DOC1138459
NN75443701

Supplementary documentation for the operation manual

PRODUCT NAME

Electric Actuator Easy to Operate Integrated Controller

IO-Link Communication Function Manual

Model / Series / Product Number

EQ∗-BL series

This manual is a user's guide for the IO-Link functions of the e-Actuator/EQ□-BL.
Please refer to the EQ□ series operation manual corresponding to your model below.

EQFS: Operation Manual “e-Actuator / Slider type” (DOC1023125)
EQY, EQYG: Operation Manual “e-Actuator / Rod type” (DOC1023126)

Contents

EQ□-BL
Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

EQ□-BL
Safety Instructions

⚠ Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not allowed.
Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Safety instruction and precautions for product specific

Please refer to the ‘Safety instruction’ section of the EQ□ series operation manual.

Safety instruction and precautions for IO-Link communication type EQ□-BL series

⚠ Warning

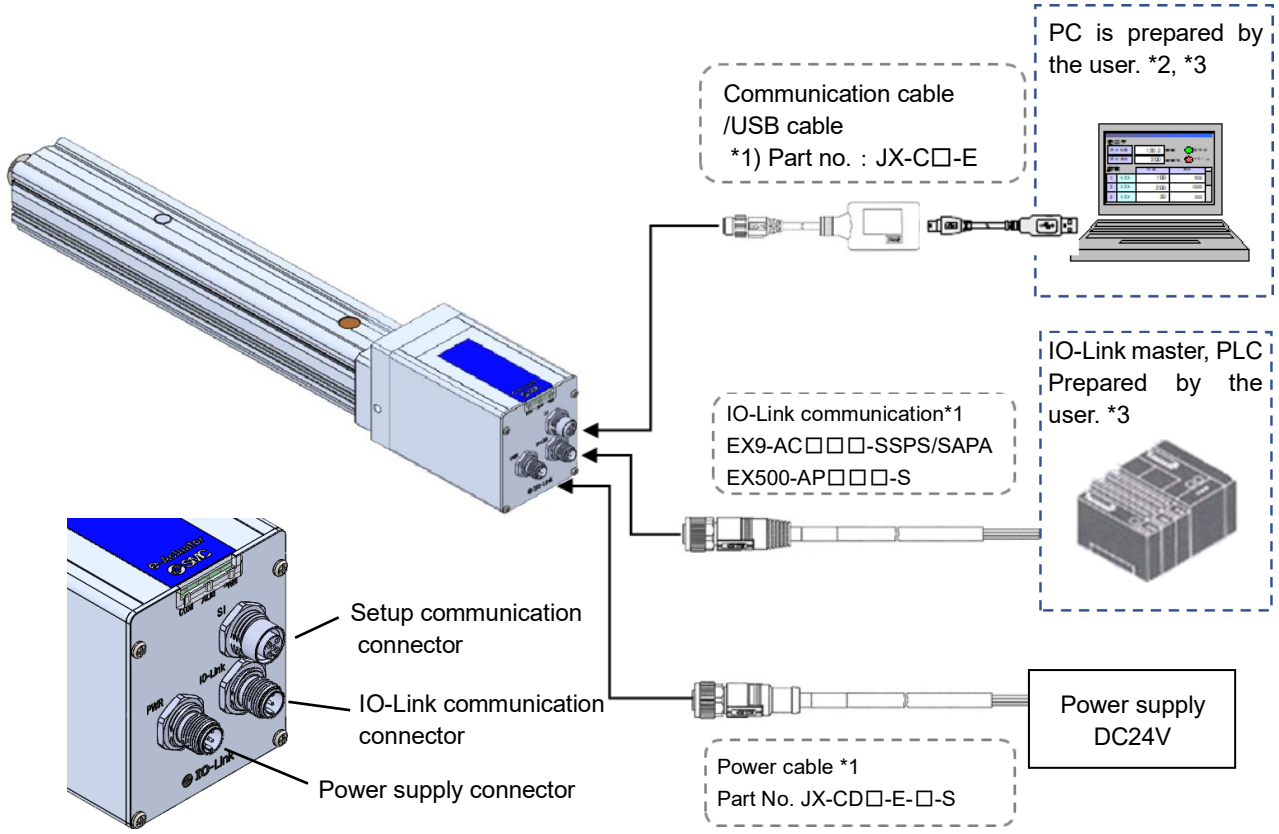
As this product has galvanic isolation between the Product power supply and the IO-Link communication power supply. Therefore please turn on both power supplies when setting the product parameters and step data via either the setting software (e-Actuator setup tool) or IO-Link communication.

If the power-on sequence is reversed (IO-Link communication power is supplied after the Product power supply is supplied), alarm No. 112 ‘Internal communication error’ will occur. In this case, the alarm can be reset using the RESET signal.

1 Outline of Product

1.1 System configuration example

An example of a system configuration using the electric actuator is shown below.



*1 Optional item. When L code power cable is required, please prepare it on the user side.
*2 Latest version of the configuration software must be used.
Please download it from the SMC website. https://www.smcworld.com/
*3 PLC, IO-Link master, IO-Link communication cable and PC are prepared by the user.
*4 For power supply connector L code, please prepare your own power supply cable.

1.2 Features

● IO-Link communication support
It is possible to connect to an IO-Link master and operate, read and write information via IO-Link communication.

● Data writing method
You can set parameters, monitor status, perform test runs and reset alarms using IO-Link communication or a PC with the controller setting software installed.

● Galvanic isolation support
The Product power supply and IO-Link communication power supply are galvanically isolated.

●Locator Function
Even when multiple-axis actuators are connected, the actuator currently communicating via IO-Link can be visually identified by a change in its LED blinking pattern.

●Compatible with L-code power supply connector option
The M12 connector for the power supply allows selection of the L-code connector.
Selecting the L-code connector for the power supply prevents miswiring with the IO-Link connector.

●Other
For product features other than those listed above, please refer to “1.2 Product Features” section of the EQ□ series operation manual.

⚠Caution

The EQ□ parallel IO communication type has three operation modes, but the IO-Link communication type EQ□-BL is only “Closed center mode”. It does not have a selection for operation modes.
“Closed center mode” allows setting the origin end, opposite end, or midpoint for positioning operations.
Note that for pushing operations, only the origin end and opposite end can be set.

1.3 How to order

Please refer to “How to order” of the EQ□ series operation manual.

1.4 Specifications

Item		Specifications
IO-Link communication	Power supply	DC18 ~30V
	Current consumption	60mA or less
Protocol		IO-Link（Version1.1）
Communication speed		COM3(230.4kbps)
Interface		M12 A code Plug 4Pin
IO-Link port Class		Class A
Setting file		IODD file (Download from SMC web site)
Prosses data		Input 4 Bytes / Output 2 Bytes
Minimum cycle time of Process data		1ms
Vender ID		131 (0x0083)
Device ID		754 (0x0002F2)
Network topology		1:1
SIO mode		Not supported

∗For product specifications other than IO-Link communication, please refer to the EQ□ series operation manual for each item.

・Actuator specifications : “Chapter 1 Specification”

・Electrical specifications : ”7.1 Basic specifications of the product”

However, as the power supply specifications and LED specifications are different, please refer to **７．３ Power supply connector**, **７．４IO-Link communication connector** and **７．５LED Display Details** in this manual.

2 Installation and Initial Setting

2.1 Flow procedure from installation to initial setting

Be sure to check the procedure below before use.

Procedure 1 Preparation
Please refer to the EQ□ series operation manual.

① Checking the contents of the package →Item 2.2

* : Please confirm that the actuator, accessories and optional items are present.

↓

② Preparation of necessary items →Item 2.3

*: Prepare the electric wires, etc. required for installation of the electric actuator.

*: Refer to **7.3 Power supply connector**, **7.4 IO-Link communication connector** for the specifications of the wires that can be used.

⇩

Procedure 2 Installation of electric actuators →Item 2.4
Please refer to the EQ□ series operation manual.

⇩

Procedure 3 Wiring and Connection →Item 2.5

① Connection to power supply →Item 2.5.1

↓

② Connection to PC →Item 2.5.2

↓

③ Connection to PLC (IO-Link master) →Item 2.5.3

*PLC is prepared by the users.

* Refer to for **7.4 IO-Link communication connector** details on interface with upper-level control component

⇩

Procedure 4 Power ON alarm (Error) →Item 2.6

⇩

Procedure 5 Setup of the operation parameters →Item 2.7

*: Set up using the electric actuator configuration software installed on your PC

*: Refer to **8 Setting** for details on interface with the upper-level control component

⇩

Procedure 6 Test run →Item 2.8

2.2 Checking the contents of the package

Please refer to the EQ□ series operation manual.

2.3 Preparation of necessary items

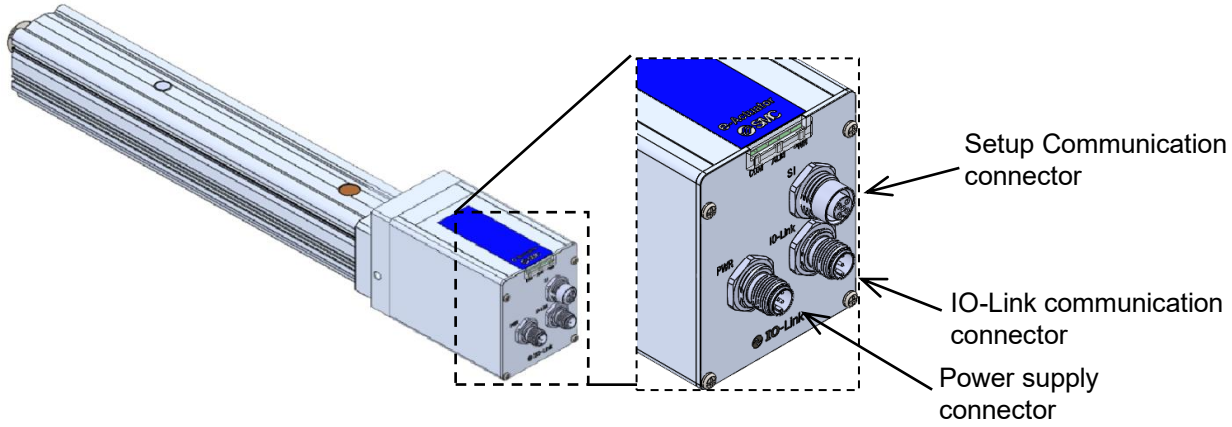
Please refer to the EQ□ series operation manual.

2.4 Installation of electric actuators

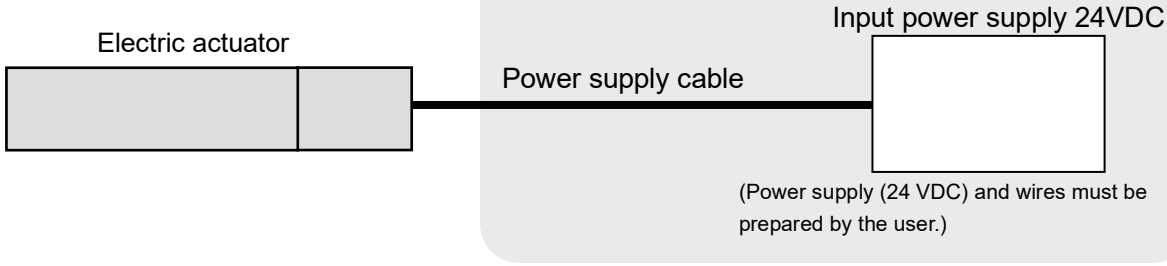
Please refer to the EQ□ series operation manual.

2.5 Wiring and Connection

Please prepare the electric actuator. Connect the cable to the connector part of the electric actuator.



2.5.1 Connection to input power supply



⚠ Caution

Please use a power supply (DC 24 V) with sufficient capacity that does not fall below the maximum power requirement specified for the electric actuator.

(1) Wiring of the power supply cable

For power connector A-code, connect the optional power cable JX-CD□-E-□-S to the DC24V input power source as described in items 1) to 3) below, then insert it into the power connector section of the electric actuator.
For power connector L-code, please prepare an M12 connector L-code power cable yourself.
7.3 Power supply connector and perform the wiring.

⚠Caution
Arrange wiring so that the conductors of each wire do not contact other lines.

1) Wiring of power supply (P24V, 0V)

Connect the positive side (+) of the product power supply 24VDC to the P24V electric wire of the power supply cable and connect the negative (-) to the 0V electric wire.

