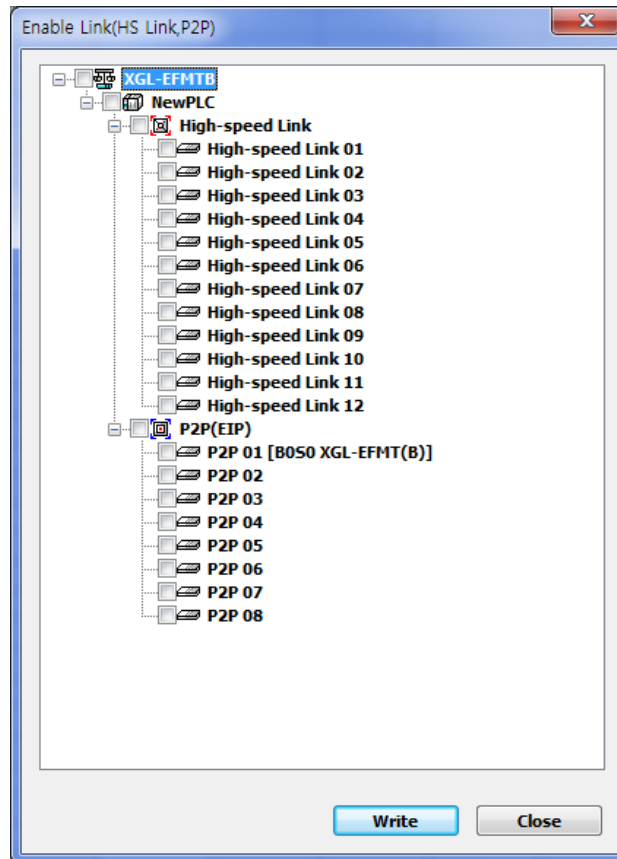


(2) P2P service start

Even after P2P parameters are downloaded, P2P shall be started in order to start the P2P service. Select [Online] -> [Communication module setting] -> [Enable Link] (HS link, P2P)] on the menu.



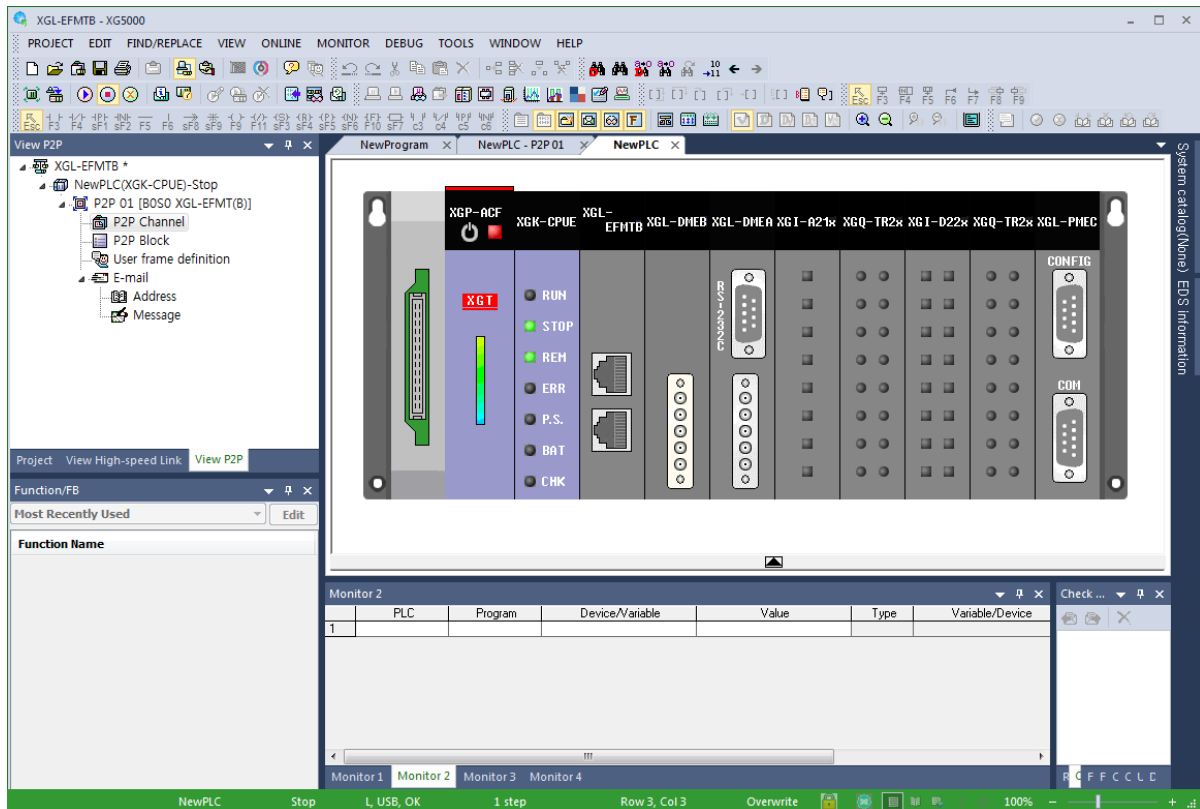
[Fig. 7.4.2] Enable setting of P2P service

Select P2P parameters to start on the [Enable Link (HS link, P2P)] window. The P2P parameters already checked is during run, whose P2P service will stop if cancelled.

In order to confirm normal downloading and normal P2P service operation, select [System Diagnosis] on the menu.

7.5 P2P Diagnosis Function

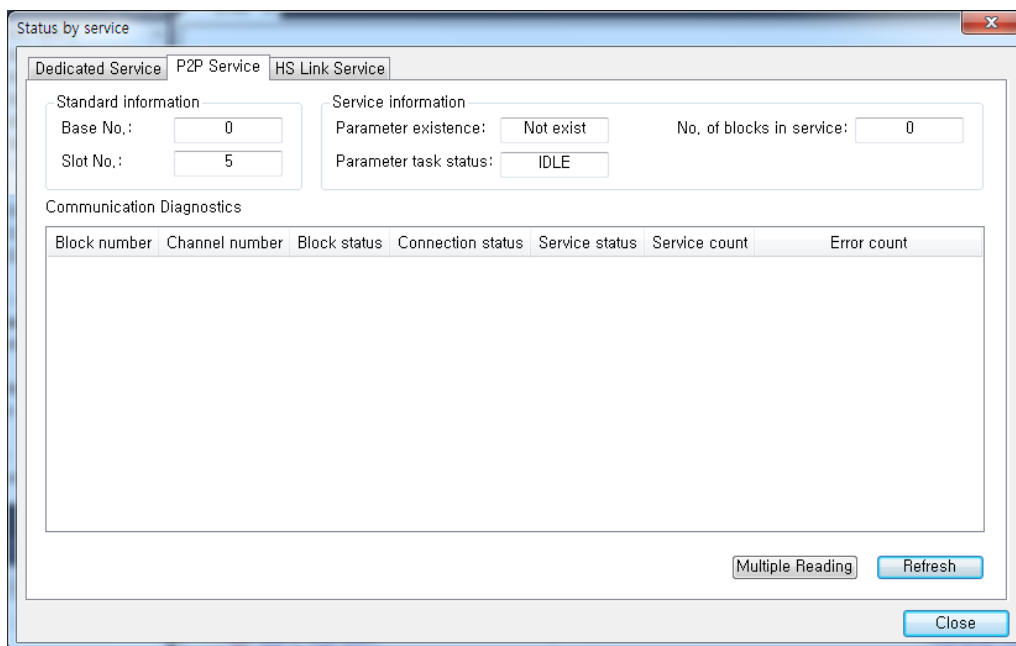
Diagnosis function of P2P system is used to display the service status and information of the communication program after the driver of the communication module is specified. The user can check the normal P2P service through the diagnosis system. Refer to Chapter 5 XG5000 Program for more details.



[Fig. 7.5.1] Information of system diagnosis module

1) P2P service

It is used to display detailed information on the user defined service executed, check and read the service status if P2P parameters are set and enabled, where real-time monitoring is available with Individual Read or Continuous Read specified on the menu.



[Fig. 7.5.2] P2P service monitor

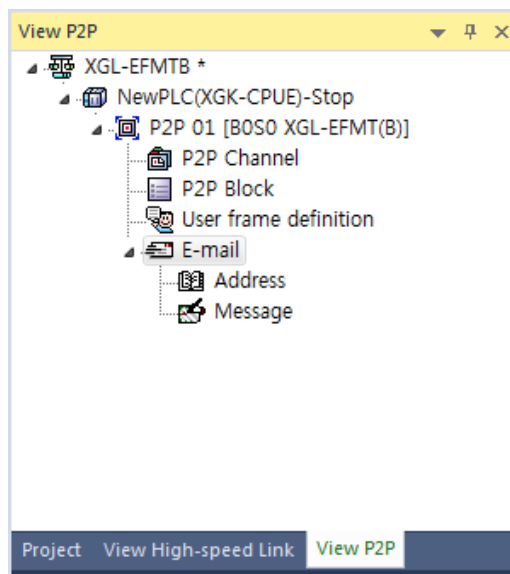
7.6 E-mail service using P2P service

7.6.1 E-mail service

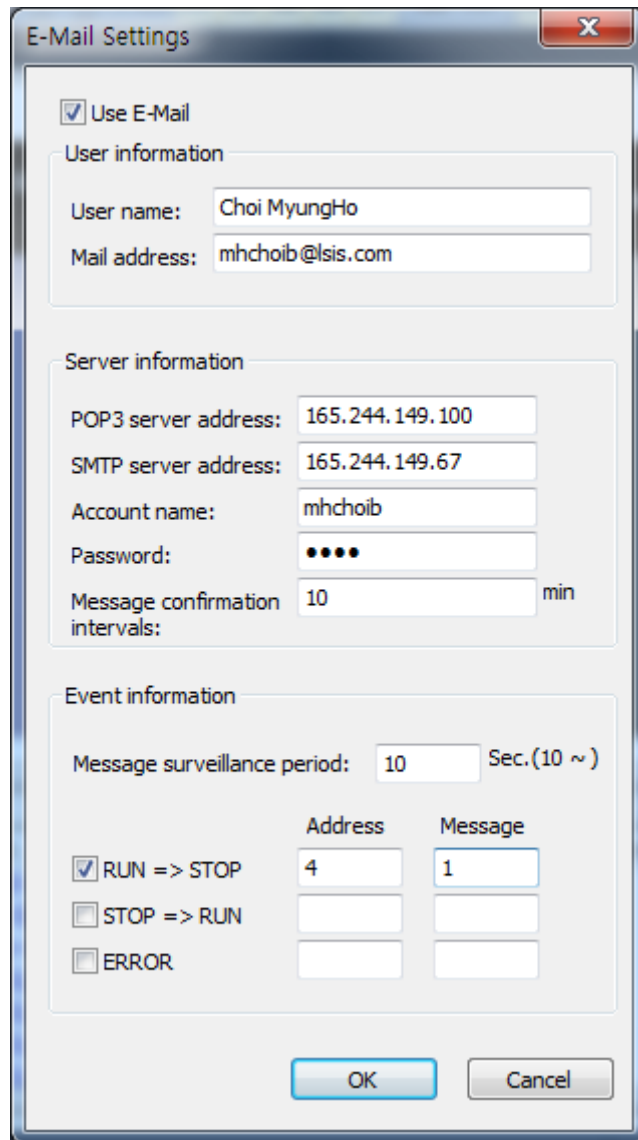
When there's problem, E-mail service can be used to notify the problem to manager. When status of CPU is changed or specific event occurs, it notified the status to manager by using E-mail or SMS service. But there is some restriction to use E-mail service. It supports ASCII and Decoding for security is not supported. Since authorization function is not supported, set the mail server not to do authorization process for TX.

(1) E-mail setting of P2P service

Double-click "E-mail" to activate the E-mail setting window



[Fig 7.6.1] P2P project window (E-mail)



[Fig 7.6.2] E-mail setting window

Item		Details
Use E-Mail		Determines whether to use E-mail service. In order to use E-mail function, check this box.
User information	User name	User name seen when partner receives the mail. If it is set as PLC, PLC will be name of E-mail sender.
	Mail address	E-mail address for reply Though PLC sends E-mail, other PC can receive the reply about E-mail PLC sent.

	Item	Details
Server information	POP3 server address	Server addresses receiving the E-mail from other device. Any mail server supporting POP3 can be used
	SMTP server address	Server addresses sending the E-mail to other device. Any mail server supporting SMTP can be used
	Account name	Account name in the POP3 which should be same with mail address
	Password	Password to access POP3 account
	Message confirmation intervals	Time of confirmation whether E-mail arrived or not

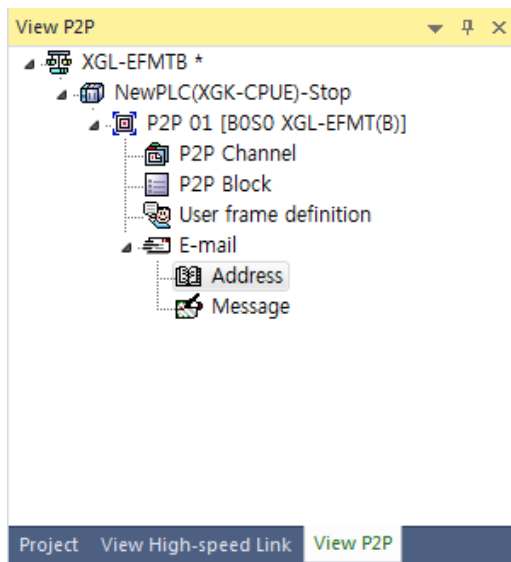
Event information monitors the CPU status periodically. If PLC becomes Stop mode or error status, communication parameter can't operate so this function is provided to prepare the Stop mode or error status.

