Right choice for ultimate yield

LSIS strives to maximize customers' profit in gratitude of choosing us for your partner.

Programmable Logic Controller

XGB CANopen I/F Module

XGT Series

User's Manual

XBL-CMEA

XBL-CSEA

Safety Instructions

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

http://www.lsis.biz

Before using the product …

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

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

- Instructions are divided into “Warning” and “Caution”, and the meaning of the terms is as follows.

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

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

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

  ⚠ Be careful! Danger may be expected.

  ⚠ Be careful! Electric shock may occur.

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

Safety Instructions for design process

⚠ Warning

- **Please install a protection circuit on the exterior of PLC so that the whole system may operate safely regardless of failures from external power or PLC.** Any abnormal output or operation from PLC may cause serious problems to safety in whole system.
  - Install protection units on the exterior of PLC like an interlock circuit that deals with opposite operations such as emergency stop, protection circuit, and forward/reverse rotation or install an interlock circuit that deals with high/low limit under its position controls.
  - If any system error (watch-dog timer error, module installation error, etc.) is detected during CPU operation in PLC, all output signals are designed to be turned off and stopped for safety. However, there are cases when output signals remain active due to device failures in Relay and TR which can't be detected. Thus, you are recommended to install an addition circuit to monitor the output status for those critical outputs which may cause significant problems.
- **Never overload more than rated current of output module nor allow to have a short circuit**. Over current for a long period time maycause a fire .
- **Never let the external power of the output circuit to be on earlier than PLC power**, which may cause accidents from abnormal output oroperation.
- **Please install interlock circuits in the sequence program for safe operations in the system when exchange data with PLC or modify operation modes using a computer or other external equipments** Read specific instructions thoroughly when conducting control operations with PLC.

Safety Instructions for design process

⚠ Caution

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

Safety Instructions on installation process

⚠ Caution

- **Use PLC only in the environment specified in PLC manual or general standard of data sheet.** If not, electric shock, fire, abnormal operation of the product may be caused.
- **Before install or remove the module, be sure PLC power is off.** If not, electric shock or damage on the product may be caused.
- **Be sure that every module is securely attached after adding a module or an extension connector.** If the product is installed loosely or incorrectly, abnormal operation, error or dropping may be caused. In addition, contact failures under poor cable installation will be causing malfunctions as well.
- **Be sure that screws get tighten securely under vibrating environments.** Fail to do so will put the product under direct vibrations which will cause electric shock, fire and abnormal operation.
- **Do not come in contact with conducting parts in each module**, which may cause electric shock, malfunctions or abnormal operation.

Safety Instructions for wiring process

⚠ Warning

- **Prior to wiring works, make sure that every power is turned off.** If not, electric shock or damage on the product may be caused.
- **After wiring process is done, make sure that terminal covers are installed properly before its use.** Fail to install the cover may cause electric shocks.

⚠ Caution

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

Safety Instructions for test-operation and maintenance

⚠ Warning

- **Don't touch the terminal when powered**. Electric shock or abnormal operation may occur.
- **Prior to cleaning or tightening the terminal screws, let all the external power off including PLC power.** If not, electric shock or abnormal operation may occur.
- **Don't let the battery recharged, disassembled, heated, short or soldered**. Heat, explosion or ignition may cause injuries or fire.

⚠ Caution

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

Safety Instructions for waste disposal

⚠ Caution

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

Revision History

Version	Date	Contents	Revised position
V 1.0	’12.4	First edition	-
V1.1	’12.11	Name of XGB CANopen configuration tool changed (XG-NET→XG-CANopen)	All
V1.2	’15.2	XG5000 V4.0 UI Updated	Entire

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

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 User'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
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
XG5000 User's Manual	It describes how to use XG5000 software especially about online functions such as programming, printing, monitoring and debugging by using XGB(IEC)	10130000834
XGK/XGB Series Instruction	It describes how to use the instructions for programming using XGK/XGB series.	10310000510
XGI/XGR/XEC Series Instruction	It describes how to use the instructions for programming using XGB(IEC) series.	10130000833
XGB Hardware User's Manual	It describes how to use the specification of power/input /output/expansion modules, system configuration and built-in High-speed counter for XGB basic unit.	10310000926
XGB Hardware User's Manual (IEC)	It describes how to use the specification of power/input /output/expansion modules, system configuration and built-in High-speed counter for XGB basic unit.	10130001059
XGB Analog User's Manual	It describes how to use the specification of analog input/analog output/temperature input module, system configuration and built-in PID control for XGB basic unit.	10310000920
XGB Position User's Manual	It describes how to use built-in positioning function for XGB unit.	10310000927

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Chapter 7 Master Setting using XG-CANopen

Chapter 8 Slave Setting using XG-CANopen

Chapter 1 Overview

1.1 Introduction

This user manual describes the CANopen I/F module (hereinafter, CANopen module) of XGB PLC system network. The CANopen network is an open-type network used for industrial control devices. It is driven by CiA (CAN in Automation) and supported by more than 400 companies across the world. On the CAN (Controller Area Network) standard, the application protocol CANopen is built in, and is defined as an international standard.

The transmission method is CSMA/BA (Carrier Sense Multiple Access/Bitwise Arbitration) and all the stations on the network can send messages whenever the network is in 'free' state. If multiple stations desire to send messages, the station having the highest priority has the right to send its message.

In the programming work, please refer to following documents in addition:

- XG5000 User's Manual
- XGK Instruction List
- XGR User's Manual

Following basic specifications apply to the construction of a XGB CANopen module system.

- XGT PLC XG5000 Programming Tool: V3.64 or newer
- XG-CANopen: V1.0 or newer
- XBC CPU

Type	Version	Type	Version
XBM-xxxxS	3.1 or above	XEC-xxxxSU	1.0 or above
XBC-xxxxSU	1.2 or above	XEC-xxxxH	1.4 or above
XBC-xxxxH	2.03 or above	XEC-xxxxU	1.0 or above
XBC-xxxxU	1.0 or above		

Note

1) International standard specification

CAN: ISO 11898

CANopen: CiA (CAN in Automation) DS 301

1.2 Features

The XGB CANopen I/F module has following features.

1) Satisfies CANopen (CiA's DS301) specification.
2) Up to 2 sets can be installed on one unit.
3) For XBL-CMEA, up to 32 slaves can be connected.
4) 10K/20K/50K/125K/250K/500K/800K/1Mbps speeds are provided.
5) For XBL-CMEA, various diagnosis functions and module and network status information is provided.

   ▶ Provide the communication statuses of the master and slave are provided via device diagnosis function.
   ▶ The Auto Scan function which provides the information of the modules including from other suppliers connected on the network
   ▶ Display latest 5 error histories
6) For XBL-CSEA, up to 10 latest error histories can be stored

1.2.1 CANopen protocol

1) Overview
   (1) On the CAN (Controller Area Network) standard, the application protocol CANopen is built in
   (2) Designed for mobility-oriented industrial control systems
   (3) International standard specification
      ▶ CAN: ISO 11898
      ▶ CANopen: EN 50325-4 (CiA DS 301)

   The CiA 301 specification describes about the overall features of the CANopen including CANopen protocol and Object Dictionary.

2) Message classification and communication entities
   (1) Communication service model
      If classified by communicating entities, Producer-Consumer and Server-Client models are used.

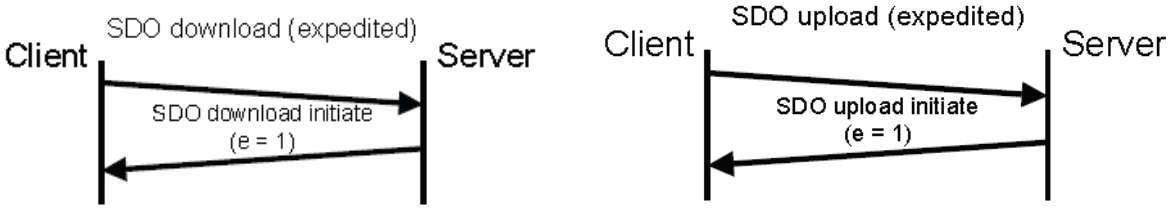
   (2) Message types
      CANopen sends data in two methods of PDO and SDO.
      a) PDO (Process Data Object)
         The PDO communication is an unconfirmed type communication in Producer/Consumer configuration. Therefore, it is used for the process data transmission which requires high speed communication. Communication method and data are determined by PDO communication parameter and mapping parameter. According to the PDO communication parameter setting, various types of transmission can be performed, such as sync, timer, COS (change of state). The mapping parameter connects PDO and a certain area of the internal Object Dictionary, so that the received data are stored in the mapped area and transmit the data in the mapped area. The transmission and reception data in the mapping area are controlled by high-level application.

▶ Data transmission types

Transmission Type	Type No.	Description
Synchronous acyclic	0	Synchronous, acyclic, periodic transmission only when the data is changed
Synchronous cyclic	1-240	Synchronous, transmission periodically when the SYNC of the transmission type value is received
Reserved	241~251	Reserved
Synchronous RTR-only	252	Only when RTR is received (RTR-only), synchronous
Asynchronous RTR-only	253	Only when RTR is received (RTR-only), event driven
event-driven, manufacturer specific	254	Event-driven, Manufacturer specific
event-driven, profile specific	255	Event-driven, device profile and application profile are unique

b) SDO (Service Data Object)

The SDO communication is a confirmed type communication in Client/Server configuration. SDO communication is used to access the entries of the Object Dictionary of the CANopen devices, by which the device parameters can be set up, stored, and monitored. SDO communication is not conducted periodically, but whenever necessary.



[Example of SDO transmission using Server-Client configuration]

1.3 Production Configuration

1.3.1 Type Indication

The product configuration of the XGB CANopen I/F module is described hereinbelow.

Type name	Description	Remarks
XBL-CMEA	CANopen Master I/F Module	-
XBL-CSEA	CANopen Slave I/F Module	-

1.4 Software for using products

This section describes the major programming tools and other software for using the CANopen module. For further details of the programming and communication application, refer to the following descriptions.

1.4.1 Software check-up

Type name	Component Product	Communication Set-up tool
XBL-CMEA	Communication module for XGB	XG-CANopen
XBL-CSEA	Communication module for XGB	XG5000

Note

1) The above software can be downloaded from our Website. If necessary, please visit your nearest distributor to obtain respective installation manual in CD-ROM.

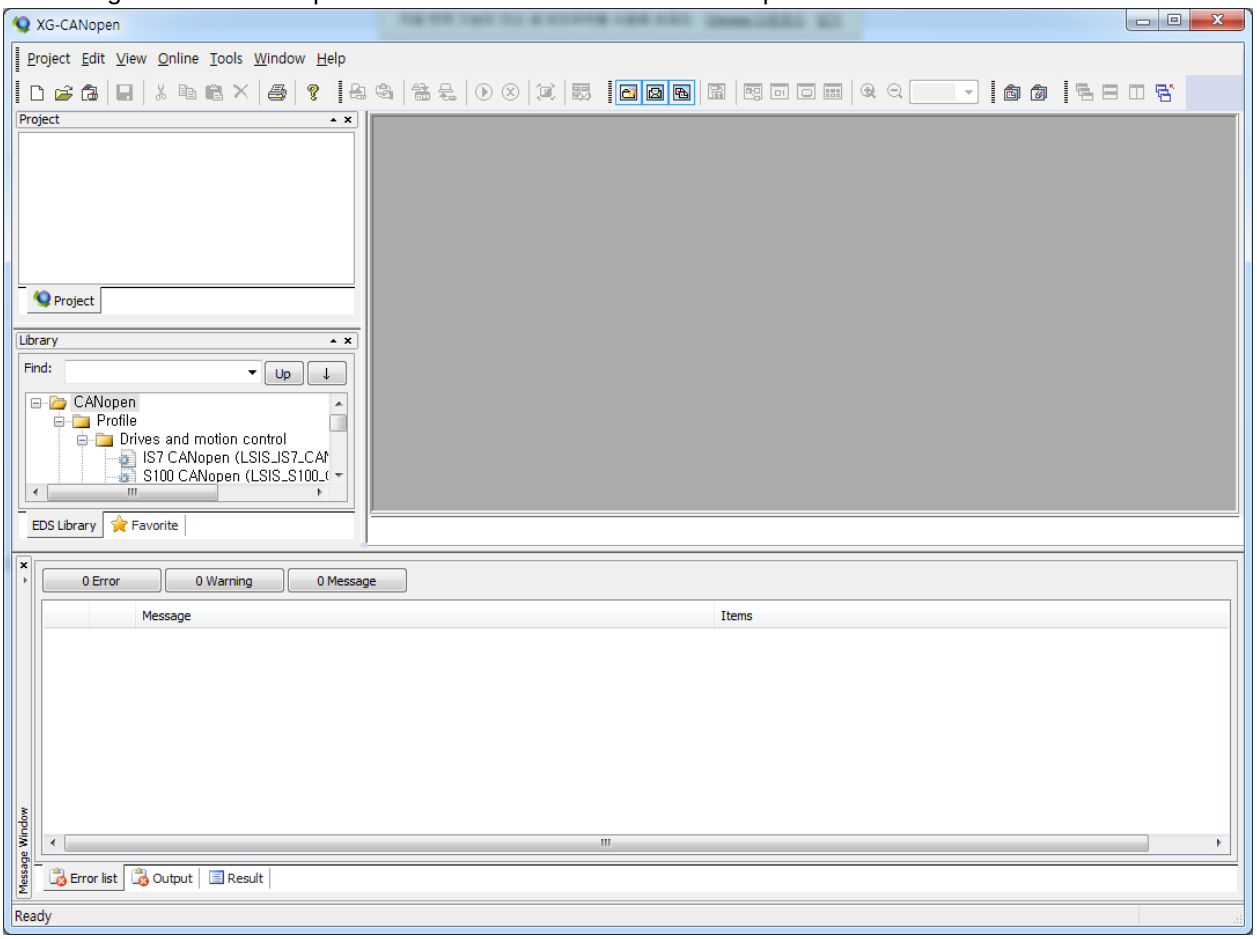
   Internet Website: http://www.lsis.biz

2) XG5000 and XG-CANopen can be programmed via the RS-232C port and USB of the CPU module. Refer to the XGT catalog for the connecting cable specification. (USB-301A, K1C-050A)

1.4.2 XG-CANopen

The XG-CANopen is dedicated software to the CANopen Master communication module with the functions for the operation of the CANopen master module including the basic parameter set up, frame preparation, module and network diagnostics.

The figure below is a snap shot of the initial screen of the XG-CANopen

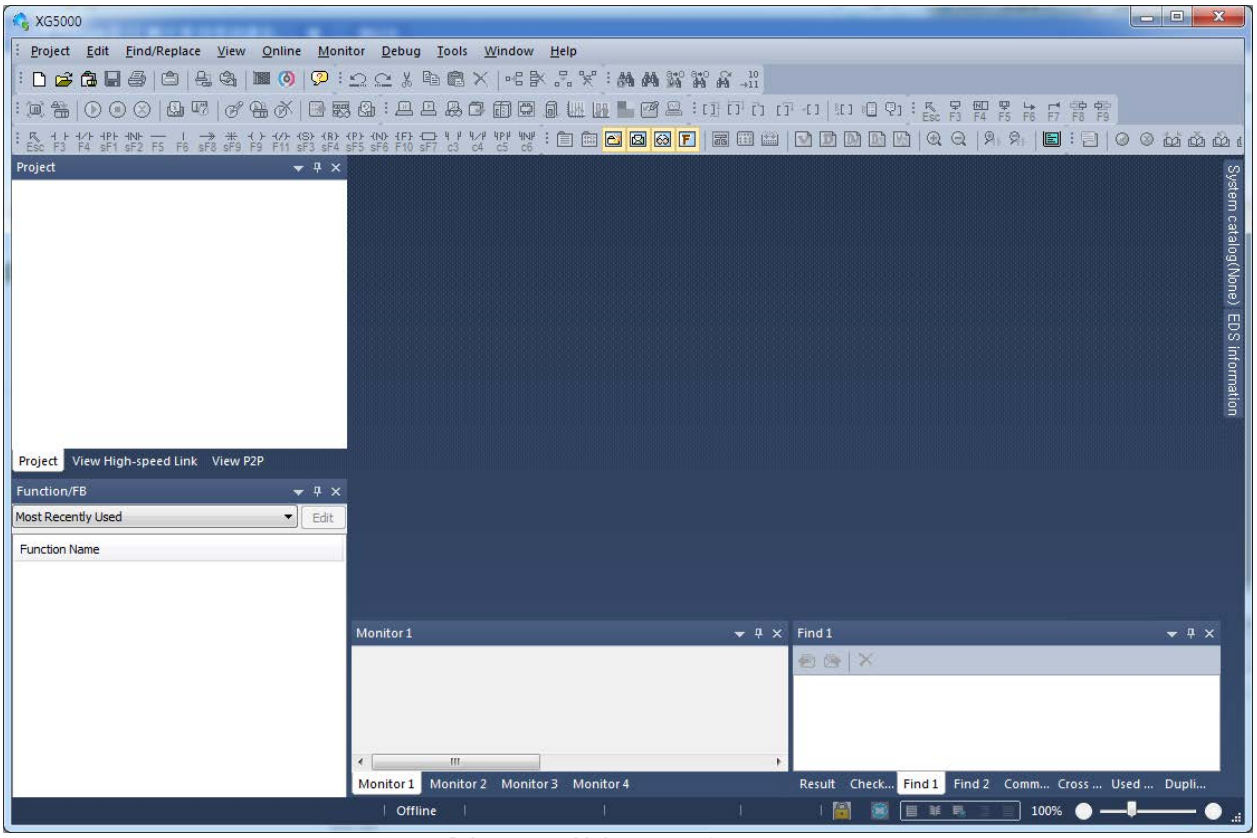


[Fig. 1.4.1 Initial screen of the XG-CANopen

1.4.3 XG5000

The XG5000 is dedicated software to the communication module with the functions for the operation of all the communication modules including the CANopen slave module providing the basic parameter set up, frame preparation, module and network diagnostics.

The figure below is a snap shot of the initial screen of the XG5000.



[Fig 1.4.2 Initial screen of XG5000

1.4.4 Version check

Before using the XGB CANopen I/F module, please check the version of the module.

1) Check up via XG5000

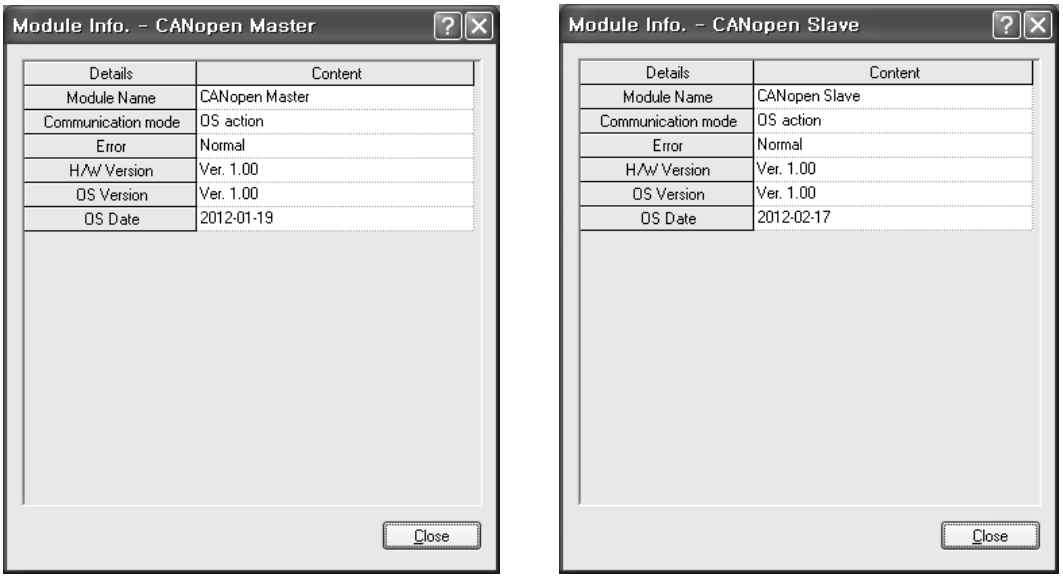
If normally interfaced with the CPU, following information can be obtained.

(1) Run XG5000.

(2) Connect to the CPU via online access.

(3) Select “I/O information” from the online menu.

Double click or select the respective communication module, and click the “Details” button.



[Fig. 1.4.3] Checking Module Version with XG5000

2) Checking the version with product case label

The label on the outer package case of each communication module contains module information.

If the version cannot be checked up via online, because no external access devices such as a PC is available, you can check the version by disconnecting the module.

The information label is attached on the backside of the product, printed with type and version information.

Chapter 2 Specification

2.1 General Specification

The general specification of XGT series is as follows

<table>
<tr><th>No.</th><th>Items</th><th colspan="6">Specifications</th><th>Related standards</th></tr>
<tr><td>1</td><td>Ambient 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>Ambient humidity</td><td colspan="6">5 ~ 95%RH (Non-condensing)</td><td></td></tr>
<tr><td>4</td><td>Storage humidity</td><td colspan="6">5 ~ 95%RH (Non-condensing)</td><td></td></tr>
<tr><td rowspan="8">5</td><td rowspan="8">Vibration resistance</td><td colspan="5">Occasional vibration</td><td>-</td><td></td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td colspan="2">Amplitude</td><td>How many times</td><td rowspan="8">IEC61131-2</td></tr>
<tr><td>5 ≤ f < 8.4Hz</td><td colspan="2">–</td><td colspan="2">3.5mm</td><td rowspan="5">10 times each directions (X, Y and Z)</td></tr>
<tr><td>8.4 ≤ f ≤ 150Hz</td><td colspan="2">9.8m/s^2(1G)</td><td colspan="2">–</td></tr>
<tr><td colspan="6">Continuous vibration</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td colspan="2">Amplitude</td></tr>
<tr><td>5 ≤ f < 8.4Hz</td><td colspan="2">–</td><td colspan="2">1.75mm</td></tr>
<tr><td>8.4 ≤ f ≤ 150Hz</td><td colspan="2">4.9m/s^2(0.5G)</td><td colspan="2">–</td></tr>
<tr><td>6</td><td>Shock resistance</td><td colspan="6">• Peak acceleration: 147 m/s^2(15G)
• Duration: 11ms
• Half-sine, 3 times each direction per each axis</td><td>IEC61131-2</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Noise resistance</td><td>Square wave Impulse noise</td><td colspan="5">AC: ±1,500 V
DC: ±900V</td><td>LSIS standard</td></tr>
<tr><td>Electrostatic discharge</td><td colspan="5">4kV (Contact discharge)</td><td>IEC61131-2
IEC61000-1-2</td></tr>
<tr><td>Radiated electromagnetic field noise</td><td colspan="5">80 ~ 1,000 MHz, 10V/m</td><td>IEC61131-2,
IEC61000-1-3</td></tr>
<tr><td rowspan="2">Fast transient/bust noise</td><td>Segment</td><td colspan="2">Power supply module</td><td colspan="2">Digital/analog input/output communication interface</td><td rowspan="2">IEC61131-2
IEC61000-1-4</td></tr>
<tr><td>Voltage</td><td colspan="2">2kV</td><td colspan="2">1kV</td></tr>
<tr><td>8</td><td>Environment</td><td colspan="6">Free from corrosive gasses and excessive dust</td><td></td></tr>
<tr><td>9</td><td>Altitude</td><td colspan="6">Up to 2,000 ms</td><td></td></tr>
<tr><td>10</td><td>Pollution degree</td><td colspan="6">Less than equal to 2</td><td></td></tr>
<tr><td>11</td><td>Cooling</td><td colspan="6">Air-cooling</td><td></td></tr>
</table>

Note

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

2) Pollution degree:
An index indicating pollution degree of the operating environment which decides insulation performance of the devices. For instance, Pollution degree 2 indicates the state generally that only non-conductive pollution occurs. However, this state contains temporary

2.2 Performance Specification

The following table describes the specification of system configuration in accordance with CANOpen I/F module's media. When you configure systems, refer to the below table.

Item		Standard	
		XBL-CMEA	XBL-CSEA
Baud rates(kbps)		10, 20, 50, 100, 125, 250, 500, 800, 1000 kbps	
Number of communication Port		1	
The number of maximum Installments		2	
The number of maximum connection nodes		32	-
The number of supported PDOs	TPDO	Total 32	64
	RPDO		64
Maximum data length per a PDO		8Byte	
Transmission type of PDOs		synchronous acyclic (0), synchronous cyclic(1~240), RTR(252~253),time-event trigger(254~255)	
Supported SDO*note 1		Client 127 / Server 1	Server 1
Transmission type of SDOs		Expedited, Normal	
Communication Zone Excess Method		CSMA/BA(Carrier Sense Multiple Access/Bitwise Arbitration)	
Topology		BUS	
SYNC Service		Producer, cycle: 20~5000ms	Consumer
NMT Node Control		NMT Master	NMT Slave
NMT Error Control		Heartbeat, Life Guarding	Heartbeat
Network Scan		Supported	-
Dimension (mm)		90(H) X 27(W) X 60(D)	
Consumption Current (mA)		211	202
Weight (g)		78	78

Note

1) SDOs services

At the initialization, the object set up can be done in the XG-CANopen "SDO Set-up." After initialization, SDO services can be used during module operation in the two methods as set forth below.

a) Using XG-CANopen

- In the SDO set-up window, "Read All SDOs" or "Read Displayed SDO": to read the object value of the slave
- "Write SDO": to modify the object value of the slave

b) XG5000 Command

- GETCOM: to read the object value of the slave
- PUTCOMM: to modify the object value of the slave

2.2.1 CANOpen Service

For the supportability of the XGB CANopen module CANopen service, please refer to the table below..

CANopen Service		Supportability	
		XBL-CMEA	XBL-CSEA
Frame tructure	CAN 2.0A	O	O
	CAN 2.0B	O	O
PDO		O	O
SDO		O	O
SYNC		O	O
TIME STAMP		X	X
EMCY		O	O
NMT		O	O
ERROR CONTROL		O	O
LSS (Later Setting Service)		X	X
FLYING MASTER		X	X

2.3 Load Specification

The specification to transmit PDO without loss is defined with the following formula. Assuming that the communication setting variables are as follows;

1) Baud rate: B (baud rate)
2) Transmission period: T (ms)
3) Data size (S): if the mapping data size is 8 byte, 10 byte including overhead
4) Bits to transmit 1 byte: 10 bits including overhead

The number of PDOs which can be transmitted is as follows;

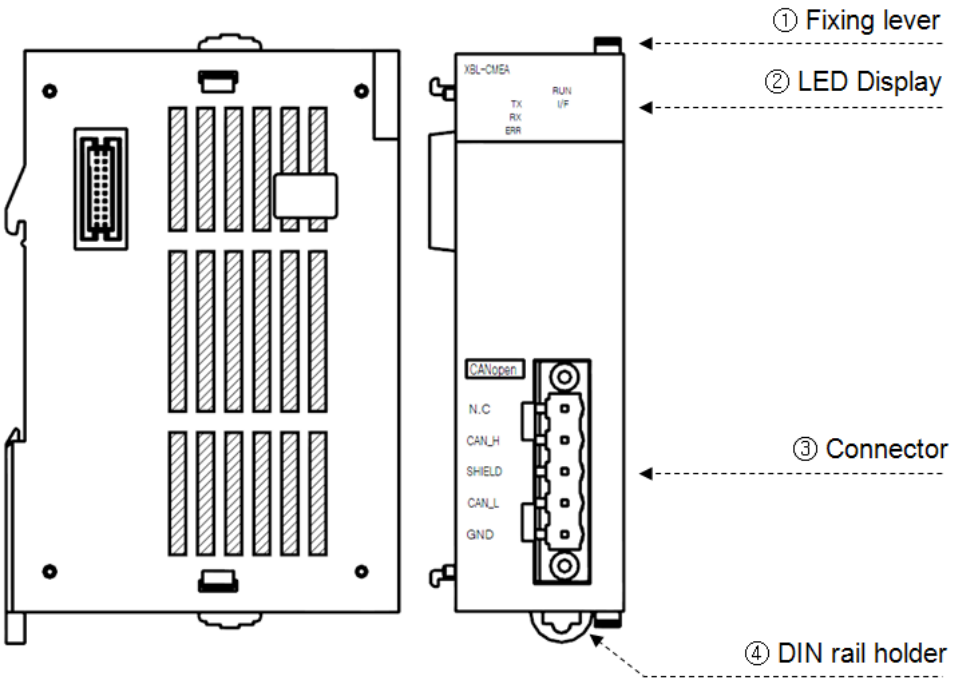
1) Number of transmitted bytes per s (N): B/10 bit
2) Number of PDOs that can be transmitted per s at the communication speed B (PB): N/10 byte
3) Number of PDOs that can be transmitted per s at the transmission period T (PT): 1000 (ms)/T (ms)
4) Number of PDOs that can be transmitted per s at the communication speed B, transmission period T (PBT): PB / PT

The exemplary number of PDOS that can be transmitted according to the values of T and B are as follows.

Transmission speed (B baud rate)	transmission period (T ms)	Transmitted bytes per second(N)	PB	PT	PBT
10,000	20	1,000	100	50	2
10,000	50	1,000	100	20	5
10,000	100	1,000	100	10	10
10,000	200	1,000	100	5	20
10,000	400	1,000	100	3	40
20,000	20	2,000	200	50	4
20,000	50	2,000	200	20	10
20,000	100	2,000	200	10	20
20,000	200	2,000	200	5	40
50,000	20	5,000	500	50	10
50,000	50	5,000	500	20	25
50,000	100	5,000	500	10	50
100,000	20	10,000	1,000	50	20
100,000	50	10,000	1,000	20	50
125,000	20	12,500	1,250	50	25
125,000	40	12,500	1,250	25	50
250,000	20	25,000	2,500	50	50
500,000	20	50,000	5,000	50	100
800,000	20	80,000	8,000	50	160
1,000,000	20	100,000	10,000	50	200

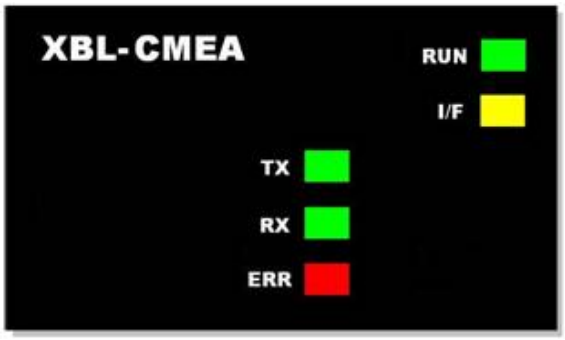
2.4 Component Names

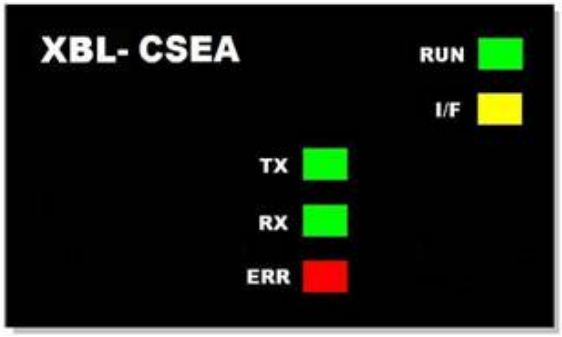
The names of the module components are as follows



Item		Description	Remark
1	Fixing lever	Extension module fixing part (the upper)	
2	LED Display	Display statuses of module and communication In the next page, descript each LED statuses	
3	Connector	CANopen Connector	
4	DIN rail holder	DIN rail fixing part	

2.4.1 LED Name and Description





1) Common Display

Item	Color	Operation	Description	Remark
RUN	Green	On	Operational state	Follow CiA303-3 standard
		Blinking (200ms On 200ms Off)	Preoperational state (Only XBL-CMEA)	
		Blinking (200ms On 1000ms Off)	Stopped	
		Off	Not set parameters or connect the cable	
I/F	Yellow	Blinking	Normal operation of a CPU and CANOpen module	In case of Abnormal state, Stop On or Off
		On or Off	Abnormal operation of a CPU and CANOpen module	
TX	Green	Blinking	Transmission state	Transmit data frame
		Off	-	
RX	Green	Blinking	Receiving state	Receive data frame
		Off	-	
ERR	Red	On or Blinking	Error occurrence	Follow CiA303-3 standard
		Off	Normal operation	

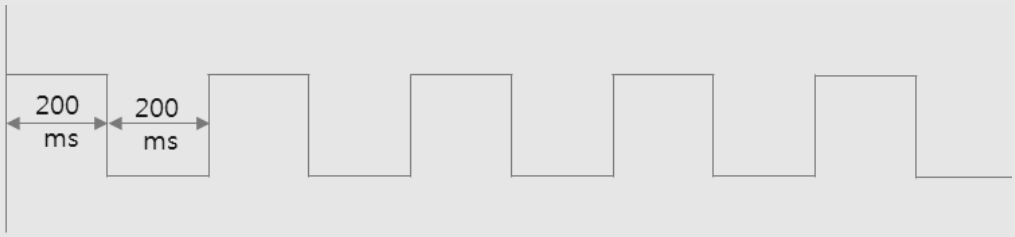
2) Error Details

Item	Operation	Description	
		XBL-CMEA	XBL-CSEA
ERR	Off	Normal operation	
	Blinking 1 note1)	Not equal a number of slaves having setting parameter and connected slaves	-
	Blinking 2 note1)	Error Passive state (TEC>=128 or REC>=128 note2)) (Not equal baud rates or error cable connection)	
	Blinking 3 note1)	Error control event(occurrence heartbeat error)	
	On	not connected	

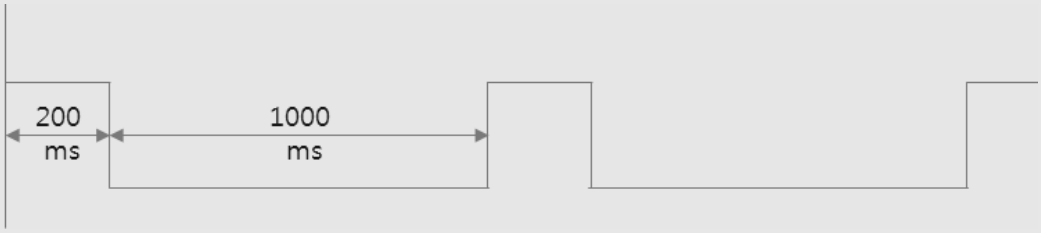
Note

1)Blinking details

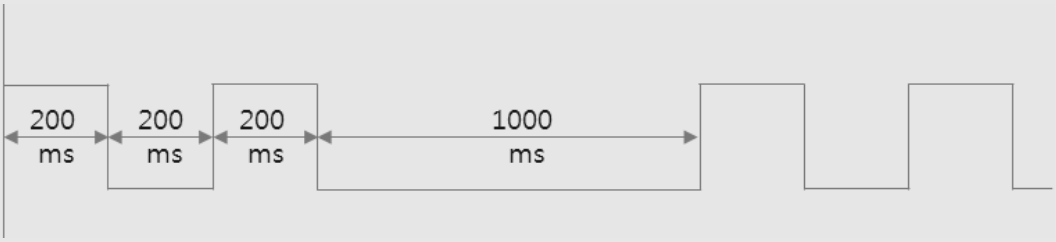
a)Blinking 1



b)Blinking 2



c)Blinking 3



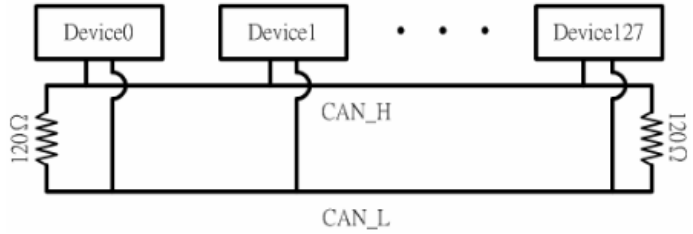
2) REC: Receive Error Counter, TEC: Transmit Error Counter

2.5 Cable Specification

The cables, connectors and terminal resistors used in the CANopen network must be in compliance with the ISO 11898 specification.

2.5.1 Bus cable and Terminal resistor

According to the ISO 11898 specification, the CAN bus network must be terminated with the 2 end resistors as shown in the figure below.



In most cases, the wires with 0.25 ~ 0.34㎟ of cross section area are recommended for the drop cables. The actual resistance of the connector must be included in the voltage drop calculation, in addition to the cable resistance. The transmission resistance of the connector shall be between **2.**5 ~ 10 ㏁.

The table below presents the lengths of the bus cables per baud rate.

Baud rate[bit/sec]	Length of BUS cable[m]
1M	25
800k	50
500k	100
250k	250
125k	500
50k	1000
20k	2500
10	5000

Note

1) Recommended cable AC parameter: 120Ω impedance, 5㎱/m

Assuming that the following values are given, the maximum wire length varies by the bus cable and the number of connected bus nodes.

1) Min. dominant value Vdiff.out.min = 1.5 V

2) Min. differential input resistance Rdiff.min = 20 kW

3) Required differential input voltage Vth.max = 1.0 V

4) Min. terminating resistance RT.min = 118 W

Cross-section [㎟]	Maximum length[m]*note1)			Maximum length[m]*note2)		
	n = 32	n = 64	n = 100	n = 32	n = 64	n = 100
0.25	200	170	150	230	200	170
0.5	360	310	270	420	360	320
0.75	550	470	410	640	550	480

Note

1)Safety margin for 0.2

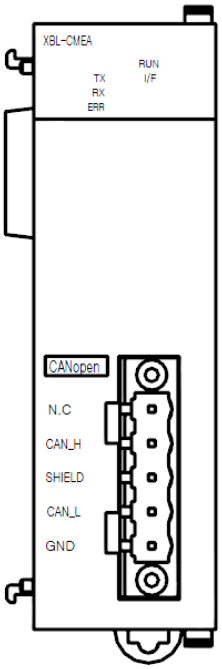
2)Safety margin for 0.1

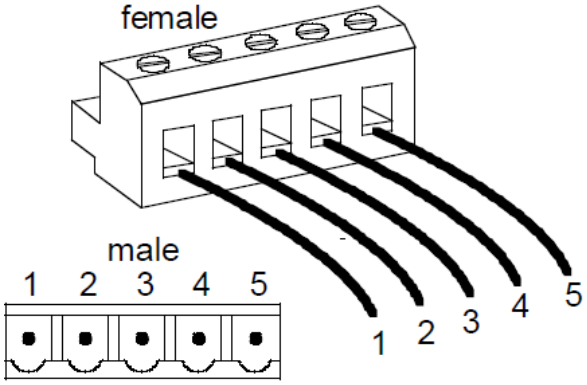
2.5.2 CAN Ground and Galvanic Isolation

In general, CAN ground has to be connected. However, in a perfectly galvanic-isolated CANopen network, the CAN ground may not be connected.

2.5.3 Communication Connector

XGB CANopen uses open-type connectors. See CiA 303-1 for other connectors recommended by CiA.





No	Signal	Description
1	GND	Ground
2	CAN_L	CAN_L bus line (dominant low)
3	SHIELD	Optional CAN Shield
4	CAN_H	CAN_H bus line (dominant high)
5	N.C	Not Connected

Note

CiA 303-1 Cabling and Connector Pin Assignment provides the recommendations for various types of cables and connectors.

Chapter 3 Installation and Trial-Run

3.1 Installation Environment

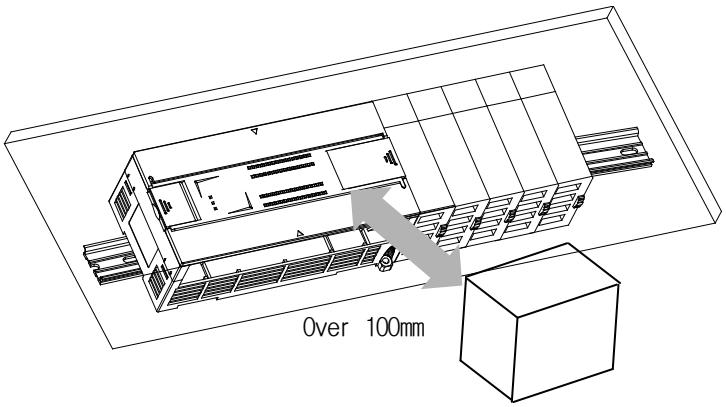
This product is very reliable regardless of installation environments, but to guaranty the reliability and stability of the system, pay attention to the following items.

