



ezABSO[®]

EtherNet/IP[™]

EZA-MAEIP-01M

Specifications & Instruction Manual



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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.

RELATED MANUALS

The following instruction manuals are available for this product.

Referring to the table below, get an applicable instruction manual as required.

Manual name	Document number
EZA-MAEIP-01M Network Configuration Manual	ZEF0059528**
EZA-MAEIP-01M Web Server Manual	ZEF0059529**

** : Revision number

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  CAUTION 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
ZEF005953600	6, July, 2021	1st Edition Japanese document: ZEF005953500
ZEF005953601	22, Feb., 2022	2nd Edition Japanese document: ZEF005953501
ZEF005953602	10, Mar., 2023	3rd Edition Japanese document: ZEF005953502
ZEF005953603	12, Dec., 2023	4th Edition Japanese document: ZEF005953503

1. OVERVIEW

EZA-MAEIP-01M (hereinafter referred to as EZA-MAEIP) 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 industrial ethernet "EtherNet/IP" is used for communicating with the host controller.

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-MAEIP 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 the EtherNet/IP

The position, speed, alarm, preset, and parameter data can be transmitted via "EtherNet/IP".

- IP address can be designated by the fixed setting by the switch or automatic setting.
- The communication speed and method are detected automatically.
- EZA-MAEIP can use for DLR (Device Level Ring).
DLR (Device Level Ring) switches a router speedily when a communication cable is severed or a network has a failure.
- EZA-MAEIP can send data to masters (maximum 3 units).
(The unicast/multicast communication is available.)

(5) Error detection function

This function detects an EZA-MAEIP failure (alarm) or usage status error of supplying power voltage and temperature (warning).

The use status such as a power supply voltage, temperature, and operation time can be monitored by EtherNet/IP or ezSCOPE.

(6) Preset function

The position data can be set to a desired value by the master device of the EtherNet/IP.

(7) Parameter

EZA-MAEIP parameters can be set by using the EtherNet/IP configuration tool (software for EtherNet/IP configuration) or web server function.

(8) ezSCOPE

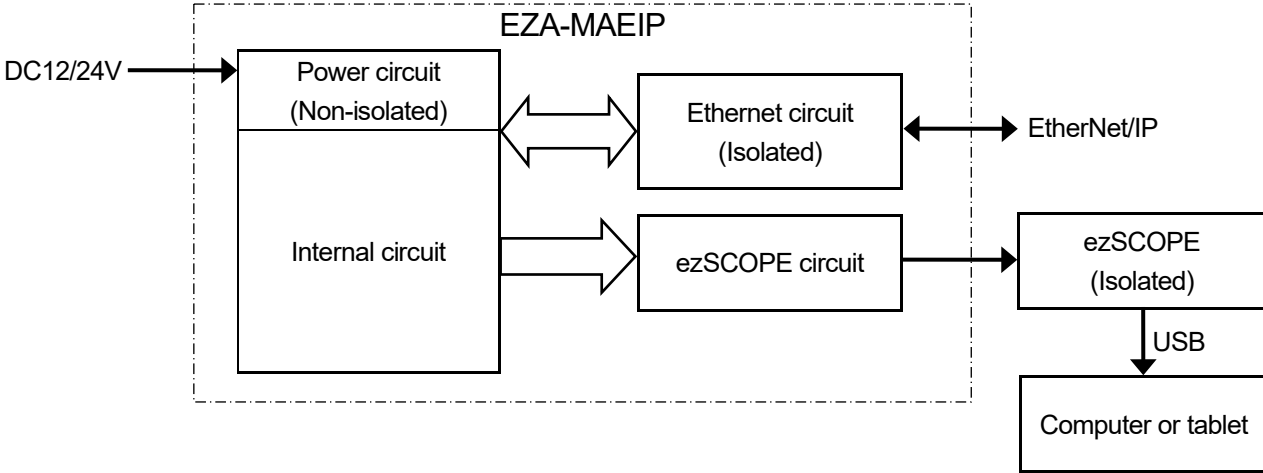
With using the device (ezSCOPE) for monitoring, EZA-MAEIP status can be checked by software for ezSCOPE of the computer or tablet.

(9) Web server function

EZA-MAEIP can do the followings by using the web server function;

- Setting parameters
- Checking the status
- Checking the event log

1-2. Internal Block Diagram

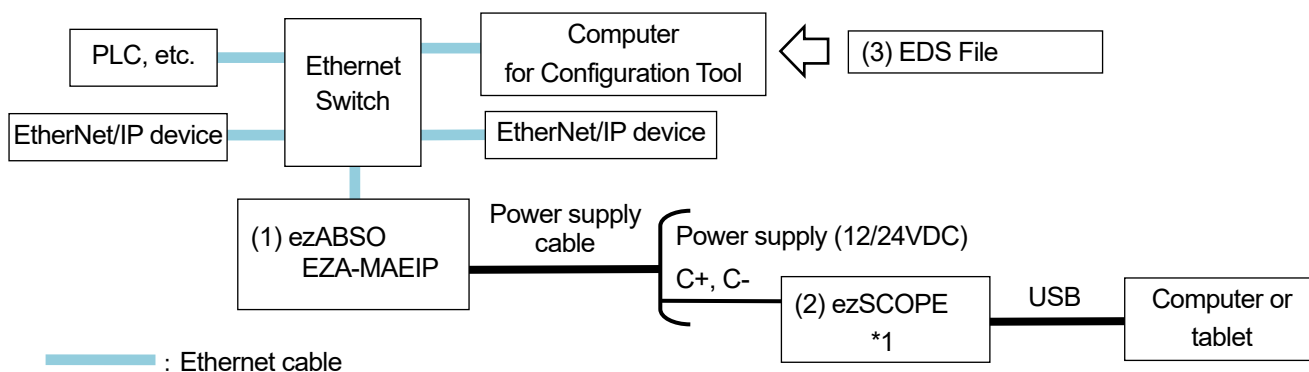


2. MODEL SELECTION WHEN ORDERING

The following figure indicates the connection configuration of EZA-MAEIP.

Before ordering, refer to the connection configuration and model list. Please prepare by customer except (1) to (3) in the connection configuration.

2-1. Connection Configuration Example



*1: ezSCOPE isn't needed for the normal operation.

ezSCOPE is a monitoring device for EZA-MAEIP. Use it for monitoring the sensor system normality and operation status. ezSCOPE is connected to EZA-MAEIP with two signals (C+ and C-) of the power supply cable and is connected to the computer with the USB cable. EZA-MAEIP data is sent to the computer or tablet by the software for ezSCOPE.

The signal line between EZA-MAEIP and ezSCOPE is isolated, thus the sensor operation isn't affected from the disturbance.

2-2. Model List

◆ezABS0

No.	Model	Descriptions
(1)	EZA-MAEIP-01M	- Multi-turn type - EtherNet/IP - Cable connection method: M12 connector

◆ezSCOPE (Option)

No.	Models	Descriptions
(2)	EZSCP-01	ezSCOPE is a monitoring device for EZA-MAEIP.
	EZSCP-TXMDL-01	Infrared transmission module

◆EDS File

No.	Models	Descriptions
(3)	EZA-MAEIP.eds	For EZA-MAEIP Download it from NSD website.

3. SPECIFICATIONS

3-1. EZA-MAEIP Specifications

3-1-1. General specification

Items	Specifications
Power supply voltage	10.8 to 28.8 DCV (including ripple)
Current consumption	300mA or less (at 12DCV) 150mA 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 *1	200m/s ² 55 to 2,000Hz (JIS C 60068-2-6)
Shock resistance *1	2,000m/s ² (6ms, JIS C 60068-2-27)
Ambient operating temperature *2	-20 to +75°C (No condensation)
Grounding	Must be securely grounded (ground resistance of 100 ohm or less)
Ambient storage temperature	-20 to +90°C (No condensation)
Outside dimension (mm)	Refer to dimensions for details.
Mass	Approx. 0.5kg

*1: The vibration and shock resistances are numeric values when EZA-MAEIP is tested alone.

*2: The ambient operation temperature indicates the surface temperature of EZA-MAEIP's case side.

Pay attention to EZA-MAEIP mounting part because it might be high temperature even though the ambient temperature is low.

3-1-2. Mechanical specification

Items	Specifications
Position detection method	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 *1	Max. 2,301,100,032 divisions (8,778 turns x 262,144 per turn) Factory setting: 575,275,008 divisions (8,778 turns x 65,536 per turn)
Output code	Binary code
Internal updating cycle	0.5ms (Position data, Speed data)
Error detection	Power supply voltage warning, Internal temperature warning, Rotation speed warning, Setting warning Sensor alarm, Memory alarm, Hardware alarm, Switch setting alarm
Event log	64 events can be recorded. (Events can be viewed with the web server function.)
Monitor function	EZA-MAEIP can be connected to ezSCOPE.
Monitor LED	MS: Module status NS: Network status L/A1 / L/A2: Link status
Switch setting	Subnet address of IP address (IP.NET): x1 Host address of IP address (IP.ADR): x16, x1
Function, parameter setting	Position data increase direction Current position preset function selection Scaling function selection Scaling data Sensor low-pass filter Sensor median filter
Parameter setting method	Configuration tool (The parameter data is received from the master.) Object communication Web server function

*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. Communication specification

Items		Specifications
Communication	Physical layer	Ethernet 10Base-T, 100Base-TX, ISO/IEC 8802-3
	Number of communication ports	2 (connector:M12)
	Communication speed *3	Auto-Negotiation (100 / 10Mbps)
	Communication method *3	Auto-Negotiation (Full / Half-Duplex)
	Communication cycle time (RPI) *1	2ms to 3200ms
	EtherNet/IP CIP protocol	CIP Conformance Test CT-16 Device Level Ring (DLR)
	EtherNet/IP CIP profile	Encoder Profile
	Recommended cable	CAT-5e STP straight cable
	Cable length *2	Between nodes: Max. 100m
Function	IP address setting	Setting by the switch (Class C) or receiving it from BOOTP or DHCP server automatically (Class A, B, and C)
	Communication setting (Speed and method)	Automatic setting by auto-Negotiation (with communication setting switch)
	Max. number of I/O connections	3 units
	Monitor function	Web server

*1: The RPI setting value is limited when using with several masters.

*2: The cable might not extend to 100m according to the connection status or environment.

Check the maximum cable length by asking a cable manufacturer or checking the following document;
EtherNet/IP Media Planning and Installation Manual [PUB00148R0]
(Download the above manual from the ODVA website.)

