WAGO-I/O-SYSTEM 750

Connection Procedure of WAGO CANopen 750-337 Bus Coupler and Pro-face display units supporting CANopen master

Instruction Manual

Version 1.2 (2017.09.15)

WAGO® INNOVATIVE CONNECTIONS

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as error can never be fully excluded, we would appreciate any information or ideas at any time.

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally trademark or patent protected.

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1 Devices in use

This manual refers to the structure using the following devices and equipments.

- WAGO CANopen Bus Coupler 750-337 and the following I/O modules
  - 750-337: CANopen Bus Coupler
  - 750-430: 8-Channel Digital Input Module
  - 750-530: 8-Channel Digital Output Module
  - 750-600: End Module
- Pro-face AGP3400-T1-D24-CA1M
- Pro-face GP-Pro EX version 4.07.200
- Pro-face USB transfer cable CA3-USBCB-01 (for transfer of screen data)

2 Installation of GP-Pro EX version 4.07.200

1) Insert the GP-Pro EX installation DVD into the PC, and the SET UP MENU window will appear.
2) Select “GP-Pro EX”, and the Microsoft .NET Framework 2.0 set up window will appear. Follow the Wizard to install Microsoft .NET Framework 2.0.
3) The GP-Pro EX 4.07.200-InstallShield Wizard window will appear. Follow the direction.
   - Enter the Serial Number (11 digits) on the Customer Information window.
   - Enter the Key-Code.
   - Follow the direction of the Wizard to install.

3 Creation of screens/programs

1) When you start up GP-Pro EX, the [Welcome to GP-Pro EX] window will appear. Select [New].
2) In the [Display Unit] setting screen, set the [Series] to GP-34**Series and the [Model] to AGP-3400T-CA1M.
3) In the [Device/PLC] setting screen, click [New Logic] or [New Screen].
4) Create screens and/or a logic program.

[Note]

When using LT3000 series, LT4000 series, SP5000 series Power Box, the [Internal I/O] screen appears after the [Device/PLC] screen. Select the [CAN open Driver] on the pull-down menu.

4 Flow of CANopen setting with the software

4.1 Displaying the I/O Driver setting screen

1) Select the [View] menu -> [Work Space] -> [Project Window].
2) In the [Project Window] window, click [I/O Driver] in the Peripheral Settings area, and the [I/O Driver] screen will be shown.

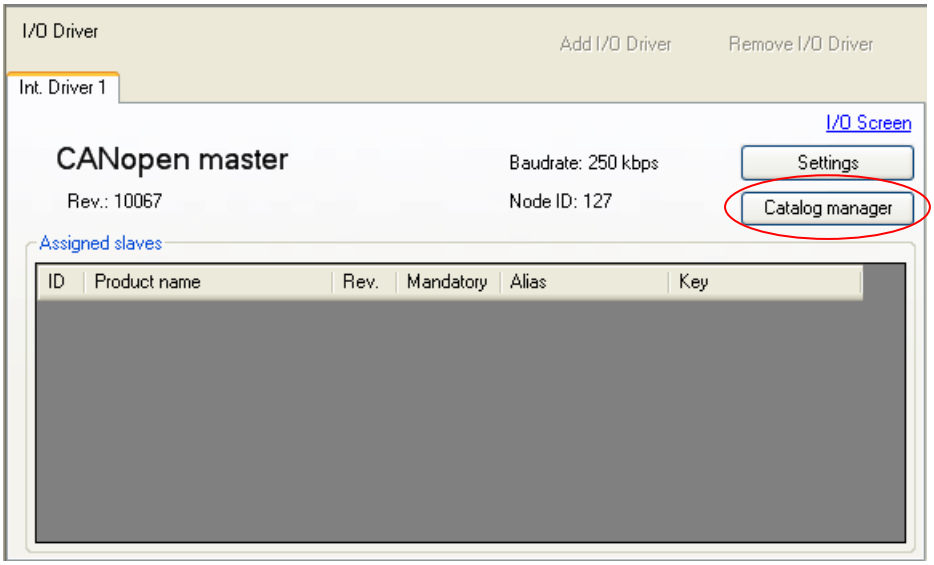
[Note]

- When using LT3000 series and SP5000 series Power Box, click the [External Driver 1] tab.
- When using LT4000 series, click the [Int. Driver 2] tab.

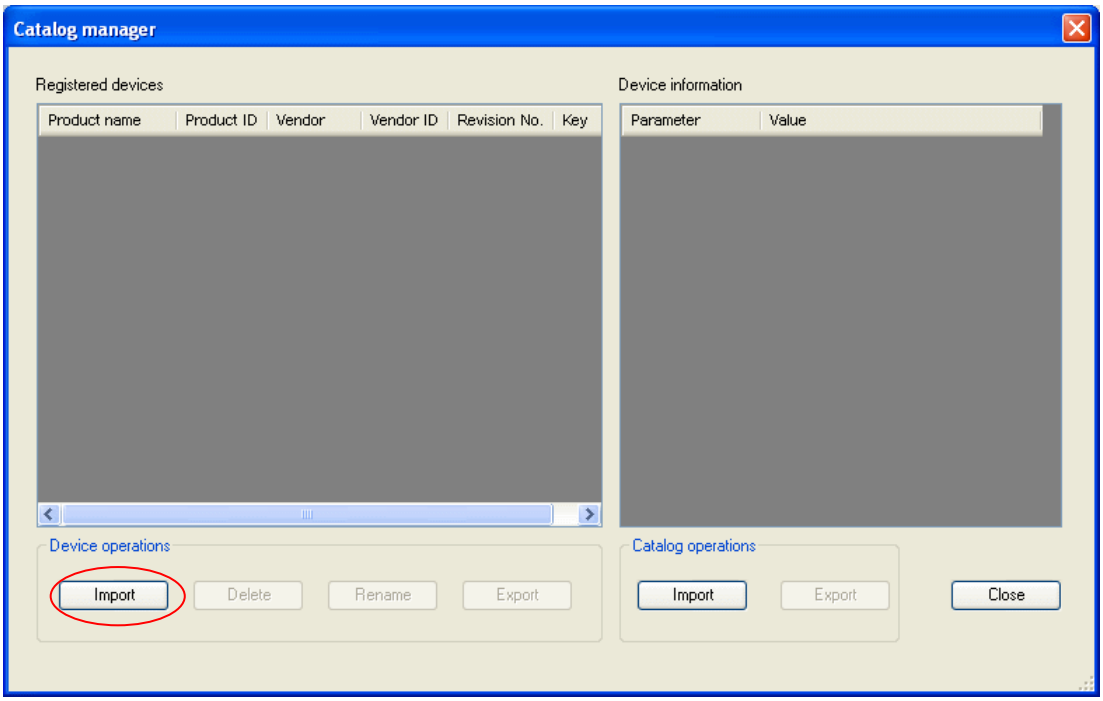
4.2 Importing an EDS file

This section shows the procedure to import an EDS file of a WAGO 750-337 slave.

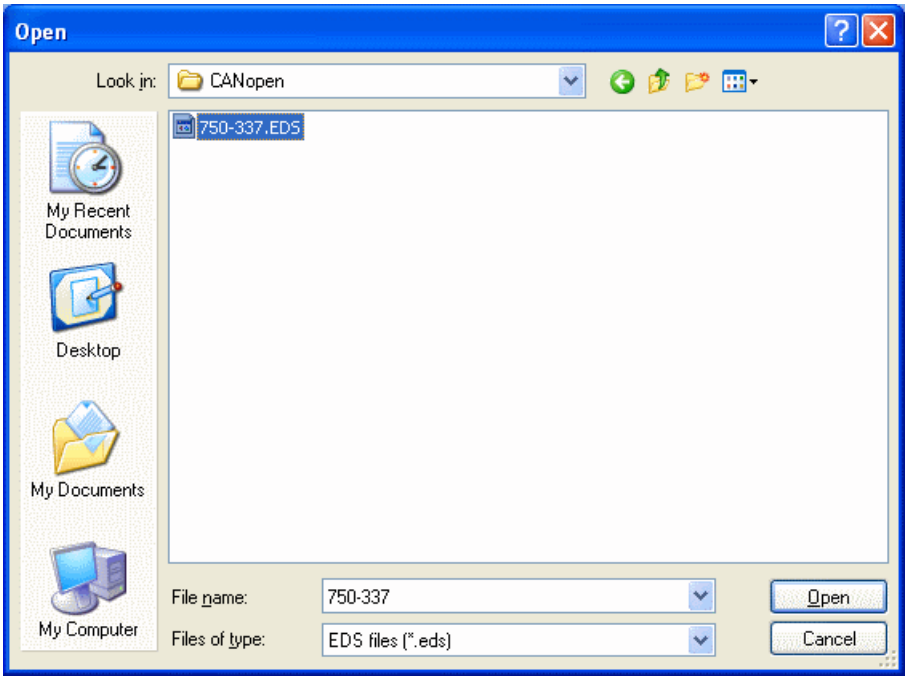
1) In the [I/O Driver] screen, click [Catalog manager].



