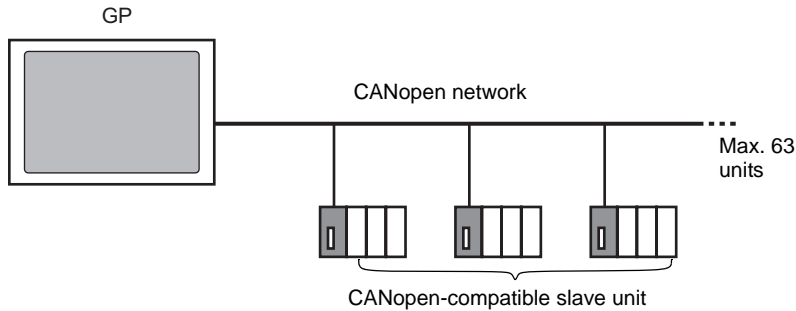


## 30.7 Controlling External I/O with CANopen

### 30.7.1 Summary

Model AGP-\*\*\*\*\*-CA1M supports the CANopen master driver. You can control remote external I/O by connecting a CANopen-compatible slave unit to the GP.



For the GP unit, an open network with maximum 63 units of connected CANopen-compatible slave unit can be constructed.

#### ■ CAN Specification

- CANopen specification is defined by CiA and can be viewed on the CiA Web site.  
<http://www.can-cia.org>

#### NOTE

- For details on CANopen specification or its basic structure, refer to the CiA Web site.

#### ■ CANopen Master Driver

- Uses DS301V4.02, DSP302V3.2, and DS405V2.0 profiles. DS301 is a profile used for the application layer and for communication. DSP302 is a framework for the CANopen Manager and programmable CANopen devices. DS405V2.0 is a profile for IEC61131-3 programmable devices.
- Supports 11 bit COB-ID (CAN2.0A). Does not support 29 bit COB-ID (CAN2.0B).
- Communication is carried out with a PDO packet as the unit.
- Does not support flying master\*1.
- Network configuration is saved in a concise DCF file\*2. This concise DCF file is transferred to the GP when transferring a project.

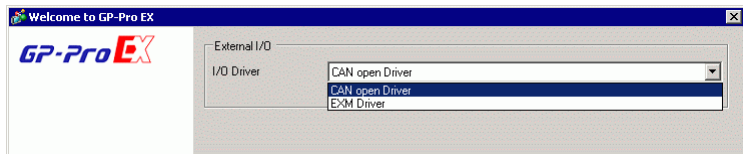
\*1 Flying Master is a feature that allows the flying master to dynamically determine the master in a network when there are multiple devices that can be used as the CANopen master.

\*2 Concise DCF is a device setting file in binary data format. The CANopen network is configured by downloading this data to the NMT master. NMT master is a feature that controls the actions of a slave node. Only one exists in any CANopen network; the node with this NMT master feature becomes the CANopen master.

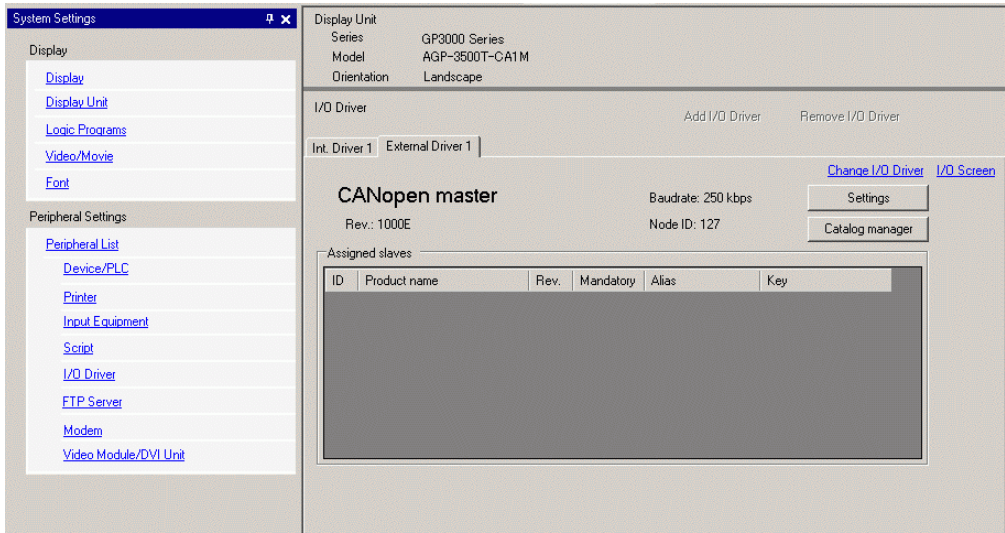
### 30.7.2 Setting Procedure

1 In Model Settings, select AGP-\*\*\*\*\*-CA1M/LT.

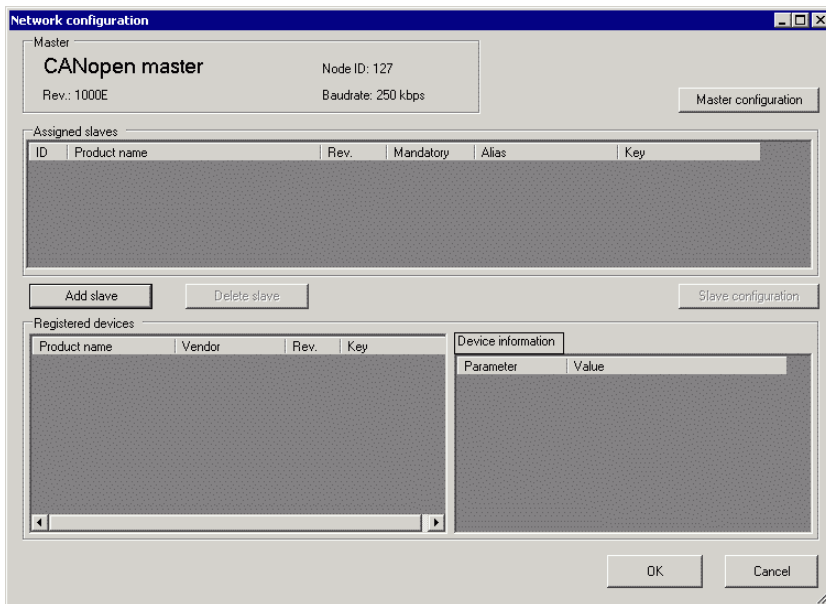
- NOTE**
- When using LT models, select "CANopen Driver" for the I/O driver.



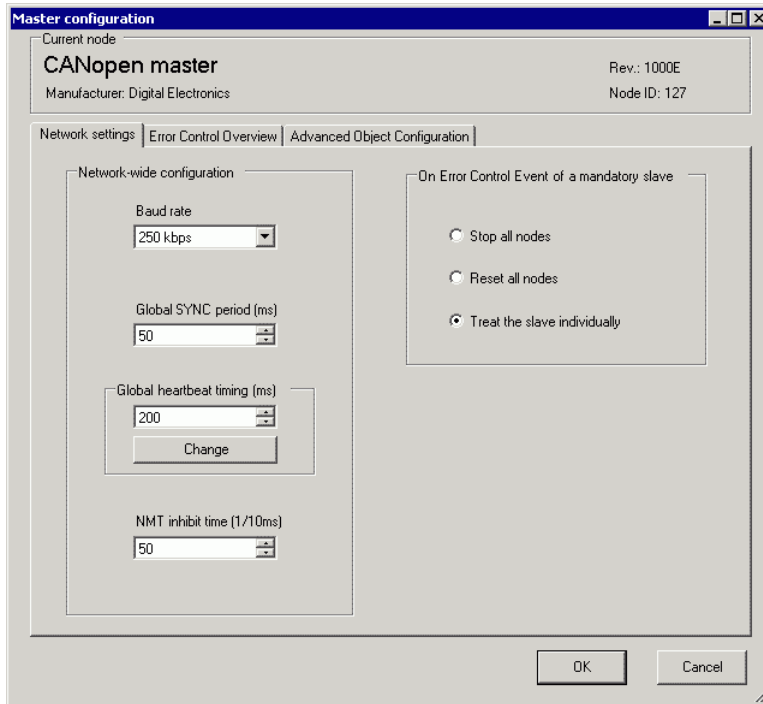
2 Open [I/O Driver] in System Settings.



3 Click [Settings] and the following dialog box appears.



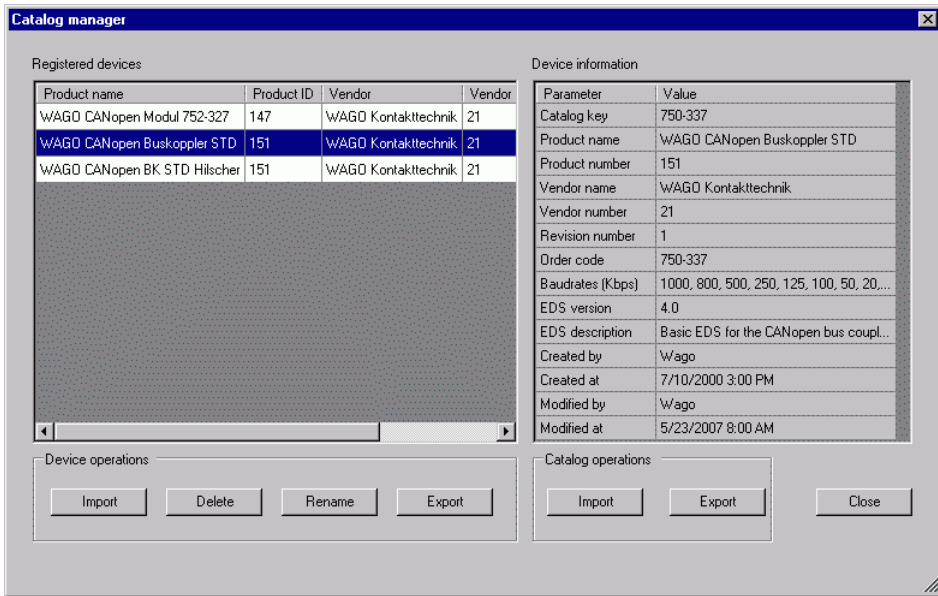
- Click [Master Configuration] and the following dialog box appears. Configure all of the CANopen network settings, such as Baud rate, SYNC sending period, and master object settings. Click [OK] to enable the settings and the dialog box closes.

**NOTE**

- Set the slave baud rate on the slave itself.

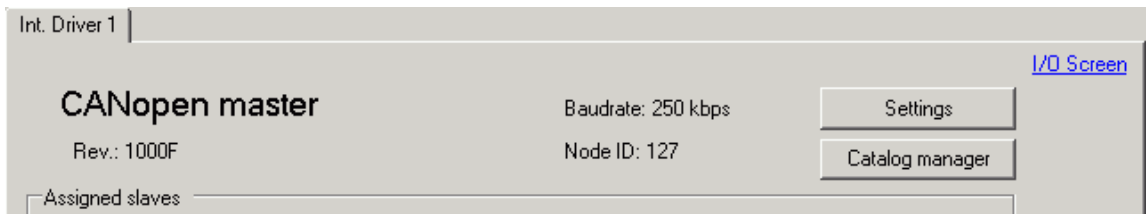
- Click [OK] in the [Network Configuration] dialog box.

- 6 Next, add a slave to the CANopen network. Click [Catalog Manager] and the following dialog box appears. Click [Import] in the [Device operation] section and specify the EDS file of the CANopen-compatible slave unit. Click [Close].

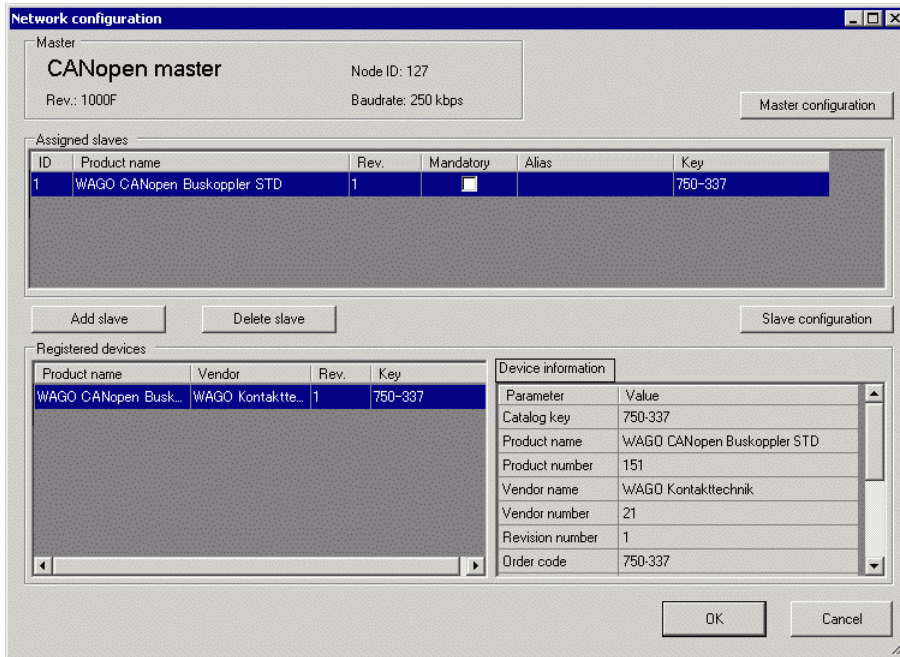


- NOTE**
- EDS files and connection methods for the models that have been confirmed to function by us are listed on the Pro-face support site "Otasuke Pro!" (<http://www.pro-face.com/otasuke/>).
  - [Import/Export] in the [Catalog] section is necessary to open the created project file or transfer it to other PCs.
- ☞ "30.7.6 [I/O Driver] Settings Guide" (page 30-170)

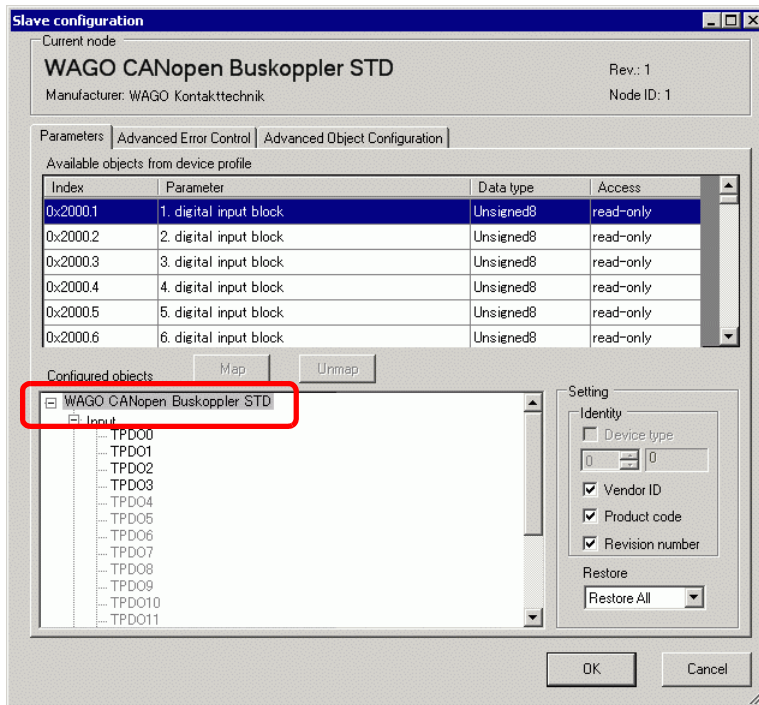
- 7 Click [Settings].