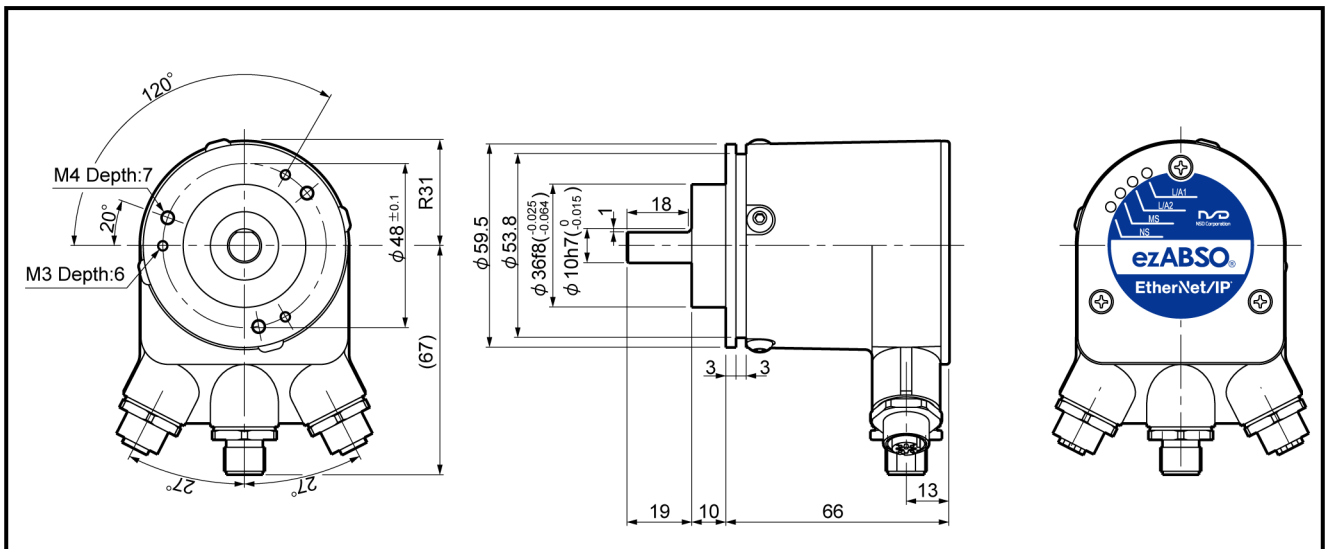
*: 3: The communication method can set to fix to 100Mbps/Full-Duplex by the communication setting switch (SW).

3-1-5. Connector specification

Items	Specifications	Remarks
Ethernet connector	4-pole, M12 "D" coded (shielded)	EZA-MAEIP side: Jack
Power supply connector	4-pole, M12 "A" coded (unshielded)	EZA-MAEIP side: Plug

4. DIMENSIONS

Units: mm





5. CHECKING THE CONTENTS OF THE SHIPPING CASE

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

Packing condition

① (EZA-MAEIP-01M) is shipped with ② (sealing cap) which are mounted on it.

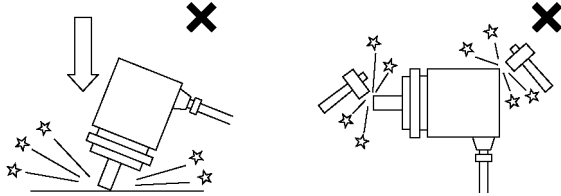
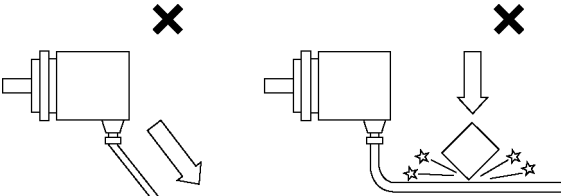
No.	①	②
Appearance		 * Put this cap to the connector that isn't connected to the cable.
Model	EZA-MAEIP-01M	Sealing cap
Quantity	1 unit	1 piece

6. INSTALLATION

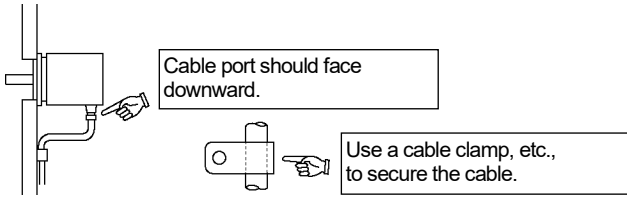
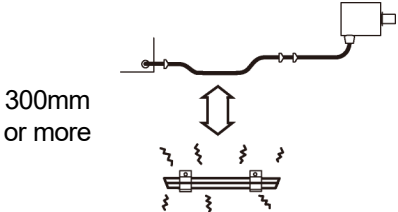
6-1. EZA-MAEIP Installation Condition and Precaution

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

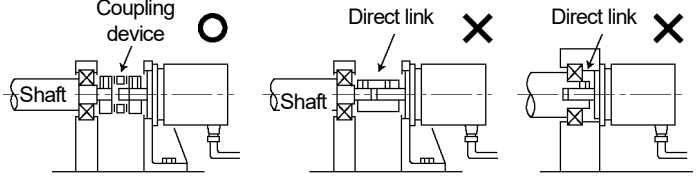
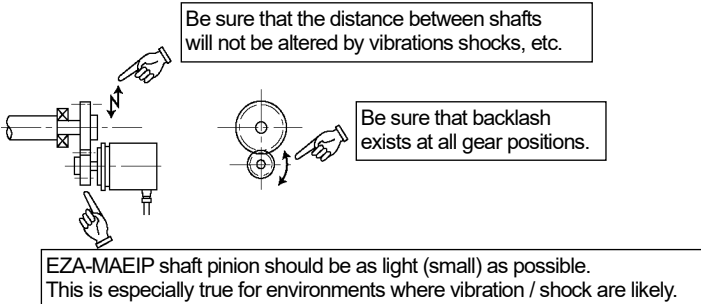
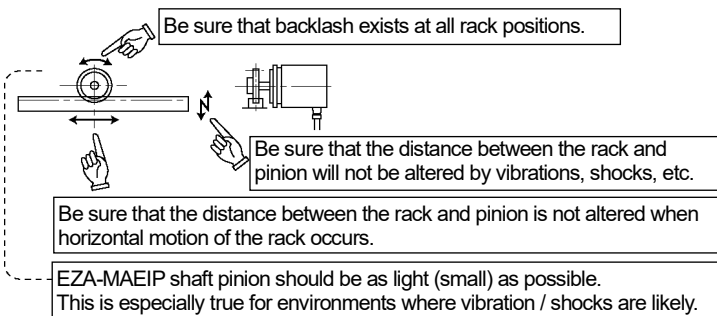
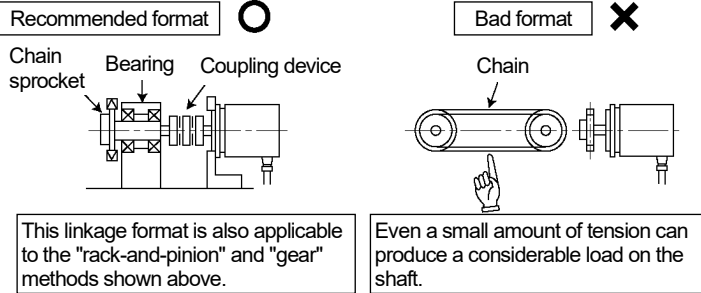
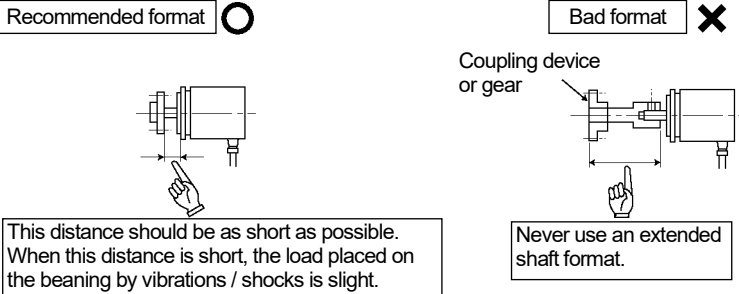
● Handling of EZA-MAEIP

Item	Explanation	Precaution
(1) Main unit	Do not loose a screw or nut except the rear lid. Do not disassemble or remodel EZA-MAEIP. Secure tightly with screws on the rear lid before the operation.	—
(2) Main unit	Never drop EZA-MAEIP, 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-MAEIP.	—
(4) Main unit	Never directly touch this EZA-MAEIP's conductive areas.	—
(5) Cable	Avoid stepping on, or applying excessive stress to the cable. 	—

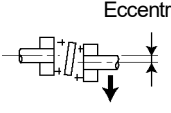
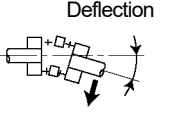
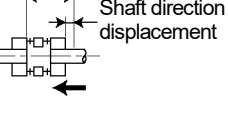
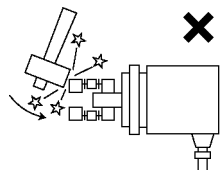
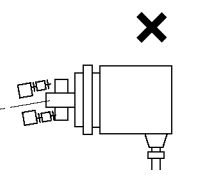
● Mounting of EZA-MAEIP

Item	Explanation	Precaution
(1) Mounting	Install EZA-MAEIP by referring to "4. DIMENSIONS".	—
(2) Cable port	Cable port should face downward.  <p>The diagram illustrates two steps: first, a hand points to a cable port on a device, with a callout box stating "Cable port should face downward."; second, a hand points to a cable clamp being applied to the cable, with a callout box stating "Use a cable clamp, etc., to secure the cable."</p>	—
(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.  <p>The diagram shows a cable connected to a device, with a double-headed arrow indicating a distance of "300mm or more" between the cable and a power line below. The power line is shown with lightning bolt symbols representing electrical noise.</p>	—
(5) Wiring	EZA-MAEIP has electrical parts inside. Never subject it to excessive shocks by tools.	The performance of EZA-MAEIP might decline or EZA-MAEIP might have a malfunction.
(6) Wiring	Be sure to shut off all power before executing wiring, installing, or uninstalling.	—

● Mounting of EZA-MAEIP

Item	Explanation	Precaution
(1) Coupling of machine shaft and EZA-MAEIP shaft	<p>Be sure to use a coupling device to link the 2 shafts.</p> 	A "direct-link" installation will result in shaft fatigue and / or breakage after using long periods.
(2) For gear-type linkage	<p>If a gear linkage is used, be sure that some backlash exists.</p> 	Incorrect gear mounting can result in shaft bending or breakage.
(3) For rack and pinion type linkage	<p>Be sure that backlash exists at all rack positions.</p> 	Incorrect rack and pinion mounting can result in shaft bending or breakage.
(4) Chain or timing belt linkage	<p>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.</p> 	-
(5) Shaft mounting position	<p>The coupling device or gear should be attached to the shaft at a point which is as near to the EZA-MAEIP body as possible.</p> 	-

● Coupling for EZA-MAEIP

Item	Explanation	Precaution
(1) Coupling device selection precaution	<p>1. Selection of the coupling device should be based on the following factors;</p> <ul style="list-style-type: none"> - Amount of a mounting error caused by machine design. - Permissible error of coupling device. - Reaction force of coupling device. - Permissible shaft load of EZA-MAEIP. <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">Amount of a mounting error caused by machine design.</div> <div style="font-size: 2em;"><</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">Permissible error of coupling device.</div> <div style="font-size: 2em;"><</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">Reaction force of coupling device.</div> <div style="font-size: 2em;"><</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">Permissible shaft load of EZA-MAEIP.</div> </div> <p>Mounting error</p> <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="text-align: center;">  <p>Eccentricity</p> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 5px auto;">Load generated by the eccentricity.</div> </div> <div style="text-align: center;">  <p>Deflection</p> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 5px auto;">Load generated by the deflection.</div> </div> <div style="text-align: center;">  <p>Prescribed dimension Shaft direction displacement</p> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 5px auto;">Load generated by the shaft direction displacement.</div> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">Radial load</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">Thrust load</div> </div>	<p>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.</p> <p>Excessive force applied to the shaft might deform the coupling and reduce durability.</p>
(2) Coupling device installation precaution	<p>2. Be sure to select a coupling device with an adequate transmission torque surplus relative to the EZA-MAEIP shaft's torque.</p> <p>Avoid bending or damaging the coupling.</p> <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;">   </div>	
(3) Recommended coupling	<p>Micro-coupling (Manufactured by Daido Precision Industries Ltd.)</p> <p>If there is a possibility of electric corrosion on the bearing, an insulated micro coupling is recommended.</p>	—