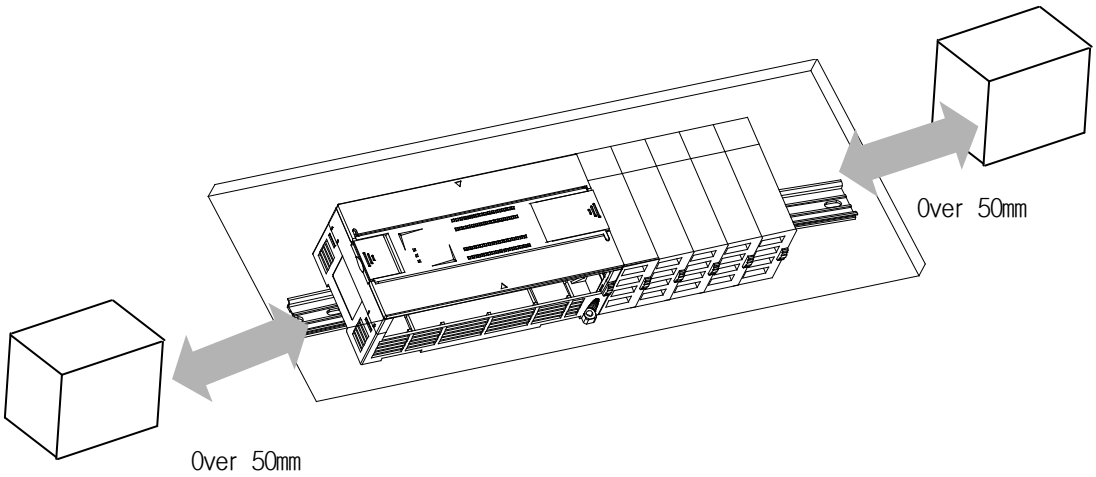
1) Environment Conditions

(1) Install in the control board where waterproof and dustproof are possible.
(2) The places where constant impacts or vibrations are imposed.
(3) The places where direct rays are not directly exposed .
(4) The places where dew is not formed by the rapid change in temperature.
(5) The places where surrounding temperature is maintained to be at 0-55℃.

2) Installation Constructions

(1) Make sure wiring leavings are not inserted inside the PLC when you process screw holes or do wiring jobs.
(2) Install the places where it is easy to control.
(3) Do not install into the same panel as high press machine.
(4) Make sure the distance to the duct and the surrounding module is maintained to be more than 50㎜.
(5) Put to earth where surrounding noise environment is good.



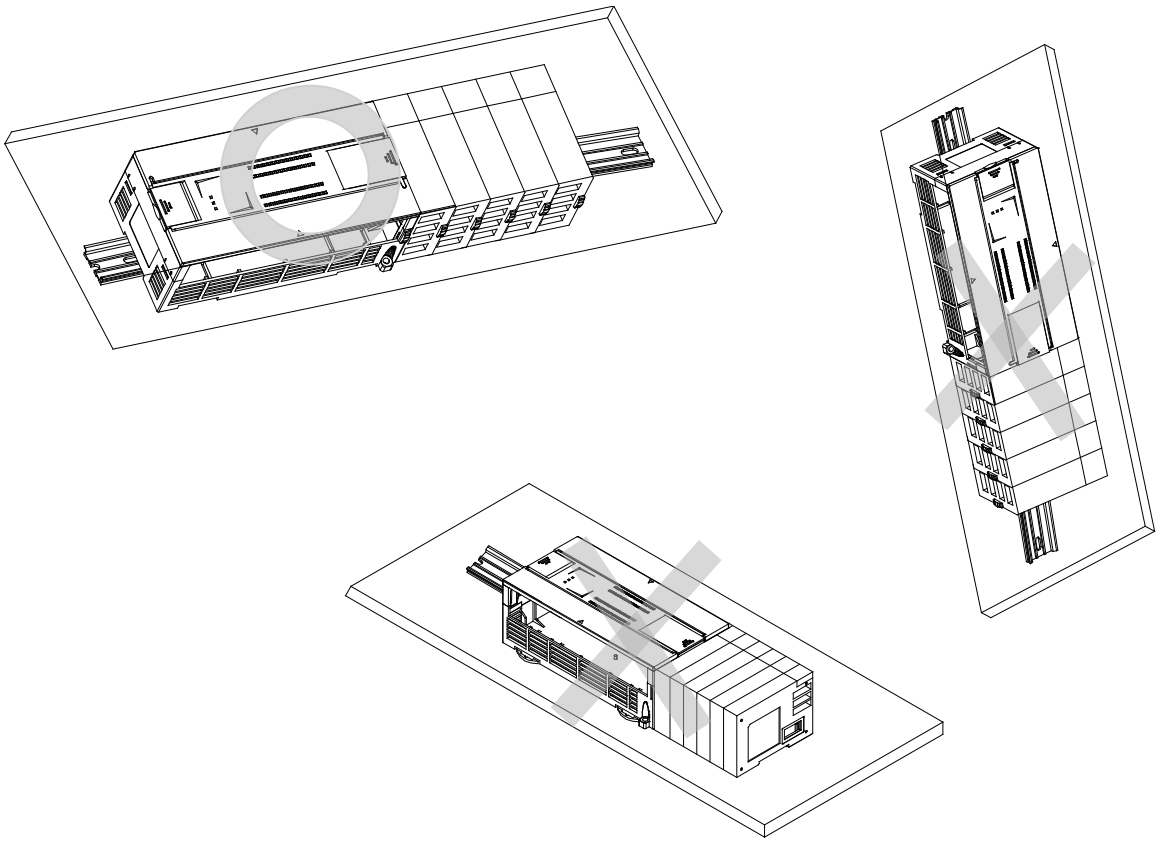


3.2 Cautions when Handling

Observe the following directions when you configure the system using CANopen I/F module.

1) Do not drop or impose strong impact.
2) Do not separate PCB from the case. It may cause malfunctions.
3) Make sure foreign objects are not put into the upper area of the module while you do wiring jobs.
4) If foreign objects are entered, remove them.
5) Do not remove the module when light is On.
6) Use standard cables and install within maximum distance.
7) Make sure communication lines are not affected by surges and inductive noises that may occur from alternating current or current parts.
8) In case the machinery or the substances that may generate high temperature are nearby you or when wires directly come into contact oil and other things for a long time when you do wiring jobs, it may cause a short cut, damage, or malfunctions.
9) When you do wirings during pipe arrangement, it is necessary to put to earth to pipes.

.



3.3 The Order for Setting up Products till Running

The following describes the order of installing or setting up products. Install the system and setting up the parameter so that they can operate in order.

3.3.1 Setting Sequence of Master module(XBL-CMEA)

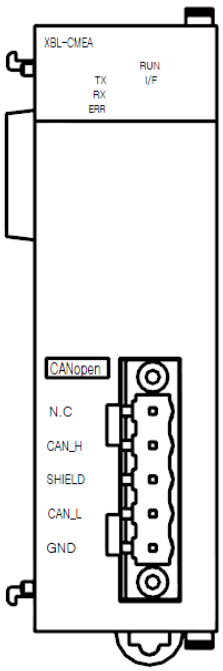
1) Check functions and specifications
2) Mount the module
3) Check I/F LED status of the communication module (flashing) after turning it on
4) Connect with XG-5000
5) Execute module synchronization.
6) Double click on CANopen Network from XG5000 parameter window and execute XG-CANopen.
7) Set basic parameters of the master module (XBL-CMEA)
8) Add slaves by directly inputting them or through auto scan.
9) Set parameters of each slave
10) Execute 'Write Parameter'
11) Implement link enable on the master module that sets parameters
12) Implement CANopen master's action.

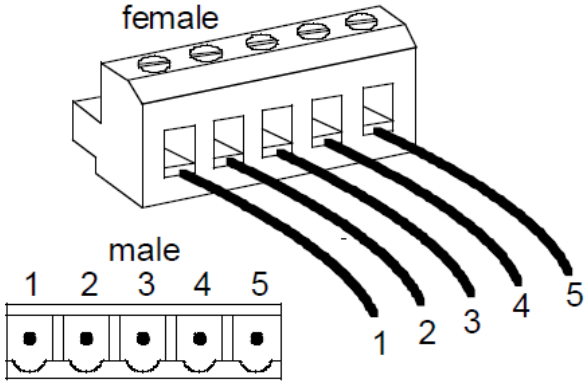
3.3.2 Setting Sequence of Slave module(XBL-CSEA)

1) Check functions and specifications
2) Mount the module
3) Check I/F LED status of the communication module (flashing) after turning it on
4) Connect with XG5000 and execute 'Read I/O Information'.
5) Select CANopen slave from the basic setting window.
6) Set basic parameters (station number, communication speed, readable area, saving area)
7) Download parameters.
8) Implement CANopen slave's action.

3.4 Installation of Product

3.4.1 Installing CANopen I/F Module





CANopen's maximum segment length may vary depending on speed.
Use shielded cables.

No	Signal	Description
1	GND	Ground
2	CAN_L	CAN_L bus line (dominant low)
3	SHIELD	Optional CAN Shield
4	CAN_H	CAN_H bus line (dominant high)
5	N.C	Not Connected

Note

Recommended cable AC parameter: 120Ω impedance, 5ns/m

3.4.2 Transfer distance by communication speed

The transfer distance by communication speed specified in the CANopen specification is as follows.

Bit rate	Bus Length
1 Mbit/s	25 m
800 kbit/s	50 m
500 kbit/s	100 m
250 kbit/s	250 m
125 kbit/s	500 m
50 kbit/s	1,000 m
20 kbit/s	2,500 m
10 kbit/s	5,000 m

3.5 Trial-Run

3.5.1 Caution in Configure the System

1) All station numbers in CANopen device including the master module should be different.
2) Use a designated cable for communication. If you use other cables, it may cause serious communication problems.
3) Inspect whether the cable is disconnected or short-circuited before installing the communication cable.
4) Firmly tighten the communication cable connector to make sure the cable is completely connected.
5) If the connection is loose, it will cause serious communication problems.
6) If the length of the communication cable is longer, keep the cable away from power line or inductive noise.

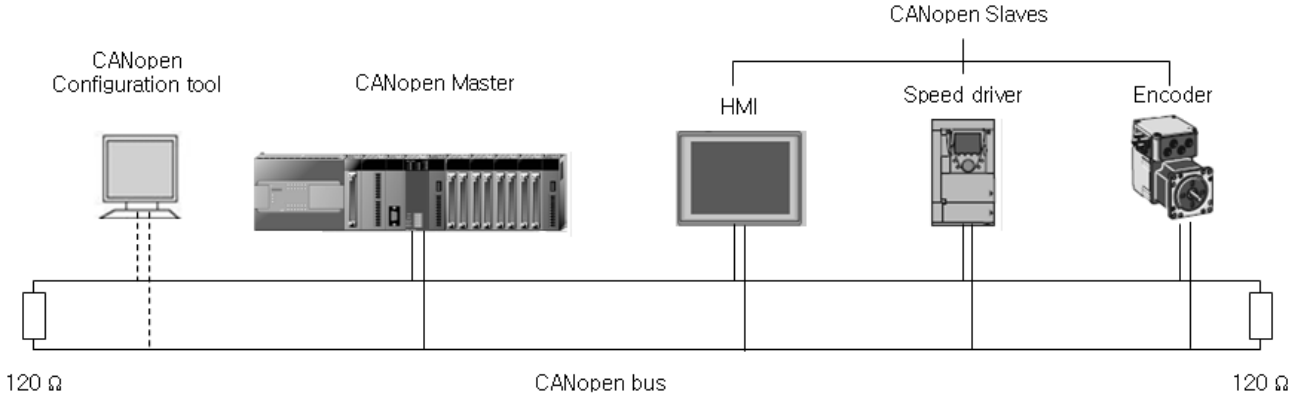
Chapter 4 System Configuration

4.1 System Configuration

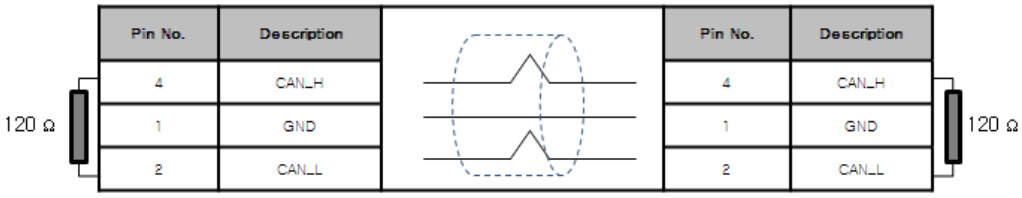
In XGB, CANopen I/F module and all other modules can be mounted up to two on one basic unit, regardless of the module type. Since the open protocol CANopen is used, bus topology system configuration is available using other supplier PLC's CANopen module, Inverter, and HMI.

(1) Network Configuration

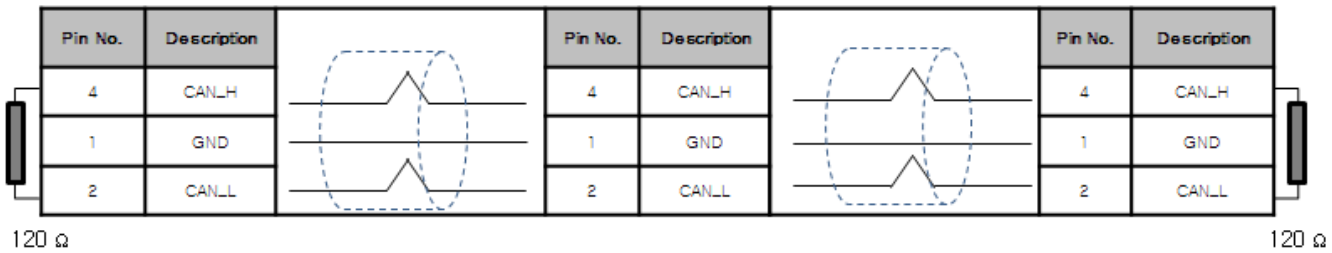
Up to 127 CANopen slaves can be connected. The maximum number may be limited by the number of the slaves allowed by the master, see the technical document of the master. Up to 32 XBL-CMEA can be connected.



(2) 1:1 Connection



(3) 1:N Connection



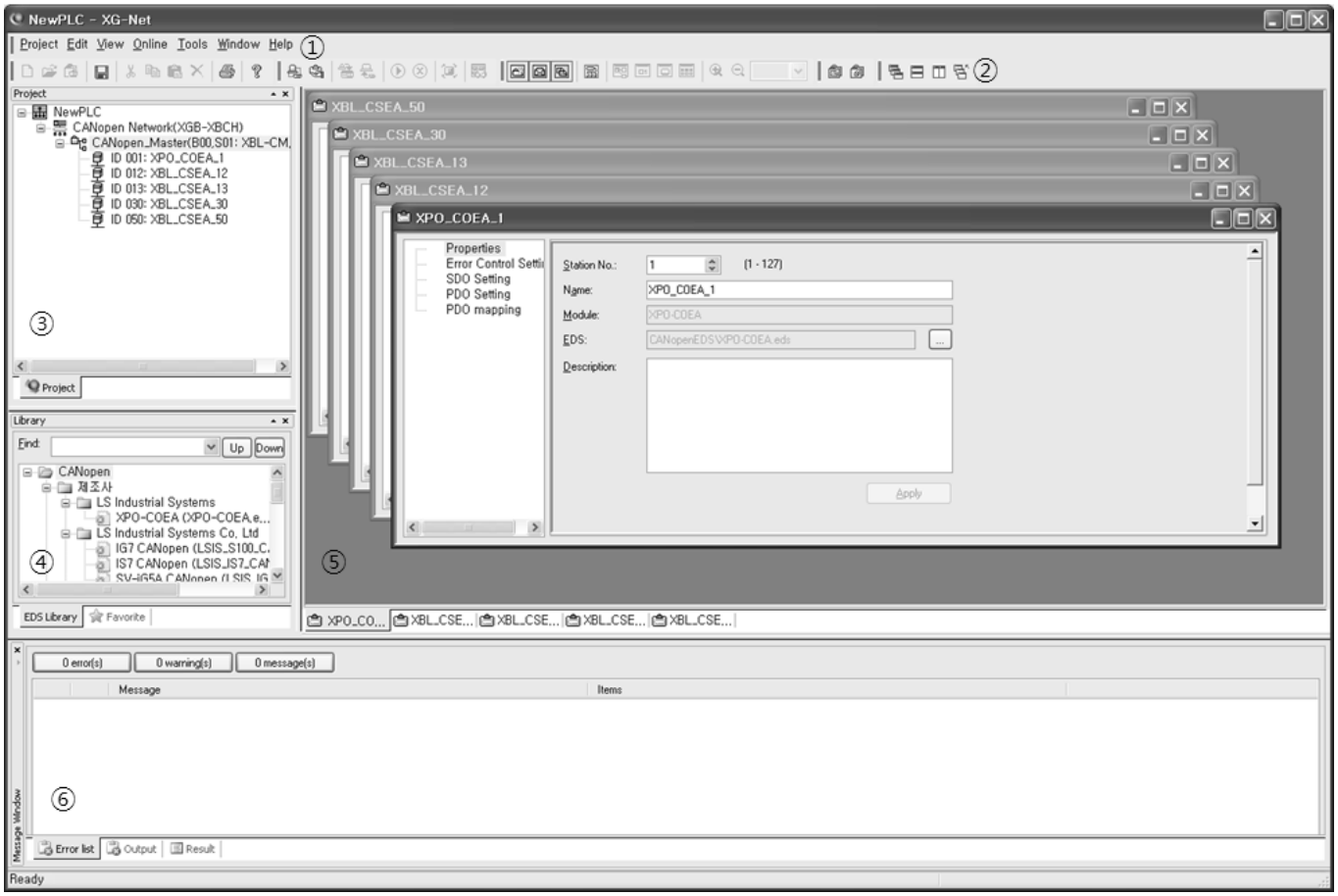
Note

1) Make sure to connect the terminating resistor (120 Ω, 1/2 W).
2) GND may be connected to the system as necessary.

Chapter 5 Using XG-CANopen

5.1 Screen Configuration

The XG-CANopen screen has 6 configurations as shown on the figure below.



① Menu: the main menu of the program.
② Toolbar: menu items can be selected and executed conveniently.
③ Project window: shows the components of the currently active project.
④ Library window: shows the slave module list where EDS file is registered.
⑤ Edit window: network configuration, master module and slave module can be configured.
⑥ Message window: show the messages generated during XG-CANopen operation.

5.1.1 Menu Structure

There are configured as following

Project

Instruction	Description
New Project	Create a new project
Open Project	Open an existing project.
Open form PLC	Upload the project and program in the PLC.
Save Project	Save a project.
Save As	Save the project under a different name.
Close Project	Close a project.
Export	Save the contents of the XG-CANopen project in a file.
Import	Upload the exported file from the XG-CANopen.
Export as package	Save the contents of the XG-CANopen project and used EDS files.
Import from package	Upload the exported file from the XG-CANopen and used EDS files.
Compare projects	Compare two project and show the result.
Print	Print the content of the active window.
Print Preview	Show the screen to be printed.
Project Print	Select and print project item.
Print Setup	Set up printer options
End	Terminate XG-CANopen

Edit

Instruction	Description
Cut	Delete a block and copy the content to the clip board.
Copy	Copy the content of the block to the clip board.
Paste	Copy the content of the clip board to the edit window.
Delete	Delete a block or selected item.
Open Item	Open the item selected in the project window.

View

Instruction	Description
Build	Perform parameter inspection and allocate variables.
Status Bar	Show or hide the status bar at the bottom screen of XG-CANopen.
Project Window	Show or hide project window.
Library Window	Show or hide library window.
Message Window	Show or hide message window.
View Network	For each master module, activate a window where slave can be added or deleted.
Default Window Position	Shift the project window, library window and message window to the initial positions.
Zoom In	Enlarge the network setting screen.
Zoom Out	Reduce the network setting screen size.
View In Detail	In the network setting window, show the master and slave information in detail (portrait configuration).
View Brief	In the network setting window, show the master and slave information in simple form (landscape configuration).
View As List	In the network setting window, show the master and slave information in list form.
View As Table	In the network setting window, show the master and slave information in tabular form.
Properties	View and modify the registered information of the selected master or slave.

Online

Instruction	Description
Connect	Connect or disconnect from PLC.
Connection Setting	Set up connection method.
Module Synchronization	
Write	Write the project in the PLC.
Read	Read the project from the PLC.
Start Monitor	Start/stop monitoring PDO data or Device status
Write SDO	Write data in the designated SDO.
Slave Error History	
Instruction	**Description**
Slave Status by Service	
Autoscan	Show the information of the slave connected with the master.
Add to Autoscan in project	
View Autoscan with project	
Reset PLC	Reset the PLC.
Download OS (Reserved)	Used for upgrading the version of the XBL-CMEA I/F module. If you need to upgrade for firmware, please contact near service center.
Enable Link	

Tool

Instruction	Description
Library Manager	Register or delete EDS file on/from the library.
Update Library	Update the library with the EDS files saved in the library folder.
Customize	User can define the tools and instructions.
Shortcut Setting	User sets up shortcut keys.

Window

Instruction	Description
Cascade	XG-CANopen windows are arranged in cascade form.
Title Horizontally	XG-CANopen windows are arranged horizontally.
Title Vertically	XG-CANopen windows are arranged vertically.
Arrange Icons	XG-CANopen icons are arranged.
Close All	Close all the XG-CANopen windows.

Help

Instruction	Description
About XG-CANopen	Show XG-CANopen information.

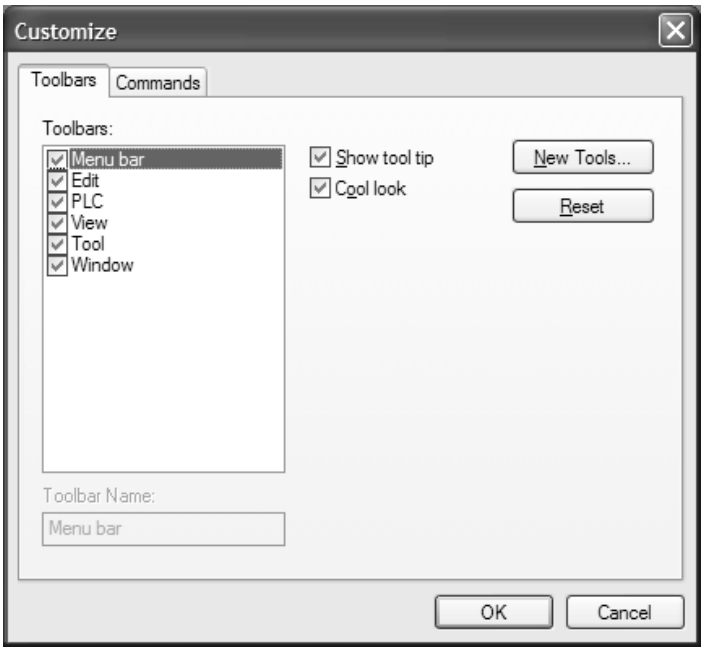
5.1.2 Toolbar

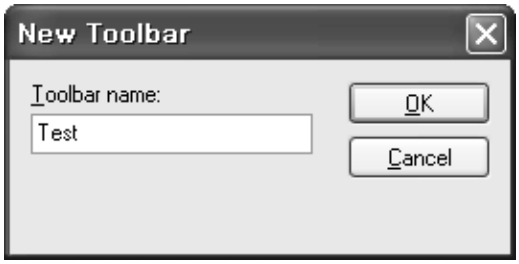
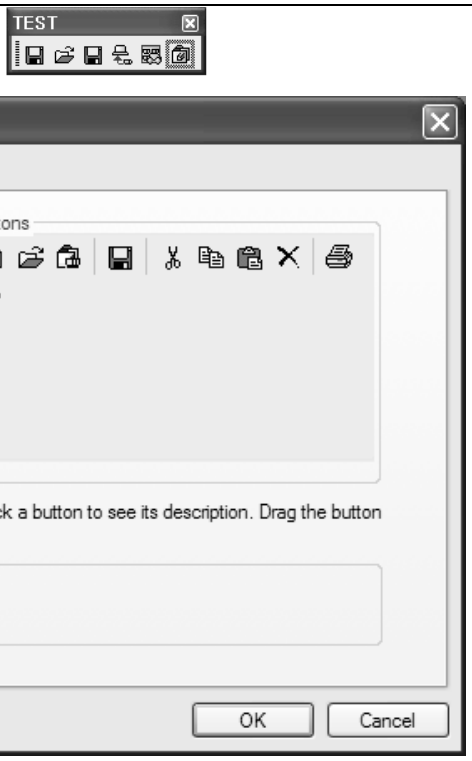
XG-CANopen provides frequently used menus in icon form.

Click the desired tool to execute the function. The user can create a customized toolbar with frequently used tools.

1) Creating a new toolbar

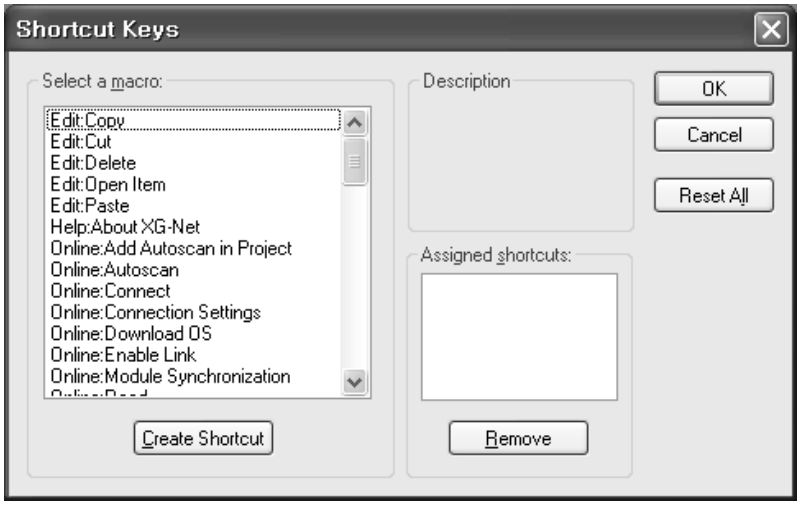
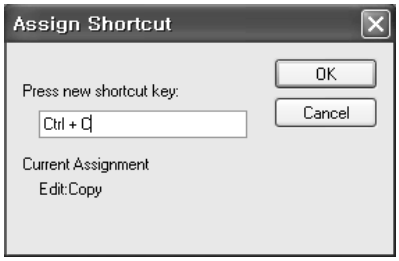
The user can create a customized toolbar with frequently used tools.

No	Process	Procedure
1	Customize	
	1. Toolbar: in the list, check the name of the toolbar to view or hide it. 2. New Tools: create a new toolbar. 3. Reset: reset the toolbar. 4. View toolbar tip 5 Cool shape	

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">2</td><td>Creating a new toolbar</td><td> 
</td></tr>
<tr><td colspan="2">1. Select the menu [Tool] - [Customize].
2. Click the New Tools button.
3. Enter the toolbar name in the New toolbar dialogue box.
4. Click the OK button. A toolbar without a tool is created.</td></tr>
<tr><td rowspan="2">3</td><td>Filling Toolbar</td><td> 
</td></tr>
<tr><td colspan="2">1. Click the Command tap.
2. Drag-and-drop frequently used tools into the new toolbar with the mouse.
3. Click OK button.</td></tr>
</table>

5.2 Setting-up Shortcut Key

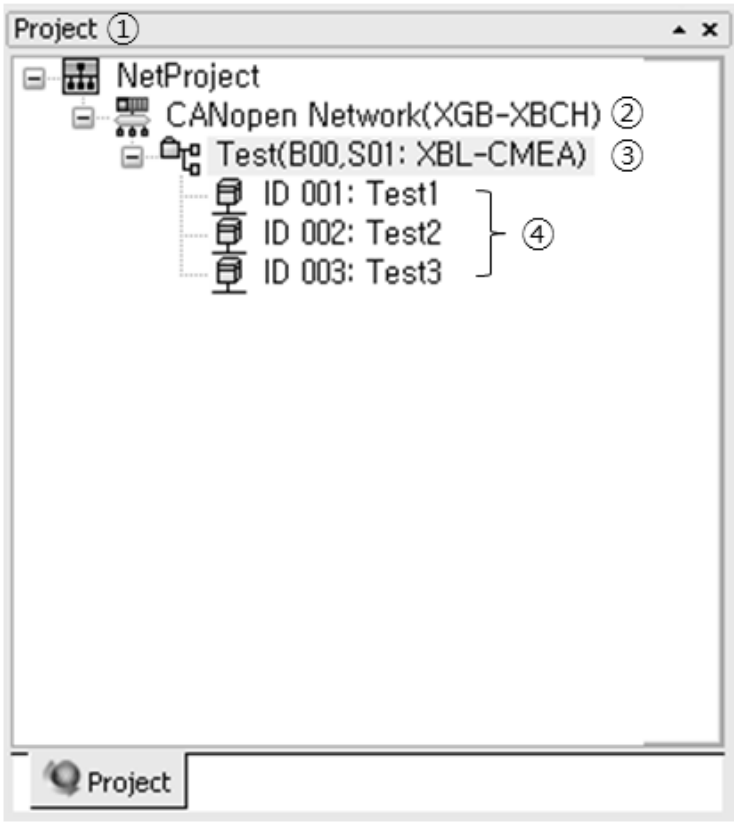
All the instructions can be assigned with a shortcut key. When set up, the old key, if any, is deleted. The set up procedures are as follows

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Shortcut Key Dialogue Description</td><td> 
</td></tr>
<tr><td colspan="2">1. Select a macro: select the menu for which a shortcut key is to be assigned from the list.
2. Create shortcut: create a shortcut key for the selected menu item.
3. Remove: Remove the set up shortcut key.
4. Rest all: delete all the user defined shortcut keys and reset the shortcut key settings to the default setting.</td></tr>
<tr><td rowspan="2">2</td><td>Setting-up Shortcut Key</td><td> 
</td></tr>
<tr><td colspan="2">1. Select menu: select a macro for which a shortcut key is to be assigned from the list.
2. Click the Create Shortcut Key button.
3. Press the shortcut key to be set up.
For example, to set up Ctrl + C as a shortcut key, keep pressing the Ctrl key and press C key in the keyboard.
The edit window will show the shortcut key. If the key set has already been in use, the shortcut key will show the menu item.
4. Click the OK button.</td></tr>
</table>

Chapter 6 XG-CANopen detail Menu

6.1 Project

The project configuration items are as follows;

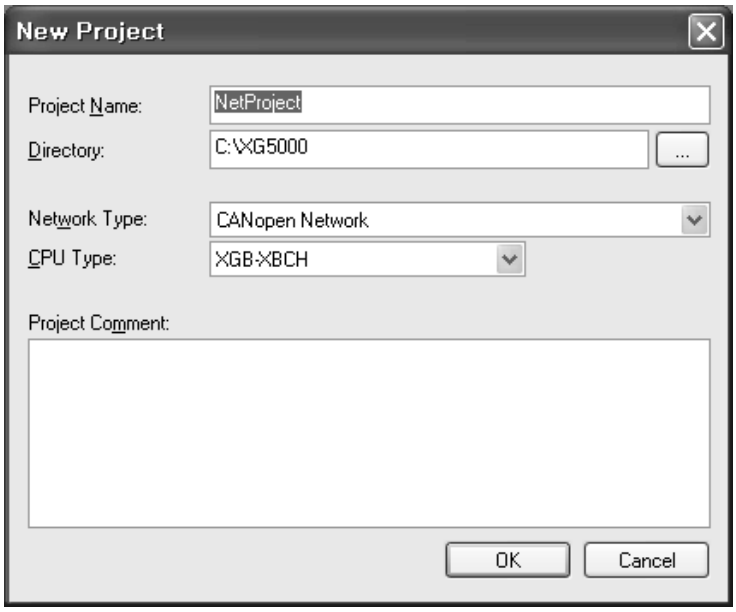


1. Project: represents the project
2. CANopen Network: represents the CANopen system respective to one CPU module
3. Master: represents the master module
4. Slave: represents the slaves connected to the master.

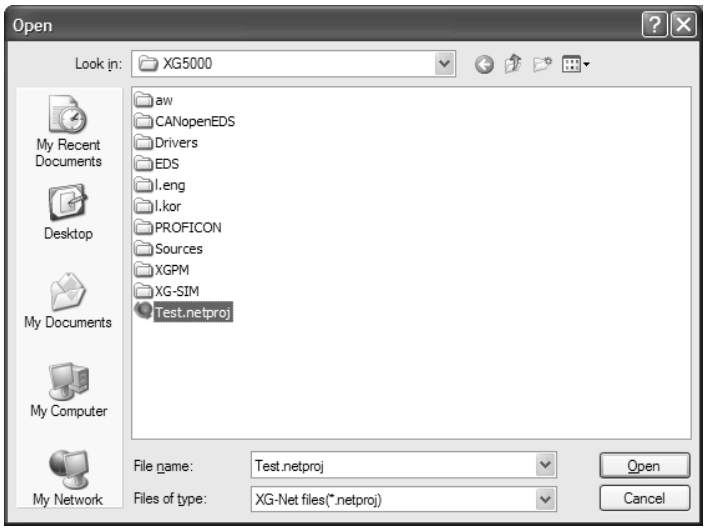
6.1.1 Project File Management

1) Creating a New Project

Create a new project. At the same time, a folder of the same name that of the project is created containing the project file.

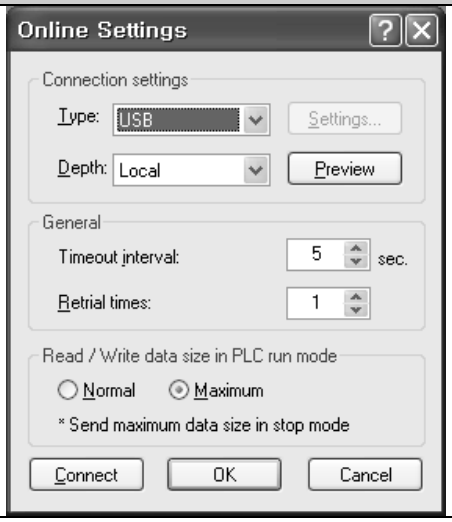
No	Process	Procedure
1	Creating a New Project	
	1. Select menu [Project]-[New Project]. 2. Project name: enter desired project name. The name will be the name of the project. 3. Directory: a folder with the entered project name is created and the project file is created in the folder. 4. Searching box: looking up the existing folders, allocate the project file location. 5. Network type: select the network type. 6. CPU type: select the CPU type. 7. Project comment: enter project description text.	

6.1.2 Opening Project

No	Process	Procedure
1	Open Project	
	1. Select menu [Project]-[Open Project]. 2. Select the file and click Open.	

6.1.3 Open from PLC

Read the memory stored in the PLC and create a new project. If a project is open in the XG-CANopen, close the project and create a new project.

No	Process	Procedure
1	Open from PLC	
	1. Select menu [Project]-[Open From PLC]. 2. Select the connect option and click Connect.	

6.1.4 Other Functions

Function	Meaning	Execution Method
Save Project	Save the modified project.	Select menu [Project]-[Save Project].
Save As	Save the project in a different file.	1. Save the project in a different file. 2. Enter the project name and click Confirm button.
Export as Package	Save the project contents in a file archive. Exporting file archive also saves the EDS file information used in the project.	1. Select menu [Project]-[Export as Package]. 2. Enter the name for saving and click [Save] button.
Import from Package	Import the project archive file. Importing file archive also loads the EDS file information used in the project.	1. Select menu [Project]-[Import from Package] 2. Enter the name of the archive file and click [Open] button.

6.2 Interconnection with XG5000

XG-CANopen supports interconnection with XG5000.

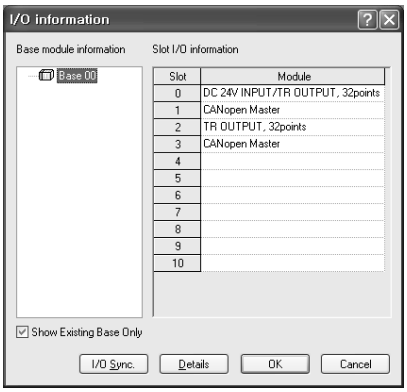
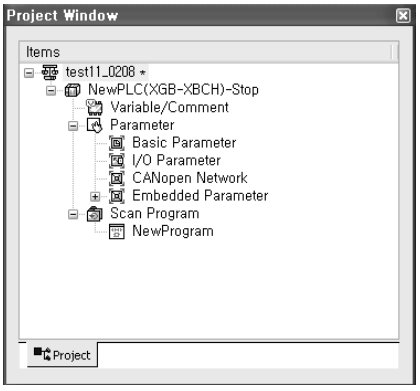
If XG-CANopen is opened via XG5000, the project file and Write PCL functions are interlocked with the XG5000 project.

To use the devices allocated by the XG-CANopen in XG5000, run XG-CANopen in the XG5000.

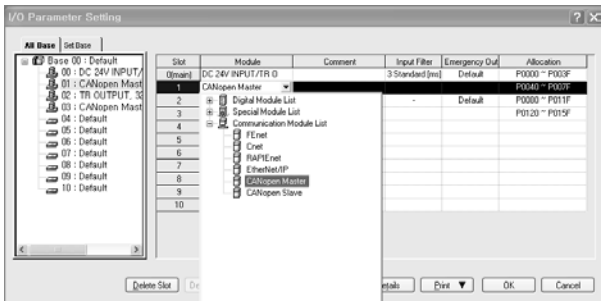
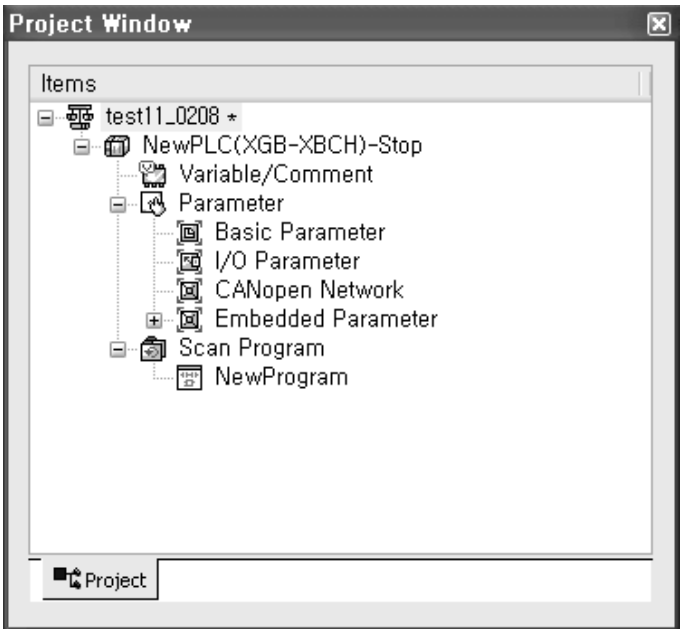
6.2.1 Opening XG-CANopen in XG5000

To run XG-CANopen in XG5000, the CANOpen master module (XBL-CMEA) must be registered in the I/O parameter. Master module can be added in I/O parameter by two methods.

1) Master module registration by I/O synchronization

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>I/O Synchronization</td><td> 
</td></tr>
<tr><td colspan="2">1. Select menu [Online]-[Change Mode]-[Stop] to switch to CPU stop mode.
2. Select menu [Online]-[Diagnosis]-[I/O Information], and select [I/O Sync] in the I/O information window.
3. When the module has been synchronized, click OK button.</td></tr>
<tr><td rowspan="2">2</td><td>Executing XG-CANopen</td><td> 
</td></tr>
<tr><td colspan="2">1. CANopen Network item is created in the project window.
2. Double click CANOpen Network to confirm execution of XG-CANopen.</td></tr>
</table>

2) Master module registration by I/O parameter setting

No	Process	Procedure
1	I/O Parameter Setting	
	1. In the XG5000 project window, select menu [Parameter]-[I/O Parameter]. 2. In the XG5000 I/O parameter window, select CANopen Master.	
2	Executing XG-CANopen	
	1. CANOpen Network item is created in the project window. 2. Double click CANOpen Network to confirm execution of XG-CANopen.	

6.2.2 Saving a Project

When the XG-CANopen is executed in connection with XG5000, saving the project in XG5000 will save the setting of the XG-CANopen too.

6.2.3 Variable Allocation

PLC devices are allocated to the PDO set up in the XG-CANopen. When the XG-CANopen is opened via XG5000, the variables allocated in the XG-CANopen can be used in the XG5000.

6.2.4 Allocating Variables in XG-CANopen

PLC devices are allocated to the set up PDO..

[Procedure]

Select menu [View]-[Build]

6.2.5 Importing the variable allocated in the XG5000

The variables allocated in the XG-CANopen can be imported to XG5000 to use the variables in the PLC program.

[Procedure]

1. Select XG5000 menu [Edit]-[Automatic allocation of network variables].
2. Network variables are added to the global variables or variables/description window.