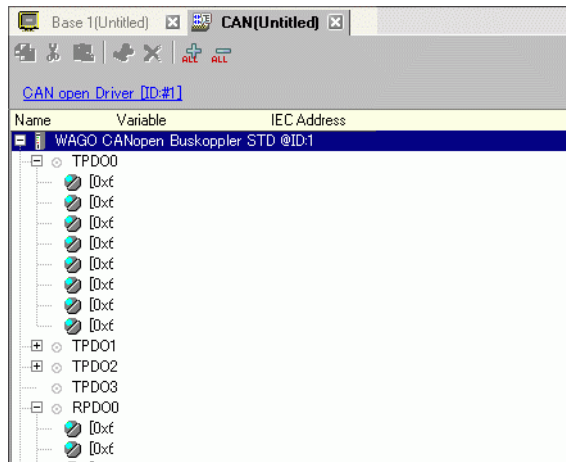
8 Select the above mentioned EDS file in [Registered devices], and click [Add Slave].



9 Click [Slave Configuration] with the added slave unit selected and the following dialog box appears. According to the function you want to use, configure the communication parameter settings and set actions and values of objects to be used. Click [OK] to enable the settings and the dialog box closes.



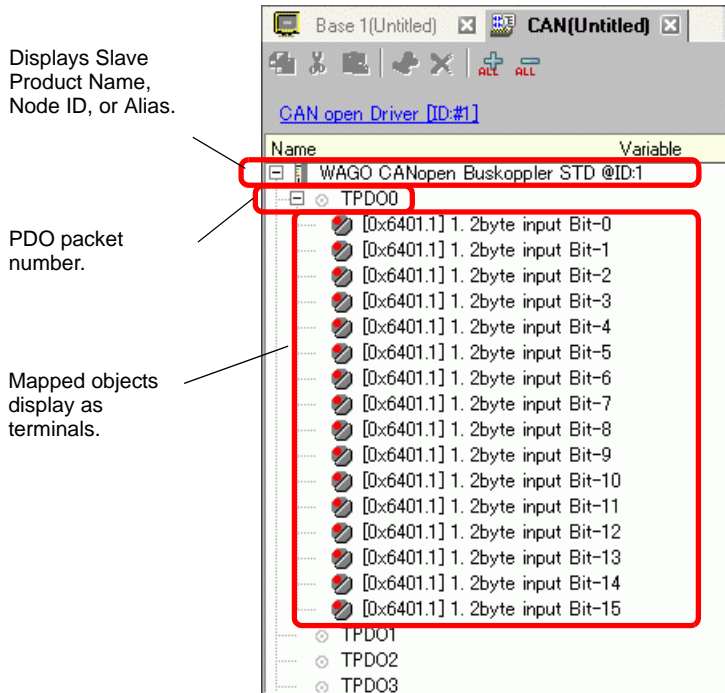
- Click [I/O Screen] in the [I/O Driver Settings] screen or select [I/O Screen] in the [Screen List] window on Work Space to allocate a variable to each of the mapped objects. For how to assign variables, refer to the following.  
☞ "30.7.3 Allocating I/O" (page 30-155)



- Create a Logic Screen and a Base Screen to access the allocated variables and transfer them to the GP.

### 30.7.3 Allocating I/O

Objects set in [I/O Driver Settings] are reflected on the I/O Screen as terminals (I/O terminals). By allocating variables to terminals, I/O can be controlled.


**NOTE**

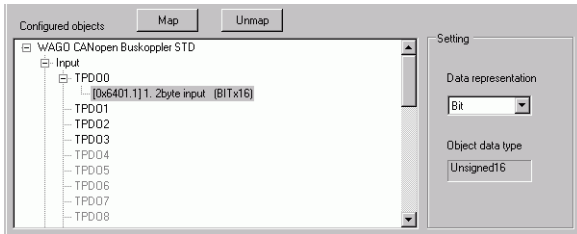
- When mapping TPDO4 or above and RPDO4 or above, the total slave settings are limited to 64.

### I/O Screen Display

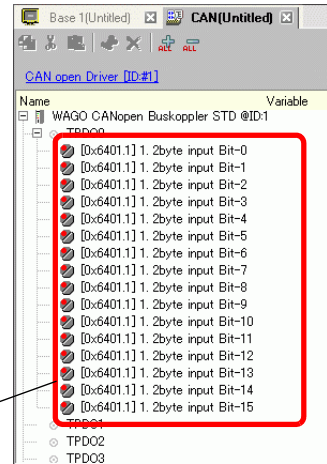
The terminal display on the I/O Screen differs depending on the type (such as, Bit, Byte, Word, Dword) of each object specified in the [Slave Configuration] dialog box in [I/O Driver Settings].

Example 1: Setting the Unsigned16 object [1. 2byte input (BITx16)] to the [Bit] display.

I/O Driver Settings



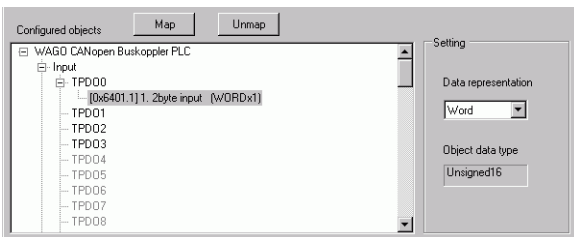
I/O Screen



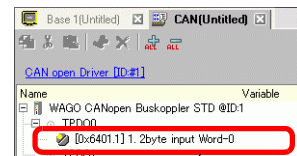
An Unsigned16 object displays as a 16 bit terminal.

Example 2: Setting the Unsigned16 object [1. 2byte input (WORDx1)] to the [Word] display.

I/O Driver Settings



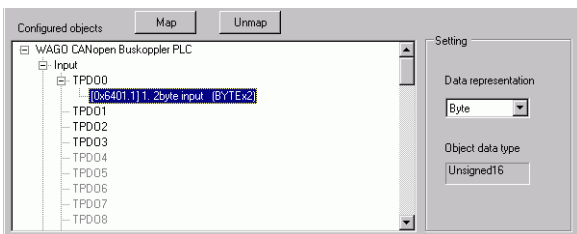
I/O Screen



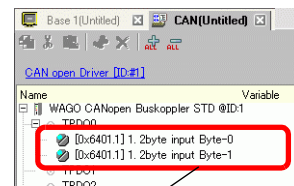
Unsigned16 displays as a 1 word terminal.

Example 3: Setting the Unsigned16 object [1. 2byte input (BYTEx2)] to the [Byte] display.

I/O Driver Settings



I/O Screen



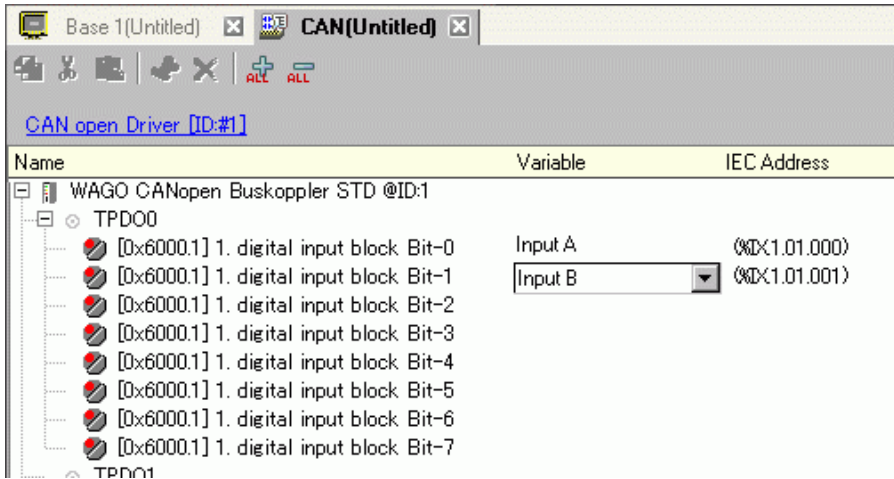
Unsigned16 displays as a 2 byte terminal.

- NOTE**
- In [1. 2byte input (BITx16)], Unsigned16 bit data the lower bytes are allocated to the "[Byte-0] terminal and higher bytes to the [Byte-1] terminal. The remaining bits of the assigned variables cannot be used.



## ■ Mapping Variables

Mapping a variable per terminal of objects. To enter a variable, double-click the [Variable] column of the terminal you wish to allocate.



[IEC Address] appears automatically after entering a variable.

| Data Type | Input | Output |
|-----------|-------|--------|
| Bit       | IX    | QX     |
| Byte      | IB    | QB     |
| Word      | IW    | QW     |
| Dword     | ID    | QD     |

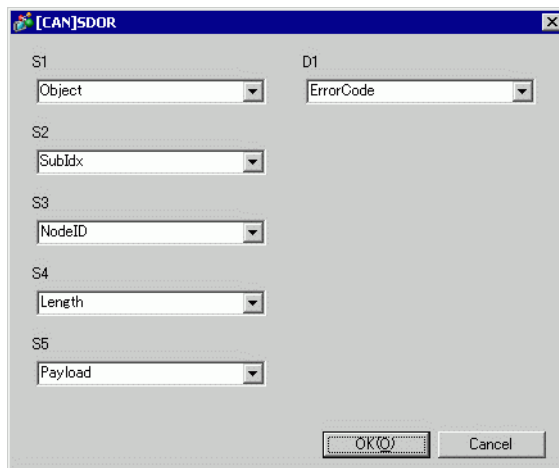
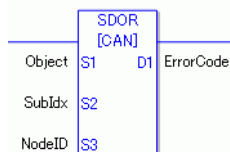
### 30.7.4 Using I/O Driver Instructions

You can change set values of objects and check the values while the program is running if you use I/O Driver Instructions on Logic Screen.

#### ◆ SDOR

Data is read from the object dictionary of the specified node.

Double-click the inserted instruction and the following dialog box appears.



#### NOTE

- Do not run two or more SDO instructions (SDOR, SDOW) at the same time. You can only run one SDO instruction at a time.
- If the network state is not READY (such as RESET state), SDOR or SDOW instructions are not accepted and error code 146 displays.

#### Operand Settings

S1: Specify index of the object.

S2: Specify sub index of the object.

S3: Specify node ID.

S4: Specify length (byte number) of SDO access.

S5: Specify where to store read data and abort code.

For the lower 16 bits, if you specify an array element in the system variable #L\_IOMasterDrv[0] to [255], that becomes the start address from which the number of bytes specified in parameter S4 is written in the variable.

For the higher 16 bits, if you specify an array element in the system variable

#L\_IOMasterDrv[0] to [255] with the most significant bit ON, the abort code is written in the specified variable.

| High word   |   |    | Low word                                   |   |
|---|---|----|--|---|
| 31  | 30  | 16 | 15   | 0 |
| Abort code is stored in #L_IOMasterDrv[ ].<br>0: Abort code is not stored in #L_IOMasterDrv[ ]. However, if the error includes the abort code, the abort code is stored in D1 (error code).<br>1: Abort code is stored in #L_IOMasterDrv[ ]. The following error code is stored in D1 (error code). | Offset of #L_IOMasterDrv[ ] to store abort code.<br>This is ignored when bit 31 is 0. |    | Offset of #L_IOMasterDrv[ ] to store data. |   |

D1: Specify the variable where error codes are stored if an instruction does not act as expected.

