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Programmable Logic Controller

Dnet I/F Module

XGT Series

User's Manual

XGL-DMEA

Safety Instructions

- Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference.

http://eng.lsis.biz

Safety Instructions

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 by using the product properly and safely.

- Precautious measures can be categorized as “Warning” and “Caution”, and each of the meanings is as follows.

⚠ **Warning**	This symbol indicates the possibility of serious injury or death if some applicable instruction is violated
⚠ **Caution**	This symbol indicates the possibility of severe or slight injury, and damages in products if some applicable instruction is violated

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

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

  Be careful! Danger may be expected.

  Be careful! Electric shock may occur.

After reading this user’s manual, it should be stored in a place that is visible to product users.

Safety Instructions

Safety Instructions for design process

⚠Warning

- **Please install a protection circuit on the exterior of PLC so that the whole system may operate safely regardless of failures from external power or PLC.** Any abnormal output or operation from PLC may cause serious problems to safety in whole system.
  - Install protection units on the exterior of PLC like an interlock circuit that deals with opposite operations such as emergency stop, protection circuit, and forward/reverse rotation or install an interlock circuit that deals with high/low limit under its position controls.
  - If any system error (watch-dog timer error, module installation error, etc.) is detected during CPU operation in PLC, all output signals are designed to be turned off and stopped for safety. However, there are cases when output signals remain active due to device failures in Relay and TR which can't be detected. Thus, you are recommended to install an addition circuit to monitor the output status for those critical outputs which may cause significant problems.

- **Never overload more than rated current of output module nor allow to have a short circuit**. Over current for a long period time may cause a fire .

- **Never let the external power of the output circuit to be on earlier than PLC power**, which may cause accidents from abnormal output or operation.

- **Please install interlock circuits in the sequence program for safe operations in the system when exchange data with PLC or modify operation modes using a computer or other external equipments** Read specific instructions thoroughly when conducting control operations with PLC.

Safety Instructions

Safety Instructions for design process

⚠ Caution

- **I/O signal or communication line shall be wired at least 100mm away from a high-voltage cable or power line.** Fail to follow this instruction may cause malfunctions from noise

Safety Instructions on installation process

⚠ Caution

- **Use PLC only in the environment specified in PLC manual or general standard of data sheet.** 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.

- **Be sure that screws get tighten securely under vibrating environments.** Fail to do so will put the product under direct vibrations which will cause electric shock, fire and abnormal operation.

- **Do not come in contact with conducting parts in each module**, which may cause electric shock, malfunctions or abnormal operation.

Safety Instructions

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.

- **After wiring process is done, make sure that terminal covers are installed properly before its use.** Fail to install the cover may cause electric shocks.

⚠ 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 FG 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.

- **Make sure that pressed terminals get tighten following the specified torque. External connector type shall be pressed or soldered using proper equipments.**

Safety Instructions

Safety Instructions for test-operation and maintenance

⚠Warning

- **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.
- **Don't let the battery recharged, disassembled, heated, short or soldered**. Heat, explosion or ignition may cause injuries or fire.

⚠Caution

- **Do not make modifications or disassemble each module.** Fire, electric shock or abnormal operation may occur.
- **Prior to installing or disassembling the module, let all the external power off including PLC power.** If not, electric shock or abnormal operation may occur.
- **Keep any wireless equipment such as walkie-talkie or cell phones at least 30cm away from PLC**. If not, abnormal operation may be caused.
- **When making a modification on programs or using run to modify functions under PLC operations, read and comprehend all contents in the manual fully.** Mismanagement will cause damages to products and accidents.
- **Avoid any physical impact to the battery and prevent it from dropping as well.** Damages to battery may cause leakage from its fluid. When battery was dropped or exposed under strong impact, never reuse the battery again. Moreover skilled workers are needed when exchanging batteries.

Safety Instructions

Safety Instructions for waste disposal

⚠ Caution

- **Product or battery waste shall be processed as industrial waste.**
  The waste may discharge toxic materials or explode itself.

Revision History

Version	Date	Remark	Page
V1.0	’05.03	First edition	-
V1.1	’05.05	Function description added	A-17
V1.2	’05.07	O/S version up description added (V1.0 → V1.1) 1) Data latch/clear function added 2)SyCon master setting changed “Handshake of the process data” setting No consistence, uncontrolled → Buffered, host controlled	5-14,6-6 7-3,7-18
V1.3	’05.11	Revision of content	
V1.4	’06.06	Added Extendable Smart I/O Dnet I/F adapter.	1-5, 7-16 ~ 7-28
V1.5	’07.03	Updated Sycon mode setting by Smart I/O Upgrade	A-17 ~ A-19
V1.6	’08.12	Added contents related with XGR Changed address of headquarter	 1-3
V1.7	’11.05	How to enable link through flag added	6-5

※ The number of User’s manual is indicated right part of the back cover.

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Chapter 1 Introduction

1.1 What is DeviceNet?

DeviceNet was developed in response to the request for replacing expensive analog 4~20mA standard with a single digital standard, which is used as a communication link to connect various industrial devices of limit switch, photo-electronic sensor, motor controller, inverter, bar code reader and panel display to the network.

CAN (Controller Area Network) developed by BOSCH was set to substitute low-priced network cable for expensive Wire Harness of automobiles for the European automobile market. It is composed of Physical Layer and Data Link Layer only. As of now, it is proposed as ISO 11898 and 11591-1 standards. Since CAN application fields require services that are beyond the basic function specified in the data link layer, research on Application Layer has been ongoing. The key results are CAL (CAN Application Layer), SDS(Smart Distributed System), DeviceNet and CAN Kingdom certified by CiA (CAN in Automation).

DeviceNet is an Application Layer developed by Rockwell/Allen-Bradley, widely used in the present industrial automation field. These compatibility characteristics are similar to other network systems. However there are few network systems that guarantee their compatibilities. It is because there is no test to check compatibility with other company's products and due to high costs for this kind of test. Thus ODVA (Open DeviceNet Vendor Association), which supports all the services of Device Net, has solved these problems through research institutes of universities and technical research institutes in USA, Japan and UK. Since DeviceNet uses CAN communication protocol, low-priced CAN micro chip applied will reduce the cost. And direct connection of master and respective devices with the network of device level is available, improving communication quality between devices. In addition, flexible counteractions against errors are also available by access to important diagnosis information of device level which was impossible to use via the I/O interface. Its application range is extended to complicated and highly-developed services (High-speed data communication between controllers, synchronization of lots of devices performing super High-speed scan, etc.).

1.2 Characteristics of the Module

DeviceNet (hereinafter referred to as Dnet) I/F module have features as follows;

▶ 1 master module can control 63 slave modules with the max. 28,000 points of I/O control available.

▶ Multi-drop and T-diverged connection is available allowing the system to be extended and changed easily with flexible system operation function provided.

▶ Open network available to connect with other company's various slave modules.

▶ Master and slave can be set through Configuration Tool (SyCon), and communication control is available through XG-PD.

▶ Automatic setting, in other words, Auto scan is available for the modules (which exist) in the network.

▶ Configuration Tool (SyCon)

1) Station number (MAC ID) can be specified (0 ~ 63) through Configuration Tool (SyCon).
2) Communication speed can be specified (125/250/500 kbps) through Configuration Tool (SyCon).
3) Out of 4 communication types (Poll, Bit strobe, COS, Cyclic), one DeviceNet can be selected through Configuration Tool (SyCon).

▶ Setup time and installation cost of the system will be saved from reduced connections and wiring works by using a single cable for communication power(24V) and communication signal line.

▶ Network setting and various diagnoses can be simply arranged through SyCon and XG-PD, in other words, diagnosis of the whole network or each slave is available.

▶ Real-time control over I/O devices in the lowest level of the network system is available. In addition, connection to various slaves I/O is available.

- General I/O, actuator, proximity switch, optical switch, valve, inverter, A/D module, D/A module, position control, etc.

1.3 Information for Module Operation

1) It describes required components to operate the product.

Classification	Type	Description	Reference
Series	XGL-DMEA	DeviceNet I/F module.	Master
Software	SyCon	Software for Station number, Speed, Communication methods, configuration of network setting.	-
	EDS	Including module information (Product code/Type, Maker name/Maker number) - It is used to configure the network in SyCon.	-
	XG 5000	Software for PLC programming - XG-PD can be executed in XG 5000.	-
	XG-PD	Software for Send/Receive parameter setting.	Included in XG 5000

Remark

XG 5000 program can be downloaded at our company website. If you do not have an access to the internet, contact the nearest agency for CD-ROM about XG 5000. EDS file related to our slave module (Smart Link) can be downloaded at Http://eng.lsis.biz.

2) It describes about the number of module and position that can be installed in a single CPU module.

Classification	Description	
Position	XGK/XGI	Standard base and Extension base
	XGR	Extension base
Number	A maximum of 12 In case of using with other communication modules, It is able to install a maximum of 24 (But High-speed link setting is limited to 12)	
High-speed link number	A maximum of 12 (It can not set for P2P)	

3) Please refer to below User Manuals to write communication program with Dnet I/F module.

- XGK Instruction Manual / XGI Instruction Manual
- XG 5000 User Manual
- XGK CPU User Manual / XGI CPU User Manual
- Smart I/O User Manual
- Other company's User Manual which is related to Dnet
- Extendable type Smart I/O User Manual

1.4 Configuration of Smart I/O for Dnet

1) Slave Products List of Stand-alone type

Product			Details
Classification	Code	Designations	
Fixed type	47060040	GDL-D22A(N)	DC input 16 points
	47060097	GDL-D22A(Q)	DC input 16 points, Quick mode
	47060039	GDL-D24A(N)	DC input 32 points
	47060098	GDL-D24A(Q)	DC input 32 points, Quick mode
	47060041	GDL-TR2A(N)	TR output 16 points (0.1A, Sink)
	47060099	GDL-TR2A(Q)	TR output 16 points (0.1A, Sink), Quick mode
	47060089	GDL-TR2A1	TR output 16 points (0.5A, Sink)
	47060112	GDL-TR2A1(Q)	TR output 16 points (0.5A, Sink), Quick mode
	47060062	GDL-TR2B	TR output 16 points (0.5A, Source)
	47060103	GDL-TR2B(Q)	TR output 16 points (0.5A, Source), Quick mode
	47060042	GDL-TR4A(N)	TR output 32 points (0.1A, Sink)
	47060100	GDL-TR4A(Q)	TR output 32 points (0.1A, Sink), Quick mode
	47060080	GDL-TR4A1	TR output 32 points (0.5A, Sink)
	47060113	GDL-TR4A1(Q)	TR output 32 points (0.5A, Sink), Quick mode
	47060061	GDL-TR4B	TR output 32 points (0.5A, Source)
	47060104	GDL-TR4B(Q)	TR output 32 points (0.5A, Source), Quick mode
	47060043	GDL-DT4A(N)	DC input 16 points/TR output 16 points (0.1A, Sink)
	47060101	GDL-DT4A(Q)	DC input 16 points/TR output 16 points (0.1A, Sink), Quick mode
	47060082	GDL-DT4A1	DC input 16 points/TR output 16 points (0.5A, Sink)
	47060114	GDL-DT4A1(Q)	DC input 16 points/TR output 16 points (0.5A, Sink), Quick mode
	47060063	GDL-DT4B	DC input 16 points/TR output 16 points (0.5A, Source)
	47060105	GDL-DT4B(Q)	DC input 16 points/TR output 16 points (0.5A,Source), Quick mode
	47060044	GDL-RY2A(N)	Relay output 16 points
	47060102	GDL-RY2A(Q)	Relay output 16 points, Quick mode
Changeable type	47060053	GDL-D22C	DC input 16 points
	47060106	GDL-D22C(Q)	DC input 16 points, Quick mode
	47060052	GDL-D24C	DC input 32 points
	47060107	GDL-D24C(Q)	DC input 32 points, Quick mode
	47060054	GDL-TR2C	TR output 16 points (0.5A, Source)
	47060108	GDL-TR2C(Q)	TR output 16 points (0.5A, Source), Quick mode
	47060087	GDL-TR2C1	TR output 16 points (0.5A, Sink)
	47060115	GDL-TR2C1(Q)	TR output 16 points (0.5A, Sink), Quick mode
	47060055	GDL-TR4C	TR output 32 points (0.5A, Source)
	47060109	GDL-TR4C(Q)	TR output 32 points (0.5A, Source), Quick mode
	47060081	GDL-TR4C1	TR output 32 points (0.5A, Sink)
	47060116	GDL-TR4C1(Q)	TR output 32 points (0.5A, Sink), Quick mode
	47060056	GDL-DT4C	DC input 16 points/TR output 16 points (0.5A,Source)
	47060110	GDL-DT4C(Q)	DC input 16 points/TR output 16 points (0.5A,Source), Quick mode
	47060083	GDL-DT4C1	DC input 16 points/TR output 16 points (0.5A, Sink)
	47060117	GDL-DT4C1(Q)	DC input 16 points/TR output 16 points (0.5A, Sink), Quick mode
	47060057	GDL-RY2C	Relay output 16 points
	47060111	GDL-RY2C(Q)	Relay output 16 points, Quick mode

Remark

1) Fixed type: A product whose I/O terminal block is fixed on the module.
2) Changeable type: A product whose I/O terminal block can be installed or removed.
3) Quick mode: A product whose initializing time is 1.5 sec. after the communication power is On.

2) Slave Products List of Extendable type

Products			Details
Classification	Code	Designations	
Communication Adapter	47060131	XDL-BSSA	Dnet I/F Adapter
Extendable I/O	47230004	XBE-DC32A	24VDC Input 32points
	47230010	XBE-DC16A	24VDC Input 16points
	47230011	XBE-DC08A	24VDC Input 8points
	47230006	XBE-RY16A	Relay Output 16points
	47230009	XBE-RY08A	Relay Output 8points
	47230005	XBE-TN32A	Transistor Output 32points(NPN Type)
	47230013	XBE-TN16A	Transistor Output 16points(NPN Type)
	47230012	XBE-TN08A	Transistor Output 8points(NPN Type)
	47230014	XBE-DR16A	24VDC Input 9points/Relay Output 16points
Extendable Special module	47230007	XBF-AD04A	Current/Voltage Input 4Ch
	47230008	XBF-DV04A	Voltage Output 4Ch
	47230018	XBF-RD04A	RTD input 4Ch
	47230017	XBF-DC04A	Current Output 4Ch

Smart Link List for wiring of Extendable Slave products

Classification		Designations	Details
Terminal Board		SLP-T40P	Connection method is changed from connector to terminal board(40p)
Relay Board		SLP-RY4A	Output type is changed from Tr.(NPN type) output to relay output. Connection method is also changed from connector to terminal board(40p).
Connection Cable		SLP-C101-XB	Expansion length 1m, Plastic Hood Type, 40p
		SLP-C201-XB	Expansion length 2m, Plastic Hood Type, 40p
		SLP-CT101-XB	Expansion length 1m, Soft Tube Type, 40p
		SLP-CT201-XB	Expansion length 2m, Soft Tube Type, 40p

Chapter 2 Specifications

2.1 General Specifications

General specifications of XGT series are as specified below in Table 2.1.

<table>
<tr><th>No.</th><th>Item</th><th colspan="6">Specification</th><th>Related specifications</th></tr>
<tr><td>1</td><td>Operating temp.</td><td colspan="6">0℃ ~ +55℃</td><td>-</td></tr>
<tr><td>2</td><td>Storage temp.</td><td colspan="6">-25℃ ~ +70℃</td><td>-</td></tr>
<tr><td>3</td><td>Operating humidity</td><td colspan="6">5 ~ 95%RH, no dew allowed</td><td>-</td></tr>
<tr><td>4</td><td>Storage humidity</td><td colspan="6">5 ~ 95%RH, no dew allowed</td><td>-</td></tr>
<tr><td rowspan="8">5</td><td rowspan="8">Vibration immunity</td><td colspan="6">For discontinuous vibration</td><td>-</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td colspan="2">Amplitude</td><td>Number</td><td rowspan="8">IEC61131-2</td></tr>
<tr><td>10≤f< 57 Hz</td><td colspan="2">-</td><td colspan="2">0.075mm</td><td rowspan="5">Each 10 times in X,Y,Z directions</td></tr>
<tr><td>57≤f≤150 Hz</td><td colspan="2">9.8 ㎨ (1G)</td><td colspan="2">-</td></tr>
<tr><td colspan="6">For continuous vibration</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td colspan="2">Amplitude</td></tr>
<tr><td>10≤f< 57 Hz</td><td colspan="2">-</td><td colspan="2">0.035mm</td></tr>
<tr><td>57≤f≤150 Hz</td><td colspan="2">4.9 ㎨ (0.5G)</td><td colspan="2">-</td></tr>
<tr><td>6</td><td>Impact immunity</td><td colspan="6">* Max. impact acceleration: 147 ㎨ (15G)
* Authorized time: 11 ㎳
* Pulse wave : Sign half-wave pulse
(Each 3 times in X,Y,Z directions)</td><td>IEC61131-2</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Noise immunity</td><td colspan="3">Square wave impulse noise</td><td colspan="3">±1,500V</td><td>Test specification of LS Industrial Systems</td></tr>
<tr><td colspan="3">Static electric discharging</td><td colspan="3">Voltage : 4kV
(contact discharging)</td><td>IEC 61131-2,
IEC 61000-4-2</td></tr>
<tr><td colspan="3">Radiation electromagnetic field noise</td><td colspan="3">27 ~ 500MHz, 10 V/m</td><td>IEC 61131-2,
IEC 61000-4-3</td></tr>
<tr><td rowspan="2">Fast Transient /burst noise</td><td>Class</td><td>Power module</td><td colspan="3">Digital/Analog I/O communication interface</td><td rowspan="2">IEC 61131-2,
IEC 61000-4-4</td></tr>
<tr><td>Voltage</td><td>2kV</td><td colspan="3">1kV</td></tr>
<tr><td>8</td><td>Ambient conditions</td><td colspan="6">No corrosive gas or dust</td><td></td></tr>
<tr><td>9</td><td>Operating height</td><td colspan="6">2,000m or less</td><td></td></tr>
<tr><td>10</td><td>Pollution level</td><td colspan="6">2 or less</td><td></td></tr>
<tr><td>11</td><td>Cooling type</td><td colspan="6">Natural air cooling</td><td></td></tr>
</table>

Table 2.1 General Specifications

Notes

[Note 1] IEC (International Electrotechnical Commission):
An international nongovernmental organization which promotes internationally cooperated standardization in electric/electronic field, publishes international standards and manages applicable estimation system related with.

[Note 2] Pollution level:
An index indicating pollution level of the operating environment which decides insulation performance of the devices. For instance, Pollution level 2 indicates the state generally that only non-conductive pollution occurs. However, this state contains temporary conduction due to dew produced.

2.2 Performance Specifications

1) Performance specifications

Performance specifications of DeviceNet (hereinafter referred to as Dnet) I/F module are as described below.

Item			Performance Specifications
Transmission Specification	Transmission Speed (kbps)		125/250/500
	Transmission Type		Poll, Bit strobe, COS, Cyclic
	Communication distance(m)	Thick Cable	500 (125kbps)/250 (250kbps)/100 (500kbps)
		Thin Cable	100 (125/250/500kbps)
	Terminal resistance (Ω)		121 (1%, 1/4W)
	Max.drop length(m)	125 kbps	6 (Max. extended length 156)
		250 kbps	6 (Max. extended length 78)
		500 kbps	6 (Max. extended length 39)
	Data Packet		0~8 Bytes
	Message Access Control		CSMA/NBA
	Network Structure		• Trunk/drop line • Power/Signal cable inside the identical network cable
	Bus Type		• Poll type
	Max. number of nods		Up to 64 (including master) MAC IDs (MAC Identifier)
	System Features		Insertion and removal of nod available in voltage On status
	Operation Voltage		DC 24V
	Diagnosis Function		Module: Checks duplicated station/ Checks CRC error SyCon: Detects defective station/Checks BusOff/Auto-scan function XG-PD: Monitors High-speed link
	Master/Slave Operation		Available only in master
Parameter setting			1) SyCon (CONFIG Port of Dnet I/F) 2) Setting to High-speed link of XG-PD (RS-232C of CPU module or USB port)
XG-PD (High-speed link)	Data process unit		Byte
	Send/Receive period		Select among 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 5s and 10s - Default : 20ms
	Max. communication point		Send 28672points, Receive 28672 points, 3584 bytes respectively
	Max. block number		63 (Setting range: 0~62)
	Max. point number per block		2048 points (256 bytes)
Basic Specification	Max. modules installed		Up to 12 (available on basic base and added base)
	Internal-consumed current (mA)		440
	Weight (g)		110

Remark

1) Transmission distance of Dnet I/F module is inversely proportional to data transmission rate. If thin cable is used, the transmission distance will be limited to 100m regardless of data transmission rate.
2) CSMA/NBA (Carrier Sense Multiple Access with Non-destructive Bitwise Arbitration)
3) If the station No. of Dnet I/F module (master module) is specified, surely reset the applicable slave module.

2) Communication methods

Communication methods can be set per module when it is supported by slave module.

Setting of Slave insertion/setting in SyCon is as shown below.

(1) Automatic setting: Online → Automatic Network Scan

(2) Manual setting: Settings → Device Configuration

Communication method's features are as shown below.

Communication method	Feature
Poll	Master and slave module Send/Receive the data by one on one.
Bit-Strobe	It is used only in input module. The way to transmit data simultaneously for master module from its input type slave modules when the master module's data transmission request is received.
COS (Change of State)	If input data status of slave module is changed, slave module transmits changed data to master module. But output type slave module, Settings → Device Configuration Menu selection → Connection Object Instance Attributes Setting window→ Expected Packet Rate Category, transmits every time according to its setting rates.
Cyclic	Slave module attempts to Send/Receive periodically. Communication period setting, Settings → Device Configuration Menu selection→ Connection Object Instance Attributes Setting window→ Expected Packet Rate Category, sent/receives data periodically between master and slave module according to its setting periods.

So, Communication method should be used with cautions along with data process of Input/Output module in the system.

3) EDS (Electronic Data Sheet) file

▶ It is to allow other vendors to use restricted information of product through EDS file format.

Restricted information of product: Maker name and unique number (ODVA Certification)

Module information (Master and slave module)

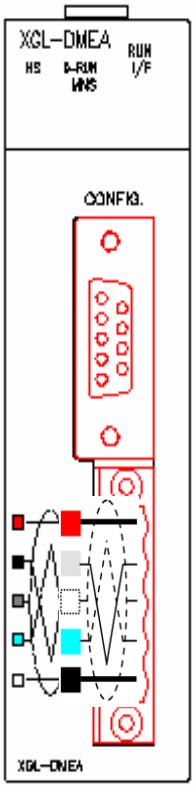
Input/Output module information (Input point, Output point)

Information on communication support method

▶ EDS file addition: It can be executed by File → Copy EDS.

Copied EDS file can be used only when located under EDS folder of SyCon execution directory

2.3 Part names and Structure



(1) LED display parts

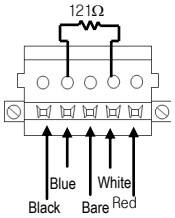
LED		Status	LED display description
RUN	On	Normal	Completion of initializing.
	Off	Error	Error is occurred.
I/F	Flickering	Normal	Normal status of interface in CPU module.
	On/Off	Error	Error status of interface in CPU module.
HS	On	Normal	Normal status when High-speed link is enabled.
	Flickering	Waiting	Communication is disconnected between Dnet I/F and Slave module while downloading at High-speed link enabled status by SyCon.
	Off	Error	High-speed link service is in Critical error while High-speed link is enabled.
D-RUN	Flickering	Stop	Stop status of communication between Dnet I/F module and slave module.
	On	Communicating	Communication status of Dnet I/F module and slave module.
MNS	Off	Power Off	● Waiting status of Dnet I/F module communication. ● Non-completed status of Checking duplicated MAC ID on network. ● It is not supplied external power supply (DC24V).
	Green Flickering	Waiting	Communication waiting status between Dnet I/F module and slave. - It is recognized the information of network (Station number, ID, Communication speed) in SyCon.
	Green Flickering	Normal	Normal communication status between Dnet I/F module and slave.
	Red Flickering	Error	Slave module is separated network while communicating.
	Red Flickering	Critical error	● Dnet I/F module could not access the network. ● Non-ability status of Communication (Bus Off). ● Duplicated ID module is existed in network.

(2) RS-232C connector for SyCon connection

Dnet I/F module		Connection number and signal direction	Computer/ Communication equipment
Pin num.	Name		Name
1	CD		CD
2	**RXD**		**RXD**
3	**TXD**		**TXD**
4	DTR		DTR
5	**SG**		**SG**
6	DSR		DSR
7	RTS		RTS
8	CTS		CTS
9	RI		RI

* Loader cable is common XGK CPU module and GM/MK module loader cable.

(3) 5 pin connector (for exeternal connection)

Color	Signal	Service	5 pin connector
Red	DC 24V(+)	Vcc	
White	CAN_H	Signal wire	
Bare	Drain	Shielded wire	
Blue	CAN_L	Signal wire	
Black	DC 24V(-)	GND	

2.4 Cable Specifications

1) Cable specifications (Belden)

Classification	Thick (class1)	Thick (class2)	Thin (class2)	
Type	7897A	3082A	3084A	Trunk and Drop line is used concurrently
Cable Type	Round			
Impedance (Ω)	120			
Temperature range (℃)	-20 ~ 75			
Max. allowable current(A)	8		2.4	
Min. radius of curvature (in.)	4.4	4.6	2.75	
Core wire number	5 wires			

2) Maximum trasmission distance for repective cable types

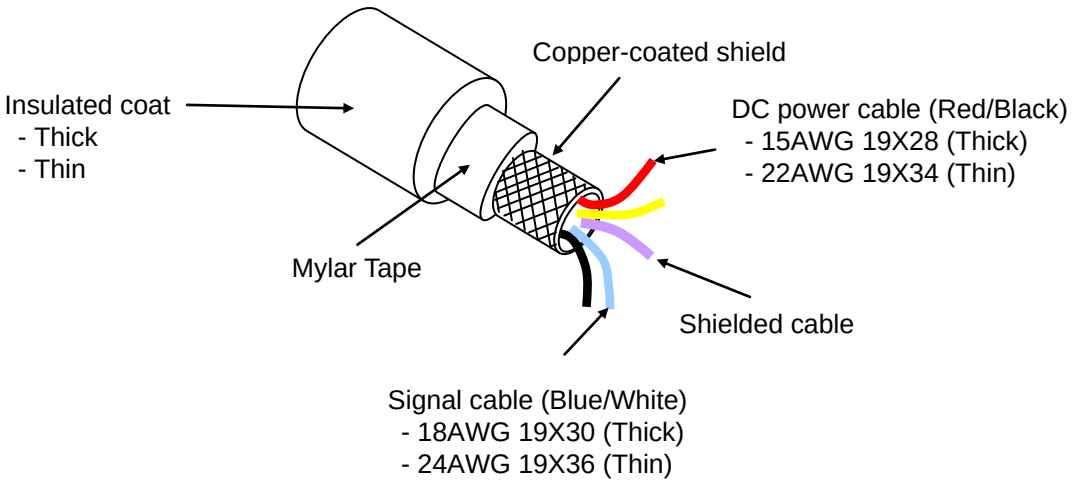
(1) If one type of trunk line is used

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

(2) If mixed with trunk line

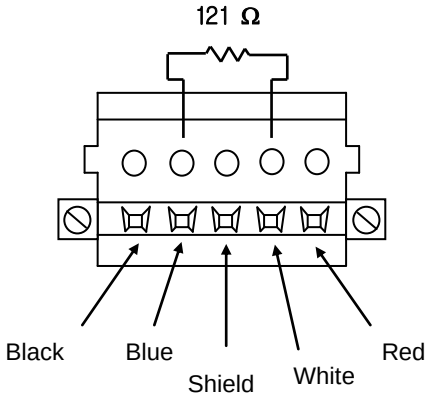
Transmission speed	Max. distance if Thin and Thick cables are used as mixed
125kbps	Thick cable length + 5 x Thin cable length ≤ 500m
250kbps	Thick cable length + 2.5 x Thin cable length ≤ 250m
500kbps	Thick cable length + Thin cable length ≤ 100m

3) Structure



2.5 Terminating Resistances

- Attach 121Ω, 1%, 1/4W of resistance to both ends of the network.
- Connect connector's CAN_H (White) with CAN_L (Blue) signal cable.



- Connection Connector

Classification	Cable connection method	
	single direction connector	dual direction connector
Shape		

Remark

1) Be sure to attach the terminating resistor to both ends of the network trunk line, or to both ends of the tap if composed of device port tap. If the terminating resistor is omitted, communication will not be normal.

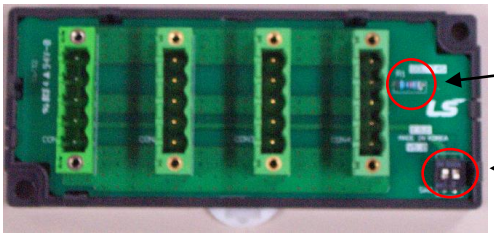
2) If the terminating resistor is installed on the port tap, it is not necessary to install an additional terminating resistor.

2.6 Tap/Divider

1) 4-Port / 8-Port Tap (LSIS)

If you use multi tap, it is convenient to configuration and modification of network system.

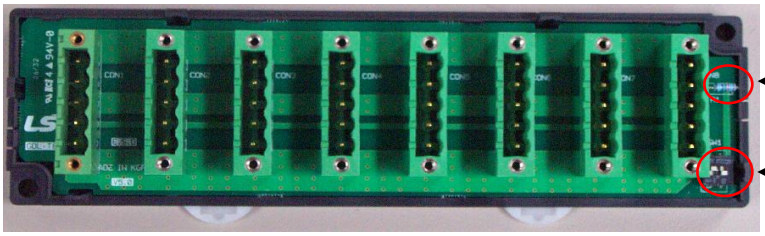
(1) 4-Port tab (GDL-T4S)



Resistor for Termination
(121Ω, 1%, 1/4W)

Switch for termination resistor
(Switch no.1 is used)

(2) 8-Port tab (GDL-T8S)



Resistor for Termination
(121Ω, 1%, 1/4W)

Switch for termination resistor
(Switch no.1 is used)

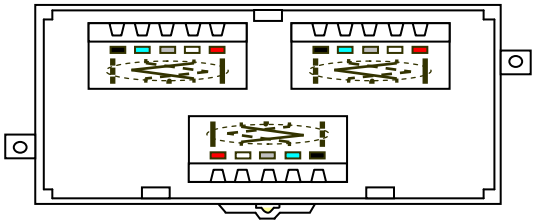
Remark

1) Be sure to set switch for the terminating resistor which is come under both ends of the network trunk line to On. If the terminating resistor is omitted, communication will not be normal.

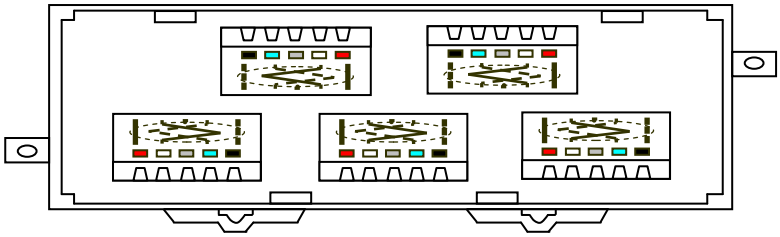
2) If you want to use multi tab two more than, don't set all switch for the terminating resistor to On. Because communication will not be normal.

2) 1-Branch (T-Branch)/3-Branch tap (Ex.: Company OMRON)

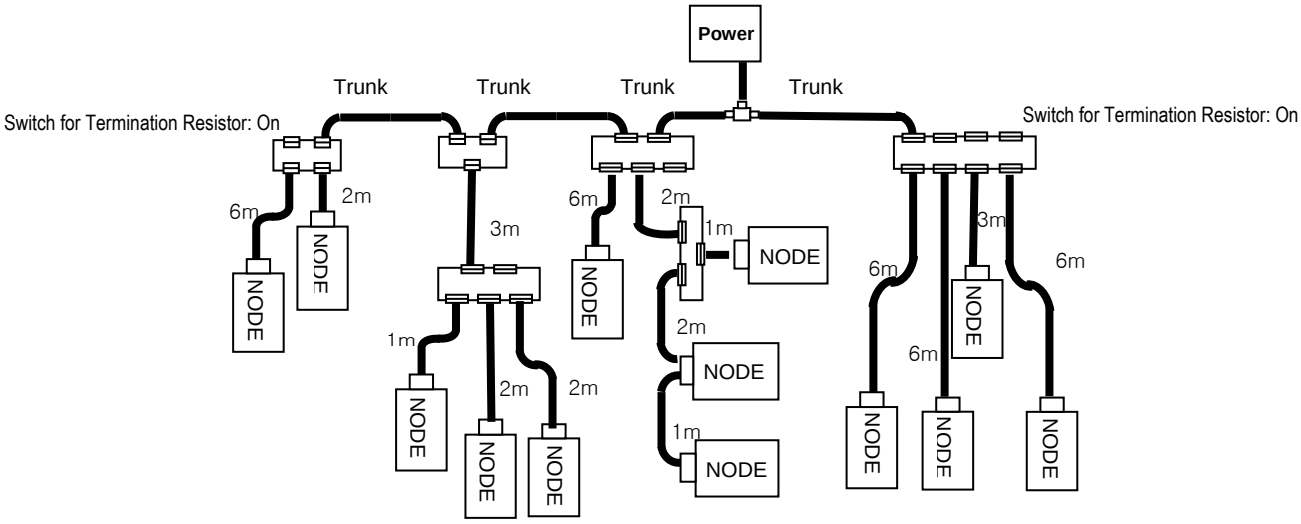
(1) 1-Branch tap (DCN-2C)



(2) 3-Branch tap (DCN-4C)



3) Multi Tab Configuration of LSIS and Other company



Chapter 3 Installation and Test Operation

3.1 Installation

3.1.1 Precautions for installation

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

1) Check the basic factors necessary for system configuration so to select an appropriate communication module.
2) Prepare accessories such as cable, tap and terminating resistor used for communication module.
3) Speed of communication modules shall be identical respectively based on the communication speed applicably used for the communication module in compliance with cable specifications.
4) If the tap is used, surely apply terminating resistor to the tap of both ends.
5) In a single network, it must be set without duplicated station number.
6) Before the communication module is installed, check for any power supply, any foreign material on the base connector the module will be installed on and any damage on the connector pin of the module.
7) The module when installed on the base board or used solely shall be securely connected with the correspondent. If the connection is incomplete, interface with CPU may be abnormal.
8) Communication speed to be applied to this communication module is 125/250/500kbps. In order to change the communication speed of slave module once specified, let it powered off and then change the communication setting switch to apply the changed mode.

3.1.2 Materials necessary for installation

Materials necessary	Dnet I/F module
Communication cable	Thick cable/Thin cable (only for Dnet)
Tap	4,8-port tap
Terminating resistor	Terminating resistor : 121Ω, 1%, 1/4W
24V power supplier	General power supplier
Connector	Open type 5-pin connector

3.1.3 Installation

1) Precautions for installation of the connector

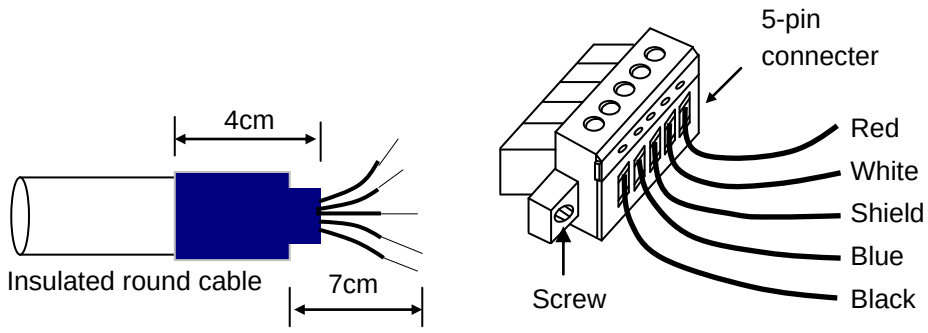
Prior to installation of the connector, please pay attention to the following.

(1) Installation shall be performed when no signal and power supply is carried by cable.

(2) If the module installed on the system operates, stop the operation prior to installation.

After the installation is complete, secure the applicable cable tightly so to keep from being vibrated or escaped.

2) How to install the connector



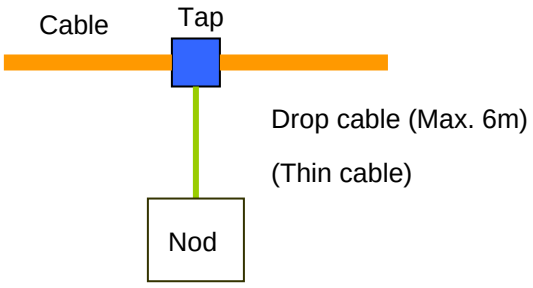
(1) First, slip off the coat of the cable about 7cm to connect.

(2) Cut the packing cover contracted about 4cm to cover on the cable and wrap up the exposed conductor and insulated coat of the cable.

(3) Slip off the coat of the cable about 8mm at the both ends respectively and apply heat to the packing cover contracted to adhere closely to the cable.

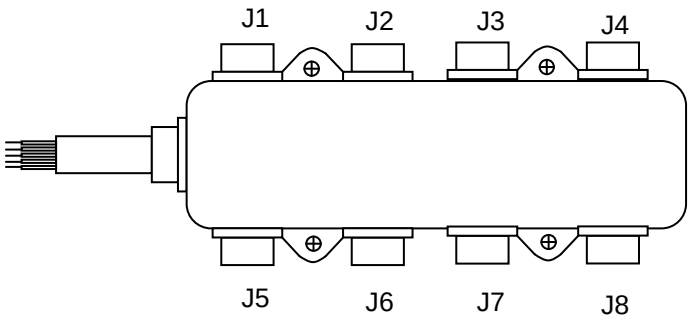
(4) Insert the slipped coat into the connector's clamp screw with a proper distance and tighten the screw (DC power supply and signal line is in identical cable, so ,be sure to make designation of the signal identical between cable and connector).

Tap-applied method and drop-applied method are available for the cable connection. And DC 24V power is recommended to be installed on the position necessary to keep the voltage when lots of Dnet I/F modules are expected or the cable is expected to get long.



3) How to install the tap (8-port tap)

Connect to device port tap's trunk line where up to 8 connections and disconnections are available.



(1) The drop line composed of Thick or Thin cable can be connected with the device through the tap. And if it is a Open-Style tap, 3 types of connectors can be used.

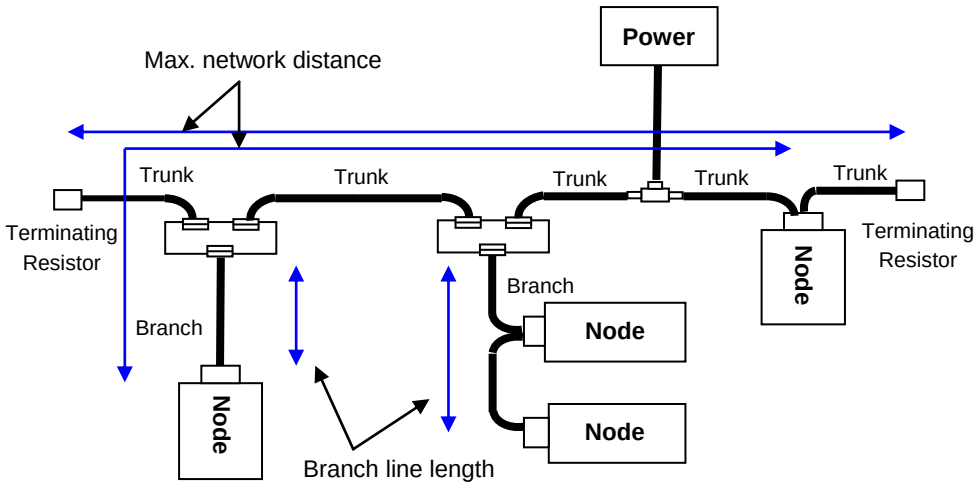
- Pluggable screw type
- Hard-wired screw type
- Soldered type

(2) The cable is most desirable to connect with drop line when the system does not operate. If the cable is to be connected when the system operates, check the connection status with other devices and let it connected with the trunk line so to avoid the influence on communication.

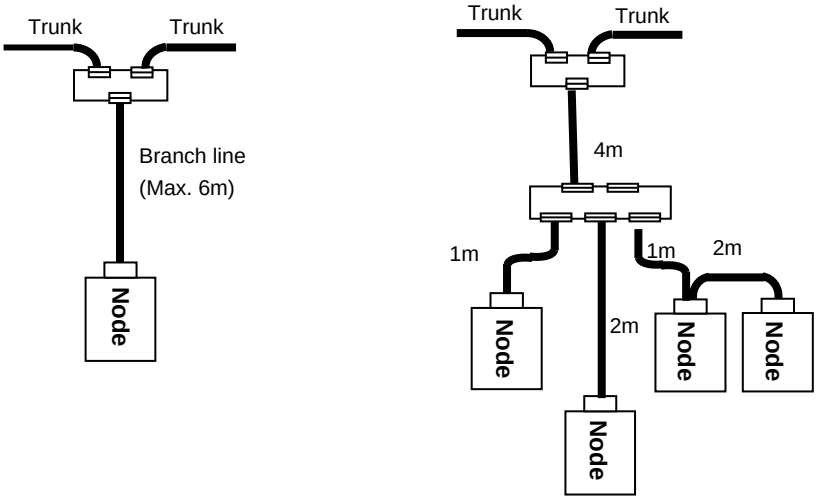
(3) When connected with the trunk line, don't let the max. allowable length exceeded.

4) How to connect with network

(1) Max. network distance: stands for the distance between nodes most far away or between terminating resistors.



(2) Branch line length: stands for the length (max. 6m) from the first branched position of the trunk line to the last of the branch line.