6-2. Ground

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

6-3. External Connecting Devices

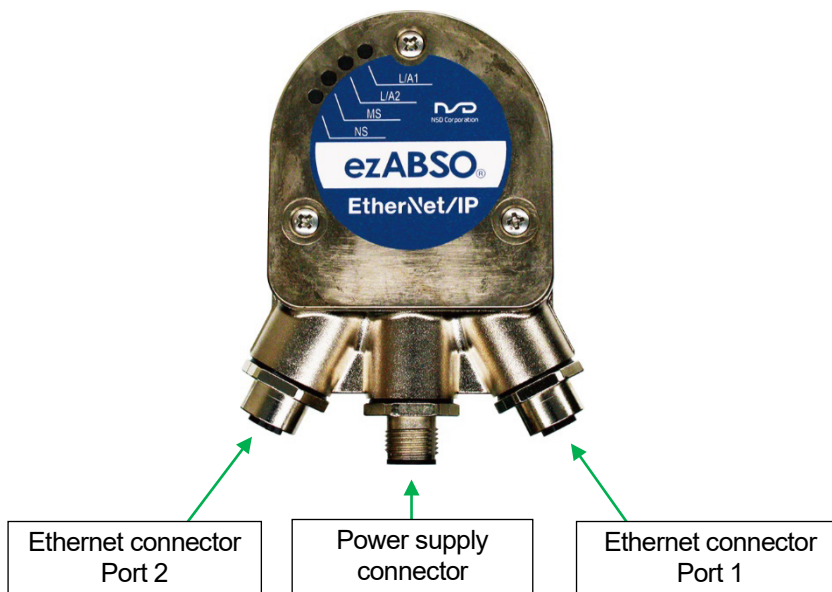
6-3-1. Power supply

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

6-3-2. ezSCOPE

- (1) Refer to "ezSCOPE specifications and instruction manual" for maximum cable lengths between EZA-MAEIP and ezSCOPE.
- (2) The following cables are recommended to extend the length.
 - ① KPEV-SB (Instrumentation cable with the shield), 0.5mm² or more
 - ② LAN cable (with the shield) * No category specified
- (3) Open the wire for ezSCOPE when not using ezSCOPE.

6-4. Cable Connection



Ethernet connector

The operation doesn't change even if a cable is connected to either port 1 or 2.
Attach the sealing cap if a cable isn't connected.

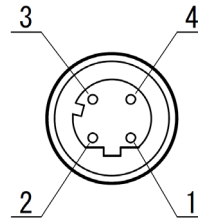
6-4-1. Wiring precautions for the cables

- (1) Do not bind or close the cable which is connected to EZA-MAEIP with the main circuit cable and the power supply cable. Separate the cable ducts or the wiring conduits for individual wiring if a location near the above cables is unavoidable.
- (2) When wiring conduits are used, they should be securely grounded.
- (3) Use a connector or connector with a cable which is complied with IEC61076-2-101.
- (4) Securely tighten by the following torque when connecting the connector if EZA-MAEIP needs water resistance meeting IP66 standard. If don't, it might cause a connection failure, communication failure, deterioration of waterproof, and damage of the internal circuit board.
 <Tightening torque>
 - Ethernet connector: 0.4N·m
 - Power supply connector: Check the cable specification which is used.
- (5) Use the robotic cables for movable parts.
- (6) The shield wire should be grounded at the spacious area for preventing noises.
- (7) Tight the connector (sealing cap) securely. If don't, it might cause a connection failure, deterioration of waterproof, and damage of the internal circuit board.
 Keep out the connector from moisture during wiring, and prevent from a looseness of the connector by vibrations.
 Tightening torque of the sealing cap: 0.4N·m
- (8) Prevent the connector affecting from vibrations if EZA-MAEIP is used in a place with vibrations.
 Vibrations cause a connector failure or deterioration of waterproof.
 Ex.
 - Use a lightweight connector.
 - Fix a cable.
 - Fix a connector.

6-4-2. Wiring precautions for the Ethernet cables

Pin No.	Signal name	Remark
1	TxD+	
2	RxD+	
3	TxD-	
4	RxD-	

Pin layout of EZA-MAEIP side connector

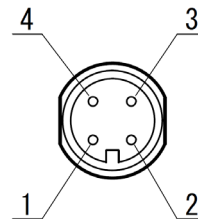


- (1) Use the CAT5E STP cable.
- (2) Do the wiring by following the below document;
 - EtherNet/IP Media Planning and Installation Manual [PUB00148R0]
 (Download the above manual from the ODVA website.)

6-4-3. Wiring precautions for the power supply

Pin No.	Signal name	Remark
1	24V	
2	C+	For ezSCOPE
3	0V	
4	C-	For ezSCOPE

Pin layout of EZA-MAEIP side connector



- (1) Be sure to use a shielded twisted pair cable for the power cable.
- (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.

7. NOMENCLATURE

7-1. Display Contents of the Monitor LEDs

The opposite side of the shaft has the monitor LED.

Monitor LEDs turn ON one by one due to the self-test when turning ON the power supply.



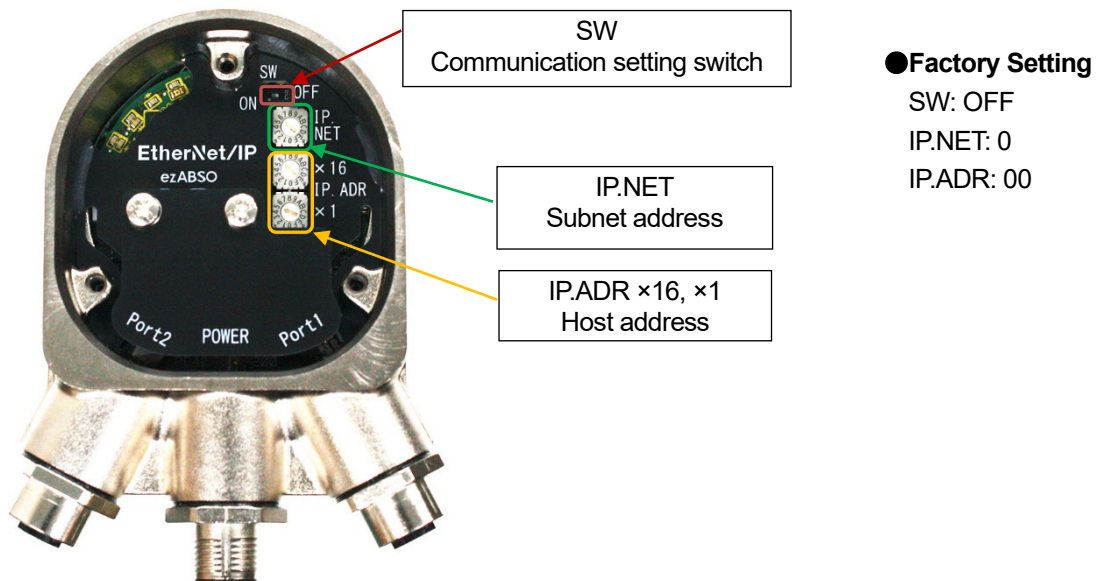
Display Monitor LED	Contents	
L/A 1	Link status: Indicates the communication status of the port 1 (Ethernet connector)	
	OFF	Port 1: No link
	Green	Port 1: Link
	Flashing Green	Port 1: During the data communication
L/A 2	Link status: Indicates the communication status of the port 2 (Ethernet connector)	
	OFF	Port 2: No link
	Green	Port 2: Link
	Flashing Green	Port 2: During the data communication
MS	Module status: Indicates the operation status EZA-MAEIP	
	OFF	No power
	Green	Normal operation (No warning or alarm is detected.)
	Flashing Green	No IP address In the following cases, the LED is flashing green; - A BOOTP/DHCP server does not exist on the network - A BOOTP / DHCP server doesn't have EZA-MAEIP settings. - The EZA-MAEIP IP address is overlapped with the default gateway. - The subnet address is wrong.
	Flashing Red	Detecting a warning (Power supply voltage warning, Internal temperature warning, Rotation speed warning, Setting warning)
	Red	Detecting an alarm (Sensor alarm, Memory alarm, Hardware alarm, Switch setting alarm)
	Flashing Green/Red	During the self-testing
NS	Network status: Indicates the EtherNet/IP communication status of EZA-MAEIP	
	OFF	No power, No IP address
	Flashing Green	IP address obtained, No connections *1
	Green	Connection is normal *1
	Flashing Red	Connection timeout *1
	Red	The IP address is overlapped with other devices.
	Flashing Green/Red	During the self-testing

*1: "Connection" indicates the I/O data communication status of EtherNet/IP.
Refer to "8-3. Connection" for details.

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 each switch.

The switch setting at when the power supply is turned ON is effective. Turned ON again when changing the setting.



NOTE

- Electrical components are used inside of EZA-MAEIP. 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-MAEIP.
- After setting switches, mount the rear lid securely.

●Checking the setting contents

EZA-MAEIP setting contents can be checked by ezSCOPE or the web server function.

- IP address
- Communication speed
- Communication method

Refer to the following documents for the web server function.

EZA-MAEIP-01M web server function manual (document No.: ZEF0059529xx)

7-2-1. SW (communication setting switch)

OFF: Auto-Negotiation
ON: 100Mbps / Full-Duplex

- Normally, the switch should be turned OFF.
(The communication speed and method are automatically set by Auto-Negotiation.)
- Turn ON if the device connected to EZA-MAEIP operates locked at 100Mbps / Full-Duplex.

7-2-2. Flowchart of IP address setting

Set the IP address by using the EZA-MAEIP host address (IP.ADR) switch.

(1) Setting value: 01 to FE (1 to 254)

The IP address is set to Class C (192.168.x.xxx) according to the setting value.
(Class C: 192.168.0.1 to 192.168.15.254)

(2) Setting value: 00 (0)

Obtaining methods of the IP address are either of followings;

