ZEF005953402

ezABSO®

PROFIBUS-DP

EZA-MAPRB-01G

Specifications & Instruction Manual

CE

CONTENTS

INTRODUCTION

Thank you very much for purchasing our product.
Before operating this product, be sure to carefully read this manual so that you may fully understand the product, safety instructions and precautions.

- Please submit this manual to the operators actually involved in operation.
- Please keep this manual in a handy place.

GENERAL SAFETY RULES

● Application Limitation

This product is not designed to be used under any situation affecting human life. When you are considering using this product for special purposes such as medical equipment, aerospace equipment, nuclear power control systems, traffic systems, and etc., please consult with NSD.

This product is designed to be used under the industrial environments categorized in Class A device. The supplier and user may be required to take appropriate measures.

● Signal Words

Safety precautions in this guide are classified into DANGER and CAUTION.

Symbol	Meaning
⚠ DANGER	Incorrect handling may cause a hazardous situation that will result in death or serious injury.
⚠ CAUTION	Incorrect handling may cause a hazardous situation that will result in moderate injury or physical damage.

Instructions accompanied by a symbol ⚠ CAUTIO may also result in serious damage or injury. Be sure to follow the all instructions accompanied by the symbol.

● Graphic Symbols

Symbol	Meaning
⃠	Indicates prohibited items.
❗	Indicates items that must be performed to.

1. Handling Precautions

⚠ DANGER	
⚡	- Do not touch components inside of ezABSO; otherwise, it will cause electric shock.
⃠	- Do not touch to ezABSO during operation; otherwise, it will cause injury. - Do not damage the cable by applying excessive load, placing heavy objects on it, or clamping; otherwise, it will cause electric shock or fire.
❗	- Turn the power supply OFF before wiring, transporting, and inspecting ezABSO; otherwise, it may cause electric shock. - Provide an external safety circuit so that the entire system functions safely even when ezABSO is faulty.

⚠ CAUTION	
⃠	- Do not use ezABSO in the following places; the atmosphere of the corrosion, the atmosphere of the flammable vapor, and the side of the combustibility. Doing so may result in fire or ezABSO may become faulty. - Do not use in areas where strong magnetic fields exist; otherwise, it will cause injury or malfunction.
❗	- Be sure to use ezABSO in the environment designated by the general specifications in the manual. Failure to do so may result in electric shock, fire, malfunction or ezABSO failure. - Be sure to use the specified combination of ezABSO and cable; otherwise, it may cause fire or ezABSO failure.

2. Transport

⚠ CAUTION	
⃠	- Do not hold the cable or shaft of ezABSO during transport; otherwise, it will cause injury or failure.

3. Storage

⚠ CAUTION	
⃠	- Do not store ezABSO in a place exposed to water, or toxic gas and liquid. - Do not to store in areas where strong magnetic fields exist.
❗	- Be sure to store ezABSO in designed temperature and humidity range, and do not exposed to direct sunlight. - Be sure to consult with NSD when ezABSO is stored for long periods.

4. Installation

⚠ CAUTION	
⃠	- Do not step on ezABSO or place heavy objects on ezABSO; otherwise, it will cause injury or malfunction. - Do not subject ezABSO to strong impact shocks; otherwise, it will cause ezABSO failure.
❗	- Be sure that ezABSO mounting adequately supports its weight. Failure to do so may result in ezABSO falling and possibly causing injury. - Mount ezABSO in the prescribed manner. Failure to do so may cause ezABSO to fall or malfunction, possible resulting in injury. - Be sure to use a coupling device to link shafts; otherwise, it will cause injury, malfunction, or ezABSO failure.

5. Wiring

⚠ CAUTION	
❗	- Be sure to keep the cable at least 300 mm away from the power line; otherwise it may malfunction. - Be sure to connect all cables correctly; otherwise, it may cause malfunction or ezABSO failure.

6. Operation

⚠ CAUTION	
⃠	- Do not change the ezABSO's function switch settings during the operation; otherwise, it will cause injury. - Do not approach the machine after instantaneous power failure has been recovered. Doing so may result in injury if the machine starts abruptly.
❗	- Be sure to check that the power supply specifications are correct; otherwise, it may cause ezABSO failure. - Be sure to provide an external emergency stop circuit so that operation can be stopped with power supply terminated immediately. - Be sure to conduct independent trial runs for ezABSO before mounting ezABSO to the machine; otherwise, it may cause injury. - When an error occurs, be sure to eliminate the cause, ensure safety, and reset the error before restarting operation; otherwise, it may cause injury.

7. Maintenance and Inspection

⚠ CAUTION	
⃠	- Do not disassemble, remodel, or repair ezABSO; otherwise, it will cause electric shock, fire, and ezABSO failure.

8. Disposal

⚠ CAUTION	
⃠	- Be sure to handle ezABSO as industrial waste while disposing of it.

REVISION HISTORY

The Document No. appears at the upper right of this manual's cover page.

Document No.	Date	Revision Description
ZEF005953400	5, Feb., 2021	1st Edition Japanese document: ZEF005953200
ZEF005953401	10, Mar., 2023	2nd Edition Japanese document: ZEF005953201
ZEF005953402	26, July, 2023	3rd Edition Japanese document: ZEF005953202

1. OVERVIEW

EZA-MAPRB-01G (hereinafter referred to as EZA-MAPRB) is a multi-turn type rotary encoder which adopts the electromagnetic induction method. A converter is incorporated in the sensor, and the machine positions can be detected by only a sensor unit.
The open field network "PROFIBUS-DP" is used for communicating with the host controller.

●A difference between existing models and EZA-MAPRB-01G

The cable gland shape is different between the following existing models and EZA-MAPRB-01G.

- EZA-MAPRB-01F
- EZA-MAPRB-01T

Change to the cable gland supplied with this product when replacing the existing model.

1-1. Features

(1) Long-life

No electrolytic capacitor, light-emitting element, light-receiving element, and variable resistor are used.

(2) Superior durability

Withstands vibrations and impact shocks because the EZA-MAPRB doesn't have a glass slit plate.

(3) Position data

Detects maximum 8,778 turns of the position data.
The maximum divisions per turn are 262,144 divisions. (The value can be changed by the parameter.)

(4) Connection with PROFIBUS-DP

The position, preset, monitor, and parameter data can be transmitted via PROFIBUS-DP.
The terminator that is mounted in EZA-MAPRB can be set.

(5) Error detection function

Detects a power supply voltage, temperature, and usage status errors (alarm).
The use status such as a power supply voltage, temperature, and operation time can be monitored by PROFIBUS-DP or ezSCOPE.

(6) Preset function

The position data can be set to a desired value by the master device of the PROFIBUS-DP.

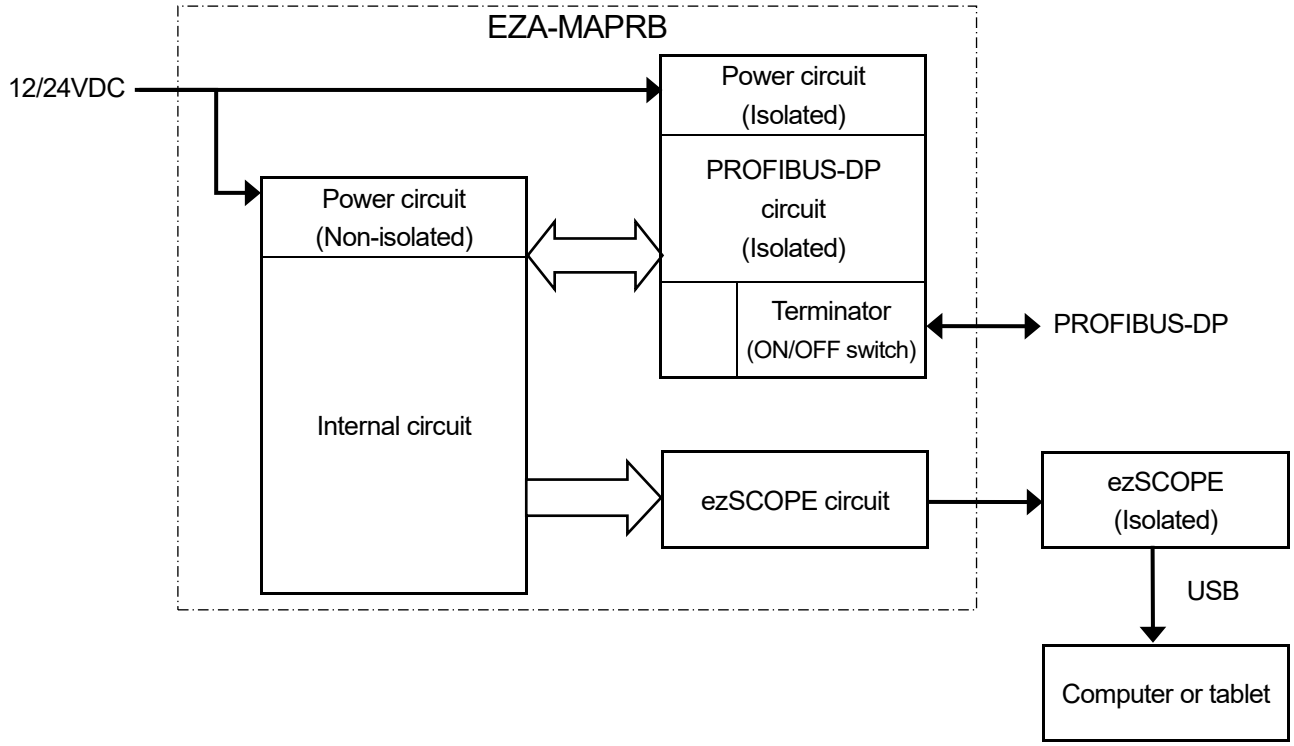
(7) Parameter

The operation (parameter data) can be changed by the configuration tool for PROFIBUS-DP (software for PROFIBUS-DP configuration) and GSD file.

(8) ezSCOPE

With using the device (ezSCOPE) for monitoring, EZA-MAPRB status can be checked by software for ezSCOPE of the computer or tablet.

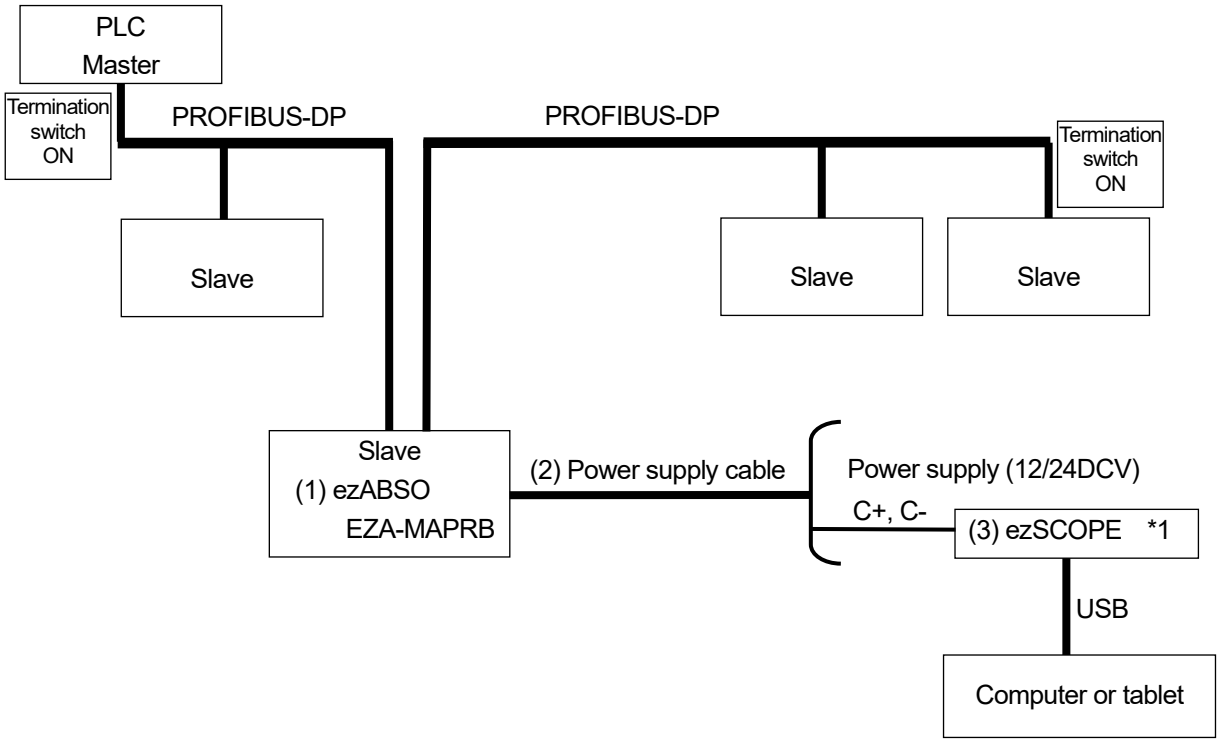
1-2. Internal Block Diagram



2. MODEL SELECTION WHEN ORDERING

The following figure indicates the connection configuration of EZA-MAPRB.
Before ordering, refer to the connection configuration and model list. Please prepare by customer except (1) and (3) in the connection configuration.

2-1. Connection Configuration



*1: ezSCOPE isn't needed for the normal operation.
ezSCOPE is a monitoring device for EZA-MAPRB. Use it for monitoring the sensor system normality or operation status.
ezSCOPE is connected to EZA-MAPRB and computer with two signals (C+ and C-)of power supply cable and USB cable. EZA-MAPRB data is sent to the computer or tablet by the software for ezSCOPE.
The signal line between EZA-MAPRB and ezSCOPE is isolated, thus the sensor operation isn't affected from the disturbance.