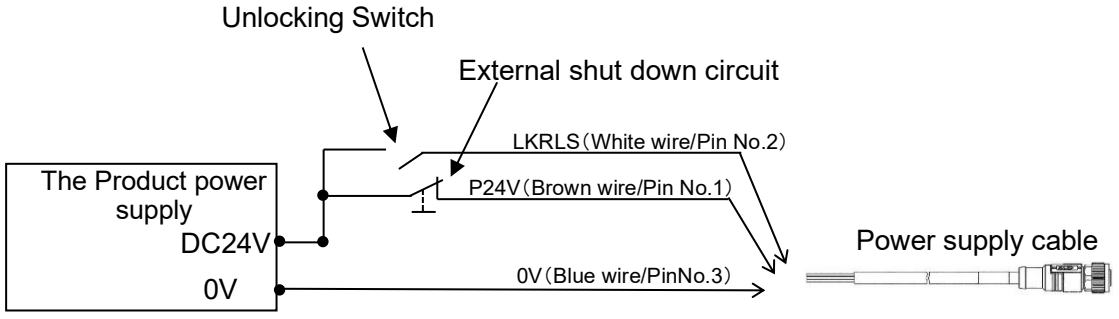
⚠Caution
Please use a power supply with a capacity that does not fall below the maximum power of the electric actuator specifications for the input power supply (24 VDC).

2) Wiring of the stop switch (EMG)

When applying 24 V to the P24V electric wire, the product starts operating. When 24 V is turned off, the power supply to motor is shut off. A stop switch must be installed by the user to stop the actuator in abnormal situations.
Please refer to **3.2.1 (2) Wiring of a shutdown circuit.**

3) Wiring of the lock release (LK RLS)

Install an unlocking t for adjustment or recovery during an emergency of an actuator with a locking mechanism.
The switch (24 VDC, contact capacity: 0.5 A or more) needs to be prepared by the user. One terminal of the lock release switch should be connected to the 24 VDC power supply and the other should be connected to the LK RLS electric wire. When this is switched on, the lock will be released.



⚠Caution
It is not necessary to connect the LK RLS terminal when the actuator does not have a locking mechanism. The LK RLS wire terminal is only used for adjustment and emergency unlock. It must not be energized during normal operation. After wiring the power supply plug, connect it to the power connector of the actuator.

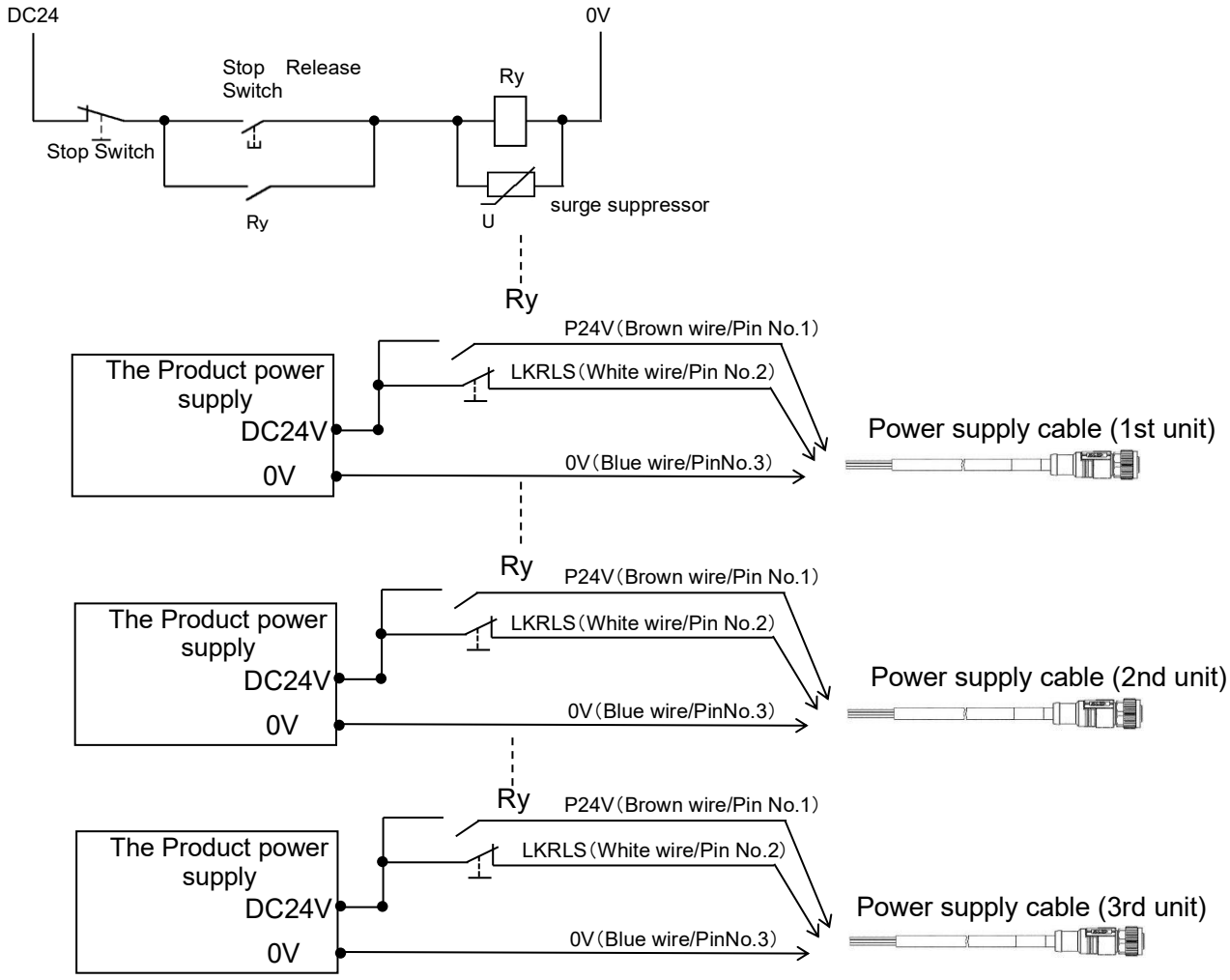
(2) Wiring of a shutdown circuit

The power supply to electric actuator stops when the external stop switch is activated

・Cut off P24V (relay contact)

If there is a separate circuit for stopping the entire device, or if there are multiple electric actuators with different power supplies, connect a relay contact between the Product power supply 24V DC and the P24V power cable.

(Circuit example: The diagram shows the stopped state.)



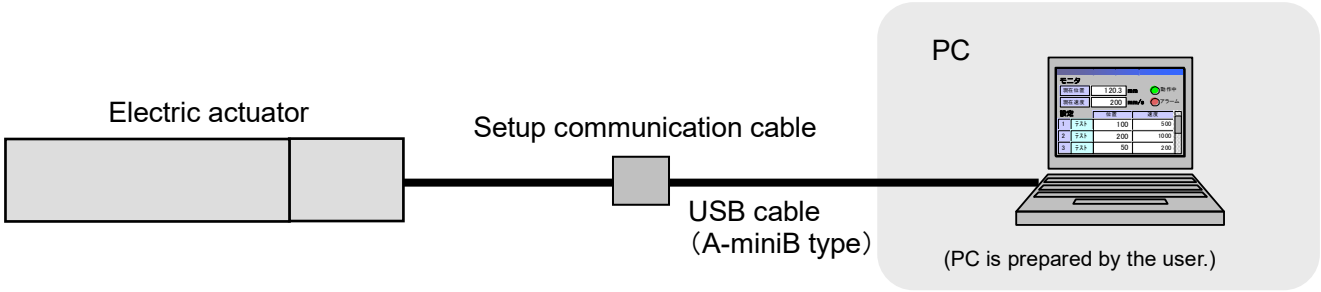
⚠Caution

- When a shutdown is input, the actuator stops with maximum deceleration, then the motor is turned OFF. Note that the electric actuator does not stop immediately, and depending on the conditions, it may continue to operate due to inertia.
- If an electric actuator with lock is used vertically, a delay in response of the Lock may occur when turning off the motor power supply (P24V). The moving part of the actuator may drop due to the weight of the actuator itself.

2.5.2 Connection to PC

When using the setup software (e-Actuator setup tool), connect the setup communication cable between the communication connector of the electric actuator and the PC.

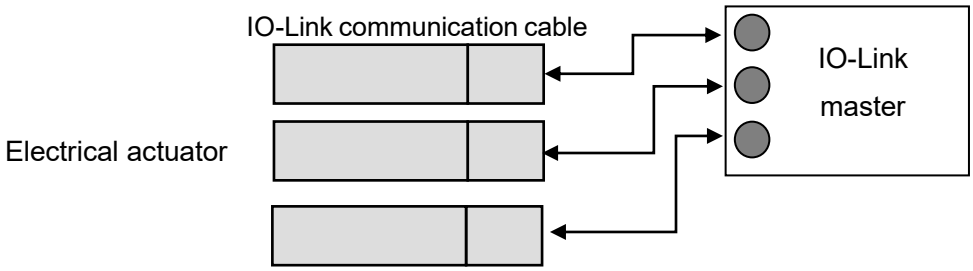
・Setup communication cable part number (with A-miniB type USB cable): JX-C□-E



2.5.3 Connection to PLC (IO-Link master)

Please prepare IO-Link master separately on the user side.
Use the optional IO-Link cable EX9-AC□-SSPS/SAPA (dual connectors) or
EX500-AP□-S (single-connector) to connect the electric actuator to the IO-Link master.

Refer to **7.4 IO-Link communication connector** for wiring.

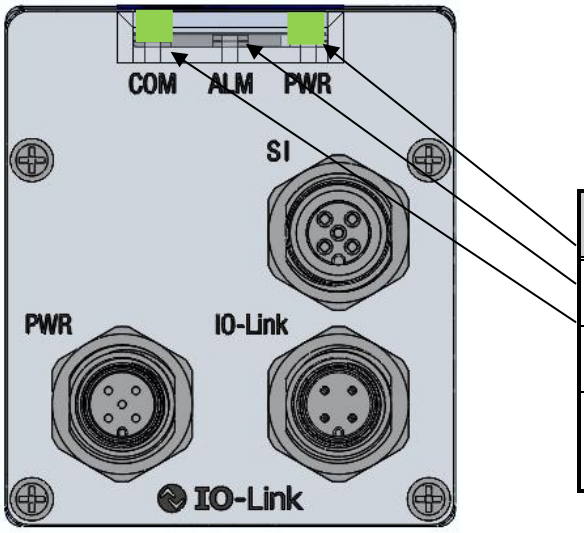


It is necessary to set the EQ□-BL actuator to the IO-Link master.
First, supply power to the IO-Link master and the power supply L+/L- for communication with IO-Link.
Then, install the IODD (I/O Device Description) file for EQ□-BL actuator in the IO-Link master configuration tool, for setting the EQ□-BL actuator to the master.
The IODD file can be downloaded from the SMC website.

・Contents of the IODD-EQ##-BL-yyyymmdd.zip
IODD file*1 : SMC-EQ##-BL-yyyymmdd-IODD1.1.xml
Device Symbol : SMC-EQ□-BL-pic.png
Device Icon : SMC-EQ□-BL-icon.png
Vendor Logo : SMC-logo.png
*1 yyyymmmdd is year, month and date.

2.6 Power ON alarm (Error)

Refer to **2.5 Wiring and Connection** for the electric actuator to confirm that all wiring is correct.
Supply power 24VDC to the IO-Link communication power supply (L+, L-) first, then supply power to the Product power supply (P24V, 0V).
If the condition is normal, the LEDs on the front of the actuator turn ON as shown on the table below.



LED	LED Status	Status
PWR (Green)	ON	Normal
ALM (Red)	OFF	No alarms
COM (Green)	Flashing	IO-Link communication established

*If the [PWR] LED is on, it is in normal condition.

*If the [ALM] LED is on, an alarm has been generated.

*If the [PWR] LED is off, the voltage between M24V - 0V is low or 0 VDC.

If the [COM] LED is on (solid), IO-Link connection is not established.

For details on each LED, refer to **7.5 LED Display Details**

⚠Caution

If the power-on sequence is reversed (i.e., if the IO-Link communication power supply is applied after the product's main power supply),
Alarm No. 112 “Internal Communication Error” will occur.
In this case, the alarm can be cleared using the RESET signal.

If an error occurs in the IO-Link communication, refer to **5 Alarm detection** to eliminate the cause.

2.7 Setup of the operation parameters

Please set the step data and parameters via the setting software (e-Actuator setup tool)

or IO-Link communication.

If using the e-Actuator setup tool to make settings, please refer to the relevant user manual for instructions.

⚠ Caution

When setting data via the e-Actuator setup tool, don't setting data via IO-Link communication.
There is a risk that the data will not be set correctly.

If setting from IO-Link communication, please refer to **9.2 Parameter** for the setting method.

⚠ Caution

- When setting data via IO-Link communication, please do not change the data via the e-Actuator setup tool at the same time. The data set via IO-Link communication may be overwritten after the setup tool setting. That is a risk that the data will not be set correctly.
- When setting data from IO-Link communication, please make sure the Product power supply turned on. If the Product power supply is off, there is a risk that the settings will not be correct.
- To change any parameter other than the 'OUT signal output width' and "JOG speed", please use the e-Actuator setup tool. (For details, see **9.2 Parameter**)

2.8 Test run

Test run to ensure that the electric actuator is operating normally in the system.
Please refer to **9 Memory Map Details** for the assignment of memory.
Input signals by IO-Link communication for checking the operation.
Please refer to **3.1 Operation flow** for the operation.

3 Operation

3.1 Operation flow

Procedure 1 Startup

The startup procedure varies depending on the power-on situation.

