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Programmable Logic Controller

XGT IFOS FEnet I/F Module

XGT Series

User's Manual

XGL-ESHF

Safety Instructions

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

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Safety Instructions

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

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

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

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

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

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

■ Safety Instructions when designing

Caution

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

■ Safety Instructions when installing

Caution

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

■ Safety Instructions when wiring

Caution

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

■ Safety Instructions for test-operation or repair

Warning

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

Caution

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

■ Safety Instructions for waste disposal

Caution

- Product waste shall be processed as industrial waste.

Revision History

Version	Data	Remark	Page
V 1.0	’06.07	First Edition	-
V 1.1	’11.05	How to enable link through flag added	CH 5.5.2

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

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About User's Manual

Congratulations on purchasing PLC of LSIS Co.,Ltd.

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

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

Relevant User's Manuals

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

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Chapter 1 Introduction

1.1 How to Use User's Manual

To create a program, refer to the following manuals together.

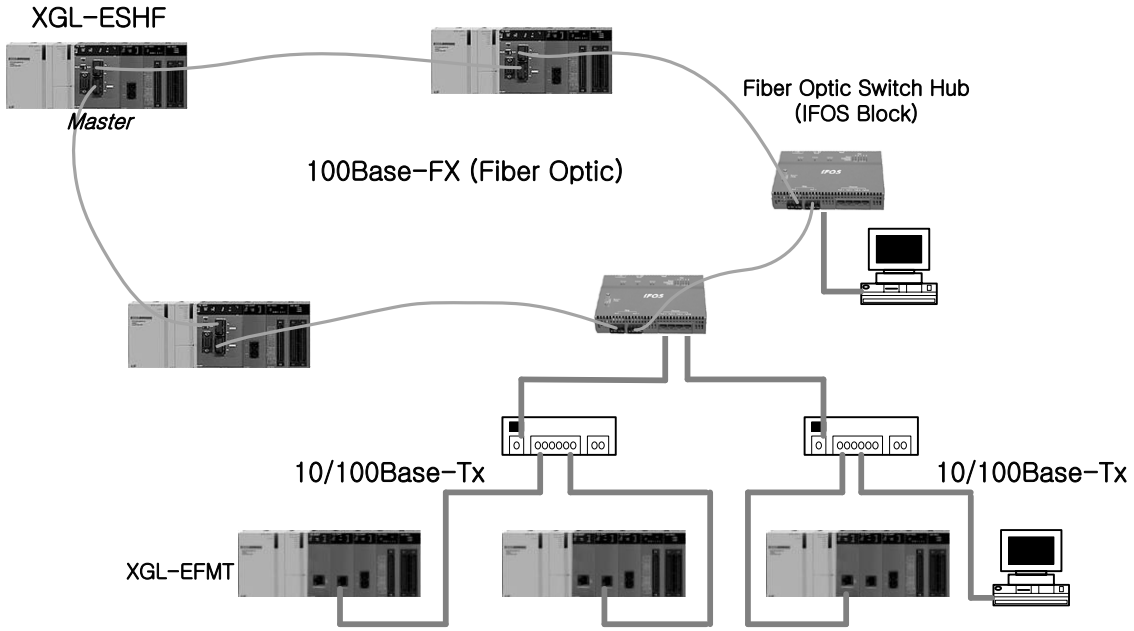
- XGK Series Instruction & Programming User's Manual
- XGT PLC XG5000 User's Manual

The current user's manual of XGT FEnet Fiber Optic Switch Module is prepared, based on the following versions.

- XGT PLC XG5000 Programming Tool(Tool): Ver 1.15
- XG-PD : Ver 1.4
- XGK-CPUH : Ver 1.4
- XGK-CPUA : Ver 1.4
- XGK-CPUS : Ver 1.4
- XGK-CPUE : Ver 1.4

1.2 Introduction of FEnet Fiber Optic Switch Module

The user's manual describes Fast Ethernet Interface of XGT PLC("FEnet Fiber Optic Switch Module, 100Mbps"). Ethernet is a 'technical standard' established by a global institution, IEEE. It can control communication by using CSMA/CD, implement network easily and collect high speed and high capacity data. FEnet fiber optic switch module is the interface module to transmit data to higher system such as higher PC or between/among PLCs by using optical media (100BASE-FX).



[Fig 1.2.1] System Structure of FEnet Fiber Optical Switch Module

Communication though FEnet Fiber Optic Switch Module is so diverse and it is helpful to refer Chapter 4 System Structure for more information on the system structure and contents.

1) Connecting Ethernet and higher PC(HMI)
2) Data exchange and monitoring between Ethernet PLCs
3) Memory control/trans-reception control of lower device through Ethernet

Remark

1) When structuring FEnet fiber optic switch system, at least, one station out of modules in the system should be set as the master.
2) When using IFOS Manager, it is necessary to connect Console port of XGL-ESHF to a PC.
3) Station List of IFOS Manager should be connected to Configuration port of the station set as the master module.

1.3 Features of FEnet Fiber Optic Switch Module

XGT FEnet fiber optic module supports TCP/IP and UDP/IP protocols and has the following features.

Fast Ethernet (IFOS FEnet I/F module) **:**

- ▶ Simply module exchange using module exchange switch of CPU
- ▶ Module exchange using the module exchange wizard of XG5000
- ▶ Support EthernetII, IEEE 802.3 standard
- ▶ Support high speed link for high speed data communication between internal modules
- ▶ Provide configuration tool(XG-PD) dedicated to communication
- ▶ Set high speed link block for inter-module link
  (max. send 32 blocks x 200 words, max. receive 128 blocks x 200 words, max. trans-receive 128 blocks x 200 words)
- ▶ Communicate with max. 16 modules save for high speed link(dedicated communication + P2P communication)
- ▶ Support Loader service(XG5000) through Ethernet: (dedicated TCP/IP PORT : 2002 assigned)
- ▶ Simply connect to others' module(system) by using P2P communication and XG-PD
  (Variable READ/WRITE service available(using Dynamic Connection))
- ▶ Support 100BASE-FX media
- ▶ Accessible to system by using public network
- ▶ Support own protocol(XGT/GLOFA) and others' protocol(MODBUS TCP) (dedicated service)
- ▶ Support simple client function for communication between own communication modules and communication with others' modules(XGT/GLOFA, modbus TCP P2P client)
- ▶ Can use ADSL network by supporting dynamic IP
- ▶ Provide access table for the security of communication with higher PC(HMI)
- ▶ Support Dynamic Connection/Disconnection using P2P service.
- ▶ Provide info about various diagnosis, modules and network status
  - CPU module status
  - Communication module information
  - communication service(high speed link, dedicated service, P2P) status
  - AutoScan providing info about own modules connected within a network
  - Provide PING function to show existence of other modules
  - Provide info about types of packets received in own communication module and average amount(estimating network load)
  - Provide diagnostics of communication module through network
- ▶ Provide E-MAIL service(ASCII).
- ▶ Can mount up to 24 Ethernet communication modules on increased base and basic base.

1.4 Product Specification

1.4.1 Type

It describes product spec. of XGT FEnet fiber optic switch module.

Type	Description	Remarks
XGL-ESHF	100BASE-FX	Fiber Optic(Multi Mode)

1.4.2 No. of modules available by CPU types

It shows the max number of modules available by CPU types of FEnet fiber optic switch modules. Make sure to structure a system considering the no. of communication modules.

1) If using XGK

Application	Available communication modules
XGK-CPUH	24 (max. 24 if other communication modules are also installed)
XGK-CPUA	24 (max. 24 if other communication modules are also installed)
XGK-CPUS	24 (max. 24 if other communication modules are also installed)
XGK-CPUE	12 (max. 24 if other communication modules are also installed)

1.5 Software for Using the Product

It describes major programming tool and other developer's software for using FEnet fiber optic switch module. For more accurate application of program and communication, it is useful to refer to the follows before applying to the system.

1.5.1 Software checks

1) Applying to XGT

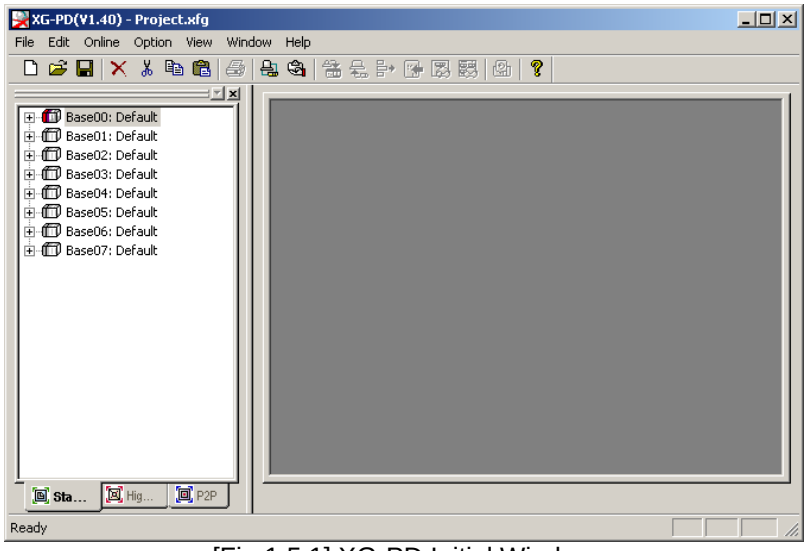
Category		Programming tool	communication setting tool
XGL-ESHF	100BASE-FX	XG5000	XG-PD

Remark

1) The above program is downloadable form the website below. If Internet is not available, it is also possible to use it from Installation CD-ROM by visiting the close agency.
   Internet Website : http://www.lsis.biz
2) XG5000 and XG-PD are programmable through RS-232C port of CPU module and USB. For the cable type, refer to XGT Catalog Product Exhibit(USB-301A, K1C-050A).

1.5.2 XG-PD

XG-PD is the dedicated communication software supporting basic parameter setting, frame creation and diagnostics of module and network for the operation of all communication modules including IFOS FEnet I/F module. For more information, refer to Chapter 5 XG-PD.
The following figure shows the initial window when starting XG-PD.



[Fig 1.5.1] XG-PD Initial Window

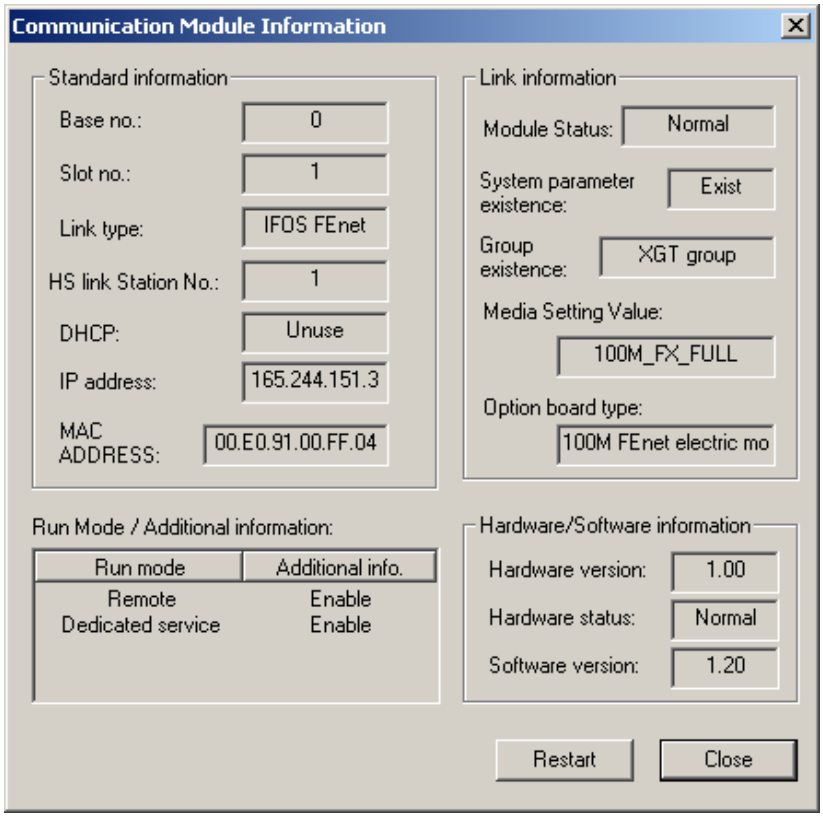
1.5.3 Version information

Before using FEnet fiber optic switch module, check the version of module.

1) Check by XG-PD

It directly connects communication module online to read the info of communication module. During normal interface with CPU, it can show the following information.

① Run XG-PD.
② With online connection, connect to CPU.
③ If connected to CPU, it executes System Diagnosis of XG-PD.
④ It executes Communication module information in System Diagnosis window.
⑤ It shows software info on the right bottom area of Communication module information window.



[Fig 1.5.2] Checking module's version by XG-PD

2) Check by product's case label

Each communication module is with module's product info on its external case.
If online check is not possible due to absence of any external device interfacing with a PC, it can be checked after detaching a module.
The rear side has product label showing the product's type and version.

Chapter 2 Product Specifications

2.1 General Specifications

It describes the general specifications of XGT series in the below table 2.1.

<table>
<tr><th>No.</th><th>Item</th><th colspan="6">Specifications</th><th>Reference</th></tr>
<tr><td>1</td><td>Operating temperature</td><td colspan="6">0 ~ 55 °C</td><td>-</td></tr>
<tr><td>2</td><td>Storage temperature</td><td colspan="6">–25 ~ +70 °C</td><td>-</td></tr>
<tr><td>3</td><td>Operating humidity</td><td colspan="6">5 ~ 95%RH, dew should not form</td><td>-</td></tr>
<tr><td>4</td><td>Storage humidity</td><td colspan="6">5 ~ 95%RH, dew should not form</td><td>-</td></tr>
<tr><td rowspan="8">5</td><td rowspan="8">Vibration resistance</td><td colspan="4">Intermittent vibration</td><td>-</td><td>-</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td><td>Times</td><td rowspan="7">IEC61131-2</td></tr>
<tr><td>10 ≤ f < 57Hz</td><td colspan="2">–</td><td>0.075mm</td><td rowspan="6">10 times to each direction of X, Y and Z</td></tr>
<tr><td>57 ≤ f ≤ 150Hz</td><td colspan="2">9.8m/s^2(1G)</td><td>–</td></tr>
<tr><td colspan="4">Continuous vibration</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td></tr>
<tr><td>10 ≤ f < 57Hz</td><td colspan="2">–</td><td>0.035mm</td></tr>
<tr><td>57 ≤ f ≤ 150Hz</td><td colspan="2">4.9m/s^2(0.5G)</td><td>–</td></tr>
<tr><td>6</td><td>Anti-shock</td><td colspan="6">• Max. impact acceleration: 147 m/s^2(15G)
• Authorized time : 11ms
• Pulse waveform : sine half wave pulse (three times to each direction of X, Y and Z)</td><td>IEC61131-2</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Anti-noise</td><td>Square wave impulse noise</td><td colspan="4">± 1,500 V</td><td>Internal Test Std of LSIS</td></tr>
<tr><td>Static electricity discharge</td><td colspan="4">Voltage : 4kV (contact discharge)</td><td>IEC61131-2
IEC61000-4-2</td></tr>
<tr><td>Emission electromagnetic field</td><td colspan="4">27 ~ 500 MHz, 10 V/m</td><td>IEC61131-2,
IEC61000-4-3</td></tr>
<tr><td rowspan="2">Fast transient/ burst noise</td><td>Cate.</td><td>Power module</td><td colspan="2">Digital/analog I/O, COM interface</td><td rowspan="2">IEC61131-2
IEC61000-4-4</td></tr>
<tr><td>Vol.</td><td>2kV</td><td colspan="2">1kV</td></tr>
<tr><td>8</td><td>Environment</td><td colspan="6">Free of corrosive gas and dust</td><td>-</td></tr>
<tr><td>9</td><td>Altitude</td><td colspan="6">2,000m and lower</td><td>-</td></tr>
<tr><td>10</td><td>Contamination</td><td colspan="6">2 and lower</td><td>-</td></tr>
<tr><td>11</td><td>Cooling method</td><td colspan="6">Natural air-cooling type</td><td>-</td></tr>
</table>

[Table 2.1 General Specification]

Remark

1) IEC(International Electrotechnical Commission)
: An International private institute promoting international cooperation on the standardization of electric/electronic fields, publishing international specifications and operating the related appropriateness evaluation.
2) Contamination
: As an indicator to represent the contamination of operating environment determining the insulation performance of a device, contamination 2 means the status with non conductive contamination. However, it may have temporary conduction depending on dewing.

2.2 Performance Specifications

The following describes the specifications of system structure depending on the media of IFOS FEnet I/F module. Refer to the table when structuring a system.

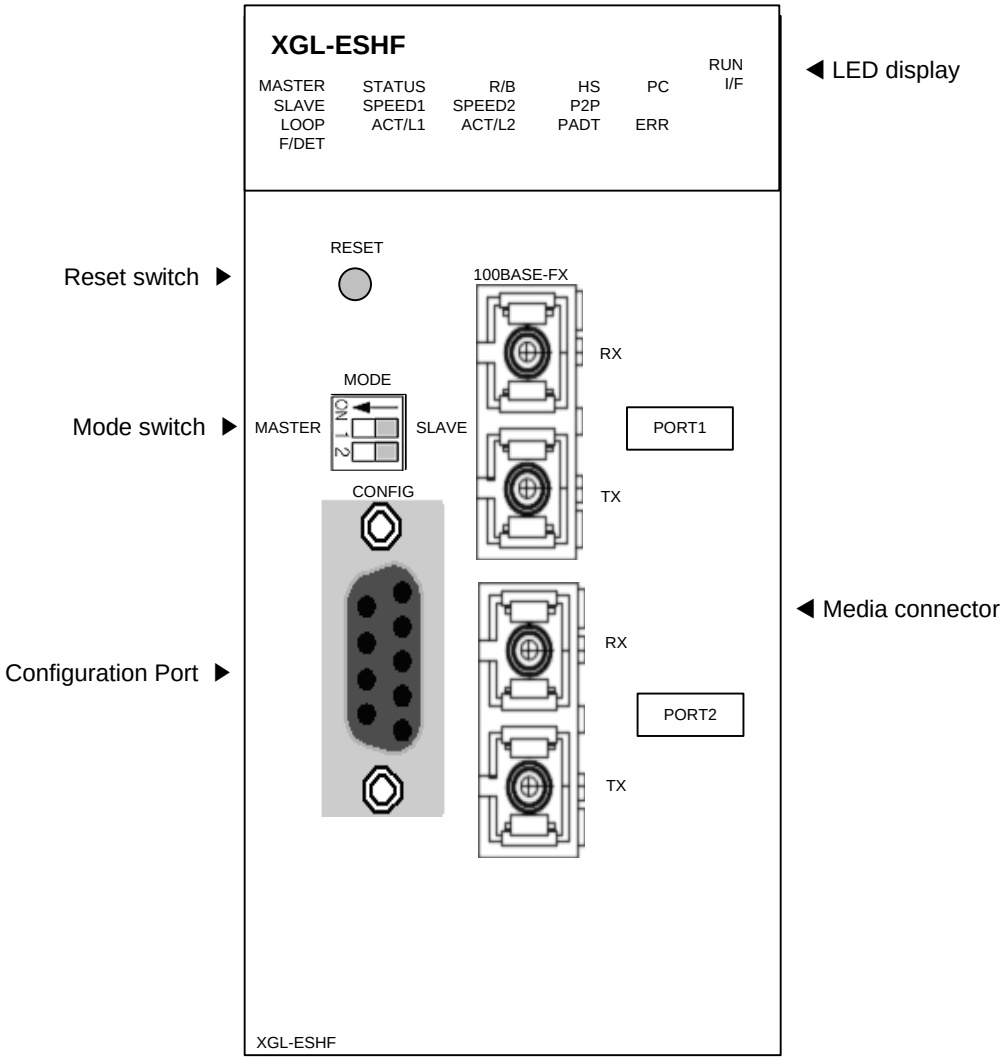
Item		Model
		XGL-ESHF (100BASE-FX)
Transmission spec.	Transfer speed(bitrate)	100Mbps
	Transfer method	Base Band
	Max. extension between nods	2km
	Max. segment length	-
	Max. no. of nods	50/segment
	Nod interval	Integer multiple of 0.5m
	Max. protocol size	1,500 bytes
	Service Area Access Method	CSMA/CD
	Frame Error Check Method	CRC 32
General spec.	Current consumption of 5V side(A)	1.2
	No. of slot occupied	2
	Wt.(g)	220g

[Table 2.2 Performance Specification of IFOS FEnet I/F module]

2.3 Structure and Features

2.3.1 Structure of FEnet fiber optic switch module

1) XGL-ESHF



① LED indication
Table 2.3.1 describes the Leds of FEnet fiber optic switch module. For determination of troubles by checking LED status and taking measures, refer to Chapter 10 Troubleshooting.

LED	Description
MASTER	Indicates whether XGL-ESHF module is set as Master. If Switch On, LED is on. If master is set, master acts as controlling ring.
SLAVE	Indicates whether XGL-ESHF module is set as Slave. If Switch Off, LED is on.
STATUS	Status shows the Live status of XGL-ESHF. In Live, LED flickers every second. Off is normal status.
R/B	Indicates whether network topology is ring or bus in master module. If ring, LED is on and slave module indicates changeover status, during which LED is on.
SPD1	Indicates speed of Ring Port1; LED On; 100Mbps, Off: 10MBps
A/L1	Indicates Link and Act status of Ring Port1. If LED Off, Link On, Off: Link Down, Blinking : Act status
SPD2	Indicates speed of Ring Port2. If LED ON, 100Mbps, OFF: 10MBps
A/L2	Indicates Link and Act status of Ring Port2. If LED On, Link On, Off: Link Down, Blinking : Act status
LOOP	If a packet is detected to be over Ref. Packet Limit, LED is on. If it is lower than the packet, LED is off.
F/DET	In case any trouble occurs a next station of network, it is fault; if detected, LED is on. If error is fixed, LED is off.
RUN	As the LED indicating whether FEnet fiber optic switch module works normally after being initialized; if normally initialized, LED is on, or if abnormally initialized or finished, LED is off.
I/F	As the LED indicating whether FEnet fiber optic switch module is normally interfaced with CPU, it flickers if it is normally interfaced with CPU; if the interface is not normal, it remains On or Off.
HS	As the LED indicating whether high speed link service is normally working, a user set the high speed link parameters and if the service is allowed and normally working, the LED is on. If high speed link is not allowed even though high speed parameter is set, the service does not work. A user who uses high speed link service should check whether HS LED turns on.

(continued)

LED	Description
P2P	As the LED indicating whether P2P service is normally working, the LED is on if a user set P2P parameter, allows P2P service and the service starts. If P2P service is not allowed even though P2P parameter is set, P2P service does not work. A user who uses P2P service should check whether P2P LED turns on.
PADT	As the LED indicating whether it is accessed to remote service from a remote Ethernet interface COM device(incl. PC), the LED is on if remote service is connected; if not, it is off.
PC	As the LED indicating whether a remote Ethernet interface COM device(incl. PC) accesses to the dedicated service, it is on if the service is used; if not, it is off.
ERR	The LED indicates any troubles in H/W. If any error is detected, it is on; if no trouble is detected, it is off. If ERR LED is on, please contact our A/S center.

[Table 2.3.1 LED description of FEnet fiber optic I/F module]

② Reset Switch

If button is pressed, it resets the entire COM module.

③ Mode Switch

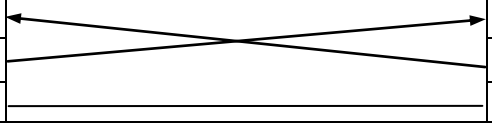
It sets working as master or slave through 2 bits type dip switch.

If bit 1 is on, it works as master while it works as slave if it is off.

④ Configuration Switch

It monitors COM status by IFOS Manager. It can also monitor and detect station's link and bad station through Config port connection.

[Fig 2.3.1] indicates cabling diagram for connection.

Config(9 pins)		Connection No. and signal direction	PC
Pin No.	Name		Name
2	RXD		RXD
3	TXD		TXD
5	SG		SG

[Fig 2.3.1] External Connection with a PC

2.4 Cable Specification

2.4.1 Optical cable

Item	Value
Cable type	Twin strands of Multi mode fiber(MMF)
Connector	SC type connector
Fiber optic length	62.5/125um (62.5um fiber optic core and 125um outer cladding)
Length of wave used	1,350 nm
Attenuation	2dB/1,000m and lower
Near-end crosstalk attenuation	11dB or less

`

Cautions

1) Since connection cable for COM module depends on system structure and environment, make sure to consult an expert.
2) If fiber optic cable is stained with fingerprint or impurities on its end, it may cause attenuation, causing troubles of communication.

Chapter 3 Installation and Test Run

3.1 Cautions in Handling

3.1.1 Handling

Before installation, check the followings when structuring a system using FEnet fiber optic switch module.

1) Check the necessary components for system structuring and select the most appropriate communication module.
2) Select a cable used for the communication module(the only 100BASE-FX is available)
3) When installing the communication module, check whether the base connector is stained with any impurities are and whether the connector pin of the module is damaged.
4) Every communication module can be mounted on the basic base or extension base but it is recommended to install on the basic base.
5) When installing the module, make sure to apply appropriate force until the upper part is completely fastened with the lock of base after inserting the projected part on the bottom of module into the base groove without communication cable connected. It may have a trouble of interface with CPU unless lock is not fastened.
6) For the cable for the communication module, the only 100BASE-FX cable may be used and installed.
7) The cable necessary for the communication with IFOS FEnet I/F module should be standardized one.

3.1.2 Product setting procedure up to the operation

It describes the procedure from installation up to operation. Upon the installation, make sure to install and set the system in order that it operates in accordance with the following procedure.

Operating procedure

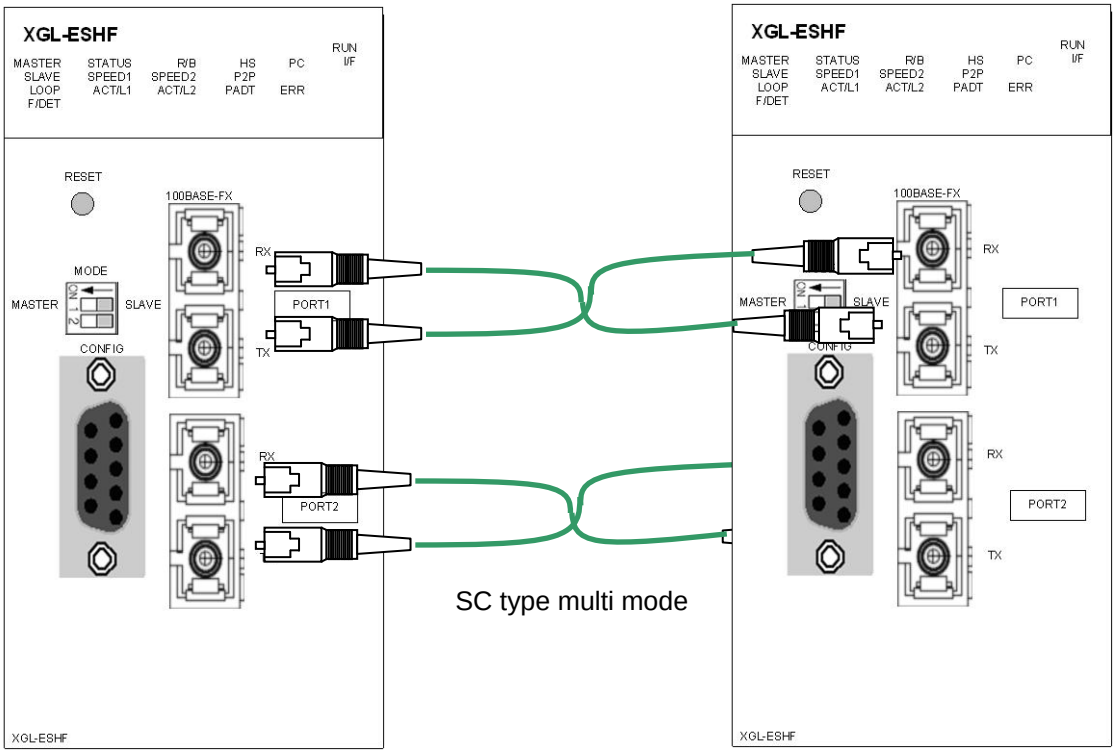
1) Install FEnet fiber optic switch module on base.
2) Connect FEnet fiber optic switch module to other network.
3) Turn off the system.
4) Execute XG-PD and set the basic parameters.
5) Download the basic parameters and reset the module
6) Upon the reset, check whether Module RUN and I/F RUN LED are normal.
7) Once it is checked that LED and CPU are normal, check communication module status info and CPU info by using diagnostic function of XG-PD.
8) Upon the check whether Module is in normal status, check whether it sends response by using ping from PC to network in order to check network connection or check it by using live check items in the diagnostic service of XG-PD unless PC is not connected to a PC.
9) Set the communication service and download it.
10) Allow the communication service link.
11) After creating a program using XG5000, write it to CPU and start operating.

Remark

1) Remember to reset the module once the station number and IP address are set by software. Also, make sure to maintain the values read from communication module when initializing the first station number and IP address(incl. frame). Any changes during communication are not applied during operation.

3.2 Installation

3.2.1 Installation of 100BASE-FX



[Fig 3.2.1] How to install 100BASE-FX

The max. segment length of 100BASE-FX is 2km(a distance between the module and optical switch). Cross-connect Tx of module to Rx of optical switch and Rx of module to Tx of optical switch.

⚠ Caution

1) During handling optical cable, note that it is vulnerable to impact, pressure, bend and pulling.
   If any contact side between optical cable of connector and cable end is contaminated, it may cause trouble in communication or make the communication impossible.
2) In case it is installed outside, it needs to take an additional measure, suitable for the installation environment, to protect cable.

3.3 Test Run

Upon communication cabling work, power it on, check LED operations whether they work normally and if normal, download the program to PLC by using XG5000 and execute the program.

3.3.1 Cautions in structuring system

1) IP address including the module should be different one another. If any duplicate address is connected, it may cause a trouble, interfering with normal communication. In addition, to use HS link service, HS link station number of all stations should be different with hat of other station.
2) Make sure to use the only specified std cable. Using any other cable unspecified may cause a trouble of communication.
3) Before installing, it is important to check if any cable is disconnected or short-circuited.
4) Fasten the cable connection by completely tightening communication cable. Any loose cable connection may cause a serious trouble of communication.
5) If communication cable is connected long distantly, make sure to cable it far way from power cable or inductive noise.
6) Because of little flexibility, coaxial cable should be bifurcated, at least, 30cm lower from connection in a communication module; if the cable is bent at a right angle or forcibly transformed, it may cause cable disconnection or destruction of connector in a communication module.
7) If LED works abnormally, refer to ‘Chapter 10 Troubleshooting’ of the user’s manual to check potential causes and take measures; if the symptom continues even after taking measures, contact the customer service center.

3.3.2 Checks before test run

It describes checks before test running communication module.

1) Communication module installed on PLC

Checks	Description
Installation and checklist of basic S/W	- Is the installation and operation of XG5000 well? - Is the execution and operation of XG-PD well?
Communication cable connection (as long as cable is connected)	- Is communication cable well connected and is tab well used? - Are the module LED and cable connection normal?
Module installation	- Is communication module correctly installed on basic base?

2) Test Run Procedure

It describes the steps up to test run just after installation of PLC.

Start

Power on :

① Check input power
② Check communication cable connection
③ Power it on.
④ Check whether Power LED of Power module is on
⑤ Check the LED status of CPU module
-> In case of abnormality, refer to the 'troubleshooting' of each PLC manual.
⑥ Check whether LED status of communication module is normal
-> If abnormal, refer to the 'Chapter 10 Troubleshooting' of the manual.
⑦ Set system parameters accurately and download them.

▼

Programming: programming in XG5000 and write it to CPU module.

▼

Sequence check:
Check the operation of communication module in accordance with program.

▼

Program modification:
If any trouble occurs in sequence program, modify it.

▼

Program reservation:

① Save it in USB memory or HDD.
② Print circuit diagram and its lists.
③ If required, save a program in memory module.

Completion

3.3.3 Separation/Replacement of module

If it is necessary to replace or remove a module owing to h/w error or system change, handle the module in accordance with the following procedure.

1) Procedure to replace communication module
   (1) Turn off the base on which communication module is installed.
   (2) Separate network cable and connector.
   (3) Operate and install a module in accordance with 3.3.2 setting procedure.

2) Communication module replacement using the module replacement switch of CPU.
   Refer to the directions of CPU module replacement switch.

3) Communication module replacement using XG5000 module replacement wizard
   Refer to the module replacement wizard of XG5000.

Remark

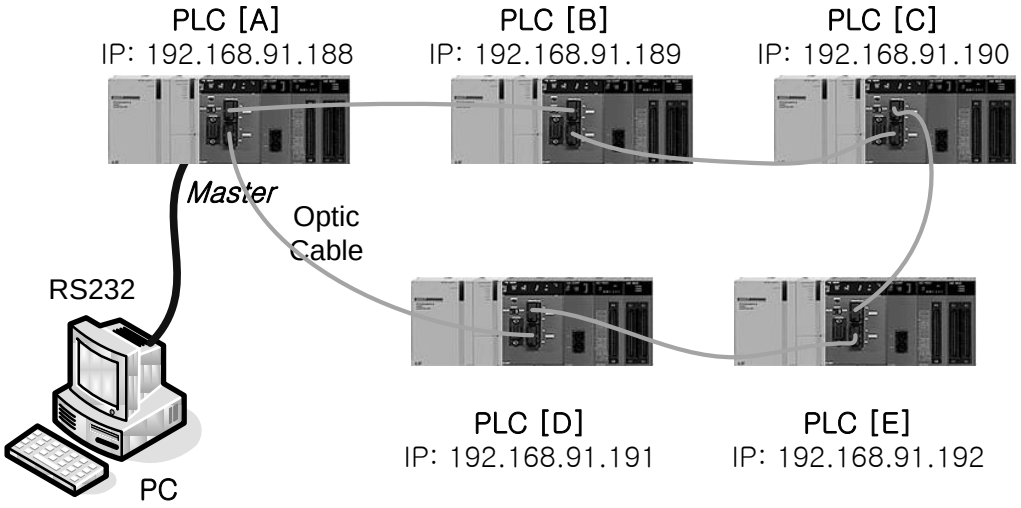
1) To replace FEnet fiber optic switch module, please reset the counterpart device(HMI or PC) or, it may cause no response from the device or cancellation of communication, making the communication impossible.

Chapter 4 System Structure

4.1 Network System Structure

4.1.1 Ring topology structure of FEnet fiber optic switch

Ring and bus topology can be structured only with FEnet fiber optic switch module and it is also possible to monitor topology in real time by using the dedicated software, IFOS Manager on a PC.



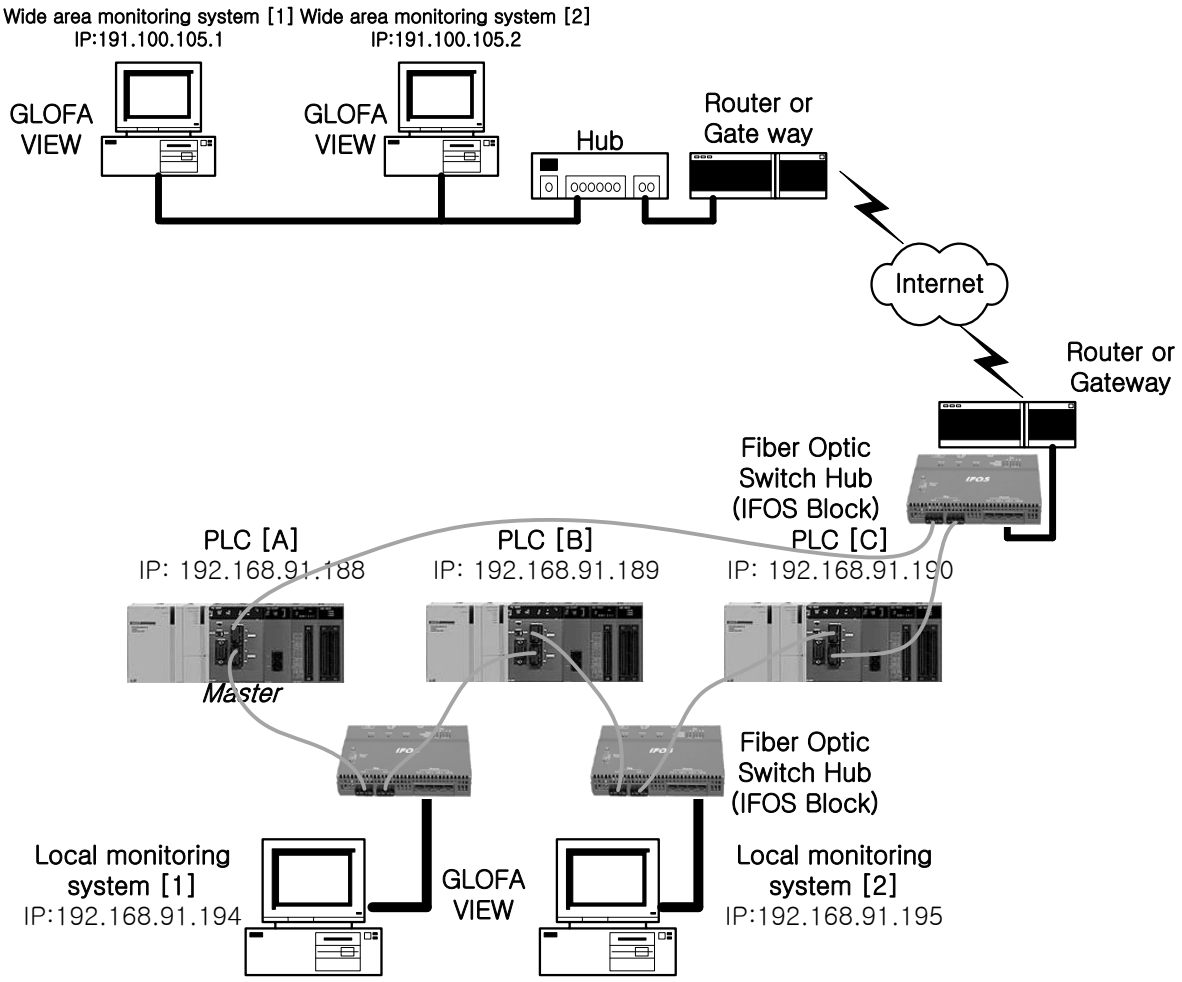
[Fig4.1.1] Ring Topology using FEnet Fiber Optic Switch Module

Remark

1) In structuring FEnet fiber optic switch module system, one station, at least, should be set as master.
2) For use of IFOS Manager, a PC should be connected to Console Port of XGL-ESHF.
3) Station list of FEnet fiber optic switch module should be connected to the config port of FEnet set as the master.

4.1.2 Company's Ethernet system

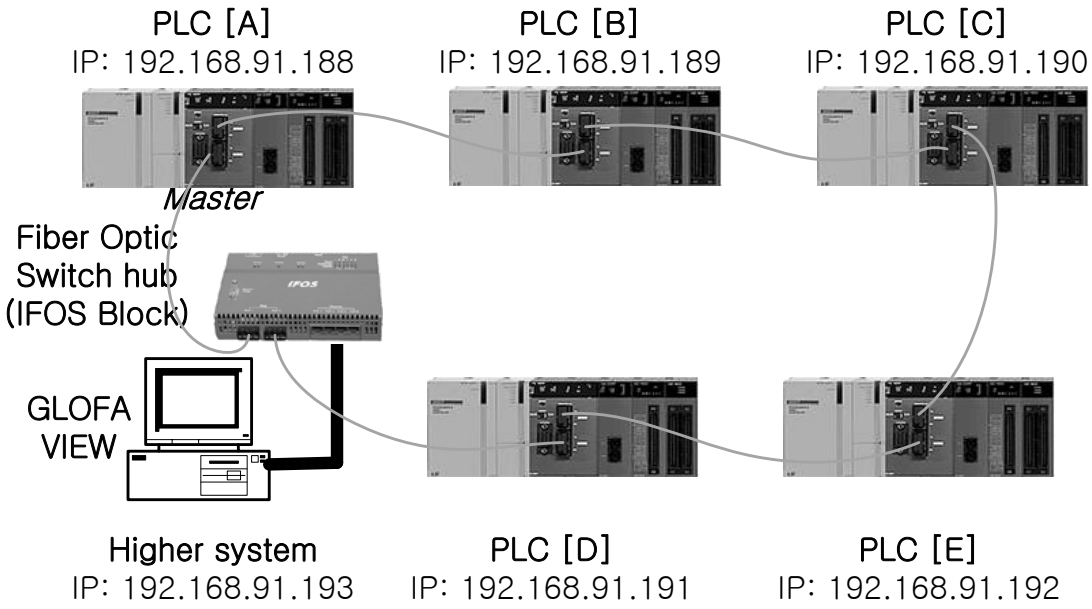
A company's Ethernet system may be connected to Internet public network by using an open type protocol, TCP/IP. Therefore, it is possible to access to the field PLC system on net by using GLOFA VIEW of the wide area monitoring system[1,2] in Fig [4.1.2]. In addition, it is also possible to approach the field PLC system only with the local monitoring system directly connected the field network.



[Fig 4.1.2] Company's Ethernet System

4.1.3 Ethernet system structure using dedicated network

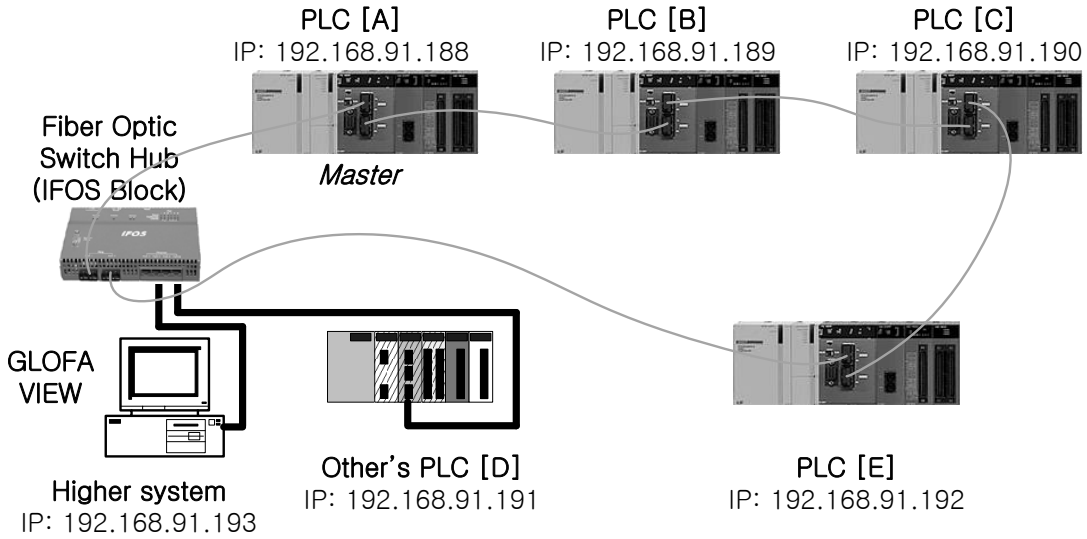
Ethernet system can be structured by using a common network, that is, dedicated network that is not connected to Internet network. Fig 4.1.3 shows an example of Ethernet system structure using a dedicated network. Each PLC system connects the dedicated network's Ethernet network using XGT Ethernet module while PLC system connected to the dedicated network Ethernet may receive or send data by using mutual HS link, P2P, dedicated service and etc.



[Fig4.1.3] Ethernet System(dedicated network)

4.1.4 Mixture of dedicated network and other's Ethernet system

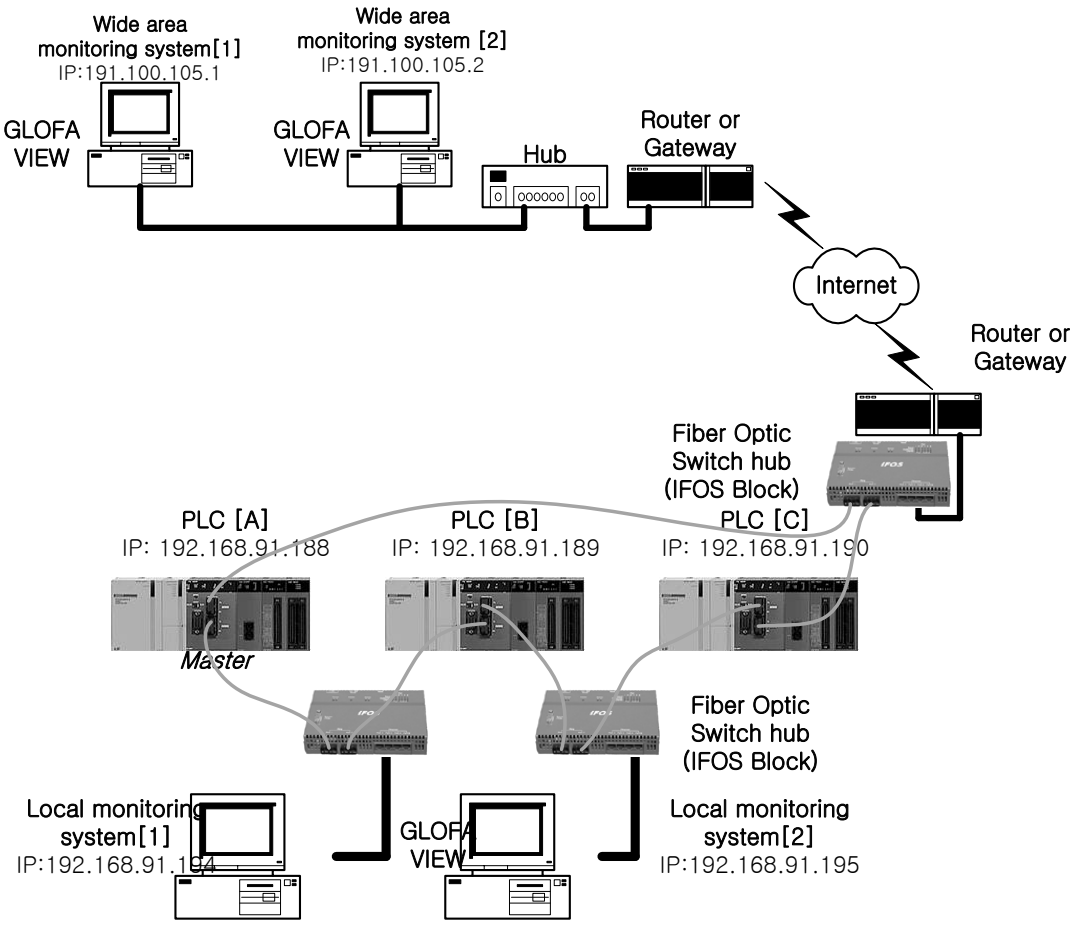
Figure 4.1.4 shows an example of dedicated network Ethernet system structured by using a company's PLC system and other's PLC system. A company's Ethernet module allows user-defined communication. Therefore, it is necessary to know other's PLC Ethernet module's frame structure to make is possible to send and receive data from/to a company's PLC and other's PLC by using user-defined communication.



[Fig4.1.4] Ethernet System(dedicated network + others)

4.1.5 Ethernet system of public network and dedicated network

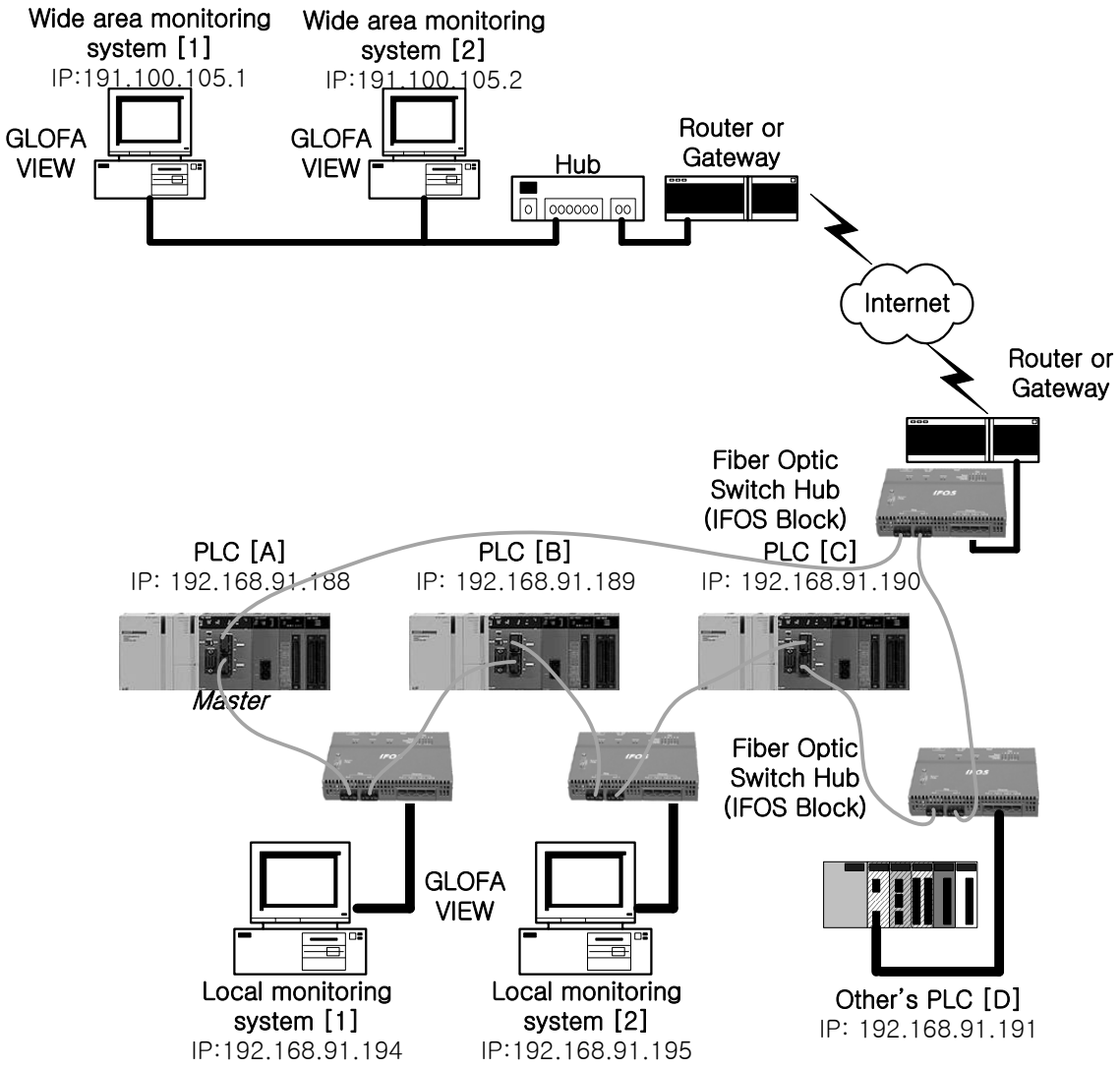
A company's Ethernet system can be connected to a public Internet network by using an open type protocol, TCP/IP. Therefore, it is possible to approach to the field PLC system through Internet by GLOFA VIEW of the wide area monitoring system[1,2] in Fig [4.1.5]. In addition, it is also possible to approach to the field PLC system only with the local monitoring system directly connected the field network.



[Fig 4.1.5] Ethernet System (public network + dedicated network)

4.1.6 Mixture of public network, dedicated network and other's Ethernet system

Figure 4.1.6 shows a mixed Ethernet network system in which a company's PLC system and other's PLC system are mixed by using Internet, that is, public network and dedicated network. The wide area monitoring system[1, 2] may approach to a remote Ethernet network by using public network. The wide area monitoring system approaching to a remote Ethernet network may receive or send necessary data by approaching to a company's PLC and other's PLC. In addition, it is also possible to approach to the field PLC system only with the local monitoring system directly connected the field network.



[Fig 4.1.6] Ethernet System (public network + dedicated network + others)

Chapter 5 XG-PD Program

A user can set or change types of parameters by using the network integration software, XG-PD in order to operate FEnet fiber optic switch module.
XG-PD is the dedicated Communication module setting tool to set or control system parameters, service selection, parameter preparation, frame information and etc of the communication module.

5.1 Introduction

As a basic program tool to control and manage network in Ethernet communication, it can set and manager everything about Communication module such as system parameter, service parameter, module and network diagnosis.

Regarding Ethernet network, XG-PD can be classified as follows.

