IAI
Quality and Innovation

EC-RTB4
EC-RTC9/12/18

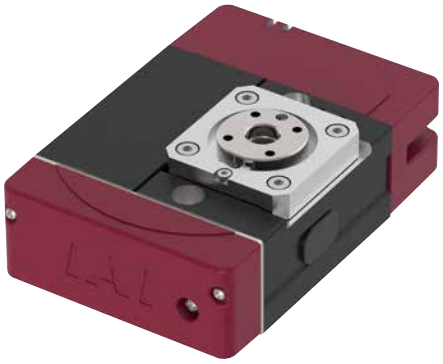
ELECYLINDER®
Rotary Type

Simple & Wireless Operation
2 Position Actuator

www.intelligentactuator.com

2-point positioning | Built-in controller

ELECYLYNDER®
ROTARY TYPE
EC-RTB4 / RTC9 / RTC12 / RTC18



Smooth stopping without impact

ELECYLINDER allows the acceleration (A), velocity (V), and deceleration (D) to be set using numeric values. This allows the deceleration speed to be adjusted for smooth stopping without impact.

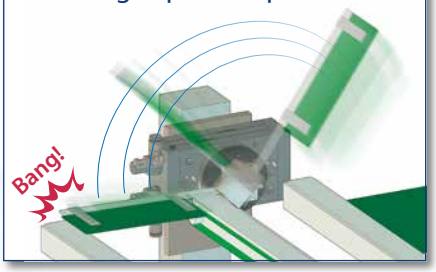
Circuit board turnover system

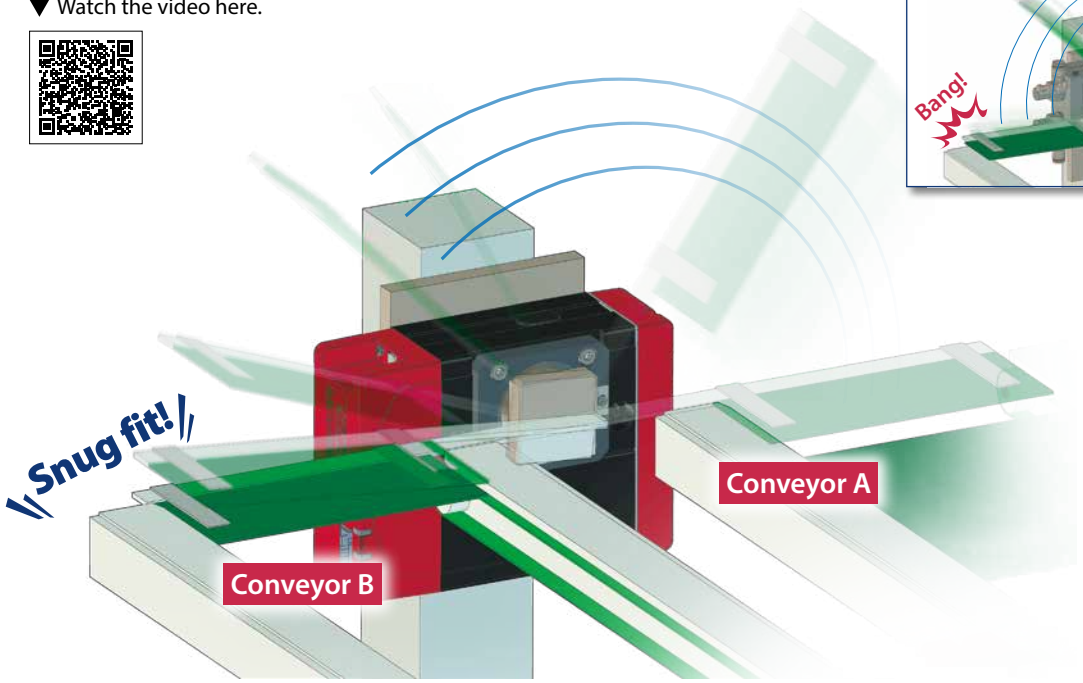
The rotary cylinder turns over circuit boards carried by conveyor A, and loads them on conveyor B

▼ Watch the video here.

Conventional system (air rotary)

High speed impact

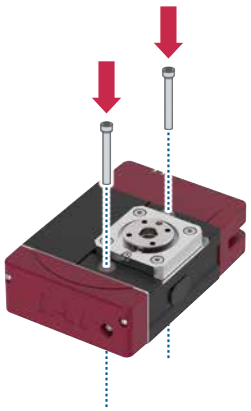




Can be bolted from the top

Installation bolt size	**RTB4: M4** **RTC9: M6** **RTC12: M8** **RTC18: M8**

* Bolts should be prepared by the customer.
* EC-RTB4 does not have through holes.



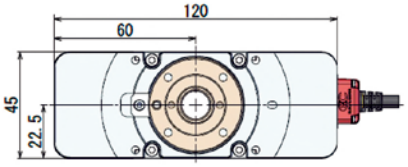
NEW! Small size rotary EC-RTB4

Vertical types with greatly reduced footprint have been added to the lineup.

Space saving

The footprint has greatly been reduced.

Footprint
5400㎟



By mounting the built-in motor vertically, the footprint has been reduced

Large hollow shaft

The φ12 hollow shaft allows easy arrangement for wiring and piping.

Symmetric design

The rotary's rotation center is located in the center of the main unit, allowing for well-balanced mounting.

Easy programming due to the wireless teaching controller

Wireless teaching controller

Easy setting	
Level	Velocity (V)
Forward (F)	10
Backward (B)	8

Easy setting (10 steps)

AVD setting			
%	A	V	D
F	30	70	20
B	80	100	50

AVD (Acceleration, Velocity and Deceleration) setting

Cycle time	
	Time (S)
Forward (F)	0.7
Backward (B)	1.2

Cycle time displayed

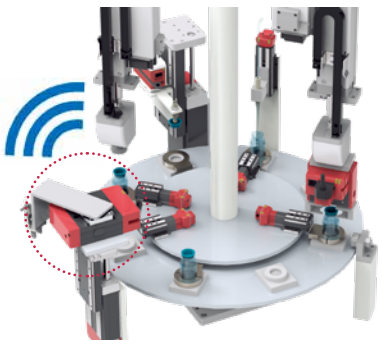
No cable connection

Operate from a remote location

Connectable up to 16 axes

The wireless teaching controller is capable of

* Basic setting (positions, acceleration, velocity and deceleration)
* Reading the current position, * Test run
* Jog motion, * Brake release
* Motor power ON/OFF
* Cycle time display
* Error display, * Alarm reset



Communication with the wireless teaching controller is possible when the ELECYLINDER® is of the wireless communication specification (Model code: WL) and wireless axis operation specification (Model: WL2).
If the wireless option is not selected, communication is not possible. (Same as the products purchased before)

Model Specification Items

【NEW!】 EC-RTB4

ELECYLINDER®

NPN specification is standard. PNP option is available

EC – [ ] **M** – **330** – [ ] – [ ] – ([ ])

Series	Type	Deceleration ratio	Oscillation angle	Actuator cable length	Power • I/O cable length	Options

Type

RTB4	Vertical type 45mm wide

Deceleration ratio

M	1/10.5

Oscillation angle

330	330 degrees rotation

Actuator cable length

1	1m
≀	(Every 1m)
10	10m

Select the length up to 9m if an interface box is used.

Power • I/O cable length

0	No cable Power • I/O cable length supplied (Note 1)
(S)1	1m
≀	(Every 1m)
(S)9	9m

(S) 4-way connector cable
(Note) Select the cable so that the total length with the actuator cable is 10m or less.
(Note 1) Choose "0" if RCON-EC connection specification (ACR) is selected. Power • I/O connector is not included.

Options

Blank	Incremental encoder specification NPN specification without option
ACR	RCON-EC connection specification (Note 1) (Note 2)
B	With brake
CJB	Cable exit orientation (bottom)
CJL	Cable exit orientation (left)
CJR	Cable exit orientation (right)
CJT	Cable exit orientation (top)
NM	Non-motor end specification
PN	PNP specification (Note 1)
SA	Shaft adaptor
TA	Table adaptor
TMD2	Split power and controller power specification (Note 1)
WA	Battery-less absolute encoder specification
WL	Wireless communication specification (Note 2)
WL2	Wireless axis operation specification (Note 2)

(Note 1) When "ACR" is selected, "PN" and "TMD2" cannot be selected.
(Note 2) When "ACR" is selected, "WL" and "WL2" cannot be selected. (For wireless communication, an interface box and cable must be ordered separately.

EC-RTC9/12/18

ELECYLINDER®

NPN specification is standard. PNP option is available

EC – [ ] **M** – **330** – [ ] – ([ ])

Series	Type	Deceleration ratio	Oscillation angle	Power • I/O cable length	Options

Type

RTC9	Flat type 90mm wide
RTC12	Flat type 117m wide
RTC18	Flat type 185mm wide

Deceleration ratio

<RTC9/RTC12>

M	1/45

<RTC18>

M	1/40

Oscillation angle

330	330 degrees rotation

Power • I/O cable length

0	No cable Power • I/O cable length supplied (Note 1)
(S)1	1m
≀	(Every 1m)
(S)10	10m

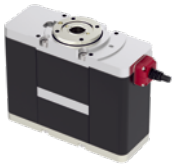
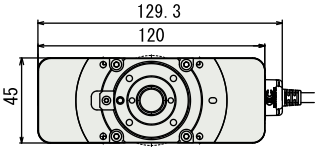
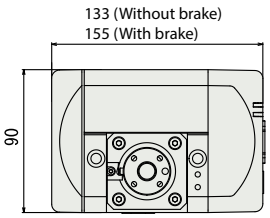
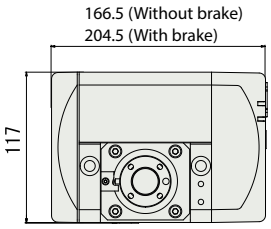
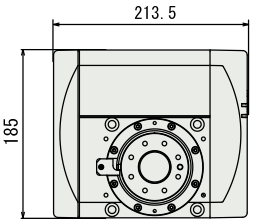
(S) 4-way connector cable
(Note 1) Choose "0" if RCON-EC connection specification (ACR) is selected. Power • I/O connector is not included.

Options

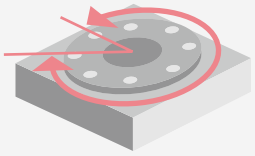
Blank	Incremental encoder specification NPN specification without option
ACR	RCON-EC connection specification (Note 1)
B	With brake
ES	External stopper (Note 2) (Note 3)
NM	Non-motor end specification
PN	PNP specification
SA	Shaft adaptor
TA	Table adaptor (Note 3)
TMD2	Split power and controller power specification
WA	Battery-less absolute encoder specification
WL	Wireless communication specification
WL2	Wireless axis operation specification

(Note 1) When RCON-EC connection specification is selected, the PNP specification (PN) and split power and controller power specification (TMD2) cannot be selected.
(Note 2) Only the EC-RTC18 can be selected.
(Note 3) When the external stopper (ES) is selected for EC-RTC18, the table adaptor (TA) is mounted and shipped.

Table of Specifications

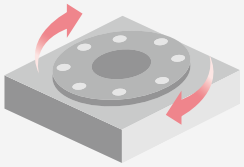
EC-RTB4	EC-RTC9	EC-RTC12	EC-RTC18
			
			

1 Operation range

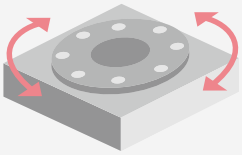


* The belt length indicates rotational angles that can be operated.

2 The maximum speed (rotation speed)



3 Allowable inertia moment



* The allowable inertia moment changes according to the rotation speed.

Type	Operation range (degree) and maximum speed (degrees/s) * The belt length = operation range. * Numbers in the belt = maximum speed. 330	Maximum torque (N·m)	Allowable inertia moment (kg·m2)	Reference page
RTB4	600	0.6	0.011	p7
RTC9	600	1.5	0.02	p11
RTC12	600	8.0	0.13	p15
RTC18	450	25.2	0.49	p19

Energy-saving setting

EC-RTC12 can select enable/disable for energy-saving setting by parameter (No. 8). The enable setting will reduce the power consumption by up to 40%, compared to that for the disable setting. On the other hand, the maximum speed, maximum accel/deceleration speed and payload will be reduced compared to that for the disable setting. If disabled, maximum speed and maximum accel/deceleration and payload will become larger compared to that of the enable setting. Refer to the "Payload by speed, acceleration" and "Maximum speed by stroke" in the product specification page. The factory default setting for the energy-saving is disabled.

Factory setting

Mode	Parameter name/description	Features
Power mode	Energy-saving setting disabled	High performance
Energy-saving mode	Energy-saving setting enabled	High energy-saving effect

Automatic servo OFF function

The Automatic servo OFF function can be set by the PC teaching software (IA-OS) or teaching pendant (TB-02/03).
When the automatic servo OFF function is set, after positioning is complete or stopped, the servo will be turned OFF after a prescribed time (delay time). When the next move command is input, servo will be automatically turned ON and positioning motion will be executed.
Because the holding current does not flow while stopping, power consumption can be reduced.

Rotary selection steps

The following conditions must be applied for use. Calculate and check the following values (procedures 1 and 2).
When an optional shaft adaptor or table adaptor is mounted, add mass and inertia moment.

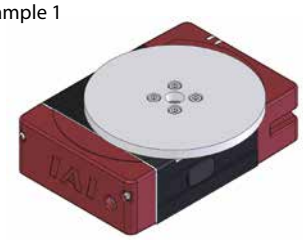
Procedure 1

Check the moment of inertia: (1) If there is no load torque, (2) If there is load torque
*The method for checking the moment of inertia differs depending on whether or not there is a load torque.

(1) If there is no load torque...

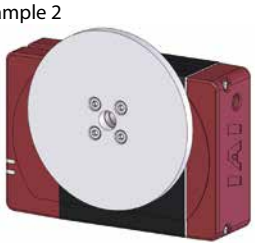
When used as shown in the figure below, there will be no load torque due to gravity. Therefore, calculate the moment of inertia of the load only, and then confirm that it does not exceed the allowable inertia moment.
Use the calculation method for the applicable typical shape to calculate the moment of inertia for the tooling or workpiece that will be used (See the next page).

Example 1



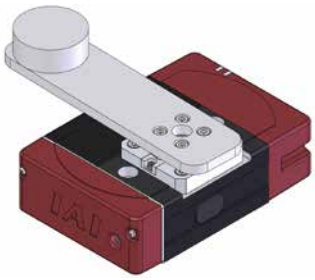
Center mass location of load: Output shaft center
Installation orientation: Horizontal on flat surface/suspended

Example 2



Center mass location of load: Output shaft center
Installation orientation: On side/vertical

Example 3

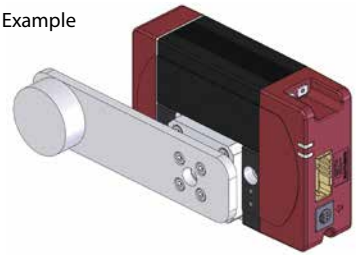


Center mass location of load: Offset from output shaft center
Installation orientation: Horizontal on flat surface/suspended

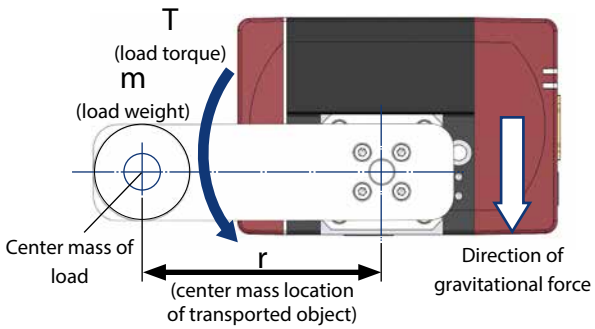
(2) If there is load torque...

When used as shown in the figure below, there will be load torque due to gravity. This will cause the allowable moment of inertia to decrease by that amount. First, calculate the load torque and obtain the corrected allowable moment of inertia. Then, calculate the moment of inertia and confirm that it does not exceed the corrected allowable moment of inertia.

Example



Center mass location of load: Offset from output shaft center
Installation orientation: On side/vertical



Step 1 Calculate load torque T

$$T = mgr \times 10^{-3}$$

T	: Load torque	[N·m]
m	: Weight of transported object	[kg]
g	: Gravitational acceleration	[m/s²]
r	: Center mass location of transported object	[mm]

Step 2 Calculate allowable moment of inertia correction factor Cj

$$C_j = \frac{T_{max} - T}{T_{max}}$$

T_{max}: Output torque [N·m]

*See the individual product pages for the value of output torque T_{max}.

Step 3 Calculate corrected allowable moment of inertia Jtl

$Jtl = Jmax \times Cj$

$Jmax$: Allowable inertia moment (kg·m²)

*See the individual product pages for the value of allowable moment of inertia Jmax .

Step 4 Check moment of inertia of transported object

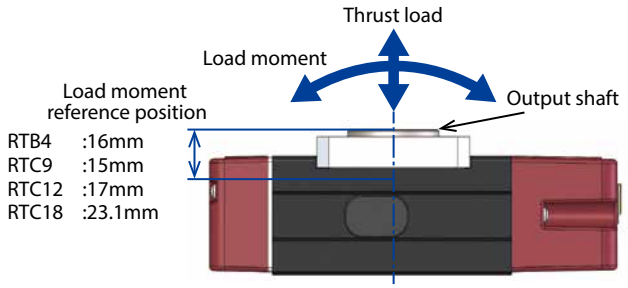
Use the "formulas for calculating moment of inertia of typical shapes" below to calculate the moment of inertia of the load, and confirm that it does not exceed the corrected moment of inertia calculated during Step 3.

Procedure 2

Check the moment load and thrust load

Confirm that the moment load and thrust load on the output shaft are within the allowable range. If used in excess of the allowable range, it could shorten product life or cause failure.

*See the individual product pages for the values of the allowable dynamic thrust load and allowable dynamic load moment.



Formulas for calculating moment of inertia of typical shapes

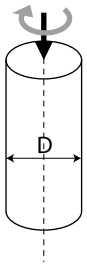
1. When the rotational axis passes through the center of the object

(1) Moment of inertia of cylinder 1

*The same formula can be applied irrespective of the height of the cylinder (also for circular plate)

<Formula> $J=M\times(D\times10^{-3})^2/8$

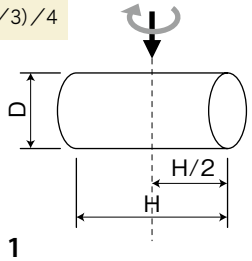
Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (unit: kg)
Cylinder diameter: D (mm)



(2) Moment of inertia of cylinder 2

<Formula> $J=M\times((D\times10^{-3})^2/4+(H\times10^{-3})^2/3)/4$

Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (kg)
Cylinder diameter: D (m)
Cylinder length: H (mm)

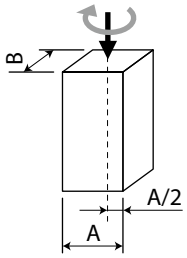


(3) Moment of inertia of prism 1

*The same formula can be applied irrespective of the height of the prism (also for rectangular plate)

<Formula> $J=M\times((A\times10^{-3})^2+(B\times10^{-3})^2)/12$

Moment of inertia of prism: J (kg·m²)
One side of prism: A (mm)
One side of prism: B (mm)



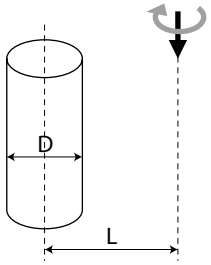
2. When the center of the object is offset from the rotational axis

(4) Moment of inertia of cylinder 3

*The same formula can be applied irrespective of the height of the cylinder (also for circular plate)

<Formula> $J=M\times(D\times10^{-3})^2/8+M\times(L\times10^{-3})^2$

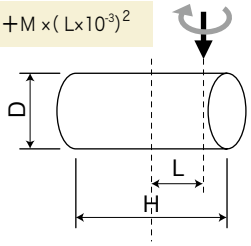
Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (kg)
Cylinder diameter: D (m)
Distance from rotational axis to center: L (mm)



(5) Moment of inertia of cylinder 4

<Formula> $J=M\times((D\times10^{-3})^2/4+(H\times10^{-3})^2/3)/4+M\times(L\times10^{-3})^2$

Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (kg)
Cylinder diameter: D (m)
Cylinder length: H (mm)
Distance from rotational axis to center: L (mm)

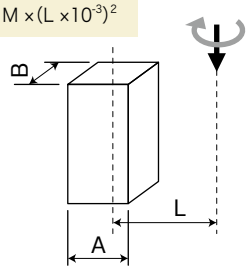


(6) Moment of inertia of prism 2

*The same formula can be applied irrespective of the height of the prism (also for rectangular plate)

<Formula> $J=M\times((A\times10^{-3})^2+(B\times10^{-3})^2)/12+M\times(L\times10^{-3})^2$

Moment of inertia of prism: J (kg·m²)
Prism weight: M (kg)
One side of prism: A (mm)
One side of prism: B (mm)
Distance from rotational axis to center: L (mm)



EC-RTB4

Body Width 50 mm | 24v Stepper Motor

Model Specification Items

Series	Type	Deceleration ratio	Stroke	Actuator cable length	Power • I/O cable length	Option
EC	RTB4	M	330			
		M: Deceleration ratio 1/10.5	330: 330 degrees rotation	Refer to the actuator cable length table below	Refer to Power • I/O cable length below	Refer to Option below

NPN specification is standard. PNP option is available.