- When turning on the power supply normally after shipment from SMC
- When supplying power again after resetting the alarm Group E or after changing the parameter of “rotating direction reference”

Procedure 2 Operation Instructions

①	Positioning operation	→Item 3.3.2
②	Pushing operation	→Item 3.3.3
③	JOG operation	→Item 3.3.4
④	Reset	→Item 3.3.5
⑤	Interrupting operation	→Item 4

3.2 Procedure for power setup

3.2.1 Procedure for power setup

The following is a Startup procedure for the battery-less absolute encoder for every occasion that occurs when the power is applied.

(1) When turning on the power supply normally after shipment from SMC

(2) When supplying power again after resetting the alarm Group E or after changing the parameter of "Rotating direction reference"

* Return to origin is required. Return to origin is performed as the first operation command after turning on the power supply.

⚠WARNING

If the power-on sequence is reversed (IO-Link communication power is supplied after the Product power supply is supplied), alarm No. 112 'Internal communication error' will occur. In this case, the alarm can be reset using the RESET signal.

⚠WARNING

"Return to origin" is executed upon the first operation command via IN* or JOG* after a Group E alarm and a change to the "Rotating direction reference" parameter.
After homing is completed, the system proceeds with the specified operation command.
Regardless of the direction specified in the operation command, the system will move toward the home position.
Please ensure thorough safety checks are performed before executing "return to origin".

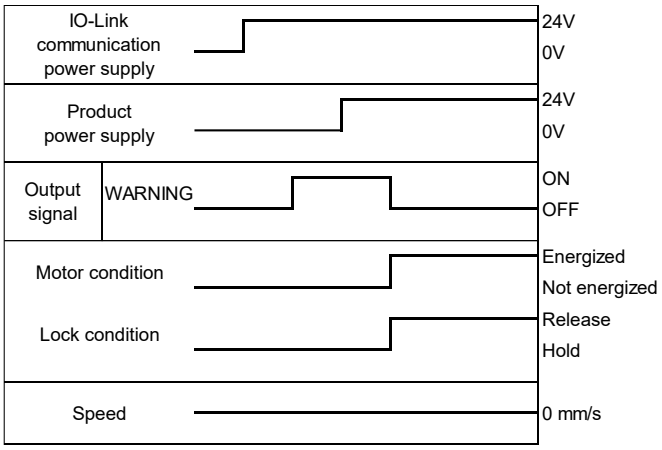
3.2.2 Power Supply Startup

1) When turning on the power supply normally after shipment from SMC

- Procedure -

1. Turn on IO-Link communication power supply
   ↓
2. IO-Link communication is established
   Turned on WARNING
   (Product power supply is off)
   ↓
3. Turn on Product power supply
   ↓
4. Turned off WARNING and servo is turned on.
   *The lock will be released for the actuator with a lock.

- Timing chart -



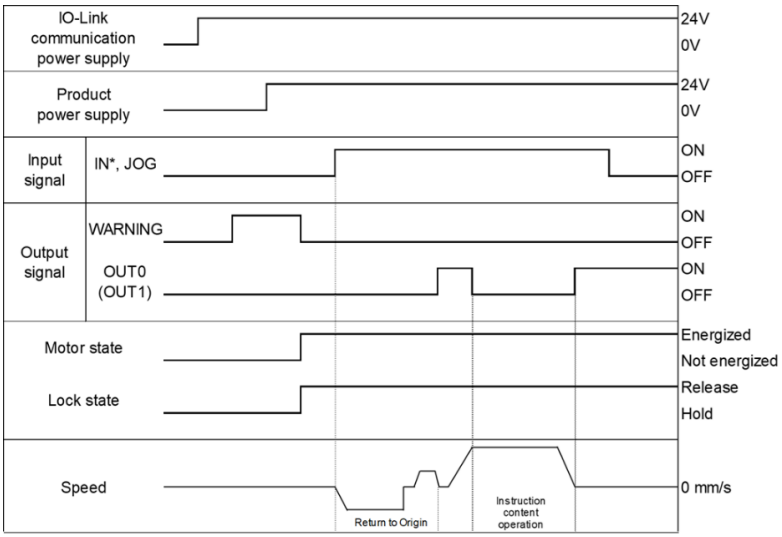
2) When supplying power again after resetting the alarm Group E due to power supply shutdown or after changing the parameter of "return to origin direction"

In this case, “return to origin” is required.

- Procedure -

1. Turn on IO-Link communication power supply
   ↓
2. IO-Link communication is established
   Turned on WARNING
   (Product power supply is off)
   ↓
3. Turn on Product power supply
   ↓
4. Turned off WARNING and servo is turned on.
   *The lock will be released for the actuator with a lock.
   ↓
5. Turn the IN* or JOG* signal on
   (Performs the return to the origin operation)
   *Return to the origin operation is performed as the first operation command after resetting the alarm Group E or after the "return to origin direction" parameter is changed.
   ↓
6. OUT 0 output is ON
   Return to origin is completed.
   Next, it operates according to the instructions given by No. 5
   ↓
7. OUT* is ON.
   Instruction content operation is completed.

- Timing chart -



⚠ WARNING

“Return to origin” is executed upon the first operation command via IN* or JOG* after a Group E alarm and a change to the “Rotating direction reference“ parameter.
After homing is completed, the system proceeds with the specified operation command.
Regardless of the direction specified in the operation command, the system will move toward the home position.
Please ensure thorough safety checks are performed before executing “return to origin”.

3.3 Operation Instructions

3.3.1 Outline of operation commands

The operation data that has been pre-registered in the electric actuator can be used to issue operation instructions via IO-Link communication process data instructions.
There are two operation patterns within the operation data.
・Positioning operation
・Pushing operation
・JOG operation

The operation procedures are described below

3.3.2 Positioning operation

- Procedure-

Setting pushing force of the step data to zero enables positioning operation (Refer to **9.2.2 (8) Step data**).

1. Specify a command operation using the operation data by turning IN*input bits ON/OFF.

IN0 input：ON → Command to move to the origin end
IN1 input：ON → Command to move to the opposite end
IN2 input：ON → Command to move to the intermediate point

↓

2. Start the positioning operation.

↓

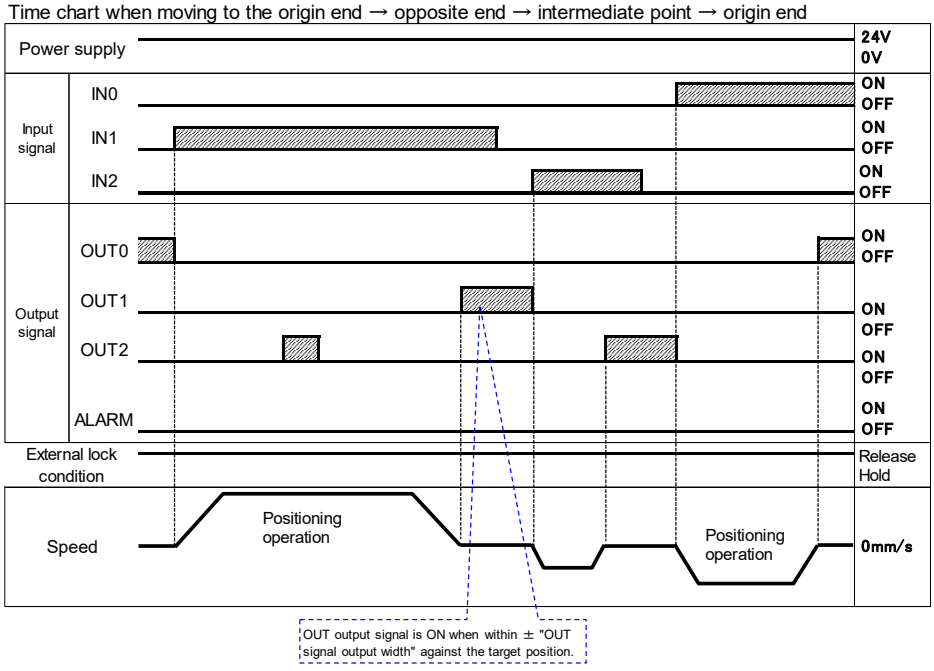
3. When reaching the target position, the OUT* output bits corresponding to the operation data turn ON. The positioning operation is completed.

OUT0 output：ON → Completes the move to the origin end
OUT1 output：ON → Completes the move to the opposite end
OUT2 output：ON → Completes the move to the intermediate point

∗ When IN0, IN1 and IN2 input are turned OFF simultaneously during positioning operation, the operation will decelerate to a stop.
∗ When IN0, IN1 and IN2 input are turned ON simultaneously during stopping, the operation will keep stopping.
∗ When IN0, IN1 and IN2 input are turned ON simultaneously during positioning operation, the current operation will continue.

- Timing chart Positioning operation -

Time chart when moving to the origin end → opposite end → intermediate point → origin end



*"Power ON" in the timing chart shows the power supply is turned ON.
*The operation stops when the signal of IN0, IN1 or IN2 is turned OFF.

3.3.3 Pushing operation

- Procedure -

Setting “pushing force” of the step data to a value other than zero enables pushing operation

(Refer to **9.2.2 (8) Step data**).

1. Specify a command operation using the operation data by turning IN0 and IN1 input bits ON/OFF. ⇒ Load the specified operation data.

IN0 input: ON (IN1, IN2: OFF) → Command to move to the origin end
IN1 input: ON (IN0, IN2: OFF) → Command to move to the opposite end
∗Pushing operation cannot be performed at the intermediate point.

↓

2. The positioning operation will start and continue up to the pushing operation start position.

↓

3. When the pushing operation start position has been reached, the pushing operation at low speed starts.

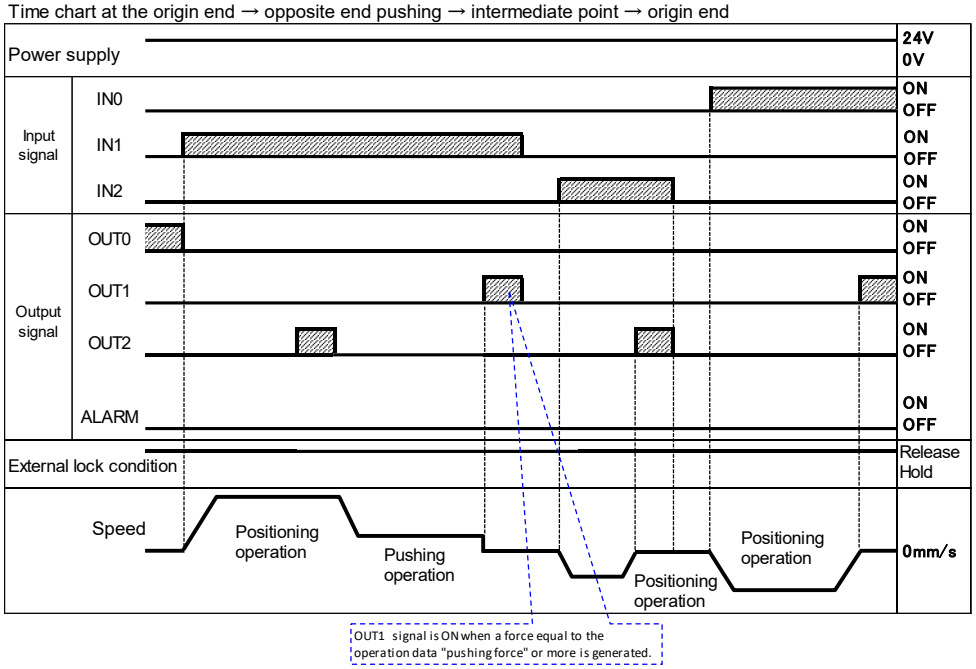
↓

4. When the pushing operation is started and the set pushing force is reached, the OUT0 and OUT1 output bits corresponding to the commanded operation data turn ON to complete the pushing operation. (Pushing force set by the operation data is generated.)

OUT0 output: ON → Completes pushing to the origin end
OUT1 output: ON → Completes pushing to the opposite end
∗Pushing operation cannot be performed at the intermediate point.

-Timing chart Pushing operation -

Time chart at the origin end → opposite end pushing → intermediate point → origin end



*"Power ON" in the timing chart shows the power supply is turned ON.
*The operation stops when the signal of IN0, IN1 or IN2 is turned OFF.

⚠ Caution

Pushing distance of pushing operation can only be set via e-Actuator setup tool.
When the pushing position is set via IO-Link, please set the pushing distance via e-Actuator setup tool again if necessary.
Pushing distance indicates the difference between the start position for the pushing operation and either the origin end or the opposite end position.