1) Communication system basic parameter setting
2) Communication service(high speed link, P2P, dedicated service) parameter setting
3) Module/Network diagnostics service

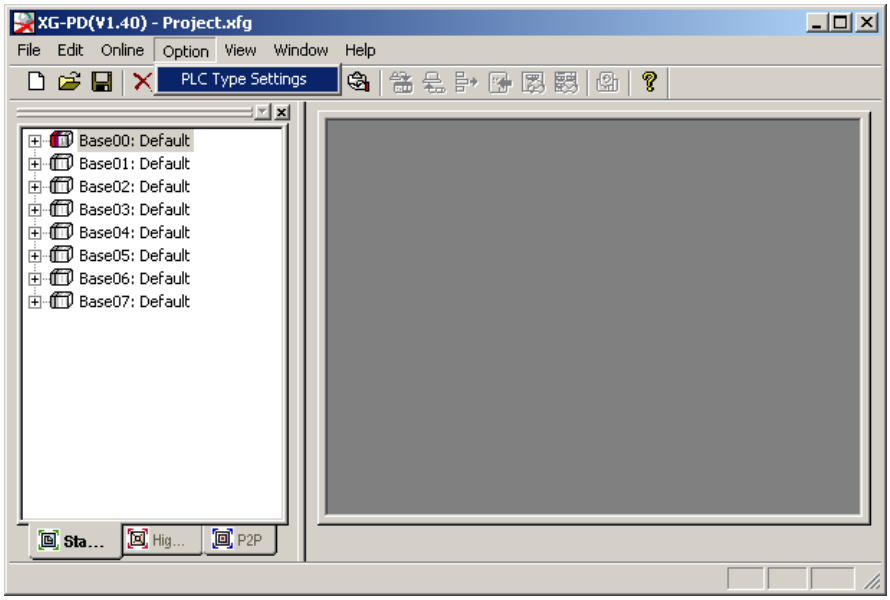
It is possible to write(download) parameter and files set by a user to Ethernet Communication module through CPU module. Since Communication system parameter downloaded once is managed by CPU, it can be immediately used without re-setting even though a new Communication module is installed.

The chapter mainly focuses on the settings necessary when using Ethernet module.

5.2 Standard setting

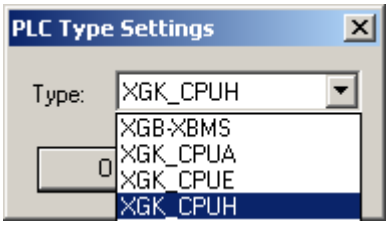
5.2.1 PLC type setting

To connect XG-PD to PLC, it is necessary to set PLC type. To set PLC Type in XG-PD, click [Option] → [PLC Type Settings] in XG-PD Menu as seen in Fig 5.2.1.



[Fig 5.2.1] Start Page of XG-PD

There are 5 types of PLC; XGK-CPUH, XGK-CPUA, XGK-CPUS, XGK-CPUE and XGB-XBMS. After checking PLC type to connect by using XG-PD, select it form the menu in Fig 5.2.2.



[Fig 5.2.2] Start Page of XG-PD

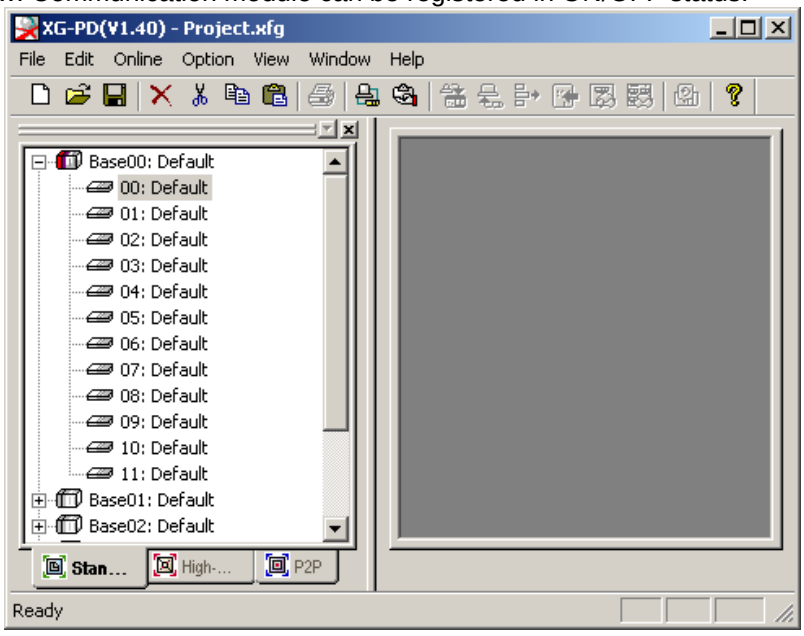
5.2.2 Register communication module

It describes the standard settings necessary to operate FEnet fiber optic switch module.

[Fig 5.2.3] shows the start page of XG-PD displayed when selecting XG-PD icon or [Network Manager] <-[Tools].

1) Executing XG-PD

Running XG-PD first shows the start page seen in Fig. 5.2.3. For standard settings, it is necessary to register Communication module to the base and slot locations in the standard setting window. Communication module can be registered in ON/OFF status.

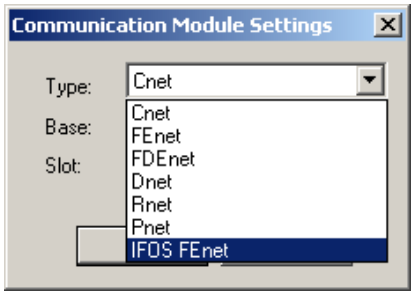


[Fig 5.2.3] Start Page of XG-PD

A) Offline registration

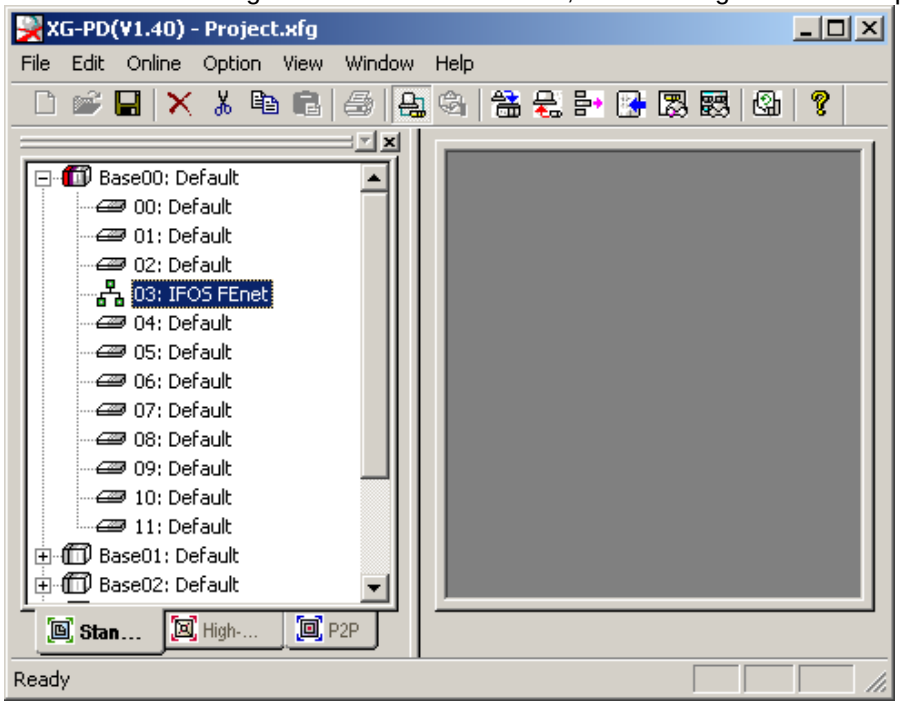
To forcibly register Communication module without connection to XGT, select a location of base or slot in the standard setting window.

For instance, to register IFOS FEnet to Base 0 and Slot 2, select the Communication module type as IFOS FEnet in the 'Communication Module Settings' window, which is displayed when selecting the location and click OK.



[Fig 5.2.4 Standard setting of XG-PD(Communication module setting)

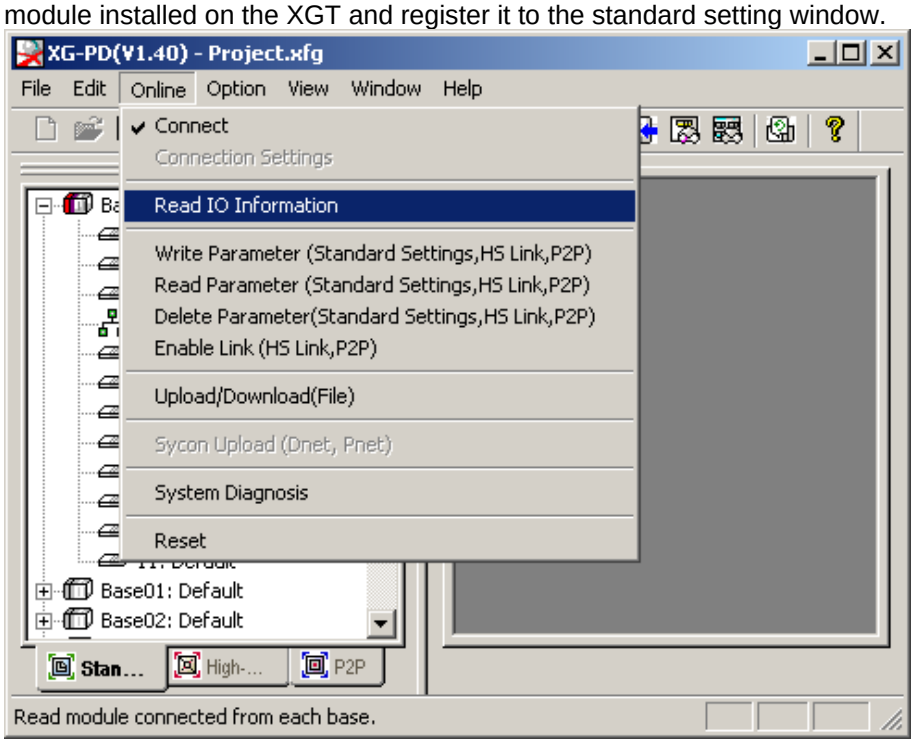
When IFOS FEnet is registered to Slot 3 of Base 0, the following window is displayed.



[Fig 5.2.5] Registration Window of Standard setting

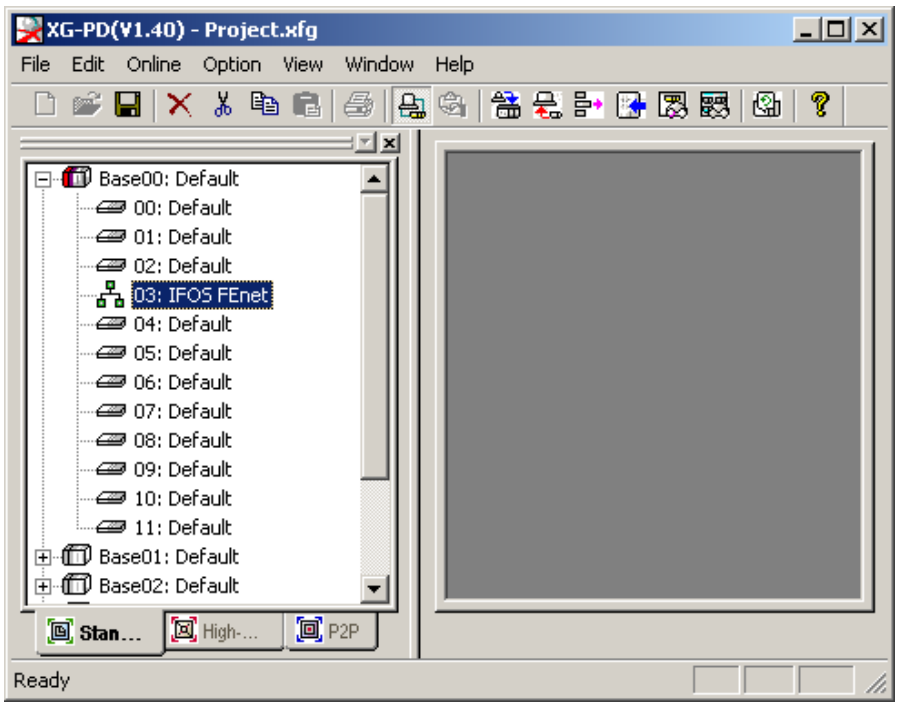
B) Online Registration

Connect to CPU module of XGT with Communication module. If selecting [Online] -> [Read IO Information] after being connected, it automatically searches every Communication module installed on the XGT and register it to the standard setting window.



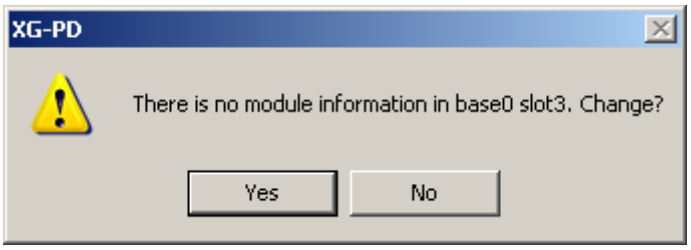
[Fig 5.2.6] Read IO Information

In case FEnet Fiber Optic Switch module is installed Slot 3 of Base 0, it automatically searches and registers Communication module as follows.



[Fig 5.2.7] Standard setting Window

At the moment, if it does not correspond to the module info registered in the previous project or in offline, it checks the info as follows.

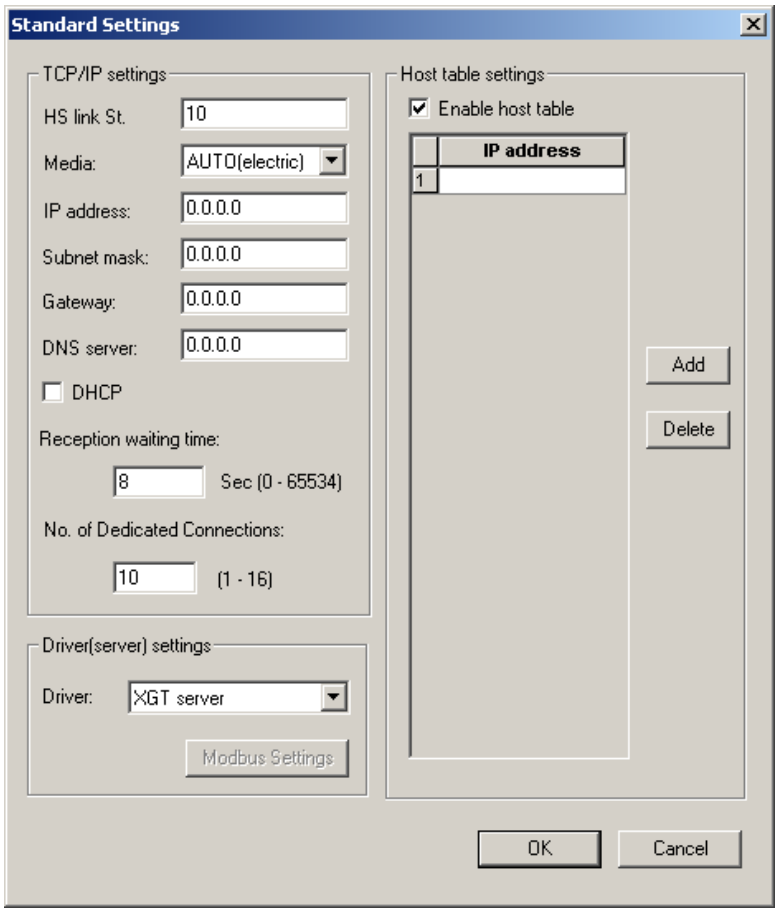


[Fig 5.2.8] IO Change Message dialogue box

5.2.3 Standard settings (Module)

Standard setting is to set Communication system parameters in order that FEnet fiber optic switch module participates in Ethernet network and it determines IP address, Subnet mask, Gateway address, DNS server, Reception waiting time, No. of Dedicated Connection, host table setting and etc of FEnet fiber optic switch module. Therefore, for Ethernet communication, it is necessary to set basic parameters in standard setting window of Module and download them.

It shows the basic parameters set in [Fig 5.2.5].



[Fig 5.2.9] Standard settings(detail items)

The description of the window of [Fig 5.2.5] is as follows.

Of the following items, IP address, high speed link station no., media and etc should be re-set suitable for operating environment.

1) TCP/IP settings

Category	Description
High speed link station no.	Set the station number for high speed link communication between XGT FEnet fiber optic switch modules Note that FEnet fiber optic switch module should not be duplicate with the station number of other FEnet fiber optic switch module on any accessible network.
Media	Select a media to use. ▷ AUTO(electricity) : Set the media of the current module as Auto. It is not available in case of FEnet fiber optic switch module. ▷ 10M/HALF : 10Mbps Half Duplex electricity ▷ 10M/FULL : 10Mbps Full Duplex electricity ▷ 100M/HALF : 100Mbps Half Duplex electricity ▷ 100M/FULL : 10Mbps Full Duplex electricity ▷ FX/100M/HALF : 100Mbps Half Duplex optic ▷ FX/100M/FULL : 100Mbps Full Duplex optic
IP address	Set the IP address of FEnet fiber optic switch module
Subnet mask	Value to check whether destination station is in the same network of a user's station
Gateway	Gateway module address(router address) to send and receive data through station or public network using other network
DNS Server	Designate domain name server
DHCP	When using floating IP instead of fixed IP(ADSL)
Reception waiting time (second)	It ends connection of dedicated service regardless of normal close on the assumption that a higher system is in difficulty if there is no response for a certain time set in higher level with connection with a higher PC or MMI during dedicated communication. The time is used by dedicated service to re-set a channel in case the destination station has any trouble or cable is disconnected.
No. of dedicated connections	Max. number of the dedicated TCP service allowed for simultaneous connection(it may be up to 16 and the default is 3).

2) Driver (server) setting

Category	Description
XGT sever	Set it when working as dedicated Communication server.
Modbus TCP/IP server	Set it when working as Modbus server driver.

3) Host Table Setting

Category	Description
Enable host table	It allows access to FEnet fiber optic switch module only for modules of IP address registered to host table (if enabled, any non-registered client(IP address) may not access).

5.3 High-speed Link Setting

5.3.1 Setting High-speed link parameter

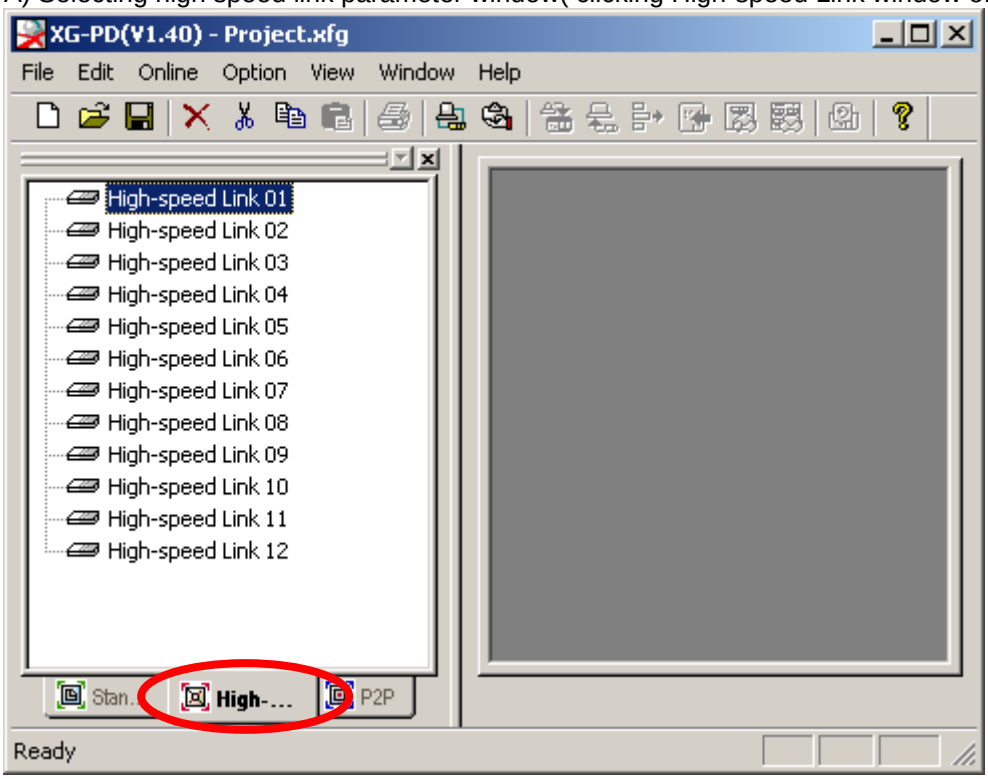
It describes how to set high speed link Communication of FEnet fiber optic switch module.

Depending on the number of module installed, FEnet fiber optic switch module's high speed link is allowed up to 12.

Each high speed link can afford to 32 blocks for sending and 128 blocks for receiving to the max and if it is mixed sending and receiving block, it can afford up to 128 blocks.

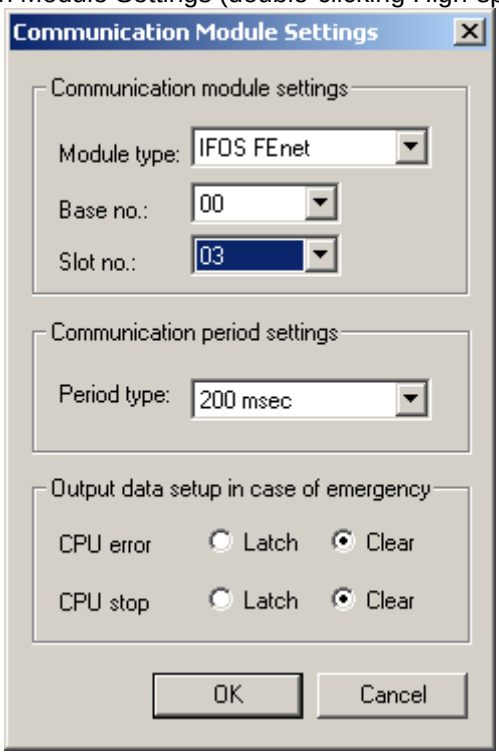
1) Initial Selection Window

A) Selecting high speed link parameter window(clicking High-speed Link window of XG-PD)



[Fig 5.3.1] High-speed Link Window

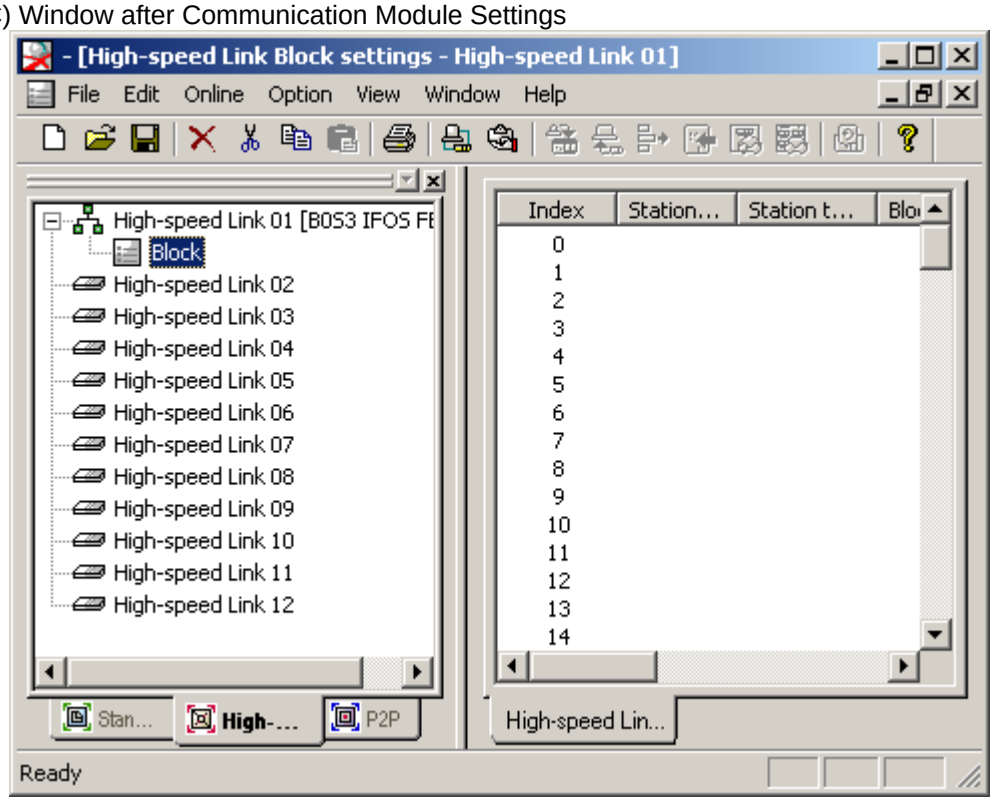
B) Communication Module Settings (double-clicking High-speed Link 1)



[Fig 5.3.2] Communication module and period setting

Category		Description
Communication Module Setting	Module type	Select IFOS FEnet.
	Base No.	Select base number on which FEnet fiber optic switch module is installed. The default base is 00.
	Slot No.	Select Slot number on which IFOS FEnet I/F module is installed.
Communication period setting	Period type	Set data sending period. (Settable between 20ms~10sec)
Output data setup in case of emergency	Latch	Maintain and send the latest data received from CPU. It is seen that it is cleared if CPU sends data as 0 even though latch is set. Make sure to check the emergency output data setting of CPU.
	Clear	It sends by setting received High-speed Link data as 0 in ignoring data from CPU. If emergency data is set as 'clear' in emergency output data setting of XG-PD High-speed Link module setting even though emergency output data setting of device area of High-speed Link sending part is set as latch in CPU, the data set as 0 is sent. Make sure to set it after checking desired operation.

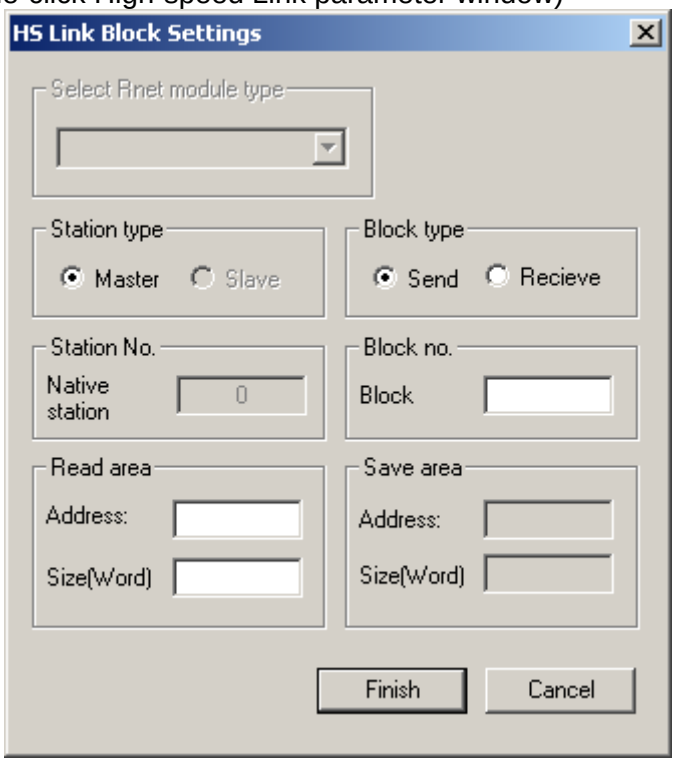
C) Window after Communication Module Settings



[Fig 5.3.3] Window appeared when double-clicking High-speed Link tab block

2) High-speed Link Parameter Settings

(double-click High-speed Link parameter window)

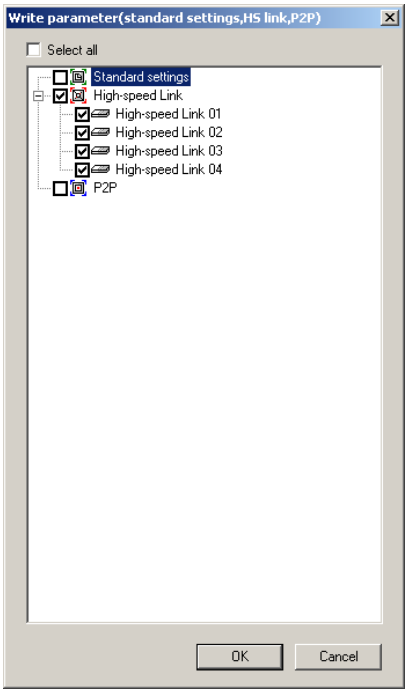


[Fig 5.3.4] High-speed Link block setting

Category		Description
Station type	Master	Since IFOS FEnet has no relation, it is always fixed as master.
	Slave	
Station No.	Native station	It means station no. of the module in case of sending or destination station number in case of receiving.
Block type	Send	Send data
	Receive	Receive data
Block no.	Block	Set receiving/sending block.
Read area	Address	Memory area of the module.
	Size (Word)	Set data size to send.
Save area	Address	Area that other's station receives and stores data.
	Size (Word)	Set the size of data to receive.

3) Writing High-speed Link Parameter

Check the High-speed Link in the Write Parameter window and click OK.

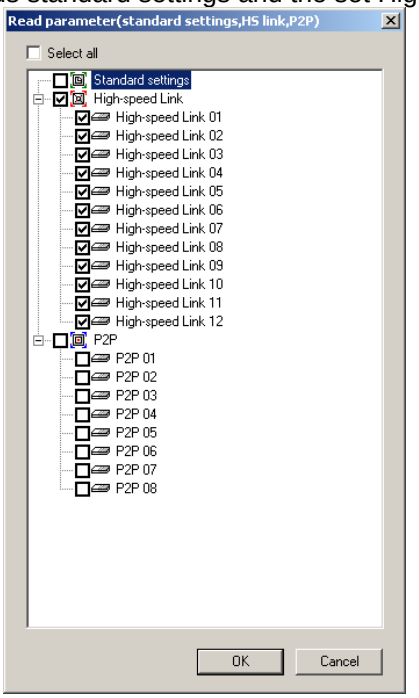


[Fig 5.3.5] Writing High-speed Link parameter

4) Reading High-speed Link parameter

A) Connect to CPU by using XG-PD.

B) If selecting reading parameter online after connection, checking the parameter and clicking OK button, it reads standard settings and the set High-speed Link parameter.



[Fig 5.3.6] Reading High-speed Link parameter

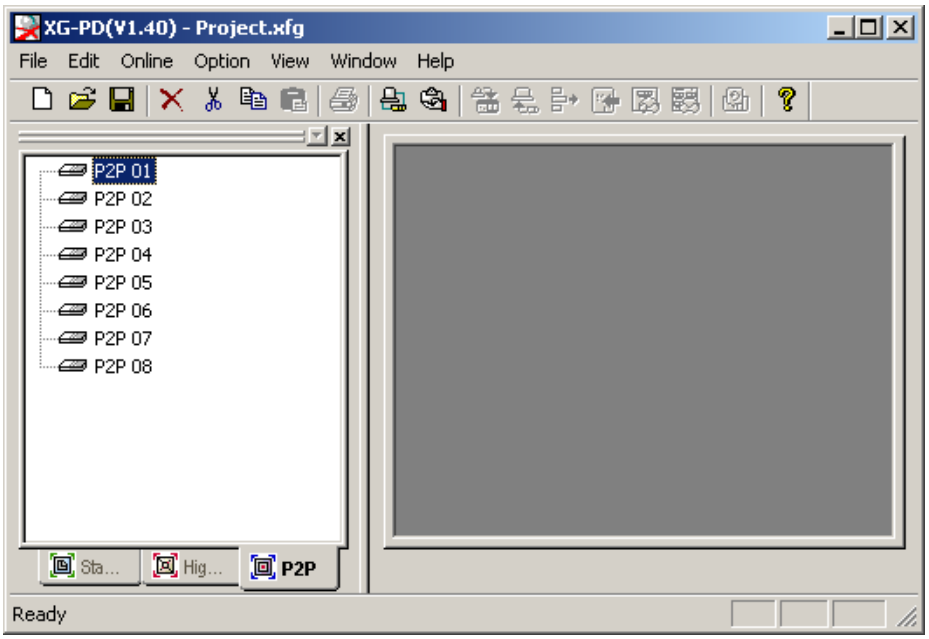
5.4 P2P Setting

5.4.1 P2P parameter setting

It describes P2P setting of FEnet fiber optic switch module. P2P setting is allowed up to 8 depending on the no. of FEnet fiber optic switch module installed. Each P2P may have up to 64 blocks.

1) P2P Parameter Setting

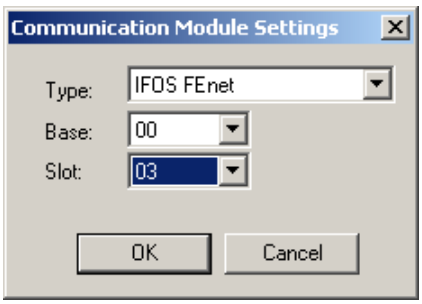
If selecting P2P parameter window(clicking P2P of XG-PD), it shows the menus seen in Fig 5.4.1.



[Fig 5.4.1] Start Page of P2P Setting

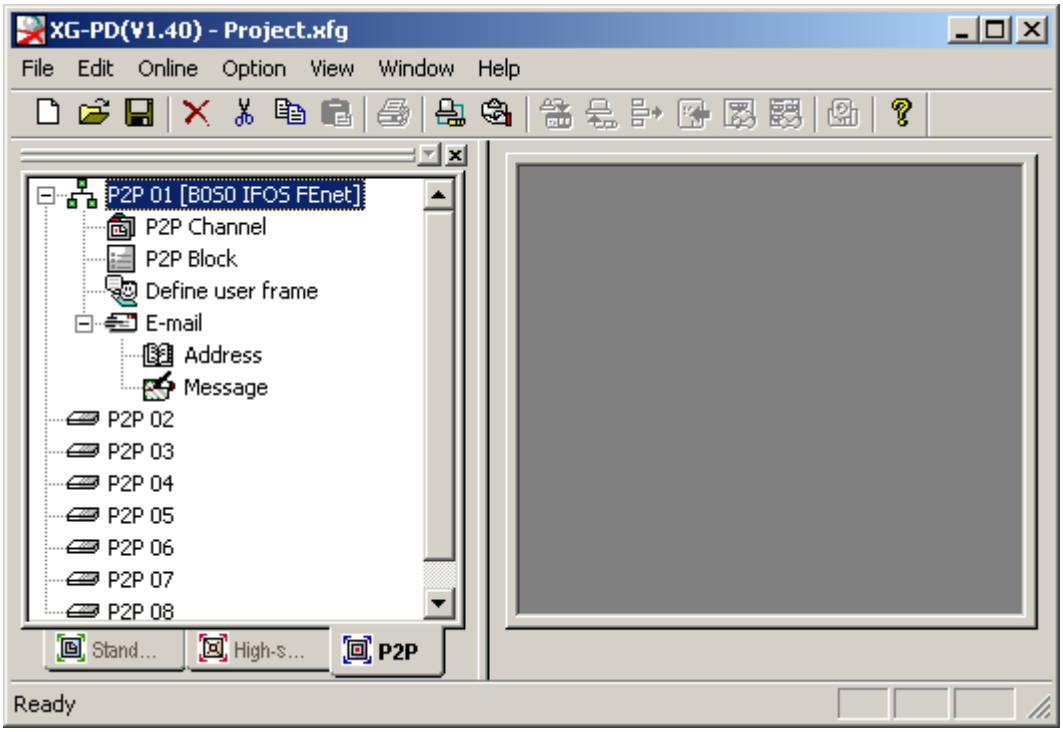
2) Standard setting of Communication module

If clicking the menu to set P2P parameter, the following menu appears, where select Communication module type. Here, select IFOS FEnet. Then, designate base number and slot of the module.



[Fig 5.4.2] Selection of Communication module

Category		Description
Communication Module Setting	Type	Select IFOS FEnet.
	Base	Select the base number on which FEnet fiber optic switch module is installed. The default is 00.
	Slot	Select the slot number on which IFOS FEnet I/O module is installed.



[Fig 5.4.3] Detailed P2P items

Once Communication module is set, detailed P2P settings window appears as seen in [Fig 5.4.3]. For more information, refer to 'Chapter 7 P2P Service.'

Category		Description
P2P Channel	Define user frame	Edit user defined protocol.
	XGT client	Set dedicated service master.
	Modbus TCP client	Set as Modbus TCP master.
P2P block		Set blocks by commands according to the XGT client setting of P2P Channel
Define user frame		Set frames by commands according to user defined frames of P2P.
E-mail		Execute user's definition in use of email service

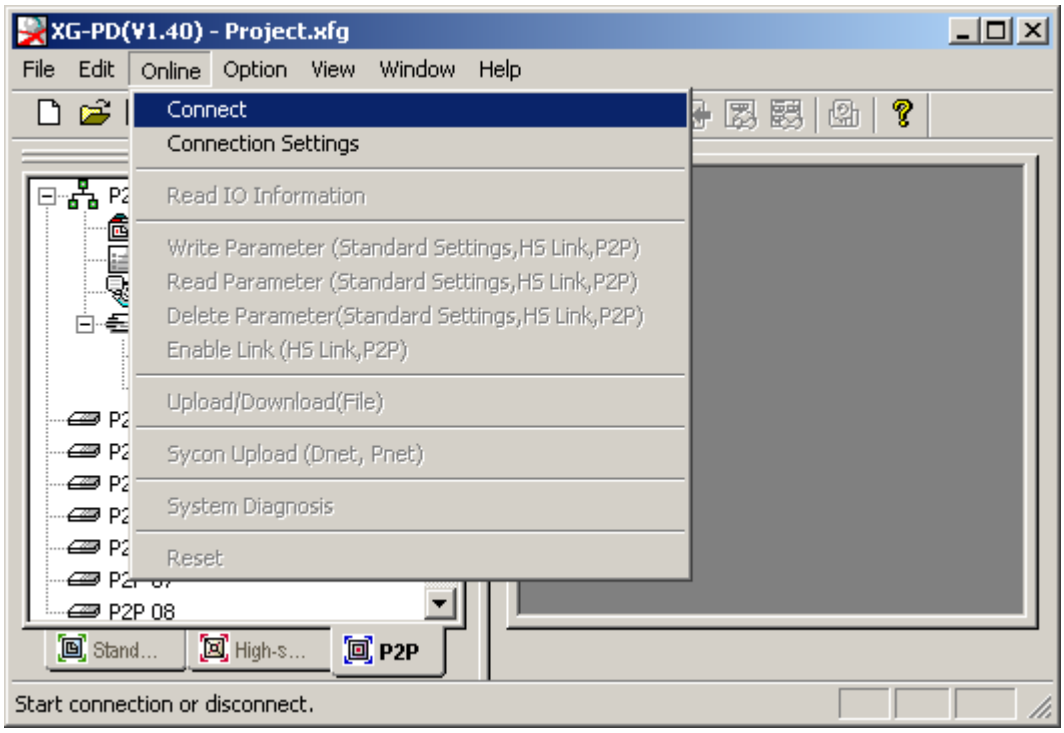
5.5 Connection and Download for Communication Module

5.5.1 Download/Upload

It is possible to write(download) or read(upload) the basic parameter set by using XG-PD.

1) Write(Download)

Connect to CPU of the basic base on which FEnet fiber optic switch module to write is installed by using [Online] -> [Connect].

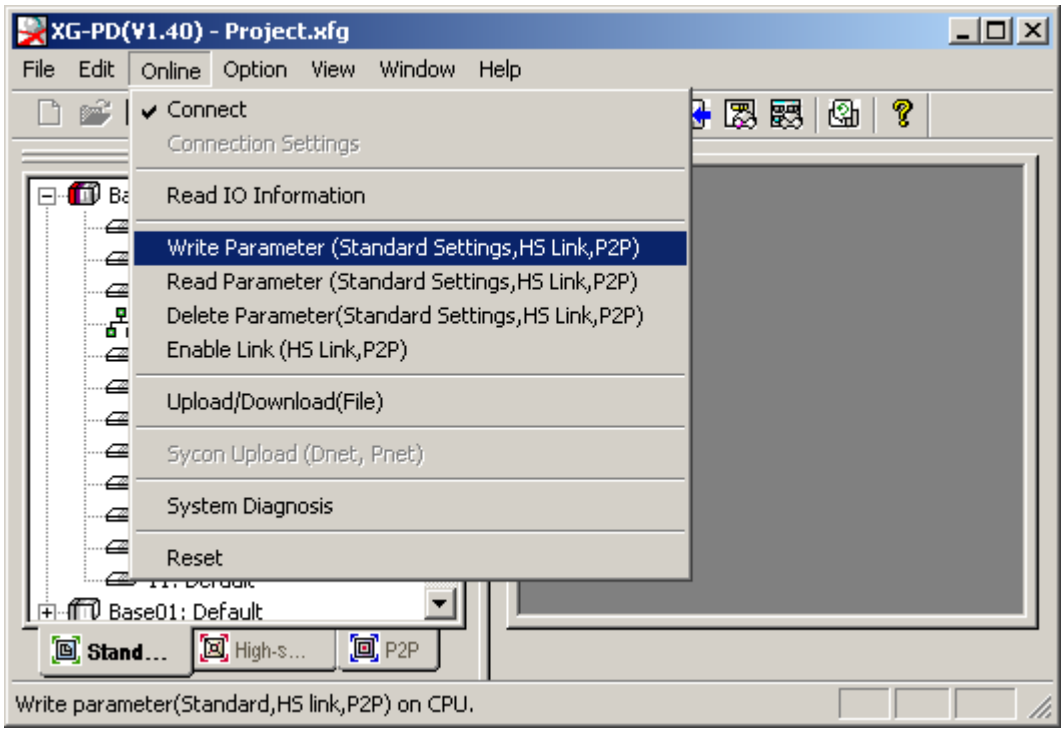


[Fig 5.5.1] Connection window

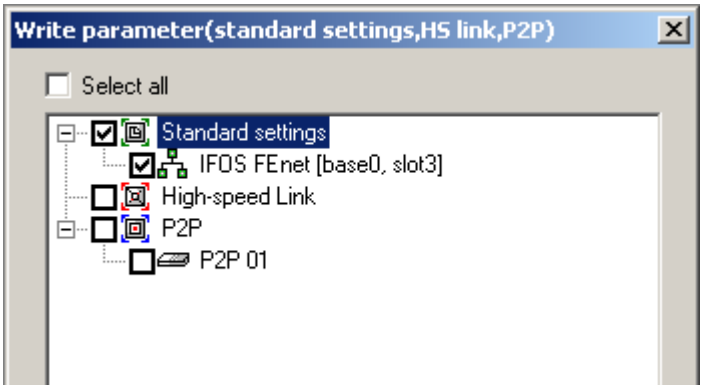
If selecting [Online] -> [Write Parameter(Standard setting, High-speed Link, P2P)] after being connected, the window seen in [Fig 5.5.3] appears. In the window, check the location of base and slot on which FEnet fiber optic switch module is installed and select the IFOF FEnet I/F module.

Remark

1) In XG-PD, programming is possible through RS-232C port or USB port of CPU module and for the cable type used, refer to the XGT Catalog product exhibit.
(USB connection cable: USB-301A, RS-232C connection cable: K1C-050A)



[Fig 5.5.2] Parameter Writing Window



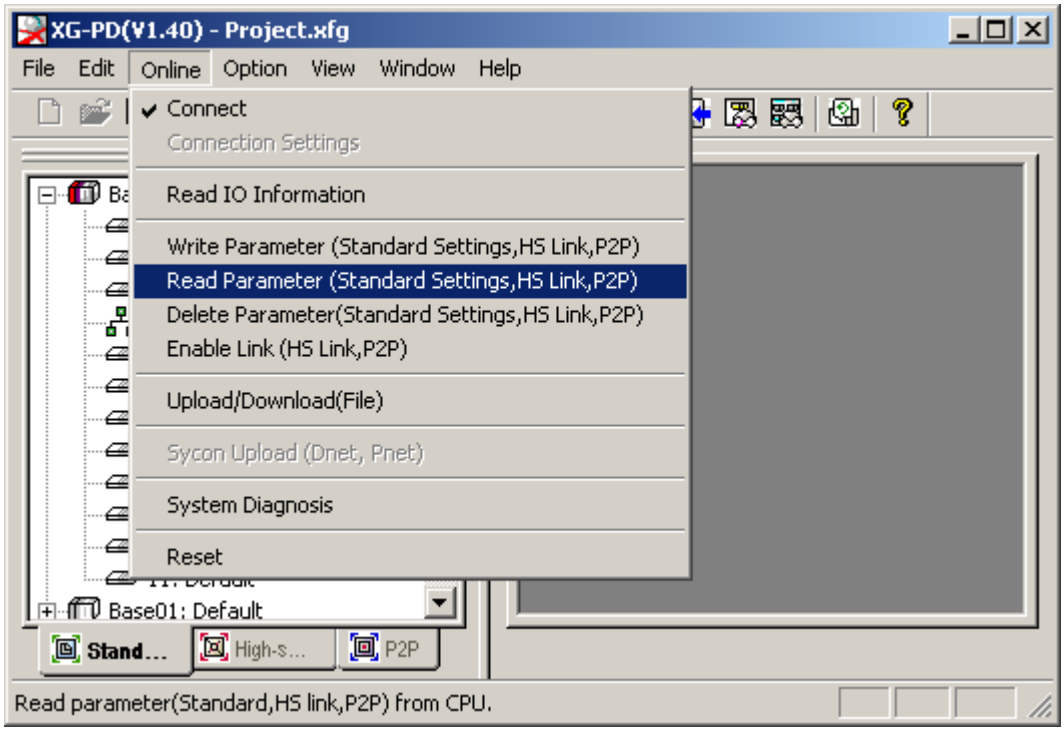
[Fig 5.5.3] Writing window

Remark

1) In case any service allows link when downloading parameter to CPU by using XG-PD, it automatically works with the parameter newly downloaded after downloading the parameter; if the service does not allow the link, the parameter is not applied until the link is allowed.

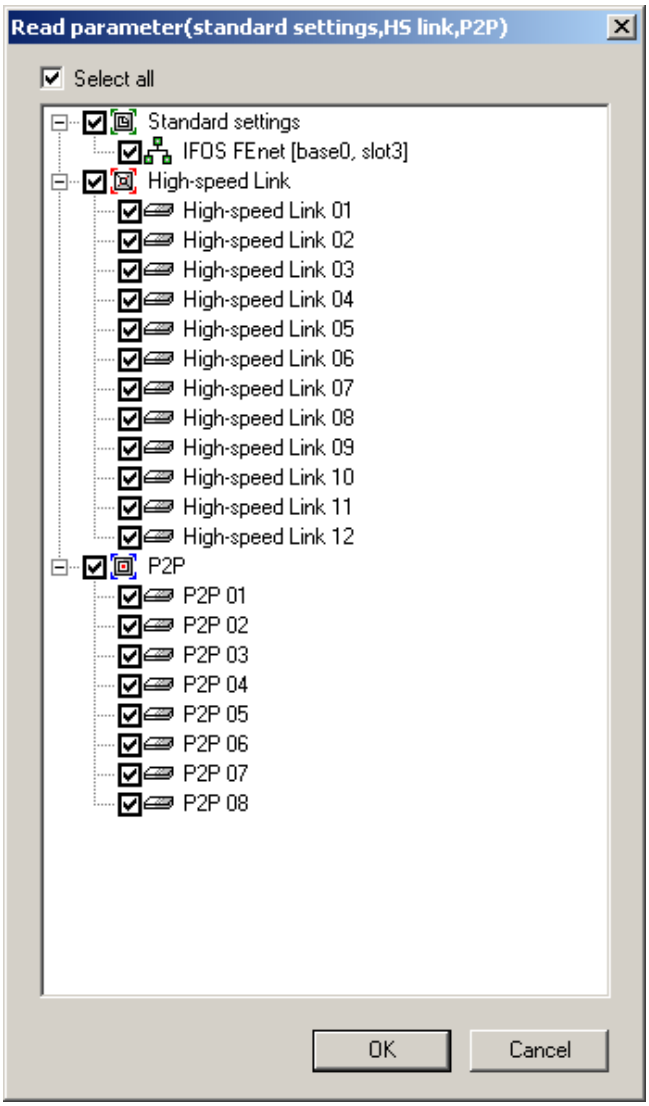
2) Read(Upload)

Connect to CPU of the basic base on which FEnet fiber optic switch module to read is installed and register the Communication module to read the standard setting.



[Fig 5.5.4] Parameter Reading Window

If selecting [Online] -> [Read Parameter (Standard Setting, High-speed Link, P2P)], the window appears as in [Fig 5.5.5].



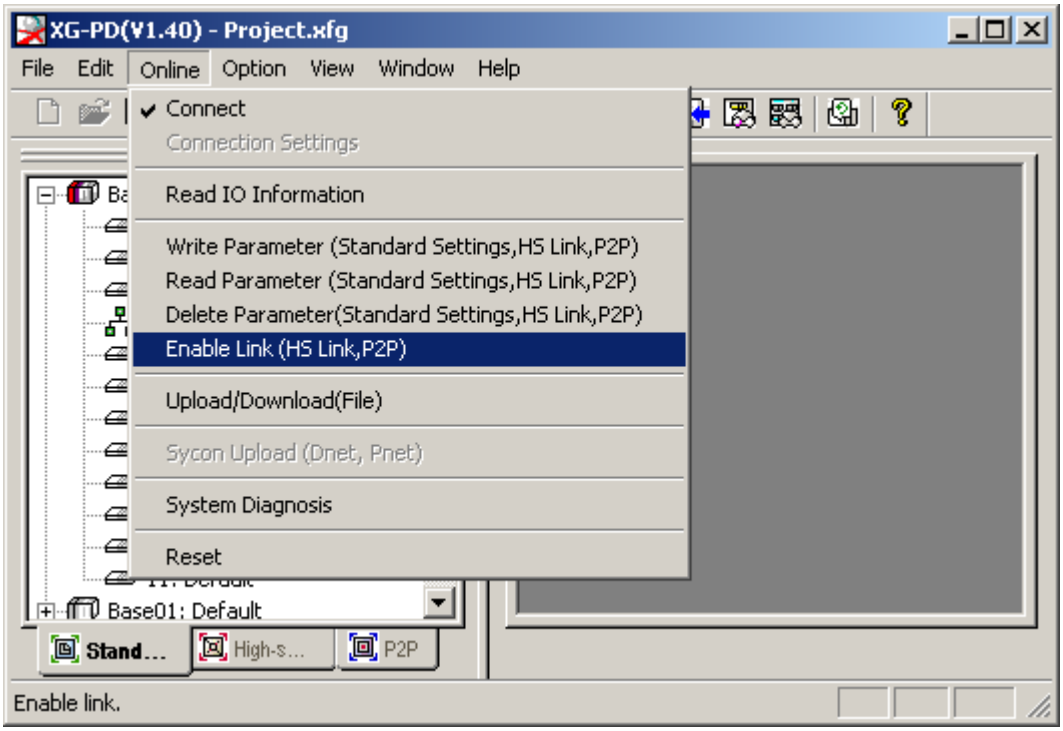
[Fig 5.5.5] Parameter Reading Menu

Here, check base number and slot number among settings and select standard setting of the Communication module. To check the data read from CPU, click a parameter to see in XG-PD window after reading finishes.

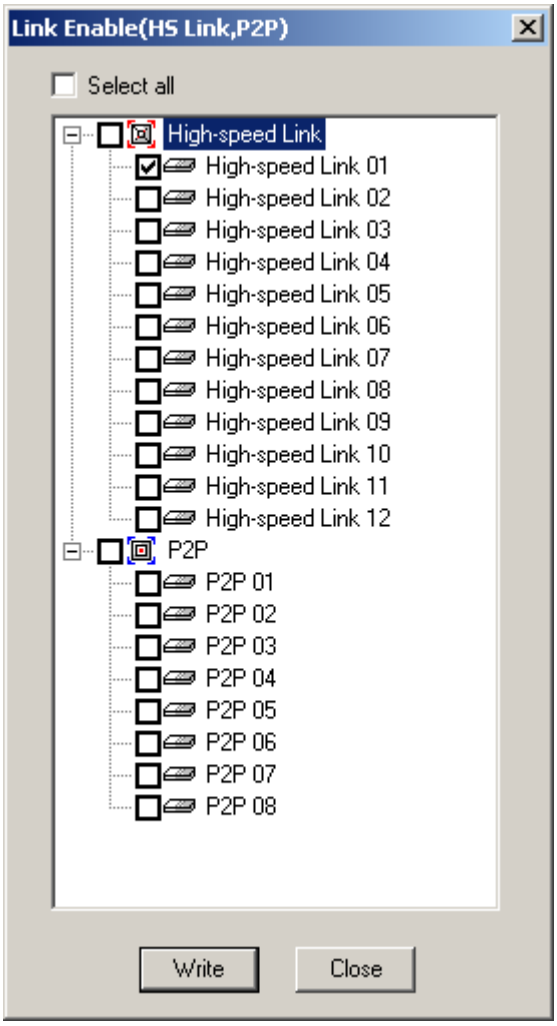
5.5.2 Enable Link

Enable Link procedure is needed to start communication in order to actually receive and send High-speed Link and P2P data downloaded by using XG-PD. Communication module can start receiving/sending by allowing Enable Link. It may control Enable/Disable operations by parameters while communication continues as long as link is enabled even though CPU stops.

