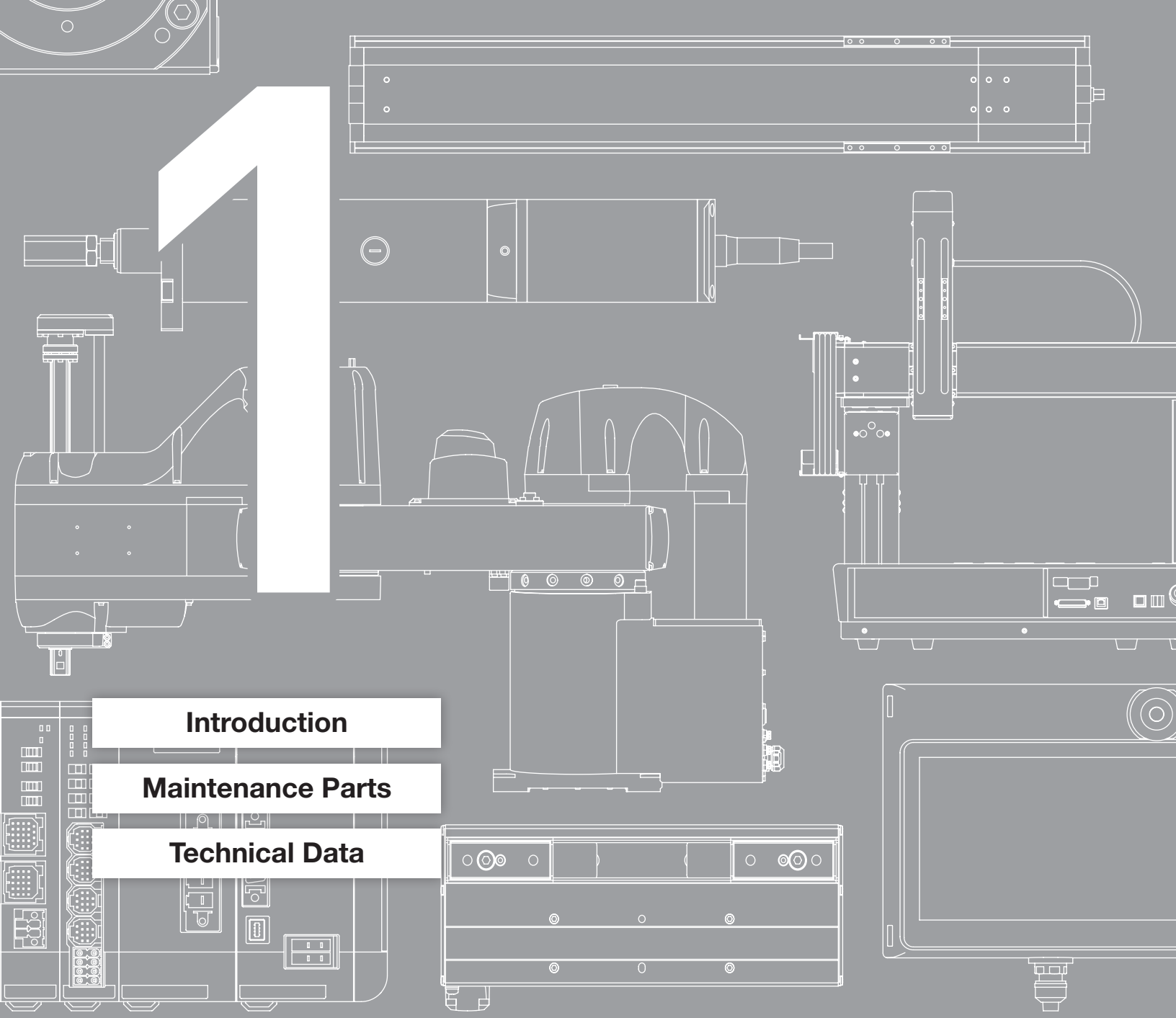


1

Introduction

Maintenance Parts

Technical Data

2024 GENERAL CATALOG

IAI

Quality and Innovation

IAI 2024 GENERAL CATALOG / LINEUP

1 Introduction Maintenance Parts Technical Data

- About IAI
- IAI technologies
- Products and features
- Application examples
- Maintenance parts
- Cautions
- Technical Data
- Models not listed in the 2024 General Catalog
- Discontinued and successor models
- Conversion table for old models

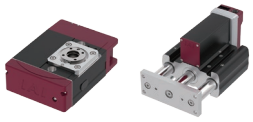
2 ELECYLINDER® (2-point positioning)

Slider

Rod
Radial Cylinder®

Table & Gripper

Rotary & Stopper



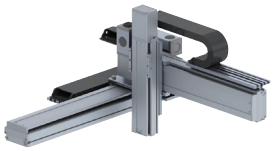
Cleanroom and
Dust & spash-proof

Control equipment

Volume 3 - In production

5 Cartesian Cartesian 6-axis Table Top SCARA

Cartesian



SCARA

Cartesian 6-axis

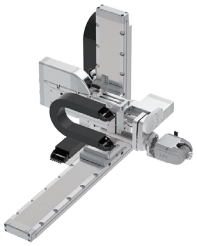


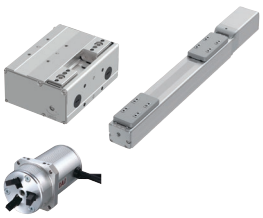
Table top

Volume 5 - In production

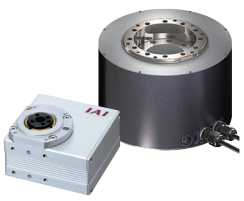
6 Pulse/Servo Press Special Applications Gripper Rotary

Pulse press
Servo press

Gripper



Rotary



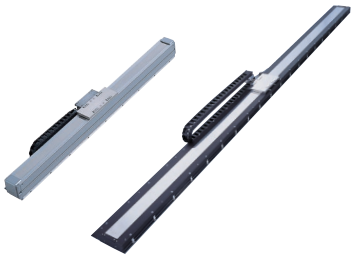
[Special applications]
Wrist unit
Rotary chuck

Volume 6 - In production

3 Slider Linear Servo

Slider

Linear servo

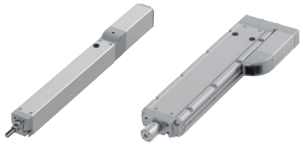


Volume 3 - In production

4 Rod Table Radial Cylinder®

Rod

Radial Cylinder®

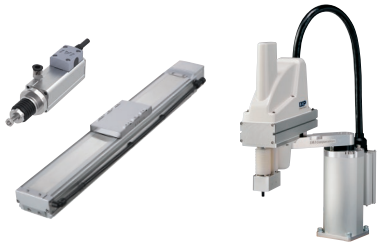


Table

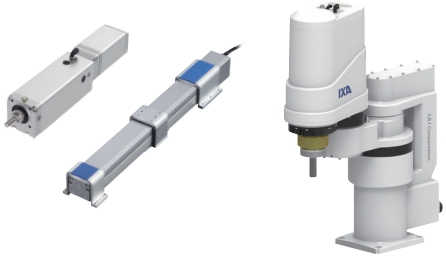
Volume 4 - In production

7 Cleanroom Dust & Splash-proof

Cleanroom specification



Dust & Splash-proof specification



Volume 7 - In production

8 Controller

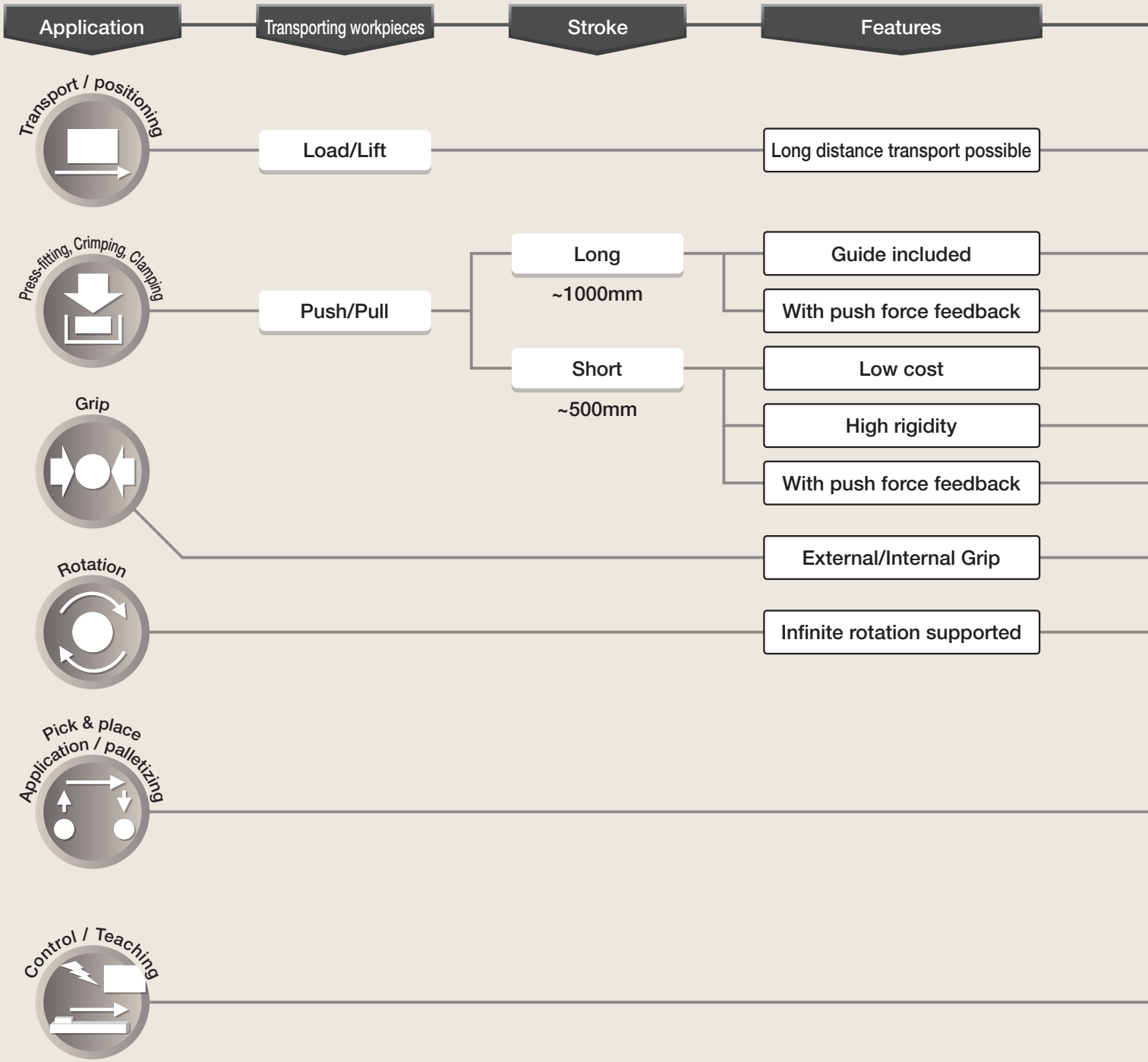
Single-axis controller

Multi-axis controller

24VDC power source

PC-compatible Teaching pendant

IAI Model Selection Flow -Selecting by Application-

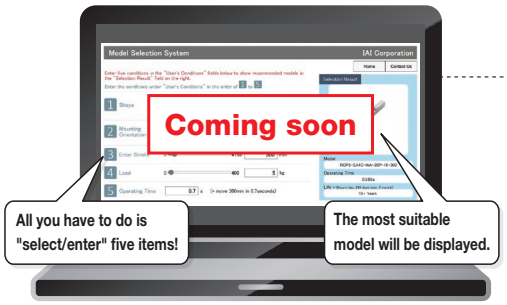


ELECYLINDER® has a built-in controller. A separate controller is not required.

If you have any questions, feel free to contact your nearest sales office or distributor.

We turn our customers' "nice to have" ideas into reality.

Specifications (stroke, payload, etc.)		Actuator type	
25~4155mm	~Horizontal 400 / Vertical 80kg	Slider	
25~1000mm	Push force: ~6000N	Radial Cylinder®	
50~520mm	Push force: ~50000N	Servo Press	
10~500mm	Push force: ~20000N	Rod	
10~390mm	~Horizontal 30 / Vertical 24kg	Table	
110~320mm	Push force: ~2000N	Pulse Press	
2~130mm (one side)	Grip force: ~1641N (both sides)	Gripper	
330/360°	Instantaneous maximum torque: ~75N·m	Rotary	
		Cartesian	
		Tabletop	
		Cartesian 6-axis	
		SCARA	
		Controller Products 24VDC Power Supply Teaching Tool	



Please make use of the Model configurator!

You can select the most suitable model in 10 seconds from about 1 million items in the entire series.

Model configurator
intelligentactuator.com/new-configurator

IAI

GENERAL CATALOG

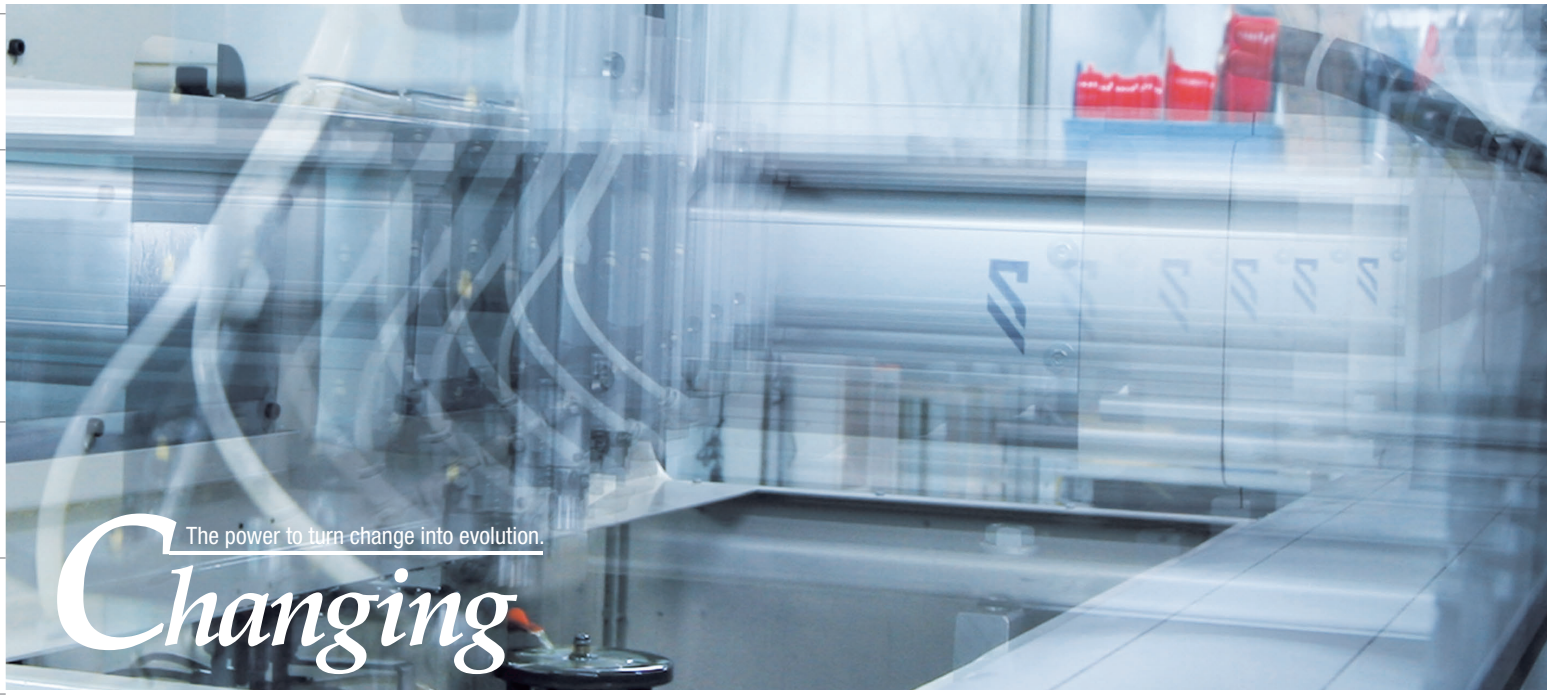
2024

1

Principle

IAI Quality and Innovation

For endless evolution.
We continue to change.



We, IAI, have consistently delivered innovative products to the market by accurately grasping the needs of small industrial robots that change every day. Underlying this is the power to transform change into evolution.
By anticipating future changes and continuously changing ourselves, we have achieved a number of market-leading evolutions.
Changing — A firm belief in continuing to change. That is our constant driving force.

Expanding into new growth areas as a leading company

"Quality and Innovation" is the company's corporate philosophy of "delivering products and services that delight our customers". Customers' needs for automation devices and facilities vary greatly depending on industry, manufacturing business, and manufacturing process. We continue to develop many new models every year to accommodate a variety of equipment and facilities. In addition to actuators, we are actively developing controllers and acquiring CE and UL standards. In April 2017, we launched a new product called "ELECYLINDER" with the concept of "easy to use yet high performance". By adding ELECYLINDER to our existing product lineup, we are confident that we will be able to eliminate the impression that "robot products are complicated and difficult to use" and meet the needs of more customers.
Our job is to deliver products and services that satisfy our customers beyond their expectations.
We will continue to strive to be the world's leading manufacturer of small industrial robots.
Thank you for your continuing support.

President and CEO Toru Ishida

Company Introduction

We create products and services that meet customers' expectations with "heart"

Creating products with all our heart and soul means imagining and responding to customers' wishes, such as ease of use and high quality. Furthermore, the appeal of such products can be transformed into customer satisfaction and appreciation only when the customer is provided with heartfelt service. Our company will never forget this spirit of hospitality and contribute to the development of our business by creating products and providing services that meet customers' expectations with our "heart".

Head Office and Plant

In 2024, a new plant was opened to double our production capacity.

Obane Plant (Former Head Office)

In 2007, the development and management divisions were relocated to the existing production plant. The windows are designed in the shape of the word "heart" in Japanese to convey our care for our customers.

Fujinomiya Plant

The Fujinomiya Plant was established in 2014 to increase production capacity.

Eco Farm Department (Agricultural Research Division)

In 2007, we established the Eco Farm Division to explore new forms of agriculture centered on organic farming.

Social Contributions

mini Robo

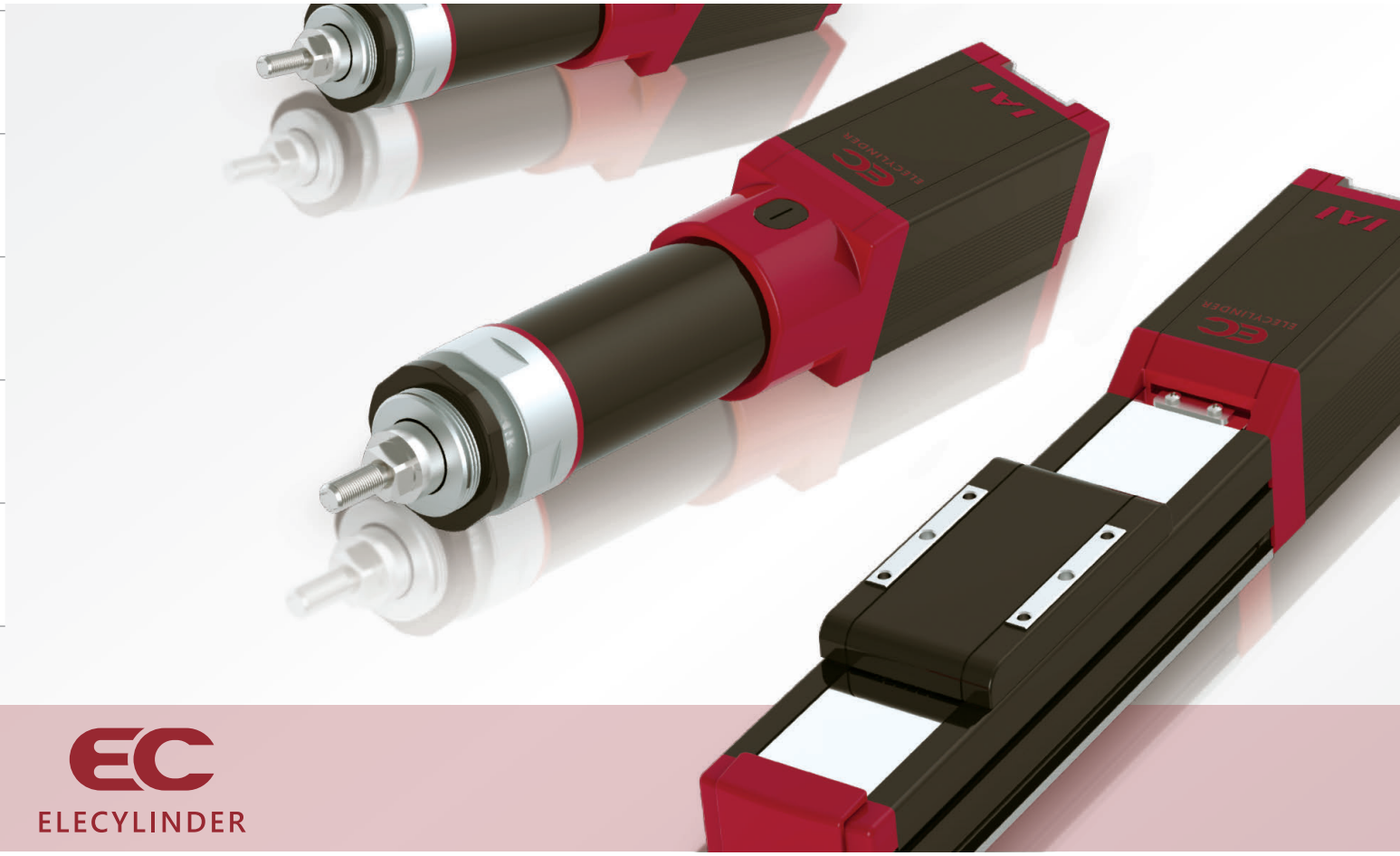
mini Robo is a soccer robot developed by IAI.
It was born out of the desire to let children know the joy of manufacturing.
Tournaments are held regularly.

IAI Stadium

IAI sponsors Shimizu S-Pulse, a professional soccer team in Shizuoka. In 2013, Shimizu S-Pulse acquired naming rights for Nihondaira Stadium, their home stadium.

Development

Always looking ahead to the next step to bring unlimited possibilities.

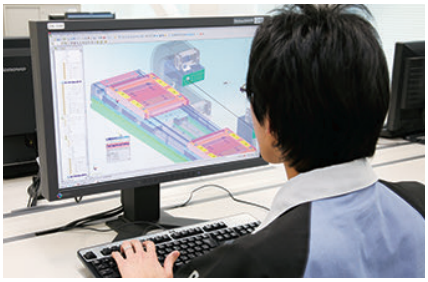


EC ELECYLINDER

Aggressive investment in research and development to meet the needs of the times

As a leading company in the field of small industrial robots, IAI is constantly anticipating market needs and actively investing in research and development to bring a variety of products to market every year.
We also incorporate customer feedback into product design to provide products that are easier to use.

Design

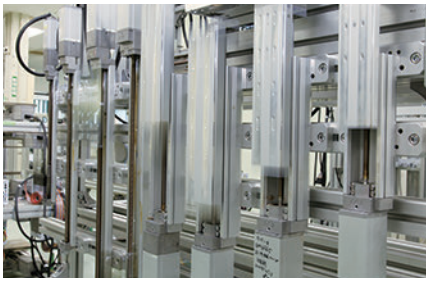


We're capable of developing new products with a large assortment in a short period of time by utilizing three-dimensional CAD. We respond to our customers' increased competitiveness with our advanced design capabilities.

Experiment

Full range of experimental facilities for use and environmental conditions in FA sites. We achieve highly reliable quality through uncompromising experiments.

Life test



As the cornerstone of advanced automation, all products undergo thorough life tests to satisfy customers' trust. 24-hour uninterrupted testing ensures high reliability.

Products

A wide variety of products provides the most appropriate systems for the field.

ELECYLINDER®

Innovative actuators that are simple, high-performance and cost-effective

The ELECYLINDER® can be operated by only ON/OFF signals, just like a solenoid valve, making it easy for people who are new to electric actuators. In addition, A (acceleration), V (velocity), and D (deceleration) can be individually input and adjusted numerically, enabling fast and smooth starts and stops. Therefore, it contributes to the reduction of cycle time and momentary stop.

ROBO Cylinder® / mini ROBO Cylinder®

Next-generation electric cylinders with high performance, convenience, and economy

ROBO Cylinder® is a next-generation high-performance electric cylinder that replaces air cylinders.
Multi-point positioning and speed/acceleration changes are possible.
In addition, the mini ROBO Cylinder® is available that can save space and is easy to use.

Single-axis robot

Intelligent actuator with high precision and rigidity

Compact and highly rigid with integrated base guide structure.
Contributes to advanced automation of machinery and equipment.

Cartesian robot

Intelligent actuator that reduces man-hours from design to deployment

This unit combines single-axis robots with 2-axis, 3-axis, 4-axis, and 6-axis and includes brackets and wiring. It reduces the design and assembly work and is ready for immediate installation and use.

PowerCON SCARA® IXP/SCARA Robot IXA

Horizontal articulated robot that contributes to high productivity

Industry-leading high performance, a wide range of arm lengths from 120mm to 1200mm, and easy operation using SEL programming language. In 2017, the IXA series, the fastest in the industry, was introduced. Its high productivity makes it useful for transfer and assembly.

Cleanroom type / Dust and splash-proof type

Actuators for a variety of applications

Cleanroom type and Dust and splash-proof type are also available for use in environments where water or foreign matter be present.

Controller

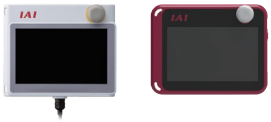
Various controllers that bring out the performance of the actuator

A controller is the brain of an actuator to fully draw out its high performance with simple operation. We have developed a series of easy-to-use and compact controllers to suit various applications. Various field networks are also supported.

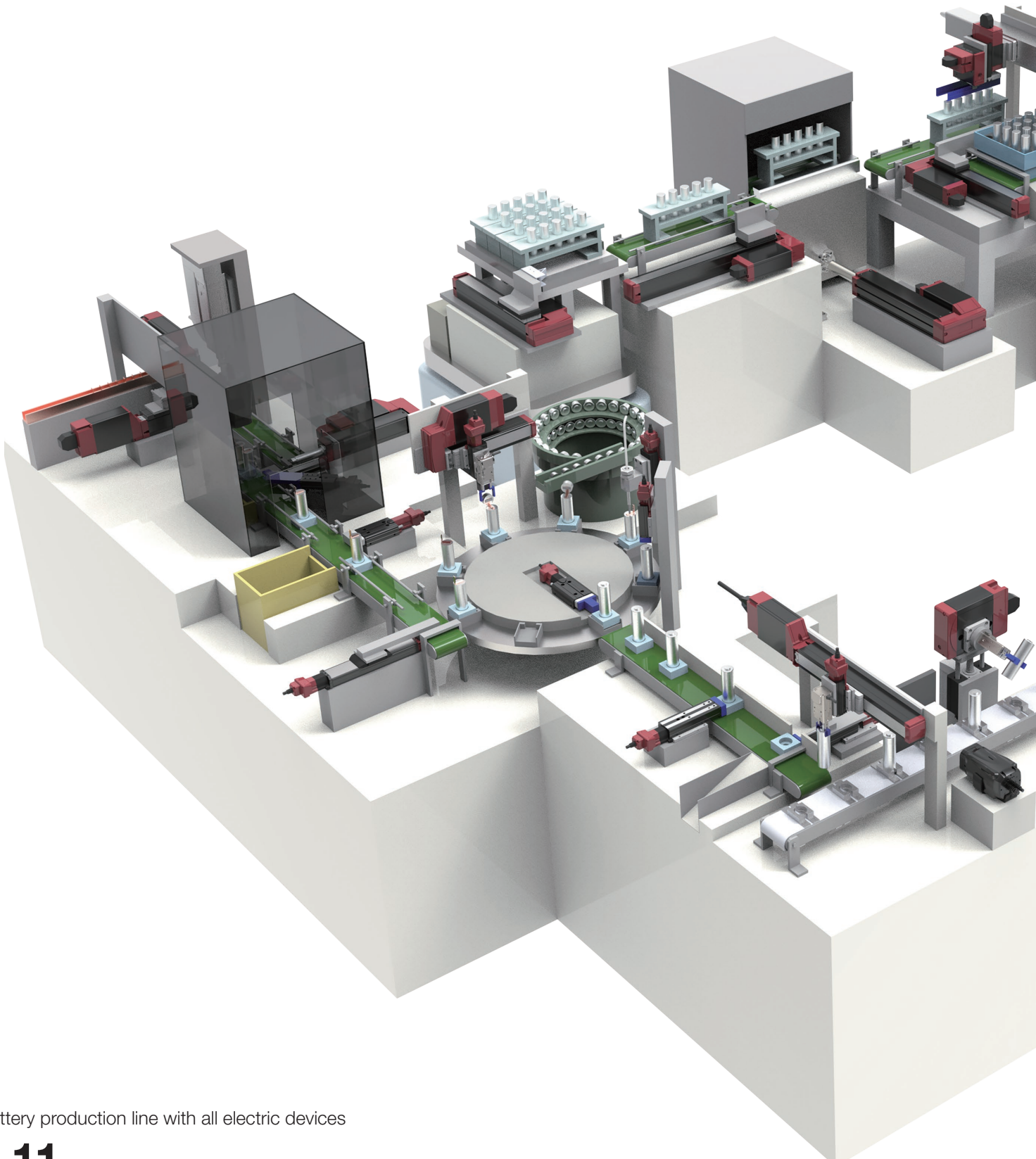
Teaching pendant

Easy controller operation

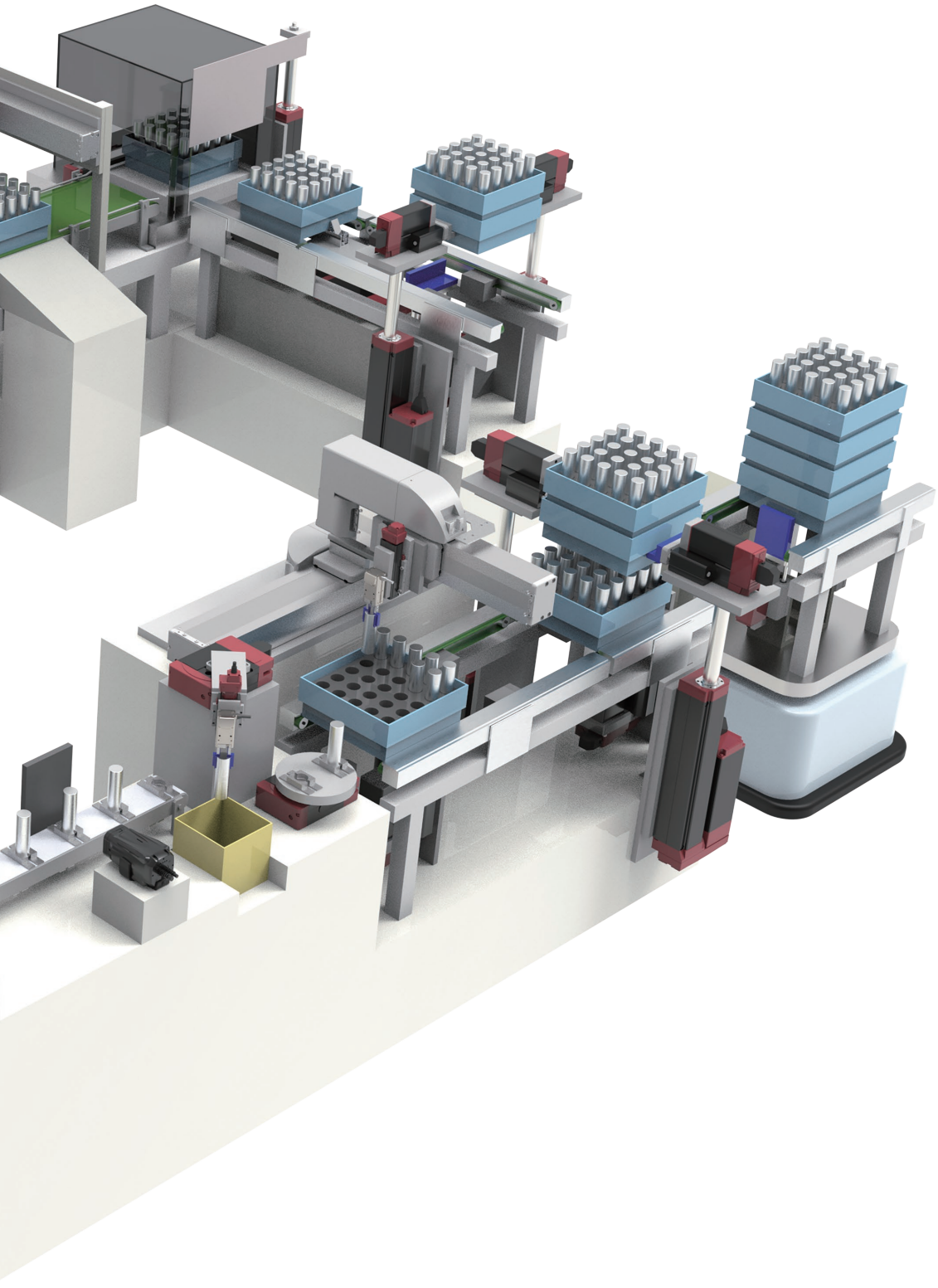
Touch panel teaching for position controllers and program controllers. The 7-inch full-color touch panel makes it easy for anyone to operate.