Note

Variable allocation is carried out in the following cases;

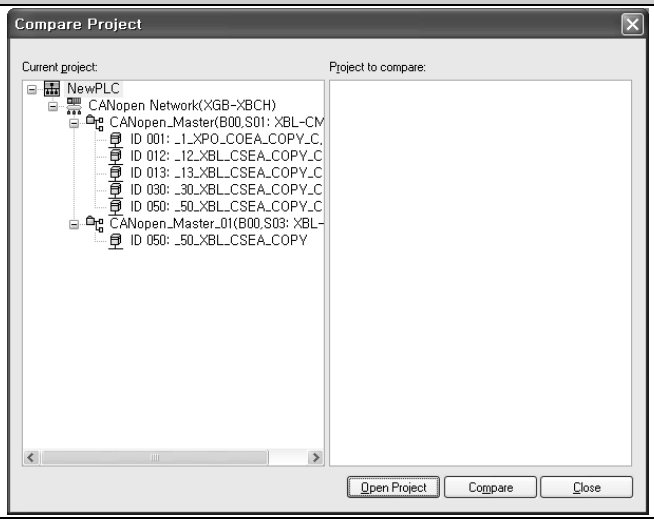
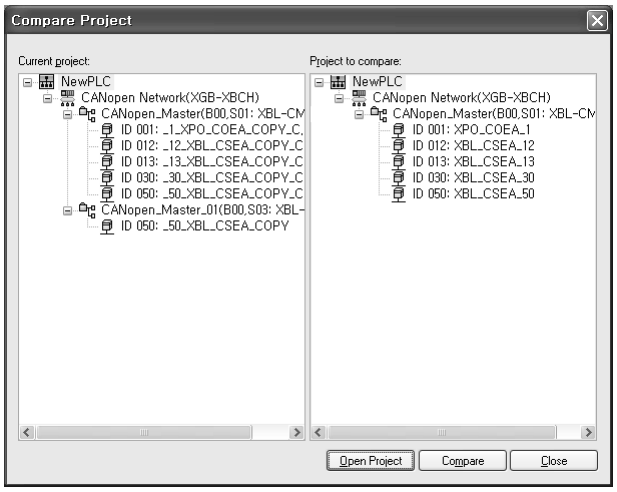
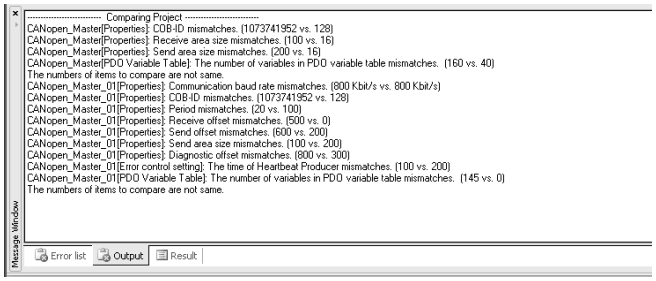
1) Menu [Build] of the XG-CANopen is executed

2) Project is saved in the XG-CANopen

3) XG5000 menu [Automatic allocation of network variables] is selected.

6.2.6 Compare Projects

Two projects can be compared item by item. The result of the comparison is displayed in the message window.

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Execute Compare Projects</td><td> 
</td></tr>
<tr><td colspan="2">Select menu [Project]-[Compare Projects].</td></tr>
<tr><td rowspan="2">2</td><td>Opening the file to be compared</td><td> 
</td></tr>
<tr><td colspan="2">1. Click the [Open Project] button in the dialog box.
2. Select the file to compare with and click [Open] button.</td></tr>
<tr><td rowspan="2">3</td><td>Result of Comparison</td><td> 
</td></tr>
<tr><td colspan="2">Click the [Compare] button. The result of the comparison is displayed in the message window.</td></tr>
</table>

6.2.7 Other Functions

Function	Meaning	Execution Method
Export	Save the contents of the XG-CANopen project in another file.	Select menu [Project]-[Export]. Enter the name for saving and click [Save] button.
Import	Load the contents of the XG-CANopen project saved in another file.	Select menu [Project]-[Import]. Enter the file name and click [Open] button.
Export as Package	Save the project contents in a file archive. Exporting file archive also saves the EDS file information used in the project.	1. Select menu [Project]-[Export as Package]. 2. Enter the name for saving and click [Save] button.
Import from Package	Import the project archive file. Importing file archive also loads the EDS file information used in the project.	1. Select menu [Project]-[Import from Package] 2. Enter the name of the archive file and click [Open] button.

6.3 Edit Network Window (Add/Delete Master and Slave)

Master and slave nodes can be added or deleted to configuration the network. Detail set up can be conducted by calling up the registration information window of the nodes.

.

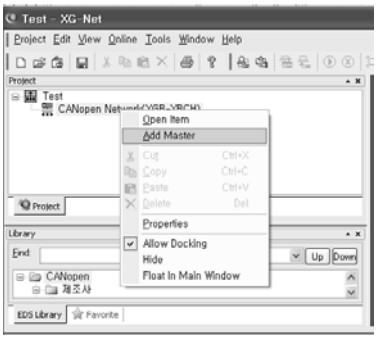
6.3.1 Conditions

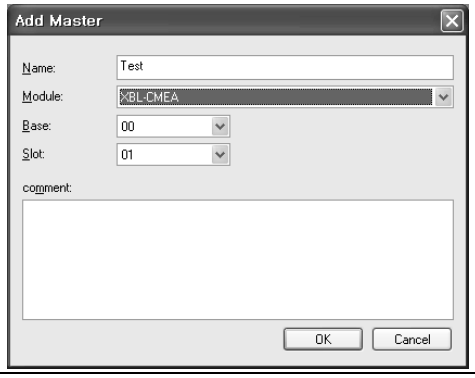
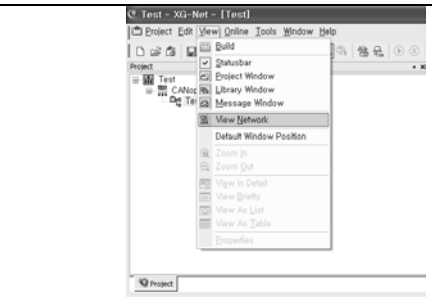
Following functional restrictions are imposed when configuring a network.

Item	Description	Limit
Max. No. of masters	Max. No. of the masters allowed to be mounted on a PLC	2 sets
Max. No. of slaves	Max. No. of the slaves allowed to be mounted on a PLC	32 sets
Slave station No.	Slave ID	1 ~ 127
Max. No. of copy nodes	Max No. of the nodes which can be copied at once	1
Max. No. of paste nodes	Max No. of the nodes which can be pasted at once	1

6.3.2 Edit Node

1) Entering master module name

No	Process	Procedure
1	Master additional selection	
	1. Enter master node in the CANopen Network 2. In the project window, select [CANopen Network] and right click the mouse to select Add Master .	

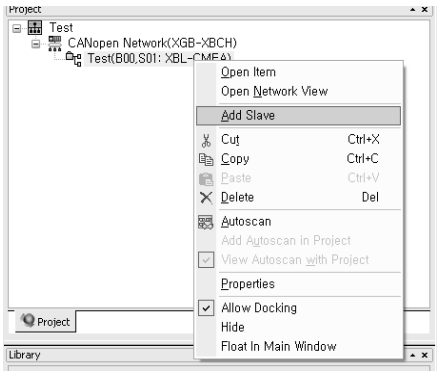
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td></td><td>Entering Detail Contents</td><td> 
</td></tr>
<tr><td>2</td><td colspan="2">1. Select [Add Master] to pop-up add master module dialogue.
2. Enter following information in the master module window, and click Confirm. The meanings of the items are as follows;
1) Name: enter name of the master node
2) Module : select master module type
3) Base: select the base on which the master module is to be mounted
4) Slot: select the slot in which the master module is to be inserted
5) Comment: enter other information of the master module.</td></tr>
<tr><td rowspan="2">3</td><td>Check Edit Window Creation</td><td> 

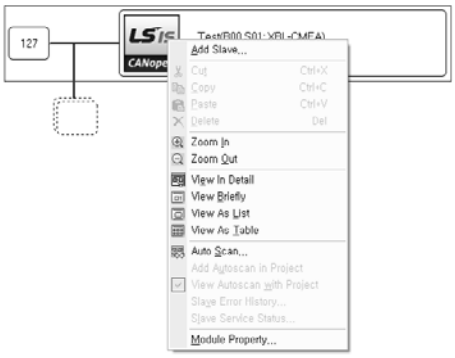
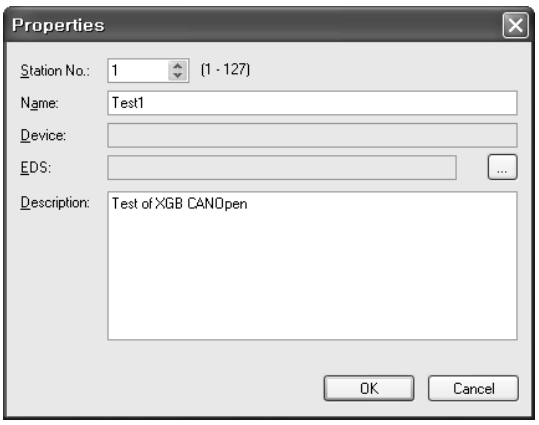

</td></tr>
<tr><td colspan="2">After finishing the entry and select [View]-[View Network], the network window of the master module is created in the edit window.</td></tr>
</table>

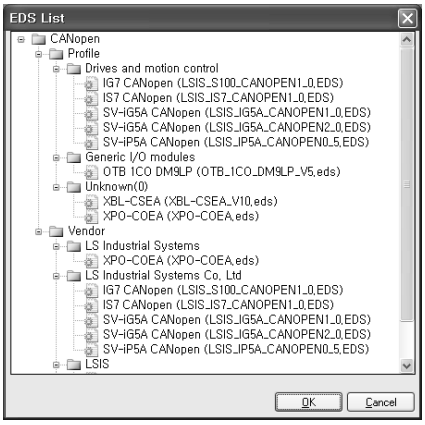
2) Adding Slaver modules

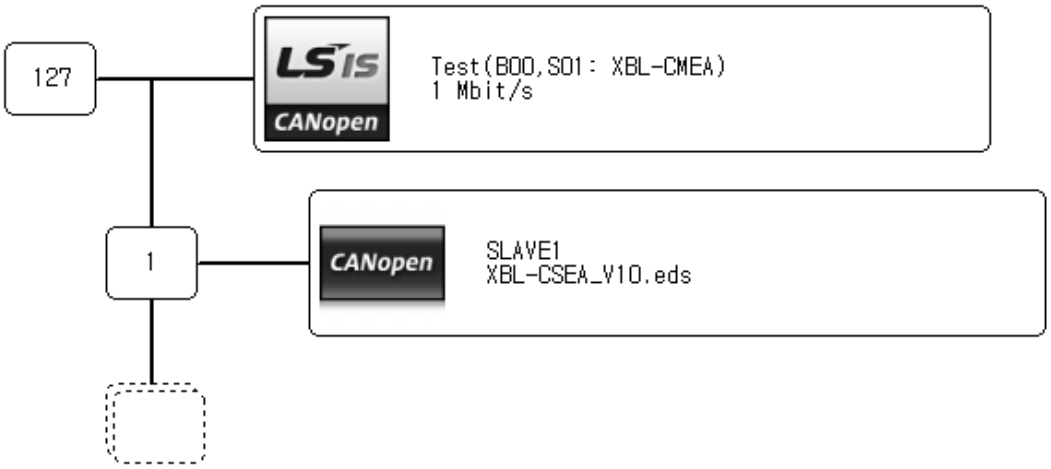
Slaves can be added by two methods. The first method is to add a slave directly to the master module, and the second is using Auto Scan. To use the Auto Scan function, the slave must be connected to the network with the same baud rate and different station No..

(1) Adding at Master module

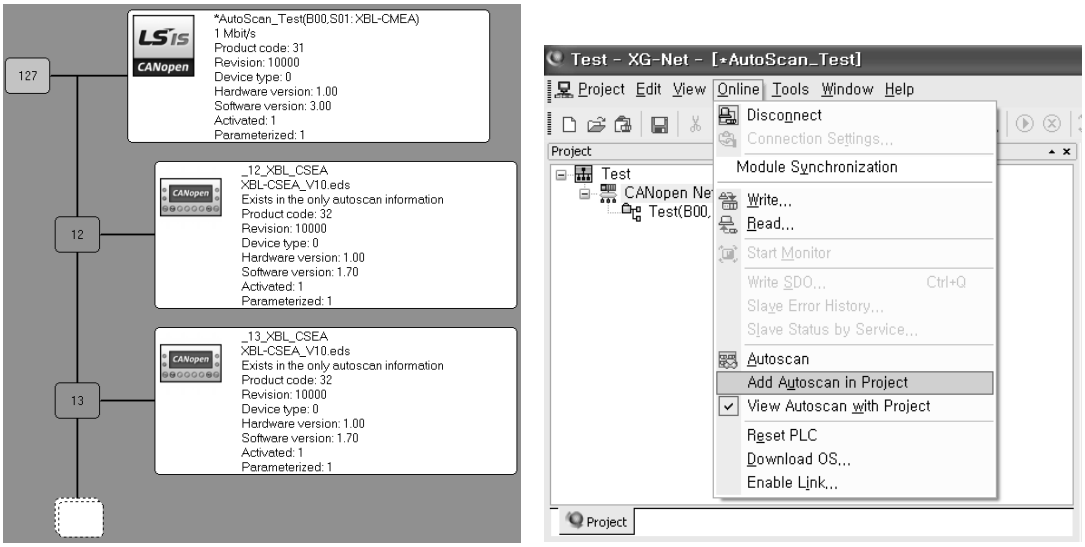
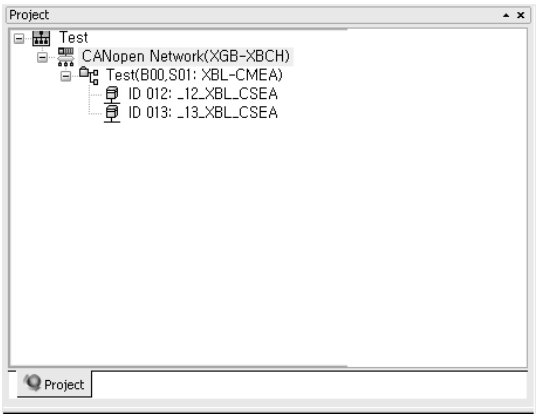
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Add Slave</td><td> 

or

</td></tr>
<tr><td colspan="2">1. Select the master module and right click the mouse to select [Add Slave].
2.Or, in the edit window, click the master module and select [Add Slave].</td></tr>
<tr><td rowspan="2">2</td><td>Slave Properties</td><td> 

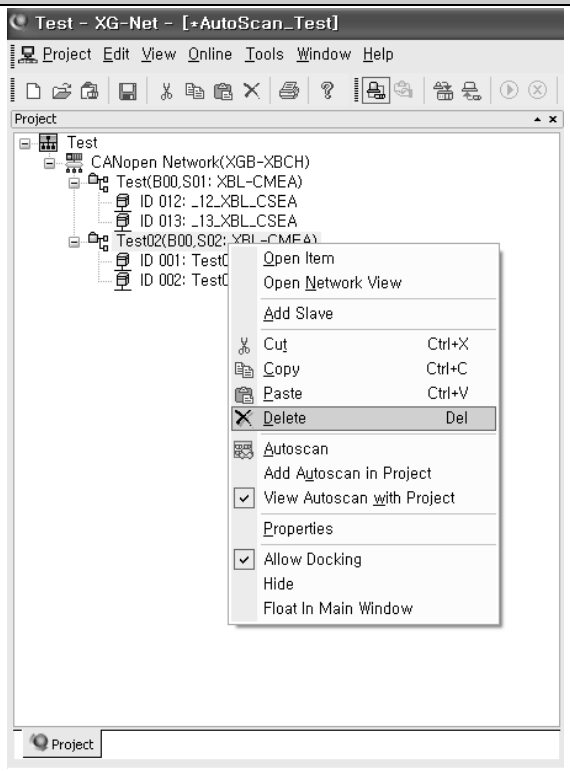

</td></tr>
<tr><td colspan="2">1. Enter following items in the slave window;
- Station No.: enter the slave node ID
- Name: enter name of the slave node
- Device: enter the EDS product name of the slave node.
- EDS: enter the EDS file path of the slave node.
2. Click EDS call-up button and add the desired EDS.
3. Click OK button.</td></tr>
</table>

No	Process	Procedure
3	Select Add to Master	
	In the network window, the slave is added beneath the master module.	

(2) Adding Slaver in the AutoScan

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Adding a Slave</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] → [Auto Scan]
2. Select [Online] → [Add AutoScan in Project]</td></tr>
<tr><td rowspan="2">2</td><td>Check Slave Registration</td><td> 
</td></tr>
<tr><td colspan="2">Check that the slaves are added in the project window</td></tr>
</table>

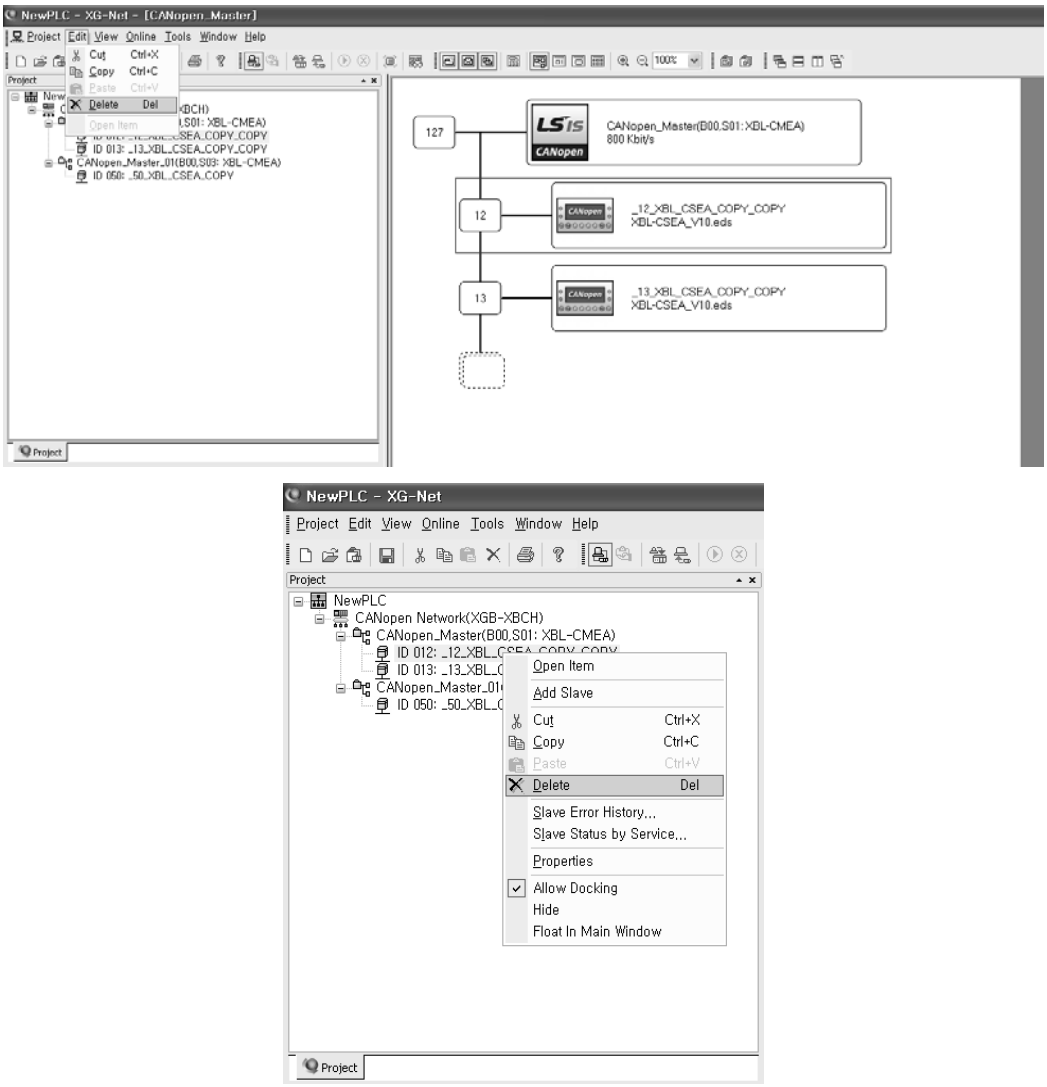
6.3.3 Deleting Master Module

No	Process	Procedure
1	Deleting Master	
	1. In the project window, select the master module to be delete 2. Click select [Delete] or Select menu [Edit]-[Delete].	

Note

If delete the master module, parameter of slaves set in master will be deleted.

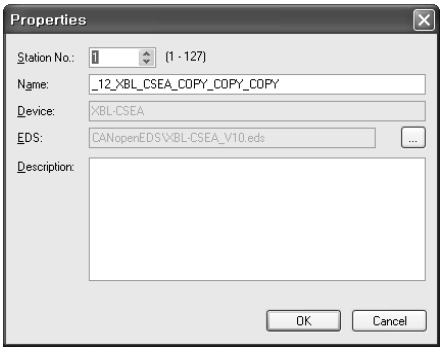
6.3.4 Deleting Slave

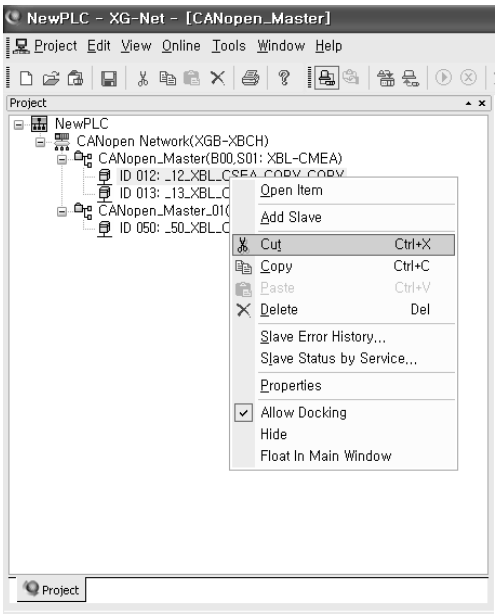
No	Process	Procedure
1	Deleting Slave	
	1. In the project window, select the slave module to be deleted. 2. Select menu [Edit]-[Delete]. From the project window, the selected slave module is deleted. Or, Slave module can be deleted in the network window.	

6.3.5 Copy/Paste/Cut

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Copy</td><td> 

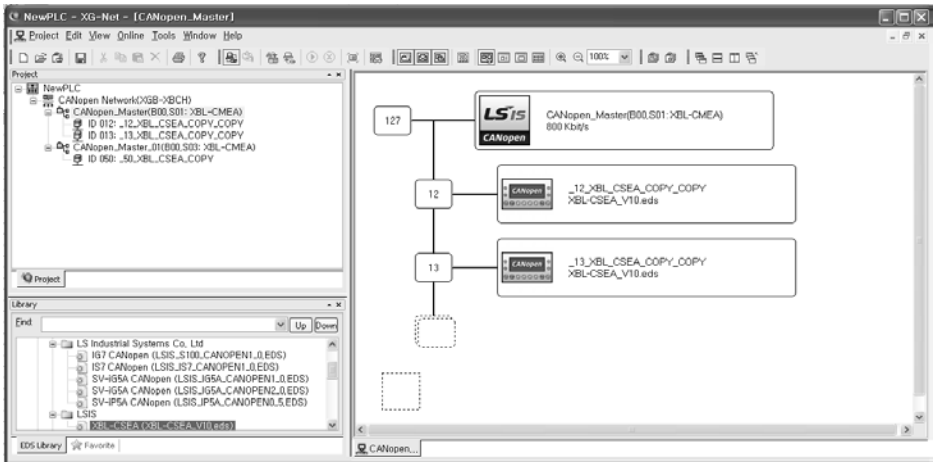
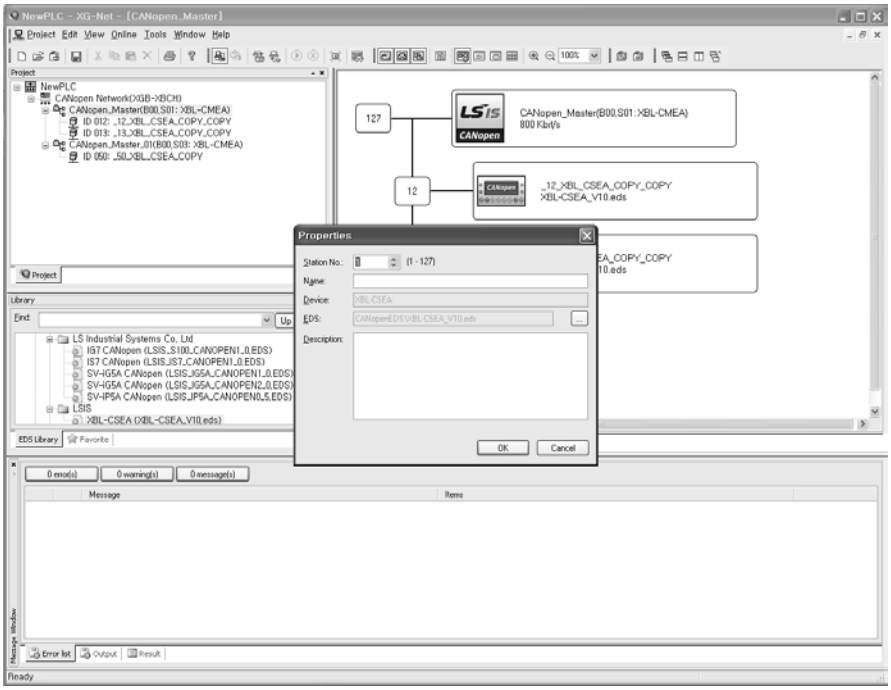

</td></tr>
<tr><td colspan="2">1. Select the module to be copied. Select menu [Edit]-[Copy].
Or, select the slave and right click the mouse to select [Copy].</td></tr>
<tr><td rowspan="2">2</td><td>Paste</td><td> 


</td></tr>
<tr><td colspan="2">1. Select a slave and select menu [Edit]-[Paste].
2. Add Slave dialogue will appear.
3. Suffix “_COPY” is attached to the end of the name of the copied slave.
4. Enter basic entries for the slave.</td></tr>
</table>

No	Process	Procedure
3	Cut	
	1. Select the slave to be cut off. 2. Select menu [Edit]-[cut]. Or, select the slave and select Cut from the context menu. 3. The cut slave can be pasted with the method described in the above Clause 2.	

6.3.6 Drag and Drop

Slave modules can be added by drag-and-drop

No	Process	Procedure
1	Drag	
		1. Select EDS file from the library window. 2. Drag the file and drop it in the network window.
2	Drop	
		1. Add Slave dialog will appear. As the default, product name and EDS file path are displayed. 2. Enter station No. and name in the slave dialog, and OK Confirm.

6.4 Library

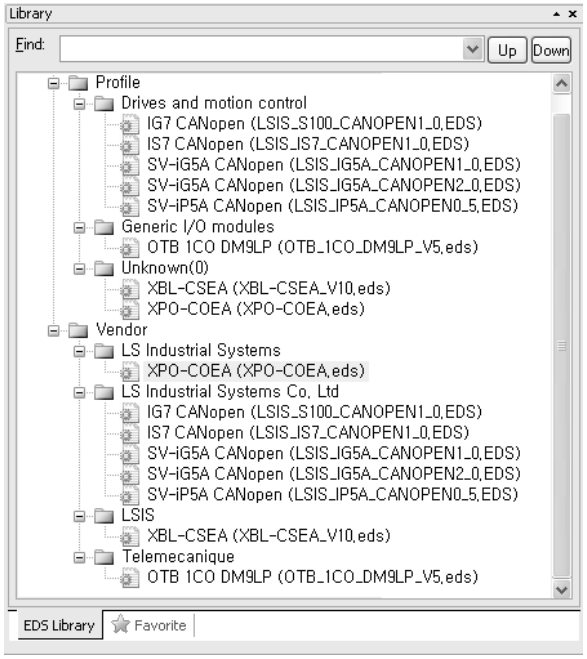
6.4.1 Overview

The library means the set of the EDS (Electronic Data Sheet) currently registered in the XG-CANopen. When the user registers the EDS via library administrator, the XG-CANopen automatically updates the library, and the information is maintained until the EDS registration is revoked.

6.4.2 Library Window

1) Library Window Configuration

To activate the library window, select menu [View] – [Library Window]. The library window consists of the EDS library tab which shows all the registered EDSs and the Favorite tab which shows desired EDS only. The EDS registered by the user is classified into manufacturer information and profile information and registered in tree structure. From the EDSs, desired EDS can be find out easily using the manufacturer and profile information. The library window tree consists of the product name and file name of the EDS.



2) Find EDS

From the EDSs, desired EDS can be find out easily using the [Find] control at top of the library window. Any character can be used in the search key word. Use the Up Down buttons for search after entering the search key word. The directions of the buttons are the directions of the search.

The ENTER key has the same function as that of the Down button.

3) Registering favorite EDSs

If many EDSs are registered, it is recommended to control the 'My Favorite' EDSs separately for convenience. To register an EDS in the 'My Favorites,' right click the mouse and select [Register in Favorites]. The registered EDSs can be confirmed with the My Favorites tab of the library window.

4) View EDS Content

To view the content of a registered EDS, right click the mouse on the EDS and select [View EDS] menu. A new window showing the whole content of the EDS will appear, showing the following information;

▶ File path: shows the absolute path of the selected EDS..

▶ Search content: enter key word(s) to search EDS content. The keyword is case sensitive and searches unit word basis[*Note1)]. (Use check box).

Note

1) Unit word based search: the search keyword is considered to be a complete word and searches exact matches only

E.g.) If the search object is ObjectType=0x7,

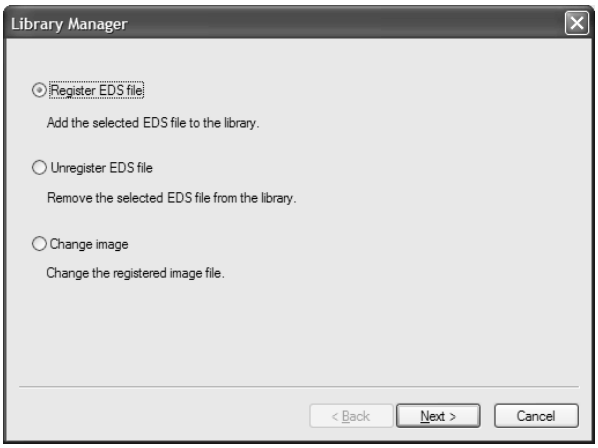
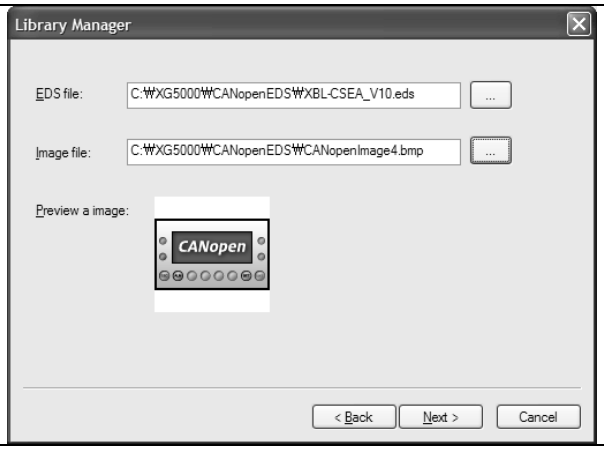
If ObjectType is entered, the search will succeed, and fail if ObJect is entered.

ObjectType=0x7 will succed, and ObjectType=0 will fail

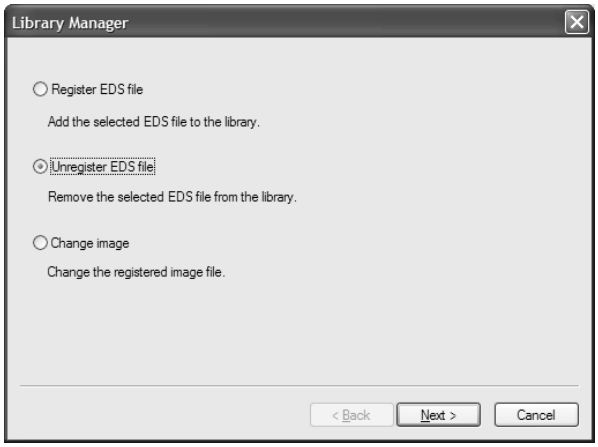
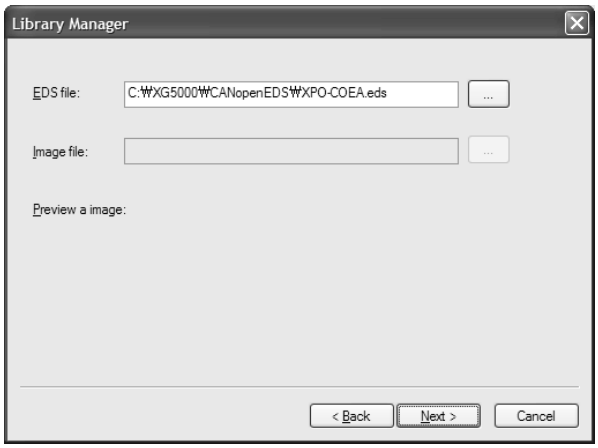
6.4.3 Library Manager

The library administrator is used to register a new EDS or revoke one, or to modify the image file registered together with the EDS.

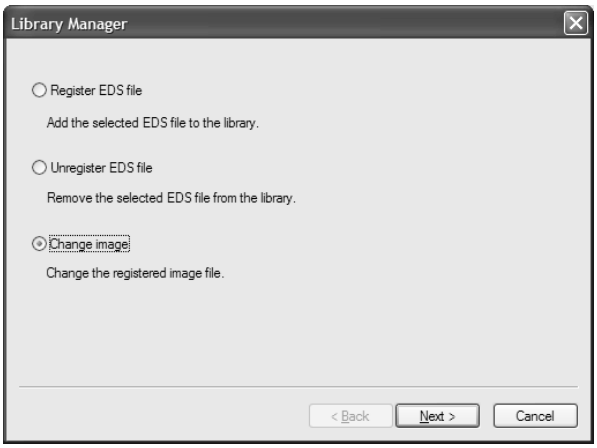
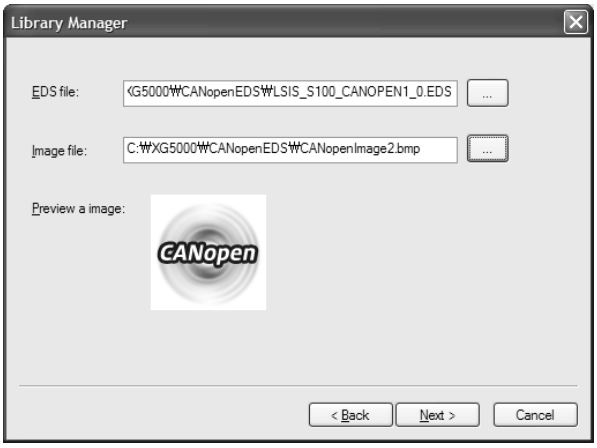
1) Register EDS file

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Register EDS file (1)</td><td> 
</td></tr>
<tr><td colspan="2">Select [Tool]-[Library Manager], select Register EDS file and click [Next] button.</td></tr>
<tr><td rowspan="2">2</td><td>Register EDS file (2)</td><td> 
</td></tr>
<tr><td colspan="2">1. Select the EDS file and image file, and click Next button. The selected image can be viewed in the Image Preview in square form. Can proceed to the next step without selecting an image.
2. Click [OK] button to complete the EDS registration.</td></tr>
</table>

2) Unregister EDS file

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Unregister EDS file(1)</td><td> 
</td></tr>
<tr><td colspan="2">Select [Tool]-[Library Manager], select revoke EDS file registration and click [Next] button.</td></tr>
<tr><td rowspan="2">2</td><td>Unregister EDS file (2)</td><td> 
</td></tr>
<tr><td colspan="2">1. Select the EDS file to be deleted and click [Next] button. The image, if any, registered with the EDS will appear at the same time.
2. Click [Finish] button to complete the EDS revocation.
3. The revoked EDS file is stored in the Deleted EDS folder of the XG5000 folder.</td></tr>
</table>

3) Change Image

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Change Image (1)</td><td> 
</td></tr>
<tr><td colspan="2">Select [Tool]-[Library Manager], select Change Image and click [Next] button.</td></tr>
<tr><td rowspan="2">2</td><td>Change Image (2)</td><td> 
</td></tr>
<tr><td colspan="2">1. Select the EDS file and image file to be changes, and click [Next] button. The selected image can be viewed in the Image Preview in square form.
2. Click [Finish] button to complete the change into the selected image.</td></tr>
</table>

6.5 Online

The functions available only when connected with PLC are described below.

6.5.1 Connection Setting

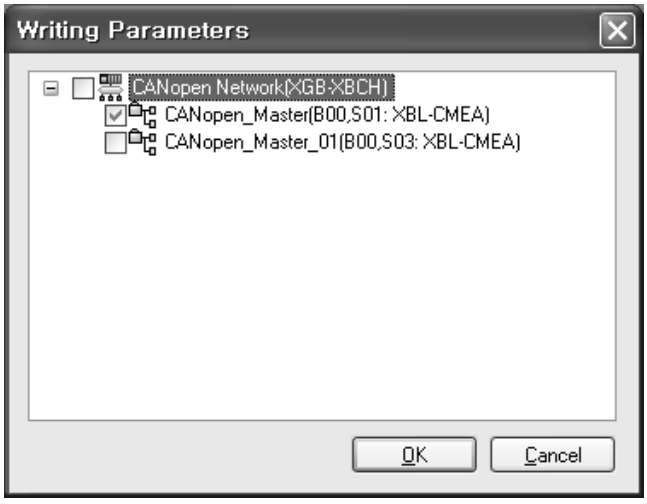
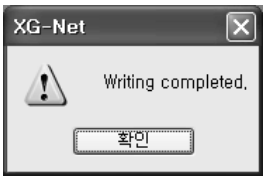
The connection method of XG-CANopen can be classified into RS-232C, USB, modem, and Ethernet, according to the connection media. Local and remote connection are supported. For further details, see Chapter 10, Online of the XG5000 User's Manual.

6.5.2 Write

This function writes the CANopen parameter set up in the XG-CANopen to the CANopen master module. The CANopen parameter can be written in the XG-CANopen or via XG5000.

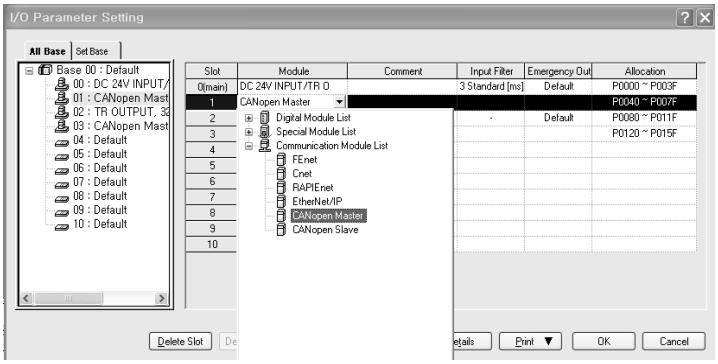
1) Write in XG-CANopen

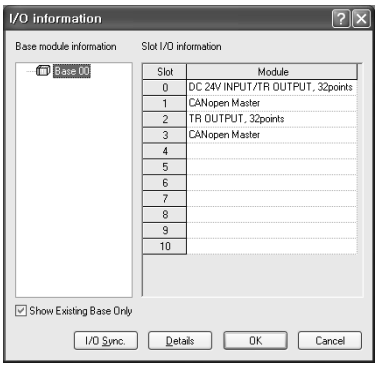
Transmit the set-up master and slave information to the CANopen master module.

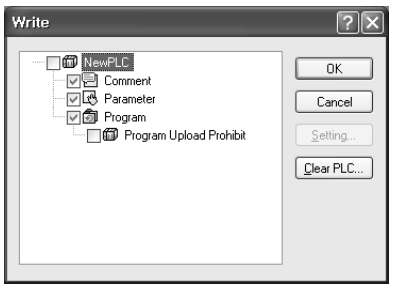
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Write in XG-CANopen</td><td> 
</td></tr>
<tr><td colspan="2">1. Select menu [Online]-[Connect] to connect the PLC via online.
2. Select menu [Online]-[Write].
3. Select the master to which write parameter</td></tr>
<tr><td rowspan="2">2</td><td>Writing Complete</td><td> 
</td></tr>
<tr><td colspan="2">When writing is completed, finish window is created.</td></tr>
</table>

2) Write in XG5000

When the XG-CANopen is called in the XG5000, the XG-CANopen is synchronized with the XG5000. Therefore, if writing is conducted in the XG5000, and if the CANopen module has been set up, CANopen parameters are also written.

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Adding Module</td><td> 

<Adding CANOpen Master using I/O parameter>


<Adding CANOpen Master by I/O synchronization></td></tr>
<tr><td colspan="2">1. Add master module to create the CANOpen Network menu in the XG5000 project window.
1) In the XG5000 project window, double click I/O parameter to add CANopen module, or
2) Select [Online]-[I/O Information] menu of XG5000 and select [I/O sync.]. To execute I/O synchronization the CPU must be in stop state.
2) Confirm that CANOpen Network is created in the XG5000 project window when the module has been added.</td></tr>
<tr><td rowspan="2">2</td><td>Writing Parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Double click the CANopen Network added in the project window.
2. The XG-CANopen will start up and edit parameter for CANOpen
3. Save project in the XG5000.
4. Conduct XG5000 menu [Online]-[Write].</td></tr>
</table>

Note

The content edited in the CANopen in connection with the XGB CPU module is saved in the CANopen master module.

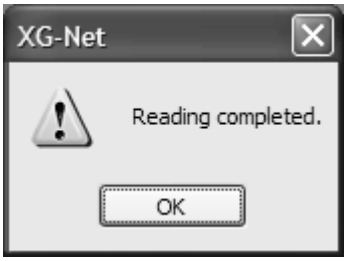
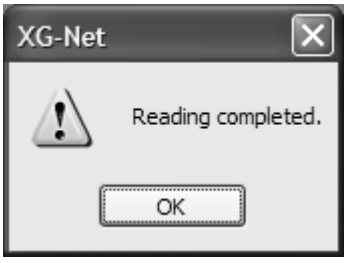
When replacing the CANopen master module, backup the parameter setting using the XG5000 or XG-CANopen.