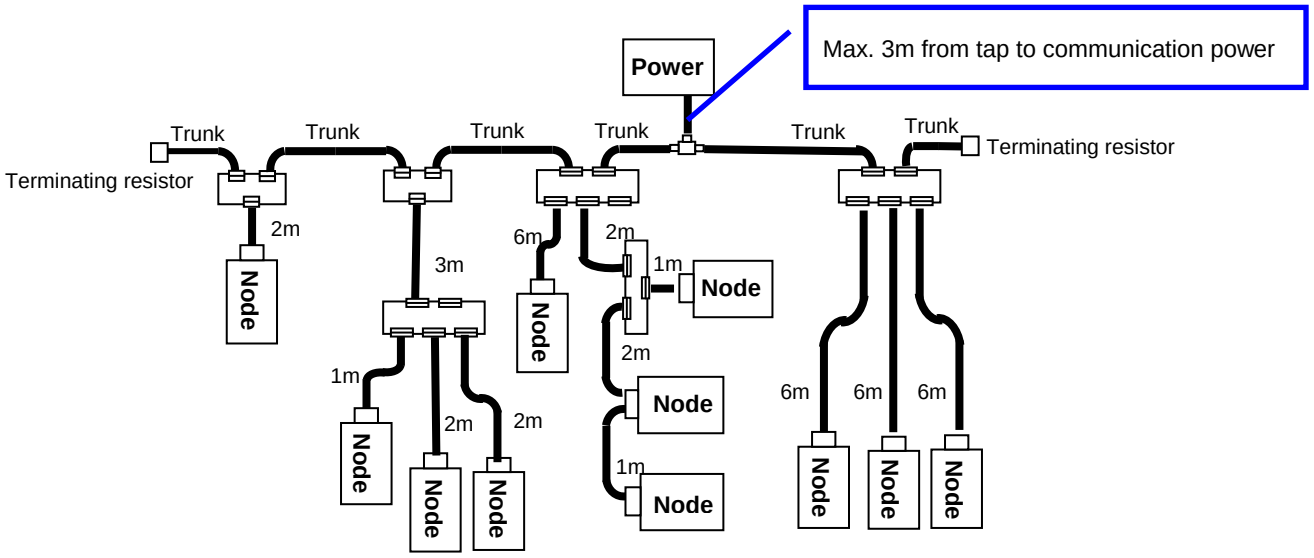


(3) Communication distance compared with communication speed

Communication speed	Max. network length		Branch line length	Branch line length in total
	Thick	Thin		
500kbps	100m or less	100m or less	6m or less	39m or less
250kbpS	250m or less			78m or less
125kbps	500m or less			156m or less

5) Branch line length in total

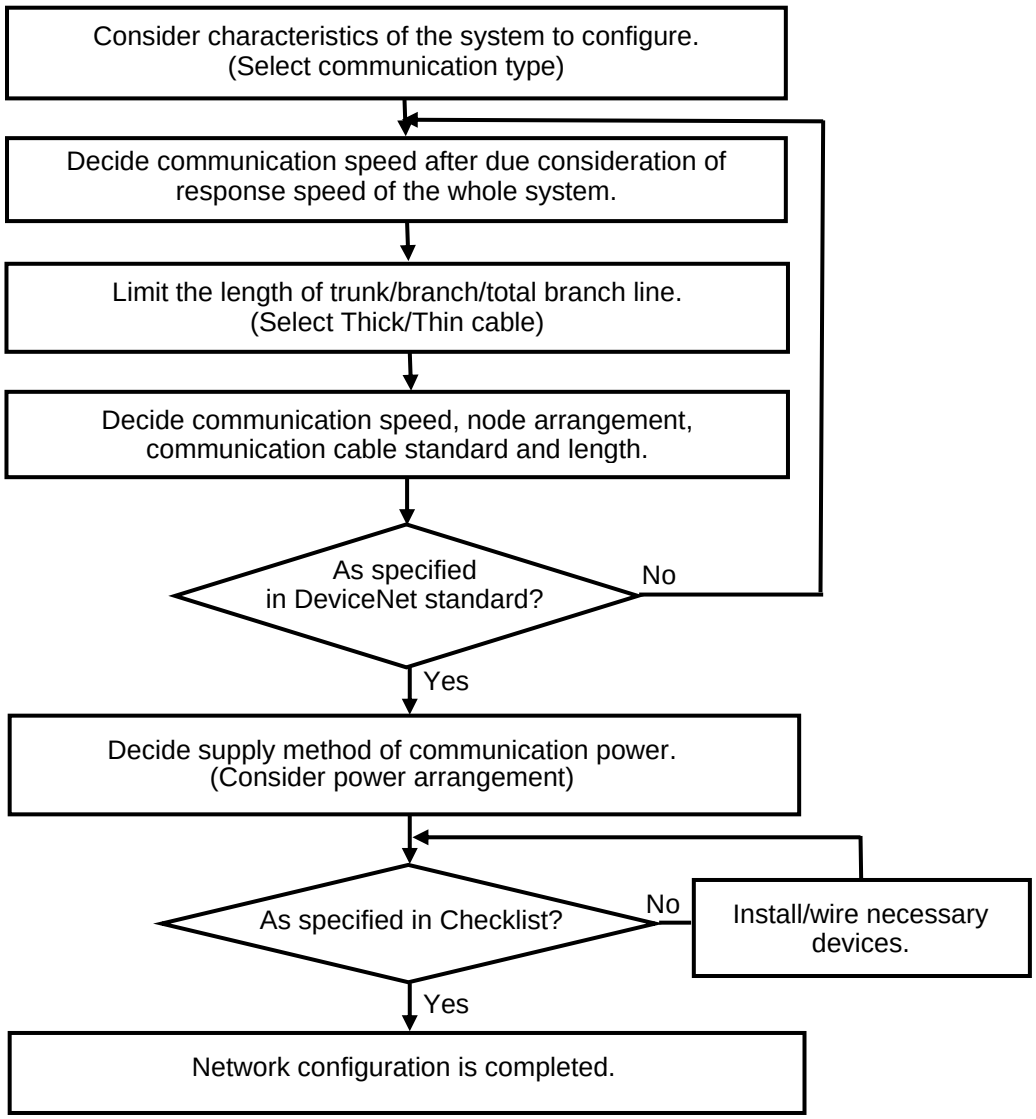
- Distance of accumulated branch line length (length of each branch line shall be within the max. 6m)



As for the configuration example above, since the branch line length is within 6m, there is no problem in the branch line length. However since the total length of the branch line is 40m which does not comply with the max. branch line length of 39m with communication speed of 500kbps, 250 and 125kpbs are only available for communication.

6) Network configuration and Checklist

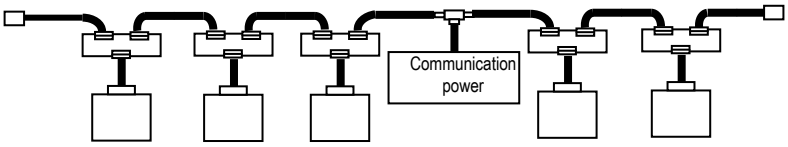
Prior to the first network configuration, please check the system to be installed in the sequence as specified below;



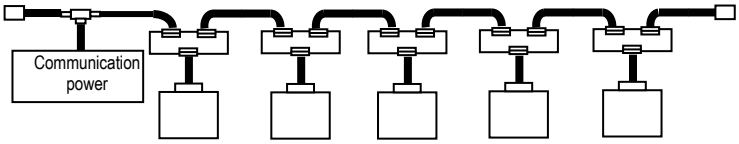
7) Power arrangement

4 types of power arrangement are available as shown below.
At this time, the distance between power and power tap shall be within 3m.

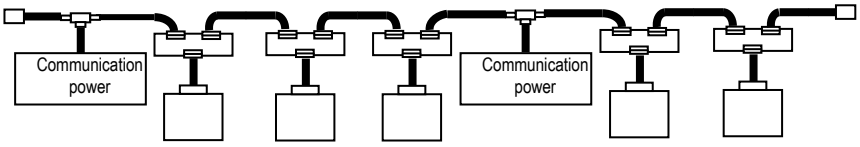
(1) If node is arranged in both directions of power



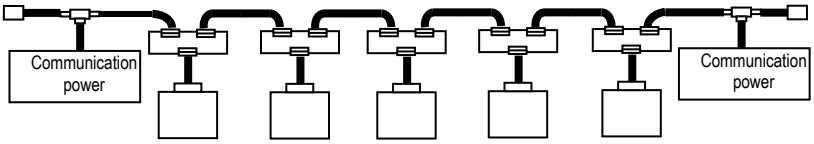
(2) If node is arranged in a direction of power



(3) If the system of power supply is separated, with the plural power installed



(4) If power duplicated



3.2 From Setting to Operation

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

Operation Sequence

▼

Install module on the base.
→ Check the applicable base/slot position for exact installation on the basic base.

▼

Configure the system with module.
→ Use DeviceNet cable specified, terminating resistor, tap, communication power to configure the system.
→ Set the station number of slave module.

▼

With power (master and slave module) On, check the LED status of the communication module.
→ Check if the interface of the communication module is normal (I/F: Flickering, Run: On, NMS: Green On) with CPU.

▼

Execute SyCon
After Master is selected, Station number and Communication speed is specified then Auto Scan function scan the configured information of network.
→ Check up the communication way of slave module whether the setting is correct and the module which is different from system configuration is corrected then Auto Scan function is operated.

▼

Using XG-PD
1) Execute [Read IO information] →2) "High-speed link" →3) [Online]- [SyCon Upload] → 4) Set the address of Read area/Save area for uploaded slave module → 5) [Online] – [Write Parameter] → 6) [Online] – [Enable Link].

▼

XG-PD
1) [Online]-[Connection] →2) [Online] – [System Diagnosis] → 3) Select the Master module in System diagnosis window and Check the system's operation status at "High-speed link" and "Auto scan" (It appeared by right button click of selected area).

▼

Start Run

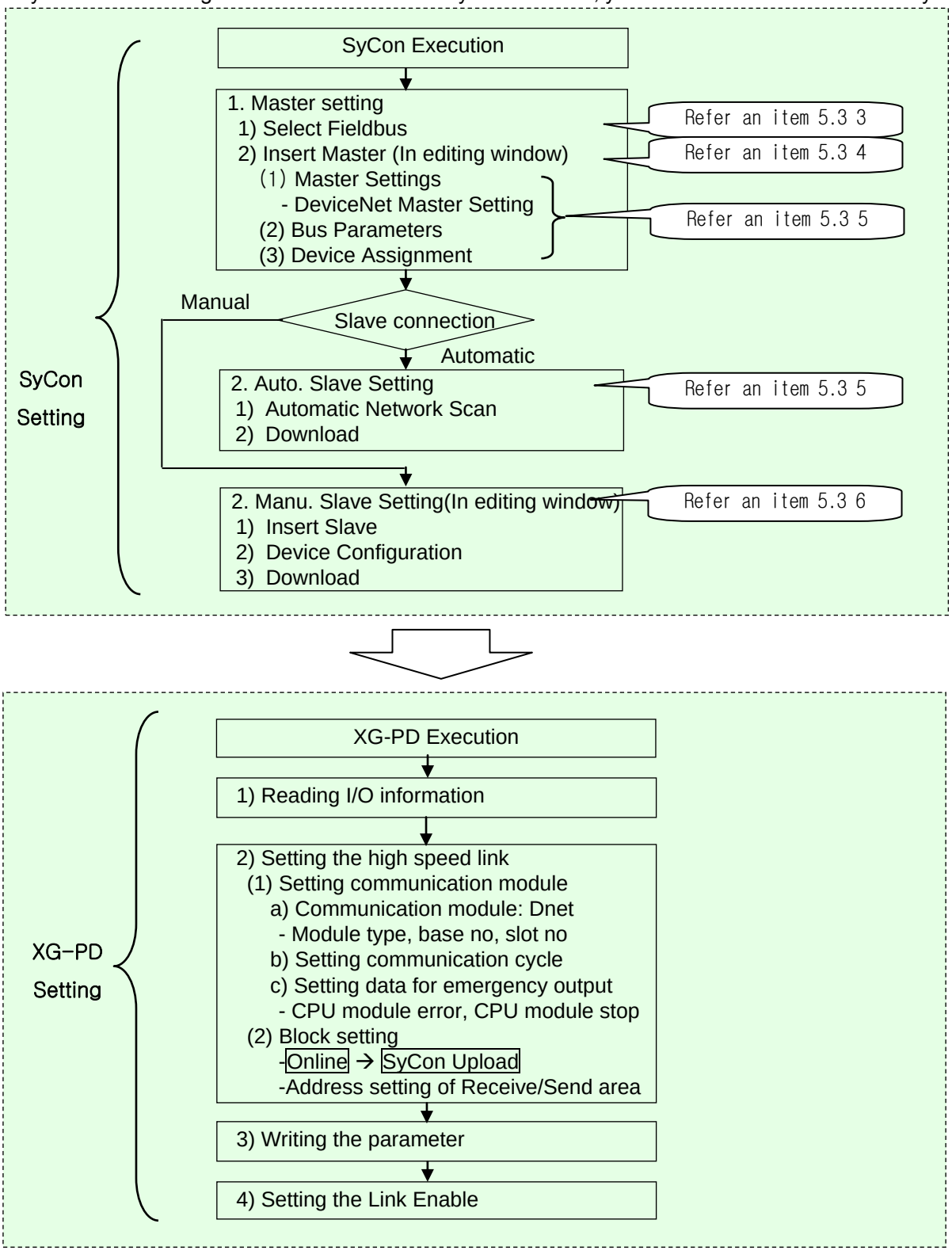
Remark

1) When the first station No. is initialized, the value read from the communication module will be kept continuously. Thus, the details changed (station No., etc.) during communication will not be applied during operation.

3.3 Setting Procedure of SyCon and XG-PD

After setting the network configuration in SyCon software, then set the high speed link parameter and data in XG-PD software.

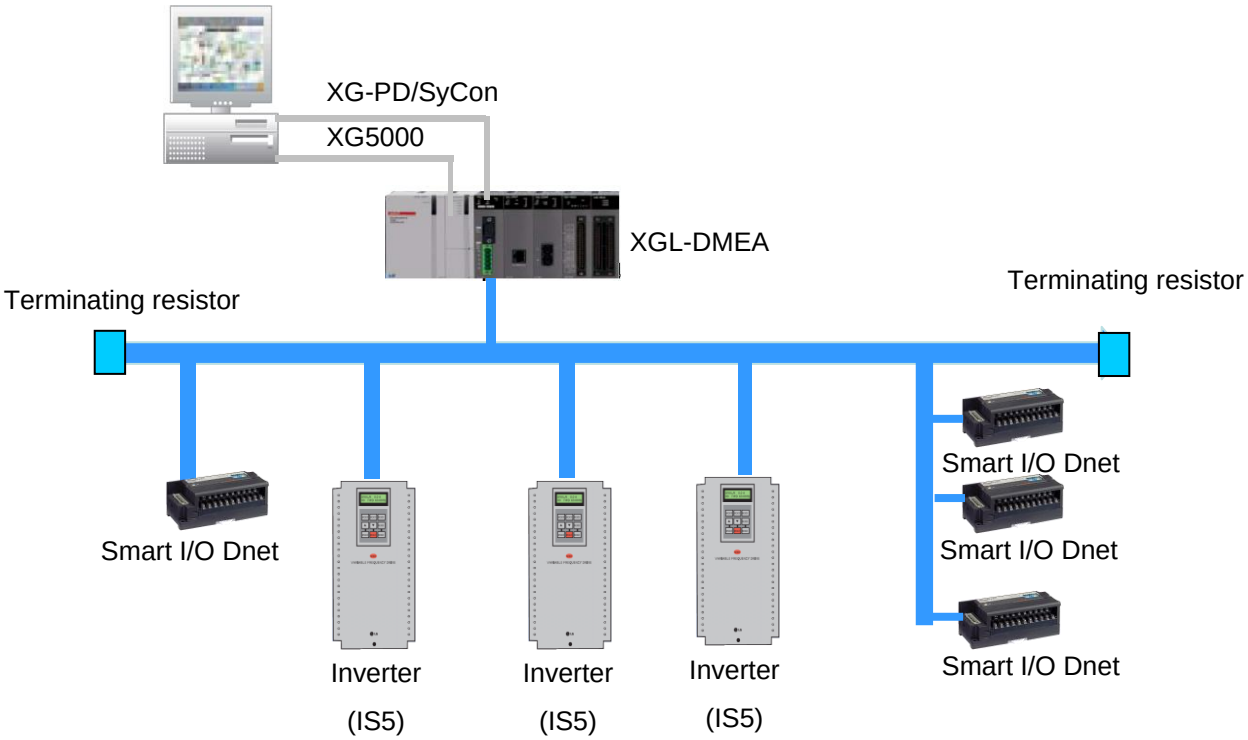
If you don't set configuration of the network in SyCon software, you can not communicate normally.



Chapter 4 System Configuration

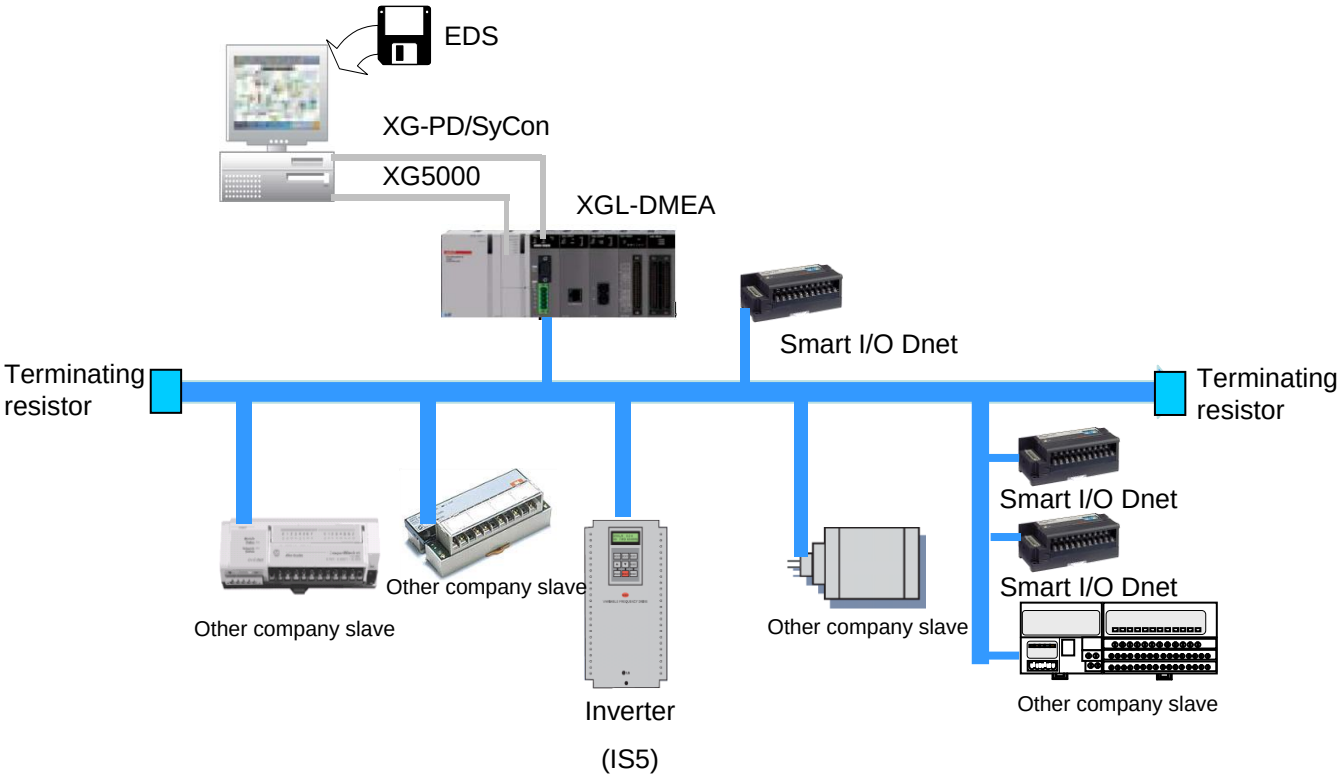
4.1 System with LS Dnet I/F module used

Communication system between LS Dnet I/F modules can be configured as shown below. In the system, XGL-DMEA communication module shall be set to the master and the rest set to slave modules. In order to connect with LS inverter, Dnet I/F option module shall be installed on the applicable product to make the communication available.



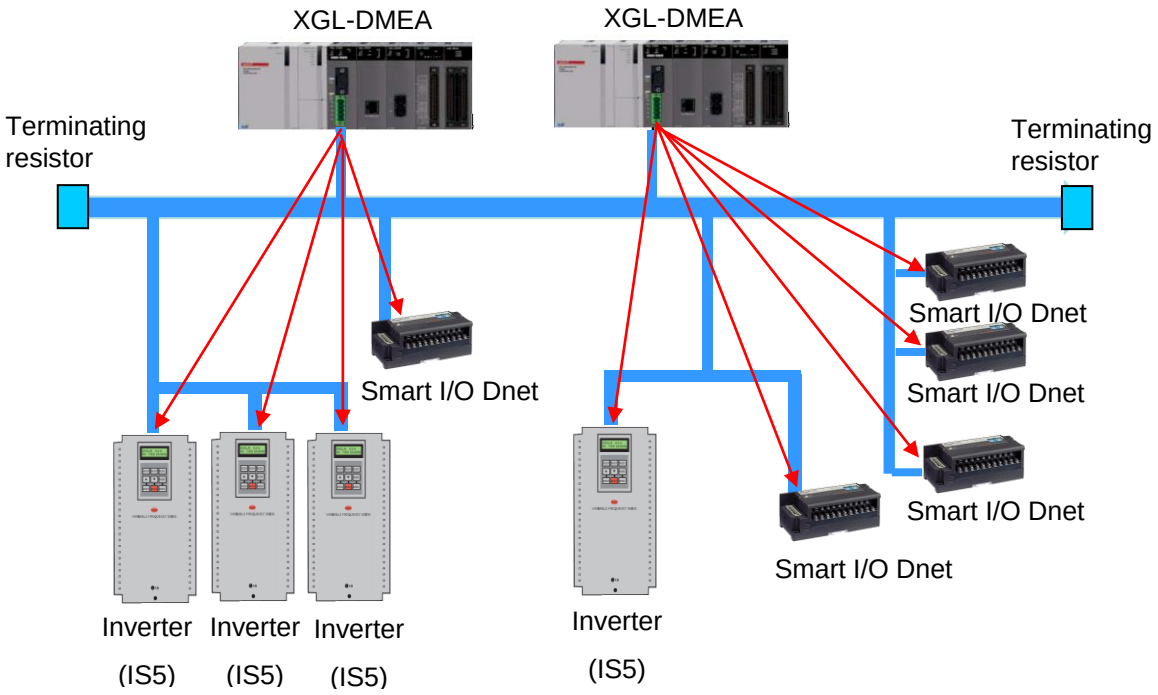
4.2 System with LS Dnet I/F module and LS or other company's slaves mixed

In order to use other company's slave module, EDS (Electronic Data Sheet) file provided by its maker is necessary. Copy EDS file on the EDS folder of SyCon, the software tool for Dnet configuration and then use SyCon automatically to set the slave modules existent in the network.



4.3 System with Multi-master used

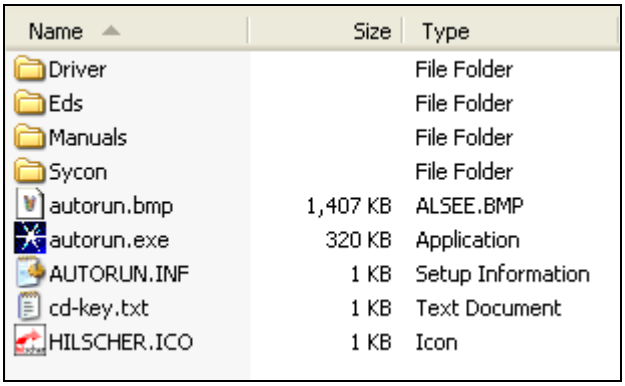
Communication system between LS Dnet I/F modules can be configured as shown below. In the system, set all the two XGL-DMEA modules to the master and then let the slave modules existent in the network shared with respective masters to make the communication available in the same network.



Chapter 5 SyCon Settings

5.1 SyCon S/W Environment

5.1.1 SyCon S/W configuration file

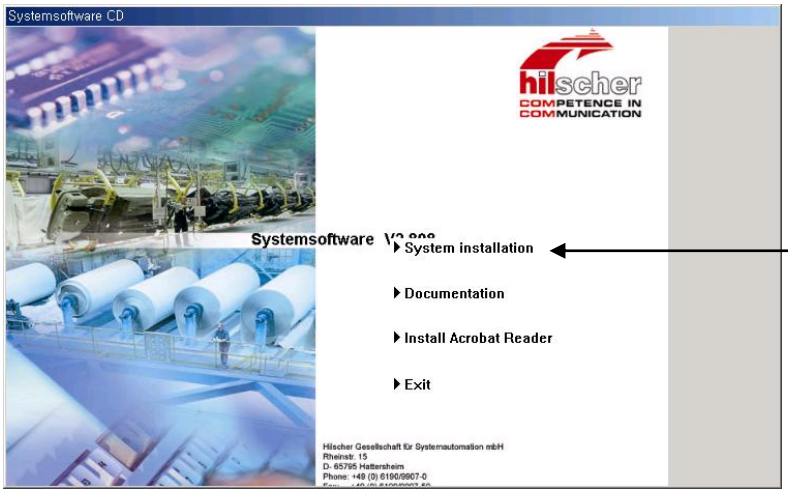


5.1.2 System requirement

- Pentium 486 MHz above
- Windows 95/98/ME/NT/2000/XP
  - Windows 95: Service Pack 1 above
  - Windows NT: Service Pack 3 above
- 80Mbytes minimum free space
- CD ROM Drive required
- RAM memory minimum 16Mbytes required
- Graphic Resolution: 800 x 600 pixel minimum
- Windows 95: Service Pack 1 above
- Windows NT: Service Pack 3 above

5.2 SyCon Program Installations

1) Executes ‘Autorun.exe’.



→ Selects ‘System Installation’.

2) Executes ‘System Installation’.

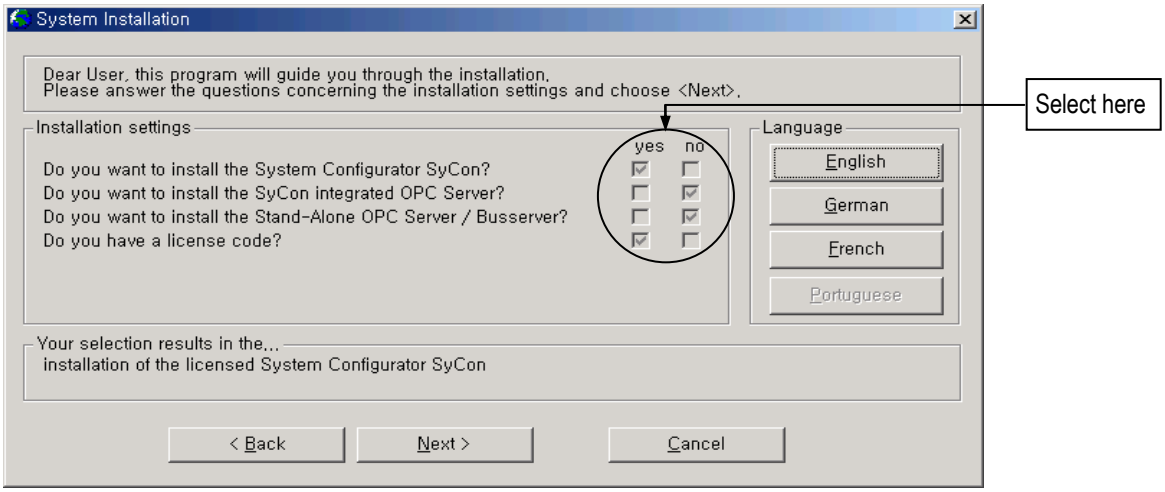
(1) Do you want to install the System Configurator SyCon? → yes

(2) Do you want to install the SyCon Integrated OPC Server? → no

(3) Do you want to the Stand-Alone OPC Server/Busserver? → no

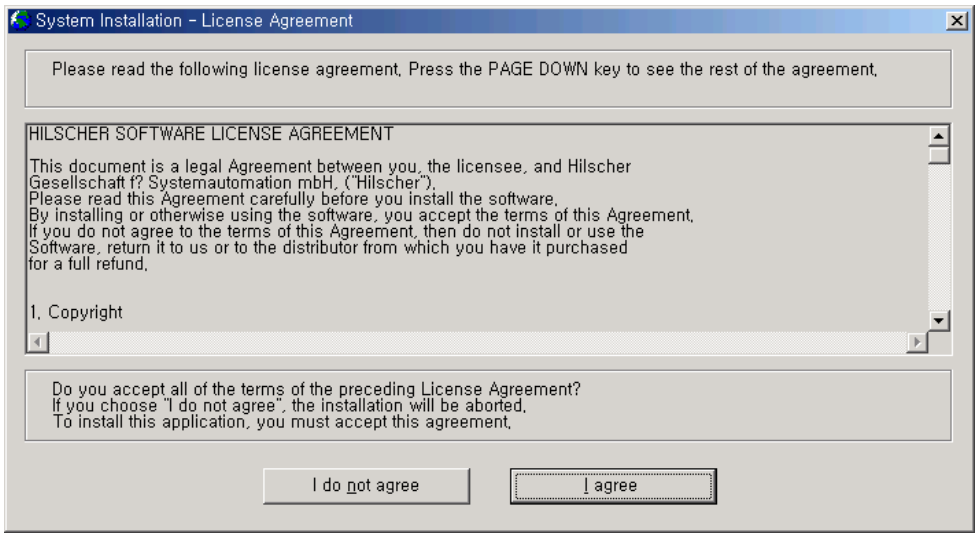
(4) Do you have a License code? → yes

(5) Select Language.



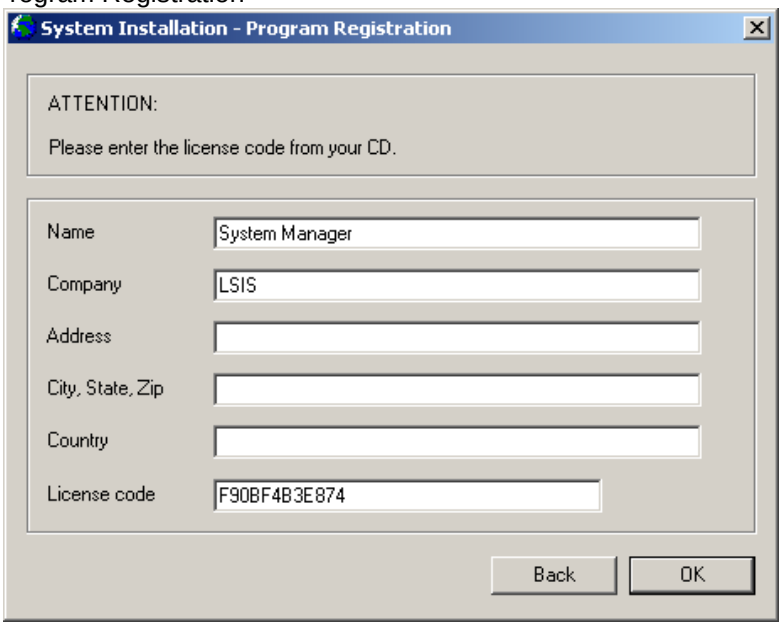
→ Select ‘Next’.

3) License Agreement



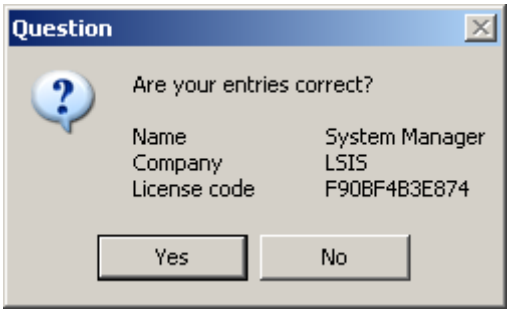
→Select 'I agree'.

4) Program Registration



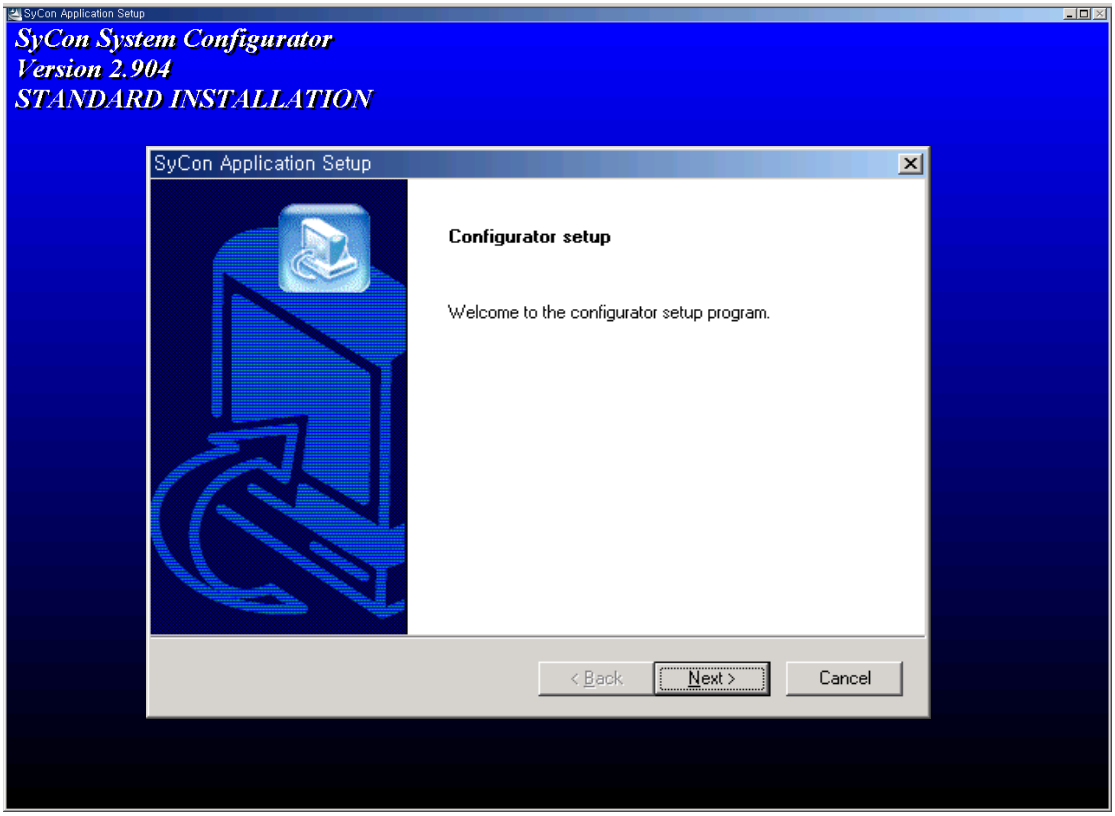
License Code: F90BF4B3E874

→ Select 'OK'.



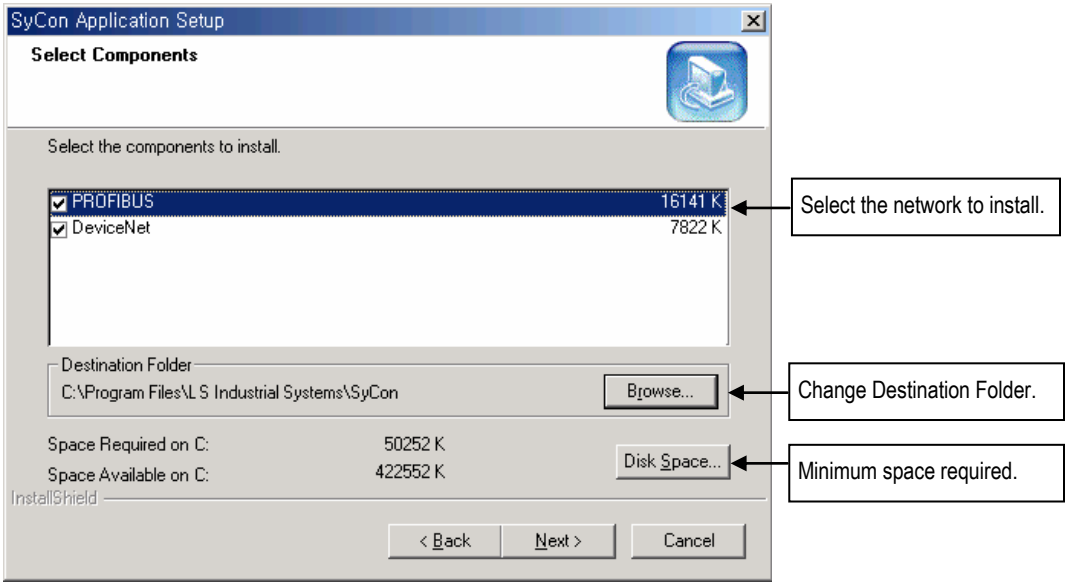
→ Select 'Yes'.

5) Configuration setup



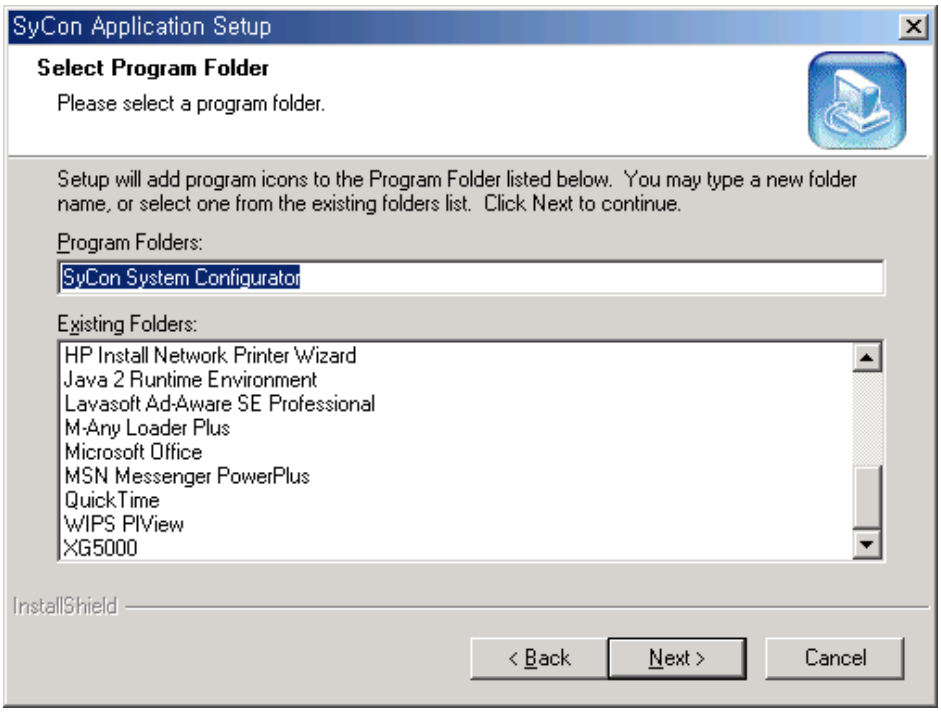
→ Select 'Next'.

(1) Components

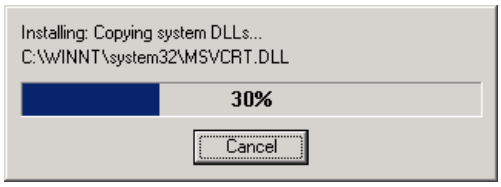


→ Select 'Next'.

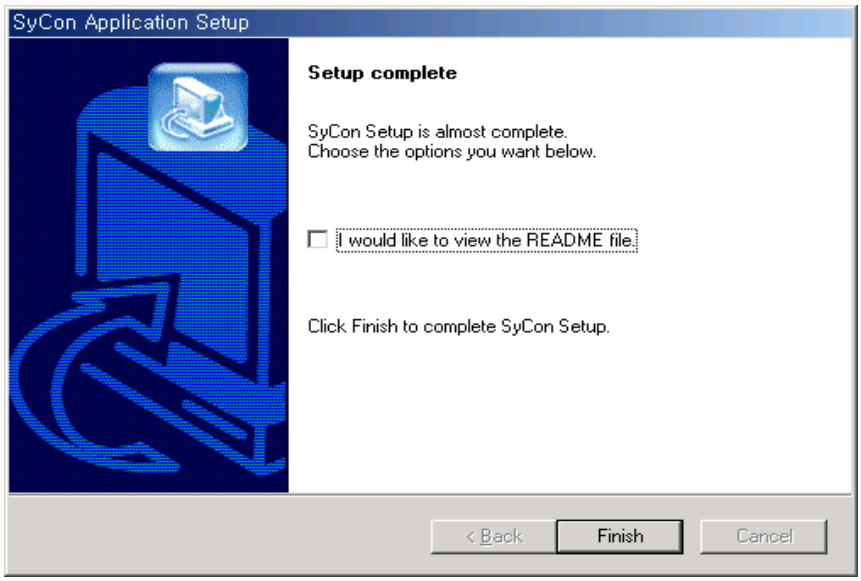
(2) Program Folder



→ Select 'Next'.

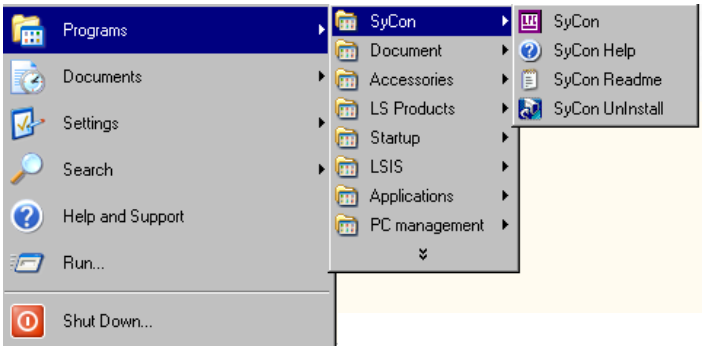


(3) Setup complete



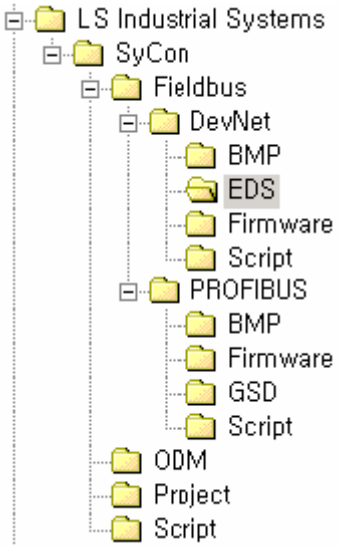
6) Content installed

(1) Execution file



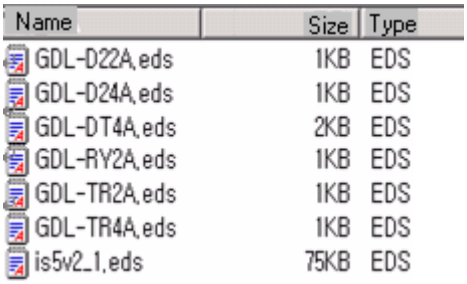
(2) Folder

- File destination: C:\Program Files\LS Industrial Systems\SyCon



(3) EDS file for DeviceNet

EDS file is created automatically as shown below.



5.3 SyCon Execution

Set the basic parameter for Dnet communication between master and slave. Master and slave configuration has 2 methods as shown below.

(1) Configuration with EDS file

Advantages: It can be set the slave which is not connected actually.

Disadvantages: If setting is wrong, the communication is operated abnormally.

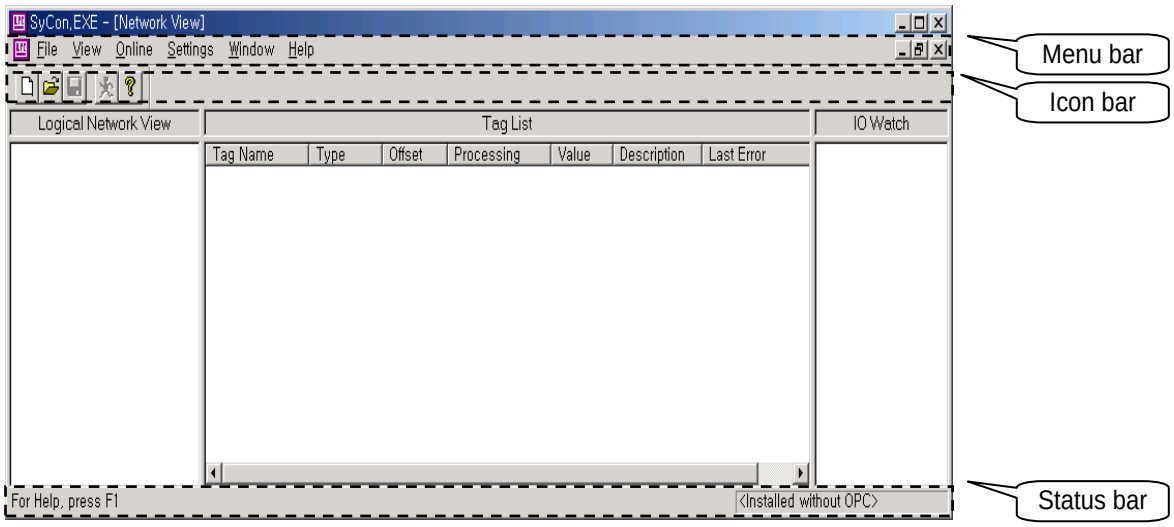
(2) Auto Scan

Advantages: It can be set the parameter easily and speedy.