As a leading manufacturer of electric actuators/compact industrial robots,
IAI always anticipates market needs and brings a variety of products to market each year.
A wide variety of variations are available to provide the best system for your site.



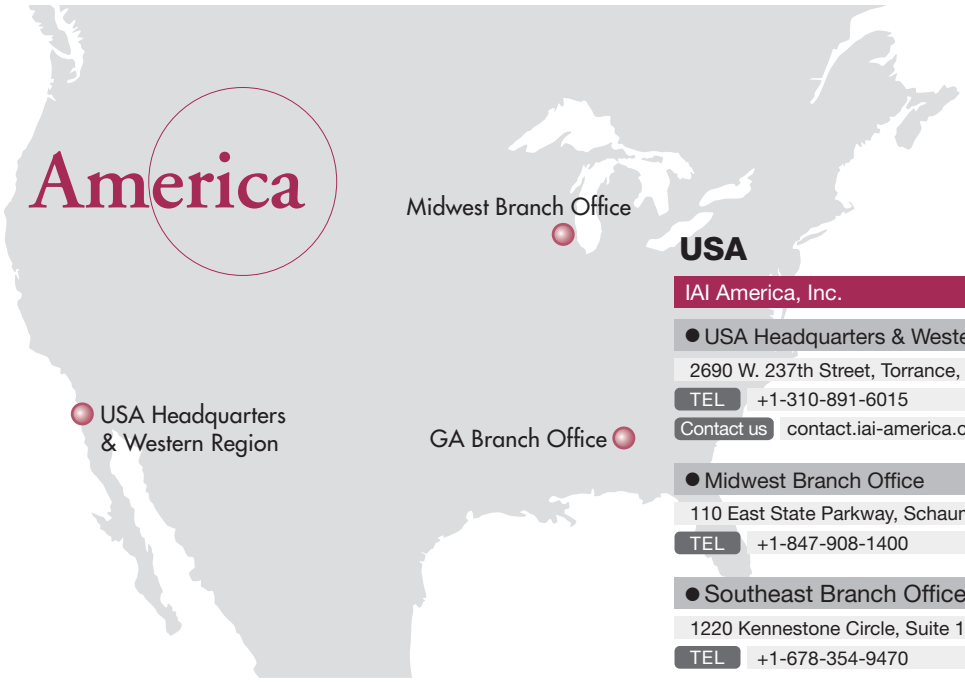
Battery production line with all electric devices



Support system

■ Overseas Sales Companies

Support overseas with the same attention to detail as in Japan ~Technical Support at USA, Europe and Asia OCEANIA~



USA

IAI America, Inc.

● USA Headquarters & Western Region
2690 W. 237th Street, Torrance, CA 90505, USA
TEL +1-310-891-6015 URL www.intelligentactuator.com
Contact us contact.iai-america.com

● Midwest Branch Office
110 East State Parkway, Schaumburg, IL 60173, USA
TEL +1-847-908-1400 Contact us contact.iai-america.com

● Southeast Branch Office
1220 Kennestone Circle, Suite 108, Marietta, GA 30066, USA
TEL +1-678-354-9470 Contact us contact.iai-america.com

Brazil

CBD Mecânica Industrial Ltda.

Rua José Tanoeiro, 261-Vila Monte Sion-08613-123-Suzano-São Paulo-Brazil
TEL +55-11-4745-3939 FAX +55-11-4745-3949
E-mail e.nakashima@cbd.com.br URL www.cbd.com.br

Germany/Europe

IAI Industrieroboter GmbH

Ober der Roth 4, D-65824 Schwalbach am Taunus, Germany
TEL +49 (0) 6196-88950 FAX +49 (0) 6196-889524
E-mail info@iai-automation.com URL www.iai-automation.com

Australia (New Zealand)

Treotham Autometion PTY LTD

109 Wicks Road, Macquarie Park NSW 2113, Australia
TEL +61-2-9907-1788 FAX +61-2-9907-1778
URL https://treotham.com.au

Japanese OK Japanese Language Support | TEC Technical Support | Simple Repair | Global Support

JAPAN

IAI Group Headquarters

● Head Office/Factory

1210 Iharacho, Shimizu-ku, Shizuoka City, Shizuoka Prefecture 424-0114

● Fujinomiya Factory

1700 Utsubusa, Fujinomiya City, Shizuoka Prefecture 419-0317

China

IAI (Shanghai) Co., Ltd.

● CHINA Headquarters

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China

TEL +86-21-6448-4753 FAX +86-21-6448-3992 E-mail shanghai@iai-robot.com

URL www.iai-robot.com

● Shenzhen Branch Office

Rm 502,212 Block, Tairan 4nd Rd, Tairan Industry Park, Chegongmiao, Shenzhen 518042, China

TEL +86-755-2393-2307 FAX +86-755-2393-2432 E-mail shenzhen@iai-robot.com

● Tianjin Branch Office

Rm 2-1105, Hesheng Fortune Square, South side of Beian Bridge, Nanshi Street, Heping Qu, TianJin 300021, China

TEL +86-22-5817-1826 FAX +86-22-5817-1828 E-mail tianjin@iai-robot.com

Korea

IA KOREA Corp.

A-501,BundangSuji U-Tower, 767, Sinsu-ro, Suji-gu, Yongin-si, Gyeonggi-do 16827 KOREA

TEL +82-31-525-3500 FAX +82-31-525-3515

E-mail info@iakorea.co.kr URL www.iakorea.co.kr

Taiwan

Alteks Co., Ltd.

5F, 580, Sec. 1, Min-Sheng N. Rd., Kuei-Shan, Taoyuan, Taiwan R.O.C.

TEL +886-3-2121020 FAX +886-3-2121250

URL www.alteks.com.tw

FEDERAL WORLD-WIDE Co., Ltd.

Rm. 1, 14F., No.150, Jian 1st Rd., Zhonghe District, New Taipei City 235, Taiwan R.O.C.

TEL +886-2-8226-5570 FAX +886-2-8226-5430

URL www.kgn.com.tw

HSIN HSIE SHIANG TRADING Co., Ltd.

4F-1, No.58, Hsing Shan Rd., Neihu Dist., Taipei City114, Taiwan R.O.C.

TEL +886-2-8792-9888 FAX +886-2-8792-9968

URL www.hhstc.com.tw

Thailand

IAI Robot (Thailand) Co., Ltd.

825 PhairojKijja Tower 7th Floor, Debaratana RD., Bangna Nuea, Bangna, Bangkok 10260, Thailand

TEL +66-2-361-4457~59 FAX +66-2-361-4456

E-mail info@iai-robot.co.th URL www.iai-robot.co.th

Singapore

SUS (Singapore) Pte. Ltd.

19 Tannery Road 347730, Singapore

TEL +65-6842-4348 FAX +65-6842-3646

Vietnam

Standard Units Supply (Vietnam) Co., Ltd.

Workshop X6, Hai Thanh Leasing workshop area, Hai Thanh Ward, Duong Kinh District, Hai Phong city, Vietnam

TEL +84-2253-632-403 FAX +84-2253-632-405

Philippines

Standard Units Supply Philippines Corporation

Building R1-D, Lot 13, Phase 1B, First Philippine Industrial Park, Special Economic Zone, Tanauan City, Batangas 4232, Philippines

TEL +63-43-430-0290~0299 FAX +63-43-430-1071

Malaysia

XTS TECHNOLOGIES SDN BHD

No.21, Jalan MJ14, Taman Industri Meranti Jaya, 47120 Puchong, Selangor,Malaysia

TEL +6-03-8066-2496 FAX +6-03-8066-2496

Indonesia

PT.ETERNA KARYA SEJAHTERA

Duta Merlin Block C No.31-32 Jl.Gajah Mada No.3-5 Jakarta 10130, Indonesia

TEL +62-21-6341749 FAX +62-21-6341751

India

Standard Units Supply (India) Pvt. Ltd.

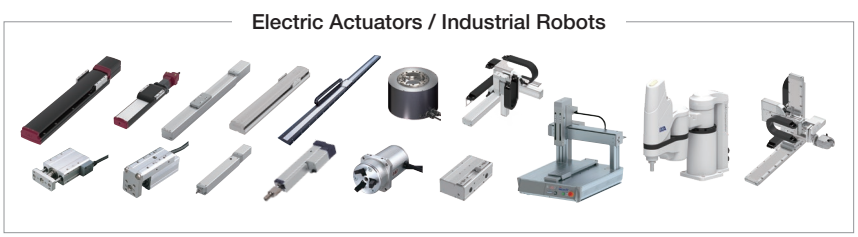
43/1 Padasalai Street, Ayanambakkam, Chennai 600095, Tamil Nadu, India

TEL-FAX +91-44-49524482

What IAI can do for you

Product Lineup

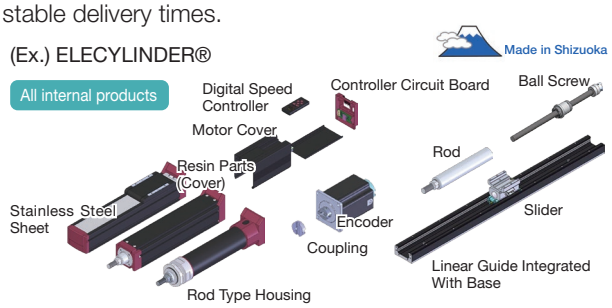
We offer the No.1 product lineup in the electric actuator industry and a wide variety of variations.
Usable for a variety of applications and conditions of use.



Short Delivery

Major components are manufactured in-house, achieving stable delivery times.

(Ex.) ELECYLINDER®



Long Service Life

No sealing material is used in sliding parts, resulting in a long service life.

(Ex.) ELECYLINDER®

Operational conditions

Operating Day Per Year	Operating Hours	Movement Stroke	Payload	Operation Cycle
240 days	16 hours per day	300mm	Horizontal: 12kg	8 seconds per reciprocating motion

Life

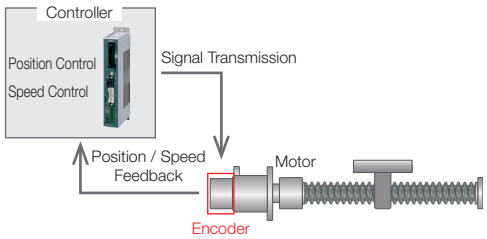
Product Specifications	Life	Operation Life	Lifespan Factors	Remarks
ELECYLINDER® EC-R7	15 Years	~16,000km	End of bearing life	Max. speed: 155mm/s Acceleration/deceleration: 0.5G

Quality Improvement / Cycle Time Reduction

Maximizing the advantages of electric power contributes to improved productivity.

● Feedback Control

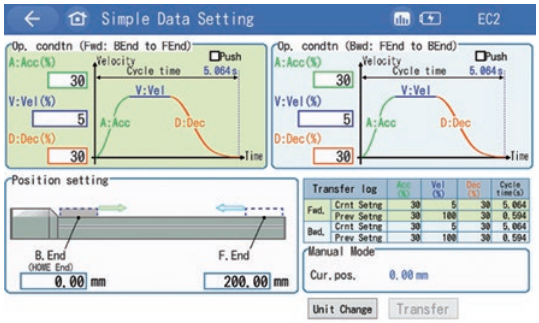
All motors, including stepper motors, are equipped with encoders. The unit continues to operate according to the command value by feedback control.



>>Feedback
Position: 1,000 times per second
Speed: ~20,000 times per second

● AVD Control

In addition to speed, acceleration and deceleration can be set respectively. Able to increase speed while reducing impact at the start and stop of movement.



Operating conditions abbreviation: AVD
Acceleration
Velocity
Deceleration

The IAI Website

Please take advantage of the useful tools on our website

Model Configurator

The optimal model can be selected from approximately 1 million items in one attempt.

Once it's available, we will put the information here.
intelligentactuator.com/new-configurator

Catalog PDFs

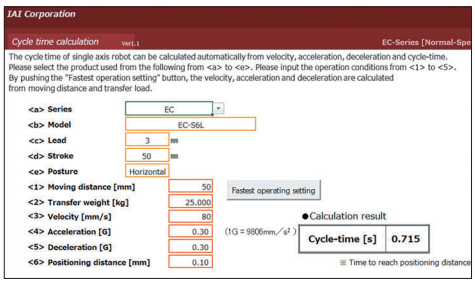
Please refer to the catalogs for dimensional drawings and specification details.

We recommend the Digital Catalog, which has an extensive search function.

Please contact your sales representative or nearest sales office.
We also accept requests for information through our website.

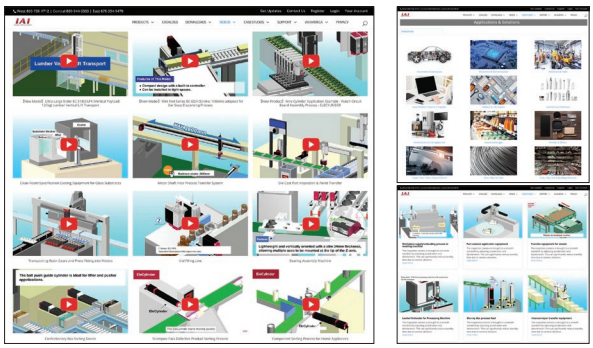
Cycle Time Calculation Software

The cycle time can be checked in advance by the desired actuator and operating conditions of the application.



Video Lineup

Over 300 videos are available on the IAI YouTube channel. Please refer to the videos for applications and solutions.



Services

We provide support from application sizing, to actuator maintenance, as well as training and seminars

Special specifications supported (customization service for standard products)

We will make proposals and modify the standard product according to your request.

Training and maintenance seminars, both on-site and in our offices are available

We actively conduct training for hands-on experiences with our softwares, as well as maintenance and safety seminars.

Troubleshooting and repair services

A dedicated maintenance and repair contact will respond in a timely manner to any issues that may arise.

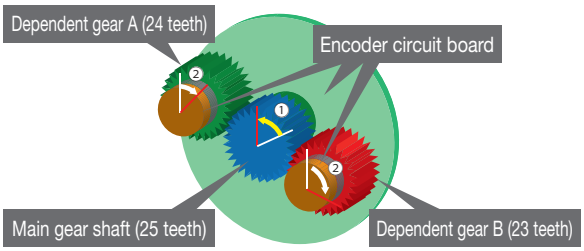
9 Innovation in Production with IAI Technology

Technology

Delivering Reliable Technology to You

1 Battery-less Absolute Encoder

The **current position can be obtained** from the positional relationship of the three gears installed in the encoder.

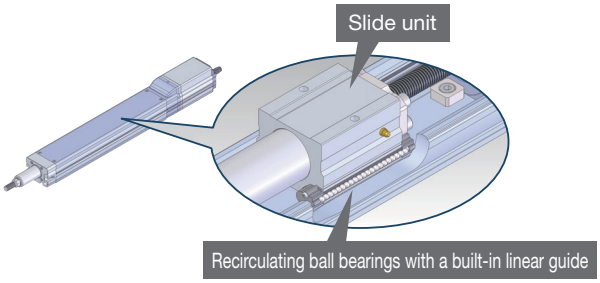


Because it has the absolute specification
→ **Home return is not required**

Because a battery is not used
→ **No battery replacement or battery trouble**

2 Radial Cylinder®

The radial cylinder has recirculating **ball bearings with a built-in linear guide** inside the body of the rod type actuator.

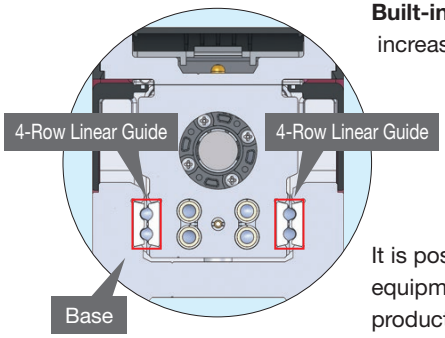


Because of built-in linear guides
→ **No external guide is needed**

Because external guides are not needed
→ **It can be used in confined spaces**

3 Built-in 4-row Guide (ELECYLINDER®)

Built-in 4-row linear guide increases rigidity.

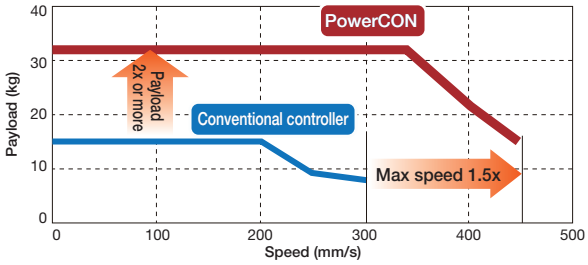


It is possible to configure equipment with smaller products than before.

Because of its high rigidity
→ **Large dynamic allowable moment**
→ **Large overhang load length**
→ **Large payload**

4 PowerCON®

Correlation Diagram of Speed and Payload



The maximum power of the stepper motor is greatly increased by using a **PowerCON equipped with a high-power driver.**

Improved torque at high speed of motor
→ **enables performance equivalent to that of advanced models at a low price**

5 Wireless Connection

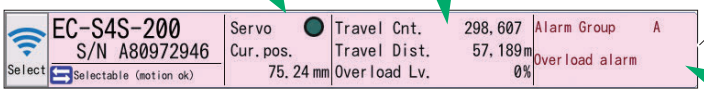
You can wirelessly **configure the operation settings** and **check the status**.

*This is for ELECYLINDER since none of the other controllers or actuators have wireless capabilities.

Status monitor screen

Axis name display
Can be configured (changed) arbitrarily according to customer applications.

Status monitor
Axis status check can be used to see how far the actuator has traveled, for maintenance purposes.

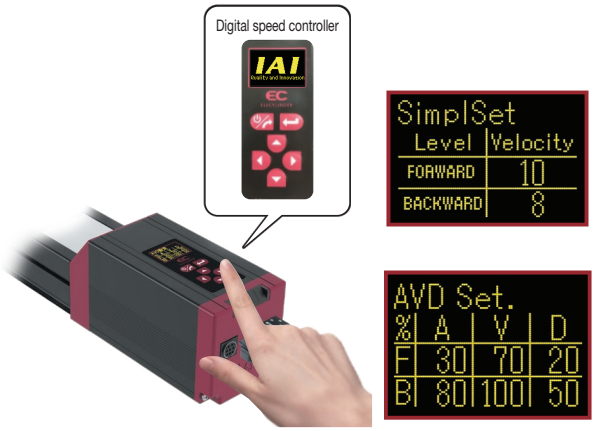


Error status monitor
Alarms and warnings are displayed when generated. This allows troubleshooting to be performed.

Wireless touch panel → **improves workability and safety**

6 Digital Speed Controller (ELECYLINDER®)

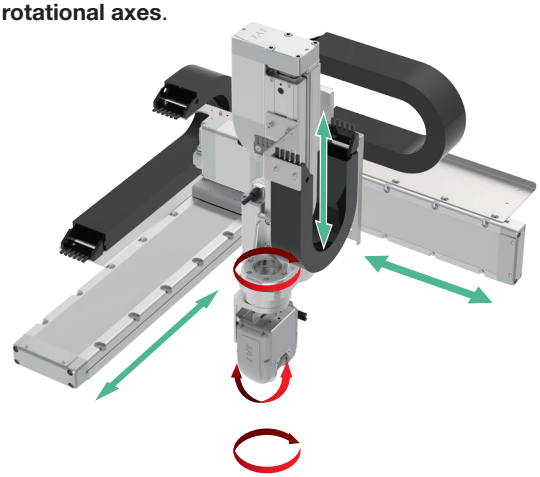
The ELECYLINDER with Digital Speed Controller can be **easily operated with one finger**.



All you have to do is select a number and input it, so
→ **it works without any program**

7 Cartesian 6-axis Robot

It is a 6-DOF robot that combines **3 Cartesian axes** and **3 rotational axes**.



→ **High degree of freedom at low cost**
→ **Compatible with simulation software**

8 Dust-proof and Splash-proof Actuator

Protective structure that prevents water from penetrating even when submerged

*Only on IP67 rated actuators

Can be used for food machines, **washing machines, and** other equipment
→ **that is heavily splashed with water**

9 R-unit

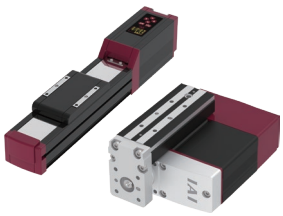
Customizable Gateway Controller

Mixed control of actuators **equipped with 24V** and **200V motors is possible**.

→ **Up to 16 axes of actuators can be connected**
→ **Supports 9 types of field networks**

Overturns conventional encoder wisdom

Battery-less Absolute Encoder



EC

RCP6 (S)

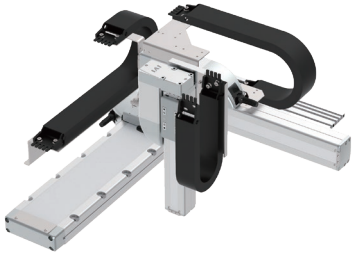
RCS4

ISB/ISDB

Can reduce work time, prevent trouble, and reduce costs!

There is no battery, so there is no need for maintenance.
No home return operation is required at startup
after an emergency stop or after a malfunction stop,
helping to reduce work time and system costs.

① The shaft angle information is read from the encoder of the main shaft gear.
② The number of rotations from the home position is calculated from the combination of encoder angle information of dependent gear A and dependent gear B.
③ The current position is calculated from the combined information of ① and ②.



IK

WU

IXA

IXP

What is a battery-less absolute encoder?

This mechanism obtains the current position from the positional relationship of the three gears installed in the encoder. With a mechanical position detection mechanism, there is no need for battery backup of position information.

Feature

Home return is not required!

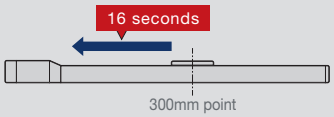
Since home return is not required, there is no need to remove the workpiece and perform home return.

MERIT 1 This reduces the recovery time due to equipment shutdown.

MERIT 2 This reduces the production costs.

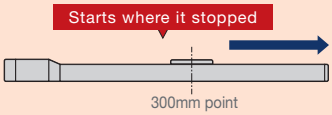
Incremental encoder

It takes 16 seconds from the 300mm point until home return is completed.



Absolute encoder

Position information is retained by the battery, so there is no need to perform a home return operation each time.



Feature

No battery to replace!

MERIT 1 This reduces battery replacement man-hours and purchase costs.

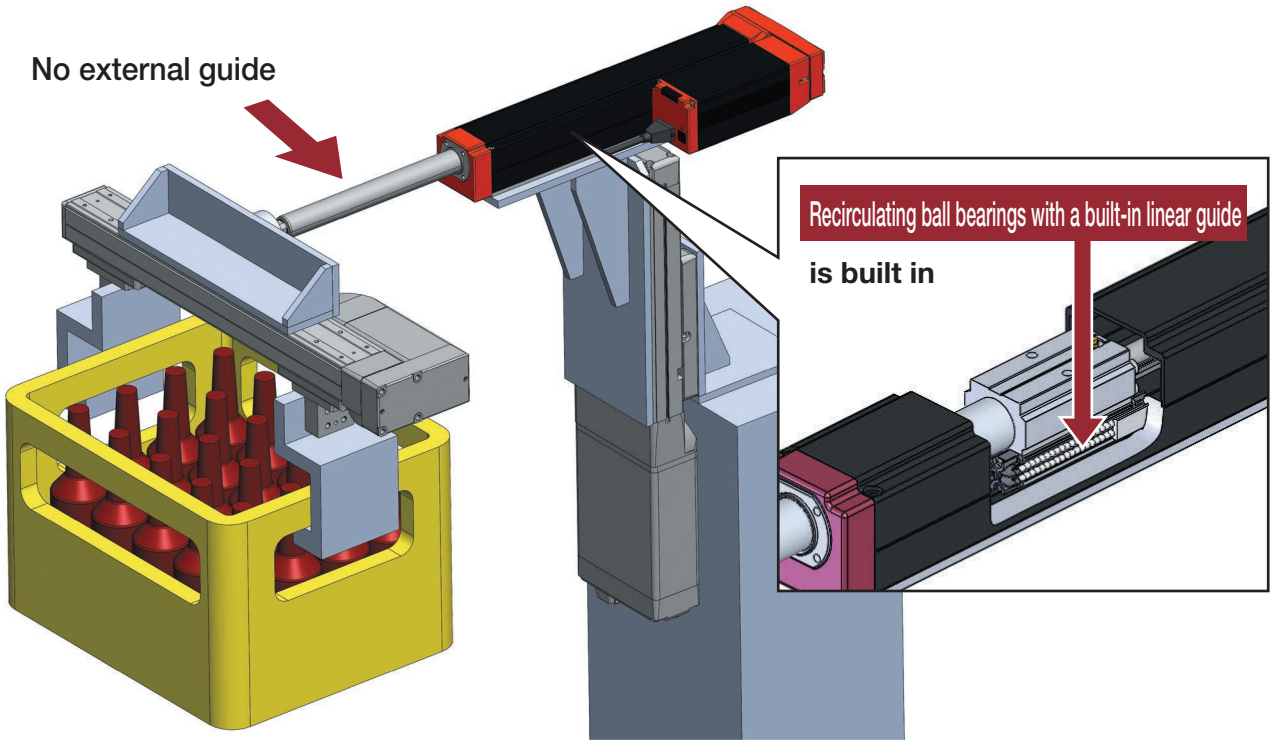
MERIT 2 Battery problems such as “voltage drop” do not occur.

Replace approximately every 3 years

Withstands radial loads without external guides

Radial Cylinder®

The Radial Cylinder has a ball circulating type with a built-in linear guide built into the rod type body. External guides are not required because radial and uneven loads can be applied.



Feature

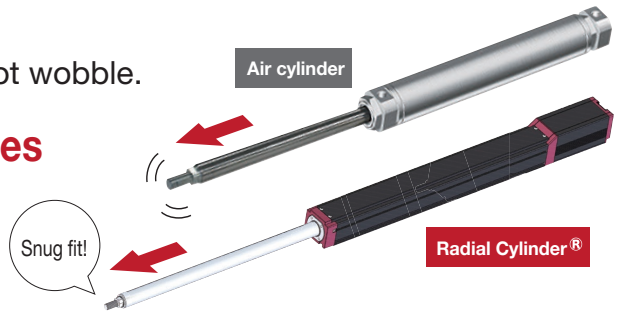
Benefits of built-in guide

No tip runout

It has a built-in linear guide, and the rod is supported by the guide, so the rod does not wobble.

Can be used even in narrow spaces

Can be used in confined spaces as external guides are not required.

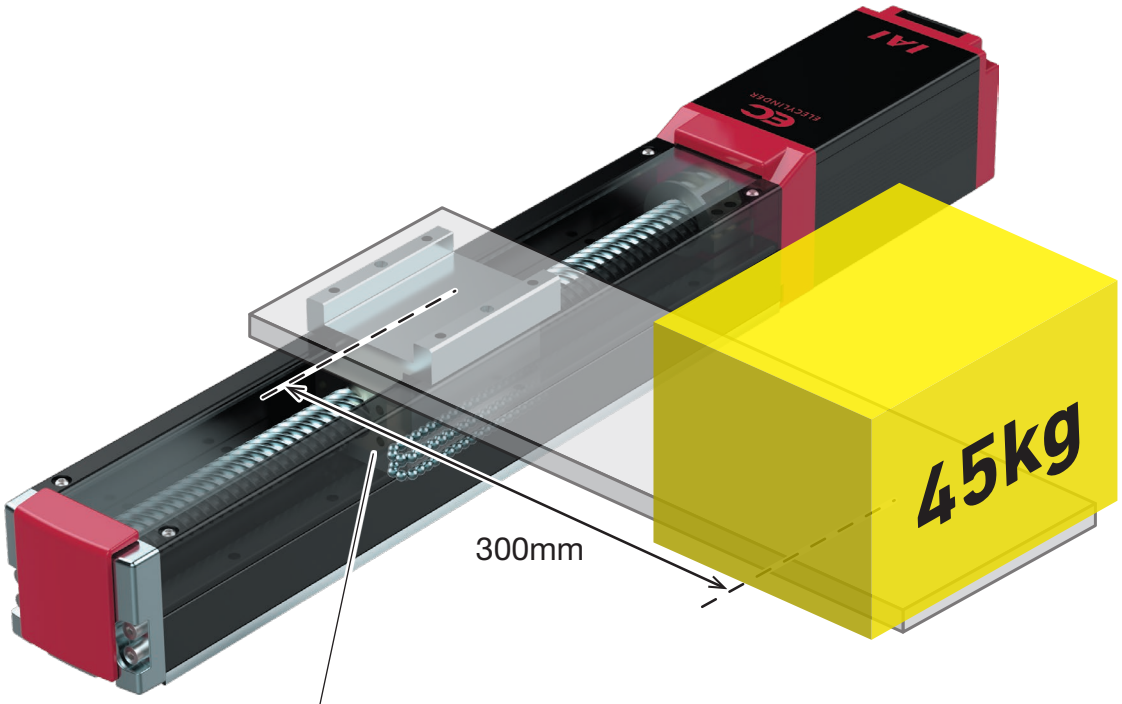


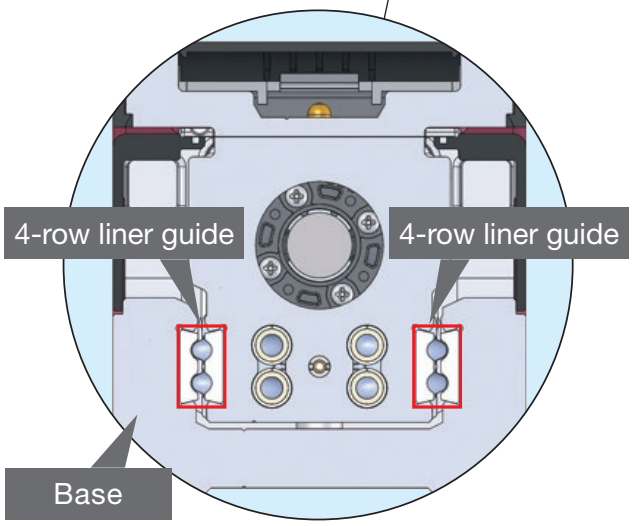
Uses a 4-row guide for increased rigidity

Built-in 4-row guide

Four rows of steel balls distribute the load.

Built-in 4-row linear guide increases rigidity.
It is possible to configure equipment with smaller products than before.





4-row guide structure (cross-section)

	S6□AH	S7□AH
Max. stroke	1500mm	1500mm
Max. payload (Horizontal)	40kg	51kg
Allowable dynamic moment (Rolling direction)	Mc 55N·m	Mc 134N·m

Feature

Compared to conventional products:

- **Increased dynamic allowable moment**
- **Increased overhang load length**

High-power driver that brings out the maximum power of the stepper motor

PowerCON®

Increased payload and maximum speed with a shorter cycle time!

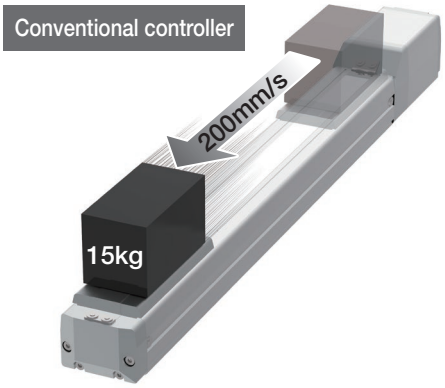
Products equipped with our stepper motors*1 use the PowerCON®.
The payload is more than twice as large as that of conventional models*2, and the power performance is equivalent to that of advanced models at a lower price.
PowerCON® can also be enabled or disabled in the parameters.*3
When PowerCON® is disabled, the power supply capacity can be reduced by up to 40%, although the specs are reduced as well.

