

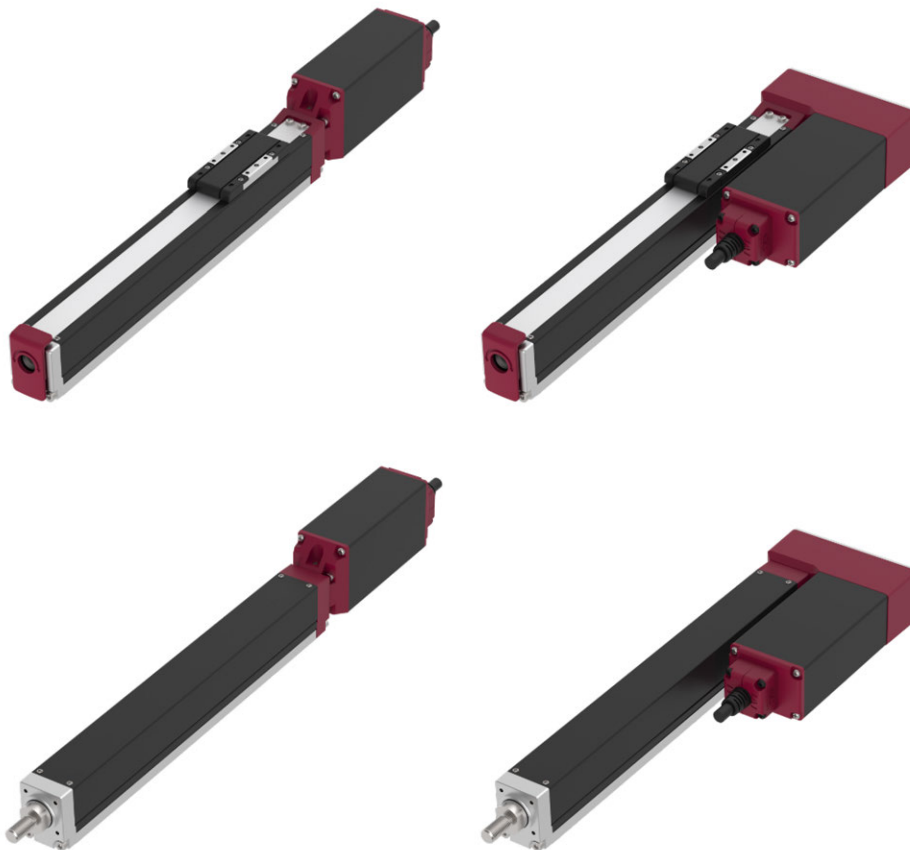
ELECYLINDER®

Products designed for use in secondary
battery production processes

Slider Type, Radial Cylinder Type

EC-S2□B/
S2□BR
EC-RR2□B/
RR2□BR

Instruction Manual First Edition ME3844-1A



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Refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)] provided separately regarding electricity/control such as the electrical specifications, wiring, connection, parameters and control system and troubleshooting.

Please Read Before Use

Thank you for purchasing our product.

This instruction manual explains the handling methods, structure and maintenance of this product, providing the information you need in order to use the product safely.

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.

Please download the user's manual from our website.

You can download it free of charge. User registration is required for the first time downloading.

URL : www.iai-robot.co.jp/data_dl/CAD_MANUAL/

When using the product, print out of the necessary portions of the relevant manual, or please display it on your computer, tablet terminal, etc. so that you can check it immediately.

After reading the instruction manual, keep it in a convenient place so that whoever is handling the product can refer to it quickly when necessary.

[Important]

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
- Use or reproduction of this instruction manual in full or in part without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the text are registered trademarks.

ELECYLINDER Instruction Manual Configuration

Product name	Instruction manual name	Control number
ELECYLINDER	Instruction Manual (this document)	ME3844
ELECYLINDER	Electricity Section Instruction Manual	ME3816
ELECYLINDER	3 position mode specification	ME3837
RCON System	RCON Instruction Manual	ME0384
RSEL System	RSEL Instruction Manual	ME0392
REC System	REC Instruction Manual	ME0394
XSEL2	Instruction Manual	ME0478
PC Teaching Software	IA-OS First Step Guide * Refer to the guidance feature stored in IA-OS for how to operate	ME0391
PC Teaching Software for XSEL	A-101-X-MW/IA-101-X-USBMW Instruction Manual	ME0154
Touch Panel Teaching Pendant TB-02/02D	Applicable for Position Controller Instruction Manual	ME0355
	Applicable for Program Controller Instruction Manual	ME0356
Touch Panel Teaching Pendant TB-03 Wireless link	Applicable for ELECYLINDER TB-03 Instruction Manual	ME0375
Touch Panel Teaching Pendant TB-03 Wired link	Applicable for Position Controller Instruction Manual	ME0376
	Applicable for Program Controller Instruction Manual	ME0377
Remote Digital Speed Controller/ Digital Speed Controller Teaching	Digital Speed Controller Instruction Manual	ME3818

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Safety Guide

“Safety Guide” has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	• This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) • Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. • Do not use it in any of the following environments. 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact • For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

No.	Operation Description	Description
2	Transportation	• When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. • When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. • When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. • Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model. • Do not step or sit on the package. • Do not put any heavy thing that can deform the package, on it. • When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. • When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment’s capability limit. • Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. • Do not get on the load that is hung on a crane. • Do not leave a load hung up with a crane. • Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	• The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. • Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	(1) Installation of Robot Main Body and Controller, etc. • Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. • Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. • When using the product in any of the places specified below, provide a sufficient shield. 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring • Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. • Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. • Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. • When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. • Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. • Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. (3) Grounding • The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. • For the ground terminal (PE) on the AC power cable of the controller and the grounding plate in the control panel, make sure for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment standards and criteria). For detail, follow the description in [an instruction manual of each controller or controller built-in actuator]. • Conduct functional grounding on the FG terminal for a controller supplying 24V DC or a controller built-in type actuator. In order to minimize influence to mechanical operation given by electromagnetic interference (noise) to an electrical device or insulation failure, conduct grounding on a terminal or a conductor that is electrically stable. The reference impedance should be Type D (Former Class 3, ground resistance 100Ω or less).

No.	Operation Description	Description
4	Installation and Start	(4) Safety Measures • When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. • When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot’s movable range. When the robot under operation is touched, it may result in death or serious injury. • Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. • Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. • Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. • When the installation or adjustment operation is to be performed, give clear warnings such as “Under Operation; Do not turn ON the power!” etc. Sudden power input may cause an electric shock or injury. • Take the measure so that the work part is not dropped in power failure or emergency stop. • Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. • Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	• When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. • Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. • When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. • When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. • Place a sign “Under Operation” at the position easy to see. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.

No.	Operation Description	Description
6	Trial Operation	• When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. • After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. • When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. • Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. • Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	• Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. • Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. • Make sure to operate automatic operation start from outside of the safety protection fence. • In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. • When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

No.	Operation Description	Description
8	Maintenance and Inspection	• When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. • Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. • When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. • When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. • When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. • Place a sign “Under Operation” at the position easy to see. • For the grease for the guide or ball screw, use appropriate grease according to the instruction manual for each model. • Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. • The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. • Pay attention not to lose the removed cover or screws, and make sure to put the product back to the original condition after maintenance and inspection works. Use in incomplete condition may cause damage to the product or an injury. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.
9	Modification and Dismantle	• Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	• When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. • When removing the actuator for disposal, pay attention to drop of components when detaching screws. • Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	• Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device. • See Overseas Specifications Compliance Manual to check whether complies if necessary. • For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety. • Using the devise in a way not indicated by IAI may lose the protection performance equipped to the device.

Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the instruction manual for each model.

Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates lower possibility for the injury, but should be kept to use this product properly.	 Notice

Precautions for Handling

1. The Safety Guide attached with the product is intended to permit safe use of the product and thus to prevent risks and property damage. Be sure to read it before handling the product.

2. Do not attempt any handling or operation that is not indicated in this instruction manual.

3. Make sure to secure the ELECYLINDER properly in accordance with this instruction manual.

If the ELECYLINDER is not securely fixed, this may lead to abnormal noise, vibration, breakdown or shortened product life.

4. Make sure to observe the usage conditions and environment of the product.

Operation outside the warranty could cause decreased performance or product breakdown.
Use within the allowable range for each item.

Item	Cautions for use	Problems or breakdowns which may occur if the allowable range is exceeded
Speed and acceleration/deceleration	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life.
Allowable load moment	Use within the allowable range (Static/dynamic)	May lead to abnormal noise, vibration, breakdown, or shortened product life. In extreme cases, flaking may occur on the guide or ball screw.
Overhang load length		Mounting a load with an overhang length greater than the allowable values may lead to vibration or abnormal noise.

5. If return operations are continued over a short distance, they may rapidly degrade the film of grease.

As a guideline, in every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film. Continued use of the actuator in that state may lead to breakdown.

In extreme cases, flaking may occur on the guide or ball screw.

6. Do not attempt to have sliders and rods collide with an obstacle at high speed.

This may damage other mechanical parts.

7. About Handling of Stainless Steel Sheet

There is a stainless steel sheet put on the driving portion in the rods and tables type. Do not happen to hit it with a tool or attempt to push strongly with hand. It may deform the sheet.

8. Base oil may separate from the grease and leak from the inside of the ELECYLINDER to the exterior due to the operating environment, mounting orientation, operating conditions, etc.

Protect the peripheral equipment if base oil adhesion negatively affects them.

9. Grease has been applied to the outer periphery of the rod.

Protect the peripheral equipment if grease adhesion negatively affects them.

10. The diagram showing the relation between the pressing force and the current limit shows the reference of the lower limit of the pressing force at each current limit.

11. The "Allow 100 or more" indicated in the External Dimensions is intended to enable wiring without excessive force applied to the cable.

Allow 100mm or more cable linearity.

International Standard Compliance

The ELECYLINDER complies with the following overseas standards.

Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

CE Marking			UL Standard
RoHS3 Directive	EMC Directive	RE Directive ^(Note 1)	
○	○	○	×

If it is necessary to announce EC Declaration of Conformity with this product built in your facility, as this product itself declares the conformity to EU Directives in some specific conditions as stated below, you would be able to utilize this declaration.

EU Directives Applicable for EC Declaration of Conformity

EMC Directive (2014/30/EU).....To be checked in CE marking described in model nameplate.

RoHS3 Directive (2011/65/EU + (EU)2015/863).....Same as above.

RE Directive (2014/53/EU) To be checked in EC Declaration of Conformity.

EC Declaration of Conformity proving conformity to RE Directive may be modified without notice according to addition of conformed models, specification change and so on. Consult with our sales person in charge if necessary.

(Note 1) RE Directive applies to ELECYLINDERS with WL (wireless communication specification) or WL2 (Wireless axis operation specification) in model name options. Certificates and self-declarations regarding the wireless function are handled under the model name below for the wireless circuit board.

MODEL: IABL3827

Precautions for Handling Wireless Operation

When the option for wireless communication support (model: WL, WL2) is selected, a wireless communication circuit board is built into the ELECYLINDER.

Certificates and self-declarations regarding the wireless function are handled under the model name below for the wireless circuit board.

Model name: IABL3827

This product uses the 2.4 GHz radio band known as an ISM band.

This frequency range is used by various devices such as microwave ovens and wireless LAN, so that communication may be disrupted by radio disturbance.

Use of this device is permitted within the following countries (regions) only. Use in other countries (regions) requires certification to be obtained based on the laws and regulations of the relevant country (region).

Wireless frequency	2,400 to 2,483.5MHz
Wireless output	+5dBm

[US]

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference and
2. This device must accept any interference received, including interference that may cause undesired operation of the device.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure limits. This transmitter must not be colocated or operating with any other antenna or transmitter.

[CANADA]

This device complies with Industry Canada licence-exempt RSS standards.

Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence

L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC RF Radiation Exposure Statement:

To comply with IC RF exposure requirements, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

Pour se conformer aux exigences de conformité RF canadienne l'exposition, cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.

[日本]

本製品で使用している無線モジュールは、工事設計認証を受けていますので、以下の事項を行うと法律で罰せられることがあります。

- 無線モジュールを分解/改造すること

[EU Member States]

- For details of the applicable standards, please refer to above mentioned international standards compliances.
- Import Corporation Name : IAI Industrieroboter GmbH
- * The product can be used in any country which is a member of EU.

[中国／CHINA]

- 许可编号 : CMIT ID=2018DJ0331
- 申请公司名 : IAI 株式会社
- 机型名 : IABL3827
- 制造国 : 日本 (Made in Japan)
- 进口企业名 : IAI (Shanghai) Co., Ltd.

[한국／KOREA]

- 식별 부호 : R-CRM-IAI-IABL3827
- 제조사명 : 주식회사 IAI
- 모델명 : IABL3827
- 제조국 : 일본(Made in Japan)
- 수입업자명 : IA KOREA Corp.

해당 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없습니다

[ประเทศไทย / Thailand]

- ผู้ผลิต : IAI CORPORATION.
- ชื่อโมเดล : IABL3827
- ประเทศผู้ผลิต : ญี่ปุ่น (Made in Japan)
- ผู้นำเข้า : IAI Robot (Thailand) Co., Ltd.

[México / Mexico]

- Número de Certificación : IFT : RCPIATB19-1956
- Nombre de la Empresa Solicitante : IAI Corporation
- Nombre del Modelo : IABL3827
- País de Fabricación : Japón (Hecho en Japón)
- Nombre de la Empresa Importadora : IAI America, Inc.

Precautions for Axis Operation with Wireless Connection

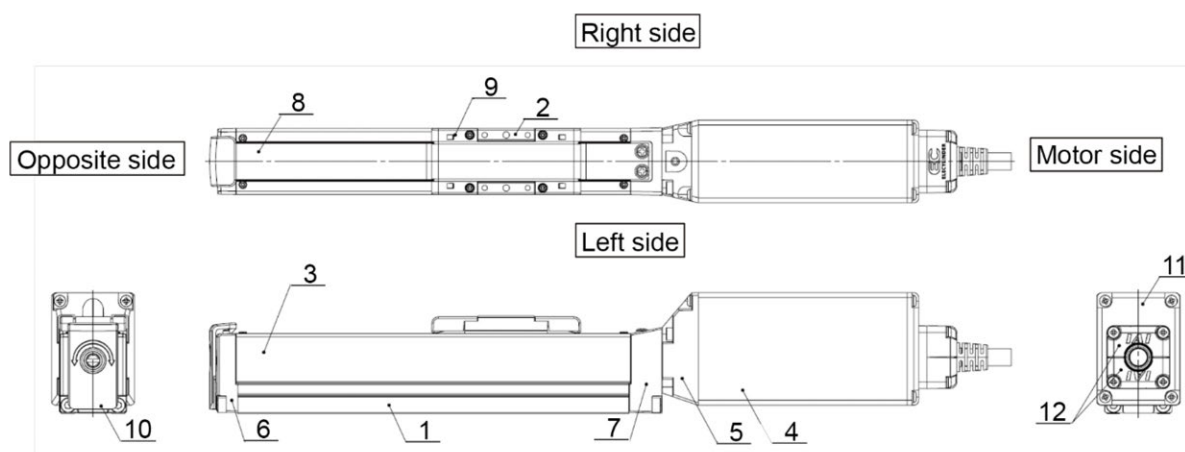
Touch Panel Teaching Pendant TB-03 (V2.30 or later) can operate the option model code -WL2 ELECYLINDER with wireless connection. For operation with wireless connection, secure safety by following the precautions below before use.

- The stop switch on Touch Panel Teaching Pendant TB-03 will not function during wireless connection. Prepare a device / circuit to stop the operation when emergency stop is required.
- For axis operation with wireless connection, operation testing (movement to forward and backward ends, jog operation, inching operation) is possible, but the control device is not designed for purposes of automatic operation. Construct a mechanical system based on the risks of the operating environment.
- Carry out risk assessment based on the standard/spec requirements of the machinery for installation. Dangerous operation, such as that requiring an automatic stop when control signals cannot be received (including disabled communication) is not acceptable.
- Stopping axis operation by wireless network cannot be used as a safety feature as defined in EN ISO 13849-1: 2015. It is also not compliant with Safety Category B or Categories 1 to 4 stated in EN ISO 13849-1: 2015.

Part Names

In this manual, the ELECYLINDER's left/right sides and motor/opposite sides are shown as in the figure below.

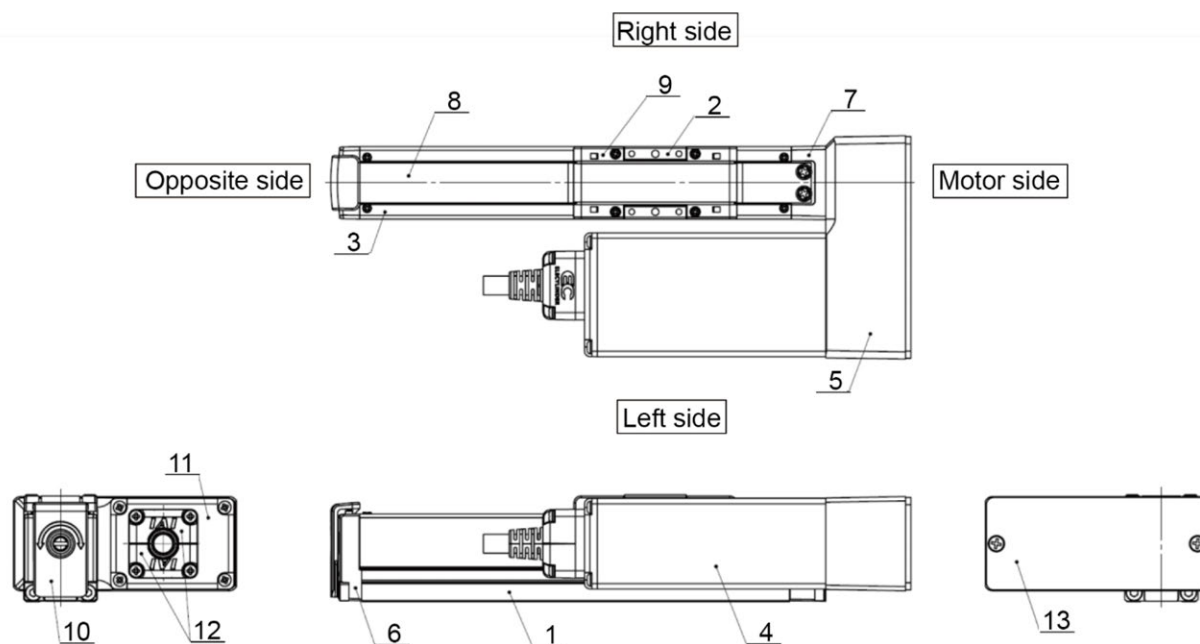
Slider type (EC-S2□B)



[Main Component Materials]

No.	Name	Material	Surface Treatment
1	Base	Aluminum Alloy	Black Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	Black Anodizing Treatment
4	Motor cover	Aluminum Alloy	Black Anodizing Treatment
5	Motor bracket	Aluminum die-casting	Decorative Surface Coating
6	Front bracket	Aluminum die-casting	—
7	Bearing housing	Aluminum die-casting	Decorative Surface Coating
8	Stainless steel sheet	Special Stainless Steel	—
9	Slider cover	Plastic	—
10	Sheet clamp	Plastic	—
11	End cover	Plastic	—
12	Cable box	Plastic	—

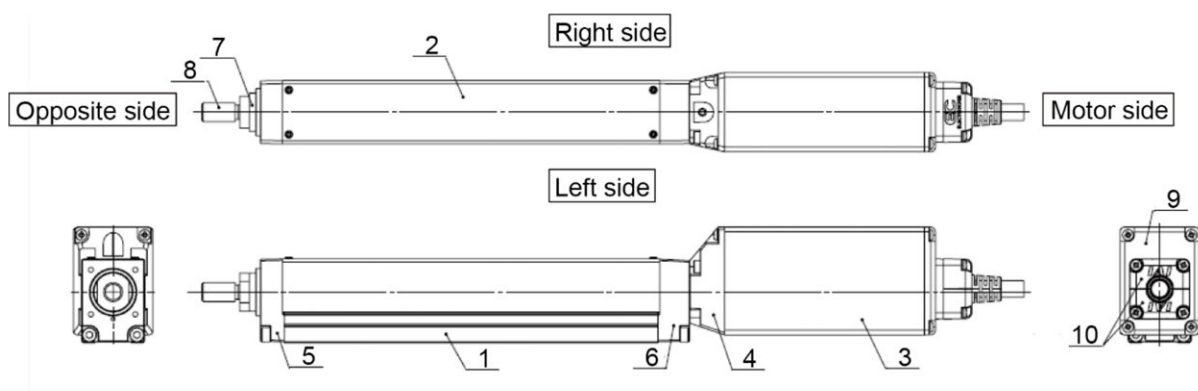
Slider type (EC-S2□BR)



[Main Component Materials]

No.	Name	Material	Surface Treatment
1	Base	Aluminum Alloy	Black Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	Black Anodizing Treatment
4	Motor cover	Aluminum Alloy	Black Anodizing Treatment
5	Reversing bracket	Aluminum die-casting	Decorative Surface Coating
6	Front bracket	Aluminum die-casting	—
7	Bearing housing	Aluminum die-casting	Decorative Surface Coating
8	Stainless steel sheet	Special Stainless Steel	—
9	Slider cover	Plastic	—
10	Sheet clamp	Plastic	—
11	End cover	Plastic	—
12	Cable box	Plastic	—
13	Pulley cover	Aluminum Alloy	White Anodizing Treatment

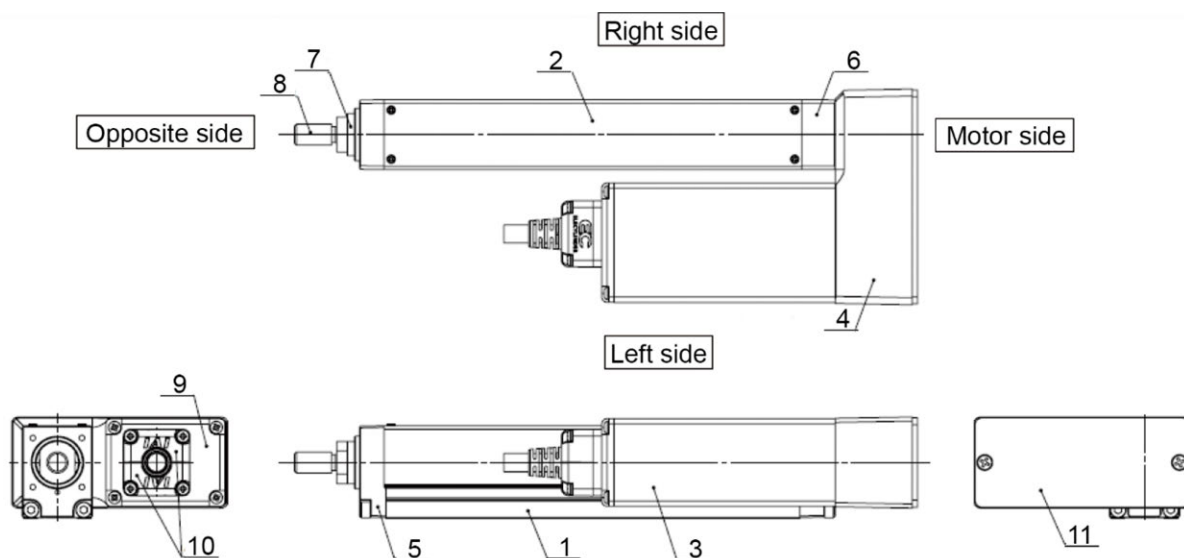
Radial cylinder type (EC-RR2□B)



[Main Component Materials]

No.	Name	Material	Surface Treatment
1	Base	Aluminum Alloy	Black Anodizing Treatment
2	Frame cover	Aluminum Alloy	Black Anodizing Treatment
3	Motor cover	Aluminum Alloy	Black Anodizing Treatment
4	Motor bracket	Aluminum die-casting	Decorative Surface Coating
5	Front bracket	Aluminum die-casting	—
6	Bearing housing	Aluminum die-casting	Decorative Surface Coating
7	Rod	Aluminum Alloy	White Anodizing Treatment
8	Rod tip adaptor	Carbon Steel	Electroless Nickel Plated Treatment
9	End cover	Plastic	—
10	Cable box	Plastic	—

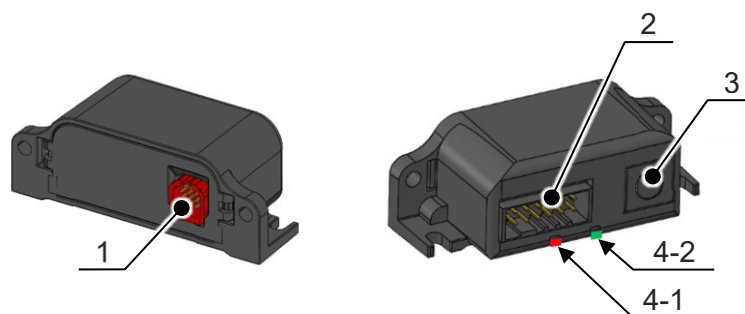
Radial cylinder type (EC-RR2□BR)



[Main Component Materials]

No.	Name	Material	Surface Treatment
1	Base	Aluminum Alloy	Black Anodizing Treatment
2	Frame cover	Aluminum Alloy	Black Anodizing Treatment
3	Motor cover	Aluminum Alloy	Black Anodizing Treatment
4	Reversing bracket	Aluminum die-casting	Decorative Surface Coating
5	Bearing housing	Aluminum die-casting	—
6	Bearing housing	Aluminum die-casting	Decorative Surface Coating
7	Rod	Aluminum Alloy	White Anodizing Treatment
8	Rod tip adaptor	Carbon Steel	Electroless Nickel Plated Treatment
9	End cover	Plastic	—
10	Cable box	Plastic	—
11	Pulley cover	Plastic	—

Interface box 2



No.	Name		Contents
1	Actuator connector		It is a connector to join an actuator.
2	Power & I/O connector		This connector connects power and I/O wiring.
3	Teaching port		This connector is for the connection of a teaching pendant or PC software. When connecting, remove the cap.
4	Status indicator LED*	1 LED1	The servo ON/OFF status and the alarm status should be indicated.
		2 LED2	The wireless status should be indicated.

* For details, refer to [3.6 Troubleshooting confirmations].

ELECYLINDER

Chapter 1

Specifications

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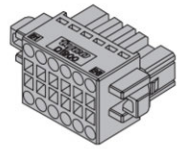
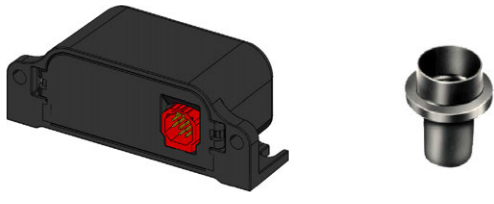
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1.1 Checking the product

1.1.1 Components

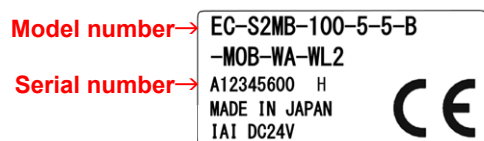
The following table shows the product configuration for the standard specification.

See the packing list for the details of the enclosed components. In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

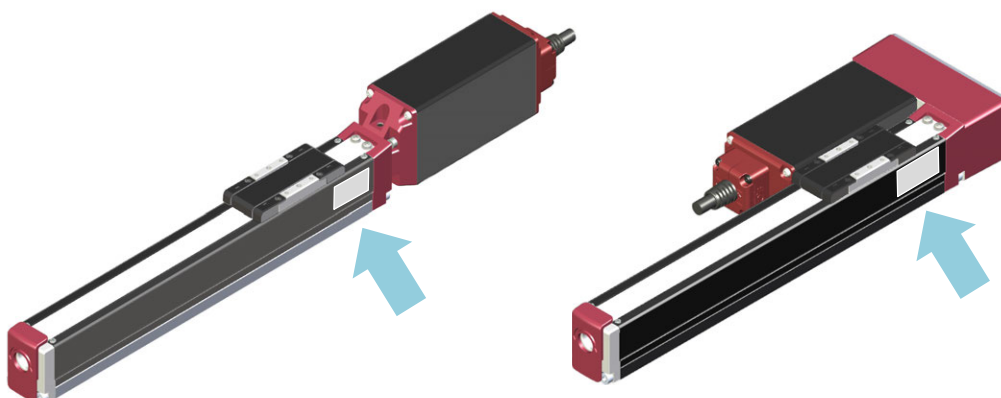
Body	
<u>ELECYLINDER Quantity 1</u>  EC-S2□B EC-S2□BR EC-RR2□B EC-RR2□BR	
Accessories	
<u>Power & I/O Cable Quantity: 1</u> (Note 1)  Standard Cable or 4-Way Connector Cable	<u>Power & I/O Connector Quantity: 1</u> (Note 1) 
Components included as selected in the model number	
<u>Interface Box 2, Protective Cap</u> <u>Quantity: 1</u> (Note 1) 	<u>Safety Guide: Quantity: 1</u> 

Note 1 It should not be enclosed when ACR type is selected.