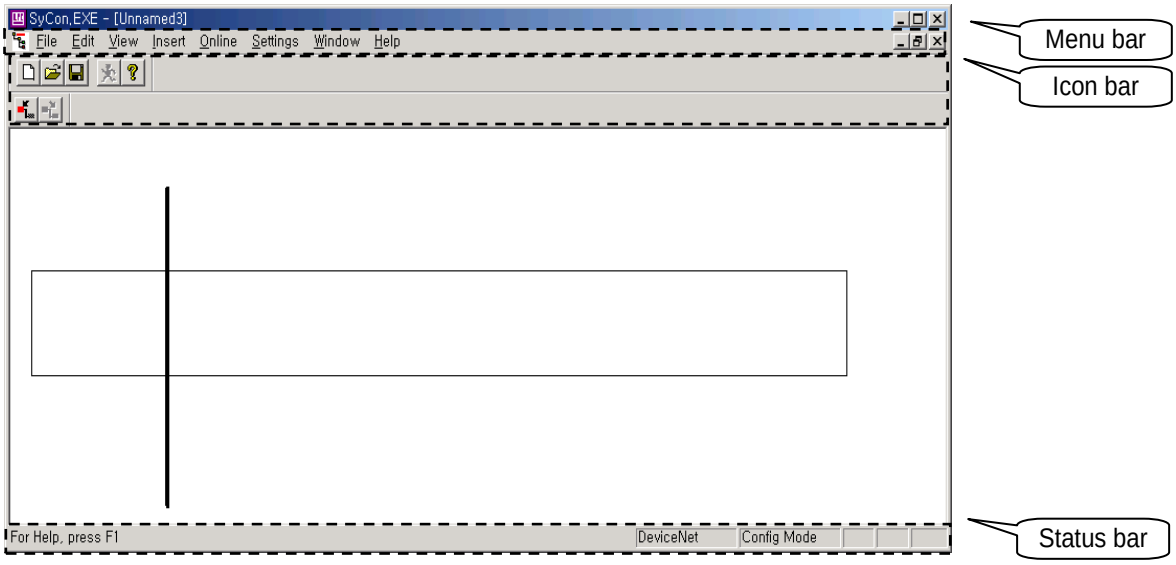
Disadvantages: It can be set only connected slave.

So, Use the methods properly by situation.

1) Initial screen execution

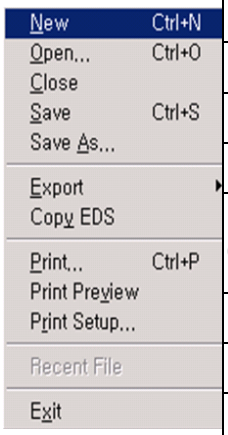
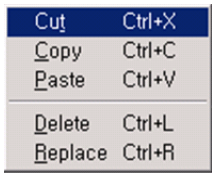
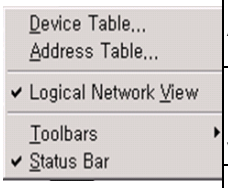


[Network]



[Editing screen]

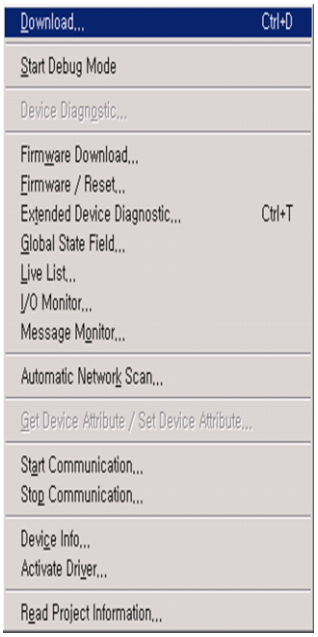
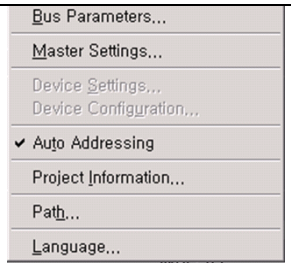
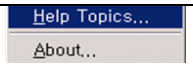
2) Configuration menu

Main menu	Submenu			Description	Remark
File		New		Make New File.	M/S
		Open		Open existed File.	M/S
		Close		Close activated file.	M/S
		Save		Save activated file.	M/S
		Save As		Save activated file as another name.	M/S
		Export		Export Project file.	M/S
		Copy	DBM	Copy DBM extension file.	M/S
			CSV	Copy CSV extension file.	M/S
		Print…		Print.	M/S
		Print Preview		Preview print.	M/S
		Print Setup…		Print setup.	M/S
		Recent File		Display file list recently used.	M/S
		Exit		Exit SyCon.	M/S
Editor		Cut		Cut.	S
		Copy		Copy.	S
		Paste		Paste.	S
		Delete		Delete.	S
		Replace		Replace.	M/S
View		Device Table		Display of Network setting status. (MAC ID, Master/Slave)	M/S
		Address Table		Display Input/Output size and slave module address.	M/S
		Logical Network View		Change into initial Logical Network View from editing screen.	M/S
		Toolbars	Standard	To activate standard menu bar.	M/S
			Fieldbus	To activate Insert Icon menu bar.	M/S
		Status Bar		To display Status Bar in basic SyCon screen.	M/S
Insert		Master		It selects to insert master module.	M/S
		Device		It selects to insert slave module.	M/S

* Remark

M: It means Master. It activates when master is selected in editing screen.

S: It means Slave. It activates when slave is selected in editing screen.

Main menu	Submenu		Description	Remark
Online		Download	To download SyCon setting file.	M
		Start Debug Mode	It displays present connection status.	M
		Device Diagnostic	It displays saved diagnostic information.	M
		Firmware Download	It is used for downloading Firmware.	M
		Firmware/Reset	Reset Firmware.	M
		Extended Device Diagnostic	Extended diagnostic function of Device.	M
		Global State Field	It displays present communication status and module status.	M
		Live List	It displays module's information and status per station number.	M
		I/O Monitor	To display I/O data.	M
		Message Monitor	Data analysis between Master and Slave	M
		Automatic Network Scan	Set Network automatically.	M
		Get Device Attribute/ Set Device Attribute	Change of slave attribute.	S
		Start Communication	Start communication.	M
		Stop Communication	Stop communication.	M
		Device Info	Display of Device's manufacture data and Serial number.	M
		Activate Driver	Register unregistered device.	M
		Read project Information	Display Project information.	M
Settings			Device Assignment	Set the method to communicate with Host.	M
			Bus Parameters	It is used for setting of communication speed and parameter.	M
			Master Settings	Master module setting.	M
			Device Settings	-	-
			Device Configuration	Set Slave parameter.	S
			Auto Addressing	Assign the address automatically.	M/S
			Project Information	Project information.	M/S
			Path	GSD setting file and project path.	M/S
			Language	Select language.	M/S
Window			Cascade	Window array is Cascade mode.	M/S
			Tile	Window array is Tile mode.	M/S
Help			Help Topics	View Help Topics.	M/S
			About	SyCon program information.	M/S

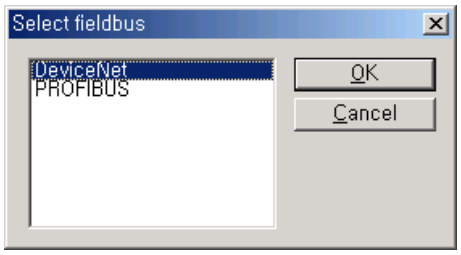
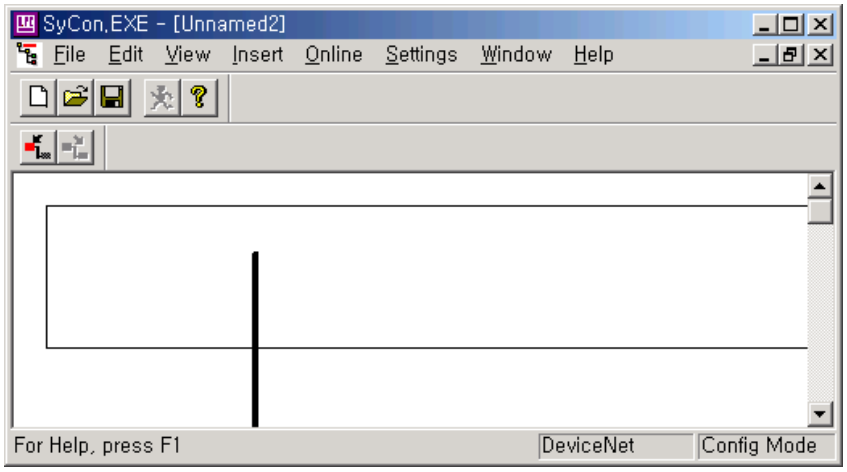
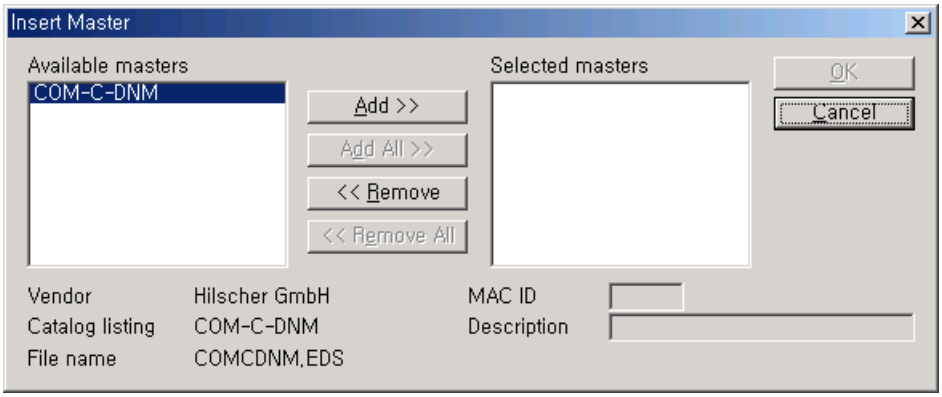
* Remark

M: It means Master. It activates when Master is selected in editing screen.

S: It means Slave. It activates when Slave is selected in editing screen.

3) New File

Master must be set by New file, It can be set the slave automatically in Auto-scan.

Classification	Configuration screen
Fieldbus	
Screen Configuration	
Select Master	

Master type		EDS File Name	Master name
XGT	XGL-DMEA	COMCDNM	COM-C-DNM

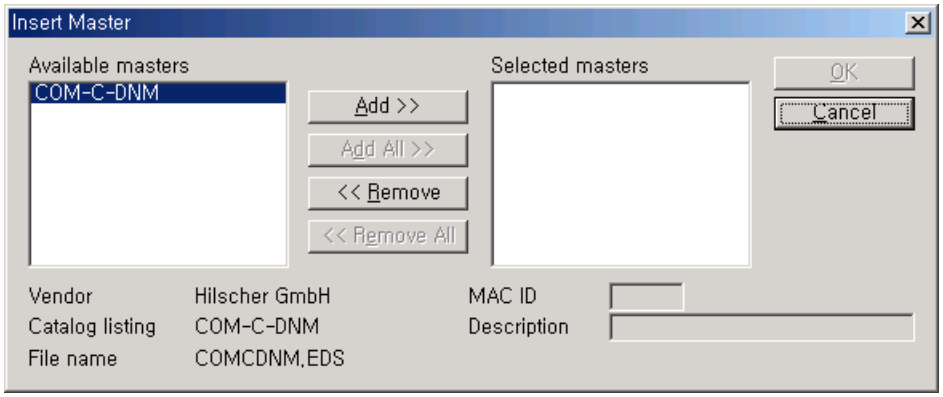
4) Master/Slave selection

(1) Master

A) Selection

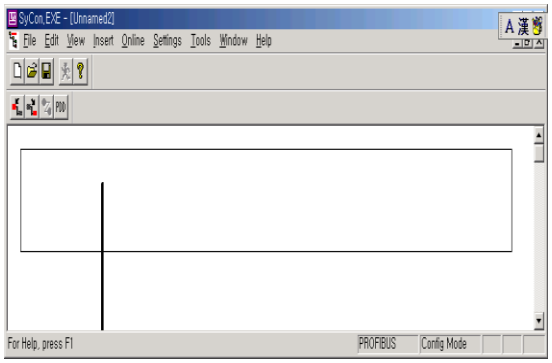
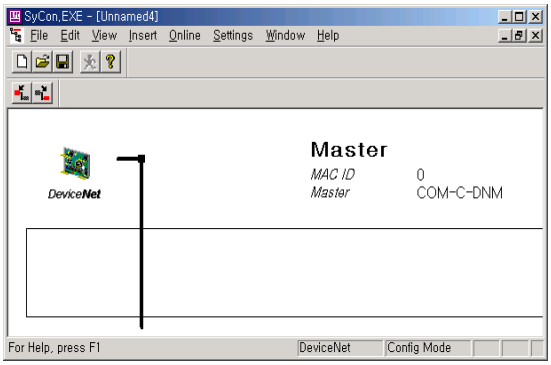
Method	Selection sequence
Menu bar	Insert → Master
Icon	

B) Insertion

Classification	DeviceNet
Master Insertion	
Master Selection	

Master type		EDS File Name	Master name
XGT	XGL-DMEA	COMCDNM	COM-C-DNM

C) Editing

	Previous editing	After editing
Master editing		

(2) Slave

It can be executed after master is inserted.

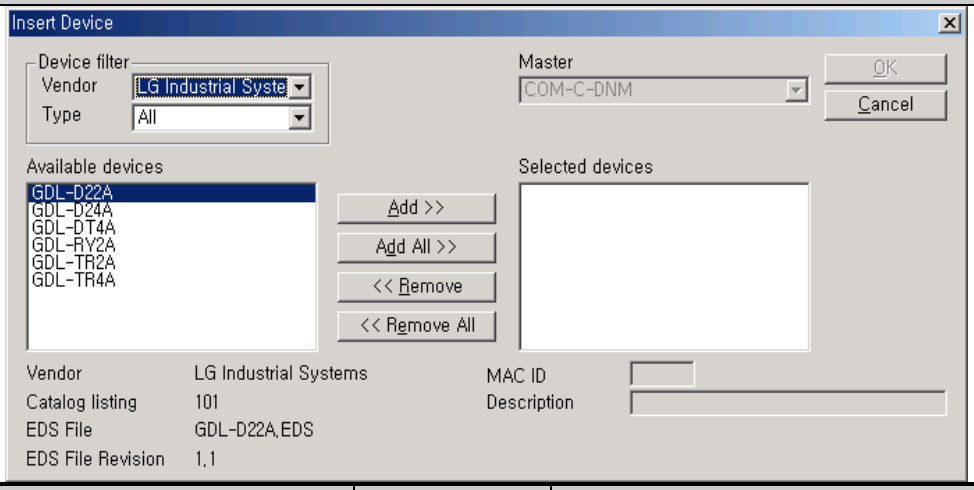
A) Selection

Method	Selection Sequence	Execution Icon
Menu bar	Insert → Slave	
Icon		

B) Insertion

DeviceNet

Slave Insertion

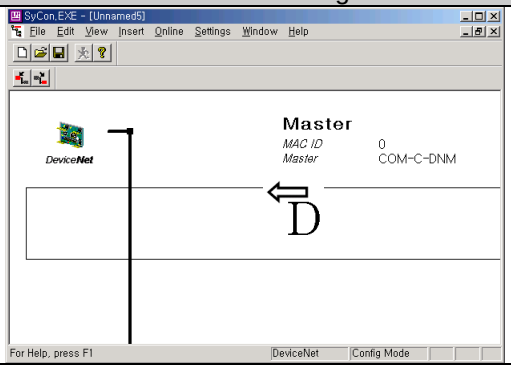
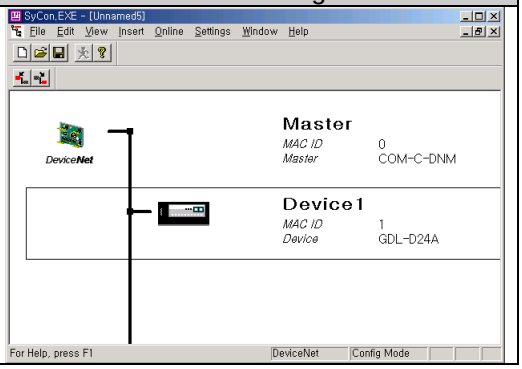


Slave selection

Slave type		EDS File Name	Slave name
PLC	DC input 16 point	GDL-D22A	GDL-D22A/D22C
	DC input 32 point	GDL-D24A	GDL-D24A/D24C
	DC input 16point, Tr output 16 point	GDL-DT4A	GDL-DT4A/DT4A1/DT4B/DT4C/D54C1
	Relay output 16 point	GDL-RY2A	GDL-RY2A/RY2C
	Tr output 16 point	GDL-TR2A	GDL-TR2A/TR2A1/TR2B/TR2C/TR2C1
	Tr output 32 point	GDL-TR4A	GDL- TR4A/TR4A1/TR4B/TR4C/TR4C1
Inverter		IS5V2_1	IS5

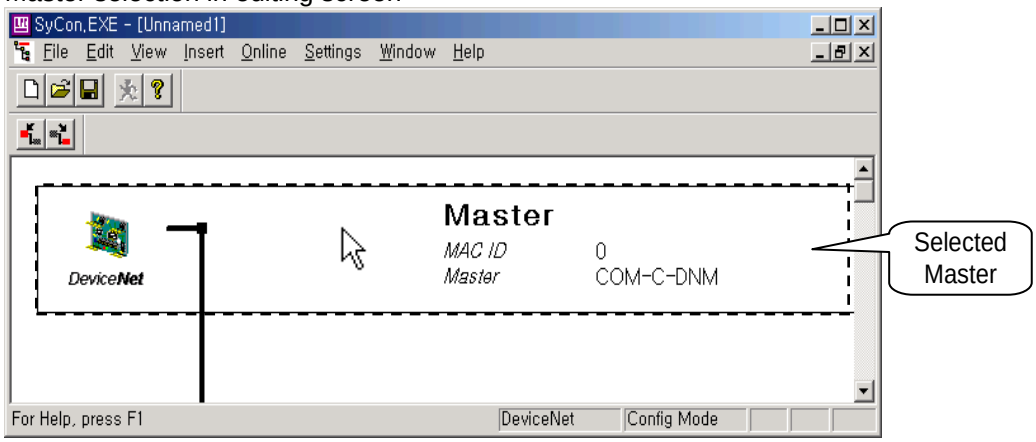
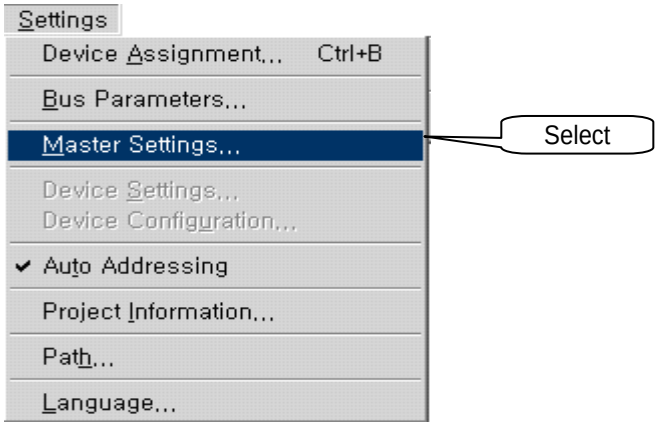
C) Editing

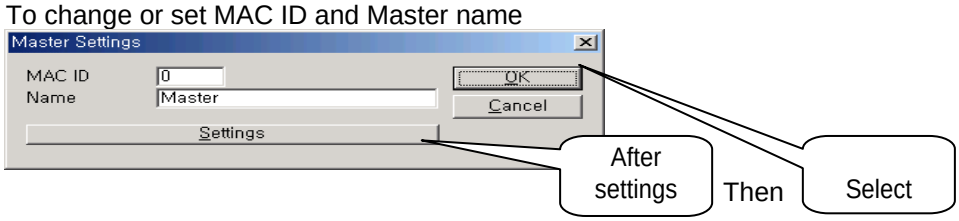
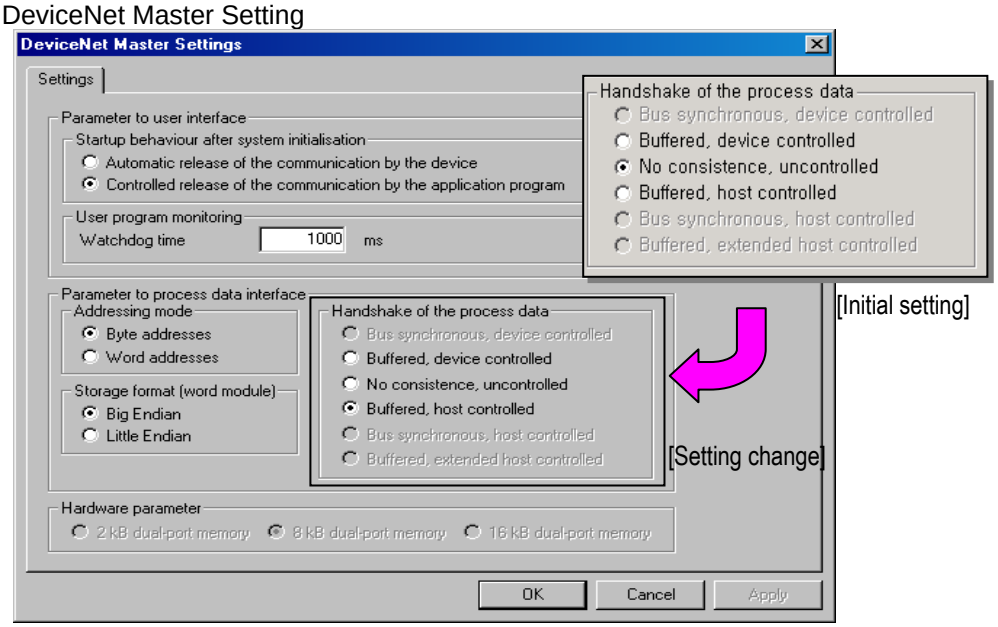
Slave editing

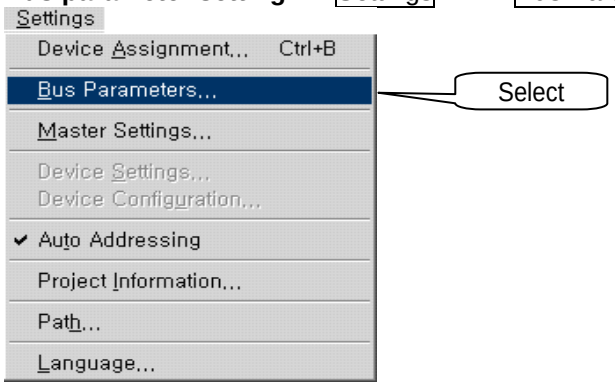
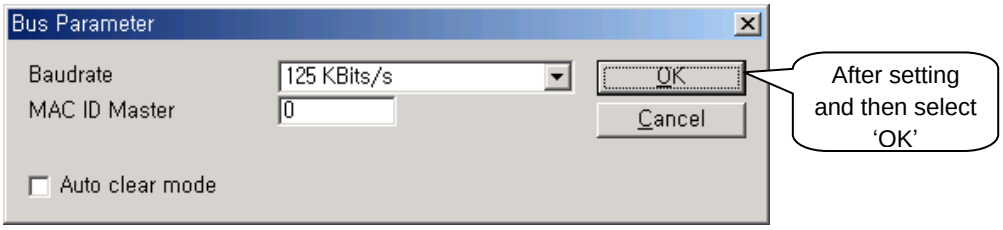
Previous editing	After editing
	

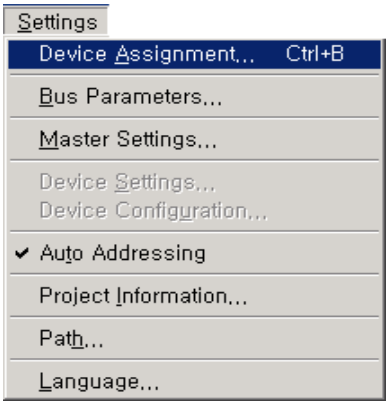
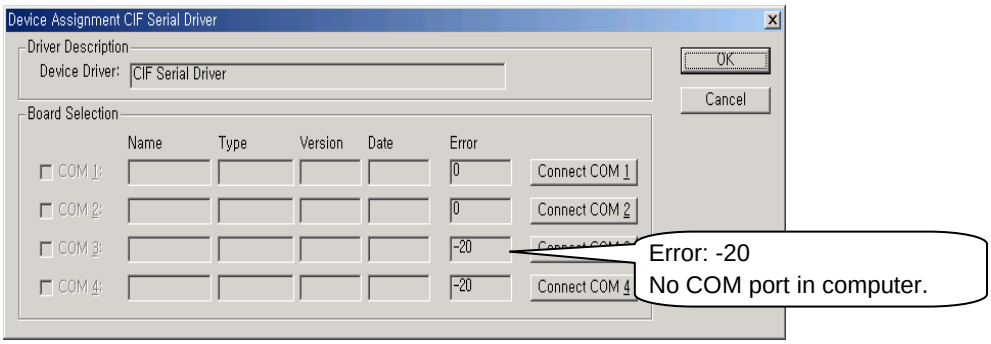
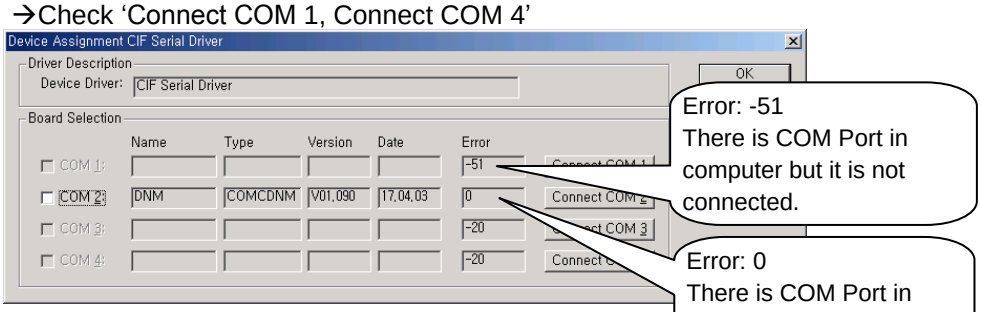
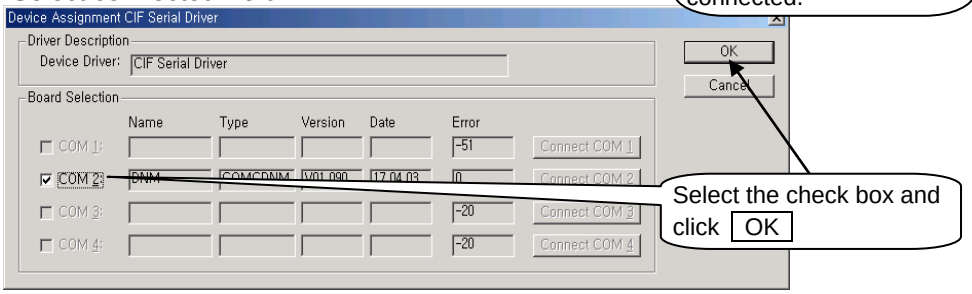
5) Master setting
To set Master, Master must be selected in editing screen.

(1) Setting sequence

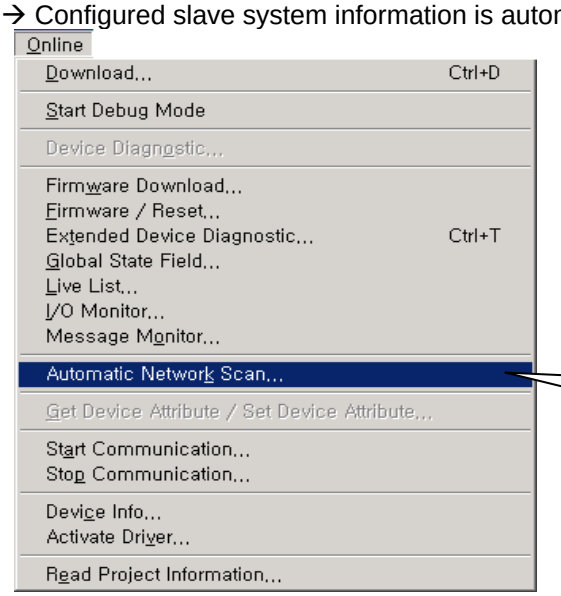
Step	Description
1	Master selection in editing screen 
2	**Master Setting:** Settings → Master Settings 

Step	Description
3	1) To change or set MAC ID and Master name  2) Select Settings DeviceNet Master Setting  ☞ Select ‘Buffered, host controlled’ in ‘Handshake of the process data’ from ‘No consistence, uncontrolled’ (1) Parameter to user interface: Do not change default setting. Default setting: A) Start behavior after system Initialization. → Controlled release of the communication by the application program B) User program monitoring. → Watch dog time : 1000 (ms) (2) Parameter to process data interface: Do not change default setting. Default setting: A) Address Mode : Byte address B) Storage Format (Word Module): Big Endian (3) Handshake of the process data - Select ‘**Buffered, host controlled’**

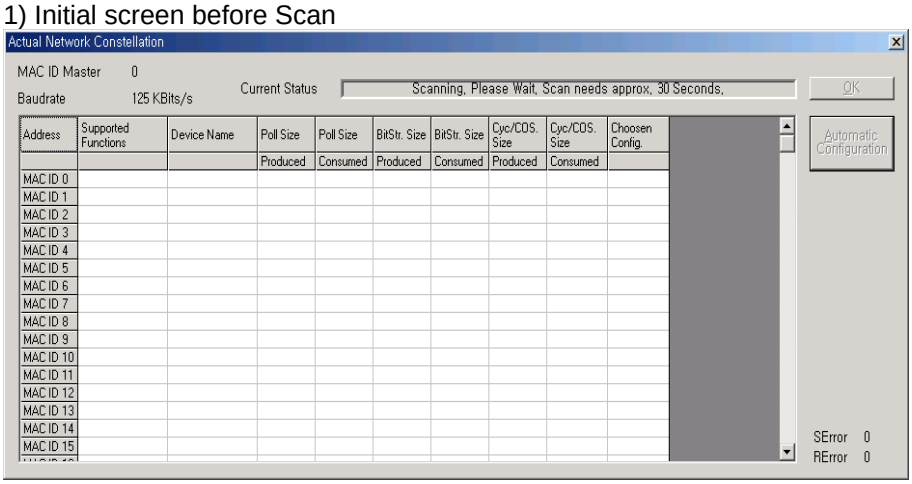
Step	Description
4	**Bus parameter setting:** Settings → Bus Parameters  ▶ To change Communication Speed and MAC ID Master  1) Baudrate: Among 125, 250, 500 KBits/s 2) MAC ID Master: Among 0 ~ 63 3) Auto clear mode (1) When Auto clear mode is selected → If the error is occurred in slave module, All communication is stopped. → Dnet I/F module's HS LED flickering, MNS LED Red ON (2) When Auto clear mode is not selected → If the error is occurred in slave module, the communication of normal slave module is continued.

Step	Description
5	**Serial port selection:** Settings → Device Assignment → Select the disconnected Port in COM Port of computer.  1) Initial screen before connection  2) Check COM Port connection →Check 'Connect COM 1, Connect COM 4'  3) Select connected Port 

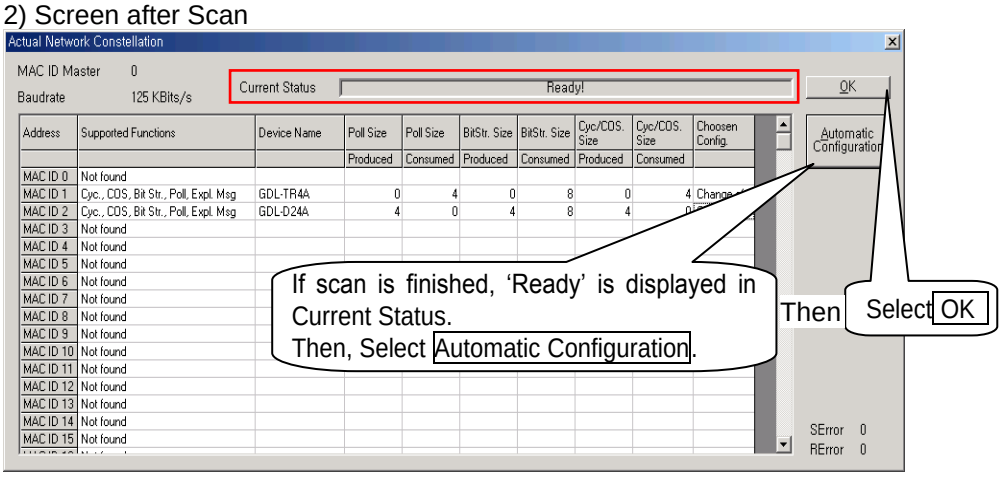
Step	Description
6	**Automatic Network setting**: Online → Automatic Network Scan → Configured slave system information is automatically scanned.



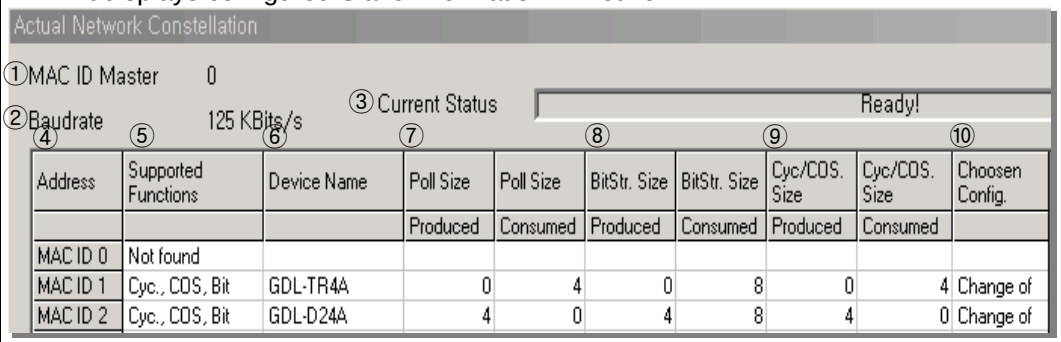
1) Initial screen before Scan



2) Screen after Scan



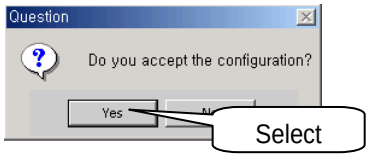
Step	Description
6	→ It displays configured Slave information in Network.

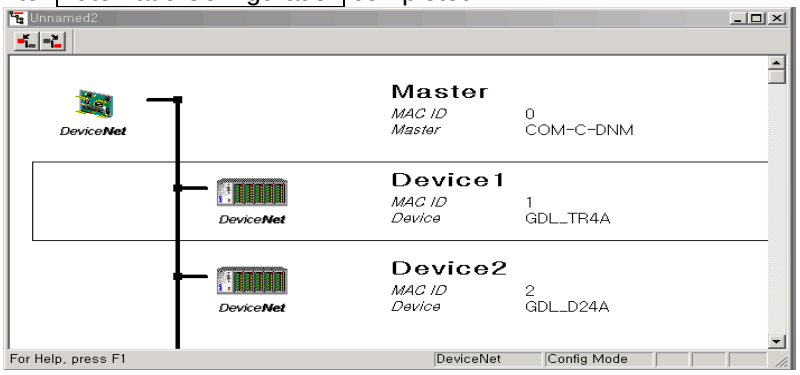
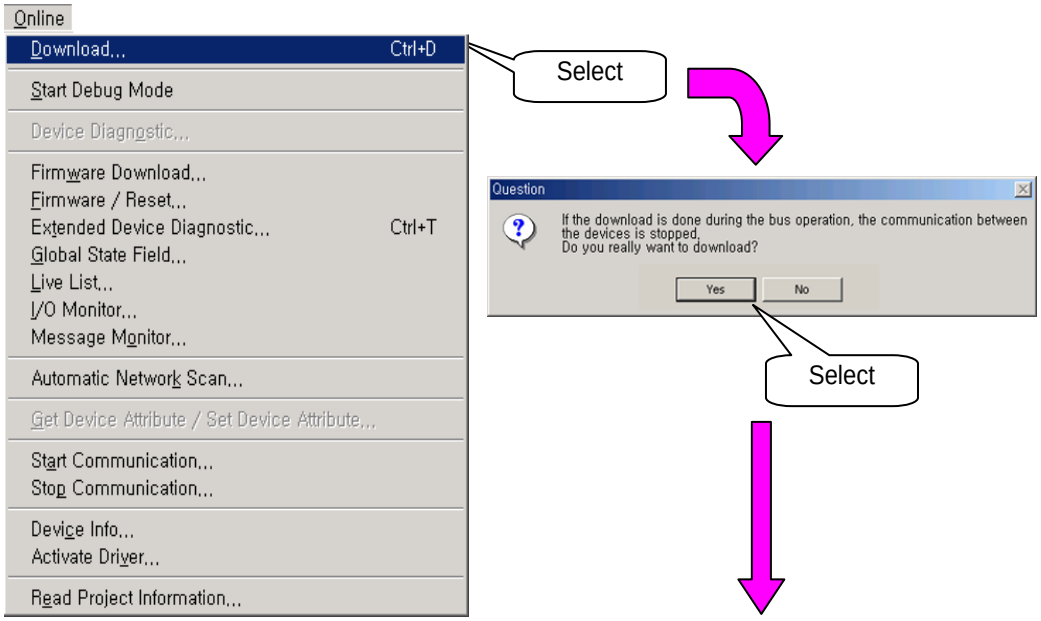


Address	Supported Functions	Device Name	Poll Size	Poll Size	BitStr. Size	BitStr. Size	Cyc/COS. Size	Cyc/COS. Size	Choosen Config.
			Produced	Consumed	Produced	Consumed	Produced	Consumed	
MAC ID 0	Not found								
MAC ID 1	Cyc., COS, Bit	GDL-TR4A	0	4	0	8	0	4	Change of
MAC ID 2	Cyc., COS, Bit	GDL-D24A	4	0	4	8	4	0	Change of

No.	Item		Description
①	MAC ID Master: 0		Master station number display
②	Baudrate: 125KBits/s		Communication speed setting display
③	Current Status		Processing display Ready: Automatic Network Scan is completed
④	Address: MAC ID 0 ~ MAC ID 63		Max. connectible station with network
⑤	Supported Functions		Communication configuration which is supported function by slave module - Cyclic, COS, Bit-Strobe, Poll
⑥	Device Name		Connected slave Device name
⑦	Poll Size	Produced	- Data transmission from slave module to master module - Input module information display - Module points display, Unit: Byte
		Consumed	- Data transmission from master module to slave module - Output module information display - Module points display, Unit: Byte
⑧	BitStr. Size	Produced	- Data transmission from slave module to master module - Input module information display - Module points display, Unit: Byte
		Consumed	- Data transmission from master module to slave module - Output module information display - Max. station information display, Unit: Byte
⑨	Cyc/COS. Size	Produced	- Data transmission from slave module to master module - Input module information display - Module points display, Unit: Byte
		Consumed	- Data transmission from master module to slave module - Output module information display - Module points display, Unit: Byte
⑩	Choosen Config		User specifies the communication method of slave module. - Setting type: Cyclic, COS, Bit-Strobe, Poll - Setting method: Click the Cell

After scan, 'Ready' is displayed at Current Status.
→ Select Automatic Configuration,
Check the using of scanned information.
→ Select OK.

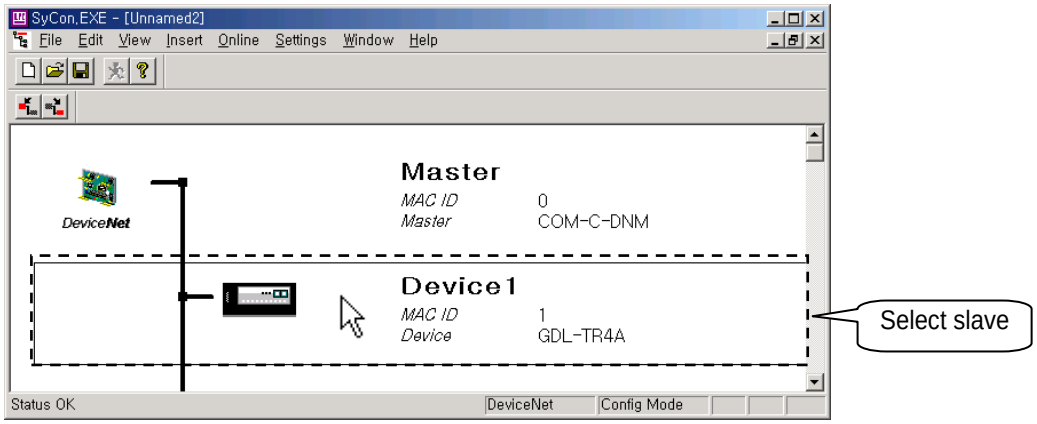
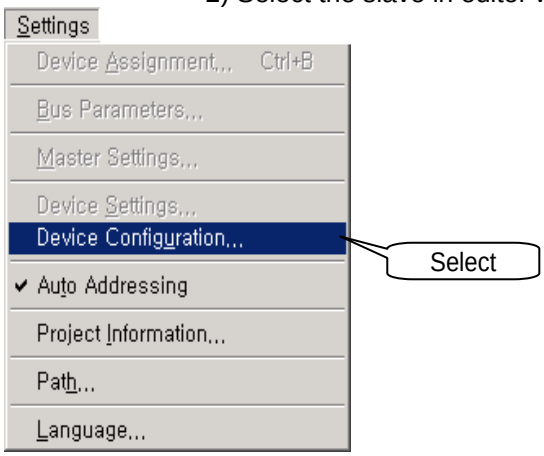


Step	Description
6	After Automatic Configuration completed  → It displays the configured slave module.
7	**System configuration download: Select** Online → Download  → Download window is disappeared after downloading.
8	**Save edited configuration file: Select** File → Save or Save As

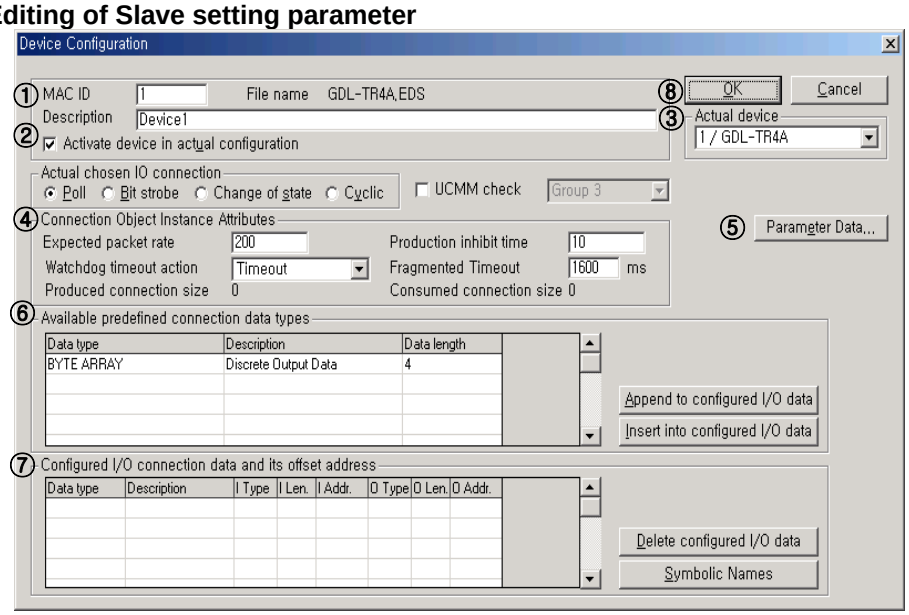
If the above 8 phases is finished, High-speed link setting is available after [SyCon Upload] at XG-PD. (Online → SyCon Upload)

6) Slave module setting (Manual setting)
Slave module setting is available on the editor. Select slave module to edit.