2-2. Model List

No.	Models	Descriptions
(1)	EZA-MAPRB-01G	ezABSO - Multi-turn type - PROFIBUS-DP - Cable connection method: Cable gland
(2)	KVC-36SBT 4(2P) × 0.5mm^2	ezABSO power supply cable (recommended product)
(3)	EZSCP-01	ezSCOPE
	EZSCP-TXMDL-01	Infrared transmission module (Option)

3. SPECIFICATIONS

3-1. EZA-MAPRB Specifications

3-1-1. General specification

Items	Specifications
Power supply voltage	10.8 to 28.8 DCV (including ripple)
Current consumption	240mA or less (at 12DCV) 120mA or less (at 24DCV)
Insulation resistance	10 M-Ohms or more between DC power terminals and case (by 500 VDC insulation resistance tester)
Withstand voltage	500 VAC, 60Hz for 1 minute between DC power terminals and case
Vibration resistance	200m/s^2 55 to 2,000Hz (JIS C 60068-2-6)
Shock resistance	2,000m/s^2 (6ms, JIS C 60068-2-27)
Ambient operating temperature *1	-20 to +80°C (No condensation)
Ambient storage temperature	-20 to +90℃ (No condensation)
Outside dimension (mm)	[Refer to dimensions for details.]
Mass	Approx. 0.5kg

*1: The ambient operation temperature indicates the surface temperature of EZA-MAPRB's case side.
Pay attention to EZA-MAPRB mounting part because it might be high temperature even though the ambient temperature is low.

3-1-2. Mechanical specification

Items	Specifications
Position detection format	Electromagnetic induction method
Shaft diameter	10mm
Protection rating	IP66 Shaft seal part: IP64 (during the shaft rotation)
Permissible shaft load	Radial: 40N Thrust: 20N
Permissible mechanical speed	6,000r/min (continuous operation)
Linearity error	0.03° (±0.015°)
Moment of inertia	1 x 10^{-6} kg·m^2
Starting torque	0.02N·m

3-1-3. Function specification

Items	Specifications
Total number of turns	8,778
Total number of divisions	Max. 2,301,100,032 divisions (8,778 turns x 262,144 per turn) *1 Factory setting: 575,275,008 divisions (8,778 turns x 65,536 per turn)
Output code	Binary code
Internal updating cycle	0.4ms (Position data, Speed data)
Error detection	Power supply voltage alarm, Internal temperature alarm, Rotation speed alarm, Setting alarm Sensor error, Memory error, Hardware error, Switch setting error
Monitor function	EZA-MAPRB can be connected to ezSCOPE.
Monitor LED	READY: System ready ERROR: Error occurred DTEX: Connection to PROFIBUS-DP master
Switch setting	Node address setting for PROFIBUS-DP Terminator setting for PROFIBUS-DP
Function, parameter setting	Position data increase direction Current position preset function Scaling function selection Scaling data Sensor low-pass filter Sensor median filter

*1: The number of divisions can be changed by the parameter setting (scaling data).
262,144 and 65,536 are number of divisions per turn.

3-1-4. PROFIBUS-DP specification

Items	Specifications
Interface	PROFIBUS-DP (V0)
Baud rates	9.6k,19.2k,45.45k,93.75k,187.5k,500k,1.5M,3M,6M,12M [bps] (Automatic Baud Rate Identification)
Supported Global Control	Freeze,Sync
Set_Slave_Address	not supported
Station type	modular device
Max_Module	1
Max_Input_length	5 / 10 [bytes]
Max_output_length	5 / 10 [bytes]
Extended diagnostic information	2 [bytes]
Ext_Module_Prm_Data_Length	7[bytes]
Others	Refer to the GSD file for details

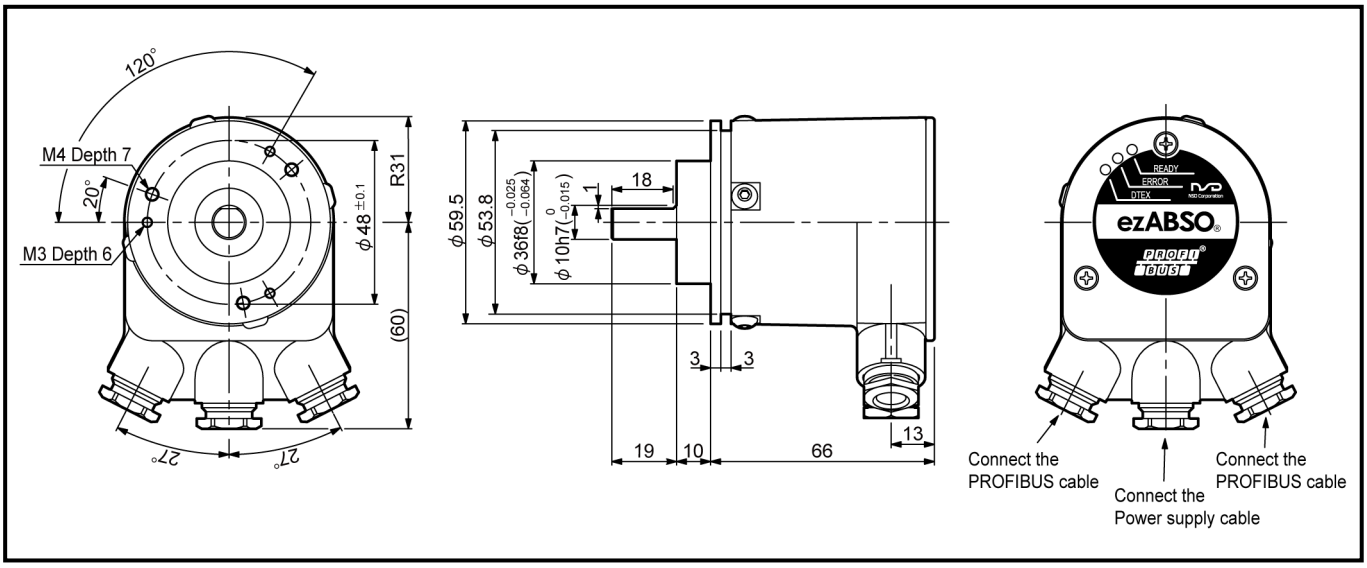
3-1-5. Terminal block for internal wiring specification

Items		Specifications	Remarks
Terminal block model		SPTA 1/12-3,5 (Manufactured by PHOENIX CONTACT GmbH & Co. KG)	—
Pin spacing		3.5mm	—
Pin spacing		8mm	—
Wire size	Solid wire	0.2mm^2 to 1.5mm^2	—
			—
	Flexible wire	0.2mm^2 to 1mm^2 (AWG24 to AWG16)	—
			—
Ferrule (Rod terminal)		0.25mm^2 to 0.75mm^2	Cover the rod terminals with the tubes in order to prevent contacting the rod terminals when using them.

*: Insert the wire by pressing the orange part on the terminal block if it is inserted to the terminal block directly. Remove the wire by pressing the orange part of the terminal block when removing the wiring.

4. DIMENSIONS

Units: mm



5. CHECKING THE CONTENTS OF THE SHIPPING CASE

Open the packing case, and verify that all items are present.

Packing list

①(EZA-MAPRB-01G) is shipped with ② (sealing plug) and ③(cable gland) which are mounted on it.

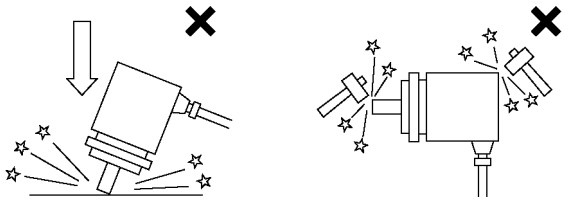
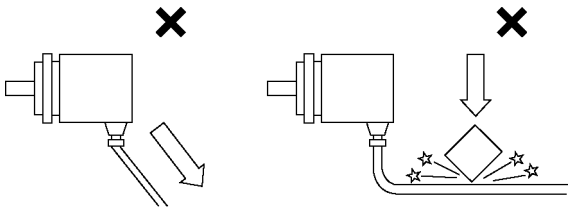
<table>
<tr><td>No.</td><td>①</td><td>②</td><td colspan="2">③</td></tr>
<tr><td rowspan="4">Shape</td><td rowspan="4">  </td><td rowspan="4"> 
*: Insert this product if the cable isn't inserted in the cable gland.</td><td>Push nut
  </td><td>Spacer
  </td></tr>
<tr><td>Rubber bush
  </td><td>Contact sleeve
  </td></tr>
<tr><td>Double ring
  </td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Model</td><td>EZA-MAPRB-01G</td><td>Sealing plug</td><td colspan="2">Cable gland</td></tr>
<tr><td>Quantity</td><td>1 unit</td><td>1 piece</td><td colspan="2">3 pieces</td></tr>
</table>

6. INSTALLATION

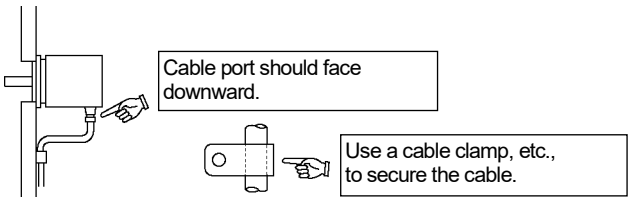
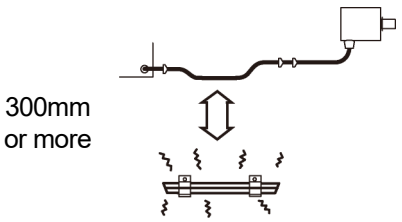
6-1. EZA-MAPRB Installation Condition and Precaution

The installation conditions and precautions for EZA-MAPRB are described in this section.

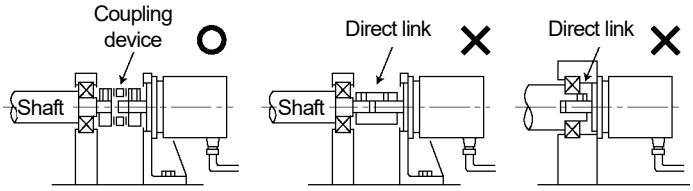
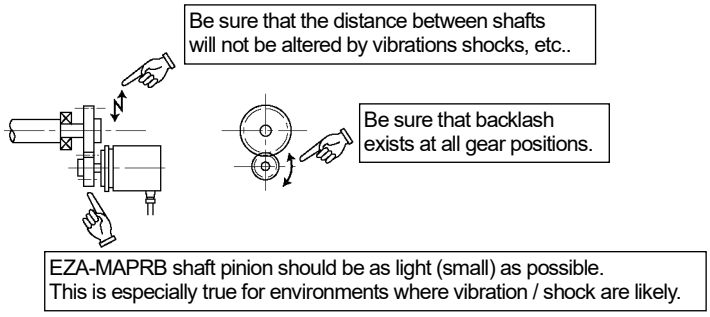
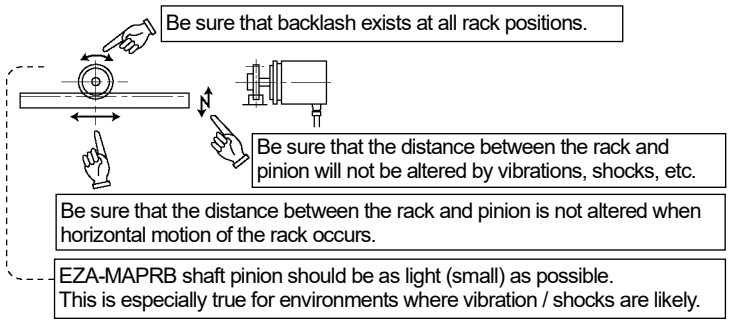
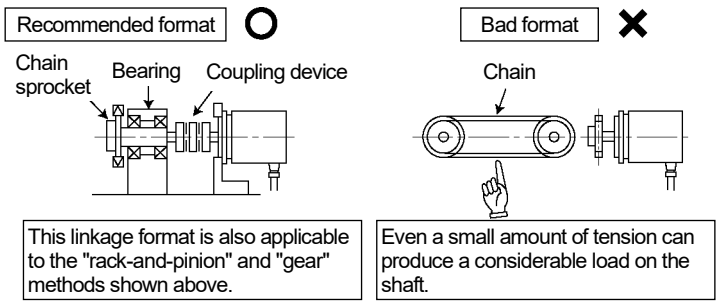
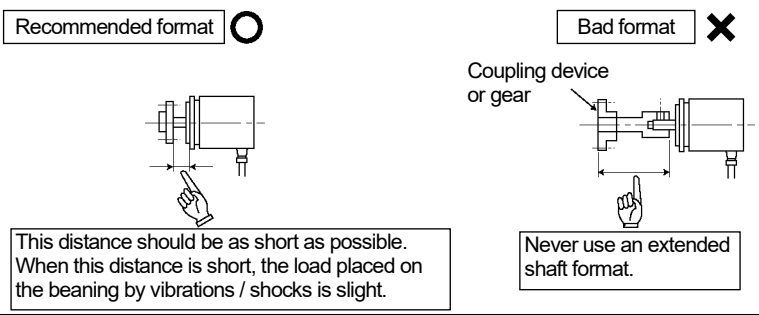
● Handling of EZA-MAPRB

Item	Explanation	Precaution
(1) Main unit	Do not loose a screw or nut except the rear lid. Do not disassemble or remodel EZA-MAPRB. Secure tightly with screws on the rear lid before the operation.	–
(2) Main unit	Never drop EZA-MAPRB, or subject it to excessive forces or shocks. 	–
(3) Main unit	Do not allow any foreign object (e.g. cutting chips, wire strips) to get into EZA-MAPRB.	–
(4) Main unit	Never directly touch this EZA-MAPRB's conductive areas.	–
(5) Cable	Avoid stepping on, or applying excessive stress to the cable. 	–

