

KOGANEI



Elewave Series
Flat Type Electric Hand
With Point Input Type Controller
With CC-Link Type Controller *CC-Link*
OWNER'S MANUAL Ver. 2.0

[Main Units]

EW2H8

EW2H18

EW2H28

EW2HL8

EW2HL18

EW2HL28

[Controllers]

EW2C-H-NP

EW2C-H-PN

EW2C-H-CC

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Chapter 1 Safety Precautions

Thank you for purchasing an Elewave series electric hand.

This manual describes the features and usage procedures of this device.

Thoroughly read this manual to ensure proper use of the device.

1-1 Safety

Observe all safety instructions and precautions in this manual. Failure to implement necessary safety measures as well as improper use of the device may damage the product, cause malfunction, and even lead to an accident or user (installers, operators, and service personnel) injury.

1-2 Precautions

(1) Automatic Operation Precautions

- Install interlock mechanisms to prevent injury to operators when coming into contact with moving parts of electric hands.

(2) Sandwiching of Hands and Other Body Parts

- Be careful not to sandwich hands in between moving parts during delivery, teaching processes, and operation of electric hands.

(3) Prohibition on Use in Environments Exposed to Flammable Gas

- Electric hands are not fireproof. Do not use these devices in environments exposed to flammable gas, flammable dust, or flammable liquids. Doing so may result fire or explosion.

(4) Prohibition on Use in Environments Exposed to Electromagnetic Interference

- Do not these devices in environments exposed to electromagnetic interference, static electricity, and radio interference. Doing so may result in malfunction.

(5) EOT (Grippers and Such) Safety

- Design and create EOTs so that loss or fluctuations in drive power (electricity, air pressure, etc.) will not result in potentially dangerous situations such as a workpiece being dropped.
- If an object held by an EOT may be thrown or dropped, implement appropriate protective safety measures in accordance with the size, weight, temperature, and chemical properties.

(6) Controller Checking Precautions

- Turn off the power to controllers and disconnect the power supply before touching exterior terminals and connectors to prevent electric shock during controller inspections.
- Do not touch internal controller parts.

(7) Responding to Electric Hand Damage and Malfunctions

- Continuing to use electric hands after the following types of damage and malfunction occur is dangerous. Stop use immediately and contact us.

Damage/Malfunction	Type of Hazard
Machine harness or motor wire damage	Electric shock and electric hand malfunction
Exterior damage to electric hand	Damaged parts being thrown during electric hand operation
Abnormal electric hand operation (misalignment, vibration, etc.)	Electric hand malfunction

(8) Precautions Against Touching Hot Areas of Motors and Controllers

- Motors and controllers will be hot after automatic operation. Touching these areas may result in burns. Turn off the power to the controller and allow parts to sufficiently cool before touching such areas for maintenance purposes.

(9) Protection Ground

- The controller must be grounded to prevent electric shock.

(10) Please fix the cable to the connector without applying excessive twist, tension, or other forces.

(11) Table of the flat type electric hand does not move by external force.

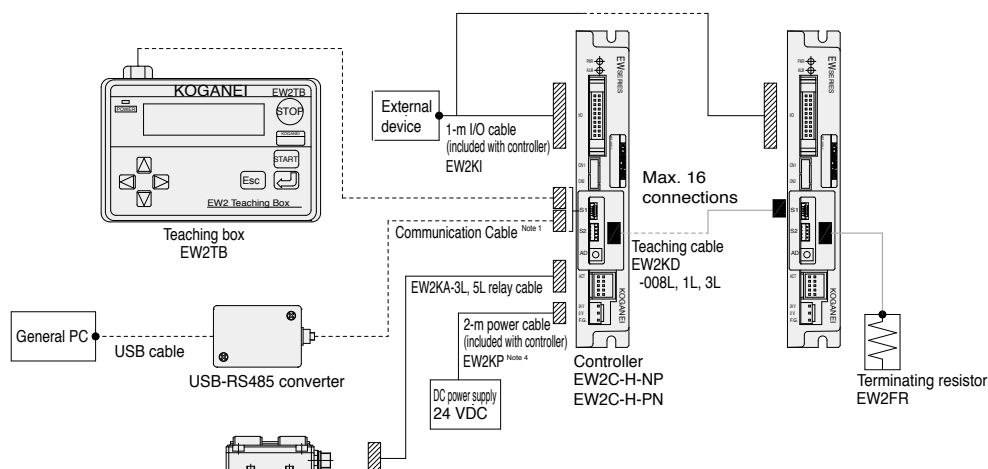
Please do not apply excessive force or impact to the table.

Chapter 2 System Configuration

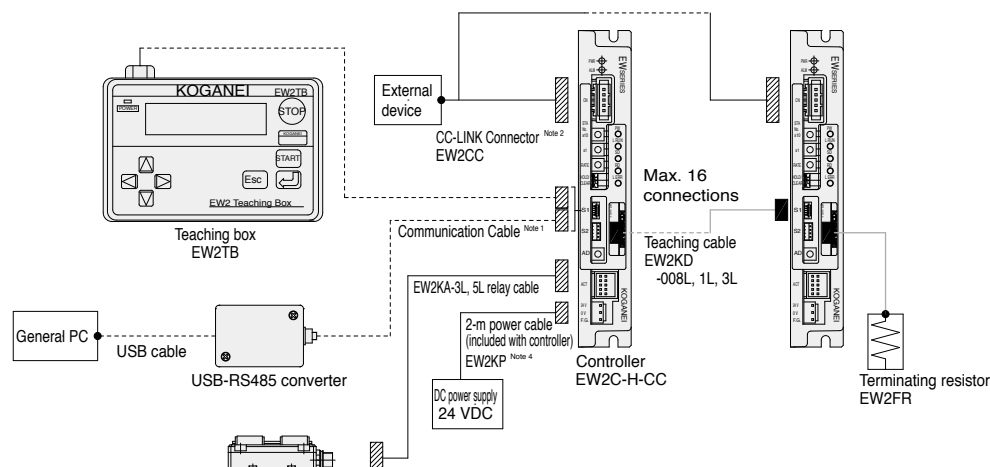
2-1 Entire System Configuration

Electric hands are configured with the following primary devices.

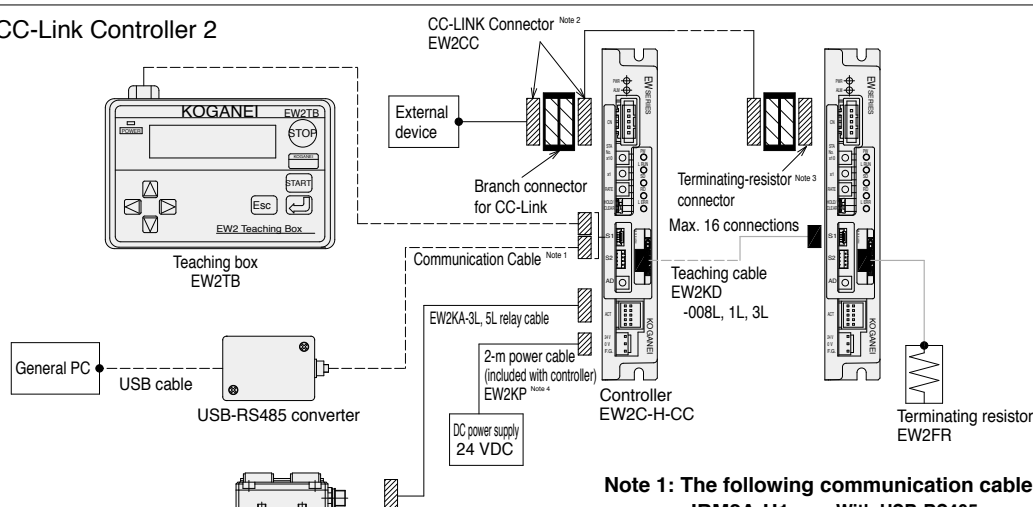
●Point Input Controller



●CC-Link Controller 1



●CC-Link Controller 2



Note 1: The following communication cables are available.

- IBM2A-H1: With USB-RS485 converter and USB cable
- IBM2A-H1-N: With USB-RS485 converter
- EW2KN: Stranded wire specification

Note 2: Only the CC-Link connector is provided.
Customers must obtain USB cables.

Note 3: Customers must obtain terminating-resistor connectors.
Recommended Product: 3M 35T05-6M00-B0M GF

Note 4: We recommend that you ground noise filters.
Refer to page 10.

2-2 Options and Accessories

1. Controller

When the NP option is selected, the EW2C-H-NP controller includes the following accessories. Confirm that all items are included at the time of purchase.

EW2KP power cable: 1

EW2KI I/O cable: 1

When the PN option is selected, the EW2C-H-PN controller includes the following accessories. Confirm that all items are included at the time of purchase.

EW2KP power cable: 1

EW2KI I/O cable: 1

When the CC option is selected, the EW2C-H-CC controller includes the following accessories. Confirm that all items are included at the time of purchase.

EW2KP power cable: 1

EW2CC CC-Link connector: 1

2. DIN rail mounting plate

When the DP option is selected, the EW2DP DIN rail mounting plate with 2 mounting screws is included. Confirm that all items are included at the time of purchase.

3. Locating dowel pin

When option (-P) is selected, 2 locating dowel pins are attached.

EW2H□8 EW2H□18	EW2P-3
EW2H□28	EW2P-4

Please check when purchased.

4. Relay cable

When the -3L or -5L option is selected, the EW2KA-3L 3-m relay cable or the EW2KA-5L 5-m relay cable used to connect the electric hand to the controller is included. Confirm that all items are included at the time of purchase.

2-3 Setting Up for Operation

	Procedure	Reference Information
Installation and connections	Installation	3-2 4-2
	↓	
	Connections	Connect the power supply, controller, actuator, PC, and teaching box. 4-1 4-2
Setting	↓	
	Turning on the power	4-2
	↓	
	Setting the actuator number	Set the correct actuator number. ^{Note} 4-4
	↓	
	Changing parameters	Configure parameter data in accordance with your usage conditions. 4-8
Operation	↓	
	Entering point data	Write point data that will result in the desired operation. 4-5
	↓	
	Test runs	Verify that the unit operates properly. 4-3
	↓	
	Operation	Perform the desired operation using the configured point data and START signal. To operate the unit continuously, use a programmable controller or other external device to control operation. 4-3

Note: When the actuator and controller are purchased together as a set, the controller is set to the correct actuator number from the factory.

Model	Actuator number
EW2H8	72
EW2H18	73
EW2H28	74
EW2HL8	82
EW2HL18	83
EW2HL28	84

Note: You must set the actuator number in accordance with the connected actuator model whenever controllers are purchased individually.

Chapter 3 Main Unit

3-1 Handling Main Unit

3-1-1 Precautions

- (1) Do not apply external force to grippers when installed to hold a workpiece.
Applying excessive external force could cause damage to parts.
- (2) Operational restrictions
The motor may increase in temperature depending on usage conditions.
Use the device within the specified operating temperature range.
Using the hand under conditions exceeding these restrictions may cause motor damage or internal burning.
- (3) Operational sound
The loudness of operational sound can sometimes increase due to operating speed, the use of grippers, or other conditions. This is not a malfunction.
- (4) Use the main unit and controller in an environment not exposed to dust and other debris. Using this device in environments exposed to dust and other debris may result in malfunction.

3-2 Installation

3-2-1 Mounting the Main Unit

- (1) The mounting surface should be flat. Any twisting or bending caused during the installation process may reduce performance or cause malfunction.
- (2) Avoid scratching or denting the mounting surface of the main unit as doing so may result in the main unit not being mounted properly.
- (3) If necessary, use screw lock to prevent screws from becoming loose to due to vibration and shock.
- (4) Secure the main unit by using the proper screws accordingly with the direct mount holes, tapping holes, and positioning holes as described in the following table. Always use screws that are shorter than the thread depth and tighten screws to the specified torque to install the main unit.

●Direct mount holes

	Hole diameter [mm]	Screw size	Thread depth [mm]	Maximum tightening torque [N·m]
EW2H□8	φ3.4	M3	11.6	0.63
EW2H□18	φ4.5	M4	12.5	1.50
EW2H□28	φ4.5	M4	18.5	1.50

●Tapping holes

	Screw size	Thread depth [mm]	Distance between screws [mm]	Maximum tightening torque [N·m]	Notes
EW2H□8	M3	4.5	26	0.63	Can be directly mounted to the tool side of the MJB34 Auto Hand Changer
EW2H□18	M3	5	26	0.63	Can be directly mounted to the tool side of the MJB34 Auto Hand Changer
	M5	5	42	3.00	Can be directly mounted to the tool side of the MJB54 Auto Hand Changer
EW2H□28	M5	5	42	3.00	Can be directly mounted to the tool side of the MJB54 Auto Hand Changer
	M5	5	60	3.00	Can be directly mounted to the tool side of the MJB70 Auto Hand Changer

*The tapping and pin holes on the bottom surface of the electric hand have been positioned to allow the unit to be directly mounted to the tool side of MJB series auto hand changers.

[Reference: Compliance Light Installation]

Adapter	Electric hand	Compliance light
EW2A-H8	EW2H□8	CPL□34□
EW2A-H18	EW2H□18	CPL□54□
EW2A-H28	EW2H□28	CPL□70□

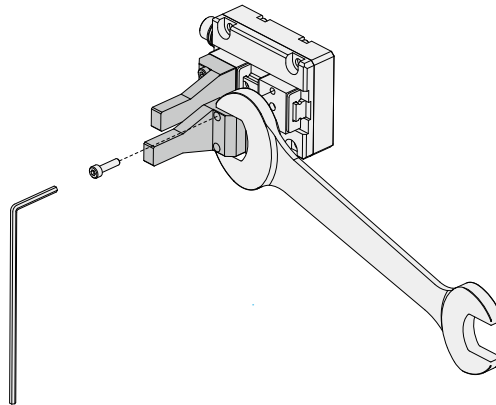
*Adapters compatible with Konagei CPL compliance lights are available.

3-2-2 Gripper Installation

- (1) Always use screws that are shorter than the thread depth to install grippers. Using screws longer than the thread depth may cause improper operation.
- (2) Tighten screws to their specified torque when installing grippers.

	Screw size	Thread depth [mm]	Maximum tightening torque [N·m]
EW2H□8	M2.5	3	0.36
EW2H□18	M3	3	0.63
EW2H□28	M3	3.5	0.63

- (3) Secure the grippers or table with a wrench and avoid any moment of inertia being placed guide.



