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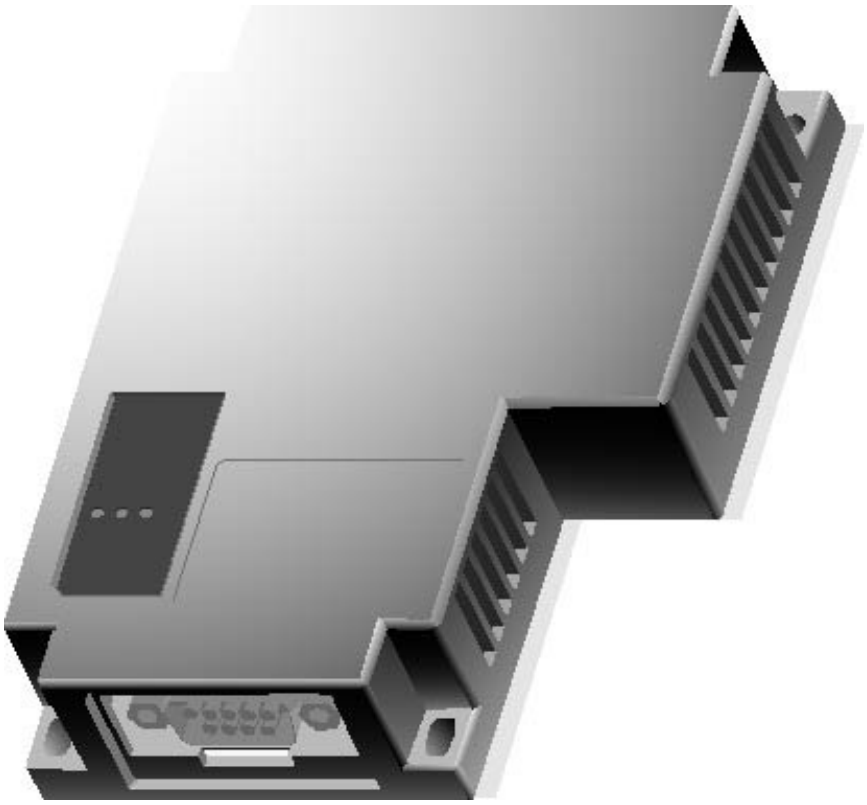
Human Machine Interface

CANopen Slave

XGT Panel Series

User's Manual

XPO-COEA



Safety Instructions

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

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Before using the product…

To use the product safely and effectively, please read this instruction manual thoroughly before use.

- Please keep to the safety precaution, for it is to prevent accidents and potential danger from occurring.

- Safety precaution is classified into 'Warning' and 'Caution' and their meanings are as follows.

⚠ **Warning**	Violating the instruction may result in serious personal injury or death.
⚠ **Caution**	Violating the instruction may result in slight personal injury or product damage.

- The indicated illustrations on the product and in the manual have the following meanings.

  ⚠ Be cautious, for danger may be present.

  ⚠ Be cautious, for there is a possibility of an electric shock.

- After reading the instruction manual, keep it handy for quick reference.

Design Precautions

⚠ Warning

- **Install a safety circuit external to the HMI to protect the whole control system in case of external power supply trouble.**

  Serious trouble may occur to the entire system due to erroneous output/operation of the HMI.

Design Precautions

⚠ Caution

- **In/output signal or communication cable should be at least 100mm apart from High-voltage/power wires.**

  Otherwise, it may cause erroneous output/operation.

Installation Precautions

⚠ Caution

- **Use the HMI in an environment that meets the general specification contained in this manual or datasheet.**

  Otherwise, it could result in electric shock, fire, erroneous operation or deterioration.

- **In case of much vibration in the installed environment, be sure to insulate the HMI from direct vibration.**

  Otherwise, it could result in electric shock, fire or erroneous operation.

- **Be sure not to let foreign substances such as conductive debris inside the product.**

  Otherwise, it could result in electric shock, fire or erroneous operation.

Wiring Precautions

⚠ Warning

- **Be sure to turn off the HMI and external power before wiring.**

  Otherwise, it may result in an electric shock or damage to the product.

⚠ Caution

- **Wire correctly by checking each of the product's rated voltage and terminal layout.**

  Otherwise, it may result in fire, electric shock or erroneous operation.

- **Tighten terminal screws with specified torque when wiring.**

  If terminal screws are loose, it may result in short circuits, fire or erroneous operation.

- **Use the exclusive HMI 3-type grounding for the FG terminal.**

  If not grounded, it may result in erroneous operation.

- **Be sure not to let any foreign substances such as wiring debris inside the module.**

  Such debris may cause fire, damage or erroneous operation.

Startup and Maintenance Precautions

⚠ Warning

- **Do not touch the terminals while power is on.**

  Otherwise, it may cause electric shock or erroneous operation.

- **Turn off the PLC and external power when cleaning or tightening the terminal.**

  Otherwise, it may cause electric shock or erroneous operation.

- **Do not charge, disassemble, heat, short circuit, solder, etc. the battery.**

  Mishandling the battery may cause overheating, crack, fire and may result in injury or fire.

⚠ Caution

- **Do not disassemble PCB from the product case or modify the product.**

  Otherwise, it may result in fire, electric shock or erroneous operation.

- **Use cellular phone or walky-talky at least 30cm away from the PLC.**

  Otherwise, it may result in erroneous operation.

Disposal Precaution

⚠ Caution

- **When disposing of this product or battery, treat it as industrial waste.**

  Otherwise, it may cause poisonous pollution or explosion.

Revision History

Version	Date	Contents	Revised location
V1.0	’11.8	First Edition	-

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

Thank you for purchasing the HMI of LS Industrial Systems Co., LTD.

For right use of the product, read carefully the manual to understand the functions, performance, installation and programming of the product you have purchased before use it and make sure that this manual is delivered to the final user and person in charge of maintenance.

The following manual deals with use of the product.

When necessary, read the following manuals and place an order.

Otherwise you can download PDF files by signing in our company's home page http://eng.lsis.biz/.

Related Manuals

Title	Contents	Serial Number
XGT Panel Communication User's Manual	This manual describes the line diagrams and communication settings necessary for connecting the XGT Panel products to control devices such as the PLC or inverter.	10310000857
XP-Builder User's Manual	This is the XGT Panel software manual describing the functions such as the display data, communication and environment setting, logging/recipe data backup, simulator and printing to use the XGT Panel products.	10310000876
XGT Panel User's Manual	This manual explains the specifications, features and system composition of the XGT Panel series.	10310000867

Contents

Chapter 1 Introduction

1.1 Introduction

CANopen network is an open type network used for control equipment for industries. It is driven by CiA (CAN in Automation) and 400 companies in the world support it.
CANopen complies with the EN 50325-4 and ISO 15745-2 standards. CANopen system is a multiple access system where every station in the network can transmit messages anytime as long as the network is free. If multiple stations try to transmit simultaneously, the station with high priority will have the authority to transmit.
Data communication is conducted in message as a unit.
The message is composed of one COB-ID and data up to 8 bytes.
The COB-ID is composed of function code and exchange number. The smaller the value is, the higher the priority is. Also, the exchange number should be set up not duplicated in the network.
The function code will be determined according to the type of the message, and the types of messages are as follows.

- ◆ Managememt messages(NMT, LMT)
- ◆ Messaging and service (SDO)
- ◆ Data exchange (PDO)
- ◆ Predefined messages (synchronization, emergency)

The transmission of message is conducted by one of following four methods.

- ◆ Request: It transmits when request is coming from another station.
- ◆ Cyclic: The transmission is conducted regularly.
- ◆ Synchronous: When another station receives synchronization message, it transmits.
- ◆ Change of state: It transmits when the value to be transmit is changed, or the time when it intends to do.

This user's manual describes the XP CANopen I/F module(XPO-COEA) which enables the XGT PANEL system to connect to the CANopen network.

Please program it by referring to following S/W and user's manual.

- XP-Builder: V1.24 or higher
- XGT Panel S/W: V1.24 or higher

1.2 Features

XP CANopen I/F module (XPO-COEA) has following features.

(1) It complies with the specification of CANopen(CiA DS301).
(2) It can transmit data of up to 256 words for input and output respectively.
(3) It provides four predefined PDO for input and output respectively.
(4) It provides total 6 domains. Each domain has 0-512 words and customizable by user. It can be transmitted to SDO.
(5) It provides diagnosis function on the CANopen slave.
(6) It can connect up to 127 stations of slave depending on the master.
(7) It provides total 8 types of communication speeds and automatic speed can be set up.
(8) 1 EA can be mounted on the XGT panel.

1.3 Composition of the product

1.3.1 Type name

It indicates the composition of the XP CANopen I/F module.

Type name	Description	Remarks
XPO-COEA	CANopen I/F	

1.3.2 Number of module available for mounting

One XP CANopen I/F module can be mounted on the one HMI device.

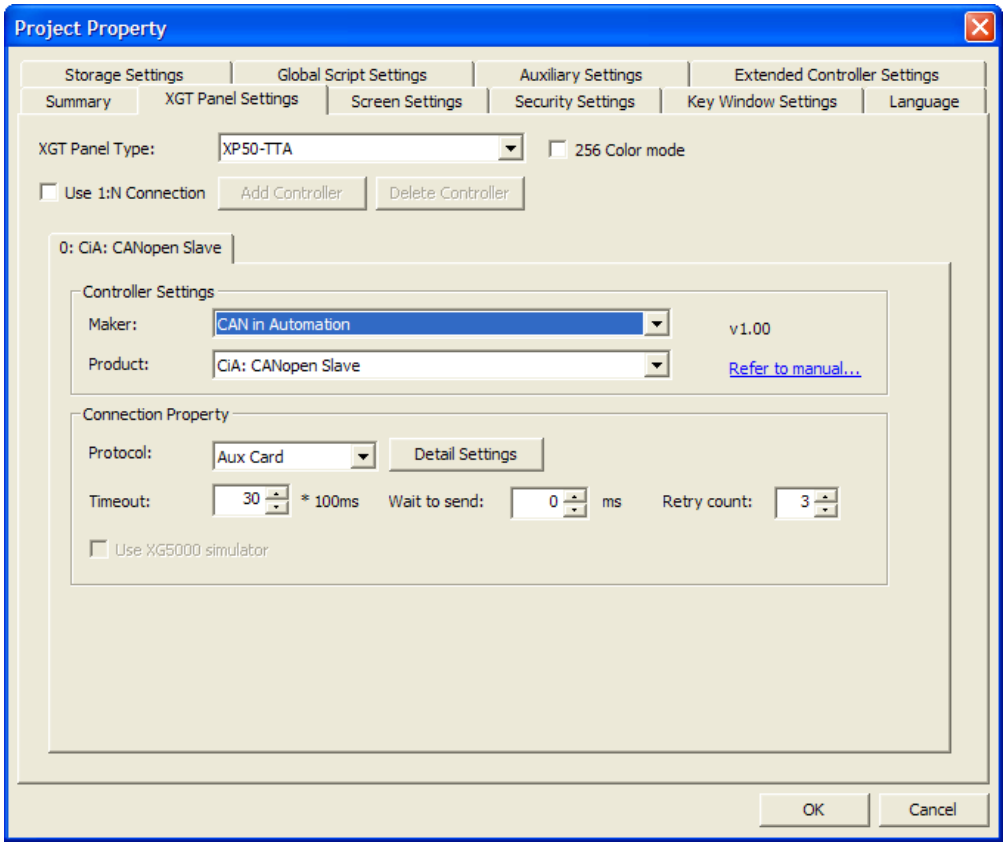
1.4 Software for the product

Following is the description about main programming tool and other production software to use the CANopen I/F module (XOP-COEA). Please refer to the following to apply the system for more accurate programming and communication.

1.4.1 XP-Builder:

The communication parameter can be set up and the driver can be downloaded for the operation of the CANopen I/F module (XPO-COEA) through XP-Builder.

Like the normal serial communication set-up, this set-up can be implemented through the menu “Project property” → “XGT Panel settings” of the XP-Builder.



[Figure 1.4.1] The setup screen of the XP-Builder CANopen

1.4.2 Checking the version of the CANopen I/F module

Each communication module has the product information of the module on the external case. The CANopen I/F module (XPO-COEA) has the label on the rear of the product. It has the type name and version of the product.

Chapter 2 Specifications

2.1 General Specifications

The general specifications of CANopen I/F module (XPO-COEA) are as follows.

