLWIN
				Size	2	KGLWIN
		GPL-D22A	Station no.		2	
		Input 16 points	Save area	Device	M0000	KGLWIN
		input to points	Save alea	Size	Size 2	
		GPL-RY2A	Station no.		3	SYCON
		Output 16 points	Read area	Device	P0005	KGLWIN
			Read alea	Size	2	
		Master settir	ng	Modificatio	SYCON	
Etc.		Device Assignr	nent	Setting communication port of PC		SYCON

- System configuration

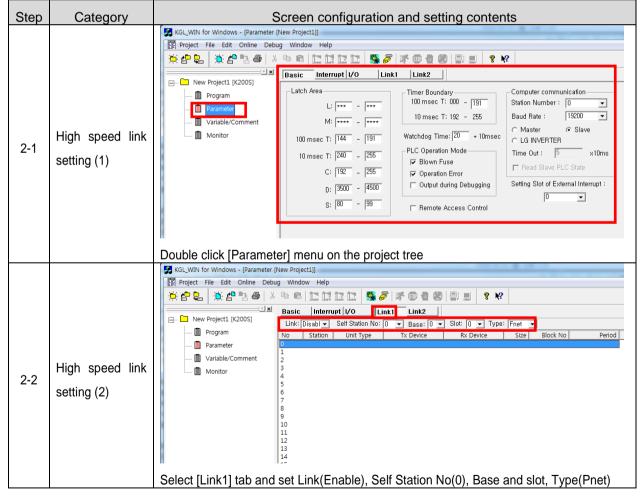


SYCON setting is same with example of GLOFA-GM series.

#### [KGLWIN 1<sup>st</sup> step] Programming



[KGLWIN 2<sup>nd</sup> step] High speed link setting in master module



Step	Category	Screen configuration and setting contents
2-3	High speed link setting (3)	KKL_WIN for Windows - [Parameter [New Project1]]         Project File Edit Online Debug Window Help         New Project1 [K2005]         Program         Program         Parameter         Variable/Comment         Wonitor         Getter         Image: Debug Window Help         Program         Program         Variable/Comment         Monitor         Image: Debug Window         From :       D0000         Size(Byte):         [P.M.L.K.T.C.D.S Area]         (P.M.L.K.T.C.D.S Area]         OK         Cancel
2-4	High speed link setting (4)	Edit Parameter     Area     From :     M0000   Size(Byte): 2     (P.M.L.K.T.C.D.S Area)     To :   P0004   Size(Byte):     (P.M.L.K.T.C.D.S Area)     OK         Area   From :   M0000   Size(Byte):   (P.M.L.K.T.C.D.S Area)     OK      Area   Poood   Size(Byte):     (P.M.L.K.T.C.D.S Area)   OK     Cancel  Area Provide the set of the

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### 5.5.3 XGT series communication

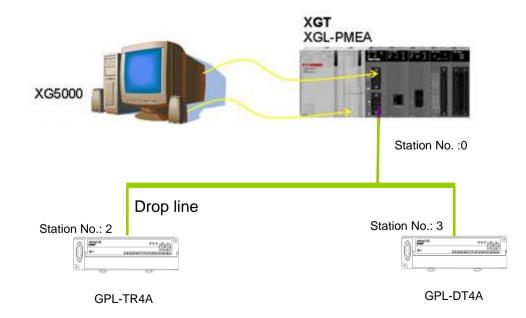
### 1) Program example – communication between our Smart I/O Pnet modules

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The basic configuration and setting value is as follows.

	Setting of	category	С	Setting program		
		Master setting		XG	SyCon	
		Base No.			0	XG5000
		Slot No.			0	XG5000
		Station No.			0	SyCon
	master	Communication	speed	1	.5Mbps	SyCon
		HSL setting		Us	e HSL 1	XG5000
Quatant		Communication setting	period	200ms		XG5000
System		Slave selection		GPL-TR4A	SyCon	
configuration	slave	GPL-TR4A Output 32point	Station No.	2		SyCon
			Read area	Device	M100	XG5000
				Size	4	X03000
		GPL-DT4A	Station No.	3		SyCon
			Save area	Device	M102	XG5000
		point		Size	2	X03000
		Input 16 point	Read area	Device	M112	XG5000
		• •		Size	2	
	Master Settin	g		Modification	SyCon	
Etc.	Device Assig	nment		Setting cor	SyCon	

## System configuration

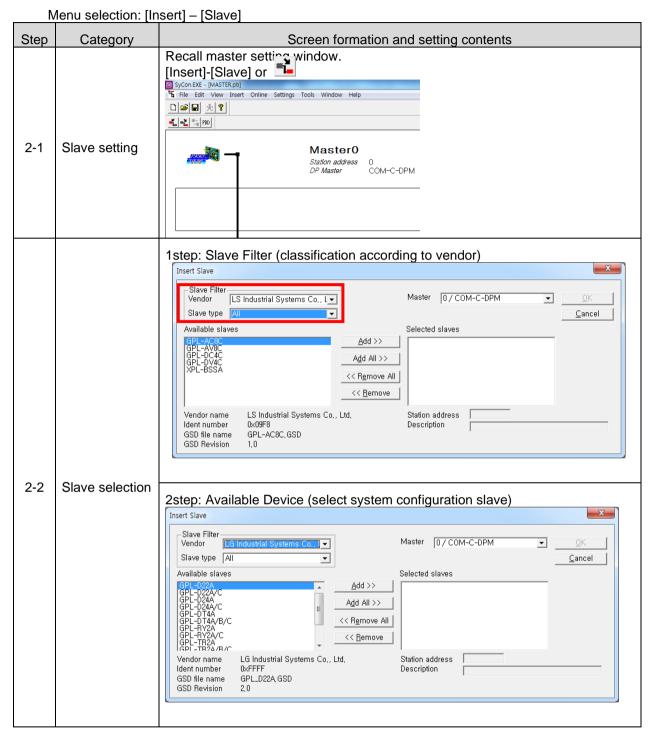


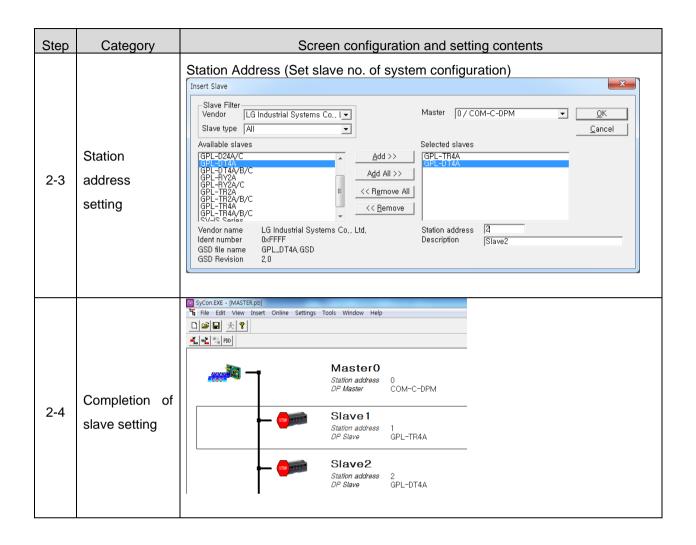
N	lenu selection: [Fi	ile] – [New]
Step	Category	Screen formation and setting contens
1-1	Make a new file	SyCon.EXE - [MASTER.pb]         File       Edit       View       Insert       Online       Settings       To         New       Ctrl+N       Open       Ctrl+O       Ctrl+O         Close       New file writing
1-2	Select PROFIBUS	Select fieldbus
1-3	Master setting	Recall master setting window [Insert]-[Master] or SyCon.EXE - [MASTER.pb] File Edit View Insert Online Settings Tools Window Help
1-4	Master insertion	Master type selection: COM-C-DPM         Insert Master         Available masters         COM-C-OPM         COM-C-OPM         Add >>         COM-PB / PKV20-DPM         Add All >>         Add All >>         Vendor name       Hilscher GmbH         Ident number       0x069E         GSD file name       HILL069E, GSD
1-5	Station no setting	Station no. setting: 0         Insert Master         Available masters         COM=C=OPM/PKV20-DPM         Add >>         COM=C=OPM/PKV20-DPM         Add All >>         COM=PB / PKV20-PB         Add All >>         Vendor name       Hillscher GmbH         Ident number       0x669E         GSD file name       HIL_069E, GSD
1-6	Master setting completion	Image: Sycon.EXE - [MASTER.pb]         Image: Sycon.EXE - [MASTER.pb] <td< td=""></td<>

[SYCON 1st step] Master and station no. setting

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[SYCON 2nd step] Basic setting modification





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[SYCON 3rd step] Serial port selection: It is same with RS-232C's wiring used in CPU module. Please use that cable.

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Step	Category	Screen configuration and setting contents
3-1	Setting window for serial port	Serial port         Device Assignment CIF Serial Driver         Driver Description         Device Driver:         CIF Serial Driver         Board Selection         Name       Type         Version       Date         Error       Cancel         Name       Type         COM 1:       F51         Connect COM 1       Connect COM 2         COM 3:       F20         Connect COM 4       F20
3-2	Port research	[Connect COM] In activated port among COM 1~4, error value is indicated as         [O]         Device Assignment CIF Serial Driver         Device Driver:         CIF Serial Driver         OK         Device Driver:         COM 1:         Type         Version         Date         Error         Connect COM 1:         COM 23         DPM         COMCADPN V01.204         P20         Connect COM 3:         COM 4:         COM 4:         COM 4:         COM 4:         COM 4:         Connect COM 4:         Connect COM 4:

#### Menu selection: [Settings] – [Device Assignment]

[SYCON 4th step] Download

Menu selection: [OnLine] - [Download]

Step	Category	Screen configuration and setting contents
1-1	CPU module selection	New Project         Project name:         Project name:         GRU type:         XGK (CPUHN )         Auto-allocation         Program name:         NewProgram         Program language         SFC         SI         Project description:

[XG5000 1st step] Select type of CPU module

Menu selection: [Option] – [PLC type setting]

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[XG5000 2nd step] Communication method setting

	<b>.</b>	
Step	Category	Screen configuration and Setting contents
2-1	Connection Settings	Connection Settings - NewPLC         Ivpe:       USB         Uppth:       Local         Preview         General         Timeout interval:       5         Retrial times:       1         Image: The sec         Retrial times:         Uppertive:         Connecting Type:         USB         Connecting Type:         USB         Connecting Depth:         Local

Menu selection: [Online] – [Connection setting]

[XG5000 3rd step] Connection

Menu selection: [Online] – [Connection]

#### [XG5000 4th step] I/O information reading

Menu selection: [Online] – [Diagnosis] – [I/O Information] – [I/O Sync]

[XG5000 5th step] High-speed Link setting

Menu selection: Right click the XGL-PMEA module and select [Add Item] - [High-speed link communication]

Step	Category	Screen configuration and setting contents
5-1	Communication module setting	Initial screen

#### [XG5000 6-1st step] SYCON upload

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### Menu selection: [Online] - [SYCON upload (Pnet, Dnet)]

Step	Category	Screen configuration and setting contents								
		Initial scree NewProgram[P Index Master Station No	rogram] X New		× ariable Variable name name comment	Sending data (Byte)	Save area	Variable name	Variable name comment	Receiving data (Byte)
	Communication	1 2 3								
6-1	module setting	SYCON up	rogram] 🗡 New	PLC - HS Link 01						
		Index Master Station No	Station number Mode		ariable Variable name name comment	Sending data (Byte)	Save area	Variable name	Variable name comment	Receiving data (Byte)
		0 0	1 Send			4				
		1 0	2 Send/Rece	ive		2				2
		2								
		3								

#### [XG5000 6-2nd step] Read area / Save area setting

Menu selection: Double click the [High-speed link 01] in the project tree

Step	Category	Screen configuration and setting contents											
6-1	Communication module setting	Ne Index 0 1 2 3 High	SCIEER WProgram[Pro Station No 0 0 0 0 0 0 0 0 0 0 0 0 0	Station number 1 2 link k	Mode Send Send/Receive	- HS Link 0 Read area	Variable name	Variable name comment	(Byte) 4 2	Save area	Variable name	Variable name comment	Receiving data (Byte) 2
		Index	Master	Station	Mode	Read area	Variable		Sending data	Save area		Variable name	Receiving data
		0	Station No 0	number 1	Send	%MW100	name	comment	(Byte) 4		name	comment	(Byte)
		1	0	2	Send/Receive	%MW102			2	%MW112			2
		2											
		3											

	lenu selection: [O	nline] – [Write]						
Step	Category	Screen configuration and setting contents						
7-1	Write parameter	Select High-speed link         Write         Sets Program Upload Prohibit         Sets Ink enable with parameters         Image: Stability of Parameter         Image: Parameter Text of Parameter         Image: Parameter is downloaded.         Image: Parameter writing is stored in CPU module. So you should back-up         High-speed link parameter when changing CPU module.						

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[XG5000 7th step] Write High-speed link parameter

[XG5000 8th step] Enable High-speed link

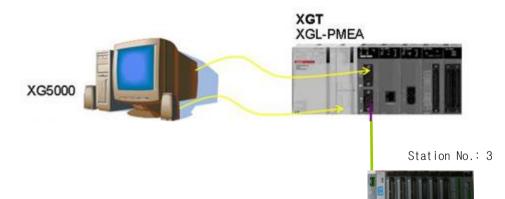
Menu selection: [Online] - [Communication module setting] - [Enable Link (HS link, P2P)]

The basic	configura	ation and setting value is a	as follows			Setting
	S	etting category		Contents	Program	
		Master setting		XGL-PMEA		SYCON
		Base no.		0		XG5000
		Slot no.		0		XG5000
	Master	Station no.		0		SYCON
		Communication speed		1.5Mbps		SYCON
		HSL setting		Use HSL 1	XG5000	
		Communication period	setting	200ms	XG5000	
System	Slave	Slave selection		XPL-BSSA	SYCON	
configuration		XBE-TN32A: Tr out XBE-RY16A: Relay out XBE-DC32A: DC input XBF-AD04A: A/D Conversion module	Station no.	3		SYCON
			Save area	Device	P1000	XG5000
				Size	14	X83000
			Read area	Device	M200	XG5000
		Conversion module		Size	12	
	Master se	etting		Modification	SYCON	
Etc.	Device As	ssignment		Setting con	SYCON	

#### 2) Program example – communication between XGL-PMEA and extantion type Smart I/O Pnet module

- System configuration

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Slot location	1	2	3	4	5	
Name	XBE-TN32A	XBE-RY16A	XBE-DC32A	XBF-AD04A	XBE-DV04A	
Content	Tr out	Relay out	DC input	A/D conversion input module	D/A conversion output module	
I/O data size	32 points (4 bytes)	16 points (2 bytes)	32 points (4 bytes)	64 points (8 bytes)	64 points (8 bytes)	

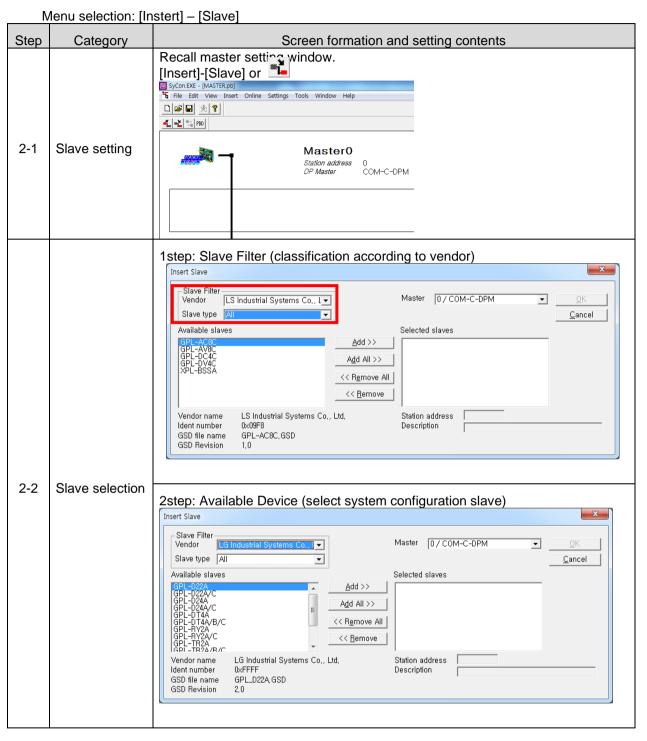
### [SYCON 1st step] Master and station no. setting

N	lenu setting: [File]	– [New]
Step	Category	Screen formation and setting contens
1-1	Make a new file	SyCon.EXE - [MASTER.pb]         File       Edit       View       Insert       Online       Settings       To         New       Ctrl+N       Open       Ctrl+O       Close       New file writing
1-2	Select PROFIBUS	Select fieldbus
1-3	Master setting	Recall master setting window [Insert]-[Master] or SyConEXE (MASTER.pb) File Edit View Insert Online Settings Tools Window Help File X Tools Window Help
1-4	Master insertion	Master type selection: COM-C-DPM         Insert Master         Available masters         COM-C-DPM         Add >>         COM-C-DPM/PKV2D-DPM         Add All >>         COM-PB / PKV2D-DPM         Add All >>         Vendor name         Hilscher GmbH         Ident number         0x099E         GSD file name
1-5	Station no setting	Station no. setting: 0         Insert Master         Available masters       QK         COM-C-DPM       Add>>>         COM-C-DPM       COM-C-DPM         COM-C-DPM       Com-C-DPM         COM-PB / PKV20-PB       Add>>>         Vendor name       Hilscher GmbH         Ident number       0x069E         GSD file name       HIL_069E, GSD
1-6	Master setting completion	ByCon.EXE - [MASTER.pb]         Image: Specific Settings Tools Window Help         Image: Specific Settingseting T

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[SYCON 2nd step] Setting of slave and station number

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Step	Category	Screen configuration and setting contents
2-3	Station address setting	Station Address (Set slave no. of system configuration)         Insert Slave         Insert Slave         Vendor         All         Available slaves         PKV30-DPS         PKV30-DPS       Add All >>         PKV40-DPS       Add All >>         SI-P3 PROFIBUS-DP INTERFACE CARD       Add All >>         SI-P3 Series       X20EC0063         X20E-0063       KSL-PSEA         Vendor name       LS Industrial Systems Co., Ltd,         Ident number       0x09F7         GSD Revision       1,1
2-4	Completion of slave setting	SyCon.EXE - [Unnamed1.pb]     File Edit View Insert Online Settings Tools Window Help      Image: Imag

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N	lenu selection: Do	ouble click the slave
Step	Category	Screen configuration and setting content
3-1	Setting window for slave communication method	State Configuration         General       Device       XPL-BSSA       Station address       3         Device       XPL-BSSA       Station address       3       Cancel         Device       XPL-BSSA       GSD file       XPLBSSA,GSD       Cancel         Max, length of in-/output data       64       Byte       Length of input data       0       Byte         Max, length of output data       32       Byte       Length of input data       0       Byte         Max, length of output data       32       Byte       Length of input data       0       Byte         Max, length of output data       32       Byte       Length of input data       0       Byte         Max, length of output data       32       Byte       Length of output data       0       Byte         Max, number of modules       8       Number of modules       0       Maxerol         Digital Input ibyte       1       Byte       0x10       Actual slave       Slave3       Slave3
3-2	Slave data structure	Slave configuration setting: Add the module equipped at the XPL-BSSA in "Slot" consequently. Module       Inputs       Outputs       In/Out       Identifier         Analog Output 4Channel       8 Byte       0x27         Analog Input 4Channel       8 Byte       0x17         Analog In/Out 2Channel       4 Byte       0x17         Analog Input 8Channel       16       0x1F         Image: Symbol       Type I Addr. I Len. Type O Addr. O Len.         1       Digital Module1       QB       0         2       1       Digital Module3       IB       0         4       1       Analog Module4       B       0         5       1       Analog Module5       QB       0

[SYCON 3rd step] Set the method for slave communication - slave: XPL-BSSA

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Step	Category	Screen configuration and setting contents									
4-1	Setting window for serial port	Serial port         Device Assignment CIF Serial Driver         Driver Description       OK         Device Driver:       CIF Serial Driver         Board Selection       Cancel         COM 1:       F51       Connect COM 1         COM 2:       0       Connect COM 2         COM 3:       F20       Connect COM 3         COM 4:       F20       Connect COM 4									
4-2	Port research	[Connect COM] In activated port among COM 1~4, error value is indicated as         [0]         Device Assignment CIF Serial Driver         Device Driver:         CIF Serial Driver         Comparison         Device Driver:         COM 1:         COM 2:         COM 3:         COM 4:         Commet COM 3:         Commet COM 4:         Commet COM 4:         Commet COM 4:         Commet COM 4:         Commet COM 5:         Commet COM 4:									

[SYCON 4th step] Serial port selection: It is same as RS-232C's wiring used in CPU module. So use that cable. Menu selection: [Settings] – [Device Assignment]

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[SYCON 5th step] Download

Menu selection: [OnLine] - [Download]

Step	Category	Screen configuration and setting contents
1-1	CPU module selection	New Project         Project name:         Project name:         GRU type:         XGK (CPUHN )         Auto-allocation         Program name:         NewProgram         Program language         SFC         SI         Project description:

[XG5000 1st step] Select type of CPU module

Menu selection: [Project] – [New Project]

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[XG5000 2nd step] Communication method setting

Step	Category	Screen configuration and Setting contents
2-1	Connection Settings	Connection Settings - NewPLC Connection settings Iype: USB Preyiew General Timeout interval: 5 sec Retrial times: 1 is times Read / Write data size in PLC run mode Normal Maximum * Send maximum data size in stop mode. Connecting Type: USB Connecting Depth: local

Menu selection: [Online] – [Connection setting]

[XG5000 3rd step] Connection Menu selection: [Online] – [Connection]

[XG5000 4th step] I/O	information reading
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Menu selection: [Online] – [Diagnosis] – [I/O Information] – [I/O Sync]

#### [XG5000 5th step] High-speed Link setting

Menu selection: Right click the XGL-PMEA module and select [Add Item] - [High-speed link communication]

Step	Category	Screen configuration and setting contents								
5-1	Communication module setting	Initial screen								

#### [XG5000 6-1st step] SYCON upload

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### Menu selection: [Online] – [SYCON upload (Pnet, Dnet)]

Step	Category	Screen configuration and setting contents											
Step 6-1	Category Communication module setting	Index 0 1 2 3 SYCC	SCIE	ogram] Station number Dad ogram] Station	NewPLC     Mode	- HS Link 0 Read area	Variable name	Variable name comment	Sending data (Byte)	Save area	Variable	Variable name comment Variable name comment	Receiving data (Byte) Receiving data (Byte)
		0	0	3	Send/Receive				14				12
		2											
		3											

#### [XG5000 6-2nd step] Read area / Save area setting

#### Menu selection: Double click the [High-speed link 01] in the project tree

Step	Category	Screen configuration and setting contents											
		Initial screen											
		Index	Master Station No	Station number	Mode	Read area	Variable name	Variable name comment	Sending data (Byte)	Save area	Variable name	Variable name comment	Receiving data (Byte)
		0	0	3	Send/Receive				14				12
		2	-										
	Communication	3											
6-2	module setting	High speed link block after set read/write area											
	Ŭ	NewProgram[Program] X NewPLC - HS Link 01 X											
		Index	Master Station No	Station number	Mode	Read area	Variable name	Variable name comment	Sending data (Byte)	Save area	Variable name	Variable name comment	Receiving data (Byte)
		0	0	3	Send/Receive	%MW1000			14	%MW200			12
		1											
		2											
		3											

e ead area / Sa	ve area of s	slave ext	ension mod	lule					
				Save area	(Slave $\rightarrow$	Master)			
Device	Send data		Output module		Device	Receive d	ata	Input odule	
%MW1000		4 bytes	TR out 32p	oints	%MW200		4 bytes	DC in 32points	
%MW1002		2 bytes	Relay out 1	6points	%MW202		2 bytes	A/Dconversion	Ch 0
%MW1003	146,400	D/A		Ch 0	%MW203		2 bytes		Ch 1
%MW1004	14bytes		Ch 1	%MW204	-	2 bytes	4Channel	Ch 2	
%MW1005		2 bytes		Ch 2	%MW205		2 bytes	1	Ch 3
%MW1006		2 bytes	4Channei	Ch 3					

Ν	lenu selection: [O	nline] – [Write]	
Step	Category	Screen configuration and setting contents	
7-1	Write parameter	Select High-speed link         Write         Sets Program Upload Prohibit         Sets Ink enable with parameters         Configuration         Configuration <td c<="" td=""></td>	

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[XG5000 7th step] Write High-speed link parameter

[XG5000 8th step] Enable High-speed link

Menu selection: [Online] – [Communication module setting] – [Enable Link (HS link, P2P)]

# 5.6 Analog Input Module

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### 5.6.1 Performance specification

Analog input module's performance specification is as follows.

Type Name	GPL-AV8C	GPL-AC8C
Channel No.	8 cha	annels
Analog Input Range	0 ~ 5V 1 ~ 5V 0 ~ 10 V -10 ~ +10 V	0 ~ 20mA 4 ~ 20mA -20 ~ 20mA
Digital Output Value	0~4000 (when 0 ~ 5V or 1 ~ 5V) 0~8000 (when 0 ~ 10 V) -8000~8000 (when -10 ~ +10 V)	0~8000 (when 0~20 mA or 4~20mA) -8000~8000 (when -20~20mA)
Input Impedance	1 MΩ	250Ω
Max. Tolerance Input	±15 V	±30mA
Resolution	1.25mV	2.5 µ <sup>A</sup>
Precision	±0.3 % (Full Scale, Ta=0~55℃)	±0.3 % (Full Scale, Ta =23℃±5℃) ±0.4 % (Full Scale, Ta=0~55℃)
Transform Speed	Less than 10	ms /8 channel
Response Period	Less than 10 ms /8 chan	nel + transmission period (ms)
Insulation Method	Analog input terminal ⇔ Co	<ul> <li>insulation</li> <li>mmunication terminal : insulation</li> <li>annel : non-insulation</li> </ul>
External Supply Power	DC 24V (DC	21.6 ~ 26.4V)
External Consumption Current	DC24V	: 220 mA
Weight	313g	313g

# Remark

1) You can't modify Offset/Gain Value which is regulated at the factory.

Type Name	GPL-DV4C	GPL-DC4C			
Channel no.	4 channels				
Analog output range	0 ~ 5V 1~ 5V 0 ~ 10 V -10 ~ +10 V	0 ~ 20mA 4 ~ 20mA			
Digital input value	0 ~ 4000 (when 0 ~ 5V or 1~ 5V) 0 ~ 8000(when 0 ~ 10V) -8000 ~ 8000 (when -10 ~ +10V)	0 ~ 8000			
Load impedance	Upper 1 kΩ (1~5V / 0~5V) Upper 2 kΩ (0~10V /-10~10V)	Less than 500Ω			
Resolution	1.25mV	2.5 / <sup>µ</sup> A			
Precision	±0.3 % (Full scale, Ta=0 ~ 55℃)	±0.3 % (Full scale, Ta=23℃±5℃) ±0.4 % (Full scale, Ta=0 ~ 55℃)			
Transformation speed	Less than 10 m	ns / 4 channels			
Response period	Less than 10 ms/ 8 channel + transmission period (ms)				
Insulation method	Analog input terminal ⇔ FG Analog input terminal ⇔ con Analog input terminal ⇔ cha	nmunication terminal : insulation			
External supply power	DC 24V ( DC2	20.4 ~ 28.8V)			
External consumption current	210 mA	240 mA			
Weight	314g	322g			

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Analog output module's performance specification is as follows

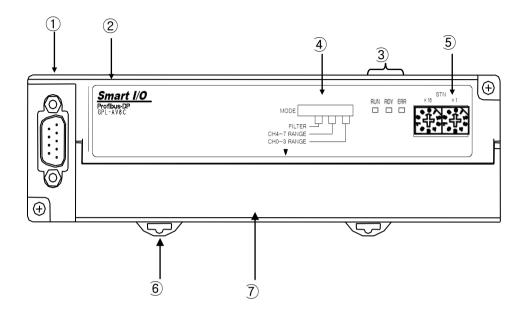
### Remark

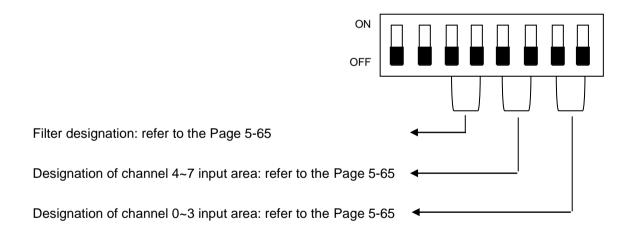
1) You can't modify Offset/ gain value which is regulated at the factory

### 5.6.2 Name and role of each part

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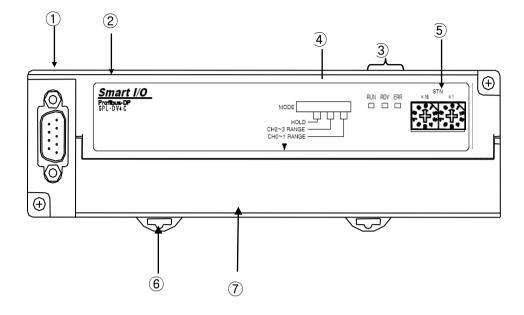
- Here it describes name and role of each part.





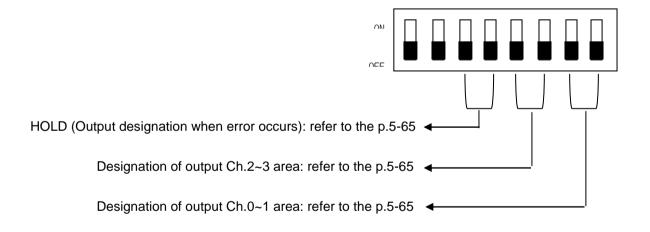
No.	1	Name					Use				
1	Connection C	Connector	Connect Master/remote module for communication. <ul> <li>9 pin connector</li> </ul>								
2	Smart I/O typ	e name indication	<ul> <li>Indicates Pnet analog module's type name.</li> <li>GPL-AV8C: analog voltage input module</li> <li>GPL-AC8C: analog current input module</li> </ul>								
		PWR LED	Indicates status of power which is supplied at system. <ul> <li>On: when supplying is normal.</li> <li>Off: when supplying is abnormal.</li> </ul>								
		ERR LED	<ul> <li>On: whe</li> </ul>	n commu	nication s	tatus of comr	munic	mmunication module. ation module has erro ation module is OK.	r.		
3	Communic ation status indication LED		<ul><li>On: whe</li><li>Off: whe</li></ul>	n analog i n analog i	module fii module hi		zation	3.1 error type referenc successfully. ng.	e)		
		RDY			ror type		F	Flicker period			
		LED		re trouble				200ms			
			Error in setting current input 0.5s								
			range								
			* If you set mode selection switch On/On when using GPL-AC8C, It causes error. Regulate range again.								
			il causes		Julate Tal	iye ayain.					
			Input rang	ge and filte	er setting.						
			Setting	Switch	status	Setting rar	nge	Setting range			
					r	(Voltage		(Current)			
			CH0 ~		Off	Off	-10V ~ +1		-20mA ~ +20mA	-	
				CH0 ~ 3	Off	On	0 ~ 10\		0 ~ 20mA		
					On	Off	0 ~ 5V		4mA ~ 20mA		
		ation availab		On Off	On Off	1V ~ 5\ -10V ~ +1		- -20mA ~ +20mA			
4	wode design	lode designation switch		lode designation switch		Off	On	-10v ~ +1 0 ~ 10V		0 ~ 20mA	-
			CH4 ~ 7	On	Off	0 ~ 10V		4mA ~ 20mA			
				On	On	1V ~ 5\		-	-		
				Off	Off			oling filter			
				Off	On			arameter 33			
			Filter	On	Off			arameter 66			
				On	On	Fil	ter pa	arameter 99			
5	Self station se	etting switch	Switch for (0 station			n No. Availab	le to s	set to 126 stations.			
6	HOOK for DI	N rail	• HOOK fo	or DIN rail							
-			Terminal			ing of I/O					
7	Terminal bloc	Ж		the Ch. 3		~					

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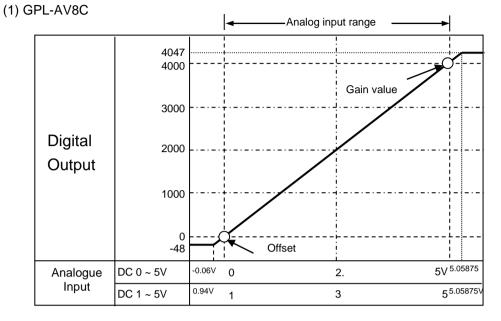
- Describes the name and role of each part.

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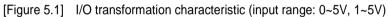
No.	Model na	ame				Use			
1	Connection conne	ctor	Connects Master/remote module for communication <ul> <li>9 pin connector</li> </ul>						
2	Smart I/O mo indication	odel name	<ul> <li>Indicates model name of Pnet analog module GPL-DV4C: analog voltage output module GPL-DC4C: analog current output module</li> </ul>						
		PWR LED	Indicates status • On: when sup • Off: when sup	oplying is	normal		at system.		
	Communication	ERR LED	<ul> <li>On: when cor</li> </ul>	nmunica	tion stat	ving status of comm us of communication us of communication	on module has error	r.	
3	status indication LED RDY LED		<ul> <li>On: when an</li> <li>Off: when and</li> <li>Flicker: when</li> </ul>	alog mod alog mod detecting or type ouble digital in	ule finis ule has g error ii	le status (refer to th hes initialization su error in initializing. n analog module Flicker period 200ms 1s	ccessfully.		
			Input range and output setting when error						
			setting		itch tus	Setting range(voltage)	Setting range(current)		
			CH0 ~ 1	Off Off On On	Off On Off On	$ \frac{-10V - +10V}{0 - 10V} = 0 - 10V = 0 - 5V = 10 - 5V $	0 ~ 20mA 4mA ~ 20mA -		
4	Mode designation	CH2 ~ 3	Off Off On On	Off On Off On	-10V ~ +10V 0 ~ 10V 0 ~ 5V 1V ~ 5V	0 ~ 20mA 4mA ~ 20mA -			
		HOLD	Off Off On On	Off On Off On	Puts out 0 Puts out Max. v Puts out Min. v Puts out previo	when error ralue when error alue when error bus value when ror			
5	Self station No. se	tting switch	Switch for sett Available to se			tion No. 0 station reservation	n)		
6	HOOK for DIN rail		HOOK for DI	N rail					
7	Terminal block		• Terminal bloc * refer to the C		or I/O wi	iring			

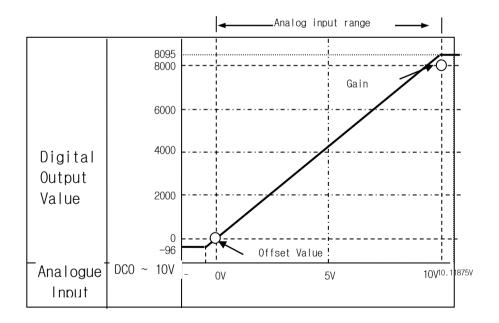
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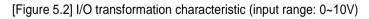


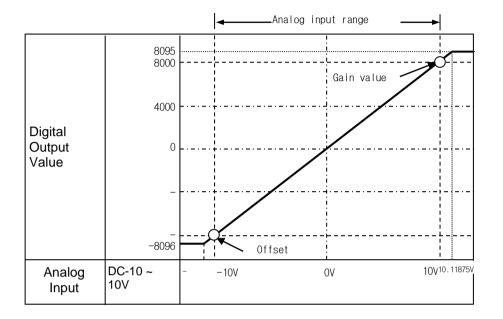
### 5.6.3 Characteristic of input transformation

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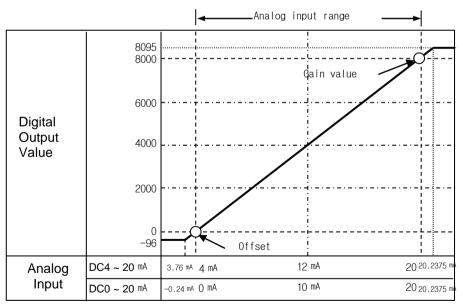


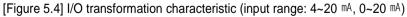


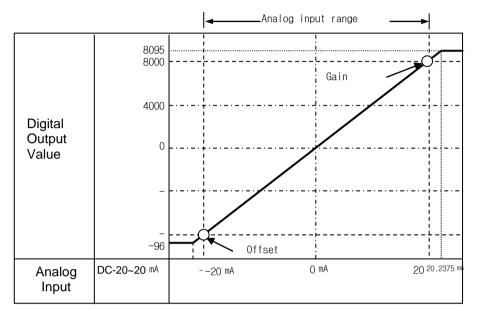




(2) GPL-AC8C



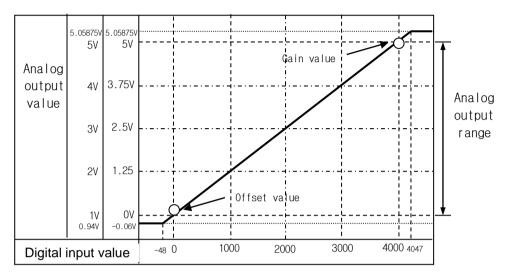




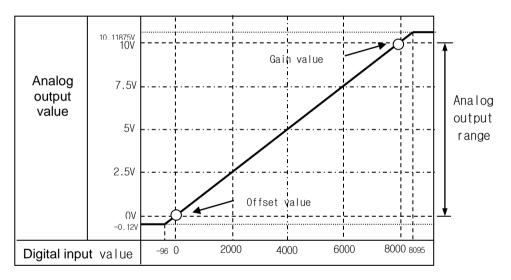
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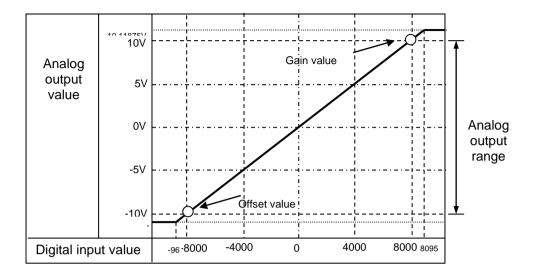
#### 3) GPL-DV4C



[Figure 5.6] I/O transformation characteristic (output range: 0~5V, 1~5V)



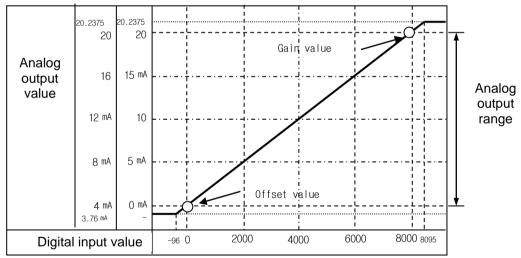
[Figure 5.7] I/O transformation characteristic (Output range: 0~10V)



[Figure 5.8] I/O transformation characteristic (Output range: -10V~10V)

4) GPL-DC4C

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[Figure 5.9] I/O transformation characteristic (Output range: 0~20 mA, 4~20mA)

#### 5.6.4 I/O Output when error occurs

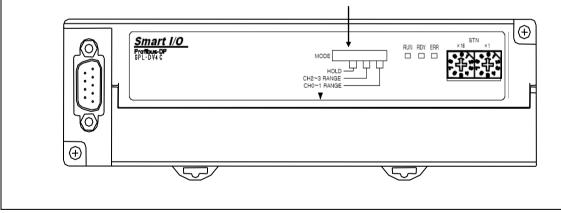
- You can designate output status according to setting and status present analog value as follows, when error occurs.

	switch )LD)	output status	-10~10V	0~10V	0~5V	1~5V		
Off	Off	0	0V	0V	0V	0V		
Off	On	Max. value	10V	10V	5V	5V		
On	Off	Min. value	-10V	0V	0V	1V		
On	On	Previous value		Previou	On On Previous value Previous value			

#### Remark

- 1) You should turn off the power when changing mode switch.
- 2) You can't designate output status when error occurs and set status is applied to all channels commonly.
- 3) Designation switch is located in the upper body of module when error occurs as follows.

#### Output designation switch when error occurs



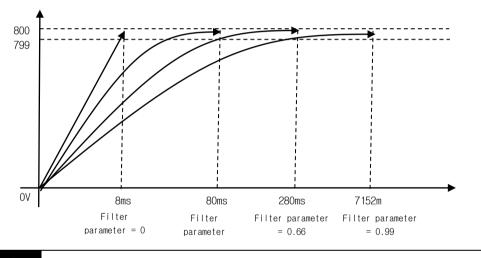
### **5.6.5 Filter Function**

We can get stable digital output value by using Filter Function which filters noise and rapid change of input value. It is available to designate filter parameter per channel by user program and I/O parameter setting.

•setting range: 33 / 66 / 99 (%)	Filter	СН	0~3	CH4	1~7
F[n] = (1 - α) x A[n] + α x F [n - 1]	Filter	Off	Off	Off	Off
F[n]: present filter output value	0.33	Off	On	Off	On
A[n]: present A/D transformation value F[n-1]: previous filter output value	0.66	On	Off	On	Off
α: filter parameter (0.33, 0.66, 0.99: previous value's weight)	0.99	On	On	On	On
*1 We can set filter parameter by using mode switch which is loc	ated at the	upper	main	body. S	setting

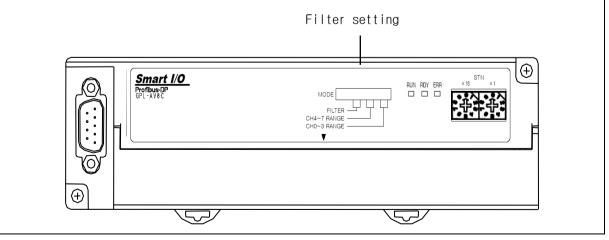
\*1 We can set filter parameter by using mode switch which is located at the upper main body. Setting parameter is the same with right table.

\*2 The following is a figure which indicates change of each digital value corresponding to filter parameter after setting 0~10V input range.



### Remark

- 1) Before changing mode switch, you should turn off the power.
- 2) Filter setting switch is located in the upper body of module as the following figure

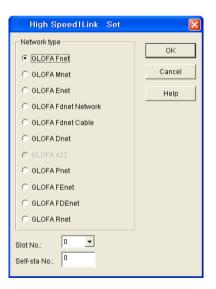


# 5.6.6 Program example

- (1) When using GLOFA Pnet master module
  - 1) SyCon setting method
    - Refer to the Chapter 5.3.3 for use of SyCon.
    - 2) GMWIN setting method
      - A) High Speed Link setting method
        - Open GMWIN's High Speed Link window.

Link set					
Network	ktype:	GLOFA Fnet			
Slot:	0	Self station No.:	0		
					Edit
Entry list					
No.	Туре	Send/Receive	Read Area	Store Area	Size
0 1 2 3 4 5 6 7 8 9 10					
		Delet	e 0	copy	Edit

- Press [Edit] and designate slot location where Pnet master is equipped after choosing GLOFA Pnet.



- Assign memory area to store analog input transformation value by double-clicking the registration list as follows.

High S	peed1Link Otem Edit	×
Station type C Local C Remote	Station No. Mode Send Receive	Block No.
Area From:	©%MW ©%W ©	Send period D(200ms) 💌
To:		Size(Word)
	OK Cano	el Help

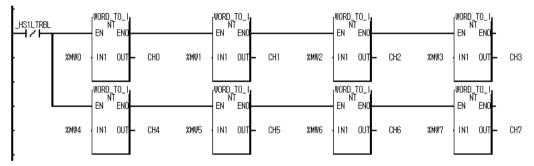
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- Analog input module use 2 byte per channel and one analog input module consist of 8 channel and 16 byte.

B) Reading analog transformation value in GMWIN

- Because analog input transformation value is signed 10 digit number, to read normal data in GMWIN, read signed value or assign M region's address after declaring variable by using WORD\_TO\_INT function.

(\_HS1LTRBL ahead of transformation function is High Speed Link Flag used not to execute function when error of High Speed Link occurs)



< Example of WORD_	_TO_INT function use>
--------------------	-----------------------

Add/Edit Variables			
Variable D Variable Kind Variable Kind :	VAR	T	OK Cancel Help
Data Type			Memory Allocation
Elementary:	WORD	~	C Auto
C FB Instance :	CTD	~	<ul> <li>Assign(AT):</li> </ul>
C Array (0	) OF BOOL	-	% [ I
Initial Value			
			Init. Array
Comments			

<Example of variable use>

#### (2) When using MASTER-K Pnet

- 1) SyCon setting method
  - Refer to the Chapter 5.3.3 to set SyCon.
- 2) KGLWIN setting method
  - A) High Speed Link setting method

- Open KGLWIN's parameter window.

署 Parameter [kukukeke]	
Basic Interrupt I/O Link1 Link2	
Link: Disabl 💌 Self Station No: 0 💌 Base: 0 💌 Slot: 0 💌 Type: Fnet 💌	
No Station Unit Type Tx Device Rx Device Size Block No Period	~
μ	
2 3	
4 5 6 7	
	Ξ.
9 10	
13	
14 15	
16 17	
18	
20	
22	
23 24	
25	
27	
29 29	
8 9 10 11 12 13 14 15 16 16 16 18 19 20 20 20 20 20 20 20 20 20 20 20 20 20	1
- #2	<u>×</u>

- Open setting window by double-clicking the category.

Edit Link				
Station No: Block No:		Tx Device: Rx Device:	P000	OK Cancel
Module Type:	Local Out 💌	Size:	1	
Period:	200 msec 💌			

- As the above, read analog input transformation value and set memory region.

- Analog input module use 2 byte per channel and analog input transformation value is 8 channels per module and 16 byte.

B) Reading analog input transformation value in KGLWIN

- The following program is a simple example which analog input transformation value received from M0 to D region.
- (BLD instruction is used as a point not to execute A/D transformation when High Speed Link No.1 has trouble.)

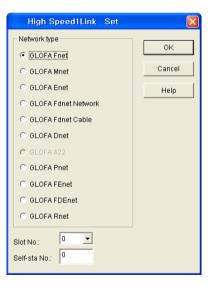
- (2) When using GLOFA Pnet master module
  - 1) SyCon setting method

Γ

- Refer to the Chapter 5.3.3 for use of SyCon.
- 2) GMWIN setting method
  - A) High Speed Link setting method
    - Open GMWIN's High Speed Link window.

_ink set -		01.054.54.4			
	rk type:	GLOFA Fnet			
Slot:	0	Self station No.:	0		
					Edit
Entry list					
No.	Туре	Send/Receive	Read Area	Store Area	Size
0 1 2 3 4 5 6 7 8 9 10					
			ie C	Copy	Edit

- Press [Edit] and designate slot location where Pnet master is equipped after choosing GLOFA Pnet.



- Assign memory area to store analog input transformation value by double-clicking the registration list as follows.

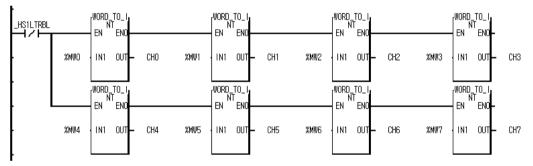
High Speed1Link Otem	Edit	
Station type Station No.	Mode Send	Block No.
C Remote	C Receive	
Area		Send period
From: © %MW © %IW ©	%QW 0	D(200ms) 💌
	%QW	Size(Word)
	OK Cancel	Help

- Analog input module use 2 byte per channel and one analog input module consist of 8 channel and 16 byte.

B) Reading analog transformation value in GMWIN

- Because analog input transformation value is signed 10 digit number, to read normal data in GMWIN, read signed value or assign M region's address after declaring variable by using WORD\_TO\_INT function.

(\_HS1LTRBL ahead of transformation function is High Speed Link Flag used not to execute function when error of High Speed Link occurs)



< Example of WORD_	_TO_INT function use>
--------------------	-----------------------

			_
Add/Edit Variables			
Variable D Variable Kind Variable Kind :	VAR	×	OK Cancel Help
Data Type			Memory Allocation
Elementary:	WORD	~	C Auto
C FB Instance :	CTD	~	<ul> <li>Assign(AT):</li> </ul>
C Array (0.	) OF BOOL	-	% [ I
Initial Value			
			Init. Array
Comments			

<Example of variable use>

#### (3) When using MASTER-K Pnet

- 1) SyCon setting method
  - Refer to the Chapter 5.3.3 to set SyCon.
- 2) KGLWIN setting method
  - A) High Speed Link setting method

- Open KGLWIN's parameter window.

asic	Interru	pt I/O	Link1	Link2						
Link:	Disabl 💌	Self Station	No: 0	▼ Base: 0	▼ Slot: 0	▼ Type: Fi	net 💌			
0	Station	Unit Typ	e	Tx Device	Rx De	/ice	Size	Block No	Period	
						Q				
						- <b>u</b>				

- Open setting window by double-clicking the category.

Edit Link				X
Station No:		↓ Tx Device:	P000	OK
Block No:		Rx Device:		Cancel
Module Type:	Local Out 💌	Size:	1	
Period:	200 msec 💌			

- As the above, read analog input transformation value and set memory region.

- Analog input module use 2 byte per channel and analog input transformation value is 8 channels per module and 16 byte.

B) Reading analog input transformation value in KGLWIN

- The following program is a simple example which analog input transformation value received from M0 to D region.
- (BLD instruction is used as a point not to execute A/D transformation when High Speed Link No.1 has trouble.)

- BN	D4600	00001	 MOV	M000	D0000
1 1					

## **Chapter 6 DeviceNet Communication**

#### 6.1 Overview

DeviceNet was born to meet the demand to replace the high-cost analog 4~20mA standard with simple digital standard and is the communication link to connect various kinds of industrial devices such as limit switch, photo electronic sensor, motor controller, inverter, barcode reader, panel display etc. to the network. The characteristics are low cost, simple installation, excellent compatibility with other maker's device as well as outstanding application in the network application such as Master/Slave, Multiple Master, and Peer-to-Peer etc. As DeviceNet uses CAN (Controller Area Network) protocol as it is and system response time is short, and the reliability is high, the production cost shall be low as we can use CAN chip with low cost.

DeviceNet Smart I/O module has the following characteristics.

- The real time control is available to communicate various I/O machines that are the lowest in the network system.
- One master module can control 63 slave module and max. 2,084 points I/O control is available.
- Network installation is flexible as multi drop and T branch connection is available.
- Available to connect the master module of LS ELECTIRC and various slave module of other maker.
- Available to configure the system with the slave module of LSIS and other maker's master module.
- Available to set station number (MAC Address) with hardware. (0 ~ 63 stations).
- The communication speed is set automatically according to the master setting.
- Available to install 2 master modules in GLOFA-GM4 and GM6.
- Available to equip 12 master modules in XGK/XGI.

• GLOFA\_GM /MASTER-K series communication is possible by simple setting high-speed link parameter, XGK/XGI series communication is possible by simple setting high-speed link parameter and SyCon(XGL-DMEA) or nConfigurator(XGL-DMEB).

- Available to communicate by *High-speed Link* parameter setting.
- Available to connect with various slaves I/O.
- Supports Poll, Cos, Cyclic, Strobe method as communication method.

• It is connection based communication, by using Explicit Messages, sends/receives real data through I/O message while connected with master.

It is used widely for general I/O, actuator, near-by switch, light switch, valve, inverter, A/D module, D/A module, position control, HSC, RTD etc.

# 6.2 Communication Specification

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# 6.2.1 Frame Specification

	Items		Performance Specification		
	Communication speed		125/250/500kbps		
	Communication distance (Thick) <sup>[*1]</sup>		500/250/100m		
	Max, duan	125 kbps	6m(max. extension 156m)		
	Max. drop	250 kbps	6m(max. extension 78m)		
	length	500 kbps	6m(max. extension 39m)		
	Data packet		0~8 Byte		
Transmission	Network structure		<ul> <li>Trunk/drop line</li> <li>Power in the same network/signal cable</li> </ul>		
specification	Bus method <sup>[*2]</sup>		Poll, Strobe, COS/Cyclic method		
	Max. node number		Max. 64 MAC ID/MAC Identifier		
	System type		Node insertion and removal in the status of voltage ON.		
	Action voltage		DC 24V (tolerance range: DC11~25V)		
	Diagnosis f	unction	The duplicate station check /bad station monitor /CRC error Check		

## 6.2.2 Slave Specification

1) Block type

Са	tegory	Specification		
Mod	ule type	slave		
Communication speed setting method		Auto baud rate		
C	able	Class 2 Thick/Thin Cable (Allen-Bradley standard)		
Communi	cation speed	125/250/500 Kbps		
Communicatio	n distance (Thick)	500/250/100 m		
Max due a	125 Kbps	6m (max. extension 156m)		
Max. drop	250 Kbps	6m (max. extension 78m)		
length	500 Kbps	6m (max. extension 39m)		
Data	n packet	0 ~ 8 Byte (64 Bits)		
Network	construction	<ul> <li>Trunk/Drop line</li> <li>Power/Signal line in same network</li> </ul>		
Communic	cation method	Poll, Bit-strobe, COS/Cyclic method		
Max. node		Max. 64 MAC ID (Including master) 32 I/O per node (max. 2,048 I/O)		
Syst	em type	Node insertion/removal in voltage ON		
Operati	on voltage	DC 24V (Tolerance range: DC11V~ 28.8V)		

#### 2) Expansion type

Ca	tegory		Specification			
		Poll, Bit-strobe, COS/Cyclic				
Communic	ation interface		Group 2 only slave			
			Auto baud rate			
Mast	ter/slave		Slave			
Max	. station		64 (including master)			
Max. No. of exter	nsion I/O equipment		8			
Max. digital I/O po	pint	512 point (input max 256 point/output max 256 point)				
Max. No. of ar	nalog I/O channel	Input 16 channels (output 16 channels)				
Communication	speed	125 kbps	250 kbps	500 kbps		
speed and distance	distance	500 m	250 m	100 m		
	Rated input voltage	DC 24V				
	Power range	19.2V ~ 28.8V (available to operate in 11V)				
Input power	Output		5\/(+20%) /1 5A			
	voltage/current		5V(±20%) /1.5A			
	Insulation		Non-insulation			
Basic specification	Weight (g)		100			

## Remark

- The transmission distance of Smart I/O module is in inverse proportion to data transmission ratio and when using Thin cable, the transmission distance is limited to 100m regardless of data transmission ratio.
- 2) For cable manufacturing and installation, please contact and discuss with the experts.

### 6.3 Communication Parameter Setting

DeviceNet should generally set the slave station that the master module will communicate with and set the station number, communication method, data size to communication, communication period necessary for the communication with the slave in order to enable to communicate. The files set as above are called "Scanlist file" with which the master module communicates with the slave module. Thus, after setting the Scanlist file such a service type, communication speed, station number etc. from *High-speed Link* parameter edit menu, Dnet I/F module begins to communicate by receiving all the setting Scanlist file from CPU.

In order to communicate with SMART I/O DeviceNet module, *High-speed Link* communication service is used. This function is used when changing the data and information of other station periodically at every specified time. By referring the changing data of the self-station or other station each other periodically, it enables to utilize the data to the system effectively and simply carry out the communication by setting the parameter.

The parameter setting method is to designate its self area and the area of other station to send or receive and data size, message type, station no. in GMWIN *High-speed Link* parameter and then carry out the communication. In XG-5000, it communicates by designating its self area and the area of other station by using XG5000.

Data size is available to communicate at least 1byte up to 256bytes (2,048 points) and the communication period is available to set min. 5ms up to 10sec. according to the communication contents. As it is available to communicate with other station by simple parameter setting, it is easy to use this program and the High-speed process of internal data enables to process lots of data at the same time periodically.

The following table shows High-speed Link point per communication model.

Class	ification	Max. communication point	Max. block no.	Others		
	GDL-TR2A	16 points	64 (0-63)	Output module		
	GDL-TR4A	32 points	64 (0-63)	Output module		
	GDL-RY2A	16 points	64 (0-63)	Output module		
SMART I/O module	GDL-DT4A	32 points	64 (0-63)	Combined module		
module	GDL-D22A	16 points	64 (0-63)	Input module		
	GDL-D24A	32 points	64 (0-63)	Input module		
	XDL-BSSA	256 점	64 (0-63)	Adapter module		

Max. Communication Point per model

#### Remark

- 1) It is divided into A/B/C/C1 according to I/O characteristic, but communication point is same
- 2) For further information for master setting, please refer to the user's manual for DeviceNet.

## 6.3.1 High-speed link

High-speed link is High-speed communication service which receives and transmits data by setting the High-speed link parameter. The user can set the data size, transmitting/receiving area and storage area by using High-speed Link parameter.

#### (1) High-speed Link station setting function:

- (a) When there are various transmitting/receiving region, each receiving and transmitting can have max.32 setting and total 64 setting.
- (b) The maximum setting Byte is 256 Byte per station.
- (c) The maximum link point is 2,048 point.

## (2) Transmitting/receiving region setting function:

According to the setting of I/O address, it is available to set the transmitting/receiving region for each station.

## 6.3.2 High-speed Link communication status flag information

(1) High Speed Link information fuction

High-speed Link flag information gives the user a method to check High-speed Link service status for reliability of data red from other station. Namely, there are TRX\_STATE, DEVICE\_MODE, DEVICE\_ERROR's each information, which inform communication status according to each 64 register category in parameter.

The user uses it as a method for emergency or maintenance by combining the above information stored as a keyword type with High-speed Link transmitting/receiving data.

Classification	Transmitting/receiving status TRX_MODE	RUN mode DEV_MODE	Error DEV_ERROR
Type of information	Each information	Each information	Each information
Key Word Name (□=High-speed Link Number 1,2,3,4)	_HS□TRX[n] (n=each parameter 0~63 )	_HS⊡MOD[n] (n= each parameter 0~63 )	_HS□ERR[n] (n= each parameter 0~63 )
Data Type	BIT-ARRAY	BIT-ARRAY	BIT-ARRAY
Monitoring	Available	Available	Available
Use of Program	Available	Available	Available

#### High-speed Link information

(a) Transmitting/receiving status (\_HSDTRX[0..63])

If each parameter operation set in each parameter registration number (0~63) operates according to transmitting/receiving period, each bit is On, otherwise Off.

(b) RUN mode (\_HSDMOD[0..63])

It indicates the mode information of parameter operation set in each parameter registration number (0~63). If the station set in registration is RUN mode, each bit is On. If STOP/PAUSE/DEBUG mode, then Off

(c) Error (\_HS□ERR[0..63])

It indicates the parameter error information set in each parameter registration number (0~63). The error signal means that the PLC can't execute the user program properly.

When Off, other station is not under normal operation.

When On, other station is under normal operation.

## Remark

Keyword contents used in category (a) ~ (c)

**□**: Indicates the High-speed Link number (1, 2, 3, and 4) used in setting parameter.

(Generally, if the number of communication module equipped is 1, we use the High-speed Link 1)

**[0..63]**: indicates the registration number of each parameter in the left figure of [Figure 6.2.2(E)] (Checks the communication status according to each parameter in 0~63's each registration number

## 6.3.3 High-speed Link information monitor (GMWIN)

After connecting the GMWIN online, we can monitor by using the monitor function. We have two methods for monitoring. (Variable Monitor and Parameter Monitor)

(1) Variable Monitor

By using the Variable Monitor, we can monitor the necessary category.

The sequence is as follows

(a) Select the Variable Monitor in the Monitor category of online.

- (b) Select the Flag in the variable registration screen.
- (c) Select the High-speed Link information flag which you want to monitor in the variable, flag list screen and register. (\_HSxERR[n], \_HSxMOD[n],\_HSxTRX[n] is ARRAY flag so you should input the registration number that you want to monitor in the parameter directly).

T X

\* 'x' indicates High-speed Link No., [n] indicates the each parameter No.(0~63)

- ∃,∛ariable	Resou Instance	Variable name	Variab
Configuration global variable	Flag	_HS1ERR[1]	0
Resource global variable	Flag	LHS1ERR[2]	ō
🖶 Instance variable	Flag	_HS1ERR[3]	Ō
Direct variable	Flag	_HS1ERR[4]	Ō
Flag	Flag	_HS1ERR[5]	Ō
1.003	Flag	_HS1ERR[6]	Ō
	Flag	_HS1ERR[7]	Ō
	Flag	_HS1ERR[8]	Ō
	Flag	_HS1TRX[1]	0
	Flag	_HS1TRX[2]	0
	Flag	_HS1TRX[3]	0
	Flag	_HS1TRX[4]	0
	Flag	_HS1TRX[5]	0
	Flag	_HS1TRX[6]	0
	Flag	_HS1TRX[7]	0
	Flag	_HS1TRX[8]	0
	Flag	_HS1MOD[1]	0
	Flag	_HS1MOD[2]	0 0
	Flag	_HS1MOD[3]	0
	Flag	_HS1MOD[4]	0
	Flag	_HS1MOD[5]	0
	Flag	_HS1MOD[6]	0
	Flag	_HS1MOD[7]	0
	Flag	_HS1MOD[8]	0

Registration screen of High-speed Link information variable

(2) Link parameter monitor

You can monitor the communication status in the parameter category directly by using this function. If you select the parameter window category in the [View] menu of the GMWIN online connection, the parameter monitor screen opens and registration list set in the above shows.

In the link parameter monitor, each information about mode (run mode), communication (transmitting/receiving status) and error is indicated according to the parameter category.

ın_Link∶O	Link_Trouble: O	HS Link 1				
No Type	Class	From Area To Area	S Mode	Trx	Error	
0			0	0	0	
1			0	0	0	
2			0	0	0	
3			0	0	0	
4			0	0	0	
5			0	0	0	
6			0	0	0	
7			0	0	0	
8			0	0	0	
9			0	0	0	
10			0	0	0	
11			0	0	0	
12			0	0	0	
13			0	0	0	
14 15			0	0	0	

Example of High-speed Link monitor screen (example)

The meaning of value monitored above figure is as follows.

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• Mode 1: It indicates that station address (6 stations) set at each parameter is RUN mode

It is '0' when mode is STOP/PAUSE/DEBUG

- <u>Communication 1</u>: As contents set in parameter registration address, it executes proper communication and express minus.
- Error 0: As contents set in parameter registration address, it indicates that error does not occur during communication.

## 6.3.4 High-speed Link Service (GMWIN)

SMART I/O Dnet module sets its self station no. to communicate with the master module by using the rotary switch and the communication speed is set automatically according to the master module setting. To control the single type remote module, it is available to communicate only by *High-speed Link* parameter setting in GMWIN and easy to interface with the module of LSIS and other maker's.

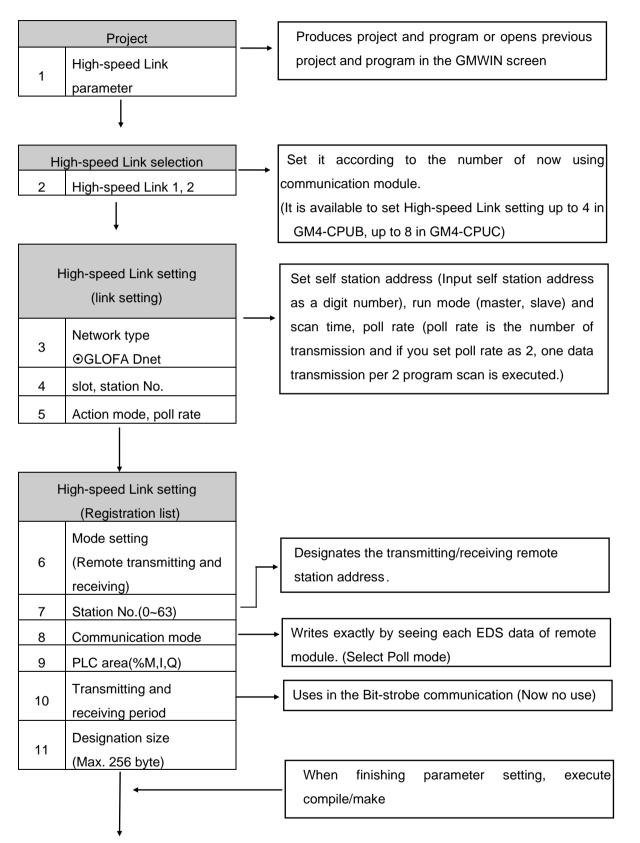
The following table shows the basic configuration of the single type remote module.

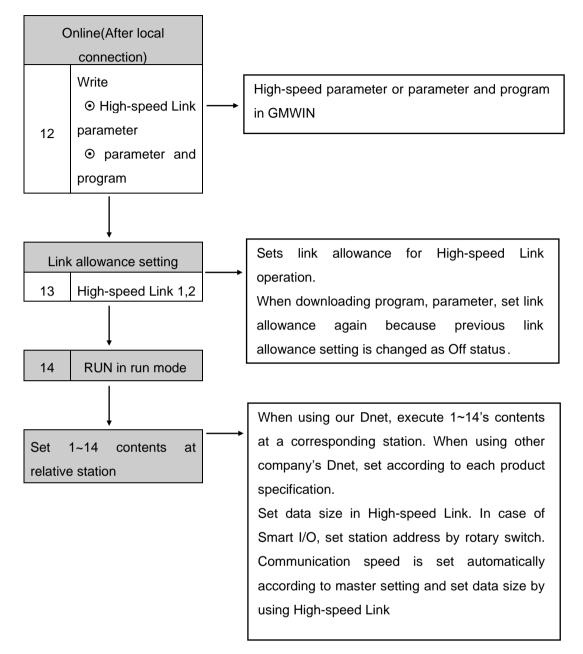
Module name		Contents	Service mode		
		GDL-TR2A	TR output 16 points		
		GDL-TR4A	TR output 32 points		
GLOF		GDL-DT2A	DC/TR combined 16 points	Poll, Strobe, COS/Cyclic service	
GLUF	A-GIM	GDL-D22A	DC input 16 points		
		GDL-D24A	DC input 32 points	Service	
		GDL-RY2A	Relay output 16 points		
Other	OMRON	DRT1-OD08	TR output 8 points	Poll service	
maker's		1794-OB16	TR output 16 points		
example	A.B	1794-IB16	DC 24V input 16 points	Poll service	

Specification of single type remote module

ScanList is the communication information data that the user must set so that the master module carries out the predefined communication with the slave module when the power ON. Thus, the user is required to set the information for the slave module to communicate with Dnet I/F module by using *High-speed Link* parameter.

The following is the setting method for High-speed Link parameter.





\* In case of GM4-CPUB, it is available to set High-speed Link 1,2,3,4

\* In case of GM4-CPUC, it is available to set High-speed Link 1,2,3,4,5,6,7,8

The following describes the method to set the Scan list by using *High-speed Link* parameter for Dnet communication.

First, select the project file which is suitable for CPU type by using GMWIN and then select *High-speed Link* parameter from the project file and finally select 'High-speed link 1'.

High-speed Link parameter selection screen

Г

High Speed Link Parameter	×
High Speed Link 1	Close
High Speed Link 2	Help
High Speed Link 3	
High Speed Link 4	

After selecting 'High-speed link 1', select '<-' mark from the below figure to set the slot position that Dnet I/F module is installed, station no, action mode and scan time and poll rate.

You can see the following screen by click 'High Speed Link 1'

#### Parameter setting initial screen

Netwo	ork Type:	GLOFA	Fnet			
Slot:	0	Self Statio	on No: 0		Edit <	Clic
-Entry Lis	t Type	Class	From Area	To Area	Size	
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15					×	
		De	lete Co	ру	Edit	

The following figure shows when you press 'Edit' button. Network type, Slot Num, Scan Time, Sele-station number and Pollate can be set

High-speed Link 1 set screen	
High Speed1Link Set	×
Network Type	ок
O GLOFA Fnet	
C GLOFA Mnet	Cancel
C GLOFA Enet	Help
C GLOFA Fdnet Network	
C GLOFA Fdnet Cable	
GLOFA Dnet	
O GLOFA 422	
C GLOFA Pnet	
C GLOFA Rnet	
Slot Num Scan Time	5 msec
Self-stat Num 🛛 Pollate	l'

When setting the network type, slot no., self-station number, delay scan time, poll rate etc, the registration list no.'0' shall be set automatically in the self-station and for the registration list no.1~63, the module that the user wants to communicate shall be set.

The following screen shows when you click 'entry list 1'. Output slave module's information is registered.

HighSpeedL1nk It1m E	Edit		×
Mode Remote Send Remote Receive	Station No	Communicatio	n Mode
Area PLC Area © %MW ©	%IW © %QW [	0	Send/Receive
	ОК	Cancel	Help

Mode and Communication area setting screen (GDL-TR2A/B/C1/C)

The following describes the sending data setting method of smart I/O output module. From the parameter menu, you set module's type (Input or output) in the 'mode', slave module's station address in the 'station addresses, and set as Poll which is communication method of slave module in the 'communication mode', set self data area to send in the 'area', set output module's data size as 2 byte in the 'size'. Slave module don't have parameter to set, according to communication speed, it is controlled by master module.

### Link setting description

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Classification	Description
Network type	This is to set the communication module type by 'GLOFA Dnet'
Slot no.	For the slot no. that the desired communication module to set is installed, select one from the range 0~7. (The right side of CPU module is '0' slot.)
Self station no.	Enter the self-station no. that is set in the station number switch of communication module front side. It is available to set 0~63 by decimal number but it is not allowed to use duplicate station no. as the self station no. is the unique number to distinguish communication module in the same network system.
Scan time	This is the scan delay time (msec) to delay to next scan after Dnet I/F module scanned the slave module all.
Poll rate	This is the rate that Dnet I/F module scans the slave module. That is, if the value is '2', this means that after scanning Dnet I/F module twice, one time 'poll' shall be executed for the module of station number set in the parameter.

In order to communicate with output module (GDLTR2A(B/C/C1)/RY2A(B/C/C1)/TR4A(B/C/C1)) among Dnet remote module, it is required to set the sending only. The receiving setting is not required.

		ication	Description			
	R	emote sending	Sends the data to SMART I/O output module.			
Mode	Remote receiving		Receives the data from SMART I/O input module.			
\$	Statio	n no.	Designates the station no. of single type I/F module to communicate.			
		Poll	Performs Poll service.			
Communica	ation	Strobe	Performs Strobe service.			
mode		COS	Performs COS service.			
		Cyclic	Performs Cyclic service.			
	In case of Remote sending mode		Designates the sending data area of the self-station to send to the SMART I/O output module.			
Area	Area		Designates the area of the self-station to save the data received from SMART I/O input module. (%IW area Disable)			
Sending/receiving period (msec)		g period (msec)	Sets the sending/receiving period of the data.			
Size (byte)		byte)	Sets the data size to send/receive and in case of communication between self-station, the unit is 2bytes and in case of communication with other makers, the data size shall be set as the byte that the corresponding module requires.			

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High-speed Link parameter setting description (master module setting)

In order to communicate with input module among SMART I/O DeviceNet module, it is required to set the parameter related with receiving only (one of the entry list) as shown on the figure. The sending setting is not required.

HighSpeedL1nk It2m E	Edit		×
Mode C Remote Send Remote Receive	Station No	Communication Poll Strobe COS Cyclic	on Mode
Area PLC Area  ⓒ %MW  ⓒ	%IW O %QW [	100	Send/Receive 50 ¥ Size(Byte)
	ок	Cancel	Help

Mode and Communication area setting screen (GDL-D22A)

Γ

The following shows the setting to communicate with station 1,2 using Poll service.