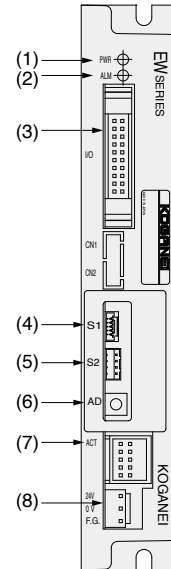
- (4) Fix the cable so that load such as twisting or pulling is not applied to the connector. Also, make sure bending moment is avoided during and after connector fixing.
- (5) Fix the cable so that load such as twisting, pulling or bending is not applied to the controller connector.
- (6) Do not apply external force to the work and fingers attached to the body. If excessive force or impact is applied from the outside, parts may be damaged or shifted. As a result, the operation failure, shifting of work piece or fingers will occur, so be sure to check the operation and the settings. In particular, the table of the electric hand flat type does not move by external force. Do not apply excessive shock to the table. If you want to move the table manually, use the slotted groove for table actuating.
- (Note) When the product is OFF, and when the cable direction "-1" is selected, the table actuating slotted groove on the body side cannot be used. (EW2H8, EW2H18, EW2HL8, EW2HL18)
- (7) When reciprocating over a short distance, the grease film may run out. As a guideline, it is recommended to recover the oil film by reciprocating about 5 cycles of full stroke, once every 5,000 to 10,000 cycles.
- (8) Set the mass of the work piece which is actually gripped, to about 1/10 to 1/20 of the gripping force.
- (9) When moving the electric hand while holding the work piece, set the work mass to about 1/30 to 1/50 of the gripping force.
- (10) The work piece mass that can be gripped varies greatly depending on the material, finger shape, gripping surface status, and moving speed of the work piece, so the specification tables and the graph values should be used only as a guideline.

Chapter 4 Controller

4-1 Appearance and Functions

4-1-1 Point Input Type Controller(NPN specification,PNP specification)

- (1) POWER LED
Turns on when the power is on.
- (2) ALARM LED
Represents controller status. Refer to the table at the lower-right.
- (3) I/O connector
Use the included I/O cable to connect with sensor switches and external programmable controllers.
- (4) S1 connector
Use a communication cable to connect with a teaching box.
- (5) S2 connector
This connector is used for daisy chain connections.
- (6) Address switch
This switch is used to set addresses. (16 addresses 0 - F)
- (7) ACT connector
This connector is used to connect with the main unit.
- (8) Power connector
Use the included power cable to connect the controller to 24 VDC power.

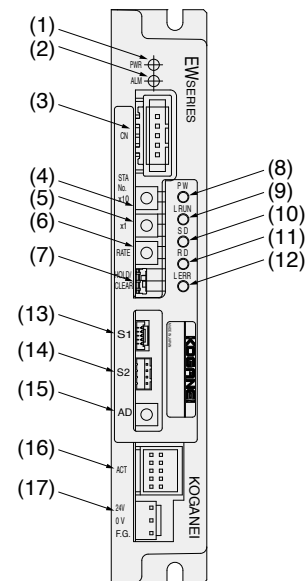


Description	LED state
Alarm triggered	On
Error triggered	Flashes quickly (On: 0.25 s/Off: 0.25 s)
Incomplete return to home	Flashes slowly (On: 0.5 s/Off: 1.5 s)
Normal	Off

4-1-2 CC-Link Type Controller

- (1) POWER LED
Turns on when the power is on.
- (2) ALARM LED
Represents controller status. Refer to the table at the lower-right.
- (3) CC-Link connector
This connector is used to connect with external programmable controllers.
*Customers must obtain cables.
- (4) and (5) CC-Link node number switches
These switches are used to CC-Link node numbers.
Addresses can be set between a range of 1 - 64.
- (6) CC-Link baud rate switch
This switch is used to set the CC-Link baud rate.
Baud rates can be set between a range of 0 - 4.

Setting	0	1	2	3	4
Communication speed	156 kbps	625 kbps	2.5 Mbps	5 Mbps	10 Mbps



Description	LED state
Alarm triggered	On
Error triggered	Flashes quickly (On: 0.25 s/Off: 0.25 s)
Incomplete return to home	Flashes slowly (On: 0.5 s/Off: 1.5 s)
Normal	Off

- (7) Link error input port data switch
This switch is used to set the input port data status used when link errors occur.
Options include HOLD (left) and CLEAR (right).
- (8) through (12) CC-Link status LEDs
(Refer to table 1)

- (13) S1 connector
Use a communication cable to connect with a teaching box.
- (14) S2 connector
This connector is used for daisy chain connections.
- (15) Address switch
This switch is used to set addresses.
- (16) ACT connector
This connector is used to connect with the main unit.
- (17) Power connector
Use the included power cable to connect the controller to 24 VDC power.

[Table 1]

	Indicators	Description
(8)	PW	Turns on when power is turned on
(9)	L RUN	Turns on when data is successfully received from the master node
(10)	SD	Turns on when the device sends data
(11)	RD	Turns on when the device is receiving data
(12)	L ERR	Turns on when a communication error occurs. Turns off after a timeout occurs. Also turns on when the node number or communication speed is set incorrectly.

4-2 Installation and Connection to External Devices

4-2-1 Controller Installation

(1) Installation Procedure

Secure the controller to an object with good thermal conductivity using the M4 screws slotted into the 5 mm, U-shaped holes on the sides.

(2) DIN Rail Installation Procedure

To install using a separately purchased DIN rail mounting plate, secure the controller to DIN rail mounting plate using the M4 screws slotted into the 5 mm, U-shaped holes on the sides.

Then install the assembly to your DIN rail.

(3) Installation Environment

- Install in locations with an ambient temperature of 0 to 40°C and 35 to 85% humidity without condensation.
- Ensure the installation area has adequate space of at least 20 mm around the controller with good ventilation.
- Do not install in locations exposed to corrosive gases such as sulfuric acid and hydrochloric acid, flammable gases, or flammable liquids.
- Do not install in locations exposed to significant amounts of dust and debris.
- Do not install in locations exposed to chips, oil, water, or other substances generated by other equipment.
- Do not install in locations exposed to electromagnetic or electrostatic noise.
- Do not install in locations exposed to significant vibration.

4-2-2 Connecting to the Power Supply

(1) Power Supply

- Connect the power cable to a 24 VDC power supply with a stability factor of $\pm 10\%$ and capacity of at least 1.6 A.
- Connector: JST Mfg. B3PS-VH

Connector Pin Table

NO.	Signal	Wire color	Description
1	24 V	Red	Power supply
2	0 V	Blue	
3	F.G	Green	Ground

[Notes]

- **Connecting the controller to an unstable power supply may result in triggering an alarm and causing a shutdown or abnormal operation.**
Make sure to use a sufficiently stable 24 V power supply.

(2) Connecting the Power Supply

- Use the include power cable to connect to the power supply. Make sure not to mix up the polarity when connecting the cable. Improper connections may result in fire and other serious hazards.
- We recommend that you use a noise filter with power cables. (Recommended noise filter: TDK-Lambda RSEN-2006)

[Notes]

- **The EW2C-H controller does not have a power switch or emergency stop switch. Always install a proper power cutoff (isolation) device that protects all related machinery and equipment.**

[Caution]

- **Turn off the power supply to all related machinery and equipment before connecting any power wire to the controller.**
Failure to do so may cause electric shock or fire.

(3) Insulation Resistance and Voltage Tolerance Testing

Do not perform insulation resistance or voltage tolerance testing on the controller.

4-2-3 Grounding the Controller

- Always install ground connections to prevent electric shock and equipment malfunction due to noise.
- We strongly recommend that you use a type 3 ground (ground resistance of no more than 100 Ω).
- Use the F.G. wires of the power cable to make controller ground connections.
- When using with EW2C-H-CC (CC-link type), we recommend you to connect the F.G. wires of the power cable within 250 mm to the ground. If its length is longer than 250 mm, external noise may interfere with the communication.

4-2-4 Precaution for wiring

To comply with the CE Mark regulation, the following procedures including connection to other equipment are required.

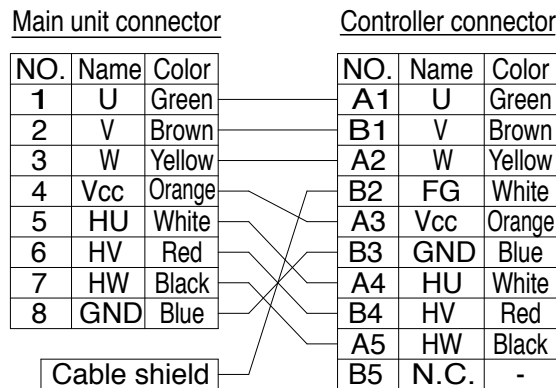
- Install the clamp filter (2 turn) with the power cable.
- Install the clamp filter to the controller side of the communication cable as follows.
 - EW2C-H-NP: 1 piece (2 turn)
 - EW2C-H-PN: 1 piece (2 turn)
 - EW2C-H-CC: 3 pieces (2 turn)

[Recommended] ZCAT3035-1330 (TDK)

- Do not twist or bundle the communication cable.
- Please keep the length of the CC-Link cable within 30 m.

4-2-5 Connecting to the Actuator

Connect the relay cable to the ACT connector on the front panel of the controller. Turn the power off before making the connection. Push the relay cable completely into the connector.



4-2-6 Connecting the I/O connector

The I/O connection is used to connect to programmable controllers and other external equipment.

4-3 I/O Interface

4-3-1 I/O Connector Signal Table

NO.	Wire color	Signal	Description	NO.	Wire color	Signal	Description
01	Brown	POS0	Point Configuration	02	Red	POS1	Point Configuration
03	Orange	POS2	Point Configuration	04	Yellow	POS3	Point Configuration
05	Green	POS4	Point Configuration	06	Blue	START	Start signal
07	Purple	STOP	Stop signal	08	Gray	ORG	Return to home position signal
09	White	READY	Ready output	10	Black	BUSY	BUSY output
11	Brown	INPOS	Positioning complete output	12	Red	HOLD	Pickup complete output
13	Orange	24G	Negative common	14	Yellow	N.C.	N.C.
15	Green	24 V GND	Ground	16	Blue	24 V IN	24 V input
17	Purple	N.C.	N.C.	18	Gray	24 V	+24 V
19	White	FG	Frame ground	20	Black	FG	Frame ground

4-3-2 Details of input signals

Input signals consist of 9 custom command inputs.

○ Custom command inputs

Custom command inputs are used for control provided by a programmable controller or other external device. READY, BUSY, and other signals must be in the following states before the system will accept input of the START and ORG signals.

■ READY output: On

■ BUSY output: Off

■ STOP input: Off

Reception of START and ORG input starts once the signals have transitioned to the on state (moment of contact closure).

Monitor BUSY signal output to determine if a controller has received commands.

■ START

Robot moves from the current position in accordance with the point number data specified by POS0 to POS4.

[Notes]

The state of the POS0 to POS4 signals must be confirmed before turning on the START signal.

■ ORG

Robot returns to the home position in the direction as specified by parameters. The robot must be returned to the home position after the power is first turned on.

■ STOP

This input signal is used to temporarily stop actuator movement.

Turning on this input signal (closing the contact) while the actuator is operating or the robot is returning to a home position causes the actuator to stop operation. When this input signal is on (contact is closed), custom I/O commands, programs from PCs, and return to home operations cannot be executed.

■ POS0 to POS4

These input signals are used to specify point numbers when the controller is connected to a programmable controller or other output circuit.

Example Point Settings

POS number Point number	POS4 (2 ⁴)	POS3 (2 ³)	POS2 (2 ²)	POS1 (2 ¹)	POS0 (2 ⁰)
P0	OFF	OFF	OFF	OFF	OFF
P1	OFF	OFF	OFF	OFF	ON
P3	OFF	OFF	OFF	ON	ON
P7	OFF	OFF	ON	ON	ON
P15	OFF	ON	ON	ON	ON
P31	ON	ON	ON	ON	ON

4-3-3 Details of Output Signals

Output signals consist of the READY, BUSY, INPOS, and HOLD signals.

On and off states refer to the on and off operation of output transistors.

○ Custom outputs

These outputs are used for communication with programmable controllers.

■ READY output

This signal is turned on while the control system is functioning properly. This signal turns off when an alarm is triggered resulting in the motor coasting.

■ BUSY output

This signal turns on while custom or PC-based commands are executing. This signal turns on once a custom command input is received. While the BUSY signal is turned on, the controller will not accept other custom command input or commands from a PC.

[Notes]

Make sure to turn off a custom command once the BUSY output signal turns on. If such input is left on, the BUSY signal will not turn off after the command finishes executing.

■ INPOS positioning complete output

This signal turns off if a custom command is received. This signal turns off once positioning processing is complete or when size detection is enabled. This signal stays off if an error occurs during execution or the STOP signal is received.

■ HOLD pickup complete output

This signal turns off if a custom command is received. This signal turns off once pickup processing completes successfully. This signal stays off if an error occurs during execution or the STOP signal is received.

4-3-4 Input/Output Circuits

This section describes the specifications of input/output circuits and provides connection examples. Refer to this section when connecting the controller to programmable controllers and other external equipment.

4-3-4-1 I/O Information

(1) Input/output circuit specifications

○ Input power supply

Input voltage: 24 V $\pm 10\%$

○ Input circuit

Isolation method: Photocoupler isolation

Input response: 30 ms or less

Input current: 5 mA/24 VDC

Input sensitivity: Min. 3 mA when on

Max. 1 mA when off

○ Output circuit

Isolation method: Photocoupler isolation between the internal circuit and output transistor

Output terminals: open collector output ^{Note}

Output response: 1 ms or less

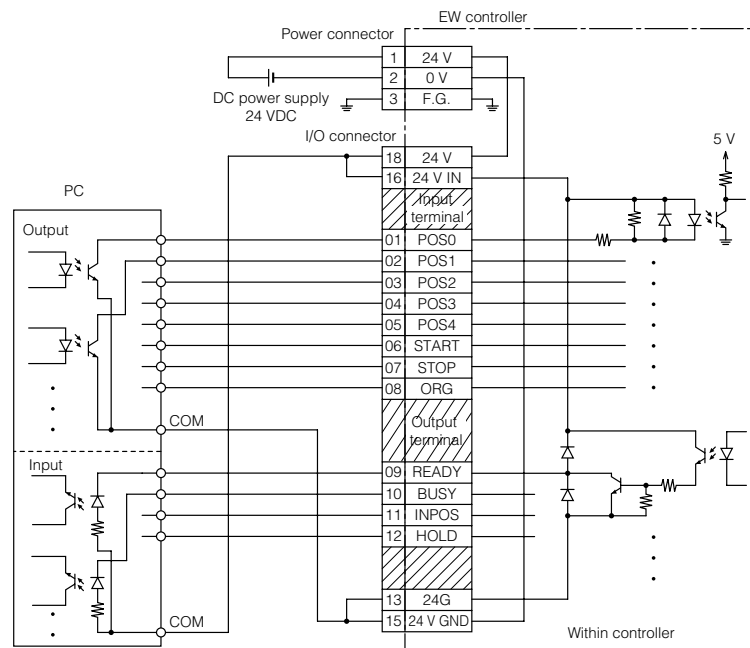
Maximum output current: 30 mA/24 VDC per output

Residual on-state voltage: 1.5 V or less

(Note) NPN specification is NPN output, PNP specification is PNP output.