No.	Items	Specifications				Related standards
1	Ambient temperature	0 ~ 50 °C				
2	Storage temperature	–20 ~ +60 °C				
3	Ambient humidity	10 ~ 85%RH (Non-condensing)				
4	Storage humidity	10 ~ 85%RH (Non-condensing)				
5	Vibration resistance	Occasional vibration			-	
		Frequency	Acceleration	Amplitude	times	IEC61131-2
		5 ≤ f < 9Hz	–	3.5mm	10 times each directions (X, Y and Z)	
		9 ≤ f ≤ 150Hz	9.8m/s^2(1G)	–		
		Continuous vibration				
		Frequency	Acceleration	Amplitude		
		5 ≤ f < 9Hz	–	1.75mm		
		9 ≤ f ≤ 150Hz	4.9m/s^2	–		
6	Shock resistance	• Peak acceleration: 147 m/s^2(15g) • Duration: 11ms • Half-sine, 3 times each direction per each axis				IEC61131-2
7	Noise resistance	Square wave Impulse noise	AC System: ±1,500V DC System: ±1,000V			LSIS standard
		Electrostatic discharge	6kV (Contact discharge)			IEC61131-2 IEC61000-4-2
		Radiated electromagnetic field noise	27 ~ 500 MHz, 10V/m			IEC61131-2, IEC61000-4-3
		Fast transient/bust noise	Segment	Power supply module	Digital/analog input/output communication interface	IEC61131-2 IEC61000-4-4
			Voltage	2kV	1kV	
8	Environment	Free from corrosive gasses and excessive dust				
9	Operating height	Up to 2,000 ms (6.562ft)				
10	Pollution degree	2 or less				
11	Cooling	Air-cooling				

Note

1) IEC(International Electro-technical Commission): This is one of international private organization which promotes international cooperation on the standardization of electric and electronic technical areas, publishes international specification and operates related conformance assessment system.
2) Pollution level: This is an indication to show the level of pollution in the environment which determines insulation performance of the device. The level 2 is the state where only non-conductive pollution occurs. It refers to the state where temporary electric conduction occurs because of dew formation.

2.2 Performance specification

The specifications on the system composition of CANopen I/F module (XPO-COEA) are as follows. Please establish the system by referring to the table below.

2.2.1 Performance specification

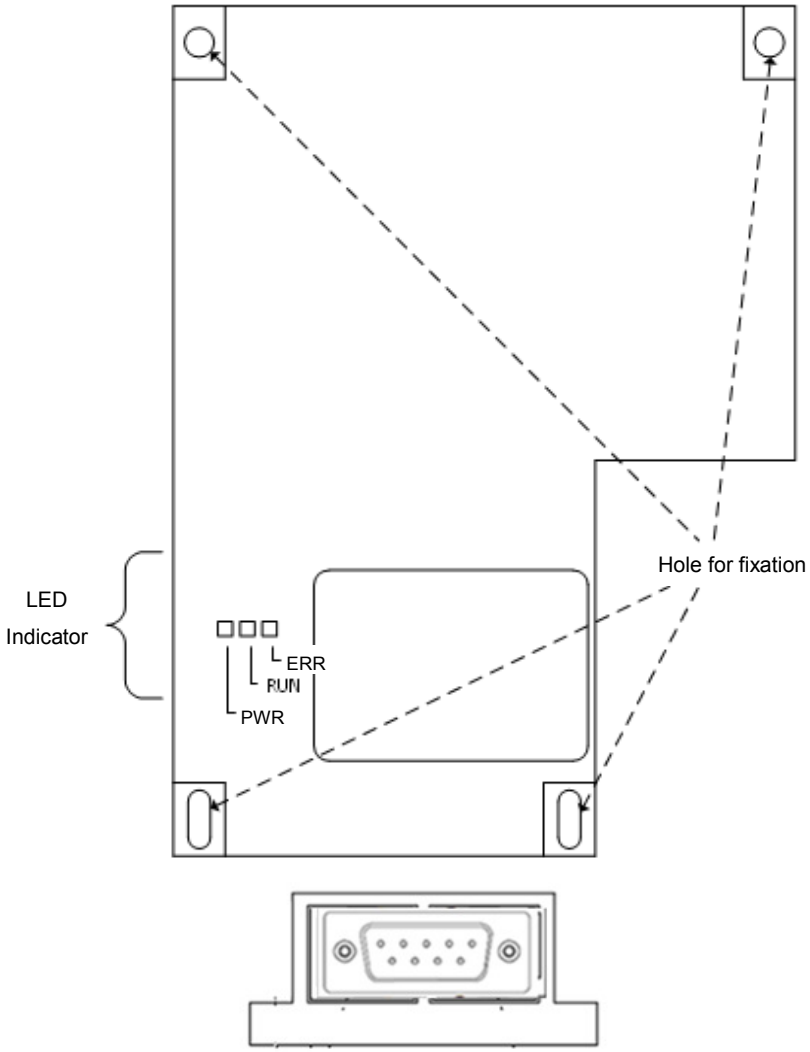
Item	Specifications	
Module type	XP CANopen I/F option module	
Topology	Bus type	
Transmission type	CSMA/NBA. Half-duplex serial transmission	
Maximum transmission distance and Baud rate	Distance (m)	Baud rate (kbps)
	20	1,000
	40	800
	100	500
	250	250
	500	125
	600	100
	1000	50
	1200	20
Number of stations available for contacting	Up to 127 stations	
Communication zone	Input zone (By PDO)	256 word
	Output zone (By PDO)	256 word
	Domain zone (By SDO)	512 word * 6
Number of PDO	TPDO 64, RPDO 64, only Static mapping possible	
Cable in use	See the 2.4 cable specification	
Connector in use	See the 2.4 connector specification	
Number of I/O module attached	1 EA	
Location	Aux slot on the rear side of XGT Panel	
Consumption current (mA)	400	

2.2.2 Installable XGT Panel

XGT Panel	Interface
XP30- BTE/TTE	X Not mountable
XP50- TTE	X Not mountable
XP30- BTA	Mountable
XP30 - TTA	Mountable
XP50 - TTA	Mountable
XP70 – TTA (DC/AC)	Mountable
XP80 – TTA (DC/AC)	Mountable
XP90 - TTA	Mountable

2.3 Name of each part

The name of each part of CANopen I/F module (XPO-COEA) is as follows.

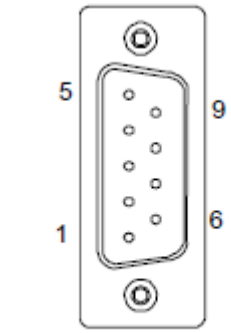


< LED part>

Item	Name	State	Description
1	PWR LED	ON	Power is normal
2	RUN LED	ON	Operational state of CANopen
		BLINKING	Preoperational state of CANopen
		SINGLE FLASH	Stop state of CANopen
3	ERR LED	ON	Bus off state
		SINGLE FLASH	Detecting error of CAN controller
		DOUBLE FLASH	Detecting unusual heartbeat
		OFF	No error state

* LED state
  - BLINKING: ON(200 ms) , OFF(200ms) …
  - SINGLE FLASH: ON(200 ms) , OFF(1000ms) …
  - DOUBLE FLASH: ON(200 ms) , OFF(200ms), ON(200 ms) , OFF(1000ms) …

< CONNECTOR part>

Pin allocation	Pin number	Pin name	Description
 (CANopen Slave Unit side)	1	NC	Not connected
	2	CAN_L	CAN_L bus line
	3	CAN_GND	CAN ground
	4	NC	Not connected
	5	NC	Not connected
	6	NC	Not connected
	7	CAN_H	CAN_H bus line
	8	NC	Not connected
	9	NC	Not connected
	Shell	FG	Frame Ground (Common with SG)

2.4 Specification of Connector and Cable

2.4.1 Connector and cable

Item	Model	Manufacturer	Description
Connector	XM2D-0901	OMRON	DSUB 9-pin socket without termination resistance
	TSXCANKCDF180T	Schneider Electric	Straight connector with terminal selector switch attached
	TSXCANKCDF90T TSXCANKCDF90TP	Schneider Electric	Right-angled connector with terminal selector switch attached.
	VS-09-BU-DSUB/CAN	PHOENIX CONTACT	Connector with terminal block attached with terminal selector switch attached
	SUBCON-PLUS-CAN/AX	PHOENIX CONTACT	Straight connector with terminal selector switch attached
	SUBCON-PLUS-CAN/PG SUBCON-PLUS-CAN	PHOENIX CONTACT	Right-angled connector with terminal selector switch attached
Cable	TSX CAN CA50 TSX CAN CA100	Schneider Electric	Cable for CANopen (IEC60332-1) 50 m/100 m
	TSX CAN CB50 TSX CAN CB100	Schneider Electric	UL-authenticated cable for CANopen (IEC60332-2) 50 m/100 m

Chapter 3 Installation and Trial Run

3.1 Installation Environment

This product is highly reliable regardless of the environment, but be sure to check out following matters to ensure the reliability and stability of the system.

(1) Ambient conditions

(a) Install the system on a control panel which is water- and vibration-proof.
(b) The place should be free from continuous impact or vibration.
(c) The place is not directly exposed to direct ray of light.
(d) The place has no dew formation by rapid temperature change.
(e) The ambient temperature should be maintained between 0-50℃

(2) Installation

(a) The scraps of wiring should not be entered into the XGT panel when processing the hole of screw or wiring work.
(b) The place to be installed should allow easy operation.
(c) Do not install high voltage device on the same panel.
(d) The distance to the duct and surrounding module should be more than 100mm.
(e) Ground it to the place where surrounding noise is low.

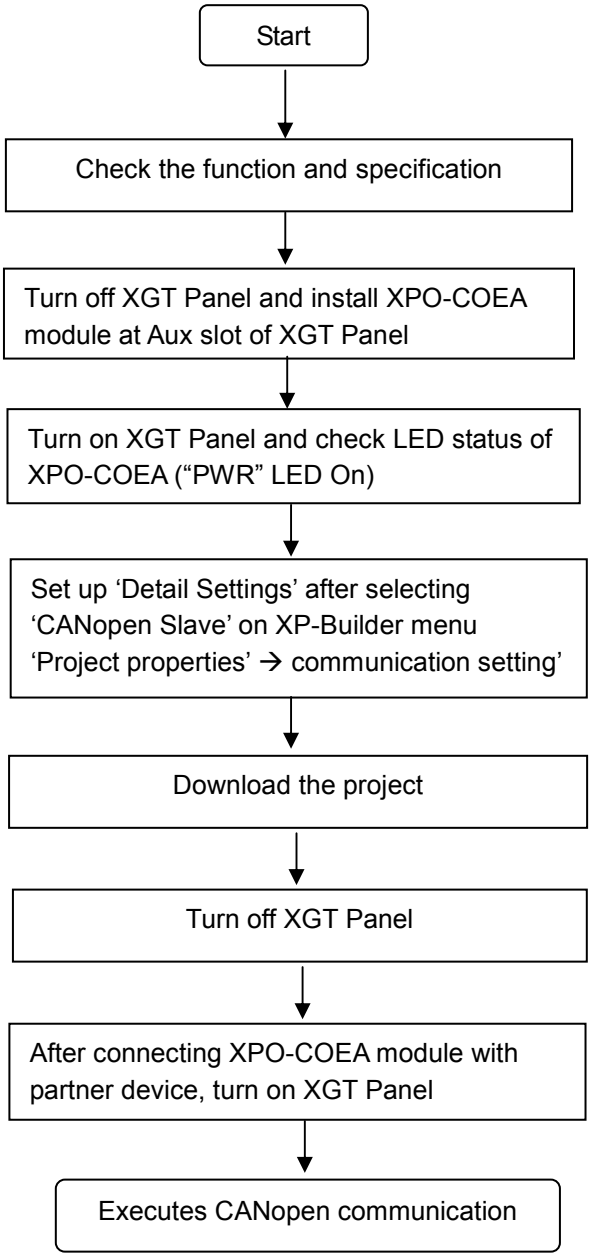
3.2 Cautions for Handling

Please be sure to be cautious for following matters when establishing the system by using the XP CANopen I/F module (XPO-COEA).

1) Do not drop it or make strong impact on it.
2) Do not separate the PCB from the case. It may cause trouble.
3) Be sure not to allow any foreign substances such as scraps of wiring in the upper part of the module during wiring work.
4) If any substance enters there, please remove it.
5) Do not attach/detach the module while the power is on.
6) Use standard cable and install it within maximum allowed distance.
7) The communication wire should not be affected by surge and induction noise occurred from AC or AC side.
8) If the wires are too close to hot devices or substances, or the wires are contacting oil for a long time, it may make a short circuit to cause damage or malfunction.
9) If the wiring work uses pipes, the pipes should be grounded.

3.3 The Order of Setting

This describes the order from the installation to the operation of the product. Please be sure to install the system and set up parameter in following orders.



Note

1) The XP CANopen I/F module (XPO-COEA) sets up the address by software.
2) If the address, speed and the length of the domain are not set up, they are set up as default value.
3) If the address is same with other modules in the network, address conflict occurs.

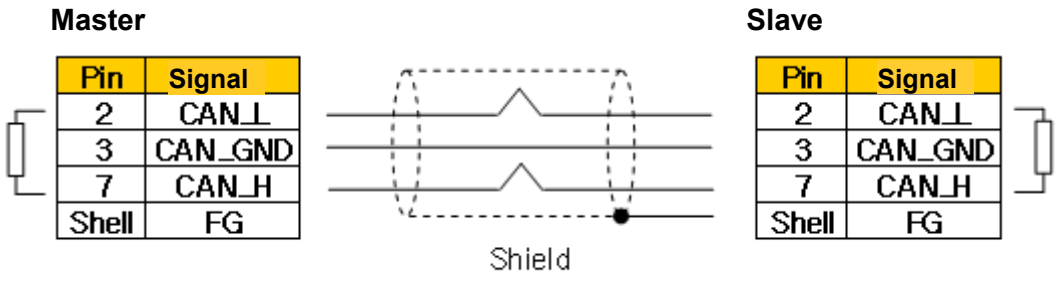
3.4 Parameter Set-up at XP-Builder

The parameter set-up at XP-Builder is as follows.