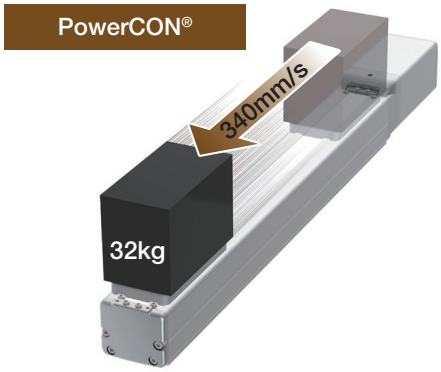
*1 RCP2, RCP3 and gripper are not supported.
*2 The rate of increase differs depending on the model.
*3 The name of the PowerCON® function differs between the ROBO Cylinder and the ELECYLINDER. (Please refer to the table below)

	Features	Notation in ELECYLINDER	Notation in ROBO Cylinder
PowerCON® enabled	Large specs	Energy-saving setting disabled	High-output setting enabled
PowerCON® disabled	Higher energy-saving	Energy-saving setting enabled	High-output setting disabled

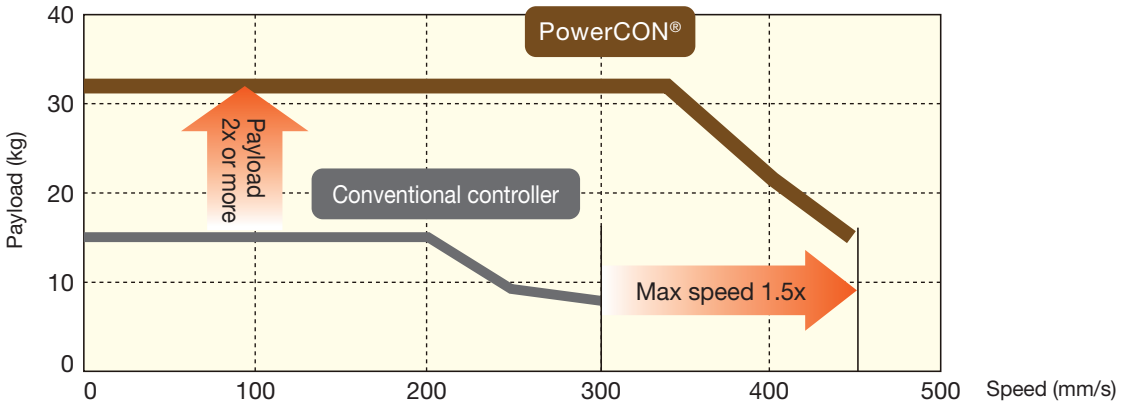
Setting when shipped

Example: □42 motorized actuator (lead 6mm, 0.3G) compared with PowerCON® and conventional controllers





Correlation Diagrams of Speed and Payload



No complicated cable connections

Wireless Connection

Only for ELECYLINDER

Improve workability and safety!

The wireless touch panel teaching pendant (TB-03) enables you to check the cause of the outage and the corrective action from a distance.

Wireless Teaching Controller

"Wireless Teaching Controller", a simple teaching program that can be used like a remote control, can also be used to set operating conditions wirelessly.
*Status monitor is not supported

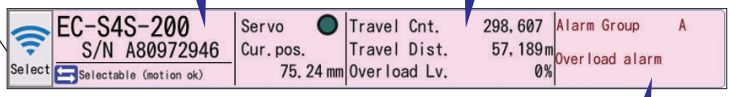
Status monitor screen

Axis name display

It can be set (changed) as desired according to the customer's use.

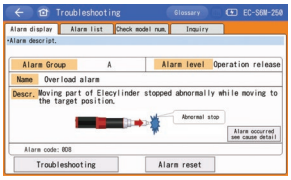
Status monitor

Axis status check can be used to see how far the actuator has traveled, for maintenance purposes.



Error status monitor

Alarms and warnings are displayed when generated. This allows troubleshooting to be performed.



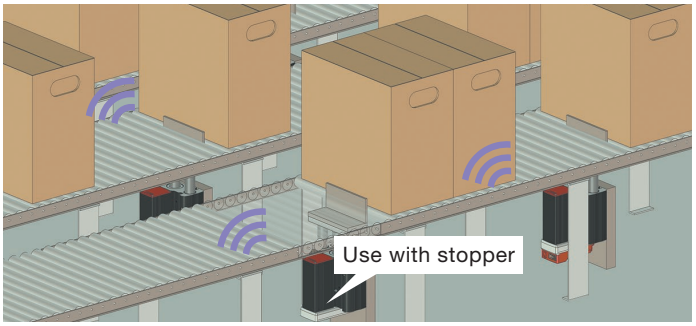
Troubleshooting screen

Feature

Set operating conditions wirelessly

You can adjust the position and set operating conditions from the outside of the device without connecting to the ELECYLINDER body with a cable. Fine adjustment and other settings can be done wirelessly, so it's effortless and efficient!

※Caution: The E-stop switch is only enabled for wired connections.
Note that it is disabled for wireless connections.



Example of use: ELECYLINDER under a conveyor distribution line

Set on site and check immediately

Digital Speed Controller

Only for ELECYLINDER

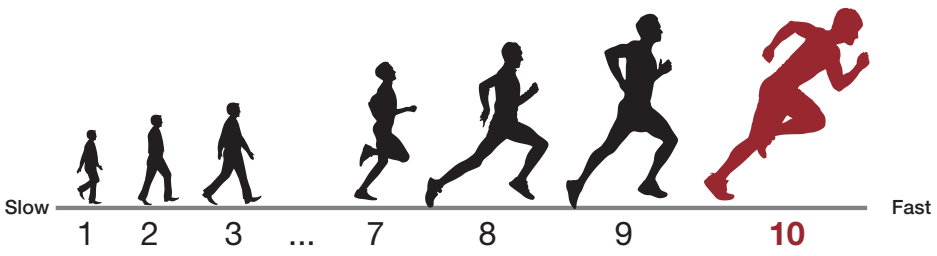
Simply select and enter numbers! It's that easy!

ELECYLINDER with digital speed controller offers intuitive operation.
Simply select and enter numbers, with no programming required.
It's that easy!

Feature

Easy speed setting!

Simply select a number from 1 to 10 to change the forward and back speed.



Feature

No need for complicated programming! Configuration is easy!

It can be used as it is!

The position (forward end, backward end), maximum speed and acceleration (0.3G) have already been set at the time of shipment.

Simply use the keys to select numbers to make individual adjustments

SimplSet

Level	Velocity
FORWARD	10
BACKWARD	8

Simple setting (10 levels)

AVD Set.

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

AVD Settings

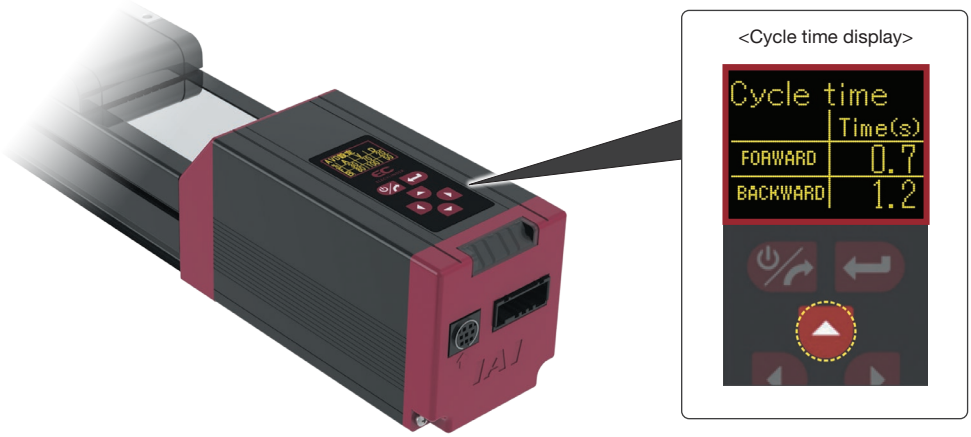
* Stop positions can also be registered using the key sheet.

Feature

Accurately displays the travel time.

Improve production line with ELECYLINDER

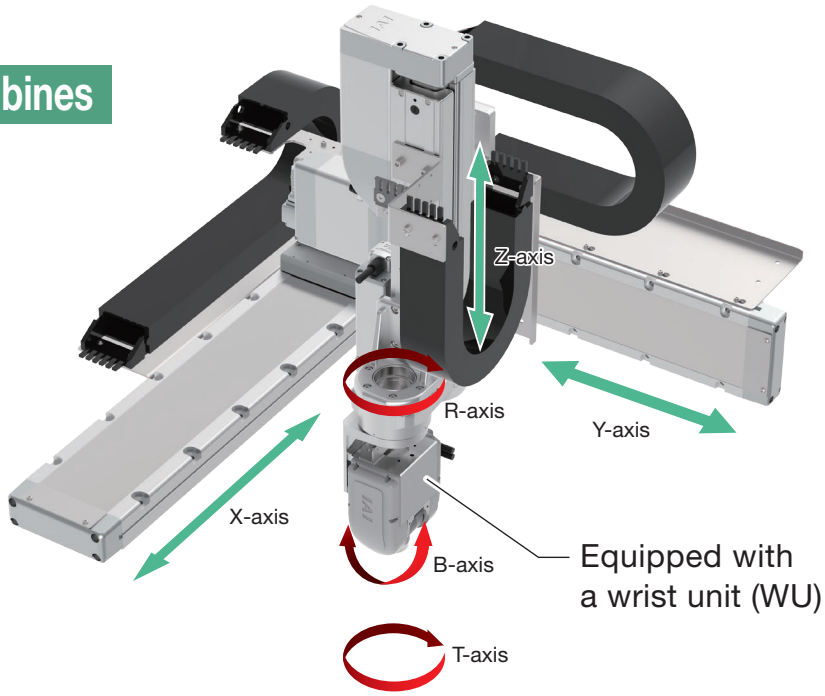
Knowing this digitally allows us to set a goal to reduce production time.



Free movement at low cost

Cartesian 6-Axis Robot

It is a 6-DOF robot that combines
3 Cartesian axes and
3 rotational axes.



Feature

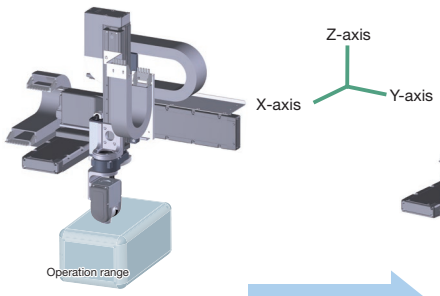
What's so great about Cartesian 6-axis robots?

① Stroke selectable per each of XYZ axes

The optimum size can be selected because it can be set for each axis. Also, the price increase by stroke length is small.

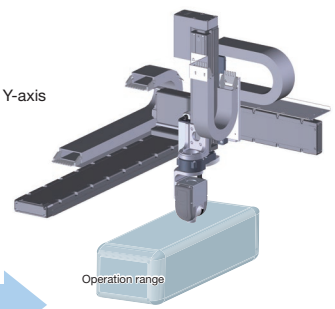
(Example) Only the X-axis of CRS-XBA has been changed from 200mm to 800mm

Stroke
XYZ: 200mm x 300mm x 190mm



(Actuators only)

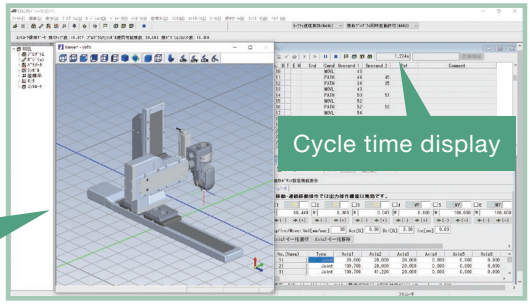
Stroke
XYZ: 800mm x 300mm x 190mm



(Actuators only)

② Compatible with simulation software

Even without the robot body, it is possible to check the operation and verify the cycle time in advance using the simulation software for PC.



The trajectory of the robot tip can be animated.

Dust-proof Splash-proof Actuator

This actuator can be used in food machines, washing machines, and other equipment that is heavily exposed to water due to its protective structure that prevents water from entering the interior even when placed in water.

Ingress protection display

IP □□□

- 1st display number
  Protection against human bodies and solid foreign bodies
- 2nd display number
  Protection from water ingress
  *Contact IAI if a liquid other than water is used.
- Supplementary letters *DDW
  Environmental conditions
  M: The rotor of the rotating machine was operated during the test.

Ingress protection description

IP67	Solid foreign matter	: Dust is completely blocked and does not enter inside.
	Water	: Water does not enter inside even when it is placed in water.
IP66M	Solid foreign matter	: Dust is completely blocked and does not enter inside.
	Water	: No harmful effects from the blast flow of water from any direction.
IP65	Solid foreign matter	: Dust is completely blocked and does not enter inside.
	Water	: Direct jets of water from any direction do not cause harmful effects.
IP54	Solid foreign matter	: Dust that may affect operation does not enter the unit.
	Water	: Water splashes from any direction do not cause harmful effects.
IP52	Solid foreign matter	: Dust that may affect operation does not enter the unit.
	Water	: Not adversely affected by drops falling from within 15° of the vertical.
IP50	Solid foreign matter	: Dust that may affect operation does not enter the unit.
	Water	: Not protected from the water.

Feature

Our company test method

IP67 Series

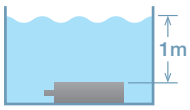
▼Our test method for solid foreign bodies▼

Operated for 12 hours in an environment with talc powder (particle size of 25μm).

Result **No powder penetrated inside.**

▼Our test method for water▼

The product was submerged 1m below the water surface and wait for 30 minutes.



Result **No water penetrated inside.**

IP66M Series

▼Our test method for solid foreign bodies▼

Operated for 8 hours in an environment with talc powder (particle size of 75μm).

Result **No powder penetrated inside.**

▼Our test method for water▼

Water jet (100/min) was discharged from all directions for 3 minutes.

Result **No water penetrated inside.**

Caution Splash-proof performance is limited to water. Note that coolant, cleaning fluid and the like are not covered. If you wish to use the product in an environment exposed to coolant, please contact us in advance.

Customizable Gateway Controller

R-unit

RCON

RSEL

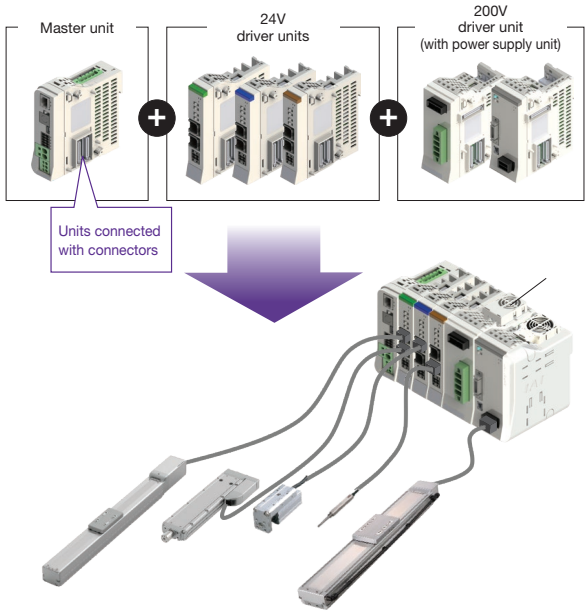
REC

Feature

Highly rated by control personnel.

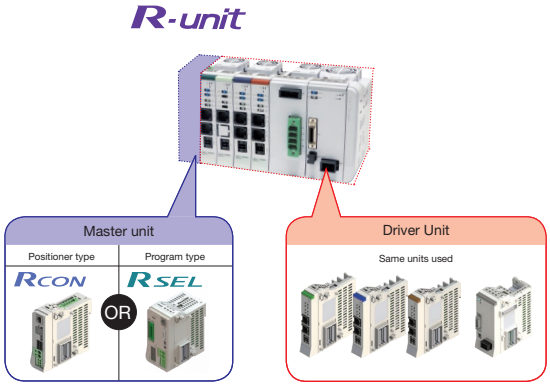
① Mixed control of different motor types

Combining drivers with the required number of axes makes the controller compact, saving space in the equipment.
It is possible to control a mixture of actuators equipped with 24V and 200V motors.



② Common driver units

The system can be changed just by switching out the master unit based on the control method. This allows the same driver units to be used.



③ Supports 9 different field networks

No.1 in the industry for compatibility.
Can be connected to various field networks.

CC-Link
CC-Link IE Field
DeviceNet
EtherNet/IP
EtherCAT
MECHATROLINK
PROFIBUS
PROFINET
SSCNET III/H

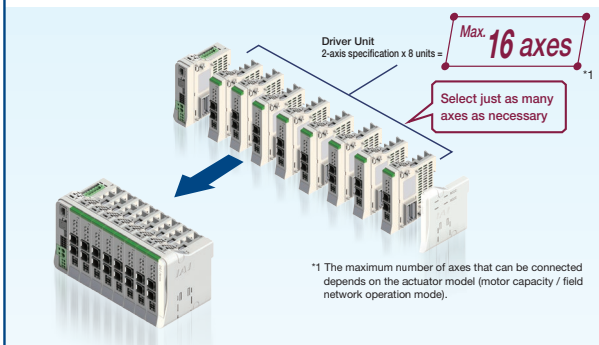
Feature

R-unit has other benefits too.

④ Multi-axis connection to one controller

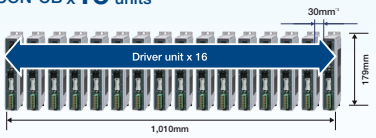
RCON

Up to 16 actuators can be connected to RCON.



Compared with units in which a single actuator is connected to a single driver unit, the control panel space can be reduced by up to 85% and the cost can be reduced by 60%.

PCON-CB x 16 units



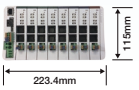
*3 Minimum distance required for natural heat dissipation of the controller

PCON-CB
CC-Link specification x 16

60% cost reduction

RCON x 16-axis connection specifications

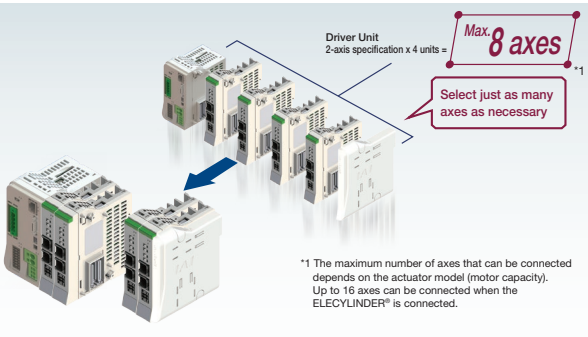
Saves space by 85%



RCON
CC-Link specification
Stepper motor 16-axis

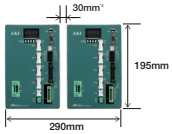
RSEL

Up to 8 actuators [*1] can be connected to RSEL.
It also supports Cartesian coordinate systems such as linear and circular interpolation behaviors.



Compared with units in which a single actuator is connected to a single driver unit, the control panel space can be reduced by up to 67%.

MSEL x 2 units (8-axis connection)

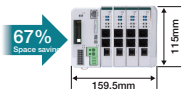


*3 Minimum distance required for natural heat dissipation of the controller

MSEL
CC-Link specification
8 axes (4 axes x 2 units)

44% cost reduction

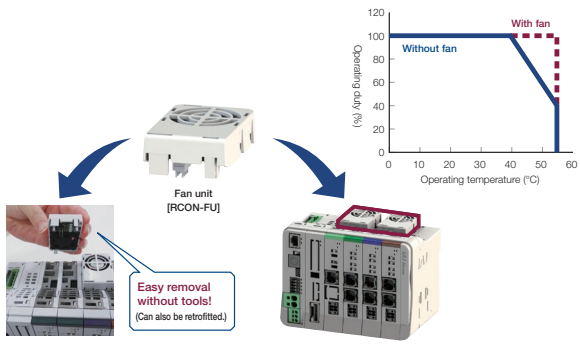
RSEL x 8-axis connection specifications



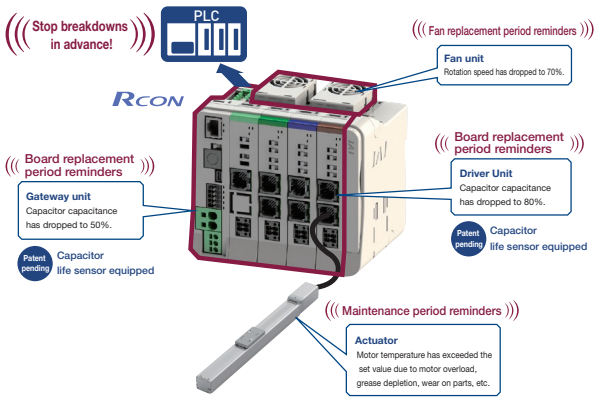
RSEL
CC-Link specification
Stepper motor 8-axis

⑤ Supports installation environment temperature of 0 to 55°C

The optional fan unit can be used in a 0 to 55°C environment without lowering the actuator operation duty.



⑥ Equipped with predictive maintenance and preventive maintenance features

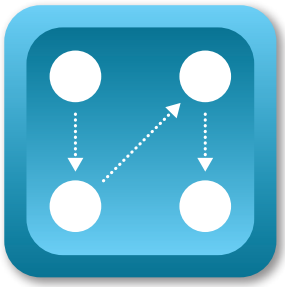


14 Technique Creating "Happy" with Technique

With this feature, you and your equipment will be upgraded.

Multi-point positioning

ROBO CYLINDER

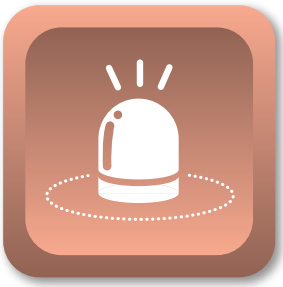


You can easily set the position on a computer or a touch panel type teaching pendant.

1-33

Zone signal

ROBO CYLINDER



The device can be sensorless by outputting signals at any location without using external sensors.

1-34

Speed changes while traveling

ROBO CYLINDER

The speed can be changed while moving without stopping.

1-35

Direct numerical movement

ROBO CYLINDER

It can be moved at any position or speed.

1-36

Operation status monitor

ROBO CYLINDER

The current value, current waveform, and other status can be monitored.

1-37

Vibration control

ROBO CYLINDER

This feature suppresses vibration of the workpiece attached to the slider during movement.

1-38

Pitch feed

It can move forward or backward at any equal interval. Only one position is used.

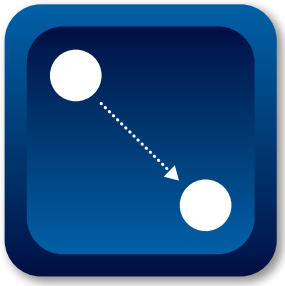
1-39

Torque adjustment

The torque during movement can be adjusted to ensure the safety of the operator.

1-40

Simple 2-point positioning



It can be easily operated by simply registering two points, the start and end points.

1-41

AVD control

(Acceleration, Velocity, Deceleration)

Acceleration, velocity, and deceleration can be easily set to a desired value.

1-42

Push-motion operation

Stable thrust allows for push-motion operation and press-fitting operation. It approaches the workpiece at high speed and push it in slowly.

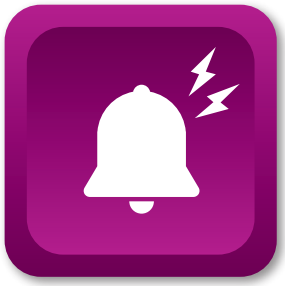
1-43

Pausing

It can be paused at any position during operation. The motor will decelerate to a stop.

1-44

Predictive maintenance



The predictive maintenance function issues an overload warning when the applied load exceeds that of normal operation.

1-45 to 46

Energy saving

Reduced power consumption helps save energy.

1-47

Supports a wide variety of products

Multi-point positioning

For the list of compatible models, refer to P1-48.

Do you have any of these concerns?

- Every time the product type is changed, the production line is stopped and the jigs are replaced...
- In order to eliminate setup changes, air cylinders are used for each type of workpiece...
- We want to be able to support many product types, but with air cylinders, positioning more than 3 points is difficult...

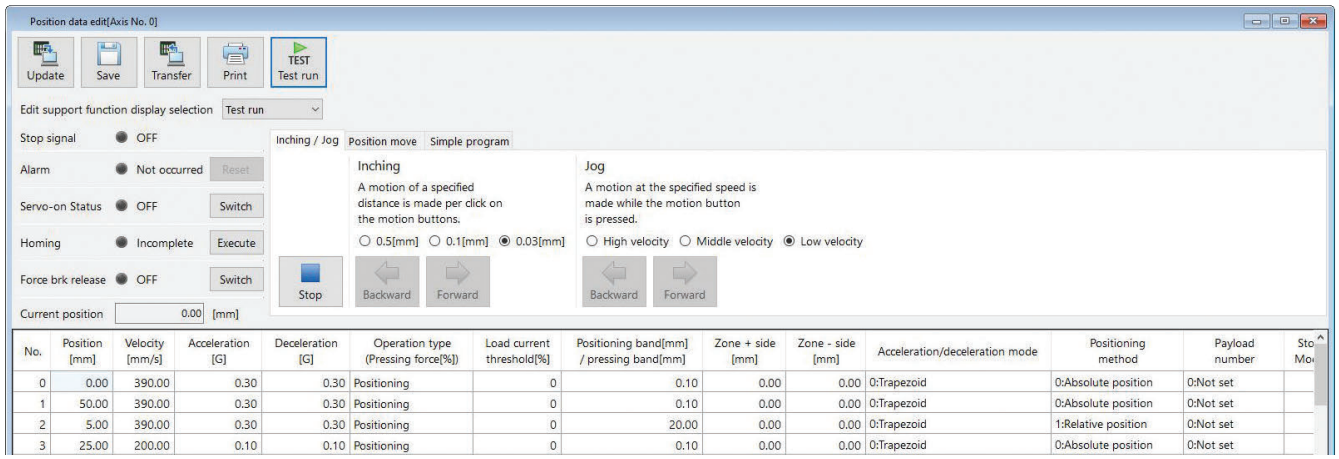
Solve these concerns with the ROBO Cylinder®'s "Multi-point positioning function"!

Inputs and changes can be made easily using the teaching pendant or teaching software for PC. As well as numerical input, you can also capture the current position after movement.

Position data example

No.	Position [mm]	Velocity [mm/s]	Acceleration [G]	Deceleration [G]	Operation type (Pressing force[%])	Positioning band[mm] / pressing band[mm]	Positioning method
0	0.00	390.00	0.30	0.30	Positioning	0.10	0: Absolute position
1	50.00	390.00	0.30	0.30	Positioning	0.10	0: Absolute position
2	5.00	390.00	0.30	0.30	Positioning	20.00	1: Relative position
3	25.00	200.00	0.10	0.10	Positioning	0.10	0: Absolute position
4	30.00	390.00	0.30	0.30	Pressing (50%)	0.10	0: Absolute position
5	15.00	390.00	0.30	0.30	Positioning	0.10	0: Absolute position

Example of position data edit screen (IA-OS software)



Replaces the sensor

Zone signal

For the list of compatible models, refer to P1-48.

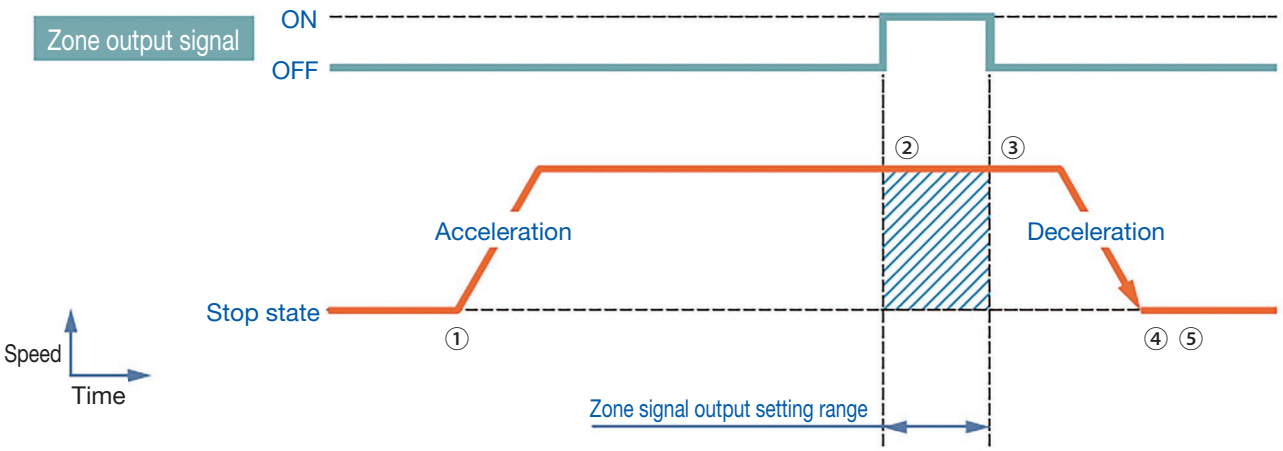
Area signal can be set easily!

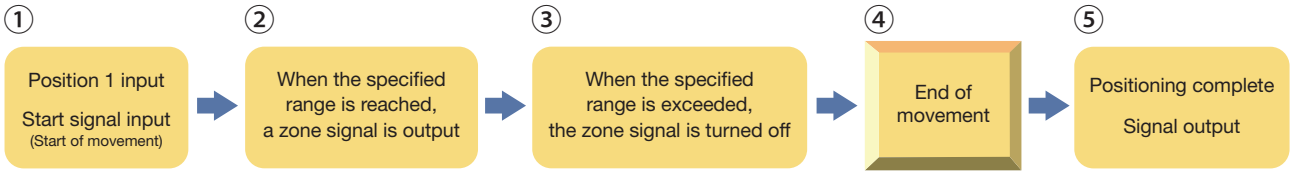
A sensor that can be used as a trigger!

It can function as a **sensor**, such as for determining whether or not the position is complete during push-motion operation, setting the continuous operation range of pitch feed, triggering speed change, and interlocking the operation of other devices within the set range. It can be set in 0.01mm increments.

This function enables the signal to be turned on while the actuator is passing or stopping at a specified position (zone range). There are two methods to do this.

① Zone signal (ZONE1, ZONE2) ... Turns on the output at the desired position specified by the parameter.
② Position zone signal (PZONE) ... Turns on the output at any position specified in the position table.





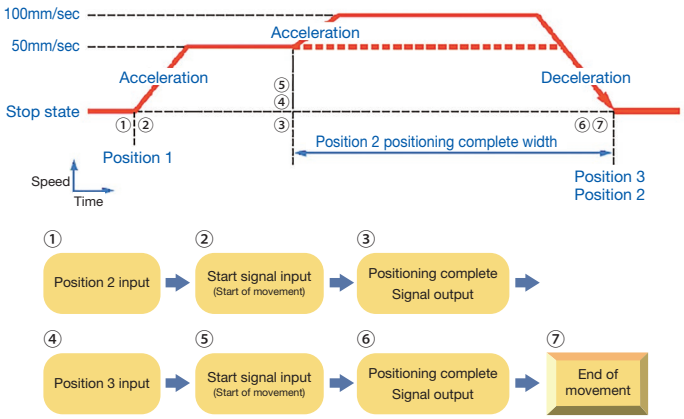
Smooth without stops

Speed changes while traveling

For the list of compatible models, see P1-48.

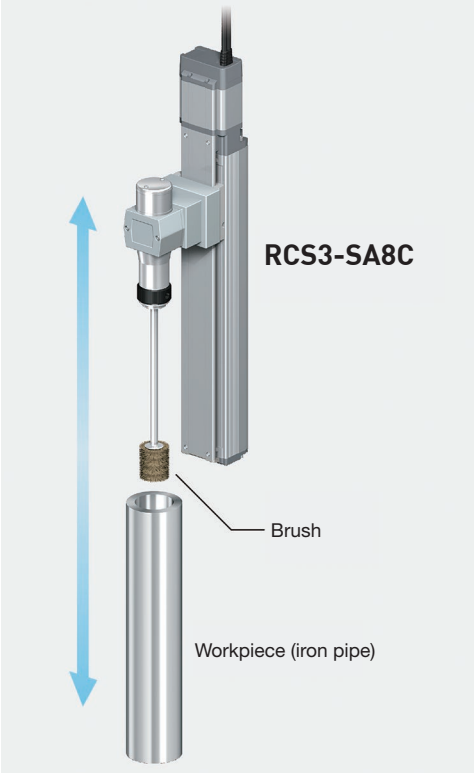
The speed can be smoothly changed without stopping!

ROBO Cylinder® can handle speed changes while moving.
The speed can be smoothly switched by overwriting only the speed with the target position as it is.



Application example: Inside a polishing device for iron pipes

In the past, an air cylinder was used, but its speed could not be increased much because of the possibility of the brush hitting the end of the pipe due to vibration.