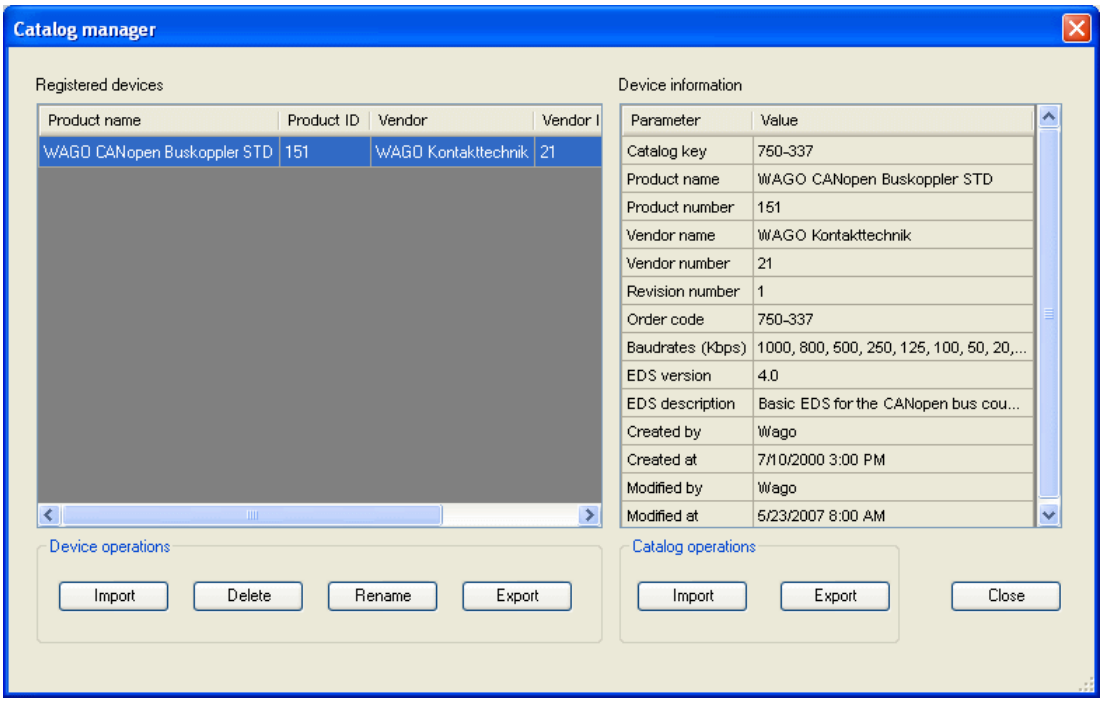
2) Click [Import].



3) The [Open] dialog box will appear. Specify the 750-337.EDS file in the save-in location. Click [Open], and the file will be registered into the [Catalog manager].

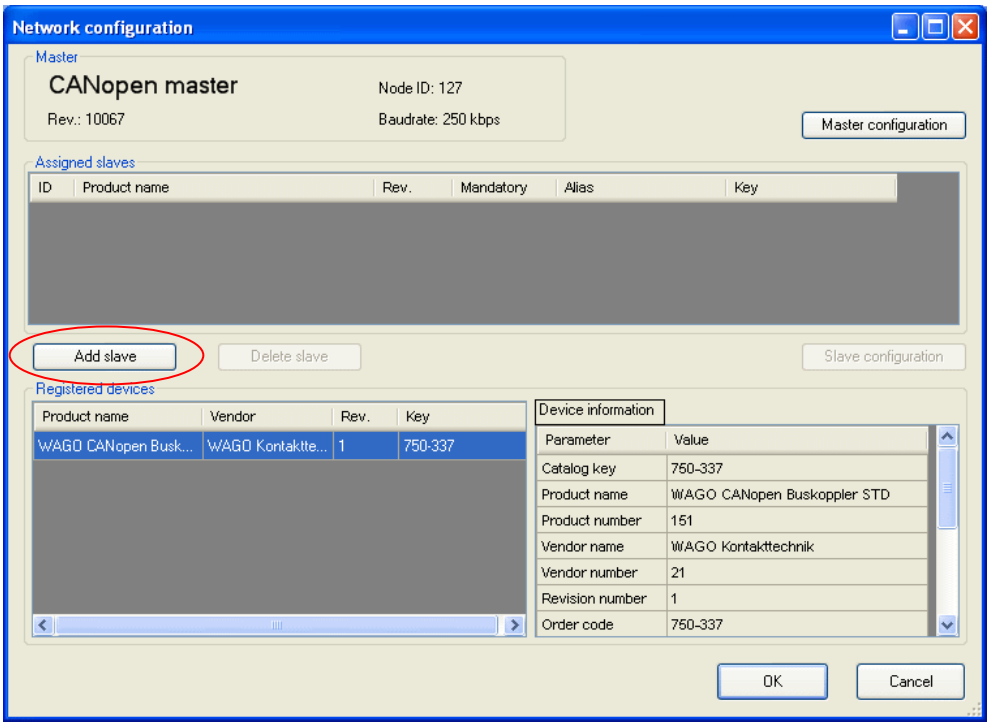


4) Click [Close].



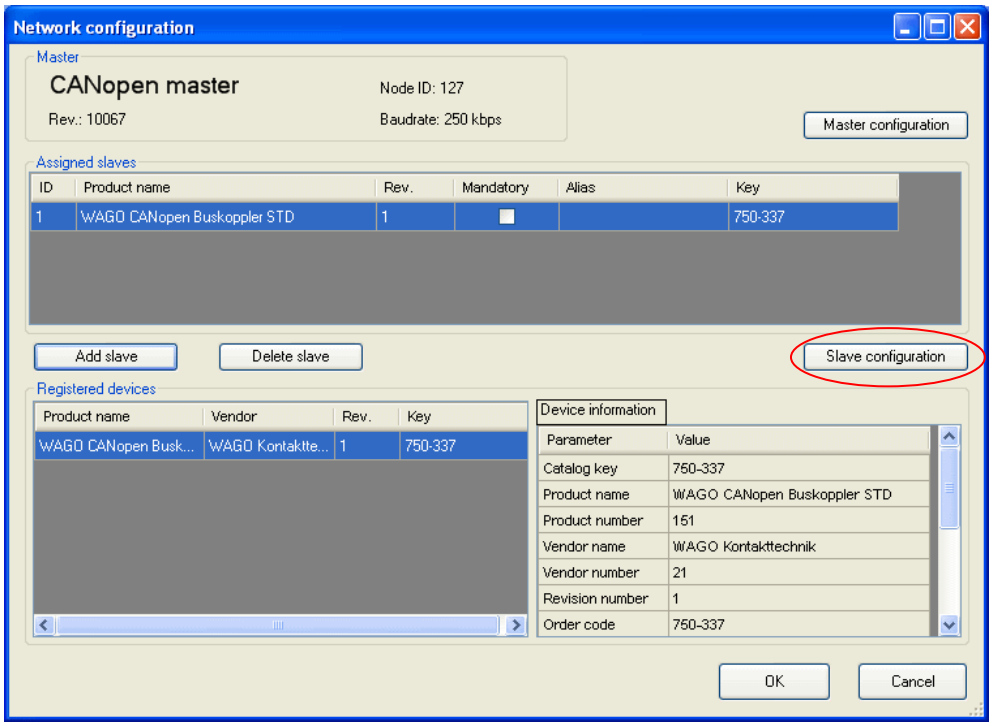
4.3 Adding a slave

1) In the [I/O Driver] screen, click [Settings], and the [Network configuration] window will appear.
2) Select the item whose Key is 750-337 from the [Registered devices] list and click [Add slave], and "WAGO 750-337" will be added in the [Assigned slaves] list.



4.4 Slave configuration

- Click [Slave configuration].



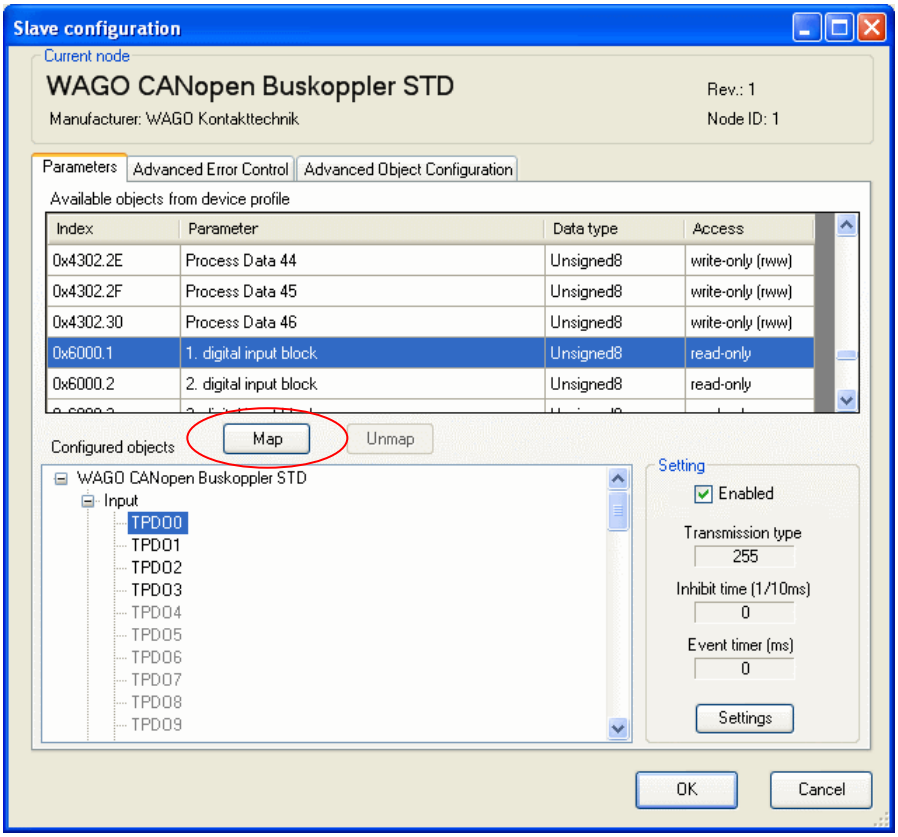
- The [Slave configuration] dialog box will appear.

4.4.1 PDO: Mapping input and output

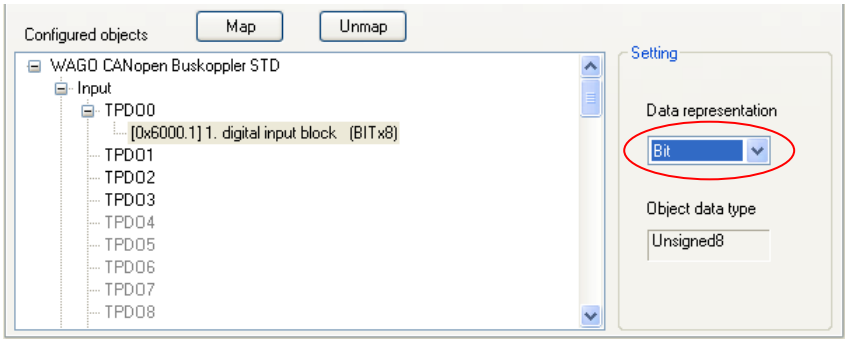
Set PDOs (Process Data Objects), as continuous communication data.