Set-up items	Set-up scope and contents	Description
Address	1 ~ 127	-
Baud rate	1000, 800, 500, 250, 125, 100, 50, 20	Speed unit kbps
Domain	(0 ~ 512 word) / Domain	Total 6 Domain

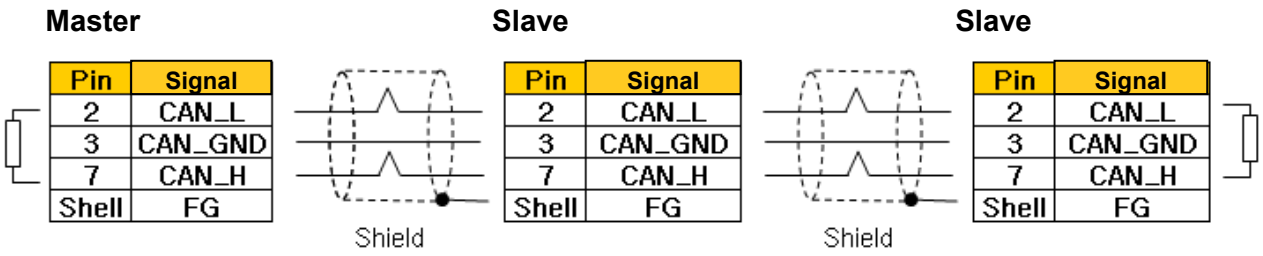
3.5 Connection of the Product

<1:1 Connection>



Terminal Resistor 120Ω 1/4W should be connected between Pin number 2 and 7

<1:N Connection>



Terminal Resistor 120Ω 1/4W should be connected between Pin number 2 and 7

Note

1) The terminal resistor (120 Ω, 1/4 W) should be connected.

2) In particular, in case of FG, do not connect the communication line shield to the one terminal among both terminals of the bus

3.6 Trial Run

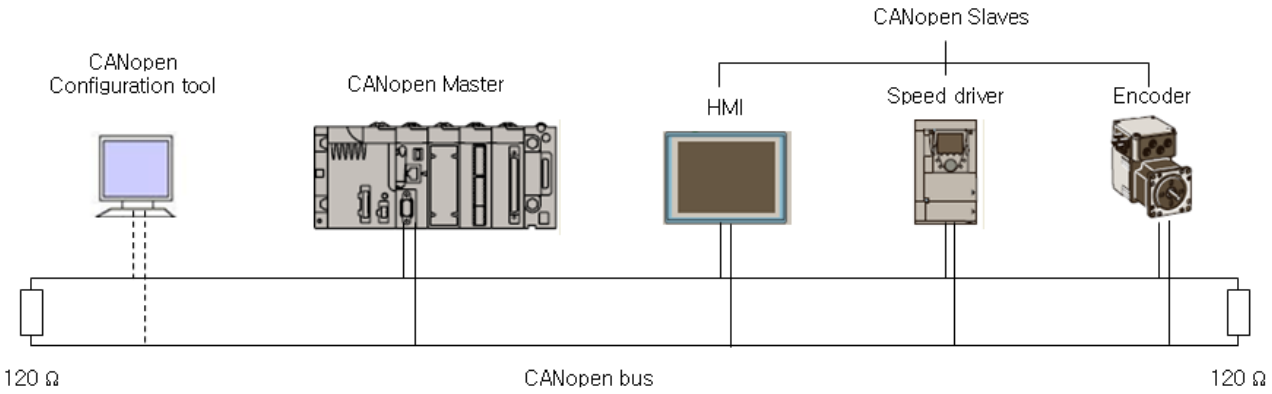
3.6.1 Cautions when Composing the System

1) Use the communication cable with designated specification. If you use cable with different specification, it may cause serious communication problem.
2) Before you install communication cable, be sure to check out whether the cable is cut or there is any short circuit.
3) Completely fasten the communication cable connector to firmly fix the connection. If the connection is incomplete, it may cause serious communication problem.
4) If you connect long distance communication cable, wiring should be far away from power line or induction noise.
5) Since the CANopen cable is not flexible, if you bend the cable at a right angle or excessively transform it, the cable may be cut and the connector in the communication module may be damaged.
6) If the LED is not normal, check out the cause by referring to the 'Chapter 7. Troubleshooting' of this user's manual and take appropriate action. If the problem continuously occurs after the action, please contact the A/S center.

Chapter 4 CANopen Communication

4.1 Overview

4.1.1 Network Composition



Up to 127 CANopen slaves can be connected but it may be restricted according to the number of slaves allowed by the master. So please see the manual of the master.

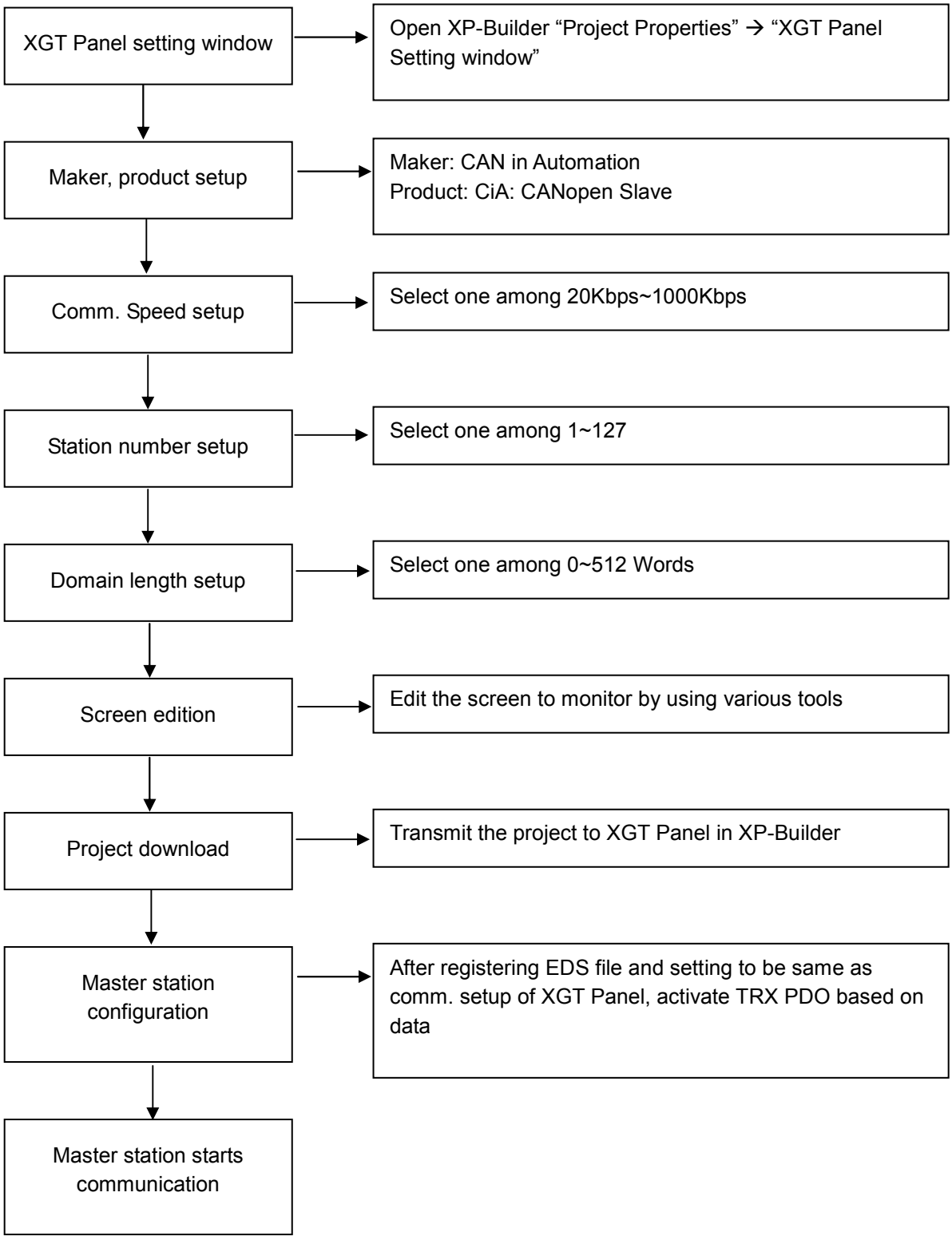
4.1.2 Communication protocol

The 301 specification of CiA describes overall CANopen such as protocol and object dictionary.

(1) SDO (Service Data Object)
SDO communication is confirmed way of communication in the type of client/server.
The entries of the object dictionary of the CANopen device can be accessed by using SDO communication, and setting, saving and monitoring of the parameters of the device can be conducted through this.
The SDO communication is not regularly conducted. It can be communicated at necessary timing.

(2) PDO (Process Data Object)
The PDO communication is unconfirmed way of communication in the type of producer/consumer. Therefore, it is used to transmit process data which requires high speed communication.
The communication method and communication data is determined by the setting of communication parameter and mapping parameter of PDO.
It can transmit in various method including sync, timer, COS (change of state) by the transmission parameter setting. The mapping parameter allows connecting the PDO to the certain area of the internal object dictionary. When receiving, the received data is saved into the mapping area, and when transmitting, it transmits by obtaining the mapped area.
The transmittance/receiving data in the mapping area is managed by upper application.

4.2 Order of Communication Operation

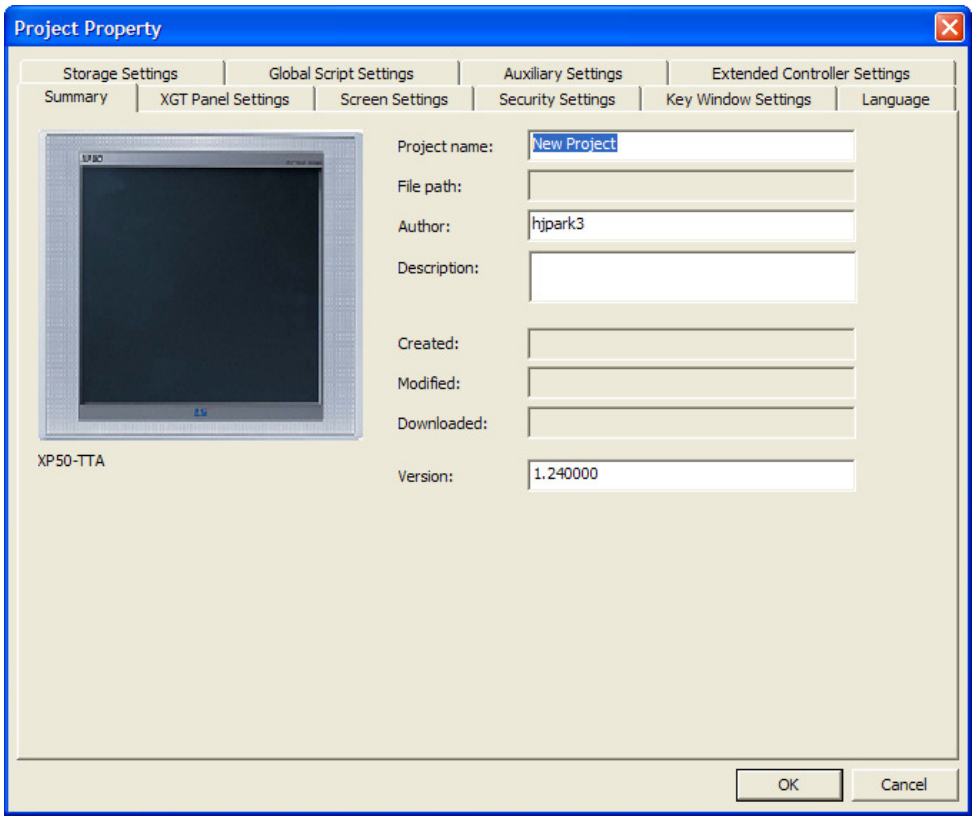


4.3 Communication Setting

4.3.1 Setting at XP-Builder

(1) Setting XP-Builder

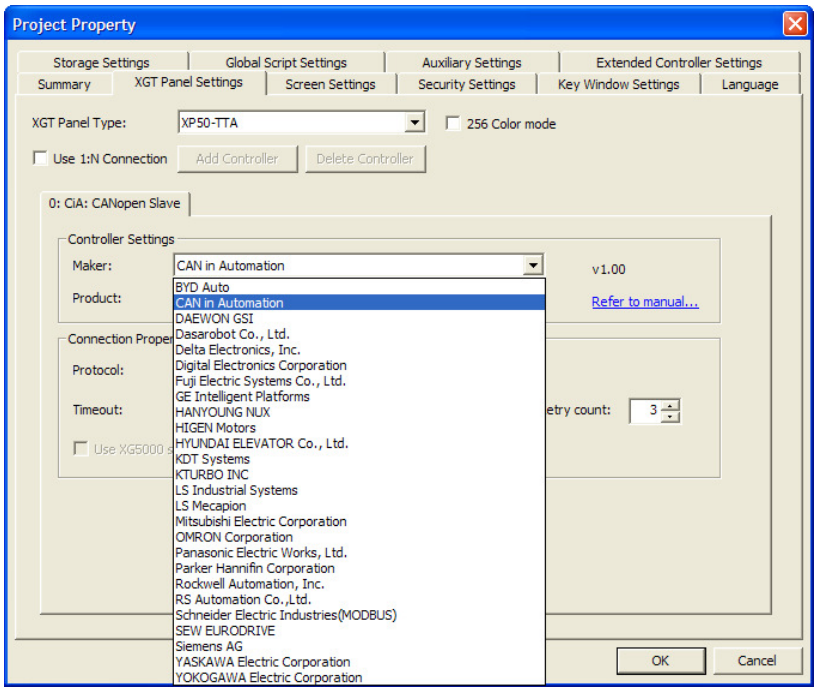
Run the XP-Builder and click “project properties” from the left “project window,” then the screen appears.