Next is about how to set XG-PD for Enable Link. If clicking setting menu from [Fig 5.5.6], it shows setting menu as seen in [Fig. 5.2.7]. Check off any item for link service.

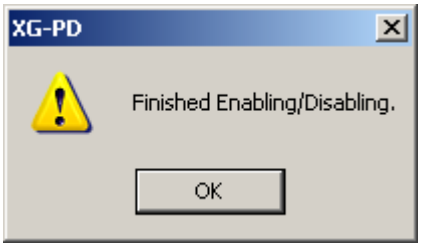


[Fig 5.5.6] Enable Link Setting



[Fig 5.5.7] Selection of Enable Link

Once Writing Enable Link is executed, it shows a message like [Fig. 5.5.8], which shows that Enable Link is normally processed.



[Fig 5.5.8] Link Allowance setting completed

* 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

Flag	Data type	Device	Description
_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
_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

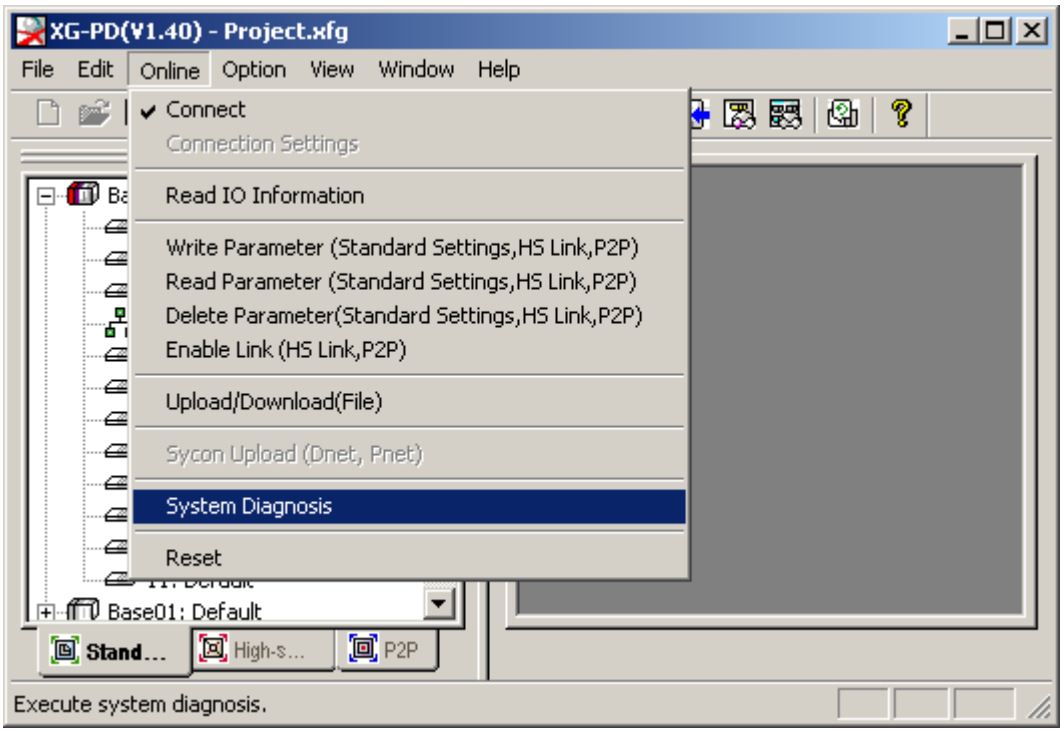
▶ How to enable link
  -HS link/P2P enable/disable setting flag ON → HS link/P2P enable/disable request flag ON
▶ How to disable link
  -HS link/P2P enable/disable setting flag OFF → HS link/P2P enable/disable request flag ON
▶ You can monitor the Enable/Disable state of the each link through “enable/disable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

5.6 System Diagnosis

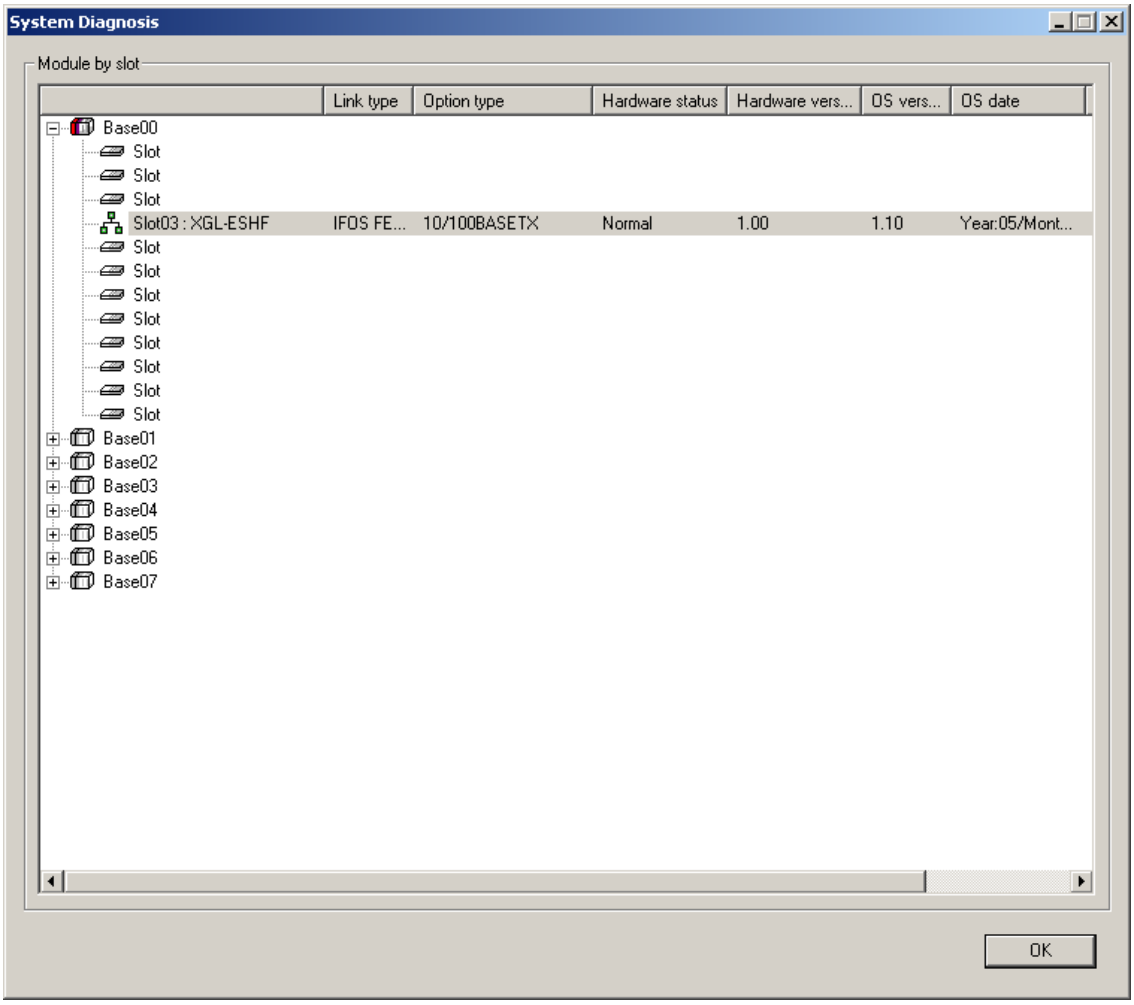
System diagnostics shows the general service status and information of Communication module. By showing detail online status such as link type, link info and O/S version, it provides a function to accurately diagnose and debug data transmission of the Communication module.

5.6.1 Execution of diagnosis

If selecting [Online] -> [System Diagnosis] upon connection by using XG-PD, it shows window as seen in [Fig 5.6.2]. It also indicates the information on base and slot of the current module and whether it works normally.



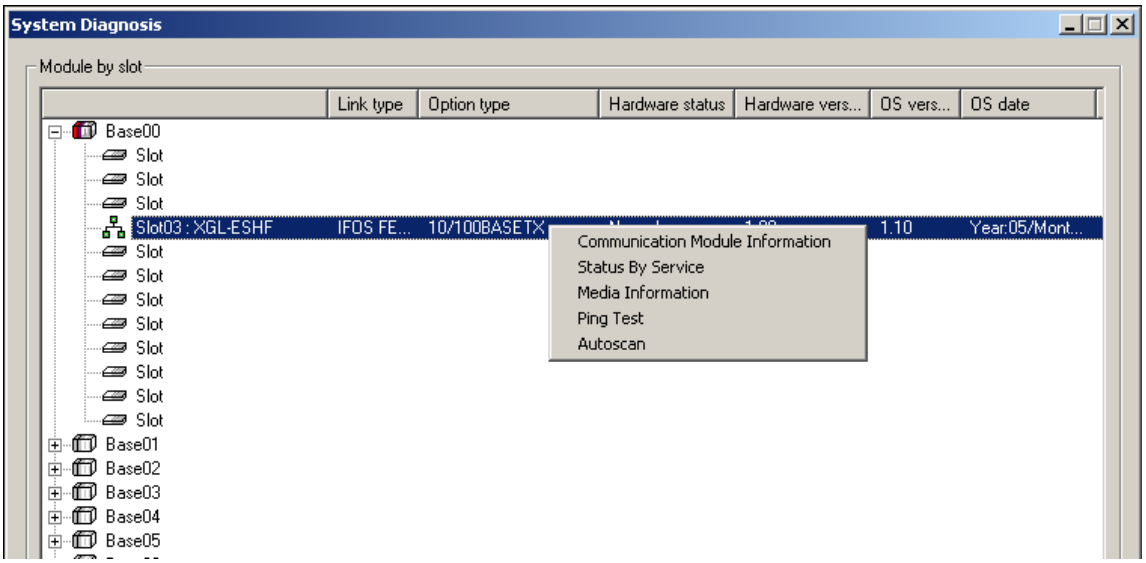
[Fig 5.6.1] Selection of System Diagnosis



[Fig 5.6.2] System Diagnosis Module Info

5.6.2 Type of diagnosis function

The system status of Communication modules can be diagnosed though pop-up menus as seen in the start page of [Fig 5.6.2] and each function of items are described in Table [5.6.1].



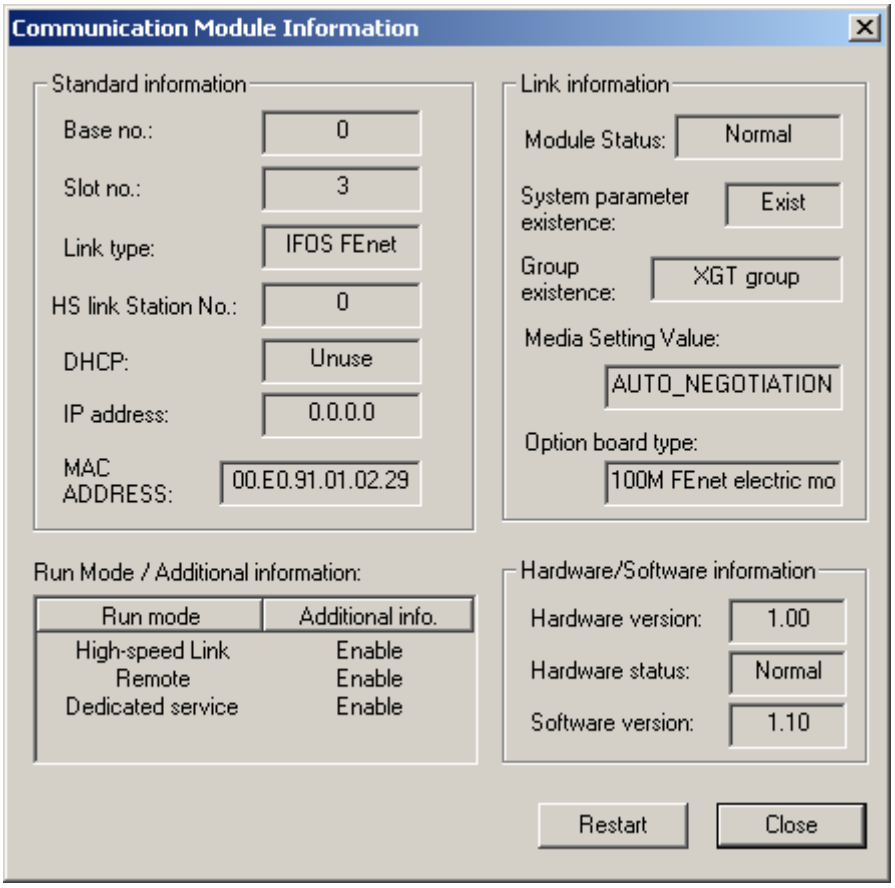
[Fig 5.6.3] Popup window of Module Diagnosis Functions

Category	Description
Communication Module Information	Basic info of Communication module, hardware and Communication status
Status by Service	Status of dedicated communication, P2P, High-speed Link service and etc
Media Information	Packet info of data sent/received though media.
Ping Test	Port connection status of other stations set in network.
Autoscan	Providing IP info activated for every module set for the current network.

[Table 5.6.1] Description of Diagnosis Service Items

1) Communication Module Information

Communication module information shows the status of media and Communication service as well as basic information such as base number, High-speed Link station number and IP info. With this, a user can see whether Communication module status is normal.



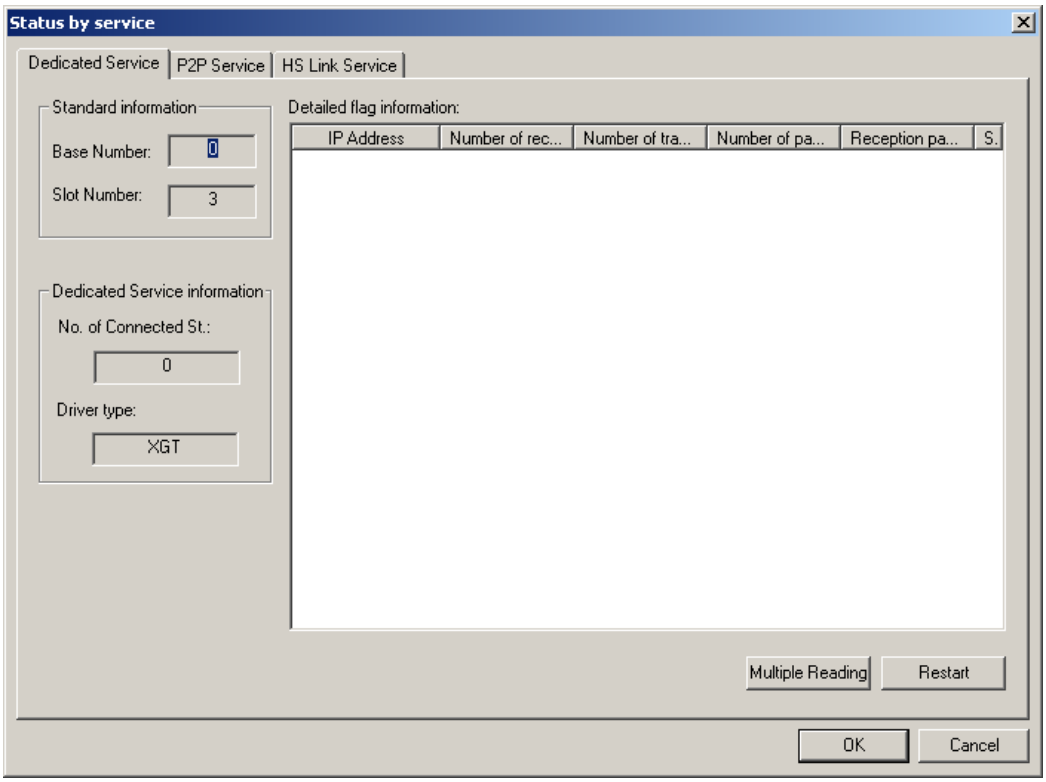
[Fig 5.6.4] Communication module info

2) Service Status

The service status of Communication module is divided into three; dedicated communication, P2P and High-speed Link and it shows detail information of each communication service.

A) Dedicated service

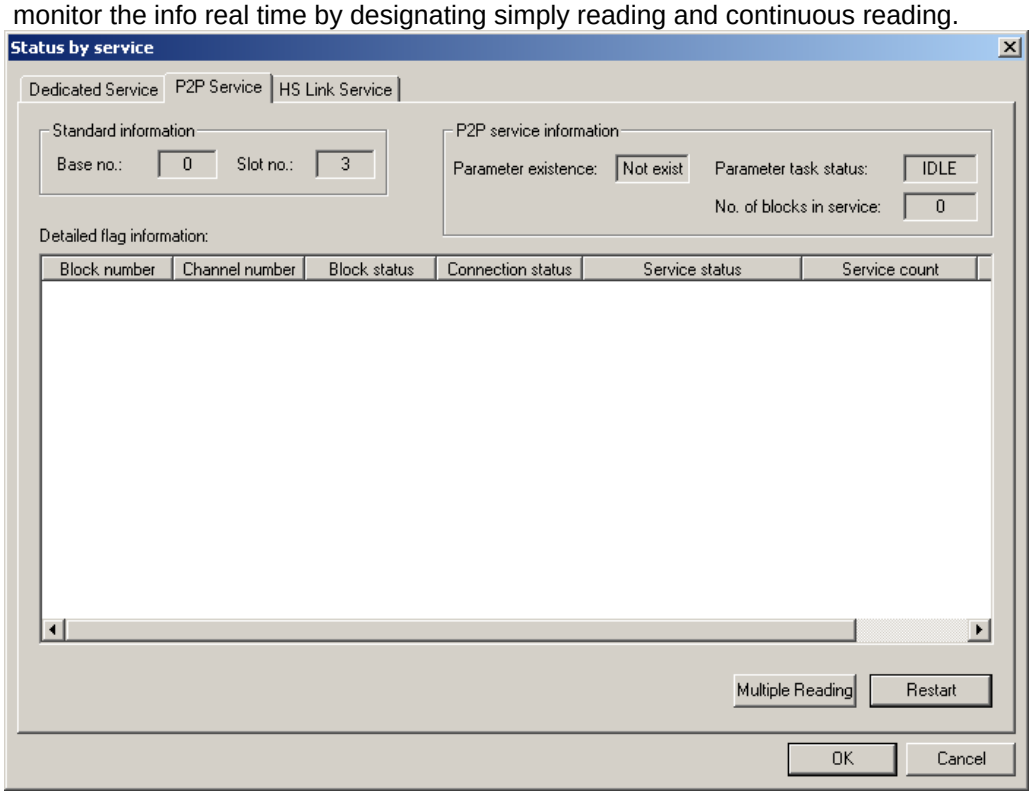
Dedicated service shows the service status of MMI or HMI protocol by higher client. It also monitors data received/sent and error for the IP set by a user.



[Fig 5.6.5] Dedicated service monitor

B) P2P service

It shows detail information about whether user-defined service is well performed. If enabled as P2P parameter is set, it reads whether the service is normal. It is designed to monitor the info real time by designating simply reading and continuous reading.

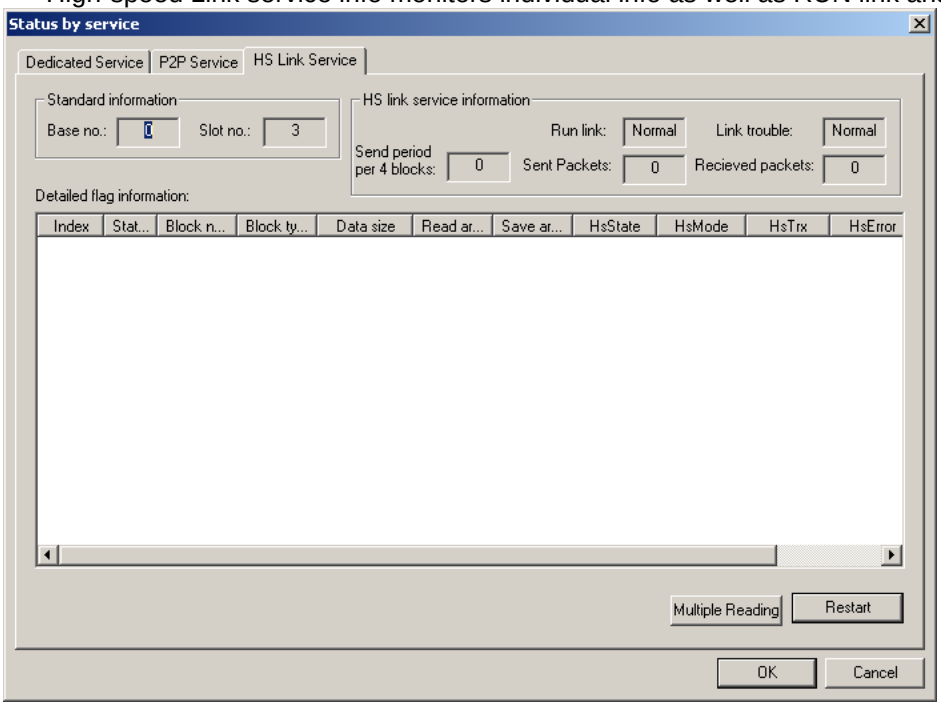


[Fig 5.6.6] P2P service monitor

C) High-speed Link Service

It monitors individual parameters for High-speed Link setting data by flags.

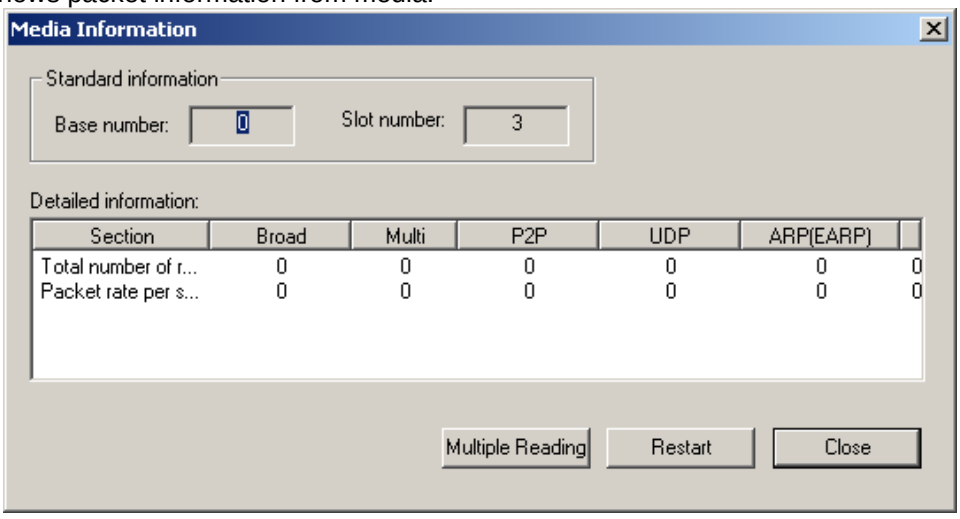
High-speed Link service info monitors individual info as well as RUN link and link trouble.



[Fig 5.6.7] High-speed Link service monitor

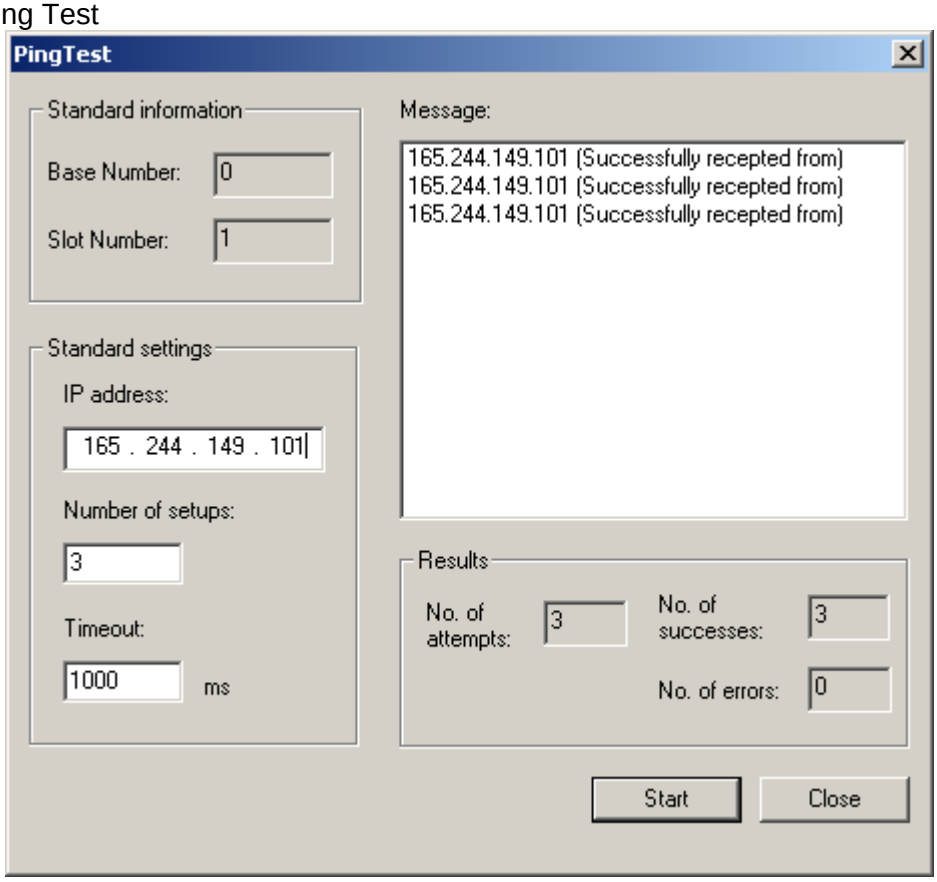
3) Media Info

It shows packet information from media.



[Fig 5.6.8] Media information

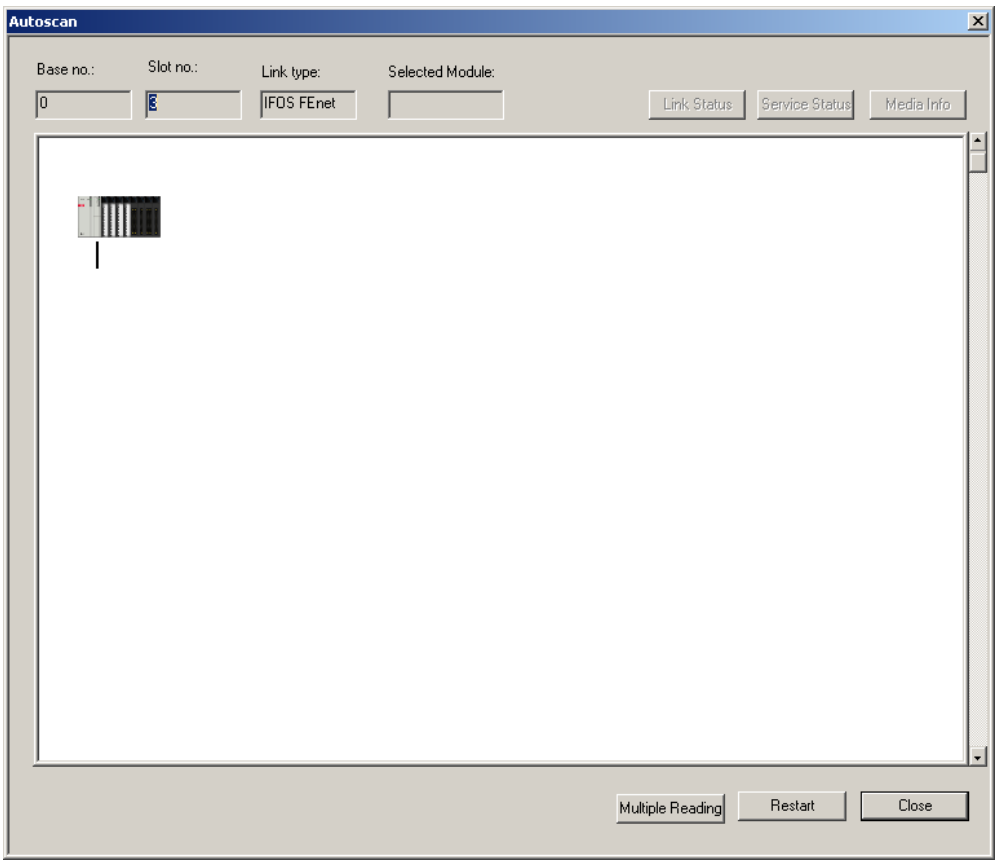
4) Ping Test



[Fig 5.6.9] Ping Test monitor for the destination station number

5) Autoscan

It shows link interface status for network in general. It also schematizes the service status of FEnet fiber optic switch module connected to a public network.



[Fig 5.6.10] Network Autoscan

Chapter 6 High-speed Link Service

6.1 Introduction

High speed link, a communication method between/among XGT PLC Communication modules is a kind of data transmission service that periodically sends and receives data by high speed parameter settings, with which a user can set data size sent/received, transmission interval, transmission area and storage in parameters to exchange data.
However, since HS link service uses subnet broad service, it may affect other Communication modules using the same network. Therefore, to maximize communication efficiency while having less influence on other modules, it is reasonable to set data as close as the max. trans-receiving size per block(400 bytes), reducing the total number of blocks. To use all functions, it is necessary to set the basic communication parameters and readily communicate.

HS link functions are as follows.

1) High-speed link Block Setting function
   (1) If trans-receiving area is plural, block can be set up to 128.
   (2) Each block can afford to set 200 words.
2) Send/Receive period Setting function
   A user can set transmission interval by parameters. To set area for specially quick transmission and the rest area separately, a user can set the interval from 20ms to 10seconds by parameters.
3) Send/Receive Area Setting function
   Send/Receive area can be set by data blocks in accordance with the I/O address.
4) High-speed link Info Providing function
   HS link info is provided to a user by keyword, facilitating reliable communication system implementation.

[Table 6.1.1] represents communication HS link points. The unit of point settable per HS link block is based on unit(16).

Category	Max. COM point(bit)	Max. transmission point(bit)	Max. block no.	Max. point per block(word)
XGL-ESHF	409,600	102,400	128(0-127)	200

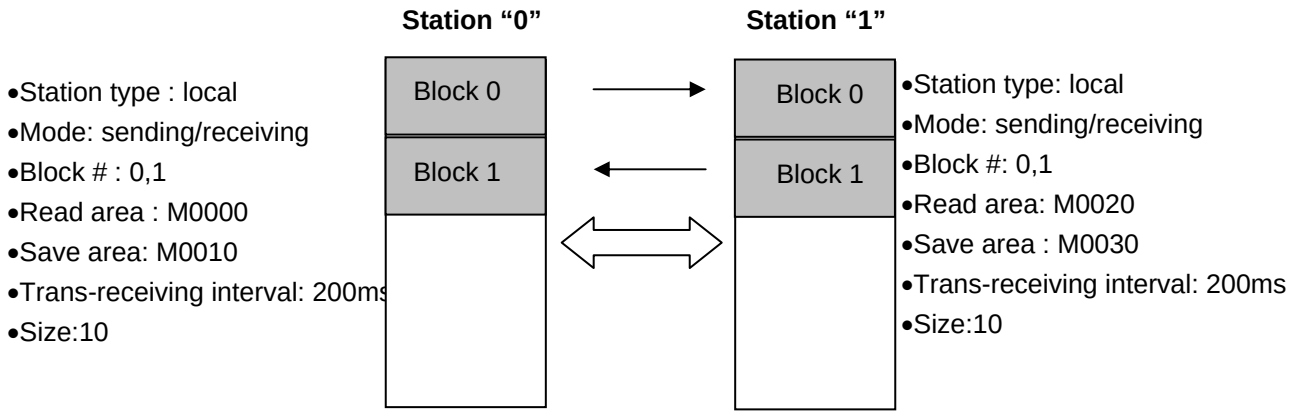
[Table 6.1.1] Max. COM point

6.2 High-speed Link Send/Receive Data Processing

Using HS link is explained with setting examples when FEnet fiber optic module of station “0” and “1” is to send/receive different data

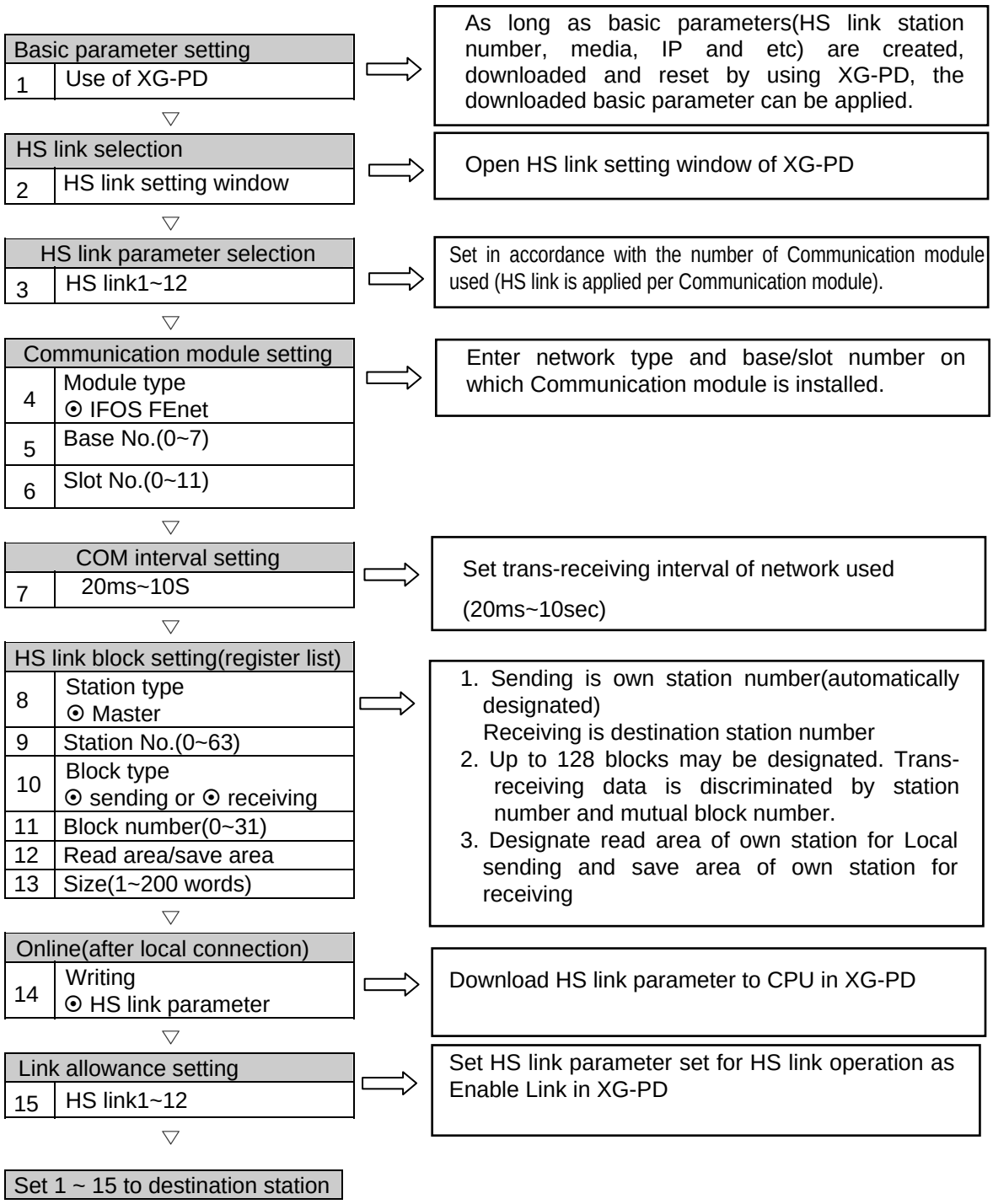
Station “0” sends M000 data of 10 words to #0 block and saves the data received form station “1” into M0010. Station “1” receives M0000 data of 10 words of station “0” into M0030 and sends M0020 data of 10 words to #1 block.

HS link parameter have 32 block numbers for sending and 64 block numbers for receiving in order to receive and send data; block number between 0 ~ 31 can be set for sending or block number between 0 ~ 63 can be set for receiving. When sending data, sending side simply determines to what number of block send which data without destination station number assigned.



[Table 6.2.1] High-speed link Processing Block diagram

6.3 Operation Procedure by High-speed Link

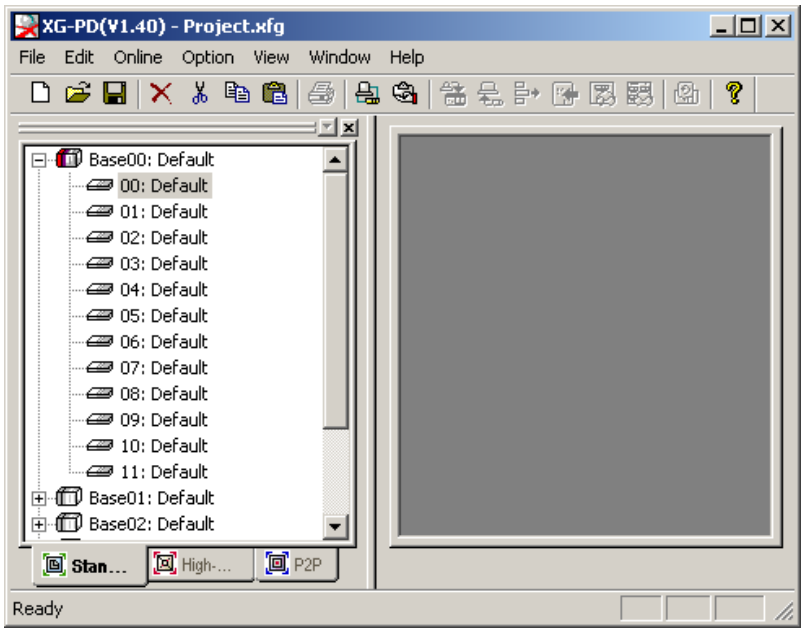


6.4 High-speed Link Parameter Setting

High-speed link Parameter is set by selecting appropriate items after selecting HS link parameter in High-speed Link window of XG-PD, and the setting procedure and items' functions are as follows.

6.4.1 Running XG-PD

If running XG-PD first, the window seen in [Fig 6.4.1] appears.
To run it, click [Tools] -> [Network Manager] of XG5000 or XG-PD icon of XG5000.



[Fig 6.4.1] Basic window of XG-PD

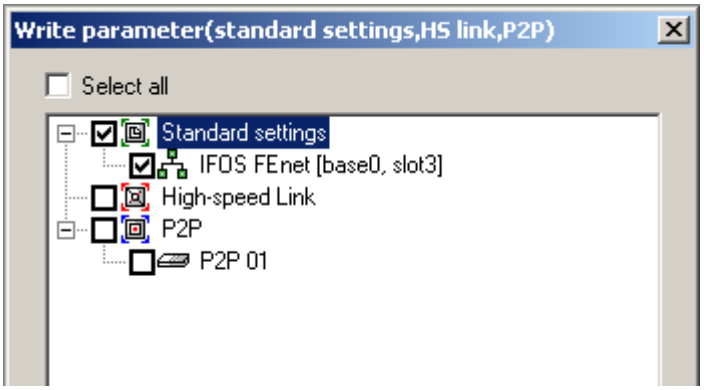
6.4.2 Standard settings (Module)

1) Setting Communication module

Communication module can be registered online or offline.
For more information, refer to 'Chapter 5 XG-PD Program.'

2) Downloading Standard settings

If selecting [Online] -> [Write Parameter], the window of [Fig 6.4.2] opens up. Check the standard settings and click OK button.
After downloading the standard settings, make sure to reset it or change PLC off to on. New parameter is not applied unless Communication module is reset.

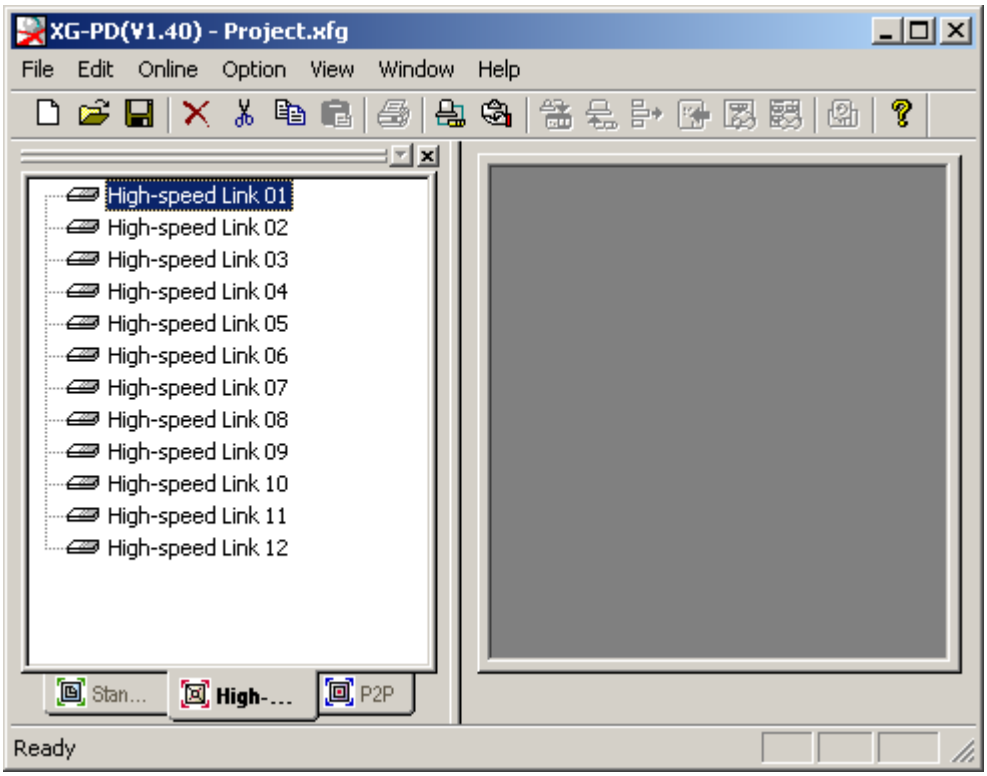


[Fig 6.4.2] Write Parameter window

6.4.3 High-speed link parameter (High-speed link)

1) Start Page Setting of High-speed link Parameter

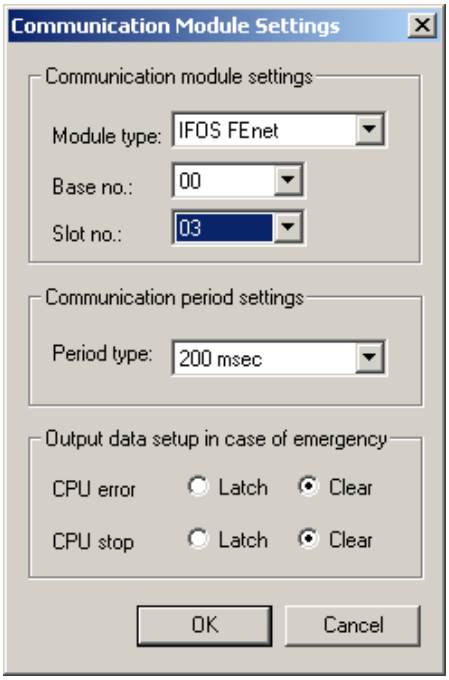
If selecting HsLink window of XG-PD, the window to register HS link parameter appears. Up to 12 HS link can be set in FEnet fiber optic switch module, and in case of the Communication module installed on the basic and extended base, parameter may be set.



[Fig 6.4.3] Start page of HS link setting

2) Communication Module settings

If double-clicking one HS between 01 ~ 12 in [Fig 6.4.3] window, the window to set Communication module and interval appears.



[Fig 6.4.4] HS link standard setting of Communication module

Set Communication module and COM interval in the window.

Item		Description
Communication module settings	Module type	As a type of Communication module installed, select IFOS FEnet.
	Base no.	Set the base location on which FEnet fiber optic switch module is installed. (0~7 base).
	Slot no.	Select slot location on which module is installed(0~11 slot)
Communication period settings	period type	- HS link is the service to send and receive at the time when PLC program ends by parameter set by a user. Therefore, if the scan time of PLC program is as short as several ms, Communication module sends data according to program scan, from which the increased communication load may lower the efficiency of the entire communication system. To prevent it, it allows that a user can set trans-receiving interval form 20ms to 10s; if no setting, the default is automatically 200ms. - Sending interval is available only for block set for sending. - Sending interval is equally applied to the entire sending block within a HS link parameter.

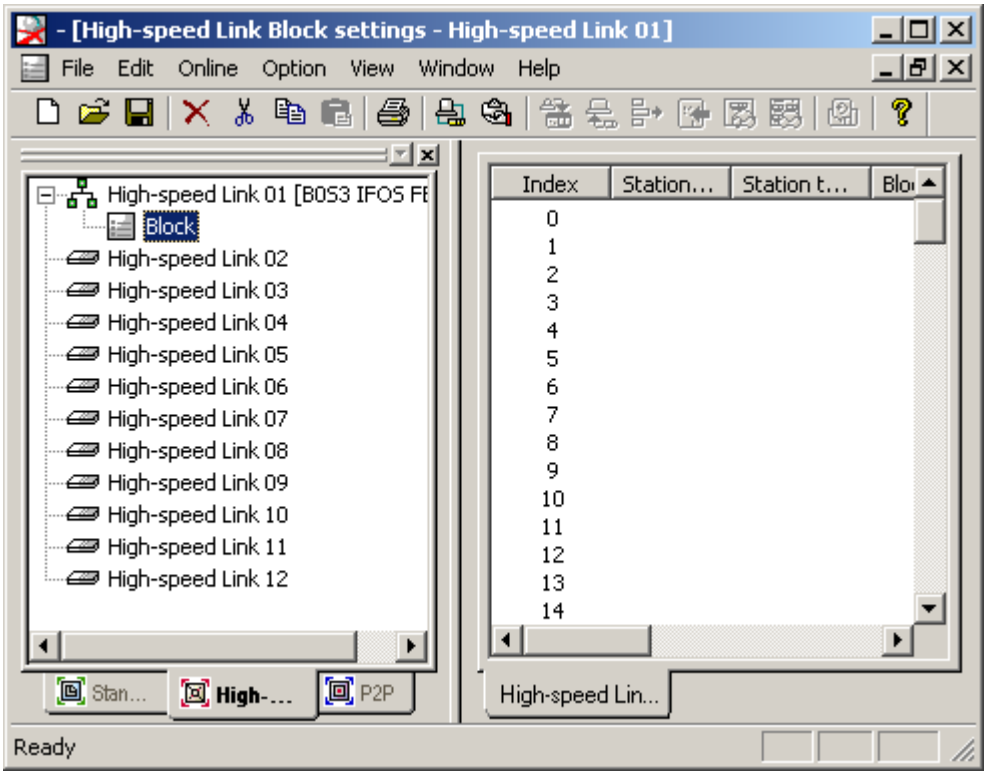
(continued)

Item		Description
Output data setup in case of emergency	Latch	It maintains and sends the latest data received from CPU. It shows 'clear' if CPU sends data as 0 even though it is set as latch. Make sure to check the emergency output data setting of CPU.
	Clear	Ignoring data received from CPU, it sets and transmits HS link sending data as 0. If setting emergency output data setting is set as 'clear' even though the emergency output data setting of device area in the sending side of HS link in CPU is set as latch, it sends data set as 0. After check a desired operation, set it.

[Table6.4.1] Communication module settings and period settings

3) HS link parameter setting

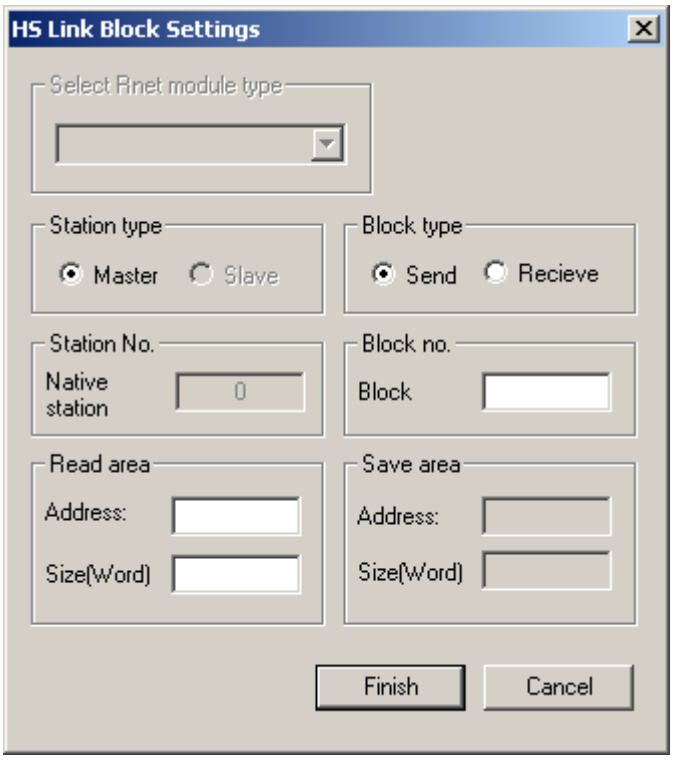
If clicking OK button in [Fig 6.4.4], the window to register parameter is created while [Fig 6.4.5] appears.



[Fig 6.4.5] High-speed link Block selection window

4) High-speed link Block Setting

To register HS link parameter, double-click the register window. Then, [Fig 6.4.8] window opens up.



[Fig 6.4.6] High-speed link Parameter Setting Window

Category		Description
Station type	Master	FEnet fiber optic switch module works as master. It does not support slave function.
Station number	Own station number/destination station number	Designate own module for sending or destination module for receiving. The station number used for HS link is between 0 ~ 63. Since the number is own station number or unique number discriminating Communication module in a same network system, any duplicate station number can not be used. It is necessary to assign station number before use.
Read area	Address	Memory area of a module to send Available memory area: P,M,K,F,T,C,U,Z,L,N,D,R,ZR For the size and range of each memory area, refer to Appendix XGK CPU Memory Device Exhibit.
	Size(word)	Represent the size of data to send
Block type	Sending	Send data
	Receiving	Receive data
Block number	Block number	Set trans-receiving block.

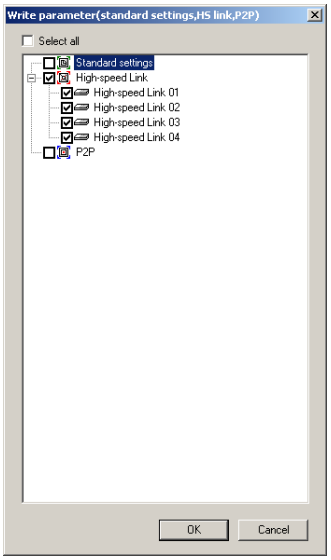
(continued)

Category		Description
Save area	Address	Save area to receive and save data from destination station. Available memory area: P,M,K,F,T,C,U,Z,L,N,D,R,ZR For the size and range of each memory area, refer to Appendix XGK CPU Memory Device Exhibit.
	Size(word)	Data size to receive.

[Table 6.4.2] High-speed link Setting

5) High-speed link Parameter Download

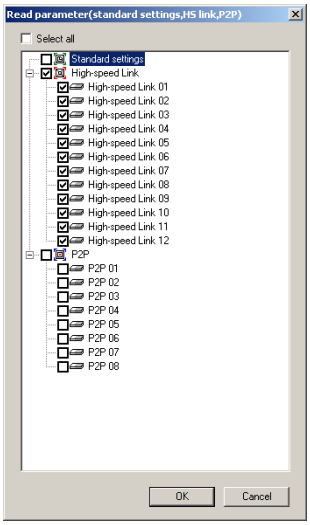
Once HS link parameter setting is complete, select [Online] -> [Write Parameter](standard setting, HS link, P2P), check the HS link and click OK button.



[Fig 6.4.7] Writing Parameter window

6) High-speed link Parameter Enable

Select [Online] -> [Enable Link] in XG-PD, check the High-speed link and click Write button. If HS link is enabled, HS LED is on in LED indication of the module and it starts HS link.