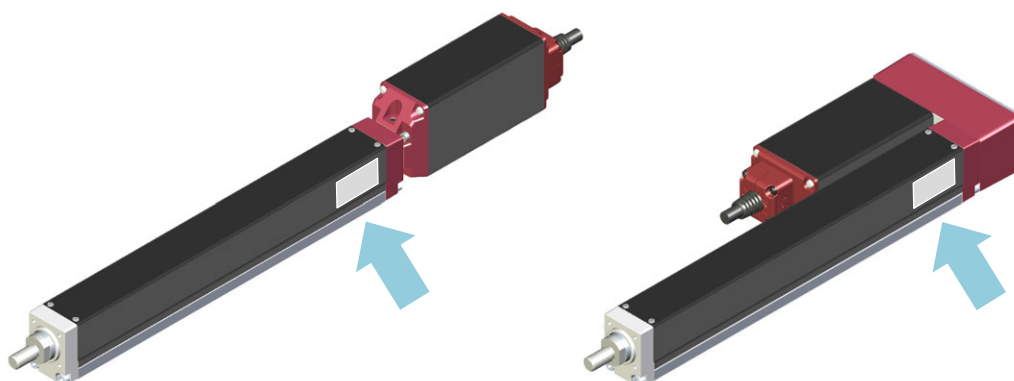
1.1.2 How to read the model nameplate



[Slider type Nameplate position]



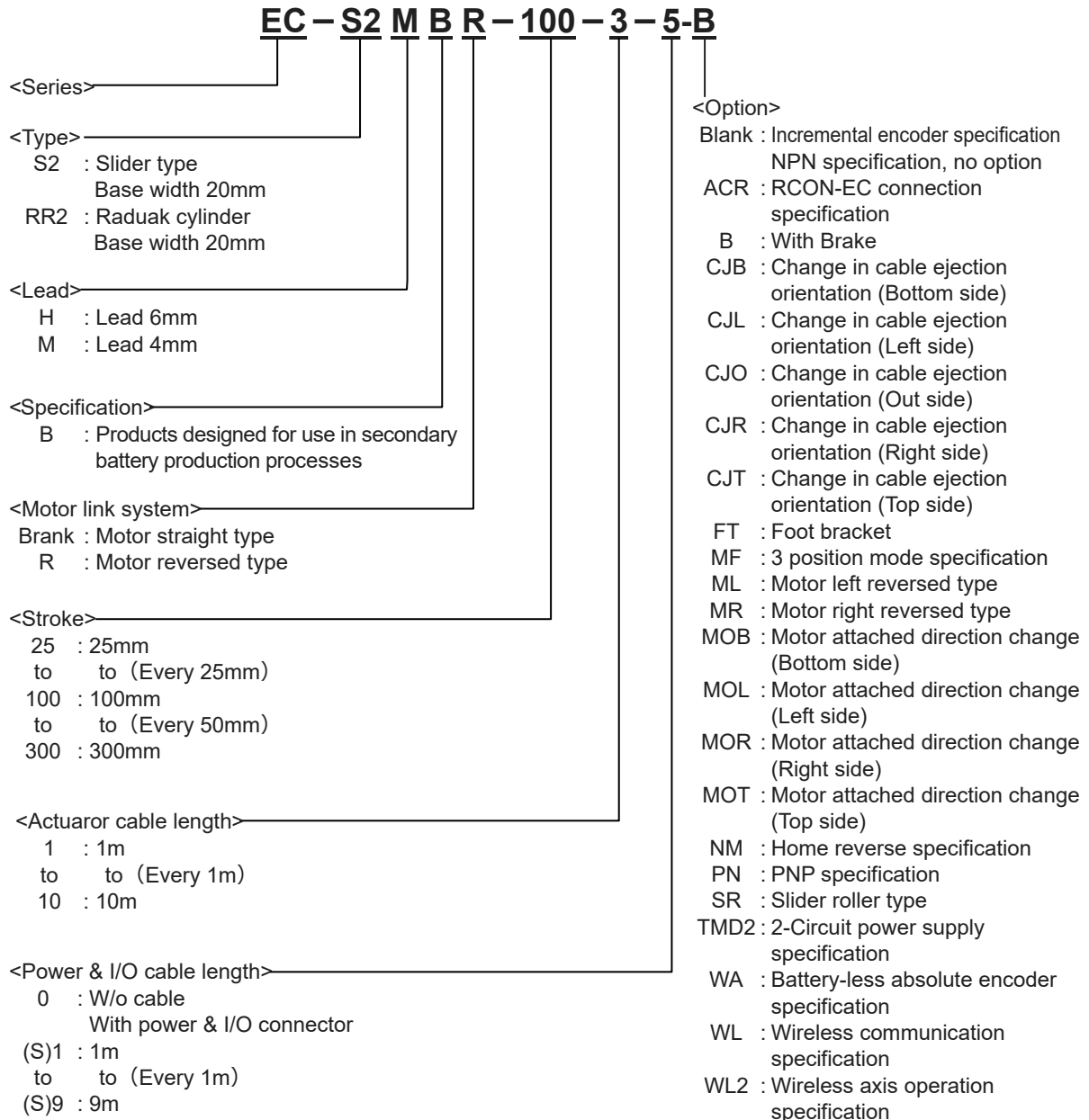
[Radial cylinder type Nameplate position]



1.1.3 How to read the model number

It is a list of the model codes.

Available options should differ depending on types and conditions. Refer to the catalog for details.



1.2 Mechanical specifications: Slider type

1.2.1 EC-S2□B

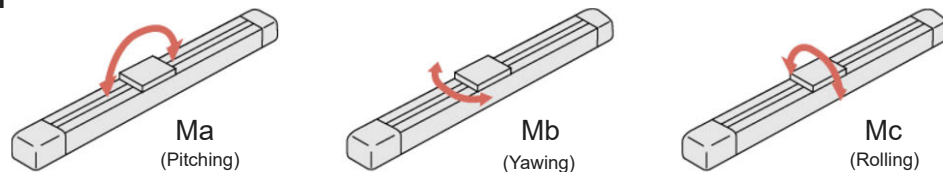
[1] Actuator Specifications

Item		Content
Drive system		Ball screw $\Phi 6\text{mm}$, rolled C10
Positioning repeatability		$\pm 0.02\text{mm}$
Lost motion		0.1mm or less
Linear guide		Linear Infinite Circulation System
Static allowable moment (Note 1)		Ma direction: $1.43\text{N}\cdot\text{m}$, Mb direction: $2.04\text{N}\cdot\text{m}$, Mc direction: $2.29\text{N}\cdot\text{m}$
Dynamic allowable moment (Note 1, 2)		Ma direction: $0.50\text{N}\cdot\text{m}$, Mb direction: $0.72\text{N}\cdot\text{m}$, Mc direction: $0.81\text{N}\cdot\text{m}$
Brake	Specification	Non-excitation activating electromagnetic brake
	Holding force (kgf)	Lead 6: —, Lead 4: 0.25kgf
Ambient operating temperature/humidity		10 to 40°C , 85%RH or less (Non-condensing)
Degree of protection		IP20
Vibration and impact resistance		4.9m/s^2
Motor type		Pulse motor (□20) (Power supply capacity Max.1.25A)
Encoder type		Incremental (Standard) / Battery-less absolute (Option)
Encoder pulse count		16384pulse/rev

Note 1 Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams. Revise the conditions for operation in such cases.

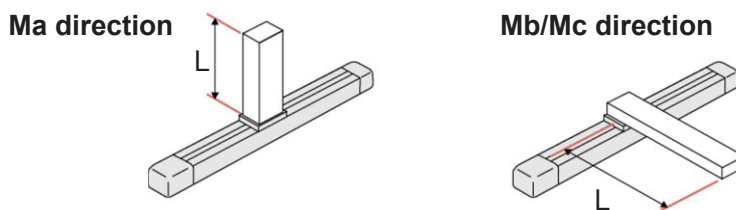
Note 2 For reference rated life of 5,000km. The running life differs according to operation conditions and mounting status.

Moment direction

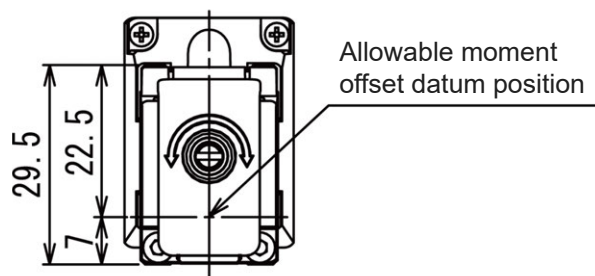


Load Overhang Length (L)

It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.



- Reference for Load Overhang Length (L = 50mm or less)

Allowable moment offset datum position**Caution**

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the ELECYLINDER.
- Keep the mounted object center of gravity at or below 1/2 the overhang load length.

[2] Lead and Maximum payload

Type	Lead [mm]	Maximum payload		Maximum pressing force [N]
		Horizontal [kg]	Vertical [kg]	
EC-S2HB	6	0.5	—	15
EC-S2MB	4	1	0.25	23

[3] Stroke and Max. Speed**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting the lower less than speed the minimum speed may cause such concerns of generating abnormal noise or making the speed unstable.
- The minimum speed is the lead 6 is 8mm/s and lead 4 is 5mm/s.

Unit [mm/s]

Lead [mm]	25 to 100mm (Every 25mm)	100 to 300 (Every 50mm)
6	200	
4	150	

[4] Payload by Speed/Acceleration

**Caution**

- Do not attempt to configure settings for acceleration/deceleration above the allowable values. It may cause to generate vibration, malfunction or shorten the product life.

The upper limit for acceleration/deceleration should be 0.3G in both horizontal and vertical directions. For input in percentage [%], 0.3G are to be set as 100%.

There may be a restriction in speed depending on the environmental temperature.

(Note) “—” represent operation not available.

Lead 6

Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	0.5	—
50	0.5	—
100	0.5	—
150	0.5	—
200	0.5	—
250	—	—
300	—	—

Lead 4

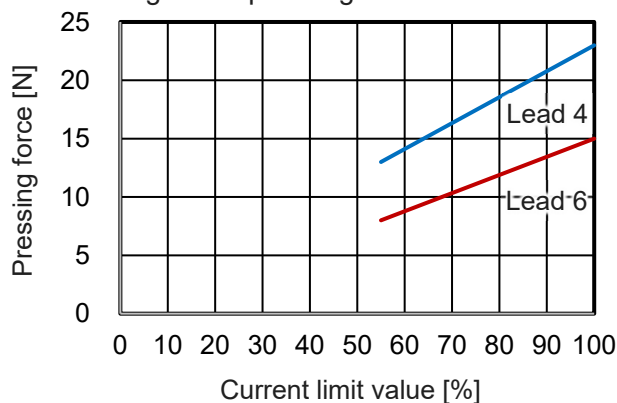
Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	1	0.25
50	1	0.25
100	1	0.25
150	1	0.25
200	—	—

[5] Pressing force and current limit value

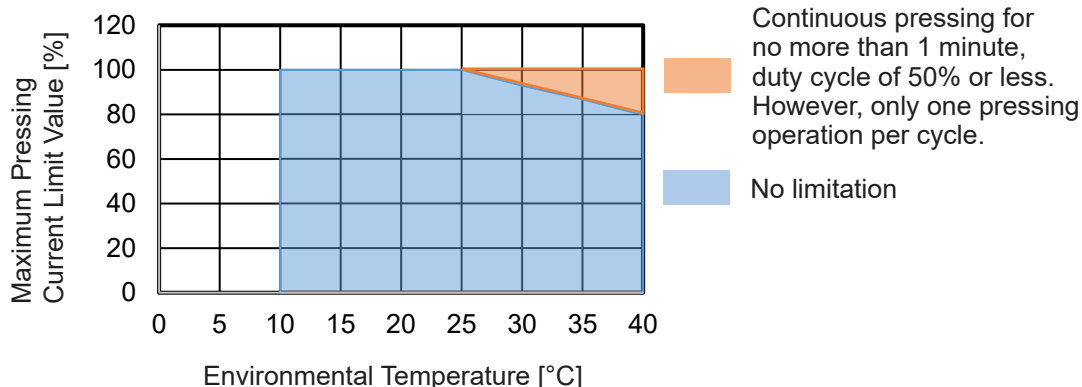
**Caution**

- The relation between the pressing force and the current is a reference under a condition of pressing operation in speed at 20mm/s for Lead 4 and 6.
There is some variance in the actual pressing force. The variance increases when the current value is low.
- Set the current limit value in 55 to 100% range.
- When the approach speed to the pressing start position is at 20mm/s or less for Lead 4 and 6, the pressing operation should be conducted at the approach speed.
When the pressing speed is less than 20mm/s for Lead 4 and 6, the pressing force (reference) shown in the graph above may not be satisfied. Confirm in advance that there is no problem in the pressing force.
- Calculate the recoil moment generated by the pressing force when performing pressing operation with the slider type.
For the offset datum position, refer to [Actuator Specifications].
Configure the current limit value to ensure that the recoil moment does not exceed the (Ma/Mb) dynamic allowable moment.

Correction diagram of pressing force and current limit value

**■ Precautions when performing push-motion operation**

When performing high-thrust push-motion operation in a high temperature environment, use within the limits of the graph.



1.2.2 EC-S2□BR

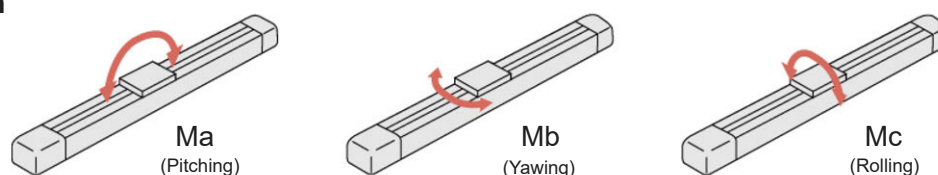
[1] Actuator Specifications

Item		Content
Drive system		Ball screw $\Phi 6\text{mm}$, rolled C10
Positioning repeatability		$\pm 0.02\text{mm}$
Lost motion		0.1mm or less
Linear guide		Linear Infinite Circulation System
Static allowable moment (Note 1)		Ma direction: $1.43\text{N}\cdot\text{m}$, Mb direction: $2.04\text{N}\cdot\text{m}$, Mc direction: $2.29\text{N}\cdot\text{m}$
Dynamic allowable moment (Note 1, 2)		Ma direction: $0.50\text{N}\cdot\text{m}$, Mb direction: $0.72\text{N}\cdot\text{m}$, Mc direction: $0.81\text{N}\cdot\text{m}$
Brake	Specification	Non-excitation activating electromagnetic brake
	Holding force (kgf)	Lead 6: —, Lead 4: 0.25kgf
Ambient operating temperature/humidity		10 to 40°C , 85%RH or less (Non-condensing)
Degree of protection		IP20
Vibration and impact resistance		4.9m/s^2
Motor type		Pulse motor (□20) (Power supply capacity Max. 1.25A)
Encoder type		Incremental (Standard) / Battery-less absolute (Option)
Encoder pulse count		16384pulse/rev

Note 1 Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams. Revise the conditions for operation in such cases.

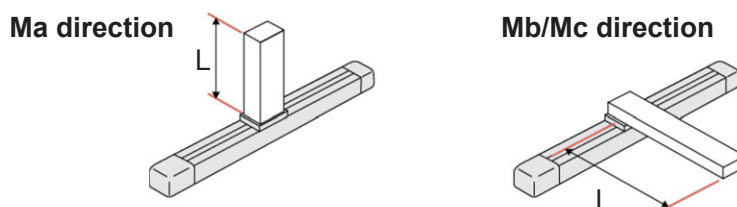
Note 2 For reference rated life of 5,000km. The running life differs according to operation conditions and mounting status.

Moment direction

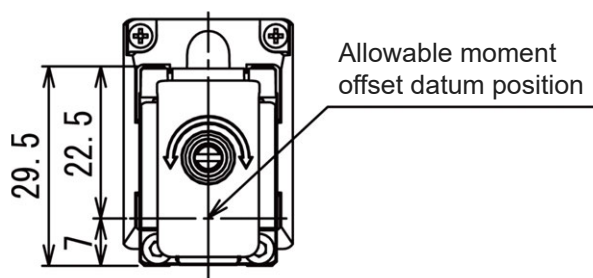


Load Overhang Length (L)

It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.



- Reference for Load Overhang Length (L = 50mm or less)

Allowable moment offset datum position**Caution**

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the ELECYLINDER.
- Keep the mounted object center of gravity at or below 1/2 the overhang load length.

[2] Lead and Maximum payload

Type	Lead [mm]	Maximum payload		Maximum pressing force [N]
		Horizontal [kg]	Vertical [kg]	
EC-S2HBR	6	0.5	—	15
EC-S2MBR	4	1	0.25	23

[3] Stroke and Max. Speed**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting the lower less than speed the minimum speed may cause such concerns of generating abnormal noise or making the speed unstable.
- The minimum speed is the lead 6 is 8mm/s and lead 4 is 5mm/s.

Unit [mm/s]

Lead [mm]	25 to 100mm (Every 25mm)	100 to 300 (Every 50mm)
6	200	
4	150	

[4] Payload by Speed/Acceleration

**Caution**

- Do not attempt to configure settings for acceleration/deceleration above the allowable values. It may cause to generate vibration, malfunction or shorten the product life.

The upper limit for acceleration/deceleration should be 0.3G in both horizontal and vertical directions.

For input in percentage (%), 0.3G are to be set as 100%.

There may be a restriction in speed depending on the environmental temperature.

(Note) “—” represent operation not available.

Lead 6

Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	0.5	—
50	0.5	—
100	0.5	—
150	0.5	—
200	0.5	—
250	—	—
300	—	—

Lead 4

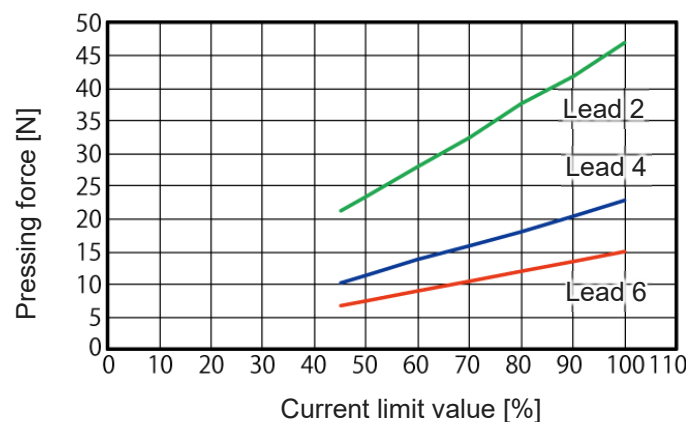
Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	1	0.25
50	1	0.25
100	1	0.25
150	1	0.25
200	—	—

[5] Pressing force and current limit value

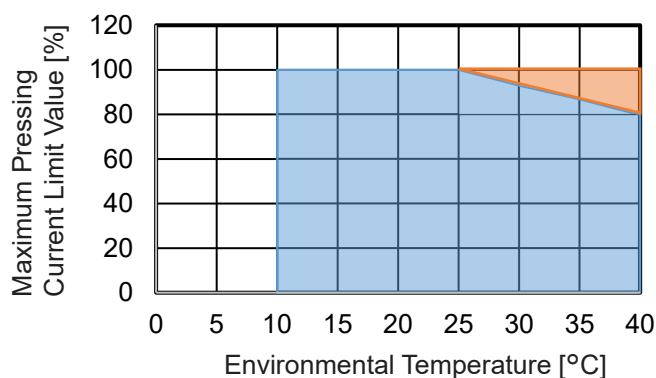
**Caution**

- The relation between the pressing force and the current is a reference under a condition of pressing operation in speed at 20mm/s for Lead 4 and 6.
There is some variance in the actual pressing force. The variance increases when the current value is low.
- Set the current limit value in 55 to 100% range.
- When the approach speed to the pressing start position is at 20mm/s or less for Lead 4 and 6, the pressing operation should be conducted at the approach speed.
When the pressing speed is less than 20mm/s for Lead 4 and 6, the pressing force (reference) shown in the graph above may not be satisfied. Confirm in advance that there is no problem in the pressing force.
- Calculate the recoil moment generated by the pressing force when performing pressing operation with the slider type.
For the offset datum position, refer to [Actuator Specifications].
Configure the current limit value to ensure that the recoil moment does not exceed the (Ma/Mb) dynamic allowable moment.

Correction diagram of pressing force and current limit value

**■ Precautions when performing push-motion operation**

When performing high-thrust push-motion operation in a high temperature environment, use within the limits of the graph.



Continuous pressing for no more than 1 minute, duty cycle of 50% or less. However, only one pressing operation per cycle.

No limitation

1.3 Mechanical specifications: Radial cylinder type

1.3.1 EC-RR2□B

[1] Actuator Specifications

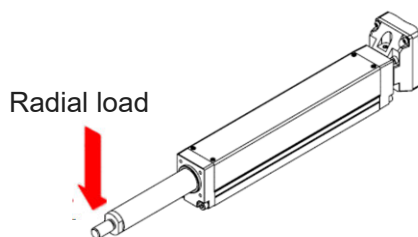
Item		Content
Drive system		Ball screw $\phi 6\text{mm}$, rolled C10
Positioning repeatability		$\pm 0.02\text{mm}$
Lost motion		0.1mm or less
Linear guide		Linear Infinite Circulation System
Brake	Specifcattion	Non-excitation activating electromagnetic brake
	Holding force (kgf)	Lead 6: —, Lead 4: 0.25kgf
Ambient operating temperature/humidity		10 to 40°C, 85%RH or less (Non-condensing)
Degree of protection		IP20
Vibration and impact resistance		4.9m/s ²
Motor type		Pulse motor (□20) (Power supply capacity Max. 1.25A)
Encoder type		Incremental (Standard) / Battery-less absolute (Option)
Encoder pulse count		16384pulse/rev

Radial Load / Moment Load

Because the radial cylinder type has a linear guide built into the body, radial and moment loads can be applied to the rod.

The applicable radial and moment loads must meet the following three conditions.

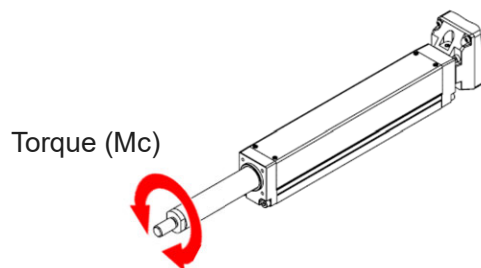
1. The radial load acting on the rod must not exceed the allowable value.



Type	Rod tip static allowable radial load	Rod tip dynamic allowable radial load (Note 1)
RR2□B	20N	10N

Note 1 The value assumes a basic rated life of 5,000km.

2. The torque (M_c) acting on the rod must not exceed the allowable value.



Type	Rod tip static allowable torque	Rod tip dynamic allowable torque (Note 1)
RR2□B	1.5N·m	1.5N·m

Note 1 The value assumes a basic rated life of 5,000km.

3. The uniform load (*) acting on the rod must not exceed the allowable value.

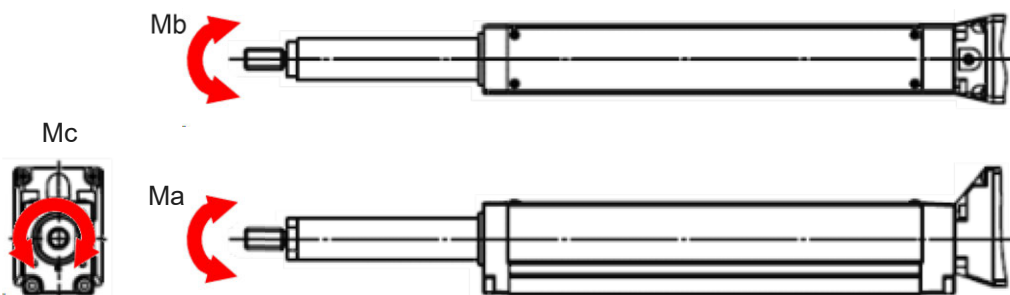
(*) Uniform load = $M_a \cdot K_a + M_b \cdot K_b + M_c \cdot K_c$

Type	Static allowable uniform load	Dynamic allowable uniform load (Note 1)	Load uniform coefficient K_a	Load uniform coefficient K_b	Load uniform coefficient K_c
RR2□B	570N	550N	297/m	208/m	186/m

Note 1 The value assumes a basic rated life of 5,000km.

Rod tip load direction

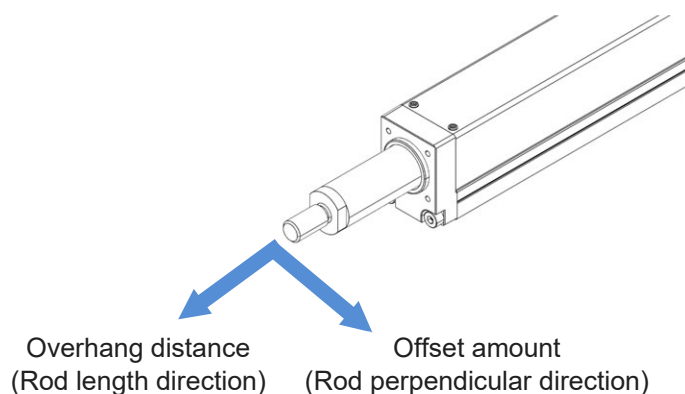
M_a , M_b , M_c : Moment load



Allowable moment offset datum position



Type	L
RR2□B	57mm

Allowable overhang distance, allowable offset amount

Type	Allowable overhang distance	Allowable offset amount
RR2□B	50mm	50mm

**Caution**

- Keep the radial load acting on the rod within the allowable offset amount and overhang distance for use. If the allowable values are exceeded, this may lead to vibration, shortened product life, or damage.
- Even if the radial load and torque load are within the allowable range, consider to ease the operational conditions when there is abnormal vibration or noise during operation.
- The position of the center of gravity on an object to be attached should be 1/2 or less of the distance of offset or overhang.

[2] Lead and Maximum payload

Type	Lead [mm]	Maximum payload		Maximum pressing force [N]
		Horizontal [kg]	Vertical [kg]	
EC-RR2HB	6	0.5	—	15
EC-RR2MB	4	2	0.25	23

[3] Stroke and Max. Speed

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting the lower less than speed the minimum speed may cause such concerns of generating abnormal noise or making the speed unstable.
- The minimum speed is the lead 6 is 8mm/s and lead 4 is 5mm/s.

Unit [mm/s]

Lead [mm]	25 to 100mm (Every 25mm)	100~200mm (Every 50mm)	250mm	300mm
6	200			165
4	150			110

[4] Payload by Speed/Acceleration

**Caution**

- Do not attempt to configure settings for acceleration/deceleration above the allowable values. It may cause to generate vibration, malfunction or shorten the product life.

The upper limit for acceleration/deceleration should be 0.3G in both horizontal and vertical directions.

For input in percentage (%), 0.3G are to be set as 100%.

There may be a restriction in speed depending on the environmental temperature.

(Note) “—” represent operation not available.

Lead 6

Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	0.5	—
50	0.5	—
100	0.5	—
150	0.5	—
200	0.5	—
250	—	—
300	—	—

Lead 4

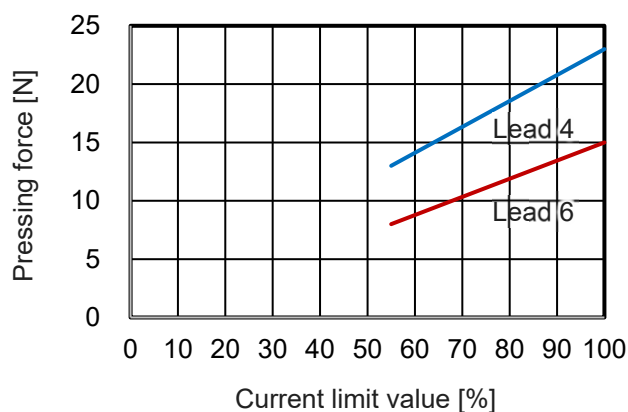
Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	1	0.25
50	1	0.25
100	1	0.25
150	1	0.25
200	—	—

[5] Pressing force and current limit value

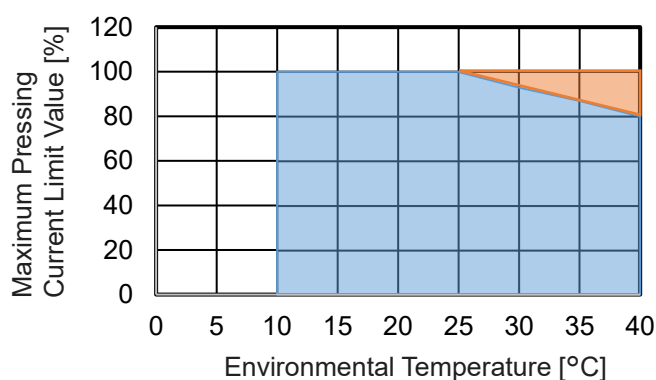
**Caution**

- The relation between the pressing force and the current is a reference under a condition of pressing operation in speed at 20mm/s for Lead 4 and 6.
There is some variance in the actual pressing force. The variance increases when the current value is low.
- Set the current limit value in 55 to 100% range.
- When the approach speed to the pressing start position is at 20mm/s or less for Lead 4 and 6, the pressing operation should be conducted at the approach speed.
When the pressing speed is less than 20mm/s for Lead 4 and 6, the pressing force (reference) shown in the graph above may not be satisfied. Confirm in advance that there is no problem in the pressing force.

Correction diagram of pressing force and current limit value

**■ Precautions when performing push-motion operation**

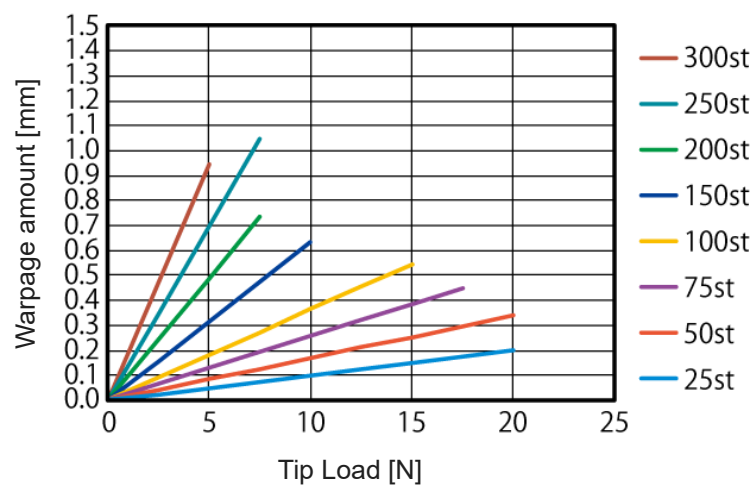
When performing high-thrust push-motion operation in a high temperature environment, use within the limits of the graph.



Continuous pressing for no more than 1 minute, duty cycle of 50% or less. However, only one pressing operation per cycle.

No limitation

[6] Rod tip warpage amount (reference value)



1.3.2 EC-RR2□BR

[1] Actuator Specifications

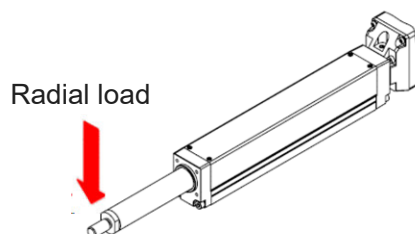
Item		Content
Drive system		Ball screw $\phi 6\text{mm}$, rolled C10
Positioning repeatability		$\pm 0.02\text{mm}$
Lost motion		0.1mm or less
Linear guide		Linear Infinite Circulation System
Brake	Specification	Non-excitation activating electromagnetic brake
	Holding force (kgf)	Lead 6: —, Lead 4: 0.25kgf
Ambient operating temperature/humidity		10 to 40°C, 85%RH or less (Non-condensing)
Degree of protection		IP20
Vibration and impact resistance		4.9m/s ²
Motor type		Pulse motor (□20) (Power supply capacity Max. 1.25A)
Encoder type		Incremental (Standard) / Battery-less absolute (Option)
Encoder pulse count		16384pulse/rev

Radial Load / Moment Load

Because the radial cylinder type has a linear guide built into the body, radial and moment loads can be applied to the rod.

The applicable radial and moment loads must meet the following three conditions.

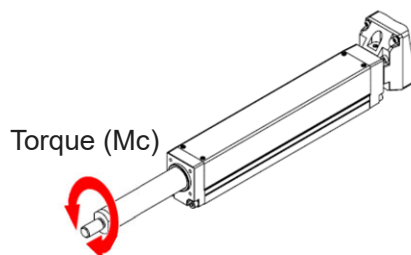
1. The radial load acting on the rod must not exceed the allowable value.



Type	Rod tip static allowable radial load	Rod tip dynamic allowable radial load (Note 1)
RR2□BR	20N	10N

Note 1 The value assumes a basic rated life of 5,000km.