High-speed Link parameter sending/receiving setting

– Link Set – Networ	rk Type:	GLOFAE	Onet	Scan Time :	5 msec
Slot:	0	Self Station	n No: 0	Pollate :	1 Edit
- Entry List	Туре	(msec Class	۱ From Area	(bvte) To Area	Size
0 L0.X9 1 R1.S 2 R2.R 3 4 5 6 7 8 9 10 11 12 13 14 15	PL	5	% MVV0 % MVV1 00	2	
		Del	ete Co	эру	Edit
				Close	Help

## Remark

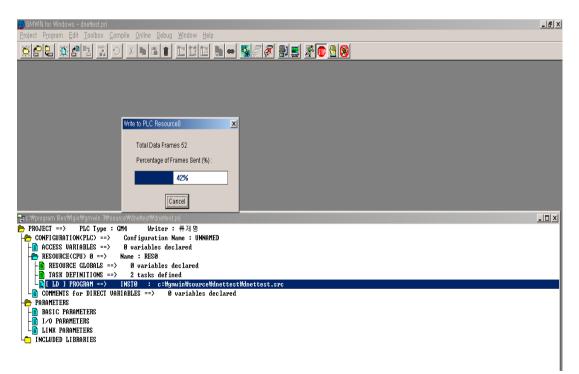
- 1) When communicating with the single type I/F module of other maker, the setting method is the same as GLOFA-GM series and only data size shall be set as follows.
  - DRT1-OD08 : 1 byte
  - 1794-OB16/IB16 : 4 bytes
- 2) When setting *High-speed Link* in the master (G4/6L-DUEA), in case of the combined module (GDL-DT4A/B/C/C1), it is not available to connect if setting only with input. If setting only with output or the combined, the connection shall be done normally.

#### The meaning of Poll service setting

Scan type	Sending period	PLC area	Size	Description
R1.S PL	5×1 = 5msec	%MW0	2	Sends 2 byte data in %MW0 to the station 1 every 5msec by using Poll Request.
R2.R PL	-	%MW100	2	Saves 2 byte received by station 1 using Poll Response in %MW100.

\* Here the sending period is Scan time  $\times$  Poll rate.

#### Program Write



As shown above, in order to communicate with Dnet master module and Smart I/O module, the user should check the slave information correctly and then set *High-speed Link* parameter. Thus, after setting *High-speed Link* parameter correctly, the user can download it through the online connection of GMWIN.

High-speed Link Enable link

Γ

Set Link Enable		×
H-S Link 1	🗖 H-S Link 2	
Ok	Cancel Help	]

If program download is completed, Enable the 'link enable' setting in the online menu. If Enable is confirmed, change the CPU program mode with RUN. If the mode is changed with RUN, the data sharing begins immediately and the communication starts.

## 6.3.5 High-speed Link information monitor (KGLWIN)

We can monitor High-speed Link information by using monitoring window and [Read Info.] menu after connecting the KGLWIN online. We have the following two methods for monitoring

#### (1) Flag monitor

We can monitor necessary monitor which we want to check by using flag monitor menu of KGLWIN. First, if select flag monitor button in the monitoring window, the lower flag monitor screen shows. And pressing ( $\bullet$ ) button, the flag registration screen shows. Select High-speed Link information flag and register it in flag registration screen. For flag information, refer to the Appendix's flag list. If monitor does not operate, check whether monitor mode is START MODE or not.

😐 Ma	onitor [New P	roject1]				
Bit	Word Double	e Word Flag	Device CORXECNT	Nun	1 I 🔻	
No	Device	Alias		Sett Sett	ing Value	Comment
			_C0SCANMN _C0SCANMX _C0STNOH _C0STNOL _c0SVBSY _C0SVCFCNT _C0TXECNT _C0VERNO	×		
<						>

Flag monitor screen and flag registration screen.

× :	Bit	Word Double Wo	rd Flag	Device			-	Num 1	~	
🖃 🗋 New Project1 [K120S]	No	Device	Alias		Current	Value		Setting	Value	Comment
📋 Program	0		D4605							
🗐 Parameter	1	_HS0ERR[31-16]								
-	2	_HS0TRX[15-0]	D4609							
🔤 🗐 Variable/Comment										
🛄 Monitor										

Flag monitor screen (flag is registered)

(2) High-speed Link parameter monitor in information reading

If you select High-speed Link parameter in Menu Online-Info., we can see specific information about Highspeed Link parameter as follows

High-speed Link parameter monitor

Γ

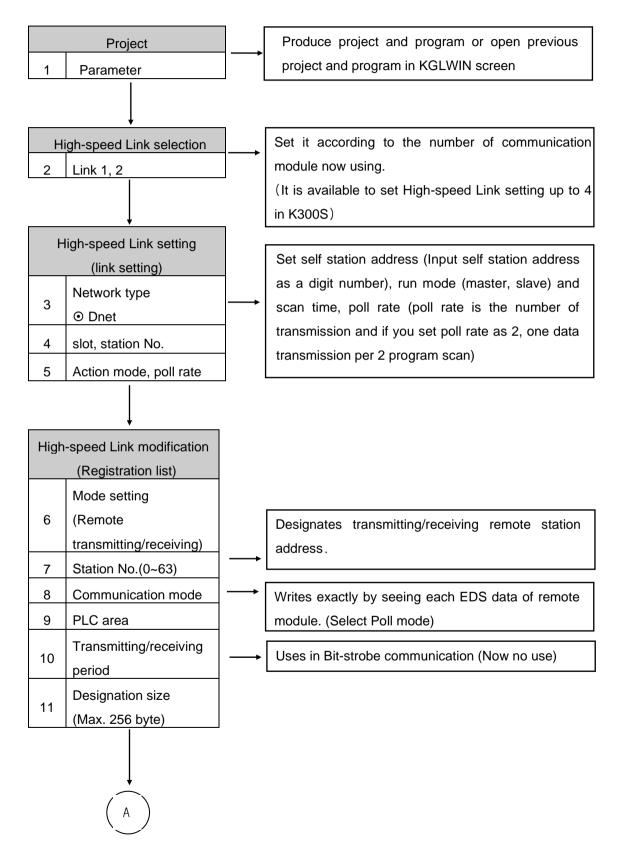
Link li	nformation	/Station No:00						
	zaluyoney	/Station No.00						
No	Station No	Kind	Device	Length	Period	Com	Mode	Trx
0	0 1	Remote Send Remote Send	S19967 D0000	0 2	50 m 50 m	Poll Poll	O	'n
2	i	Tiemble Bend	M000	2	50 m	Poll	ŏ	0
•								Þ
			Oł	<				

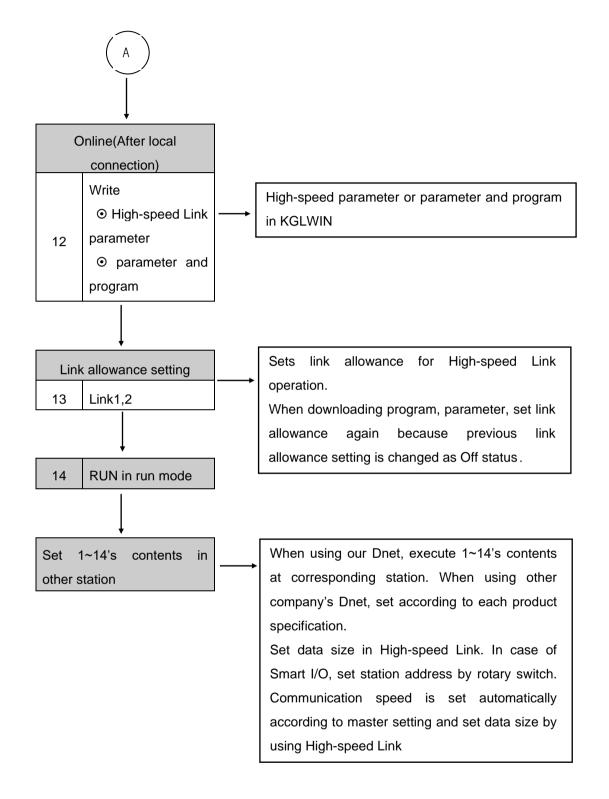
(3) Link information monitor in Read Info.

If selecting Menu Online-Read Info. - Link Info., you can monitor link status of communication module equipped according to the slot.

Link Inform	ation		X
Slot No	Network Type	Station No	
0	GLOFA Dnet	00	
,			
[[	07	Metrovie Tufermetica	
<u> </u>	OK	Network Information	

## 6.3.6 Sequence of High-speed Link setting (KGLWIN)





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## 6.3.7 High-speed Link operation (KGLWIN)

After finishing parameter setting pressing [OK] button, if you execute parameter download, High-speed Link service starts. When doing this, each link should be allowance status. Next figure is screen downloading the parameter, if you select menu-online-download, the following figure shows

Download to PLC ( k	(Glwin => P 🔀
I Parameter I Program From 0	To 10239
ОК	Cancel

Parameter downing loading screen

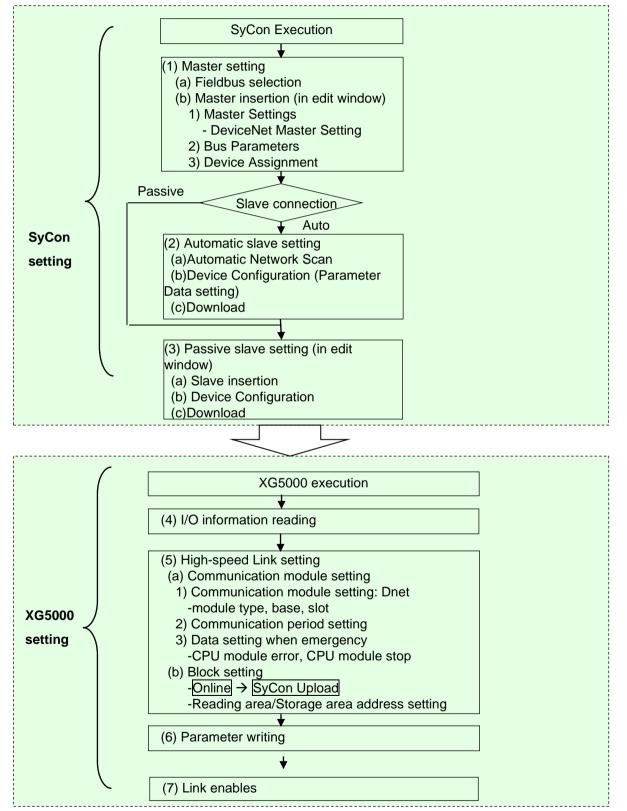
High-speed Link downloading is available when PLC mode is PLC STOP mode. And if you start by High-speed Link allowance, it executes High-speed Link regardless of the PLC mode. Parameter and Link allowance information is reserved when POWER is off by battery back up. The following table explains PLC mode's relation with High-speed Link operation

Mode	Parameter download	High-speed Link operation	Reference
RUN	Х	0	High-speed Link operates regardless of PLC mode wher High-speed Link allowance
STOP	0		
PAUSE	Х		
DEBUG	Х	0	

## 6.3.8 Sequence of High-speed Link setting (XG5000)

Set the XG5000 After setting the SyCon.

If SyCon is not set properly, you can't communication.



#### (1)SyCon execution

Sets basic parameter about Dnet communication between master and slave.

In order to configure master and slave, it has two method as follows.

(a) configuration by EDS file

Merit: setting early about actually unconnected slave

Demerit: if it is not set correctly, communication is not conducted.

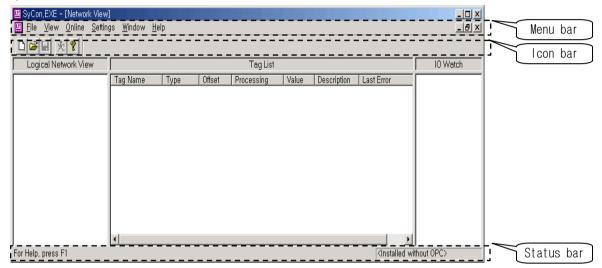
(b)Auto Scan method

Merit: speed is fast and able to set parameter fast.

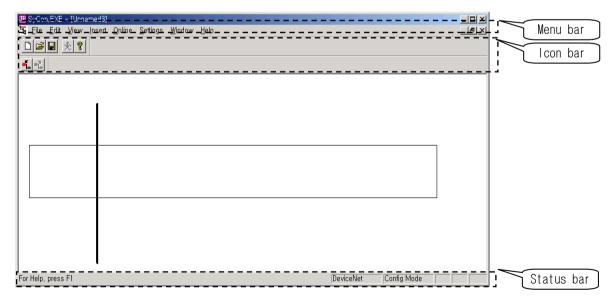
Demerit: it is limited to slave actually connected to network

Therefore, you should choose proper method according to user needs

1) Initial screen execution



#### [Network screen]



[Edit screen]

## 2) Configuration menu

Γ

Main menu	Sun menu		Description	reference
	<u>N</u> ew Ctrl+N	New	Make new files	M/S
	Open Ctrl+O	Open	When opening the previous files	M/S
	Close	Close	When closing the activated files	M/S
	Save Ctrl+S	Save	When saving the activated files	M/S
	Save <u>A</u> s	Save As	When saving the activated files as another name	M/S
	Export >	Export	When sending the project files	M/S
File	Copy EDS		DBM When opening the file of DBM extension	M/S
	Print Ctrl+P	COPY CSV	CSV When opening the file of CSV extension	M/S
	Print Pre <u>v</u> iew	Print	Print	M/S
	Print Setup	Print Preview	Preview print	M/S
	Recent File	Print Setup	Setting the print	M/S
	Eula	Recent File	Indicates the recent files.	M/S
	Exit	Exit	When exiting the SyCon	M/S
	Cu <u>t</u> Ctrl+X	Cut	Cut	S
	Copy Ctrl+C	Сору	Сору	S
Editer	Paste Ctrl+V	Paste	Paste	S
	<u>D</u> elete Ctrl+L	Delete	Delete	S
	<u>R</u> eplace Ctrl+R	Replace Replace		M/S
			Indicates Network setting status(MAC ID,Master/Slave) as Table form	M/S
		Address Table Shows address of slave module and I/O size.		M/S
	Device Table Address Table	Logical Convert as initial screen's Logical View in the en		M/S
View	✓ Logical Network <u>V</u> iew     Toolbars	Stan dard	When activating the basic menu bar.	M/S
	✓ <u>S</u> tatus Bar	Toolbars Fiel dbu s	When activating the Insert Icon menu bar	M/S
		Status Bar	When indicates Status Bar in the SyCon basic window.	M/S
Insert	<u>M</u> aster	Master	When inserting the master module	M/S
inseit	<u>D</u> evice	Device	When inserting the slave module	M/S

\* M in the reference category: It means master and it is sub-menu activated when selecting the master in the edit window.

S: It means slave and it is sub-menu activated when selecting the slave in the edit window.

Main menu	Sub-menu		Description	Reference
		Download	When downloading the SyCon setting file	М
		Start Debug Mode	When seeing the present connection status	М
	Download Ctrl+D	Device Diagnostic	When seeing the saved diagnosis information	М
	Start Debug Mode	Firmware Download	When downloading as Firmware	М
	Device Diagnostic,,,		When resetting Firmware	М
	Firm <u>w</u> are Download	Extended Device Diagnostic	Device's extended diagnosis	М
	Eirmware / Reset, Extended Device Diagnostic Ctrl+T	Global State Field	When seeing the present status of communication and module	М
	<u>G</u> lobal State Field, Live List I/O Monitor,	Live List	When seeing information and status according to station address	М
Online	Message Monitor	I/O Monitor	Shows I/O data	М
		Message Monitor	Analysis data between master and slave	М
	Automatic Networ <u>k</u> Scan,	Automatic Network Scan	When setting the network automatically	М
	Get Device Attribute / Set Device Attribute,,, Start Communication,,,	Get Device Attribute/ Set Device Attribute	When changing the slave characteristic value	S
	Stop Communication	Start Communication	When operating the communication	М
	Devi <u>c</u> e Info,	Stop Communication	When stopping the communication	М
	Activate Driver, Device Info		Indicates Device's manufactured data, serial number	М
	R <u>e</u> ad Project Information,	Activate Driver	When selecting the connection driver with PC	М
		Read project Information	Indicates project information	М
		Device Assignment	Sets method to communicate with Host	М
	Device <u>A</u> ssignment Ctrl+B <u>B</u> us Parameters	Bus Parameters	When setting communication speed and parameter	
	Master Settings	Master Settings	Master module's setting	М
o	Device <u>S</u> ettings Device Config <u>u</u> ration	Device Settings	-	-
Settings	✓ Auto Addressing	Device Configuration	When setting slave parameter	S
	Project Information	Auto Addressing	When allocating the address automatically	M/S
	Path	Project Information	Sows project's information	M/S
	Language	Path	Route of EDS setting file and project file	M/S
	Farigon2011	Language	Language selection	M/S
Window	<u>C</u> ascade Tile	Cascade	When setting window array as cascade	M/S
	1 Network View ✓ 2 Unnamed2	Tile	When setting window array as tile	M/S
Help	Help Topics	Help Topics	Seeing HELP	M/S
, icib	<u>A</u> bout	About	SyCon program information	M/S

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\* M in the reference category: It means master and it is sub-menu activated when selecting the master in the edit window.

S: It means slave and it is sub-menu activated when selecting the slave in the edit window.

#### 3) Make New File

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You can auto-set slave through Aut0scan if you set master through 'make new file'.

Classification	Composition screen			
Fieldbus selection	Select fieldbus       DeviceNet       PROFIBUS       Cancel			
Screen configuration	SyCon,EXE - [Unnamed2]         File       Edit       View       Insert       Online       Settings       Window       Help         E       Image: System of the setting of the settin	Config Mode		
Master selection	Insert Master         Available masters       Selected masters         COM-C-DNM       Add >>         Add All >>       Add All >>         << Remove	<u>OK</u> <u>Cancel</u>		
	Master type         EDS File name         Master name           XGT         XGL-DMEA         COMCDNM         COM-C-DNM			

## 4) Master/slave selection

- a) Master
  - (1) Selection

Method	Selection sequence
Method by menu bar	Insert → Master
Method by icon	-t <sub>ex</sub>

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## (2) Insert

Classification	Dnet
Master insert	Insert Master       X         Available masters       Selected masters       OK         Add >>       Add >>       Image: Cancel       Image:
Master selection	Master typeEDS File nameMaster nameXGTXGL-DMEACOMCDNMCOM-C-DNM

## (3) Edit

	Before edit	After edit
Master edit	Sylan EDE - Dimanet()       A ***         E E Eath Yew (nest Online Settings Tools Window Help       Image: Setting	SyCon EXE - [Unnamed]         Elle Edit View Insert Quiline Settings Window Help         Image: Symplectic Settings Window Help         Image: Setting Window Help         Image: Setting Window Help         Image: Setting Window Help         Image: Seting Window Help         Image: Setting<

# b) Slave

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You can execute it after inserting master.

# (1) Selection

Method	Selection sequence	Execution icon
Method by menu bar	Insert $\rightarrow$ Slave	¢Ę.
Method by icon		D

(2) Insert

	Dnet				
Slave insert	Drict         Inset Device         Device filter         Vendor       Condustrial Syste         Type       All         Available devices       Selected devices         GDL-D22A       GDL-D22A         GDL-D74A       Add >>         GDL-T74A       GDL-D22A         GDL-T74A       GDL-D22A         GDL-T74A       GDL-D22A         GDL-T74A       GDL-T74A         GDL-T74A       DES File Bevising       MAC ID         Catalog listing       101       Description         EDS File       GDL-D22A, EDS         EDS File Revision       1,1				
	Slave type     EDS File Name       DC input 16 point     GDL-D22A     G	Slave name GDL-D22A/D22C			
	DC input 32 point GDL-D24A G	GDL-D24A/D24C			
	DC input 16 point Tr output 16 point GDL-DT4A	DL- T4A/DT4A1/DT4B/DT4C/D54C1			
Slave	Relay output 16 point GDL-RY2A G	GDL-RY2A/RY2C			
selection	PLC GDI -TR2A G	DL- R2A/TR2A1/TR2B/TR2C/TR2C1			
	I routput 32 point IGUL-LR4A	DL- R4A/TR4A1/TR4B/TR4C/TR4C1			
	Extension type Smart I/O Dnet I/F XDL-BSSA X module	DL-BSSA			
	Inverter IS5V2_1 IS	S5			

## (3) Edit

		Before edit		ŀ	After edit
Slave edit	Image: Second		0 COM-C-DNM	Constraints of the second seco	Intings Window Help
	For Help, press F1	DeviceNet Co	onfig Mode	For Help, press F1	DeviceNet Config Mode

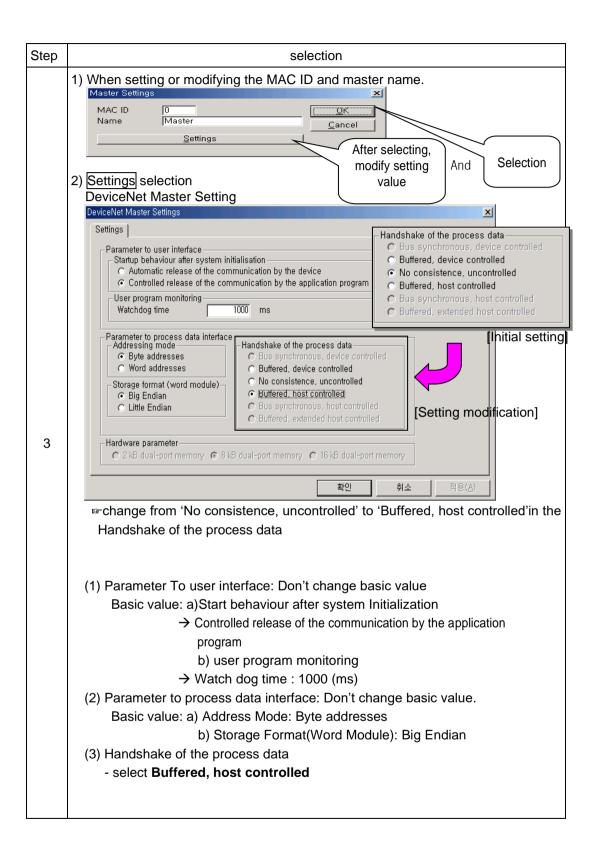
## 5) Master setting

In order to set master, first you should select master which is set in the edit window.

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## a) Setting sequence

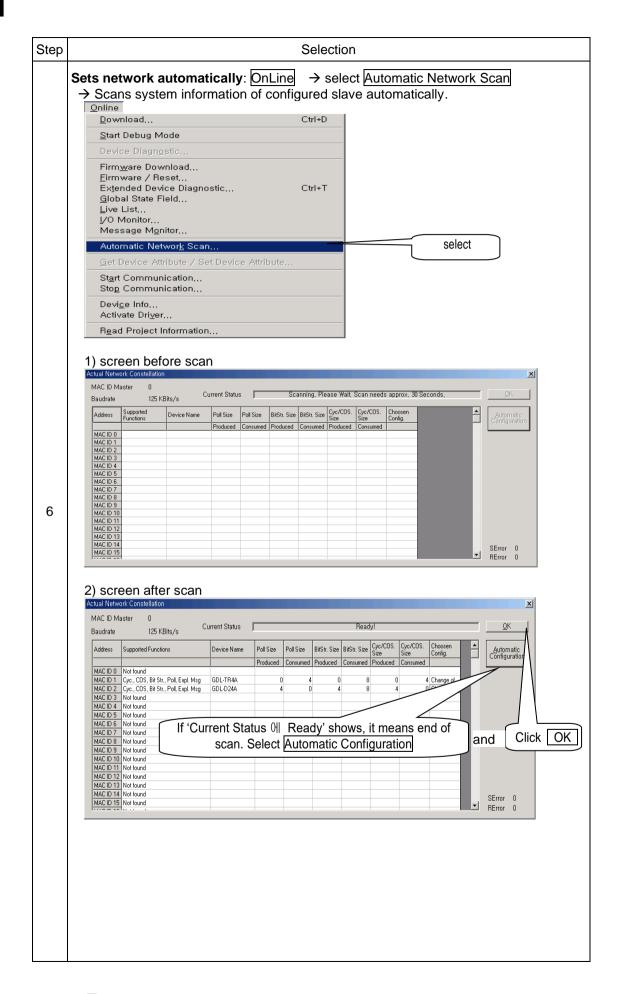
	_
Master	
selection	.1



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tep		selection	
		<b>Frial port selection:</b> Settings $\rightarrow$ Device Assignment selection selects connected port among COM port of PC.	
		ettings	
		Device Assignment Ctrl+B	
		Bus Parameters	
		Master Settings	
		Device Settings	
		Device Configuration,	
	~	Auto Addressing	
		Project Information	
		Pat <u>h</u>	
		Language	
	1)	Initial screen before selecting connection	
	.,	Device Assignment CIF Serial Driver	
		Driver Description	
		Device Driver: CIF Serial Driver	
		Board Selection	
		Name Type Version Date Error □ COM 12 □ COM 12 □ COM 12 □ COM 13	
		Connect COM 4: Connec	n tl
			1 (1
5	2)	Check whether COM port is connected or not	
Ū	ī	→ select 'Connect COM1,, COM4' and check	
		Device Assignment CIF Serial Driver	
		Device Driver: ICIF Serial Driver	
		Board Selection EITOT	
		F51 which is not connected.	
		COM 23 DNM COMCDNM V01.090 17.04.03 0 Connect COM 2	J
			$\leq$
		Connect Commet	
	L	which is connected.	
	3)		/
		Device Assignment CIF Serial Driver	
		Device Driver: CIF Serial Driver OK Cancel	
		Board Selection	
		Name         Type         Version         Date         Error           □ COM ⊥:         □	
		COM 23 DNM COMCDNM IV01.090 117.04.03 10 Connect.COM 21 Select and click OK	
		Connect COM 2 Select and Click OK	
		COM <u>4</u> : Connect COM <u>4</u>	

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Step		Selection											
		→Ind	icates info	rmation	n of :	slave w	/hich i	s configu	red at	the net	work.		
	→Indicates information of slave which is configured at the network. Actual Network Constellation												
	<u>1</u> М/	DMAC ID Master 0											
		2 Baudrate 125 KBits/s (Brent Status)					s j	Ready! (8) (9) (10)		(10)			
		<del>ly</del> ddress	Supported Functions	6 Device Nar	me	Poll Size	Poll Size	BitStr. Size		Cyc/COS. Size	Cyc/COS. Size	Choosen Config.	
						Produced	Consume	ed Produced	Consumed	Produced	Consumed	Coring.	1
			Not found Cyc., COS, Bit	GDL-TR4A		0	)	4 0	8	0	4	1 Change of	
	М		Cyc., COS, Bit	GDL-D24A		4	l.	0 4	8	4		) Change of	
		No. Category Contents											
		1	MAC ID Ma		5-7			Indicates I	master s	tation ad	dress		
		2	Baudrate : 125KBits/s					Indicates t	the comr	nunicatio	on speed		
		(3)	Current Sta	itus				Indicates		•			
		3 Current Status						Ready: co					
		(4)	Address : N	AC ID 0	~ M.	AC ID 63	5	Indicates I					
		5	5 Supported Functions			s		Indicates communication method slave module supplies					
								-Cyclic, COS, Bit-Strobe, Poll					
		6	Device Nar	ne				Connected slave device name					
		(7) F				Produced		-transmits data from slave module to master module -indicates input module information					
			Poll Size				-indicate module's point No. and unit is byte. -transmits data from master module to slave module						
6					Consumed		-indicates output module information - indicates module's point No. and unit is byte						
		8			Produced			-transmits data from slave module to master module -indicate input module information - indicates module's point No. and unit is Byte					
			BitStr. Size			- transmits data from master module to slav - indicates output module information -Indicates information of Max. station a byte		n					
			0.0000	2:	Pr	oduced		<ul> <li>transmits</li> <li>indicate i</li> <li>indicates</li> </ul>	input mo	dule info	rmation		
		9 Cyc/COS. Size		Size	Consumed			<ul> <li>transmits</li> <li>indicates</li> <li>indicates</li> </ul>	output r	module ir	nformatio	n	
		10	Choosen C	-				The user s -setting typ -setting m	pe: Cycli ethod: cl	c, COS,	Bit-Strob	e, Poll	n method
	4		can is finish his time, se										
			use scanne							estion			×
		$\rightarrow$ sele	ects OK				-			🌮 Do	you accept	the configur	ation?
										Ye		No	[
										Ĺ	selec	L	

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Step	Selection
	Edit window after completing Automatic Configuration
	Master MAG ID 0 DeviceNet Master COM-C-DNM
6	Device1 MAC ID 1 DeviceNet Device GDL_TR4A
	Device2 MAC ID 2 DeviceMet Device GDL_D24A
	<ul> <li>For Help, press F1</li> <li>→ Information of slave module configured at the system shows.</li> <li>(In case that you equip analog module to extension type Smart I/O, in order to set analog module's parameter, double-click each module in the above figure and click 'Parameter Data' button in the 'Device Configuration window'. Then set analog module's parameter per each slot. For more details, refer to the Appendix.)</li> </ul>
	System configuration download: select OnLine → Download
	Start Debug Mode
	Device Diagnostic
	Firmware Download       21         Firmware / Reset,       11 the download is done during the bus operation, the communication between the devices is stopped. Do you really want to download?         Extended Device Diagnostic       Ctrl+T         Global State Field       12         Live List       Yes         JO Monitor       Yes
	Automatic Network Scan
7	Get Device Attribute / Set Device Attribute,
	Start Communication, Stop Communication, Device Info,
	Activate Driver
	Read Project Information
	Data base Unnamed2 Length of data base 220 Error 0 0 ∎ 1830 → If download is completed , <u>Download</u> window disappears.
8	Saves the edited system configuraion file:select File $\rightarrow$ Save or Save As

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If you complete the above 8 steps, you can communicate by High Speed Link and SyCon upload( Online  $\rightarrow$  SyCon upload ).

6) Slave module setting (manual setting)

In order to set slave module, select slave set in the edit window.

### a) Setting sequence

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Step	selection
	Select slave in the edit window          Sycon, EXE - [Unnamed2]         Elle Edit View [nsert Online Settings Window Help         Settings Window Help
1	Master MAC ID 0 DeviceNet Master COM-C-DNM Select slave
	Device1       MAC ID     1       Device GDL-TR4A
2	Slave setting : 1) select Settings → Device Configuration 2) select the slave in the edit window and click again by mouse Settings Device Assignment Ctrl+B Bus Parameters Master Settings Device Settings Device Configuration Auto Addressing Project Information Path Language

Step	selection								
			etting parameter edit						
	Dev	vice Confi	guration						
	MAC ID       I       File name       GDL-TR4A_EDS								
		Actual ch	iosen IO connection	Cvclic UCMM check Group 3					
	4	Connection Object Instance Attributes Expected packet rate 200 Production inhibit time 10 Watchdog timeout action Timeout Fragmented Timeout 1600 ms Produced connection size 0 Consumed connection size 0							
	6	Available predefined connection data types           Data type         Description         Data length           BYTE ARRAY         Discrete Output Data         4							
	7	Configure Data type	ed I/O connection data and its offset a Description I Type I Len. I A						
		No.	Category	Contents					
		1	MAC ID & Description	<ul> <li>-setting the slave station address: 0~63</li> <li>-setting slave explanation</li> <li>-Activate device in actual configuration</li> <li>1) When selecting it: existing in the real network.</li> <li>2) When not selecting it: not existing in the real network</li> </ul>					
3		2	Actual chosen IO Connection	-select communication method slave supports: Cyclic, COS, Bit-Strobe, Poll -UCMM Check: It's for slave module which supports function					
		3	Actual Device	Indicates slave configured at the network					
			(4)	Connection Object Instance Attributes	<ul> <li>-Expected Packet Rate: <ol> <li>COS method receiving period of output module.</li> <li>Cyclic method sending/receiving period of I/O module</li> <li>-Production Inhibit Time: delay time between sending/receiving data.</li> <li>-Watchdog Timeout Action: in case of no response at the slave <ol> <li>Transition to timeout :hold error status</li> <li>Auto Delete: delete from network automatically.</li> <li>Auto Reset: return automatically.</li> </ol> </li> <li>-Fragmented Timeout: Max. response time when sending data to slave module more than 8 byte.</li> <li>-Produced connection size: slave output data size</li> </ol></li></ul>				
		(5)	Parameter Data	Analog module's parameter setting window					
		6	Available predefined Connection data types	Data type: indicates data basic unit. Description: indicates input data or output data Data Length: indicates data size					
		7	Configured I/O Connection data and offset address	Data type: indicates data basic unit Description: module name I Type: indicates input data's basic unit I Len: indicates input data size I Address: indicates input data start address O Type: indicates output data's basic unit O Len: indicates output data size O Address: indicates output data start address					
		8	ОК	Save setting value					

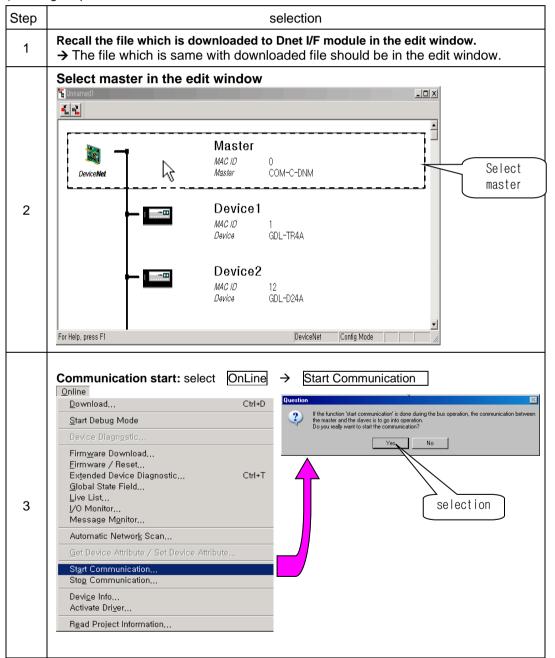
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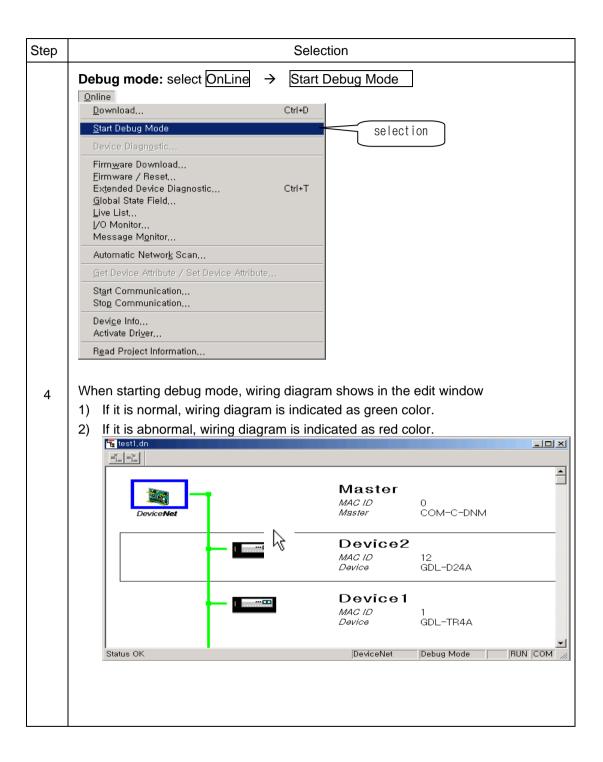
Step	selection
	System configuration download: select $OnLine \rightarrow Download$ $\rightarrow$ when conducting download, you should select master in the edit window.
	Qnline
	Download Ctrl+D Selection
	Start Debug Mode
	Device Diagn <u>o</u> stic.,,
	Firmware Download       If the download is done during the bus operation, the communication between the download is done during the bus operation, the communication between Do you really want to download?         Global State Field       If the download is done during the bus operation, the communication between Do you really want to download?         Live List       I/O Monitor         Message Monitor       Selection
	Automatic Network Scan
	Get Device Attribute / Set Device Attribute,
4	Start Communication Stop Communication
	Devi <u>c</u> e Info… Activate Dri <u>v</u> er…
	Read Project Information
	Download
	Error 0
	0 1830
	$\rightarrow$ If download is completed, Download window disappear.
5	Saves the edited system configuration file: select File $\rightarrow$ Save or Save As

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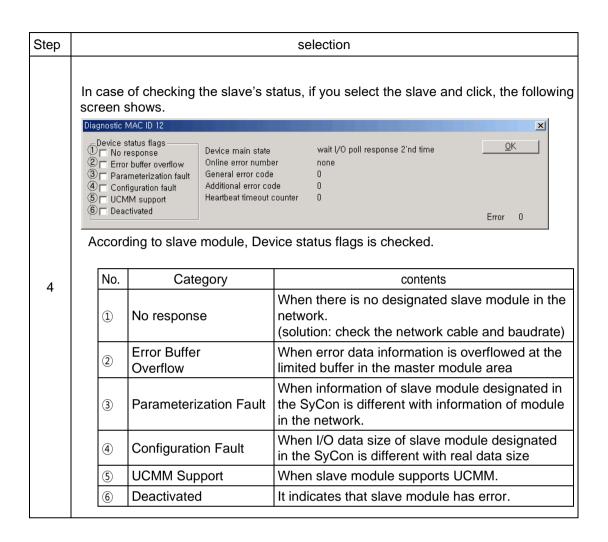
- 7) diagnosis
  - ▶ In order to diagnose
    - The file which is same with downloaded file should be in the edit window.
    - You should select master in the edit window.
    - In order to diagnose, meet the above 2 conditions.
  - You can check station address, module name, communication speed, communication method and wiring through diagnosis.

a) Setting sequence





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# (2)SyCon monitoring information

Here describes how to monitor diverse network status information in communicating.

### (a) Global State Field

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Method	Contents					
Selection method	OnLine $\rightarrow$ Global State Field					
Online	Global state field	<u>&gt;</u>				
Download       Ctrl+D         Start Debug Mode       Device Diagnostic         Firmware Download       Eirmware / Reset         Eixtended Device Diagnostic       Ctrl+T         Global State Field       Live List         I/O Monitor       Selection         Message Mgnitor       Automatic Network Scan	Online master main state       OPERATE         Collective status bits       PDUP       DMAC       NRDY       EVE       FAT       NEXC       ACLR       CTR         Collective online error location and corresponding error       Error at remote address       0       dec       Corresponding error         Error at remote address       0       dec       Corresponding error event       (none)         Statistic bus information       Counter of detected bus off reports       0       dec         Counter of rejected telegram transmissions       0       dec         Device specific status bits       Parameterized Devices       Activated Devices       Devices with Diagnostic         0       1       2       2       4       5       0       8       2       2       2         14       15       16       16       16       16       16       14       14       14	<u>о</u> к				
Get Device Attribute Set Device Attrib <u>u</u> te	Column         Column<	Error 0				
St <u>a</u> rt Communication Stop Communication	Device specific status bits					
Devi <u>c</u> e Info Activate Dri <u>v</u> er	0 <b>1</b> 2 3 4 5 6 7 8 9 10 11 <b>1</b> 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27					
Read Project Information	- 28 29 30 31 32 33 34 35 36 37 38 39 40 41					
Kear Hojett Information	42 43 44 45 46 47 48 49 50 51 52 53 54 55					
	56 57 58 59 60 61 62 63	Error 0				

### Global State Field's content is as follows.

Classification	Contents						
OnLine Master main state	Operate						
Online Master main state	Stop	When master module's communication part does not work.					
	PDUP	Device is checking	Device is checking MAC ID (duplex station address).				
	DMAC	There is duplex station address in the network module.					
	NRDY	Communication is r	Communication is not ready in the main program.				
Collective Status Bits	EVE	There is error in ser					
	FAT	Communication is i	mpossible because of sev	/ere error			
	NEXC		does not reach Data Exc				
	ACLR	All devices stop cor	mmunicating and are clea	red automatically.			
	CTRL	Master parameter e	error				
Collective OnLine error	Error at remote address			Indicates error station			
location and corresponding				address			
error	corresponding error event			Indicates error contents			
	Counter of detected bus off report			Counts No. of the Bus off			
Statistic bus information	Counter	of rejected telegram	Count No. of stopped transmission				
	Parameterized Devices		Indicates slave module where parameter is set (Blue)				
	Activated Devices		Indicates operating slave module (green)				
			- Green color disappears in the station address which				
Device energific status hits			has error.				
Device specific status bits	Devices with Diagnostic		Indicate operating slave module (red)				
		-	- When double-clicking the red color station address,				
			diagnosis window shows.				
			→refer to 4 step of car	tegory (7)			

(b) Live List

Method	Contents				
Selection method	OnLine $\rightarrow$ Live List				
<u>O</u> nline	Live List				
Download Ctrl+D	Devices 0 1 2 3 4 5 6 7 8 9 10 11 12 13 QK				
<u>S</u> tart Debug Mode	14 1 15 17 18 19 20 21 22 23 25 26 27				
Device Diagn <u>o</u> stic,,,,	2 Activated 34 35 36 Non-activated				
Firm <u>w</u> are Download,,, Firmware / Reset,,,	5 62 63 SError 0 RError 0				
 Extended Device Diagnostic,,, Ctrl+T Global State Field,,,	Devices: indicate slave station address				
Live List,	1) Activated: indicates slave module which conducts normal				
J/O Monitor Message M <u>o</u> nitor selection	communication				
Automatic Networ <u>k</u> Scan,,,	2) Non-activated: indicates slave module which does not				
<u>G</u> et Device Attribute / Set Device Attribute,,,	conduct normal communication				
St <u>a</u> rt Communication,,, Sto <u>p</u> Communication,,,					
Devi <u>c</u> e Info Activate Dri <u>v</u> er					
Read Project Information,					

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# (3)XG5000 setting

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If you execute XG5000, the following screen shows

🙀 XG-PD	
Elle Edit Yew Online Icols Window Help	
▶♥■◎ 100% #B® × 44 @ @ # # # # # # # # # # # # # # # #	
Image: Control of the second secon	
X Standard Set X High-speed X P2P	
<ul> <li>I (1) ≥ \ band ∫ barrete dot. ), itsel does ∫</li> </ul>	
Ready	NUM
	, and a

[Basic screen]

Parameter you can set in the XG5000 is as follows

Standard setting window	HsLink window	P2P window	
Project window       ×         Image: pdf(XGK-CPUH)       Image: pdf and the second seco	Project window ✓ ×	Project window       - x         □       p2P 01 (B0S1 FEnet)         □       P2P 01 (B0S1 FEnet)         □       P2P D2 Block         □       P2P Block         □       P2P Block         □       P2P 03         □       P2P 03         □       P2P 03         □       P2P 05         □       P2P 05         □       P2P 08	

[Parameter window]

HsLink window is used in the Dnet I/F module.

You can set High-speed Link up to 12.

You can use one High-speed Link per one Dnet I/F module.

(a) How to use HSL window

If you select HSL window, you can set the parameter as shown below

There are two types of window (Communication module setting and HSL block setting window)

High-speed Link window	Parameter setting window
Project window	Communication module settings Communication module settings Module type: Dnet Base Number: DO Slot Number: DO Communication period settings Period type: SO msec Output data setup in case of emergency CPU error CLatch OClear CPU stop Latch OClear
Project window • x pdf(XGK-CPUH) pdf(XGK-CPUH) pdf(XGK-CPUH) pdf(XGK-CPUH) pdf(XGK-CPUH) pdf(XGK-CPUH) pdf(XGK-CPUH) pdf(XGK-CPUH) pdf(XGK-CPUH) cdf(Boston) pdf(XGK-CPUH) cdf(Boston) pdf(XGK-CPUH) cdf(Boston) pdf(XGK-CPUH) cdf(Boston) pdf(XGK-CPUH) cdf(Boston)	High-speed Link block setting

# Remark

The meaning of High-speed Link 01[B0S0 Dnet] is as follows

- 1) High-speed Link 01: indicates High-speed Link's No.
- 2) B0: indicates base's No. (example, extension base 2 step: B2, extension base 5step:B5)
- 3) S0: indicates slot's No. (example, slot 5: S5, slot 11: S11)

### (b) Communication module setting parameter

You can set communication module setting parameter as follows.

Parameter window	Setting c	atego	ory	Setting contents	
	O	Modu	le type	Select Dnet	
Communication Module Settings	Communication module setting	Base No		Setting range: 0 ~ 7 It's different according to CPU module	
Communication module settings Module type: Dnet	setting	Slot No.		Setting range: 0 ~ 11 It's different according to base type	
Base Number: 00 Slot Number: 00 Communication period settings Period type: 50 msec Output data setup in case of emergency CPU error OLatch OClear	Communication period setting (period type)			Select among 10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 5s, 10s - Default is set as 10ms. - It's applied to sending data - The receiving data is processed every 'End' of scan program	
CPU stop O Latch O Clear		CPU	Latch	Hold output state (But P device is cleared)	
OK Cancel	Output data setting when	Error	Clear	Clear output data	
	emergency	CPU	Latch	Hold output state (But P device is cleared)	
		stop	Clear	Clear output data	

Click OK button and finish the parameter setting.

# Remark

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Notice in setting the communication period

Communication period setting value is sending data period. (CPU module's data → Dnet I/F module )
 If you set communication period loner than data change time written in the scan program, the data
 transmitted to slave module is indicated differently with program's data

### (c) High-speed Link block setting parameter

You can set High-speed Link block setting parameter as follows.

### 1) SyCon upload

Before setting high-speed link block, you should upload SyCon.

Upload method: online → SyCon upload (Dnet, Pnet)

Classification		High-speed link block setting window											
Before upload	Index         Mode           0	Station number	Read area	Sending data (Byte)	Save area	Receiving data (Byte)							
After upload	IndexMode0Send/Receive1Send/Receive2Send/Receive3Send/Receive4Send/Receive5Send/Receive6Send	2 COS 3 COS 4 COS 5 Con 6 If you do SyCon show If setting al	Read area upload, inforr v in the HSL bl pout 'reading a letter written	lock setting v area' and 'st	vindow. torage area' is	;							

### You can see the following information you ca read after upload.

Category	contents
Index	Read information from block who has low station address and display it from 0
Station	indicates station address of slave module in the network
Communication	Indicates contents designated at the SyCon among 4 communication methods
method	(Poll, Bit-Strobe, Cyclic, COS)
Reading area	First address of device you want to send from master module to slave module
Sending data	Indicates slave module's size by byte.
Storage area	First address of device you want to receive in slave module
Receiving area	Indicates slave module's size by byte.

You can't use the uploaded SyCon information by saving file edited at the XG5000. So when you monitor by XG5000 file, upload it to SyCon again.

### 2) Editing High-speed Link block

Γ

The contents you can edit in the high-speed link block is first address you want to send/receive.

classificat ion	contents												
	Luduu Station Communication Sending data Current Receiving data												
	Index	Mode	number	method	Read area	(Byte)	Save area	(Byte)					
	0	Send/Receiv		COS		32		16					
Uploaded	1	Send/Receiv		COS		20		28					
window	2	Send/Receiv		COS		22		24					
Willdow	3	Send/Receiv Send/Receiv		COS COS		2 6		2					
	5	Send/Receiv		COS		2		2					
	6	Send	7			4		2					
	Cate mode		contents sending: convey data from master module to slave module receiving: convey data from slave module to master module										
	Station a		Ŭ										
HSL Block edit	Commu method	nication		ation address (range: 0 ~ 63) nication method designated in the slave by SyCon									
window	Reading (master		Address		ess of device y device: P, M, I			R, ZR					
	$\rightarrow$		Size		IO contact no.								
	Slave m	odule)	(Byte)	-deals wit	h IO module le	ess than 8 bit	as 1 byte						
	Storage (slave m		Address	First address of device you want to receive Available device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR									
	<ul> <li>→ Size Indicates IO contact no. of slave module by byte</li> <li>Master module) (Byte) -deals with IO module less than 8 bit as 1 byte</li> </ul>												

The slave module that has low station address has priority in processing.

### Remark

Setting unit of address is byte.

So when you set address, deal with 8 contact no. module or less than as 1 byte.

3) How to use HSL block editing tool

How to use HSL block editing tool is as follows.

Index	Mode	Station number	Communication method	Read area	Sending data (Byte)	Save area	Receiving data (Byte)					
0	Send/Receive	1	COS		32		16					
1	Send/Receive	2	COS		20 22		28					
2	Send/Receive	3	COS	24								
3	Send/Receive	4	If you select by mouse and click right button, 15									
4	Send/Receive		-	-		ight button,	15					
5	Send/Receive	6	The follow	ing screen sho	DWS.		2					
6	Send	7										
		U	ndo	When canceli	ng the edite	d contents						
		R	edo	When returnir	ng edited co	ntents to the p	revious status					
		С	ut	When cutting	the edited c	ontents						
		С	ору	When copying								
			aste	When pasting								
			elete	When deleting								
-		Т	iew tree b ransmission eception	When indicati	ng HSL bloc Reception \$ Communication n ece 1 COS	ck by tree struc	ture					

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Screen1: locate the mouse over the HSL block window and click right mouse button.

Screen configuration	contents
Enable Link(HS Link,P2P)         Imagin         Imagin <tr< td=""><td><ul> <li>1) You can set max. 12 HSL parameter</li> <li>2) You can read/write about HSL parameter respectively. <ul> <li>You select it by click left mark of HSL by mouse.</li> </ul> </li> <li>3) reading/writing HSL parameter is not affect by CPU module's run mode.</li> </ul></td></tr<>	<ul> <li>1) You can set max. 12 HSL parameter</li> <li>2) You can read/write about HSL parameter respectively. <ul> <li>You select it by click left mark of HSL by mouse.</li> </ul> </li> <li>3) reading/writing HSL parameter is not affect by CPU module's run mode.</li> </ul>

The following screen used when reading or writing HSL parameter.

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When you write HSL parameter to CPU module, the CPU module has that data.

So when you change CPU module, read HSL parameter from CPU module and back up it and write it to new CPU module.

# 6.4 Analog I/O module Parameter Setting

# 6.4.1 XDL-BSSA Analog I/O module Parameter Setting

Type and parameter setting of analog I/O module available to be installed at XDL-BSSA are as follows.

### ► XBF-AD04A

Address	7	6	5	4	3	2	1	0	Meaning
0	-	-	-	-	СНЗ	CH 2	CH 1	CH 0	<ch byte="" enable_="" lower=""> Bit On(1) : Enable Bit Off(0): Disable</ch>
1	Cł	H 3	Cŀ	12	Cł	CH 1		H 0	<input current="" range="" voltage=""/> Bit(00):0~10V Bit(01):0~20mA Bit(10):4~20mA
2	Cł	Η3	Cŀ	12	Cł	CH 1		Η0	<output data="" range=""> Bit(00): 0~4000 Bit(01):-2000~2000 Bit(10): precise value (0~1000/400~2000/0~2000) Bit(11):percentile value (0~1000)</output>

### ► XBF-DV04A

Address	7	6	5	4	3	2	1	0	Meaning
0	-	-	-	-	CH 3	CH 2	CH 1	CH 0	<ch byte="" enable_="" lower=""> Bit On(1) : Enable Bit Off(0): Disable</ch>
1	Cł	13	СН	12	C⊦	CH 1		10	<voltage range=""> Bit (00): 0 ~ 10V</voltage>
2	Cŀ	13	CH	12	CH	CH 1		10	<input data="" type=""/> Bit (00): 0 ~ 4000 Bit (01): -2000 ~ 2000 Bit (10): 0 ~ 1000 Bit (11): 0 ~ 1000

### ► XBF-DC04A

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Address	7	6	5	4	3	2	1	0	Meaning
0	-	-	-	-	CH 3	CH 2	CH 1	CH 0	<ch byte="" enable_="" lower=""> Bit On(1) : enable Bit Off(0): disable</ch>
1	СН	13	Cŀ	12	CH 1		CH 0		<current range=""> Bit (00): 4 ~ 20mA Bit (01): 0 ~ 20mA</current>
2	CH	13	Сŀ	12	CH 1		C⊦	10	<input data="" type=""/> Bit (00): 0 ~ 4000 Bit (01): -2000 ~ 2000 Bit (10): 400 ~ 2000/ 0 ~ 2000 Bit (11): 0 ~ 1000

# ► XBF-RD04A

Address	7	6	5	4	3	2	1	0	Meaning
0	CH 3	CH 2	CH 1	CH 0	CH 3	CH 2	CH 1	CH 0	<ch byte="" enable_lower=""> Bit On(1) : enable Bit Off(0): disable <temp. byte="" unit_upper=""> Bit On(1): Fahrenheit Bit Off(0): Celsius</temp.></ch>
1	-	-	-	-	CH 3	CH 2	CH 1	CH 0	<sensor input="" range=""> Bit On(1) : JPT100 Bit Off(0): PT100</sensor>

### ► XBF-TC04S

Address	7	6	5	4	3	2	1	0	Meaning
0	CH 3	CH 2	CH 1	CH 0	CH 3	CH 2	CH 1	CH 0	<ch byte="" enable_lower=""> Bit On(1): enable Bit Off(0): disable <temp. byte="" unit_upper=""> Bit On(1): Fahrenheit Bit Off(0): Celsius</temp.></ch>
1	CH	13	Cł	CH 2		CH 1		10	<sensor input="" type=""> K type: 00, J type: 01 T type: 10, R type: 11</sensor>

► XBF-AH04A

Address	7	6	5	4	3	2	1	0	Meaning	
0		INP CH				INPI CH			<i o="" range=""> Bit(0000): 4 ~ 20 mA Bit(0001): 0 ~ 20 mA</i>	
1	OUTPUT OUTPU CH 1 CH 0						UT Bit(0010): 1 ~ 5 V Bit(0011): 0 ~ 5 V			
2		rput H 1		PUT 10	INF Cł	2UT † 1		2UT 10	<i data="" o="" type=""> Bit(00): 0 ~ 4000 Bit(01): -2000 ~ 2000 Bit(10): Precise value Bit(11): 0 ~ 1000 - In case of precise value 4 ~ 20 mA: 400 ~ 2000 0 ~ 20 mA: 0 ~ 2000 1 ~ 5 V: 100 ~ 500 0 ~ 5 V: 0 ~ 500 0 ~ 10 V: 0 ~ 1000</i>	

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Note

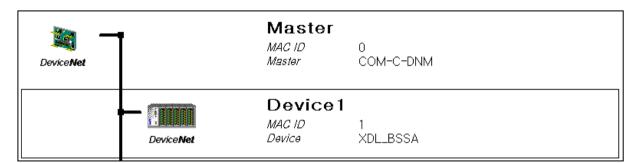
- Cautions in setting an analog parameter (1) For analog I/O module, all channels are set as Enable status internally. (2) A setting parameter is sent from master to slave.

### 6.4.2 How to set XDL-BSSA analog I/O module parameter

Dnet adapter, slave module is configured at SyCon. At this time, EDS file of XDL-BSSA is necessary. How to set is as follows.

### ▶ Double-click a XDL-BSSA at SyCon

Γ



### ► Click "Parameter Data..." button

evice Configuration				<u>×</u>
MAC ID 1	File name	XDL-BSSA,EDS		<u> </u>
Description Device1				Actual device
I → Activate device in actual	configuration			1 / XDL_BSSA
Actual chosen IO connection C Poll C Bit strobe C (		C⊻clic □ UCMM check	Group 3 💌	
- Connection Object Instance	Attributes — — —			Parameter Data,,,
Expected packet rate	200	Production inhibit tim	e 100	<u> </u>
Watchdog timeout action	Timeout	<ul> <li>Fragmented Timeout</li> </ul>	1600 ms	
Produced connection size	32	Consumed connection	on size 24	
-Available predefined connec	tion data types —			
Data type	Description	Data length		
BIT	Input_Bit	1		
BIT	Output_Bit	1		
BYTE	Input_Byte	1	Append	to configured I/O data
BYTE	Output_Byte	1	📕 🔤 Insert in	to configured I/O data
WODD	Transit Versia	1		ie coningeroe ( o data
Configured I/O connection d	ata and its offset a	address		
Data type Description	I Type I Len. I A	Addr. O Type O Len. O Addr.	<b></b>	
BYTE ARRAY Module1	IB 32 0			
BYTE ARRAY Module2		QB 24 0	Dalata	
			Delete	configured I/O data
			<b>▼</b> I S	ymbolic Names

# Select slot you want to set and double-click it at Available Parameters window. Then Customized Parameters window appears.

Pa	rameter	Data									×
	Availab	le Par	amete	rs ——				Parameter	access filter	all	<u>O</u> K Cancel
	Obj,	Clas	Inst,	Attr,	Туре	Acces	Parameter Name	Min	Max		
	0001	64	01	01	DWOR	R/W	Set Slot1 Parameter	00000000	OOFFFFFF		analog module
	0002	64	01	02	DWOR	R/W	Set Slot2 Parameter	00000000	OOFFFFFF	Double offer	
	0003	64	01	03	DWOR	R/W	Set Slot3 Parameter	00000000	OOFFFFFF		
	0004	64	01	04	DWOR	R/W	Set Slot4 Parameter	00000000	OOFFFFFF		
	0005	64	01	05	DWOR	R/W	Set Slot5 Parameter	00000000	OOFFFFFF	<b>•</b>	Values
	Help									4	Decimal

### ▶ Input a parameter at 'Value" of Customized Parameters window

	Data										
vailab	le Par	amete	rs —				Parameter a	access filter	all	•	<u>O</u> K Cancel
Obj,	Clas	Inst,	Attr,	Туре	Acces	Parameter Name	Min	Max			
0002	64	01	02	DWOR	R/W	Set Slot2 Parameter	00000000	OOFFFFFF			
0003	64	01	03	DWOR	R/W	Set Slot3 Parameter	00000000	OOFFFFFF			
										-	
•										▶	Values
John											
lelp										<u>_</u>	
тегр										<u>▲</u>	D <u>e</u> cimal
·		Dorom	otoro								
ustorr	nized I				Param	eter Name	( Value				 D <u>e</u> cimal
ustor Clas	Inst,	Attr,	Туре			eter Name 11 Parameter	Value		-		
uston Clas 64	Inst, 01	Attr. 01	Type DWOF	RD	Set Slo	t1 Parameter	0000000F				 D <u>e</u> cimal
ustom Clas 64 64	Inst, 01 01	Attr. 01 04	Type DWOF DWOF	7D 7D	Set Slo Set Slo	t1 Parameter t4 Parameter	0000000F				 D <u>e</u> cimal  <u>A</u> dd
ustom Clas 64 64 64	Inst, 01 01 01	Attr. 01 04 05	Type DWOF DWOF DWOF	RD RD RD	Set Slo Set Slo Set Slo	t1 Parameter t4 Parameter t5 Parameter	0000000F 0000000F 0000550F				<u>De</u> cimal <u>A</u> dd <u>D</u> elete
ustorr Clas 64 64 64 64	Inst, 01 01 01 01	Attr. 01 04 05 06	Type DWOF DWOF DWOF DWOF	90 90 90 90	Set Slo Set Slo Set Slo Set Slo	t1 Parameter t4 Parameter t5 Parameter t6 Parameter	0000000F 0000000F 0000550F 0000000F				<u>De</u> cimal <u>A</u> dd <u>D</u> elete
ustom Clas 64 64 64 64 64	Inst, 01 01 01	Attr. 01 04 05	Type DWOF DWOF DWOF	90 90 90 90	Set Slo Set Slo Set Slo Set Slo	t1 Parameter t4 Parameter t5 Parameter	0000000F 0000000F 0000550F				<u>De</u> cimal <u>A</u> dd <u>D</u> elete er:
ustorr Clas 64 64 64 64	Inst, 01 01 01 01	Attr. 01 04 05 06	Type DWOF DWOF DWOF DWOF	90 90 90 90	Set Slo Set Slo Set Slo Set Slo	t1 Parameter t4 Parameter t5 Parameter t6 Parameter	0000000F 0000000F 0000550F 0000000F			Input paramete	Decimal Add Delete

- ► After parameter setting is complete, download to a master module.
  - 1) In case network is not set

After executing SyCon→Online→Download, complete through High Speed Link parameter setting of XG5000.

2) In case of changing a parameter while network setting is completed

Complete through SyCon→Online→Download->Start Communication

Restart a DC24V power of expansion type Smart I/O Dnet

# 6.4.3 Example of Parameter Setting

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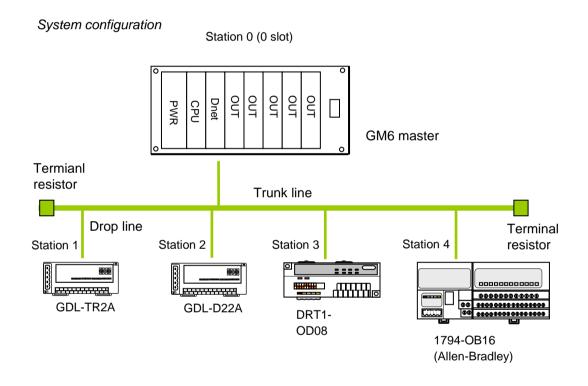
Module	Mode	Parameter	Contents
XGF-DV04A	-	0x00 <b>00000F</b>	<ul><li>1.all channels: Enable</li><li>2.all channels voltage range: 0~10V</li><li>3.all channels data type: 0 ~ 4000</li></ul>
XGF-AD04A	Current	0x00 <b>00550F</b>	1.all channels: Enable 2.all channels input range: 0~20mA 3.all channels data type: 0 ~ 4000
XGF-AD04A	Voltage	0x00 <b>00000F</b>	1.all channels: Enable 2.all channels input range: 0~10V 3.all channels data type: 0 ~ 4000
XGF-RD04A	-	0x00 <b>00000F</b>	<ul><li>1.all channels: Enable</li><li>2.all channels temp. unit: Celsius</li><li>3.all channels sensor range: PT100</li></ul>
XGF-TC04S	-	0x00 <b>0000FF</b>	<ul><li>1.all channels: Enable</li><li>2.all channels temp. unit: Fahrenheit</li><li>3.all channels sensor type: K</li></ul>
XGF-AH04A	-	0x00 <b>004444</b>	<ul><li>1.all channels: Enable</li><li>2.all input channels range: 0~10V</li><li>3.all output channels range: 0~10V</li><li>4.all channels data type: 0~4000</li></ul>

### 6.5 Program Examples

### 6.5.1 GLOFA-GM Series

### Program Example 1: Communication between Dnet modules of LSIS and other maker

This is the program that the master communication module (station 0) is installed in GM6 base slot '0' and sends/receives the data to the remote module (station 1~4) respectively. (Please refer to I/O configuration map).



I/O cont	iguration map			-
	Send/receive structure	Area to read	Storage area	Size (byte)
<u>o Mo</u>	Sending: GDL-TR2A (station 1)	%MW0	-	2
GM6	Receiving: GDL-D22A (station 2)	-	%QW0.1.0	2
(Station 0)	Sending: DRT1-OD08 (station 3)	%MW100	-	1
(Master)	Sending: 1794-OB16 (station 4)	%MW200	-	4

# (a) *High-speed Link* parameter setting in GM6 (station 0)

Master module 'link information' setting

Γ

High Speed1Link Set	×
Network Type	
O GLOFA Fnet	ок
C GLOFA Mnet	Cancel
GLOFA Enet	Help
O GLOFA Ednet Network	
O GLOFA Fdnet Cable	
GLOFA Dnet	
🔿 GLOFA 422	
C GLOFA Pnet	
C GLOFA Rnet	
Slot Num 0 Scan Time Self-stat Num 0 Pollate	s 5 💌 msec

The sending parameter setting to Station 1(GDL-TR2A)

HighSpeedL1nk It1m Edit Mode © Remote Send © Remote Receive	Station no. of remote I/F module to send the data. Communication Mode © Poll © Strobe © COS © Cyclic
Area	Send/Receive
PLCArea © %MW C %IW C %QW 0	Size(Byte)
ОК	Cancel
	When sending GDL-TR2A, data size is set as 2bytes.
	(basic value)

HighSpeedL1nk It2m Edit Mode Station No	Station No. of GDL-D22A
C Remote Send	© Pon © Strobe
Remote Receive     The storage area of	C COS C Cyclic
Area GDL-D22A.	Send/Re 50 Send/Re 50 Send/Re 50 Send/Re 50 Send/Re 50 Send/Re 50 Send/Re 50 Send/Re 50 Send/Re 50 Send/Re
PLCArea C %MVV C %IVV C %QVV	0.1.0 Size (Byte)
OK	Cancel Help

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The receiving parameter setting from station 2(GDL-D22A)

The sending parameter setting to station 3(DRT1-OD08)

HighSpeedL1nk It3m Edit	×
Mode Remote Send Remote Receive Station No. of Communication No. Communication No.	Sets the sending data size (1byte) to DRT1-OD08.
DRT1-OD08	DITI-OD00.
	end/R ize(Byte)
OK Cancel	Help

HighSpeedL1nk It4m	Edit		×
Mode	Station No	Communication	n Mode
Remote Send	4	Poll	
		C Strobe	
C Remote Receive		C cos	Sets the sending
		C Cyclic	data size to 1794- OB16. (4bytes)
Area			Send/Rec
Di O Assa			50
PLC Area 💿 %MW 🔿	°%IW ⊂ %QW  :	200	Size eyte)
			4
	ОК	Cancel	Help

The sending parameter setting to station 4(1794-OB16)

Γ

Master module 'High-speed Link 1' setting completion screen

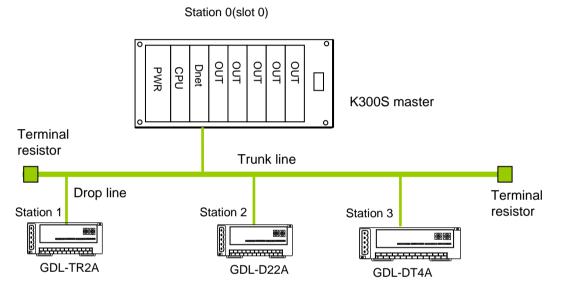
High Speed L	.ink 1				
- Link Set-					
Netwo	ork Type:	GLOFA D	net	Scan Time :	5 msec
Slot:	0	Self Station	No: 0	Pollate :	1
					Edit
Entry List		(msec)		(bvte)	
Num	Туре	Class	From Area	To Area	Size
0 L0 X 1 R1.8 2 R2.8 3 R3.8 4 R4.8 5 6 7 8 9 10 11 12 13 14 15	PL PL PL	5 5 5	%MVV0 %QVV0.1.0 %MVV100 %MVV200	2 2 1 4	
		Dele	te Co	opy	Edit
				Close	Help

# 6.5.2 MASTER-K Series

### Program Example - The communication between Dnet modules of LSIS

This is the program that the master communication module (station 0) is installed in K300S base slot 0 and sends/receives the data to the remote module (station 1~4) respectively. (Please refer to I/O configuration map).

### System Configuration



### I/O configuration map

	Send/receive structure	Area to read	Storage area	Size (byte)
1/0000	Sending: GDL-TR2A (station 1)	P007	-	2
K300S	Receiving: GDL-D22A (station 2)	-	P000	2
(Station 0)	Sending/receiving:	P007		2
(Master)	GDL-DT4A (station 3)		P001	2

### (a) High-speed Link parameter setting in K300S (station 0)

Г

To make Station 0,1,2 to change the data as specified on the table in the master configuration system, the user should write the user program first and then prepare the data sending/receiving map as shown on the table. And to send/receive the data as shown on the table, it is required to write *High-speed Link* parameter and download it in PLC and *High-speed Link* start shall be carried out according to the following order.

- 1) Station number allocation and communication cable connection
- 2) The user program writing (per station)
- 3) Makes the data sending/receiving map
- 4) Parameter setting in KGLWIN High-speed Link parameter setting item
- 5) Program and parameter download execution in the online menu.
- 6) Changing the mode to RUN in the online menu.
- 7) High-speed Link status checking through flag monitor
- 8) If the error occurs, repeat the above from 1).

High-speed Link parameter for the system of Example Program shall be set as follows.