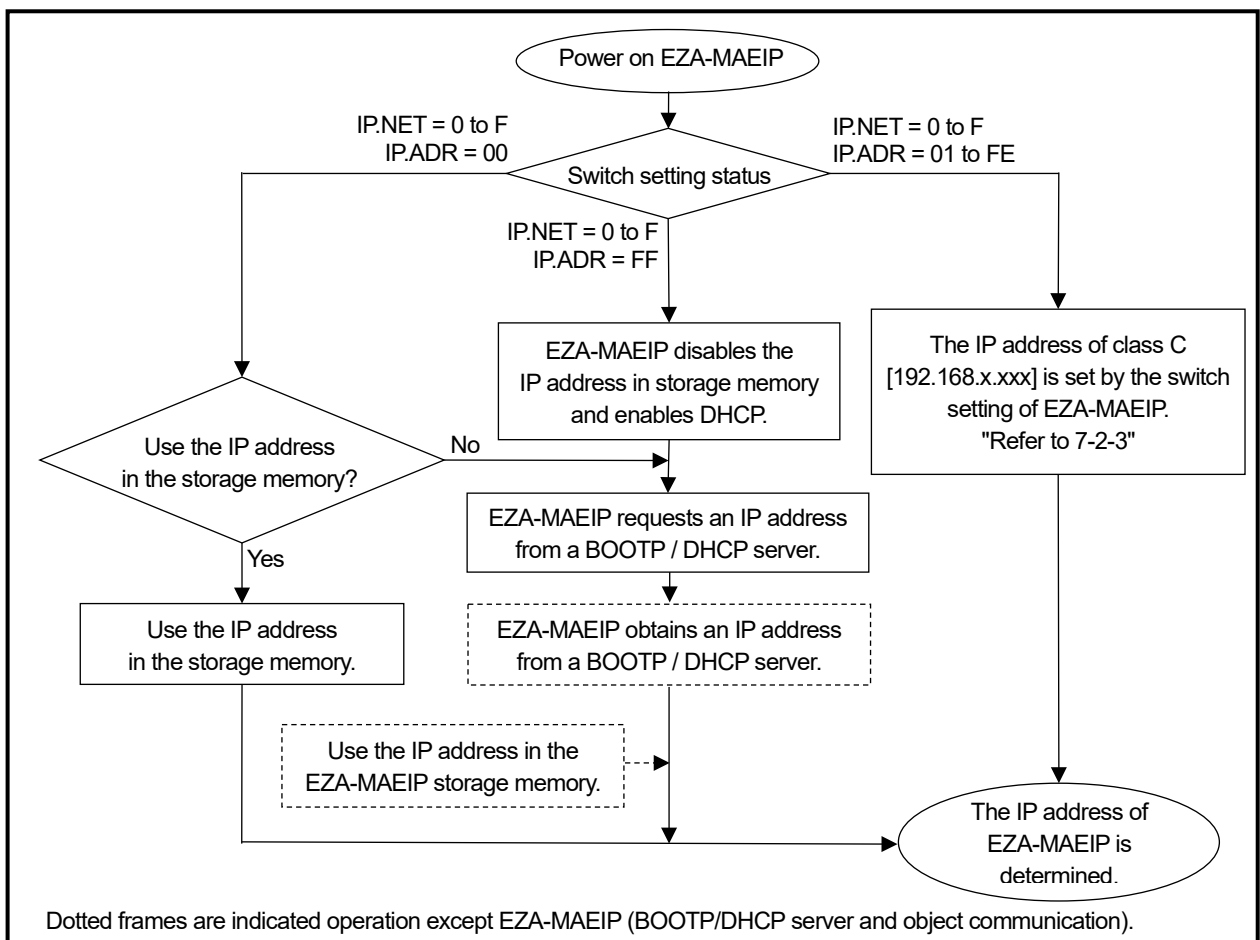
- Obtaining the IP address from BOOTP/DHCP server.
(The obtained IP address can be stored in the storage memory.)
- Use the IP address which is stored in the storage memory.

(3) Setting value: FF (255)

Obtaining an IP address from the DHCP server

Only Class C [192.168.0.1 to 192.168.15.254] can be used when the IP address is set by the switch.
Class A [0.0.0.1 to 126.255.255.254], Class B [128.0.0.1 to 191.255.255.254], and Class C [192.0.0.1 to 223.255.255.254] can be used when the IP address is obtained from the BOOTP/DHCP server.

A flowchart is indicated below for setting the EZA-MAEIP IP address.

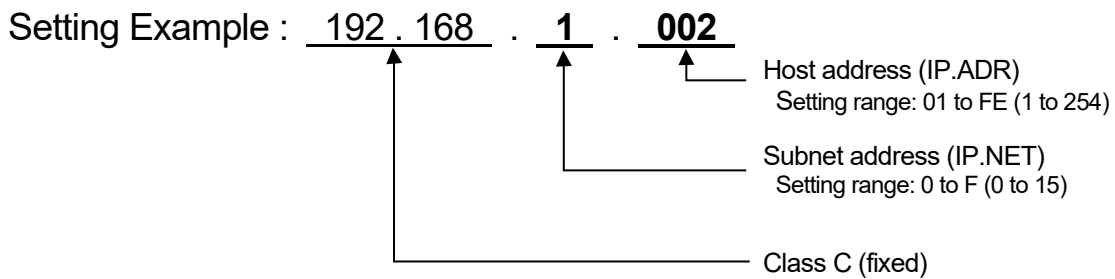
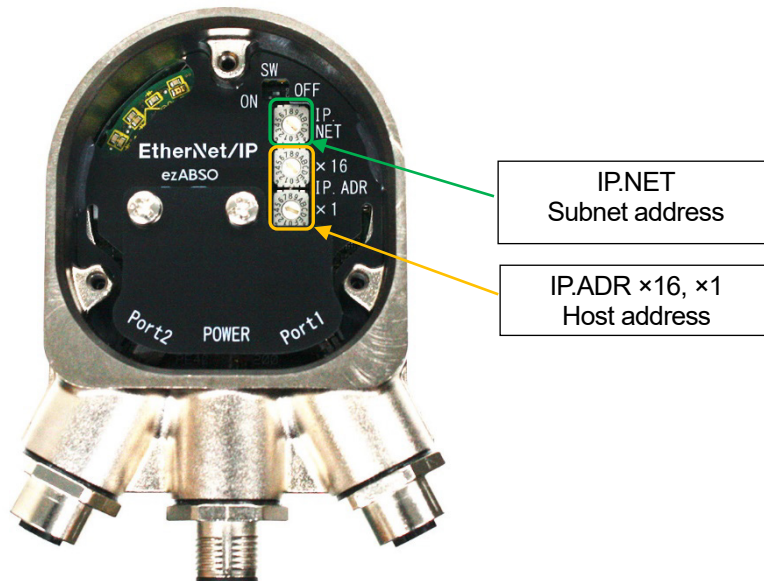


NOTE

- The IP address isn't set in the following cases;
- The EZA-MAEIP IP address is overlapped with the default gateway.
 - The subnet address is wrong.

7-2-3. IP address setting by switch

A subnet address (IP.NET) of IP address "Class C [192.168.0.1 to 192.168.15.254]" and host address (IP.ADR) are set by the switch.



Switch setting conditions (factory setting)

Subnet mask: 255.255.255.0

Gateway address: 0.0.0.0

NOTE

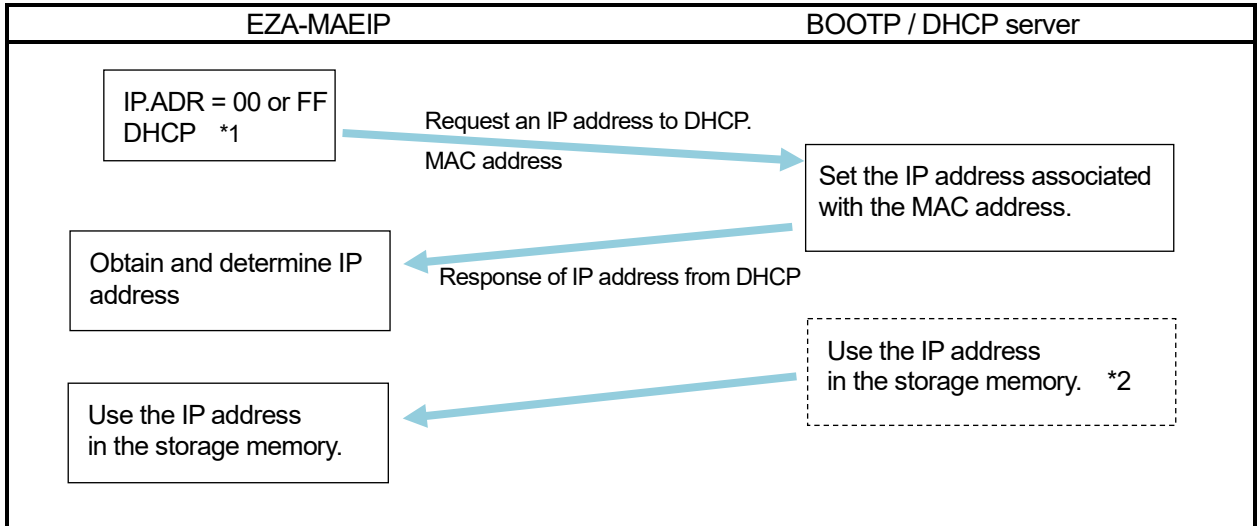
The subnet mask and gateway address set by the BOOTP/DHCP server would be used even when the IP address set by the switch.

Change the subnet mask and gateway address by the BOOTP/DHCP server if a problem occurs.

7-2-4. IP address setting by BOOTP / DHCP server

The BOOTP or DHCP server should be on the network in order to be set the IP address by the BOOTP/DHCP server.

The IP address setting procedure by BOOTP/DHCP server indicates below;



*1: DHCP is valid when the host address (IP.ADR) switch is "00 (factory setting)" or "FF".

[TCP/IP Interface Object — Configuration Control (Class ID: 0xF5, Instance ID: 0x01, Attribute ID: 0x03) = 2]

Set the following instance "1 (BOOTP)" after setting a temporary IP address if the BOOTP server is used.

[TCP/IP Interface Object — Configuration Control (Class ID: 0xF5, Instance ID: 0x01, Attribute ID: 0x03)]

*2: Set the following instance "0 (Stored Value)" if an IP address in storage memory.

If don't, an IP address is requested to the BOOTP/DHCP server every time when turning ON the power supply.

[TCP/IP Interface Object — Configuration Control (Class ID: 0xF5, Instance ID: 0x01, Attribute ID: 0x03)]

The IP address might be set without paying attention to the TCP/IP Interface object depending on the BOOTP/DHCP server.

8. EtherNet/IP COMMUNICATION

EtherNet/IP communication of EZA-MAEIP is described.

EZA-MAEIP has two Ethernet ports.

By using two ports, EZA-MAEIP can be connected with the linear or DLR network.

Two ports cannot be connected with separate subnets.

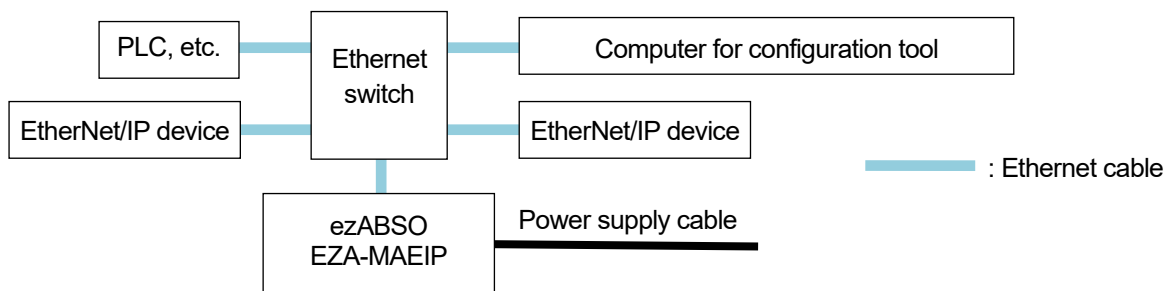
8-1. Example of the EtherNet/IP Network Configuration

The EtherNet/IP network can be selected various configurations.

Refer to PLC manual for the configuration and wiring methods of EtherNet/IP network.

8-1-1. Star network

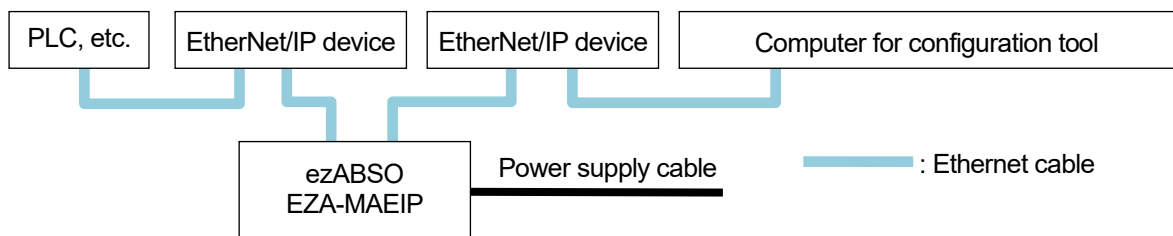
EZA-MAEIP is connected via an Ethernet switch.



8-1-2. Linear network

EZA-MAEIP is connected by a daisy chain without using the Ethernet switch.

All devices are disconnected from a severed part if the cable is severed.