● Mounting of EZA-MAPRB

Item	Explanation	Precaution
(1) Mounting	Install EZA-MAPRB by referring to “4. DIMENTIONS”.	—
(2) Cable port	Cable port should face downward.  	—
(3) Cable	Use a flexible cable if a cable moves.	—
(4) Wiring	The cable should be located at least 300mm away from power lines and other lines which generate a high level of electrical noise.  	—
(5) Wiring	EZA-MAPRB has electrical parts inside. Never subject it to excessive shocks by tools.	The performance of EZA-MAPRB might decline or EZA-MAPRB might have a malfunction.
(6) Wiring	Be sure to shut off all power before executing wiring, installing, or uninstalling.	—

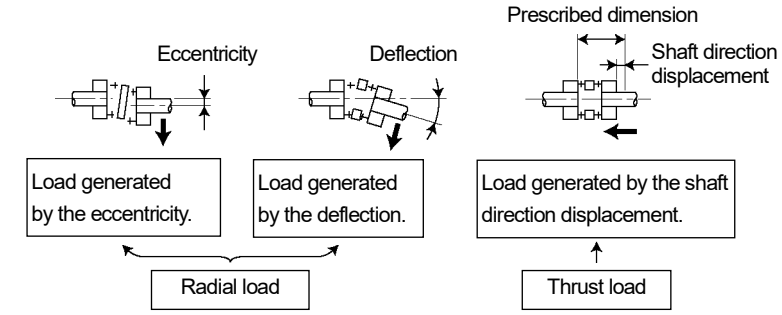
● Mounting of EZA-MAPRB

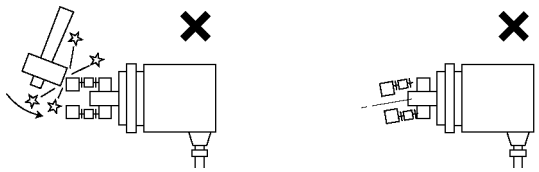
Item	Explanation	Precaution
(1) Coupling of machine shaft and EZA-MAPRB shaft	Be sure to use a coupling device to link the 2 shafts. 	A “direct-link” installation will result in shaft fatigue and / or breakage after using long periods.
(2) For gear-type linkage	If a gear linkage is used, be sure that some backlash exists. 	Incorrect gear mounting can result in shaft bending or breakage.
(3) For rack and pinion type linkage	Be sure that backlash exists at all rack positions. 	Incorrect rack and pinion mounting can result in shaft bending or breakage.
(4) Chain or timing belt linkage	When a chain or timing belt linkage format is used, there is an inherent risk of the shaft's load being increased by the resulting tension. Therefore, a bearing should be used, with the shafts being linked by a coupling device immediately behind the bearing. 	–
(5) Shaft mounting position	The coupling device or gear should be attached to the shaft at a point which is as near to the EZA-MAPRB body as possible. 	–

●Coupling for EZA-MAPRB

<table>
<tr><th>Item</th><th>Explanation</th><th>Precaution</th></tr>
<tr><td rowspan="2">(1) Coupling device selection precaution</td><td>1. Selection of the coupling device should be based on the following factors;
- Amount of a mounting error caused by machine design.
- Permissible error of coupling device.
- Reaction force of coupling device.
- Permissible shaft load of EZA-MAPRB.

Amount of a mounting error caused by machine design. < Permissible error of coupling device. Reaction force of coupling device. < Permissible shaft load of EZA-MAPRB.

Mounting error
 
</td><td rowspan="3">If the selected coupling device is larger than necessary (When used in high vibration/shock environments), the load which is applied to the shaft by the vibrations/shocks will be increased by the weight of the coupling device.

Excessive force applied to the shaft might deform the coupling and reduce durability.</td></tr>
<tr><td>2. Be sure to select a coupling device with an adequate transmission torque surplus relative to the EZA-MAPRB shaft's torque.</td></tr>
<tr><td>(2) Coupling device installation precaution</td><td>Avoid bending or damaging the coupling.
  </td></tr>
<tr><td>(3) Recommended coupling</td><td>Micro-coupling (Manufactured by Daido Precision Industries Ltd.)

If there is a possibility of electric corrosion on the bearing, an insulated micro coupling is recommended.</td><td>—</td></tr>
</table>

6-2. Cable Connection

6-2-1. Wiring precautions for the cables

(1) Do not bind or close the cable which is connected to EZA-MAPRB with the main circuit cable and the power supply cable. If location near the above cables is unavoidable, the cable ducts should be separated with individual wiring conduits being provided.

(2) When wiring conduits are used, they should be securely grounded.

(3) Use all cable gland parts, and tighten the cable gland securely.
Tighten the push nut of cable gland securely.
It will cause the connection failure, deterioration of waterproof, damage of the internal board if the cable gland isn't tightened.
For the tightening of the cable gland, refer to "6-2-4. Precaution for the cable gland".

(4) Use the robotic cables for movable parts.

(5) The shield wire should be grounded at the spacious area for preventing noises.

6-2-2. Wiring precautions for the power supply cable

(1) Use the twist pair cable with shield.

(2) Twist the wires for the power supply (24VDC and 0V) and ezSCOPE (C+ and C-) individually in order to prevent noises, and use combinations of the twist.

(3) The cable length should be decided with considering the voltage drops. (Refer to *1)

(4) Use the cable whose finished outer diameter must be 7 to 8mm.
It might cause the connection failure, deterioration of waterproof, and damage of the internal board.

Recommended cable

Cable	Model	Manufacturer
Power supply cable	KVC-36SBT 4(2P) x 0.5mm^2 *1	Kuramo Electric Co., LTD.

*1: The maximum cable length will be calculated by following formulas if the supply voltage is 24V±10%.
(Refer to "ezSCOPE specifications and instruction manual" for cable models and maximum cable lengths between EZA-MAPRB and ezSCOPE.)

Conductor resistance of KVC-36SBT 4(2P) x 0.5mm^2: 34.3Ω/km [20℃ or less] (loop resistance 68.6Ω/km)
Current consumption of EZA-MAPRB: 0.24A (at 12VDC of power supply voltage)
Allowable voltage difference of cable: (24V x 0.9)−10.8V = 10.8V
Allowable resistance value of cable: 10.8V / 0.24A = 45Ω
Maximum cable length: 45Ω / 68.6Ω = 0.655km → 655m

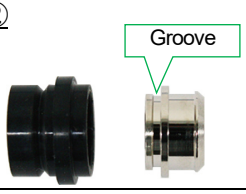
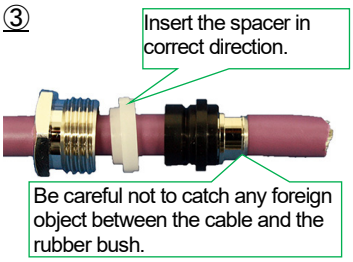
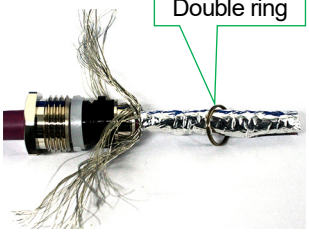
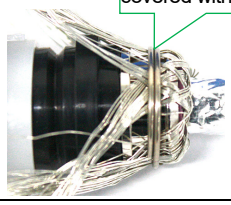
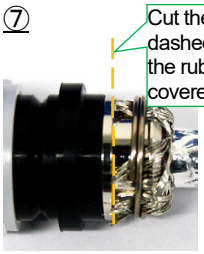
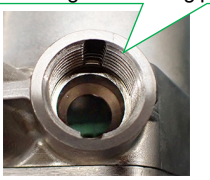
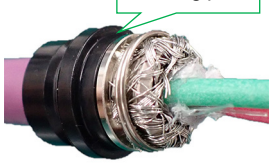
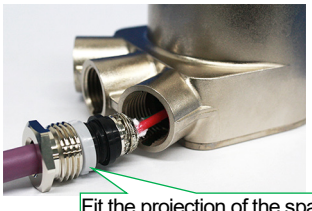
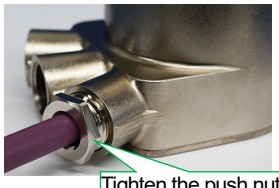
6-2-3. Wiring precautions for the PROFIBUS-DP cable

(1) Use the cable for PROFIBUS-DP whose finished outer diameter must be 7 to 8mm.
It might cause the connection failure, deterioration of waterproof, and damage of the internal board
(2) We recommend to be the cable length 1m or more between modules.
(3) The branch line cannot be used if the baud rate is faster than 1.5Mbps.
(4) Refer to "Installation guidelines" for wiring PROFUBUS-DP
Download the Installation guidelines from the web site of “PROFIBUS & PROFINET International”.
(http://www.profibus.com)
(5) PROFIBUS-DP cable should be connected to IN side of the terminal block for internal wiring when turning ON the terminator (termination switch).

6-2-4. Precaution for the cable gland

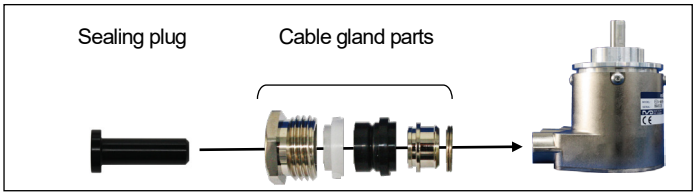
(1) Process the shield of PROFIBUS-DP cable and power supply cable on the EZA-MAPRB side by referring to the following photos for preventing noises.

Cable Gland Parts

①  ② 	① Check that there is no foreign object adhering to the rubber bush. If adhering, remove it. ② Insert the contact sleeve to the rubber bush. (Insert the contact sleeve in correct direction.)
③  ④ 	③ Insert the cable to the push nut, spacer, and parts assembled in step ②. At this time, be careful not to catch any foreign object between the cable and the rubber bush. **NOTE** Foreign objects caught between the cable and the rubber bush may cause the deterioration of waterproof. ④ Strip the sheath of the cable approximately 40mm.
⑤  ⑥ 	⑤ Fold all shields back, and cover the contact sleeve. ⑥ Put the double ring on the contact sleeve covered with the shield.
⑦  ⑧ 	⑦ Cut the shield at the dashed line to avoiding the rubber bush being covered with the shield. ⑧ Strip the cover for each wire.(Stripping length: 8mm)
⑨  	⑨ Check that there is no foreign object adhering to the cable gland inserting part of the case and the rubber bush of the cable gland. If adhering, remove it. Be especially careful as the contact sleeve side becomes the sealing part of the rubber bush. **NOTE** Foreign objects caught between the case and the rubber bush may cause the deterioration of waterproof.
⑩  ⑪ 	⑩ Insert to EZA-MAPRB in order to prevent the shield slipping off from the contact sleeve. ⑪ Tighten the push nut by wrench. (Tightening torque: 3N・m)

(2) Process following methods on the power supply and master sides for preventing noises.
- Ground the shield section of the power supply cable at the spacious area on the power supply side.
- Ground the shield section of PROFIBUS-DP cable at the spacious area on the master side.

(3) Insert the sealing plug to the cable insertion hole for preventing water and dusts if a cable isn't inserted to the hole.



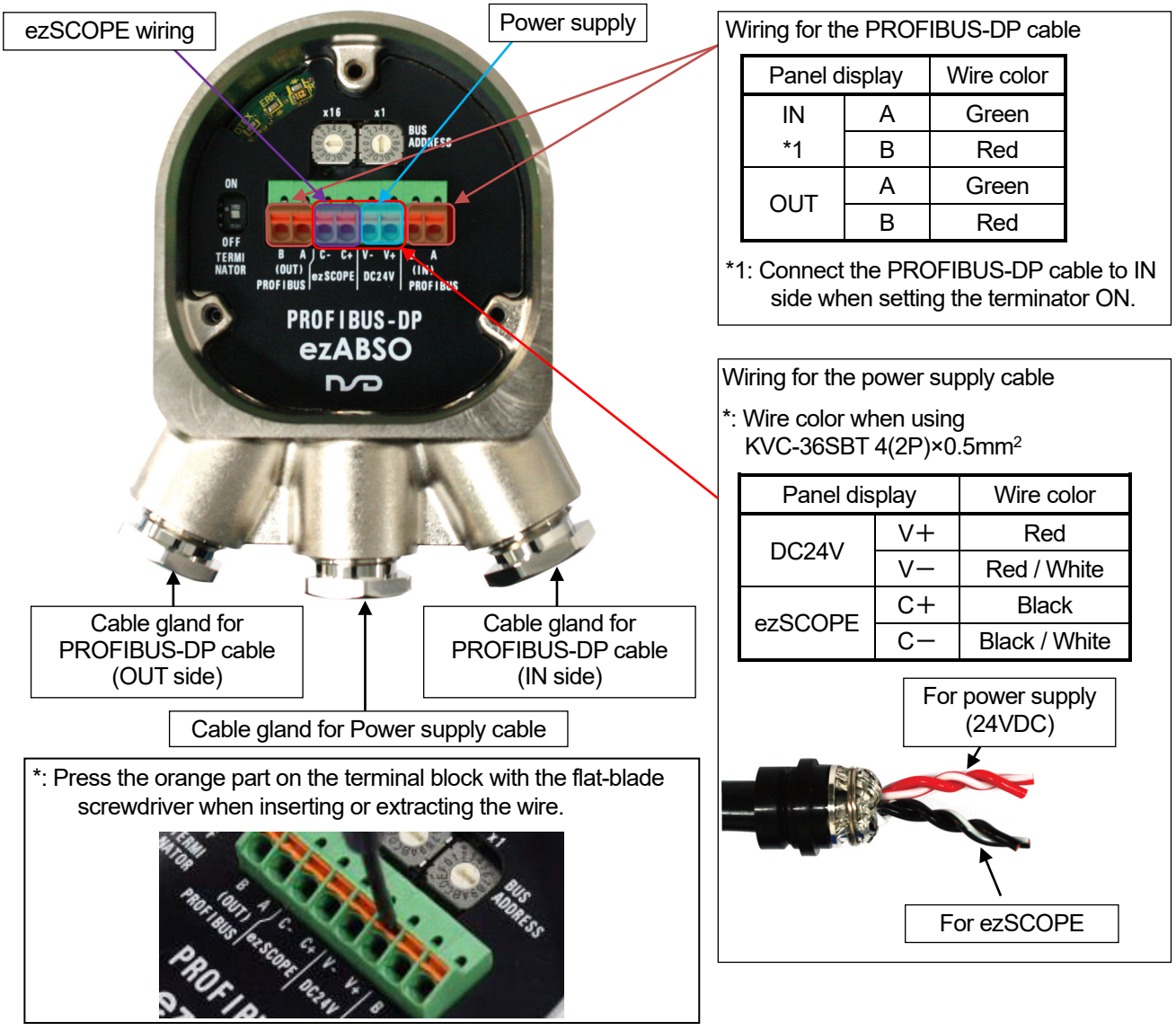
(4) Tighten the push nut of cable gland to the designated tightening torque. (Tightening torque: 3N·m)