KGLWIN parameter basic screen (in case of K300S)

薯 Parameter [New Project1]		
Basic Interrupt I/O Link1	Link2 Link3 Link4	
Latch Area L:	Timer Boundary 100 msec T: 000 - 191 10 msec T: 192 - 255 Watchdog Time: 20 * 10msec PLC Operation Mode Ø Blown Fuse Ø Operation Error Output during Debugging Ø Remote Access Control	Computer communication Station Number : Baud Rate : C Master Slave Time Out : Read Slave PLC State Setting Slot of External Interrupt : T

Master module 'link information' setting

<b>≣</b> Para⊓	neter [Nev	v Project1]								_ 🗆 🗙
Basic	Interro	upt 1/0 L	ink1 Link2.	Lii	nk3 Lin	k4				
Link: [	Enable 💌	Self Station No:	: 💽 💌 Base:	0 🗸	Slot: 0	) Type	Dnet	- Set Dnet		
No	Stati	Туре	Device	Size	Period		Mode			<b></b>
Ų	Master									
12						_				
3						$\sim$				
4							<u> </u>	Station	no.'0' of	G4L-DUEA,
5								alat 0		
Ĩ							l	slot 0		

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The sending parameter setting to station 1(GDL-TR2A)

暮 Parameter [New Project1]					
Basic Interrupt I/O	Link1 Link2 Lin	k3 Link4			
Link: Enable ▼ Self Station N				Set Dnet	
No Stati Type 0 Master	Device Size	Period	Mode		<u> </u>
1 1 Remote Out	P007 2	50 msec	Poll		
3				-	
4 Edit Paramet	er		x		
6	F <sup>N</sup>	lode	OK		
8 Station No		Poll	Cancel		
Type:	Remote Out 💌	C Strobe			
12					
13 Device: 14	P007	O COS			
2 3 4 5 6 7 8 9 10 11 12 13 13 14 15 16 15 16 17 18 19 20 21 22 23 24 25 24 25 25 25 25 25 25 25 25 25 25	2	C Cyclic			
17   18   Period:	E0. march				
19 20	50 msec				
21					
23	/ ~			_	
24 25	$\backslash$				-
1.00					
	S	size of station	1 GDL-		
	т	R2A, 2 bytes			
	$\subseteq$				

🐺 Paran	meter [N	ew Project1]									<u>_     ×</u>
Basic	Inte	rrupt 1/0	Link1	Link2 L	.ink3 Lin	k4					
Link:	Enable 🔻	<ul> <li>Self Statio</li> </ul>	n No: 🛛 💌	Base: 0 💌	Slot: 0 💌	] Type:	Dnet	•	Set Dnet		
No	Stati	Туре	Device	Size	e Period		Mode				<b></b>
0 1 2	Master 1 2	Remote Ou Remote In	t P007 P000	2	50 msec 50 msec		Poll Poll				
2	-	Hemole III	1 000		30 11360		1 011				
5	E	dit Paramete	,					×			
7				_ Mode	в		OK	٦L			
8		Station No:	2 💌	6	• Poll		Cancol				
10		Type:	Remote In		) Strobe		Cancel				
12		Device:	P000		D COS						
15											
16		Size:	2	(	D Cyclic						
18		Period:	50 msec 💌	1							
20				<u>.</u>							
23	_										
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 20 21 22 21 22 22 22 22 22 22 22 22											•

The receiving parameter setting to station 2(GDL-D22A)

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The sending parameter setting to station 3(GDL-DT4A)(combined module)

暮 Parar	meter [N	ew Project1)										
Basic	Inte	rrupt 1/0	Link1	Link2	Link3	Link	4					
Link:	Enable	- Self Stati	on No: 🚺 💌	Base: 0	- Slot:	0 💌	Type:	Dnet	•	Set Dnet		
No	Stati	Туре	Device	Siz	e Pe	riod		Mode				▲
0 1 2 3 4	Master 1 2 3	Remote O Remote In Remote O	P000	2 2 2	50	msec msec msec		Poll Poll Poll				
5	Ed	lit Paramete	ſ					2	<u>×</u>			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 20 21 22 22 22 22 22 22 22 22 22 22		Station No: Type:	Remote Out		<b>Poll</b> Strobe			OK Incel				
14		Device:	P007		COS							
17		Size:	2	0	Cyclic							
19 20 21		Period:	50 msec 💌									
22 23 24 25												-

🚆 Paran	neter [Ne	w Project1	]												_ 🗆	×
Basic	Inter	rupt 1/0	[	_ink1	Link2	Li	nk3	Link	4							
Link:	Enable 💌	Self Stat	tion No		Base:	0 💌	Slot:	0 💌	Type:	Dnet	•	Set	Dnet			
No	Stati	Туре		Device		Size	Pe	eriod		Mode						
0 1 2 3 4	Master 1 2 3 3	Remote C Remote Ir Remote C Remote Ir	n Fut	P007 P000 P007 P001		2 2 2	50 50	msec msec msec msec		Poll Poll Poll Poll						
6	Edit	Parameter								×	1					
5 6 7 8 9 10 11 12 13 14 15 16 7 18 9 22 1 22 23 24 25	0.			7	٦	Mode —				Ж						
10	5t)	ation No:	3			• Po	DII		Car	ncel						
12 13		Type:	Remote	In 💌		O 81	trobe									
15 16		Device:	P001		]	0.00	DS									
17 18		Size:	2			0 0	yclic									
20 21		Period:	50 mse	c 💌												
23																
24 25																•

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The receiving parameter setting to station 3(GDL-DT4A) (combined module)

# K300S High-speed Link parameter

<b>≣</b> Paran	neter [Ne	w Project1]						
Basic	Interr	upt 1/0	Link1	Link2 Lii	nk3 Link	4		
Link:	Enable 💌	Self Station	No: 🛛 💌 I	Base: 🛛 💌	Slot: 0 💌	Type: Dnet 💌	Set Dnet	
No	Stati	Туре	Device	Size	Period	Mode		<b>▲</b>
0 1 3 4 5 6 7 8 9	Master 1 2 3 3	Remote Out Remote In Remote Out Remote In	P007 P000 P007 P001	2 2 2	50 msec 50 msec 50 msec 50 msec	Poll Poll Poll Poll		

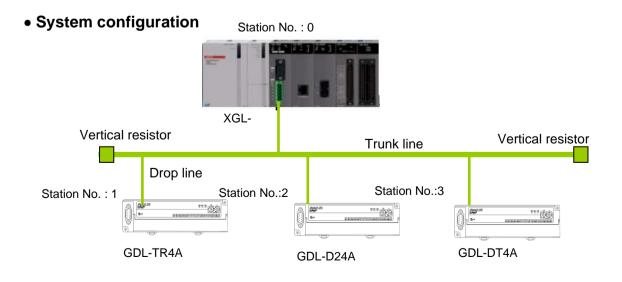
# 6.5.3 XGT Series

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#### 1. Program example - communication among our Smart I/O Dnet modules

Example's basic configuration and setting value is as follows.

	Setting	category		С	ontents	Setting program	
		Master setting		XGL-DMEA		SyCon	
		Base No.	Base No.		0		
		Slot No.			0		
	master	Station No.		0		SyCon	
	maotor	Communication s	peed	1	125kbps		
		High-speed Link s	setting	Uses High-spe	ed Link 1 area	XG5000	
		Communication p	eriod setting		200ms	XG5000	
		Slave selection		GDL-TR4A,GD	DL-D24A,GDL-DT4A	SyCon	
			Station No.		1	SyCon	
	slave	GDL-TR4A (Output 32 point)	Communication method		Poll	SyCon	
Custom			Reading area	Device	M100	XG5000	
System				Size	4		
configuration		GDL-D24A (Input 32 point)	Station No.	2		SyCon	
			Communication		COS	SyCon	
			Storage area	Device	M110	XG5000	
				Size	4		
		GDL-DT4A	Station No.	3		SyCon	
			Communication method		COS ng period: 200ms)	SyCon	
		Output 16point	Change and	Device	M102	XG5000	
		Input 16point	Storage area	Size	2		
			Reading area	Device	M112	XG5000	
				Size	2		
	Master Setting			Change of basic setting		SyCon	
Etc	Device Assignment				tion port setting in omputer	SyCon	



[SyCon 1 step] master and station No. setting

Menu se	etting: File $\rightarrow$	New	
Step	Category	Screen formation and setting co	ontents
1-1	File writing	File     Yiew     Online     Settings     Window     Help       New     Ctrl+N       Open     Ctrl+O       1 C:\#Program Files\\#test1.dn       Exit   New File writing	
1-2	Fieldbus selection	Select fieldbus	selection
1-3	Master setting	Recall master setting window Insert → Master or	
1-4	Master selection	Insert Master     X       Available masters     Selected masters       COM-C-DNM     Add >>       Add All >>     Cancel       Add All >>     Cancel       Add All >>     Cancel       Vendor     Hilscher GmbH     MAC ID       Catalog listing     COM-C-DNM     Description       File name     COMCDNM,EDS	Master type selection : COM-C-DNM
1-5	Station No. setting	Insert Master       XI         Available masters       QK         COM-C-DNM       Add >>>         Add All >>>       COM-C-DNM         Add All >>>       Com-C-DNM         Add All >>>       Com-C-DNM         Vendor       Hilscher GmbH       MAC ID         Catalog listing       COM-C-DNM       Description         File name       COMCDNM,EDS	Station No. selection: 0 Explanation-text addition: Master (Available to input only English, number)
1-6	Master Setting completion	Image: Second	Aode

	an 2 stanl Basis of	etting modification
		ttings → Master Settings
Step	Category	Screen configuration and setting contents
2-1	Master Settings	Master Settings       Setting of master station         MAC ID       0         Name       Master         Settings       Cancel         Modify explanation-context:       Master
2-2	Basic setting	DeviceNet Master Settings       ×         Settings       Parameter to user interface         Startup behaviour 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       •         • Little Endian       •         Hardware parameter       •         • 2 kB dual-port memory       •         8 kB dual-port memory       •         ¥인       취소
2-3	Modification of setting value	DeviceNet Master Settings       X         Settings       Parameter to user interface         Startup behaviour after system initialisation       Controlled release of the communication by the device         © Controlled 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       Handshake of the process data         C Byte addresses       Bus synchronous, device controlled         C Word addresses       Buffered, device controlled         Storage format (word module)       Elifiered, nost controlled         C Big Endian       Bus synchronous, host controlled         Hardware parameter       2 kB dual-port memory @ 8 kB dual-port memory         XB dual-port memory       8 kB dual-port memory         XB dual-port memory       AB(A)

\* Do not set except Handshake of the process data.

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## [SyCon 3 step] Communication speed

Menu selection: Settings → Bus Parameter

Step	Category		Screen configuration and se	etting contents
3-1	Bus Parameter	Bus Parameter Baudrate MAC ID Master C Auto clear mode	I25 KBits/s     ✓       0     Cancel	Communication speed (Baudrate) :125KBit/s Setting of master station number: 0

\* Auto Clear Mode

(1) When selecting

 $\rightarrow$  If error occurs at slave module, it stops communicating with the entire system.

 $\rightarrow$  Dnet I/F module's HS LED flicker

Red MNS LED On

(2) When not selecting

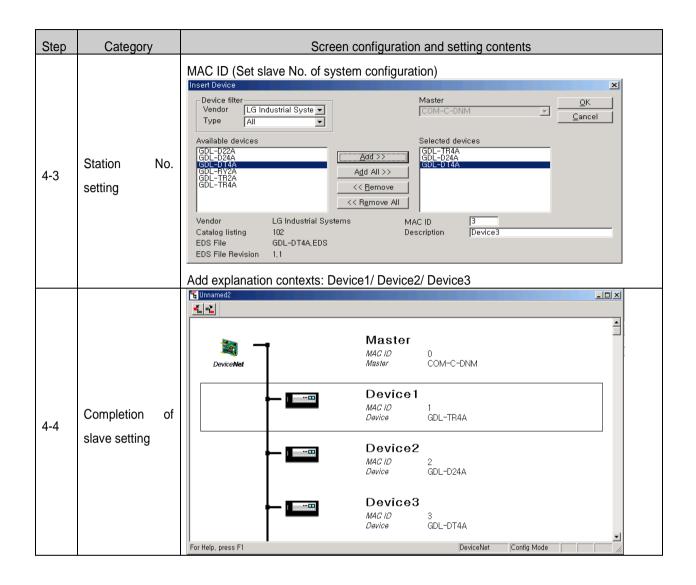
 $\rightarrow$  If error occurs at slave module, it continues communicating with normal module.

[SyCon 4 step] Setting of slave and station number

Menu selection: Insert  $\rightarrow$  Master

Γ

Step	Category	Screen configuration and setting contents
4-1	Slave setting	Recall master setting window.         Insert → Master or         Image: Setting window.         Image: Setting w
4-2	Slave selection	1 step: Device filter (Classification according to maker) Insert Device Device filter Vendor Type All Type All Type All Type CFECL-ONS CFFOL-O
		2 step: Available Device (select system configuration slave)         Insert Device         Device filter         Vendor         Type         Available devices         GDL-D22A         GDL-TR2A         GDL-TR2A         GDL-TR4A         Vendor         LG Industrial Syste         LG Add All >>         GDL-TR2A         GDL-TR2A         GDL-TR4A         Vendor         LG Industrial Systems         MAC ID         Catalog listing         EDS File         GDL-D22A,EDS         EDS File Revision



[SyCon 5-1 Step] set the method for slave communication -slave: GDL-TR4A

Menu selection: Settings  $\rightarrow$  Device Configuration

Γ

Step	Category	Screen configuration and setting contents
5-1	Setting window for slave communication method	Set slave         Device Configuration         MAC ID       File name       GDL-TR4A, EDS         Description       Device1         Concetion       Concetion       Concetion         Poll       Bit strobe       Change of gtate       Cyclic         UCMM check       Group 3       Paramgter Data         Poll       Bit strobe       Change of gtate       Cyclic         Connection Object Instance Attributes       Production inhibit time       Paramgter Data         Produced connection size       0       Consumed connection size 0       Paramgter Data         Available predefined connection data types       Description       Paramgter Data       Insert into configured I/O data         BYTE ARRAY       Discrete Output Data       4       Insert into configured I/O data       Insert into configured I/O data         Data type       Description       IType I Len. IAddr. 0 Type0 Len.0 Addr.       Insert into configured I/O data         Symbolic Names       Itype I Len. IAddr. 0 Type0 Len.0 Addr.       Insert into configured I/O data
5-2	Slave station No.	Set station No. (MAC ID): 1 MAC ID I File name GDL-TR4A,EDS Description Device1 FActivate device in actual configuration
5-3	Slave communication method	Select communication method: Poll Actual chosen IO connection © Poll C Bit strobe C Change of state C Cyclic UCMM check
5-4	Setting of Slave transmitting- receiving period	Set conditions for transmitting-receiving data period and response status.         → Set Poll method as a basic value.         Connection Object Instance Attributes         Expected packet rate       200         Watchdog timeout action       Timeout         Produced connection size       0         Consumed connection size 4
5-5	Data structure of slave (EDS File)	Indicates EDS File's information(data type, I/O characteristic, data size)         Available predefined connection data types         Data type         Description         Data type         Description         Data type         Description         Data type         Description         Data type         Append to configured I/O data         Insert into configured I/O data         , data         shows through 5-6.
5-6	Data structure of slave	Conveys salve structure (data type, I/O characteristic, data size) to master Configured I/O connection data and its offset address Data type Description I Type I Len. I Addr. 0 Type[0 Len.0 Addr. BYTE ARRAY Discrete_Output_De 0 B 4 0  Delete configured I/O data Symbolic Names

[SyCon 5-2 step] Setting of slave communication method - slave: GDL-D24A

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Menu selection: Settings  $\rightarrow$  Device Configuration

Step	category	Screen configuration and setting contents
5-1	Setting window for slave communication method	Sets slave         Device Configuration         MAC ID       2         Description       Device2         Image: Actual device       Actual device         Image: Actual device       Image: Actual device
5-2	Slave station No.	Set station No.(MAC ID): 2 MAC ID 2 File name GDL-D24A,EDS Description Device2 Activate device in actual configuration
5-3	Slave communication method	Select communication method: COS Actual chosen IO connection C Poll C Bit strobe C Change of state C Cyclic UCMM check
5-4	Setting of slave transmitting- receiving period	Set conditions for transmitting/receiving period and response period of slave module.         →COS Method sets Expected packet rate as 200(ms).         (Setting value must be Expected packet rate > Production Inhibit time.)         Connection Object Instance Attributes         Expected packet rate       200         Production inhibit time       10         Watchdog timeout action       Timeout         Produced connection size       0         Consumed connection size 4
5-5	Slave data structure (EDS File)	Indicates EDS File's information (data type, I/O characteristic, data size)         Available predefined connection data types         Data type       Description         Data type       Description         BYTE ARRAY       Discrete Input Data         4
5-6	Slave data structure	Conveys salve structure (data type, I/O characteristic, data size) to master Configured I/O connection data and its offset address Data type Description I Type I Len. I Addr. Dype 0 Len. 0 Addr. BYTE ARRAY Discrete_Input_Data B 4 0 Delete configured I/O data Symbolic Names

[SyCon 5-3 step] Setting of slave communication method - slave: GDL-DT4A

Menu selection: Settings  $\rightarrow$  Device Configuration

Γ

Step	Category	Screen configuration and setting contents
5-1	Setting window for slave communication method	Sets slave         Device Configuration         MAC ID       3       File name       GDL-DT4A,EDS         Description       Device3       QK       Cancel         Actual device       B       Actual device       B         Image: Connection       Device3       Device3       Device3       Device3         Image: Connection       Device3       Devica3       Device3       Devi
5-2	Slave station No.	Sets station No.( (MAC ID): 3 MAC ID 3 File name GDL-DT4A,EDS Description Device3 Activate device in actual configuration
5-3	Slave communication method	Select communication method: COS Actual chosen IO connection C Poll C Bit strobe C Change of state C Cyclic UCMM check
5-4	Setting of slave transmitting- receiving period	Set conditions for transmitting-receiving period and response period of slave module.         →COS Method sets Expected packet rate as 200(ms).         (Setting value must be Expected packet rate > Production Inhibit time.)         Connection Object Instance Attributes         Expected packet rate       200         Watchdog timeout action       Timeout         Produced connection size       0
5-5	Slave data structure (EDS File)	Indicates EDS File's information (data type, I/O characteristic, data size)         ^wailable predefined connection data types         Data type       Description         BYTE ARRAY       Discrete Input Data         BYTE ARRAY       Discrete Output Data         BYTE ARRAY       Discrete Output Data         →       If you select BYTE ARRAY by mouse and select Append to configured I/O data         →       If you select BYTE ARRAY by mouse and select Append to configured I/O data
5-6	Slave data structure	Conveys salve structure (data type, I/O characteristic, data size) to master Configured I/O connection data and its offset address Data type Description    Type    Len.    Addr.    O Type    Len.    Addr. BYTE ARRAY Discrete_Input_Datr.   B 2 4 BYTE ARRAY Discrete_Output_Dat QB 2 4

# [SyCon 6 step] Serial port selection

: It is same with RS-232C's wiring used in CPU module.

So use the cable.

Menu selection: Settings → Device Assignment

Step	Category	Screen configuration and setting contents
6-1	Setting window for serial port	Serial port         Device Assignment CIF Serial Driver         Driver Description       OK         Device Driver:       CIF Serial Driver         Board Selection       Cancel         Name       Type         Version       Date         Fror       Connect COM 1         COM 1:       -51         Connect COM 2:       -51         COM 3:       -20         COM 4:       -20
6-2	Port search	In activated port among Connect COM1 $\rightarrow$ Connect COM2 $\rightarrow$ Connect COM3 $\rightarrow$ Connect COM4, error value is indicated as "0" Device Assignment CIF Serial Driver Driver Description Device Driver: [CIF Serial Driver Board Selection Name Type Version Date Error COM 1: DNM [COMCDNM [V01.090] [17.04.03] [0] [Connect COM 1] COM 2: [2] [2] [2] [2] [2] [2] [2] [2] [2] [2]

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#### [SyCon 7 step] download

