

Minebea

***DIGITAL TRANSMITTER
CANopen Interface
OPT-563B-71***

Instruction Manual

Introduction

Thank you for your purchasing OPT-563B-71 Digital Transmitter with CANopen interface for optical transmission system flange torque converters.

This instruction manual describes how to operate the device and discusses noteworthy points.

Note that handling or operating the device incorrectly may result in malfunctions. Read this manual thoroughly before use for correct usage.

Keep this instruction manual in a location where it will be readily accessible to end users.

Note that this manual is intended to be read by engineers.

The explanations included in this manual assume a basic knowledge of CANopen PLC programs and CANopen interfaces.

Pictograms and Conventions Used in This Manual

This manual uses the following pictograms to indicate actions that must be avoided at all times, aspects requiring caution, and other noteworthy matters.

Be sure to read the descriptions provided alongside these pictograms.



WARNING

This indicates circumstances in which incorrect handling may result in death or serious injury to users. Avoid the actions described here at all times.



CAUTION

This indicates circumstances in which incorrect handling may result in injury to users or damage to property.



This indicates operating or procedural precautions or restrictions. Always read the details included here to avoid malfunctioning.

About This Manual

This instruction manual describes the connection and usage procedures for CANopen interface specifications available separately for the OPT-563B.

For details of other functions, basic handling instructions, and precautions concerning the OPT-563B, refer to the OPT-563B Instruction Manual.

- OPT-563B Instruction Manual (DRW. No. EN294-1596*)

Revision History

Date	Manual No.	Revision reason (details)
2015/03	DRW. NO. EN294-1634	First issue. ROM VER.1.000
2016/06	DRW. NO. EN294-1634A	Due to ECN No, FN16-02057 -Deletion- Delete 'Minebea Co., Ltd. Measuring Components Business Unit' from the front cover.
2016/09	DRW. NO. EN294-1634B	Due to ECN No, FN16-02139 ROM Ver1.800 or later 5-1. Sub Index of Index "0x2001" and "0x2002" is changed to "0x00" by "0x01". Explanatory note addition. 5-1.(*5) Explanatory note addition.
2017/09	DRW. NO. EN294-1634C	Due to ECN FN17-02017 • Delete the company name in the contents.

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1. Overview

This product is a CANopen slave device.

It supports CANopen communication functions (CiA DS301) by adding a CANopen interface to the OPT-563B.

1-1. Features

The main features of the OPT-563B-71 are as follows:

(1) PDO transfer

Supports PDO transmission. Receiving is not supported.

- Torque + rotation speed
- Torque status + rotation speed status

(2) SDO transfer

Supports SDO transfer.

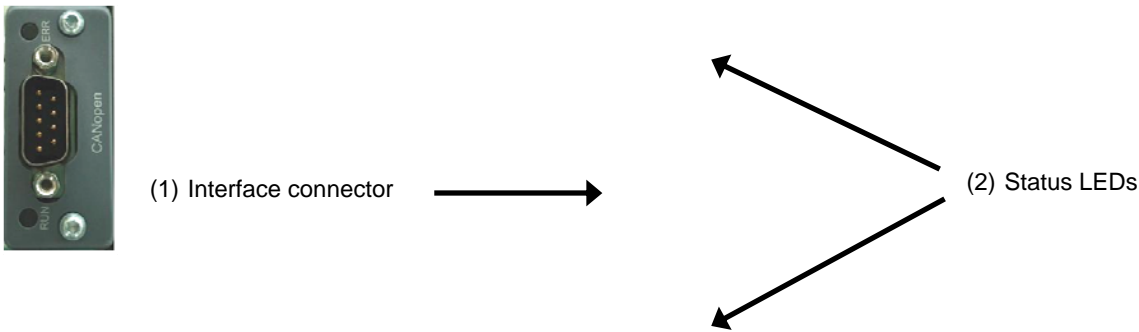
- Torque (reading only)
- Rotation speed (reading only)
- Torque status (reading only)
- Rotation speed status (reading only)
- Torque units/decimal places/polarity (reading and writing)
- Rotation speed units/decimal places (reading only)
- Rotation speed polarity (reading and writing)
- Manufacturer device name (reading only)
- Manufacturer hardware version (reading only)
- Manufacturer software version (reading only)
- PDO transmission interval

(3) CANopen parameter setting

Sets the address and baud rate for the CAN bus.

2. Part Names and Functions

2-1. Rear Panel CANopen Interface



(1) Interface connector

Connector for the CANopen interface

The connector pins are configured as follows:

Pin No.	Signal name	Details
1	N.C.	Not used
2	CAN_L	CAN signal Low
3	CAN_GND	CAN ground
4	N.C.	Not used
5	CAN_SHLD	Shield
6	N.C.	Not used
7	CAN_H	CAN signal High
8	N.C.	Not used
9	N.C.	Not used
Housing	SHIELD	Shield

* The connector is not provided. Compatible plug: Dedicated CANopen connector
Use a connector meeting specifications for CiA DR-303-1.

