Minebea

DIGITAL TRANSMITTER
PROFIBUS Interface
OPT-563B-70

Instruction Manual

Introduction

Thank you for purchasing OPT-563B-70 digital transmitter with PROFIBUS interface for Optical transformer method flange type torque transducer.

This operating manual describes how to operate the device, as well as noteworthy points.

Note that handling or operating the device incorrectly may result in malfunctions. Read this manual thoroughly before use for safety and optimal results.

Keep this operating manual in a location where it is readily accessible to users.

This manual is intended for the technical experts to read.

In reading this manual, a basic knowledge of the sequencer program and PROFIBUS interface is required for proper understanding of this manual.

Pictograms and conventions used in this manual

This manual uses the following pictograms to indicate actions to avoid 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.

How to read this manual

This manual explains a connecting method and operating method for POFIBUS interface as an option. Refer the instruction manual of OPT-563B for the other functions, the basic operating method and notes.

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

Furthermore, refer to the instruction manual of PLC or PROFIBUS interface at PLC side for a sequencer program and PROFIBUS.

When the network construction of PROFIBUS, GSD file where the environmental set data has written previously is required.

Download this file from our homepage (http://www.minebea-mcd.com/).

- PROFIBUS is registered trade mark of PROFIBUS international.

Revition history

Date	Management No.	Details of revision (Contents)
2014/12	DRW. NO.EN294-1633	First release VER.1.000
2016/06	DRW. NO.EN294-1633A	Due to ECN No, FN16-02057 -Deletion- Delete 'Minebea Co., Ltd. Measuring Components Business Unit' from the front cover.
2017/09	DRW. NO.EN294-1633B	Due to ECN FN17-02017 ・Delete the company name in the contents.

Contents

1．Outlines

This is a slave device of PROFIBUS DP-V1.

This can connect with a master device of PROFIBUS DP-V0 or DP-V1.

1-1. Feature

The main features of OPT-563B-70 are shown as follows.

(1) This device is used as a slave device of PROFIBUS, and the program volume of a sequencer can be reduced because I/O control and reading out a torque value and rotational frequency can be executed by the memory operation of PLC (Programmable Logic Controller).

(2) Wiring with a PLC (Programmable Logic Controller) can be reduced by using authorized cables and connectors for PROFIBUS.

2．Names and functions of each part

2-1. PROFIBUS interface in rear panel

(1) PROFIBUS connector

(2) Status LED
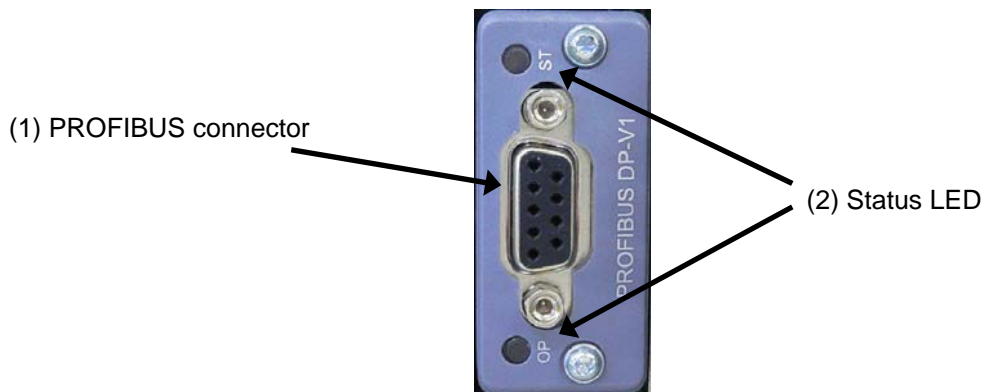
(1) Connector
   Use this connector for communicating with PROFIBUS interface.
   Pin configuration of the connector is as follows;

Pin No.	Signal name	Contents
1	N.C.	Not used
2	N.C.	Not used
3	RXD/TXD-P	Receive / Send data (Positive)
4	CNTR-P	RTS
5	DGND	Data ground
6	VP	Power supply (+)
7	N.C.	Not used
8	RXD/TXD-N	Receive / Send data (Negative)
9	N.C.	Not used
Housing	SHIELD	Shield

※ Connector is not attached. Applicable plug: Authorized connector designed for PROFIBUS.
   Refer the product catalog in the homepage of PROFIBUS & PROFINET international.
   (http://www.profibus.jp/)
※ Don't connect with N.C. pin.
※ [DGND] and [SHIELD] are insulated.
※ The internal circuit is insulated by photo coupler.