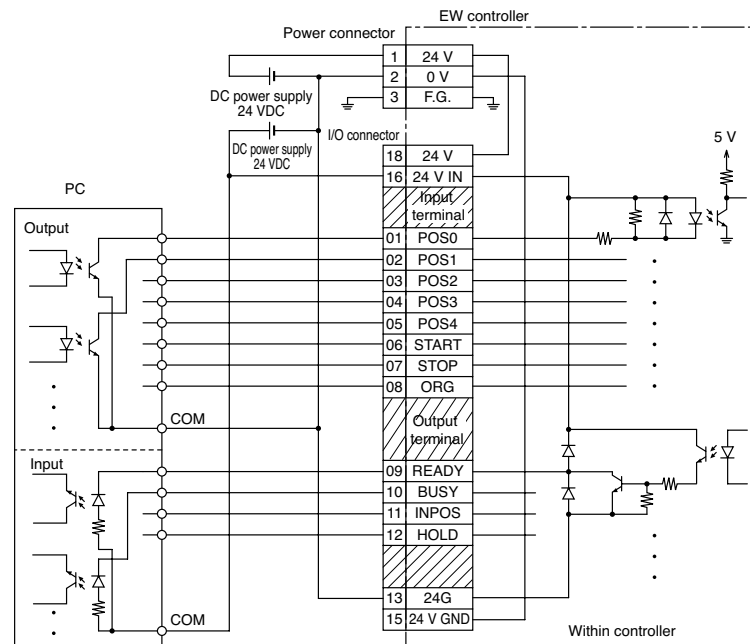
●Point Input Controller (NPN specification)

(2) Wiring when using the controller internal power supply



*Short both 13-15 and 16-18 even when using only input or output.

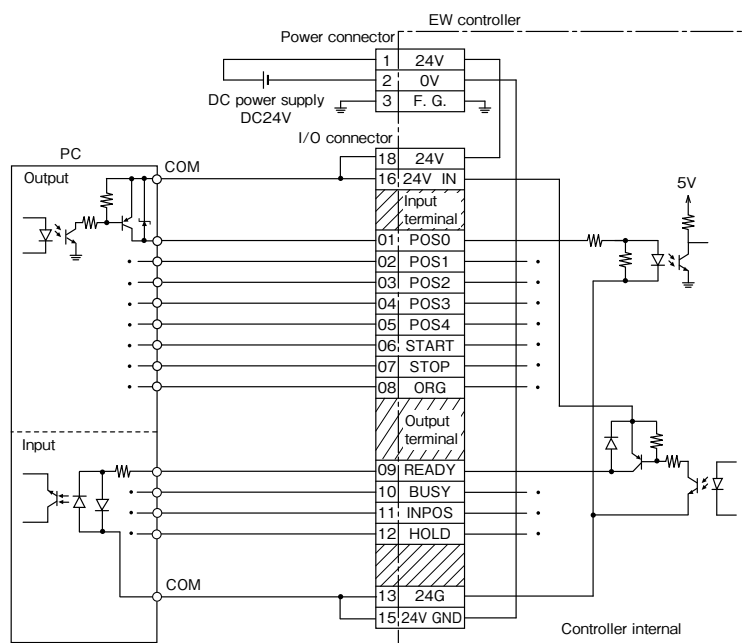
(3) Wiring when using a separate power supply instead of the controller internal power supply



*Connect 13 and 16 to the power supply even when using only input or output.

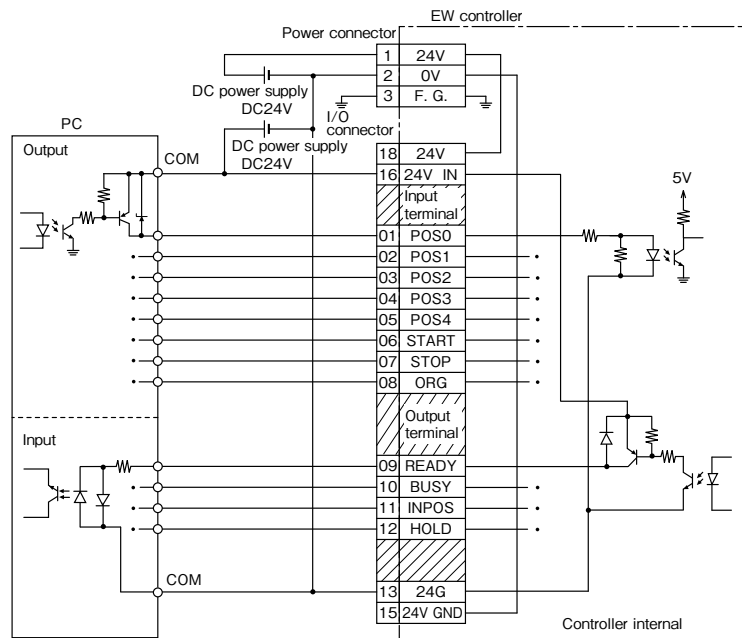
●Point Input Controller (PNP specification)

(2) Wiring when using the controller internal power supply



*Short both 13-15 and 16-18 even when using only input or output.

(3) Wiring when using a separate power supply instead of the controller internal power supply



*Connect 13 and 16 to the power supply even when using only input or output.

4-3-4-2 CC-Link Input/Output Information

●CC-Link Controllers

(1) Master node buffer memory table

The EW2C-H-CC is a remote I/O node with 16 inputs and 16 outputs.

Ex.: Node number setting of 01

Master node buffer area

Node number	Remote input (RX)	Remote output (RY)
1	RX0F to RX00	RY0F to RY00
	RX1F to RX10	RY1F to RY10
2	RX2F to RX20	RY2F to RY20
	RX3F to RX30	RY3F to RY30
3	⋮	⋮
⋮	⋮	⋮
⋮	⋮	⋮
64	RX7EF to RX7E0 RX7FF to RX7F0	RY7EF to RY7E0 RY7FF to RY7F0



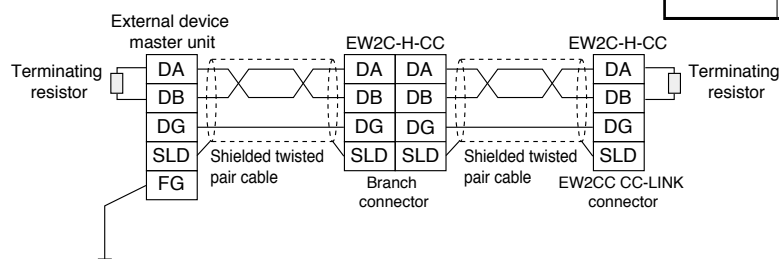
Ex.: Node number setting of 01

EW2C-H-CC I/O memory map

Remote input (RX)		Remote output (RY)	
RX00	READY	RY00	Not used
RX01	BUSY	⋮	
RX02	INPOS	⋮	
RX03	HOLD	⋮	
RX04	Not used	⋮	
⋮		RY0F	Not used
RX0F		⋮	
RX10		RY10	
⋮	Not used	RY11	
⋮		RY12	
⋮		RY13	
⋮		RY14	
⋮		RY15	
⋮		RY16	
⋮		RY17	
⋮		RY18	
⋮		⋮	
RX1F		RY1F	

(2) Wiring

(Example)



0: Contact off
1: Contact on

*Use cables as recommended by the CC-Link Partner Association.

Connect terminating resistors between terminals DA and DB of end nodes.

*Use a terminating resistor having specifications of 110 Ω and 1/2 W for CC-Link cables and Ver. 1.10 CC-Link cables. Use a terminating resistor having specifications of 130 Ω and 1/2 W for high-performance CC-Link cables.

*Make sure connections are properly grounded.

(3) CC-Link node number switches

One STA x10 rotary switch and one STA x1 rotary switch are located on the front panel of the controller to set node numbers.

Ex.: To set a node number of 39, set the x10 switch to the #3 position and set the x1 switch to the #9 position.

Note: The valid range of node numbers is 1 to 64.

(4) CC-Link baud rate switch

A RATE rotary switch is located on the front panel of the controller to configure the baud rate.

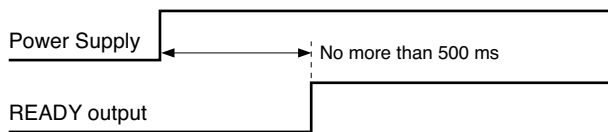
Setting	0	1	2	3	4
Communication speed	156 kbps	625 kbps	2.5 Mbps	5 Mbps	10 Mbps

Note: The valid range of baud rate settings is 0 to 4. Set the communication speed to the same setting as set on the master node.

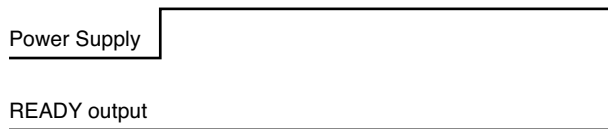
4-3-5 Timing Chart

(1) Power is turned on

Normal state



Alarm has been triggered



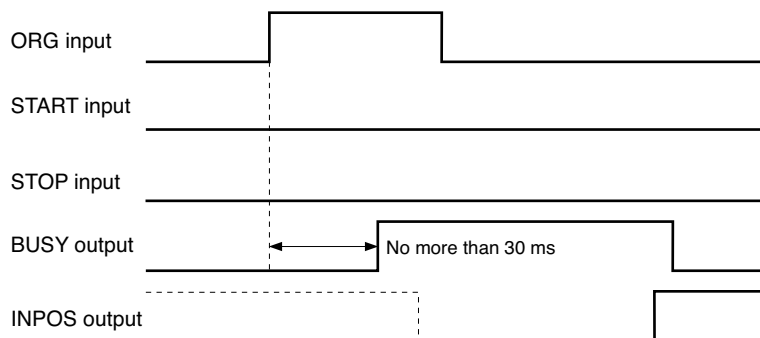
Turn on custom command input signals after confirming that the READY output signal has turned on after the power is turned on.

If the READY output signal does not turn on by a predetermined amount of time after the power is turned on, this indicates that an alarm has been triggered.

(2) Executing custom commands

- The BUSY output signal turns on once a custom command is received. The system turns off the BUSY output signal to indicate that the received command was successfully processed.
- Always use pulse input for custom commands. If such input is left on, the BUSY output signal will not turn off after the command finishes executing.

1. Return to home position operation



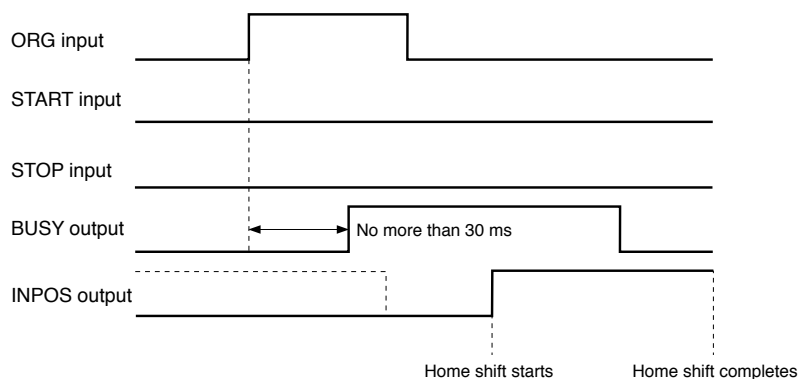
(1) The BUSY output signal turns on once the ORG input signal turns on.

(2) Confirm that the BUSY output signal turns on and then turn off the ORG input signal (open the contact).

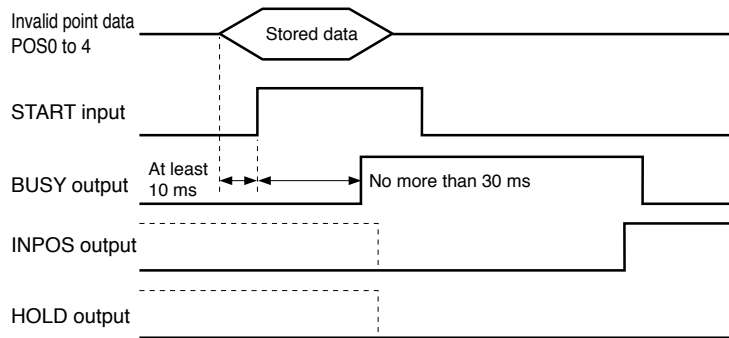
(3) Wait until the BUSY output signal turns off.

(4) The INPOS output signal turns on after the BUSY output signal turns off indicating that operation has completed successfully.

1-1. Return to home position operation with home shift

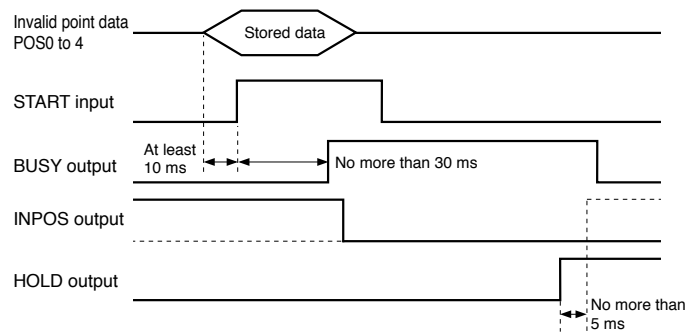


2. Position mode A or I



- (1) Point data is input for POS0 to POS4. Maintain this input state until the BUSY output signal turns on. Changing the input state before the BUSY signal turns on may result in data misinterpretation.
- (2) Turn on the START input signal but with a delay of at least 10 ms.
- (3) The BUSY output signal turns on once the custom command input signal rises.
- (4) Confirm that the BUSY output signal turns on and then turn off the custom command input signal (open the contact).
Point data can be changed any time after this point.
- (5) Wait until the BUSY output signal turns off.
- (6) The INPOS output signal turns on after the BUSY output signal turns off indicating that operation has completed successfully.

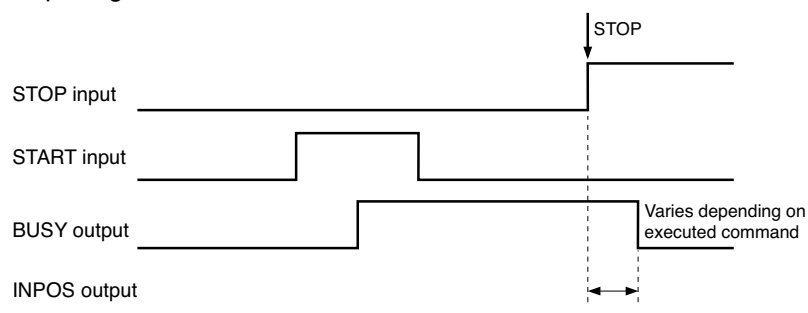
3. Gripping mode U, C, or O



- (1) Point data is input for POS0 to POS4. Maintain this input state until the BUSY output signal turns on. Changing the input state before the BUSY signal turns on may result in data misinterpretation.
- (2) Turn on the START input signal but with a delay of at least 10 ms.
- (3) The BUSY output signal turns on once the custom command input signal rises.
- (4) Confirm that the BUSY output signal turns on and then turn off the custom command input signal (open the contact).
Point data can be changed any time after this point.
- (5) Wait until the BUSY output signal turns off.
- (6) The HOLD output signal turns on after the BUSY output signal turns off indicating that operation has completed successfully.

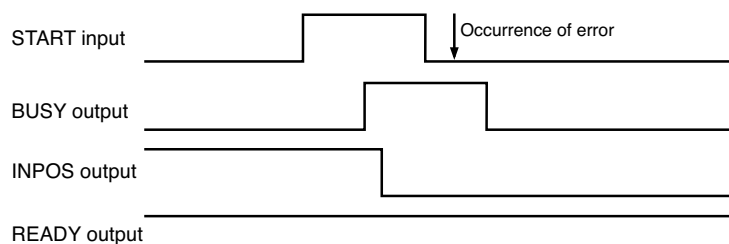
* When size detection is enabled, and a workpiece is picked up with the configured range, the HOLD output signal turns on followed by the INPOS output signal turning on within 5 ms.