For WAGO 750-337, the standard inputs, which are digital inputs, start from “0x6000” and the standard outputs, which are digital outputs, from 0x6200.

1) As an example of inputs, select “Index = 0x6000.1” from the list of the [Available objects from device profile] in the [Parameters] tab.
2) If you select “TPDO0” in the [Configured objects], the [Map] button will be enabled.

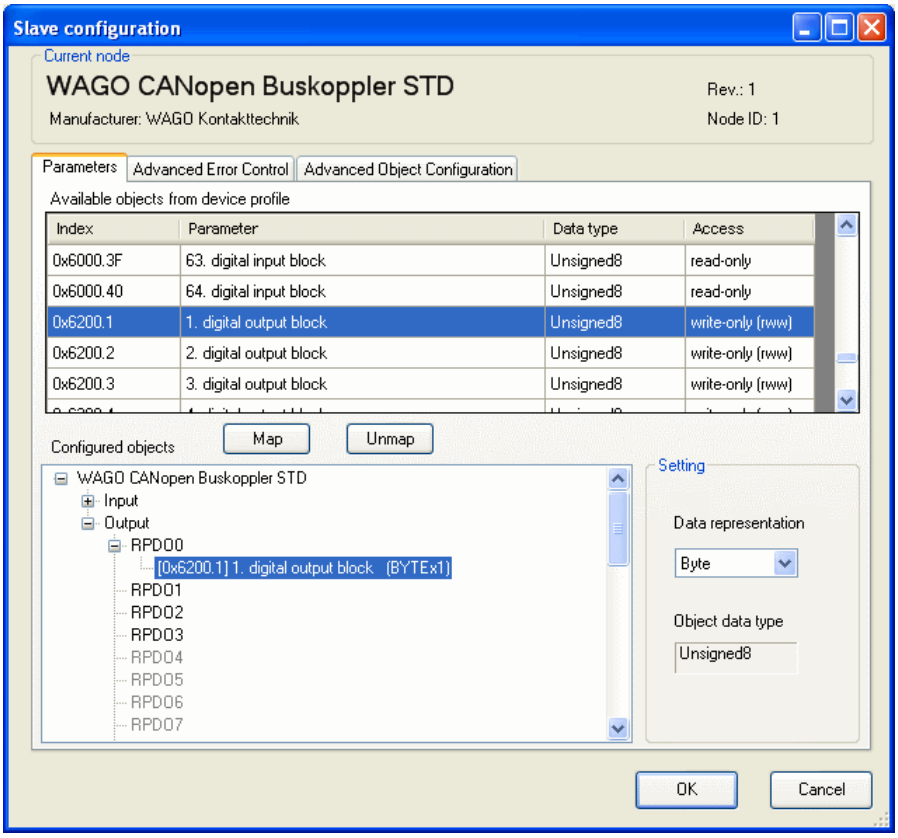


3) Click [Map], and “[0x6000.1] 1.digital input block” will be appended under “TPDO0”.
4) Set the [Data representation] in the [Setting] area to “Bit”.



5) As an example of outputs, select “Index = 0x6200.1” from the list of the [Available objects from device profile” on the [Parameters] tab.

6) Select “RPDO0” in the [Configured objects] and click [Map], and “[0x6200.1] 1.digital output block” will be appended under “RPDO0”.



7) Set the [Data representation] in the [Setting] area to “Bit” and click [OK].

Then click [OK] in the [Network configuration] window, and it will be close and the [I/O Driver] screen will be shown.

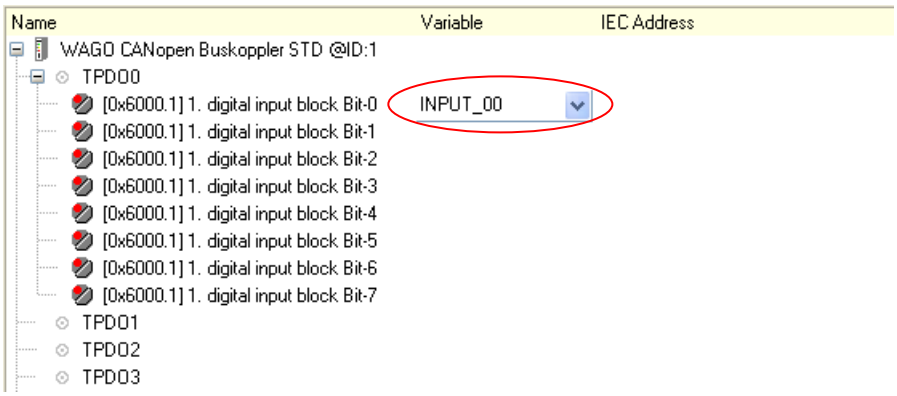
4.4.2 Allocating I/O variables to the I/O tree

Allocate I/O variables after the PDO settings (mapping).

1) Click [I/O Screen] in the [I/O Driver] screen.

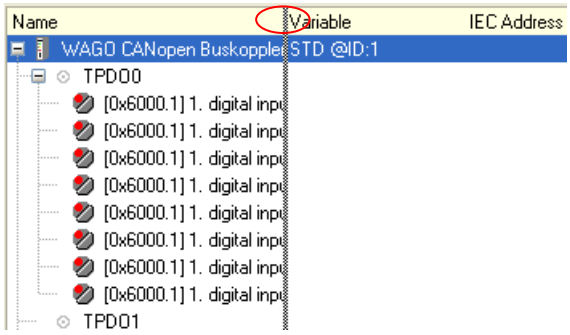
2) The [WAGO CANopen Buskoppler STD] tree will be shown. As an example, allocate variables to four lower bits of 8-channel inputs.

   Set the variables from “INPUT_00” to “INPUT_03” for the items from “Bit-0” to “Bit-3”, which are under “TPDO0”. To set a variable, double click the corresponding variable field and enter the variable.

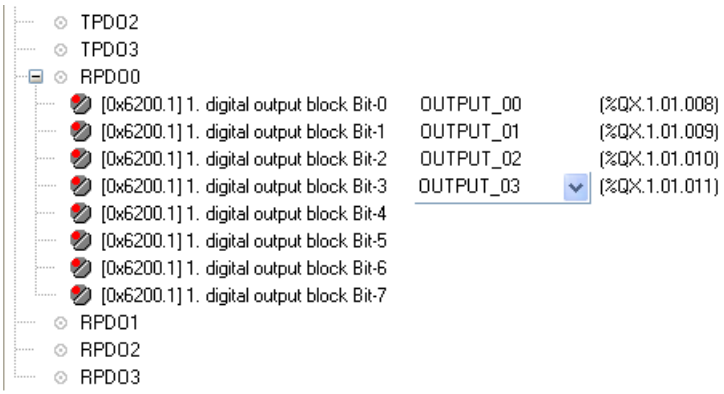


[MEMO]

* By pointing the cursor on the red marked area and dragging, you can change the column width.



3) In the same way, set the variables from “OUTPUT_00” to “OUTPUT_03” for the items from “Bit-0” to “Bit-3”, which are under “RPDO0”.



4) Click [CANopen Driver] to return to the [I/O Driver] screen.

4.5 Master configuration

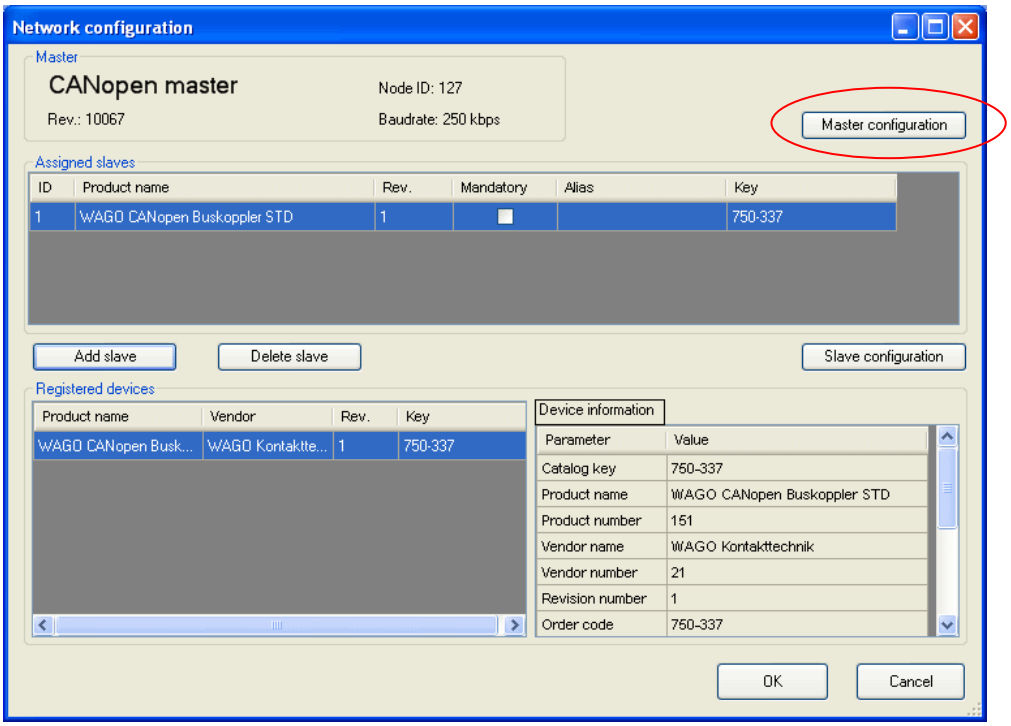
- In the [I/O Driver] screen, click [Settings].

