

KOGANEI



ELEWAVE SERIES
Electric Rotary Actuators
Point input type controller

OWNER'S MANUAL Ver. 3.0

[Main Units]

EWHRT1A

EWHRT3A

EWHRT5A

EWHRT10A

EWHRT20A

EWHRT40A

EWHRT60A

[Controllers]

EWHC-RS

EWHC-RA

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Chapter 1 Safety Precautions

Thank you for purchasing the Elewave Series Rotary Actuator.

This owner's manual describes the features of and how to operate this product.

Please read the manual carefully and use the product in a correct manner.

1-1 Safety

Always observe the safety instructions and precautions listed in this manual. Neglect of necessary safety measures or improper handling could result in product breakdown or damage, or in accidents that lead to injury to the users (people who set up, operate, or adjust and check, etc.).

1-2 Precautions

(1) Precaution for automatic operations

- To prevent injury, install an interlock device to prevent the operator from touching the moving parts of the rotary actuator.

(2) Precaution against pinched fingers, etc.

- Be careful to prevent fingers, etc., from being pinched by the rotary actuator's moving parts during transportation, teaching, or operation.

(3) Operation not allowed in ambient atmospheres containing flammable gases, etc.

- The rotary actuator is not built to explosion-proof specifications. Do not use in ambient atmospheres containing flammable gases, flammable dust, or flammable liquids, etc. It could result in ignitions or explosions.

(4) Operation not allowed in locations subject to electromagnetic interference, etc.

- Do not use in locations subject to electromagnetic interference, static electric discharge, or radio frequency interference. It could result in erratic operations.

(5) Precautions for controller checks

- To prevent electric shock when touching the outside terminal and connector of the controller during controller checks, etc., always switch off the controller power and turn off the power supply.
- Never touch the inside of the controller.

(6) Response to a damaged or defective rotary actuator

- If any of the damage or defects listed below have occurred, continuing use of the rotary actuator is dangerous. Immediately stop operation and contact us.

Description of damage or defect	Types of danger
Damage to machine harness or motor wiring	Electric shock or erratic operation by rotary actuator
Damage to exterior covering of rotary actuator	Damaged parts could be thrown off while the rotary actuator is operating
Abnormal operation of rotary actuator (such as skewed positioning or vibrations)	Erratic operation by rotary actuator

(7) Be careful to not touch hot parts of the motor or controller

- The motor and controller will be very hot in some areas after automatic operations, and touching those areas may cause burns. For checks, etc., first cut the power to the controller, wait for the areas to cool down, confirm the cooled temperature, and then handle those areas.

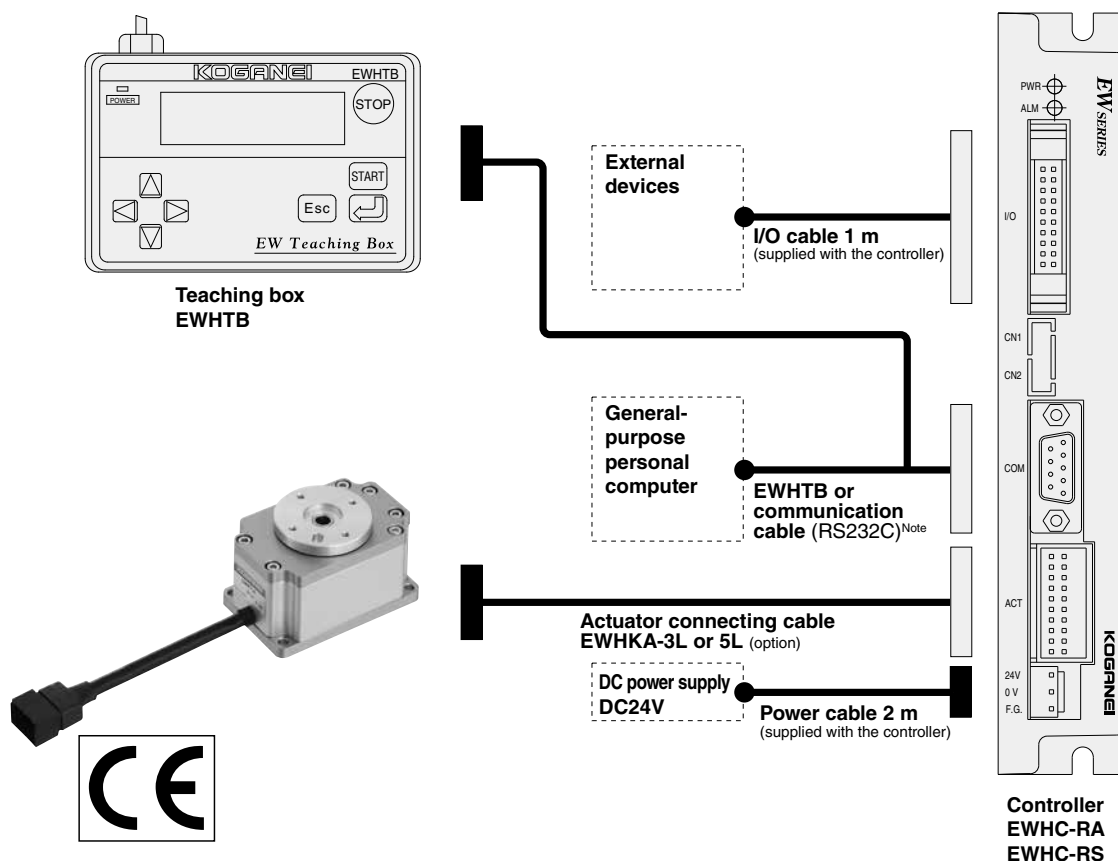
(8) Protective grounding

- Always ground the controller to protect it against electric shock.

Chapter 2 System Configuration

2-1 Entire system configuration

The rotary actuator consists of the following major components.



Note: RS232C cable (reference)

Specifications: D-sub 9-pin female ↔ D-sub 9-pin female, cross cable

Model : C232R-ECO915 (1.5m)/C232R-ECO930 (3.0m)

Manufacturer : Elecom

The communication cable must be prepared by the customer.

2-2 Options and accessories

- When Option -C (with controller) is selected, the controller and the following accessories are included in the package. Please confirm at time of purchase.

Controller models:

EWHC-RS when using EWHRT1A-C

EWHC-RA when using EWHRT3A-C, 5A-C, 10A-C, 20A-C, 40A-C, 60A-C

Power cable (1 pc.)

I/O cable (1 pc.)

- When Option -3L or -5L (the cable connecting the rotary actuator main unit and the controller) is selected, the cable (-3L : cable length 3 m, -5L : cable length 5 m) is included in the package. Please confirm at time of purchase.

2-3 Setting up for operation

	Procedure	Reference section
Installation and connection	Installation	3-2 4-2
	↓	
	Connections	Connect the power supply, controller, actuator, and personal computer or teaching box. 4-1 4-2
	↓	
	Turning on the power	4-2
	↓	
Settings	Setting the actuator number	Set the specified actuator number. ^{Note} 4-4
	↓	
	Changing parameters	Configure parameter data in accordance with your usage conditions. 4-7
	↓	
	Point data input	Enter point data suitable for the operation. 4-5
	↓	
Operations	Test operations	Check that it operates normally. 4-3
	↓	
	Operations	Use the set point commands and START signal to run the desired operation. For continuous operations, use a programmable controller or other external devices to control operations. 4-3

Note: When you purchase the actuator and controller as a set, the controller's actuator number is set to the specified actuator number at the time of shipping.

Model	Actuator No.
EWHRT1A	50
EWHRT3A	61
EWHRT5A	62
EWHRT10A	63
EWHRT20A	64
EWHRT40A	65
EWHRT60A	66

*Be sure to set the actuator number for the connected model of actuator.

Chapter 3 Main Unit

3-1 Handling the main unit

3-1-1 Precautions

- (1) Do not apply repeated bending or tensile force to the lead wires. Moreover, never carry the main unit by the lead wires. Applying repeated bending stress or tension force to the lead wire could result in wire breakage.
- (2) Be sure that the inertial moment of the workpiece is less than the maximum load inertia. Exceeding the allowed value could cause defective operation, damage to parts, or shortened service life.
- (3) When using the product with the table mounted perpendicularly, design the workpiece so the applied load torque is as low as possible.

If a load torque is applied, keep it below 60% of the maximum torque of the actuator.

[Caution] Set the speed to under the following limits if a load torque is applied.

Load factor (%)	20	40	60
Speed setting (%)	50 or less	33 or less	25 or less

$$\text{Load factor} = \frac{\text{Load torque}}{\text{Maximum torque}} \times 100 (\%)$$

- (4) Use at 50% duty or less.

$$\text{Duty} = \frac{\text{Operating time}}{\text{Operating time} + \text{Idle time}} \times 100 (\%)$$

- (5) Do not apply excessive force to the cover on the side of the main unit. Doing so could cause defective operation or damage to parts.
- (6) On the no-brake type (standard specifications), the table moves freely when the power is turned off. If the table needs to be anchored, select a type with a brake in the option selections or design an external stopper to anchor the table. Note that the EWHRT1A has no brake.

3-2 Mounting

3-2-1 Mounting the main unit

- (1) The mounting surface must be flat. Twisting or bending during the mounting could result in defective operation or degraded performance.
- (2) Avoid scratching or denting the mounting surface of the main unit, because doing so could cause a detrimental effect on levelness.
- (3) Use the through holes on the bottom face to secure the main unit.

3-2-2 Mounting a workpiece

- (1) When mounting the workpiece, always use bolts that are shorter than the thread depth. Using screws longer than the thread depth could interfere with the main unit and prevent normal operation.
- (2) Tighten the screws for mounting the workpiece within the allowable torque range.

Main unit type	Mounting position	Screw size	Thread depth (mm)	Maximum tightening torque (N•m)
EWHRT1A	Mounting a workpiece	M3	6.5	0.63
EWHRT3A, 5A, 10A, 20A	Mounting a workpiece	M4	6	1.50
EWHRT40A, 60A	Mounting a workpiece	M5	9	3.00

[Caution] Hold the table or workpiece when securing the workpiece to the table with bolts.

- (3) The origin position on the table should be at the position of the marking on the side of the table indicated in the drawing. Confirm the position of the mark before mounting the workpiece. However, there may be a misalignment in the positions of the mounting holes and the origin position, so do a return to origin to adjust the origin position after mounting the work.

Chapter 4 Controller

4-1 Appearance and functions

① POWER LED

Lights when the power supply is turned on.

② ALARM LED

Shows the state of the controller.

(See the table below on the right)

③ I/O connector

Use the supplied I/O cable for connecting to sensor switches or an external programmable controller, etc.

④ COM connector

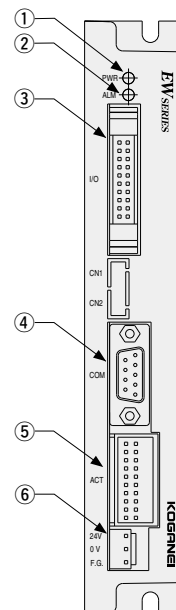
This is the connector for connecting to the RS-232C terminal on a personal computer, or the teaching box, etc.

⑤ ACT connector

This is the connector for connecting to the main unit.

⑥ Power connector

Connects the supplied power cable to supply 24 VDC.