2. The torque (M_c) acting on the rod must not exceed the allowable value.



Type	Rod tip static allowable torque	Rod tip dynamic allowable torque (Note 1)
RR2□BR	1.5N·m	1.5N·m

Note 1 The value assumes a basic rated life of 5,000km.

3. The uniform load (*) acting on the rod must not exceed the allowable value.

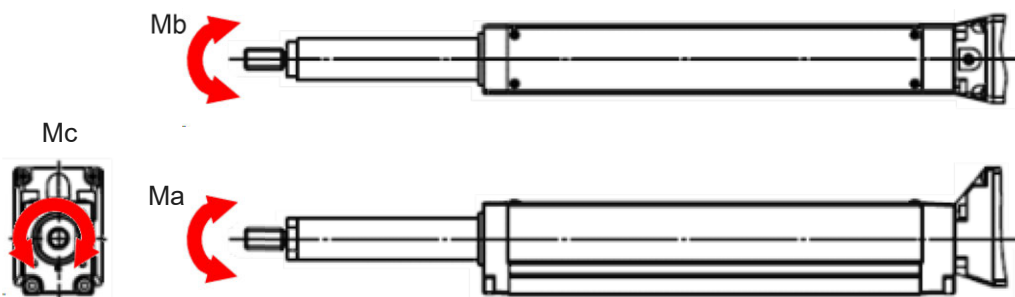
(*) Uniform load = $M_a \cdot K_a + M_b \cdot K_b + M_c \cdot K_c$

Type	Static allowable uniform load	Dynamic allowable uniform load (Note 1)	Load uniform coefficient K_a	Load uniform coefficient K_b	Load uniform coefficient K_c
RR2□BR	570N	550N	297/m	208/m	186/m

Note 1 The value assumes a basic rated life of 5,000km.

Rod tip load direction

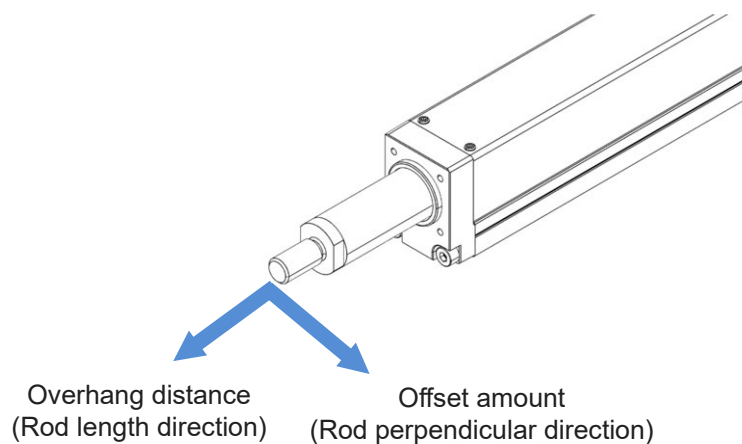
M_a , M_b , M_c : Moment load



Allowable moment offset datum position



Type	L
RR2□BR	57mm

Allowable overhang distance, allowable offset amount

Type	Allowable overhang distance	Allowable offset amount
RR2□BR	50mm	50mm

**Caution**

- Keep the radial load acting on the rod within the allowable offset amount and overhang distance for use. If the allowable values are exceeded, this may lead to vibration, shortened product life, or damage.

[2] Lead and Maximum payload

Type	Lead [mm]	Maximum payload		Maximum pressing force [N]
		Horizontal [kg]	Vertical [kg]	
EC-RR2HB	6	0.5	—	15
EC-RR2MB	4	1	0.25	23

[3] Stroke and Max. Speed

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting the lower less than speed the minimum speed may cause such concerns of generating abnormal noise or making the speed unstable.
- The minimum speed is the lead 6 is 8mm/s and lead 4 is 5mm/s.

Unit [mm/s]

Lead [mm]	25 to 100mm (Every 25mm)	100~200mm (Every 50mm)	250mm	300mm
6	200			165
4	150			110

[4] Payload by Speed/Acceleration

**Caution**

- Do not attempt to configure settings for acceleration/deceleration above the allowable values. It may cause to generate vibration, malfunction or shorten the product life.

The upper limit for acceleration/deceleration should be 0.3G in both horizontal and vertical directions.

For input in percentage (%), 0.3G are to be set as 100%.

There may be a restriction in speed depending on the environmental temperature.

(Note) “—” represent operation not available.

Lead 6

Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	0.5	—
50	0.5	—
100	0.5	—
150	0.5	—
200	0.5	—
250	—	—
300	—	—

Lead 4

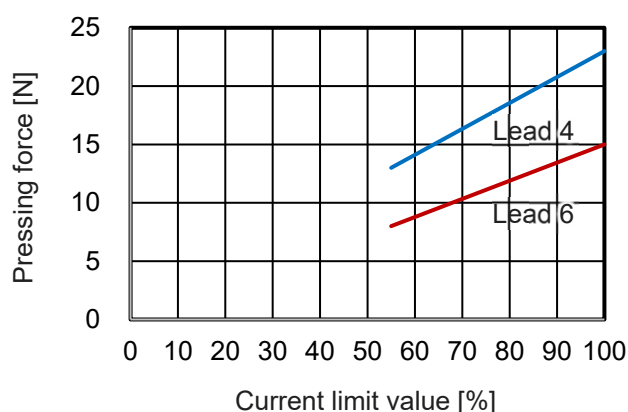
Orientation	Horizontal	Vertical
Speed [mm/s]	Acceleration [G]	
	0.3	0.3
0	1	0.25
50	1	0.25
100	1	0.25
150	1	0.25
200	—	—

[5] Pressing force and current limit value

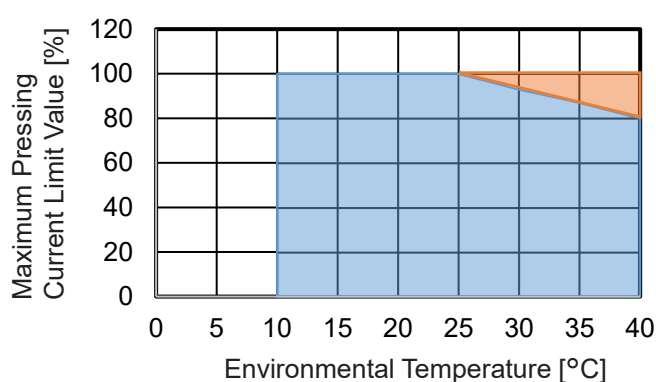
**Caution**

- The relation between the pressing force and the current is a reference under a condition of pressing operation in speed at 20mm/s for Lead 4 and 6.
There is some variance in the actual pressing force. The variance increases when the current value is low.
- Set the current limit value in 55 to 100% range.
- When the approach speed to the pressing start position is at 20mm/s or less for Lead 4 and 6, the pressing operation should be conducted at the approach speed.
When the pressing speed is less than 20mm/s for Lead 4 and 6, the pressing force (reference) shown in the graph above may not be satisfied. Confirm in advance that there is no problem in the pressing force.

Correction diagram of pressing force and current limit value

**■ Precautions when performing push-motion operation**

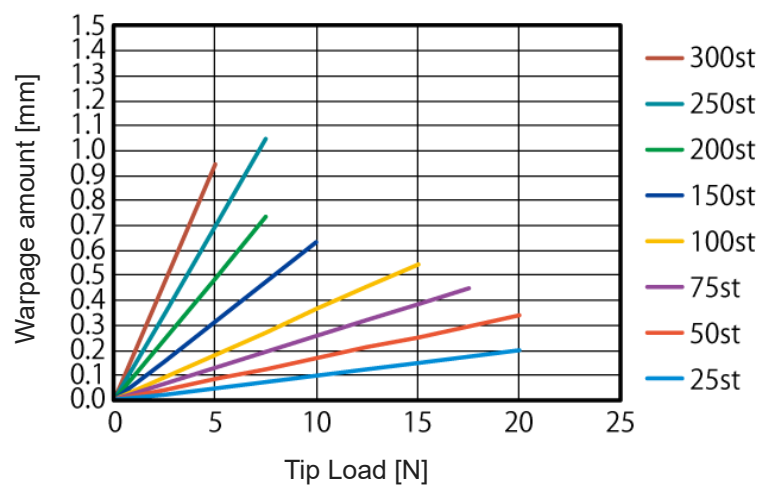
When performing high-thrust push-motion operation in a high temperature environment, use within the limits of the graph.



Continuous pressing for no more than 1 minute, duty cycle of 50% or less. However, only one pressing operation per cycle.

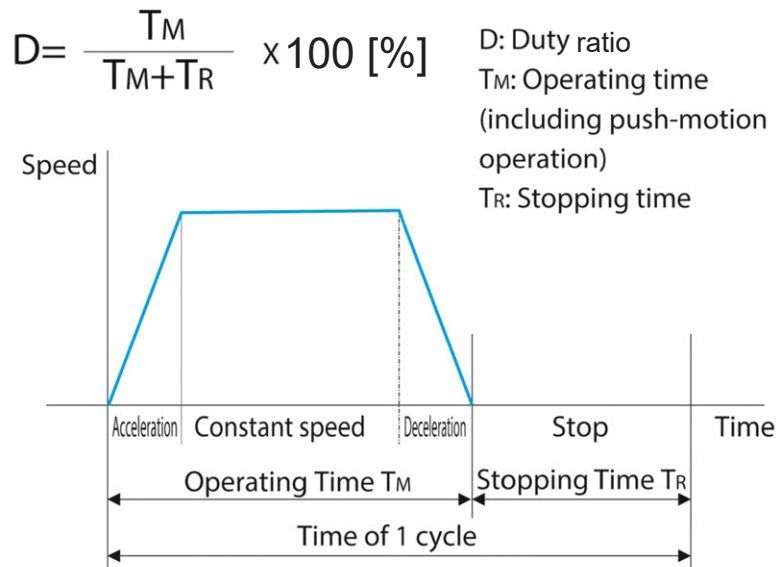
No limitation

[6] Rod tip warpage amount (reference value)



1.4 Duty ratio

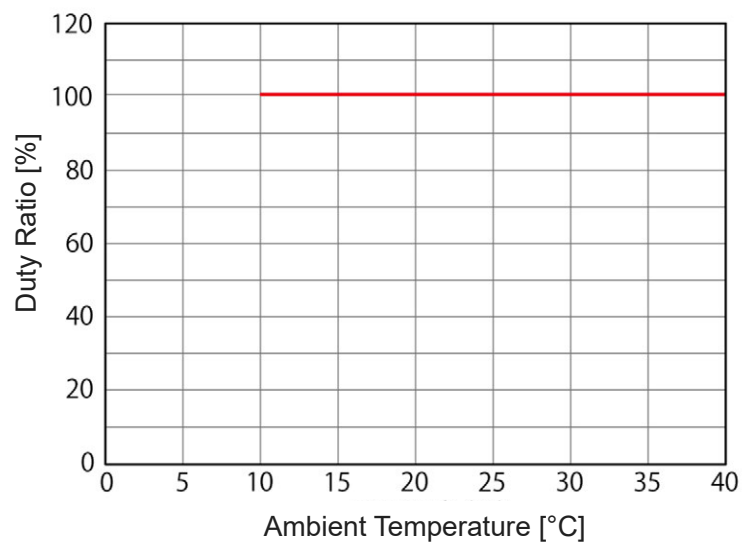
The duty ratio is the operating rate, shown in percentage [%], of the actuator operating time within one cycle.



Continuous operation is possible when the duty ratio is 100%.

However, there is a restriction for the pressing operation in high temperature environment. Refer to [Precautions when performing push-motion operation] in [1.2 Mechanical specifications: Slider type] and [1.3 Mechanical specifications: Radial cylinder type].

The relation of the ambient temperature and duty ratio



1.5 Options

1.5.1 RCON-EC connection specification (Model: ACR)

The field network connection is established via R-unit

- * When this option is selected, the power supply is configured as dual and the input and output specification is fixed to NPN, therefore it cannot be selected simultaneously with the TMD2 or PN options.

1.5.2 With brake (Model: B)

It is a structure to retain force so the slider, rod output shaft, etc. would not move while the power is turned off or servo is turned off. It can also be used to prevent from falling when mounted vertically.

1.5.3 Change the cable ejection direction (Model: CJB, CJL, CJR, CJT, CJO)

The actuator cable ejection direction can be changed.

●: Available for selection

Option model code	Direction	Slider type		Rod type	
		S2□	S2□R	RR2□	RR2□R
CJB	Bottom side	●	●	●	●
CJL	Left side	●		●	
CJR	Right side	●		●	
CJT	Top Side	●	●	●	●
CJO	Outside		●		●

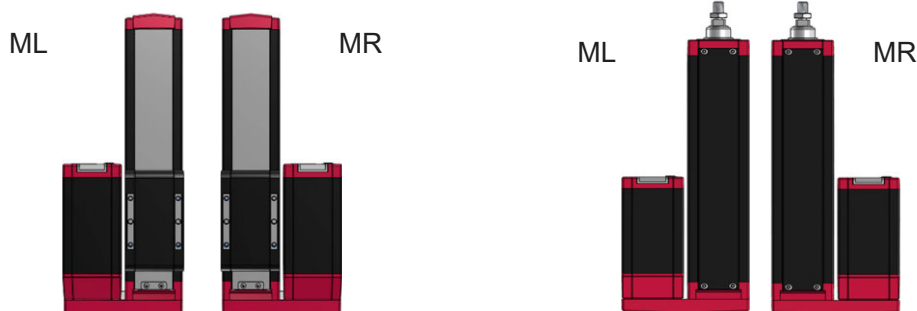
1.5.4 Foot bracket (Model: FT)

It is a bracket to hold the actuator main body with screws on the top.

- * For details, refer to [2.3.5 Body mounting, 2.4.4 Body mounting].

1.5.5 Motor reversed direction (Model: ML, MR)

At the view from the motor side, reversed on the left is ML and reversed to the right is MR.



1.5.6 3 position mode specification (Model: MF)

This is an option that enables 3-point positioning (intermediate stop).

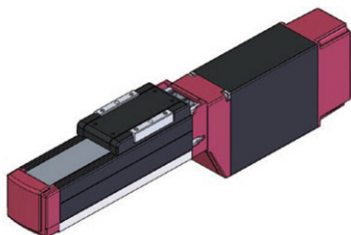
For details, refer to the separate volume [an instruction manual of ELECYLINDER 3 position mode specification (ME3837)]

1.5.7 Motor attached direction change (Model: MOB, MOL, MOR, MOT)

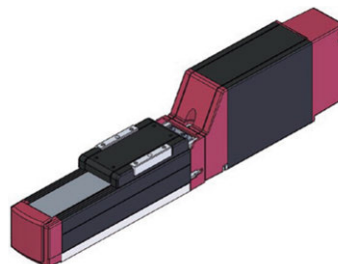
The orientation to install a motor can be selected from the four orientations, bottom / left / right / top.

* For details, refer to [Chapter 5 External Dimensions].

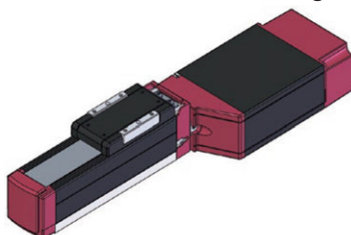
MOB
Motor attached direction change (Bottom side)



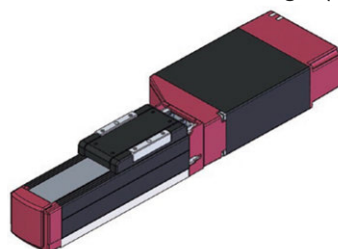
MOT
Motor attached direction change (Top side)



MOL
Motor attached direction change (Left side)



MOR
Motor attached direction change (Right side)



1.5.8 Home reverse specification (Model: NM)

The normal home position is on the motor side.

However, the opposite side specification is selected if the home position direction is reversed in accordance with equipment layout or assembly direction.

1.5.9 PNP specification (Model: PN)

I/O input/output specifications are NPN specification as standard.

Specifying this option changes the unit to PNP specification.

* It cannot be selected together with the RCON-EC connection type (option model code: ACR).

1.5.10 Slider roller specification (Model: SR)

The slider structure of the standard slider type is to be changed to the roller structure same as that for the cleanroom type.

1.5.11 2-circuit power supply specification (Model: TMD2)

This is an option that is equipped with an actuator operation stop input.

It allows only the actuator drive power to be cut off.

* It cannot be selected together with the RCON-EC connection type (option model code: ACR).

1.5.12 Battery-less absolute encoder specification (Model: WA)

The standard specification is for incremental encoder.

It can be changed to a battery-less absolute encoder specification.

1.5.13 Wireless communication specification (Model: WL)

Wireless communication is available between the ELECYLINDER and the touch panel teaching pendant.

Using wireless communication, the start point, end point, and AVD can be adjusted.

1.5.14 Wireless axis operation specification (Model: WL2)

In addition to the operations available via WL wireless communication (adjustment of start point, end point, and AVD), axis movement operation tests (forward end movement, backward end movement, JOG, and inching) can also be performed. However, this function is not intended for automatic operation.

Be sure to refer to the Precautions for Axis Operation with Wireless Communication.

(Note) Changes from WL to WL2 and from WL2 to WL cannot be performed by the customer.

Please contact us.

ELECYLINDER

Chapter 2

Installation

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2.1 Precautions for transportation

[Handling the package]

- Do not damage or drop the package.

The package is not specially designed to withstand dropping or shock due to collision.

- Keep the unit in horizontal position for storage or transportation.
- Do not climb onto the package.
- Do not put anything that could deform the package on it.

[Handling after unpacking]

- Hold the base part to bring it.
- Do not attempt to hold the motor cover or stainless steel sheet for transportation.
- Do not damage or drop the package during transportation.
- Do not apply excessive force to any part of the ELECYLINDER.
- The actuator cable is joined to the built-in controller.

Avoid any external force applied on it.

[Handling when assembled into machinery (system)]

- Hold the sliders and rods so they would not move unexpectedly during transportation.
- If the ELECYLINDER body or any moving part is overhanging, fix it appropriately to avoid large wobbles due to external vibration. When transporting without fixing the tip, do not apply impact of 0.3G or more.
- When suspending machinery (system) with ropes, be careful not to catch the rope on the ELECYLINDER or cable.

2.2 Installation and storage/preservation environment

Usage is possible in environments of pollution degree 2 or equivalent.

Pollution degree 2: Environment in which generally only nonconductive pollution occurs, but temporary conductive pollution may occur due to condensation (IEC 60664-1)

2.2.1 Installation environment

In general, it is an environmental that an operator can work without protection gear.

Avoid the following locations for installation.

- Where the unit receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 10 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity is out of the range from 10%RH to 85%RH
- Where the unit receives direct sunlight
- Where the unit is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of dust, salt or iron (at levels exceeding those typical of an assembly plant)
- Where the unit is subject to splashed water or oil (including oil mist or cutting fluid) or chemical solutions
- Where the body receives impact or vibration
- Where the altitude is more than 1,000m

Provide sufficient work space for the following maintenance and inspection:

- Space to insert the teaching tool connector
- Space to replenish grease
- Space for controller replacing work

For details, refer to [Chapter 4 Maintenance and Inspection].

If the actuator is used in any of the following locations, provide sufficient shielding measures:

- Where noise is generated due to static electricity, etc.
- Where the unit is subject to a strong electric or magnetic field
- Where the unit is subject to ultraviolet or radiation

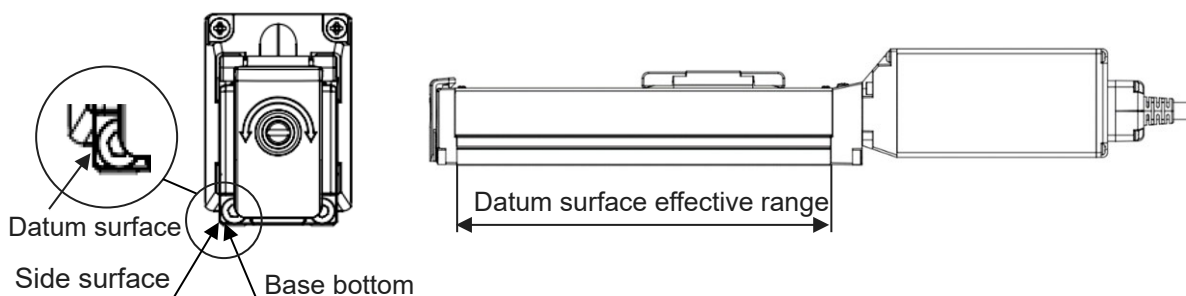
2.2.2 Storage/preservation environment

- For the storage and preservation environment, see the installation environment.
However, give especial consideration to the prevention of condensation during long-term storage/preservation.
- Unless especially specified, desiccant is not included in the package at shipping.
If the product is to be stored/preserved in an environment where condensation is anticipated, take condensation preventive measures.
- For short-term storage, it can be stored at 60°C or below.
For storage of one month or more, make sure that the temperature does not exceed 50°C.
- The product should be placed horizontally for storage and preservation.
If storing in the packaged condition, observe the conditions, if any, regarding storage orientation.
Refer to horizontal orientation in [2.3.2, 2.4.2 Mounting orientation] for the status of the horizontal orientation.

2.3 Installation of slider type (S2□B/S2□BR)

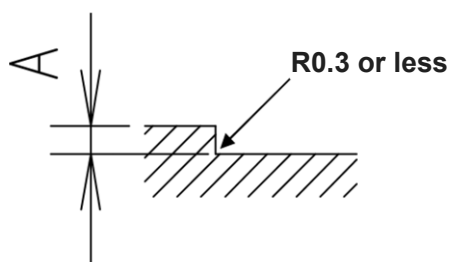
2.3.1 Installation surface

- The body mounting surface should be a machined surface or a plane with similar accuracy, with flatness within 0.05mm/m.
- The mounting frame should have a structure rigid enough to prevent the generation of vibration.
- Also consider the necessary space for maintenance work such as ELECYLINDER replacement and inspection.
- The bottom surface and left side surface (viewed from motor opposite side) of the body base serve as the datum surfaces for slider running accuracy.
Use these surfaces as the datum surfaces for mounting when running accuracy is required.



(When viewed from the opposite side of the motor,
the left side surface is the datum surface)

When mounting using the side datum surface, machine the installation surface according to the figure below.

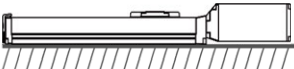
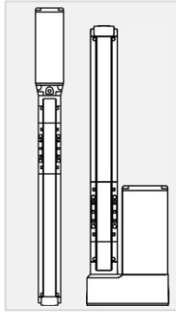
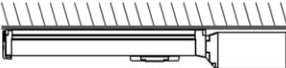


A dimension
2 to 4mm

2.3.2 Mounting orientation

○: Available for Installation

△: Confirm in [2.3.3 Precautions regarding stainless steel sheet] for use.

			
Horizontal installation	Vertical installation	Horizontal lateral installation	Horizontal ceiling mount installation
○	○	△	△



Caution

- For installation in vertical orientation, it is recommended to have the motor installed on top.

2.3.3 Precautions regarding stainless steel sheet

- During installation and transport, do not grasp or press on the stainless steel sheet. Otherwise, this may lead to stainless steel sheet damage.
- Although lateral or ceiling installation is possible, it may cause slackness or misalignment of the stainless steel sheet. Continued usage in this orientation may lead to damage to the stainless steel sheet.
- Adjust the stainless steel sheet if slackness or misalignment occurs.
- Keep adhesive, paint, and other viscous material off the stainless steel sheet. Such material adhering to the stainless steel sheet can lead to defective slider operation or sheet damage. Avoid installation in environments of this kind, or take safety measures to prevent adhesion.

2.3 Installation of slider type (S2□B/S2□BR)

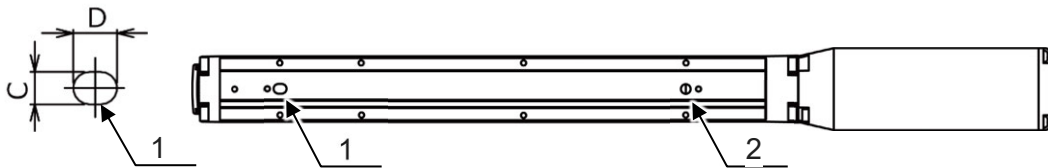
2.3.4 Fixing bolts

- Use a high-tensile hex socket head bolt with ISO-10.9 or higher for fixing male screws.
- The effective length of engagement between a screw and a female thread should secure 1.5 times or more of the nominal diameter.
- Screws for base bottom and those to fix a foot bracket on the installation surface need to be prepared by the user.

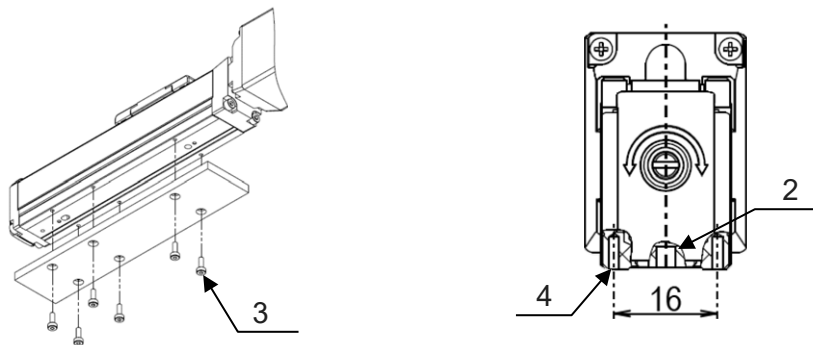
Type	Size	Tightening torque [N·m]	
		Screw Seating Surface	
		Copper	Aluminum
Common	M2	0.424	0.254

2.3.5 Body mounting

There are a reamed hole and an oblong hole prepared on the base bottom for positioning pins. Use the reamed hole and oblong hole if mounting reproducibility after detachment is required. When fine adjustment of angles, etc. is required, consider using only the reamed hole. For details regarding the position and dimensions, refer to [Chapter 5 External Dimensions].



[1] When using screw holes on base bottom



No.	Type	Part Name	Size	Quantity	Tightening torque [N·m]	
					Screw Seating Surface	
					Steel	Aluminum
1	Common	Oblong hole	C:3mm D:4mm	1	—	
2		Reamed hole	Φ3H7 depth 3	1	—	
3		Fixing bolt	M2	By stroke	0.424	0.254
4		Screw hole	M2 depth 4	By stroke	—	

* Depth from base seating surface for reamed hole

[2] When using foot bracket (option model code: FT)

The foot bracket is a component to hold the actuator main body from the top with screws.

As it is not assembled on delivery, put it on once received.

It is to be fixed from the back of an actuator with screws (accessory).

For details regarding the position and dimensions, refer to [Chapter 5 External Dimensions].

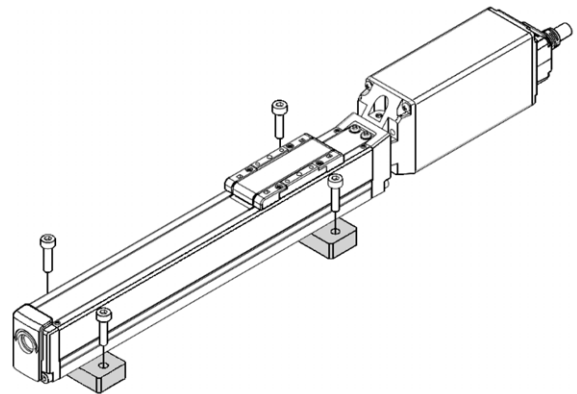
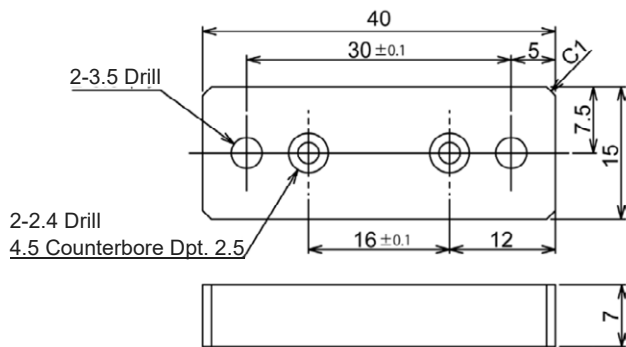
[Foot bracket]

◆ S2□B

Part model number: EC-FT-SRR2 (1 set of 2pcs)

Material: Aluminum

* There should be two hex socket head bolts (M2 × 8) enclosed to 1 piece of foot bracket.

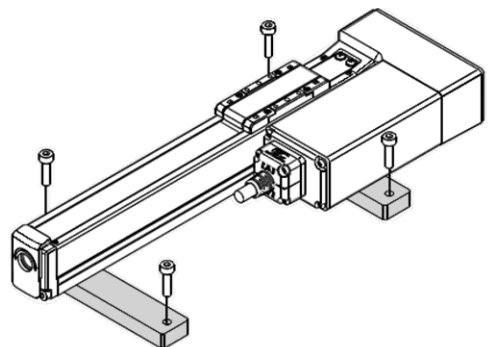
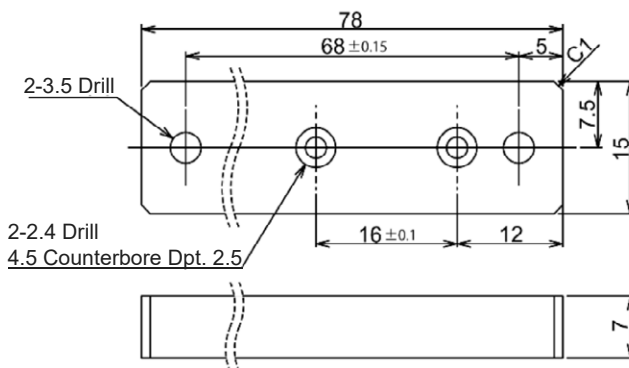


◆ S2□BR

Part model number: EC-FT-SRR2R (1 set of 2pcs)

Material: Aluminum

* There should be two hex socket head bolts (M2 × 8) enclosed to 1 piece of foot bracket.