8-1-3. DLR (Device Level Ring) network

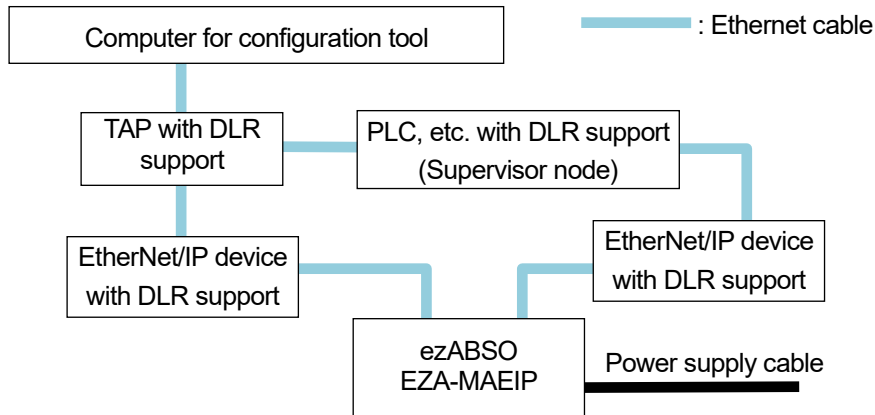
EZA-MAEIP can be used for the DLR (Device Level Ring) network.

All devices on the network must support DLR function when using the DLR function.

The DLR function can change the route speedily when a network failure such as disconnection of the communication cable occurs.

The DLR function operates by setting the DLR network to a PLC's supervisor node.

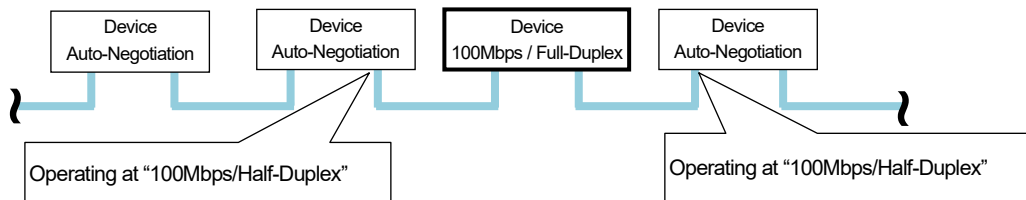
Refer to PLC's supervisor node manual for the operation and setting of the DLR network.



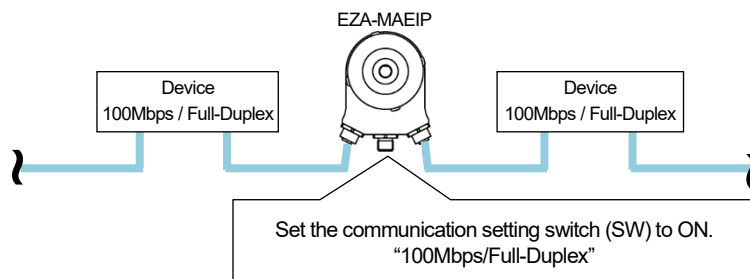
NOTE

The DLR network needs to operate all devices by "100Mbps/Full-Duplex".
The communication setting for all devices connected to the DLR network should be "Auto-Negotiation".

If a device set to "100Mbps/Full-Duplex" is on the DLR network, devices both sides of it operate by "100Mbps/Half-Duplex" even though they are set to "Auto-Negotiation". Thus, the operation of the DLR function cannot be guaranteed.



Set the EZA-MAEIP communication setting switch (SW) to ON if a device connected with EZA-MAEIP is set to "100Mbps/Full-Duplex", not to "Auto-negotiation".



8-2. EDS File

EDS (Electric Data Sheet) is a file which is described the information for EtherNet/IP device configuration. Device configuration and parameter setting can be set easily by installing the EDS file to the configuration tool.

Download the EDS file for EZA-MAEIP from NSD web site.

URL: www.nsdcorp.co.jp

File name: EZA-MAEIP.eds

8-3. Connection (Implicit Message)

The Input and Output data contents of EZA-MAEIP are changed by selecting "Connection".

Refer to "8-5. Input" and "8-6. Output" for data details when selecting each connection.

Connection	Data information				Instance		
	Input	byte	Output	byte	Input	Output	Config
EO Position	Position data	4	Preset Alarm clear	8	0x01	0x66	0x67
EO Position + Alarm	Position data, alarm	5	Preset Alarm clear	8	0x02		
EO Position + Speed	Position data, speed data	8	Preset Alarm clear	8	0x03		
EO All Data	Position data, Alarm, Status, Speed data, Power supply voltage data, Internal temperature data, Operating time data	20	Preset Alarm clear	8	0x65		
IO Position	Position data	4	—		0x01	0xC6	
IO Position + Alarm	Position data, alarm	5	—		0x02		
IO Position + Speed	Position data, speed data	8	—		0x03		
IO All Data	Position data, Alarm, Status, Speed data, Power supply voltage data, Internal temperature data, Operating time data	20	—		0x65		



NOTE

Consider specifications and parameters carefully when replacing even though a part of the connection complies with the encoder's device profile.



NOTE

Normally, I/O data update would stop if EZA-MAEIP or a network has an error.

Include the check item whether EZA-MAEIP and the network are normal in the operating conditions of the control system.

8-3-1. Connection with several masters (scanners)

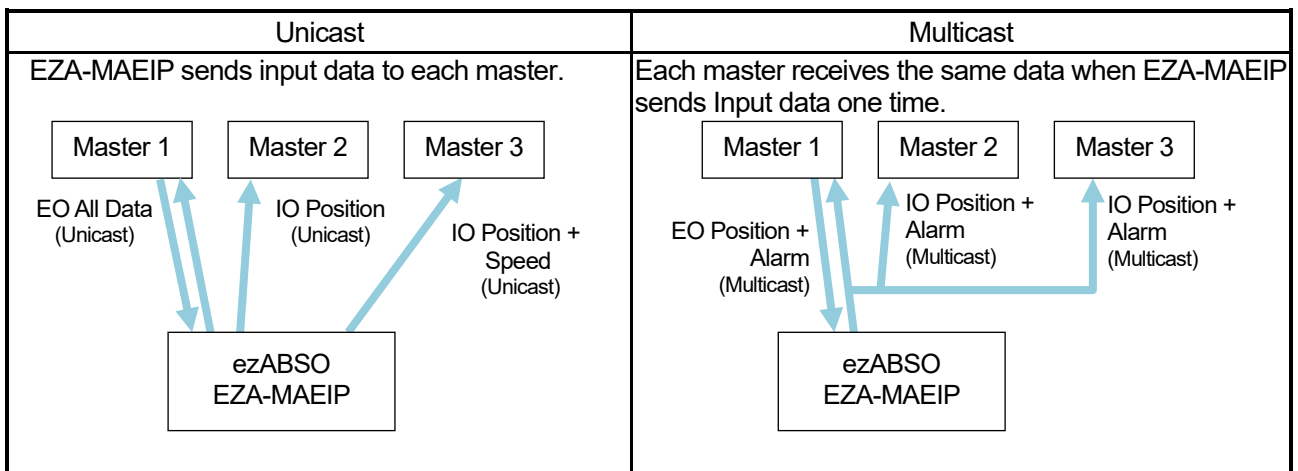
Input data of EZA-MAEIP can be acquired at the several masters by setting EZA-MAEIP's "Connection" to the several masters (PLC).

The numbers of the master which can be set to "Connection" is up to 3 unit; however, output data cannot send from the several masters. (The master which can set to Connection's "EO****" only one unit.)

Unicast: "Connection" and RPI (Requested Packet Interval) set to the master can be designated to the desired setting though EZA-MAEIP needs to send input data to each master.

Multicast: The same "Connection" can be set to the input data of several masters.

In addition, several masters can receive the same data by sending data(frame) only once from EZA-MAEIP.



NOTE

- Connection's "EO****" can be set only one master.
Other masters should be set to "IO****".
- EZA-MAEIP parameter should be set to the same value from all masters.
- RPI must be set 4ms or more.
- RPI must be set the same value to all masters if the multicast is executed.

8-4. RPI (Requested Packet Interval)

RPI (Requested Packet Interval) is an update time of the EZA-MAEIP connection communication (Implicit message communication).

Actual update time might change according to the following conditions;

- Executing frequent object communication (Explicit message communication)
- Using several masters
- Occurring a network communication traffic

NOTE

RPI should be set the same value to all masters if the multicast is executed by using several masters. EZA-MAEIP won't operate normally if the setting values are different.

NOTE

- The object communication (Explicit message communication) isn't a constant period.
Do not use this communication normally.
- Execute the following object communication after checking a response.
Do not overlap the object communication when using several masters.

NOTE

In the following cases, the EtherNet/IP's communication condition might deteriorate and an operation error of EZA-MAEIP might occur.

- RPI is set less than 4ms when several masters are used.
- The object communication (Explicit message communication) is executed all the time.

The following operation errors might occur according to deterioration of the communication condition;

- Communication error
- The current position preset doesn't operate, or response delays.
- The web server update delays.
- The parameter update delays.
- The operating time update stops.
- The power voltage and internal temperature update delays.
- The power supply voltage warning and internal temperature warning detections are delays.

8-5. Input Data

Input data is data that the PLC(Originator) read from EZA-MAEIP (Target).
(EZA-MAEIP (Target) → PLC etc. (Originator))

The data construction for the Input data is different each connection.

8-5-1. EO Position (IO Position)

EO Position (IO Position) can read the position data.

This connection complies with the encoder's device profile.

Instance: 1 (0x01)

byte	bit								Data name
	7/F	6/E	5/D	4/C	3/B	2/A	1/9	0/8	
0	D7	D6	D5	D4	D3	D2	D1	D0(LSB)	Position data
1	D15	D14	D13	D12	D11	D10	D9	D8	
2	D23	D22	D21	D20	D19	D18	D17	D16	
3	D31 (MSB)	D30	D29	D28	D27	D26	D25	D24	

8-5-2. EO Position + Alarm (IO Position + Alarm)

EO Position + Alarm (IO Position + Alarm) can read the position data and alarm information.

This connection complies with the encoder's device profile except for gray cells.

Instance: 2 (0x02)

byte	bit								Data name
	7/F	6/E	5/D	4/C	3/B	2/A	1/9	0/8	
0	D7	D6	D5	D4	D3	D2	D1	D0(LSB)	Position data
1	D15	D14	D13	D12	D11	D10	D9	D8	
2	D23	D22	D21	D20	D19	D18	D17	D16	
3	D31 (MSB)	D30	D29	D28	D27	D26	D25	D24	
4	READY	Config Param Data	PRESET Answer	Reserved	Reserved	Reserved	Warning Flag	Alarm Flag	alarm

8-5-3. EO Position + Speed (IO Position + Speed)

EO Position + Speed (IO Position + Speed) can read the position and speed data.

This connection complies with the encoder's device profile.