4-2 Installation and connection to external devices

Description	ALARM LED state
Alarm occurs	Lights
Error occurs	Quick blinking (ON: 0.25 s, OFF: 0.25 s)
Origin return not completed	Slow blinking (ON: 0.5 s, OFF: 1.5 s)
Normal	Not lit

4-2-1 Controller installation

1. Installation method

Use M4 screws in the 5-mm U-grooves on the back of the controller to secure it to a rack that has good thermal conductivity.

(2) Installation environment

- Install the controller in a location with an ambient temperature of 0 to 40°C, humidity of 35 to 85%, and no condensation.
- Install the controller so there is adequate space around it (20 mm or more) with good ventilation.
- Avoid installations in locations subject to corrosive gases, such as sulfuric acid or hydrochloric acid, as well as ambient atmospheres containing flammable gases or liquids, etc.
- Install the controller where there is little dust or dirt.
- Avoid installations in locations subject to metal chips, oil, or water from other equipment.
- Avoid installations in locations subject to electromagnetic or electrostatic noises.
- Install the controller in a location that is free from large vibrations.

4-2-2 Connecting the power supply

(1) Power supply

- Connect the power cable to a power supply with a capacity of 24 VDC $\pm 10\%$, with and 1.6 A or higher for EWHC-RA and 0.6 A or higher for EWHC-RS.
- Connector: B3PS-VH (JST Mfg. Co., Ltd.)

Connector pin number table

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

Caution:

- **Supply of an unstable power voltage to the controller will cause alarm shutdowns or abnormal operation. Use adequate care, therefore, in selecting a 24-V power supply. Ensure as stable a power supply as possible.**

(2) How to connect the power supply

- Use the supplied power cable to connect to the power supply. Connect the polarity correctly to prevent mis-wiring. Wrong connections could result in fire or other dangerous conditions.

Caution:

- **The EWHC-RA and EWHC-RH controllers do not have a power switch or an emergency stop function. Always install an appropriate power cut-off (isolator) device for the overall system of equipment.**

Danger:

- **Before wiring to the controller, always turn off the power to the overall system of equipment to avoid the danger of electric shock.**
There is a risk of electric shock.

(3) Insulation resistance/Dielectric strength test

Never conduct an insulation resistance test or dielectric strength test on the controller.

4-2-3 Grounding work

- Always ground the equipment to prevent electric shock to people if there is electric leakage and to prevent erratic operation due to electrical noise.
- We strongly recommend type D grounding (grounding resistance of 100 Ω or less) or better.
- Use the F.G. wire of the power cable, for the ground terminal of the controller.

4-2-4 Connecting the communication unit

- The **EWHC-RA and EWHC-RS** can be connected to equipment, such as a personal computer, that has an RS-232C interface.
- To connect to a personal computer, connect the RS-232C connector (9 pins) of the dedicated cable to the controller's connector.

4-2-5 Connecting to the actuator

Connect the actuator connecting cable to the ACT connector on the front of the controller. Turn off the power supply before performing the connection. Be sure that the actuator connecting cable is firmly inserted into the connector.

Position used	Part name	Model
Connector (main unit side)	Header	1376137-1 (Made by Amp)
Socket (cable side)	Socket	1-1318118-9 (Made by Amp)
Housing contact	Connector	1318107-1 (Made by Amp)

No.	Signal name	Description	No.	Signal name	Description
A1	A+	Motor output A+	B1	B+	Motor output B+
A2	A-	Motor output A-	B2	B-	Motor output B-
A3	F.G.	Frame ground	B3	BRK	Brake signal
A4	COM1 (24V)	COM 24V	B4	COM2 (24V)	COM 24V
A5	N.C.	N.C.	B5	N.C.	N.C.
A6	F.G.	Frame ground	B6	GND 5V	Ground (5V)
A7	DV+	Encoder power supply+	B7	DV-(GND 5V)	Encoder power supply-
A8	EA+	Encoder signal A+	B8	EA-	Encoder signal A-
A9	EB+	Encoder signal B+	B9	EB-	Encoder signal B-
A10	EC+	Encoder signal C+	B10	EC-	Encoder signal C-

4-2-6 Connecting the I/O connector

Connect the I/O connector to a programmable controller or other external device.

4-3 I/O interface

4-3-1 I/O connector signal table

No.	Wire color	Signal name	Description	No.	Wire color	Signal name	Description
01	Brown	POS0	Point setting	02	Red	POS1	Point setting
03	Orange	POS2	Point setting	04	Yellow	POS3	Point setting
05	Green	POS4	Point setting	06	Blue	START	Start signal
07	Purple	STOP	Stop signal	08	Gray	ORG	Return to origin signal
09	White	RDY	Preparation completed output	10	Black	BUSY	Command execution in progress output
11	Brown	INPOS	Positioning completed output	12	Red	N.C.	Not connected
13	Orange	24G	- common	14	Yellow	24G	- common
15	Green	24V GND	Ground	16	Blue	24V IN	24-V input
17	Purple	POS5	Point setting	18	Gray	24V	+24V
19	White	F.G.	Frame ground	20	Black	F.G.	Frame ground

4-3-2 Details of input signals

There are 9 dedicated command inputs as input signals.

○Dedicated command inputs

Dedicated command inputs are inputs to control from an external device, such as a programmable controller. To accept the START and ORG inputs, the READY and BUSY signals must meet the following conditions.

- READY output : ON
- BUSY output : OFF
- STOP input : OFF

The START and ORG inputs are accepted when the OFF state is switched to the ON state (the moment when the contact closes).

Whether the controller has accepted the command or not can be confirmed by monitoring the BUSY output.

■ START

From the current position, the tooling moves by the data of the point no. specified from POS0 to POS5.

Caution:

To execute START, it is necessary to confirm the entry states of POS0 to POS5.

■ ORG

Executes return to origin in the direction of the origin return specified in the parameters.

■ STOP

This is an input to stop the actuator's movement temporarily.

Turning this input ON (closing the contact) while the actuator is operating, or while it is executing return to origin, stops the actuator's movement. While this is in the ON state (the contact is in a closed state), no dedicated command from I/O, no program from a personal computer, and no return to origin command can be executed.

■ POS0 to POS5

These are inputs for connecting to output circuits of the programmable controller or other devices, and for specifying the point no.

Examples of point specification

Point No. \ POS No.	POS5 (2 ⁵)	POS4 (2 ⁴)	POS3 (2 ³)	POS2 (2 ²)	POS1 (2 ¹)	POS0 (2 ⁰)
P0	OFF	OFF	OFF	OFF	OFF	OFF
P1	OFF	OFF	OFF	OFF	OFF	ON
P3	OFF	OFF	OFF	OFF	ON	ON
P7	OFF	OFF	OFF	ON	ON	ON
P15	OFF	OFF	ON	ON	ON	ON
P31	OFF	ON	ON	ON	ON	ON
P63	ON	ON	ON	ON	ON	ON

4-3-3 Details of output signals

There are 3 output signals: READY, BUSY, and INPOS.

ON and OFF refer to the turning on and off of the output transistor.

○Dedicated outputs

These outputs are for signal interaction with a programmable controller, etc.

■ Preparation complete output (READY)

When the controller system is operating normally, this output is set to ON. If an alarm is issued, this output is set to OFF and the motor enters a free state. Note that in these cases, the controller's power must be turned off to restart operations.

■ Command execution in progress output (BUSY)

This signal is set to ON when a dedicated command is being executed or when a command from a personal computer is being executed. This signal is ON whenever a dedicated command input is accepted. As a result, when the BUSY signal is ON, the controller cannot accept other dedicated command inputs or commands from a personal computer.

Caution:

Always turn off dedicated commands when BUSY is ON. Leaving input ON prevents BUSY from switching to OFF, even after completing execution of a command.

■ Positioning operation complete output (INPOS)

When a custom command input is accepted, this signal temporarily turns OFF, and comes ON when the positioning operation execution process has been completed normally. If an error occurs during execution, or if STOP has been input, the signal remains unchanged in the OFF state.

4-3-4 Input/output circuits

This section provides the specifications for the input/output circuits and example connections. Refer to this example when connecting to the programmable controller or other external equipment.

(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 : ON current Min. 3 mA

OFF current Max. 1 mA

○Output circuit

Isolation method: Photocoupler isolation between internal circuits and output transistor

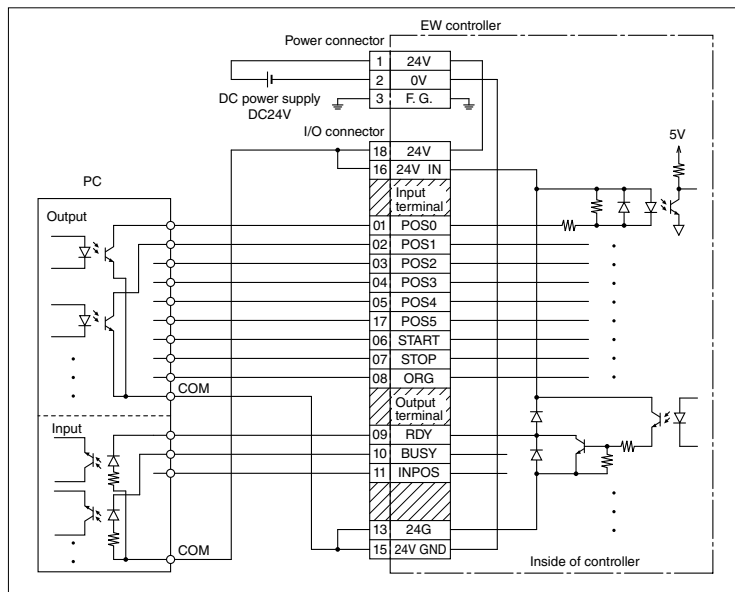
Output terminals: NPN open collector output for all output common terminals (0V side)

Output response: 1 ms or less

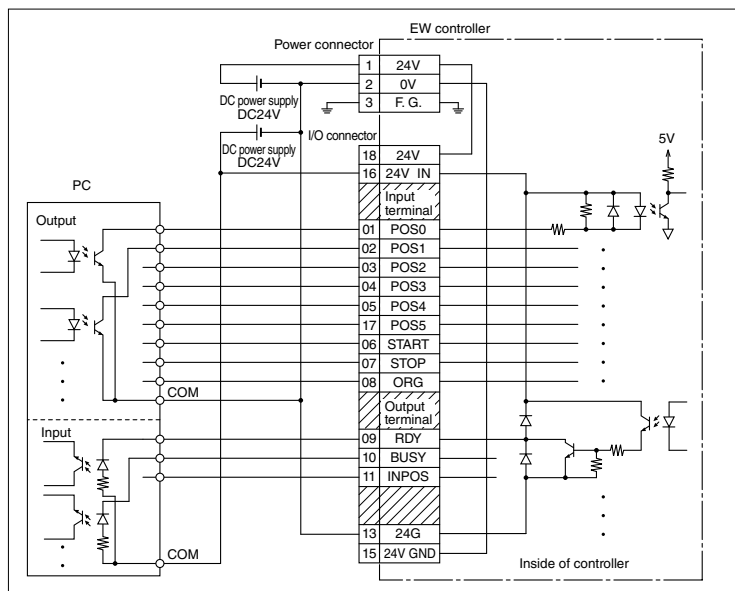
Maximum output current: 30 mA/24 VDC per 1 output

Residual ON voltage : 1.5 V or less

(2) Wiring system when using the controller's internal power supply



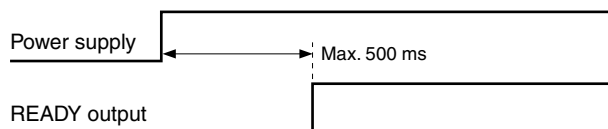
(3) Wiring method when a separate power supply is used without using the controller's internal power supply



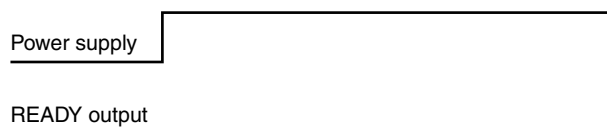
4-3-5 Timing chart

(1) When the power is turned on

Normal condition



Alarmed condition



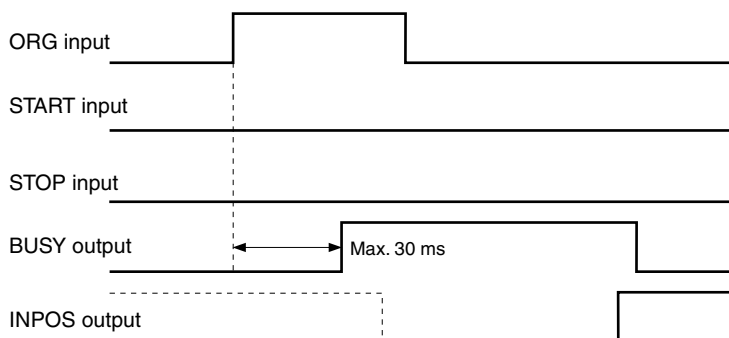
Before inputting a dedicated command, check that the READY output is turned ON after the power has been supplied.