CE RoHS 10

Horizontal | Vertical | Side | Ceiling

Product

Rotation angle (degree)	RCON-EC connection specification (Note 1)	NPN/PNP connection specification
330	✓	✓

(Note 1) Be sure to select "ACR" as an option.

Option

Name	Option code	Reference page
RCON-EC connection specification (Note 3) (Note 4)	**ACR**	23
Brake	**B**	23
Cable exit orientation (bottom)	**CJB**	23
Cable exit orientation (left)	**CJL**	23
Cable exit orientation (right)	**CJR**	23
Cable exit orientation (top)	**CJT**	23
Non-motor end specification	**NM**	23
PNP specification (Note 3)	**PN**	24
Shaft adaptor	**SA**	24
Table adaptor	**TA**	24
Split power and controller power specification (Note 3)	**TMD2**	24
Battery-less absolute encoder specification	**WA**	24
Wireless communication specification (Note 4)	**WL**	24
Wireless axis operation specification (Note 4)	**WL2**	24

(Note 3) If the RCON-EC connection specification (ACR) is selected, the PNP specification (PN) and split motor and controller power supply specification (TMD2) cannot be selected. The interface box and conversion cable are not included.

(Note 4) If the RCON-EC connection specification (ACR) is selected, the wireless communication specification (WL) and wireless axis operation specification (WL2) cannot be selected. For wireless communication (WL) with RCON-EC connection, an interface box, conversion cable and power • I/O cable should be ordered separately. Refer to P26 for details. In case of the wireless axis operation specification (WL2), contact IAI.

Other options

Name	Model code	Reference page
Interface box conversion cable	CB-CVN-BJ002	36
RCON-EC connection specification Power • I/O cable (Standard connector cable)	CB-REC-PWBIO□□□-RB	37
RCON-EC connection cable Power • I/O cable (4-way connector cable)	CB-REC2-PWBIO□□□-RB	37
RCON-EC connection cable Interface box for split power and controller power specification (Wireless specification)	ECW-CVNWL-CB-ACR	36

(Note) The power • I/O cable is a robot cable.
Specify the cable length in □□□. (e.g., 010=10m)

POINT Selection Notes

(1) Output torque decreases as rotation speed increases. Refer to the "correlation diagram between rotation speed and output torque" for details.

(2) The allowable moment of inertia of a workpiece being rotated will vary depending on the rotation speed. Refer to the "correlation diagram between rotation speed and output torque" for details.

(3) The brake is used for retention purposes only, Do not use it for braking or emergency stopping.

(4) When selecting, calculate values as described in "Selection Method (from P5)" and check the usage conditions.

(5) If performing push-motion operations, refer to the "correlation diagrams between push force and current limit". The push forces listed are for reference only.

Actuator cable length

Cable code	Cable length	Actuator cable length
1 ~ 3	1 ~ 3m	✓
4 ~ 5	4 ~ 5m	✓
6 ~ 10	6 ~ 10m(Note 5)	✓

(Note 5) When connection is via the interface box, the maximum is 9m.s.
(Note) Select the cable so that the total length with the actuator cable is 10m or less.
(Note) Robot cable.

Power • I/O Cable Length

Standard connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC-PWBIO□□□-RB supplied
0	No cable	✓ (Note 6)
1 ~ 3	1 ~ 3m	✓
4 ~ 5	4 ~ 5m	✓
6 ~ 7	6 ~ 7m	✓
8 ~ 9	8 ~ 9m	✓

(Note 6) Only terminal block connector is included. Please refer to P. 53 for details.
(Note) Robot cable.

4-way connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC2-PWBIO□□□-RB supplied
S1 ~ S3	1 ~ 3m	✓
S4 ~ S5	4 ~ 5m	✓
S6 ~ S7	6 ~ 7m	✓
S8 ~ S9	8 ~ 9m	✓

(Note) Robot cable.

Main Specifications

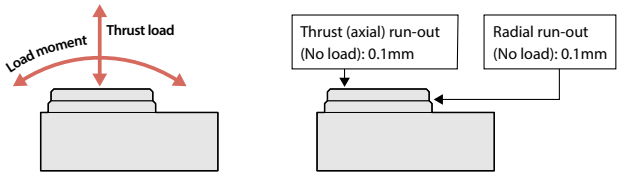
Item		Description
Deceleration ratio		1/10.5
Maximum torque (N·m)		0.6
Speed/Acceleration/Deceleration (degree/s)(Note7)	Maximum speed (degree/s)	600
	Minimum speed (degree/s)	20
	Rated acceleration/deceleration (G)	0.3
	Maximum acceleration/deceleration (G)	0.5
Brake	Brake specification	non-excitation actuating solenoid brake
	Brake holding torque (N·m) (Note 8)	0.5
Operation range (degrees)		330

(Note 7) 1G≒9807 degrees/s^2
(Note 8) Allowable inertia moment and brake holding toque are not necessarily compatible. Confirm that the load torque is less than the brake holding torque.

Item	Description
Driving system	Timing belt
Positioning repeatability	±0.05 degrees
Homing method	Mechanical stopper system
Home return accuracy	±0.05 degrees
Backlash (Note 9)	0.15 degrees
Allowable thrust lead	100N
Dynamic allowable load moment (Note 10)	1.5N・m
Allowable inertia moment	0.011kg・m^2
Radial rotation runout	0.1mm or less
Thrust rotation runout	0.1mm or less
Ambient operating temperature, humidity	0-40°C, 85%RH or less (non-condensing)
Degree of protection	IP20
Vibration/shock resistance	4.9m/s^2
Overseas standards	CE marking, RoHS directive
Motor type	Stepper motor (□28) (Power capacity: Maximum 2A)
Encoder type	Incremental (standard) /battery-less absolute
Number of encoder pulses	16384 pulse/rev

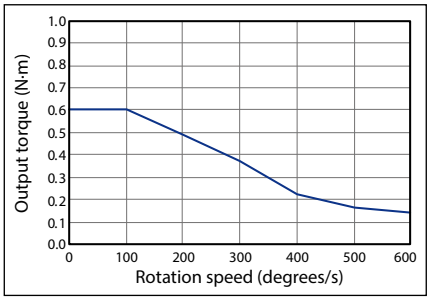
(Note 9) Due to the timing belt driving system, there is no mechanical backlash. However, there is a hysteresis loss due to the timing belt stretching.
(Note 10) 0.5N・m for the side and vertical mount.

■ Rotary type moment direction

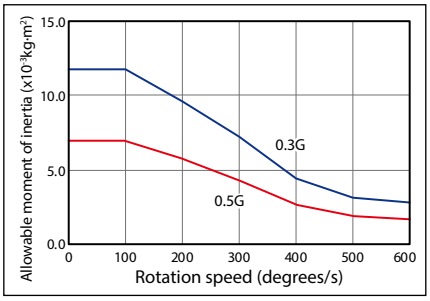


Correlation diagram between speed and output torque, allowable moment of inertia

■ Correlation diagram between rotation speed and output torque



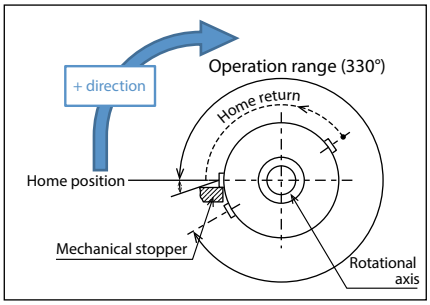
■ Correlation diagram between rotation speed and allowable moment of inertia



(Note) 0.5G can be used only when horizontal/suspended.

Homing method and positive rotation direction

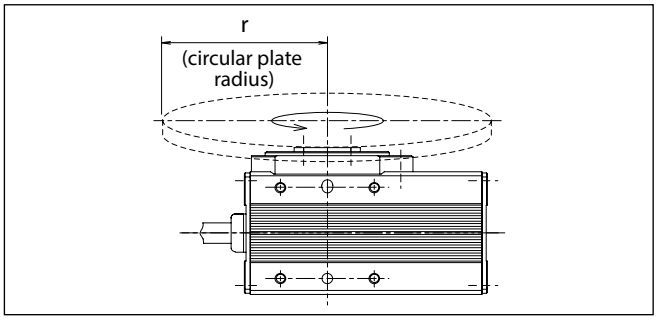
■ 330-degree rotation specification



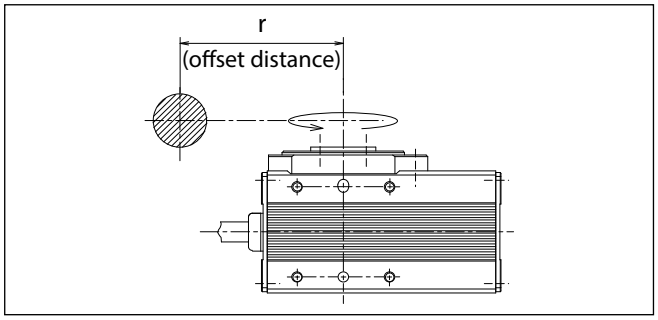
The positive rotation direction will be clockwise when viewing the rotating part from above. During home return motion, it rotates counterclockwise. It detects the mechanical stopper position, moves in reverse, and then stops.
(Note) For the non-motor end specification, all movement directions are in reverse.

Guideline for load shape and mass

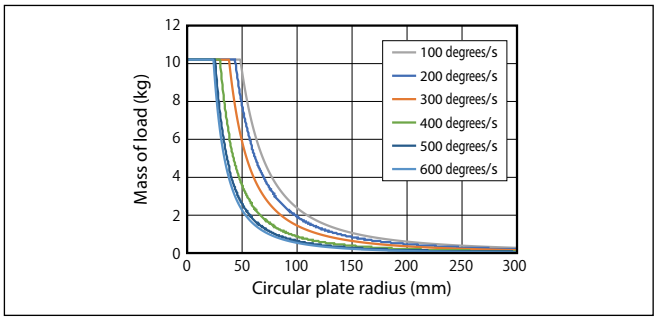
■ When the center of gravity of a circular plate load is the same as the rotational center of the output shaft



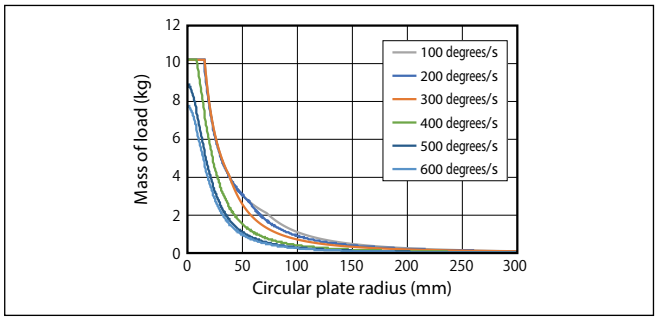
■ When the center of gravity of the load is offset from the rotational center of the output shaft



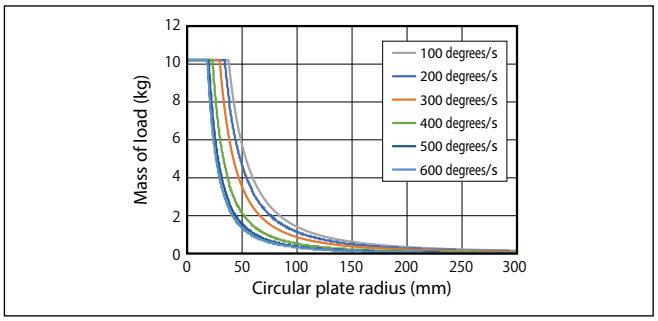
Acceleration 0.3G



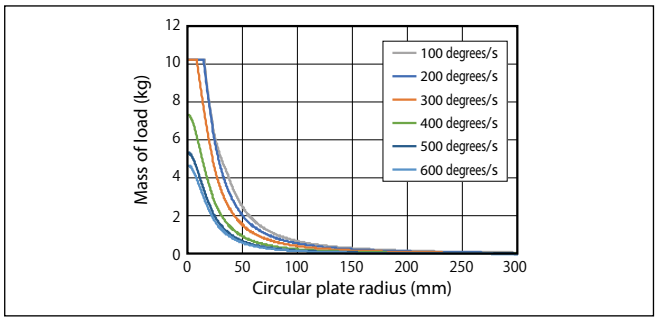
Acceleration 0.3G



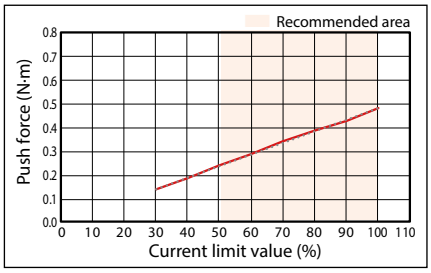
Acceleration 0.5G



Acceleration 0.5G



Correlation of push force and current limit value

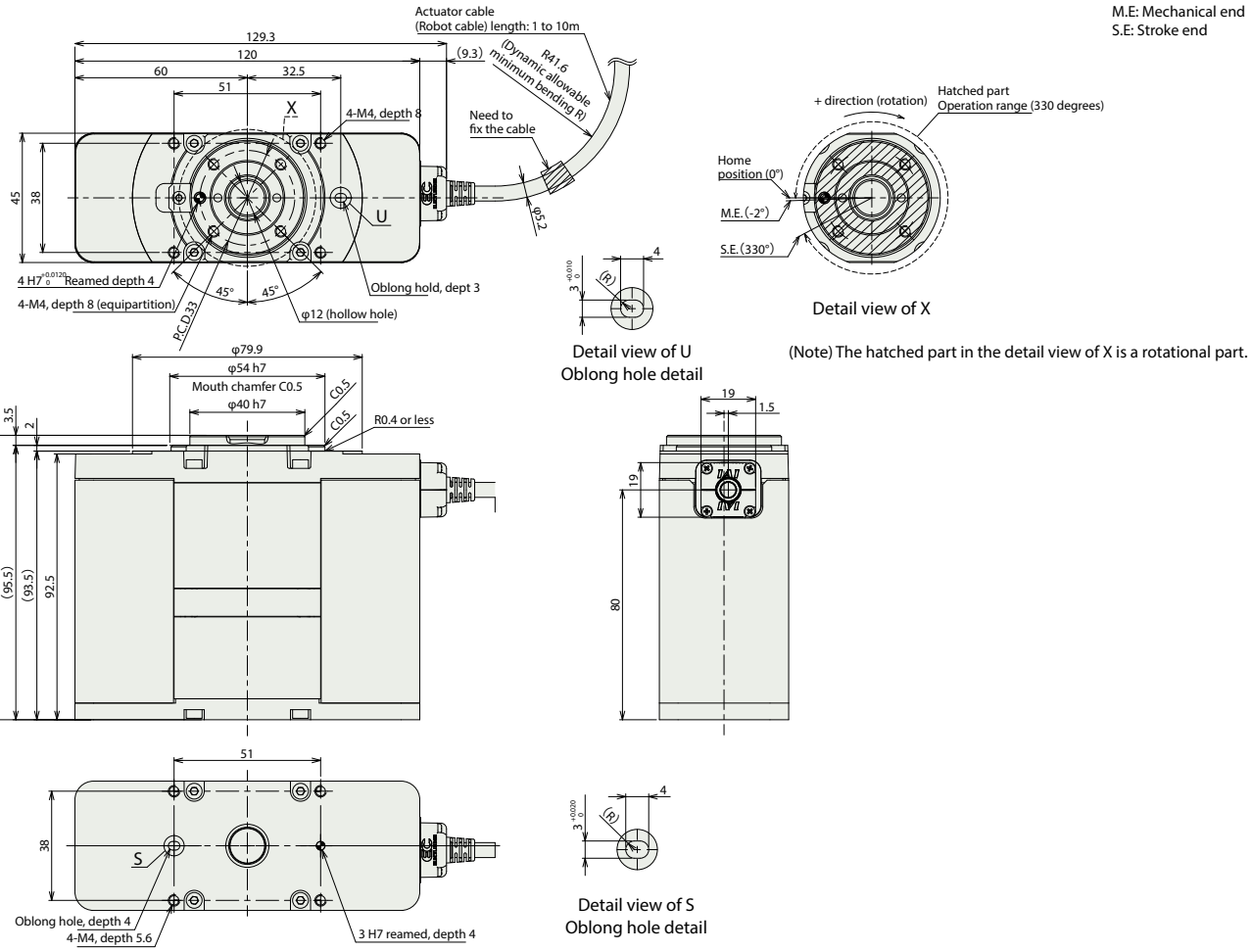


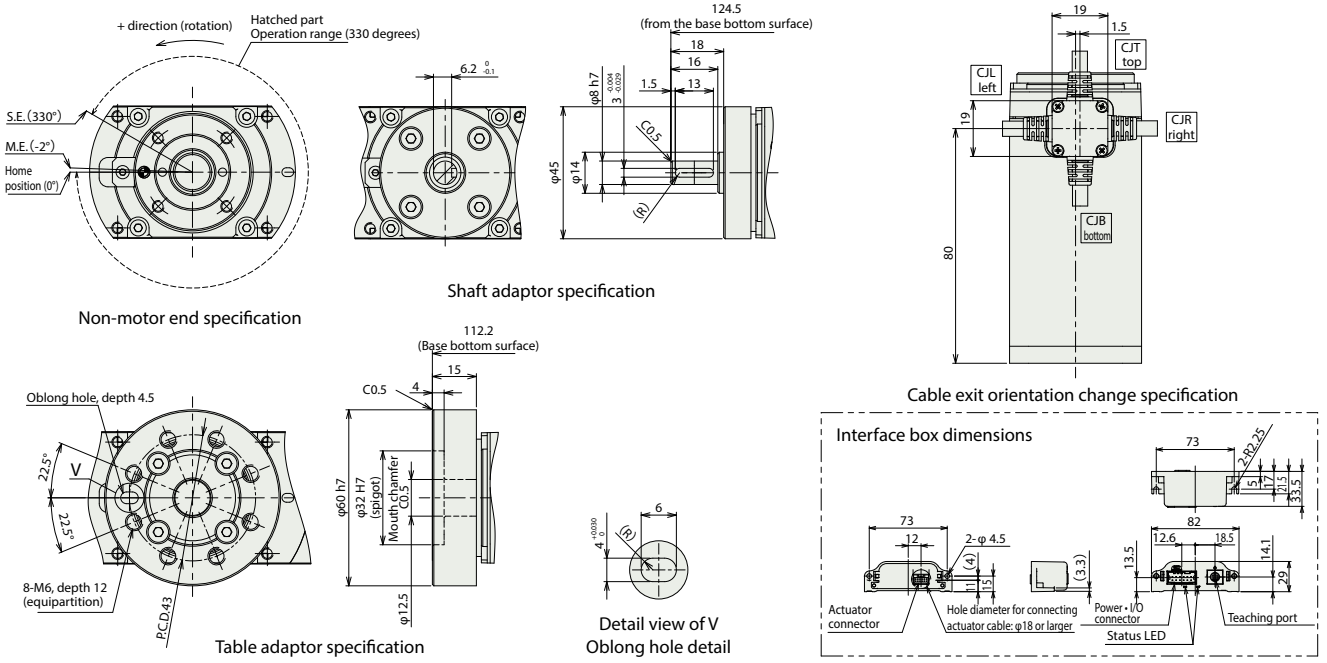
Dimensions

CAD drawings can be downloaded from our website.
www.intelligentactuator.com

2D CAD 3D CAD

M.E: Mechanical end
S.E: Stroke end





Mass

Item		Description
Mass	Without brake	1.00kg
	With brake	1.10kg

(Note) The product weight is the value when RCON connection specification and actuator cable length of 1m are selected.