* Do not connect to N.C. pins.

* Insulated photocoupler from internal circuit.

(2) Status LEDs

The communication status is indicated by two LEDs.

Specifications are defined in the DR303-3 (CiA) standard.

RUN LED (green)

State	Description
Off	Off
Lit	Operating
Continuous blinking	Before operation
Blinks once	Stopped
Flickering	Automatically detecting baud rate
Lit (red)	Shifting to abnormal state

ERR LED (red)

State	Description
Off	Off or operating
Blinks once	Error counter reached or exceeded preset value
Flickering	Automatically detecting baud rate
Blinks twice	NMT slave or NMT master detected a Heartbeat event (Heartbeat consumer)
Lit	Bus off

3. Connections

3-1. Interface Connector Pin Arrangement

Refer to "2-1. Rear Panel CANopen Interface."

3-2. Cable Length

The relationship between the baud rate and overall cable length is as shown below.

Baud rate	Overall length
10 kbps	Up to 1,000 m
20 kbps	Up to 1,000 m
50 kbps	Up to 1,000 m
100 kbps	Up to 600 m
125 kbps	Up to 500 m
250 kbps	Up to 250 m
500 kbps	Up to 100 m
800 kbps	Up to 50 m
1 Mbps	Up to 25 m

3-3. Connection Precautions

- Always turn off the power before connecting wires.
- Do not turn on the power until all installation work is complete. This device lacks a dedicated power on/off switch.
- Where possible, keep the cables connected to the device away from noise sources such as motor power lines and control I/O units.
- Always ground the device. Ground using a Class D independent ground. Do not use a ground shared with motor power supplies.



- Turn on the terminating resistance for the CANopen connector farthest from the PLC.
- Use a dedicated CANopen connector cable.
Use a connector cable meeting specifications for CiA DR-303-1.

4. CANopen Communication Settings

Set the following items to use the CANopen interface.

4-1. Function Mode Selection

Select Function mode as described below.

- 1) Hold down the **[FUNC]** key for two seconds.
- 2) Press the **[ENTER]** key when [FUNC] appears.
- 3) Set the desired function number.

For details of function mode settings and operations, refer to "9. Function Mode" in the OPT-563B Instruction Manual (DRW. No. EN294-1596).

4-2. CANopen Settings

Function No.	Item	Setting	Details
F-42	Node ID	001 to 127	
		●001	
F-43	Baud rate	0	10 kbps
		1	20 kbps
		2	50 kbps
		3	100 kbps
		4	125 kbps
		5	250 kbps
		6	500 kbps
		7	800 kbps
		●8	1 Mbps
F-45	PDO output interval	0 to 100	0: OFF
		●100	Units: 1 ms

(1) Node ID

Set the node ID number.

The number can be set to a value from 001 to 127.

The default setting is 001.

(2) Baud rate

Set the baud rate (in units of bps).

The baud rate can be set to 10 k, 20 k, 50 k, 100 k, 125 k, 250 k, 500 k, 800 k, or 1 M.

The default setting is 1 M.

(3) PDO output interval

Set the PDO output interval (in units of ms).

The interval can be set to a value from 0 to 100. (0: OFF)

The default setting is 100

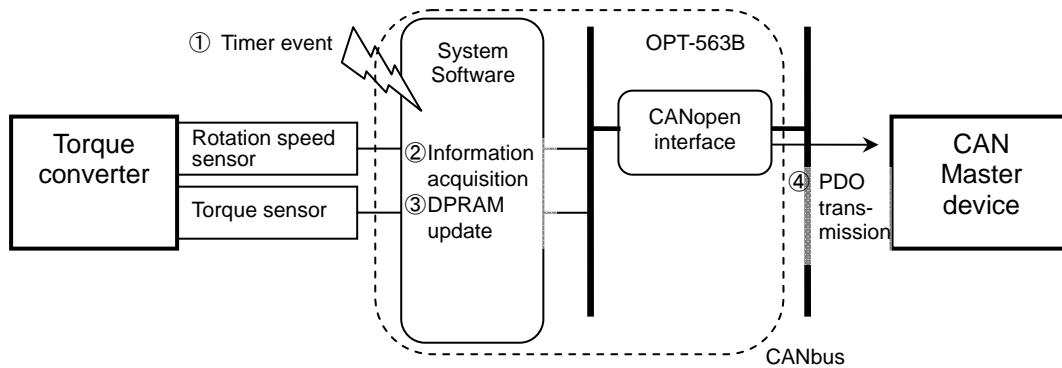


- The settings take effect after power is turned off, then turned back on. Turn power off and then back on after changing any of the settings
- An EDS file must be loaded when setting CANopen objects.
If necessary, this can be downloaded from the our website (<http://www.minebea-mcd.com/>)