Menu selection: Online → Download

[XG5000 1 step] select type of CPU module

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Menu selection: OPTION \rightarrow PLC TYPE setting
```

Step	Category	Screen configuration and setting contents
		PLC Type Settings
1-1	CPU module	Type XGK_CPUS
	selection	OK Cancel Select CPU module as XGK-CPUS

[XG5000 2 step] Communication method setting

Menu selection: Online  $\rightarrow$  Connection Setting

Step	Category	Screen configuration and setting contents
2-1	Communication method setting	Online Settings - NewPLC         Connection settings         Iype:       Image: Settings         Depth:       Local       Preview         General       Timeout interval:       5 * sec.         Betrial times:       1 *       1 *         Read / Write data size in PLC run mode       Normal       Maximum         * Send maximum data size in stop mode       OK       Cancel         Connecting method: USB       Connecting step: local       Image: Sec.

[XG5000 3 step] connection

Menu selection: Online  $\rightarrow$  Connection

[XG5000 4 step] I/O information reading

Menu selection: [Online]-[Diagnosis]-[I/O Information]-[I/O Sync]

[XG5000 5 step] High-speed Link setting

Menu selection: parameter → High-speed Link (HS Link) → High-speed Link 1

Step	Categoty	Screen configuration and setting contents
5-1	Communication module setting	Initial screen         Communication Module Settings         Set Dret I/F module in High-speed Link         Set Dnet I/F module in High-speed Link         Communication module settings         Clear         Communication Module Settings         Output data setup in case of emergency         OK         OK

# [XG5000 6-1 Step] SyCon upload

Γ

Menu selection: [Online]-[Communication module setting]-[SyCon upload (Pnet, Dnet)]

Step	Category	Screen configuration and setting contents									
		Initial screen         Index       Mode       Station       Communication       Read area       Sending data       Save area       Receiving data         0									
6-1	Communication module setting	Select index in the block window									
		SyCon upload         Index       Mode       Station       Communication       Read area       Sending data       Save area       Receiving data         0       send       1       Poll       4       Image: Sending data       Image: Sending data									

[XG5000 6-2 step] Reading area/storage area setting

Menu selection: parameter  $\rightarrow$  High-speed Link (HS Link)  $\rightarrow$  High-speed Link 1  $\rightarrow$  Block

Step	Category		Screen configuration and setting contents								
	Calegory	Initial screen	Station number 2 re 3	Communication method Poll COS COS	Read area Se		Save area F	Receiving data (Byte) 4 2	A] F		
		GDL-TR4A	0	Index         Mode           0         send           1         receive           2         send/receive           3         4           High-speed Lin         1	Station Communicatic method 1 Poll 2 COS 3 COS	m Read area M0100	Sending data (Byte) 4 2	Save area	Receiving data (Byte) 4 2	×	
6-2	Communication module setting	GDL-D24A	1	Index Mode 0 send 1 receive 2 send/teceive 3 4 High-speed Lin	Station Communicative method 1 Poll 2 COS 3 COS	m Read area M0100	Sending data [Byte] 4 2	Save area M0110	Receiving data (Byte) 4 2	×	
		GDL-DT4A	2	Index Mode 0 send 1 receive 2 send/receive 3 4 High-speed Lin	Station Communicatio number method 1 Poll 2 COS 3 COS	n Read area M0100 M0102	Sending data (Byte) 4 2	Save area M0110 M0112	Receiving data (Byte) 4 2	A I	
		High-speed l	Link blo	ck after set	ck after setting reading area/storage area						
		Index Mode 0 send 1 receive 2 send/rece 3 4		Communication method Poll COS COS	Read area M0100 M0102	Sending data (Byte) 4 2	Save area M0110 M0112	а <u>(Ву</u>	ing data 4 2		
		High-speed Lin									

## [XG5000 7 Step] High-speed Link parameter writing

Menu selection: [Online]-[Write]

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Step	Category	Screen configuration and setting contents							
		Initial screen	High-speed Link selection						
7-1	Parameter writing	Write parameter(standard settings, HS link, P2P)         Image: Standard settings         Image: Standard settings	Write parameter(standard settings.HS link,P2P)         Image: constraint of the settings         Image: constraint of the settingsettings         Image: constraint of th						

The data of parameter writing is stored in CPU module.
 -So you should back up High-speed Link parameter when changing CPU module.

[XG5000 8 step] High-speed Link enable

Menu selection: [Online]-[Communication module setting]-[Enable link(HS Link, P2P)]

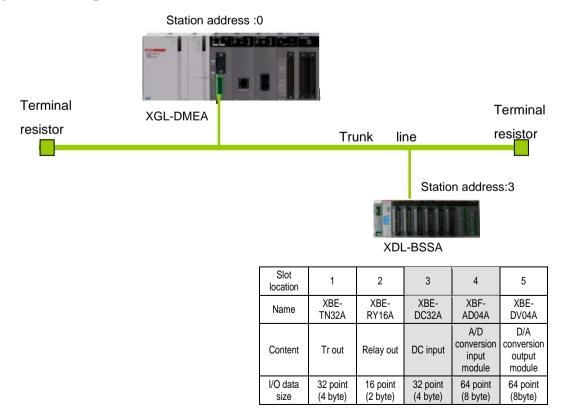
 $\rightarrow$  Communication between master module and slave module is allowed.

#### (2) Program example - Communication between our extension type Smart I/O Pnet

		Setting category	Co	Setting program		
		Master setting		XG	SyCon	
		Base No.			0	XG5000
		Slot No.			0	XG5000
	Master	Station No.			0	SyCon
		Communication speed		1.	5Mbps	SyCon
		HSL setting		Use	e HSL 1	XG5000
		Communication period sett	ing	2	XG5000	
System	Slave	Slave selection		XPL-BSSA		SyCon
configuration		XDL-BSSA (XBE-TN32A:Tr out	Station No.	3		SyCon
		XBE-RY16A:Relay out	Reading	Device	P1000	V05000
		XBE-DC32A:DC input XBF-AD04A:A/D conversion module	area	Size	14	XG5000
			Storage	Device	M200	XG5000
		XBE-DV04A:D/A conversion module	area	Size	12	X03000
ETC	Master S	Setting		Basic s mod	SyCon	
	Device A	Assignment	PC's communication port setting		SyCon	

The basic configuration and setting value is as follows.

# • System configuration



[SyCon 1 step] master and station No. setting

Menu setting: File  $\rightarrow$  New

Г

Step	Category	Screen formation and setting contents
1-1	File writing	File     View     Online     Settings     Window     Help       New     Ctrl+N       Open     Ctrl+O       1 C:\#Program Files\#\#test1.dn       Exit   New File writing
1-2	Fieldbus selection	Select fieldbus
1-3	Master setting	Recall master setting window Insert → master or Insert → master or
1-4	Master selection	Master type selection: COM-C-DNM         Insert Master         Available masters       Selected masters         COM-DPM / PK/20-DPM       Add >>         COM-DPM / PK/20-DPM       Add All >>         COM-PB / PK/20-PB       Add All >>         Vendor name       Hilscher GmbH         Ident number       0x069E         GSD file name       HIL_069E, GSD
1-5	Station No. setting	Insert Master         Available masters       Selected masters       OK         COM-C-DNM       Com-C-DNM       Cancel         Add All >>       Com-C-DNM       Cancel         Vendor       Hilscher GmbH       MAC ID       0         Catalog listing       COM-C-DNM       0       number)
1-6	Master Setting completion	Master0 Station address 0 DP Master COM-C-DPM

# [SyCon 2 step] basic setting modification

Menu selection: Settings → Master Settings

Step	Category	Screen configuration and setting contents							
2-1	Master Settings	Master Settings       Image: Cancel       Master station address: 0         MAC ID       Image: Cancel       Image: Cancel							
2-2	Basic setting	DeviceNet Master Settings       Image: Settings         Settings       Startup behaviour after system initialisation         Cature action 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         Watchdog time         Parameter to process data interface         Addressing mode         Addresses         Word addresses         Word addresses         Storage format (word module)         Big Endian         Clittle Endian         Hardware parameter         2 1kB dual-port memory         Stellal-port memory         Stellal-port memory         Stell         Stell							
2-3	Setting value modification	DeviceNet Master Settings         Settings         Parameter to user interface         Starup behaviour 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            • Byte addresses             • Word addresses             • Big Endian             • Little Endian          Hardware parameter            • 2 kB dual-port memory            • 8 kB dual-port memory            • 16 kB dual-port memory            • 176 kB dual-port memory							

\* Do not change default value except 'Handshake of the process data'

## [SyCon 3 step] communication speed

Γ

Menu selection: Settings → Bus Parameter

Step	Category	Screen configuration and setting contents							
3-1	Bus Parameter	Bus Parameter Baudrate MAC ID Master MAC ID Master	∑ 125 KBits/s 0 <u>Cancel</u>	Baudrate:125KBit/s Master station address setting : 0					

\* Auto Clear Mode

- (1) When selecting it
  - $\rightarrow$  If error occurs in some slave module, stop all communication with normal slave module.
  - $\rightarrow$  Dnet I/F module's HS LED red color flicker

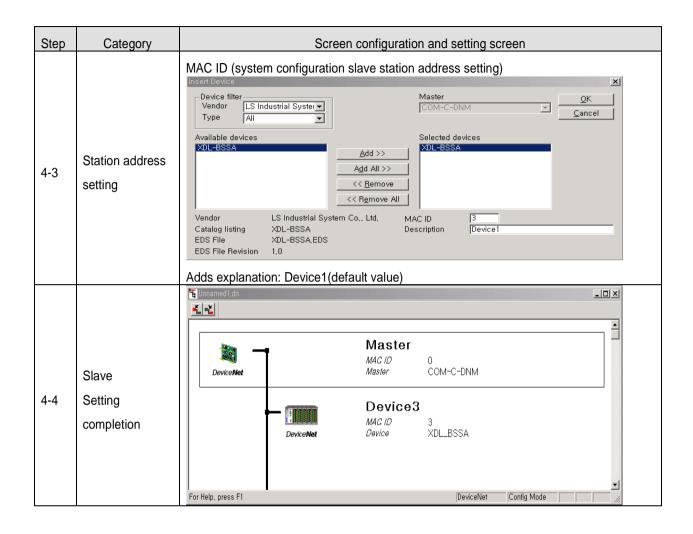
MNS LED red color flicker

## (2) When not selecting it

 $\rightarrow$  If error occurs in some slave module, continue communication with normal salve module.

[SyCon 4 step] Setting of slave and station number

Men	u selection: Inser	$t \rightarrow Master$
Step	Category	Screen configuration and setting contents
4-1	Slave setting	Recall master setting window     Insert → Master or     Image: Control of the control of t
		1 step: Device filter (product classification according to maker)
4-2	Slave selection	2 step: Available Device (system configuration slave selection) Insert Device filter Vendor LS Industrial Syster Available devices Vendor LS Industrial System Co., Ltd, Add >> Add >> Add >> Add >> Add >> Add >> Add >> Add >> Cancel Description EDS File Revision 1,0



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[SyCon 5 step] set the method for slave communication -slave: XPL-BSSA

Men	u selection: Settin	$rgs \rightarrow$ Device Configuration							
Step	Category	Screen configuration and setting contents							
5-1	Slave communication method setting window	Stave setting         Veter Configuration         MAC ID       3         File name       XDL-BSSA_EDS         Description       Device1         P Activate device in actual configuration       Actual device         Actual chosen IO connection       Connection         Connection       Description         Poll       Bit strobe       Change of state         Connection Object Instance Attributes       Production inhibit time       ID         Expected packet rate       200       Production on size 0       Parameter Data         Valiable predefined connection data types       Consumed connection size 0       Parameter Data         Valiable predefined connection data types       Deta length       Imput_Ba         Bit       Unput_Ba       1       Imput_Ba       Imput_Ba         Bit       Unput_Ba       1       Imput_Ba       Imput_Ba         Bit       Unput_Ba							
5-2	Slave station address	Station address (MAC ID) setting: 1 MAC ID 3 File name XDL-BSSA EDS Description Device 1 F Activate device in actual configuration							
5-3	Slave communication method	Communication method selection: Poll Actual chosen IO connection Poll O Bit strobe O Change of state O Cyclic UCMM check							
5-4	Slave sending/receiving period setting	Setting the slave module's sending/receiving data period and response status condition - The following figure is default value of each category. Connection Object Instance Attributes Expected packet rate Watchdog timeout action Produced connection size Consumed connection size 4							
5-5	Slave Data structure (EDS file)	Indicates EDS file's information (data type, IO characteristic, data size) Available predefined connection data types Bit Bit Bit Bit Bit Bit Bit Bit Bit Bit							
5-6	Slave data structure	Set Slave structure(data type, IO characteristic, data size). Configured I/O connection data and its offset address Data type Description I Type I Len. I Addt. D Type[0 Len.0 Addt. BYTE ARRAY Module1 IB 12 0 QB 14							
5-7	Analog module parameter setting window	Click 'Parameter Data' Available Parameters Parameter access filter all Obj. Clas Inst. Attr. Type Acces Parameter Name Min Max 0000 64 01 01 DWOR R/W Set Slot1 Parameter 00000000 00FFFFF 0002 64 01 02 DWOR R/W Set Slot2 Parameter 00000000 00FFFFF 00003 64 01 03 DWOR R/W Set Slot3 Parameter 00000000 00FFFFF 00005 64 01 04 DWOR R/W Set Slot3 Parameter 00000000 00FFFFF Help → Double-click relevant block of slot 4(AD04A), slot 5(DV04A)							

step	Category	Screen configuration screen contents						
5-8	Analog module parameter setting	Set para para Custo Gas Help → eac	aramete mized Inst. 01 Se	eter v Paran Attr. 04 05 t Slot2	value in th etting. Type DWORD DWORD DWORD 4 Configuration e's paramo	parameter setting mo ne'Value'block. If setti Parameter Name Set Slot4 Parameter Set Slot5 Parameter an Parameter eter setting contents	ove to the'Customized Para ng is completed, press'OK' Value 0000000F 00000000	and finish
		- slo	ot5(D)	V04/	A):all chai	nnels (allowance), out	tput(DC 0~10V), data range	e(0~4000)

[SyCon 6 step] Serial port selection

: Use RS-232C cable (loader cable) used in CPU module.

So use the cable.

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Menu selection: Settings → Device Assignment

Step	Category	Screen configuration and setting contents								
6-1	Setting window for serial port	Serial port         Device Assignment CIF Serial Driver         Driver Description         Device Driver:         CIF Serial Driver         Board Selection         Com 1:         Com 2:         Com 2:         Com 2:         Com 3:         Com 4:								
6-2	Port search	In activated port among Connect COM1 $\rightarrow$ Connect COM2 $\rightarrow$ Connect COM3 $\rightarrow$ Connect COM4, error value is indicated as "0" Device Assignment CIF Serial Driver Device Driver: CIF Serial Driver Device Driver: CIF Serial Driver Com 1: DNM COMCONN V01.090 17.04.03 0 Connect COM 1 COM 2: COM 2: COMCONN V01.090 17.04.03 0 Connect COM 1 COM 4: COM 1: $\rightarrow$ COM 1: $\rightarrow$ COM 1: $\rightarrow$ Select OK								

[SyCon 7 step] download		
Menu selection: OnLine	$\rightarrow$	Download

[XG5000 1 step] select type of CPU module

Menu selection: OPTION → PLC TYPE setting

Step	Category	Screen configuration and setting contents			
		PLC Type Settings			
1-1	CPU module	Type XGK_CPUS			
	selection	OK Cancel Select CPU module as XGK-CPUS			

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[XG5000 2 step] Communication method setting

Menu selection: Online	$\rightarrow$	Connection Setting	g
------------------------	---------------	--------------------	---

Step	Category	Screen configuration and setting contents
2-1	Communication method setting	Online Settings - NewPLC         Connection settings         Iype:       ISE         Depth:       Local         Preview         General         Timeout interval:       5 \$ sec.         Betrial times:       1 \$         Read / Write data size in PLC run mode         Normal       Maximum         * Send maximum data size in stop mode         Connecting method:       USB         Connecting step:       local

[XG5000 3 step ] connection

Menu selection: Online  $\rightarrow$  Connection

[XG5000 4 step] I/O information reading

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Menu selection: [Online]-[Diagnosis]-[I/O Information]-[I/O Sync]

[XG5000 5 step] High-speed Link setting

Menu selection: parameter  $\rightarrow$  High-speed Link (HS Link)  $\rightarrow$  High-speed Link 1

Step	Category	Screen configuration and setting contents				
5-1	Communication module setting	Initial screen         Communication module Settings         Base no.:       Image: Communication period settings         Period type:       Image: Communication period settings         Output data setup in case of emergency       Image: Communication period settings         Output data setup in case of emergency       Image: Communication period settings         OK       Clear         OK       Clear         Ommunication module settings       Set Dnet I/F module in High-speed Link         Module type:       Image: Communication module settings         Module type:       Image: Communication module settings         Period type:       Image: Communication period settings         Output data setup in case of emergency       Clear         Output data setup in case of emergency       Clear <t< td=""></t<>				

# [XG5000 6-1 Step] SyCon upload

Menu selection: [Online]-[Communication module setting]-[SyCon upload (Dnet)]

Step	Category		Screen configuration and setting contents						
		Initial screen							
		Index Mode	Station number	Communication method	Read area	Sending data (Byte)	Save area	Receiving data (Byte)	
		3							_
		High-speed Lin	1			1 1			
		Select index i	n the	block win	dow				
		Index Mode	Station number	Communication method	Read area	Sending data (Byte)	Save area	Receiving data (Byte)	
	Communication	0							
6-1	module	2 3							
	setting	High-speed Lin							
		SyCon upload	4						
		Index Mode	Station	Communication	Read area	Sending data	Save area	Receiving data	
		0 send	number 1	method Poll	neau alea	(Byte) 4	Jave died	(Byte)	
		1 receive	2	COS				4	
		2 send/receive	3	COS		2		2	
		4							<b>_</b>
		High-speed Lin							

[XG5000 6-2 step] Reading area/storage area setting

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Menu selection: parameter  $\rightarrow$  High-speed Link (HS Link)  $\rightarrow$  High-speed Link 1  $\rightarrow$  Block

Step	Category		Screen configuration and setting contents													
		Initial scree	nitial screen													
				tation iumber	Mode	Rea	d area	Sending data (Byte)	Save are	a Receivi a data (Byte	_					
		0	0	1	Send			4								
		2														
		3														
		Index select	ion in Bl	ock wir	ndow.											
		Index	Index					Index								
	Communication								Sending		Receiving					
6-1	module setting			Index		Station number	Mode	Read area	data (Byte)	Save area	data (Byte)					
		XDL-BSSA	0	0	0	1	Send	p1000	4							
									2							
				3												
		High-spee	d Link b	lock a	fter settir	ng rea	ding are	ea/storage	area							
				Station number	Mode	Re	ad area	Sending data (Byte)	Save	area d	eiving ata yte)					
		0	0	1	Send	P ا	1000	4								
		1														
		2														

۲ 🚸	The structure of reading/storage area of slave module					
	1. I/O configuration of extens	sion type F	Pnet modu	ıle		
Co	mmunication adapter					
Re	ading area					
		Slot 0:	Slot 1:	Slot 2:	Slot 3:	Slot 4:
	Slot0: output 4 byte	P1000	P1002	M0200	P1003	M0202
	Slot1: relay 2byte	TR	Relay	ос	OA	AD
	Slot3: DV 8byte	Output	Output	Input	Output	Input
Sto	rage area	32 point	16 point	32 point	4ch	4ch
	Slot2: input 4 byte	(XBE-	(XBE-	(XBE-	(XBF-	(XBF-
	Slot4: AV 8 byte	TN32A)	RY32A)	DC32A)	DA04A)	AD04A)

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# 2. Reading/storage area of each module

Reading area (master -> slave)					Storage a	Storage area (slave -> master)			
Device	Transn data	nitting	Extension module	output	Device	Transmi data	itting	Extension module	input
P1000		4 byte	TR output 32	2 point	M0200	_	4 byte	DC input 32	point
P1002		2 byte	Relay 16 poi	nt	M0202	-	2 byte		Ch.0
P1003	14 byte	2 byte	D/A Conversion 4 channel	Ch.0	M0203		2 byte	A/D Conversion	Ch.1
P1004		2 byte		Ch.1	M0204		2 byte	4 channel	Ch.2
P1005		2 byte		Ch.2	M0205		2 byte		Ch.3
P1006		2 byte		Ch.3					

## [XG5000 7 Step] High-speed Link parameter writing

Menu selection: [Online]-[Write]

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Step	Category	Screen configuration	and setting contents
		Initial screen	High-speed Link selection
7-1	Parameter writing	Write parameter(standard settings, HS link, P2P)         Image: Standard settings         Image: Standard settings	Vitte parameter(standard settings, HS link, P2P)         Image: Standard settings         Image: High-speed Link         Image: High-speed Link

The data of parameter writing is stored in CPU module.
 -So you should back up High-speed Link parameter when changing CPU module.

[XG5000 8 step] High-speed Link enable

Menu selection: [Online]-[Communication module setting]-[Enable link(HS Link, P2P)]

 $\rightarrow$  Communication between master module and slave module is allowed.

## **Chapter 7 Rnet Communication**

#### 7.1 Overview

The major characteristics of Rnet network are the cost saving of installation/maintenance, diversification of system configuration, easy maintenance, reparation and easy system modification.

This network supports the electrical network (twisted pair cable) that is cost effective and easy to install for the diversification of configuration.

Rnet module can be used in common for GLOFA series and MASTER-K series and applied diversely according to the system application.

In Rnet more than version V1.0, GLOFA Rnet and MASTER-K Rnet module can be in common.

Туре	Rnet V1.0	Description		
	G3L-RUEA	GM3/K1000S Rnet (electric)		
	G4L-RUEA	GM4/K300S Rnet (electric)		
Master (Rnet)	G6L-RUEA	GM6/K200S Rnet (electric)		
(Rifel)	G7L-RUEA	GM7/K80S Rnet (electric)		
	XGL-RMEA/B	XGT Rnet (electric)		

## 7.2 Communication Specification

#### 7.2.1 Master specification

	Items	Specification			
	Transmission speed	1Mbps (Rnet module common)			
	Encoding method	Manchester Biphase-L			
Transmission distance (Master + Slave or Repeater)		Max. 750m			
Electric	· · · · · ·	- LIREV-AMESB 1Px22AWG: 1.05km			
	(Master + Repeater + Slave)	- CAN Bus Drag Chain: 1.35km			
	Transmission wire	Twisted pair shield cable			
Ma	ax. no of station number	Master + slave + repeater = 64 stations (At least one master should be connected.)			
Max. protocol size		256 bytes			
Access type of communication		Circulated token passing			
Communication method		Connection oriented service Connectionless service			
	Frame error check	CRC 16 = $X^{15} + X^{14} + X^{13} + \dots + X^2 + X + 1$			

# **7.2.1 Slave specification**

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1) Block type			
Classification	Specification		
Allowable inspection power cut time	20 ms		
Communication speed	1Mbps		
Communication method	Semi dual bit serial method		
Synchronous method	Frame synchronous method		
Transmission path method	BUS		
Total extension distance	750m		
	With repeater: 64 stations (including master stations and		
No. of connecting station	repeater)		
	Without repeater: 32 stations (including master stations)		
Modulation method	Manchester Bi-phase-L		
Error control method	Retry by CRC-CCITT and Time Over		
Connector connection	9-PIN D-Sub type, 5-PIN connector type		
Using cable	Twisted air shielded cable		
Max. No. of communication point	3,840 words (for master module)		
Max. No. of transmit point	1,920 words (for master module)		
Max. No. of block	63		
Max. point per block	60 words		

# 2) Expansion type

Classification		Specification		
	Communication speed	1Mbps		
	Transmission path method	BUS		
	Total extension distance	750m		
	Connector connection	Open type 5 pin connector		
	Used cable	Twisted pair shielded cable		
Commu nication	No. of NOD (based on master)	32: repeater not used, 64: repeater used		
	Max. digital I/O point	512 (input: 256, output: 256)		
	Max. I/O connection number	8		
	Extension analog module occupation number	2 byte		
	Latch/Clear select	Operation by mode change switch		
	Rated input voltage/current	DC 24V/0.55A		
Power	Power range	DC 19.2V ~ 28.8V		
	Output voltage/current	5V(±20%)/1.5A		
	Insulation	Non-insulation		
-	Weight(g)	100		

## 7.3 Communication Parameter Setting

#### 7.3.1 Overview

The method to program in RNET communication module is supposed to enable to communicate with Smart I/O module through *High-speed Link* service as mentioned on 'Chapter 4 Communication Programming'.

#### High-speed Link

The *High-speed Link* service through Rnet communication module is available to use all the existing function and carry out the communication by simple parameter setting. The parameter shall be set in GMWIN for GLOFA series and in KGLWIN for MASTER-K and in XGT for XG5000 and from RNET version V1.0, min. communication period can be set every scan.

(1) Setting available range of Rnet communication module

Classification		Max. communi- cation point	Max. sending point	Max. block no.	Max. point per block
	G3L-RUEA	3,780 words	1,920 words	64 (0-63)	60 words
RNET	G4L-RUEA	3,780 words	1,920 words	64 (0-63)	60 words
Communi	G6L-RUEA	3,780 words	1,920 words	64 (0-63)	60 words
cation module	G7L-RUEA	3,780 words	1,920 words	64 (0-63)	60 words
module	XGL-RMEA	3,780 words	1,920 words	64 (0-63)	60 words

Max. High-speed Link point per communication model (Rnet master standard)

Communication setting when communicating with Smart I/O module

HS link block setting		Sending/	Address area		HS link	
Sending	Receiving	Receiving period	GLOFA-GM	MASTER-K	XGT	information
32	32	20ms ~ 10s	%QW, %IW	P area	Select module	Ref.7.3.2

## Remark

- 1) In case of Smart I/O, if 32 points are installed for one module, max. link point is available to use up to 2,016 words for 63 stations.
- 2) For further information, please refer to 'Chapter 4. Communication Programming'.
- 3) XGT's address area is set by Smart I/O

# 7.3.2 High-speed Link Communication Status Flag

## (1) High-speed Link information function

It is available to confirm the reliability of data sent/received to/from other station (remote station) through *High-speed Link* and the user can utilize the above information by combining with *High-speed Link* sending/receiving data as keyword type when writing the program in case of emergency or maintenance.

Classification	Run-link	Link-trouble LINK_ TROUBLE	Sending/ receiving status TRX_MODE	Action mode DEV_MODE	Error DEV_ERROR	High-speed Link status HS_STATE
Information	Overall	Overall	Individual	Individual	Individual	Individual
type	information	information	information	information	information	information
Keyword name (□=HS link no. 1,2,3,4)	_HS⊡RLINK	_HSOLTRBL	_HS⊡TRX[n] (n=individual parameter no.0~63)	_HS⊟MOD[n] (n=individual parameter no. 0~63)	_HS⊡ERR[n] (n=individual parameter no. 0~63)	_HS⊡STATE[n] (n=individual parameter no. 0~63)
Data type	BIT	BIT	BIT-ARRAY	<b>BIT-ARRAY</b>	<b>BIT-ARRAY</b>	<b>BIT-ARRAY</b>
Monitoring	Available	Available	Available	Available	Available	Available
Program	Available	Available	Available	Available	Available	Available

High-speed Link Information

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# 7.3.3 GMWIN High-speed Link Setting

#### (1) GMWIN project and Link parameter

If you select the *High-speed Link* parameter from GMWIN project basic screen, the *High-speed Link* parameter basic screen will appear and you can select the corresponding item.

High-speed Link parameter basic so	creen
High Speed Link Parameter	×
High Speed Link 1	Close
High Speed Link 2	Help
High Speed Link 3	
High Speed Link 4	

If selecting 'parameter'-'High-speed Link parameter' from project screen, the above menu will appear.

nmunicaton Parameter	
Communication Method	
Station No. : 0	Y
Baud Rate : 1920	0 🔽 Data Bit : 🛛 💌
Parity Bit : None	Stop Bit : 1 🔽
Communication Channe	əl
C RS232C Null Moder	n or RS422/485
C R6232C Modem (Da	edicated Line) Init. Command :
C RS232C Dial Up Mod	dem ATZ
Protocol and Mode	
	Timeout in Master Mode : 500 ms
Dedicated	
🔿 Master	Read Status of Slave PLC List
🔿 Slave	
Modbus	
C Master	Transmission Mode : ASCII 🚽
User Defined	
C Master	
C Slave	List
FIELDBUS	
Master	
C Slave	List
0.010	

In case of GM7 RNET, select [Link Parameters]-[High Speed Link Parameter] from project screen.

#### (2) Maximum number to install

The *High-speed Link* items 1~4 means max. installation number of communication module according to PLC CPU type. It is available to install max. 4 communication module for GLOFA GM1/GM2/GM3, CPU/GM4-CPUB, max. 2 for GLOFA GM4-CPUA/GM6, max. 1 for GM7 and max.12 for XGT.

In case of XGT, you can install module as many as max. installation number anywhere, basic base or extension base.

Classification	Available communication module	Max. installation number (note 1)
GLOFA-GM3	G3L-RUEA	4 EA
GLOFA-GM4-CPUA	G4L-RUEA	2 EA
GLOFA-GM4-CPUB	G4L-RUEA	4 EA
GLOFA-GM4-CPUC	G4L-RUEA	8 EA
GLOFA-GM6	G6L-RUEA	2 EA
GLOFA-GM7	G7L-RUEA	1 EA
XGT	XGL-RMEA	12 EA

Communication module installation relation per CPU model

#### (3) Link parameter setting

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If you select the corresponding parameter from parameter setting basic screen, the *High-speed Link* parameter setting first screen will appear as shown in the following figure. When setting the parameter at first, the initial value will be indicated as the below shown figure.

Parameter setting screen	
High Speed1Link Set	×
Network Type	
C GLOFA Fnet	ок
C GLOFA Minet	Cancel
C GLOFA Enet	Help
C GLOFA Ednet Network	
O GLOFA Ednet Cable	
C GLOFA Dnet	
C GLOFA Pnet	
C GLOFA FEnet	
C GLOFA FDEnet	
GLOFA Rnet	
Slot Num 0 💌 Self-stat Num 0	

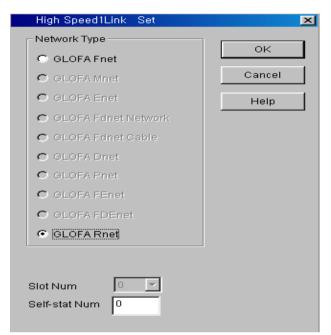
#### (a) Link setting

Link setting is the item to set the basic items of communication module to perform the High-speed Link.

		set screen			
- Link Set					
	ork Type:	GLOFA F			
Slot:	0	Self Station	n No: 0		
					Edit
Entry Lis	t				
Num	Туре	Class	From Area	To Area	Size
2 3 5 6 7 8 9 10 11 12 13 14 15					
		Delt	ete Co	ру	Edit
				Close	Help

- 1) Network type: It sets the installed communication module type and Rnet shall be set.
- 2) Slot no.: It sets the position that the communication module to set is installed. (0 ~ 7 slot).
- 3) Self Station No.: Enters the setting self station no. into the station address switch of communication module front side. The self station no. of Rnet shall be set as '0' to use.

#### (b) G7L-RUEA link setting



- 1) Network type: It sets GLOFA Rnet.
- 2) Slot no. : Not-active
- 3) Self station no. : The self station no. shall be set as '0' and used.
- (3) Entry list setting

Entry list is the area to register the actual data sending/receiving information. For further information, please refer to 'Chapter 4. Communication Programming'.

## Remark

GRL-DT4A among Smart I/O modules has 'input' and 'output'. Thus, in case of using the Entry list, please be sure that two lists are required for one module. In this case, when sending/receiving, the station no. shall be set same but the block no. differently.

#### (4) High-speed Link operation

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After setting the *High-speed Link* parameter and executing 'make' from GMWIN compile menu, if you select 'parameter write' and start the *High-speed Link* service, the *High-speed Link* service by the parameter setting begins to run. The *High-speed Link* start order is as follows.

#### (a) Write Parameter

Parameter download screen	
Write	×
Range	
O Basic Parameter	
O I/O Parameter	
O HS Link Parameter	
O Redundancy Parameter	
O Communication Parameter	
🔿 Program	
🔽 Upload Program	
Parameter and Program	
🔽 Upload Program	
O Upload Program	
OK Cancel Help	

After saving the *High-speed Link* parameter written by the user in the GMWIN project file and connecting with PLC through 'online connect' from GMWIN basic menu, select 'Write' and download the *High-speed Link* parameter or 'parameter and program'.

(b) High-speed Link start

×

#### (c) G7L-RUEA High-speed Link start

GMWIN f	or Windows 🛛 🔀
•	Communication is enabled
	Ok

After parameter write, *High-speed Link* is executed after setting the 'Link enable'. Link enable setting is available only in the stop mode of PLC. And if the *High-speed Link* enable setting starts, it carries out the *High-speed Link* regardless of PLC action mode and 'parameter' and 'Link enable information' shall be battery backup in the PLC CPU and preserved if the power is cut off.

#### (5) High-speed Link information monitor

It is available to monitor the current *High-speed Link* status by using 'monitor' function after the GMWIN online connection. There are two kinds of methods to monitor : by selecting 'variable monitor' from monitor menu and by High-speed parameter monitor.

#### (a) Variable monitor

'Variable monitor' is the function to monitor the necessary items by using the GMWIN flag monitor function and the order to monitor is as follows.

- 1) Select Variable monitor from online monitor items.
- 2) Select Oflag from 'register variable ' screen as shown on the figure.
- 3) Select the *High-speed Link* information flag you want to monitor directly one by one from **Variable, Flag list** screen and register. (As \_HSxSTATE[n], \_HSxERR[n], \_HSxMOD[n],\_HSxTRX[n] is ARRAY flag, the user enters the registration no. of parameter that he wants to monitor directly).

## Remark

'X' shows the *High-speed Link* no. and it has the range1~4 for GM1/GM2/GM3/GM4-CPUB PLC, 1~2 for GM4-CPUA,GM6 PLC and only 1 is effective for GM7. [n] is the individual parameter no.(0~63).

4) If you register the variable from the menu and select 'Close', the corresponding monitor screen will appear and the monitoring begins.

<i>igh-speed Link infor</i> legister Variable	mation variable reg	ister screen		2
Kind C Configuration Glo C Instance Variable C Direct Variable		<ul> <li><u>R</u>esource Global</li> <li><u>S</u>ystem Flag</li> </ul>	Variable	Close Register <u>S</u> elect Help
Resource Resourc	_	Instance Registered-V	INSTO ariables	7
HS1ERR S HS1LTRBL A HS1MOD S HS1RLINK H HS1STATE G HS1TRX C	lot restart unable error tation status information bnormal information of tation mode informatic IS RUN_LINK information eneral communication tation status informatic tation status informatic			

High-speed Link information monitor screen (variable registration)

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🔩 User Selection V	ariable Monitor		
System Flag	_HS1ERR[0]	0	
System Flag	_HS1LTRBL	0	
System Flag	HS1MOD[0]	1	
System Flag	HS1RLINK	1	
System Flag	HS1STATE[0]	1	
System Flag	_HS1TRX[0]	1	
•			•

5) The detailed contents for the corresponding flag is described in 'Communication module flag application' and it is available to carry out the RNET network status diagnosis by the corresponding flag monitor properly.

(b) High-speed parameter monitor

This is the function to monitor the *High-speed Link* communication status from the menu as below. Select 'LINK Parameters' item from monitor menu of GMWIN online connection.

Link parameter se	election screen
Select Link Parameter	×
Select HS Link1 HS Link2 HS Link3 HS Link4	OK Cancel

Link parameter monitor shows the general information for RUN-LINK, LINK-TROUBLE on the top screen as below and the individual information such as mode (action mode), communication (sending/receiving status), and an error on the setting parameter items.

High-speed Link parameter monitor screen (Example)

≀un_	Link:1 Link_	Trouble:()							
No	Туре	Class	From Area	To Area	Size	Mode	Trx	Error	
8	Remote1.Send0	A(20ms)	%MW0	%QW0.0.0	1	1	1	0	
1						0	0	0	
2						0	0	0	
3						0	0	0	
4						0	0	0	
5						0	0	0	
6						0	0	0	
7						0	0	0	
8						0	0	0	

For the meaning of the value monitored on the above figure, please refer to 'Chapter 4. Communication Programming'.

# Remark

# 1. RUN-LINK monitoring

In case that GRL-TR4A among Smart I/O is set in the parameter, RUN-LINK shall be indicated as '0'.

# 7.3.4 KGLWIN Link Setting

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#### (1) KGLWIN project and Link parameter

*High-speed Link* parameter selects link parameter from KGLWIN project screen and sets the corresponding item. The setting order and the function per item are as follows.

#### (a) KGLWIN project setting

The following shows parameter basic screen appeared when selecting 'parameter' window.

KGLWIN parameter basic screen (in case of K200S)

Basic       Interrupt       I/O       Link1       Link2         Latch Area	🗃 Parameter [New Project1]		
L:       ****         100 msec T:       00 msec T:         100 msec T:       101 msec T: <tr< th=""><th>Basic Interrupt I/O Li</th><th>nk1 Link2</th><th></th></tr<>	Basic Interrupt I/O Li	nk1 Link2	
	L: •••• - •••• M: •••• - •••• 100 msec T: 144 - 191 10 msec T: 240 - 255 C: 192 - 255 D: 3500 - 4500	100 msec T: 000 - 191 10 msec T: 192 - 255 Watchdog Time: 20 * 10msec PLC Operation Mode I Blown Fuse I Operation Error I Output during Debugging	Station Number : 0 Baud Rate : 19200 ○ Master ⓒ Slave Time Out : 5 ×1 ☐ Read Slave PLC State

#### (b) Link parameter basic setting

If you select 'Link 1' from KGLWIN parameter basic screen, the *High-speed Link* 1 parameter basic screen as shown below will appear.

Link parameter basic screen	
🛱 Parameter [New Project1]	. 🗆 🗵
Basic Interrupt I/O Link1 Link2	
Link: Encluse Self Station No: 0 💌 Base: 0 💌 Slot: 0 💌 Type: Fnet 💌	
No         Station         Unit Type         Tx Device         Rx Device         Size         Block No           0	
Image: A state of the state	

(c) K80S project and Link parameter basic setting

This is parameter basic screen to be appeared when selecting K80S parameter window.

	er [New Projec			
Basic	Interrupt	Comm.	PID(TUN) PID(CAL) Pulse Ou	t Analog
	L: •••• M: •••• ec T: 144 ec T: 240 C: 192	- **** - **** - 191 - 255 - 255 - 4500 - 99	Timer Boundary 100 msec T: 000 - 191 10 msec T: 192 - 255 Watchdog Time: 20 * 10msec PLC Operation Mode PLC Operation Error Operation Error Output during Debugging Remote Access Control	Input Setting Input Filter Time : 8 Pulse Catch Set ( P000X ) 0 1 2 3 4 5 6 7
▲				

KGLWIN parameter basic screen (in case of K80S)

When selecting 'Communication' from KGLWIN parameter basic screen as shown on the above figure, the communication parameter setting screen will appear as below and if you select 'master' from the FIELDBUS menu on the right bottom side and press 'register list', the *High-speed Link* parameter basic screen will appear.

Basic       Interrupt       Comm.       PID(TUN)       PID(CAL)       Pulse Out       Analog         Communication       Disable       Timeout in Master Mode:       500         Communication Method       Timeout in Master Mode:       500         Station Number :       Image: Communication Channel       Dedicated         Parity Bit :       None       Stop Bit :       Image: Communication Channel         Communication Channel       C Master       Transmission Mode:       ASCI         C RS232C Null Modem or RS422/485       User Defined       User Defined	) ms
Communication :       Disable       Timeout in Master Mode:       500         Communication Method       Dedicated       Dedicated       Communication Channel       Communication Channel<	
Baud Rate :       19200       Data Bit :       8       Communication Channel       Communication Channel	List
Communication Channel C Master Transmission Mode: ASC C RS232C Null Modern or RS422/485 C RS232C Modern(Dedicated Line) Init Command : User Defined	
C RS232C Modem(Dedicated Line) Init Command : User Defined	<b>v</b>
C RS232C Dial-up Modern ATZ C Master C Slave FIELDBUS	List
C Slave	List

Communication parameter setting screen

Link param	eter bas	ic screen						
FIELDBU	JS							×
Kind	Rnet	▼ Self-	-Station No 🛛					
- Entry No	·List — Station	Туре	From Area	To Area	Size	Block No	Period	
0 1 2 3 4 5 6 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20								1
			Delete.	Co	ру	Edit		
			OK	Ca	Incel	Help	)	

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 Link1 : This is one of *High-speed Link* type and max.4 communication modules can be installed for K1000S CPU, max. 2 for K300S/K200S and max.1 for K80S. The *High-speed Link* no. is not related to the installed slot no. and only one *High-speed Link* parameter is available to set for one communication module. The table below shows the installation available communication module per CPU model and max. installation amount.

Classification	Communication module	Max. installation amount	Remarks
K1000S	G3L-RUEA	4 EA	
K300S (below v2.2)	G4L-RUEA	2 EA	Each communication
K300S (more than v2.2)	G4L-RUEA	4 EA	module can be installed
K200S	G6L-RUEA	2 EA	by combining each other.
K80S	G7L-RUEA	1 EA	

- 2) Link: It sets whether or not to execute the link of communication module. (Enable, Prohibit)
- 3) Self station no. : Self station no. should be set as '0' and used.
- 4) Slot: This is the communication module installed slot no. and it is set by selecting one from '0'~'7'.

- 5) Registration no. : This is the serial no. to indicate the registered order of the Individual parameter and it is set by '0' ~'63'. It is available to register up to a total of 63 and not related to the sending/ receiving order. But it is available to register max. 32 for sending and 32 for receiving respectively.
- (d) Link parameter detail setting

If you double-click in the status that the *High-speed Link* registration no.1 is selected, the link parameter setting screen will appear as shown on the figure below.

Link parameter modification screen (in case of the HS link registration no.0)

Edit Link		×
Station No: Tx Device: M000 Rx Device: P000 Block No: 0 T Size: 1	OK Cancel	
Module Type: Remote Out 💌 Period: 20 msec 💌		

1) **Station no.** : When sending/receiving the data of the setting item, it is required to set other station no. The following table shows the method to set the station no.

Station no. setting method

Communication type	Station no.	Range of station no.
Remote sending	Station no. of other station	1 00
Remote receiving	(remote)	1~63

2) Block No. : This is the parameter to send/receive lots of data of various areas from one station and distinguish the data of various blocks each other. If setting 32 stations for Smart I/O output module, the input should be set as 31 stations and if setting 32 stations for input. The output should be set as 31 stations because this supports up to 64 stations including master station. In this case, if setting more than 2 same block no. for the same station no., the network will be down. Thus it is not available to set more than 2 blocks for the same station. The max. number of connection station is 64 stations including the master station but if the sending/receiving is set for the one station at the same time, it is not available to set max. station setting.

3) Module type: It is set by remote sending and remote receiving.

- a) Remote sending: when sending the data of self station to remote station.
- b) Remote receiving: when receiving the data of remote station to self station.

4) Sending (Tx) / Receiving (Rx) device: This means the area of sending/receiving. In case of remote sending that means the sending to remote station, set the sending area of self station for the sending device and the receiving area (P area) of remote station for the receiving device. As the remote receiving means the receiving from remote station, set the sending area (P area) of remote station for the sending device and the receiving area of self station for the sending area (P area) of remote station, set the sending area (P area) of remote station for the sending device and the receiving area of self station for the receiving device.

Communication type Device		Setting available area	Remarks		
Domoto condina	Sending	P,M,L,K,F,D,T,C all area	Sending area of self station		
Remote sending	Receiving	P area	Receiving area of remote station		
Demete receiving	Sending	P area	Sending area of remote station		
Remote receiving	Receiving	P,M,L,K,D,T,C area	Receiving area of self station		

Sending/Receiving device setting area per communication type

- 5) Size: This means the size of sending/receiving data and the unit is 1 word (16 points). It is available to set max. 60words but for Rnet, it is set as 2 words at the present time because max. points of the current Smart I/O is 2words (32 points).
- 6) Communication period: *High-speed Link* is the service to carry out the sending/receiving by the parameter set by the user at the point where the PLC program ends. Thus, when PLC program scan time is short within several ms, communication module begins to transmit the data according to every program scan which results in increasing the communication amount and reducing the effectiveness of overall communication system. Thus, to prevent this, the user can set the sending/receiving period from min.20ms (RNET version V1.0 : from every scan) to max. 10sec. The sending/receiving period means the sending period if the corresponding block is set as 'sending' and the period to check the data receiving of the corresponding block if it is set as 'receiving'.
- (e) High-speed Link operation

After completing the *High-speed Link* parameter setting, if you click the 'verify' button from download menu and execute the parameter download, the *High-speed Link* service begins. In this case, the corresponding link of the link parameter basic screen should be at Enable status.

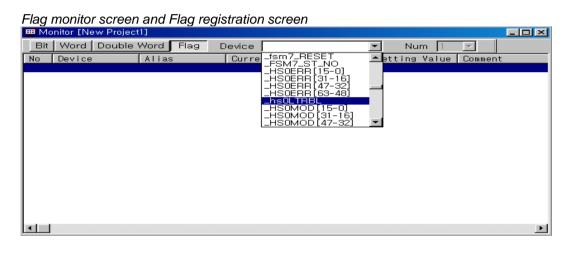
Paramete	Parameter download screen					
	Download to PLC ( KGLW	IN => PLC)	×			
	I✓ Parameter I✓ Program					
	From 0	To 7167				
	ОК	Cancel				

#### (2) High-speed Link information monitor

After KGLWIN online connection, it is available to monitor High-speed Link information by using monitoring window and 'information read' window. There are two kinds of method to monitor : one is by selecting the flag to monitor from flag monitor menu of monitoring window to monitor the individual information and overall information and the other one is by selecting the High-speed Link parameter from online-information read menu to monitor overall information.

#### (a) Flag monitor

Flag monitor is the function to monitor by selecting the necessary flag from KGLWIN [project]→[monitoring] using the flag monitor menu. First, if you select flag monitor button from monitoring window, the flag monitor screen as shown on the figure below will appear and if you press the registration button ( $\bullet$ ), the flag registration screen will appear. Select the High-speed Link information flag to monitor from the flag registration screen one by one and register it. If flag registration is completed, it begins to monitor in 'monitor' screen. If the monitoring does not work, please check the monitor start mode once again.



#### Flag monitor screen (the flag is registered.)

😐 M	onitor [New Projec	:t1]				<u>- 🗆 ×</u>
Bit	Word Double	Word Flag (	Device 📔	•	Num 1	7
No	Device	Alias	Current Value	Sett	ing Value	Comr 🔺
0 1 2 3	_hsORLINK _hsOLTRBL _HSOERR[15-0] _HS1MOD[15-0]	D4600.0 D4600.1 D4613 D4625	1 0 00000/h0000/ 00000/h0000/			

1) Reading information in High-speed Link parameter monitor

If you select the High-speed Link parameter from the menu 'online-information read', you can see the detailed information for the High-speed Link parameter as shown on the above figure.

	d Link paramet	er monitoi	•					
HSLink Infor	mation							×
	0Slot/Rnet/S	Station No:	00					
No	Туре	Period	TxArea	RxArea	Length	Mode	Trx	Erro
0	R02.S00 R03.S01	20ms 20ms	M000 M000	P000 P000	1 1 1	0		:
-				OK				Þ

R02.R03 from the type item means Remote station (Smart I/0) 2 and 3 and SOO,S01 means the block no., and this is the parameter to transmit the data of self station (M000) to Remote (Smart I/O) station 2 (P000) through block no.'0'. R03 is also the parameter to transmit the data of self station (M000) to Remote (Smart I/O) station 3 (P000) through block no.1.

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2) Link information monitor from information Read

If you select the menu 'Online'-'Information Read'-'Link Information', it is available to easily monitor the link status of the communication module installed per slot.

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Lir	nk Informatio	n		×
	Slot No	Network Type	Station No	
	0	GLOFA Rnet	00	
	J			
		OK	Network Information	

If you select the module to monitor and click the verify button, you can see the connection status of all RNET network connected to the corresponding module. **(except K80S)** 

Slot No	Networ	k Type S	tation No				
0	GLOFA	Rnet (	00				
Network Infor	rmation						×
Station	NO NO	PLC Type	Mode	Error	Connection	Slot No	
00		K200S SRU	XXXX XXXX			0 0	
		280				5	
			OK				

# (3) Flag

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L area list when using the data link module (in case that installed in Slot no.0)

		X	: slot no., n : station no. of other station
Keyword		Address no.	Description
_NETx _LIV[n]	L0001~L00 3F	L0001 ~ L000F (1~15 stations) L0010 ~ L001F (16~31 stations) L0020 ~ L002F (32~47	This is the flag to inform that the power of other station is normal and the data is sending/receiving normally with other station through communication cable as
		stations) L0030 ~ L003F (48~63 stations)	the Alive information of other station. (Reading only)

High-speed Link detail flag

x : K1000S=9, K300S/K200S=4 m : HS link no.

Keyword	Туре	Bit position	Items	Description
_HSmRLINK	Bit	Dx600.0	<i>High-speed Link</i> RUN_LINK information	<ul> <li>This indicates that all stations are acting normally according to the parameter set in the High-speed line and will be 'ON' under the following conditions.</li> <li>1. When all station set in the parameter is RUN mode and there is no an error,</li> <li>2. When all data block set in the parameter is communicating normally,</li> <li>3. When the parameter set in the parameter of each station itself is communicating normally,</li> <li>Once 'ON', RUN-LINK maintains the 'ON' unless stopped by Disable.</li> </ul>
_HSmLTRBL	Bit	Dx600.1	Abnormal information of <i>High-speed Link</i> (LINK_TROUBLE)	<ul> <li>In the status that _HSmRLINK is ON, if the communication status of the station set in the parameter and the data block is as follows, this flag shall be ON.</li> <li>1. When the station set in the parameter is not RUN mode,</li> <li>2. When there is an error in the station set in the parameter,</li> <li>3. When the communication status of data block set in the parameter is not smooth,</li> <li>LINK-TROUBLE shall be ON if the above 1,</li> <li>2, 3 condition occurs, and if the condition returned to the normal condition, it shall be OFF.</li> </ul>

Keyword	Туре	Bit position	Items	Description
_HSmSTATE[ k] (k=0~63)	Bit Array	Dx601.0 ~ Dx604.15	General communication status information of k data block set in the <i>High</i> - <i>speed Link</i> parameter	This indicates the general status of communication information for each data block of the setting parameter. _HSmSTATE[k] = _HSmMOD[k] & _HSmTRX[k] & _HSmERR[k]
_HSmMOD[k] (k=0~63)	Bit Array	Dx605.0 ~ Dx608.15	Mode information (RUN = 1, others = 0)	Indicates the action mode of the station set in k data block of parameter.
_HSmTRX[k] (k=0~63)	Bit Array	Dx609.0 ~ Dx612.15	Status information (normal=1, abnormal=0)	Indicates whether the communication status of k data block of the parameter is communicating smoothly as set in the parameter.
_HSmERR[k] (k=0~63)	Bit Array	Dx613.0 ~ Dx616.15	The status information of the station set in k data block from the <i>High-speed Link</i> parameter. (normal=1, abnormal=0)	Indicates if an error occurs in the station set in k data block of the parameter.

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HS link type	D area address no.	Remarks
High-speed Link2 (m=1)	Dx620 ~ Dx633	
High-speed Link3 (m=2)	Dx640 ~ Dx653	
High-speed Link4 (m=3)	Dx660 ~ Dx673	

# 7.3.5 XGT Rnet's HS Link parameter setting

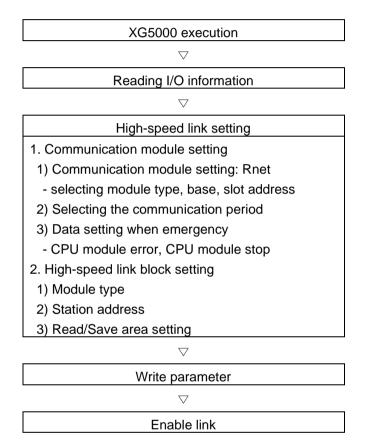
In order to use XGT Rnet, you should set the High-speed Link parameter through XG5000.

## (1) HSL parameter in XG5000

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High-speed Link parameter is set through High-speed Link of XG5000 and sequence and category is as follows

(a) Setting sequence of High-speed Link parameter in XG5000



# (b) Reading I/O information

- 1) Execute the XG5000 and select new file.
- a) Press OK after selecting the project name and PLC type.
- b) When using the parameter saved in PLC, select "Open from PLC".

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New Project				? 🛛
Project <u>n</u> ame:	I			ОК
File <u>d</u> irectory:	C:₩XG5000₩			Cancel
			Eind	
PLC Series				
⊙ XG <u>K</u>	○×G <u>B</u>	<mark>○</mark> ×G <u>I</u>		
<u>C</u> PU type:	XGK-CPUH			
P <u>r</u> ogram name:	NewProgram			
Program langu				
.⊛ <u>L</u> D				
Project descript	ion:			
			~	
			~	

2) Click Online Settings and select connection Type and Depth.

Online Settings - NewPLC ?X									
Connection settings									
Type: RS-232C V Settings									
Depth: Local 💌 Preview									
General									
Timeout <u>i</u> nterval: 5 📚 sec,									
<u>R</u> etrial times: 1 📚									
Read / Write data size in PLC run mode									
○ Normal									
★ Send maximum data size in stop mode									
Connect OK Cancel									

3) Click "Read IO Information" and read information about module.

(c) Communication module setting method

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The following figure is setting screen of communication module and describes the meaning of the each category.

Communication module setting								
Communication Module Settings 🛛 🛛 🔀								
_ Communicatio	n module settings							
Module	Rnet	<b>_</b>						
Base no,:	00	- -						
Slot	03	-						
Communicatio	Communication period settings Period type: 20 msec							
_Output data se	tup in case of em	ergency						
CPU error	C Latch	Clear						
CPU stop	C Latch	Clear						
OK								

- 1) Communication Module Settings
  - a) It is made when selecting HSL and double-click HSL screen.
  - b) Module type: selects module (Rnet) which operates as a master.
  - c) Base and slot No.: sets the location where master module is equipped.
- 2) Communication period setting
  - a) Communication period means the period which takes on reading the CPU data from Rnet.
  - b) The number of period is 8; Min. 20msec~ Max.10sec
- 3) Output data setting when emergency
  - a) CPU error: It is divided into Latch Clear. Latch holds its data and Clear initialize its data as 0 when an error occurs.
  - b) CPU stop: It is divided into Latch Clear. Latch holds its data and Clear initialize its data as 0 when CPU stops.

## (d) HSL block setting

HSL block setting is set according to the characteristic of communication module and screen configuration is as follows and refers to the following setting method.

HSL block setting s	creen								
Project window v x				1				1.0.11.1.1	
😑 🛲 kukukeke(XGI-CPUU)	Index	Module type	Mode	Station number	Read area	Sending data (Byte)	Save area	Receiving data (Byte)	•
High-speed Link 01 [B050 Rnet]	0	*							
High-speed Link 02	1	DC input 16 points							
IIIgh-speed Link 03	2	DC input 32 points TR output 16 points							
- High-speed Link 04	3	TR output 32 points							
High-speed Link 05	4	Relay output 16 points DC input 16 points/output 16 poi							
High-speed Link 06	5	GM3, GM4, GM6, PMU							
High-speed Link 07	6	XRL_BSSA							
High-speed Link 00	7	Inverter							
High-speed Link 10	8								
- High-speed Link 11	9								
High-speed Link 12	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
Standard s     High-spee	High-sper	ed Lin							

- 1) Index: It means HSL's block No. and it consists of 0~127(128).
- 2) Module type: select Smart I/O Rnet's module name.
- 3) Mode: Mode is set automatically according to the module type except the combined module (DC input 16 point/output 16 point) and Smart I/O Rnet
- 4) Station No. : It means Smart I/O Rnet's station No.
- 5) Read area/Save area: When selecting output module, the reading area is activated and outputted. It means PLC's device area which is transmitted into module and when selecting module, Save area is activated and means the PLC Save area where data transmitted from input module is saved. When selecting the combined module, both reading area and Save area is activated
- 6) Sending/Receiving data: It is set automatically according to the module type.
- (e) Parameter writing

Click "parameter writing" in online and select HSL No. and press "OK".

(f) Link enable

Click "link enable" in online and select HSL No. and press "OK".

#### (2) HSL information monitor

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You can check the communication status of Smart I/O which is connected with XGL-RMEA and information about each HSL through the XG5000's system diagnosis menu.

- (a) Checking the communication module status
  - 1) Click system diagnosis in Online.
  - 2) Select XGL-RMEA with right mouse and select Auto scan.
  - 3) You can check the Smart I/O connection status through Auto scan.

Image: Second

(b) Checking the information about each HSL.

- 1) Click system diagnosis in Online.
- 2) Select XGL-RMEA with right mouse and select HSL.
- 3) You can check communication status about each block through HSL information.
- 4) HSL flag's meaning and device area is as follows.

Name	4) HSL hags mea	unit	Device area	Details		
-	_HS1_STATE000~127	BIT	L000020~9F	Indicates total status of HSL 1, block 000~127		
	_HS2_STATE000~127	BIT	L000520~9F	Indicates total status of HSL 2, block 000~127		
	_HS3_STATE000~127	BIT	L001020~9F	Indicates total status of HSL 3, block 000~127		
	_HS4_STATE000~127	BIT	L001520~9F	Indicates total status of HSL 4, block 000~127		
	_HS5_STATE000~127	BIT	L002020~9F	Indicates total status of HSL 5, block 000~127		
HsState	_HS6_STATE000~127	BIT	L002520~9F	Indicates total status of HSL 6, block 000~127		
	_HS7_STATE000~127 BIT L003		L003020~9F	Indicates total status of HSL 7, block 000~127		
	_HS8_STATE000~127	BIT	L003520~9F	Indicates total status of HSL 8, block 000~127		
	_HS9_STATE000~127 BI		L004020~9F	Indicates total status of HSL 9, block 000~127		
	_HS10_STATE000~127	BIT	L004520~9F	Indicates total status of HSL 10, block 000~127		
	_HS11_STATE000~127	BIT	L005020~9F	Indicates total status of HSL 11, block 000~127		
	_HS12_STATE000~127	BIT	L005520~9F	Indicates total status of HSL 12, block 000~127		
	_HS1_MOD000~127	BIT	L000100~7F	Indicates run mode of HSL 1, block 000~127		
	_HS2_MOD000~127	BIT	L000600~7F	Indicates run mode of HSL 2, block 000~127		
	_HS3_MOD000~127	BIT	L001100~7F	Indicates run mode of HSL 3, block 000~127		
	_HS4_MOD000~127	BIT	L001600~7F	Indicates run mode of HSL 4, block 000~127		
	_HS5_MOD000~127	BIT	L002100~7F	Indicates run mode of HSL 5, block 000~127		
HaMada	_HS6_MOD000~127	BIT	L002600~7F	Indicates run mode of HSL 6, block 000~127		
HsMode	_HS7_MOD000~127	BIT	L003100~7F	Indicates run mode of HSL 7, block 000~127		
	_HS8_MOD000~127	BIT	L003600~7F	Indicates run mode of HSL 8, block 000~127		
	_HS9_MOD000~127	BIT	L004100~7F	Indicates run mode of HSL 9, block 000~127		
	_HS10_MOD000~127	BIT	L004600~7F	Indicates run mode of HSL 10, block 000~127		
	_HS11_MOD000~127	BIT	L005100~7F	Indicates run mode of HSL 11, block 000~127		
	_HS12_MOD000~127	BIT	L005600~7F	Indicates run mode of HSL 12, block 000~127		
HsTrx	_HS1_TRX000~127	BIT	L000180~25F	Indicates normal communication between HSL 1 000~127~127 block station		
	_HS2_TRX000~127	BIT	L000680~75F	Indicates normal communication between HSL 2 000~127~127 block station		

Name	Indication	unit	Device area	Details					
	_HS3_TRX000~127	BIT	L001180~25F	Indicates normal communication between HSL 3 000~127~127 block station					
	_HS4_TRX000~127	BIT	L001680~75F	Indicates normal communication between HSL 4 000~127~127 block station					
	_HS5_TRX000~127	block station							
	_HS6_TRX000~127	BIT	L002680~75F	<ul> <li>Indicates normal communication between HSL 6 000~127~127 block station</li> </ul>					
	_HS7_TRX000~127	BIT	L003180~25F	Indicates normal communication between HSL 7 000~127~127 block station					
	_HS8_TRX000~127	DIOCK STATION							
	_HS9_TRX000~127	BIT	L004180~25F	Indicates normal communication between HSL 9 000~127~127 block station					
	_HS10_TRX000~127	BIT	L004680~75F	Indicates normal communication between HSL 10 000~127~127 block station					
	_HS11_TRX000~127	BIT	L005180~25F	Indicates normal communication between HSL 11 000~127~127 block station					
	_HS12_TRX000~127	BIT	L005680~75F	Indicates normal communication between HSL 12 000~127~127 block station					
	_HS1_ERR000~127	BIT	L000260~33F	Indicates an error mode of HSL 1 000~127					
	_HS2_ERR000~127	BIT	L000760~83F	Indicates an error mode of HSL 2 000~127					
_HS3_ERR000~127 BIT L001260~33F Indicates an error mode of HSL 3 (				Indicates an error mode of HSL 3 000~127					
	_HS4_ERR000~127	BIT	L001760~83F	Indicates an error mode of HSL 4 000~127					
	_HS5_ERR000~127	BIT	L002260~33F	Indicates an error mode of HSL 5 000~127					
LISE	_HS6_ERR000~127	BIT	L002760~83F	Indicates an error mode of HSL 6 000~127					
HsError	_HS7_ERR000~127	BIT	L003260~33F	Indicates an error mode of HSL 7 000~127					
	_HS8_ERR000~127 BIT L003760~83F			Indicates an error mode of HSL 8 000~127					
	_HS9_ERR000~127	BIT	L004260~33F	Indicates an error mode of HSL 9 000~127					
	_HS10_ERR000~127	BIT	L004760~83F	Indicates an error mode of HSL 10 000~127					
	_HS11_ERR000~127	BIT	L005260~33F	Indicates an error mode of HSL 11 000~127					
	_HS12_ERR000~127	BIT	L005760~83F	Indicates an error mode of HSL 12 000~127					

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# 7.4 Analog I/O module Parameter Setting

# 7.4.1 XRL-BSSA analog I/O module Parameter Setting

Type and parameter setting of analog I/O module available to be installed at XRL-BSSA are as follows. \* **Parameter** setting as below is provided for OS Version 1.3 or higher.

If you are using V1.2 or less, refer to A.5.2

	XBF-AD04A
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Memory	Description				E	Bit				Continuetion
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H <sup>1)</sup>	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0: L <sup>1)</sup>	Designation of Input voltage/ current range	C	h3	Cł	2 ו	Cł	n 1	Cł	n O	00: 0 ~ 10V(4 ~ 20mA) 01: 0 ~ 20mA 10: 4 ~ 20mA
1 : H	Designation of output data range	Ch 3		Cł	ז 2	Cł	n <b>1</b>	Ch 0		00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value <sup>2)</sup> 11: 0 ~ 1000

XBF-AD08A

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of Input voltage/	CI	h 3	Cł	า 2	Cł	n 1	Cł	n 0	00:4~20 mA 01:0~20 mA
1 : H	current range	CI	h 7	Ch 6		Cł	n 5	Cł	า 4	10 : 0 ~ 5 V 11 : 0 ~ 10 V
1 : L	Designation of output data range	Ch	6,7	Ch	4,5	Ch	2,3	Ch	0,1	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

► XBF-AD04C

Memory					E	Bit				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0: L	Designation of Input		CI	h 1			Cł	n 0		0000: 4 ~ 20mA 0001: 0~20mA
1: H	voltage/ current		CI	h 3			Cł	ז 2		0010: 1~5V 0100: 0~10V
1: L	range Designation of output data range	CI	n 3	Cł	n 2	Cł	n 1	Cł	n 0	0101: -10V~10V 00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise Value 11: 0 ~ 10000

#### Note

1) Meaning of memory address

- H : High byte (In case that setting area of parameter value of PLC is 0x1234, H byte  $\rightarrow$  0x12)
- 0:H means that high byte of an word from memory address 0.
- L: Low byte (In case that setting area of parameter value of PLC is 0x1234, L byte  $\rightarrow$  0x34)
- 1:L means that low byte of an word from memory address 1

#### 2) Precise Value

Precise Value = Range of input/output × 100

(Ex: Input range=0~5, Input or Output data range= Precise value

 $\rightarrow$  Data input range is 0~500)

## ► XBF-DV04A

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Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	CI	h 3	Cł	n 2	Cł	n 1	Cł	n 0	00: 0 ~ 10V
1 : H	Designation of input data range	CI	h 3	CI	n 2	Cł	1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

# ► XBF-DV04C

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	CI	h 3	Cł	1 2	Cł	า 1	Cł	n 0	00: 1~5V 01: 0~5V 10: 0~10V 11: -10~10V
1 : H	Designation of input data range	CI	n 3	CI	า 2	Cł	n 1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000

# ► XBF-DC04A

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	CI	h 3	CI	ז 2	Cł	า 1	Cł	n 0	00: 4 ~ 20mA 01: 0 ~ 20mA
1 : H	Designation of input data range	CI	n 3	CI	ז 2	Cł	n 1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

## ► XBF-DC04C

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	CI	h 3	Cł	า 2	Cł	n 1	Cł	n 0	00: 4~20mA 01: 0~20mA
1 : H	Designation of input data range	CI	h 3	Cł	า 2	Cł	n 1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000

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# ► Thermocouple Input Parameter Setting (XBF-TC04S)

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Configuration of output type	CI	h 3	CI	ז 2	Cł	ו 1	Cł	ח 0	00 : K 01 : J 10 : T 11 : R
1 : H	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit

# Resistance temperature detector Input Parameter Setting (XBF-RD04A)

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Configuration of output type	CI	h 3	Cł	า 2	Cł	n 1	Cł	n 0	00: PT100 01: JPT100
1 : H	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit

Memory			. (			Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Output Ch1	Output Ch0	Input Ch1	Input Ch0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of Input/ Output voltage/ current range		tput h1		tput h0		out n1		out n0	00 : 4 ~ 20 mA 01 : 0 ~ 20 mA 10 : 0 ~ 5 V 11 : 0 ~ 10 V
1 : H	Designation of input/ output data range		tput h1		tput h0		put n1		out n0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

Analog I/O Combined Module (XBF-AH04A)

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# 7.4.2 How to set XRL-BSSA analog I/O module parameter

In case analog module is installed at XRL-BSSA, 4 byte parameter setting area other than I/O data area should be allocated. You can set analog I/O range by inputting a value at parameter setting area of figure below. At this time, parameter setting area is allocated as Read Area.

\* Parameter setting as below is provided for OS Version 1.3 or higher. If you are using V1.2 or less, refer to A.5.2

(1) Device area allocation of analog input/output module

Si	ize	4 byte	2 byte	2 byte	2 byte	2 byte
		Parameter	CH 0	CH 1		CH N
Ar	rea	setting area	data	data		data

# 7.4.3 Example of parameter setting

Meaning of each device area according to CPU type is as follows in case system is configured as XRL-BSSA + XBF-DV04C + XBF-AD04C + XBF-AD04A + XBF-DC04C + XBE-DC16A

#### In case of XGI series

	Index	Module type	Mode	Station number	Read area	Variable name	Variable name comment	Sending data (Byte)	Save area	Variable name	Variable name comment	Receiving data (Byte)
ſ	0	XRL_BSSA	Send/Receive	1	%MW0			32	%MW100			18

#### ▶ In case of XGK series

Index	Module type	Mode	Station number	Read area	Variable name	Variable name comment	Sending data (Byte)	Save area	Variable name	Variable name comment	Receiving data (Byte)
0	XRL_BSSA	Send/Receive	1	M0000			32	M0100			18

CPU type	ltem	Size (byte)	Device area	Contents
			MW0 ~ MW1	XBF-DV04C's parameter setting area
			MW2	XBF-DV04C's CH0 output data
			MW3	XBF-DV04C's CH1 output data
			MW4	XBF-DV04C's CH2 output data
			MW5	XBF-DV04C's CH3 output data
	Deederee		MW6 ~ MW7	XBF-AD04C's parameter setting area
	Read area	32byte	MW8 ~ MW9	XBF-AD04A's parameter setting area
			MW10 ~ MW11	XBF-DC04C's parameter setting area
			MW12	XBF-DC04C's CH0 output data
			MW13	XBF-DC04C's CH1 output data
XGI			MW14	XBF-DC04C's CH2 output data
			MW15	XBF-DC04C's CH3 output data
			MW100	XBF-AD04C's CH0 input value save area
			MW101	XBF-AD04C's CH1 input value save area
			MW102	XBF-AD04C's CH2 input value save area
		18 byte	MW103	XBF-AD04C's CH3 input value save area
	Save area		MW104	XBF-AD04A's CH0 input value save area
			MW105	XBF-AD04A's CH1 input value save area
			MW106	XBF-AD04A's CH2 input value save area
			MW107	XBF-AD04A's CH3 input value save area
			MW108	XBE-DC16A's input value save area
			M0 ~ M1	XBF-DV04C's parameter setting area
			M2	XBF-DV04C's CH0 output data
			M3	XBF-DV04C's CH1 output data
			M4	XBF-DV04C's CH2 output data
			M5	XBF-DV04C's CH3 output data
	Read area	22 huto	M6 ~ M7	XBF-AD04C's parameter setting area
	Reau alea	32 byte	M8 ~ M9	XBF-AD04A's parameter setting area
			M10 ~ M11	XBF-DC04C's parameter setting area
			M12	XBF-DC04C's CH0 output data
			M13	XBF-DC04C's CH1 output data
XGK			M14	XBF-DC04C's CH2 output data
			M15	XBF-DC04C's CH3 output data
			M100	XBF-AD04C's CH0 input value save area
			M101	XBF-AD04C's CH1 input value save area
			M102	XBF-AD04C's CH2 input value save area
			M103	XBF-AD04C's CH3 input value save area
	Save area	18 byte	M104	XBF-AD04A's CH0 input value save area
			M105	XBF-AD04A's CH1 input value save area
			M106	XBF-AD04A's CH2 input value save area
			M107	XBF-AD04A's CH3 input value save area
			M108	XBE-DC16A's input value save area

# Meaning per each device area

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# Note

# Cautions in setting an analog parameter

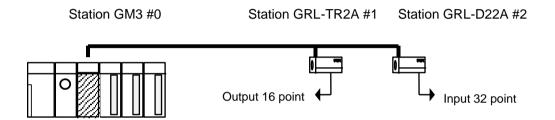
1. After setting a parameter, make sure you restart a power of XRL-BSSA module.

# 7.5 Program Example

# 7.5.1 GLOFA-GM Series

### Program Example 1:

In GM3 base, the communication module (G3L-RUEA) is installed for slot 0, output 32 points for slot 1, and input 32 points for slot 2, respectively. This is the example to send GM3 %IW0.2.0 data to station 1 and output the data of station 2 to GM3 %QW0.1.0.



To perform the program example, first make the I/O configuration table as shown on the table below and write the *High-speed Link* parameter in the corresponding CPU module, respectively.

I/O configuration and Sending/receiving flow

Sending/Receiving structure	Read area	Save area	Block no.	Size
Sending from GM3→station 1	%IW0.2.0	%QW0.0.0	0	1
Receiving from GM3←station 2	%IW0.0.0	%QW0.1.0	1	1

#### (a) Working order

- 1) Station number allocation and communication cable connection
- 2) The user program writing (per each station)
- 3) Make the data sending/receiving map same type of the above table
- 4) Parameter setting in GMWIN High-speed Link parameter setting item
- 5) Execute 'compile' and 'make' from compile menu
- 6) Execute program and parameter write from online menu.
- 7) Select 'Link Enable set' from online menu and set the *High-speed Link* Enable that corresponds to the setting no.
- 8) Change the mode to RUN from online menu.
- 9) Start 'monitor' from online menu and check if RUN-LINK is ON without an error in the *High-speed Link* monitor.
- 10) If an error occurs, repeat the above from '1)'.

Sending parameter	setting from GN	M3 station 0 to station 1	
High Speed	1Link Otem Ed	dit	×
Station Type - C Local C Remote	Station N	o Mode © Send © Receive	Block No
_ Area		. <u>.</u>	Send Period
From C	%MVV © %IVV	/ C %QW 0.2.0	A(20ms)
T0 C	%MW <b>O</b> %IV	• • %QW 0.0.0	Size
	[	OK Cancel	Help

Receiving parameter setting by GM3 station 0 from station 2

High Speed1Lin	< 1tem Edit		×
Station Type	Station No	Mode C Send	Block No
Area From C 35M	w • %W	© %QW 0.0.0	Send Period A(20ms)
To C%M		© %QW 0.1.0	Size
		OK Cancel	Help

# Remark

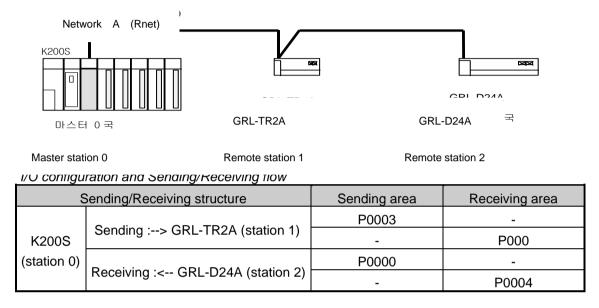
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1) Do not register the same station no. more than 2 or the same block no. more than 2.

# 7.5.2 MASTER-K Series

## **Program Example 1**

Here it describes the *High-speed Link* parameter setting method to perform the data communication in RNET master system below with the I/O structure same as shown on the table below.



From the example, K200S CPU sends the input value of input module (P3) installed in self station slot 2 by 1 word and outputs the data received from other station to P4 output module. The *High-speed Link* parameter configuration and program for data exchange on the above are described in the figure below. The program can be used in common and sets only link parameter respectively. (it is available to use the same program and parameter in the K1000S/K300S RNET communication.)

#### (a) The user program writing

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📅 Program [New Pr	oject1]				- 🗆 ×
¬ □ + + + + −	ा < भ व्य अ	*   • •	a. a. 💽 🎫 🗷 🗷 🕽 🗸 🍫		
о —] в	D4600	00000		M0000	_
6 —]в	D4600	00001		M0001	
12				END	-
  ▲					

The above figure is the program to set M0000 area when RUN-LINK is ON and M0001 area when LINK-TROUBLE flag is ON.

(b) High-speed Link parameter setting

To make Station 0, 1, 2 to change the data as specified on the table in the master configuration system, the user should write the user program first and then prepare the data sending/receiving map as shown on the table. And to send/receive the data as shown on the table, it is required to write the *High-speed Link* parameter and download it in PLC and the *High-speed Link* start shall be carried out according to the following order.

- 1) Station number allocation and communication cable connection
- 2) The user program writing (per each station)
- 3) Make the data Sending/Receiving map
- 4) Parameter setting in KGLWIN High-speed Link parameter setting item
- 5) Execute program and parameter download from the online menu
- 6) Change the mode to RUN from the online menu.
- 7) Check the High-speed Link status through flag monitor
- 8) If an error occurs, repeat the above from '1)'.

(c) The High-speed Link parameter for the system of program example is set as follows.

K200S (station 0) High-speed Link parameter

1420	000 (0.u	aon of right o	pood Enin paran	10101			
🐺 Paran	neter [New	/ Project1]					
Basic	Interru	ıpt 1/0 Lii	nk1 Link2				
Link:	Enable	Self Station No:	0 💌 Base: 🛛 💌	Slot: 0 💌 Type	Rnet 💌		
No	Station	Unit Type	Tx Device	Rx Device	Size	Block No	
0	1	Remote Out	P003	P000	1	0	
1	2	Remote In	P000	P004	2	1	
2							
3							
1 5							
a							
17.							-
•							

(d) High-speed Link speed fixing method.

The system of Example 1) is a simple system that the communication module of station 3 sends/receives the data of 1word per each station. And the calculation method for communication speed is as follows.

Formula  $St = P\_scanA + C\_scan$ 

St = *High-speed Link* max. transmission time P\_scanA = PLC A max. program scan time

C\_scan = max. communication scan time

As P\_scanA is PLC scan time on the above, if assuming that it is 3ms each for the above program, (available to verify through online-information read-PLC information)

 $C\_scan = n1 \times 180us + n2 \times 828us + 1,000us \qquad ------ [formula 7-1]$  n1 : output station number n2 : input station number  $C\_scan = 1 \times 180 + 1 \times 828 + 1,000 = 2,008us$   $St = P\_scanA(=3ms) + Cscan(2ms) = 5ms$ 

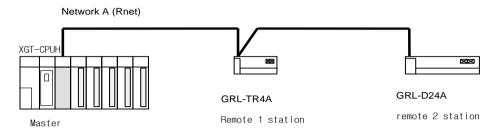
Therefore, the sending/receiving period should be set as min. more than 5ms.

# 7.5.3 XGT series

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# (1) Program Example 1

Here it describes the *High-speed Link* parameter setting method to perform the data communication in RNET master system below with the I/O structure same as shown on the table below.



I/O configuration and Sending/Receiving flow

Sending/	Receiving structure	Sending area	Receiving area
		M200	-
XGK (station 0)	Sending (1station)	-	GRL-TR4A
		GRL-D24A	-
	Receiving (2 station)	_	M300

As the above figure, Rnet master module (XGL-RMEA) in the PLC (XGT) is connected with 32 point output module (GRL-TR4A) and 32 input module (GRL-D24A).