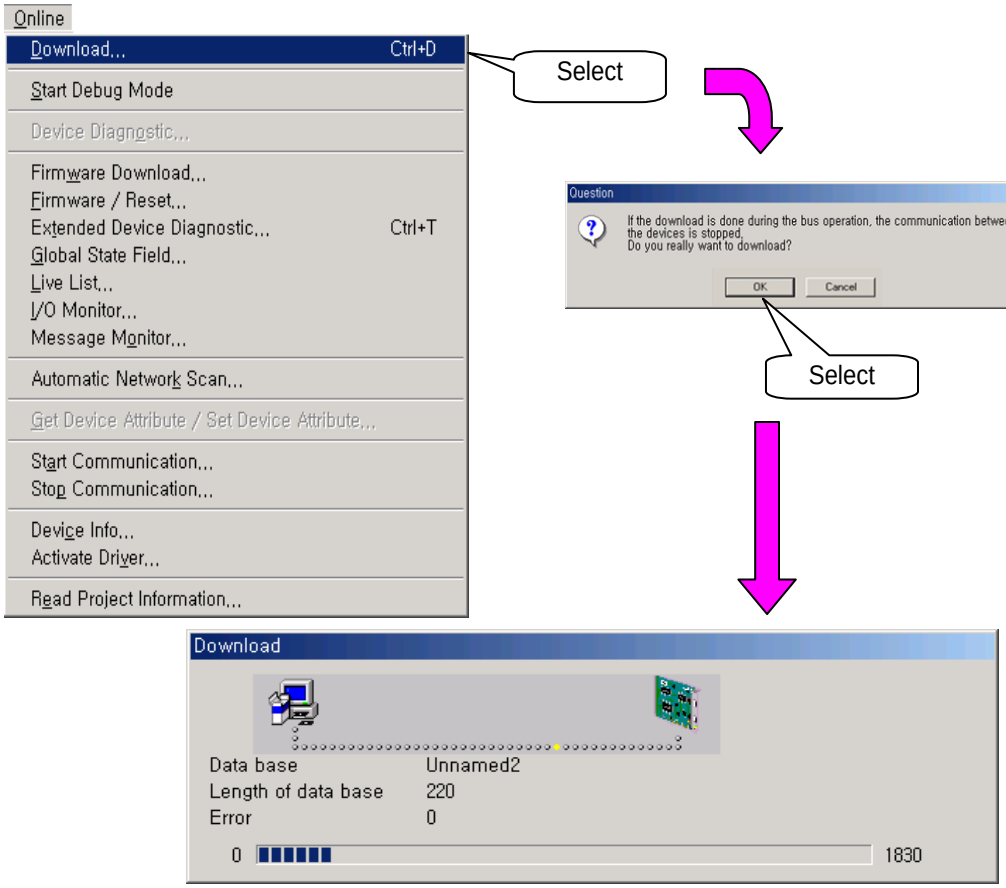
(1) Setting sequence

Step	Description
1	Select Slave in editor window 
2	**Slave setting:** 1) Select Settings → Device Configuration 2) Select the slave in editor window and Click the mouse 

Step	Description
3	**Editing of Slave setting parameter**



No.	Item	Description
①	MAC ID & Description	- Slave station number setting: 0~63 - Slave description setting (in English) - Activate device in actual configuration 1) If it is selected: It is existed in network. 2) If it is not selected: It is not existed in network.
②	Actual chosen IO connection	- Communication method which slave module supports: Cyclic, COS, Bit-Strobe, Poll - UCMM Check: It is applicable to slave module which supports the function.
③	Actual device	It displays the configured slave in network.
④	Connection Object Instance Attributes	-Expected packet rate: 1) COS: Reception period of output module. 2) Cyclic: Transmission/Reception period of input/output module. -Production Inhibit Time: Delayed time between the data (Transmission or reception data) -Watchdog Timeout Action: No response from slave module. 1) Transition to timeout: Maintenance of error status. 2) Auto delete: It makes to delete in network automatically. 3) Auto reset: It makes to recover automatically. -Fragmented Timeout: Maximum response time when data is transmitted to slave module (more than 8 byte) -Produced connection size: Slave input data size -Consumed connection size: Slave output data size
⑤	Parameter Data	Module parameter data in EDS file
⑥	Available predefined connection data types	Data type: Standard data type Description: Input or output data display Data length: Data length
⑦	Configured I/O Connection data and offset address	Data type: Standard data type Description: Module name I Type: Standard input data type I Len: Input data length I Address: Input data start address O Type: Standard output data type O Len: Output data length O Address: Output data start start address
⑧	OK	Save the configured data value

Step	Description
4	**System configuration download:** Online → Download → Master must be selected when Download menu is executed.  → Download window is disappeard when download is completed.
5	**Save edited system configuration file:** File → Save or Save As

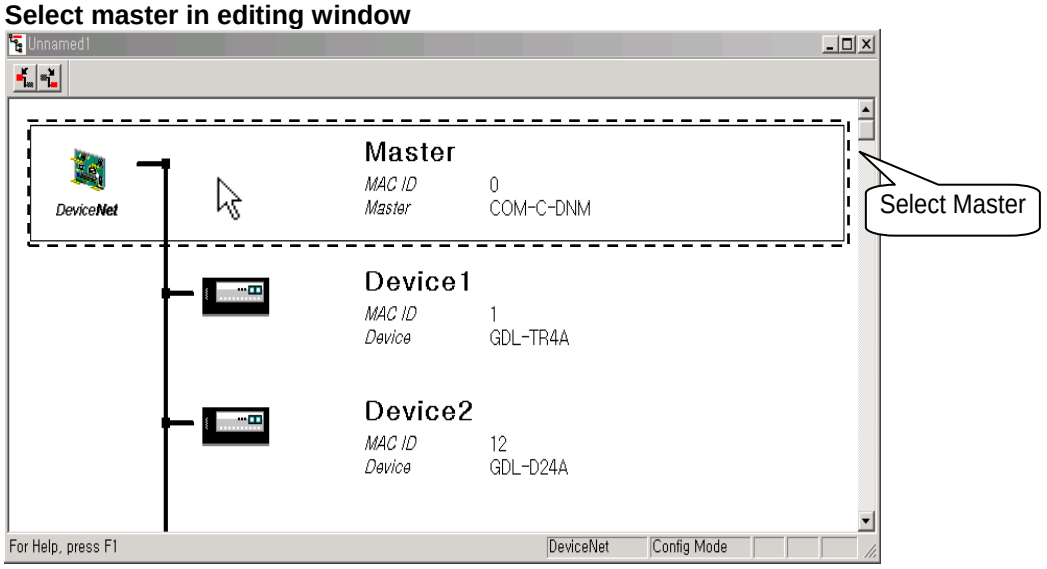
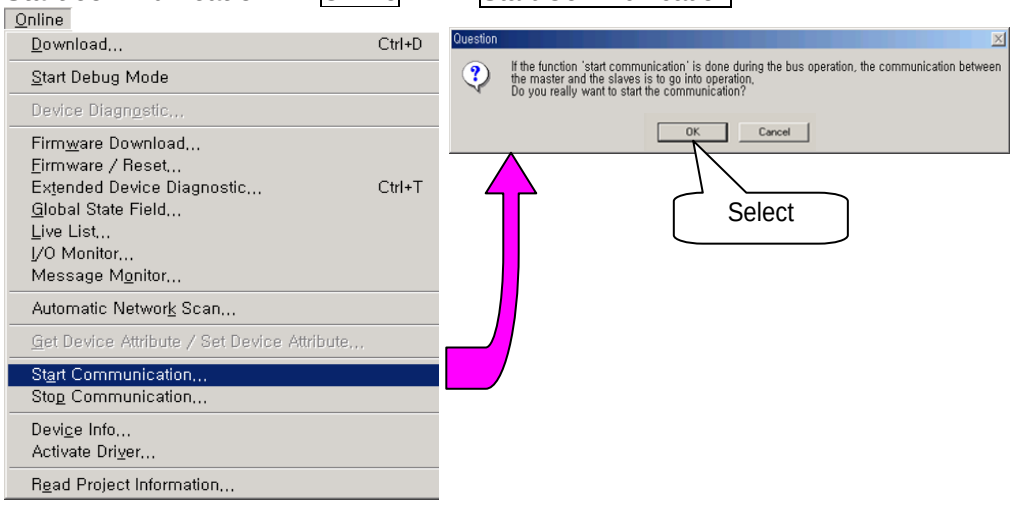
7) Diagnosis

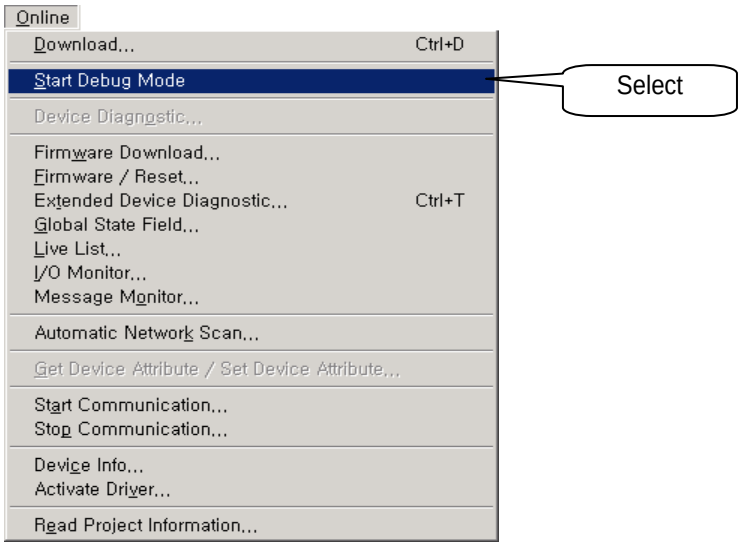
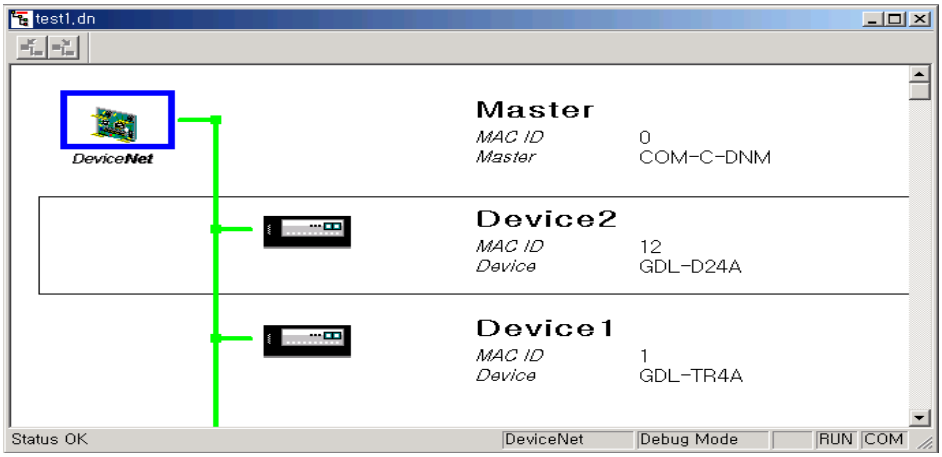
▶ To diagnose

- It is possible to diagnose that the downloaded file exists at the same editing window.
- It is possible to diagnose when master is selected in editing window.
- To diagnose, above 2 conditions have to satisfy.

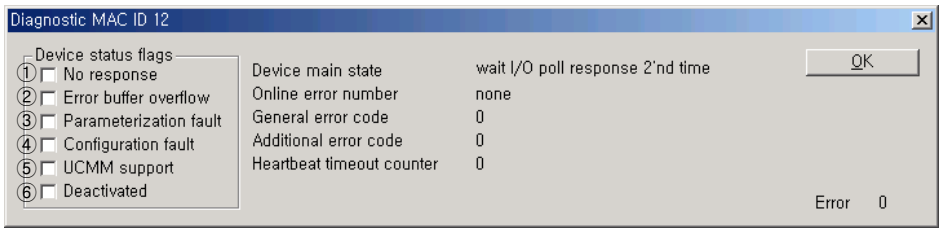
▶ It can confirm the station number, module type, communication speed, communication method and wire diagram through diagnosis.

(1) Setting Sequence

Step	Description
1	**Open the file which is downloaded in Dnet I/F master module in editing window** → It is possible to diagnose that the downloaded file exists at the same editing window.
2	**Select master in editing window** 
3	**Start communication:** Online → Start Communication 

Step	Description
4	**Debug Mode : Select** Online → Start Debug Mode  The wire diagram is changed after debug mode started. 1) If normal status, wire diagram is displayed green color. 2) If abnormal status, wire diagram is displayed red color. 

<table>
<tr><th>Step</th><th>Description</th></tr>
<tr><td>4</td><td>
To check the slave module status, select and click the applicable slave module. The setting window is appeared as shown below.



Device status flags menu is checked by slave module status.

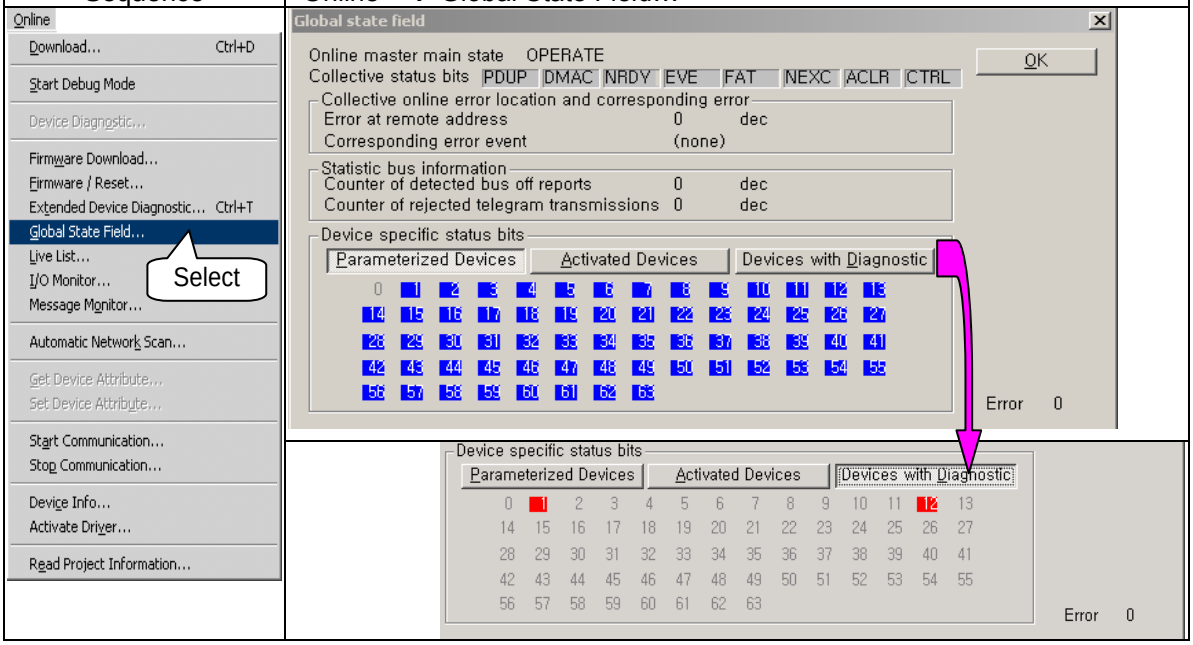
<table>
<tr><th>No.</th><th>Item</th><th>Description</th></tr>
<tr><td>①</td><td>No response</td><td>Specified slave module is not existed in network. (Solution: Check Network cable and Baud rate)</td></tr>
<tr><td>②</td><td>Error buffer overflow</td><td>Error data's information is overflowed the limited buffer memory in master module.</td></tr>
<tr><td>③</td><td>Parameterization fault</td><td>Specified slave module's information in SyCon is not correspondent with slave module's information in network.</td></tr>
<tr><td>④</td><td>Configuration fault</td><td>Input/Output data size of slave module which is specified in SyCon is different from real Input/Output data size.</td></tr>
<tr><td>⑤</td><td>UCMM support</td><td>Slave module supports the UCMM.</td></tr>
<tr><td>⑥</td><td>Deactivated</td><td>Slave module status is abnormal.</td></tr>
</table>
</td></tr>
</table>

5.4 Monitoring Information in SyCon

It monitors variable status information of communicating network.

1) Global State Field

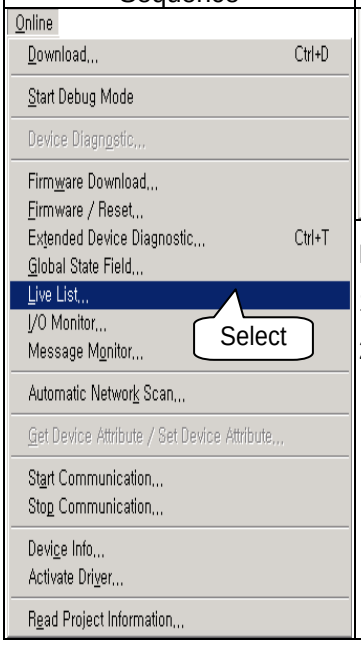
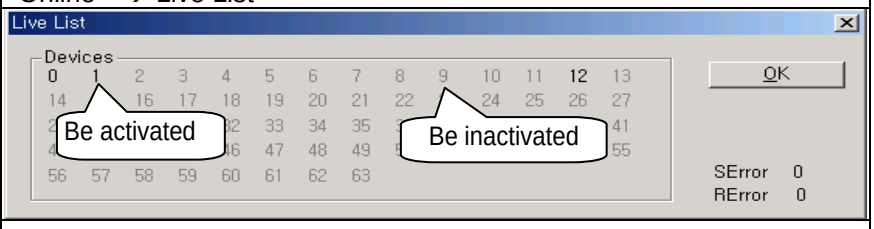
Menu	Description
Sequence	Online → Global State Field…



Global State Field's description is as shown below.

Classification			
Online master main state	OPERATE	Master module is operating.	
	STOP	Communication part of Master module is not operation.	
Collective status bits	PDUP	Device executes the duplicated MAC ID checking.	
	DMAC	Duplicated MAC ID module is existed.	
	NRDY	The communication of main program is not ready.	
	EVE	Transmission error	
	FAT	Communication can not available because of fatal error.	
	NEXC	The at least 1 device can not reach Data Exchange State.	
	ACLR	All devices stop the communication and are cleared automatically.	
	CTRL	Master parameter error	
Collective online error location and corresponding error	Error at remote address		Error address displayed
	corresponding error event		Error event displayed
Statistic bus information	Counter of detected bus off report		Counting the number of Bus off
	Counter of rejected telegram transmissions		Counting the rejected telegram transmissions
Device specific status bits	Parameterized Devices	Display of parameterized slave module (Blue)	
	Activated Devices	Display of activating slave module (Yellowish green) -The yellowish green is disappeared when slave module has the error.	
	Devices with Diagnostic	Display of activating slave module (Red) -The diagnosis window is appeared when red color station is double-clicked. → Refer to 7) Diagnosis's 4 step.	

2) Live List

Menu	Description
Sequence	Online → Live List
	 Devices: It displays slave station number. 1) Activation: It displays normal communicating slave module. 2) Inactivation: It displays abnormal communicating slave module.

Chapter 6 High-speed Link Setting

6.1 Introduction

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

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

<table>
<tr><th colspan="3">Description</th><th colspan="3">High-speed Link</th></tr>
<tr><td rowspan="14">Communication module setting</td><td rowspan="3">Communication module setting</td><td>Module type</td><td colspan="2">Dnet</td></tr>
<tr><td>Base no.</td><td colspan="2">Max.: 0 ~ 7
Setting range is different from CPU module.</td></tr>
<tr><td>Slot no.</td><td colspan="2">Max.: 0 ~ 11
Setting range is different from Base type.</td></tr>
<tr><td>Communication period setting (Period type)</td><td colspan="3">Select among 10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 5s, 10s.
- Default setting: 10 ms</td></tr>
<tr><td rowspan="4">Output data setup in case of emergency</td><td rowspan="2">CPU error</td><td>Latch</td><td>Keep the previous output status.</td></tr>
<tr><td>Clear</td><td>Clear the output.</td></tr>
<tr><td rowspan="2">CPU stop</td><td>Latch</td><td>Keep the previous output status.</td></tr>
<tr><td>Clear</td><td>Clear the output.</td></tr>
<tr><td>Mode *1</td><td colspan="3">Send : the data transfer from master module to slave module
Receive : the data transfer from slave module to master module</td></tr>
<tr><td>Station No. *1</td><td colspan="3">Slave station number (Range: 0 ~ 63)</td></tr>
<tr><td>Communication Method *1</td><td colspan="3">The communication method between master and slave(Poll, Bit-Strobe, COS, Cyclic)</td></tr>
<tr><td rowspan="2">Read area (From Master to Slave module)</td><td>Address</td><td colspan="2">Head address of the sending device
Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR</td></tr>
<tr><td>Size *1
(Byte)</td><td colspan="2">Input/Output point of slave module is displayed Byte.
- If input /Output module is less than 8 bit, it is processed 1 Byte.</td></tr>
<tr><td rowspan="2">Save area (From Slave to Master module)</td><td>Address</td><td colspan="2">Head address of the receiving device
Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR</td></tr>
<tr><td>Size *1
(Byte)</td><td colspan="2">Input/Output point of slave module is displayed in Byte.
- If input/Output module is less than 8 bit, it is dealt with 1 Byte.</td></tr>
<tr><td colspan="2">PLC connection</td><td colspan="3">RS-232C or USB Port of CPU module</td></tr>
<tr><td colspan="2">Control condition</td><td colspan="3">It can control regardless of position of Run mode switch (Run, Stop) of CPU module.</td></tr>
<tr><td colspan="2">Max. communication point</td><td colspan="3">Transmission 28672 points, Reception 28672 points, Respectively 3584 Bytes</td></tr>
<tr><td colspan="2">Max. block number</td><td colspan="3">63 (Setting Range : 0~62)</td></tr>
<tr><td colspan="2">Max. point per block</td><td colspan="3">256 Byte (2,048 point) (Setting range 1 ~ 256)</td></tr>
<tr><td colspan="2">Number of High-speed link setting</td><td colspan="3">Up to 12</td></tr>
</table>

Note

*1 : 1) It can not set in XG-PD.
2) It displays the uploaded data from SyCon to XG-PD.
3) The setting sequence is from 1 phase to 2 phase.
1 phase: Parameter setting in SyCon→Download
2 phase: XG-PD →Read I/O information → SyCon upload → High-speed link parameter setting → Download the parameter → High-speed link permission
Setting value can be changed according to the changing phases (2 phase → 1 phase).

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

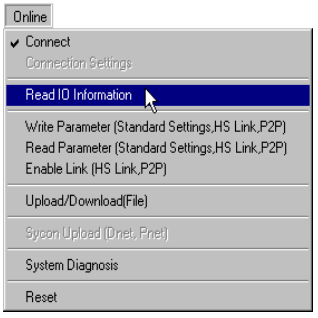
6.2 How to use XG-PD

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

XG-PD execution

1) Read I/O information

Read Dnet I/F module information



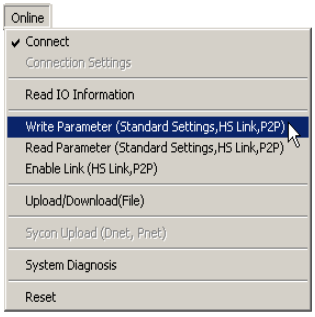
or

2) High-speed link setting
 (1) Communication module setting
  A) Communication module setting: Dnet
  - Module type, Base, Slot
  B) Communication period setting
  C) Data setup in case of emergency
  -CPU module error, CPU module stop
 (2) Block setting
  - Online → SyCon Upload
  - Read area/Save area address setting

1) Connects High-speed link and Dnet I/F module (The module information get through 'Read IO information').
2) Reads system information in SyCon.
3) PLC's program synchronizes with slave module's input/output point setting in SyCon. It is to synchronize the using device and address.

3) Write Parameter

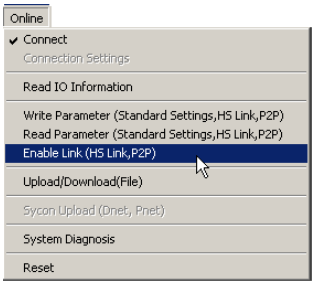
Write of High-speed link parameter value of installed Dnet I/F module.



or

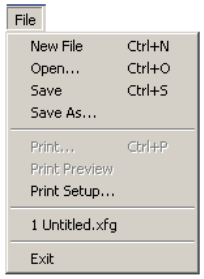
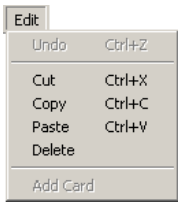
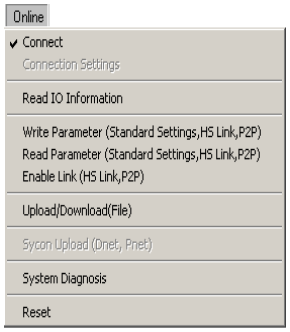
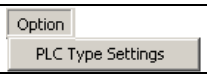
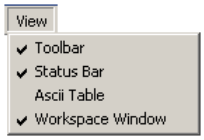
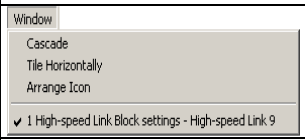
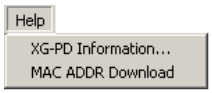
4) Enable Link

Communication permission of installed Dnet I/F module.



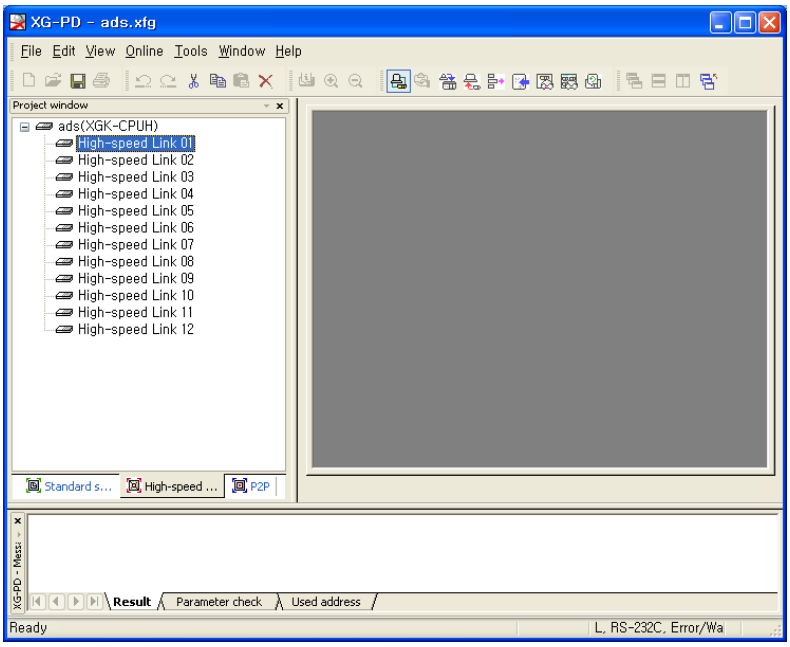
or

*** Relation of Menubar and shortcut**

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

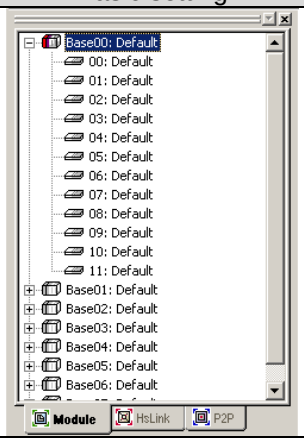
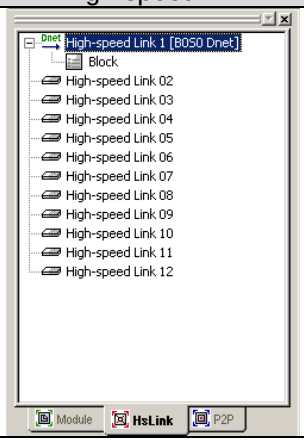
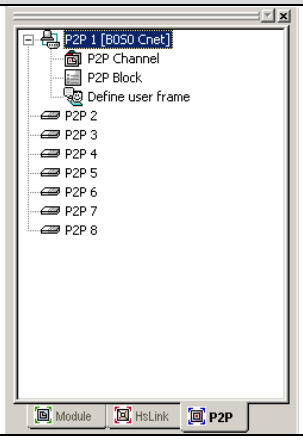
6.3 High-speed Link Editing

XG-PD is executed as shown below.



[Standard window]

The parameter in XG-PD is as shown below.

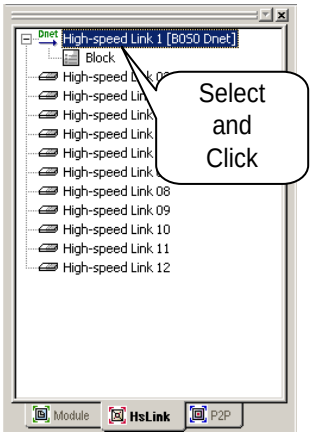
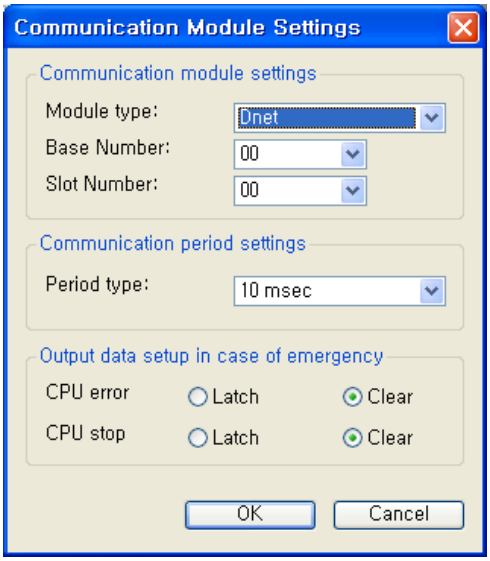
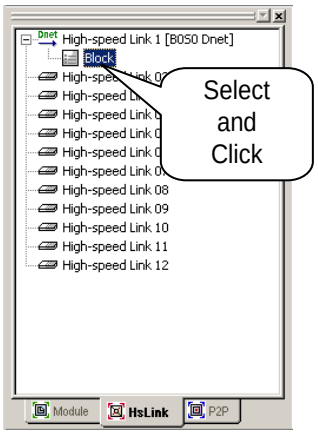
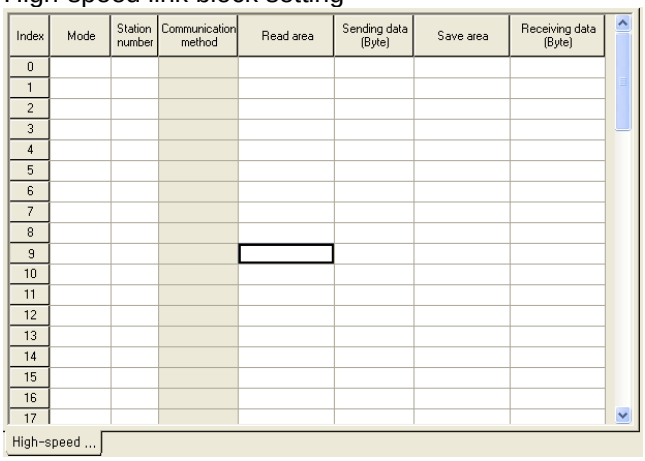
Basic setting	High-speed link	P2P
		

[Parameter window]

Dnet I/F module is set in High-speed link window. It can use the High-speed link up to maximum 12. A High-speed link is available per a Dnet I/F module.

1) How to use High-speed link window

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

High-speed link	Parameter setting
	Communication module setting 
	High-speed link block setting 

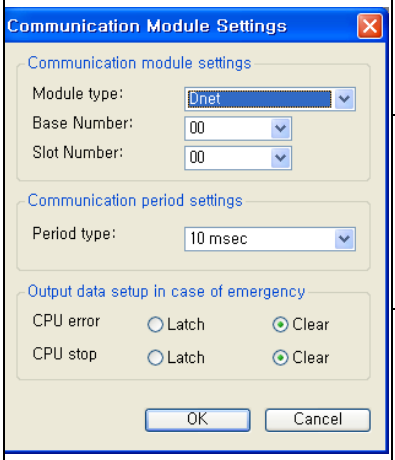
Remark

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

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

2) Communication module setting parameter

Communication module parameter setting is as shown below.

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

Remark

Cautions of communication period setting

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

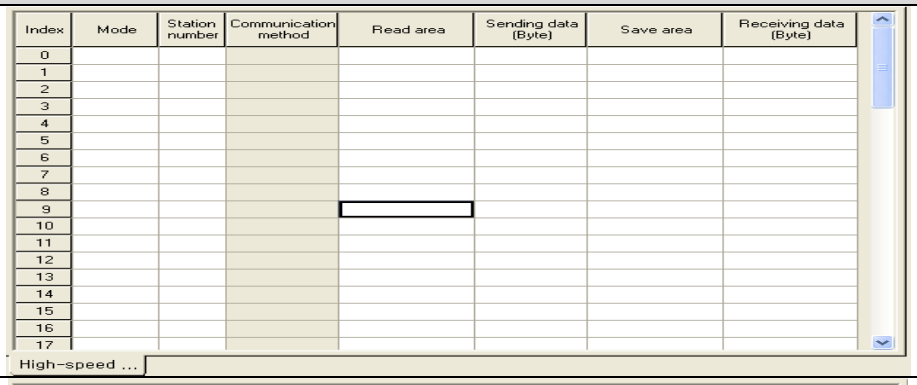
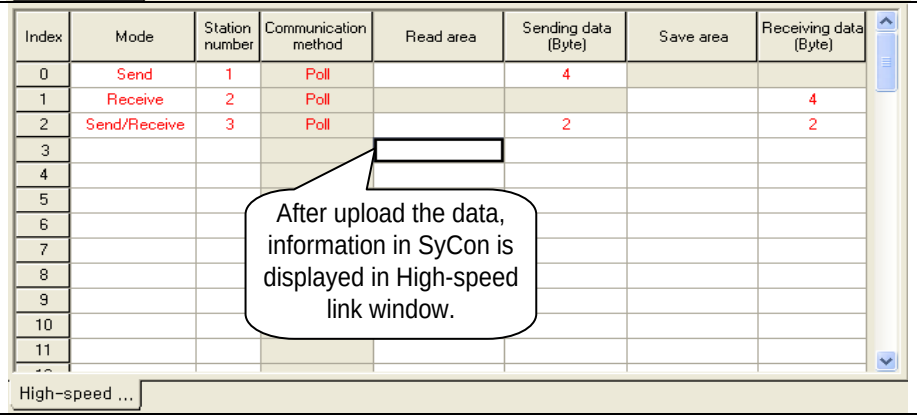
3) Parameter of High-speed link block setting

High-speed link block setting parameter is as shown below.

(1) SyCon Upload

SyCon configuration must be uploaded before High-speed link block setting.

Upload way: Online → SyCon Upload (Dnet, Pnet)

Classification	High-speed link block setting
Before Upload	
After Upload	

The uploaded information is as shown below.

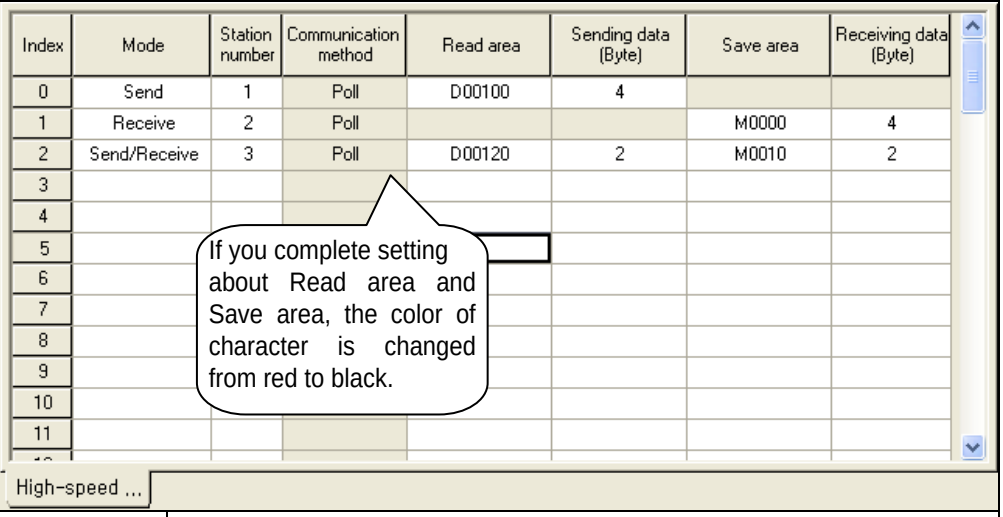
Item	Description
Index	Arrange starting from the lowest station number in SyCon.
Station No.	Station number of slave module in network.
Communication method	Display communication setting among the communication methods (Poll, Bit-Strobe, Cyclic, COS).
Read area	Head address of transmitting device from master module to slave module.
Transmission data	Size of slave module (Byte).
Save area	Head address of receiving device from slave module to master module.
Reception data	Size of slave module (Byte).

The uploaded information in SyCon is not able to edit in XG-PD. In case of monitoring, SyCon has to upload again.

(2) High-speed link block editing

Head address of Send/Receive address can be edited in High-speed block.

Select index to edit and please set Read area & Save area.

<table>
<tr><th>Classification</th><th>Description</th></tr>
<tr><td>Screen After uploaded the data</td><td>


</td></tr>
<tr><td>High-speed link block editing window</td><td>
<table>
<tr><th>Classification</th><th colspan="2">Description</th></tr>
<tr><td>Station type *1</td><td colspan="2">Select slave.</td></tr>
<tr><td>Block type *1</td><td colspan="2">Transmission: Data is transmitted from master module to slave module.
Reception: Data is transmitted from slave module to master module.</td></tr>
<tr><td>Station No. *1</td><td colspan="2">Slave station number (range: 0 ~ 63)</td></tr>
<tr><td>Block No. *1</td><td colspan="2">Not used in Dnet I/F module.</td></tr>
<tr><td rowspan="2">Read area (Master module → Slave module)</td><td>Address</td><td>Head address of transmitting device.
Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR</td></tr>
<tr><td>Size *1 (Byte)</td><td>Input/Output point of slave module is displayed in Byte.
- If input module point is less than 8 bit, it is dealt with 1 Byte.</td></tr>
<tr><td rowspan="2">Save area (Slave module → Master module)</td><td>Address</td><td>Head address of receiving device.
Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR</td></tr>
<tr><td>Size *1 (Byte)</td><td>Input/Output point of slave module is displayed in Byte.
- If input module point is less than 8 bit, it is dealt with 1 Byte.</td></tr>
</table>
</td></tr>
</table>

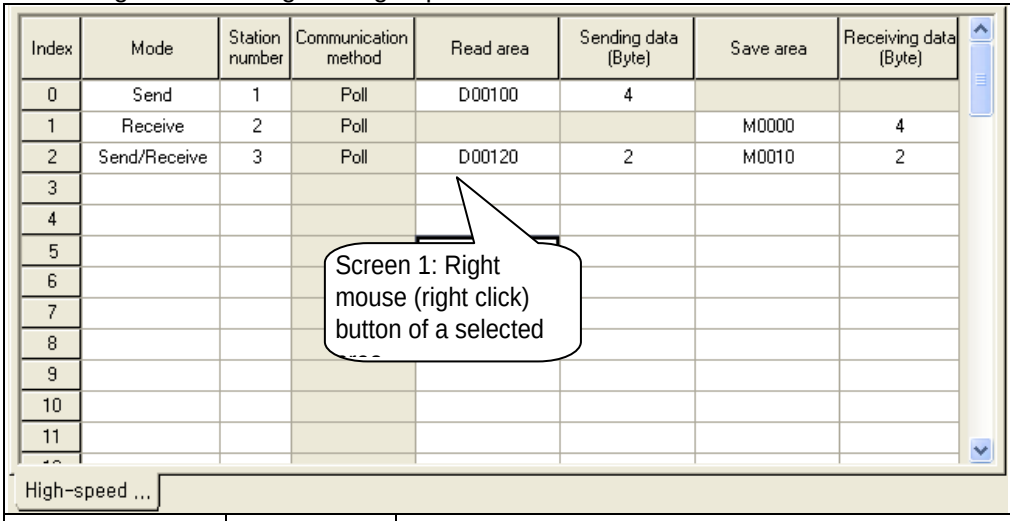
The priority order of data is the slave module which has lowest station number.

Remark

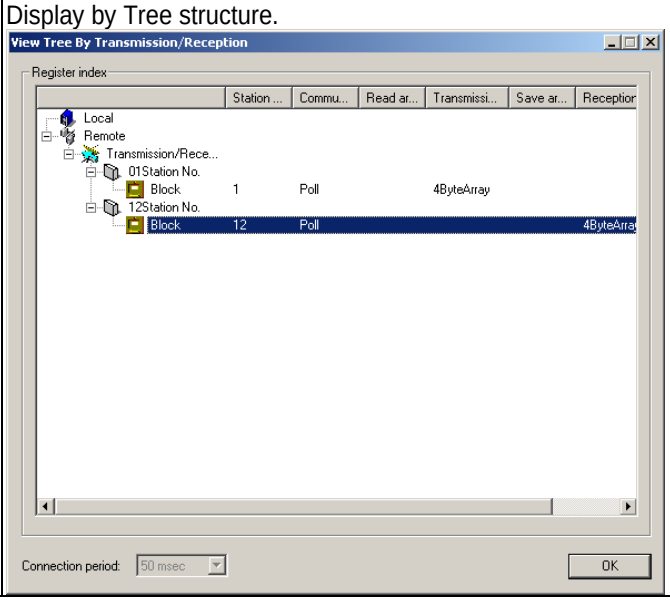
Unit of address setting is Word. But slave module's unit size is Byte. Less than 8 point module is processed by 1 Word when address is specified.

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

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

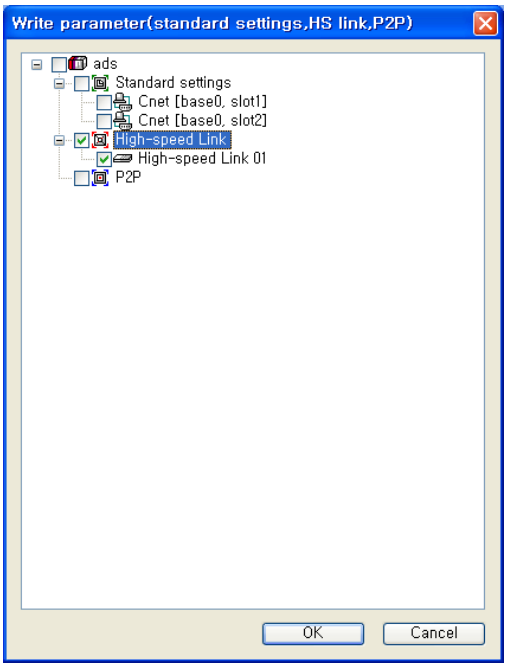


[Screen 1]

Edit Block	Changes the edited index block.
Copy Block	Copies the edited index block.
Paste Block	Pastes the copied index block.
Delete Block	Deletes the edited index block.
Lump Setup	Read/Save area is specified in a lump when the slave module's data size is regular.
Insert Block	Inserts the index block.
View Tree by Transmission/ Reception	Display by Tree structure. 