If READY output is OFF, even after the specified time has elapsed after the power is turned on, it means that an alarm has occurred.

(2) Execution of custom command

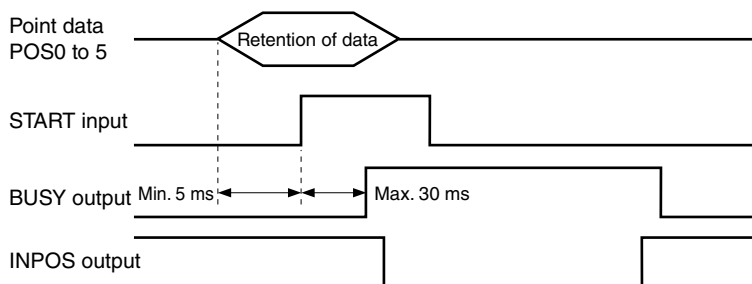
- When a dedicated command is received, the BUSY output turns ON. Whether the BUSY output turns off determines whether the command has ended normally.
- Always use pulse inputs for dedicated commands. Leaving input ON prevents BUSY output from turning OFF even after execution of a command has been completed.

1. When returning to origin



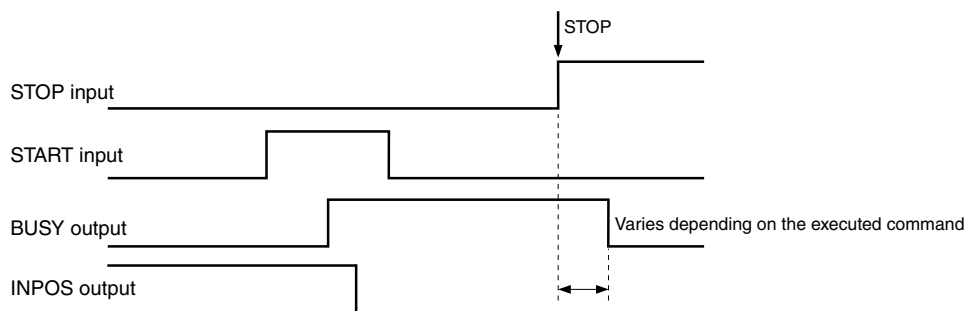
- ① After ORG input is turned ON, the BUSY output is turned ON.
- ② After confirming that BUSY output has turned ON, the ORG input is turned OFF (contact is opened).
- ③ Waits until BUSY output is turned OFF.
- ④ When BUSY output is turned OFF, INPOS output is ON, and this means that the operation has ended normally.

2. In positioning mode



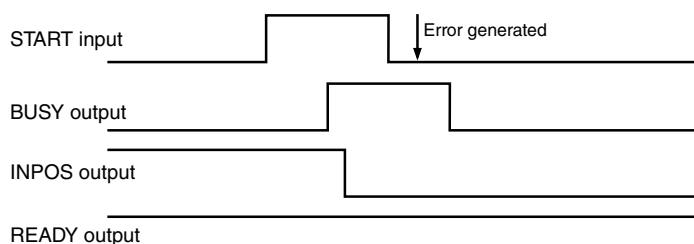
- ① Input point data in POS0 to POS5. Maintain this input state until BUSY output turns ON.
(Changing the input state too early could cause mis-recognition of data.)
- ② Introduce a delay of at least 5ms, and then input START input.
- ③ At the rise of a custom command input, INPOS output turns OFF, and BUSY output turns ON.
- ④ Check that BUSY output is ON, and then set the dedicated command input to OFF (open the contact).
After this, the point data can be freely changed.
- ⑤ Wait until BUSY output turns OFF.
- ⑥ When BUSY output turns OFF, INPOS output is ON, and this means that the operation has ended normally.

3. When STOP is input



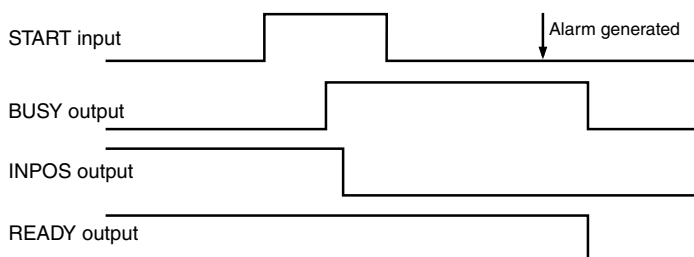
- When inputting STOP input during execution of a command, BUSY output turns OFF. The READY output remains unchanged.

4. When an error has occurred



- With the READY output is in the ON state, the BUSY and INPOS outputs are in the OFF state.

5. When an alarm is issued



- The READY, BUSY, and INPOS outputs all turn OFF.

4-4 Actuator number setting

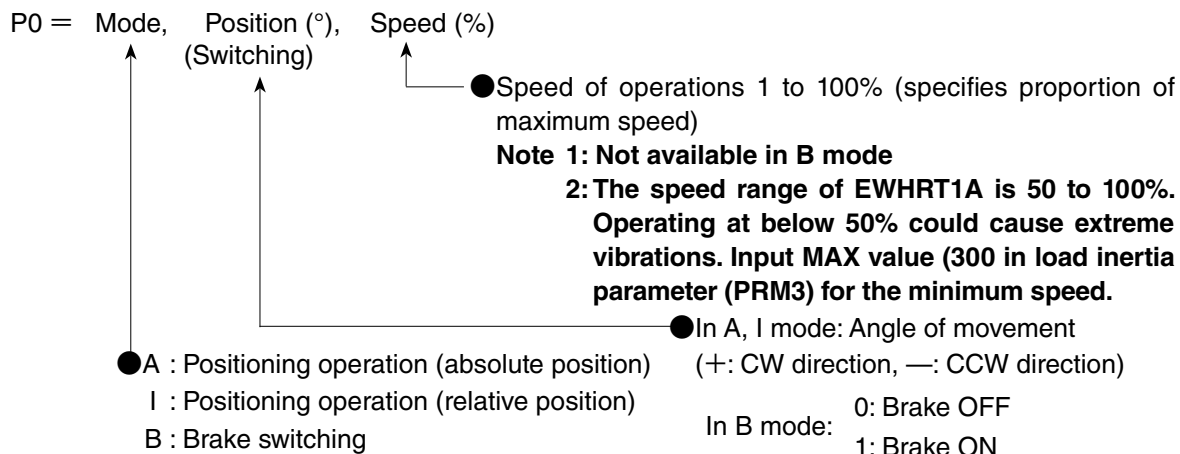
Set the actuator number in the following table in accordance with the actuator type.

Model	Actuator No.
EWHRT1A	50
EWHRT3A	61
EWHRT5A	62
EWHRT10A	63
EWHRT20A	64
EWHRT40A	65
EWHRT60A	66

Actuator number setting method (Use either of the following methods for the setting.)

- Using the communication command @INIT PRM. (Refer to p. 23.)
- Using the initialization command in the support software to initialize parameters.
(For details, see the support software owner's manual.)

4-5 Point data specifications



Point setting method

Point editing is performed via the RS232C port, on either a personal computer or the teaching box. For the communication parameters and cable specifications, see section “4-6 Communication with a personal computer” on p. 16.

Editing of parameters is done by using general communications software or custom support software.

For how to use the support software, see the separately available support software User's Manual.

For how to use the teaching box, see the separately available teaching box User's Manual.

Use the communication command @WRITE PNT to edit.

@WRITE PNT

Personal computer side

@WRITE PNT c/r l/f

P0 = A, 6.00, 50 c/r l/f

P1 = I, 3.00, 50 c/r l/f

P2 = B, 1 c/r l/f

^Z

Controller side

READY c/r l/f

OK c/r l/f

After editing, use the communication command @READ PNT to check the point data.

Transmission example @READ PNT c/r l/f

Response

P0 = A, 20.00, 50 c/r l/f

P1 = I, 30.00, 50 c/r l/f

P2 = A, 60.00, 100 c/r l/f

P5 = I, 20.00, 100 c/r l/f

P6 = B, 0 c/r l/f

OK c/r l/f

Reads all data that has been entered.

*1) • Mode B is only enabled with brake (option).

- When power is OFF, then brake is ON, and when power is ON, then brake is OFF.
- If torque is applied to the table, then the table may move when the power is cut. If you want to keep it in the stop position, then apply the brake before turning off the power. To change braking, there are commands that are sent as commands using point data (see p. 20).
- After the brakes are turned ON, operation is not possible. (Error message 36: Brake ON)
 When you want to do operations without turning off the power, turn off the brake and then do the operations.

4-6 Communication with personal computer

4-6-1 Communication parameter specifications

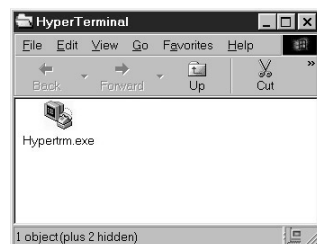
Set the communication parameter settings for a personal computer and other external equipment in the following manner. For the setting methods, see the User's Manual for each machine.

■ Transmission rate	9600 bps
■ Data bit length	8 bits
■ Stop bit length	1 bit
■ Parity check	On
■ Parity setting	Odd parity (ODD)
■ Control method (X parameter)	XON/XOFF software control method (Effective)
■ Communication method	Full duplex
■ Synchronous method	Asynchronous method
■ Return key transmission	CR/LF code
■ CR code reception	For CR/LF reception Return + line feed

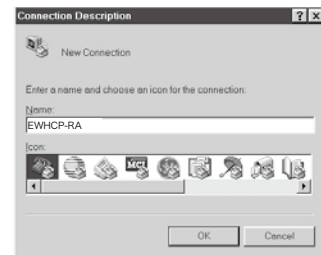
Setting method for Hyperterminal, as standard with Windows 95 to Windows XP* and later

*Windows is the registered trademark of the U.S. Microsoft Corp.