6.5.3 Read

This function reads CANopen parameters from the CANopen master module. Reading can be conducted in the XG-CANopen or XG5000.

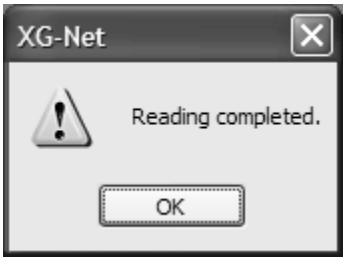
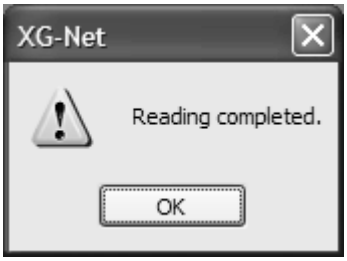
1) Read in XG-CANopen

Read the parameters stored in the CANopen master module.

No	Process	Procedure
1	Read form PLC	
	1. Select menu [Project]-[Open From PLC]. 2. Enter connection setting and click the Confirm button. 3. When reading has been completed, finish window appears.	
2	Read	
	1. With the project open, select menu [Online]-[Read] to connect the PLC via online. 2. Select menu [Online]-[Read]. 3. If there are two masters in the open project, select Master.	

2) Read in XG5000

If reading is carried out in the XG5000, and if CANopen master module is installed, CANopen parameters are read, too

No	Process	Procedure
1	Open from PLC	
	1. Select menu [Project]-[Open From PLC]. 2. Enter connection setting and click the Confirm button. 3. When reading has been completed, finish window appears.	
2	Read	
	1. With the project open, select menu [Online]-[Connect] to connect the PLC via online. 2. Select menu [Online]-[Read].	

Note

Only when the CANopen module is set up in the base/slot information of the I/O parameter, CANopen parameter information is read from the CANopen master module.

6.5.4 Monitor

XG-CANopen monitor displays PDO variable (device) values and diagnosis variable values.
PDO variable values can be viewed in the PDO variable table in the master set up window and the values of the diagnosis variables can be viewed in the system configuration diagram window.

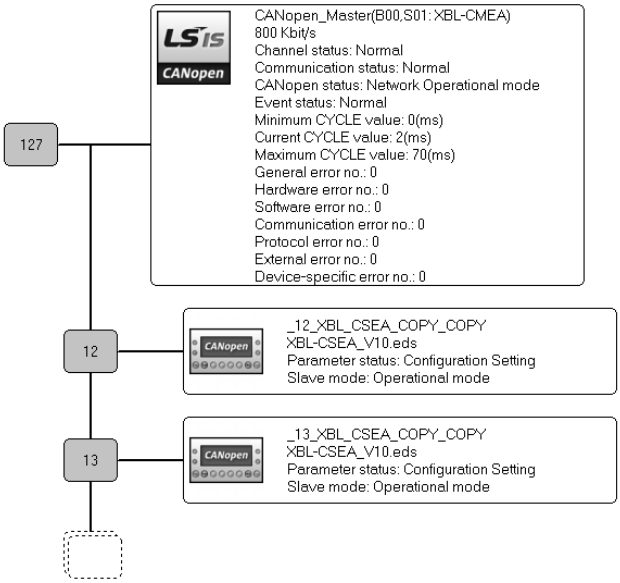
[Order]

1. Select menu [Online]-[Connect] to connect the PLC via online.
2. Select menu [Online]-[Start Monitor] to start monitor.
3. If the PDO variable tab and diagnosis variable tab are active, monitor mode is activated.
4. Select menu [Online]-[End Monitor] to stop the monitor,

1) Monitor function in the View Network

[Order]

1. In the monitor mode, select [View]-[View Network].



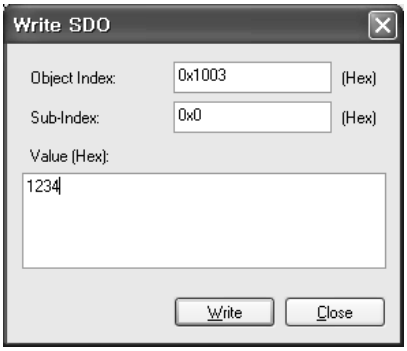
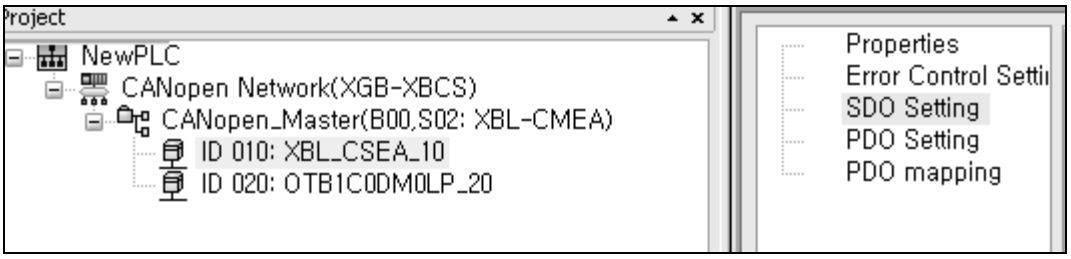
Note

For the monitor function, accurate monitoring of the current status is possible only when the error control setting of the slave is selected.
In the default network view, the meanings of the states are as follows;
1) No monitor value in the monitor mode: monitor value has yet not been read after starting up the monitor. Momentarily appeared and then disappeared soon.
2) If the master status is error;
   a) When no monitor value is available
   b) When the channel status is error: if any one or more of the channel status is 1
   c) When the common status is error: if any one or more of the common status is 1
   d) When the event status is error: if any one or more of the event status is 1

3) About the slave node
  a) No monitor value in the monitor mode: monitor value has yet not been read after starting up the monitor. Momentarily appeared and then disappeared soon.
    - Slave status: not allocated to the master.
  b) If the slave status is error:
    (1) No monitor value is available
    (2) Configuration error
    (3) EMCY error
    (4) If not in operational mode
4) Color indication
  a) if in monior mode
    (1) Green: normal
    (2) Red: Error. For master node, refer to master status error,
        For slave node, refer to slave stauts error
  b) If not in monitor mode (edit mode): white

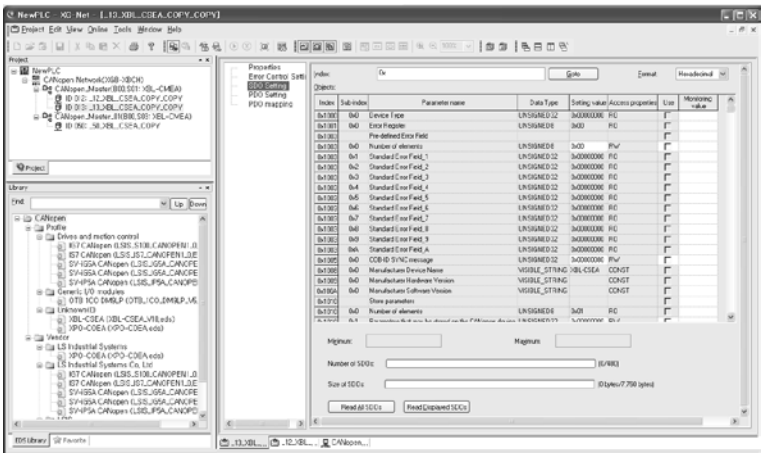
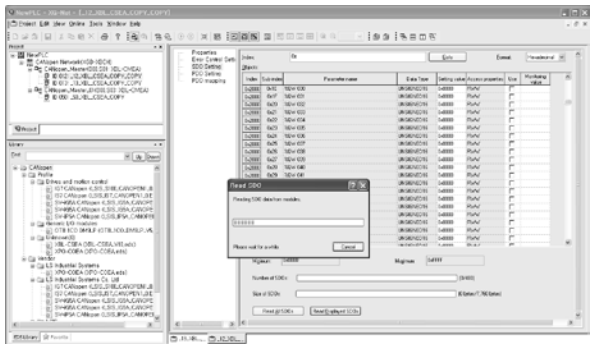
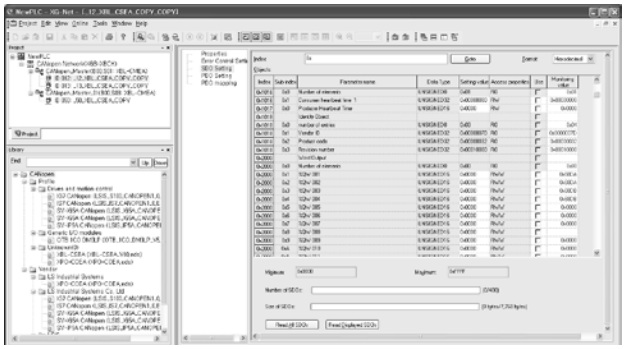
6.5.5 Write SDO

The SDO value of slave module can be modified. The changed value after SDO writing can be checked using the SDO setting tab in the slave edit window by viewing all or viewing current screen only..

No	Process	Procedure
1	Write SDO	 
	1. Select menu [Online]-[Access] to connect the PLC 2. Select menu [Online]-[Writing SDO], or click SDO setting in slave side, and right click the mouse at the object with which Write SDO will be executed, and carry out write SDO. 3. In the Write SDO dialog, edit the object index and sub-index values, and select the Write button. Here, Write SDO is allowed only when the access attribute of the object list is RW.	

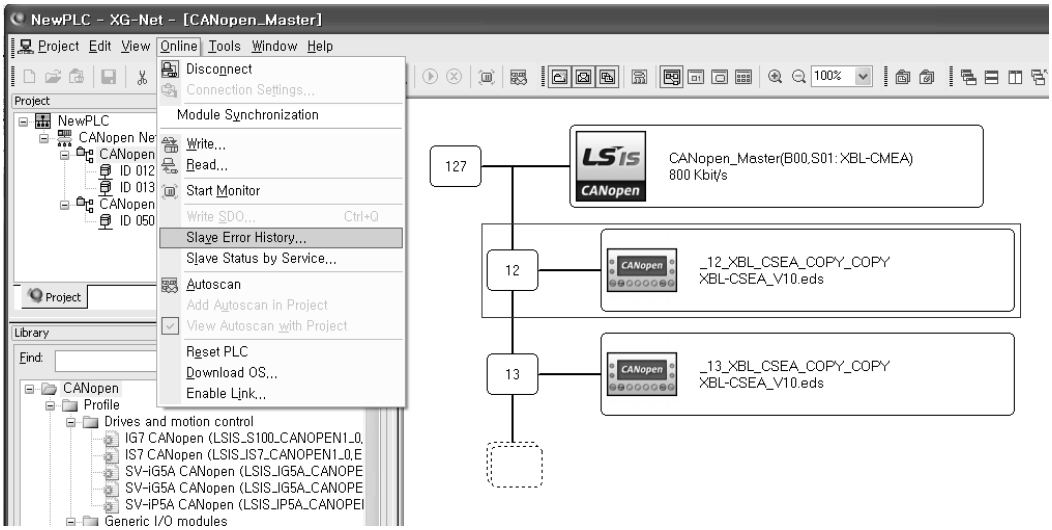
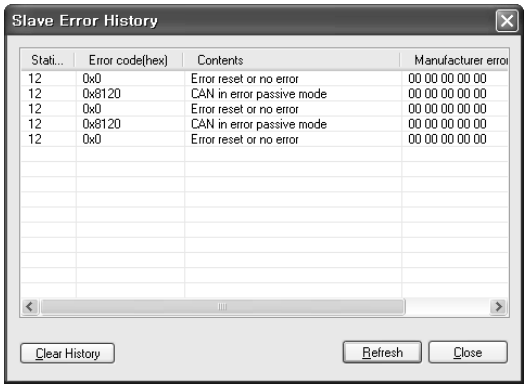
6.5.6 Read SDO

The current value of the SDO in the slave module can be read. Select [Read All or Read Current Screen Only from the SDO setting tab in the slave edit window.

No	Process	Procedure
1	Select SDO	
	1. Double click the slave item in the project tree, open the specification edit window. 2. In the slave edit window, select SDO Setting.	
2	Read SDO	 
	1. Select menu [Online]-[Connect] to connect the PLC 2. Select [Read All SDOs] or [Read Displayed SDOs] button. 3. The SDO value read from the object list in the SDO setting tab is displayed in the monitoring value.	

6.5.7 Slave Error History

Shows the latest 5 errors of the individual slave which is conducting CANopen communication .

순서	설정과정	설정방법
1	Slave Error History	
	1. Select menu [Online]-[Connect] to connect the PLC 2. From the project tree, select the slave item for which error history is to be searched. 3. Select menu [Online]-[Slave Error History].	
2	Detail Slave Error History	
	1. Station No.: shows the station No. of the slave 2. Error code: shows the error code 3. Content: shows the content of the error 4. Manufacturer error code: shows the error code inscribed by the slave manufacturer 5. Clear History: Clear the slave error histories 6. Close: close the dialog.	

Note

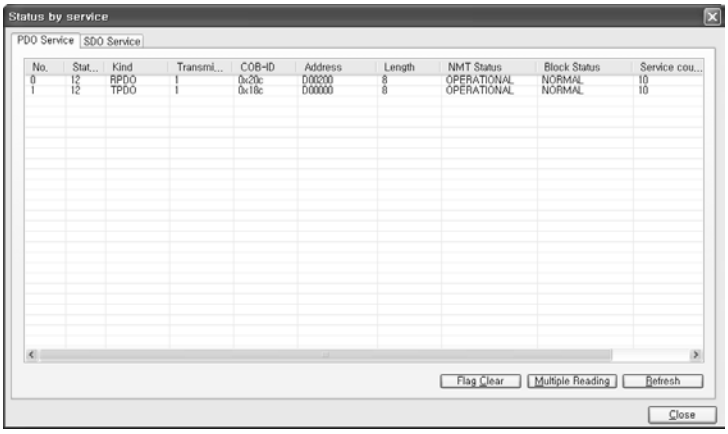
CiA(CAN in Automation) Standard defines error code as follows.

Error code	Description
0000_h	Error reset or no error
1000_h	Generic error
2000_h	Current – generic error
2100_h	Current, CANopen device input side – generic
2200_h	Current inside the CANopen device – generic
2300_h	Current, CANopen device output side – generic
3000_h	Voltage – generic error
3100_h	Mains voltage – generic
3200_h	Voltage inside the CANopen device – generic
3300_h	Output voltage – generic
4000_h	Temperature – generic error
4100_h	Ambient temperature – generic
4200_h	Device temperature – generic
5000_h	CANopen device hardware – generic error
6000_h	CANopen device software – generic error
6100_h	Internal software – generic
6200_h	User software – generic
6300_h	Data set – generic
7000_h	Additional modules – generic error
8000_h	Monitoring – generic error
8100_h	Communication – generic
8110_h	CAN overrun (objects lost)
8120_h	CAN in error passive mode

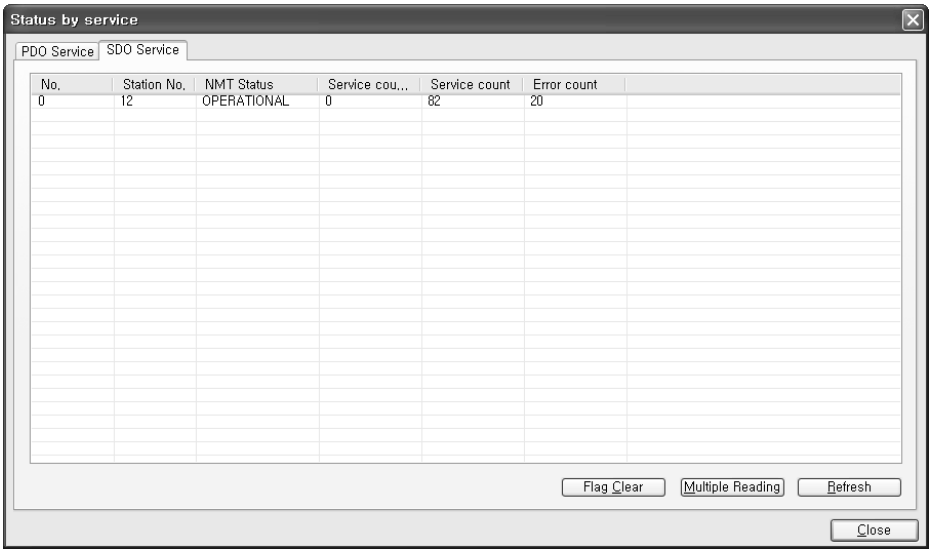
Error code	Description
8130_h	Life guard error or heartbeat error
8140_h	recovered from bus off
8150_h	CAN-ID collision
8200_h	Protocol error - generic
8210_h	PDO not processed due to length error
8220_h	PDO length exceeded
8230_h	DAM MPDO not processed, destination object not available
9000_h	External error – generic error
$F000_h$	Additional functions – generic error
$FF00_h$	Device specific – generic error

6.5.8 Slave Status by Service

Shows the PDO/SDO service statuses .

No	Process	Procedure
1	Slave Status by Service (PDO service)	

1. Select menu [Online]-[Connect] to connect the PLC
2. From the project tree, select the slave item for which error history is to be searched.
3. Select menu [Online]-[Slave Service by Status].
4. The details of the system history are as follows;
   (1) No.: order of parameter during downloading
   (2) Station No.: shows the station No. of the slave
   (3) Kind: shows the type (TPDO, RPDO) of the PDO
   (4) Transmission type: shows the transmission type of the PDO
   (5) COB-ID: shows the COB-ID of the PDO.
   (6) Address: shows the starting address of the device mapped on the PDO
   (7) Length: shows the entire size of the object mapped on the PDO
   (8) NMT status: shows the status of NMT
   -The NMT status can be INIT, PREOPERATIONAL, OPERATIONAL, or STOPPED
   (9) Block status: shows the status of PDO block
   -The block status can be INIT, NORMAL, or ABNORMAL
   (10) Service count: shows No. of services per one second
   (11) Flag clear: initializes the values of the No, of services per s, No. of services, and No. of errors
   (12) Multiple Reading: reads PDO service status continuously
   (13) Refresh: reads PDO service status again

No	Process	Procedure
2	Slave Status by Service (SDO Service)	

1. Select menu [Online]-[Connect] to connect the PLC
2. From the project tree, select the slave item for which error history is to be searched.
3. Select menu [Online]-[Slave Service by Status].
4. In the status by service dialog, select [SDO Service] tab.
5. The details of the system history are as follows;
   (1) No.: order of parameter during downloading
   (2) Station No.: shows the station No. of the slave
   (3) NMT status: shows the status of NMT
      -The NMT status can be INIT, PREOPERATIONAL, OPERATIONAL, or STOPPED
   (4) Service count per second: shows No. of services per one second
   (5) Service count: shows No. of all the services
   (6) Error count: shows No. of all the errors
   (7) Flag clear: initializes the values of the No, of services per s, No. of services, and No. of errors
   (8) Multiple reading: reads SDO service status continuously.
   (9) Refresh: reads PDO service status again.

6.5.9 Autoscan

From a real CANopen network whose device configuration is unknown, collect slave information via master module and investigate the network configuration to create a configurable topology screen.

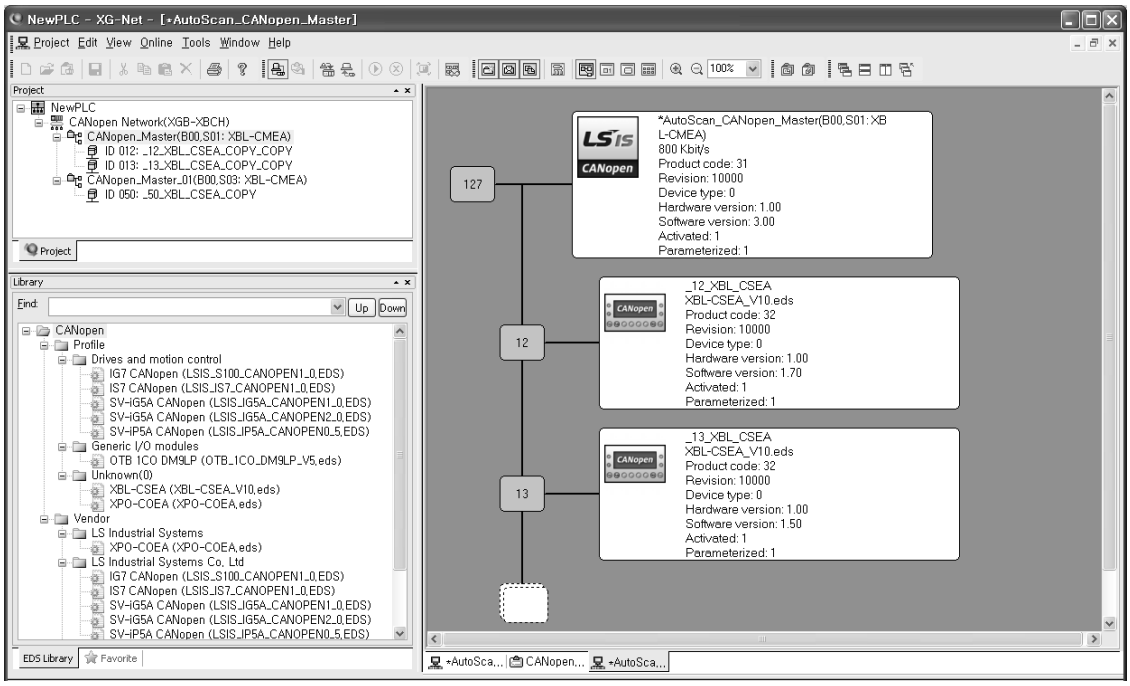
Result of Autoscan is displayed in the network configuration screen. The list of the slaves to the master which has conducted Auto Scan is created.

The display window varies by the View mode of the network window.

If [Autoscan] menu is clicked again during Auto Scanning, the Autoscan information is read to update the screen.

[Order]

1. Select menu [Online]-[Connect].
2. Select the master which will conduct Auto Scan.
3. Select menu [Online]-[Autoscan].



Note

At Auto Scan, only the information of the slaves whose baud rate is the same as that of the master can be obtained.
Following information can be obtained in Auto Scan;

1) Product code: information in the EDS file
2) Revised version: information in the EDS file
3) Device type: information in the EDS file
4) Hardware version: information in the EDS file
5) Software version: information in the EDS file
6) Operating state: shows the operating state of the module
7) Parameter existence: shows the existence/inexistence of module parameter

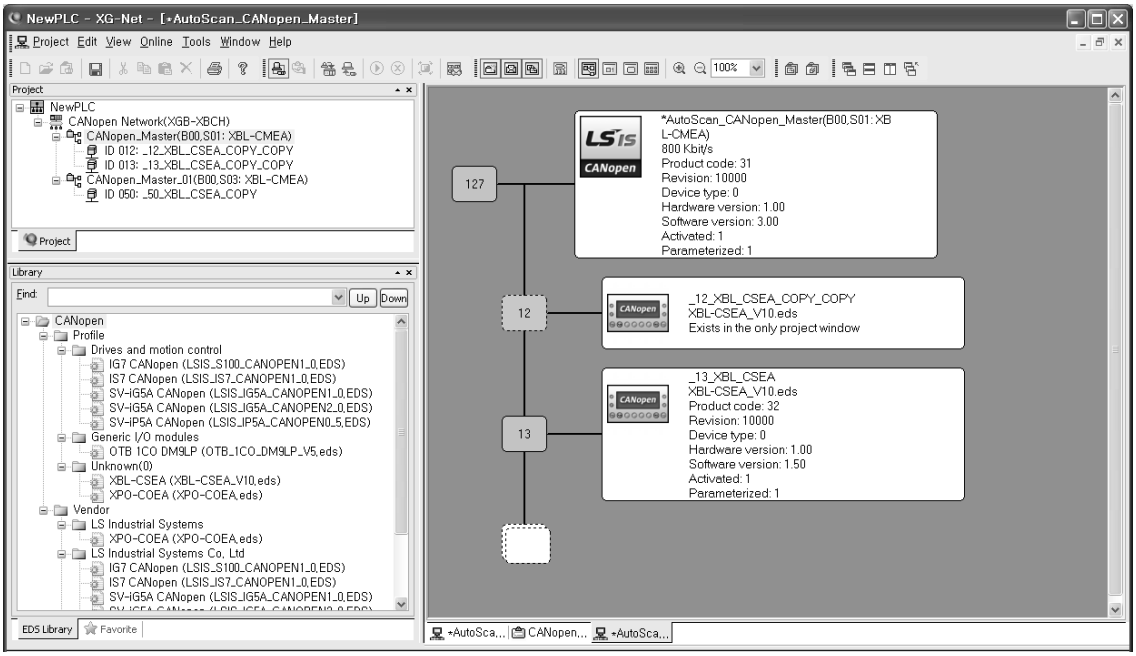
6.5.10 View Autoscan with Project

The data obtained from Auto Scan are compared with the project window and displayed in network configuration screen.

[Order]

1. Select menu [Online]-[Connect].
2. Select the master which will conduct Auto Scan.
3. Select menu [Online]-[Autoscan].
4. Select menu [Online]-[View AutoScan with Project]

The operating conditions of the [View Autoscan with Project] menu are as follows;
- Checked: the information on the project window and Auto Scan information are displayed in comparison.
- Unchecked: only the existing Auto Scan information is displayed.



Note

The background colors of the station number indicate following information;

1) Green: the project window and Auto Scan information are identical

2) Red: EDS cannot be found, or the station number read by Auto Scan exists on the project but the EDS information is different

3) Orange: exists in the Auto Scan information only and no parameter exists

4) Gray: exists only in the project window

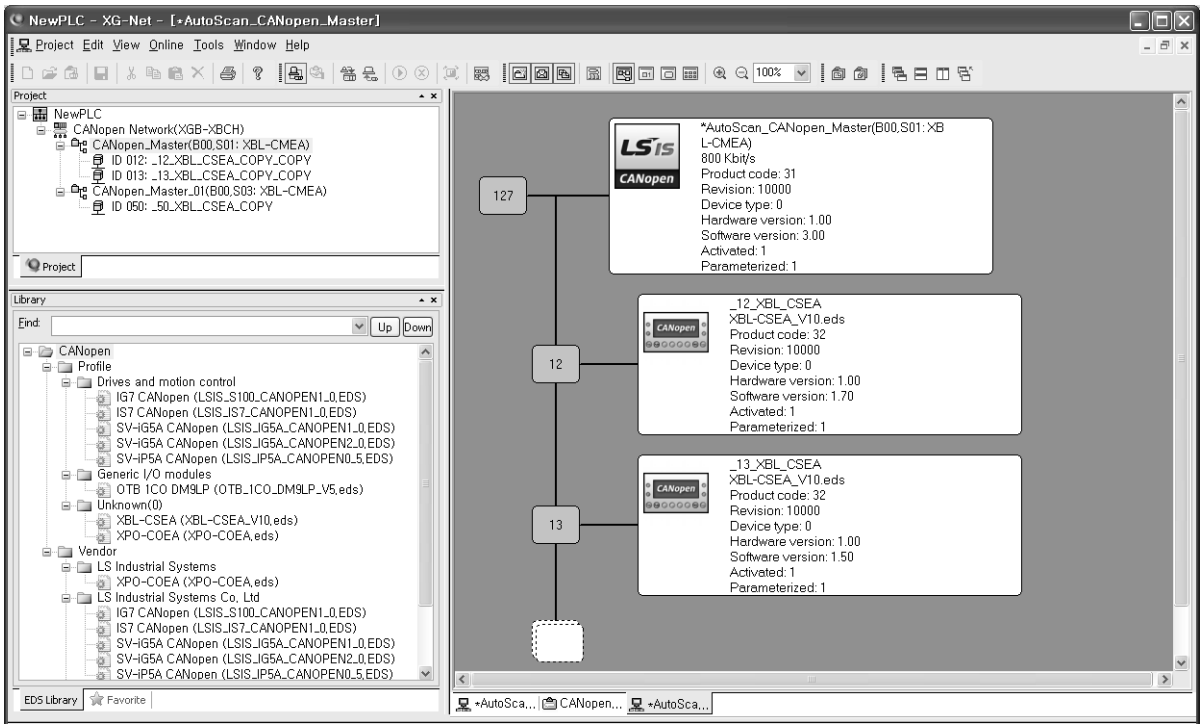
6.5.11 Add Autoscan in Project

Although not actually registered with the master(not registered project window in XG-CANopen) as a slave, the EDS information acquired from the Auto Scan is added in the project window.

[Order]

1. Select menu [Online]-[Connect].
2. Select the master which will conduct Auto Scan.
3. Select menu [Online]-[Autoscan].
4. Select menu [Online]-[Add Autoscan in Project].

Delete the slave information added in the existing project window, and configure the project window with the data obtained from the Autoscan



Note

The slave name added to project is set up "_Station No._Module name" format.

The messages which can be generated when adding to a project are as follows;

1) Master name is in the project after Auto Scan: master name changed, thus, cannot be added to the project
2) Data obtained from previous Auto Scan are deleted from the memory: no Auto Scan data, thus, cannot be added to the project
3) Slave station No. exceeds the range of 1 ~ 127: the slave station No. is invalid, thus, cannot be added to the project.

6.5.12 Rest PLC

PLC can be reset. PLC can be reset with the reset dip switch of the PLC too.

[Order]

1. Select menu [Online]-[Connect] to connect the PLC
2. Select menu [Online]-[Reset PLC].
3. Select reset type and click Confirm button to reset the PLC.

.

Note

Remember that PLC is energized again after reset

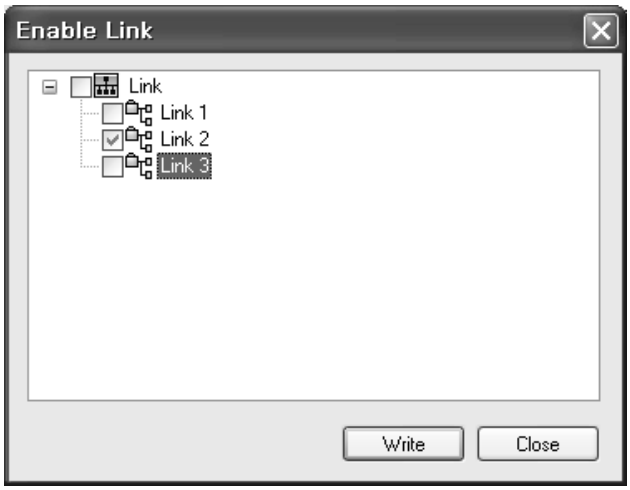
6.5.13 Enable Link

Link Enable starts CANopen communication in accordance with the downloaded parameter.

If not checked, CANopen communication doesn't operate

[Order]

1. Select menu [Online]-[Connect] to connect the PLC
2. Select menu [Online]-[Link Enable].
3. Select the module to conduct link enable, click the Write button.

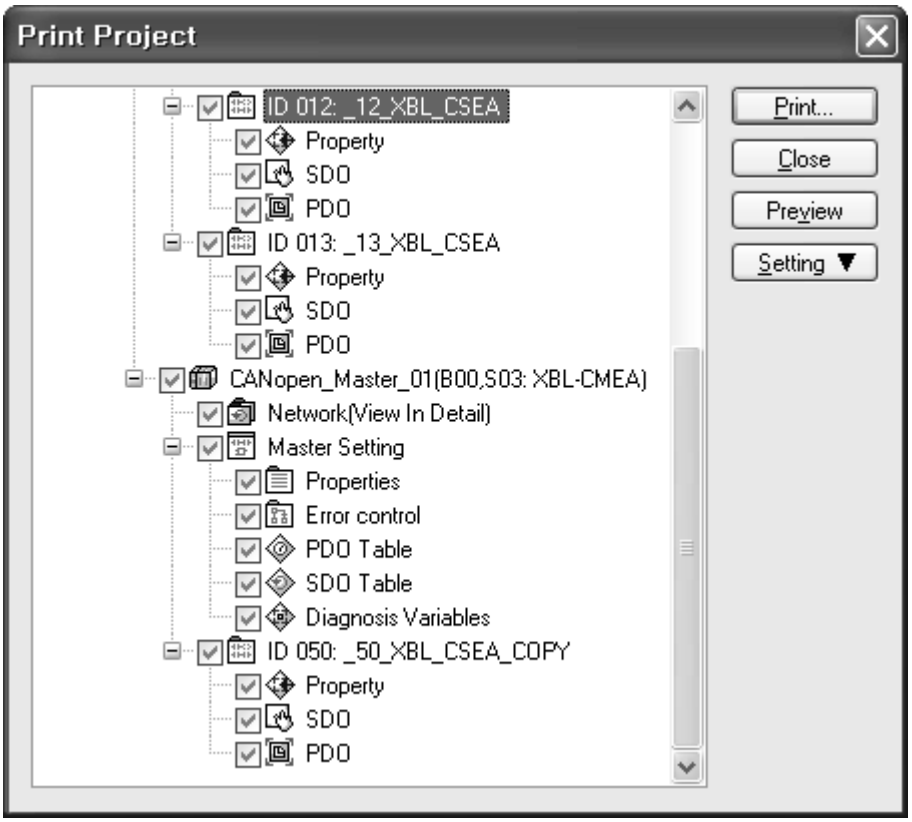


6.6 Print

6.6.1 Print Project

This function prints the whole content of the project in order.

The function can select the items to be printed and set up and preview the setting required for te printing, and perform print function.

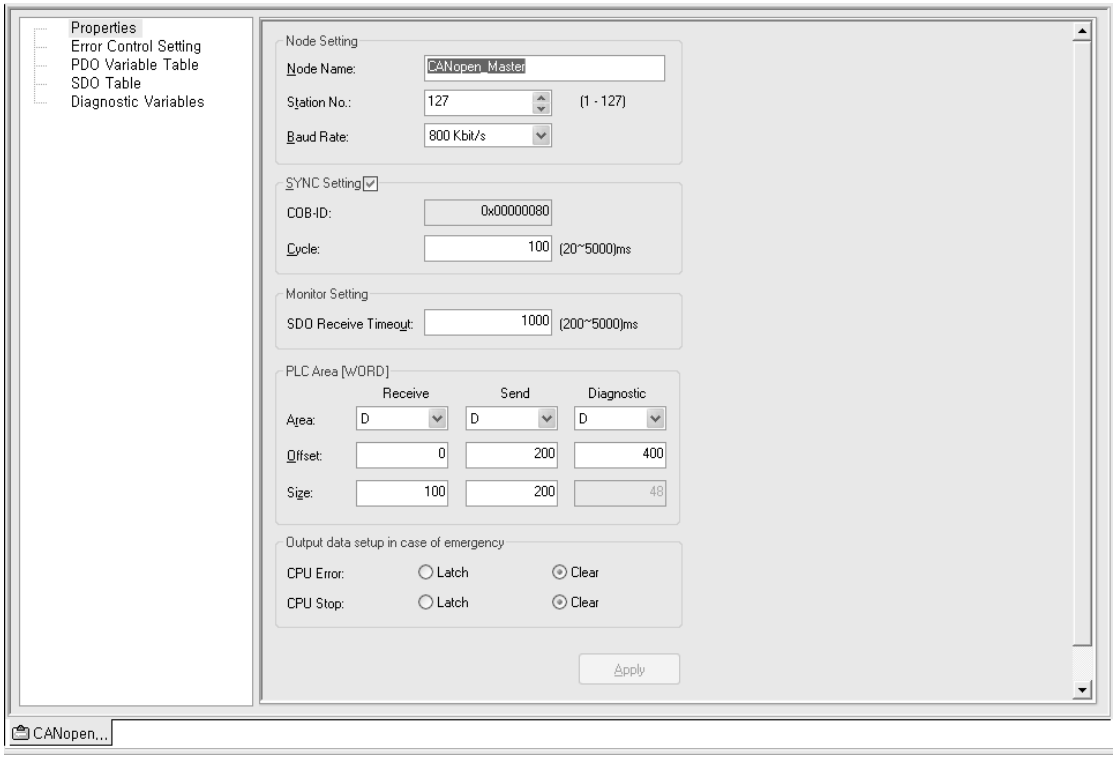
No	Process	Procedure
1	Slave Status by Service (PDO Service)	
		1. Select menu [Project]-[Print Projects]. 2. Print Project dialogue appears. 3. Select the items to be printed and click [Print] button.

Chapter 7 Master Setting using XG-CANopen

Edit windows of the master module(XBL-CMEA) will be displayed when double click of project widow(master module) is executed.

7.1 Properties

With the master registration information tab, the basic data of the master are set up. Registration information can be coarsely classified into node setting, SYNC setting, monitor setting and PLC reception/transmission area setting.



7.1.1 Node setting

1) Node name: enter name of the master node (master module) The restrictions are as follows;.

(1) Shorter than 256 Alphabet letters.

(2) The first letter must be an Alphabet or a Korean letter, or "_"

(3) The following letters can be Alphabets or Korean letters, figures or "_"

2) Station No.

Enter station No. to the modules operating as a master, within the range of 1~127.

3) Baud rate

Enter the communication speed, within the range of 10kbps~1Mbps.

7.1.2 SYNC Setting

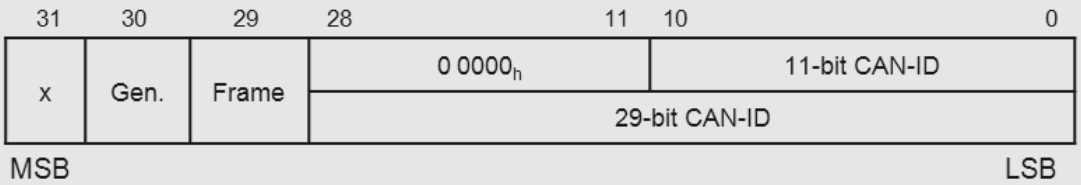
1) SYNC messages are received only when SYNC is checked. If not checked, the data which need to be synchronized to SYNC for transmission cannot be transmitted. In other words, if the PDO transmission type is 0~240, or 252, transmission cannot be carried out.

2) The value of COB-ID[*Note1)] is SYNC h0000080 when SYNC is set up, or h00000080 when SYNC is not set up, and cannot be changed

3) Cycle period must be entered within the range of 20~5000ms.

Note

The structure of SYNC COB-ID is as follows;



The meanings of bits of the SYNC COB-ID is as follows;

1)x: not in use.

2)Gen: 0-CANopen device does not generate SYNC message. 1-CANopen device generates SYNC messages.

3)frame: 0 stands for 11 bit CAN-ID (CAN basic frame), 1 stands for 29 bit CAN-ID (CAN expanded frame).

4)The meanings of bit 0-28 differs by frame value as in the above structure.

7.1.3 Monitor Setting

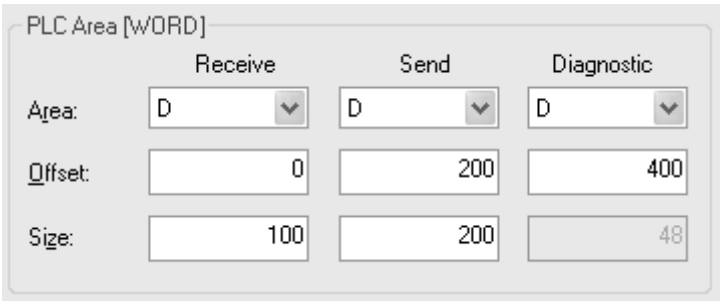
Means SDO reception time out, and the input range is 200~5000ms.

7.1.4 PLC Area

Set up the addresses and sizes of the devices to be allocated to the objects of the mapped RPDO/TPDO parameters.

Available address types are P, M, and D for type K, and I, Q, M, and D for type IEC.

The areas are allocated to reception and transmission areas, and 48 words (XGB) are allocated for the area for the diagnosis variables used for monitoring communication error and monitor information.

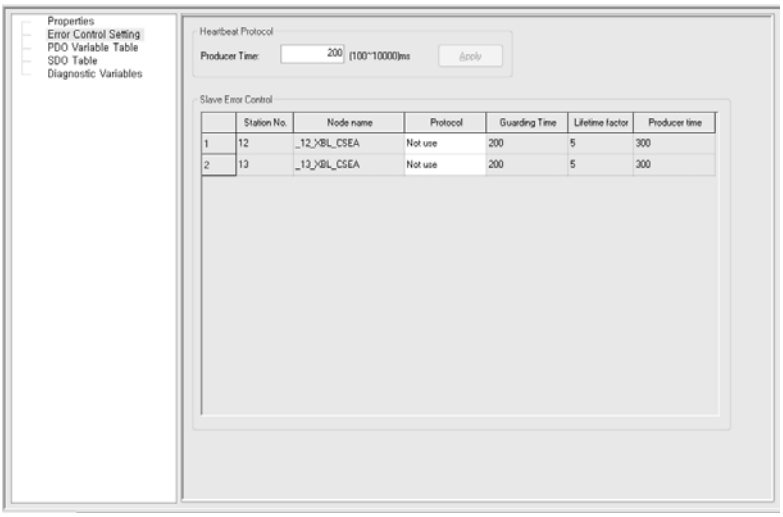


7.1.5 Output data setup in case of emergency

This function decides, in case of CPU error or CPU is changed to stop, whether the data is cleared (initialized to zero) or latched (maintain the last data value).

7.2 Error Control Setting

Sets up the error control related values of the master nodes and slave nodes of the CANopen network in the current configuration. XG-CANopen supports Heartbeat protocol and Node Guarding protocol. Newly set parameters are effective when Apply button is clicked.