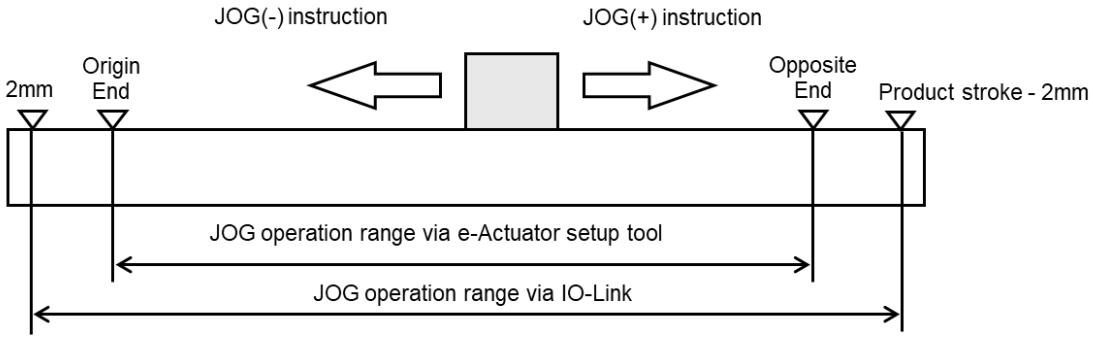
3.3.4 JOG operation (IO-Link)

- Procedure -

1. Operate by turning the JOG+ and JOG- inputs ON/OFF.
   ↓
2. Inputting JOG+ starts movement toward the opposite end position at the JOG speed specified by the parameter.
   Inputting JOG- starts movement toward the origin position at the JOG speed specified by the parameter.
   ↓
3. When the position enters the range of the ±OUT output width for the opposite end position, OUT1 output turns ON. Movement stops upon reaching the position 2mm or the product stroke - 2mm. if the JOG* signal is turned OFF during the movement, it decelerates and stops from that position.

*JOG operation via IO-Link communication and JOG operation via the e-Actuator setup tool differ in their operational range and the reference speed used (Refer to **9.1.2 Process data output**).

Operational range



Reference speed in JOG operation

JOG operation via IO-Link	ISDU parameter (Refer to **9.2.2 ISDU parameter (6) parameter**)
JOG operation via e-Actuator setup tool	Setting speed within e-Actuator setup tool.

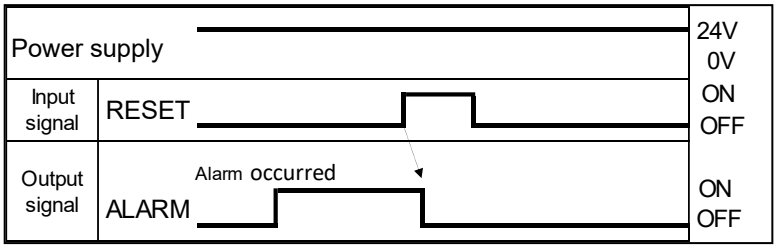
3.3.5 Reset

Alarm reset

-Procedure-

1. Alarm is generated
   （ALARM output bit turns ON）
   ↓
2. Turn the RESET input bit ON.
   ↓
3. The ALARM output bit turns OFF when the generated alarm is of the alarm Groups B to D and the cause of the alarm is solved. (Alarm will be reset.)

-Timing chart: Alarm reset-



⚠Warning

When the alarm is reset, the command from the upper-level device such as a PLC will take effect. The operation commanded by the upper-level device will be operated immediately.

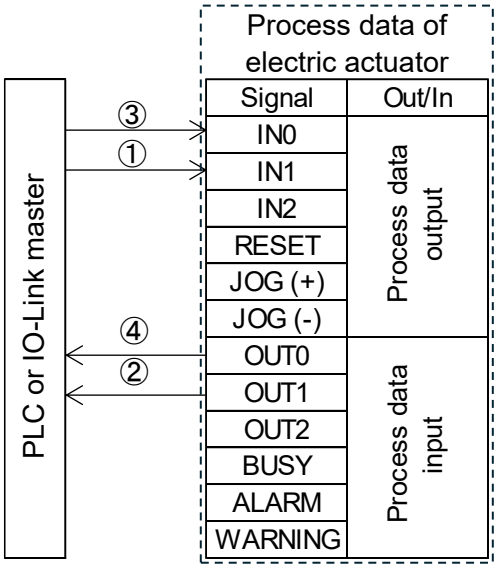
3.4 Operation Examples

3.4.1 Positioning operation

Example) A setting is described when it is moved from the origin end (0 mm position) to the opposite end (100 mm position) with a speed of 100 mm/s (operation command to the opposite end) and then moved from the opposite end (100 mm position) to the origin end (0 mm position) with a speed of 300 mm/s (operation command to the intermediate point).

■Operation data setting

No	position mm	speed mm/s	Acceleration mm/s^2	Deceleration mm/s^2
1	Origin End : 0.00	300	3000	3000
2	Opposite End : 100.00	100	3000	3000



Flow chart (Reference)

①Command operation of the operation data to the Opposite end (Turn IN1 input ON, IN0, IN2 input OFF)

↓

Starts moving the position to the opposite end.

↓

OUT0 to OUT2 outputs turn OFF.

↓

②OUT1 output turns ON.

↓

Moving the position to the opposite end is completed.

↓

③Command operation of the operation data to the origin end. (Turn IN0 input ON, IN1, IN2 input OFF)

↓

Starts moving the position to the origin end.

↓

OUT0 to OUT2 outputs turn OFF.

↓

④OUT0 output turns ON.

↓

Moving the position to the origin end is completed.

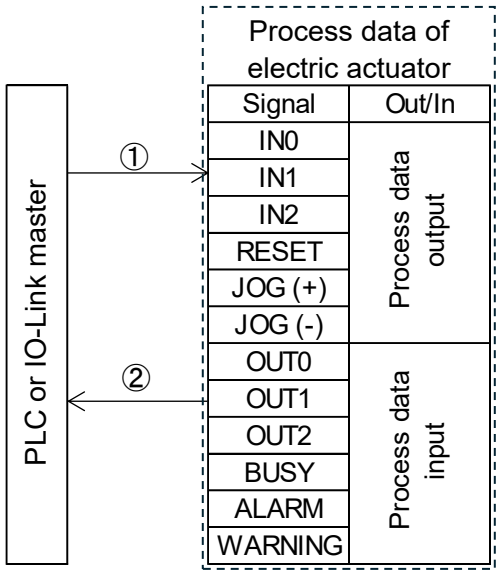
3.4.2 Pushing operation

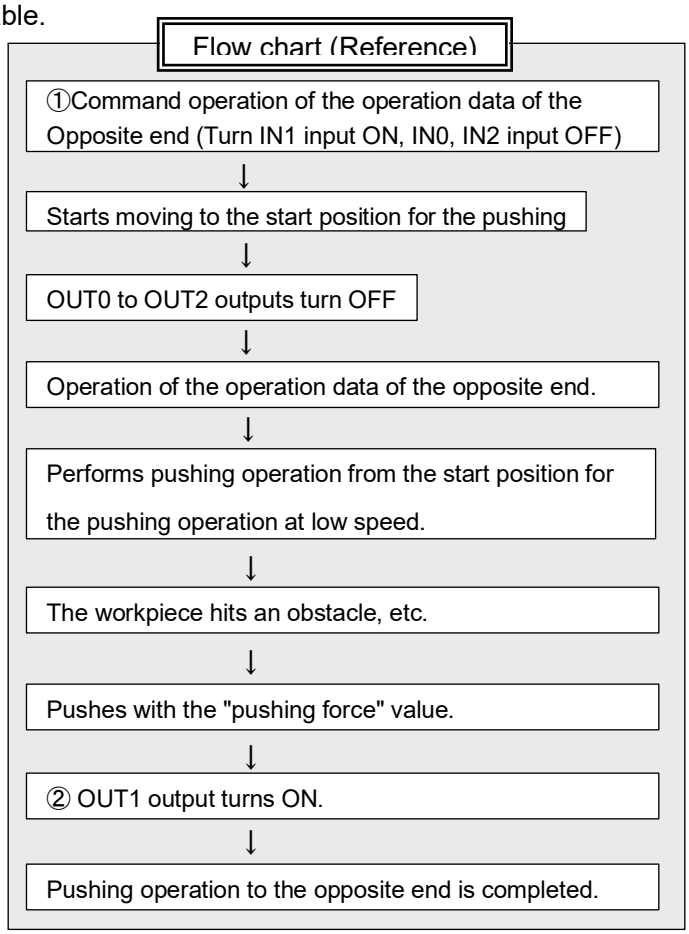
Example) A setting example is described when it is moved from the origin end to het position 85 mm from the start position for the pushing operation with a speed of 50 mm/s (move command to the opposite end), moved from the 85 mm position to the opposite end in low speed (ushing operation), and when the workpiece hits an obstacle, perform pushing operation with 60% force.

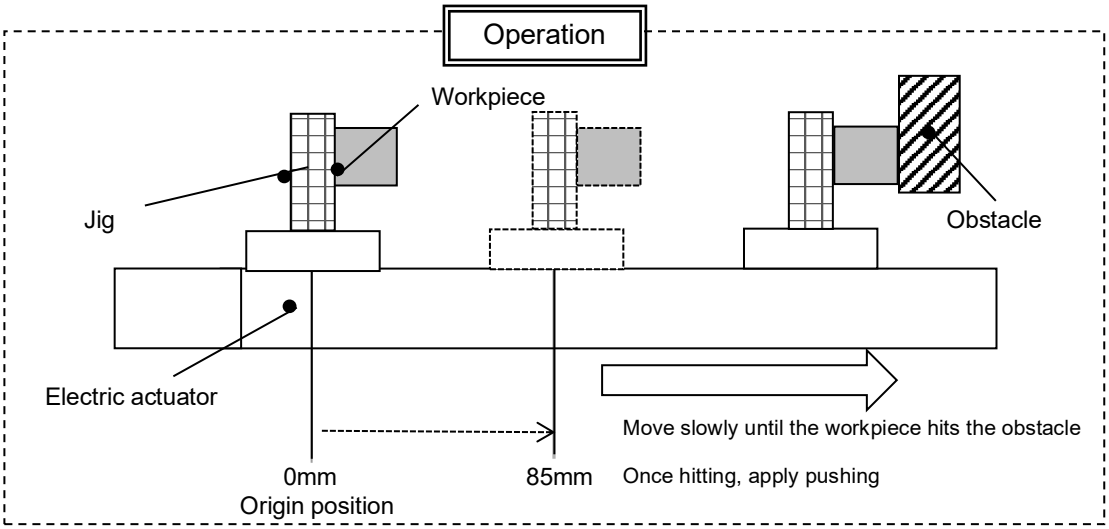
Operation data setting example

No.	Position mm		Speed mm/s	Acceleration mm/s^2	Deceleration mm/s^2	Start position for the pushing operation mm	Pushing force %
1	Origin end	0.00	100	3000	3000	10.00	50
2	Opposite end	100.00	50	3000	3000	85.00	60
3	Intermediate point	40.00	200	3000	3000	Setting not available	Setting not available

* Pushing to the intermediate point is not available.







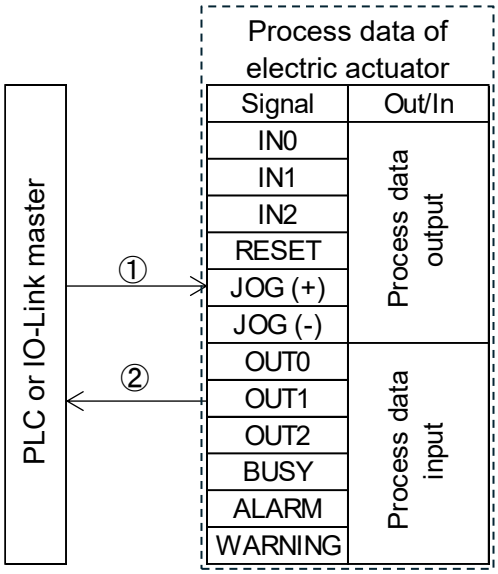
3.4.3 JOG operation (IO-Link)

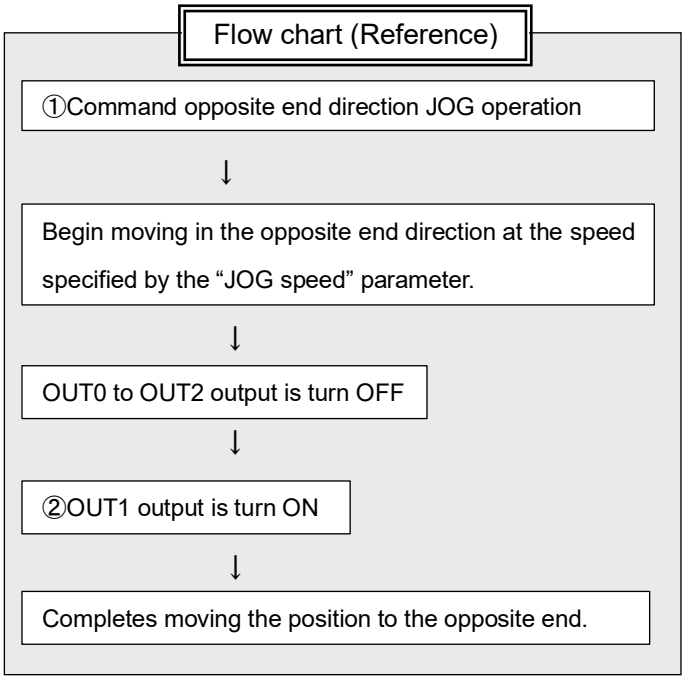
Example) A setting example is described JOG operation from the origin end to the opposite end at a speed of 100 mm/s.