	Item	Details
Event information	Message surveillance period	Set to be larger than 10s. Time for checking whether PLC mode is changed.
	RUN -> STOP	Communication sends message when mode of PLC is changed from Run to Stop
	STOP -> RUN	Communication sends message when mode of PLC is changed from Stop to Run
	ERROR	Communication sends message when error occurs regardless its status.

(2) Writing address and message

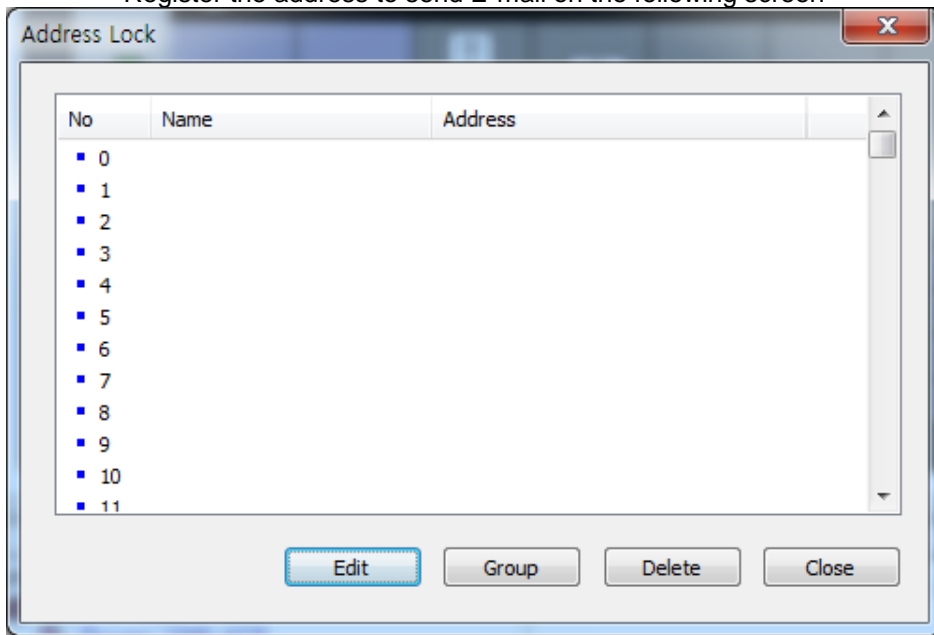
1) Writing address

Double-click 'Address' to activate the following screen



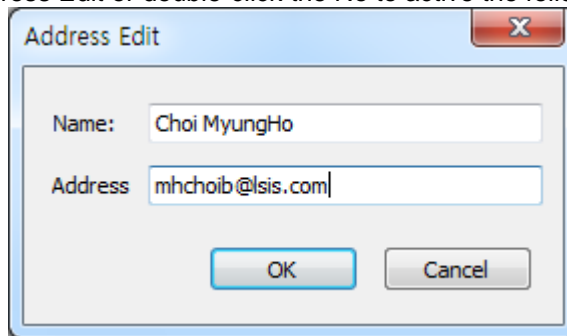
[Fig 7.6.3] E-mail setting (address setting)

Register the address to send E-mail on the following screen

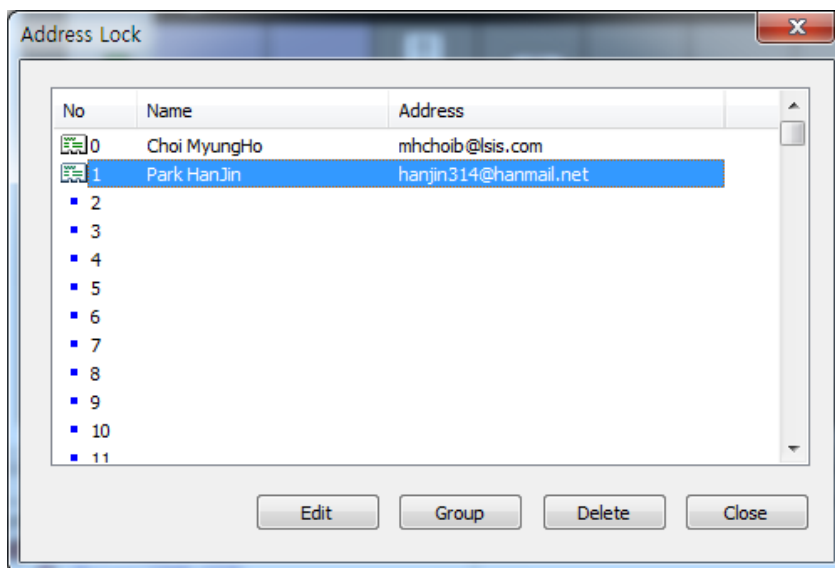


[Fig 7.6.4] Setting screen of Address Lock

Select the No and press Edit or double-click the No to active the following screen

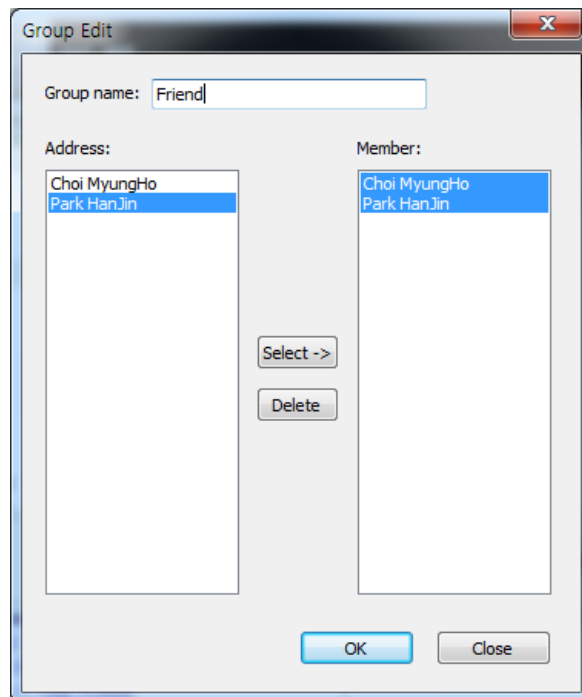


[Fig 7.6.5] Address Edit window

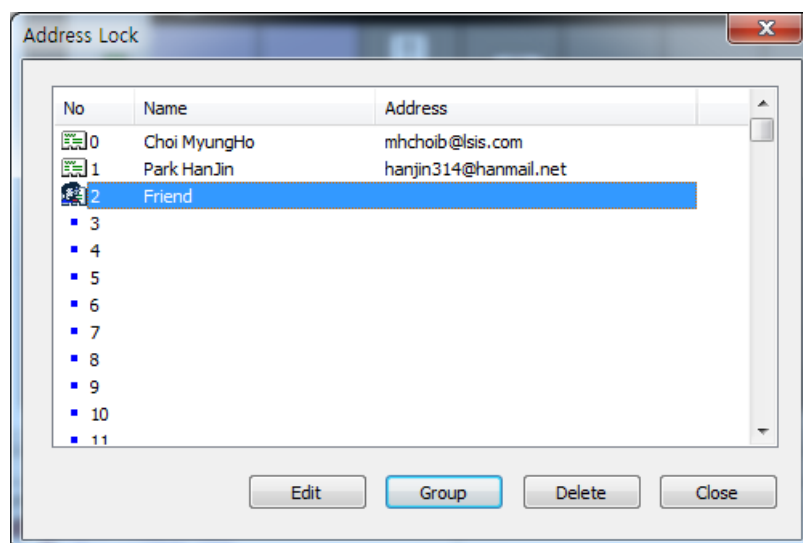


[Fig 7.6.6] complete screen of Address Lock

When sending E-mail to group, press Group



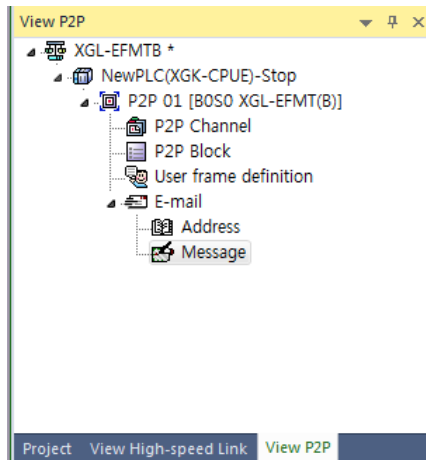
[Fig 7.6.7] Group setting screen



[Fig 7.6.8] complete screen of Address Lock (including Group)

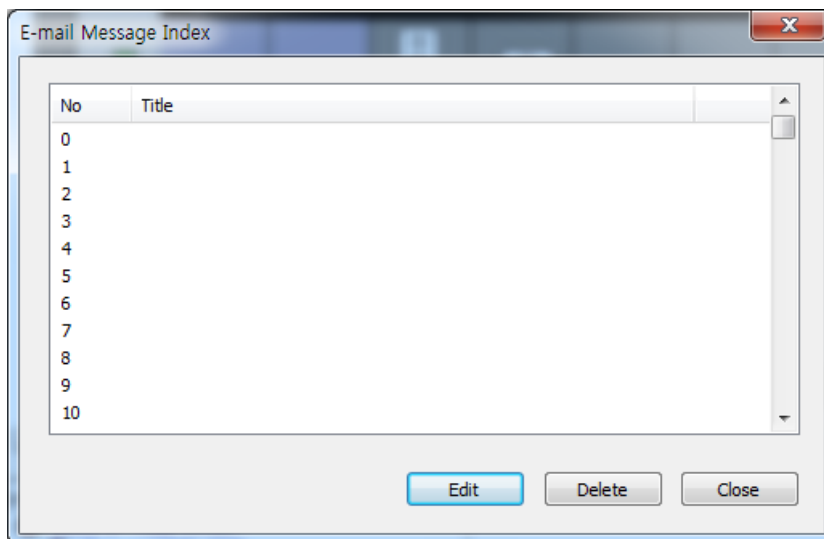
If you select Group, already registered individual address is indicated at left side. Select individual to be member of group and press OK to create Group address. In the above screen, if you send to Friend, ParkHanJin and Choi MyungHo will get message simultaneously.

- 2) Writing message
Press "Message" to edit message



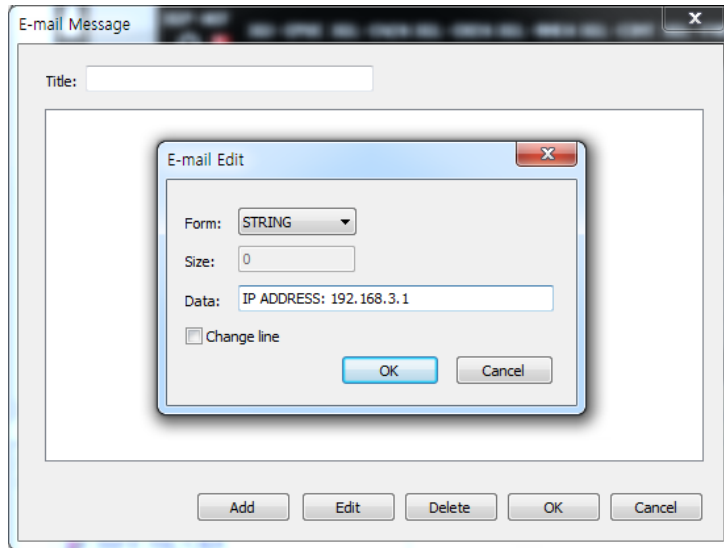
[Fig 7.6.9] P2P project window (Message setting)

The following figure is message edit window

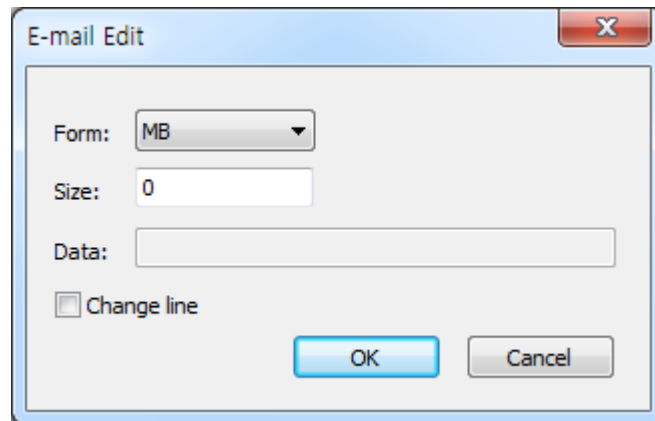


[Fig 7.6.10] E-mail message registration window

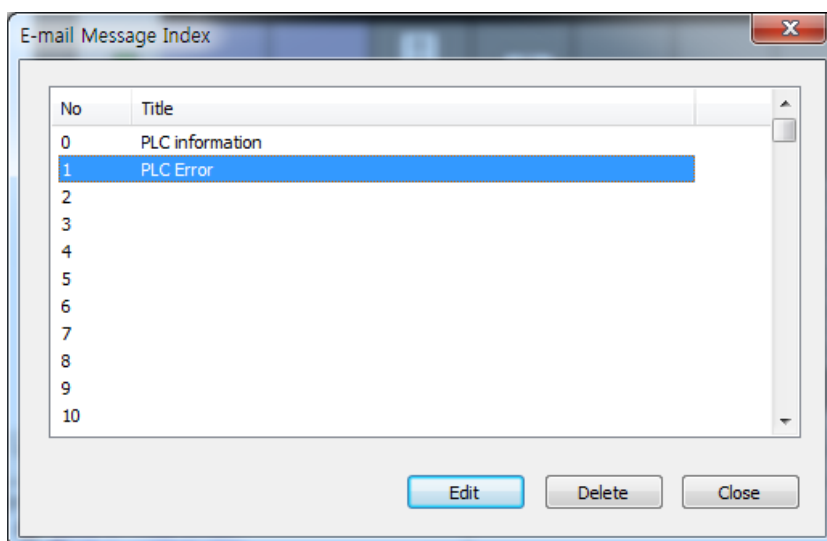
Click "Add" to activate the following screen. Set the Form and Size and write the message data. Form is classified into String and Byte data receiving from CPU. Form MB is used to send as many message data of P2P ESend parameter as byte set in Size
"Change" is used to change the line when outputting data at the received screen.