[Fig 6.4.8] Enable Link window

6.5 High-speed Link Information

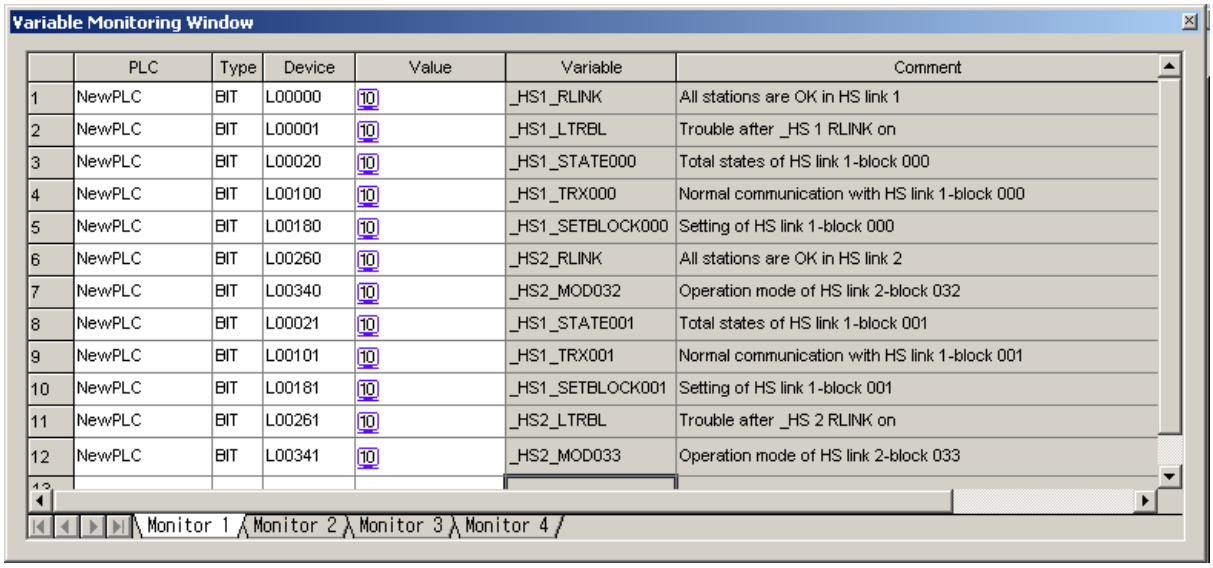
6.5.1 High-speed link flag

High-speed link service executes exchange of data between Communication modules of two and more stations, so it provides a user with a method to check HS link service status in order to see the data reliability as HS link info. That is, Communication module integrates the data that are periodically received in order to check whether HS link operates by user-defined parameter, and HS info contains RUN-Link(_HSxRLINK) showing the entire COM network info, the entire info of Link-Trouble(_HSxLTRBL) and individual info of _HSxSTATE, _HSxTRX, _HSxMOD and _HSxERR showing COM status of 64 registered items in parameter. A user can use the above information as keyword type when creating a program and monitor HS link status by using HS link info monitoring function. Before use, it is necessary to check the reliability of data sent/received by using HS link info including RUN-Link, Link-Trouble and etc when operating several PLC through HS link. [Table 6.5.1] shows the functions and definitions of HS link information.

Category	Run-link	Link-trouble	Send/Receive status	Operating mode	Error	HS link status
Info type	Entire	Entire	Individual	Individual	Individual	Individual
Keyword name (x=HS link number)	_HSxRLINK	_HSxLTRBL	_HSxTRX[n] (n=0..128)	_HSxMOD[n] (n=0..128)	_HSxERR[n] (n=0..128)	_HSxSTATE[n] (n=0..128)
Data type	Bit	Bit	Bit-Array	Bit-Array	Bit-Array	Bit-Array
Monitoring	Y	Y	Y	Y	Y	Y
Program	Y	Y	Y	Y	Y	Y

[Table 6.5.1] HS link info functions

If selecting [Variable/Comment] in XG5000 project window of [Fig 6.5.1], it shows Flag View window. In the window, drag a device and move it to Variable monitor window.



	PLC	Type	Device	Value	Variable	Comment
1	NewPLC	BIT	L00000	10	_HS1_RLINK	All stations are OK in HS link 1
2	NewPLC	BIT	L00001	10	_HS1_LTRBL	Trouble after _HS 1 RLINK on
3	NewPLC	BIT	L00020	10	_HS1_STATE000	Total states of HS link 1-block 000
4	NewPLC	BIT	L00100	10	_HS1_TRX000	Normal communication with HS link 1-block 000
5	NewPLC	BIT	L00180	10	_HS1_SETBLOCK000	Setting of HS link 1-block 000
6	NewPLC	BIT	L00260	10	_HS2_RLINK	All stations are OK in HS link 2
7	NewPLC	BIT	L00340	10	_HS2_MOD032	Operation mode of HS link 2-block 032
8	NewPLC	BIT	L00021	10	_HS1_STATE001	Total states of HS link 1-block 001
9	NewPLC	BIT	L00101	10	_HS1_TRX001	Normal communication with HS link 1-block 001
10	NewPLC	BIT	L00181	10	_HS1_SETBLOCK001	Setting of HS link 1-block 001
11	NewPLC	BIT	L00261	10	_HS2_LTRBL	Trouble after _HS 2 RLINK on
12	NewPLC	BIT	L00341	10	_HS2_MOD033	Operation mode of HS link 2-block 033

[Fig 6.5.1] Variable Monitor Window

1) RUN-Link(_HSxRLINK)

As a type of entire information showing whether HS link is normally executed by parameter, it maintains ‘On’ till it turns ‘off’ if it is set as ‘on’ once. And it is ‘on’ in the following conditions.

A) Enable Link is ‘On’

B) Parameter register list settings are all normal

C) All data of parameter register list are sent/received according to the interval

D) All destination stations set in parameter is RUN and there is no error.

2) Link-Trouble(_HSxLTRBL x=HS Link Number(1~12))

As a type of entire information showing whether HS link is normally executed by parameter, it is on when it violates a condition that RUN Link is on and it turns off if recovered.

3) Send/Receive status(_HSxTRX[0..128] x=HS Link number(1~12))

As a type of individual information showing operations by HS link parameter register lists, it shows trans-receiving information of up to 128 register lists. If trans-receiving operation for register item meets the trans-receiving interval, the bit is on, or it turns off.

4) Operation Mode(_HSxMODE[0..128] x=HS Link number(1~12))

As a type of individual information showing operations by HS link parameter register lists, it shows operation mode information of up to 128 register lists. If the station set for the register item is Run mode, the bit is on; if in Stop/Pause/Debug mode, it is off.

5) Error(_HSxERR[0..128] x=HS Link number(1~12))

As a type of individual information showing operations by HS link parameter register lists, it shows error information of up to 128 register lists. Error shows a situation that PLC may not execute user's program normally; off means destination station PLC works normally and on means destination station is in abnormal status.

6) High-speed link Status(_HSxSTATE[0..128] x=HS link number(1~12))

As a type of individual information showing operations by HS link parameter register lists, it shows error information of up to 128 register lists as same as the max. register number, in which it indicates general information about register lists by integrating individual items' information. That is, on means that the item's trans-receiving status is normal, operation mode is Run and there is no error; if not, it shows off.

6.5.2 High-speed link information monitoring

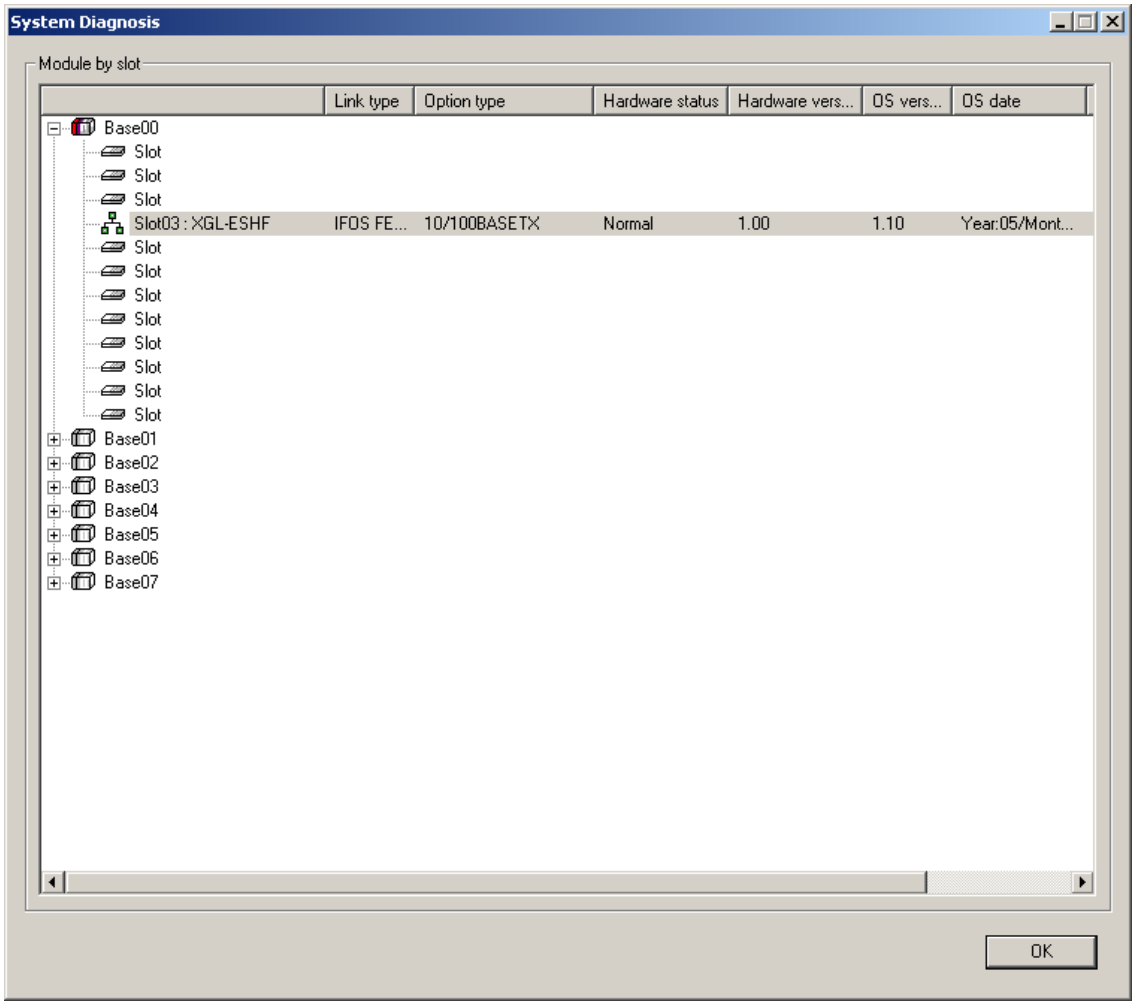
High-speed link info can be checked by using variable monitor in monitor menu after connecting to XG5000 or the diagnostic service of XG-PD.

1) Variable Monitor

Variable monitor is a function to monitor by selecting the only necessary items using flag monitor function of XG5000. If [Fig 6.5.1] variable register window appears when selecting 'Variable Monitor Window' of 'View', select HS info flag in the variable flag list window one by one and register them. At the moment, since _HSxSTATE[n], _HSxERR[n], _HSxMOD[n] and _HSxTRX[n] are Array type flag, a user should directly select the array number, which means the register number in the parameter

2) High-speed link Monitor in XG-PD Diagnostic Service

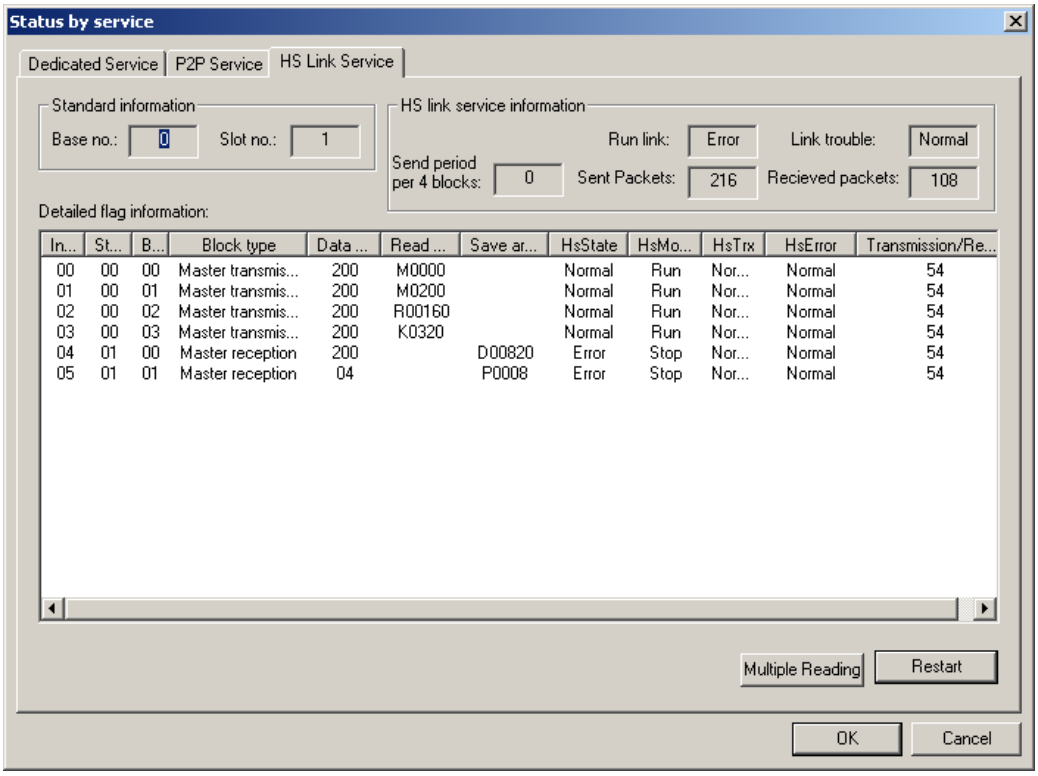
A) Run [Connect] -> [Online] -> [System diagnosis] of XG-PD.



[Fig 6.5.2] System diagnosis

Item	Description
Link type	Indicates Communication module type.
Option type	Indicates media type of Communication module.
Hardware status	Indicates H/W status.
Hardware version	Indicates H/W version.
OS version	Indicate OS version.
OS date	Indicates OS distribution date.
Remote access	Indicates remote connection.

3) If right clicking with cursor placed on XGL-ESHF and clicking ‘Status by Service’, it shows the window in [Fig 6.5.3].



[Fig 6.5.3] XG-PD System Diagnosis (status by services)

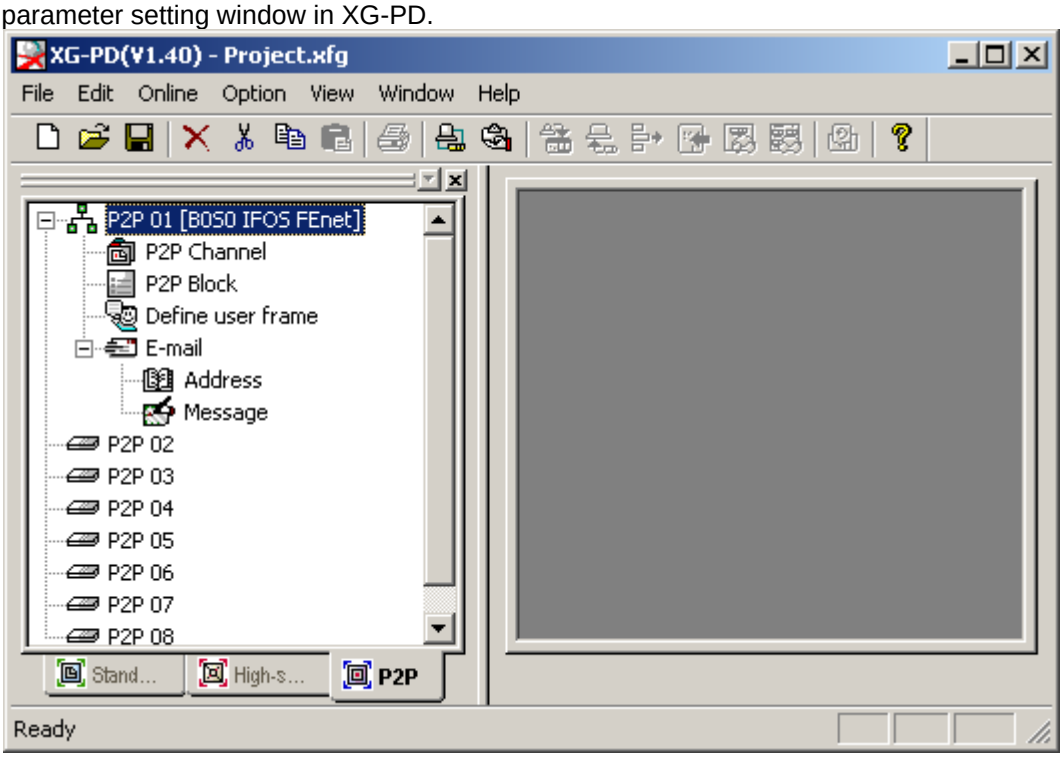
Chapter 7 P2P Service

7.1 Introduction

7.1.1 Introduction of P2P service

P2P service operates master operation of Communication module that is embodied by parameter setting, which was embodied by function block(Instruction) in the past. P2P Instructions available in FEnet fiber optic switch module are 6; Read, Write, Send, Receive, ESend and EReceive.

P2P service is registered and edited in XG-PD and up to 8 P2P parameters can be set. Each P2P parameter consists of up to 64 P2P blocks. [Fig 7.1.1] shows an example of P2P parameter setting window in XG-PD.



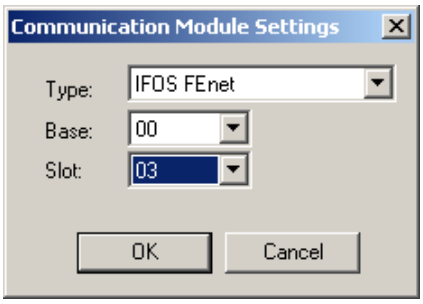
[Fig 7.1.1] P2P Parameter Setting Window of XG-PD

1) P2P Parameter Registration Window
- Up to 8 P2P parameters can be set.
- Multiple P2P parameters can be set for a same Communication module.
  But, Enable allows only one of multiple P2P parameters for a same Communication module.
- Each P2P parameter consists of P2P channel, P2P block, user-defined frame and email.

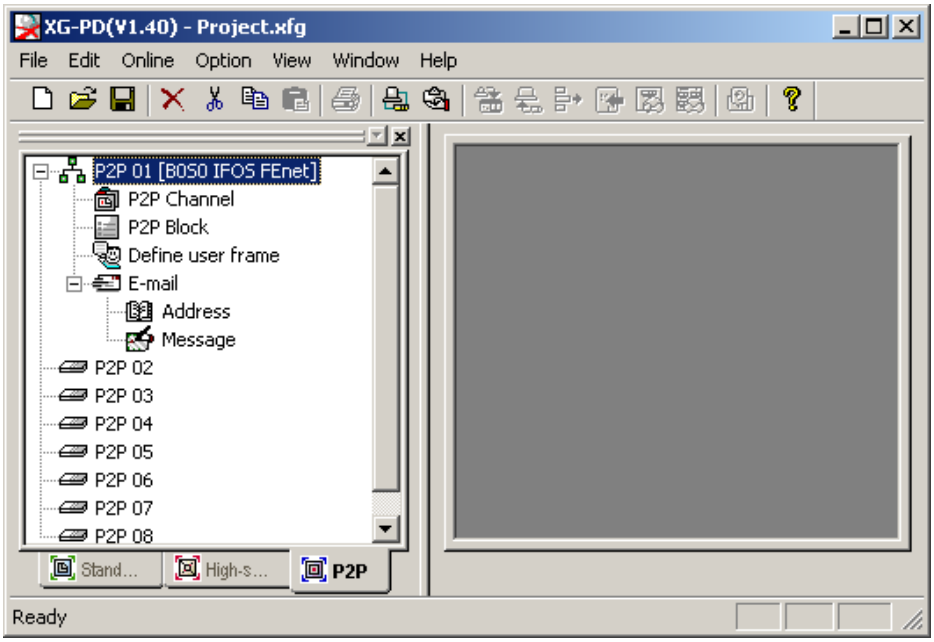
2) P2P Edit Window
- Up to 64 P2P blocks can be registered and edited.
- Frames can be registered by drivers.

7.1.2 P2P parameter structure

A user should complete settings for desired operation in P2P parameter window. If setting type, base and slot in P2P window, it opens up the window to set parameter consisting 4 information blocks.



[Fig 7.1.2] P2P parameter module selection



[Fig 7.1.3] P2P parameter setting register window

1) P2P Channel
- Set the logical channel of P2P service to execute(IP, PORT, dedicated driver)
- Set Define user frame, XGT client and Modbus TCP client
- Set COM device using other protocol but XGT/Modbus TCP client.

2) P2P Block
- Set 64 P2P blocks that work independently

3) Define user frame
- Register define user frame

4) Email
- Register frame to receive/send email frame

7.2 Types of P2P Service

7.2.1 P2P instruction type

1) P2P Instruction

P2P Instructions used by user when creating a program can be classified into 6 types. Considering that use of Instruction depends on service method, refer to the following table.

Category	Instruction	Application
XGT(GLOFA) client	Read	Reading designated area of destination station
	Write	Sending data in own station area to destination station
Define user frame	Send	Sending data in own station area to destination station
	Receive	Receiving and saving data sent from destination station
Modbus TCP client	Read	Reading designated area of destination station
	Write	Sending data in own station area to destination station
E-mail	ESend	Sending a message when an event occurs
	EReceive	Receiving a message when an event occurs

[Table 7.2.1] Type of P2P Instructions

7.2.2 P2P services

1) XGT client

XGT client Service is used to define receiving/sending data between XGT FEnet fiber optic switch modules. Communication can be simply set as a user designates basic settings such as channel and data type(bit, byte, word and etc) and memory area through the built-in internal protocol without any separate frame definition. In general, if TCP, it uses 2004 port and if UDP, it uses 2005 port.

2) Define user frame

For communication between XGT FEnet fiber optic switch modules or between other devices, this service allows a user to define other protocol in XGT IFOS FEnet. Since the communication protocol of Ethernet-based device is differently defined by manufacturers and it is not possible to support all the protocols as drivers, a user should be able to apply and edit it suitable for the characteristics of the Communication module. For this, it is necessary to define Ethernet user frame after designating Define user frame and it has the basic structure of header, BODY and tail. Up to 16 channels can be set. Since channel can be assigned to dedicated channel, the max. available channel in P2P is 13 if the number of dedicated channel is 3.

3) Modbus TCP client

XGT IFOS FEnet supports MODBUS protocol that is widely used but for Define user frame.

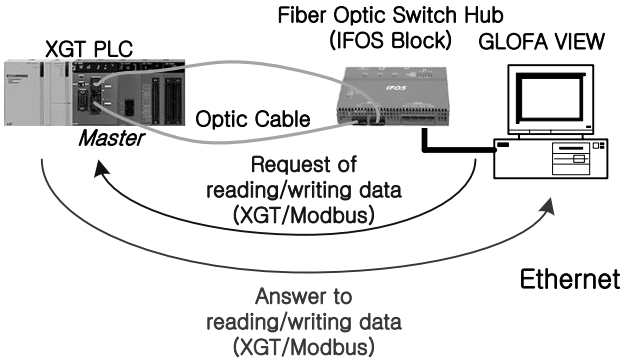
7.3 P2P Service Setting

7.3.1 Ethernet (Server) driver

1) Driver Setting

Ethernet(server) driver is called server protocol built in XGT IFOS FEnet. There are built-in protocols such as XGT server and MODBUS TCP/IP. Ethernet(server) driver is used when destination station reads FEnet fiber optic switch module data by using MODBUS or XGT protocol or when writing destination station data to the memory of FEnet fiber optic switch module. Most communication destination stations are MMI(or HMI). It enables a user to communicate with destination device only with parameter settings without any separate program created. [Fig 7.3.1] shows an example of communicating MMI PC, a prototype using Ethernet driver. It operates as IFOS FEnet responds to the request from MMI PC.

To connect MMI PC such as GLOFA View to IFOS FEnet, a separate fiber optic switch is needed.



[Fig 7.3.1] Example of using Ethernet(server) driver

2) Ethernet(server) driver types

Supportable drivers are as follows.

Type	Description
XGT server	**XGT FEnet fiber optic dedicated protocol of LSIS**
MODBUS TCP/IP server	**Modicon's open type protocol**

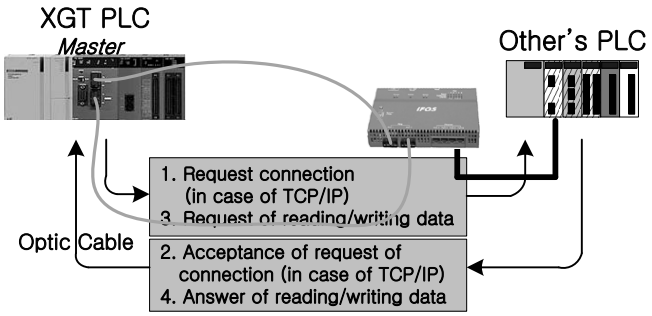
[Table 7.3.1] Ethernet driver types

Remark

1) The number of drivers varies depending on Ethernet channels set beforehand and the number of drivers is reduced as much as the number set. Note the above.
2) Ethernet(server) driver is available for 1:N communication. Therefore, data can be taken by connecting a port set with several clients.

7.3.2 P2P channel

Ethernet P2P channel is used when it is to work as master by using the built-in protocol of XGT IFOS FEnet or to communicate by user defined protocol.



[Fig 7.3.2] Example of using P2P channel information

1) P2P Channel Setting

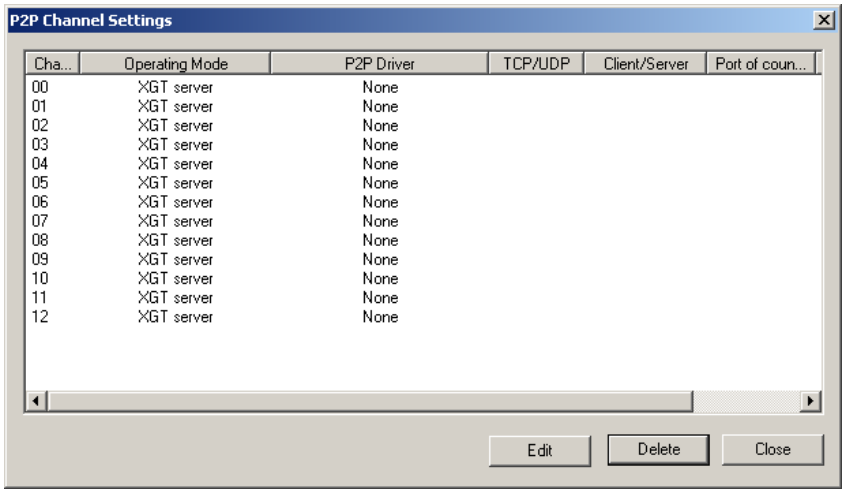
IFOS FEnet I/F can send and receive data by using up to 16 channels and each channel consists of IP address and port number of two communication devices. The number of channels available in P2P is calculated by subtracting the number of dedicated connection in the basic parameter from the total channel number(16)(No. of P2P channel = 16 – no. of dedicated connection)

For user's convenience, P2P can support communication even simply by setting parameter for the communication with a device using XGT, MODBUS TCP protocol and also supports a function of communication by user's definition of frame.

In addition, it is possible to register message and mail address to send and receive email frame(supporting ASCII)

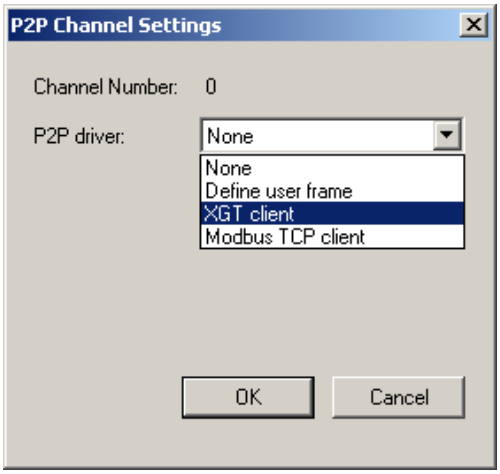
But, it does not need to set a channel for emailing.

If selecting P2P channel in P2P setting window, P2P channel setting window appears as below.



[Fig 7.3.3] P2P Channel Setting Window

If selecting a port for setting, “P2P Channel Setting” window appears, where a user can define the P2P driver type for the port.



[Fig 7.3.4] P2P Driver client selection

The driver type selectable in XGT IFOS FEnet I/F and the meaning are as follows.

Driver	Meaning
None	Do not use P2P service
Define user frame	Used when receiving and sending a desired define user frame
XGT client	Select it when reading/writing XGT memory
Modbus TCP client	Select it when operating by Modbus TCP client

[Table 7.3.2] Types of P2P driver clients

If selecting XGT or Modbus for COM port as P2P driver type, a define user frame is not available.

A) Directions of Modbus Driver

The below [table 7.3.3] shows the Instructions and address of Modbus device.

Code	Function code name	Modicon PLC Data address	Remarks
01	Read output junction status(Read Coil Status)	0XXXX(bit-output)	Read bit
02	Read input junction status(Read Input Status)	1XXXX(bit-input)	Read bit
03	Read output register(Read Holding Registers)	4XXXX(word-output)	Read word
04	Read input register(Read Input Registers)	3XXXX(word-input)	Read word
05	Write output junction 1 bit(Force Single Coil)	0XXXX(bit-output)	Write bit

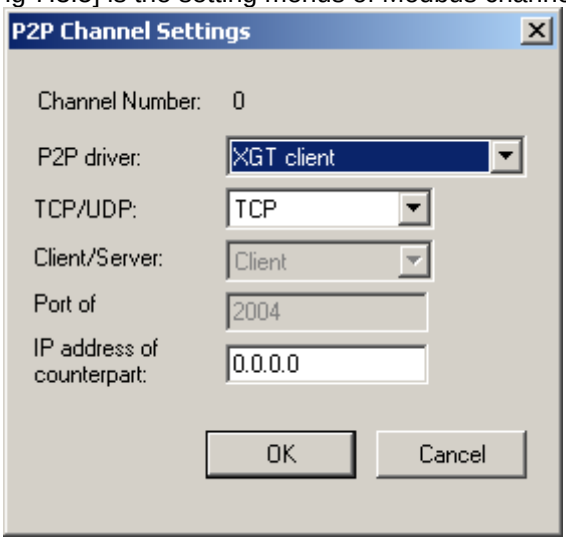
(continued)

Code	Function code name	Modicon PLC Data address	Remarks
06	Write output register 1 word (Preset Single Register)	4XXXX(word-output)	Write word
15	Writing output junction continuously (Force Multiple Coils)	0XXXX(bit-output)	Write bit
16	Write output register continuously (Preset Multiple Register)	4XXXX(word-output)	Write word

[Table 7.3.3] Modbus TCP Address MAP

2) P2P Channel Setting

To use P2P service, it is necessary to set a channel and IP address of a device for communication. [Fig 7.3.5] is the setting menus of Modbus channel.



[Fig 7.3.5] Example of Modbus TCP Channel Setting

Next is about driver setting items.

Item		Description
P2P driver	none	Not designated
	Define user frame	As a protocol used for communication with destination device, it is user defined protocol (defining protocol).
	XGT client	XGT dedicated (built-in) protocol. (not define frame)
	Modbus TCP client	Define operation with MODBUS TCP protocol of MODICON.
TCP/UDP		Fixed as TCP if selecting among TCP/UDP and selecting Modbus TCP

(Continued)

Item	Description
Client/Server	Fixed as client if selecting in Client/Server and then selecting protocol as XGT/Modbus TCP. (operating as master.)
Destination station port	Input the port number of destination station. Designate a temporary port when defining protocol as define user frame and it is settable between H400 ~ H1024. But, XGT client is fixed as 2004 and TCP client as 502.
Destination IP address	Input IP address destination device to communicate with XGT IFOS FEnet with a designated channel.

Remark

1) Destination Station IP

If XGT is a client, make sure to set IP address of server device. Since IP address continuously changes if a server uses DHCP and is assigned with IP dynamically, communication is not possible because of changed IP. Therefore, it should have a fixed IP address and using DHCP makes communication impossible.

7.3.3 Define user frame

In case a user sends a desired frame or receives frame on network, the sending/receiving frame should be defined. It is only available for P2P service.

Every frame consists of header, data and tail and each can be omitted.

The Define user frame in XGT is expressed with group name and frame name and each means as follows.

1) Group
   A) A group of frames of which header and tail are same
   B) It is necessary to register a group in order to register frames.
2) Frame
   A) It consists of Header, Body and Tail.
   B) It defines receiving/sending frames.
   C) It is designed to add fixed/variable size variable to Body.
   D) Frame consists of various segments and up to 4 variable segments can be registered to a body.

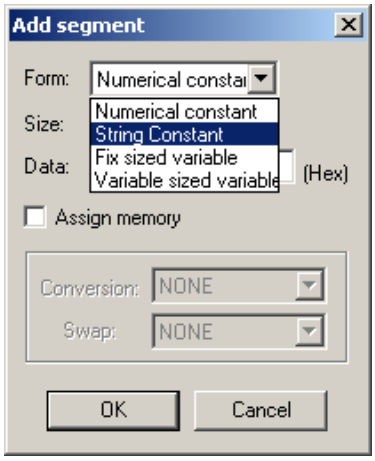
3) Segment Types

Frame consists of Header, Body and Tail and it is registered to the below frame editing window.

Nu...	Form	Size	Data	Memory
00	Numerical const...	1	05	
01	String Constant	3	TST	

[Fig 7.3.6] Segment Registration

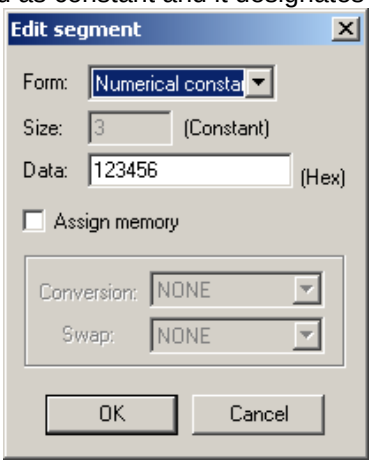
Segments of frame are Numeral Constant, String Constant, Fixed sized variable and Variable sized variable.



[Fig 7.3.7] Segment addition window

A) Numeral constant

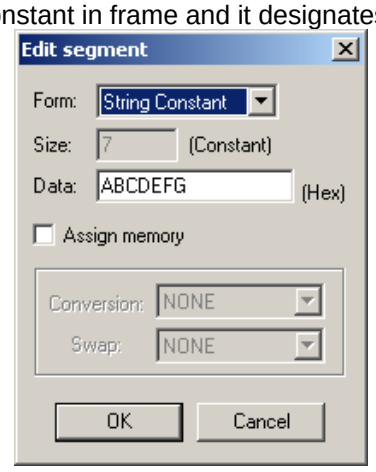
It defines a part fixed as constant and it designates the value of data term as Hex.



[Fig 7.3.8] Selection and Entry of Numeral Constant

B) String Constant

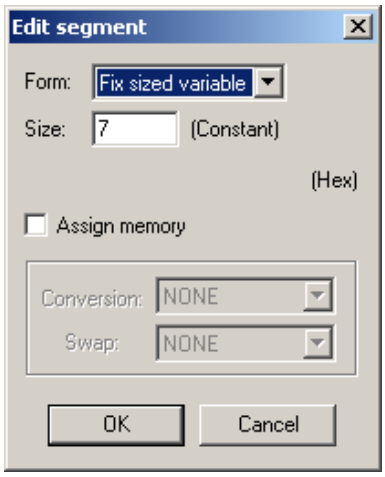
It registers string constant in frame and it designates the value of data term as ASCII.



[Fig 7.3.9] Selection and Registration of String Constant

C) Fixed sized variable

Fixed size variable is available only in body of frame. If checking memory designation when processing data as much as defined in received frame(bytes), it may be saved in PLC memory. At the moment, the saved data is readily designed for conversion and swap.



[Fig 7.3.10] Selection and registration of Fixed sized variable

D) Variable sized variable

(1) Available in body of frame

(2) Sending frame

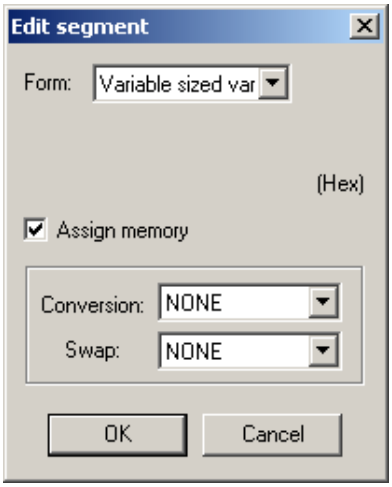
It is used to make the length of frame variable and if checking memory designation, the frame consists of data read from PLC memory.

(3) Receiving frame

a) It is used to process variable size data in frames received.

b) The only last segment in body can be registered.

Here, if designating memory, the data for the segment in frames received is saved(swap, conversion process available)



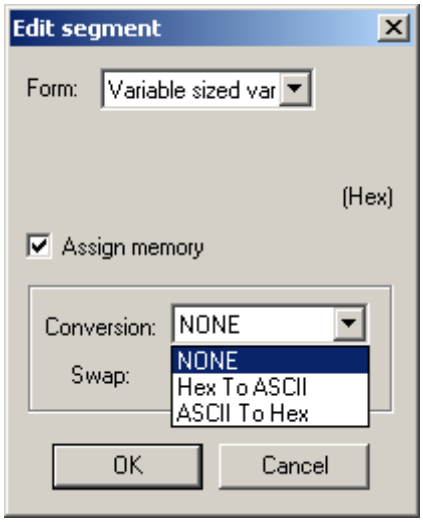
[Fig 7.3.11] Selection and registration of Variable sized variable

(4) Data conversion process

In case converting data from hex to ASCII or executing byte swap and etc when sending or receiving data, it can be defined in frame edit window.

a) Conversion

- Hex To ASCII
  Sending: structuring sending frame by converting data read from PLC to ASCII
  Receiving: Converting and saving received data in ASCII
- ASCII To Hex
  Sending: structuring sending frame by converting data read from PLC memory to Hex
  Receiving: converting and saving received data



[Fig 7.3.12] Selection of data processing method

When structuring sending frame, use 2 words of PLC memory MW100 and to convert it from Hex to ASCII, the segment of the sending frame is structured with “4567” if h34353637 is saved in MW100.
And, if converting and saving part of received frame to Hex, h34353637 is saved in PLC memory if the value of the area is “4567.”

b) Swap

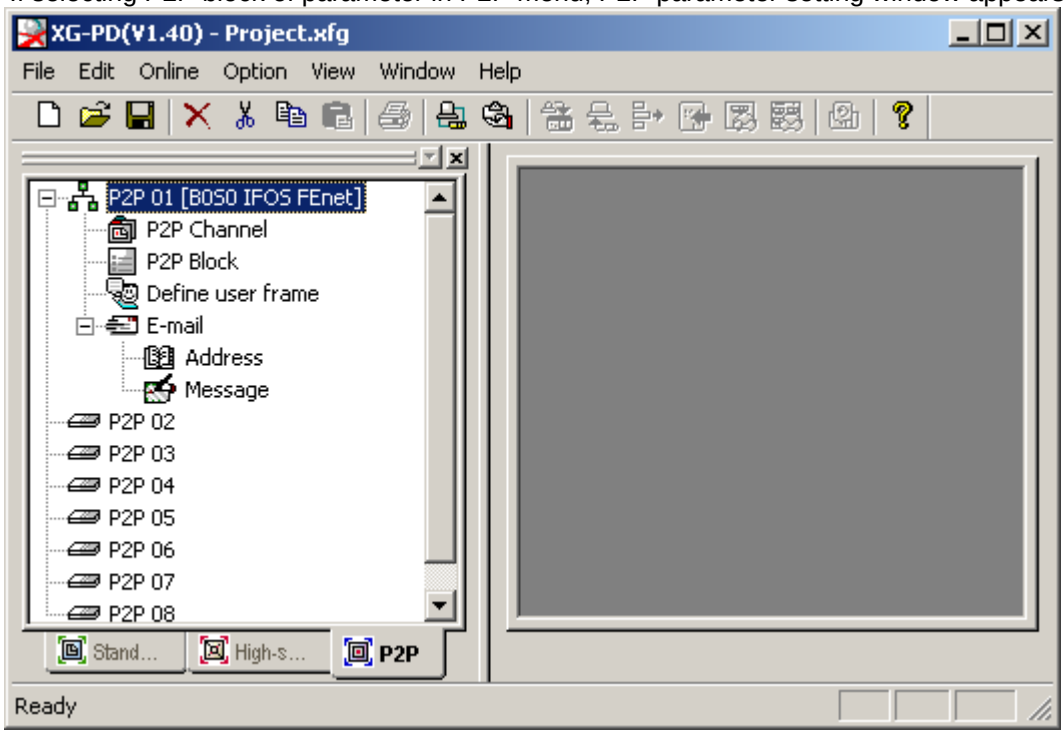
- 2 bytes
  2 bytes Swap of the part in receiving/sending frame
- 4 bytes
  4 byes Swap of the part in receiving/sending frame
- 8 bytes
  8 Swap of the part in receiving/sending frame

When converting h1234567811223344 by each method, the results are as follows.

- 2 bytes Swap : h3412785622114433
- 4 bytes Swap : 7856341244332211
- 8 bytes Swap : 4433221178563412

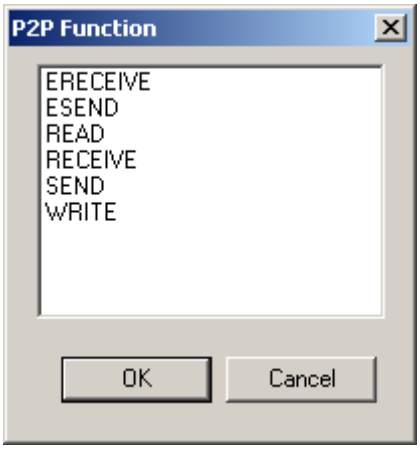
7.3.4 P2P block

If selecting P2P block of parameter in P2P menu, P2P parameter setting window appears.



[Fig 7.3.13] Selection of P2P block

Up to 64 independent blocks can be set. If selecting a temporary block in XG-PD, it is possible to designate the operation of block by function selection.

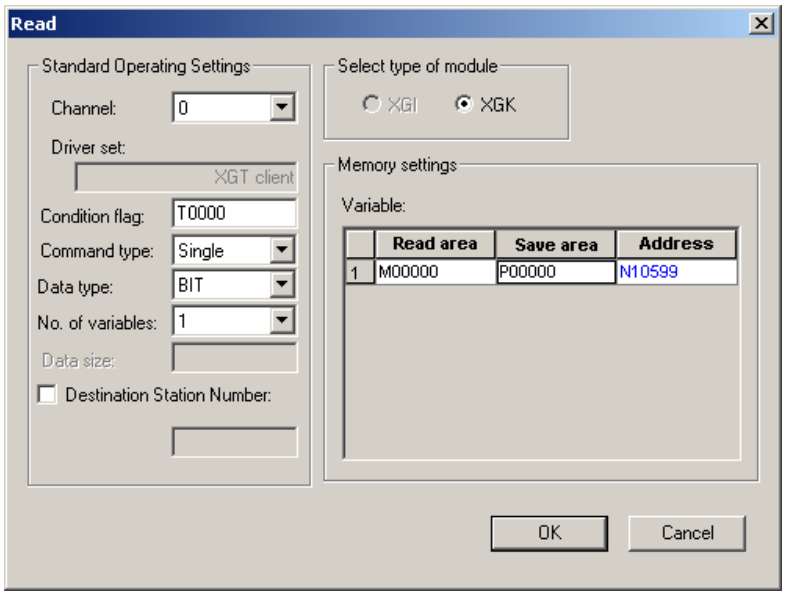


[Fig 7.3.14] P2P function Instructions

Setting items of each function and the meaning are as follows.

1) Read

As a function used to read and save temporary area of destination station, it is equally used to XGT client and Modbus TCP client driver. The basic structure is as the figure below.



[Fig 7.3.15] Setting READ Instructions

It consists of basic operation setting and memory setting and each has the following meaning.

A) Basic Operation Setting

(1) Channel

Select a COM port used by the selected block. COM port for each block is determined when setting parameter and may not be changed during run.

(2) Condition flag

It defines the time when P2P block operates and it is possible to set interval and select memory set trigger condition.

(3) Command type

It determines detail operation of reading and individual reading and continuous reading are selectable.

The former one reads up to 4 memory areas while the latter reads as much as defined in designated area.

(4) Data type

It determines data type processed by block and it can process data type as bit, byte, 2 bytes(1 word), 4 bytes(double words) and 8 bytes(long words).

(5) No. of variables

It is defined when individual reading is selected. It determines the number of areas to read individually and selects up to 4 areas.

(6) Data size

If continuous reading is selected, it defines the size of data to read while the meaning depends on data type.

(7) Destination Station Number

It is not used in FEnet fiber optic switch module.

B) Selecting XGK, XGI

If it is XGK series depending on CPU type, designate the module type as XGK. If it is XGI series, designate the module type as XGI.

C) Memory setting

(1) Read Area

Set an area to read of destination

Available memory areas: P, M, K, F, T, C, U, Z, L, N, D, R, ZR

For the size and scope of each memory area, **refer to XGK CPU Memory Device Lists of the appendix.**

(2) It should be set as many as variables and the input varies depending on driver type.

(3) XGT Client

Enter M100 if reading %MW100 data of the destination

(4) Modbus TCP Client

Enter 30010 if reading AI 10 address data of the destination

(5) Save area

a) Setting an area to save data read

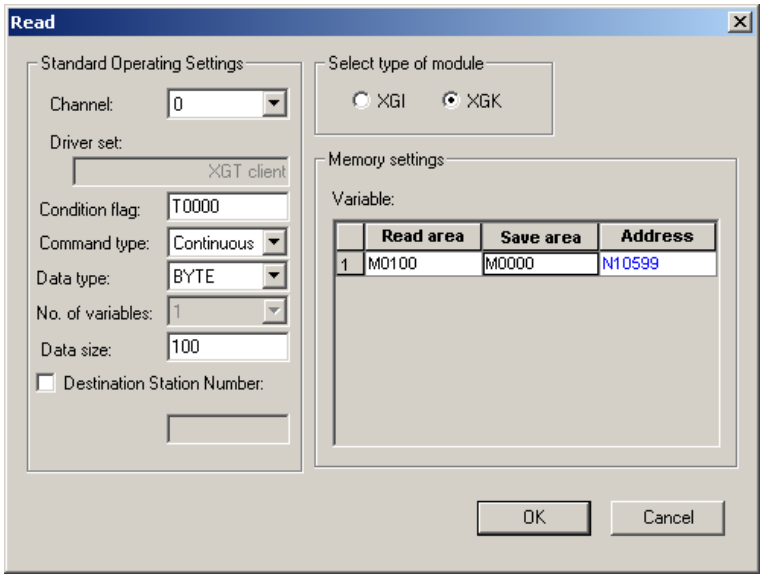
Available memory areas: P, M, K, F, T, C, U, Z, L, N, D, R, ZR

For the size and scope of each memory area, **refer to XGK CPU Memory Device Lists of the appendix.**

b) It should be set as many as variables and the meaning of setting depends on driver type.

c) Enter P100 if saving data read to %PW100

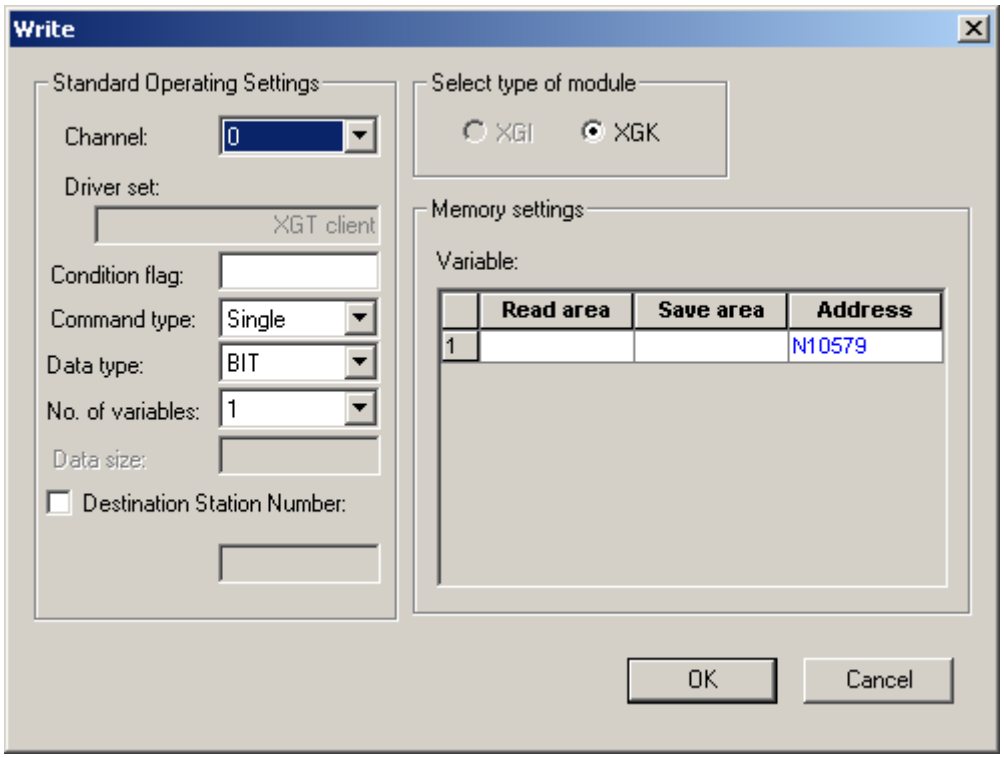
If reading %M1B100 up to 100 bytes of the destination IP (165.244.149.244) station and saving it into a user's PLC %M0 ever time T0000 is set by using CH 0, set it as follows.



[Fig 7.3.16] READ Instruction setting competed

2) Write

As a function used when writing data into a desired temporary area of the destination, it is equally used to XGT client and Modbus TCP client driver. It supports continuous writing and individual writing and data can be written up to 4 individual areas. The basic form is as follows.



[Fig 7.3.17] WRITE Instruction setting

The meaning of each input is as follows.

A) Basic operation setting

(1) Channel
Select a COM Port used by a block. COM port for each block is determined when setting parameter and not changed during run.

(2) Condition Flag
It defines the time when P2P block operates and it is possible to set interval and select memory set trigger condition.

(3) Command Type
It determines detail operation of reading and individual reading and continuous reading are selectable.
The former one reads up to 4 memory areas while the latter reads as much as defined in designated area.

(4) Data Type
It determines data type processed by block and if XGT, it can process bit and word only.

(5) No. of variables
It is defined when individual reading is selected. It determines the number of areas to read individually and selects up to 4 areas.

(6) Data Size
If continuous reading is selected, it defines the size of data to read while the meaning depends on data type.

(7) Destination station number

It is not used in FEnet fiber optic switch module.

B) Selecting XGI, XGK

If it is XGI series depending on CPU type, designate the module type as XGI. If it is XGK series, designate the module type as XGK.

C) Memory Setting

(1) Reading Area
Set an area to read of destination.

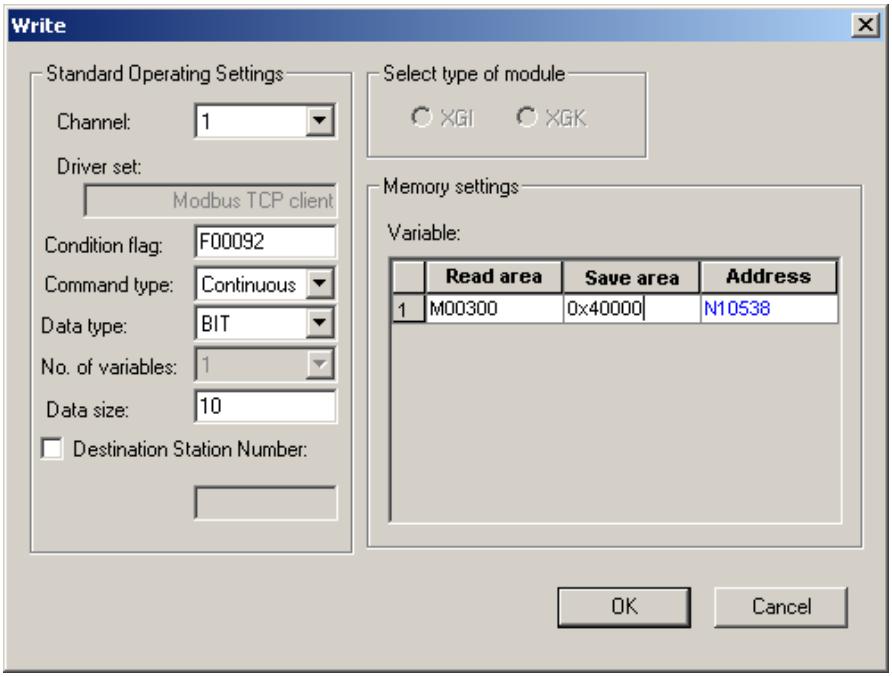
(2) It should be set as many as variables and the input varies depending on driver type.

(3) XGT Client
Enter M100 if reading %MW100 data of the destination

(4) Modbus TCP Client
Enter 30010 if reading AI 10 address data of the destination

(5) Saving area
a) Setting an area to save data read
b) It should be set as many as variables and the meaning of setting depends on driver type.
c) Enter P100 if saving data read to %PW100

When writing MW0 data 10 words of own station to destination AO area by using CH 1(IP address, Port 502), the editing is as the following example.