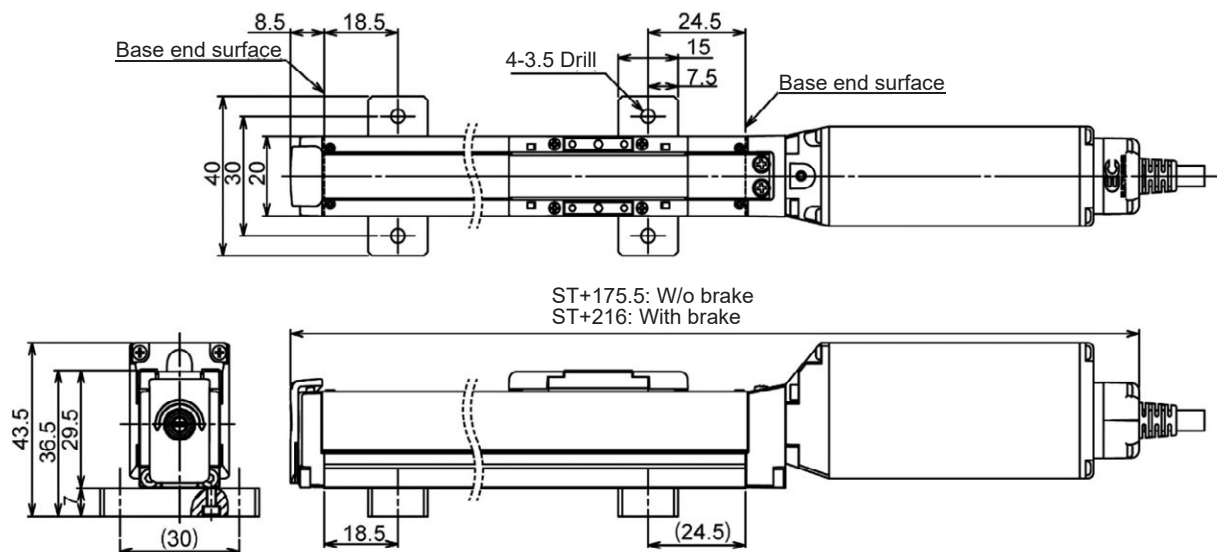


* Screws to fix a foot bracket on the installation surface need to be prepared by the user.

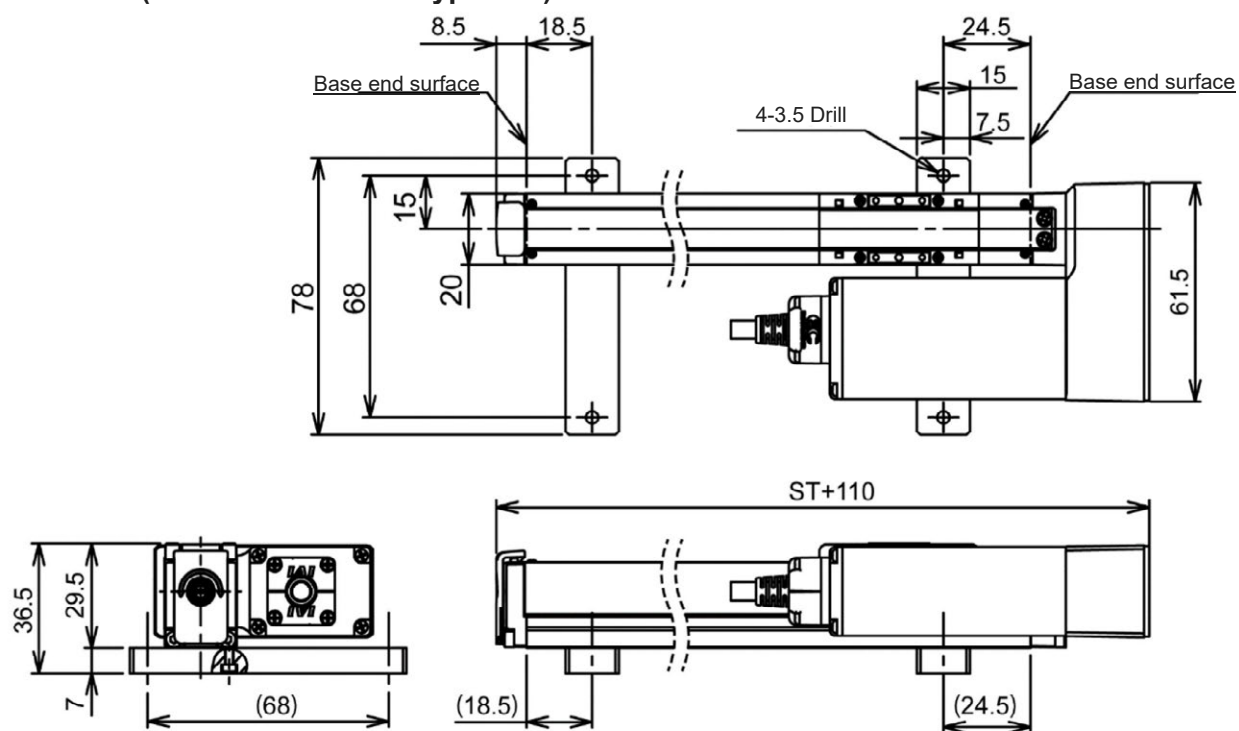
2.3 Installation of slider type (S2□B/S2□BR)

[Foot bracket mounting dimensions]

◆ S2□B



◆ S2□BR (Motor left reversed type: ML)



Part Name	Screw size	Tightening torque [N·m]
Foot Bracket Attachment Screw (Enclosed)	M2×8	0.254
Installation Surface Fixing Screw (To be prepared by user)	M3	0.83

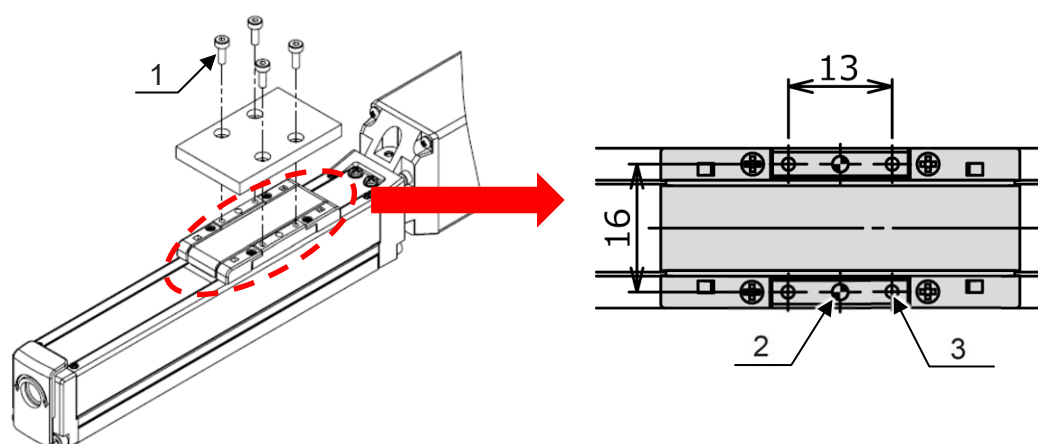
2.3.6 Mounting transported objects

Mount a transported object using the screw hole on the top surface of the slider.

There are two reamed holes prepared on the top of the slider.

Use these reamed holes if repeated attaching and detaching is required.

If fine-tuning of perpendicularity, etc. is required, use one of the reamed holes for this adjustment.



No.	Type	Part Name	Size	Quantity	Tightening torque [N·m]	
					Screw Seating Surface	
					Steel	Aluminum
1	Common	Fixing bolt	M2	4	0.424	0.254
2		Reamed hole	Φ2H7 depth 3	2	—	
3		Screw hole	M2 depth 4	4	—	

* Reamed hole pitch tolerance: $\pm 0.02\text{mm}$



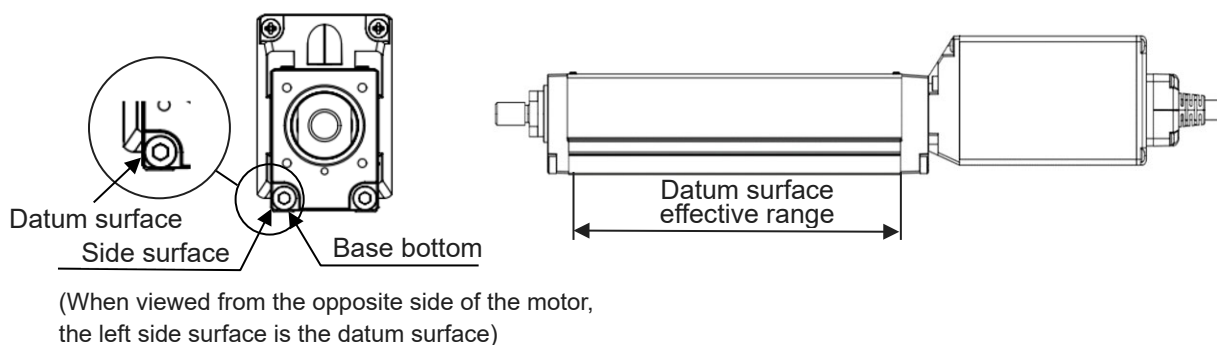
Caution

- Be careful with regard to the length of the mounting bolt and positioning pin.
- The use of screw-in depth greater than that of the screw or reamed mounting holes may damage the screw hole or reduce the mounting strength of the transported object, leading to decreased accuracy or unexpected accidents.

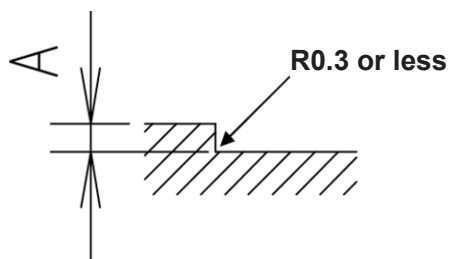
2.4 Installation of radial cylinder type (RR2□B/RR2□BR)

2.4.1 Installation surface

- The body mounting surface should be a machined surface or a plane with similar accuracy, with flatness within 0.05mm/m.
- The mounting frame should have a structure rigid enough to prevent the generation of vibration.
- Also consider the necessary space for maintenance work such as ELECYLINDER replacement and inspection.
- The base bottom and the left side (at view opposite side from the motor) should be the datum surfaces for a rod for its run. Use these surfaces as the datum surfaces for mounting when running accuracy is required.
- When applying radial load/moment load, fix the entire surface of the base bottom. Flange fixing may cause deflection or reflection throughout the product due to radial load/moment load, leading to vibration, shortened product life, or breakdown.



When mounting using the side datum surface, machine the installation surface according to the figure below.



A dimension

2 to 4mm

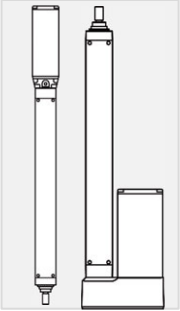
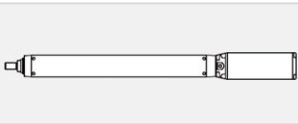
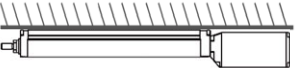
2.4.2 Mounting orientation

○: Available for Installation

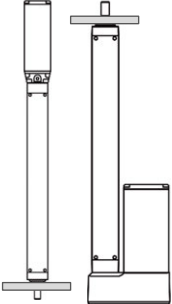
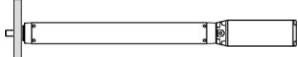
△: Confirm [2.4.4 Body mounting] before use.

×: Not available for installation

[Fixed on base]

			
Horizontal installation	Vertical installation	Horizontal lateral installation	Horizontal ceiling mount installation
○	○	○	○

[Fixing at screw holes on front bracket]

		
Horizontal installation	Vertical installation	Horizontal lateral installation
△	△	×



Caution

- Excessive greasing may cause the grease to drip from the rod.
- When the moving part is installed upwards and kept stopped for long time, grease may separate and the base oil may flow into the motor unit and malfunction the motor unit.
- Pay attention not to apply external force on it.
(Do not attempt to apply radial or moment load.)
- Have a platform prepared for installation in the horizontal orientation. Refer to [2.4.4 Body mounting].

2.4.3 Fixing bolt

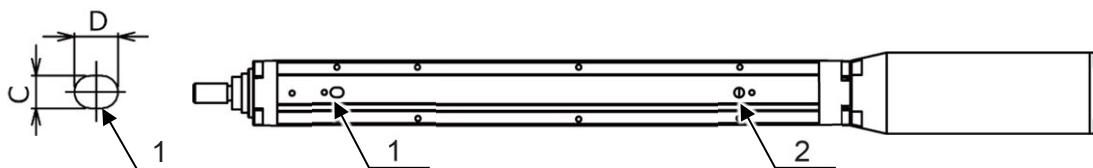
- Use a high-tensile hex socket head bolt with ISO-10.9 or higher for fixing male screws.
- The effective length of engagement between a screw and a female thread should secure 1.5 times or more of the nominal diameter.
- Screws for base bottom and those to fix a foot bracket on the installation surface need to be prepared by the user.

Type	Size	Tightening torque [N·m]	
		Screw Seating Surface	
		Copper	Aluminum
Common	M2	0.424	0.254

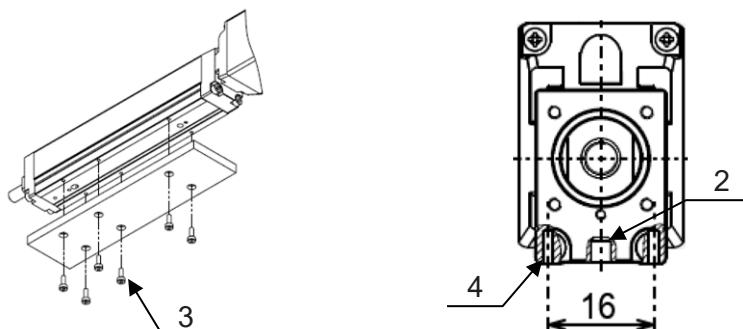
2.4.4 Body mounting

There are several ways of installation available, fixing at screw holes on the base bottom, at the screw holes on the front bracket and with the foot bracket (option).

For details regarding the position and dimensions, refer to [Chapter 5 External Dimensions].



[1] When using the screw holes on the bottom

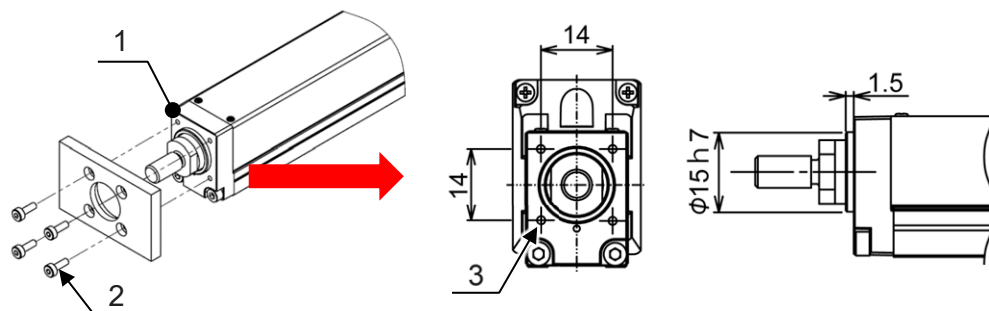


No.	Type	Part Name	Size	Quantity	Tightening torque [N·m]	
					Screw Seating Surface	
					Steel	Aluminum
1	Common	Oblong hole	C:3mm D:4mm	1	—	
2		Reamed hole	Φ3H7 depth 3	1	—	
3		Fixing bolt	M2	By stroke	0.424	0.254
4		Screw hole	M2 depth 4	By stroke	—	

* Reamed hole pitch tolerance: ±0.02mm

* Depth from base seating surface for reamed hole

[2] When using screw holes on front bracket

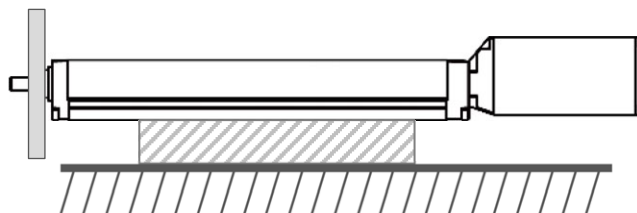


No.	Type	Part Name	Size	Quantity	Tightening torque [N·m]	
					Screw Seating Surface	
					Steel	Aluminum
1	Common	Front bracket	—	1	—	
2		Fixing bolt	M2	4	0.424	0.254
3		Screw hole	M2 depth 4	4	—	



Caution

- It is necessary to have a support block as shown in the figure for installation on the front bracket even when there is no external force applied.
There may be vibration occurred in some operational conditions or installing conditions, which may cause operation error or malfunction of components.
- It is recommended to appress a block (of such as aluminum alloy) towards the frame.



[3] When using foot bracket (option model code: FT)

The foot bracket is a component to hold the actuator main body from the top with screws.

As it is not assembled on delivery, put it on once received.

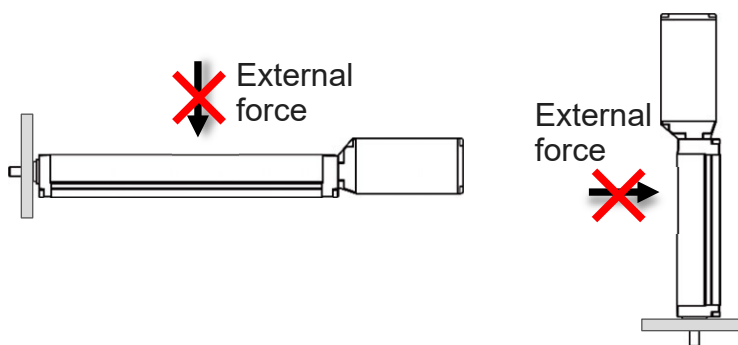
It is to be fixed from the back of an actuator with screws (accessory).

For details regarding the position and dimensions, refer to [Chapter 5 External Dimensions].

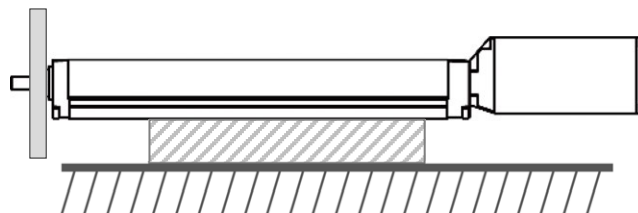


Caution

- Do not apply external force to the ELECYLINDER body.
External force may cause malfunctions or damage to parts.



- A support block should be installed as shown in the figure.
- The support block should be installed on the frame motor side.
- It is recommended to appress a block (of such as aluminum alloy) towards the frame.



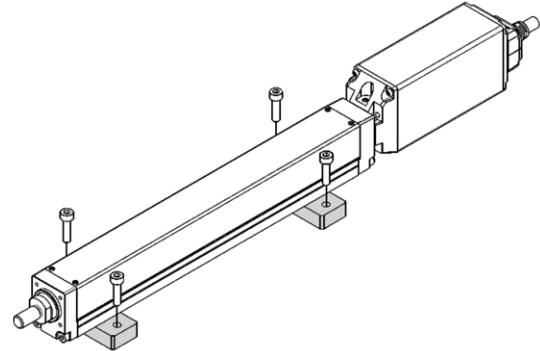
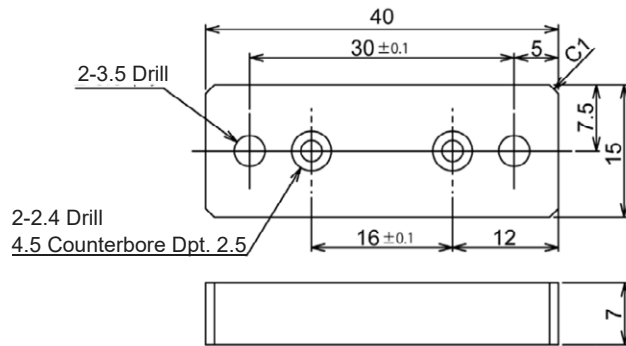
[Foot bracket]

◆ RR2□B

Part model number: EC-FT-SRR2 (1 set of 2pcs)

Material: Aluminum

* There should be two hex socket head bolts (M2 × 8) enclosed to 1 piece of foot bracket.

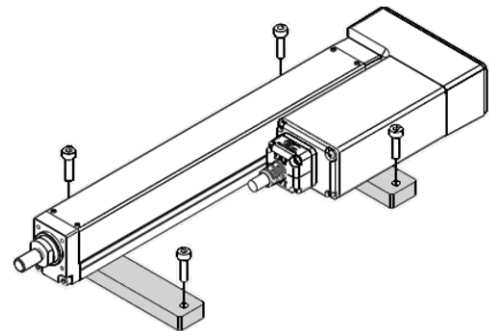
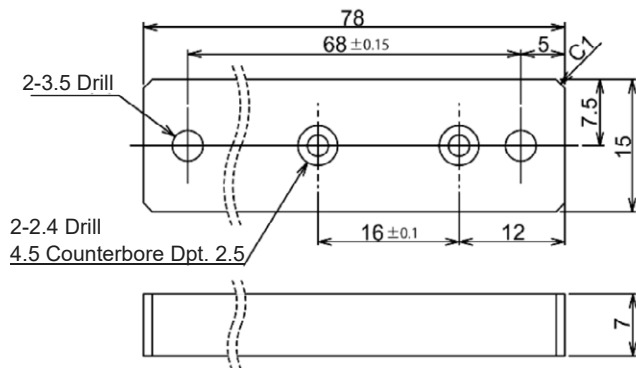


◆ RR2□BR

Part model number: EC-FT-SRR2R (1 set of 2pcs)

Material: Aluminum

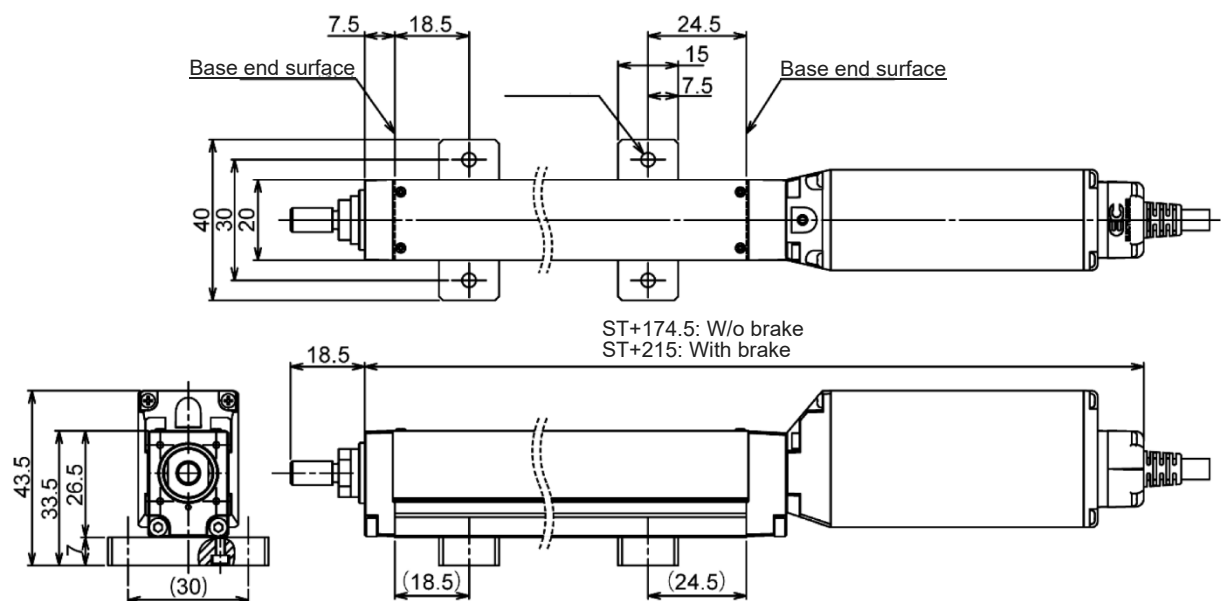
* There should be two hex socket head bolts (M2 × 8) enclosed to 1 piece of foot bracket.



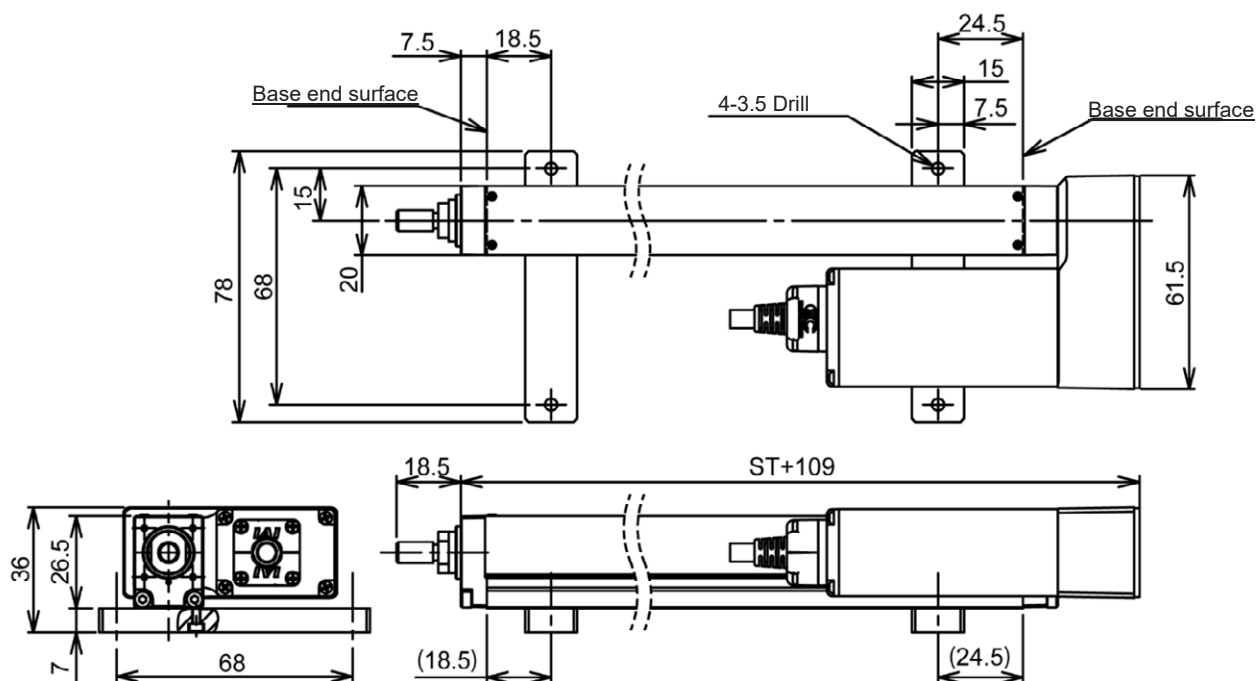
* Screws to fix a foot bracket on the installation surface need to be prepared by the user.

[Foot bracket mounting dimensions]

◆ RR2□B



◆ RR2□BR (Motor left reversed type: ML)



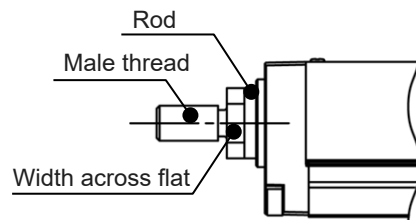
Part Name	Screw size	Tightening torque [N·m]
Foot Bracket Attachment Screw (Enclosed)	M2×8	0.254
Installation Surface Fixing Screw (To be prepared by user)	M3	0.83

2.4.5 Mounting transported objects

Take the cap off the internal thread on the rod tip bracket.

When fixing a conveyed object, fix the two parallel faces on the rod tip bracket with such as a wrench to avoid any load being applied on the rod.

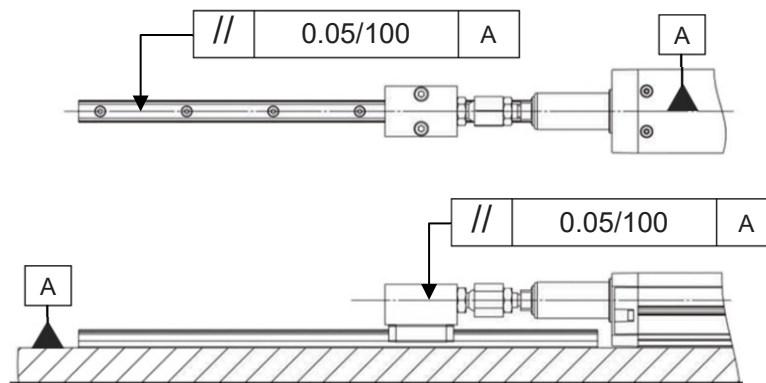
* The orientation of the parallel flats cannot be changed.



Male thread	Tightening torque	Width across flat
M6×1.0 Thread effective length 10.5mm	4.2N·m	10mm

2.4.6 External guide mounting

- If the parallelism between the ELECYLINDER and external guide (horizontal/vertical surfaces) is not adjusted with sufficient precision, malfunctions and premature ELECYLINDER damage may occur.
- When mounting the guide, perform centering for the ELECYLINDER and guide. Make sure that the sliding resistance is constant over the entire stroke.
- Make sure that the current value is constant, using the monitoring function of the teaching tool.

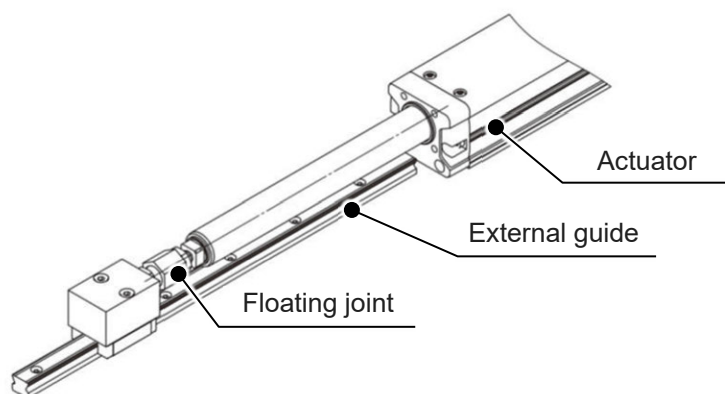


[How to Install to External Guide]

It is recommended to have fixation using a “floating joint” to fix to an external guide.

The floating joint absorbs misalignment in parallelism between the built-in guide and the external guide so it can be easier to adjust it.

With “rigid fixing*”, adjustment of parallelism between the built-in guide and the external guide gets difficult, and even slight misalignment in parallelism would apply load to the guides, which could cause a risk of early malfunction.



* Rigid fixing is a way to fix to prevent the rod turning, which can be achieved by e.g. fixing the rod directly to the moving part of the guide.

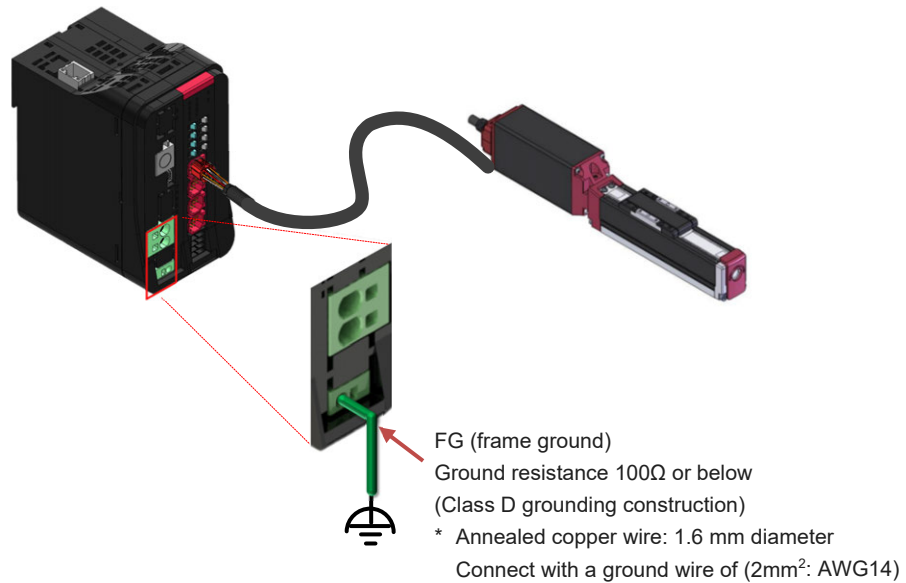
2.5 Frame grounding wiring

The ELECYLINDER has a built-in controller circuit board.