1. Double-click on Hyperterm.exe.



2. Enter name, select icon and click "OK."



3. For the connection method, select "Direct to Com1" and click "OK."



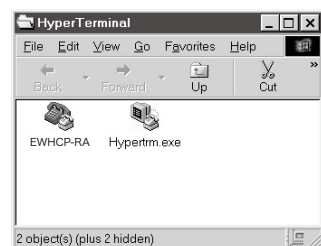
4. Set the port and click "OK."



5. In the properties dialog box, click the "Settings" tab, then click "ASCII Setup," and then add check marks as shown in the figure at right, and click "OK."



6. When starting up for the second time or later, double-click on the icon of the newly created file.



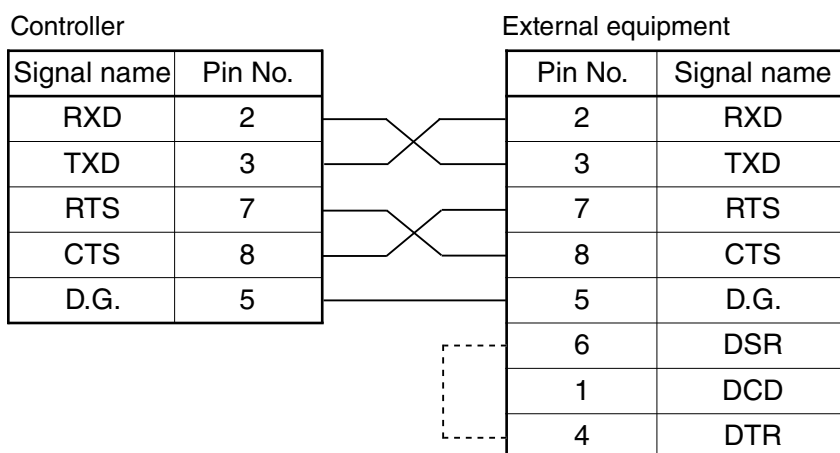
Note: If you want to input commands in Windows 7 or later, do the operations in the "Free Command Transmission Window" of the support software.

4-6-2 Communication cable

Connector type

Applicable connector part no. : XM2D-0901 (Made by OMRON) or equivalent product

Applicable connector cover part No.: XM2S-0911 (made by OMRON) or equivalent products



4-6-3 Communication commands

To facilitate easy communication with external equipment, communication commands are as standard.

Communication commands are divided into the following 4 categories.

1. Robot language
2. Data handling
3. Utilities
4. Special codes

With the exception of the special codes, the format for communication commands is as follows.

@<Operation code>[<Operand 1>][,<Operand 2>][,<Operand 3>]c/r l/f

- Basically, communication commands are executed by sending 1 line that begins with the start code '@' (=40H) and ends with the code c/r (=0DH) l/f (=0AH) to the controller. The special codes, however, do not require the start code and c/r l/f.
- Communication commands are composed of operation codes and operands. Depending on the command, either no operand is used or up to a maximum of 3 operands are used. The brackets [] refer to items that can be omitted.
- The character codes used are the JIS8 level codes (ASCII codes with katakana characters added).
- At least 1 space must be inserted between the operation code and the operand.
- Items with the < > mark (angle brackets) in the operand should be specified by the user. Check the details of each communication command, and enter appropriate data. (See "4-6-4 List of communication commands" on p. 18.)
- When entering 2 or more operands, insert a comma (,) between them.

4-6-4 List of communication commands

Classification	Command	Operand 1	Operand 2	Operand 3	Command description
Actuator operation	@ORG	—	—	—	Returns to origin
	@MOVD	Coordinate value (°)	Speed (%)	—	Executes coordinate specified movement
	@MOVP	Point No.	—	—	Moves to the specified point
	@X+	—	—	—	(+) movement by specified distance
	@X-	—	—	—	(-) movement by specified distance
	@XINC	—	—	—	(+) movement at constant speed
	@XDEC	—	—	—	(-) movement at constant speed
	@SRVO	Switch	—	—	Energizes motor
	@BRK	Switch	—	—	Brake ON/OFF
Data handling	@?POS	—	—	—	Reads current position
	@?PNO	—	—	—	Reads current point No.
	@?PRM	Parameter No.	—	—	Reads specified parameter
	@?P	Point No.	—	—	Reads specified point data
	@?ORG	—	—	—	Confirms return to origin
	@?SRVO	—	—	—	Confirms motor energized state
	@?VER	—	—	—	Reads version number
	@READ	PNT	—	—	Reads all point data
		PRM	—	—	Reads all parameters
		DIO	—	—	Reads I/O states
		ERR	—	—	Reads error history records
	@WRITE	PNT	—	—	Writes point data
		PRM	—	—	Writes parameters
	@PDEL	Point No.	Number of points	—	Deletes point data
Utilities	@INIT	PNT	—	—	Initializes all point data
		PRM	Actuator No.	—	Initializes all parameters
		ERR	—	—	Initializes error history
		ORG	—	—	Initializes origin position data
	@ORGC	—	—	—	Changes origin position data

Classification	Code	Command description
Special code	^C(=03H)	Interrupts ORG, XINC, XDEC
	^Z (=1AH)	Ends data transmission

Classification	Response	Description
Response from controller	OK	Normal completion of operation
	NG	Error generated Contents of error at next line (within 20 characters)
	STOP	Stop command Reason for stop at next line (within 20 characters)
	READY	Completion of writing preparation

4-6-5 Details of communication commands

(1) **@ORG**

Function	Return to origin.
Format	@ORG c/r l/f
Transmission example 1	@ORG c/r l/f
Response example 1	OK c/r l/f

(2) **@MOVD**

Function	Performs positioning to the specified position (absolute position of origin reference) at the specified speed.
Format	@MOVD position, speed c/r l/f
Transmission example 1	@MOVD 30.5, 50c/r l/f
Response	OK c/r l/f
Explanation	Moves at speed of 50% of maximum speed to position 30.5° from the origin.
Transmission example 2	@MOVD 380, 100 c/r l/f
Response	NG c/r l/f 23: Data error c/r l/f
Explanation	Data beyond the range of the operation speed (PRM21) cannot be entered.

(3) **@MOVP**

Function	Operates by using the specified POS No. data.
Format	@MOVP point No. c/r l/f
Transmission example 1	@MOVP 2 c/r l/f
Response	OK c/r l/f
Explanation	Performs operation specified at POS2.
Transmission example 2	@MOVP 12 c/r l/f
Response 2	NG c/r l/f 52: No point data c/r l/f
Explanation	No data at the point specified by POS12, causing an error.

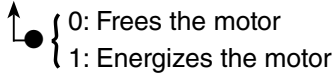
(4) **@X+(@X-)**

Function	Moves by only the specified distance to (+) side "CW direction" ((-) side "CCW direction") at the speed shown below. Distance moved = PRM25 [×0.01°] Speed moved = PRM24 [×0.01 rps]
Format	@X+ c/r l/f
Transmission example	@X+ c/r l/f
Response	OK c/r l/f

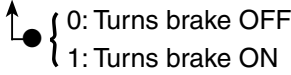
(5) **@XINC (@XDEC)**

Function	Moves continuously at the speed shown in the following equation to (+) side "CW direction" ((-) side "CCW direction"). Stops when ^C is input or the tooling reaches the software limit. Speed moved = PRM24 [×0.01 rps]
Format	@XINC c/r l/f
Transmission example	@XINC c/r l/f
Response 1	STOP c/r l/f 63: Stop command c/r l/f

(6) @SRVO

Function	Commands either for energizing the motor and performing feedback control, or for de-energizing the motor.
Format	@SRVO switch c/r l/f 
Transmission example	@SRVO 1 c/r l/f
Response	OK c/r l/f

(7) @BRK

Function	Switches brake ON/OFF. (Brake is OFF during normal operation)
Format	@BRK switch c/r l/f 
Transmission example	@BRK 1 c/r l/f
Response	OK c/r l/f

(8) @?VER

Function	Checks the controller software version number.
Format	@?VER c/r l/f
Transmission example	@?VER c/r l/f
Response	1.01 c/r l/f OK c/r l/f

(9) @?POS

Function	Reads the current position. (Resolution is 0.01° when motor is energized, resolution is 0.45° when not energized.)
Format	@?POS c/r l/f
Transmission example	@?POS c/r l/f
Response	5.85 c/r l/f Current position is 5.85° from the origin OK c/r l/f

(10) @?PNO

Function	Reads the current point no.
Format	@?PNO c/r l/f
Transmission example	@?PNO c/r l/f
Response	2 c/r l/f Point no. is 2 OK c/r l/f

(11) @?PRM

Function	Reads the specified parameter.
Format	@?PRM parameter no. c/r l/f
Transmission example	@?PRM 25 c/r l/f
Response	100 c/r l/f OK c/r l/f

(12) @?P

Function	Reads the specified point data.
Format	@?P point no. c/r l/f
Transmission example	@?P 10 c/r l/f
Response	P10 = A, 50.00, 50 c/r l/f Absolute position of 50°, speed of 50% OK c/r l/f
Explanation	See “4-5 Point data specifications” on p. 15 for a description of the response data.

(13) @?ORG

Function	Confirms whether return to origin has been completed or not.
Format	@?ORG c/r l/f
Transmission example	@?ORG c/r l/f
Response 1	0 c/r l/f Return to origin not completed OK c/r l/f
Response 2	1 c/r l/f Return to origin completed OK c/r l/f

(14) @?SRVO

Function	Can confirm the motor energized state.
Format	@?SRVO c/r l/f
Transmission example	@?SRVO c/r l/f
Response 1	0 c/r l/f De-energized state OK c/r l/f
Response 2	1 c/r l/f Energizing OK c/r l/f

(15) @READ PNT

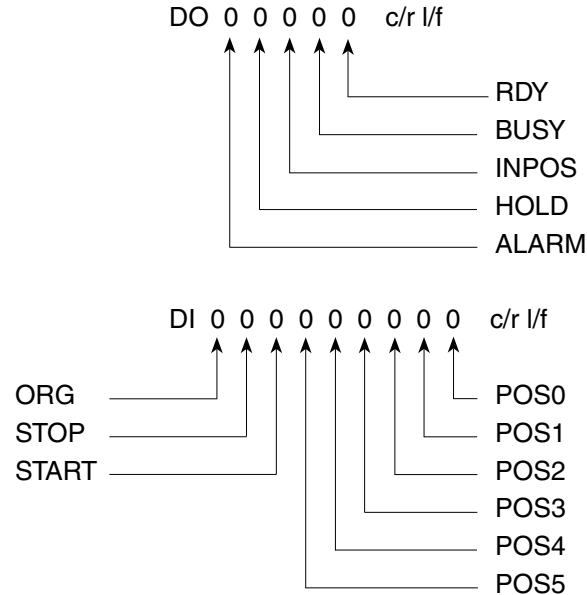
Function	Reads all point data.
Format	@READ PNT c/r l/f
Transmission example	@READ PNT c/r l/f
Response	P0 = A, 20.00, 50 c/r l/f P1 = I, 30.00, 50 c/r l/f P2 = A, 60.00, 100 c/r l/f P5 = I, 20.00, 100 c/r l/f OK c/r l/f Reads all data that has been entered.
Explanation	See “4-5 Point data specifications” on p. 15 for a description of the response data.