Applicable controllers

(Note) The EC series is equipped with a built-in controller. Please refer to P.29 for more information on built-in controllers.

EC-RTC9

Body Width 90 mm | 24v Stepper Motor

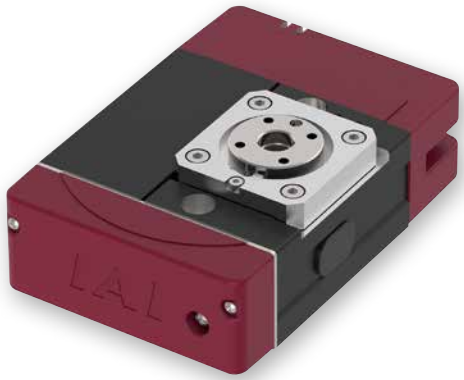
Model Specification Items

EC	-	RTC9	M	-	330	-		-	
Series	-	Type	Deceleration ratio	-	Oscillation angle	-	Power • I/O cable length	-	Options
			M: Deceleration ratio 1/45		330: 330-degree rotation		Refer to Power • I/O cable length below		Refer to Options table below

NPN specification is standard. PNP option is available.

CE RoHS 10

Horizontal | Vertical | Side | Ceiling



Products

Oscillation angle (degree)	EC-RTC9
330	✓

Options

Name	Option code	Reference page
RCON-EC connection specification (Note 1)	**ACR**	23
Brake	**B**	23
Non-motor end specification	**NM**	23
PNP specification	**PN**	24
Shaft adaptor	**SA**	24
Table adaptor	**TA**	24
Split power and controller power specification	**TMD2**	24
Battery-less absolute encoder specification	**WA**	24
Wireless communication specification	**WL**	24
Wireless axis operation specification	**WL2**	24

(Note 1) If the RCON-EC connection specification (ACR) is selected, the PNP specification (PN) and split motor and controller power supply specification (TMD2) cannot be selected.

Power • I/O Cable Length

Standard connector cable

Cable code	Cable length	User wiring specification (flying leads)	RCON-EC connection specification (Note 3) (with connectors on both ends)
		CB-EC-PWBIO□□□-RB supplied	CB-REC-PWBIO□□□-RB supplied
0	No cable	✓ (Note 2)	✓
1 ~ 3	1 ~ 3m	✓	✓
4 ~ 5	4 ~ 5m	✓	✓
6 ~ 7	6 ~ 7m	✓	✓
8 ~ 10	8 ~ 10m	✓	✓

(Note 2) Only terminal block connector is included. Please refer to P. 53 for details.
(Note 3) If RCON-EC connection specification (ACR) is selected as an option.
(Note) Robot cable.

4-way connector cable

Cable code	Cable length	User wiring specification (flying leads)	RCON-EC connection specification (Note 4) (with connectors on both ends)
		CB-EC2-PWBIO□□□-RB supplied	CB-REC2-PWBIO□□□-RB supplied
S1 ~ S3	1 ~ 3m	✓	✓
S4 ~ S5	4 ~ 5m	✓	✓
S6 ~ S7	6 ~ 7m	✓	✓
S8 ~ S10	8 ~ 10m	✓	✓

(Note 4) If RCON-EC connection specification (ACR) is selected as an option.
(Note) Robot cable.

POINT Selection Notes

(1) Output torque decreases as rotation speed increases. Refer to the "correlation diagram between rotation speed and output torque" for details.
(2) The allowable moment of inertia of a workpiece being rotated will vary depending on the rotation speed. Refer to the "correlation diagram between rotation speed and allowable moment of inertia" for details.
(3) The brake is used for retention purposes only, Do not use it for braking or emergency stopping.
(4) When selecting, calculate values as described in "Selection Method (from P. 5)" and check the usage conditions.
(5) If performing push-motion operations, refer to the "correlation diagrams between push force and current limit". The push forces listed are for reference only.
(6) The maximum acceleration/deceleration is 0.5G when horizontal/suspended, or 0.3G when on side/vertical.

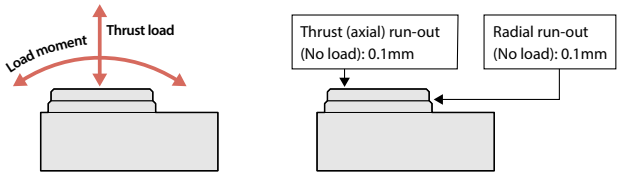
Main Specifications

Item		Description
Deceleration ratio		1/45
Maximum torque (N·m)		1.5
Speed/Acceleration/Deceleration (degree/s)(Note5)	Maximum speed (degree/s)	600
	Minimum speed (degree/s)	20
	Rated acceleration/deceleration (G)	0.3
	Maximum acceleration/deceleration (G) (note 6)	0.5
Brake	Brake specification	non-excitation actuating solenoid brake
	Brake holding torque (N·m) (Note 7)	0.9
Operation range (degrees)		330

(Note 5) 1G≒9807 degrees/s^2
(Note 6) Horizontal only. The maximum acceleration/deceleration will be 0.3G when on side/vertical.
(Note 7) Allowable inertia moment and brake holding toque are not necessarily compatible. Confirm that the load torque is less than the brake holding torque.

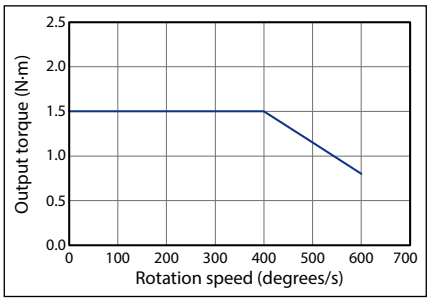
Item	Description
Driving system	Hypoid gear + timing belt
Positioning repeatability	±0.05 degrees
Homing method	Mechanical stopper method
Home return accuracy	±0.05 degrees
Backlash	0.2° or less
Allowable thrust lead	50N
Dynamic allowable load moment	5N·m
Allowable inertia moment	0.02kg·m^2
Radial rotation runout	0.1mm or less
Thrust rotation runout	0.1mm or less
Ambient operating temperature, humidity	0-40°C, 85%RH or less (non-condensing)
Degree of protection	IP20
Vibration/shock resistance	4.9m/s^2
Overseas standards	CE marking, RoHS directive
Motor type	Stepper motor (□28) (Power capacity: Maximum 2A)
Encoder type	Incremental /battery-less absolute
Number of encoder pulses	800 pulse/rev

Rotary type moment direction

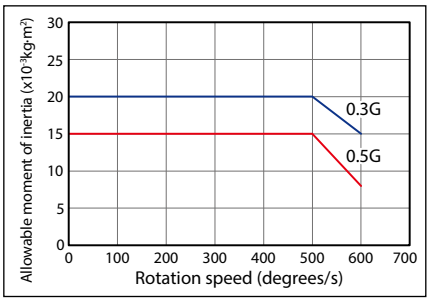


Correlation diagram between speed and output torque, allowable moment of inertia

Correlation diagram between rotation speed and output torque



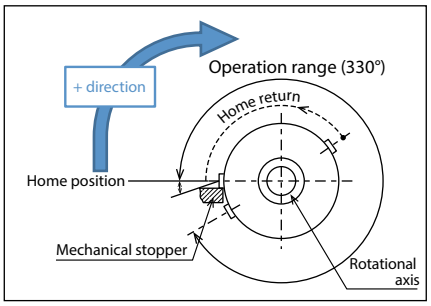
Correlation diagram between rotation speed and allowable moment of inertia



(Note) 0.5G can be used only when horizontal/suspended.

Homing method and positive rotation direction

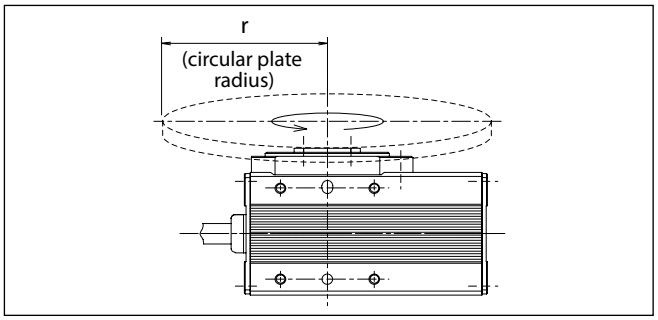
330-degree rotation specification



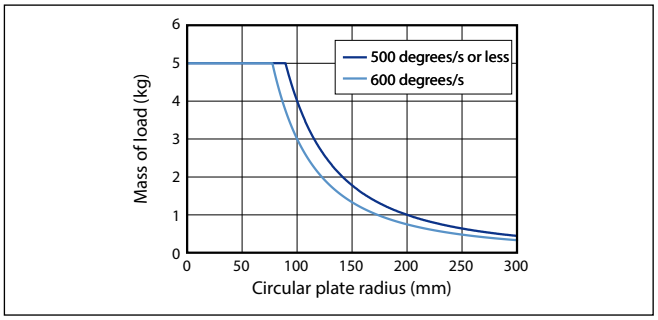
The positive rotation direction will be clockwise when viewing the rotating part from above. During home return motion, it rotates counterclockwise. It detects the mechanical stopper position, moves in reverse, and then stops.
(Note) For the non-motor end specification, all movement directions are in reverse.

Guideline for load shape and mass

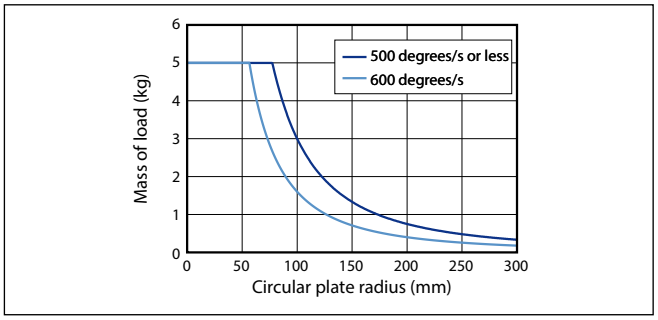
■ When the center of gravity of a circular plate load is the same as the rotational center of the output shaft



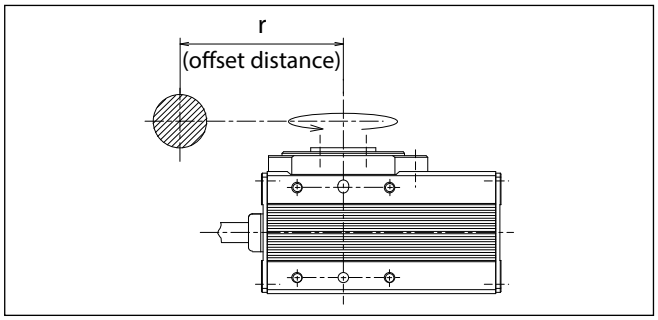
Acceleration 0.3G



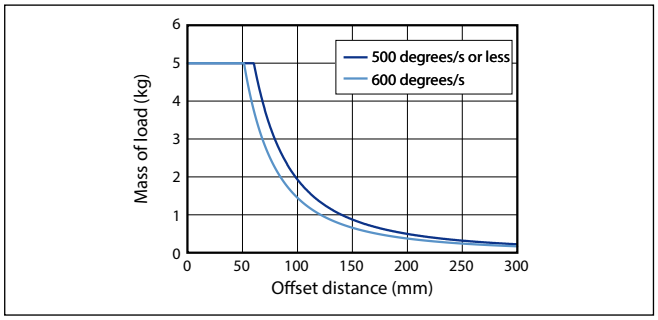
Acceleration 0.5G



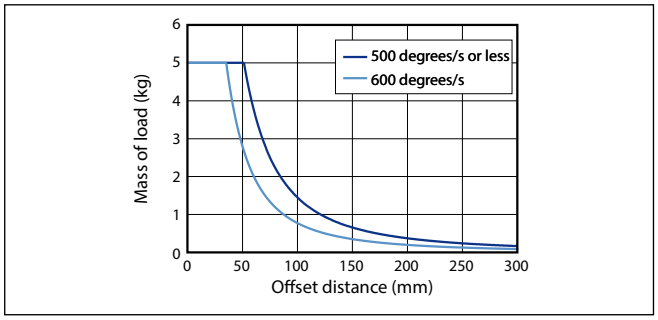
■ When the center of gravity of the load is offset from the rotational center of the output shaft



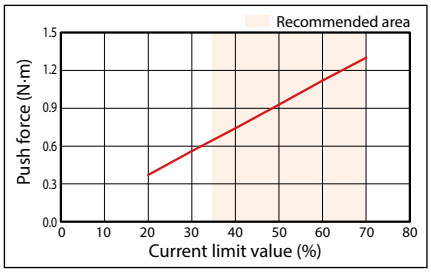
Acceleration 0.3G



Acceleration 0.5G



Correlation of push force and current limit value

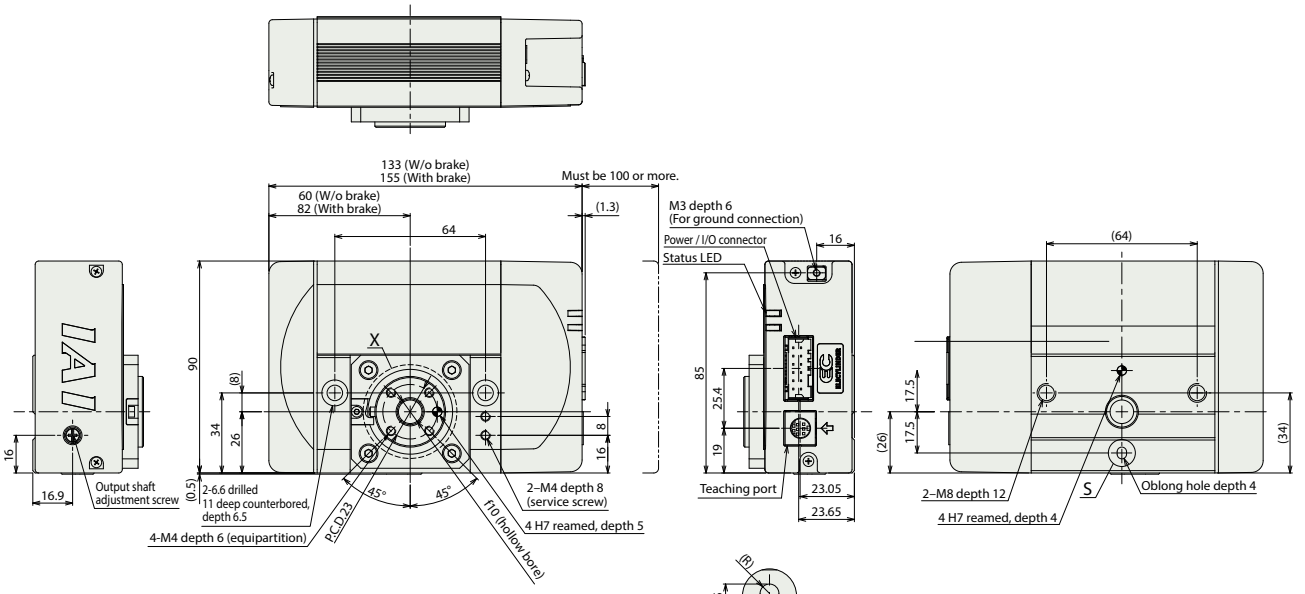


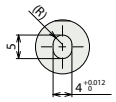
Dimensions

CAD drawings can be downloaded from our website.
www.intelligentactuator.com

2D CAD 3D CAD

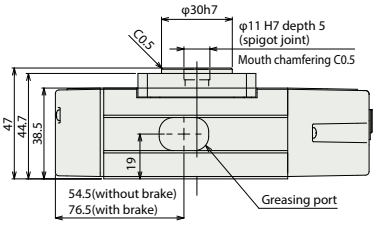
M.E: Mechanical end
S.E: Stroke end

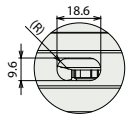




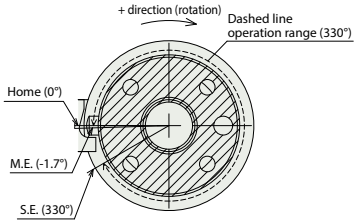
Detailed view of S
Details of base oblong hole

(Note) The hatched part in the detail view of X is a rotational part.

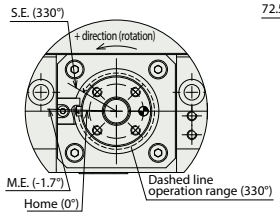




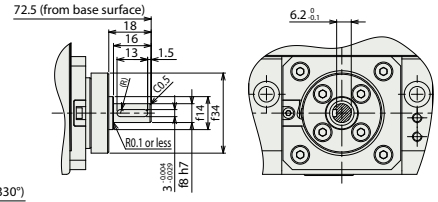
Grease lubrication port
detailed view



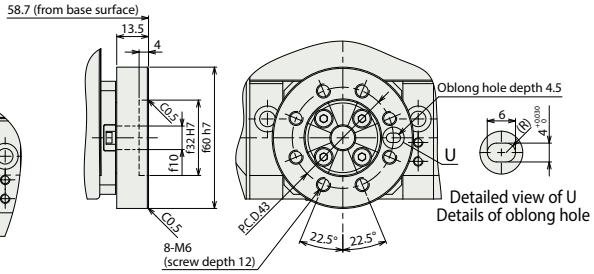
Detailed view of X



Non-motor end specification



Shaft adapter specification



Detailed view of U
Details of oblong hole

Table adapter specification

Mass

Item		Description
Mass	Without brake	0.88kg
	With brake	0.98kg

Applicable controllers

(Note) The EC series is equipped with a built-in controller. Please refer to P.29 for more information on built-in controllers.

EC-RTC12

Body Width 120 mm | 24v Stepper Motor

Model Specification Items

EC	-	RTC12	M	-	330	-		-	
Series	-	Type	Deceleration ratio	-	Oscillation angle	-	Power • I/O cable length	-	Options
			M: Deceleration ratio 1/45		330: 330-degree rotation		Refer to Power • I/O cable length below		Refer to Options table below.

NPN specification is standard. PNP option is available.

CE RoHS 10

Horizontal | Vertical | Side | Ceiling

Products

Oscillation angle (degree)	EC-RTC12
330	✓

Options

Name	Option code	Reference page
RCON-EC connection specification (Note 1)	**ACR**	23
Brake	**B**	23
Non-motor end specification	**NM**	23
PNP specification	**PN**	24
Shaft adaptor	**SA**	24
Table adaptor	**TA**	24
Split power and controller power specification	**TMD2**	24
Battery-less absolute encoder specification	**WA**	24
Wireless communication specification	**WL**	24
Wireless axis operation specification	**WL2**	24

(Note 1) If the RCON-EC connection specification (ACR) is selected, the PNP specification (PN) and split motor and controller power supply specification (TMD2) cannot be selected.

Power • I/O Cable Length

Standard connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC-PWBIO□□□-RB supplied	RCON-EC connection specification (Note 3) (with connectors on both ends) CB-REC-PWBIO□□□-RB supplied
0	No cable	✓ (Note 2)	✓
1 ~ 3	1 ~ 3m	✓	✓
4 ~ 5	4 ~ 5m	✓	✓
6 ~ 7	6 ~ 7m	✓	✓
8 ~ 10	8 ~ 10m	✓	✓

(Note 2) Only terminal block connector is included. Please refer to P. 53 for details.
(Note 3) If RCON-EC connection specification (ACR) is selected as an option.
(Note) Robot cable.