**Error Code**

- 0: Normal
- 1: Error in operand number
- 111: Error in set up value for operand S4 or S5
- 120: Error in SDO communication or error in set up value for operand S1, S2, or S3
- 123: Timeout error
- 140: SDO protocol error
- 141: SDO send overflow
- 142: SDO master setting error
- 143: SDO access error
- 144: SDO receive timeout
- 145: SDO operand error
- 146: SDO master status error
- 147: SDO master status stopped
- 148: SDO abort error

Example: S4=20, S5=3



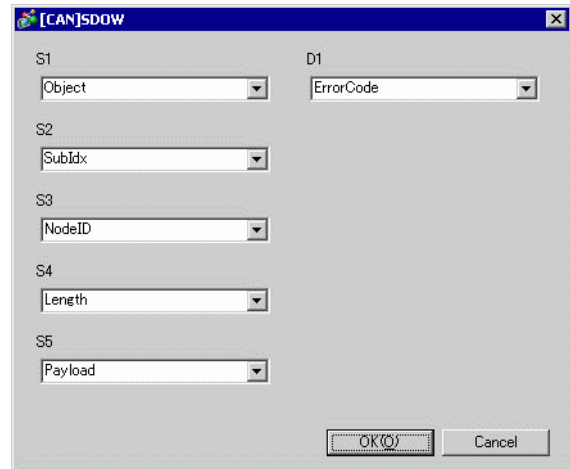
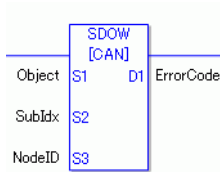
### Abort Code

- 0503 0000h: Toggle bit was not changed.
- 0504 0000h: SDO protocol timeout
- 0504 0001h: Invalid or unknown Client/Server command
- 0504 0002h: Invalid block size (block mode)
- 0504 0003h: Invalid sequence number (block mode)
- 0504 0004h: CRC error (block mode)
- 0504 0005h: insufficient memory
- 0601 0000h: access to unsupported objects
- 0601 0001h: Read access to write-only objects
- 0601 0002h: Write access to read-only objects
- 0602 0000h: Object does not exist in the object dictionary
- 0604 0041h: Cannot map PDO objects
- 0604 0042h: The number and length of objects to map exceed the PDO length
- 0604 0043h: Incompatibility of general parameters
- 0604 0047h: General internal incompatibility of the device
- 0606 0000h: Access failure due to a hardware error
- 0607 0010h: Data type mismatch. Length of the service parameter does not match.
- 0607 0012h: Data type mismatch. Length of the service parameter is too long.
- 0607 0013h: Data type mismatch. Length of the service parameter is too short.
- 0609 0011h: Sub index does not exist
- 0609 0030h: Parameter value out of range (for write access)
- 0609 0031h: Written parameter value is too large.
- 0609 0032h: Written parameter value is too small.
- 0609 0036h: Max. value is smaller than Min. value
- 060A 0023h: Resource cannot be used
- 0800 0000h: General error
- 0800 0020h: Data cannot be transferred or stored by the application
- 0800 0021h: Data cannot be transferred or stored by the application due to local control
- 0800 0022h: Data cannot be transferred or stored by the application in the current device state.
- 0800 0023h: Dynamic creation of the object dictionary failed or the object dictionary does not exist
- 0800 0024h: Valid data does not exist

## ◆ SDOW

Data is written in the object dictionary of the specified node.

Double-click the inserted instruction and the following dialog box appears.



### NOTE

- Do not run two or more SDO instructions (SDOR, SDOW) at the same time. You can only run one SDO instruction at a time.
- If the network state is not READY (such as RESET state), SDOR or SDOW instructions are not accepted and error code 146 displays.

### Operand Settings

S1: Specify index of the object.

S2: Specify sub index of the object.

S3: Specify node ID.

S4: Specify length (byte number) of SDO access.

S5: Specify where to store data to be written and abort code.

For the lower 16 bits, if you specify an array element in the system variable #L\_IOMasterDrv[0] to [255], that becomes the start address from which the data with the number of bytes specified in parameter S4 is written in the specified object.

For the higher 16 bits, if you specify an array element in the system variable #L\_IOMasterDrv[0] to [255] with the most significant bit ON, the abort code is written in the specified variable.

### NOTE

- For details on the abort code, refer to the "SDOR Command" section.

D1: Specify the variable where error codes are stored if an instruction does not act as expected.

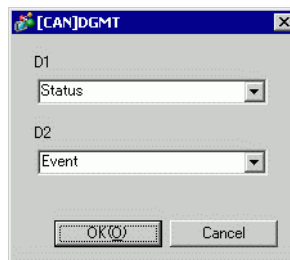
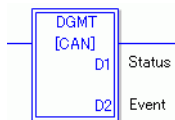
### Error Code

- 0: Normal
- 1: Error in operand number
- 111: Error in set up value for operand S4 or S5
- 120: Error in SDO communication or error in set up value for operand S1, S2, or S3
- 123: Timeout error
- 140: SDO protocol error
- 141: SDO send overflow
- 142: SDO master setting error
- 143: SDO access error
- 144: SDO receive timeout
- 145: SDO operand error
- 146: SDO master status error
- 147: SDO master status stopped
- 148: SDO abort error

### ◆ DGMT

State on the master is read.

Double-click the inserted instruction and the following dialog box appears.



### Operand Settings

D1: Specify the variable to store status.

D2: Specify the variable to store information on an event.

- Status

|                  |       |                      |               |
|------------------|-------|----------------------|---------------|
| 31               | 16 15 | 8 7                  | 0             |
| Unused (0 fixed) |       | Communication status | Master status |

| Bit    | Description                |                         | Details  |
|--------|----------------------------|-------------------------|--|
| 0 to 7 | 0x00                       | Initializing            | In the process of initializing.  |
|        | 0x01                       | Reset request           | Change to reset.   |
|        | 0x40                       | Reset the object        | Resetting  |
|        | 0x60                       | Slave checking          | Check slave mapping  |
|        | 0x61                       | Resetting network       | Reset all the nodes  |
|        | 0x62                       | Network standby         | Waits for a specified amount of time while the communication command can be reset. |
|        | 0x64                       | Initializing each slave | Initialize each slave in the network.  |
|        | 0x70                       | Module defect           | A deficiency exists for the module.  |
|        | 0x8x *1                    | Clearing                | Scan the network. The state in which firmware can be started.                      |
|        | 0x90                       | Fatal error             | Fatal error occurred in the network. Firmware will be reset.                       |
|        | 0xAx *1                    | Operating               | The network is operating   |
|        | 0xCx *1                    | Stopped                 | The network is stopped.  |
|        | 0xE <sub>x</sub> *1        | Preparing for operation | The network is in pre-operating state.   |
| 8      | Queue overrun (RXLP)       |                         | Overrun of receiving queue with low priority*2 has occurred.                       |
| 9      | Controller overrun         |                         | CAN controller overrun has occurred  |
| 10     | Controller bus off         |                         | CAN controller bus off has occurred  |
| 11     | Controller error occurred  |                         | Error has occurred in CAN controller   |
| 12     | Controller error recovered |                         | CAN controller has recovered from error state                                      |
| 13     | Queue overrun (TXLP)       |                         | Overrun of sending queue with low priority*2 has occurred.                         |
| 14     | Queue overrun (RXHP)       |                         | Overrun of receiving queue of high priority*3 has occurred.                        |
| 15     | Queue overrun (TXHP)       |                         | Overrun of sending queue with high priority*3 has occurred.                        |

\*1 The following states are shown according to the state of lower 4 bits.

Bit 0: Error bit of the optional slave or the slave that is not set.

0: No error

1: Error in 1 or more optional slaves or the slave that is not set.

Bit 1: Error bit of mandatory slave

0: No error

1: Error in 1 or more mandatory slaves

Bit 2: Common action bit

0: No active slaves

1: At least one active slave

Bit 3: Action bit of CANopen master module

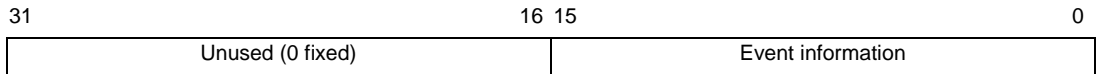
0: Not active

1: Active

\*2 Queue with low priority is used for heartbeat, node guard and SOD transfer.

\*3 Queue with high priority is for messages of TPDO, NMT command, SYNC and EMCY.

- Event

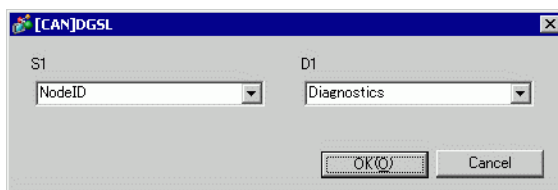
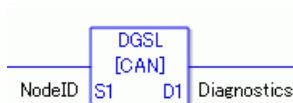


| Bit  | Description   |
|------|---|
| 0    | Network communication error                                       |
| 1    | Node ID error   |
| 2    | Error controlling event of mandatory slave                        |
| 3    | Identification error of mandatory slave or incomplete concise DCF |
| 4    | Identification error of optional slave                            |
| 5, 6 | Reserved  |
| 7    | Set if there are changes to bits in the bit list                  |
| 8    | Requested feature is unsupported                                  |
| 9    | Data byte number of received RxPDO is too small                   |
| 10   | Incomplete concise DCF  |
| 11   | Overrun of application specific SDO queue                         |
| 12   | Reserved  |
| 13   | Master alone  |
| 14   | Change the state of the network with NMT command                  |
| 15   | Change the state of the slave with the NMT command                |



◆ **DGSL**

State on the slave is read.



**Operand Settings**


S1: Specify node ID.

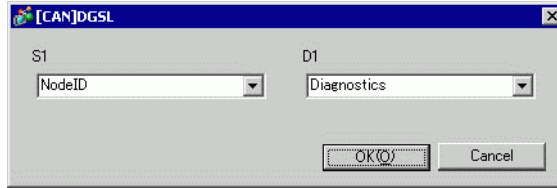
D1: Specify the variable to store slave information.

- Slave information

| Bit      | Description                                     | Details   |
|----------|---|---|
| 0        | Mapping   | 0: Slave is not assigned to master.<br>1: Slave is assigned to master.                          |
| 1        | Configuration                                   | Not set as slave. Startup is disabled.<br>1: Set as slave. Startup enabled.                     |
| 2        | Defect  | Configured Slave<br>Unconfigured Slave  |
| 3        | Emergency message (EMCY)                        | Slave has not sent the emergency message<br>Slave has sent the emergency message.               |
| 4        | Operating                                       | Slave is not operating.<br>1: Slave is operating.   |
| 5        | Stopped   | Slave is not stopped<br>Slave is stopped  |
| 6        | Preparing for operation                         | Slave is not preparing for operation.<br>Slave is preparing for operation                       |
| 7        | Inconsistent Concise DCF for one or more slaves | Normal concise DCF file<br>1: Incorrect concise DCF file  |
| 8        | Concise DCF mismatch for one or more slaves     | Objects of DCF and slave are matched.<br>1: Objects of DCF and slave are mismatched.            |
| 9        | Identity error                                  | 0: Slave information of the slave is normal.<br>1: Slave information of the slave has an error. |
| 10 to 15 | Reserved  | —   |

◆ **Setting Method**

- 1 Open Logic Screen (MAIN or SUB) and right-click the rung to select [Insert Instructions (I)]. Click the  icon to select [9. I/O Driver Instructions], point to [CAN], and click [DGSL] (instruction to read the state on slave side).
- 2 Mapping variables to operands. Double-click the inserted instruction. The following dialog box appears. Map variables and click [OK].



### 30.7.5 PDO mapping on the slave and method of setting objects

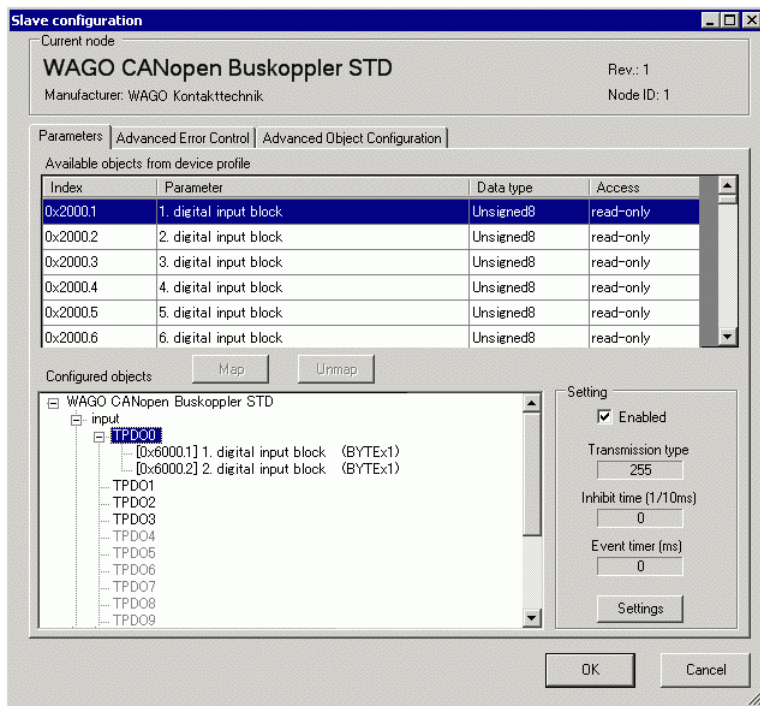
PDO mapping on the slave and the method of setting objects will be explained below.

Settings in GP-Pro EX

- 1 Click [Settings] from System window [I/O Driver Settings] and add a slave unit to the network.

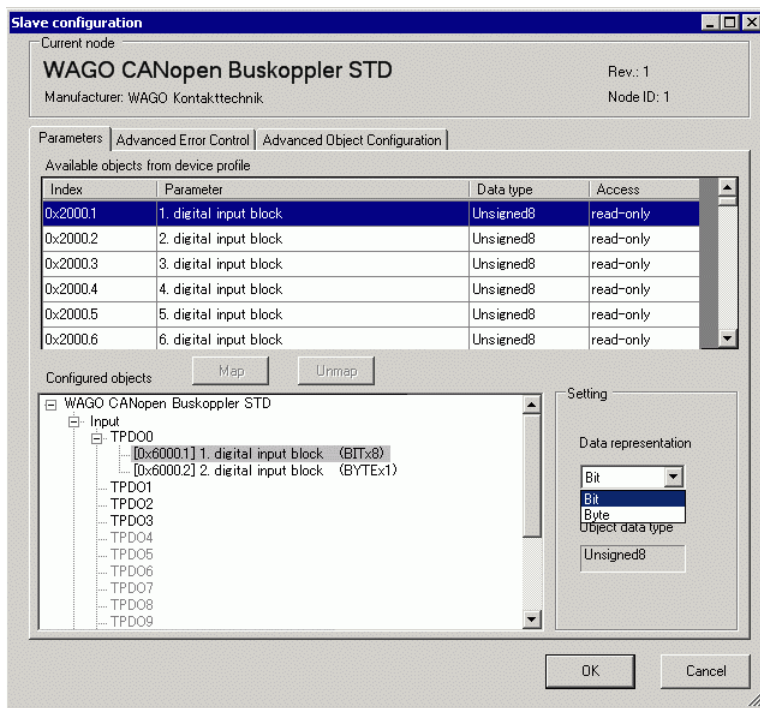
☞ "30.7.2 Setting Procedure" (page 30-150)

- 2 Click [Slave Configuration] with the added slave unit selected and the following dialog box appears. In the [Parameters] tab, expand the [Configured objects] tree to open [TPDO0].