Instance: 3 (0x03)

byte	bit								Data name
	7/F	6/E	5/D	4/C	3/B	2/A	1/9	0/8	
0	D7	D6	D5	D4	D3	D2	D1	D0(LSB)	Position data
1	D15	D14	D13	D12	D11	D10	D9	D8	
2	D23	D22	D21	D20	D19	D18	D17	D16	
3	D31 (MSB)	D30	D29	D28	D27	D26	D25	D24	
4	SPD7	SPD6	SPD5	SPD4	SPD3	SPD2	SPD1	SPD0 (LSB)	Speed data
5	SPD15	SPD14	SPD13	SPD12	SPD11	SPD10	SPD9	SPD8	
6	SPD23	SPD22	SPD21	SPD20	SPD19	SPD18	SPD17	SPD16	
7	SPD31 (MSB)	SPD30	SPD29	SPD28	SPD27	SPD26	SPD25	SPD24	

8-5-4. EO All Data (IO All Data)

EO All Data (IO All Data) can read the following information;

- Position data
- Alarm
- Status
- Speed data
- Power supply voltage data
- Internal temperature data
- Operating time data

Instance: 101 (0x65)

byte	bit								Data name
	7/F	6/E	5/D	4/C	3/B	2/A	1/9	0/8	
0	D7	D6	D5	D4	D3	D2	D1	D0(LSB)	Position data
1	D15	D14	D13	D12	D11	D10	D9	D8	
2	D23	D22	D21	D20	D19	D18	D17	D16	
3	D31 (MSB)	D30	D29	D28	D27	D26	D25	D24	
4	READY	Config Param Data	PRESET Answer	Reserved	Reserved	Reserved	Warning Flag	Alarm Flag	Alarm
5	Reserved	Setting warning	Rotation speed warning	Internal temperature warning	Power supply voltage warning	Hardware alarm	Memory alarm	Sensor alarm	Status
6	Reserved								Reserved
7									
8	SPD7	SPD6	SPD5	SPD4	SPD3	SPD2	SPD1	SPD0 (LSB)	Speed data
9	SPD15	SPD14	SPD13	SPD12	SPD11	SPD10	SPD9	SPD8	
10	SPD23	SPD22	SPD21	SPD20	SPD19	SPD18	SPD17	SPD16	
11	SPD31 (MSB)	SPD30	SPD29	SPD28	SPD27	SPD26	SPD25	SPD24	
12	VOLT7	VOLT6	VOLT5	VOLT4	VOLT3	VOLT2	VOLT1	VOLT0 (LSB)	Power supply voltage data
13	VOLT15 (MSB)	VOLT14	VOLT13	VOLT12	VOLT11	VOLT10	VOLT9	VOLT8	
14	TEMP7	TEMP6	TEMP5	TEMP4	TEMP3	TEMP2	TEMP1	TEMP0 (LSB)	Internal temperature data
15	TEMP15 (MSB)	TEMP14	TEMP13	TEMP12	TEMP11	TEMP10	TEMP9	TEMP8	
16	TIME7	TIME6	TIME5	TIME4	TIME3	TIME2	TIME1	TIME0 (LSB)	Operating time data
17	TIME15	TIME14	TIME13	TIME12	TIME11	TIME10	TIME9	TIME8	
18	TIME23	TIME22	TIME21	TIME20	TIME19	TIME18	TIME17	TIME16	
19	TIME31 (MSB)	TIME30	TIME29	TIME28	TIME27	TIME26	TIME25	TIME24	

8-5-5. Explanation of signal name

Bit name	Data name	Value	Explanation
D0-31	Position data		The position data can be read out by a binary code.
Alarm Flag	Alarm flag	0	EZA-MAEIP operates normally.
		1	One of following alarm has occurred; Sensor alarm, Memory alarm, Hardware alarm
Warning Flag	Warning flag	0	EZA-MAEIP operates normally.
		1	One of following warning has occurred; Power supply voltage warning, Internal temperature warning, Rotation speed warning, Setting warning
PRESET Answer	Preset answerback		This is an operation checking signal of PRESET. (Refer to "8-6-4. Current position preset" for details.)
READY	Ready		Operation checking signal for EZA-MAEIP (Logic reversal signal of the alarm flag)
		0	One of following alarm has occurred; Sensor alarm, Memory alarm, Hardware alarm
		1	EZA-MAEIP operates normally.
Config Param Data	Configuration parameter data		Parameter setting status signal of EZA-MAEIP
		0	A parameter cannot be set by the configuration tool. (It can be set by the web server function.)
		1	A parameter can be set by the configuration tool. (Factory Setting)
Sensor alarm	Sensor alarm		EZA-MAEIP has failure.
Memory alarm	Memory alarm		An error has occurred at the storage memory inside EZA - MAEIP.
Hardware alarm	Hardware alarm		EZA-MAEIP has failure.
Power supply voltage warning	Power supply voltage warning		The power voltage supplied to EZA-MAEIP is outside of the range between 10.8 and 28.8V.
Internal temperature warning	Internal temperature warning		The EZA-MAEIP's ambient temperature is out of the range between -20 and 75°C.
Rotation speed warning	Rotation speed warning		The EZA-MAEIP's rotation speed is more than 6100r/min.
Setting warning	Setting warning		The preset data is out of the range.
SPD0-31	Speed data		The speed can be read out by a binary code. (Unit: 0.1 r/min) - Positive numerical value: 16# 0000 ~ 16# 0001 5F90 (0 ~ 90,000) The shaft of EZA-MAEIP turns in clockwise (CW) direction. - Negative numerical value: 16# FFFF FFFF ~ 16# FFFE A070 (-1 ~ -90,000) The shaft of EZA-MAEIP turns in counterclockwise (CCW) direction. The positive and negative of the speed data cannot reverse even though the position data increase direction of parameter is changed. When the shaft rotates in 9000r/min or more, the speed data might be unstable.
VOLT0-15	Power supply voltage data		The power supply voltage which is supplied to EZA-MAEIP is read out. Ex.) 24.0V: 240 (16# 00F0)
TEMP0-15	Internal temperature data		The internal temperature of EZA-MAEIP is read out. Ex.) 25°C: 25 (16# 0019) -10°C: -10 (16# FFF6)
TIME0-31	Operating time data		Operating time of EZA-MAEIP (Power supply ON time) is read out. Ex.) After 80,000 hours are passing: 80,000 (16# 0001 3880)
Reserved	Reserved		This is the NSD area for an extension. Data contents are undefined.

(Refer to "9. ERROR CONTENTS" for details of the error.)

**NOTE**

The internal temperature is approximately 20°C higher than the surface (sides of the case) temperature of the EZA-MAEIP.

(Internal temperature is increase about 20°C)

The operating time is measured at internal EZA-MAEIP every 1/8 hours (7.5 minutes), and the monitor data reads out. (The data which is 1 hour or less is omitted.)

The operating time isn't increased when the power supply turns ON less than 7.5 minutes.

* The memory error doesn't occur when the operating time memory is malfunction.

The readout data is -1 (16# FFFF FFFF).

8-6. Output Data

Output data is the written data to EZA-MAEIP (Target) by PLC(Originator).
 (PLC etc. (Originator) → EZA-MAEIP (Target))
 Output data are the same between All EO*** connections.

8-6-1. Data configuration

Instance: 102 (0x66)

byte	bit								Data name
	7/F	6/E	5/D	4/C	3/B	2/A	1/9	0/8	
0	PRD7	PRD6	PRD5	PRD4	PRD3	PRD2	PRD1	PRD0 (LSB)	Preset data
1	PRD15	PRD14	PRD13	PRD12	PRD11	PRD10	PRD9	PRD8	
2	PRD23	PRD22	PRD21	PRD20	PRD19	PRD18	PRD17	PRD16	
3	PRD31 (MSB)	PRD30	PRD29	PRD28	PRD27	PRD26	PRD25	PRD24	
4	Reserved						CLR	PRESET	Command
5	Reserved								
6									
7									

8-6-2. Explanation of signal name

Bit name	Data name	Explanation
PRD0-31	Preset data	Writing data for the current position preset Setting range: $0 \leq \text{preset data} \leq (\text{scaling data} - 1)$
PRESET	Preset	The position data can be changed to the desired value (Preset data: PRD0-31) by setting this command to "1". (For details, refer to "8-6-4. Current position preset".)
CLR	Alarm clear	The alarm can be cleared by setting this command to "1".
Reserved	Reserved	Don't write any numbers except "0".

8-6-3. Alarm clear

Switch the CLR command from "0" to "1". "Alarm Flag (alarm information)" and "Alarm (Status information)" will be "0" (alarm clear) if an error cause is cleared.

After clearing the alarm, switch the CLR command to "0". "READY (alarm information)" is switched to "1".

"Warning" is automatically recovered after clearing an error cause, so there is no clearing method by the CLR command.

For more details of the alarm, refer to "9. ERROR CONTENTS".

EZA-MAEIP needs an interval of 100ms or more until accepting the CLR command change from "0 to 1" or "1 to 0". (The CLR command cycle requires 200ms or more.)

8-6-4. Current position preset

The position data is changed by the preset data (PRD0-PRD31) and PRESET command (1 bit) which are written from the PLC or another device.

The position data is changed when the PRESET command is switched to "0" to "1".

(1) Setting range of preset data

The preset data should be set in EZA-MAEIP's detection range.

Setting range: $0 \leq \text{preset data} \leq (\text{scaling data} - 1)$

(The scaling data is changed according to the parameter setting.)

(2) Setting warning

"PRESET answer" and "Warning Flag" will be "1" with detecting "Setting warning" if the preset data out of the setting range is written and the preset is done.

"Warning Flag" will be "0" with clearing "Setting warning" if the preset data in the setting range is written and the preset is redone.

However, "Setting warning" cannot be cleared by the preset of the object communication.

"Setting warning" will not be detected if the preset data out the setting range is written by object communication. An error response is sent back.

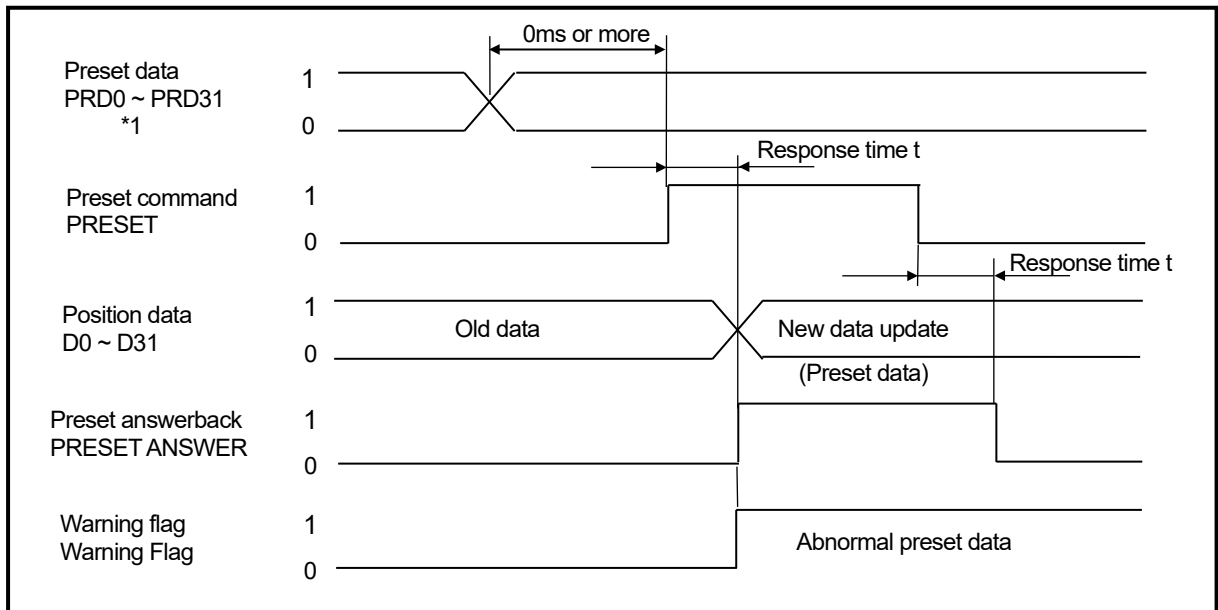
(3) Preset timing

The response time from the point when the PRESET command switches from "0" to "1", until the preset setting occurs, is shown below.

Response time can be calculated by the following calculation expression.