4-way connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC2-PWBIO□□□-RB supplied	RCON-EC connection specification (Note 4) (with connectors on both ends) CB-REC2-PWBIO□□□-RB supplied
S1 ~ S3	1 ~ 3m	✓	✓
S4 ~ S5	4 ~ 5m	✓	✓
S6 ~ S7	6 ~ 7m	✓	✓
S8 ~ S10	8 ~ 10m	✓	✓

(Note 4) If RCON-EC connection specification (ACR) is selected as an option.
(Note) Robot cable.

POINT Selection Notes

(1) Output torque decreases as rotation speed increases. Refer to the "correlation diagram between rotation speed and output torque" for details.

(2) The allowable moment of inertia of a workpiece being rotated will vary depending on the rotation speed. Refer to the "correlation diagram between rotation speed and allowable moment of inertia" for details.

(3) The brake is used for retention purposes only, Do not use it for braking or emergency stopping.

(4) When selecting, calculate values as described in "Selection Method (from P. 5)" and check the usage conditions.

(5) If performing push-motion operations, refer to the "correlation diagrams between push force and current limit". The push forces listed are for reference only.

(6) The maximum acceleration/deceleration is 0.7G when horizontal/suspended or 0.5G when on side/vertical with the energy-saving setting disabled, or 0.5G when horizontal/suspended or 0.3G on side/vertical with the energy-saving setting enabled.

Main Specifications

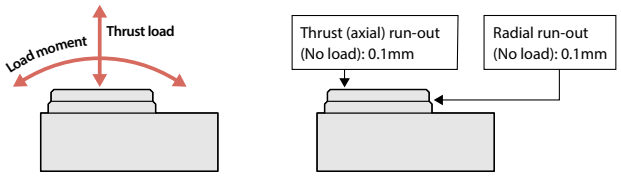
Item		Description
Deceleration ratio		1/45
Maximum torque (N·m)		8.0
Speed/Acceleration/Deceleration (degree/s)(Note5)	Maximum speed (degree/s)	600
	Minimum speed (degree/s)	20
	Rated acceleration/deceleration (G)	0.3
	Maximum acceleration/deceleration (G) (note 6)	0.6
Brake	Brake specification	non-excitation actuating solenoid brake
	Brake holding torque (N·m) (Note 7)	5.3
Operation range (degrees)		330

(Note 5) 1G≒9807 degrees/s^2
(Note 6) Horizontal only. The maximum acceleration/deceleration will be 0.3G when on side/vertical.
(Note 7) Allowable inertia moment and brake holding toque are not necessarily compatible. Confirm that the load torque is less than the brake holding torque.

Item	Description
Driving system	Hypoid gear + timing belt
Positioning repeatability	±0.01 degrees
Homing method	Mechanical stopper method
Home return accuracy	±0.01 degrees
Backlash	0.2° or less
Allowable thrust lead	400N
Dynamic allowable load moment (Note 8)	18N·m
Allowable inertia moment	0.13kg·m^2
Radial rotation runout	0.1mm or less
Thrust rotation runout	0.1mm or less
Ambient operating temperature, humidity	0-40°C, 85%RH or less (non-condensing)
Degree of protection	IP20
Vibration/shock resistance	4.9m/s^2
Overseas standards	CE marking, RoHS directive
Motor type	Stepper motor (□42) (Power capacity: Maximum 2A)
Encoder type	Incremental /battery-less absolute
Number of encoder pulses	800 pulse/rev

(Note 8) 12N·m when on side/vertical.

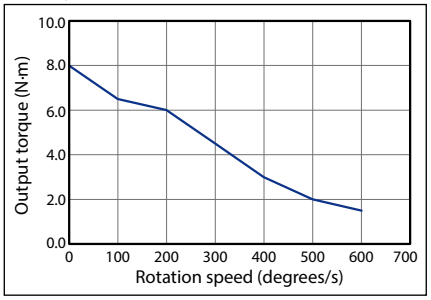
Rotary type moment direction



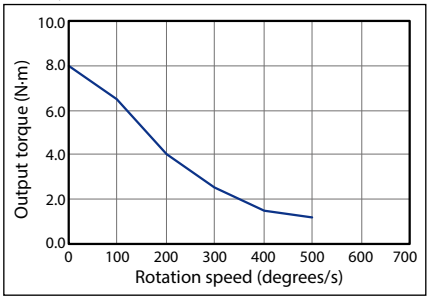
Correlation diagram between speed and output torque, allowable moment of inertia

Correlation diagram between rotation speed and output torque

Energy-saving setting disabled (power mode)

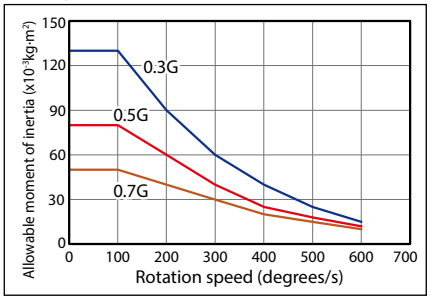


Energy-saving setting enabled (Energy saving mode)



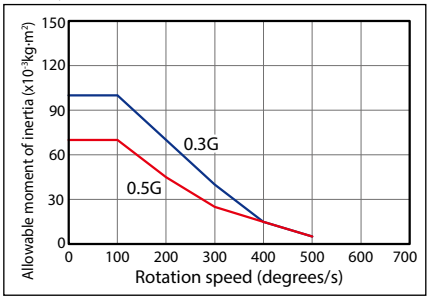
Correlation diagram between rotation speed and allowable moment of inertia

Energy-saving setting disabled (power mode)



(Note) 0.7G can be used only when horizontal/suspended.

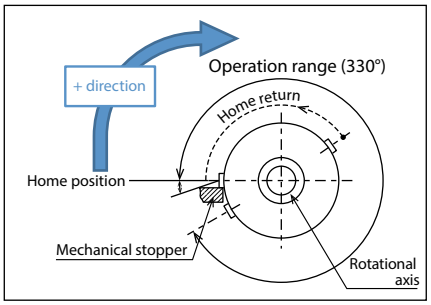
Energy-saving setting enabled (Energy saving mode)



(Note) 0.5G can be used only when horizontal/suspended.

Homing method and positive rotation direction

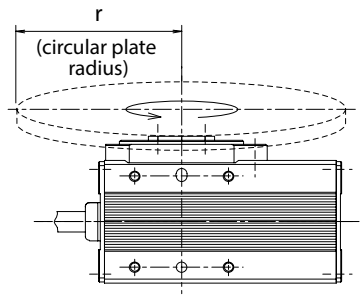
330-degree rotation specification



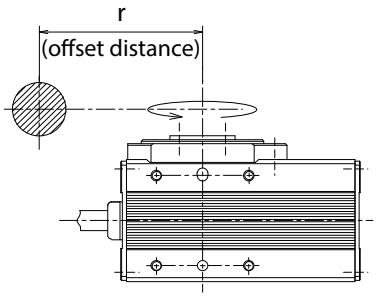
The positive rotation direction will be clockwise when viewing the rotating part from above.
During home return motion, it rotates counterclockwise.
It detects the mechanical stopper position, moves in reverse, and then stops.
(Note) For the non-motor end specification, all movement directions are in reverse.

Guideline for load shape and mass

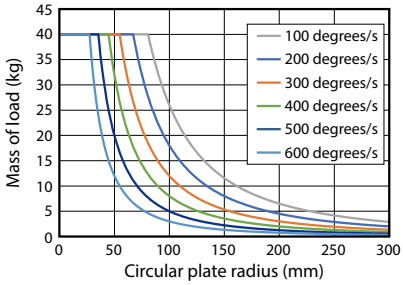
When the center of gravity of a circular plate load is the same as the rotational center of the output shaft



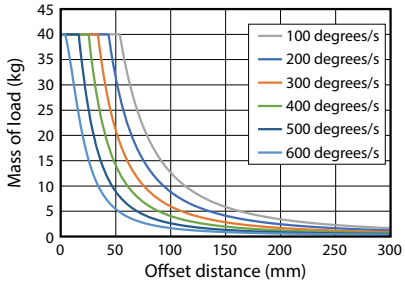
When the center of gravity of the load is offset from the rotational center of the output shaft



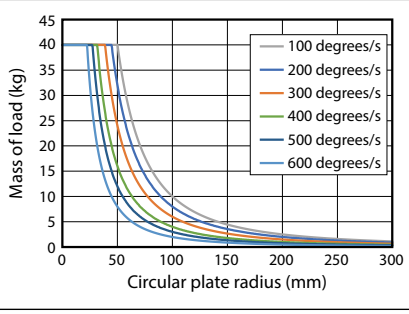
Acceleration 0.3G [energy-saving setting disabled (power mode)]



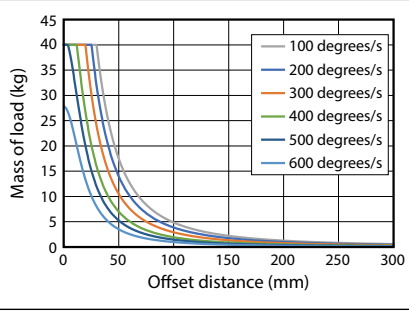
Acceleration 0.3G [energy-saving setting disabled (power mode)]



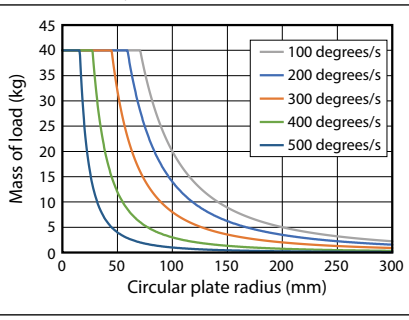
Acceleration 0.7G [energy-saving setting disabled (power mode)]



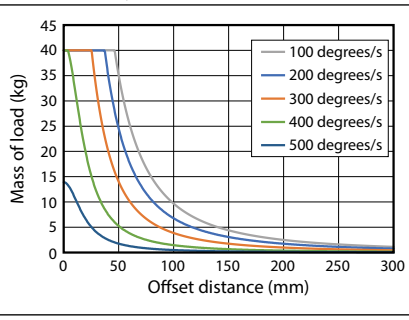
Acceleration 0.7G [energy-saving setting disabled (power mode)]



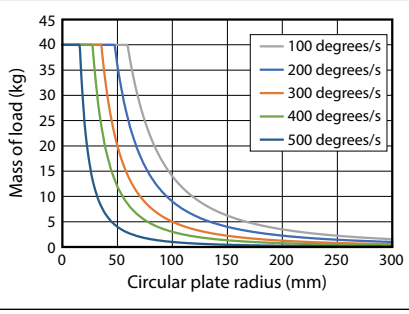
Acceleration 0.3G [energy-saving setting enabled (Energy saving mode)]



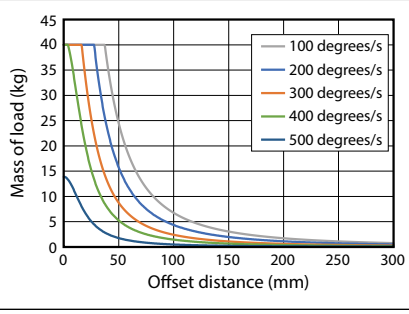
Acceleration 0.3G [energy-saving setting enabled (Energy saving mode)]



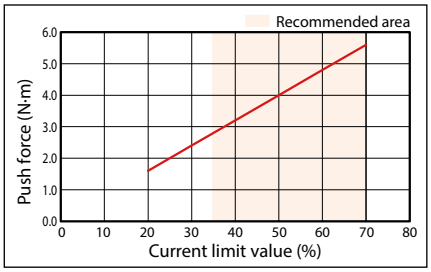
Acceleration 0.5G [energy-saving setting enabled (Energy saving mode)]



Acceleration 0.5G [energy-saving setting enabled (Energy saving mode)]



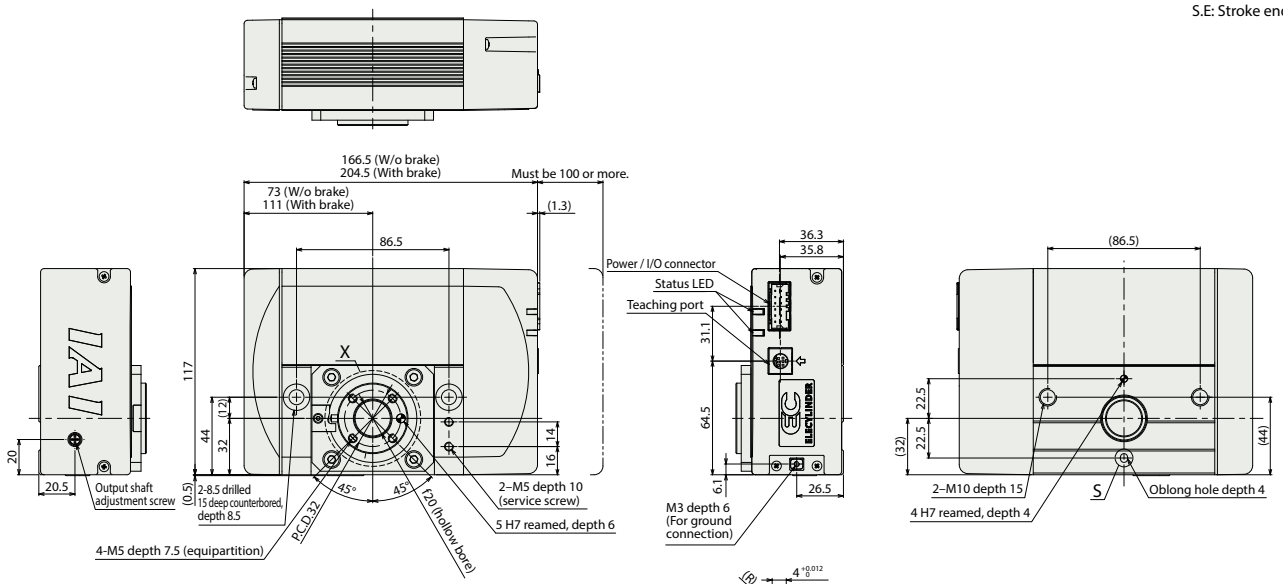
Correlation of push force and current limit value

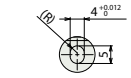


Dimensions

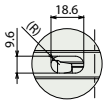
CAD drawings can be downloaded from our website.
www.intelligentactuator.com
2D CAD 3D CAD

M.E: Mechanical end
S.E: Stroke end

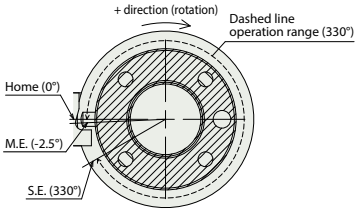




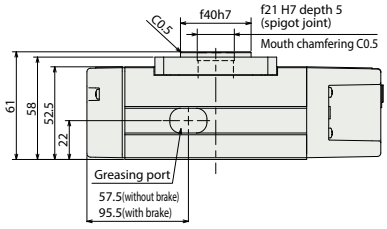
Detailed view of S
Details of base oblong hole



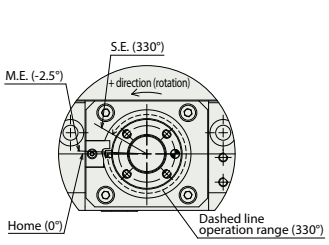
Grease lubrication port detailed view



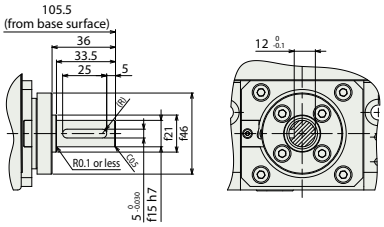
Detailed view of X



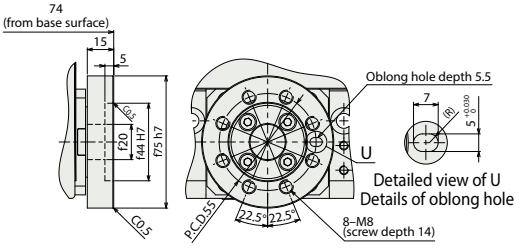
(Note) The hatched part in the detail view of X is a rotational part.



Non-motor end specification



Shaft adapter specification



Detailed view of U
Details of oblong hole

Table adapter specification

Mass

Item		Description
Mass	Without brake	1.74kg
	With brake	1.90kg

Applicable controllers

(Note) The EC series is equipped with a built-in controller. Please refer to P.29 for more information on built-in controllers.

EC-RTC18

Body Width 190 mm | 24v Stepper Motor

Model Specification Items

EC	-	RTC18	M	-	330	-		-	
Series		Type	Deceleration ratio		Oscillation angle		Power • I/O cable length		Options
			M: Deceleration ratio 1/40		330: 330-degree rotation		Refer to Power • I/O cable length below		Refer to Options table below.

NPN specification is standard. PNP option is available.

CE RoHS 10

Horizontal | Vertical | Side | Ceiling

Products

Oscillation angle (degree)	EC-RTC18
330	✓

Options

Name	Option code	Reference page
RCON-EC connection specification (Note 1)	**ACR**	23
Brake	**B**	23
External stopper (Note 2)	**ES**	23
Non-motor end specification	**NM**	23
PNP specification	**PN**	24
Shaft adaptor	**SA**	24
Table adaptor	**TA**	24
Split power and controller power specification	**TMD2**	24
Battery-less absolute encoder specification	**WA**	24
Wireless communication specification	**WL**	24
Wireless axis operation specification	**WL2**	24

(Note 1) If the RCON-EC connection specification (ACR) is selected, the PNP specification (PN) and split motor and controller power supply specification (TMD2) cannot be selected.
(Note 2) When the external stopper (ES) is selected, the table adaptor (TA) will be mounted and shipped.

Power • I/O Cable Length

Standard connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC-PWBIO□□□-RB supplied	RCON-EC connection specification (Note 4) (with connectors on both ends) CB-REC-PWBIO□□□-RB supplied
0	No cable	✓ (Note 3)	✓
1 ~ 3	1 ~ 3m	✓	✓
4 ~ 5	4 ~ 5m	✓	✓
6 ~ 7	6 ~ 7m	✓	✓
8 ~ 10	8 ~ 10m	✓	✓

(Note 3) Only terminal block connector is included. Please refer to P. 53 for details.
(Note 4) If RCON-EC connection specification (ACR) is selected as an option.
(Note) Robot cable.

4-way connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC2-PWBIO□□□-RB supplied	RCON-EC connection specification (Note 5) (with connectors on both ends) CB-REC2-PWBIO□□□-RB supplied
S1 ~ S3	1 ~ 3m	✓	✓
S4 ~ S5	4 ~ 5m	✓	✓
S6 ~ S7	6 ~ 7m	✓	✓
S8 ~ S10	8 ~ 10m	✓	✓

(Note 5) If RCON-EC connection specification (ACR) is selected as an option.
(Note) Robot cable.

POINT Selection Notes

(1) Output torque decreases as rotation speed increases. Refer to the "correlation diagram between rotation speed and output torque" for details.
(2) The allowable moment of inertia of a workpiece being rotated will vary depending on the rotation speed. Refer to the "correlation diagram between rotation speed and allowable moment of inertia" for details.
(3) The brake is used for retention purposes only, Do not use it for braking or emergency stopping.
(4) When selecting, calculate values as described in "Selection Method (from P. 5)" and check the usage conditions.
(5) If performing push-motion operations, refer to the "correlation diagrams between push force and current limit". The push forces listed are for reference only.
(6) The maximum acceleration/deceleration is 0.7G for horizontal/ceiling mount, or 0.5G for side/vertical mount.
(7) When RCON-EC connection specification (ACR) is connected to the EC connection unit (RCON-EC-4), there is a limit to the number of connections. Refer to P34 for details.