(16) @READ PRM

Function	Reads all parameter data.
Format	@READ PRM c/r l/f
Transmission example	@READ PRM c/r l/f
Response	PRM0 = 20 c/r l/f PRM1 = 0 c/r l/f PRM2 = 0 c/r l/f • • PRM63 = 2 c/r l/f OK c/r l/f

(17) @READ DIO

Function Reads custom input/output status.
 Format @READ DIO c/r l/f
 Transmission example @READ DIO c/r l/f
 Response DO 00001 c/r l/f
 DI 000000000 c/r l/f
 OK c/r l/f
 Explanation Contents of response data are shown below.

**(18) @READ ERR**

Function Reads error history records. (Up to the latest 16 records.)
 Format @READ ERR c/r l/f
 Transmission example @READ ERR c/f l/f
 Response 32: Origin return not completed c/r l/f
 01: Overload c/r l/f
 03: Overheat c/r l/f
 OK c/r l/f

(19) @WRITE PNT

Function Writes point data
 Format @WRITE PNT c/r l/f
 Transmission example
 Personal computer side @WRITE PNT c/r l/f
 Controller side
 READY c/r l/f
 P0 = A, 60.00, 50 c/r l/f
 P1 = I, 30.00, 50 c/r l/f
 ^Z
 OK c/r l/f
 Explanation See "4-5 Point data specifications" on p. 15 for the data format.

(20) @WRITE PRM

Function Writes parameters.

Format @WRITE PRM c/r l/f

Transmission example Personal computer side Controller side

@WRITE PRM c/r l/f

READY c/r l/f

PRM1 = 10 c/r l/f

PRM2 = 0 c/r l/f

^Z

OK c/r l/f

Sends only data that requires changes.

(21) @PDEL

Function Deletes point data from the specified "Point No." by the number shown as "number of points."

Format @PDEL, point no., number of points c/r l/f

Transmission example @PDEL 10, 5 c/r l/f

Response OK c/r l/f

(22) @INIT PNT

Function Deletes all point data.

Format @INIT PNT c/r l/f

Transmission example @INIT PNT c/r l/f

Response OK c/r l/f

(23) @INIT PRM

Function Resets parameters to their initial values. The electric rotary actuator numbers are shown below.

Format @INIT PRM actuator No. c/r l/f

Transmission example @INIT PRM 50 c/r l/f

Response OK c/r l/f

Model	Actuator No.
EWHRT1A	50
EWHRT3A	61
EWHRT5A	62
EWHRT10A	63
EWHRT20A	64
EWHRT40A	65
EWHRT60A	66

(24) @INIT ERR

Function Deletes all error history.

Format @INIT ERR c/r l/f

Transmission example @INIT ERR c/r l/f

Response OK c/r l/f

(25) @INIT ORG

Function Initializes the origin position data. Execute this command when the actuator unit was replaced during use.

Format @INIT ORG c/r l/f

Transmission example @INIT ORG c/r l/f

Response OK c/r l/f

(26) @ORGC

Function	Changes the origin position data. Do this if changing the controller or initializing the origin position data causes a deviation in the return to origin position during use.
Format	@ORGC c/r l/f
Transmission example	@ORGC c/r l/f
Response	OK c/r l/f

4-7 Parameters

The controller does not have any potentiometer, dip switches, or any other hardware adjustment mechanism.

Instead, it uses parameters that can easily be set through a personal computer.

This section describes how to change and set the parameters, and gives details of each parameter.

Safety

Because software is used to detect motor overload and other abnormalities, the controller parameters must be set correctly to match the connected actuator.

So, before starting to use an actuator, match them to the actuator model and set the actuator number.

If any problem is found, please contact us.

Caution:

Changing parameters other than those described in this manual could result in fatal damage or defects in the actuator and controller.

4-7-1 Parameter setting method

Parameter editing is performed via the RS232C port, on either a personal computer or the teaching box. For the communication parameters and cable specifications, see section “4-6 Communication with a personal computer” on p. 16.

The editing of computer parameters is carried out by using general-purpose communication software or dedicated support software.

For how to use the support software, see the separately available support software User's Manual.

For how to use the teaching box, see the separately available teaching box User's Manual.

Parameter edit commands

@WRITE PRM

Function	Writes parameters.	
Format	@WRITE PRM c/r l/f	
Transmission example	Personal computer side	Controller side
	@WRITE PRM c/r l/f	
		READY c/r l/f
	PRM1 = 0 c/r l/f	
	PRM2 = 0 c/r l/f	
	^Z	
		OK c/r l/f
	Sends only data that requires changes.	

After editing, read and check the parameter data.

@READ PRM

Function	Reads all parameter data.
Format	@READ PRM c/r l/f
Transmission example	@READ PRM c/r l/f
Response	PRM0 = 50 c/r l/f
	PRM1 = 0 c/r l/f
	PRM2 = 0 c/r l/f
	•
	•
	PRM63 = 2 c/r l/f
	OK c/r l/f

4-7-2 Explanation of parameters

PRM0 : Actuator No.

Displays the actuator No. This parameter is only for reading.

PRM1 : (+) software limit

Sets the (+) side actuator movement range.

For safety, always set a suitable value.

Input "0" when no limit is set.

Input range 0 to 9999 (°)

Initial value 0

PRM2 : (-) software limit

Sets the (-) side actuator movement range.

For safety, always set a suitable value.

Input "0" when no limit is set.

Input range -9999 to 0 (°)

Initial value 0

PRM3 : Load inertia

Input the inertia of the load attached to the actuator. If the load inertia is changed, input the maximum load inertia.

The controller determines the optimum acceleration of the actuator based on this parameter. Because of this, be sure to set a suitable value. If an unsuitably small value is set, the abnormal vibrations and abnormal overheating could cause problems to occur in the controller and actuator. On the other hand, if the set value is larger than the actual load inertia, then a loss will occur in the tact time, which is linked to reduced productivity.

Input range 0 to 20000 $\left(\begin{array}{l} \times 10^{-6} \text{ kg}\cdot\text{m}^2: \text{EWHRT1A, 3A, 5A, 10A, 20A} \\ \times 10^{-3} \text{ kg}\cdot\text{m}^2: \text{EWHRT40A, 60A} \end{array} \right)$

Initial value According to table below.

Model	EWHRT1A	EWHRT3A	EWHRT5A	EWHRT10A	EWHRT20A	EWHRT40A	EWHRT60A
Initial value	300	1000	3000	2000	20000	50	100

PRM4 : Acceleration

Sets the acceleration. When lower acceleration is required, change this parameter.

Input range 1 to 100 (%)

Initial value 100

PRM5 : Origin return direction

Sets the origin return direction. Normally, selecting 0 sets the origin return in the CW direction, and selecting 1 sets the origin return in the CCW direction.

Input range 0, 1

Meaning 0: CW 1: CCW

Initial value 1

PRM10: Origin return speed

Sets the speed when returning to origin.

($\times 0.01$ rps)

	EWHRT1A	EWHRT3A, 5A, 10A, 20A, 40A, 60A
Input range	50	1 to 50
Initial value	50	10

PRM21: Operating angle

Input the effective operating angle of the actuator.

Positioning can be determined by absolute position within the set range (\pm input range).

Input range 1 to 32400 (however, multiples of 360) ($^{\circ}$)

Initial value 360

RPM22: Select English or Japanese

Sets the language used for response messages in communications.

Input range 0, 1

Meaning 0: English 1: Japanese

Initial value 1

PRM24: Moving speed when teaching

Parameter for specifying the speed during movement by the communication command @X+, @X-, @XINC, or @XDEC.

This is also used during teaching playback for point.

($\times 0.01$ rps)

	EWHRT1A	EWHRT3A, 5A, 10A, 20A, 40A, 60A
Input range	50 to 100	1 to 100
Initial value	50	20

PRM25: Movement unit when teaching

Sets the movement amount by the communication command @X+, or @X-.

Input range 1 to 9999 ($\times 0.01^{\circ}$)

Initial value 50

PRM30: Maximum speed

Sets the maximum speed when the communication commands (@MOVD), or the custom command START signal is input.

Input range 1 to 100 (%)

Initial value 100

PRM35: Origin shift

Data is shifted by the amount of the value in this parameter to the coordinates of the position when return to origin is completed. The normal coordinates when return to origin is completed is 0, but the parameters can be changed to shift a specified amount for whatever reason. For example, if an accidental position deviation occurred, it is ordinarily necessary to re-teach all point data. However, by setting the amount of deviation as this parameter, a quick recovery is possible without taking the time to re-teach.

Input range -32768 to 32767 ($\times 0.01^{\circ}$)

Initial value 0

PRM36: Origin shift speed

Sets the speed for origin shift.

($\times 0.01$ rps)

	EWHRT1A	EWHRT3A, 5A, 10A, 20A, 40A, 60A
Input range	50 to 100	1 to 100
Initial value	50	10

Caution:

- Normally, this parameter does not need to be changed except for the above reasons.

4-8 List of error messages

(1) Command related

Error No.	Item	Description
21	Message	Typing mistake
	Cause	Command is not correct
	Countermeasure	Input a correct command
23	Message	Data error
	Cause	Error in the numerical data
	Countermeasure	Correct the data
24	Message	Overrun error
	Cause	Error in the transferred data
	Countermeasure	Send the correct command
25	Message	Framing error
	Cause	Error in the transferred data
	Countermeasure	Send the correct command

(2) Operation related

Error No.	Item	Description
31	Message	Running
	Cause	Another command is already being executed, so this command cannot be accepted
	Countermeasure	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
	Countermeasure	Execute origin return
34	Message	Motor free
	Cause	Command cannot be executed because the motor is in a free state
	Countermeasure	Return the motor to normal
35	Message	Can't execute
	Cause	The parameter contradicts the operation command
	Countermeasure	Change the parameter or point data
36	Message	Brake on
	Cause	Command cannot be executed because the brake is on
	Countermeasure	Turn brake off
37	Message	Limit exceeded
	Cause	The position to be moved to exceeds the software limit
	Countermeasure	Edit the point data

(3) System related

Error No.	Item	Description
52	Message	No point data
	Cause	No data has been registered at the specified point number
	Countermeasure	Register the point data
53	Message	No actuator type
	Cause	Actuator type number setting is incorrect
	Countermeasure	Redo the initialization using actuator numbers that support the various models
56	Message	Data protected
	Cause	Protected parameters have been rewritten
	Countermeasure	Data that is protected cannot be rewritten
57	Message	No parameter
	Cause	Attempted to rewrite parameter numbers that are not registered as parameters
	Countermeasure	Rewrite with numbers that are registered as parameters
58	Message	Saving data
	Cause	Data that was being saved to memory was overwritten
	Countermeasure	Proceed after saving the data in memory

(4) Stop messages

Error No.	Item	Description
61	Message	Stop command
	Meaning	Stopped due to the stop command
63	Message	Stop input
	Meaning	Stopped due to a STOP input entered from I/O
64	Message	Stop limit
	Meaning	Stopped at the limit position

Chapter 5 Troubleshooting

5-1 If a problem occurs

When informing Koganei of trouble, please provide information that is as detailed as possible about the following items.

Item	Description (Example)
What?	Controller model Actuator model Power supply
When?	Time of purchase (Serial No.) Period of use, conditions of operation When the power is turned on? 1 hour after the power is turned on
Under what conditions?	During operation The position of the table when the problem occurred
What happened?	Does not operate Alarm is output
How frequently?	Always occurs Once an hour Cannot be reproduced

5-2 Countermeasures for alarms

When READY output is OFF, an alarm is determined to have been issued. In addition, when an alarm is issued, the ALARM LED on the front of the controller lights.