[Fig 7.6.11] E-mail message edit window



[Fig 7.6.12] E-mail Edit setting (MB)

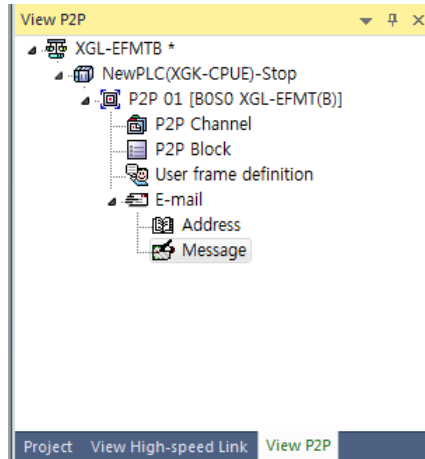


[Fig 7.6.13] Registration result screen of E-mail message

(3) Setting of P2P block

Sets the parameter of P2P block to send message set in the previous steps

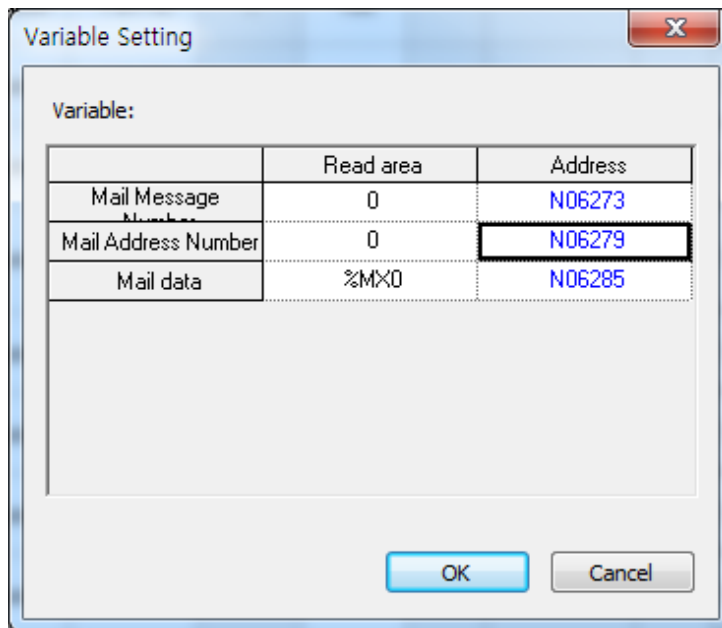
If setting the E-mail button after clicking the P2P block, P2P instruction can be selectable.



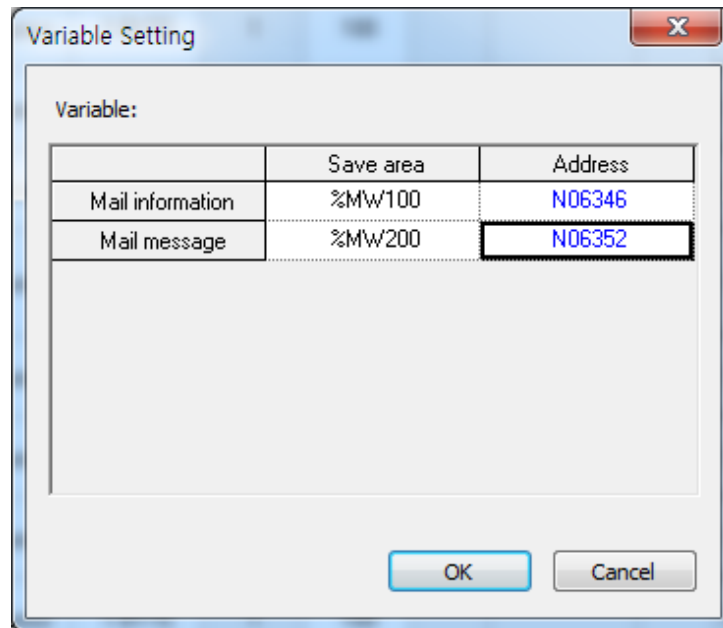
[Fig 7.6.14] P2P project window (P2P block)

Index	E-mail	Ch.	Driver Setting	P2P function	Conditional flag	Data size	Setting	Variable setting contents
0	<input checked="" type="checkbox"/>			ESEND	%MX0		Setting	Line:3Mail Message Number:0Mail Address Number:0Mail data:%MX0
1	<input checked="" type="checkbox"/>			ERECEIVE	%MX1		Setting	Line:2Mail information:%Mw100Mail message:%Mw200
2	<input type="checkbox"/>						Setting	

[Fig 7.6.15] P2P parameter setting window



[Fig 7.6.16] Setting screen in case of E-mail TX



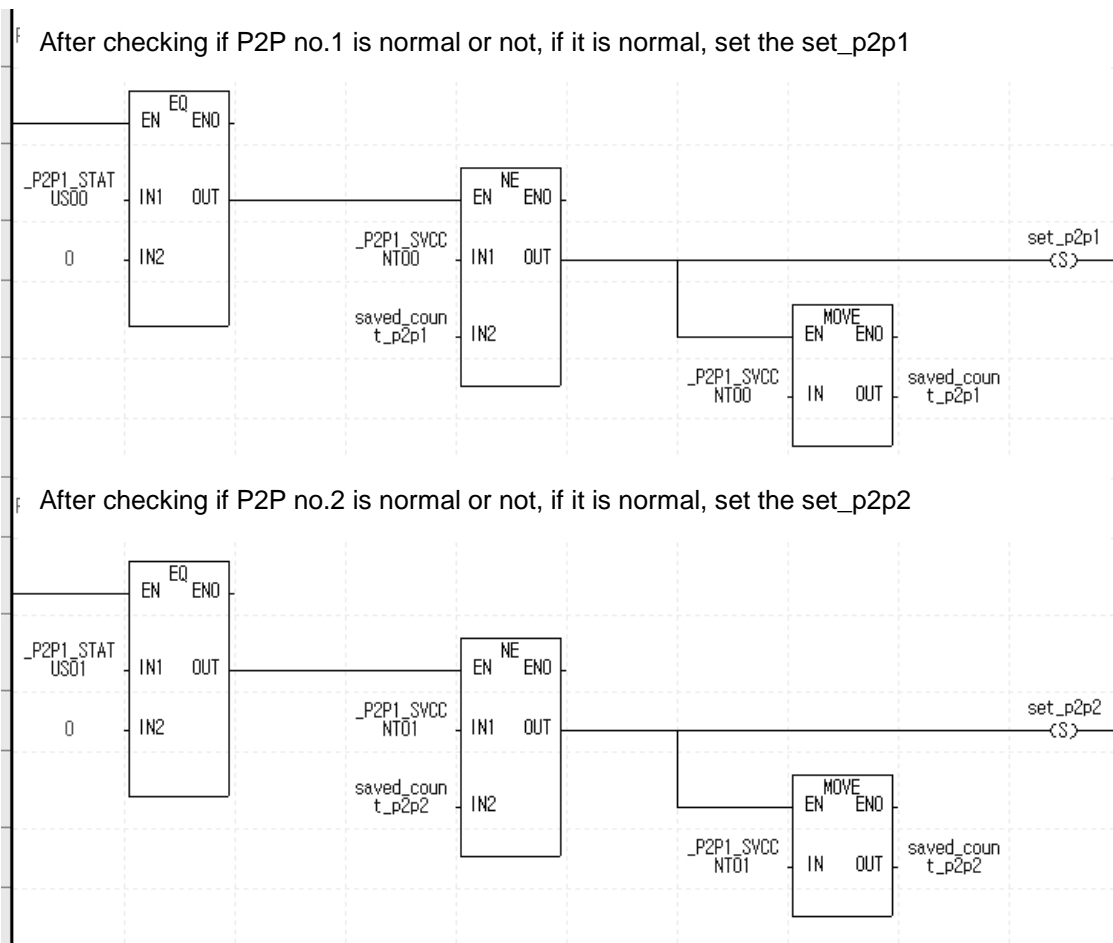
[Fig 7.6.17] Setting screen in case of E-mail RX

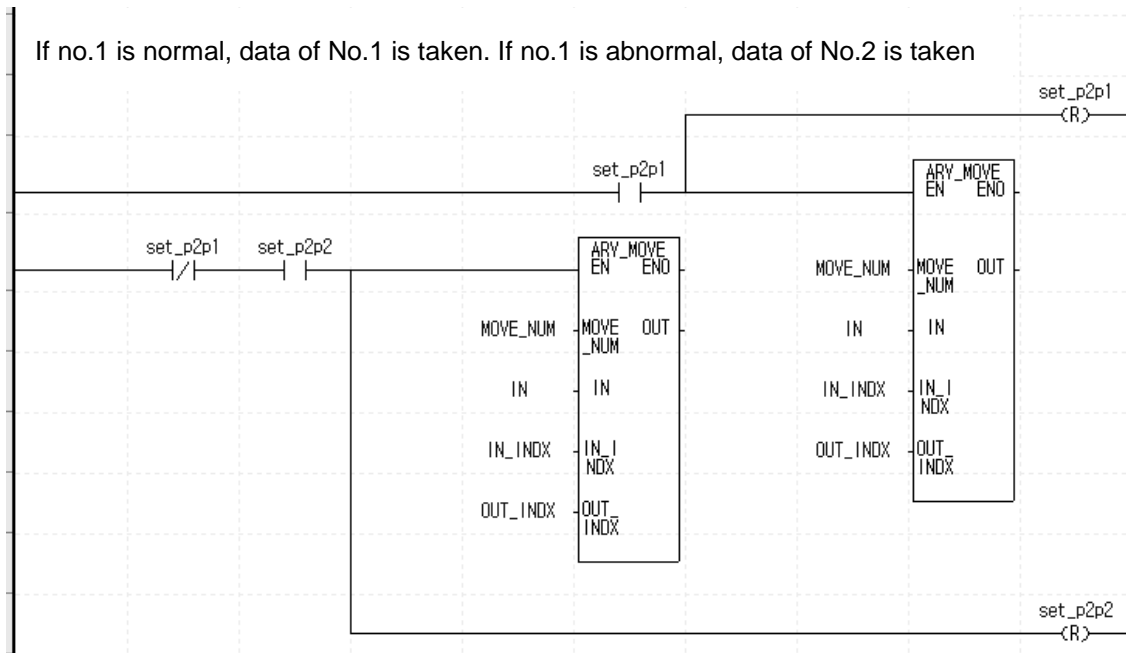
Item		Details	
E-mail		Enables the E-mail service	
P2P function	ESEND	Sends E-mail	
	ERECEIVE	Receives E-mail	
Conditional flag		Inputs device to use as start condition Memory area and flag are available	
Setting	ESend	Mail message number	Inputs index number of message list among the E-mail setting in P2P Determines title and data of mail
		Mail address number	Sets registration number set in Address Lock. Determines who to send When you want to send many people, use Group. But before using Group, the address of partner should be inputted. The number of Group member is limited to maximum 10.
		Mail data	Indicates the start address of data to send. It sends as many data as the number of array (10 byte) starting the first of array applying to MB[10].
	ERECEIVE	Mail information	Area where mail information is saved
		Mail message	Saves the received mail message at memory of PLC