## (a) GRL-TR4A's operation

It receives M200 and M201's data of PLC from Rnet master module and output.

(b) GRL-D24A's operation

PLC receives the GRL-D24A's input value through Rnet master module and save it in M300 and M301 of PLC

# (c) Setting in the XG5000

1) Setting the HSL

As described in 7.3.5, connect Rnet master module with Smart I/O and configure the system and set the parameter through the HSL and the sequence is as follows.

- a) Select new file in file menu and set suitable CPU
- b) After setting the connection in Online, connect PC
- c) Click the HSL of project window
- d) By double-clicking, the HSL 01, set module and module equipment location
- e) Double-click the block and set the detail parameter.
- f) Click "parameter writing" in Online and select each HSL No. and write
- g) Click link enable in online menu and select each HSL No. and write

🗙 XG-PD - [High-speed Link Block settings - High-speed Link 01]							
Eile Edit View Online Tools Window Help			- 8 ×				
▶ ☞ 뭐 좋 * ■ @ × _ & @ @ Q _ & \$ \$ \$ \$ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩							
Project window 👻 🗙							1
🖃 🛲 kaka(XGK-CPUH)	Index	Station number	Read area	Sending data (Byte)	Save area	Receiving data (Byte)	
High-speed Link 01 [B050 Rnet]	0	1	M0200	4			
High-speed Link 02	1	2			M0300	4	
IIII High-speed Link 03	2						
High-speed Link 04	3						

# (d) Program

	h555555
	DMOVP h55555555 M0200
	h555555
	DMOVP hAAAAAAA M0200
mment Data received from GRL_D24A	
	h00000000 h0000000
	DM0V M0300 P0000
	END
15	

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Chapter 8 Modbus Communication

# 8.1 Overview

Smart I/O module communication supports Modbus through GM3/4/6/7 master module.

(G3L-CUEA/G4L-CUEA/G6L-CUEC/G7L-CUEC)

This supports ASCII mode that communicates using ASCII (American Standard Code for Information Interchange) data and RTU (Remote Terminal Unit) mode that uses HEX data and the function code used in the modbus is supported by the *Function Block* and only function code 01, 02, 03, 04, 05, 06, 15, 16 are supported.

# 8.2 Communication Specification

# 8.2.1 Modbus(Snet) Slave specification

Classification	Snet		
Module type	Remote slave		
Protocol	Modbus-RTU		
Max. protocol size	8 Byte		
Topology	BUS		
Cable	Twisted air shielded cable		
Communication speed	2400 ~ 38,400 BPS		
Communication distance	1.2 km		
Medium access	POLL		
Max. node	32 stations		
Communication point	16/32 points		

# 8.2.2 ASCII Mode

- (1) This communicates using ASCII data.
- (2) Each frame uses ':(Colon) : H3A)' for the header, CRLF (Carriage Return-Line Feed) : HOD HOA) for the tale.
- (3) Max. 1second interval between Characters is allowed.
- (4) It uses LRC to check the error.
- (5) Frame structure (ASCII data)

Classification	Header	Station no.	Function code	Data	LRC	Tale (CR LF)
Size	1 byte	2 byte	2 byte	n byte	2 byte	2 byte

## 8.2.3 RTU Mode

- (1) It uses HEX data to communicate.
- (2) There is no header and tale, and it starts from station no. (Address) and ends the frame with CRC.
- (3) It has min. 3.5 Character Time Interval between frames.
- (4) When exceeding more than 1.5 Character Time between Characters, please disregard the corresponding frame.
- (5) It uses 16 bit CRC to check the error.
- (6) Frame structure (HEX data)

Classification	Station no.	Function code	Data	CRC
Size	1 byte	1 byte	n byte	2 byte

Remark	
1) The size to compose one letter (character) is called '1 character', that is, 1 character is 8 bits a 1byte.	=
2) 1 character time means the time to take when sending 1 character.	
Ex.1) 1 character time calculation in communication speed 2,400 bps	
2,400 bps is the speed that takes 1 second to send 2,400 bits. When sending 1 bit,	
1 (sec) ÷ 2,400 (bit) = 0.41 (ms).	

Thus, 1 character time is 0.41 (ms)  $\times$  8 (bit) = 3.28 (ms).

## 8.2.4 Station no. (Address) Area

- (1) Smart I/O series supports 0 ~ 31.
- (2) Station 0 uses Broadcast address. Bro adcast address is the station no. the slave device except self station no. recognizes and responds, and it does not support in Smart I/O series.

## 8.2.5 Function Code Area

- (1) In Smart I/O series, it supports Modicon function code 01, 02, 03, 04, 05, 06, 15, 16 only.
- (2) When the response format is Confirm+ (ACK response), the same function code is used.
- (3) When the response format is Confirm- (NCK response), set the 8<sup>th</sup> bit of function code as '1' and return.

Ex) when function code is 03,

- specify only the function code part as there is a difference in the function code only.

[Request]	0000 0011 (H03)	
[ACK response]	0000 0011 (H03)	
[NAK response]	1000 0011 (H83)	
		Set the 8 <sup>th</sup> bit of frame function

## 8.2.6 Data Area

- (1) It transmits the data using ASCII (ASCII mode) data or HEX (RTU mode).
- (2) The data structure is changed according to each function code.
- (3) Response frame uses the data area as response data or error code.

## 8.2.7 Error Check (LRC Check/CRC Check) Area

- (1) LRC (Longitudinal Redundancy Check): this is used in ASCII mode and takes the 2's complement from the sum of frame except the header/the tale and carries out the ASCII conversion.
- (2) CRC (Cyclical Redundancy Check): this is used in RTU mode and uses 2 bytes of CRC check regulation s.

# Remark All numeric data uses by mixing the hexadecimal, decimal, binary number. Each number is specified as following example. The example that decimal number 7, 10 is marked as each number. - Hexadecimal : H07, H0A or 16#07, 16#0A

- Decimal : 7, 10

- Binary : 2#0111, 2#1010

## 8.2.8 Function Code Type and Memory Mapping

Code	Function code name	Modicon PLC Data address	Smart I/O Mapping	Remarks
01	Read output contact status (Read Coil Status)	0XXXX (bit-output)	%QX0~%QX31	Bit read
02	Read input contact status (Read Input Status)	1XXXX (bit-input)	%IX0~%IX31	Bit read
03	Read output registers (Read Holding Registers)	4XXXX (word-output)	%QW0~%QW3	Bit read
04	Read input register (Read Input Registers)	3XXXX (word-input)	%IW0~%IW3	Word read
05	Write output contact 1 bit (Force Single Coil)	0XXXX (bit-output)	%QX0~%QX31	Bit write
06	Write output register 1 word (Preset Single Register)	4XXXX (word-output)	%QW0~%QW3	Word write
15	Write output contact continuously (Force Multiple Coils)	0XXXX (bit-output)	%QX0~%QX31	Bit write
16	Write output register continuously (Preset Multiple Register)	4XXXX (word-output)	%QW0~%QW3	Word write

Bit area			Vord area		
Address	Data area	Address	Data area		
H0000	P area	h0000	P area		
H1000	M area	H1000	M area		
H2000	L area	H2000	L area		
H3000	K area	H3000	K area		
H4000	F area	H4000	F area		
H5000	T area (contact)	H5000	T area (current value)		
H6000	C area (contact)	H6000	C area (current value)		
H8000, H9000	D area	H7000	S area		

MASTER-K mapping

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## 8.2.9 Modbus Addressing Regulation

(1) GLOFA-GM series

In Smart I/O series, the address in the frame begins from '0' and maps with Modicon data address 1, and 'n'th address of Smart I/O series becomes Modicon address n+1. And in Smart I/O series, it uses only the continuous M area without being distinguished by output contact (0XXXX), input contact (1XXXX), output register (4XXXX), input register (3XXXX). That is, the output contact 1(00001) of Modicon product is indicated as the address '0' of communication frame and the input contact 1(10001) of Modicon product is indicated as the address '0' of communication frame.

Output contact (0XXXX), input contact (1XXXX), output register (4XXXX), input register (3XXXX)

Most significant data of data address in Modicon product that distinguishes output contact, input contact, output register, input

(2) MASTER-K series

XXXX area of Modicon PLC data address is allocated by the mapping of MASTER-K series. For example, when you try to read M0002 bit of MASTER-K in Modicon PLC, use the function code 01 or 02 and set the data address as H1002. When you try to read D0010 word area, use the function code 03 or 04 and set the address as H800A.

## (3) XGT series

XXXX area of data address of Modbus is mapped with that of XGT as 1:1. Write frame at P2P block by using Modbus RTU/ASCII client of XG5000.

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For more detail, refer to CH 8.3 Communication parameter setting.

## 8.2.10 Data Size

Smart I/O series supports the data size of 128bytes for ASCII mode and 256bytes for RTU mode.

# 8.2.11 Wiring diagram

	PIN spec.	Smart I/O (9-PIN)
	1	
	2	(1) No.1 : reserved
5 9	3	(2) No.2 : reserved
	4	<ul><li>(3) No.3 : RX-</li><li>(4) No.4 : RX+</li></ul>
	5	(5) No.5 : GND
	6	<ul><li>(6) No.6/7: reserved</li><li>(7) No.8 : TX-</li></ul>
	7	(8) No.9 : TX+
	8	
Male Type	9	

## 8.3 Communication Parameter Setting

## 8.3.1 GLOFA-GM Series

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## (1) In case of GM3/4/6 is the master,

(a) Insert communication Function Block

When communicating modbus communication with Smart I/O using GM3/4/6 as the master, it is required to insert the following *Function Block* library into GMWIN Lib folder.

Classification		Corresponding Function Block library	Remarks
GM3	G3L-CUEA	Modbus.3FB	
GM4	G4L-CUEA	Modbus.4FB	GMWIN
GM6	G6L-CUEA	Modbus.6FB	Library adding

1) Select GMWIN menu [Project] → [Add Item] → [Library] and insert the corresponding library per model.

Open				? 🔀
Look in: 🗀 Lib		•	<del>(</del> •	-10 *
APP.3fb APP.3fu COMMUNI.3fb DUAL_FB.3fb Mknewlib.3fb	mkstdlib.3fu Modbus.3fb REMOTE3.3fb REMOTE4.3fb REMOTE6.3fb SPECIAL.3fb	छ STDLIB.3fb छ Stdlib.3fu		
File name:				Open
Files of type: 김(	) 브러리 파일(*.3f*)		•	Cancel

2) Insert the *Function Block* into GMWIN scan program and set the *Function Block* I/O variable. For the *Function Block* type and the method to use, please refer to Chapter 8.4. *Function Block*.

- RTU\_WR
- RTU\_RD

#### (2) In case of GM7 is the master,

- (a) Communication parameter setting
  - 1) Open the new project file in GMWIN.

a) Select 'GM7' as PLC type.

b) Create new project file for the master and the slave, respectively.

2) Select communication parameter from GMWIN parameter and double-click and the following figure will appear.

Commun	icaton Param	eter					×
Com	munication Me	thod					
Sta	tion No. :	0	•				
Bai	ud Rate :	1200	•	Data Bit	: 8	•	
Par	ity Bit :	None	•	Stop Bit	: 1	•	
CC	mmunication	Channel —					
	RS232C Nul	I Modem or I	RS422/485				
0	RS232C Mod	dem (Dedica	ated Line)	Init. Comm	nand :		
0	RS232C Dial	Up Modem					
- Proto	col and Mode-						·
		т	imeout in Mas	ter Mode :	0	ms	
De	dicated						
	C Master	r	🗖 Read S	tatus of Slav	e PLC	List	
Ma	<ul> <li>Slave</li> <li>idbus</li> </ul>						
MIC	C Master	r	Transmiss	ion Mode :	ASCII	_	
	C Slave		Hanomioa	non mode .	расп		
Us	er Defined C Master						
	C Slave	•				List	
FIE	LDBUS —						
	C Master	r				List	
	C Slave						
		Ok	Can	cel	He	elp	

3) Set the contents as follows.

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	Items	Setting Description
		Available to set 1~31 stations. (do not set station 0 as broadcast station no. It may cause
	Self station no.	the failure.)
	Communication	
	speed	Available to set 2400, 4800, 9600, 19200, 38400 bps.
		Available to set as 7 or 8 bits.
	Data bit	ASCII mode: set as 7 bits.
		RTU mode: set as 8 bits.
/be	Parity bit	Available to set as None, Even, Odd.
on ty		Available to set as 1 or 2 bits.
catio	Stop bit	In case that the parity bit is set: set as 1 bit.
innr		In case that the parity bit is not set: set as 2 bits.
Communication type		• RS-232C null modem or RS422/485 : when communicating using GM7 basic unit and
ŏ		Cnet I/F module (G7L-CUEC).
		• RS-232C dedicated modem : when communicating by the dedicated modem using Cnet
		I/F module (G7L-CUEB).
	Communication	• RS-232C dialup modem : when communicating by the general modem connecting with
	channel	other station by the phone using Cnet I/F module (G7L-CUEB).
		Note) RS-232C exclusive modem and RS-232C dialup modem communication is done only
		by Cnet I/F module (G7L-CUEB) that supports RS-232C but not by Cnet I/F module
		(G7L-CUEC) that supports RS-422/485.
c		• This is the time to wait the response frame after sending the request frame from GM7
sion		basic unit set as the master.
smis	Time out when	Default value is 500ms.
Protocol and Transmission mode	setting the master	• When setting, max. sending/receiving period of master PLC should be considered.
		<ul> <li>If the value smaller than max. sending/receiving period is set, it may cause the</li> </ul>
ol ar		communication error.
tocc	Modbus master /	If setting as the master, it shall be the subject in the communication system and if setting as
Pro	slave	the slave, it will reply only according to the request frame of the master.
	Transmission mode	Available to select one from ASCII mode or RTU mode.

# 8.3.2 MASTER-K series

#### (1) K80S modbus communication

- (a) Communication parameter setting
  - 1) Open new project file in KGLWIN.
    - a) Select MK80S as PLC type.
    - b) Create new project file for the master and the slave respectively.

2) Select communication parameter from KGMWIN parameter and doubleclick, and the following figure will appear.

Basic Interrupt Comm. PID(TUN) PID(CAL) Puts	se Out Analog
Communication : Enable	Protocol and Mode Timeout in Master Mode: 500 ms
Station Number :       2         Baud Rate :       38400         Parity Bit :       None         Stop Bit :       T	Dedicated C Master T Read Status of Slave PLC List C Slave Modbus
Communication Channel © RS232C Null Modern or RS422/485	C Master Transmission Mode: ASCII
C RS232C Modem(Dedicated Line) Init Command : C RS232C Dial-up Modem	User Defined
	C Master List

When transmission mode is

ASCII mode, set as 7 bits.

3) Set the contents as follows.

Items		Setting Description
be	Self station no. Available to set 1~31 stations. (do not set station 0 as broadcast station no may cause the failure.)	
tyl	Communication speed	Available to set 2400, 4800, 9600, 19200, 38400 bps.
Communication	Data bit	Available to set as 7 or 8 bits. ASCII mode : set as 7 bits. RTU mode : set as 8 bits.
nu	Parity bit Available to set as None, Even, Odd.	
Com	Stop bit	Available to set as 1 or 2 bits. When the parity bit is set : set as 1 bit. When the parity bit is not set : set as 2 bits.

	Items	Setting Description
ssion mode	Communication channel	<ul> <li>RS-232C null modem or RS-422/485 : when communicating using MK80S basic unit and Cnet I/F module (G7L-CUEC).</li> <li>RS-232C dedicated modem : when communicating by the dedicated modem using Cnet I/F module (G7L-CUEB).</li> <li>RS-232C dialup modem : when communicating by the general dialup modem using Cnet I/F module (G7L-CUEB).</li> <li>Note) RS-232C dedicated modem and RS232C dialup modem communication is done by Cnet I/F module (G7L-CUEB) only that supports RS-232C and not by Cnet I/F module (G7L-CUEC) that supports RS-422/485.</li> </ul>
Protocol and Transmission mode	Timeout when setting the master	<ul> <li>This is the time to wait the response frame after sending the request frame from MK80S basic unit set as the master.</li> <li>Default value is 500ms.</li> <li>When setting, max. sending/receiving period of master PLC should be considered.</li> <li>If the value smaller than max. sending/receiving period is set, it may cause the communication error.</li> </ul>
	Modbus master /Slave	If setting as the master, it shall be the subject in the communication system and if setting as the slave, it will reply only according to the request frame of the master.
	Transmission mode	Available to select one from ASCII mode or RTU mode.

# Remark

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1) Modbus master communication of MASTER-K series operates only at the K80S and K120s K1000S/300/200S don't support Modbus master communication.

# 8.3.3 XGT series

When using XGT Cnet I/F module as client and executing Modbus communication, set each parameter through XG5000.

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Sequence	Setting process	Setting method							
	I/O	1. After online connecting, select [Online]-[Diagnosis]-[I/O Information]-[I/O							
1	information	Sync] and read information of module which is equipped at the current							
	reading	base.							
2	Basic setting	Standard Settings - Cret   Communication settings   Type:   RS232C   Speed:   9600   Data bit:   8   8   Stop bit:   1   Party bit:   NONE   Modem type:   Null Modem   Intialization:   Station Number:   0   0   Time settings   Time out:   1   (0-55)(*10ms)   Delay time:   (0-255)(*10ms)   1   1   Active mode   Channel 1:   Use P2P settings   Modbus Settings   Channel 2:   Use P2P settings							
	1. Connec	t by double-clicking the module you want to use.							
	(1) Modb	us RTU protocol: set data bit as 8.							
	(2) Modb	us ASCII protocol: set data bit as 7.							
	2. select "Use p2p settings" in Active mode								

#### (1) Basic parameter setting method in the XG5000

# (2) P2P parameter setting method in the XG5000

## (a) P2P service

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P2P service is used when communication module operates as client and P2P function (command) is different according to protocol. P2P function is set as WRITE/READ when it operates as Modbus RTU/ASCII. When P2P function is set as WRITE, it write data in the Smart I/O module which operate as a server and when READ, it read data from the Smart I/O module which operates as a server and when READ, it read data from the Smart I/O module which operate as a server and when READ, it read data from the Smart I/O module which operates as a server. 8 and each service consists of Max. 64. The following figure is parameter setting example.

XG-PD - [P2P block settings - P2P 01]									
Eile Edit <u>V</u> iew Online <u>T</u> o	ools <u>W</u> ind	dow <u>H</u> el	p						. 8 ×
	□ ☞ 🗑 🚭 🖕 ♀ 🐇 ங 🛍 🗙 😃 ④ ♀ 😫 🍇 뚫 듯 탄 🕾 閥 행 🔮 🗮 Ξ 🔲 🕾								
Project window × × General Staff(XGK-CPUH) General P2P 01 [B05]	Index	Ch.	Driver Setting	P2P function	Conditional flag	Command type	Data type	No. of variables	D
P2P Cha	0	2	Modbus RTU client	WRITE	M00010	Continuous	WORD	1	
User fra	1	2	Modbus RTU client	WRITE	M00011	Continuous	WORD	1	
- 🖅 P2P 02	2	2	Modbus RTU client	WRITE	M00012	Continuous	WORD	1	
	3	2	Modbus RTU client	WRITE	M00013	Continuous	WORD	1	
	4	2	Modbus RTU client	WRITE	M00014	Continuous	WORD	1	
P2P 05	<								>
<u> 9 9</u> (	P2	P 01	]						
× Device Device	type	Data siz	ze Setarea Module n	ame Base	Slot	Block in	dex	Used area	
vert and the suit A Parameter check A Used address /									
Ready									

- 1) P2P parameter setting window
  - a) Max. 8 P2P parameter can be set.
  - b) It is available to set many P2P parameter per one Cnet I/F module.

But only one enable among P2P parameter is available about Cnet I/F module.

c) Each P2P parameter consist of P2P channel, P2P block, user frame definition.

#### 2) P2P edit window

a) Max. up to 64 P2P block can be registered and edited.

In order to use P2P service, the user set for the wanted action in the P2P parameter window. P2P parameter consists of 3 category.

🖹 XG-PD 📃 🗖 🖉				
Elle Edit Yiew Qnline Iools Window Help				
▶☞■● 오오ໍ↓ № @ ×   씰 @ Q   및 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$				
Project window       ×         Project window       ×				
Device Device type Data size Set area Module name Base Slot Block index Used area				
2 2 2 2 2 2 2 2 2 2 2 2 2 2				
Ready				

- 1) P2P channel
  - a) Set the P2P channel which defines P2P service's communication protocol.
  - b) Support protocol: XGT/Modbus client, user frame definition
  - c) Set it per channel. It is applied when basic setting's run mode is "Use P2P settings"
- 2) P2P block: set 64 P2P blocks which operate independently.
- 3) User frame definition: register user definition frame

#### (2) P2P channel setting

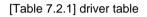
Cnet I/F module provide two communication channels (channel 1, 2) which operate independently.

About each channel, you can set driver type for P2P service. But when P2P channel is client, you should set run mode as "Use P2P settings". P2P channel setting according to operating mode is as follows.

Operating mode	P2P channel setting
Standard Settings       Channel 1         Communication settings       Channel 2         Type:       BS230C       P         Speed:       S600       9600       P         Data bit:       8       8       P         Spebil:       1       P       Party bit:       NONE       P         Modem type:       Null Modern       NUll Modern       P       P         Initialization:       0       0       0       0       0       0         Data titi:       0	Channel Setting       Yes         Channel Operating Mode       P2P Driver       TCP/UDP       Client/Server       Pather Pot       Pather IP address         1       Yes       Yes       Image: Client Server       Pather IP address       Image: Client Server       Pather IP address         VGT client       Modbus ASCII client       Image: Client Server       Ima

1			
	Driver	Meaning	
	User frame definition	It is used when transmitting and receiving desirable user definition frame.	
	XGT client	Select when you read and write by using XGT dedicated protocol.	
	Modbus ASCII client	Select when it operated as modbus client and ASCII mode.	
	Modbus RTU client	Select when it operated as modbus client and RTU mode.	

When setting as "Use P2P settings" in operating mode, the available driver in the XGT Cnet and meaning is as follows.



## (3) P2P setting for using Smart I/O Snet

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Modbus RTU/ASCII client's action is divided into Read and Write. Modbus RTU's setting method is same with ASCII client's setting method.

	P2P block	P2P block settings - P2P 03					
	Index Channel	Driver Setting P2P fun Modbus RTU client WRI					
No.	Туре	Block type	Description				
1	Channel	Channel 1 2	Setting driver name is changed according to the driver which is set in the P2P driver.				
2	P2P function	P2P function WRITE READ WRITE	<ol> <li>Read : reads data from other station.</li> <li>Write : writes data at the other station.</li> </ol>				
3	Conditional flag	Conditional F00092	<ol> <li>select when to transmit or receive the data by using special flag or bit point.</li> <li>In case of XGK type: F90 (operate every 20ms), M01</li> <li>In case of XGI type: _T20MS (operate every 20ms), %MX01</li> </ol>				
4	Command type	Continuous Single Continuous	<ol> <li>Single: is used when reading or writing data of max. 4 memory area. (example: M01, M10, M20, M30)</li> <li>Continuous: is used when reading or writing data continuously. (example: M01~M10)</li> </ol>				
5	Data type	Data type WORD BIT WORD	Data type can be selected as Bit or Word.				

No.	Туре	Block type	Description
6	Data size	Data size	<ul> <li>It define data size and it is activated when continuous method.</li> <li>1. when P2P function is Read <ul> <li>modbus RTU client</li> <li>bit type: 1~2000</li> <li>word type: 1~125</li> </ul> </li> <li>(2) modbus ASCII client <ul> <li>bit type: 1~976</li> <li>word type: 1~61</li> </ul> </li> <li>when P2P function is Write <ul> <li>modbus RTU client</li> <li>bit type: 1~1968</li> <li>word type: 1~123</li> </ul> </li> <li>(2) modbus ASCII client</li> <li>bit type: 1~123</li> <li>(2) modbus ASCII client</li> <li>word type: 1~944</li> <li>word type: 1~125</li> </ul>
7	Destination station	Destination station	It is checked automatically and if you don't want to use this function, click the box and cancel the check.
8	Destination station number	Destination station number	It means other station's address and the range is 0~31 total 32 station.
9	Setting	Variable Setting Variable: 1 0-0000 N05083 Cancel Variable Setting Variable Setting Variable Setting Variable Setting Variable: 1 0-0000 N05080 Cancel OK Cancel	<ul> <li>When P2P function is Read</li> <li>1.Read area: start address of other station's data area <ul> <li>(1) bit: bit input (0x00000), bit output (0x10000)</li> <li>(2) word: word input (0x30000), word output (0x40000)</li> </ul> </li> <li>2.Save area: data writing area at the self station (client)</li> <li>When P2P function is Write</li> <li>1. Read area: data area of self station</li> <li>2. Save area: start address of other station's data area <ul> <li>(1) bit: bit input (0x00000), bit output (0x10000)</li> </ul> </li> <li>(2) word: word input (0x30000), word output (0x40000)</li> </ul>

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(4)	Basic setting an	d P2P parameter writing		
Sequence	Setting process	Setting method		
1	Write Parameter	Write parameter(standard settings,HS link,P2P)         Image: Standard settings         Image: Standard settings <t< td=""></t<>		
2.	Check the module	riting in online menu. where basic is set and P2P parameter and click OK. odule is reset automatically.		
2	Enable Link	Enable Link(HIS Link,P2P)         Image: High-speed Link         Image: P2P 01         Image: P2P 03         Image: P2P 06         Image: P2P 08         Image: P2P		
	Click link enable i			
2. Check P2P parameter and click Write.				

(4) Basic setting and P2P parameter writing

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# 8.4 Function Block

# 8.4.1 GLOFA-GM Series

## (1) For GM3/4/6

## (a) RTU\_RD

ltem	IN / OUT	Туре	Description
	REQ	BOOL	<i>Function Block</i> execution condition (Rising edge action) - When changing from 0 to 1, one time executed.
	SLOT	USINT	Cnet module slot no. (0 ~ 7)
	СН	USINT	Channel setting (0 : RS-232C, 1 : RS-422/485)
0510	STN	USINT	Other station no. setting (0 ~ 32)
READ RTU_RD - REQ NDR - SLOT ERR - CH STAT - STN DATA	CMND	USINT	Modbus Command (1 ~4) 1 : Read coil status (Bit) 2 : Read input status (Bit) 3 : Read holding register (Word) 4 : Read input register (Word)
	ADDR	INT	Leading address of other station to Read (1 ~ 9999)
- CMND	NUM	USINT	Data number to Read (1 ~ 64)
- ADDR - NUM	RES_WAIT	TIME	Response wait time (after the setting wait time, receive the response data from Cnet module of CPU.)
- RES WAIT	NDR	BOOL	After completing the normal communication, 1 Scan 'ON'.
	ERR	BOOL	When communication error occurs, 1 Scan 'ON'.
	STATUS	USINT	Communication status code (Error code) 0 : normal, if not 0, : Error code
	DATA	USINT ARRY (256)	Receiving data storage area          Array [0] : High Byte of first word         Array [1] : Low Byte of first word         Array [2] : High Byte of second word         Array [3] : Low Byte of second word            Array [3] : Low Byte of 256 word

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#### 1) Function

This is the *Function Block* that is executed by selecting function code 01, 02, 03, 04 from modbus protocol communication and used for Bit/Word Read. Function code 01 executes output contact status (Coil Status) Data Read and function code 02 executes input contact status (Input Status) Data Read. Function code 03 executes output register (Holding Registers) Data Read and function code 04 executes input register (Input Registers) Data Read.

#### 2) Error

Output the error code from output STATUS. For further information, please refer to error code.

#### Remark

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#### **Response Wait Time setting**

- 1) After the setting wait time, receive the response data from Cnet module of CPU.
- 2) If the response does not reach from other station within the setting time, error (code 74 or code 10) occurs. This

Function Block acts in Cnet function 'User Definition Mode'.

- 3) Response Wait Time shall be set considering Read/Write data number, transmission speed (Baudrate), the response speed of other station etc.
- 4) When setting, please refer to the table below and if error occurs, extend the setting time.

Classification	1 ~ 16 word	17 ~ 32 word	33 ~ 48 word	49 ~ 64 word
4800 bps	150ms	250ms	330ms	400ms
9600 bps	100ms	180ms	230ms	280ms
19200 bps	80ms	150ms	180ms	230ms

(b) RTU\_WR

ltem	IN / OUT	Туре	Description				
	REQ	BOOL	<i>Function Block</i> execution condition (Rising edge action) - When changing from 0 to 1, one time executed.				
	SLOT	USINT	Cnet module slot no. (0 ~ 7)				
WRITE RTU_WR	СН	USINT	Channel setting (0 : RS-232C, 1 : RS-422/485)				
- REQ NDR	STN	USINT	Other station no. setting (0 ~ 32)				
- SLOT ERR - CH STAT US	CMND	USINT	Modbus function code (15 ~ 16) 15 : Force Multiple coils(Bit) 16 : Preset Multiple register (Word)				
- STN	ADDR	INT	Leading address to Write (1 ~ 9999)				
- CMND	NUM	USINT	Data number to Write (1 ~ 64)				
- ADDR - NUM	RES_WAIT	TIME	Response wait time (after the setting wait time, receive the response data from Cnet module of CPU.)				
- DATA - RES WAIT	NDR	BOOL	After completion of the normal communication, 1 Scan 'ON'.				
WAIT	ERR	BOOL	When communication error occurs, 1 Scan 'ON'.				
	STATUS	USINT	Communication status code (Error code) 0 : normal, if not 0: Error code				
	DATA	USINT ARRY (256)	Self station data storage area to Write          Array [0] : High Byte of first word         Array [1] : Low Byte of first word         Array [2] : High Byte of second word         Array [3] : Low Byte of second word				

## 1) Function

This is the *Function Block* to execute by selecting function code 15 and 16 from modbus protocol communication and used for Continuous 1 bit Write (function code 15), Continuous 1 word Write (function code 16). Function code 15 performs 1 bit Data Write to output contact (Coil) continuously and function code 16 performs 1 word Data Write to output register (Holding Registers) continuously.

#### 2) Error

Output the error code to output STATUS. For further information, please refer to the error code.

## Remark

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- 1) This Function Block acts in Cnet function 'User Definition Mode'.
- 2) Basic parameter (Baudrate, Data bit, Stop bit, Parity check, Station No. etc.) shall be set in Cnet editor and the frame editing is not needed.
- 3) This supports Modbus RTU Protocol. (scheduled to support ASCII Protocol later)
- 4) Cnet module requirements to use this Function Block are as follows.
  - Cnet module version : more than v2.0 (available to verify in GMWIN)
  - Cnet module Flash Rom OS version : more than v1.01 (available to verify in Cnet Editor)
  - Modbus.Nfb (Modbus *Function Block* file, N=3,4,6) needed.

#### Error code table

Status code (Dec)	Description	Solution	Remarks
0	Normal	No error	
1	Illegal function code (When the master requires the command that the Slave does not support.)	After confirming the command available to support by the Slave, modify the command on FB.	
2	Illegal address (When the Master requires the address that the Slave does not support.)	After confirming the address available to support by the Slave, modify the address on FB.	The error
3	Illegal data value (When the Master requires the data of the range that the Slave does not support.)	After confirming the data range available to support by the Slave, modify the data on FB.	returned from the Slave
4	Slave device failure (The unrecoverable error occurs while performing the Master requirements in the Slave.)	Check the Slave station status.	Slave
6	Slave device busy	After waiting for the regular time, Master	
10	Receiving Frame CRC error	<ol> <li>After confirming the receiving frame status, extend the Response Wait Time.</li> <li>Check the Cable and Noise status.</li> </ol>	Function Block
16	Cnet module I/F error (No Cnet module in the designated slot.)	Check the slot no. designated on FB.	setting error
64	Channel (RS-232C/422) stop	RUN the Cnet module. (power reinput)	
74	Time out error	<ol> <li>Check the basic parameter (station no./speed etc.)</li> <li>Check the Slave station status (power etc.)</li> <li>Check the Cable status and disconnection</li> </ol>	
115	Communication mode error	Check if Cnet user definition	

#### (2) For GM7

## (a) MOD0102 (reading bit)

Function Block		Description
	Input	
	Input	
	REQ	: When 1 (rising edge), <i>Function Block</i> execution
	SLV_ADDR	: Input of Slave station number
MOD0102	FUNC	: Function code input
BO RE ND BO		It supports function code 01 and 02.
USIN SLV ER BO	ADDRH	: High address of starting address to read in the Slave station.
USIN <b>P</b> BN USIN AD	ADDRL	: Low address of starting address to read in the Slave station.
	NUMH	: High address of data size to read from the starting address to read in the Slave station.
	NUML	: Low address of data size to read from the starting address to read in the Slave station.
USIN NU	Output	
BOOL[ RD_ DAT A	RD_DATA	: Variable name to save the Read data. (Array number should be declared as equal to or greater than the data size.)
	NDR	: If executing without error, output 1 and maintain 1 until calling next <i>Function Block</i> .
	ERR	: When error occurs, output 1 and maintain 1 until calling next <i>Function Block</i> .
	STATUS	: When error occurs, output the error code.

## 1) Function

This is the *Function Block* to execute by selecting function code 01 and 02 from modbus protocol communication and used for Bit Read. Function code 01 performs output contact status (Coil status) data Read and function code 02 performs input contact status (Input Status) data Read.

## 2) Error

Output the error code to the Output STATUS. For further information, please refer to the error code.

a) Program Example

Γ

This is the example when GM7 basic unit is the Master and when reading output contact data of Modicon product that is station no.17.

•Execute the Status Read of output contact (Coil) 00000 ~ 00010 of the Slave station (Station no.17). The output contact of the Slave station is assumed as follows and the read data is saved in the BOOL type random array variable RD\_DB0 whose size is 16.

Output contact	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Contact status	1	1	1	1	0	0	0	1	1	1	1	0	0	1	1	0
Hex		F	=				1			E				6	6	

<Data status of Smart I/O 16 point output module 'contact (00000~00009)>

•The data shall be transmitted from low bit by byte unit. The insufficient bit part of the byte shall be filled with '0'. The transmission of the above data is shown on Ex.1). Ex.1) E6 F1

Function Block	Input value				
REQ	Enter the input cor	ndition to run.			
SLV_ADDR	16#11 or 17	Slave station no.			
FUNC	16#01 or 1	Enter '1' when reading output contact status.			
ADDRH	16#00 or 0	High byte among the address starting to read from the Slave station.			
ADDRL	16#FF or 255	Low byte among the address starting to read from the Slave station. - In order to read from output contact 00000, it is required to read <b>from no. 255</b> according to the 8) modbus addressing regulation. And most significant data in its address shall be processed automatically by the input value of 'FUNC' without a separate input.			
NUMH	16#00 or 0	High byte when expressing total size of data to read by Hexadecimal.			
NUML	16#0A or 10	Low byte when expressing total size of data to read by Hexadecimal. - From the example, it is required to read 00000 ~ 00010 and total size of data shall be 10. If expressing 10 by Hexadecimal, it shall be H000A and it is required to enter H00 for NUMH and H0A for NUML.			

Results

Variable name	Storage value						
RD_DB0[0]	0	RD_DB0[4]	0	RD_DB0[8]	1	RD_DB0[12]	Х
RD_DB0[1]	1	RD_DB0[5]	1	RD_DB0[9]	0	RD_DB0[13]	Х
RD_DB0[2]	1	RD_DB0[6]	1	RD_DB0[10]	Х	RD_DB0[14]	Х
RD_DB0[3]	0	RD_DB0[7]	1	RD_DB0[11]	Х	RD_DB0[15]	Х

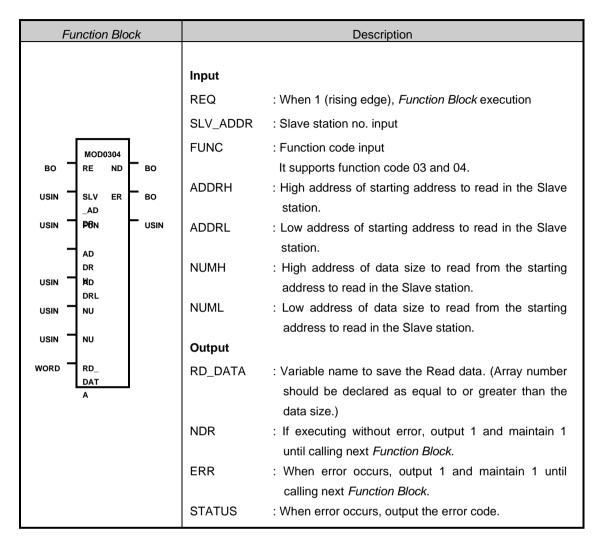
• The variable to save the read data should be array type variable and the size of array type variable should be equal to or greater than that of the data to read. If it is smaller, error code shall be indicated on the STATUS.

٦

• The read data shall be saved from array variable RD\_DB0[0].

• The remaining part after filling the array variable by the read data shall be redundancy.

## (b) MOD0304 (reading word)



#### 1) Function

This is the *Function Block* to execute by selecting function code 03 and 04 from modbus protocol communication and used for Word Read. Function code 03 performs output register (Holding Registers) data Read and function code 04 performs input register (Input Registers) data Read.

2) Error

Hold the error code to the Output STATUS. For further information, please refer to the error code.

a) Program Example

This is the example when GM7 basic unit is the Master and when reading output register data of Smart I/O 32 point output module that is station no.17.

•Execute the Read of output register (Holding Registers) 40000 ~ 40001 of the Slave station (Station no.17). The output register of the Slave station is assumed as follows and the read data is saved in the WORD type random array variable RD\_DW0 whose size is 4.

Output Register	40000	40001
Register Status	H0064	H1234

• The data shall be transmitted from high byte of low word per byte unit. The transmission of the above data is shown on Ex.1).

Function Block input		Input value
REQ	Enter the input o	condition to run.
SLV_ADDR	16#11 or 17	: Slave station no.
FUNC	16#03 or 3	: Enter '3' when reading output register.
ADDRH	16#00 or 0	: High byte among the address starting to read from the Slave station.
ADDRL	16#FF or 255	<ul> <li>Low byte among the address starting to read from the Slave station.</li> <li>In order to read from output register 40000, it is required to read from no.255 according to the 8) modbus addressing regulation. And the most significant data in its address shall be processed automatically by the input value of 'FUNC' without a separate input.</li> </ul>
NUMH	16#00 or 0	: High byte when expressing total size of data to read by Hexadecimal.
NUML	16#02 or 2	<ul> <li>Low byte when expressing total size of data to read by Hexadecimal.</li> <li>From the example, it is required to read 40000 ~ 40001 and total sizes of data shall be 2. When expressing 2 by Hexadecimal, it shall be H0002 and it is required to enter H00 for NUMH and H02 for NUML.</li> </ul>

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Ex.1) 12 34 00 64	
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Results	
Variable name	Storage value
RD_DW0[0]	H1234 or 4660
RD_DW0[1]	H0064 or 100
RD_DW0[2]	Х
RD_DW0[3]	X

• The variable to save the read data should be array type variable and the size of array type variable should be equal to or greater than that of the data to read. If it is smaller, error code shall be indicated on the STATUS.

• The read data shall be saved from array variable RD\_DW0[0].

• The remaining part after filling the array variable by the read data shall be redundancy.

Function Block	Description
Function Block	Input         REQ       : When 1 (rising edge), Function Block execution         SLV_ADDR       : Slave station address input         FUNC       : Function code input         It supports function code 05 and 06.
USIN PRN USIN	ADDRH : High address among start address to write in the Slave station.
	ADDRL : Low address among start address to write in the Slave station.
	NUMH : High address among data to write in the Slave station.
	NUML : Low address among data to write in the Slave station.
	Output
	NDR : If executing without error, output 1 and maintain 1 until calling next <i>Function Block</i> .
	ERR : When error occurs, output 1 and maintain 1 until calling next <i>Function Block</i> .
	STATUS : When error occurs, output the error code.

## (c) MOD0506 (writing 1bit/1word)

Γ

#### 1) Function

This is the *Function Block* to execute by selecting function code 05 and 06 from modbus protocol communication and used for 1 Bit Write (function code 05) and 1 Word Write (function code 06). Function code 05 performs 1Bit data Write for output contact (Coil) and if setting 255 (or HFF) for input NUMH of *Function Block* or 0 (or H00) for input NUML, write '1' for output contact and if setting 0 (or H00) for input NUMH or 0 (or H00) for NUML, write '0' for output contact. Function code 06 performs 1 word data write in output register.

#### 2) Error

Output the error code to the output STATUS. For further information, please refer to Error code.

a) Program Example

This is the example when GM7 basic unit is the Master and when writing 1 bit data to the 16 point output contact of smart I/O that is station no.17.

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• Write '1' to the output contact (Coil) 00000 of the Slave station (station no.17)

Function Block input		Input value
REQ	Enter the input co	pndition to run.
SLV_ADDR	16#11 or 17	: Slave station no.
FUNC	16#05 or 5	: Enter '5' when writing 1 Bit to output contact.
ADDRH	16#00 or 0	: High byte among the address starting to write in the Slave station.
ADDRL	16#FF or 255	<ul> <li>Low byte among the address starting to write in the Slave station.</li> <li>In order to write to output contact 00000, it is required to write from No.255 according to the 8) modbus addressing regulation. And most significant data of data address shall be processed automatically by the input value of FUNC without a separate input.</li> </ul>
NUMH	16#00 or 0	: Data to write in the Slave station
NUML	16#00 or 0	: Data to write in the Slave station <ul> <li>From the example, it is required to write '1'. Thus,</li> <li>enter H00 for NUMH and H01 for NUML.</li> </ul>

• Results: Output contact 00000 shall be ON. (In case of GM7 basic unit, '1' shall be saved in the corresponding M area.)

Output contact	00000
Contact status	1

- This is the example when GM7 basic unit is the Master and when writing 2 Word Data to the 32 point output contact of smart I/O that is station no.17.
  - This is the example to write '3' to the output register (Holidng Registers) 40000 of the Slave station (Station no.17).

Function Block input	Input value							
REQ	Enter the input	condition to run.						
SLV_ADDR	16#11 or 17	: Slave station no.						
FUNC	16#06 or 6	: Enter '6' when writing 1 Word to output register.						
ADDRH	16#00 or 0	: High byte among the address starting to write in the Slave station.						
ADDRL	16#FF or 255	<ul> <li>Low byte among the address starting to write in the Slave station.</li> <li>In order to write to output contact 40000, it is required to write from No.255 according to the 8) modbus addressing regulation. And most significant data of its address shall be processed automatically by the input value of 'FUNC' without a separate input.</li> </ul>						
NUMH	16#00 or 0	: High byte when expressing the data to write in the Slave station by Hexadecimal.						
NUML	16#03 or 3	<ul> <li>Low byte when expressing the data to write in the Slave station by Hexadecimal.</li> <li>From the example, it is required to write '3' and if expressing the data by Hexadecimal, it shall be H0003 and it is required to enter H00 for NUMH and H03 for NUML.</li> </ul>						

Γ

• Results: H0003 shall be saved in output register 40000. (In case of GM7 basic unit, H0003 shall be saved in the corresponding M area.)

Output register	40000
Register status	H0003

Function Block		Description
	Input	
	REQ	: When 1 (rising edge), <i>Function Block</i> execution
MOD1516	SLV_ADDR	: Slave station address input
BO RE ND BO	FUNC	: Function code input
USIN SLV ER BO _AD USIN <b>PGN ST</b> USIN	ADDRH	It supports function code 15 and 16. : High address among starting address to write in the Slave station.
AD DR	ADDRL	: Low address among starting address to write in the Slave station.
USIN ÄD DRL	NUMH	: High address of data size to write in the Slave station.
	NUML	: Low address of data size to write in the Slave station.
	BYTE_CNT	: Byte size of data to write in the Slave station.
USIN BYT E_C BYTEI WR	WR_DATA	: Variable name to save the data to write. (It should be declared as equal to or greater than the data size.)
	Output	
	NDR	: If executing without error, output 1 and maintain 1 until calling next <i>Function Block</i> .
	ERR	: When error occurs, output 1 and maintain 1 until calling next <i>Function Block</i> .
	STATUS	: When error occurs, output the error code.

## (d) MOD1516 (writing 1 bit/1 word continuously)

#### 1) Function

This is the *Function Block* to execute by selecting function code 15 and 16 from modbus protocol communication and used for Continuous 1Bit Write (function code 15) and Continuous 1Word Write (function code 16). Function code 15 performs 1Bit Data Write for output contact (Coil) by 1 byte continuously and Function code 16 performs 1 Word Data Write for output register (Holding Registers) continuously.

#### 2) Error

Output the error code to the output STATUS. For further information, please refer to Error Code.

a) Program Example

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- This is the example when GM7 basic unit is the Master and when writing Bit Data continuously to 16 point output contact of Smart I/O that is station no.17.
- It writes the continued 10bit 1010101010101010 to output contact (Coil) 00000 in the Slave station (Station no.17) by 1bit. The data to write is saved in BYTE type random array variable WR\_DB0 whose size is 2.

Variable name	Storage value
WR_DB0[0]	2#01010101 or 16#55
WR_DB0[1]	2#01010101 or 16#55

• The data shall be transmitted by byte unit from low bit. The transmission of the above data is shown on Ex.1). Ex.1) 55 55

Function Block input		Input value									
REQ	Enter the input co	Enter the input condition to run.									
SLV_ADDR	16#11 or 17	: Slave station no.									
FUNC	16#0F or 15	: Enter '15' when writing Bit to output contact continuously.									
ADDRH	16#00 or 0	: High byte among starting address to write in the Slave station.									
ADDRL	16#FF or 255	<ul> <li>Low byte among starting address to write in the Slave station.</li> <li>In order to write from output contact 00020, it is required to write from No.255 according to the 8) modbus addressing regulation. And the most significant data of data address shall be processed automatically by the input value of 'FUNC' without separate input.</li> </ul>									
NUMH	16#00 or 0	: High byte when expressing total size of data to write in the Slave station by Hexadecimal.									
NUML	16#0F or 16	<ul> <li>: Low byte when expressing total size of data to write in the Slave station by Hexadecimal.</li> <li>From the example, it is the 16 bit data continued from 00000 and total size shall be 16. If expressing 16 by Hexadecimal, it shall be H000A and it is required to enter H00 for NUMH and H0A for NUML.</li> </ul>									
BYTE_CNT	16#02 or 2	<ul> <li>This is the size when converting total size of data to write in the Slave station by byte unit.</li> <li>From the example, it is the continued 16 bit data and if converted by byte unit, it shall be 2 bytes. Thus, it is required to enter H02 for BYTE_CNT.</li> </ul>									

#### Results

Output contact	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Contact status	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

- This is the example when GM7 basic unit is the Master and when writing Bit Data continuously to 32 contact output module of Smart I/O that is station no.17.
- It writes 000A and 0102 to output register (Holding Registers) 40000 in the Slave station (station no.17). The data to write is saved in BYTE type array variable WR\_DB1 whose size is 4.

Variable name	Storage value
WR_DB1[0]	2#00001010 or 16#0A
WR_DB1[1]	2#0000000 or 16#00
WR_DB1[2]	2#00000010 or 16#02
WR_DB1[3]	2#0000001 or 16#01

- The size of BYTE\_CNT is the size when converting the data to write by byte unit. As the above data is 2 words, it is required to use 4 bytes. Thus, the size of BYTE\_CNT is 4.
- The data is transmitted from low word by byte unit. The transmission of the above data is shown on Ex.1). Ex.1) 00 0A 01 02

Function Block input		Input value									
REQ	Enter the input	condition to run.									
SLV_ADDR	16#11 or 17	: Slave station no.									
FUNC	16#0F or 16	: Enter '16' when writing Word to output register continuously.									
ADDRH	16#00 or 0	: High byte among starting address to write in the Slave station.									
ADDRL	16#FF or 255	: Low byte among starting address to write in the Slave station.									
		- In order to write from output register 40000, it is									
		required to write from No.255 according to the 8)									
		modbus addressing regulation. And most significant									
		data of data address shall be processed									
		automatically by the input value of 'FUNC' without									
		separate input.									
NUMH	16#00 or 0	: High byte when expressing total size of data to write in the									
		Slave station by Hexadecimal.									
NUML	16#02 or 2	: Low byte when expressing total size of data to write in the									
		Slave station by Hexadecimal.									
		- From the example, it is the 2 word data continued									
		from 40000 and total size shall be 2. If expressing 2									
		by Hexadecimal, it shall be H0002 and it is required									
		to enter H00 for NUMH and H02 for NUML.									

Function Block input		Input value									
BYTE_CNT	16#04 or 4	: This is the size when converting total size of data to write									
		in Slave station by byte unit.									
		- From the example, it is the continued 2 word data									
		and if converted by byte unit, it shall be 4 byte.									
		Thus, it is required to enter H04 for BYTE_CNT.									

Results

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Output register	40001	40000
Register status	H0102	H000A

# e) Error code

CODE	Error type	Meaning
01	Illegal Function	Function code input error to the Function Block
02	Illegal Address	The area to read/write in the slave exceeds the allowed range.
03	Illegal Data Value	The data value to read/write in the Slave is not allowed.
04	Slave Device Failure	Slave error status
05	Waiting for Acknowledge	This is a kind of response code that the Slave sends to the master to prevent the time of the master when it takes a time for the processing of demand command. In the master, it indicates the error code and wait for the regular time without demanding again.
06	Slave Device Busy	The error caused by long processing time of the slave. Master must demand again.
07	Time Out Error	The error occurred when exceeding the setting time of the communication parameter while communication.
08	Data Size Error	The error occurred when data is '0' or more than 256byte, when data size is greater than array size, and when number and BYTE_CNT is different.
09	Parameter Error	Parameter setting error (mode, master/slave)
10	Station Error	The error occurred when the station no. set in self station and input parameter of function is the same.

# 8.4.2 MASTER-K Series

#### (1) Command Modbus

MODBUS command is available only in the K80S, K120S.

But in case of using the K120S, it is available to use communication port by only RS-232C.

			Available area to use												Flag		
Command		М	Ρ	К		L	F	т	С	S	D	#D	Integral number	Step no.	Error (F110)	Zero (F111)	Carry (F112 )
	S1	0	0	0	0	0	0	0	0	-	0	0	-				
Modbus	S2	0	0	0	0	0	I	0	0	-	0	0	-	7	0	-	-
	S3	0	0	0	0	0	-	0	0	-	0	0	-				

	Flag	Flag					
	F110	When exceeding #D area, it shall be ON.					
	Area	Area setting					
│ │ │ └ Modbus S1 S2 S3	S1	Device address to register sending/receiving parameter.					
		(3 words)					
	S2	Device address to save sending/receiving data. (1 word)					
	S3	Device address to indicate sending/receiving status. (1					
		word)					

#### (a) Function

1) Here sets data saved in device designated in S1 to fit Modbus protocol type.

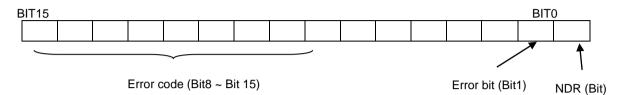
It consist of 3 words and must be set by Hexdecimal code.

- a) first word : slave station address (high byte) + function code (low byte)
- b) second word : means Smart I/O's IO address (h0000).
- c) third word
  - ▶ When Smart I/O is output module: device address where data for tansmission is saved.
  - When Smart I/O is input module: data number for reading
- d) This designates the leading address of the device where the received data is saved to S2.
  - → According to function of S1, it designates the leading address of the device that the received data is saved in when receiving and the leading address of the data to sending when sending.
- e) The communication action status is saved in S3.

(b) error code

Γ

1) S3 (sending/receiving status)'s format is as follows.



2) NDR : when completing the normal communiction, 1 Scan ON.

3) Error bit : when communication error occurs, 1 Scan ON and in this case, error code is indicated Bit8 ~ Bit15.

4) Error code : when error occurs, it shows the information for the error.

(refer to the error code table as below.)

Error code table

Code	Name	Description
01	Illegal Function	Function code error
02	Illegal Address	Address allowed range exceeded
03	Illegal Data Value	The error that data value is not allowed.
04	Slave Device Failure	Slave error status
05	Waiting for Acknowledge	When it takes a time for the processing of demand command, the slave sends to prevent Time Out Error of the master.
06	Slave Device Busy	The slave takes a time for the processing. The master must demand again.
07	Time Out Error	When no response during Time out of communication parameter.
08	Data Size Error	When data size is '0' or exceeds 256Byte. In case of data size is larger than Array size or Number and BYTE_CNT is different.
09	Parameter Error	When the items set in the parameter (such as transmission mode etc.) are wrong.
10	Station Error	When self station no. and input parameter of Modbus command are the same.

#### (2) Command MODCOM

It is available to use MODCOM command only in the K120S.

			Available area to use												Flag		
Command		М	Ρ	к		L	F	Т	с	S	D	# D	Integral number	Step no	Error (F110 )	Zero (F111)	carry (F112)
	СН	-	-	-	-	-	-	-	-	-	-	-	0	7 0			
	S1	0	0	0	0	0	0	0	0	1	0	0	-				
Modbus	S2	0	0	0	0	0	-	0	0	-	0	0	-		0	-	-
	S3	0	0	0	0	0	-	0	0	-	0	0	-				

	Flag							
	F110 When exceeding #D area, it shall be ON.							
	Area setting							
	CH Communication channel							
	S1 Device address to register sending/receiving							
	parameter.							
	S2 Device address to save sending/receiving data.							
	S3 Device address to indicate sending/receiving							
	status.							

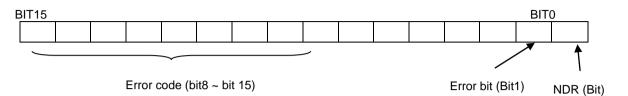
(a) Function

- 1) CH means commucication channel and is set as integral number.
  - a) 0 : set when using built-in RS-232C communication or extension communication module (G7L-CUEC)
  - b) 1 : set when using built-in RS-485 communication.
- 2) Here sets data saved in device designated in S1 to fit Modbus protocol type.
- It consist of 3 word and must be set by Hexdecimal code.
- a) first word : slave station address (high byte) + function code (low byte)
- b) second word : means Smart I/O's IO address (h0000).
- c) third word
  - When Smart I/O is output module: device address where data for tansmission is saved.
  - ► When Smart I/O is input module: data No. for reading
- 3) This designates the leading address of the device where the received data is saved to S2.
  - ➔ According to function of S1, it designates the leading address of the device that the received data is saved in when receiving and the leading address of the data to sending when sending.
- 4) The communication action status is saved in S3.

(b) error code

Γ

1) S3 (sending/receiving status)'s format is as follows



2) NDR : when completing the normal communiction, 1Scan ON.

3) Error bit : when communication error occurs, 1Scan ON and in this case, error code is indicated Bit8 ~ Bit15.

4) Error code : when error occurs, it shows the information for the error.

(refer to the error code table as below.)

Error code table

Code	Name	Description
01	Illegal Function	Function code error
02	Illegal Address	Address allowed range exceeded
03	Illegal Data Value	The error that data value is not allowed.
04	Slave Device Failure	Slave error status
05	Acknowledge	When it takes a time for the processing of demand command, the slave sends to prevent time out of the master.
06	Slave Device Busy	The slave takes a time for the processing. The master must demand again.
07	Time Out Error	When no response during Time out of communication parameter.
08	Data Size Error	When data size is '0' or exceeds 256Byte. In case of data size is larger than Array size or Number and BYTE_CNT is different.
09	Parameter Error	When the items set in the parameter (such as transmission mode etc.) are wrong.
10	Station Error	When self station no. and input parameter of Modbus command are the same.

## 8.5 Program Example

# 8.5.1 GLOFA-GM Series

#### (1) When the Master is GM4

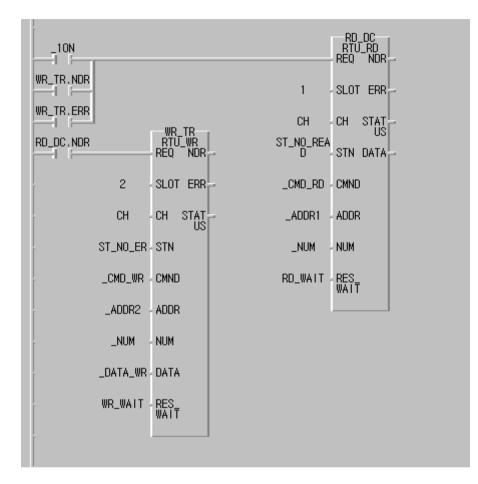
(a) Set the basic frame in Cnet module of Master PLC.

🔜 Cnet Frame Editor (untitled, frm)									
<u>F</u> ile	<u>O</u> nline	O <u>p</u> tion	<u>M</u> onitor	<u>H</u> elp					
Cł	nannel –		© RS232	side		C RS422 side			
	sic Para tation: [			: Null Modem	•	Init Command:	ATZ		
	aud Rati			Data I			Monitor Entry • 4x32 • 16x20		
	Parity:     None     Stop Bit:     1     C 16x20       Frame List								
0 1			<b>_</b>	Tx/Rx: Send		Header:			
2				SG1: null		SG5: nu	11		
3 4				SG2: null		SG6: nu	II		
2 3 4 5 6 7 8 9				SG3: null		SG7: nu			
7				SG4: null		SG8: nu	11		
9			•	Tailer:		BCC: No	ine		

Basic parameter (Baudrate, Parity, Data bit, Stop bit) is required to correspond with the setting content of other station.
 It is not necessary to write the frame list.

(b) Library -> Add item -> Library

열기				? 🗙
찾는 위치(!): 🛛	🔁 Lib 💌	+	£	💣 🎟 •
APP, 6fb APP, 6fu COMMUNI, 6fb Mknewlib, 6fb MKNEWLIB, 6fu mkstdlib, 6fu	國 Modbus, 6fb 國 REMOTE6, 6fb 國 SPECIAL, 6fb 國 STDLIB, 6fb 國 Stdlib, 6fu			
파일 이름( <u>N</u> ):	<u></u>			열기( <u>0</u> )
파일 형식( <u>T</u> ):	라이브러리 파일(*,6f*)	•	·	취소



(c) Load the Function Block from Scan program of GMWIN program and program it.

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### (2) When the Master is GM7

- (a) Slave station program: output the receiving data saved in M area to the output contact (Coil).
- (b) Master station program: After saving 16#FF (OR 255) to %MW0 (this corresponds with %MX0 ~ %MX15 or %MB0 ~ %MB1.) in the *Function Block* MOD0506 (function code 06), read %MX0 using the *Function Block* MOD0102 (function code 01) and save '0' to %MX0 ~ %MX9 using the *Function Block* MOD1516 (function code 15) again and then read %MW0 using the *Function Block* MOD0304 (function code 03).
  - 1) Slave station setting and Program

Create new project file and new program for the Slave station.

💼 GMWIN for Windows – c:\#gmwin3,61e\#source\#modbus_slave,prj	- O X
<u>P</u> roject P <u>r</u> ogram <u>E</u> dit <u>T</u> oolbox <u>C</u> ompile <u>O</u> nline <u>D</u> ebug <u>W</u> indow <u>H</u> elp	
▓▛▙ ▓▛▝▙ ▓ ◇ ✗ヽヽ゠゠ヹヹヹヹ ゚゚゚゚ヽ゠゠ヹ	
🚼 c:₩gmwin3,61e₩source₩noname01,src	- D ×
Row 0	
Row 1	
Row 2	
Row 3	
Row 4	
Row 5	<b>_</b>
📷 c:\#gmwin3,61e\#source\#modbus_slave,prj	
PROJECT ==> PLC Type : GM7	
CONFIGURATION(PLC) ==> Configuration Name : UNNAMED	
- ACCESS UARIABLES ==> Ø variables declared RESOURCE <cpu> Ø ==&gt; Name : RESØ</cpu>	
RESOURCE GLOBALS ==> Ø variables declared	
TASK DEFINITIONS ==> 1 tasks defined	
Image: LD ] PROGRAM ==> INST0 : c:\#gmwin3.61e\#source\#noname01.src         Arranges the windows as horizontal nonoverlapping tile Offline	▼ Edit
mrranges the windows as norizontal honoverlapping tile viriline	Earc

Communicaton Parameter	×
Communication Method	
Station No. : 17	•
Baud Rate : 2400	▼ Data Bit : 7 ▼
Parity Bit : Even	▼ Stop Bit : 1 ▼
Communication Channel	
RS232C Null Modem or R	8422/485
C RS232C Modem (Dedicat	ed Line) Init. Command :
O RS232C Dial Up Modem	ATZ
Protocol and Mode	
	neout in Master Mode : 500 ms
Dedicated	
C Master	Read Status of Slave PLC     List
O Slave	
Modbus	
O Master	Transmission Mode : ASCII 💌
Slave     User Defined	
C Master	
C Slave	List
FIELDBUS	
C Master	List
C Slave	
Ok	Cancel Help

a) If you select 'Communication Parameter' from GMWIN parameter and double-click, the communication parameter menu window will open.

- Please set the parameter as below.

Г

	Communication method						ol and sion mode
Self station no.	Commu- nication speed	Data bit					Exclusive mode
17	2400	7	EVEN	1	RS232C null modem or RS422/485	Slave	ASCII

b) After creating the program as below, download it in the GM7 basic unit of the Slave station. For further program creation and download method, please refer to GMWIN user's manual.

٦

• The slave program is the program to output the data of M area to the output contact.

🎰 GMWIN for Windows - c:₩gmwin3,61e₩source₩modbus_slave,prj	
<u>Project</u> P <u>r</u> ogram <u>E</u> dit <u>T</u> oolbox <u>C</u> ompile <u>O</u> nline <u>D</u> ebug <u>W</u> indow <u>H</u> elp	
tit c:₩gmwin3,61e₩source₩noname01,src	<u>-</u> R
Row 0 EN EN EN .	
Row 1 / XMWO - IN1 OUT - XQWO.O.O	4/1
Row 2	484
Row 3	↓ ↓
Row 4	
Row 5	() ()
na c:₩gmwin3,61e₩source₩modbus_slave,prj	
TASK DEFINITIONS ==> 1 tasks defined	- (R)
L LD ] PROGRAM ==> INSTØ : c:\gmwin3.61e\source\noname01.src COMMENTS for DIRECT VARIABLES ==> Ø variables declared	(9)
PARAMETERS	(\)
BASIC PARAMETERS	{F}
Arranges the windows as horizontal nonoverlapping tile Offline R0,C0	) Edit

2) Master Station setting and Program

Г

Create new project file and new program for the Master Station.

😭 GMWIN for Windows – c:\#gmwin3,61e\#source\#modbus_master,prj	<u>_                                    </u>
Project P <u>r</u> ogram <u>E</u> dit <u>T</u> oolbox <u>C</u> ompile <u>O</u> nline <u>D</u> ebug <u>W</u> indow <u>H</u> elp	
<u> </u>	
🎲 c:₩gmwin3,61e₩source₩noname01,src	-UX R
Row 0	
	41-
Row 1	1/1
Row 2	. 귀만
Row 3	+N+
Row 4	
Row 5	()
	<b>.</b> ()
	<u>)</u> // (5)
ter c:₩gmwin3,61e₩source₩modbus_master,prj	- U × (R)
PROJECT ==> PLC Type : GM7     CONFIGURATION(PLC) ==> Configuration Name : UNNAMED	(P)
ACCESS VARIABLES ==> Ø variables declared	
RESOURCE(CPU) Ø ==> Name : RESØ	(№)
	{F}
L I LD ] PROGRAM ==> INSTO : c:#gmwin3.61e#source#noname01.src	<b>↓</b> [FB]
Arranges the windows as horizontal nonoverlapping tile Offline	RØ,CØ Edit

Communicaton Param	eter		×
Communication Me	hod		
Station No. :	17 💌		
Baud Rate :	2400 💌	Data Bit :	7 💌
Parity Bit :	Even	Stop Bit :	1 💌
Communication	Channel		
RS232C Null	Modem or RS422/485		
C RS232C Mod	em (Dedicated Line)	Init. Command	:
C RS232C Dial	Up Modem	ATZ	
- Protocol and Mode -			
Trotocor and mode	Timeout in M	laster Mode :	500 ms
Dedicated			
C Master	🗖 Rear	d Status of Slave PL	.C List
C Slave			
Modbus — O Master			
<ul> <li>Slave</li> </ul>	Transm	ission Mode : AS	SCII 🔽
User Defined			
O Master			List
C Slave FIELDBUS			
C Master			
C Slave			List
	Ok C:	ancel	Help

a) If you select 'Communication Parameter' from GMWIN parameter and double-click, the communication parameter menu window will be open.

٦

• Please set the parameter as below.

Communication method						ocol & sion mode	
Self station no.	Commu nication speed	Data bit					Exclusive mode
1	2400	7	EVEN	1	RS232C null modem or RS422/485	Master	ASCII

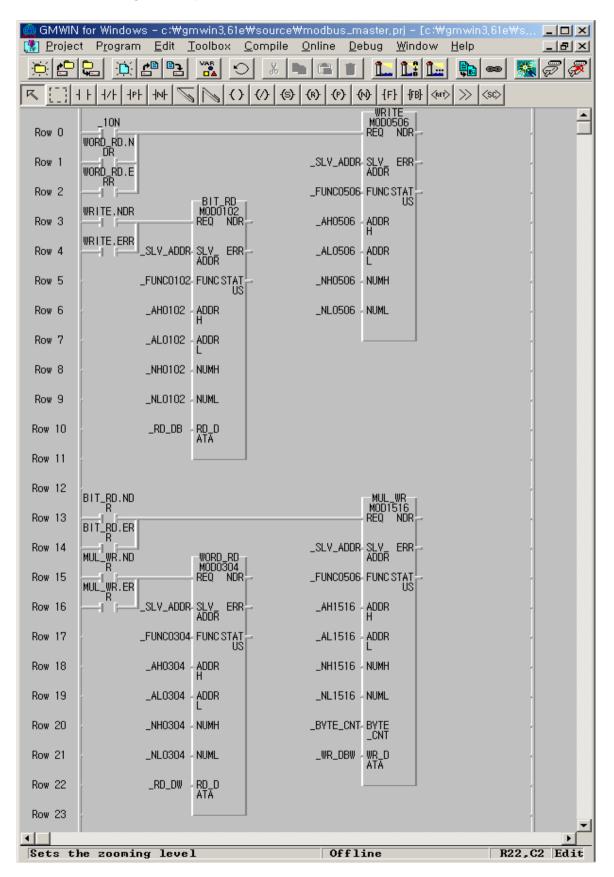
- b) After creating the program as below, download it to the GM7 basic unit of the Master station. For further program creation and download method, please refer to GMWIN user's manual.
- In the program, the Function Block is used. If you double-click GMWIN 'inserted library files' items before using the Function Block, the library insert window will be open as below. Press 'Add (A)...' button and add COMM.7FB library and then press 'verify' button.

Include Library	×
Current Included Libraries	
Add Delete	
OK Cancel Help	

Г

Include Library	×
Current Included Libraries	
c:\gmwin3.61e\lib\comm.7fb	
<u>A</u> dd <u>D</u> elet	ie
OK Cancel H	Help

- Program Example



- After saving 16#FF (or 255) to %MW0 (this corresponds with %MX0 ~ %MX15 or %MB0 ~ %MB1.) in the Function Block MOD0506 (function code 06), read %MX0 using the Function Block MOD0102 (function code 01) and save '0' to %MX0 ~ %MX9 using the Function Block MOD1516 (function code 15) again and then read %MW0 using the Function Block MOD0304 (function code 03).
- You can see that 8 LED of output contact continues to repeat ON/OFF.
- The above figure is the screen that monitors the program execution. Thus, the value to be indicated on Array variable \_RD\_DB, \_RD\_DW is the result value after executing 'Read' not the initial value.
- The variable such as instance name.NDR, instance name.ERR, instance name.STATUS is generated automatically if declaring the instance variable of the *Function Block*.
- ▶ \_10N flag is the flag that will be ON only for 1Scan.
- Each Function Block input REQ is each Function Block output.
- The size of \_BYTE\_CNT must be same when converting the data by byte unit.
- If the size of Array variable is smaller than that of the data to read or write, error occurs.

Variable name	Variable type	Initial value	Variable name	Variable type	Initial value
_SLV_ADDR	USINT	17(H11)	_NH0102	USINT	0(H00)
_FUNC0102	USINT	1(H01)	_NH0304	USINT	0(H00)
_FUNC0304	USINT	3(H03)	_NH0506	USINT	0(H00)
_FUNC0506	USINT	6(H06)	_NH1516	USINT	0(H00)
_FUNC1516	USINT	15(H0F)	_NL0102	USINT	1(H01)
_AH0102	USINT	0(H00)	_NL0304	USINT	255(HFF)
_AH0304	USINT	0(H00)	_NL0506	USINT	1(H01)
_AH0506	USINT	0(H00)	_NL1516	USINT	10(H0A)
_AH1516	USINT	0(H00)	_RD_DB	BOOL type ARRAY[40]	{0,0,,0}
_AL0102	USINT	0(H00)	_RD_DW	WORD type ARRAY[4]	{0,0,0,0}
_AL0304	USINT	0(H00)	_WR_DBW	BYTE type ARRAY[4]	{0,0,0,0}
_AL0506	USINT	0(H00)	_BYTE_CNT	USINT	2(H02)
_AL1516	USINT	0(H00)			

Variable table

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# 8.5.2 MASTER-K Series

- (1) Program example 1) when using MODBUS
  - (a) This example is system configuration of RS-485 communication between GSL-DT4A and G7L-CUEC(K80S)
  - (b) program of GSL-DT4A output part
    - 1) D0000 : set GSL-DT4A's station address (no.1) and fuction code (06 writing 1 word)
    - 2) D0001 : set GSL-DT4A's address
    - 3) D0002 : data storage area sended to the GSL-DT4A
    - 4) When every 200msec rising edge, it send data saved at the M100 to Smart I/O and error history is saved at the M000

(c) program of GSL-DT4A output part

1) D0010 : set GSL-DT4A's station address (no.1) and fuction code (04 reading 1 word)

- 2) D0011 : set GSL-DT4A's address
- 3) D0012 : data no. to read from Smart I/O

(Because function code is 04, it reads 1 word)

4) Every 200msec when falling edge, it save data received from the input area of GSL-DT4A at the M110 and save it at the M001.

F0094					
		MOV	haaaa	M100	
FDD94 / GSL-DT4A output part		MOV	h5555	M100	
F0010		MOV	h0106	D0000	
		MOV	h0000	D0001	
		MOV	M100	D0002	
F0093	MODBUS D	0000	M100	M000	
GSL-DT4A input part					
F0010		MOV	h0104	D0010	
		MOV	h0000	D0011	
F0093		MOV	h0001	D0012	
- /	MODBUS D	0010	M101	M001	
				END	]_

(2) program example 2) when using command MODCOM

(a) This example is system configuration of RS-485 communication between GSL-DT4A and G7L-CUEC(K120S)(b) program of GSL-DT4A output part

1) D0000 : set GSL-DT4A's station address (no.1) and fuction code (06 writing 1 word)

2) D0001 : set GSL-DT4A's address

Γ

3) D0002 : data storage area sended to the GSL-DT4A

When every 1 sec rising edge, at the 1 channel, it send data saved at the M100 to Smart I/O and error history is saved at the M000

(C) program of GSL-DT4A output part

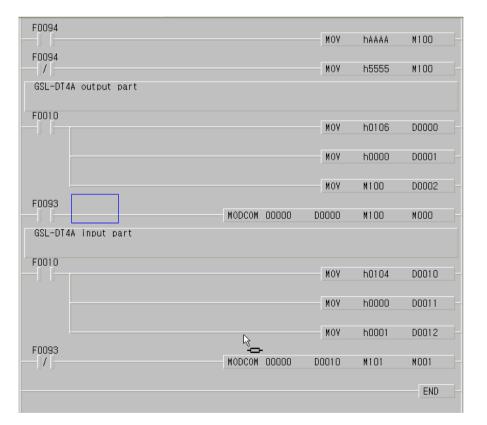
1) D0010 : set GSL-DT4A's station address (no.1) and fuction code (04 reading 1 word)

2) D0011 : set GSL-DT4A's address

3) D0012 : data no. to read from Smart I/O

(Because functio code is 04, it reads 1 word)

4) When every 1sec falling edge, at the 1 channel, it save data received from the input area of GSL-DT4A at the M110 and save it at the M001.

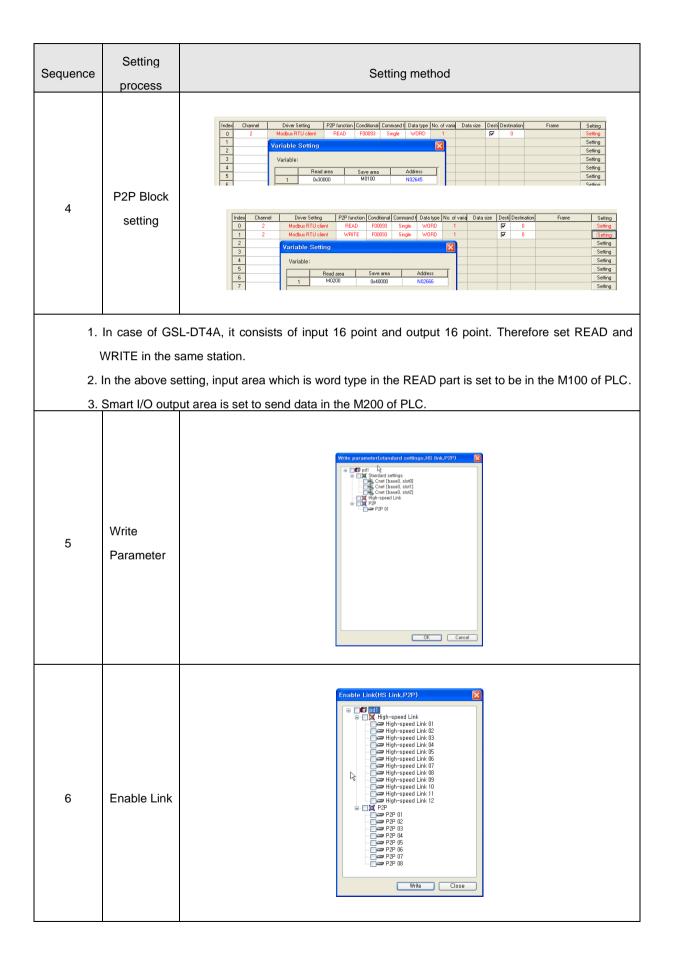


# 8.5.3 XGT Series

The following program read input 16 point of Smart I/O GSL-DT4A and save it at XGK M100, write M200's data at the Smart I/O's output (16 point) with setting XGT Cnet I/F module as client.

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Sequence	Setting process	Setting method		
1	Basic setting	Standard Settings       Communication settings         Type:       RS232C         Speed:       38400         Data bit:       8         Stop bit:       1         1       1         Parity bit:       NONE         Modem       NUll Modem         Initialization:       0         Station       0         Delay time:       0         (0-550)(+100ms)       1         Active mode       1         Channel 1:       XGT server         Modbus Settings       Modbus Settings         Channel 2:       Use P2P settings         Modbus Settings       Modbus Settings		
	Setting channe Setting run mc	el 2. Node of channel as "use P2P".		
2	P2P setting	Pile Edit View Online Iools Window Help         Project window         Project Channel         Project window         Project window		
1.	Double-click th	ne P2P in the project window and select module location.		
3	P2P Channel Setting	P2P Channel Setting       X         Channel Operating Mode       P2P Diver       TCP/UDP       Client/Server       Patner IP address         1       Use P2P       V       V       V       V         2       Use P2P       V       V       V       V         0K       Cancel       Cancel		
1.3	Setting P2P dr	iver as modbus RTU client.		
	-			



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# **Chapter 9 Ethernet Communication**

### 9.1 Introduction

Ethernet is a 'technical standard' issued by IEEE, a world-wide entity. Using CSMA/CD method, it can collect a large capacity of data in a high speed as well as build a network easily by controlling communication.

Smart I/O Enet module has the following characteristics;

- Support IEEE 802.3 Standard
- Support 10/100BASE-TX media
- Accessible to the system thorough public network
- Support Ethernet Electricity 2 Ports (RJ-45)
- Available to run separately from each other because 2-channel Ethernet MAC is mounted
- Support Auto-Negotiation / Auto-Crossover function
- Support topology: Bus, Star
- Support communication protocol: Modbus/TCP, EtherNet/IP

# 9.2 Communication Dimension

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Item		Performance Dimension
	Data Transmission Speed	10/100Mbps
	Transmission System	Base Band
	Standard	IEEE 802.3
	Flow Control	Full-duplex/half-duplex
	Modulation	NRZI
	Max length between nodes	100m
	Min length between nodes	1m or more <sup>Note1)</sup>
	Max protocol size	1500byte
	Access to communication zone	CSMA/CD
Communication	Check method for frame error	CRC32
	Connector	RJ-45 (2-port)
	IP Setting	S/W Setting
	Topology	Bus, Star
	Communication protocol	XEL-BSSA: MODBUS/TCP
		XEL-BSSB: EtherNet/IP
	Max. digital in/output point	512 points (each 256 points)
	Max. number of extension digital modules to be connected to	8
	Occupation Score of extension analog modules	8byte
	Input voltage/current	DC24V / 0.7A
	Allowed range	DC19.2V ~ 28.8V
Power	Output voltage/current	5V(±20%) / 1.5A
	Isolation	Non-Isolation,
		Communication isolation
Etc	Weight(g)	100

\*Note1) When using a cable of less than 1 m, the SNR (Signal to Noise Ratio) decreases due to the influence of reflected waves, which may cause Link Down or packet loss.

# 9.3 Module Parameter Setting

### 9.3.1 BootpServer

Smart I/O Enet module, as a slave module, needs to set up IP Address, Subnet Mask, and Gateway Address to communication with the master module. .

To set up parameters of Smart I/O Enet module, BootpServer program shall be used.

(	🔀 BootpServer			×	
	MAC Address	Request Count	Request Time		
a 👞					
b 🗲	Server IP(PC):	165 . 244 . 149	. 97	List Clear	
c 🛶	Selected MAC: JP Address: Subnet Mask:	165 . 244 . 14 255 . 255 . 25	55 . 0		-+ (
e 🗲	Gatewa Address:	165 . 244 . 14	49 . 1 <u>W</u> ite		

[Description of BootpServer Screen]

a: Bootp Module List Window – A list of Bootp service support devices connected to PC is displayed.

- b: PC IP Address Window IP Address of the user's PC is displayed.
- c: Parameter Setting Window Communication parameters of a target device are set up.

d: Write Button - Parameter Writing is executed.

e: Output Window - The results of parameter settings are displayed.

f: Close Button – The program is ended.

### 9.3.2 Parameter setting

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Confirm the power of Smart I/O Enet module and connect to the user's PC with Enet cable.

MAC Address	Request Count	Request Time
00:e0:91:03:0d:6a	3	10:44:00

Check and select MAC Address of Smart I/O Enet module to be set up from the Bootp module list window.

- Target Address Selected MAC:	00:e0:91:03:0d:6a
IP Address:	165 . 244 . 149 . 156
Subnet Mask:	255 . 255 . 255 . 0
Gatewa Address:	165 . 244 . 149 . 1

<u>W</u>rite

Enter IP Address, Subnet Mask and Gateway Address setting values on the parameter setting window.

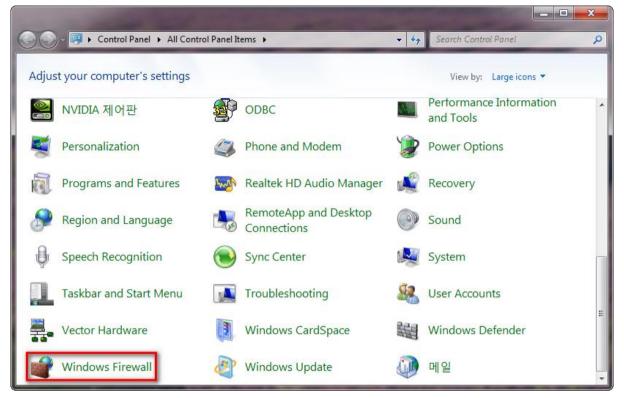
Press Write button to download parameter to Smart I/O Enet module.

• •	Dutput
	New IP Assigned

Check "New IP Assigned" message on the output window.

### 9.3.3 Check points before running BootpServer.

(1) Program allowance in the Windows Firewall.(a) Select Windows Firewall in the Control Panel.



(b) Select Allow a program or feature through Windows Firewall.

Concernation and the second second					x
G S ♥ 🖉 ► Control Panel ►	All Control Panel Items 🕨 Windows Firewall	<b>- </b>	Search Control Panel		٩
Control Panel Home Allow a program or feature. through Windows Firewall Change notification settings Turn Windows Firewall on or off Restore defaults Advanced settings Troubleshoot my network	<ul> <li>Help protect your computer with Wi</li> <li>Windows Firewall can help prevent hackers or rethrough the Internet or a network.</li> <li>How does a firewall help protect my computer?</li> <li>What are network locations?</li> <li>Tor your security, some settings are mana</li> <li>Update your Firewall settings</li> <li>Windows Firewall is not using the recommended settings to protect your computer.</li> </ul>	nalicious software	e from gaining access to y		E
See also Action Center Network and Sharing Center	What are the recommended settings?           Image: Domain networks           Networks at a workplace that are attached to a           Windows Firewall state:           Incoming connections:	Off Block all cor	Co nnections to programs th lowed programs	nnected 👁	

# (c) Select Allow another program.

Г

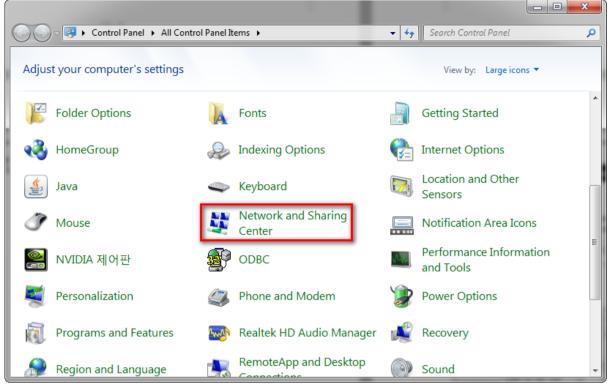
							x
🚱 🕞 🗢 🔐 « All Contro	I Panel Items 🕨 Windows Firewall	<ul> <li>Allowed</li> </ul>	Programs •	• • •	Search Control I	Panel	٩
	ur security, some settings are manag	jed by you	r system administrato	or.			*
Name	5	Domain	Home/Work (Pri	Public	Group Policy	*	
✓ flexsv	r.exe VStudio.exe				No		
✓ FTSP <sup>1</sup>	VStudio.exe -performance Embedded Workshop				No	=	
Hom	eGroup				No		
☐ iSCSI					No No		-
	TM) Platform SE binary ⁄lanagement Service				No No		-
☑ Imgra					No No		
<b>∠</b> Lync					No	-	
				Details	s Remov	e	
				Allow	another progran	n	*