The connected to the through to ground via the actuator mounting surface.

[1] When connecting with RCON-EC (option model code: ACR)

Ground the FG (frame grounding) on the controller side.



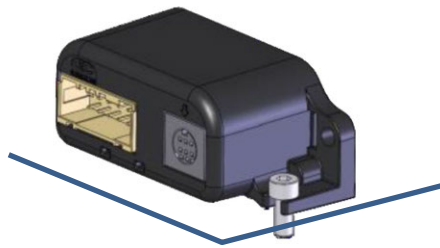
2.6 Interface box 2 installation

In order to use this product in NPN/PNP specifications or wireless communication specification, it is necessary to have an interface box 2 connected.

For dimensions, refer to [5.3 1 Interface box 2].

- Is there is no dust and splash proof function in the interfacing box 2, pay attention not to have it exposed to water or dust.
- The interface box 2 can be mounted on two body surfaces.
(Interface box 2 orientation is irrelevant)

Horizontal surface mounting



Vertical surface mounting



- When mounting the interface box 2 on a vertical surface, prepare a cable pass-through hole of $\Phi 18\text{mm}$ or more for the actuator cable.
- Install the wireless specification interface box 2 so that it is not separated from the touch panel teaching pendant by metal panels, etc. Obstacles of this kind may adversely affect wireless communication.

ELECYLINDER

Chapter 3

Electricity and Control

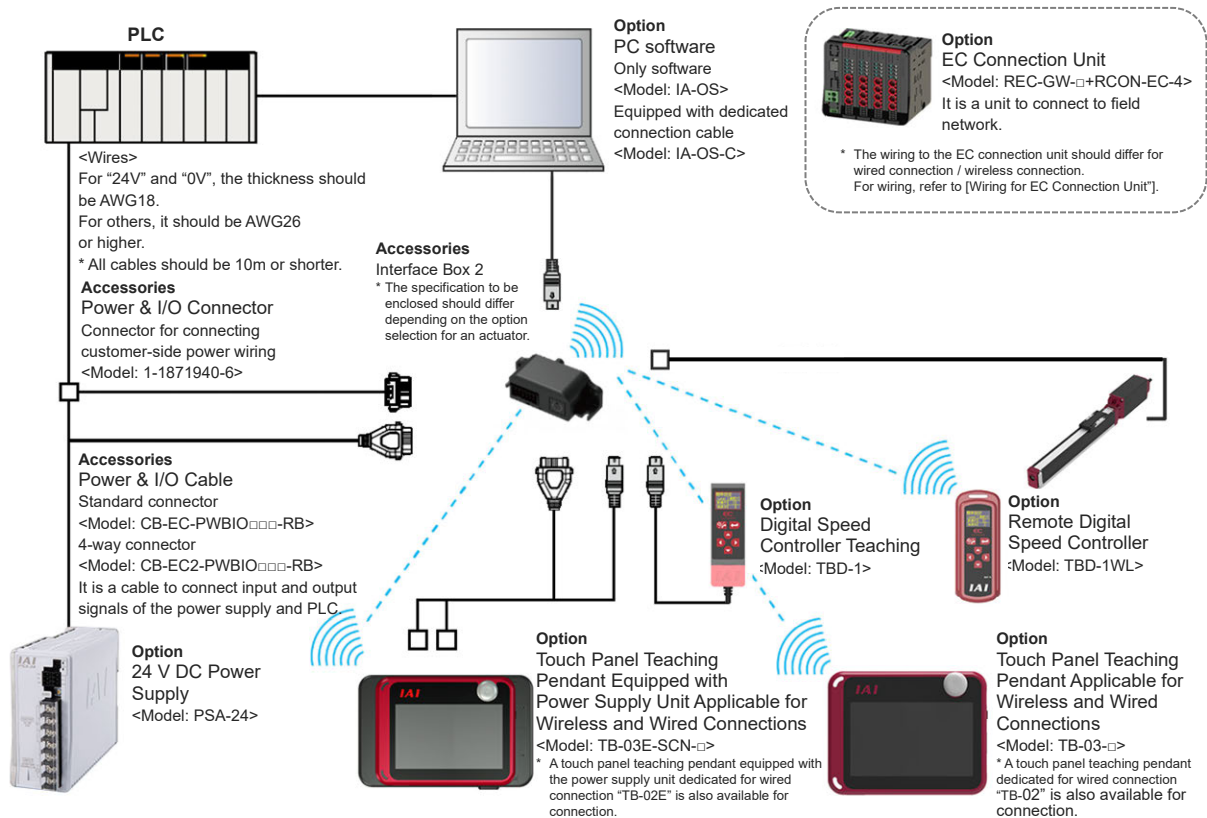
3.1	System configuration	3-1
3.2	Cable and connector	3-2
3.2.1	Power & I/O Cable	3-2
3.2.2	Power & I/O Connector	3-3
3.2.3	RCON-EC connection specification / Power & I/O Cable	3-4
3.2.4	Power & I/O cable connection	3-6
3.3	Basic operation	3-7
3.4	Teaching tool	3-8
3.5	Preventive/predictive maintenance	3-9
3.6	Troubleshooting confirmations	3-10

3.1 System configuration

Reference

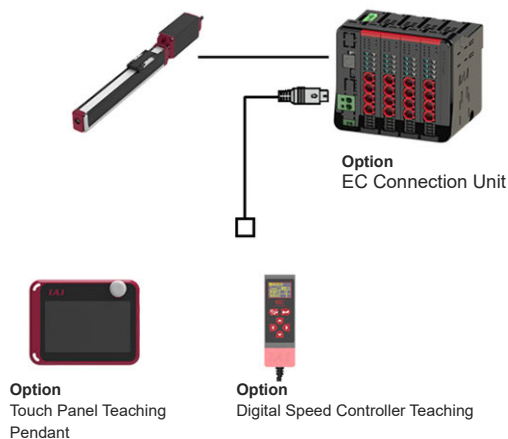
- For electric / control details such as electrical specification, wiring, connection, parameters and how to control, and also trouble shooting, refer to [ELECYLINDER Electric Section Instruction Manual (ME3816)] provided separately.

The following shows the system configuration.

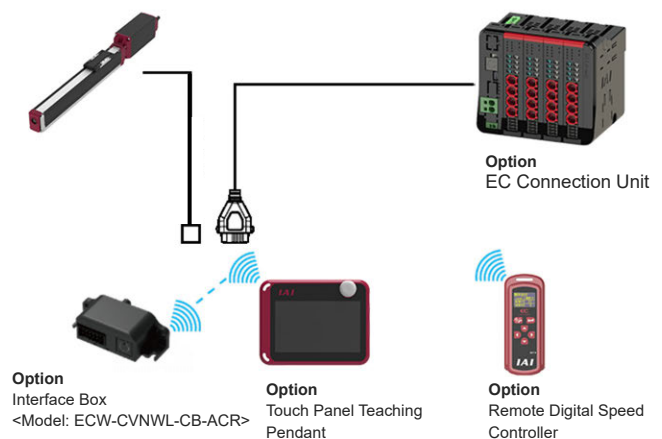


Wiring for EC Connection Unit

(For teaching pendant wired connection)



(For teaching pendant wireless connection)

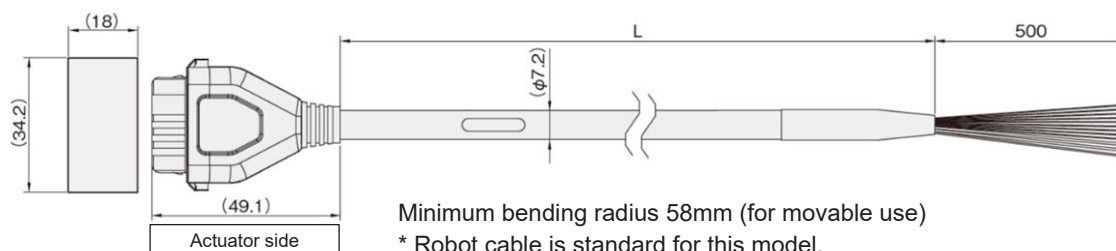


3.2 Cable and connector

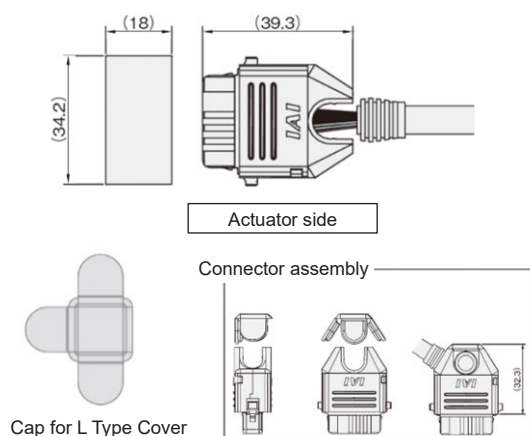
3.2.1 Power & I/O Cable

◆ Model CB-EC-PWBIO□□□-RB (Standard connector) CB-EC2-PWBIO□□□-RB (4-way connector)

● Standard connector



● 4-way Connector



Color	Signal name		Pin No.
	2-point positioning	3-point positioning	
Black (AWG18)	0V	0V	A1
Red (AWG18)	24V	24V	B1
Light blue (AWG22)	(Reserve) ^(Note 1)	(Reserve) ^(Note 1)	A2
Orange (AWG26)	ST0	ST0	B3
Yellow (AWG26)	ST1	ST1	B4
Green (AWG26)	RES	(Reserve)	B5
Pink (AWG26)	(Reserve)	RES	B6
Blue (AWG26)	LS0/PE0	LS0/PE0	A3
Purple (AWG26)	LS1/PE1	LS1/PE1	A4
Gray (AWG26)	*ALM	LS2	A5
White (AWG26)	(Reserve)	*ALM	A6
Brown (AWG26)	BKRLS	BKRLS	B2

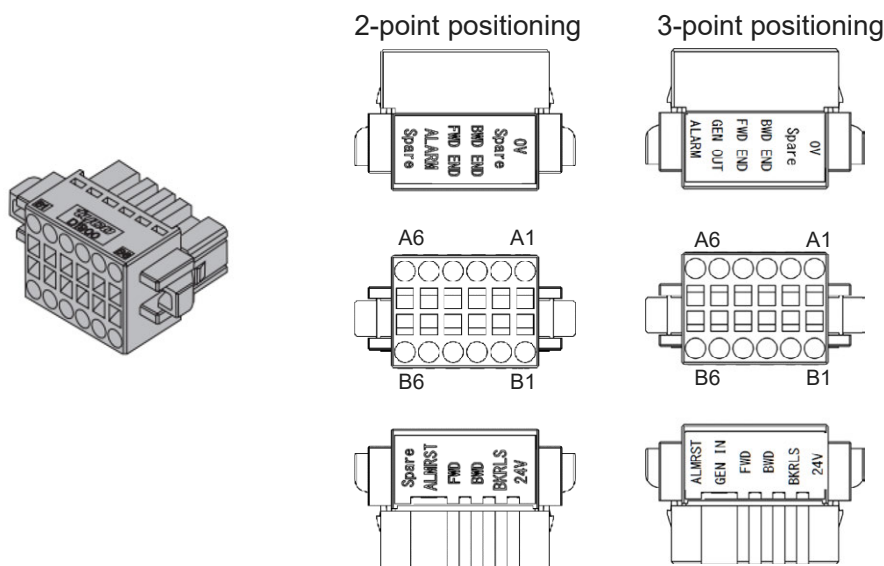
Note 1 It should be 24V (Control) when 2-circuit power supply specification (TMD2).

(Note) Cable in light green and light gray not in use.

(Note) The signal name of Pin No. B3 is FWBW and Pin No. B4 is not for use in the single solenoid type.

- The wiring on the opposite side of the connector has not been processed.
- The cable length (L) is available from 1m to 10m. Specify the length in increments of 1m.
- Sample model number: Cable length 3m → CB-EC(2)-PWBIO030-RB

3.2.2 Power & I/O Connector



Option	Connector Single Model Code
None	1-1871940-6
TMD2 (2-circuit power supply specification)	1-1871940-6-TMD2
MF (3 position mode specification)	1-1871940-6-MF * Seal in MF+TMD2 specification enclosed
English notation	1-1871940-6-ENG

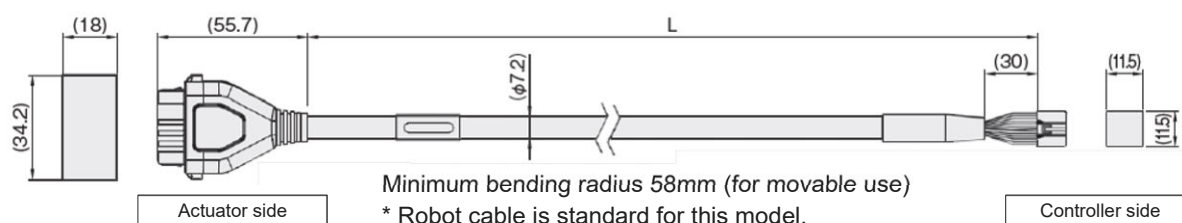
Pin No.	Signal name		Function
A1	0V		Ground
A2	Spare (CP: 2-circuit power supply specification)		Spare (24V for control power supply when power supply 2-system specification)
A3	BWD END		Backward completion (Pressing complete 0 when pressing operation)
A4	FWD END		Forward completion (Pressing complete 1 when pressing operation)
A5	2-point positioning	Alarm	Alarm output
	3-point positioning	General OUT	Intermediate position completion
A6	2-point positioning	Spare	Spare
	3-point positioning	Alarm	Alarm output
B1	24V (MP: 2-circuit power supply specification)		24V power supply (24V for motor power supply when power supply 2-system specification)
B2	BKRLS		Brake release input
B3	BWD (Note 1)		Backward command
B4	FWD (Note 1)		Forward command
B5	2-point positioning	ALMRST	Alarm release signal input
	3-point positioning	General IN	Spare
B6	2-point positioning	Spare	Spare
	3-point positioning	ALMRST	Alarm release signal input

Note 1: B4 should not be used and B3 should be the forward/backward command in the single solenoid system.

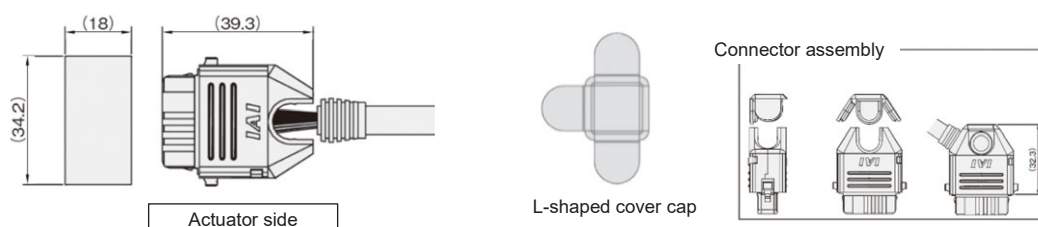
3.2.3 RCON-EC connection specification / Power & I/O Cable

◆ Model CB-REC-PWBIO□□□-RB (Standard connector) CB-REC2-PWBIO□□□-RB (4-way connector)

● Standard connector



● 4-way connector

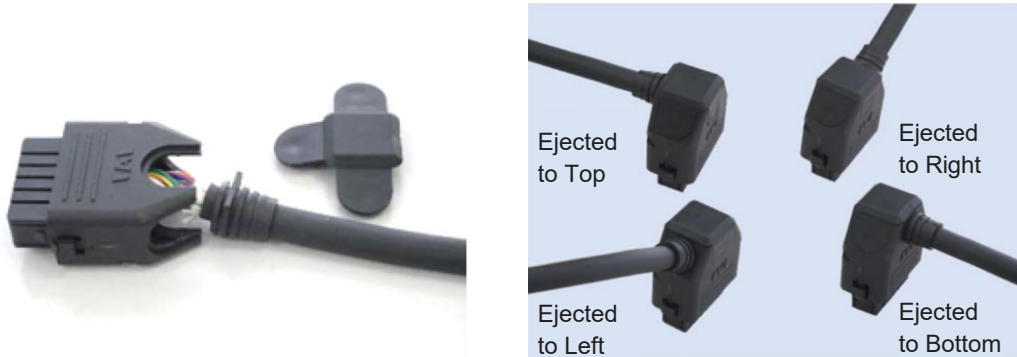


Color	Signal name	Pin No.	Pin No.	Signal name	Color
Black (AWG18)	0V	A1	2	0V	Black (AWG18)
Red (AWG18)	24V (MP)	B1	1	24V (MP)	Red (AWG18)
Light blue (AWG22)	24V (CP)	A2	12	24V (CP)	Light blue (AWG22)
Orange (AWG26)	IN0	B3	7	OUT0	Orange (AWG26)
Yellow (AWG26)	IN1	B4	8	OUT1	Yellow (AWG26)
Green (AWG26)	IN2	B5	9	OUT2	Green (AWG26)
Yellow green (AWG26)	SD+	B6	6	SD+	Yellow green (AWG26)
Light gray (AWG26)	SD-	A6	10	SD-	Light gray (AWG26)
Blue (AWG26)	OUT0	A3	3	IN0	Blue (AWG26)
Purple (AWG26)	OUT1	A4	4	IN1	Purple (AWG26)
Gray (AWG26)	OUT2	A5	5	IN2	Gray (AWG26)
Brown (AWG26)	BKRLS	B2	11	BKRLS	Brown (AWG26)
			13	FG	Green (AWG26)

- The wiring on the opposite side of the connector has not been processed.
- The cable length (L) is available from 1m to 10m. Specify the length in increments of 1m.
- Sample model number: Cable length 3m → CB-REC(2)-PWBIO030-RB

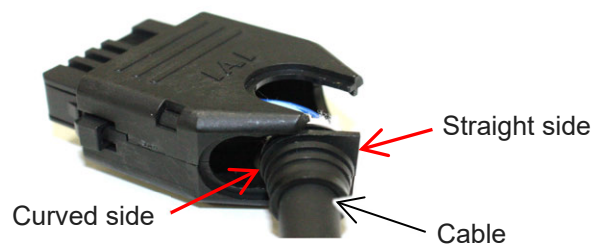
■About 4-way Connector

It is a cable capable to change the orientation of the connector in four ways.



Follow the process bellow to build up the connector in the orientation of your demand.

1. Insert the cable by sliding it from the curved side of the cable-end to your desire direction.



2. Be sure to check that the cable is settled firmly and insert two tabs of the cover along the slits of socket.



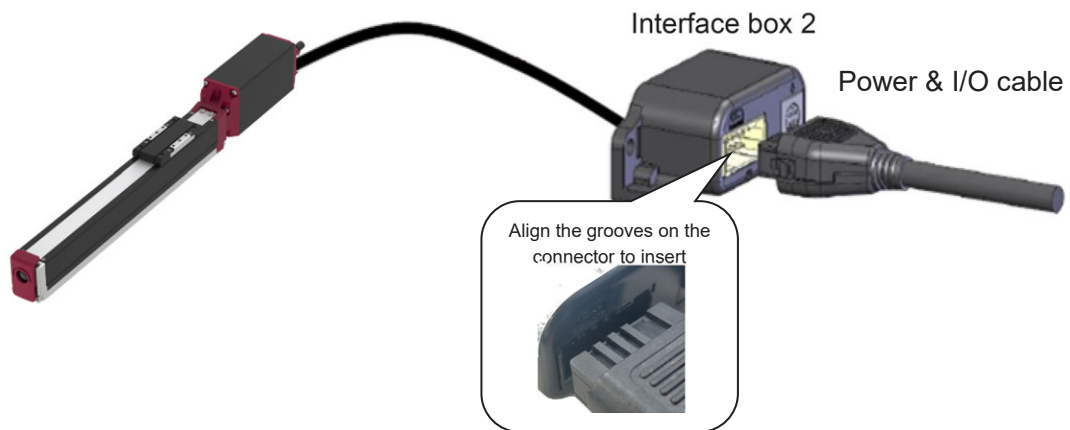
3. Then, push the last tab to the socket.



3.2.4 Power & I/O cable connection

Connect the power & I/O cable to ELECYLINDER or an interface box 2.
Insert it till it makes a “click” noise.

[Cable connection diagram]



Caution

- The connector must be inserted in a given direction.
Align the arrow on the connector and insert until you hear the click.
 - Take appropriate care to prevent unused wiring in the loose wire end on the cable from shorting out other wires by protecting them with insulation tape.
-

3.3 Basic operation

An input signal from a master device to the ELECYLINDER triggers operation of the ELECYLINDER.

The ELECYLINDER status can also be determined when the master device receives signal output from the ELECYLINDER.

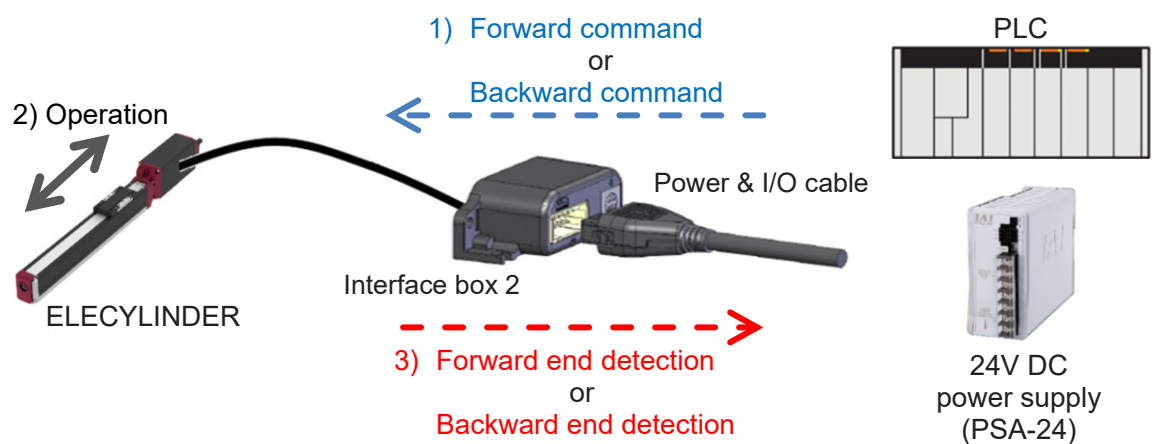
Control is just as simple as when using a solenoid valve (SOL valve) and air cylinder drive.

Shown below is an image when connecting ELECYLINDER with PLC as the host device.

Refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)] provided separately for details of control systems.

- Image of Connecting PLC and ELECYLINDER

- 1) Input a movement command signal from the PLC. (forward or backward)
- 2) The ELECYLINDER operates.
- 3) A position detection signal is output from the ELECYLINDER. (forward end or backward end)



3.4 Teaching tool

For setup and operation of ELECYLINDER, the following teaching tools are to be used.

◆ Digital speed controller teaching / Remote digital speed controller



Digital speed controller
teaching (Wired)
TBD-1



Remote digital speed
controller (Wireless)
TBD-1WL

Refer to [Digital Speed Controller / Digital Speed Controller Teaching / Remote Digital Speed Controller (ME3818)] for how to use them.

◆ Touch panel teaching pendant



TB-03 (Wireless/Wired)



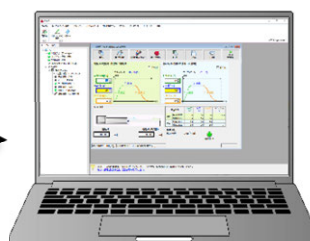
TB-02 (Wired)

Refer to [ELECYLINDER Applicable Teaching Pendant TB-03 (Wireless: ME0375 / Wired: ME0376)] or [ELECYLINDER Applicable Teaching Pendant TB-02 (ME0355)] for how to use them.

◆ IA-OS (PC teaching software)



IA-OS



Refer to [IA-OS Fast Step Guide (ME0391)] for how to install.
Refer to the help window in IA-OS for how to use.

3.5 Preventive/predictive maintenance

The ELECYLINDER has a **predictive maintenance function** that notifies the user with an "overload warning" when the load exceeds normal status.

It also has a **preventive maintenance function** that prompts the user to perform maintenance if the travel count or the travel distance exceeds the set values.



Overload level (%) can be set in advance.



Preventative maintenance	Predictive maintenance
Travel distance (km/m)	Overload warning
Travel count (times)	

If the criteria are set in advance, the LED built into the body will flash green/red to notify that the maintenance period is up.

Preventative maintenance

- Regular maintenance that is performed based on a reference period regardless of whether or not there are equipment breakdowns.
- Prevents unexpected breakdowns.
- Extends service life.

Predictive maintenance

- Maintenance that is performed when, based on regular equipment monitoring, an abnormality is predicted to occur.
- Predicts unexpected breakdowns.
- Prevents sudden line stoppages.

Reference

- For how to set up or how to use preventive maintenance or predictive maintenance, refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)] provided separately.

3.6 Troubleshooting confirmations

If a problem occurs, check the following points first in order to ensure quick recovery and prevent recurrence of the problem.

There is no status indicator LED equipped on the main body for EC-S2□B/S2□BR/RR2□B/RR2□BR. Check the LED status on the connected interface box 2.

Refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)] provided separately for details / measures of trouble diagnosis and generated alarms.

For details / measures of the generated alarms, it can also be checked in the help window in IA-OS and the touch panel teaching tool.



Caution

- When troubleshooting, exclude normally functioning parts from the targets to narrow down the causes.
- First, check (1) to (10) so that countermeasures can be taken swiftly.

(1) Checking status indicator LED (SV/ALM) on interface box



○: Light ON ×: Light OFF ★: Blinking

SV/ALM		Operation status	* ALM signal output status
SV (green)	ALM (red)		
×	×	Power OFF, Servo OFF	OFF
×	○	Alarm generated	OFF
		Stop switch ON (When using teaching tool)	ON
○	×	Power ON, Servo ON	ON
★ Green 500 ms ⇔ Red 500 ms alternate blinking in 1 Hz cycle		Maintenance warning generated (When the travel count or the travel distance has exceeded the set value, or when overload warning is generated)	ON
○ (both green & red ON)		Initializing when power comes ON	OFF

(2) Check status indicator LED (wireless status)

O: Light ON ×: Light OFF ★: Blinking

Wireless status		Motor power supply status
Green	Red	
×	×	Wireless hardware initializing Wireless not connected (transmitting monitor data) Connecting from wired teaching pendant
×	★ ON200ms/OFF200ms alternate blinking	Wireless hardware error
★ ON150ms/OFF150ms alternate blinking	×	Connecting through wireless

(3) Check for abnormality in the master device (PLC, etc.)**(4) Check the voltage of the main power supply (24VDC)**

Check for momentary power failure, voltage drop, power failure, etc.

(5) Confirm the generated alarm

Check the alarm information with the teaching tool.

(6) Check the connectors for disconnection or incomplete connection**(7) Check the cables for connection error, disconnection or snagging**

Cut off the main power supply of the equipment (to avoid electric shock) and remove the cables around the measurement point (to avoid conductivity through the surrounding circuit) before checking the conductivity.

(8) Check the I/O signals

Use the master device and ELECYLINDER teaching tool to check for inconsistency or abnormality in the input/output signal status of the two units.

(9) Check the noise elimination measures (grounding, connection of noise suppressor, etc.)**(10) Check the events leading to the occurrence of the problem, as well as the operating conditions at the time of occurrence****(11) Analyze the cause****(12) Countermeasures**

ELECYLINDER

Chapter 4

Maintenance and Inspection

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4.1 Precautions for maintenance and inspection work

Make sure to read the following precautions before conducting any maintenance or inspection work.



Warning

- Do not climb on or put anything on the ELECYLINDER.
Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life.
- Before releasing the brake, make sure to check there is nothing that will interfere with moving parts within the operation range.
A rod or slider may drop and it may cause an operator or peripheral people get injured or damage ELECYLINDER, workpiece or equipment.



Caution

- Check that the power to the ELECYLINDER is OFF before conducting any maintenance or inspections.
- Be careful not to lose the cover or any removed screws.
Be sure to return the product to the original condition after maintenance and inspection work.
Mounting in an incomplete state may cause injuries or damage to the product.
- Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion under any circumstances.



Notice

- First, be sure to wipe off the old grease, and then supply new grease.
 - The degradation speed of grease may differ depending on the operating environment (temperature, humidity and ambient atmosphere).
It is recommended to shorten the grease supply period if the actuator is used under poor environmental conditions such as high temperatures, high humidity or dusty atmospheres.
Also, when the grease changes its color remarkably in use in an adverse environment, it is recommended to improve the environment.
 - Base oil may separate from the grease due to the mounting orientation or operating conditions.
Base oil may also leak from the inside of the ELECYLINDER to the exterior through gaps.
Check visually for oil drips when supplying grease.
Wipe it off in case of any dripping.
 - An ELECYLINDER stored for 6 months or more may suffer from grease degradation.
Supply grease before the start of use.
Refer to [4.4 Grease supply].
-

4.2 Inspection

Follow the maintenance inspection schedule below.

It is assumed that the equipment is operating 8 hours per day.

If the equipment is running continuously night and day or otherwise running at a high operating rate, inspect more often.

For detailed grease supply procedures, refer to [4.4 Grease supply]. For parts replacement and adjustment procedures, refer to [4.5 Parts Replacement].

4.2.1 Inspection items and schedule

Inspection period	External inspection	Internal inspection	Greasing supply	
			Ball screw	Guide
Start of work inspection	○	—	—	
1-month inspection	○	—	—	
3-month inspection	—	—	○	○
6-month inspection	○	○	Grease supply timing (Guideline) dependent	
Every 6 months thereafter	○	○		



Caution

- Coating of grease may get worn out in case of continuous back and forth operation in short distance.
In order to recover the grease coating, it is recommended to have five times of back and forth operation in the full stroke distance in every 5,000 to 10,000 times of back and forth operation as a reference.
- The ball screw or guide may be damaged if the oil film runs out.
- In case it is extremely contaminated, wipe it off before supplying grease.

4.2.2 Grease supply timing (Guideline)

Maximum operating speed (mm/s)	Grease supply timing (Guideline)	
	Operation distance	Months
0 to 300 or less	1,250km	6 months



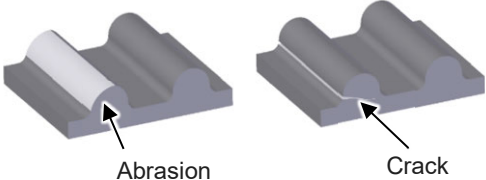
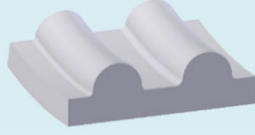
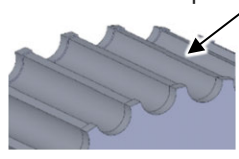
Caution

- Grease may be degraded when an actuator is stored for 6 months or more.
Supply grease before the start of use.
- Speed of grease degradation may differ depending on the environment of use (temperature, humidity and peripheral atmosphere).
It is recommended to shorten the grease supply period if the actuator is used under poor environmental conditions such as high temperatures, high humidity or dusty atmospheres.
- Also, it is recommended to improve the environmental conditions in case the grease changes color notably due to poor operating conditions.