Operation data setting example

No.	Position mm	
1	Origin end	0.00
2	Opposite end	100.00
3	Intermediate Point	40.00

Parameter	Speed mm/s
JOG speed	100





4 Operation Mechanism

Please refer to the EQ□ series operation manual.

Regarding the “Methods of interrupting operation”, please refer to the contents below.
The methods for interrupting the operation and stopping the electric actuator during the positioning operation and pushing operation is all of IN* and JOG* must be turned off.

If the product power supply is turned OFF during operation, the electric actuator does not hold the stopped position. (For an electric actuator with a lock, it is held by the lock function.)

⚠Warning

When the product power supply is turned on again, the command from the upper-level device such as a PLC will take effect. The operation commanded by the upper-level device when the product power supply is turned on will operate immediately.

5 Alarm detection

The details of the alarm can be checked via e-Actuator setup tool or IO-Link communication.
Refer to the operation manual of the e-Actuator setup tool for the alarm checking method.
Please refer to **9.2.2 (7)Current Alarm** checking alarm via IO-Link communication.
When an alarm is generated, deactivate the alarm after troubleshooting and correcting the error with reference to **5.2 Alarm details**.

5.1 Alarm group

Please refer to the EQ□ series operation manual.

5.2 Alarm details

Please refer to the EQ□ series operation manual.

*For IO-Link communication types, four new alarm has been added to the above. See below for details.

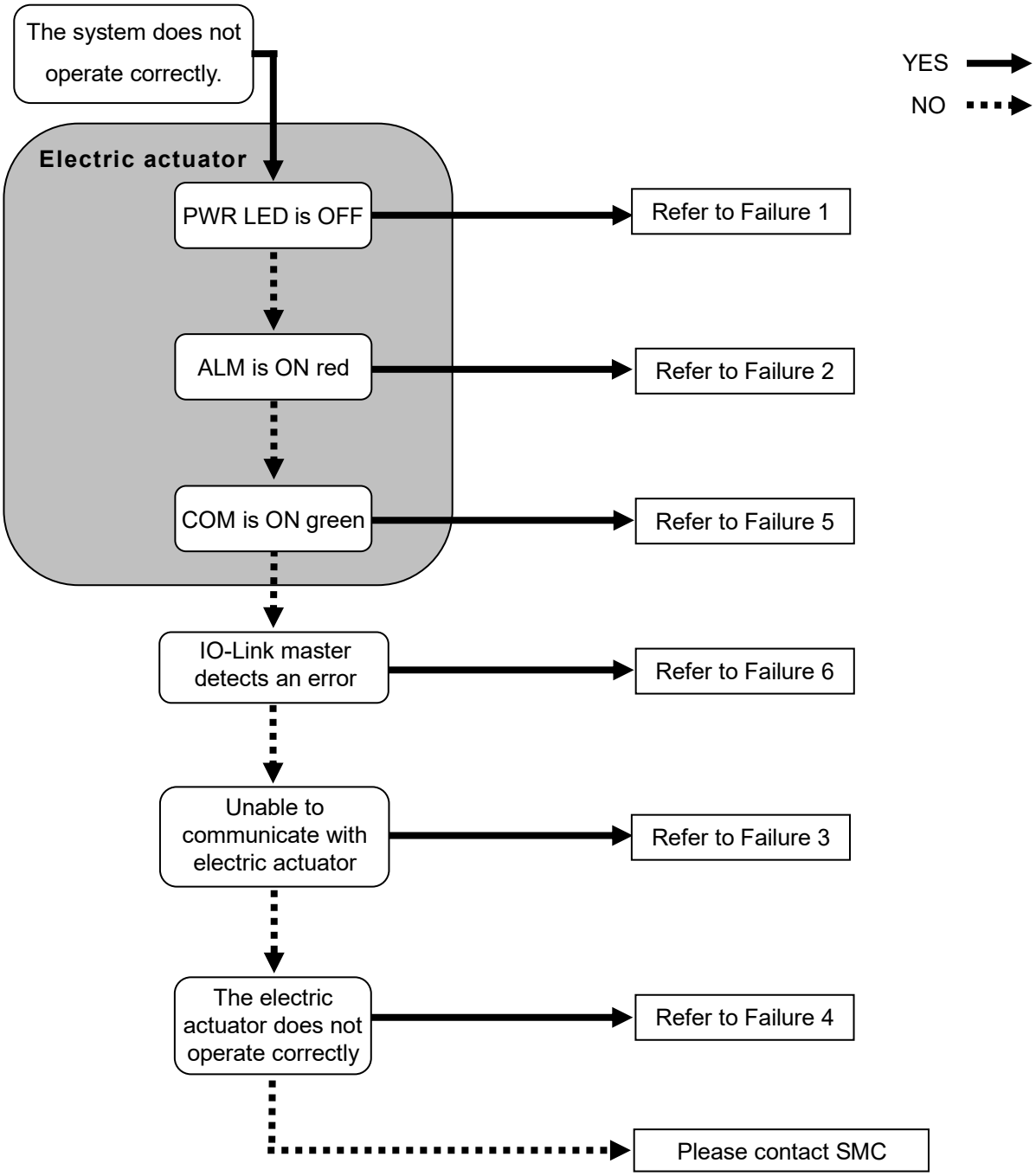
Electric actuator setup software name (code)	Group	Alarm reset method	Conditions/Countermeasures
Internal communication error(112)	C	Input RESET	＜**Contents**＞ (1) This alarm occurs when the IO-Link communication power is turned off. (2) This alarm occurs when there is a problem with the internal communication. ＜**Countermeasures**＞ (1) Please turn on the IO-Link communication power supply. (2) If this alarm is not cleared even after performing RESET as described in (1) above, please turn off all power supplies (Product power supply and IO-Link communication power supply), then supply the IO-Link communication power supply first, followed by the Product power supply after. If this alarm still occurs, please contact SMC.
Electrolytic capacitor estimated life-cycle (151)	D	Input RESET	＜**Contents**＞ This alarm occurs when the capacitance of the motor drive capacitor in the product decreases and the estimated product replacement time has arrived. ＜**Countermeasures**＞ It is recommended that the product is replaced before the motor drive capacitor reaches its estimated life.
Encoder error (192)	E	Turn off Power supply And supply again	＜**Contents**＞ (1) When the IO-Link communication power supply is turned on, the product power supply is turned on, and normal startup is completed, turning off only the IO-Link communication power supply will occur alarm with alarm No. 112 (2) Abnormality in communication with the encoder ＜**Countermeasures**＞ Turn off all power sources (product power supply and IO-Link communication power supply). First supply the IO-Link communication power supply, then supply the product power supply. If this alarm persists, please contact us.
Electrolytic capacitor estimated life limit (204)	E	Alarm reset is not allowed	＜**Contents**＞ This alarm occurs when the motor drive capacitor in the driver unit has reached its estimated life. ＜**Countermeasures**＞ Please replace the driver unit to a new one.

6 Troubleshooting

Refer to the table below for troubleshooting. When the causes in the troubleshooting table cannot be identified and normal operation can be recovered only by replacing the product, the product itself is probably faulty. The product failure may be due to the operating conditions (application). Please contact SMC for assistance.

⚠Warning

When the alarm is reset, the command from the upper-level device such as a PLC will take effect, and the operation commanded by the upper-level device will be operated immediately.



Problem No.	Problem	Possible causes	Investigation method and location of possible causes	Countermeasures
4	Parameter writing via IO-Link communication is not functioning correctly	The Product power supply is OFF	Make sure that there are no loose connectors, incorrect wiring or broken wires in the power cable. And make sure that PWR LED is ON.	Connect the power cable correctly so that the connector is not loose. (Replace the cable if it is broken.)
5	COM LED is ON	IO-Link communication not established	Make sure that there are no loose connectors, incorrect wiring or broken wires in the communication cables.	Connect the communication cable correctly so that the connector is not loose. (Replace the cable if it is broken.)
			Please check the connection port settings of the upper IO-Link master.	Please set the connection port C/Q line of the master to IO-Link mode. Please set the process data length of the connection port of the master correctly. Please check that the process data length of the connection port of the master is larger than the process data length of this product.
			Please check that there are no noise sources around the communication line.	Do not place noise sources near the communication line.
6	IO-Link master detects a problem (COM LED is ON)	IO-Link matching failure	When the matching level of connection port for the EQ□ actuator is "TYPE_COMP (type is compatible)", confirm that the JXC controller and device ID registered to the master are matched.	Connect a EQ□ actuator for which the device ID matches with the device ID registered to the master. ⇒**9. 2. 2 ISDU parameters**
			When the matching level of connection port for the JXCL1 controller is "IDENTICAL (complete match)", confirm that the JXC controller and serial No. registered to the master are matched.	Connect a EQ□ actuator for which the device ID matches with the device ID registered to the master. ⇒**9. 2. 2 ISDU parameters**

For troubleshooting issues not covered above, please refer to the EQ☐ series operation manual.

7 Parts Description

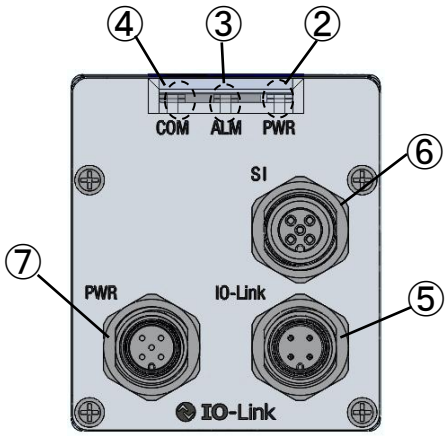
7.1 Basic specifications of the product

Basic specifications of the product are shown below.
Please refer to “7.1Basic specifications of the product” of the EQ□ series operation manual

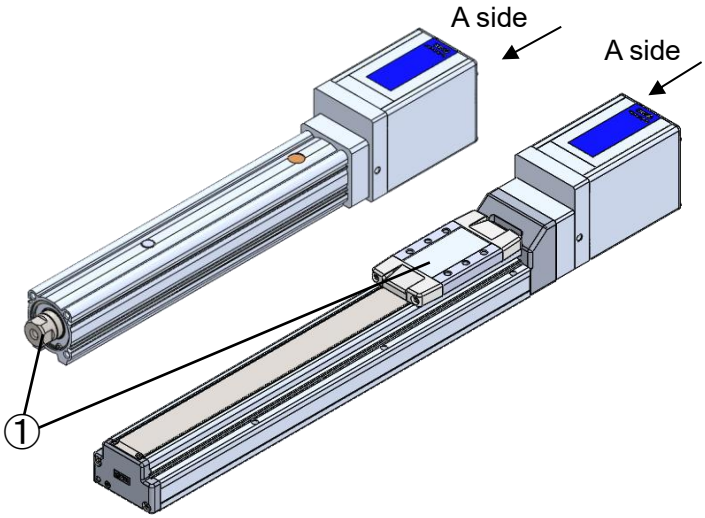
Item	Specifications
IO-Link power supply	Power supply voltage：18VDC to 30VDC Current consumption: 60mA or less
LED display	LEDx3（Green / Red / Green）
Cable length	IO-Link communication cable：10m or less Power supply cable：10m or less

7.2 Part Description

Details of the parts of the electric actuator.



Viewed from A side



No.	Item	Details
①	Table / Piston rod (EQFS / EQY)	Drive terminal Loads and transfers workpieces, etc.
②	Power supply LED PWR (Green)	Green LED is ON: Power supply ON / No alarm LED off: Power off (P24V: OFF, L+: OFF or ON)
③	Alarm LED ALM(Red)	Red LED is ON: Alarm is generated
④	IO-Link communication LED COM（Green）	This indicates the IO-Link communication status. For details, please see **7.5 LED Display Details**.
⑤	IO-Link communication connector (4 pins)	Connect to the IO-Link master using the IO-Link communication cable.
⑥	Setup Communication Connector (5 pins)	Connects to a PC. *Please be sure to use the dedicated communication cable JX-C□-E.
⑦	Power supply connector (5 pins)	Connect to actuator input power supply (24 VDC) using power supply cable. The M12 connector offers optional selection between A code and L code.