6.4 Read and Write of High-speed Link

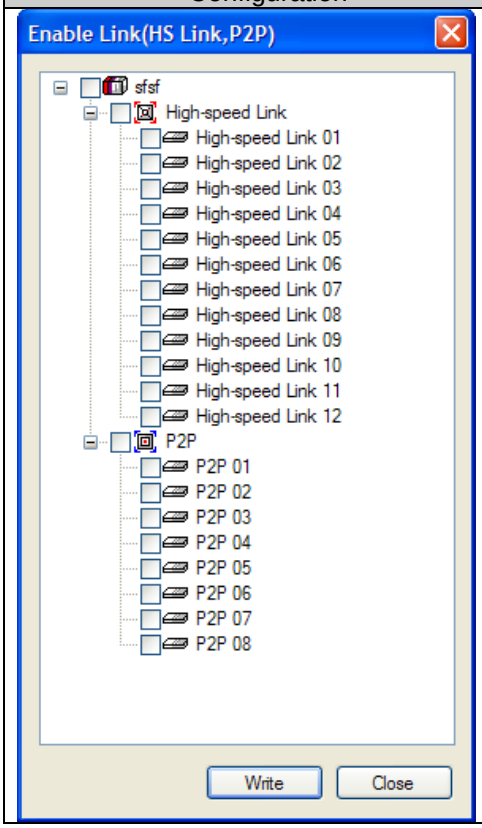
The screen is used for read/write of High-speed link's parameter.

Configuration	Description
	1) High-speed link is available up to 12 for installed Dnet I/F module. - It can be used up to 12 with the other communication module which use High-speed link. 2) It can read/write for each High-speed parameter. - Check the box to set the High-speed link. 3) Read/Write of High-speed link parameter not affect to CPU's Run mode.

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

6.5 Enable Link

You need to enable the link for actual data communication of the downloaded HS link data.

Configuration	Description
	1) Select “Online” → “Enable Link” on the menu. Then, “Enable Link” screen appears. 2) Check the item you want to enable and click “Write”.

* Enable Link through flag

It describes “Enable Link” method through flag. The following XG5000 version, CPU OS version is needed.

Item	Version
XG5000	V3.61 or above
XGR CPU	V1.91 or above
XGI CPU	V3.4 or above
XGK CPU	V3.7 or above

Flag list related with “Enable Link”

-XGR

Flag	Data type	Device	Description
_HS_ENABLE_STATE	ARRAY[0..11] OF BOOL	%FX19040	HS link enable/disable current state
_HS_REQ	ARRAY[0..11] OF BOOL	%FX31520	HS link enable/disable request
_HS_REQ_NUM	ARRAY[0..11] OF BOOL	%FX31536	HS link enable/disable setting
_P2P_ENABLE_STATE	ARRAY[0..7] OF BOOL	%FX19072	P2P enable/disable current state
_P2P_REQ	ARRAY[0..7] OF BOOL	%FX31552	P2P enable/disable request
_P2P_REQ_NUM	ARRAY[0..7] OF BOOL	%FX31568	P2P enable/disable setting

-XGI

Flag	Data type	Device	Description
_HS_ENABLE_STATE	ARRAY[0..11] OF BOOL	%FX15840	HS link enable/disable current state
_HS_REQ	ARRAY[0..11] OF BOOL	%FX16480	HS link enable/disable request
_HS_REQ_NUM	ARRAY[0..11] OF BOOL	%FX16496	HS link enable/disable setting
_P2P_ENABLE_STATE	ARRAY[0..7] OF BOOL	%FX15872	P2P enable/disable current state
_P2P_REQ	ARRAY[0..7] OF BOOL	%FX16512	P2P enable/disable request
_P2P_REQ_NUM	ARRAY[0..7] OF BOOL	%FX16528	P2P enable/disable setting

-XGK

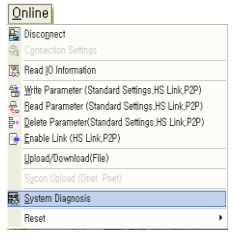
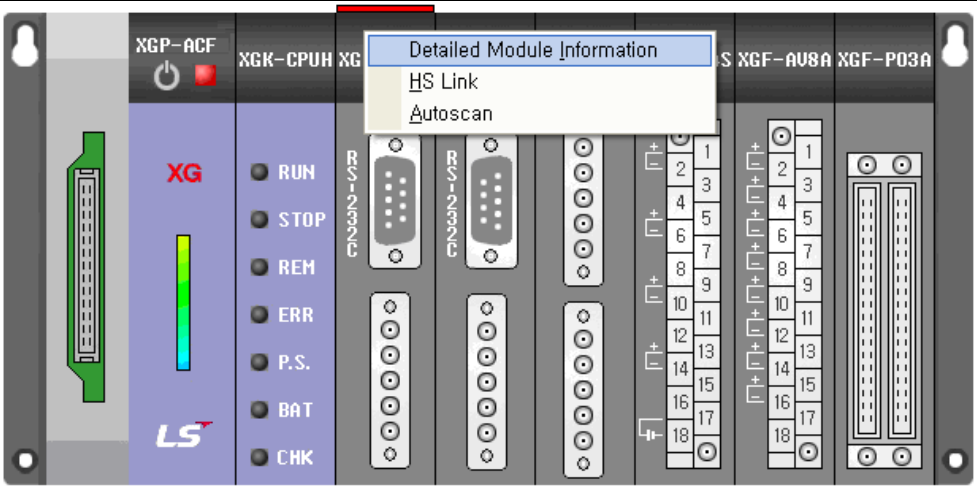
Flag	Data type	Device	Description
_HS1_ENABLE_STATE	BIT	F09600	HS link 1 enable/disable current state
_HS2_ENABLE_STATE	BIT	F09601	HS link 2 enable/disable current state
_HS3_ENABLE_STATE	BIT	F09602	HS link 3 enable/disable current state
_HS4_ENABLE_STATE	BIT	F09603	HS link 4 enable/disable current state
_HS5_ENABLE_STATE	BIT	F09604	HS link 5 enable/disable current state
_HS6_ENABLE_STATE	BIT	F09605	HS link 6 enable/disable current state
_HS7_ENABLE_STATE	BIT	F09606	HS link 7 enable/disable current state
_HS8_ENABLE_STATE	BIT	F09607	HS link 8 enable/disable current state
_HS9_ENABLE_STATE	BIT	F09608	HS link 9 enable/disable current state
_HS10_ENABLE_STATE	BIT	F09609	HS link 10 enable/disable current state
_HS11_ENABLE_STATE	BIT	F0960A	HS link 11 enable/disable current state
_HS12_ENABLE_STATE	BIT	F0960B	HS link 12 enable/disable current state
_HS1_REQ	BIT	F10300	HS link 1 enable/disable request
_HS2_REQ	BIT	F10301	HS link 2 enable/disable request
_HS3_REQ	BIT	F10302	HS link 3 enable/disable request
_HS4_REQ	BIT	F10303	HS link 4 enable/disable request
_HS5_REQ	BIT	F10304	HS link 5 enable/disable request
_HS6_REQ	BIT	F10305	HS link 6 enable/disable request
_HS7_REQ	BIT	F10306	HS link 7 enable/disable request
_HS8_REQ	BIT	F10307	HS link 8 enable/disable request
_HS9_REQ	BIT	F10308	HS link 9 enable/disable request
_HS10_REQ	BIT	F10309	HS link 10 enable/disable request
_HS11_REQ	BIT	F1030A	HS link 11 enable/disable request
_HS12_REQ	BIT	F1030B	HS link 12 enable/disable request
_HS1_REQ_NUM	BIT	F10310	HS link 1 enable/disable setting
_HS2_REQ_NUM	BIT	F10311	HS link 2 enable/disable setting

Flag	Data type	Device	Description
_HS3_REQ_NUM	BIT	F10312	HS link 3 enable/disable setting
_HS4_REQ_NUM	BIT	F10313	HS link 4 enable/disable setting
_HS5_REQ_NUM	BIT	F10314	HS link 5 enable/disable setting
_HS6_REQ_NUM	BIT	F10315	HS link 6 enable/disable setting
_HS7_REQ_NUM	BIT	F10316	HS link 7 enable/disable setting
_HS8_REQ_NUM	BIT	F10317	HS link 8 enable/disable setting
_HS9_REQ_NUM	BIT	F10318	HS link 9 enable/disable setting
_HS10_REQ_NUM	BIT	F10319	HS link 10 enable/disable setting
_HS11_REQ_NUM	BIT	F1031A	HS link 11 enable/disable setting
_HS12_REQ_NUM	BIT	F1031B	HS link 12 enable/disable setting
_P2P1_ENABLE_STATE	BIT	F09620	P2P1 enable/disable current state
_P2P2_ENABLE_STATE	BIT	F09621	P2P2 enable/disable current state
_P2P3_ENABLE_STATE	BIT	F09622	P2P3 enable/disable current state
_P2P4_ENABLE_STATE	BIT	F09623	P2P4 enable/disable current state
_P2P5_ENABLE_STATE	BIT	F09624	P2P5 enable/disable current state
_P2P6_ENABLE_STATE	BIT	F09625	P2P6 enable/disable current state
_P2P7_ENABLE_STATE	BIT	F09626	P2P7 enable/disable current state
_P2P8_ENABLE_STATE	BIT	F09627	P2P8 enable/disable current state
_P2P1_REQ	BIT	F10320	P2P1 enable/disable request
_P2P2_REQ	BIT	F10321	P2P2 enable/disable request
_P2P3_REQ	BIT	F10322	P2P3 enable/disable request
_P2P4_REQ	BIT	F10323	P2P4 enable/disable request
_P2P5_REQ	BIT	F10324	P2P5 enable/disable request
_P2P6_REQ	BIT	F10325	P2P6 enable/disable request
_P2P7_REQ	BIT	F10326	P2P7 enable/disable request
_P2P8_REQ	BIT	F10327	P2P8 enable/disable request
_P2P1_REQ_NUM	BIT	F10330	P2P1 enable/disable setting
_P2P2_REQ_NUM	BIT	F10331	P2P2 enable/disable setting
_P2P3_REQ_NUM	BIT	F10332	P2P3 enable/disable setting
_P2P4_REQ_NUM	BIT	F10333	P2P4 enable/disable setting
_P2P5_REQ_NUM	BIT	F10334	P2P5 enable/disable setting
_P2P6_REQ_NUM	BIT	F10335	P2P6 enable/disable setting
_P2P7_REQ_NUM	BIT	F10336	P2P7 enable/disable setting
_P2P8_REQ_NUM	BIT	F10337	P2P8 enable/disable setting

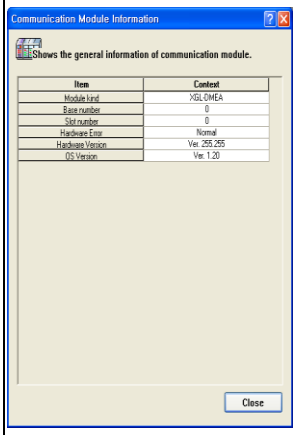
▶ How to enable link
  -HS link/P2P enable/disable setting flag ON → HS link/P2P enable/disable request flag ON
▶ How to disable link
  -HS link/P2P enable/disable setting flag OFF → HS link/P2P enable/disable request flag ON
▶ You can monitor the Enable/Disable state of the each link through “enable/disable current states” flag.

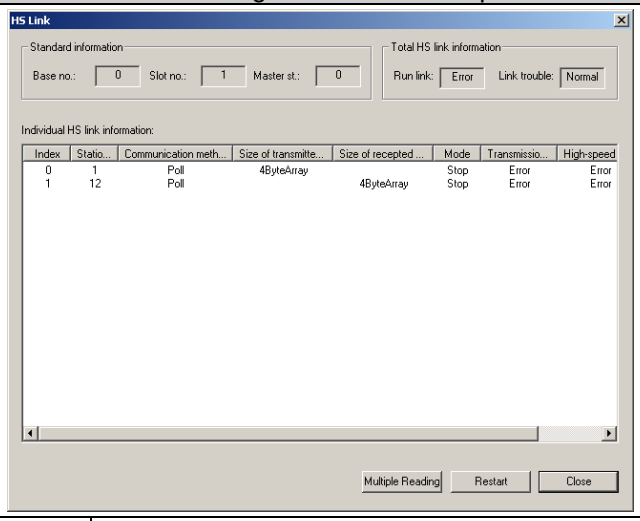
6.6 System Diagnosis

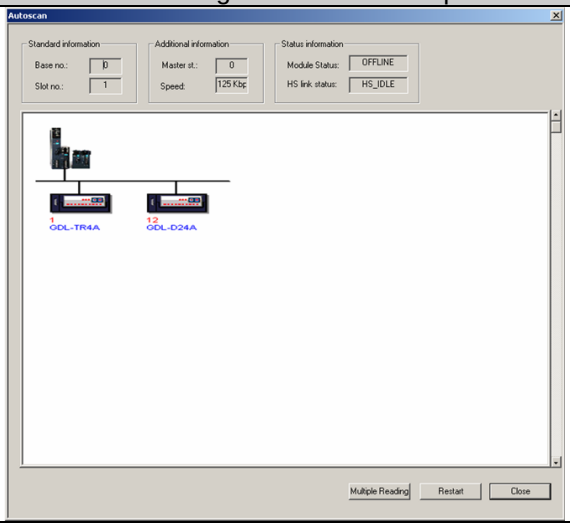
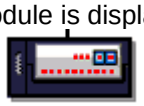
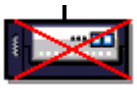
System diagnosis provides the information of Dnet I/F module system. The System diagnosis screen is as shown below.

Menubar	System diagnosis window
	

It describes the menu of system diagnosis.

Menu	Screen configuration and description			
Communic-ation module information		Standard information	Module Kind	Communication module type.
			Base number	Base number of communication module which is connected with High-speed link.
			Slot number	Slot number of communication module which is connected with High-speed link.
		Hardware/ Software information	Hardware Error	Hardware error of communication module.
			Hardware version	Hardware version of communication module.
			OS Version	Software version of communication module.

Menu	Screen configuration and description		
HS (High-speed) link information			
	Standard information	Base no.	Base number of communication module which is connected with High-speed link.
		Slot no.	Slot number of communication module which is connected with High-speed link.
		Master station	Station number of Dnet I/F module.
	Total HS link information	Run link	Normal: All salve modules communicates normally.
		Link trouble	Error: Error is occurred in slave station after Run link becomes normal status.
	Individual HS link information	Index	Arrange starting from the lowest station number in SyCon.
		Station number	Slave module's station number which is existed in network.
		Communication method	Display communication setting among the communication methods (Poll, Bit-Strobe, Cyclic, COS).
		Size of transmitted data	Data size of transmitting data from master module to slave module.
		Size of recepted data	Data size of receiving data from master module to slave module.
		Mode	RUN: Normal communication status between master and slave module. STOP: Abnormal communication status between master and slave module.
		Transmission/Reception status	Display of communication status between master and slave module.
		High-speed link status	Display of error occurring Transmission/Reception status or Error status.
		Error	Error is displayed while High-speed link data is processed.

Menu	Screen configuration and description
Autoscan	
	Communication status of slave module is displayed as shown below. 1) Connected communication :  2) Disconnected communication: 

6.7 High-speed Link Information

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

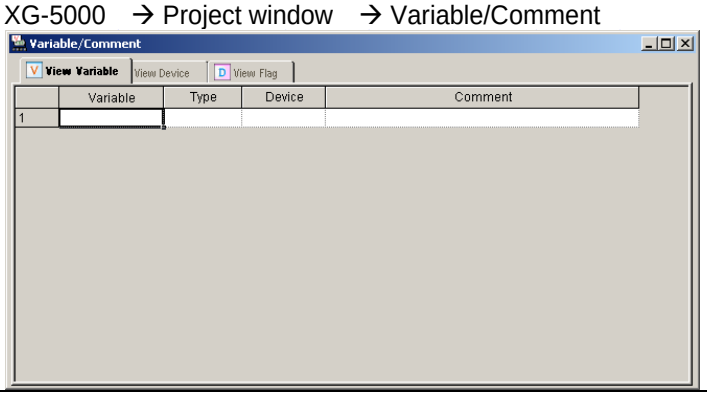
Classification	Run-Link	Link-Trouble	Transmission /Reception status	Operation mode	Error	High-speed link status
Information type	All		Respectively			
Flag name (x=High-speed link number)	_HSxRLINK	_HSxLTRBL	_HSxTRX[n] (n=0..63)	_HSxMOD[n] (n=0..63)	_HSxERR[n] (n=0..63)	_HSxSTATE[n] (n=0..63)
Data type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

[Table] Function of High-speed link information

The way of selecting flag is as shown below.

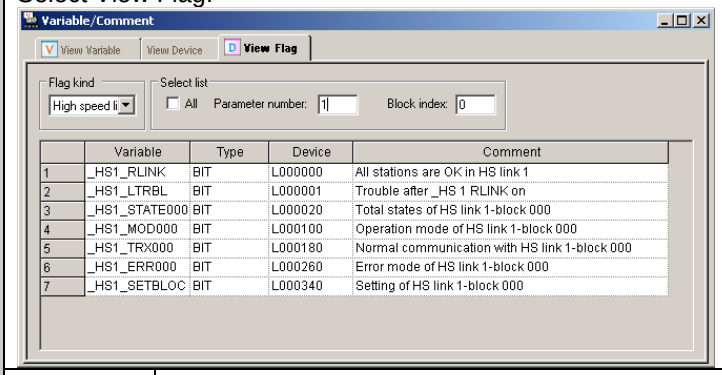
Setting sequence

XG-5000 → Project window → Variable/Comment



How to use

Select View Flag.

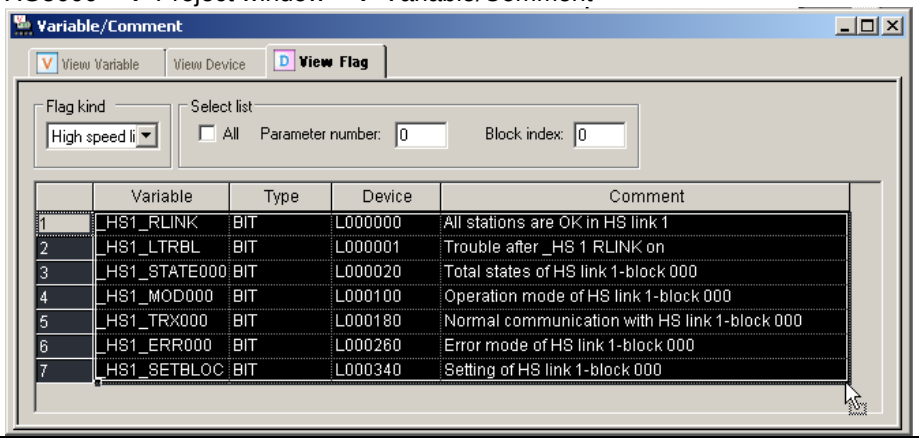


Flag kind	Select among the System/High-speed link/P2P/PID.	
Select list	All	It is showed the list of all High-speed links.
	Parameter number	It means High-speed link number. The selected number is only displayed in List.
	Block index	It is index number of High-speed link block.

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

Setting sequence

XG5000 → Project window → Variable/Comment



	Variable	Type	Device	Comment
1	_HS1_RLINK	BIT	L000000	All stations are OK in HS link 1
2	_HS1_LTRBL	BIT	L000001	Trouble after _HS 1 RLINK on
3	_HS1_STATE000	BIT	L000020	Total states of HS link 1-block 000
4	_HS1_MOD000	BIT	L000100	Operation mode of HS link 1-block 000
5	_HS1_TRX000	BIT	L000180	Normal communication with HS link 1-block 000
6	_HS1_ERR000	BIT	L000260	Error mode of HS link 1-block 000
7	_HS1_SETBLOC	BIT	L000340	Setting of HS link 1-block 000

How to use

XG5000 → View → Variable Monitoring Window

	PLC	Type	Device	Value	Variable	Comment
1	NewPLC	BIT	L000000	10	_HS1_RLINK	All stations are OK in HS link 1
2	NewPLC	BIT	L000001	10	_HS1_LTRBL	Trouble after _HS 1 RLINK on
3	NewPLC	BIT	L000020	10	_HS1_STATE000	Total states of HS link 1-block 000
4	NewPLC	BIT	L000100	10	_HS1_MOD000	Operation mode of HS link 1-block 000
5	NewPLC	BIT	L000180	10	_HS1_TRX000	Normal communication with HS link 1-block 000
6	NewPLC	BIT	L000260	10	_HS1_ERR000	Error mode of HS link 1-block 000
7	NewPLC	BIT	L000340	10	_HS1_SETBLOCK	Setting of HS link 1-block 000
8						

- Select variable in Variable/Comment screen and then Drag/Drop the variable to Variable Monitoring Window. The value is appeared in variable Monitoring Window.

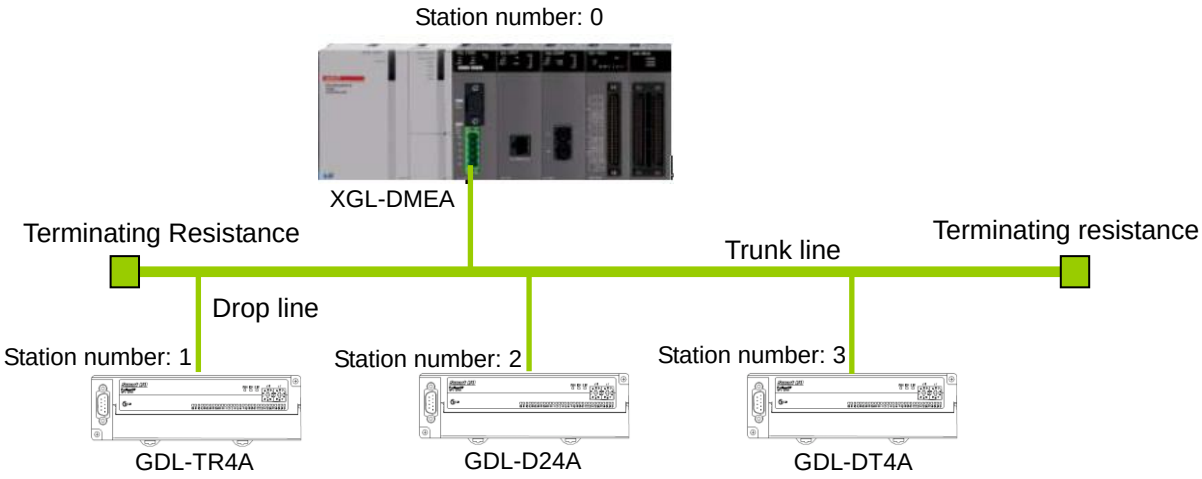
Chapter 7 Communication Program

7.1 Example Program

Basic configuration of example and setting value is as shown below.

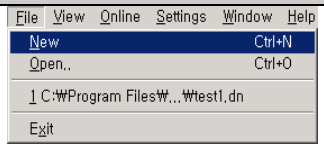
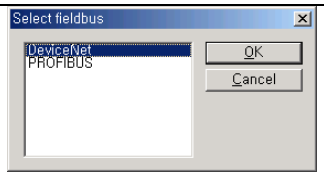
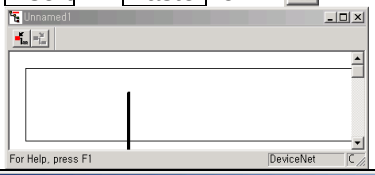
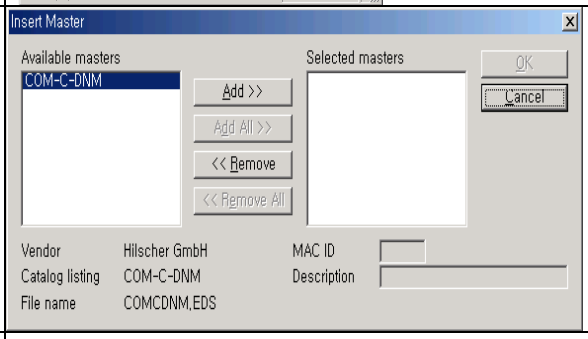
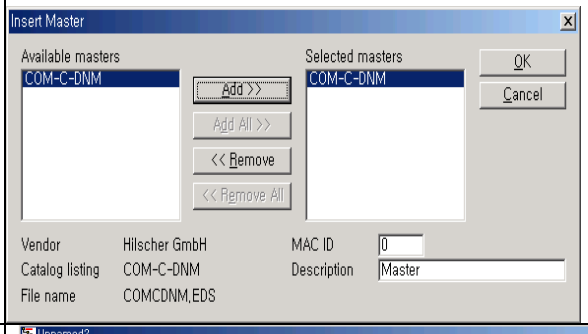
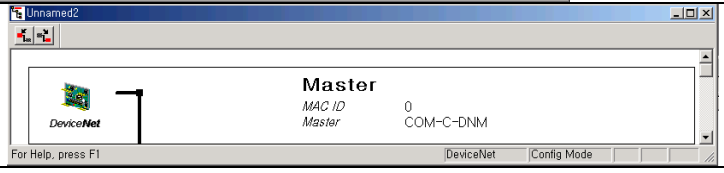
Classification						Description	Setting program	Setting phase
System configuration	Master module	Master setting				XGL-DMEA	SyCon	1-3 ~ 1-4
		Base number				0	XG-PD	5-1
		Slot number				0	XG-PD	5-1
		Station number				0	SyCon	1-5, 3-1
		Communication speed				125kbps	SyCon	3-1
		High-speed link setting				High-speed link 1 area	XG-PD	5-1
		Communication period setting				200ms	XG-PD	5-1
	Slave module	Slave type				GDL-TR4A,GDL-D24A,GDL-DT4A	SyCon	4-1 ~ 4-4
		GDL-TR4A (Output 32 points)	Station no.			1	SyCon	4-3, 5-2
			Communication method			Poll	SyCon	5-3
			Save area	Device	M100		XG-PD	6-1
				Size	4			
		GDL-D24A (Input 32 points)	Station no.			2	SyCon	4-3, 5-2
			Communication method			COS (Change of State) (Transmission period: 200ms)	SyCon	5-3 (5-4)
			Read area	Device	M110		XG-PD	6-1
				Size	4			
		GDL-DT4A (Output 16 points, Input 16 points)	Station no.			3	SyCon	4-3, 5-2
			Communication method			COS (Change of State) (Transmission period: 200ms)	SyCon	5-3 (5-4)
			Read area	Device	M102		XG-PD	6-1
				Size	2			
			Save area	Device	M112		XG-PD	6-1
				Size	2			
Etc.	Master Setting					Change of basic setting value	SyCon	2-1 ~ 2-3
	Device Assignment					Setting of computer's communication port	SyCon	6-1 ~ 6-2

- **Configuration of system**



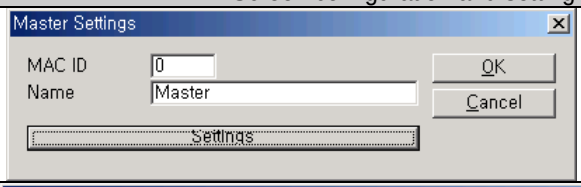
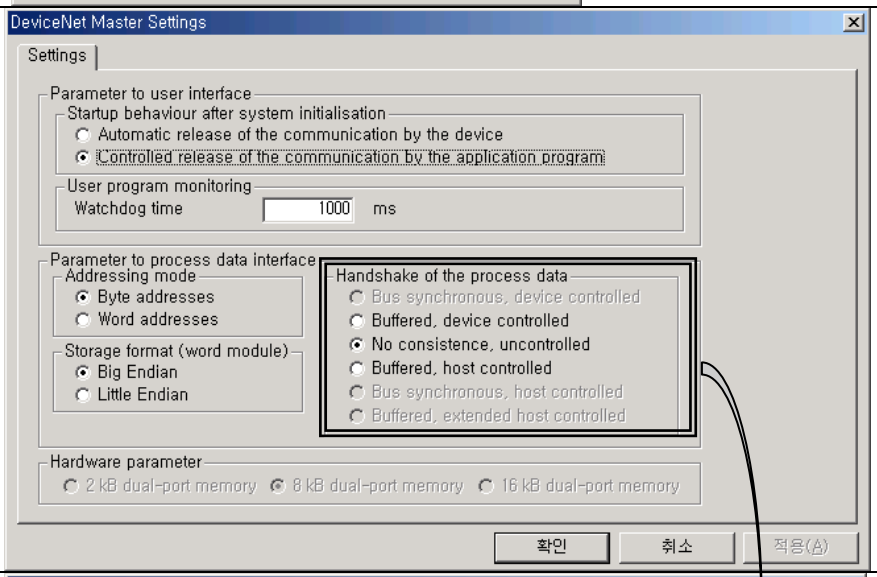
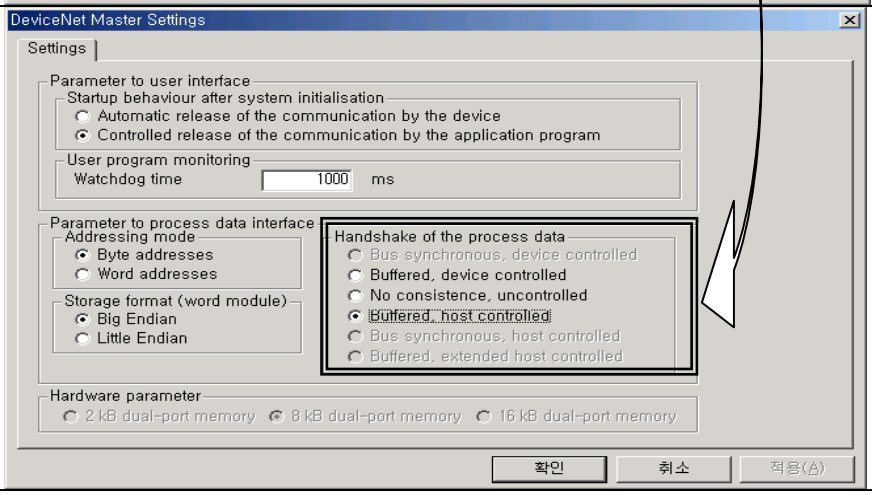
[SyCon 1 phase] Master and MAC ID setting

Menu: File → New

Phase	Item	Screen configuration and setting description
1-1	Make a new file	 - Make a new file.
1-2	Select fieldbus	 - Select DeviceNet.
1-3	Master setting	Master setting Insert → Master or 
1-4	Select masters	 Master type : COM-C-DNM
1-5	MAC ID setting	 MAC ID: 0 Description: Master (Input only English and figure)
1-6	Master setting completion	

[SyCon 2 phase] Change of Basic setting

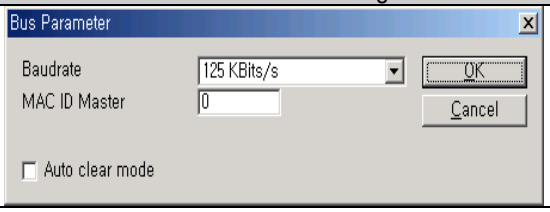
Menu: Settings → Master Settings

Phase	Item	Screen configuration and setting description
2-1	Master Settings	 Master MAC ID: 0 Name: Master
2-2	Settings	
2-3	Change of setting value	

*Only ‘Handshake of the process data’ setting can be set.

[SyCon 3 Phase] Baudrate

Menu: Settings → Bus Parameter

Phase	Item	Screen configuration and setting description
3-1	Bus Parameter	 Baudrate: 125KBits/s MAC ID Master: 0 Auto clear mode: Refer to 5-3-4.

* Auto clear mode

(1) If Auto clear mode is selected

→ If error is occurred in slave module, the communication stops for the whole system.

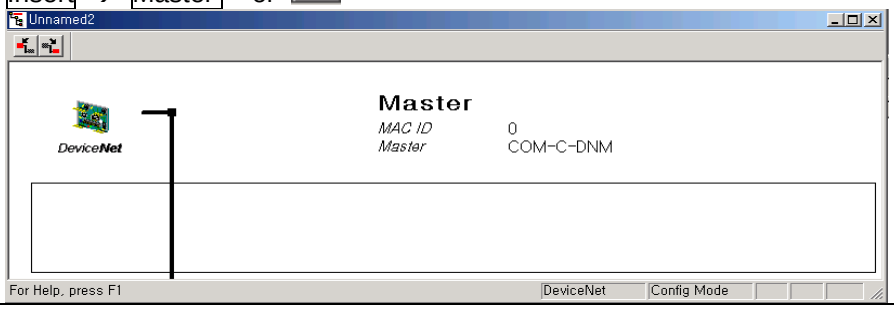
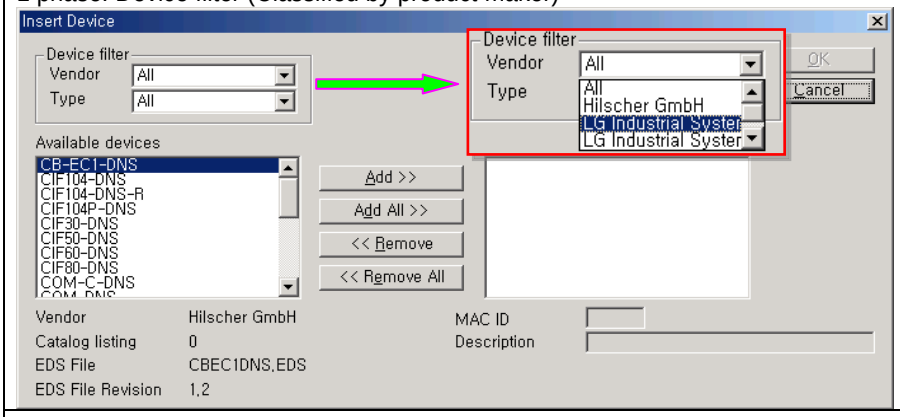
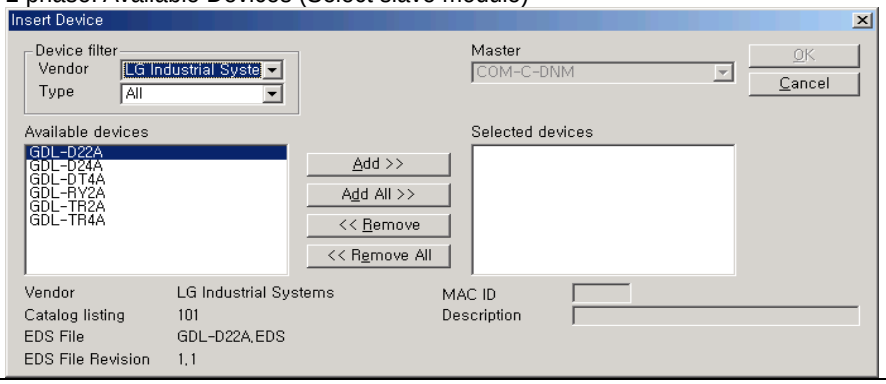
→ Dnet I/F module's HS LED is flickering, MNS LED red light flickering.

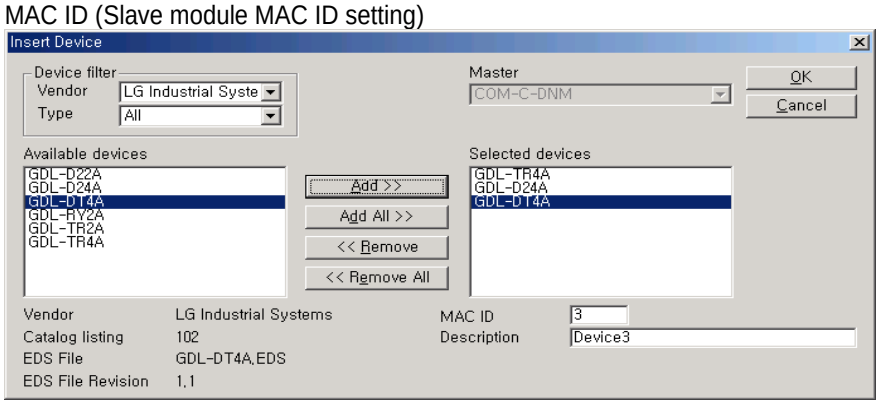
(2) If Auto clear mode is not selected

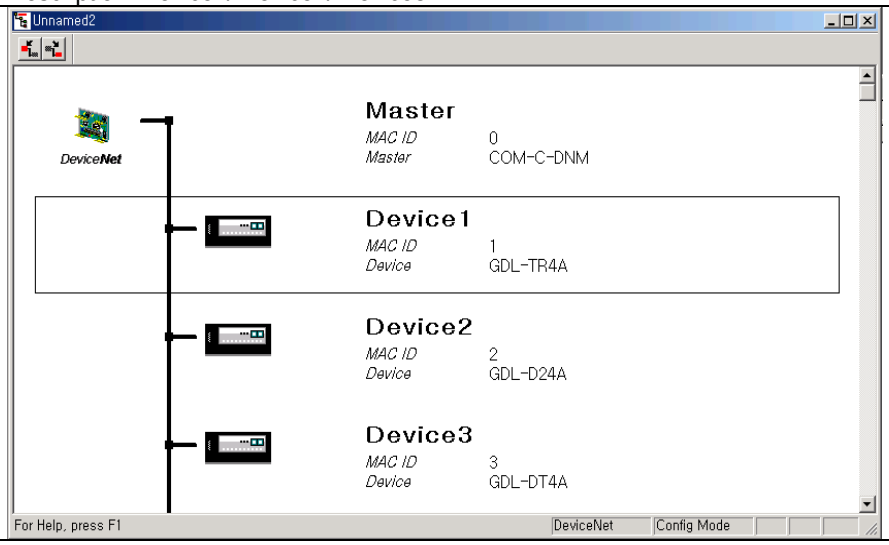
→ If error is occurred in slave module, the communication keeps for normal slave module.

[SyCon 4 phase] Slave and MAC ID setting

Menu: Insert → Master

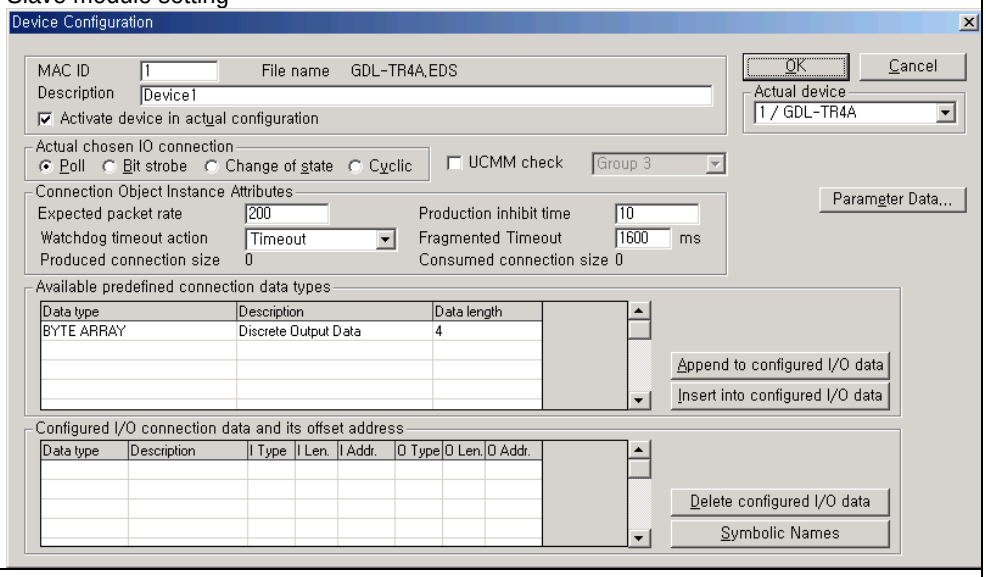
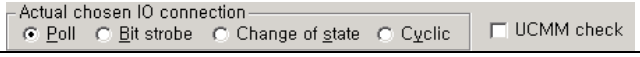
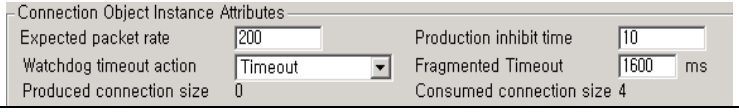
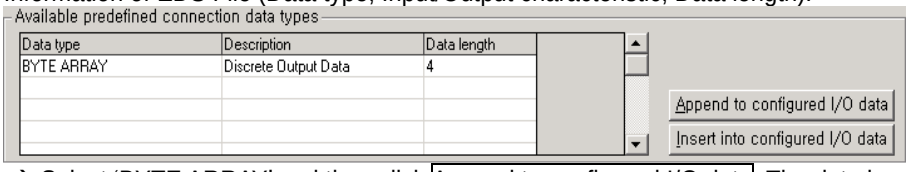
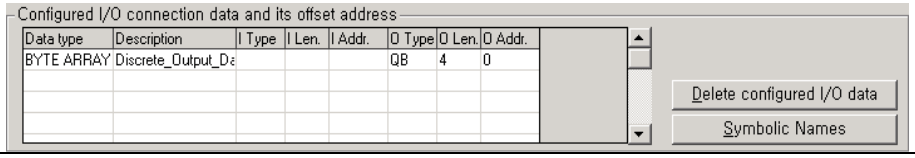
<table>
<tr><th>Phase</th><th>Item</th><th>Screen configuration and setting description</th></tr>
<tr><td>4-1</td><td>Slave setting</td><td>Master setting
Insert → Master or
 
</td></tr>
<tr><td rowspan="2">4-2</td><td rowspan="2">Select slave</td><td>1 phase: Device filter (Classified by product maker)
 
</td></tr>
<tr><td>2 phase: Available Devices (Select slave module)
 
</td></tr>
</table>

<table>
<tr><th>Phase</th><th>Item</th><th>Screen configuration and setting description</th></tr>
<tr><td>4-3</td><td>MAC ID setting</td><td>MAC ID (Slave module MAC ID setting)
 

Description: Device1/ Device2/ Device3</td></tr>
<tr><td>4-4</td><td>Slave setting completion</td><td> 
</td></tr>
</table>

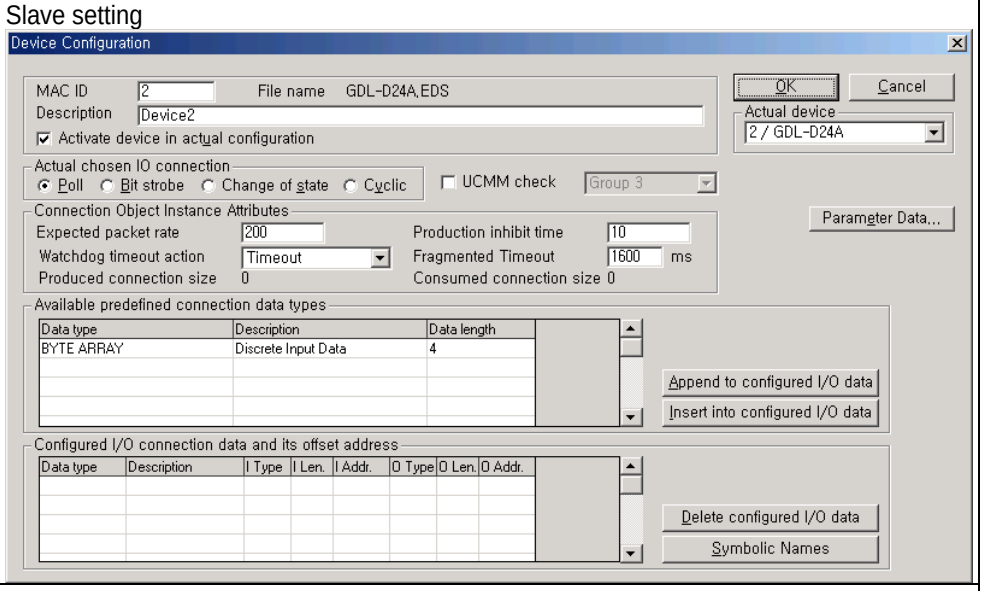
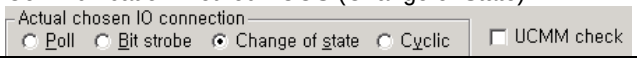
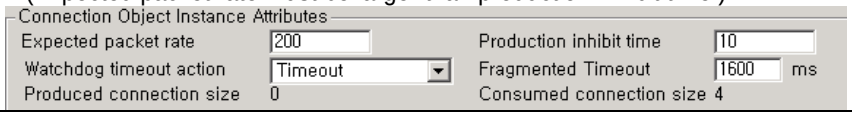
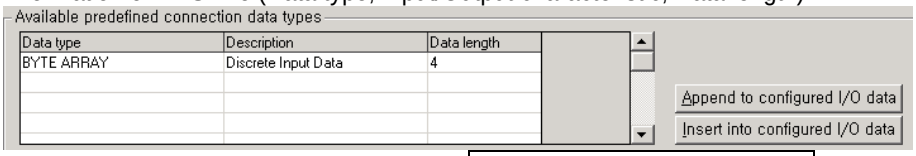
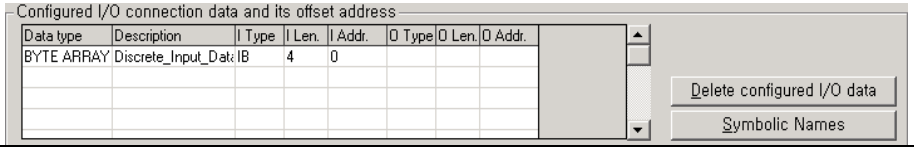
[SyCon 5-1 phase] Slave module communication methods setting – Slave module: GDL-TR4A

Menu: Settings → Device Configuration

Phase	Item	Screen configuration and setting description
5-1	Slave communication methods setting	Slave module setting 
5-2	Slave MAC ID	MAC ID setting: 1
5-3	Slave communication method	Communication method: Poll 
5-4	Slave Transmission/ Reception period setting	Transmission/Reception data period and response condition setting →Poll is default communication method. 
5-5	Slave data structure (EDS File)	Information of EDS File (Data type, Input/Output characteristic, Data length).  → Select 'BYTE ARRAY' and then click Append to configured I/O data. The data is displayed as next 5-6 phase.
5-6	Slave data structure	Slave structure (Data type, Input/Output characteristic, Data length) is transmitted to master module. 