ROBO Cylinder® solves this by allowing

"the speed to be changed while moving".

Since the speed of the ROBO Cylinder can be changed while moving, the speed can be reduced in the parts where the brush enters the workpiece, and the rest of the parts can move at high speed, which greatly reduces cycle time. In addition, the accuracy of polishing has increased and the quality has improved.

Can be moved to a desired position.

Direct numerical movement

For the list of compatible models, refer to P1-48.

The most common method!

Direct numerical movement is a function where the unit is operated by directly numerically specifying position, speed, acceleration, push force, etc. from a host device over the network. Depending on how it is used, you can select simple linear, half linear, and full linear modes.

Benefits of network control

- Wire saving
- Long-distance communication
- Handling of numerical data
- No limit on the number of registered positions

Extensive field network support

CC-Link, PROFIBUS, EtherCAT, EtherNet/IP, SSCNETIII/H (SERVO SYSTEM CONTROLLER NETWORK), DeviceNet, CompoNet, MECHATROLINK, PROFINET, CC-Link IE Field

*Different controllers support different field networks.

Visibility promotes safety

Operation status monitor

For the list of compatible models, see P1-48.

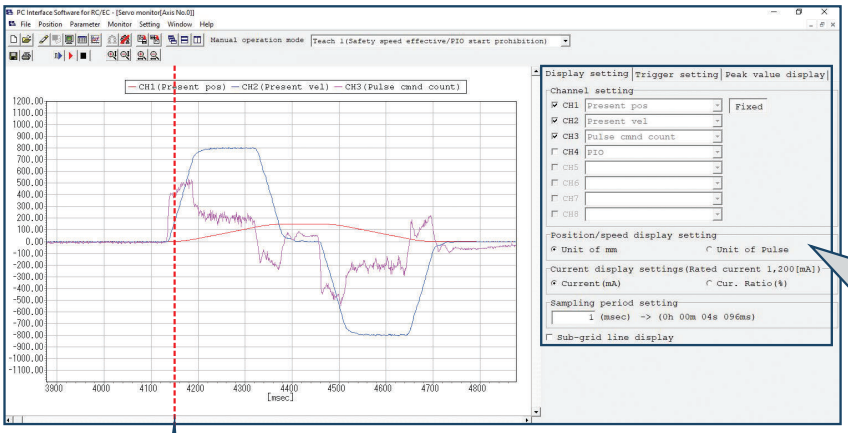
Visible status. Confident operation.

- By using teaching software for PC, the information of actuators and controllers during operation can be displayed as waveforms on the PC screen.

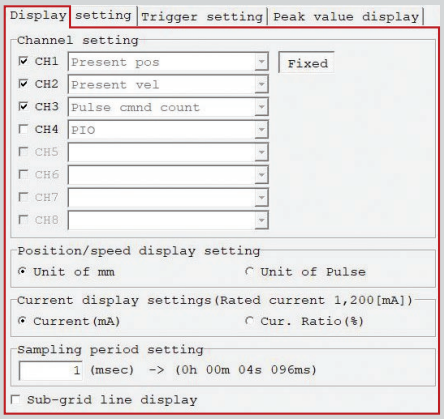
*Information that can be displayed: Command current value, current speed/position, PIO signal (start, positioning complete, alarm, etc.)

- It also has a trigger function that allows you to start waveform display on the PC screen by setting the PIO signal change point and operation time as desired.

Monitor function screen (example)

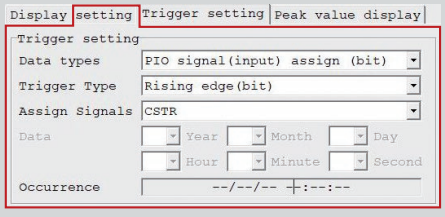


Display settings



*You can select what you want to monitor.

Trigger settings



*Data acquisition starts when the selection changes.

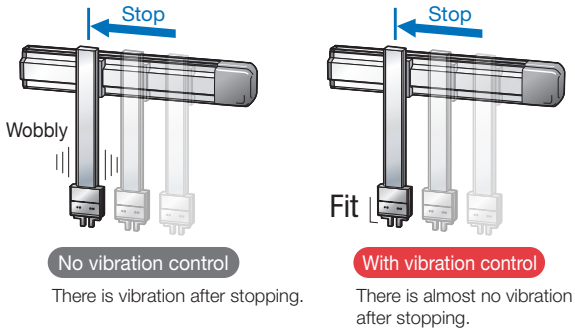
Does not vibrate

Vibration control

For the list of compatible models, see P1-48.

Cycle time can be shortened because it does not vibrate.

It is equipped with a vibration control function to suppress vibration of the workpiece mounted on the slider when the actuator moves the slider.
The waiting time for vibration convergence is reduced, and the cycle time can be shortened.



No vibration control
There is vibration after stopping.

With vibration control
There is almost no vibration after stopping.

The vibration conditions that can be suppressed are as follows.

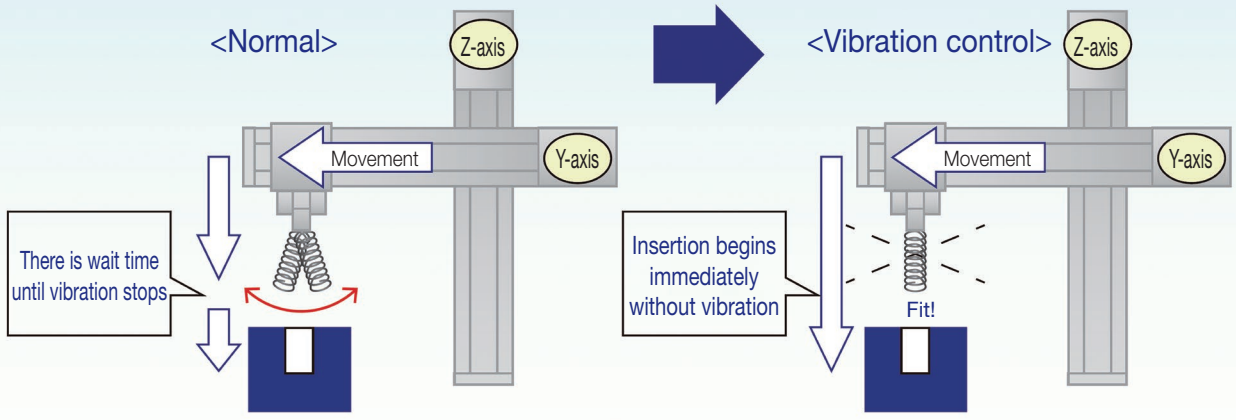
① The vibration of the load caused by our actuator and in the same direction as the direction of travel of the actuator.

② Vibration with a vibration frequency in the range of 0.5 Hz to 30 Hz

Note that the following conditions are not subject to vibration control.

- Vibration (external force) whose source of vibration is not actuator operation
- Vibration source in a direction different from the moving direction of the actuator
- Vibration that has already begun before the movement of the actuator
- When operating in pulse train input mode or motion control
- For home return motion and push-motion operation

Example of use Step of moving workpieces prone to vibration



Cycle time = 8.23sec

Cycle time = 2.56sec

Effect

This eliminates wait time until the vibration of the workpiece stops, allowing the cycle time to be shortened.

Easy setup

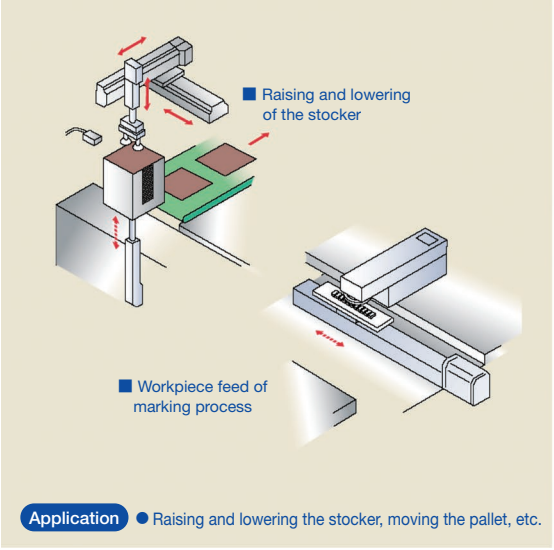
Pitch feed

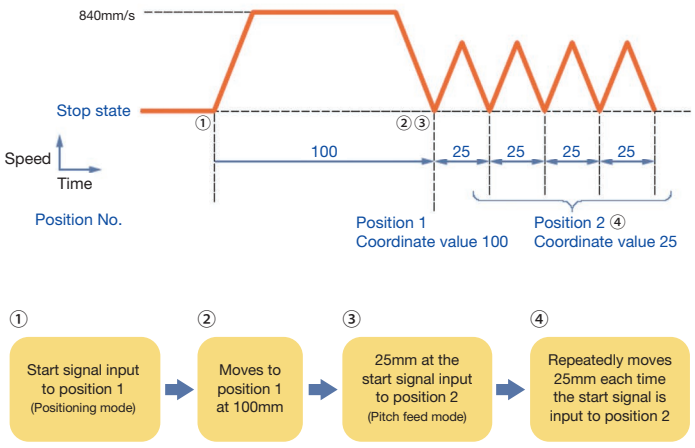
For the list of compatible models, see P1-48.

Pitch feed (relative movement = incremental movement) can be easily performed.

- Ideal for equal-interval movement such as raising and lowering stockers and moving pallets.
- Only one position can be used.

Examples of Applications





No.	Position [mm]	Velocity [mm/s]	Acceleration [G]	Deceleration [G]	Operation type (Pressing force[%])	Positioning band[mm] / pressing band[mm]	Positioning method
0							
1	100.00	840.00	0.30	0.30	Positioning	0.10	0: Absolute position
2	25.00	840.00	0.30	0.30	Positioning	0.10	1: Relative position

(Position No.2 is the pitch feed setting.)

For pitch feed, do not send commands below the minimum encoder resolution (number of read/encoder pulses) or below the repetitive positioning accuracy.
Even if a command is issued, the command is sent to the same position as the positioning completed state, so deviation occurs but normal positioning control cannot be performed.

Torque adjustment

For the list of compatible models, see P1-48.

Protect the workers' safety.

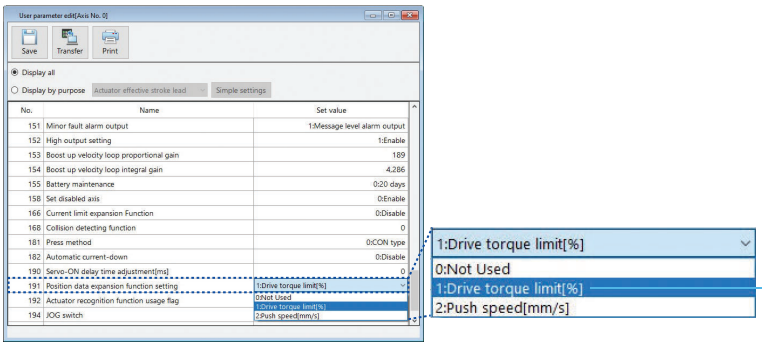
Torque adjustment function during movement

By lowering the torque at the time of movement, the push force is reduced, and even if the hand is caught, the unit will stop at the set torque.

Feature Description — Driving torque limit [%]

By setting "User Parameter No.191", "Drive torque limit [%]" can be added to the item on the position data edit screen.

Editing user parameters



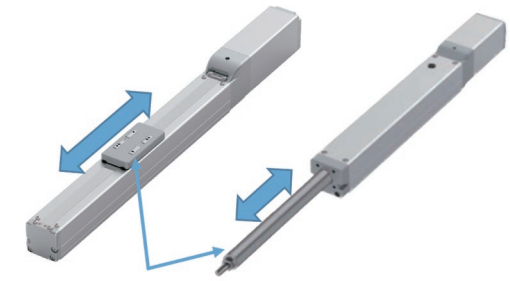
Position data editing

No.	Position [mm]	Veloci [mm/		Drive torque limit[%]
0	100.00	50.	ition	100
1	80.00	50.	ition	100
2	50.00	50.	ition	100

What is the drive torque limit [%]?

This function can limit the motor current when the actuator moves.

It is recommended to limit the current flowing to the motor so that excessive force is not applied.



Actuator operating section

- Depending on the use, setting, operation and control, the actuator may behave unexpectedly.

[Example of unexpected behavior]

- If the "drive torque limit" is set too low when the workpiece is set vertically and it moves up and down, the workpiece may not only be unable to move, but may stop and fall.
- If a movement command is issued to another position number while moving to a certain position number, and the "driving torque control value" of the position number indicated later is large, there is a possibility that the unit suddenly starts moving with force.

Programmless for ease of use

ELECYLINDER

Simple 2-point positioning

For the list of compatible models, see P1-48.

Just register the start point and end point.

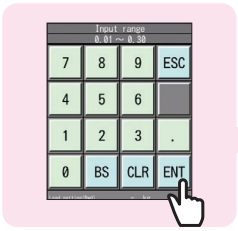
- It can be operated simply by entering data.
- No troublesome programs are required.
- Like a solenoid valve, it can be operated only by ON/OFF signal.

Feature

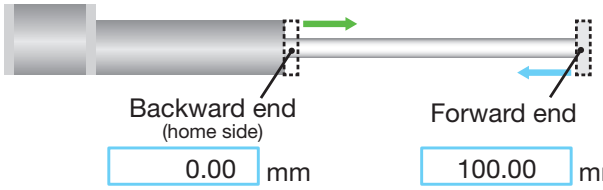
Easy to operate—no programming required!

Start and end points can be set to any position

Enter the stop position.



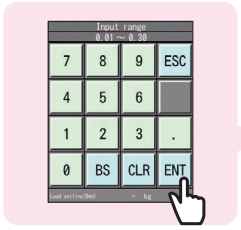
Position setting



AVD can be easily set to any value.

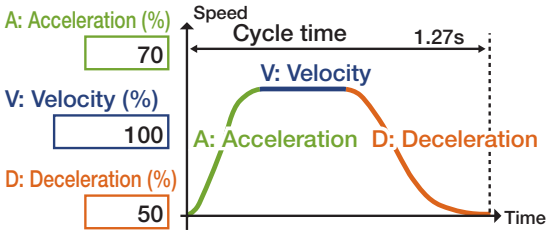
Enter the movement conditions.

Operating Conditions
Abbreviation: AVD
Acceleration
Velocity
Deceleration



Operating conditions

(Forward: Backward end → Forward end)



Allows for any range of adjustment

ROBO CYLINDER ELECYLINDER

AVD control (Acceleration, Velocity, Deceleration)

For the list of compatible models, see P1-48.

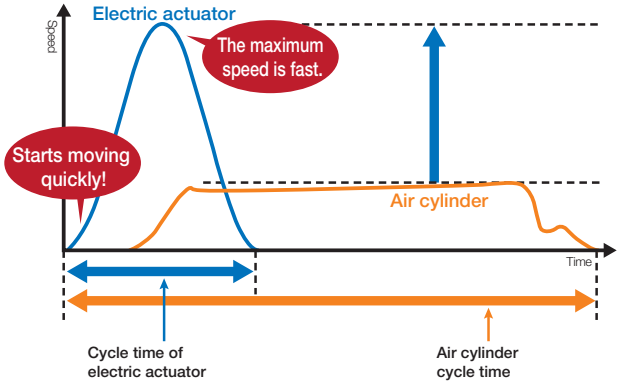
AVD can be adjusted individually!

The air cylinder adjusts the speed by adjusting the air flow rate using a speed controller. Acceleration, velocity and deceleration cannot be precisely adjusted.
Electric actuators can be individually set and adjusted for AVD.

Operating Conditions
Abbreviation: AVD
Acceleration
Velocity
Deceleration

Using an electric actuator is much cheaper than using an air cylinder. It helps significantly lower labor costs.

Using an electric actuator will shorten the cycle time.



Air cylinder
- Maximum speed : 300mm/s
- Acceleration/Deceleration : 0.3G
- Stroke : 300mm

Cycle time **1.1** seconds

Electric actuator
- Maximum speed : 1000mm/s
- Acceleration/Deceleration : 1.0G
- Stroke : 300mm

Cycle time **0.4** seconds

Under the above conditions, the actuator operation time can be reduced by 64%. As a result, it is assumed that the cycle time of the entire device can be reduced by 20% by using the electric actuator.

An example of the effect of introducing an electric actuator in an assembly line is introduced.

Conditions of Use

Operating hours: 12 hours/day (250 days/year) Labor cost: $15.33/hour

The assembly line is **20%** faster.

Operating hours were reduced from 12 hours to **9.6** hours.

Labor cost reduction
$9,200/year
*(12-9.6) hours $15.33 x 250 days

Note: Researched by IAI Japan. Exchange Rate: 1 (USD)= 150 (Japanese yen)

Not just pushing

ROBO CYLINDER ELECYLINDER

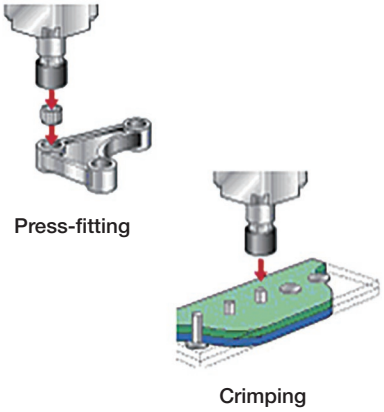
Push-motion operation

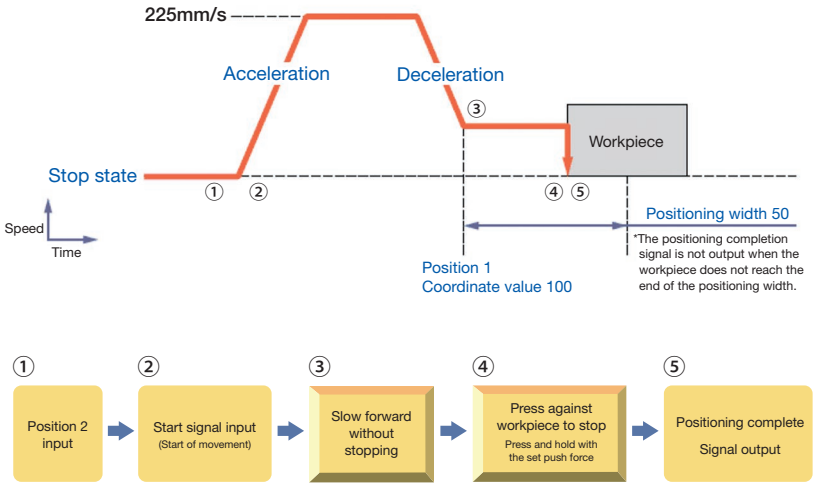
For the list of compatible models, see P1-48.

The push force can be easily set and changed!

Workpiece can be discriminated by pushing + zone signal.

- Press-fitting, crimping
- Workpiece discrimination (Pass / Fail determination)
- Clamps, etc.





No.	Position [mm]	Velocity [mm/s]	Acceleration [G]	Deceleration [G]	Operation type (Pressing force[%])	Positioning band[mm] / pressing band[mm]	Positioning method
0							
1	0.00	225.00	0.30	0.30	Positioning	0.10	0: Absolute position
2	100.00	225.00	0.30	0.30	Pressing (50%)	50.00	0: Absolute position

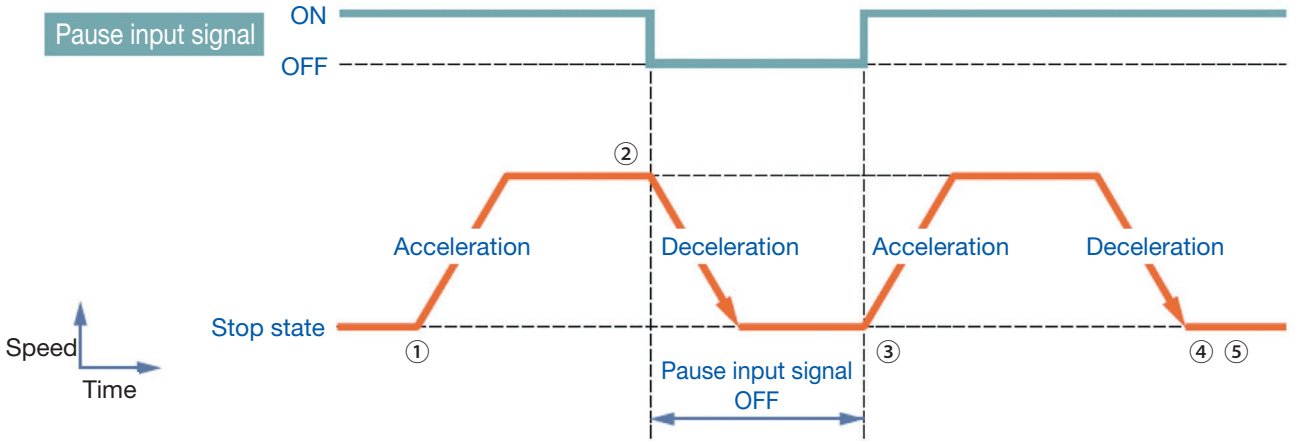
(Position No.2 is the setting of push-motion operation.)

Pausing

For the list of compatible models, see P1-48.

Decelerates to a stop by pause input signal

The ROBO Cylinder can be used as an interlock function because it can be paused at any position while moving.



① Position 1 input
Start signal input
(Start of movement)

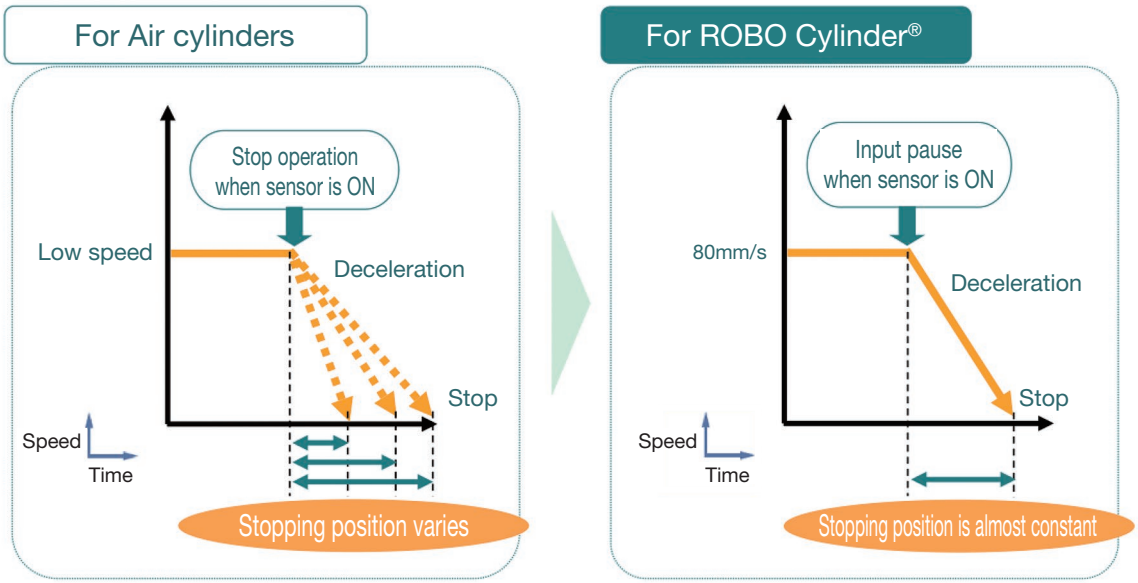
② Decelerates to a stop with pause input signal OFF

③ Movement resumes with pause input signal ON

④ End of movement

⑤ Positioning complete
Signal output

The temporary stop position of the ROBO Cylinder is almost constant.



Better safe than sorry

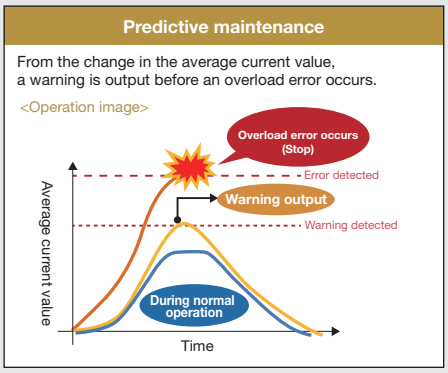
Predictive maintenance

For the list of compatible models, see P1-48.

Get notified before a problem occurs.

Predictive maintenance

You can monitor the average current value change caused by the depletion of grease or the wear of parts. Gives a warning if the specified value is exceeded. In this way, it is possible to detect an abnormality before a failure or breakdown occurs.



- The current applied to the motor increases due to increased sliding resistance or excessive load due to insufficient maintenance of the guide and ball screw. **As a result, an overload error occurs and the unit stops.**
- If the guide and ball screw are not greased, the sliding resistance increases and the current applied to the motor gradually increases. It alerts when a customer-configured threshold is reached. **The device will not stop, but please perform inspection and maintenance to eliminate the cause as soon as possible.**
- During normal operation

- You can avoid sudden equipment outages.
- Since maintenance personnel can be kept to a minimum, it is effective in reducing personnel costs.

■ Overload warning function

The overload warning function can be set by changing parameters.
By estimating the temperature change of the motor from the motor current, it is possible to detect abnormality before failure or breakdown occurs.

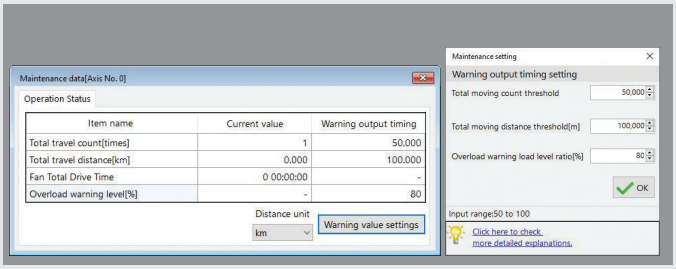
■ Collision detection function (limited to stepper motor specifications excluding EC)

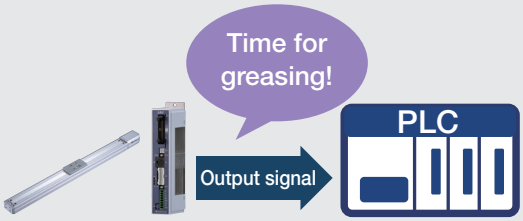
This function stops the operation immediately when the actuator comes into contact with an object.
The collision detection function generates an alarm and turns the servo off to stop operation when the command current value exceeds the set value. You can also set the range to detect.
This function is an auxiliary function to reduce breakage of the workpiece in case of emergency.
We cannot compensate for unexpected damage.
The setting of this function must be adjusted to the expected collision. The appropriate value will vary depending on the system. Please check carefully before use.

Maintenance function

The distance traveled by the actuator is accumulated and recorded in the controller. When the distance exceeds the preset distance, an output signal is turned on.
This function can be used to confirm the timing of greasing or periodic inspection

<Maintenance information>





It is automatically output to PLC when the set maintenance inspection time (number of operations, mileage) is reached.

■ Total number of movements

The total number of actuators moved is counted, and by setting a target value for the total number of actuators moved in the parameter, a message-level alarm can be generated when the target value is exceeded.

■ Total distance traveled

The cumulative distance traveled by the actuator is counted, and by setting the total mileage target value in the parameter, a message level alarm can be generated when the target value is exceeded.

Environmentally-friendly devices

ROBO CYLINDER ELECYLINDER

Energy saving

For the list of compatible models, see P1-48.

Power-saving feature helps increase profits

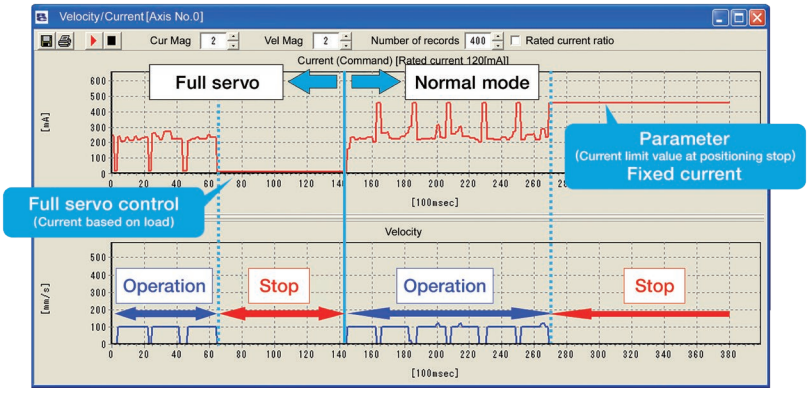
■ Automatic servo OFF function

This function reduces power consumption while the actuator is stopped.
After positioning complete, servo is automatically turned off after a certain time elapses.
When the next positioning is commanded, the servo is automatically turned on and positioning is executed.
Power consumption is reduced since there is no holding current while stopped.

■ Full servo function (limited to stepper motor specifications excluding EC and RCP6)

With the full servo function, power consumption can be reduced by servo-controlling a stepper motor with a relatively high stopping current (Note 1) even when the motor is stopped.

Note 1: A constant stopping current is applied to completely stop the unit by suppressing fine vibration at the time of stop.



■ Auto current down function (limited to stepper motor type except EC)

If it is possible to remain at the same stop position after stopping positioning (no deviation), the stop current value is gradually reduced. If it moves, increase the stopping current value little by little until the stop state can be maintained. If it is possible to remain at the same stop position, the current value at stop is reduced and power can be saved.

■ Power saving settings (EC)

The ELECYLINDER® can be set to Enable/Disable (No.8).
When enabled, power capacity can be reduced up to around 40% compared with the setting disabled.
However, the maximum speed, maximum acceleration/deceleration, and payload will be lower compared with the setting disabled.
When disabled, the maximum speed, maximum acceleration/deceleration, and payload will be higher compared with the setting enabled.
Refer to the “Table of Payload by Speed/Acceleration” and “Stroke and Max. Speed” on each product specification page for more details. The energy-saving setting is disabled at shipping.

List of compatible models

Legend:
◎: Compatible
○: See notes

	Multi-point positioning	Zone signal	Speed changes while moving	Direct numerical movement	Operation status monitor	Vibration control	Pitch feed
EC							
RCON	◎	◎	◎	◎	◎	○ *1	◎
RCP6S	◎	◎	◎	◎	◎		◎
PCON	◎	◎	◎	◎	◎		◎
ACON	◎	◎	◎	◎	◎	○ *2	◎
DCON	◎	◎	◎	◎	◎		◎
SCON2	◎	◎	◎	◎	◎	○ *2	◎
SCON	◎	◎	◎	◎	◎	○ *2	◎
RSEL	◎	◎	◎	◎	◎		◎
MSEL	◎	◎	◎	◎	◎		◎
XSEL	◎	◎	◎	◎	◎	◎	◎

	Torque adjustment	Simple 2-point positioning	AVD control	Push-motion operation	Pausing	Predictive maintenance *5	Energy Saving *6
EC		◎	◎	◎	◎	◎	◎
RCON	○ *3		◎	◎	◎	◎	◎
RCP6S			◎	◎	◎	◎	◎
PCON			◎	◎	◎	◎	◎
ACON			◎	◎	◎	◎	◎
DCON			◎	◎	◎	◎	◎
SCON2			◎	◎	◎	◎	◎
SCON			◎	◎	◎	◎	◎
RSEL	◎		◎	◎	◎	◎	◎
MSEL	○ *4		◎	◎	◎	◎	◎
XSEL	◎		◎	◎	◎	◎	◎

*1 Limited to AC servo motor specifications. Cannot be used in combination with direct numeric specification mode.

*2 Cannot be used in combination with pulse train control mode and half linear mode.

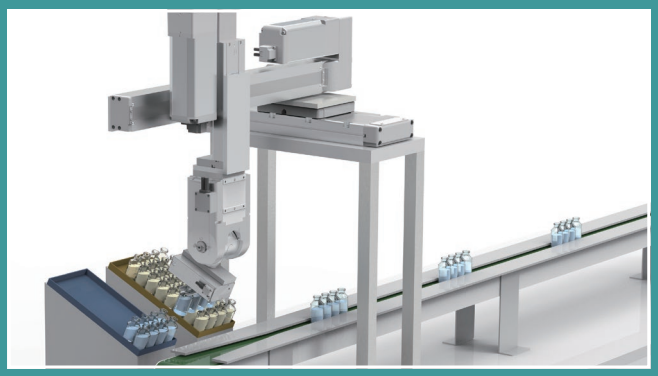
*3 Cannot be used in combination with direct value specification mode.