Main Specifications

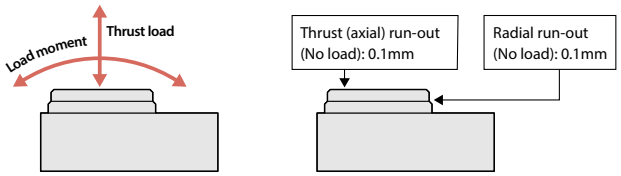
Item		Description
Deceleration ratio		1/40
Maximum torque (N·m)		25.2
Speed/Acceleration/Deceleration (degree/s)(Note6)	Maximum speed (degree/s)	450
	Minimum speed (degree/s)	20
	Rated acceleration/deceleration (G)	0.3
	Maximum acceleration/deceleration (G) (note 7)	0.7
Brake	Brake specification	non-excitation actuating solenoid brake
	Brake holding torque (N·m) (Note 7)	16
Operation range (degrees)		330

(Note 6) 1G≒9807 degrees/s^2
(Note 7) Horizontal only. The maximum acceleration/deceleration will be 0.3G when on side/vertical.
(Note 8) Allowable inertia moment and brake holding toque are not necessarily compatible. Confirm that the load torque is less than the brake holding torque.

Item	Description
Driving system	Hypoid gear + timing belt
Positioning repeatability	±0.02 degrees
Homing method	Mechanical stopper method
Home return accuracy	±0.02 degrees
Backlash	0.2° or less
Allowable thrust lead	1000N
Dynamic allowable load moment (Note 9)	25N·m
Allowable inertia moment	0.49kg·m^2
Radial rotation runout	0.1mm or less
Thrust rotation runout	0.1mm or less
Ambient operating temperature, humidity	0-40°C, 85%RH or less (non-condensing)
Degree of protection	IP20
Vibration/shock resistance	4.9m/s^2
Overseas standards	CE marking, RoHS directive
Motor type	Stepper motor (□56SP) (Power capacity: Maximum 6A)
Encoder type	Incremental /battery-less absolute
Number of encoder pulses	800 pulse/rev

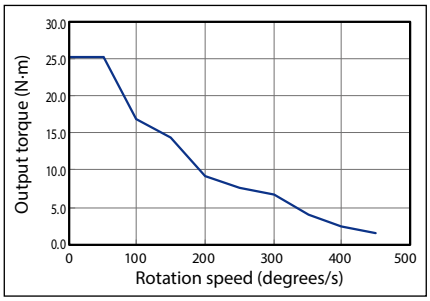
(Note 9) 16N·m when on side/vertical.

Rotary type moment direction

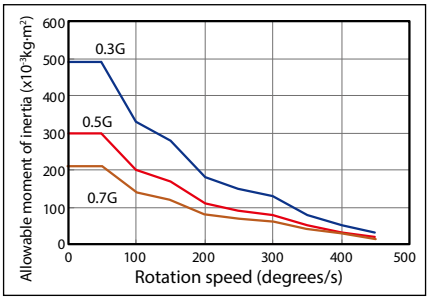


Correlation diagram between speed and output torque, allowable moment of inertia

Correlation diagram between rotation speed and output torque



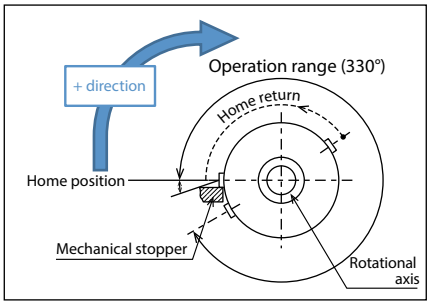
Correlation diagram between rotation speed and allowable moment of inertia



(Note) 0.7G can be used only when horizontal/suspended.

Homing method and positive rotation direction

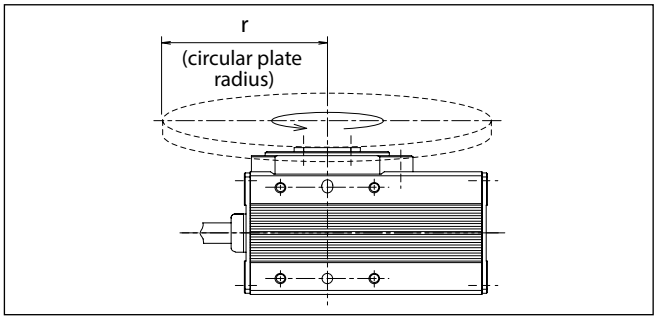
330-degree rotation specification



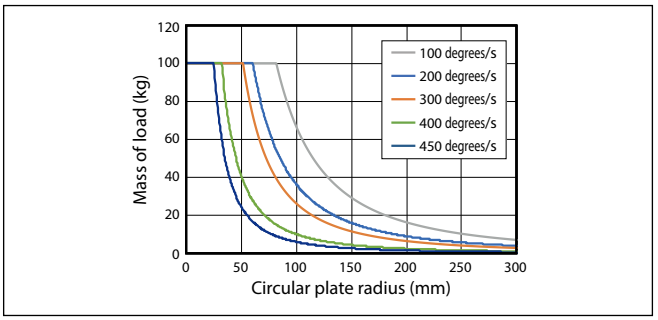
The positive rotation direction will be clockwise when viewing the rotating part from above. During home return motion, it rotates counterclockwise. It detects the mechanical stopper position, moves in reverse, and then stops.
(Note) For the non-motor end specification, all movement directions are in reverse.

Guideline for load shape and mass

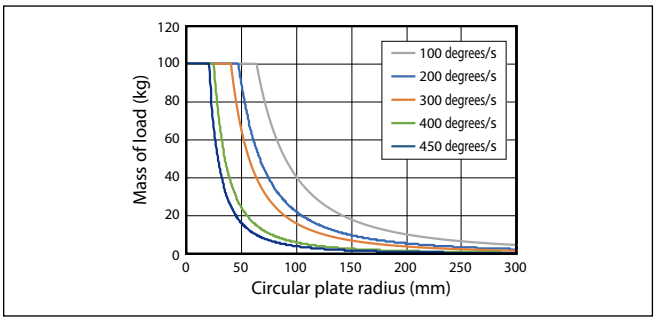
■ When the center of gravity of a circular plate load is the same as the rotational center of the output shaft



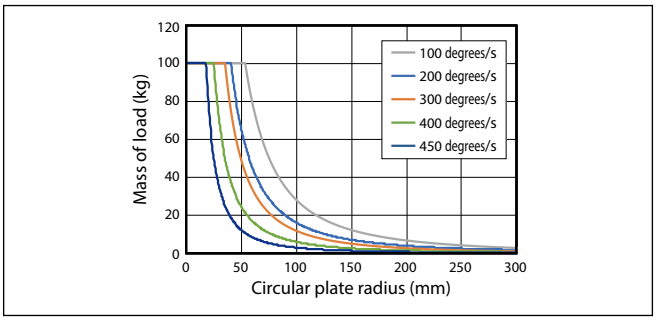
Acceleration 0.3G



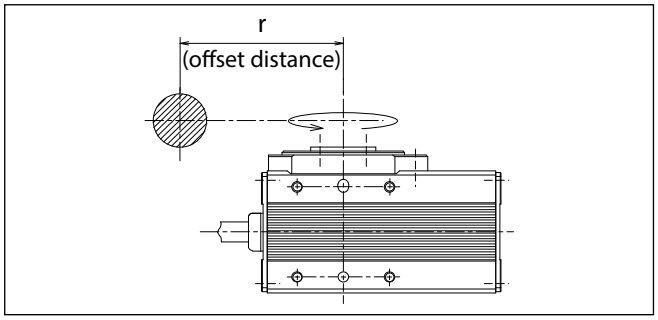
Acceleration 0.5G



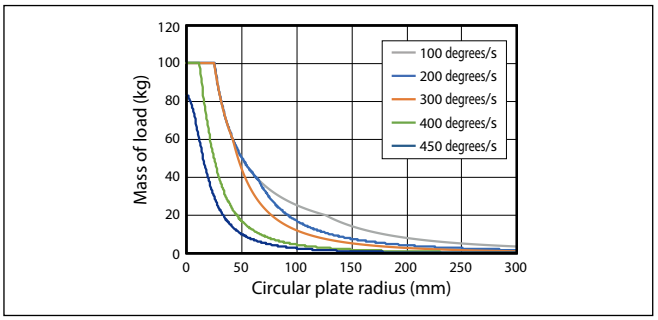
Acceleration 0.7G



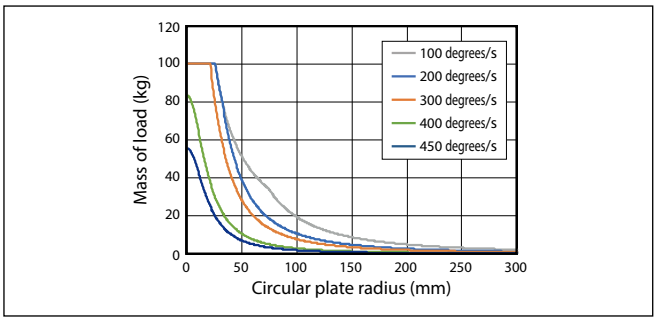
■ When the center of gravity of the load is offset from the rotational center of the output shaft



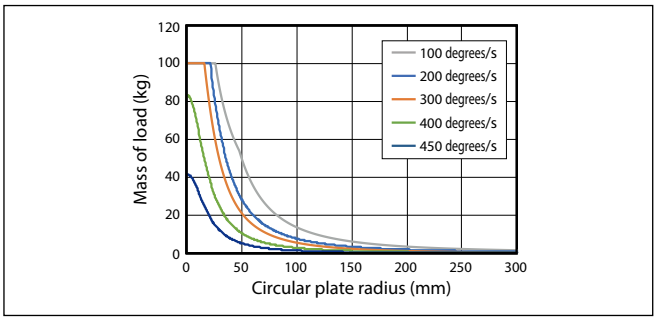
Acceleration 0.3G



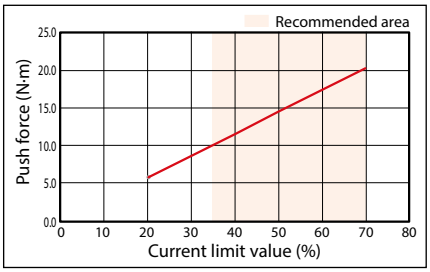
Acceleration 0.5G



Acceleration 0.7G



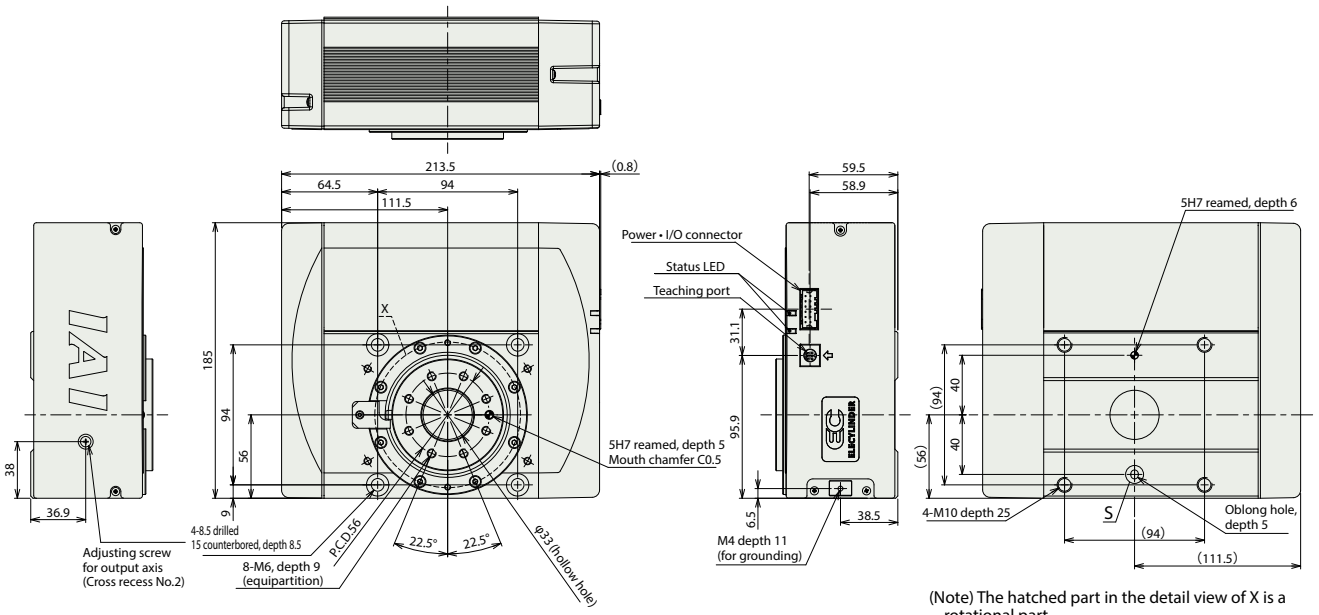
Correlation of push force and current limit value



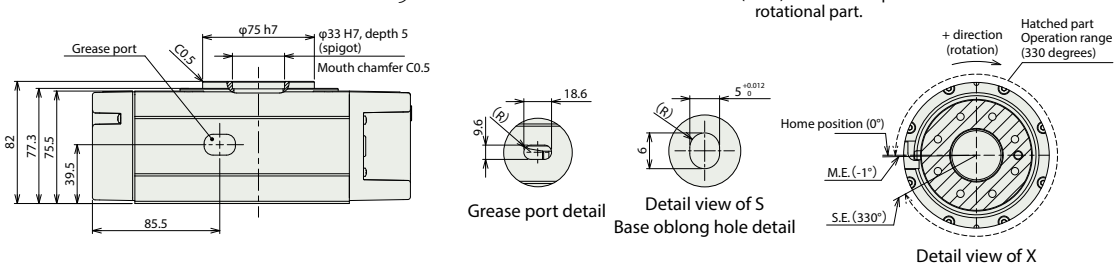
Dimensions

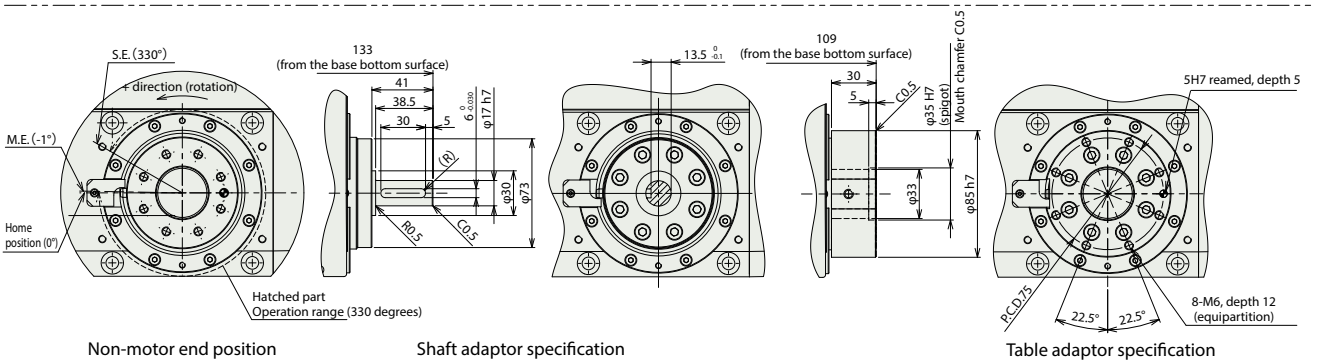
CAD drawings can be downloaded from our website.
www.intelligentactuator.com

M.E: Mechanical end
S.E: Stroke end



(Note) The hatched part in the detail view of X is a rotational part.





Mass

Item		Description
Mass	Without brake	6.16kg
	With brake	6.54kg

Applicable controllers

(Note) The EC series is equipped with a built-in controller. Please refer to P.29 for more information on built-in controllers.

Options

RCON-EC connection spec.

* TMD2 and PN options cannot be selected at the same time as ACR (ACR option includes Split power and controller power spec)

Model **ACR** Applicable models **All models**

Description This option is for connecting field networks via RCON-EC.
This option provides split power and controller power specification. The input/output specification is fixed to NPN, so it cannot be selected simultaneously with the TMD2 and PN options.

Brake

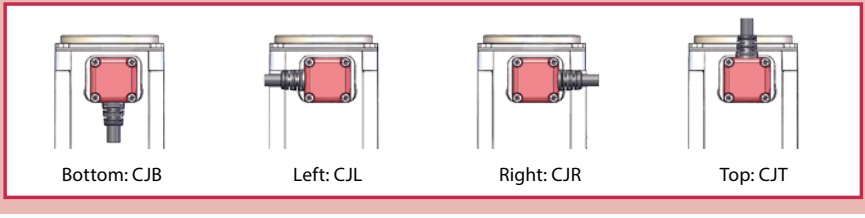
Model **B** Applicable models **All models**

Description This option is for holding the fingers at the time of power OFF or servo OFF.

Cable exit orientation

Model **CJB / CJL / CJR / CJT** Applicable models **EC-RTB4**

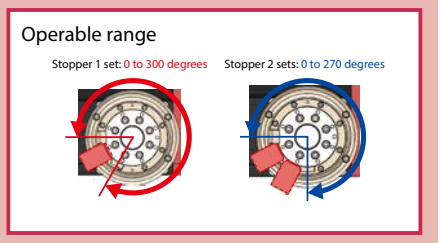
Description The exit orientation of the actuator cable can be changed to top, bottom, left and right.



External stopper

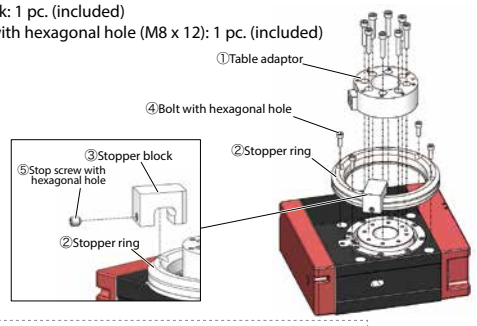
Model **ES** Applicable models **EC-RTC18**

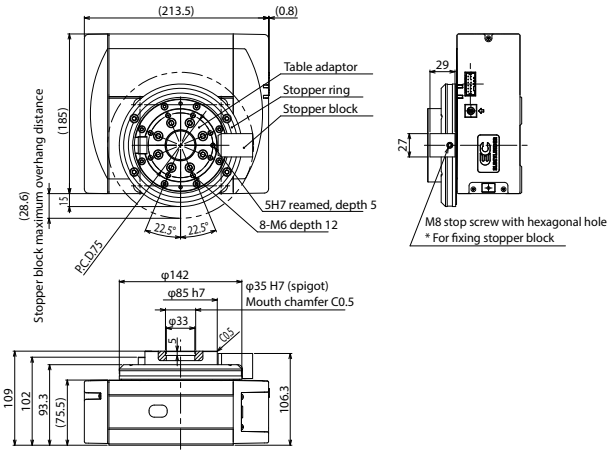
Description Stopper for dedicated use of push stop.
The stop position can be freely adjusted by mounting the stopper at any position.
(Note 1) The external stopper is a dedicated stopper for push motion (including homing operation). Do not use it for positioning operation. If used in positioning operation, the stopper may be damaged or misaligned, causing an unexpected accident.
(Note 2) When adjusting both the forward/backward ends, the second stopper block should be ordered as a single item. (The push operation is for one direction only. The position in the other direction is determined by the homing operation.)



For EC-RTC18
Single unit model EC-ESBR-RTC18 (single unit mass: 0.18kg, Material: steel [nickel plated])

◆Component parts (when purchased as a single unit)
③ Stopper block: 1 pc. (included)
⑤ Stop screw with hexagonal hole (M8 x 12): 1 pc. (included)





◆Component parts (when selected as an option)
① Table adaptor: 1 pc. (mounted for shipment)
② Stopper ring: 1 pc. (included)
③ Stopper block: 1 pc. (included)
④ Bolt with hexagonal hole (M5 x 15): 4 pcs. (included)
⑤ Stop bolt with hexagonal hole (M8 x 12): 1 pc. (included)

Non-motor end specification

Model **NM** Applicable models **All models**

Description The positive rotation direction will normally be clockwise when viewing the rotating part from above.
Counterclockwise can optionally be set as the positive rotation direction.
Contact IAI if you would like to change the rotation direction after shipment.

Options

PNP specification

* Cannot be selected together with the ACR option (NPN specification).

Model **PN** Applicable models **All models**

Description The EC series offers NPN specification input/output for connecting external devices as standard.
Specifying this option changes input/output to PNP specification.