				(	DK Car	ncel	

(d) Select Browse and check the path of BootpServer execution file.

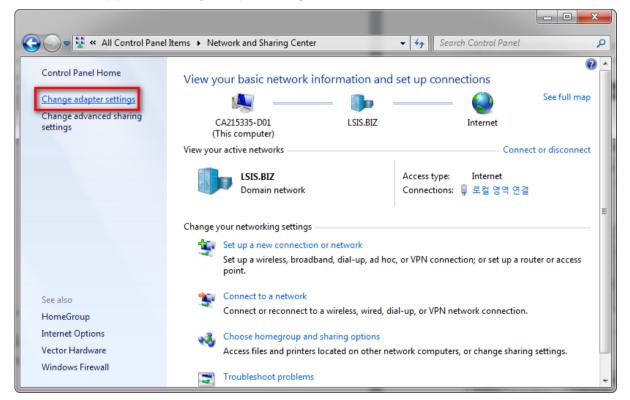
Add a Program
Select the program you want to add, or click Browse to find one that is not listed, and then click OK.
Programs:
Flash Development Toolkit 4.00 Flash Development Toolkit 4.09
GMWIN 4 EISH8S Device Group EISH8SX Device Group Reigh-performance Embedded Workshop
iCDB Project Backup
Conternet Explorer
Keil uVision5
Path: C:\BootpServer\BootpServer_V1.2.exe Browse
What are the risks of unblocking a program?
You can choose which network location types to add this program to.
Network location types Add Cancel

# (2) Disable unused LAN card

(a) Select Network and Sharing Center in Control Panel



(b) Select Change adapter settings



(c) Disable unused LAN cards with BootpServer.

Γ

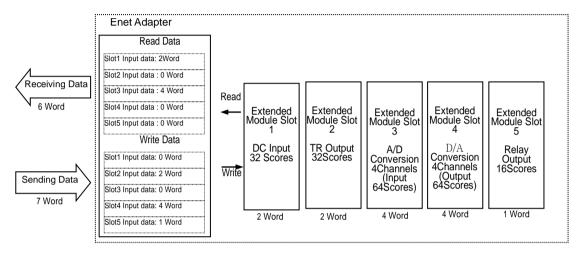
🔾 🗢 🖳 🕨 Control Panel 🕨 Network	and Internet 🕨 Network Connec	tions 🕨 👻 🍫 Search Netwo	ork Connections
Organize ▼ Disable this network device 로컬 영역 연결 LSIS.BIZ		Rename this connection »	u≓ ▼ @
Intel(R) 82579V Gigabit Network (	<ul> <li>Disable</li> <li>Status Diagnose</li> <li>Bridge Connections</li> <li>Create Shortcut</li> <li>Delete</li> <li>Rename</li> <li>Properties</li> </ul>		

Do r	not set DHCP on your	local LAN card when using BootpServer	
	ternet Protocol Version 4 (TC		
	General		
	this capability. Otherwise, you for the appropriate IP settings Obtain an IP address aut	tomatically	
	Ouse the following IP addr IP address:	165 . 244 . 149 . 100	
	Subnet mask:	255.255.255.0	
	Default gateway:	165.244.149.1	

## 9.4 Modbus/TCP communication

#### 9.4.1 I/O data assignment

- (1) Input data and output data are separated.
- (2) I/O Addresses are assigned automatically in order of being mounting to the adapter from Address 0 to 1, 2, 3 and etc.
- (3) Example of data assignment



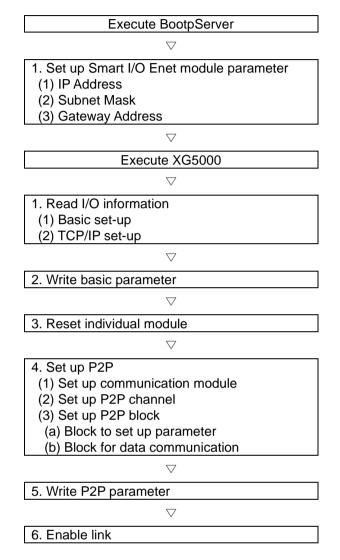
Receiving Data (Slave -> Master)					Sendin	g Data (	Master -> Slav	e)	
Address	Address Data Size		Extension Input Module		Address	data	Size	Extension Out	tput Module
0		2Word	DC Input 32	scores	0		2Word	TR Output 3	22 scores
1		20000	DC Input 32	. 300163	1		200010		52 300165
2	6Word		A/D	CH0	2			D/A	CH 0
3	000010	4Word	Conversion	CH 1	3	7Word	4Word	Conversion	CH 1
4		40000	4CH	CH 2	4		40000	4CH	CH 2
5			4011	CH 3	5			4011	CH 3
			6		1Word	Relay Output	16 scores		

- (4) How to set up extension module parameter
  - (a) The extension modules mounted on Smart I/O Enet module are assigned with Word Address of 2-Word parameter setting area, which starting from 0x100 without distinguishing input modules from output modules.
    - (When 8 modules are mounted, 0x100~0x10F is assigned)
  - (b) Parameter setting is available with Read/Write commands-Modbus Words.
  - (c) Set up parameter read/writ block on XG5000
    - 1) Read/Write Block setting is equal to data communication setting.
    - 2) Only words are selectable for data type (Since parameters of a module shall be set up at the same time, parameter Read/Write consists of multiple numbers of data at least more than 2 words).
    - 3) It impossible to Read or Write both data and parameter on the same block.
    - 4) For parameter setting values of extension modules, refer to Appendix A.6.1.

### 9.4.2 Communication Setting

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To communication with Smart I/O Enet module, first, download basic parameter of Smart I/O Enet module, then set up the Master module's communication parameter and P2P parameter.

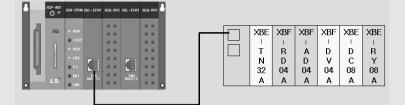


#### Note

#### When set the XBL-BSSA P2P data block, please note that as below

(1) Modbus TCP can use bit or word type data only. So, there will be problem if you mount the byte type module to first or in the middle. (such as XBE-RY08A, TN08A, DC08A, DR16A)

(2) The example of setting byte type module

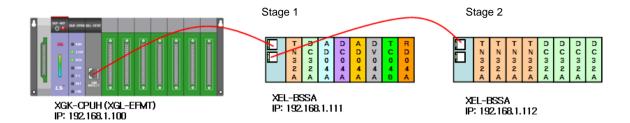


- a) I/O configuration
  - Input: 17 bytes
  - Output: 13 bytes
- b) Size of parameter block setting: 12words
- c) Data communication block setting
  - (a) Input module (RD04A, AD04A,DC08A): Read word type(8words) and bit type (8bits) of 17 bytes data
    - Read word type: 0x30000~0x30007
    - Read bit type: 0x10080~0x10087
  - (b) Output module (TN32A, DV04A,RY08A): Write word type(6words) and bit type(8bits) of 13bytes data
    - Write word type: 0x40000~0x40005
    - Write bit type: 0x00060~0x00067
  - (c) Parameter setting: 2words of each module
    - Word type: 0x40100~0x4010B(12words)

# 9.4.3 XGT Series communication

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Ex) It has the following basic configuration and setting values:



Setting Item				Setting program		
	Master s	etting	XGL-EFM	XGL-EFMT		
	Base Nu	mber	0		XG5000	
	Slot Num	nber	0		XG5000	
			IP Address	192.168.1.100		
Master	TCP/IP s	setting	Subnet Mask	255.255.255.0	XG5000	
			Gateway Address	192.168.1.1		
	P2P Cha	annel setting		TCP Client	XG5000	
	P2P Trig	ger	20ms cloc	:k	XG5000	
	P2P Way	y	Continual		XG5000	
	Data Typ	)e	Word		XG5000	
	module paramet setting			IP Address	192.168.1.111	
		module parameter setting Block 1 Reading Block	Subnet Mask	255.255.255.0	BootpServer	
			Gateway Address	192.168.1.1		
	BIOCK 1		Device	D00000	XG5000	
	Saving Block		Size	18		
		Saving Block	Device D00100	XG5000		
			Daving block	Size	10	700000
		Parameter Setting	Device	D00500	XG5000	
Slave		Block	Size	16	700000	
			IP Address	192.168.1.112		
		Module Parameter Setting	Subnet Mask	255.255.255.0	BootpServer	
			Gateway Address	192.168.1.1		
	Block 2	Reading Block	Device	D00200	XG5000	
			Size	8	AG3000	
		Soving Block		D00300	XG5000	
		Saving Block	Size	8	AG3000	
		Parameter Setting	Device	D00600	XG5000	
		Block	Size	16	100000	

[BootpServer - Step1] Smart I/O Enet module parameter setting

Step	Item	Screen Configuration and Setting
		Check Bootp module list
		MAC Address Request Count Request Time
1-1	Run BootpServer	00:e0:91:03:0d:6b 3 19:28:33 00:e0:91:03:0d:6a 3 19:30:29
	Kun BoolpServer	Select module to be set up
1-2	Input parameter setting value	Target Address         Selected MAC:       00:e0:91:03:0d:6b         IP Address:       192 . 168 . 1 . 112         Subnet Mask:       255 . 255 . 255 . 0         Gatewa Address:       192 . 168 . 1 . 1
1-3	Download parameter	Write Select Write button
1-4	Confirm completion of parameter setting	New IP Assigned Check output window
1-5	Set up extension block 2 module	Repeat 1-1 ~ 1-4

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# [XG5000 - Step1] Program Creation

Menu Selection: File - New File

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Step	Item	Screen Configuration and Setting		
1-1	Set up program name	Project name: adapter		
1-2	Specify file location	File directory: C:\XG5000\source\adapter		
1-3	Select PLC Series	PLC Series • XGK XGB XGI XGR Select XGK		
1-4	Select CPU Kind CPU type: XGK-CPUH Select XGK-CPUH			
1-5	Complete program creation	OK Select OK button		

[XG5000 - Step2] Communication Method Setting

Menu Selection: Online - Connection Setting

Step	Item	Screen Configuration and Setting
2-1	Set up communication method	Online Settings - NewPLC       ? ×         Connection settings       ? ×         Type:       USB       > ettings         Depth:       Local       Preview         General       ? * sec.       ettial times:         Timeout interval:       5 * sec.       sec.         Retrial times:       1 *       *         Normal       Maximum       *         * Send maximum data size in stop mode       Connect       DK         Connection Method:       USB         Connection Step:       Local

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[XG5000 - Step 3] Connection

Menu Selection: Online - Connection

[XG5000 - Step 4] I/O Information Reading

Menu Selection: Online – Diagnosis – I/O Information – I/O sync

Step	Item	Screen Configuration and Setting		
5-1	Set up Master module	Project window       < ×		
5-2	Set up TCP/IP	TCP/IP settings         HS link Station No.:         0         Media:         AUTO(electric)         IP address:         192.168.1         Subnet mask:         255.255.255.0         Gateway:         192.168.1         DHCP         Reception waiting time:         15         sec(2.255)         No. of Dedicated Connections:         3       (1-16)         IP Address:       192.168.1.100         Subnet Mask:       255.255.255.0         Gateway:       192.168.1.10         Subnet Mask:       255.255.255.0         Gateway:       192.168.1.1         DNS Server, Waiting Time, Exclusive Connection Count:         Setting suitable for user's environment		
5-3	Set up	OK Select OK button		

# [XG5000 - Step 5] Master module TCP/IP setting

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[XG5000 - Step 6] Basic setting parameter writing

Menu Selection: Online - Parameter Writing

Step	Item	Screen Configuration and Setting	
6-1	Select parameter writing	Write parameter (standard settings, HS link, P2P)         Image: Standard settings         Image: Standard settings	
		Select Master module	
6-2	Download parameter	OK Select OK button	

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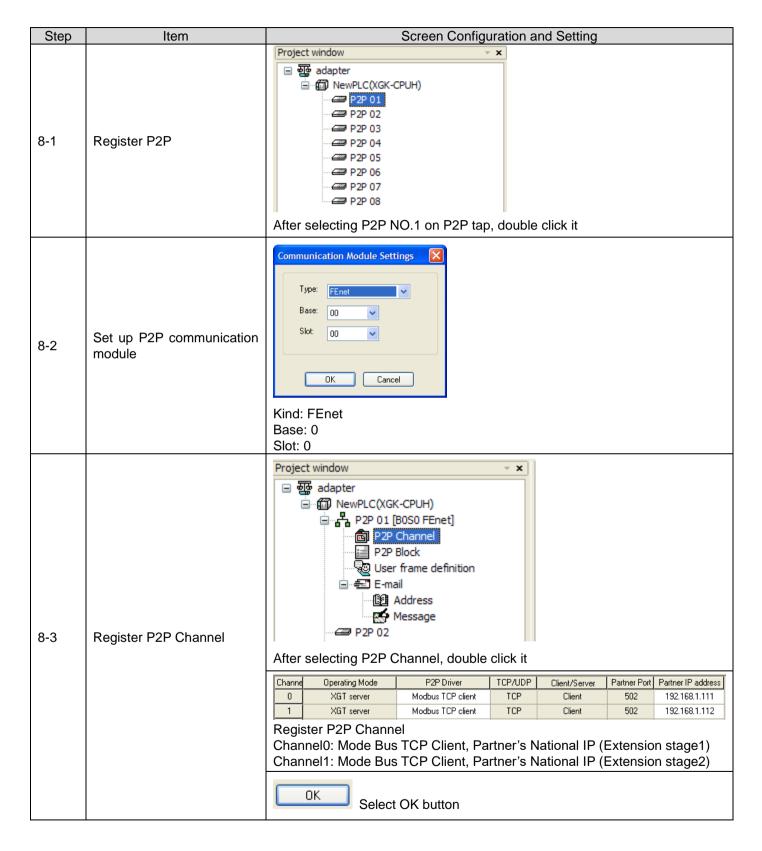
# [XG5000 - 7] Individual module reset

Menu Selection: Online - Reset - Individual Module Reset

Step	Item	Screen Configuration and Setting	
7-1	Select module	Individual module reset	
		Select Master module	
7-2	Reset module	OK Select OK button	

### [XG5000 - Step 8] P2P communication setting

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Step	Item	Screen Configuration and Setting								
		Parameter Setting Block								
		Index E-mail	Ch. Driv	er Setting	P2P function	Conditional flag	Command type	Data type	No. of variables	Data size
		0 🗖	0 Modbu	is TCP client	WRITE	M00000	Continuous	WORD	1	16
		1 🗆	1 Modbu	is TCP client	WRITE	M00001	Continuous	WORD	1	16
8-4	Set up P2P Block (Extension Module Parameter Setting Block)	- Writing T - data Size - Set up V Read a D005 Extension s - Writing T - Data Siz	Vriting Block rea Sa 00 0; stage 2 para rigger : M00 e: 16Word Vriting Block	000 ve area 40000 meter wri	NO ting trig	dress 10001 ger MOC	0001			
		D0060		40000		0042	1			
		0 Moo	bus TCP client bus TCP client bus TCP client ing Block Save area	WRITE READ	n settin	g Continuous Continuous	WORD /	1	10 18	
		D00000	0x40000	NO	0083					
		Set up Rea	ding Block			_				
	Set up P2P	Read area	Save are		ldress	I				
8-5	Block (Data	0x30000	D00100		00144					
	Communicati	Extension s	stage 1 com	municatio	n settin	g				
	on Block)	0 Mo	lbus TCP client	WRITE	F00090	Continuous	WORD	1	8	
		0 Mo	dbus TCP client	READ	F00090	Continuous	WORD	1	8	
		· Set up Writ	ing Block			-	-			
			Read area	Save	area	Add	ress			
		1	D00200	0x40		N00	083			
		Set up Rea	ding Block							
			Read area	Save	area	Add	ress			
		1	0x30000	D003	300	N00	144			

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[XG5000 - 9Step] P2P setting writing

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Menu Selection: Online - Parameter Writing

Step	Item	Screen Configuration and Setting	
9-1	Select parameter writing	Write parameter (standard settings, HS link, P2P)	
		SELECT P2P NO.1	
9-2	Download P2P setting	Select OK button	

[XG5000 - Step 10] Link Enable

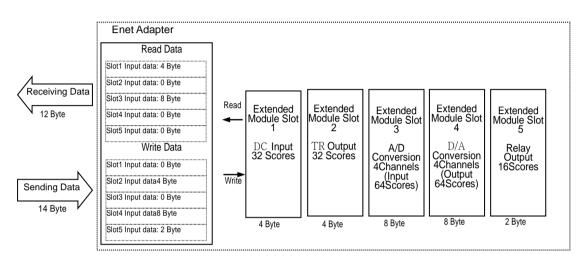
Menu Selection: Online – Link Enable

Step	Item	Screen Configuration and Setting		
10-1	Set up Link Enable	Enable Link(HS Link, P2P)		
10-2	Set up Link Enable	Write Select Write button		

# 9.5 EtherNet/IP communication

### 9.5.1 I/O data assignment

- (1) Input data and output data are separated.
- (2) I/O Addresses are assigned automatically in order of being mounting to the adapter.
- (3) Example of data assignment



### (4) How to set up I/O module

(a) In case there are Input and Output module,

Item	Description	Vale
Transport	Originator → Target	Point To Point
Туре	Target → Originator	Multicast
Connection	Originator → Target	170(Decimal)
Point (Assembly Instance)	Target → Originator	160(Decimal)
data	Originator → Target	Adapter Output Size(Byte)
Size(Byte)	Target → Originator	Adapter Input Size(Byte)

### (b) In case there is input module only,

Item	Description	Vale
Transport	Originator → Target	Point To Point
Туре	Target → Originator	Multicast
Connection	Originator → Target	128(Decimal)
Point		
(Assembly	Target → Originator	160(Decimal)
Instance)		
data	Originator → Target	-
Size(Byte)	Target → Originator	Adapter Input Size(Byte)

Item	Description	Vale
Transport	Originator → Target	Point To Point
Туре	Target → Originator	Multicast
Connection	Originator → Target	170(Decimal)
Point		
(Assembly	Target $\rightarrow$ Originator	160(Decimal)
Instance)		
data	Originator → Target	Adapter Output Size(Byte)
Size(Byte)	Target → Originator	1Byte

### (c) In case there is output module only,

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### (5) How to set up extension module parameter

- (a) Extension module parameters of XEL-BSSB module are set up with Assembly Object through UCMM Message.
- (b) Parameter setting Assembly Object of XEL-BSSB module has Instance ID 180 (0xB4).
- (c) Parameter size of extension modules is 4 bytes per module.
- (d) Data size of parameter setting Assembly Object Instance is equal to the sum of parameter setting blocks of the extension module mounted on XEL-BSSB module.
- (e) New parameter can be applied only to XEL-BSSB module whose parameter values are changed when setting up parameter writing with UCMM Message.
- (f) For parameter setting values of extension modules, refer to Appendix A.7.1.

**※** Example of UCMM Message

Service Code	: 16	(0x10 : Set)
Class	: 04	(0x04 : Assembly Class)
Instance	: 180	(0xB4 : parameter setting Assembly Object )
Attribute	: 03	(0x03 : Data)
Data	: XX	XX (parameter setting value)

### (6) UCMM Communication

# (a) Parameter setting

Description	Value
Service Code	16 (0x10)
Class	04 (0x04)
Instance	180 (0xB4)
Attribute	03 (0x03)
Data	Parameter setting value

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### (b) Send data

Description	Value
Service Code	16 (0x10)
Class	04 (0x04)
Instance	170 (0xAA)
Attribute	03 (0x03)
Data	Send data

## (c) Receive data

Description	Value
Service Code	14 (0x0E)
Class	04 (0x04)
Instance	160 (0xA0)
Attribute	03 (0x03)
Data	Receive data

# 9.5.2 Communication Setting

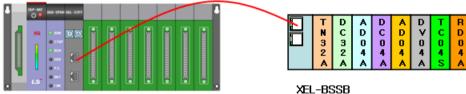
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To communication with Smart I/O Enet module, first, download basic parameter of Smart I/O Enet module, then set up Master module의 communication parameter and P2P parameter of the master module.

Execute BootpServer				
$\nabla$				
1. Set up Smart I/O Enet module parameter				
(1) IP Address				
(2) Subnet Mask				
(3) Gateway Address				
$\bigtriangledown$				
Execute XG5000				
$\bigtriangledown$				
1. Read I/O information				
(1) Basic set-up				
(2) TCP/IP set-up				
$\bigtriangledown$				
2. Write basic parameter				
$\bigtriangledown$				
3. Reset individual module				
$\bigtriangledown$				
4. Set up P2P(EIP)				
(1) EIP configuration				
(2) Set up EIP channel				
(3) Set up EIP block				
(a) Block to set up parameter				
(b) Block for data communication				
$\bigtriangledown$				
5. Write P2P parameter				
$\bigtriangledown$				
6. Enable link				

# 9.5.3 XGT Series Communication

Ex) It has the following basic configuration and setting values:



XGK-CPUH (XGL-EIPT) IP: 192.168.1.100



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Setting Item				Descrip	setting program	
	Master setting		XGL-EIPT	-	XG5000	
	Base Number		0			XG5000
	Slot Number		0			XG5000
			IP Address	192.168		
	Set up TCP/IP		Subnet Mask	255.25	5.255.0	XG5000
			Gateway Address	192.168		
	Non-periodic cor		Device	D00200	)	XG5000
	(Extension modu	ule parameter setting)	Size	32		
Master		EDS Channel setting	Generic E		P Module	XG5000
		І/О Туре	Exclusive (8bit insta			XG5000
		Connection Type	Multicast			XG5000
			T2O Data	Size	36	
			O2T Data Size		20	
	Periodic communication	ion Parameter	Config Instance		2	XG5000
			Output Connectio Point(8bit)		170	AG3000
			Input Con Point(8bit)	nection 160		
		Transmission Cycle	20ms			
		Time Out	RPI X 16			
			IP Address	192.168	3.1.101	
	Set up module p	Set up module parameter		255.255.255.0		BootpServer
Slave			Gateway Address			
	Receiving data		Device	D00100		XG5000
	(Slave -> Master	·)	Size	36		XG2000
	Sending data		Device	D00000		XG5000
	(Master -> Slave	e)	Size	20		703000

Step	Item	Screen Configuration and Setting
1-1	Execute BootpServer	MAC Address       Request Count       Request Time         00:e0:91:03:4c:02       5       10:28:29         Select module to be set up
1-2	Input parameter setting value.	Target Address         Selected MAC:       00:e0:91:03:4c:02         IP Address:       192 . 168 . 1 . 101         Subnet Mask:       255 . 255 . 255 . 0         Gatewa Address:       192 . 168 . 1 . 1
1-3	Down load parameter	Write Select Write button
1-4	Confirm completion of parameter setting	Output New IP Assigned Check output window

[BootpServer - Step1] Smart I/O Enet module parameter setting

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[XG5000 - Step1] Program Creation

Menu Selection: File - New File

Step	Item	Screen Configuration and Setting					
1-1	Set up program name	Project name: Enet Adapter					
1-2	Specify file location	File location:         C:\XG5000\Enet Adapter					
1-3	Select PLC Series	PLC Series • XGK XGB XGI XGR Select XGK					
1-4	Select CPU Kind	CPU kind: XGK-CPUH  Select XGK-CPUH					
1-5	Complete program creation	OK Select OK button					

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[XG5000 - Step2] ] Communication Method Setting

Menu Selection: Online - Connection Setting

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Step	Item	Screen Configuration and Setting					
2-1	Set up communication method	Online Settings       Image: Connection settings         Type:       USB         Depth:       Local         Preview       Preview         General       5 \$ sec.         Timeout interval:       5 \$ sec.         Retrial times:       1 \$ sec.         Normal       Maximum         * Send maximum data size in PLC run mode         Connection Method:       USB         Connection Step:       Local					

[XG5000 - Step 3] Connection

Menu Selection: Online - Connection

[XG5000 - Step 4] I/O Information Reading

Menu Selection: Online – diagnosis - I/O Information – I/O sync

[XG5000 - Step 5] Master module TCP/IP setting

Step	Item	Screen Configuration and Setting				
5-1	Set up Master module	Project window				
5-2	Set up TCP/IP	Select Master module from basic setting tap and double click.         IP address:       192 . 168 . 1 . 100         Subnet mask:       255 . 255 . 255 . 0         Gateway:       192 . 168 . 1 . 1         IP Address: 192.168.1.100       Subnet Mask: 255.255.255.0         Gateway:       192.168.1.10         Subnet Mask: 255.255.255.0       Gateway: 192.168.1.1         DNS Server: Setting suitable for user's environment				
5-3	Set up	OK Select OK button				

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[XG5000 - Step 6] Basic setting parameter writing

Menu Selection: Online - Parameter Writing

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Step	ltem	Screen Configuration and Setting				
6-1	Select parameter writing	Write parameter (standard settings, HS link, P2P)				
		Select Master module				
6-2	Download parameter	OK Select OK button				

[XG5000 - Step 7] Individual module reset

Menu Selection: Online - Reset - Individual Module Reset

Step	Item	Screen Configuration and Setting					
7-1	Select module	Individual module reset					
		Select Master module					
7-2	Reset module	CK Select OK button					

# [XG5000 - Step 8] P2P communication setting (Explicit communication)

Step	Item	Screen Configuration and Setting						
8-1	Register P2P	Project window $\sim \times$ From Enet Adapter P2P 01 P2P 02 P2P 02 P2P 03 P2P 03 P2P 04 P2P 05 P2P 05 P2P 06 P2P 07 P2P 08 After selecting P2P NO.1 on P2P tap, double click it						
8-2	Set up P2P communication module	Communication Module Settings       X         Image: Im						
	Set up EIP Channel	Channel Operating Mode 0 Explicit Client Register Explicit communica Partner's National IP: Regis	4481 ation channel	8	Partner IP address 192.168.1.101 PSS			
8-3		Ch. Operating Mode O Explicit Client Function: Generic WRITE Parameter items	1/0 type	Connection type	Function Generic WRITE			
			Contents					
		Service Code(Hex) Class(Hex)	10					
		Instance	4 180					
		Attribute(Hex)	3					
		Parameter setting (UCMM setting)						

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Step	Item	Screen Configuration and Setting						
	Set up EIP Channel	Conditional flag M00000 Trigger for writing parameter: M00000						
8-3		Data type tag settings						
			Local tag	Remote tag	Size			
		1 BYTE	D00200		32			
		Data Type: 1E	ВҮТЕ					
		Local Tag: D0	0200					
		Size: 32 (byte	e)					

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[XG5000 - Step 9] P2P communication setting (Implicit communication): There are two way that using dedicated or generic EDS

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(1) Using dedicated EDS (XBL-BSSB EDS)

Step	Item	Screen Configuration and Setting					
9-1	Register P2P	Refer to 8-1					
9-2	Set up P2P communication module	Refer to 8-2					
9-3	Set up EIP configuration	EDS information window       *         EDS information window       *         EDS information window       *         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparison of the Net/IP Nodule       Image: Comparison of the Net/IP Nodule         Image: Comparis					
9-4	Set up P2P Channel	Channel         Operating Mode         Partner Port         Partner IP address           1         Implicit Client         2222         192.168.1.101           Ensure that the channel number and partner nation's IP address are properly registered on EIP configuration window.         Implicit Client         Implicit Client					

Step	Item	Screen Configuration and Setting							
		Ch.	Ch. Operating Mode I/O type Connection				Connection type		
		1	Impli	icit Client	Ov	Exclusive vner(8bit hstance)	Multicast	-	
		1	Impl	icit Client					
		After se	After selecting communication channel, set up I/O type and connection type.						
		0: Excl	usive Ow	ner					
		1: Inpu	t Only						
		2: Liste	en Only						
			Paramete	r items		Con	tents		
			T20 Dat				6		
			02T Dat		_		0		
		Config Instance Output Assembly Instance(8bit)					) 70		
		Input Assembly Instance(8bit)				160			
9-5	Set up P2P Block								
	DIOOR	Set up I/O data size and co			nnection points on the parameter setting window.				
		period		Time out					
		20	,	2. RPI x16					
		20		2. NEI XIO					
		20	1						
				smission cy	rcle a	nd time o	ut.		
					_				
		Loc	al tag	tag settings Remote tag		Size			
		DC	0100			36			
		DC	0000			20			
		Set up In/Output data local tag.							

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Step	Item	Screen Configuration and Setting
9-1	Register P2P	Refer to 8-1
9-2	Set up P2P communication module	Refer to 8-2
9-3	Set up EIP configuration	EDS information window         Image: Select Distribution window         Image: Select OK button
9-4	Set up P2P Channel	ChannelOperating ModePattner PortPattner IP address1Implicit Client2222192.168.1.101Ensure that the channel number and partner nation's IP address areproperly registered on EIP configuration window.

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# (2) Using generic EDS

Step	Item		Scree	n Configuratio	n and Setting	
		Ch.	Operating Mode	I/O type	Connection type	
		1	Implicit Client	2.Exclusive Owner(8bit instance)	Multicast	
			Implicit Client			
		After select	ing communicat	on channel, s	et up I/O type a	nd connection type.
		Para	ameter items	Cor	ntents	
			) Data Size		36	
			T Data Size		20	
			fig Instance		0	
			embly Instance(8bit) mbly Instance(8bit)		70 60	
		InputAsse	mbly mstance(obit)		00	
9-5	Set up P2P	Set up I/O o	data size and co	nnection point	s on the parame	eter setting window.
3-3	Block	Transmission period(ms)	Time out			
		20	2. RPI x16			
		20				
		Set up data	transmission cy	cle and time c	out.	
			tag setting:			
		Local tag	g Remote tag	) Size		
		D00100		36		
		D.00000				
		D00000		20		
		Set up In/O	utput data local	tag.		

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# [XG5000 - Step 10]P2P setting writing

Menu Selection: Online – Parameter Writing

Step	Item	Screen Configuration and Setting
10-1	Select parameter writing	Write parameter (standard settings, HS link, P2P)
10-2	Download P2P setting	CK Select OK button

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# [XG5000 - Step11] Link Enable

Menu Selection: Online – Link Enable

Step	Item	Screen Configuration and Setting
11-1	Set up Link Enable	Enable Link(HS Link, P2P)
11-2	Set up Link Enable	Write Select Write button

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# **Chapter 10. RAPIEnet Communication**

### 10.1 Overview

This chapter provides information on each module's specifications, performance, and operating method for using the Smart I / O module. This chapter contains the following.

The RAPIEnet I/F Module carries out the communication between the PLCs in the XGT series on the basis of Ethernet communication, and provides two Ethernet ports which can be configured in line (daisy chain) and ring structure, enabling construction of network which is more flexible than conventional star-type PLC communication module. Smart I/O RAPIEnet module supports 2 electrical ports(100BASE-TX) and It is a kind of remote I/O module using XGT RAPIEnet module as a master module.

- Smart I/O RAPIEnet module has following features.
- 1) Supports IEEE 802.3 Standard
- 2) Supports 100BASE-TX media and 100Mbps Full Duplex
- 3) Available to set station number (MAC Address) with hardware (0~ 63stations)
- 4) Supports ring and line (daisy chain) topology to enable construction of networks most suitable for on-site use. Ring topology structure supports redundancy function.
- 5) Built-in switching function enables construction of ring and line topology without additional switch or hub, with reduced wiring and improved flexibility in installation.
- 6) Provides alarm function for station number conflict
- 7) Auto Cross-Over function is provided for convenient cable work.
- 8) Cable distance measuring function is provided for the use of electrical cable.
- 9) Network-based simultaneous OS upgrade.
- 10) Various diagnoses functions are provided. The status information of modules and network is provided.
- 11) Module can be set up simply with station number, without IP.

When using Smart I/O RAPIEnet, please refer to following manuals.

- 1) XG5000 User's Manual
- 2) XGK Instructions & Programming User's Manual
- 3) XGK User's Manual
- 4) XGI/XGR Instructions & Programming User's Manual
- 5) XGI/XGR User's Manual

When you configure the communication module system, please check each of the programs and modular versions. Available product specific version is as follows.

Classification	OS version
XGK CPU series	v2.0 or Above
XGI CPU series	v2.0 or Above
XGR CPU series	v1.0 or Above
XGT RAPIEnet Master	v3.0 or Above
XG5000	v4.07 or Above

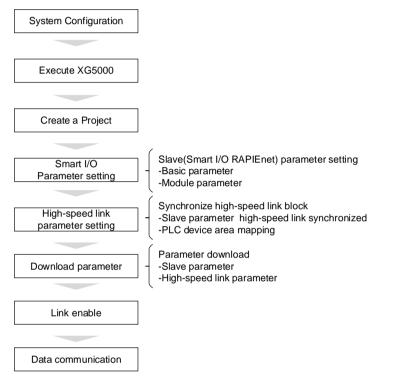
# 10.2 Product Specification

	Category	Specification	Reference
	Communication speed	100 Mbps	
	Transmission path method	Base Band	
	Max distance between nodes	100 m	
Communication specification	Min length between nodes	1m or more <sup>listet)</sup>	
	Max node/ network	64	Including master
	Max protocol size	1516 bytes	
	Access to communication zone	CSMA/CD	
	Check method for frame error	CRC 32	
	Allowes communication packet amount.	Max 1,500(Packet/sec)	
	Min communication period	5 msec	
	Station number setting	Set by rotary switch	Decimal
	Emergency output of output module	Latch, Clear	Default Latch
	Communication method of input module	Cos(Change of State), Cyclic	Default Cyclic
Additional functions	Heart beat setting time (msec)	200~65,500	
	Station number duplication	Displys station number duplication	
	Diagnostic parameters	Heartbeat error, Ethemet CRC error (Port1,2)	
Location of	Parameter of Slave module	Master module	
saved	Parameter of High-Speed communication	CPU	

\*Note1) When using a cable of less than 1 m, the SNR (Signal to Noise Ratio) decreases due to the influence of reflected waves, which may cause Link Down or packet loss.

# 10.3 Communication Settings

Smart I/O RAPIEnet can be used after setting high-speed links and parameters of Smart I/O using XG5000, and the whole setting procedures are as follows.



#### 10.3.1 XG5000 Parameter Settings

For Smart I/O RAPIEnet, basic parameters and module parameters can be set by using XG5000. Methods on how to set the parameters are divided into a method in On-line and a method through Off-Line, and can be set via slave configuration menu.

1) Slave configuration window creation

Slave configuration window can be created by registering PARIEnet in I/O parameter after creating the project through the project creation of XG5000, and setting order and functions per item are as follows.

(1) Project creation

a)Run XG5000 and select [Project]—[New Project]. Select CPU series and type by referring to the module information of the system configuration.

New Project			? <b>X</b>
Project name: File directory:	Test C:\XG5000\VTest		OK Cancel
CPU Series	xgk • xgk-cpuh •	Product Name	
Program name:	NewProgram		
Program languag (i) LD	e O SFC	ं इन	
Project description			

b) Click OK after entering the basic information necessary to create the project.

(2) Registration of master module

Methods on how to register a master module are divided into a method in online mode in which XG5000 is connected to CPU and an off-line setting method.

a) Setting in the online mode

(a)Connect to PLC via [Online] →[Connect] of XG5000 menu.

(b)Change to [Online] $\rightarrow$ [Mode] $\rightarrow$ [Stop] for I/O parameter synchronization.

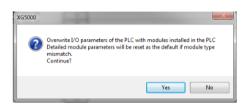
(c)Select [Online]→[Diagnosis]→[I/O information], and I/O information window is shown below.

Click I/O synchronization and proceed with the synchronization of the module installed between CPU and base.

Base module information		nformation
Base 00	Slot	Module
Base 01	0	XGL-EIMT
Base 02	1	
Base 03	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Show Existing Base Onl		

# **Chapter 10 RAPIEnet Communication**

(d) Click I/O synchronization, and the message that indicates I/O parameters are overwritten to the PLC is generated. Click [OK].



(e) Check if XGL-EIMT module is registered in the project window [Network Configuration][Basic Network].



(f) Select [Add item] →[Add slave] menu by clicking the right mouse button after selecting XGL-EIMT registered as new on the network configuration screen. Or, select [Project] →[Add item] →[Add slave] of XG5000 menu to perform the same function.

Onspecified Ne     NewPLC [B				
System Variable		Add Item	<b>,</b>	Network
Variable/Comn	Bà	Сору	Ctrl+C	Communication Module
🔟 Basic Paran			Ctrl+V	P2P Communication
🖽 I/O Parame a 🧒 Scan Program	×	Delete	Delete	High-speed Link Communication User Frame
Scan Program	٢	Properties		Add a Group
		Communication m	odule setting 🔸 🤇	Add Slave

Test - XG5000	
Project         Edit         Find/Replace         View         Online         Monit           □	or       Debug       Tools       Window       Help         C       X
	Monitor1
	PLC Program Device/Variable

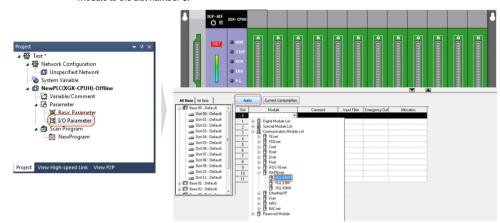
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#### **Chapter 10 RAPIEnet Communication**

b) Setting in the offline mode

(a) Double click the I/O parameter of the project window and then select XGL-EIMT as the application module to the slot number 0.



(b) Click the application, and the message that indicates the module set in I/O parameter is registered is generated. Click [Yes].

?	Automatically register variable comments in the I/O parameter. The previous comments will be deleted. Continue?	s according to the module set

Project 👻 🕂 🗙
⊿ .⊉ Test *
Network Configuration
Inspecified Network
NewPLC [BOSO XGL-EIMT]
🆓 System Variable
MewPLC(XGK-CPUH)-Offline
🖓 Variable/Comment
🛛 🧒 Parameter
Basic Parameter
🚾 I/O Parameter
🛛 🌀 Scan Program
- RewProgram
Project View High-speed Link View P2P

(c) Check if XGL-EIMT module is registered in the project window [Network Configuration][Basic Network].

(d) Select [Add item] →[Add slave] menu by clicking on the right mouse button after selecting XGL-EIMT registered as new on the network configuration screen. Or, select [Project] →[Add item] →[Add slave] of XG5000 menu to perform the same function.

Inspecified Net WewPLC [BP				
System Variable		Open		
MewPLC(XGK-CPL		Add Item	•	Network
Variable/Comn	Ra I	Сору	Ctrl+C	Communication Module
		Paste	Ctrl+V	P2P Communication
[13] I/O Parame	×	Delete	Delete	High-speed Link Communication
▲ Scan Program IN NewProgram	۵	Properties		User Frame Add a Group
		Communication mo	odule setting	Add Slave

(e) Check if the slave config	guration window is created.
🔩 Test - XG5000	
Project Edit Find/Replace View Online Monito 日本語 (日本語) (日本語) (日本語) (日本語) (日本語) 日本語 (日本語) (日本語) (日本語) (日本語) 日本語 (日本語) (日本) (日本語) (日本) (日本) (日本) (日本) (日本) (日本) (日本) (日本	
NewPLCXGKACPUH-Offline     Synthe/Comment	Slave Configuration window
	Monitor 1 👻 🕂 X Check Program 👻 🖗 X
	PLC Program Device/Variable See See X
	Monitor 1 Monitor 3 Monitor 4     Result Chec Find 1 Find 2 Com, Cros, Used Dupl
NewPLC Offline	I sten Row 3 Col Overwrite I M

٦

**Chapter 10 RAPIEnet Communication** 

#### 2) Slave configuration menu

Smart I/O RAPIEnet module is a slave module, and thus it requires parameter settings by each slave in order to communicate with a master module. The configuration window for slave setting 'notice1) is as follows.

메모 포함[[1]: 각 슬레이브별 파라미터를 설정하여야 합니다.

Prayet Ent Find Architeke View Online Monitor Debug Tools Window Help Project Tent Find Architeke View Online Monitor Debug Tools Window Help Project View High-Speed Link View P2P Findion Name Findion Name F	🚯 Test - XG5000		• ×
Image: Control of the second secon			
Point       Image: Configuration - BOSSD X         Point       Image: Configuration - BOSSD X         Image: Configuration - BOSSD X       Image: Configuration - BOSSD X         Image: Configuration - BossD X       Image: Configuration - BOSSD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration - BossD X         Image: Configuration - BossD X       Image: Configuration			
Polet       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image: Configuration - 500500 x       Image: Configuration - 500500 x         Image:	the second s		-
Project       • 3 ×       NewProgram       Stave Configuration - 800500 ×         • Test*       • Unspecified Network       • Unspecified Network       • NewProgram       Stave Configuration - 800500 ×         • Winspecified Network       • Unspecified Network       • NewProgram       • Using the diagnostic area       • NewProgram       NewProgram         • Winspecified Network       • Stave Configuration       • Other thest       1000       (200-45535mec) Network of number 2       • • • • • • • • • • • • • • • • • • •			
Test*       Auto scan       Using the diagnostic area       Mester module number 1       King the diagnostic area       Mester module number 2       King the diagnostic area			
Network Configuration       Auto stan       I dear the degrostic area       Mester module number 1       I         Image: State Configuration	and a second	A X NewProgram X Slave Configuration - B00500 X	
Auto scon       Auto scon       Mester module maskers       Mester module maskers       Mester module maskers       Exter module maske			-
Weit Black Configuration         Weit Namble         Weit Namble         Basic Plannter         Monitor 1         PLC         Plannter         Monitor 2         Monitor 3         Result Creect Find 1         Basic Plannter		Auto scan Using the diagnostic area Master module numb	ier 1 6:
System Variable         System Variable         Variable/Comment         Starter         Project         View High-speed Link:         View High-spiele Link: <t< td=""><td></td><td>Batch application of parameters Using Heartbeat 1000 (200~65535msec) Master module numb</td><td>er 2 6.</td></t<>		Batch application of parameters Using Heartbeat 1000 (200~65535msec) Master module numb	er 2 6.
Image: Slave Configuration window         Findion Name         Monitor1         PLC         Program         Device/Vaiable         Device/Vaiable         Image: Slave Configuration window			
Image: Check Program       Image: Check Program <td< td=""><td></td><td></td><td></td></td<>			
Baic Parameter Projed View High-speed Link View P2P Fundson/FB Mont Recently Lined Prunction Name Monitor 1 PLC Plc Plc Plc Plc Plc Plc Plc Plc			
Project View High-speed Link View P2P Function/B Configuration window Slave Configuration window Function Name  Mentor1 PLC Program Davice/Vaiable  Result Cited, Find1 Find2 Com Cres Used Dupd.:			
Function/FIS       • • • • • •         Most Recently Used       • • • • •         Function Name       • • • • • • • • • • • • • • • • • • •		-	
Monter1     Monter1     Procession       Monter1     Monter2     Monter4	Project View High-speed Link View P2P		
Monter1     Procession       Nonter1     Procession       Nonter1     Monter2       Monter1     Monter4	Function/FB	a x	
Monitor1 • • • × Check Program • • • × PLC Program Device/Variable • • • × • • • • • • • • • • • • • • • • • • •			
Monitor1 • • • × Check Program • • • × PLC Program Device/Variable • • • × • • • • • • • • • • • • • • • • • • •			
PLC     Program     Device/Vailable       1	- Checker Hame		
PLC     Program     Device/Vailable       1			
PLC     Program     Device/Vailable       1			
PLC     Program     Device/Vailable       1			
PLC     Program     Device/Vailable       1			
1     Image: Second state       4     Image: Second state       Monitor1     Monitor2       Monitor1     Result       Checs     Find1       Find2     Com       Cross     Used		Monitor 1 🗸 🗘 🗙 Check Program	<b>▼</b> ₽ ×
Monitor 1 Monitor 2 Monitor 3 Monitor 4 Result Chec., Find 1 Find 2 Com Cros Used Dupl		PLC Program Device/Variable	
Monitor 1 Monitor 2 Monitor 3 Monitor 4 Result Chec., Find 1 Find 2 Com Cros Used Dupl			
Monitor 1 Monitor 2 Monitor 3 Monitor 4 Result Chec., Find 1 Find 2 Com Cros Used Dupl			
Monitor 1 Monitor 2 Monitor 3 Monitor 4 Result Chec., Find 1 Find 2 Com Cros Used Dupl			
Monitor 1 Monitor 2 Monitor 3 Monitor 4 Result Chec., Find 1 Find 2 Com Cros Used Dupl			
Monitor 1 Monitor 2 Monitor 3 Monitor 4 Result Chec., Find 1 Find 2 Com Cros Used Dupl			
			Dual
	Navel C Offline		Dupi

### Remarks

Notice1) Slave configuration window is created by clicking [XG5000—Project—Add item—Add slave] after registering RAPIEnet master module(XGL-EIMT)in the basic network.

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(1) System catalog

It includes the information about module parameter and basic parameter on the Smart I/O RAPIEnet module. Double click the Smart I/O to be used or drag-in to the slave configuration window, and the parameter setting window for the module is created.

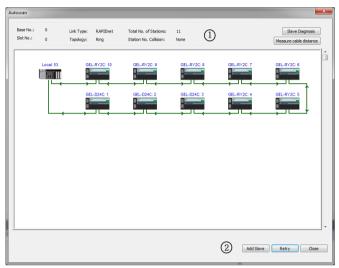
System catalog() 🔷 🚽 🗙	GEL-D24C
<b>₩ X↓</b>   ↑ ↓	GEL-D24C
RAPIEnet 	Product Name: GEL 024C Station:

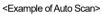
<System catalog>

<Example of parameter setting window>

#### (2) Auto Scan

It is an item which is enabled only when XG5000 is connected to the PLC online. Smart I/O connected to the RAPIEnet master module can be added by clicking Auto Scan. Click Add Slave of Auto Scan, and the slave list available on the network is created.





Select	Station Number		Master Station(1)	Master Station(2)
	1	GEL-D24C		
	5	GEL-RY2C		•
	6	GEL-RY2C	•	•
	7	GEL-RY2C	•	•
	8	GEL-RY2C	•	•
	9	GEL-RY2C		•
	10	GEL-RY2C	•	•
•				Þ

<Add slaves>

Division	Name	Meaning
1	Basic Information	It refers to the network configuration information of the master station No. (Local).
2	Add Slave	It is a function to select the module intended to controlled among Smart I/O modules that exist within the network in the master station No.(Local). <sup>*Note1)</sup>

#### Remarks

Notice1) When you click the Slave Add button, only the Smart I/O in which parameters are not set can be added. If the slave you want to select from [Add Slave] window is controlled by another master module, the slave cannot be selected.

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# (3) Batch application of parameters

It is a function used for batch application depending on the module type. It is convenient to set parameters since batch application of parameters for each module is possible in the system constituted by the same kind of Smart I/O.

Product Name: GEL-AC8C Station: Input Module	Ŧ	U						
Input Module								
High-speed link transfer mode	2:	Cyclic	-	)				
High-speed link frequency(ms	ec):	200	+	1				
Minimum transmission prohibiti	tion time (meac):	200						
	uon une (insec).	Broadcast	O Unicast					
Data Transfer:		o producast						
Input Filter(msec):	3		<b>*</b>					
Output Module								
Emergency output mode:		Latch						
							Apply(	A) Close
							Apply(	A) Clos
							Apply(	A) Clos
pply All							Apply(	A) Clos
pply All						_	Apply(	A) Clos
	nt type, 8Channels	▼]	_		_		Apply(	A) Clos
e Selection: GEL-AC8C (Curren		•	_		_		Apply(	A) Clos
e Selection: GEL-AC8C (Curren sic Parameter Module Param		•	_				Apply(	A) Clos
e Selection: GEL-AC&C (Curren sic Parameter Module Param SEL-AC&C 3	neter							
e Selection: GEL-AC8C (Curren sic Parameter Module Param SEL-AC8C 3 Parameter	CH 0	CH 1	CH 2	СН 3	СН 4	СН 5	CH 6	СН 7
e Selection: GEL-AC&C (Curren Sic Parameter Module Param SEL-AC&C (3) Parameter Channel status	CH 0 Disable	CH 1 Disable	Disable	Disable	Disable	Disable	CH 6 Disable	CH 7 Disable
e Selection: [SEL-AC8C (Curren SIC Parameter Module Param SEL-AC8C (3) Parameter Channel status Input range	CH 0 Disable 4~20mA	CH 1 Disable 4~20mA	Disable 4~20mA	Disable 4~20mA	Disable 4~20mA	Disable 4~20mA	CH 6 Disable 4~20mA	CH 7 Disable 4~20mA
e Selecton: GEL-AC&C (Curren sic Parameter Module Param SEL-AC&C (3) Parameter Channel status Input range Output Data Type	CH 0 Disable 4~20mA 0~16000	CH 1 Disable 4~20mA 0~16000	Disable 4~20mA 0~16000	Disable 4~20mA 0~16000	Disable 4~20mA 0~16000	Disable 4~20mA 0~16000	CH 6 Disable 4-20mA 0~16000	CH 7 Disable 4~20mA 0~16000
e Selection: (SEL-AC8C (Curren SIC Parameter SEL-AC8C (3) Parameter Channel status Input range Output Data Type Filter process	CH 0 Disable 4~20mA 0~16000 Disable	CH 1 Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	CH 6 Disable 4~20mA 0~16000 Disable	CH 7 Disable 4~20mA 0~16000 Disable
e Selecton: [GEL-ACSC (Curren sik Farameter Module Param SEL-ACSC 3 Parameter Channel status Input range Output Data Type Filler process Filler constant	CH 0 Disable 4~20mA 0~16000 Disable 1	CH 1 Disable 4-20mA 0~16000 Disable 1	Disable 4~20mA 0~16000 Disable 1	Disable 4~20mA 0~16000 Disable 1	Disable 4~20mA 0~16000 Disable 1	Disable 4~20mA 0~16000 Disable 1	CH 6 Disable 4~20mA 0~16000 Disable 1	CH 7 Disable 4~20mA 0~16000 Disable 1
e Selecton: [6EL-AC8C (Curren sic Parameter Module Param SEL-AC8C 33 Parameter Channel status Input range Output Data Type Filler process Filler constant Average processing	CH 0 Disable 4~20mA 0~16000 Disable	CH 1 Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	Disable 4~20mA 0~16000 Disable	CH 6 Disable 4~20mA 0~16000 Disable	CH 7 Disable 4~20mA 0~16000 Disable
e Selecton: [GEL-ACSC (Curren sic Parameter Module Param GEL-ACSC 3 Parameter Channel status Input range Output Data Type Filter process Filter constant	CH 0 Disable 4~20mA 0~16000 Disable 1 Disable	CH 1 Disable 4-20mA 0-16000 Disable 1 Disable	Disable 4~20mA 0~16000 Disable 1 Disable	Disable 4~20mA 0~16000 Disable 1 Disable	Disable 4~20mA 0~16000 Disable 1 Disable	Disable 4~20mA 0~16000 Disable 1 Disable	CH 6 Disable 4-20mA 0-16000 Disable 1 Disable	CH 7 Disable 4-20mA 0~16000 Disable 1 Disable
Parameter Channel status Input range Output Data Type Filter process Filter constant Average processing Average processing	CH 0 Disable 4~20mA 0~16000 Disable 1 Disable Count-Avr	CH 1 Disable 4~20mA 0-16000 Disable 1 Disable Count-Avr	Disable 4~20mA 0~16000 Disable 1 Disable Count-Avr	Disable 4~20mA 0~16000 Disable 1 Disable Count-Avr	Disable 4~20mA 0~16000 Disable 1 Disable Count-Avr	Disable 4~20mA 0~16000 Disable 1 Disable Count-Avr	CH 6 Disable 4-20mA 0-16000 Disable 1 Disable Count-Avr	CH 7 Disable 4-20mA 0~16000 Disable 1 Disable Count-Aw

#### Functions for each menu are as follows.

Division	Name	Meaning
1	Slave selection	It refers to the module in which the parameter batch application function is to be applied.
2	Basic parameter	It means the basic parameter of the module.
3	Module parameter	It means the module parameter. The module parameter is enabled only if the analog I/O module is selected.
4	Apply	The set parameter is applied.

<ul> <li>(4) Diagnostic area use</li> <li>Diagnostic area use function is to transmit the diagnostic information provided by the slave module to the PLC device area. Check the diagnostic area use and enter the starting address of the PLC device in which the diagnostic information is stored, and the diagnostic area of 1 word per slave is automatically allocated to the high-speed link block.</li> <li>(Diagnostic information area is updated every 500ms.)</li> </ul>	
(5) Heartbeat use It is a function to check if network elimination between Smart I/O and RAPIEnet master occurs. The presence within the network can be confirmed by checking heartbeat signals at set time intervals. The heartbeat period can be set up to 200~65500msec, and the heart beat error information for each Smart I/O can be provided if the diagnostic area use is checked.	
(6) Master module station No It is a function that is enabled when Smart I/O is used in the XGR CPU and refers to the station number of the master module mounted on the side of standby and master of the XGR CPU.	
Auto scan       Using the diagnostic area       Master module number 1       62         Batch application of parameters       Vising Heartbeat       1000       (200~65535mser) Master module number 2       63	

<Slave modules common parameter>

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#### 3) Basic parameter setting items

Basic parameter means the basic parameter settings for the communication between Smart I/O module and master, and the setting method is to double click or drag in the slave module to the slave module from the catalog menu of the slave configuration window. Basic parameter are largely divided into the station No. information, input module and output module setting items, and the setting items are automatically enabled, depending on the module type.

EL-AC8C		×
Basic Parameter Module Parameter		
Product Name: GEL-AC8C Station: 0 -		
Input Module	Cyclc 👻	
High-speed link transfer mode: High-speed link frequency(msec):	200 -	
Minimum transmission prohibition time (msec):	200	
Data Transfer:	Broadcast     O     Unicast	
Input Filter(msec): 3	v	
Output Module		
Emergency output mode:	Latch 👻	
		 OK Cancel

<Example of basic parameter (GEL-AC8C)>

Product Name: GEL-D24C	
Station: 0 •	
Input Module	
High-speed link transfer mode:	Cydic 💌
High-speed link frequency(msec):	200 👻
Minimum transmission prohibition time (ms	c): 200
Data Transfer:	Broadcast     O Unicast
Input Filter(msec): 3	•
Output Module	
Emergency output mode:	Latch v

< Example of basic parameter (GEL-D24C>

# (1) Product name

It displays the product name of the Smart I/O module.

(2) Station No.

It is the setting menu for the station No. of the Smart I/O, and the setting range is from 0 to 63. (3) High-speed link transmission mode

It is an item that is enabled only when the module of input type is selected and can be set to Cyclic and CoS.

Name	Meaning	Remarks
Cyclic	It is used if the data is transmitted periodically.	Default value
CoS	It is used if the data is transmitted only when the input status changes. In case the change of data is slow, the network load can be reduced by applying the CoS method.	

(4) High-speed link transmission cycle It is an item that is enabled only if the high-speed link mode is Cyclic mode means the transmission cycle in the Cyclic mode of the input module. The transmission cycle is as follows.

High-speed link transmission cycle(msec)	Reference
5	
10	
20	
50	
100	
200	Default value
500	
1000	

The transmission cycle of the output module follows the data transmission cycle of the high-speed link.

Communication mo	dule settings		<b>X</b>		
Communication mo	odule settings				
Module type:	XGL-EIMT	-			
Base No.:	• 00				
Slot No.:	<b>00 v</b>				
High-speed link index:	01		•		
Communication pe	riod settings				High-speed link transmission cycle o
				I.	output module
Output data settir	ngs in case of eme		0.7		
CPU error:		🔘 Latch	Olear		
CPU stop:		🔘 Latch	Olear		
Sla	ve Registration	ОК	Cancel		



#### **Chapter 10 RAPIEnet Communication**

(5) Minimum transmission prohibition time

It is a function that is enabled when the high-speed link transmission mode is CoS, and the time means the minimum interval for transmission in the CoS mode

Since if the non-periodical data transmission occurs frequently, it affects the network load of the entire system, the data is transmitted only if the input value is changed to more than the setting time, when the data of input module occurs non-periodically.

#### Remarks

1. Examples of network load calculations according to the minimum transmission prohibition time

If the data of the input module is changed to the unit of 2msec

1) When the minimum transmission prohibition time is set to 2msec

(1) Packets per second(pps)= 1/0.002 = 500pps

(2) 5,000pps(XGL-EIMT allowable packet amount(3,600pps)exceeded) when 10 units are configured with the module of the same condition

2) When the minimum transmission prohibition time is set to 200ms

(1) Packets per second(pps)= 1/0.2 = 5pps

(2) 50pps when 10 units are configured with the module of the same condition

2. If the data change cycle of the input module is less than the minimum transmission cycle (5msec), it is recommended to select Cyclic mode as the high-speed link transmission mode for stable system operations.

# (6) Input filter

This function is enabled only in case of the digital input module, and it supports the input filter function to prevent the processing of invalid values caused by external nose. It means that only when the data is maintained at more than the input filter value, it is processed into valid data, and it is required to set the input filter value in consideration of the use environment.

Setting range of input filter (msec)	Reference
1	
3	Default Value
5	
7	
10	
20	
70	
100	

#### (7) Emergency output module

It is a function that is enabled only in case of the output module type. When the network configuration is disconnected physically during normal communication with master module, the existing output data can be set to

latch mode and clear mode.

Name	Meaning	Reference
Latch	It maintains the existing output module when the communication	
Laton	is physically disconnected with the master module.	
Clear	It initializes the existing output data to 0 when the communication	Default value
Clear	is physically disconnected with the master module.	Delault value

4) Module parameter setting item Module parameter is an item that can be set only in case of the analog I/O module, and setting details for each product are as follows.

(1) GEL-AV8C

Parameter	CH 0	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7
Channel status	Disable							
📃 Input range	1~5V							
Output Data Type	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000
Filter process	Disable							
Filter constant	1	1	1	1	1	1	1	1
Average processing	Disable							
Average processing	Count-Avr							
Average value	2	2	2	2	2	2	2	2
Average value 2 2 2 2 2 2 2 2 2 2								

No.	Class	sification		Specification			
1	Channel Ope	ration	Stop / Run				
2	Input voltage	range	1~5V , 0~5V, 0~10V	′,-10~10V			
		Unsigned value	0~16000				
	Output data type	Signed value	-8000 ~ 8000				
						1~5V	1000 ~ 5000
3			0~5V	0~5000			
		type Precise value	0~ 10V	0~ 10000			
					-10~10V	-10000~10000	
		Percentile value	0~10000				
4	Filtered		Prohibition or Allowance				
5	Filter consta	nt	1~99				
6	Average pro	cessing	Prohibition or Allowa	nce			
7	Average me	thod	Average number /	Average time			
8	Average val	ue	Average number (	2~64,000), Average time (20~16,000)			

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# (2) GEL-AC8C

Parameter	CH 0	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7
Channel status	Disable	Disable						
Input range	4~20mA	4~20mA						
Output Data Type	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000
Filter process	Disable	Disable						
Filter constant	1	1	1	1	1	1	1	1
Average processing	Disable	Disable						
Average processing	Count-Avr	Count-Av						
Average value	2	2	2	2	2	2	2	2

No.	Class	sification		Specification	
1	Channel Ope	ration	Stop / Run		
2	Input voltage	range	4~20mA/0~20mA		
		Unsigned value	0 ~ 16,000		
		Signed value	-8,000 ~ 8,000		
3	Output data	Dra sis s vislus	4~20 mA	4,000 ~ 20,000	
	type	Precise value	0~20 mA	0~20,000	
		Percentile value	0~10,000		
4	Filtered		Prohibition or Allowa	nce	
5	Filter consta	nt	1~99		
6	Average pro	cessing	Prohibition or Allowance		
7	Average me	ethod	Average number /	Average time	
8	Average val	ue	Average number (	2~64,000), Average time (20~16,000)	

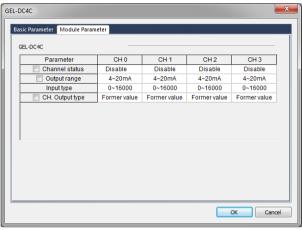
# Chapter 10 RAPIEnet Communication

# (3) GEL-DV4C

EL-DV4C	CH 0	CH 1	CH 2	СН 3
Channel status	Disable	Disable	Disable	Disable
Output range	1~5V	1~5V	1~5V	1~5V
Input type	0~16000	0~16000	0~16000	0~16000
CH. Output type	Former value	Former value	Former value	Former value

No.	Class	sification		Specification		
1	Channel Ope	ration	Stop / Run			
2	Output voltag	e range	1~5V , 0~5V, 0~10V, -10~10V			
		Unsigned value	0~16,000			
	Input data	Signed value	-8,000 ~ 8,000			
		Input data type Precise value	1~5V	1,000 ~ 5,000		
3			0~5V	0~5,000		
	туре		0~10V	0~ 10,000		
			-10~10V	-10,000~10,000		
		Percentile value	0 ~ 10,000			
4	Channel outp	ut status	Previous value/ Min	. value/ Middle value/ Max. value		

# (4) GEL-DC4C



٦

No.	Class	sification		Specification
1	Channel Ope	ration	Stop / Run	
2	Output voltag	e range	4~20mA or 0~20mA	
		Unsigned value	0 ~ 16,000	
	In sector de de de	Signed value	-8,000 ~ 8,000	
3	Input data		4~20 mA	4,000 ~ 20,000
	type	Precise value	0~20 mA	0~20,000
		Percentile	0~10.000	
		value	0 10,000	
4	Channel outp	ut status	Previous value/ Min.	value/ Middle value/ Max. value

#### 10.3.2 High-speed link setting

High-speed link is a method of communication between XGT PLC communication modules, and it is a data transmission service that can send and receive data by high-speed parameter setting and allows users to exchange data by setting the transmitting and receiving data size, transmission and reception cycle, transmission and reception area and storage area in the parameter with the use of XG5000. Smart I/O RAPIEnet can be used by synchronizing the slave parameter set value to the high-speed link block.

The high-speed link functions of RAPIEnet master module are as follows.

- 1) High-speed block setting function
  - (1) If there are multiple transmission and reception areas, the maximum of 128 (64 for XGB) blocks can be set up to 64
  - for transmission and 128 (64 for XGB) for reception.
  - (2) The maximum of 200 words per block can be set.
  - (3) The maximum link point is available up to 19,200 words.
- 2) Transmission and reception cycle setting function

Users can set the transmission and reception cycle ranging from 5msto 1s.

- 3) Transmission and reception area setting function Transmission and reception area for each data block can be set depending on the set I/O address.
- 4) High-speed link information providing function

It provides users with high-speed link information as user keywords, which facilitates construction of reliable communication system.

The communication high-speed link points are as follows, and the basic point is 1 word.

Product	Maximum communication point	Maximum reception point	Maximum block number	Maximum point per block
XGK CPU	12,800	12,800	128(0-63)	200
XGI CPU	12,800	12,800	128(0-63)	200
XGB CPU	12,800	12,800	64(0-63)	200

5) High-speed link parameter settings

High-speed link parameter is selected in the high-speed link screen of XG5000, and the applicable item is set. The setting order and functions for each item are as follows.

In the case of high-speed parameter settings, methods on how to set in the online mode and offline mode are the same.

(1) Addition of high-speed link communication

 a) Select [Add item] →[Add high-speed link communication] menu by clicking on the right mouse button after selecting XGL-EIMT registered as new o the network configuration screen. Or select [Project] →[Add item] →[Add s high-speed link communication] of XG5000 menu to perform the same function.

Project     ■ 1       ● 1     ● 1       ● 1 <t< th=""><th>▼ ₽ ×</th></t<>	▼ ₽ ×				
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🛛 🔟 I/O Parameter a 🎒 Scan Program	×	Paste Delete Properties	Delete	C	High-speed Link Communication User Frame Add a Group
				-	

b) [Communication module setting] window for setting the high-speed link communication is created.

Project View High-speed Link View P2P

Module type:	XGL-EIMT	~	
Base No.:	00 🔻		
Slot No.:	• 00		
High-speed link index:	01		
ommunication pe	eriod settings		
Period type:	200 msec	•	
Period type: Nutput data setti		• nergency	
utput data setti		nergency	Olear
			<ul><li>Olear</li><li>Olear</li></ul>

(2) Communication module settings The details of the master module that performs the high-speed link communication are as follows.

Co	ommunication mo	dule settings		×
	Communication mo	dule settings		
	Module type:	XGL-EIMT	-	
	Base No.:	00 -		
	Slot No.:	• 00		
	High-speed link index:	01		•
	Communication pe	riod settings		
	Period type:	200 msec	•	
	Output data settir	igs in case of eme	ergency	
	CPU error:		🔘 Latch	Olear
	CPU stop:		🔘 Latch	Olear
	_			
	Sla	ve Registration	ОК	Cancel

lte	ems	Contents				
	Module type	Set the installed communication module(RAPIEnet)				
Communication	Base number	Set the base position of the installed module(extension of 7 stages)				
o on an an a data of the		Set the slot location of the installed module(installation of up to 12 units)				
module setting	Slot number	Setting range: 0~11				
		* For XGB, the maximum of 10 slots can be set.				
		- Specify that the data is transmitted every set cycle.				
		- Setting range: 5ms, 10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1s				
Communication cycle setting		(operates 200ms in the case of the basic settings)				
	Cudo turos	- Reception data is updated every scan regardless of the communication cycle.				
	Cycle type	- The same communication cycle is applied with respect to the entire transmission and				
		reception block.				
		- The data that can be transmitted once is four blocks, and it is divided into the unit of four				
		blocks when exceeding four blocks, when the data size of one block doesn't matter.				
		Set the output data in case of CPU error				
Output data	CPU error	-Latch: Latched to the output just before the CPU error				
setting in case of		-Clear: Cleared to '0'				
U U		Set the output data in case of CPU stop				
emergency	CPU stop	-Latch: Latched to the output just before the CPU stop				
		-Clear: Cleared to '0'				
Slavor	egistration	Conduct synchronization of Smart I/O RAPIEnet with the high-speed link block				
Slaven	eyisuauon	- Need to register the slave module through the slave configuration in advance				

(3) High-speed link block settings

Click OK after setting the items required for the high-speed link service in the [Communication Module Settings], the high-speed link is added as shown below. Double click the added [High-speed link], the high-speed link block window is created.

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Build Bandwards       7       1	High-speed Link 01															H 19
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The details on the high-speed link block are as follows.

Index	Mode	Station number	Block number	Module type	Read area	Variable name	Variable name comment	Read area Word size	Save area	Variable name	Variable name comment	Save area Word size	Diagnostic information device
0													
1													
Index Mode 0 1 1 2 3 4 5 6 Mode													
-													
6									l				[
		lte	ems					Cor	ntents			F	Reference
		In	dex			Number o	of high-spe	ed link blo	ocks tha	t can be s	set(0~127)		
			Tra	ansmissio	n	Transmit d	lata						Mode
			F	Reception		Receive da	ata						
1	iviode		Tran	smission	and								
			r	eception		I ransmit/re	eceive data						
		F	RAPIEnet		Station nu	mber of data	a to be rece	eived: Se	tting range	(0~63)	ę	Station No	
		on No. RAPIEnet Smart I/O				Station No. of Smart I/O							

Remarks

If you proceed with the slave synchronization, Smart I/O is automatically set, except for the Read area/Save area.

Classifi	cation	Description	Reference
Block num	ber <sup>*Notice1)</sup>	Setting transmission block/ reception block 1. Transmission block: Max 64block(Range: 0 ~ 63) 2. Reception block : Max 128block(Range: 0 ~ 63) * Transmission block, Reception block of XGB can be set up to 64 blocks	
	RAPIEnet	RAPIEnet	Master module
Module type	LS INVERTER	LS Inverter	When using inverter
	Smart I/O	Product name	
Read	area	Specifying the address of the device that is used when the transmitting area - XGK: P,M,L,K,D,T,C,U,N,R,ZR - XGI: M,I,Q,R,W	
Varia	ble	Indicates variable name of device when the device which is set for save area and read area has variable name.	
Variable de	escription	Indicates variable description	
Word size o	f read area	Setting data size for transmission Data unit: Word Data range: 1~200	
Save area		Specifying the address of the device that is used when the receiving area - XGK: P,M,L,K,D,T,C,U,N,R,ZR - XGI: M,I,Q,R,W	
Word size of save area		Setting data size for reception Data unit: Word Data range: 1~200	
Diagnostic i save are		Diagnostic information save area of Smart I/O module	

#### Remarks

Notice1) Precautions when entering the block number

- 1. In case of entering the block number in transmission mode, if the block number is duplicated with that of Smart I/O, normal communication cannot be made. (Error occurs in writing the high-speed parameter) 2. Duplicate settings on the same block are prohibited in creating the transmission block.
- Duplicate settings on the same station number are prohibited in creating the reception block, but duplicate settings are possible for the block number on the other station number.
   Notice 2) Diagnostic information save area is displayed only when the diagnostic information use is selected in the slave configuration, and one word per slave module is automatically allocated.

1) Slave registration

Slave registration is a service to register the Smart I/O module set in the slave configuration window in the high-speed link block or set if the change of the subject for application is needed due to a change in network system among the Smart I/O modules registered in the high-speed link block.

The data communication through the high-speed link is possible only in case the Smart I/O is registered in the high-speed link block.

The registration of slave to be applied to the high-speed link block can be set by means of the method on how to register the slave of [Communication module setting] menu and the method on how to apply [Slave registration] in the high-speed link block.

(1) Slave registration in communication module setting menu

a) Click [Communication module setting] →[Slave registration], and [RAPIEnet slave configuration apply] window is created.

b) Select the slave to be applied and then click Apply.\*Notice1)

Communication mo	dule settings	Apply RAPIEnet slave configuration	x
Communication mo Module type:	XGL-EIMT *	Station Addr : 10, GEL-DT4C/C1	
Base No.: Slot No.:	00 ~		
High-speed link index:	01 👻		
	riod settings 200 msec  rios in case of emergency		
CPU error: CPU stop:	<ul> <li>○ Latch <ul> <li>● Clear</li> <li>○ Latch <ul> <li>● Clear</li> </ul> </li> </ul></li></ul>		
(Sia	ve Registration OK Cancel	Select All Apply Cancel	

#### Remarks

Notice 1) Select the slave to be used by clicking the slave registration and then click Apply even when the change of the slave list within the high-speed link block is needed due to a change in the network system.

c) Click [OK] of [Communication module setting] menu.d) Check if the selected Smart I/O is displayed in the high-speed link block window when double clicking [Highspeed link 01].

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(2) Slave registration within high-speed link block

- a) Double click [High-speed link 01] of [Project] window.
- b) Select any block of the high-speed link block, click the right mouse and then select [Slave registration].
  c) Select the slave to be applied and then click Apply.<sup>\*Notice2)</sup>

😋 Test - XG5000							Apply RAPIEnet slave configuration	x
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(Ja) High-speed Link 01	0		Import	variable	name			
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- 🍪 System Variable	3		Redo			Ctrl+Y		
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Variable/Comment	5		Cut			Ctrl+X		
Basic Parameter	6		Сору			Ctrl+C		
1/O Parameter	7		Paste			Ctrl+V		
Scan Program	8		Delete			Delete		
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# Remarks

Notice 2) Select the slave to be used by clicking the slave registration and then click Apply even when the change of the slave list within the high-speed link block is needed due to a change in the network system.

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Wetwork Configuration     Jon Unspecified Network	Index	Mode	number n	umber	Module type	Read area	Variable name	comment	Word size	Save area	Variable name	comment	Word size	information device	1
<ul> <li>MewPLC [B050 XGL-EIMT]</li> </ul>	0 (	Send/Re ceive	10	10 GEL-0	746/01				1.00				1	M0000	
High-speed Link 01		Receive	20	20 GEL-4	cac )								8	M0001	
WW Slave Configuration	2														
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-2 Variable/Comment	5														
4 B Parameter	6														
- A Basic Parameter	7														
I/O Parameter     Scan Program	8														
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# d) Check if the selected Smart I/O is displayed in the high-speed link block window.

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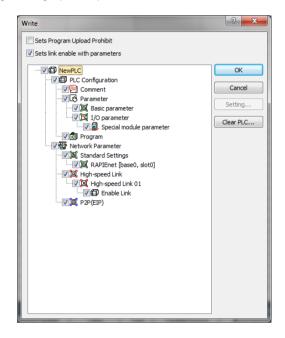
#### 10.3.3 Writing Parameters and Link Enable

In order to use Smart I/O RAPIEnet, the high-speed link should be enabled after writing the high-speed link parameters and slave set above for normal communication. The procedures for writing parameters and link enable are as follows.

1) Click [Online]  $\rightarrow$  [Connect] of XG5000 menu and connect to the PLC.

2) Click [Online]  $\rightarrow$  [Write].

3) Check the items in [Write] menu and click [OK], when if [Set Link Enable together] is checked, Link Enable is also executed after writing the set high-speed link parameters.



#### Remarks

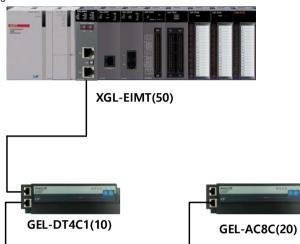
In writing parameters, the slave parameter of the Smart I/O module is stored in RAPIEnet master module, and the high-speed link parameter in CPU, respectively. Therefore, if [Basic setting]— [RAPIEnet] of [Network parameter] is checked and downloaded after changing the parameter

in case a change in the slave parameter occurs, the changed parameter is applied.

# 10.4 Smart I/O Communication Setting Example

### 10.4.1 Communication Setting Example

- 1) System Configuration (1) System Configuration



2) Module Information Classification	Name	Description	Reference
Classification	Name	•	Reference
		1. Read area: M100	
CPU	XGK-CPUH	2. Save area: M200	-
		3. Diagnostic area: M300	
RAPIEnet Master	XGL-EIMT	1. High-speed link information: 01	Master Station address 50
		2. High-speed link cycle: 200msec	Master Station address 50
Creart I/O	GEL-DT4C1	1. Station address: 10	-
Smart I/O	GEL-AC8C	1. Station address: 20	-
		1. Heartbeat cycle: 1000msec	
		2. Diagnostic area: Use	
		3. High-speed link	
		transmission mode: Cyclic	1.Input filter: Only for GEL-DT4C1
	Basic parameter	4. High-speed link	2. Emergency output mode: Only for
Demonster		transmission cycle: 200msec	GEL-DT4C1
Parameter		5. Data transmission: Unicast	
		6. Input filter: 3msec	
		7. Emergency Output Mode: Clear	
		1. Input range: 4~20mA	
	Module parameter	2. Output data type: 0~16,000	Common for all channels
		3. Average processing: Prohibition	

### 2) Project creation

- (1) Project creation
  - a) Run XG5000 and select [Project]→[New project]. Select the CPU series and type by referring to the module information of the system configuration.

New Project			? ×
Project name:	Test		ОК
File directory:	C:\WXG5000\WTest		Cancel
CPU Series	ХСК	Product Name	
CPU type:	XGK-CPUH	Auto-allocation	
Program name:	NewProgram		
Program langua		0.7	
() LD	○ SFC	) ST	
Project description	1:		

b) Click OK after entering the basic information necessary to create the project.

#### 3) Smart I/O parameter settings

Methods on how to set Smart I/O parameters are divided into a setting method in online mode in which XG5000 is connected to CPU and an off-line setting method.

### (1) Setting in the online mode

a) Slave configuration window creation

(a)Connect to PLC via [Online]  $\rightarrow$  [Connect] of XG5000 menu.

(b)Change to [Online] $\rightarrow$ [Mode] $\rightarrow$ [Stop] for I/O parameter synchronization.

(c)Select [Online]→[Diagnosis]→[I/O information], and I/O information window is shown below.

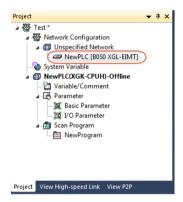
Click I/O synchronization and proceed with the synchronization of the module installed between CPU and base.

Base 00	Slot	м	odule
Base 01	0	XGL-EIMT	
Base 02	1		
Base 03	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		

(d) Click I/O synchronization, and the message that indicates I/O parameters are overwritten to the PLC is generated. Click [OK].



(e) Check if XGL-EIMT module is registered in the project window [Network Configuration][Basic Network].



(f) Select [Add item]  $\rightarrow$  [Add slave] menu by clicking on the right mouse button after selecting XGL-EIMT registered as new on the network configuration screen. Or, select [Project]  $\rightarrow$  [Add item]  $\rightarrow$  [Add slave] of XG5000 menu to perform the same function.

System Variable	Open		
NewPLC(XGK-CPL Variable/Comn Cmg Basic Parameter Cg I/O Parame Cg I/O Parame Cg NewProgra	Paste Delete	Ctrl+C Ctrl+V Delete	Network Communication Module P2P Communication High-speed Link Communication User Frame Add a Group
	Communication module	setting 🔸	Add Slave

(5) =		0							
🍕 Test - XG5000									
Project Edit Find/Replac	e View Online	Monitor D	ebug Tools	Window Help					
: D 😅 🖧 🖬 🚳 🖄	8 3 🔳 🚳	pina	X mm >	< 1-6 BX .2. 92	MA # # # #	10 + >			
							lin i On	5 9 00 9	4 e @ @
Esc F3 F4 sF1 sF2 F5 F6	sF8 sF9 F9 F11 s	F3 sF4 sF5 sF6						1 a a   N >	
Project		• # X	NewProgram	× Slave Confi	guration - B00500 ×				
A A Network Configura	tion	Â.							
J Duspecified Ne			A	iuto scan	Using the diagnosti	ic area		Master	module number 1 6
A CON NewPLC IB			Batch applic	ation of parameters	Using Heartbeat	1000	(200~	65535msec) Master	module number 2 6
Slave Co	onfiguration	E							
System Variable	IH).Offline								
Variable/Comn									
A 🛃 Parameter									
- 🔟 Basic Param									
- 🔯 I/O Parame		-							
Project View High-speed Lin	k View P2P								
Function/FB		₩ 4 ×							
Most Recently Used		Edit			Slave Conf	iguration v	window		
Function Name									
		Mo	nitor 1		-	후 × Check F	Program		<b>→</b> 9 ×
			PLC	Program	Device/Variable	00	12.2002		
		1				121123			
		1							
		Mo	nitor 1 Monif	tor 2 Monitor 3 N	lonitor 4	Result	Chec Find 1	Find 2 Com C	ros Used Dupl
NewPLC   (	Offline		1 step	Row 3, C	ol 0 Overwrite	e I 🔝 🕷	1 H H	100%	

(g) Check if the slave configuration window is created.

# c) Slave module parameter settings

(a) Set the basic parameters required for the slave configuration.

Auto scan Batch application of parameters	Using the diagnostic area		Aaster module number 1     62       Aaster module number 2     63
(b) Click [Auto scan].			×
Base No.: 0 Slot No.: 0	Link Type: RAPIEnet Total No. of Stations: Topology: Ring Station No. Collision:	3 None	Slave Diagnosis Measure cable distance
Local 53	GEL-DT4C/C1: 10 GEL-AC8C : 20		

(c) Click [Add slave] to select the entire module. Click [OK].

Sele ct	Stati on Num ber		Master Station(1)	Master Station(2)
V	10	GEL-DT4C/C1	-	-
<b>V</b>	20	GEL-AC8C		-

- Protein Lass
   <td
- (d) Check if the module name of the Smart I/O module added to the slave configuration window and station number are displayed.

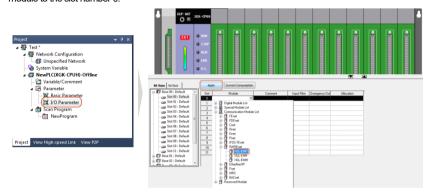
(e) Double click the G	EL-DT4C1 in the slave configura	tion window to er	nter the param	eters defined above.
	GEL-DT4C/C1		×	
	Basic Parameter			
	Product Name: GEL-DT4C/C1 Station: 10 •			
	Input Module High-speed link transfer mode: High-speed link frequency(msec): Minimum transmission prohibition time (msec): Data Transfer:	Cyclic 200 © Broadcast © U	▼ ▼ Unicast	
	Input Filter (msec): 3 Output Module Emergency output mode:	▼ Latch	•	
		ОК	Cancel	

(f) Enter the parameters on the GEL-AV8C in the same way.

Γ

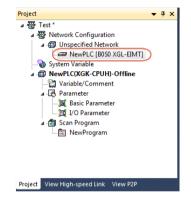
(2) Setting in the offline mode

 a) Slave configuration window creation
 (a) Double click the I/O parameter of the project window and then select XGL-EIMT as the application module to the slot number 0.



(b) Click the application, and the message that indicates the module set in I/O parameter is registered is generated. Click [Yes].

XG5000	×
?	Automatically register variable comments according to the module set in the I/O parameter. The previous comments will be deleted. Continue?
	Yes No



(c) Check if XGL-EIMT module is registered in the project window [Network Configuration][Basic Network].

(d) Select [Add item] →[Add slave] menu by clicking on the right mouse button after selecting XGL-EIMT registered as new on the network configuration screen. Or, select [Project] →[Add item] →[Add slave] of XG5000 menu to perform the same function.

<ul> <li>Wetwork Configurati</li> <li>Unspecified Network</li> </ul>	vork		
System Variable	Open		