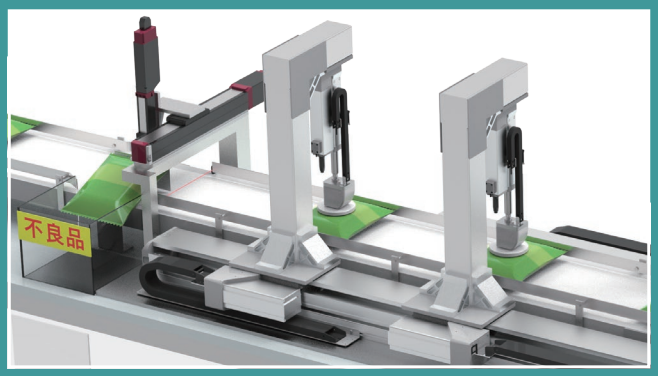
*4 Limited to high resolution actuators such as RCP6.

*5 “Collision detection function” is limited to stepper motor specifications excluding EC.

*6 “Full servo function” is limited to stepper motor specifications excluding EC and RCP6.
“Auto current down function” is limited to stepper motor specifications excluding EC.

Application Examples INDEX





Automobiles and Machinery

Usage Examples	Introduction Effects	Page
1. Resin case insert defect inspection device	Reduces operation time by shock-free stopping and high-speed operation	1-59
2. Wire harness tensile test	Easy to set the pulling motion with dedicated tool	1-60
3. High-speed pick and place of radiators and chips	Space saving and shortened cycle time	1-61
4. Glass substrate carrying device	Can be used in cleanroom environments	1-62
5. Connector inspection device for automobile	Equipment costs can be reduced with the wrist unit	1-63
6. Index system automatic assembly machine	Space saving means increased production	1-64
7. Cartesian 3-axis nut runner screw fastening device	Low-cost "bolting unit"	1-65

Automobile Machinery

Logistics

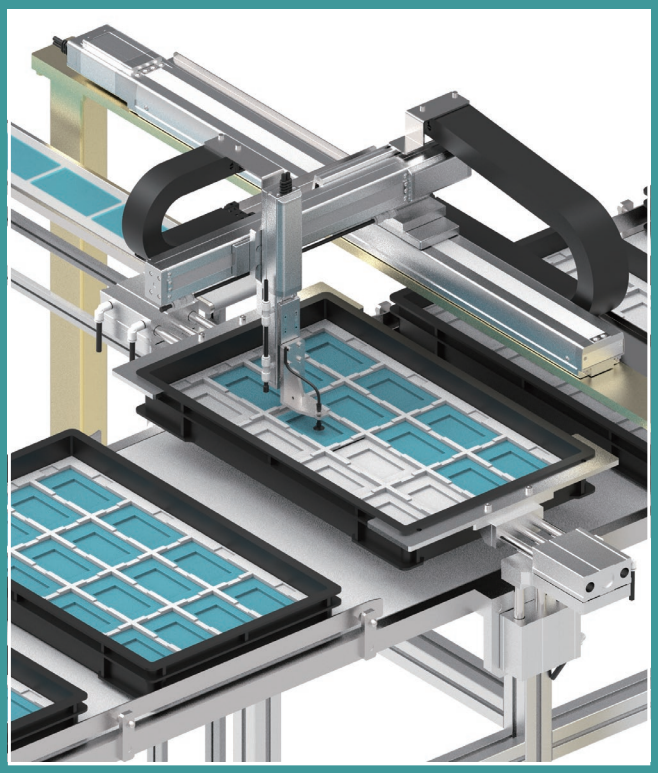
Usage Examples	Introduction Effects	Page
8. Automatic sorting device for corrugated board	Cycle time is shortened by changing speed while moving	1-66

Logistics

Pharmaceuticals Medical Products

Usage Examples	Introduction Effects	Page
9. Medical bottle pick & place	Can be used in cleanroom environments	1-67
10. Shampoo bottle filling machine	Cycle time is shortened by changing speed while moving	1-68
11. Picking and placing vials	Reduces initial costs	1-69
12. Barcode reading of samples	Can be used in cleanroom environment	1-70

Pharmaceuticals Medical supplies



Foodstuffs

Usage Examples	Introduction Effects	Page
13. Beer bottle case transfer device	Cycle time can be shortened even with long strokes	1-71
14. Loader and unloader for press	Shortened cycle time	1-72
15. Packaging bag leak tester	Reduces inspection defects	1-73
16. Decorating by cake maker	Stable operation reduces defects	1-74

Electrical Machinery Precision

Usage Examples	Introduction Effects	Page
17. Transport equipment between substrate inspection processes	Cycle time can be shortened even with long strokes	1-75
18. Glass substrate loader and unloader	Shortened cycle time	1-76

Other Products

Usage Examples	Introduction Effects	Page
19. Small LED light assembly machine	Shortened cycle time	1-77
20. Electric parts shelf	Initial cost reduction	1-78

Automobile Machinery | Speed Acceleration/ deceleration Setting function | High-Speed Transport

Video available here.
intelligentactuator.com/ae23d-01

Reduces operation time by shock-free stopping and high-speed operation

Applications Insert missing parts inspection equipment for resin cases

■ Equipment for inspecting the mounting condition, position, and quantity of two types of insert parts mounted on large resin cases for automotive use.

■ Operational description

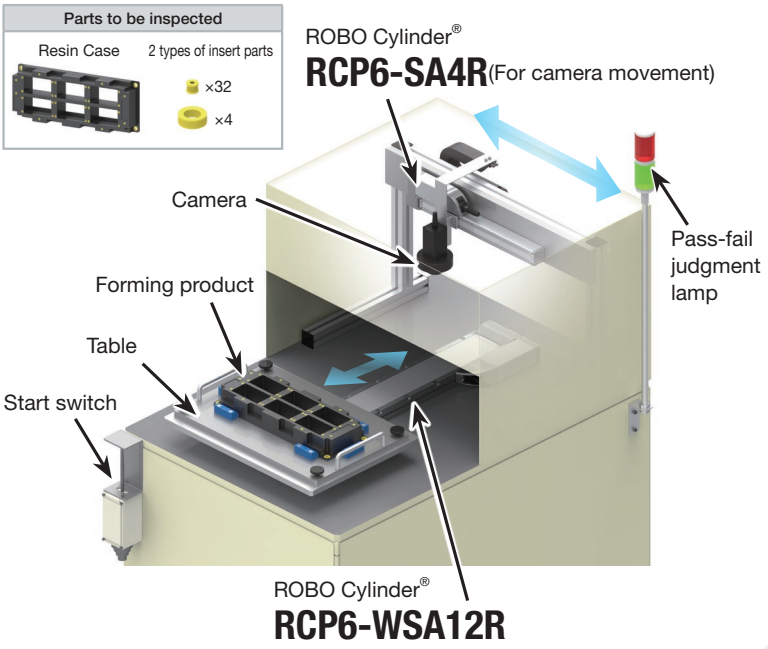
① Waits until the table moves to the camera side and the vibration caused by the impact when the table stops is over.

② Camera moves to the next photo position. Camera waits until the vibration caused by the impact when the camera is stopped stops, takes a picture of the formed product, and inspects it. After that, the judgment result is indicated via lamp.

③ After the inspection, the formed products are sorted by operators according to the judgment results.

■ Operating conditions (RCP6-WSA12R)

[Workpiece weight] 3kg
[Stroke] 600mm
[Speed] 500mm/s
[Acceleration/Deceleration] 0.7G



Effect of introducing ROBO Cylinder®

Shortened facility operating time

Shock-free stopping and high-speed operation **reduced facility operating time.**

Since the acceleration(A), velocity(V) and deceleration(D) of the ROBO Cylinder can be individually set, it is possible to maintain the maximum speed and operate without impact.

Automobile Machinery | Pull | Zone Output | Easy Numerical Setting 1·2·3 | Load Cell Used

Video available here.
intelligentactuator.com/ae23d-02

Easy to set the pulling motion with dedicated tool

Applications Tensile testing of wire harnesses

ROBO Cylinder® Pulse Press
RCP6-RRA6R

What is a Pulse Press?
Actuator that enables force control by combining a stepper motor and load cell. Based on feedback from the load cell, a loading repeatability of ±1.0% F.S. (full scale = maximum measurable value) is achieved.

■ **Operational description**

Pull the wiring harness and check its durability. → If the pre-set load value is reached, it is judged "OK"; if not, it is judged "NG".

■ **Operating conditions**

[Stroke] 215mm
[Speed] 70mm/s
[Acceleration/Deceleration] 0.3G

Effect of introducing ROBO Cylinder®

1. Tensile operation is possible

Supports the load in the pulling direction, and **there is no limit to the pulling time.**

2. Reasonable price

Products with stepper motors cost less than **1/2 of our servo press.**

3. Shortened adjustment time

Pushing and pulling can be easily set numerically using teaching software for PC or the teaching pendant, **reducing adjustment time.**

The ROBO Cylinder pulse press can read the current load value from the load cell.

Automobile Machinery | High-Speed Transport | Compact

Video available here.
intelligentactuator.com/ae23d-03

Space saving and shortened cycle time

Applications Fast pick and place of radiators and tips

■ Pick and place parts supplied from the parts feeder with high speed operation.

■ **Operational description**

Part A supplied from the parts feeder are picked and placed on the index table. → Another SCARA robot fits part A with part B.

■ **Operating conditions**

[Workpiece weight] 0.01kg
[Arm Length] 180mm
[Speed] 1200mm/s
[Acceleration/Deceleration] 1G

What is the Zone output function?
This function outputs a signal from the controller when the actuator moving part enters the specified range.

Effect of introducing the SCARA robot

1. Space saving + Cost saving

The SCARA robot IXA is capable of pressing and zone output, **eliminating the need for external sensors.** This enabled us to reduce costs and save space.

2. Reduced defects due to misalignment

In the **compliance control** of the SCARA robot, the robot is softly controlled to follow the external force to reduce the contact force when inserting the workpiece and assist/support the fitting of workpieces.
The smooth insertion of workpieces has reduced defects.

Compliance control is provided by the SCARA robot as a positional error correction function. This allows for efficient fitting of workpieces.

Automobile Machinery | Ingress Protection | Interpolaton Operation

Video available here.
intelligentactuator.com/ae23d-04

Can be used in cleanroom environment

Applications Glass circuit board transfer equipment

■ This process aligns glass circuit boards on pallets. Aligns 16 parts on 1 pallet.

■ Operational description

① The workpiece is fed by the conveyor and the pallet is raised to the specified height.

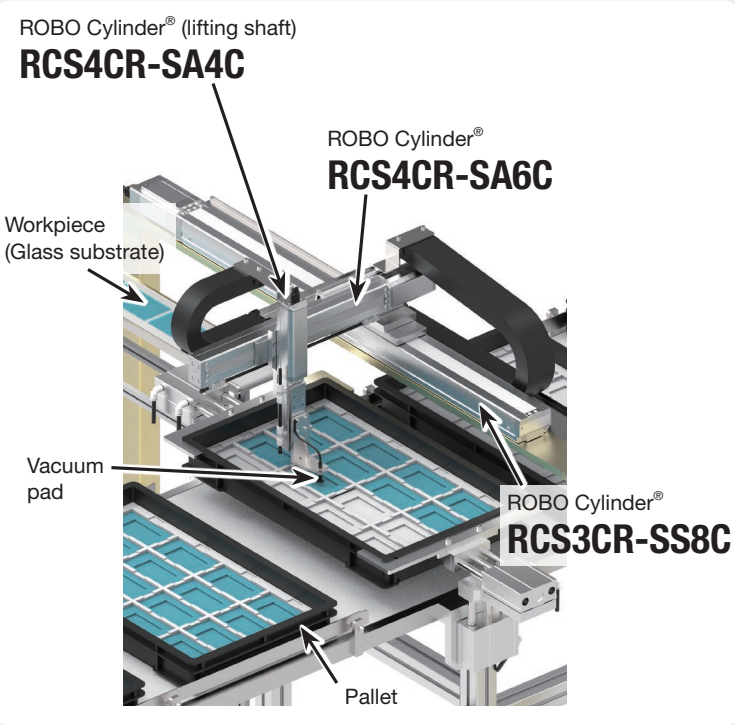
② The hoist axis is lowered and the glass circuit board is lifted up by the suction pad.

③ Move to the pallet and unload the workpiece.

④ After 1 pallet (16 pieces) has been aligned, the pallet is lowered for unloading.

■ Operating conditions

[Workpiece weight] 0.01kg
[Speed] 400mm/s
[Acceleration/Deceleration] 0.5G



Effect of introducing ROBO Cylinder®

1. Can be used in a cleanroom environment

Equivalent to ISO Class 2.5.

2. Shortened cycle time

By making the movement trajectory arched, it became possible to move on the **shortest path**, and **the cycle time was shortened**.

3. Shortened setup change time

The ROBO Cylinder can stop in 0.01mm increments. A program matching the height of the pallet can be created in advance, **eliminating the need to replace the special jig for adjusting the height, thus reducing the time required to change the setup**.

Palletizing is easy to set up programmatically.

Automobile Machinery | Compact | Interpolaton Operation

Video available here.
intelligentactuator.com/ae23d-05

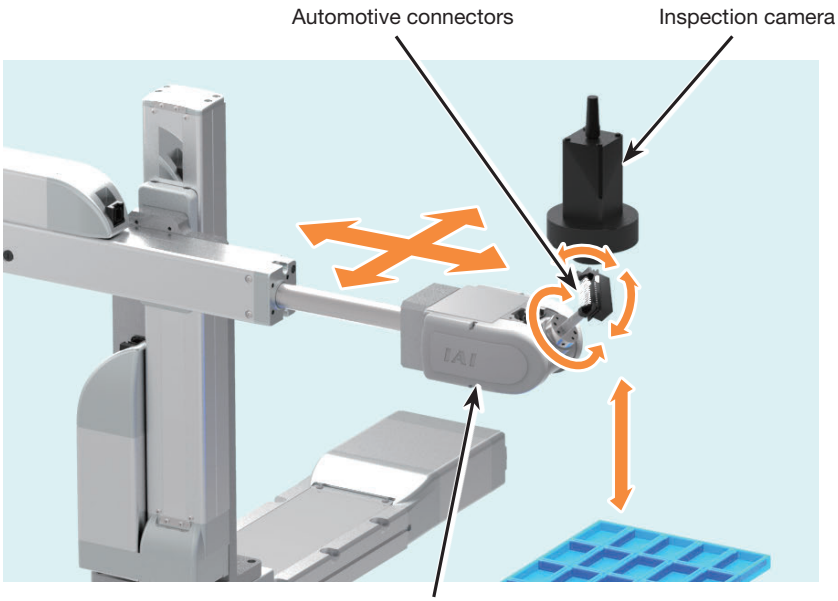
Equipment costs can be reduced with the Wrist unit

Applications Automotive connector inspection equipment

■ **Operational description**

Grab the automotive connector and move it close to the camera.

The Wrist Unit rotates the connector for inspection from various angles.



■ **Operating conditions**

[Workpiece weight] 0.5kg
[Speed] 200deg./s
[Acceleration/Deceleration] 0.5G

Effect of introducing the Wrist unit + ROBO Cylinder®

1. To reduce equipment costs

Oblique approach and tip turning, which were previously only possible with vertical articulated robots, can be realized with minimal shaft configuration. This has made it possible to reduce equipment costs.

2. The wrist part is small and lightweight

The original structure (patent pending) **has enabled miniaturization and weight reduction of the wrist.**

The "Wrist unit" is capable of Cartesian axis and interpolation command.

Automobile Machinery | Multiaxial Control | Compact

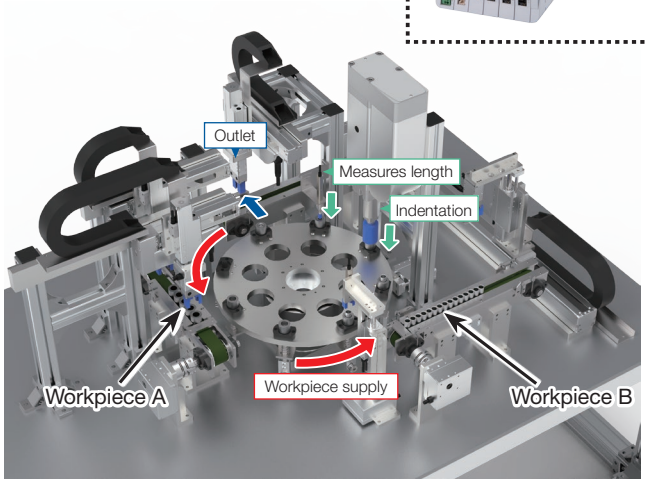
Video available here.
intelligentactuator.com/ae23d-06

Increase production efficiency by saving space

Applications

Automatic assembly machine with indexing system (press fitting of bushings)

■ More than 20 axes of actuators are used in a space of about 1m square.



A direct drive motor is used to rotate the index table. Direct drive motors have thrust and are suitable for rotating heavy objects.

■ **Workpiece**

[Workpiece name] Bushing
[Workpiece weight] 0.1kg
[Cycle time] 1.5 seconds

■ **Operational description**

Workpiece supply
Grasps workpiece A as it flows through the conveyor and feed it to the index table. Places another workpiece B on workpiece A.

Indentation
A rod-type ROBO Cylinder applies pressure from above to push the workpiece in.

Measures length
Inspects the press-fit to the default depth.

Workpiece outlet
After the inspection, the workpiece is delivered to the conveyor.

■ **Actuator used (Series, Type)**

RCP6: Sliders, Radial Cylinders
RCP2: Rod, Rotary, Gripper
RCA2: Rod, Table
DDA: Rotary
RCD: Gripper, Rod

Effect of introduction

Can connect up to 16 axes!

1. Compact and inexpensive coupled controller RCON

The RCON can be connected with multiple axes, and can be used with both **24V and 200V motors**. A single controller can control multiple axes, saving space. Also, the price is 60% lower than that of a single-axis controller. (*When connecting up to 16 axes)

2. Compact facilities

With its extensive lineup, it is possible to fit more than **20 actuators in a 1m square**.

Space saving and production efficiency can be improved by using more compact actuators and controllers.

Automobile Machinery | Zone Output | High Rigidity | Multiaxial Control | Interpolaton operation

Video available here.
intelligentactuator.com/ae23d-07

Low-cost "bolt tightening unit"

Applications

Cartesian 3-axis nut runner screw tightening equipment

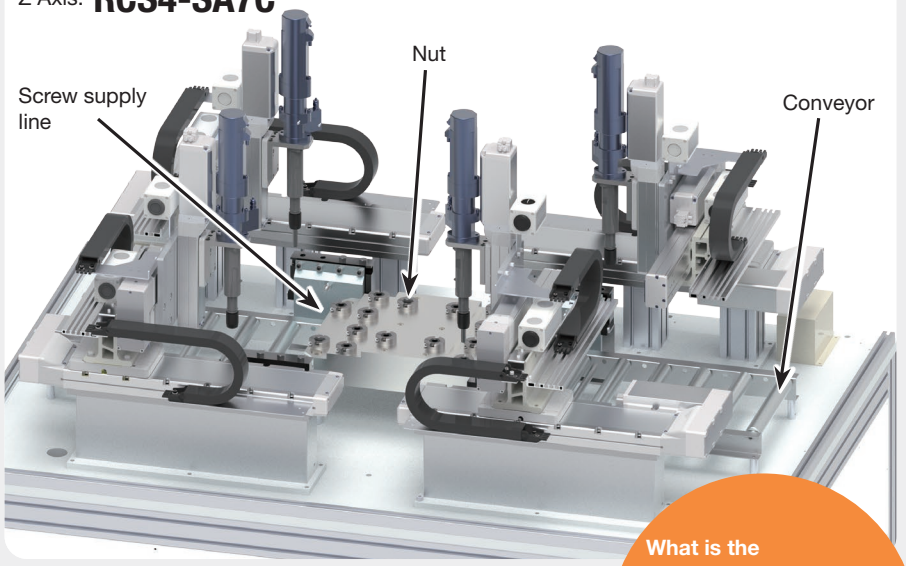
■ Four sets of "Cartesian robots" are simultaneously tightening screws.

■ **Operational description**

Nuts flow down the conveyor.

The Cartesian robot grasps the screw with the nut runner attached to the tip and screws the nut on the conveyor.

X Axis: **RCS4-WSA16R**
Y Axis: **RCS4-SA8R**
Z Axis: **RCS4-SA7C**



■ **Operating conditions**

[Workpiece weight] 0.01kg
[Speed] 400mm/s
[Acceleration/Deceleration] 0.7G

What is the Zone output function?
This function outputs a signal from the controller when the actuator moving part enters the specified range.

Effect of introduction

1. Reduces costs

ROBO Cylinder is highly rigid and inexpensive because **core components such as linear guides and ball screws are optimally designed** and manufactured in-house.

2. Safe operation with zone output function and torque limit

The actuator stops when it is about to hit.

3. Compact and inexpensive controller RSEL

RSEL can **save space on the control panel**. In addition, the price is 30% lower than that of conventional products.

Since IAI's Cartesian robots are highly rigid and inexpensive, they can be used for long periods of time at low cost even in applications with large load reaction forces.

Logistics | High-Speed Transport | Speed Acceleration/ deceleration Setting function

Video available here.
intelligentactuator.com/ae23d-08

Cycle time is shortened by changing speed while moving

Applications Automatic sorting equipment for corrugated cardboard

■ This is a sorting system for cardboard boxes containing CDs flowing on a conveyor.
Sort 5 different cardboard boxes containing different CDs by type.

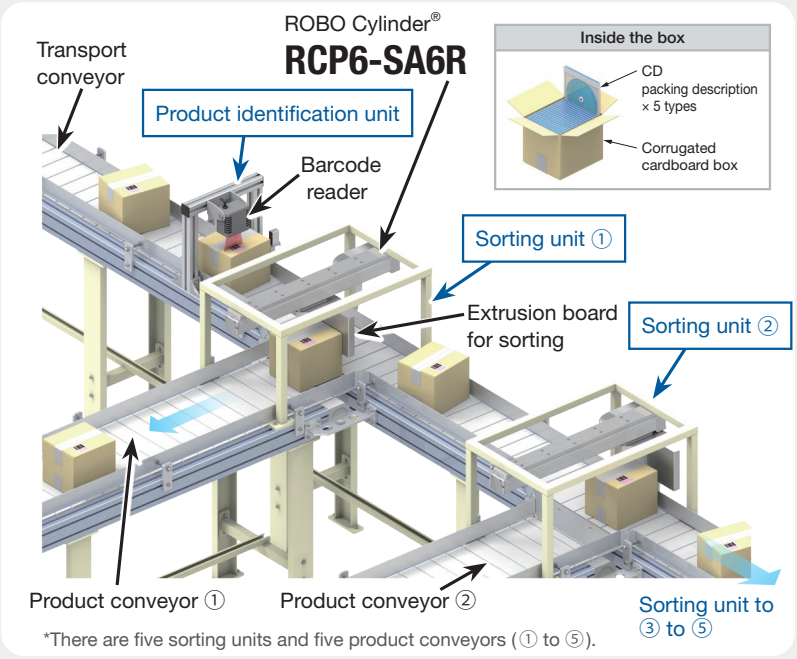
■ Operational description

Corrugated boxes move on the transport conveyor and pass through the product identification unit.

The sorting unit transfers the target corrugated box to the product conveyor.

■ Operating conditions

[Workpiece weight] 3kg
[Stroke] 400mm
[Speed] 800mm/s
[Acceleration/Deceleration] 0.5G



*There are five sorting units and five product conveyors (① to ⑤).

Effect of introducing ROBO Cylinder®

1. Shortened cycle time

The ROBO Cylinder can change speed while moving. We were able to shorten the cycle time by **lowering the speed in the range where the extruder plate for sorting comes into contact with the cardboard box, and then increasing the speed in the range of extruder operation**.

2. Reduced defects

Since the **acceleration(A), velocity(V) and deceleration(D) of the ROBO Cylinder can be set individually**, it is possible to stop the ROBO Cylinder without impact even if it is operated at high speed. As a result, **product damage due to impact has been reduced to zero.**

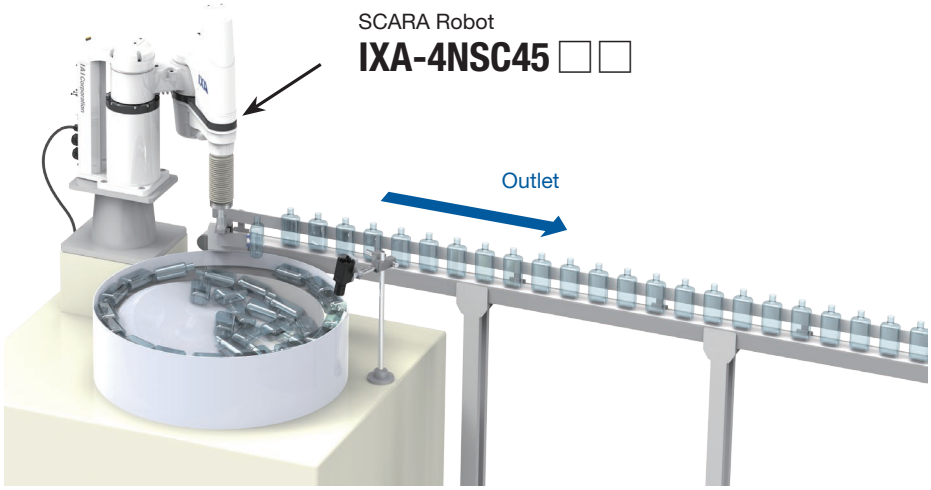
The ROBO Cylinder can be moved by specifying an arbitrary position and speed numerically.

Pharmaceuticals Medical supplies | Ingress Protection | High-Speed Transport

Video available here.
intelligentactuator.com/ae23d-09

Can be used in cleanroom environment

Applications Pick and place medical bottles



■ Bottles flowing from the parts feeder are transferred to the conveyor.

■ Operational description

Medical bottles flow from the parts feeder. → Medical bottles are transferred to the next conveyor in a high-speed motion.

■ Operating conditions

[Workpiece weight] 3kg
[Arm Length] 450mm
[Speed] 1600mm/s
[Acceleration/Deceleration] 1G

Effect of introducing the SCARA robot

1. Can be used in cleanroom

Supports ISO Class 3.

2. Industry-leading speed cycle time reduction

IXA, a cleanroom type SCARA robot, has a **standard cycle time of 0.28s**, the fastest in the industry. This reduced the overall cycle time.

3. Simulating software makes it easy to check the operation

Even without the SCARA robot itself, you can use simulation software to check the robot's motion and calculate the cycle time.

The cycle time of the IAI's SCARA robots is the fastest in the industry. In addition, it can be used in a wide range of applications since it can be combined with other models.

Pharmaceuticals Medical supplies | Multi-Point Positioning | Speed Acceleration/ deceleration Setting function

Video available here.
intelligentactuator.com/ae23d-10

Cycle time is shortened by changing speed while moving

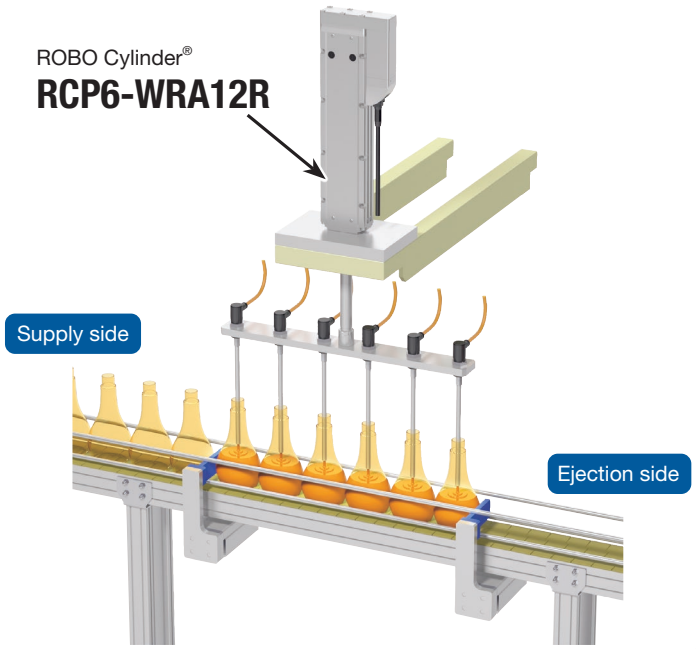
Applications Shampoo bottle filling equipment

■ Fill 6 bottles of shampoo at the same time. There are two types of bottles: 500mL and 250mL.

■ Operational description

Position the empty bottle with the bottle stopper.

The nozzle enters the bottle and fills it as it rises.



■ Operating conditions

[Workpiece weight] 3kg
[Stroke] 300mm
[Speed] 200mm/s
[Acceleration/Deceleration] 0.5G

Effect of introducing ROBO Cylinder®

1. Shortened cycle time

Since the ROBO Cylinder can **change the speed while moving**, the nozzle tip can move according to the rising speed of the liquid level. Since the distance between the nozzle tip and the liquid surface can be kept constant, the discharge volume can be increased and **the cycle time can be shortened.**

2. Reduced temporary stops

At the bottom of the bottle, the liquid level rises slowly and foaming occurs when the nozzle moves away from the liquid level. The ROBO Cylinder **keeps the distance between the nozzle and the liquid level constant and prevents foaming, thus reducing the number of temporary stops.**

3. Multi-product support

We were able to shorten the setup time by **creating a program** tailored to each bottle size in advance.

Since the acceleration(A), velocity(V) and deceleration(D) of the ROBO Cylinder can be individually set, it is possible to maintain the maximum speed and move without impact.

Pharmaceuticals Medical supplies

Space Saving

Video available here.
intelligentactuator.com/ae23d-11

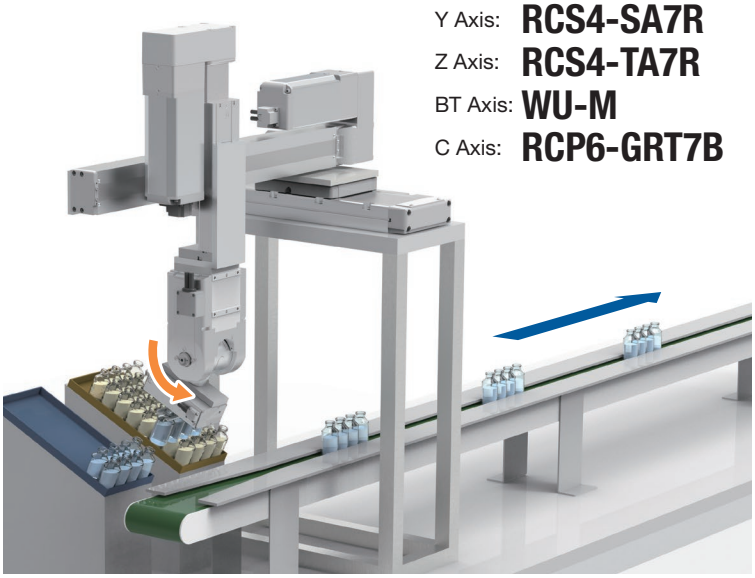
Initial costs reduced

Applications Pick and place vials

■ A Cartesian robot carries vials on an inclined plane.

■ Operational description

Pick and place is performed from a stocker installed at an angle to a conveyor on a flat surface.



X Axis: **RCS4-WSA14C**
Y Axis: **RCS4-SA7R**
Z Axis: **RCS4-TA7R**
BT Axis: **WU-M**
C Axis: **RCP6-GRT7B**

■ Operating conditions

[Workpiece weight] 0.8kg
[Cycle time (one way)] 2 seconds

Effect of introducing Cartesian robot + wrist unit

1. Initial cost reduction

By combining an Cartesian robot with a wrist unit, **we were able to lower the cost than an articulated robot.**

2. Space-saving

Since the operating range of the Cartesian robot is limited, the size of the safety fence has been reduced, **saving space.**

Even if a vertical articulated robot is not used, a [Cartesian robot + wrist unit] can pick and place even on a slope.