Shaft adapter

Model **SA** Applicable models **All models**

Description This adapter is used to mount jigs, etc., to rotating parts.
Refer to the dimensions on the individual product page for detailed dimensions. (Mounted for shipment)

for EC-RTB4, Single unit model EC-SA-RTB4 (Single unit mass: 0.1kg, material: cupper [nickel plated]) Inertia moment 0.02× 10^{-3}kg・m^2	for EC-RTC9, Single unit model EC-SA-RTC9 (Single unit mass: 0.06kg, material: steel [nickel plated]) Inertia moment 0.006×10^{-3}kg・m^2
for EC-RTC12, Single unit model EC-SA-RTC12 (Single unit mass: 0.16kg, material: cupper [nickel plated]) Inertia moment 0.05×10^{-3}kg・m^2	for EC-RTC18, Single unit model EC-SA-RTC18 (Single unit mass: 0.39kg, material: steel [nickel plated]) Inertia moment 0.19× 10^{-3}kg・m^2

◆Component parts (when purchased as a single unit)
Shaft adaptor: 1 pc.

Table adapter

Model **TA** Applicable models **All models**

Description This adapter is used to mount jigs, etc., to rotating parts.
Refer to the dimensions on the individual product page for detailed dimensions. (Mounted for shipment)

for EC-RTB4, Single unit model EC-TA-RTB4 (Single unit mass: 0.09kg, material: Aluminum [white anodized]) Inertia moment 0.04×10^{-3}kg・m^2	for EC-RTC9, Single unit model EC-TA-RTC9 (Single unit mass: 0.08kg, material: Aluminum [white anodized]) Inertia moment 0.04×10^{-3}kg・m^2
for EC-RTC12, Single unit model EC-TA-RTC12 (Single unit mass: 0.13kg, material: Aluminum [white anodized]) Inertia moment 0.11×10^{-3}kg・m^2	for EC-RTC18, Single unit model EC-TA-RTC18 (Single unit mass: 0.32kg, material: Aluminum [white anodized]) Inertia moment 0.34×10^{-3}kg・m^2

◆Component parts (when purchased as a single unit)
Table adaptor: 1 pc.

Split motor and controller power supply specification

* Cannot be selected together with the ACR option (because RCON-EC connection specification is split power and controller power).

Model **TMD2** Applicable models **All models**

Description This option provides an input for actuator motion stop. Use this option to cut off only the actuator power source. Please refer to P.33 for more information on wiring.

Battery-less Absolute Encoder specification

Model **WA** Applicable models **All models**

Description The EC series offers incremental encoder specification as standard. Specifying this option installs a built-in battery-less absolute encoder.

Wireless communication specification

Model **WL** Applicable models **All models**

Description This option supports wireless communication. Specifying this option enables wireless connection with the TB-03 teaching pendant or wireless teaching controller. The start point, end point and AVD can be adjusted by wireless communication.

Wireless axis operation specification

Model **WL2** Applicable models **All models**

Description Specifying WL2 allows for the product to operate wirelessly as with WL (start point, end point, and AVD adjustment), and to also perform axis travel operation tests (forward end/backward end movement, jog, and inching). However, this function is not meant to perform automatic operation. Refer to P. 2-700 of the General Catalog 2023 for precautions on axis operations using a wireless connection.
(Note) WL cannot be changed to WL2, or WL2 to WL, by the customer. Please contact IAI for this.

About push motion

The push motion function is for pushing and stopping.

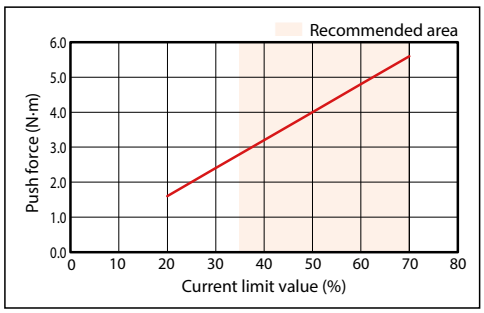
[Adjusting the push force]

* The push force during push motion can be adjusted by changing the push force (%) of the ELECYLINDER.

* Confirm the push force in the "Correlation diagram between the push force and current limit" on each product page and select the optimal model that suits the required conditions.

(Example)

EC-RTC12



<Correlation diagram between push force and current limit>

Precaution

* The correlation diagram between push force and current limit shows a guideline for the push force at each current limit.

*Even if the current limit value is the same, the push force may become larger due to individual motor differences and variations in mechanical efficiency. Especially, when the current limit value is less than 30% (42% for EC-RTB4 only), the push force in the correlation diagram could increase by more than 40%.

Duty ratio

The duty ratio is the operation rate in % of the time the actuator is operating in one cycle.

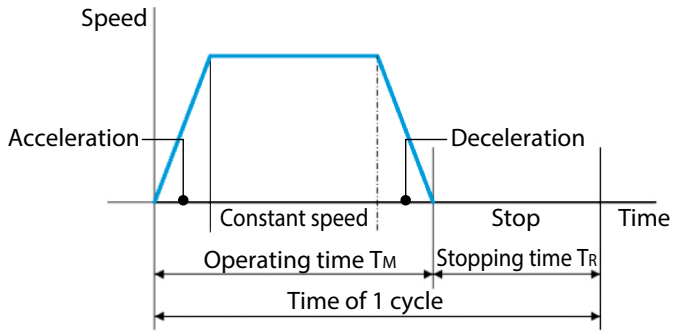
The ELECYLINDER rotary type can operate at 100% duty ratio.

$$D = \frac{T_M}{T_M + T_R} \times 100\,(\%)$$

D : Duty ratio

T_M: Motion time (including push motion)

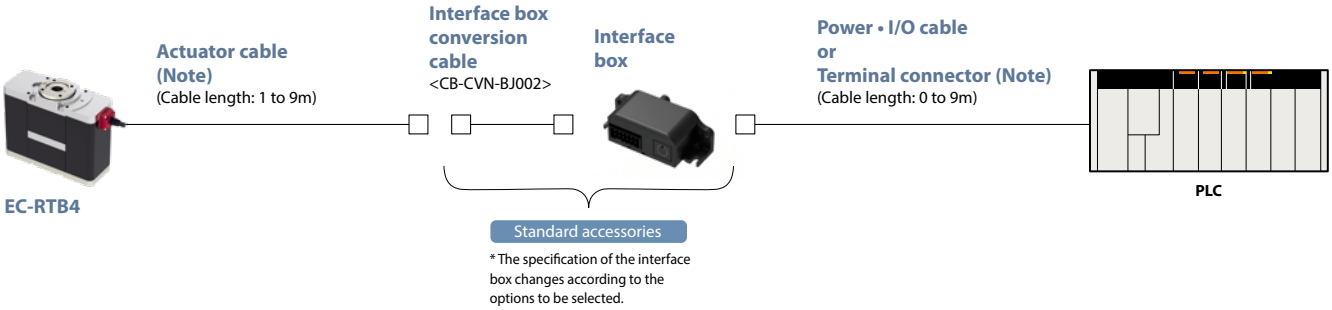
T_R: Stop time



Precautions on model selection

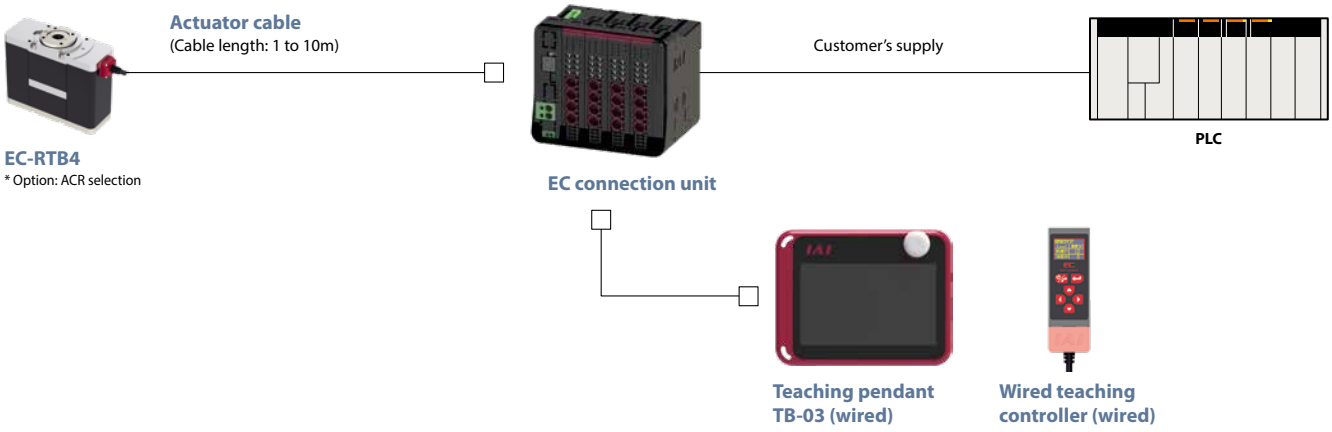
There are three connection methods for connecting EC-RTB4 and PLC. Choose one of these three connection methods. Be aware of connection limit and parts to be ordered separately. * When changing the connection method, contact IAI.

1. When connecting PLC directly (NPN/PNP specification)



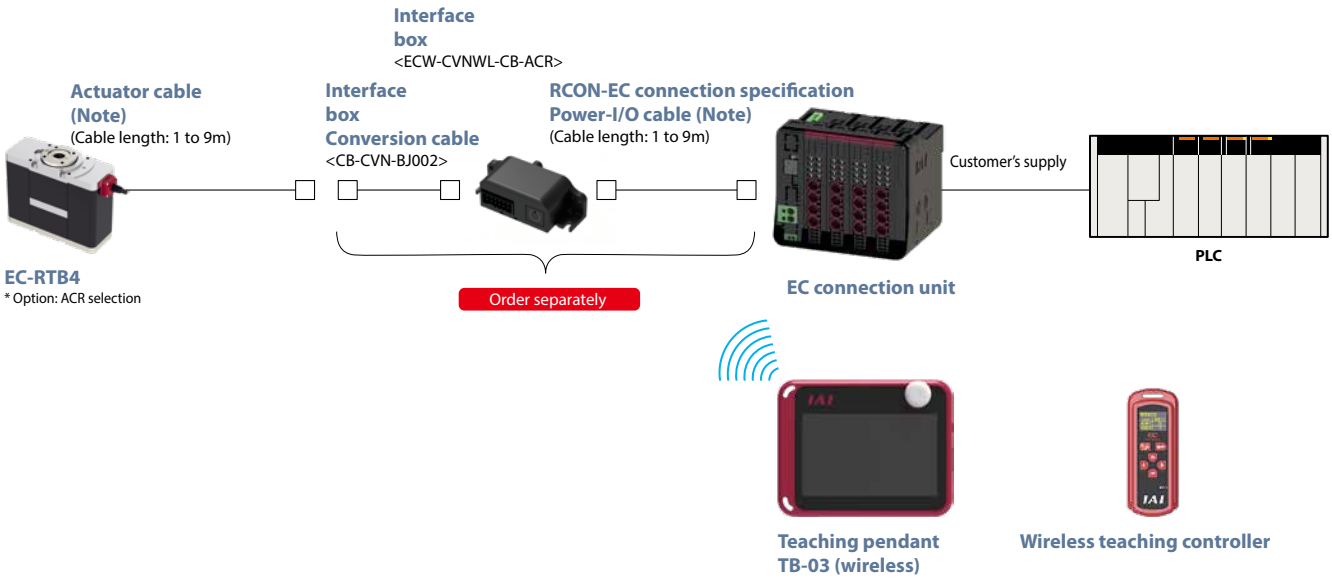
(Note) Select the cable so that the total length of the actuator cable and power • I/O cable (customer's cable in case of the terminal connector) is 10m or less.

2. When connecting a PLC via the EC connection unit (RCON-EC connection specification) [Wired connection of the teaching pendant]



3. When connecting a PLC via EC connection unit (RCON-EC connection specification) [Teaching pendant wireless connection]

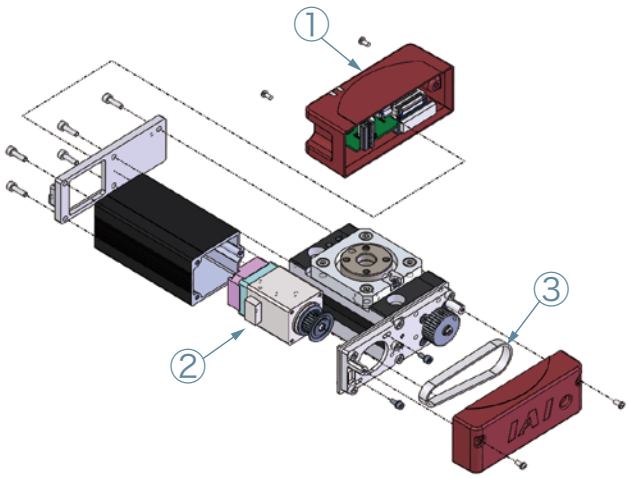
The following configuration shows wireless communication specification (WL).
For wireless axis operation specification (WL2), contact IAI.



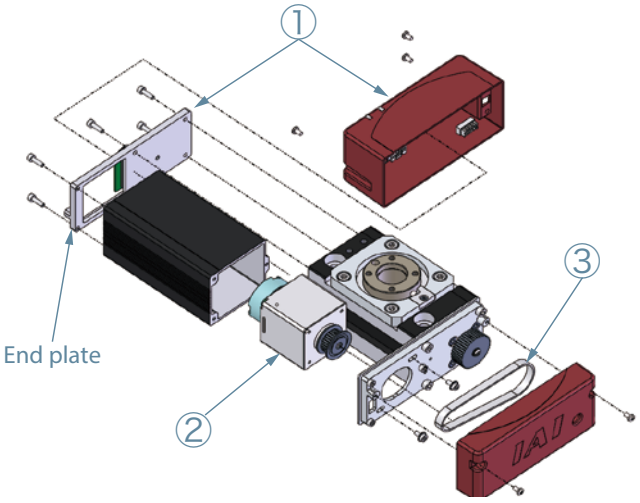
(Note) Select the cable so that the total length of the actuator cable and power • I/O cable of the RCON-EC connection specification is 10m or less.

Maintenance parts

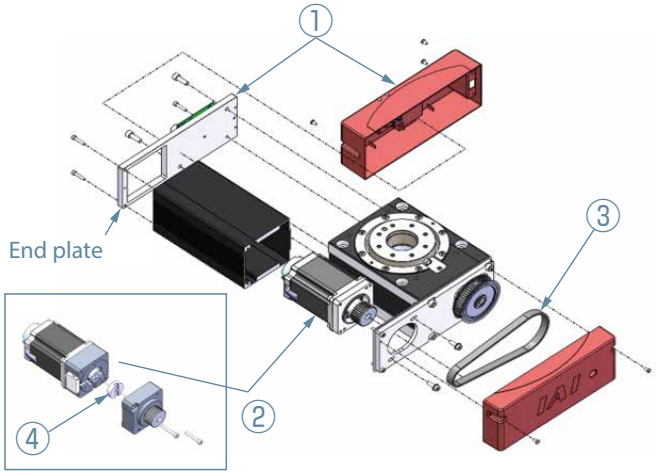
RTC9



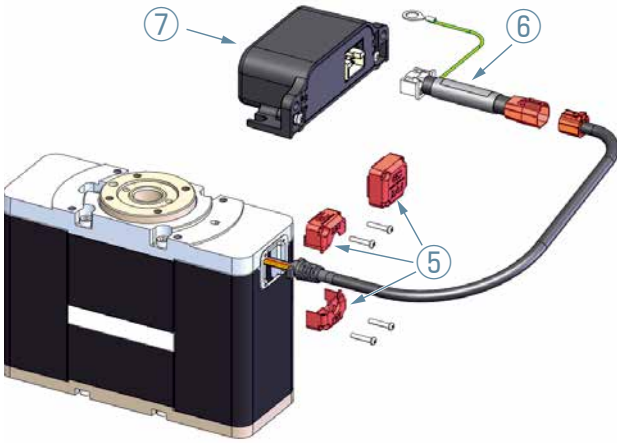
RTC12



RTC18



RTB4



① Controller cover Assy
(RTC9: Controller cover/substrate cable)
(RTC12: Controller cover/substrate cable/end plate)
(RTC18: Controller cover/substrate cable/end plate)
② Motor unit
③ Timing belt
④ Coupling spacer
⑤ Actuator cable mounting box
⑥ Interface box conversion cable
⑦ Interface box

Numbers in the table correspond to those in the schematic drawings.
(Note) Maintenance parts do not include mounting screws except for⑤.
For a modification purpose, contact IAI.

①-1 Controller cover Assy

Type	I/O	Wireless	Model
RTC9	NPN	No	CCA-EC-RTC9
		WL	CCA-EC-RTC9-WL
		WL2	CCA-EC-RTC9-WL2
	PNP	No	CCA-EC-RTC9-P
		WL	CCA-EC-RTC9-P-WL
		WL2	CCA-EC-RTC9-P-WL2
RTC12	NPN	No	CCA-EC-RTC12
		WL	CCA-EC-RTC12-WL
		WL2	CCA-EC-RTC12-WL2
	PNP	No	CCA-EC-RTC12-P
		WL	CCA-EC-RTC12-P-WL
		WL2	CCA-EC-RTC12-P-WL2
RTC18	NPN	No	CCA-EC-RTC18
		WL	CCA-EC-RTC18-WL
		WL2	CCA-EC-RTC18-WL2
	PNP	No	CCA-EC-RTC18-P
		WL	CCA-EC-RTC18-P-WL
		WL2	CCA-EC-RTC18-P-WL2

①-2 Controller cover Assy for split motor and controller power (Option code: TMD2)

Type	I/O	Wireless	Model
RTC9	NPN	No	CCA-EC-RTC9-TMD2
		WL	CCA-EC-RTC9-TMD2-WL
		WL2	CCA-EC-RTC9-TMD2-WL2
	PNP	No	CCA-EC-RTC9-P-TMD2
		WL	CCA-EC-RTC9-P-TMD2-WL
		WL2	CCA-EC-RTC9-P-TMD2-WL2
RTC12	NPN	No	CCA-EC-RTC12-TMD2
		WL	CCA-EC-RTC12-TMD2-WL
		WL2	CCA-EC-RTC12-TMD2-WL2
	PNP	No	CCA-EC-RTC12-P-TMD2
		WL	CCA-EC-RTC12-P-TMD2-WL
		WL2	CCA-EC-RTC12-P-TMD2-WL2
RTC18	NPN	No	CCA-EC-RTC18-TMD2
		WL	CCA-EC-RTC18-TMD2-WL
		WL2	CCA-EC-RTC18-TMD2-WL2
	PNP	No	CCA-EC-RTC18-P-TMD2
		WL	CCA-EC-RTC18-P-TMD2-WL
		WL2	CCA-EC-RTC18-P-TMD2-WL2

①-3 Controller cover Assy for split motor and controller power RCON-EC connection specification (Option code: ACR)

Type	I/O	Wireless	Model
RTC9	NPN_ REC	No	CCA-EC-RTC9-ACR
		WL	CCA-EC-RTC9-ACR-WL
		WL2	CCA-EC-RTC9-ACR-WL2
RTC12		No	CCA-EC-RTC12-ACR
		WL	CCA-EC-RTC12-ACR-WL
		WL2	CCA-EC-RTC12-ACR-WL2
RTC18		No	CCA-EC-RTC18-ACR
		WL	CCA-EC-RTC18-ACR-WL
		WL2	CCA-EC-RTC18-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
RTC9	Incremental	No	EC-MURTC9
	Battery-less absolute	No	EC-MURTC9-WA
RTC12	Incremental	No	EC-MURTC12
	Battery-less absolute	No	EC-MURTC12-WA
RTC18	Incremental	No	EC-MURTC18
		Yes	EC-MURTC18-B
	Battery-less absolute	No	EC-MURTC18-WA
		Yes	EC-MURTC18-WA-B

* When the motor unit with brake has to be replaced, contact IAI.

③ Timing belt

Type	Model
RTC9	TB-EC-RTC9
RTC12	TB-EC-RTC12
RTC18	TB-EC-RTC18

* When the timing belt with brake has to be replaced, contact IAI.

④ Coupling spacer

Type	Model
RTC18	CPG-EC-SR7

⑤ Mounting box for actuator

Type	Cable exit orientation	Model
RTB4	Rear surface	EC-CASBR-RTB4
	Side surface	EC-CASBS-RTB4

* The supplied screws are M2 x 10 knob screws with cross recess.