6-3. Ground

EZA-MAPRB case must be securely grounded (ground resistance of 100 ohm or less) to prevent electrical shocks and noises

6-4. Internal Wiring

The rear lid can be taken off when removing screws (3-piece) which is on the opposite side of the shaft.
Wire and set the switches.
For the switch setting, refer to "7-2. Switch Setting".
For the wire specifications, refer to "3-1-5. Terminal block for internal wiring specification".



Wiring for the PROFIBUS-DP cable

Panel display		Wire color
IN *1	A	Green
	B	Red
OUT	A	Green
	B	Red

*1: Connect the PROFIBUS-DP cable to IN side when setting the terminator ON.

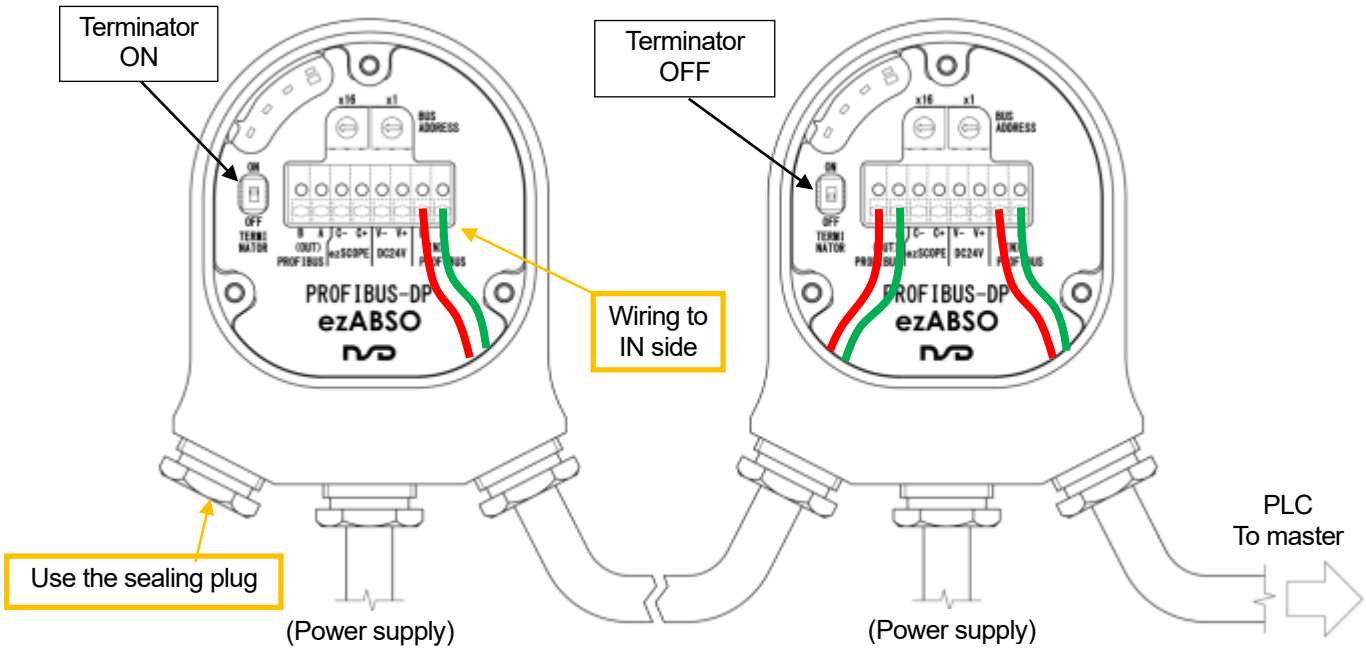
Wiring for the power supply cable

*: Wire color when using KVC-36SBT 4(2P)×0.5mm^2

Panel display		Wire color
DC24V	V+	Red
	V−	Red / White
ezSCOPE	C+	Black
	C−	Black / White

*: Press the orange part on the terminal block with the flat-blade screwdriver when inserting or extracting the wire.

●PROFIBUS-DP Cable wiring diagram (without lid)



NOTE

- The terminal (OUT side) of the PROFIBUS-DP cable wiring part won't be connected to any circuit if the terminator is set to ON. (It isn't connected to internal EZA-MAPRB and IN side.) Therefore, PROFIBUS-DP communication isn't executed even though the PROFIBUS-DP cable is wired to OUT side.
- Insert the sealing plug to the cable gland on the OUT side for PROFIBUS-DP cable when the terminator is set to ON, and then tighten the push nut (Use all cable gland parts.)
- Check the wire connecting to the terminal block securely.
- Electrical components are used inside of EZA-MAPRB. Do not give impact shocks to them by tools. It may cause failure.
- Do not allow any cutting chips and wire strips to get into EZA-MAPRB.
- After wiring internal cables and setting the switches, mount the rear lid securely without a wire being caught in it.
- Cover the rod terminals with the tubes in order to prevent contacting the rod terminals or the rear lid when using them.
- Don't insert two or more wires or rod terminals in one terminal.
- Refer to "3-1-5.Terminal block for internal wiring specification" for specifications of wires connected to the terminal block and rod terminals. Do not apply excessive force to wires and rod terminals after connecting the terminal block.

6-5. External Connecting Devices

6-5-1. Power supply

(1) The power supply capacity should be more than twice the current consumption of EZA-MAPRB. Refer to "3-1-1. General specification" for the current consumption of EZA-MAPRB. Consider the voltage drop of the cable.

(2) The power supply must have an over current protector.

(3) Use the power supply which should be isolated from the commercial one.

6-5-2. ezSCOPE

(1) Refer to "ezSCOPE specifications and instruction manual" for maximum cable lengths between EZA-MAPRB and ezSCOPE.

(2) The following cables are recommended to extend the length.
① KPEV-SB (Instrumentation cable with the shield), 0.5mm^2 or more
② LAN cable (with the shield) * No category specified

(3) Open the signal for ezSCOPE when not using ezSCOPE.

7. NOMENCLATURE

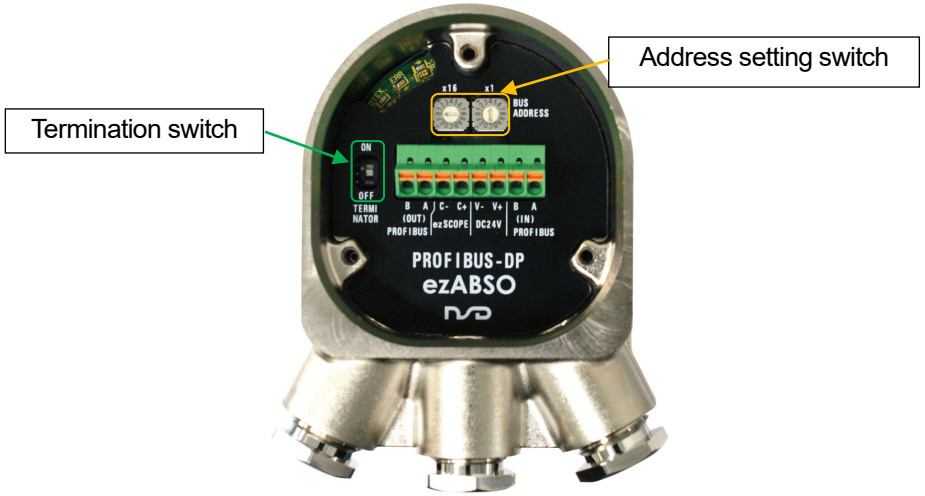
7-1. Display Contents of the Monitor LEDs

The opposite side of the shaft has the monitor LED.

Display Monitor LED	Contents
READY	LED turns ON when EZA-MAPRB operates normally. "READY (byte offset4 bit2)" of the input data is changed to "1" simultaneously during PROFIBUS communication. (For details of lighting condition, refer to "8-6. Error Detection".)
ERROR	LED turns ON when EZA-MAPRB has an error. ERROR (byte offset4 bit1) of the input data and Ext_Diag (byte offset0 bit3) of the diagnostic data are changed to "1" simultaneously during the PROFIBUS communication. (For details of lighting condition, refer to "8-6. Error Detection".)
DTEX	LED turns ON when data can be updated by PROFIBUS-DP. Communication should be established between EZA-MAPRB and the master unit by using PROFIBUS-DP configuration tool (PROFIBUS-DP configuration software). If not, the LED doesn't turn ON.

7-2. Switch Setting

The rear lid can be taken off when removing screws (3-piece) which is on the opposite side of the shaft.
Set the switches.



7-2-1. Address setting switch (BUS ADDRESS)

Set the PROFIBUS-DP node address by the address setting switches.
Set the address to H7D(125) or less by hexadecimal number. (Factory setting: H00)

7-2-2. Termination switch (TERMINATOR)

Set that the terminator which is incorporated in EZA-MAPRB is valid or invalid.
ON : Valid
OFF : Invalid (factory setting)

The terminal (OUT side) of the PROFIBUS-DP cable wiring part won't be connected to any circuit if the terminator is set to ON. (It isn't connected to internal EZA-MAPRB and IN side.)
Therefore, PROFIBUS-DP communication isn't executed even though the PROFIBUS-DP cable is wired to OUT side.

8. PROFIBUS-DP Communication

Master: PLC etc.
Slave: EZA-MAPRB

※ Download GSD file for EZA-MAPRB from NSD web site.

(Note: The parameter initial value may be different depending on GSD version.)

8-1. Module

Data contents which are communicated by Input or Output Data can be selected by module selection.
Refer to the following sections "8-2. Input Data", "8-3. Output Data", and "8-4. Monitor" for the communication data when selecting each module

Module name	Input/Output data length	Contents
EZA-MAPRB-01(Position)	5 /5 [bytes]	Input : Position, Status data Output: Preset
EZA-MAPRB-01(Position, Monitor)	10 / 10 [bytes]	Input : Position, Status data, Monitor Output : Preset, Monitor selection code

8-2. Input Data (Slave → Master)

8-2-1. Input Data list

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	Remarks
0	D31 (MSB)	D30	D29	D28	D27	D26	D25	D24	Position data
1	D23	D22	D21	D20	D19	D18	D17	D16	
2	D15	D14	D13	D12	D11	D10	D9	D8	
3	D7	D6	D5	D4	D3	D2	D1	D0 (LSB)	
4	0	0	0	0	0	READY	ERROR	PRESET ANSWER	Status

Signal name	Name	Information	Description
D0-31	Position data	Reads out the position by binary data.	
PRESET ANSWER	Preset answer back	This is an operation checking signal of PRESET. (Refer to "8-3-2. Preset timing".)	
ERROR *1	Error	0	No error has occurred on EZA-MAPRB.
		1	One of following errors has occurred; Sensor error, memory error, hardware error, power supply voltage alarm, internal temperature alarm, rotation speed alarm, setting alarm (For the details of errors, refer to "8-6. Error Detection".)
READY *2	Ready	0	One of following errors has occurred; Sensor error, memory error, hardware error (For the details of errors, refer to "8-6. Error Detection".)
		1	EZA-MAPRB operates normally.

*1: The ERROR LED turns ON when ERROR of Input Data is "1".
Ext_Diag (byte offset0 bit3) of Diagnostic Data is changed to "1".
*2: READY LED turns ON when READY of the Input Data is "1"

The following data can be read when selecting the EZA-MAPRB-01(Position, Monitor) module.

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	Remarks
5	Answer back for monitor selection code								Monitor
6	(MSB) Monitor data								
7									
8									
9								(LSB)	

Name	Description
Answer back for monitor selection code	This is a confirmation data of the monitor selection code. Monitor data indicated by the monitor selection code answerback can be read from byte offset 6~9 (Monitor data). (Refer to “8-4. Monitor”.)
Monitor data	This is the internal status data of EZA-MAPRB designated by the monitor selection code (Refer to “8-4. Monitor”.)

● Setting of position data division number

The division number of the position data per turn can be changed by the scaling data setting.
Set "8,778 turns (Total number of turns) × division number of data per turn" when changing it.
For the scaling data setting, refer to "8-5. Parameter Setting".