4.2.3 External visual inspection

Inspection items	Maintenance work
Is abnormal noise or vibration generated?	Refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816) 8.5 Troubleshooting with no alarm generated] for help.
Are ELECYLINDER mounting bolts loose?	Tighten them further. Refer to the tightening torque described in [Chapter 2 Installation].
Is the cable scratched?	Replace if the damage is severe.
Is the connector loose?	Re-insert correctly.
Is grease dripping out? (especially if vertically mounted)	If grease is flown out, clean it up and supply grease.
Is there any damage or dent on the stainless steel sheet? Applicable Models: EC-S2□B/S2□BR	Replace if the damage is severe.
Is there foreign matter or dust adhered to the rod sliding surface? Applicable Models: EC-RR2□B/RR2□BR	Clean up the rod sliding surface and supply grease.

4.2.4 Internal visual inspection

Inspection items	Maintenance work
Is play or dust generated?	The ball screw guide may be damaged. Contact IAI.
Has foreign matter penetrated inside?	Remove the foreign matter, clean, and inspect the interior for any damage.
Is there any problem with the lubricant condition of grease?	Wipe away the old grease, then replenish with new grease.
Is there any dust or contamination adhered?	Clean it up and supply new grease.
Is the belt significantly worn out on the teeth area? Is there any crack on the teeth area? Is there any chipped tooth? 	Replace the belt in case any of those stated on the left is found. Refer to [4.5.5 Timing belt replacement in 4.5 Component Replacement]. Applicable Models: Motor reversed type
Is the belt hardened, softened or deformed (shrunk or expanded)? 	Replace the belt in case any of those stated on the left is found. Refer to [4.5.5 Timing belt replacement in 4.5 Component Replacement]. Applicable Models: Motor reversed type
Is there any significant abrasion on pulley teeth? 	In case the error shown on the left is confirmed, contact IAI. Applicable Models: Motor reversed type
Is there any significant abrasion, crack or chipping on the slider roller (option model code: SR)?	Have the slider roller replaced. Refer to [4.5.7 Replacing slider roller assembly in 4.5 Component replacement]. Applicable Models: Slider roller specification (option)

* Even if grease is brown, it is still effective when the running surface is shinny as it is wet.

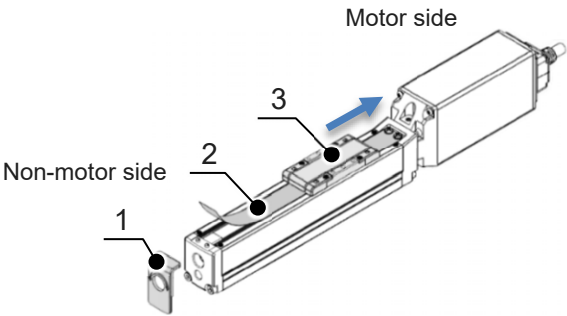
[1] Internal inspection on EC-S2□B/S2□BR

1.

Move the slider to the motor end and take off the sheet cramp.
2.

Pull up the stainless steel sheet and inspect inside by visual.
3.

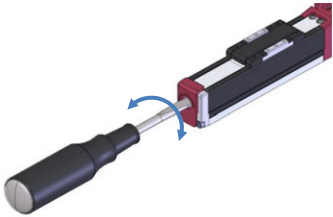
Put the stainless steel sheet back on and attach the sheet cramp.
For how to release a brake, refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)].



No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□B S2□BR	Sheet cramp	—	1	—
2		Stainless steel sheet	—	1	—
3		Slider	—	1	—

Reference

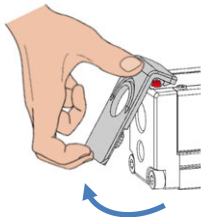
● How to move slider manually



Use a slotted screwdriver (blade thickness 1mm) at the slot in the slider position adjustment hole on the opposite side of the motor to move the slider.

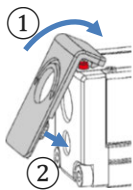
- * Make sure to turn the servo off during manual work.
- * Release a brake before starting work for the brake-equipped type.
- * Do not attempt to turn it with excess torque (0.1N·m or more).

● How to take off sheet cramp



Pull the bottom of the sheet clamp towards you to take it off

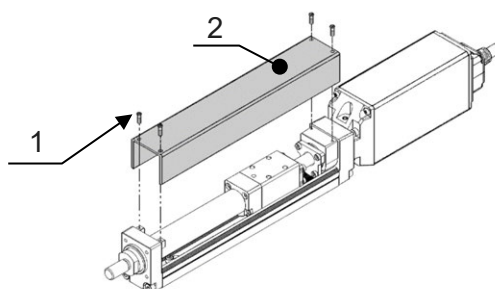
● How to put on sheet cramp



Hang the snap feature on the sheet cramp on the flange of the front bracket, and put the extrusion part of the sheet cramp into the hole on the front bracket.

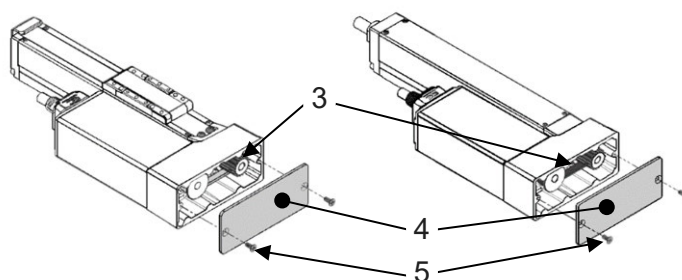
[2] Internal inspection on EC-RR2□B/RR2□BR

1. Remove the precision machinery screws (4pcs) and take the frame cover off.
2. Inspect inside by visual.
3. Put the frame cover on and affix it with the precision machinery screws (4pcs).
For how to release a brake, refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)].



[3] Inspection of timing belt on motor reversed type

1. Remove the hex socket flat-head bolts (2pcs) to take the pulley cover off.
2. Inspect the timing belt.
3. Put the pulley cover on and affix it with the hex socket flat-head bolts (2pcs).
For how to release a brake, refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)].



No.	Type	Part Name	Size	Quantity	Tightening torque
1	RR2□B	Precision machinery screw	M1.6×5	4	0.083N·m
2	RR2□BR	Frame cover	—	1	—
3	S2□BR RR2□BR	Timing belt	—	1	—
4		Pulley cover	—	1	—
5		Hex socket flat-head bolt	M2×5	2	0.21N·m

4.3 Cleaning

4.3.1 External cleaning

- Clean exterior surfaces as necessary.
- For the rod type, if grease base oil etc. drips on the rod sliding surface and its periphery, wipe it off with a soft cloth, etc.
- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air, as it may cause dust to get in through gaps.
- Do not use petroleum-based solvents as they can harm resin and painted surfaces.
- To remove severe buildup, wipe gently with a soft cloth soaked in a neutral detergent or alcohol.

4.3.2 Internal cleaning

- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air, as it may cause dust to get in through gaps.
- Do not use petroleum-based solvents, neutral detergent or alcohol.

4.4 Grease supply

4.4.1 Grease used

◆ **Standard specifications** Use an equivalent product

Type	Place to apply	Grease (recommended product)
S2□(R) RR2□B(R)	Ball screw	IAI Corporation IAGR-LDP01-400
	Guide	
	Coupling spacer	NOK Co., Ltd NOXLUB TL1013 (Lithium Based Grease)

[Reference] Grease equivalent to recommended is used on delivery.



Caution

- Do not attempt to apply any grease other the above.
Mixing with other types of grease not only reduces the performance of the grease, it may even cause damage to the ELECYLINDER.

4.4.2 How to supply grease



Caution

- Too much grease applied on may increase the sliding resistance, which could result in increase of load on a motor and may drop the performance.
Also, excess grease on a ball screw may splash and dirt its peripheral.
- Do not attempt to bend a stainless steel sheet forcefully or damage it during work.
- It is recommended to wear gloves during work as you may get scratch on the edge of a stainless steel sheet.
- In case grease gets into eye, clean it with clean water for 15 minutes and visit the doctor to have appropriate treatment.
- Wash your hands well with soap to rinse grease off after supplying grease.

◆ Preparation

- Phillips screwdriver
- Protection equipment (Rubber gloves, etc.)
- Grease
- Tools to supply grease

[Equipment Reference]

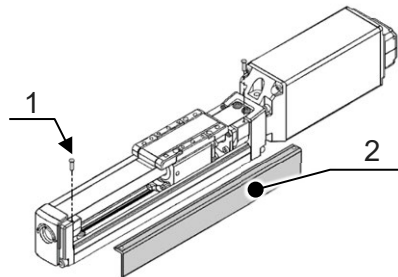
Item	Manufacturer	Model
Syringe	San-Ei Tech	SH11CPP-B
Tapered Nozzle	San-Ei Tech	TT Gauge 14 (Olive)

◆ How to supply grease

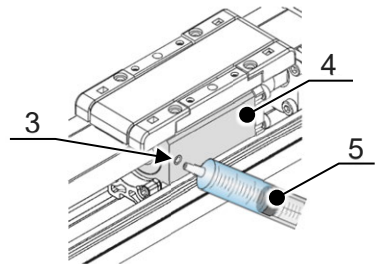
[1] EC-S2□B/S2□BR

For how to release a brake, refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)].

1. The off the precision machinery screws (2pcs) on one end to take the side cover off.
(25st and 50st go to [3])



2. From a grease supply inlet on the slider, supply grease with a tool such as syringe.



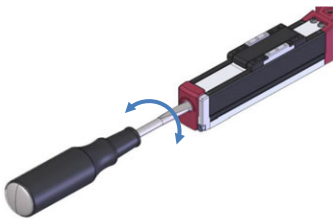
3. Move the slider full-stroke to apply the grease thoroughly.

4. Put the side cover on and affix it with the precision machinery screws (2pcs).

No.	Type	Part Name	Size	Quantity	Tightening torque/ Reference for grease supply volume
1	S2□B S2□BR	Precision machinery screw	M1.6×5	2	0.083N·m
2		Side cover	—	1	—
3		Grease Supply Inlet	—	1	0.3cc to 0.5cc
4		Slider	—	1	—
5		Syringe, etc.	—	1	—

Reference

- How to move slider manually
Use a slotted screwdriver (blade thickness 1mm) at the slot in the slider position adjustment hole on the opposite side of the motor to move the slider.
 - * Make sure to turn the servo off during manual work.
 - * Release a brake before starting work for the brake-equipped type.
 - * Do not attempt to turn it with excess torque (0.1N·m or more).

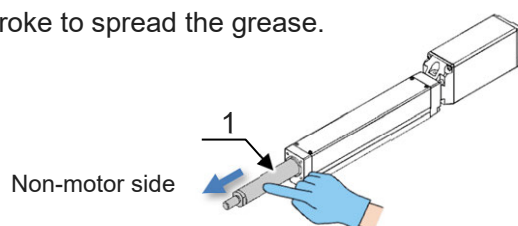


[2] EC-RR2□B/RR2□BR

For how to release a brake, refer to [ELECYLINDER Electricity Section Instruction Manual (ME3816)].

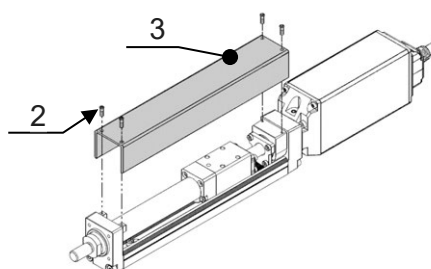
◆ Rod sliding part

1. Pull the rod towards the non-motor side.
2. Clean up the rod sliding part and apply grease with hand.
3. Move the rod in its full stroke to spread the grease.

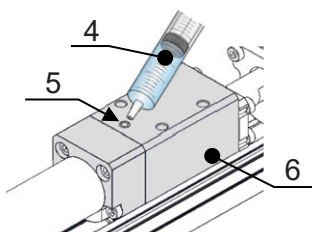


◆ Ball screw and guide

1. Remove the precision machinery screws (4pcs) and take the frame cover off.
(25st and 50st go to [3])



2. From a grease supply inlet on the top of the nut holder, supply grease with a tool such as syringe.



3. Move the rod in its full stroke to spread the grease.
4. Put the frame cover on and affix it with the precision machinery screws (4pcs).

No.	Type	Part Name	Size	Quantity	Tightening torque/ Reference for grease supply volume
1	RR2□B RR2□BR	Rod	—	1	0.5cc to 1.0cc
2		Precision machinery screw	M1.6×5	4	0.083N·m
3		Frame cover	—	1	—
4		Syringe, etc.	—	1	—
5		Grease Supply Inlet	—	1	0.3cc to 0.5cc
6		Nut holder	—	1	—

[3] S2, RR2 common Short stroke (25st, 50st)

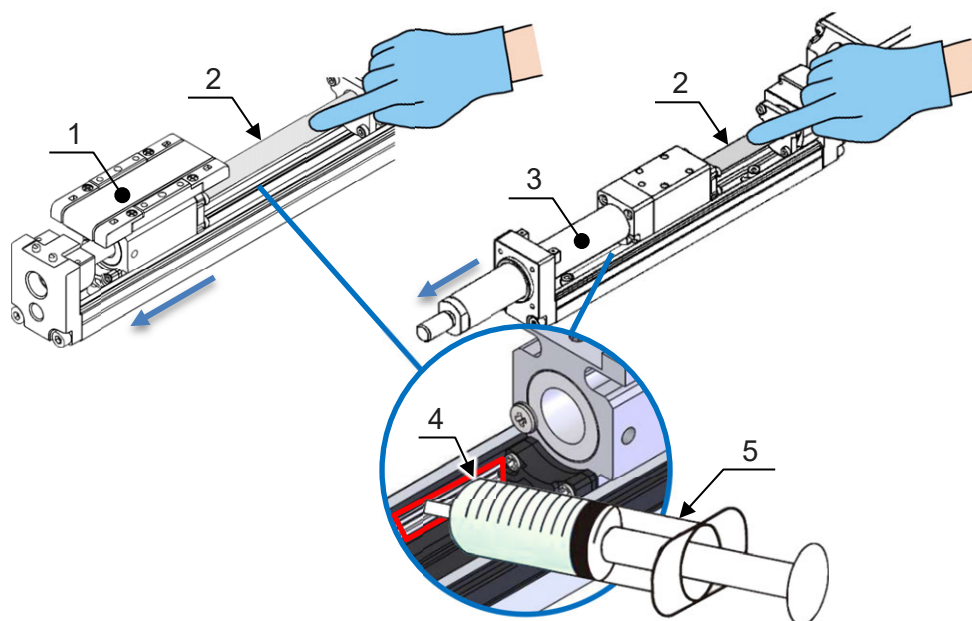
◆ Ball screw and guide

For how to take off / put on the cover, refer to Slider Type [1] and Rod Type [2].

* For the slider type, take off the side covers on both sides and the stainless steel sheet.

* For the Stainless steel sheet, refer to [4.5.2 Stainless steel sheet replacement].

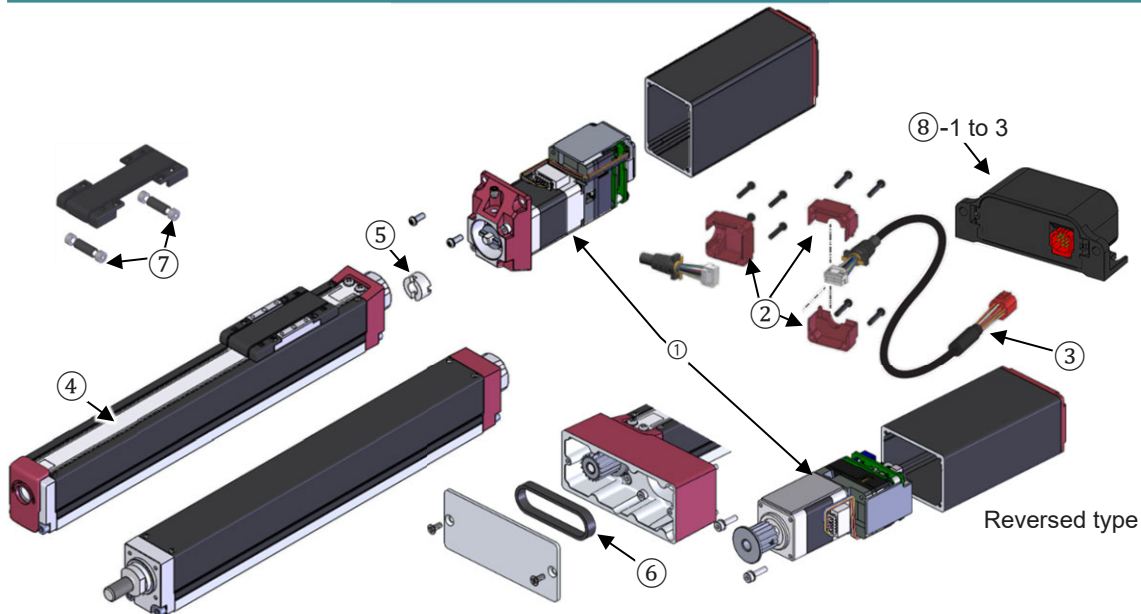
1. Move the slider or rod to the side opposite the motor.
2. Apply grease with hand on the ball screw shaft.
3. Supply grease using such as a syringe on the base rails (both sides) of the guide.
4. Move the slider or rod in the entire stroke to spread the grease evenly.



No.	Type	Part Name	Size	Quantity	Tightening torque/ Reference for grease supply volume
1	Common (25st, 50st)	Slider	—	1	—
2		Ball screw shaft	M1.6×5	4	0.3cc
3		Rod	—	1	—
4		Base rail	—	1	0.3cc
5		Syringe, etc.	—	1	—

4.5 Component replacement

4.5.1 List of parts for replacement



① Motor unit

Type	Encoder	Brake	Model
S2□B RR2□B	Incremental	No	EC-MUSRR2(-MF)(-WL2)
		Yes	EC-MUSRR2-B(-MF)(-WL2)
	Battery-less absolute	No	EC-MUSRR2-WA(-MF)(-WL2)
		Yes	EC-MUSRR2-WA-B(-MF)(-WL2)
S2□R RR2□BR	Incremental	No	EC-MUSRR2R(-MF)(-WL2)
		Yes	EC-MUSRR2R-B(-MF)(-WL2)
	Battery-less absolute	No	EC-MUSRR2R-WA(-MF)(-WL2)
		Yes	EC-MUSRR2R-WA-B(-MF)(-WL2)

* Describe "-MF" when the 3 position mode specification (model code: MF) is to be selected.

* Describe "-WL2" at the end when the wireless axis operation specification (model code: WL2) is to be selected.

② Actuator cable attachment box

Type	Cable ejection direction	Model
All types	Back	EC-CASBR-SLTGD3
	Side	EC-CASBS-SLTGD3

③ Actuator cable assembly * □ shows cable length

Type	Model
All types	CB-EC-SRR2-MPA□□-AS

④ Stainless steel sheet * □ shows stroke

Type	Model
S2□B(R)	ST-EC-S2-□□□

⑤ Coupling spacer

Type	Model
S2□B, RR2□B	CPG-EC-SRR2

⑥ Timing belt

Type	Model
S2□BR, RR2□BR	TB-EC-SRR2R

⑦ Slider roller assembly (in single unit)

Type	Model
S2□B(R)	EC-SR-S2

⑧-1 Interface box 2

Type	Wireless	I/O	Model
S2□B(R) RR2□B(R)	No	NPN	EC-CVN-CB
		PNP	EC-CVP-CB
	WL/ WL2	NPN	EC-CVNW-L-CB
		PNP	EC-CVPWL-CB

⑧-2 2-circuit power supply interface box 2

Type	Wireless	I/O	Model
S2□B(R) RR2□B(R)	No	NPN	EC-CVN-CB-TMD2
		PNP	EC-CVP-CB-TMD2
	WL/ WL2	NPN	EC-CVNW-L-CB-TMD2
		PNP	EC-CVPWL-CB-TMD2

⑧-3 RCON-EC connection specification 2-circuit power supply interface box 2

Type	Wireless	I/O	Model
S2□B(R) RR2□B(R)	WL/ WL2	NPN/ REC	EC-CVNW-L-CB-ACR

4.5.2 Stainless steel sheet replacement (EC-S2□B/S2□BR)



Caution

- Pay attention on the stainless steel sheet so that it would be bent forcefully or get damaged.
- They may be a risk of getting hurt on the edge of the stainless steel sheet. Use a glove or equivalent during work.

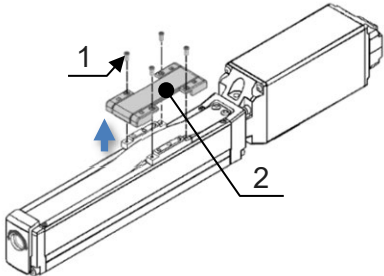
◆ Preparation

- Phillips screwdriver
- Protection equipment (e.g. cotton work gloves)
- Replacement stainless steel sheet

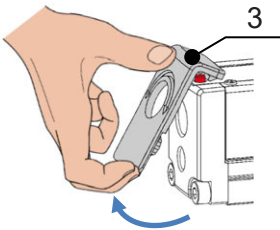
Type	Model
S2□B(R)	ST-EC-S2-□□□ (Stroke)

◆ Replace Procedure

1. Remove the precision machinery screws (4pcs) and take the slider cover off.

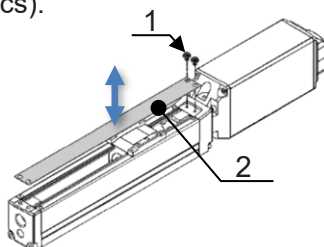


2. Pull the bottom of the sheet clamp towards you to take it off.

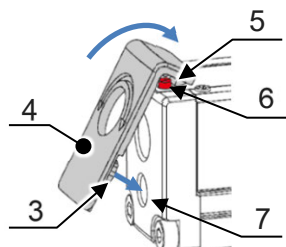


No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□B S2□BR	Precision machinery screw	M1.6×3.5	4	—
2		Slider cover	—	1	—
3		Sheet clamp	—	1	—

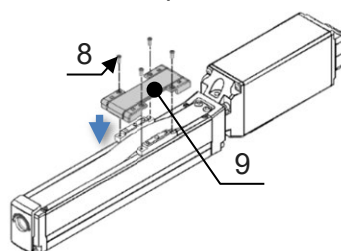
3. Remove the cross recessed flat head screws with captive washer to take the stainless steel sheet off.
4. Apply a stainless steel sheet for replacement and affix it with the cross recessed flat head screws with captive washer (2pcs).



5. Hang the snap feature on the sheet clamp on the flange of the front bracket, and put the extrusion part of the sheet clamp into the hole on the front bracket.



6. Attach the slider cover and affix it with the precision machinery screws (4pcs).

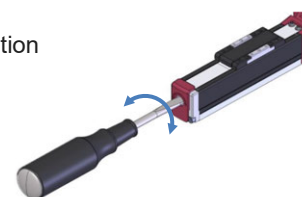


7. Move the slider in its full stroke to confirm there is no twist or looseness on the stainless steel sheet.

- How to move slider manually

Use a slotted screwdriver (blade thickness 1mm) at the slot in the slider position adjustment hole on the opposite side of the motor to move the slider.

- * Make sure to turn the servo off during manual work.
- * Release a brake before starting work for the brake-equipped type.
- * Do not attempt to turn it with excess torque (0.1N·m or more).



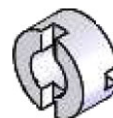
No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□B S2□BR	Cross-recessed pan head machine screw with captive washer	M2×3	2	0.17N·m
2		Stainless steel sheet	—	1	—
3		Flange on sheet clamp	—	1	—
4		Sheet clamp	—	1	—
5		Snap feature	—	1	—
6		Flange on front bracket	—	1	—
7		Hole on front bracket	—	1	—
8		Precision machinery screw	M1.6×3.5	4	0.083N·m
9		Slider cover	—	1	—

4.5.3 Coupling spacer replacement

◆ Preparation

- Hex wrench or torque wrench parallel faces: 2.5mm
- Protection equipment (e.g. cotton work gloves)
- Grease NOK corporation NOXLUB TL1010 or TL1013 (Lithium based)
- Coupling spacer for replacement

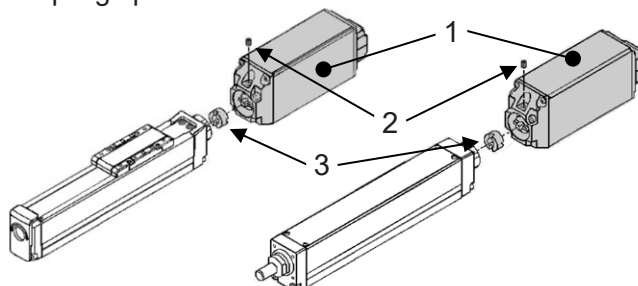
Type	Model
S2□B/RR2□B	CPG-EC-SRR2



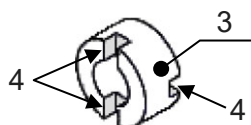
◆ Replace Procedure

1. Remove the hex socket set screw (1pc) and take off the motor unit assembly.

2. Take off the old coupling spacer.



3. Apply grease on the groove of the coupling spacer for replacement and attach it.



4. Attach the motor unit assembly and affix it with the hex socket set screw (1pc).

No.	Type	Part Name	Size	Quantity	Tightening torque/ Reference for grease supply volume
1	Common	Motor unit assembly	—	1	—
2		Hex socket set screw	M3×4	1	0.69N·m
3		Coupling spacer	—	1	—
4		Groove	—	1	0.02g

4.5.4 Motor unit replacement

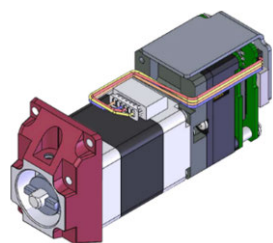
◆ Preparation

- Phillips screwdriver
- Hex wrench or torque wrench parallel faces: 1.5mm
- Tension gauge (for motor reversed type only)
- A long string such as wire and zip ties (for motor reversed type only)
- Protection equipment (e.g. cotton work gloves)
- Replacement motor unit

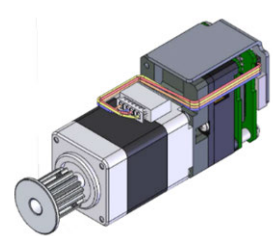
Type	Encoder	Brake	Model
S2□B RR2□B	Incremental	No	EC-MUSRR2(-MF)(-WL2)
		Yes	EC-MUSRR2-B(-MF)(-WL2)
	Battery-less absolute	No	EC-MUSRR2-WA(-MF)(-WL2)
		Yes	EC-MUSRR2-WA-B(-MF)(-WL2)
S2□BR RR2□BR	Incremental	No	EC-MUSRR2R(-MF)(-WL2)
		Yes	EC-MUSRR2R-B(-MF)(-WL2)
	Battery-less absolute	No	EC-MUSRR2R-WA(-MF)(-WL2)
		Yes	EC-MUSRR2R-WA-B(-MF)(-WL2)

Motor unit

For S2□B/RR2□B



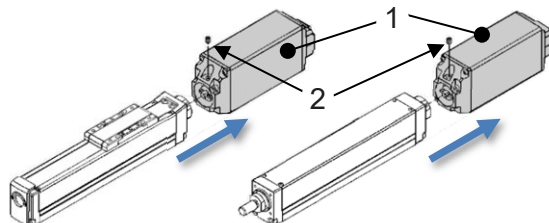
For S2□BR/RR2□BR



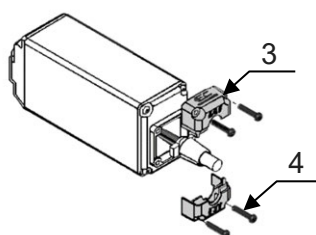
◆ Replace Procedure

[1] EC-S2□B/RR2□B

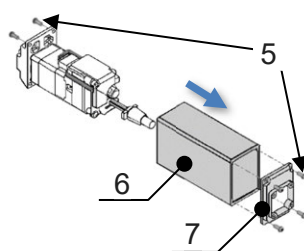
1. Remove the hex socket set screw (1pc) and take off the motor unit assembly.



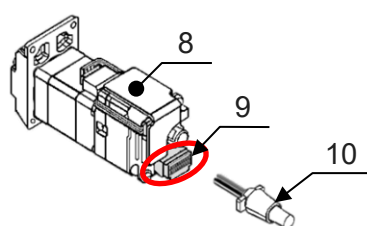
2. Remove the cross-recessed tapping screw on the motor unit assembly that was taken off to take off the cable box.



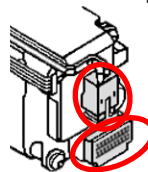
3. Remove the hex socket flat-head bolts (6pcs) to take off the end cover and motor cover.



4. Press the snap feature on the actuator cable assembly to take the connector off the motor unit that was taken off and change it with a motor unit for replacement.

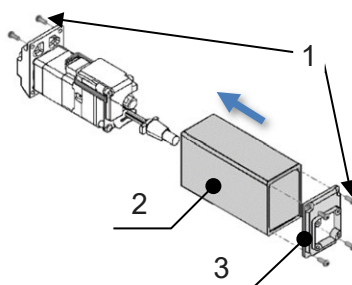


2 places when equipped with brake



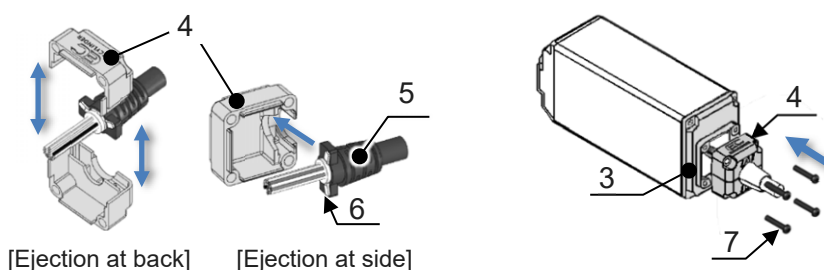
No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□B RR2□B	Hex socket set screw	M3×4	1	—
2		Motor unit assembly	—	1	—
3		Cable box	—	1	—
4		Cross-recessed tapping screw	M2×10	4	—
5		Hex socket flat-head bolt	M2×5	6	0.25N·m
6		Motor cover	—	1	—
7		End cover	—	1	—
8		Motor unit	—	1	—
9		Connector	—	1 (2)	—
10		Actuator cable assembly	—	1	—

5. Put on the motor cover and end cover and affix them with the hex socket flat-head bolts (6pcs).

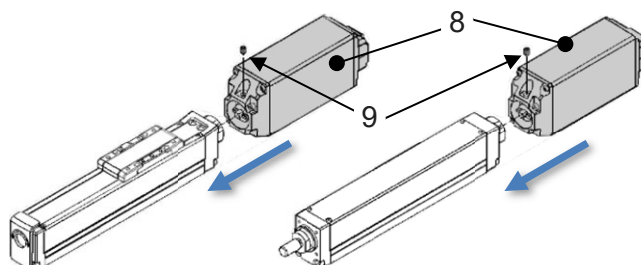


6. Put the cable box on the actuator cable assembly and affix them on the end cover with the cross-recessed tapping screws (4pcs).