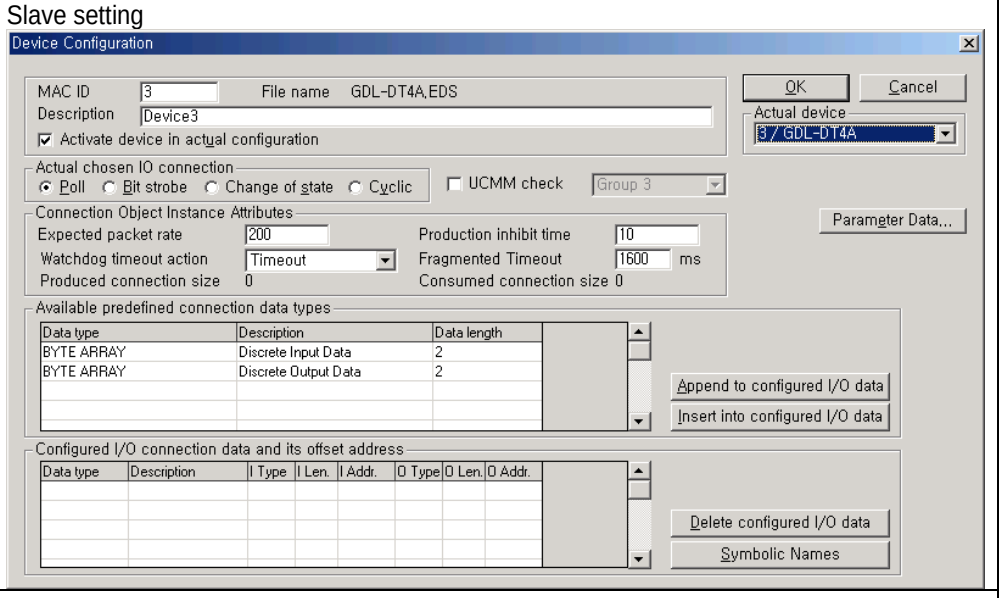
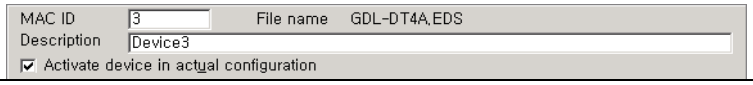
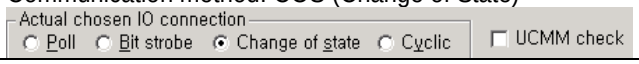
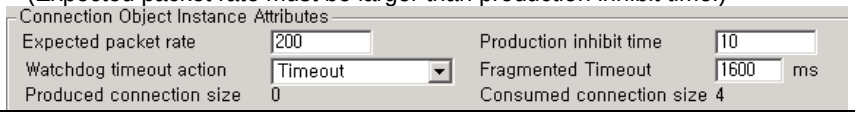
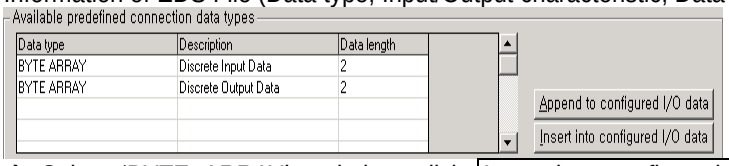
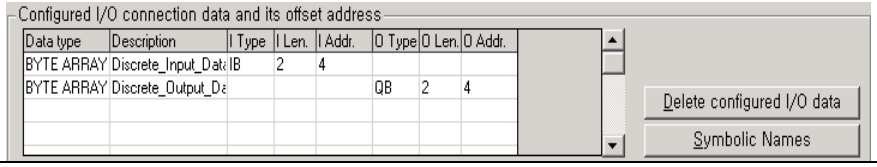
[SyCon 5-2 phase] Slave communication method setting – slave module: GDL-D24A

Menu: Settings → Device Configuration

Phase	Item	Screen configuration and setting description
5-1	Slave communication method setting	Slave setting 
5-2	Slave MAC ID	MAC ID: 2
5-3	Slave communication method	Communication method : COS (Change of State) 
5-4	Slave Transmission /Reception period setting	Transmission/Reception data period and response condition setting → Expected packet rate must be 200ms in COS (Change of State) communication method. (Expected packet rate must be larger than production inhibit time.) 
5-5	Slave data structure (EDS File)	Information of EDS File (Data type, Input/Output characteristic, Data length).  → Select 'BYTE ARRAY' and then click Append to configured I/O data. The data is displayed as next 5-6 phase.
5-6	Slave data structure	Slave structure (Data type, Input/Output characteristic, Data length) is transmitted to master module. 

[SyCon 5-3 phase] slave communication method setting – slave module: GDL-DT4A

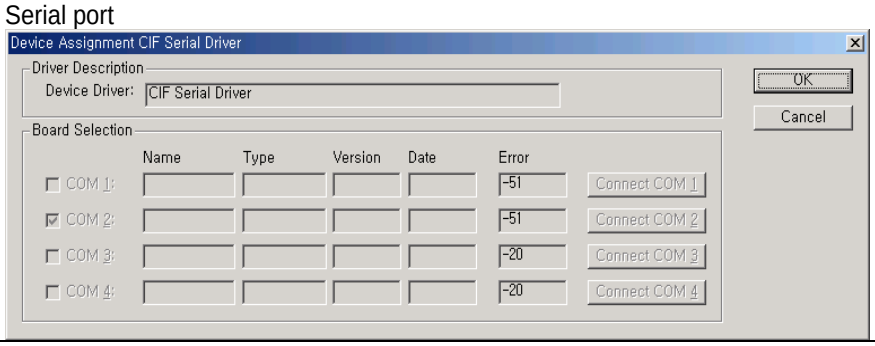
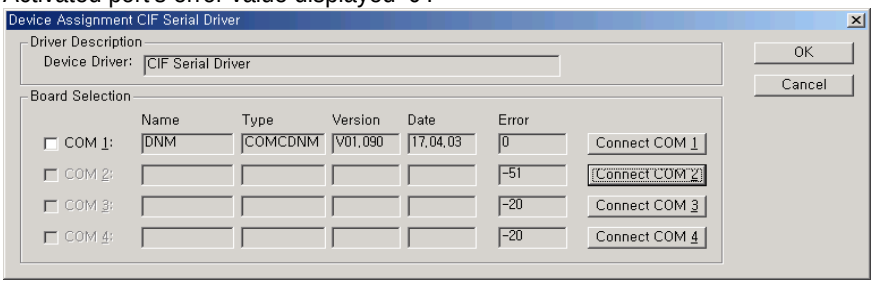
Menu: Settings → Device Configuration

Phase	Item	Screen configuration and setting description
5-1	Slave communication method setting	Slave setting 
5-2	Slave MAC ID	MAC ID: 3 
5-3	Slave communication method	Communication method: COS (Change of State) 
5-4	Slave Transmission /Reception period setting	Transmission/Reception data period and response condition setting → Expected packet rate must be 200ms in COS (Change of State) communication method. (Expected packet rate must be larger than production inhibit time.) 
5-5	Slave data structure (EDS File)	Information of EDS File (Data type, Input/Output characteristic, Data length).  → Select 'BYTE ARRAY' and then click Append to configured I/O data. The data is displayed as next 5-6 phase.
5-6	Slave data structure	Slave structure (Data type, Input/Output characteristic, Data length) is transmitted to master module. 

[SyCon 6 phase] Serial port selection

The cable diagram is same as RS-232C cable diagram using in CPU module. Use same kind cable.

Menu: Settings → Device Assignment

<table>
<tr><th>Phase</th><th>Item</th><th>Screen configuration and setting description</th></tr>
<tr><td>6-1</td><td>Serial port setting</td><td>Serial port
 
</td></tr>
<tr><td>6-2</td><td>Port search</td><td>Connect COM1 → Connect COM2 → Connect COM3 → Connect COM4
Activated port's error value displayed '0'.
 

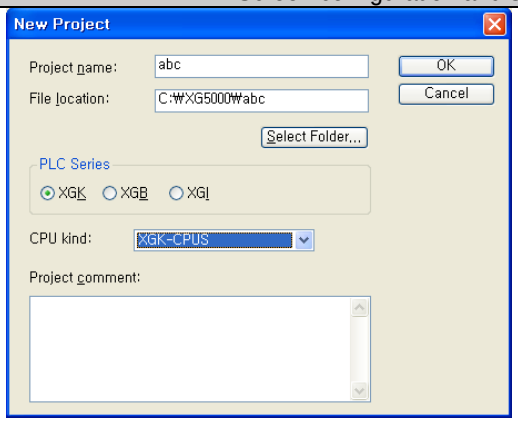
Check COM 1 (→) and Select OK.</td></tr>
</table>

[SyCon 7 phase]

Menu: Online → Download

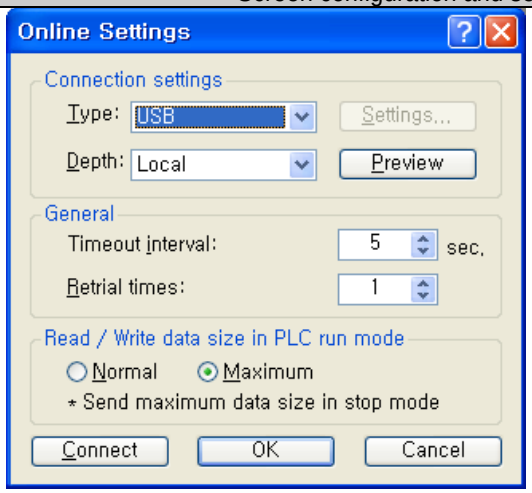
[XG-PD 1 phase] Select CPU module type

Menu: Option – PLC Type Settings

Phase	Item	Screen configuration and setting description
1-1	Select CPU module	 CPU module type: XGK-CPUS

[XG-PD 2 phase] Connection settings

Menu: Online – Connection settings

Phase	Item	Screen configuration and setting description
2-1	Connection settings	 Type: USB Depth: Local

[XG-PD 3 phase] Connection

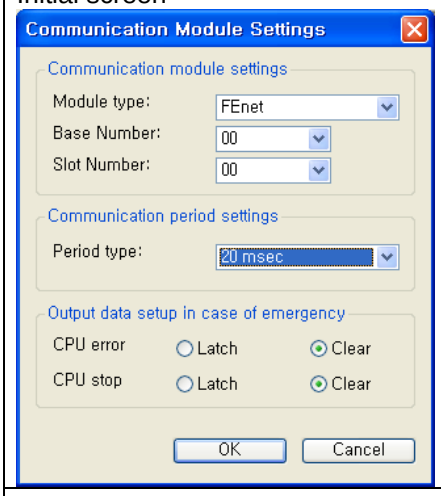
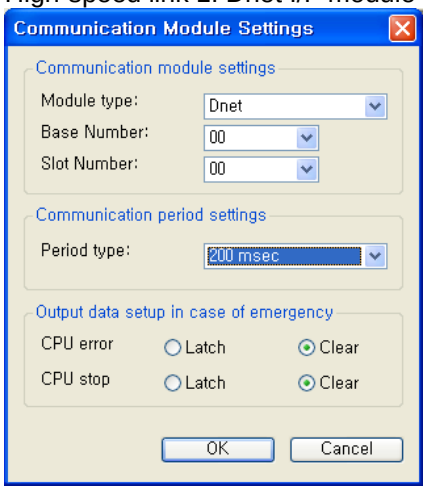
Menu: Online – Connection

[XG-PD 4 phase] Read IO information

Menu: Online - Read I/O information

[XG-PD 5 phase] High-speed link setting

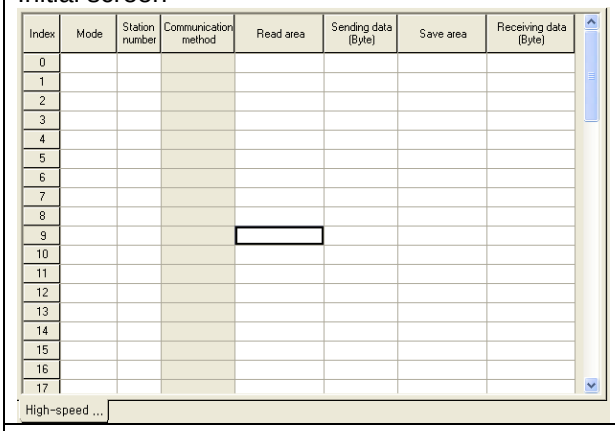
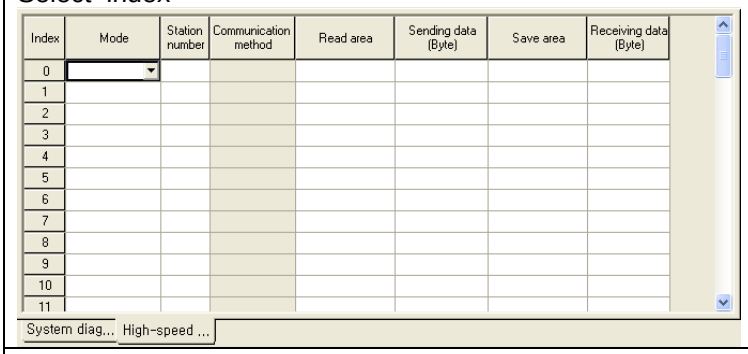
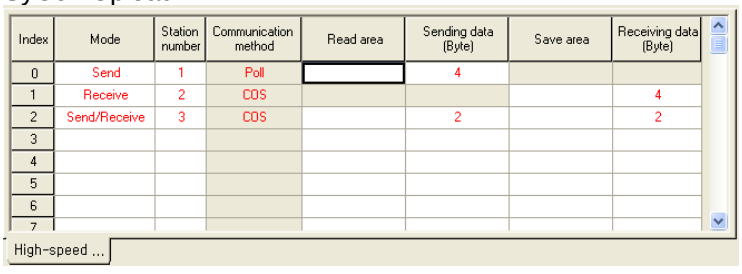
Menu: Parameter → High-speed link (HS Link) → High-speed link1

<table>
<tr><th>Phase</th><th>Item</th><th>Screen configuration and setting description</th></tr>
<tr><td rowspan="2">5-1</td><td rowspan="2">Communication Module Settings</td><td>Initial screen
 
</td></tr>
<tr><td>High-speed link 1: Dnet I/F module
 

Module type: Dnet
Base no.: 00
Slot no.: 00
Communication period settings: 200ms</td></tr>
</table>

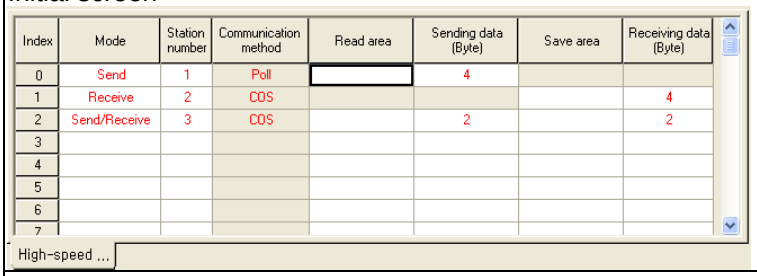
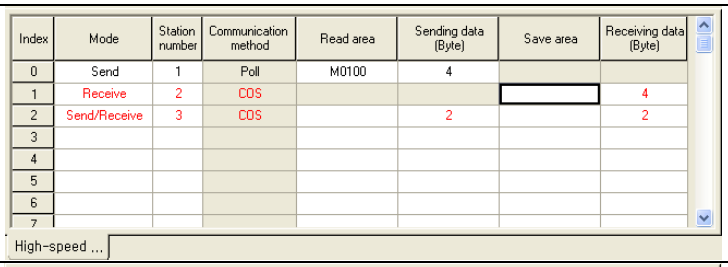
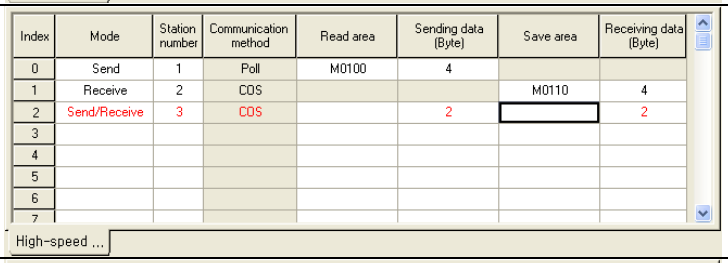
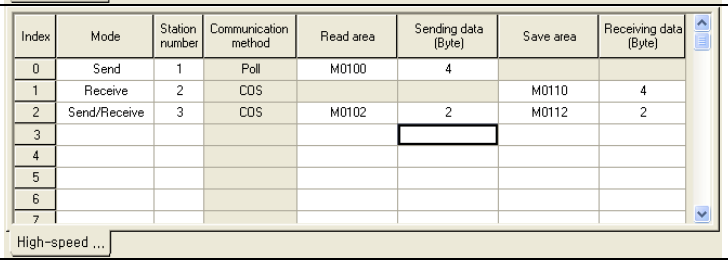
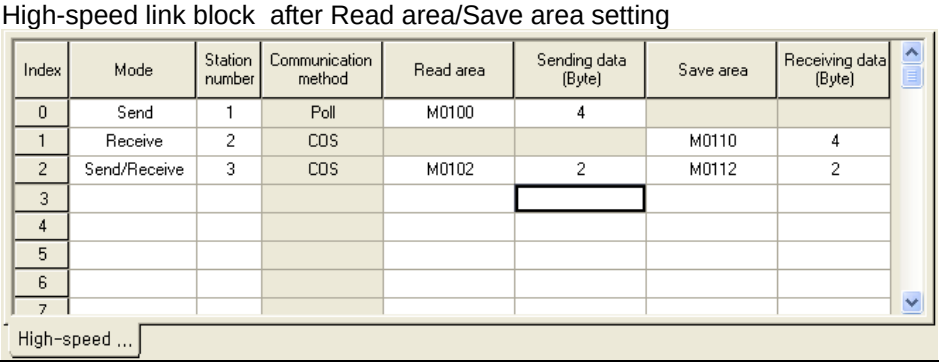
[XG-PD 6] SyCon Upload (Dnet, Pnet)

Menu: Online → SyCon Upload (Dnet, Pnet)

Phase	Item	Screen configuration and setting description
6-1	Communication module settings	Initial screen  Select index  SyCon Upload 

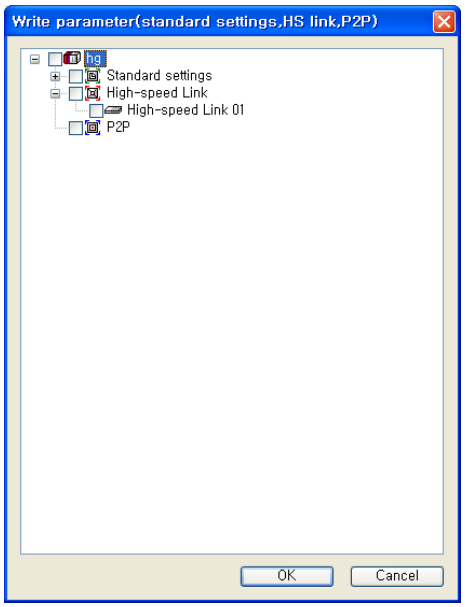
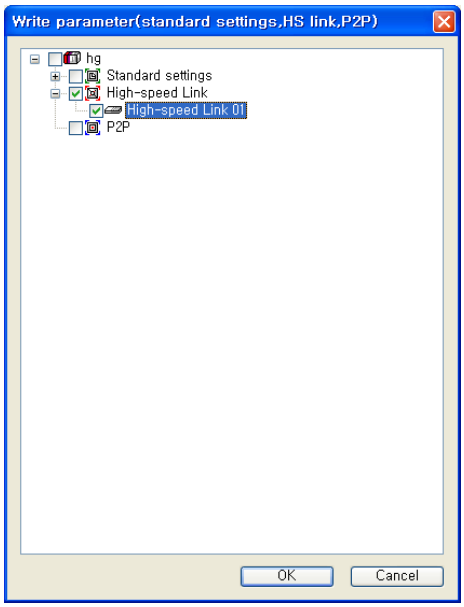
[XG-PD 6 Phase] Read area/Save area setting

Menu: HS Link → High-speed link1 → block

<table>
<tr><th>Phase</th><th>Item</th><th>Screen configuration and setting description</th></tr>
<tr><td rowspan="5">6-1</td><td rowspan="5">Communication module setting</td><td>Initial screen
 
</td></tr>
<tr><td>Select index of block window
<table>
<tr><th>Slave module</th><th>Index</th><th>High-speed link block setting</th></tr>
<tr><td>GDL-TR4A</td><td>0</td><td> 
</td></tr>
<tr><td>GDL-D24A</td><td>1</td><td> 
</td></tr>
<tr><td>GDL-DT4A</td><td>2</td><td> 
</td></tr>
</table></td></tr>
<tr><td>High-speed link block after Read area/Save area setting
 
</td></tr>
</table>

[XG-PD 7 phase] Write High-speed link parameter

Menu: Online → Write Parameter

<table>
<tr><th>Phase</th><th>Item</th><th colspan="2">Screen configuration and setting description</th></tr>
<tr><td rowspan="3">7-1</td><td rowspan="3">Write parameter</td><td>Initial screen</td><td>Select High-speed link</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Parameter is downloaded after click ‘OK’.</td></tr>
</table>

- Written parameter is saved CPU module.
  - If CPU module is exchanged, High-speed link parameter has to backup from used CPU module.

[XG-PD 8 phase] High-speed link enabling

Menu: Online → Enable Link (HS Link, P2P)

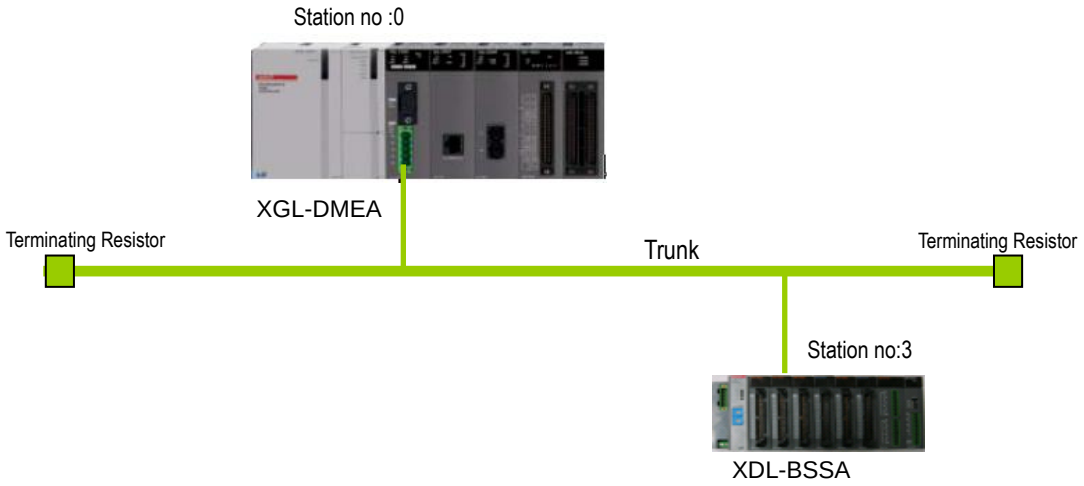
→ Communication is permitted between master module and slave module.

7.2 Example Program (XDL-BSSA setting)

Basic configuration and setting value for example is as below.

Setting item				Setting		Software	Phase
System configuration	Master	Master setting		XGL-DMEA		SyCon	1-3 ~ 1-4
		Base no.		0		XG-PD	5-1
		Slot no.		0		XG-PD	5-1
		Station no.		0		SyCon	1-5, 3-1
		Communication speed		125kbps		SyCon	3-1
		High Speed Link setting		High Speed Link 1		XG-PD	5-1
		Communication cycle setting		200ms		XG-PD	5-1
	Slave	Select slave		XDL-BSSA		SyCon	4-1 ~ 4-4
		XDL-BSSA (XBE-TN32A:Tr. Output XBE-RY16A:Relay Output XBE-DC32A:DC Input XBF-AD04A:A/D Conversion module XBE-DV04A:D/A Conversion module)	Station no.	3		SyCon	4-3, 5-2
			Communication method	Poll		SyCon	5-3 (5-4)
			Read area	Device	P1000	XG-PD	6-1
				Size	14		
			Save area	Device	M200	XG-PD	6-1
				Size	12		
Etc.	Master Setting			Change of basic setting value		SyCon	2-1 ~ 2-3
	Device Assignment			Communication port setting of computer		SyCon	6-1 ~ 6-2

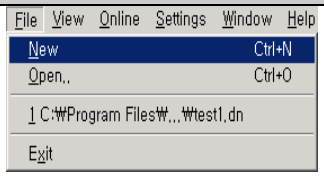
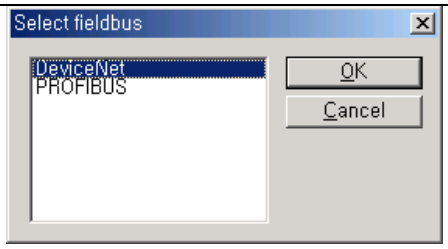
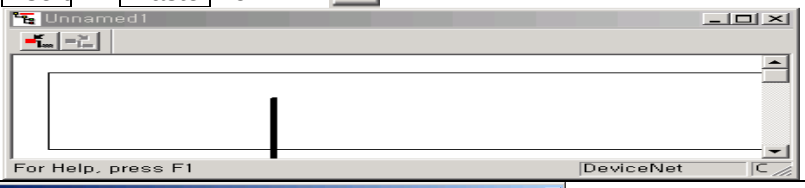
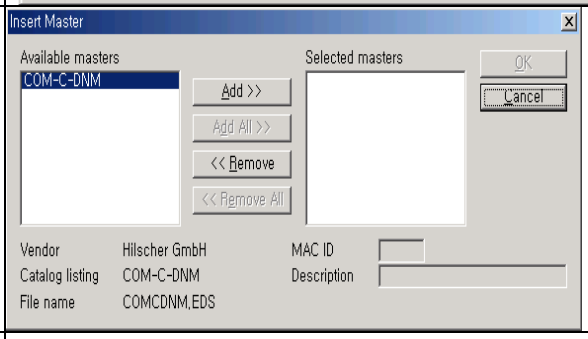
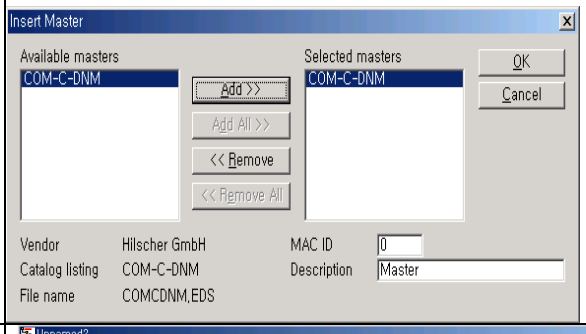
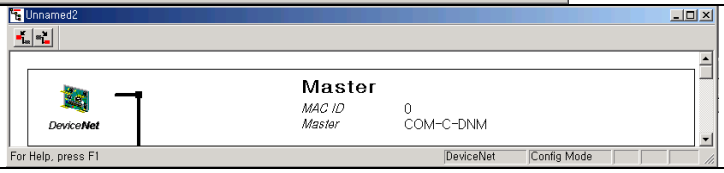
- **System Configuration**



Slot no.	1	2	3	4	5
Model Name	XBE-TN32A	XBE-RY16A	XBE-DC32A	XBF-AD04A	XBE-DV04A
Contents	Tr. Output	Relay Output	DC Input	A/D Conversion module	D/A Conversion module
Occupied I/O points	32points (4Byte)	16Points (2Byte)	32Points (4byte)	64Points (8Byte)	64Points (8Byte)

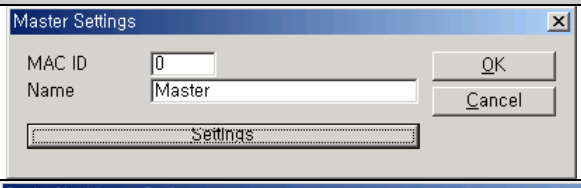
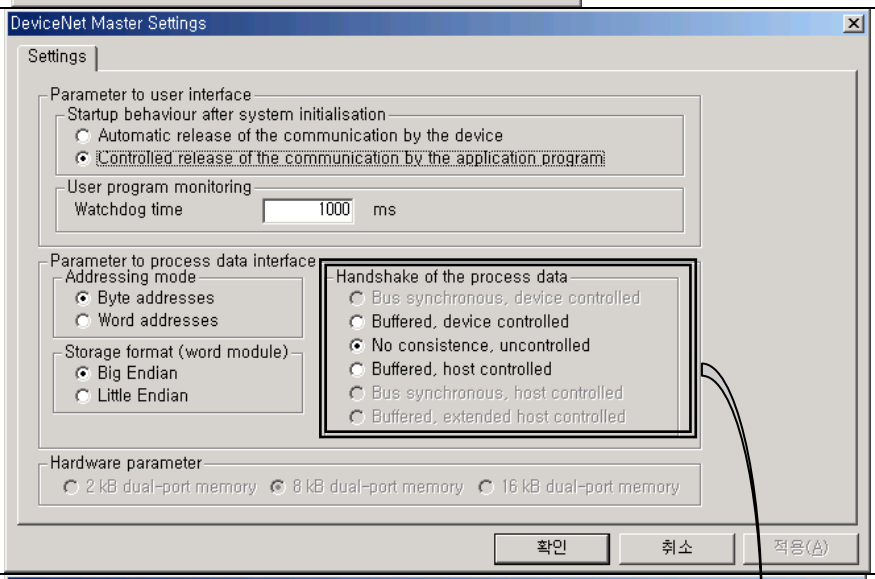
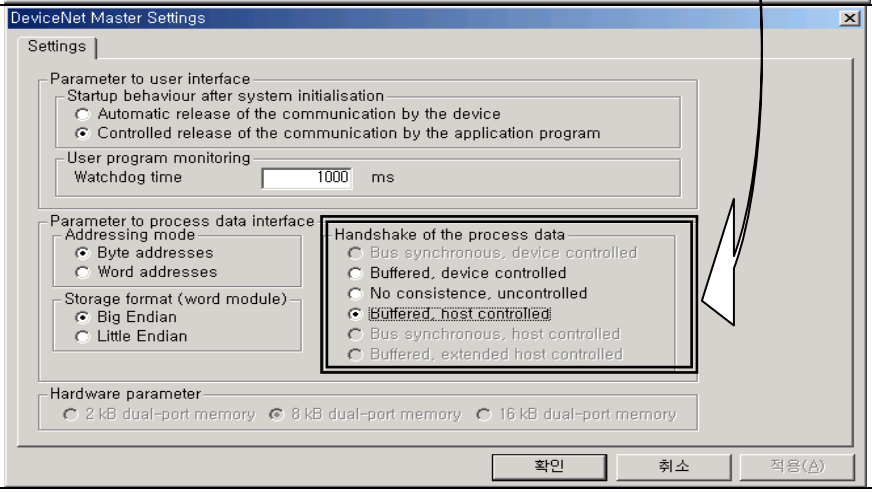
[SyCon 1 Phase] Master and station no. setting

Menu selection : File → New

Phase	Item	Screen configuration and setting description
1-1	File writing	 New File writing
1-2	Fieldbus selection	 DeviceNet selection
1-3	Master setting	Insert master setting window Insert → Master or 
1-4	Master selection	 Master type selection : COM-C-DNM
1-5	Station no. setting	 station no selection: 0 Added description: Master (only english or numeric)
1-6	Master setting completion	

[SyCon 2 Phase] Basic setting change

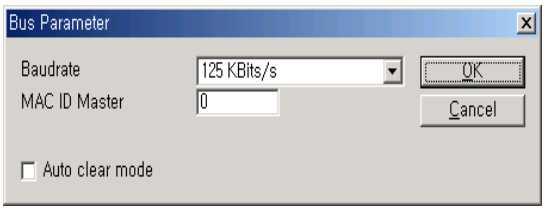
Menu selection : Settings → Master Settings

Phase	Item	Screen configuration and setting description
2-1	Master Settings	 Master station no. change : 0 Description change: Master
2-2	Basic setting	
2-3	Setting value change	

* Please don't set exclusive of "Handshake of the process data".

[SyCon 3 Phase] Communication speed

Menu selection : Settings → Bus Parameter

Phase	Item	Screen configuration and setting description
3-1	Bus Parameter	 Communication speed(Baudrate) : 125KBit/s Master station no. setting : 0 Auto Clear mode : refer to 5-3-4

* Auto Clear Mode

(1) When it is selected

→ If it is occurred to error in slave module, communication stop on overall system.

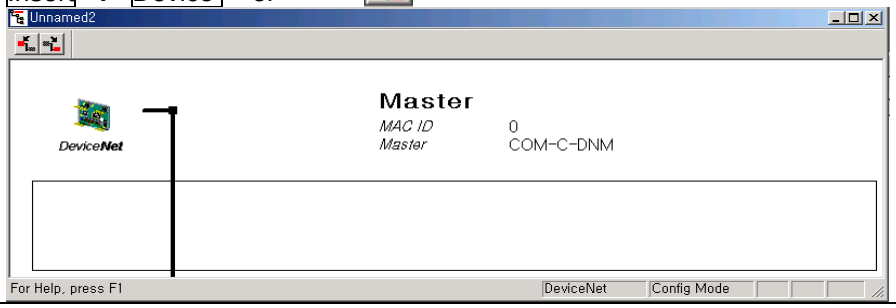
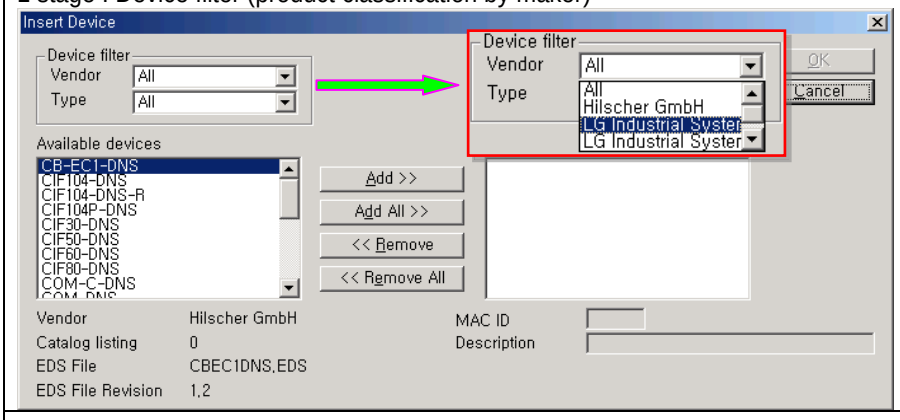
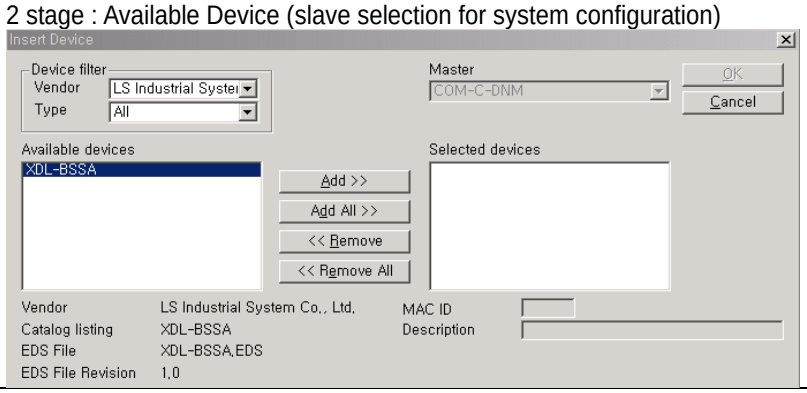
→ HS LED flickering of Dnet I/F module
MNS Red LED On

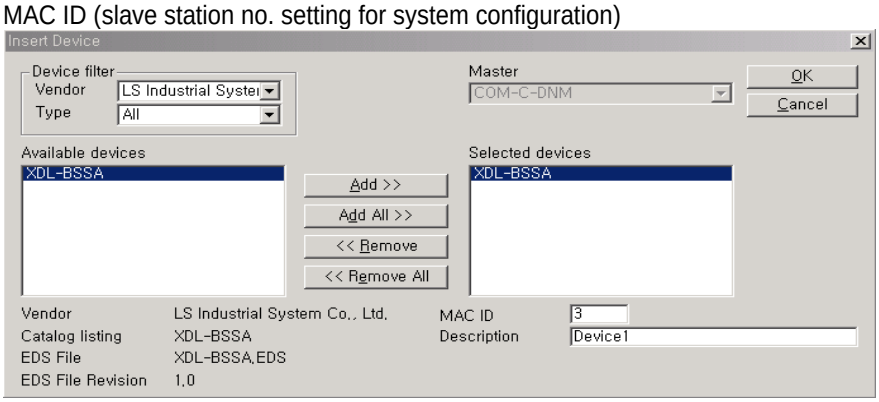
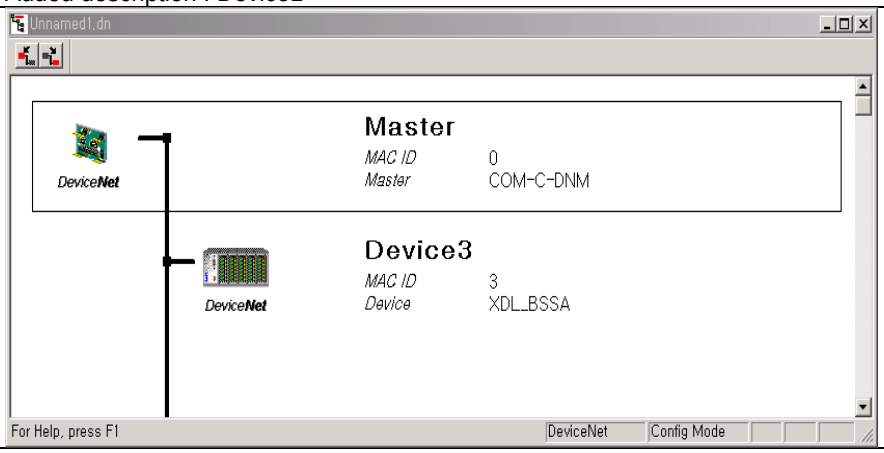
(2) When it is not selected

→ If it is occurred to error in slave module, communication is kept about normal slave Module.

[SyCon 4 Phase] Slave and station no. setting

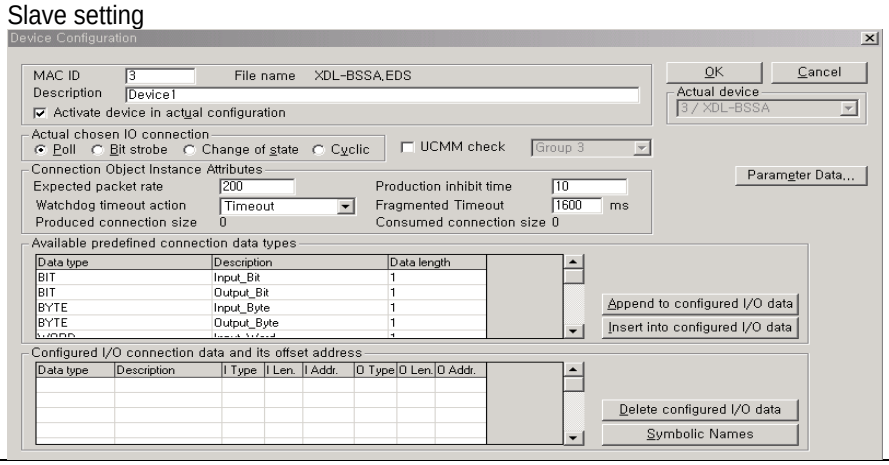
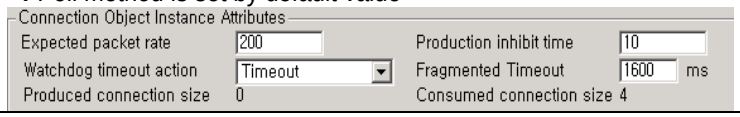
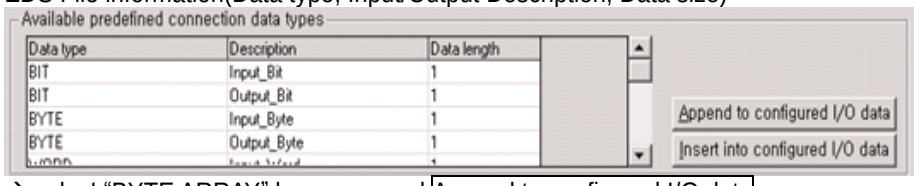
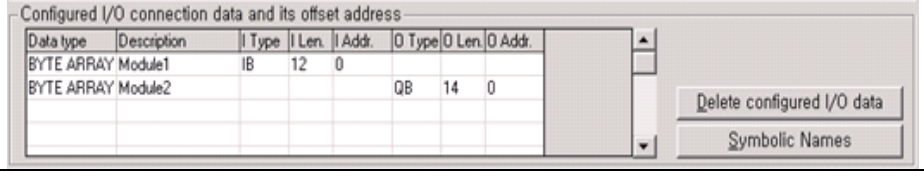
Menu selection : Insert → Device

Phase	Item	Screen configuration and setting description
4-1	Slave setting	Insert Device setting window Insert → Device or 
4-2	Slave selection	1 stage : Device filter (product classification by maker)  2 stage : Available Device (slave selection for system configuration) 

Phase	Item	Screen configuration and setting description
4-3	Station no. setting	MAC ID (slave station no. setting for system configuration)  Added description : Device1
4-4	Slave setting completion	

[SyCon 5 Phase] Slave communication method setting - Slave : XDL-BSSA

Menu selection : Settings → Device Configuration

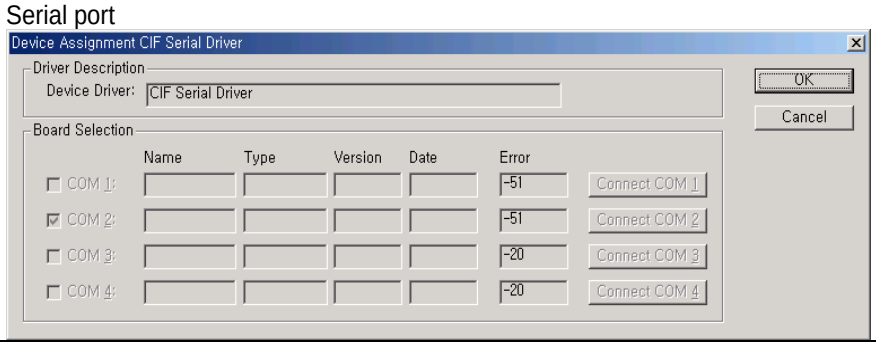
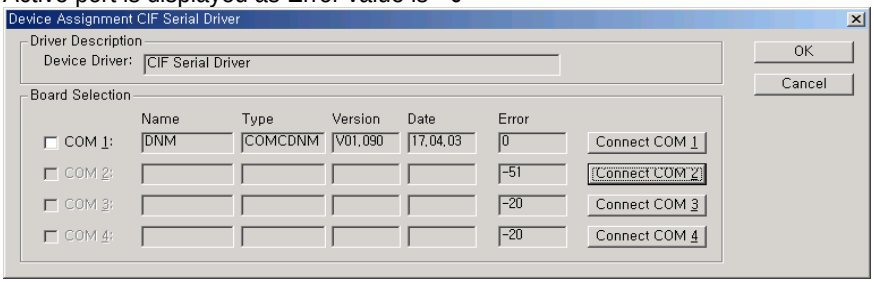
Phase	Item	Screen configuration and setting description
5-1	Setting window for slave communication method	Slave setting 
5-2	Slave station no	Station no. (MAC ID) setting : 3
5-3	Slave communication method	Communication method selection : Poll
5-4	Slave Send/Receive cycle	Send/Receive cycle of slave module and condition setting of response status →Poll method is set by default value 
5-5	Slave Data Configuration (EDS File)	EDS File information(Data type, Input/Output Description, Data size)  → select “BYTE ARRAY” by mouse and Append to configured I/O data then data is displayed as 5-6
5-6	Slave Data Configuration	Slave configuration(Data type, Input/Output Description, Data size)is transferred to master. 