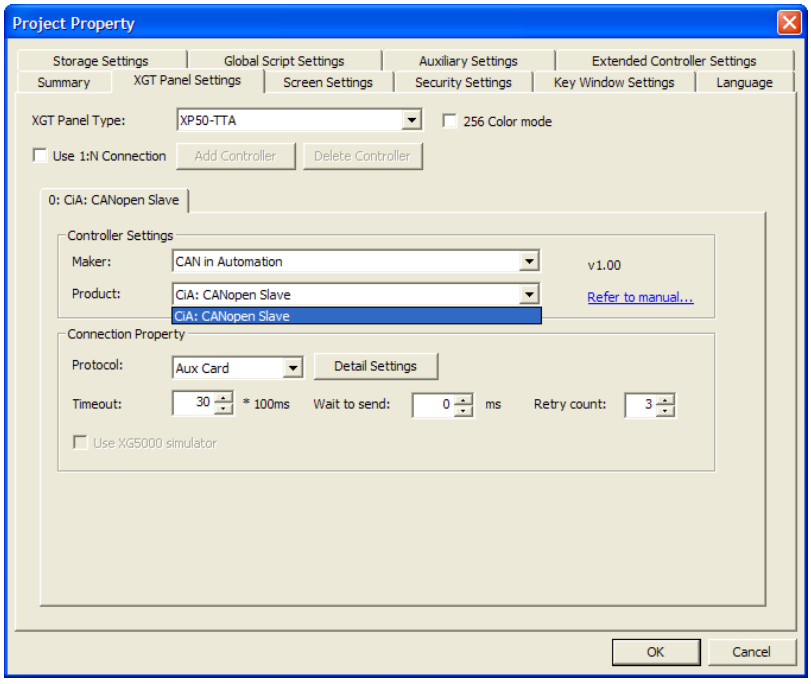
[Figure] “Project properties” screen of the XP-Builder

(2) Selection of CANopen

After clicking “XGT Panel Settings” tab from the upper tabs of the screen above, and select “CAN in Automation” from the “Maker” drop-down menu.



And, select ““CiA: CANopen Slave” from the “product” drop-down menu.



(3) Settings of CANopen

If you click “Detailed connection settings” from “Connection properties” on the same screen, then “AuxCard settings" window appears, and set up “transmission speed,” “Node ID,” and “Domain Length” here.

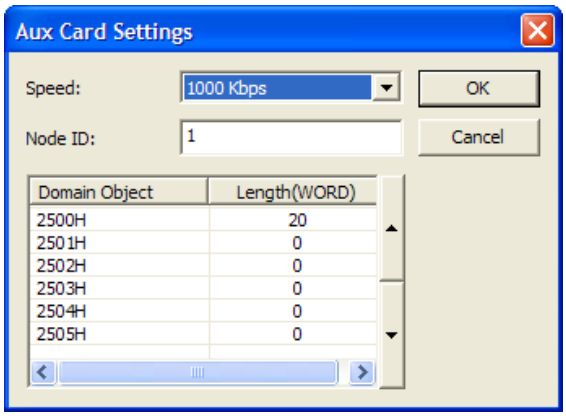


Figure. CANopen detailed settings window

Speed (kbps): 1000, 800, 500, 250, 125, 100, 50, 20

Node ID: 1-127.

Domain Length: 0~512 words.

The default transmission speed is 1000Kbps, address is 1, and the length of domain is 20 words only for 2500H.

(4) Device input

In order to display input, output and domain area on the screen;

1) Select device settings
2) Select CANopen slave
3) Select device

Select input, output and domain area. See 5.4 for PDO mapping.

See “6.2 How to set up the TAG of XP builder” for the detailed settings screen.

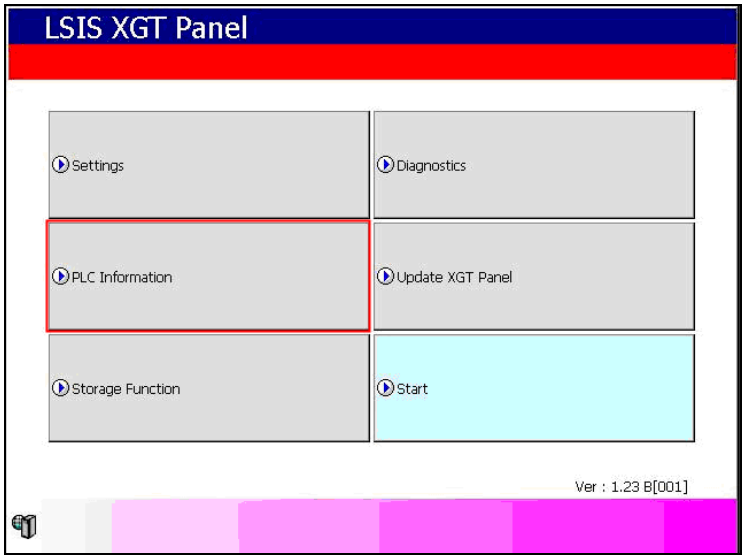
Device	Device name (on EDS)	Device name	Actual object dictionary
Output (Master → Slave)	%QW 001 ~ %QW128 %QW 129 ~ %QW256	2000H000 ~ 2000H127 2010H000 ~ 2010H127	2000H001 ~ 2000H128 2010H001 ~ 2010H128
Input (Slave → Master)	%IW 001 ~ %IW128 %IW 129 ~ %IW256	2100H000 ~ 2100H127 2110H000 ~ 2110H127	2100H001 ~ 2100H128 2110H001 ~ 2110H128
Domain (Master ←→ Slave)	Domain1 data area	2500H000 ~ 2500H511	2500H000
	Domain2 data area	2501H000 ~ 2501H511	2501H000
	Domain3 data area	2502H000 ~ 2502H511	2502H000
	Domain4 data area	2503H000 ~ 2503H511	2503H000
	Domain5 data area	2504H000 ~ 2504H511	2504H000
	Domain6 data area	2505H000 ~ 2505H511	2505H000

In case of domain area, the name of object used in device is assigned by word, but only one sub index is assigned as 0 for the entire length of the domain set up on in the object dictionary.

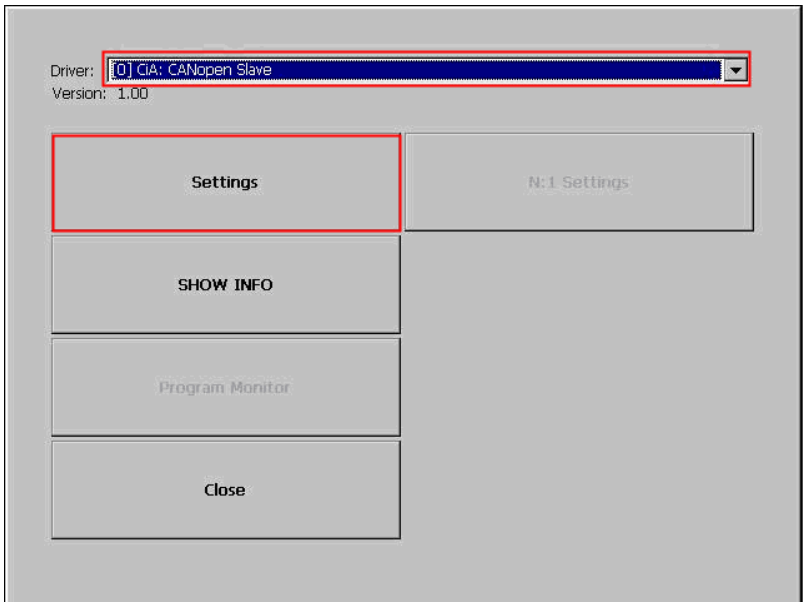
4.3.2 Settings on the XGT Panel

After the settings value is downloaded through the XP-Builder, even XP panel can directly set up address number, communication speed and domain length.

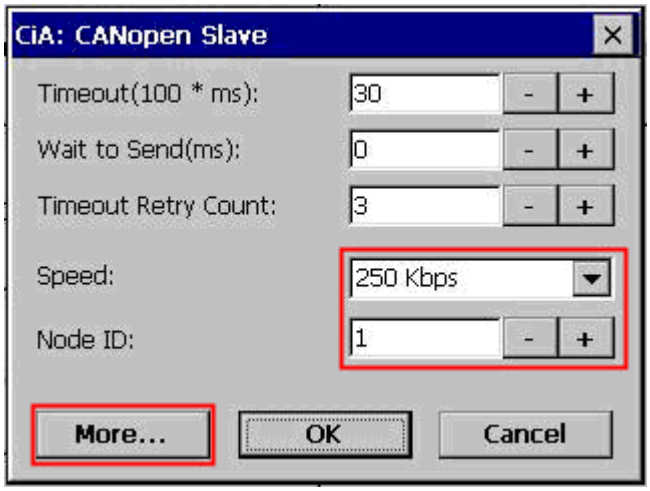
(1) Select PLC information



(2) Select settings

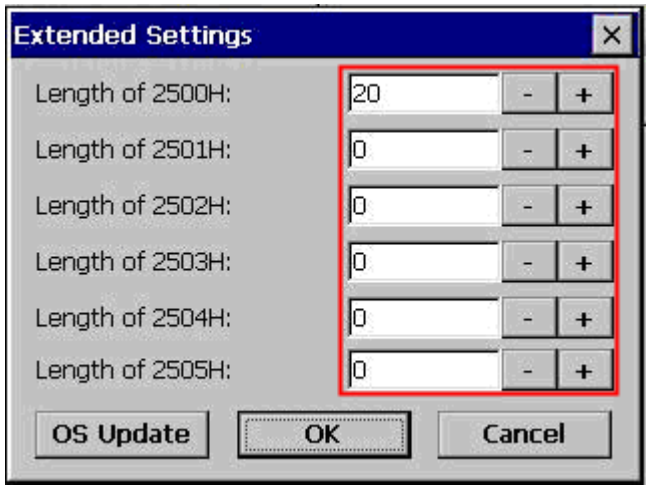


(3) Select communication speed and address number



After selecting communication speed and address number (Node ID), click OK or select More to set up the length of the domain.

(4) Select domain length



The length of each domain can be set up within the range of 0-512 words.

Chapter 5. Device

5.1 Entire devices

Device	Device Name	Size	R/W (1)	Transmission / Reception (2)	PDO/SDO(3)	Remarks
Output	(5) 2000H000 ~ 2000H127 2010H000~ 2010H127	WORD	R/W	Reception Area	PDO	Output Area (4)
Input	(5) 2100H000~ 2100H127 2110H000~ 2110H127	WORD	R/W	Transmission Area	PDO	Input Area
DG	DG000 ~ DG007	WORD	R	-	-	Diagnosis Information
Domain 1	2500H000 ~ 2500H511	WORD	R/W	Transmission / Reception Area	SDO	Domain Area
Domain 2	2501H000 ~ 2501H511	WORD	R/W	Transmission / Reception Area	SDO	Domain Area
Domain 3	2502H000 ~ 2502H511	WORD	R/W	Transmission / Reception Area	SDO	Domain Area
Domain 4	2503H000 ~ 2503H511	WORD	R/W	Transmission / Reception Area	SDO	Domain Area
Domain 5	2504H000 ~ 2504H511	WORD	R/W	Transmission / Reception Area	SDO	Domain Area
Domain 6	2505H000 ~ 2505H511	WORD	R/W	Transmission / Reception Area	SDO	Domain Area

(1) It means the availability to read or write on the TAG matched in the XGT Panel.

(2) The transmission and reception is based on XGT Panel.

(3) It means the protocol of CANopen available to access data in this area.

(4) The output means transmission to CANopen slave from CANopen master.

(5) There is difference between meaning of device name and the sub index of the actual object dictionary.

Therefore, device name 2000H000~2000H127, 2010H000~2010H127, 2100H000~2100H127 and 2110H000~2110H127 means Object Dictionary 2000H001~2000H128, 2010H001~2010H128, 2100H001~2100H128 and 2110H001~2110H128 respectively.

5.2 Diagnosis Device

It has various diagnosis information including communication status. Total 8 words in DG000 – DG007.