MewPLC(XGK-CPL	Add Item	,	Network
Variable/Comn	🗎 Сору	Ctrl+C	Communication Module
	Paste	Ctrl+V	P2P Communication
	< Delete	Delete	High-speed Link Communication
Scan Program     NewProgra	Properties		User Frame Add a Group
	Communication	module setting 🔸 🌈	Add Slave

(e) Check if the slave configu	ration window is created.	
🍕 Test - XG5000		×
Project         Edit         Find/Replace         View         Online         Monito           □	2.⊂ X № ® X «8 № % <b># # %</b> % & 4 € ● G: = = = ⊕© = © = ⊡ = © = : 0 ° 0 ° 0 ° 0 ° 0 <mark>0 ° 0 </mark>	
NewPLCXGK-CPUH-Offline     Veriable/Comment     Evic Parameter     Disci Parameter     Use High-speed Link View P2P Function/FB		
	Monitor 1 🗸 🗘 X Check Program 👻	₽ ×
	PLC Program Device/Variable	
	4	
NewPIC Offline	Monitor 1 Monitor 2 Monitor 3 Monitor 4 Result Chec., Find 1 Find 2 Com., Cros., Used., D	upl

٦

# b) Slave module parameter settings

(a) Set the basic parameters required for the slave configuration.

Auto scan 🔲 Using the diagnostic area		Master module number 1	62
Batch application of parameters 🛛 🕅 Using Heartbeat	1000	(200~65535msec) Master module number 2	63

Nort State A 2 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	표종(11) 21 12 12 12 12 12 12 12 12 12 12 12 12	System cetalog)	* * *
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Signal Standard Stan	Basic Haustrom       Productive       Basic Haustrom       Basic Haustr	DOM: 30 (	
	ander and Angel Departments View Teel Young Force Courses		

(b) Double click [GEL-DT4C1] after selecting the [System catalog] or click [OK] after entering the parameter values defined by selecting through drag-in to the [Slave configuration window].

(c) Enter the parameters on the GEL-AV8C in the same way.

(d) Check if the module name of the Smart I/O module added to the slave configuration window and station number are displayed.

🔩 Test - XG5000	a los des des De Autor	- • ×
Project Edit Find/Replace View Online Monitor De	bug Tools Window Help	
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Esc F3 F4 sF1 sF2 F5 F6 sF8 sF9 F9 F11 sF3 sF4 sF5 sF6 F	11 닭 날 것 빵 빵 : 白 🛍 🖬 🖼 🖬 🏛 🕮 🖬 🖿 🖬 🖿 🖬 🖿 🖬 🖬 🖉 🖬 🖿 🖉 🖬 🖬 👘 🖉	
Project 👻 🕂 🛪	NewProgram 🗴 Slave Configuration - B00500 🗙	<u>र</u> छ
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Gystem Variable     Gomment     Government     Government	Elation number 10 CELOTACCI OEL-ACRC	EQS information
	Montor1 → 9 X Check Program	<del>~</del> # ×
	1	D. Duplica
NewPLC	Offline     1 step   Row 2, Col 9   Overwrite   🎽 📕 📑 🗰 🔍 🔄 100% 🔵 —	

4) High-speed link parameter settings

In the case of high-speed parameter settings, methods on how to set in the online mode and offline mode are the same.

(1) Addition of high-speed link communication

a) Select [Add item] →[Add high-speed link communication] menu by clicking the right mouse button after selecting XGL-EIMT registered as new on the network configuration screen. Or select [Project]  $\rightarrow$ [Add item]  $\rightarrow$ [Add s high-speed link communication] of XG5000 menu to perform the same function.

[Add s	s nign-speed	I III IK COMM	iunicationj c	N XG2000	menu to	penorm me	same	uncuc

	GL-I	IMT] Open			
MewPLC(XGK-CPUH)- Wariable/Comment		Add Item	•		Network
a 🚯 Parameter		Сору	Ctrl+C		Communication Module
Basic Parameter	ß	Paste	CtrI+V	-	P2P Communication
	$\boldsymbol{x}$	Delete	Delete	C	High-speed Link Communication
NewProgram	٢	Properties			User Frame Add a Group
		Communication modu	e setting 🕨		Add Slave

b) Enter the high-speed link information of the master module to perform the high-speed link communication, when if the slave to be applied to the high-speed link block is conducted in the [Communication module setting] window, click the [Slave registration].

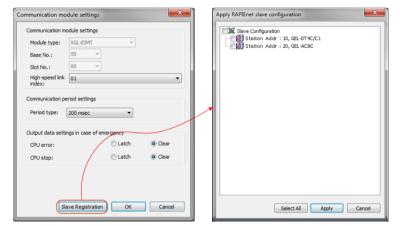
Communication mod	dule settings		×
Communication mo	dule settings		
Module type:	XGL-EIMT	-	
Base No.:	00 -		
Slot No.:	00 -		
High-speed link	01		•
Output data settir	ıgs in case of eme	rgency	Clear
CPU stop:		C Latch	Clear
Sla	ve Registration	ОК	Cancel

**메모 포함[t2]:** 스펠링 누락

#### (2) Run slave synchronization

The registration of slave to be applied to the high-speed link block can be set by means of the method on how to use the slave registration of [Communication module setting] menu and the method on how to apply [Slave registration] in the high-speed link block.

- a) Slave registration in communication module setting menu
  - (a) Click [Communication module setting] →[Slave registration], and [RAPIEnet slave configuration window apply ]window is created
  - (b) Click Apply after clicking Select All.



(c) Click [OK] of [Communication module setting] menu.

(d) ) Check if the selected Smart I/O is displayed in the high-speed link block window when double clicking [High-speed link 01].

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Network Configuration     Unspecified Network	Index	_	number	number	Module type	nead area	variacie name	comment	Word size	Save area	vanable name	comment	Word size	information device	
NewPLC (B0S0 XGL-EIMT)	0 (	Send/Re ceive	10		GEL-DT4C/C1				1				1	M0000	
High-speed Link 01	2	Receive	20	20	GEL-ACRC								8	M0001	
System Variable	2														1U 🛛
MewPLC(XGK-CPUH)-Offline	4														
Variable/Comment	5														
Basic Parameter	6														
	7														
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	10														
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	12														
	14														
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					NewPLC	Offline					nwrite i 🔛 💌	N N N 3	100% 🕚		-•

b) Slave registration within high-speed link block

- (a) Double click the [High-speed link 01] of [Project] window.
- (b) Select any block of the high-speed link blocks, click the right mouse button and select [Synchronize slave configuration].
- (c) Click Apply after clicking Select All.

🍕 Test - XG5000						-	Apply RAPIEnet slave configuration
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		1 3/1 321	W : 0				
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Unspecified Network     Second C [B050 XGI -FI/4T]     [-]     [/] High-speed Link 01	0		Impo	t variable	name		
Hit Slave Configuration	2		Undo			Ctrl+Z	
System Variable  MewPLC(XGK-CPUH)-Offline	3		Redo			Ctrl+Y	
a Variable/Comment	4		Cut			Ctrl+X	
Parameter     Basic Parameter	6		Сору			Ctrl+C	
10 Parameter	7		Paste		1	Ctrl+V	
Scan Program	8		Delet			Delete	
NewProgram	9		View	tree by Tra	nsmission/Reception		
	10	1	Slave	Registratio	n		
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Image: March 1000000000000000000000000000000000000			Index	Mode	number number	Module type	Read area	Variable name		Word size	Save area	Variable name		Word size	
Image: Provide Line         No         No <td></td> <td></td> <td>0 (</td> <td>Send/Re</td> <td>10 10</td> <td>GEL-DT4C/C1</td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td>1</td> <td>M0000</td>			0 (	Send/Re	10 10	GEL-DT4C/C1				1				1	M0000
• Monthald: Connect         • Monthald: Connec	High-speed Link 01				20 20	GELACE								8	M0001
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27         23         24															
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#### (d) Check if the selected Smart I/O is displayed in the high-speed link block window.

#### Remarks

1. Add and Remove Slave can be set only by the slave registration.

2. If the module station number registered in the slave configuration window does not match the station number registered in the high-speed link bock due to a change in the slave configuration, the module type of the high-speed link is displayed as the module type mismatch. Please check the module information registered in the slave configuration window in this case.

메모 포함[t3]: 슬레이브

#### 5) PLC device area settings

Enter the Read area and Save area of each Smart I/O module by referring to the module information contents of the system configuration (Read area: M100, Save area: M200).

(1) GEL-DT4C1: Read area (M100), Save area (M200)

(2) GEL-AC8C: Save area (M201)

In the above device areas, the data of M100 is transferred to the output data of GEL-DT4C1 in the case of Read area, and the input data is received in Save area. For GEL-AC8C, the data of one word per channel is received based on the M201.

If the data of the high-speed link is entered correctly, the color of the text is changed to black as shown below

New	Program X	Slave C	onfigurat	ion - 800201	NewPi NewPi	LC - HS LINK 01	×						
Index	Mode	Station number	Block number	Module type	Read area	Variable name	Variable name comment	Read area Word size	Save area	Variable name	Variable name comment	Save area Word size	Diagnostic information device
0	Send/Receive	10	10	GEL-DT4C/C1	M0100			1	M0200			1	M0300
1	Receive	20	20	GEL-AC8C					M0201			8	M0301
2													

#### 6) Writing parameters and Link Enable

(1) Click [Online]  $\rightarrow$  [Connect] of XG5000 menu and connect to the PLC.

(2) Click [Online]  $\rightarrow$  [Write].

(3) Check the items in [Write] menu and click [OK], when if [Set Link Enable together] is checked, Link Enable is also executed after writing the set high-speed link parameters.



(4) Check if normal communication is made by utilizing a diagnostic service function.

# 10.5 Analog input/output module

# 10.5.1 Performance specification

# 1) Analog input block typee

Classif	ication	GEL-AV8C	GEL-AC8C					
Input channel I	No.	8 Channels						
Analog Input ty	/pe	Voltage	Current					
Analog Input ra	ange	DC 1 ~ 5V     DC 0 ~ 5V       DC 0 ~ 5V     DC 4 ~ 20 mA       DC 0 ~ 10V     DC 0 ~ 20 mA       (Input resistance: more than 1 MΩ)     (Input resistance: 250Ω)						
		parameter,						
Digital Output		16bits binary value(Data 14bits)						
	Unsigned value	0~16,000						
	Signed value	-8,000 ~ 8,000						
Digital output range	Precise value	1,000 ~ 5,000 (DC 1 ~ 5V) 0 ~ 5,000 (DC 0 ~ 5V) 0 ~ 10,000 (DC 0 ~ 10V) -10,000 ~ 10,000 (DC -10 ~ 10V)	4,000 ~ 20,000 (DC 4 ~ 20 mÅ) 0 ~ 20,000 (DC 0 ~ 20 mÅ)					
	Percentile value	0~10,000						
Max. resolution	า	1/16,000						
Precision		0.3% (Full Scale, Ta= 0 ~ 55°C)						
Max conversio		10ms/8 channels						
Additional func	tions	Filter processing(1~99), Count average(2~64,000times), Time average(20~16,000ms)						
Insulation meth	nod	Photo-coupler insulation between output terminal and PLC power (non-insulation between channels)						
Output termina	al	38 Points terminal block						
Supply	Voltage	DC 24V $\pm$ 10%(Ripple voltage less than 4	-Vp-p)					
power	Current	Less than 322mA	Less than 341mA					
Terminal	GEL-AV8C	2000         2001         0 </td						
block configuration	GEL-AC8C	$\begin{array}{c c c c c c c c c c c c c c c c c c c $						

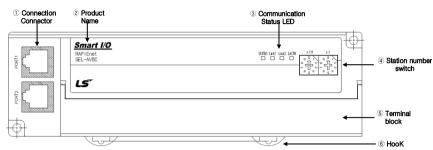
# 2) Analog output block type

Classi	fication	Specif	fication					
Product Name	;	GEL-DV4C	GEL-DC4C					
No. of output of	channel	4 Channels						
Analog output	type	Voltage	Current					
Analog output	range	DC 1 ~ 5V         DC 0 ~ 5V         DC 4 ~ 20 mA           DC 0 ~ 10V         DC 0 ~ 20 mA         (Load resistance: less than 600Ω)           (Load resistance: more than 1 kΩ)         (Load resistance: less than 600Ω)						
		Output range can be set per channel	by user program or after setting I/O					
		parameter,						
Digital input ty		16 bits binary value(data 14 bits)						
	Unsigned value	0 ~ 16,000						
	Signed value	-8,000 ~ 8,000						
Digital input range	Precise value	1,000 ~ 5,000 (DC 1 ~ 5V) 0 ~ 5,000 (DC 0 ~ 5V) 0 ~ 10,000 (DC 0 ~ 10V) -10,000 ~ 10,000 (DC -10 ~ 10V)	4,000 ~ 20,000 (DC 4 ~ 20 mA) 0 ~ 20,000 (DC 0 ~ 20 mA)					
	Percentile value	0 ~ 10,000						
Max. resolutio	n	1/16,000						
Precision		0.3% (Full Scale, Ta= 0 ~ 55°C)						
Max. conversi	on speed	10ms/4 channels						
Additional fund	ctions	Setting functions of channel output status (Previous, Min, Middle, Max)						
Insulation met	hod	Photo coupler insulation between I/O terminal and PLC power.						
		(No insulation between channels)						
Output termina	al	38 points terminal block						
Supply	Voltage	DC 24V $\pm$ 10% (Ripple voltage less th	an 4Vp-p)					
power	Current	Less than 315mA	Less than 481mA					
Terminal	GEL-DV4C							
Configuratio n	GEL-DC4C		i         i					

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# 10.5.2 Names of Each Part





### Describes the Name and Purpose of each Smart I/O RAPIEnet

No.	Name	Purpose				
1	Connection connector	Connect Master/remote module for communication				
1		-RJ-45 Connector 2ports				
		GEL-D24C : DC input 32 points				
		GEL-TR4C1 : TR output 32 points				
2	Smart I/O type name	GEL- RY2C : Relay output 16 points				
2	indication	GEL-DT4C1 : DC input 16points/TR output 16points				
		GEL-AC8C/AV8C : 8 channel analog current/voltage input				
		GEL-DC4C/DV4C : 4channel analog current/voltage output				
3	Communication status indication LED	Communication status (See LED operating characteristics)				
		1. Switch for setting own node station No. from 0 to 63				
	Quitab for patting station	2. When station number is set by 90 or above, this module will operate as a special purpose.				
4	Switch for setting station	1) 90, 91: O/S download mode "Nde1)				
	namber	2) 92~94: Self-Test mode				
		3)96~99: Communication status LED check mode				
5	Terminal block	Terminal block array for I/O wiring * refer to the Ch.3.3				
6	HOOK for DIN rail	HOOK for DIN rail				
7	I/O LED	Indicates the points status of I/O terminal block				

Note1) In case of O/S download mode, the user is prohibited any setting..

The colors and roles of each LED are as follows.

STATUS PORT1 PORT2 LATCH

Classificat ion	Color			Operation Status	Reference
		On	Normal	Normal status	
	Green	Flicker	Normal	Self-diagnosis normal service	Station number Switch: 92
			Error	Heartbeat Error occurred, Network disconnected	
STATUS		On	Error	Self-diagnosis service error	Station number Switch: 92
	Red		Normal	Boot mode operation	
		Flicker	Error	Duplicated station address	See Remark
			Error	Parameter setting error, Initialization error, Frame error	
	C	On	Normal	Network link is successfully configured through port 1	
PORT1	Green	Off	Stand-by	Network disconnected	
	Red	Flicker	Normal	Communication on Port1	
	Green	On	Normal	Network link is successfully configured through port 2	
PORT2	Green	Off	Stand-by	Network disconnected	
	Red	Flicker	Normal	Communication on Port2	
LATCH <sup>*Note2)</sup>	Green	On	Latch	When emergency *Note1) Hold output state	
	Green	Off	Clear	When emergency Clear output data	

\*Note1) When emergency status: The data of Master module is not received within given time due to network problems. \*Note2) LATCH: Latch functions are shown only for output module (GEL-TR4C1/DT4C1/RY2C).

onfiguration. STATUS LE Data Output	:D: Red Fli	f Smart I/O RAPIEnet module ker	s tums on at the same t	ime in duplicated network		
Classific	cation	Data stat	us	Reference		
Input m	odule	No data trans	mission			
Output n	nodule	No data ou	ıtput			
	eartbeat of	f added Smart I/O is duplicate master module is set (Normal	0			
Classific		STATUS LED(Red)	R	eference		
	Green	Off		-		
STATUS	Red	On When duplicated station address is internally On monitored, LED status is changed from fliker ON.				
(2) Input/ C	utput Data					
Classific	cation	Data stat	us	Reference		
Input m	odule	No data trans	mission			
Output n	nodule	Emergency output	data output	Clear default value		
) When the l (1) STATU (2) Data O	S LED: Re	of master module is set (Newly d Fliker	added module in a net	work)		
(1) STATU	S LED: Re utput:			work) Reference		
(1) STATU: (2) Data O	S LED: Re utput: cation	d Fliker	us	,		
(1) STATUS (2) Data O Classific	S LED: Re utput: cation odule	d Fliker Data stal	us mission	,		
(1) STATU: (2) Data O Classific Input m Output n When the h 1) STATUS I	S LED: Re utput: cation odule nodule eartbeat of LED: Red F	d Fliker Data stal No data trans No data ou master module is not set (Nor	us mission ıtput	Reference		
(1) STATU: (2) Data O Classific Input m Output n When the h I) STATUS I	S LED: Re utput: cation odule nodule eartbeat of LED: Red fout:	d Fliker Data stal No data trans No data ou master module is not set (Nor	us mission ttput mally operated module;	Reference		
(1) STATU: (2) Data O Classific Input m Output n Output n When the h I) STATUS I 2) Data Outp	S LED: Re utput: cation odule nodule eartbeat of LED: Red F out: cation	d Fliker Data stal No data trans No data ou master module is not set (Nor Fliker	us mission itput mally operated module; us	Reference		
(1) STATU: (2) Data O Classific Input m Output n Output n I) STATUS I 2) Data Outp Classific	S LED: Re utput: cation odule nodule eartbeat of LED: Red Fout: cation odule	d Fliker Data stal No data trans No data ou master module is not set (Nor Fliker Data stal	us mission utput mally operated module; us mission	Reference		
(1) STATU: (2) Data O Classific Input m Output n Uhen the h 1) STATUS I 2) Data Outp Classific Input m Output n	S LED: Re utput: cation odule nodule eartbeat of LED: Red f odule nodule heartbeat of S LED: Re	d Fliker Data stat No data trans No data ou master module is not set (Nor Fliker Data stat No data trans Maintain previous of master module is set (Newly	us mission ttput mally operated module; us mission output value	Reference		
(1) STATU: (2) Data O Classific Input m Output n 1) STATUS I 2) Data Outp Classific Input m Output n Output n ) When the I (1) STATUS	S LED: Re utput: aation odule eartbeat of LED: Red f odule aation odule heartbeat of S LED: Re utput:	d Fliker Data stat No data trans No data ou master module is not set (Nor Fliker Data stat No data trans Maintain previous of master module is set (Newly	us mission ttput mally operated module; us mission output value added module in a net	Reference		
(1) STATU: (2) Data O Classific Input m Output n 1) STATUS I 2) Data Outp Classific Input m Output n Output n ) When the I (1) STATU: (2) Data O	S LED: Re utput: cation odule nodule eartbeat of ED: Red f nut: cation odule nodule nodule nodule nodule cat beat of ED: Red f cation odule nodule nodule nodule cat beat of ED: Red f cation cation nodule	d Fliker Data stat No data trans No data ou master module is not set (Nor Fliker Data stat No data trans Maintain previous of master module is set (Newly d Fliker	us mission ttput mally operated module; us mission output value added module in a net	Reference Reference work)		

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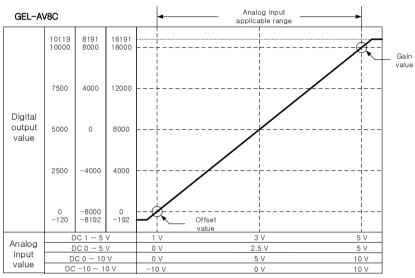
#### 10.5.3 Characteristic of I/O conversion

Each channel of voltage/current I/O range can be set by using module parameter. I/O conversion characteristics of A/D conversion modules are as described below.

- Unsigned Value
- Signed Value
- Precise Value

- Percentile Value

1) Input characteristic



(1)	DC	1~5V	Input	range
-----	----	------	-------	-------

Digital			Ana	log input valu	e (V)		
output range	0.952	1	2	3	4	5	5.047
Unsigned value (-192 ~ 16191)	-192	0	4000	8000	12000	16000	16191
Signed value (-8192 ~ 8191)	-8192	-8000	-4000	0	4000	8000	8191
Precise value (952 ~ 5047)	952	1000	2000	3000	4000	5000	5047
Percentile value (-120 ~ 10119)	-120	0	2500	5000	7500	10000	10119

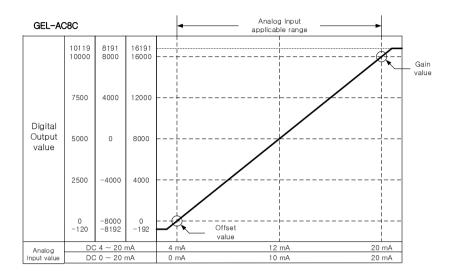
Digital			Analo	g intput volta	ge (V)		
output range	-0.06	0	1.25	2.5	3.75	5	5.059
Unsigned value (-192 ~ 16191)	-192	0	4000	8000	12000	16000	16191
Signed value (-8192 ~ 8191)	-8192	-8000	-4000	0	4000	8000	8191
Precise value (-60 ~ 5059)	-60	0	1250	2500	3750	5000	5059
Percentile value (-120 ~ 10119)	-120	0	2500	5000	7500	10000	10119

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(3) DC 0 ~ 10V Inp	(3) DC 0 ~ 10V Input range									
Digital			Analo	og intput volta	ige (V)					
output range	-0.12	0	2.5	5	7.5	10	10.119			
Unsigned value (-192 ~ 16191)	-192	0	4000	8000	12000	16000	16191			
Signed value (-8192 ~ 8191)	-8192	-8000	-4000	0	4000	8000	8191			
Precise value (-120 ~ 10119)	-120	0	2500	5000	7500	10000	10119			
Percentile value (-120 ~ 10119)	-120	0	2500	5000	7500	10000	10119			

(4) DC -10 ~ 10V I	(4) DC -10 ~ 10V Input range									
Digital			Analo	og intput volta	ige (V)					
output range	-10.24	-10	-5	0	5	10	10.239			
Unsigned value (-192 ~ 16191)	-192	0	4000	8000	12000	16000	16191			
Signed value (-8192 ~ 8191)	-8192	-8000	-4000	0	4000	8000	8191			
Precise value (-10240 ~ 10239)	-10240	-10000	-5000	0	5000	10000	10239			
Percentile value (-120 ~ 10119)	-120	0	2500	5000	7500	10000	10119			





### (1) DC 4 ~ 20mA Input range

Digital		Analog input current (mA)							
Output range	3.808	4	8	12	16	20	20.191		
Unsigned value (-192 ~ 16191)	-192	0	4000	8000	12000	16000	16191		
Signed value (-8192 ~ 8191)	-8192	-8000	-4000	0	4000	8000	8191		
Precise value (3808 ~ 20191)	3808	4000	8000	12000	16000	20000	20191		
Percentile value (-120 ~ 10119)	-120	0	2500	5000	7500	10000	10119		

(2	) D	C 0 ^	~ 20mA	Input	value
----	-----	-------	--------	-------	-------

Digital			Analo	g input curre	ent (mA)							
Output range	-0.24	0	5	10	15	20	20.239					
Unsigned value (-192 ~ 16191)	-192	0	4000	8000	12000	16000	16191					
Signed value (-8192 ~ 8191)	-8192	-8000	-4000	0	4000	8000	8191					
Precise value (-240 ~ 20239)	-240	0	5000	10000	15000	20000	20239					
Percentile value (-120 ~ 10119)	-120	0	2500	5000	7500	10000	10119					

# 2) Output characteristic

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	5.048	5.06	10.12	10.24				Gain value -		
	5V	5V	10V	10V					>	
	4V	3.75V	7.5V	5V						
Analog output	3V	2.5V	5V	ov						Analog
value		2.51								applicable range
	2V	1.25V	2.5V	-5V					         	
	1V 0.952	0V -0.06	0V -0.12	-10V -10.24		Offset value			+	<b>_</b>
Digital		Unsign	ed value		-191 O		8000		16000	
input			d value		-8192 -8000		0		8000	
value		Percent	tile value		-120 0		5000		10000	10119

# (1) DC 1 ~ 5V Output range

Digital input	Analog output voltage (V)						
range	0.952	1	2	3	4	5	5.047
Unsigned value (-192 ~ 16,191)	-192	0	4,000	8,000	12,000	16,000	16,191
Signed value (-8,192 ~ 8,191)	-8,192	-8,000	-4,000	0	4,000	8,000	8,191
Precise value (952 ~ 5,047)	952	1,000	2,000	3,000	4,000	5,000	5,047
Percentile value (-120 ~ 10,119)	-120	0	2,500	5,000	7,500	10,000	10,119

# (2) DC 0 ~ 5V Output range

Digital input	Analog output voltage (V)						
range	-0.06	0	1.25	2.5	3.75	5	5.059
Unsigned value (-192 ~ 16,191)	-192	0	4,000	8,000	1,2000	16,000	16,191
Signed value (-8,192 ~ 8,191)	-8,192	-8,000	-4,000	0	4,000	8,000	8,191
Precise value (-60 ~ 5,059)	-60	0	1,250	2,500	3,750	5,000	5,059
Percentile value (-120 ~ 10,119)	-120	0	2,500	5,000	7,500	10,000	10,119

# (3) DC 0 ~ 10V Output range

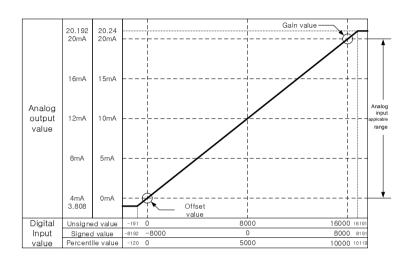
Digital input range	Analog output voltage (V)						
	-0.12	0	2.5	5	7.5	10	10.119
Unsigned value (-192 ~ 16,191)	-192	0	4,000	8,000	12,000	16,000	16,191
Signed value (-8,192 ~ 8,191)	-8,192	-8,000	-4,000	0	4,000	8,000	8,191
Precise value (-120 ~ 10,119)	-120	0	2,500	5,000	7,500	10,000	10,119
Percentile value (-120 ~ 10,119)	-120	0	2,500	5,000	7,500	10,000	10,119

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# (4) DC -10 ~ 10V Output range

Digital input	Analog output voltage (V)						
range	-10.24	-10	-5	0	5	10	10.239
Unsigned value (-192 ~ 16,191)	-192	0	4,000	8,000	12,000	16,000	16,191
Signed value (-8,192 ~ 8,191)	-8,192	-8,000	-4,000	0	4,000	8,000	8,191
Precise value (-10,240 ~ 10,239)	-10,240	-10,000	-5,000	0	5,000	10,000	10,239
Percentile value (-120 ~ 10,119)	-120	0	2,500	5,000	7,500	10,000	10,119

## Chapter 10 RAPIEnet Communication



# (1) DC 4 ~ 20 mA Output range

Digital input	Analog output current (mA)						
range	3.808	4	8	12	16	20	20.191
Unsigned value (-192 ~ 16,191)	-192	0	4,000	8,000	12,000	16,000	16,191
Signed value (-8,192 ~ 8,191)	-8,192	-8,000	-4,000	0	4,000	8,000	8,191
Precise value (3,808 ~ 20,191)	3,808	4,000	8,000	12,000	16,000	20,000	20,191
Percentile value (-120 ~ 10,119)	-120	0	2,500	5,000	7,500	10,000	10,119

## (2) DC 0 ~ 20 mA Output range

Digital input	Analog output current ( <sup>mA</sup> )						
range	-	0	5	10	15	20	20.239
Unsigned value (-192 ~ 16,191)	-	0	4,000	8,000	12,000	16,000	16,191
Signed value (-8,192 ~ 8,191)	-	-8,000	-4,000	0	4,000	8,000	8,191
Precise value (0 ~ 20,239)	-	0	5,000	10,000	15,000	20,000	20,239
Percentile value (-120 ~ 10,119)	-	0	2,500	5,000	7,500	10,000	10,119

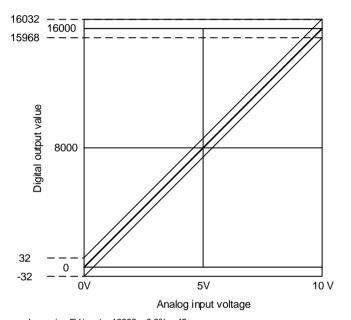
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#### 10.5.4 Analog accuracy

#### 1) Input accuracy

Accuracy of digital output value does not changed even if input range is changed. Figure below shows the range of the accuracy with analog input range of 0 ~ 10 V and digital output type of unsigned

value selected. Accuracy is ±0.3% (0~55°C).

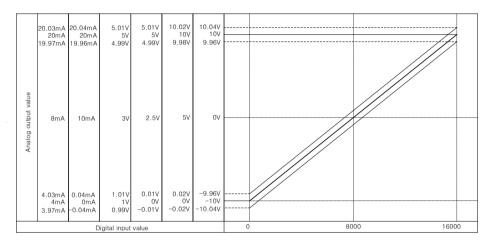


(1) Accuracy when using 5V input = 16000 × 0.3% = 48 Therefore the range of the accuracy will become (8000-48) ~ (8000+48) = 7952 ~ 8048 when using 5V input.

(2) Accuracy when using 10V input = 16000 × 0.3% = 48 Therefore the range of the accuracy will become (16000-48) ~ (16000+48) = 15952 ~16048 when using 10V input.

#### 2) Output accuracy

Though the range of input is changed, the accuracy for the analog output values doesn't change. The range of accuracy is displayed at the ambient temperature of  $25 \pm 5$  °C if you select unsigned value as your range of the digital input. The accuracy is satisfied ±0.3%.



(1) Accuracy in case of -10~10V output

16000 × 0.3% = 48

in case of -10V output, accuracy range is (-10V - 48×1.25<sup>mV</sup>) ~ (-10V + 48×1.25<sup>mV</sup>) = -10.04 ~ -9.96V, in case of 10V output, accuracy range is (10V - 48×1.25<sup>mV</sup>) ~ (10V + 48×1.25<sup>mV</sup>) = 9.96 ~ 10.04V

(2) Accuracy in case of 4~20 mA output

16000 × 0.3% = 48

in case of  $4^{\text{mA}}$  output, accuracy range is  $(4^{\text{mA}} - 48 \times 1 \mu^{\text{A}}) \sim (4^{\text{mA}} + 48 \times 1 \mu^{\text{A}}) = 3.97^{\text{mA}} \sim 4.03^{\text{mA}}$ ,

in case of 20<sup>mA</sup> output, accuracy range is (20<sup>mA</sup> - 48×1 $\mu$ A) ~ (20<sup>mA</sup> + 48×1 $\mu$ A) = 19.97<sup>mA</sup> ~ 20.03<sup>mA</sup>

#### 10.5.5 Functions of Analog Module

Here describes functions of analog module.

Function	Details
Channel Run/Stop setting	$\cdot$ It sets up Run/Stop of a channel that will operate an A/D conversion.
Input voltage/current range setting	<ul> <li>It sets up the range of an analog input.</li> <li>Analog module offers input current of two range (4~20mA, 0~20mA) and voltage input of four range (1~5V, 0~5V, 0~10V, -10~10V).</li> </ul>
Output data type setting	<ul> <li>It specifies digital output type.</li> <li>It offers four types of output data status</li> <li>(Unsigned value, signed value, precise value, percentile value)</li> </ul>
A/D input conversion method	Sampling Process     If A/D conversion method has not been specified, the module processes sampling.     Filter process     Filters rapid changes in input value by external noise.     Averaging process     Outputs A/D converted value averaged by time, cycle, and moving.

#### 1) Sampling Process

In popular A/D conversion process, analog input signals are collected at constant time intervals. and A/D converted. The time elapsed for the analog signals converted into digital signals and saved in memory device depends upon the number of channels used.

#### (Process Time) = (No. of channels used) x (Conversion speed)

(Ex.) Processing time when using 8 channels : 8 x 10ms = 80ms The term 'sampling' means taking analog signal values at certain time intervals.

#### 2) Filtering Function

(1) Filtering Processing Filter process function is used to obtain stable digital output value by filtering (delaying) noise or sudden change of input value.

Setting range: 1 ~ 99(%)

$$F[n] = (1 - \alpha) \times A[n] + \alpha \times F[n - 1]$$

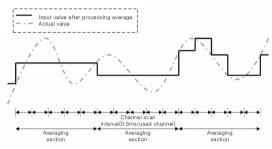
 $\begin{bmatrix} F[n]: \text{Present filter output value} \\ A[n]: \text{Present A/D converted value} \\ F[n-1]: \text{Previous filter output value} \\ \alpha: \text{Filter constant}(0.01 \sim 0.99: \text{previous value added}) \end{bmatrix}$ 

Setting value	Description	
Non-setting	Non-filtering	
1	Accept previous 1%	
50	Accept previous 50%	
99	Accept previous 99%	

#### 3) Average processing

#### (1) Time average

It accumulates input values of a selected channel and displays the average of the total sum in digital data.



Setting rage = 20 ~ 16000 [ms]

Average processing count within specified time is decided based on the number of channels used.

Average Process count =  $\frac{\text{Setting time}}{\text{No. of channel used x 10ms}}$ 

(Ex.) If the number of channels used is 8, and setting time is 16000 ms:

16000 ms ÷ (8 x 10 ms) = 200 times

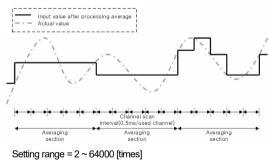
Time average is processed after converted to average of the times inside the A/D conversion module. In this case, a remainder may be produced when setting time is divided by (number of channels used X conversion speed), which will be disregarded. Thus, the average processing frequency will be the quotient of [(setting time) ÷ (number of channels used x conversion speed)].

(Ex.) If the number of channels used is 1, and setting time is 151 ms

151 ms  $\div$  (10 ms) = 15.1 times  $\rightarrow$  15 times

#### (2) Count average

It accumulates input values of a selected channel as many as frequency and displays the average of the total sum in digital data.



The time required for average value to be saved on memory when frequency average used depend on the number of

channels used.

Process time [ms] = Setting frequency x Number of channels used x Conversion speed

(Ex.) If the number of channels used is 3, its process time will be  $4 \times 50 \times 10^{\text{ ms}} = 2000 \text{ ms}$ 

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#### Here describes functions of analog output module.

Functions	Contents
Operating channel	<ul> <li>It sets up Run/Stop of a channel that will operate an analog output.</li> <li>You can save the time of whole operation by stopping unused channels.</li> </ul>
Output range	<ul> <li>It sets up the range of an analog output.</li> <li>Analog output voltage module offers four types of output range(DC 1~5V, DC 0~5V, DC 0~10V, DC -10~10V), Analog output voltage module offers two types of output range (DC 4~20mA, DC 0~20mA)</li> </ul>
Input data range	<ul> <li>It sets up the range of a digital input.</li> <li>It offers four types of a digital input.</li> <li>(Unsigned value, signed value, precise value, percentile value)</li> </ul>
Channel output	· It sets output status when communication cable is disconnected.
status	· It offers four types of output status.(Previous, Min, Middle, Max value)

#### 4) Channel Output State Setting Function

It sets output against PLC stop and abnormal state.

#### (1) Functions

It is used to output an already set value when PLC system switches RUN to Stop.

#### (2) Types

You can select one among previous, min, middle and max value.

- a) Previous value: Keeps last normal output value.
- b) Min. value: Outputs minimum value of the each output range.
- c) Middle value: Outputs middle value of the each output range.
- d) Max. value: Outputs max. value of the each output range..

#### (3) Example

When output is 10mA and range of output channel is 4~20mA, if system switches Run to Stop, it outputs as follows according to output state setting.

- (a) Previous value: keeps previous output, 10mA
- (b) Min. value: outputs min. value of corresponding range, 4mA.
- (c) Middle value: outputs middle value of corresponding range, 12mA
- (d) Max. value: outputs max. value of corresponding range, 20mA.

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# **Chapter 11 Installation and Wiring**

## **11.1 Installation**

## **11.1.1 Installation Environment**

This machine has a high reliability regardless of the environment to install. But cares should be taken to secure the reliability and the safety as follows.

## 1) Environment Condition

- (1) Install it to a water-proof and dust-proof control panel.
- (2) Do not apply continuous impact or vibration.
- (3) Do not expose it directly to direct rays.
- (4) No dew by sudden change of temperature.
- (5) Do not exceed surrounding temperature 0~55°C.
- (6) Do not exceed relative humidity 5 ~ 95%.
- (7) No corrosive gas or combustible gas.

## 2) Installation Construction

- (1) When working the screw hole and the wiring, it is not allowed to put the wire remnants into the PLC.
- (2) The installation location should be the place to operate.
- (3) Do not install it on the same panel as the high voltage machine.
- (4) The distance between wiring duct and the surrounding module should be at least 50mm apart.
- (5) The grounding should be done on a good place free from noise.

## 3) Radiation Design of Control Panel

(1) When installing the PLC in the sealed control panel, the radiation design should be done considering the radiation of other machine as well as the radiation of PLC itself. When circulating the air using the vent or the general fan, it may effect the PLC system due to the inflow of gas or dust.

(2) It is recommended to install the filter or use the sealed type thermal exchanger.

## 11.1.2 Notices in installing Profibus-DP module

Profibus-DP Smart I/O can set max. 126 stations. (including master)

- (1) Check the basic factors necessary for the system configuration and select the proper communication module.
- (2) Prepare the cable and accessories such as tab, terminal resistance etc. to be used for this communication.
- (3) The station no. of all other stations including this module should be different. If connecting with double station no., it may cause the communication error.
- (4) In case of operating with normal communication, the mode switch of master module should be at RUN mode. If changing the mode switch of master module in the status that other stations are in communication, it may cause significant communication obstacle with other stations. So, special cares are needed.
- (5) For communication cable, the designated standard cable should be used. If not, it may cause significant communication obstacle.
- (6) Check if the communication cable is cut off or short-circuited before installation.
- (7) Tighten the communication cable connector completely and fix the cable connection tightly. If cable connection is not complete, it may cause significant communication obstacle.
- (8) If the communication cable is twisted or the cable is not connected properly, it may cause communication error.
- (9) In case of connecting the long distance communication cable, the wiring should be done far from the power line or inductive noise.
- (10) If LED action is abnormal, check the trouble causes referring to this manual Chapter 12. "Trouble Shooting". If the problem repeats after taking the action, contact customer service center.
- (11) Install this communication module in the status that PLC power is 'OFF'.
- (12) After finishing the communication cable connection, put the power ON and check the normal action in the LED action status. If it is normal, download the corresponding program into GMWIN for GLOFA series and into KGLWIN for MASTER-K series and run the program.

# 11.1.3 Notices in installing DeviceNet module

DeviceNet Smart I/O can set max. 64 stations(one master module included).

- (1) Check the basic factors necessary for the system configuration and select the proper communication module.
- (2) Prepare the cable and accessories such as tab, terminal resistance etc. to be used for this communication.
- (3) It is available to control the speed automatically in accordance with the communication speed of master module by the means of Auto baudrate function and it is required to comply the cable specification.
- (4) In case of using the tab, it is required to use terminal resistance on both side of the tab. In case of single network system, set it not to repeat the station no. Install the master module in the base with the PLC power Off and set the communication address and communication speed accurately.
- (5) Check if the connector pin of this communication module is normal and make sure that the power cable and the communication cable are not short-circuited.
- (6) If using the combined module (GDL-DT4A) when setting the *high speed link* parameter of G4/6L-DUEA, the module will occupy 2 registration lists and it is available to register max. 31 (but only GDL-DT4A is installed). If using XGL-DMEA module, the module is available to register max. 63 stations.
- (7) The communication speed to be used for this communication module is 125K, 250K, 500Kbps and when changing the communication speed after setting the communication speed, turn power 'Off' and change the communication setting switch and then apply the power 'On'. Then the changed mode shall be applied.

Communication speed parameter is downloaded from SyCon after resetting and turn the power On.

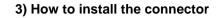
Required material	Dnet I/F module	
Communication cable	Thick cable/Thin cable	
Tab/terminal resistance	4/8 port tab, terminal resistance:121 $\Omega$ , 1%, 1/4W	
24V power supply device	General power supply	
Connection connector	5 pin open type connector	

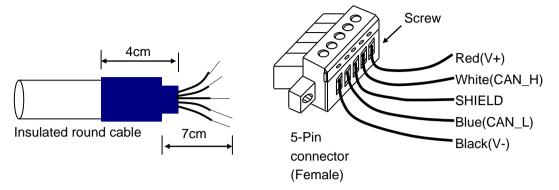
#### 1) Materials required in installation

## 2) Notices in installing the Connector

The following cares should be taken before installing the connector.

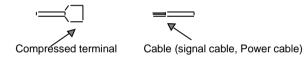
- (1) Deal the connector when the signal is not loaded in the cable.
- (2) If the module installed in the system is in action, stop the action and then install it.
- (3) If the power is supplied, the power should be 'Off' before working.
- (4) After completing the installation, tighten the corresponding cable completely not to be shaken or removed.
- (5) Install for cable signal line to be connected with conductor of connector.





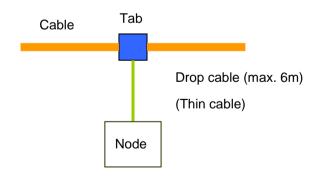
- (1) Peel off the cover of the cable apprx. 7cm for cable connection.
- (2) Remove the covered net covering the signal cable and remove the aluminum foil covering the signal cable and the power cable.
- (3) Cut the shrinkage cover for packing approx. 4cm and wrap the cable and then cover the exposed conductor and insulated coverings of the cable.
- (4) Peel off the coverings of the signal cable and the power cable approx. 3mm from the ends.

(For safe cabling, apply heat to the compressed cover for packing and stick to the cable closely.)

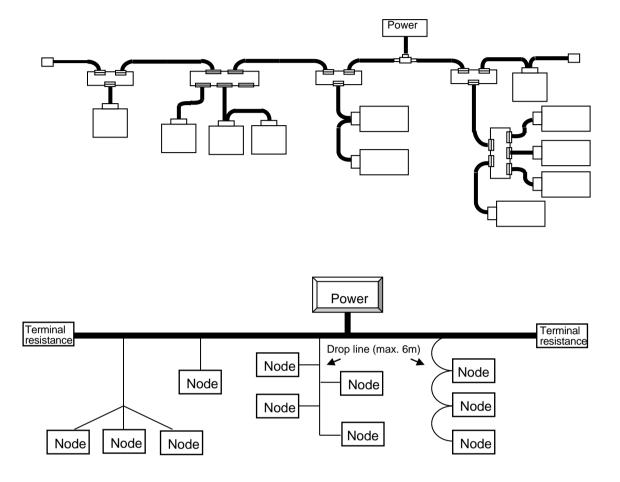


(5) After inserting the peeled coverings into the clamp screw of the connector, tighten the screw. (Cares should be taken to match the cable with the signal name of the connector.)

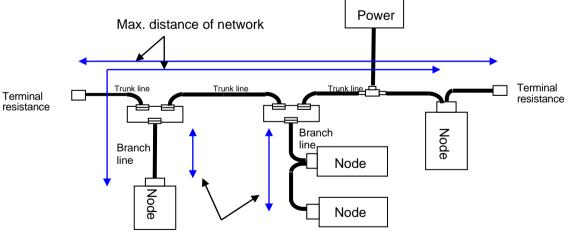
There are 2 ways of cable connection : one way to use the tab as below and another way to connect by the drop method. DC 24V power should be installed in the place necessary to maintain the voltage when Smart I/O module is getting more or the cable is getting longer.



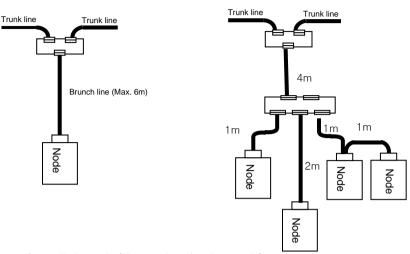
The method to connect the network is as follows.



Max. distance of Network: Max. distance of node and terminal resistance



Distance of branch line

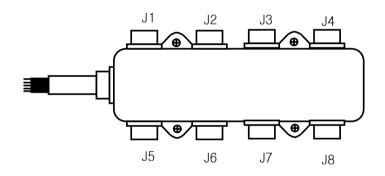


Distance of brunch line: Distance from first branch line of trunk line to the end of brunch line (Max. 6m)

## 4) How to install the tab (Example of 8-Port tab)

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It is available to connect to the trunk line of device port tab and connect or remove max. 8 port tab.



- (1) The drop line composed of Thick cable or Thin cable is available to connect to the device by the tab and in case of Open-style tab, it is available to use 3 types of connectors.
  - Pluggable screw type
  - Hard-wired screw type
  - Soldered type
- (2) For the cable connection, it is ideal to connect the drop line when the system does not act. If connecting when cable system is acting, it is required to connect to the trunk line after checking the connection status with other devices not to influence the communication.

(3) If connecting to the trunk line, it is required not to exceed max. allowable length.

Network max. distance according to the cable type is as follows.

Cable type	Network max. distance	
THICK cable	500 m	
THIN cable	100 m	

Network max. distance according to the communication speed is as follows.

Communication speed	Network max. distance	
500 Kbps	LTHICK + LTHIN ≤ 100 m	
250 Kbps	LTHICK + 2.5 * LTHIN $\leq$ 250 m	
125 Kbps	LTHICK + 5 * LTHIN $\leq$ 500 m	

LTHICK:THICK cable length (max.8A), LTHIN:THIN cable length (max.3A)

Communication	Network max. distance		
speed	THICK cable length	THIN cable length	
500 Kbps	Less than 100 m		
250 Kbps	Less than 250 m	Less than 100 m	
125 Kbps	Less than 500 m		

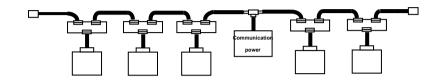
If the communication speed is 500Kbps, the length of branch line is less than 6m and total distance of branch line is less than 39m. And if the communication speed is 250Kbps, the length of branch line is less than 6m and total distance of branch line is less than 78m and if the communication speed is 125Kbps, the distance of branch line is less than 6m and total distance of branch line is less than 156m respectively.

## 5) Power Layout

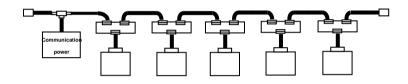
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The layout of the power is as follows.

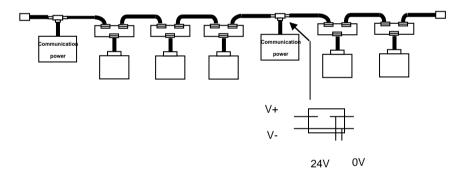
(1) In case of arranging the node on both side of the power,



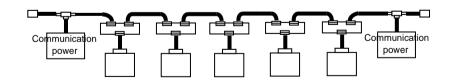
(2) In case of arranging the node on one side,



(3) In case of installing double power and dividing the power supply system,



(4) In case of duplication of the power



The distance between the power and the power tab shall be within 3m.

# 11.1.4 Notices in installing Rnet module

Rnet Smart I/O can set max. 64 stations(one master module included).

- (1) The station no. of all other stations including this module should be different. If connecting with double station no., it may cause communication error.
- (2) In case of operating with normal communication, the mode switch of master module should be at RUN mode. If changing the mode switch of master module in the status in which other stations are in communication, it may cause significant communication obstacle with other stations. So, special cares are needed.
- (3) For communication cable, the designated standard cable should be used. If not, it may cause significant communication obstacle.
- (4) Check if the communication cable is cut off or short-circuited before installation.
- (5) Tighten the communication cable connector completely and fix the cable connection tightly. If cable connection is not complete, it may cause significant communication obstacle.
- (6) If the communication cable is twisted or the cable is not connected properly, it may cause communication error.
- (7) If using the combined module (GRL-DT4A) when setting *high speed link* parameter, the module will occupy 2 registration lists and it is available to register max. 31 (but only GRL-DT4A is installed).
- (8) In case of connecting the long distance communication cable, the wiring should be done far from the power line or inductive noise.
- (9) Please do not use other than the provided connector like terminal block when wiring communication cables.
- (10) If LED action is abnormal, check the trouble causes referring to this manual Chapter 12.'Trouble Shooting". If the problem repeats after taking the action, contact to A/S center.
- (11) Install this communication module in the status that PLC power is 'OFF'.
- (12) After finishing the communication cable connection, apply the power ON and check the normal action in the LED action status. If it is normal, download the corresponding program into GMWIN for GLOFA series and into KGLWIN for MASTER-K series and run the program.

# 11.1.5 Notices in installing Modbus module

Modbus Smart I/O can set max. 32 stations.

- (1) The user must select the action mode for Cnet I/F module correctly and set the action mode accordingly. If setting the action mode wrong, it may cause communication error.
- (2) For the channel using the exclusive communication mode, it is required to set the station no. In case of the system using the exclusive communication mode and communicating by RS-422/485, it is not allowed to have Modbus module of the same station no. in the same network. In case of RS-422 communication, if there is double station no., it may cause communication error.
- (3) For communication cable, the designated standard cable should be used. If not, it may cause significant communication obstacle.
- (4) Check if the communication cable is cut off or short-circuited before installation.
- (5) Tighten the communication cable connector completely and fix the cable connection tightly. If cable connection is not complete, it may cause significant communication obstacle.
- (6) RS-422/485 cable should connect the TX/RX correctly. When several stations are connected, the first 2 stations should be connected by TX and RX and other stations should be connected by TX to TX and RX to RX themselves. (RS-422 communication)
- (7) In case of RS-485 communication, TX and RX of Cnet I/F module should be connected to each other.
- (8) If the communication cable is twisted or the cable is not connected properly, it may cause communication error.
- (9) In case of connecting the long distance communication cable, the wiring should be separated far from the power line or inductive noise and if necessary, it should be covered.
- (10) If LED action is abnormal, check the trouble causes referring to this manual "Chapter 13. Trouble Shooting". If the problem repeats after taking the action, contact Customer service center.

# 11.1.6 Notices in Handling

Here it describes notices in handling from the opening of each unit and module to the installation.

- Do not drop or apply the strong impact.
- Do not remove the PCB from the case. It may cause failure.

• Cares should be taken not to make foreign materials such as the wire remnants etc. enter the unit when wiring. If entered, remove them before applying power.

### 1) Notices in handling the product

Here it describes the notices in handling and installing the basic unit and the extended module.

## (1) Recheck the I/O standard specification

Input part should pay attention to the input voltage and in case of output part, if applying the voltage exceeding max. capacity to Open/Close, it may cause failure, breakage and fire.

### (2) Use Wire

The wire should be selected considering the ambient temperature, allowable current and the min. spec. of the wire should be more than AWG24(0.18mm<sup>2</sup>).

## (3) Environment

When I/O wiring, if it is close to heat generating machine or material or if the wiring is contacted directly to oil for long time, it may cause short-circuit, breakage and failure.

## (4) Polarity

Check the polarity before applying power to the terminal block that has the polarity. Special cares should be taken not to wire AC input power to DC24V external power supply terminal on the edge of basic unit input part. In case of DeviceNet, 24V power enters into the communication cable together and it is not necessary to wire separately.

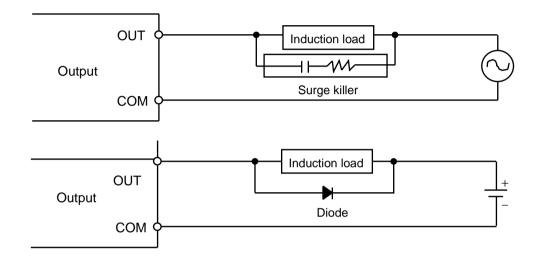
## (5) Wiring

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• When wiring the I/O line with high voltage cable and the power cable together, induction obstacle occurs which may cause the failure and malfunction.

• It is not allowed to pass the cable in front of I/O action indication part (LED). (because it prevents from distinguishing the I/O indication.)

• In case the inductive load is connected to the output part, please connect the surge killer or diode to the load in parallel. Connect the cathode of diode to the '+' side of the power.



## (6) Terminal block

When wiring terminal block or making screw hole, cares should be taken not to make the wire remnants enter the PLC. It may cause malfunction and failure.

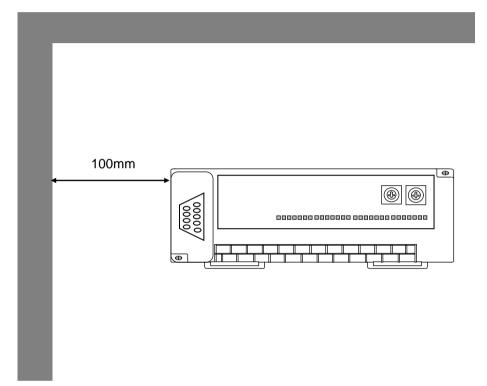
(7) Except for the mentioned above, do not apply strong impact to the basic or extended unit or remove the PCB from the case.

## 2) Notices in installation

Here it describes the notices in attaching the PLC to the control panel.

(1) Sufficient distance is required to have well-ventilated room and facilitate the exchange of the basic unit and the extended module. Especially, for the periodical exchange of battery (3 years), please separate the left side of the basic unit and the control panel for at least 100mm.

(2) For the max. radiation effect, it is required to install it as shown on the figure below.



(3) Use different panel for large sized electronic contactor or vibration source such as no-fuse breaker etc. and install separately.

(4) Install the duct for wiring if necessary.

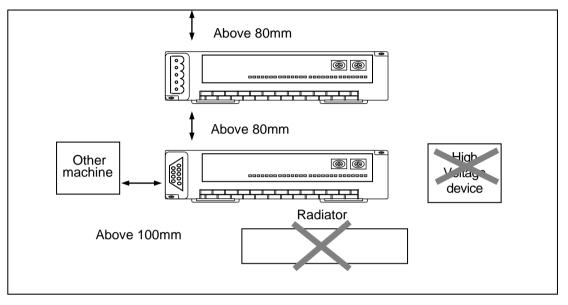
But, if the dimension of upper part or lower part of PLC is smaller than the figure below, please pay attention to the following.

• In case of installing on the upper PLC, the height of wiring duct should be less than 50mm for good ventilation.

• In case of installing on the lower PLC, please consider minimum radius of the cable.

(5) In case the equipment is installed in front of the PLC (inside the door) to avoid the effect of radiant noise or the heat, it is required to separate it more than 100mm and be install.

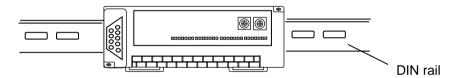
And the left/right direction of the unit and the equipment should be separated more than 100mm and installed.



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**PLC** Attaching

(6) As Smart I/O is installed with Hook for DIN rail (rail width 35mm), it is available to attach the DIN rail.



# 11.2 Wiring

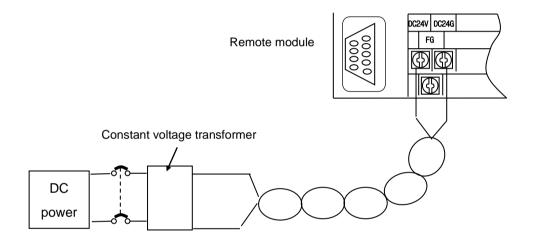
Here it describes the notices related to the wiring in case of using the system..

# 11.2.1 Power Wiring

1) For power, please use DC 24V power supply.

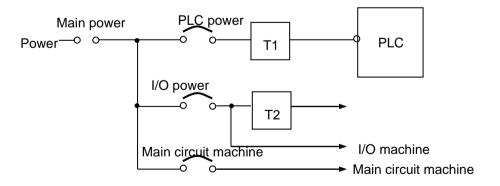
2) If the power variation is larger than the regular range, please connect a constant voltage transformer.

3) In order to prevent the noise from the power cable, it is required to twist the power cable densely if possible, and connect within the shortest distance.



4) Connect power of which the noise between lines or between grounds is small. (if there is much noise, please connect the insulation transformer.)

5) For PLC power, I/O machine and power machine, it is required to divide the system as follows.

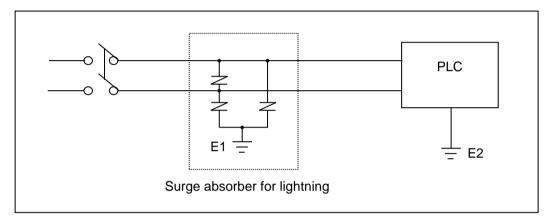


\* T1,T2: Constant voltage transformer

6) For the power cable, it is required to use a thick one (2mm<sup>2</sup>) to make the small falling down of the voltage.

7) Smart I/O can be abnormal status by cable voltage drop of power cable when many Smart I/O products are installed on a pair of power cable.

8) The power DC24V cable is not allowed to approach closely to the main circuit (high voltage, convection current) cable, I/O signal cable and needs to separate more than 80mm apart.



9) Please use the surge absorber to prevent the lightning as shown on the below.

## Remark

- 1) Separate the earth (E1) of the surge absorber for lightning and the earth (E2) of PLC.
- 2) Select the surge absorber for lightning so that it does not exceed max. allowable voltage of the absorber even when the power voltage is rising maximum.

10) When you are afraid of the invasion of the noise, please use the insulation sealed transformer or the noise filter.

11) In case of the wiring of each input resource, the wiring of the sealed transformer or the wiring of the noise filter is not allowed to pass the duct.

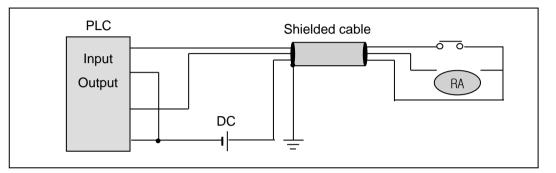
# 11.2.2 I/O Device Wiring

1) The spec. of I/O wiring cable is 0.18~2 mm<sup>2</sup> and it is recommended to use the cable spec. (0.5mm<sup>2</sup>) conveniently.

2) Input cable and output cable should be separated for wiring.

3) I/O signal cable should be separated at least 80mm from main circuit cable of high voltage, high current when wiring.

4) In case it is not available to separate the main circuit cable and the power cable, please use the shielded cable and earth the PLC.



5) In case of pipe wiring, make sure of the pipe and then ground it.

6) DC24V output cable should be separated from AC110V cable and AC220V cable.

7) In case of wiring the long distance more than 200m, the error occurs according to the leakage current caused by the interline capacity.

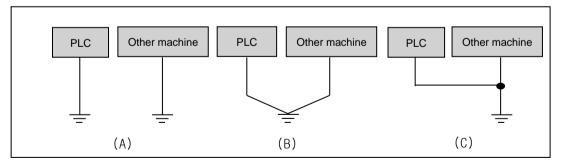
# 11.2.3 Grounding Wiring

1) As this PLC carries out sufficient noise policy, it is available to use without grounding except the case where there is much noise. But, when grounding, please refer to the following notices.

2) When grounding, please use the exclusive grounding if possible.

For he grounding construction, please use the  $3^{rd}$  class grounding (grounding resistance less than 80  $\Omega$  ).

3) If not available to use the exclusive grounding, please use the common grounding as shown on the figure (B).



(A) exclusive grounding: Excellent (B) common grounding: Good (C) common grounding : Bad

4) Please use the electric wire for grounding more than 2 mm<sup>2</sup>. Place the grounding point near this PLC if possible and shorten the length of the grounding cable.

> When connecting the extended base, please connect the extended connector accurately.

- Do not remove the PCB from the module case and modify the module.
- > When attaching/removing the module, the power should be OFF.
- Use the cellular phone or radio phone apart more than 30mm from the product.
- ▶ I/O signal cable and communication cable should be at least 10cm apart from the high voltage cable or the power cable to avoid the effect caused by the noise or the change of magnetic filed.

# **11.2.4 Cable Specification for Wiring**

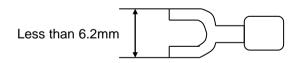
	Cable spec.(mm <sup>2</sup> )			
External connection type	Low limit	High limit		
Digital input	0.18 (AWG24)	1.5 (AWG16)		
Digital output	0.18 (AWG24)	2.0 (AWG14)		
Analog I/O	0.18 (AWG24)	1.5 (AWG16)		
Communication	0.18 (AWG24)	1.5 (AWG16)		
Main power resource	1.5 (AWG16)	2.5 (AWG12)		
Protection grounding	1.5 (AWG16)	2.5 (AWG12)		

The Cable specification to be used for the wiring is as follows.

For the power and I/O wiring for Smart I/O, it is required to use the compressed terminal.

- Use 'M3' type screw for the terminal.
- Tighten the terminal screw with 6 ~ 9 kg  $\cdot$  cm torque.
- Use the fork type screw for the compressed terminal.

Example of the proper compressed terminal (fork type)



# **Chapter 12 Maintenance and Repair**

To maintain the PLC in optimal status, please carry out daily check and regular check.

# **12.1 Repair and Check**

I/O module is usually composed of semiconductor microelectronic device and the life is semi-permanent. As the microelectronic device may occur the error caused by the ambient environment, it is required to check it periodically. The following are items to be checked 1~2 times every 6 months.

Check items		Judgment basis	Action	
	Temperature	0 ~ +55°C		
Ambient	Humidity	5 ~ 95%RH	Control the use temperature and the use humidity.	
environment	Vibration	No vibration	Use the dust-proof rubber or take the vibration protection policy.	
Shaking of each unit and module		No shake	Make all unit and module not to be shaker	
Terminal screw	loosened.	No loosening	Tighten the loosened screw.	
Input voltage change rate		Within 15%/+10%	Maintain the change rate within the allowable range.	
Spare parts		Check if the quantity of spare part and the preservation status is good.	Make up insufficient and improve the preservation status.	

# 12.2 Daily Check

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Daily checking point for Smart I/O module is as follows.

1) Daily check for Profibus-DP module

Checking items		Description	Judgment basis	Action
Cable connection status		Cable loosening	No loosening	Tighten the cable
Module connection status		Screw loosening	No loosening	Tighten the module screw.
	RUN LED	Light 'ON' check	Steady-state of Power	Refer to Chapter 3.
Indication LED	RDY LED	Light 'ON' check	Steady-state of communica- tion module interface	Refer to Chapter 3.
	ERR LED	Light 'ON' check	Abnormal communication H/V or cable check	Refer to Chapter 3.

2) Daily check for DeviceNet module

Checking items		Description	Judgment basis	Action
Cable connection status		Cable loosening	No loosening	Tighten the cable
Module connection status		Screw loosening	No loosening	Tighten the module screw.
Indication LED	PWR LED	Light 'ON' check	Steady-state of Power	Refer to Chapter 3.
	MS LED	-	Steady-state of communication module interface (if abnormal, check the H/W or the cable)	Refer to Chapter 3.
	NS LED	Light 'ON' check	Steady-state of communication module network (if abnormal, check Smart I/O H/W)	

## 3) Daily check for Rnet module

Checki	ng items	Description	Judgment basis	Action
Cable connection status		Cable loosening	No loosening	Tighten the cable
Module connection status		Screw loosening	No loosening	Tighten the module screw.
Indication LED	PWR LED	Light 'ON' check	Steady-state of power	Refer to Chapter 3.
	TX LED	Light 'ON' check	While sending/receiving with the master (if error occurs, check the H/W or the cable)	Refer to Chapter 3.
	RX LED	Light 'ON' check	While communicating with Smart I/O, (if error occurs, check Smart I/O Hardware.)	Refer to Chapter 3.

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## 4) Daily check for Modbus module

Checking items		Description	Judgment basis	Action
Cable connection status		Cable loosening	No loosening	Tighten the cable
Module connection status		Screw loosening	No loosening	Tighten the module screw.
Indication LED	PWR LED	Light 'ON' check	Steady-state of power	Refer to Chapter 3.
	TX LED	LIGNT BIINK	Steady-state of communication module interface (if error occurs, check the H/W or the cable)	Refer to Chapter 3.
	RX LED		Steady-state of communication network (if error occurs, check Smart I/O hardware.)	Refer to Chapter 3.

## 5) Daily check for RAPIEnet module

Chec	king items	Description	Judgment basis	Action
	connection status	Cable loosening	No loosening	Tighten the cable
Module connection status		Screw loosening	No loosening	Tighten the module screw.
Indicat ion LED	STATUS LED	Light'ON' check(Green)	Normal	Refer to Chapter 3.
	PORT1,2	Light 'ON'check	PORT1 Network nornal	Refer to Chapter 3.
	LATCH	Light 'ON' check	Output latch when communication error	Refer to Chapter 3.

# 12.3 Regular Check

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Check the following items 1~2 times every 6 months and take the necessary actions.

Checking items		Checking method	Judgment basis	Action
	Temperature	Measure by	0 ~ 55°C	Adjust suitable for general standard (in case of using in the area, apply the environment basis in the area)
Ambient environment	Humidity	thermometer/hygrometer.	5 ~ 95%RH	
	Pollution	Measure the corrosive gas.	No corrosive gas	
Module status	Loosening, shaking	Shake the communication module.	Tightening status	Tighten the screw.
	Dust, foreign material adding	Macrography	No adding	
	Terminal screw loosened	Tightening by the driver	No loosening	Tightening
Connection status	Pressed terminal approach	Macrography	Proper interval	Correction
	Connector loosened.	Macrography	No loosening	Connector correction Screw tightening
Power voltage check		Voltage measure between terminals	DC 20.4 ~ 28.8V	Power supply change

#### **Chapter 13 Trouble Shooting**

Here it describes the contents of each error to be occurred while operating the system, the method to find the cause and the action.

#### **13.1 Basic Procedure of Trouble Shooting**

It is important to use high reliable machine to increase the system reliability but it is important to take prompt action when trouble occurs as well.

To start the system promptly, it is more important to find the trouble occurring cause promptly and take the necessary action. The basic items to comply when taking this trouble shooting are as follows.

1) Check with the naked eye

Check the following items with the naked eye.

- Machine action status (stop, action)
- Power appliance status
- I/O machine status
- Wiring status (I/O cable, extended or communication cable)
- Check the indication status of each indicator (POWER LED, RUN LED, ERR LED, TX LED,RX LED, MS LED,NS LED, I/O LED etc.) and connect the peripheral device and then check the PLC action status or the program contents.
- 2) Check the trouble

Examine how the trouble is changed by the following action.

- Place the key switch on STOP position and apply power ON/OFF.
- 3) Limit range

Estimate the cause of trouble using the above method.

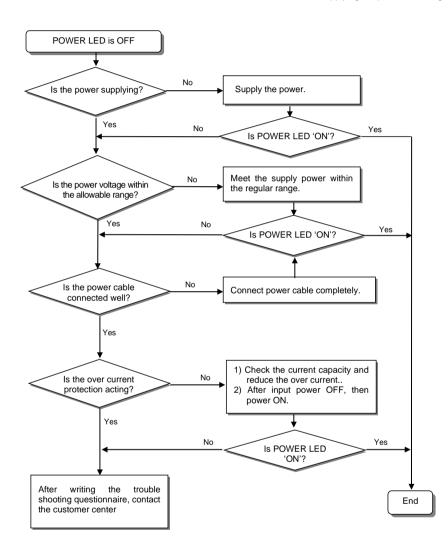
- Is it the cause from PLC itself? Or external cause?
- Is it the cause from I/O part? Or other cause?
- Is it the cause from PLC program?

# **13.2 Trouble Shooting** Here it describes the trouble finding method, the error code and the actions on the above by dividing them per phenomenon. Description of Trouble Action method when POWER LED is OFF. When POWER LED is OFF Action method when ERR LED is blinking. When ERR LED is blinking Action method when RUN LED is OFF. When RUN LED is OFF. Action method in case of abnormal operation of I/O In case of abnormal operation I/O part part Action method when program write does not work. When program write does not work

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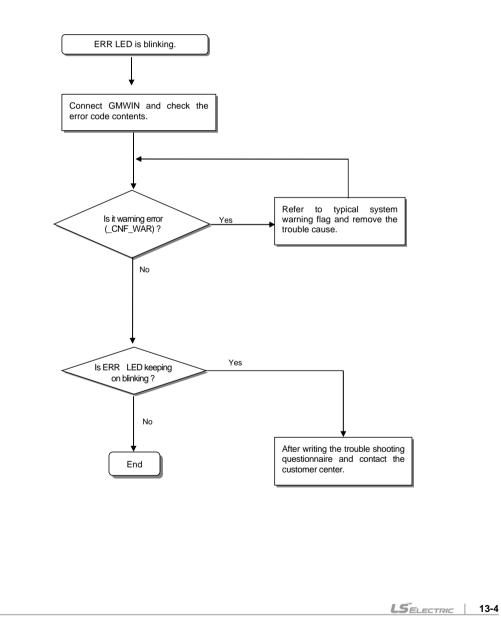
#### 13.2.1 Action method when POWER LED is OFF.

Here it describes the action order when POWER LED is OFF while applying the power or during the operation.



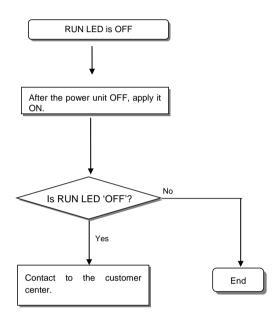
## 13.2.2 Action method when ERR LED is blinking.

Here it describes the action order when ERR LED is blinking in case of power input, or when operation start, or during operation.



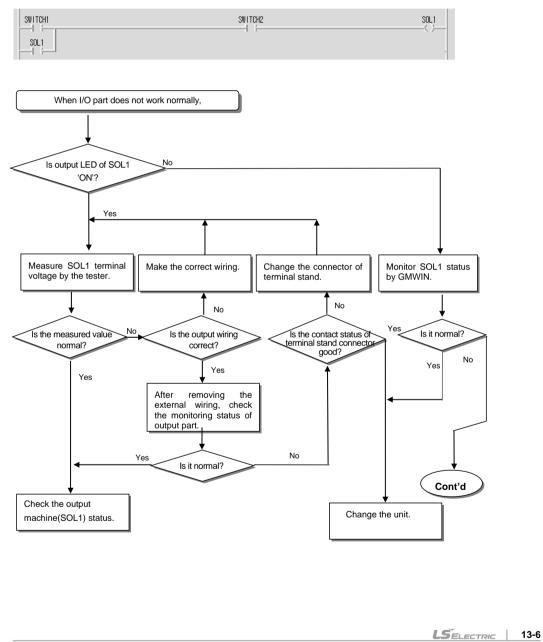
## 13.2.3 Action method when RUN LED is OFF

Here it describes the action order when RUN LED is blinking in case of the power input, or when operation start, or during operation.

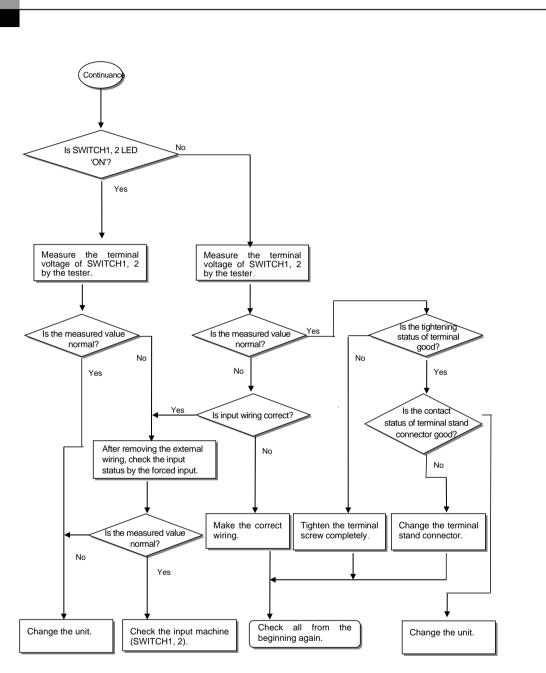


## 13.2.4 Action method when I/O part does not work normally.

Here it describes the action order when I/O part does not work normally during operation, as shown on the program example below.

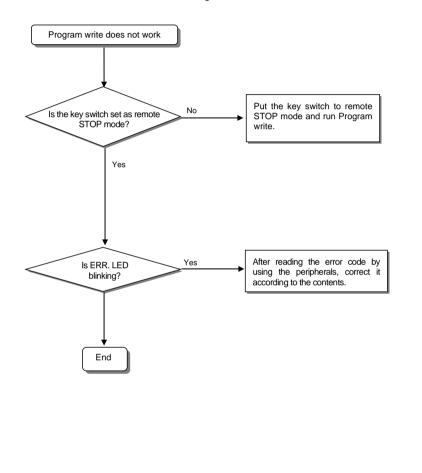






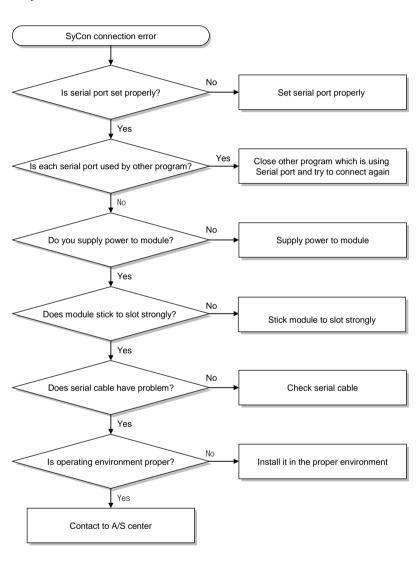
# 13.2.5 Action method when Program Write does not work

Here it describes the action order when Program write does not work in the Master CPU.

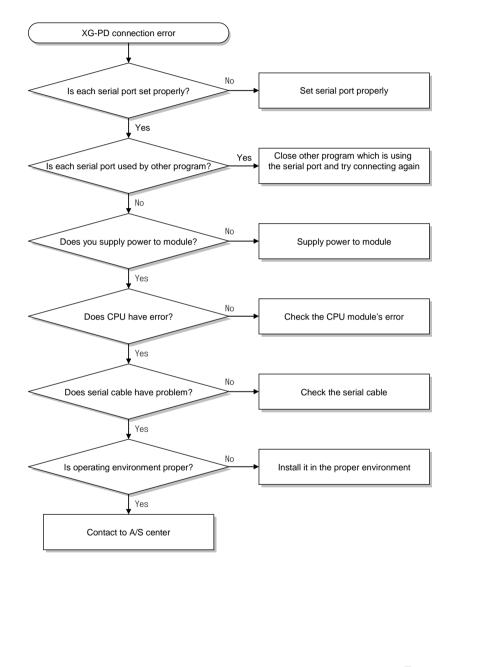




# 13.2.6 SyCon connection error

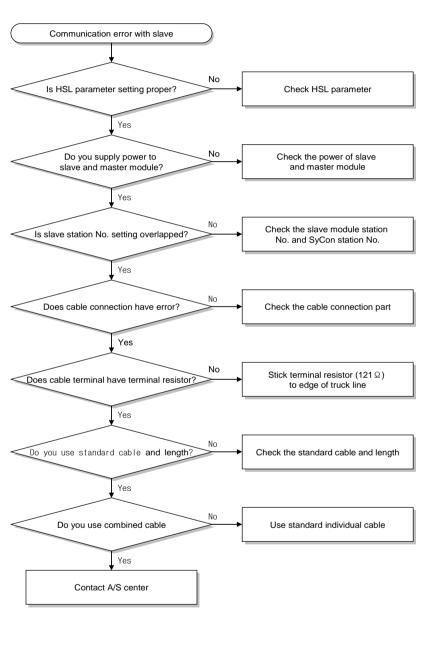


# 13.2.7 XG5000 connection error



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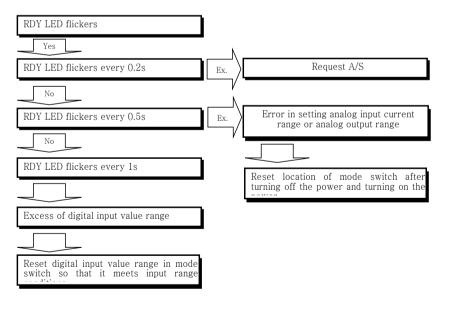
# 13.2.8 Communication error with slave



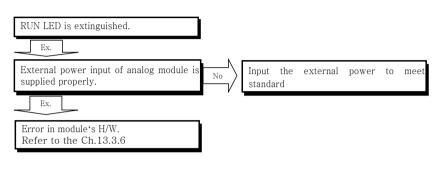
# 13.3 Profibus-DP analog block typw

	pe of error		
Type of error	status	Cause of error	Measures
Severe trouble	200ms flicker	Breakdown of module	Request A/S
		1. It is available to set the input range of GPL-AC8C from -	
		20mA to 20mA, 0~20mA, 4~20mA. But setting the mode	
Error in setting	0 Ee flicker	switch as ON/ON may cause excess of input range.	Refer to the
current range	0.5s flicker	2. It is available to set input range of GPL-DC4C from 0mA	Ch.9.3.2
		to 20mA, 4~20mA. But setting the mode switch as	
		ON/OFF or ON/ON may cause excess of input range.	
Excess of digital input value range	1s flicker	Digital input value range has redundancy more than real use value as follows. -8000~8000 -> -8096~8095 0 ~ 8000 -> -96 ~8095 0 ~ 4000 -> -48 ~4047 But if input value exceeds the above range, it may cause error.	Refer to the Ch.9.3.2

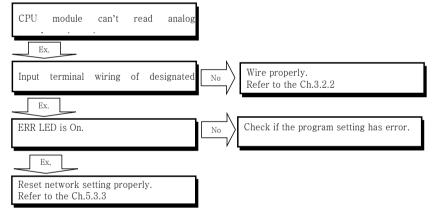
# 13.3.2 Checking error



## 13.3.3 RDY LED is Off

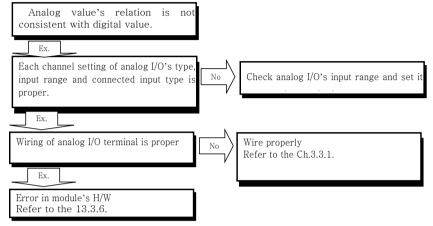


#### 13.3.4 CPU module can't read transformation value.



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# 13.3.5 Analog value's relation is not consistent with digital value.



# 13.3.6 Breakdown in hardware of analog module.



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# 13.4 RAPIEnet block type

Smart I/O RAPIEnet provides S/W diagnostic function that can check the status within the network through the master module and H/W diagnostic function service that can identify the hardware status of the Smart I/O.

#### 13.4.1 S/W diagnostic function

Smart I/O RAPIEnet makes it possible to check the communication status and information of each slave within the network through the diagnostic information provided by the master module.

# 1) How to use diagnostic function

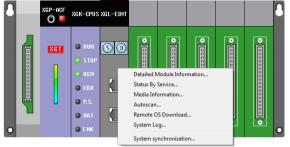
Methods on how to switch screen for system diagnostics are as follows.

(1) Click [Online→ Connect] and then click [Online→ Communication module setting→System diagnostics menu].

Or click [Network configuration $\rightarrow$ RAPIEnet master selection  $\rightarrow$  Right mouse click  $\rightarrow$  Communication module setting $\rightarrow$  System diagnostics] menu to switch to the system diagnostic screen in the same manner.

🔩 Test - XG5000				
Project Edit Find/Replace	v	iew Online Monitor Debug	Tools	Window Help
: D 🚅 🖨 🖬 🖨 🖄 🗄	<b>r</b> 6	🖁   🎟 🥥   🗞 : ೮ ೮ % ։	b 🛱	╳┝╬Ӿ╬╬;≱₩₩₩₩₩₩₩₩
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Esc F3 F4 sF1 sF2 F5 F6	→ sF8 s	# + > +/> +S> +R> +P> +N> +F} +	₽ 4 # F7 c3	V W W 🗄 🖿 🗖 🖓 🗗 🗃 🕮 🖬 🗹 🚺
Project				<del>→</del> # ×
	work			
🌚 System Variable		Open		
MewPLC(XGK-CPU Wariable/Comm		Add Item	•	
	Ba	Copy Ctrl+1	-	
🔟 Basic Param	R	Paste Ctrl+)		
⊿ - 📆 Scan Program	×	Delete Delet		
NewProgram	٢	Properties	-	
		Communication module setting	• 🗷	Enable Link (HS Link,P2P)
				OS Upload/Download
				EIP Tag Manager
				Config. Upload (Dnet, Pnet)
			Q	Reset Individual Module
			8	Delete Parameter(Standard Settings, HS Link, P2P)
Project View High-speed Link	Vi	ew P2P	<b>E</b>	System Diagnosis

(2) Do a right mouse click after clicking RAPIEnet module (XGL-EIMT/EIMH), and the detailed diagnostics items are displayed. In order to open the system diagnostics screen of an extension base in case RAPIEnet module is installed in the extension base, click the extension base of the system information window to switch to the system diagnostics screen of the extension base.



System information	Allocation information - Variable	Comment
□ @ Base 0 : XGB-M06A		Main Base(6 Slots)
- Power: XGP-ACF		AC100~240V Input
- CPU: XGK-CPUS		Standard CPU Module(I/O: Maximum 3,072 Points)
Ic CPU: XGK-CPUS If Slot 0: XGL-EIMT	[P00000 ~ P0000F]	RAPIEnet Module, Electrical Master
	[P00010 ~ P0001F]	
- 2 Slot 2: Empty slot	[P00020 ~ P0002F]	
- Is Slot 3: Empty slot	[P00030 ~ P0003F]	
- 4 Slot 4: Empty slot	[P00040 ~ P0004F]	
5 Slot 5: Empty slot	[P00050 ~ P0005F]	

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Division	Meaning	Reference
Communication module information	Provides the module information of the master module	-
Service status	Provides the high-speed link/P2P communication information of the master module	-
Media information	Provides the information about communication load (packet volume) of the network	-
Auto Scan	Provides the module information connected to the network	-
Remote O/S Download <sup>*Notice1)</sup>	Provides OS download function of the module configured with the master module in network	-
System Log	Provides the information about the abnormality of the master module	-
System synchronization	Provides the module mounted on the base and I/O synchronization function	-

# (2) The meaning of each item on the system diagnostics menu is described below.

# Remarks

Notice1) Remote O/S Download

For a stable operation of the system, Please ask the LS ELECTRIC Service Center as to the Remote O/S Download function.

2) Meanings for each diagnosis item In order to use the diagnosis item, select the menu you want to check by doing a right mouse click after clicking the RAPIEnet module (XGL-EIMT/EIMH) module.

- (1) Communication module information
  - The module information of the master module is provided in the communication module information.

List	Context
Module kind	XGL-EIMT
Base Number	0
Slot Number	0
Station Number	53
Option board type	RJ45 2 PORT
Maximum link scan(ms)	24
Minimum link scan(ms)	1
Current link scan(ms)	1
MAC Address	00 E0 91 06 94 BE
Hardware Error	Normal
Hardware Version	Ver. 3.00
OS ver	Ver. 3.00
0/S Date	2016. 01. 06
Remote	Disable
Dedicated Service	Enable
Parameter information	OK

#### 메모 포함[t1]: RAPIEnet

#### Meanings for each item are as follows.

Items	Sub-items	Contents
	Communication module type	Displays the type of module: RAPIEnet
Basic information	Base number	Displays the base location of the mounted module(0 ~ 7)
	Slot number	Displays the slot location of the mounted module(0 ~ 11)
	Station number	Displays the station number of the module(0 ~ 63)
Link information	Option board type	Communication port type - TP 2 port: Electrical 2 port - HYBRID: Optical 1 port, electrical 1port - FIBER 2 port: Optical 2 port
	Link scan maximum	The maximum task performing time (ms) of OS
	Link scan minimum	The minimum task performing time (ms) of OS
	Link scan current	The current task performing time (ms) of OS
	MAC ADDRESS	Displays MAC address
Hardware /	Hardware error status	Displays hardware status
Software	Hardware version	Displays hardware version
information	OS version	Software version
	OS date	Software date
Communication	P2P	Displays the status of service performed currently
service type and	High-speed link	by the module(Enable/Disable)
status	Remote	Access service information(Enable/Disable)
310103	Dedicated service	Access Service Information(Enable/Disable)
Parameter	_	Displays parameter setting status
information	-	<ul> <li>Display type: Normal, error</li> </ul>

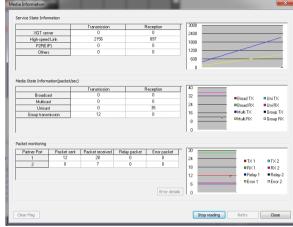
(2) Status by service

In the Status by service, you can check the operating status of the high-speed link service and P2P being serviced in the RAPIEnet master module. In the case of the Smart I/O, since the high-speed link service is used, the service status for each high-speed link block can be checked through the high-speed link service function.

dicated	Service P2P Service	ervice HS Link	Service								
Standa	rd Information	HS Li	nk Servic	e Informatio	n						
Base I	No.: 0	Sent		35	In noma	al communica	tion.				
Slot N	o.: 0	Rece Pack		15	(Run lin	k: 1, Link trou	ble:0)				
ommuni	ication Diagnostic	s:									
Index	Station number	Block number	Bloc	k type	Data size	Read area	Save area	HS state	HS mode	HS trx	н
00	01	01	Slave	reception	02		M0100	Normal	Run	Normal	1
01	02	02	Slave	reception	02		M0100	Normal	Run	Normal	1
02	03	03	Slave	reception	02		M0100	Normal	Run	Nomal	1
03	04	04	Slave tr	ansmission	01	M0000		Normal	Run	Nomal	1
04	05	05	Slave tr	ansmission	01	M0000		Normal	Run	Nomal	1
05	06	06	Slave tr	ansmission	01	M0000		Normal	Run	Nomal	1
06	07	07	Slave tr	ansmission	01	M0000		Normal	Run	Nomal	1
07	08	08	Slave tr	ansmission	01	M0000		Normal	Run	Nomal	1
08	09	09	Slave tr	ansmission	01	M0000		Normal	Run	Nomal	1
09	10	10	Slave tr	ansmission	01	M0000		Normal	Run	Normal	٩
(											Þ
								Multiple re		Refresh	
							lear Flag	multiple re		neiresn	

#### **Chapter 13 Trouble Shooting**

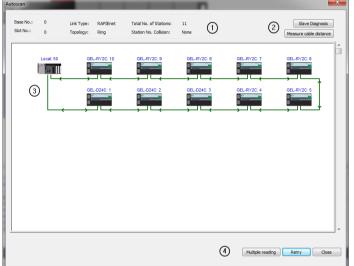
(3) Media information In the media information, the communication load (packet volume) of the network is provided. Click on the continuous reading of the media information screen, and the status information and packing monitoring contents can be checked in real time, and the information about the packet volume is provided in a graphic form. The meanings for each item are as follows.



Items	Sub-items	Contents
	XGT server	The total number of frames to be transmitted and received to the XGT server service
Service status	High-speed link	The total number of frames to be transmitted and received to the high-speed link service
information	P2P	The total number of frames to be transmitted and received to the P2P service
	Others	The total number of frames to be transmitted and received to other services
	Broad cast	The number of packets per second of frames to be transmitted and received to the broadcast
Media status	Multicast	The number of packets per second of frames to be transmitted and received to the multicast
information (packet/second)	Unicast	The number of packets per second of frames to be transmitted and received to the unicast
(packet/second)	Group transfer	The number of packets per second of frames to be transmitted and received to the group transfer
	Transmission	The number of packets per second of frames to be transmitted at each port
Packet monitoring	Reception	The number of packets per second of frames to be received at each port
(packet/second)	Relay	The number of packets per second of frames to be relayed at each port
ų	Error	The number of packets of errors occurring during the transmission and reception at each port
Flag	Clear	Initializes the full service count and packet volume
Continuou	s reading	Provides real-time information about the service status and media status
Re	do	Request reading the service status and media status one time
Clc	se	Exits the media information provision

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- (4) Auto Scan
  - Auto Scan function provides the system configuration information and information on the module connected to the network. The meanings for each item are as follows.



	Division	Meaning	Reference
1	System information	Provides information about the RAPIEnet system connected to the Local master module <sup>*Notice1)</sup>	
	Slave diagnostics	Provide diagnostic information related to the slave. Please refer to the slave diagnostics for details	
2	Cable distance measurement	Provides communication distance between modules. However, the cable distance may be measured incorrectly depending on the status of the cable.	
3	Network configuration screen	Displays the current network configuration map	
	Continuous reading	Provides network configuration information in real time	
4	Redo	Request reading the network configuration information one time	
	Close	Exits the Auto Scan service	

#### Remarks

Notice1) Local master module

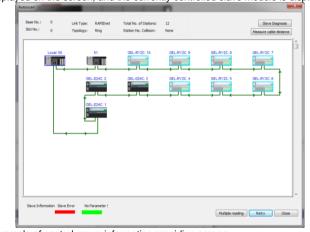
It refers to the RAPIEnet module mounted on the PLC connected to XG5000, and the master module that performs the system diagnostics is displayed as a Local master module.