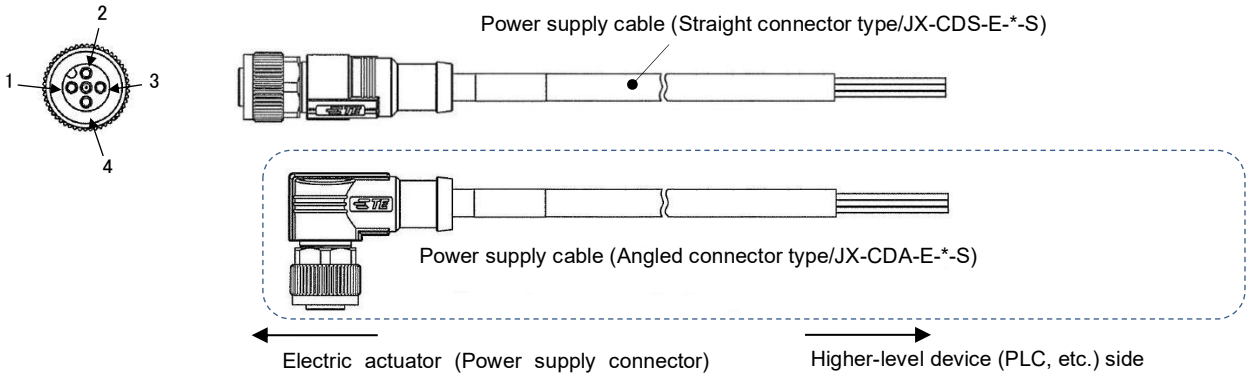
7.3 Power supply connector

For power supply connector A code, connect the power supply cable (JX-CD*-E-*-S) to the power supply connector. (**１０.１Power supply cable**)

For power supply connector L code, prepared by user side.

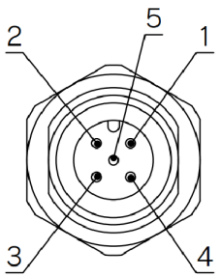
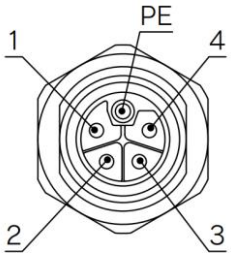
Tighten the connector securely by hand (0.6 N·m).

Specifications of the power supply cable in case of A code are described below.



Wire conductor size	AWG22
Number of core wires	4
Connector specification	M12, 4pin socket, A code (Normal key)

The specifications for the actuator-side power connector are described below.

Power supply connector: A code (End of part no.: -BLA)	Power supply connector: A code (End of part no.: -BLB)
	

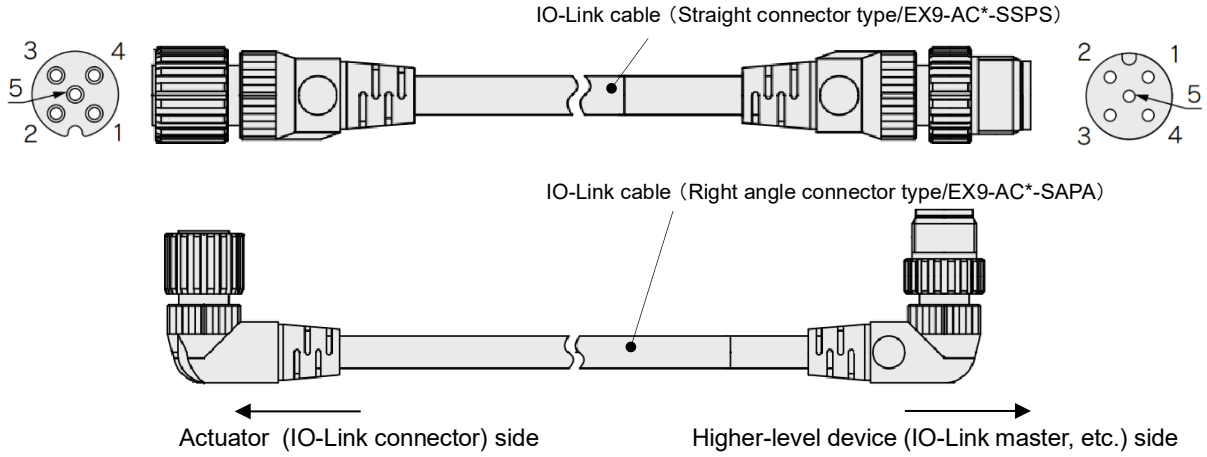
Pin No.	Cable color	Terminal name	Function name	Functional explanation
1	Brown	P24V	Product power supply (+)	The product power supply (+) supplied to the electric actuator.
2	White	LK RLS	Lock release (+)	Lock release (+) input.
3	Blue	0V	Common power supply (-)	Common for P24V /LK RLS (-).
4	Black	N.C.	-	No wiring
5	-	N.C.	-	No wiring

7.4 IO-Link communication connector

The IO-Link communication connectors also include the EX9-AC□-S□P□ (dual-ended connector) and EX500-AP□-□ (single-ended, cut-off) as options.

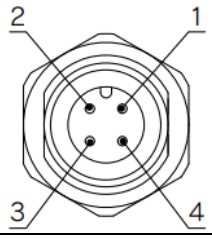
Tighten the connector securely by hand (0.6 N·m).

The specifications for the IO-Link cable are described below.



Wire conductor size	AWG24
Number of core wires	5
Connector specification	M12, 5pin socket – 5 pin plug, A code (Normal key)

The specifications for the actuator-side IO-Link connector are described below.

IO-Link connector (Both -BLA and -BLB)


Pin No.	Cable Color (EX500-AP□-P□)	Terminal name	Function name	Functional explanation
1	Brown	L+	IO-Link power supply (+)	Input the +24V power supply for IO-Link communication.
2	White	N.C.	-	No wiring
3	Blue	L-	IO-Link power supply (-)	Input the 0V power supply for IO-Link communication.
4	Black	C/Q	IO-Link communication	Connect the IO-Link signal.
5	Grey	-	N.C.	-

⚠ Warning

Due to potential processing delays in the PLC and controller scan delays, ensure that the interval between input signals and the duration for which the signal state is maintained are at least twice the communication cycle time.

7.5 LED Display Details

7.5.1 LED display

Please refer to the table below for details of the LED status.

LED	Contents		
PWR	Power supply status for the Product power supply.	OFF	Power is not supplied Red ALM is on when an alarm is generated.
		Green LED flashing	Writing to EEPROM
		Green LED ON	Power is supplied
ALM	Controller alarm status.	OFF	Normal operation
		Red LED ON	Alarm generated
COM	IO-Link communication status *1	Green LED ON	IO-Link communication is not established
		OFF	IO-Link communication error, power supply L+/L- is not connected
		Green LED flashing	No error in IO-Link communication

7.5.2 Controller Status and LED Display

Refer to the table below for the LED and the controller status.

Controller status		LED description		
		PWR	**ALM**	**COM**
When power is supplied for the Product power supply		Green LED ON	LED OFF	—
IO-Link communication (*1)	Normal communication (Locator function disable)	—	—	Green LED single flashing*2
	Locator function enable			Green LED double flashing*2
	Communication not established IO-Link communication error C/Q line not connected	—	—	Green LED ON
	IO-Link power supply (L+/L-) cut off	—	—	LED OFF
Motor controller	The Product power supply cut off	LED OFF	LED OFF	—
	Controller alarm occurs	LED OFF	Red LED ON	—
	Writing to EEPROM	Green LED flashing	—	—

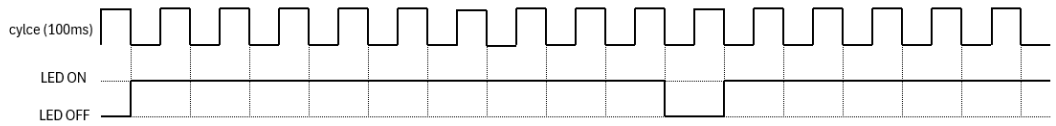
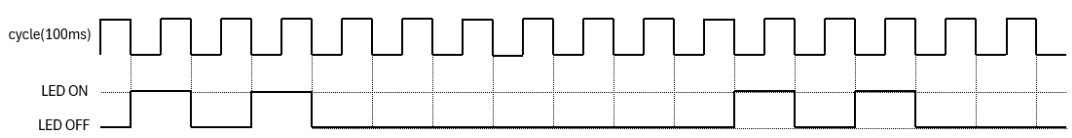
—: LED display is unstable

⚠ Caution

If the power-on sequence is reversed (IO-Link communication power is supplied after the Product power supply is supplied), alarm No. 112 'Internal communication error' will occur. In this case, please turn off both of power supply, then turn them back on in the following order: first the IO-Link communication power supply, then the product power supply.

Do not turn OFF the power supply for the actuator or IO-Link communication or disconnect and connect the cable while data is being written to EEPROM (PWR LED (green) is flashing).
* This is to avoid the possibility of incorrect / corrupt data (step data, parameter)

*2 LED flashing bellow diagram

LED	Indication
Single flashing	
Double flashing	

8 Setting

8.1 Operation data

Details of settable operation data

Name	Input range	Description
Speed	Minimum value to maximum speed Note 1)	Sets the speed for moving to the target position or the start position for the pushing operation. (Unit: mm/s)
Acceleration	1 to maximum acceleration Note 1)	Sets the acceleration to reach the moving speed. (Unit: mm/s^2)
Deceleration	1 to maximum acceleration Note 1)	Sets the deceleration from the moving speed to stop. (Unit: mm/s^2)
Pushing force	Note 1)	Set the ratio of the pushing force (unit: %)
Origin end Opposite end Intermediate point	0 to product stroke	Set the target position (unit: mm)
Pushing position	0 to product stroke	Set the starting position for pushing in pushing operation (unit: mm)

Note 1) The range that can be set varies depending on the type of actuator. For details, please check the EQ□ series operation manual.

8.2 Parameter

Please refer to the EQ□ series operation manual.
The items configurable via IO-Link communication and the e-Actuator setup tool differ.
Please refer to the table below.

○: Can be changed ×: Cannot be changed

Item	IO-Link Communication	Setting software e-Actuator setup tool
Speed	○	○
Acceleration / Deceleration	○	
Pushing force	○	
Origin end position (Origin end start position for pushing operation)	○	
Opposite end position (Opposite end start position for pushing operation)	○	
Intermediate point position	○	
OUT signal output width	○	
JOG speed *1	○	
Pushing distance *2	×	
Rotating direction reference	×	
Acceleration and Deceleration ratio	×	
Torque when hold	×	
Position loop P constant	×	
Speed loop P constant	×	
Speed loop I constant	×	
Positioning time level	×	

∗1 The JOG speed settings are independently set via the setup software and IO-Link communication. A value set on one side will not be reflected on the other.
*2 Pushing distance indicates the difference between the start position for the pushing operation and either the origin end or the opposite end position.

⚠ Caution

・When setting data via the e-Actuator setup tool, please refrain from changing the data via IO-Link communication. There is a risk that the data will not be set correctly.

8.3 Preventive maintenance function

The e-Actuator setup tool software allows monitoring of Records relating to preventive maintenance functions ("Cumulative values", "Estimated life of the electrolytic capacitors for the motor drive of the driver unit" and "EEPROM write cycle limit" shown below). This allows the maintenance timing to be set and checked. If the accumulated value exceeds the set number of times and distance, when the estimated life of the electrolytic capacitor for the motor drive falls below 30% remaining, or when less than 10% of the EEPROM write cycle limit remains, a warning (WARNING) turns ON.

・Cumulative specified number of times set value[value]

Name	Unit	Setting range	Default
Cumulative instruction count	times	0 to 4294967295	0 [No warning]

・Cumulative distance travelled set value[m]

Name	Unit	Setting range	Default
Cumulative distance	m	0 to 4294967295	0 [No warning]

・Electrolytic capacitor waning

Name	Unit	Setting range	Default
Electrolytic capacitor waning	-	Enable or Disable (Enable：Warning output if the current value is below 30%)	1 (Enable)

・EEPROM write cycle limit warning

Name	Unit	Setting range	Default
EEPROM write cycle limit warning	-	Enable or Disable (Enable：Warning output if the current value is below 10%)	1 (Enable)

Please refer to the e-Actuator setup tool instruction manual for how to set each parameter or to reset the Cumulative instruction count and the Cumulative distance.
To check the warning signal via the IO-Link communication, see **9.2.2 ISDU parameters.**

⚠ Caution

The controller stores records relating to the predictive maintenance function at 30-minute intervals. If the Product power supply is cut off within 30 minutes after the last record relating to the predictive maintenance function to the controller, the record relating to the predictive maintenance function from the last record until the power supply is cut off will not be stored. Therefore, if the Product power supply is cut off within 30 minutes after a warning (WARN) has occurred, the warning (WARNING) may return to off at the next start-up.

9 Memory Map Details

9.1 Process data

9.1.1 Process data input

(1) Process data input list (from EQ□-BL actuator to IO-Link master)

Input process data																
Bit offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Signal Name	ACTUAL POSITION (2byte)															
Bit offset	31		30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Signal Name	WARNING	ALARM	BUSY	-	-	OUT2	OUT1	OUT0	-	-	-	-	-	-	-	-

Bit offset	Signal	Contents
24	OUT0	The conditions where outputs OUT0, OUT1, and OUT2 turn ON differs according the operation mode. [For positioning operation and JOG operation] Turns ON when the current position is within the "Position" +/- "OUT output width" of the operation data. [For pushing operation] Turns ON when the pushing force is equal to the "pushing force" of the operation data. The OUT0, OUT1, and OUT2 outputs that turn ON by the commanded operation data are shown in the table below. ○ : OFF ● : ON
25	OUT1	
26	OUT2	
27	-	-
28	-	
29	BUSY	This bit is ON during the movement of the actuator (during the positioning operation, etc.). **⚠ Caution** During the pushing operation without movement (no movement but the actuator generating the pushing force), “BUSY” is OFF.
30	ALARM	This indicates the state of alarm occurrence. It will turn off when all alarms have been cleared.
31	WARNING	This indicates the state of warning occurrence (without stopping).