4. STOP input signal is on



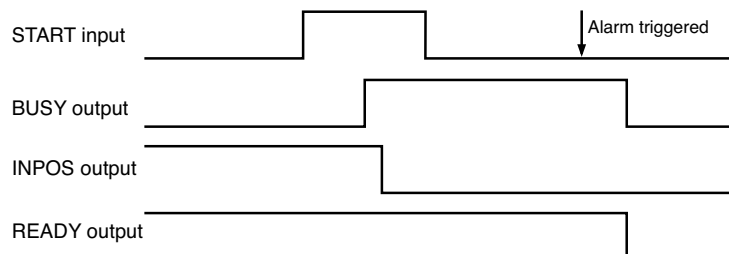
The BUSY output signal turns off if the STOP input signal is received while a command is executing. The READY output signal does not change.

5. When an error has occurred



■ The READY output signal does not change. This timing chart illustrates the timing for error 64 (stop limit).

6. An alarm is triggered



■ The READY, BUSY, INPOS, and HOLD output signals all turn off.

4-4 Actuator Number Setting

Set the actuator number in accordance with the actuator model as described in the following table.

Model	Actuator number
EW2H8	72
EW2H18	73
EW2H28	74
EW2HL8	82
EW2HL18	83
EW2HL28	84

Actuator number configuration methods - Use either method

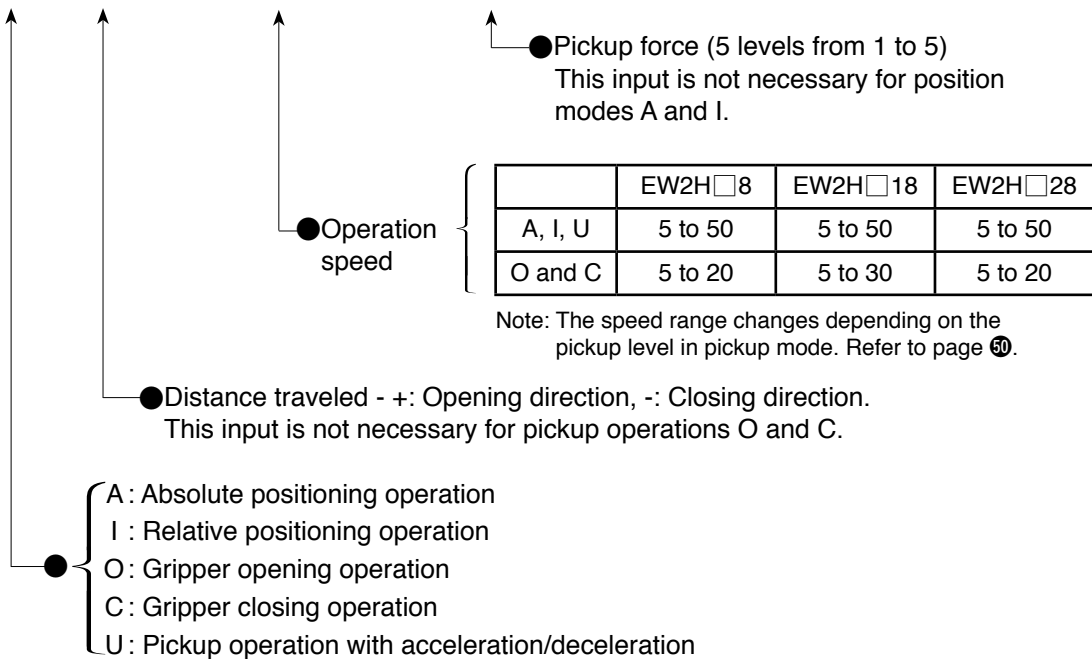
1. Use a communication command. Refer to page 29.
2. Use the initialize command in the support software to initialize parameters.

Refer to the support software manual for more information.

Note: When the actuator and controller are purchased together as a set, the controller is set to the correct actuator number from the factory.

4-5 Point Data Specifications

P0 = Mode, Position (mm), Speed (mm/s), and Force



4-5-1 Point Setting Method

Point editing can be performed using a PC or a teaching box.

Refer to section 4-7 "Communication" on page 22 for more information on communication parameters and cable specifications.

Point editing can be performed using general communication software or the specialized support software.

Refer to the support software manual for more information on using the support software.

Refer to the teaching box manual for more information on using the teaching box.

[Ex.] Editing and verifying point data using communication commands

- Use the @WPNT communication command to edit point settings.

WPNT

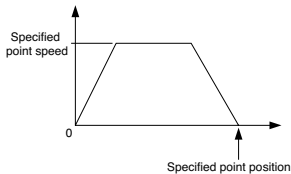
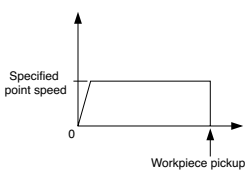
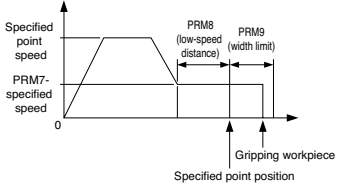
Function	Writes point data.
Syntax	@Address, WPNT, Point number, Mode, Position, Speed, Force c/r
Example	@0, WPNT, 0, A, -3.5, 50 c/r
Response	OK c/r
Additional info	Refer to page 16 for more information on the data format.

- After editing point settings, use the @?PNT communication command to verify point data.

? PNT

Function	Reads specified point data.
Syntax	@Address, ?PNT, Point number c/r
Example	@0, ?PNT, 0 c/r
Response	OK, A, -3.5, 50 c/r Absolute position of -3.5 mm and speed of 50 mm/s
Additional info	Refer to page 17 for more information on response data.

●Electric hand operation modes

Mode	Positioning		Gripping ^{Note}		Gripping with acceleration/deceleration
	Moves to the specified point via acceleration/deceleration and then stops.		Operates at a constant speed to grip a workpiece using the configured force.		Gripping a workpiece during the acceleration/deceleration movement.
Set value	A	I	C	O	U
Description	Moves to the specified point position along the coordinate system with the home position as the 0 position.	Moves from the current position to the specified point position.	Moves in the closing direction.	Moves in the opening direction.	Moves to the specified point and grip a workpiece at the speed set with PRM7 from a distance before the point specified with PRM8.
Operation pattern					
Notes	—		—		This operation is suitable for high-frequency soft gripping.

Note: Operation to change the gripping mode from C to O or from O to C cannot be performed.

Note: When operating in I mode after manually changing the position, it will operate using the position before manually moving it as the reference position.

4-6 How to Use the Size Detecting Function

4-6-1 When Using an Actual Workpiece for Size Detecting Range Setting

Procedure	Communication command	Notes
(1) Execute the return to home position operation.	@Address, ORG	
(2) Set the minimum sample and configure the dimensions.	@Address, GMIN, C(O), Speed and gripping force	Use HOLD ON to save the pickup position in PRM32.
(3) Execute the return to home position operation.	@Address, ORG	
(4) Set the maximum sample and configure the dimensions.	@Address, GMAX, C(O), Speed and gripping force	Use HOLD ON to save the pickup position in PRM31.
(5) Enable size detection.	@Address, WPRM, 33, 1	Setting PRM33 = 0 disables size detection.

- This configuration enables size detection for the next pickup process (O, C, and U modes). This configuration is not applicable to modes A and I.
- Use communication commands to specify the pickup direction during the configuration process. Use C to specify the closing direction and O to specify the opening direction.
- The INPOS signal turns on when a workpiece is picked up, the HOLD signal is turned on, and conditions (minimum sample dimensions < Dimensions of workpiece being held < Maximum sample dimensions) are satisfied. Otherwise, the INPOS signal remains off.

Note 1: Size detection is disabled when either the minimum sample dimensions are equal to or greater than the maximum sample dimensions.

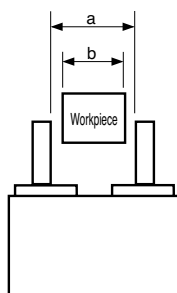
Note 2: Configure PRM31 and PRM32 so that their values have the same sign (+ or -). Size detection is disabled if either value is 0 or their signs are different.

4-6-2 When Using Direct Input for Size Detecting Function Setting

Procedure	Communication command example	Notes
(1) Enter the pickup position for the minimum sample.	@Address, WPRM, 32, -500	This example sets the pickup position for the minimum sample at -5 mm.
(2) Enter the pickup position for the maximum sample.	@Address, WPRM, 31, -450	This example sets the pickup position for the maximum sample at -4.5 mm.
(3) Enable size detection.	@Address, WPRM, 33, 1	Setting PRM33 to 0 disables size detection.

Note: The values written to PRM31 and PRM32 do not represent workpiece dimensions but the gripper positions used to hold a workpiece. Enter values based on calculations of the workpiece dimensions and the distance between grippers after having returned to their home positions, or enter values based on confirmation via @?POS of distance traveled when the workpiece is held.

[Distance Traveled Calculation Method]



a: Distance between grippers after having returned to their home positions

b: Workpiece dimensions

Hold position = $-(a - b) / 2$

*The gripping position in the closing direction is a negative value.

Note: Refer to the corresponding manual for more information on using the support software or teaching box.

4-7 Communication with Personal Computer

Use the S1 connector to communicate (initialization, point parameter configuration, operation) with external devices such as USB-RS485 converters and teaching boxes.

Chapter 4 Controllers

Use the S2 connector for daisy chain connections.

Note 1: Use a teaching box or USB-RS485 converter to configure controllers.

4-7-1 Communication Parameter Specifications

Communication Specifications

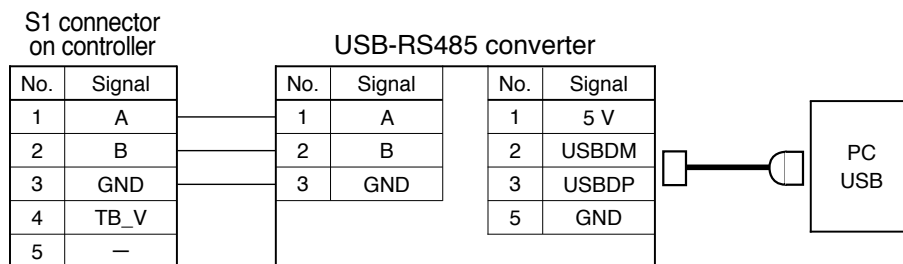
Parameter	Specification
Baud rate	115.2 kbps
Stop bit	1
Start bit	1
Parity bit	Odd
Data bit length	8
Communication Protocol	Half-duplex, start-stop synchronization method

4-7-2 Communication Cable

Connector S1: SM05B-GHS-TB (JST)

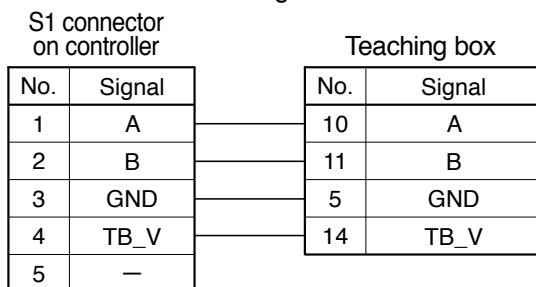
S2: DF3-4P-2DS (HRS)

●Connected to a PC using a USB-RS485 converter



Pin assignment and wiring between USB-RS485 converter and PC

●Connected to a teaching box



Pin assignment and wiring with teaching box

4-7-3 Addresses

The AD address switch on the front panel of the controller is used to configure RS485 addresses. Parameters can also be configured instead of using this switch. Refer to section 4-8 "Parameters" on page 30.

Note: Do not connect devices with duplicate addresses in a daisy chain configuration.

4-7-4 Communication Commands

Standard commands are available to easily communicate with external devices.

```
@<Address> ,<Command> [,<Operand 1>] [,<Operand 2>] [,<Operand 3>] [,<Operand 4>] [,<Operand *>] c/r
```

4-7-5 List of Communication Commands

Category	Command	Operand 1	Operand 2	Operand 3	Operand 4	Operand 5	Description of command
Actuator operation	ORG						Returns to home position
	MOVD	Coordinate value (mm)	Speed (mm/s)				Executes movement to specified coordinates
	MOVH	Coordinate value (mm)	Speed (mm/s)	Force			Executes pickup operation at specified coordinates
	MOVP	Point number					Moves to specified point
	GMIN	Pickup direction	Speed (mm/s)	Force			Minimum sample hold position setting for size detection
	GMAX	Pickup direction	Speed (mm/s)	Force			Maximum sample hold position setting for size detection
	X+						Positive movement by specified distance
	X-						Negative movement by specified distance
	XINC						Positive movement at constant speed
	XDEC						Negative movement at constant speed
	STOP						Stops operation
Data handling	?POS						Reads current position
	?PRM	Parameter number					Reads specified parameter
	?PNT	Point number					Reads specified point data
	?ORG						Confirmation of return to home position
	?VER						Reads version information
	?DIO						Reads I/O status
	?MOVE						Reads operations status
	?ERR						Reads error history information
	?EALL						Reads all error history information
	WPNT	Point number	Mode	Position (speed)	Speed (force)	Force	Writes point data
	WPRM	Parameter number	Data				Writes parameter data
	DPNT	Point number	Data				Delete point data
Utility	IPNT						Initializes all point data
	IPRM	Actuator number					Initializes all parameters
	IERR						Initializes error history information

Category	Response	Description
Response from controller	OK	Successful completion
	NG	Error triggered Error number after comma
	STOP	Stop command Stop number after comma

*Refer to pages 33, 34, and 36 for more information on error and stop numbers.

4-7-6 Details of Communication Commands

(1) **ORG**

Function	Executes the return to home position operation.
Syntax	@Address, ORG c/r
Example	@0, ORG c/r
Response	OK c/r

(2) **MOVD**

Function	Positioning operation to move to the specified position (absolute position in reference to the home position) at the specified speed (speed per side of the moving part).
Syntax	@Address, MOVD, Position, Speed c/r
Example 1	@0, MOVD, -3.5, 50 c/r
Response	OK c/r
Additional info	Moves to a position 3.5 mm from the home position at a speed of 50 mm/s.
Example 2	@0, MOVD, -10, 20 c/r
Response	NG, 23c/r
Additional info	Data that exceeds the software limits cannot be entered.

(3) **MOVH**

Function	Executes the pickup operation including moving to the specified position, which is an absolute value in relation to the reference home position, at the specified speed per side of the moving part and picking up a workpiece at the specified gripping force. Refer to page 17 for information on mode U.
Syntax	@Address, MOVH, Position, Speed, Force c/r
Example	@0, MOVH, -3.5, 50, 5 c/r
Response	OK c/r
Additional info	Moves to a position 3.5 mm from the home position at a speed of 50 mm/s in positioning mode and then picks up a workpiece using a gripping force of 5.

(4) **MOVP**

Function	Moves in accordance with the data of the specified PNT number.
Syntax	@Address, MOVP, Point number c/r
Example 1	@0, MOVP, 2 c/r
Response	OK c/r
Additional info	Moves per the PNT No.2 point data.
Example 2	@0, MOVP, 12 c/r
Response	NG, 52c/r
Additional info	PNT No.12 is not configured with any point data resulting in an error.