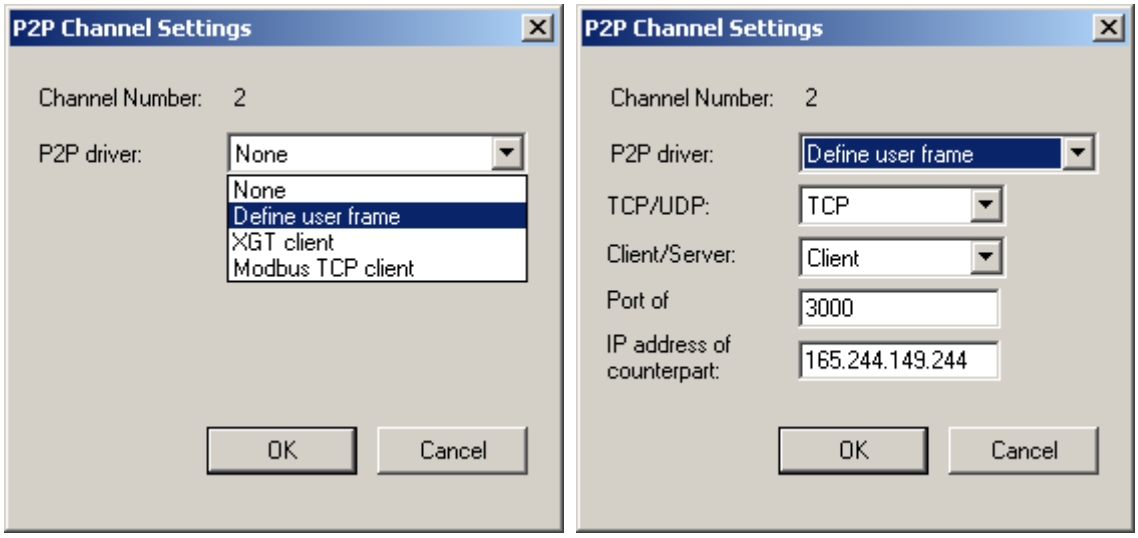


[Fig 7.3.18] WRITE Instruction Setting

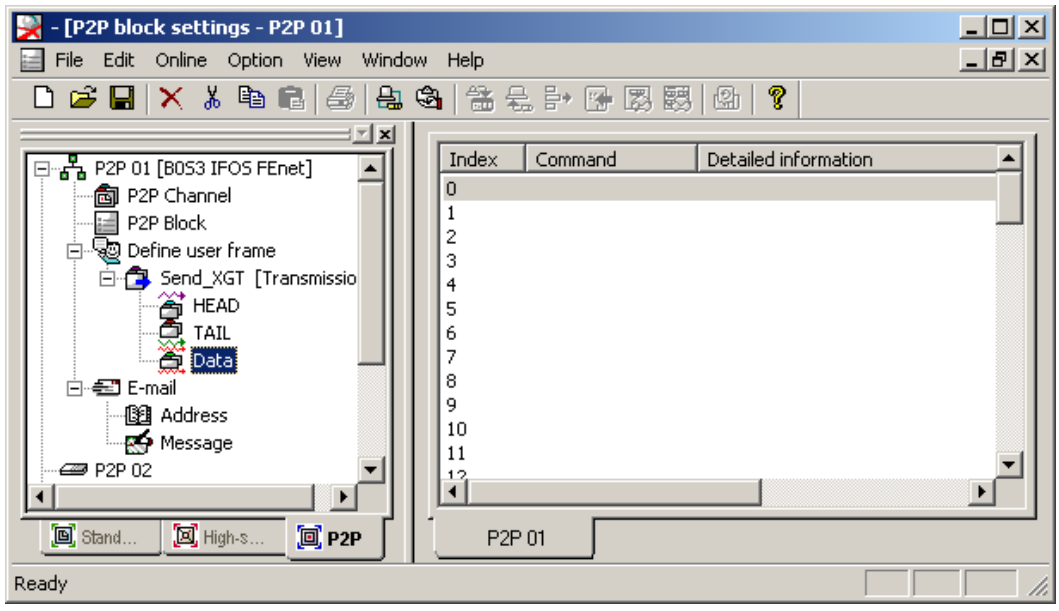
3) Send

This function is used when sending a temporary frame to an external device by uncertain communication method instead of XGT Client/Modbus TCP client protocol. It is used by Define user frame.

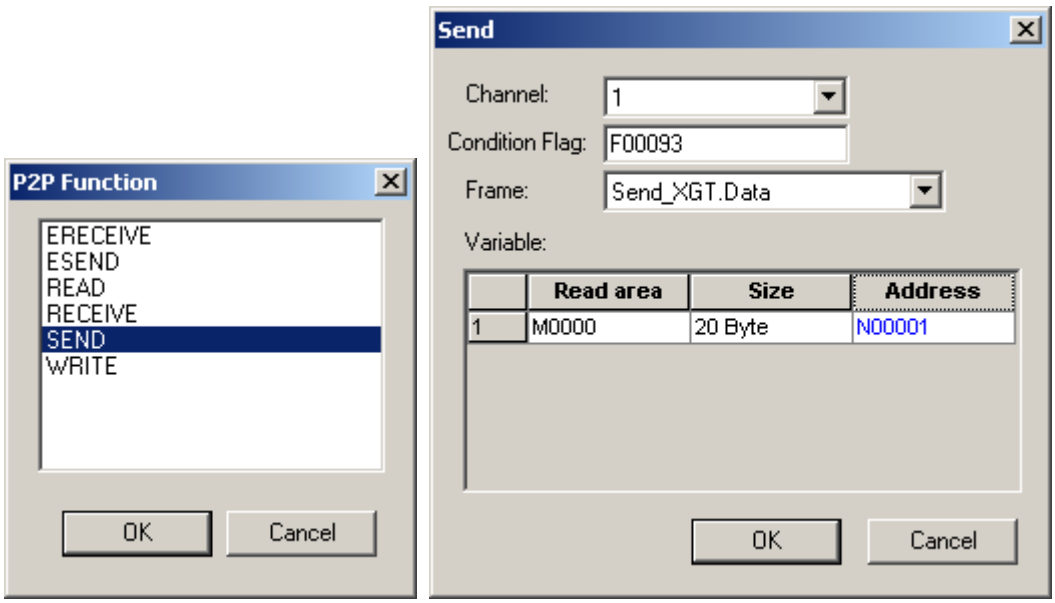
It is limited to use only one frame per frame send function and the memory setting for fixed size/variable size variable of the frame is to be designated in the function. Before using the function, make sure to define the frame to send.



[Fig 7.3.19] Driver Setting of Send Instruction



[Fig 7.3.20] P2P Parameter Setting



[Fig 7.3.21] Send Instruction Setting

The meaning of the above item is as follows.

A) Basic Setting Items

(1) Channel

Select a channel to send desired frame(IP:165.244.149.244, D_PORT : 3000)

(2) Condition Flag

Determine the time to send a frame.

(3) Frame

Select a name of Define user frame used in the P2P block. Frames should be defined before registering a function and it can be selected among the frames registered as sending frame.

B) Variable

(1) Read Area

a) As the information about variable area in sending frame, it designates the location of data comprising a frame.

b) Word address should be entered and if structuring a frame's variable area by reading data from %DW200, enter D200.

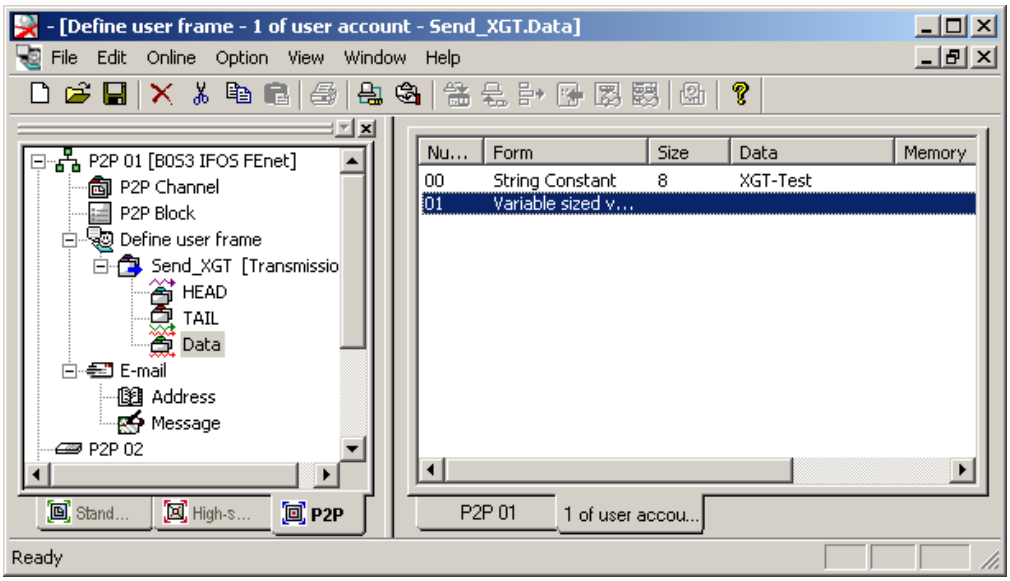
c) Define as many as the variables in a frame.

(2) Size

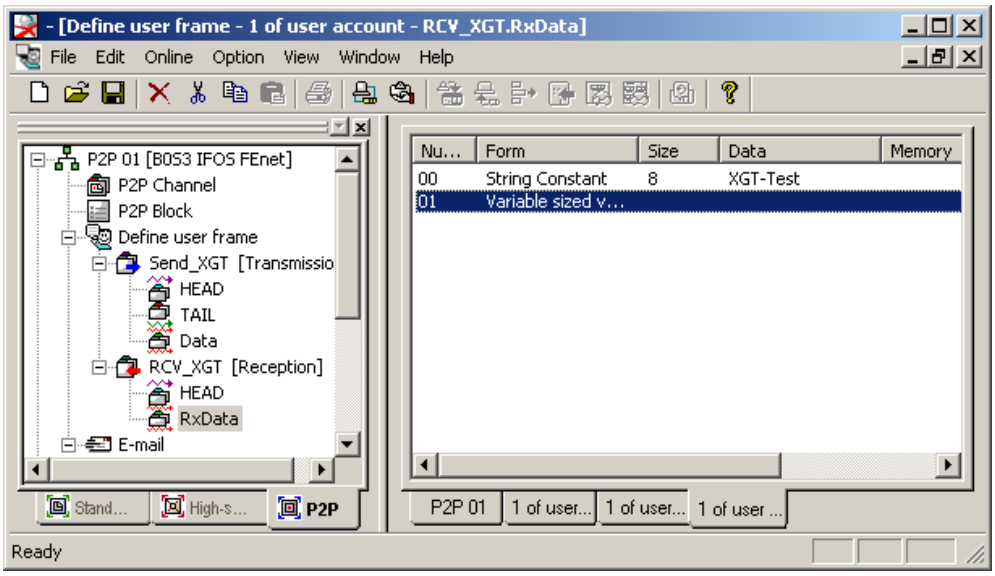
It defines the size of data entered into variable area within a selected sending frame and it should be as many as the variables.

4) Receive

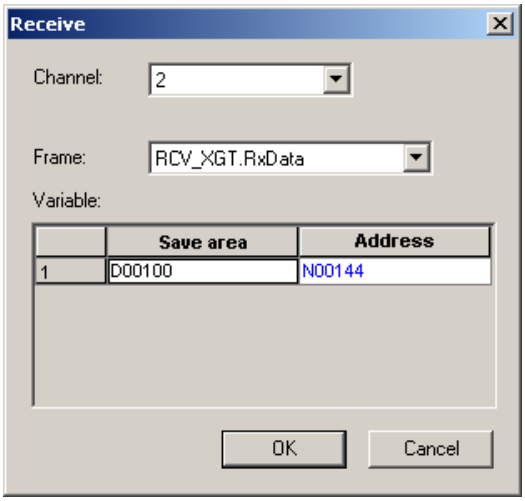
It is the function used when receiving a part of frame among frames receiving from destination station. The receiving function block for receiving frame should be only one.



[Fig 7.3.22] Receive Instruction setting



[Fig 7.3.23] Registering receive Instruction to P2P block



[Fig 7.3.24] P2P block setting of Receive Instruction completed

A) Basic setting items

(1) Channel: select a channel to send a desired frame to be received
(IP:165.244.149.244, D_PORT : 3000)

(2) Frame: select a user defined receive frame.

B) Memory setting items

(1) Saving Area

a) When receiving a registered frame, designate the location to save the segment defined by variable.

b) Designate as many as the number of variables in receive frame.

5) ESend/EReceive

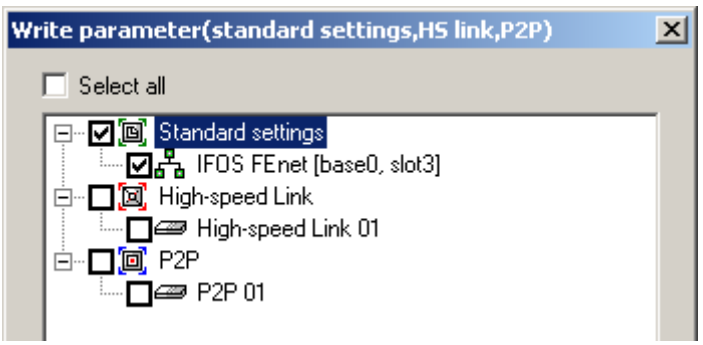
As a service receiving and sending error from/to user by email when any event occurs during communication, it is due in service later.

7.4 P2P Service Operation

Once P2P parameter is set completely, download it to PLC CPU and P2P service should be started. Suppose that P2P parameter to download is created and it is already connected to CPU of the PLC.

1) P2P Parameter Download

If selecting [Online] -> [Write Parameter] in XG-PD menu window in order to download P2P parameter created, parameter download window is opened and a user can select user registered basic setting, P2P parameter and HS Link parameter.



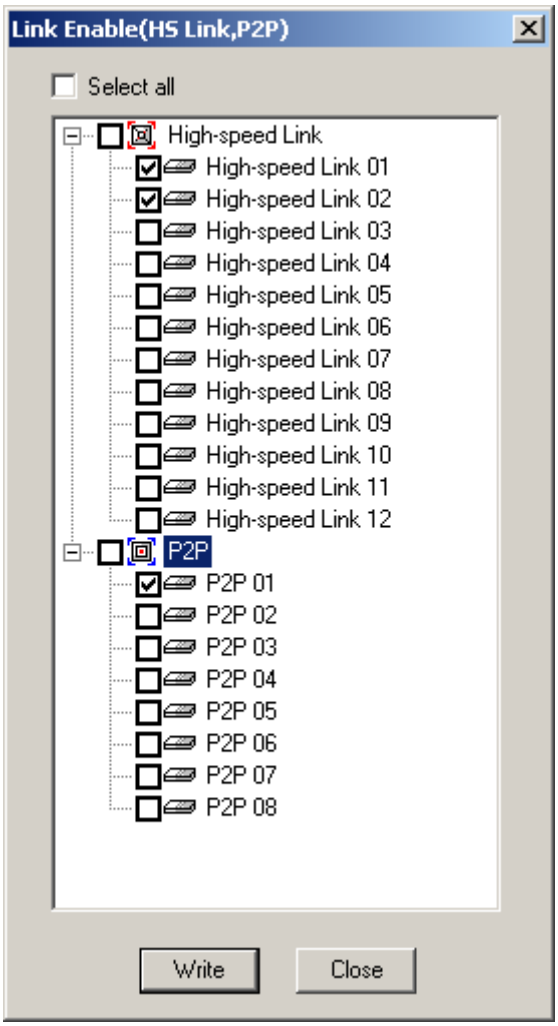
[Fig 7.4.1] P2P Parameter download

When the created P2P parameters appeared selectively among P2P 0~7, select P2P parameter to download among such parameters.

If clicking OK, it starts downloading P2P parameter to CPU.

2) P2P Service Operation

To start P2P service although P2P parameter is downloaded, it is necessary to operate P2P service. For this, select [Online] -> [Enable Link (HS Link, P2P)].



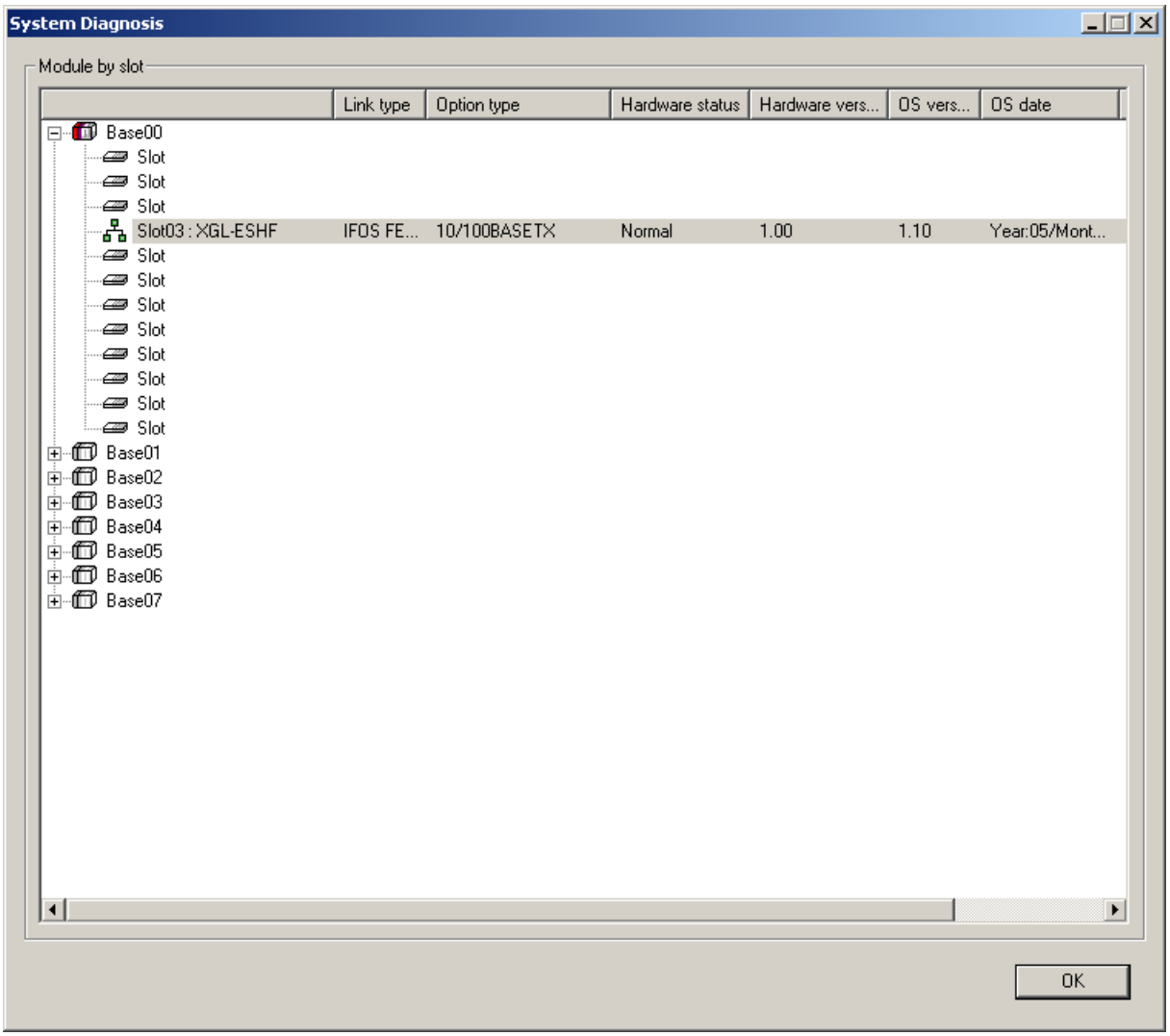
[Fig 7.4.2] P2P Service Enable Setting

Select P2P parameter to operate [Enable Link (HS Link, P2P)]. If canceling P2P parameter already checked off, the P2P service stops.

It can be checked whether P2P service works by downloading normally and selecting [System Diagnosis]

7.5 P2P Diagnosis Function

P2P system Diagnosis function shows the service status and information about COM program after setting Communication module's driver. A user can see whether P2P service is normally operating through the Diagnosis system. For more information, refer to Chapter 5 XG-PD Program.

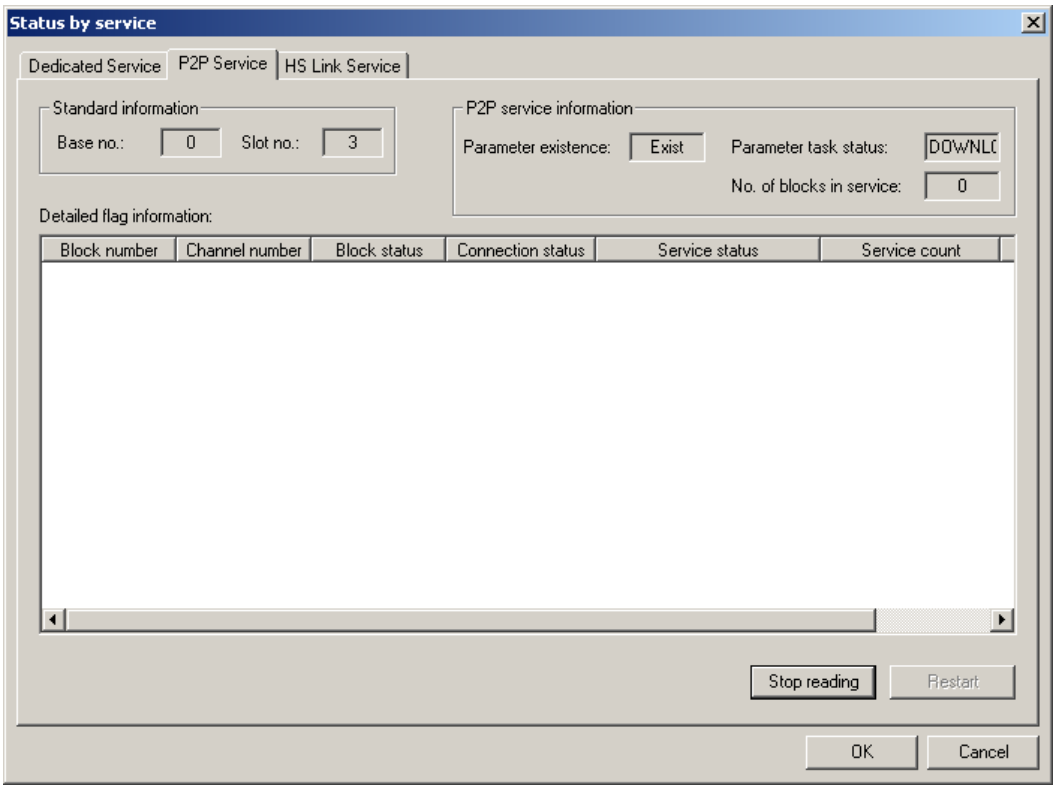


[Fig 7.5.1] System Diagnosis Module Info

1) P2P Service

It shows detail information on whether user defined service is working. If P2P parameter is set and enabled, it loads the information whether the service is working.

It was designed to monitor simple or continuous reading in real time through the menus.



[Fig 7.5.2] P2P Service Monitor

Chapter 8 Dedicated Communication

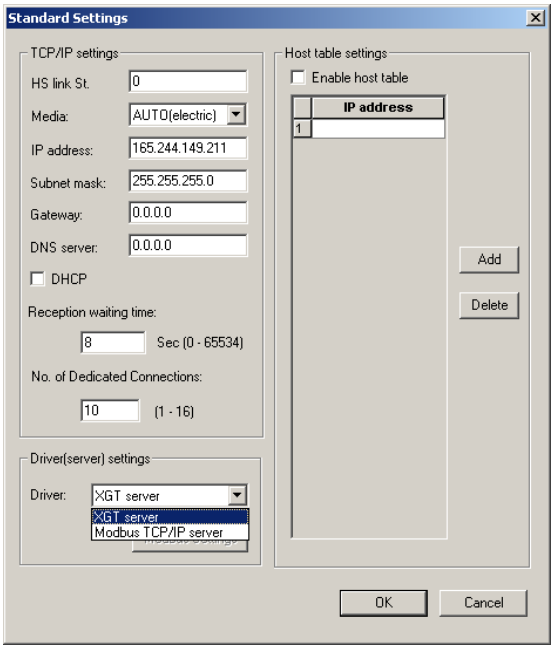
8.1 Dedicated Communication

8.1.1 Introduction

Dedicated Communication service is the service to read and write information and data in PLC of PC or peripherals with the protocol built in FEnet fiber optic switch module. It operates as server in communication network and responds to request of reading and writing memory in accordance with XGT protocol and Modbus TCP protocol from external device and PC(supporting XGT dedicated driver and Modbus TCP driver). It uses TCP port 2004 and UDP port 2005 for XGT dedicated driver of FEnet fiber optic switch module and Modbus TCP driver uses TCP 502.

It would be useful for the communication between own Ethernet modules and between own Ethernet module and higher systems(PC program and MMI).

1) Setting Dedicated XGT Driver



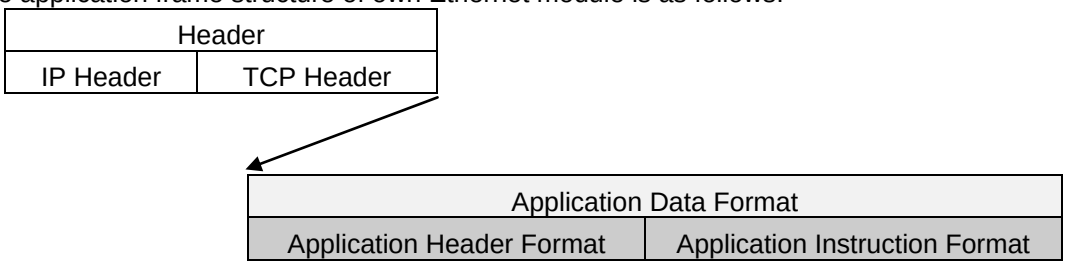
[Fig 8.1.1] Driver Setting

As it is necessary to set basic parameter and download it for Ethernet communication, make sure to set and download it for dedicated service(XGT server unless it is set)

The number of dedicated connection in the basic parameter means the number of channel(MMI connection) connected by using own dedicated port(2004). Therefore, the number of channel connection can be changed by changing the number of dedicated connection of frame editor.

8.1.2 Frame structure

The application frame structure of own Ethernet module is as follows.



1) Application Header Format

Item	Size(byte)	Description
Company ID	8	"LSIS-XGT" (ASCII CODE : 4C 53 49 53 2D 58 47 54 00 00)
Reserved	2	H'00 : reserved area
PLC Info	2	* Client(MMI) ➔ server(PLC) : Don' care (h'00) * Server(MMI) ➔ client(PLC) : 1) If Reserved1 is h'00; Bit 00~05 : CPU TYPE 01(XGK-CPUH), 02(XGK-CPUS) Bit 06 : 0(duplex Master / Sole), 1(duplex Slave) Bit 07 : 0(normal CPU operation), 1(CPU operation error) Bit 08~12 : system error 1(RUN),2(STOP), 4(ERROR), 8(DEBUG) Bit 13~15 : Reserved
CPU Info	1	h'A0 note 1)
Source of Frame	1	* Client(MMI) ➔ server(PLC) : h'33 * Server(PLC) ➔ client(MMI) : h'11
Invoke ID	2	ID discriminating the sequence of frames (Sending by attaching the number to response frame)
Length	2	Bytes of Application Instruction
IFOS FEnet Position	1	Bit 0~3 : slot number of FEnet fiber optic switch module Bit 4~7 : base number of FEnet fiber optic switch module
Reserved2 (BCC)	1	H'00 : reserved area (byte sum of Application Header)

note1) determine whether XGK/XGI or not through the reserved area

2) Application Instruction Format

(1) Header

Company ID ('LSIS-XGT')	PLC Info area(2)	Reserved (1)	H'33 (1)	Invoke ID (2)	Length (2)	Reserved area (1)	BCC (1)

** the number in ( ) means bytes

▷ Company ID: 'LSIS-XGT' in ASCII character string
▷ Info area about PLC Info PLC
▷ Invoke ID: As an ID to discriminate the sequences of frames, it can be temporarily designated and the response frame re-sends Invoke ID received when requiring a instruction (area used to check errors in PC or MMI)
▷ Length: length of data followed behind header in frame

(2) Instruction Request Frame (external communication device → FEnet fiber optic switch module)

header	Instruction	Data type	Reserved area (2 bytes)	Structured data area

(3) ACK response frame (IFOS FEnet module → External communication device, in case data is normally received)

header	Instruction	Data type	Reserved area (2 bytes)	Error status (2 bytes h'0000)	Structured data area

(4) NAK response frame (IFOS FEnet module → external communication device, in case data is abnormally received)

header	Instruction	Data type	Reserved area (2 bytes)	Error status (2 bytes: Not h'0000)	Error code (1 byte)

Remark

1) In case of hexadecimal number data front of a number in frame, it indicates that the data is hexadecimal number by 'h' or '0x' such as 01, h'12345, h'34, 0x12, 0x89AB.

8.1.3 Instructions list

Instructions used in the dedicated communication service are summarized in the following table.

Instruction	Instruction code	Data type	Process description
Reading	Request:h'0054 Response:h'0055	Single	Reading data according to data type of variables of which types are Bit, Byte, Word, DWord or LWord
		Continuous	Read byte type variable in unit of blocks. (max. 1,400 bytes).
Writing	Request:h'0058 Response:h'0059	Single	Writing data according to data type of variables of which types are Bit, Byte, Word, DWord or LWord.
		Continuous	Write byte type variables in unit of blocks. (max. 1,400 bytes).

[Table 8.1.1] Instructions list

8.1.4 Data type

1) Data type of variables

Memory device type of XGT PLC: the data type of P, M, L, F, K, C, D, T, N and R is indicated after the character of variable, '%'.

Data type	Example
Bit	%PX0,%LX0,%FX0
Byte	%MB0, %PB0, %DB0
Word	%PW0,%LW0,%FW0,%DW0
DWord	%PD0,%LD0,%FD0,%DD0
LWord	%PL0,%LL0,%FL0,%DL0

[Table 8.1.2] Data type list of direct variables

2) Data type

Designate data type as Instruction to read or write direct variable.

Data type	Code	Data type	Code
Bit	h'00	LWord	h'04
Byte	h'01	DWord	h'03
Word	h'02	LWord	h'04
DWord	h'03	Continuous	h'14

[Table 8.1.3] Data type list of direct variables

8.2. Running Instruction

8.2.1 Single Reading Direct Variables

1) Introduction

The function is designed to read data according to memory data type by designating PLC device memory. Up to 16 independent device memory can be read per time.

2) Required format (PC -> PLC)

■ Request of reading single variables (MMI ➔ PLC)

Item	Size(byte)	Description
Instruction	2	h0054 : Read Request
Data type	2	Refer to Table of Data Type(X,B,W,D,L)
Reserved area	2	h0000 : Don't Care.
No. of variables	2	The max. number of variables to read is 16.
Length of variable name	2	The length of direct variable. Max. 16 characters
Variable	Length of variable name	The only direct variable is available
...	...	(repeated as many as variables/max. 16)
Length of variable name	2	The length of direct variable. Max. 16 characters
Variable	Length of variable name	The only direct variable is available

Format name	Header	Instruction	Data type	Reserved area	No. of blocks	Length of variable	Direct variable	...
Code (example)		h'0054	h'0002	h'0000	h'0001	h'0006	%MW100	

1 block (repetitively settable up to 16 blocks)

(1) No. of blocks

It is to designate how many blocks consisting of '[length of variable][variable]'is contained in the requested block and up to 16 blocks can be set. Therefore, [no. of blocks] should be between h'0001 ~ h'0010.

(2) Length of variable (length of variable name)

It indicates the number of characters meaning a variable and it allows up to 16 characters. The range of the value is from h'01 to h'10.

(3) Variables

Enter the address of a variable to read actually. It should be ASCII within 16 characters and consist of number, alphabets, '%' and'.'.

The available variables depending on PLC type are summarized as follows.

Category	Bool	Byte	Word	Double Word	Long Word
XGT memory	%(P,M,L,K,F,T)X	-	%(P,M,L,K,F,T,C,D,S)W	-	-

[Table 8.2.1] Variable Type

Remark

1) When expressing hexadecimal word data in the above frame if creating a frame, the positions of both bytes should be changed each other except for h front of number.
i.e.) h'0054 ⇒5400

3) Response Format (if PLC ACK response)

■ Response to reading single variable(PLC ➔MMI)

Item	Size(byte)	Description
Instruction	2	h0055 : Read Response
Data type	2	Refer to Table of Data Type
Reserved area	2	h0000 : Don't Care
Error status	2	0 is normal; if not 0, error
Error info	2	If Error State is error, the lower byte is error number
No. of variables		If Error State is normal, the number of variables read
Data size	2	Byte Size of data.
Data	Data size	Data read.
...	...	(repeated as many as variables/max 16)
Data size	2	Byte Size of data.
Data	Data size	Data read.

Format name	Header	Instruction	Data type	Reserved area	Error status	No. of blocks	No. of data	Data	.....
Code(i.e.)	...	h'0055	h'0002	h'0000	h'0000	h'0001	h'0002	h'1234	

1 block(up to 16 blocks)

(1) No. of data

It means the bytes of HEX type. The number is determined by memory type(X, B, W, D, L) contained in variable name of a format requested by computer.

(2) No. of blocks

It designates how many blocks consisting of '[No. of data][data]'the request format contain and it can set up to 16 blocks. Therefore, the value of [no. of blocks] should be between h'0001 ~ h'0010.

Category	Available variables	Data(Byte)
Bool(X)	%(P,M,L,K,F,T)X	1 (the only lowest bit is valid)
Word(W)	%(P,M,L,K,F,T,C,D,S)W	2

[Table 8.2.2] No. of data by variables

Remark

1) That the number of data is H04 means that the data contains hexadecimal data of 4 bytes.
2) If data type of is bool, the read data is expressed as byte(hex). That is, if bit value is 0, it is indicated as h'00; if 1, it is h'01.

4) Response Format (NAK response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Error code (Hex 1 Byte)
Code(i.e.)	...	h'0055	h'0002	h'0000	h'FFFF (value but for 0)	h'21

Remark

1) Error code is hex and indicates error type with 1 byte data.
For more information, refer to 'error code table.'

8.2.2 Continuous Reading Direct Variable

1) Introduction

It directly designates PLC device memory and continuously reads from the designated address as much as designated.

2) Required format (PC ⇒ PLC)

■ Request of continuously reading variables (MMI ➔ PLC)

Item	Size(byte)	Description
Instruction	2	h0054 : Read Request
Data type	2	h0014 : Block Type
Reserved area	2	h0000 : Don't Care.
No. of variables	2	The max. number of variables to read is 16
Length of variable	2	The max. length of variable name is 16 characteristics.
Variable	Length of variable name	Variable name. The only byte type direct variables are available. (that is, types like %MB / %PB / %DB….. : Supportable devices: P,N,L,K,T,C,D,N, F) Represent the initial address of block(i.e. %MB0, %PB0)
Length of variable name	2	Byte Size of data, max. 1400byte

Format name	Header	Instruction	Data type	Reserved area	No. of blocks	Length of variable	Direct variable	No. of data
Code(i.e.)	...	h'0054	h'0014	h'0000	h'0001	h'0006	%MWOOO	h'0006

Remark

1) No. of data means the number of bytes in data(max. 1,400 bytes).

(1) Data type

Data type should be h'0014 only.

(2) No. of blocks

The no. of blocks should be h'0001 only.

(3) Length of variable

It represents the number of characters meaning a variable name consisting up to 16 characters and the range is from h'0001 to h'0010.

(4) Variable

It is the address of a variable to actually read, should be ASCII within 16 characters and variable name should consist of number, alphabet, '%' and '.' Only. The types of variables to read continuously are summarized in the below table depending on PLC type.

3) Response format (if PLC ACK response)

■ Response of Reading variables continuously (PLC ➔MMI)

Item	Size(byte)	Description
Instruction	2	h0055 : Read Response
Data type	2	h0014 : block type
Reserved area	2	h0000 : Don't Care
Error status	2	If 0, it is normal; if any other value but 0, it is error
Error info	2	If Error State is error, the lower byte is error number
No. of variables		If h0001 : Error State is normal
Data size	2	Byte Size of data.
Data	Data size	Data to read up to 1400byte

Format name	Header	Instruction	Data type	Reserved area	Error status	No. of blocks	No. of data	Data
Code (i.e.)	...	h'0055	h'0014	h'0000	h'0000	h'0001	h'0006	h'0123456 789AB

▷ No. of data means the number of hexadecimal bytes.

4) Response format (if PLC NAK response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Error code (Hex 1Byte)
Code (i.e.)	...	h'0055	h'0014	h'0000	h'FFFF	h'21

Remark

1) Error code is hex and indicates error type with 1 byte data.
For more information, refer to 'error code table.'

8.2.3 Single writing direct variables

1) Introduction

It directly designates PLC device memory and writes in accordance with memory data type. Data can be written to 16 independent device memories simultaneously.

2) Required format (PC -> PLC)

■ Request of writing single variables (MMI ➔ PLC)

Item	Size(byte)	Description
Instruction	2	h0058 : Write Request
Data type	2	Refer to Data Type table
Reserved area	2	h0000 : Don't Care.
No. of variables	2	No. of variables to write. Max. 16.
Length of variable name	2	Length of direct variable. Max. 16.
Variable name	Length of variable name	Direct variables are available only
...	...	(repeated as many as variables/max. 16)
Length of variable name	2	Length of direct variables. Max. 16.
Variable name	Length of variable name	Direct variables are available only
Data size	2	Byte size of data.
Data	Data size	Data to write.
...	...	(repeated as many as variables/max. 16)
Data size	2	Byte Size of data.
Data	Data size	Data to write.

Format name	header	Instruction	Data type	Reserved area	No. of blocks	Length of variable	Direct variable	..	No. of data	Data	..
Code (i.e)	..	h'0058	h'0002	h'0000	h'0001	h'0006	%MW100	..	h'0002	h'1234	

1 block (repetitively settable up to 16 blocks)

(1) No. of blocks

It designates how many blocks consisting of '[No. of data][data]'the request format contain and it can set up to 16 blocks. Therefore, the value of [no. of blocks] should be between h'0001 ~ h'0010.

(2) Length of variable(length of variable name)

It represents the number of characters meaning a variable name consisting up to 16 characters and the range is from h'01 to h'10.

(3) Variable

Enter the address of a variable to write actually. It should be ASCII within 16 characters and the name should consist of number, alphabet, '%' and '.' only.

Remark

1) Device data type of each block should be same. If the data type of the first data block is word and the second one is double word, an error occurs.
2) If data type is Bool, the read data is expressed as a hexadecimal byte. That is, if BIT is 0, it is h'00; if 1, it is h'01.
3) When approaching bit area as variable name expression method, it should be expressed as an order of data type unit. To write, for instance, Cth bit of M172, it is necessary to calculate it as a bit type as follows because M is a word device.
   Wrong: %MX172C
   Correct: 172 x 16(WORD) + 12(BIT) = 2764
   ➔ %MX2764

3) Response format (if PLC ACK response)

Format name	Header	Instruction	Data type	Reserved area	Error status	No. of blocks
Code(i.e.)	...	h'0059	h'0002	h'0000	h'0000	h'0001

(1) No. of blocks

It indicates the number of blocks normally written.

4) Response format (NAK response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Error code (Hex 1 Byte)
Code(i.e.)	...	h'0059	h'0002	h'0000	h'FFFF (value but for 0)	h'21

Remark

1) Error code is hex and indicates error type with 1 byte data.
   For more information, refer to 'error code table.'

8.2.4 Continuous writing direct variable

1) Introduction

This is the function that directly designates PLC device memory and writes data in memory. But, byte type variables are available only.

B) Required Format

■ Request of writing variables continuously (MMI ➔ PLC)

Item	Size(byte)	Description
Instruction	2	h0058 : Write Request
Data type	2	h0014 : block type
Reserved area	2	h0000 : Don't Care.
No. of variables	2	No. of variables to write. 0x0001
Length of variable name	2	The length of variable. Max. 16 characters.
Variable name	Length of variable	Variable name. The byte type direct variables available only. (that is, %MB / %PB / %DB/….. forms available: Supportable device: P,N,L,K,T,C,D,N) Indicating the initial address of a block. (i.e. %MB0, %PB0)
Data	Data size	Data to write, max. 1400bytes

Format name	Header	Instruction	Data type	Reserved area	No. of blocks	Length of variable	Variable	No. of data	Data
Code(i.e.)	...	h'0058	h'0014	h'0000	h'0001	h'0006	%MB100	h'0002	h'1234

(1) No. of data

It means the number of bytes in data(max. 1,400 bytes).

(2) No. of blocks

The no. of blocks should be h'0001 only.

(3) Length of variable

It indicates the number of characters meaning a variable and the range is from h'01 to h'10.

(4) Variable

It means the address of a variable to write actually and should be within 16 ASCII characters and the name should consist of number, alphabet, '%' and '.'. The types of variables available for continuous writing depending on PLC type are summarized in the below [Table 10.3.2] No. of data according to variable.

Remark

1) For how to designate areas of each device in XGT series, refer to the technical data.

3) Response format (if PLC ACK response)

■ Response to continuous variable reading (PLC ➔MMI)

Item	Size(bytes)	Description
Instruction	2	h0059 : Write Response
Data type	2	h0014 : block type
Reserved area	2	h0000 : Don't Care
Error status	2	If 0, it is normal; if not 0, it is error
Error information	2	If Error State is error, the lower byte is error number
No. of variables		h0001 : if Error State is normal

Format name	Header	Instruction	Data type	Reserved area	Error status	No. of blocks
Code(i.e.)	...	h'0059	h'0014	h'0000	h'0000	h'0001

(1) Data type

Available data type is byte type(%MB,%IB,%QB).

(2) No. of data

It means the no. of byte(hex).

4) Response format (in case of PLC NAK response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Error code (Hex 1 Byte)
Code(i.e.)	....	h'0059	h'0014	h'0000	h'FFFF	h'21

(1) Error code

Error code is hex and indicates error type with 1 byte data.

For more information, refer to 'error code table.'

8.2.5 Request of status reading (MMI -> PLC)

1) Introduction

This is the service to use data and status in PLC using communication.

2) Format required by Computer

Item	Size(byte)	Description
Instruction	2	h00B0 : Status Request
Data type	2	h0000 : Don't Care
Reserved area	2	h0000 : Don't Care

3) Response format (if PLC ACK response)

Item	Size(byte)	Description
Instruction	2	h00B1 : Status Response
Data type	2	h0000 : Don't Care
Reserved area	2	h0000 : Don't Care
Error status	2	If 0, it is normal; if not 0, it is error code
Reserved area	2	h0000 : Don't Care
Data size	2	h0018
Data	24	Status Data

4) XGT Status Data Structure

Item	Size (byte)	Byte location	Description
Slot Info	4	0	Slot information Bit 00~ bit 03 : slot info that local remotely connects to other station Bit 04~ bit 07 : base info that local remotely connects to other station Bit 08~ bit11 : slot info that other station remotely connects Bit 12~ bit15 : base info that other station remotely connects Bit 16~ bit19 : slot info on which the module is built Bit 20~ bit23 : base info on which the module is built Bit 24~ bit31 : Reserved
_CPU_TYPE	2	4	System type : flag
_PADT_CNF	2	6	XG5000 connection status : flag
_SYS_STATE	4	8	PLC mode and operation status : flag
_CNF_ER	4	12	System error(error): flag
_CNF_WAR	4	16	System warning: flag
_VER_NUM	2	20	OS version number : flag
Reserved	2	22	Reserved area

* For more information about each item, refer to *flag description.

5) Flag Description

▣ _CPU_TYPE

15Bit : XGK(1)/XGI(0), 15Bit : Sole, duplex master(0)/duplex slave(1)

Sole : h8000~hffff

hA001 : XGK-CPUH

hA002 : XGK-CPUS

▣ _VER_NUM

hXXYY : xx.yy

▣ _SYS_STATE

Indicate system operation mode and operation status information (DWORD, F00~F01).

Variable	Type	Device	Function	Description
_RUN	Bit	F00000	RUN	CPU module's operation status is RUN
_STOP	Bit	F00001	STOP	CPU module's operation status is STOP
_ERROR	Bit	F00002	ERROR	CPU module's operation status is ERROR
_DEBUG	Bit	F00003	DEBUG	CPU module's operation status is DEGUB
_LOCAL_CON	Bit	F00004	Local control	Operation mode can be changed only by mode key
_MODBUS_CON	Bit	F00005	Modbus mode On	Modbus slave service
_REMOTE_CON	Bit	F00006	Remote mode On	Operation in Remote mode
-	Bit	F00007	-	-
_RUN_EDIT_ST	Bit	F00008	Modifying during run (downloading program)	Program modified during modification of run is waiting
_RUN_EDIT_CHK	Bit	F00009	Modifying during run (internal process)	Internal process of modifying during run
_RUN_EDIT_DONE	Bit	F0000A	Modifying during run completed	Modifying during run normally completed
_RUN_EDIT_END	Bit	F0000B	Internal flag at the end of modifying during run	Modifying during run normally completed
_CMOD_KEY	Bit	F0000C	Factor changing operation mode	Operation mode change by key
_CMOD_LPADT	Bit	F0000D	Factor changing operation mode	Operation mode change by local PADT
_CMOD_RPADT	Bit	F0000E	Factor changing operation mode	Operation mode change by remote PADT
_CMOD_RLINK	Bit	F0000F	Factor changing operation mode	Operation mode change by remote communication module
_FORCE_IN	Bit	F00010	Forced input	Forced on/off by input junction
_FORCE_OUT	Bit	F00011	Forced output	Forced on/off by output junction

Variable	Type	Device	Function	Description
_SKIP_ON	Bit	F00012	I/O Skip in operation	I/O module designated to check error and stop data refresh
_EMASK_ON	Bit	F00013	Error mask in operation	I/O module designated to resume despite of error
_MON_ON	Bit	F00014	Monitor in operation	External monitor by program and variables in operation
_USTOP_ON	Bit	F00015	Stop by Stop function	Stop after scan ends by stop function during run mode operation
_ESTOP_ON	Bit	F00016	Stop by ESTOP function	Immediate stop by ESTOP function during run mode operation
_CONPILE_MODE	Bit	F00017	Compiling	Compiling
_INIT_RUN	Bit	F00018	Initializing	Initializing task in operation
-	Bit	F00019	-	-
-	Bit	F0001A	-	-
-	Bit	F0001B	-	-
_PB1	Bit	F0001C	Program code1	#1 program code in operation
_PB2	Bit	F0001D	Program code2	#2 program code in operation
_CB1	Bit	F0001E	Compile code1	#1 compile code in operation
_CB2	Bit	F0001F	Compile code2	#2 compile code in operation

▣ _CNF_ER

Indicate error flags related with operation stop error

Variable	Type	Device	Function	Description
_CPU_ER	Bit	F00020	CPU structure error	Normal operation is not possible due to error of CPU module health check
_IO_TYER	Bit	F00021	Module type inconsistency error	When the I/O parameter and module structure of each slot is different
_IO_DEER	Bit	F00022	Module separation error	If module structure of each slot is changed during operation, it detects and indicates it
_FUSE_ER	Bit	F00023	Fuse disconnection error	If a fuse of module among modules in each slot is disconnected, it detects and indicates it
_IO_RWER	Bit	F00024	I/O module read/write error	In case it is not possible to write/read I/O module among modules of each slot, it indicates error
_IP_IFER	Bit	F00025	Special/communication module interface error	In case interface is not normal due to malfunction of special or communication module among modules of each slot, it indicates the error
_ANNUM_ER	Bit	F00026	External device error detection	If it detects error of external device by user's program and records in ANC_ERR[n], it indicates the error

Variable	Type	Device	Function	Description
-	Bit	F00027	-	-
_BPRM_ER	Bit	F00028	Abnormal basic parameter	Check and indicate whether basic parameter is abnormal
_IOPRM_ER	Bit	F00029	Abnormal IO parameter	Check and indicate whether I/O parameter is abnormal
_SPPRM_ER	Bit	F0002A	Abnormal special module parameter	Check and indicate whether special module parameter is abnormal
_CPPRM_ER	Bit	F0002B	Abnormal communication module parameter	Check and indicate whether special module parameter is abnormal
_PGM_ER	Bit	F0002C	Program error	Check and indicate whether user's program is abnormal
_CODE_ER	Bit	F0002D	Program code error	It occurs when it encounters a Instruction not to interpret during user's program
_SWDT_ER	Bit	F0002E	System watchdog error	It occurs when it exceeds system watchdog time
_BASE_POWER_ER	Bit	F0002F	Power error	Error occurs when base power is abnormal
_WDT_ER	Bit	F00030	Scan watchdog	Error occurs when scan time of program exceeds scan watchdog time
-		F00031 F0003F	-	-

▣ _CNF_WAR

Indicate warning flags related to operation resumption(DWORD, F004~F005)

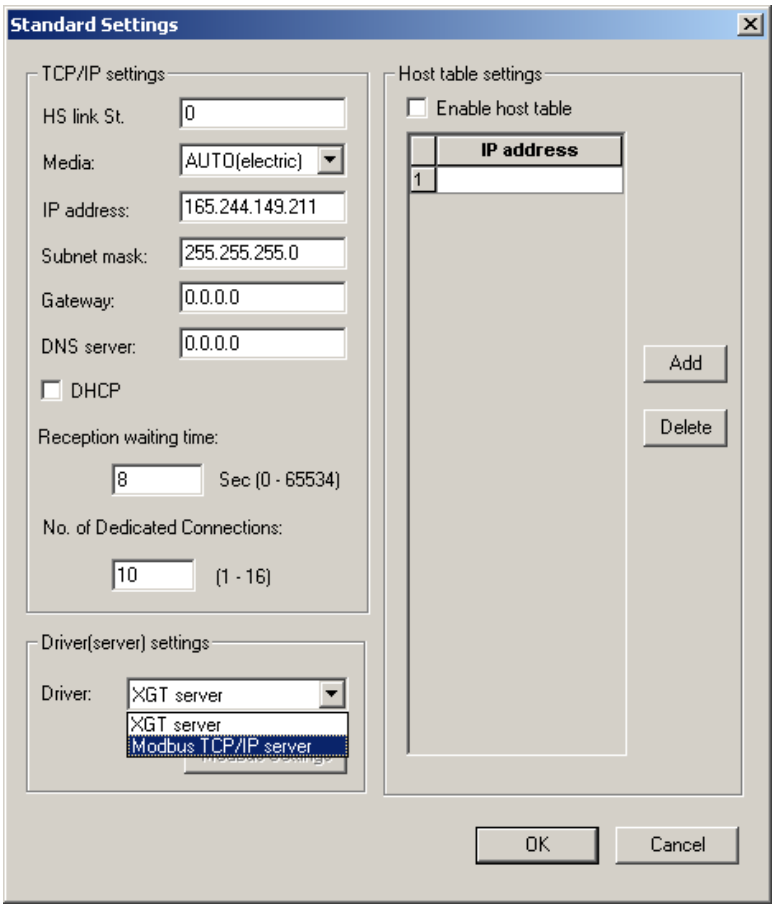
Variable	Type	Device	Function	Description
_RTC_ER	Bit	F00040	Abnormal RTC data	Indicate abnormal RTC data
_DBCK_ER	Bit	F00041	Abnormal data backup	Normal(hot) warm restart program can not be modified due to damaged data memory from abnormal backup. Then, if running cold restart, it is available in initialization program with the flag; if the program completes, it automatically resets.
_HBCK_ER	Bit	F00042	Hot restart impossible error	-
_ABSD_ER	Bit	F00043	Abnormal operation stop	This flag warns that continuous operation fails as reserving data synchronized at unit of scan when it turns on again after program suspends due to causes such as power failure. It is available in initialization program and it automatically resets when initialization program completes.