	Description
Lower byte of DG000	0: It is initializing CANopen stack. After completion, it becomes 0x42. 0x41: The XPO-COEA is stop state. (Receives stop command from master) 0x42: The XPO-COEA is preoperational state. 0x43: The XPO-COEA is operational state. 0x90: The XPO-COEA is fatal error state. The error should be resolved to progress it.
Upper byte of DG000	bit1 - Quantity of the CAN controller data is over range. bit2 - The CAN controller is bus off state. bit3 - The CAN controller is error state. If the error is resolved, it is reset. bit4 - If the CAN controller is resolved from error state, then it is set. The error history in the stack is not reset. bit6 - Quantity of the high-priority receive data is over range. bit7 - Quantity of the high-priority transmit data is over range.
DG001	bit0 - Fatal error state. bit3 - RPDO frame's size error. bit4 - Network is not connected.
DG002	-
DG003	ERROR LED status bit0 -On(Bus Off) bit3 - Single flash (CAN controller detecting error) bit4 - Double flash(detecting abnormal Heartbeat)
DG[4] (RUN LED)	RUN LED status bit0 - On (Operational state) bit2 - Blink (Preoperational state) bit3 - Single flash (Stop state)
DG[5]	Baud Rate 0 - 1000 Kbps 1 - 800 Kbps 2 - 500 Kbps 3 - 250 Kbps 4 - 125 Kbps(default) 5 - 100 Kbps 6 - 50 Kbps 7 - 20 Kbps

DG[6]	Firmware version
DG[7]	-

5.3 Object Dictionary

This is the object dictionary of the CANopen slave. It is saved in the EDS file.

Index(Hex)	Sub Index	Name	Data Type
1000		Device Type	VAR
1001		Error register	VAR
1003		EMCY message object	ARRAY
	0	Number of errors	
	1	EMCY field 1	
	2	EMCY field 1	
1005		COB-ID SYNC	VAR
1008		manufacturer device name	VAR
1009		Manufacturer hardware version	VAR
100A		Manufacturer software version	VAR
1010		Store parameters	ARRAY
	0	largest sub index supported	
	1	save all parameters	
1011		Restore default parameters	ARRAY
	0	Number of entries	
	1	parameters that can be restored	
1014		COB-ID for EMCY message	VAR
1015		Inhibit time for EMCY message	VAR
1016		Consumer heartbeat time	ARRAY
	0	Number of entries	
	1	Consumer heartbeat time	
1017		Producer heartbeat time	VAR
1018		Identity object	RECORD
	0	Number of entries	
	1	Vendor ID	
	2	Product code	

	3	Revision number	
1020		Verify Configuration	ARRAY
	0	Number of entries	
	1	Configuration date	
	2	Configuration time	

Index(Hex)	Sub Index	Name	Data Type
1200		1. Server SDO	VAR
	0	Number of entries	
	1	COB-ID Client → Server (Rx)	
	2	COB-ID Server → Client (Tx)	
1400 ~ 143F		Receive PDO	RECORD
	0	Number of entries	
	1	COB-ID	
	2	Transmission type of RxPDO	
1600 ~ 163F		Receive PDO mapping	RECORD
	0	Number of entries	
	1	PDO mapping for the 1st application object to be mapped	
	2	PDO mapping for the 2nd application object to be mapped	
	3	PDO mapping for the 3rd application object to be mapped	
	4	PDO mapping for the 4th application object to be mapped	
1800 ~ 183F		Transmit PDO	RECORD
	0	Number of entries	
	1	COB-ID	
	2	Transmission Type of TxPDO	
	3	Inhibit time	
	4	Reserved	
	5	Event timer	
1A00 ~ 1A3F		Transmit PDO mapping	RECORD
	0	Number of entries	

	1	PDO mapping for the 1st application object to be mapped	
	2	PDO mapping for the 2nd application object to be mapped	
	3	PDO mapping for the 3rd application object to be mapped	
	4	PDO mapping for the 4th application object to be mapped	
2000		Word Output	ARRAY
	0	Number of entries	
	1	1st output word	
	…		
	128	128th output word	

Index(Hex)	Sub Index	Name	Data Type
2010		Word Output	ARRAY
	0	Number of entries	
	1	1st output word	
	…		
	128	128th output word	
2100		Word Input	ARRAY
	0	Number of entries	
	1	1st input word	
	…		
	128	128th input word	
2110		Word Input	ARRAY
	0	Number of entries	
	1	1st input word	
	…		
	128	128th input word	
2500	0	Length is defined by user	DOMAIN
2501	0	Length is defined by user	DOMAIN
2502	0	Length is defined by user	DOMAIN
2503	0	Length is defined by user	DOMAIN

2504	0	Length is defined by user	DOMAIN
2505	0	Length is defined by user	DOMAIN
5000		Slave Diagnostics	ARRAY
	0	Number of entries	
	1	Slave Diagnostics DG[0]	
	2	Slave Diagnostics DG[1]	
5FFF		LSIS specific object	RECORD
	0	Number of entries	
	1	Company name	
	2	Manufacturer Brand	

5.4 PDO Mapping

There are 64 transmission and reception PDOs respectively. Four words are mapped at each PDO in static type. Therefore, the size and location of transmission/reception object for each PDO is fixed.

Master can activate the transmission/reception PDO competent to the transmission/reception area by using the table below.

Receipt PDO(RPDO)	Receipt area(output area)	Transmission PDO(TPDO)	Transmission area (Input area)
RPDO 1	2000H001 ~ 2000H004	TPDO 1	2100H001 ~ 2100H004
RPDO 2	2000H005 ~ 2000H008	TPDO 2	2100H005 ~ 2100H008
RPDO 3	2000H 009~ 2000H012	TPDO 3	2100H 009~ 2100H012
RPDO 4	2000H 013~ 2000H016	TPDO 4	2100H 013~ 2100H016
RPDO 5	2000H 017~ 2000H020	TPDO 5	2100H 017~ 2100H020
RPDO 6	2000H 021~ 2000H024	TPDO 6	2100H 021~ 2100H024
RPDO 7	2000H 025~ 2000H028	TPDO 7	2100H 025~ 2100H028
RPDO 8	2000H 029~ 2000H032	TPDO 8	2100H 029~ 2100H032
RPDO 9	2000H 033~ 2000H036	TPDO 9	2100H 033~ 2100H036
RPDO 10	2000H 037~ 2000H040	TPDO 10	2100H 037~ 2100H040
RPDO 11	2000H 041~ 2000H044	TPDO 11	2100H 041~ 2100H044
RPDO 12	2000H 045~ 2000H048	TPDO 12	2100H 045~ 2100H048
RPDO 13	2000H 049~ 2000H052	TPDO 13	2100H 049~ 2100H052
RPDO 14	2000H 053~ 2000H056	TPDO 14	2100H 053~ 2100H056

Receipt PDO(RPDO)	Receipt area(output area)	Transmission PDO(TPDO)	Transmission area (Input area)
RPDO 15	2000H 057~ 2000H060	TPDO 15	2100H 057~ 2100H060
RPDO 16	2000H 061~ 2000H064	TPDO 16	2100H 061~ 2100H064
RPDO 17	2000H 065~ 2000H068	TPDO 17	2100H 065~ 2100H068
RPDO 18	2000H 069~ 2000H072	TPDO 18	2100H 069~ 2100H072
RPDO 19	2000H 073~ 2000H076	TPDO 19	2100H 073~ 2100H076
RPDO 20	2000H 077~ 2000H080	TPDO 20	2100H 077~ 2100H080
RPDO 21	2000H 081~ 2000H084	TPDO 21	2100H 081~ 2100H084
RPDO 22	2000H 085~ 2000H088	TPDO 22	2100H 085~ 2100H088
RPDO 23	2000H 089~ 2000H092	TPDO 23	2100H 089~ 2100H092
RPDO 24	2000H 093~ 2000H096	TPDO 24	2100H 093~ 2100H096
RPDO 25	2000H 097~ 2000H100	TPDO 25	2100H 097~ 2100H100
RPDO 26	2000H 101~ 2000H104	TPDO 26	2100H 101~ 2100H104
RPDO 27	2000H 105~ 2000H108	TPDO 27	2100H 105~ 2100H108
RPDO 28	2000H 109~ 2000H112	TPDO 28	2100H 109~ 2100H112
RPDO 29	2000H 113~ 2000H116	TPDO 29	2100H 113~ 2100H116
RPDO 30	2000H 117~ 2000H120	TPDO 30	2100H 117~ 2100H120
RPDO 31	2000H 121~ 2000H124	TPDO 31	2100H 121~ 2100H124
RPDO 32	2000H 125~ 2000H128	TPDO 32	2100H 125~ 2100H128
RPDO 33	2010H001 ~ 2010H004	TPDO 33	2110H001 ~ 2110H004
RPDO 34	2010H005 ~ 2010H008	TPDO 34	2110H005 ~ 2110H008
RPDO 35	2010H 009~ 2010H012	TPDO 35	2110H 009~ 2110H012
RPDO 36	2010H 013~ 2010H016	TPDO 36	2110H 013~ 2110H016
RPDO 37	2010H 017~ 2010H020	TPDO 37	2110H 017~ 2110H020
RPDO 38	2010H 021~ 2010H024	TPDO 38	2110H 021~ 2110H024
RPDO 39	2010H 025~ 2010H028	TPDO 39	2110H 025~ 2110H028
RPDO 40	2010H 029~ 2010H032	TPDO 40	2110H 029~ 2110H032
RPDO 41	2010H 033~ 2010H036	TPDO 41	2110H 033~ 2110H036
RPDO 42	2010H 037~ 2010H040	TPDO 42	2110H 037~ 2110H040
RPDO 43	2010H 041~ 2010H044	TPDO 43	2110H 041~ 2110H044
RPDO 44	2010H 045~ 2010H048	TPDO 44	2110H 045~ 2110H048
RPDO 45	2010H 049~ 2010H052	TPDO 45	2110H 049~ 2110H052
RPDO 46	2010H 053~ 2010H056	TPDO 46	2110H 053~ 2110H056
RPDO 47	2010H 057~ 2010H060	TPDO 47	2110H 057~ 2110H060
RPDO 48	2010H 061~ 2010H064	TPDO 48	2110H 061~ 2110H064

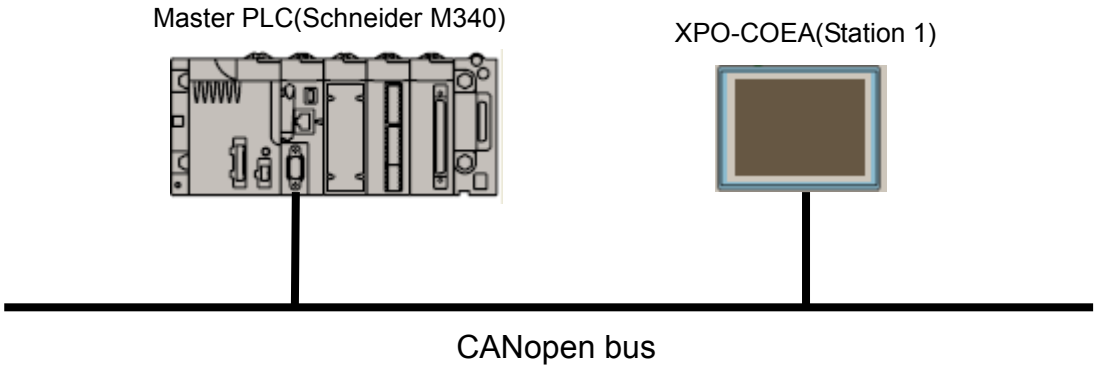
Receipt PDO(RPDO)	Receipt area(output area)	Transmission PDO(TPDO)	Transmission area (Input area)
RPDO 49	2010H 065~ 2010H068	TPDO 49	2110H 065~ 2110H068
RPDO 50	2010H 069~ 2010H072	TPDO 50	2110H 069~ 2110H072
RPDO 51	2010H 073~ 2010H076	TPDO 51	2110H 073~ 2110H076
RPDO 52	2010H 077~ 2010H080	TPDO 52	2110H 077~ 2110H080
RPDO 53	2010H 081~ 2010H084	TPDO 53	2110H 081~ 2110H084
RPDO 54	2010H 085~ 2010H088	TPDO 54	2110H 085~ 2110H088
RPDO 55	2010H 089~ 2010H092	TPDO 55	2110H 089~ 2110H092
RPDO 56	2010H 093~ 2010H096	TPDO 56	2110H 093~ 2110H096
RPDO 57	2010H 097~ 2010H100	TPDO 57	2110H 097~ 2110H100
RPDO 58	2010H 101~ 2010H104	TPDO 58	2110H 101~ 2110H104
RPDO 59	2010H 105~ 2010H108	TPDO 59	2110H 105~ 2110H108
RPDO 60	2010H 109~ 2010H112	TPDO 60	2110H 109~ 2110H112
RPDO 61	2010H 113~ 2010H116	TPDO 61	2110H 113~ 2110H116
RPDO 62	2010H 117~ 2010H120	TPDO 62	2110H 117~ 2110H120
RPDO 63	2010H 121~ 2010H124	TPDO 63	2110H 121~ 2110H124
RPDO 64	2010H 125~ 2010H128	TPDO 64	2110H 125~ 2110H128

Chapter 6 Sample of Settings

6. 1 Examples of Communication Settings

6.1.1 Sample system

CANopen master uses Schneider PLC (M340) and sets up the XP Panel (XPO-COEA) as slave station 1.