[SyCon 6 Phase] Serial port selection

: It is the same with the wiring of RS-232C Loader Cable to be used through CPU module.

Therefore you have to use that cable.

Menu selection : Settings → Device Assignment

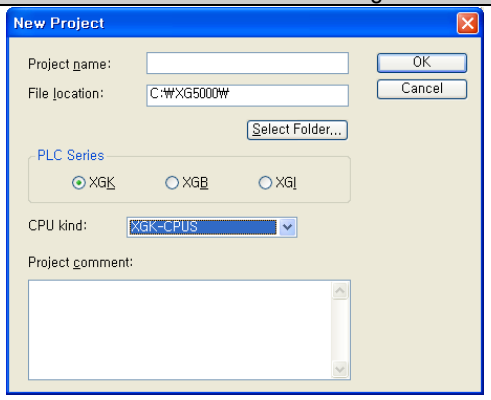
Phase	Item	Screen configuration and setting description
6-1	Serial port setting window	Serial port 
6-2	Port searching	Connect COM1 → Connect COM2 → Connect COM3 → Connect COM4 Active port is displayed as Error value is "0"  Marking COM 1(COM 1: → COM 1:),then select OK

[SyCon 7 Phase] Download

Menu selection : OnLine → Download

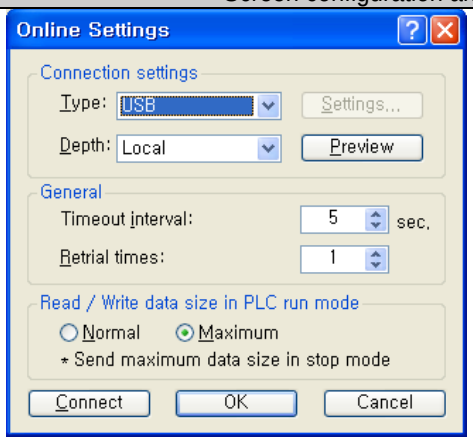
[XG-PD 1 Phase] CPU module type selection

Menu selection : Option – PLC type setting

Phase	Item	Screen configuration and setting description
1-1	CPU module selection	 Select “XGK-CPUS”

[XG-PD 2 Phase] Communication method setting

Menu selection : Online – Connection setting

Phase	Item	Screen configuration and setting description
2-1	Communication method setting	 Connection Type : USB Connection depth : Local

[XG-PD 3 Phase] Connection

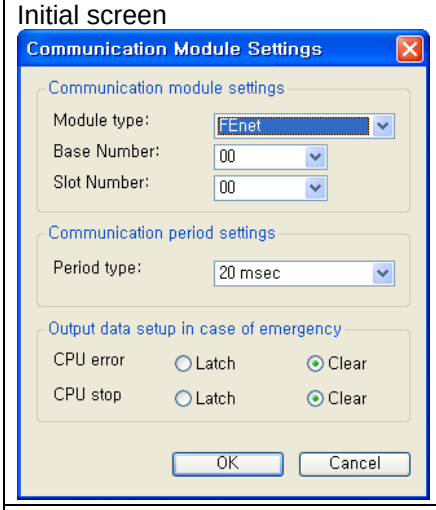
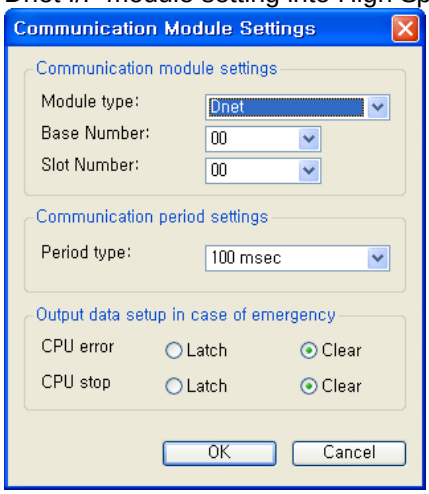
Menu selection: Online – Connection

[XG-PD 4 Phase] I/O information reading

Menu selection : Online - I/O information setting

[XG-PD 5 Phase] High Speed Link setting

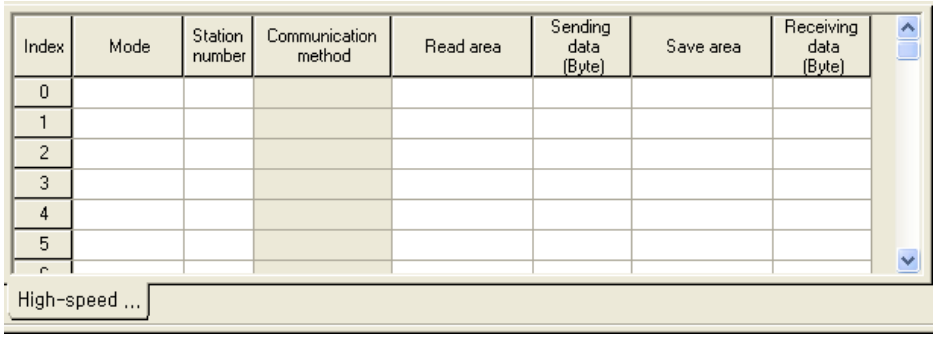
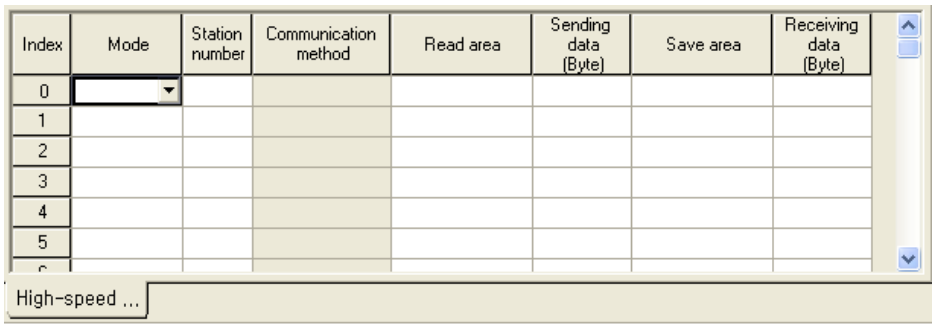
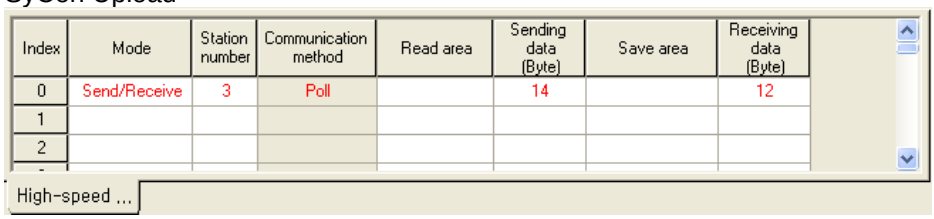
Menu selection : Parameter → High Speed Link(HS Link) → High Speed Link 1

<table>
<tr><th>Phase</th><th>Item</th><th>Screen configuration and setting description</th></tr>
<tr><td rowspan="2">5-1</td><td rowspan="2">Communication module setting</td><td>Initial screen
 
</td></tr>
<tr><td>Dnet I/F module setting into High Speed Link 1
 

Module type : Dnet
Base no. : 00
Slot no. : 00
Communication cycle setting : 100ms</td></tr>
</table>

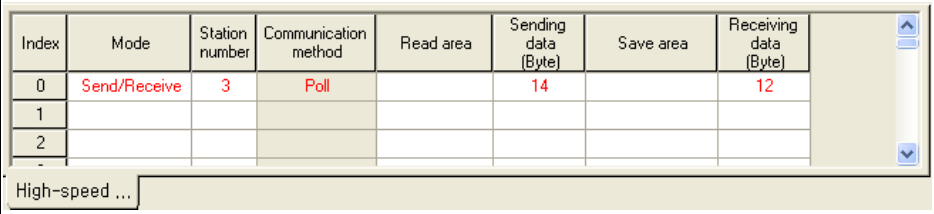
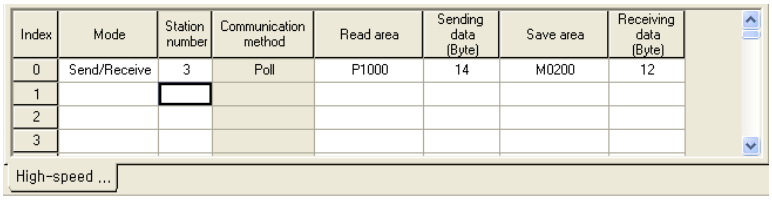
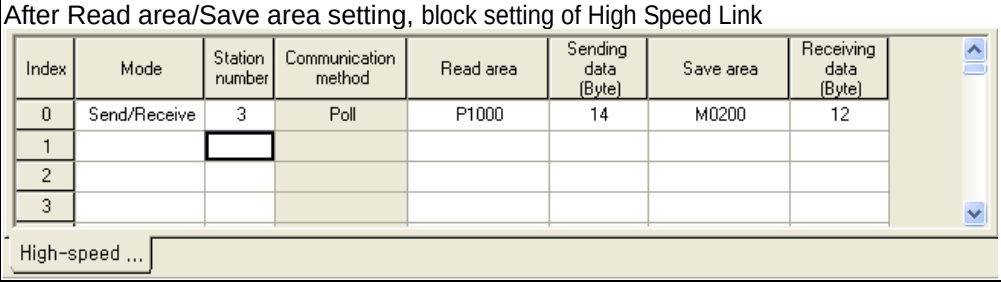
[XG-PD 6 Phase] SyCon Upload

Menu selection : Online → SyCon Upload (Dnet)

Phase	Item	Screen configuration and setting description
6-1	Communication module setting	Initial screen  Index selection of block screen  SyCon Upload 

[XG-PD 6 Phase] Read area/Save area setting

Menu selection : Parameter → High Speed Link(HS Link) → High Speed Link 1 → Block

<table>
<tr><th>Phase</th><th>Item</th><th>Screen configuration and setting description</th></tr>
<tr><td rowspan="4">6-1</td><td rowspan="4">Communica-
tion
module setting</td><td>Initial screen
 
</td></tr>
<tr><td>Index selection of block screen
<table>
<tr><th>Slave module</th><th>Index</th><th>Block setting of High Speed Link</th></tr>
<tr><td>XDL-BSSA</td><td>0</td><td> 
</td></tr>
</table></td></tr>
<tr><td>After Read area/Save area setting, block setting of High Speed Link
 
</td></tr>
</table>

◈ Read area/Save area configuration of slave module

1. I/O configuration of Dnet module of extendable type

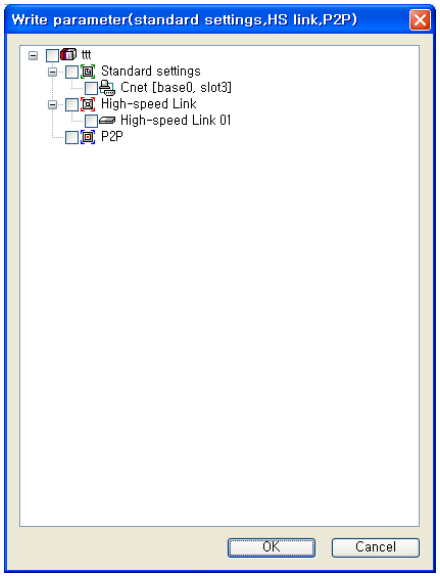
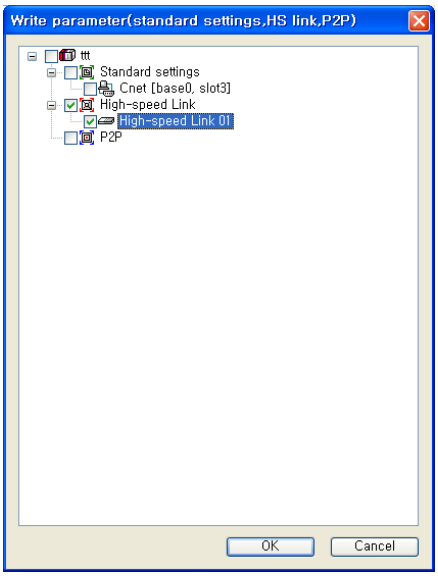
Communication Adapter	Slot 0: P1000 Tr. Output	Slot 1: P1002 Relay Output	Slot 2: M0200 DC Input	Slot 3: P1003 DA Output	Slot 4: M0202 AD Input
Read area Slot0: Slot1: Slot3:	32points (XBE-TN32A)	16points (XBE-RY16A)	32points (XBE-DC32A)	(XBF-DA04A)	(XBF-AD04A)
Save area Slot2: Slot4:					

2. Read area/Save area of module

Read area(Master→Slave)					Save area(Slave→Master)				
Device	Tx Data		Extendable Output Module		Device	Rx Data		Extendable Input Module	
P1000	14 Byte	4Byte	TR Output 32points		M0200	12 Byte	4Byte	DC Input 32points	
P1002		2Byte	Relay 16points		M0202		2Byte	A/D Conversion 4Ch	Ch0
P1003		2Byte	D/A Conversion 4Ch	Ch0	M0203		2Byte		Ch1
P1004		2Byte		Ch1	M0204		2Byte		Ch2
P1005		2Byte		Ch2	M0205		2Byte		Ch3
P1006		2Byte		Ch3					

[XG-PD 7 Phase] High Speed Parameter Writing

Menu selection : Online → Parameter writing

<table>
<tr><th>Phase</th><th>Item</th><th colspan="2">Screen configuration and setting description</th></tr>
<tr><td rowspan="3">7-1</td><td rowspan="3">Parameter writing</td><td>Initial screen</td><td>High Speed Link selection</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">If you click “ok”, then the parameter is downloaded.</td></tr>
</table>

- The parameter wrote is saved to CPU module.
  - Therefore if you exchange CPU module, you have to backup the parameter of High Speed Link.

[XG-PD 8 Phase] High Speed Link enable

Menu selection : Online → Link enable(High speed link, P2P)

→ Enable the communication between master module and slave module

Chapter 8 Troubleshooting

This chapter is to describe various errors that may occur in system operation, their causes and actions to take against. If any error occurs on the communications module, related error details will be displayed through LED of the communication module. Follow the procedures below to shoot the troubles after checking for errors displayed, based on the applicable LED status referring to product specification.

8.1 Symptoms and Management by LED Status

It shows the symptoms of communication module by LED status and the management.
(When High-speed link is enabled)

RUN	I/F	HS	D-RUN	MNS	Symptoms	Management
ON	Flickering	OFF	Flickering	Green ON	High-speed link disable	-
ON	Flickering	ON	ON	Red ON	Slave connection abnormal	Slave connection check Check slave setting
ON	Flickering	Flickering	Flickering	Green ON	SyCon setting changed while High-speed link is executed	-
ON	Flickering	Flickering	Flickering	Red ON	Whole slave connection error	Check slave connection Check slave setting
OFF	OFF	OFF	-	-	Critical defect	Ask customer service center

[Table 8.1] The symptoms of communication module error (High-speed link is enabled)

8.2 System Diagnosis in XG-PD

It shows the diagnosis item in XG-PD.

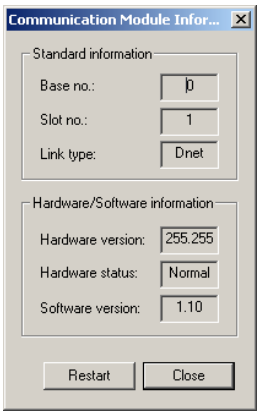
Diagnosis item	Description
Communication module information	It displays the standard information of communication module.
High-speed link	It displays the flag information of High-speed link.
Log	It displays system log and running log.
Auto-scan	It displays the slave module which is connected Dnet I/F module.

[Table 8.2] System diagnosis in XG-PD

It diagnoses the system by [Online] - [System Diagnosis] in XG-PD.

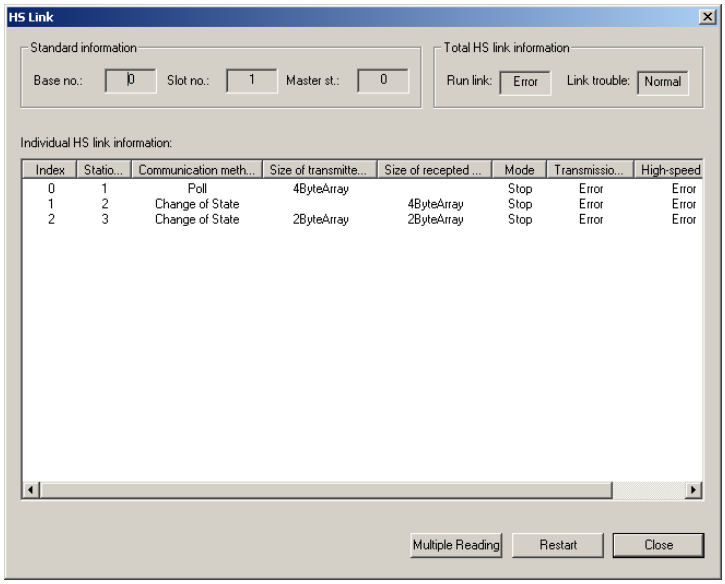
8.2.1 Communication module information

It displays the information of Dnet I/F module.



[Figure 8.1] Communication module information

8.2.2 High-speed link



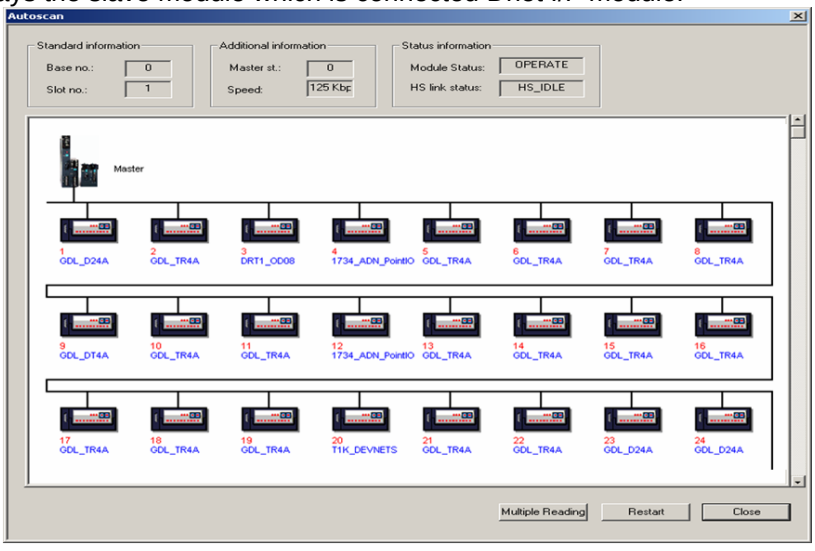
[Figure 8.2] High-speed link

High-speed link diagnosis		
Classification (Main item)	Classification (Sub item)	Description
Standard information	Base no.	Base number: 0~7
	Slot no.	Slot number: 0~11
	Master st.	Master station number
Total High-speed link information	Run link	Normal: All station is a normal communication. Error: If only one station can not to communicate, it is an error.
	Link trouble	Communication line's status
Individual High-speed link information	Index	High-speed link parameter index (High-speed link block number in XG-PD)
	Station number	Master station number
	Communication method	Slave's communication method
	Size of transmitted data	Transmission data size (Byte)
	Size of recepted data	Received data size (Byte)
	Mode	Present operation status
	Transmission/Reception status	transmission/reception status
	High-speed link status	High-speed link status
	Error	Error status

[Table 8.3] High-speed link diagnosis

8.2.3 Autoscan

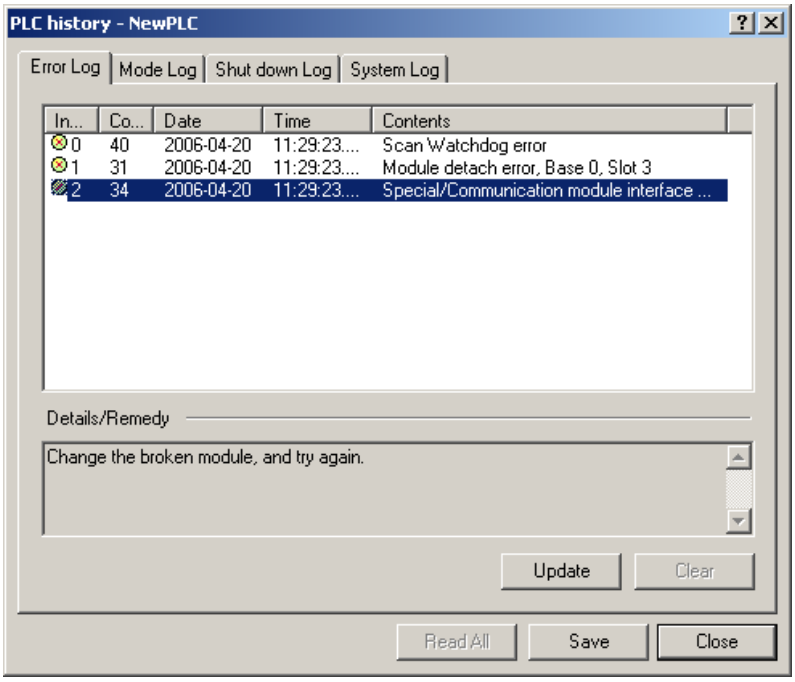
It displays the slave module which is connected Dnet I/F module.



[Figure 8.4 Autoscan]

8.3 Diagnosis of Communication Module through XG5000

It can monitor the communication status by XG-5000. Connect to CPU port and [Online] – [PLC History] – [PLC Errors/Warnings].

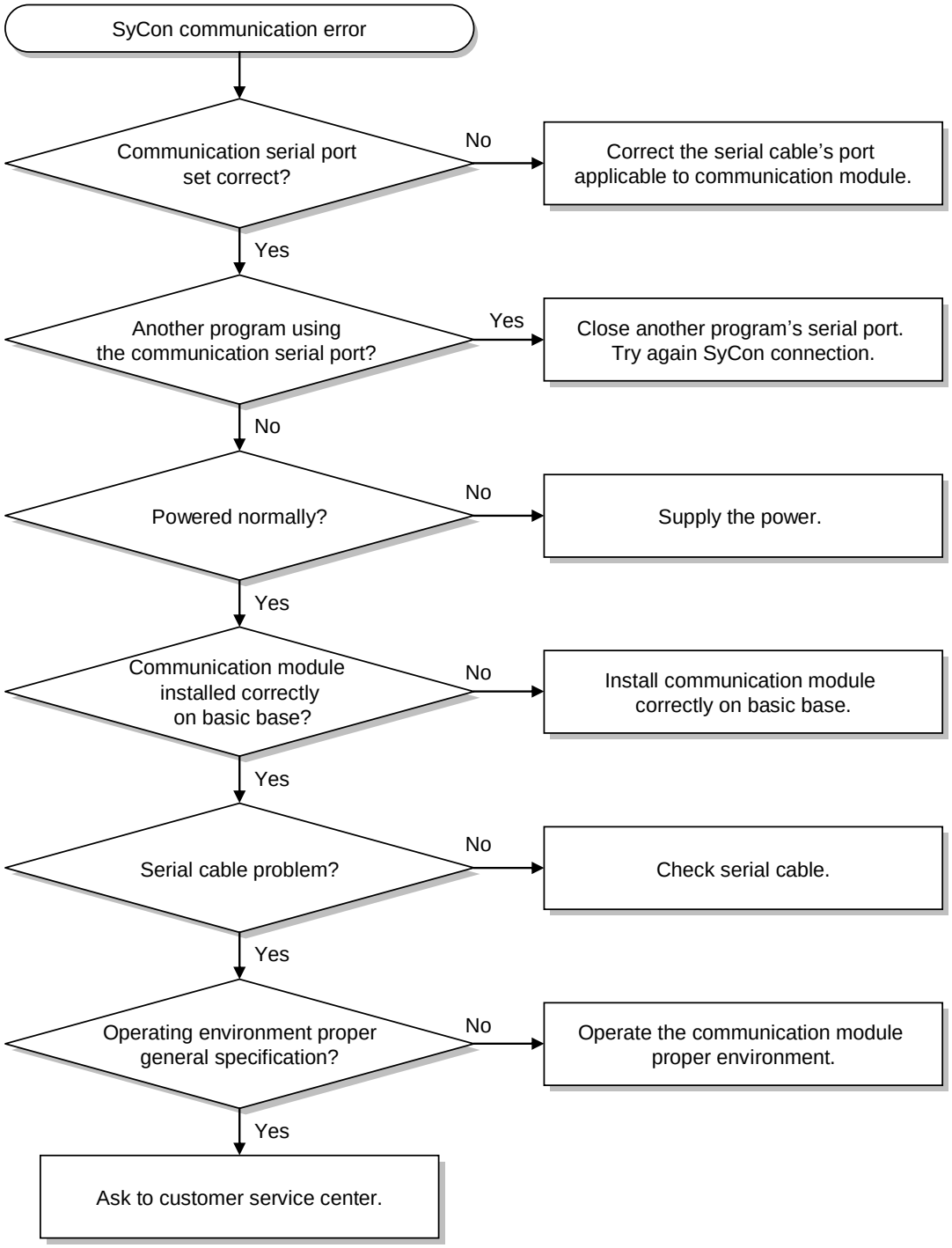


[Figure 8.5] Detailed information of PLC history

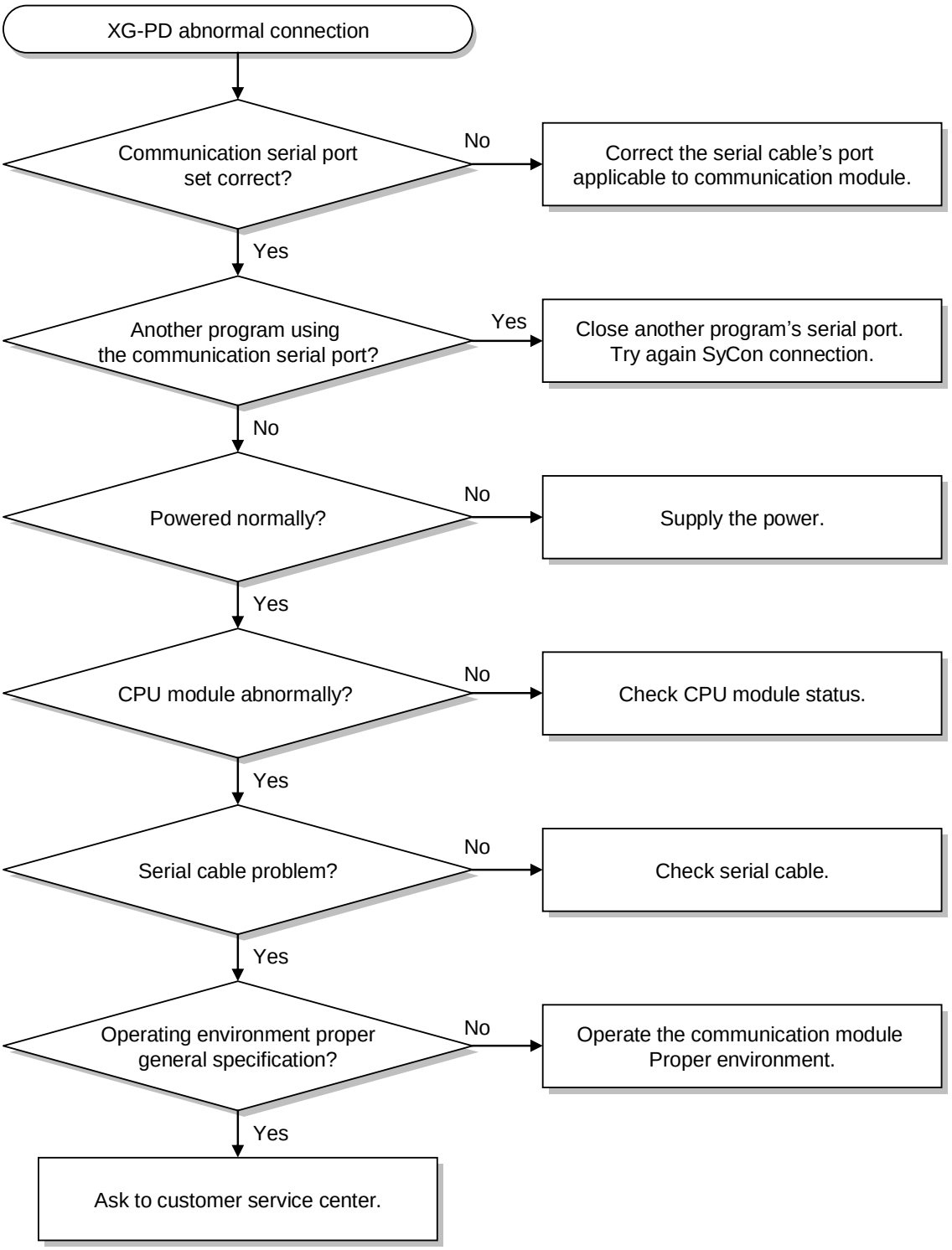
If hardware error or CPU interface error is occurred, communication module's LED operates abnormally. Also, the error information is shown through XG-5000.
[Figure 8.5] shows Error/Warning information from [Online] - [PLC History] menu in XG-5000.

8.4 Trouble shooting for Respective Error

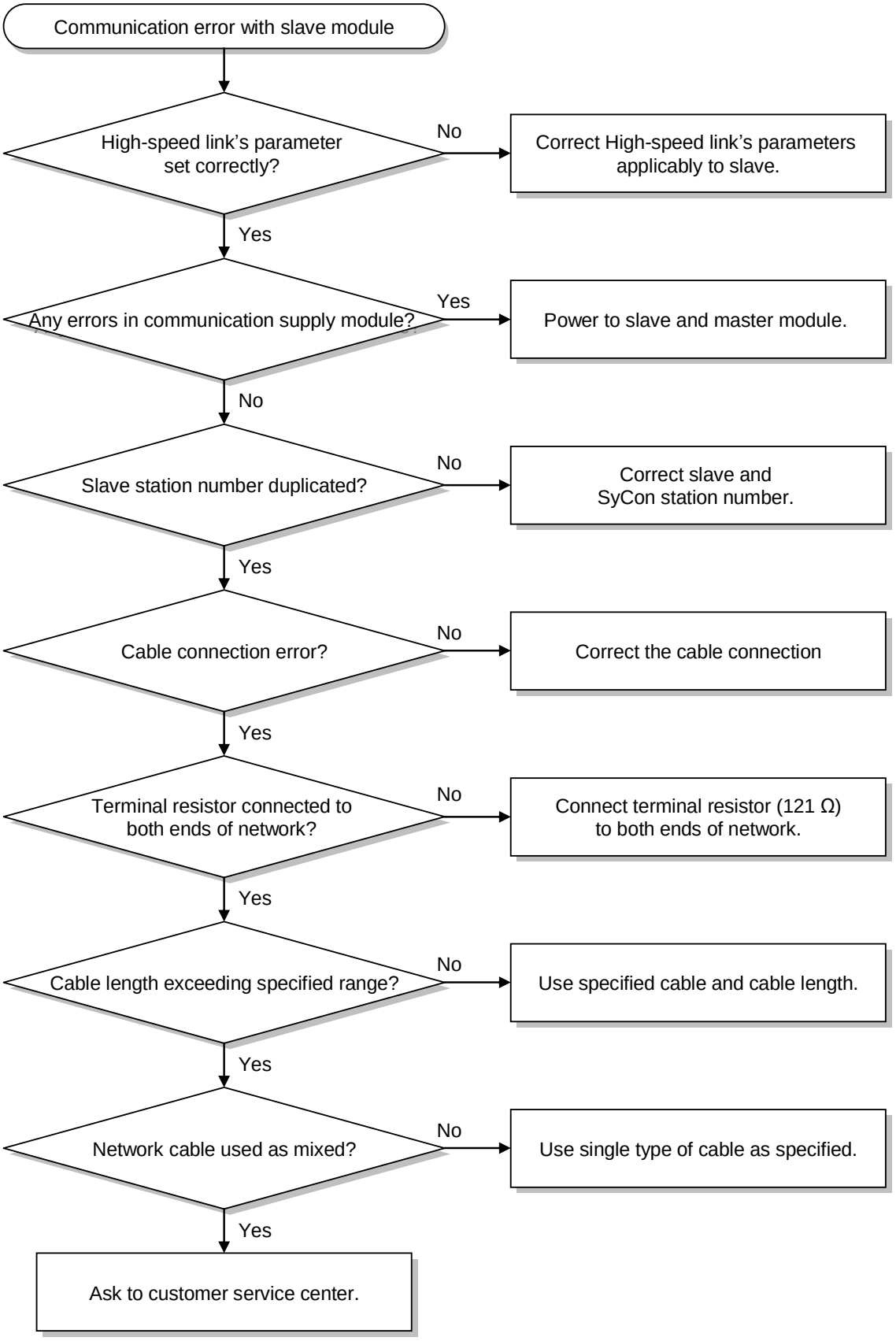
8.4.1 SyCon communication error



8.4.2 XG-PD abnormal connection



8.4.3 Communication error with slave module



A.1 List of Flags

A.1.1 Special relays

Device 1	Device 2	Type	Variable	Function	Description
F0000		DWORD	_SYS_STATE	Mode & Status	PLC mode & run status displayed.
	F00000	BIT	_RUN	RUN	RUN status.
	F00001	BIT	_STOP	STOP	STOP status.
	F00002	BIT	_ERROR	ERROR	ERROR status.
	F00003	BIT	_DEBUG	DEBUG	DEBUG status.
	F00004	BIT	_LOCAL_CON	Local control	Local control mode.
	F00005	BIT	_MODBUS_CON	Modbus mode	Modbus control mode.
	F00006	BIT	_REMOTE_CON	Remote mode	Remote control mode.
	F00008	BIT	_RUN_EDIT_ST	Modification during run	Program being downloaded during run.
	F00009	BIT	_RUN_EDIT_CHK	Modification during run	Modification in progress during run.
	F0000A	BIT	_RUN_EDIT_DONE	Modification complete during run	Modification complete during run.
	F0000B	BIT	_RUN_EDIT_END	Modification complete during run	Modification complete during run.
	F0000C	BIT	_CMOD_KEY	Run Mode	Run Mode changed by key.
	F0000D	BIT	_CMOD_LPADT	Run Mode	Run Mode changed by local PADT.
	F0000E	BIT	_CMOD_RPADT	Run Mode	Run Mode changed by remote PADT.
	F0000F	BIT	_CMOD_RLINK	Run Mode	Run Mode changed by remote communication module.
	F00010	BIT	_FORCE_IN	Compulsory input	Compulsory input status.
	F00011	BIT	_FORCE_OUT	Compulsory output	Compulsory output status.
	F00012	BIT	_SKIP_ON	I/O SKIP	I/O SKIP being executed.
	F00013	BIT	_EMASK_ON	Error mask	Error mask being executed.
	F00014	BIT	_MON_ON	Monitor	Monitor being executed.
	F00015	BIT	_USTOP_ON	STOP	Stopped by STOP function
	F00016	BIT	_ESTOP_ON	ESTOP	Stopped by ESTOP function.
	F00017	BIT	_CONPILE_MODE	Compiling	Compile being performed.
	F00018	BIT	_INIT_RUN	Initializing	Initialization task being performed.
	F0001C	BIT	_PB1	Program code 1	Program code 1 selected.
	F0001D	BIT	_PB2	Program code 2	Program code 2 selected.
	F0001E	BIT	_CB1	Compile code 1	Compile code 1 selected.
	F0001F	BIT	_CB2	Compile code 2	Compile code 2 selected.

Device 1	Device 2	Type	Variable	Function	Description
F0002		DWORD	_CNF_ER	System error	Serious error in system reported.
	F00020	BIT	_CPU_ER	CPU error	CPU configuration error found.
	F00021	BIT	_IO_TYER	Module type error	Module type is not identical.
	F00022	BIT	_IO_DEER90	Module installation error	Module is displaced.
	F00023	BIT	_FUSE_ER	Fuse error	Fuse blown.
	F00024	BIT	_IO_RWER	Module I/O error	Module I/O error found.
	F00025	BIT	_IP_IFER	Module interface error	Error found in Special/communication module interface.
	F00026	BIT	_ANNUM_ER	External equipment Error	Serious error detected in external equipment.
	F00028	BIT	_BPRM_ER	Basic parameter	Basic parameter is abnormal.
	F00029	BIT	_IOPRM_ER	IO parameter	IO configuration parameter abnormal.
	F0002A	BIT	_SPPRM_ER	Special module parameter	Special module parameter abnormal.
	F0002B	BIT	_CPPRM_ER	Communication module parameter	Communication module parameter abnormal.
	F0002C	BIT	_PGM_ER	Program error	Program error found.
	F0002D	BIT	_CODE_ER	Code error	Program code error found.
	F0002E	BIT	_SWDT_ER	System watch-dog	System watch-dog active.
	F0002F	BIT	_BASE_POWER_ER	Power error	Base power abnormal.
	F00030	BIT	_WDT_ER	Scan watch-dog	Scan watch-dog active.
F0004		DWORD	_CNF_WAR	System warning	Slight error in system reported.
	F00040	BIT	_RTC_ER	RTC error	RTC data abnormal.
	F00041	BIT	_DBCK_ER	Back-up error	Data back-up error found.
	F00042	BIT	_HBCK_ER	Restart error	Hot restart unavailable.
	F00043	BIT	_ABSD_ER	Run error stop	Stopped due to abnormal run.
	F00044	BIT	_TASK_ER	Task impact	Task being impacted.
	F00045	BIT	_BAT_ER	Battery error	Battery status abnormal.
	F00046	BIT	_ANNUM_WAR	External equipment error	Slight error detected in external equipment.
	F00047	BIT	_LOG_FULL	Memory full	Log memory full
	F00048	BIT	_HS_WAR1	HS link 1	HS link – parameter 1 error
	F00049	BIT	_HS_WAR2	HS link 2	HS link – parameter 2 error
	F0004A	BIT	_HS_WAR3	HS link 3	HS link – parameter 3 error
	F0004B	BIT	_HS_WAR4	HS link 4	HS link – parameter 4 error
	F0004C	BIT	_HS_WAR5	HS link 5	HS link – parameter 5 error
	F0004D	BIT	_HS_WAR6	HS link 6	HS link – parameter 6 error
	F0004E	BIT	_HS_WAR7	HS link 7	HS link – parameter 7 error
	F0004F	BIT	_HS_WAR8	HS link 8	HS link – parameter 8 error
	F00050	BIT	_HS_WAR9	HS link 9	HS link – parameter 9 error

Device 1	Device 2	Type	Variable	Function	Description
	F00051	BIT	_HS_WAR10	HS link 10	HS link – parameter 10 error
	F00052	BIT	_HS_WAR11	HS link 11	HS link - parameter11 error
	F00053	BIT	_HS_WAR12	HS link 12	HS link - parameter12 error
	F00054	BIT	_P2P_WAR1	P2P parameter 1	P2P - parameter1 error
	F00055	BIT	_P2P_WAR2	P2P parameter 2	P2P – parameter2 error
	F00056	BIT	_P2P_WAR3	P2P parameter 3	P2P – parameter3 error
	F00057	BIT	_P2P_WAR4	P2P parameter 4	P2P – parameter4 error
	F00058	BIT	_P2P_WAR5	P2P parameter 5	P2P – parameter5 error
	F00059	BIT	_P2P_WAR6	P2P parameter 6	P2P – parameter6 error
	F0005A	BIT	_P2P_WAR7	P2P parameter 7	P2P – parameter7 error
	F0005B	BIT	_P2P_WAR8	P2P parameter 8	P2P – parameter8 error
	F0005C	BIT	_CONSTANT_ER	Fixed cycle error	Fixed cycle error
F0009		WORD	_USER_F	User contact point	Timer available for user.
	F00090	BIT	_T20MS	20ms	CLOCK of 20ms cycle.
	F00091	BIT	_T100MS	100ms	CLOCK of 100ms cycle.
	F00092	BIT	_T200MS	200ms	CLOCK of 200ms cycle.
	F00093	BIT	_T1S	1s	CLOCK of 1s cycle.
	F00094	BIT	_T2S	2s	CLOCK of 2s cycle.
	F00095	BIT	_T10S	10s	CLOCK of 10s cycle.
	F00096	BIT	_T20S	20s	CLOCK of 20s cycle.
	F00097	BIT	_T60S	60s	CLOCK of 60s cycle.
	F00099	BIT	_ON	Always ON	Bit always ON.
	F0009A	BIT	_OFF	Always OFF	Bit always OFF
	F0009B	BIT	_1ON	1 scan ON	Bit only ON for the first scan.
	F0009C	BIT	_1OFF	1 scan OFF	Bit only OFF for the first scan.
	F0009D	BIT	_STOG	Reverse	Every scan reversed.
F0010		WORD	_USER_CLK	User CLOCK	CLOCK available to set by user.
	F00100	BIT	_USR_CLK0	Repeat specific scan	ON/OFF CLOCK 0 for specific scan
	F00101	BIT	_USR_CLK1	Repeat specific scan	ON/OFF CLOCK 1 for specific scan
	F00102	BIT	_USR_CLK2	Repeat specific scan	ON/OFF CLOCK 2 for specific scan
	F00103	BIT	_USR_CLK3	Repeat specific scan	ON/OFF CLOCK 3 for specific scan
	F00104	BIT	_USR_CLK4	Repeat specific scan	ON/OFF CLOCK 4 for specific scan
	F00105	BIT	_USR_CLK5	Repeat specific scan	ON/OFF CLOCK 5 for specific scan
	F00106	BIT	_USR_CLK6	Repeat specific scan	ON/OFF CLOCK 6 for specific scan
	F00107	BIT	_USR_CLK7	Repeat specific scan	ON/OFF CLOCK 7 for specific scan

Device 1	Device 2	Type	Variable	Function	Description
F0011		WORD	_LOGIC_RESULT	Logic result	Logic result displayed.
	F00110	BIT	_LER	Calculation error	ON for 1 scan if calculation in error.
	F00111	BIT	_ZERO	Zero flag	ON if calculation result is 0.
	F00112	BIT	_CARRY	Carry flag	ON if Carry found during calculation.
	F00113	BIT	_ALL_OFF	Whole output OFF	ON if all output OFF
	F00115	BIT	_LER_LATCH	Calculation error latch	ON kept if calculation in error.
F0012		WORD	_CMP_RESULT	Compared result	Compared result displayed.
	F00120	BIT	_LT	LT flag	ON if “less than”
	F00121	BIT	_LTE	LTE flag	ON if “less than or equal”
	F00122	BIT	_EQU	EQU flag	ON if “equal”
	F00123	BIT	_GT	GT flag	ON if “greater than”
	F00124	BIT	_GTE	GTE flag	ON if “greater than or equal”
	F00125	BIT	_NEQ	NEQ flag	ON if “not equal”
F0013		WORD	_AC_F_CNT	Inspected power cut	Number of inspected power-cuts displayed.
F0014		WORD	_FALS_NUM	FALS No.	FALS No. displayed.
F0015		WORD	_PUTGET_ERR0	PUT/GET error 0	Main base PUT / GET error
F0016		WORD	_PUTGET_ERR1	PUT/GET error 1	Added base step 1 PUT / GET error
F0017		WORD	_PUTGET_ERR2	PUT/GET error 2	Added base step 2 PUT / GET error
F0018		WORD	_PUTGET_ERR3	PUT/GET error 3	Added base step 3 PUT / GET error
F0019		WORD	_PUTGET_ERR4	PUT/GET error 4	Added base step 4 PUT / GET error
F0020		WORD	_PUTGET_ERR5	PUT/GET error 5	Added base step 5 PUT / GET error
F0021		WORD	_PUTGET_ERR6	PUT/GET error 6	Added base step 6 PUT / GET error
F0022		WORD	_PUTGET_ERR7	PUT/GET error 7	Added base step 7 PUT / GET error
F0023		WORD	_PUTGET_NDR0	PUT/GET complete 0	Main base PUT / GET complete
F0024		WORD	_PUTGET_NDR1	PUT/GET complete 1	Added base step 1 PUT / GET complete
F0025		WORD	_PUTGET_NDR2	PUT/GET complete 2	Added base step 2 PUT / GET complete
F0026		WORD	_PUTGET_NDR3	PUT/GET complete 3	Added base step 3 PUT / GET complete
F0027		WORD	_PUTGET_NDR4	PUT/GET complete 4	Added base step 4 PUT / GET complete
F0028		WORD	_PUTGET_NDR5	PUT/GET complete 5	Added base step 5 PUT / GET complete
F0029		WORD	_PUTGET_NDR6	PUT/GET complete 6	Added base step 6 PUT / GET complete
F0030		WORD	_PUTGET_NDR7	PUT/GET complete 7	Added base step 7 PUT / GET complete
F0044		WORD	_CPU_TYPE	CPU type	Information on CPU type displayed.
F0045		WORD	_CPU_VER	CPU version	CPU version displayed.
F0046		DWORD	_OS_VER	OS version	OS version displayed.
F0048		DWORD	_OS_DATE	OS date	OS released date displayed.