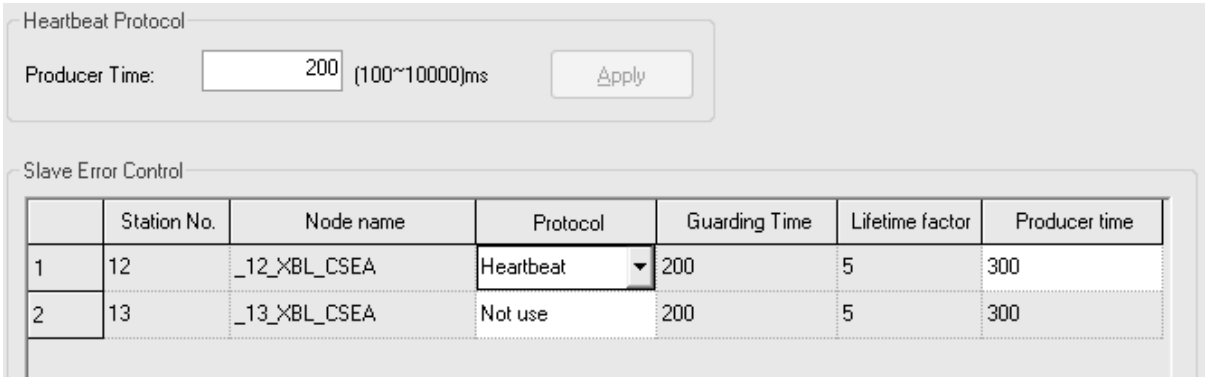
7.2.1 Heartbeat Protocol Setting

This means the producer time[Note1)] of the heartbeat protocol for the master module.

7.2.2 Slave Error Control

This is activated only when the error control protocol is selected in the slave error control setting.

From the slave error control list, select an error control protocol for each slave. For heartbeat, enter producer time only, but for node guarding, enter guard time and lifetime factor, too.



Note

1) When setting up the heartbeat producer time, if the baudrate is 100kbps or less, the producer times of the master and slave must be set to 500ms or above for normal operation.

Note

1) The error control service is used to detect the error in the CAN based networks. This is mainly implemented with the message sent from CANopen device on regular basis. Two types of error control methods are available; Node Guarding and Heartbeat. Since the XGB CANopen master supports both heartbeat and node guarding, it can control error with the slaves supporting heartbeat by heartbeat method, and with the slaves supporting node guarding by node guarding method.

2) Node Guarding

Node Guarding is conducted by NMT (Network Management) master sending guarding request (RTR, Remote Transmission Request). The meanings of the guard time and node lifetime are as follows;

If a slave device fails to receive the RTR from NMT master within the node lifetime, it judges that it is a remote node error (NMT master) and notices a life guarding event to the application. When RTR is received after an error occurrence, the error status is reset.

If the master device fails to receive the reply to RTR from the slave within the node lifetime, or, reply has been received but the state of the NMT slave in the response frame fails to meet the expectation, it notices a node guarding event to the application.

When the reply to the RTR from the slave is received after a timeout error, or the master has received expected NMT slave state after an error caused by NMT state, the error status is reset.

▶ Guard time (or node guard time): NMT master sends RTRs to check the state of slave at constant time intervals which is the guard time. This can be set up differently for different slaves.

▶ Node lifetime: calculated with the formula (Guard time x Lifetime Factor). This can be set up differently for different slaves.

3) Heartbeat

Heartbeat producers send heartbeat messages and heartbeat consumers receive heartbeat messages. The heartbeat is different from guarding by that the roles of the master and slave are not divided and the heartbeat producers send heartbeat messages by broadcasting.

Therefore, the message transmitted from a producer is received by multiple consumers.

If heartbeat message is not received for a given time period, the device acting as the heartbeat producer determines an error. The error status is reset when a heartbeat message is received.

▶ Heartbeat producer time

The period at which a heartbeat producer transmits heartbeat messages.

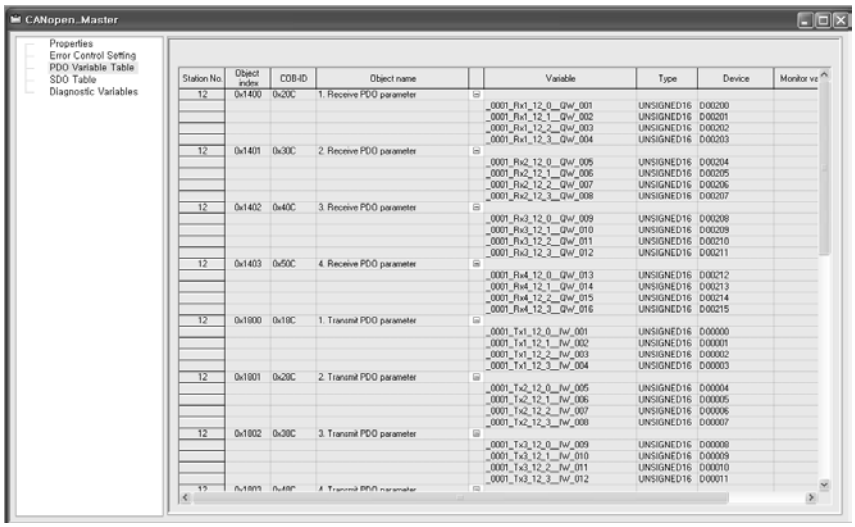
▶ Heartbeat consumer time

A heartbeat consumer judges error if it fails to receive a heartbeat message within the heartbeat consumer time. In the XGB CANopen master, the consumer time is not set up as a parameter but as 1.5 times of the producer time, internally. That is, all the slaves set the consumer time by 1.5 times of the producer time. The master also sets up with 1.5 times of the producer time set up in the slaves. The consumer time of master can be set up differently for different slaves.

7.3 POD Variable Table

The POD Variable Table shows the names of the PDO mapping object variables set up at the slave.

These variables can be used by XG5000.



7.3.1 Variable

Variables represent the mapping information per PDO object set up in the respective slave. Variables are in the form of: [_Base and slot positions of master module_Transmission/reception type_Sv station No._Mapped order_ Parameter name].

Object name		Variable
1. Receive PDO parameter	⊟	
		_0001_Rx1_12_0__QW_001
		_0001_Rx1_12_1__QW_002
		_0001_Rx1_12_2__QW_003
		_0001_Rx1_12_3__QW_004

E.g.: _0001_Rx1_12_0_QW_001
0001: No. 0 base o. 1 slot (in the order of Base/Slot)
Rx1: Receive PDO1
12: slave station No.
0: mapped order
_QW_001: name of the parameter declared in EDS

7.3.2 Device

This means allocating the mapping information of the objects set up in slave to the master devices. To allocate devices automatically, select menu [View] → [Build], or execute Online → Write menu.

Station No.	Object index	COB-ID	Object name		Variable	Type	Device	Monitor value
20	0x1400	0x214	1. Receive PDO parameter	⊟				
					_0002_Rx1_20_0__QW_001	UNSIGNED16	D00200	
					_0002_Rx1_20_1__QW_002	UNSIGNED16	D00201	
					_0002_Rx1_20_2__QW_003	UNSIGNED16	D00202	
					_0002_Rx1_20_3__QW_004	UNSIGNED16	D00203	

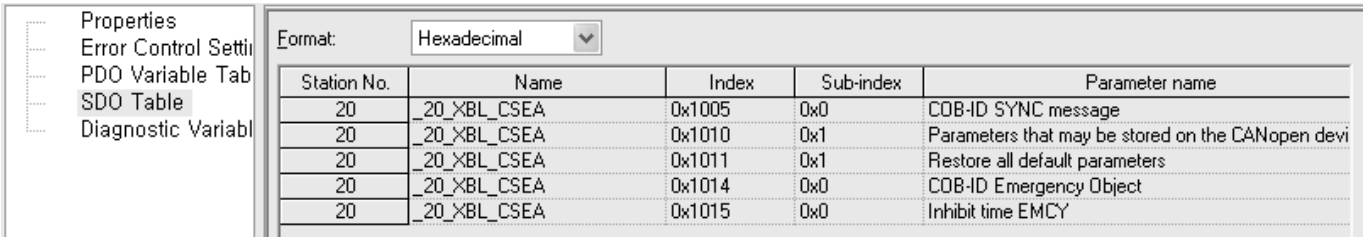
7.3.3 Monitor

This is used to monitor the master device values. Click online monitor execution to check the respective device value.

Station No.	Object index	COB-ID	Object name		Variable	Type	Device	Monitor value
20	0x1400	0x214	1. Receive PDO parameter	⊟				
					_0002_Rx1_20_0__QW_001	UNSIGNED16	D00200	21845
					_0002_Rx1_20_1__QW_002	UNSIGNED16	D00201	21845
					_0002_Rx1_20_2__QW_003	UNSIGNED16	D00202	21845
					_0002_Rx1_20_3__QW_004	UNSIGNED16	D00203	21845

7.4 SDO Table

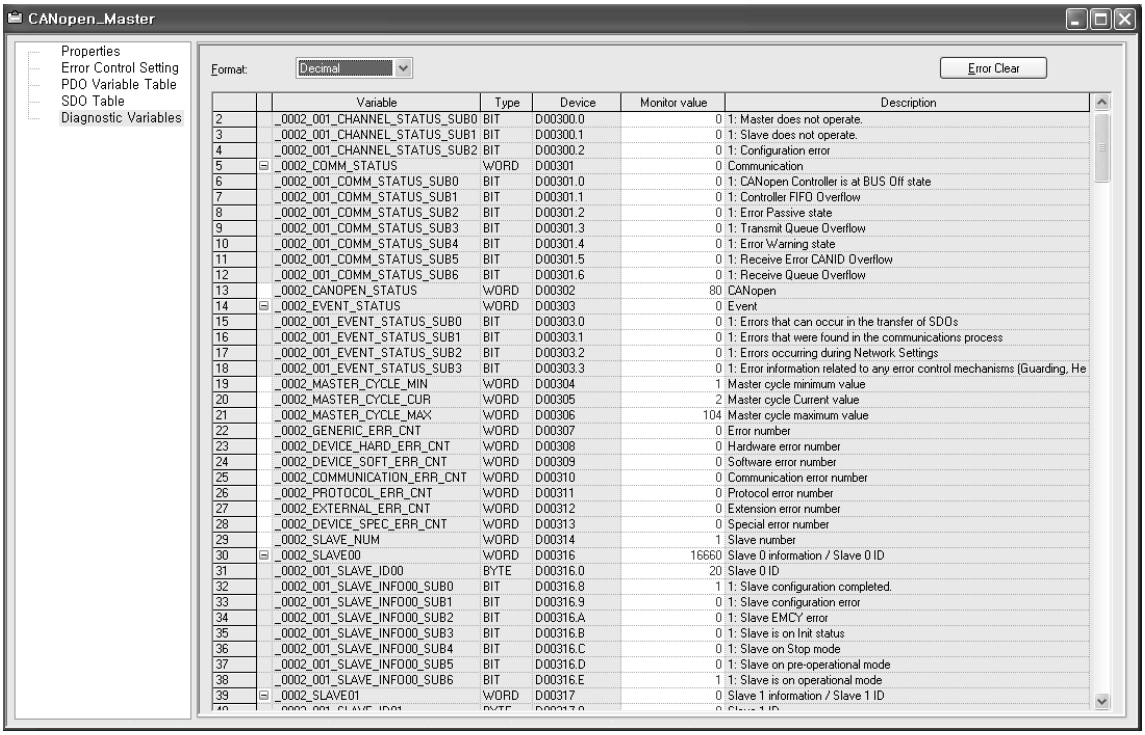
SDO table shows the entire list of the SDOs which are set up to be used by the slave. Here, only monitoring of the SDOs set up per slave is allowed and editing is not allowed. If editing is required, use the SDO setting tab of the respective slave.



Station No.	Name	Index	Sub-index	Parameter name
20	_20_XBL_CSEA	0x1005	0x0	COB-ID SYNC message
20	_20_XBL_CSEA	0x1010	0x1	Parameters that may be stored on the CANopen devi
20	_20_XBL_CSEA	0x1011	0x1	Restore all default parameters
20	_20_XBL_CSEA	0x1014	0x0	COB-ID Emergency Object
20	_20_XBL_CSEA	0x1015	0x0	Inhibit time EMCY

7.5 Diagnostic Variables

This function enables to monitor the status information of the master module and slave modules. In the Diagnosis Variable status, select [Online] → [Start Monitoring] to monitor current states, where the meanings of the items are presented in the table below. The variable names consist of "Base_Slot_Variable." Addresses are allocated sequentially starting from the offset address of the diagnosis variable area of the master. 96 bytes are used for each master.



2		_0002_001_CHANNEL_STATUS_SUB0	BIT	D00300.0	0 1: Master does not operate.
3		_0002_001_CHANNEL_STATUS_SUB1	BIT	D00300.1	0 1: Slave does not operate.
4		_0002_001_CHANNEL_STATUS_SUB2	BIT	D00300.2	0 1: Configuration error
5	⊟	_0002_COMM_STATUS	WORD	D00301	0 Communication
6		_0002_001_COMM_STATUS_SUB0	BIT	D00301.0	0 1: CANopen Controller is at BUS Off state
7		_0002_001_COMM_STATUS_SUB1	BIT	D00301.1	0 1: Controller FIFO Overflow
8		_0002_001_COMM_STATUS_SUB2	BIT	D00301.2	0 1: Error Passive state
9		_0002_001_COMM_STATUS_SUB3	BIT	D00301.3	0 1: Transmit Queue Overflow
10		_0002_001_COMM_STATUS_SUB4	BIT	D00301.4	0 1: Error Warning state
11		_0002_001_COMM_STATUS_SUB5	BIT	D00301.5	0 1: Receive Error CANID Overflow
12		_0002_001_COMM_STATUS_SUB6	BIT	D00301.6	0 1: Receive Queue Overflow
13		_0002_CANOPEN_STATUS	WORD	D00302	80 CANopen
14	⊟	_0002_EVENT_STATUS	WORD	D00303	0 Event
15		_0002_001_EVENT_STATUS_SUB0	BIT	D00303.0	0 1: Errors that can occur in the transfer of SDOs
16		_0002_001_EVENT_STATUS_SUB1	BIT	D00303.1	0 1: Errors that were found in the communications process
17		_0002_001_EVENT_STATUS_SUB2	BIT	D00303.2	0 1: Errors occurring during Network Settings
18		_0002_001_EVENT_STATUS_SUB3	BIT	D00303.3	0 1: Error information related to any error control mechanisms (Guarding, He
19		_0002_MASTER_CYCLE_MIN	WORD	D00304	1 Master cycle minimum value
20		_0002_MASTER_CYCLE_CUR	WORD	D00305	2 Master cycle Current value
21		_0002_MASTER_CYCLE_MAX	WORD	D00306	104 Master cycle maximum value
22		_0002_GENERIC_ERR_CNT	WORD	D00307	0 Error number
23		_0002_DEVICE_HARD_ERR_CNT	WORD	D00308	0 Hardware error number
24		_0002_DEVICE_SOFT_ERR_CNT	WORD	D00309	0 Software error number
25		_0002_COMMUNICATION_ERR_CNT	WORD	D00310	0 Communication error number
26		_0002_PROTOCOL_ERR_CNT	WORD	D00311	0 Protocol error number
27		_0002_EXTERNAL_ERR_CNT	WORD	D00312	0 Extension error number
28		_0002_DEVICE_SPEC_ERR_CNT	WORD	D00313	0 Special error number
29		_0002_SLAVE_NUM	WORD	D00314	1 Slave number
30	⊟	_0002_SLAVE00	WORD	D00316	16660 Slave 0 information / Slave 0 ID
31		_0002_001_SLAVE_ID00	BYTE	D00316.0	20 Slave 0 ID
32		_0002_001_SLAVE_INFO00_SUB0	BIT	D00316.8	1 1: Slave configuration completed.
33		_0002_001_SLAVE_INFO00_SUB1	BIT	D00316.9	0 1: Slave configuration error
34		_0002_001_SLAVE_INFO00_SUB2	BIT	D00316.A	0 1: Slave EMCY error
35		_0002_001_SLAVE_INFO00_SUB3	BIT	D00316.B	0 1: Slave is on Init status
36		_0002_001_SLAVE_INFO00_SUB4	BIT	D00316.C	0 1: Slave on Stop mode
37		_0002_001_SLAVE_INFO00_SUB5	BIT	D00316.D	0 1: Slave on pre-operational mode
38		_0002_001_SLAVE_INFO00_SUB6	BIT	D00316.E	1 1: Slave is on operational mode
39	⊟	_0002_SLAVE01	WORD	D00317	0 Slave 1 information / Slave 1 ID

Variable	Type	Description
CHANNEL_STATUS	WORD	Channel information BIT0=1: master is not activated BIT1=1: 1 or more slaves are not in Operational mode BIT2=1: 1 or more slaves have configuration error
COMM_STATUS	WORD	Communication information BIT0=1: CAN controller "BUS Off"status BIT1=1: CAN controller receiver buffer overflow BIT2=1: CAN controller in "Error Passive"status BIT3=1: internal transmission queue overflow BIT4=1: CAN controller in "Error Warning"status BIT5=1: received message exceeds CANID valid range error BIT6=1: internal reception queue overflow

Variable	Type	Description
CANOPEN_STATUS	WORD	Master mode information 0x00: initializing, or error 0x10: Reset Node 0x20: Reset Communication 0x30: Stop mode 0x40: Pre-Operational mode 0x50: Operational mode
EVENT_STATUS	WORD	Event information BIT0=1: PUTCOMM, GETCOMM, read present screen only, read all, Reset if error occurs during Writing SDO and cleared if successful with the latest command. BIT1=1: Error[*5] occurred during communication process BIT2=1: when the slaves set up with the parameter differ from those on the network. BIT3=1: among the slaves set up with error control, 1 or more nodes failed error control
MASTER_CYCLE_MIN	WORD	Master cycle min. value (ms)
MASTER_CYCLE_CUR	WORD	Master cycle current value (ms)
MASTER_CYCLE_MAX	WORD	Master cycle max. value (ms)
GENERIC_ERR_CNT	WORD	Count of generic errors. Count of the received emergency messages having codes 10xxH
DEVICE_HARD_ERR_CNT	WORD	Count of device hardware errors Count of the received emergency messages having codes 50xxH
DEVICE_SOFT_ERR_CNT	WORD	Count of device software errors Count of the received emergency messages having codes 60xxH 61xxH, 62xxH, 63xxH
COMMUNICATION_ERR_CNT	WORD	Communication error count Count of the received emergency messages having codes 81xxH
PROTOCOL_ERR_CNT	WORD	Protocol error count Count of the received emergency messages having codes 82xxH
EXTERNAL_ERR_CNT	WORD	Count of external errors. Count of the received emergency messages having codes 90xxH
DEVICE_SPEC_ERR_CNT	WORD	Count of device-specific errors Count of the received emergency messages having codes FFxxH
SLAVE_NUM	BYTE	No. of the slaves set up in parameter (max.: 32)
Reserved	3*BYTE	Reserved
SLAVE_ID_0 ~ n	BYTE	ID of the slaves set up in parameter (1 ~ 127)
SLAVE_INFO_0 ~ n	BYTE	BIT0=1: slave configuration progress completed BIT1=1: slave configuration error BIT2=1: when slave EMCY error exists (Cleared if the latest recorded Emcy is h8140, 0x00xx) BIT3=1: Init status BIT4=1: Stop mode BIT5=1: Pre-Operational mode BIT6=1::Operational mode BIT7: Reserved

Note

1) CHANNEL_STATUS: master module's channel information
   a) BIT0: 1 if stack initialization error, 0 if initialization normal Set to 1 at reset, link inactive, or parameter downloading, then set to 0 after parameter download success or link becomes active, after stack initialization.
   b) BIT1: 1 if 1 or more slaves set up in the parameter have non-operational modules, or 0 when all the slaves set up in the parameter are operational. (If the BIT6 of SLAVE_INFO_n is 1, the status is "Operational.")
   c) BIT2: 1 if 1 or more slaves set up in the pmt have modules having configuration errors, 0 otherwise. (If the BIT1 of SLAVE_INFO_n is 1, the status is "Configuration error.")
2) CHANNEL_STATUS: master module's communication status information
   a) BIT0: 1 if the CAN controller is "Bus Off" status
      Occurs when TEC (Transmit Error Counter) is 256 or more.
   b) BIT1: 1 if CAN controller receiver buffer overflow
      This occurs when another message is received before the received message in the CAN controller buffer is read
   c) BIT2: 1 if the CAN controller is in "error passive" status
      This occurs when TEC (Transmit Error Counter) or REC (Receive Error Counter) is 128 or more.
   d) BIT3: 1 if internal transmission queue overflow.
      This occurs when other data is added to the transmission queue of the master before transmitting data.
   e) BIT4: 1 of the CAN controller is in "error warning" status.
      This occurs when TEC (Transmit Error Counter) or REC (Receive Error Counter) is 96 or more.
   f) BIT5: 1 if the CAN ID exceeds the range.
      This occurs when the CAN ID of the received message is not extended id and h800 or above, and not h801 (error no event).
   g) BIT6: 1 if internal reception queue overflow.
      This occurs when other data is added to the receiver queue of the master before receiving the data.
3) CANOPEN_STATUS: master status information
   a) h0000: Master Init or Error. Master stack's initial status or error status.
   b) h0010: Reset Node. Module reset, after parameter downloading, master status is changed to node reset status.
   c) h0020: Reset Communication. After node reset completed. Changed to communication reset status.
In this status, Communication objects are initialized.
   d) h0030: Stop status
   e) h0040: Pre-Operational status
   f) h0050: Operational status
4) EVENT_STATUS: event status information
   a) BIT0: 1 if the error occurred at SDO transmission exists, otherwise, set to 0.
      1 if error occurs during PUTCOMM, GETCOMM, read current screen only, read all, or writing SDO, or 0 if the latest command succeeds.
   b) BIT1: error occurred during communication: 1 if the slave is set up with mapping parameter or comes under anyone of the following cases during communication, 0 otherwise.
      - Count 8 which is the maximum number for mapping is exceeded
      - 64 bits which is the entire mapping size is exceeded
      - Set up object cannot be mapped
      - Access right is illegal
      - Object type or size is different

- Object does not exist

c) BIT2: 0 if the nodes set up in the parameter and network coincide, 1 otherwise.

d) BIT3: 1 if guarding or heartbeat error has occurred, 0 otherwise.

5) MASTER_CYCLE_MIN: min. scan cycle time in the master module (ms)

6) MASTER_CYCLE_CUR: current scan cycle time in the master module (ms)

7) MASTER_CYCLE_MAX: max. scan cycle time in the master module (ms)

Under 8) ~ 14), at each reception of Emcy event from slave, the respective error count is increased according to the error code range.

8) GENERIC_ERR_CNT: generic error count. No. of the received Emcy messages having the error codes of 10xxH.

9) DEVICE_HARD_ERR_CNT: device hardware error count, No. of the received Emcy messages having the error codes of 50xxH.

10) DEVICE_SOFT_ERR_CNT: device software error count, No. of the received Emcy messages having the error codes of 60xxH, 61xxH, 62xxH, and 63xxH.

11) COMMUNICATION_ERR_CNT: communication error count, No. of the received Emcy messages having the error codes of 81xxH.

12) PROTOCOL_ERR_CNT: protocol error count, No. of the received Emcy messages having the error codes of 82xxH.

13) EXTERNAL_ERR_CNT: external error count, No. of the received Emcy messages having the error codes of 90xxH.

14) DEVICE_SPEC_ERR_CNT: Device-specific error count, No. of the received Emcy messages having the error codes of FFxxH.

15) SLAVE_NUM: No. of the slaves set up in the parameter (max. 32)

16) SLAVE_ID_n: n-th slave set up in the parameter ID (1~127)

17) SLAVE_INFO_n:status to SLAVE_ID_n

a) BIT0: slave configuration completed, PDO mapping parameter and SDO default value downloading have been completed and SDO write, read, Auto Scan, and XG5000 command execution are possible. When the value is 0, SDO write, read, Auto Scan and , XG5000 command request are processed as an error.

b) BIT1: slave configuration error, meaningful only when BIT0 is 1. When the BIT0 is 1, the value is 0 If the slave node status is Operational, or 1 if it is not Operational and judged to be normal configuration has failed.

c) BIT2: slave EMCY error occurred
Referring to the slave history (stored up to latest 5 per slave), 1 if there is saved error(s) and the latest error code is neither 00XXh (Error reset or no error) nor h8140, 0 if there is no saved error or the latest error code is either 00XXh (Error reset or no error) or h8140.

d) BIT3: Init status. 1 if configuration has not been completed, or the status is not Stop, Pre-Operational, or Operational, 0 otherwise.

e) BIT4: Stop mode. 1 if in Stop status, 0 otherwise.

f) BIT5: Pre-Operational mode. 1 if in Pre-Operational status, otherwise 0.

g) BIT6: Operational mode. 1 if in Operational status, otherwise 0.

Note

* In the above Note 8) ~ 14), the Emcy errors received from XBL-CSEA are as presented in the table below.

Error Code Classification	Error Code	Remark
COMMUNICATION_ERR_CNT	0x8110	Los of message occurred due to CAN controller receiver buffer overflow, or internal transmission/reception queue overflow
	0x8120	CAN controller is in “Error Passive” status
	0x8130	Heartbeat error has occurred
	0x8140	CAN controller has recovered from “Bus Off” status
	0x8150	Invalid COB-ID has been received. The message is not processed.
PROTOCOL_ERR_CNT	0x8210	PDO was not processed as a length error. Length of the received PDO is shorter than the initial mapping value
	0x8220	Length of the received PDO is longer than the initial mapping value The PDO data are processed.
	0x8240	SYNC data length error. Since the CSEA does not support SYNC counter, judges an error if the dlc (data length counter) of the received SYNC message is not 0, and does not process the SYNC message.

Note

When the Error Clear button is selected in the Diagnosis Device, following items are cleared;

1) COMM_STATUS
   BIT3=1: internal transmission queue overflow
   BIT5=1: received message exceeds CANID valid range error
   BIT6=1: internal reception queue overflow
2) EVENT_STATUS
   BIT0=1: error occurred during SDO transmission
   BIT1=1: Error occurred during communication process
3) MASTER_CYCLE_MIN, MASTER_CYCLE_CUR, MASTER_CYCLE_MAX
4) GENERIC_ERR_CNT, DEVICE_HARD_ERR_CNT, DEVICE_SOFT_ERR_CNT, COMMUNICATION_ERR_CNT, PROTOCOL_ERR_CNT, EXTERNAL_ERR_CNT, DEVICE_SPEC_ERR_CNT

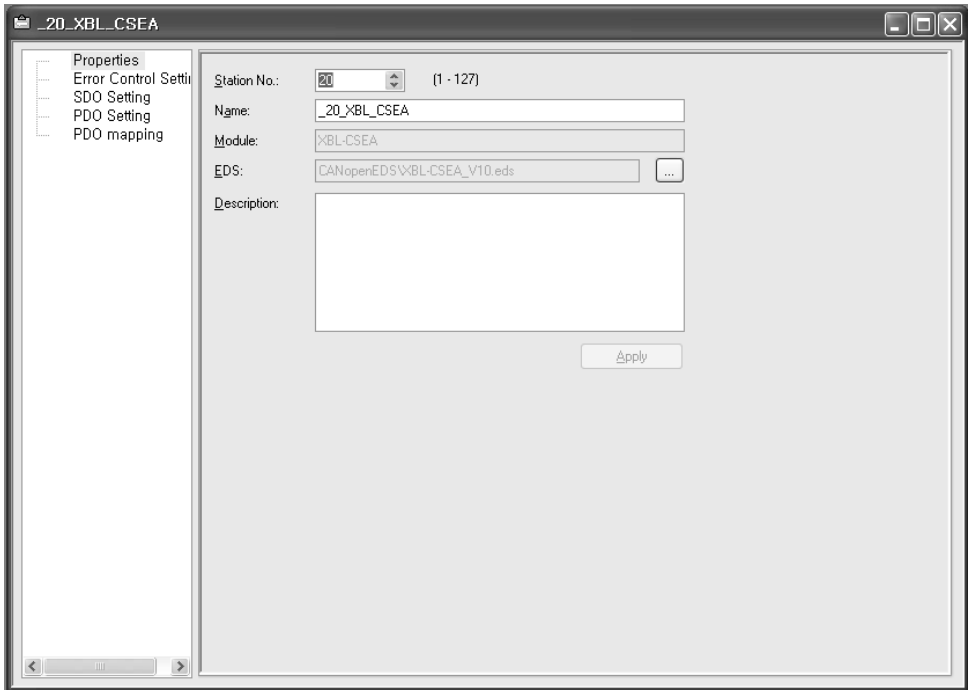
Chapter 8 Slave Setting using XG-CANopen

The slave setting window consists of registration information, error control setting, SDO setting, PDO setting and PDO mapping. Edit windows of the Slave module will be displayed when double click of project widow(Slave module) is executed.

8.1 Properties

With the slave Properties tab, the basic data of the slave are set up.

The Properties consist of station No., name, module name, EDS and description.



[Figure 8.1.1] Slave Setting

8.1.1 Station No.

A slaves must have a unique station number, ranging from 1 to 127, within the network.

8.1.2 Name

Name of the slave assigned by the user. The name must be unique to identify the slave. Like the master node. Slave names have restrictions. It length must not exceed 20 Alphabets, with the first letter in an Alphabet or Korean alphabets, or "_" followed by Alphabets or Korean alphabets, figures, or "_."

8.1.3 Module

Moules(porduct name) specified in the EDS file of the slave. Automatically entered when the EDS file is selected, and cannot be changed.

8.1.4 EDS

Shows the EDS file path selected by the user from library. EDS file can be changed using the [...] button to the right.

8.1.5 Description

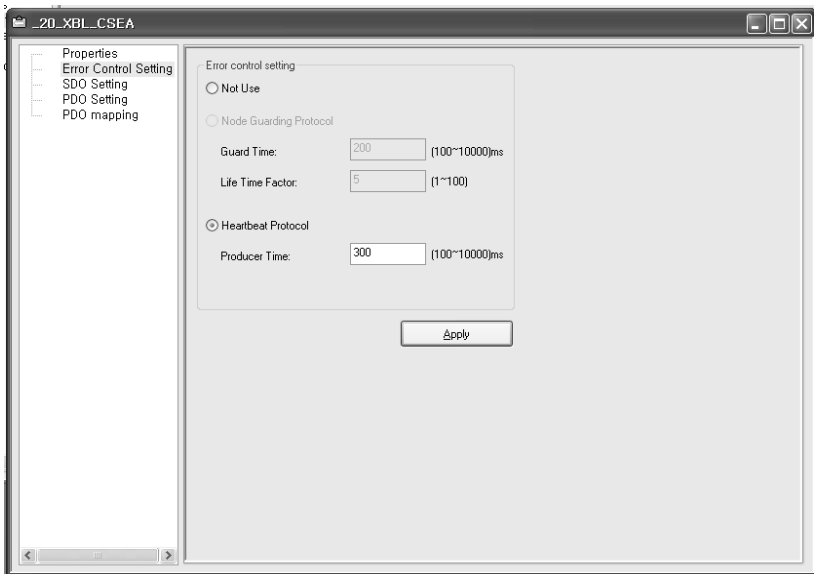
Enter the description of the slave node. Allowable length is 256 bytes(128 Korean letters, 256 Alphabets) of any character.

When registration information has been modified, click the Apply button to apply the cahnge.

8.2 Error control setting

Select error control method for the slave module. When the slave error control setting button is clicked, following screen will appear.

The error control service is used to detect the error in the CAN based networks. This is mainly implemented with the message sent from CANopen device on regular basis. Two types of error control methods are available; Node Guarding and Heartbeat protocols. Since the XGB CANopen master supports both heartbeat and node guarding, it can control error with the slaves supporting heartbeat by heartbeat method, and with the slaves supporting node guarding by node guarding method.



[Figure 8.1.2 Error control setting window

8.2.1 Node Guarding

Node Guarding is conducted by NMT(Network Management) master sending guarding request(RTR, Remote Transmission Request). The meanings of the guard time and node lifetime are as follows;

If a slave device fails to receive the RTR from NMT master within the node lifetime, it judges that it is a remote node error(NMT master) and notices a life guarding event to the application. When RTR is received after an error occurrence, the error status is reset.

If the master device fails to receive the reply to RTR from the slave within the node lifetime, or, reply has been received but the state of the NMT slave in the response frame fails to meet the expectation, it notices a node guarding event to the application.

When the reply to the RTR from the slave is received after a timeout error, or the master has received expected NMT slave state after an error caused by NMT state, the error status is reset.

▶ Guard time (or node guard time): NMT master sends RTRs to check the state of slave at constant time intervals which is the guard time. This can be set up differently for different slaves.

▶ Node lifetime: Calculated with the formula (Guard time x Lifetime Factor). This can be set up differently for different slaves.

8.2.2 Heartbeat

Heartbeat producers send heartbeat messages and heartbeat consumers receive heartbeat messages. The heartbeat is different from guarding by that the roles of the master and slave are not divided and the heartbeat producers send heartbeat messages by broadcasting. Therefore, the messages transmitted from a producer is received by multiple consumers.

If heartbeat message is not received for a given time period, the device acting as the heartbeat producer determines an error. The error status is reset when a heartbeat message is received.

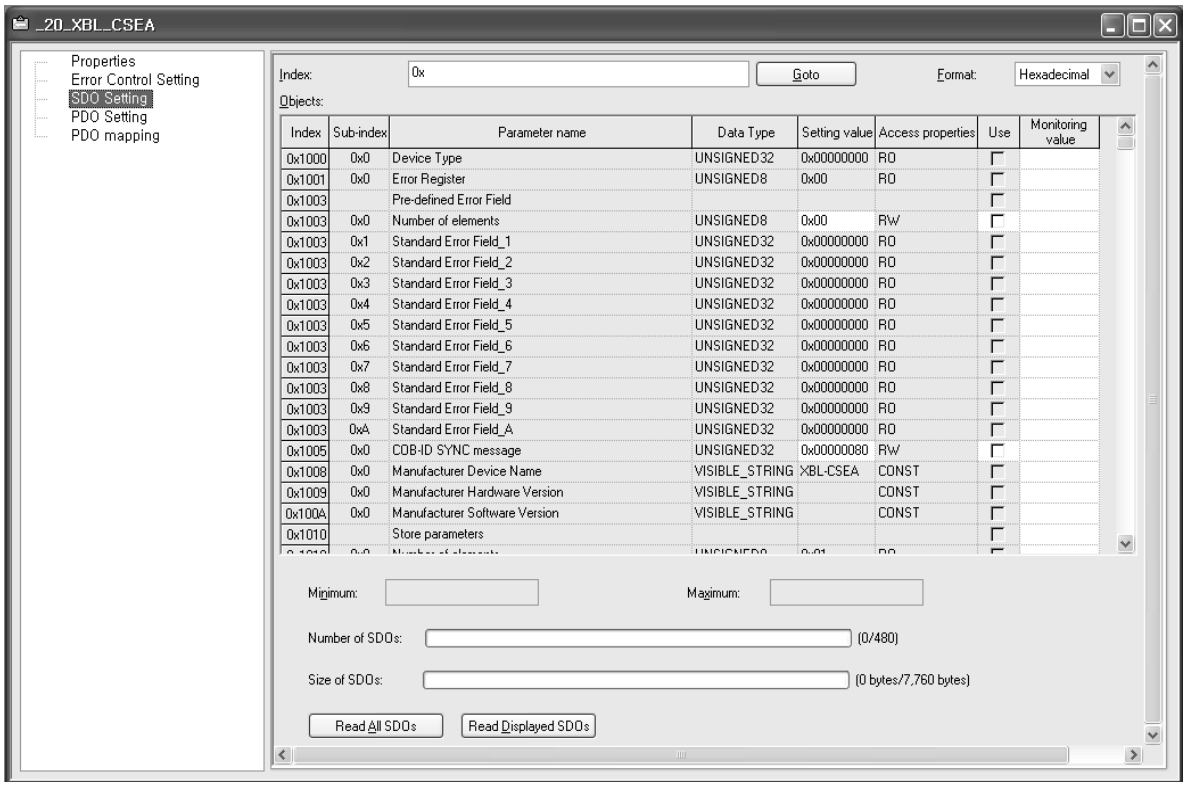
▶ Producer time: the period at which a heartbeat producer transmits heartbeat messages.

Note

Error control setting of our CANopen slave module(XBL-CSEA) supports only heartbeat protocol.

8.3 SDO setting

SDO (Service Data Object) transmission is mainly used to set up the initial values of the devices in the CANopen network. The priority level is low and non-periodic. The objects are classified into 16 bit indexes and 8 bit sub-indexes.



8.3.1 Objects

Shows all the object information recorded in the EDS. For each cell, the [Setting Value] and [Use] cells are activated for editing when the access attribute is RW, and inactive otherwise.

If the user checks the check-box of the Use cell and setup the current value, the setting value is transferred to the respective object when the slave starts operation.

1) Index: the objects in the Object Dictionary are searched using 16 bit indexes.
2) Sub-index: the 8 bit values used for searching the records in the objects.
3) Parameter name: the text string describing an object.
4) Data type: a Table presents the types of all the data.
5) The data types used in the XBL-CSEA are 4 type of; 5 (UNSIGNED8), 6 (UNSIGNED16), 7 (UNSIGNED32), and 9 (VISIBLE_STRING)
6) Setting value: enter the value of the object item checked for use. Entered values are stored in the parameter when the project is saved.

7) Access attribute: the attribute of the object accessibility. For example, writing is allowed by W (Write) attribute.

Access Attribute	Description
RW	Read/Write access allowable
WO	Write Only
RO	Read Only
CONST	Read Only, constant value
RWW	Read/Write accessibility to process output
RWR	Read/Write accessibility to process input

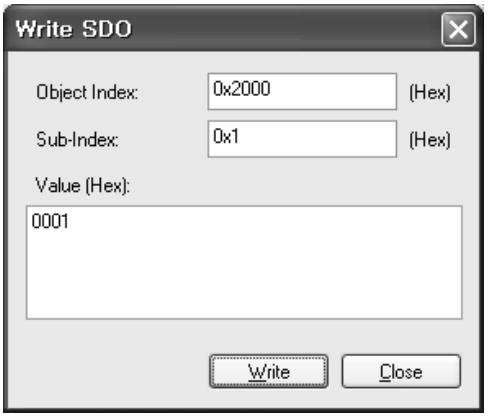
8) Use: select use or no use. If checked, registered with the SDO table of the master module.

8.3.2 Write SDO

Write SOD can be conducted in the 3 methods as follows;

1) Write after module initialization: The value entered into the setting value is downloaded at the time of parameter writing, and the n downloaded to slave device from the master, when the slave id initialized. At this time, the setting value can be entered both online and offline.

2) Writing in operation: this function enables SDO parameter writing during normal operation. SDO writing window appears when Online → Write SDO is selected, or right click the mouse on the setting value and select Write SDO from the context menu. Check the object index and sub-index, enter value and click Write after Input, Write SDO is completed. The result of writing can be checked by selecting Read All Screens or Read Current Screen menu. Writing in operation is applicable in online mode only.



3) Write SDO using instruction

GETCOMM and PUTCOMM commands are used to write and read SDO. For further details, see section [8.4, SDO Command].

8.3.3 Index

The function to search the index presented in the object list of the EDS. Write the index to be searched and select [GO to] button.

8.3.4 Format

Select decimal or hexadecimal system to express object list and minimum and maximum values.

8.3.5 Minimum/Maximum

Refer to the minimum and maximum values of the object selected from the object list. When editing the value in the Current Value cell, if the value exceeds the min./max. value range, an error message is triggered.

8.3.6 Number of SDOs

Show the maximum number of available SDOs and the number of currently set-up SDOs. The maximum number is the maximum that can be set up in the master module.

8.3.7 Size of SDOs

Show the maximum size of available SDOs and the size of currently set-up SDOs. The maximum SDO capacity is the largest capacity that can be set up in the master module.

8.3.8 Writeable Object list when XBL-CSEA is selected

Index	Sub index	Parameter name	Data type	Access property	Min.	Max
h1003	h00	Number of elements	UNSIGNED8	RW	h00	h00
h1005	h00	COB-ID SYNC message	UNSIGNED32	RW	-	-
h1010	h01	Parameters that may be stored on the CANopen device	UNSIGNED32	RW	-	-
h1011	h01	Restore all default parameters	UNSIGNED32	RW	-	-
h1014	h00	COB-ID Emergency Object	UNSIGNED32	RW	-	-
h1015	h00	Inhibit time EMCY	UNSIGNED16	RW	-	-
h1016	h01	Consumer heartbeat time 1	UNSIGNED32	RW	-	-
h1017	h00	Producer Heartbeat Time	UNSIGNED16	RW	h0000	hFFFF
h2000	h01-h80	%QW 001 - %QW 128	UNSIGNED16	RWW	h0000	hFFFF
h2010	h01-h80	%QW 129 - %QW 256	UNSIGNED16	RWW	h0000	hFFFF
H2100	h01-h80	%IW 001 - %IW 128	UNSIGNED16	RO	h0000	hFFFF
h2110	h01-h80	%IW 129 - %IW 256	UNSIGNED16	RO	h0000	hFFFF

▶ h1003: Pre-defined error field

This object provides the error occurred in the CANopen device. The sub-index 0 present the number of error stored from sub-index 1. XBL-CSEA can store up to 10 errors. Only the sub-indexes whose values are stored in the sub-index 0 can be read. For example, if the value is 0 which means there has been no error, reading sub-index value of 1 or higher gives an error message. Wrting 0 into the sub-index 0 will delete the entire error history. Other values than 0 are not allowed to write in.