When an alarm is issued, turn the power off temporarily, eliminate the cause of the alarm, and then turn on the power again.

Doing this cancels the alarm.

5-3 Alarm specifications

The transmission format for an alarm message is as follows.

```
<Alarm No.>: <Alarm message> c/r l/f
```

Checking the alarm content

To check the content of the alarm, use a communication cable to connect to a personal computer, and enter the @READ ERR command. (Refer to p. 22.)

5-3-1 Alarm message list

Alarm No.	Alarm message	Meaning	Probable cause	Countermeasure
01	Overload	<ul style="list-style-type: none"> Excessive load Cable disconnected 	1) Inertia is extreme 2) Motor cable is broken or connection is defective	1) Reduce the acceleration 2) Inspect the cable continuity
03	Overheat	Rise in circuit temperature	1) Overcurrent 2) Shorted cable	Inspect the cables
04 ^{Note}	Power supply voltage drop	Input voltage is too low	Power supply	Increase power supply voltage
05	Power supply voltage high	Input voltage is too high	Power supply	Reduce power supply voltage
06	Cable disconnected	<ul style="list-style-type: none"> Excessive load Cable disconnected 	1) Motor cable is broken or connection is defective 2) Mechanical interference due to obstacle	1) Inspect the cable continuity 2) Check for mechanical interference
07	Stop position misaligned	Table position misalignment occurred at stop	External force being applied to table when stopped	Execute origin return
08	Point data error	Point data has been corrupted	Power supply was turned off while writing data	Turn on the power supply again, and initialize the point data
09	Parameter data error	Parameter data has been corrupted	Power supply was turned off while writing data	Turn on the power supply again, and initialize the parameter data

Note: Alarm number 4 power supply drop may output an alarm message when the power (24 VDC) is turned off normally also. Furthermore, it is not recorded in the error history.

Chapter 6 Specifications

6-1 Basic specifications of main unit

Item	Model	EWHRT1A	EWHRT3A	EWHRT5A	EWHRT10A	EWHRT20A	EWHRT40A ^{Note 1}	EWHRT60A ^{Note 1}
Motor		2-phase stepping motor						
Maximum torque N·m		0.1	0.25	0.5	1.0	2.0	4.0	6.0
Repeatability of positioning accuracy ^{Note 2}		±0.02°						
Angle detection		Optical encoder (with origin)						
Maximum load inertia ^{Note 3} kg·m ²		3.0×10 ⁻⁴	1.0×10 ⁻³	3.0×10 ⁻³	2.0×10 ⁻³	2.0×10 ⁻²	5.0×10 ⁻²	1.0×10 ⁻¹
Minimum operating time ^{Note 4}	(90° no load) s	0.2	0.1	0.2	0.12	0.2	0.3	
	(90° maximum load) s	0.35	0.25	0.4	0.25	0.5		0.65
Minimum speed rps		0.5	0.01					
Operating temperature range°C		0 to 40						
Allowed thrust load N		100			200		400	
Allowed radial load N		100			200		400	
Allowed moment N·m		2.5			5.5		10.0	
Weight ^{Note 5} kg		0.3	0.34 (0.4)		0.8 (0.9)		2.0 (2.3)	2.2 (2.5)
Applicable controller		EWHC-RS	EWHC-RA					

Note 1: The **EWHRT40A** and **EWHRT60A** types have no cables coming out of the main unit (connectors are internal on side of main unit).

2: Repeatability of positioning accuracy when pulsating

3: Be sure that the inertial moment of the workpiece is less than the maximum load inertia.

4: Value when there is no load torque.

5: Value in () is for models with brake.

6-2 Basic specifications of the controller

Item	Model	EWHC-RA, EWHC-RS
Axial control	Motor drive method	Microstep drive
	Control method	Closed loop control
	Operating method	PTP
	Origin detection method	Encoder Z phase
	Location detection method	Encoder A, B phase output
	Minimum setting angle	0.01°
	Speed setting	EWHC-RA: 1 to 100%, EWHC-RS: 50 to 100%
	Acceleration setting	1 to 100% (automatically set according to load inertia)
	Point setting	64 points
	Point input method	Numeric input, teaching input, direct teaching
External input/output	Point setting input	6 inputs photocoupler reception, 5 mA TYP/1 input
	Control input	3 inputs (ORG, START, STOP) photocoupler reception, 5 mA TYP/1 input
	Control output	3 outputs (READY, BUSY, INPOS), 30 mA MAX./1 output
	Abnormality detection output	Overload, disconnection, incorrect data, system abnormality
	External communications	RS232C 1ch (Communication with personal computer or teaching box)
	Motor drive output	Dedicated cable (with F.G.)
	Encoder input	Dedicated cable (with shielding)
General specifications	Mass	0.2 kg
	Power supply	24 VDC ±10% EWHC-RA: 1.6 A MAX. ^{Note} EWHC-RS: 0.6 A MAX. (motor and I/O share power source)
	Operating temperature	0 to 40°C
	Operating humidity	35 to 85% RH (no condensation)
	Storage temperature	-10 to 65°C
	Back-up	EEPROM used to maintain setting conditions
	Noise resistance	IEC61000-4-4 level 3
	Accessories	I/O cable, power cable

Note: Maximum power consumption varies depending on the model.