[Figure 6.1.1] System composition

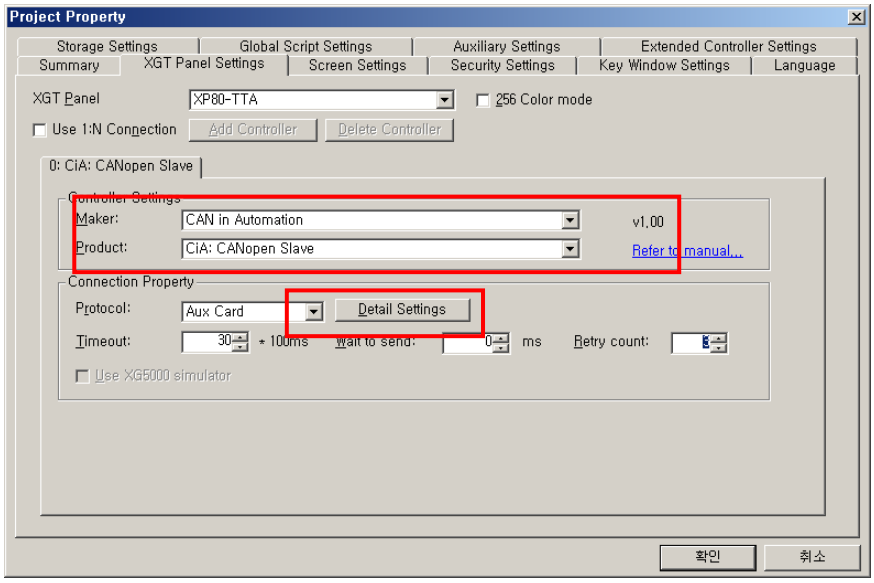
The communication settings are as follows.

	PLC area	XP area
Transmission (PLC → XP)	M400 ~ M655(256 word)	2000H000 ~2000H127
		2010H127 ~2010H127
Reception (PLC ← XP)	M100 ~ M355(256 word)	2100H000~2100H127
		2110H000~2110H127

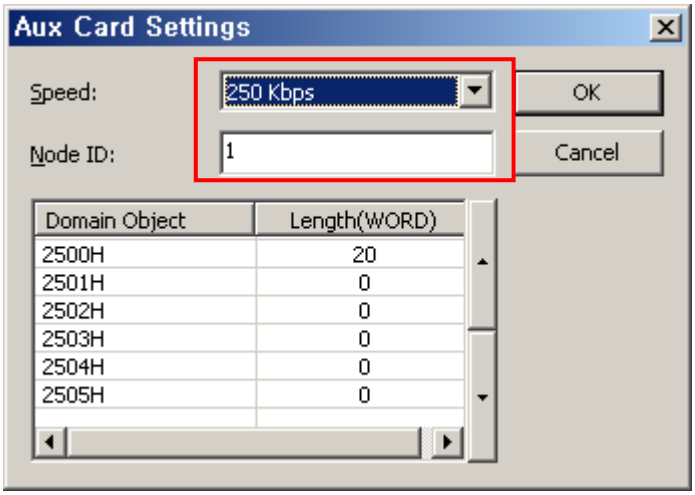
The communication speed sets at 250Kbps.

6.1.2 Parameter settings of slave (XP)

(1) Select CAN in Automation as a manufacturer and select CiA:CANopen Slave as a product from “Project properties” -> “XGT Panel Settings.”



(2) If you click detailed connection settings on the same screen, Aux Card settings screen will be displayed.



Select transmission speed and address here.

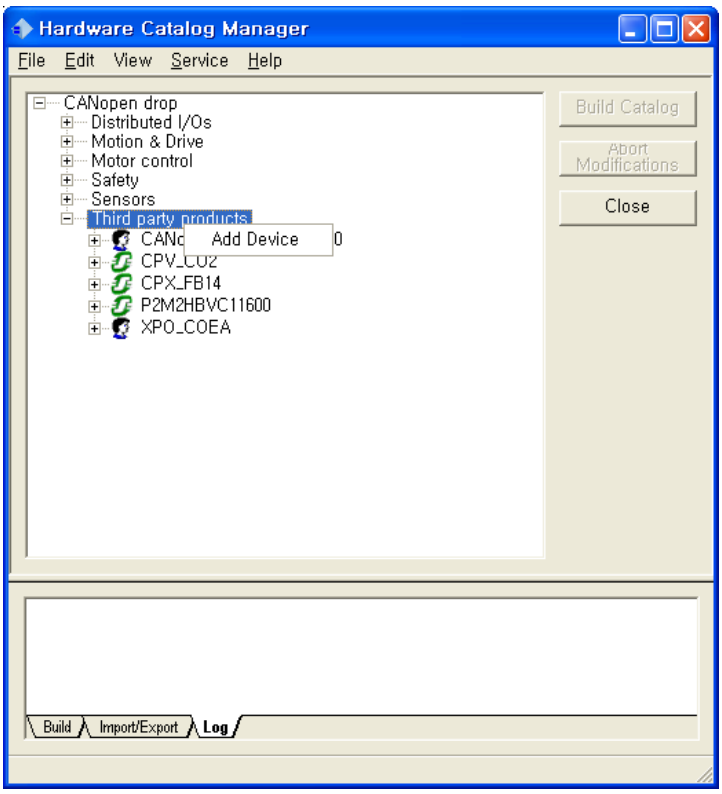
(3) Complete necessary things and transmit the project to XP.

6.1.3 Settings of master (Schneider PLC M340)

(1) Pre-register EDS file (run it from Hardware Catalog Manager)

In order to use the CANopen slave device at the Unity Pro S (programming tool), run the Schneider tool, hardware catalog manager to register the EDS file in advance to import and use it at Unity Pro S.

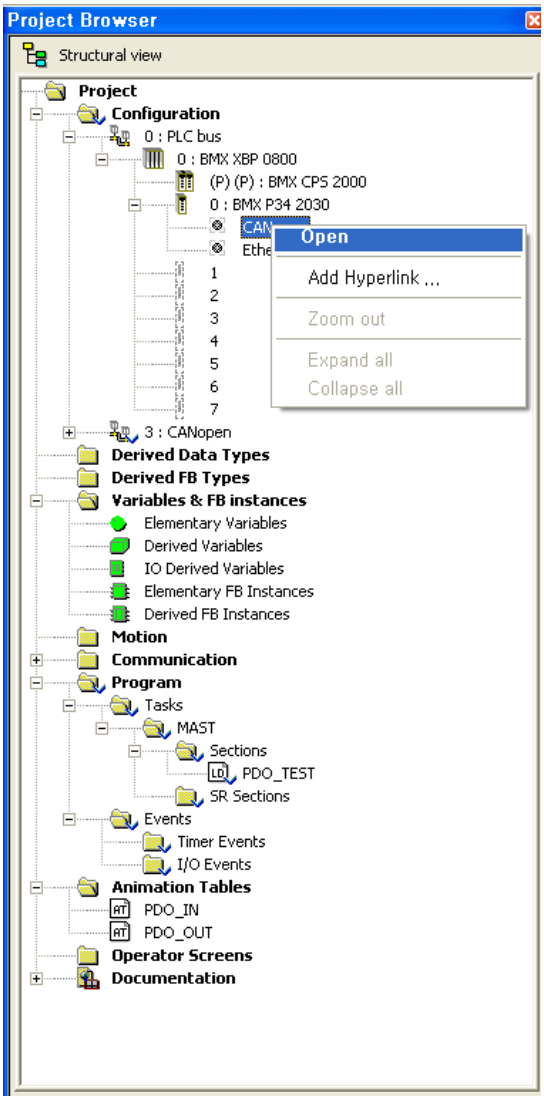
① Run the Hardware Catalog Manager



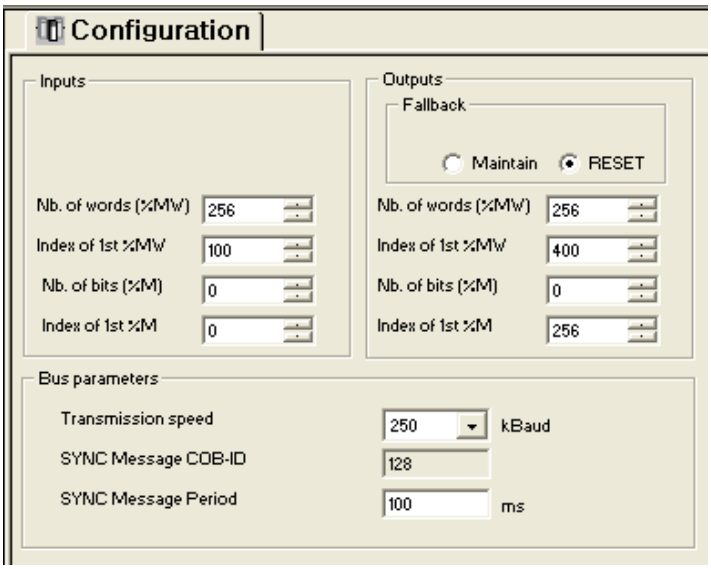
Select "Add Device" to select the EDS file of XP from the file selection screen to register it.

(2) Settings of CANopen Master (Run it from Unity Pro S)

① Click CANopen →Open from the screen of the project window below.



② The settings screen below will be displayed.



- Settings of transmission/reception area

The input area %MW100 ~ %MW355 is set up as reception area, and output area %MW400 ~ %MW655 is set up as transmission area.

If the data is written on the output area by the PLC program, it is transmitted to the CANopen bus, and the received data is saved in the input area. So it can be read and used from the PLC program.

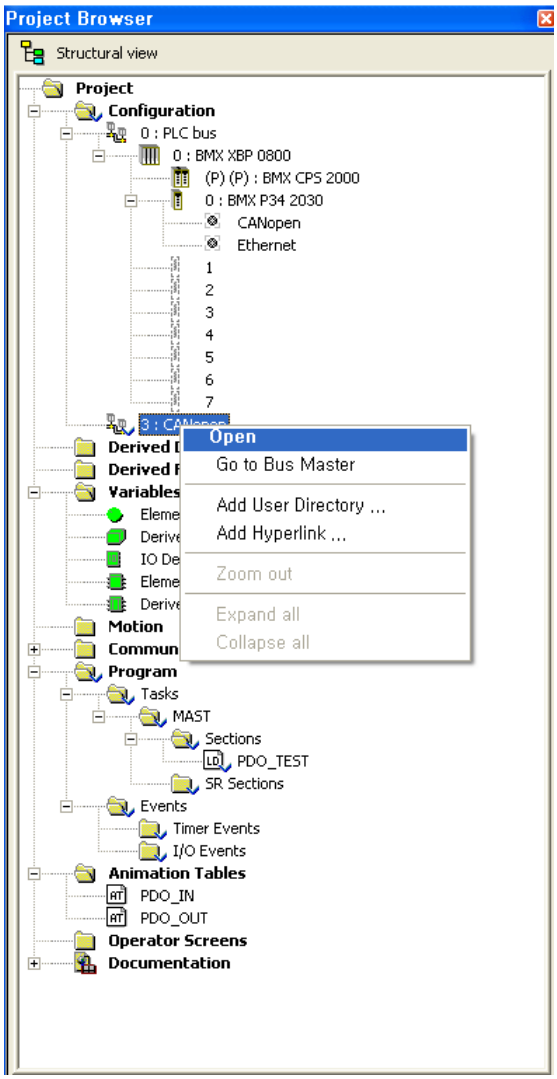
- Communication speed settings

Set up the transmission speed.

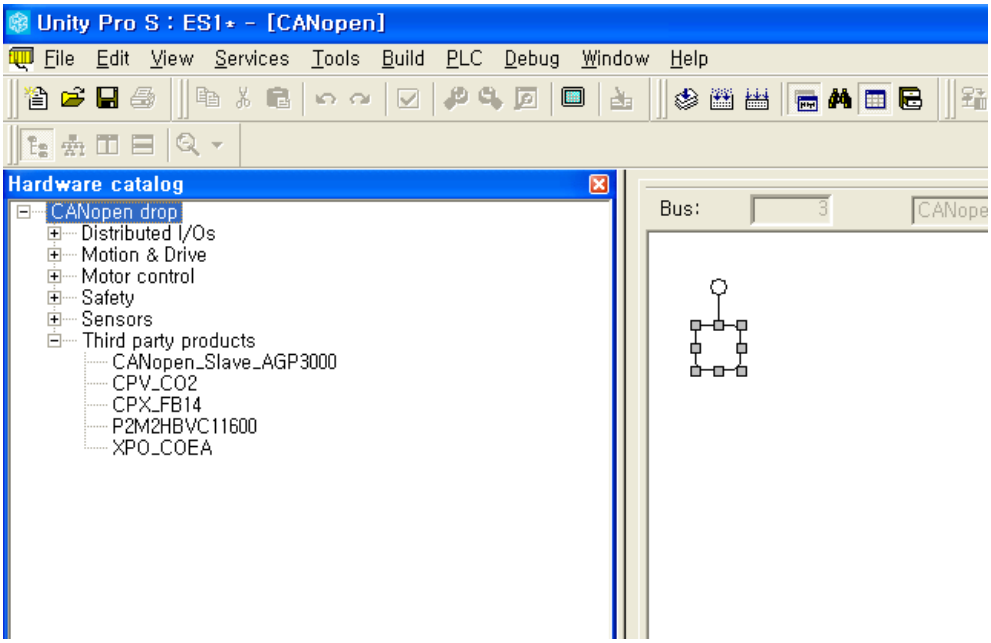
(3) Settings of CANopen Slave (Run it from Unity Pro S)

Register the pre-registered CANopen Slave EDS file and conduct PDO settings.