Device 1	Device 2	Type	Variable	Function	Description
F0050		WORD	_SCAN_MAX	Max. scan time	Max. scan time displayed
F0051		WORD	_SCAN_MIN	Min. scan time	Min. scan time displayed
F0052		WORD	_SCAN_CUR	Present scan time	Present scan time displayed.
F0053		WORD	_MON_YEAR	Month / Year	PLC's time information (Month/Year)
F0054		WORD	_TIME_DAY	Hour / Date	PLC's time information (Hour/Date)
F0055		WORD	_SEC_MIN	Second / Minute	PLC's time information (Second/Minute)
F0056		WORD	_HUND_WK	100 years / Day	PLC's time information (100 years/Day)
F0057		WORD	_FPU_INFO	FPU calculation result	Floating decimal calculation result displayed.
	F00570	BIT	_FPU_LFLAG_I	Incorrect error latch	Latched if in incorrect error.
	F00571	BIT	_FPU_LFLAG_U	Underflow latch	Latched if underflow found.
	F00572	BIT	_FPU_LFLAG_O	Overflow latch	Latched if overflow found.
	F00573	BIT	_FPU_LFLAG_Z	Latch divided by 0	Latched if divided by 0.
	F00574	BIT	_FPU_LFLAG_V	Invalid calculation latch	Latched if invalid calculation.
	F0057A	BIT	_FPU_FLAG_I	Incorrect error	Reported if incorrect error found.
	F0057B	BIT	_FPU_FLAG_U	Underflow	Reported if underflow found.
	F0057C	BIT	_FPU_FLAG_O	Overflow	Reported if overflow found.
	F0057D	BIT	_FPU_FLAG_Z	Division by 0	Reported if divided by 0.
	F0057E	BIT	_FPU_FLAG_V	Invalid calculation	Reported if calculation invalid.
	F0057F	BIT	_FPU_FLAG_E	Irregular value input	Reported if irregular value input.
F0058		DWORD	_ERR_STEP	Error step	Error step saved.
F0060		DWORD	_REF_COUNT	Refresh	Increased when module refresh executed.
F0062		DWORD	_REF_OK_CNT	Refresh OK	Increased if module refresh normal
F0064		DWORD	_REF_NG_CNT	Refresh NG	Increased if module refresh abnormal.
F0066		DWORD	_REF_LIM_CNT	Refresh LIMIT	Increased if module refresh abnormal (TIME OUT).
F0068		DWORD	_REF_ERR_CNT	Refresh ERROR	Increased if module refresh abnormal.
F0070		DWORD	_MOD_RD_ERR_CNT	Module READ ERROR	Increased if module reads 1 word abnormally.
F0072		DWORD	_MOD_WR_ERR_CNT	Module WRITE ERROR	Increased if module writes 1 word abnormally.
F0074		DWORD	_CA_CNT	Block service	Increased if module's block data serviced
F0076		DWORD	_CA_LIM_CNT	Block service LIMIT	Increased if module's block data service abnormal.
F0078		DWORD	_CA_ERR_CNT	Block service ERROR	Increased if module's block data service abnormal.
F0080		DWORD	_BUF_FULL_CNT	Buffer FULL	Increased if CPU's internal buffer is FULL.
F0082		DWORD	_PUT_CNT	PUT count	Increased if PUT executed.
F0084		DWORD	_GET_CNT	GET count	Increased if GET executed.
F0086		DWORD	_KEY	Present key	Local key's present status displayed.
F0088		DWORD	_KEY_PREV	Previous key	Local key's previous status displayed.

Device 1	Device 2	Type	Variable	Function	Description
F0090		WORD	_IO_TYER_N	Discordant slot	Slot number with discordant module type displayed.
F0091		WORD	_IO_DEER_N	Displaced slot	Slot number with displaced module displayed.
F0092		WORD	_FUSE_ER_N	Fuse blown slot	Slot number with fuse blown displayed.
F0093		WORD	_IO_RWER_N	RW error slot	Slot number with module Read/Write error displayed.
F0094		WORD	_IP_IFER_N	IF error slot	Slot number with module interface error displayed.
F0096		WORD	_IO_TYER0	Module type 0 error	Main base module type error.
F0097		WORD	_IO_TYER1	Module type 1 error	Added base step 1 module type error.
F0098		WORD	_IO_TYER2	Module type 2 error	Added base step 2 module type error.
F0099		WORD	_IO_TYER3	Module type 3 error	Added base step 3 module type error.
F0100		WORD	_IO_TYER4	Module type 4 error	Added base step 4 module type error.
F0101		WORD	_IO_TYER5	Module type 5 error	Added base step 5 module type error
F0102		WORD	_IO_TYER6	Module type 6 error	Added base step 6 module type error
F0103		WORD	_IO_TYER7	Module type 7 error	Added base step 7 module type error
F0104		WORD	_IO_DEER0	Module installation 0 error	Main base module installation error
F0105		WORD	_IO_DEER1	Module installation 1 error	Added base step 1 module installation error
F0106		WORD	_IO_DEER2	Module installation 2 error	Added base step 2 module installation error
F0107		WORD	_IO_DEER3	Module installation 3 error	Added base step 3 module installation error
F0108		WORD	_IO_DEER4	Module installation 4 error	Added base step 4 module installation error
F0109		WORD	_IO_DEER5	Module installation 5 error	Added base step 5 module installation error
F0110		WORD	_IO_DEER6	Module installation 6 error	Added base step 6 module installation error
F0111		WORD	_IO_DEER7	Module installation 7 error	Added base step 7 module installation error
F0112		WORD	_FUSE_ER0	Fuse blown 0 error	Main base Fuse blown error
F0113		WORD	_FUSE_ER1	Fuse blown 1 error	Added base step 1 Fuse blown error
F0114		WORD	_FUSE_ER2	Fuse blown 2 error	Added base step 2 Fuse blown error
F0115		WORD	_FUSE_ER3	Fuse blown 3 error	Added base step 3 Fuse blown error
F0116		WORD	_FUSE_ER4	Fuse blown 4 error	Added base step 4 Fuse blown error
F0117		WORD	_FUSE_ER5	Fuse blown 5 error	Added base step 5 Fuse blown error
F0118		WORD	_FUSE_ER6	Fuse blown 6 error	Added base step 6 Fuse blown error
F0119		WORD	_FUSE_ER7	Fuse blown 7 error	Added base step 7 Fuse blown error
F0120		WORD	_IO_RWER0	Module RW 0 error	Main base module Read/Write error
F0121		WORD	_IO_RWER1	Module RW 1 error	Added base step 1 module Read/Write error
F0122		WORD	_IO_RWER2	Module RW 2 error	Added base step 2 module Read/Write error
F0123		WORD	_IO_RWER3	Module RW 3 error	Added base step 3 module Read/Write error
F0124		WORD	_IO_RWER4	Module RW 4 error	Added base step 4 module Read/Write error
F0125		WORD	_IO_RWER5	Module RW 5 error	Added base step 5 module Read/Write error
F0126		WORD	_IO_RWER6	Module RW 6 error	Added base step 6 module Read/Write error

Device 1	Device 2	Type	Variable	Function	Description
F0127		WORD	_IO_RWER7	Module RW 7 error	Added base step 7 module Read/Write error
F0128		WORD	_IO_IFER_0	Module IF 0 error	Main base module interface error
F0129		WORD	_IO_IFER_1	Module IF 1 error	Added base step 1 module interface error
F0130		WORD	_IO_IFER_2	Module IF 2 error	Added base step 2 module interface error
F0131		WORD	_IO_IFER_3	Module IF 3 error	Added base step 3 module interface error
F0132		WORD	_IO_IFER_4	Module IF 4 error	Added base step 4 module interface error
F0133		WORD	_IO_IFER_5	Module IF 5 error	Added base step 5 module interface error
F0134		WORD	_IO_IFER_6	Module IF 6 error	Added base step 6 module interface error
F0135		WORD	_IO_IFER_7	Module IF 7 error	Added base step 7 module interface error
F0136		WORD	_RTC_DATE	RTC date	RTC's present date
F0137		WORD	_RTC_WEEK	RTC day	RTC's present day of the week
F0138		DWORD	_RTC_TOD	RTC time	RTC's present time (ms unit)
F0140		DWORD	_AC_FAIL_CNT	Power-cut times	Power-cut times saved.
F0142		DWORD	_ERR_HIS_CNT	Errors found	Number of found errors saved.
F0144		DWORD	_MOD_HIS_CNT	Mode conversion times	Mode conversion times saved.
F0146		DWORD	_SYS_HIS_CNT	History updated times	System's history updated times saved.
F0148		DWORD	_LOG_ROTATE	Log rotate	Log rotate information saved.
F0150		WORD	_BASE_INFO0	Slot information 0	Main base slot information
F0151		WORD	_BASE_INFO1	Slot information 1	Added base step 1 slot information
F0152		WORD	_BASE_INFO2	Slot information 2	Added base step 2 slot information
F0153		WORD	_BASE_INFO3	Slot information 3	Added base step 3 slot information
F0154		WORD	_BASE_INFO4	Slot information 4	Added base step 4 slot information
F0155		WORD	_BASE_INFO5	Slot information 5	Added base step 5 slot information
F0156		WORD	_BASE_INFO6	Slot information 6	Added base step 6 slot information
F0157		WORD	_BASE_INFO7	Slot information 7	Added base step 7 slot information
F0158		WORD	_RBANK_NUM	Used block number	Presently used block number
F0159		WORD	_RBLOCK_STATE	Flash status	Flash block status
F0160		DWORD	_RBLOCK_RD_FLAG	Flash Read	ON when reading Flash N block data.
F0162		DWORD	_RBLOCK_WR_FLAG	Flash Write	ON when writing Flash N block data.
F0164		DWORD	_RBLOCK_ER_FLAG	Flash error	Error found during Flash N block service.
F1024		WORD	_USER_WRITE_F	Available contact	Contact point available in program
	F10240	BIT	_RTC_WR	RTC RW	Data Write & Read in RTC
	F10241	BIT	_SCAN_WR	Scan WR	Scan value initialization
	F10242	BIT	_CHK_ANC_ERR	Detect external serious error	Detection of serious error in external equipment requested.
	F10243	BIT	_CHK_ANC_WAR	Detect external slight error	Detection of slight error in external equipment requested.

Device 1	Device 2	Type	Variable	Function	Description
F1025		WORD	_USER_STAUS_F	User contact point	User contact point
	F10250	BIT	_INIT_DONE	Initialization complete	Initialization complete displayed.
F1026		WORD	_ANC_ERR	External serious error information	Serious error information in external equipment displayed.
F1027		WORD	_ANC_WAR	External slight error information	Slight error information in external equipment displayed.
F1034		WORD	_MON_YEAR_DT	Month / Year	Time information data (Month/Year)
F1035		WORD	_TIME_DAY_DT	Hour / Date	Time information data (Hour/Date)
F1036		WORD	_SEC_MIN_DT	Second / Minute	Time information data (Second/Minute)
F1037		WORD	_HUND_WK_DT	100 years / Day	Time information data (100 years/Day)

A.1.2 Special register for data link

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

No.	Keyword	Type	Detail	Description
L000000	_HS1_RLINK	Bit	HS link parameter No.1's all stations normally operated	Displays all stations normally operated as specified in HS link parameter, which will be On if 1.There is no RUN mode error in all stations specified in parameter 2.All data block is in normal communication as specified in parameter. 3.The parameter specified in each station itself is in normal communication. Run_link will be kept On if once On until stopped by link disenable.
L000001	_HS1_LTRBL	Bit	After _HS1RLINK is ON, abnormal status displayed	This flag will be On if the station specified in parameter and the data block's communication status are as described below with _HSmRLINK flag On,. 1. When the station specified in parameter is not in RUN mode, 2. When the station specified in parameter is in error, 3. When data block's communication status specified in parameter is unstable, The link trouble will be On if one of those conditions 1,2 and 3 Above occurs. And if such a condition is back to normal, it will be Off.
L000020 ~ L00009F	_HS1_STATE[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k's general status displayed	Displays the general status of the communication information for the specified parameter's respective data blocks. HS1STATE[k]=HS1MOD[k]&_HS1TRX[k]&(~_HSmERR[k])
L000100 ~ L00017F	_HS1_MOD[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k station's Run operation mode	Displays the operation mode of the station specified in parameter's data block k.
L000180 ~ L00025F	_HS1_TRX[k] (k=000~127)	Bit Array	Normal communication displayed with HS link parameter No.1, Block No.k station	Displays the communication status of parameter's data block k to check if normal as specified.
L000260 ~ L00033F	_HS1_ERR[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k station's Run error mode	Displays the communication status of parameter's data block k to check for any error.
L000340 ~ L00041F	_HS1_SETBLOCK [k]	Bit Array	HS link parameter No.1, Block No.k setting displayed	Displays the setting status of parameter's data block k.

* In the case of Dnet and Pnet, Block No.k stands for the station No. of the slave (in other words, it is station No.k).

Remark

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

K as a block number is displayed through 8 words by 16 for 1 word for the information of 128 blocks from 000 to 127.
For example, block information of 16~31, 32~47, 48~63, 64~79, 80~95, 96~111, 112~127 will be displayed in L00011, L00012, L00013, L00014, L00015, L00016, L00017 from block 0 to block 15 for mode information (_HS1MOD). Thus, the mode information of the block No. 55 will be displayed in L000137.

A.2 Terminology

General terms of DeviceNet I/F module are as described below for the suitable application of the product. Refer to DeviceNet specification for more details.

1) Fieldbus

Electric system to transmit small quantity of data between automatic devices fast and reliably so to execute a given task thoroughly.

2) Master Module

A module to send/receive and control data.

3) Slave Module

A module to respond to the data sent from the master module.

4) CAN (Controller Area Network) Protocol

Communication protocol designed compatible with dedicated automobile communication. CAN technology has been adopted in the device network. CAN is divided into 11-bit Identifier Field and Data Field which can transmit up to 8 bytes.

Identifier Field	RTR	Data Length	Data

- Identifier Field : Area to set address (composed of 11 bits)
- Data : Field composed of actual data (up to 8 bytes can be transmitted)

5) Bus-Off

It produces an applicable error to abnormal network power.

6) ODVA (Open DeviceNet Vendor Association)

An association established to propagate DeviceNet communication widely.

7) Connection

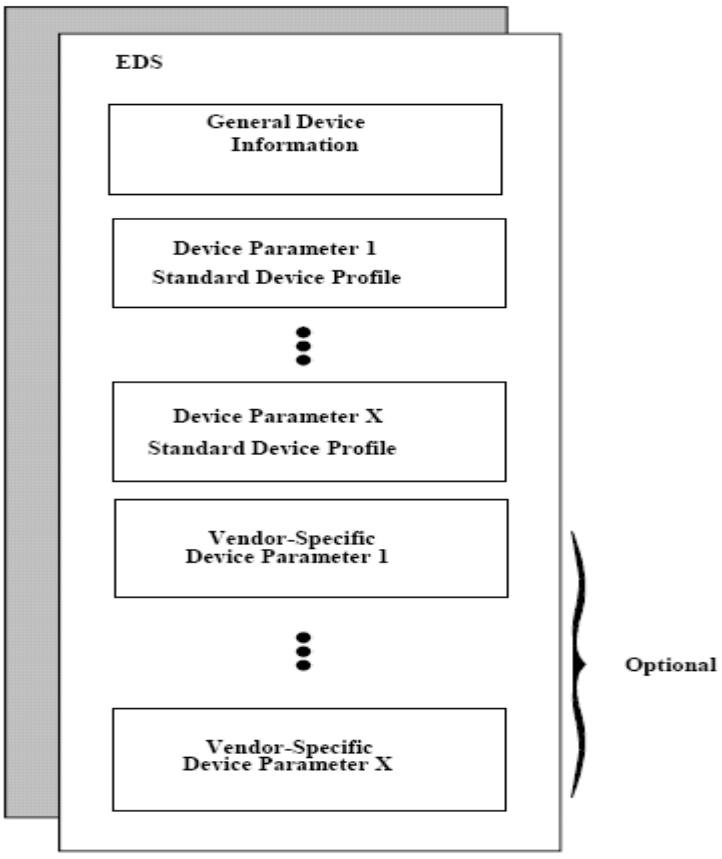
As logic connection between master and slave which are connected through DeviceNet, it is used to keep and control all kinds of communication.

8) DeviceNet station No. (DeviceNet MAC ID)

Station No. of the communication module which has adopted DeviceNet standard. XGL_DMEA is specified through SyCon, and generally the station No. used for DeviceNet module is set by means of the switch installed on the front of the communication module. And this station No. is used as the station No. for all the services including HS link service.

9) Profile

It provides information on the device configuration data. (Printed data sheet, EDS; Electronic Data Sheet, etc.) It is named EDS in DeviceNet. It contains attributes of device and object address information of parameter. EDS's constitution is as shown below.



10) Packet

A data packet which is the basic unit used to transmit data through the network. With the header (Message identifier) attached in front, information on destination of the packet and other information necessary are added thereto.

11) CRC (Cyclic Redundancy Check)

As one of the error detection methods mostly used for synchronous transmission, it is also called as patrol signed type. CRC field of CAN protocol is displayed in 15- bit CRC and 'r' bit, composed of 1-bit CRC delimiter. If Rx node receives data frame, it deletes stuffing bits first and then checks for errors from SOF to data field through CRC. Since 15-bits CRC is suitable for the frame with bit counts less than 127 bits and CAN is of the max. 108-bit frame, it is appropriate to check for errors. If CRC divides transmitted value by multinomial expression created when transmitting and sends the value together attached to the back of message, the Rx side will divide the received data by the identical multinomial expression. And if the remainder is 'zero', it is regarded as No Error identified in this method.

12) Terminating resistance

Resistance used to adjust mutual impedance between Tx and Rx sides on the Physical Layer. Terminating resistance of DeviceNet is 121Ω,1/4 W,1% .

13) High-speed Link

A communication type used only between DeviceNet communication modules for the user to send/receive data at high speed, which execute communication with HS link parameters setting of XG-PD.

14) XG-PD (PLC Programming And Debugging Tool)

Software used for programming, downloading, run, stop, debugging applicably to PLC CPU module, where a diagnosis function is included to check the status of respective communication modules.

15) SyCon (System Configuration Tool)

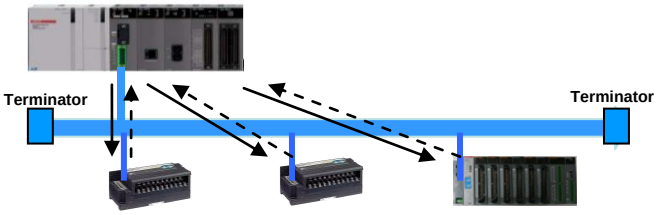
Software used for system configuration through DeviceNet, where basic DeviceNet parameters can be set for master module and slave module, and setting details can be monitored through XG-PD as well.

16) Communication Type

4 types of DeviceNet communication are available (Poll, Bit-Strobe, COS and Cyclic). The communication types provided by respective slaves (remote I/O) may be different as such. DeviceNet can use the 4 communication types as mixed in a single network.

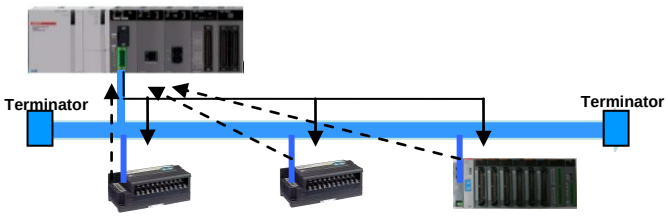
17) Poll

Master executes monitoring and data Tx/Rx for the respective slaves whenever scanned.



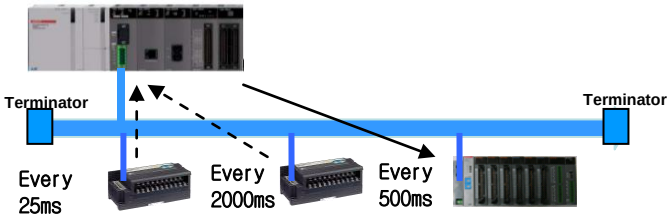
18) Bit Strobe

Master sends 1-bit output signal to respective slaves. Each slave which receives the output sign operates as specified. With data Tx/Rx minimized between master and slaves, the speed of the whole scan can be increased.



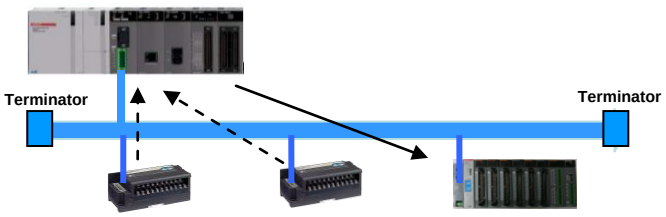
19) Cyclic

The slave set to cyclic sends the data of one time to the master for every cycle (max. 65535mS) specified.



20) COS (Change of State)

If any change occurs in the status of respective slaves, communication will be executed with the master. It is effective only for the slave monitoring the objects whose distance of status change is long. Data will be also sent to the master even if there is no change in the status with the max. COS distance of 65535ms specified in the slave.



21) MAC ID (Media Access Control Identifier)

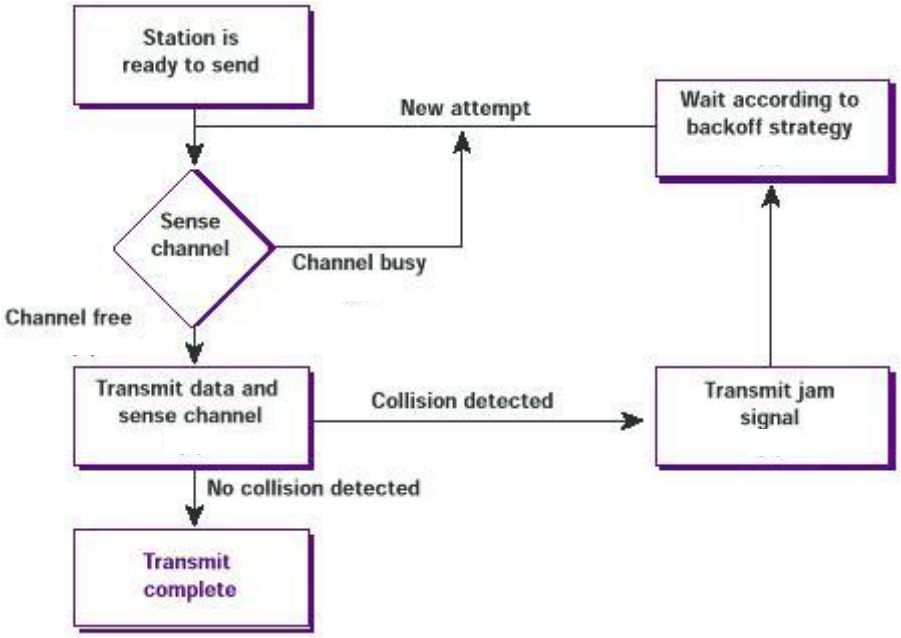
Node Address on the DeviceNet network is defined as MAC ID, which uses 6 bits among 11 bits of CAN Identifier Field. MAC ID range of DeviceNet is available up to 0 ~ 63.

22) CSMA/CD (Carrier Sense Multiple Access with Collision Detection)

Ethernet is of the structure configured to send the data after a client to send data checks if other computer in the network is being communicated and then no sign is found to be sent. If any collision occurs between data sent from various nodes at a time, CSMA/CD which monitors such a collision will keep the data for a specific time and then resend the sign to control the communication. For example, if a node is to use the network, cable status of the network will be checked first. At this time there will be no problem if any other node is not to use the network and there is no data in the cable, which allows normal execution free of any problem. However, if the network is tried to be used when other node is already using the network, there will be a collision in the cable. Once such a collision occurs, wait for the first node to complete the use and then retry after a while. The time necessary to wait after a collision occurs is mostly decided by the timer installed on the node. The time for respective nodes to wait shall be different from each other so to keep from another collision, which can be resolved with the time adjustment fixed inside the node, or by means of principal of random numbers applied. Use CSMA/CD to reduce the band width which is wasted during transmission of collided packets. CSMA/CD is as follows;

Access method	Description
CS (Carrier Sense)	**Checks the network if being used.**
MA (Multiple Access)	**Available for any user if the network is empty.**
CD (Collision Detection)	**Checks for any collision while sending messages.**

CSMA/CD Flow Chart



23) CSMA/NBA (Carrier Sense Multiple Access with Non-destructive Bitwise Arbitration)

Data Tx mechanism of CAN is similar to IEEE 802.3 CSMA/CD protocol. In other words, respective nodes check the status of the bus previously to sending the data, and then send the ready message if the bus is inactive. In CSMA/CD if two or more nodes send the messages at a time, the message will be collided and all lost. However, in CAN the message to be sent has 11-bit identifier allowing the message of high priority to be sent first. In other words, if two or more nodes send the messages at a time, the message of the highest priority (that is, the message with the lowest identifier value) will be sent while transmission of other messages of lower priority is stopped after identifiers are compared with each other bit by bit. As for the bus, '0' bit is superior to '1' bit. In other words, '0' bit is called as 'dominant' ('d' bit) and '1' as 'recessive' ('r' bit). Tx node monitors the bus whenever sending a bit. If a node sends 'r' bit and the monitoring result of the bus is 'd' bit, it means other node in the bus is sending the message of higher priority, thus the node will promptly stop transmitting the message to convert to Rx mode. The node which stops transmitting will monitor the status of the bus and then restart to transmit the message automatically if the bus is back to inactive status.

24) Reset

Communication module is initialized when error is occurred. It is executed [Online] – [Reset] menu in XG-PD. PLC is restarted.

25) Expected Packet Rate

Transmission value from slave module for I/O data exchange of master module

a) Cyclic communication : Slave update the data by this setting value.
b) COS communication : Slave can set the time of Watchdog timeout through this setting value.

26) Production inhibit time

Minimum delay time for updating of new data. It is not updated during this production inhibit time.

27) Fragmented Timeout

If I/O data is 8 bytes more than, master module wait until slave module give response within fragmented timeout setting.

A.3 Smart I/O Mode Setting in SyCon

Our company's slave module Smart I/O has built-in mode as shown below.

1) Standard mode
2) Quick start mode
3) Dummy mode

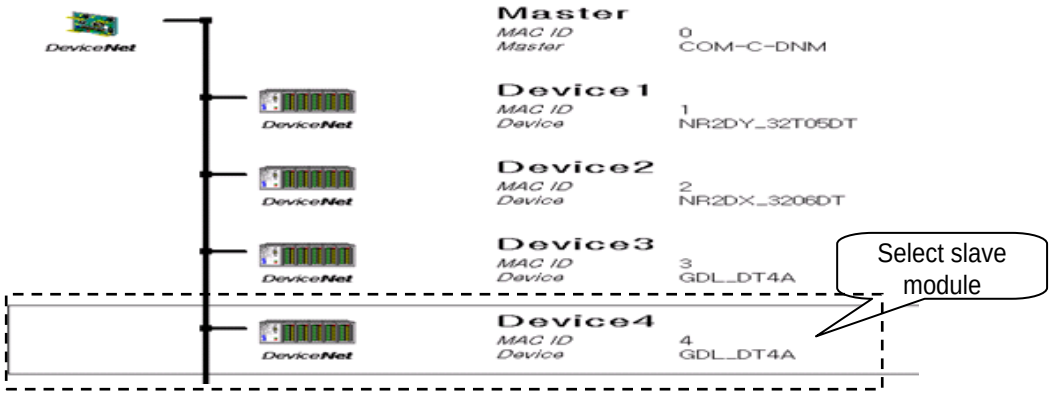
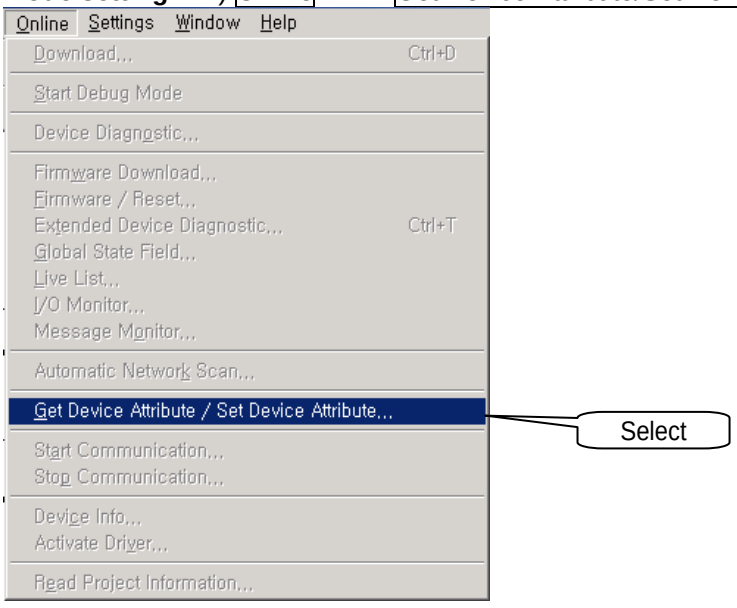
Each mode's characteristic is as shown below.

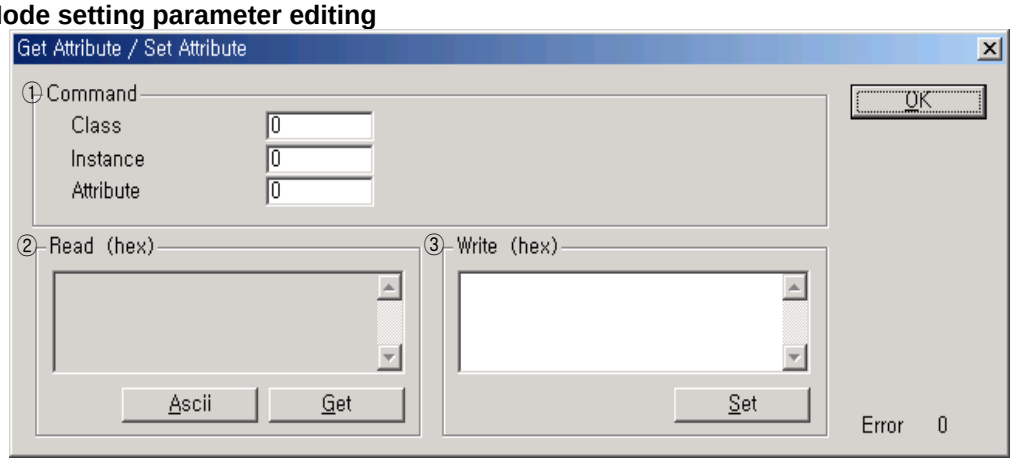
Mode type	Description
Standard mode	▶ After powered on master and slave model. - It takes 5~6 second to start the communication. - Default setting
Quick start mode	▶ If master and slave module support the Quick start mode function, it takes 1.5 second to start the communication. ▶ If only slave module supports the Quick start mode function, it takes 3~4 second to start the communication. (Setting address: Class-3, Instance-1, Attribute-10)
Dummy mode	▶ It makes a 1 word data size of slave input module additionally. - It can't write the data. (Setting address: Class-3, Instance-1, Attribute-40)

Mode setting is as shown below.

1) Mode setting

Select slave module to edit in editing window. Setting is available at menu bar.

Phase	Description
1	Execute 5) Master setting's 8 phase in 'Chapter 5 SyCon Setting'.
2	Select slave to edit. 
3	**Mode setting:** 1) Online → Get Device Attribute/Set Device Attribute  **Menu** / **Description** Get Device Attribute: It reads the mode's information from slave module. - It is displayed Hexadecimal. (If click the ASCII button, it is displayed ASCII type.) Set Device Attribute: It writes the mode's information from slave module. - It is displayed Hexadecimal.

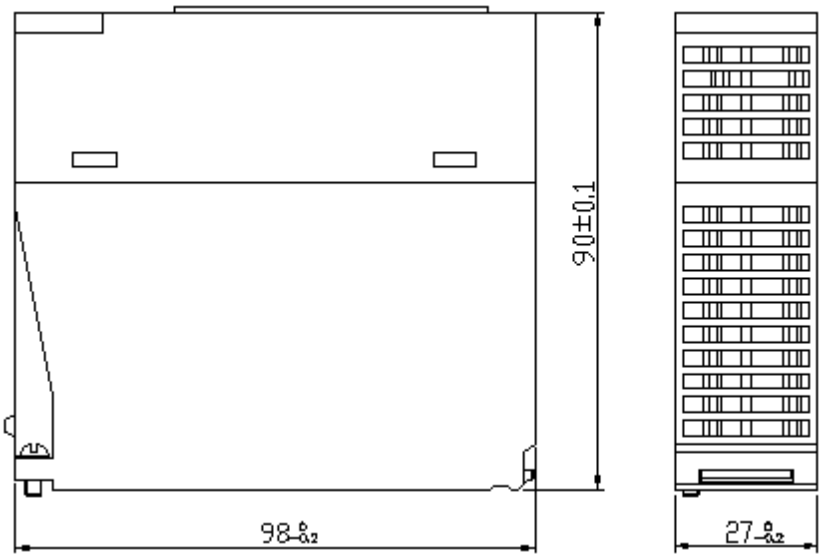
<table>
<tr><th>Phase</th><th>Description</th></tr>
<tr><td>4</td><td>
Mode setting parameter editing


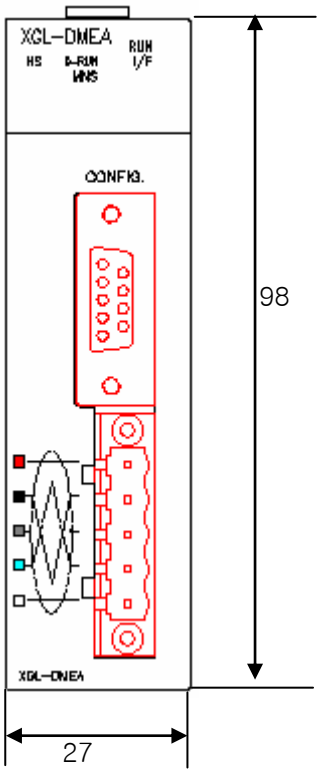
<table>
<tr><th>No.</th><th>Item</th><th>Description</th></tr>
<tr><td>①</td><td>Command</td><td>Mode setting address of slave module
<table>
<tr><th rowspan="2">Classification</th><th colspan="3">Setting address</th></tr>
<tr><th>Class</th><th>Instance</th><th>Attribute</th></tr>
<tr><td>Quick start mode</td><td>3</td><td>1</td><td>10</td></tr>
<tr><td>Dummy mode</td><td>3</td><td>1</td><td>40</td></tr>
</table></td></tr>
<tr><td>②</td><td>Read
(hex)</td><td>Displayed area of Read value (Click Get)
→ “00”: Clear
→ “01”: Set</td></tr>
<tr><td>③</td><td>Write
(hex)</td><td>Input area of Write value (Click Set)
→“00”: Clear
→“01”: Set</td></tr>
</table>
▶ To Read
Input the setting value in command area (Class, Instance and Attribute) and click Get.
▶ To Write
Input the setting value in command area (Class, Instance and Attribute) and input Set
or Clear value in write area. Click Set.

After the all settings, [OK] button closes the setting window. Turn off the slave module’s power, setting value is applied after turn on the salve module.
</td></tr>
</table>

A.4 External Dimensions

Unit: mm





Warranty

1. Terms of warranty
   LSIS provides an 18-month warranty starting from the date of production.

2. Range of warranty
   For problems within the terms of the warranty, LSIS will replace the entire PLC or repair the defective parts free of charge except for the following cases.

   (1) Problems caused by improper conditions, environment or treatment.
   (2) Problems caused by external devices.
   (3) Problems caused by the user remodeling or repairing the PLC.
   (4) Problems caused by improper use of the product.
   (5) Problems caused by circumstances where the expectations exceed that of the science and technology level when LSIS produced the product.
   (6) Problems caused by natural disaster.

3. This warranty is limited to the PLC itself only. It is not valid for the system which the PLC is attached to.

Environmental Policy

LSIS Co., Ltd supports and observes the environmental policy as below.

Environmental Management

LSIS considers the environmental preservation as the preferential management subject and every staff of LSIS use the reasonable endeavors for the pleasurably environmental preservation of the earth.

About Disposal

LSIS' PLC unit is designed to protect the environment. For the disposal, separate aluminum, iron and synthetic resin (cover) from the product as they are reusable.

LSIS values every single customers.

Quality and service come first at LSIS.

Always at your service, standing for our customers.

http://eng.lsis.biz

LS IS

10310000638

■ **HEAD OFFICE**
LS tower, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do 1026-6, Korea http://eng.lsis.biz
Tel : (82-2)2034-4870/Fax : 82-2-2034-4648 e-mail : cshwang@lsis.biz

■ **LSIS Tokyo Office _ Tokyo, Japan**
Address: 16FL. Higashi-Kan. Akasaka Twin Tower 17-22, Akasaka.Monato-ku Tokyo 107-8470. Japan
Tel : 81-3-3582-9128/Fax : 81-3-3582-2667 e-mail : jschuna@lsis.biz

■ **LSIS (ME) FZE _ Dubai, U.A.E.**
Address : Jafza View Tower Lob 19, Room 205 Along Sheikh Zayed Road Jebel Aali Free Zone Dubai, United Arab Emirates
Tel : 971-4-886-5360/Fax : 971-4-886-5361 e-mail : jungyongl@lsis.biz

■ **LSIS Shanghai Office _ Shanghai, China**
Address : Room E-G. 12FL Hiamin Empire Plaza. No.726. West. Yan'an Road Shanghai 200050. P.R. China e-mail : liyong@lsis.com.cn
Tel : 86-21-5237-9977(609)/Fax : 89-21-5237-7189

■ **LSIS Beijing Office _ Beijing, China**
Address : B-Tower 17FL. Beijing Global Trade Center B/D. No. 36. East BeisanHuan-Road. DongCheng-District. Beijing 100013. P.R. China
Tel : 86-10-5825-6027(666)/Fax : 86-10-5825-6028 e-mail : xunmj@lsis.com.cn

■ **LSIS Guangzhou Office _ Guangzhou, China**
Address : Room 1403.14FL. New Poly Tower. 2 Zhongshan Liu Road.Guangzhou.P.R China
Tel : 86-20-8328-6754/Fax : 86-20-8326-6287 e-mail : chenxs@lsis.com.cn

■ **LSIS Chengdu Office _ Chengdu, China**
Address : 12FL. Guodong Buiding. No.52 Jindun Road Chengdu.610041. P.R. China
Tel : 86-28-8612-9151(9226)/Fax : 86-28-8612-9236 e-mail : comysb@lsis.biz

■ **LSIS Qingdao Office _ Qingdao, China**
Address : YinHe Bldg. 402 Room No. 2P Shandong Road, Qingdao-City,Shandong-province 266071, P.R. China
Tel : 86-532-8501-6068/Fax : 86-532-8501-6057 e-mail : wangzy@lsis.com.cn

■ **LSIS Europe B.V. , Netherlands**
Address : 1st. Floor, Tupolevlaan 48, 1119NZ, Schiphol-Rijk, The Netherlands
Tel : +31 (0)20 654 1420/Fax : +31 (0)20 654 1429 e-mail : junshickp@lsis.biz

■ **Wuxi LSIS Co., Ltd _ Wuxi, China**
Address : 102-A. National High & New Tech Industrial Development Area. Wuxi. Jiangsu. 214028. P.R. China
Tel : 86-510-8534-6666/Fax : 86-510-8534-4078 e-mail : caidx@lsis.com.cn

■ **Dalian LSIS Co., Ltd. _ Dalian, China**
Address : No. 15. Liaohexi 3-Road. Economic and Technical Development zone. Dalian 116600. China
Tel : 86-411-273-7777/Fax : 86-411-8730-7560 e-mail : cuibx@lsis.com.cn

※ LSIS constantly endeavors to improve its product so that information in this manual is subject to change without notice.

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