(5) **GMIN (GMAX)**

Function	Specifies the pickup position of the minimum/maximum sample used for size detection.
Syntax	@Address, GMIN, Pickup direction, Speed, Gripping force c/r
Example	@0, GMIN, C, 10, 5 c/r
Response	OK c/r
Additional info	Indicates that the pickup operation and configuration of this parameter completed successfully.

Note: The speed range changes depending on the pickup level in pickup mode. Refer to page 50.

(6) X + (X-)

Function	Moves by the specified distance only in the positive (opening)/negative (closing) direction at the following speed. Amount of movement = PRM25/100 [mm] Speed = PRM24 [mm/s]
Syntax	@Address, X+ c/r
Example	@0, X+ c/r
Response	OK c/r

(7) XINC (XDEC)

Function	Moves continuously in the positive (opening)/negative (closing) direction at the following speed. Movement stops when the Stop command is received or the software limit is reached. Speed = PRM24 [mm/s]
Syntax	@Address, XINC c/r
Example	@0, XINC c/r
Response	OK c/r

(8) STOP

Function	Stops operation.
Syntax	@Address, STOP c/r
Example	@0, STOP c/r
Response	STOP, 61 c/r

(9) ? POS

Function	Reads the current position.
Syntax	@Address, ?POS c/r
Example	@0, ?POS c/r
Response 1	OK, -5.67 c/r The current position is 5.67 mm from the home position. A negative value indicates the closing direction.
Response 2	NG, 01, -1.47 c/r NG description and current position is returned when an error is triggered. Over times error is triggered and current position is 1.47 mm away from the home position.

(10) ? PRM

Function	Reads the specified parameter.
Syntax	@Address, ?PRM, Parameter number c/r l/f
Example	@0, ?PRM, 25 c/r
Response	OK, 100 c/r

(11) ? PNT

Function	Reads specified point data.
Syntax	@Address, ?PNT, Point number c/r
Example	@0, ?PNT, 10 c/r
Response	OK, A, -5.00, 35 c/r Absolute position of 5 mm and speed of 35 mm/s
Additional info	Refer to page 19 for more information on response data.

(12) ? ORG

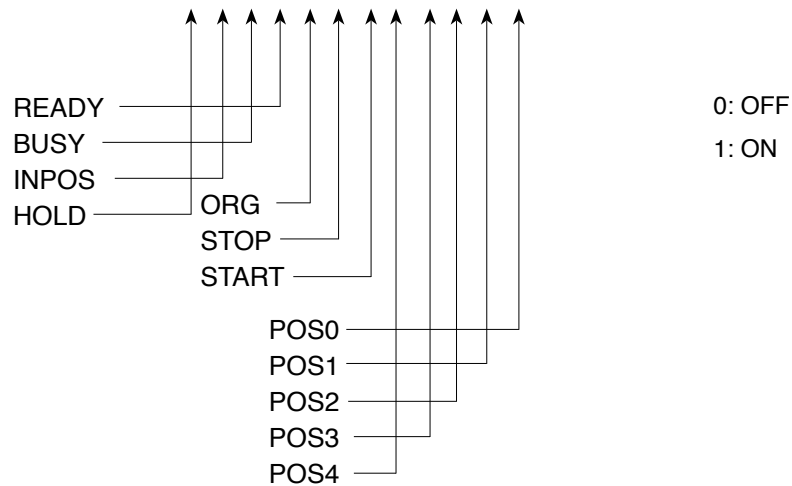
Function	Verifies if the return to home position operation is complete.
Syntax	@Address, ORG c/r
Example	@0, ?ORG c/r
Response 1	OK, 0 c/r Return to home position incomplete
Response 2	OK, 1 c/r Return to home position complete

(13) ? VER

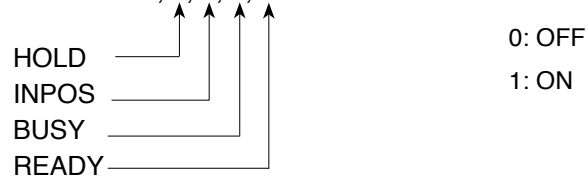
Function	Checks the version number of the controller software.
Syntax	@Address, ?VER c/r
Example	@0, ?VER c/r
Response	OK, 1.01c/r

(14) ? DIO

Function Reads the status of custom input/output.
 Syntax @Address, ?DIO c/r
 Example @0, ?DIO c/r
 Response OK, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 c/r

**(15) ? MOVE**

Function Reads the operational state of the actuator.
 Syntax @Address, ?MOVE c/r
 Example @0, ?MOVE c/r
 Response OK, 0, 0, 1, 1 c/r



Additional info @Use this command to confirm that operation has finished after using ORG and other commands.

(16) ? ERR

Function Reads the latest alarm and error information.
 Syntax @Address, ?ERR c/r
 Example @0, ?ERR c/r
 Response OK, 23 c/r

Note: Alarm 04 (reduced power voltage) is not stored.

(17) ?EALL

Function	Reads history information for previous alarms and errors. Up to the latest 16 entries of history information can be retrieved in descending order from the newest entry.
Syntax	@Address, ?EALL c/r
Example	@0, ?EALL c/r
Response	OK, 32, 01, 03 c/r 03 represents the latest error.

Note: Alarm 04 (reduced power voltage) is not stored.

(18) WPNT

Function	Writes point data.
Syntax	@Address, WPNT, Point number, Mode, Position, Speed, Force c/r
Example	@0, WPNT, 0, A, -3.5, 50 c/r
Response	OK c/r
Additional info	Refer to page 19 for more information on the data format.

(19) WPRM

Function	Writes parameters.
Syntax	@Address, WPRM, Parameter number, Value c/r
Example	@0, WPRM, 2, -400 c/r
Response	OK c/r

Data is only sent when parameter values actually change.

Note: PRM0 represents the actuator number, and so this parameter cannot be changed with a parameter write command. Initialize parameters to change this parameter.

(20) DPNT

Function	Delete point data.
Syntax	@Address, DPN, pointdata c/r
Example	@0, DPNT, 0 c/r
Response	OK c/r

(21) IPNT

Function	Deletes all point data.
Syntax	@Address, IPNT c/r
Example	@0, IPNT c/r
Response	OK c/r

(22) IPRM

Function	Resets parameters to their default values.
Syntax	@Address, IPRM, Actuator number c/r
Example	@0, IPRM, 72 c/r
Response	OK c/r

*The first two digits of the actuator serial number represent the actuator number.
Check the actuator number on the actuator and initialize parameters.

Model	Actuator number
EW2H8	72
EW2H18	73
EW2H28	74
EW2HL8	82
EW2HL18	83
EW2HL28	84

(23) IERR

Function	Deletes all alarm and error history information.
Syntax	@Address, IERR c/r
Example	@0, IERR c/r
Response	OK c/r

4-8 Parameters

This controller is not equipped with hardware such as potentiometers and dip switches for configuration.

Instead, parameters easily configured from a PC are used for this purpose.

This section describes the procedures used to configure and change parameters as well as details on each parameter.

Safety

Software is used to detect errors such as motor overload states. As such, controller parameters must be configured correctly in accordance with the connected actuator.

When the actuator and controller are purchased together as a set, the controller is initialized from the factory to match the actuator model. For all other cases, the actuator number must be configured on the controller in accordance with the model of your actuator before use. Contact us if you have any problems.

[Notes]

Changing parameters other than those described in this manual may result in fatal errors occurring in the actuator and controller.

4-8-1 Parameter Setting Method

Parameters are configured using a PC. Refer to section 4-7 "Communication with Personal Computer" on page 21 for more information on communication parameters and cable specifications.

Parameter editing can be performed using general communication software or the specialized support software.

Refer to the support software manual for more information on using the support software.

4-8-2 Explanation of Parameters

PRM0: Actuator number

Displays the actuator number. This is a read-only parameter. This parameter can be changed by initializing parameters.

PRM1: Positive software limit

Sets the actuator range of movement in the positive direction. This setting is only valid for operation modes A, I, C, and O.

Set values as appropriate to ensure safety.

Input range 0 to 9995 (×0.01 mm)

Default value 10

PRM2: Negative software limit

Sets the actuator range of movement in the negative direction. This setting is only valid for operation modes A, I, C, and O.

Set values as appropriate to ensure safety.

Input range -9995 to 0 (×0.01 mm)

Default values

Actuator number	72	73	74	82	83	84
Default value	-500	-700	-900	-1600	-2100	-2600

PRM5: Return to home position direction

Sets the return to home position direction. A value of 0 sets this parameter to the opening side. A value of 1 sets this parameter to the closing side.

Input range 0, 1

Meaning 0: Opening direction 1: Closing direction

Default value 0

PRM7: Gripping speed

Sets the gripping speed used for the gripping operation in mode U.

This speed represents the speed per side of the moving part.

Input range

Actuator number	72	73	74	82	83	84
Input range	5~20	5~30	5~20	5~20	5~30	5~20

*Refer to page 60 for more information on the relationship between grip levels and maximum speed.

Default value 10

PRM8: Low-speed distance

Sets the distance for low-speed movement from the specified position in mode U. Refer to page 20.

Input range 5 to 9995 (×0.01 mm)

Default value 100

PRM9: Width limit

Sets the range in which the pickup operation should be performed from the specified position in mode U. Refer to page 20.

If the distance traveled during the pickup operation exceeds the configured limit, an over limit error occurs and operation stops.

Input range 5 to 9995 (×0.01 mm)

Default value 100

PRM10: Return to home position speed

Sets the returns to home position speed. This speed represents the speed per side of the moving part.

Input range 5 to 20 (mm/s)

Default value

Actuator number	72	73	74	82	83	84
Default value	10	10	10	20	20	20

PRM21: Stroke

Input valid stroke for the actuator.

Input range 5 to 9995 (×0.01 mm)

Default value

Actuator number	72	73	74	82	83	84
Default value	500	700	900	1600	2100	2600

PRM24: Teaching movement speed

This parameter is used for movement performed by communication commands X+, X-, XINC, and XDEC.

This parameter is also used for teaching playback of points. This speed represents the speed per side of the moving part.

Input range 5 to 20 (mm/s)

Default value 10

PRM25: Distance for teaching movement

Sets the distance of movement performed by communication commands X+ and X-.

Input range 1 to 9995 (×0.01 mm)

Default value 10

PRM26: Teaching operation gripping force

Sets the gripping force used during movement performed by communication commands XINC and XDEC.

Input range 1 to 5

Default value 5

PRM31: Maximum sample pickup position

Sets the pickup position at which the maximum sample is picked up when using size detection. Default value: 0 (×0.01mm)

Actuator number	72	73	74	82	83	84
Input range	-500~500	-700~700	-900~900	-1600~1600	-2100~2100	-2600~2600

PRM32: Minimum sample pickup position

Sets the pickup position at which the minimum sample is picked up when using size detection. Default value: 0 (×0.01mm)

Actuator number	72	73	74	82	83	84
Input range	-500~500	-700~700	-900~900	-1600~1600	-2100~2100	-2600~2600

PRM33: Size detection

Enables/disables size detection.

Input range 0, 1

Meaning 0: Disables size detection 1: Enables size detection

Default value 0

PRM35: Home position shift

Sets a virtual home position. Always perform the return to home position operation after setting this parameter. When the return to home position operation is performed, the robot returns to the mechanical home position first and then moves per the setting of the home position shift parameter. The return to home position operation is complete after both movements. This position becomes the 0 position. If programmed movements somehow become slightly out of position, for example, the teaching process normally has to be performed again to reprogram all point data. However, using this parameter to set a position offset eliminates the need to completely redo the teaching process.

Input range -9995 to 9995 (×0.01 mm)

Default value 0

PRM36: Home position shift speed

Sets the speed used for the home position shift movement. This speed represents the speed per side of the moving part.

Input range 5 to 50 (mm/s)

Default value 10

PRM60: RS485 address setting

Sets the RS485 address when parameter is selected (PRM61=1) as the configuration method by PRM60.

Input range 0 to F (16 addresses)

PRM61: RS485 address configuration method

Sets the RS485 address configuration method.

Input range 0, 1

Meaning 0: Switch, 1: Parameter

Default value 0

*The minimum setting unit for the parameters concerning distance is 0.05 mm.

4-9 Message list

(1) Command errors

Error number	Related info	Description
21	Message	Typo
	Cause	Erroneous command
	Remedy	Use the correct command.
23	Message	Data error
	Cause	Error in the numerical data
	Remedy	Correct the data.
24	Message	Overflow error
	Cause	Error in the transferred data
	Remedy	Send the correct command
25	Message	Framing error
	Cause	Error in transfer data or noise
	Remedy	Use commands correctly. Turn power off and on again. Disconnect and reconnect communication cables.
26	Message	Parity error
	Cause	Error in transfer data or noise
	Remedy	Use commands correctly. Turn power off and on again. Disconnect and reconnect communication cables.

(2) Operational errors

Error number	Related info	Description
31	Message	Running
	Cause	Another command is already being executed, and the command cannot be accepted.
	Remedy	Wait until the current command finishes before inputting the new command.
32	Message	origin incomplete
	Cause	Command cannot be executed because the origin return has not been completed.
	Remedy	Execute origin return.
35	Message	can't execute
	Cause	The parameter is against the operation command.
	Remedy	Change the parameter or point data.
37	Message	too long
	Cause	The position to be moved is over the software limit.
	Remedy	Change the point data.

(3) System errors

Error number	Related info	Description
52	Message	No point data
	Cause	No data has been registered at the specified point No.
	Remedy	Register the point data.
53	Message	no actuator type
	Cause	Setting error in actuator No.
	Remedy	Check the actuator No., and try the initialization again.
56	Message	Data protect
	Cause	Attempted to write to a parameter that is write-protected
	Remedy	Writing is allowed only to parameters that are write-enabled
57	Message	No parameter
	Cause	Attempted to read a parameter number that is not registered
	Remedy	Read a registered parameter number
58	Message	Data save in progress
	Cause	Attempt to perform another write operation while writing to non-volatile memory
	Remedy	Wait until writing to non-volatile memory is complete before writing

(4) Stop messages

Error number	Related info	Description
61	Message	stop command
	Meaning	Execution has stopped due to the stop command.
63	Message	stop on
	Meaning	Execution has stopped due to the entry of a STOP input from I/O.

Chapter 5 Troubleshooting

5-1 If a Problem Occurs

Provide as much detail as possible regarding the following information when contacting Koganei for support.

Parameter	Example
Device	Controller Actuator Power Supply
Time of occurrence	Time of purchase (serial number) Usage period and conditions Did this occur after turning the power on? 1 hour after turning on the power
Conditions	During operation At specific electric hand positions
Description of issue	No operation Alarm was triggered
Frequency	Happens all the time Once an hour Happened only once

5-2 Remedy for Alarm

An alarm has been triggered if the READY output signal turns off. The ALM LED on the front panel of the controller also turns on when an alarm is triggered.

If an alarm is triggered, turn off the power, resolve the cause of the alarm, and then turn the power on again.

5-3 Alarm Specifications

Alarm messages are written in the following format.

NG, <Alarm number> c/r

Checking alarm details

To check alarm details, use a communication cable to connect the controller to a PC and enter either the ?EALL or ?ERR command. Refer to pages 27 and 28 for more information.