EWHRT3A, 5A, 10A, 20A(-B): 1.0 A MAX

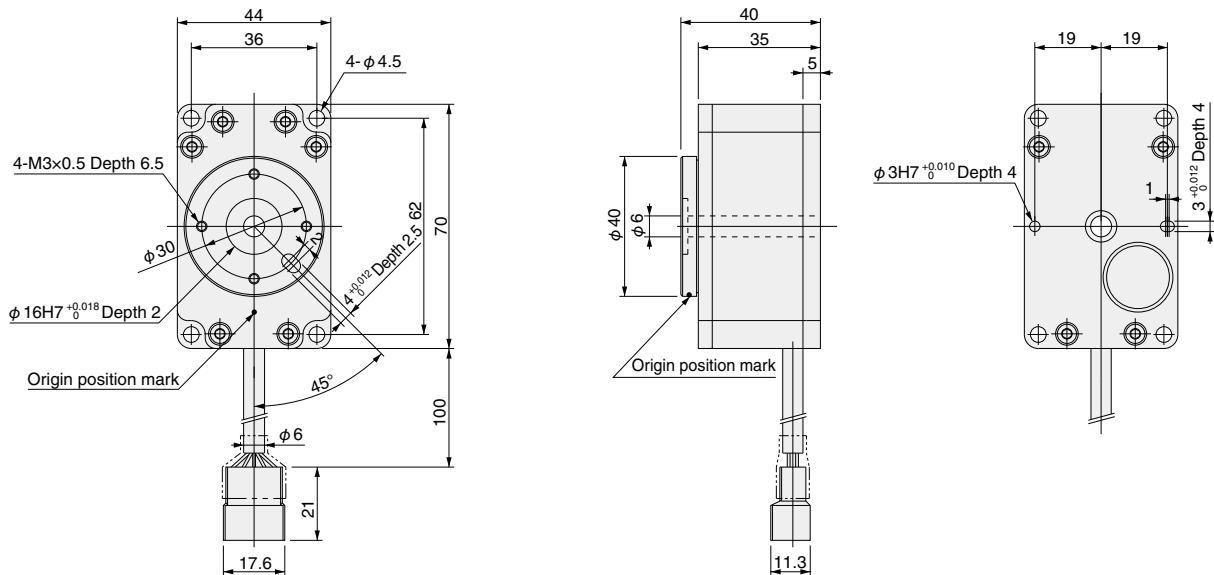
EWHRT40A, 60A: 1.3 A MAX

EWHRT40A-B, 60A-B: 1.6 A MAX

Chapter 7 Outline Drawings

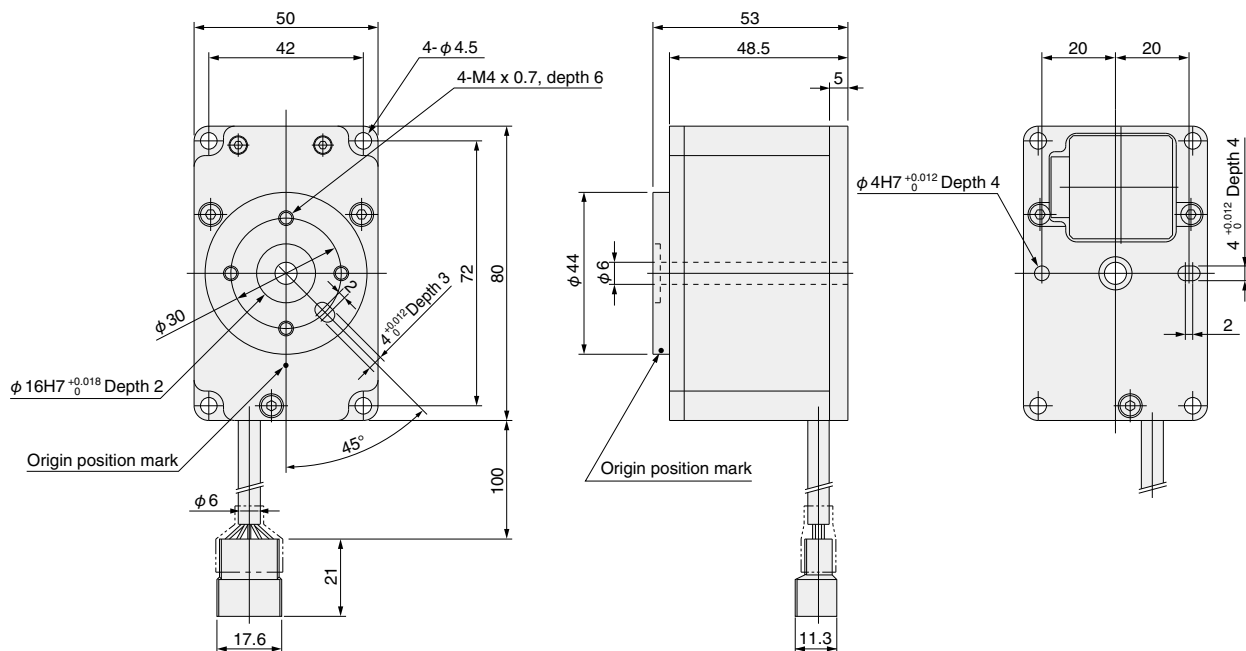
7-1 Main unit outline drawings

EWHRT1A



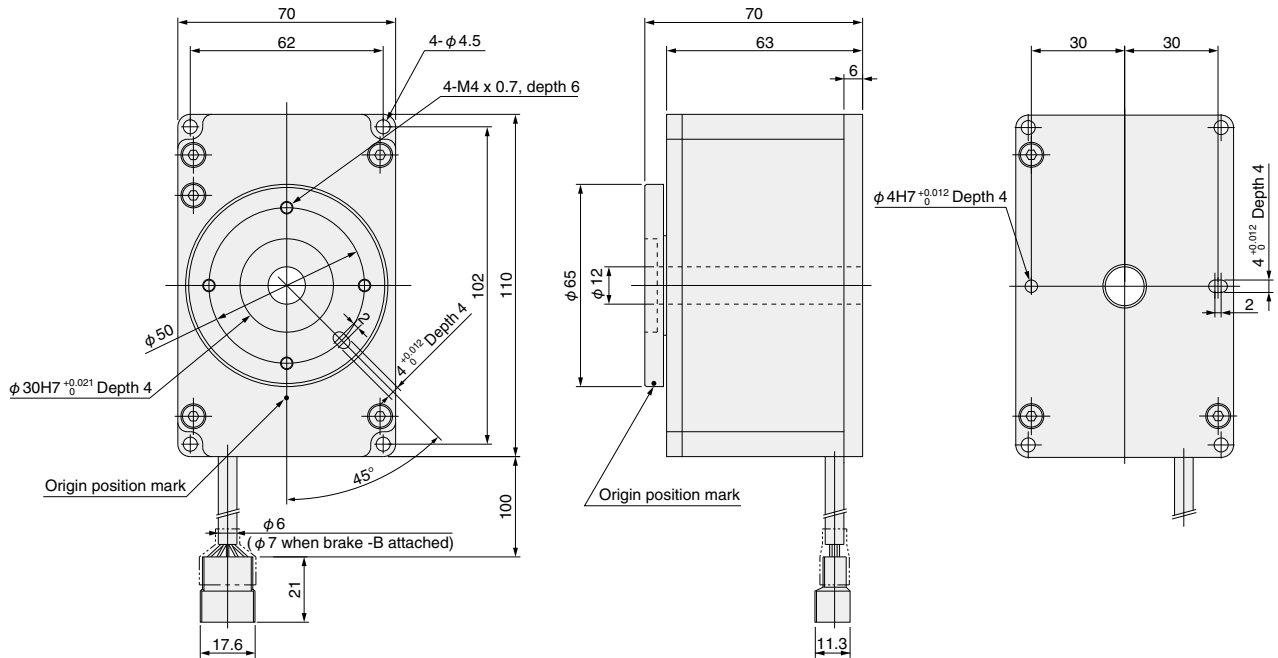
Note: The origin position on the table is when the oval hole for the positioning pin is in the position in the above drawing.

EWHRT3A, EWHRT5A



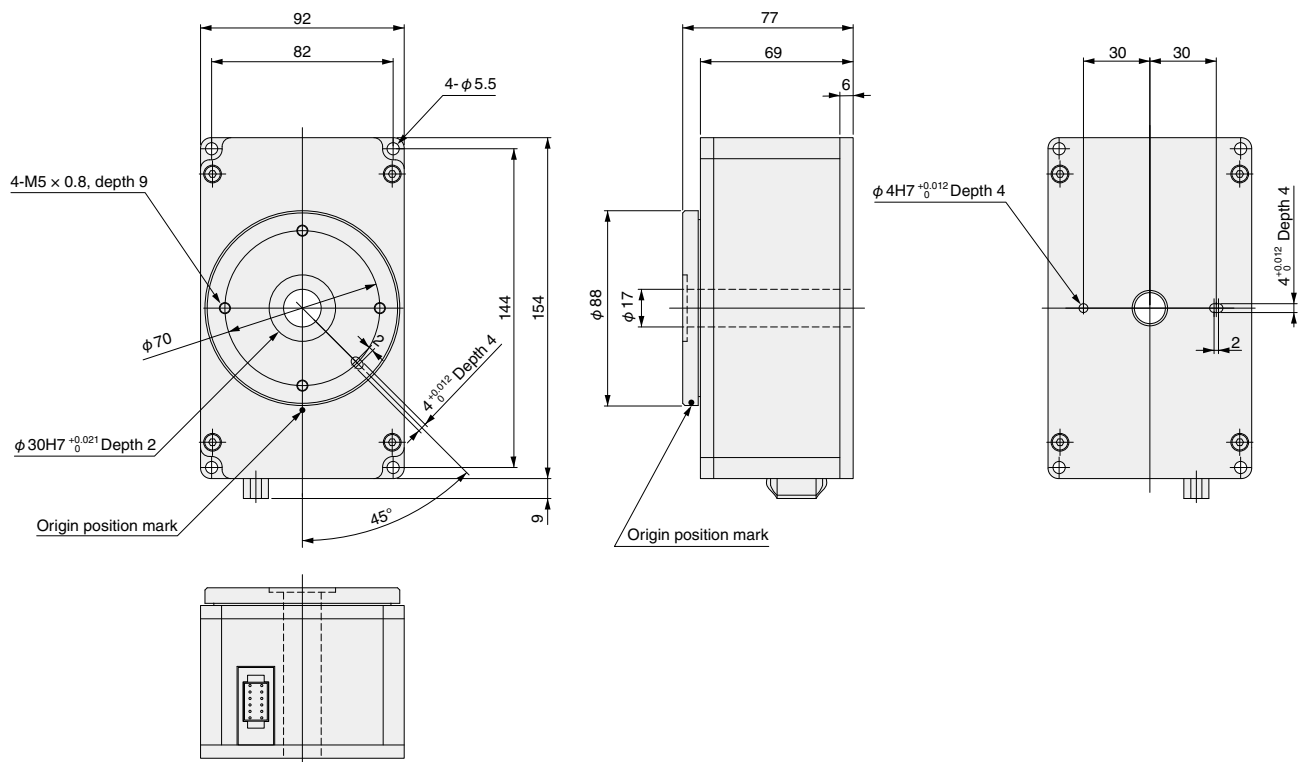
Note: The origin position on the table is when the oval hole for the positioning pin is in the position in the above drawing.

EWHRT10A, EWHRT20A

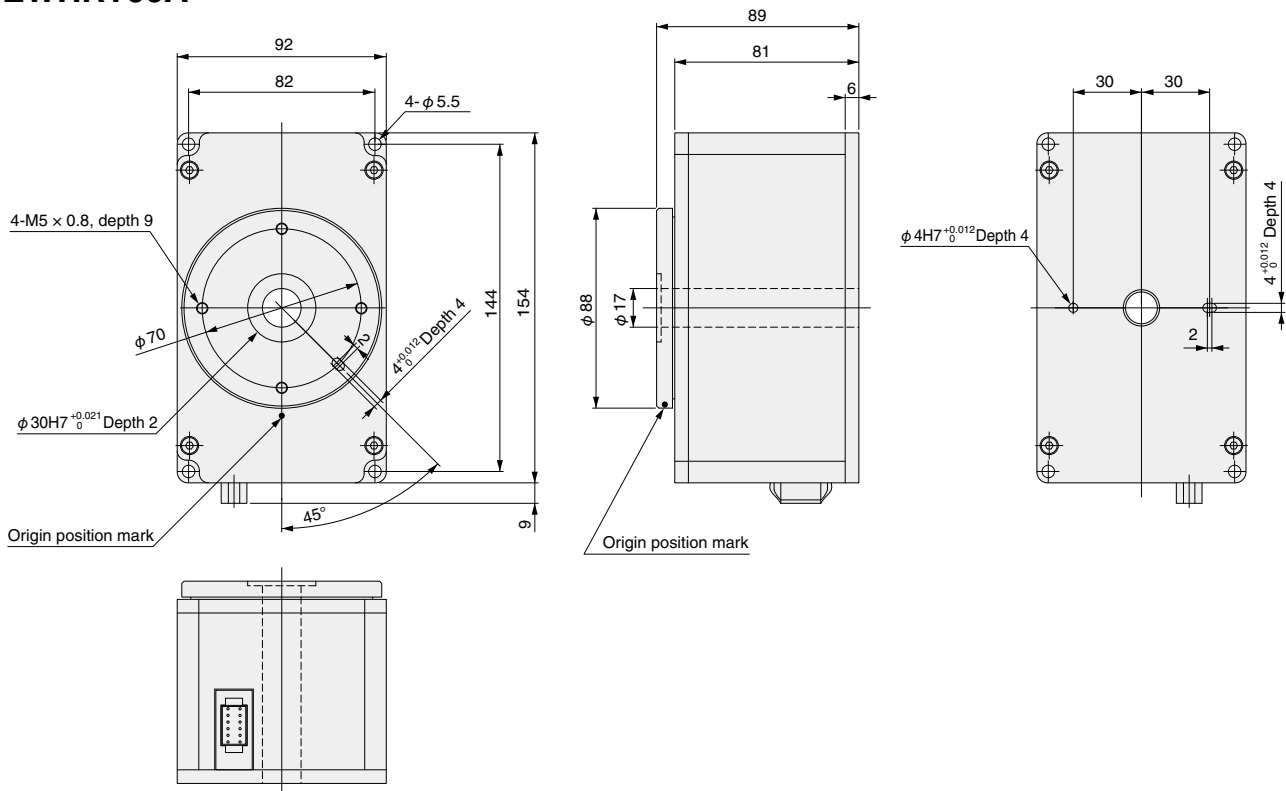


Note: The origin position on the table is when the oval hole for the positioning pin is in the position in the above drawing.

EWHRT40A



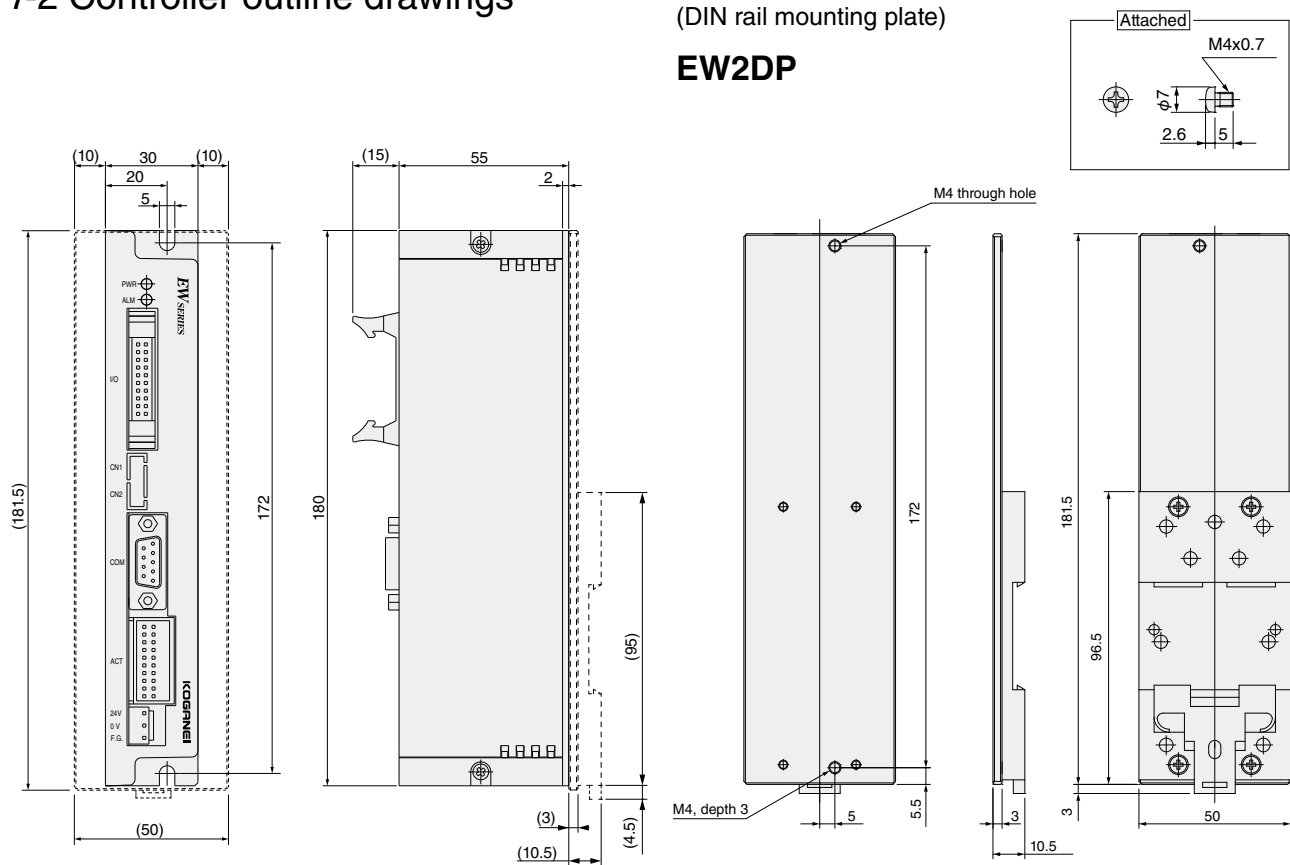
Note: The origin position on the table is when the oval hole for the positioning pin is in the position in the above drawing.