⑥ Interface box conversion cable

Type	Model
RTB4	CB-CVN-BJ002

⑦-1 Interface box

Type	Wireless	I/O	Model
RTB4	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL/WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑦-2 Interface box for split motor and controller power (Option code: TMD2)

Type	Wireless	I/O	Model
RTB4	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL/WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑦-3 Interface box for split motor and controller power of RCON-EC connection specification. (Option code: ACR)

Type	Wireless	I/O	Model
RTB4	WL WL2	NPN _REC	ECW-CVNWL-CB-ACR

System configuration

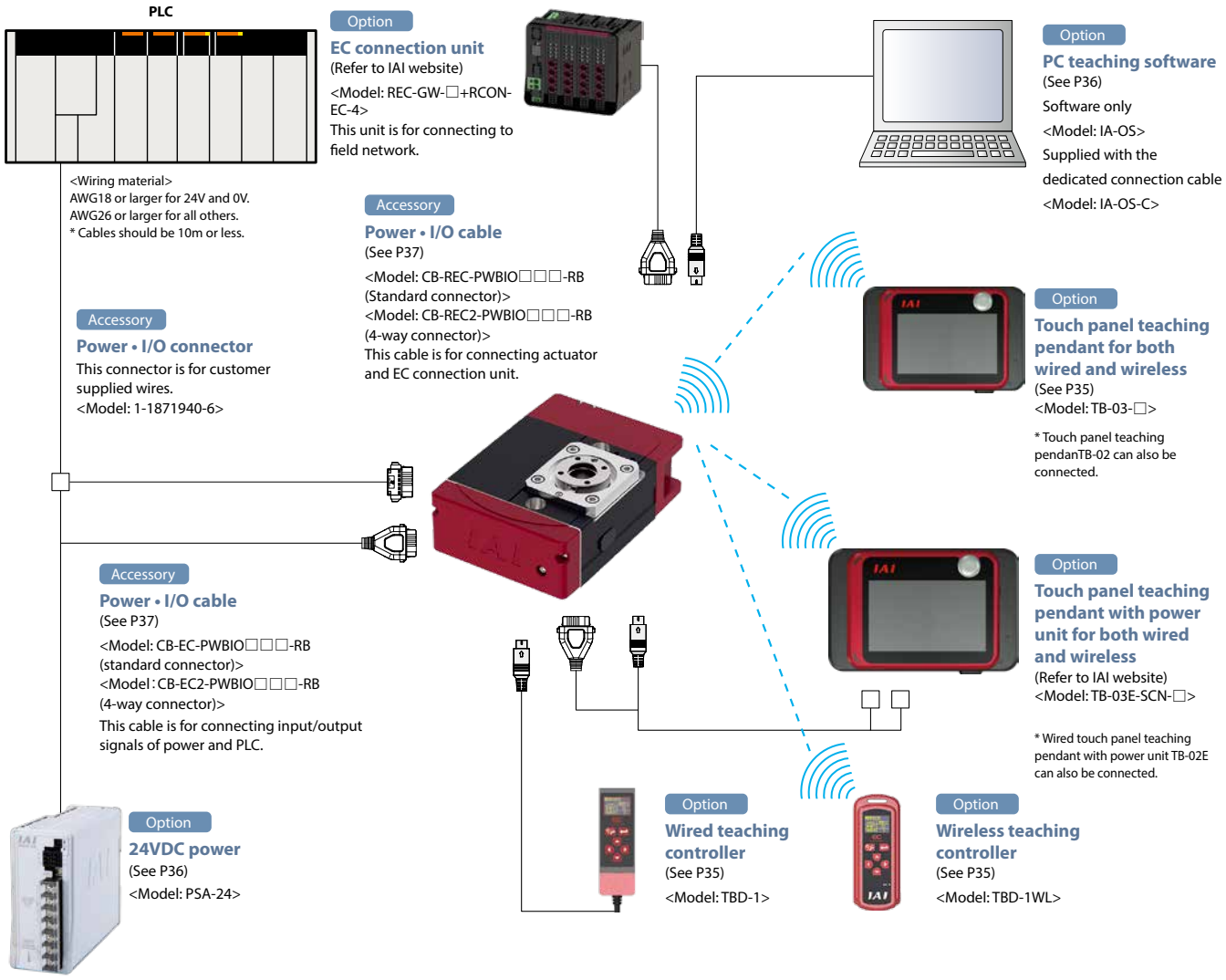


Table of accessories

■ Power • I/O cable and connector

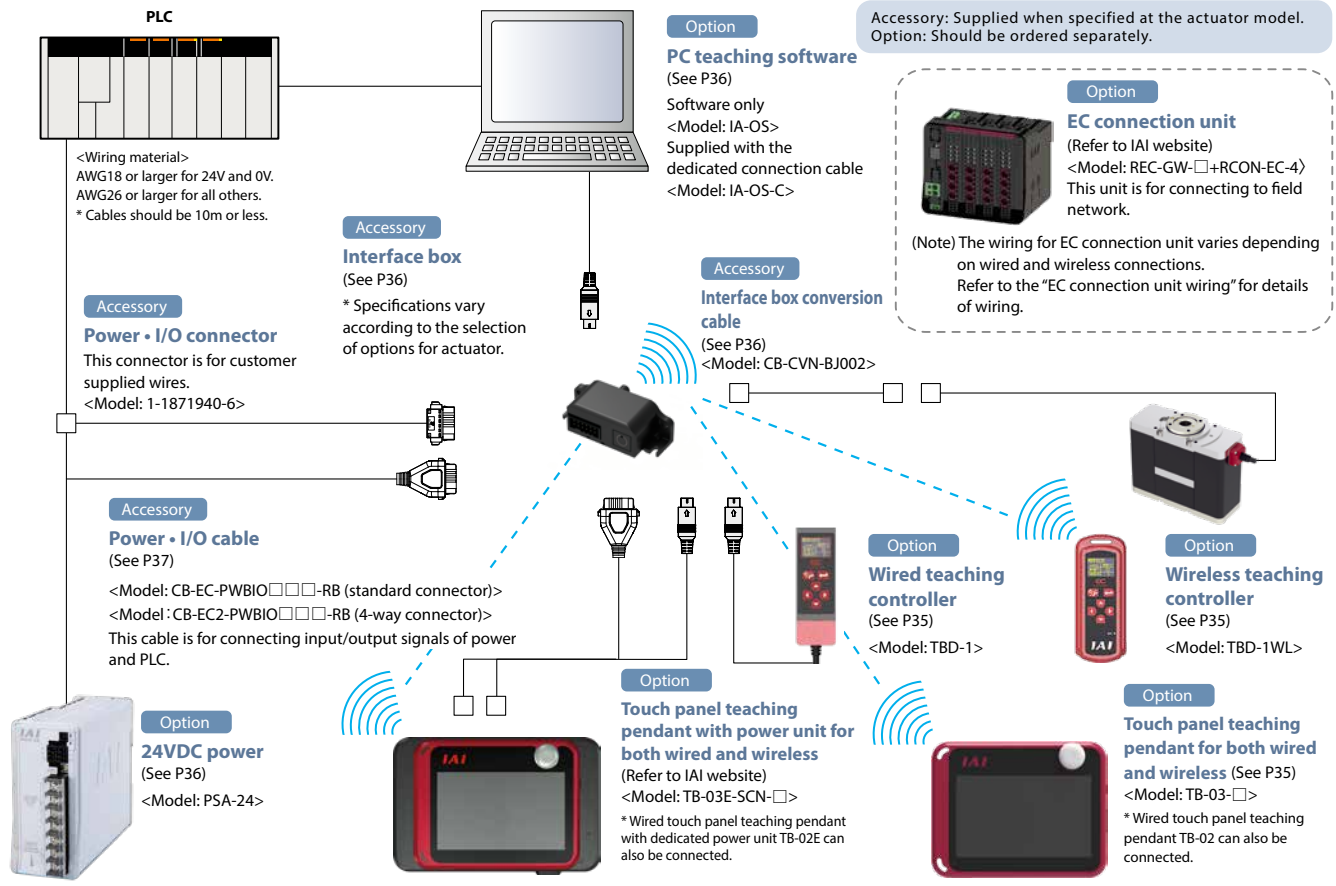
[Standard connector]

Classification		Accessory
(Selected at the actuator model) Power • I/O cable length	Selection of the RCON-EC connection specification (ACR)	
0	No	Power • I/O connector (1-1871940-6)
	Yes	-
1 to 10	No	Power • I/O cable (CB-EC-PWBIO□□□-RB)
	Yes	Power • I/O cable (CB-REC-PWBIO□□□-RB)

[4-way connector]

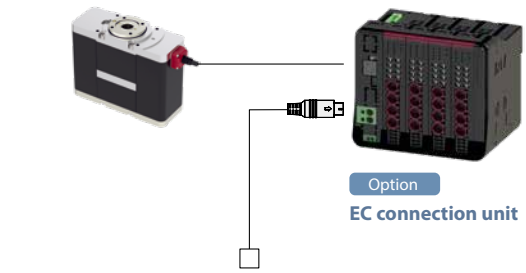
Classification		Accessory
(Selected at the actuator model) Power • I/O cable length	Selection of the RCON-EC connection specification (ACR)	
S1 to S10	No	Power • I/O cable (CB-EC2-PWBIO□□□-RB)
	Yes	Power • I/O cable (CB-REC2-PWBIO□□□-RB)

System configuration

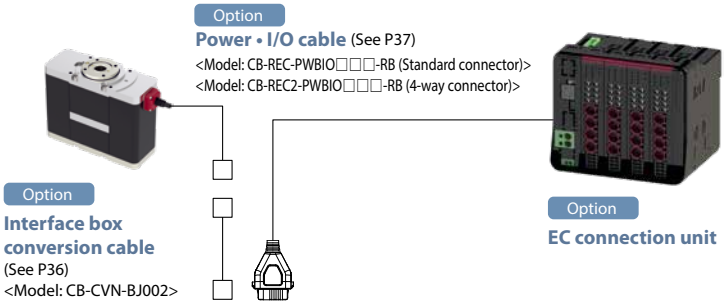


EC connection unit wiring

(When teaching pending is for wired connection)



(When teaching pending is for wireless connection)



List of accessories

■ Power • I/O cable and connector

[Standard connector]

Classification		Accessory
(Selected at the actuator model) Power • I/O cable length	Selection of the RCON-EC connection specification (ACR)	
0	No	Power • I/O cable and connector(1-1871940-6)
	Yes	-
1 to 9	No	Power • I/O cable (CB-EC-PWBIO□□□-RB)

[4-way connector]

Classification		Accessory
(Selected at the actuator model) Power • I/O cable length	Selection of the RCON-EC connection specification (ACR)	
S1 to S9	No	Power • I/O cable (CB-EC2-PWBIO□□□-RB)

Basic Controller Specifications

Specification item			Specification content
Number of controlled axes			1 axis
Power supply voltage			24VDC ±10%
Power capacity (Including 0.3A control power) (Note 1)		RTB4	Rated 1.5A, Max. 2A (energy-saving setting enabled only)
		RTC9	Max. 2A (with energy-saving setting enabled only)
		RTC12	With energy-saving setting disabled: Rated 3.5A, max. 4.2A With energy-saving setting enabled: Max. 2.2A
		RTC18	Maximum 6A (energy-saving setting disabled only)
Brake release power			24VDC±10%, 200mA (only for external brake release)
Generated heat (at duty ratio 100%)		RTB4	5W
		RTC9	5W
		RTC12	8W/5W
		RTC18	19.2W
Inrush current (Note 2)		RTB4	2A
		RTC9	8.3A
		RTC12	8.3A (with inrush current limit circuit)
		RTC18	10A
Momentary power failure resistance			Max. 500μs
Motor size			□28,□42,□56SP
Motor rated current		RTB4/RTC9/12	1.2A
		RTC18	4A
Motor control system			Weak field-magnet vector control
Supported encoders			Incremental, battery-less absolute encoder
SIO			RS485 1ch (Modbus protocol compliant)
PIO	Input specification	No. of inputs	3 points (forward, backward, alarm clear)
		Input voltage	24VDC ±10%
		Input current	5mA per circuit
		Leakage current	Max. 1mA/1 point
		Isolation method	Non-isolated
	Output specification	No. of outputs	3 points (forward complete, backward complete, alarm)
		Output voltage	24VDC ±10%
		Output current	50mA/1 point
		Residual voltage	2V or less
		Isolation method	Non-isolated
Data setting, input method			PC teaching software, touch panel teaching pendant, digital speed controller
Data retention memory			Position and parameters are saved in non-volatile memory (no limit to number of rewrites)
LED display (Note 3)	Controller status display		Servo ON (green light ON) / Alarm (red light ON) / Initializing when power comes ON (orange light ON) / Minor failure alarm (green/red alternately blinking) / Operation from teaching: Stop from teaching (red light ON) / Servo OFF (light OFF)
	Wireless status display		Initializing wireless hardware, without wireless connection, or connecting from TP board (light OFF) Connecting through wireless (green blinking) / Wireless hardware error (red blinking) / Initializing when power comes ON (orange light ON)
Predictive maintenance/preventative maintenance (Note 3)			When the number of movements or operation distance has exceeded the set value and when the LED (right side) blinks alternately green and red at overload warning *Only when configured in advance
Ambient operating temperature			0 ~ 40°C
Ambient operating humidity			5%RH - 85%RH or less (no condensation or freezing)
Operating environment			No corrosive gas or excessive dust
Insulation resistance			500VDC 10MΩ
Electric shock protection mechanism			Class 1 basic insulation
Cooling method			Natural air cooling

(Note 1) When connecting RCON-EC, the value will be subtracted by 0.3A of control current.
(Note 2) The rush current flows for 5ms after power is turned on. (At 40°C) Rush current value varies depending on the impedance of the power line.
(Note 3) EC-RTB4 has no LED indicator on the main unit. It can be checked on the interface box or EC connection unit.

Solenoid valve system

Normally ELECYLINDER is of the double solenoid system.
When using the single solenoid system, change the parameter to No.9 "Solenoid system selection."
(Note) When connecting RCON-EC, the single solenoid system cannot be operated.

Table of connectability for ELECYLINDER and teaching tools

■ ELECYLINDER single unit

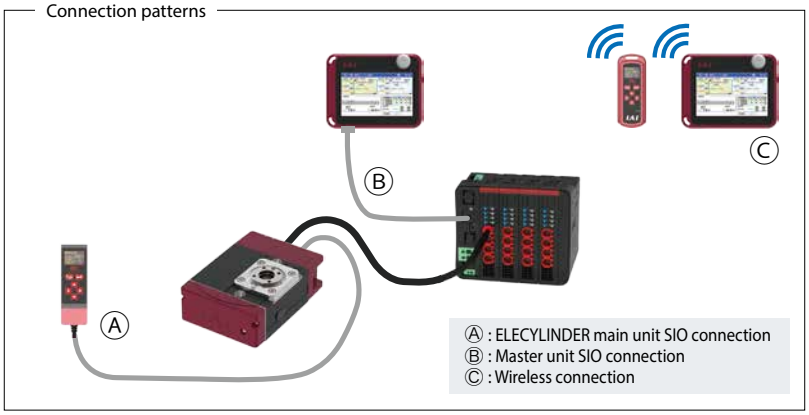
○: Connection/Operation possible

Teaching tool			Connection/Operation possibility	Priority order (When connected simultaneously)
Wired connection	TB-02/03		○	1
	Wired teaching controller (TBD-1)		○	1
Wireless connection	TB-03		○ *1 *2	2
	Wireless teaching controller (TBD-1WL)		○ *1 *2	2

*1 Connectable only when ELECYLINDER is of the wireless connection specification (WL or WL2 is suffixed to the option code).
*2 Trial operations are not possible when connected with WL specification, but possible when connected with WL2 specification.

■ When ELECYLINDER is connected to REC/RCON/RSEL (RCON-EC-4 connection).

Connection patterns

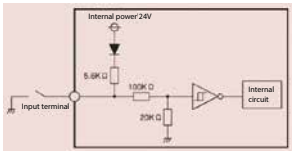
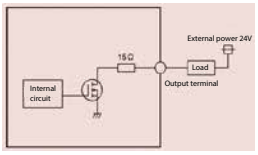
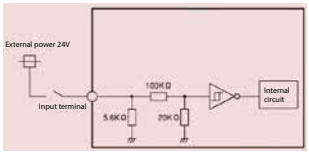
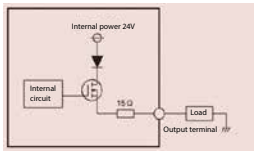


○ : Connection/Operation possible, △ : Connection/Operation partially impossible, X: Connection/operation not possible

Teaching tool			Connection patters	Auto (during automatic operation)		Manual	
				Connection/Operation possibility	Priority order (when simultaneous connection)	Connection/Operation possibility	Priority order (when simultaneous connection)
Wired connection	TB-02/03		Ⓐ	×		×	
			Ⓑ	△ *3	1	○	1
	Wired teaching controller (TBD-1)		Ⓐ	×		×	
			Ⓑ	×		×	
Wireless connection	TB-03		Ⓒ	△ *1 *3	2	○ *1 *2	2
	Wireless teaching controller (TBD-1WL)		Ⓒ	△ *1 *4	2	○ *1 *2	2

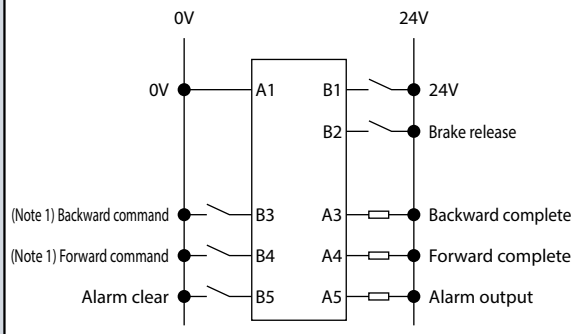
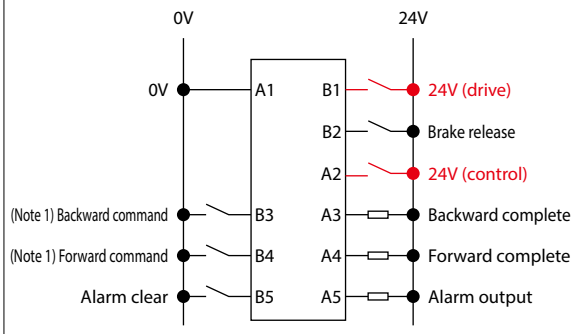
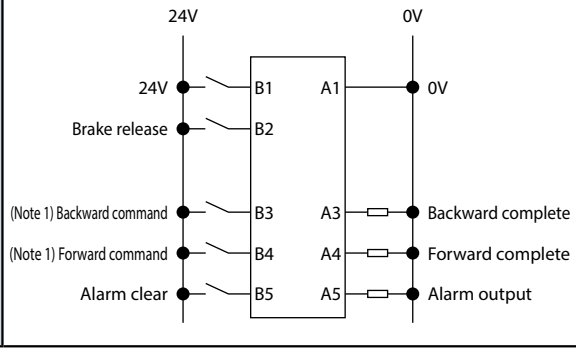
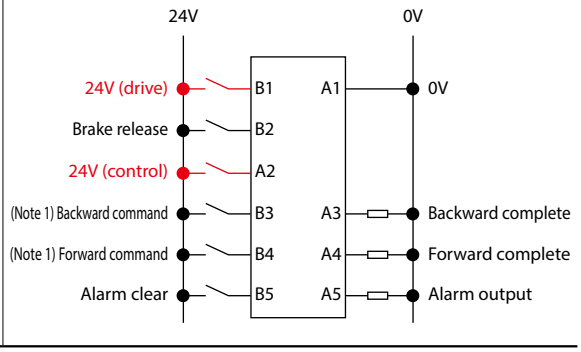
*1 Connectable only when ELECYLINDER is of the wireless connection specification (WL or WL2 is suffixed to the option code).
*2 Trial operations are not possible when connected with WL specification, but possible when connected with WL2 specification.
*3 Only monitoring is possible (operations are not possible).
*4 Setting of speed and acceleration/deceleration and operation are possible. Position edits and trial operations are not possible.