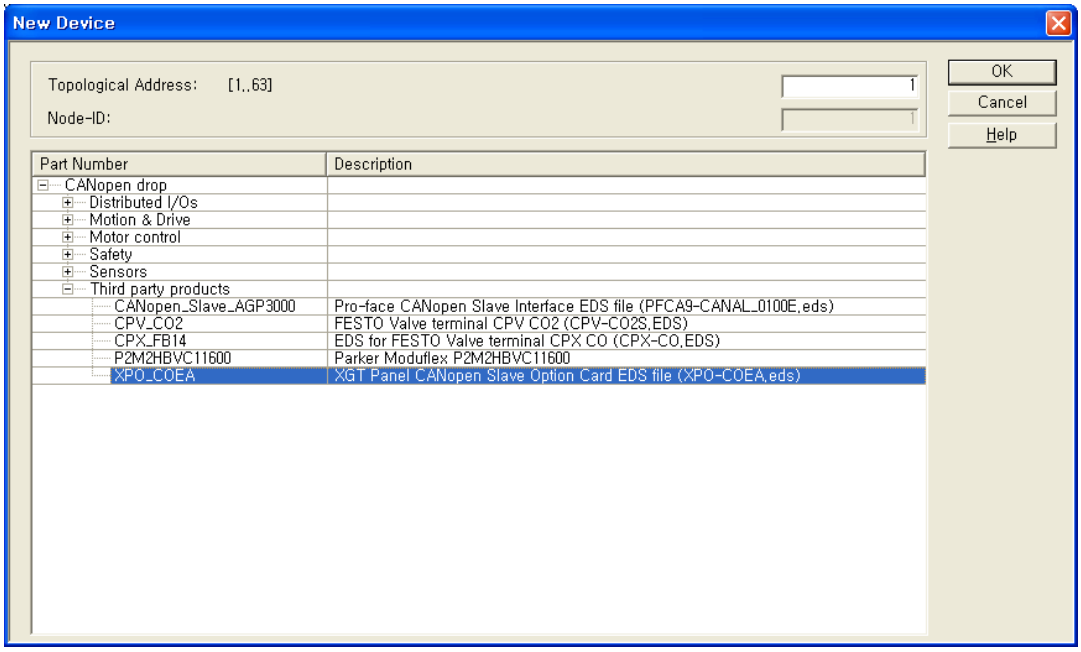
① Click CANopen →Open from the screen below.



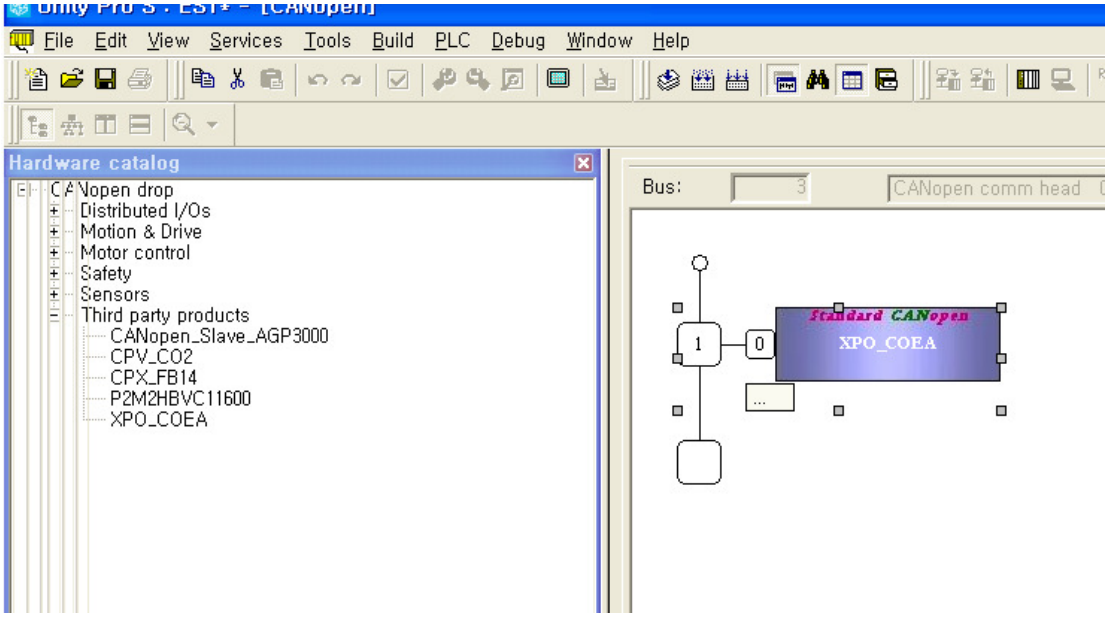
② If you doubleclick the designated part on the screen below, the screen for registration will be displayed.



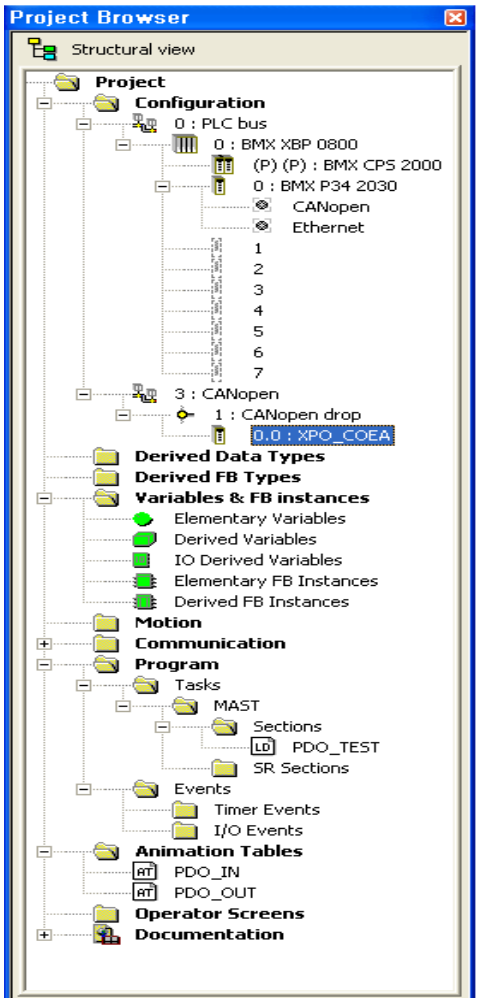
Enter the address into the screen below and select the pre-registered XP EDS file (XPO_COEA) for registration.



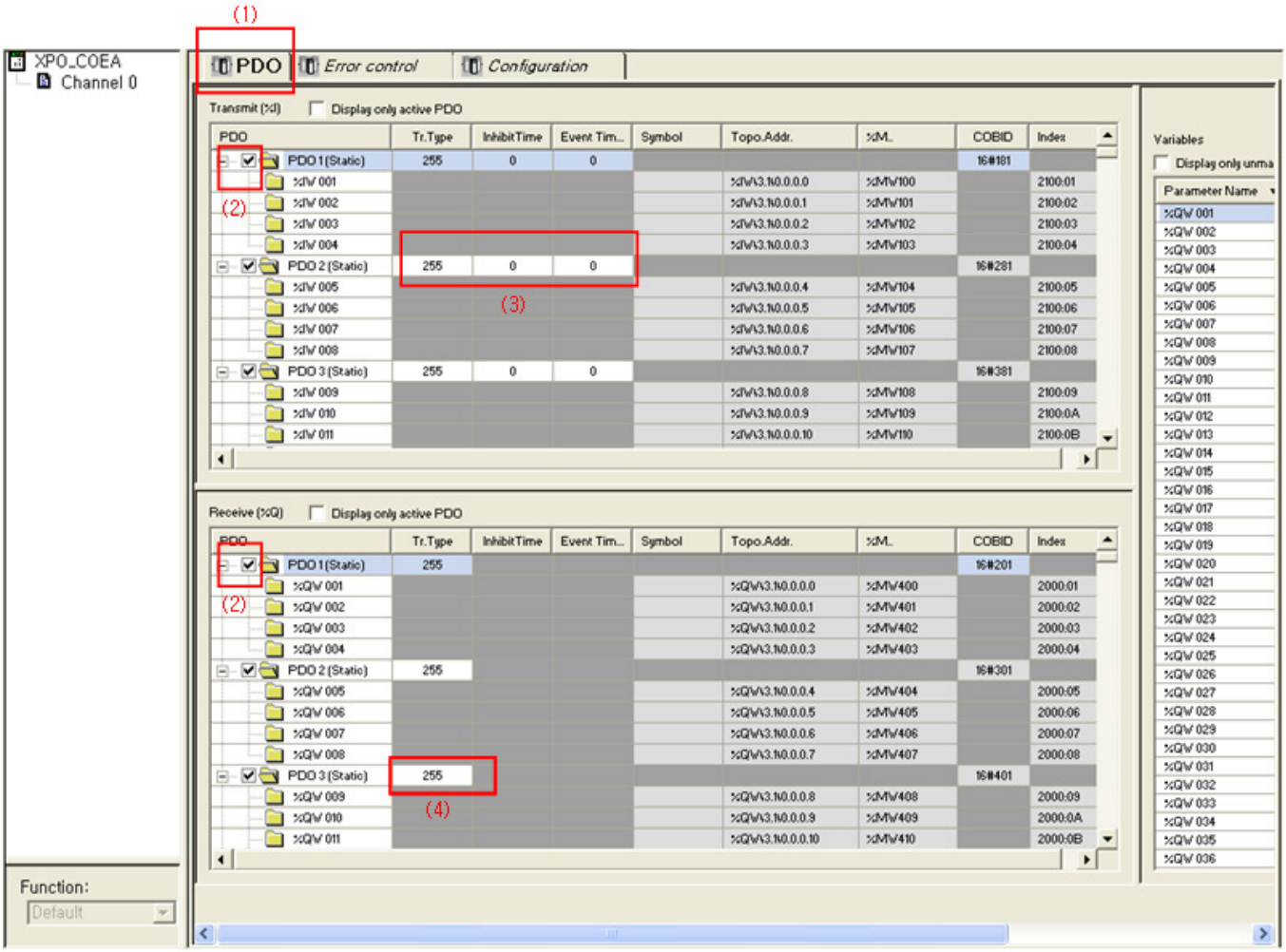
Confirm the registered contents from the screen below.



③ Conduct PDO settings and enable for the registered EDS file.



Double-click the EDS file from the project browser.



(1) Select the PDO tab.

(2) Enable the transmission/reception PDO to be used.

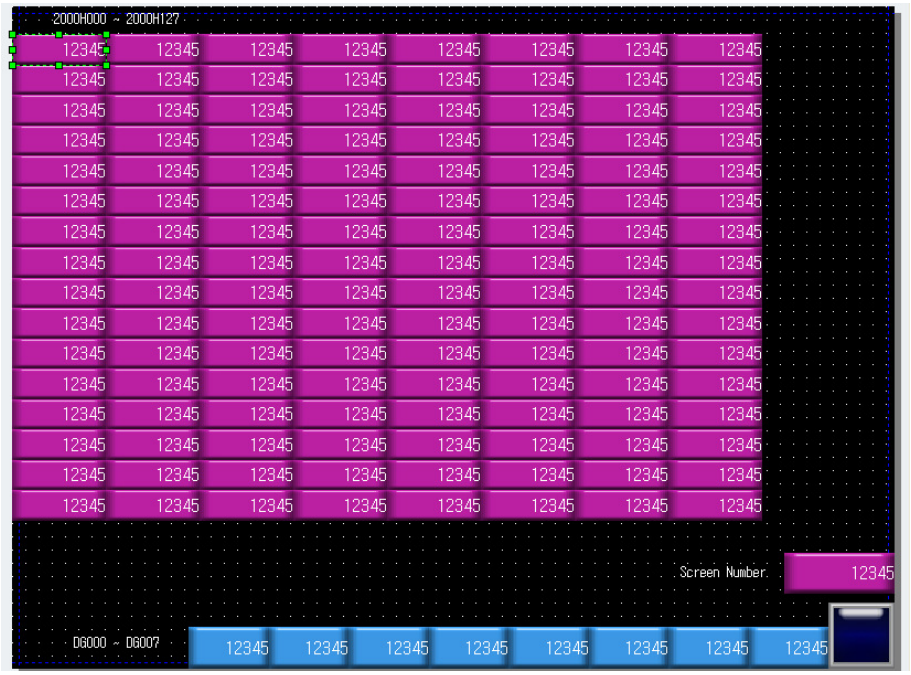
(3) Set up the communication parameter of the transmission PDO (TPDO).