(2) Status LED
   Two LEDs indicate the status of the interface.

Status	ST　LED	OP　LED
Turn off	—	Off line / No power
Green ON	Normal operation	On-line, normal communication
Green flashing	—	On-line, No communication
Red ON	Hardware is abnormal	—
Red flashing	—	Communication error

3．Wiring

3-1. Pin arrangement of the communication connector

Refer to [(1) Connector] of [2-1. PROFIBUS interface in rear panel].

3-2. Cable length

The maximum cable length according to transmission speed is as follows;

Communication speed	Maximum total cable length
9.6 kbps	1 200 m or less
19.2 kbps	1 200 m or less
93.75 kbps	1 000 m or less
187.5 kbps	1 000 m or less
500 kbps	400 m or less
1.5 Mbps	200 m or less
3 Mbps	100 m or less
6 Mbps	100 m or less
12 Mbps	100 m or less

3-3. Note in connection

・ Always turn off power before connecting.

・ Do not turn on the power until all installation processes are completed. There is no switch for turning on and off the power.

・ Separate the cable connected to this device from noise source, such as the power supply line, I/O for the control as much as possible.

・ Always connect a grounding cable. Ground using a Class D independent ground. Do not share with other ground wires for the power supply system.

・ **Turn on the terminator of PROFIBUS connector that is the furthest from PLC.**
・ **Connected cable must use the authorized cable designed only for PROFIBUS.**
  Refer the product catalog in the homepage of PROFIBUS & PROFINET international.

4．PROFIBUS communication setting

The following items are to be set before using PROFIBUS interface.

4-1. Switch to function mode

Switch to Function mode by the following operation.

(1) Press FUNC key kept for 2 second.

(2) Display switches to [FUNC], then press ENTER key.

(3) Select the function number to be set.

(4) Refer to [9.Function mode] of the instruction manual for OPT-563B (DRW No.294-1596) for the setting and operation method of function mode.

4-2. Setting item of PROFIBUS interface

Function No.	Item	Set value	Contents
F-41	Station address	000～125	
		●000	

(1) Station address
Set the station address.
The set value is input in the range from [000] to [125].
[000] is set as default.

(2) Baud rate
There is no setting for communication speed.
The baud rate is selected automatically from 9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps or 12 Mbps
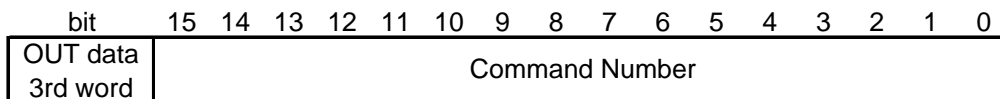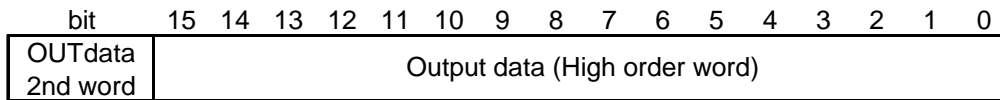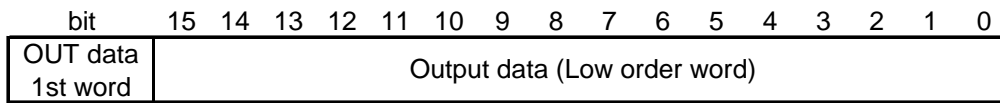
・ **Set value becomes effective after the power is turned on again. Restart this device when you switch the setting.**
・ **When the network construction of PROFIBUS, GSD file where the environmental set data has written previously is required.**
Download this file from our homepage (http://www.minebea-mcd.com/).