Variable	Type	Device	Function	Description
_TASK_ER	Bit	F00044	Task collision	Flag indicating task collision when a same task is demanded in duplicate while running user's program.
_BAT_ER	Bit	F00045	Abnormal battery	When battery voltage for user's program of data memory backup is lower than the limit, it detects and indicates it
_ANNUM_ER	Bit	F00046	Warning of external device	It detects warning of external device by user's program and records in ANC_WB[n], it indicates the error detection
_LOG_FULL	Bit	F00047	Log memory full warning	Indicate that PLC log memory is full
_HS_WAR1	Bit	F00048	HS parameter1 and higher	This flag checks any abnormal parameter of each HS link if HS link enable and indicates it; if HS link disable, it resets.
_HS_WAR2	Bit	F00049	HS parameter2 and higher	
_HS_WAR3	Bit	F0004A	HS parameter3 and higher	
_HS_WAR4	Bit	F0004B	HS parameter4 and higher	
_HS_WAR5	Bit	F0004C	HS parameter5 and higher	
_HS_WAR6	Bit	F0004D	HS parameter6 and higher	
_HS_WAR7	Bit	F0004E	HS parameter7 and higher	
_HS_WAR8	Bit	F0004F	HS parameter8 and higher	
_HS_WAR9	Bit	F00050	HS parameter9 and higher	
_HS_WAR10	Bit	F00051	HS parameter10 and higher	
_HS_WAR11	Bit	F00052	HS parameter11 and higher	
_HS_WAR12	Bit	F00053	HS parameter12 and higher	
_P2P_WAR1	Bit	F00054	P2P parameter 1 and higher	This flag checks any abnormal P2P parameter if HS link enable and indicates it; if P2P disable, it resets
_P2P_WAR2	Bit	F00055	P2P parameter 2 and higher	
_P2P_WAR3	Bit	F00056	P2P parameter 3 and higher	
_P2P_WAR4	Bit	F00057	P2P parameter 4 and higher	
_P2P_WAR5	Bit	F00058	P2P parameter 5 and higher	
_P2P_WAR6	Bit	F00059	P2P parameter 6 and higher	
_P2P_WAR7	-	F0005A	P2P parameter 7 and higher	
_P2P_WAR8	-	F0005B	P2P parameter 8 and higher	
_Constant_ER	-	F0005C	Cycle time error	It is 'ON' when the time is larger than 'cycle time' in which scan time is set.
-	-	F0005D ~F0005F	-	-

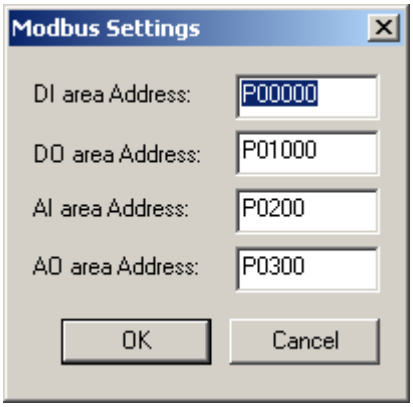
8.3 Dedicated Modbus/TCP Server

Use when operating as Modbus master of other device or higher pc(MMI).

8.3.1 Driver setting



[Fig 8.3.1]Modbus TCP Driver Setting



[Fig 8.3.2] Modbus TCP Address

Modbus function and the max number of response data supported by Modbus TCP Driver is summarized in the below table. The destination master device should demand only within the range. Request of Reading Bit, for instance, is up to 2000 bytes and request of writing bit is up to 1600 bits.

Code	Description	Address	Response size
01	Read Coil Status	0XXXX	2000 Coils
02	Read Input Status	1XXXX	2000 Coils
03	Read Holding Registers	4XXXX	125 Registers
04	Read Input Registers	3XXXX	125 Registers
05	Force Single Coil	0XXXX	1 Coil
06	Preset Single Register	4XXXX	1 Register
15	Force Multiple Coils	0XXXX	1600 Coils
16	Preset Multiple Registers	4XXXX	100 Registers

For the request by the above function codes, it needs mapping for XG-T PLC memory. The meanings of the items are as follows.

Item	Meaning	Remarks
DI area address	Address of XGT digital input area	Bit address
DO area address	Address of XGT digital output area	Bit address
AI area address	Address of XGT analog input area	Word address
AO area address	Address of XGT analog output area	Word address

The address of each item is the address of base for the area

The above window shows an example that DI area is assigned from MX1000 and AO is from PW200.

Base address input should be valid areas of %M, P and others. Modbus address is between 1 ~ 999, so the size of bit input/output would be 9999/8 = 1249.875 bytes. In addition, the size of word input/output areas would be 9999*2 = 19998 bytes.

If a user sets the base address of bit output(0XXX) area as 0, Modbus bit area 0001 corresponds to 0^{th} byte and #0 bits while 0002 does 0^{th} byte and #1 bit.

Chapter 9 Using IFOS Manager

9.1 Introduction

IFOS Manager is the software for Windows to monitor the status of XGL-ESHF and IFOS module and set the rate control, a function of Layer 2 switch.

In XGL-ESHF, it consists of ring ports and the functions available in XGL-ESHF are setting on Port 1 and 2 of Rate Control. In Station List and Ref. Packet Limit, it is possible to set Ring Port.

* To use IFOS Manager, RS-232C should be connected to the control port of XGL-ESHF.

9.2 Functions and Features of IFOS Manager

* Reading the status of XGL-ESHF and IFOS
* Setting rate control to control lead-in speed of each port
* IFOS Station View function to monitor the status of entire system

9.3 System Environment and Installation

It describes the installation environment and how to install in order to install IFOS Manager on a PC.

9.3.1. System environment

CPU : Pentium and higher

Memory : 32Mbytes and more

OS: Microsoft Windows 95/98/ME/2000/XP

9.3.2. Installation

IFOS Manager is not provided with any separate installation version but it is available by simply copying compressed files to a folder.

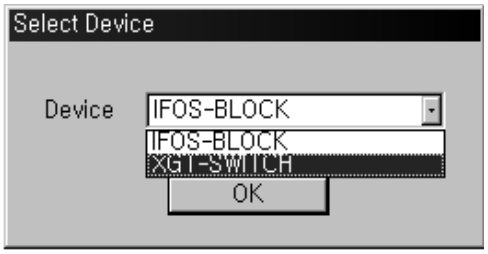
9.4 Window Description

It describes the window of IFOS Manager.

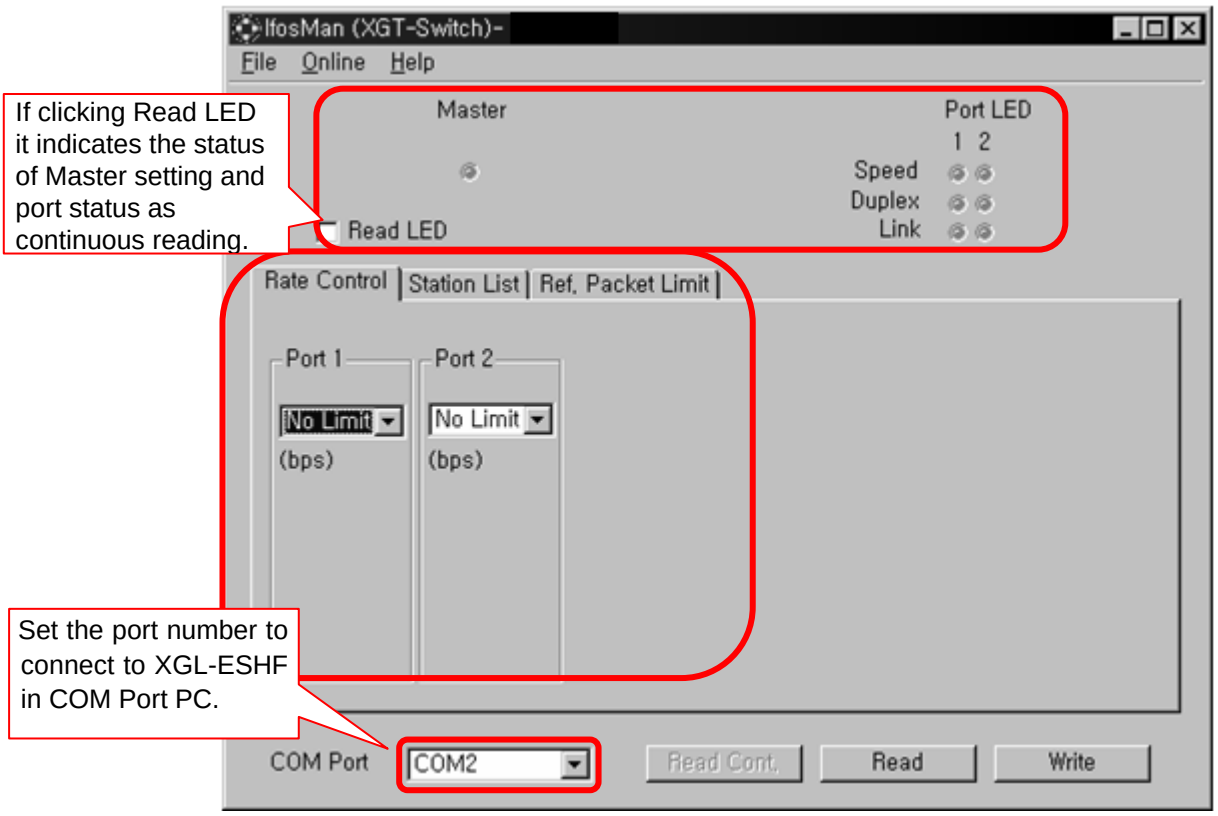
9.4.1 Basic window

The following figure shows the window just after running IFOS Manager.

Select XGT-SWITCH in IFOS-BLOCK/XGT-SWITCH Device window.



If selecting XGT-SWITCH, it shows the following window.



[Fig 9.4.1] Basic Window of IFOS Manager(when XGT-SWITCH is set)

9.4.2 Detail explanation of menus

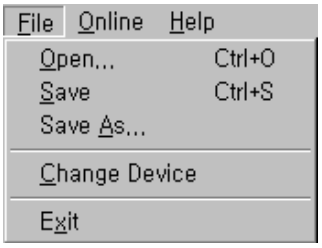
It describes main menus in detail.

(1) File – save the current settings as a file or open a file.

File is used to save the current status.

A file is saves with extension of ifx.

Note that it does not save a file in relation with Station List.



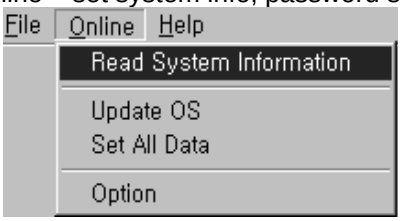
(a) Open : open a file.

(b) Save : save the current settings.

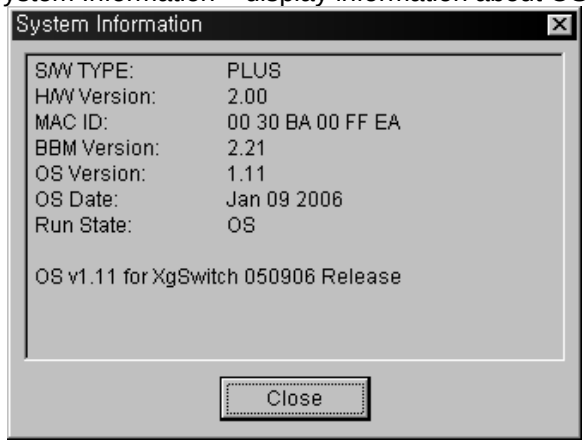
(c) Save As : save a file as another filename.

(d) Change Device : select IFOS Block or XGT-Switch(XGL-ESHF) module.

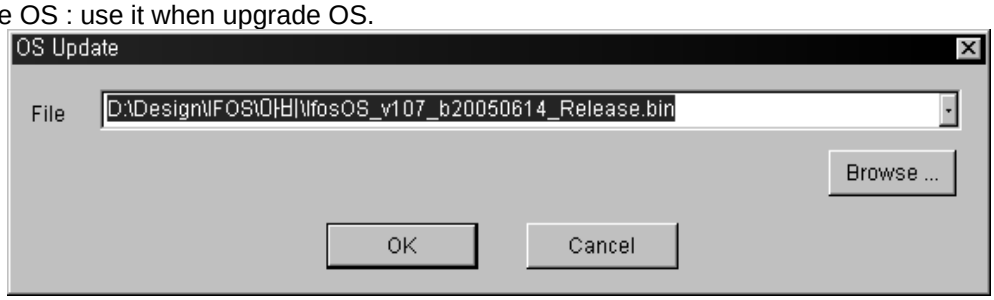
(2) Online – set system info, password setting or settings.



(a) Read System Information – display information about OS version.

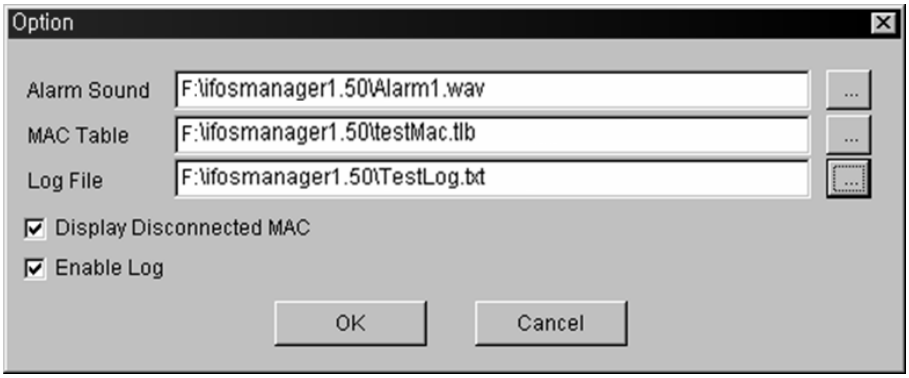


(b) Update OS : use it when upgrade OS.

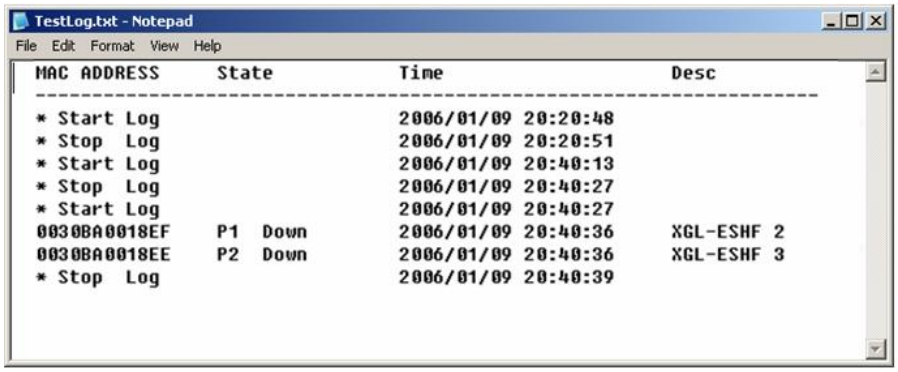


(c) Set All Data : Use it when write settings of display(Rate Control, Ref Packet Limit Value) collectively.

(d) Option – Set emergency status detection, stations' list control and log control



- Alarm Sound : PC replays a sound when emergency status is detected.
- MAC Table : used when managing stations' list of the entire system.
- Log File : Set it when creating changeover status as a log file.



9.4.3 IFOS status

The following figure is the indications of IFOS status.

[Fig 9.4.2]IFOS Status Window

The information is periodically read if Read LED button is checked off.

If Console Port is separated, Rx Timeout occurs. Then, if pressing OK button, the status window is initialized.

(1) Master : It indicates whether the XGL-ESHF module is set as Master. If indicated, it is indicated in yellow.

(2) Port LED

(a) Speed : indicate transfer speed connected.

If it is 100Mbps, it is indicated in green; if 10Mbps, it is indicated in grey. Port1,2 is fixed at 100Mbps.

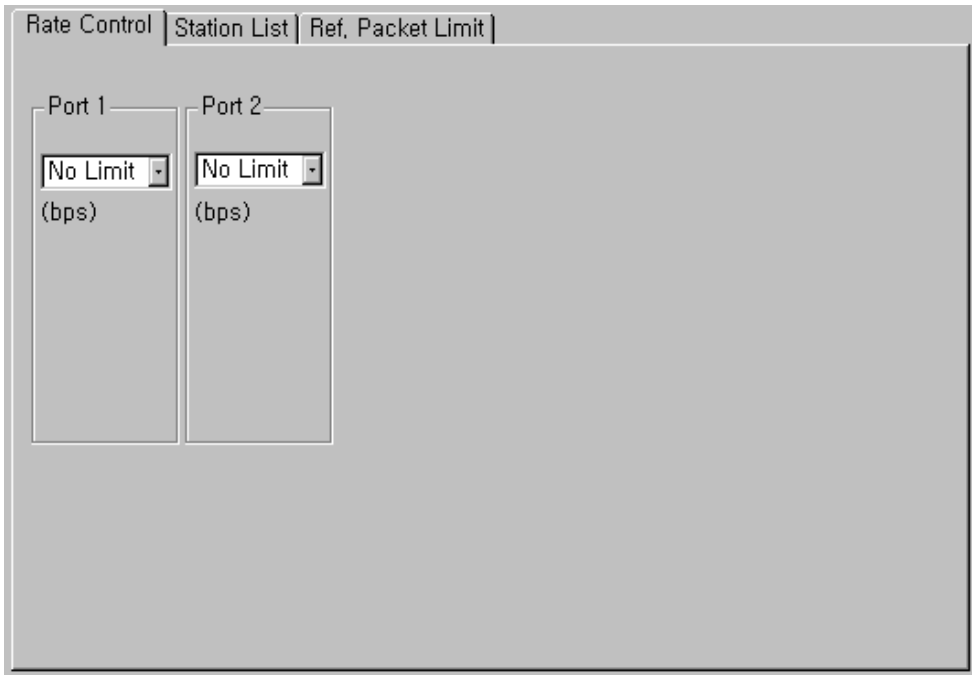
(b) Duplex : indicate the connected Duplex.

If it is FULL-Duplex, it is indicated in green; if HALF-Duplex, it is indicated in grey. Port1,2 is fixed at Full-Duplex.

(c) Link : indicate whether it is connected with other device.

If connected, it is indicated in green; if not, it is in grey.

9.4.4 Rate control



[Fig 9.4.3] Rate Control setting window

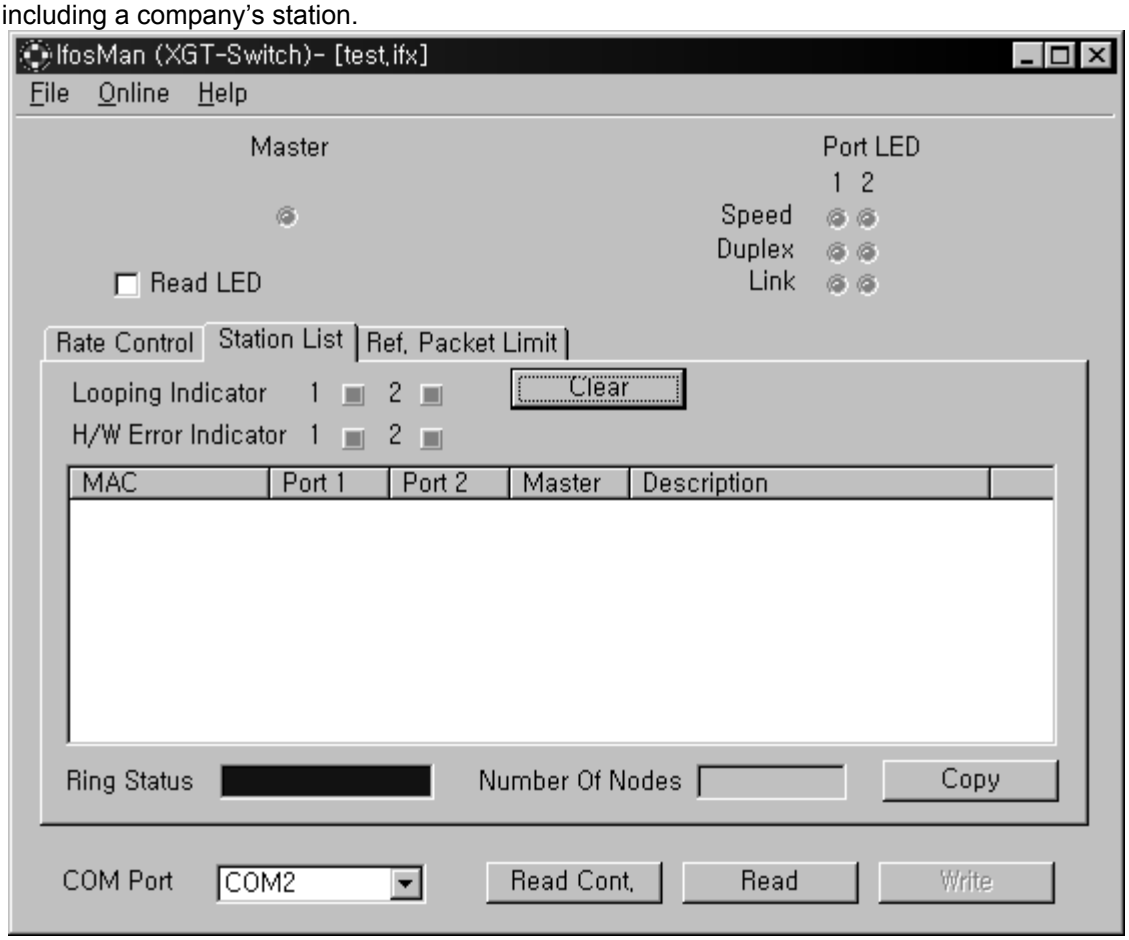
This is the menu to limit max. speed by Ethernet ports of XGL-ESHF by using software. It can be set between min. 128Kbps ~ max. 8Mbps. If not setting it, set it 'No Limit.'

Remark

1) Since settings of rate control and Ref.Packet Limit may cause communication trouble in network, make sure to contact and consult a user's network administrator.

9.4.5. Station list

The system consisted of XGL-ESHF provides the status information of all stations connected including a company's station.



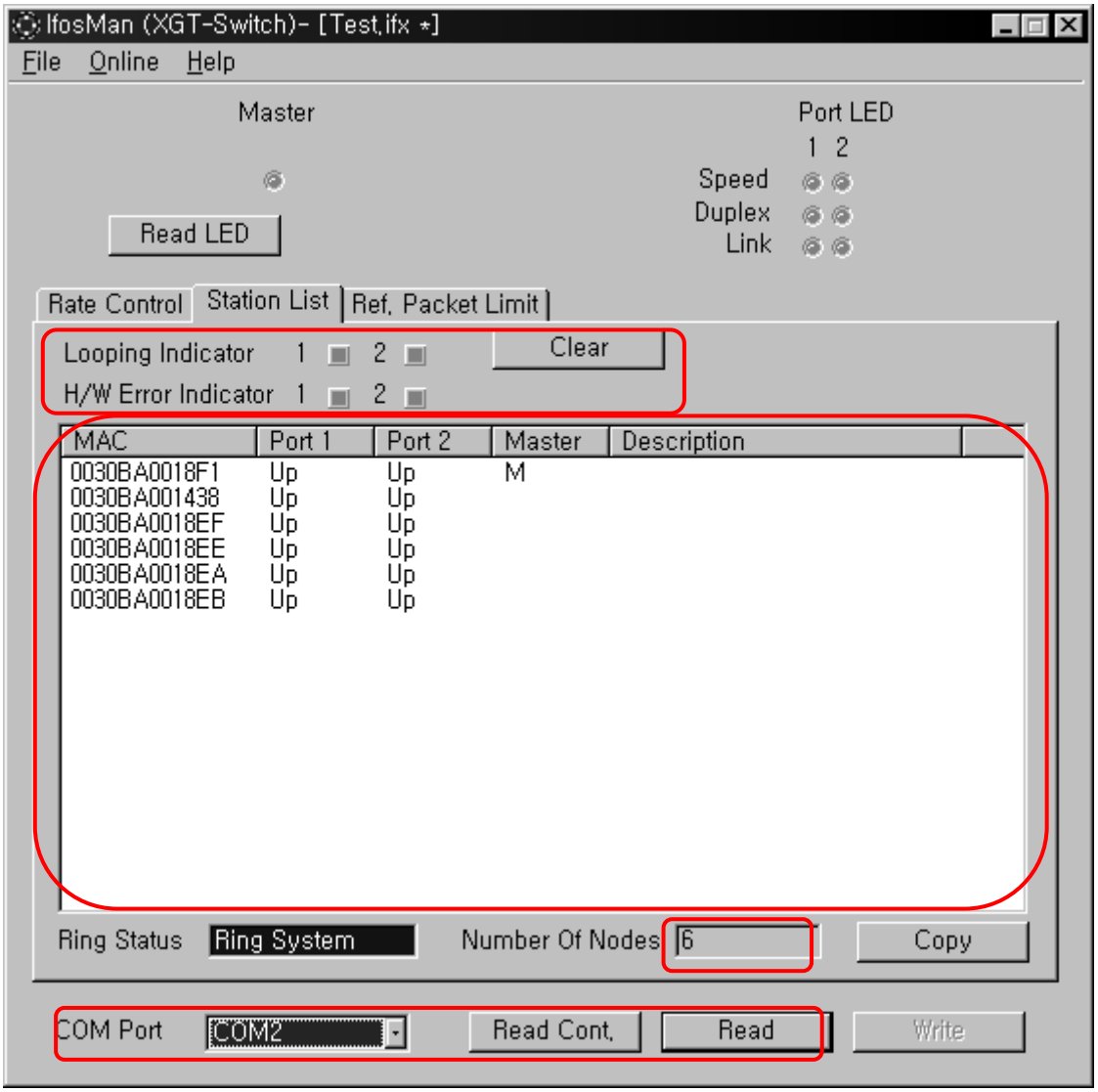
Station List monitoring is available only in XGL-ESHF set as master.

It is to prevent several stations from being set as master.

Remark

1) When structuring IFOS FEnet system, at least, one of modules should be set as master.
2) When using IFOS Manager, the Console Port of XGL-ESHF should be connected to a PC.
3) Station list of IFOS Manager should be connected to the console port of a station set as master.

When structuring system, serial port of monitoring PC should be inserted to the monitor port of master station.



(1) Looping Indicator: indicates records with any runaway in Ring network.

☞ 1: a record of loop in RING network. No Loop now.

☞ 2: a record that loop is in RING network.

(2) H/W Error Indicator: indicates records of H/W error in IFOS on network.

☞ 1: a record of H/W Err in RING network, No Err now.

☞ 2: a record that H/R Err is in RING network.

(3) Station List: indicates the XGL-ESHF connection status that is currently connected on RING Network.

☞ UP: XGL-ESHF is normally connected via optical cable.

☞ DOWN: bad communication section between XGL-ESHF and IFOS.

☞ M: indicate XGL-ESHF set as master.

☞ Description: description of XGL-ESHF in question.

(4) Ring Status: indicates the current network status.

☞ Ring System: indicates that it is structured with the current RING system.

☞ Bus System: Indicates that the current RING network has a disconnected section and is with BUS network.

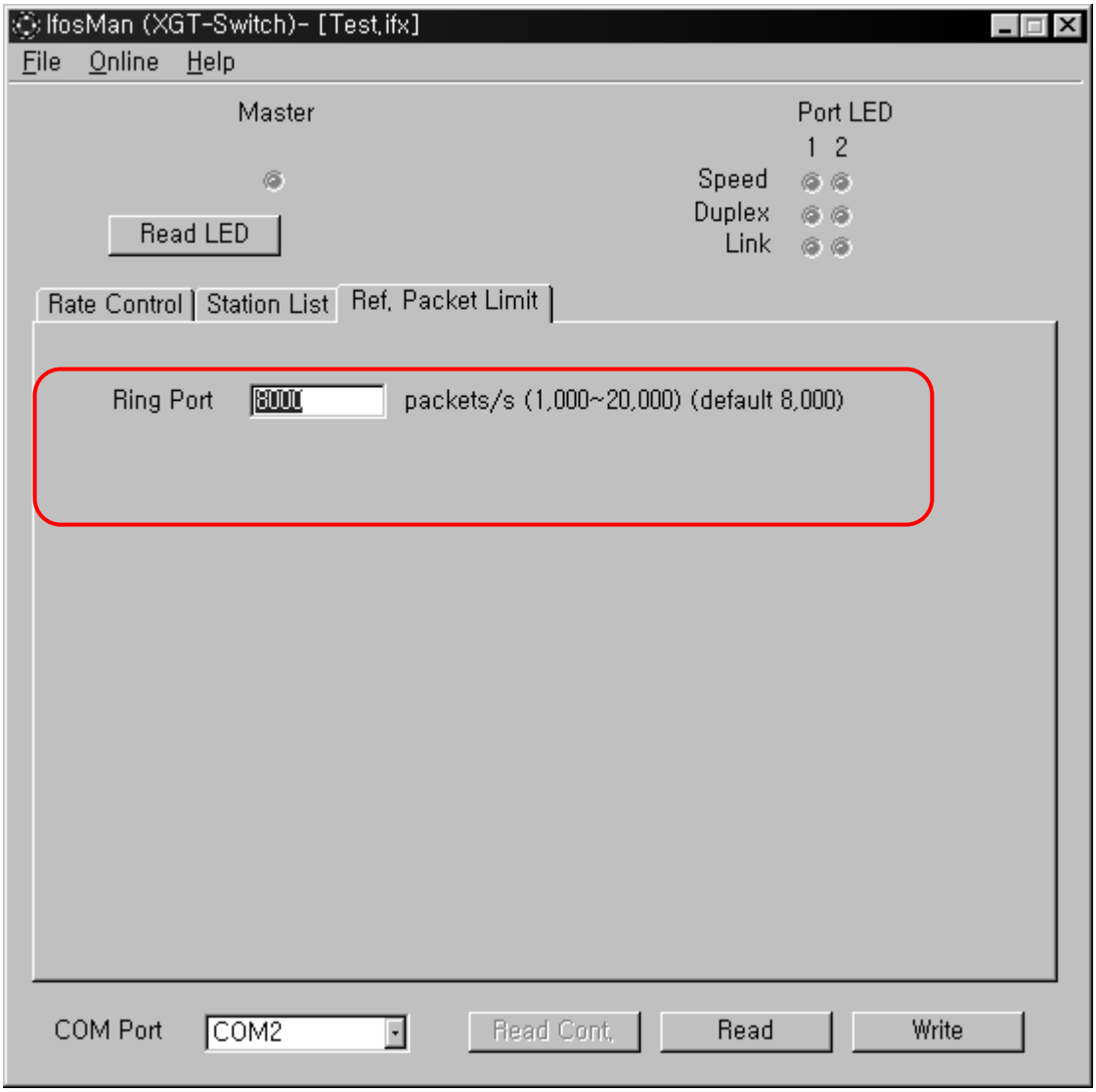
☞ H/W Fault: Indicates that the current network has H/W Error.

☞ Number Of Nodes: indicates the number of XGL-ESHF modules currently structured.

(5) Read Cont.: used when monitoring Station List in real time.

9.4.6. Reference packet limit

Ref. Packet Limit determines the number of reference packet to operate looping indicator in Station List.



(1) Ref.Packet Limit: set the reference packet limit to operate Looping Indicator.

☞ Ring Port: indicates the number of reference packets that RING PORT detects looping.

☞ User Port: indicates the number of reference packets that USER PORT detects Looping.

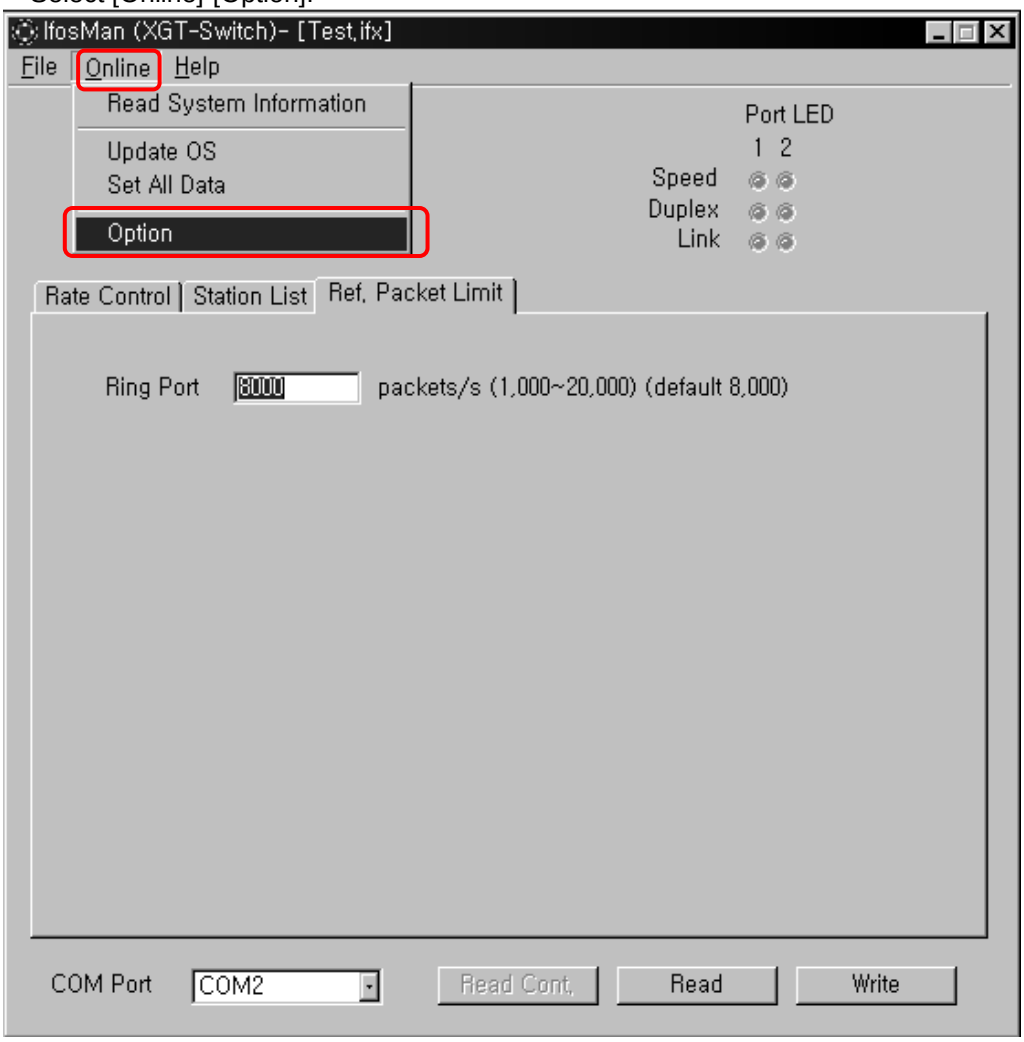
Remark

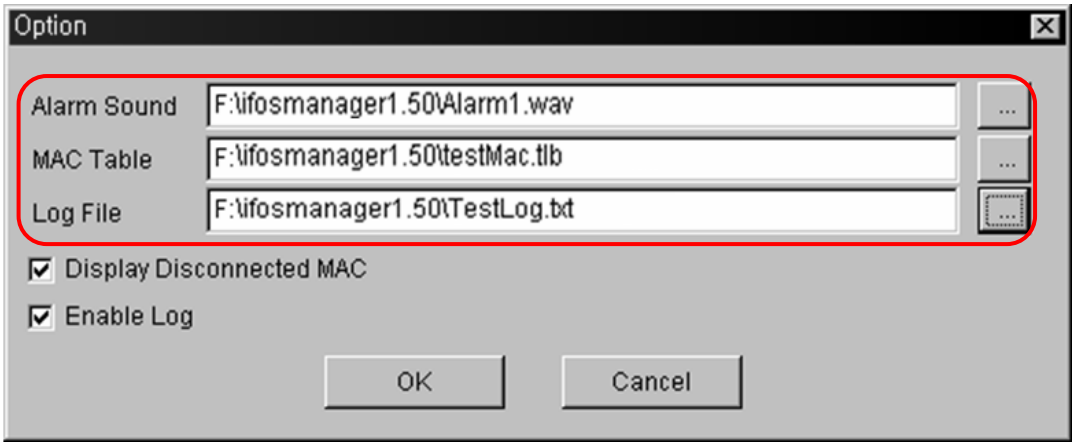
1) Since settings of rate control and Ref.Packet Limit may cause communication trouble in network, make sure to contact and consult a user's network administrator.

9.4.7 Option

Set a variety of options to see XGL-ESHF Station List.

Select [Online]-[Option].





(1) Alarm Sound: Select a sound file to output to a PC in case of looping, H/W error. Wav file is available. In case a PC does not have any sound card, it outputs beep sound through the built-in speaker.

(2) MAC Table: A file setting MAC Address and Description shown in station list.

(3) Log File: In case any event of changeover for RING/BUS on RING network occurs, it creates and manages a log by ports. It can be checked by opening a notepad.

Chapter 10 Troubleshooting

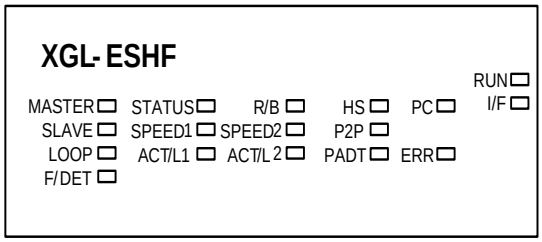
It describes potential troubles, causes of errors and measures during the system operation. When checking any abnormality of XGT FEnet fiber optic switch module, follow the procedure. If determining abnormal module status, make sure to take measures according to the troubleshooting and note that any unauthorized repair or disassembly would invalidate A/S service based on A/S rules.

10.1 Check by Communication Module LEDs

To check any defect or status of module, it is possible to check the status of communication module depending on LED light.

10.1.1 Abnormal operation indication

It is possible to check with LED front of Ethernet module.



[Fig 10.1.1] LED Structure of FEnet fiber optic switch module

LED Indication	Error	Measure
LOOP	LED on during normal operation of IFOS FEnet	1) It means network communication overload and check looping - Check lower device communication and the entire network load - Check communication by disconnecting one end ring port of network - Check Ref. Packet Limit of IFOS manager 2) Check a device in case packet exceeds due to a certain device
F/DET	LED on or off during normal operation of FEnet fiber optic switch module	1) Check hardware module by opening IFOS Manager. 2) Replace the module of XGL-ESHF in question. 3) Check whether it normally communicate after the replacement.

LED Indication	Error	Measure
RUN	LED on or off during normal operation of FEnet fiber optic switch module	1) Defect installation of Ethernet communication module - Check whether DC 5V of power module is supplied. - Check whether communication module is normally installed on base. 2) Check whether communication module is normally recognized by using XG-PD.
I/F	LED on or off during normal operation of FEnet fiber optic switch module	1) Check whether CPU normally works 2) Check whether communication module is correctly installed on base. 3) Check whether module information is correctly recognized by PADT software
P2P	IFOS FEnet I/F module turns off during P2P service	1) Check whether the basic parameter of IFOS FEnet I/F communication module is correctly structured by using XG-PD. 2) Check whether function block/command input are normally executed 3) Check whether media connection is correct. 4) Check P2p link enable(allowed) of XG-PD menu is set.
HS	IFOS FEnet I/F module turns off during HS link service	1) Check whether the basic parameter of IFOS FEnet I/F communication module is correctly set by using XG-PD. 2) Check whether HS link setting is correct. 3) Check whether HS link enable(allowed) of XG-PD menu is on.
PADT	FEnet fiber optic module turns off during remote connection service	1) Check whether IP address for remote connection(PADT) is correct. 2) Check whether PADT program's remote connection is disconnected.
PC	IFOS FEnet I/F module turns off during dedicated service	1) Check whether IP address for dedicated connection is correct. 2) Check whether dedicated connection table is enabled and if enabled, check whether the IP of MMI(PC) is registered to the dedicated connection table. 3) Check whether connection request is correct in MMI(PC) device.
ERR	FEnet fiber optic switch module turns on after turning it on	1) Check whether the basic parameter of IFOS FEnet I/F communication module is correctly set by using XG-PD. 2) Check whether there is any interface error with CPU.

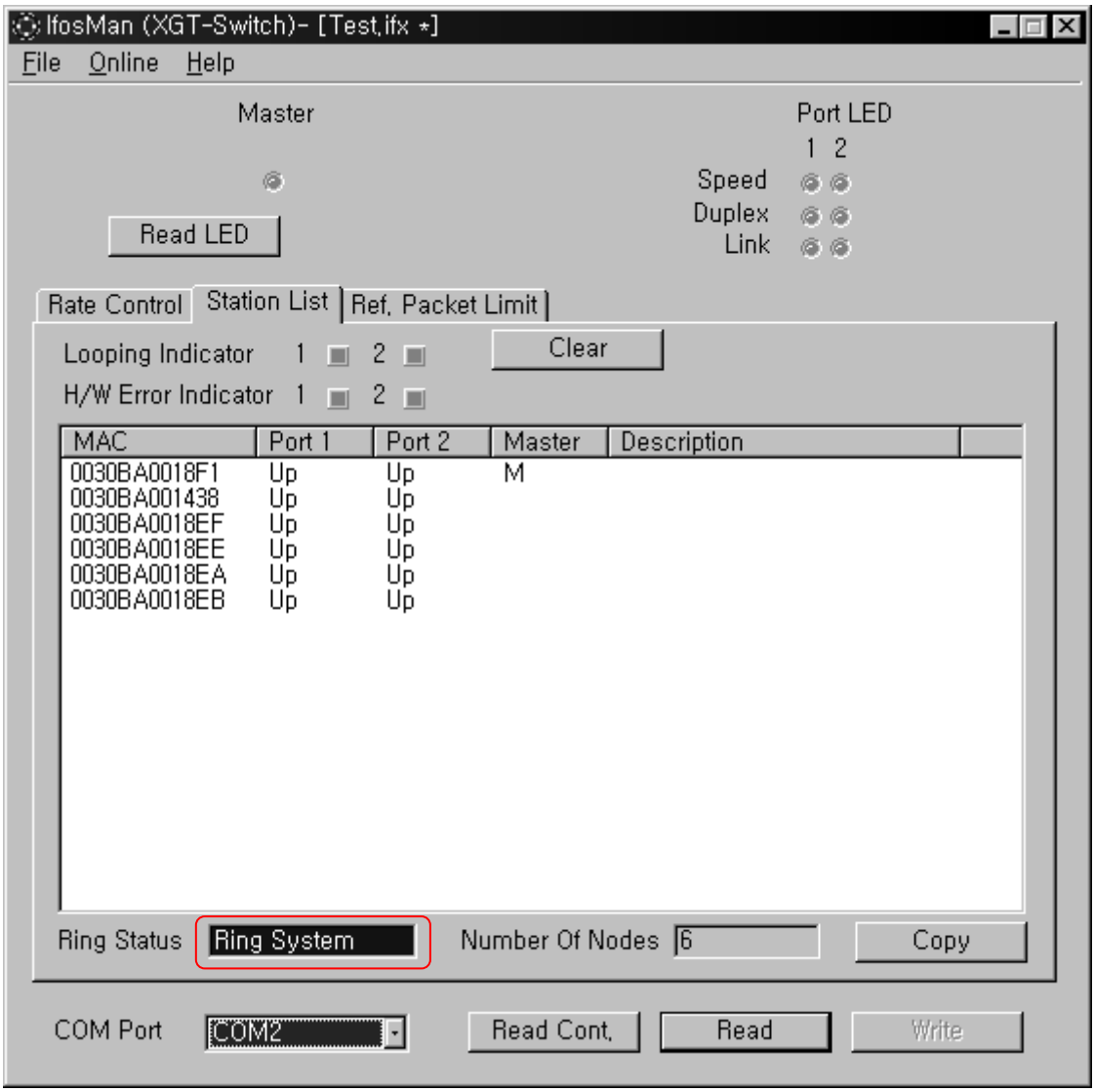
10.2 Checking Errors Through IFOS Manager

10.2.1 Monitoring RING/BUS Changeover

By using IFOS MANAGER, it is possible to monitor RING/BUS changeover in real time.

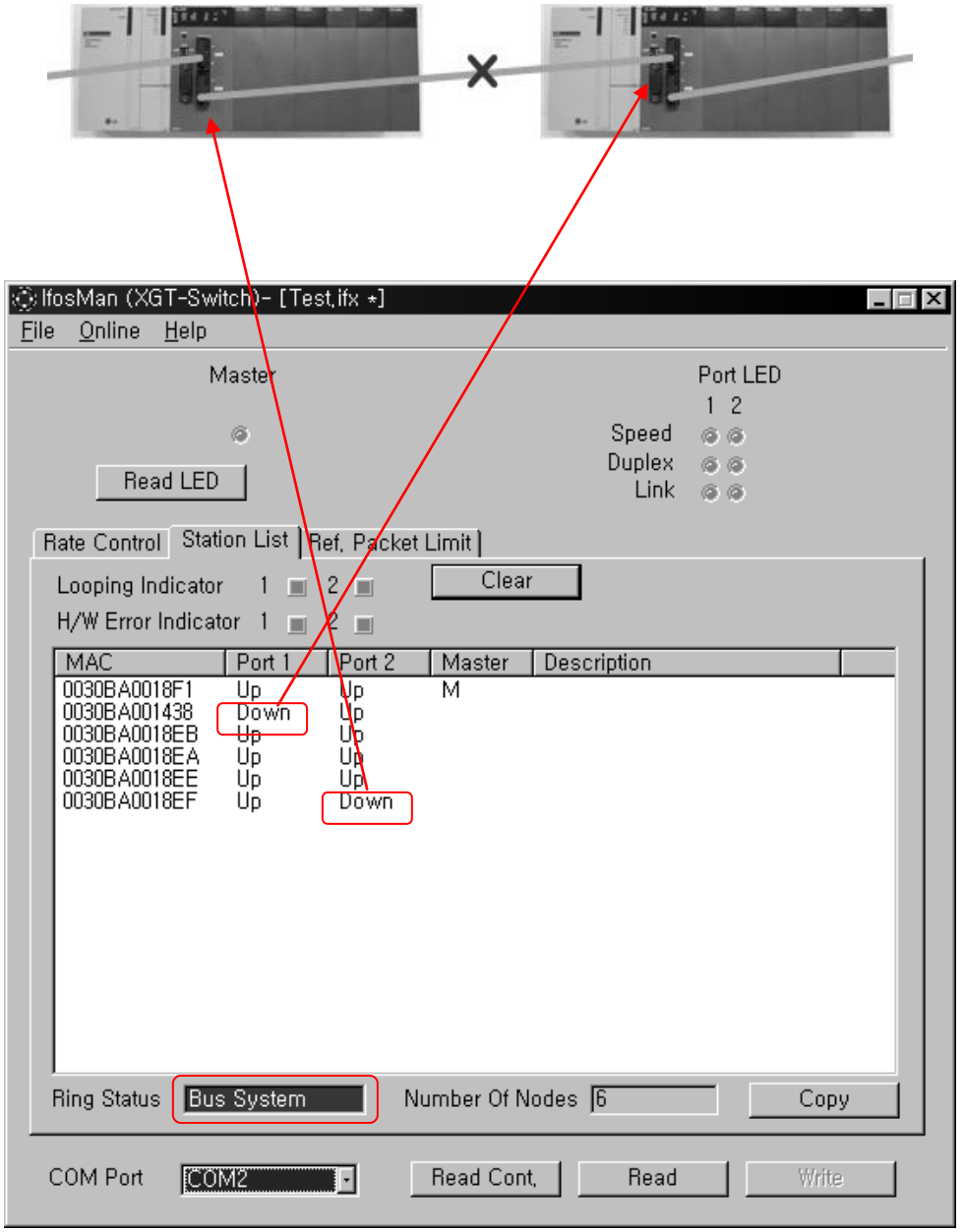
1) Normal Status

In [Station List], every port of XGL-ESHF is expressed as [Up] and it is also expressed on the bottom as [Ring System] in blue.



2) BUS Changeover Status

In case Ring cable is short-circuited or RING port is removed in RING System Structure, RING structure is changed over to BUS system. In the case, IFOS MANAGER expresses the port in which IFOS RING is disconnected in [Station List] as [Down] and shows it in [Ring Status] as [Bus System] in red on the bottom.

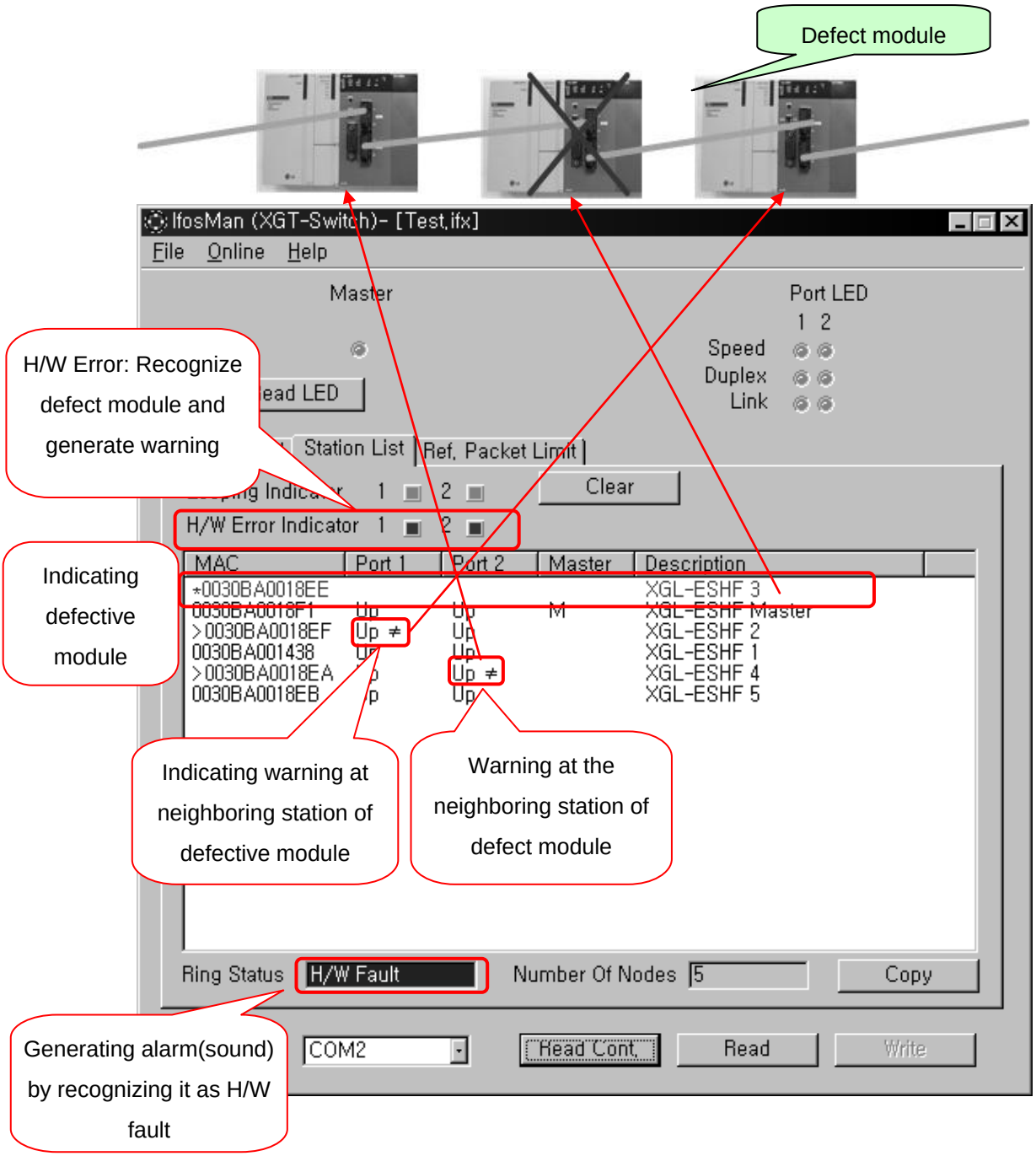


10.2.2 Warning of defective IFOS module

IFOS warns whether any defective module exists once any defective module is detected in RING network.

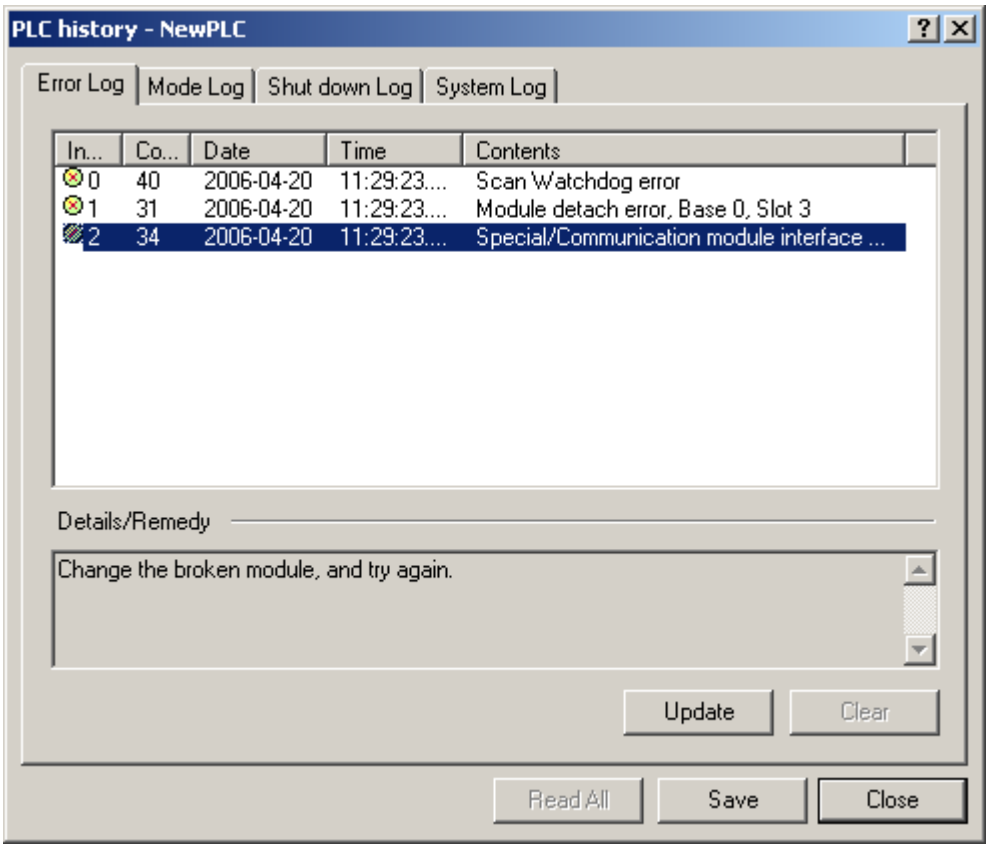
1) In case IFOS Defect Module occurs

If any defect module exists on Ring network, it is changed to Bus network. In addition, it warns on IFOS MANAGE about which XGL-ESHF has a problem in network.