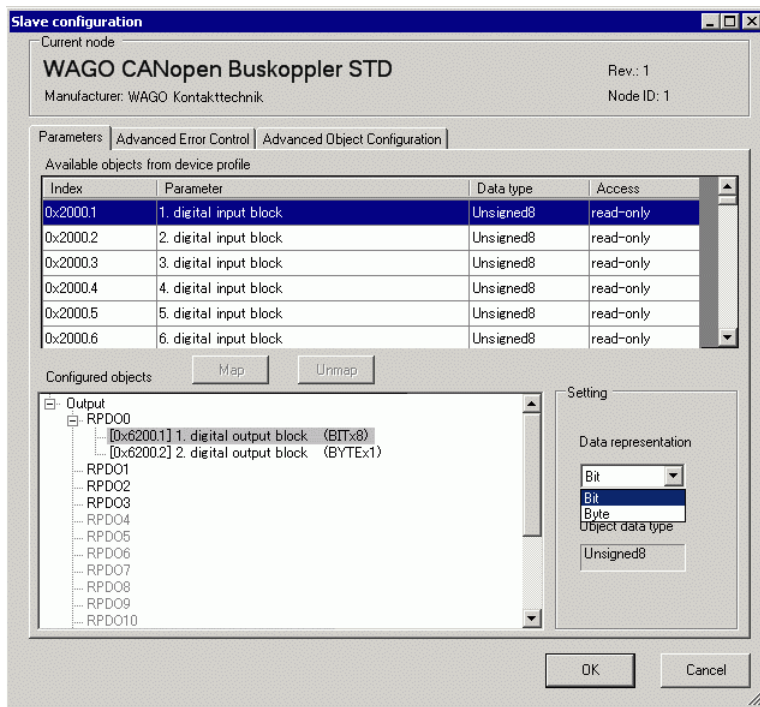


- 3 Check whether [0x6000.1] and [0x6000.2] have been allocated.

4 To change the data type of the object in TPDO, select the object and then select the [Data representation] in [Settings]. (For example, Bit)



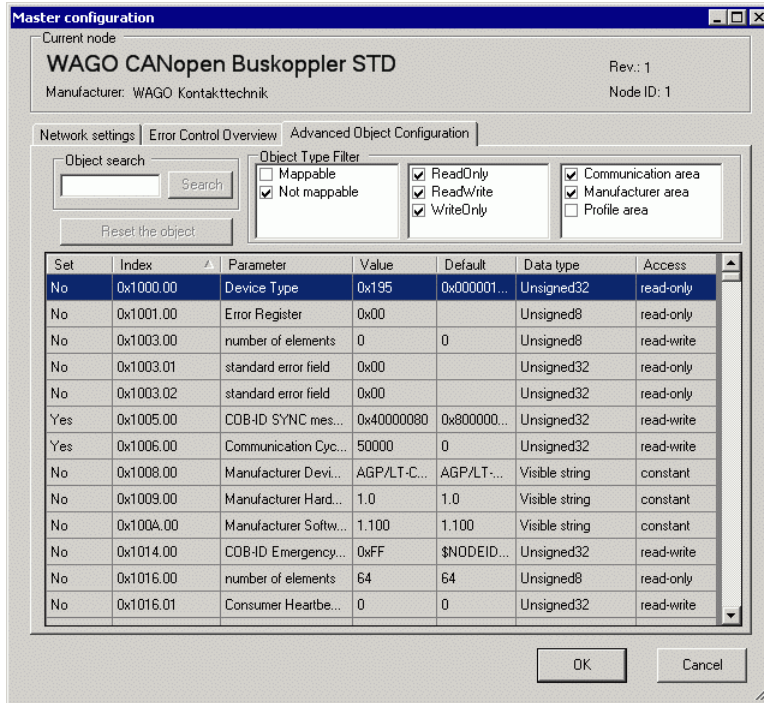
5 Similarly, open RPDO0 and check whether [0x6200.1] and [0x6200.2] have been allocated. To change the data type of the object in RPDO, select the object and then and select [Data representation] in [Settings]. (For example, Bit)



**NOTE**

- Objects related to input data from CANopen slave to GP (CANopen master) are mapped to TPDO, and objects related to output data from GP (CANopen master) to CANopen slave are mapped to RPDO.

6 Open the [Advanced Object Configuration] tab and configure detailed settings of the object.



7 Click [I/O Screen] in [I/O Driver Settings] or select [I/O Screen] in the [Screen List] window on Work Space to assign a variable to each of the mapped objects. For how to assign variables, refer to the following.

☞ "30.7.3 Allocating I/O" (page 30-155)

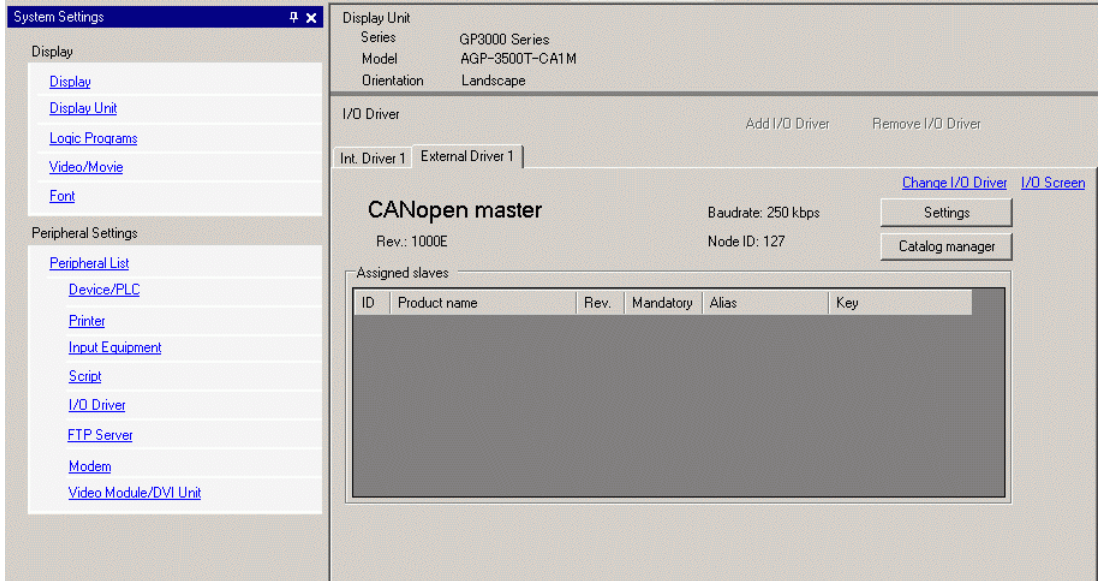
8 Create a Logic Screen and a Base Screen to access the allocated variables and transfer them to the GP.

**NOTE**

- To check set values, use SDOR instructions.

### 30.7.6 [I/O Driver] Settings Guide

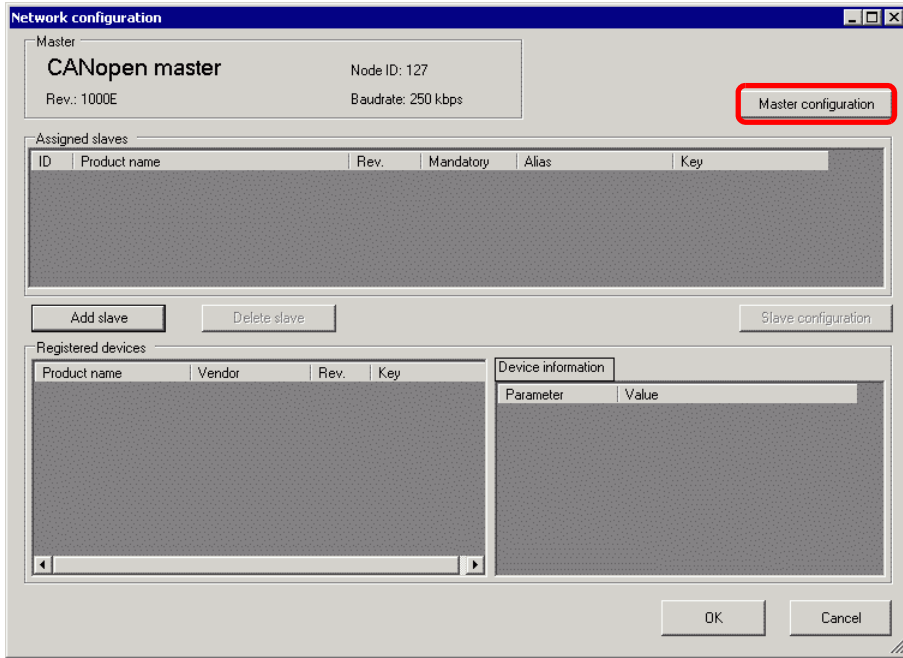
When AGP-\*\*\*\*\*-CA1M/LT is selected in Display Settings, click [I/O Driver] in System Settings to open the following screen.



| Setting                                     | Description   |
|---|---|
| Revision                                    | Displays revision number for EDS file of CANopen master.  |
| Baud rate                                   | Displays baud rate of CANopen master.   |
| Node ID                                     | Displays node ID of CANopen master.   |
| I/O Screen                                  | Go to I/O Screen.   |
| Settings                                    | Displays [Network Configuration] dialog box.<br>" ■ Network Configuration Dialog Box" (page 30-171)   |
| Catalog Manager                             | Displays the [Catalog Manager] dialog box.<br>" ■ Catalog Manager Dialog Box" (page 30-188)   |
| Assigned slaves                             | Slave devices added to CANopen network displays. The details of [Network Configuration] and [Slave Configuration] dialog boxes display in the list. |
| ID  | Node ID of the slave in CANopen network.  |
| Product Name                                | Displays the product name of the slave.   |
| Revision                                    | Displays the slave's EDS file revision number.*1  |
| On Error Control Event of a Mandatory Slave | Displays whether the slave is mandatory in the network.   |
| Key   | Displays the device registration key of the slave.<br>The device registration key will be the name of the EDS file without extension.               |


\*1 EDS file is a text file in ASCII format that describes specification (example, useful features and objects) of the device. It is required to register and set the device to the network.

## ■ Network Configuration Dialog Box



| Setting                                     | Description   |
|---|---|
| Master Configuration                        | Displays Master Configuration dialog box.<br>☞ " ◆ Master Configuration Dialog Box" (page 30-173)   |
| Assigned slaves                             | Slave devices added to CANopen network displays. The details of [Network Configuration] and [Slave Configuration] dialog boxes display in the list.   |
| ID  | Node ID of the slave in CANopen network.  |
| Product Name                                | Displays the product name of the slave.   |
| Revision                                    | Displays the slave's EDS file revision number.*1  |
| On Error Control Event of a Mandatory Slave | Defines whether the slave is mandatory in the network. Select this option to turn ON bit 3 in object 1F81h.   |
| Alias                                       | Defines the comment set for the slave.  |
| Key   | Displays the device registration key of the slave.<br>The device registration key will be the name of the EDS file without extension.   |
| Add Slave                                   | Add the slave selected in [EDS List] to [Assigned slaves]. You can change Node ID (1 to 63) of the added slave. You can also enter comments within 18 characters.<br>In order to add a slave manufactured by another company, you need to import the EDS file using [Catalog Manager].<br>☞ " ■ Catalog Manager Dialog Box" (page 30-188) |

Continued

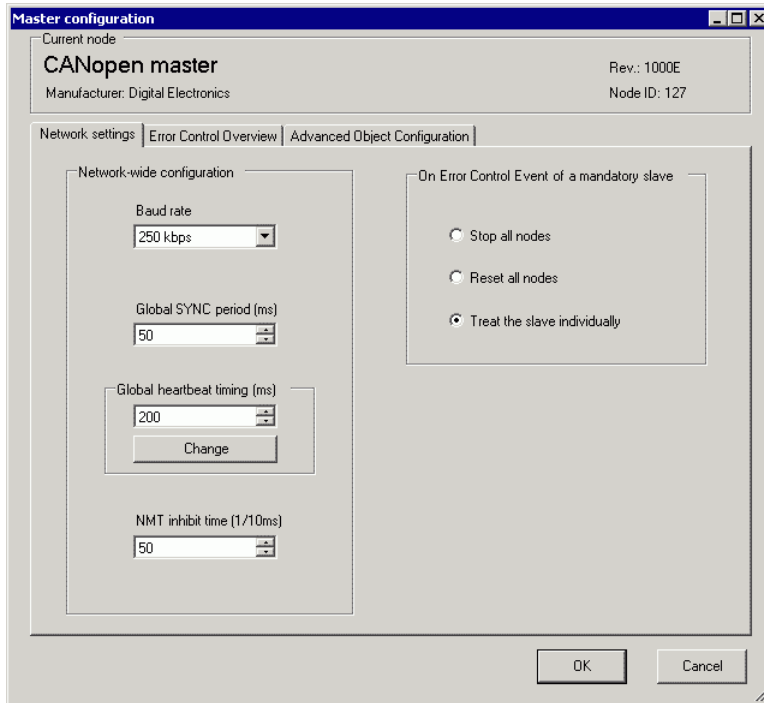
| Setting             | Description   |
|---------------------|---|
| Delete Slave        | Deletes the slave selected in [Assigned slaves] from the network.   |
| Slave Configuration | Displays Slave Configuration dialog box.<br> " ◆ Slave Configuration Dialog Box" (page 30-179) |
| Registered EDS      | Displays available slaves in the list.  |
| Product Name        | Displays the product name of the slave.   |
| Vendor Name         | Displays the vendor name of slave.  |
| Revision            | Displays the revision number for EDS file of the slave.   |
| Key                 | Displays the device registration key of the slave.<br>The device registration key will be the name of the EDS file without extension.   |
| Device Information  | Information on the currently selected EDS displays.   |

\*1 EDS file is a text file in ASCII format that describes specification (example, useful features and objects) of the device. It is required to register and set the device to the network.