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5．Explanation of PLC memory

5-1. Address map
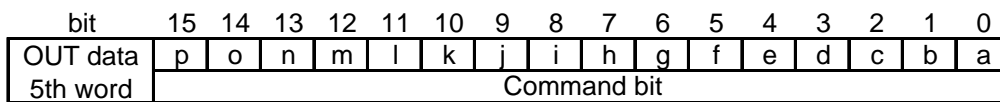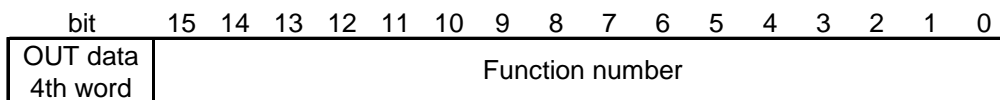
5-1-1. OUT data (6 words) Host (PLC)→OPT-563B

Save the operating command of this instrument to OUT DATA of PLC memory, and execute it.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT data 1st word	Output data (Low order word)															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUTdata 2nd word	Output data (High order word)															

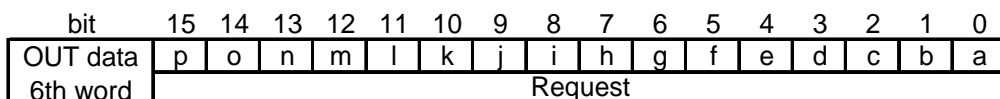| bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT data 3rd word	Command Number															

Command No.
- 20 Read out torque amount.
- 21 Read out rotational frequency display.
- 22 Read out A/D data1. (Torque: input the frequency.)
- 70 Read out the function data.
- 80 Write in the function data.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT data 4th word	Function number															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT data 5th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
	Command bit															

a: A/Z   i: Not used. Fixed to 0.
b: A/Z OFF   j: Not used. Fixed to 0.
c: CHECK   k: Not used. Fixed to 0.
d: Move to measurement mode.   l: Not used. Fixed to 0.
e: Not used. Fixed to 0.   m: Not used. Fixed to 0.
f: Not used. Fixed to 0.   n: Not used. Fixed to 0.
g: Not used. Fixed to 0.   o: Not used. Fixed to 0.
h: Not used. Fixed to 0.   p: Not used. Fixed to 0.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT data 6th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
	Request															

a: Flag for read out and write   i: Not used. Fixed to 0.
b: Command request flag   j: Not used. Fixed to 0.
c: Not used. Fixed to 0.   k: Not used. Fixed to 0.
d: Not used. Fixed to 0.   l: Not used. Fixed to 0.
e: Not used. Fixed to 0.   m: Not used. Fixed to 0.
f: Not used. Fixed to 0.   n: Not used. Fixed to 0.
g: Not used. Fixed to 0.   o: Not used. Fixed to 0.
h: Not used. Fixed to 0.   p: Not used. Fixed to 0.

5-1-2. IN data (11 words) OPT-563B → Host（PLC）

Return data of OUT data is read out from the IN data.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 1st word							Data of display-1 (Low order word)									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 2nd word							Data of display-1 (High order word)									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 3rd word							Data of display-2 (Low order word)									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 4th word							Data of display-2 (High order word)									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 5th word							Input data (Low order word)									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 6th word							Input data (High order word)									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 7th word							Response of command No.									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 8th word							Response of function No.									

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data 9th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
							Response									

a: Reading out/Writing flag
b: Reply flag of command request
c: Flag during writing
d: Not used, Fixed to zero.
e: Not used, Fixed to zero.
f: Not used, Fixed to zero.
g: Not used, Fixed to zero.
h: Not used, Fixed to zero.

i: Execution erro
j: Setting error
k: Command number error
l: A/Z error
m: Function number error
n: Not used, Fixed to zero.
o: Not used, Fixed to zero.
p: Not used, Fixed to zero.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
10th word	Status															

a: Torque +OL (Error information)
b: Torque -OL (Error information)
c: Rotational frequency +OS
　(Error information)
d: Rotational frequency -OS
　(Error information)
e: A/Z error (Error information)
f: Input 1 error (Error information)
g: Not used, Fixed to zero.
h: Input 3 error (Error information)

i: A/Z (LED information)
j: CHECK (LED information)
k: LOCK (LED information)
l: ERROR (LED information)
m: On line
　(Toggle input in every 0.5 second)
n: Input ACK
o: Not used, Fixed to zero.
p: Not used, Fixed to zero.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN data	Mode information: Mode number								Mode information: Processing STEP							
11th word	(for maintenance use)								(for maintenance use)							

5-2. Operation method of command bit

5-2-1. How to use command bit

Turn on the bit that the fifth word of OUT data corresponds and execute it.