▶ h1005: SYNC message COB-ID(COB-ID SYNC message)

The SYNC COB-ID can have two values of; h40000080 at SYNC creation, or h00000080 when SYNC is not created. Since SYNC creation exists only one on a network, if there is a master, only h00000080 is allowed.

▶1010: Store parameters

The object enables storing parameters in non-volatile memory. To prevent saving parameter by mistake, the object can be activated by a specific sign value. The recognizable sign value is “save” as shown below.

Signature	MSB			LSB
/ISO8859/ character	e	v	a	s
hex	65_h	76_h	61_h	73_h

▶ h1011: Restore default parameters

The parameter values stored in the flash memory are deleted and the default parameter values kept in the module are restored. To prevent restoring to default parameter by mistake, the object can be activated by a specific sign value. The recognizable sign value is “load” as shown below.

Signature	MSB			LSB
/ISO8859/ character	d	a	o	l
hex	64_h	61_h	$6F_h$	$6C_h$

▶h1014: EMCY COB-ID(COB-ID EMCY)

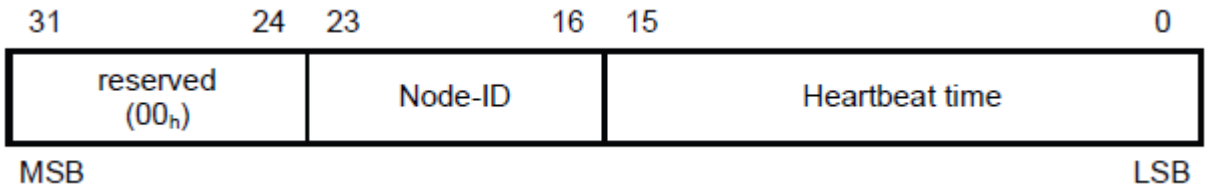
The COB-ID configured for emergency writing service. When the object uexists and the valid is 1, the bit 0-29 is not changed.

▶ h1015: EMCY (Inhibit time EMCY)

Even when an EMCY has occurred, no message is transmitted until the inhibit time has not been elapsed after sending a previous EMCY message. The default value is a multiple of 100u㎲, and 0 inactivates the inhibit time. Allowable setting range is h000~hFFFF.

▶ h1016: Consumer heartbeat time

The structure of the consumer heartbeat time is as shown below. When XBL-CMEA is used as a master, enter the node ID of the master as the Node-ID. The setting range of the heartbeat time is a h0000~hFFFF, and a multiple of 1㎳. If h0000 is set, the consumer heartbeat becomes inactive.

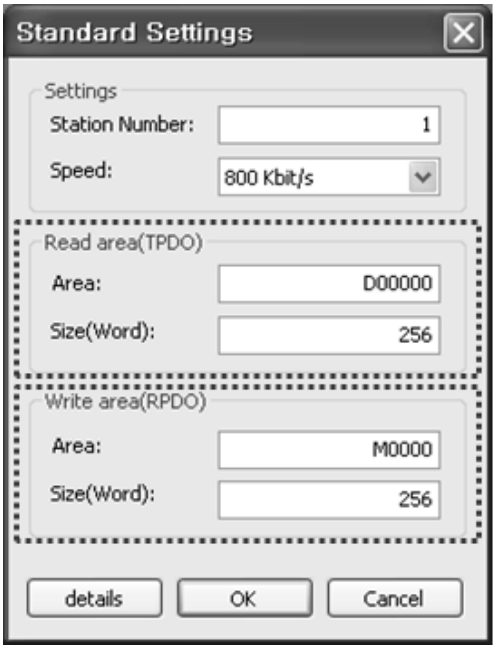


▶h1017: Producer heartbeat time

The setting value is a multiple of 1ms, and h0000 inactivates the producer heartbeat

▶ h2000, h2010: equivalent to the storage field (RPDO) of our slave module.

When the settings are as shown in the dialog shown below, the sub-index 1 of the object h2000 corresponds to the word address D00000 field, and the sub-index h80 corresponds to D00127. The sub-index 1 of the object h2010 points at the word address D00128, and the sub-index h80 points at D00255.



▶ Object h2000, h2010: equivalent to the storage field (TPDO) of our slave module.

When the settings are as shown in the dialog shown below, the sub-index 1 of the object h2100 corresponds to the word address M00000 field, and the sub-index h80 corresponds to M00127. The sub-index 1 of the object h2110 points at the word address M00128, and the sub-index v h80 points at M00255.

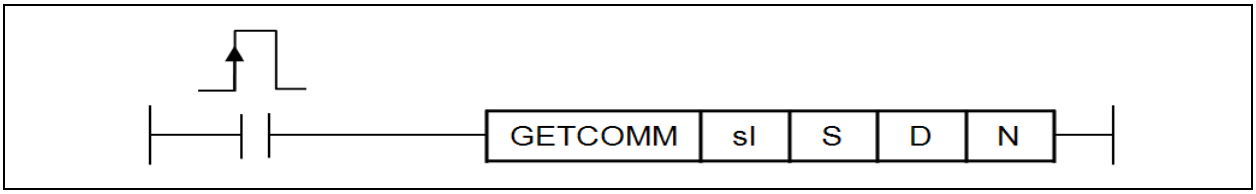
8.4 SDO Command

The SDO command can be classified into GETCOMM and PUTCOMM, which are for reading and writing, respectively. The commands canbe set up for only one sub-index.

8.4.1 GETCOMM

▶ Using in the XBM,XBC Series

Command		Device														Step	Flag		
		PMK	F	L	T	C	S	Z	D.x	R.x	Const.	U	N	D	R		error (F110)	zero (F111)	carry (F112)
GETCOMM	sl	-	-	-	-	-	-	-	-	-	O	-	-	-	-	4~7	O	-	-
	S	O	-	O	-	-	-	-	-	-	-	O	O	O	O				
	D	O	-	O	-	-	-	-	-	-	-	O	O*1)	O	O				
	N	O	-	O	-	-	-	-	-	-	O	O	O	O	O				



[Field Setting]

Operand	Description	Data size
sl	No. of the slot where communication module is installed (set up with hexadecilmal number)	WORD
S	Station number of the slave to be read, SDO index/sub-index	WORD
D	Starting address of the device where the data read from slave is to be stored	WORD
N	Max. bytes of the data to be read from communication module. The actual data are from after N (total size)-8.	WORD

[Flag Set]

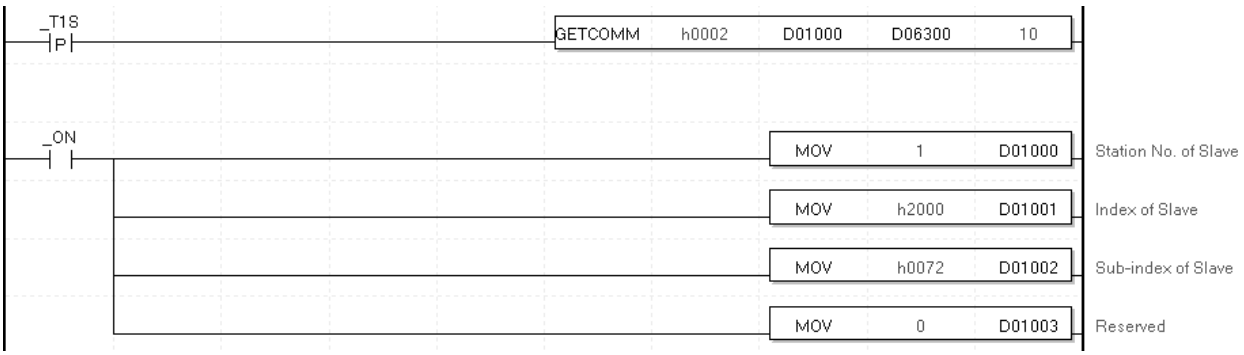
Flag	Description	Device No.
PUTCOMM/ GETCOMM Error	- If no communication module, the bit of the slot turns ON - If the PUTCOMM/GETCOMM command failed to be executed properly, the bit turns ON	F0015 Bit14 of D
PUTCOMM / GETCOMM Complete	- If normal response is received from the corresponding communication module, the bit turns ON	F0023 Bit15 of D

1) This command is for reading the data of the corresponding device via communication module.
2) In the communication module designated with sl (slot No. of the communication module), send 6 byte command data from the internal device field designated with S to the communication module, and save the return result of the communication module in the internal device field designated by operand D. Here, the maximum allowable reception byte is N.
3) If there is no communication module at the position pointed by sl (slot No. of communication module), or the GETCOMM command has failed to be executed properly, the respective location bit of the PUTCOMM/GETCOMM error flag F0015 (WORD) is set.

4) Ths command is not processed in scan synchronous manner. That is, the response from the corresponding device may arrive after several scans, the result cannot be known right after processing the command .
5) Process result check can be confirmed with flag.
6) sl (slot No, of communication module) is set up with two digits in hexadecimal, and if h0002 as shown in the figure below, the h0002 refers to the slot No.
7) (S + 8)Byte or (D + N)Byte exceeds the range, F110 and F115 bits are set.

▶ Exemplary application of GETTCOM

The exemplary software program below reads 4 bytes of data from the index h2000 and h0072 sub-index of the slave station 1, CANOpen master module installed in slot No. 2, and save the data in D6300..



▷ Meanings of the operands

1) sl(h0002): base No. 00, slot No.02
2) S(D1000~D1003): slot and object index

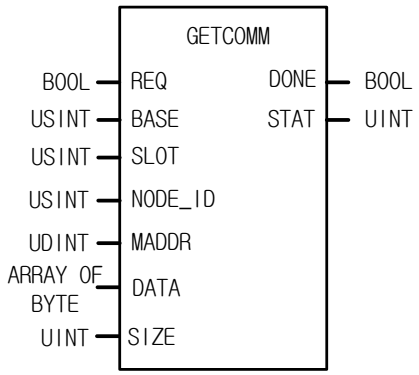
Device	Bit[15-8]	Bit[7-0]	Address Allocation
S + 0	-	Station No. of Slave	D1000
S + 1	Slave-side object index (High)	Slave-side object index (Low)	D1001
S + 2	-	Slave-side object sub-index	D1002
S + 3	Reserved	Reserved	D1003

3) D(6300~D6304)

Device	Bit[15-8]	Bit[7-0]	Address Allocation
D + 0	NDR(Bit15), ERR(Bit14)	-	D6300
D + 1	Length(High)-	Length(Low)	D6301
D + 2	Error Code(High)	Error Code(Low)	D6302
D + 3	Reserved	Reserved	D6303
D + 4	Data0	Data1	D6304

4) N (10): total data length. Pure data length is 2 bytes of N-8

▶ Using in the XEC Series

Function Block	Description
	**Input** **REQ** : executes the function in case of 1 **BASE**: No. of Base installed with the communication module **SLOT**: No. of Slot installed with the communication module **NODE_ID**: Station No. of Slave(1 ~ 127) **MADDR**: SDO index/sub-index of the slave to be read **DATA**: Address of the device where the data read from slave is to be stored (ARRAY of BYTE) **SIZE**: Data size(1 ~ 512 byte) Output **DONE**: If normal response is received from the corresponding communication module, the bit turns ON **STAT** : Error code

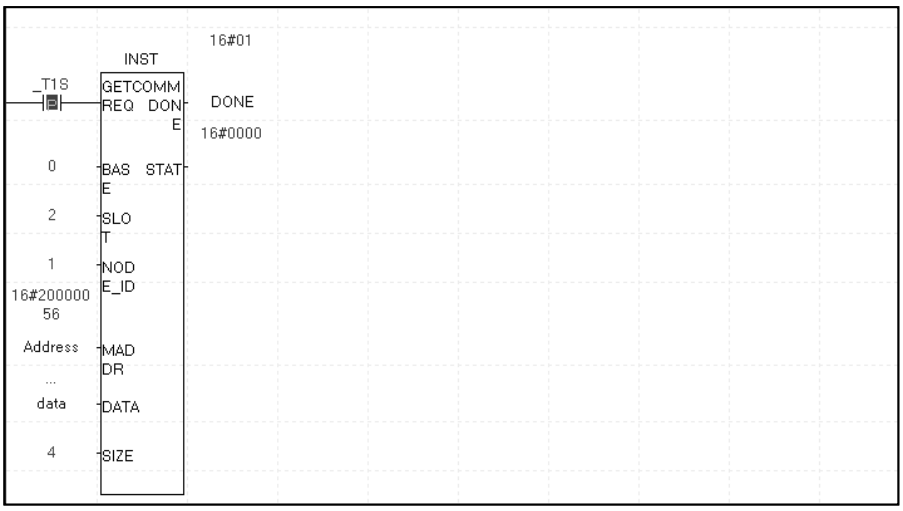
[Flag Set]

Flag	Description	Device No.
PUTCOMM/ GETCOMM Error	- If no communication module, the bit of the slot turns ON - If the PUTCOMM/GETCOMM command failed to be executed properly, the bit turns ON	F0015 Bit14 of D
PUTCOMM / GETCOMM Complete	- If normal response is received from the corresponding communication module, the bit turns ON	F0023 Bit15 of D

1) This command is for reading the data of the corresponding device via communication module.
2) In the communication module designated base and slot No., send designed command to module and save the return data from the communication module . Then the maximum allowable reception byte is SIZE
3) This command is not processed in scan synchronous manner. That is, the response from the corresponding device may arrive after several scans, the result cannot be known right after processing the command .
4) If SIZE is over the data array length, do not execute the command.

▶ Exemplary application of GETCOMM:

The exemplary software program below reads 4 bytes of data from the index h2000 and h0056 sub-index of the slave station 1, CANOpen master module installed in slot No. 2, and save the data in data array variable.



1) BSAE: base NO. of master (0)
2) SLOT: slot NO. of master (2)
3) NODE_ID: station NO. of slave(2)
4) MADDR: OD Index(2000),Sub-Index(0056) of slave

Variable	Description	Variable	Description
High word	OD index	Low word	Sub index

5) DATA: read data of slave(Data0, Data1)

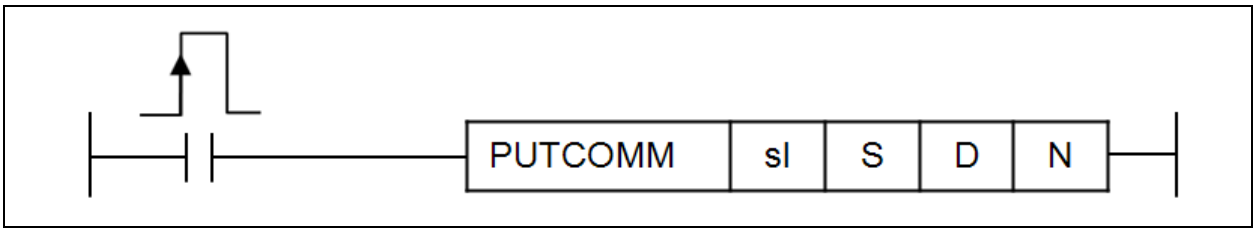
Variable	Description	Variable	Description
data[1]	Length(High)	data[0]	Length(Low)
data[3]	Data0	data[2]	Data1

6) SIZE: Data length(byte): data length(2byte)+ data(2byte)
7) DONE: Status of command

8.4.2 PUTCOMM

▶ Using in the XBM,XBC Series

Command		Device														Step	Flag		
		PMK	F	L	T	C	S	Z	D.x	R.x	Const.	U	N	D	R		error (F110)	zero (F111)	carry (F112)
PUTCOMM	sl	-	-	-	-	-	-	-	-	-	O	-	-	-	-	4~7	O	-	-
	S	O	-	O	-	-	-	-	-	-	-	O	O	O	O				
	D	O	-	O	-	-	-	-	-	-	-	O	O*2)	O	O				
	N	O	-	O	-	-	-	-	-	-	O	O	O	O	O				



[Field Setting]

Operand	Description	Data size
sl	No. of the slot where communication module is installed (set up with hexadecilmal number)	WORD
S	Station number of the slave to be read, SDO index/sub-index	WORD
D	Starting address of the device where the data read from slave is to be stored	WORD
N	Max. bytes of the data to be read from communication module. The actual data are from after N (total size)-8.	WORD

[Flag Set]

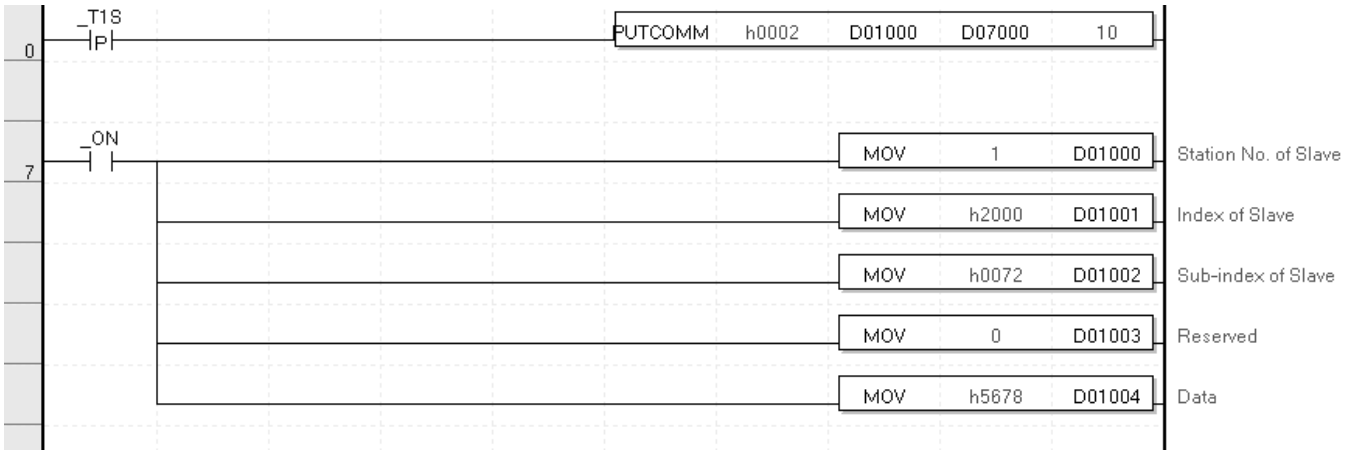
Flag	Description	Device No.
PUTCOMM/ GETCOMM Error	- If no communication module, the bit of the slot turns ON - If the PUTCOMM/GETCOMM command failed to be executed properly, the bit turns ON	F0015 Bit14 of D
PUTCOMM / GETCOMM Complete	- If normal response is received from the corresponding communication module, the bit turns ON	F0023 Bit15 of D

1) This command is for writing data in the corresponding device via communication module.
2) In the communication module designated with sl (slot No. of the communication module), send 6 byte command data from the internal device field designated with S to the communication module, and save the return result of the communication module in the internal device field designated by D.
3) If there is no communication module at the position pointed by sl (slot No. of communication module), or the PUTCOMM command has failed to be executed properly, the respective location bit of the F0015 (WORD) is set.
4) The command is not processed in scan synchronous manner. That is, the response from the corresponding device may arrive after several scans, the result cannot be known right after processing the command .

5) Process result check can be confirmed with flag.
6) sl (slot No, of communication module) is set up with two digits in hexadecimal, and if h0002 as shown in the figure below, the 0002 refers to the slot No.
7) (S + N)Byte or (D + 8)Byte exceeds the range, F110 and F115 bits are set.

▶ Exemplary application of PUTCOMM:

The exemplary software program below writes 2 bytes of data from the index h2000 and h0072 sub-index of the slave station 1, CANOpen master module installed in slot No. 2.



▷ Meanings of the operands

1) sl(h0002): Base No 00, Slot No 02
2) S(D1000~D1004): slot and object index, data

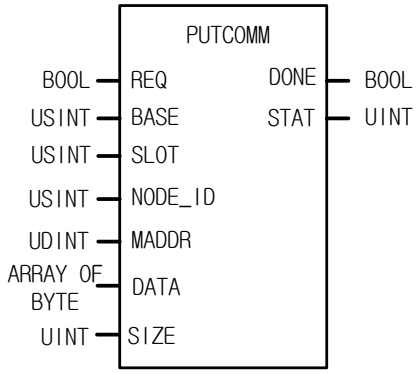
Device	Bit [15-8]	Bit [7-0]	Adddress Allocation
S + 0	-	Station No. of corressponding device	D1000
S + 1	Slave-side object index (High)	Slave-side object index (Low)	D1001
S + 2	-	Slave-side object sub-index	D1002
S + 3	Reserved	Reserved	D1003
S + 4	Data0	Data1	D1004

3) D(7000~D7003): Result of command

Device	Bit [15-8]	Bit [7-0]	Adddress Allocation
D + 0	NDR (Bit15), ERR (Bit14)	-	D7000
D + 1	Length (High)-	Length (Low)	D7001
D + 2	Error Code (High)	Error Code (Low)	D7002
D + 3	Reserved	Reserved	D7003

4) N (10): total data length. Pure data length is 2 byte by N-8

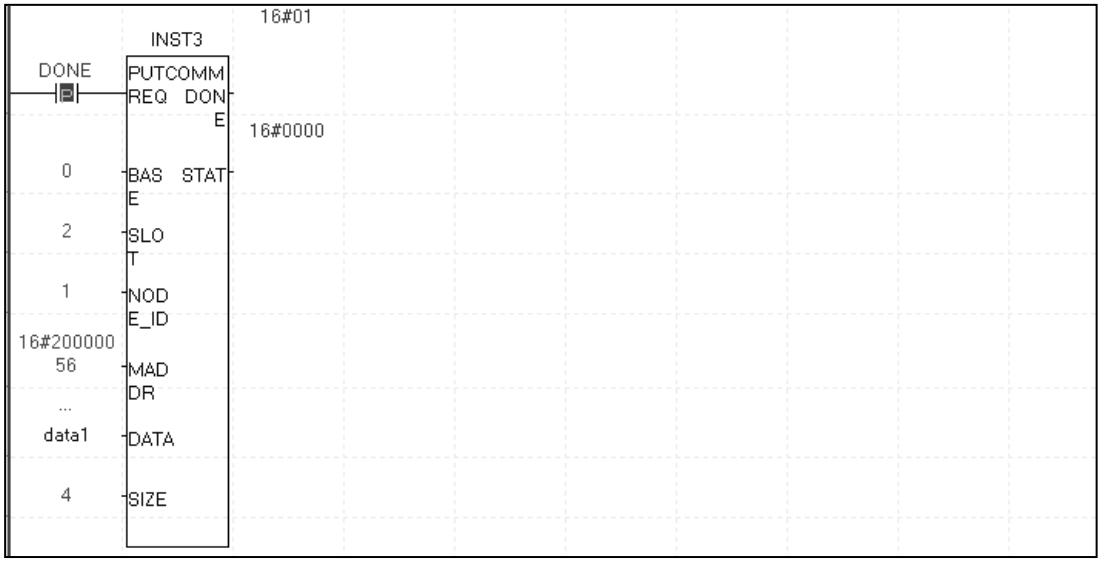
▶ Using in the XEC Series

Function Block	Description
	**Input** **REQ** : executes the function in case of 1 **BASE**: No. of Base installed with the communication module **SLOT**: No. of Slot installed with the communication module **NODE_ID**: Station No. of Slave(1 ~ 127) **MADDR**: SDO index/sub-index of the slave to be read **DATA**: Writing data (ARRAY of BYTE) **SIZE**: Data size(1 ~ 512 byte) Output **DONE**: If normal response is received from the corresponding communication module, the bit turns ON **STAT** : Error code

1) This command is for reading the data of the corresponding device via communication module.
2) In the communication module designated base and slot No., send designed command to module and save the return data from the communication module . Then the maximum allowable reception byte is SIZE
3) This command is not processed in scan synchronous manner. That is, the response from the corresponding device may arrive after several scans, the result cannot be known right after processing the command .
4) If SIZE is over the data array length, do not execute the command.

▶ Exemplary application of PUTCOMM:

The exemplary software program below writes 2 bytes of data from the index h2000 and h0056 sub-index of the slave station 1, CANOpen master module installed in slot No. 2.



1) BSAE: base NO. of master (0)
2) SLOT: slot NO. of master (2)
3) NODE_ID: station NO. of slave(2)
4) MADDR: OD Index(2000),Sub-Index(0056) of slave

Variable	Description	Variable	Description
High word	OD index	Low word	Sub index

5) DATA: write data of slave(Data0, Data1)

Variable	Description	Variable	Description
data[1]	Length(High)	data[0]	Length(Low)
data[3]	Data0	data[2]	Data1

6) SIZE: Data length(byte): data length(2byte)+ data(2byte)
7) DONE: Status of command

8.4.3 Meanings of the Error Code for XBM, XBC series

Symbol	Code	Description
COMM_ERR_SUCCESS	0x0000	Executed successfully
COMM_ERR_IF_TIMEOUT	0x8001	Timeout error (no response for 5 s between the basic and link module)
COMM_ERR_NODEID	0x8002	The station No. of the corresponding device is not within 1~127.
COMM_ERR_LENGTH	0x8003	1. SIZE is small than 1 or bigger than 520. 2.Receviced byte No. for GETCOMM command is over max. byte size
COMM_ERR_SUBINDEX	0x8004	The sub-index is bigger than 255
COMM_ERR_SDO_WRITE_FAIL	0x8005	In the PUTCOMM command, failed to stack on the stack queue due to queue overflow -Data overload, adjust the communication load.
COMM_ERR_SDO_READ_FAIL	0x8006	In the GETCOMM command, failed to stack on the stack queue due to queue overflow -Data overload, adjust the communication load.
COMM_ERR_NOT_READY	0x8007	The slave is not ready for service yet -Check the installment of slave
COMM_ERR_MASTER_NOT_READY	0x8008	The master module is not ready for service yet -Check the Link-Enable of master module, or master module is initializing parameter -Edit program(It need to execute command just few second ago)
SDO_ERR_WRITE_FAIL	0xF001	1.SDO Write error occurred at stack(limited for PUTCOMM) - Station No. error of slave module or NAK response from slave - NAK response occurrences unsupported index(sub-index)of the slave or data length is in discard with object length of the slave.
SDO_ERR_READ_FAIL	**0xF002**	SDO Read error occurred at stack(limited for GETCOMM) Station No. error of slave module or NAK response from slave - NAK response occurrences unsupported index(sub-index)of the slave
SDO_ERR_TIMEOUT	**0xF003**	Reached to the communication module, but time out occurred

8.4.4 Meanings of the Error Code for XEC series

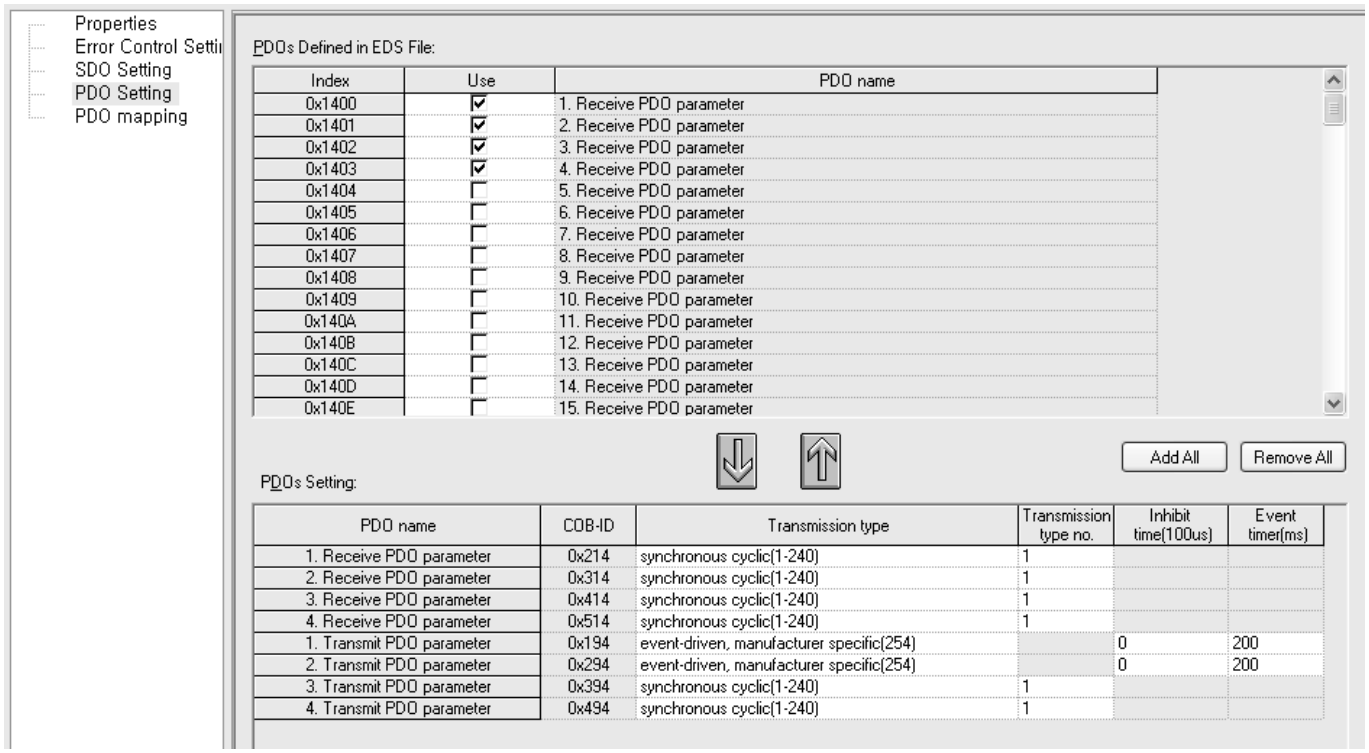
Status	Description
0x0000	Executed successfully
0x0001	Base No. setting error - Check the base(In case of XGB series, Base No. is always 0
0x0003	The slave No. is over
0x0004	Set module at slot is not installed
0x0005	Installed module is not matched
0x0006	Size is over about Data Array size
0x000A	Next command is executed despite existing uncompleted command Command of CANopen is possible to run one command per 1 scan.
0x8001	Timeout error (no response for 5 s between the basic and link module)
0x8002	The station No. of the corresponding device is not within 1~127.
0x8003	1. Size is small than 1 or bigger than 520. 2.Recevice byte No. for GETCOMM command is over max. byte size
0x8004	The sub-index is bigger than 255
0x8005	In the PUTCOMM command, failed to stack on the stack queue due to queue overflow -Data overload, adjust the communication load.
0x8006	In the GETCOMM command, failed to stack on the stack queue due to queue overflow -Data overload, adjust the communication load.
0x8007	The slave is not ready for service yet -Check the installment of slave
0x8008	The master module is not ready for service yet -Check the Link-Enable of master module, or master module is initializing parameter -Edit program(It need to execute command just few second ago)
0xF001	1.SDO Write error occurred at stack(limited for PUTCOMM) - Station No. error of slave module or NAK response from slave - NAK response occurrences unsupported index(sub-index)of the slave or data length is in discard with object length of the slave.
0xF002	SDO Read error occurred at stack(limited for GETCOMM) Station No. error of slave module or NAK response from slave - NAK response occurrences unsupported index(sub-index)of the slave
0xF003	Reached to the communication module, but time out occurred

8.5 PDO Setting

All the nodes (slaves) have the PDOs (Process Data Objects) containing the actual process data.

In the CANopen, classified into Receive PDO and Transmit PDO. In the view point of node (slave), the Transmit PDO are the data generated by nodes and Receive PDO are the data consumed by nodes. In the view point of the master, the Receive PDO contains the process output data transmitted to the nodes, and the Transmit PDO contains the input process data received from the nodes.

In PDO setting, the PDOs used by the slaves are set up.



8.5.1 PDOs (Process Data Objects) defined in the EDS file

Shows all the PDOs recorded in the EDS. To set up PDO, select the check box or click the arrow key.

8.5.2 PDO Setting

The PDOs to be used are displayed.

Transmission type and transmission type NO., Inhibit time, Event timer are set up here.

1) Transmission type

Transmission Type	Type No.	Description
Synchronous acyclic	0	Synchronous, acyclic, periodic transmission only when the data is changed
Synchronous cyclic	1-240	Synchronous, transmission periodically when the SYNC of the transmission type value is received
Reserved	241~251	Reserved
Synchronous RTR-only	252	Only when RTR is received (RTR-only), synchronous
Asynchronous RTR-only	253	Only when RTR is received (RTR-only), event driven
event-driven, manufacturer specific	254	Event-driven, Manufacturer specific*Note1
event-driven, profile specific	255	Event-driven, device profile and application profile are unique*Note1

(1) PDO Transmission mode

PDO transmission modes are classified as follows;.

a) Synchronous transmission

b) Event-driven transmission

(2) PDO start-up mode are as follows;

a) Event-and time-driven

Messages are transmitted by the events unique to the application as specified in the device profile or application profile, or unique to the manufacturer. Or transmitted after a certain time (event-time) without an event.

b) Remotely requested

The event-driven transmission of PDO starts on receiving the RTR initiated by PDO consumer.

c) Synchronously triggered

Message transmission is triggered by generation of SYNC object. The trigger conditions are No. of SYNC and selective internal event.

(3) TPDO transmission type

a) The term synchronous means that the PDO is transmitted after the SYNC object.

On receiving SYNC, the CANopen devices starts data sampling. If acyclic, sampling begins at the next SNC after triggering of CANopen device internal event, followed by PDO transmission.

In case of cyclic, sampling begins when receiving from 1 to 240 SYNC according to the transmission type

value, followed by PDO transmission.

b) Only when RTR is received

RTRPDO is not transmitted in normal situation, except when RTR has been received. If the transmission type is 252, the CANopen devices begins sampling at each reception of SYNC to buffer the PDO. If the transmission type is 253, the CANopen device begines sampling on receiving RTR and transmits PDO immediately.

c) Event-drive *Note1

PDO can be transmitted every time when CANopen device internal event occurrence. Event definition can be specified in the devide profile and application profile.

* The XGB CANopen module processes 254 and 255 equally, and transmits when device value is changed.

Transmission Type Value	Description
0	Synchronous, acyclic
1-240	Synchronous, transmission periodically when the SYNC of the transmission type value is received
241~251	Reserved
252	Only when RTR is received (RTR-only), synchronous
253	Only when RTR is received (RTR-only), event driven
254	Event-driven, Manufacturer specific
255	Event-driven, Manufacturer specific. Device profile and application profile specific.

(4) RPDO transmission type

In the table below, the term synchronous means that the CANopen device applies the received data to the reception of the next SYNC object. Event-driven means that PDO can be received whenever, and that the CANopen device applies received data immediately.

Transmission Type Value	Description
0-240	Synchronous
241~253	Reserved
254	Event-drive (manufacturer specific)
255	Event-drive (device profile and application profile specific)

2) Transmission type No.

Activated only when synchronous cyclic (1-240) is selected as the transmission type, and the PDO transmission period is (master-side cycle period x transmission type No.).

▶ Example: master-side cycle period is 100ms, and the transmission type No. is set to 3;

Synchronous cyclic period = 100×3 = 300ms. I.e, data communication at every

3) Inhibit time

Used when the transmission type is 254 or 255. The time is the minimum time interval for PDO transmission. When data exchange occurs frequently and irregularly, PDO transmission within this time from the previous PDO transmission is inhibited. The value is not changed as long as PDO exists in valid status.

4) Event Time

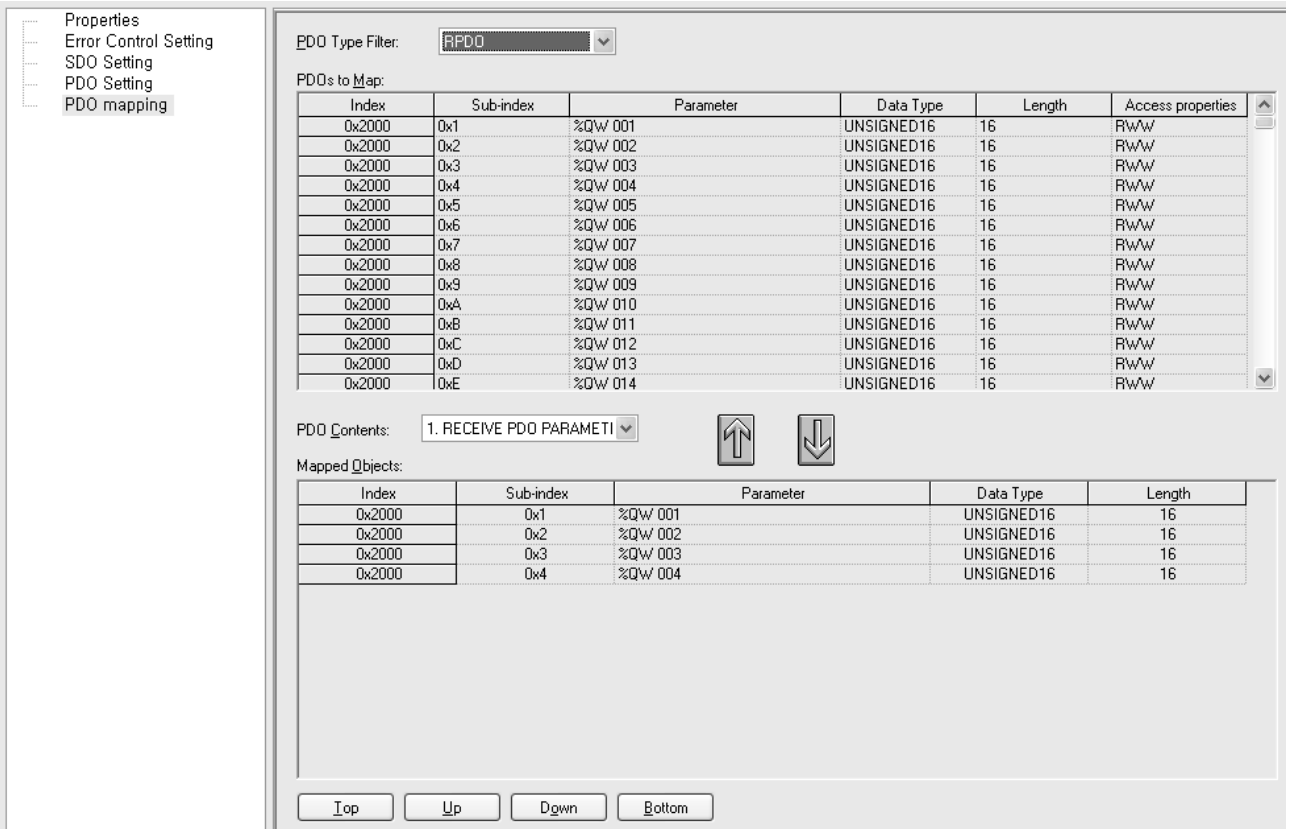
Applied when the transmission type is 254 or 255. The time is the maximum time interval for PDO transmission. When data exchange occurs infrequently and irregularly, PDO is transmitted after this time from the previous PDO transmission forcedly.

Note

The XGB CANopen module processes 254 and 255 equally, and transmits when device value is changed.
Our own COB-ID starts from 0x681.

8.6 PDO mapping

Objects can be mapped on the set up PDOs.



8.6.1 PDO Type Filter

Select Receive PDO or Transmit PDO for setting up.

8.6.2 PDO contents

The PDOs selected for used in the PDO setting are displayed. Indicated PDOs are mapped with objects .

8.6.3 PODs Map

Show the object recorded in the EDS. To start mapping, select an object and click the downward arrow key. For the meanings of the index, sub-index, parameter, and data type, see the description of the section 8.3 SDO Setting, 1) Object List. Size refers to bit size. For example, UNSIGNED16 refers to 16 bit size..