◆ **Master Configuration Dialog Box**

- Master Configuration



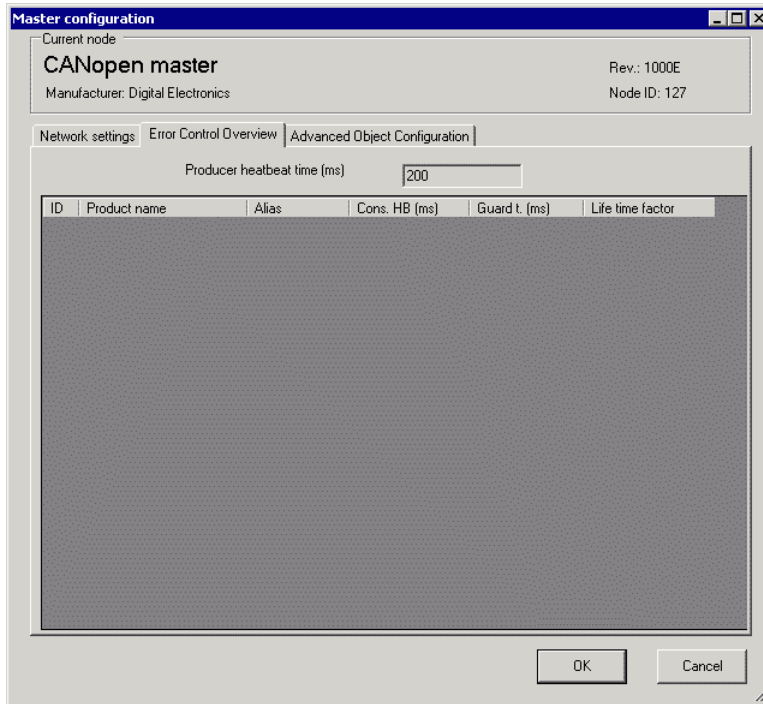
| Setting                    | Description   |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
|----------------------------|---|-----------------|-----------------|-----|------|------|-----|------|-----|------|-----|------|----|-------|---|
| Network-wide configuration | Configures CANopen network settings.  |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| Baud rate                  | <p>Selects corresponding baud rate from [50kbps], [125kbps], [250kbps], [500kbps], [800kbps] and [1000kbps].</p> <table border="1"> <thead> <tr> <th>Baud rate (bps)</th> <th>Wire length (m)</th> </tr> </thead> <tbody> <tr> <td>50K</td> <td>1000</td> </tr> <tr> <td>125K</td> <td>500</td> </tr> <tr> <td>250K</td> <td>250</td> </tr> <tr> <td>500K</td> <td>100</td> </tr> <tr> <td>800K</td> <td>25</td> </tr> <tr> <td>1000K</td> <td>4</td> </tr> </tbody> </table> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Set the slave baud rate on the slave itself.</li> </ul> | Baud rate (bps) | Wire length (m) | 50K | 1000 | 125K | 500 | 250K | 250 | 500K | 100 | 800K | 25 | 1000K | 4 |
| Baud rate (bps)            | Wire length (m)   |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| 50K                        | 1000  |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| 125K                       | 500   |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| 250K                       | 250   |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| 500K                       | 100   |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| 800K                       | 25  |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| 1000K                      | 4   |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |
| Global SYNC period         | Defines the frequency of the SYNC signal sent by the slave unit. The set up range is 0, or 3 to 32767. The set up value is stored in object 1006h.  |                 |                 |     |      |      |     |      |     |      |     |      |    |       |   |

Continued

| Setting                                     |                         | Description   |  |       |       |                 |  |    |                  |    |     |                              |     |     |
|---|-------------------------|---|--|-------|-------|-----------------|--|----|------------------|----|-----|------------------------------|-----|-----|
| Network Configuration                       | Global Heartbeat Timing | <p>Set the heartbeat time sent from slave to master (or from master to slave). Unit is in milliseconds (ms). The value can be from 50 to 21844. Press [Apply to All Slaves] and the value of object 1016h (consumer heartbeat time) for CANopen master changes to the automatically optimized value. The value of object 1017h (producer heartbeat time) is overwritten by the value set here. Object 1017h (producer heartbeat time) for all slave objects is overwritten with the value set here, and the value of object 1016h (consumer heartbeat time) changes to the automatically optimized value.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>To individually specify heartbeat time on slave side, it can be set in the [Slave Configuration] dialog box.</li> </ul> |  |       |       |                 |  |    |                  |    |     |                              |     |     |
|   | NMT Inhibit Time        | <p>Set the lagged time after the master input one NMT command into the network until the next NMT command is issued. "NMT Inhibit Time" is set in 100 microseconds. The value can be from 0 to 32767. You can disable this feature by setting 0.</p>  |  |       |       |                 |  |    |                  |    |     |                              |     |     |
| On Error Control Event of a Mandatory Slave |                         | <p>Select the action when an error occurs in the slave set in [Mandatory Slave] from [Stop All Slaves], [Reset All Slaves] and [Prioritize slaves individually]. When this item is set, bit 4 and 6 of the object 1F80h for CANopen master is as follows:</p> <table border="1"> <thead> <tr> <th></th> <th>4 Bit</th> <th>6 Bit</th> </tr> </thead> <tbody> <tr> <td>Stop all slaves</td> <td></td> <td>ON</td> </tr> <tr> <td>Reset all slaves</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>Treat the slave individually</td> <td>OFF</td> <td>OFF</td> </tr> </tbody> </table>   |  | 4 Bit | 6 Bit | Stop all slaves |  | ON | Reset all slaves | ON | OFF | Treat the slave individually | OFF | OFF |
|   | 4 Bit                   | 6 Bit   |  |       |       |                 |  |    |                  |    |     |                              |     |     |
| Stop all slaves                             |                         | ON  |  |       |       |                 |  |    |                  |    |     |                              |     |     |
| Reset all slaves                            | ON                      | OFF   |  |       |       |                 |  |    |                  |    |     |                              |     |     |
| Treat the slave individually                | OFF                     | OFF   |  |       |       |                 |  |    |                  |    |     |                              |     |     |

- Error Control Overview

Displays the state of each slave. No settings are allowed.



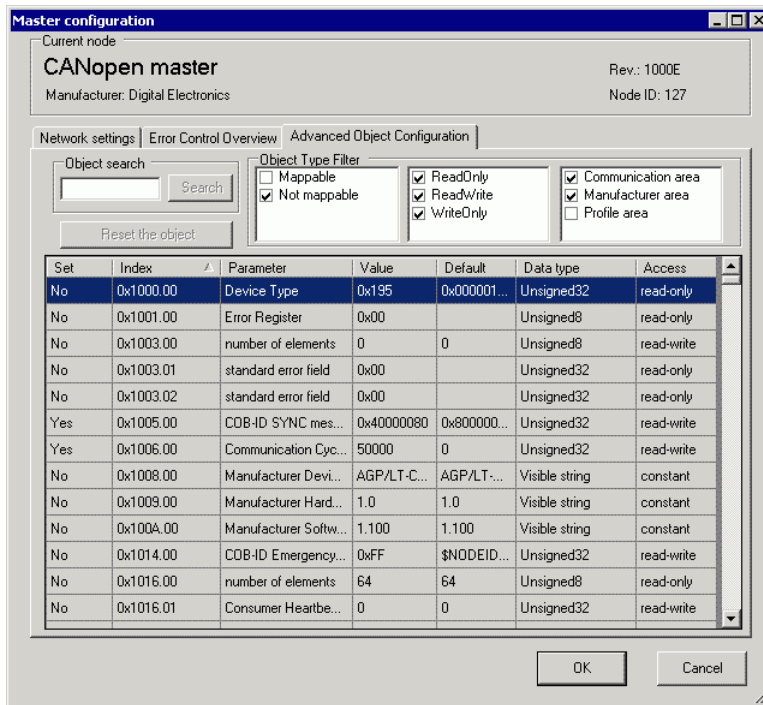
| Setting                 | Description   |
|-------------------------|---|
| Producer Heartbeat Time | Displays the sending period of the heartbeat set in [Global Heartbeat Time] in [Network Settings] tab. Unit is in milliseconds (ms). It is stored in the object 1017h for CANopen master. |
| ID                      | Node ID in CANopen network.   |
| Product Name            | Display EDS product name.   |
| Alias                   | Displays the alias assigned to the slave.   |
| Consumer Heartbeat      | Display consumer heartbeat set in each slave. It is stored in the object 1016h for slave.   |
| Guard Time              | When [Use Node Guard] is selected in the [Advanced Error Control] tab in [Slave Configuration], displays [Guard Time] that is set. It is stored in the object 100Ch on slave side.        |
| Life time factor        | When [Use Node Guard] is selected in [Advanced Error Control] tab in [Slave Configuration], displays [Life time factor] that is set. It is stored in the object 100Dh on slave side.      |

- **Advanced Object Configuration**

You can change the values of read-write and write-only objects. The values you can change are objects that are writable and not grayed out. The values set here are written in the objects during startup.

**NOTE**

- To use Advanced Object Configuration, you must have sufficient knowledge about CANopen.



| Setting          | Description  |
|------------------|--|
| Object Search    | Enter the object you want to search, or enter the parameter text string. Click [Search]. The application searches for the corresponding object in the object list. |
| Reset the object | Returns the set up value of the object selected in the [Object List] to its initial value.   |

Continued

| Setting                               | Description  |        |  |       |  |           |                                       |       |   |         |                                      |
|---------------------------------------|--|--------|--|-------|--|-----------|---------------------------------------|-------|---|---------|--------------------------------------|
| Object Type Filter                    | Select the extracting conditions you want to display in [Available objects from device profile] from the following three categories: <ul style="list-style-type: none"> <li>• PDO mapping                             <ul style="list-style-type: none"> <li>    PDO mapping enabled</li> <li>    PDO mapping disabled</li> </ul> </li> <li>• Access                             <ul style="list-style-type: none"> <li>    Read only</li> <li>    Write only</li> <li>    Read/Write enabled</li> </ul> </li> <li>• Data Area                             <ul style="list-style-type: none"> <li>    Commutation Area (1000h to 1FFFh)</li> <li>    Manufacturer Area (2000h to 5FFFh)</li> <li>    Profile Area (6000h to 9FFFh)</li> </ul> </li> </ul>  |        |  |       |  |           |                                       |       |   |         |                                      |
| Available objects from device profile | Display the list of objects according to the conditions selected in [Object type filter]. <table border="1" data-bbox="166 697 1263 1070"> <tbody> <tr> <td data-bbox="166 697 375 807">Enable</td> <td data-bbox="375 697 1263 807">When the "Set Value" changes, this check box is automatically selected; you can confirm that the object has changed. When the check box is cleared, the object returns to its initial value.</td> </tr> <tr> <td data-bbox="166 807 375 917">Index</td> <td data-bbox="375 807 1263 917">Display index and sub index of the object. The sub index appears after the comma. For example, for "0x1003.2", "0x1003" is index and "2" is sub index.</td> </tr> <tr> <td data-bbox="166 917 375 954">Parameter</td> <td data-bbox="375 917 1263 954">Display parameter name of the object.</td> </tr> <tr> <td data-bbox="166 954 375 1031">Value</td> <td data-bbox="375 954 1263 1031">The value of the object can be changed. The number with "0x" indicates a hexadecimal, otherwise without, it indicates a decimal number.</td> </tr> <tr> <td data-bbox="166 1031 375 1070">Default</td> <td data-bbox="375 1031 1263 1070">Display initial value of the object.</td> </tr> </tbody> </table> | Enable | When the "Set Value" changes, this check box is automatically selected; you can confirm that the object has changed. When the check box is cleared, the object returns to its initial value. | Index | Display index and sub index of the object. The sub index appears after the comma. For example, for "0x1003.2", "0x1003" is index and "2" is sub index. | Parameter | Display parameter name of the object. | Value | The value of the object can be changed. The number with "0x" indicates a hexadecimal, otherwise without, it indicates a decimal number. | Default | Display initial value of the object. |
| Enable                                | When the "Set Value" changes, this check box is automatically selected; you can confirm that the object has changed. When the check box is cleared, the object returns to its initial value.   |        |  |       |  |           |                                       |       |   |         |                                      |
| Index                                 | Display index and sub index of the object. The sub index appears after the comma. For example, for "0x1003.2", "0x1003" is index and "2" is sub index.   |        |  |       |  |           |                                       |       |   |         |                                      |
| Parameter                             | Display parameter name of the object.  |        |  |       |  |           |                                       |       |   |         |                                      |
| Value                                 | The value of the object can be changed. The number with "0x" indicates a hexadecimal, otherwise without, it indicates a decimal number.  |        |  |       |  |           |                                       |       |   |         |                                      |
| Default                               | Display initial value of the object.   |        |  |       |  |           |                                       |       |   |         |                                      |