OUT data 5th word	bit0	(1) A/Z
	bit1	(2) A/Z OFF
	bit2	(3) CHECK
	bit3	(4) Transition to measurement mode.
	bit4	Not used, fixed to zero.
	bit5	Not used, fixed to zero.
	bit6	Not used, fixed to zero.
	bit7	Not used, fixed to zero.
	bit8	Not used, fixed to zero.
	bit9	Not used, fixed to zero.
	bit10	Not used, fixed to zero.
	bit11	Not used, fixed to zero.
	bit12	Not used, fixed to zero.
	bit13	Not used, fixed to zero.
	bit14	Not used, fixed to zero.
	bit15	Not used, fixed to zero.

(1) A/Z
> A/Z is executed.
>> ON   : When A/Z is requested.
>> OFF : Normal

(2) A/Z OFF
> A/Z OFF is executed.
>> ON   : When A/Z OFF is requested.
>> OFF : Normal

(3) CHECK
> CHECK is executed.
>> ON   : When CHECK is requested.
>> OFF : Normal

(4) Transition to measurement mode
> Transition to measurement mode is executed.
>> ON   : When transition to measurement mode is requested.
>> OFF : Normal

5-2-2. Operating procedure of command bit

Operate the command bit by the following procedures.

1) Turn off all command bit of PLC memory. (Confirm that all are turned off.)

2) Turn on one of command bit that execute by PLC memory.

3) This unit executes the command.

4) Turn off all command bit of PLC memory as a termination.

## 5-3. Operating method by a command

5-3-1. How to use command

Operate the command bit according to the following procedures.

1) Confirm that [Flag during writing] turns off.

2) Confirm that [Command request flag] turns off.

3) Specify the [Reading out/Writing flag].
   0: Writing
   1: Reading out

4) Specify a command to be executed for [Command No.]

5) Turn on [Command request flag]. It has effect at the leading edge.
   This unit replies.

6) The requesting result is output to [Command request flag], the flag of [Reading out and writing] and [Command No.].

7) When the specified command is reading out command, the result is output to [Reading out data].
   Turn off [Command request flag].