5. Access Sequences

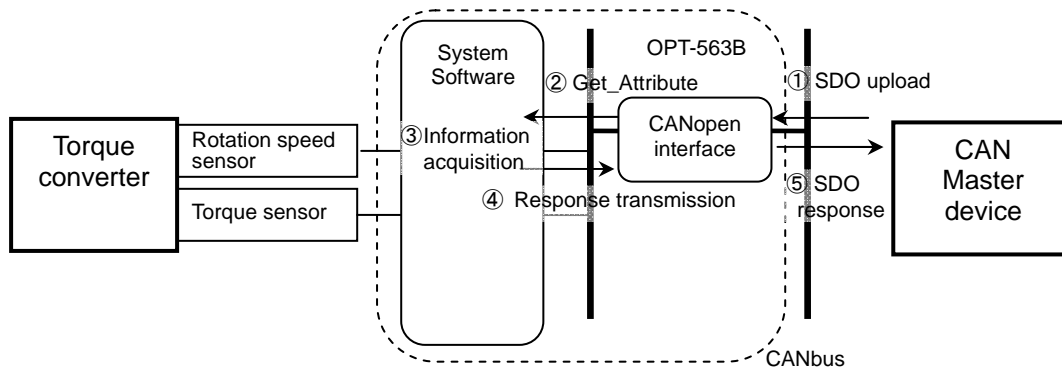
CANopen is accessed as shown in the following diagrams.

(1) PDO transmission

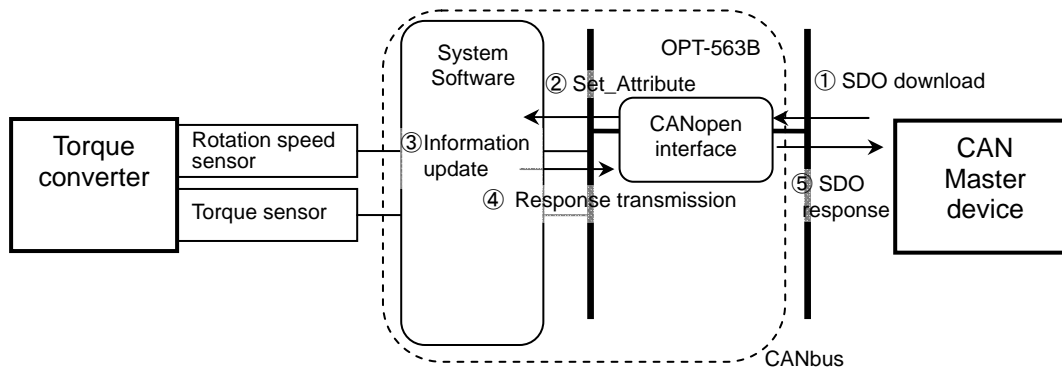


* ④ PDO transmission occurs only if there are changes in the data updated in ② and ③.

(2) SDO transmission (SDO reading)



(3) SDO reception (SDO writing)



5-2. CANopen Object Mapping

Manufacturer-specific Object

Order#	Index (ADI# + 0x2000)	Sub-index (ADI Element#)	Data Type	Data
1	0x2001	0x00	SINT32	Torque (*1)
2	0x2002	0x00	SINT32	Rotation speed (*2)
3	0x2011	0x01	UINT32	Torque status (*3)
		0x02	UINT32	Rotation speed status (*4)
4	0x2333	0x00	UINT16	Torque units (0: Nm, 1: kNm, 2: V)
5	0x2334	0x00	UINT16	Torque decimal places (0: No decimal point, 1 - 4: decimal places) * Decimal places returned as 3 only if the torque units are V and the value set specifies 4 decimal places
6	0x2335	0x00	UINT16	Torque polarity (135: + for counter-clockwise, 136: + for clockwise)
7	0x2343	0x00	UINT16	Rotation speed units (1644: rpm fixed)
8	0x2344	0x00	UINT16	Rotation speed decimal places (0: No decimal point, fixed)
9	0x2345	0x00	UINT16	Rotation speed polarity (135: + for counter-clockwise, 136: + for clockwise)
10	0x2350	0x00	UINT16	PDO transmission interval (ms)

PDO Mapping

PDO#	Transmission Details	COB-ID (*5)	Tx Type	Inhibit Time	Event Timer	Mapped Objects
1	Torque + rotation speed	0x180	COS(254)	0	0	0x2001 - 0x00
						0x2002 - 0x00
2	Status	0x280	COS(254)	0	0	0x2011 - 0x01
						0x2011 - 0x02



- When this device is used without the configuration change from the condition at the shipment, the data from [COB-ID 0 x 380+ Device Address] and [0 x 480+ Device Address] outputs once from master by the communication-start request. When the configuration has been changed, data is not output.