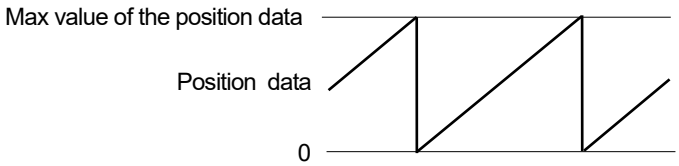
For the following example ① and ②, the scaling data setting value is designated to "8778 x 2^n "
(2^n =division number of data per turn).
In this case, the specific bit range can read out as the single-turn data or multi-turn data.

For the following example ③, the scaling data setting value is designated to a value except "8778 x 2^n "
(2^n =division number of data per turn).
In this case, specific bit range cannot readout as the single-turn data or multi-turn data.

<table>
<tr><th rowspan="2">Ex.</th><th rowspan="2">Scaling data setting value</th><th colspan="12">Position data (32bit)</th></tr>
<tr><th>D31</th><th>D30</th><th>D29</th><th>・・・・・・・・</th><th>D18</th><th>D17</th><th>D16</th><th>D15</th><th>・・・・・・・・</th><th>D0</th></tr>
<tr><td rowspan="2">①</td><td rowspan="2">(Factory setting)
575,275,008
=8,778 turns x 65,536 / turn</td><td rowspan="2">0</td><td rowspan="2">0</td><td colspan="6">Multi-turn data
H 0 ~ H 2249 : 0 ~ 8,777</td><td colspan="6">Single-turn data: 16bit
H 0 ~ H FFFF : 0 ~ 65,535</td></tr>
<tr><td colspan="12">Position data range: H 0～H 2249 FFFF : 0～575,275,007</td></tr>
<tr><td rowspan="2">②</td><td rowspan="2">(Maximum value of the total division number)
When scaling is invalid,
2,301,100,032
=8,778 turns x 262,144 / turn</td><td colspan="6">Multi-turn data
H 0 ~ H 2249 : 0 ~ 8,777</td><td colspan="6">Single-turn data: 18bit
H 0 ~ H 3 FFFF : 0 ~ 262,143</td></tr>
<tr><td colspan="12">Position data range: H 0 ~ H 8927 FFFF : 0 ~ 2,301,100,031</td></tr>
<tr><td rowspan="2">③</td><td rowspan="2">2^n setting example
2,147,483,648
(=2^{31})</td><td rowspan="2">0</td><td colspan="11">Multi-turn data (8778) x Single-turn data (244,643.8423 divisions)</td></tr>
<tr><td colspan="11">Position data range: H 0 ~ H 7FFF FFFF : 0 ~ 2,147,483,647</td></tr>
</table>

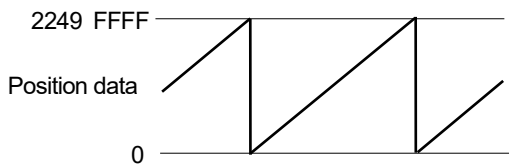
⚠ NOTE

If the position data exceeds the maximum value, the data will return to "0". (If the data exceeds "0", it will become maximum value.)
In the factory setting, if the multi-turn data exceeds 8777 (maximum value), it will return to "0".

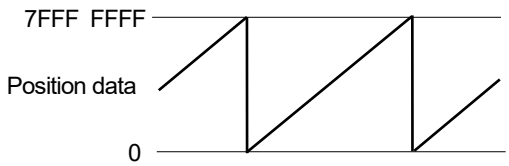


When the position data exceeds maximum value and return to 0, it might be difficult to calculate correct position data if positions of the device which rotates continuously like a roll are detected.
In this case, set the scaling data to "2^n (example ③ in above table)".

(Example① in above table)



(Example ③ in above table)



H 7FFFFFFF (maximum value data) is easier to calculate than H 2249FFFF when calculating the position changing amount which is over 0.

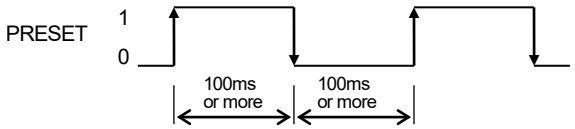
8-3. Output Data (Master → Slave)

8-3-1. Output Data list

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0	PRD31 (MSB)	PRD30	PRD29	PRD28	PRD27	PRD26	PRD25	PRD24	Preset data
1	PRD23	PRD22	PRD21	PRD20	PRD19	PRD18	PRD17	PRD16	
2	PRD15	PRD14	PRD13	PRD12	PRD11	PRD10	PRD9	PRD8	
3	PRD7	PRD6	PRD5	PRD4	PRD3	PRD2	PRD1	PRD0 (LSB)	
4	Reserved (0)						CLR	PRESET	Command

Signal name	Name	Description
PRD0-31	Preset data	The position data can be changed to any desired value (Preset data: PRD0-31) by setting PRESET to "1". *1 (Setting range: 0 ≦preset data ≦ (scaling data－1))
PRESET	Preset	
CLR	Error clear	Designating CLR to "1" can clear an error. *2 (For details of the error, refer to "8-6. Error Detection".) -After CLR is designated to "1", ERROR becomes "0". - After CLR is designated to "0", READY becomes "1".
Reserved		Reserved area for the extension Don't write any number except "0" in this area.

*1: EZA-MAPRB needs a period of 100ms or more until accepting the PRESET signal change from "0 to 1" or "1 to 0".



*2: The error cannot be cleared without removing an error cause.

The following data can be written when selecting the EZA-MAPRB-01(Position, Monitor) module.

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
5	Monitor selection code								－
6	Reserved (0)								－
7									
8									
9									

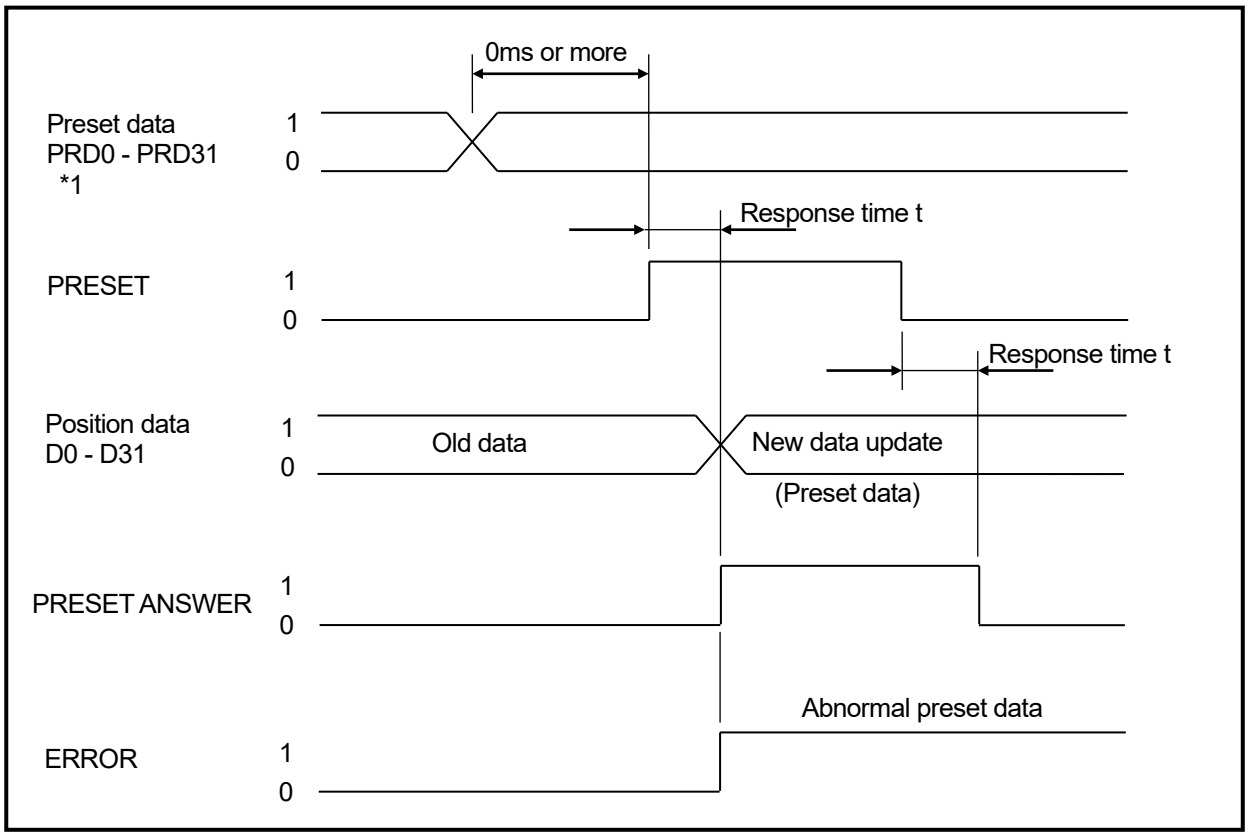
Name	Description
Monitor selection code	Designates the selection code for reading out the internal status of EZA-MAPRB. (Refer to "8-4. Monitor").
Reserved	Reserved area for the extension Don't write any number except "0" in this area.

8-3-2. Preset timing

The position data is changed by the preset data (PRD0-PRD31) and PRESET signal (1 bit) which are written from the master.

The response time from the point when the PRESET signal changes from “0” to “1”, until the preset setting occurs, is shown below.
Response time can be calculated by the following calculation expression.

Response time t =
PLC scan time + PROFIBUS-DP update time + EZA-MAPRB internal process time (Max. 10ms)



*1: The PRESET signal should be changed from "0" to "1", after the Preset data are written. (0ms or more)

*2: When PRESET is executed with writing an out-of-range value of the preset data (preset data≧ scaling data) , the setting alarm is detected and PRESET ANSWER and ERROR changes "1".
The setting alarm is cleared and ERROR is changed to "0" by designating the preset data in the setting range and executing the preset again.

⚠ NOTE

In the following cases, PRESET cannot be done.
And PRESET ANSWER cannot be changed to "1" even though PRESET is changed to "1".
- "Invalid" is designated for the current position preset function of the parameter.
- READY is 0 (OFF). An error (sensor error, hardware error, or memory error) is occurred.

8-4. Monitor

The internal status of EZA-MAPRB selected by the monitor selection code can be read out.

This function is available when selecting EZA-MAPRB-01(Position, Monitor) module.
Refer to "8-1. Module" for selectable module.

8-4-1. Monitor data list

Monitor selection code	bit31~8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	Remarks
H00	0	0	Setting alarm	Rotation speed alarm	Internal temperature alarm	Power supply voltage alarm	Hardware error	Memory error	Sensor error	Error information
H01	Speed data									Operation information
H02	0	0	0	0	0	0	0	0	0	
H03	Power supply voltage									Condition information
H04	Internal temperature									
H05	Operating time									
H06	Serial number									Product information
H07	Divisions/Turn									
H08	Total number of turns									
H09	Current position preset function selection									Parameter information
H0A	Position data increase direction									
H0B	Scaling function selection									
H0C	Scaling data									
H0D	Sensor low-pass filter									
H0E	Sensor median filter									

8-4-2. Monitor data contents

(1) Error information

EZA-MAPRB detects errors. For more details of the error, refer to “8-6. Error Detection".

(2) Operation information

Code	Name	Unit	Description
H01	Speed data	0.1r/min	The speed can be read out by a binary code. (Unit: 0.1 r/min) - Positive numeric value: H 0 ~ H 15F90 (0 ~ 90,000) The shaft of EZA-MAPRB turns in clockwise direction. - Negative numeric value: H FFFF FFFF ~ H FFFE A070 (-1 ~ -90,000) The shaft of EZA-MAPRB turns in counterclockwise direction.

⚠ NOTE

The positive and negative of the speed data cannot reverse even though the position data increase direction is changed.
When the shaft rotates in 9000r/min or more, the speed data might be unstable.

(3) Condition information

Code	Name	Unit	Description
H03	Power supply voltage	0.1V	The power supply voltage which is supplied to EZA-MAPRB is read out. Ex.) 24.0V: 240(HF0)
H04	Internal temperature	℃	The internal temperature is read out. Ex.) 25℃: 25 (H 19) -10 ℃:-10 (H FFFF FFF6)
H05	Operating time	hour (hr.)	Operation time (Power supply ON time) is read out. Ex.) After 80,000 hour is passing: 80,000 (H 1 3880)

⚠ NOTE

The internal temperature is approximately 10℃ higher than the surface (sides of the case) temperature of the EZA-MAPRB.
(Internal temperature is increase about 10℃)

The operation time is measured at internal EZA-MAPRB every 1/8 hours (7.5 minutes), and the monitor data reads out. (The data which is 1 hour or less is omitted.)
The operation time isn't increased when the power supply turns ON less than 7.5 minutes.

* The memory error doesn't occur when the operation time memory is malfunction.
The readout data is-1 (H FFFF FFFF).