EWHRT60A

Note: The origin position on the table is when the oval hole for the positioning pin is in the position in the above drawing.

7-2 Controller outline drawings

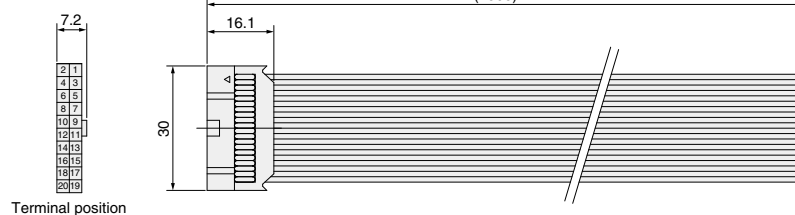
(DIN rail mounting plate)

EW2DP

Supplied with the controller

- I/O cable

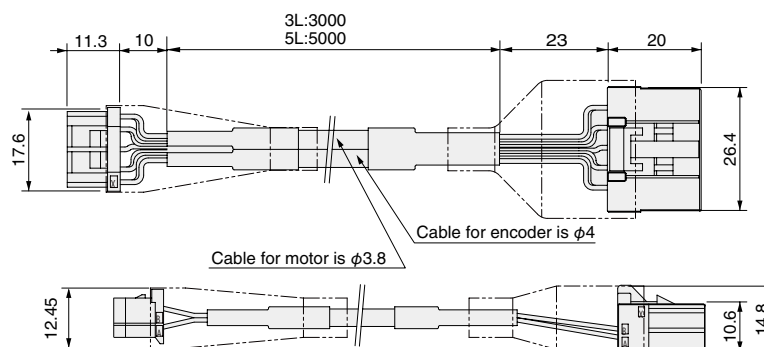
EW2KI



Cables (additional parts)

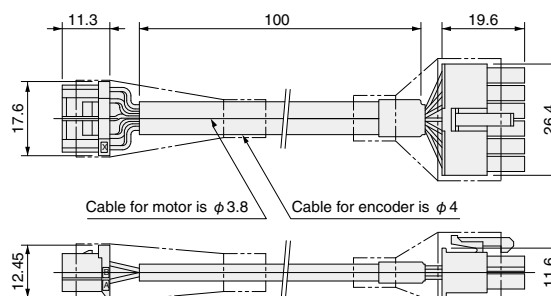
- Connecting cable

EWHKA- ☐



- Conversion cable^{Note}

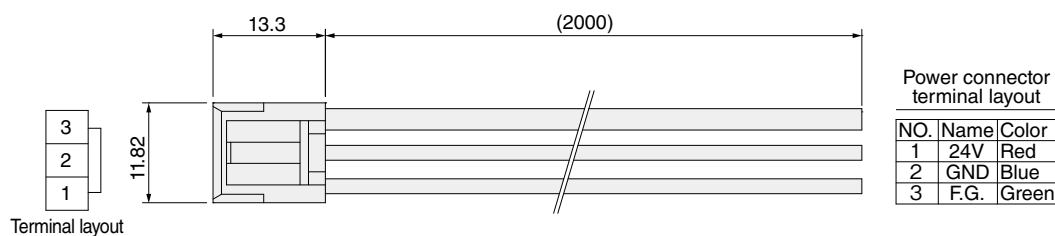
EWTK



Note: Conversion cable is to be connected to the EWHRT-☐A, and EWHK-☐ (old cable).

- Power cable

EW2KP



Chapter 8 Technical Data

8-1 Inertial moment calculation example

[Note] Be sure that the inertial moment of the workpiece is less than the maximum load inertia.

1. For load on round plate on rotation of axis

Load quality: Aluminum alloy (density $2.7 \times 10^3 \text{ kg/m}^3$)

$$I = \frac{md^2}{8}$$

I: Moment of inertia around axis of rotation ($\text{kg}\cdot\text{m}^2$)

d: Outer diameter of round plate (m)

m: Load mass (kg)

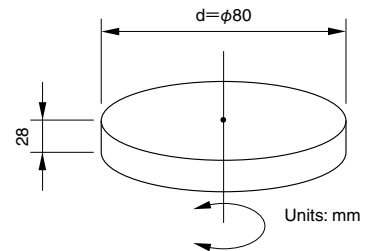
d = 0.16 (m)

$$m = \frac{\pi \times 0.08^2}{4} \times 0.028 \times 2.7 \times 10^3$$

$$= 0.38 \text{ (kg)}$$

$$I = \frac{0.38 \times 0.08^2}{8}$$

$$= 3.0 \times 10^{-4} \text{ (kg}\cdot\text{m}^2\text{)}$$



This is the maximum load inertia for the **EWHRT1A**.

2. For load on cuboid with offset rotation of axis

Load quality: Aluminum alloy (density $2.7 \times 10^3 \text{ kg/m}^3$)

$$I = \frac{m}{12} (a^2 + b^2) + mL^2$$

I: Moment of inertia around axis of rotation ($\text{kg}\cdot\text{m}^2$)

a, b: Length of side (m)

L: Offset of center of load and rotational axis

m: Load mass (kg)

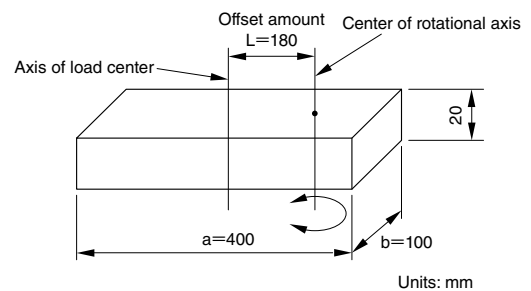
$$m = 0.4 \times 0.1 \times 0.02 \times 2.7 \times 10^3$$

$$= 2.16 \text{ (kg)}$$

$$I = \frac{m}{12} (a^2 + b^2) + mL^2$$

$$= \frac{2.16}{12} (0.4^2 + 0.1^2) + (2.16 \times 0.18^2)$$

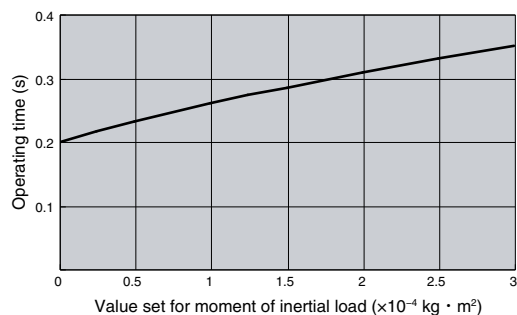
$$= 1.0 \times 10^{-1} \text{ (kg}\cdot\text{m}^2\text{)}$$



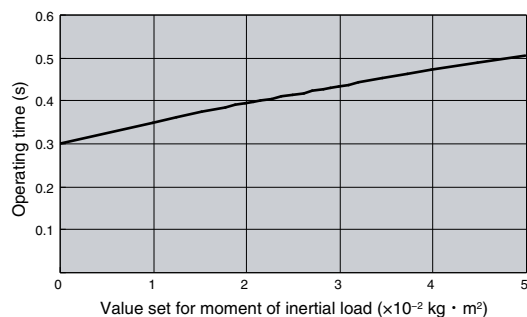
This is the maximum load inertia for the **EWHRT60A**.

8-2 Operating time (operating angle 90°)

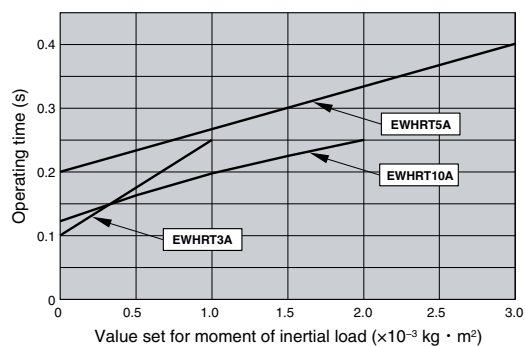
● EWHRT1A



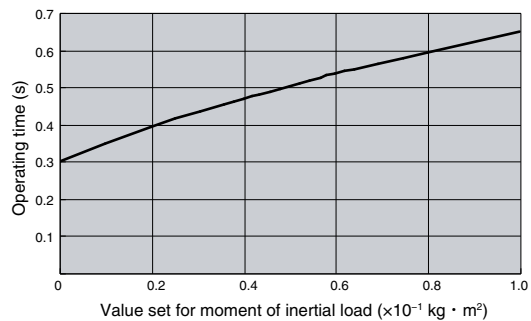
● EWHRT40A



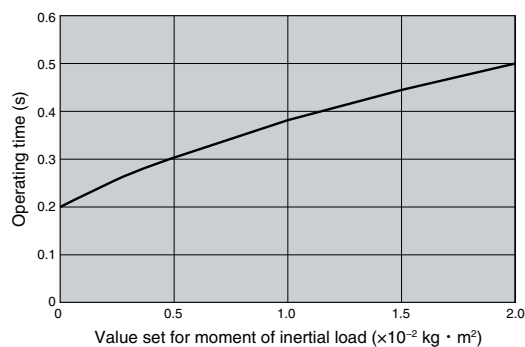
● EWHRT3A, EWHRT5A, EWHRT10A



● EWHRT60A



● EWHRT20A



Revision History

Ver. 2.0

P.6 Locating pin holes added to the EWHRT3, 5, 10, and 20 dimension diagrams.

P25 PRM10 input range changed from “1 to 100” to “1 to 50.”

P26 PRM36 input range changed from “1 to 200” to “1 to 100.”

Caution added.

P27 Error numbers 35 and 36 added to “(2) Operation error.”

P31 Locating pin holes added to the EWHRT3, 5, 10, and 20 dimension diagrams

Ver. 3.0

All pages Added CE compliance mark, edited controller internal wiring, edited communications command list, edited error message list, edited main unit dimensions, edited connecting cable diagram dimensions.

P. 34 Added drawing of DIN rail mounting plate EW2DP.

P. 35 Added drawing of power cable EW2KP.

P. 31 General specifications of 「Controller Basic Specifications」 Noise resistance revised.

ELEWAVE SERIES Electric rotary actuator

Point input type controller

OWNER'S MANUAL

Aug. 2022 Ver 3.0 X495025

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