(4) Set up the communication parameter of the reception PDO (RPDO).

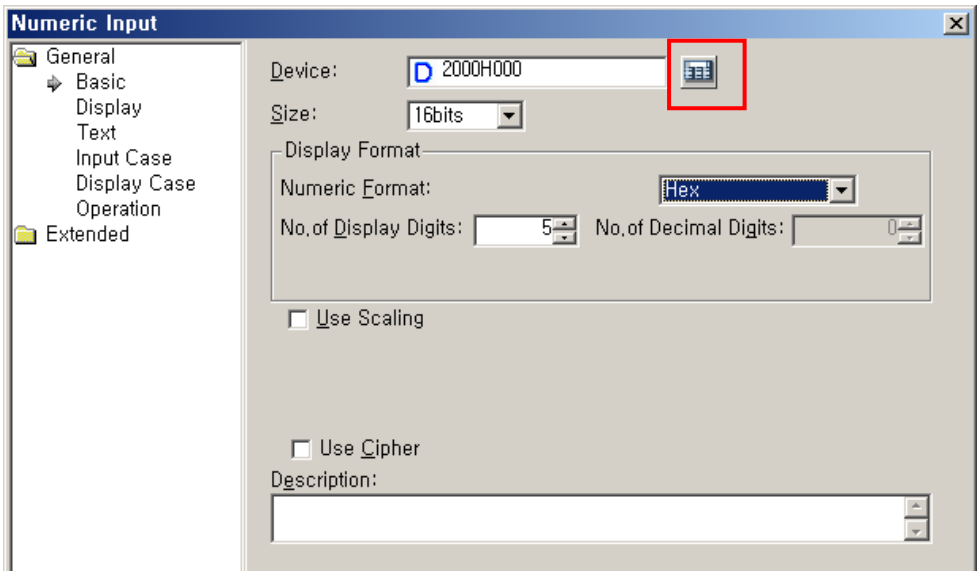
6.2 How to set up the Tag of XP-Builder

Following is the method to connect and display the CANopen input/output device to the tag of XP screen.

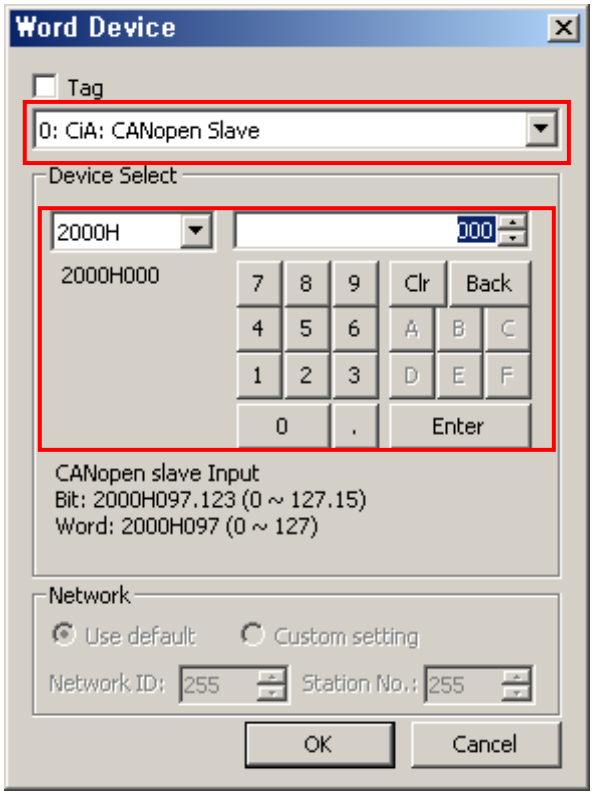
(1) Make the tag at the XP Builder.



(2) Doubleclick the tag to display number input screen.



(3) If you click the device, word device settings screen will be displayed.



Set up the CANopen slave and select the device.

(4) After the drawing is finished, transmit it to the XP.

Chapter 7 Troubleshooting

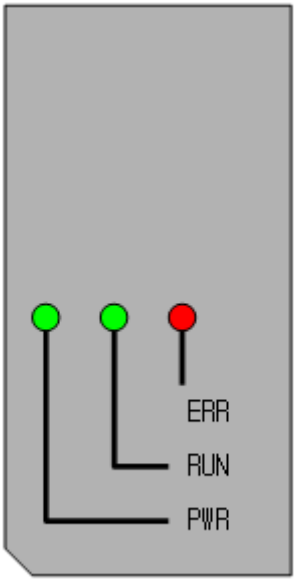
This chapter explains causes and solutions against the malfunctions and errors which may be occurred during the system operation. Whether the CANopen I/F module is good and checking problems can be implemented through the procedure below. Be sure to take action through troubleshooting to determine the status of the abnormal module, and do not repair or disassemble it without authorization.

7.1 Checking through the LED of communication module

This is the method to check out the status of communication module according to the LED lighting status to check out the module.

(1) Abnormal action displays

As shown in the [Figure 7.1], it can be checked out through the LED on the rear of the CANopen I/F module.



[Figure 7.1] LED of CANopen I/F module

LED	State	Actions
PWR (GREEN)	Lights-out when the XGT panel is turned On.	1) Reconnect the module and check the connector 2) Replace the module
	Lights-on when the XGT panel is turned On.	1) Normal
RUN (GREEN)	Lights-out after XP panel booting is completed	1) Reconnect the module and check the connector 2) Replace the module
	Blinking after XP panel booting is completed	1) Normal
	Lights-on after XP panel booting is completed	1) Normal
	Flickering by alternating with ERR LED for more than 10 seconds after the XP panel booting is finished	1) Check out the connection of communication line 2) Check out whether more than one station is operating besides the module.
ERR (RED)	Lights-out after XP panel booting is completed	1) Normal
	Single flash after XP panel booting is completed	1) Check out the connection of communication line 2) Check out whether the communication speed of module is same with the communication speed of another station in the network 3) Check out whether more than one station is operating besides the module.
	Double flash after XP panel booting is completed	1) Check out whether the station monitored by heartbeat is normally communicating 2) Check out the connection of communication line
	Lights-on while the module is communicating	1) Check out the connection of communication line 2) Check out whether there is another station with different communication speed 3) Check out whether there is more than one station is operation besides the module.

* LED status
  - BLINKING: ON(200 ms) , OFF(200ms) …
  - SINGLE FLASH: ON(200 ms) , OFF(1000ms) …
  - DOUBLE FLASH: ON(200 ms) , OFF(200ms), ON(200 ms) , OFF(1000ms) …

Appendix

A.1 Terminology

1. CAN(Controoller Area Network)
   As standard open field bus specified at ISO 11898, that makes it possible to communicate between different devices of diverse maker

2. CANopen
   As description language for communication on CAN bus, not related with a device and maker, it belongs to 'Application layer'

3. CiA(CAN in Automation)
   Group standardizing CAN and CANopen

4. COB
   As basic communication object on CAN network, all data communication is done by using COB

5. COB ID
   As number specifying each communication object (COB) on CAN network, it is unique and consists of station number and function code, and determines communication priority.

6. DCF(Device Configuration File)
   Conforming to EDS file structure, the file including configuration information (Communication speed, station number, PDO mapping and etc) determined per project

7. EDS(Electronic Data Sheet)
   Standardization file including device communication method and parameter description

8. Heartbeat
   As message received from the device every period, it makes other device know whether connected or not

9. NMT(Network Management)
   As a part of CANopen communication profile, in charge of initialization of network and device, start and end of device and monitoring

10. Node guarding
    Master's action monitoring communication connection to slave every period

11. Object Dictionary
    List on all parameters, values and functions in device. Each entry can be accessed by using index (16bit) and sub-index (8bit)

12. Parameter
    Data and value of device which can be set by a user

13. PDO(Process Data Object)
    Actual way to transmit process-data, object having high priority, it is sent by one producer and one or multiple consumer receives it. One PDO can have up to 8 byte, and should have unique COB ID, doesn't need acknowledgement from the receiver. Meaning of the received data is determined by COB ID and PDO Mapping. And Priority and operating mode are determined by communication parameter. Producer's data structure is determined by TPDO data structure and consumer's data structure is determined by RPDO data structure.

14. PDO-Mapping
    It means assign 'Application object' to PDO data field. For mapping method, there are static method and dynamic method. In static mapping, objects of PDO should be continuous and dummy object can't be assigned

15. Predefined Connection Set
    It means already assigned COB ID based on station number and function code. In communication objects by 'predefined connection set', there are Node guarding/heartbeat, emergency object, sync message, time stamp, server-SDO 1, RPDO1~4, TPDO1~4

16. RPDO(Receive PDO)
    PDO used for reception

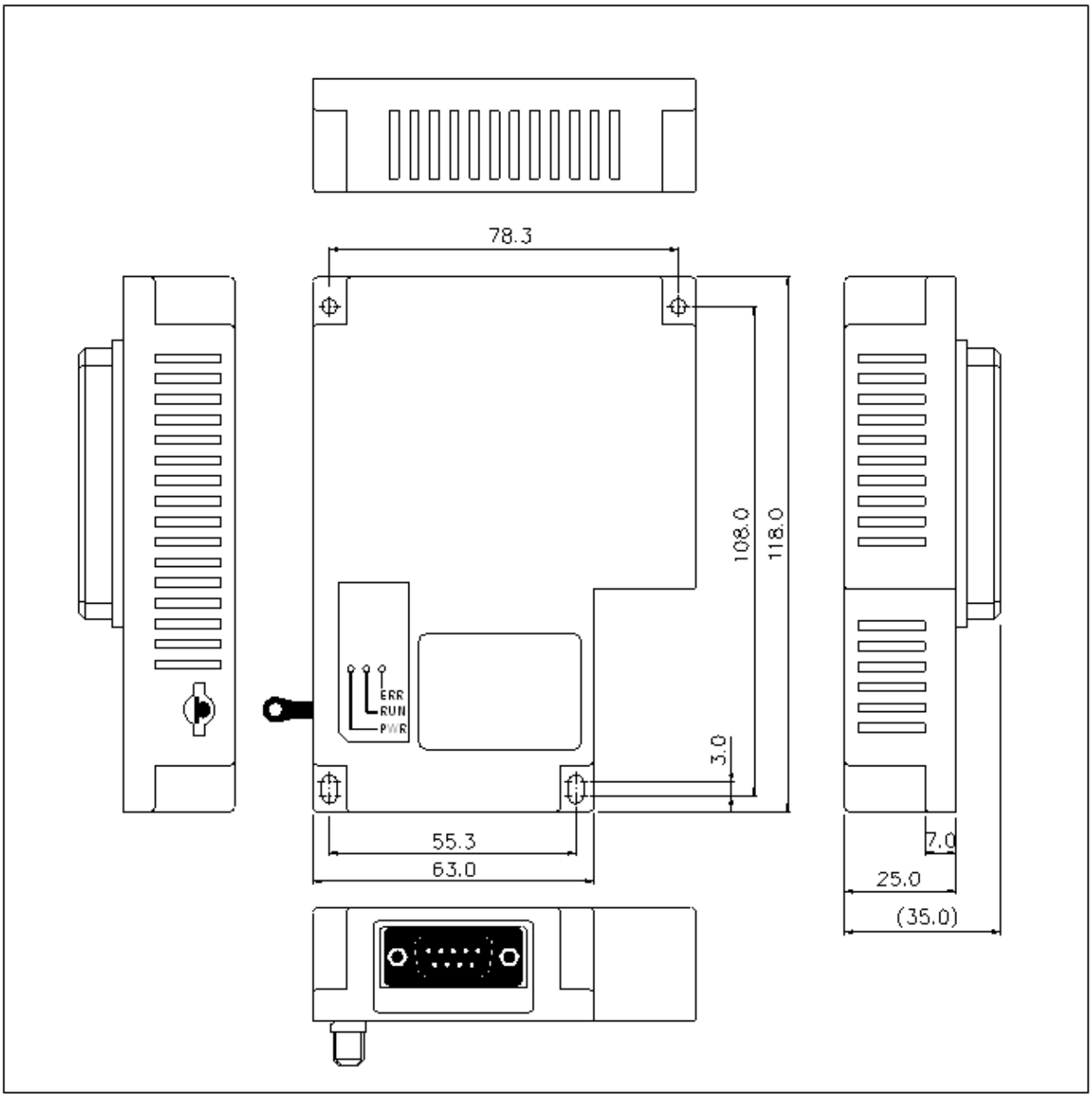
17. SDO(Service Data Object)
    As communication object, it is used to transmit initialization of CANopen device, parameter setting, long data recode (ex: domain data) and has low priority. It is available to read/write on entry of object dictionary by using SDO. Assigning entry is executed by index and sub-index.

18. TPDO(Transmit PDO)
    PDO used for reception

A.2 Dimension

• **XPO-COEA**

Unit: mm



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.

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

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

Environmental Policy

LS Industrial Systems Co., Ltd supports and observes the environmental policy as below.

Environmental Management

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

About Disposal

LS Industrial Systems' 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.

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