10.3 Determining Abnormal Module through XG5000

It is also possible to monitor any abnormal communication module through XG5000 program. It can be checked by [Online] -> [PLC History], [PLC Error/Warning] after connecting RS-232C to CPU port.



[Fig 10.3.1] Detail info monitoring of PLC history

In case hardware error or CPU interface error occurs in module, it is common that LED on the communication module works abnormally, but the status information is simply checked by the dedicated program.

[Fig 10.2.1] shows how to check error/warning information through PLC history(log) from [Online] menu of XG5000 and the problem can be fixed by referring to [Detail & Measure]

10.4 Determining Abnormal Module by Error Code

Troubleshooting consists of 10.3.1 Abnormal Operation Type to check Error Code and 10.3.2 Error Description and Measures for errors.

10.4.1 Abnormal operation type

Error Code	Indication	Description
E00-01	ECM_12 ~ ECM_15	Hardware health-check error
E00-02	ECM_13, ECM_18	CPU Interface error

[Table 10.4.1] communication Module H/W error

Error Code	Indication	Description
E02-01	ECM_18	Abnormal interface between FEnet I/F module and CPU

[Table 10.4.2] Abnormal interface with communication Module CPU

Error Code	Indication	Potential causes
E03-01	HS Link Parameter Setting Error	It occurs if HS link parameter is incorrectly set or is not set after setting Online Link Enable or if parameter is broken.
E03-02	HS Link is not executed	It occurs when communication does not work although HS link parameter is normal after setting Link Enable
E03-03	If HS Link is executed _Junction of HSxRLNK,_HSxTRX is not on.	It occurs when _HSxRLNK is not on although HS link parameter is normal after setting Link Enable
E03-04	If HS Link is executed _Junction of HSxLTBL is on.	It occurs when _HSxLTBL is on due to PLC or communication troubles after _HSxRLNK is on followed by Link Enable

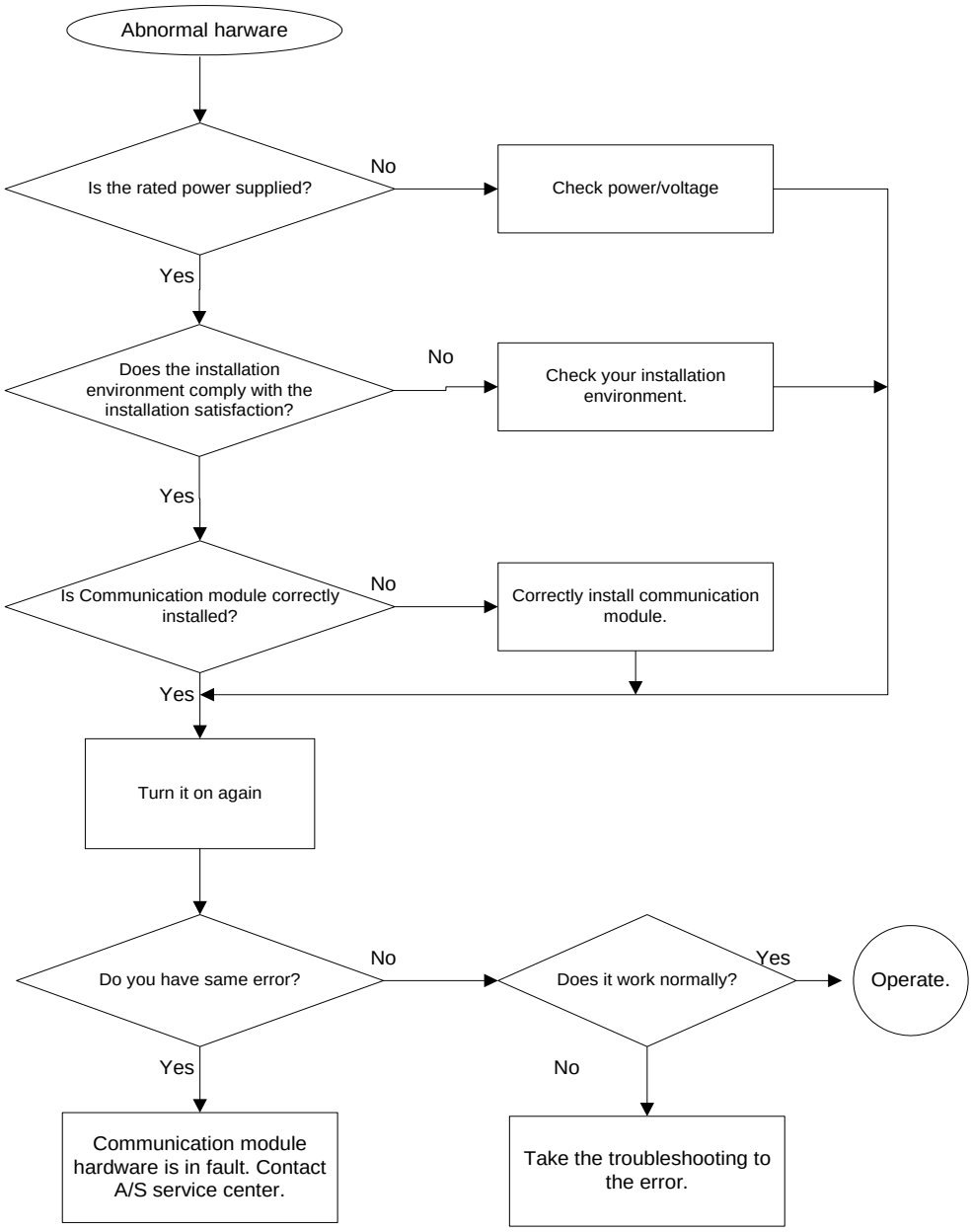
[Table 10.4.3] Abnormal operation of HS Link

Error Code	Indication	Potential causes
E04-01	A message 'No response' occurs when requesting remote connection	When RS-232C cable is not connected between XGT and PLC or when PLC power is off
E04-02	In case any other error message occurs when requesting remote connection	Status that service is not executed due to inappropriate requirements.

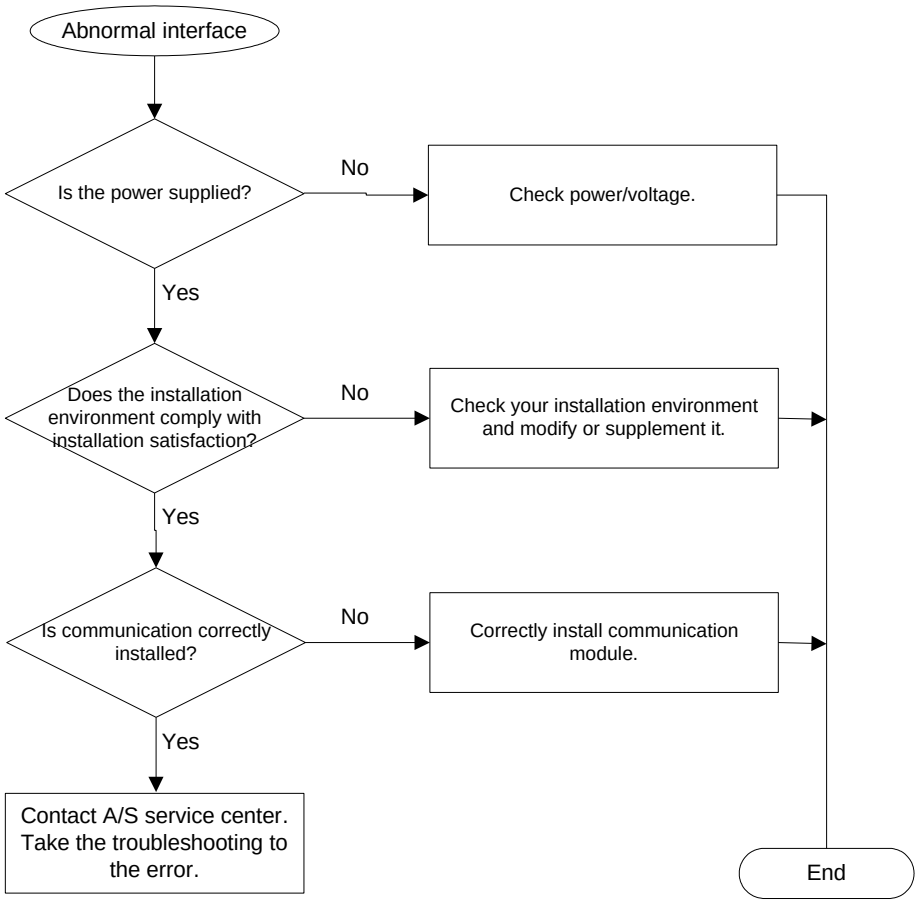
[Table 10.4.4] Operation error of PADT communication service

10.4.2 Troubleshooting

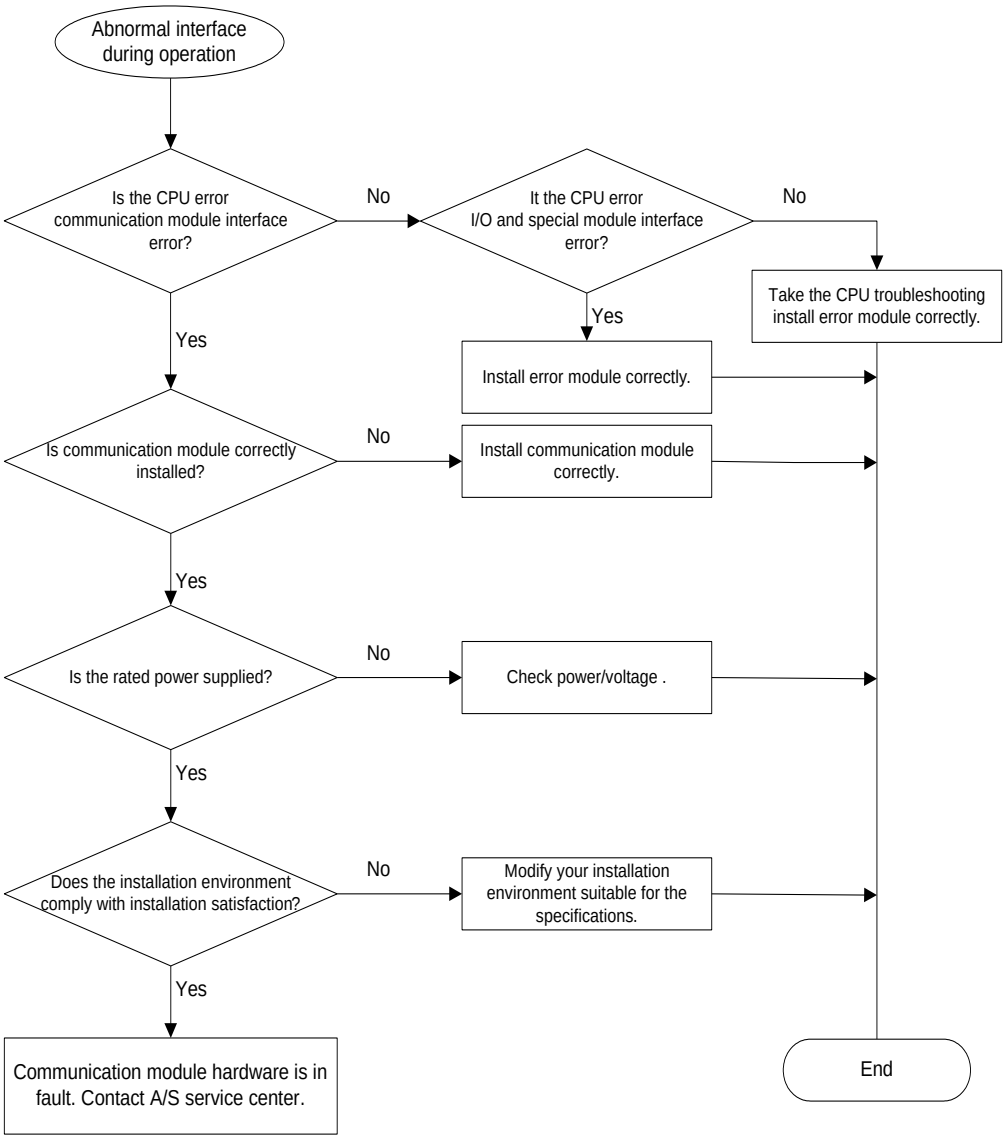
1) Error Code E00-01 : Abnormal hardware



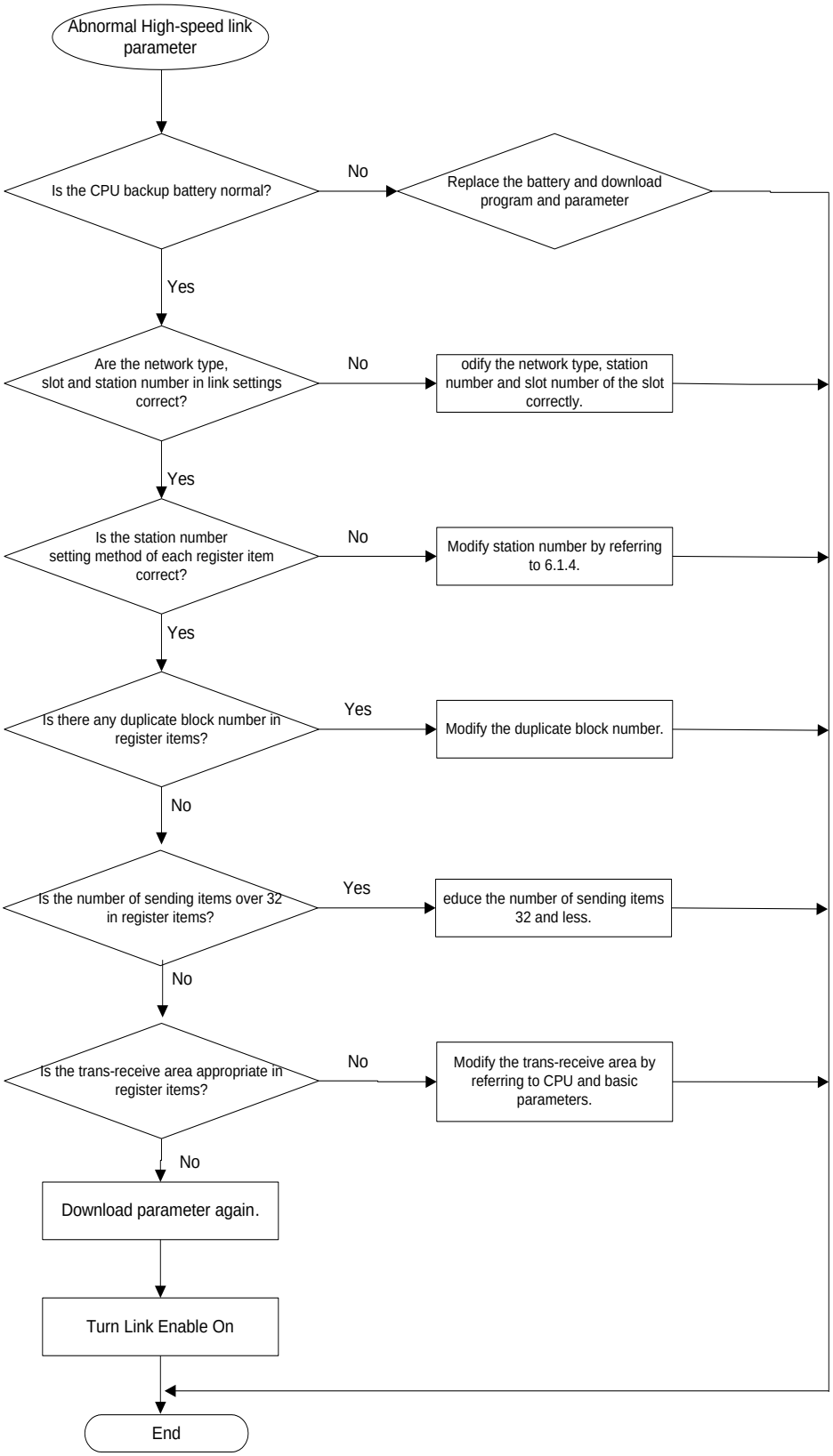
2) Error Code E00-02 : Abnormal interface



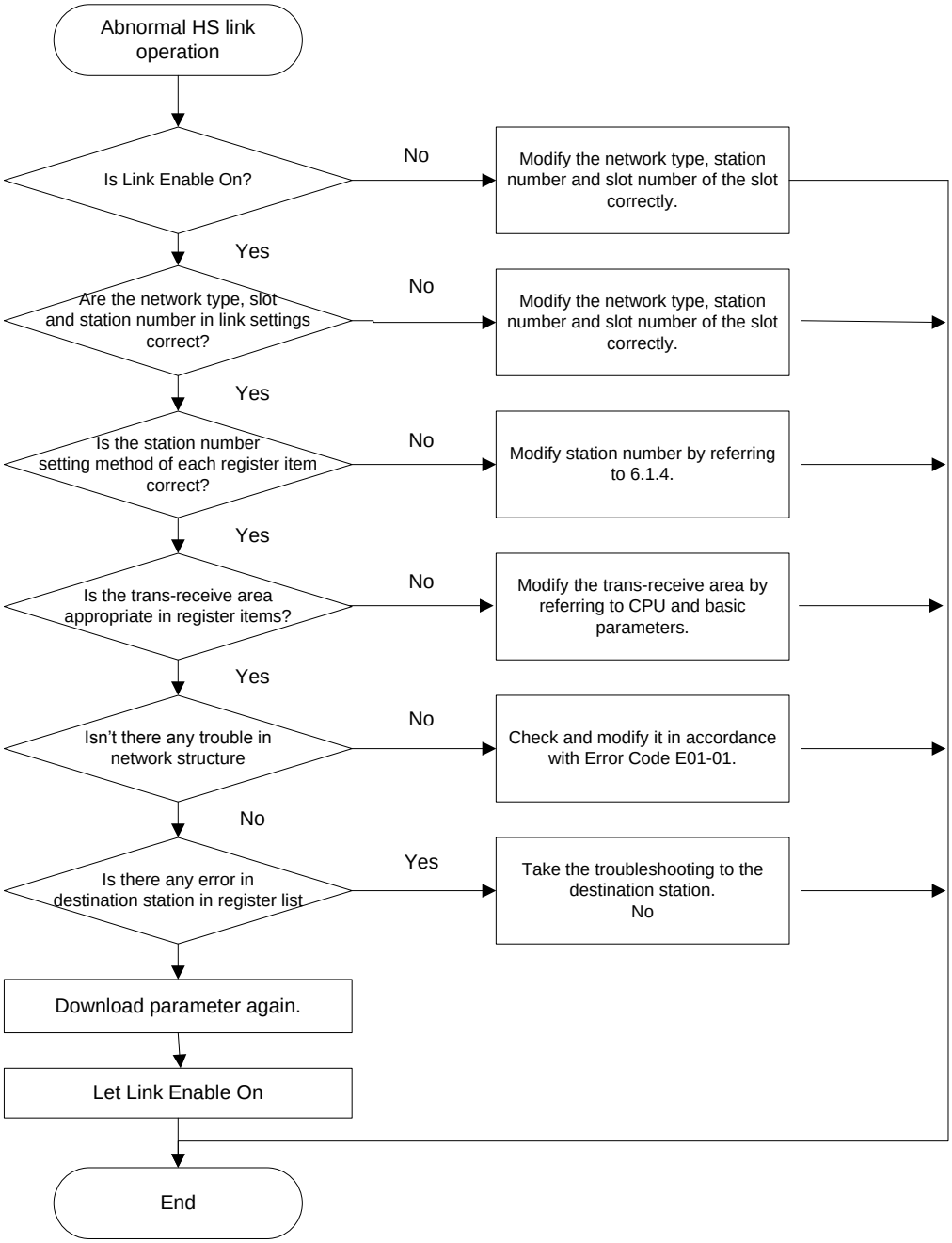
3) Error Code E02-01 : Abnormal interface with CPU during operation



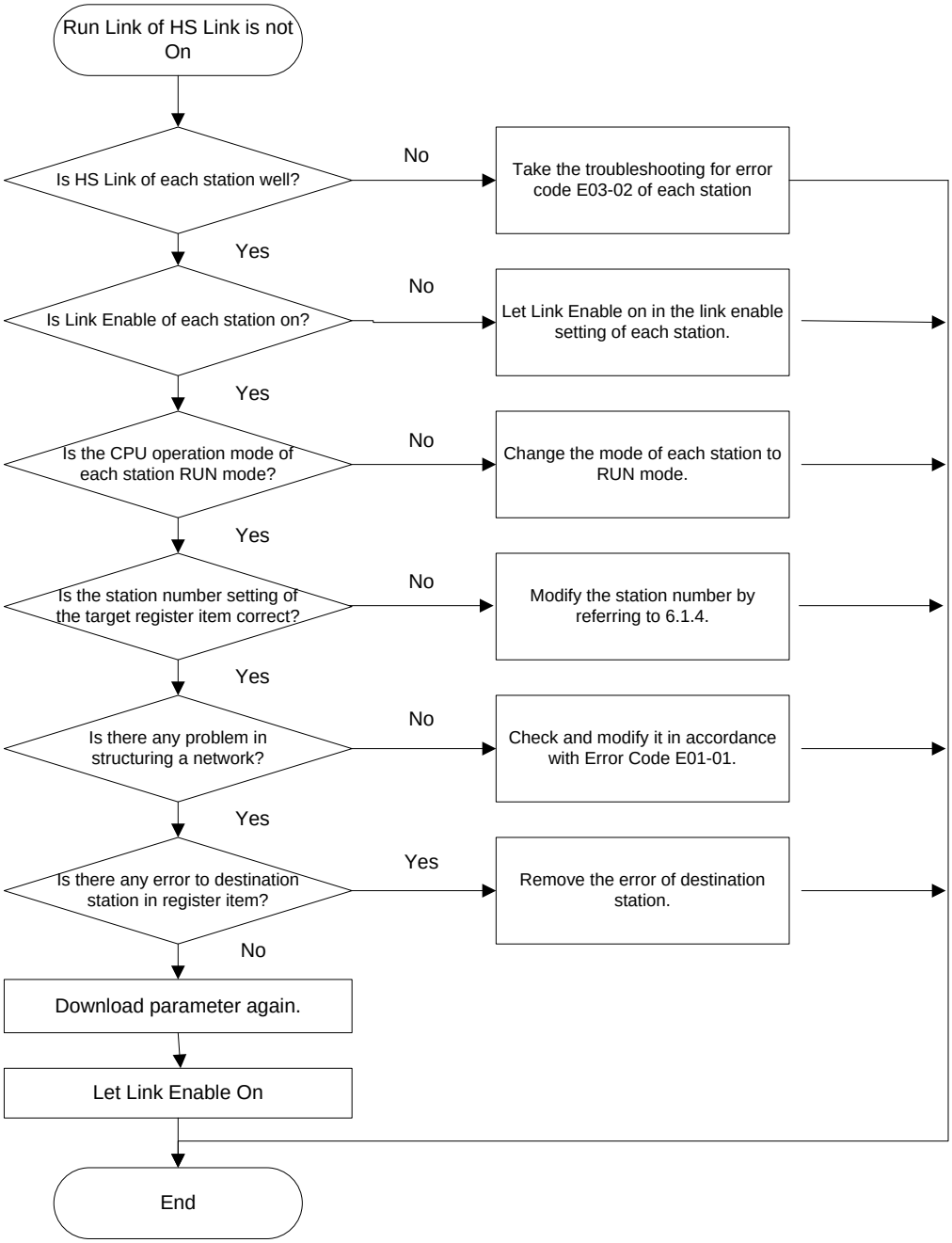
4) Error Code E03-01 : Abnormal HS Link Parameter



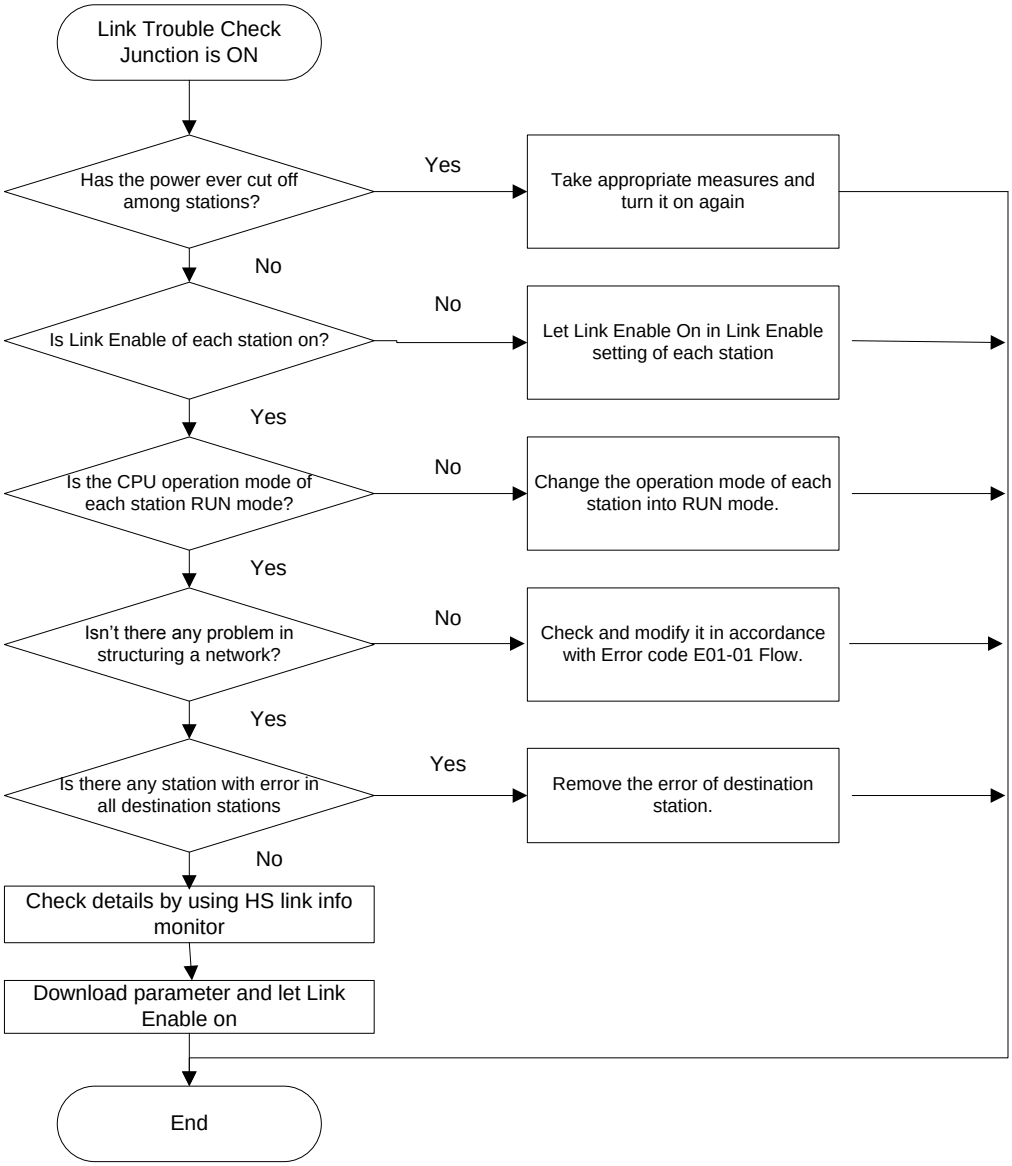
5) Error Code E03-02 : Abnormal HS Link



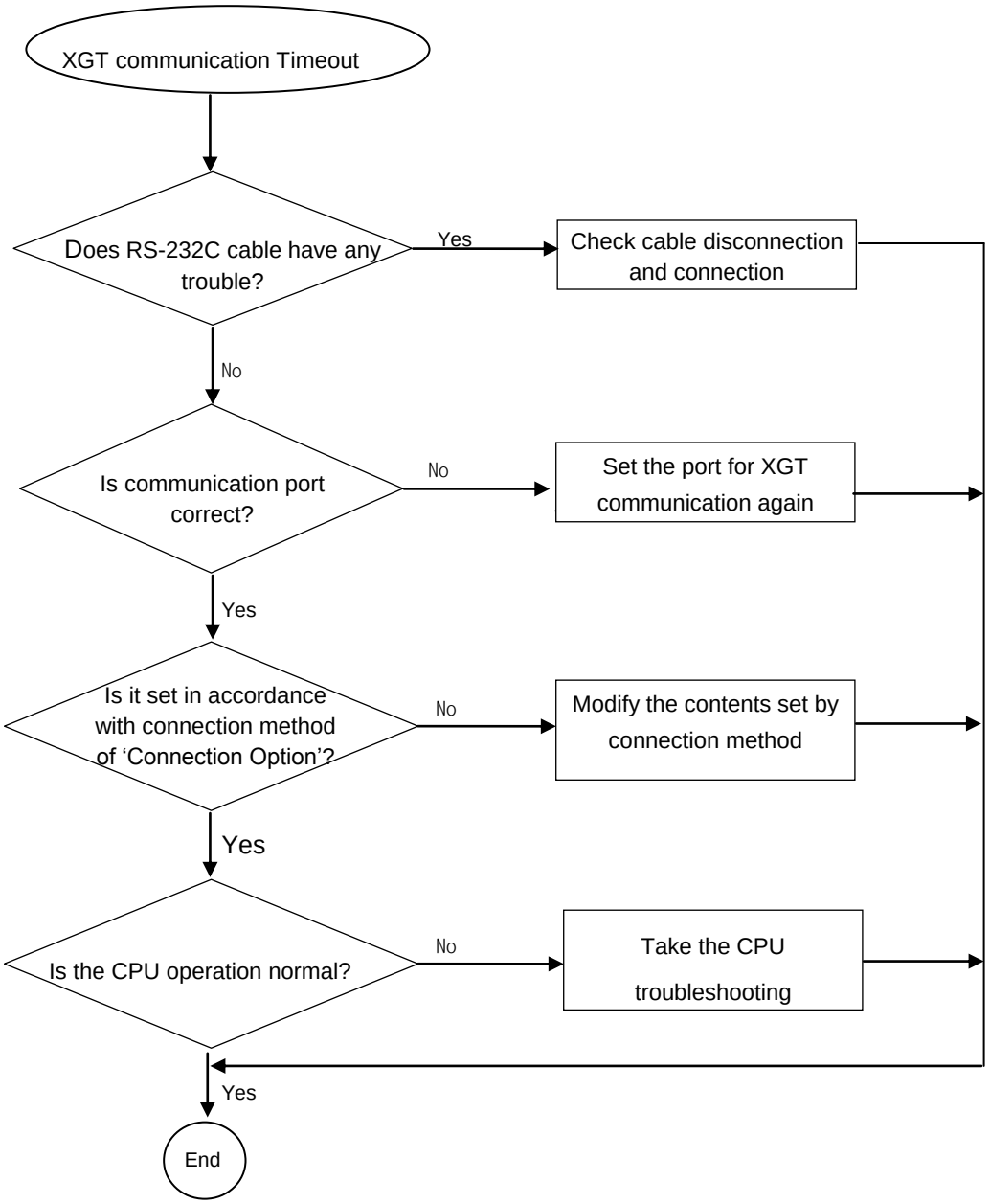
6) Error Code E03-03 : HS Link Run Link Junction is not on



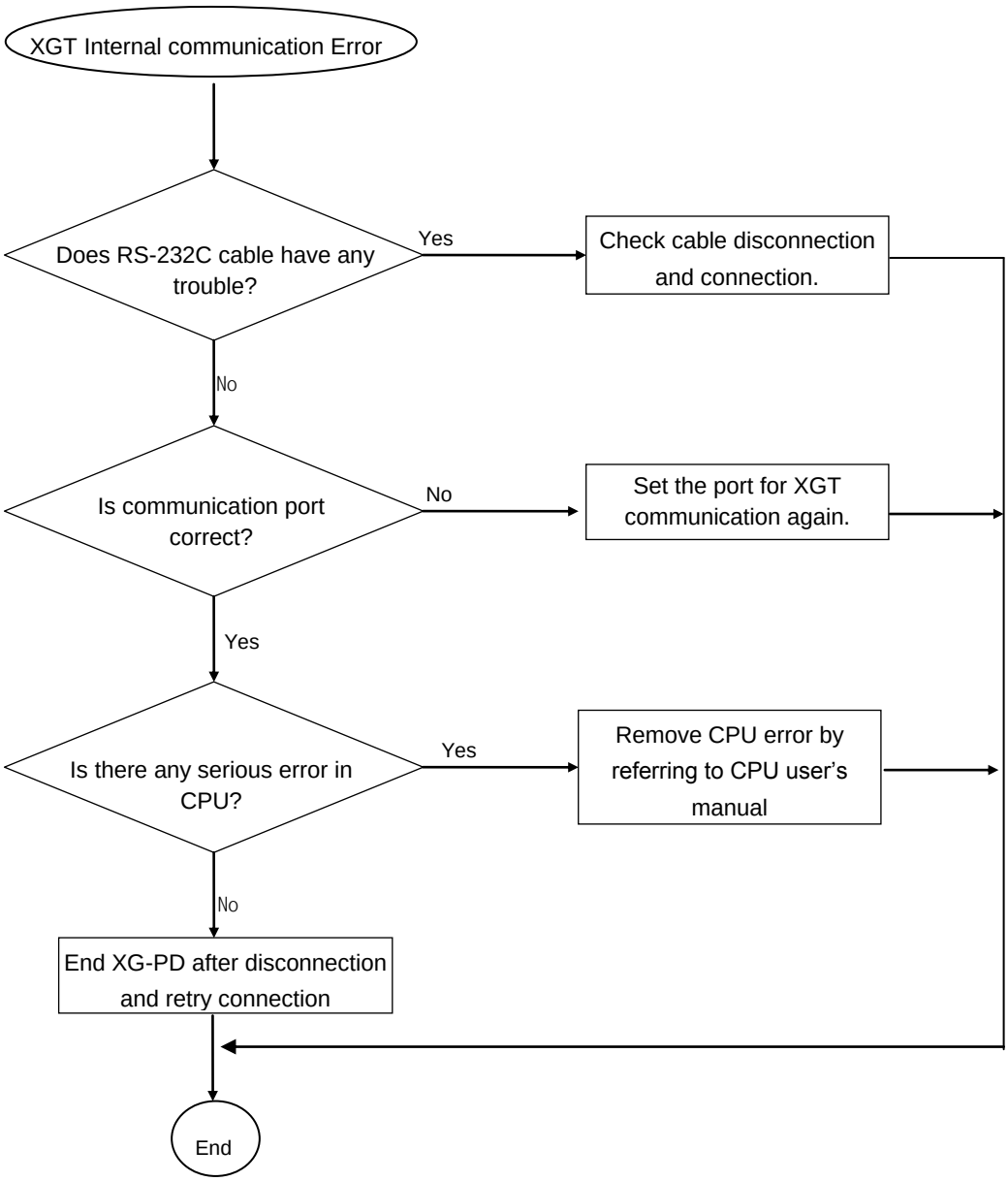
7) Error Code E03-04 : HS Link Link Trouble Junction is on



8) Error Code E04-01 : XGT communication timeout



9) Error Code E04-02 : XGT Internal communication abnormality



Appendix

A.1 XGK CPU Memory Device Exhibit

For device by the latest CPU types, refer to CPU Manual. In addition, for any other CPU models released later, based on the time when the user's manual is prepared, refer to the user's manual of CPU.

Refer to the below table when sending data of memory device through communication by reading memory device of local CPU using COM module or when saving the data received from COM into local CPU memory.

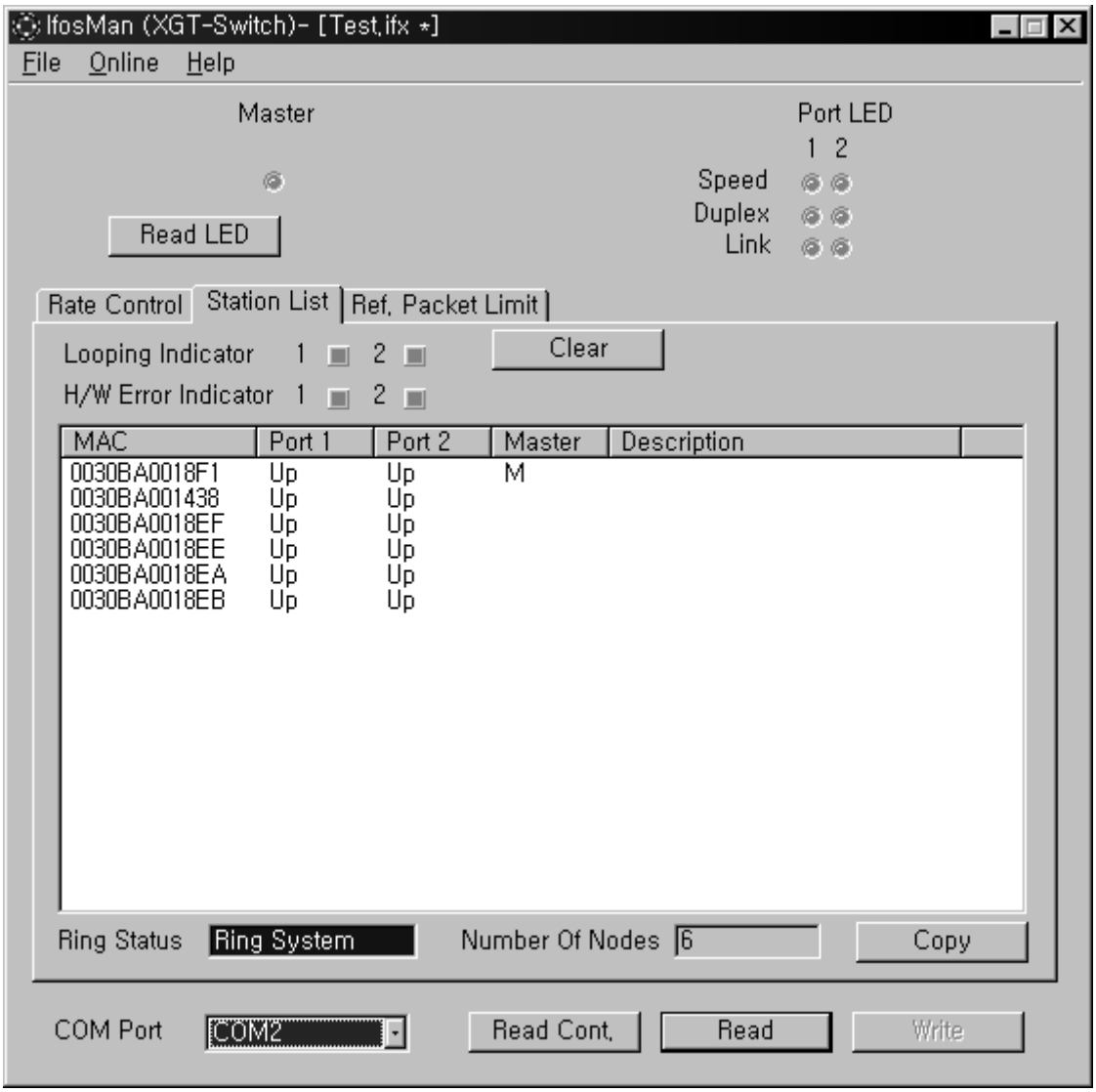
Local Device Type	Range	Size(word)	Read/Write
P	P0 - P2047	2048	R/W
M	M0 - M2047	2048	R/W
K	K0 - K2047	2048	R/W
F	F0 - F1023	1024	R
F	F1024 - F2047	1024	R/W
T	T0 - T2047	2048	R/W
C	C0 - C2047	2048	R/W
U	U00.00 - U7F.31	4096	R/W
Z	Z0 - Z127	128	R/W
L	L0 - L11263	11264	R/W
N	N0 - N21503	21504	R/W
D(CPUH)	D0 - D32767	32768	R/W
D(CPUS)	D0 - D19999	20000	R/W
R	R0 - R32767	32768	R/W
ZR	ZR0 -ZR65535	65536	R/W

Refer to the following table when reading memory device of remote CPU using COM module and saving local CPU memory device value to remote CPU memory device.

Remote Device Type	Range	Size(Word)	Read/Write
P	P0 - P2047	2048	R/W
M	M0 - M2047	2048	R/W
K	K0 - K2047	2048	R/W
F	F0 - F1023	1024	
F	F1024 - F2047	1024	R/W
T	T0 - T2047	2048	R/W
C	C0 - C2047	2048	R/W
U	U00.00 - U7F.31	4096	R/W
Z	Z0 - Z127	128	R/W
L	L0 - L11263	11264	R/W
N	N0 - N21503	21504	R/W
D(CPUH)	D0 - D32767	32768	R/W
D(CPUS)	D0 - D19999	20000	R/W
R	R0 - R32767	32768	R/W
ZR	ZR0 -ZR65535	65536	R/W

A.2 Making Station List using IFOS Manager

Since it is not easy to tell IFOS station only with MAC address, a user can create the contents related with MAC address of user's own accord.



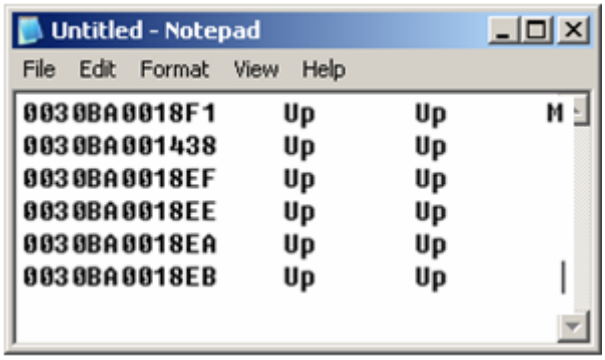
If clicking Read Station List in the window, it shows the window consisting of the current IFOS.

Then, click the upper part of Mac and click Copy button on the right bottom.

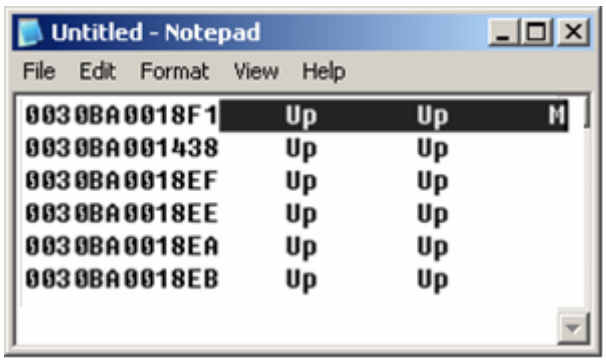
Pressing Copy button would copy the current window structure.

Open notepad and paste the copied contents.

If pasting it, it shows the following.

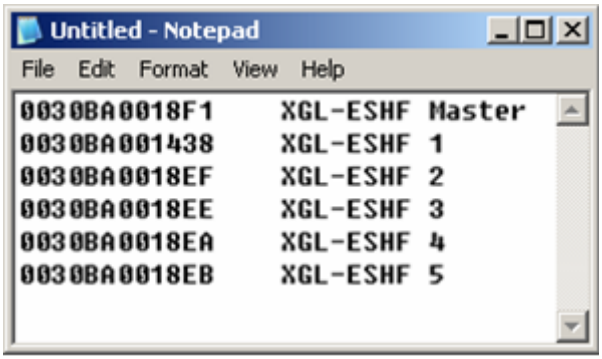


Then, delete any unnecessary part and edit it so that the only MAC address is left.



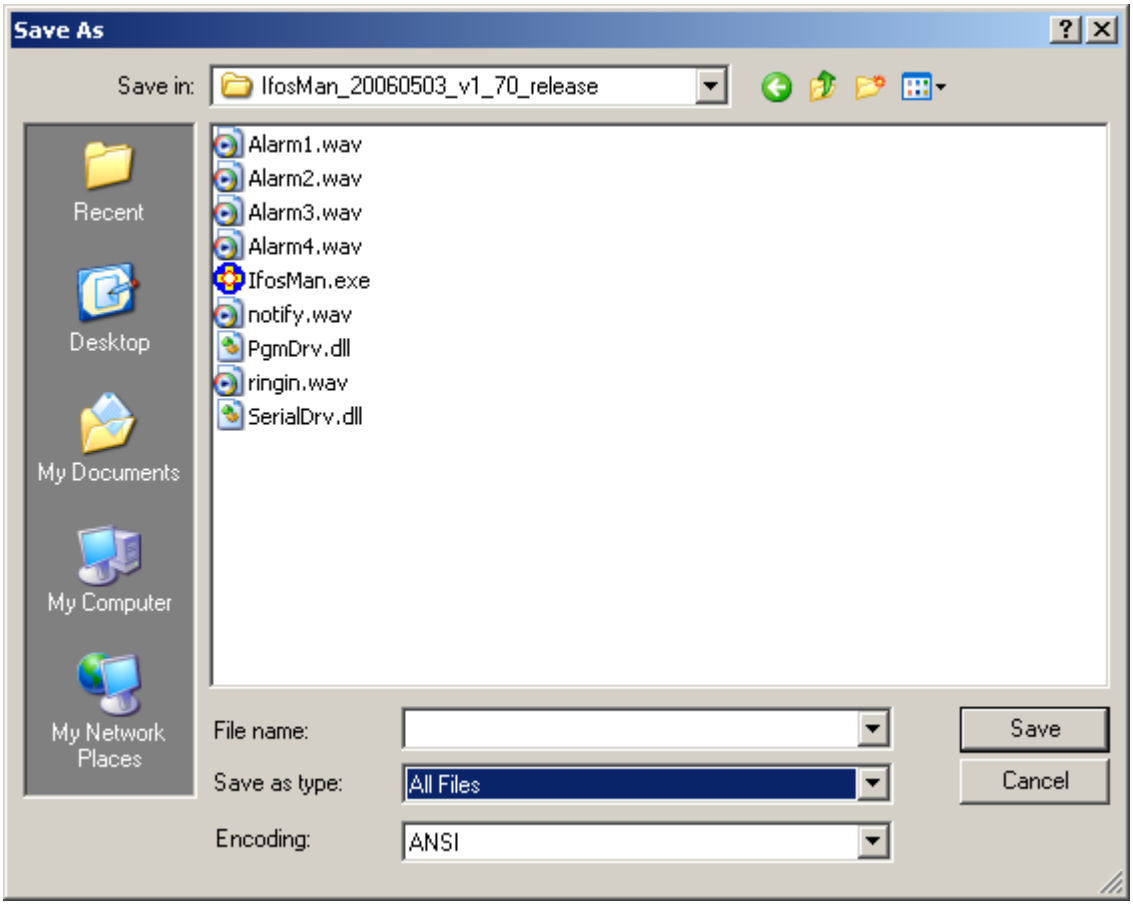
After unnecessary part is deleted, insert description that is to be attached behind MAC Address.

Here, the example shows inserting Station1-Master, Station2 and Station3.



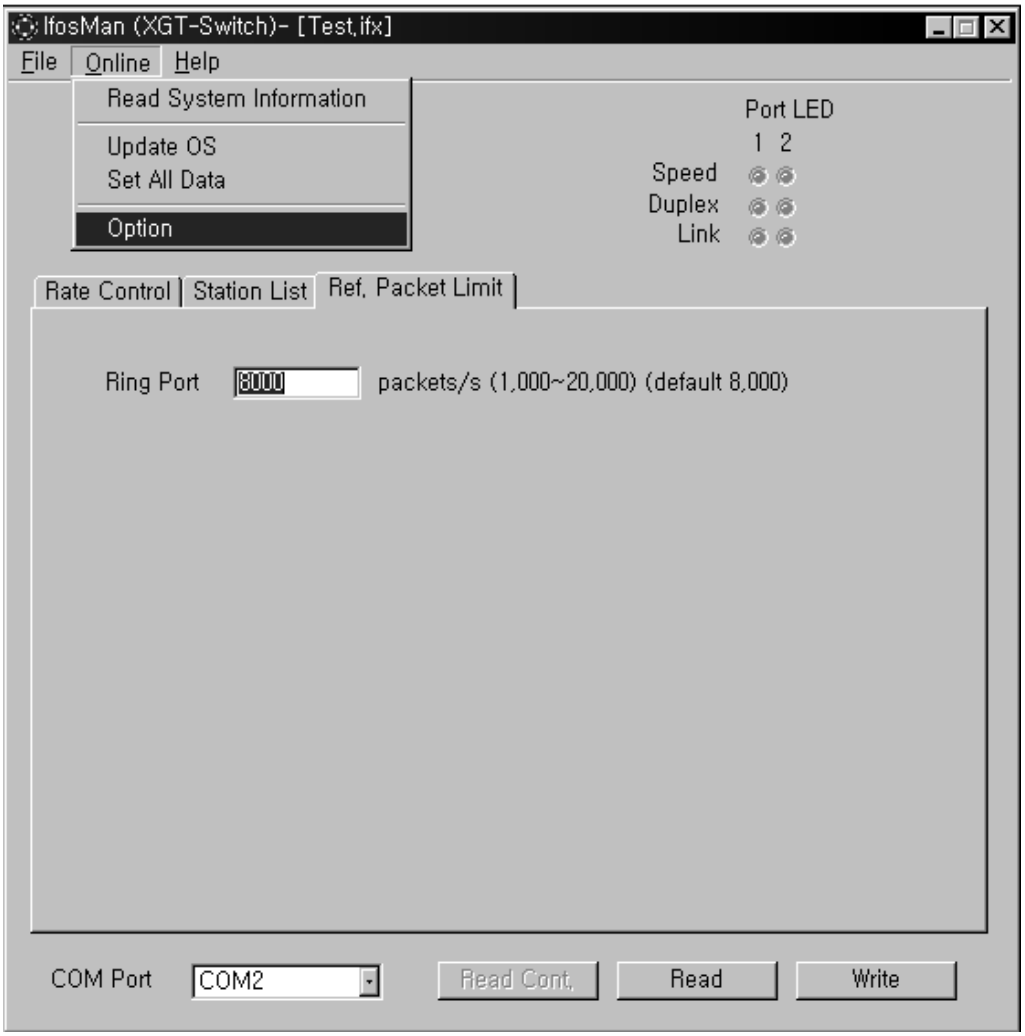
Once Station List Nick Name is completely edited, save the file.

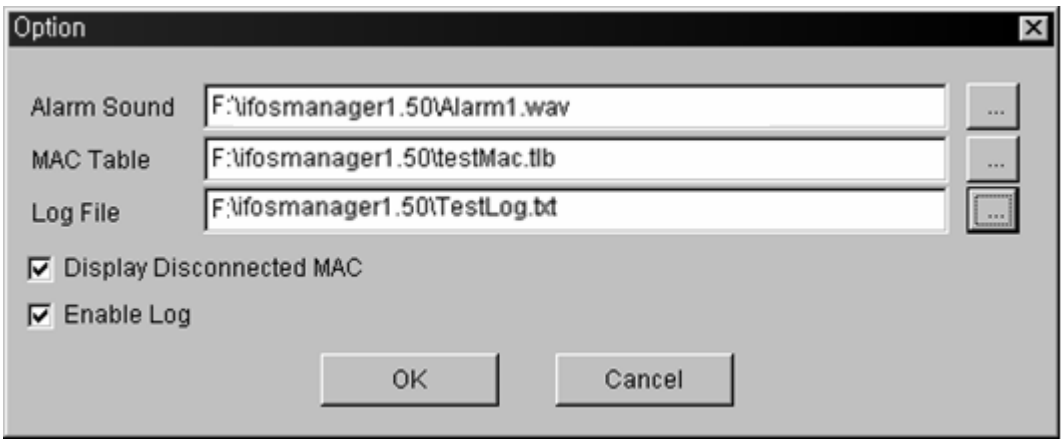
At the moment, the location to save files is the directory where IFOS manager's exe file exists and the name is to be designated.



Now, return to IFOS Manager.