5-3-1 Alarm Message

Alarm number	Alarm	Meaning	Likely cause	Resolution
01	Overtimes	<ul style="list-style-type: none"> • Excessive load • Cable disconnection 	1) Problem with the application 2) Relay cable is disconnected or making a bad connection 3) Mechanical lock 4) Gripping at over the grip range in the U mode 5) Too much friction in the actuator unit	1) Reduce the acceleration. 2) Check the cable continuity. 3) Check for external interference. 4) Recheck the point data, low speed movement distance, and limit width. 5) Check whether or not the friction resistance of the moving part of the actuator is too high, and adjust correctly
04 ^{Note}	Power supply voltage drop	Power supply (24 VDC) input voltage is too low	Setting mistake for power supply voltage value Power supply is unstable	Raise the power supply voltage Use a stable power supply
05	voltage over	Excessive input voltage	Power supply	Reduce the power supply voltage.
08	point data error	Point data has been damaged.	Power supply was turned off while writing data.	Turn on the power supply again, and perform initialization for the point data.
09	param data error	Parameter data has been damaged.	Power supply was turned off while writing data.	Turn on the power supply again, and perform initialization for the parameter data.

Note: Alarm No. 4 (reduced power voltage) may be output even when the 24 VDC power is turned off normally. This event will not be entered into the alarm or error history.

Chapter 6 Specifications

6-1 Basic Specifications of the Main Unit

● Standard stroke type

Specification		Model	EW2H8	EW2H18	EW2H28
Motor			Brushless motor		
Maximum Speed (per side during positioning mode)		mm/s [in./sec.]	50 [1.97]		
Maximum Speed (per side during pickup mode) ^{Note}		mm/s [in./sec.]	20 [0.79]	30 [1.18]	20[0.79]
Minimum speed (per side)		mm/s [in./sec.]	5 [0.20]		
Maximum Gripping Force ^{Note}		N [lbf.]	8~16 [1.8~3.6]	18~33 [4.0~7.4]	28~50 [6.3~11.2]
Operating Temperature Range		°C [°F]	0 to 40 [32~104]		
Open/Close Stroke		mm [in.]	10 [0.39] (One side 5 [0.195])	14 [0.55] (One side 7 [0.275])	18 [0.71] (One side 9 [0.355])
Continuous Positioning Accuracy		mm [in.]	±0.05 [±0.0020]		
Allowed Moment of Inertia (dynamic)	Mp	[in·lbf]	0.05 [0.44]	0.1 [0.89]	0.3 [2.66]
	My	[in·lbf]	0.03 [0.27]	0.1 0.89]	0.4 [3.54]
	Mr	[in·lbf]	0.06 [0.53]	0.2 [1.77]	0.8 [7.08]
Maximum Payload Capacity (one side)		[lbf]	0.2 (0.1) [0.44 (0.22)]	0.3 (0.15) [0.66 (0.33)]	0.4 (0.2)[0.88 (0.44)]
Weight		[lbf]	0.09 [0.20]	0.16 [0.35]	0.36 [0.79]
Compatible Controllers			EW2C-H-NP and EW2C-H-PN and EW2C-H-CC		

● Long stroke type

Specification		Model	EW2HL8	EW2HL18	EW2HL28
Motor			Brushless motor		
Maximum Speed (per side during positioning mode)		mm/s [in./sec.]	50 [1.97]		
Maximum Speed (per side during pickup mode) ^{Note}		mm/s [in./sec.]	20 [0.79]	30 [1.18]	20[0.79]
Minimum speed (per side)		mm/s [in./sec.]	5 [0.20]		
Maximum Gripping Force ^{Note}		N [lbf.]	8~16 [1.8~3.6]	18~33 [4.0~7.4]	28~50 [6.3~11.2]
Operating Temperature Range		°C [°F]	0 to 40 [32~104]		
Open/Close Stroke		mm [in.]	32 [1.26] (One side 16 [0.63])	42 [1.65] (One side 21 [0.83])	52 [2.05] (One side 26 [1.02])
Continuous Positioning Accuracy		mm [in.]	±0.05 [±0.0020]		
Allowed Moment of Inertia (dynamic)	Mp	[in·lbf]	0.05 [0.44]	0.1 [0.89]	0.3 [2.66]
	My	[in·lbf]	0.03 [0.27]	0.1 0.89]	0.4 [3.54]
	Mr	[in·lbf]	0.06 [0.53]	0.2 [1.77]	0.8 [7.08]
Maximum Payload Capacity (both sides)		[lbf]	0.2 (0.1) [0.44 (0.22)]	0.3 (0.15) [0.66 (0.33)]	0.4 (0.2)[0.88 (0.44)]
Weight		[lbf]	0.14 [0.31]	0.25 [0.55]	0.48 [1.06]
Compatible Controllers			EW2C-H-NP and EW2C-H-PN and EW2C-H-CC		

Note: Refer to the graph on page 50 for more information on gripping force and gripping speed.

6-2 Basic Specifications of the Controller

●Point Input Controller (NPN specification)

Specification	Model	EW2C-H-NP
Control Specifications	Motor Drive System	Pulse drive
	Control Method	Closed-loop control ^{Note}
	Operational Method	PTP, force control
	Home Position Detection Method	End of stroke detection
	Position Detection Method	Hall IC output
	Minimum Configurable Distance	0.05 mm [0.0020 in]
	Point Configuration	32 points
	Point Input Method	Numerical value input, teaching input, and direct teaching
	Point Configuration Input	5 inputs
	Control Input	3 inputs - ORG, START, and STOP
	Control Output	4 outputs - READY, BUSY, HOLD, and INPOS
	Error Detection Output	Overload, disconnections, data errors, and system errors
	Motor Drive Cable	Specialized motor drive output and Hall IC input cable (shielded F.G)
	Hall IC Cable	
RS485 Communication Protocol	External Communication	RS485, 1 ch (PC/teaching box communication) Supports daisy chain connections (up to a maximum of 16 daisy-chained devices)
	Communication Protocol	Half-duplex
	Synchronization Method	Start-stop synchronization method
	Communication Speed	115.2 kbps
	Parity Bit	Odd [0.045 lb.]
	Network Length	Total cable length of no more than 100 m
General Specifications	Communication Cable	Network cable (2-pair twisted pair cable)
	Weight	0.2 kg
	Power Supply	24 VDC±10% 1.6 A MAX (common power supply that includes RS485 communication)
	Power Indicator	PWR
	Operating Temperature Range	0 to 40 °C [32~104°F]
	Operating Humidity Range	35 to 85% RH (no condensation)
	Storage Temperature Range	-10 to 65°C [14~149°F]
	Backup	Settings and conditions are stored in EEPROM
	Noise Tolerance	IEC61000-4-4 Level 3
	Accessories	I/O cable and power cable

(Note) Detection of step out by Hall IC is performed.

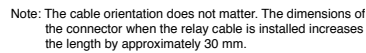
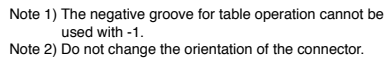
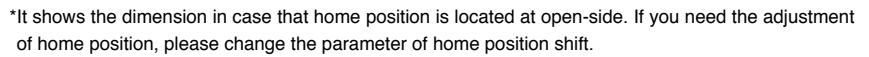
●Point Input Controller (PNP specification)

Specification	Model	EW2C-H-PN
Control Specifications	Motor Drive System	Pulse drive
	Control Method	Closed-loop control ^{Note}
	Operational Method	PTP, force control
	Home Position Detection Method	End of stroke detection
	Position Detection Method	Hall IC output
	Minimum Configurable Distance	0.05 mm [0.0020 in]
	Point Configuration	32 points
	Point Input Method	Numerical value input, teaching input, and direct teaching
	Point Configuration Input	5 inputs
	Control Input	3 inputs - ORG, START, and STOP
	Control Output	4 outputs - READY, BUSY, HOLD, and INPOS
	Error Detection Output	Overload, disconnections, data errors, and system errors
	Motor Drive Cable	Specialized motor drive output and Hall IC input cable (shielded F.G)
	Hall IC Cable	
RS485 Communication Protocol	External Communication	RS485, 1 ch (PC/teaching box communication) Supports daisy chain connections (up to a maximum of 16 daisy-chained devices)
	Communication Protocol	Half-duplex
	Synchronization Method	Start-stop synchronization method
	Communication Speed	115.2 kbps
	Parity Bit	Odd [0.045 lb.]
	Network Length	Total cable length of no more than 100 m
General Specifications	Communication Cable	Network cable (2-pair twisted pair cable)
	Weight	0.2 kg
	Power Supply	24 VDC±10% 1.6 A MAX (common power supply that includes RS485 communication)
	Power Indicator	PWR
	Operating Temperature Range	0 to 40 °C [32~104°F]
	Operating Humidity Range	35 to 85% RH (no condensation)
	Storage Temperature Range	-10 to 65°C [14~149°F]
	Backup	Settings and conditions are stored in EEPROM
	Noise Tolerance	IEC61000-4-4 Level 3
	Accessories	I/O cable and power cable

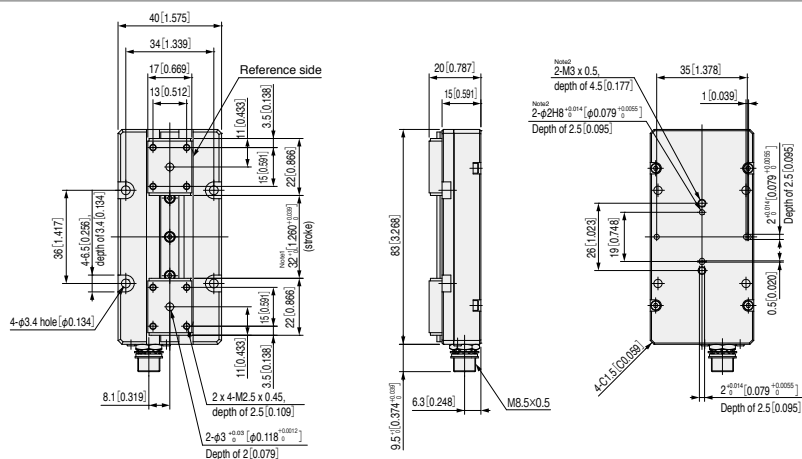
(Note) Detection of step out by Hall IC is performed.

●CC-Link Controllers

Specification		Model	EW2C-H-CC					
Control Specifications	Motor Drive System		Pulse drive					
	Control Method		Closed-loop control					
	Operational Method		PTP, force control					
	Home Position Detection Method		End of stroke detection					
	Position Detection Method		Hall IC output					
	Minimum Configurable Distance		0.05 mm [0.0020 in]					
	Point Configuration		32 points					
	Point Input Method		Numerical value input, teaching input, and direct teaching					
	Point Configuration Input		5 inputs					
	Control Input		3 inputs - ORG, START, and STOP					
	Control Output		4 outputs - READY, BUSY, HOLD, and INPOS					
	Error Detection Output		Overload, disconnections, data errors, and system errors					
	Motor Drive Cable		Specialized motor drive output and Hall IC input cable (shielded F.G)					
	Hall IC Cable							
RS485 Communication Protocol	External Communication		RS485 1 ch (PC/teaching box communication) Supports daisy chain connections (up to a maximum of 16 daisy-chained devices)					
	Communication Protocol		Half-duplex					
	Synchronization Method		Start-stop synchronization method					
	Communication Speed		115.2 kbps					
	Parity Bit		Odd					
	Network Length		Total cable length of no more than 100 m					
	Communication Cable		Network cable (2-pair twisted pair cable)					
General Specifications	Weight		0.2 kg [0.045 lb.]					
	Power Supply		24 VDC \pm 10% 1.6 A MAX (common power supply that includes CC-Link and RS485 communication)					
	Power Indicator		PWR					
	Operating Temperature Range		0 to 40 °C [32~104°F]					
	Operating Humidity Range		35 to 85% RH (no condensation)					
	Storage Temperature Range		-10 to 65°C [14~149°F]					
	Backup		Settings and conditions are stored in EEPROM					
	Noise Tolerance		IEC61000-4-4 Level 3					
	Accessories		CC-Link connector and power cable					
CC-Link Communication Specifications	Version		Ver. 1.10					
	Communication Protocol		Broadcast polling					
	Synchronization Method		Frame synchronization					
	Topology		Bus (EIA RS485-compliant)					
	Communication Speed		156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps, and 10 Mbps - Rotary switch used to select the speed					
	Number of Nodes		1 remote I/O node					
	Node Configuration		1 - 64, Rotary switches used to select number					
	CLEAR/HOLD		DIP switch used for selection CLEAR: Clears all data other than the controller connection setting when CC-Link errors occur HOLD: Retains the previous state when CC-Link communication errors occur					
	Indicators		PW, L RUN, SD, RD, L ERR (LED: Red)					
	Maximum Network Distance	Communication speed bps	156 k	625 k	2.5 M	5 M	10 M	
		Maximum length of cable m[ft]	1200 [3937]	900 [2953]	400 [1312]	160 [525]	100 [328]	
	Communication Cable		Ver. 1.10 CC-Link cable					
	Terminating Resistor		110 Ω when using Ver 1.10 CC-Link cable					



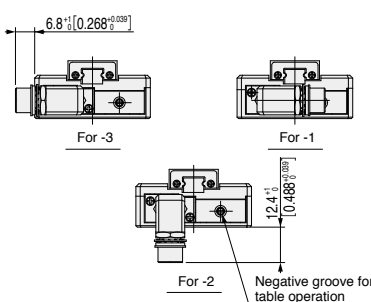
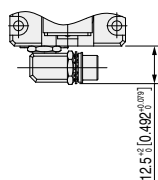
EW2HL8



Note 1 *It shows the dimension in case that home position is located at open-side. If you need the adjustment of home position, please change the parameter of home position shift.

Note 2 Direct mounting is possible with our auto hand changer MJB34T.

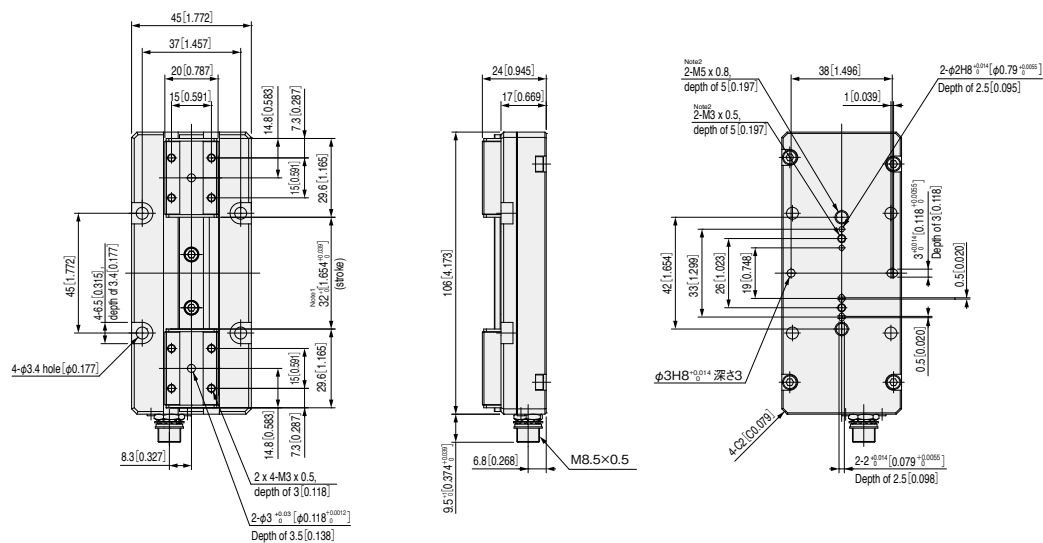
ケーブル方向：1,2,3の場合



Note 1) The negative groove for table operation cannot be

Note 2) Do not change the orientation of the connector.