4.5.1 Setting a baud rate

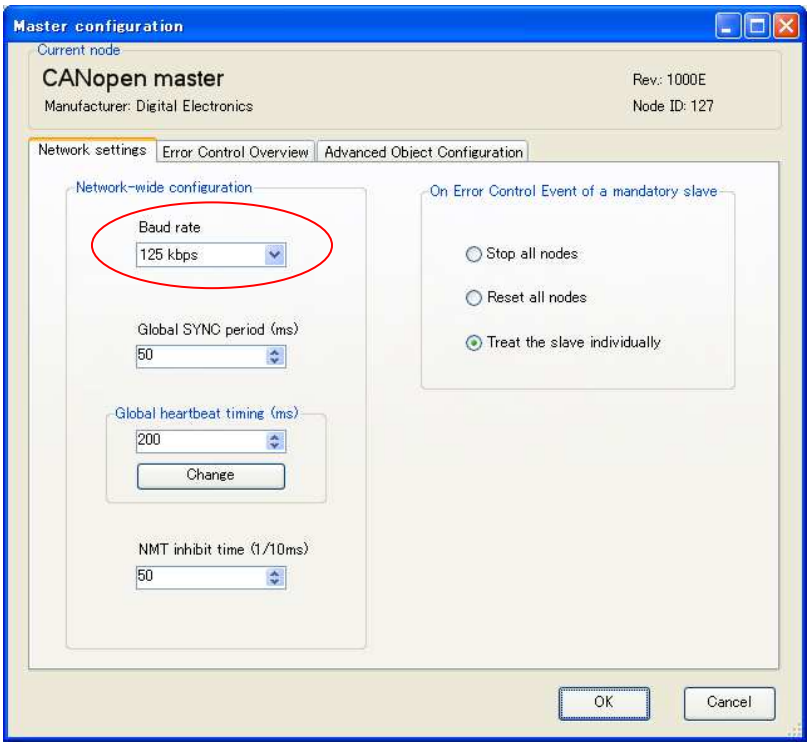
In the Master configuration, you can make a baud rate settings.

Baud rate settings on a slave unit can be made with the DIP switches on it.

1) In the [Network configuration] window, click [Master configuration].



2) In the [Master configuration] dialog box, specify the [Baud rate].



[Note]

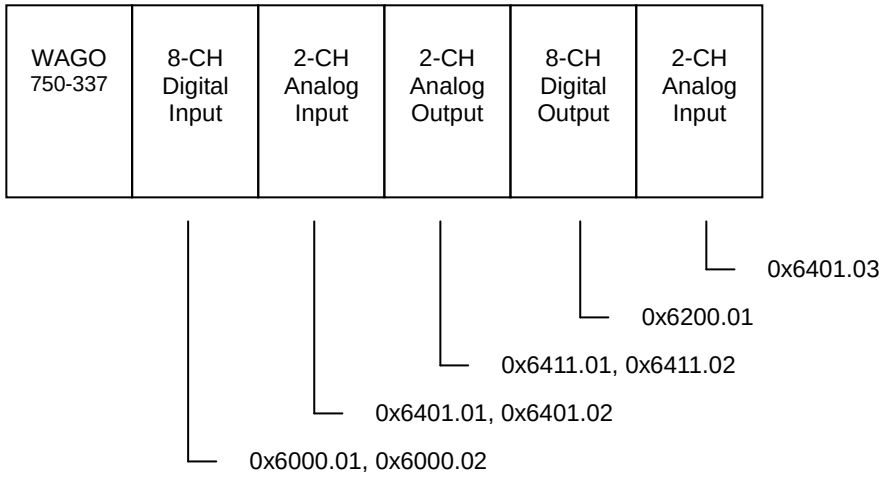
When LT4000 series is used, the baud rate cannot be set to 500kbps and 1000kbps.

5 Relation between objects and I/O module

The relation between objects and I/O modules is as follows. Please refer to the Modular I/O System CANopen 750-337 Manual for the details. The values in parentheses are ones in the manufacturer area; for example, 0x6000 and 0x2000 are the same value.

0x6000	Digital input	(0x2000)	0x6200	Digital output	(0x2100)
0x6401	Analog input	(0x2400)	0x6411	Analog output	(0x2500)

e.g.)



* Object

Data areas of objects are identified as follows.

Commutation area	0x1000 to 0x1FFFF
Manufacturer area	0x2000 to 0x5FFF
Profile area	0x6000 to 0x9FFF

* NOTE

- As for the transmission of analog input data, CAN messages can be sent even when tiny variations of values are found. This may cause an overflow. To avoid this, the transmission of analog input data via PDOs is deactivated by default. This communication load can be inhibited by the “inhibit time” of the slave settings. Please refer to 5.2.1 Parameters (POD settings) for the details. For the transmission of analog input/output data using the object 0x6401 or 0x6411, set the object 0x6423, Analog Input Global Interrupt Enable, which is to control the transmission of analog input data using PDOs, to 1.
- For the transmission of analog input/output data using the object 0x2400 or 0x2500, the above setting is not necessary. The objects 0x2000s to 0x5000s are in the manufacture area and they do not depend on the above setting.
-

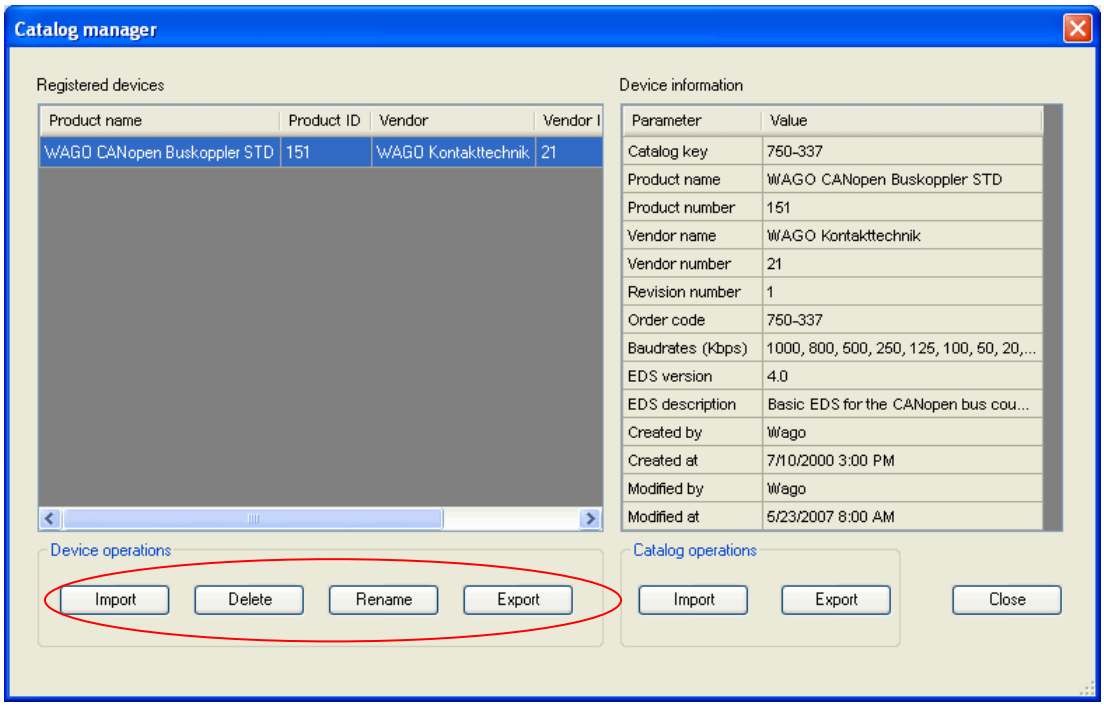
Index 0x6423:Analog Input Global Interrupt Enable

Sub Index0: = [1] The default value is set to “0”.

Details of settings with the software

5.1 Catalog manager

5.1.1 Device operations



* Import

Imports an EDS (Electronic Data Sheet) file.

The EDS file is registered in the Catalog manager of GP-Pro EX, and the contents in the EDS file is shown in the Catalog manager.

* Delete

Deletes a designated device from the catalog in GP-Pro EX.

* Rename

Allows you to rename the key of a device registered in the catalog.

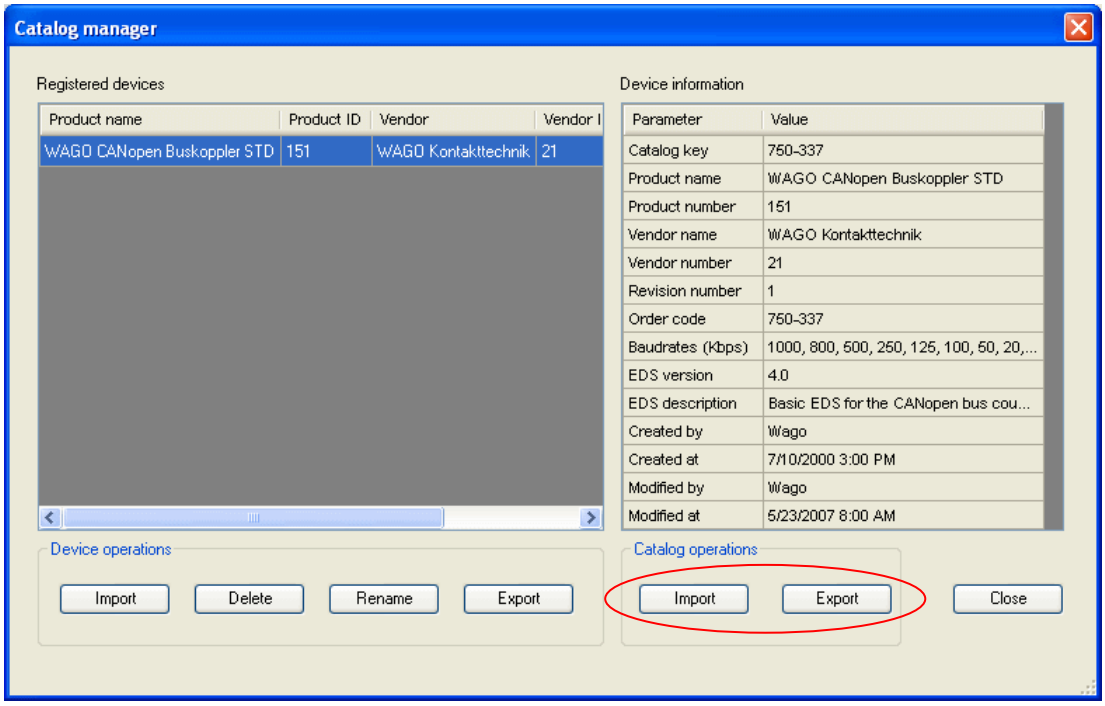
The name of the key when importing an EDS file is the EDS file name without the extension.