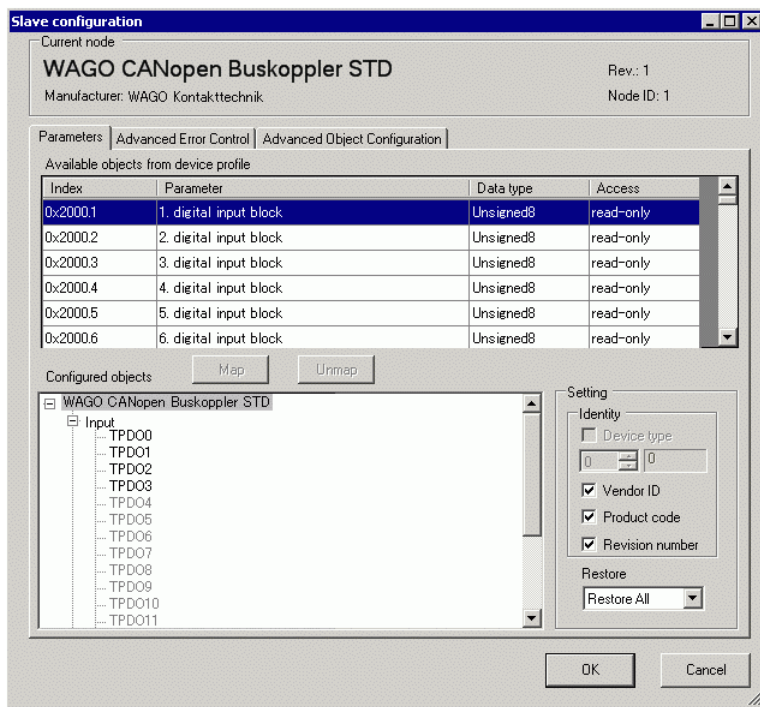
Continued

| Setting                               |           | Description  |
|---------------------------------------|-----------|--|
| Available objects from device profile | Data Type | <p>Display data type of the object. The following data types are included.</p> <ul style="list-style-type: none"> <li>• Boolean (Single bit value)</li> <li>• Integer8 (Integer with 8 bit code)</li> <li>• Integer16 (Integer with 16 bit code)</li> <li>• Integer24 (Integer with 24 bit code)</li> <li>• Integer32 (Integer with 32 bit code)</li> <li>• Integer40 (Integer with 40 bit code)</li> <li>• Integer48 (Integer with 48 bit code)</li> <li>• Integer56 (Integer with 56 bit code)</li> <li>• Integer64 (Integer with 64 bit code)</li> <li>• Unsigned8 (Integer without 8 bit code)</li> <li>• Unsigned16 (Integer without 16 bit code)</li> <li>• Unsigned24 (Integer without 24 bit code)</li> <li>• Unsigned32 (Integer without 32 bit code)</li> <li>• Unsigned40 (Integer without 40 bit code)</li> <li>• Unsigned48 (Integer without 48 bit code)</li> <li>• Unsigned56 (Integer without 56 bit code)</li> <li>• Unsigned64 (Integer without 64 bit code)</li> <li>• Float (32 bit single accuracy fixed decimal point)</li> <li>• Float64 (64 bit single accuracy fixed decimal point)</li> <li>• Visible String (Text string including ASCII text)</li> <li>• Octet string (Array of integer without 8 bit code)</li> <li>• Unicode string (Array of integer without 16 bit code)</li> <li>• Bit string (Array of single bit)</li> <li>• Time of day (48 bit value indicating time and date)</li> <li>• Time difference (48 bit value indicating time)</li> <li>• Domain (Application specific data block)</li> <li>• Reserved (Reserved type)</li> </ul> |
|                                       | Access    | <p>Displays access method of the objects. The following types are included.</p> <ul style="list-style-type: none"> <li>• readonly (Read only)</li> <li>• writeonly (Write only)</li> <li>• readwrite (Read/Write)</li> <li>• constant (Constant)</li> </ul>  |

◆ **Slave Configuration Dialog Box**

Configure detailed settings of the slave selected in [Slave Configuration].

- Parameters



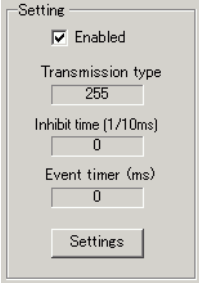
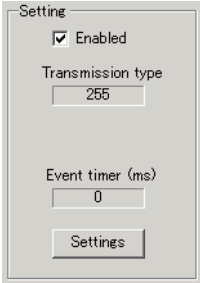
| Setting                               | Description  |
|---------------------------------------|--|
| Available objects from device profile | Display the list of objects that can be mapped to PDO.   |
| Index                                 | Display index and sub index of the object. The sub index appears after the comma. For example, for "0x1003.2", "0x1003" is index and "2" is sub index. |
| Parameter                             | Display parameter name of the object.  |

Continued

| Setting                               |           | Description  |
|---------------------------------------|-----------|--|
| Available objects from device profile | Data Type | <p>Display data type of the object. The following data types are included.</p> <ul style="list-style-type: none"> <li>• Boolean (Single bit value)</li> <li>• Integer8 (Integer with 8 bit code)</li> <li>• Integer16 (Integer with 16 bit code)</li> <li>• Integer24 (Integer with 24 bit code)</li> <li>• Integer32 (Integer with 32 bit code)</li> <li>• Integer40 (Integer with 40 bit code)</li> <li>• Integer48 (Integer with 48 bit code)</li> <li>• Integer56 (Integer with 56 bit code)</li> <li>• Integer64 (Integer with 64 bit code)</li> <li>• Unsigned8 (Integer without 8 bit code)</li> <li>• Unsigned16 (Integer without 16 bit code)</li> <li>• Unsigned24 (Integer without 24 bit code)</li> <li>• Unsigned32 (Integer without 32 bit code)</li> <li>• Unsigned40 (Integer without 40 bit code)</li> <li>• Unsigned48 (Integer without 48 bit code)</li> <li>• Unsigned56 (Integer without 56 bit code)</li> <li>• Unsigned64 (Integer without 64 bit code)</li> <li>• Float (32 bit single accuracy fixed decimal point)</li> <li>• Float64 (64 bit single accuracy fixed decimal point)</li> <li>• Visible String (Text string including ASCII text)</li> <li>• Octet string (Array of integer without 8 bit code)</li> <li>• Unicode string (Array of integer without 16 bit code)</li> <li>• Bit string (Array of single bit)</li> <li>• Time of day (48 bit value indicating time and date)</li> <li>• Time difference (48 bit value indicating time)</li> <li>• Domain (Application specific data block)</li> <li>• Reserved (Reserved type)</li> </ul> |
|                                       | Access    | <p>Displays access method of the objects. The following types are included.</p> <ul style="list-style-type: none"> <li>• readonly (Read only)</li> <li>• writeonly (Write only)</li> <li>• readwrite (Read/Write)</li> <li>• constant (Constant)</li> </ul>  |
| Map                                   |           | Map the object selected in [Available objects from device profile] to [Configured objects] tree.   |
| Unmap                                 |           | Remove the object mapped to [Configured objects] tree.   |
| Configured objects                    |           | <p>Mapped objects per slave displays in tree configuration.<br/> Map the object.<br/> TPDO<br/> PDO sent from slave to master. When data is input from the external I/O that's connected to the selected slave, map the object here.<br/> RPDO<br/> PDO sent from master to slave. When data is output from the external I/O that's connected to the selected slave, map the object here.</p>  |

Continued

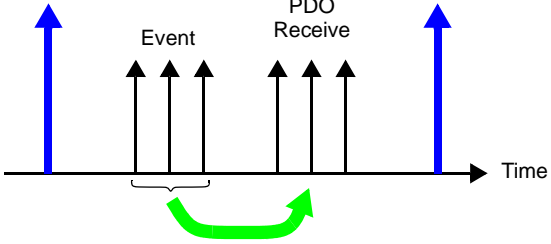
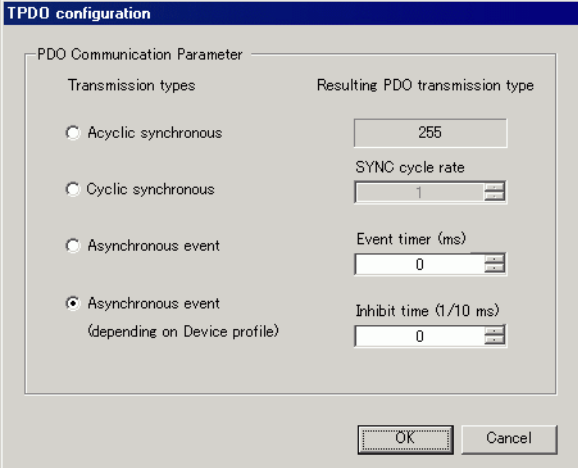


| Setting   | Description  |                                     |                   |   |              |   |                    |  |   |
|---|--|-------------------------------------|-------------------|---|--------------|---|--------------------|--|---|
| Settings  | Configure detailed settings of the item selected in [Configured objects].<br>Setting contents vary from when: the slave is selected on the tree, TPDO or RPDO is selected, or the mapped object is selected.   |                                     |                   |   |              |   |                    |  |   |
| Verification <table border="1" data-bbox="227 421 419 958"> <tr> <td data-bbox="227 421 419 459">Vendor ID</td> <td data-bbox="419 421 1266 459">Displays the vendor ID of slave.</td> </tr> <tr> <td data-bbox="227 459 419 498">Product Code</td> <td data-bbox="419 459 1266 498">Displays the product code of the slave.</td> </tr> <tr> <td data-bbox="227 498 419 537">Revision</td> <td data-bbox="419 498 1266 537">Displays the revision number for EDS file of the slave.</td> </tr> <tr> <td data-bbox="227 537 419 958">Restore Parameters</td> <td data-bbox="419 537 1266 958">                             Return the parameters to the initial value when restarting the network. You can set so as to restore the parameters for each slave.                             <ul style="list-style-type: none"> <li>• None<br/>Parameters are not restored.</li> <li>• All<br/>All parameters are restored.</li> <li>• Communication only<br/>Parameters in the area shown in [Commutation Area] of [Slave Configuration/Extended] are restored.</li> <li>• Application only<br/>Parameters in the area shown in [Manufacturer Area] and Profile Area] of [Slave Configuration/Extended] are restored.</li> </ul> </td> </tr> </table> | Vendor ID  | Displays the vendor ID of slave.    | Product Code      | Displays the product code of the slave.                     | Revision     | Displays the revision number for EDS file of the slave.   | Restore Parameters | Return the parameters to the initial value when restarting the network. You can set so as to restore the parameters for each slave. <ul style="list-style-type: none"> <li>• None<br/>Parameters are not restored.</li> <li>• All<br/>All parameters are restored.</li> <li>• Communication only<br/>Parameters in the area shown in [Commutation Area] of [Slave Configuration/Extended] are restored.</li> <li>• Application only<br/>Parameters in the area shown in [Manufacturer Area] and Profile Area] of [Slave Configuration/Extended] are restored.</li> </ul> | Defines whether or not to run the device type reference. Select this option to check whether the structure matches the set up value in object 1000h. If 1000h is zero, reference does not take place.   |
| Vendor ID   | Displays the vendor ID of slave.   |                                     |                   |   |              |   |                    |  |   |
| Product Code  | Displays the product code of the slave.  |                                     |                   |   |              |   |                    |  |   |
| Revision  | Displays the revision number for EDS file of the slave.  |                                     |                   |   |              |   |                    |  |   |
| Restore Parameters  | Return the parameters to the initial value when restarting the network. You can set so as to restore the parameters for each slave. <ul style="list-style-type: none"> <li>• None<br/>Parameters are not restored.</li> <li>• All<br/>All parameters are restored.</li> <li>• Communication only<br/>Parameters in the area shown in [Commutation Area] of [Slave Configuration/Extended] are restored.</li> <li>• Application only<br/>Parameters in the area shown in [Manufacturer Area] and Profile Area] of [Slave Configuration/Extended] are restored.</li> </ul> |                                     |                   |   |              |   |                    |  |   |
| When TPDO/<br>RPDO Is Selected <table border="1" data-bbox="227 1489 419 1746"> <tr> <td data-bbox="227 1489 419 1528">Enable</td> <td data-bbox="419 1489 1266 1528">Select the check box to enable PDO.</td> </tr> <tr> <td data-bbox="227 1528 419 1595">Transmission Type</td> <td data-bbox="419 1528 1266 1595">Display the transmission type for PDO in [Change Settings].</td> </tr> <tr> <td data-bbox="227 1595 419 1663">Inhibit Time</td> <td data-bbox="419 1595 1266 1663">Display time when continuously transmitting PDO is inhibited only for TPDO. Set in [Change Settings]. The unit is 100 μs.</td> </tr> <tr> <td data-bbox="227 1663 419 1746">Event Timer</td> <td data-bbox="419 1663 1266 1746">Displays transmission interval in which PDO is continuously sent. Set in [Change Settings]. The unit is in milliseconds (ms).</td> </tr> </table>  | Enable   | Select the check box to enable PDO. | Transmission Type | Display the transmission type for PDO in [Change Settings]. | Inhibit Time | Display time when continuously transmitting PDO is inhibited only for TPDO. Set in [Change Settings]. The unit is 100 μs. | Event Timer        | Displays transmission interval in which PDO is continuously sent. Set in [Change Settings]. The unit is in milliseconds (ms).  | Set PDO enabled/disabled and set [Transmission Type], [Inhibit Time] and [Event Timer]. <div style="display: flex; justify-content: space-around; margin: 10px 0;">   </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <b>NOTE</b> <ul style="list-style-type: none"> <li>• When PDO is disabled, when you re-open the project, all the information set up in the PDO is initialized to its initial values.</li> </ul> </div> |
| Enable  | Select the check box to enable PDO.  |                                     |                   |   |              |   |                    |  |   |
| Transmission Type   | Display the transmission type for PDO in [Change Settings].  |                                     |                   |   |              |   |                    |  |   |
| Inhibit Time  | Display time when continuously transmitting PDO is inhibited only for TPDO. Set in [Change Settings]. The unit is 100 μs.  |                                     |                   |   |              |   |                    |  |   |
| Event Timer   | Displays transmission interval in which PDO is continuously sent. Set in [Change Settings]. The unit is in milliseconds (ms).  |                                     |                   |   |              |   |                    |  |   |