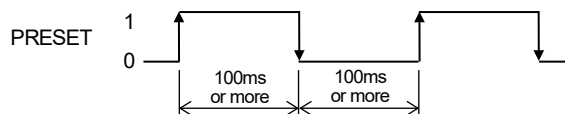
Response time $t =$

PLC scan time + RPI of EZA-MAEIP + EZA-MAEIP internal process time (Max. 10ms)



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

*2: EZA-MAEIP needs an interval of 100ms or more until accepting the PRESET command change from "0" to "1" or "1" to "0". (The PRESET cycle should be 200ms or more.)



NOTE

In the following cases, PRESET cannot be done. ("Preset Answer" doesn't change to "1".)

- "Invalid" is designated for the current position preset function of the parameter.
- READY of Input data is "0". (Alarm Flag is "1".)

8-7. Parameter (Configuration Parameter Data)

Generally, EZA-MAEIP's parameter is set by the configuration tool for the PC when starting the system, also it can be done by using the object communication or web server function.

(PLC etc. (Originator) → EZA-MAEIP (Target))

EZA-MAEIP would operate with initial setting value (factory settings) if the parameter doesn't set.

The parameter isn't required to set every time when turning ON the power supply because the setting parameter to EZA-MAEIP is stored in the internal storage memory.



NOTE

Input data is unstable during a period of up to 100ms when changing the parameter.
The system should be stopped in advance when changing the EZA-MAEIP's parameter in order to avoid affecting the system from the data change.



NOTE

The parameter setting cannot be done by the configuration tool when "Config Param Data (Configuration parameter data)" is "Invalid (0)" by the web server function.



NOTE

EZA-MAEIP parameters should be set the same value even though they set by using any means.
EZA-MAEIP won't operate normally if the value is wrong.
An error response might be sent if the parameter data is received during changing the parameters.
Parameters should be set the same value for each master if several masters are connected by the unicast.
The connection won't be established when the setting value is different.



NOTE

The parameter won't be set if "READY" of Input data is "0". (Alarm flag is "1".)

8-7-1. Parameter List

The EZA-MAEIP parameter list is indicated below;

Instance: 103 (0x67)

byte	Parameter name	Setting range	Factory setting
0	Current_Position_Preset_Function	0,1	1
1	Position_Data_Increase_Direction	0,1	0
2	Scaling_Function	0,1	1
3	Sensor_Low_Pass_Filter	0 to 4	2
4	Sensor_Median_Filter	0,1	0
5	Scaling_Data	2 to 2,301,100,032 (16#2 ~ 16#8928_0000)	575,275,008 (16#224A_0000)

8-7-2. Parameter setting contents

(1) Current_Position_Preset_Function

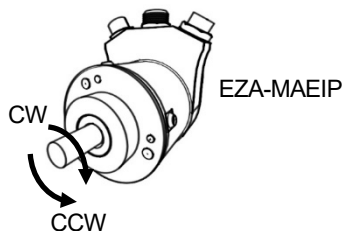
Select whether "Valid" or "Invalid" to the current position preset function.

byte	Setting value	Selection content	Explanation
0	0	Invalid	The position data cannot be changed by PRESET.
	1	Valid (Factory setting)	The position data can be changed by PRESET.

(2) Position_Data_Increase_Direction

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

byte	Setting value	Selection content	Explanation
1	0	CW (Factory setting)	The position data value will increase when the shaft of EZA-MAEIP turns in the clockwise direction as viewed from the shaft end.
	1	CCW	The position data value will increase when the shaft of EZA-MAEIP turns in the counterclockwise direction as viewed from the shaft end.



NOTE

The speed data's positive and negative isn't reversed even though the Position_Data_Increase_Direction is changed.

(3) Scaling_Function and Scaling_Data

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

byte	Setting value	Selection content	Explanation
2	0	Invalid	The scaling is invalid. The total division number of the position data is as follows; $8,778 \text{ turns} \times 262,144/\text{turn} = 2,301,100,032$
	1	Valid (Factory setting)	The scaling is valid.

Scaling_Data

byte	Setting range	Explanation
8-11	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"

Refer to (6) on the next page for details of Scaling_Data.

(4) Sensor_Low_Pass_Filter

The low-pass filter's cutoff frequency of the EZA-MAEIP'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	Setting value	Selection content	Explanation
3	0	1kHz	Filter frequency = 1kHz
	1	500Hz	Filter frequency = 500Hz
	2	250Hz (Factory setting)	Filter frequency = 250Hz
	3	125Hz	Filter frequency = 125Hz
	4	62Hz	Filter frequency = 62Hz

(5) Sensor_Median_Filter

Designates the sensor median filter which is installed on EZA-MAEIP'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 this filter is valid.

This filter is effective when using an inverter that generates cyclic 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	Setting value	Selection content	Explanation
4	0	Invalid (Factory setting)	Median filter is invalid.
	1	Valid	Median filter is valid.

(6) Details of Scaling_Data

Scaling data is set by "8,778 turns (Total number of turns) × division number of data per turn".

For the following example ① and ②, the scaling data setting value is designated to "8778 x 2ⁿ" (2ⁿ = 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 2ⁿ" (2ⁿ = division number of data per turn).

In this case, specific bit range cannot read out as the single-turn data or multi-turn data.

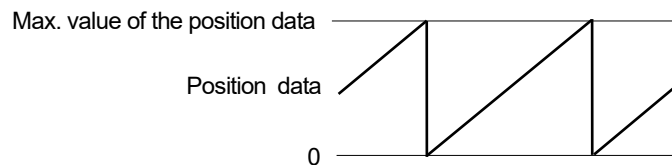
Ex.	Scaling data setting value	Position data (32bit)															
		D31	D30	D29					D18	D17	D16	D15			
①	(Factory setting) 575,275,008 =8,778 turns x 65,536 / turn	0	0	Multi-turn data						Single-turn data: 16bit							
				H 0 ~ H 2249: 0 ~ 8,777						H 0 ~ H FFFF: 0 ~ 65,535							
				Position data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



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.)

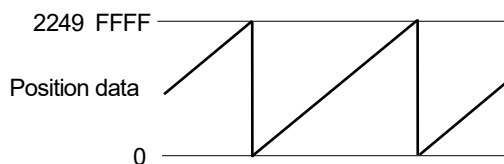
In the factory setting, if the multi-turn data exceeds 8777 (maximum value), it will return to "0".



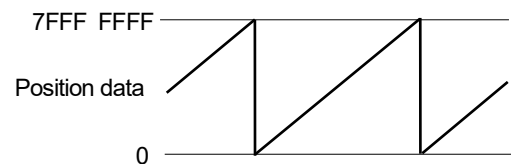
When the position data exceeds maximum value and return to 0, it might be difficult to calculate correct position data if positions of the device which rotates continuously like a roll are detected.

In this case, set the scaling data to "2ⁿ (example ③ in the previous page)".

(Example ① in previous page)



(Example ③ in previous page)



H 7FFFFFFFF (maximum value data) is easier to calculate than H 2249FFFFFF when calculating the position changing amount which is across 0.

9. ERROR CONTENTS

Error Name	Explanation	When Detected	Monitor LED or alarm				Status	Clear Method	Probable cause
			MS	READY	Warning Flag	Alarm Flag			
Sensor alarm	EZA-MAEIP has failure	Always	Red	0	0	1	The position and speed data are unstable.	- CLR - Restart	EZA-MAEIP has failure
Memory alarm	An error has occurred at the storage memory inside EZA - MAEIP.	At power ON	Red	0	0	1	The position and speed data are unstable. (EZA-MAEIP operates with factory settings.)	- CLR	EZA-MAEIP has failure
Hardware alarm	EZA-MAEIP has failure	Always	Red	0	0	1	The position and speed data are unstable.	- CLR - Restart	EZA-MAEIP has failure
	The internal CPU of EZA-MAEIP had a runaway.		Unstable (Red, flashing or OFF)	Unstable (0 or 1)	Unstable (0 or 1)	Unstable (0 or 1)			
Power supply voltage warning	The power voltage supplied to EZA-MAEIP is outside of the range between 10.8 and 28.8V.	Always	Flashing Red	1	1	0	The position and speed data output normally.	Automatic recovery	The power voltage supplied to EZA-MAEIP is outside of the specification range. Or, EZA-MAEIP has failure.
Internal temperature warning	The EZA-MAEIP's ambient temperature is out of the range between -20 and 75°C.	Always	Flashing Red	1	1	0	The position and speed data output normally, but we cannot guarantee the accuracy.	Automatic recovery	The EZA-MAEIP's temperature is out of the specification range. Or, EZA-MAEIP has failure.
Rotation speed warning	The EZA-MAEIP's rotation speed is more than 6100r/min.	Always	Flashing Red	1	1	0	The position and speed data are unstable.	Automatic recovery	The EZA-MAEIP's rotation speed is out of the specification range. Or, EZA-MAEIP has failure.
Setting warning	The preset data is out of the range.	Always	Flashing Red	1	1	0	EZA-MAEIP operates with data before the preset.	- Reset the preset. - Restart	The preset setting has error.
Switch alarm	An error has occurred at the switch inside EZA - MAEIP.	At power ON	Red	Unstable (0 or 1)	Unstable (0 or 1)	Unstable (0 or 1)	EtherNet/IP communication is unavailable.	- Restart	Switch has failure Or, EZA-MAEIP has failure.



NOTE

- EZA-MAEIP might be damaged when the internal temperature warning occurs.
Lower the ambient temperature quickly.
Or, the installation place should move to a place which is within a permissible temperature range.
- The EtherNet/IP communication cannot be executed if the "Switch alarm" is occurred.
Check the state by the monitoring LED or ezSCOPE because it cannot be checked by the PLC or web server function.
- The setting warning isn't detected when the preset data out of the setting range is written by the object communication, but an error response is returned.

**NOTE**

- EZA-MAEIP will operate with the factory setting values of the parameter and position data if a memory alarm occurs. The memory alarm is cleared when CLR (Alarm clear) is designated to "1", but parameter settings and position data doesn't change.

- An IP address is requested for the DHCP server as the same as the factory setting state when the "Memory alarm" occurs during using the IP address of the storage memory.
The EtherNet/IP communication starts by obtaining the IP address from the DHCP server, but the IP address isn't stored when "Memory alarm" isn't cleared by CLR (Alarm clear).

- The memory alarm isn't occurred when the memory for operating time is broken.
However, the operating time's data become -1(FFFF FFFF H).

- The memory alarm isn't occurred when the memory for event log is broken.
It isn't sure what will be written in the event log.