- Put the cord bush and bracket in the groove on the cable box.



7. Put the motor unit assembly on and affix it with a hex socket set screw (1pc).

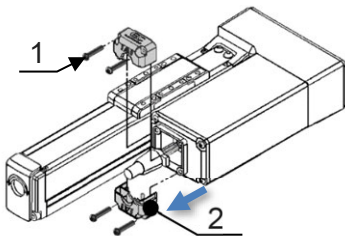


No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□B RR2□B	Hex socket flat-head bolt	M2×5	6	0.25N·m
2		Motor cover	—	1	—
3		End cover	—	1	—
4		Cable box	—	1	—
5		Actuator cable assembly	—	1	—
6		Cord bush bracket	—	1	—
7		Cross-recessed tapping screw	M2×10	4	0.17N·m
8		Hex socket set screw	M3×4	1	0.69N·m
9		Motor unit assembly	—	1	—

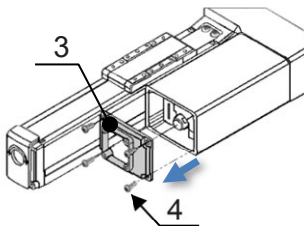
[2] EC-S2□BR/RR2□BR

* The image shows S2□BR.

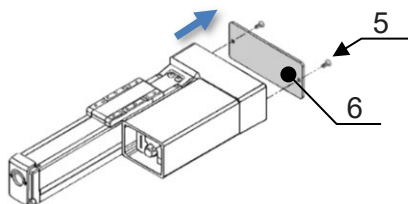
1. Remove the cross-recessed tapping screws (4pcs) to take off the cable box off.



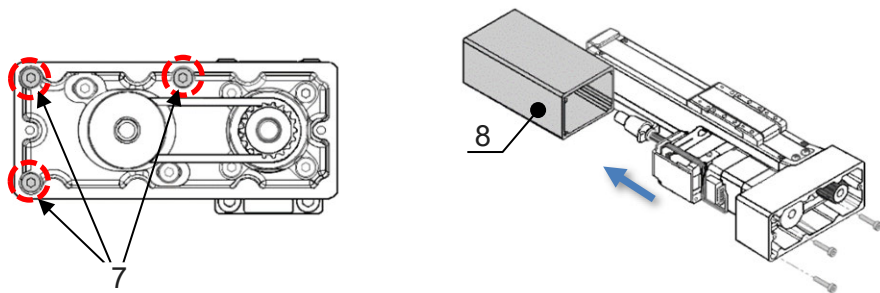
2. Remove the hex socket head bolts (4pcs) to take the end cover off.



3. Remove the hex socket flat-head bolts (2pcs) to take the pulley cover off.

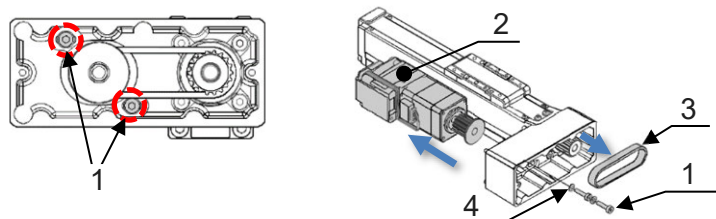


4. Remove the hex socket head bolt to take the motor cover off.

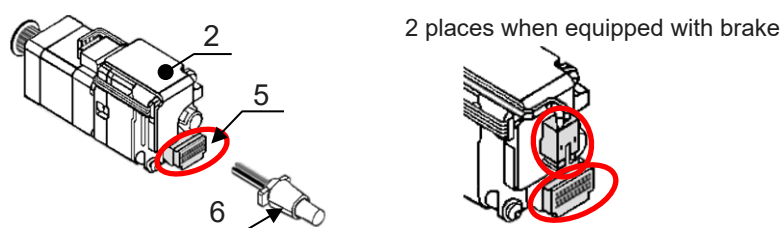


No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□BR RR2□BR	Cross-recessed tapping screw	M2×10	4	—
2		Cable box	—	1	—
3		End cover	—	1	—
4		Hex socket head bolts	M2×5	4	—
5		Hex socket flat-head bolts	M2×5	2	—
6		Pulley cover	—	1	—
7		Hex socket head bolt	M2×10	3	—
8		Motor cover	—	1	—

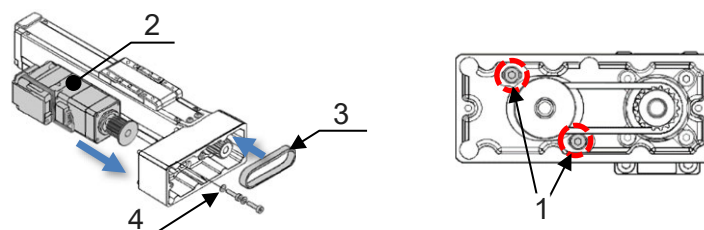
5. Remove the hex socket head bolt and plane washers to take off the timing belt and motor unit.



6. Press the snap feature on the actuator cable assembly to take the connector off the motor unit that was taken off and change it with a motor unit for replacement.

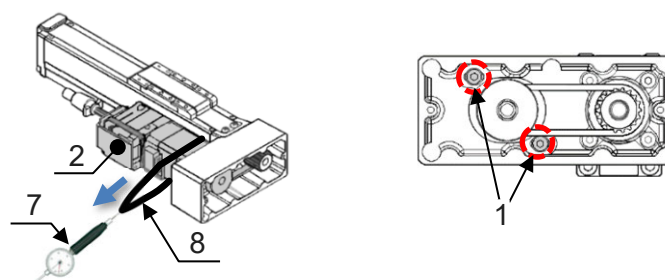


7. Fix the motor unit with the plane washers and hex socket head bolt (2pcs) loosely and put the timing belt on.



8. Hang a string on the motor unit, apply 5 to 6N·m with a tension gauge and pull it.

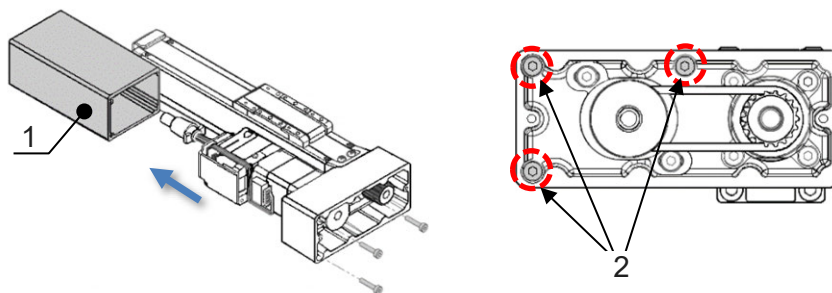
9. With load being applied, tighten up the hex socket head bolt (2pcs).



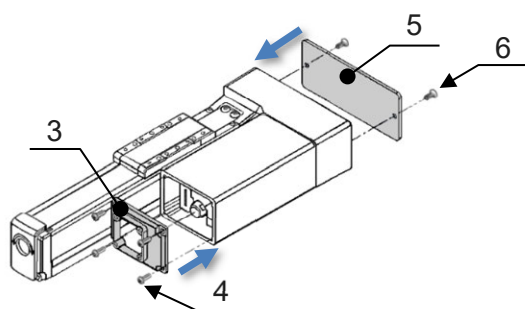
* 2 places when equipped with brake

No.	Type	Part Name	Size		Quantity	Pulling force/ Tightening torque
1	S2□BR RR2□BR	Hex socket head bolt	W/o brake	M2×8	2	0.25N·m
			With brake	M2×10	2	
2		Motor unit	—		1	—
3		Timing belt	—		1	—
4		Plane washer	—		2	—
5		Connector	—		1*	—
6		Actuator cable assembly	—		1	—
7		Tension gauge	—		1	5 to 6N
8		A string	—		1	—

10. Put the motor cover over and affix it with the hex socket head bolt (3pcs).

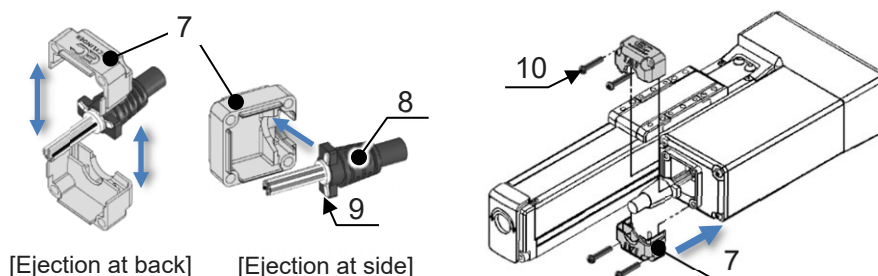


11. Put the end cover with the hex socket head bolts (4pcs) and put the pulley cover on with the hex socket flat-head bolts (2pcs).



12. Put the cable box on the actuator cable assembly and affix them on the end cover with the cross-recessed tapping screws (4pcs).

- Put the cord bush and bracket in the groove on the cable box.



No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□R RR2□BR	Motor cover	—	1	—
2		Hex socket head bolt	M2×10	3	0.25N·m
3		End cover	—	1	—
4		Hex socket head bolt	M2×5	4	0.25N·m
5		Pulley cover	—	1	—
6		Hex socket flat-head bolt	M2×5	2	0.21N·m
7		Cable box	—	1	—
8		Actuator cable assembly	—	1	—
9		Cord bush bracket	—	1	—
10		Cross-recessed tapping screw	M2×10	4	0.17N·m

4.5.5 Timing belt replacement

Applicable Models: EC-S2□BR/RR2□BR

* The image shows S2□BR.

◆ Preparation

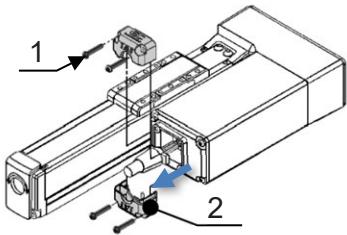
- Phillips screwdriver
- Hex wrench or torque wrench parallel faces: 1.5mm
- Protection equipment (e.g. cotton work gloves)
- Replacement timing belt

Type	Model
S2□BR/RR2□BR	TB-EC-SRR2R

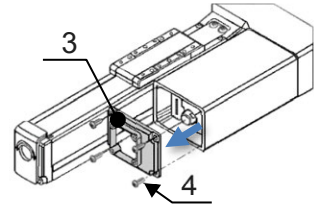


◆ Replace Procedure

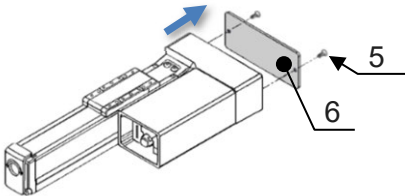
1. Remove the cross-recessed tapping screws (4pcs) to take off the cable box off.



2. Remove the hex socket head bolts (4pcs) to take the end cover off.

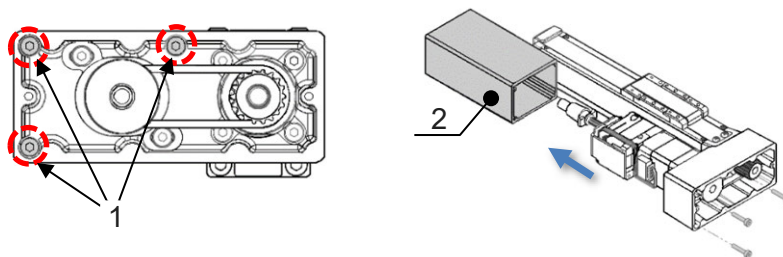


3. Remove the hex socket flat-head bolts (2pcs) to take the pulley cover off.



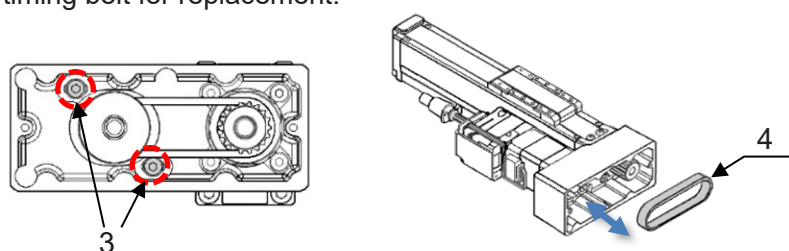
No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□BR RR2□BR	Cross-recessed tapping screw	M2×10	4	—
2		Cable box	—	1	—
3		End cover	—	1	—
4		Hex socket head bolt	M2×5	4	0.25N·m
5		Hex socket flat-head bolt	M2×5	2	—
6		Pulley cover	—	1	—

4. Remove the hex socket head bolt to take the motor cover off.



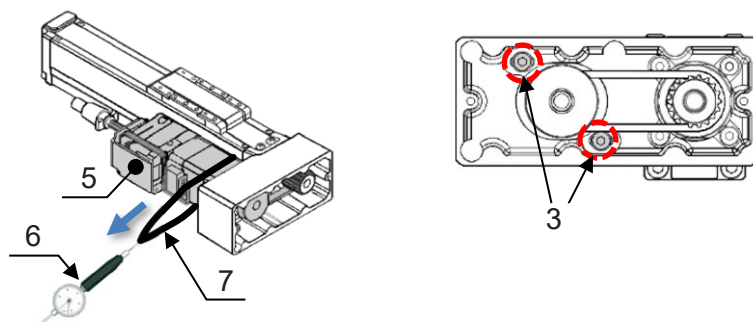
5. Loosen the hex socket head bolt to take the timing belt off.

6. Apply a timing belt for replacement.



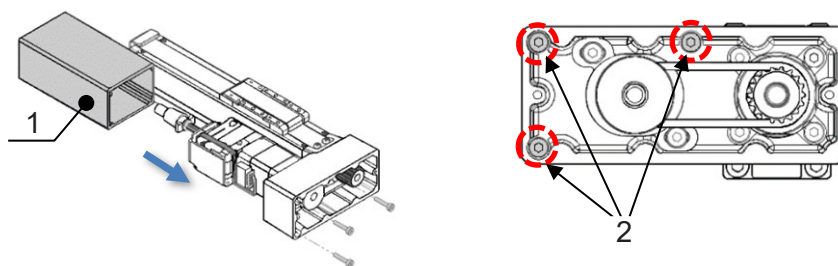
7. Hang a string on the motor unit, apply 5 to 6N·m with a tension gauge and pull it.

8. With load being applied, tighten up the hex socket head bolt (2pcs).

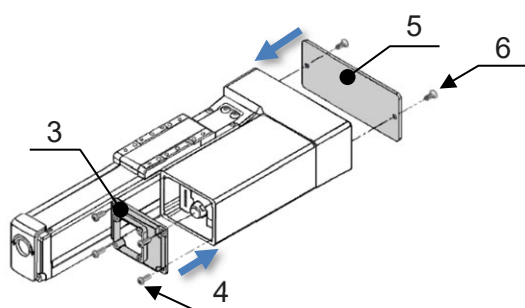


No.	Type	Part Name	Size		Quantity	Pulling force/ Tightening torque
1	S2□BR RR2□BR	Hex socket head bolt	M2×10		3	—
2		Motor cover	—		1	—
3		Hex socket head bolt	W/o brake	M2×8	2	0.25N·m
4			With brake	M2×10	2	
5		Timing belt	—		1	—
6		Motor unit	—		1	—
7		Tension gauge	—		1	5 to 6N
7		A string	—		1	—

9. Put the motor cover over and affix it with the hex socket head bolt (3pcs).

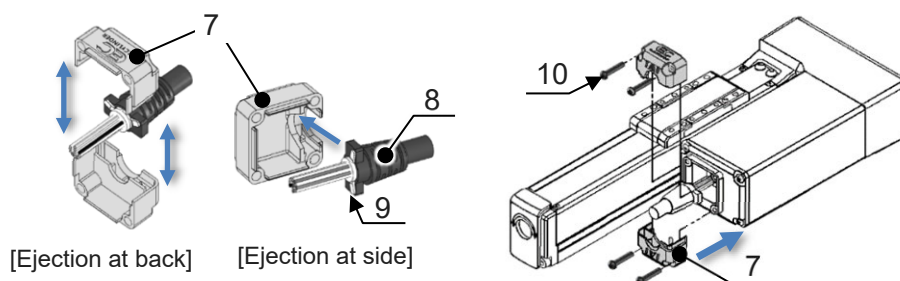


10. Put the end cover with the hex socket head bolts (4pcs) and put the pulley cover on with the hex socket flat-head bolts (2pcs).



11. Put the cable box on the actuator cable assembly and affix them on the end cover with the cross-recessed tapping screws (4pcs).

- Put the cord bush and bracket in the groove on the cable box.



No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□BR RR2□BR	Motor cover	—	1	—
2		Hex socket head bolt	M2×10	3	0.25N·m
3		End cover	—	1	—
4		Hex socket head bolt	M2×5	4	0.25N·m
5		Pulley cover	—	1	—
6		Hex socket flat-head bolt	M2×5	2	0.21N·m
7		Cable box	—	1	—
8		Actuator cable assembly	—	1	—
9		Cord bush bracket	—	1	—
10		Cross-recessed tapping screw	M2×10	4	0.17N·m

4.5.6 Replacing actuator cable assembly (Change of cable ejection direction)

◆ Preparation

- Phillips screwdriver
- Hex wrench or torque wrench parallel faces: 1.5mm
- Protection equipment (e.g. cotton work gloves)
- Replacement actuator cable assembly (□□□ shows cable length)

Type	Model
All types	CB-EC-SRR2-MPA□□□-AS

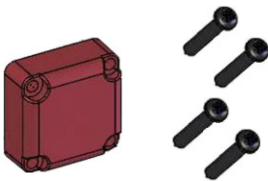
- Cable box for replacement

Type	Cable ejection direction	Model
All types	Back	EC-CASBR-SLTGD3
	Side	EC-CASBS-SLTGD3

Actuator cable assembly

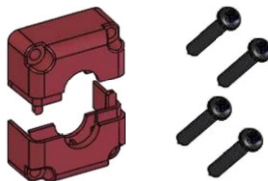


Cable box (Ejected on Side)



Tapping screws 2 × 10 (4pcs)

Cable box (Ejected at Back)

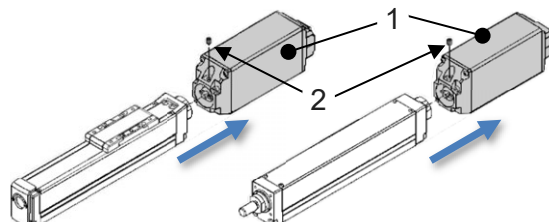


Tapping screws 2 × 10 (4pcs)

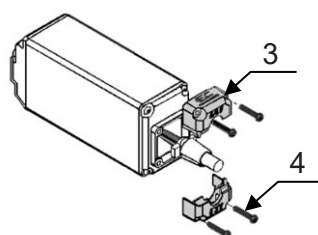
◆ Replace Procedure

[1] EC-S2□B/RR2□B

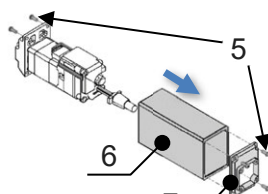
1. Remove the hex socket set screw (1pc) to take the motor unit assembly off.



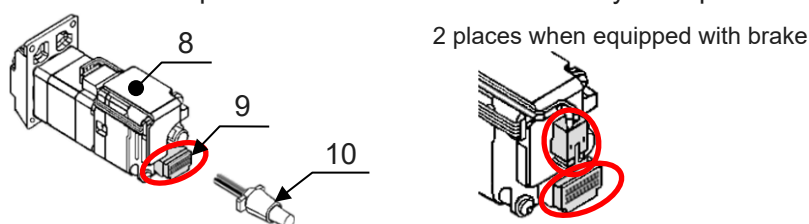
2. Remove the cross-recessed tapping screw on the motor unit assembly that was taken off to take off the cable box.



3. Remove the hex socket head bolt (6pcs) to take off the end cover and motor cover.



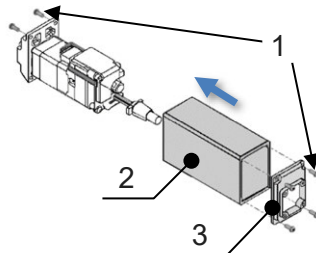
4. Press the snap feature on the actuator cable assembly to take the connector off the motor unit that was taken off and put on an actuator cable assembly for replacement.



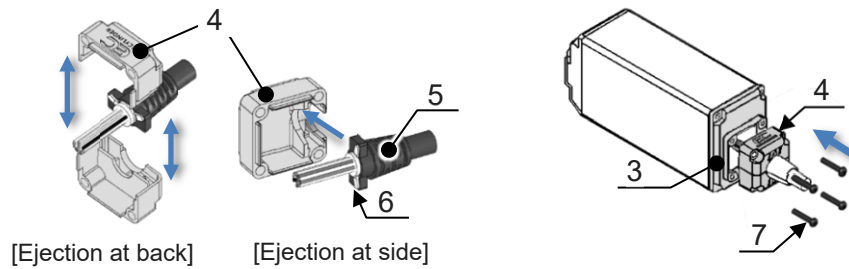
* 2 places when equipped with brake

No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□B RR2□B	Motor unit assembly	—	1	—
2		Hex socket set screw	M3×4	1	—
3		Cable box	—	1	—
4		Cross-recessed tapping screw	M2×10	4	—
5		Hex socket head bolt	M2×5	6	—
6		Motor cover	—	1	—
7		End cover	—	1	—
8		Motor unit	—	1	—
9		Connector	—	1*	—
10		Actuator cable assembly	—	1	—

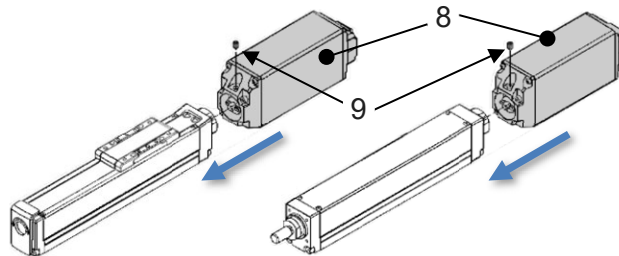
5. Put on the motor cover and end cover and affix them with the hex socket head bolts (6pcs).



6. Put the cable box on the actuator cable assembly and affix them on the end cover with the cross-recessed tapping screws (4pcs).
- Put the cord bush and bracket in the groove on the cable box.



7. Attach the motor unit assembly and affix it with the hex socket set screw (1pc).

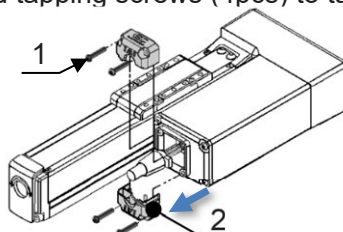


No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□B RR2□B	Hex socket head bolt	M2×5	6	0.25N·m
2		Motor cover	—	1	—
3		End cover	—	1	—
4		Cable box	—	1	—
5		Actuator cable assembly	—	1	—
6		Cord bush bracket	—	1	—
7		Cross-recessed tapping screw	M2×10	4	0.17N·m
8		Motor unit assembly	—	1	—
9		Hex socket set screw	M3×4	1	0.69N·m

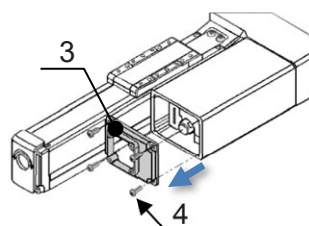
[2] EC-S2□BR/RR2□BR

* The image shows S2□BR.

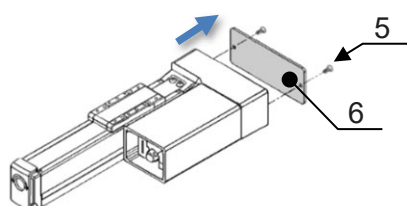
1. Remove the cross-recessed tapping screws (4pcs) to take off the cable box off.



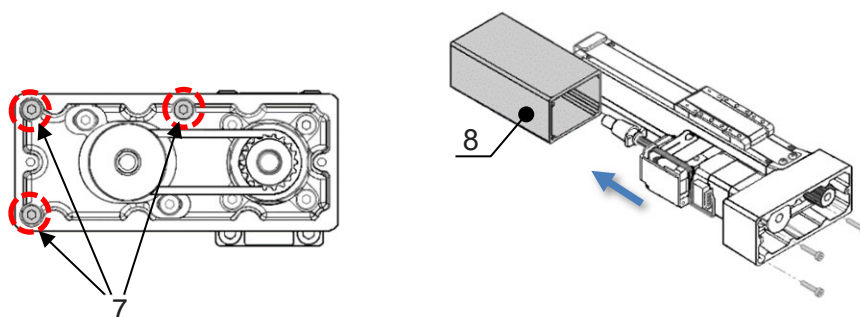
2. Remove the hex socket head bolts (4pcs) to take the end cover off.



3. Remove the hex socket flat-head bolts (2pcs) to take the pulley cover off.

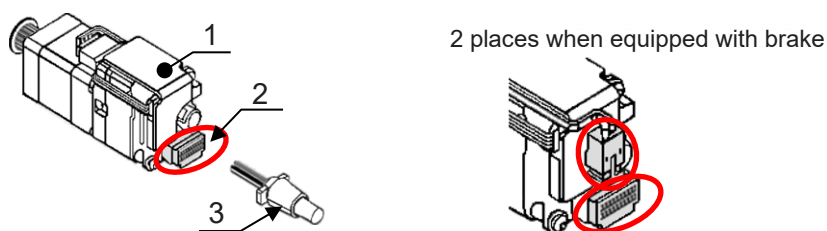


4. Remove the hex socket head bolt to take the motor cover off.

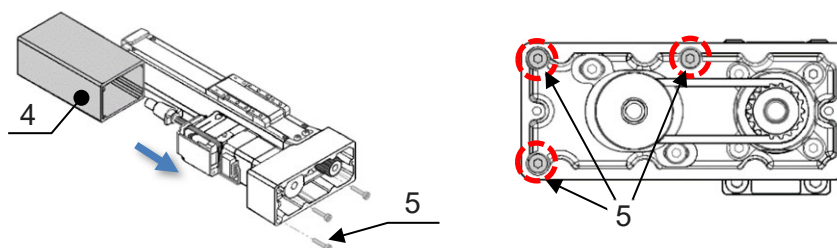


No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□BR RR2□BR	Cross-recessed tapping screw	M2×10	4	—
2		Cable box	—	1	—
3		End cover	—	1	—
4		Hex socket head bolt	M2×5	4	—
5		Hex socket flat-head bolt	M2×5	2	—
6		Pulley cover	—	1	—
7		Hex socket head bolt	M2×10	3	—
8		Motor cover	—	1	—

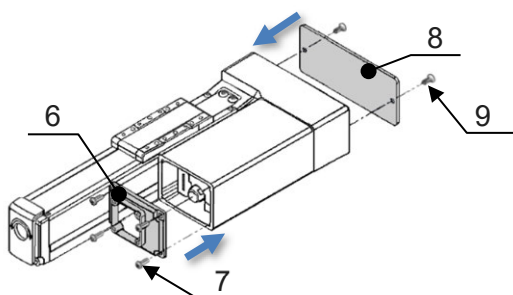
5. Press the snap feature on the actuator cable assembly to take the connector off the motor unit and put on an actuator cable assembly for replacement.



6. Put the motor cover over and affix it with the hex socket head bolt (3pcs).

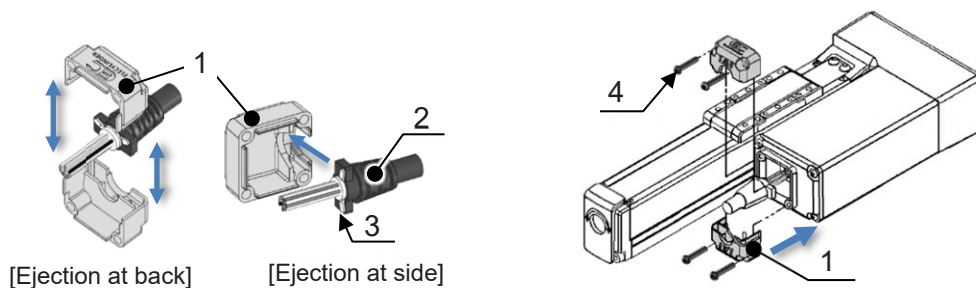


7. Put the end cover with the hex socket head bolts (4pcs) and put the pulley cover on with the hex socket flat-head bolts (2pcs).



No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□BR RR2□BR	Motor unit	—	1	—
2		Connector	—	1 (2)	—
3		Actuator cable assembly	—	1	—
4		Motor cover	—	1	—
5		Hex socket head bolt	M2×10	3	0.25N·m
6		End cover	—	1	—
7		Hex socket head bolt	M2×5	4	0.25N·m
8		Pulley cover	—	1	—
9		Hex socket flat-head bolt	M2×5	2	0.21N·m

8. Put the cable box on the actuator cable assembly and affix them on the end cover with the cross-recessed tapping screws (4pcs).
- Put the cord bush and bracket in the groove on the cable box.



No.	Type	Part Name	Size	Quantity	Tightening torque
1	S2□BR RR2□BR	Cable box	—	1	—
2		Actuator cable assembly	—	1	—
3		Cord bush bracket	—	1	—
4		Cross-recessed tapping screw	M2×10	4	0.17N·m

4.5.7 Replacing slider roller assembly

◆ Preparation

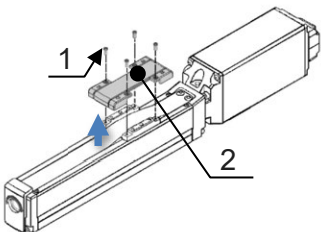
- Phillips screwdriver
- Protection equipment (e.g. cotton work gloves)
- Slider roller assembly for replacement (Single unit)

Type	Model
S2□B(R)	EC-SR-S2



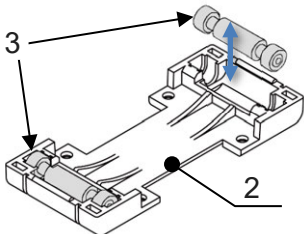
◆ Replace Procedure

1. Remove the precision machinery screws (4pcs) and take the slider cover off.



2. Pull the slider roller assembly at the center of it to take it off the slider cover.

3. Put a slider roller assembly for replacement on the slider cover.
* Push in the bearings on the both ends evenly.



4. Attach the slider cover and affix it with the precision machinery screws (4pcs).

No.	Type	Part Name	Size	Quantity	Tightening torque
1	Common	Precision machinery screw	M1.6×3.5	4	0.083N·m
2		Slider cover	—	1	—
3		Slider roller assembly	—	2	—
4		Bearing	—	4	—

ELECYLINDER

Chapter 5

External Dimensions

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5.1.1 EC-S2□B

(Note) As the slider will move to M.E. when the home-return operation is performed, pay attention to interference to peripherals.