7.7 P2P service at Redundant System

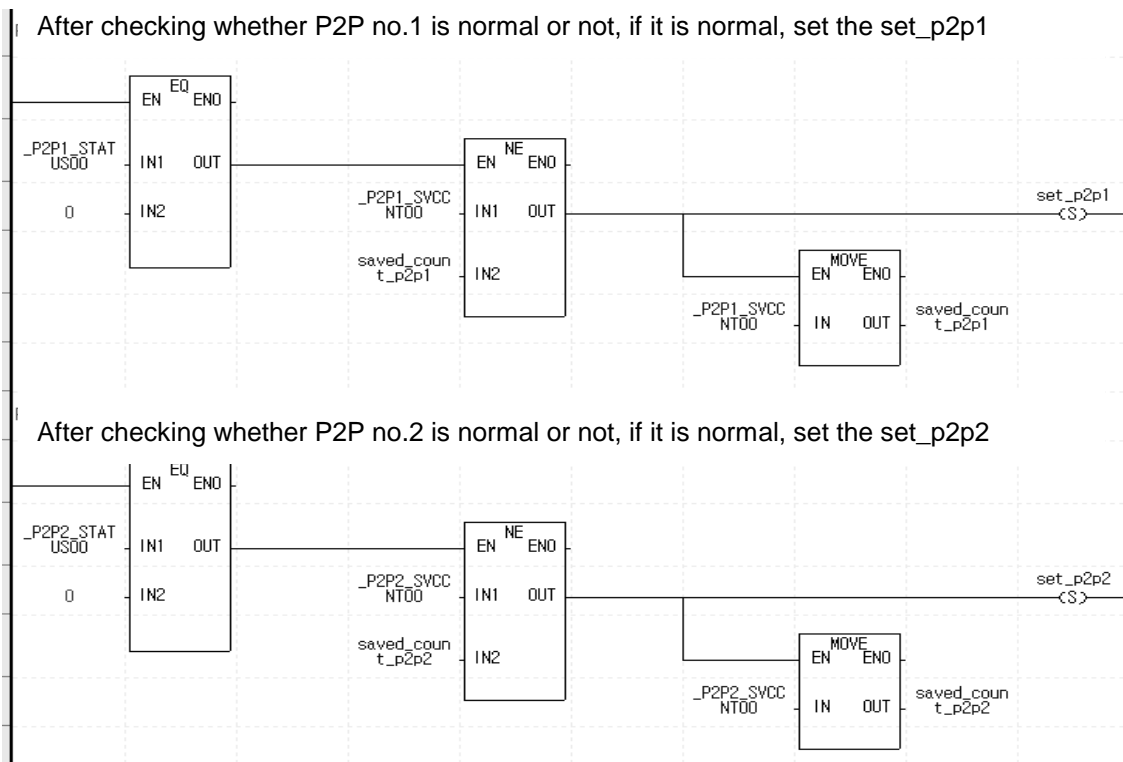
In case of P2P service, if you want to take data of redundant system, don't use P2P Write at XGR side and Set READ at XGK(I) side by using flag of P2P service. Save the normal service count of P2P service connected to A-Side and B-Side and after you check if the STATUS of relevant block is 0 or not, take the data of one side by checking STATUS is 0 and normal service count increases.

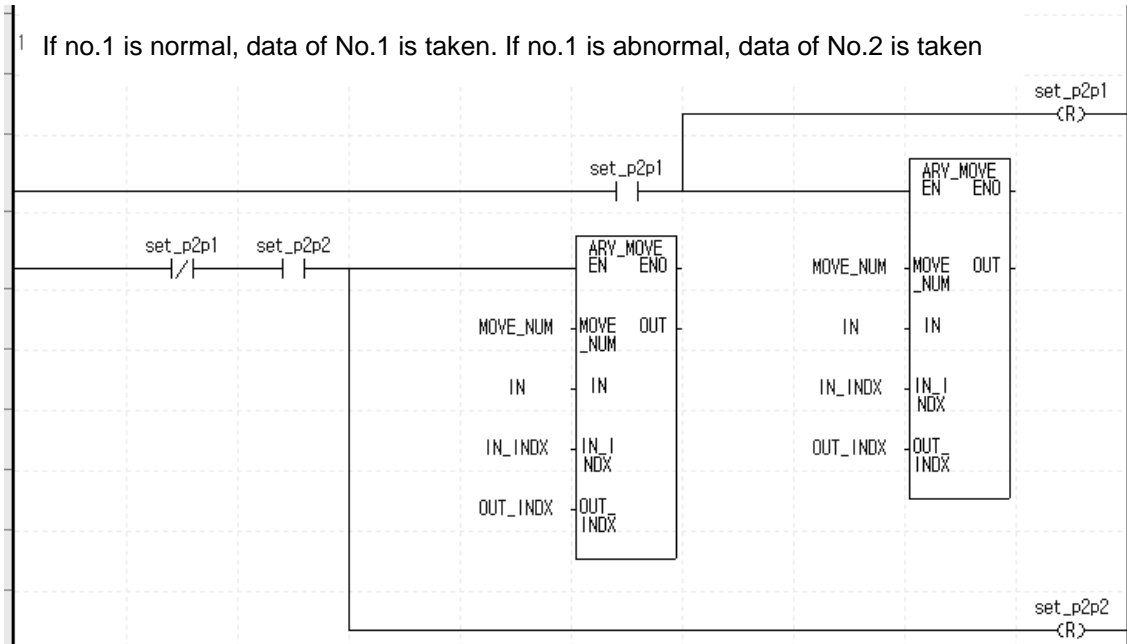
- (1) In case XGR and XGK(I) are configured as redundant system by using different IP address at single network, since P2P service have to configure service with different one block, you can write ladder program like the figure below.





(2) In case XGR and XGK(I) are configured as redundant system with different IP address at the separated network, P2P service connected to Master (standby) is no.1 and P2P service connected to Standby (master) is no.2. If you write ladder about P2P block no.0, you can write the ladder like figure below.





- (3) In case XGR and XGK(I) are configured as redundant system with same IP address at the separated network, only standard setting is different with (2). You can configure the redundant system by using same ladder program to configure redundant system.

Chapter 8 Dedicated Communication

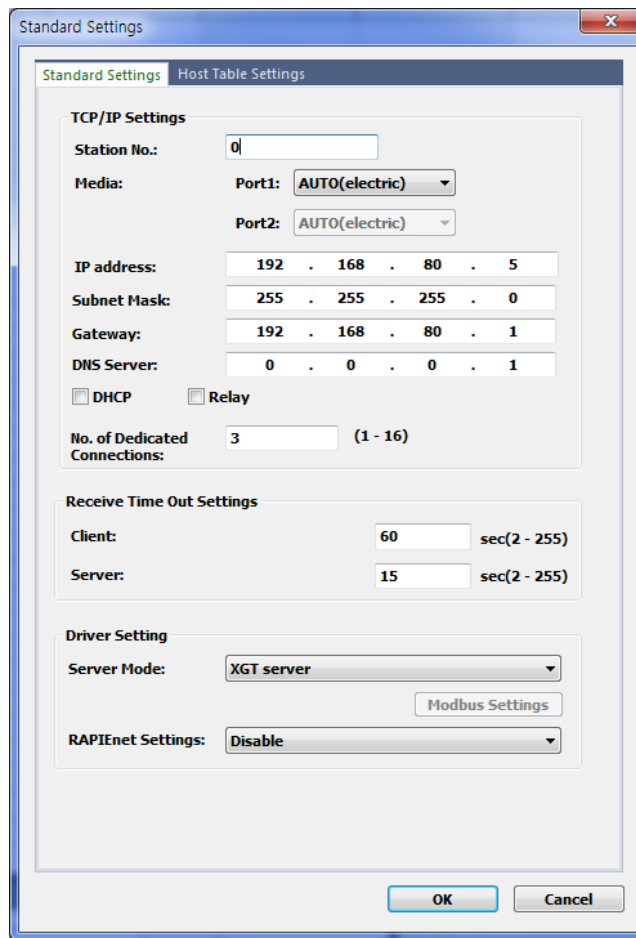
8.1 Dedicated Communication

8.1.1 Introduction

The dedicated communication service is reading and writing information and data of PLC from/on PC and associated devices with the protocol built-in FENet I/F module.

The FENet I/F module operates as a server in the network and responds to memory Read/Write request instruction with XGT dedicated protocol or MODBUS TCP protocol by Computer or external devices. It uses 2004 and 2005 for TCP and UDP port number of XGT dedicated driver, respectively and 502 for the port number of MODBUS TCP driver. This service mainly used to communicate between higher level system (PC program, MMI) and LS Ethernet module or between LS Ethernet modules.

(1) Setting of XGT dedicated driver



[Fig. 8.1.1] Driver setting screen

As basic parameters shall be surely specified and downloaded prior to use in the Ethernet communication, the dedicated communication services shall be also surely specified and downloaded for its application (XGT server if not specified).

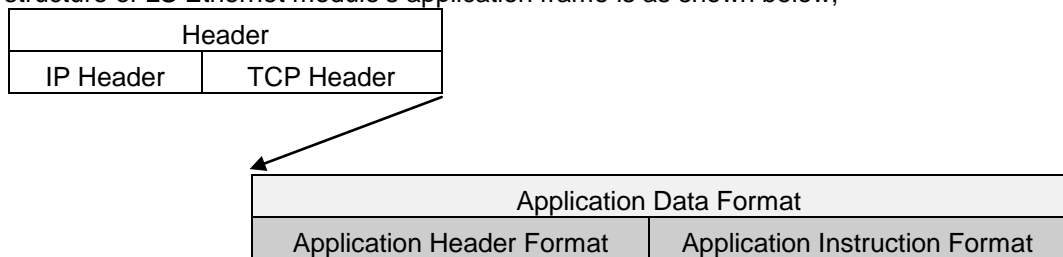
The number of dedicated connections in the basic parameters is the number of channels (MMI connections) connected through LS dedicated port (2004).

(In case of V6.0 or above, up to 64 per TCP server port can be set.)

Thus, by changing the number of dedicated connections on the frame editor, the number of channel connections for LS dedicated communication can be changed.

8.1.2 Frame structure

The structure of LS Ethernet module's application frame is as shown below;



(1) Header Structure (Application Header Format)

Item	Size(byte)	Description
Company ID	8	"LSIS-XGT" + "NULL NULL(reserved area)" (ASCII CODE : 4C 53 49 53 2D 58 47 54 00 00)
Reserved	2	h00 : Reserved area
PLC Info	2	* Client(MMI) → Server(PLC) : Don't care (h00) * Server(PLC) → Client(MMI) : Bit 00~05 : CPU TYPE 01(XGK/R-CPUH), 02(XGK-CPUS), 05(XGI-CPUU) Bit 06 : 0(Redundancy Master / Single), 1(Redundancy Slave) Bit 07 : 0(CPU normal operation), 1(CPU error) Bit 8~12 : System status 1(RUN),2(STOP), 4(ERROR), 8(DEBUG) Bit 13~15 : Reserved
CPU Info	1	It is determined to be the XGK/I/R series through a reserved area XGK: 0xA0,XGI: 0XA4,XGR: 0xA8
Source of Frame	1	* Client(MMI) → Server(PLC) : h33 * Server(PLC) → Client(MMI) : h11
Invoke ID	2	ID used to discriminate the sequence among frames (This number is sent as attached to Response frame)
Length	2	Byte size of application Instructions.
FEnet Position	1	Bit 0~3 : FEnet I/F module's Slot No.

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		Bit 4~7 : FEnet I/F module's Base No.
Reserved 2 (BCC)	1	h00 : Reserved area (Application Header's Byte Sum)

(2) Basic Structure of Frame (Application Instruction Format)

1) Header

Company ID (‘LSIS- XGT’)	Rese rved (2)	PLC information area (2)	CPU Info (1)	H33 (1)	Invoke ID (2)	Length (2)	Reserved area (1)	BCC (1)
--------------------------------	---------------------	--------------------------------	--------------------	------------	------------------	---------------	-------------------------	------------

** Figure in () means the number of bytes.

- ▷ Company ID: ‘LSIS-XGT’ in ASCII text
- ▷ Reserved: area to match the character string number with LGIS-GLOFA
- ▷ PLC Info: Information area for PLC
- ▷ Invoke ID: ID used to discriminate the sequence among frames, which can be set optionally at request instruction. And Response frame resends the received Invoke ID at request instruction (an area used for checking for errors in PC or MMI).
- ▷ Length: Length of the data area at the back of Header in the frame.

2) Data Request frame (external communication device → FENet I/F module)

Header	Instruction	Data type	Reserved area (2 bytes)	Structurized data area
--------	-------------	--------------	----------------------------	---------------------------

3) ACK Response frame (FENet module → external communication device, if data is received normally)

Header	Instruction	Data type	Reserved area (2 bytes)	Error status (2 bytes h0000)	Structurized data area
--------	-------------	--------------	-------------------------------	---------------------------------	---------------------------

4) NAK Response frame (FENet module → external communication device, if data is received abnormally)

Header	Instruction	Data type	Reserved area (2 bytes)	Error status (2 bytes: Not h0000)	Error code (1 byte)
--------	-------------	--------------	-------------------------------	---	------------------------

Notes

- 1) If hexadecimal data is applied, the Hexadecimal type of data is indicated with ‘h’ or ‘h’ attached in front of figures inside frame like 01, h12345, h34, h12 and h89AB.

8.1.3 Instruction list

Instructions used in dedicated communication service are as shown below in the table.