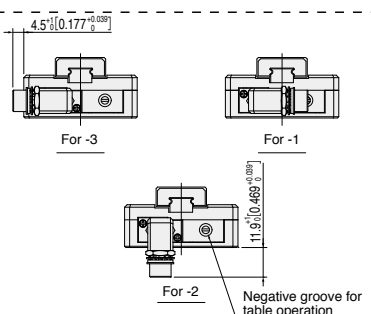
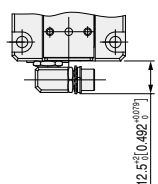
EW2HL18



Note1 *It shows the dimension in case that home position is located at open-side. If you need the adjustment of home position, please change the parameter of home position shift.

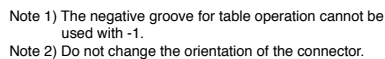
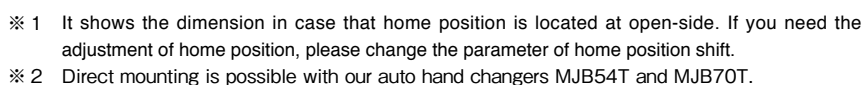
※ 2 Direct mounting is possible with our auto hand changers MJB34T and MJB54T.

ケーブル方向：1,2,3の場合





Note 1) The negative groove for table operation cannot be used with -1.

Note 2) Do not change the orientation of the connector.



7-2 Controller

(point input controller)

EW2C-H-  - **DIN rail mounting plate**

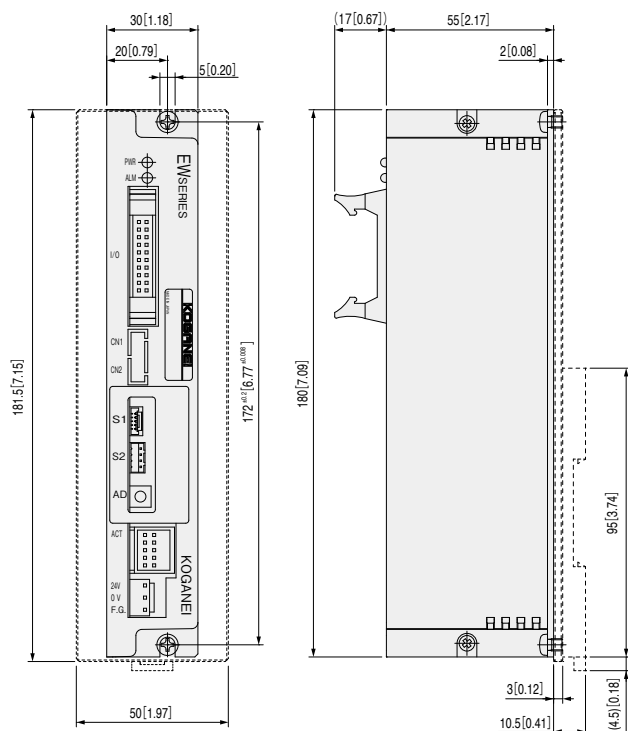
Blank : without

DP : with DIN rail mounting plate

Controller type


NP : Point input type (NPN specification)

PN : Point input type (PNP specification)



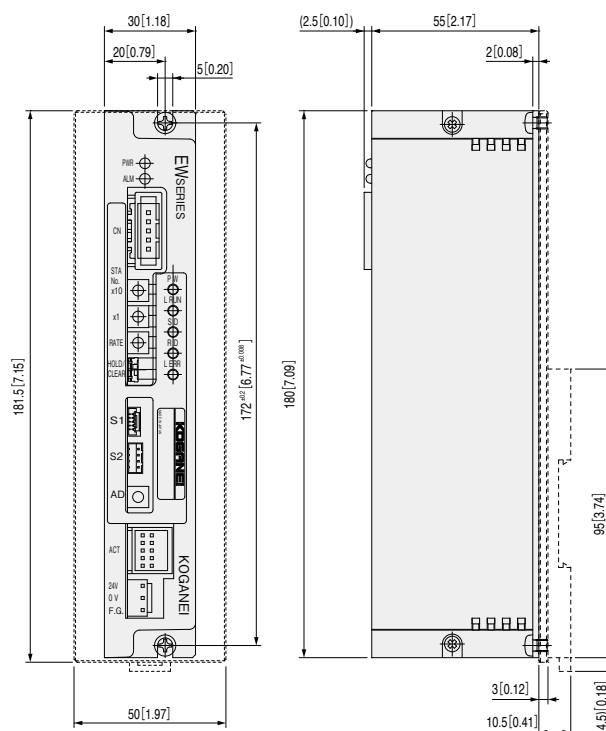
※ Broken line shows the dimension of DIN rail mounting plate.

(CC-Link controller)

EW2C-H-CC- **DIN rail mounting plate**

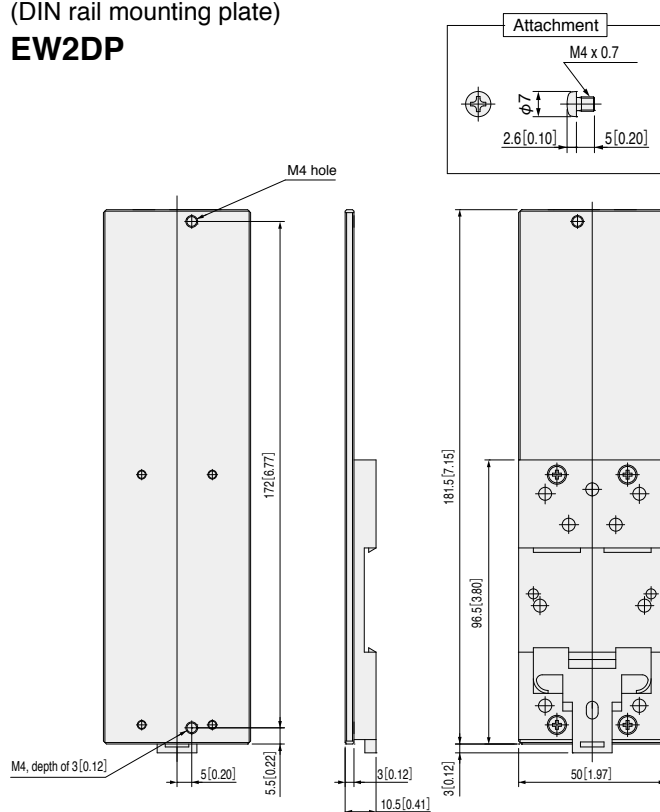
Blank : without

DP : with DIN rail mounting plate

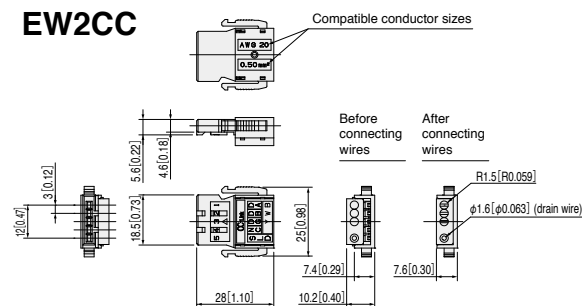


※ Broken line shows the dimension of DIN rail mounting plate.

(DIN rail mounting plate)

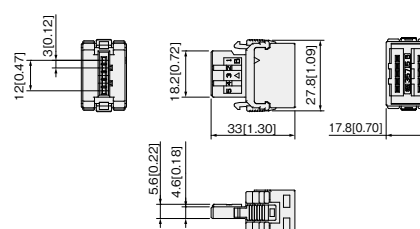
EW2DP

(CC-Link connector)

EW2CC

*This connector is compatible with CC-Link cables.

(Branch connector for CC-Link)

EW2CY

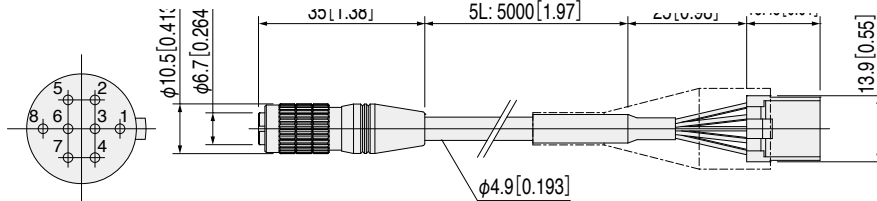
※ This connector is a CC-Link communication connector
It conforms to (Format: EW2CC).

7-3 Additional Parts

· Relay

EW2KA-

3L: 3 m [118 in]
5L: 5 m [197 in]



Pin Assignment

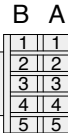
Main unit connector

NO.	Name	Color
1	U	Green
2	V	Brown
3	W	Yellow
4	Vcc	Orange
5	HU	White
6	HV	Red
7	HW	Black
8	GND	Blue

Controller connector

NO.	Name	Color
A1	U	Green
B1	V	Brown
A2	W	Yellow
B2	FG	White
A3	Vcc	Orange
B3	GND	Blue
A4	HU	White
B4	HV	Red
A5	HW	Black
B5	N.C.	-

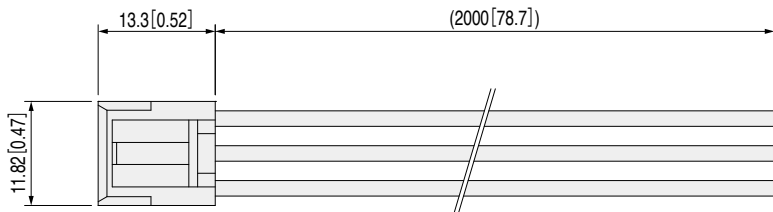
Cable shield



Pin Assignment

· Power

EW2KP



Power Connector
Pin Assignment

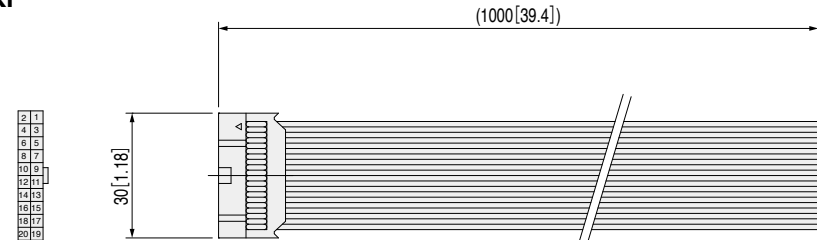
NO.	Name	Color
1	24 V	Red
2	GND	Blue
3	F.G.	Green



Pin Assignment

· I/O

EW2KI



Pin Assignment

I/O Connector Pin Assignment

NO.	Name	Color
1	POS0	Brown
2	POS1	Red
3	POS2	Orange
4	POS3	Yellow
5	POS4	Green
6	START	Blue
7	STOP	Purple
8	ORG	Gray
9	RDY	White
10	BUSY	Black
11	INPOS	Brown
12	HOLD	Red
13	24G IN	Orange
14	N.C.	Yellow
15	24G	Green
16	24 V IN	Blue
17	N.C.	Purple
18	24 V	Gray
19	F.G.	White
20	F.G.	Black

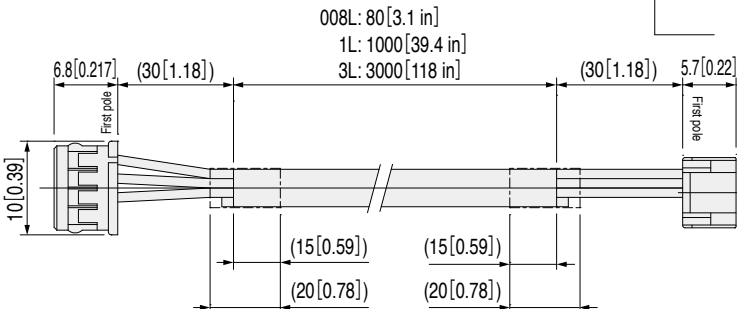
· Daisy chain

EW2KD-

008L: 80 mm [3.1 in]
1L: 1 m [39.4 in]
3L: 3 m [118 in]

Connector Pin
Assignment (Upstream from
controller)

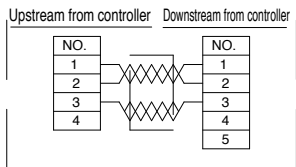
NO.	Name	Color
1	A	Brown
2	B	Blue
3	GND	Black
4		



Connector Pin
Assignment (Downstream from
controller)

NO.	Name	Color
1	A	Brown
2	B	Blue
3	GND	Black
4		
5		

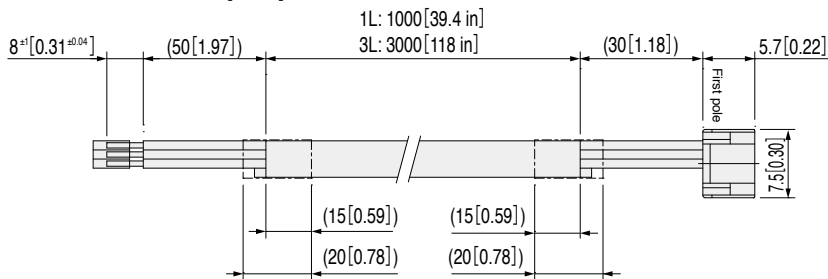
Cable Wiring Table



· Communication

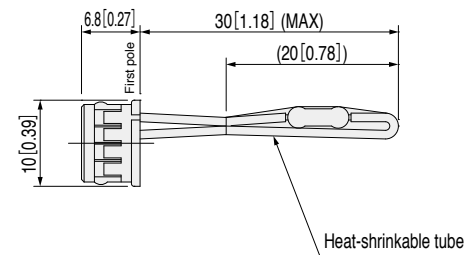
EW2KN-

1L: 1 m [39.4 in]
3L: 3 m [118 in]



· Terminating resistor

EW2FR

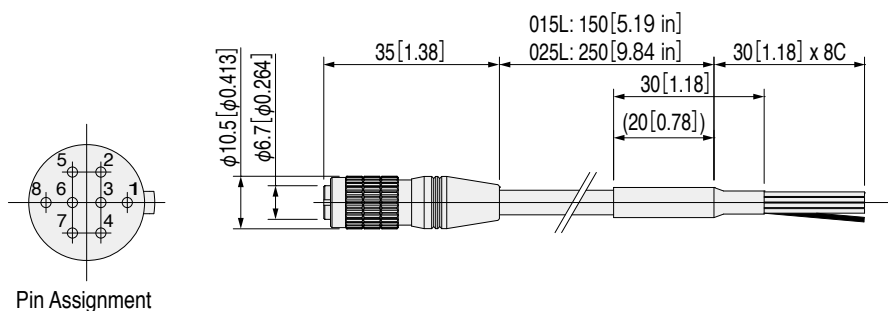


· Main unit relay (stranded wire)*

EW2KBA-

015L: 150 mm [5.91 in]
025L: 250 mm [9.84 in]