Up to 256 characters

* Export

Exports contents in a device registered in the catalog as an EDS file.

5.1.2 Catalog operations



* Export

Exports registered devices into one file (a catalog file; .cat).

By doing so, it will be easier to make the same environment in another PC.

* Import

Imports a catalog file.

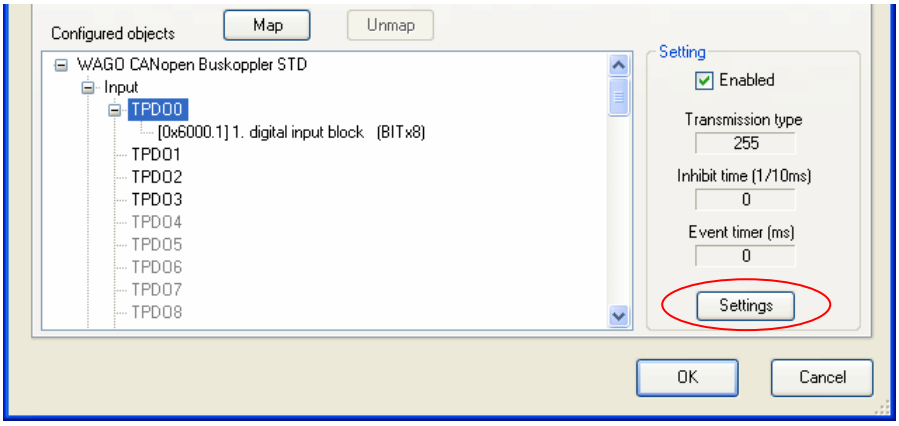
5.2 Slave configuration

5.2.1 Parameters (PDO settings)

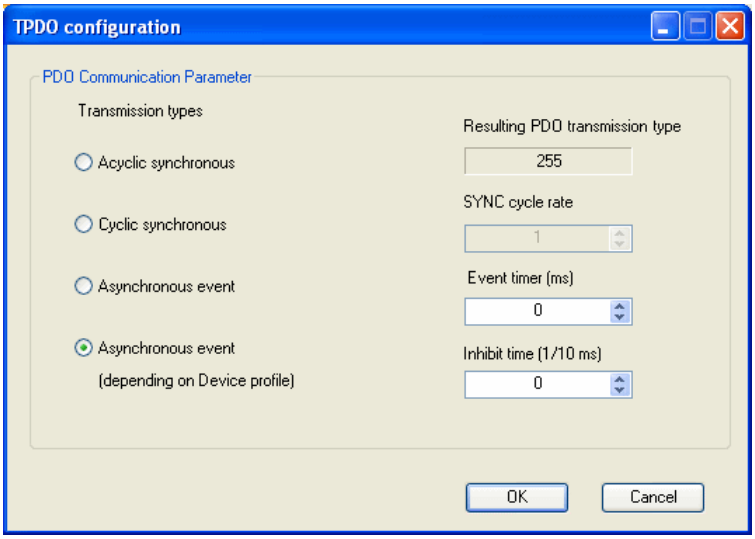
Up to 8 bytes (64 bits) of data can be assigned per PDO.

The transmission type can be set by each PDO.

- In the [Network configuration] window, click [Slave configuration]. In the [Slave configuration] dialog box, select “TPDO0” in the [Configured objects] and click [Settings].



The [TPDO configuration] dialog box will appear.



* Asynchronous event

A PDO is received immediately when an event occurs regardless of the SYNC signal.

For 254, this is defined by the manufacturer.

For 255, this is defined in the device profile.

* Acyclic synchronous / Cyclic synchronous

A PDO is sent synchronizing in synchronization with the SYNC signal flowing into the network.

For the cyclic synchronous, whose SYNC cycle rate can be set from 1 to 240, when 1 is set, a PDO is sent for every SYNC object.

When 3 is set, a PDO is sent each time that three SYNC signals flow into the network.

* Event timer, Inhibit time

The Event timer and the Inhibit time can be set when the transmission type is set to Asynchronous event.

The Event timer is the setting to send data consistently besides to send it when it changes.

The Inhibit time is the setting to inhibit increase of communication load by continuous data change.

* Identity settings

The master unit makes matching check between the device information (the contents of the imported EDS file) and the actual slave unit when communication starts.

Items to be checked are follows.

Device type

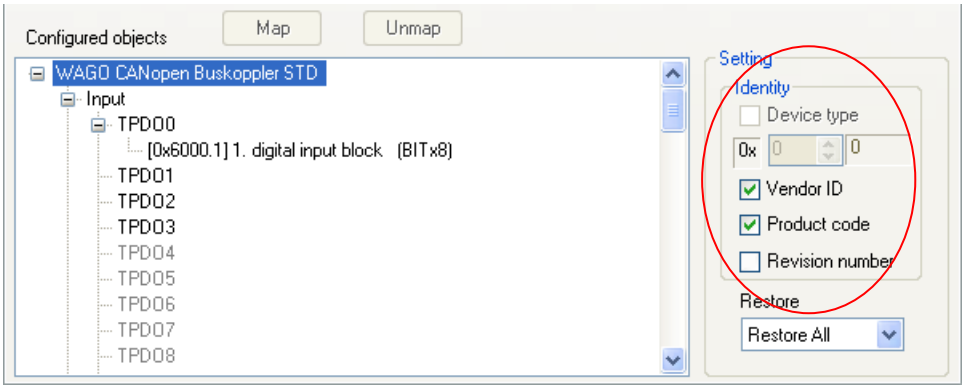
Vendor ID

Product code

Revision number

[NOTE]

Check off the [Revision number] when connecting with 750-337.



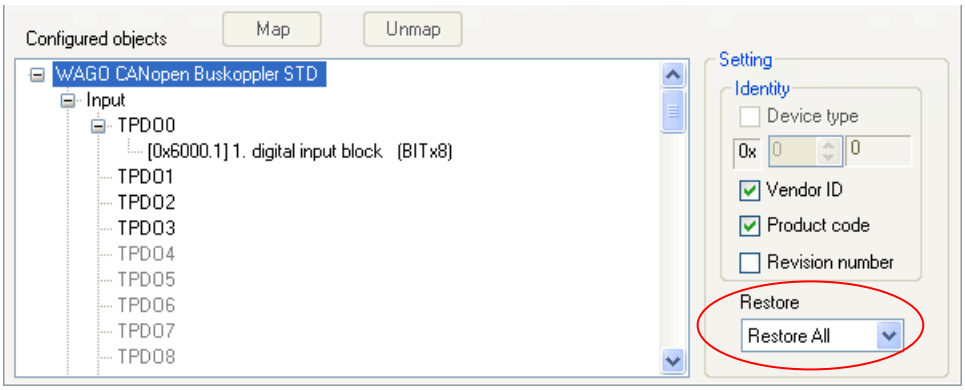
When connecting with WAGO 750-337, the Device type cannot be selected.

The imported EDS file identifies if each item is enabled or disabled.

* Restore

Set for the master unit whether or not to restore, or write, the parameters of slave units on occasions such as when a communication cable is disconnected and the system is recovered.

If you select “No restore”, the slave units can operate retaining the outputting signals.



Select from the following 3 for the parameter restoration.

- No restore: Parameters are not restored.
- Restore All (default): All parameters are restored.
- Man. 4: restore manufacturer defined default parameters

  For WAGO 750-337, “Only Comm” and “Only App” are not supported.

* NOTE

- Even if you set the object 0x6206, Error Mode Output 8-Bit, which is to retain the transmission of output data, it is set off once when recovering from a communication error.

5.2.2 Advanced error control

* HeartBeat

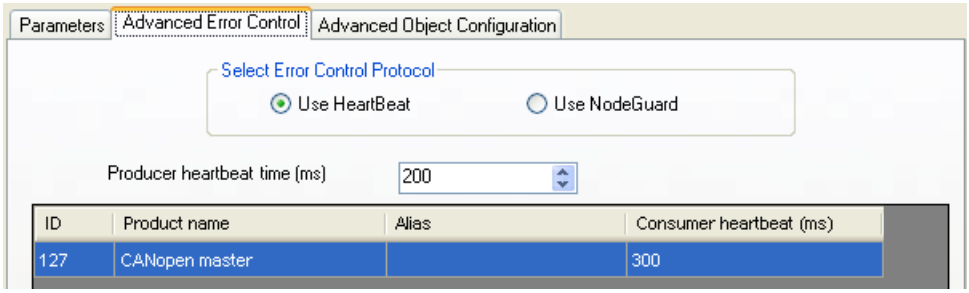
Each node (the master and slaves) sends heartbeat messages.

By monitoring (receiving) heartbeat messages, the master can check each node is active.

The producer is the one that sends messages, and the consumer is the one that receives the messages.

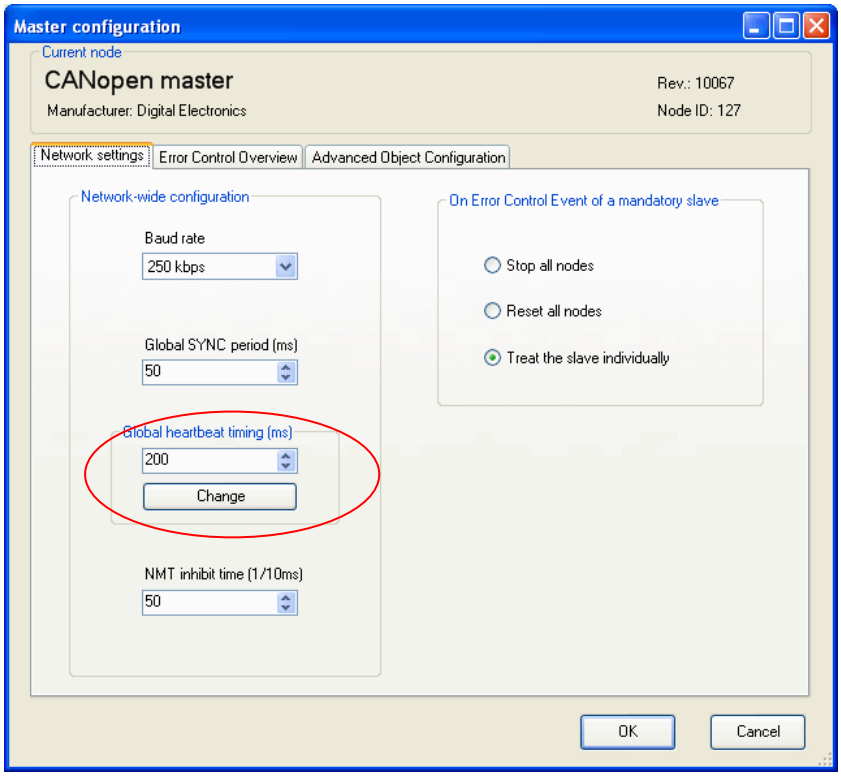
Currently, not NodeGuard but HeartBeat is recommended to use.