Instruction	Instruction code	Data type	Processing Details
Read	Request : h0054	Individual	Reads Bit, Byte, Word, Double word and Long word type of variables data based on each data type.
	Response : h0055	Continuous	Reads byte type of variables in block unit. (up to 1,400 bytes).
Write	Request : h0058	Individual	Writes Bit, Byte, Word, Double word and Long word type of variables data based on each data type.
	Response : h0059	Continuous	Writes byte type of variables in block unit. (up to 1,400 bytes).

[Table 8.1.1] List of Instructions

8.1.4 Data type

(1) Data type of variables

The Data types of variables in the P, M, L, F, K, C, D, T, N, R, etc device areas are to be included after the variable indicating letter of '%'.
 Example: %PX0, %LX0, %FX0

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

[Table 8.1.2] List of data types of direct variables

(2) Data type

Data type is to be set to Instruction type when reading or writing direct variables.

Data type	Code	Data type	Code
BIT	h00	LWORD	h04
BYTE	h01	DWORD	h03
WORD	h02	LWORD	h04
DWORD	h03	Continuous	h14

[Table 8.1.3] List of data types of direct variables

8.2. Execution of Instructions

8.2.1 Read Separated Direct Variable

(1) Introduction

This function is used to directly specify the device memory address and the data type to read. Up to 16 separate device memory areas can be read at a time

(2) Request format (PC -> PLC)

- Read Request of Individual Variable (MMI → PLC)

Item	Size(byte)	Description
Instruction	2	h0054 : Read Request
Data type	2	Refer to Data Type table(X,B,W,D,L)
Reserved area	2	h0000 : Don't Care.
Number of blocks	2	Number of memory address to read; up to 16
Variable length	2	The number of characters in the Direct variable; Max. 16
Direct variable	Length of variable name	Direct variable only available
...	...	(Repeatedly as many as the number of blocks /up to 16)
Variable length	2	The number of characters in the Direct variable; up to 16 characters.
Direct variable	Length of variable name	Direct variable only available

Format name	Header	Instruction	Data type	Reserved area	Number of blocks	Variable length	Direct variable	...
Code (Ex.)	...	h0054	h0002	h0000	h0001	h0006	%MW100	

1 block (up to 16 blocks setting available repeatedly)

1) Number of blocks

Used to specify the number of blocks composed of '[Variable Length][Variable]' in the request format up to 16 blocks. Accordingly, the value of [Number of Blocks] shall be h0001 ~ h0010.

2) Variable length

It means the number of characters of the variable name which is available up to 16 characters, whose range is h01 ~ h10.

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3) Variable

Input the address of memory device to be read actually. It shall be ASCII value within 16 characters. Others than figure, capital/small letter, ‘%’ and ‘.’ are not allowed.

Based on the PLC type, available types of variables are as described below.

Classification	Bit	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] Types of Variables

Notes

- (1) When the frame is composed with hexadecimal word data to be displayed on the frame above, ‘h’ in front of figures shall be taken out with the positions of two bytes exchanged as below.
Ex.) h0054 ⇒5400

(3) Response format (For PLC’s ACK Response)

- Read Response of Individual variable (PLC →MMI)

Item	Size(byte)	Description
Instruction	2	h0055 : Read Response
Data type	2	Refer to Data Type table
Reserved area	2	h0000 : Don’t Care
Error status	2	Normal if it is 0, abnormal if not 0.
Error code	2	If Error State is abnormal, the lower Byte is the error code.
Number of blocks		If Error State is normal, it means the number of blocks to be read.
Data size	2	The size of data in byte unit.
Data	Data size	Data read.
...	...	(Repeatedly as many as the number of variables /up to 16)
Data size	2	The size of data in byte unit.
Data	Data size	Data read.

Format name	Header	Instruction	Data type	Reserved area	Error status	Number of blocks	Data Size	Data
Code (Ex.)	...	h0055	h0002	h0000	h0000	h0001	h0002	h1234	

1 block (up to 16 blocks)

1) Data Size

It means the number of bytes in Hexadecimal. This number is decided based on the memory type (X,B,W,D,L) included in variable name of the computer request format.

2) Number of blocks

Used to specify the number of blocks composed of '[Number of Data][Data]' in the request format up to 16 blocks. Accordingly, the value of [Number of Blocks] shall be h0001 ~ h0010.

Classification	Available variables	Number of data (Byte)
Bit (X)	%(P,M,L,K,F,T)X	1 (Lowest bit only effective)
Word (W)	%(P,M,L,K,F,T,C,D,S)W	2

[Table 8.2.2] Number of data based on variables

Notes
<p>1) Number of data 'H04' means that 4 bytes of Hexadecimal data (Double Word) exists in the data.</p> <p>2) If data type is Bit, the read data will be displayed in one byte (HEX). In other words, if BIT value is 0, h00 will be displayed, and if the value is 1, h01 will be displayed.</p>

4) Response format (For NAK Response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Error code (Hex 1 Byte)
Code (Ex.)	...	h0055	h0002	h0000	hFFFF (other than 0)	h21

Notes
<p>(1) Error code displays the type of error in 1 byte of Hexadecimal. Refer to 'Error Codes Table' for more details.</p>

8.2.2 Read Continuous Direct Variable

(1) Introduction

This function is used to read the data of directly defined PLC device memory continuously as many as specified from the address specified.

(2) Request format (PC ⇒ PLC)

■ Read Request of Continuous Variable (MMI → PLC)

Item	Size (byte)	Description
Instruction	2	h0054 : Read Request
Data type	2	h0014 : Continuous
Reserved area	2	h0000 : Don't Care.
Number of blocks	2	It is fixed with h0001 for Continuous read.
Variable length	2	The number of characters in the variable field; Max. 16
Variable	Length Variable name	Variable name; Byte type of direct variables only available (In other words, types of %MB / %PB / %DB/... available: supporting devices: P,N,L,K,T,C,D,N, F) It displays block's start address. (Ex. %MB0, %PB0)
Number of Data	2	Data Size in byte whose Maximum value is 1400.(h0578)

Format name	Header	Instruction	Data type	Reserved area	Number of blocks	Variable length	Variable	Number of data
Code (Ex.)	...	h0054	h0014	h0000	h0001	h0006	%MB000	h0006

Notes

(1) Number of data means the number of data in byte unit (up to 1,400 bytes available).

1) Data type

h0014 only can be used for the data type.

2) Number of blocks

Definitely h0001 only can be used for the number of blocks.

3) Variable length

It means the number of characters of the variable name which is available up to 16 characters, whose range is h0001 ~ h0010.

4) Variable

It stands for variable's address to read actually. It shall be ASCII value within 16 characters. Others than figure, capital/small letter, '%' and '.' are not allowed for the variable name. Based on the PLC type, types of variables available to read continuously are as described below.

(3) Response format (For PLC's ACK Response)

- Read Response of Continuous Variable (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	Normal if it is 0, abnormal if not 0.
Error code	2	If Error State is abnormal, the lower byte is the error code.
Number of blocks		
Number of data	2	The Size of Data in byte.
Data	Data size	Data to read; up to 1400 bytes

Format name	Header	Instruction	Data type	Reserved area	Error status	Number of blocks	Number of data	Data
Code (Ex.)	...	h0055	h0014	h0000	h0000	h0001	h0006	h012345 6789AB

▷ Number of data means the number of bytes in Hexadecimal number.

(4) Response format (For PLC's NAK Response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Error code (Hex 1 Byte)
Code (Ex.)	...	h0055	h0014	h0000	hFFFF	h21

Notes
1) Error code displays the type of error in 1 byte of Hexadecimal code. Refer to 'Error Code Table' for more details.

8.2.3 Write Separated Direct Variable

(1) Introduction

This function is used to directly specify the PLC device memory to write data on applicably to its memory data type. The data can be written on up to 16 separate device memories at a time.

(2) Request format (PC -> PLC)

■ Write Request of Individual Variable (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.
Number of blocks	2	Number of memory address to write; up to 16.
Variable length	2	The number of characters in the Direct variable; Max. 16
Variable name	Length of variable name	Direct variable only available
...	...	(Repeatedly as many as the number of blocks /up to 16)
Length of variable name	2	Length of direct variable. Max. 16
Variable name	Length of variable name	Direct variable only available
Data size	2	Byte size of Data
Data	Data size	Data to write
...	...	(Repeatedly as many as the number of blocks /up to 16)
Data size	2	Byte size of Data
Data	Data size	Data to write

Format name	Header	Instruction	Data type	Reserved area	Number of blocks	Variable length	Direct variable	..	Number of data	data	..
Code (Ex.)	..	h0058	h0002	h0000	h0001	h0006	%MW100	..	h0002	h1234	..

1 block (up to 16 blocks setting available repeatedly)

1) Number of blocks

Used to specify the number of blocks composed of '[Variable Length][Variable]'and '[Data Length] [Data]' in the frame whose Maximum number is 16(h10). Accordingly, the value of [Number of Blocks] shall be h01~ h10.

2) Variable length

It means the number of characters of the variable name which is available up to 16 characters, whose range is h01 ~ h10.

3) Variable

Input variable's address to read actually. It shall be ASCII value within 16 characters. Others than figure, capital/small letter, '%' and '.' are not allowed for the variable name.

Notes
<p>(1) Device data type of each block shall be surely identical. If the data type of the first block is Word, and that of the second is Double Word, an error may occur.</p> <p>(2) If data type is Bit, the data format will be one byte (HEX). In other words, if BIT value is 0, the data will be h00 and if the value is 1, the data will be h01.</p> <p>(3) When Bit write function is used, the address must be calculated in Bit unit. For example, to write a data in the hC (12th) bit of M172 word, the Bit address can be calculated as follow processing.</p> <p>Wrong Expression: %MX172C Right Expression: $172(\text{Word number}) \times 16 + 12(\text{Bit number}) = 2764$ → %MX2764</p>

(3) Response format (For PLC's ACK Response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Number of blocks
Code (Ex.)	...	h0059	h0002	h0000	h0000	h0001

1) Number of blocks

It is the number of blocks normally written.

(4) Response format (For NAK Response)

Format name	Header	Instruction	Data type	Reserved area	Error status	Error code (Hex 1 Byte)
Code (Ex.)	...	h0059	h0002	h0000	hFFFF (other than 0)	h21

Notes
<p>1) Error code is attached the type of error in 1 byte of Hexadecimal code. Refer to 'Error Codes Table' for more details.</p>

8.2.4 Write Continuous Direct Variable

(1) Introduction

This function is used to write the data on the directly defined PLC device memory continuously as many as specified from the address specified. However, byte type of variables is only available.

(2) Request format

■ Write Request of Continuous Variable (MMI → PLC)

Item	Size(byte)	Description
Instruction	2	h0058 : Write Request
Data type	2	h0014 : Block Type
Reserved area	2	h0000 : Don't Care.
Number of blocks	2	It is fixed with h0001 for Continuous write.
Variable length	2	The number of characters in the variable field; Max. 16
Variable	Variable length	Variable name; Byte type of direct variables only available. (In other words, types of %MB / %PB / %DB/... available: supporting devices: P,N,L,K,T,C,D,N) It displays block's start address. (Ex. %MB0, %PB0)
Data	Data size	Data to write, up to 1400 bytes

Format name	Header	Instruction	Data type	Reserved area	Number of blocks	Variable length	Variable	Number of data	Data
Code (Ex.)	...	h0058	h0014	h0000	h0001	h0006	%MB100	h0002	h1234

1) Number of data

It means the number of data in byte unit. (up to 1,400(h0578) bytes available).

2) Number of blocks

h0001 only can be used for Number of blocks field .

3) Variable length

It is the number of characters of the variable which is available up to 16 characters, whose range is h01 ~ h10.

4) Variable

It stands for variable's address to write actually. It shall be ASCII value within 16 characters. Others than figure, capital/small letter, '%' and '.' are not allowed for the variable name. Based on the PLC type, types of variables available to write continuously are described in [Table 10.3.2].

Notes

(1) Refer to applicable technical materials for respective device areas setting of XGT series.

(3) Response format (in case of PLC ACK response)

- Write Response of Continuous Variable (PLC →MMI)

Item	Size(byte)	Description
Instruction	2	h0059 : Write Response
Data type	2	h0014 : Block Type
Reserved area	2	h0000 : Don't Care.
Error status	2	Normal if it is 0, abnormal if not 0.
Number of blocks	2	If Error State abnormal, the lower Byte is error code.
Error code		h0001: If Error State normal.

Format name	Header	Instruction	Data type	Reserved area	Error status	Number of blocks
Code (Ex.)	...	h0059	h0014	h0000	h0000	h0001

1) Data type

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

2) Number of data

It means the number of bytes (Hexadecimal).

(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 (Ex.)	h0059	h0014	h0000	hFFFF	h21

1) Error code

Error code is attached the type of error in 1 byte of Hexadecimal code.

Refer to 'Error Codes Table' for more details.

8.2.5 Status Read Request (MMI -> PLC)

(1) Introduction

This service allows the user to use information and status of PLC through communication.