	OUT0	OUT1	OUT2
IN0 : Origin end	●	○	○
IN1 : Opposite end	○	●	○
IN2 : Intermediate point	○	○	●

Byte offset 0 to 15 : Current position

Byte offset	Signal	Contents	Unit
0 to 15	Position	Outputs the current position of the actuator.	0.1mm

9.1.2 Process data output

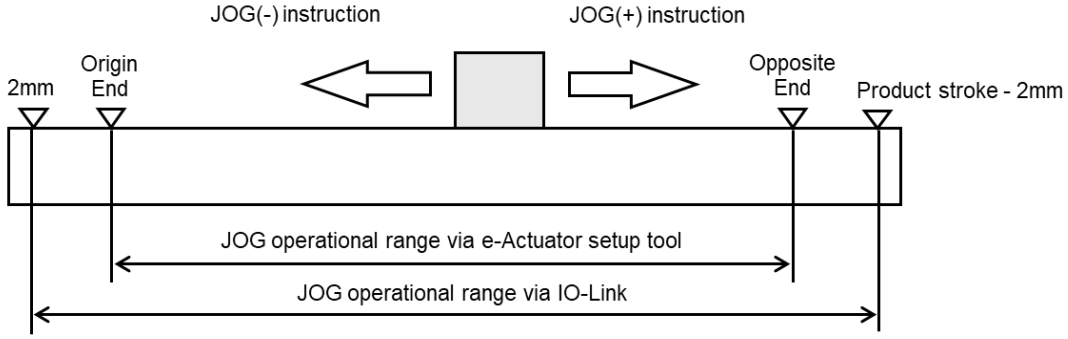
(2) Process data output list (from IO-Link master to EQ□-BL actuator)

Output process data																
Bit offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Signal Name	JOG(+)	JOG(-)	RESET	-	-	IN2	IN1	IN0	-	-	-	-	-	-	-	-

Bit offset	Signal	Contents
8	IN0	When IN0 is turned on, the actuator starts moving to the origin end.
9	IN1	When IN1 is turned on, the actuator starts moving to the opposite end.
10	IN2	When IN2 is turned on, the actuator starts moving to the intermediate point.
11	-	Please always set to OFF (0).
12	-	
13	RESET	Resets the Alarm status.
14	JOG(-) *1	JOG operation instruction; moves in the - direction while ON
15	JOG(+)*1	JOG operation instruction; moves in the + direction while ON

*1 JOG operational range differs between IO-Link and the e-Actuator setup tool.(Bellow diagram)
JOG operation via IO-Link is available from 2 to product stroke - 2 mm , regardless of the origin and opposite end.
JOG operation via e-Actuator setup tool is limited to the range between origin and opposite end.
If the actuator is positioned outside the JOG operational range, the alarm “Set stroke is outside the stroke limit (052)” occurs.
Additionally, JOG operation behaves as shown in the table below, depending on the current position.
(If the current position is outside of JOG operational range, move to within JOG operational range.)

Current position [mm]	JOG (-)	JOG (+)
0 to 2	Operate in the **+ direction** up to 2mm	Operate in the **+ direction** up to product stroke - 2mm
2 to product stroke - 2	Operate in the **- direction** up to 2mm	Operate in the **+ direction** up to product stroke - 2mm
Product stroke - 2 to product stroke	Operate in the **- direction** up to 2mm	Operate in the **- direction** up to product stroke - 2mm



⚠ Caution

When starting to use the “Easy setup Screen” in the e-Actuator Setup Tool, make sure that all operation commands (process data output) via IO-Link are turned OFF.

9.2 Parameter

9.2.1 Direct parameters

Address	Parameter name	Data size	Access ∗1	Contents
0x07	VendorID(MSB)	1byte	R	Vender ID：0x0083 (Decimal : 131)
0x08	VendorID(LSB)	1byte		
0x09	DeviceID(MSB)	1byte	R	Device ID：0x0002F2
0x0A	DeviceID	1byte		
0x0B	DeviceID(LSB)	1byte		

∗1 R: Read W: Write

*2 The prefix '0x' is used to denote a hexadecimal number.

9.2.2 ISDU parameters

(1) Device parameters

Index	Sub Index	Parameter name	Data type ∗2	Access ∗1	Contents	Data Storage ∗3
0x0002	0x00	SystemCommand	UINT8	W	System commands See (2) for details.	N
0x0010	0x00	VendorName	STR48	R	SMC Corporation	N
0x0011	0x00	VendorText	STR48	R	www.smcworld.com	N
0x0012	0x00	ProductName	STR48	R	EQFS-BL/EQY-BL/ EQYG-BL*4	N
0x0013	0x00	ProductID	STR48	R	EQFS-BL/EQY-BL/ EQYG-BL∗4	N
0x0014	0x00	ProductText	STR48	R	Electric Actuator	N
0x0015	0x00	SerialNumber	STR16	R	Unique serial number	N
0x0016	0x00	HardwareRevision	STR48	R	HW-V□. □□	N
0x0017	0x00	FirmwareRevision	STR48	R	SW-V□. □□	N
0x0018	0x00	ApplicationSpecificTag *4	STR32	R/W	The character string from 16 to 32 can be set arbitrarily. The initial value is all '*'	**Y**
0x0019	0x00	Function Tag *4	STR32	R/W	The string can be set arbitrarily up to 32 characters. The initial value is all '*'	**Y**
0x001A	0x00	Location Tag *4	STR32	R/W	The string can be set arbitrarily up to 32 characters. The initial value is all '*'	**Y**
0x0024	0x00	DeviceStatus	UINT8	R	Device status. See (3) for details	N
0x0025	0x01 - 0x07	DetailedDeviceStatus	STR[7][3] *5	R	Device status. See (4) for details	N
0x00A0	0x00	Order Code	STR32	R	Part No.	N

∗1 R: Read、 W: Write

∗2 UINT8: Unsigned Integer(1byte)、UINT16: Unsigned Integer(2bytes)、STR□□: String(Max□□bytes)

∗3 Y: Included in data storage, N: Not included in data storage
For more information about data storage, see **9.3 Data storage**

∗4 These parameters are always saved to the EEPROM regardless of the Autosave setting.

∗5 It is an array of 7 elements of 3 bytes.

(2) System Command (Index:0x0002, Sub Index:0x00)

The following commands can be issued for the EQ□-BL series actuators.

Command	Command name	Description
0x05	ParamDownloadStore	This is a backup instruction for parameter setting data. When the EQ*-BL actuator receives a command, it will start uploading parameter data to the master.
0x07E	LocatorStart	To start Locater function.
0x07F	LocatorStop	To stop Locater function. Locator turns off automatically after 10 minutes.
0x80	Device reset*1	Perform a software reset while the power is on.
0x81	Application reset*2	Return some parameters to their initial values while continuing IO-Link communication.
0x83	Back-to-box*2	Return all parameters that can be set via IO-Link communication to their initial values. IO-Link communication will be disabled until the power is turned on again.

∗1 The software reset is performed only on the IO-LINK communication section. As a result, Alarm 112 “Internal Communication Error” will occur after a device reset.

∗2 Please perform this procedure while the product power supply is turned ON. If the product power supply is OFF, the settings may not be applied correctly.

(3) Device Status (Index:0x0024, Sub Index:0x00)

It is possible to check the status of the device (EQ□-BL actuator).

The device status based on the read values is as follows.

Value	Actuator status
0	Operating normally
1	Maintenance Required
2	Out of the specification
3	Functional check
4	Failure

(4) Detailed Device Status (Index:0x0025, Sub Index:0x01 ~ 0x07)

Details of the device status (EQ□-BL actuator) can be checked, see **8.3 Preventive maintenance function**

The table below shows the readable status of the EQ□-BL actuator status.

Sub Index	Event	Event code (Byte1,2)	Classification code (Byte0)	Event class
0x01	NVRAM Error ∗1	0x5011	0xF4	Error
0x02	Cumulative number of indications exceeded	0x1830 (Event not present :0x0000)	0x E4 (Event not present :0x0000)	Warning
0x03	Cumulative mileage exceeded	0x1831 (Event not present :0x0000)	0x E4 (Event not present :0x0000)	Warning
0x04	Electrolytic capacitor warning occurs	0x1832 (Event not present :0x0000)	0x E4 (Event not present :0x0000)	Warning
0x05	EEPROM Write Count warning	0x1833 (Event not present :0x0000)	0x E4 (Event not present :0x0000)	Warning
0x06	Power supply not switched on	0x1820 (Event not present :0x0000)	0xF4 (Event not present :0x0000)	Error
0x07	Alarm occurs regarding motor control	0x1810 (Event not present :0x0000)	0xE4 (Event not present :0x0000)	Warning

∗1 When this event “NVRAM Error” occurs, please contact SMC.

(5) SMC parameter

The EQ□-BL actuator has parameters designated for SMC which can be set using IO-Link communication:
These are the Drive parameter, Alarm, Step data and Status monitor.
Refer to (6) (7) (8) (9) for the parameters.
Some of the SMC parameters will be reflected in the IO-Link master when the data storage function is used. The parameters stored by the data storage function are parameters indicated with “Y” in section (6) and (8).

⚠Caution

When changing process data or parameters using the IO-Link master configuration tool, be sure to first upload all process data and parameters from the electric actuator EQ□BL.

(6) Drive parameter

Index	Sub Index	Parameter name	Data type ∗1	Access ∗2	Input range	Unit	Data Storage ∗3
0x0040	0x00	OUT Signal output Width	UINT32	R/W	∗4	0.01mm	Y
0x0041	0x00	JOG Speed	UINT16	R/W	∗4	mm/s	

∗1 UINT32: Unsigned Integer(4bytes), UINT32: Unsigned Integer(4bytes)
∗2 R: Read, W: Write
∗3 Y: Included in data storage, N: Not included in data storage
For more information about data storage, see **9.3 Data storage**
∗4 Different depending on the actuator type

(7) Current Alarm

Index	Sub Index	Parameter name	Data type ∗1	Access ∗2	Contents	Unit	Data Storage ∗3
0x0050	0x01	Alarm1	UINT8	R	0: No alarm. Others: Alarm code Please refer to **5.2 Alarm details**	-	N
	0x02	Alarm2	UINT8	R			
	0x03	Alarm3	UINT8	R			
	0x04	Alarm4	UINT8	R			

∗1 UINT8: Unsigned Integer(1bytes)
∗2 R: Read, W: Write
∗3 Y: Included in data storage, N: Not included in data storage

(8) Step data

Index	Sub Index	Parameter name		Data type ∗1	Access ∗2	Input range	Unit	Data Storage ∗3
0x0060	0x01	Step to the Origin end	Position (Origin end)	INT32	R/W		0.01mm	Y
	0x02		Speed (Origin end)	UINT16	R/W		mm/s	Y
	0x03		Acceleration (Origin end)	UINT16	R/W		mm/s^2	Y
	0x04		Deceleration (Origin end)	UINT16	R/W		mm/s^2	Y
	0x05		Pushing Force (Origin end)	UINT16	R/W		%	Y
0x0061	0x01	Step to the Opposite end	Position (Opposite end)	INT32	R/W		0.01mm	Y
	0x02		Speed (Opposite end)	UINT16	R/W		mm/s	Y
	0x03		Acceleration (Opposite end)	UINT16	R/W	∗4	mm/s^2	Y
	0x04		Deceleration (Opposite end)	UINT16	R/W		mm/s^2	Y
	0x05		Pushing Force (Opposite end)	UINT16	R/W		%	Y
0x0062	0x01	Step to the midpoint	Position (Midpoint)	INT32	R/W		0.01mm	Y
	0x02		Speed (Midpoint)	UINT16	R/W		mm/s	Y
	0x03		Acceleration (Midpoint)	UINT16	R/W		mm/s^2	Y
	0x04		Deceleration (Midpoint)	UINT16	R/W		mm/s^2	Y

∗1 UINT16: Unsigned Integer(2bytes), INT32: Signed Integer(4bytes)
∗2 R: Read, W: Write
∗3 Y: Included in data storage, N: Not included in data storage
For more information about data storage, see **9.3 Data storage**
∗4 Different depending on the actuator type.
∗5 Clipping Priority for Position Setting Range:
"Position(Opposite End)">"Position(Midpoint)">"Position(Origin End)"
Example: To set the value
"Position (Opposite end):200mm", "Position(Midpoint):100mm", "Position(Origine end)":10mm
[1] When the Position (Opposite end) is set to a value smaller than the Position (Midpoint), the Position (Midpoint) is automatically adjusted to match the Position (Opposite end).
For example, if the Position (Opposite end) is set to 80 mm, the Position (Midpoint) will automatically be updated to 80 mm.
[2] When the Position (Origin end) is set to a value greater than the Position (Midpoint), it will be automatically clipped to the already set Position (Midpoint).
For example, if the Position (Origin end) is set to 120 mm while the Position (Midpoint) is set to 100 mm, the Position (Origin end) will automatically be clipped to 100 mm.
[3] To set the Position (Origin end) to a value greater than the Position (Midpoint), first change the Position (Midpoint) to a value greater than the intended Position (Origin end), then update the Position (Origin end). For example, to set the Position (Origin end) to 120 mm, first set the Position (Midpoint) to 120 mm or more and write it to the actuator. Then, set the Position (Origin end) to 120 mm.