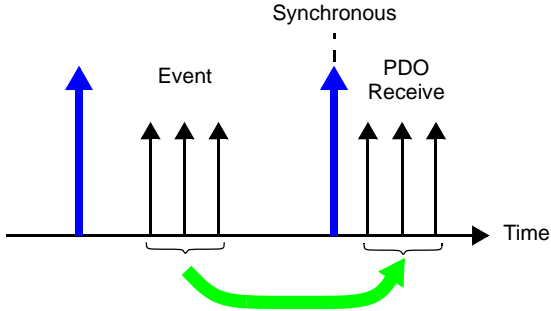
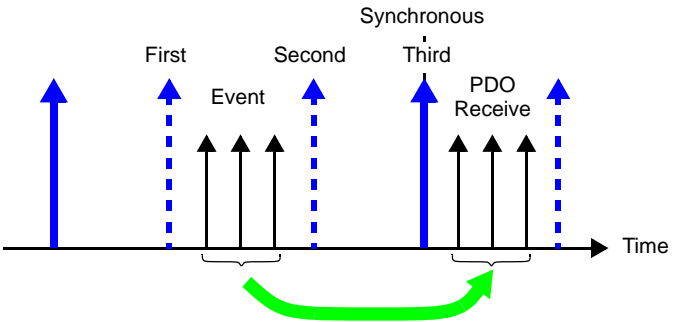
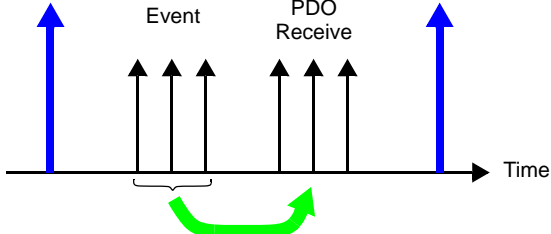
Continued

| Setting  | Description  |
|--|--|
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Settings</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">When TPDO/RPDO Is Selected</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Change Settings</p> | <p>Click to display the following screen. Different screens are displayed for RPDO and TPDO.</p> <p>When RPDO is selected</p> <div data-bbox="565 316 1066 670" data-label="Image"> </div> <ul style="list-style-type: none"> <li> <p>Acyclic synchronous (non cyclic)<br/>                     PDO is received when an event occurs as in the case in which 255/254 is set, but its timing is after the next SYNC signal flows into the network. In addition, if no event occurs, PDO is not received even when the SYNC signal has flown to the network.</p> <div data-bbox="569 875 1118 1178" data-label="Diagram"> </div> </li> <li> <p>Cyclic synchronous (cyclic)<br/>                     In synchronization with the SYNC signal flowing into the network, PDO is received based on the value set to the SYNC cyclic number. For example, when 1 is set, PDO is received for every SYNC object. When 3 is set, PDO is received each time that three SYNC signals flow into the network. The following figure shows the case in which 3 is set.</p> <div data-bbox="528 1450 1200 1767" data-label="Diagram"> </div> </li> </ul> |

Continued

| Setting             |                            | Description  |               |          |           |                     |   |                |   |        |   |                   |   |              |   |             |
|---------------------|----------------------------|--|---------------|----------|-----------|---------------------|---|----------------|---|--------|---|-------------------|---|--------------|---|-------------|
| Settings            | When TPDO/RPDO Is Selected | <p>Change Settings</p> <ul style="list-style-type: none"> <li>Asynchronous event (standard event)/Determined by (standard event) device profile<br/>                     PDO is received immediately when an event occurred regardless of the SYNC signal. For 254, this is defined by the manufacturer. For 255, this is defined in the device profile.</li> </ul>  <p>The information of PDO that has been set is reflected for the following objects:</p> <table border="1" data-bbox="445 763 1255 966"> <thead> <tr> <th>Object number</th> <th>SubIndex</th> <th>Item Name</th> </tr> </thead> <tbody> <tr> <td rowspan="5">0x1400 + PDO number</td> <td>0</td> <td>Number of RPDO</td> </tr> <tr> <td>1</td> <td>COB ID</td> </tr> <tr> <td>2</td> <td>Transmission Type</td> </tr> <tr> <td>3</td> <td>Inhibit Time</td> </tr> <tr> <td>5</td> <td>Event Timer</td> </tr> </tbody> </table> <p>TPDO</p>  | Object number | SubIndex | Item Name | 0x1400 + PDO number | 0 | Number of RPDO | 1 | COB ID | 2 | Transmission Type | 3 | Inhibit Time | 5 | Event Timer |
| Object number       | SubIndex                   | Item Name  |               |          |           |                     |   |                |   |        |   |                   |   |              |   |             |
| 0x1400 + PDO number | 0                          | Number of RPDO   |               |          |           |                     |   |                |   |        |   |                   |   |              |   |             |
|                     | 1                          | COB ID   |               |          |           |                     |   |                |   |        |   |                   |   |              |   |             |
|                     | 2                          | Transmission Type  |               |          |           |                     |   |                |   |        |   |                   |   |              |   |             |
|                     | 3                          | Inhibit Time   |               |          |           |                     |   |                |   |        |   |                   |   |              |   |             |
|                     | 5                          | Event Timer  |               |          |           |                     |   |                |   |        |   |                   |   |              |   |             |

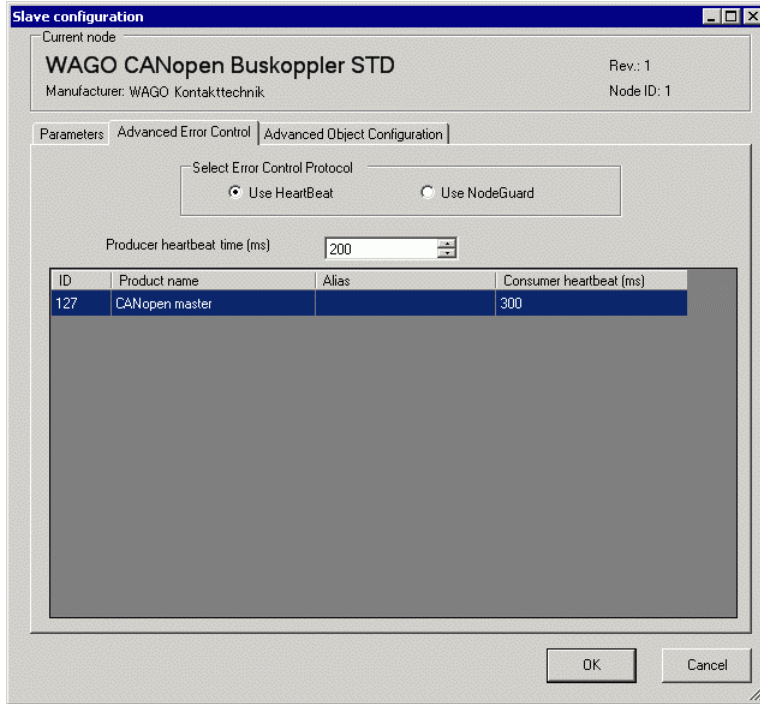
Continued

| Setting  | Description   |
|--|---|
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Settings</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">When TPDO/RPDO Is Selected</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Change Settings</p> | <ul style="list-style-type: none"> <li> <p>Acyclic synchronous (non cyclic)<br/>                     PDO is sent when an event occurs as in the case in which 255/254 is set, but its timing is after the next SYNC signal flows into the network. In addition, if no event occurs, PDO is not sent even when the SYNC signal has flown to the network.</p>  </li> <li> <p>Cyclic synchronous (cyclic)<br/>                     In synchronization with the SYNC signal flowing into the network, PDO is sent based on the value set to the SYNC cyclic number. For example, when 1 is set, PDO is sent for every SYNC object. When 3 is set, PDO is sent each time that three SYNC signals flow into the network. The following figure shows the case in which 3 is set.</p>  </li> <li> <p>Asynchronous event (standard event)/Determined by (standard event) device profile<br/>                     PDO is sent immediately when an event occurred regardless of the SYNC signal. For 254, this is defined by the manufacturer. For 255, this is defined in the device profile.</p>  </li> </ul> |

Continued

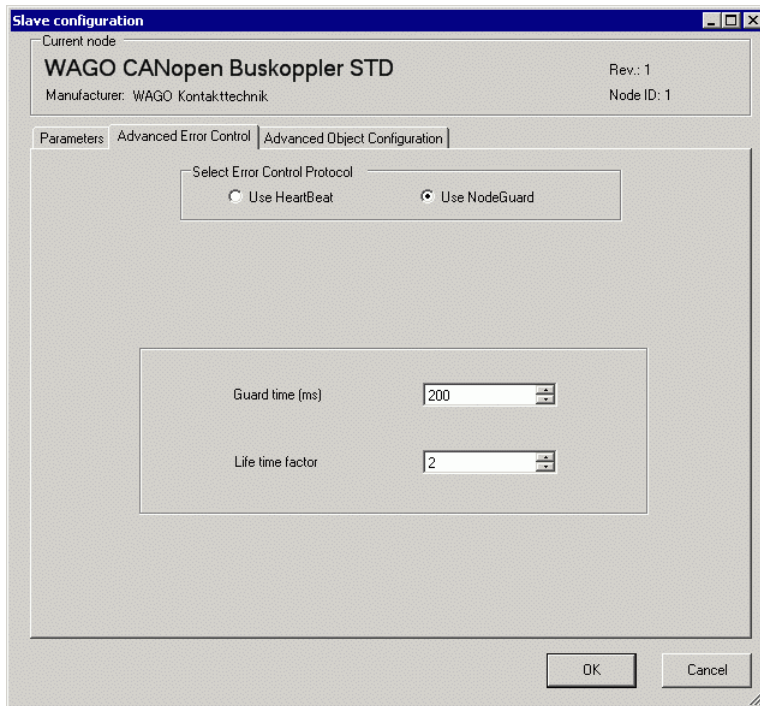
| Setting   |                             | Description   |               |           |           |                     |   |                |   |        |   |                   |   |              |   |             |
|---|-----------------------------|---|---------------|-----------|-----------|---------------------|---|----------------|---|--------|---|-------------------|---|--------------|---|-------------|
| Settings  | When the object is selected | <p>The information of PDO that has been set is reflected for the following objects:</p> <table border="1"> <thead> <tr> <th>Object number</th> <th>SubIndex</th> <th>Item Name</th> </tr> </thead> <tbody> <tr> <td rowspan="5">0x1800 + PDO number</td> <td>0</td> <td>Number of TPDO</td> </tr> <tr> <td>1</td> <td>COB ID</td> </tr> <tr> <td>2</td> <td>Transmission Type</td> </tr> <tr> <td>3</td> <td>Inhibit Time</td> </tr> <tr> <td>5</td> <td>Event Timer</td> </tr> </tbody> </table> | Object number | SubIndex  | Item Name | 0x1800 + PDO number | 0 | Number of TPDO | 1 | COB ID | 2 | Transmission Type | 3 | Inhibit Time | 5 | Event Timer |
|   |                             | Object number   | SubIndex      | Item Name |           |                     |   |                |   |        |   |                   |   |              |   |             |
| 0x1800 + PDO number   | 0                           | Number of TPDO  |               |           |           |                     |   |                |   |        |   |                   |   |              |   |             |
|   | 1                           | COB ID  |               |           |           |                     |   |                |   |        |   |                   |   |              |   |             |
|   | 2                           | Transmission Type   |               |           |           |                     |   |                |   |        |   |                   |   |              |   |             |
|   | 3                           | Inhibit Time  |               |           |           |                     |   |                |   |        |   |                   |   |              |   |             |
|   | 5                           | Event Timer   |               |           |           |                     |   |                |   |        |   |                   |   |              |   |             |
| <p>Configure how to work with the mapped object. Display on I/O Screen varies depending on the type set here.</p> <p>☞ "30.7.3 Allocating I/O ■ I/O Screen Display" (page 30-156)</p> <ul style="list-style-type: none"> <li>• Type<br/>Select from "Bit", "Byte", "Word" and "Dword" (Double Word).</li> <li>• Data Type<br/>Data type of the selected object displays.</li> </ul> <div data-bbox="769 780 943 1058" style="border: 1px solid gray; padding: 5px; margin: 10px auto; width: fit-content;"> <p>Setting</p> <p>Data representation<br/> <input type="text" value="Byte"/></p> <p>Object data type<br/> <input type="text" value="Unsigned8"/></p> </div> |                             |   |               |           |           |                     |   |                |   |        |   |                   |   |              |   |             |

- Advanced Error Control (when heartbeat is selected)



| Setting                 | Description   |
|-------------------------|---|
| Producer Heartbeat Time | Set the transmission cycle of heartbeat. Unit is in milliseconds (ms). The value can be from 50 to 21844. It is stored in the object 1017h on slave side. |
| ID                      | Displays Node ID of CANopen master.   |
| Product Name            | Displays the product name of CANopen master.  |
| Alias                   | Displays alias of CANopen master.   |
| Consumer Heartbeat      | Consumer heartbeat of CANopen master displays. Stored in the object 1016h on master side.   |

- Advanced Error Control (when no guard is selected)



| Setting          | Description  |
|------------------|--|
| Guard Time       | When NMT master polls the slaves, sets up the frequency for when slaves receive polling requests. Unit is in milliseconds (ms). The set up range is 0, or 50 to 32767. Heartbeat is used when set to zero. It is stored in object 100Ch.                                 |
| Life time factor | Set the time to monitor errors when NMT master polls the slaves. An error occurs if it is not polled when the time which is the value set in [Guard Time] multiplied by the value set here has passed. The set up range is 0, or 2 to 255. It is stored in object 100Dh. |

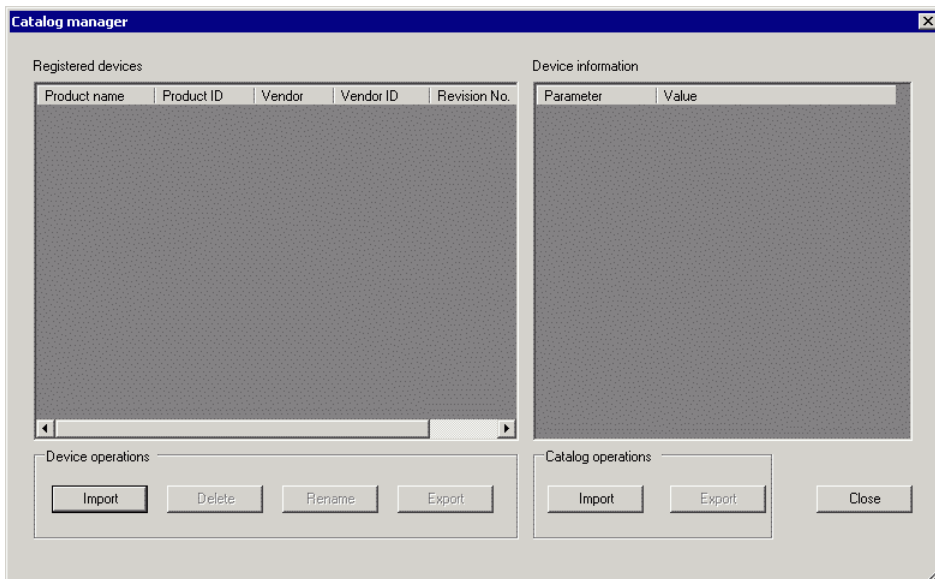
- Extended

You can change the values of read-write and write-only objects for access method. The values you can change are objects that are writable and not grayed out. The values set here are written in the objects on slave side on startup.