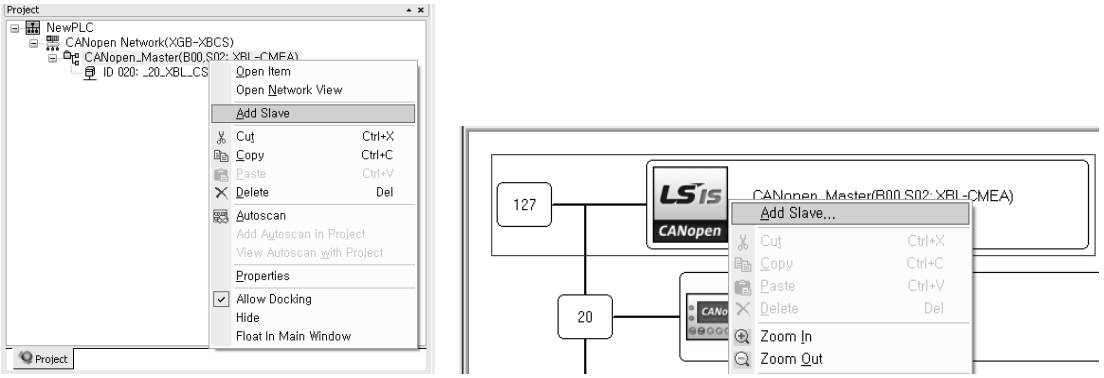
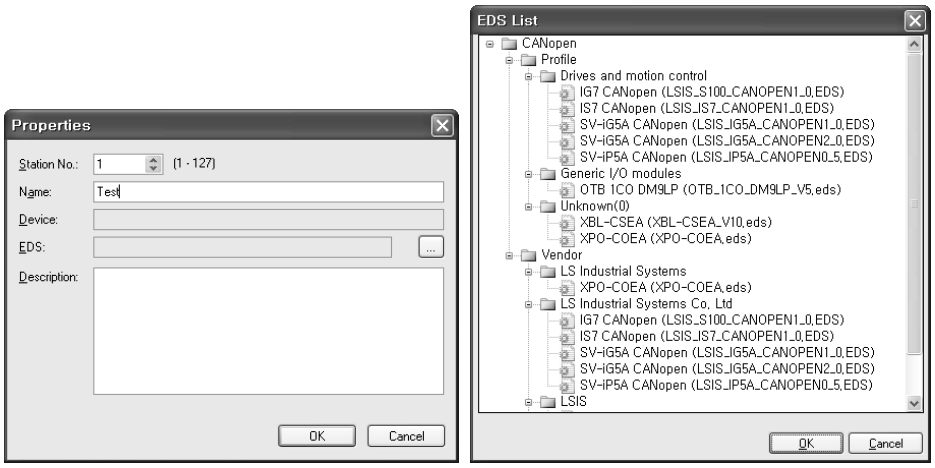
8.6.4 Mapped Objects

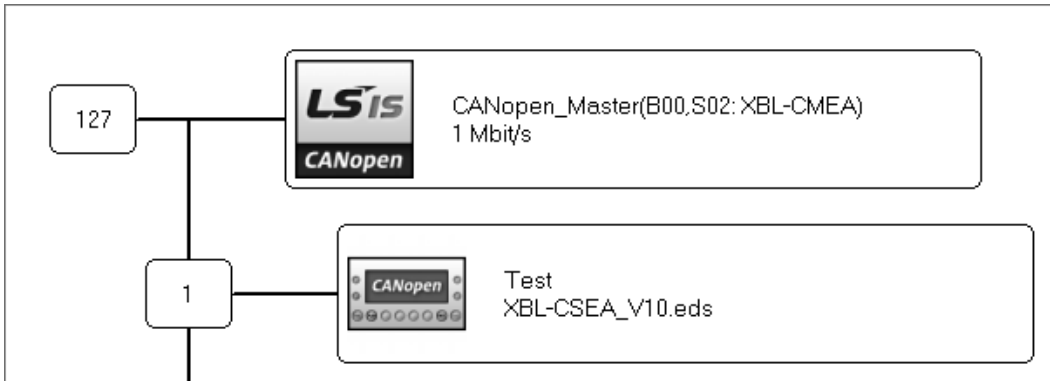
The objects selected for mapping are displayed. To cancel mapping, select the object to delete from the mapped objects, and click upward arrow key.

8.7 Add slave

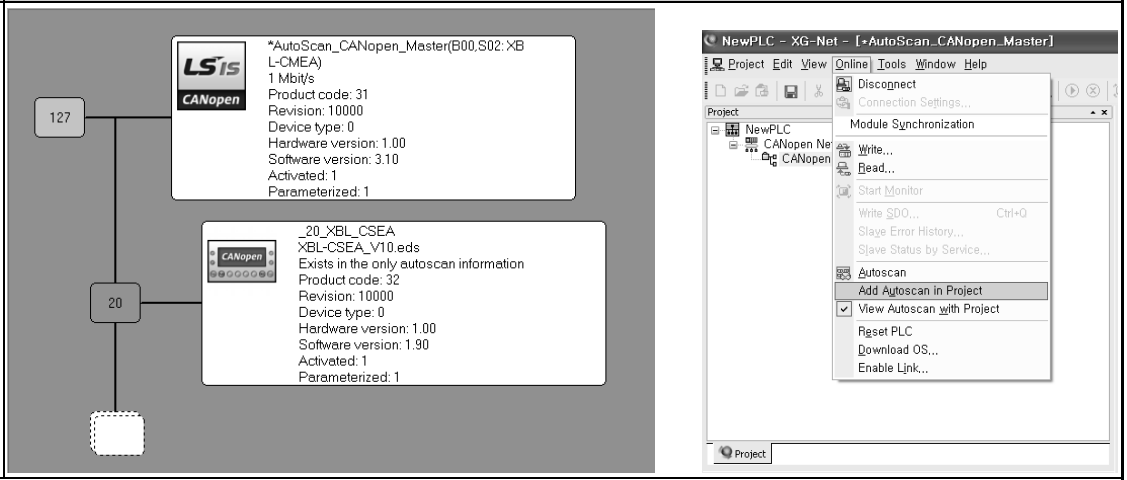
Slaves can be added by two methods. The first method is to add a slave directly to the master module, and the second is using Auto Scan. To use the Auto Scan function, the slave must be connected to the network with the same baud rate and different station No..

(1) Adding at master module

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Add slave</td><td> 
</td></tr>
<tr><td colspan="2">1. Select the master module and right click the mouse to select [Add Slave].
2. Or, in the edit window, click the master module and select [Add Slave].</td></tr>
<tr><td rowspan="2">2</td><td>Properties of slaves</td><td> 
</td></tr>
<tr><td colspan="2">1. Enter following items in the slave window;
1) Station No.: enter the slave node ID.
2) Name: enter name of the slave node
3) Device: enter the EDS product name of the slave node.
4) EDS: enter the EDS file path of the slave node.
2. Click EDS call-up button and add the desired EDS.
3. Click [OK] button.</td></tr>
</table>

No	Process	Procedure
3	Select Add to Master	
	1. In the network window, the slave is added beneath the master module.	

(2) Adding slave in Auto Scan

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Add Slave</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] → [Auto Scan]
2. Select [Online] → [Auto Scan Add Project]</td></tr>
<tr><td rowspan="2">2</td><td>Check Slave Registration</td><td></td></tr>
<tr><td colspan="2">1. Check that the slaves are added in the project window.</td></tr>
</table>

Chapter 9 Slave Module(XBL-CSEA) Setting using XG5000

9.1 Registration of Communication Module

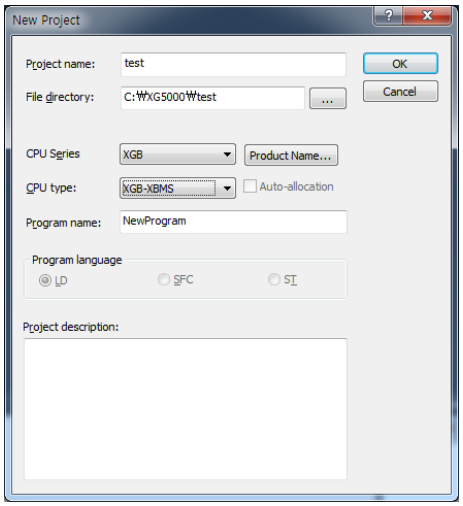
To used the XGB CANopen slave I/F module(XBL-CSEA), make out the communication parameters with XG5000. Before preparing the parameters, register the slot of the module mounted in XG5000. The registration procedures of the CANopen I/F modules are as follows, according to the online or off-line status.

9.1.1 **Off-line** Registration

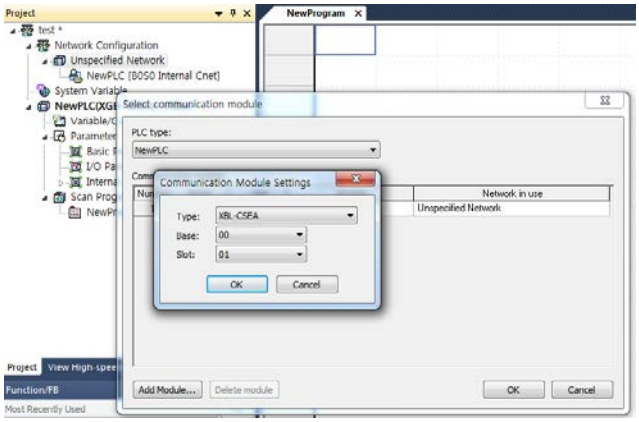
This method applies for communication module setting and preparing communication related parameters while not in connection with PLC.

1) Run XG5000, select Project → New Project, or click ( ) icon.

2) Enter project name in the project name field, select PLC series and CPU type of the selected PLC in the PLC type.



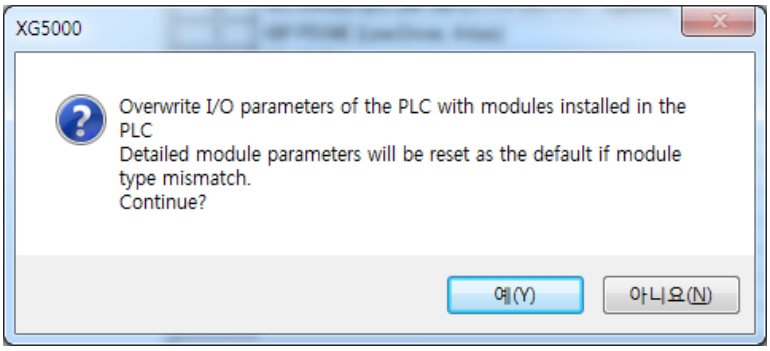
3) In the Project Window of the XG5000, right click on Unspecified Network and select [Add Item]-[Communication module]. Click [Add Module] and set the type, base and slot of CANopen I/F module to registration.



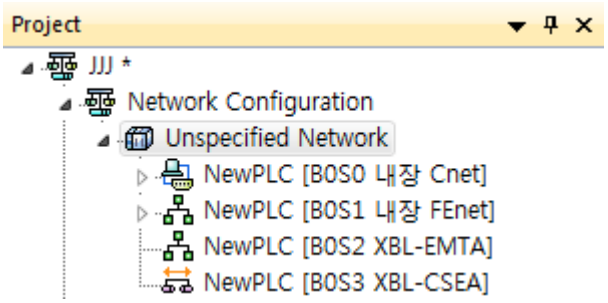
9.1.2 **Online** Registration

To register communication module using XG5000 in online status, conduct the steps No. 1 and 2 of the off-line registration and conduct following steps.

1) Enter project name in the project name field, select PLC series type and select the PLC CPU type in the CPU type
2) If unable to connect, check the connectivity with the PLC, select [Online →Connect Setting] or click ( ) icon to select connection method. Available connection methods are RS-232C cable, USB cable, Ethernet module and EtherNet/IP module.
3) When normally connected, the submenus of the online menus are enabled.
4) To check up the module currently mounted in the basic unit,
   select [Online →Diagnosis →Read IO Information]. And all the communication modules are searched and displayed in the project window. If the modules registered offline differ from the information of the currently connected PLC, or differ from the type of the communication module worked in the previous project, check the change in addition with the above message.



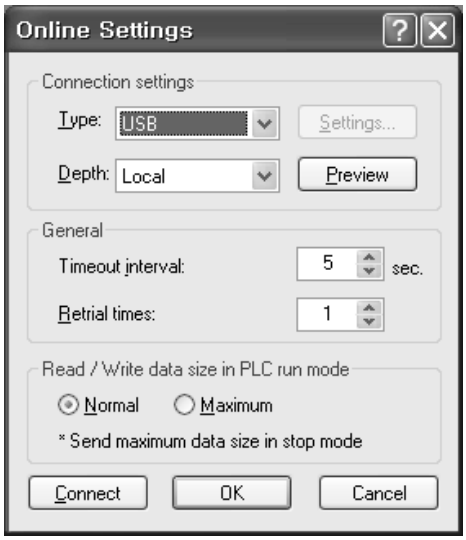
5) The list of the communication modules installed in the product is created in the project window.



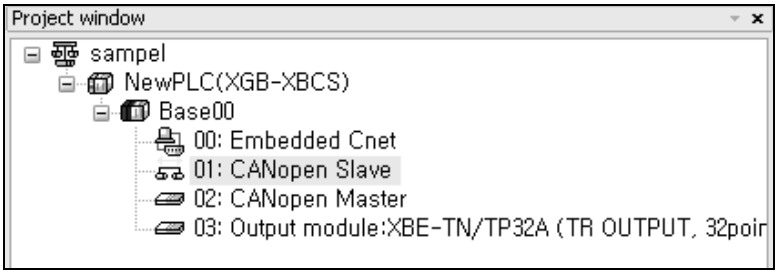
9.1.3 Reading Parameters from PLC

The default parameters stored in PLC can be loaded with following procedures.

1) From file menu, select Open from PLC.



2) Set up access method and step click [Connect] or [OK].
3) The default parameters stored in the PLC is loaded PLC.

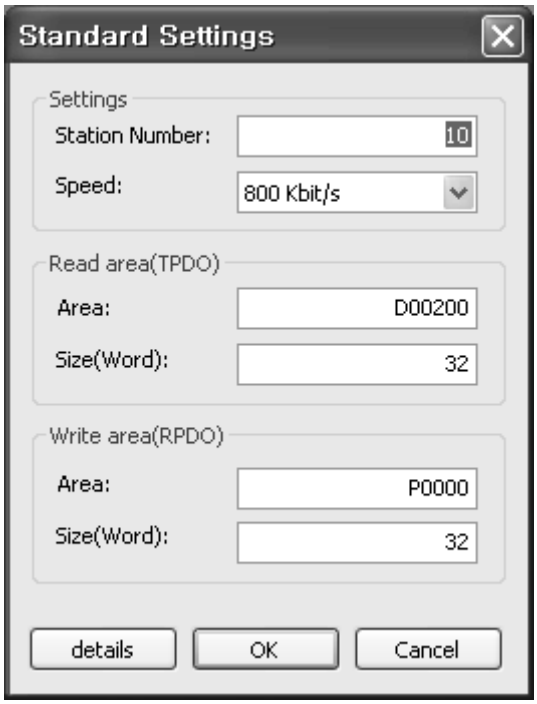


9.2 Basic Parameter Setting

9.2.1 Basic Parameter Setting

The method and procedures of setting up the basic parameters of the CANopen slave are as follows;

1) In the project window, select CANopen Slave and double click it.



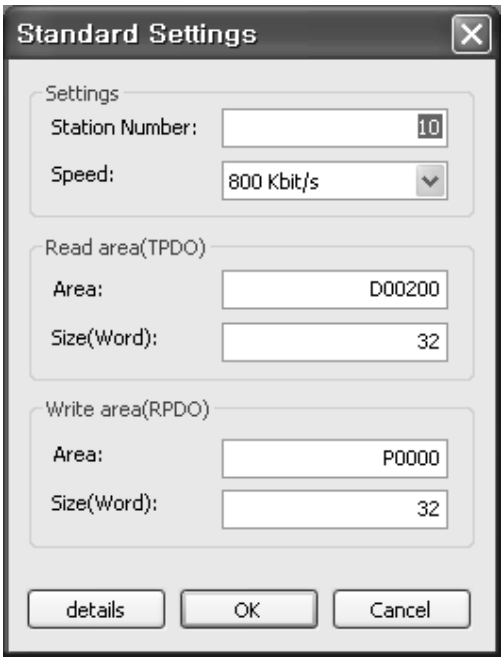
2) Enter station No. Available station numbers are 1~127.
3) Enter communication speed. Same as the XGB CANopen master, following 9 baud rates are supported
10K, 20K, 50K, 100K, 125K, 250K, 500K, 800K, 1Mbit/s
4) Set up the starting address and size of the area to be read. The starting address and size are all word size
5) Set up the starting address and size of the storage area. The starting address and size are all word size.
Available size are 8~256 words.

Note

In the slave EDS, 256 objects can be set up. Therefore, all 256 objects can be set up when setting up the master.
However, the basic unit and communication module exchanges data by the size set up in the basic parameter.
As such, when the setting is less than 256, the master and slave can conduct PDO mapping and exchange data properly.
However, in case of RPDO, it is not reflected on the device of the basic unit, and in the case of TPDO,
the value changed in the basic unit is not transferred to the slave module and not reflected on the master.

9.2.2 Relationship between PLC Address and CANopen Object

If the basic parameters are set up as follows, the relationship between the PLC address and XGB CANopen slave object can be checked up with the Detail View of Basic Setting



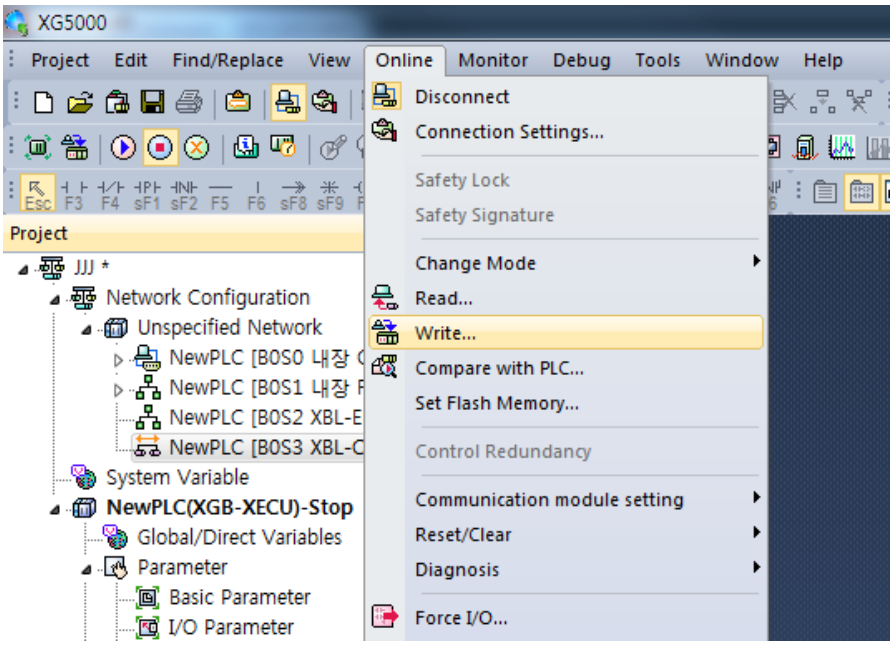
Detailed View

TPDO				RPDO			
PLC Address	Object Index(Hex)	Object Subindex(Hex)	Parameter Name	PLC Address	Object Index(Hex)	Object Subindex(Hex)	Parameter Name
D0200	0x2100	0x1	%IW001	P0000	0x2000	0x1	%QW001
D0201	0x2100	0x2	%IW002	P0001	0x2000	0x2	%QW002
D0202	0x2100	0x3	%IW003	P0002	0x2000	0x3	%QW003
D0203	0x2100	0x4	%IW004	P0003	0x2000	0x4	%QW004
D0204	0x2100	0x5	%IW005	P0004	0x2000	0x5	%QW005
D0205	0x2100	0x6	%IW006	P0005	0x2000	0x6	%QW006
D0206	0x2100	0x7	%IW007	P0006	0x2000	0x7	%QW007
D0207	0x2100	0x8	%IW008	P0007	0x2000	0x8	%QW008
D0208	0x2100	0x9	%IW009	P0008	0x2000	0x9	%QW009
D0209	0x2100	0xa	%IW010	P0009	0x2000	0xa	%QW010
D0210	0x2100	0xb	%IW011	P0010	0x2000	0xb	%QW011
D0211	0x2100	0xc	%IW012	P0011	0x2000	0xc	%QW012
D0212	0x2100	0xd	%IW013	P0012	0x2000	0xd	%QW013
D0213	0x2100	0xe	%IW014	P0013	0x2000	0xe	%QW014
D0214	0x2100	0xf	%IW015	P0014	0x2000	0xf	%QW015
D0215	0x2100	0x10	%IW016	P0015	0x2000	0x10	%QW016
D0216	0x2100	0x11	%IW017	P0016	0x2000	0x11	%QW017
D0217	0x2100	0x12	%IW018	P0017	0x2000	0x12	%QW018
D0218	0x2100	0x13	%IW019	P0018	0x2000	0x13	%QW019
D0219	0x2100	0x14	%IW020	P0019	0x2000	0x14	%QW020
D0220	0x2100	0x15	%IW021	P0020	0x2000	0x15	%QW021
D0221	0x2100	0x16	%IW022	P0021	0x2000	0x16	%QW022
D0222	0x2100	0x17	%IW023	P0022	0x2000	0x17	%QW023
D0223	0x2100	0x18	%IW024	P0023	0x2000	0x18	%QW024
D0224	0x2100	0x19	%IW025	P0024	0x2000	0x19	%QW025
D0225	0x2100	0x1a	%IW026	P0025	0x2000	0x1a	%QW026
D0226	0x2100	0x1b	%IW027	P0026	0x2000	0x1b	%QW027
D0227	0x2100	0x1c	%IW028	P0027	0x2000	0x1c	%QW028
D0228	0x2100	0x1d	%IW029	P0028	0x2000	0x1d	%QW029
D0229	0x2100	0x1e	%IW030	P0029	0x2000	0x1e	%QW030

Close

9.2.3 Writing Parameters

Apply the basic settings of the slave by selecting [Online] → [Write].

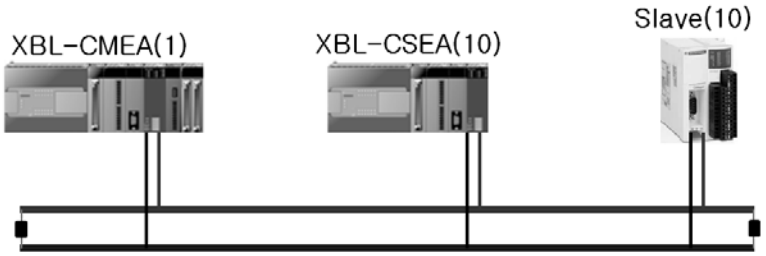


Chapter 10 Examples

10.1 Examples of System Configuration

10.1.1 System Configuration

The following example is for a configuration with the CANOpen master module (XBL-CSEA) and slave module (XBL-CSEA) and the slave module from another manufacturer (Schneider OTB1C0DM0LP). The layout is shown in the figure below. Product settings are presented in the table below.



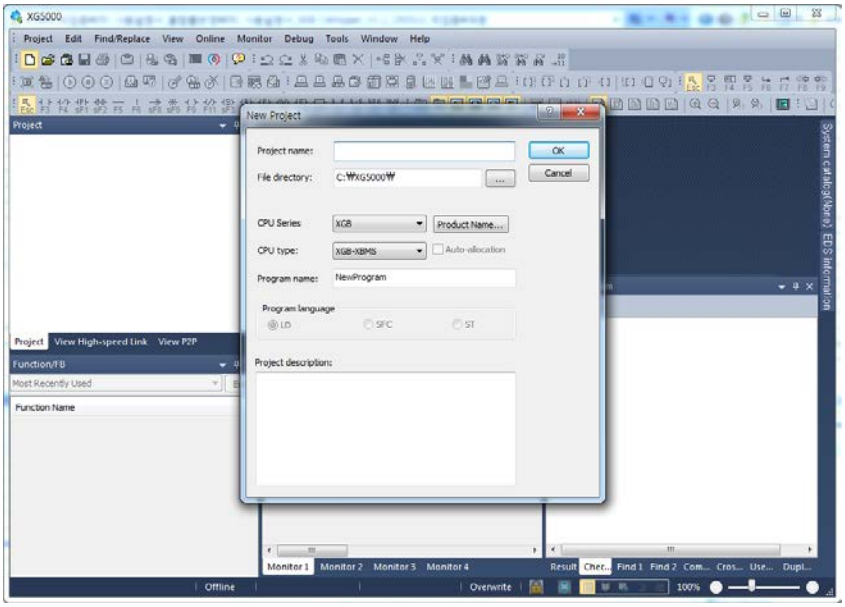
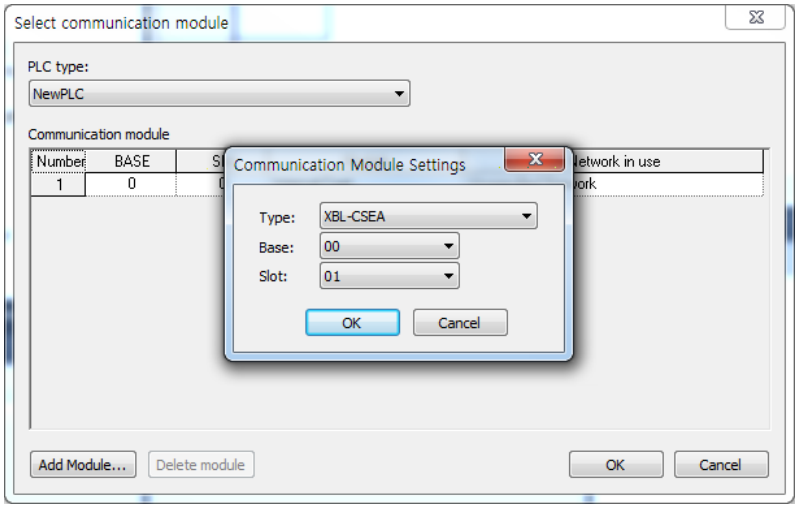
Type	XBL-CMEA	XBL-CSEA	OTB1C0DM0LP
Station No.	1	10	20
Baud rate	1Mbps	1Mbps	1Mbps
No. of PODs	-	RPDO: 4 TPDO: 4	RPDO: 1(1byte)
Transmission period (ms)	100	100	100
Transmission type	Synchronous cyclic	Synchronous cyclic	Synchronous cyclic
Error control setting	Heartbeat	Heartbeat	Heartbeat
Produce time	200ms	200ms	200ms
Device allocation	TPDO: M0 RPDO: D0	TPDO: M0 RPDO: D0	-

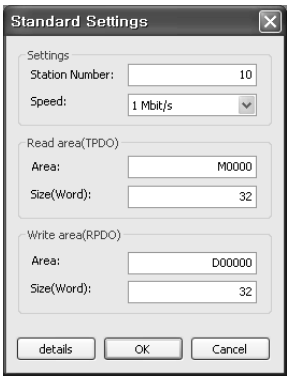
10.1.2 Description Operation

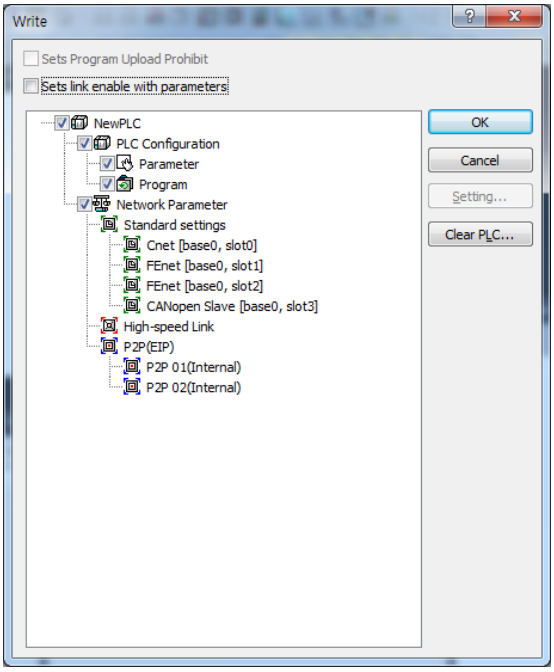
1) CANOpen master I/F Module(XBL-CMEA)
   (1) 16 words (M49~M64) data are sent to #10 station
   (2) Receive 16 word of data from #10 station and store them in the D0~D15 area
   (3) Send 1byte which is No. zero in the M65 area to #20 station
2) CANOpen slave I/F module(XBL-CSEA)
   (1) Receive 16 word of data from #1 master station and store them in the D0~D15 area
   (2) Send the data of M0~M15 to the #1 master station
3) Schneider slave module (OTB1C0DM0LP)
   (1) Receiver 1 byte data from the #1 master station

10.1.3 Parameter Setting

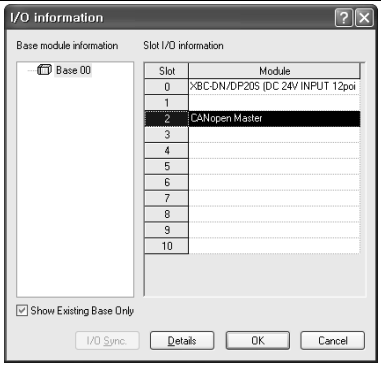
1) CANOpen Slave setting(XBL-CSEA, OTB1C0DM0LP)

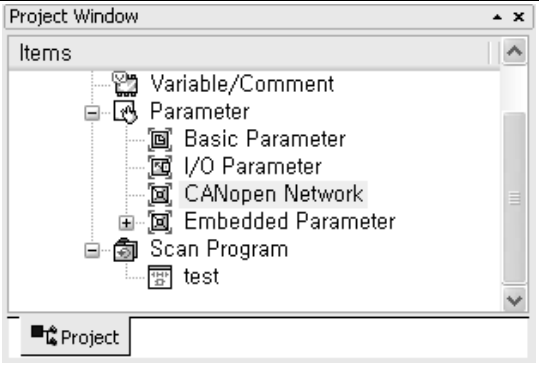
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>XBL-CSEA
parameter setting</td><td>  </td></tr>
<tr><td colspan="2">1. Execute XG5000.
2. Set up the project name and applied PLC type. and click [OK] button.</td></tr>
<tr><td rowspan="2">2</td><td>XBL-CSEA
parameter setting
(1) Basic Setting</td><td>  </td></tr>
<tr><td colspan="2">1. Offline setting
(1) Right click on Unspecified Network of project window → Add Item → Communication Module → Add Module → Select XBL-CSEA
(2) in the communication module set up, select the CANopen Slave and mounted slot, and click [OK]
2. Online mode setting
(1) Select File → Open form PLC, or execute XG5000, create a new project, and select Online → Diagnosis → Read I/O Information → I/O Sync</td></tr>
</table>

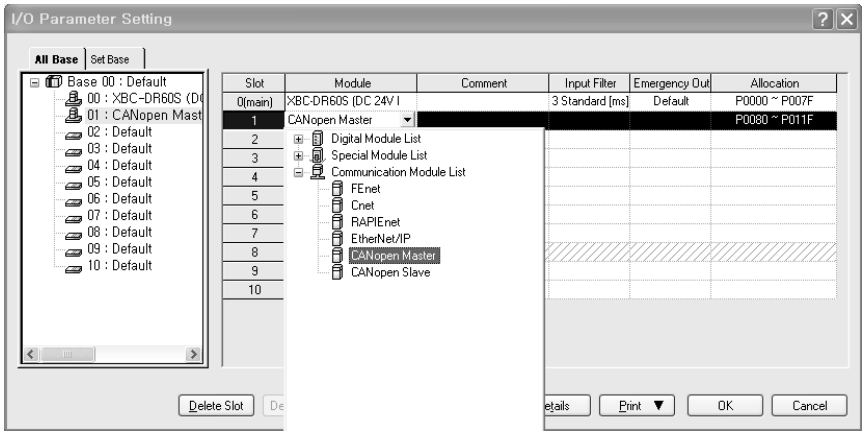
3	XBL-CSEA parameter setting (2) Basic Setting	
	1. Double click CANOpen Slave 2. As suggested in the system configuration, enter the station No., baud rate TPDO, RPDO area and size.	

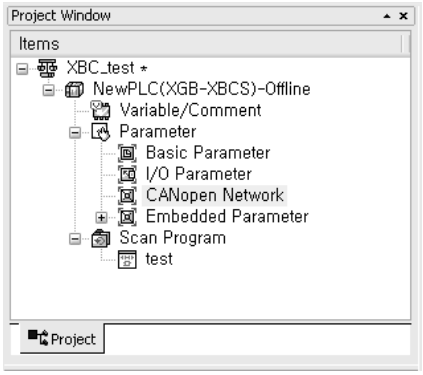
No	Process	Procedure
4	Write Parameter	
	1. Select Online → Write. 2. Click [OK] button.	
5	OTB1C0DM0LP	1. Set up parameters referring to OTB1C0DM0LP datasheet and user manual. (1) Station No. set up: open the front cover of OTB1C0DM0LP and set the Address switch to No. 20. (2) baud rate set up: Set the BAUD RATE rotary switch to No. 7. - No. 7: 1000kbps

2) CANOpen master I/F module (XBL-CMEA)

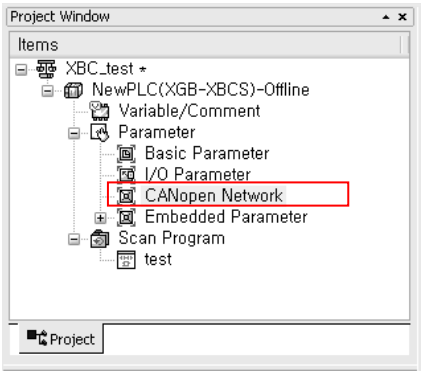
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td>1</td><td>Master module registration</td><td>


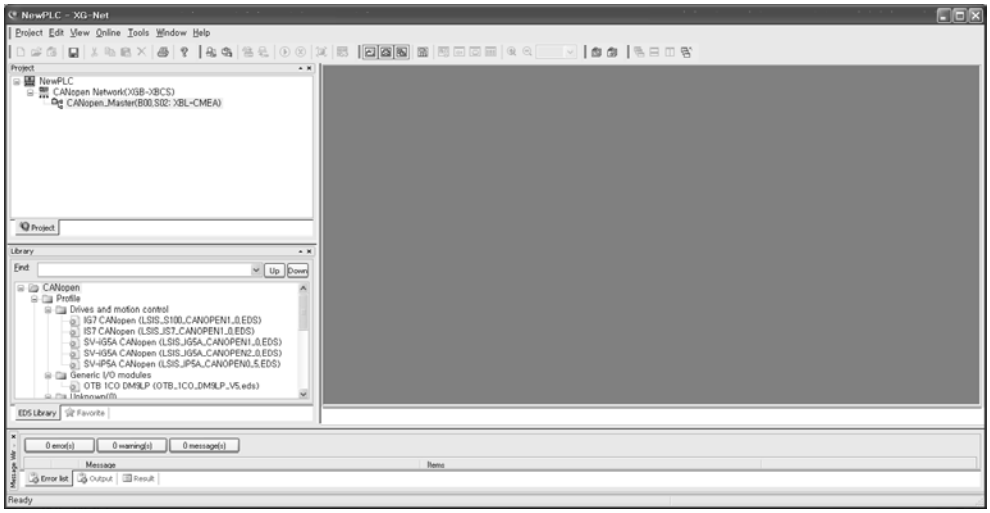


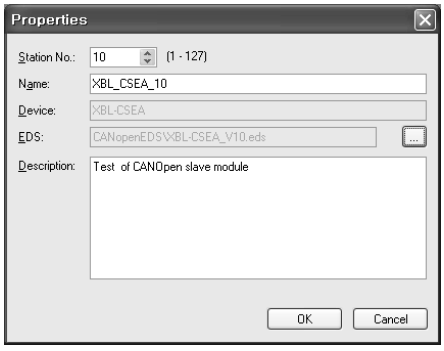
<Example of master module registration by I/O synchronization>


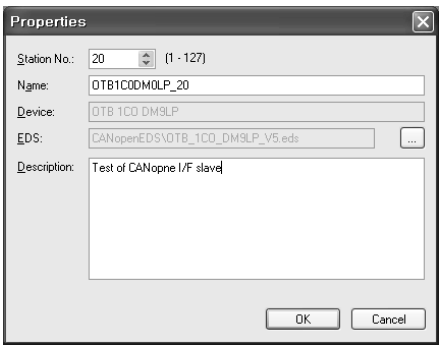


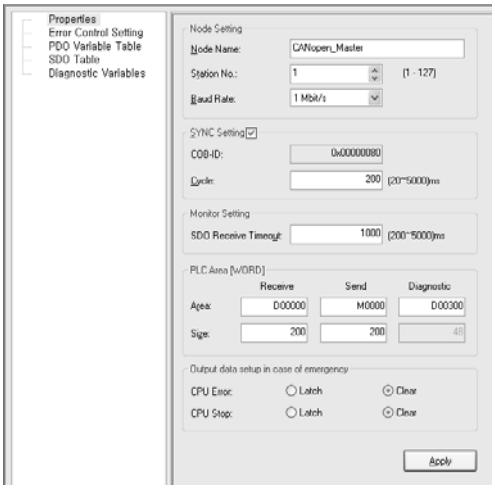
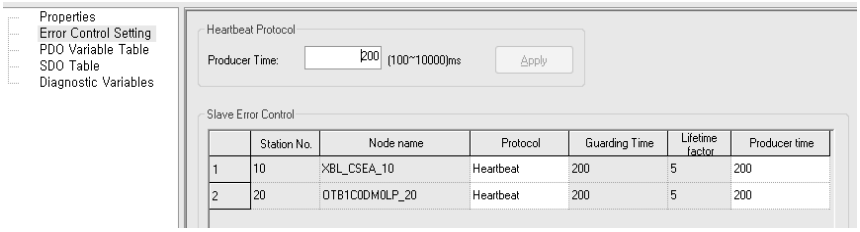
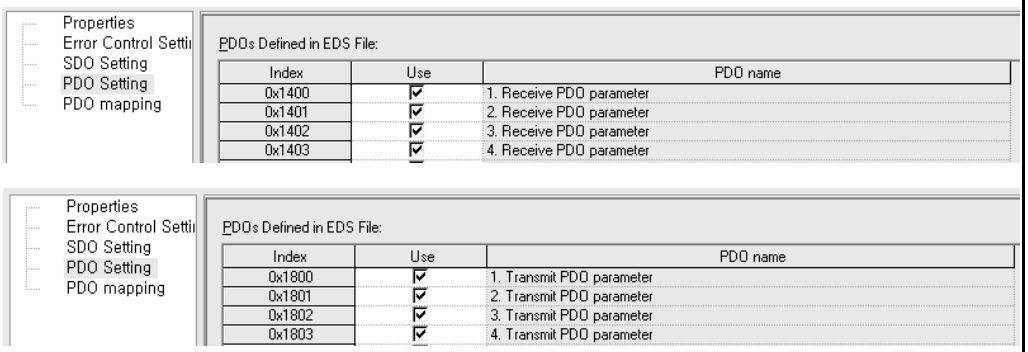
<Example of master module registration by I/O parameter addition></td></tr>
<tr><td></td><td colspan="2">1. Master module registration by I/O synchronization
1) Mount the XBL-CMEA to basic unic
2) Connect XG5000 and select Online → Diagnosis → I/O Information → I/O Sync
3) Confirm that CANOpen Network is created in the XG5000 parameter.
2. Master module registration by I/O parameter addition
1) Execute XG5000 and double click the I/O parameter in the project window.
2) Select CANOpen Master in the slot where the module is mounted, and click Confirm
3) Confirm that CANOpen Network is created in the XG5000 parameter.</td></tr>
</table>

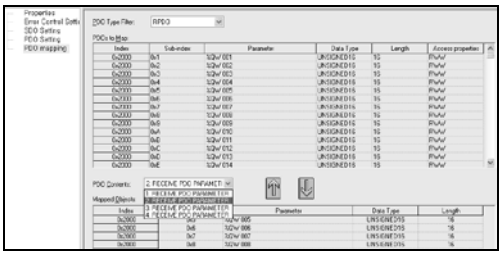
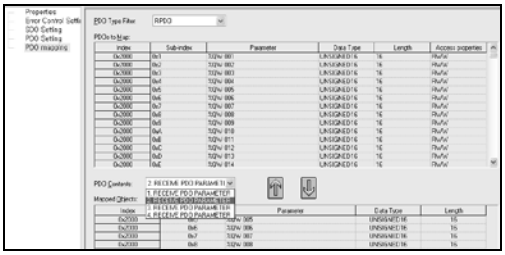
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">2</td><td>Executing
XG-CANopen</td><td> 

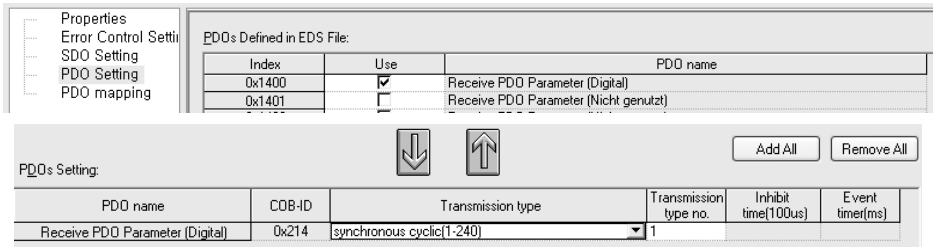
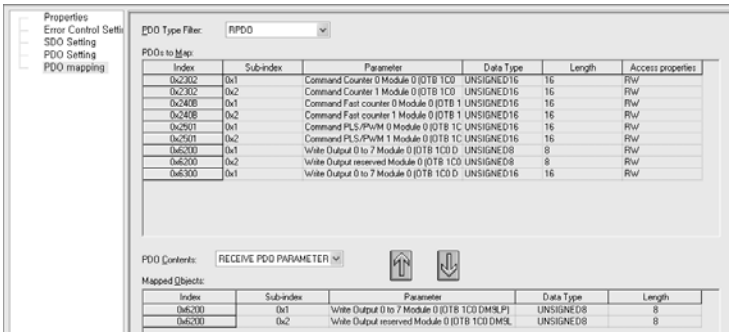
<CANOpen Network>
 