(9) Monitor

Index	Sub Index	Parameter name	Data type ∗1	Access ∗2	Contents	Unit	Data Storage ∗3
0x0070	0x01	Position	INT32	R	Current position	0.01mm	N
	0x02	Speed	UINT16		Current speed	mm/s	
	0x03	Force	UINT16		Current torque	%	
0x0071	0x00	Warning occurrence state*4	UINT8		It is output when a warning occurs.	-	

∗1 UINT8: Unsigned Integer(1byte), UINT16: Unsigned Integer(2bytes), INT32: Signed Integer(4bytes)
∗2 R: Read, W: Write
∗3 Y: Included in data storage, N: Not included in data storage
For more information about data storage, see **9.3 Data storage**
∗4 The warning output for each bit number is shown in the table below.

Bit No	Parameter name
Bit2	Total instructions Exceeded Warning
Bit3	Total distance Exceeded Warning
Bit5	Electrolytic capacitor Warning
Bit6	EEPROM Write Limit Warning
Bit7	Product power supply OFF warning

(10) Save to EEPROM, save count

Index	Sub Index	Parameter	Data type∗1	Access ∗2	Details	Data Storage∗3
0x0080	0x00	Autosave	UINT8	RW	0 - RAM write only 1 - Always saved automatically	Y
0x0081	0x00	Single save	UINT8	W	Save all the parameter (When 0X0080 is 0.)	
0x0082	0x00	Save Count	UINT32	R	Counts the number of times parameters have been saved to EEPROM.	

∗1 UINT8: Unsigned Integer(1byte), UINT16: Unsigned Integer(2bytes), INT32: Signed Integer(4bytes)
∗2 R: Read, W: Write
∗3 Y: Included in data storage, N: Not included in data storage
For more information about data storage, see **9.3 Data storage.**

(11) Save to EEPROM, save count

The device product number can be shown by following commands.

Index	Sub Index	Parameter	Data type∗1	Access∗2	Details	Data Storage∗3
0x00A0	0x00	Order Code	STR32	R	Show the Product number (Max32 words)	N

∗1 STR32: String(Max32bytes)
∗2 R: Read, W: Write
∗3 Y: Included in data storage, N: Not included in data storage
For more information about data storage, see **9.3 Data storage.**

9.3 Data storage

The data storage function stores the IO-Link device parameters data in the IO-Link master.
For information on specific parameters that can be saved using the EQ□-BL series actuator, see **8.2 Parameter**

(1) Storage of the changed parameter data

The IO-Link master automatically stores the changed parameters.
The following is a description of how to do this manually.
It is also possible to change the parameters via the e-Actuator setup tool or IO-Link communication.

The EQ□-BL actuator parameters specified can be stored in the data storage server of the IO-Link master.
In order to store the parameter, write "ParamDownloadStore (command code: 0x05)" to the system command of Index:0x0002, SubIndex:0x00. The parameters will be sent by the EQ□-BL actuator.
When a system command is sent, the EQ□-BL actuator will send the changed parameter data to the IO-Link master. When the IO-Link master receives the data, it stores the data in its data storage server.
When a block parameter function of the IO-Link master tool is enabled and all the parameters are set in a batch, "ParamDownloadStore" is automatically sent to the system command as a part of the block parameter sequence.

⚠Caution

Be sure the product's main power supply is turned on before changing any parameters. If the power is turned off, there is a risk that the settings will not be correct.
Be sure to change any parameters within the product specification of each EQ□ series actuator.
When using the block parameter function to change parameters in bulk, no write error will occur over IO-Link communication even if values outside the specified range are set. However, the actual values will be automatically clipped to fall within the specification range and those values will be written to the device."

(2) Restoration of parameters changed during an EQ*-BL actuator replacement

When an EQ□-BL actuator is replaced with one of the same model number, the specified parameters stored in the IO-Link master are automatically downloaded to the new EQ□-BL actuator. The stored parameters overwrite the default parameters of the EQ□-BL actuator so that the existing parameters are reflected in the replacement actuator.

⚠Caution

Be sure to check that the replacement EQ□-BL series actuator has the same model number as the one being replaced before replacing the actuator. The data storage function only saves and downloads some parameters of the EQ□-BL series actuator.

9.4 Fail safe

Once IO-Link communication is established, if an IO-Link communication error occurs, the connected actuator is stopped based on the operation instructions shown below.

If an alarm relating to the motor control has not been generated, the actuator is able to operate when IO-Link communication is recovered. The process data during communication recovery is as follows.

Process data during IO-Link communication recovery	
Process data output	**Process data input**
Based on the process data output from the IO-Link master	Reflect the actuator status of communication recovery

10 Optional parts

The optional parts described below are available (sold separately).

- Power supply cable
- IO-Link communication cable
- Setup communication cable
- e-Actuator setup tool/setup software (download from SMC webpage)

10.1 Power supply cable

For wiring method, refer to **7.3 Power supply connector**

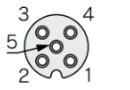
JX-CD□-E-□-S

Cable length (L[m])

1	1.5
3	3
5	5
10	10

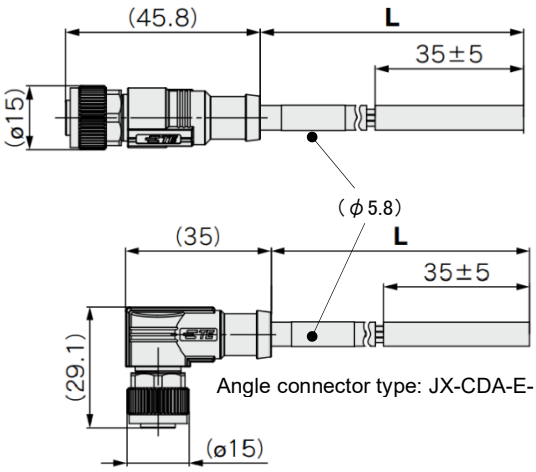
Connector type

S	Straight
A	Angle

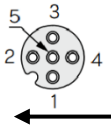


M12
4pin socket
A code
(normal key)

Connector type: Straight JX-CDS-E-□-S



Angle connector type: JX-CDA-E-□-S



Electric actuator
(power supply connector) side

Electric actuator input
power supply side

10.2 IO-Link communication cable

For wiring methods, refer to **7.4 IO-Link communication connector**

With connectors on both sides (Socket / Plug)

EX9-AC□-S□P□

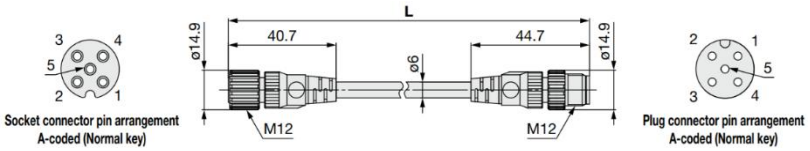
● Connector type

S	Straight
A	Angle

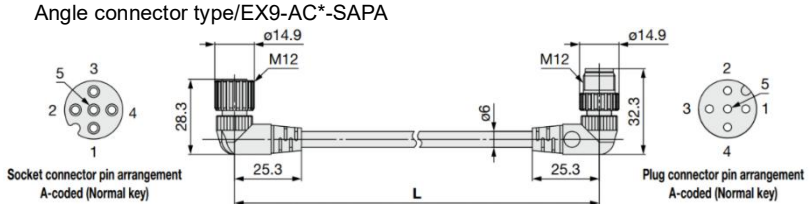
● Cable length (L[mm])

005	500
010	1,000
020	2,000
030	3,000
050	5,000
100	10,000

Straight connector type /EX9-AC*-SSPS



Angle connector type/EX9-AC*-SAPA



With connector on one side

EX500-AP□-□

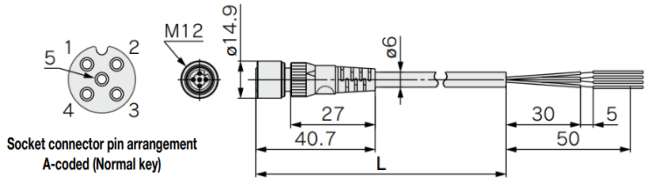
● Connector type

S	Straight
A	Angle

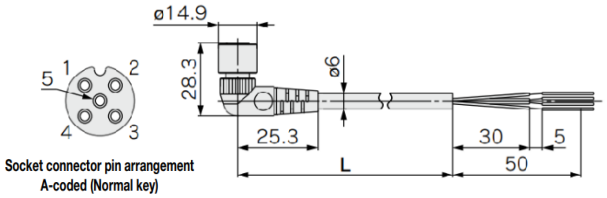
● Cable length (L [mm])

005	500
050	5,000

Straight connector type/EX500-AP*-S



Angle connector type /EX500-AP*-A



Tighten the connector securely by hand (0.6 N·m).

10.3 Setup communication cable

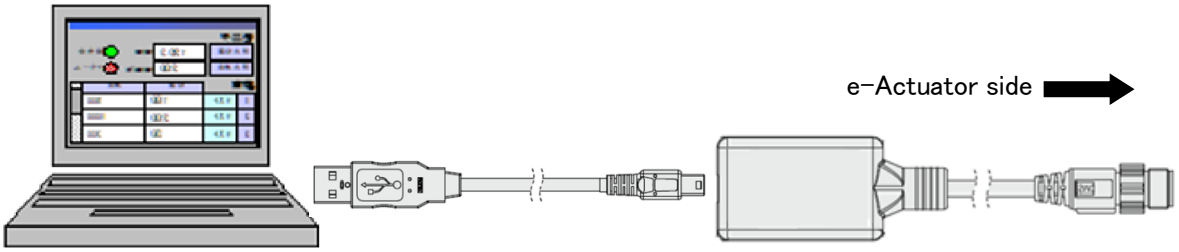
JX-C□□-E

● USB cable

C	Without USB cable
Nil	With USB cable (LEC-W3-U)

● Connector type

T	Threaded M12 connector
Q	Push-Pull M12 connector



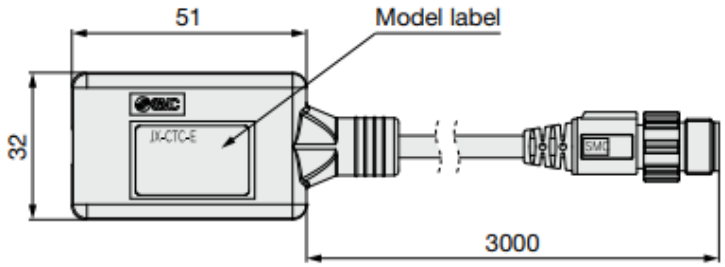
PC

USB cable
(LEC-W2-U)

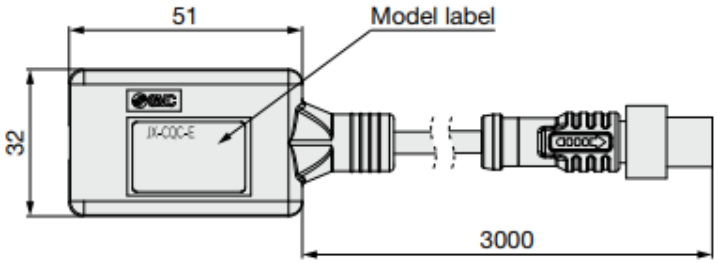
Setting communication cable
(JX-CTC-E or JX-CQC-E)

・Setting software (e-Actuator setup tool)
・USB driver
Download from SMC's website:
https://www.smcworld.com

●Communication cable JX-CTC-E (Threaded M12 connector)

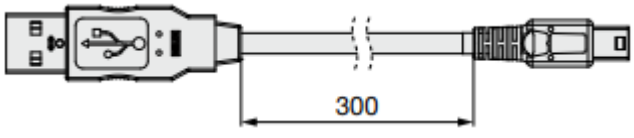


●Communication cable JX-CQC-E (Push-pull M12 connector)



■Easy to insert/remove

●USB cable LEC-W2-U



10.4 Setting software

e-Actuator setup tool

Operating environment

OS	Windows®10(64bit) Windows®11(64bit)
Communication interface	USB1.1 or USB2.0 port
Display	1024×768 or more

＊Windows®10、 Windows®11 are registered trademarks of United States Microsoft Corporation.

⚠Caution

Please obtain the USB driver and the setup software (e-Actuator setup tool) from SMC website.
Use the latest version for the setup software.
Download the upgrade file from the SMC website.
http://www.smcworld.com/

Revision history
September 2025: Frist edition March 2026: Second edition

SMC Corporation

Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362
URL https://www.smcworld.com