Detail settings are the same as those of [Advanced Object Configuration] tab in [Master Configuration] dialog box.

☞ 30.7.6 [I/O Driver] Settings Guide ◆ Master Configuration Dialog Box •Advanced Object Configuration 30-176

## ■ Catalog Manager Dialog Box



| Setting            | Description  |
|--------------------|--|
| Registered Devices | Displays a list of the registered slaves<br>In order to register a slave, import the EDS file using [Import] in the [Device] section.  |
| Product Name       | Displays the product name of the slave.  |
| Product Code       | Displays the product code of the slave.  |
| Vendor Name        | Displays the vendor name of slave.   |
| Vendor ID          | Displays the vendor ID of slave.   |
| Revision           | Displays the revision number for EDS file of the slave.  |
| Key                | Displays the device registration key of the slave.<br>The device registration key will be the name of the EDS file without extension.  |
| Device             | Slave can be registered or deleted.<br><b>NOTE</b><br><ul style="list-style-type: none"> <li>In order to edit/transfer the project file (PRX) in the environment other than the PC where the file is created, you need to import the device information (EDS file) again.</li> </ul> |
| Import             | Imports an EDS file to register a slave.   |
| Delete             | Deletes the EDS file specified in [Registered Devices] to delete the registered slave. Note that the device that is currently used in the open project cannot be deleted.  |
| Change Key         | Changes [Key].   |
| Export             | Exports an EDS file.   |

Continued



| Setting | Description  |
|---------|--|
| Catalog | <p>In order to edit/transfer the project file (PRX) in the environment other than the PC where the file is created, you need to import the device information for each slave again.</p> <p>You can collectively import/export device information of multiple slaves.</p> |
| Import  | Imports a CAT file in which device information of multiple slaves is contained.  |
| Export  | Exports device information of multiple slaves as a CAT file.   |

### 30.7.7 Error information

The system variable #L\_IOStatus stores error information in the bottom 8 bits.

#L\_IOStatus

|   |                    |   |   |   |   |   |   |            |
|---|--------------------|---|---|---|---|---|---|------------|
| H | Reserved (0 Fixed) |   |   |   |   |   |   |            |
| L | Major Fault        | 0 | 0 | 0 | 0 | 0 | 0 | Error Code |

Major Fault

"1" is set when it detects a malfunction that needs to stop the logic.

## ■ Error code

|                            | Error Code | Error Message                           | Description   |                      | Solution  |  |
|----------------------------|------------|---|---|----------------------|---|--|
| Project data related error | 000        | No error                                | —   | Initialization error | —   |  |
|                            | 001        | Illegal Instruction(s)                  | I/O Driver Instruction Error  |                      | Check the set value of operand for I/O Driver Instructions and re-transfer the project. |  |
|                            | 002        | Too many instructions                   | Number of used I/O Driver Instructions is greater than 16                                 |                      | Check the number of used I/O Driver Instructions and re-transfer the project.           |  |
|                            | 003        | Driver ID error                         | The driver/unit results in an error while registering, and they have not been registered. |                      | The project file might not have been sent properly. Transfer the project file again.    |  |
|                            | 004        | Repeat driver setting                   | The driver is registered twice.   |                      |   |  |
|                            | 005        | Setting level value error               | The driver is not correct.  |                      |   |  |
|                            | 006        | Data obtaining address error            | The driver information is in correct. The controller information is not correct.          |                      |   |  |
|                            | 007        | Driver not registered                   | Driver is not registered  |                      |   |  |
|                            | 008        | PDO Settings Error Initialization error | PDO Settings Error Initialization error   |                      |   | Confirm PDO Settings and re-transfer the project.                                    |
|                            | 009        | Invalid terminal type                   | Invalid terminal type   |                      |   | The project file might not have been sent properly. Transfer the project file again. |
|                            | 010        | Concise DCF not found                   | There is no concise DCF   |                      |   |  |
|                            | 011        | Invalid Concise DCF                     | Invalid concise DCF   |                      |   |  |
|                            | 012        | F/W File Read Error                     | Invalid firmware  |                      |   |  |
|                            | 013        | Inappropriate firmware                  | Failure in downloading set value  |                      | Reset AGP. If the problem is unresolved, please contact your support center.            |  |

Continued

|                            | <b>Error Code</b> | <b>Error Message</b>              | <b>Description</b>                      |                      | <b>Solution</b>   |
|----------------------------|-------------------|-----------------------------------|---|----------------------|---|
| Project date related error | 014               | Setting value error               | Error code is 0 when error flag is set  | Initialization error | Reset AGP. If the problem is unresolved, please contact your support center.  |
| H/W related error          | 050               | I/O board ID different            | The connected I/O board is not correct. | Hardware error       | Display type may be different.<br>Confirm the display type and transfer the project file again.   |
|                            | 051               | CANopen unit initialization error | The I/O board initialization fails.     |                      | The project file might not have been sent properly.<br>Transfer the project file again.<br>If the problem is still not solved, there may be a problem with the hardware. Contact your support center. |

Continued

|                           | Error Code | Error Message                                     | Description  |                    | Solution   |
|---------------------------|------------|---|--|--------------------|--|
| Application related error | 100        | Fatal error: Bus off                              | Bus failure (such as noise failure), hardware failure, abnormal baud rate settings, etc. | Fatal master error | Confirm the connection state of the communication cable and check the baud rate settings of all the slaves to re-transfer the project.<br>If the problem is still not solved, there may be a problem with the hardware. Contact your support center. |
|                           | 101        | Fatal error: high priority receive queue overrun  | Excessive amount of received data such as PDO, NMT, and SYNC.                            |                    | Review the network settings by decreasing PDO.   |
|                           | 102        | Fatal error: high priority transmit queue overrun | Excessive amount of sending data such as PDO, NMT and SYNC.                              |                    | Review the network settings by increasing node guard intervals.  |
|                           | 103        | Fatal error: low priority receive queue overrun   | Excessive amount of receiving data such as heartbeat, node guard, and SDO.               |                    |  |
|                           | 104        | Fatal error: low priority transmit queue overrun  | Excessive amount of transmitting data such as heartbeat, node guard, and SDO.            |                    | Review the network settings by decreasing PDO and SDO.   |
|                           | 105        | Fatal error: CAN controller overrun               | Data loss due to excessive amount of data such as PDO and SDO.                           |                    | Confirm whether node ID is duplicated and re-transfer the project.   |
|                           | 106        | Fatal error: duplicate node ID detected           | More than two identical node IDs are used.   |                    | Review the slave configuration.  |
|                           | 107        | Unsupported slave error                           | Unsupported slave exists   |                    |  |

Continued

|                           | Error Code | Error Message                    | Description   |                    | Solution  |
|---------------------------|------------|----------------------------------|---|--------------------|---|
| Application related error | 108        | Fatal error: invalid Concise DCF | Network configuration is wrong  | Fatal master error | Please download concise DCF again. If the problem is unresolved, check all the EDS files and review the network settings.                                       |
|                           | 109        | Mandatory slave error            | Concise DCF file of the mandatory slave is invalid  |                    | Check the EDS file and confirm whether it matches the hardware configuration.   |
|                           | 110        | Master fatal error               | Fatal error has occurred in CANopen master.   |                    | Reset the display.  |
|                           | 111        | Invalid value in instruction     | An I/O driver instruction has run with an operand value that is out of range.   | Runtime error      | Please run each I/O driver with values inside specified ranges.   |
|                           | 112        | No mandatory slave               | There is a problem with the defined mandatory slave.  |                    | Confirm whether the mandatory slave is correctly connected and that the power is on.  |
|                           | 120        | SDO communication error          | Slave object information specified in SDO communication is invalid, or communication partner is unavailable for communication. *Excluding error codes 140 to 148. |                    | Confirm whether the specified information of the SDO communication is correct. If correct, confirm the communication state of the network or reset the network. |
|                           | 121        | CANopen module timeout (Input)   | I/O firmware is not updating input data.  |                    | I/O firmware is not operating properly. Reset the display.  |
|                           | 122        | CANopen module timeout (Output)  | I/O firmware does not update output data.   |                    |   |
|                           | 123        | CANopen module interface is busy | I/O firmware is not running SDO communication.  |                    |   |

Continued

|                           | <b>Error Code</b> | <b>Error Message</b>     | <b>Description</b>  |                | <b>Solution</b>   |
|---------------------------|-------------------|--------------------------|---|----------------|---|
| Application related error | 130               | Incorrect PDO received   | Invalid size for the received PDO   | Nonfatal error | Confirm the EDS file.   |
|                           | 131               | SDO queue overrun        | Excessive SDO communication data size   |                | Make SDO communication data size smaller.   |
|                           | 132               | Master alone             | Slave does not exist  |                | Confirm whether slave is correctly connected and that the power is on.  |
|                           | 140               | SDO protocol error       | SDO server (slave) protocol error   |                | Check the abort code. Check the object dictionary of the slave.   |
|                           | 141               | SDO send overflow        | Overflow of sending queue with low priority (see error 104)                         |                | See error 104. Fatal error: Overrun of receiving queue with low priority  |
|                           | 142               | SDO master setting error | AGP is not set as a CANopen master. Therefore, SDO sending is not performed.        |                | Please check the network settings. Check the network status from the offline menu. Reset AGP.   |
|                           | 143               | SDO access error         | Object specified with the SDO instruction is accessed with another service via SDO. |                | Check whether only AGP is CANopen master through the network. (multiple masters are not supported.) Check whether only one SDO instruction is executed at the same time.          |
|                           | 144               | SDO receive timeout      | SDO request is not responded to within the SDO timeout period.                      |                | Check the abort code. Check whether the node ID exists in the network. Check whether the object exists in the object dictionary of the slave. Check whether the sub index exists. |

Continued

|                           | Error Code                                      | Error Message   | Description   |  | Solution   |
|---------------------------|---|---|---|--|--|
| Application related error | 145   | SDO operand error                                       | SDO instruction parameter error   | Nonfatal error   | Check the abort code. Check the parameter of the SDO instruction. Check whether the object is read-only or write-only.                                     |
|                           | 146   | SDO master status error                                 | SDO transmission cannot be performed due to the status of AGP   |  | Check the status of AGP with DGMT instruction or offline menu.   |
|                           | 147   | SDO master status stopped                               | SDO sending cannot be performed because AGP is in the STOP mode or changed to the STOP mode during SDO transmission |  | Change the AGP to RUN mode.  |
|                           | 148   | SDO abort error   | SDO transmission was aborted by the SDO server (slave)  |  | Check the abort code. Check the status of the slave.   |
|                           | 150   | Identity error  | The set slave is different from the connected slave.  | Slave error  | Check the EDS file and network settings to ensure that the node and EDS file are correct. You can find the node ID of the slave using an offline function. |
|                           | 151   | Optional slave error                                    | Incorrect configuration of the optional slave   |  | Confirm slave configuration in the network settings and re-transfer the project.   |
|                           | 152   | Unexpected state for one or more mandatory slaves       | Mismatched state of the Mandatory slave and that of the network   |  |  |
|                           | 153   | Abnormal Slave  | Abnormal Slave  |  |  |
| 154                       | Inconsistent Concise DCF for one or more slaves | CDCF is mismatched with the object dictionary of slave. |   | The project file might not have been sent properly. Transfer the project file again. |  |

Continued



|                           | <b>Error Code</b> | <b>Error Message</b>                        | <b>Description</b>   |             | <b>Solution</b>  |
|---------------------------|-------------------|---|--|-------------|--|
| Application related error | 155               | Concise DCF mismatch for one or more slaves | Slave configuration and the object directory are mismatched. | Slave error | Check whether correct EDS file is used. Using an offline function, you can find node ID of slave.  |
|                           | 156               | Identity error for one or more slaves       | One or multiple set slaves do not match the connected slave. |             | Check the EDS file and network settings to ensure that the node and EDS file are correct. You can find the node ID of the slave using an offline function. |

### 30.7.8 Restrictions

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- If a project with a different I/O Driver version is transferred, it takes time to start the GP.
- If there are many PDO data, the number of processes executing the logic increases, so scanning may take longer than the set scan time.
- Depending on the I/O driver settings, when the CANopen communication cable is disconnected, the CANopen network is reset upon restoration.
- The number of I/O bit points you can set up is 512 (input bits: 256 points, output bits: 256 points). The number of I/O integer points you can set up is 128 (input integer: 64 points, output integer: 64 points).
- Please do not set values outside the valid range. Even if you set up a value outside the range, an error may not display.
- If you open the network setup dialog box, despite not making any changes, a save project message may display when you close the project.
- After mapping I/O, deleting objects, disabling PDO, or deleting the slave will not cancel the I/O mapping.
- When using the CANopen driver, the undo operation is not available in the associated I/O screen or I/O driver settings.
- While the LT unit is powered ON, such as when it is running, do not install or remove the LT unit to/from the CANopen unit.