(2) Computer Request format

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 (ACK Response from PLC)

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	Normal if it is 0, abnormal if not 0.
Reserved area	2	h0000 : Don't Care
Data size	2	h0018
data	24	Status Data

(4) Data structure of XGT status

Item	Size (byte)	Byte position	Description
Slot Info	4	0	Slot information Bit00~Bit03: Local's slot information remotely connected with other station. Bit04~Bit07: Local's base information remotely connected with other station. Bit08~Bit11: Other station's slot information remotely connected. Bit12~Bit15: Other station's base information remotely connected. Bit16~Bit19: Slot information this module is installed on. Bit20~Bit23: Base information this module is installed on. Bit24~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 (serious) : Flag
_CNF_WAR	4	16	System warning : Flag
_VER_NUM	2	20	OS version No. : Flag
Reserved	2	22	Reserved area

* Refer to Description of flags below for more details on respective items.

(5) Description of flags

1) _CPU_TYPE

15Bit : XGK(1)/XGI(0), 15-Bit : Single, Redundancy master(0)/ Redundancy slave(1)

Single : h8000~hffff

hA001 : XGK-CPUH

hA002 : XGK-CPUS

2) _VER_NUM

hXYYY : xx.yy

3) _SYS_STATE

It displays operation mode and operation status information of the system (DWORD, F00~F01)

Variable	Type	Device	Function	Description
_RUN	Bit	F00000	RUN	CPU module's operation status in RUN.
_STOP	Bit	F00001	STOP	CPU module's operation status in STOP.
_ERROR	Bit	F00002	ERROR	CPU module's operation status in ERROR.
_DEBUG	Bit	F00003	DEBUG	CPU module's operation status in DEBUG.
_LOCAL_CON	Bit	F00004	Local control	Operation mode changeable only by mode key
_MODBUS_CON	Bit	F00005	Modbus mode On	During Modbus slave service.
_REMOTE_CON	Bit	F00006	Remote mode On	During Run in remote mode.
-	Bit	F00007	-	-
_RUN_EDIT_ST	Bit	F00008	Modification in progress during Run (program being downloaded)	Modified program standing by while modified during Run.
_RUN_EDIT_CHK	Bit	F00009	Modification in progress during Run (internally processed)	Modification during Run being processed Internally.
_RUN_EDIT_DONE	Bit	F0000A	Modification complete during run	Modification normally complete during run.
_RUN_EDIT_END	Bit	F0000B	Internal flag known when modification complete during run	Modification normally complete during run.
_CMOD_KEY	Bit	F0000C	Operation mode change cause	Operation mode changed by key.
_CMOD_LPADT	Bit	F0000D	Operation mode change cause	Operation mode changed by local PADT.
_CMOD_RPADT	Bit	F0000E	Operation mode change cause	Operation mode changed by remote PADT.
_CMOD_RLINK	Bit	F0000F	Operation mode change cause	Operation mode changed by remote communication module.
_FORCE_IN	Bit	F00010	Compulsory input	Compulsory On/Off being executed for input contact.
_FORCE_OUT	Bit	F00011	Compulsory output	Compulsory On/Off being executed for output contact.

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Variable	Type	Device	Function	Description
_SKIP_ON	Bit	F00012	I/O skip being executed	Specified I/O module existent to stop error check and data refresh.
_EMASK_ON	Bit	F00013	Error mask being executed	Specified I/O module existent to speedily carry out the operation even if a defect occurred.
_MON_ON	Bit	F00014	Being monitored	External monitor in progress for programs and Variables.
_USTOP_ON	Bit	F00015	Stop by stop function	Stopped by stop function after scan closed during RUN mode operation.
_ESTOP_ON	Bit	F00016	Stop by ESTOP function	Immediately stopped by ESTOP function during RUN mode operation.
_CONPILE_MODE	Bit	F00017	Compiling	Compile being performed.
_INIT_RUN	Bit	F00018	Initializing	Initialization task being performed.
-	Bit	F00019	-	-
-	Bit	F0001A	-	-
-	Bit	F0001B	-	-
_PB1	Bit	F0001C	Program code 1	No.1 program code being executed.
_PB2	Bit	F0001D	Program code 2	No.2 program code being executed.
_CB1	Bit	F0001E	Compile code 1	No.1 compile code being executed.
_CB2	Bit	F0001F	Compile code 2	No.2 compile code being executed.

4) _CNF_ER

It displays the error flags related with the operation stop errors.

Variable	Type	Device	Function	Description
_CPU_ER	Bit	F00020	CPU configuration Error	Normal operation unavailable due to CPU module' error found by self-diagnosis.
_IO_TYER	Bit	F00021	Module type discordant Error	Different configuration between each slot's I/O configuration parameters and actually installed module.
_IO_DEER	Bit	F00022	Module installation error	If each slot's module configuration changes during Run, it will be detected and displayed.
_FUSE_ER	Bit	F00023	Fuse blown error	If fuse is blown on the module among each slot's modules, it will be detected and displayed.
_IO_RWER	Bit	F00024	I/O module Read/Write error	Displayed if normal Read/write of I/O module among each slot's modules is not available.
_IP_IFER	Bit	F00025	Special/communication module interface error	Displayed if normal interface is unavailable due to abnormal special or communication module among each slot's modules.
_ANNUM_ER	Bit	F00026	Serious error detected in external equipment	Displayed if serious error detected in external device by user program and recorded on ANC_ERR[n].

Variable	Type	Device	function	Description
-	Bit	F00027	-	-
_BPRM_ER	Bit	F00028	Basic parameters error	Displayed if basic parameters abnormal.
_IOPRM_ER	Bit	F00029	IO configuration parameters error	Displayed if I/O configuration parameters abnormal.
_SPPRM_ER	Bit	F0002A	Special module parameters error	Displayed if special module parameter abnormal.
_CPPRM_ER	Bit	F0002B	Communication module parameters error	Displayed if communication module parameter abnormal.
_PGM_ER	Bit	F0002C	Program error	Displayed if user program abnormal.
_CODE_ER	Bit	F0002D	Program code error	Displayed if an indecipherable instruction is met while uses program executed.
_SWDT_ER	Bit	F0002E	System watch-dog error	Displayed if System watch-dog exceeded.
_BASE_POWER_ER	Bit	F0002F	Power error	Displayed if base power abnormal.
_WDT_ER	Bit	F00030	Scan watch-dog	Displayed if program scan time exceeds scan watch-dog time specified with parameters.
-	-	F00031 F0003F	-	-

5) _CNF_WAR

It displays all the warning flags related with continuation of the operation (DWORD, F004~F005)

Variable	Type	Device	Function	Description
_RTC_ER	Bit	F00040	RTC data error	Displayed if RTC data abnormal.
_DBCK_ER	Bit	F00041	Data back-up error	Displays that normal (hot or) warm restart program unavailable due to damaged data memory, thus cold-restart executed, which will be available in initialization program. If the initialization program complete, it will be reset automatically.
_HBCK_ER	Bit	F00042	Hot restart unavailable	-
_ABSD_ER	Bit	F00043	Abnormal operation stopped	Displays that continuous operation not allowed with the synchronized data kept in scan unit when program stopped in the middle due to power-cut while program executed and then powered back, which is available in initialization program. If the initialization program complete, it will be reset automatically.

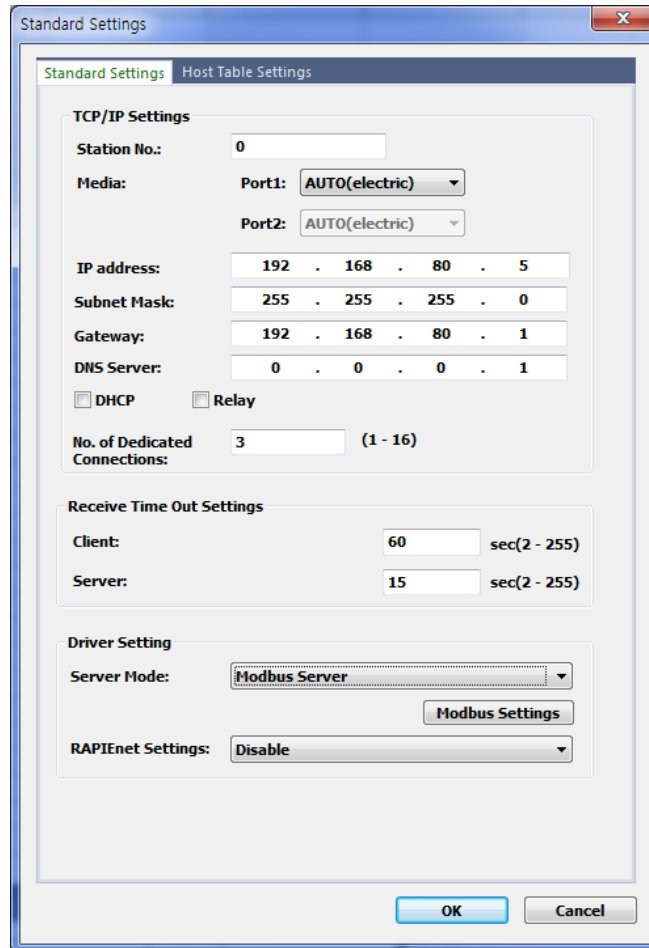
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Variable	Type	Device	Function	Description
_TASK_ER	Bit	F00044	Task impact	Displayed if identical tasks requested as duplicated when user program executed.
_BAT_ER	Bit	F00045	Battery error	Displayed if battery voltage for back-up of user program and data memory is less than specified.
_ANNUM_ER	Bit	F00046	Slight error detected in external equipment.	Displayed if slight error detected in external equipment by user program and recorded on ANC_WB[n].
_LOG_FULL	Bit	F00047	Log memory full warning	Displays PLC's log memory full.
_HS_WAR1	Bit	F00048	HS parameter 1 error	Representative flag used to display HS link unavailable by checking parameters of HS link if enabled, which shall be reset if HS link disenabled.
_HS_WAR2	Bit	F00049	HS parameter 2 error	
_HS_WAR3	Bit	F0004A	HS parameter 3 error	
_HS_WAR4	Bit	F0004B	HS parameter 4 error	
_HS_WAR5	Bit	F0004C	HS parameter 5 error	
_HS_WAR6	Bit	F0004D	HS parameter 6 error	
_HS_WAR7	Bit	F0004E	HS parameter 7 error	
_HS_WAR8	Bit	F0004F	HS parameter 8 error	
_HS_WAR9	Bit	F00050	HS parameter 9 error	
_HS_WAR10	Bit	F00051	HS parameter 10 error	
_HS_WAR11	Bit	F00052	HS parameter 11 error	
_HS_WAR12	Bit	F00053	HS parameter 12 error	
_P2P_WAR1	Bit	F00054	P2P parameter 1 error	Representative flag used to display P2P unavailable by checking parameters of each P2P if enabled, which shall be reset if P2P disenabled.
_P2P_WAR2	Bit	F00055	P2P parameter 2 error	
_P2P_WAR3	Bit	F00056	P2P parameter 3 error	
_P2P_WAR4	Bit	F00057	P2P parameter 4 error	
_P2P_WAR5	Bit	F00058	P2P parameter 5 error	
_P2P_WAR6	Bit	F00059	P2P parameter 6 error	
_P2P_WAR7	-	F0005A	P2P parameter 7 error	
_P2P_WAR8	-	F0005B	P2P parameter 8 error	
_Constant_ER	-	F0005C	Fixed cycle error	It will ON if the scan time is greater than 'Fixed Cycle' specified.
-	-	F0005D ~F0005F	-	-

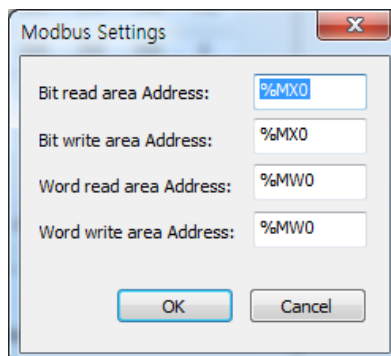
8.3 Modbus/TCP Dedicated Server

This is used when it operates as the master of other device or higher PC (MMI) Modbus.

8.3.1 Driver setting



[Fig. 8.3.1] Modbus TCP driver setting



[Fig. 8.3.2] Modbus TCP address

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Modbus function and the maximum number of response data that Modbus TCP driver supports are described in the table below. The correspondent master device shall make a request within the range specified in the table. For example, Bit Read Request is available up to 2000 bits, and Bit Write Request is up to 1600 bits.

Code	Description	Address	Response Size
01	Read Coil Status	hXXX	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	hXXX	1 Coil
06	Preset Single Register	4XXXX	1 Register
15	Force Multiple Coils	hXXX	1600 Coils
16	Preset Multiple Registers	4XXXX	100 Registers

[table 8.3.1] Modbus function code

Mapping of XG-T PLC memory is required for each function code's request.

Respective setting details are as follows;

Item	Description	Remarks
DI area address	XGT address applicable to digital input area	Bit address
DO area address	XGT address applicable to digital output area	Bit address
AI area address	XGT address applicable to analog input area	Word address
AO area address	XGT address applicable to digital output area	Word address

The address value specified in each item is the base address of the applicable area.

Fig 8.3.1 shows that DI area is assigned starting from PX0000 and that AO area is assigned starting from PW300.