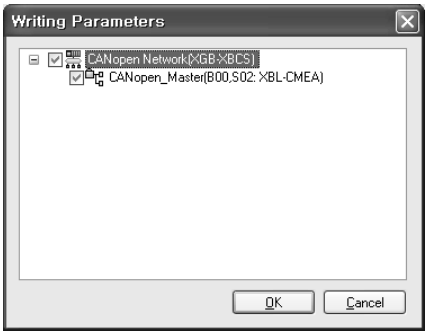
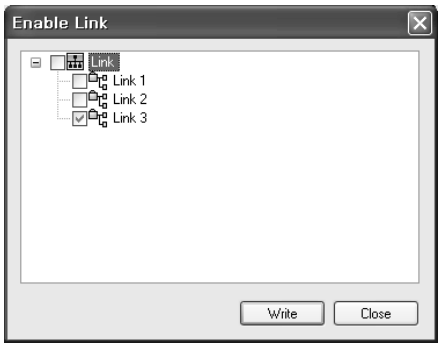
<XG-CANopen Window></td></tr>
<tr><td colspan="2">1. In the project window, click CANOpen Network to execute XG-CANopen.</td></tr>
<tr><td rowspan="2">3</td><td>Adding slave a module</td><td> 


</td></tr>
<tr><td colspan="2">1. In the XG-CANopen project window, select CANOpen_Master, right click the mouse and select Add Slave Module.
-Set up station No. and name EDS path to register XBL-CSEA and OTB1C0DM0LP</td></tr>
</table>

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">4</td><td>Master module
parameter setting
(1) Properties</td><td> 
</td></tr>
<tr><td colspan="2">1. In the XG-CANopen project window, double click CANOpen_Master and select register information.
2. Set up the station No., baud rate, cycle, PLC reception/transmission are as suggested
in the system configuration.
3. Make sure to click Apply after entering the setting values.</td></tr>
<tr><td rowspan="2">5</td><td>Master module
parameter setting
(2) Error Control Setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Set up the master-side Heartbeat producer type and slave producer type.
2. Select Heartbeat as the protocol from the slave error control list.</td></tr>
<tr><td rowspan="2">6</td><td>XBL-CSEA setting
(1) PDO Setting</td><td> 
</td></tr>
<tr><td colspan="2">1. In the XG-CANopen project window, double click the XBL-CSEA added in above paragraph 3 and select PDO set up.
2. Select 4 TPOD and 4 RPDO suggested in the system configuration.
-The T/RPDO of the XBL-CSEA are arranged in the order of TPDO1~64 after P RPOD1~64.</td></tr>
</table>

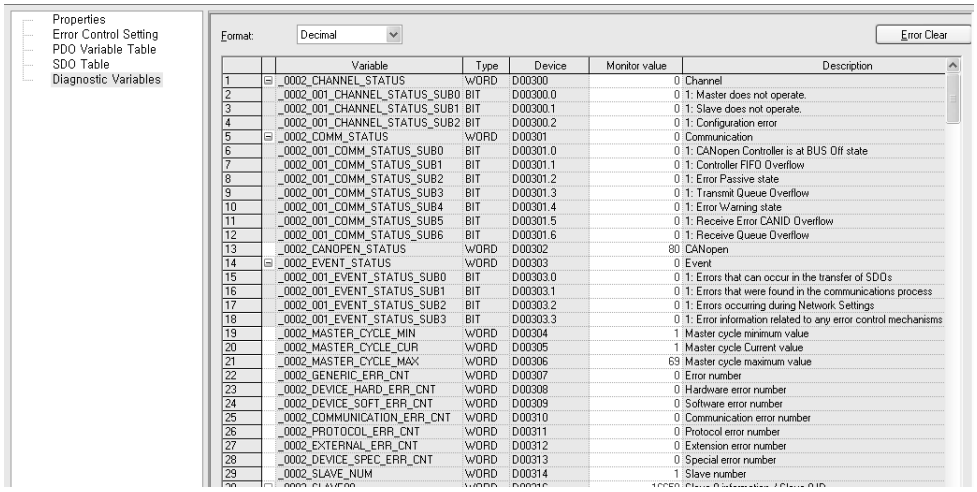
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">7</td><td>XBL-CSEA setting (1)
PDO Setting</td><td>
PDOs Setting:
Add All | Remove All
<table>
<tr><th>PDO name</th><th>COB-ID</th><th>Transmission type</th><th>Transmission type no.</th><th>Inhibit time(100us)</th><th>Event timer(ms)</th></tr>
<tr><td>1. Receive PDO parameter</td><td>0x20a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
<tr><td>2. Receive PDO parameter</td><td>0x30a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
<tr><td>3. Receive PDO parameter</td><td>0x40a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
<tr><td>4. Receive PDO parameter</td><td>0x50a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
<tr><td>1. Transmit PDO parameter</td><td>0x18a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
<tr><td>2. Transmit PDO parameter</td><td>0x28a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
<tr><td>3. Transmit PDO parameter</td><td>0x38a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
<tr><td>4. Transmit PDO parameter</td><td>0x48a</td><td>synchronous cyclic(1-240)</td><td>1</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td colspan="2">1. In the PDOs setting, set up the transmission type and transmission type numbers for each TPOD and RPDO, as suggested in the system configuration.
(1) Transmission type: set to Synchronous cyclic type
(2) Transmission type No.: for Synchronous cyclic, data are transmitted after the master cycle periodic signal is generated, set up with 1.
- After set up Synchronous cyclic, if the transmission type No. is 2, data communication starts after 2 cycle signals of the master.</td></tr>
<tr><td rowspan="2">8</td><td>XBL-CSEA setting (2)
PDO Mapping</td><td>   </td></tr>
<tr><td colspan="2">1. Click the PDO mapping.
2. In the POD type filter, select RPDO, and in the PDO contents, select No. 1 RECEIVE PDO PARAMETER.
3. From the objects available for mapping, double click the parameter of the index to be used, or click ↓ to map the parameter.
- In the example, %QW1~4 is selected for convenience
4. In the same methods as of above clauses 2 and 3, map the 2~4 RECEIVE PDO PARAMETER.
- the entire mapping parameter is %QW1~16
5. In the POD type filter, select TPDO, and in the PDO contents, select No. 1 TRANSMIT PDO PARAMETER.
6. In the same method as of above clause 2, map the 1~4 TRANSMIT PDO PARAMETER.
- the entire mapping parameter is %IW1~16</td></tr>
</table>

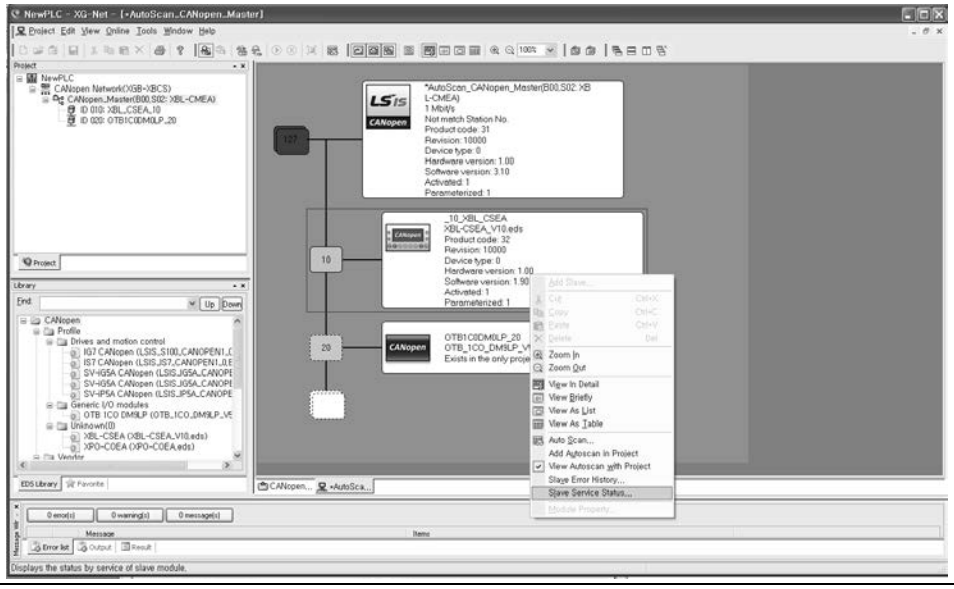
<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">9</td><td>OTB1C0DM0LP setting
(1) PDO Setting</td><td> 
</td></tr>
<tr><td colspan="2">1. In the XG-CANopen project window, double click the OTB1C0DM0LP added in above paragraph 3 and select PDO set up
- for the case of the module, only 8 bit output module is installed without adding I/O.
2. In the PDOs setting, enter transmission type and transmission type No.
(1) Transmission type: set to Synchronous cyclic type
(2) Transmission type No.: as described in the clause 10, set the type No. to 1 for operation at 100ms cycle time..</td></tr>
<tr><td rowspan="2">10</td><td>OTB1C0DM0LP setting
(2) PDO Mapping</td><td> 
</td></tr>
<tr><td colspan="2">1. Click the PDO mapping.
2. In the POD type filter, select RPDO, and in the PDO contents, select RECEIVE PDO PARAMETER.
3. From the objects available for mapping, double click the parameter of the index to be used, or click ↓ to map the parameter.
- Since OTB1C0DM0LP uses only 8 bit output, select b bit write parameter which is the No. 1 of the sub-index of the index No. 6200 for the RPDO (Receive PDO).</td></tr>
</table>

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">11</td><td>Writing Parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Select Online → Writing
2. Select the CANOpen master set up with parameter, and click Confirm.</td></tr>
<tr><td rowspan="2">12</td><td>Enable Link</td><td> 
</td></tr>
<tr><td colspan="2">1. Select Online → Enable Link
2. Check the No. of the link set up with parameter, and click Write.
- The link No. must be selected in the order to the communication module installation.
Ex) If another communication module is installed before CANOpen master module, set up the link No. with 3.</td></tr>
</table>

10.1.4 Operation Check

1) Network state check using diagnosis function

<table>
<tr><th>No</th><th>Process</th><th>Procedure</th></tr>
<tr><td rowspan="2">1</td><td>Diagnosis Variable</td><td> 

<table>
<tr><th></th><th>Variable</th><th>Type</th><th>Device</th><th>Monitor value</th><th>Description</th></tr>
<tr><td>1</td><td>_0002_CHANNEL_STATUS</td><td>WORD</td><td>D00300</td><td>0</td><td>Channel</td></tr>
<tr><td>2</td><td>_0002_001_CHANNEL_STATUS_SUB0</td><td>BIT</td><td>D00300.0</td><td>0</td><td>1: Master does not operate.</td></tr>
<tr><td>3</td><td>_0002_001_CHANNEL_STATUS_SUB1</td><td>BIT</td><td>D00300.1</td><td>0</td><td>1: Slave does not operate.</td></tr>
<tr><td>4</td><td>_0002_001_CHANNEL_STATUS_SUB2</td><td>BIT</td><td>D00300.2</td><td>0</td><td>1: Configuration error</td></tr>
<tr><td>5</td><td>_0002_COMM_STATUS</td><td>WORD</td><td>D00301</td><td>0</td><td>Communication</td></tr>
<tr><td>6</td><td>_0002_001_COMM_STATUS_SUB0</td><td>BIT</td><td>D00301.0</td><td>0</td><td>1: CANopen Controller is at BUS Off state</td></tr>
<tr><td>7</td><td>_0002_001_COMM_STATUS_SUB1</td><td>BIT</td><td>D00301.1</td><td>0</td><td>1: Controller FIFO Overflow</td></tr>
<tr><td>8</td><td>_0002_001_COMM_STATUS_SUB2</td><td>BIT</td><td>D00301.2</td><td>0</td><td>1: Error Passive state</td></tr>
<tr><td>9</td><td>_0002_001_COMM_STATUS_SUB3</td><td>BIT</td><td>D00301.3</td><td>0</td><td>1: Transmit Queue Overflow</td></tr>
<tr><td>10</td><td>_0002_001_COMM_STATUS_SUB4</td><td>BIT</td><td>D00301.4</td><td>0</td><td>1: Error Warning state</td></tr>
<tr><td>11</td><td>_0002_001_COMM_STATUS_SUB5</td><td>BIT</td><td>D00301.5</td><td>0</td><td>1: Receive Error CANID Overflow</td></tr>
<tr><td>12</td><td>_0002_001_COMM_STATUS_SUB6</td><td>BIT</td><td>D00301.6</td><td>0</td><td>1: Receive Queue Overflow</td></tr>
<tr><td>13</td><td>_0002_CANOPEN_STATUS</td><td>WORD</td><td>D00302</td><td>80</td><td>CANopen</td></tr>
<tr><td>14</td><td>_0002_EVENT_STATUS</td><td>WORD</td><td>D00303</td><td>0</td><td>Event</td></tr>
<tr><td>15</td><td>_0002_001_EVENT_STATUS_SUB0</td><td>BIT</td><td>D00303.0</td><td>0</td><td>1: Errors that can occur in the transfer of SDOs</td></tr>
<tr><td>16</td><td>_0002_001_EVENT_STATUS_SUB1</td><td>BIT</td><td>D00303.1</td><td>0</td><td>1: Errors that were found in the communications process</td></tr>
<tr><td>17</td><td>_0002_001_EVENT_STATUS_SUB2</td><td>BIT</td><td>D00303.2</td><td>0</td><td>1: Errors occurring during Network Settings</td></tr>
<tr><td>18</td><td>_0002_001_EVENT_STATUS_SUB3</td><td>BIT</td><td>D00303.3</td><td>0</td><td>1: Error information related to any error control mechanisms</td></tr>
<tr><td>19</td><td>_0002_MASTER_CYCLE_MIN</td><td>WORD</td><td>D00304</td><td>1</td><td>Master cycle minimum value</td></tr>
<tr><td>20</td><td>_0002_MASTER_CYCLE_CUR</td><td>WORD</td><td>D00305</td><td>1</td><td>Master cycle Current value</td></tr>
<tr><td>21</td><td>_0002_MASTER_CYCLE_MAX</td><td>WORD</td><td>D00306</td><td>69</td><td>Master cycle maximum value</td></tr>
<tr><td>22</td><td>_0002_GENERIC_ERR_CNT</td><td>WORD</td><td>D00307</td><td>0</td><td>Error number</td></tr>
<tr><td>23</td><td>_0002_DEVICE_HARD_ERR_CNT</td><td>WORD</td><td>D00308</td><td>0</td><td>Hardware error number</td></tr>
<tr><td>24</td><td>_0002_DEVICE_SOFT_ERR_CNT</td><td>WORD</td><td>D00309</td><td>0</td><td>Software error number</td></tr>
<tr><td>25</td><td>_0002_COMMUNICATION_ERR_CNT</td><td>WORD</td><td>D00310</td><td>0</td><td>Communication error number</td></tr>
<tr><td>26</td><td>_0002_PROTOCOL_ERR_CNT</td><td>WORD</td><td>D00311</td><td>0</td><td>Protocol error number</td></tr>
<tr><td>27</td><td>_0002_EXTERNAL_ERR_CNT</td><td>WORD</td><td>D00312</td><td>0</td><td>Extension error number</td></tr>
<tr><td>28</td><td>_0002_DEVICE_SPEC_ERR_CNT</td><td>WORD</td><td>D00313</td><td>0</td><td>Special error number</td></tr>
<tr><td>29</td><td>_0002_SLAVE_NUM</td><td>WORD</td><td>D00314</td><td>1</td><td>Slave number</td></tr>
</table></td></tr>
<tr><td colspan="2">1. Double click the master module of the XG-CANopen.
2. Click the diagnosis variable table
3. Select Online → Start Monitor
4. Check up the states of the master module and slave module referring to the monitor values and explanation.</td></tr>
<tr><td rowspan="2">2</td><td>Auto Scan Service</td><td> 
</td></tr>
<tr><td colspan="2">1. Select Online → Auto Scan.
2. The entire network condition can be checked up with the report of the Auto Scan.
3. To check the status of each slave, select the slave, right click the mouse to check specification error history and slave service status.</td></tr>
</table>

A.1 Terms

1. CAN (Controller Area Network)
   The open-type field bus specified in ISO11898 to enable communication between various heterogeneous devices of different manufacturers.

2. CANopen
   A description language for communication on CAN bus, independent of devices and manufacturers. It is an application layer.

3. CiA (CAN in Automation): a group conducting standardization of CAN and CANopen

4. COB
   The basic communication object on the CAN network. All the data are communicated using COB.

5. COB ID
   The unique numbers designating the COBs on the CAN network, consists of station number and functional code. This determines the communication priority of the COB.

6. DCF (Device Configuration File)
   The file in EDS structure containing the configuration information (baud rate, station No., PDO mapping, etc.) determined by project.

7. EDS (Electronic Data Sheet)
   The standardization file containing the communication method of the device and parameter description.

8. Heartbeat
   The message transmitted from a device at preset cycles to notice other devices of the connection.

9. NMT (Network Management)
   A component of the CANopen communication profile, which conducts the initialization of the network and device, start-up, termination and monitoring of the device.

10. Node guarding: the periodic action of the master monitoring the communication connection of slave

11. OD (Object Dictionary)
    The list of all the values and functions of the parameters of the device. Each entry can be accessed using index (16 bit) and sub-index (8 bit).

12. Parameter: the data and value of device which can be set up by users.

13. PDO (Process Data Object)
    A practical means for transmitting process data. It is a communication object having high priority, transmitted by 1 producer and received by 1 or more stations of consumers. One PDO can have up to 8 bytes and unique COB ID, and does not require the acknowledgement from the receiver station. The meaning of the transmitted data is determined by COB ID and PDO Mapping. The PDO priority and operating mode are determined by communication parameter setting. PDO producer and consumer must have the same data structure to process PDO. The data structure of the Producer and consumers are determined by TPDO and RPDO, respectively.

14. PDO-Mapping
Means allocation of application object to the data field of PDO. Mapping has two methods of static and dynamic. In the static mapping, the objects of the PDO must be continuous, and cannot be omitted or allocated with a dummy object.

15. Predefined Connection Set
The COB ID pre-allocated with reference to the station No. and function code. The communication object by such predefined connection set are Node guarding/heartbeat, emergency object, sync message, time stamp, server-SDO 1, RPDO1~4, and TPDO1~4.

16. RPDO (Receive PDO)
PDO used for reception.

17. SDO (Service Data Object)
A communication object used to initialize CANopen device, set up parameters, or to transmit long data records (e.g.: domain data), and has low priority. The entries in the object dictionary can be written and read using SDO, and the entry designation is performed with index and sub-index.

18. Producer
An entity crating information

19. Consumer
An entity receiving and consuming information

20. Server
The subject providing information on request

21. Client
The subject requesting information

A.2 Flag List

A.2.1 Special Relay (F) List

Word	Bit	Variable	Function	Description
F000~1	-	_SYS_STATE	Mode and State	Displays the Mode and Run State of PLC
	F0000	_RUN	RUN	Run State
	F0001	_STOP	STOP	Stop state
	F0002	_ERROR	ERROR	Error state.
	F0003	_DEBUG	DEBUG	Debug State
	F0004	_LOCAL_CON	LOCAL CONTROL	Local Control Mode
	F0006	_REMOTE_CON	REMOTE MODE	Remote Control Mode
	F0008	_RUN_EDIT_ST	CORRECTING WHILE RUN	Downloading Correction Program while Run.
	F0009	_RUN_EDIT_CHK	CORRECTING WHILE RUN	Internal Processing for Correction while Run
	F000A	_RUN_EDIT_DONE	CORRECTION COMPLETED WHILE RUN	Correction Completed while Run
	F000B	_RUN_EDIT_END	CORRECTION END WHILE RUN	Correction Ended while Run
	F000C	_CMOD_KEY	OPERATION MODE	Operation Mode Transformed by the Key
	F000D	_CMOD_LPADT	OPERATION MODE	Operation Mode Transformed by the Local PADT
	F000E	_CMOD_RPADT	OPERATION MODE	Operation Mode Transformed by Remote PADT
	F000F	_CMOD_RLINK	OPERATION MODE	Operation Mode Transformed by Remote Communication Mode
	F0010	_FORCE_IN	FORCIBLE ENTRY	Forcible Entry State
	F0011	_FORCE_OUT	FORCIBLE OUTPUT	Forcible Output State
	F0014	_MON_ON	MONITOR	Executing Monitor
	F0015	_USTOP_ON	STOP	Stopped by Stop Function
	F0016	_ESTOP_ON	ESTOP	Stopped by EStop Function
	F0017	_CONPILE_MODE	COMPILING	Performing Compiling
	F0018	_INIT_RUN	INITIALIZING	Performing Initializing Task
	F001C	_PB1	PROGRAM CODE 1	Program Code 1 Selected
	F001D	_PB2	PROGRAM CODE 2	Program Code 2 Selected
	F001E	_CB1	COMPILE CODE1	Compile Code 1 Selected
	F001F	_CB2	COMPILE CODE 2	Compile Code 2 Selected
F002~3		_CNF_ER	SYTEM ERROR	Reports Serious Failure State of the System
	F0021	_IO_TYER	MODULE TYPE ERROR	Module Type does not corresponds.
	F0022	_IO_DEER	MODULE REMOVAL ERROR	Module Removed
	F0024	_IO_RWER	MODULE IN/OUTPUT ERROR	Problems occurred in to Module In/Output
	F0025	_IP_IFER	MODULE INTERFACE ERROR	Problems occurred in the special/communication module interface
	F0026	_ANNUM_ER	EXTERNAL DEVICE ERROR	Serious Errors detected from External Devices

Word	Bit	Variable	Function	Description
F002~3	F0028	_BPRM_ER	BASIC PARAMETER	Errors in Basic Parameter
	F0029	_IOPRM_ER	IO PARAMETER	Errors with IO Configuration Parameter
	F002A	_SPPRM_ER	SPECIAL MODULE PARAMETER	Special Module Parameter is in Abnormal State
	F002B	_CPPRM_ER	COMMUNICATION MODULE PARAMETR	Communication Module Parameter is in Abnormal State
	F002C	_PGM_ER	PROGRAM ERROR	Errors in Program
	F002D	_CODE_ER	CODE ERROR	Errors in Program Code
	F002E	_SWDT_ER	SYSTEM WATCH DOG	Scan Watchdog Operated
	F0030	_WDT_ER	SCAN WATCHDOG	Scan Watchdog Operated
F004	-	_CNF_WAR	SYSTEM WARNIGN	Reports on the Light Errors of the System
	F00041	_DBCK_ER	BACKUP ERROR	Problem Occurred in Data Back Up
	F00043	_ABSD_ER	OPERATION ERROR STOP	Stops due to Abnormal Operation
	F00046	_ANNUM_WAR	EXTERIAL DEVCIE ERROR	The Light Error of the External Device Detected
	F00048	_HS_WAR1	HIGH SPEED LINK1	High Speed Link – abnormal
	F00049	_HS_WAR2	HIGH SPEED LINK2	High Speed Link – abnormal
	F0054	_P2P_WAR1	P2P PARAMETER 1	P2P – abnormal
	F0055	_P2P_WAR2	P2P PARAMETER 2	P2P – abnormal
	F0056	_P2P_WAR3	P2P PARAMETER 3	P2P – abnormal
	F005C	_CONSTANT_ER	FIXED PERIOD ERROR F	Fixed Period Errors
F009	-	_USER_F	USER CONTACING POINT	User Usable Timer
	F0090	_T20MS	20ms	20ms Periodic Clock
	F0091	_T100MS	100ms	100ms Periodic Clock
	F0092	_T200MS	200ms	200ms Periodic Clock
	F0093	_T1S	1s	1s Periodic Clock
	F0094	_T2S	2s	2s Periodic Clock
	F0095	_T10S	10s	10s Periodic Clock
	F0096	_T20S	20s	20s Periodic Clock
	F0097	_T60S	60s	60s Periodic Clock
	F0099	_ON	ALWAYS - ON	Always On – State Bit
	F009A	_OFF	ALWAYS - ON	Always Off – State Bit
	F009B	_1ON	1 SCAN - ON	1st Scan Only On –State
	F009C	_1OFF	1 SCAN -OFF	1st Scan Only Off –State
	F009D	_STOG	ANTi - CLOCK	Every Scan Anti –Clocked

Word	Bit	Variable	Function	Description
F0010	-	_USER_CLK	USER-CLOCK	User Set-up Available Clock
	F0100	_USR_CLK0	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 0
	F0101	_USR_CLK1	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 1
	F0102	_USR_CLK2	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 2
	F0103	_USR_CLK3	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 3
	F0104	_USR_CLK4	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 4
	F0105	_USR_CLK5	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 5
	F0106	_USR_CLK6	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 6
	F0107	_USR_CLK7	DEGIGNATED SCAN REPEATED	On/Off Clock as much as Designated Scan 7
F0011	-	_LOGIC_RESULT	LOGIC RESULTS	Displays Logic Results
	F00110	_LER	CALCULATION ERROR	On during 1 Scan when Errors made to Calculation
	F00111	_ZERO	ZERO FLAG	On if Calculation Result is 0
	F00112	_CARRY	CARRY FLAG	On if Carry occurred during Calculation
	F00113	_ALL_OFF	ALL OUTPUT OFF	On if All Outputs are OFF
	F00115	_LER_LATCH	CALCULATION ERROR LATCH	On Maintained when Errors made to Calculation
F0012	-	_CMP_RESULT	COMPARISION RESULTS	Display Comparison Results
	F0120	_LT	LT FLAG	On if " Less Than "
	F0121	_LTE	LTE FLAG	On if "The Same or Less Than"
	F0122	_EQU	EQU FLAG	On if "The Same "
	F0123	_GT	GT FLAG	On if "Larger Than "
	F0124	_GTE	GTE FLAG	On "Larger Than or The Same "
	F0125	_NEQ	NEQ FLAG	On if "Not The Same "
F014	-	_FALS_NUM	FALS NUMBER	Displays the Number of FALS
F015	-	_PUTGET_ERR0	PUT/GET ERROR 0	Main Base PUT / GET ERROR
F023	-	_PUTGET_NDR0	PUT/GET COMPLETED 0	Main Base PUT / GET COMPLETED
F044	-	_CPU_TYPE	CPU TYPE	Displays the Information on CPU Type
F045	-	_CPU_VER	CPU VERSION	Displays CPU Version
F046	-	_OS_VER	O/S VERSION	Displays O/S Version
F048	-	_OS_DATE	O/S DATE	Displays O/S Distribution Date
F050	-	_SCAN_MAX	MAXIMUM SCAN TIME	Displays Maximum Scan Time
F051	-	_SCAN_MIN	MINIMUM SCAN TIME	Displays Minimum Scan Time
F052	-	_SCAN_CUR	CURRENT SCAN TIME	Displays Current Scan Time.
F0053	-	_MON_YEAR	MONTH /YEAR	Month, Year Data of PLC
F0054	-	_TIME_DAY	HOUR / DATE	Hour, Date Data of PLC
F0055	-	_SEC_MIN	SECOND / MINUTE	Second, Minute Data of PLC
F0056	-	_HUND_WK	100 YEARS / DAY	100 Years , Minute Data of PLC

Word	Bit	Variable	Function	Description
F0057	-	_FPU_INFO	Not used	
	F00570	_FPU_LFLAG_I	Not used	
	F00571	_FPU_LFLAG_U	Not used	
	F00572	_FPU_LFLAG_O	Not used	
	F00573	_FPU_LFLAG_Z	Not used	
	F00574	_FPU_LFLAG_V	Not used	
	F0057A	_FPU_FLAG_I	Not used	
	F0057B	_FPU_FLAG_U	Not used	
	F0057C	_FPU_FLAG_O	Not used	
	F0057D	_FPU_FLAG_Z	Not used	
	F0057E	_FPU_FLAG_V	Not used	
	F0057F	_FPU_FLAG_E	IRREGULAR VALUE ENTRY	Reports when Entering Irregular Value
F0058	-	_ERR_STEP	ERROR STTEP	Stores Error Step.
F0060	-	_REF_COUNT	REFRESH	Increases if Module Refresh Performed
F0062	-	_REF_OK_CNT	REFRESH OK	Increases if Module Refresh is in Normal State
F0064	-	_REF_NG_CNT	REFRESH NG	Increases if Module Refresh in Abnormal State
F0066	-	_REF_LIM_CNT	REFRESH LIMIT	Increases if Module Refresh in Abnormal State (Timeout)
F0068	-	_REF_ERR_CNT	REFRESH ERROR	Increases if Module Refresh in Abnormal State
F0070	-	_MOD_RD_ERR_CNT	Not used	
F0072	-	_MOD_WR_ERR_CNT	Not used	
F0074	-	_CA_CNT	Not used	
F0076	-	_CA_LIM_CNT	Not used	
F0078	-	_CA_ERR_CNT	Not used	
F0080	-	_BUF_FULL_CNT	BUFFUR FULL	Increases if CPU Internal Buffer FULL
F0082	-	_PUT_CNT	PUT COUNT	Increases if Performing PUT.
F0084	-	_GET_CNT	GET COUNT	Increases if Performing GET.
F0086	-	_KEY	CURRENT KEY	Displays the Current State of Local Key.
F0088	-	_KEY_PREV	PREVIOUS KEY	Displays the Previous State of Local Key
F0090	-	_IO_TYER_N	INCONSISTENT SLOT	Displays Module Type – Inconsistent Slot No.
F0091	-	_IO_DEER_N	REMOVAL SLOT	Displays Slot No. where Module Removal Occurred
F0093	-	_IO_RWER_N	RW ERROR SLOT	Displays Module Read/Write –Error Slot No.
F0094	-	_IP_IFER_N	I/F ERROR SLOT	Displays Interface Error Slot No.
F0096	-	_IO_TYER0	MODULE TYPE 0 ERROR	Main Base - Module Type Error
F0104	-	_IO_DEER0	MODULE REMOVAL 0 ERROR	Main Base Module Removal Error
F0120	-	_IO_RWER0	MODULE RW 0 ERROR	Main Base - Module Read/Write Error
F0128	-	_IO_IFER_0	MODULE I/F 0 ERROR	Main Base Module - Interface Error
F0140	-	_AC_FAIL_CNT	POWER SHUT-OUT FREQUENCY	Stores the Frequency that Power has been Shut out.

Word	Bit	Variable	Function	Description
F0142	-	_ERR_HIS_CNT	ERROR OCCURRENCE FREQUENCY	Stores the Frequency that Error s were Made
F0144	-	_MOD_HIS_CNT	MODE CONVERSIO N FREQUENCY	Stores the Frequency that the Mode has been Converted
F0146	-	_SYS_HIS_CNT	HISTORY OCCURRENCE FREQUENCY	Stores the Frequency that the System History Occurred.
F0148	-	_LOG_ROTATE	LOG ROTATE	Stores Log Rotate Information
F0150	-	_BASE_INFO0	SLOT INFORMATION 0	Main Base Slot Information
F200	-	_USER_WRITE_F	USABLE CONTACTING POINT	Contacting Point Usable in Program
	F2000	_RTC_WR	RTC RW	Writes and Read Data to RTC
	F2001	_SCAN_WR	SCAN WR	Scan Value Initialization
	F2002	_CHK_ANC_ERR	EXTERNA L SERIOUS FAILURE REQUEST	Requires Serious Failures from External Devices
	F2003	_CHK_ANC_WAR	EXTERNAL WARNING REQUEST	Requests to Detect Light Failures from External Devices
F201	-	_USER_STAUS_F	USER CONTACTING POINT	User Contacting Point
	F2010	_INIT_DONE	INTIALIZATION COMPLETED	Displays Initialization Task Performance Completed
F202	-	_ANC_ERR	EXTERNAL SERIOUS FAILURE INFORMATION	Displays Serious Failures Information of External Devices
F203	-	_ANC_WAR	EXTERNAL LIGHT FAILURE WARNING	Displays the Light Failures Information of External Devices
F210	-	_MON_YEAR_DT	MONTH / YEAR	Clock Information Data (Month / Year)
F211	-	_TIME_DAY_DT	HOUR / DAY	Clock Information Data (Hour / Day)
F212	-	_SEC_MIN_DT	SECOND / MINUTE	Clock Information Data (Second / Minute)
F213	-	_HUND_WK_DT	100 YEARS / DAY	Clock Information Data(100 Years / Day)

(2) Common area

Communication flag according to P2P service setting
In case of XGB, P2P parameter 1~3, P2P block 0~31

Device	IEC type	Key word	Type	Description
L5120	%LX8192	_P2P1_NDR00	Bit	P2P Parameter 1 block 0 service normal end
L5121	%LX8193	_P2P1_ERR00	Bit	P2P Parameter 1 block 0 service abnormal end
L513	%LW513	_P2P1_STATUS00	Word	When P2P Parameter 1 block 0 service abnormal end, indicates error code.
L514	%LD257	_P2P1_SVCCNT00	Double Word	Indicates P2P Parameter 1 block 0 service normal execution count
L516	%LD258	_P2P1_ERRCNT00	Double Word	Indicates P2P Parameter 1 block 0 service abnormal execution count
L5180	%LX8288	_P2P1_NDR01	Bit	P2P Parameter 1 block 1 service normal end
L5181	%LX8289	_P2P1_ERR01	Bit	P2P Parameter 1 block 1 service abnormal end
L519	%LW519	_P2P1_STATUS01	Word	When P2P Parameter 1 block 1 service abnormal end, indicates error code.
L520	%LD260	_P2P1_SVCCNT01	Double Word	Indicates P2P Parameter 1 block 1 service normal execution count
L522	%LD264	_P2P1_ERRCNT01	Double Word	Indicates P2P Parameter 1 block 1 service abnormal execution count
L524~L529	%LW524~ %LW529	-	Word	P2P parameter1 block 2 service
L530~L535	%LW530~ %LW535	-	Word	P2P parameter1 block 3 service
L536~L697	%LW536~ %LW697	-	Word	P2P parameter1 block 4~30 service
L698~L703	%LW698~ %LW703	-	Word	P2P parameter1 block 31 service

A.2.2 Network Register (N) List

This chapter describes on communication network register (P2P parameter: 1~3, P2P block: 0~31)

Device	IEC type	Key word	Type	Description
N000	%NW000	_P1B00SN	Word	Saves P2P parameter1 block 00's partner station number.
N0001~0004	%NW0001~0005	_P1B00RD1	Word	Saves Saves P2P parameter1 block 00 Read area device 1
N005	%NW006	_P1B00RS1	Word	Saves Saves P2P parameter1 block 00 Read area size 1
N0006~0009	%NW0007~0011	_P1B00RD2	Word	Saves Saves P2P parameter1 block 00 Read area device 2
N010	%NW012	_P1B00RS2	Word	Saves Saves P2P parameter1 block 00 Read area size 2
N0011~0014	%NW0013~0017	_P1B00RD3	Word	Saves Saves P2P parameter1 block 00 Read area device 3
N015	%NW018	_P1B00RS3	Word	Saves Saves P2P parameter1 block 00 Read area size 3
N0016~0019	%NW0019~0023	_P1B00RD4	Word	Saves Saves P2P parameter1 block 00 Read area device 4
N020	%NW024	_P1B00RS4	Word	Saves Saves P2P parameter1 block 00 Read area size 4
N0021~0024	%NW0025~0029	_P1B00WD1	Word	Saves Saves P2P parameter1 block 00 Save area device 1
N025	%NW030	_P1B00WS1	Word	Saves Saves P2P parameter1 block 00 Save area size 1
N0026~0029	%NW0031~0035	_P1B00WD2	Word	Saves Saves P2P parameter1 block 00 Save area device 2
N030	%NW036	_P1B00WS2	Word	Saves Saves P2P parameter1 block 00 Save area size 2
N0031~0034	%NW0037~0041	_P1B00WD3	Word	Saves Saves P2P parameter1 block 00 Save area device 3
N035	%NW042	_P1B00WS3	Word	Saves Saves P2P parameter1 block 00 Save area size 3
N0036~0039	%NW0043~0047	_P1B00WD4	Word	Saves Saves P2P parameter1 block 00 Save area device 4
N040	%NW0048	_P1B00WS4	Word	Saves Saves P2P parameter1 block 00 Save area size 4
N0041~0081	%NW0049~0097	-	Word	P2P parameter 1 block 01 Save area
N0082~0122	%NW0098~0146	-	Word	P2P parameter 1 block 02 Save area
N0123~1311	%NW0147~1567	-	Word	P2P parameter 1 block 03 ~ 31 Save area
N1312~2623	%NW1568~3135	-	Word	P2P parameter 2 Save area
N2624~3935	%NW3136~4703	-	Word	P2P parameter 3 Save area

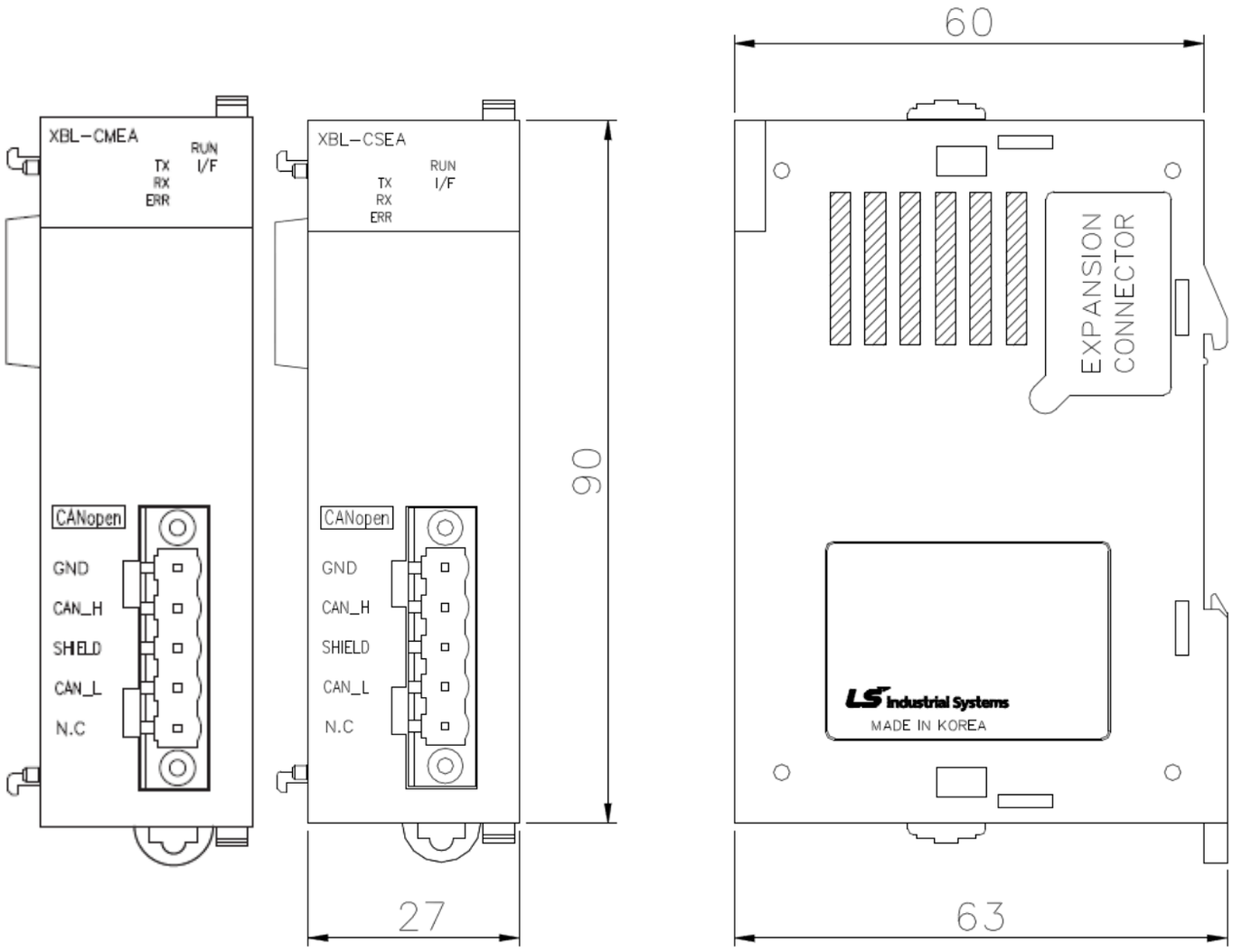
Note

Network register is Read Only device in the XGB.

A.3 External Dimension

[Dimension Unit : mm]

- **XBL-CMEA and XBL-CSEA have the same dimension**



Warranty

1. Warranty Period

The product you purchased will be guaranteed for 18 months from the date of manufacturing.

2. Scope of Warranty

Any trouble or defect occurring for the above-mentioned period will be partially replaced or repaired. However, please note the following cases will be excluded from the scope of warranty.

(1) Any trouble attributable to unreasonable condition, environment or handling otherwise specified in the manual,
(2) Any trouble attributable to others' products,
(3) If the product is modified or repaired in any other place not designated by the company,
(4) Due to unintended purposes
(5) Owing to the reasons unexpected at the level of the contemporary science and technology when delivered.
(6) Not attributable to the company; for instance, natural disasters or fire

3. Since the above warranty is limited to PLC unit only, make sure to use the product considering the safety for system configuration or applications.

Environmental Policy

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

Environmental Management

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

About Disposal

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

LS values every single customers.

Quality and service come first at LSIS.

Always at your service, standing for our customers.

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■ **HEAD OFFICE**
LS Tower, 127, LS-ro, Dongan-gu, Anyang-si,Gyeonggi-do, 431-848, Korea
Tel: 82-2-2034-4870 Fax: (82-2)2034-4648 e-mail: cshwang@lsis.biz

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

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

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

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

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

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

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

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

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

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

■ **Homepage**
http://eng.lsis.biz

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

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