I/O (Input/Output) Specifications

I/O		Input		Output	
Specifications		Input voltage	24VDC ±10%	Load voltage	24VDC ±10%
		Input current	5mA per circuit	Maximum load current	50mA/1 point
		ON/OFF voltage	ON voltage: Min. 18VDC OFF voltage: Max. 6VDC	Residual voltage	2V or less
		Leakage current	Max. 1mA/1 point	Leakage current	Max. 0.1mA/1 point
Isolation method		Non-isolated from external circuit		Non-isolated from external circuit	
I/O logic	NPN				
	PNP				

(Note) Isolation method is non-isolated. When grounding an external device (such as a PLC) connected to ELECYLINDER, use the same ground as ELECYLINDER.

I/O Signal Wiring Diagram

I/O		Standard specification	Split motor and controller power supply specification (option model: TMD2)
Power • I/O connector		0V A1 (Reserved) A2 Backward complete A3 Forward complete A4 Alarm output A5 (Reserved) A6 B1 24V B2 Brake release B3 Backward command (Note 1) B4 Forward command (Note 1) B5 Alarm clear B6 (reserved)	Drive power and control power are separate for the TMD2 specification. 0V A1 24V (control) A2 Backward complete A3 Forward complete A4 Alarm output A5 (Reserved) A6 B1 24V (drive) B2 Brake release B3 Backward command (Note 1) B4 Forward command (Note 1) B5 Alarm clear B6 (reserved)
I/O logic	NPN		
	PNP		

(Note 1) Switching to the single solenoid method will change B3 to "forward/backward command" and B4 to "unused."

I/O Signal Table

Power • I/O connector pin assignment			
Pin No.	Connector nameplate name	Signal abbreviation	Function overview
B3 (Note 1)	Backward	ST0	Backward command
B4 (Note 1)	Forward	ST1	Forward command
B5	Alarm clear	RES	Alarm clear
A3	Backward complete	LS0/PE0	Backward complete/push complete
A4	Forward complete	LS1/PE1	Forward complete/push complete
A5	Alarm	*ALM	Alarm detection (b-contact)
B2	Brake release	BKRLS	Brake forced release (for brake equipped specification)
B1 (Note 2)	24V	24V	24V input
A1	0V	0V	0V input
A2 (Note 2)	(24V)	(24V)	24V input

(Note 1) When the single solenoid system is used, B3 will be "Forward/Backward commands" and B4 is not used.
However, power • I/O connector indications will be unchanged, i.e. B3: Backward and B4: Forward.
(Note 2) For the twin power supply specification (TMD2), B1 is 24V (drive) and A2 is 24V (control).

Limit on connectable axes

* The number of all the connected axes should be 16 or less.
* When connecting EC-RTC18 to one of EC connection units (RCON-EC-4), the number of maximum connectable axes is 2.

RTC18 Number of connections	RCON-EC-4 (1 unit)	ELECYLINDERs other than the model listed on the left
1 axis	○	3 axes
2 axes	○	Cannot be connected

○ : compatible

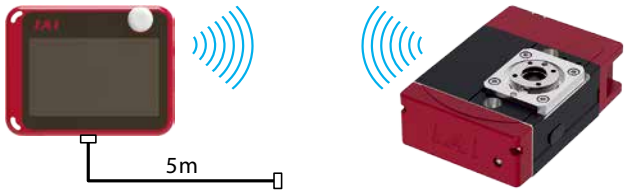
Option

Wireless/wired touch panel teaching pendant

Features This teaching device supports wireless connections. Start point/end point/AVD input and axis operations can be performed wirelessly.

Model **TB-03-□** Please contact IAI for the current supported versions.

Configuration Wireless or wired connection



Specifications

Rated voltage	24VDC±10%
Power input voltage range	3.6W or less (150mA or less)
Operating ambient temperature	0 - 40°C(non-condensing, no frost)
Operating ambient humidity	5 - 85%RH (non-condensing, no frost)
Degree of protection	IPX0
Mass	Approx. 485g (body) + approx. 175g (battery)
Recharging method	Wired connection with dedicated adapter/controller
Wireless connection	Bluetooth4.2 class2

Wireless teaching controller

Features Start point/end point/AVD input and jog motions can be performed remotely.
(Only for the ELECYLINDER with wireless option)

Model **TBD-1WL-□**

Configuration Wireless connection

Specifications

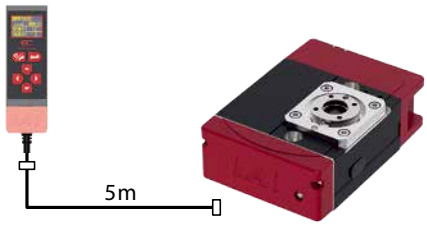
Power input voltage range	5.9VDC (5.7 - 6.3V) [Supplied from the dedicated ACadapter]
Operating ambient temperature	0 - 40°C(non-condensing, no frost)
Operating ambient humidity	5 - 85%RH (non-condensing, no frost)
Degree of protection	IPX0
Mass	Approx. 115g (including 55g battery)
Recharging method	Dedicated adapter
Wireless connection	Bluetooth4.2 class2

Wired teaching controller

Features Start point/end point/AVD input and jog motions can be performed easily.
Can be used for all ELECYLINDER models.

Model **TBD-1**

Configuration Wired connection



Specifications

Rated voltage	24VDC±10% [supplied from the controller]
Power input voltage range	1.44W or less (60mA or less)
Operating ambient temperature	0 - 40°C(non-condensing, no frost)
Operating ambient humidity	5 - 85%RH (non-condensing, no frost)
Degree of protection	IP20
Mass	Approx. 21g (main unit) + 184g (5m main unit integrated cable)

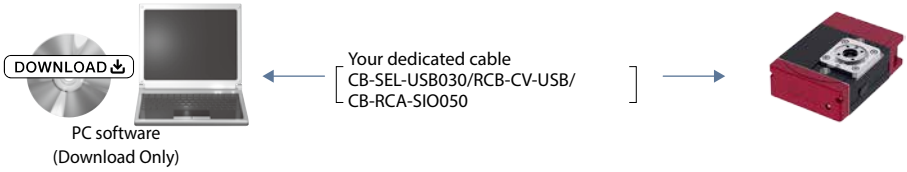
Teaching software for PC (Windows only)

Features The start-up support software which comes equipped with functions such as position teaching, trial operation, and monitoring. A complete range of functions needed for making adjustments contributes to shortened start-up time.

Model **IA-OS** (software only, for customers who already own a dedicated connection cable)

Configuration

Please contact IAI for the current supported versions.

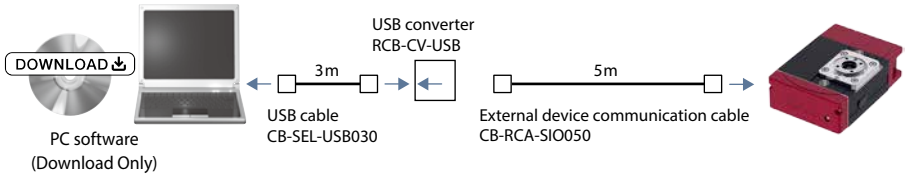


* Please purchase through your distributor and a download link will be sent to your valid email address.

Model **IA-OS-C** (with an external device communication cable + USB conversion adapter + USB cable)

Configuration

Please contact IAI for the current supported versions.



* Please purchase through your distributor and a download link will be sent to your valid email address.

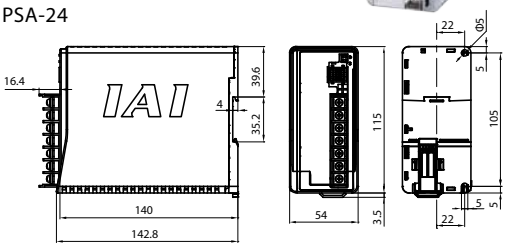
24V power supply

Model **PSA-24** (without fan)

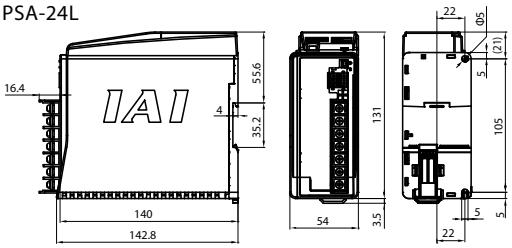
Model **PSA-24L** (with fan)

External dimensions

PSA-24



PSA-24L



Specifications

Item	Model	
	for 100VAC input	for 200VAC input
Input voltage range	100VAC~230VAC±10%	
Input power current	3.9A or less	1.9A or less
Power capacity	Without fan: 250VA With fan: 390VA	Without fan: 280VA With fan: 380VA
Rush current *1	With fan: 17A (typ) Without fan: 27A (typ)	Without fan: 34A (typ) With fan: 548A (typ)
Heat quantity	33W (at 204W continuous rated) 33W (at 300W continuous rated)	33W (at 204W continuous rated) 33W (at 330W continuous rated)
Output voltage range *2	24V±10%	
Continuous rated output	Without fan: 8.5A (204W) With fan: 13.8A (330W)	
Peak output	17A(408W)	
Efficiency	86% or higher	90% or higher
Parallel connection *3	Up to 5 units	

*1 The pulse width of rush current flow is 5ms or less.
*2 This power source can change output voltage according to the load to enable parallel operations. Therefore, this power unit is only for IAI controllers.
*3 Parallel connections under the following conditions are not possible.
- Parallel connection of PSA-24 (without fan) and PSA-24L (with fan).
- Parallel connection with power units other than this unit.
- Parallel connection with PS-24.

Power capacity calculation "Calculator" software | The Calculator comes with the IA-OS software.

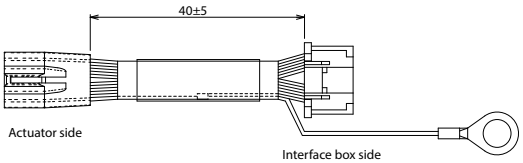
RCON-EC connection specification Interface box for split power and controller power specification (wireless communication supported)

Model **ECW-CVNWL-CB-ACR**

Interface box conversion cable

Features This cable is for connecting actuator cable and interface box.

Model **CB-CVN-BJ002**



Maintenance Parts (Cable)

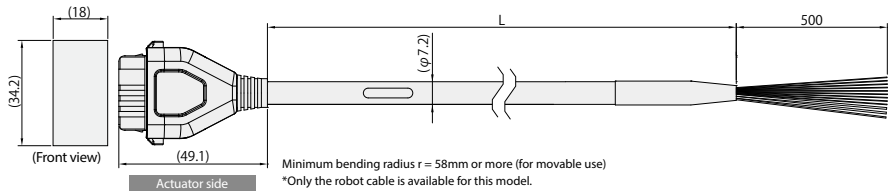
When placing an order for a replacement cable after purchasing a product, please use the model name shown below.

■ **Table of compatible cables**

Cable type	Cable model	Applicable models
Power • I/O cable (user-wired specification)	CB-EC-PWBIO□□□-RB	All models
Power • I/O cable (user-wired specification, four-way connector)	CB-EC2-PWBIO□□□-RB	Stepper motor only
Power • I/O cable (RCON-EC connection specification)	CB-REC-PWBIO□□□-RB	All models
Power • I/O cable (RCON-EC connection specification, four-way connector)	CB-REC2-PWBIO□□□-RB	Stepper motor only

Model CB-EC-PWBIO□□□-RB

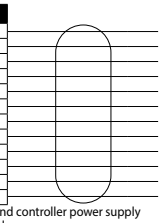
*Please indicate the cable length (L) in □□□,
Up to 10m(for example. 030 = 3m



Minimum bending radius r = 58mm or more (for movable use)
*Only the robot cable is available for this model.

1-1871940-6

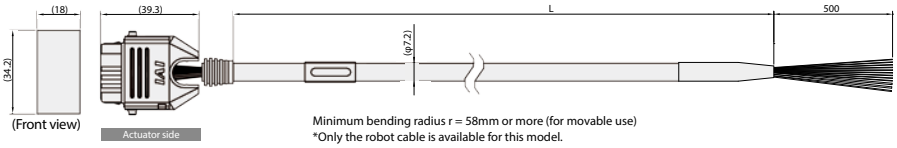
Color	Signal name	Pin No.
Black (AWG18)	0V	A1
Red (AWG18)	24V	B1
Light blue (AWG22)	(Reserved) (Note 1)	A2
Orange (AWG26)	IN0	B3
Yellow (AWG26)	IN1	B4
Green (AWG26)	IN2	B5
Pink (AWG26)	(Reserved)	B6
Blue (AWG26)	OUT0	A3
Purple (AWG26)	OUT1	A4
Gray (AWG26)	OUT2	A5
White (AWG26)	(Reserved)	A6
Brown (AWG26)	BKRLS	B2



(Note 1) 24V (control) when split motor and controller power supply specification (TMD2) are selected.
(Note 2) Yellowish green and light gray wires are not used. (after cutting inside the shrinkable ube)

Model CB-EC2-PWBIO□□□-RB

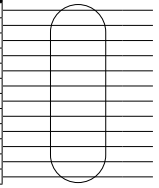
*Please indicate the cable length (L) in □□□,
Up to 10m(for example. 030 = 3m



Minimum bending radius r = 58mm or more (for movable use)
*Only the robot cable is available for this model.

1-1871940-6

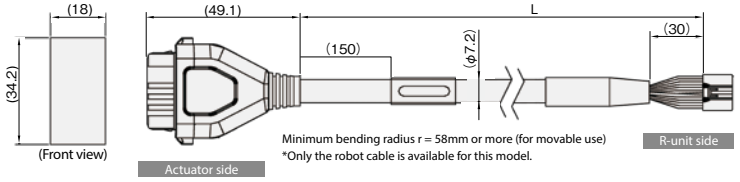
Color	Signal name	Pin No.
Black (AWG18)	0V	A1
Red (AWG18)	24V	B1
Light blue (AWG22)	(Reserved) (Note 1)	A2
Orange (AWG26)	IN0	B3
Yellow (AWG26)	IN1	B4
Green (AWG26)	IN2	B5
Pink (AWG26)	(Reserved)	B6
Blue (AWG26)	OUT0	A3
Purple (AWG26)	OUT1	A4
Gray (AWG26)	OUT2	A5
White (AWG26)	(Reserved)	A6
Brown (AWG26)	BKRLS	B2



(Note 1) 24V (control) when split motor and controller power supply specification (TMD2) are selected.
(Note 2) Yellowish green and light gray wires are not used. (after curing inside the shrinkable ube)

Model CB-REC-PWBIO□□□-RB

*Please indicate the cable length (L) in □□□,
Up to 10m(for example. 030 = 3m



Minimum bending radius r = 58mm or more (for movable use)
*Only the robot cable is available for this model.

1-1871940-6

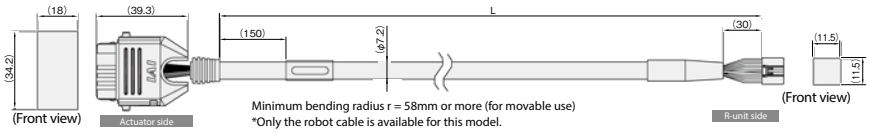
Color	Signal name	Pin No.
Black (AWG18)	0V	A1
Red (AWG18)	24V(MP)	B1
Light blue (AWG22)	24V(CP)	A2
Orange (AWG26)	IN0	B3
Yellow (AWG26)	IN1	B4
Green (AWG26)	IN2	B5
Yellowish green (AWG26)	SD+	B6
Light gray (AWG26)	SD-	A6
Blue (AWG26)	OUT0	A3
Purple (AWG26)	OUT1	A4
Gray (AWG26)	OUT2	A5
Brown (AWG26)	BKRLS	B2

DF62E-13S-2.2C(18)

Pin No.	Signal name	Color
2	0V	Black (AWG18)
1	24V(MP)	Red (AWG18)
12	24V(CP)	Light blue (AWG22)
7	OUT0	Orange (AWG26)
8	OUT1	Yellow (AWG26)
9	OUT2	Green (AWG26)
6	SD+	Pink (AWG26)
10	SD-	White (AWG26)
3	INO	Blue (AWG26)
4	IN1	Purple (AWG26)
5	IN2	Gray (AWG26)
11	BKRLS	Brown (AWG26)
13	FG	Green (AWG26)

Model CB-REC2-PWBIO□□□-RB

*Please indicate the cable length (L) in □□□,
Up to 10m(for example. 030 = 3m



Minimum bending radius r = 58mm or more (for movable use)
*Only the robot cable is available for this model.

1-1871940-6

Color	Signal name	Pin No.
Black (AWG18)	0V	A1
Red (AWG18)	24V(MP)	B1
Light blue (AWG22)	24V(CP)	A2
Orange (AWG26)	IN0	B3
Yellow (AWG26)	IN1	B4
Green (AWG26)	IN2	B5
Yellow (AWG26)	SD+	B6
Light gray (AWG26)	SD-	A6
Blue (AWG26)	OUT0	A3
Purple (AWG26)	OUT1	A4
Gray (AWG26)	OUT2	A5
Brown (AWG26)	BKRLS	B2

DF62E-13S-2C(18)

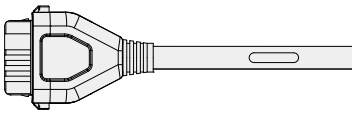
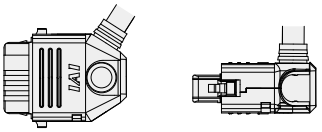
Pin No.	Signal name	Color
2	0V	Black (AWG22)
1	24V(MP)	Red (AWG22)
12	24V(CP)	Light blue (AWG22)
7	OUT0	Orange (AWG26)
8	OUT1	Yellow (AWG26)
9	OUT2	Green (AWG26)
6	SD+	Yellow (AWG26)
10	SD-	Light gray (AWG26)
3	INO	Blue (AWG26)
4	IN1	Purple (AWG26)
5	IN2	Gray (AWG26)
11	BKRLS	Brown (AWG26)
13	FG	Green (AWG26)

Maintenance Parts (Cable)

4-way connector cable

This cable allows the connector direction of ELECYLINDER to be changed any of 4 directions.
The cable wiring for the connector is the same as that of power • I/O cable CB-EC-PWBIO□□□-RB / CB-REC-PWBIO□□□-RB.

Specify cable length in □□□.
(Ex.) 050=5m

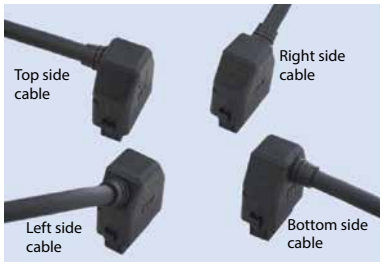
	Standard connector (mechanical side)	4-way connector (mechanical side)
External appearance		
User wiring specification	CB-EC-PWBIO□□□-RB	CB-EC**2**-PWBIO□□□-RB
RCON-EC connection specification	CB-REC-PWBIO□□□-RB	CB-REC**2**-PWBIO□□□-RB

■Ordering method

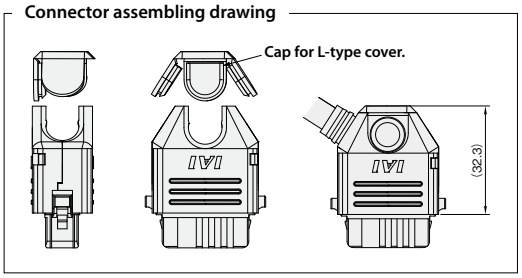
Cable length is minimum 1m and maximum 10m.
Lengths can be specified in 1m increments.

(Ex.) In case of ordering a 4-way connector 3m/10m.
Cable length 3m : CB-EC2-PWBIO030-RB
Cable length 10m : CB-EC2-PWBIO100-RB

■Assembling method



Cable exit direction can freely be selected.



(1) Insert while sliding along the groove in the desired direction from the semi-cylindrical curved portion.

(2) Confirm that the cable has been firmly inserted, and then insert the 2 sides of the lid along the groove.

(3) Finally, press the remaining side of the lid.

Catalog No. CE0271-3A (2024JUN)

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The information contained in this product brochure may change without prior notice due to product improvements.

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