Pharmaceuticals Medical supplies | Ingress Protection | Speed Acceleration/ deceleration Setting function | Multi-Point Positioning

Video available here.
intelligentactuator.com/ae23d-12

Can be used in cleanroom environment

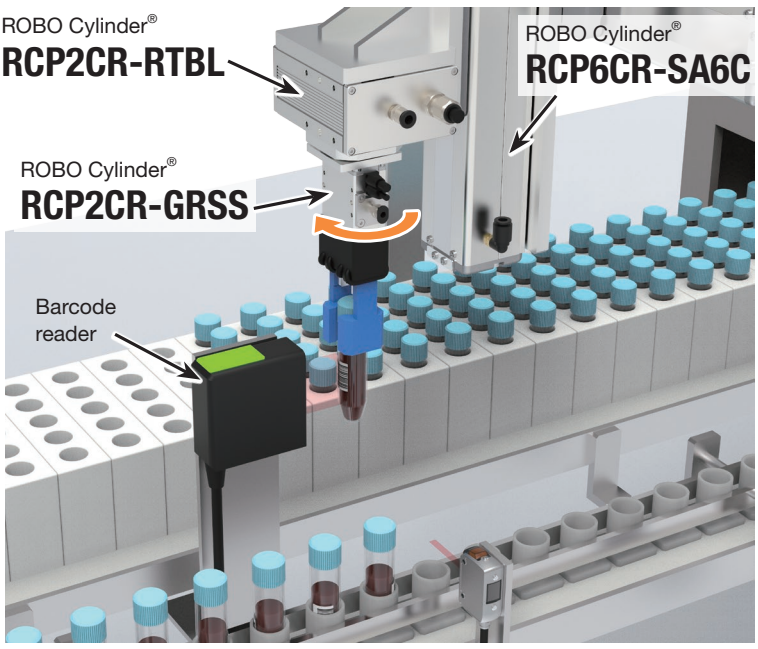
Applications Barcode reading of specimen samples

■ A combination of rotary and gripper types can be used to transfer samples.

■ Operational description

Specimen samples flowing on the conveyor are grasped by the gripper.

The rotary rotates the specimen sample, reads the barcode with a barcode reader, and transfers the sample to the next conveyor.



■ Operating conditions (RCP2CR-RTBL)

[Workpiece weight] 1.5kg
[Rotation speed] 600deg./s

Effect of introducing ROBO Cylinder®

1. Can be used in a cleanroom environment

Equivalent to **ISO Class 2.5.**

2. Simpler devices

ROBO Cylinder is capable of multi-point positioning. This **simplifies the configuration** of devices that require a lot of positioning.

The ROBO Cylinder can be moved by specifying its position and speed numerically.

Foodstuffs | High-Speed Transport | High Rigidity

Video available here.
intelligentactuator.com/ae23d-13

Cycle time can be shortened even with long strokes

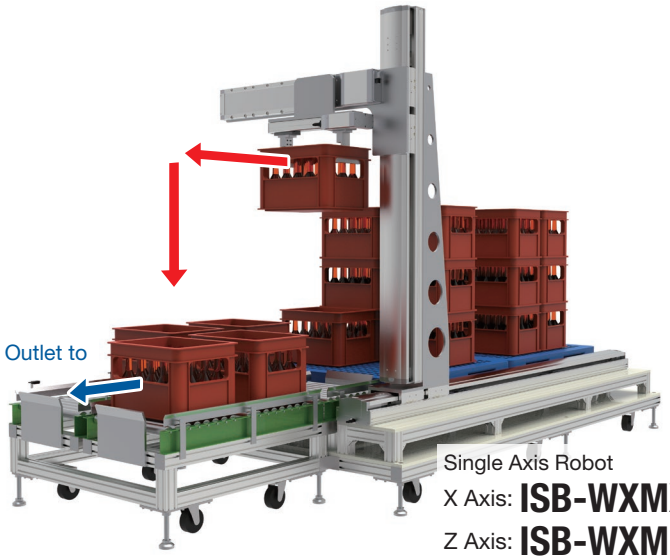
Applications Beer bottle case transfer equipment

■ A case containing 20 beer bottles is transferred.

■ **Operational description**

The stocked beer bottle case is lifted by the 2-claw gripper.

The product is moved by a X Axis and Z Axis large single axis robot and transferred to a conveyor for the next process.



Single Axis Robot
X Axis: **ISB-WXMX**
Z Axis: **ISB-WXM**
Y Axis: **RCS4-WSA16C**
G Axis: **RCP6-GRST7R**

■ **Operating conditions**

[Workpiece weight] 22kg
[Stroke] X Axis: 1800mm
Z Axis: 1000mm
Y Axis: 600mm

Effect of introducing single axis robot + ROBO Cylinder®

1. Shortened cycle time

IS(P)B-WXMX has a **maximum stroke of 3000mm and a maximum speed of 2500mm/s**. Equipped with a newly constructed intermediate support, there is no speed reduction due to stroke length. This **reduced the cycle time.**

2. Shortened start-up time

The IS(P)B is equipped with a battery-less absolute encoder as standard. Even when the power is turned on again, **the mechanical position detection mechanism** reduces the start-up time during long strokes.

IS(P)B-WXM has a maximum payload of **400kg horizontally** and **80kg vertically**.

Foodstuffs | Compact | Speed Acceleration/ deceleration Setting function

Video available here.
intelligentactuator.com/ae23d-14

Reduced cycle time

Applications Loader/Unloader for Press Machine

■ This is a loader/unloader for a press machine that makes can lids.
Materials prepared by the material feeder are delivered to the press, and products after pressing are discharged to the product shooter.

■ Operational description

① The loader/unloader moves up and down by the Z Axis, and the arm mounted on the X Axis moves forward to mount the material on the press.

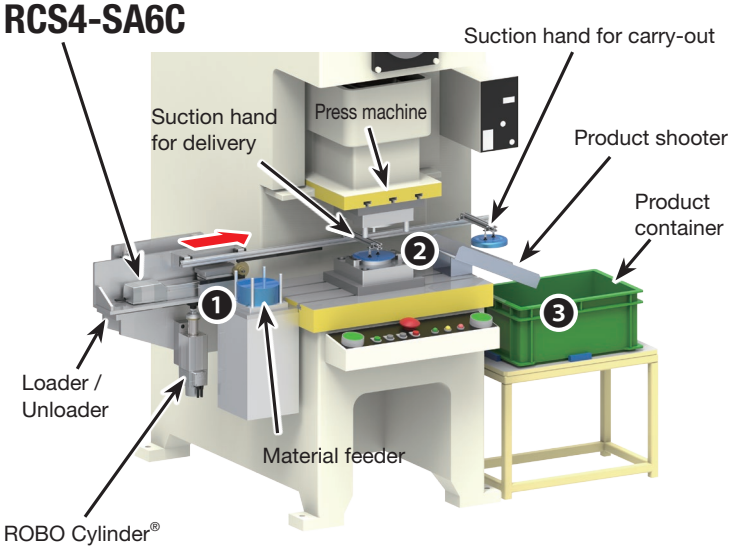
② The loader/unloader moves to the standby position and presses.

③ When the press rises, the product is unloaded into the chute at the same time as the material is loaded.

■ Operating conditions (RCS4)

[Workpiece weight] 0.3kg
[Stroke] 200mm
[Speed] 1000mm/s
[Acceleration/Deceleration] 1G

ROBO Cylinder®
RCS4-SA6C



Effect of introducing ROBO Cylinder®

1. Shortened cycle time

Since the **acceleration(A), velocity(V) and deceleration(D) of the ROBO Cylinder can be set individually**, it is possible to stop the ROBO Cylinder without impact even if it is operated at high speed. This **reduces the cycle time.**

2. Space-saving and high thrust

This product is compact and has high thrust (RCS4-SA6C lead 20mm has a rated thrust of 85N).
Therefore, **it helps save space and provides high thrust simultaneously.**

3. Multi-point positioning simplifies equipment

The ROBO Cylinder can be used for **multi-point positioning**. This simplifies the **configuration of devices that require a lot of positioning**.

By setting the deceleration to a moderate degree, we were able to reduce the impact when stopping and eliminate the failure caused by falling.

Foodstuffs | Easy Numerical Setting 1·2·3 | Load Cell Used | Zone Output | Push-Motion

Video available here.
intelligentactuator.com/ae23d-15

Reduced inspection defects

Applications Packaging Bag Leak Test Machine

■ Leak tester for packaging bags combining multi-slider and pulse press.

What is a Pulse Press?
Actuator that enables force control by combining a stepper motor and load cell. Based on feedback from the load cell, a loading repeatability of ±1.0% F.S. (full scale = maximum measurable value) is achieved.

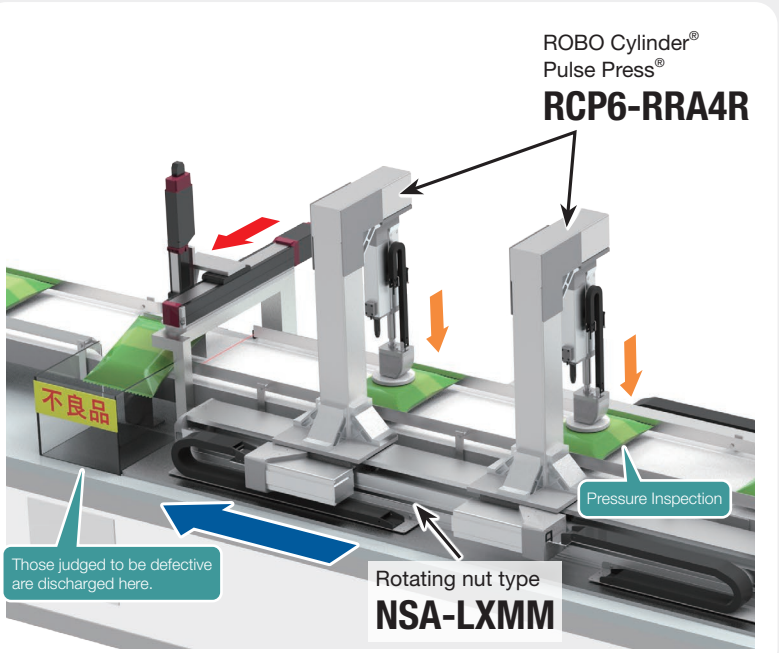
■ **Operational description**

Packaged bags of candy are flowing from the conveyor.

An actuator follows the conveyor and inspects the pressure of the bag.

■ **Operating conditions**

[Workpiece weight] 0.1kg
[Inspection speed] 0.3sec.



Effect of introducing ROBO Cylinder®

1. Reduced inspection defects

Manual inspection results in variations among inspectors, but the pulse press makes the quality criteria clear by numerical values, **thereby reducing inspection failures.**

2. Shortened cycle time

Each slider moves in conjunction with the conveyor, eliminating the need to stop the conveyor every time it is inspected, thus **shortening the cycle time.**

The pulse press can read the current load value from the load cell.

Foodstuffs | Speed Acceleration/ deceleration Setting function | Multi-Point Positioning

Video available here.
intelligentactuator.com/ae23d-16

Defects are reduced by stable operation

Applications Cake decorating equipment

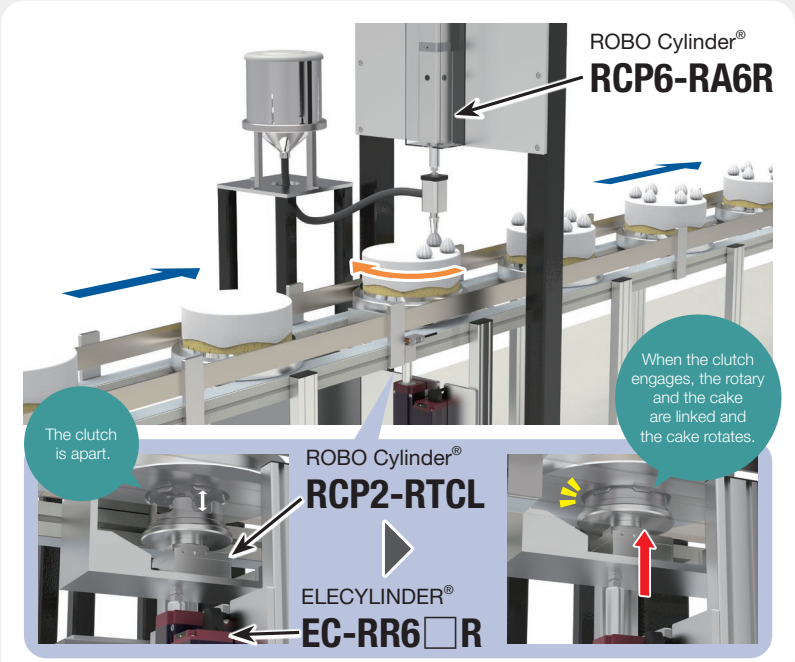
■ The ROBO Cylinder is used to decorate the whole cake.

■ **Operational description**

Cakes flow down the conveyor.

When the cake flows under the dispenser, the rod-shaped ELECYLINDER under the conveyor pushes the cake up.

The rotary and the cake are linked by the clutch mechanism, and the cake rotates according to the decoration.



■ **Operating conditions (RCP2-RTCL)**

[Workpiece weight] 5kg
[Rotation speed] 60deg./s

Effect of introducing ROBO Cylinder®

1. Highly accurate and stable operation

Since the ROBO Cylinder has **feedback control of speed 20,000 times per 1 second and position 1,000 times per 1 second**, once it is set, stable operation is possible and there is no displacement.
As a result, operation was stabilized and **defects were reduced.**

2. Support a wide variety of products

Since the rotary can be positioned at multiple points, **it is possible to support multiple types** without changing the setup.

The ROBO Cylinder rotary type is capable of infinite rotation.
Therefore, it can be used to continuously send workpieces in the same direction.

Electrical Machinery Precision

High-Speed Transport

Video available here.
intelligentactuator.com/ae23d-17

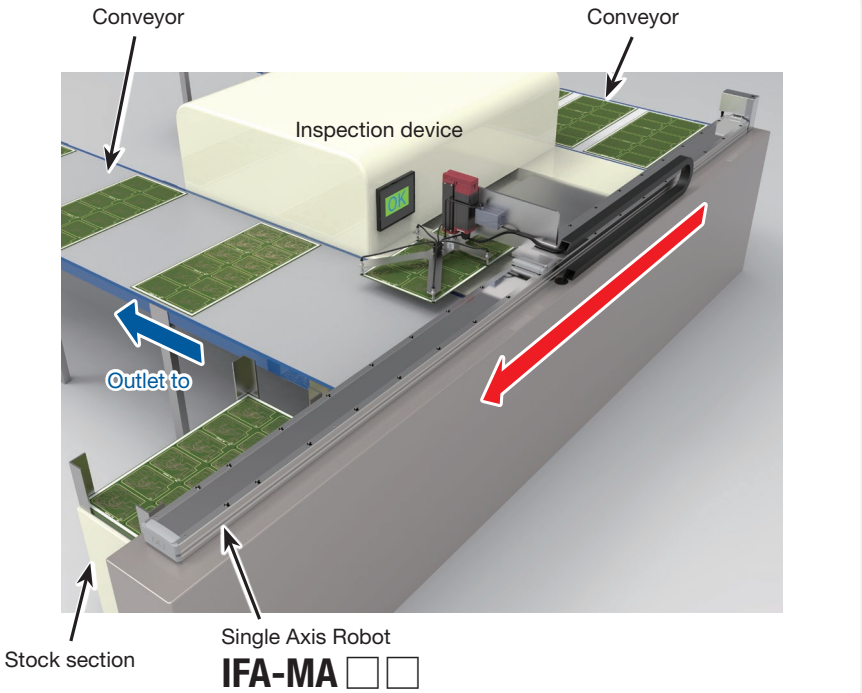
Cycle time can be shortened even with long strokes

Applications Circuit board inspection inter-process transfer equipment

■ **Operational description**

Circuit boards flowing on a conveyor are passed through an inspection device.

Acceptable products are transferred to the next process lane, and defective products are transferred to NG stock.



■ **Operating conditions**

[Workpiece weight] 0.2kg
[Stroke] 3200mm
[Speed] 2000mm/s
[Acceleration/Deceleration] 0.7G

Effect of introducing the single axis robot

1. Shortened cycle time

The belt drive actuator IFA has **a maximum stroke of 3200mm, a maximum speed of 3000mm/s, and a maximum acceleration/deceleration of 2G**. The cycle time was reduced because the speed did not decrease even with long strokes.

2. Initial cost reduction

We were able to reduce initial costs by introducing long robots at affordable prices.

IFA is highly portable with a maximum of 40kg. Even heavy objects can be transported without worry.

Electrical Machinery Precision

High-Speed Transport

Video available here.
intelligentactuator.com/ae23d-18

Reduced cycle time

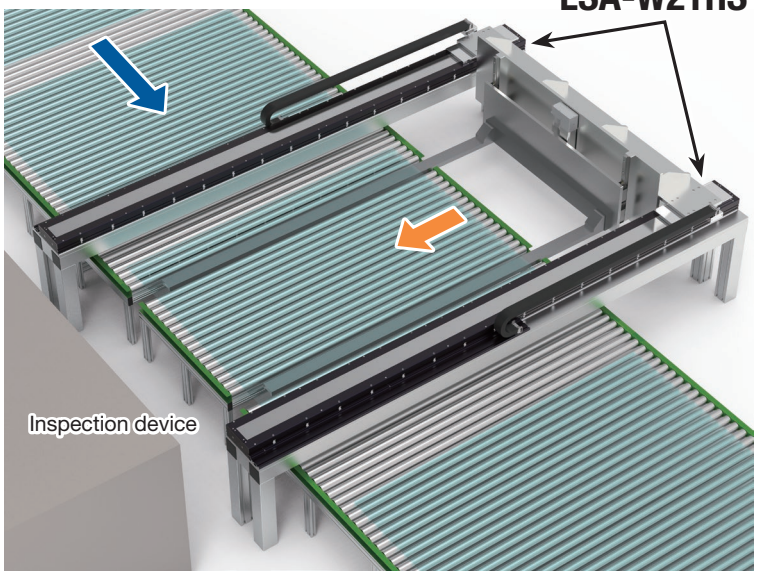
Applications Glass circuit board loader/unloader

■ Linear servo type actuators are synchronously operated.

■ Operational description

Glass circuit boards flowing on a conveyor are fed into the inspection equipment.

After inspection, the glass circuit board is removed and returned to the conveyor.



■ Operating conditions

[Workpiece weight] 34kg
[Stroke] 2785mm
[Speed] 1000mm/s
[Acceleration/Deceleration] 0.7G

Effect of introducing the LSA series

Reduced cycle time

The linear servo type has a **maximum speed of 2,500mm/s** and a **maximum acceleration/deceleration of 3G**. Since the speed does not decrease even with long strokes, **the cycle time was shortened.**

The linear servo type has a maximum stroke of 4,155mm.

Other Products | Space Saving | Built-in Controller

Video available here.
intelligentactuator.com/ae23d-19

Reduced cycle time

Applications Compact LED light assembly machine

■ By installing a 3-axis actuator on 1 table-top robot, 4 processes of cell production are integrated.

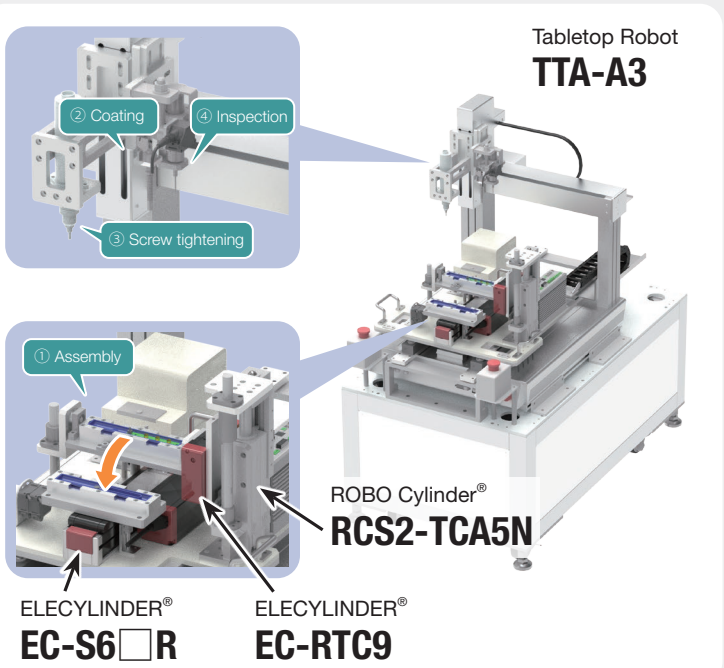
■ Operational description

① Assembly
Overlap the set workpieces on top and bottom.

② Coating
Apply adhesive to the screw holes.

③ Screw tightening
Tighten the screws into the adhesive-coated screw holes.

④ Inspection
Press the button to check if the light comes on.



■ Operating conditions

[Workpiece weight] 0.2kg
[Cycle time] 30 seconds

Effect of introducing the tabletop robot

1. Shortened cycle time

By consolidating the processes into a single robot, the number of worksets was reduced and **the cycle time was shortened**.

2. Space-saving

By consolidating the processes, **we were able to reduce equipment space by more than 1/2**.

Since the tabletop robot has a built-in controller and power supply, it can be operated easily without complicated wiring.

Other Products | Push-Motion

Video available here.
intelligentactuator.com/ae23d-20

Initial costs reduced

Applications Electric parts rack

■ This is an electric parts rack that combines a ROBO cylinder with a direct-drive motor.

■ Operational description

① The robot moves to the position of the parts tray to be used in the operation and pushes out the parts tray.

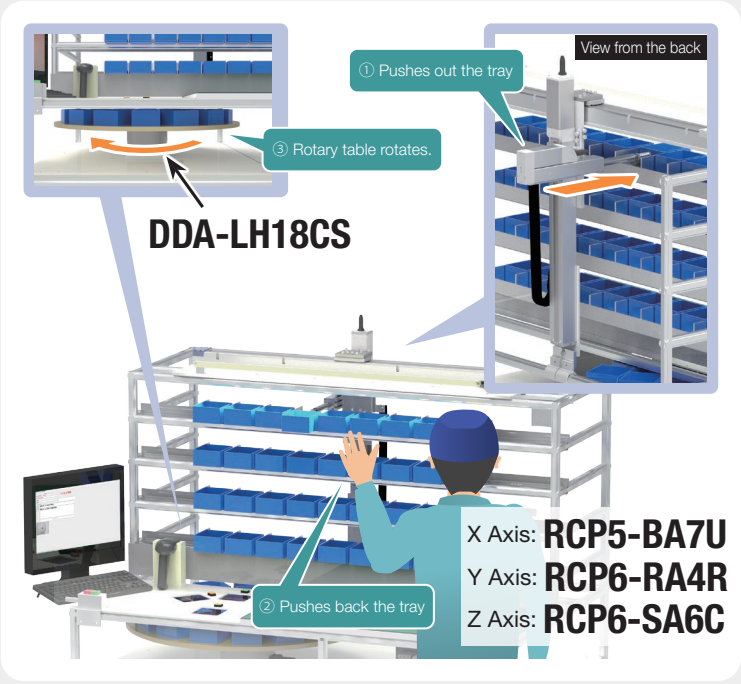
② When a person removes a part and pushes back the tray, the robot checks that the tray has been pushed back and pushes out the next tray of parts.

③ The rotary table rotates and moves the tray to be picked to the opening.

④ Repeat steps ① to ③ until assembly is completed.

■ Operating conditions

[Workpiece weight] 0.1kg



Effect of introducing ROBO Cylinder®

1. Initial cost reduction

Since it uses few sensors, **costs were kept down** compared to a typical error-proof system.

2. Eliminating parts picking errors

By automating the system, we **were able to eliminate picking errors** that inevitably occur in manual operations.

The ROBO Cylinder reads the minute changes in position information as a person takes out the parts and pushes back the tray, and moves on to the next process.

Maintenance Parts

Table of Actuator-Controller Connecting Cable Models		1-81
Table of Corresponding Actuator Cables and Robot Cables		1-88
Actuator/Controller Connection Cable Detailed View		1-93
Illustrations of Maintenance Parts/ List of Maintenance Parts	**EC**	1-113
	RCP6(CR)	1-165
	RCP6(Pulse press)	1-167
	RCP6S(CR)	1-169
	RCP6(S)W	1-173
	RCP6-RTCK/GRS RCP6-RTFML	1-176
	RCP5(CR)	1-179
	RCP5(W)	1-181
	RCP4(CR)	1-183
	RCP4W	1-185
	RCS4(CR)	1-187
	RCS3(Servo press)	1-191
	IS(P)B/ IS(P)DB(CR)	1-193
	IS(P)B-WXM/WXMX	1-195
	NSA	1-197
	IFA	1-198
	IF	1-199
	FS	1-200
	IXP	1-201
	IXA	1-203
	WU	1-215
Maintenance Parts by Series	**EC Series** EC	
	① Controller assembly / Motor cover assembly / Controller cover assembly	1-217
	② Motor unit	1-220
	③ Stainless steel sheet	1-222
	④ End cover assembly	1-222
	RCP Series RCP6(CR), RCP6(Pulse press), RCP6S(CR), RCP5(CR), RCP4(CR), RCP3, RCP2(CR)	
	① Replacement stainless steel sheet	1-223
	② Replacement motor	1-224
	③ Replacement belt	1-229

Maintenance Parts by Series	**ERC Series** ERC3, ERC2	
	① Replacement stainless steel sheet	**1-231**
	② Replacement motor	**1-231**
	RCA/RCL Series RCA2, RCA, RCACR, RCL	
	① Replacement stainless steel sheet	**1-233**
	② Replacement motor	**1-234**
	③ Replacement belt	**1-235**
	RCS Series RCS4(CR), RCS3(CR), RCS3(Servo press), RCS2(CR)	
	① Replacement stainless steel sheet	**1-236**
	② Replacement motor	**1-237**
	③ Replacement belt	**1-242**
	④ Load cell unit	**1-242**
	IS Series IS(P)B, IS(P)A, IS(P)DB, IS(P)DBCR, ISD, IS(P)DA IS(P)DACR, SSPA, SSPDACR	
	① Replacement stainless steel sheet	**1-243**
	② Replacement motor	**1-243**
	③ Mid-support parts	**1-244**
	LSA Series LSA, LSAS	
	① Replacement stainless steel sheet	**1-245**
	② Replacement cable assembly for cable carrier	**1-245**
	NS Series NS	
	① Mid-support parts	**1-246**
	② Replacement internal carrier cable	**1-246**
	NSA Series NSA	
	① Replacement motor	**1-247**
	② Replacement belt	**1-247**
	③ Replacement internal carrier cable	**1-247**
	IXP Series Standard specification, Cleanroom specification, Dust/Splash-proof specification	
	① Replacement motor	**1-248**
	② Replacement belt	**1-248**
	③ Relay cable connected to RCP4-GRS☐☐ for IXP	**1-248**
	IXA Series Standard specification, Cleanroom specification, Dust/Splash-proof specification	
	① Replacement motor	**1-249**
	② Replacement belt	**1-250**
	IK Series(Combination of RCP6's) IK2, IK3, IK4	
	① Replacement cable assembly for cable carrier	**1-251**
	TTA Series TTA	
	① Replacement timing belt	**1-253**
	② Replacement fan	**1-253**
Maintenance Parts for Controller	① Replacement battery	**1-255**
	② Replacement fan	**1-257**
	③ Replacement driver circuit board	**1-259**

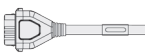
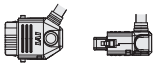
Table of Actuator/Controller Connecting Cable Models

The motor and encoder cables for connecting the actuators to the controllers are listed in the table.
Depending on the connecting actuator, only robot cables are used.

Connecting actuator		Cable type	Connecting controller				
			PCON-C/CG/CY/PL/PO/SE・PSEL (The controller is no longer produced)	PCON-CF (The controller is no longer produced)	MSEP/MCON PCON-CB(P)/CGB(P)/CYB/PLB/POB (*Some models cannot be connected.)	PCON-CFB/CGFB	
RCP6 RCP6CR RCP6W RCP5 RCP5CR RCP5W	High-thrust type (Note 1) SA8/WSA16 RA8/RA10/RRA8/WRA16	Motor-encoder integrated cable	–	–	–	CB-CFA3-MPA□□□	
		Motor-encoder integrated robot cable	–	–	–	CB-CFA3-MPA□□□-RB	
	Other than high thrust type (Note 1)	Motor-encoder integrated cable	–	–	CB-CAN-MPA□□□	–	
		Motor-encoder integrated robot cable	–	–	CB-CAN-MPA□□□-RB	–	
RCP4 RCP4CR RCP4W	SA3/RA3/ST4525E Gripper type (all models) GRSML/GRSLL/GRSWL GRLM/GRLL/GRLW	Motor-encoder integrated cable	–	–	CB-CAN-MPA□□□	–	
		Motor-encoder integrated robot cable	–	–	CB-CAN-MPA□□□-RB	–	
	High-thrust type (Note 1) RA6(56SP)	Motor-encoder integrated cable	–	–	–	CB-CFA2-MPA□□□	
		Motor-encoder integrated robot cable	–	–	–	CB-CFA2-MPA□□□-RB	
	Types other than specified above SA5/SA6/SA7 RA5/RA6(56P) ST615E/ST68E	Motor-encoder integrated cable	–	–	CB-CA-MPA□□□	–	
		Motor-encoder integrated robot cable	–	–	CB-CA-MPA□□□-RB	–	
RCP3		Motor-encoder integrated cable	–	–	–	–	
		Motor-encoder integrated robot cable	CB-PCS-MPA□□□	–	CB-APSEP-MPA□□□	–	
RCP2	RTBS(L) RTCS(L)	Motor-encoder integrated robot cable	CB-PCS-MPA□□□	–	CB-RPSEP-MPA□□□	–	
RCP2 RCP2CR RCP2W	GRSS/GRLS/GRST GRHM/GRHB SRA4R/SRGS4R SRGD4R	Motor-encoder integrated cable	–	–	–	–	
		Motor-encoder integrated robot cable	CB-PCS-MPA□□□	–	CB-APSEP-MPA□□□	–	
	High-thrust type (Note 1) HS8/RA8/RA10	Motor robot cable	–	CB-RFA-MA□□□	–	–	
		Encoder cable	–	CB-RFA-PA□□□	–	–	
		Encoder robot cable	–	CB-RFA-PA□□□-RB	–	–	
		Motor-encoder integrated cable	–	–	–	CB-CFA-MPA□□□	
		Motor-encoder integrated robot cable	–	–	–	CB-CFA-MPA□□□-RB	
	Types other than specified above BA□/SA5/SA6/SA7/SS7/SS8 RA2/RA3/RA4/RA6 RGS□C/RGD□C	Motor robot cable	CB-RCP2-MA□□□	–	–	–	
	Standard environment specification (RCP2-) Rotary type RTB(L)/RTBB(L)/RTC(L)/RTCB(L)	Encoder cable	CB-RCP2-PB□□□	–	–	–	
		Encoder robot cable	CB-RCP2-PB□□□-RB	–	–	–	
	Standard environmental specification (RCP2-) Gripper GRS/GRM/GR3SS/GR3SM/GR3LS/GR3LM	Motor-encoder integrated robot cable	–	–	CB-PSEP-MPA□□□	–	
RCP2CR RCP2W	GRS/GRM GR3SS/GR3SM Rotary type (All models) RTB(L)/RTBB(L)/RTBS(L) RTC(L)/RTCB(L)/RTCS(L)	Motor-encoder integrated cable	–	–	CB-CAN-MPA□□□	–	
		Motor-encoder integrated robot cable	CB-PCS2-MPA□□□	–	CB-CAN-MPA□□□-RB	–	
IXP	3N□/4N□ 3C□/4C□	Motor-encoder integrated cable	–	–	–	–	
		Motor-encoder integrated robot cable	–	–	–	–	
WU	S M	Motor-encoder integrated cable	–	–	–	–	
		Motor-encoder integrated robot cable	–	–	–	–	

ELECYLINDER	Cable type	Connection	
		User wiring	RCON-EC
ELECYLINDER (24V)	Power · I/O cable	CB-EC-PWBIO□□□-RB	CB-REC-PWBIO□□□-RB
ELECYLINDER (200V)	Power · I/O cable	CB-EC-PWBIO□□□-RB	CB-REC-PWBIO□□□-RB
	Motor power cable	CB-EC-PW□□□-RB	

◆4-way connector type can also be selected for the power · I/O cable.

Standard connector type (mechanical side)	4-way connector type (mechanical side)
	
CB-EC-PWBIO □□□ -RB	CB-EC2-PWBIO □□□ -RB
CB-REC-PWBIO □□□ -RB	CB-REC2-PWBIO □□□ -RB

*Refer to 1-91 for details.

We recommend the cable model search system!
intelligentactuator.com/iai-cables-search-tool/

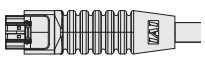
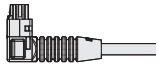
(Note 1) Actuator using high-thrust stepper motors (565P, 60P and 86P).
(Note 2) Cables will not be supplied even when the cable length is specified at the actuator model. It is required to specify a model code separately for ordering.

Refer to 1-93 for detailed view of the cable.