10. INSPECTION

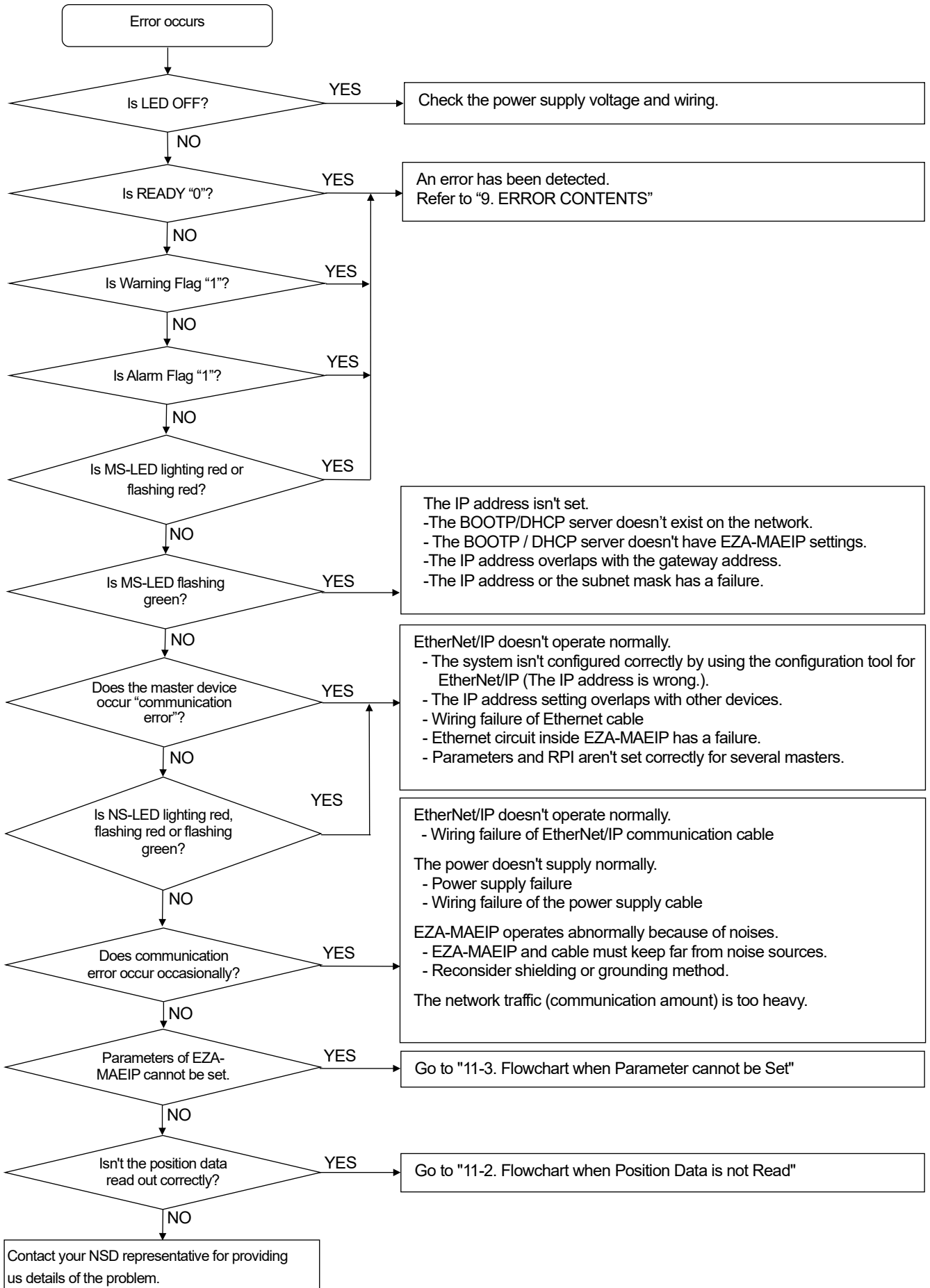
The inspection should be conducted once every 6 months to a year.

Any inspected items which do not satisfy the criteria shown below should be corrected.

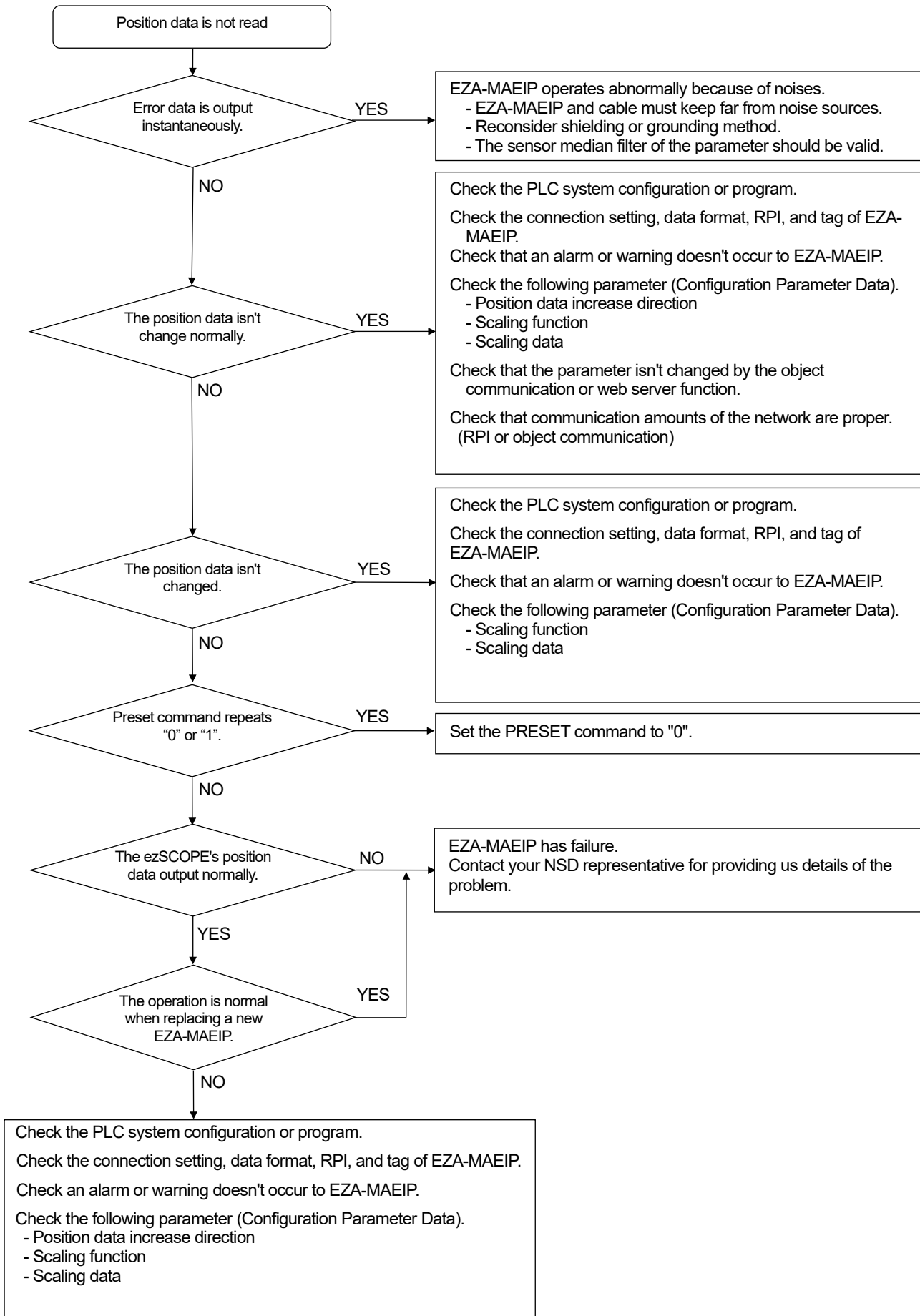
Inspection item	Inspection Description	Criteria	Remark
Power supply	Measure the voltage fluctuation at the power supply terminal block.	Within 10.8V to 28.8VDC range	Tester
Ambient Conditions	Check the ambient temperature.	-20 to +75°C	Thermometer
	Check the accumulation of dust.	None	Visual Inspection
Mount Conditions	Verify that EZA-MAEIP is securely mounted.	There should be no looseness.	
	Verify that the shaft of EZA-MAEIP 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 for cable are securely tightened.	There should be no looseness.	
	Check the connector is securely connected.	There should be no looseness.	

11. TROUBLE SHOOTING

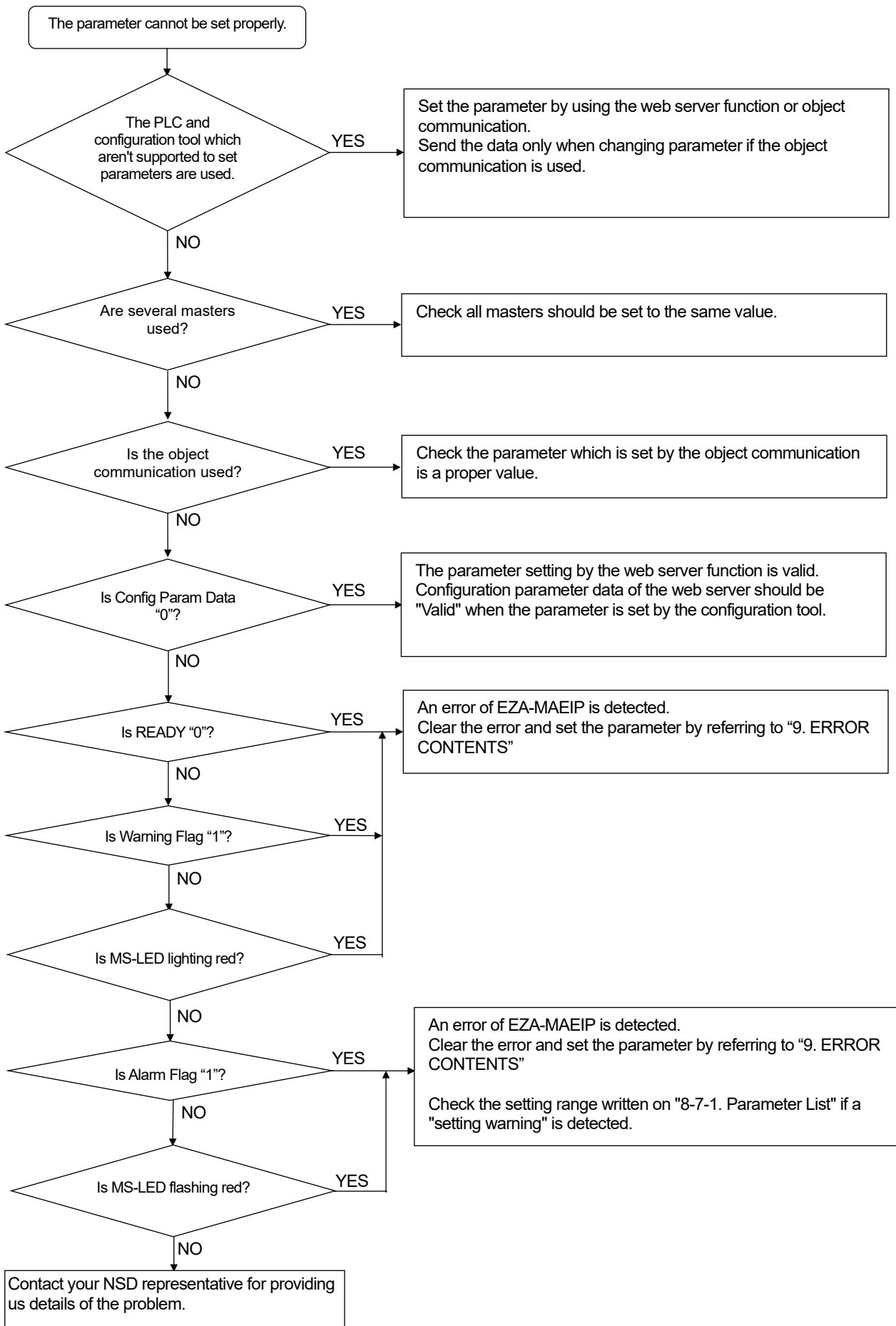
11-1. Trouble Shooting Flowchart



11-2. Flowchart when Position Data is not Read



11-3. Flowchart when Parameter cannot be Set



APPENDIX 1. CE MARKING

EZA-MAEIP conforms to EMC directive.

The low voltage directive is out of the range because EZA-MAEIP 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 Ethernet cable when it operates faultily by the influence from the peripheral devices.

Recommendation clamp filter

Mounting location	Clamp filter model	Manufacturer
- Power supply cable - Ethernet cable	ZCAT2032-0930 (inner dimensions: $\phi 9$)	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

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