(1) Reading out
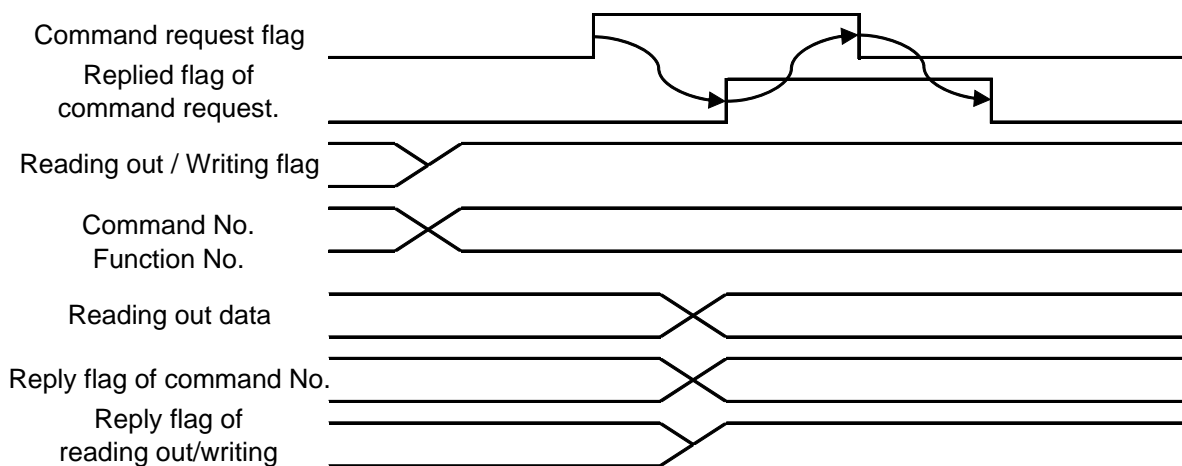
(2) Writing
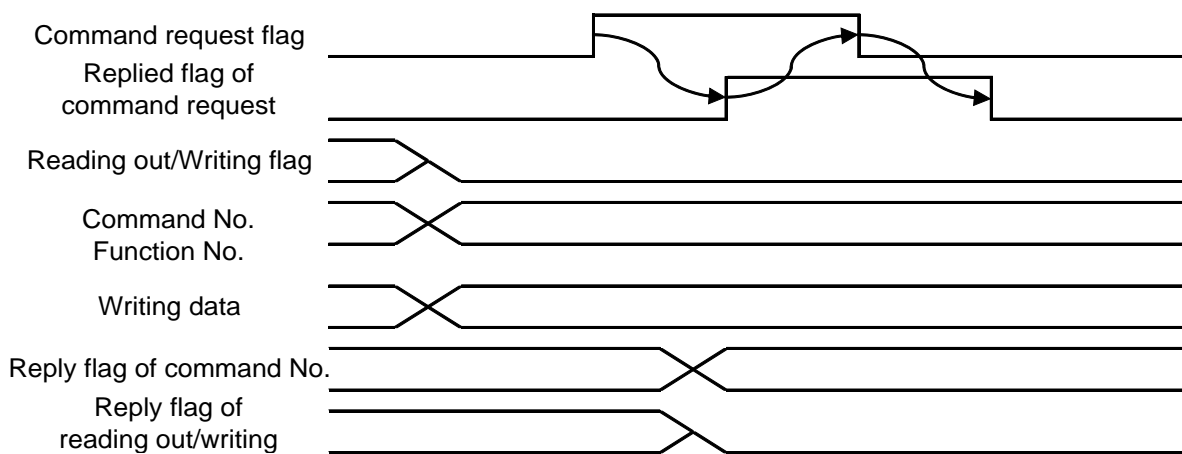
5-3-2. Reading out command list

Command No.	Command name	Note
20	Reading out the display of torque amount	
21	Reading out the display of rotational frequency.	
22	Reading out A/D data (Torque: Frequency input)	
70	Reading out the function data.	Confirm [9-3.] of the instruction manual of this unit for the function number and that contents.

5-3-3. Writing command list

Command No.	Command name	Note
80	Writing the function data	Confirm [9-3.] of the instruction manual of this unit for the function number and that contents.

An alphabetic capital letter, the numeric figure and katakana can be used for the brand name and recipe name. Input them by ASCII code or the JIS 8 bit code. When you use neither the brand name nor the recipe name, set space (20H).

Control command list

Command No.	Writing data	Command name	Note
0	1	A/Z	
0	2	A/Z OFF	
0	3	CHECK	
0	4	Transition to measurement mode	

5-4. Error information

When an error occurs, the error information can be read from the following data.

IN data 9th word	bit8	Execution error	
	bit9	Setting Error	
	bit10	Command number error	
	bit11	A/Z error	
	bit12	Function number error	
IN data 10th word	bit0	Torque +OL (Error information)	
	bit1	Torque -OL (Error information)	
	bit2	Rotational frequency +OS (Error information)	
	bit3	Rotational frequency -OL (Error information)	
	bit4	A/Z error (Error information)	
	bit5	Input 1 error (Error information)	
	Bit7	Input 3 error (Error information)	

6．Specifications of interface

6-1. Specifications of PROFIBUS interface

Specification	内容
Baud rate	Automatically set from 9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps, 12 Mbps.
Communication type	RS-485 bus
Station address	Select one from 0 to 125.
Cable length	Baud rate (bps) Total extension distance (m) 9.6 k 1 200 or less 19.2 k 1 200 or less 93.75 k 1 000 or less 187.5 k 1 000 or less 500 k 400 or less 1.5 M 200 or less 3 M 100 or less 6 M 100 or less 12 M 100 or less
Cable	Use authorized cable for PROFIBUS
Connector	Use authorized connector for PROFIBUS
Termination	Use a connector with built-in terminator.
Status LED	[OP], [ST]

6-2. Accessories

Instruction manual for PROFIBUS	1 pad

●The contents of this manual may subject to change without notice.