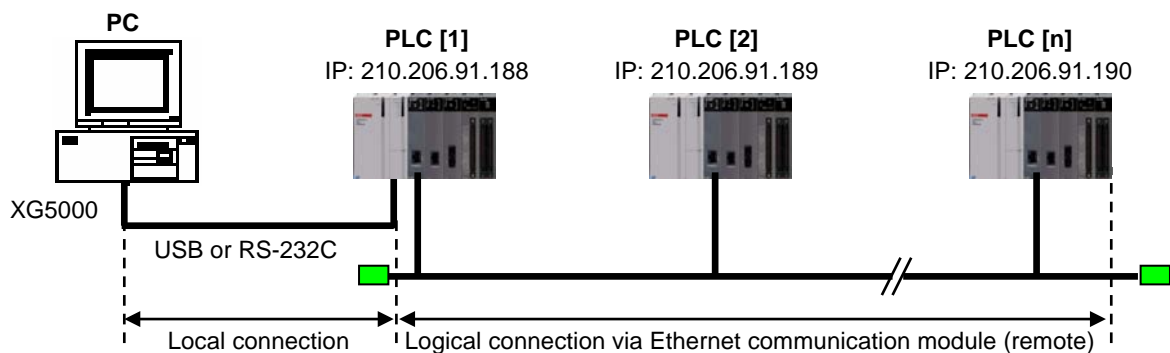
The input value of the base address shall be within the effective areas of %M, P, etc. Since Modbus address is 1 ~ 9999 (decimal), the size of the bit I/O area will be $9999/8 = 1249.875$ bytes. In addition, the size of the word I/O area will be $9999*2 = 19998$ bytes.

If the user sets the base address of the bit output (hXXX) area to 0, Modbus bit area 00001 will be correspondent to 0th byte, 0th bit, and 00002 to 0th byte, 1st bit.

Chapter 9 Remote Connection Service

9.1 Introduction

This function is used for programming, downloading of user program, program debugging, monitoring, etc in network system where PLCs are connected with each other via Ethernet by remote control without moving the physical connection status of XG5000. It is especially convenient for easy access to each device from a place without repositioning when network-connected devices are separated far. XG5000 remote connection service is available under the following Logical Path to attain its purpose.



[Fig. 9.1.1] Ethernet network

A network is supposed where RS-232C cable is connected between PC in which XG5000 is installed and PLC #1 station, and PLC #1, PLC #2 and PLC #n are connected with each other via Ethernet in XG5000 of [Fig.9.1.1]. To access the contents of PLC #1 station in the figure above, Local connection is needed in XG5000's on-line menu. After finishing accessing the contents of PLC #1, disconnect the Local connection with 'Disconnect' menu. To access the PLC #n station, select PLC #n by setting the IP address of PLC #n and Base and Slot No. where FEnet module is installed in the PLC #1 station in the remote connection dialog box and connect. Then logical connection between XG5000 and PLC #n will be established via RS-232C and Ethernet. This status is identical to the status that RS-232C cable is connected between PC and PLC #n station and it is available to execute all functions of programming, downloading, debugging and monitoring as in PLC #1.

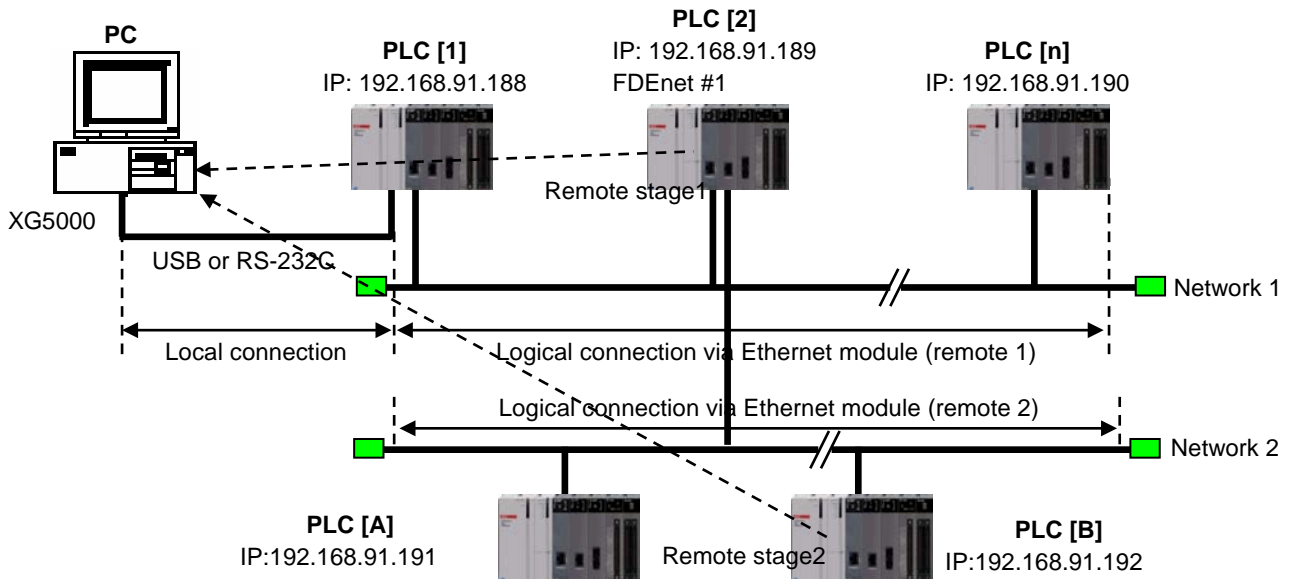
Also, if Ethernet module (LAN Card) is installed on PC where XG5000 is installed and connected to the identical network to PLC, remote stage 1 connection with PLC is available via Ethernet without local connection via RS-232C.

With the remote connection service of XG5000, easy access to PLC is possible even if the PLC is located at a far place. And re-programming without repositioning the PLC is possible when PLC is located at a place hard to reach.

9.2 Setting and Connection

All PLCs connected via XGT network are available to connect with each other by remote connection service. XG5000 remote connection is composed of stage 1 and stage 2 connections as described below.

The followings explains remote 1 and remote 2 connections.



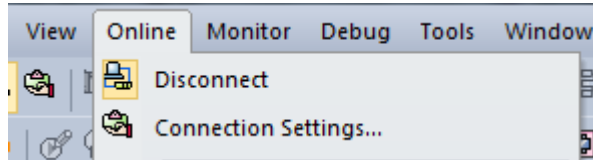
[Fig. 9.2.1] Remote connection

[Fig. 9.2.1] shows an example of network system composed of two networks.

9.2.1 Remote stage 1 connection (If RS-232C cable used)

For remote stage 1 connection, XG5000 shall be in off-line state.

Click [Online] -> [Connection settings]



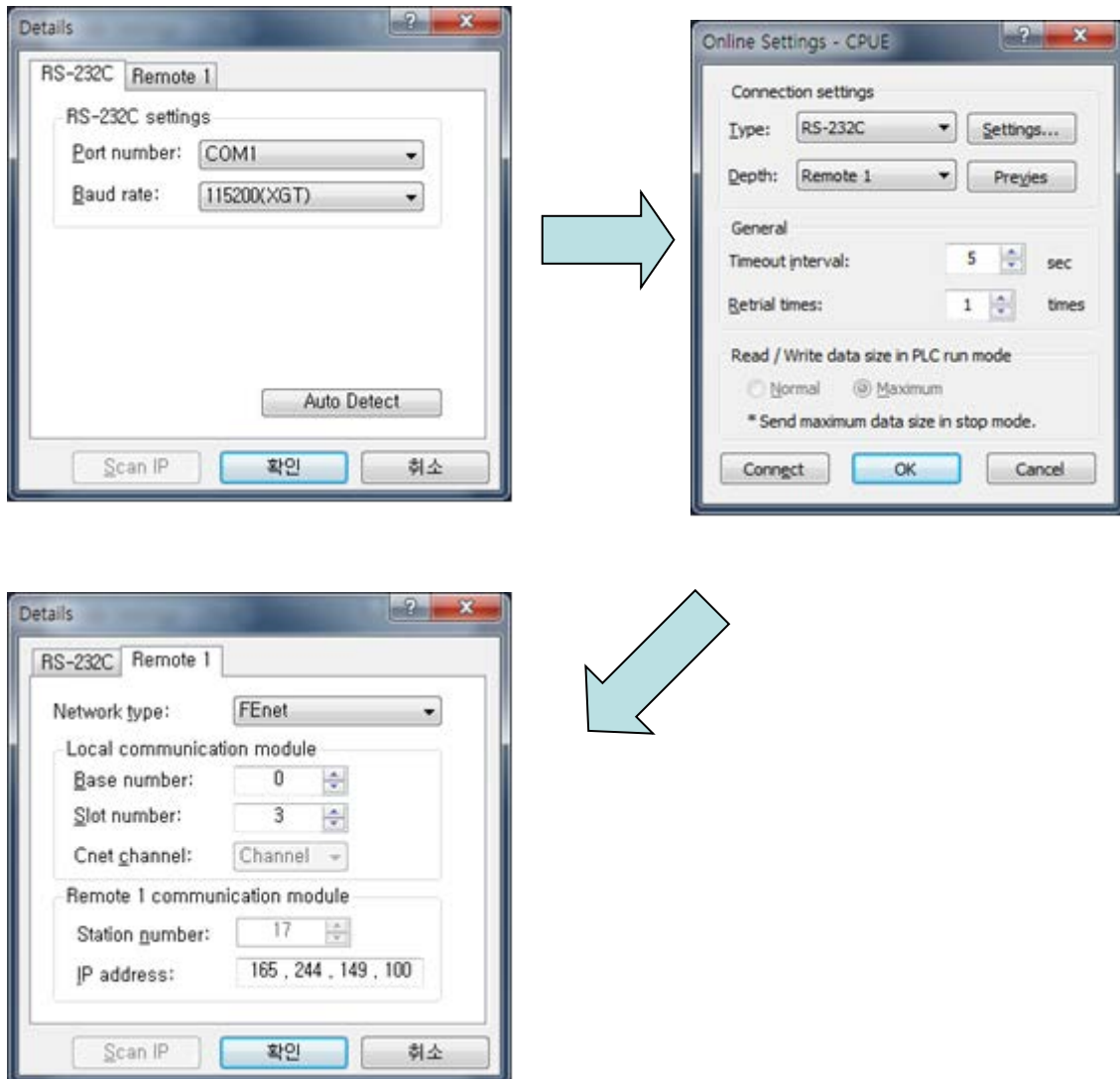
[Fig. 9.2.2] XG5000 remote connection option to select

(1) Connection type

It designates the connecting method for local connection. Local connection is applied with RS-232C used as in [Fig. 9.2.3]. Select the port used in PC for a communication port. The case that Ethernet is used for local connection will be described in the next section. Refer to user's manual of each communication module for the case with other connection types.

(2) Connection depth

Decide a PLC Connection stage of local, remote stage 1 or 2. Select remote stage 1 here.



[Fig. 9.2.3] XG5000 remote stage 1 connection

(3) Network type

Select a network type for stage 1 connection among Rnet, Fdnet, Cnet, FEnet and FDEnet. XGL-FEnet is to be selected because stage 1 connection is applied through FEnet in [Fig. 9.2.3].

(4) Base No.

Specify the base No. where FEnet I/F module of PLC #1 for remote connection is installed.

(5) IP address

Specify the IP address of FENet I/F module installed in the PLC which will be connected with XG5000 in the network 1. Use the IP address of FENet module installed in PLC #2 station, 192.168.91.189 in [Fig. 9.2.3].

(6) Slot

It indicates the slot number where FENet module is installed in locally connected PLC via RS-232C. Select No.0 in [Fig. 9.2.3] since FENet installed on PLC #1 is on slot No.0.

Now click [OK] and then select [Connect] on the Online menu.

Since stage 1 connection-completed status is the logical connection status identical to the local connection with RS-232C cable is connected to the PLC, where all of the on-line menus are available. (Except that CPU type between PLC and presently open project is disagreeable)

Notes

1) Precautions for remote connection

Prepare a program suitable for the correspondent CPU type to connect with remotely. If the CPU type is disagreeable between the two, limited functions only will be allowed, where program uploading/downloading and monitoring are not available.

9.2.2 Remote stage 2 connection (RS-232C cable is used for local connection)

For remote stage 2 connection, XG5000 shall be in off-line state.