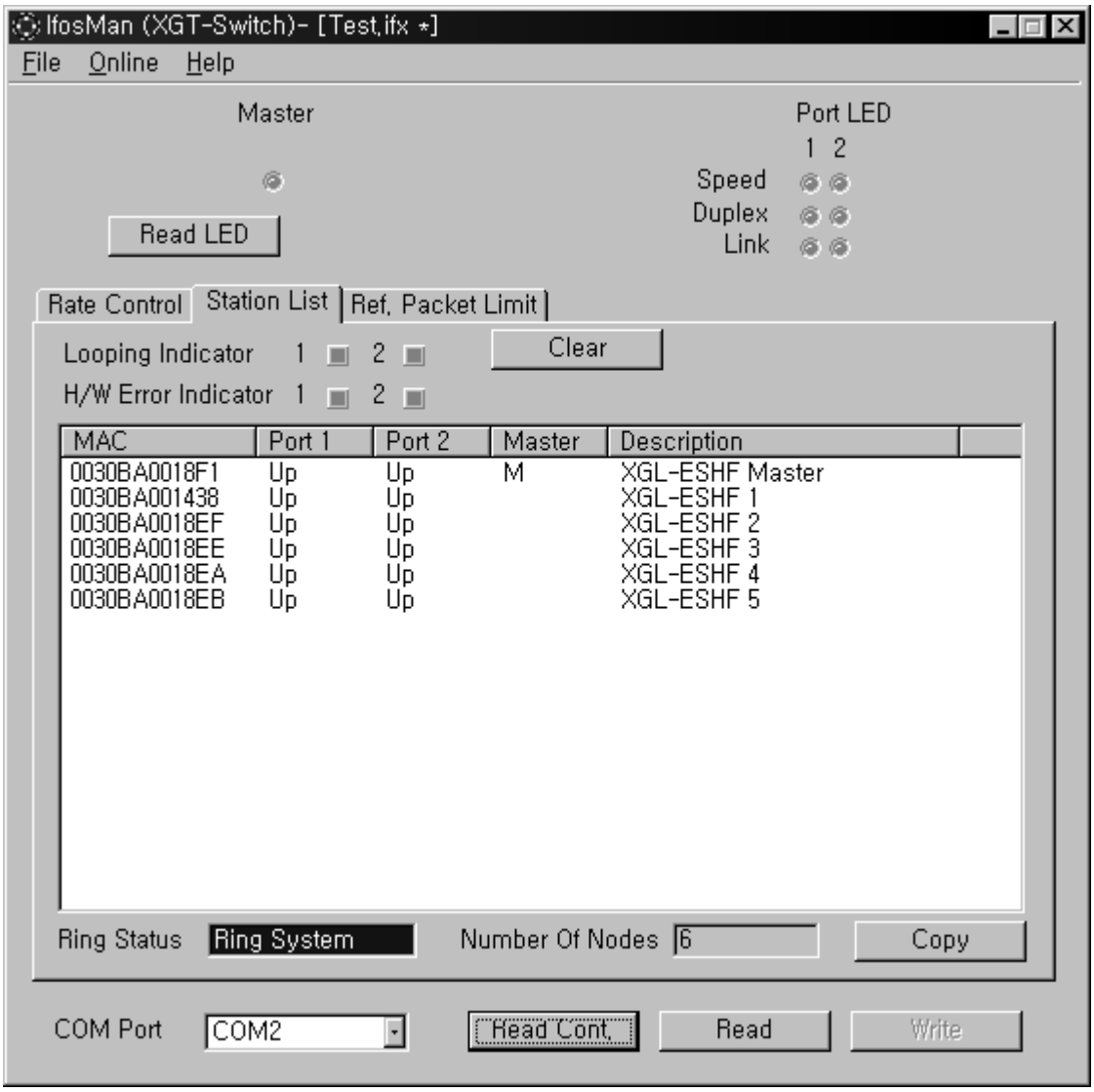
To upload the applied file, click [Online->Option].





By moving from Option to MAC Table, click tlb file created.

If pressing [Read] in Station List, you can see the window that description is applied.



A user can easily manage it by using mac.tlb because of less IFOS locations and characteristics.

A.3 Terms and Definitions

Before using the product, it describes general terms used in FEnet I/F module. For more information, refer to special textbooks related to Ethernet.

1) IEEE 802.3

IEEE 802.3 stipulates the standard of CSMA/CD based Ethernet. To speak accurately, it is LAN based on CSMA/CD (Carrier Sense Multiple Access with Collision Detection) Ethernet devised by IEEE 802.3 group and it consists of the following three projects.

A) IEEEP802.3 - 10G Base T study Group

B) IEEE P802.3ah - Ethernet in the First Mile Task Force

C) IEEE P802.3ak - 10G Base-CX4 Task Force

Both IEEE 802.3 and Ethernet are wideband network using CSMA/CD method. In addition, both have common characteristics applied to Network interface Card hardware.

2) ARP(Address Resolution Protocol)

Protocol searching MAC Address by using destination IP address on Ethernet LAN

3) Bridge

It is a device used to connect two networks and act as single network. Although bridge is used to connect two different networks, it is also used to divide a large network into two smaller networks in order to improve performance capability.

4) Client

Refers to a computer or program(normally a side requesting services) using network service user or resources of other computer.

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

Each client checks whether there is any signal before sending data on network(carrier sense) and sends own data if network is empty. At the moment, every client has the equal authority to send(multiple access). If two and more clients try to send, it may cause collision; a client subject to collision detect would re-send in a certain time.

6) DNS(Domain Name System)

It is the method used to convert alphabetical domain name on Internet into the matched Internet number(IP address).

7) Dot Address

It represents an IP address expressed as‘100.100.100.100’ and each number consists of decimal system; each takes 1 bytes out of total 4 bytes.

8) E-mail Address

Address of a user that has a login account in a specific machine connected on Internet. It is given in a format like user's ID@domain name(machine's name). That is, it's like hjj@microsoft.com, where @ is read 'at' and the keyboard appears when pressing shift+2. That is, the characters behind @ is domain's name such as a specific institute(school, lab and etc) connected to Internet and the characters front of @ is a user's ID. The end characters of domain name is the highest level and in US, they use the following abbreviation and we use .kr, abbreviation of Korea Republic. .com : company / .edu : educational institute such as univ. / in general, .ac(academy) is widely used in Korea / .gov : government's related institutes, for instance, NASA is nasa.gov(government) / .mil : military sites. For instance, US air force uses af.mil(military)/ .org : private organization / .au : Australia / .uk : United Kingdom / .ca : Canada / .kr : Korea / .jp : Japan / .fr : France / .tw : Taiwan and etc

9) Ethernet

As a representative LAN connection method(IEEE 802.3) co-developed by Xerox, Intel and DEC in U.S., it refers to the network connection system with 10Mbps transmission capability using 1.5kB packet. Since Ethernet can bind a variety of computers in a network, it is called a synonym of LAN and as a common std, not only for a specific company's standard, various products are marketed at present.

10) FTP(File Transfer Protocol)

Application program used to transfer files between computers among applications provided by TCP/IP. It is possible to copy files by login process wherever a computer exists as long as a user has a login account in a PC.

11) Gateway

As the software/hardware translating so that two different protocol interact with each other, it is like an entrance to help different systems exchange information.

12) Header

It is called a part of packet containing own station, destination station number and error check.

13) HTML

It is abbreviation of hypertext markup language, standard of language of WWW, that is, Language system to make a hypertext document. A document created by HTML can be seen on web browser.

14) HTTP

Protocol supporting Hypertext Transfer Protocol, standard protocol of WWW Hypermedia method

15) ICMP(Internet Control Message Protocol)

It generates error message and test packet to control Internet with the extended protocol of IP address.

16) IP(Internet Protocol)

Protocol of network layer for Internet

17) IP Address

165.244.149.190 Address on Internet of each computer consisting of numbers. Binary numeral of 32 bits(4 bytes) to discriminate each machine on Internet. IP address consists of two parts; network address and host address. Depending on how many bits are assigned to network address and host address, it can be divided into class A/B/C and the IP address is unique in the world, so it is assigned by NIC(Network Information Center), the information network center when registering to Internet service. And KRNIC(Korea Network Information Center) acts as the role in the territory. i.e.) 165.244.149.190

18) ISO(International Organization for Standardization)

An organization enacting and managing international standard as an institute under UN

19) LAN(Local Area Network)

It is called a network in which several computers are inter-connected via COM line within a limited range of a building or an office to exchange data.

20) MAC(Medium Access Control)

Method to determine which device uses a network for a given time within broadcast network

21) Node

Each computer connected on network is called a node

22) Packet

Data bundle being a basic unit to transmit data through network. In general, a bundle consists of several dozens or hundreds of bytes and header is attached to the front of each bundle to add information about destination where the bundle to go and other necessary information

23) PORT number

Use to discriminate applications on TCP/UDP.

i.e.) 21/tcp : Telnet

24) PPP(Point-to-Point Protocol)

Telephone communication protocol allowing packet transmission for Internet connection. That is, it is the most general and common Internet protocol so that a computer could connect via TCP/IP by using telephone line and modem.

It is similar to SLIP but it is significantly superior to SLIP because of modern COM protocol factors.

25) Protocol

Rules about methods by which computers connected on network exchange information one another. Protocol often means detail description of inter-machine interface in low level(for instance, which bit/byte should go out through a line) and high level message exchange rule as files are transmitted via Internet

26) Router

Device used to transmit data packet between networks. It sends data packet to the final destination, waits during network jamming and often determines which LAN is better at plural LAN bifurcations. That is, it is called a special computer/software connecting two and more networks.

27) Server

It is called the device to passively respond to client's request and share its own resources.

28) TCP(Transmission Control Protocol)

A transport layer protocol for the Internet

- Data sending/receiving using connection
- Multiplexing
- Reliable transmission
- Supporting emergent data transmission

29) TCP/IP (Transmission Control Protocol/Internet Protocol)

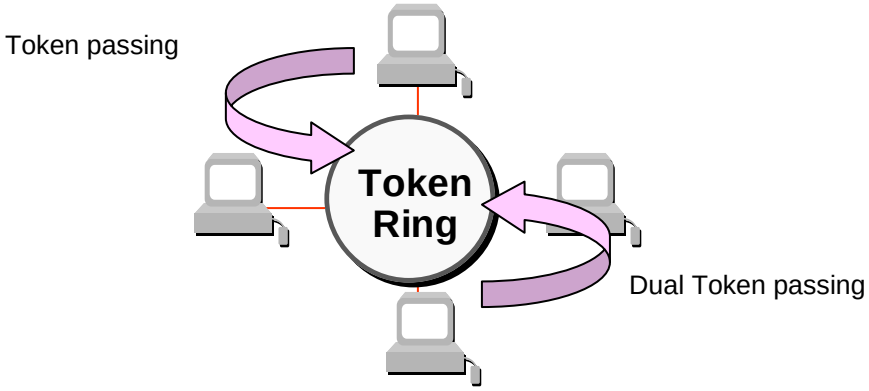
Communication transmission protocol for communication between/among different computers. It plays a role to help communication between a PC and large host, IBM pc and MAC and large computers in different companies. It is also collectively called a protocol to transmit information between and among computer networks and contains FTP, Telnet and SMTP. TCP divides data into packets and transmits by IP while transmitted packets are joined by TCP again.

30) Telnet

As a remote login from a host to another host through Internet, a user should have a login account in a host in order to log in the host via TELNET. However, several public services(white page directory and etc) does not ask users to have personal accounts.

31) Token Ring

As a local communication network using token to approach a COM network with ring structure physically, it is one of node connection methods in network. It sends message packet if a sending node gains a token and acquires control right. For an actual instance, there are IEEE 802.5, ProNet-1080 and FDDI; a term, token ring is also referred to IEEE 802.5.



32) UDP(User Datagram Protocol)

A transport layer protocol for the Internet

- HS communication is possible because data is sent/received without connection
- Multiplexing
- Transmission inferior to TCP in view of reliability(it does not try re-transmission even though data does not arrive at destination station)

33) Auto-Negotiation

Fast Ethernet is process to exchange information about performance such as operation speed and duplex mode of Ethernet.

1. Detect causes why connection is rejected
2. Determine the performance that network device has
3. Change connection speed

34) FDDI(Fiber Distributed Data Interface)

It supports high speed up to 100Mbps based on optical cable and in this shared media network, token passing is, as dual ring type, bi-directionally executed. The maximum distance of entire network is 200km and the max distance between nodes is 2km with the max no. of nodes set at 500(1000). In general, it is used as backbone network.

35) Reset

Use when initializing due to error on COM module.

It executes reset if selecting [Online] → [Reset] icon by using XG-PD

If the function is executed, it restarts.

A.4 Flag Lists

A.4.1 Special relay (F) list

Device1	Device2	Type	Variable	Function	Description
F0000		DWORD	_SYS_STATE	Mode and status	Indicate the mode and operation status of PLC.
	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	Modifying during run	Downloading modifying program during run
	F00009	BIT	_RUN_EDIT_CHK	Modifying during run	Internal process of modification during run
	F0000A	BIT	_RUN_EDIT_DONE	Modifying during run completed	Modifying during run completed
	F0000B	BIT	_RUN_EDIT_END	Modifying during run completed	Modifying during run ends
	F0000C	BIT	_CMOD_KEY	Operation mode	Operation mode is changed by key
	F0000D	BIT	_CMOD_LPADT	Operation mode	Operation mode is changed by local PADT
	F0000E	BIT	_CMOD_RPADT	Operation mode	Operation mode is changed by remote PADT.
	F0000F	BIT	_CMOD_RLINK	Operation mode	Operation mode is changed by remote communication module.
	F00010	BIT	_FORCE_IN	Forced input	Forced input status
	F00011	BIT	_FORCE_OUT	Forced output	Forced output status
	F00012	BIT	_SKIP_ON	I/O SKIP	I/O SKIP in operation
	F00013	BIT	_EMASK_ON	Error mask	Error mask in operation
	F00014	BIT	_MON_ON	Monitor	Monitor in operation
	F00015	BIT	_USTOP_ON	STOP	Stop by STOP function
	F00016	BIT	_ESTOP_ON	ESTOP	Stop by ESTOP function
	F00017	BIT	_CONPILE_MODE	Compiling	Compiling
	F00018	BIT	_INIT_RUN	Initializing	Initialization task in operation
	F0001C	BIT	_PB1	Program code1	Program code 1 is selected.
	F0001D	BIT	_PB2	Program code2	Program code 2 is selected.

Device1	Device2	Type	Variable	Function	Description
	F0001E	BIT	_CB1	Compile code1	Compile code 1 is selected.
	F0001F	BIT	_CB2	Compile code2	Compile code 2 is selected.
F0002		DWORD	_CNF_ER	System Error	Report system error status.
	F00020	BIT	_CPU_ER	CPU Error	CPU structure has an error.
	F00021	BIT	_IO_TYER	Module type Error	Module type is not correct.
	F00022	BIT	_IO_DEER	Module separation Error	Module is separated.
	F00023	BIT	_FUSE_ER	Fuse Error	Fuse is burnt out
	F00024	BIT	_IO_RWER	Module I/O Error	Module I/O trouble.
	F00025	BIT	_IP_IFER	Module Interface Error	Special/COM Module interface has a problem.
	F00026	BIT	_ANNUM_ER	External device trouble	Error of external device is detected.
	F00028	BIT	_BPRM_ER	Basic Parameter	Abnormal basic parameter.
	F00029	BIT	_IOPRM_ER	IO Parameter	IO structure parameter is not normal
	F0002A	BIT	_SPPRM_ER	Special Module Parameter	Special Module Parameter is not normal
	F0002B	BIT	_CPPRM_ER	COM Module Parameter	COM Module Parameter is not normal
	F0002C	BIT	_PGM_ER	Program Error	Program has an error.
	F0002D	BIT	_CODE_ER	Code Error	Program code has an error.
	F0002E	BIT	_SWDT_ER	System watchdog	System watchdog operates.
	F0002F	BIT	_BASE_POWER_ER	Power Error	Base power is not normal.
	F00030	BIT	_WDT_ER	Scan watchdog	Scan watchdog operates.
F0004		DWORD	_CNF_WAR	System warning	Report system error.
	F00040	BIT	_RTC_ER	Abnormal RTC	Abnormal RTC data.
	F00041	BIT	_DBCK_ER	Abnormal backup	Data backup has an error.
	F00042	BIT	_HBCK_ER	Abnormal restart	Hot restart is not possible.
	F00043	BIT	_ABSD_ER	Stop by Abnormal Operation	Stop by abnormal operation.
	F00044	BIT	_TASK_ER	Task collision	Task is colliding.
	F00045	BIT	_BAT_ER	Abnormal battery	Battery has an error.
	F00046	BIT	_ANNUM_WAR	External device error	Warning of external device is detected.
	F00047	BIT	_LOG_FULL	Memory full	Log memory is full
	F00048	BIT	_HS_WAR1	HS Link1	HS Link – abnormal parameter1
	F00049	BIT	_HS_WAR2	HS Link2	HS Link – abnormal parameter2
	F0004A	BIT	_HS_WAR3	HS Link3	HS Link – abnormal parameter3
	F0004B	BIT	_HS_WAR4	HS Link4	HS Link – abnormal parameter4

Device1	Device2	Type	Variable	Function	Description
	F0004C	BIT	_HS_WAR5	HS Link5	HS Link – abnormal parameter5
	F0004D	BIT	_HS_WAR6	HS Link6	HS Link – abnormal parameter6
	F0004E	BIT	_HS_WAR7	HS Link7	HS Link – abnormal parameter7
	F0004F	BIT	_HS_WAR8	HS Link8	HS Link – abnormal parameter8
	F00050	BIT	_HS_WAR9	HS Link9	HS Link – abnormal parameter9
	F00051	BIT	_HS_WAR10	HS Link10	HS Link – abnormal parameter10
	F00052	BIT	_HS_WAR11	HS Link11	HS Link – abnormal parameter11
	F00053	BIT	_HS_WAR12	HS Link12	HS Link – abnormal parameter12
	F00054	BIT	_P2P_WAR1	P2P Parameter1	P2P – abnormal parameter1
	F00055	BIT	_P2P_WAR2	P2P Parameter2	P2P – abnormal parameter2
	F00056	BIT	_P2P_WAR3	P2P Parameter3	P2P – abnormal parameter3
	F00057	BIT	_P2P_WAR4	P2P Parameter4	P2P – abnormal parameter4
	F00058	BIT	_P2P_WAR5	P2P Parameter5	P2P – abnormal parameter5
	F00059	BIT	_P2P_WAR6	P2P Parameter6	P2P – abnormal parameter6
	F0005A	BIT	_P2P_WAR7	P2P Parameter7	P2P – abnormal parameter7
	F0005B	BIT	_P2P_WAR8	P2P Parameter8	P2P – abnormal parameter8
	F0005C	BIT	_CONSTANT_ER	Cycle time error	Cycle time error
F0009		WORD	_USER_F	User junction	Timer used by a 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	Always ON bit
	F0009A	BIT	_OFF	Always OFF	Always OFF bit
	F0009B	BIT	_1ON	1scan ON	ON bit only for the first scan
	F0009C	BIT	_1OFF	1scan OFF	Off bit only for the first scan
	F0009D	BIT	_STOG	Reverse	Every scan reverses
F0010		WORD	_USER_CLK	User clock	Clock set by a user
	F00100	BIT	_USR_CLK0	Repeat designated scan	ON/OFF Clock as much as designated scan
	F00101	BIT	_USR_CLK1	Repeat designated scan	ON/OFF Clock 1 as much as designated scan

Device1	Device2	Type	Variable	Function	Description
	F00102	BIT	_USR_CLK2	Repeat designated scan	ON/OFF Clock 2 as much as designated scan
	F00103	BIT	_USR_CLK3	Repeat designated scan	ON/OFF Clock 3 as much as designated scan
	F00104	BIT	_USR_CLK4	Repeat designated scan	ON/OFF Clock 4 as much as designated scan
	F00105	BIT	_USR_CLK5	Repeat designated scan	ON/OFF Clock 5 as much as designated scan
	F00106	BIT	_USR_CLK6	Repeat designated scan	ON/OFF Clock 6 as much as designated scan
	F00107	BIT	_USR_CLK7	Repeat designated scan	ON/OFF Clock 7 as much as designated scan
F0011		WORD	_LOGIC_RESULT	Logic results	Indicates logic results.
	F00110	BIT	_LER	Operation Error	ON for 1 scan if any operation error
	F00111	BIT	_ZERO	Zero Flag	ON if operation result is 0
	F00112	BIT	_CARRY	Carry Flag	ON if carry occurs during operation
	F00113	BIT	_ALL_OFF	All output OFF	ON if all output is off
	F00115	BIT	_LER_LATCH	Operation Error latch	keeping ON in case of operation error
F0012		WORD	_CMP_RESULT	Comparison results	Indicates comparison results.
	F00120	BIT	_LT	LT Flag	ON if “less then”
	F00121	BIT	_LTE	LTE Flag	ON if “and less”
	F00122	BIT	_EQU	EQU Flag	ON if “same”
	F00123	BIT	_GT	GT Flag	ON if “larger than”
	F00124	BIT	_GTE	GTE Flag	ON if “and more”
	F00125	BIT	_NEQ	NEQ Flag	ON if “not same”
F0013		WORD	_AC_F_CNT	Instantaneous power failure	Indicates the frequency of instantaneous power failure.
F0014		WORD	_FALS_NUM	FALS no.	Indicate FALS no.
F0015		WORD	_PUTGET_ERR0	PUT/GET Error 0	Main base PUT / GET Error
F0016		WORD	_PUTGET_ERR1	PUT/GET Error 1	Increase base 1step PUT / GET Error
F0017		WORD	_PUTGET_ERR2	PUT/GET Error 2	Increase base 2step PUT / GET Error
F0018		WORD	_PUTGET_ERR3	PUT/GET Error 3	Increase base 3step PUT / GET Error
F0019		WORD	_PUTGET_ERR4	PUT/GET Error 4	Increase base 4step PUT / GET Error
F0020		WORD	_PUTGET_ERR5	PUT/GET Error 5	Increase base 5step PUT / GET Error
F0021		WORD	_PUTGET_ERR6	PUT/GET Error 6	Increase base 6step PUT / GET Error
F0022		WORD	_PUTGET_ERR7	PUT/GET Error 7	Increase base 7step PUT / GET Error
F0023		WORD	_PUTGET_NDR0	PUT/GET completion 0	Main base PUT / GET completed
F0024		WORD	_PUTGET_NDR1	PUT/GET completion 1	Increase base 1step PUT / GET completed
F0025		WORD	_PUTGET_NDR2	PUT/GET completion 2	Increase base 2step PUT / GET completed

Device1	Device2	Type	Variable	Function	Description
F0026		WORD	_PUTGET_NDR3	PUT/GET completion 3	Increase base 3step PUT / GET completed
F0027		WORD	_PUTGET_NDR4	PUT/GET completion 4	Increase base 4step PUT / GET completed
F0028		WORD	_PUTGET_NDR5	PUT/GET completion 5	Increase base 5step PUT / GET completed
F0029		WORD	_PUTGET_NDR6	PUT/GET completion 6	Increase base 6step PUT / GET completed
F0030		WORD	_PUTGET_NDR7	PUT/GET completion 7	Increase base 7step PUT / GET completed
F0044		WORD	_CPU_TYPE	CPU type	Information about CPU type
F0045		WORD	_CPU_VER	CPU version	Indicate CPU version
F0046		DWORD	_OS_VER	OS version	Indicate OS version
F0048		DWORD	_OS_DATE	OS data	Indicate OS distribution date
F0050		WORD	_SCAN_MAX	Max. scan time	Indicate max. san time
F0051		WORD	_SCAN_MIN	Min. scan time	Indicate min. scan time
F0052		WORD	_SCAN_CUR	Present scan time	Indicate present scan time
F0053		WORD	_MON_YEAR	month / year	Month/Year data of PLC
F0054		WORD	_TIME_DAY	hr / date	Hr/date data of PLC
F0055		WORD	_SEC_MIN	sec / min	Sec/min data of PLC
F0056		WORD	_HUND_WK	Cen. / day	Cen/day data of PLC
F0057		WORD	_FPU_INFO	FPU operation results	Floating point operation result
	F00570	BIT	_FPU_LFLAG_I	Incorrect error latch	Latch for Incorrect Error
	F00571	BIT	_FPU_LFLAG_U	Underflow latch	Latch for underflow
	F00572	BIT	_FPU_LFLAG_O	Overflow latch	Latch for overflow
	F00573	BIT	_FPU_LFLAG_Z	Division by zero latch	Latch for division-by-zero
	F00574	BIT	_FPU_LFLAG_V	Invalid operation latch	Latch for invalid operation
	F0057A	BIT	_FPU_FLAG_I	Incorrect Error	Report incorrect error
	F0057B	BIT	_FPU_FLAG_U	Underflow	Report underflow occurrence
	F0057C	BIT	_FPU_FLAG_O	Overflow	Report overflow occurrence
	F0057D	BIT	_FPU_FLAG_Z	Division by zero	Report division-by-zero
	F0057E	BIT	_FPU_FLAG_V	Invalid operation	Report invalid operation
	F0057F	BIT	_FPU_FLAG_E	Irregular Value input	Report when irregular value is entered
F0058		DWORD	_ERR_STEP	Error step	Save error step
F0060		DWORD	_REF_COUNT	Refresh	Increase if executing module refresh
F0062		DWORD	_REF_OK_CNT	Refresh OK	Increase if module refresh is normal
F0064		DWORD	_REF_NG_CNT	Refresh NG	Increase if module refresh is abnormal
F0066		DWORD	_REF_LIM_CNT	Refresh LIMIT	Increase if module refresh is abnormal(TIME OUT)

Device1	Device2	Type	Variable	Function	Description
F0068		DWORD	_REF_ERR_CNT	Refresh error	Increase if module refresh is abnormal
F0070		DWORD	_MOD_RD_ERR_CNT	Module READ ERROR	Increase if reading Module 1Word abnormally
F0072		DWORD	_MOD_WR_ERR_CNT	Module WRITE ERROR	Increase if writing Module 1Word abnormally
F0074		DWORD	_CA_CNT	Block service	Increase if Module block service
F0076		DWORD	_CA_LIM_CNT	Block service limit	Increase if block data service is not normal
F0078		DWORD	_CA_ERR_CNT	Block service error	Increase if block data service is not normal
F0080		DWORD	_BUF_FULL_CNT	Buffer full	Increase if CPU inner buffer is full
F0082		DWORD	_PUT_CNT	PUT count	Increase if executing PUT
F0084		DWORD	_GET_CNT	GET count	Increase if executing GET
F0086		DWORD	_KEY	Present key	Indicates the present status of local key.
F0088		DWORD	_KEY_PREV	Previous key	Indicates the previous status of local key.
F0090		WORD	_IO_TYER_N	Inconsistent slot	Indicate Module type inconsistent slot number
F0091		WORD	_IO_DEER_N	Separate slot	Indicate slot number with Module separation
F0092		WORD	_FUSE_ER_N	Fuse disconnection slot	Indicate slot number with fuse disconnection
F0093		WORD	_IO_RWER_N	RW Error slot	Indicate slot number with Module reading/writing error
F0094		WORD	_IP_IFER_N	IF Error slot	Indicate slot number with Module interface error
F0096		WORD	_IO_TYER0	Module type0 Error	Main base Module type Error
F0097		WORD	_IO_TYER1	Module type1 Error	Increase base 1step Module type Error
F0098		WORD	_IO_TYER2	Module type2 Error	Increase base 2step Module type Error
F0099		WORD	_IO_TYER3	Module type3 Error	Increase base 3step Module type Error
F0100		WORD	_IO_TYER4	Module type4 Error	Increase base 4step Module type Error
F0101		WORD	_IO_TYER5	Module type5 Error	Increase base 5step Module type Error
F0102		WORD	_IO_TYER6	Module type6 Error	Increase base 6step Module type Error
F0103		WORD	_IO_TYER7	Module type7 Error	Increase base 7step Module type Error
F0104		WORD	_IO_DEER0	Module separation0 Error	Main base Module separation Error
F0105		WORD	_IO_DEER1	Module separation1 Error	Increase base 1step Module separation Error
F0106		WORD	_IO_DEER2	Module separation2 Error	Increase base 2step Module separation Error
F0107		WORD	_IO_DEER3	Module separation3 Error	Increase base 3step Module separation Error
F0108		WORD	_IO_DEER4	Module separation4 Error	Increase base 4step Module separation Error
F0109		WORD	_IO_DEER5	Module separation5 Error	Increase base 5step Module separation Error
F0110		WORD	_IO_DEER6	Module separation6 Error	Increase base 6step Module separation Error

Device1	Device2	Type	Variable	Function	Description
F0111		WORD	_IO_DEER7	Module separation7 Error	Increase base 7step Module separation Error
F0112		WORD	_FUSE_ER0	Fuse disconnection0 Error	Main base fuse disconnection error
F0113		WORD	_FUSE_ER1	Fuse disconnection1 Error	Increase base 1step fuse disconnection error
F0114		WORD	_FUSE_ER2	Fuse disconnection2 Error	Increase base 2step fuse disconnection error
F0115		WORD	_FUSE_ER3	Fuse disconnection3 Error	Increase base 3step fuse disconnection Error
F0116		WORD	_FUSE_ER4	Fuse disconnection4 Error	Increase base 4step fuse disconnection Error
F0117		WORD	_FUSE_ER5	Fuse disconnection5 Error	Increase base 5step fuse disconnection Error
F0118		WORD	_FUSE_ER6	Fuse disconnection6 Error	Increase base 6step fuse disconnection Error
F0119		WORD	_FUSE_ER7	Fuse disconnection7 Error	Increase base 7step fuse disconnection Error
F0120		WORD	_IO_RWER0	ModuleRW 0 Error	Main base Module reading/writing Error
F0121		WORD	_IO_RWER1	ModuleRW 1 Error	Increase base 1step Module reading/writing Error
F0122		WORD	_IO_RWER2	ModuleRW 2 Error	Increase base 2step Module reading/writing Error
F0123		WORD	_IO_RWER3	ModuleRW 3 Error	Increase base 3step Module reading/writing Error
F0124		WORD	_IO_RWER4	ModuleRW 4 Error	Increase base 4step Module reading/writing Error
F0125		WORD	_IO_RWER5	ModuleRW 5 Error	Increase base 5step Module reading/writing Error
F0126		WORD	_IO_RWER6	ModuleRW 6 Error	Increase base 6step Module reading/writing Error
F0127		WORD	_IO_RWER7	ModuleRW 7 Error	Increase base 7step Module reading/writing Error
F0128		WORD	_IO_IFER_0	ModuleIF 0 Error	Main base Module interface Error
F0129		WORD	_IO_IFER_1	ModuleIF 1 Error	Increase base 1step Module interface Error
F0130		WORD	_IO_IFER_2	ModuleIF 2 Error	Increase base 2step Module interface Error
F0131		WORD	_IO_IFER_3	ModuleIF 3 Error	Increase base 3step Module interface Error
F0132		WORD	_IO_IFER_4	ModuleIF 4 Error	Increase base 4step Module interface Error
F0133		WORD	_IO_IFER_5	ModuleIF 5 Error	Increase base 5step Module interface Error
F0134		WORD	_IO_IFER_6	ModuleIF 6 Error	Increase base 6step Module interface Error
F0135		WORD	_IO_IFER_7	ModuleIF 7 Error	Increase base 7step Module interface Error
F0136		WORD	_RTC_DATE	RTC date	Present data of RTC
F0137		WORD	_RTC_WEEK	RTC day of a week	Present day of RTC
F0138		DWORD	_RTC_TOD	RTC time	Present time of RTC(ms)
F0140		DWORD	_AC_FAIL_CNT	Frequency of power cut-off	Save the frequency of power cut-off

Device1	Device2	Type	Variable	Function	Description
F0142		DWORD	_ERR_HIS_CNT	Frequency of error occurrence	Save the frequency of error occurrence
F0144		DWORD	_MOD_HIS_CNT	Frequency of mode conversion	Save the frequency of mode conversion
F0146		DWORD	_SYS_HIS_CNT	Frequency of history occurrence	Save the frequency of system history
F0148		DWORD	_LOG_ROTATE	Log rotate	Save log rotate info
F0150		WORD	_BASE_INFO0	Slot info 0	Main base Slot info
F0151		WORD	_BASE_INFO1	Slot info 1	Increase base 1step Slot info
F0152		WORD	_BASE_INFO2	Slot info 2	Increase base 2step Slot info
F0153		WORD	_BASE_INFO3	Slot info 3	Increase base 3step Slot info
F0154		WORD	_BASE_INFO4	Slot info 4	Increase base 4step Slot info
F0155		WORD	_BASE_INFO5	Slot info 5	Increase base 5step Slot info
F0156		WORD	_BASE_INFO6	Slot info 6	Increase base 6step Slot info
F0157		WORD	_BASE_INFO7	Slot info 7	Increase base 7step Slot info
F0158		WORD	_RBANK_NUM	Block no in use	Block number in use
F0159		WORD	_RBLOCK_STATE	Flash status	Flash block status
F0160		DWORD	_RBLOCK_RD_FLAG	Reading flash	ON when reading flash N block data
F0162		DWORD	_RBLOCK_WR_FLAG	Writing flash	ON when writing flash N block data
F0164		DWORD	_RBLOCK_ER_FLAG	Flash Error	Error during flash N block service
F1024		WORD	_USER_WRITE_F	Available junction	Junction available in program
	F10240	BIT	_RTC_WR	RTC RW	Write/read data in RTC
	F10241	BIT	_SCAN_WR	Scan WR	Scan value initialization
	F10242	BIT	_CHK_ANC_ERR	Request of external error	Request of detecting external device error
	F10243	BIT	_CHK_ANC_WAR	Request of external warning	Request of detecting external device error
F1025		WORD	_USER_STAUS_F	User junction	User junction
	F10250	BIT	_INIT_DONE	Initialized	Indicate initialization task completed
F1026		WORD	_ANC_ERR	External error info	Indicate external device error info
F1027		WORD	_ANC_WAR	External error info	Indicate external device warning info
F1034		WORD	_MON_YEAR_DT	month / year	Clock data (month / year)
F1035		WORD	_TIME_DAY_DT	hr / date	Clock data (hr / date)
F1036		WORD	_SEC_MIN_DT	sec / min	Clock data (sec / min)
F1037		WORD	_HUND_WK_DT	Sec. / day	Clock data (cen. / day)

A.4.2 Communication relay (L) list

1) Special register for Data Link

HS Link No. 1 ~ 12

No.	Keyword	Type	Description	Information
L000000	_HS1_RLINK	Bit	Normal operation of HS link parameter at every station	It indicates that every station normally operates according to parameters set in HS link and it is on with the following conditions. 1. Every station set in parameter is RUN mode; 2. All data blocks set in parameter is normally communicated; and 3. Parameter set in each station of parameter is normally communicated RUN_Link maintains ON until it stops by Link Disable once it is ON.
L000001	_HS1_LTRBL	Bit	Abnormal status after _HS1RLINK ON	The flag is on when the station set in parameter and the communication status of data block are as follows with _HSmRLINK Flag on. 1. Station set in parameter is not in RUN mode; 2. Station set in parameter has an error; or 3. Communication status of data block set in parameter is not normal. Link trouble is ON if the above conditions 1 through 3 occur; if returning to normal, it turns Off again.
L000020 ~ L00009F	_HS1_STATE[k] (k=000~127)	Bit Array	General status of HS Link Parameter #1 block #k	Indicates general status of COM information about each data block of parameter set HS1STATE[k]=HS1MOD[k]&_HS1TRX[k]&(~_HSmERR[k])
L000100 ~ L00017F	_HS1_MOD[k] (k=000~127)	Bit Array	Run operation mode of HS Link Parameter #1 block #k	Indicates the operation mode of station set in parameter k data block.
L000180 ~ L00025F	_HS1_TRX[k] (k=000~127)	Bit Array	Normal communication of Parameter #1 block #k	Indicates whether the communication status of parameter K data block communicates in accordance with the setting
L000260 ~ L00033F	_HS1_ERR[k] (k=000~127)	Bit Array	Operation error mode of HS Link Parameter #1 block #k	Indicates whether the communication status of parameter k data block has any error
L000340 ~ L00041F	_HS1_SETBLOCK[k]	Bit Array	Block setting of HS link Parameter #1 block #K	Indicate whether parameter k data block is set.

[Table A.1] COM flag list by HS Link Number

HS Link No.	L area address	Remarks
2	L000500~L00099F	Comparing to when it is HS link 1 of [Table A.1], Flag address of other HS link station is as following simple calculation. ∗Calculation: L area address = L000000 + 500 x (HS link number – 1) When using HS link flag for program and monitoring, it is useful to use flag map registered to XG5000.
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 is block number and the information about 128 blocks from 000 to 127 appears with 8 words in 16 each per 1 word.

For instance, mode information(_HS1MOD) shows the information from block 0 to block 15 in L00010 and blocks 16~31, 32~47, 48~63, 64~79, 80~95, 96~111 and 112~127 in L00011, L00012, L00013, L00014, L00015, L00016 and L00017 respectively. Therefore, mode information about block 55 is in L000137.

P2P Parameter : 1~8, P2P block : 0~63

No	Keyword	Type	Description	Information
L006250	_P2P1_NDR00	Bit	Normal completion of P2P Parameter #1, block #00 service	Normal completion of P2P Parameter #1, block #0 service
L006251	_P2P1_ERR00	Bit	Abnormal completion of P2P Parameter #1, block #00 service	Abnormal completion of P2P Parameter #1, block #0 service
L00626	_P2P1_STATUS00	Word	Error code for abnormal completion of P2P Parameter #1, block #00 service	Indicates the error code in case of abnormal completion of P2P parameter #1, block #0 service
L00627	_P2P1_SVCCNT00	Dword	Frequency of normal completion of P2P Parameter #1, block #00 service	Indicates the frequency of normal completion of P2P Parameter #1, block #00 service
L00629	_P2P1_ERRCNT00	DWord	Frequency of abnormal completion of P2P Parameter #1, block #00 service	Indicates frequency of abnormal completion of P2P Parameter #1, block #00 service
L006310	_P2P1_NDR01	Bit	Normal completion of P2P Parameter #1, block #01 service	Normal completion of P2P Parameter #1, block #01 service
L006311	_P2P1_ERR01	Bit	Abnormal completion of P2P Parameter #1, block #01 service	Abnormal completion of P2P Parameter #1, block #01 service
L00632	_P2P1_STATUS01	Word	Error code in case of abnormal completion of P2P Parameter #1, block #01 service	Indicates the error code in case of abnormal completion of P2P Parameter #1, block #01 service
L00633	_P2P1_SVCCNT01	DWord	Frequency of normal completion of P2P Parameter #1, block #01 service	Indicates frequency of normal completion of P2P Parameter #1, block #01 service
L00635	_P2P1_ERRCNT01	DWord	Frequency of abnormal completion of P2P Parameter #1, block #01 service	Indicates frequency of abnormal completion of P2P Parameter #1, block #01 service

[Table A.2] COM Flag list according to P2P service setting

2) Link Device (N) List

P2P no. : 1~8, P2P block : 0~63

No.	Keyword	Type	Description	Information
N00000	_P1B00SN	Word	Destination station number of P2P Parameter #1, block #00	Save the destination station number of P2P Parameter #1, block #3. In case using destination station number in XG-PD, it may be modified during run by using P2PSN command
N00001 ~ N00004	_P1B00RD1	Device structure	Device1 of the area to read P2P Parameter #1, block #00	Save device1 of the area to read P2P Parameter #1, block #00
N00005	_P1B00RS1	Word	Size 1 of the area to read P2P Parameter #1, block #00	Save Size 1 of the area to read P2P Parameter #1, block #00
N00006 ~ N00009	_P1B00RD2	Device structure	Device2 of the area to read P2P Parameter #1, block #00	Save Device2 of the area to read P2P Parameter #1, block #00
N00010	_P1B00RS2	Word	Size 2 of the area to read P2P Parameter #1, block #00	Save Size 2 of the area to read P2P Parameter #1, block #00
N00011 ~ N00014	_P1B00RD3	Device Structure	Device3 of the area to read P2P Parameter #1, block #00	Save Device3 of the area to read P2P Parameter #1, block #00
N00015	_P1B00RS3	Word	Size 3 of the area to read P2P Parameter #1, block #00	Save Size 3 of the area to read P2P Parameter #1, block #00
N00016 ~ N00019	_P1B00RD4	Device Structure	Device4 of the area to read P2P Parameter #1, block #00	Save Device4 of the area to read P2P Parameter #1, block #00
N00020	_P1B00RS4	Word	Size 4 of the area to read P2P Parameter #1, block #00	Save Size 4 of the area to read P2P Parameter #1, block #00
N00021 ~ N00024	_P1B00WD1	Device Structure	Device 1 of the area to save P2P Parameter #1, block #00	Save Device 1 of the area to save P2P Parameter #1, block #00
N00025	_P1B00WS1	Word	Size 1 of the area to save P2P Parameter #1, block #00	Save Size 1 of the area to save P2P Parameter #1, block #00
N00026 ~ N00029	_P1B00WD2	Device Structure	Device 2 of the area to save P2P Parameter #1, block #00	Save Device 2 of the area to save P2P Parameter #1, block #00
N00030	_P1B00WS2	Word	Size 2 of the area to save P2P Parameter #1, block #00	Save Size 2 of the area to save P2P Parameter #1, block #00
N00031 ~ N00034	_P1B00WD3	Device Structure	Device 3 of the area to save P2P Parameter #1, block #00	Save Device 3 of the area to save P2P Parameter #1, block #00
N00035	_P1B00WS3	Word	Size 3 of the area to save P2P Parameter #1, block #00	Save Size 3 of the area to save P2P Parameter #1, block #00

No.	Keyword	Type	Description	Information
N00036 ~ N00039	_P1B00WD4	Device Structure	Device4 of the area to save P2P Parameter #1, block #00	Save Device4 of the area to save P2P Parameter #1, block #00.
N00040	_P1B00WS4	Word	Size 4 of the area to save P2P Parameter #1, block #00	Save Size 4 of the area to save P2P Parameter #1, block #00
N00041	_P1B01SN	Word	Destination station number of P2P Parameter #1, block #01	Save Destination station number of P2P Parameter #1, block #01. Can modify it during RUN by using P2PSN command if XG-PD uses destination station number.
N00042 ~ N00045	_P1B01RD1	Device Structure	Device area 1 of the area to read P2P Parameter #1, block #01	Save Device area 1 of the area to read P2P Parameter #1, block #01.
N00046	_P1B01RS1	Word	Size 1 of the area to read P2P Parameter #1, block #01	Save Size 1 of the area to read P2P Parameter #1, block #01.
N00047 ~ N00050	_P1B01RD2	Device Structure	Device2 of the area to read P2P Parameter #1, block #01	Save Device2 of the area to read P2P Parameter #1, block #01.
N00051	_P1B01RS2	Word	Size 2 of the area to read P2P Parameter #1, block #01	Save Size 2 of the area to read P2P Parameter #1, block #01.
N00052 ~ N00055	_P 1B01RD3	Device Structure	Device3 of the area to read P2P Parameter #1, block #01	Save Device3 of the area to read P2P Parameter #1, block #01.
N00056	_P1B01RS3	Word	Size 3 of the area to read P2P Parameter #1, block #01	Save Size 3 of the area to read P2P Parameter #1, block #01.
N00057 ~ N00060	_P1B01RD4	Device Structure	Device4 of the area to read P2P Parameter #1, block # 01	Save Device4 of the area to read P2P Parameter #1, block # 01.
N00061	_P1B01RS4	Word	Size 4 of the area to read P2P Parameter #1, block #01	Save Size 4 of the area to read P2P Parameter #1, block #01.
N00062 ~ N00065	_P1B01WD1	Device Structure	Device1 of the area to save P2P Parameter #1, block #01	Save Device1 of the area to save P2P Parameter #1, block #01.
N00066	_P1B01WS1	Word	Size 1 of the area to save P2P Parameter #1, block #01	Save Size 1 of the area to save P2P Parameter #1, block #01.
N00067 ~ N00070	_P1B01WD2	Device Structure	Device2 of the area to save P2P Parameter #1, block #01	Save Device2 of the area to save P2P Parameter #1, block #01.
N00071	_P1B01WS2	Word	Size 2 of the area to save P2P Parameter #1, block #01	Save Size 2 of the area to save P2P Parameter #1, block #01.
N00072 ~ N00075	_P1B01WD3	Device Structure	Device3 of the area to save P2P Parameter #1, block 01	Save Device3 of the area to save P2P Parameter #1, block 01.

No.	Keyword	Type	Description	Information
N00076	_P1B01WS3	Word	Size 3 of the area to save P2P Parameter #1, block #01	Save Size 3 of the area to save P2P Parameter #1, block #01.
N00077 ~ N00080	_P1B01WD4	Device Structure	Device4 of the area to save P2P Parameter #1, block #01	Save Device4 of the area to save P2P Parameter #1, block #01.
N00081	_P1B01WS4	Word	Size 4 of the area to save P2P Parameter #1, block #01	Save Size 4 of the area to save P2P Parameter #1, block #01.

[Table1] COM Device List according to P2P number

Remark

1) N area is automatically set in case setting P2P parameter by using XG-PD and may be modified during run by using P2P command.
2) N area address is discriminated by P2P Parameter setting number and block index number, so any other area not using P2P service can be used as internal device.

A.5 ASCII Code Table

American National Standard Code for Information Interchange

ASCII Code		Value	ASCII Code		Value	ASCII Code		Value	ASCII Code		Value
Hex	Deci		Hex	Deci		Hex	Deci		Hex	Deci	
00	000	NULL	40	064	@	80	128	€	C0	192	À
01	001	SOH	41	065	A	81	129	□	C1	193	Á
02	002	STX	42	066	B	82	130	,	C2	194	Â
03	003	ETX	43	067	C	83	131	ƒ	C3	195	Ã
04	004	EQT	44	068	D	84	132	„	C4	196	Ä
05	005	ENQ	45	069	E	85	133	…	C5	197	Å
06	006	ACK	46	070	F	86	134	†	C6	198	Æ
07	007	BEL	47	071	G	87	135	‡	C7	199	Ç
08	008	BS	48	072	H	88	136	ˆ	C8	200	È
09	009	HT	49	073	I	89	137	‰	C9	201	É
0A	010	LF	4A	074	J	8A	138	Š	CA	202	Ê
0B	011	VT	4B	075	K	8B	139	‹	CB	203	Ë
0C	012	FF	4C	076	L	8C	140	Œ	CC	204	Ì
0D	013	CR	4D	077	M	8D	141	□	CD	205	Í
0E	014	SO	4E	078	N	8E	142	Ž	CE	206	Î
0F	015	SI	4F	079	O	8F	143	□	CF	207	Ï
10	016	DLE	50	080	P	90	144	□	D0	208	Đ
11	017	DC1	51	081	Q	91	145	‘	D1	209	Ñ
12	018	DC2	52	082	R	92	146	’	D2	210	Ò
13	019	DC3	53	083	S	93	147	“	D3	211	Ó
14	020	DC4	54	084	T	94	148	”	D4	212	Ô
15	021	NAK	55	085	U	95	149	•	D5	213	Õ
16	022	SYN	56	086	V	96	150	–	D6	214	Ö
17	023	ETB	57	087	W	97	151	—	D7	215	×
18	024	CAN	58	088	X	98	152	˜	D8	216	Ø
19	025	EM	59	089	Y	99	153	™	D9	217	Ù
1A	026	SUB	5A	090	Z	9A	154	š	DA	218	Ú
1B	027	ESC	5B	091	[	9B	155	›	DB	219	Û

ASCII Code		Value	ASCII Code		Value	ASCII Code		Value	ASCII Code		Value
Hex	Deci		Hex	Deci		Hex	Deci		Hex	Deci	
1C	028	FS	5C	092	\	9C	156	œ	DC	220	Ü
1D	029	GS	5D	093	]	9D	157	□	DD	221	Ý
1E	030	RS	5E	094	^	9E	158	ž	DE	222	Þ
1F	031	US	5F	095	_	9F	159	Ÿ	DF	223	ß
20	032	(space)	60	096	`	A0	160		E0	224	à
21	033	!	61	097	a	A1	161	¡	E1	225	á
22	034	"	62	098	b	A2	162	¢	E2	226	â
23	035	#	63	099	c	A3	163	£	E3	227	ã
24	036	$	64	100	d	A4	164	¤	E4	228	ä
25	037	%	65	101	e	A5	165	¥	E5	229	å
26	038	&	66	102	f	A6	166	¦	E9	230	æ
27	039	'	67	103	g	A7	167	§	EA	231	ç
28	040	(	68	104	h	A8	168	¨	EB	232	è
29	041	)	69	105	i	A9	169	©	EC	233	é
2A	042	*	6A	106	j	AA	170	ª	ED	234	ê
2B	043	+	6B	107	k	AB	171	«	EE	235	ë
2C	044	`	6C	108	l	AC	172	¬	EF	236	ì
2D	045	-	6D	109	m	AD	173		F0	237	í
2E	046	.	6E	110	n	AE	174	®	F1	238	î
2F	047	/	6F	111	o	AF	175	¯	F2	239	ï
30	048	0	70	112	p	B0	176	°	F3	240	ð
31	049	1	71	113	q	B1	177	±	F4	241	ñ
32	050	2	72	114	r	B2	178	²	F5	242	ò
33	051	3	73	115	s	B3	179	³	F6	243	ó
34	052	4	74	116	t	B4	180	´	F7	244	ô
35	053	5	75	117	u	B5	181	µ	F8	245	õ
36	054	6	76	118	v	B6	182	¶	F9	246	ö
37	055	7	77	119	w	B7	183	·	FA	247	÷
38	056	8	78	120	x	B8	184	¸	FB	248	ø
39	057	9	79	121	y	B9	185	¹	FC	249	ù
3A	058	:	7A	122	z	BA	186	º	FD	250	ú

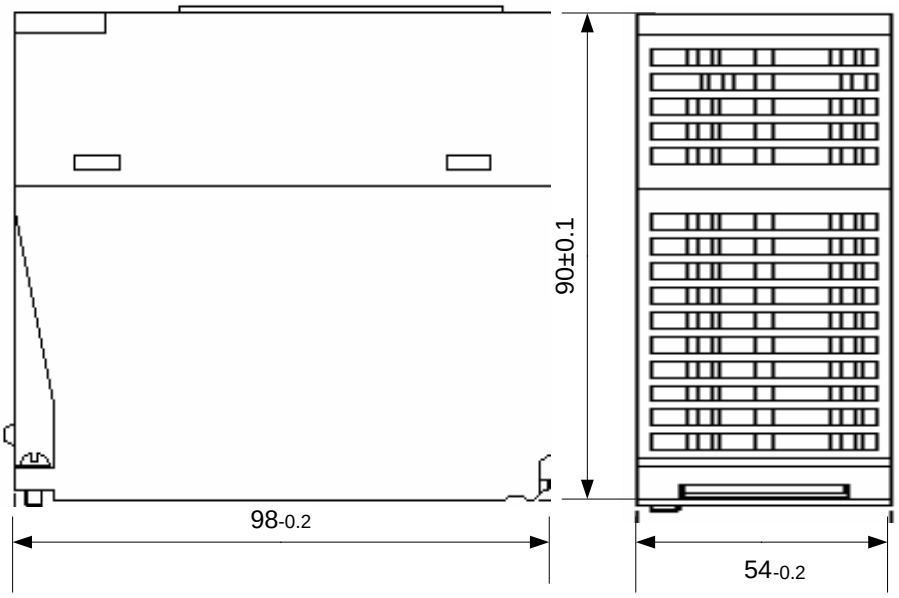
ASCII Code		Value	ASCII Code		Value	ASCII Code		Value	ASCII Code		Value
Hex	Deci		Hex	Deci		Hex	Deci		Hex	Deci	
3B	059	;	7B	123	{	BB	187	»	FE	251	û
3C	060	<	7C	124	|	BC	188	½	FF	252	ü
3D	061	=	7D	125	}	BD	189	¾	EF	253	ý
3E	062	>	7E	126	~	BE	190	¿	EF	254	þ
3F	063	?	7F	127	□	BF	191	À	EF	255	ÿ

A.6 Comparative Table of Ethernet Technology

Technology		Speed (Mbps)	Media	Max. distance
Token Ring		4,16	UTP	100m
Ethernet	10BASE-T	10	UTP	100m
	10BASE-F(multi mode)	10	Optical cable	Max. 2km
	10BASE-F(single mode)	10	Optical cable	Max. 2.5km
	10BASE-5	10	Coaxial cable	500m
	10BASE-2	10	Coaxial cable	185m
Fast Ethernet	100BASE-T4	100	UTP	100m
	100BASE-TX	100	UTP	100m
	100BASE-FX(multi mode)	100	Optical cable	412m(Half Duplex) 2km(Full Duplex)
	100BASE-FX(single mode)	100	Optical cable	20km
Gigabit Ethernet	1000BASE-T	1000	UTP	100m
	100BASE-FX(single mode)	1000	Optical cable	3km
	100BASE-FX(multi mode)	1000	Optical cable	500m
	100BASE-T	1000	Coaxial cable	25m
100VG-AnyLAN		100	UTP	-
ATM		155-622	UTP,Optical cable	-
FDDI(single mode)		100	Optical cable	40-60km
FDDI(multi mode)		100	Optical cable	2km

A.7 Dimensions

Unit: mm



Warranty

1. Warranty Period
   The product purchased will be guaranteed for a period of 18 months upon manufactured

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

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

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

LSIS values every single customers.

Quality and service come first at LSIS.

Always at your service, standing for our customers.

http://eng.lsis.biz

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

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