(4) Product information

Code	Name	Unit	Description
H06	Serial number	—	The serial number is read out. (Fixed data “8-bit” + binary “24-bit”) * The fixed number of the products whose serial codes start from K is "00".
H07	Divisions/Turn	bit	The maximum division number for 1-turn is read out by bit unit. Fixed at 18 (H 12)
H08	Total number of turns	turns	The total number of turns is read out. Fixed at 8,778 (H 224A)

(5) Parameter information

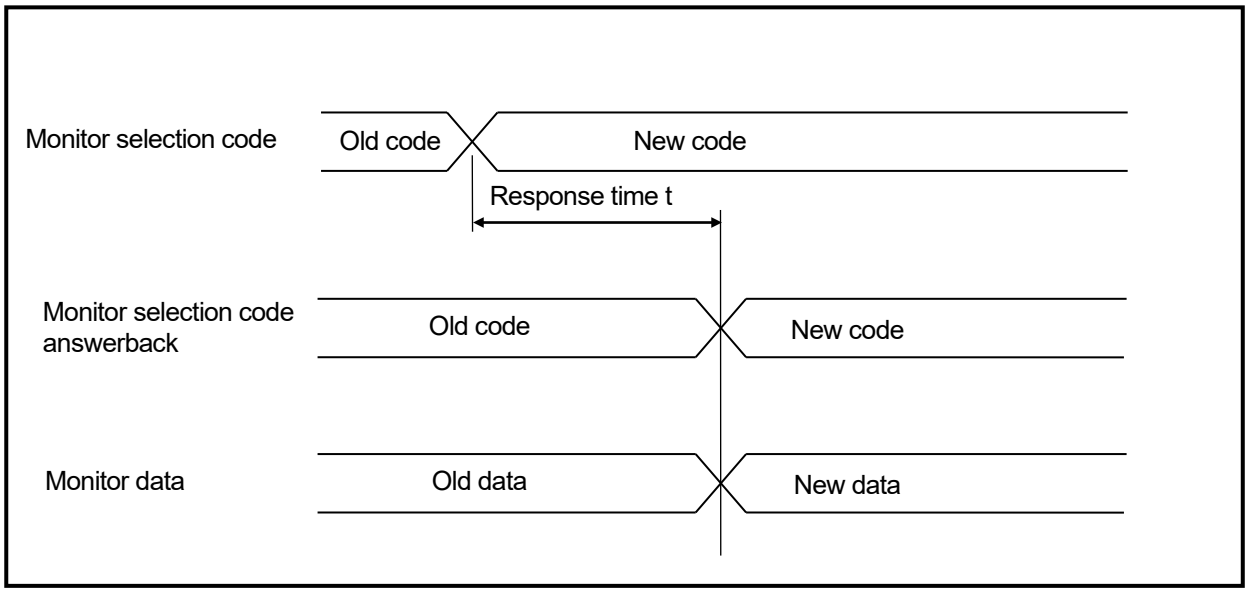
The parameter data are set to EZA-MAPRB.
Refer to "8-5. Parameter".

8-4-3. Monitor selection timing

The monitor selection code answerback and monitor contents are changed by writing the monitor selection code from the master.
Read out the data after checking the monitor selection code answerback value.

The response time from when the monitor selection code is finished to write until the monitor data starts to change is indicated.
The response time can calculate by the following expression.

Response time t =
PLC scan time + PROFIBUS-DP update time + EZA-MAPRB internal process time (Max.0.4ms)



The monitor data is updated by the following interval.

Monitor selection code	EZA-MAPRB monitor data internal update cycle
H01 (Speed data)	0.4ms
H00 (Error information) H03 (Power supply voltage) H04 (Internal temperature)	10ms or less
H05 (Operating time)	1 hour

⚠ NOTE

When the monitor selection code is designated undefined number (H0For more), the monitor data is changed as indicated below.
- The monitor selection code answerback changes to new code (undefined number).
- The monitor data changes to the monitor selection code H00 (error information).

8-5. Parameter

8-5-1. Parameter data list

The parameter is set by the configuration tool for PROFIBUS-DP (software for PROFIBUS-DP configuration) when starting up the system.
If one of following cases occur, Prm_Fault (8-6-1. Diagnostic data list, byte offset0 bit6) will occur and the data cannot be exchanged.

- The parameter setting value is out of the range.
- The fixed value is wrong value.
- The module selection of the configuration setting is different from the actual model.

* Designated parameter is stored at the non-volatile memories in EZA-MAPRB.

※ Download GSD file for EZA-MAPRB from NSD web site.

(Note: The parameter initial value may be different depending on GSD version.)

The setting value of the parameter can be checked by the monitor.
For the checking method, refer to"8-4. Monitor".

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0-6	*	*	*	*	*	*	*	*	For system
7	0	0	0	0	0	0	0	1	Fixed value
8	0	0	1	0	0	Scaling_ function_ selection	Current_ position_ preset_ function	Position_ data_ increase_ direction	
9	0	0	0	Sensor_ median_ filter	Sensor low-pass filter				
10-13	Scaling data								

⚠ NOTE

*: These are system parameters. Do not change the GSD file values.

⚠ NOTE

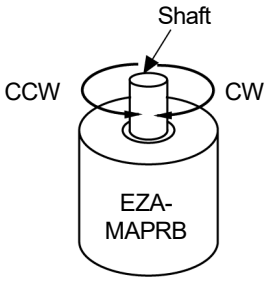
Parameter data is transmitted from the master when the master and PROFIBUIS start communicating.
After turning ON the power supply, previous parameter data is used until the data is transmitted from the master.

8-5-2. Parameter setting contents

(1) Position data increase direction settings

This setting determines rotation direction in which the position data value increases.

byte offset	bit0	Selection Content	Description
8	0	CW **(Factory setting)**	The position data value will increase when the shaft of EZA-MAPRB turns in the clockwise direction as viewed from the shaft end.
	1	CCW	The position data value will increase when the shaft of EZA-MAPRB turns in the counterclockwise direction as viewed from the shaft end.



> ⚠ NOTE
>
> Even though the position data increase direction of the parameter is changed, the speed data's positive and negative isn't reversed.

(2) Current position preset function selections

Select whether "Valid" or "Invalid" to the current position preset function.

byte offset	bit1	Selection Content	Description
8	0	Invalid	The position data cannot be changed by PRESET.
	1	Valid **(Factory setting)**	The position data can be changed by PRESET.

(3) Scaling function selection and scaling data setting

The scaling setting can be changed the division number of the position data per turn.
Set the total number of divisions when changing it.

Scaling function selection

byte offset	bit2	Selection Content	Description
8	0	Invalid	The scaling is invalid. The total division number of the position data is as follows; 8,778 turns x 262,144/turn = 2,301,100,032
	1	Valid **(Factory setting)**	The scaling is valid.

Scaling data

byte offset	Selection Content	Description
10-13	2 ~ 2,301,100,032 **(Factory setting=575,275,008)**	The total division number of the position data is designated. Total number of divisions = “total number of turns (8,778 turns)” x “division number of data per turn”

(4) Sensor low-pass filter

The low-pass filter's cutoff frequency of the EZA-MAPRB's internal sensor circuit is designated.
The position data's flicker can be inhibited more when the cut-off frequency is set low. However, the response time might be delayed.
Designate this function when you need to reduce influences such as random noises (white noise) or mechanical oscillations.

byte offset	bit0-3	Selection Content	Description
9	0	1kHz	Cutoff frequency = 1kHz
	1	500Hz	Cutoff frequency = 500Hz
	2	250Hz **(Factory setting)**	Cutoff frequency = 250Hz
	3	125Hz	Cutoff frequency = 125Hz
	4	62Hz	Cutoff frequency = 62Hz

(5)Sensor median filter

Designates the sensor median filter which is installed on EZA-MAPRB's internal sensor circuit either "valid" or “invalid". The position data will be a median value of data which is extracted within a certain amount of time if the filter is valid.
This filter is effective when using an inverter that generates instantaneous noises.
With using sensor median filter, the data might have a certain period delay.
This filter and low-pass filter can be used together.

byte offset	bit4	Selection Content	Description
9	0	Invalid **(Factory setting)**	Median filter is invalid.
	1	Valid	Median filter is valid.

8-6. Error Detection

8-6-1. Diagnostic data list

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0	Master _Lock	Prm _Fault	Invalid _Slave _Response	Not _Supported	Ext_Diag	Cfg_Fault	Station _Not _Ready	Station _Not _Existent	Standard Diagnosis Information
1	Deacti-vated	0	Sync _Mode	Freeze _Mode	Wd_On	set to 1 by slave	Stat _Diag	Prm _Req	
2	Ext _Diag _Overflow	0	0	0	0	0	0	0	
3	Master Address								
4	Ident_Number High Byte (H 0F)								
5	Ident_Number Low Byte (H 6E)								
6	0	0	0	0	0	0	1	0	Extended Diagnostic Header
7	0	Setting alarm	Rotation speed alarm	Internal temperature alarm	Power supply voltage alarm	Hardware error	Memory error	Sensor error	Error information

* The byte offset 0~5 data (Standard Diagnosis Information) is the standard diagnosis data for the PROFIBUS-DP slave.

8-6-2. Error information "data contents"

(1) Ext_Diag

"ERROR" of the monitor LED will turn ON and ERROR (byte offset4 bit1) of the input data will be 1 if Ext_Diag (byte offset0 bit3) of Diagnostic Data is 1.

byte offset	bit	Information	Description
0	3	0	No error has occurred on EZA-MAPRB.
		1	One of following errors has occurred; Sensor error, memory error, hardware error, power supply voltage alarm, internal temperature alarm, rotation speed alarm, setting alarm

(2) Prm_Fault

If one of following cases occur, Prm_Fault of Diagnostic Data (byte offset0 bit6) will be 1 and the data cannot be exchanged.

- The parameter setting value is out of the range.
- The fixed value is wrong value.
- The module selection of the configuration setting is different from the actual model.

byte offset	bit	Information	Description
0	6	0	The parameter is normal.
		1	The parameter setting value is out of the range.

(3) Error information

Error Name	Description	When Detected	Input Data or Monitor LED		Status	Clear Method	Probable cause
			ERROR	READY			
Sensor error	EZA-MAPRB has failure	Always	1	0	The position and speed data are unstable.	-CLR -Restart	EZA-MAPRB has failure
Memory error	An error has occurred at the non-volatile memory inside EZA-MAPRB.	At power ON	1	0	The position and speed data are unstable. (EZA-MAPRB operates with factory settings.)	-CLR	EZA-MAPRB has failure
Hardware error	EZA-MAPRB has failure	Always	1	0	The position and speed data are unstable.	-CLR -Restart	EZA-MAPRB has failure
Power supply voltage alarm	The power voltage supplied to EZA-MAPRB is outside of the range between 10.8 and 28.8V.	Always	1	1	The position and speed data output normally.	Automatic recovery	The power voltage supplied to EZA-MAPRB is outside of the specification range. Or, EZA-MAPRB has failure.
Internal temperature alarm	The EZA-MAPRB's temperature is out of the range between -20 and 80℃.	Always	1	1	The position and speed data output normally, but we cannot guarantee the accuracy. *1	Automatic recovery	The EZA-MAPRB's temperature is out of the specification range. Or, EZA-MAPRB has failure.
Rotation speed alarm	The EZA-MAPRB's rotation speed is more than 6100r/min.	Always	1	1	The position and speed data are unstable.	Automatic recovery	The EZA-MAPRB's rotation speed is out of the specification range. Or EZA-MAPRB has failure.
Setting alarm	The preset data is out of the range.	Always	1	1	EZA-MAPRB operates with data before the preset.	Reset the preset.	The preset data has error.
Switch setting error	The address setting switch is out of the setting range.	At power ON	1	0	PROFIBUS-DP communication is unavailable.	Turn ON the power supply again after changing the switch setting.	The address setting switch is designated ”126 or more". Or, EZA-MAPRB has failure.

*1: EZA-MAPRB might be damaged when the internal temperature alarm occurs.
Lower the ambient temperature quickly.
Or, the installation place should move to a place which is within a permissible temperature range.

⚠ NOTE

- EZA-MAPRB will operate with the factory setting values of the parameter and position data if a memory error occurs. The memory error is cleared when CLR (error clear) setting is designated to "1", but parameter settings and position data doesn't change.
- The memory error isn't generated when the memory of operation time is broken. However, the operation time's data become -1(FFFF FFFF H).
- PROFIBUS-DP communication is not available when a switch setting error is occurred. Check the data by monitor LED or ezSCOPE because ERROR and READY cannot be checked by the host PLC.

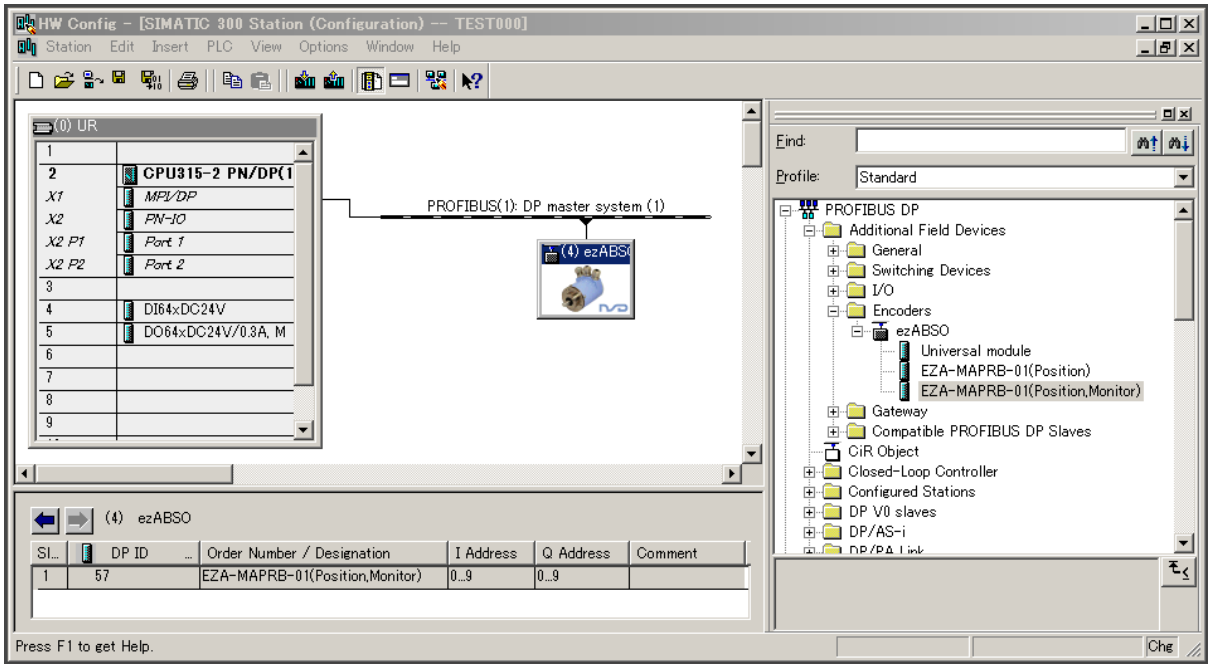
9. SAMPLE PROGRAM

The program example of EZA-MAPRB is indicated.