In the [Network configuration] window, click [Slave configuration] to set the heartbeat in the [Advanced Error Control] tab.



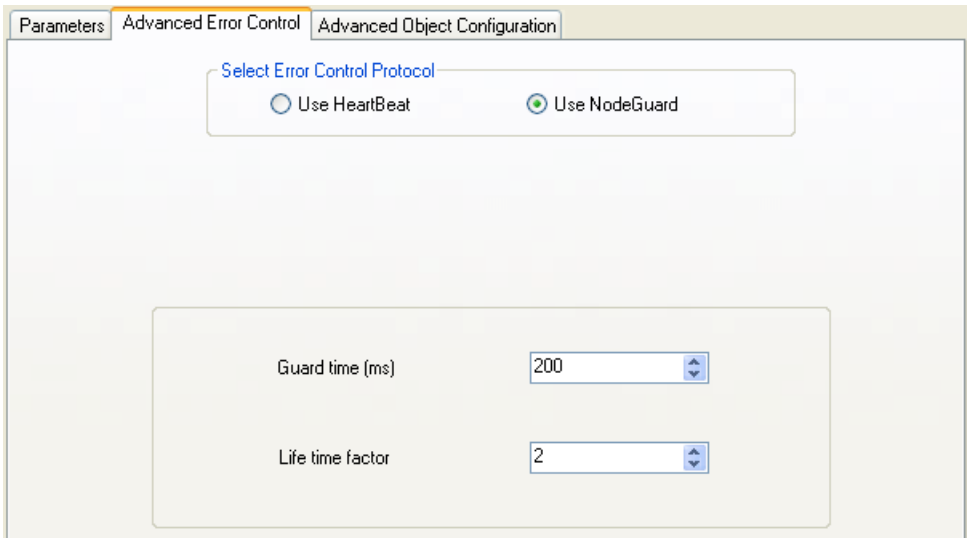
[Remark]

The heartbeat can be set in the Master configuration dialog box ordinarily. Set the [Global heartbeat timing] on the [Network settings] tab and click [Change] to apply the setting to all slaves.



* NodeGuard

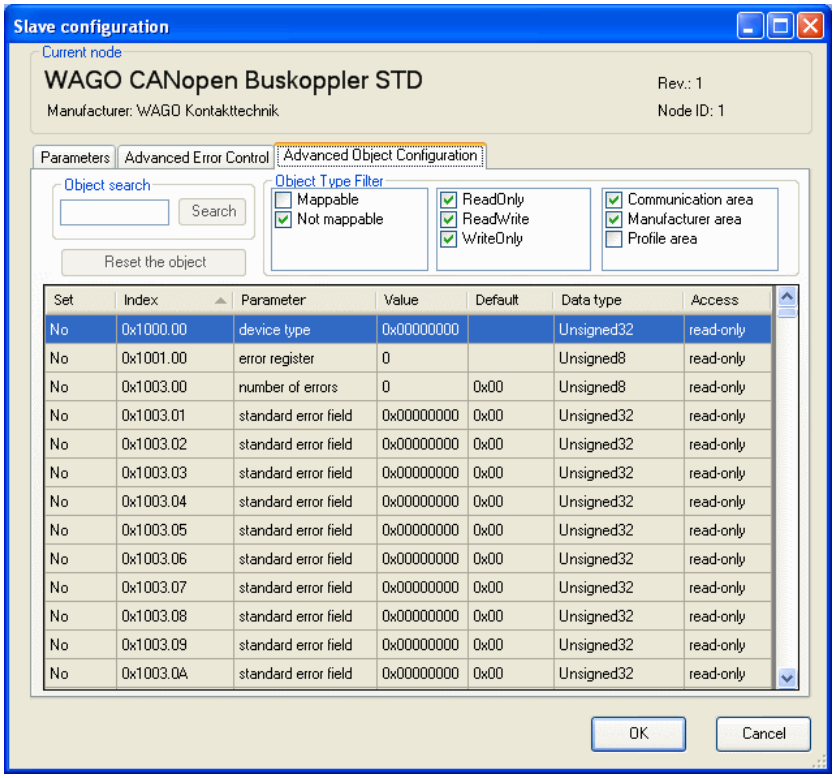
The master unit monitors slaves by polling (guarding) for the time of the Guard time multiplied by the Life time factor.



5.2.3 Advanced object configuration

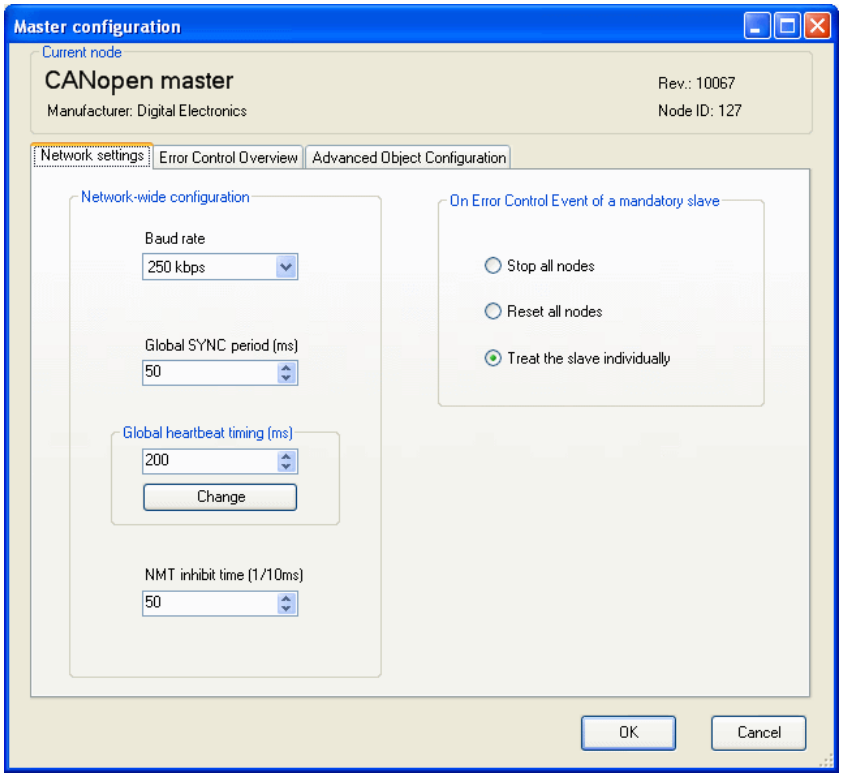
The Advanced Object Configuration tab shows the object list of the slave unit.

The contents of objects vary depending on the type of the slave unit.



5.3 Master configuration

5.3.1 Network settings



* Baud rate

Select the baud rate of the master unit.

50kbps to 1000kbps (default: 250kbps)

[Note]

When LT4000 series is used, the baud rate cannot be set to 500kbps and 1000kbps.

* Global SYNC period

Set the send cycle time of SYNC messages.

0 (disabled), 3 to 32767ms (default: 50ms)

[Note]

When using LT4000 series, select [Enabled] or not for sending SYNC messages. When [Enabled] is selected for SYNC transmission, the SYNC messages are sent at the cycle time synchronizing with the scan time of the logic program.

* Global heartbeat timing

To check, or monitor, whether the slave unit is active or not, use the heartbeat or the node guarding.

50 to 21844ms (default: 200ms)

* NMT inhibit time

This is the setting to inhibit the master unit to send NMT messages continuously.

NMT stands for “Network Management”.

0 to 3276.7ms (default: 5ms)

* On Error Control Event of a mandatory slave

Select from the following 3.

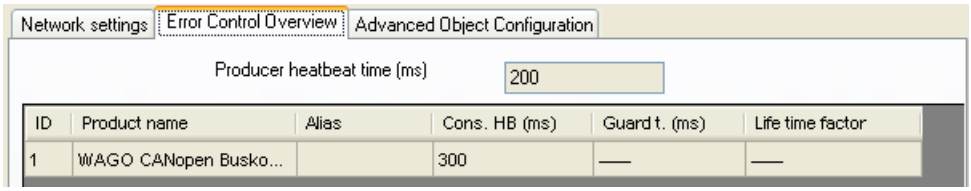
- Stop all nodes
- Reset all nodes
- Treat the slave individually (default)

For WAGO 750-337, use the default because DS302 is not supported.

If you select [Treat the slave individually], each slave unit sends the reset signal, not the master unit sends the reset signal by broadcast.