* Please indicate the cable length (L) in □□□
e.g.) 080 = 8m

Connecting controller						
	MSEL-PC/PCX	MSEL-PCF	RCM-P6PC		R-unit	
			Motor-encoder integrated cable	Conversion cable/unit (Note 2)	Motor-encoder integrated cable	Conversion cable/unit (Note 2)
	–	CB-CFA3-MPA□□□	–	–	CB-ADPC-MPA□□□	CB-CAN-AJ002 (Conversion cable)
	–	CB-CFA3-MPA□□□-RB	–	–	CB-ADPC-MPA□□□-RB	
	CB-CAN-MPA□□□	CB-CAN-MPA□□□	CB-ADPC-MPA□□□	–	CB-ADPC-MPA□□□	–
	CB-CAN-MPA□□□-RB	CB-CAN-MPA□□□-RB	CB-ADPC-MPA□□□-RB	–	CB-ADPC-MPA□□□-RB	–
	CB-CAN-MPA□□□	CB-CAN-MPA□□□	CB-ADPC-MPA□□□	–	CB-ADPC-MPA□□□	–
	CB-CAN-MPA□□□-RB	CB-CAN-MPA□□□-RB	CB-ADPC-MPA□□□-RB	–	CB-ADPC-MPA□□□-RB	–
	–	CB-CFA2-MPA□□□	–	–	CB-ADPC-MPA□□□	CB-CAN-AJ002 (Conversion cable)
	–	CB-CFA2-MPA□□□-RB	–	–	CB-ADPC-MPA□□□-RB	
	CB-CA-MPA□□□	CB-CA-MPA□□□	CB-ADPC-MPA□□□	CB-CAN-AJ002 (Conversion cable)	CB-ADPC-MPA□□□	CB-CAN-AJ002 (Conversion cable)
	CB-CA-MPA□□□-RB	CB-CA-MPA□□□-RB	CB-ADPC-MPA□□□-RB		CB-ADPC-MPA□□□-RB	
	–	–	CB-RCAPC-MPA□□□	–	CB-RCAPC-MPA□□□	–
	CB-APSEP-MPA□□□	CB-APSEP-MPA□□□	CB-RCAPC-MPA□□□-RB	–	CB-RCAPC-MPA□□□-RB	–
	CB-RPSEP-MPA□□□	CB-RPSEP-MPA□□□	CB-RPSEP-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA002	CB-RPSEP-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA002
	–	–	CB-RCAPC-MPA□□□	–	CB-RCAPC-MPA□□□	–
	CB-APSEP-MPA□□□	CB-APSEP-MPA□□□	CB-RCAPC-MPA□□□-RB	–	CB-RCAPC-MPA□□□-RB	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	CB-CFA-MPA□□□	–	–	CB-CFA-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA002
	–	CB-CFA-MPA□□□-RB	–	–	CB-CFA-MPA□□□-RB	
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	CB-PSEP-MPA□□□	CB-PSEP-MPA□□□	CB-PSEP-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA002	CB-PSEP-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA002
	CB-CAN-MPA□□□	CB-CAN-MPA□□□	CB-ADPC-MPA□□□	–	CB-ADPC-MPA□□□	–
	CB-CAN-MPA□□□-RB	CB-CAN-MPA□□□-RB	CB-ADPC-MPA□□□-RB	–	CB-ADPC-MPA□□□-RB	–
	CB-CAN-MPA□□□	–	–	–	–	–
	CB-CAN-MPA□□□-RB	–	–	–	–	–
	CB-CAN-MPA□□□	CB-CAN-MPA□□□	–	–	CB-ADPC-MPA□□□	–
	CB-CAN-MPA□□□-RB	CB-CAN-MPA□□□-RB	–	–	CB-ADPC-MPA□□□-RB	–

◆4-way connector type can also be selected for [CB-CAN-MPA□□□ (-RB)] and [CB-ADPC-MPA□□□ (-RB)].

Standard connector type (mechanical side)	4-way connector type (mechanical side)
	
CB-CAN-MPA □□□ (-RB)	CB-CAN2-MPA □□□ (-RB)
CB-ADPC-MPA □□□ (-RB)	CB-ADPC2-MPA □□□ (-RB)

*Refer to 1-89 for details.

Table of Actuator/Controller Connecting Cable Models

The motor and encoder cables for connecting the actuators to the controllers are listed in the table.
Depending on the connecting actuator, only robot cables are used.

Connecting actuator			Cable type	Connecting controller			
				MSEP/MCON	ACON-CA/CB/CGB/ CYB/PLB/POB	ACON-C/CG/CY/ PL/PO/SE・ASEL (The controller is no longer produced)	
RCA2 RCA2CR RCA2W	CNS (small connector) specification Options available		Motor-encoder integrated cable	CB-CAN-MPA□□□	CB-CAN-MPA□□□	–	
			Motor-encoder integrated robot cable	CB-CAN-MPA□□□-RB	CB-CAN-MPA□□□-RB	–	
	CNS (small connector) specification No options		Motor-encoder integrated cable	–	–	–	
			Motor-encoder integrated robot cable	CB-APSEP-MPA□□□	CB-APSEP-MPA□□□	CB-ACS-MPA□□□	
RCA RCACR RCAW	SRA4R SRGS4R SRGD4R		Motor-encoder integrated cable	–	–	–	
			Motor-encoder integrated robot cable	CB-APSEP-MPA□□□	CB-APSEP-MPA□□□	CB-ACS-MPA□□□	
	Types other than specified above		Motor Cable	–	–	CB-ACS-MA□□□	
			Encoder Cable	–	–	CB-ACS-PA□□□	
			Encoder robot cable	–	–	CB-ACS-PA□□□-RB	
			Motor-encoder integrated robot cable	CB-ASEP2-MPA□□□	CB-ASEP2-MPA□□□	–	
RCD	RA1DA	Applicable controller D3	Motor-encoder integrated cable	CB-CA-MPA□□□	–	–	
			Motor-encoder integrated robot cable	CB-CA-MPA□□□-RB	–	–	
		Applicable controller D5, D6	Motor-encoder integrated cable	CB-CAN-MPA□□□	–	–	
			Motor-encoder integrated robot cable	CB-CAN-MPA□□□-RB	–	–	
	GRSNA		Motor-encoder integrated cable	CB-CAN-MPA□□□	–	–	
			Motor-encoder integrated robot cable	CB-CAN-MPA□□□-RB	–	–	
RCL	RA1L/2L/3L (with brake)(Note2) (Note3)		Motor-encoder integrated robot cable	CB-APSEP-MPBA□□□	CB-APSEP-MPBA□□□	CB-ACS-MPBA□□□	
	Types other than specified above		Motor-encoder integrated robot cable	CB-APSEP-MPA□□□	CB-APSEP-MPA□□□	CB-ACS-MPA□□□	

We recommend the cable model search system!
intelligentactuator.com/iai-cables-search-tool/

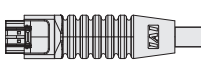
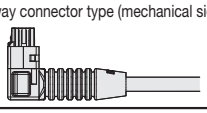
(Note 1) Cables will not be supplied even when the cable length is specified at the actuator model. It is required to specify a model code separately for ordering.
(Note 2) A brake cable (CB-RCLB-BJ□□□) is needed for the controller with brake (B/BN).
(Note 3) RCL Actuators with brake are not connectable to R-unit.

Refer to 1-93 for detailed view of the cable.

* Please indicate the cable length (L) in □□□
e.g.) 080 = 8m

Connecting controller						
	DCON-CA/CB/CGB/CYB/PLB/POB	RCM-P6AC		RCM-P6DC	R-unit	
		Motor-encoder integrated cable	Conversion cable/unit		Motor-encoder integrated cable	Conversion cable/unit
	–	CB-ADPC-MPA□□□	–	–	CB-ADPC-MPA□□□	–
	–	CB-ADPC-MPA□□□-RB	–	–	CB-ADPC-MPA□□□-RB	–
	–	CB-RCAPC-MPA□□□	–	–	CB-RCAPC-MPA□□□	–
	–	CB-RCAPC-MPA□□□-RB	–	–	CB-RCAPC-MPA□□□-RB	–
	–	–	–	–	CB-RCAPC-MPA□□□	–
	–	CB-APSEP-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA□□□-RB	–	CB-RCAPC-MPA□□□-RB	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	CB-ASEP2-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA□□□-RB	–	CB-ASEP2-MPA□□□	RCM-CV-APCS (Conversion unit) CB-ADPC-MPA002
	CB-CA-MPA□□□	–	–	–	–	–
	CB-CA-MPA□□□-RB	–	–	–	–	
	CB-CAN-MPA□□□	–	–	CB-ADPC-MPA□□□	CB-ADPC-MPA□□□	–
	CB-CAN-MPA□□□-RB	–	–	CB-ADPC-MPA□□□-RB	CB-ADPC-MPA□□□-RB	–
	CB-CAN-MPA□□□	–	–	CB-ADPC-MPA□□□	CB-ADPC-MPA□□□	–
	CB-CAN-MPA□□□-RB	–	–	CB-ADPC-MPA□□□-RB	CB-ADPC-MPA□□□-RB	–
	–	–	–	–	–	–
	–	–	–	–	CB-RCAPC-MPA□□□(-RB) (Note 3)	–

◆4-way connector type can also be selected for [CB-CAN-MPA□□□ (-RB)] and [CB-ADPC-MPA□□□ (-RB)].

Standard connector type (mechanical side)	4-way connector type (mechanical side)
	
CB-CAN-MPA □□□ (-RB)	CB-CAN2-MPA □□□ (-RB)
CB-ADPC-MPA □□□ (-RB)	CB-ADPC2-MPA □□□ (-RB)

*Refer to 1-89 for details.

Table of Actuator/Controller Connecting Cable Models

The motor and encoder cables for connecting the actuators to the controllers are listed in the table.
Depending on the connecting actuator, only robot cables are used.

<table>
<tr><th rowspan="2" colspan="4">Series / Type</th><th colspan="2">SCON/SSEL/XSEL-P/Q/R/S/RA/SA
MSCON (*Some models cannot be connected.)</th><th colspan="2">R-unit/SCON2
(*Some models cannot be connected.)</th><th rowspan="2">Encoder Cable</th><th rowspan="2">Encoder Robot Cable</th></tr>
<tr><th>Motor Cable</th><th>Motor Robot Cable</th><th>Motor Cable</th><th>Motor Robot Cable</th></tr>
<tr><td colspan="4">RCS4(CR)</td><td>CB-RCC-MA□□□</td><td>CB-RCC-MA□□□-RB</td><td>CB-RCC1-MA□□□</td><td>CB-X2-MA□□□</td><td>–</td><td>CB-X1-PA□□□</td></tr>
<tr><td rowspan="5">RCS3(P)</td><td colspan="3">RA15R/RA20R</td><td>–</td><td>CB-RCS3-MA□□□-RB</td><td>–</td><td>–</td><td>–</td><td>CB-RCS3-PLA□□□-RB</td></tr>
<tr><td colspan="3">RA4R/RA6R/RA7R
/RA8R/RA10R</td><td rowspan="15">CB-RCC-MA□□□</td><td rowspan="15">CB-RCC-MA□□□-RB</td><td rowspan="15">CB-RCC1-MA□□□</td><td rowspan="15">CB-X2-MA□□□</td><td>CB-RCS2-PLDA□□□</td><td>CB-RCS2-PLDA□□□-RB</td></tr>
<tr><td colspan="3">CTZ5C
CT8C</td><td>–</td><td>CB-X1-PA□□□</td></tr>
<tr><td colspan="3">Types other than
specified above</td><td>CB-RCS2-PA□□□</td><td>CB-X3-PA□□□</td></tr>
<tr><td rowspan="3">RCS3(P)CR
RCS2
RCS2CR
RCS2W</td><td colspan="2">RTC□L</td><td rowspan="2">CB-RCS2-PLA□□□</td><td rowspan="2">CB-X2-PLA□□□</td></tr>
<tr><td colspan="2">RT6</td></tr>
<tr><td colspan="2">Types other than
specified above</td><td>CB-RCS2-PA□□□</td><td>CB-X3-PA□□□</td></tr>
<tr><td rowspan="5">RCS2</td><td rowspan="5">RA13R
(Note 1)</td><td rowspan="3">Without load cell</td><td>Without brake</td><td>CB-RCS2-PLA□□□</td><td>CB-X2-PLA□□□</td></tr>
<tr><td>With brake (with box)</td><td>[Actuator ~ Brake box]
CB-RCS2-PLA□□□
[Brake box ~ Controller]
CB-RCS2-PLA010</td><td>[Actuator ~ Brake box]
CB-X2-PLA□□□</td></tr>
<tr><td>With brake (without box)</td><td>[Actuator ~ Brake box]
CB-RCS2-PLA□□□</td><td>[Actuator ~ Brake box]
CB-X2-PLA□□□</td></tr>
<tr><td rowspan="2">With load cell*1</td><td>Without brake</td><td>CB-RCS2-PLLA□□□</td><td>CB-RCS2-PLLA□□□-RB</td></tr>
<tr><td>With brake (with box)</td><td>[Actuator ~ Brake box]
CB-RCS2-PLA□□□
[Brake box ~ Controller]
CB-RCS2-PLLA010
[Load cell ~ Controller]
CB-LDC-CTL□□□-JY *3</td><td>[Actuator ~ Brake box]
CB-X2-PLA□□□</td></tr>
<tr><td></td><td>With brake (without box)*2</td><td>[Actuator ~ Brake box]
CB-RCS2-PLA□□□</td><td>[Actuator ~ Brake box]
CB-X2-PLA□□□</td></tr>
</table>

*1 CB-LDC-CTL□□□ (cable inside the carrier) is included with actuators with load cells. (Cable length depends on stroke)
*2 CB-RCS2-PLLA010 (brake box to controller) or CB-LDC-CTL□□□ -JY (load cell to controller) is required.
*3 Robot cable is standard.

We recommend the cable model search system!
intelligentactuator.com/iai-cables-search-tool/

(Note 1) Encoder cable with limit switch wiring is for actuators equipped with limit switch. (Limit switch wiring is built-in.)

Refer to 1-93 for detailed view of the cable.

* Please indicate the cable length (L) in □□□
e.g.) 080 = 8m

Series	Type	SCON/SSEL/XSEL-P/Q/R/S/RA/SA MSCON (*Some models are not connectable.)	R-unit/SCON2	Encoder Robot Cable
		Motor Robot Cable	Motor Robot Cable	
IS(P)B	SXM/SXL MXM/MXL MXMX LXM/LXL LXMX/LXUWX WXM/WXMX	CB-X-MA□□□	CB-X2-MA□□□	CB-X1-PA□□□ (Standard spec.) CB-X1-PA□□□-AWG24 (Battery-less absolute with cable of 20–30m) CB-X1-PLA□□□ (Note 1) (With home limit switch / creep sensor) CB-X1-PLA□□□-AWG24 (Battery-less absolute with cable of 20–30m)
IS(P)DB IS(P)DBCR	S M MX L LX			
SSPA SSPDACR	SXM/MXM/LXM			CB-X1-PA□□□ (Standard spec.) CB-X1-PLA□□□ (Note 1) (With home limit switch / creep sensor)
IS(P)A IS(P)ACR	SXM/SYM/SZM MXM/MYM/MZM MXMX LXM/LYM/LZM LXMX/LXUWX WXM/WXMX			
IS(P)DA IS(P)DACR	S M MX L LX			
IFA	SA MA			
RS	RS-30/60			
NSA	MXMS/MXMM LXMS/LXMM LXMXS/LXMXM WXMS/WXMM WXMXS/WXMXM			CB-X1-PA□□□ (Standard spec.)
NS	SXMSA/SXMMA SZMSA/SZMMA MXMSA/MXMMA MXMXSA MZMSA/MZMMA LXMSA/LXMMA LXMXSA LZMSA/LZMMA			CB-X3-PA□□□ (Standard spec.) CB-X2-PLA□□□ (Note 1) (With home limit switch / creep sensor)
ZR	S M		–	CB-X1-PA□□□ *For incremental specifications, the R axis is CB-X1-PLA□□□
DDW DDA DDACR	LT18□		CB-X2-MA□□□	CB-X3-PA□□□ (Standard spec.)
	LH18□	CB-XMC-MA□□□	CB-XMC1-MA□□□	

Table of Actuator/Controller Connecting Cable Models

(Note 1) Encoder cable with limit switch wiring is for actuators equipped with limit switch. (Limit switch wiring is built-in.)

Refer to 1-93 for detailed view of the cable.

* Please indicate the cable length (L) in □□□
e.g.) 080 = 8m

Series	Type	SCON/SSEL/XSEL-P/Q/R/S/RA/SA MSCON (*Some models are not connectable.)	R-unit/SCON2	Encoder Robot Cable
		Motor Robot Cable	Motor Robot Cable	
LSA	S6 S8 S10	CB-X-MA□□□	CB-X2-MA□□□	CB-X3-PA□□□
	H8			
	L15			
	N10 N15 N19			
	W21	CB-XMC-MA□□□	CB-XMC1-MA□□□	CB-X2-PLA□□□ (Note 1) (Specifications with home limit switch)
LSAS	N10 N15	CB-X-MA□□□	CB-X2-MA□□□	CB-X1-PA□□□ (Standard spec.)
IXA *1	NNN18□□ NN□30□□ NN□45□□ NN□60□□ NNN80□□ NNN100□□ NSN30□□ NSN45□□ NSN60□□	CB-X-MA□□□		CB-X1-PA□□□
	NS□80□□ NS□100□□ NHN10040 NH□12040	CB-X-MA□□□ (1st axis only: CB-XMC-MA□□□)		
IS(P)WA	S M L	CB-XEU-MA□□□	CB-XEU1-MA□□□	CB-X1-PA□□□-WC (Splash-proof spec.)

*1 A separate brake cable (CB-IXA-BK□□□-□) is required. Refer to P. 1-108 for details.

Table of Corresponding Actuator Cables and Robot Cables

The following table shows whether actuator cables are corresponding to robot cables or non-robot cables.
There is no actuator cable for the joint type, but the motor-encoder cable is directly connected to the actuator.

Corresponding to Robot Cable ○: Corresponding ×: Non-corresponding –: Actuator cable is not used due to the joint type.

■ Slider type

Type		Corresponding to robot cable
ERC2	SA6,7	○
ERC3	SA5,7	–
RCP2	SA5,6,7	×
	SS7,8	×
	HS8	×
	BA6,7	×
RCP3	SA2	○
	SA3,4,5,6	–
RCP4	SA3	–
	SA5,6,7	×
RCP5	SA4,6,7	–
	BA4,6,7	–
RCP6	SA4,6,7,8	–
	WSA10,12,14,16	–
RCA	SA4,5,6	×
	SS4,5,6	×
RCA2	SA3,4,5,6	–
RCS2	SA4,5,6,7	×
	SS7,8	×
RCS3	SA8	×
	SS8	×
	CT8	○
RCS4	All types	○
ISA	S,M,L	×
	W	×
ISB	S,M,L,W	○
ISDA	S,M,L	×
ISDB	S,M,L	○
SSPA	S,M,L	○
NS	S,M,L	○
NSA	All types	○
IFA	SA,MA	×
RS	30,60	○
LSA	S6,S8,S10	○
	H8	○
	L15	○
	N10,N15,N19	○
	W21S	○
	W21H	○
LSAS	N10,N15	○

■ Gripper

Type		Corresponding to robot cable
RCP2	GRSS,GRLS	×
	GRS,GRM	×
	GRST	○
	GR3L,GR3S	×
	GRHM,GRHB	–
RCP4	GRSML,GRSLL,GRSWL	○
	GRLM,GRLL,GRLW	○
RCP6	GRT7	○
RCD	GRSNA	×
RCS2	GR8	×

■ Rod type

Type		Corresponding to robot cable
ERC2	RA6,7	○
ERC3	RA4,6	–
RCP2	RA2	×
	RA3	×
	RA4,6	×
	RA8	×
	RA10	×
	SRA4R	○
RCP3	RA2(Sliding screw)	○
	RA2(Ball screw)	○
RCP4	RA3	–
	RA5,6	×
RCP5	RA4,6,7,8,10	–
RCP6	RA4,6,7,8	–
	RRA4,6,7,8	–
	WRA10,12,14,16	–
RCD	RA1DA	×
RCA	RA3,4	×
	SRA4R	○
RCA2	R*3N,4N(Sliding screw)	○
	R*3N,4N(Ball screw)	○
	RA2	×
RCS2	RA4	×
	RA5	○
	RA13R	×
	SRA7BD	○
	**5N	×
RCS3	RA4,6,7,8,10	○

■ Table type

Type		Corresponding to robot cable
RCP3	TA3,4	–
	TA5,6,7	–
RCP6	TA4,6,7	–
RCS3	CTZ5C	○
RCA2	TA4,5,6,7	–
	**3N,4N(Sliding screw)	○
	**3N,4N(Ball screw)	○

■ Multi-axis products

Type		Corresponding to robot cable
TT	A,C	–
TTA	A,C	–
IX	NNN1*05(Small type)	×
	NNN****	×
	NNN1****(Extra large)	–
	NSN****	×
	TNN****	×
	HNN****	×
	NNC****	×
	NNW****	×
	NNN1***H	×
	NNN****H	×
	NSN****H	×
	TNN****H	×
	HNN****H	×
	NNC****H	×
	NNW****H	×
IXP	3N****,4N****	–

■ Rotary

Type		Corresponding to robot cable
RCP2	RT*S(Small type)	×
	RT* (Medium type)	○
	RT*B(Large type)	○
RCS2	RT6,7	×
	Hollow rotary	×
DD	*18	○
DDA	*18	○
RS	30,60	○

■ Special application

Type		Corresponding to robot cable
RCP4	ST68,615	×
	ST4525	–
ZR	S,M	×
WU	S,M	○

■ Cleamroom specification

Type		Corresponding to robot cable
RCP2CR	SA5,6,7	×
	SS7,8	×
	HS8	×
	GRSS,GRLS	×
	GRS,GRM	×
	GR3L,GR3S	×
	RT*S(Small type)	○
	RT* (Medium type)	○
	RT*B(Large type)	○
RCP4CR	SA5,6,7	×
RCP5CR	SA4,6,7	–
RCP6CR	SA4,6,7,8	–
	WSA10,12,14,16	–
RCACR	SA3,4,5,6	×
RCA2CR	Ultra small type	○
RCS2CR	SA4,5,6,7	×
	SS7,8	×
	SA8	×
	Ultra small type	○
RCS3CR	SS8	×
ISDACR	S,M,L	×
	S,M,L(ESD)	×
	W	×
ISDBCR	S,M,L	○
SSPACR	S,M,L	○
DDCR	*18	○
DDACR	*18	○

■ Dust/splash-proof specification

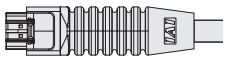
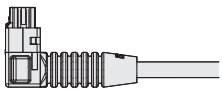
Type		Corresponding to robot cable
RCP2W	RA4,6	×
	RA10	×
	GRSS,GRLS	×
	GRS,GRM	×
	GR3L,GR3S	×
	RT*S(Small type)	○
	RT* (Medium type)	○
	RT*B(Large type)	○
RCP4W	SA5,6,7	○
	RA6,7	○
RCP5W	RA8,10	○
RCP6(S)W	All types	○
RCAW	RA3,4	×
RCA2W	Ultra small type	○
RCS2W	RA4	×
	Ultra small type	○
ISWA	S,M,L	×
DDW	*18	○

RC 4-way connector cable

This cable can change the orientation of the cable connector of the ROBO Cylinder in four directions.
It can also be used for models for which the cable exit direction change option is not available.

■ Model

* Please indicate the cable length in □□□
e.g.) 050 = 5m

		Standard connector (actuator side)	4-way connector (actuator side)
External view			
Applicable controller	MSEP MCON PCON ACON DCON MSEL	CB-CAN-MPA□□□(-RB)	CB-CAN2-MPA□□□(-RB)
	RCON RSEL	CB-ADPC-MPA□□□(-RB)	CB-ADPC2-MPA□□□(-RB)

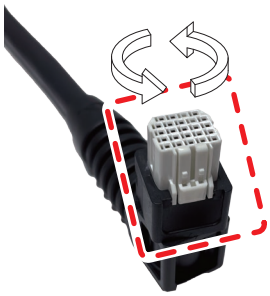
■ How to Order

Specify "N" (no cable) as the cable length of the actuator type, and arrange the cable separately.

(Example) When ordering a 4-way connector 5m
Actuator model : RCP6-SA6C-WA-42P-12-600 P3-N
4-way cable model : CB-CAN2-MPA050

■ Assembly Method

① Rotate the connector housing.



Caution

It cannot rotate by 360 degrees.

The reference position can be rotated "once to the left" or "twice to the right".
(The number of times of construction shall be **10 or less**.)

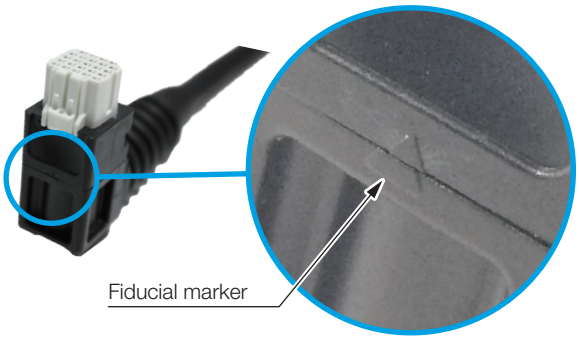
Reference position

180° rotation

90° left rotation

90° right rotation

② Align the claw with the base marker.

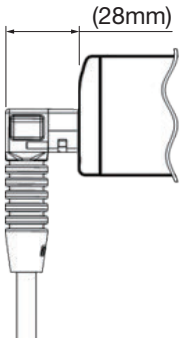


Caution

Be aware that the cable may interfere with the actuator depending on the cable exit direction.

(Example) RCP6-SA4R
CJO option selected

Mounting cannot be performed in the orientation shown in the above image.

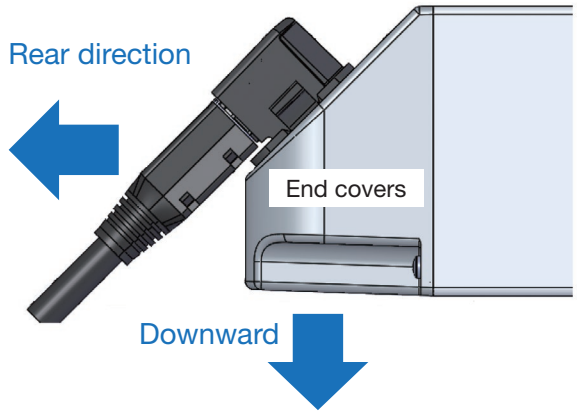


RCP6 high-rigidity 4-row guide cable connector

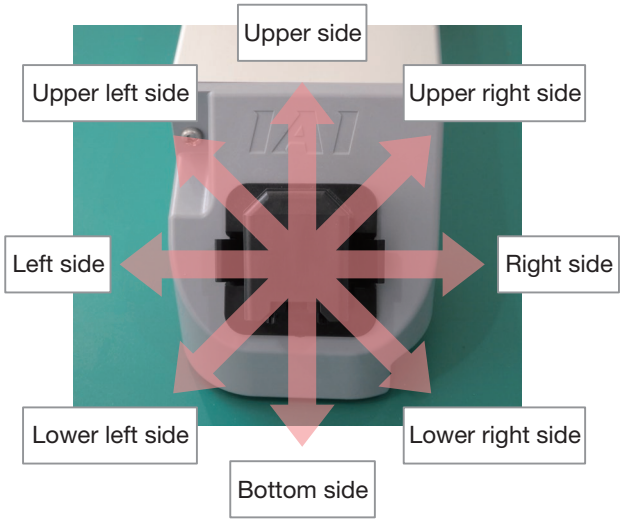
Applicable models: RCP6-HSA□R, HSA□X

The customer can select any of the eight cable exit directions (toward the connector).

[Cable exit direction (default)]

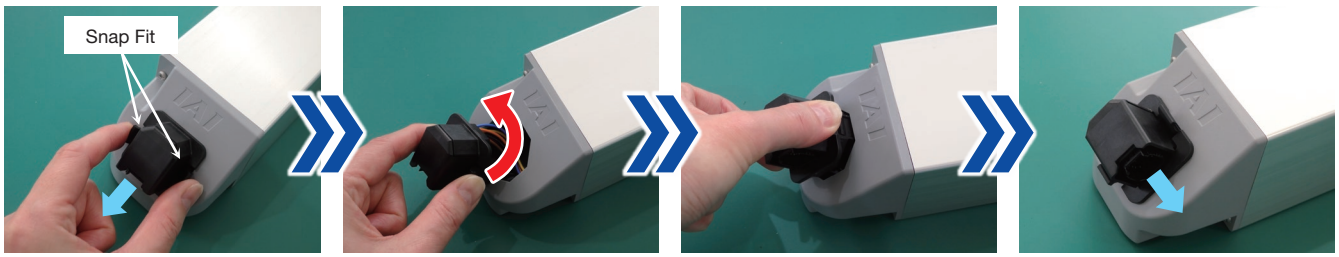


[Change of cable exit direction (8 directions)]



■ Changing the cable exit direction

Example: Changing the cable exit direction from down to right



Remove the connector by pushing in the snap fit on both sides.

Rotate the connector in the direction you want the cable to exit.

Push in until the snap fit clicks.

Right direction change is complete.

<Notes>

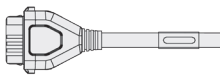
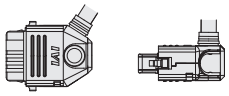
- When removing the connector from the cover, do not pull the internal wiring too far.
- When inserting the connector into the end cover, be careful not to get the wiring pinched.
- If the connector is rotated beyond 360 degrees, the internal wiring will be overloaded and may malfunction. If you feel the load when rotating it, rotate it in the opposite direction.
- When disconnecting the connector, take care not to allow foreign matter or dust to get inside.

EC 4-way connector cable

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

■ Model

* Please indicate the cable length in □□□
e.g.) 050 = 5m

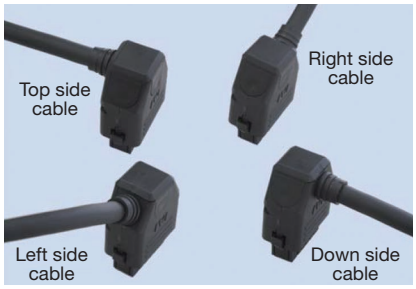
	Standard connector (actuator side)	4-way connector (actuator side)
External view		
User wiring specification	CB-EC-PWBIO□□□-RB	CB-EC2-PWBIO□□□-RB
RCON-EC connection specification	CB-REC-PWBIO□□□-RB	CB-REC2-PWBIO□□□-RB

■ How to Order

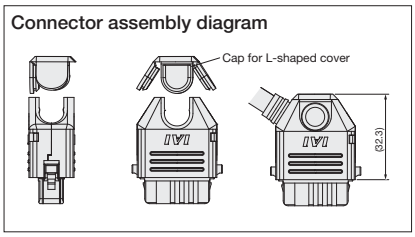
The cable length may be from 1m to 10m long. The length can be specified in 1m units.

(Example) When ordering a 4-way connector 3m/10m
Cable length 3m : CB-EC2-PWBIO030-RB
Cable length 10m : CB-EC2-PWBIO100-RB

■ Assembly Method



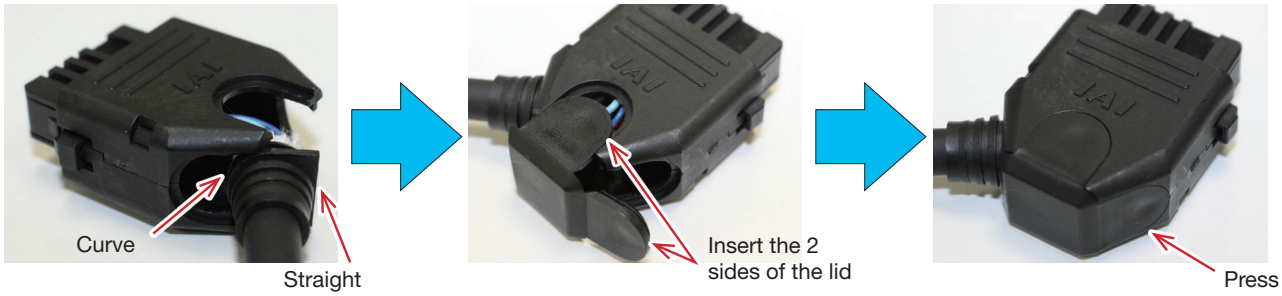
Cable direction can be set to any of 4 directions



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

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

③ Finally, press the remaining side of the lid.