Main unit side



Main unit connector

NO.	Name	Color
1	U	Green
2	V	Brown
3	W	Yellow
4	Vcc	Orange
5	HU	White
6	HV	Red
7	HW	Black
8	GND	Blue

Cable shield

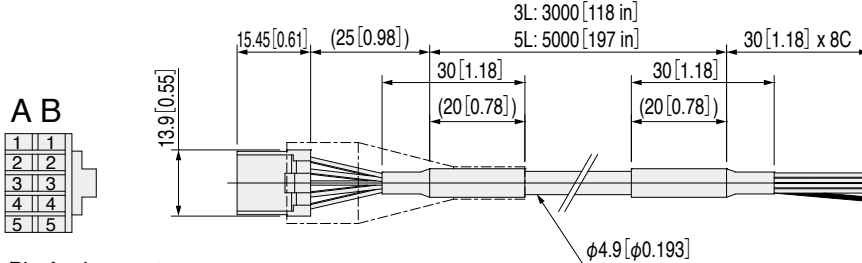
Cable Wiring Table

· Controller relay (stranded wire)*

EW2KBB-

3L: 3 m
5L: 5 m

Controller side



Controller connector

NO.	Name	Color
A1	U	Green
B1	V	Brown
A2	W	Yellow
B2	FG	Shield
A3	Vcc	Orange
B3	GND	Blue
A4	HU	White
B4	HV	Red
A5	HW	Black
B5	N.C.	-

Cable shield

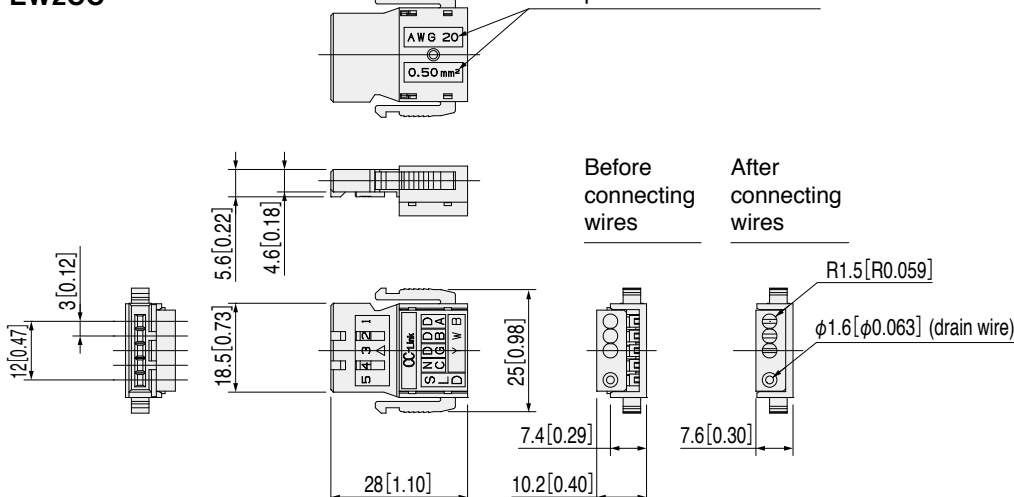
Cable Wiring Table

*MJB Auto Hand Changer wiring

· CC-Link connector

EW2CC

Compatible conductor sizes



Locating dowel pin

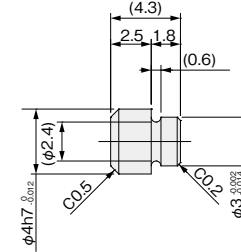
EW2P - 

Size

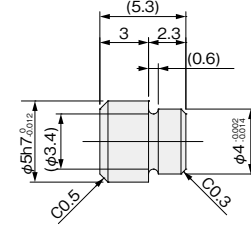
3 : $\phi 3$ (For EW2□8, EW2□18)

4 : $\phi 4$ (For EW2□28)


EW2P-3



EW2P-4



Adapter

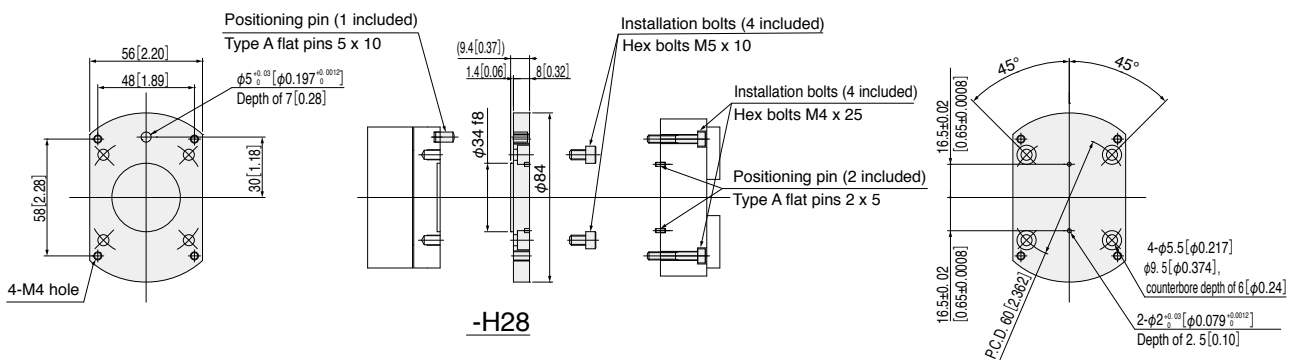
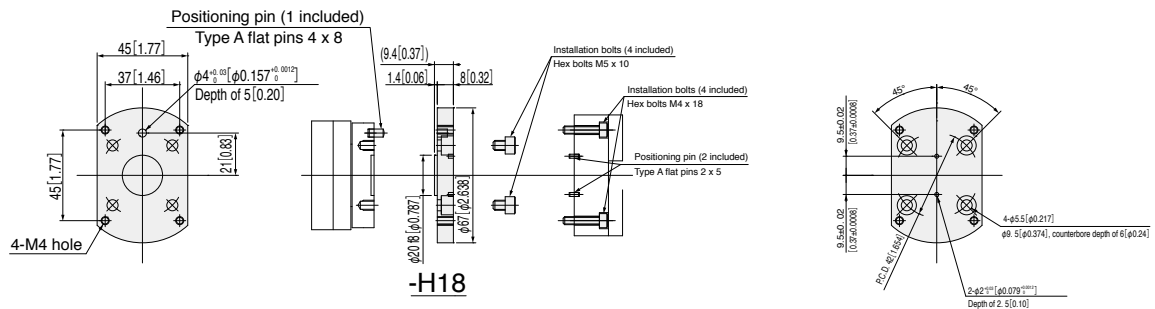
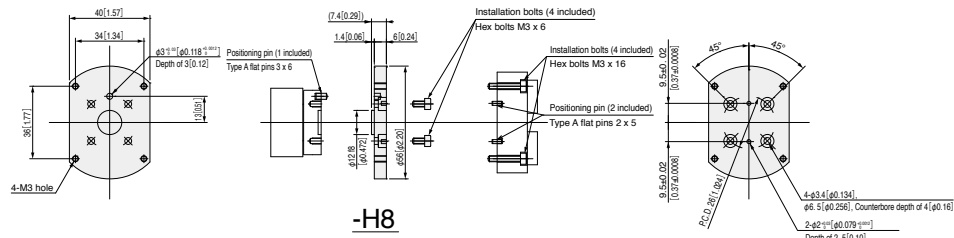
EW2A-H- 

Size (gripping force)

8 : 8 N (CPL□34□) [1.8 lbf]

18 : 18 N (CPL□54□) [4.0 lbf]

28 : 28 N (CPL□70□) [6.3 lbf]



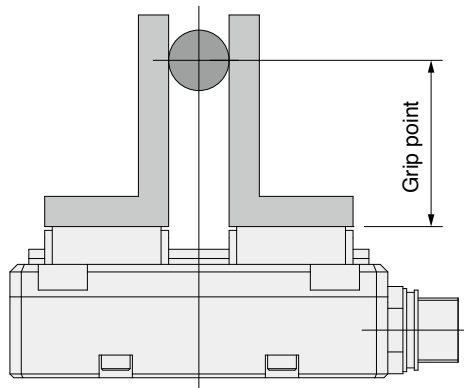
Tightening torque

Workpiece installation

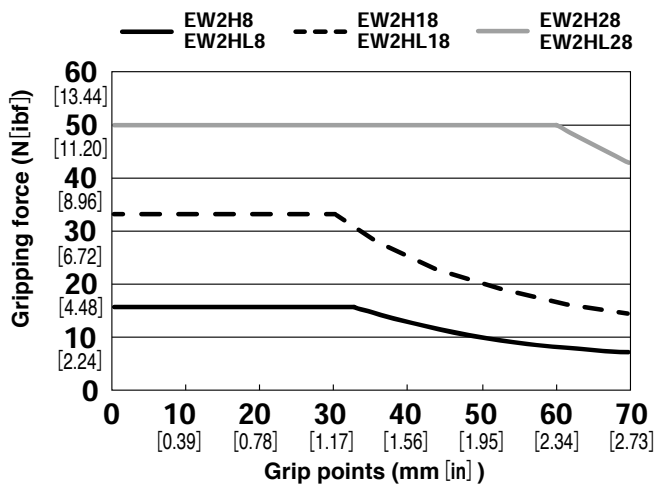
Used bolt	Maximum tightening torque (N·m)
M3 × 0.5	0.63
M4 × 0.5	1.5
M5 × 0.8	3

Chapter 8 Technical Data

8-1 Limits on Gripping Force at Grip Points

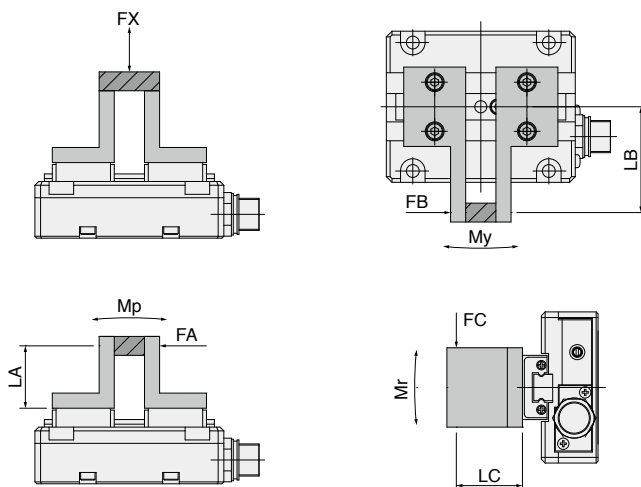


●Grip point and gripping force graph



*This graph represents the maximum gripping force used for each size corresponding to grip points. Set grip points so that gripping force is not more than the allowed moment of inertia (Mp).

8-2 Load Capacity and Allowed Moment of Inertia



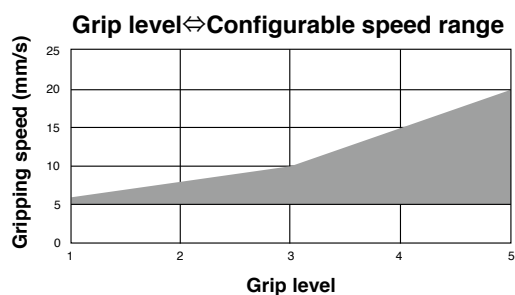
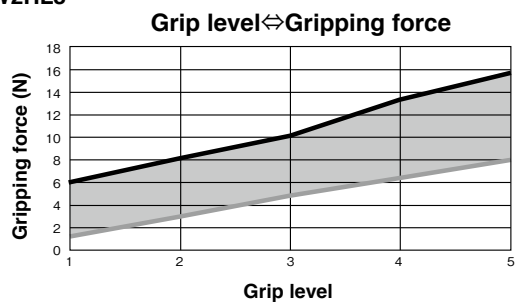
- $M_p = F_A \times L_A$ (N·m) [lbf·in]
- $M_y = F_B \times L_B$ (N·m) [lbf·in]
- $M_r = F_C \times L_C$ (N·m) [lbf·in]

[Smart Model]

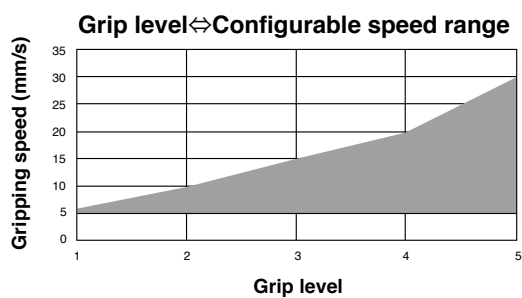
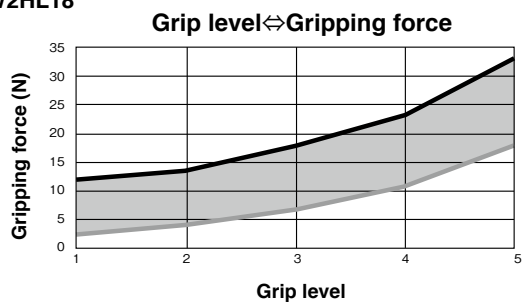
Model	FX N [lbf]	Mp N·m [lbf·in]	My N·m [lbf·in]	Mr N·m [lbf·in]
EW2H□8	40 [9.0]	0.51 [4.51]	0.3 [2.65]	0.6 [5.30]
EW2H□18	120 [27.0]	1.0 [8.84]	1.0 [8.84]	2.0 [17.68]
EW2H□28	190 [42.7]	3.0 [26.51]	4.0 [35.35]	8.0 [70.70]

8-3 Gripping Force Specifications

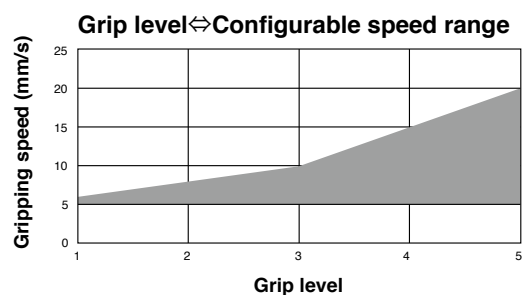
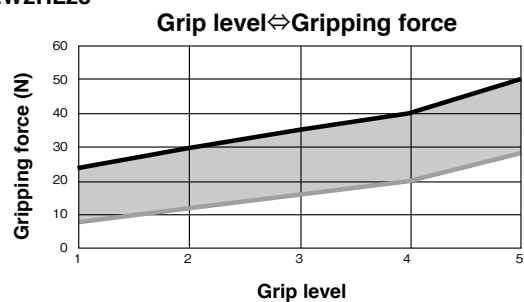
EW2H8
EW2HL8



EW2H18
EW2HL18



EW2H28
EW2HL28



Force is generated with in the range shown in the above graph according to the grip level.
The speed range that can be set changes according to the grip level.

*These gripping state graphs are approximations.

Contact the Technical Service Center below
if you have any concerns or technical questions.

Contact Info

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Elewave Series
Flat Type Electric Hand

With Point Input Controller

With CC-Link Controller

Operating Instructions

July 2019 Ver. 2.0 X435177

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Koganei Corporation

Overseas Department

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