# a) Slave diagnostic service Click the slave diagnostics, and the current slave diagnostic information is provided. The 메모 포함[t2]: 슬레이브 contents by diagnostic information are summarized below. (a) High-speed link abnormality information provision In case the high-speed parameter information applied to the RAPIEnet master module connected to XG5000 is different from the information of the Smart I/O that exists in the actual network, the information about the module that does not match is provided after a comparison with the module that exists in the actual network based on the Smart I/O information set in the high-speed link block. In this case, the provided information is limited to the RAPIEnet master (Local) of the PLC connected to XG5000. HS link Error Info ×

Local m	nodule infor	mation	
Stati	on	50	
Base	No.:	0	
Slot	No.:	0	
HS link E	rror Module	: List:	
2	GEL-D240	:	
10	GEL-RY20	2	
			ОК

(b) Control group information provision

Click on the slave diagnostics in Auto Scan service, and the slave group 'Notice1) controlled based on the master module is displayed on the Auto Scan screen. Click each master module displayed on the screen, and the currently controlled slave module is displayed.



<Example of control group information providing screen: No. 50 master module controls the GEL-D24C module of No. 1~ 3 station>

(c) Slave status information provision If Smart I/O module in which parameters are not set or a module where an error occurs exists in the Auto Scan screen, the applicable module is displayed.

Base Role     Link Typer:     APIETret     Told No. of Statebors:     11     State Degross:       Jost No.:     0     Topology:     Ring     Stateon No. Collision:     None         Local:     50     GEL.024C: 1     GEL.024C: 2     GEL.024C: 3     GEL.RY2C: 4     GEL.RY2C: 5         GELRY2C:     10     GELRY2C: 10     GELRY2C: 8     GELRY2C: 7     GELRY2C: 7	toscan			-	_	n		<u> </u>
	Base No.: Slot No.:	0						
		Local 50	GE				,	GEL-RY2C: 5

<Example of slave status information: GEL-RY2C of No. 10 station indicates that parameters are not set>

#### Remarks

Notice1) Slave group

The slave group that appears when you click on the first slave diagnostics displays the Smart I/O module that is controlled from the Local master module.

#### b) Slave module information

Double click the slave module, except for the Local master module on the Auto Scan screen, the detailed information on each module is provided. The configuration and contents on the slave module information are as follows.

-	1		n information	90.13
Station No.:		SOTTW	are Version:	
Product Name:	GEL-D24C	S.W. (	date:	2015-12-23
Parameter:	Select Directory	: Address:	00 E0 91 05 4	11 EE
Communication				
Master code(1):	50	Ma	aster code(2):	N//
Transmission Mode	Cydic		nergency Outp ade:	ut -
Transmission Cycle	200	(	peration Mode	
Heartbeat	1000	(msec)		RUN
Ethernet CRC error	count			
Port 1:	0	Port 2	:	D

#### (a) Link information

Division	Contents	Reference
Station No.	Displays the set station No. of Smart I/O	
Product name	Display the module name of Smart I/O	
Parameter	Displays whether to set the parameter of Smart I/O	If the high-speed link is not Enabled, it is displayed as the parameter not set.
MAC address	Displays the set MAC address of Smart I/O	

#### (b) Version information

Division	Contents	Reference
Software version	Displays O/S version of Smart I/O	
Software date	Displays O/S version of Smart I/O	

# (c) Communication information

Division	Contents	Reference
		Master station No. (2)
Master station		is displayed in case of
No.(1).(2)	Smart I/O	the master module
		mounted on XGR
Transmission mode	Means the high-speed transmission cycle of input	
Transmission mode	module	
Transmission cycle	Means the high-speed transmission cycle of output	
Transmission cycle	module	
Heartbeat time	Means the set heartbeat value	
Emergency output	Displays the set output mode in case of the	
mode	emergency output of digital output module	
Operation mode	Displays the operating status of Smart I/O	

(d) Ethernet CRC error count

Division	Contents	Reference		
	CRC error counter increases when error frame occurs		 	메모 포함[t3]: CRC
Port1, Port2	due to the noise and faulty cable connected to the		(	
	Ethernet port.			

(5) System log
 When a network-related event occurs, system log stores the information in memory area (RAM) and flash area (flash memory of the master module) and provides the system log information.
 In the case of flash area log, the log of memory area is stored in the flash area if you press LOG switch in the front side of the module.

Number	Date	Time	Contents	
1	2016-04-21	12:18:15.068	Slave station 3 flag update (0x01)	
2	2016-04-21	12:18:15.068	Slave station 7 flag update (0x01)	
3	2016-04-21	12:18:15.068	Slave station 8 flag update (0x01)	
4	2016-04-21	12:18:15.068	Slave station 9 flag update (0x01)	
5	2016-04-21	12:18:15.068	Slave station 10 flag update (0x01)	
6	2016-04-21	12:18:16.861	Network topology conversion: Line => Ring	
7	2016-04-21	12:18:16.070	Slave station 2 flag update (0x00)	
8	2016-04-21	12:18:16.075	Slave station 3 flag update (0x00)	
9	2016-04-21	12:18:16.075	Slave station 7 flag update (0x00)	
10	2016-04-21	12:18:16.567	Slave station 8 flag update (0x00)	
11	2016-04-21	12:18:16.568	Slave station 9 flag update (0x00)	
Details:			Read all Sav	e File

<Example of system log >

(6) System synchronization

System synchronization function is a service that provides the module mounted on the base and I/O synchronization function.

(7) Diagnostic area

Diagnostic area use function is to transmit the diagnostic information provided by the slave module to the PLC device area. Check the diagnostic area use and enter the start address of the PLC device in which the diagnostic information is to be stored, the diagnostic area of one word per slave

is automatically allocated to the high-speed link block. The diagnostic information provided by the diagnostic area is as follows, and the operation bit is changed to 1 when the problem occurs.

Operation Modes	Operation Conditions Operation Bit
Heartbit error	Heartbit error occured Bit 0
Ethernet CRC Error Count(Port 1)	CRC error occured of Bit 1
	Port1
Ethernet CRC Error Count(Port 2	CRC error occured of Bit 2
	Port2

메모 포함[t4]: Set 을 많이 사용

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#### 13.4.2 H/W Diagnostic Function

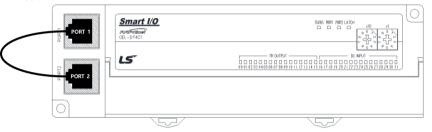
H/W diagnostic function provides a self-diagnostic function. A user can check the LED status and hardware abnormality of the communication port through the self-diagnostic function.

1) Communication port diagnostic function

Communication port diagnostic function is a service that provides the information about hardware abnormality of the communication port. If the communication is not normally made even when the apparent problem is not found after the installation of the product, the hardware abnormality can be determined through the service. The procedures are as follows.

- (1) Station number settings
  - Power is provided after the station number is set to 92.
- (2) Cable connection

Both ends of the communication cable are connected to Port 1 and Port 2 as shown in the figure below.



(3) LED status

(a) When the station number switch is set to 92, Smart I/O module LED is subject to the following conditions.

	Division		LED	Meaning	Remarks	
	m		mode			
		Green	Blinking	Displays self-test in progress	STATUS	
	STATUS	Red	Lighting	Error between communication ports occurs(RJ-45 ↔PHY IC)		
	PORT1/2	Green	Lighting	Completes physical connection of the port	PORT1/2	
PORTI/2 Red		Blinking	Proceeds with communication through the port			
/1.	V VAUL (L			itali ia antita 00, Oment I/O manhala I ED ia ambiant	the these field areas	

(b) When the station number switch is set to 93, Smart I/O module LED is subject to the following conditions

contantions				
Divis	ion	LED mode	Meaning	Remarks
STATUS	Green	Blinking	Displays self test in progress	STATUS
314103	Red	Lighting	PHY IC error occurs	
PORT1/2	Green	Lighting	Completes physical connection of the port	PORT1/2
FURI 1/2	Red	Blinking	Proceeds with communication through the port	

(c) When the station number switch is set to 94, Smart I/O module LED is subject to the following conditions.

	Division LEI		LED	Meaning	Remarks
mode					
	STATUS	Green	Blinking	Displays self test in progress	STATUS
	STATUS Red Lighting		Lighting	Error in the Ethernet part inside ASIC occur	
	PORT1/2	Green	Lighting	Completes physical connection of the port	PORT1/2
	PORT1/2 Red		Blinking	Proceeds with communication through the port	

LSELECTRIC | 13-26

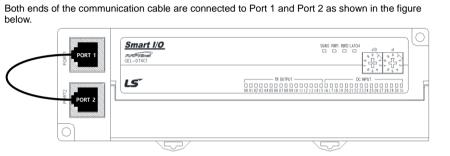
2) LED diagnostic function

LED diagnostic function is a service that provides the information about the operating mode of LED (STATUS, PORT1, PORT2, LATCH) that displays the operating status of Smart I/O.

(1) Station number settings

Power is provided after the station number is set to 96-99.

(2) Cable connection



(3) LED status

Check hardware status through LED operating mode.

Classification		Normal	Abnormal	Reference
	Green	Fliker	On, Maintain Off	-
STATUS	Red	Fliker	On, Maintain Off	-
	Green	On	Maintain Off	-
PORT1	Red	Fliker	On, Maintain Off	-
	Green	On	Maintain Off	-
PORT2	Red	Fliker	On, Maintain Off	-
	Green	Fliker	On, Maintain Off	
LATCH	Red	Fliker	On, Maintain Off	Only for GEL-DT4C1/TR4C1

# 13.5 Trouble Shooting Questionnaire

- If the trouble occurs when using SMART I/O series, fill in the following questionnaire and contact to the customer center by phone or by fax.
- In case of error related to specific and communication module, use the questionnaire added to the user's manual of the corresponding product.

1. User contact point :	TEL.) _				
	FAX)				
2. Model :	( )				
3. Applied machine details					
<ul> <li>Network status :</li> </ul>	– OS version (	),	<ul> <li>Serial no. of product</li> </ul>	(	)
- GMWIN version no. us	sed in program compile	:(	)		
4. brief description of control	object machine and sys	stem :			
5. Network model using :					

- 6. ERR LED 'OFF' of network unit? Yes( ), No( )
- 7. Error message content by GMWIN :
- 8. Action trial status for the error code. :
- 9. Trouble shooting method for other error action :
- 10. Error features
- Repeat(): periodical(), specific sequence level related()
   environment related()
  - Intermittent( ): error interval:
- 12. Detail description for the error phenomena :

14. Configuration diagram of applied system:

# **Chapter 14 Compliance with EMC Specifications**

# 14.1 Requirements Complying with EMC Specifications

EMC Directions describe "Do not emit strong electromagnetic wave to the outside: Emission" and "Do not have an influence of electromagnetic wave from the outside: Immunity", and the applicable products are requested to meet the directions. The chapter summarizes how to structure a system using XGT PLC to comply with the EMC directions. The description is the data summarized for the requirements and specifications of EMC regulation acquired by the company but it does not mean that every system manufactured according to the description meets the following specifications. The method and determination to comply with the EMC directions should be finally determined by the system manufacturer self.

# 14.1.1 EMC specifications

The EMC specifications affecting the PLC are as follows.

Specification	Test items	Test details	Standard value
	EN55011 Radiated	Measure the wave emitted from a product.	30~230 Mtz QP:50 dB, W/m *1
	noise *2		230~1000 MHz QP:57 dB///m
EN50081-2	EN55011 conducted	Measure the noise that a product emits to the	150~500 kHz QP : 79 dB
EN30001-2	noise	power line.	Mean : 66 dB
			500~230 MHz QP: 73 dB
			Mean : 60 dB
	EN61000-4-2	Immunity test allowing static electricity to the	4 kV Contact discharge
	Electrostatic immunity	case of a device.	
	EN61000-4-4	Immunity test allowing a fast noise to power	Power line : 2 <sup>kV</sup>
	Fast transient burst noise	cable and signal cable.	Digital I/O : 1 <sup>kV</sup>
			Analogue I/O, signal lines : 1 <sup>kV</sup>
EN61131-2	EN61000-4-3	Immunity test injecting electric field to a	10Vm, 26~1000 MHz
	Radiated field AM	product.	80% AM modulation@ 1 kHz
	modulation		
	EN61000-4-12	Immunity test allowing attenuation vibration	Power line : 1 <sup>kV</sup>
	Damped oscillatory wave	wave to power cable.	Digital I/O(24V and higher) : 1 $^{\rm kV}$
	immunity		

\* 1 : QP: Quasi Peak, Mean : average value

\* 2 : PLC is a type of open device(installed on another device) and to be installed in a panel. For any applicable tests, the system is tested with the system installed in a panel.

# 14.1.2 Panel

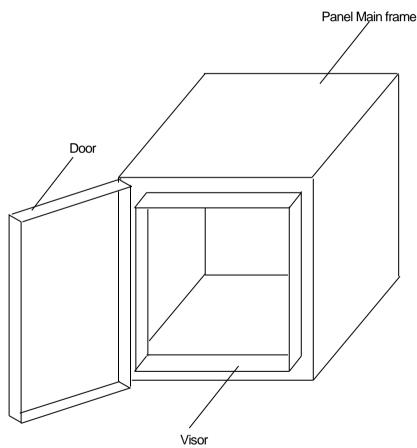
The PLC is a kind of open device(installed on another device) and it should be installed in a panel. It is because the installation may prevent a person from suffering from an accident due to electric shock as the person contacts with the product(XGT PLC) and the panel can attenuates the noise generating from the PLC.

In case of XGT PLC, to restrict EMI emitted from a product, it should be installed in a metallic panel. The specifications of the metallic panel are as follows.

# 1) Panel

The panel for PLC should be installed and manufactured as follows.

- (1) The panel should be made of SPCC(Cold Rolled Mild Steel)
- (2) The plate should be 1.6mm and thicker
- (3) The power supplied to the panel should be protected against surge by using insulated transformer.
- (4) The panel should be structured so that electric wave is not leaked outside. For instance, make the door as a box as presented below. The main frame should be also designed to be covered the door in order to restrict any radiating noise generated from the PLC.



(5) The inside plate of panel should have proper conductivity with a wide surface as possible by eliminating the plating of the bolt used to be mounted on the main frame in order to secure the electric contact with the frame.

2) Power cable and grounding cable

The grounding/power cable of PLC should be treated as follows.

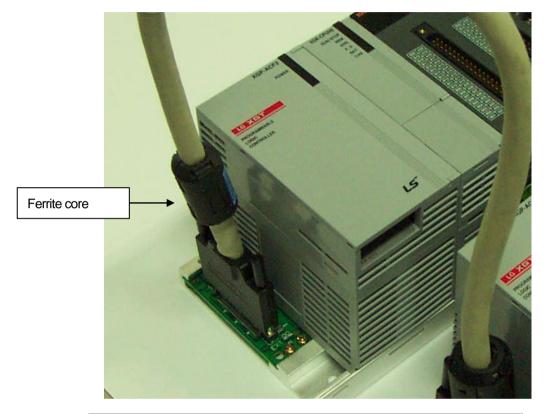
- (1) The panel should be grounded with a thick wire() to secure a lower impedance even in high frequency.
- (2) LG(Line Ground) terminal and PE(Protective Earth) terminal functionally let the noise inside the PLC flow into the ground, so a wire of which impedance is low should be used.
- (3) Since the grounding cable itself may generate noise, thick and short wiring may prevent it serving as an antenna.
- 3) Ferrite core

When the cables that insufficient shielding effect are exposed outside from the panel, It is recommended to use for noise reduction.

# 14.1.3 Cable

#### 1) Extension cable treatment

The extension cable of XGT series is with fast electric signal. Therefore, high frequency noise wave is emitted from the extension cable. To comply with the CE specifications, please attach the ferrite core on the extension cable as presented in the figure.



	Mode	Manufacturer	Remarks
Ī	CU1330D	E Tech Electronics	-
	ZCAT3035-1330	TDK	-

2) Fixing a cable in the panel

If the extension cable of XGT series is to be installed on the metallic panel, the cable should be 1cm and more away from the panel, preventing the direct contact.

The metallic plate of panel may shield noise from electromagnetic wave while it a cable as a noise source is close to the place, it can serve as an antenna. Every fast signal cable as well as the extension cable needs proper spacing from the panel.

# 14.2 Requirements Complying with Low Voltage Direction

The low voltage direction requires a device that operates with AC50~1000V, DC 75 ~ 1500V to have proper safety. The followings summarize the cautions for installing and wiring PLC of the XGT series to comply with the low voltage directions. The description is the data based on the applicable requirements and specifications as far as we know but it does not mean that every system manufactured according to the description meets the following specifications. The method and determination to comply with the EMC directions should be finally determined by the system manufacturer self.

# 14.2.1 Specifications applicable to XGT series

XGT series follow the EN6100-1 (safety of the device used in measurement/control lab). XGT series is developed in accordance with the above specifications, even for a module operating at the rated voltage higher than AC50V/DC75V.

# 14.2.2 Selection of XGT series PLC

(1) Power module

The power module of which rated input voltage is AC110/220V may have dangerous voltage(higher than 42.4V peak) inside it, so any CE mark compliance product is insulated between the primary and the secondary.

(2) I/O module

The I/O module of which rated voltage is AC110/220V may have dangerous voltage(higher than 42.4V peak) inside it, so any CE mark compliance product is insulated between the primary and the secondary. The I/O module lower than DC24V is not applicable to the low voltage directions.

(3) CPU Module, Base unit

The modules use DC5V, 3.3V circuits, so they are not applicable to the low voltage directions.

(4) Special module, Communication module The modules use the rated voltage less than DC 24V, so they are not applicable to the low voltage directions. Chapter 14 Compliance with EMC Specifications

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# APPENDIX

# A.1 Communication Terminology

# A.1.1 Profibus-DP

# Profibus

Profibus is the protocol that Bosch, Siemens, Klockener-Moeller in Germany has developed and designated as German standard DIN 19245 as well as the network designated as European standard EN50 170 with WorldFIP, P-NET recently.

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

# **Profibus-FMS**

This is the solution for general purpose that provides the communication function in the cell level including the function to send the program file to act the field equipment and the related data file, the function to control the program remotely through the network, and the function to manage the various accidents to be occurred in the process of control and automation system etc.

#### **Profibus-DP**

This is the communication method to send the real time data between field equipment within the shortest time and substitute the communication system using the existing 24V or 4~20 mA analog signal with high speed digital communication method. The example to be applied is the communication between field equipment such as various sensor and actuator etc. installed in the PLC and the field.

# **Profibus-PA**

This is made specially for process automation and the safety device is embedded and available to connect the sensor and actuator with one common bus line and perform the data communication and the power supply on the bus using 2-wire technology in accordance with International Standard IEC 1158-2.

# Sycon

This is a Profibus Network Configuration Tool and when using the LSIS Master module (G3/4/6L-PUEA, XGL-PMEA) as a Profibus Network, use Sycon to configure Profibus Network and download the information to the corresponding master module.

# GSD file

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This is the electronic device data sheet and includes manufacturer name, device name, H/W and S/W release status, support transmission rate, master related spec. (max. slave number available to connect, upload/download option etc.) and slave related spec. (I/O channel number and type, diagnosis text spec. and module information equipped with moduler device.).

#### **EDD (Electronic Device Description)**

This introduces the device registration information of field device generally. It allows to describe the complicated automation system as well as simple field device (such as sensor and actuator) regardless of manufacturer. The device description is provided per device in the electronic form made by the manufacturer and EDD file is read by engineering tool and enables Profibus system to be set easily. And it describes the device variable and its function as well as contains the elements for operation and visualization.

#### **Broadcast Communication**

This means to send the message not recognized by the action Station to all Station (Master, Slave).

# **Multicast Communication**

This means that the action station sends the not recognized message to the pre-defined Station group (Master, Slave).

# A.1.2 DeviceNet

# **ODVA (Open DeviceNet Vendor Association)**

This is to contribute for the promotion of World industrial Automation technology, DeviceNet and the related technology. It participates in the exhibition for technical seminar and PR activity and writes/distributes the technical documents to attract the attention of the sales agents and the user for DeviceNet. ODVA's activity includes the PR of DeviceNet Specification for each industrial sales organization in charge of network standardization, the requirements of the expansion or amendment for DeviceNet Specification according to the requirement of the market when the same Specification is selected in the real industrial automatic control system, and the proposal of the expansion or amendment of DeviceNet Specifications to the ODVA.

#### **Bus-off**

When the trouble occurs in the power of network, the error will occur.

# **CAN (Controller Area Network)**

This is the communication protocol designed for automobile exclusive communication. Device network adapted CAN technology.

## Scanlist

If the master module wants to communicate with the Slave module, it is required to know all information of the slave module (station address. message selection (Poll, Strobe etc.)) and set. This information is called 'Scanlist'. Dnet I/F module of GLOFA-GM PLC can set this easily just by high speed link parameter setting in GMWIN.

#### Connection

This means the logical connection between master and slave connected by DeviceNet and is used to maintain and manage all communication.

## Profile

This provides the information for Device Configuration data. (Printed data sheet, EDS; Electronic Data Sheet etc.)

#### Master/Slave

The module to send/receive and manage the data is 'master module' and the module to reply to the data that the master module sends is 'slave module'.

## Packet

This is a pack of data that is a basic unit to transmit the data through the network. It attaches the header (Message Identifier) to the front part to add the information of the destination to go and other necessary information etc.

# A.1.3 Rnet

#### Master module (Rnet Master Module: RMM)

This is Rnet I/F module that is installed I/O digit of basic base.

#### **Master station**

This is the station connected directly GMWIN/KGLWIN so that the user performs the program download and monitoring/debugging in the same network including CPU.

# **Remote I/O station**

Remote I/O module controls the I/O of remote station receiving I/O data from master station instead of PLC CPU in the PLC system.

#### Rnet

Fieldbus is the lowest network connecting the control machine and instrument device, selecting 3 among 7 layers of OSI. 3 layers are composed of Physical layer which is composed of H2 (1Mbps electric), H1 (31.23Kbbs electric), light, Wireless etc., Data Link layer selecting the Scheduled and Circulated Token bus, and Application layer that charges in the application role and this is the standard selecting the 'User layer' additionally.

#### Token

This is the access right control for Physical Medium and has the right to send the data of self station.

# Rnet station no.

Station no. (G3L-RUEA...etc.) of communication module selecting Rnet specification. The station no. used in Rnet shall be set by the switch attached in the front of communication module and used as station no. of all service including high speed link service.

# **Manchester Biphase-L**

This is data modulation method used in Rnet. The data is encoded (Encode) using Manchester-L Code and sent and the received data after encoding by Manchester is converted by Decoding.

# CRC (Cyclic Redundancy Check)

This is one of error detection method and is used widely for the synchronous transmission that is called as 'cyclic sign method'.

# **Terminal resistor**

This is the resistance to be used to meet the mutual impedance between sending/receiving side of Physical Layer and Terminal resistance of Rnet 110 $\Omega$ , 1/2W.

# **High Speed Link**

This is the communication method to be used only between Rnet communication module so that the user can send/receive the data with high speed. The communication is carried out by setting the high speed link parameter in GMWIN/KGL-WIN.

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# Segment

This is the local network connecting all station by using the same Token without using any other connecting device (Gateway, repeater).

# Network

This is the overall communication system composed of more than one segment and using the same Token.

# A.1.4 Modbus

# Protocol

This is the communication regulation pre-defined on the sending/receiving side of information to send/receive the efficient and reliable information without error between more than 2 computer and terminals. Generally, it defines the establishment of calling, connection, structure of message exchange form, retransmission of error message, line inversion procedure, character synchronization between terminal etc.

# BPS (Bits Per Second) and CPS(Characters Per Second)

BPS is the transmission rate unit how many bit is transmitted per second when transmitting the data and CPS is the number of character to be transmitted per second. Usually 1 character is 1Byte(8Bit) and thus, CPS is the byte number available to transmit per second.

#### Node

This means the connecting joint of data in network tree structure and generally the network is composed of lots of node. This is expressed also as Station no.

#### Packet

This is the term used in packet exchange method that divides the information into packet unit and transmits and also is the compound term of Package and Bucket. Packet is the thing attached the header indicating the address of other station by dividing the transmitting data into the designated length.

# Port

This is a part of data processing device to send/receive the data from remote terminal in the data communication and in case of Cnet serial communication.

# RS-232C

This is the serial communication standard designated by EIA according to the recommendation of CCITT as the interface to connect the modem and terminal or model and computer. This is used for modem connection as well as direct connection to the null modem. The demerits are that the transmission distance is short and only 1:1 communication is available. The specification that overcome this demerits is RS-422, RS-485.

#### RS-422/RS-485

This is one of serial transmission specification and the transmission distance is long and 1:N connection is available comparing with RS-232C. The difference between 2 specification is that RS-422 uses 4 signal cable such as TX(+), TX(-), RX(+), RX(-) while RS-485 has (+), (-) 2 signal cable and performs the sending/receiving through the same signal cable. So, RS-422 performs full duplex mode communication and RS-485 performs half duplex mode communication.

# A.1.5 Ethernet

# **IEEE 802.3**

IEEE 802.3 specifies standards regarding to CSMA/CD-based Ethernet. More specific, it is a Local Area Network (LAN) based on CSMA/CD (Carrier Sense Multiple Access with Collision Detection) Ethernet designed by IEEE 802.3 Group and it is divided into three sub projects as below:

(1) IEEE P802.3 - 10G Base T Study Group

(2) IEEE P802.3ah - Ethernet in the First Mile Task Force

(3) IEEE P802.3ak - 10G Base-CX4 Task Force

\* Ethernet and IEEE 802.3are standardized by RFC894 and RFC1042, and they shall conduct frame treatment mutually.

## **ARP (Address Resolution Protocol)**

A protocol to find MAC addresses by using partner's IP address on the Ethernet LAN.

## Bridge

A device used to connect two networks together to ensure they act as if they are one network. Even though Bridge is used to connect two different types of networks, it is also used to divide one large network into two small networks to improve its performance.

(1) Related standard : IEEE 802.1D

(2) Bridge (Layer 2 Switch) is a device to link to Layer2 and it extends the limit of distribution of Ethernet, performing filtering and forwarding.

#### Client

A network service user or, a computer or a program using other computer's resource (Mainly the party who requests the service.)

#### CSMA/CD (Carrier Sense Multiple Access with Collision Detection)

Before sending data to the network, each terminal (Client) checks if there is any signal on the network (Carrier Sense) and sends data when the network is empty. At this time, all terminals have the equal authority to send data (Multiple Access) and, if more than two terminals send data and any collision takes place, the terminal that detects this resends data after a few minutes later (Collision Detect).

#### **DNS (Domain Name System)**

A method used to convert a domain name in Alphabet on the Internet to its corresponding Internet number (IP Address)

#### **Dot Address**

It is expressed in '100.100.100.100', representing IP Address. Each number is expressed in decimal and dominates each one byte of total four bytes.

# E-mail Address

The address of the user who has a login account on a specific device connected to the Internet. Typically, it forms like the user's ID@ domain name (device name). It looks like this example, hjjee@microsoft.com, where, @ is called 'at' and it appears on the screen if shift key and number 2 are pressed simultaneously on the keyboard. The letters after @ represent the domain name of a specific organization (school, research center, company...) connected to the Internet and the letters before @ show the user's ID. The last few letters are for the top level. For example, if it is the US, most cases show the following abbreviation words, and if it is Korea, 'kr' is used. .com : companies / .edu : mainly universities or other educational organization (education). / In Korea, .ac(academy) is widely used., / .gov : government agencies, For example, nasa.gov is used for NASA(government) / .mil : military related sites. For example, af.mil is used for the US Air Force (military)/ .org : private entities. Each nation is identified as follows:/ .au : Australia / .uk : the United Kingdom / .ca : Canada / .kr : Korea / .jp : Japan / .fr : France / .tw : Taiwan etc.

#### Ethernet

A representative LAN link system (IEEE 802.3) jointly developed by the US Xerox, Intel and DEC. As a network link system with 10Mbps transmission capability using 1500-byte packets, Ethernet is called a major term of LAN because it can bind various kinds of computer with a network. Various goods are available because it is not a standard only for a certain company but a universal standard,

## FTP (File Transfer Protocol)

As one of the application programs provided by TCP/IP protocol, it can be used to transfer files between computers. Only if only the user has an account on the computer he wants to log in, it is possible to log in to the computer fast and copy data on it to bring in wherever the computer is in the world.

#### Gateway

Software/hardware to translate two different protocols into those that can work well each other. A device that serves as a gate where information exchange takes place among different systems

#### Header

Part of a packet containing national address or partner nation's address and part for error inspection

# HTML (Hypertext Markup Language, Standard Language of WWW)

A language system to create a hypertext document, Any document made in HTML can be viewed through web browser.

#### HTTP (Hypertext Transfer Protocol, Standard Protocol of WWW)

A protocol used for the purpose of sending and receiving various files and data on the World Wide Web (WWW)

#### ICMP (Internet Control Message Protocol)

An extension protocol of IP Address for the purpose of creating error messages and test packets and reporting and controlling errors to ensure the Internet is properly managed.

## **IP (Internet Protocol)**

This is a protocol of the network layer for the Internet. It is non-connection datagram type protocol, and data such as TCP, UDP, ICMP, IGMP is transmitted and received by using IP(32 bits).

#### **IP Address**

This refers to the address of each computer in the internet. It is binary number with 32 bits (4 bytes) to identify each device in the internet. IP address is composed of two parts. One is network address to identify network and the other is host address to identify host. It is divided into class A/ B/ C according to how many bits are allocated to network address and host address respectively. Since each IP address is unique in the world, it is not decided discretionally. When subscribing internet, the Network Information Center (NIC) allocates the address. For Korea, KRNIC is in charge of this role. e.g.) 165.244.149.190

#### ISO (International Organization for Standardization)

This organization is a subsidiary organization of UN, and it establishes and manages international standard specification.

#### LAN (Local Area Network)

This is also called as information network in the local area. This refers to the network where multiple computers are connected by communication lines to exchange data in a limited range like one office or building.

#### MAC (Medium Access Control)

A method to decide which device will be used for a given time on the Broadcast network.

#### Node

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Each computer connected to the network is called a nod.

#### Packet

This is a packet of data, the basic unit for transmitting data via the network. Usually the size of one packet is between tens and hundreds bytes, and header is attached to the front of the packet to include information about the destination that where this packet should go and other necessary information.

#### PORT number

This is an identifier to identify application on TCP/UDP. TCP determines that data is sent to which application after identify this port number. The programs used in general operating system have each port. Ex.) 21/tcp : Telnet

#### **PPP (Point-to-Point Protocol)**

This is telephone communication protocol to allow packet transmission in connecting internet. This is the most common internet protocol when computer is connected to TCP/IP by using normal telephone line and modem. This is similar to SLIP, but it shows more excellent performance than SLIP since PPP has modern communication protocol elements such as error detection and data compression, etc.

#### Protocol

This refers to the rules about how computers connected to network can send and receive information mutually. Protocol also means low level description (e.g. which bit/byte should be out through the line) for interface between devices, or high level message exchange rules like transmitting files through internet.

#### Router

A device used to transmit data packet between networks. It sends data packets to the destination and holds them if the network is crowed and also judges which LAN is better to connect to at a junction of multiple LANs. That is, it refers to special computer software that manages connection of more than two networks.

#### Server

A party to passively respond to the client's request and share its own resource.

#### **TCP (Transmission Control Protocol)**

- (1) Transport Layer Protocol for the Internet
- Support sending/receiving data by using connection.
- Support multiplexing function
- Perform a reliable connection-oriented transmission of data
- Support emergency data transmission

#### TCP/IP (Transmission Control Protocol/Internet Protocol)

This refers to the transmission protocol for communications between different type of computers. It plays a role to enable communications between general computers and mid-sized host, IBM PC and MAC, and different companies' mid-sized computers. This is used as general name of protocol for transmitting information between computer networks, and it includes FTP, Telnet and SMTP. TCP divides data into packet and it is transmitted by IP. The transmitted packet is reorganized by TCP.

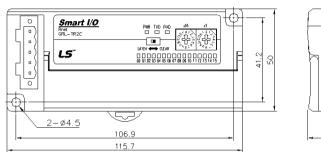
#### Near-end crosstalk

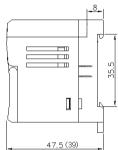
Crosstalk is a sort of disturbance incurred from electricity or magnetic field of communication signal, which affects another signal of near line. In telephone line, crosstalk may cause to hear some of the talks of another line. The phenomenon caused by crosstalk is also called as electromagnetic interference (EMI). This also happens in small circuit inside of computer or audio equipment as well as network line. This term may be applied to optical signals which interfere with each other. For example, like insulated conductor of telephone cable, there may be electrostatic coupling or electromagnetic coupling between any insulated conductor and another insulated conductor. And call current of one insulated conductor may be exposed to another conductor, and cause the crosstalk phenomenon. When crosstalk occurs at the transmission side, it is called as near-end crosstalk, and when crosstalk occurs at the receiving side, it is called as far-end crosstalk.

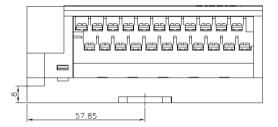
### **A.2 External Dimension**

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 External dimension of 16 point unit The external dimension of Pnet, Rnet, Snet etc are all same.

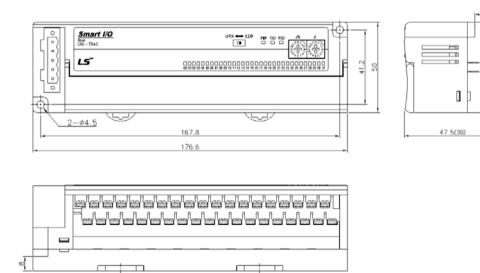






#### 2) External dimension of 32 point unit

The external dimension of Pnet, Rnet, Snet etc are all same.



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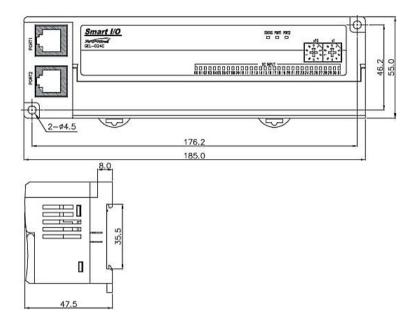
Unit: mm

Unit: mm

 External dimension of 32 point unit The external dimension of Pnet APIEnet is below

Unit: mm

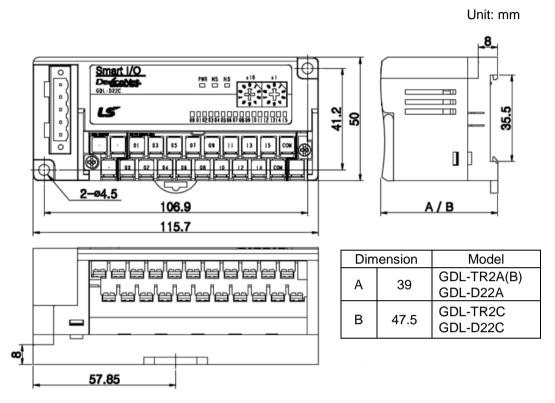
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4) External dimension of 16 point unit

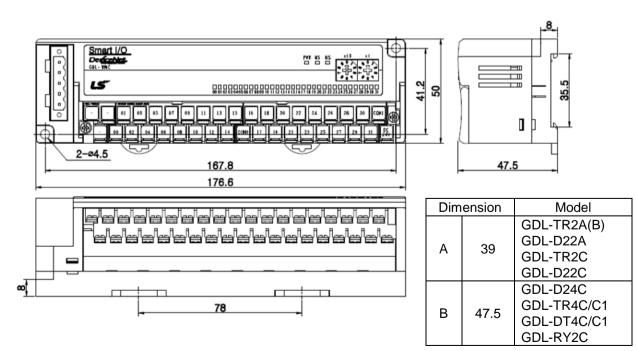
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The external dimension of Dnet is as follows.



5) External dimension of 32 point unit The external dimension of Dnet is as follows.

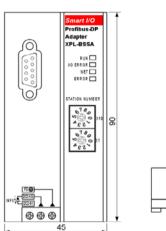
Unit: mm

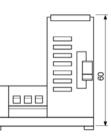


Expansion type I/F unit's External dimension
 Expansion type Smart I/O(Pnet, Dnet, Rnet, Enet) external dimension is as follows.

Unit: mm

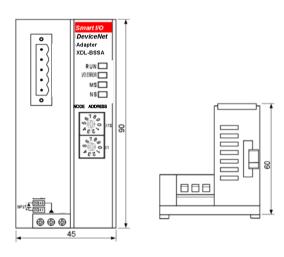
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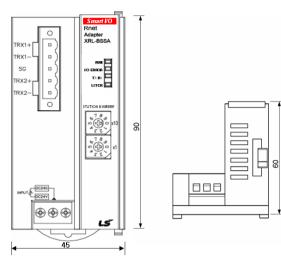
### (2) Dnet

(1) Pnet

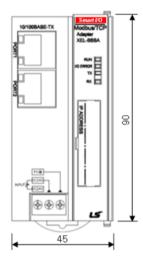


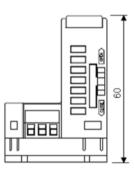
(3) Rnet

Γ



(4) Enet





### A.3 Expansion type analogue module parameter setting method (XDL-BSSA)

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#### A.3.1 Analogue I/O module parameter setting standard

(1) XBF-AD04A

address	7	6	5	4	3	2	1	0	meaning
0					С	С	С	С	<channel byte="" enable_low=""></channel>
0					Н	Н	Н	Н	Bit On(1): run
					3	2	1	0	Bit off(0): stop
									<input designation="" i="" range="" v=""/>
1		-13		H2	0	H1	CI	-U	Bit(00): 0~10V
1		15		12				10	Bit(01): 0~20mA
									Bit(10): 4~20mA
									<output data="" designation="" range=""></output>
									Bit(00): 0~4000
2	CI	-13	C	H2	C	H1	CI	-10	Bit(01): -2000~2000
2		10		12			CH0		Bit(10): standard value
									(0~1000/400~2000/0~2000)
									Bit(11): percent value(0~1000)

#### (2) XBF-DV04A

address	7	6	5	4	3	2	1	0	meaning
0					C H 3	C H 2	C H 1	C H O	<channel byte="" enable_low=""> Bit On(1): run Bit off(0): stop</channel>
1	CI	-13	CH2		CH1		CH0		<voltage range="" setting=""> Bit(00): 0~10V</voltage>
2	CI	-13	CI	H2	CI	-11	Cł	-10	<input data="" setting="" type=""/> Bit(00): 0~4000 Bit(01): -2000~2000 Bit(10): 0~1000 Bit(11): 0~1000

#### (3) XBF-DC04A

address	7	6	5	4	3	2	1	0	meaning
0					С	С	С	С	<channel byte="" enable_low=""></channel>
Ũ					н	н	Н	Н	Bit On(1): run
					3	2	1	0	Bit off(0): stop
									<current range="" setting=""></current>
1	CH3		CH2		CH1		CH0		Bit(00): 4~20mA
									Bit(01): 0~20mA
									<input data="" setting="" type=""/>
									Bit(00): 0~4000
2	CH3		CH2		CI	CH1		-10	Bit(01): -2000~2000
									Bit(10): 400~2000/0~2000
									Bit(11): 0~1000

### (4) XBF-RD04A

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address	7	6	5	4	3	2	1	0	meaning
0					C H 3	C H 2	C H 1	С Н 0	<channel byte="" enable_low=""> Bit On(1): run Bit off(0): stop <tmp. indication="" unit<br="">designation_high byte&gt; Bit On(1): Fahrenheit Bit off(0): Celsius</tmp.></channel>
1	Cł	-13	CI	H2	CI	H1	CI	-10	<sensor input="" range="" setting=""> Bit On(1): JPT100 Bit Off(0): PT100</sensor>

### (5) XBF-TC04S

Address	7	6	5	4	3	2	1	0	Meaning
0	С Н З	C H 2	C H 1	С Н 0	С Н З	С Н 2	С Н 1	С Н 0	<ch byte="" enable_low=""> Bit On(1): run Bit Off(0): stop <tmp. indication="" unit<br="">designation_high byte&gt; Bit On(1): Fahrenheit Bit off(0): Celsius</tmp.></ch>
1	CH 3		C⊦	12	Cł	H 1	C⊦	0	<sensor input="" setting="" type=""> K type: 00, J type: 01 T type: 10, R type: 11</sensor>

### (6)XBF-AH04A

Address	7	6	5	4	3	2	1	0	Meaning		
0		INF Cł	-				PUT H 0		<i o="" range="" setting=""> Bit(0000): 4 ~ 20 mA Bit(0001): 0 ~ 20 mA</i>		
1		OUT CH					TPUT CH 0		Bit(0010): 1 ~ 5 V Bit(0011): 0 ~ 5 V Bit(0100): 0 ~ 10 V		
2		TPUT H 1	OUT Cŀ		INF Cł			2UT 1 0	<i data="" o="" setting="" type=""> Bit(00): 0 ~ 4000 Bit(01): -2000 ~ 2000 Bit(10): precise value Bit(11): 0 ~ 1000 - In case of precise value 4 ~ 20 mA: 400 ~ 2000 0 ~ 20 mA: 0 ~ 2000 1 ~ 5 V: 100 ~ 500 0 ~ 5 V: 0 ~ 500 0 ~ 10 V: 0 ~ 1000</i>		

### Note

#### Caution in setting an analog parameter

- (1) For analog module, all channels are set as Enable status internally.(2) If you don't set any parameter, module operates with initial parameter value.

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(3) The setting parameter is sent from master to slave.

#### A.3.2 Analog parameter setting method

Configure the Dnet adapter which is slave module in the SyCon. (But this time use EDS file as XDL-BSSA.EDS). Slave module setting method in the network can be divided into 'manual setting' and 'auto setting'

(1) Manual setting

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Execution method: SyCon  $\rightarrow$  Insert  $\rightarrow$  Device...

The following screen shows

(2) Auto setting

Execution method:

SyCon  $\rightarrow$  Online  $\rightarrow$  Automatic Network Scan  $\rightarrow$  Double-click the each module The following screen shows.

#### <Setting screen 1>: click parameter setting button.

Device Configuration	×
MAC ID T File name XDL-BSSA,EDS Description Device 1 If Actual configuration II XDL-BSS	
Actual chosen IO connection C Poll C Bit strobe  € Change of state  C Cyclic  ☐ UCMM check  Group 3  ▼	
Connection Object Instance Attributes P	'aram <u>e</u> ter Data,
Expected packet rate 200 Production inhibit time 100	N
Watchdog timeout action Timeout	
Produced connection size 32 Consumed connection size 24	
Available predefined connection data types	Parameter setting button
Data type Description Data length	
BIT Input Bit 1	
BIT Output_Bit 1	
BYTE Input_Byte 1 Append to configured I/0	O data
BYTE Output_Byte 1 Insert into configured I/C	O data
Lucopo lassi Visid 1	
Configured I/O connection data and its offset address	
Data type Description I Type I Len. I Addr. O Type O Len. O Addr.	
BYTE ARRAY Module1 IB 32 0	
BYTE ARRAY Module2 QB 24 0 Delete configured I/O	l eteb
↓ Symbolic Names	

<Setting screen 2>: In the Available Parametersproject window, double-click the slot you want to set parameter. After double-click, Customized Parameters window shows.

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	le Par	amete	rs —					Parameter a	access filter 🛛 🛛	all 💌	<u>0</u> K
Obj.	Clas	Inst,	Attr,	Туре	Acces	Parameter Nai	me	Min	Max		<u>C</u> ancel
0001	64	01	01	DWOR	R/W	Set Slot1 Parai	meter	00000000	00FFFFFF	Double-click	analog
0002	64	01	02	DWOR	R/W	Set Slot2 Para	meter	00000000	OOFFFFFF	module	analog
0003	64	01	03	DWOR	R/W	Set Slot3 Para	meter	00000000	00FFFFFF		
0004	64	01	04	DWOR	R/W	Set Slot4 Para	neter	00000000	OOFFFFF		
0005	64	01	05	DWOR	R/W	Set Slot5 Para	meter	00000000	OOFFFFFF		Values
ustorr	 hized f	<sup>o</sup> aram	eters -						Move to module	each	D <u>e</u> cimal
Clas	Inst,	Attr,	Туре	!	Param	eter Name	7	Value			Add
											 Delete
											<u></u> 0.000
lelp											<u>U</u> ser Paramete

<Setting screen 3>: set parameter value at 'Value' in the Customized Parameters winow.

rameter	Data									×
Availab	ole Par	amete	rs —				Parameter ac	anna filtar	[-!!	<u>0</u> K
							Parameter ac	cess filter	all	<u> </u>
Obj.	Clas	Inst,	Attr,	Туре	Acces	Parameter Name	Min	Max		
0002	64	01	02	DWOR	R/W	Set Slot2 Parameter	00000000	OOFFFFFF	-	-
0003	64	01	03	DWOR	R/W	Set Slot3 Parameter	00000000	OOFFFFFF		
									-	-
	1	1	1	·			- I	1		- Values 1
Help									4	<u>V</u> alues
~ .		_								
Custon										_
	Inst,	Attr,				eter Name	Value		4	<u>A</u> dd
64	101	01	DWO	RD	Set Slo	t1 Parameter	0000000F		-	
64	01	04	DWO	RD	Set Slo	t4 Parameter	0000000F			<u>D</u> elete
64	01	05	DWO	RD	Set Slo	t5 Parameter	0000550F			
64	01	06	DWO	RD	Set Slo	t6 Parameter	0000000F			
64	01	07	DWO	RD	Set Slo	t7 Parameter	0000000F			a attin av by
Help									Parameter	setting: er ameter
									0000550F	
	,									

<Setting screen 4>: When completion of parameter setting, download it to master module  $SyCon \rightarrow Online \rightarrow$ Download :

<Setting screen 5>: Turn off/on expansion type Smart I/O Dnet's DC 24V power.

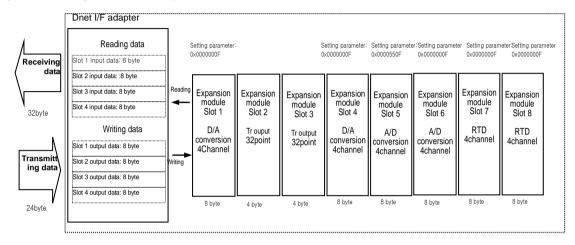
#### <Setting screen 6>

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- 1) When setting network first
- Setting HSL parameter through the XG5000
- 2) When changing the analog parameter after network setting

SyCon  $\rightarrow$  Online  $\rightarrow$  Start Communication

#### <System configuration example: 1station>

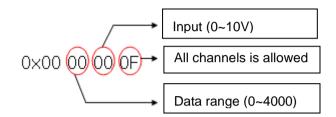


#### <Parameter setting contents example per each module>

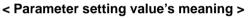
Module	Mode	Setting parameter	contents
			1. all channels: enable
XGF-DV04A	-	0x0000000F	2. voltage range: 0~10V 3. data type: 0~ 4000
			1. all channels: enable
XGF-AD04A	Current	0x0000550F	2. current range: 0~20mA
			3. data type: 0~4000
			1. all channels: enable
XGF-AD04A	Voltage	0x0000000F	2. voltage range: 0~10V
			3. data type: 0~4000
			1. all channels: enable
XGF-DC04A	-	0x0000000F	2. current range : 4~20mA
			3. data type: 0~4000
			1. all channels: enable
XGF-RD04A	-	0x0000000F	2. Temp. unit: Celsius
			3. sensor range: PT100
			1.all channels: Enable
XGF-TC04S	-	0x00 <b>0000FF</b>	2.all channels temp. unit: Fahrenheit
			3.all channels sensor type: K
			1.all channels: Enable
XGF-AH04A	-	0x00 <b>004444</b>	2.all input channels range: 0~10V
			3.all output channels range: 0~10V
			4.all channels data type: 0~4000

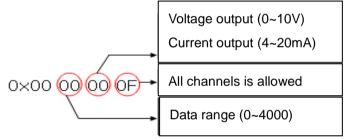
\*When not setting the parameter, all analog modules are set as default value (0x000000F)

- 1) XBF-AD04A : All channel (Enable), input (DC 0~10 V), data range ( 0 ~ 4000 )  $\rightarrow$  This value is effective when switch is off, voltage mode.
  - In case of current mode, you should modify the parameter value.
    - < Parameter setting value's meaning >

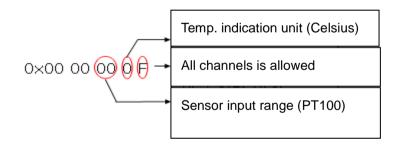


2) XBF-DV04A: all channels (Enable), output (DC 0~10 V), data range (0 ~ 4000) XBF-DC04A: all channels (Enable), output (4 ~ 20 mA), data range (0 ~ 4000)





3) XBF-RD04A: all channels (Enable), Temp. unit (centigrade), input sensor type (PT100)
 **Parameter setting value's meaning >**



### A.4 How to set an expansion type analog module parameter (XPL-BSSA)

### A.4.1 Configuration of analog IO module parameter

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Analog I/O module parameter of XPL-BSSA is as follows.

	Parameter		Contents	
Module type	setting value (Decimal)	Analog I/O value	Digital I/O value	Remark
	0	0~10V	0~4,000	Initial value
	1	0~20mA	0~4,000	
	2	4~20mA	0~4,000	
	3	0~10V	-2,000~2,000	
XBF-AD04A	4	0~20mA	-2,000~2,000	
	5	4~20mA	-2,000~2,000	
	6	0~10V	0~1,000	
	7	0~20mA	0~1,000	
	8	4~20mA	0~1,000	
	0	0~10V	0~4,000	Initial value
XBF-DV04A	1	0~10V	0~1,000	
	2	0~10V	-2,000~2,000	
	0	4~20mA	0 ~ 4,000	Initial value
	1	0~20mA	0 ~ 4,000	
	2	4~20mA	0 ~ 1,000	
	3	0~20mA	0 ~ 1,000	
XBF-DC04A	4	4~20mA	-2,000~2,000	
	5	0~20mA	-2,000~2,000	
	6	4~20mA	Precise value	
	7	0~20mA	Precise value	
	0	pt100	Celsius	Initial value
	1	jpt100	Celsius	
XBF-RD04A	2	pt100	Fahrenheit	
	3	jpt100	Fahrenheit	
	0	K		Initial value
	1	J		
	2	Т	Celsius	
	3	R		
XBF-TC04S	4	K		
	5	J		
	6	T	Fahrenheit	
	7	R		
	0		0~4,000	Initial value
	1		-2,000~2,000	
	2	– 1~5V	Precise value	
	3	1	0~1000	
	4		0~4,000	
XBF-AH04A,	5		-2,000~2,000	
XBF-AD08A	6	- 0~5V	Precise value	
	7	1	0~1000	
	8		0~4,000	
	9	-	-2,000~2,000	
	10	0~10V	Precise value	
	11	-1	0~1000	

	Parameter		Contents	
Module type	setting value (Decimal)	Analog I/O value	Digital I/O value	Remark
	12		0~4,000	
	13	1 00m A	-2,000~2,000	
	14	- 4~20mA	Precise value	
XBF-AH04A,	15		0~1000	
XBF-AD08A	16		0~4,000	
	17	0.00	-2,000~2,000	
	18	- 0~20mA	Precise value	
	19		0~1000	
	0		0~16,000	Initial value
	1	4.00mA	-8,000~8,000	
	2	- 4~20mA	Precise value	
	3	1	0~10,000	
	4		0~16,000	
	5		-8,000~8,000	
	6	- 0~20mA	Precise value	
	7	1	0~10,000	
	8		0~16,000	
	9	1	-8,000~8,000	
	10	- 1~5V	Precise value	
	11	-	0~10,000	
XBF-AD04C	12		0~16,000	
	13	-	-8,000~8,000	
	14	0~5V	Precise value	
	15	-	0~10,000	
	16		0~16,000	
	17	-	-8,000~8,000	
	18	0~10V	Precise value	
	19	-	0~10,000	
	20		0~16,000	
	20	-	-8,000~8,000	
	22	-10~10V	Precise value	
	23	-	0~10,000	
	0		0~10,000	Initial value
	1	4	-8,000~8,000	
	2	- 1~5V	Precise value	
	3	4	0~10,000	
	4		0~10,000	
	5	4	-8,000~8,000	
	6	0~5V	Precise value	
	7	4	0~10,000	
XBF-DV04C	8		0~10,000	
	9	4	-8,000~8,000	
	10	0~10V	Precise value	
	11	4	0~10,000	
	12		0~10,000	
	12	-	-8,000~8,000	
	13	-10~10V	Precise value	
	14	-	0~10,000	
	10		0~10,000	

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	Parameter	Contents								
Module type	setting value (Decimal)	Analog I/O value	Digital I/O value	Remark						
	0		0~16,000	Initial value						
	1	4~20mA	-8,000~8,000							
	2	4~20MA	Precise value							
XBF-DC04C	3		0~10,000							
	4		0~16,000							
	5	0~20mA	-8,000~8,000							
	6	0~20MA	Precise value							
	7		0~10,000							

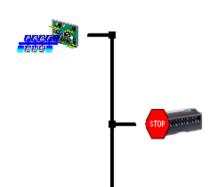
#### A.4.2 How to set an analog parameter

How to set the analog parameter of XPL-BSSA is classified into two methods according to master module type. (Setting at Sycon and Setting at PROFICON). For G4L-PUEC and XGK-PMEC, PROFICON is used. And for other modules, Sycon is used for parameter setting

### (1) Setting at Sycon

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a) Double-click XPL-BSSA as below.



### Master0

Station address DP Master 0 COM-C-DPM

### Slave 1

Station address DP Slave

1 XPL-BSSA b) Click the "Parameter Data" at "Slave Configuration"

Slave Configuration				
General Device XPL-BSSA Description Slave1 I Activate device in actua I Enable watchdog contr	~	Station address		<u>O</u> K <u>C</u> ancel
Max, length of in-/output dat Max, length of input data Max, length of output data Max, number of modules	a 64 Byte 32 Byte 32 Byte 8	Length of in-/output data Length of input data Length of output data Number of modules	0 Byte 0 Byte 0 Byte 0	<u>D</u> PV1 Settings Assigned master Station address 0 Master0
Nodule Digital Input lbyte Digital Input 2byte Digital Input 4byte Digital Output lbyte Digital Output 2byte	Inputs Outputs 1 Byte 2 Byte 4 Byte 1 Byte 2 Byte 4 Dyte 4 Dyte 4 Dyte 4 Dyte 4 Dyte 5	In/Out Identifier 0x10 0x11 0x13 0x20 0x21 0x22		Actual slave Station address 1 Slave1
Slot Idx Module Symbol	Type I Addr.	I Len. Type 0 Addr. 0 I	ien.	▲ <u>Append Module</u> <u>B</u> ernove Module Insert Module Predefined <u>M</u> odules ✓ <u>Symbolic Names</u>

c) Set a parameter per each slot at Parameter Data. For parameter input, double-click the slot. At this time, parameter input value is decimal number.

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P	aram	eter Data										×	
	Descrip		eter Dat	a in hex d	escrip							ок	
	Byte	Description				Value							_
	0	1 parameter data by	/te			0x00			Slot	no.1 pa	ram	eter setting	
	1	2 parameter data by	/te			0x00		L					
	2	3 parameter data by	/te	Double	مانما						P	arameter Data	
	3	4 parameter data by	/te	Double	-CIICI	(					<u> </u>		
	4	5 parameter data by	/te			0x00						Common	
	5	6 parameter data by	/te			0x00		Г			-		
	6	7 parameter data by		0x00	•		Slot	no.7 pa	ram	eter setting			
	7	8 parameter data by	/te			0x00		L				-	
			1 nai	rameter	data	a byte							
			- pai	Gintocon	0000	. Byes							
			Data	type	Uns	igned8	[	ОК					
			Offse			-	l	UIX		×.			
-				-	0.4	>		Cancel		-			
				value	0 (d		-			- I	h	nsert Module	
			Max	value	255	(dec)		Hex					
			Value	e	0		 dec			_	Prec	defined Modules	
				-						- <b>-</b> [	Sv	mbolic Names	

#### (2) Setting at nConfigurator

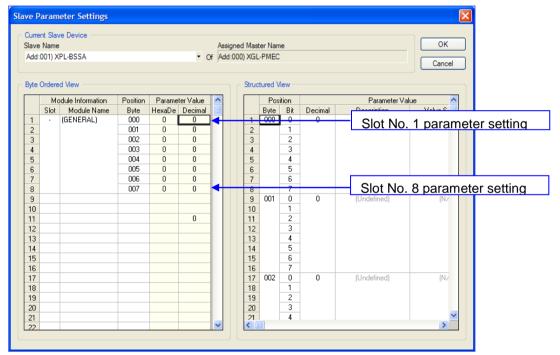
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Click XPL-BSSA and then click "Configuration  $\rightarrow$  Parameter Settings" in menu.



a) Click a "Parameter Data" at "Slave Configuration"

Set a parameter per each slot at Parameter Value. For parameter input, click Decimal and input a parameter. At this time, input value of each parameter is decimal number.



#### Note

#### Caution in setting an analog parameter

(1) Each parameter setting is necessary for each analog module.

- (2) If you don't set any parameter, module operates with initial parameter value.
- (3) The parameter is sent from master to slave.
  - Slave keeps previous value while cable is connected, regardless of power on/off.

If you restart the power while cable is not connected, module operated with initial value.

### A.5 How to set an expansion type analog module parameter (XRL-BSSA)

#### A.5.1 Analog IO module parameter setting (Only for OS version 1.3 or higher)

\* Parameter setting as below is provided for OS Version 1.3 or higher.

If you are using V1.2 or less, refer to A.5.2

(1) Analog Input Parameter Setting

### 1) XBF-AD04A

Memory	Description				E	Bit				Configuration	
address	Description	7	6	5	4	3	2	1 0		Configuration	
0 :H <sup>1)</sup>	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop	
0: L <sup>1)</sup>	Designation of Input voltage/ current range	C	h3	Ch 2		Cł	1	Cł	n 0	00: 0 ~ 10V(4 ~ 20mA) 01: 0 ~ 20mA 10: 4 ~ 20mA	
1 : H	Designation of output data range	Cł	ר 3	Ch 2		Cł	1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value <sup>2)</sup> 11: 0 ~ 1000	

#### 2) XBF-AD08A

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Connguration
0 :H	Configuration of channels to be used	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of Input voltage/	CI	Ch 3		า 2	Cł	n 1	Cł	n 0	00:4~20 mA 01:0~20 mA
1 : H	current range	Cł	Ch 7		Ch 6		n 5	5 Ch 4		10 : 0 ~ 5 V 11 : 0 ~ 10 V
1 : L	Designation of output data range	Ch	6,7	Ch	4,5	Ch	2,3	Ch	0,1	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

#### 3) XBF-AD04C

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0: L	Designation of Input voltage/		Cł	า 1			Cł	n 0		0000: 4 ~ 20mA 0001: 0~20mA 0010: 1~5V
1: H	current range		Cł	n 3			Ch	า 2		0100: 0~10V 0100: 0~10V 0101: -10V~10V
1: L	Designation of output data range	Cł	า 3	Cł	n 2	Cł	1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise Value 11: 0 ~ 10000

#### Note

#### 1) Meaning of memory address

- H : High byte (In case that setting area of parameter value of PLC is 0x1234, H byte  $\rightarrow$  0x12)
- 0:H means that high byte of an word from memory address 0.
- L: Low byte (In case that setting area of parameter value of PLC is 0x1234, L byte  $\rightarrow$  0x34)
- 1:L means that low byte of an word from memory address 1

#### 2) Precise Value

Precise Value = Range of input/output × 100

(Ex: Input range=0~5, Input or Output data range= Precise value

 $\rightarrow$  Data input range is 0~500)

#### 3) Cautions in setting an analog parameter

- (1) After setting a parameter, make sure you restart a power of XRL-BSSA module. If the wrong device size does not operate.
- (2) Parameter input value should be a decimal number.

### (2) Analog Output parameter setting

## 1) XBF-DV04A

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	n 3	Cł	Ch 2		n 1	Ch	n 0	00: 0 ~ 10V
1 : H	Designation of input data range	Cł	n 3	Cł	Ch 2		n 1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

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### 2) XBF-DV04C

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1 0		Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	n 3	Cł	Ch 2		n 1	Cł	n 0	00: 1~5V 01: 0~5V 10: 0~10V 11: -10~10V
1 : H	Designation of input data range	Cł	n 3	Cł	Ch 2		n 1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000

### 3) XBF-DC04A

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	n 3	Ch 2		Cł	n 1	Cł	n 0	00: 4 ~ 20mA 01: 0 ~ 20mA
1 : H	Designation of input data range	Cł	n 3	Cł	n 2	Cł	1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

### 4) XBF-DC04C

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Memory	Description				E			Configuration		
address	Description	7	6	5 4		3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	n 3	Cł	Ch 2		n 1	Ch	n 0	00: 4~20mA 01: 0~20mA
1 : H	Designation of input data range	Cł	n 3	Cł	Ch 2		1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000

### (3) Thermocouple Input Parameter Setting (XBF-TC04S)

Memory	Description				E	Bit				Configuration
address	Description	7	7 6 5 4 3 2 1 0					0	Configuration	
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Configuration of output type	Cł	n 3	Cł	Ch 2		n 1	Cł	n 0	00 : K 01 : J 10 : T 11 : R
1 : H	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit

### (4) Resistance temperature detector Input Parameter Setting (XBF-RD04A)

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Configuration of output type	Cł	Ch 3 Ch 2 Ch 1						n 0	00: PT100 01: JPT100
1 : H	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit

Memory	Description	Bit								Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Output Ch1	Output Ch0	Input Ch1	Input Ch0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of Input/ Output voltage/ current range		tput h1	Output Ch0		Input Ch1		Input Ch0		00 : 4 ~ 20mA 01 : 0 ~ 20mA 10 : 0 ~ 5 V 11 : 0 ~ 10 V
1 : H	Designation of input/ output data range		tput h1		tput h0	Inț Ci	out n1	Input Ch0		00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

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#### (5) Analog I/O Combined Module (XBF-AH04A)

### Note

Cautions in setting an analog parameter 1. After setting a parameter, make sure you restart a power of XRL-BSSA module.

### A.5.2 Analog IO module parameter setting (Only for OS version 1.2 or less)

\* Parameter setting as below is provided for OS Version V1.2 or less.

If you are using 1.3 or higher, refer to A.5.1

(1) Ana	log IO	module	parameter
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	Parameter		Contents	
Module type	setting value (Decimal)	Analog I/O value	Digital I/O value	Remark
	0	0~10V	0~4,000	Initial value
	1	0~20mA	0~4,000	
	2	4~20mA	0~4,000	
	3	0~10V	-2,000~2,000	
XBF-AD04A	4	0~20mA	-2,000~2,000	
	5	4~20mA	-2,000~2,000	
	6	0~10V	0~1,000	
	7	0~20mA	0~1,000	
	8	4~20mA	0~1,000	
	0	0~10V	0~4,000	Initial value
XBF-DV04A	1	0~10V	-2,000~2,000	
	2	0~10V	0~1,000	
	0	4~20mA	0 ~ 4,000	Initial value
	1	0~20mA	0 ~ 4,000	
XBF-DC04A	2	4~20mA	0 ~ 1,000	
	3	0~20mA	0 ~ 1,000	
	0	pt100	Celsius	Initial value
	1	jpt100	Celsius	
XBF-RD04A	2	pt100	Fahrenheit	
	3	jpt100	Fahrenheit	
	0	, K		Initial value
	1	J		
	2	Т	Celsius	
	3	R		
XBF-TC04S	4	K		
	5	J		
	6	T	Fahrenheit	
	7	R		
	0		0~4,000	Initial value
	1	- - -	-2,000~2,000	
	2	1~5V	Precise value	
	3		0~1000	
	4		0~4,000	
XBF-AH04A,	5		-2,000~2,000	
XBF-AD08A	6	0~5V	Precise value	
	7	1	0~1000	
	8		0~4,000	
	9		-2,000~2,000	
	10	0~10V	Precise value	
	11	1	0~1000	

	Parameter		Contents	
Module type	setting value (Decimal)	Analog I/O value	Digital I/O value	Remark
	12		0~4,000	
	13	4.00~	-2,000~2,000	
	14	4~20mA	정규값	
XBF-AH04A,	15		0~1000	
XBF-AD08A	16		0~4,000	
	17	0.00~0	-2,000~2,000	
	18	0~20mA	정규값	
	19		0~1000	

#### (2) How to set analog parameter

In case analog module is installed at XRL-BSSA, 2 byte parameter setting area other than I/O data area should be allocated. You can set analog I/O range by inputting a value at parameter setting area of figure below. At this time, parameter setting area is allocated as Read Area.

(1) Device area allocation of analog input module

► XBF-AD04A/RD04A/TC04A/AD08A

Size	2 byte	2 byte	2 byte	2 byte	2 byte
	Parameter	CH 0	CH 1		CH N
Area	setting area	Input data	Input data		Input data

- (2) Device area allocation of analog output module
- ► XBF-DV04A/DC04A

Size	2 byte	2 byte	2 byte	2 byte	2 byte
	CH 0	CH 1		CH N	Parameter
Area	Output data	Output data		Output data	setting area

(3) Device area allocation of analog I/O module

► XBF-AH04A

Size	2 byte	2 byte	2 byte	2 byte	2 byte
A	CH 0	CH 1	CH 0	CH 1	Parameter
Area	Input data	Input data	Output data	Output data	setting area

#### (4) Example when consisted of XRL-BSSA + XBE-TN32A + XBF-AD04A + XBF-DV04A+XBE-DC32A

### ► In case of XGI series

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Module type	Mode	Station number	Read area	variable name	variable name comment	Sending data (Byte)	Save area	variable name	variable name comment	Receiving data (Byte)
XRL_BSSA	Send/Receive	1	%MW0			16	%MW200			12

#### ▶ In case of XGK series

Module type	Mode	Station number	Read area	variable name	variable name comment	Sending data (Byte)	Save area	variable name	variable name comment	Receiving data (Byte)
XRL_BSSA	Send/Receive	1	M0000			16	M0200			12

Meaning per each device area

CPU type	ltem	Size (byte)	Device area	Contents
			MW0~MW1	XBE-TN32A's output value
			MW2	XBF-AD04A's parameter setting area
			MW3	XBF-DC04A's CH0 output data
	Read area	16 byte	MW4	XBF-DC04A's CH1 output data
			MW5	XBF-DC04A's CH2 output data
XGI			MW6	XBF-DC04A's CH3 output data
7.01			MW7	XBF-DC04A's parameter setting area
			MW200	XBF-AD04A's CH0 input value save area
			MW201	XBF-AD04A's CH1 input value save area
	Save area	12 byte	MW202	XBF-AD04A's CH2 input value save area
			MW203	XBF-AD04A's CH3 input value save area
			MW204~MW205	XBE-DC32A's input value save area
			M0~M1	XBE-TN32A's output value
			M2	XBF-AD04A's parameter setting area
			M3	XBF-DC04A's CH0 output data
	Read area	16 byte	M4	XBF-DC04A's CH1 output data
			M5	XBF-DC04A's CH2 output data
ХGК			M6	XBF-DC04A's CH3 output data
AGK			M7	XBF-DC04A's parameter setting area
			M200	XBF-AD04A's CH0 input value save area
			M201	XBF-AD04A's CH1 input value save area
	Save area	12 byte	M202	XBF-AD04A's CH2 input value save area
			M203	XBF-AD04A's CH3 input value save area
			M204~M205	XBE-DC32A's input value save area

### Note

Cautions in setting an analog parameter 1. After setting a parameter, make sure you restart a power of XRL-BSSA module.

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2. Parameter input value should be a decimal number.

### A.6 Expansion Analog Module Parameter Setting Method (XEL-BSSA)

#### A.6.1 Analog Expansion Module Parameter Setting Criteria

- (1) Analog Input Parameter Setting
  - 1) XBF-AD04A

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Memory	Description		Bit							Configuration	
address	•	7	6	5	4	3	2	1 0		Configuration	
0 :H <sup>1)</sup>	Configuration of channels to be used	-	-	Ch 3 Ch 2		Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop			
0: L <sup>1)</sup>	Designation of Input voltage/ current range	C	h3	Cł	1 2	Cł	Ch 1 Ch 0		n 0	00: 0 ~ 10V(4 ~ 20mA) 01: 0 ~ 20mA 10: 4 ~ 20mA	
1 : H	Designation of output data range	Cł	n 3	Cł	n 2	Cł	n 1	Ch 0		00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value <sup>2)</sup> 11: 0 ~ 1000	

#### 2) XBF-AD08A

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Connguration
0 :H	Configuration of channels to be used	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of Input voltage/	CI	n 3	Cł	า 2	Cł	n 1	Cł	n 0	00 : 4 ~ 20 mA 01 : 0 ~ 20 mA
1 : H	current range	Cł	ז 7	Ch 6		Ch 5		Cł	n 4	10 : 0 ~ 5 V 11 : 0 ~ 10 V
1 : L	Designation of output data range	Ch 6,7		Ch 4,5		Ch 2,3		Ch 0,1		00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

3) XBF-AD04C

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0: L	Designation of Input voltage/		Cł	า 1			Cł	n 0		0000: 4 ~ 20mA 0001: 0~20mA 0010: 1~5V
1: H	current range		Cł	n 3			Ch	n 2		0100: 0~10V 0100: 0~10V 0101: -10V~10V
1: L	Designation of output data range	Cł	า 3	Cł	n 2	Cł	n 1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise Value 11: 0 ~ 10000

#### Note

#### 1) Meaning of memory address

H : High byte (In case that setting area of parameter value of PLC is 0x1234, H byte  $\rightarrow$  0x12)

- 0:H means that high byte of an word from memory address 0.
- L: Low byte (In case that setting area of parameter value of PLC is 0x1234, L byte  $\rightarrow$  0x34)
- 1:L means that low byte of an word from memory address 1

#### 2) Precise Value

Precise Value = Range of input/output × 100

(Ex: Input range=0~5, Input or Output data range= Precise value

 $\rightarrow$  Data input range is 0~500)

### (2) Analog Output parameter setting

### 1) XBF-DV04A

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Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	n 3	Cł	n 2	Cł	n 1	Ch	n 0	00: 0 ~ 10V
1 : H	Designation of input data range	Cł	n 3	Ch 2		Cł	n 1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

### 2) XBF-DV04C

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	า 3	Cł	n 2	Cł	n 1	Cł	n 0	00: 1~5V 01: 0~5V 10: 0~10V 11: -10~10V
1 : H	Designation of input data range	Cł	n 3	Cł	h 2 Ch 1 Ch 0		n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000		

### 3) XBF-DC04A

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	n 3	Cł	ז 2	Cł	n 1	Cł	n 0	00: 4 ~ 20mA 01: 0 ~ 20mA
1 : H	Designation of input data range	Cł	n 3	Ch 2		Cł	1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

4) XBF-DC04C

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of output range	Cł	n 3	Cł	า 2	Cł	n 1	Ch	n 0	00: 4~20mA 01: 0~20mA
1 : H	Designation of input data range	Cł	n 3	Ch 2		Cł	n 1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000

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### (3) Thermocouple Input Parameter Setting (XBF-TC04S)

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Configuration of output type	Cł	n 3	Cł	ז 2	Cł	า 1	Cł	n 0	00 : K 01 : J 10 : T 11 : R
1 : H	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit

### (4) Resistance temperature detector Input Parameter Setting (XBF-RD04A)

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Configuration of output type	Cł	ר 3 ו	Cł	า 2	Cł	n 1	Ch	n 0	00: PT100 01: JPT100
1 : H	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit

### (5) Digital I/O Parameter Setting

Γ

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Input filter	-	-	-	-		0000: 3ms 0001: 1 ms 0010: 5 ms 0011: 10 ms 0100: 20 ms 0101: 70 ms 0110 : 100 ms			
0 : L	Maintaining output is allowed			Conf	iguration of	maintaining	output		0x01 : Allow Others: Prohibit	
1 : H	Configuration of maintaining output by channels	56~63	48~55	40~47	32~39	24~31	16~23	8~15	0~7	0 : Clear 1 : Maintaining

### (6) Analog I/O Combined Module (XBF-AH04A)

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0 :H	Configuration of channels to be used	-	-	-	-	Output Ch1	Output Ch0	Input Ch1	Input Ch0	Bit On (1): Operation Bit Off (0): Stop
0 : L	Designation of Input/ Output voltage/ current range		tput h1		tput h0	Int Cl	out n1		out n0	00 : 4 ~ 20 mA 01 : 0 ~ 20 mA 10 : 0 ~ 5 V 11 : 0 ~ 10 V
1 : H	Designation of input/ output data range		Output Ch1		tput h0	Inț Cl	put n1		but n0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

### A.7 Expansion Analog Module Parameter Setting Method (XEL-BSSB)

#### A.7.1 Analog Expansion Module Parameter Setting Criteria

(1) Analog Input Parameter Setting

#### 1) XBF-AD04A

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
1	Designation of Input voltage/ current range	C	h3	Cł	1 2	Cł	n 1	Cł	n 0	00: 0 ~ 10V(4 ~ 20mA) 01: 0 ~ 20mA 10: 4 ~ 20mA
2	Designation of output data range	Cł	ז ז 3	Cł	n 2	Cł	n 1	Cł	n 0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

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#### 2) XBF-AD08A

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0	Configuration of channels to be used	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	Bit On (1): Operation Bit Off (0): Stop
1	Designation of Input voltage/	CI	h 3	Cł	า 2	Cł	n 1	Cł	n 0	00 : 4 ~ 20 mA 01 : 0 ~ 20 mA
2	current range	Cł	n 7	Cł	n 6	Cł	n 5	Cł	n 4	10 : 0 ~ 5 V 11 : 0 ~ 10 V
3	Designation of output data range	Ch 6,7		Ch	4,5	Ch	2,3	Ch	0,1	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000

### 3) XBF-AD04C

Γ

Memory	Description					Configuration				
address	Description	7	6	5	4	3	2	1	0	Configuration
0	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
1	Designation of Input voltage/		Cł	า 1			Cł	n 0		0000: 4 ~ 20mA 0001: 0~20mA 0010: 1~5V
2	current range		Cł	n 3			Ch	n 2		0100: 0~10V 0100: 0~10V 0101: -10V~10V
3	Designation of output data range	Cł	า 3	Cł	n 2	Cł	1	Cł	n 0	00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise Value 11: 0 ~ 10000

### (2) Analog Output parameter setting

## 1) XBF-DV04A

Memory	Description				E	Bit				Configuration	
address	Description	7	6	5	4	3	2	1	0	Configuration	
0	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop	
1	Designation of output range	Ch 3		Ch 2		Ch 1		Ch 0		00: 0 ~ 10V	
2	Designation of input data range	Ch 3		Ch 2		Ch 1		Ch 0		00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000	
3	Designation of output status	Cł	ז ז 3	Ch 2		Ch 1		Ch 0		00: previous output 01: mininum output 10: median output 11: maximum output	

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### 2) XBF-DV04C

Memory	Description			Configuration						
address	Description	7	6	5	4	3	2	1	0	Configuration
0	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
1	Designation of output range	Ch 3		Ch 2		Ch 1		Ch 0		00: 1~5V 01: 0~5V 10: 0~10V 11: -10~10V
2	Designation of input data range	Ch 3		Ch 2		Ch 1		Ch 0		00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000
3	Designation of output status	Cł	n 3	Ch 2		Ch 1		Ch 0		00: previous output 01: mininum output 10: median output 11: maximum output

### 3) XBF-DC04A

Γ

Memory	Description				E	Bit				Configuration	
address	Description	7	6	5	4	3	2	1	0	Configuration	
0	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop	
1	Designation of output range	Ch 3		Ch 2		Ch 1		Ch 0		00: 4 ~ 20mA 01: 0 ~ 20mA	
2	Designation of input data range	Ch 3		Ch 2		Ch 1		Ch 0		00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000	
3	Designation of output status	Cł	n 3	Ch 2		Ch 1		Ch 0		00: previous output 01: mininum output 10: median output 11: maximum output	

### 4) XBF-DC04C

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
1	Designation of output range	Ch 3		Ch 2		Ch 1		Cł	n 0	00: 4~20mA 01: 0~20mA
2	Designation of input data range	Cł	n 3	Ch 2		Ch 1		Ch 0		00: 0 ~ 16000 01: -8000 ~ 8000 10: Precise value 11: 0 ~ 10000
3	Designation of output status	Cł	n 3	Ch 2		Ch 1		Ch 0		00: previous output 01: mininum output 10: median output 11: maximum output

Memory	Description				E	Bit				Configuration
address	Description	7	6	5	4	3	2	1	0	Configuration
0	Configuration of channels to be used			-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop
1	Configuration of output type	Ch 3		Cł	Ch 2		Ch 1		n 0	00 : K 01 : J 10 : T 11 : R
2	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit

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### (3) Thermocouple Input Parameter Setting (XBF-TC04S)

(4) Resistance temperature detector Input Parameter Setting (XBF-RD04A)

Memory	Description				E	Bit				Configuration	
address	Description	7	6	5	4	3	2	1	0	Configuration	
0	Configuration of channels to be used	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	Bit On (1): Operation Bit Off (0): Stop	
1	Configuration of output type	Ch 3		Ch 2		Ch 1		Ch 0		00: PT100 01: JPT100	
2	Designation of input data range	-	-	-	-	Ch 3	Ch 2	Ch 1	Ch 0	0: Centigrade 1: Fahrenheit	

### (5) Digital I/O Parameter Setting

Γ

Memory	Description		Configuration											
address	Description	7	6	5	4	3	2	1	0	Configuration				
0	Input filter	-	-	-	-		0000: 3ms 0001: 1 ms 0010: 5 ms 0011: 10 ms 0100: 20 ms 0101: 70 ms 0110 : 100 ms							
1	Maintaining output is allowed		Configuration of maintaining output											
2	Configuration of maintaining output by channels	56~63	48~55	40~47	32~39	24~31	16~23	8~15	0~7	0 : Clear 1 : Maintaining				

### (6) Analog I/O Combined Module (XBF-AH04A)

Memory	Description				Configuration					
address	Description	7	6	5	4	3	2	1	0	Configuration
0	Configuration of channels to be used	-	-	-	-	Output Ch1	Output Ch0	Input Ch1	Input Ch0	Bit On (1): Operation Bit Off (0): Stop
1	Designation of Input/ Output voltage/ current range	Output Ch1		Output Ch0		Input Ch1		Input Ch0		00 : 4 ~ 20 mA 01 : 0 ~ 20 mA 10 : 0 ~ 5 V 11 : 0 ~ 10 V
2	Designation of input/ output data range	Output Ch1			Output Ch0		Input Ch1		out n0	00: 0 ~ 4000 01: -2000 ~ 2000 10: Precise value 11: 0 ~ 1000
3	Configuration of output status by channels		С	h1			CI	hO	0000: former value 0001: minimum value 0010: medium value 0011: maximum value	

### Warranty

#### 1. Warranty Period

The product you purchased will be guaranteed for 18 months from the date of manufacturing.

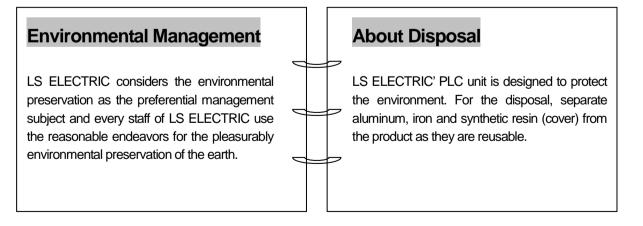
#### 2. Scope of Warranty

Any trouble or defect occurring for the above-mentioned period will be partially replaced or repaired. However, please note the following cases will be excluded from the scope of warranty.

- (1) Any trouble attributable to unreasonable condition, environment or handling otherwise specified in the manual,
- (2) Any trouble attributable to others' products,
- (3) If the product is modified or repaired in any other place not designated by the company,
- (4) Due to unintended purposes
- (5) Owing to the reasons unexpected at the level of the contemporary science and technology when delivered.
- (6) Not attributable to the company; for instance, natural disasters or fire
- 3. Since the above warranty is limited to PLC unit only, make sure to use the product considering the safety for system configuration or applications.

### **Environmental Policy**

LS ELECTRIC Co., Ltd supports and observes the environmental policy as below.



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# LS ELECTRIC Co., Ltd.

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