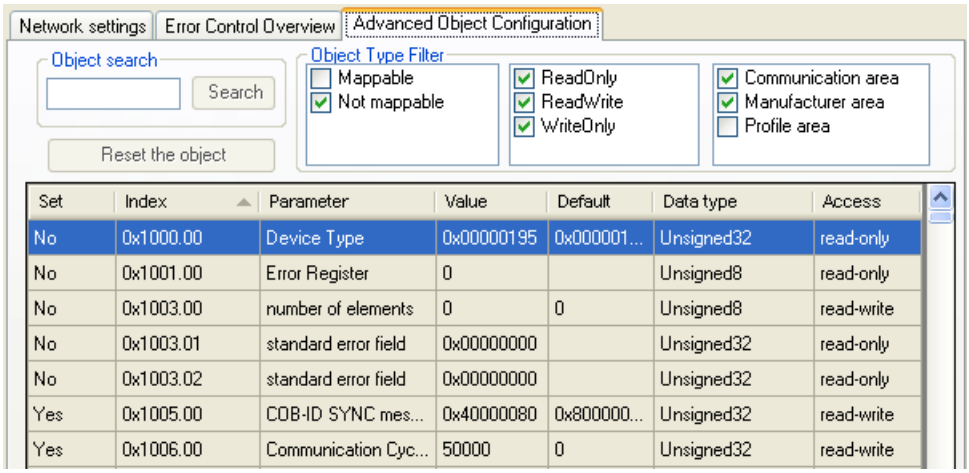
5.3.2 Error control overview

The Error Control Overview tab allows you to check the list of the node monitor (Heartbeat / Node guard).



5.3.3 Advanced object configuration

The Advanced Object Configuration tab shows the list of objects of the master unit.



6 PDO protocol, SDO protocol

6.1 PDO (Process Data Object) protocol

The PDO protocol is used for communicating data such as digital inputs and outputs continuously.

6.2 SDO (Service Data Object) protocol

The SDO protocol is used for communicating data not necessary to be sent continuously, such as infrequent changes of setting values.

Data assigned to SDOs are communicated by the SDO instructions (SDOR, SDOW) of the logic program.

7 I/O driver instructions

7.1 SDOR, SDOW

Reads from / writes to objects of the slave unit.

SDOR (SDO Read)

S1: index number of the object

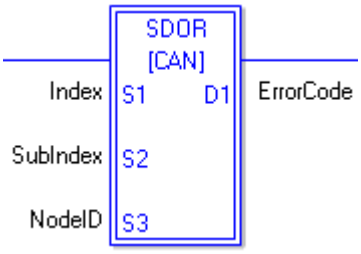
S2: sub index number of the object

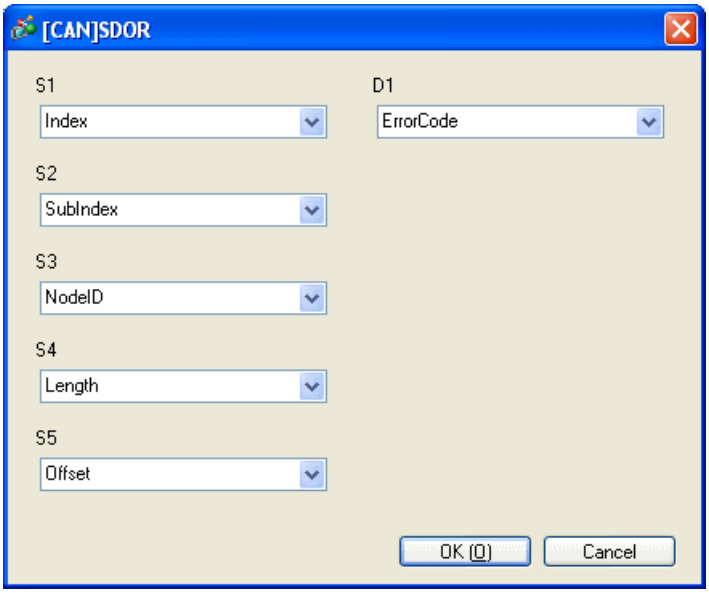
S3: node ID

S4: length (byte number) of the object access

S5: location to store read data (offset number of #L_IOMasterDrv[])

D1: error code





SDOW (SDO Write)

S1: index number of the object

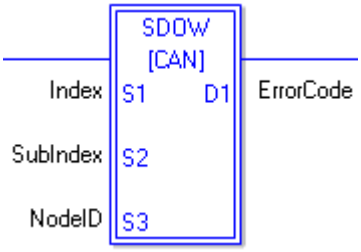
S2: sub index number of the object

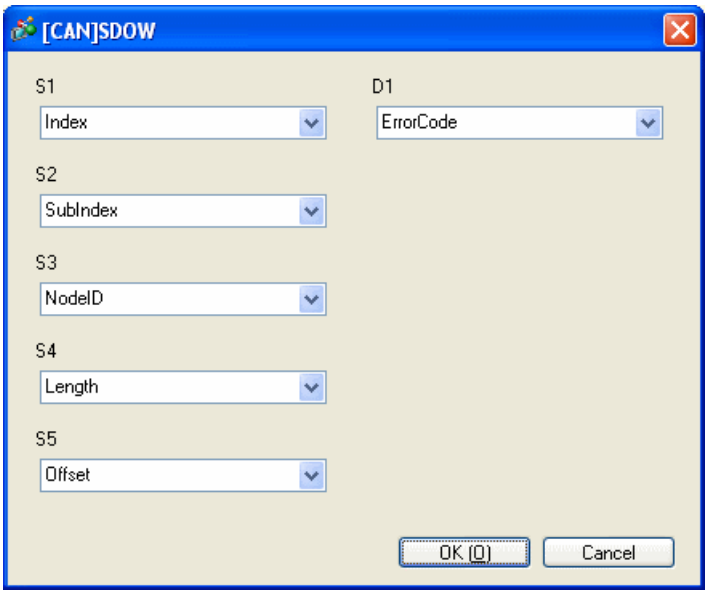
S3: node ID

S4: length (byte number) of the object access

S5: location to store data to be written (offset number of #L_IOMasterDrv[])

D1: error code





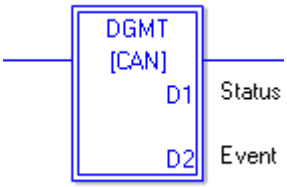
7.2 DGMT, DGSL

Reads the status of the master unit / slave unit.

DGMT (Diagnostic Master)

D1: status information

D2: event information



DGSL (Diagnostic Slave)

S1: node ID

D1: slave diagnostic information

8 Transferring I/O firmware

Firmware for the CANopen board is not yet installed in CANopen units for AGP-3****-CA1M/LT by factory default. The firmware is transferred and written when the first screen data transfer.

This I/O firmware is written when the unit is restarted after transferring the project file.

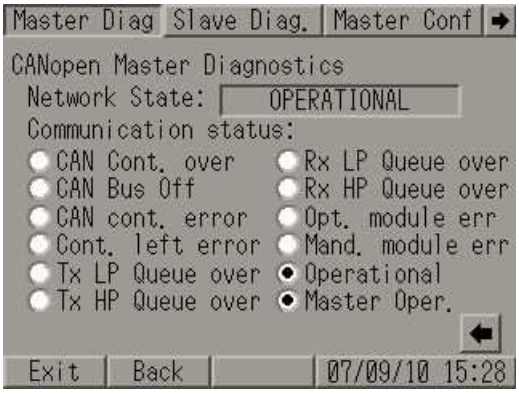
9 AGP-3****-CA1M/LT unit

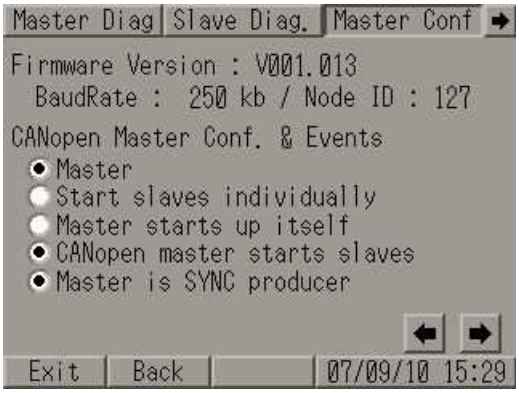
9.1 Offline menu

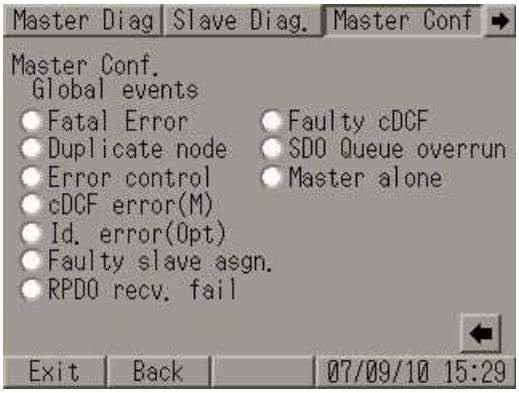
* Master Diagnostics, Master Configuration & Events

These menus have the same contents as the DGMT instruction does, which is one of the I/O driver instructions.

The Master Diagnostics screen includes status information and the Master Configuration & Events screen includes event information.