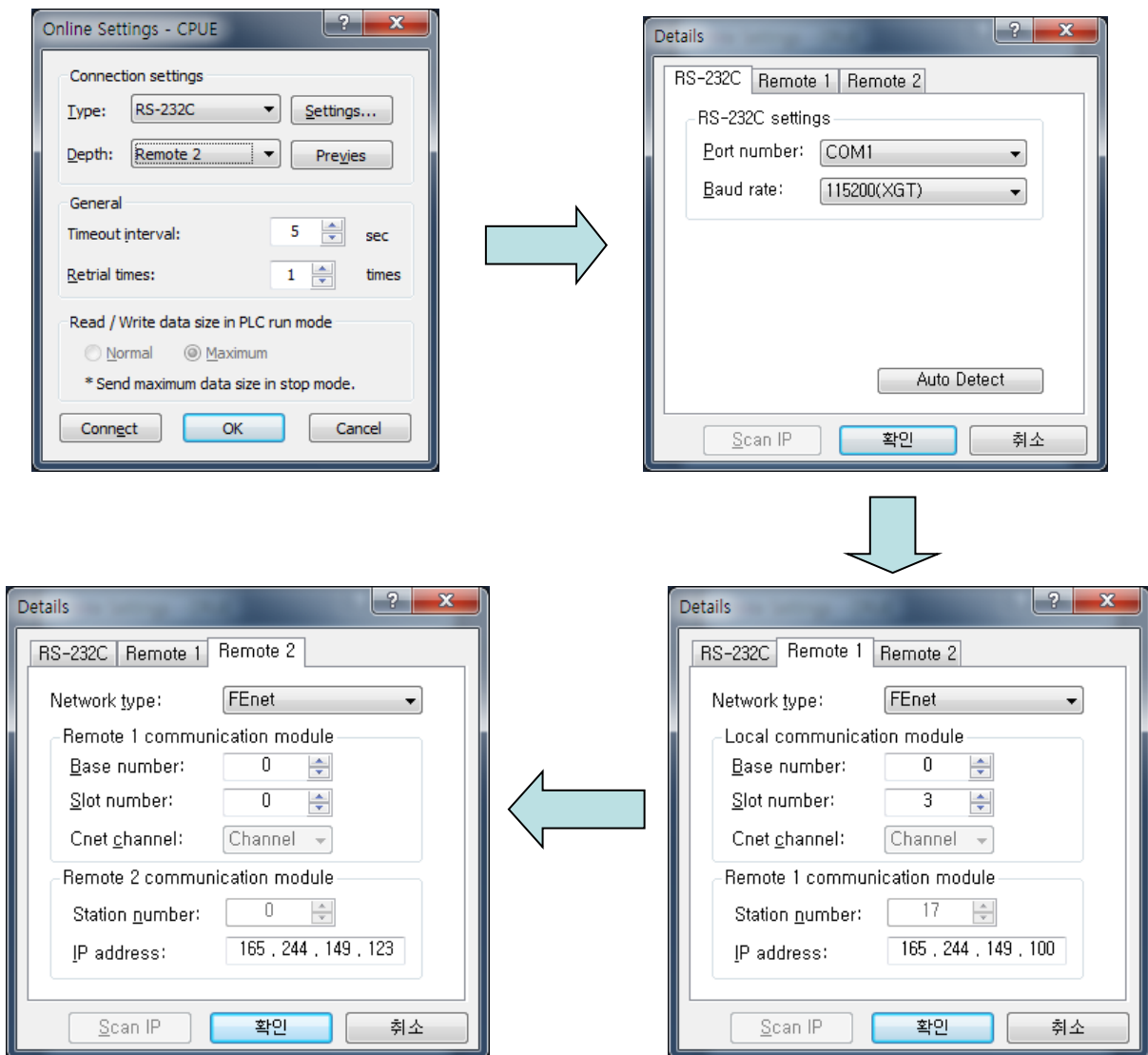
Click [Online] -> [Connection settings] like [fig.9.2.2]

(1) Connection type

Select Local connection. [Fig. 9.2.4] shows that select RS-232C for Type and Remote 2 for Depth. The communication port choose using PC port. If use Ethernet, explain it in the next chapter. If use other communication module, Please refer to manual each communication modules.

(2) Connection depth

Select Remote 2



[Fig. 9.2.4] XG5000 remote stage 2 connection

Remote 2 only will be described below since the others are the same in the dialog box above.

(1) Setting of network type

Select a network type for remote stage 2 connection among XGT Rnet, Fdnet, Cnet, FEnet and FDEnet. Network types of stage 1 and stage 2 connections bear no relation to each other. XGL-FEnet is to be selected since stage 2 connection is with FEnet in [Fig. 9.2.4].

(2) IP address

Specify the IP address of FEnet I/F module installed in the PLC [B] which will be connected with XG5000 in the network 2. Use the IP address of FEnet module installed in PLC [B] station, 192.168.91.192 in [Fig. 9.2.4].

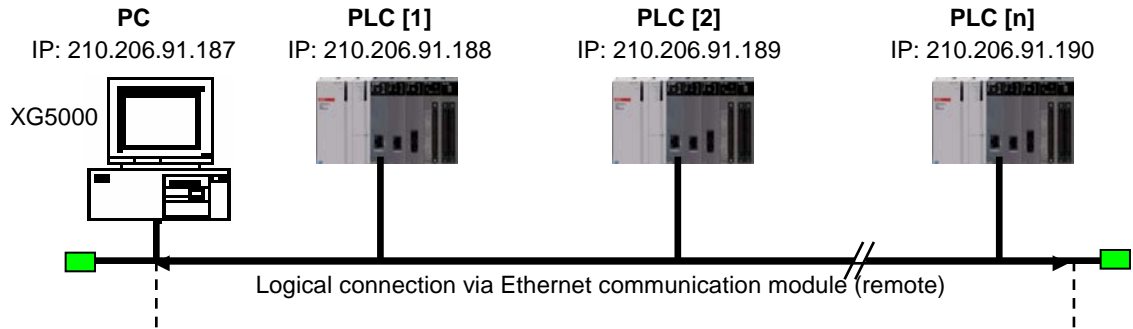
(3) Base and slot No.

Set the Base and Slot No. where FEnet module is installed in the PLC [2] which will be connected with stage 2 in the network 2.

Stage 2 connection-completed status as above is the logical connection status identical to the connection with RS-232C cable is connected to PLC [B], where all of the on-line menus are available.

9.2.3 Remote 1 connection directly from PC connected with Ethernet

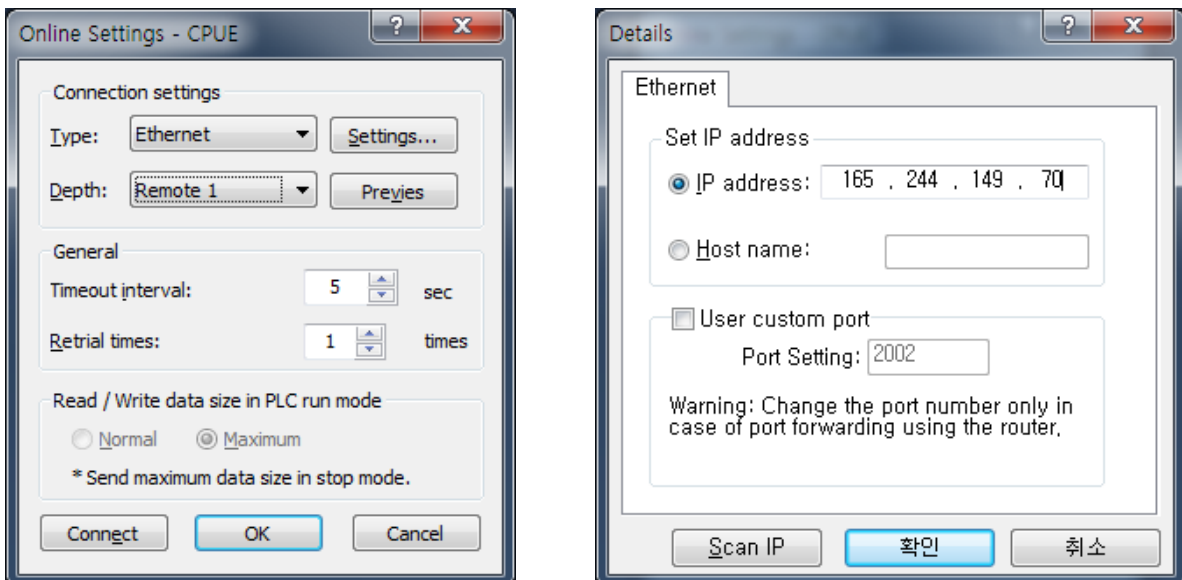
Remote stage 1 connection via Ethernet without connecting RS-232C is available if a PC where XG5000 is operating is included in PLC Ethernet network.



[Fig. 9.2.5] Remote stage 1 connection system through PC

[Fig. 9.2.5] shows the connection between PC and PLC via Ethernet, where connection to all PLCs on the network is available without RS-232C used in XG5000. In this case local connection is omissible and remote 1 connection is available with all PLCs.

Select 'Connection settings' on the Online menu and change the setting in the dialog box as specified below to establish remote stage 1 connection directly via Ethernet.



[Fig. 9.2.6] Remote 1 connection directly via Ethernet

(1) Connection type

Select an applicable type for connection. In the case of [Fig. 9.2.6], select Ethernet because the connection is established directly via Ethernet without application of RS-232C.

(2) Connection depth

Decide a PLC connection stage of remote stage 1 or 2. Select remote 1 here.

(3) IP address

Set the IP address of FEnet I/F module to connect to. Use IP address, 210.206.91.190 to connect to PLC [n] in [Fig. 9.2.6].

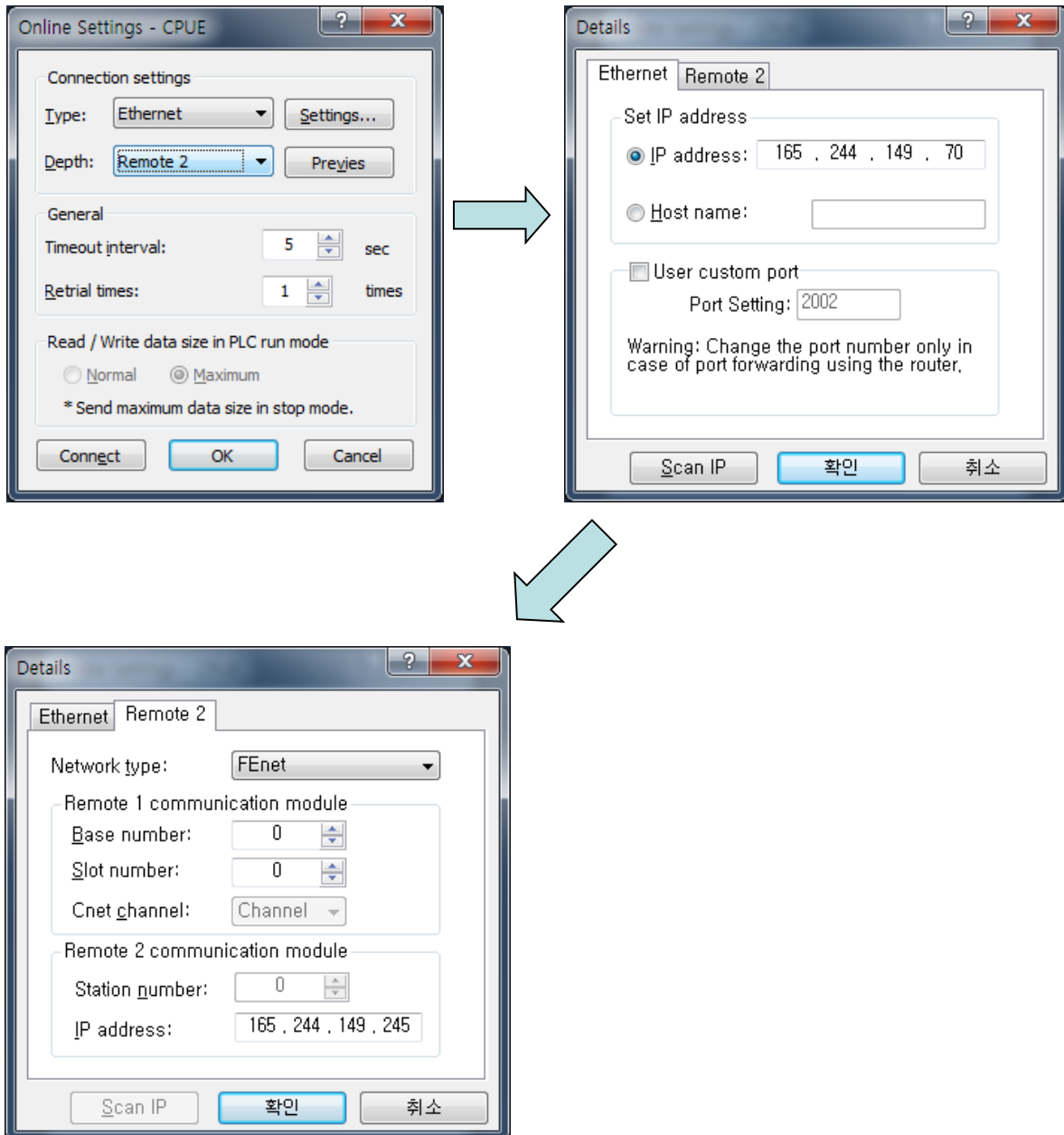
The rest procedures are the same as with RS-232C used. Now click [OK] and then select [Connect] on the Online menu.

It is accessible through Ethernet which the CPU module direct connection without Ethernet I/F module. CPU direct connection support high performance XGT-series.

(High performance XGT: Ethernet port internal CPU)

9.2.4 Remote 2 connection directly from PC connected with Ethernet

Remote stage 2 connection is available via Ethernet if a PC where XG5000 is operating is included in one PLC Ethernet network and one Ethernet is connected with other Ethernet network. The procedures are the same as in remote 1 connection and a setting example of 'Connection Setting' is as [Fig. 9.2.7].



[Fig. 9.2.7] Remote 2 connection directly via Ethernet