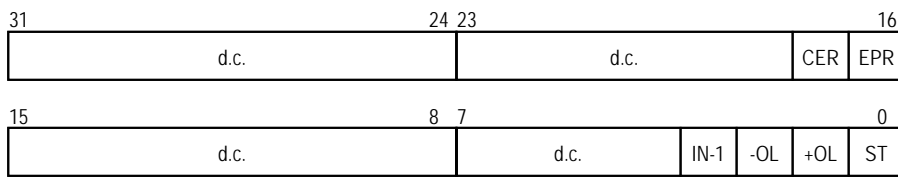
(*1) Torque value format (SINT32)

0x8000_0000: IN-1 error
 0x8000_0001: +OL error
 0x8000_0002: -OL error

(*2) Rotation speed value format (SINT32)

0x8000_0000: Function F-24 setting is off (rotation speed detection signal is off).
 0x8000_0001: +OS error
 0x8000_0002: -OS error

(*3) Torque status format (UINT32)



bit0(ST):

1: Torque value normal

0: Error value

bit1(+OL):

1: +OL error, 0: Normal

bit2(-OL):

1: -OL error, 0: Normal

bit3(IN-1):

1: IN-1 error, 0: Normal

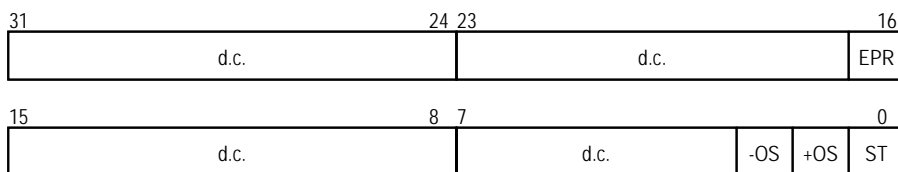
bit16(EPR):

1: EEPROM error, 0: Normal

bit17(CER):

1: PDO communication error, 0: Normal

(*4) Rotation speed status format (UINT32)



bit0(ST):

1: Rotation speed value normal

0: Error value

bit1(+OS):

1: +OS error, 0: Normal

bit2(-OS):

1: -OS error, 0: Normal

bit16(EPR):

1: EEPROM error, 0: Normal

(*5) The actual COB-ID will consist of the value indicated plus the device address.



- When the configuration has been changed, COB-ID becomes the fixed value set by the configuration.

SDO Mapping

Details	CANopen Object	Writing	Remarks
Manufacturer device name	0x1008 - 0x00	No	
Manufacturer hardware version	0x1009 - 0x00	No	
Manufacturer software version	0x100A - 0x00	No	
Torque, rotation speed, status	See "Manufacturer-specific Object."	No	
Torque units, decimal places, polarity	See "Manufacturer-specific Object."	Yes	
Rotation speed units, decimal places	See "Manufacturer-specific Object."	No	
Rotation speed polarity	See "Manufacturer-specific Object."	Yes	
PDO transmission interval	See "Manufacturer-specific Object."	Yes	

* The COB-ID uses the default value (From server: 0x580 + device address, From client: 0x600 + device address).

6. Errors

Error	Details
IN-1 error	Displayed when no torque signal is input in measurement mode or monitor mode
+OL error	Displayed when the input torque exceeds [+110% of maximum display value] or 16 kHz in measurement mode
-OL error	Displayed when the input torque is less than [-110% of maximum display value] or 4 kHz in measurement mode
+OS error	Displayed when the rotation speed exceeds 27500 in measurement mode
-OS error	Displayed when the rotation speed is less than -27500 in measurement mode
EEPROM error	Displayed when an EEPROM write error or read error is detected
PDO communication error	Displayed when a PDO communication error is detected

7. Interface Specifications

7-1. CANopen Interface Specifications

Specifications	Details	
Baud rate	Select from 10 kbps, 20 kbps, 50 kbps, 100 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps, and 1 Mbps.	
Node ID	Select a value from 001 to 127.	
PDO output interval	Select a value from 000 to 100 (Units: ms).	
Cable length	Baud rate (bps)	Overall length (m)
	10 k	Up to 1,000
	20 k	Up to 1,000
	50 k	Up to 1,000
	100 k	Up to 600
	125 k	Up to 500
	250 k	Up to 250
	500 k	Up to 100
	800 k	Up to 50
	1 M	Up to 25
Connector cable	Use a dedicated CANopen cable.	
Connector	Use a dedicated CANopen connector.	
Termination	Use a connector with internal terminating resistance.	
Status LEDs	[RUN] and [ERR]	

7-2. Accessories

CANopen Instruction Manual	1 copy
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●The contents of this manual may subject to change without notice.

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