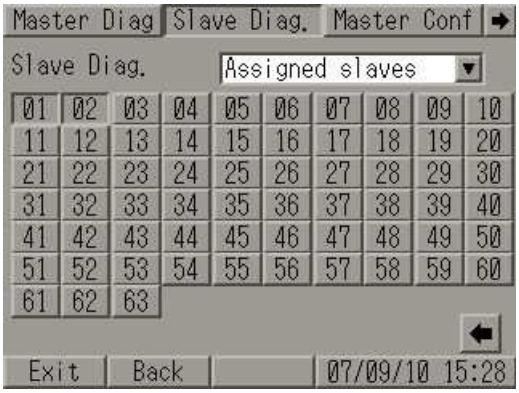




* Slave Diagnostics

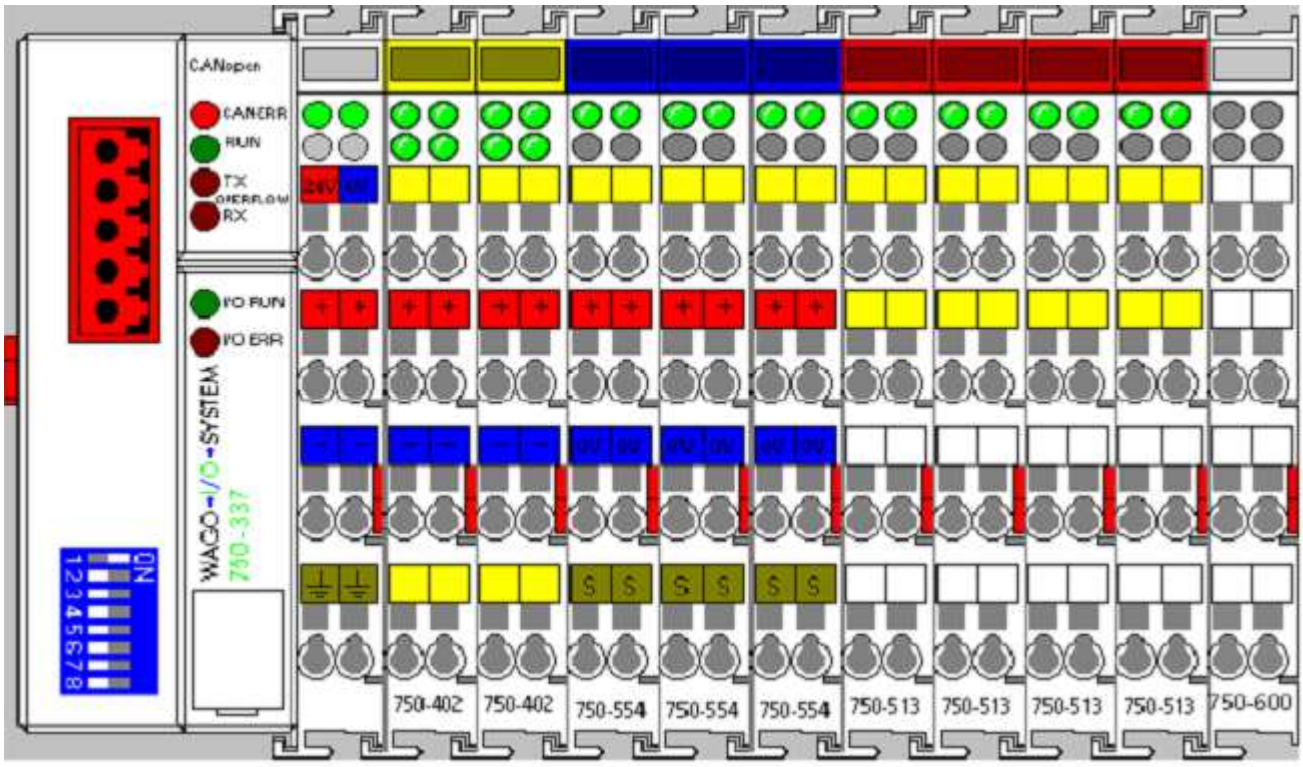
This menu has the same contents as the DGSL instruction does, which is one of the I/O driver instructions.

You can select the status of the slaves and check nodes in the list.



10 Installation of WAGO 750-337

10.1 Hardware structure

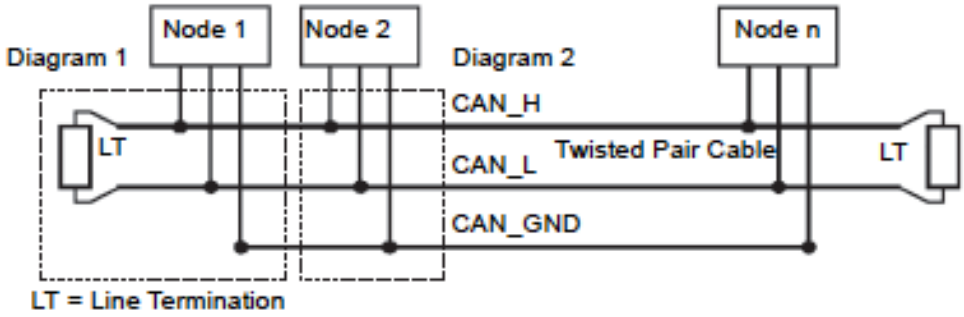


Hardware is consist of the Bus Coupler 750-337, I/O modules Series 750 (up to 63 modules), and the End Module 750-600.

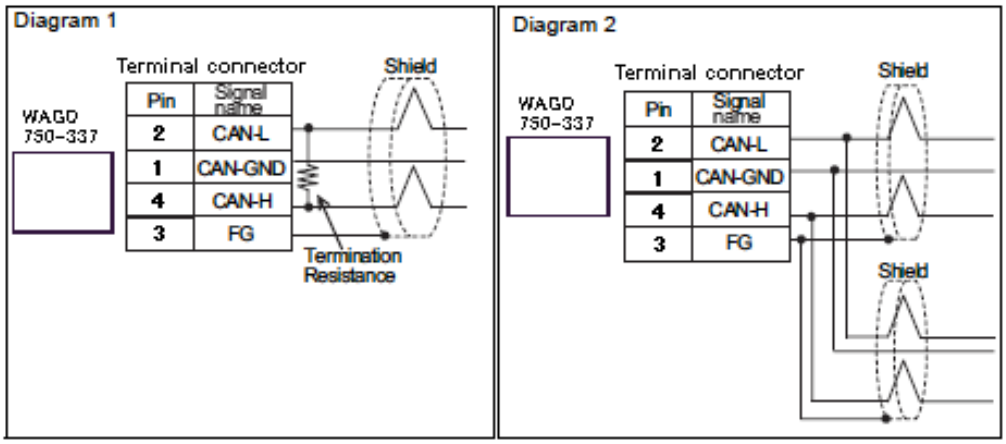
DIs, DOs, AIs, and AOs can be mixed. Select necessary modules. A DC 24V power supply is required. Please refer to the Modular I/O System Design Notes for the details.

http://www.wago.com/wagoweb/documentation/750/eng_manu/m01xxphe.pdf

Diagram



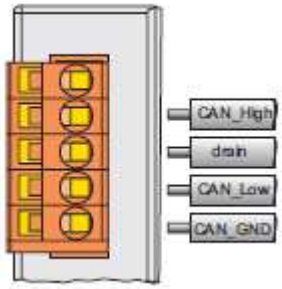
WAGO 750-337



* NOTE

- To minimize the signal's reflections from the end of the cable, a line termination shall be placed close to the 2ends of the bus. Connect both ends of the twisted pair cable (CAN_H and CAN_L) to each LT. Use line terminationwhose resistance value is 120 Ω. (5%, 1/4 W maximum).

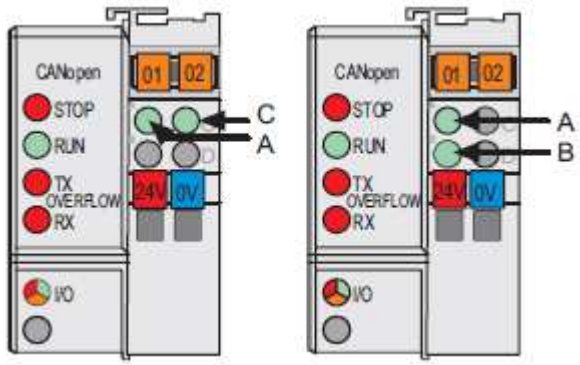
10.2 Connector diagram



Pin No.	Signal Name	Description
1	CAN_V+	Not used
2	CAN_H	CAN signal high
3	Drain (Shield)	Shield connection
4	CAN_L	CAN signal low
5	GND	Ground

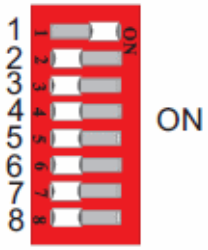
10.3 Display elements

The operating condition of the bus coupler or node is signaled via LEDs.



LED	Color	Description
STOP	Red	The bus coupler / node is in the state STOP.
RUN	Green	The bus coupler / node is in the state OPERATIONAL.
Tx-Overflow	Red	CAN transmitter buffer is full.
Rx-Overflow	Red	CAN receiver buffer is full.
IO	Red/green /orange	The “I/O” LED indicates the operation of the node and signals faults encountered.
A	Green	Status of the operating voltage system
B or C	Green	Status of the operating voltage – power jumper contacts (LED position is manufacturing dependent)

10.4 Hardware address (Module ID)



The DIP switch is used both for setting the baud rate of the bus coupler and for setting the module ID.

This module ID is necessary for calculating the COB IDs.

The binary significance of the individual DIP switches increases according to the switch number, i.e. the module ID 1 is set by DIP1 = ON, the module ID 8 by DIP4 = ON.

The nodes of the WAGO-I/O-SYSTEM can have module IDs from 1 to 127.

10.5 Setting the baud rate

This bus coupler supports 9 different baud rates. DIP switches are used to set the baud rate.

The bus coupler changes to the configuration mode using the set module ID = 0 (all DIP switches off) with subsequent power on. The current set baud rate is displayed in this status (starting from Firmware WT). The baud rate display is shown by the top LED group (STOP, RUN, Tx-, Rx-Overflow), whereby STOP = Switch1, RUN = Switch2, Tx-Overflow = Switch3, Rx-Overflow = Switch4. The current set baud rate is displayed by the corresponding LEDs blinking slowly. Now the new baud rate can be set using the DIP switch, by turning the corresponding DIP switches to “ON”.

The set configuration is saved by turning DIP8 to “ON”. Following saving, the new baud rate is displayed by the corresponding LEDs having a steady light. Except for the baud rate of 1M baud, this is displayed by all 4 LEDs blinking/ being lit.

In this status, no data exchange via CAN is possible.

DIP	Function	1M bit	800 kB	500 kB	250 kB	125 kB	100 kB	50 kB	20 kB	10 kB	Displayed by LED
1(LSB)	Baud rate	0	1	0	1	0	1	0	1	0	STOP
2	Baud rate	0	0	1	1	0	0	1	1	0	RUN
3	Baud rate	0	0	0	0	1	1	1	1	0	Tx-Overflow
4(MSB)	Baud rate	0	0	0	0	0	0	0	0	1	Rx-Overflow
5											
6											
7											
8	Acceptance	“off” -> “on” : Accepting the configuration settings									

Once the baud rate setting / baud rate check is completed, switch off the operating voltage knowing that only the DIP value will be used to calculate the IDs which has been set during power ON. When switched off, the desired module ID can be set on the DIP.

For more information on WAGO 750-337, visit WAGO's website.

http://www.wago.com/wagoweb/documentation/index_e.htm