(This is an example which is configured by STEP7 manufactured by SIEMENS AG.)

9-1. Configuration Setting

(1) PLC address



Module		Address	Remarks
EZA-MAPRB	I Address	IB0 ~ 9	[Additional Field Devices: Encoders] Select EZA-MAPRB-01(Position, Monitor) from the ezABSO module.
	Q Address	QB0 ~ 9	
	Diagnostic address	2043 (#7FB)	
Digital input module		IB20 ~ 27	
Digital output module		QB30 ~ 37	

(2) Data Block (DB)

Address	Name	Type	Initial value	Comment
*0.0		STRUCT		
+0.0	DB_VAR	ARRAY[1..250]		
*1.0		BYTE		
=250.0		END_STRUCT		

(3) Variable

M0.0: Error detection (Error-Detect)
M0.1: During readout an error (Error-Read)
MW2: Error code (Error-Code)
MD4: Preset data (Preset-Data)
MB8: Monitor selection code (Monitor-Code)
MD30: Positon data (Position-Data)
MD34: Monitor data (Monitor-Data)
DB1.DBB0 ~ 7: Error information for EZA-MAPRB (Diagnostic-Data)
I20.0: Preset command (Preset-Command)
I20.1: Monitor command (Monitor-Command)
QB30 ~ 33: Positon data output from EZA-MAPRB (Position-Data-*-Out)
QB34: Error information output for EZA-MAPRB (Error-Status-Out)
Q35.0: Preset completion output from EZA-MAPRB (Preset-Complete)

9-2. Program for Error Detection

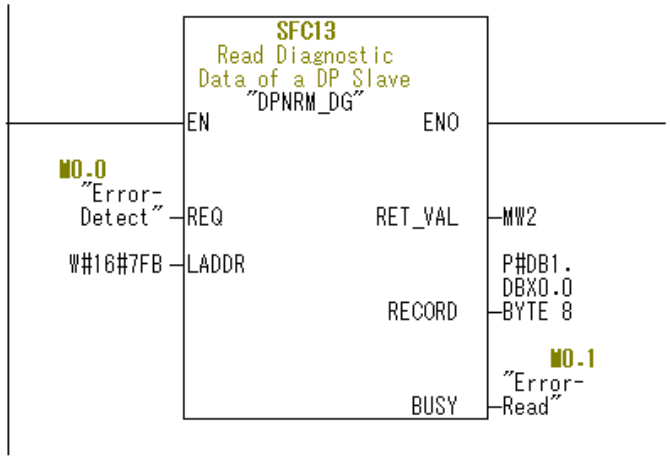
(1) OB1

OB1 : "Main Program Sweep (Cycle)"

```
Error/Alarm Check & Clear & Out
Position Data Out
Preset Position Data
Monitor Data Read
```

⊟ **Network 1** : Error/Alarm Check

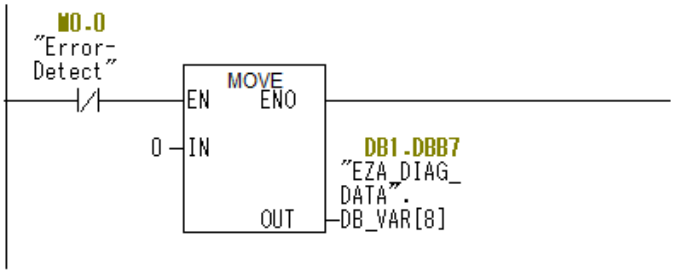
```
Read Diagnostic Data to DB1
```



"Diagnostic Data" is transmitted to DB1 when the error detection is ON.

⊟ **Network 2** : Error/Alarm Clear

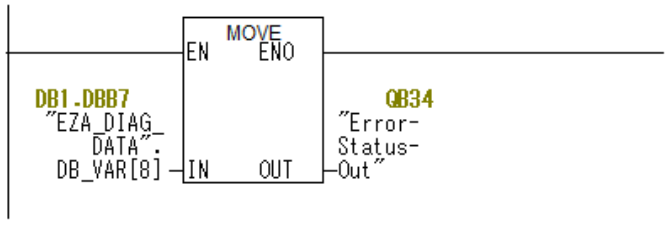
```
EZA-Status Clear
```



Error information is cleared when the error detection is OFF.

⊟ **Network 3** : Error/Alarm Out

```
EZA-Status Output
```



Outputs the error information.

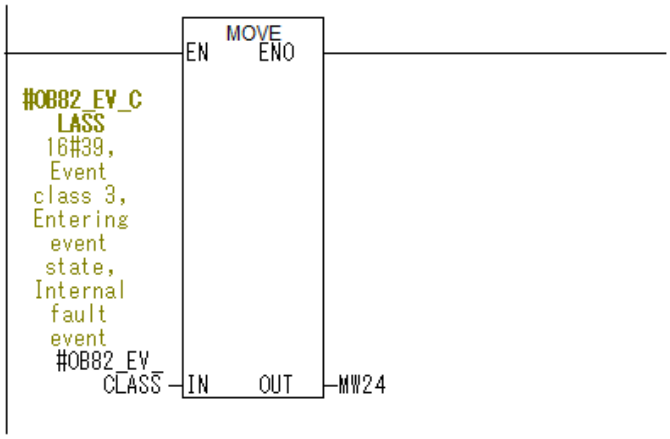
(2) OB82

OB82 : "I/O Point Fault"

```
Error Detect & Cancel
```

⊟ **Network 1** : Event Start & End

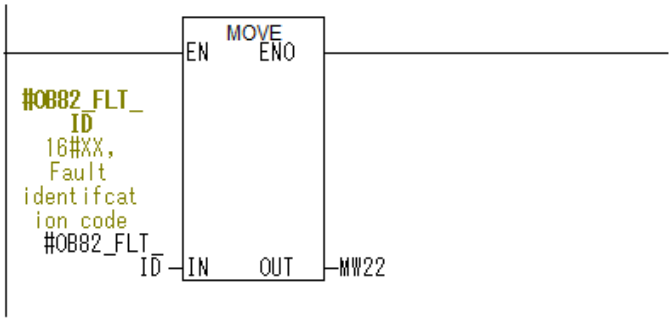
```
Event Start : Error Detect : 57=B#16#39
Event End   : Error Cancel : 56=B#16#38
```



The data type of the error detection data is converted.
Conversion (byte to int)

⊟ **Network 2** : Error Code Read

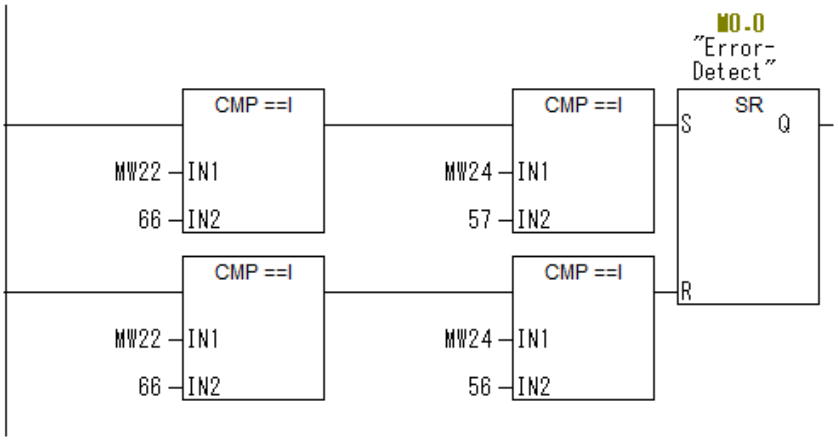
```
Error Code : 66=B#16#42
```



The data type of the error code is converted.
Conversion (byte to int)

⊟ **Network 3** : Error-Detect Set/Reset

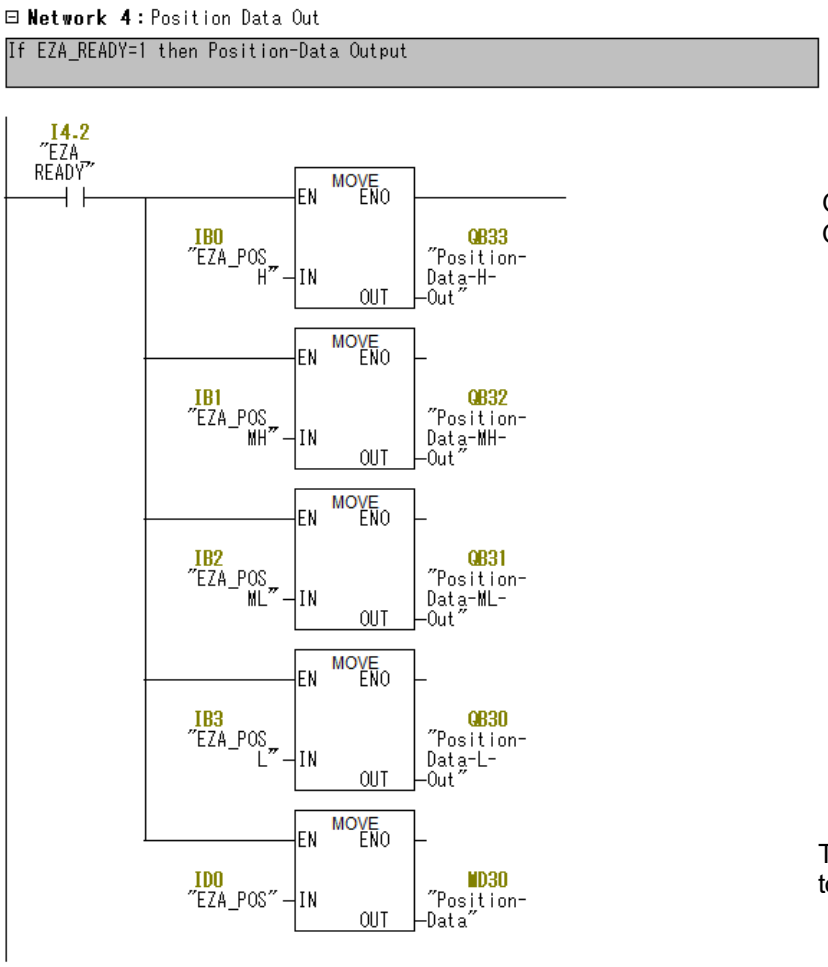
```
Error Detect : M0.0 Set
Error Cancel : M0.0 Reset
```



The error detection is set to ON or OFF.

9-3. Program for Position Data Reading

(1) OB1



Outputs the position data to QB30 to33.

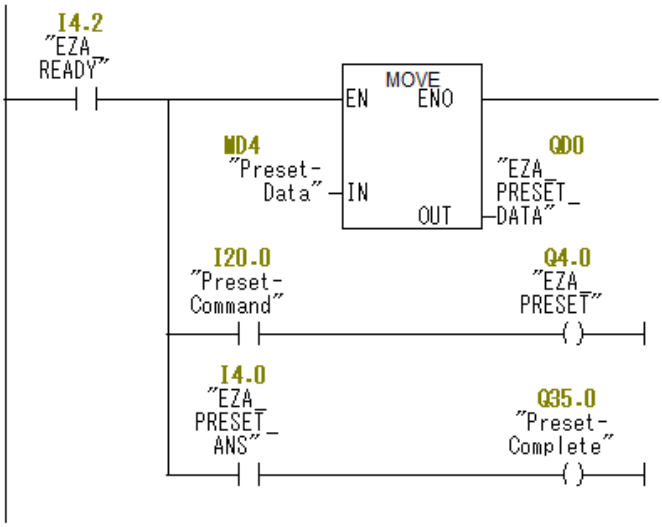
The position data is transmitted to MD30.

9-4. Program for Preset

(1) OB1

⊟ **Network 5 :** Preset Position Data

If Preset-Command=1 then Preset is performed



Transmits the preset data.