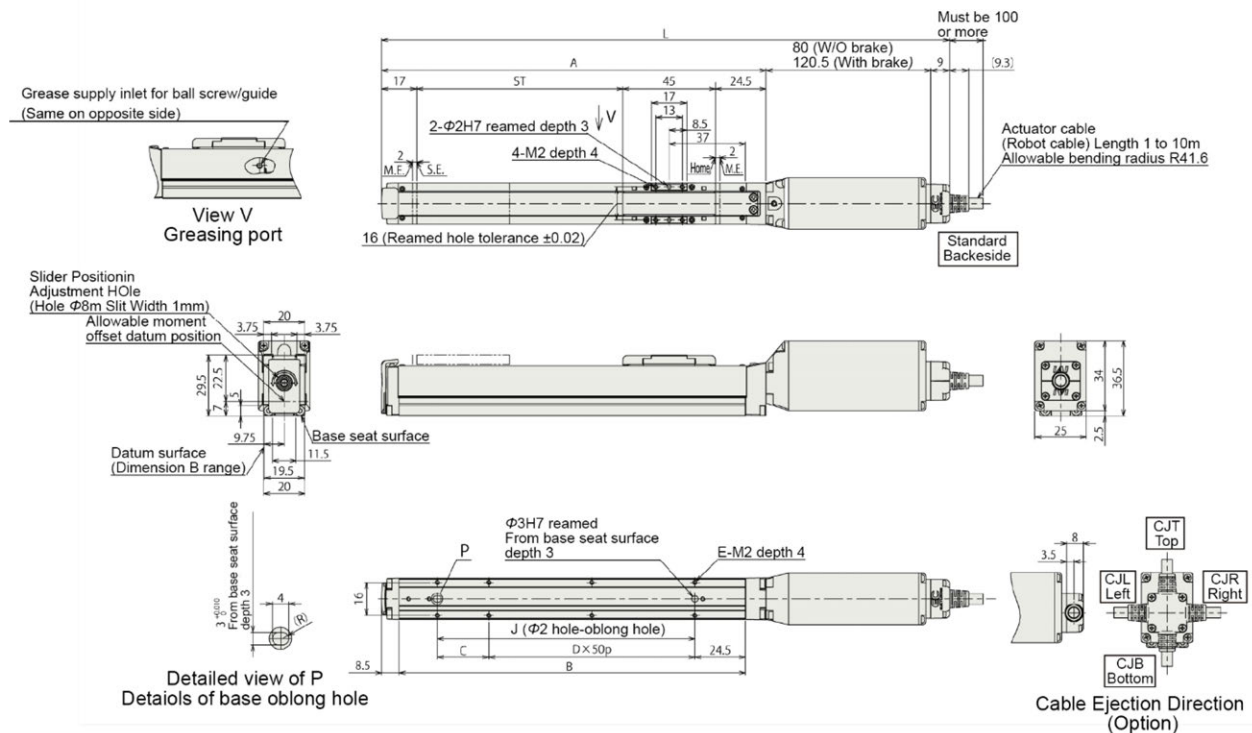
(Note) Hold the cables so the root of the cables would not move.

Separation and replacement of cables are available. (Connector connection inside cable box).

The direction of cable ejection (option) can be changed by the direction change of the cable box.

(Note) The figure below shows the motor attachment direction on top (MOT)

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



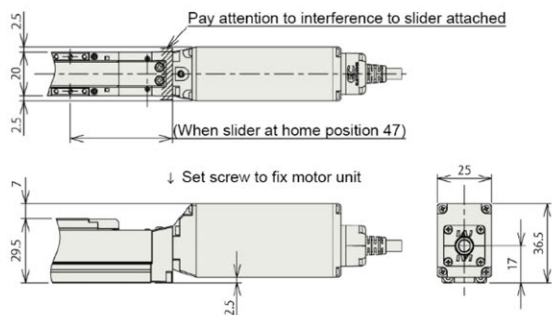
■ Dimensions by Stroke

■ Dimensions by Stroke									Unit [mm]
Stroke		25	50	75	100	150	200	250	300
L	W/o Brake	200.5	225.5	250.5	275.5	325.5	375.5	425.5	475.5
	With Brake	241	266	291	316	366	416	466	516
A		111.5	136.5	161.5	186.5	236.5	286.5	336.5	386.5
B		93	118	143	168	218	268	318	368
C		0	25	0	25	25	25	25	25
D		1	1	2	2	3	4	5	6
E		4	6	6	8	10	12	14	16
J		50	75	100	125	175	225	275	325

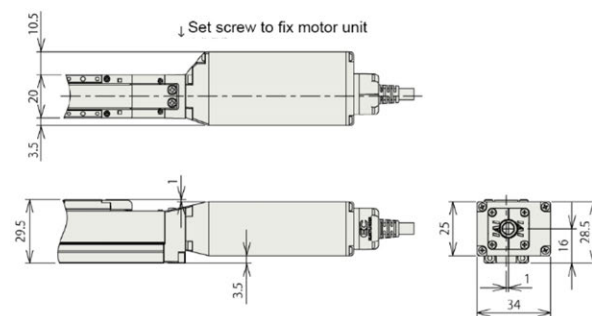
■ Mass by Stroke

■ Mass by Stroke									Unit [kg]
Stroke		25	50	75	100	150	200	250	300
Mass	W/o Brake	0.31	0.32	0.34	0.35	0.39	0.42	0.45	0.48
	With Brake	0.39	0.40	0.42	0.43	0.46	0.50	0.53	0.56

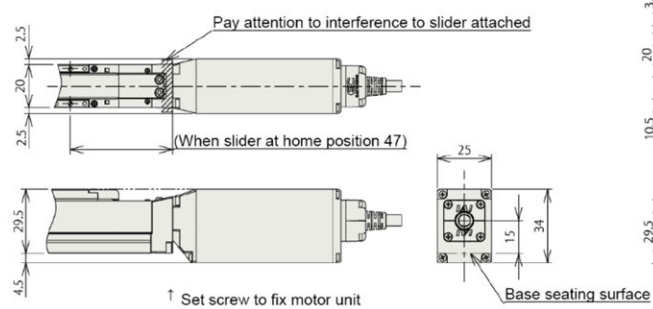
■ Motor attached direction change (Option)



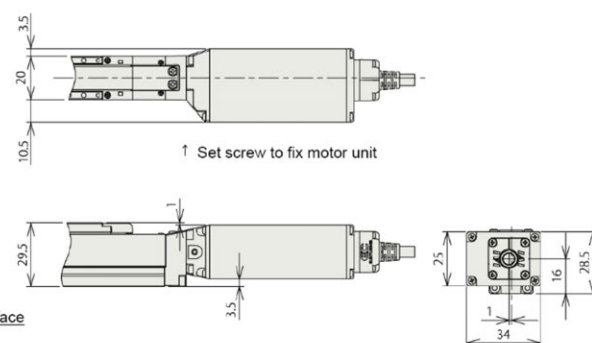
Motor attached direction chang (Top): MOT



Motor attached direction chang (Right): MOR



Motor attached direction chang (Bottom): MOB



Motor attached direction chang (Left): MOL

5.1.2 EC-S2□BR

(Note) As the slider will move to M.E. when the home-return operation is performed, pay attention to interference to peripherals.

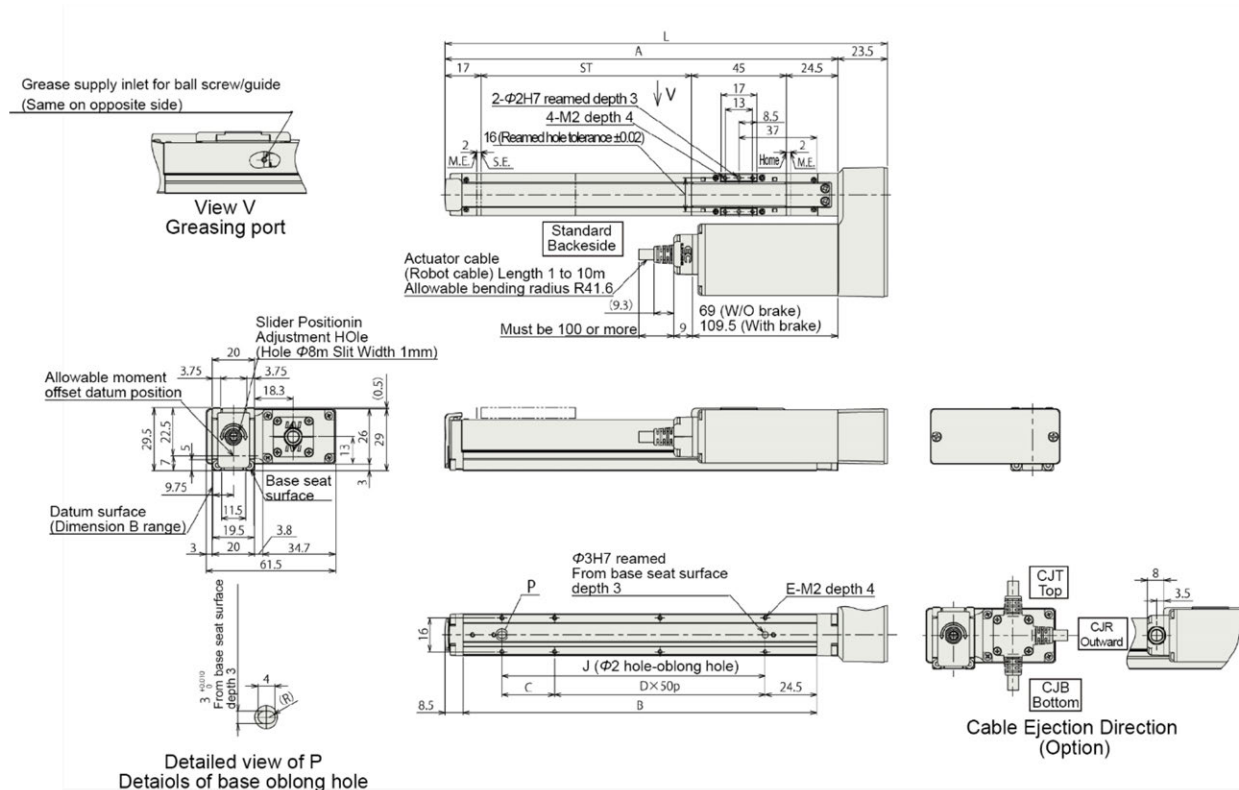
(Note) Hold the cables so the root of the cables would not move.

Separation and replacement of cables are available. (Connector connection inside cable box).

The direction of cable ejection (option) can be changed by the direction change of the cable box.

(Note) The figure below shows the motor attachment direction on top (MOT)

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



■ Dimensions by Stroke

Unit [mm]

Stroke	25	50	75	100	150	200	250	300
L	135	160	185	210	260	310	360	410
A	111.5	136.5	161.5	186.5	236.5	286.5	336.5	386.5
B	93	118	143	168	218	268	318	368
C	0	25	0	25	25	25	25	25
D	1	1	2	2	3	4	5	6
E	4	6	6	8	10	12	14	16
J	50	75	100	125	175	225	275	325

■ Mass by Stroke

Unit [kg]

Stroke	25	50	75	100	150	200	250	300
Mass								
W/o Brake	0.35	0.36	0.38	0.40	0.43	0.46	0.49	0.52
With Brake	0.42	0.44	0.46	0.47	0.50	0.54	0.57	0.60

5.2.1 EC-RR2□B

(Note) As the slider will move to M.E. when the home-return operation is performed, pay attention to interference to peripherals.

(Note) Hold the cables so the root of the cables would not move.

Separation and replacement of cables are available. (Connector connection inside cable box).

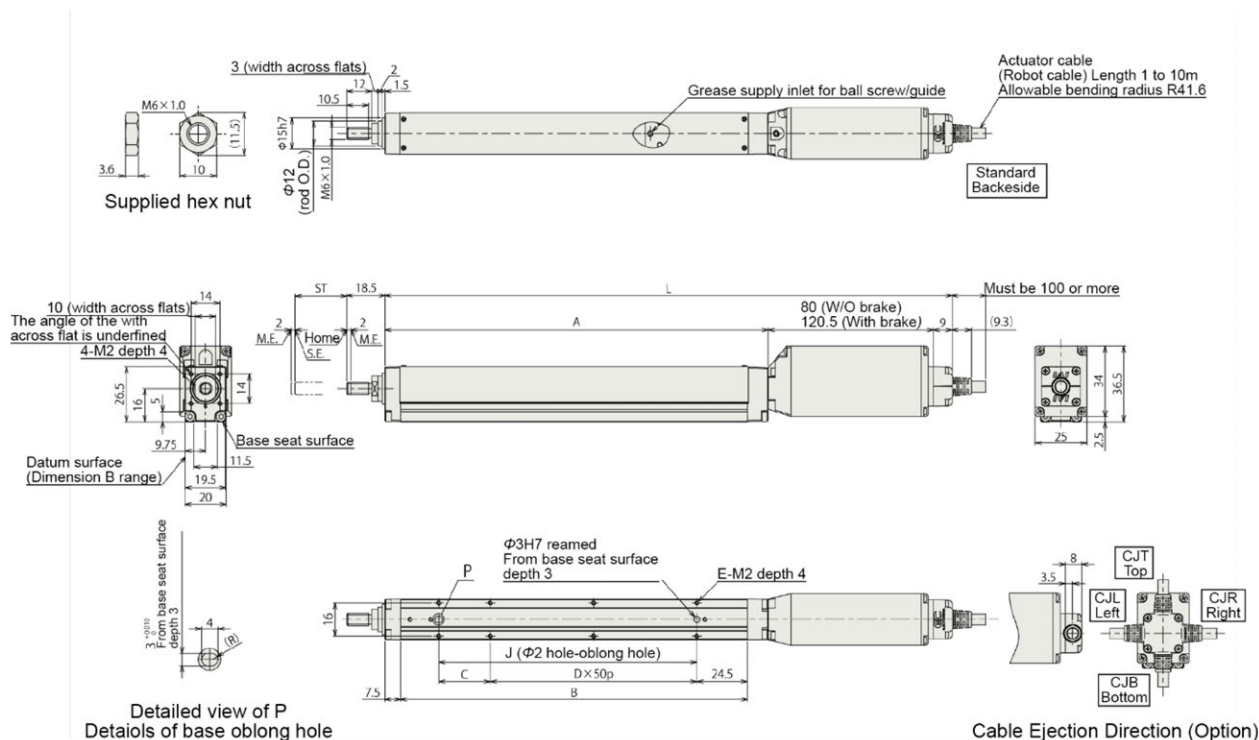
The direction of cable ejection (option) can be changed by the direction change of the cable box.

(Note) The figure below shows the motor attachment direction on top (MOT)

ST: Stroke

M.E.: Mechanical end

S.E.: Stroke end



■ Dimensions by Stroke

Unit [mm]

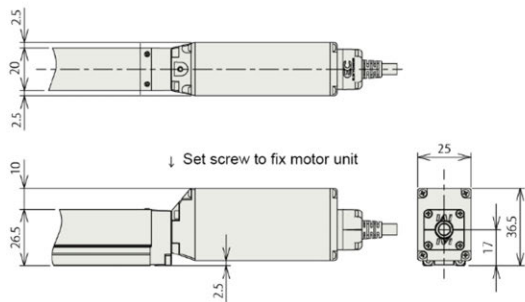
L Dimensions by Stroke									Unit [mm]
Stroke		25	50	75	100	150	200	250	300
L	W/o Brake	199.5	224.5	249.5	274.5	324.5	374.5	424.5	474.5
	With Brake	240	265	290	315	365	415	465	515
A		110.5	135.5	160.5	185.5	235.5	285.5	335.5	385.5
B		93	118	143	168	218	268	318	368
C		0	25	0	25	25	25	25	25
D		1	1	2	2	3	4	5	6
E		4	6	6	8	10	12	14	16
J		50	75	100	125	175	225	275	325

■ Mass by Stroke

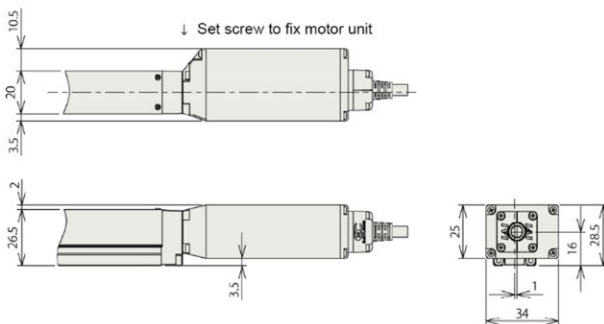
Unit [kg]

Stroke		25	50	75	100	150	200	250	300
Mass	W/o Brake	0.31	0.33	0.35	0.38	0.42	0.46	0.51	0.55
	With Brake	0.39	0.41	0.43	0.45	0.50	0.54	0.58	0.63

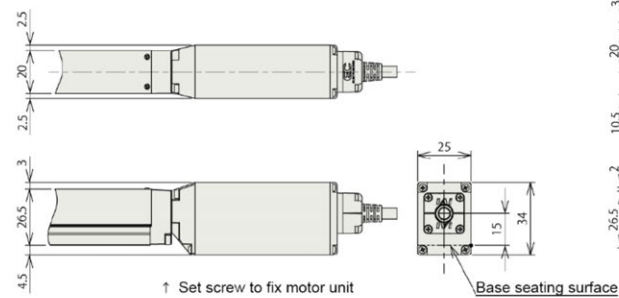
■ Motor attached direction change (Option)



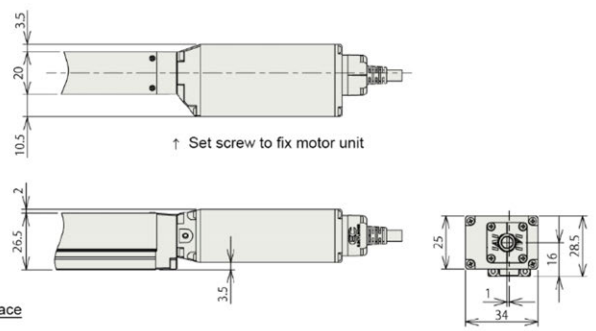
Motor attached direction chang (Top): MOT



Motor attached direction chang (Right): MOR



Motor attached direction chang (Bottom): MOB



Motor attached direction chang (Left): MOL

5.2 Radial cylinder type (EC-RR2□B)

5.2.2 EC-RR2□BR

(Note) As the slider will move to M.E. when the home-return operation is performed, pay attention to interference to peripherals.

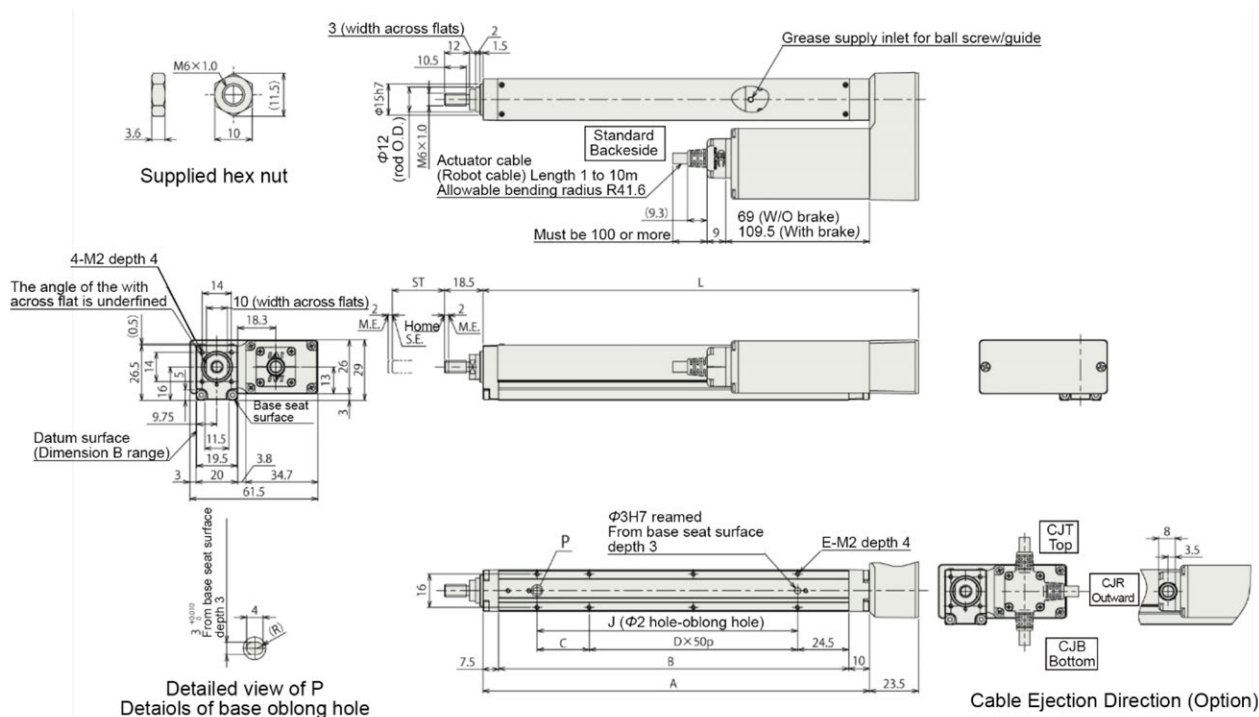
(Note) Hold the cables so the root of the cables would not move.

Separation and replacement of cables are available. (Connector connection inside cable box).

The direction of cable ejection (option) can be changed by the direction change of the cable box.

(Note) The figure below shows the motor attachment direction on top (MOT)

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



■ Dimensions by Stroke

Unit [mm]

Stroke	25	50	75	100	150	200	250	300
L	134	159	184	209	259	309	359	409
A	110.5	135.5	160.5	185.5	235.5	285.5	335.5	385.5
B	93	118	143	168	218	268	318	368
C	0	25	0	25	25	25	25	25
D	1	1	2	2	3	4	5	6
E	4	6	6	8	10	12	14	16
J	50	75	100	125	175	225	275	325

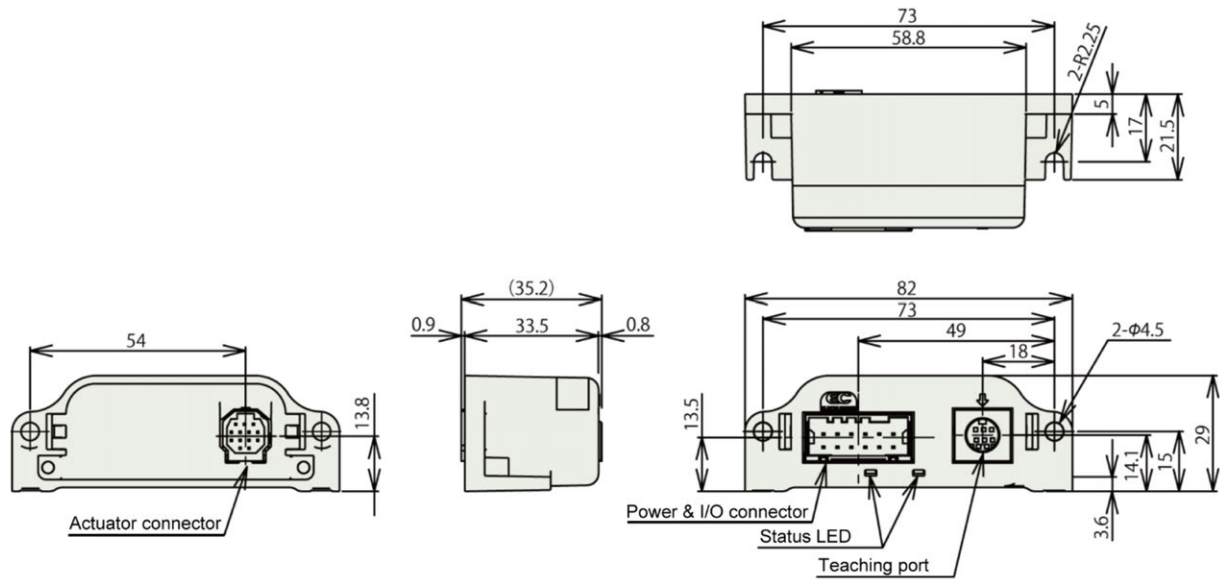
■ Mass by Stroke

Unit [kg]

Stroke	25	50	75	100	150	200	250	300
Mass								
W/o Brake	0.35	0.37	0.39	0.42	0.46	0.50	0.55	0.59
With Brake	0.43	0.45	0.47	0.49	0.54	0.58	0.62	0.67

5.3 Interface box

5.3.1 Interface box 2



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Chapter 6

Life

6.1	Concept of life for slider type	6-1
6.1.1	How to calculate operation life	6-1
6.1.2	Relation between operation life and moment	6-3
6.2	Concept of life for rod type	6-4

6.1 Concept of life for slider type

The mechanical life of the slider type is represented by that of the linear guide receiving the greatest moment load.

The operation life of the linear guide is to be determined by the total driving distance reachable without flaking (peeling on rail surface) in 90% of a group of products operated under the same conditions.

Operation life can be calculated with the method shown below.

6.1.1 How to calculate operation life

For the operation life of the linear guide, use the dynamic allowable moment stated in [1.2 Mechanical specifications], and calculate with the formula below.

$$L = \left(\frac{C_M}{M} \right)^3 \times 5,000\text{km}$$

L	: Operation life [km]
C_M	: Dynamic allowable moment [N·m]
M	: Moment acting [N·m]
5,000km	: Standard rated life of ELECYLINDER

In addition, calculate with the formula below if the life may be shortened due to vibration or mounting status.

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{ws}}{f_w} \cdot \frac{1}{f_\alpha} \right)^3 \times 5,000\text{km}$$

L	: Operation life [km]	f_{ws}	: Standard load coefficient
C_M	: Dynamic allowable moment [N·m]	f_w	: Load coefficient
M	: Moment acting [N·m]	f_α	: Mounting coefficient
5,000km	: Standard rated life of ELECYLINDER		

For "Standard load coefficient fws", "Load coefficient fw" and "Mounting coefficient fa", refer to the contents below for configuration and selection.

[Standard load coefficient fws]

For ELECYLINDERS described in this manual, calculate with fws = 1.2.

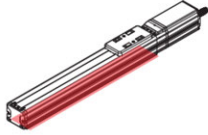
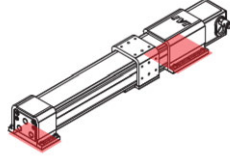
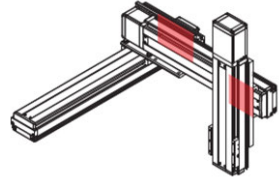
[Load coefficient fw]

This coefficient allows consideration of the effects on life due to operating conditions.

Load coefficient fw	Operating conditions	Guideline for acceleration/deceleration
1.0 to 1.5	Low vibration/impact, slow operation	1.0G or less

[Mounting coefficient fa]

This coefficient allows consideration of the effects on life due to ELECYLINDER mounting status.

Mounting coefficient fa	1.0	1.2	1.5
Mounting status	Fixed on entire surface 	Fixed at both ends 	Fixed locally 

- The actuator used in the explanatory figures above is not the ELECYLINDER. Replace with ELECYLINDER and select the mounting coefficient.
- Even when seated over the total length of the product, select 1.2 or 1.5 for the mounting coefficient depending on the position of screw fixing and not "fixing over the entire surface".
- Various mounting methods are available for the ELECYLINDER.
"Fixing over the entire surface" is considered to be the case only when fixing with all the screw holes provided on the mounting surface used.

6.1.2 Relation between operation life and moment

The operation life depends on the moment acting on the slider.

With a light load, it may be longer than 5,000km, the standard rated life.

With no consideration of vibration and mounting conditions, the operation life is 40,000km according to the calculation with the formula on the previous page, assuming that 0.5 CM (half of dynamic allowable moment) of moment is applied.

We see that it can be 8 times longer than the standard rated life, which is 5,000km.

- * The slider life could vary largely depending on the condition of use, environment and maintenance.

6.2 Concept of life for rod type

The service life of the rod type is 5,000km as a guideline when it is operated under maximum payload and acceleration/deceleration.

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Chapter 7

Warranty

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7.1 Warranty period

Whichever of the following periods is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to a specified location
- 2,500 operational hours

7.2 Scope of the warranty

Our products are covered by warranty when all of the following conditions are met.

Faulty products covered by warranty will be replaced or repaired free of charge:

- (1) The breakdown or malfunction in question pertains to our product as delivered by IAI or our authorized dealer.
- (2) The breakdown or malfunction in question occurred during the warranty period.
- (3) The breakdown or malfunction in question occurred while the product was in use for an appropriate purpose under the operating conditions and operating environment specified in the instruction manual and catalog.
- (4) The breakdown or malfunction in question was caused by a specification defect, malfunction, or poor product quality.

Note that breakdowns due to any of the following reasons are excluded from the scope of warranty:

- Anything other than our product
- Modification or repair performed by a party other than IAI (unless approved by IAI)
- Anything that could not be easily predicted with the level of science and technology available at the time of shipment from IAI
- Natural disaster, unnatural disaster, incident or accident for which we are not liable
- Natural fading of paint or other symptoms of aging
- Wear, depletion or other expected results of use
- Operation noise, vibration or other subjective sensations not affecting function or maintenance

Note that the warranty only covers our product as delivered and that any secondary loss arising from a breakdown of our product is excluded from the scope of warranty.

7.3 Honoring the warranty

As a rule, the product must be consigned to IAI for repair under warranty.

7.4 Limited liability

- (1) We assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.
- (2) We assume no liability for any program or control method created by the customer to operate our product or for the results of any such program or control method.

7.5 Conformance with applicable standards/regulations, etc., and application conditions

- (1) If our product is combined with another product or any system, equipment, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc.
In such a case we assume no liability for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications.

Contact IAI if you must use our product for any of these applications:

- Medical equipment used to maintain, control or otherwise affect human life or physical health
 - Mechanisms and machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)
 - Machinery components essential for safety (safety devices etc.)
 - Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact IAI in advance if our product is to be used in any condition or environment that differs from that specified in the catalog or instruction manual.

7.6 Other items excluded from warranty

The price of the product delivered to you does not include expenses associated with programming, the dispatch of engineers, etc. Accordingly, a separate fee will be charged in the following cases even during the warranty period:

- Guidance for mounting/adjustment and witnessing of test operation
- Maintenance and inspection
- Technical guidance and education on operating/wiring methods, etc.
- Technical guidance and education on programming and other items related to programs

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