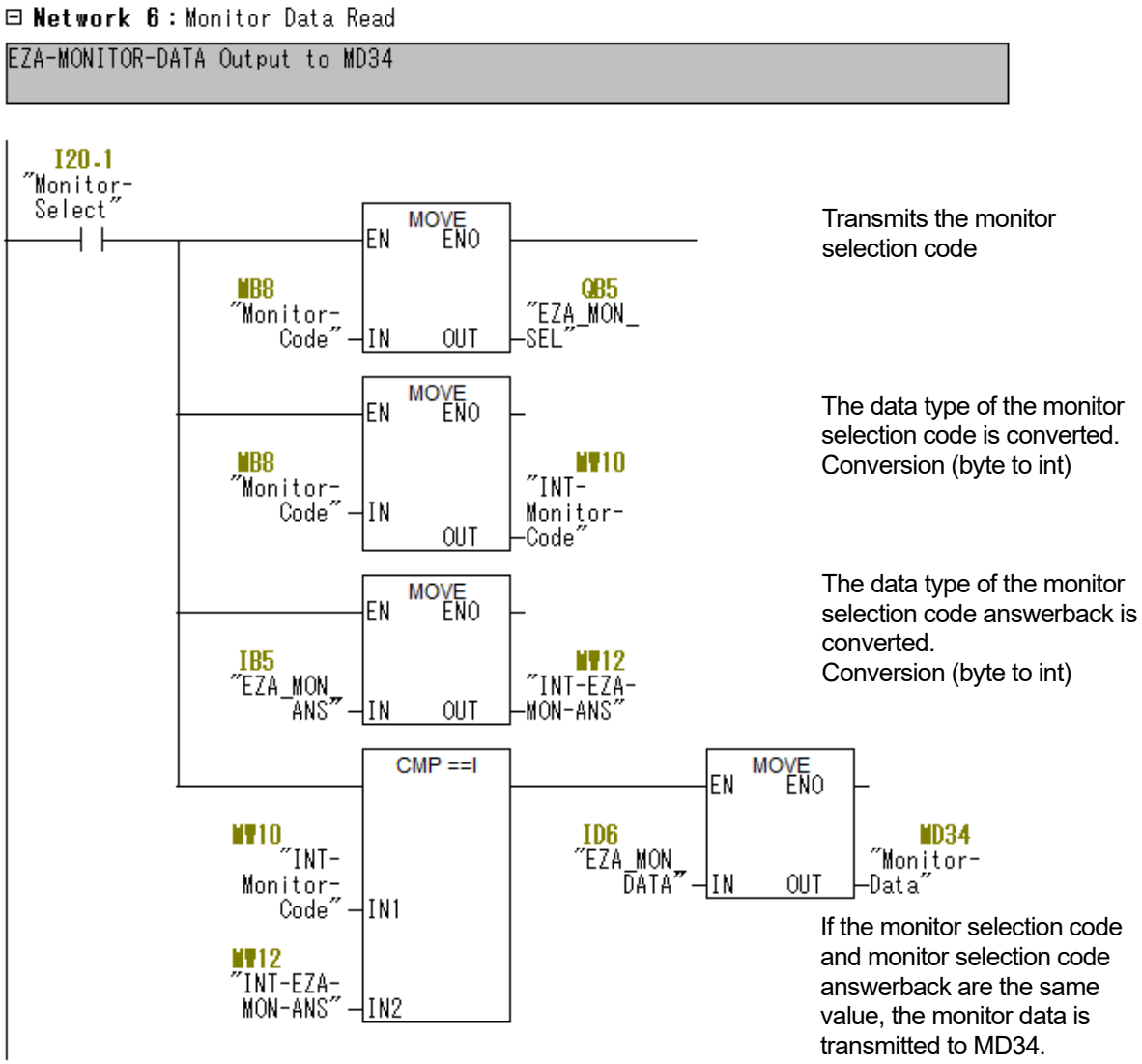
Preset command

Preset completion output

9-5. Program for Monitor

The program for monitor is needed to select EZA-MAPRB-01(Position, Monitor) from module selection. For the module selection, refer to "8-1. Module".

(1) OB1



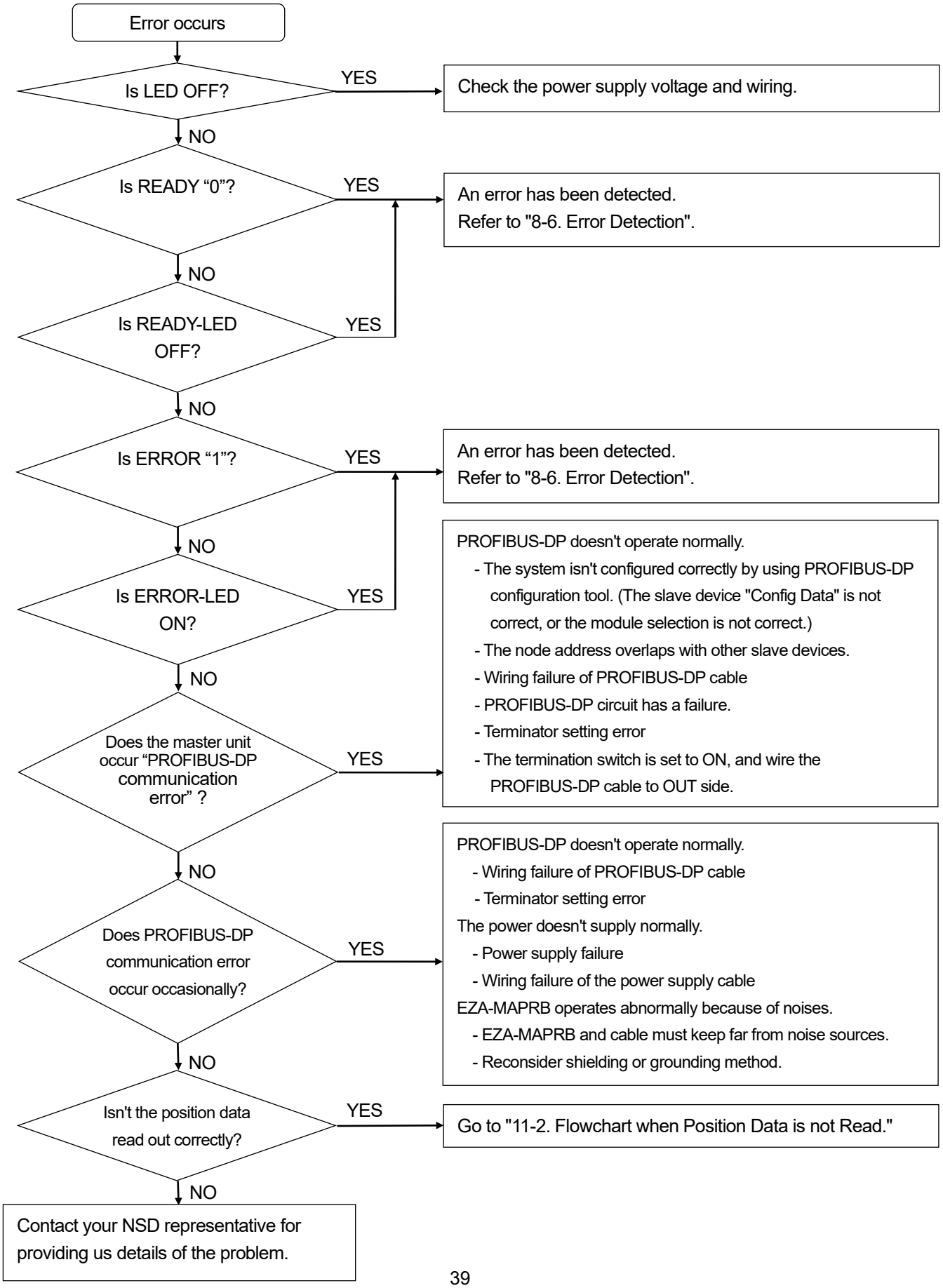
10. INSPECTION

The inspection should be conducted once every 6 months to a year.
Any inspected items which do not satisfy the criteria shown below should be repaired

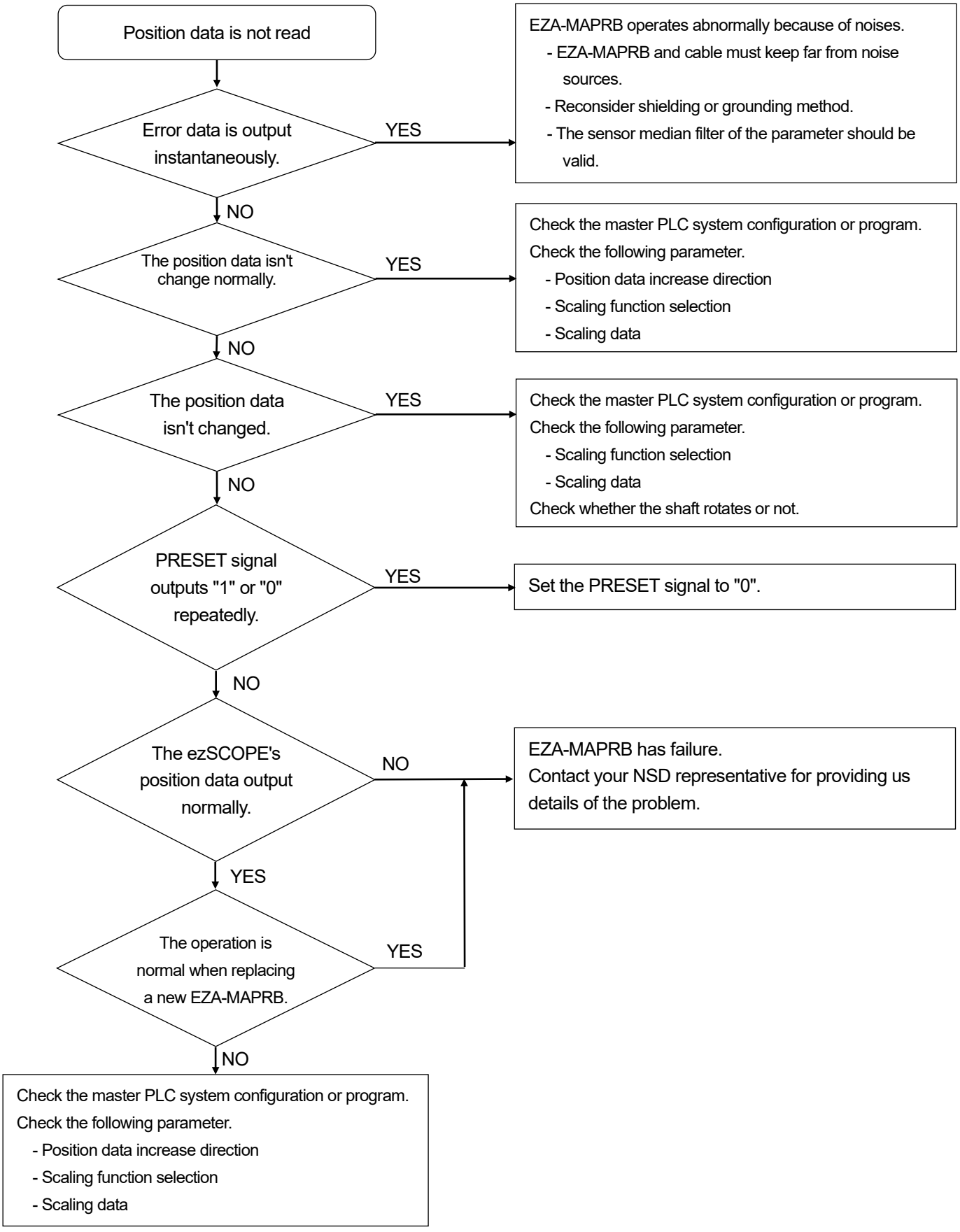
Inspection item	Inspection Description	Criteria	Remark
Power supply	Measure the voltage fluctuation at the power supply terminal block.	Within 10.8V to 28.8VDC range	Tester
Ambient Conditions	Check the ambient temperature.	-20 to +80°C	Thermometer
	There should be no accumulation of dust.	None	Visual Inspection
Mount Conditions	Verify that EZA-MAPRB is securely mounted.	There should be no looseness.	
	Verify that the shaft of EZA-MAPRB is securely coupled to the machine shaft.	There should be no looseness.	
	Check for severed cables.	Cable should appear normal.	
	Check the screws of the relay terminal are securely tightened.	There should be no looseness.	
	Check the wires are securely connected to the terminal block for internal wiring.	Cable should be connected.	

11. TROUBLE SHOOTING

11-1. Trouble Shooting Flowchart



11-2. Flowchart when Position Data is not Read



APPENDIX 1. CE MARKING

EZA-MAPRB conforms to EMC directive.
The low voltage directive is out of the range because EZA-MAPRB is activated by 24VDC power supply.

APPENDIX 1-1. EMC Directives

It is necessary to do CE marking in the customer's responsibility in the state of a final product.
Confirm EMC compliance of the machine and the entire device by customer because EMC changes configuration of the control panel, wiring, and layout.

APPENDIX 1-2. EMC Directive and Standards

EMC Directive consists of immunity and emission items.
EMC standards and Testing item is indicated in the following table.

EMC Standard and Testing

Class	Standard No.	Name
EMI (Emission)	EN61000-6-4	Generic standards. Emission standard for industrial environments
EMS (Immunity)	EN61000-6-2	Generic standards. Immunity standard for industrial environments
	EN61000-4-2	Electrostatic Discharge
	EN61000-4-3	Radiated, Radio frequency, Electromagnetic Field
	EN61000-4-4	Electrical Fast Transient / Burst
	EN61000-4-5	Surge Immunity
	EN61000-4-6	Conducted Disturbances, Induced by Radio-Frequency Fields
	EN61000-4-8	Power Frequency Magnetic Field

Reference

It might be improved when the clamp filter is installed to the power supply cable or the PROFIBUS-DP cable when it operates faultily by the influence from the peripheral devices.

Recommendation clamp filter

Mounting location	Clamp filter model	Manufacturer
- Power supply cable - PROFIBUS-DP cable	ZCAT2032-0930 (inner dimensions: ϕ9)	TDK Corporation

NSD Group

Manufacturer
NSD Corporation 3-31-28, OSU, NAKA-KU, NAGOYA, JAPAN 460-8302

Distributor
NSD Trading Corporation 3-31-23, OSU, NAKA-KU, NAGOYA, JAPAN 460-8302
Phone: +81-52-261-2352 Facsimile: +81-52-252-0522
URL: www.nsdcorp.com E-mail: foreign@nsdcorp.com