MEMO

Actuator/Controller Connection Cable Detailed View

■ Cable Model List

Motor/Encoder Integrated cable	Reference Page
CB-ACS-MPA□□□	1-94
CB-ACS-MPBA□□□	
CB-ADPC-MPA□□□/CB-ADPC-MPA□□□-RB	
CB-ADPC-MPA□□□-RB-JY	
CB-ADPC2-MPA□□□/CB-ADPC2-MPA□□□-RB	1-95
CB-APSEP-MPA□□□	
CB-ASEP2-MPA□□□	
CB-CA-MPA□□□/CB-CA-MPA□□□-RB	
CB-CAN-MPA□□□/CB-CAN-MPA□□□-RB	1-96
CB-CAN2-MPA□□□/CB-CAN2-MPA□□□-RB	
CB-CFA-MPA□□□/CB-CFA-MPA□□□-RB	
CB-CFA2-MPA□□□/CB-CFA2-MPA□□□-RB	1-97
CB-CFA3-MPA□□□/CB-CFA3-MPA□□□-RB	
CB-PSEP-MPA□□□	
CB-RCAPC-MPA□□□/CB-RCAPC-MPA□□□-RB	1-98
CB-RPSEP-MPA□□□	

Motor cable	Reference Page
CB-ACS-MA□□□	1-99
CB-RCC-MA□□□/CB-RCC-MA□□□-RB	
CB-RCC1-MA□□□/CB-X2-MA□□□	
CB-RCP2-MA□□□/CB-RFA-MA□□□	
CB-RCS3-MA□□□-RB	
CB-X-MA□□□	1-100
CB-X-MA□□□-JY1	
CB-XEU-MA□□□	
CB-XEU1-MA□□□	
CB-XMC-MA□□□	
CB-XMC1-MA□□□	

Encoder cable	Reference Page
CB-ACS-PA□□□/CB-ACS-PA□□□-RB	1-101
CB-RCP2-PB□□□/CB-RCP2-PB□□□-RB	
CB-RFA-PA□□□/CB-RFA-PA□□□-RB	
CB-RCS3-PLA□□□-RB	
CB-RCS2-PA□□□/CB-X3-PA□□□	1-102
CB-RCS2-PLA□□□/CB-X2-PLA□□□	
CB-RCS2-PLDA□□□/CB-RCS2-PLDA□□□-RB	
CB-RCS2-PLLA□□□/CB-RCS2-PLLA□□□-RB	1-103
CB-X1-PA□□□	
CB-X1-PA□□□-JY1	
CB-X1-PA□□□-AWG24	
CB-X1-PA□□□-WC	1-104
CB-X1-PLA□□□	
CB-X1-PLA□□□-JY1	
CB-X1-PLA□□□-AWG24	

ELECYLINDER cable	Reference Page
CB-EC-PW□□□-RB	1-105
CB-EC-PWBIO□□□-RB	
CB-EC2-PWBIO□□□-RB	
CB-REC-PWBIO□□□-RB	1-106
CB-REC-PWBIO□□□-RB-JY	
CB-REC2-PWBIO□□□-RB	

RCP6S cable	Reference Page
CB-RCP6S-PWBIO□□□/CB-RCP6S-PWBIO□□□-RB	1-107
CB-RCP6S-RLY□□□/CB-RCP6S-RLY□□□-RB	
CB-RCP6S-PWBIO□□□-JY1/CB-RCP6S-PWBIO□□□-JY1-RB	
CB-RCP6S-RLY□□□-JY1/CB-RCP6S-RLY□□□-JY1-RB	

Brake cable	Reference Page
CB-DDB-BK□□□	1-108
CB-IXA-BK□□□-1	
CB-IXA-BK□□□-2	
CB-IXA-BK□□□-3	

Load cell-controller connection cables	Reference Page
CB-LDC-CTL□□□-JY	1-108

PIO cable	Reference Page
CB-DS-PIO□□□	1-109
CB-PAC-PIO□□□	
CB-PAD-PIO□□□	
CB-PAD-PIOS□□□	
CB-X-PIO□□□	1-110
CB-X-PIOH□□□	

Pulse train control cable	Reference Page
CB-SC-PIOS□□□	1-110

I/O cables for driver stop and safety functions	Reference Page
CB-SC-STO030	1-110

RCON-EXT connection cable	Reference Page
CB-RE-CTL□□□	1-111

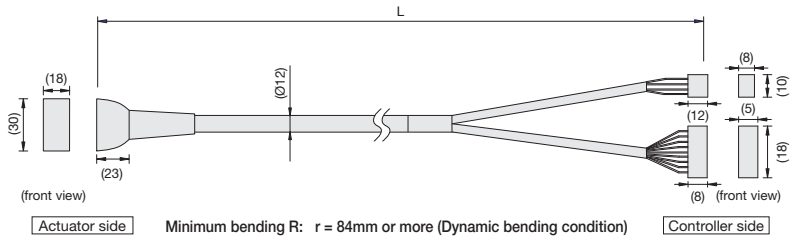
Conversion cable	Reference Page
CB-CAN-AJ002	1-111

Multi-function connector cable	Reference Page
CB-SC2-MFC□□□	1-111

■ Motor/Encoder Integrated Cable

Model CB-ACS-MPA□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



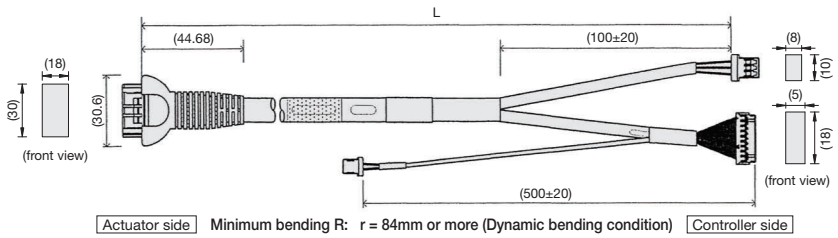
Actuator side　Minimum bending R: r = 84mm or more (Dynamic bending condition)　Controller side

1-1827863-1 (AMP)　DF1E-3S-2.5C (HIROSE ELECTRIC CO., LTD.)

Signal	Pin No.	(Wire color)	Pin No.	Signal
U	A1	Red	1	U
V	B1	Yellow	2	V
W	A2	Black	3	W
NC	B2			
NC	A3			
NC	B3	PHDR-18VR (J.S.T. MFG. Co., Ltd.)		
BK+	A4	Yellow (Red •)	16	BK+
BK-	B4	Yellow (Blue •)	15	BK-
LS+	A5	Pink (Red •)	18	LS+
LS-	B5	Pink (Blue •)	17	LS-
A+	A6	White (Red •)	14	A+
A-	B6	White (Blue •)	13	A-
B+	A7	Orange (Red •)	12	B+
B-	B7	Orange (Blue •)	11	B-
Z+	A8	Gray (Red •)	10	Z+
Z-	B8	Gray (Blue •)	9	Z-
-	A9	Orange (Red • continuous)	8	-
/PS	B9	Orange (Blue • continuous)	7	/PS
VCC	A10	Gray (Red • continuous)	6	VCC
GND	B10	Gray (Blue • continuous)	5	GND
NC	A11			NC
FG	B11	Shield	1	FG

Model CB-ACS-MPBA□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



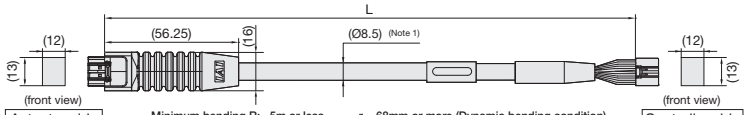
Actuator side　Minimum bending R: r = 84mm or more (Dynamic bending condition)　Controller side

1-1827863-1 (AMP)　DF1E-3S-2.5C (HIROSE ELECTRIC CO., LTD.)

Signal	Pin No.	(Wire color)	Pin No.	Signal
U	A1	Red	1	U
V	B1	Yellow	2	V
W	A2	Black	3	W
NC	B2			
NC	A3			
NC	B3	PHDR-18VR (J.S.T. MFG. Co., Ltd.)		
BK+	A4	Yellow (Red •)	16	BK+
BK-	B4	Yellow (Blue •)	15	BK-
LS+	A5	Pink (Red •)	18	LS+
LS-	B5	Pink (Blue •)	17	LS-
A+	A6	White (Red •)	14	A+
A-	B6	White (Blue •)	13	A-
B+	A7	Orange (Red •)	12	B+
B-	B7	Orange (Blue •)	11	B-
Z+	A8	Gray (Red •)	10	Z+
Z-	B8	Gray (Blue •)	9	Z-
-	A9	Orange (Red • continuous)	8	-
/PS	B9	Orange (Blue • continuous)	7	/PS
VCC	A10	Gray (Red • continuous)	6	VCC
GND	B10	Gray (Blue • continuous)	5	GND
NC	A11			NC
FG	B11	Shield	1	FG

Model CB-ADPC-MPA□□□/CB-ADPC-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 030 = 3m, maximum 20m



Minimum bending R: 5m or less　r = 68mm or more (Dynamic bending condition)
Longer than 5m　r = 73mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is over 5m, Ø9.1 cable diameter applies.

DF62DL-24S-2.2C (HIROSE ELECTRIC CO., LTD.)

Color		Signal name			Pin No.
Standard cable	Robot cable	DC	AC	PC	
Blue (AWG22/19)	Black (AWG22/19)	U	U	ØA	3
Orange (AWG22/19)	White (AWG22/19)	V	V	VMM	5
Brown (AWG22/19)	Green (AWG22/19)	-	-	ØB	10
Gray (AWG22/19)	Yellow (AWG22/19)	-	-	VMM	9
Green (AWG22/19)	Brown (AWG22/19)	W	W	Ø_A	4
Red (AWG22/19)	Red (AWG22/19)	-	-	Ø_B	15
Light blue (AWG26)	White (AWG26)	A+	A+	SA[mABS]	12
Orange (AWG26)	Yellow (AWG26)	A-	A-	SB[mABS]	17
Green (AWG26)	Red (AWG26)	B+	B+	A+	1
Brown (AWG26)	Green (AWG26)	B-	B-	A-	6
Gray (AWG26)	Black (AWG26)	HS1_IN	Z+/SA[mABS]	B+	11
Red (AWG26)	Brown (AWG26)	HS2_IN	Z-/SB[mABS]	B-	16
Black (AWG26)	Blue (AWG26)	-	VPS/BAT-	VPS	18
Yellow (AWG26)	Pink (AWG26)	-	BK+	LS+	8
Light blue (AWG26)	Black (AWG26)	-	LS+	BK+	20
Orange (AWG26)	Brown (AWG26)	-	LS-	BK-	2
Gray (AWG26)	White (AWG26)	VCC	VCC	VCC	21
Red (AWG26)	Yellow (AWG26)	GND	GND	GND	7
Brown (AWG26)	Red (AWG26)	-	BK-	LS-	14
Green (AWG26)	Green (AWG26)	HS3_IN	LS_GND	LS_GND	13
		-	-	-	19
Pink (AWG26)	Orange (AWG26)	-	BAT+	CF_VCC	22
-	-	-	-	-	23
Black (AWG26)	Green (AWG26)	FG	FG	FG	24

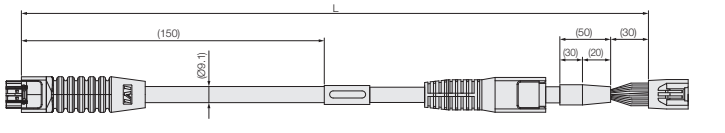
Standard: Purple (AWG26)
Robot: Gray (AWG26)

DF62DL-24S-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name			Color	
	PC	AC	DC	Standard cable	Robot cable
3	ØA	U	U	Blue (AWG22/19)	Black (AWG22/19)
5	VMM	V	V	Orange (AWG22/19)	White (AWG22/19)
10	ØB	-	-	Brown (AWG22/19)	Green (AWG22/19)
9	VMM	-	-	Gray (AWG22/19)	Yellow (AWG22/19)
4	Ø_A	W	W	Green (AWG22/19)	Brown (AWG22/19)
15	Ø_B	-	-	Red (AWG22/19)	Red (AWG22/19)
12	SA[mABS]	A+	A+	Light blue (AWG26)	White (AWG26)
17	SB[mABS]	A-	A-	Orange (AWG26)	Yellow (AWG26)
1	A+	B+	B+	Green (AWG26)	Red (AWG26)
6	A-	B-	B-	Brown (AWG26)	Green (AWG26)
11	B+	Z+/SA[mABS]	HS1_IN	Gray (AWG26)	Black (AWG26)
16	B-	Z-/SB[mABS]	HS2_IN	Red (AWG26)	Brown (AWG26)
18	VPS	VPS/BAT-	-	Black (AWG26)	Blue (AWG26)
8	LS+	BK+	-	Yellow (AWG26)	Pink (AWG26)
20	BK+	LS+	-	Light blue (AWG26)	Black (AWG26)
2	BK-	LS-	-	Orange (AWG26)	Brown (AWG26)
21	VCC	VCC	VCC	Gray (AWG26)	White (AWG26)
7	GND	GND	GND	Red (AWG26)	Yellow (AWG26)
14	LS-	BK-	-	Brown (AWG26)	Red (AWG26)
13	LS_GND	LS_GND	HS3_IN	Green (AWG26)	Green (AWG26)
19	-	-	-	-	-
22	CF_VCC	BAT+	-	Pink (AWG26)	Orange (AWG26)
23	-	-	-	-	-
24	FG	FG	FG	Black (AWG26)	Green (AWG26)

Model CB-ADPC-MPA□□□-RB-JY

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m



Minimum bending R: 5m or less　r = 68mm or more (Dynamic bending condition)
Longer than 5m　r = 73mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

DF62DL-24S-2.2C (HIROSE ELECTRIC CO., LTD.)

Color	Signal name				Pin No.
	D	A+/DC	A	P+/DC	P
Black (AWG19)	U	-	U	-	ØA
White (AWG19)	V	-	V	-	VMM
Green (AWG19)	-	-	-	-	ØB
Yellow (AWG19)	-	-	-	-	VMM
Brown (AWG19)	W	-	W	-	Ø_A
Red (AWG19)	-	-	-	-	Ø_B
White (AWG26)	A+	-	A+	-	SD+
Yellow (AWG26)	A-	-	A-	-	SD-
Red (AWG26)	B+	-	B+	-	A+
Green (AWG26)	B-	-	B-	-	A-
Black (AWG26)	HS1_IN	-	Z+/SD+	-	B+
Brown (AWG26)	HS2_IN	-	Z-/SD-	-	B-
Blue (AWG26)	-	-	VPS/BAT-	-	VPS
Pink (AWG26)	-	-	BK+	LDC_VCC	LS+
Black (AWG26)	-	LDC_VCC	LS+	-	BK+
Brown (AWG26)	-	LDC_SD	LS-	-	BK-
White (AWG26)	VCC	-	VCC	-	VCC
Yellow (AWG26)	GND	SELD_SD	GND	SELD_SD	GND
Red (AWG26)	-	-	BK-	LDC_SD+	LS-
Green (AWG26)	HS3_IN	LDC_SD	LS_GND	LDC_SD-	LS_GND
-	-	-	-	-	-
Orange (AWG26)	-	-	BAT+	-	CF_VCC
-	-	-	-	-	-
Green (AWG26)	FG	-	FG	-	FG

DF62B-24EP-2.2C (HIROSE ELECTRIC CO., LTD.)

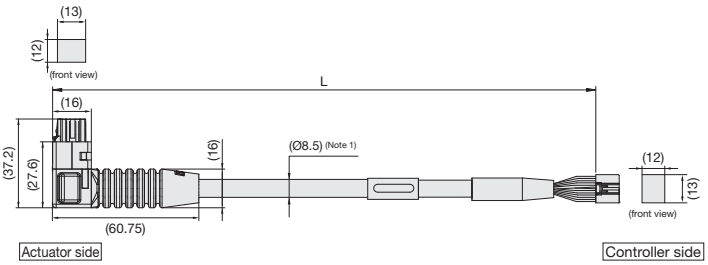
Pin No.	Signal name				Color
	P	P+/DC	A	A+/DC	D
3	ØA	-	U	-	U
5	VMM	-	V	-	V
10	ØB	-	-	-	-
9	VMM	-	-	-	-
4	Ø_A	-	W	-	W
15	Ø_B	-	-	-	-
12	SD+	-	A+	-	A+
17	SD-	-	A-	-	A-
1	A+	-	B+	-	B+
6	A-	-	B-	-	B-
11	B+	-	Z+/SD+	-	HS1_IN
16	B-	-	Z-/SD-	-	HS2_IN
18	VPS	-	VPS/BAT-	-	-
8	LS+	LDC_VCC	BK+	-	-
20	BK+	-	LS+	LDC_VCC	-
2	BK-	-	LS-	LDC_SD+	-
21	VCC	-	VCC	-	VCC
7	GND	SELD_SD	GND	SELD_SD	GND
14	LS-	LDC_SD+	BK-	-	-
13	LS_GND	LDC_SD-	LS_GND	LDC_SD-	HS3_IN
19	-	-	-	-	-
22	CF_VCC	-	BAT+	-	-
23	-	-	-	-	-
24	FG	-	FG	-	FG

Gray (AWG26)

Actuator/Controller Connection Cable Detailed View

Model CB-ADPC2-MPA□□□/CB-ADPC2-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 030 = 3m, maximum 20m



Minimum bending R: 5m or less r = 68mm or more (Dynamic bending condition)
5m or longer r = 73mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance. Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is over 5m, Ø9.1 cable diameter applies.

DF62DL-24S-2.2C (HIROSE ELECTRIC CO., LTD.)

Color		Signal name			Pin No.
Standard cable	Robot cable	DC	AC	PC	
Blue (AWG22/19)	Black (AWG22/19)	U	U	ØA	3
Orange (AWG22/19)	White (AWG22/19)	V	V	VMM	5
Brown (AWG22/19)	Green (AWG22/19)	-	-	ØB	10
Gray (AWG22/19)	Yellow (AWG22/19)	-	-	VMM	9
Green (AWG22/19)	Brown (AWG22/19)	W	W	Ø_A	4
Red (AWG22/19)	Red (AWG22/19)	-	-	Ø_B	15
Light blue (AWG26)	White (AWG26)	A+	A+	SA[mABS]	12
Orange (AWG26)	Yellow (AWG26)	A-	A-	SB[mABS]	17
Green (AWG26)	Red (AWG26)	B+	B+	A+	1
Brown (AWG26)	Green (AWG26)	B-	B-	A-	6
Gray (AWG26)	Black (AWG26)	HS1_IN	Z+/SA[mABS]	B+	11
Red (AWG26)	Brown (AWG26)	HS2_IN	Z-/SB[mABS]	B-	16
Black (AWG26)	Blue (AWG26)	-	VPS/BAT-	VPS	18
Yellow (AWG26)	Pink (AWG26)	-	BK+	LS+	8
Light blue (AWG26)	Black (AWG26)	-	LS+	BK+	20
Orange (AWG26)	Brown (AWG26)	-	LS-	BK-	2
Gray (AWG26)	White (AWG26)	VCC	VCC	VCC	21
Red (AWG26)	Yellow (AWG26)	GND	GND	GND	7
Brown (AWG26)	Red (AWG26)	-	BK-	LS-	14
Green (AWG26)	Green (AWG26)	HS3_IN	LS_GND	LS_GND	13
-	-	-	-	-	19
Pink (AWG26)	Orange (AWG26)	-	BAT+	CF_VCC	22
-	-	-	-	-	23
Black (AWG26)	Green (AWG26)	FG	FG	FG	24

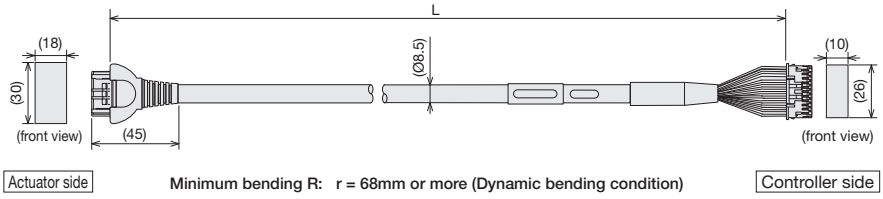
DF62DL-24S-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name		
	PC	AC	DC
3	ØA	U	U
5	VMM	V	V
10	ØB	-	-
9	VMM	-	-
4	Ø_A	W	W
15	Ø_B	-	-
12	SA[mABS]	A+	A+
17	SB[mABS]	A-	A-
1	A+	B+	B+
6	A-	B-	B-
11	B+	Z+/SA[mABS]	HS1_IN
16	B-	Z-/SB[mABS]	HS2_IN
18	VPS	VPS/BAT-	-
8	LS+	BK+	-
20	BK+	LS+	-
2	BK-	LS-	-
21	VCC	VCC	VCC
7	GND	GND	GND
14	LS-	BK-	-
13	LS_GND	LS_GND	HS3_IN
19	-	-	-
22	CF_VCC	BAT+	-
23	-	-	-
24	FG	FG	FG

Standard: Purple (AWG26)
Robot: Gray (AWG26)

Model CB-APSEP-MPA□□□ *Robot cable is standard.

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: r = 68mm or more (Dynamic bending condition)

1-1827863-1 (AMP)

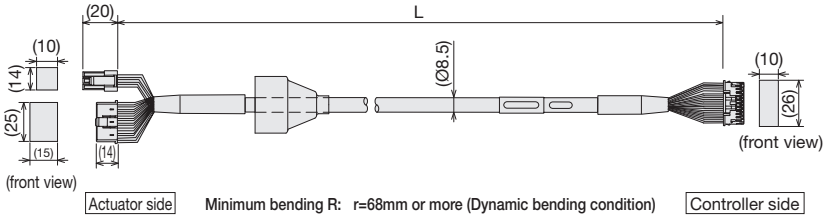
Color	Signal name		Pin No.
	PC	AC	
Black (AWG22)	ØA	U	A1
White (AWG22)	VMM	V	B1
Brown (AWG22)	Ø_A	W	A2
Green (AWG22)	ØB	-	B2
Yellow (AWG22)	VMM	-	A3
Red (AWG22)	Ø_B	-	B3
Orange (AWG26)	LS+	BK+	A4
Gray (AWG26)	LS-	BK-	B4
White (AWG26)	-	A+	A6
Yellow (AWG26)	-	A-	B6
Red (AWG26)	A+	B+	A7
Green (AWG26)	A-	B-	B7
Black (AWG26)	B+	Z+	A8
Brown (AWG26)	B-	Z-	B8
Black (AWG26)	BK+	LS+	A5
Brown (AWG26)	BK-	LS-	B5
Green (AWG26)	LS_GND	LS_GND	A9
Red (AWG26)	VPS	VPS	B9
White (AWG26)	VCC	VCC	A10
Yellow (AWG26)	GND	GND	B10
-	-	-	A11
Shield	FG	FG	B11

PADP-24V-1-S (J.S.T. Mfg. Co., Ltd.)

Pin No.	Signal name		Color
	PC	AC	
1	ØA	U	Blue (AWG22)
2	VMM	V	Orange (AWG22)
5	Ø_A	W	Green (AWG22)
3	ØB	-	Brown (AWG22)
4	VMM	-	Gray (AWG22)
6	Ø_B	-	Red (AWG22)
7	LS+	BK+	Light blue (AWG26)
8	LS-	BK-	Orange (AWG26)
11	-	A+	Green (AWG26)
12	-	A-	Brown (AWG26)
13	A+	B+	Gray (AWG26)
14	A-	B-	Red (AWG26)
15	B+	Z+	Black (AWG26)
16	B-	Z-	Yellow (AWG26)
9	BK+	LS+	Light blue (AWG26)
10	BK-	LS-	Orange (AWG26)
20	LS_GND	LS_GND	Green (AWG26)
18	VPS	VPS	Brown (AWG26)
17	VCC	VCC	Gray (AWG26)
19	GND	GND	Red (AWG26)
21	—	—	—
22	FG	—	—
23		—	—
24		—	Shield

Model CB-ASEP2-MPA□□□ *Robot cable is standard.

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: r=68mm or more (Dynamic bending condition)

SLP-03V
(J.S.T. Mfg. Co., Ltd.)

Cable color	Signal name	Pin name
Red (AWG22)	U	1
Yellow (AWG22)	V	2
Black (AWG22)	W	3

XMP-18V
(J.S.T. MFG. Co., Ltd.)

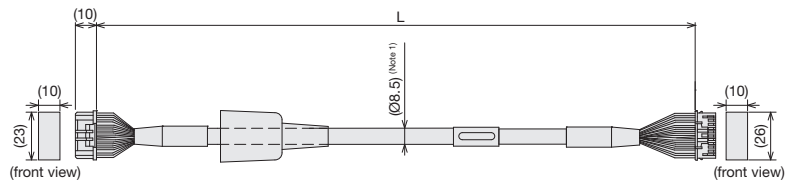
Cable color	Signal name	Pin name
White (AWG25)	A+	1
Yellow (AWG25)	A-	2
Red (AWG25)	B+	3
Green (AWG25)	B-	4
	N.C.	5
Green (AWG25)	(Reserved)	6
Black (AWG25)	LS+	7
	N.C.	8
Shield (AWG25)	FG	9
Black (AWG25)	Z+/SD+	10
Brown (AWG25)	Z-/SD-	11
White (AWG22)	BAT+	12
Red (AWG25)	VPS/BAT-	13
White (AWG25)	VCC	14
Yellow (AWG25)	GND	15
Brown (AWG25)	LS-	16
Gray (AWG25)	BK-	17
Orange (AWG25)	BK+	18

PADP-24V-1-S
(J.S.T.MFG.CO.,LTD.)

Pin name	Signal name	Cable color
1	U	Red (AWG22)
2	V	Yellow (AWG22)
3	N.C.	
4	N.C.	
5	W	Black (AWG22)
6	N.C.	
7	BK+	Orange (AWG25)
8	BK-	Gray (AWG25)
9	LS+	Black (AWG25)
10	LS-	Brown (AWG25)
11	A+	White (AWG25)
12	A-	Yellow (AWG25)
13	B+	Red (AWG25)
14	B-	Green (AWG25)
15	Z+/SD+	Black (AWG25)
16	Z-/SD-	Brown (AWG25)
17	VCC	White (AWG25)
18	VPS/BAT-	Red (AWG25)
19	GND	Yellow (AWG25)
20	(Reserved)	Green (AWG25)
21	BAT+	White (AWG22)
22	N.C.	
23	N.C.	
24	F.G	Shield (AWG25)

Model CB-CA-MPA□□□/CB-CA-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: 5m or less r = 68mm or more (Dynamic bending condition)
Longer than 5m r = 73mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is longer than 5m, it will be Ø9.1.

1-1827863-1 (AMP)

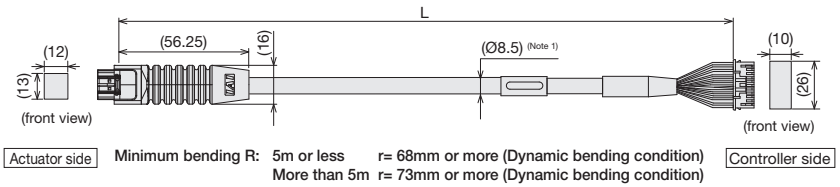
Color	Signal name	Pin No.
Blue (AWG22/19)	ØA	A1
Orange (AWG22/19)	VMM	B1
Green (AWG22/19)	Ø_A	A2
Brown (AWG22/19)	ØB	B2
Gray (AWG22/19)	VMM	A3
Red (AWG22/19)	Ø_B	B3
Light blue (AWG26)	—	A6
Orange (AWG26)	—	B6
Green (AWG26)	A+	A7
Brown (AWG26)	A-	B7
Gray (AWG26)	B+	A8
Red (AWG26)	B-	B8
Black (AWG26)	VPS	B9
Yellow (AWG26)	LS+	A4
Light blue (AWG26)	BK+	A5
Orange (AWG26)	BK-	B5
Green (AWG26)	LS_GND	A9
Brown (AWG26)	LS-	B4
Gray (AWG26)	VCC	A10
Red (AWG26)	GND	B10
–	–	A11
Black	FG	B11

PADP-24V-1-S (J.S.T. Mfg. Co., Ltd.)

Pin No.	Signal name	Color
1	ØA	Blue (AWG22/19)
2	VMM	Orange (AWG22/19)
5	Ø_A	Green (AWG22/19)
3	ØB	Brown (AWG22/19)
4	VMM	Gray (AWG22/19)
6	Ø_B	Red (AWG22/19)
11	—	Light blue (AWG26)
12	—	Orange (AWG26)
13	A+	Green (AWG26)
14	A-	Brown (AWG26)
15	B+	Gray (AWG26)
16	B-	Red (AWG26)
18	VPS	Black (AWG26)
7	LS+	Yellow (AWG26)
9	BK+	Light blue (AWG26)
10	BK-	Orange (AWG26)
20	LS_GND	Green (AWG26)
8	LS-	Brown (AWG26)
17	VCC	Gray (AWG26)
19	GND	Red (AWG26)
21	—	—
22	—	—
23	–	–
24	FG	Black

Model CB-CAN-MPA□□□/CB-CAN-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: 5m or less r= 68mm or more (Dynamic bending condition)
More than 5m r= 73mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is longer than 5m, it will be Ø9.1.

DF62DL-24S-2.2C (Hirose)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Blue (AWG22/19)	Black (AWG22/19)	ØA	3
Orange (AWG22/19)	White (AWG22/19)	VMM	5
Brown (AWG22/19)	Green (AWG22/19)	ØB	10
Gray (AWG22/19)	Yellow (AWG22/19)	VMM	9
Green (AWG22/19)	Brown (AWG22/19)	Ø_A	4
Red (AWG22/19)	Red (AWG22/19)	Ø_B	15
Light blue (AWG26)	White (AWG26)	SA[mABS]	12
Orange (AWG26)	Yellow (AWG26)	SB[mABS]	17
Green (AWG26)	Red (AWG26)	A+	1
Brown (AWG26)	Green (AWG26)	A-	6
Gray (AWG26)	Black (AWG26)	B+	11
Red (AWG26)	Brown (AWG26)	B-	16
Black (AWG26)	Blue (AWG26)	VPS	18
Yellow (AWG26)	Pink (AWG26)	LS+	8
Light blue (AWG26)	Black (AWG26)	BK+	20
Orange (AWG26)	Brown (AWG26)	BK-	2
Gray (AWG26)	White (AWG26)	VCC	21
Red (AWG26)	Yellow (AWG26)	GND	7
Brown (AWG26)	Red (AWG26)	LS-	14
Green (AWG26)	Green (AWG26)	LS_GND	13
—	—	—	19
Pink (AWG26)	Orange (AWG26)	CF_VCC	22
—	—	—	23
Black (AWG26)	Green (AWG26)	FG	24

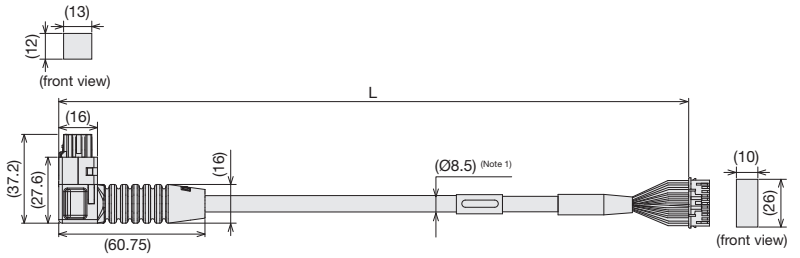
PADP-24V-1-S (J.S.T. MFG. Co., Ltd.)

Pin No.	Signal name
1	ØA
2	VMM
3	ØB
4	VMM
5	Ø_A
6	Ø_B
11	SA[mABS]
12	SB[mABS]
13	A+
14	A-
15	B+
16	B-
18	VPS
7	LS+
9	BK+
10	BK-
17	VCC
19	GND
8	LS-
20	LS_GND
22	—
21	CF_VCC
23	—
24	FG

Standard: Purple (AWG26)
Robot: Gray (AWG26)

Model CB-CAN2-MPA□□□/CB-CAN2-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: 5m or less r= 68mm or more (Dynamic bending condition)
More than 5m r= 73mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is longer than 5m, it will be Ø9.1.

DF62DL-24S-2.2C (Hirose)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Blue (AWG22/19)	Black (AWG22/19)	ØA	3
Orange (AWG22/19)	White (AWG22/19)	VMM	5
Brown (AWG22/19)	Green (AWG22/19)	ØB	10
Gray (AWG22/19)	Yellow (AWG22/19)	VMM	9
Green (AWG22/19)	Brown (AWG22/19)	Ø_A	4
Red (AWG22/19)	Red (AWG22/19)	Ø_B	15
Light blue (AWG26)	White (AWG26)	SA[mABS]	12
Orange (AWG26)	Yellow (AWG26)	SB[mABS]	17
Green (AWG26)	Red (AWG26)	A+	1
Brown (AWG26)	Green (AWG26)	A-	6
Gray (AWG26)	Black (AWG26)	B+	11
Red (AWG26)	Brown (AWG26)	B-	16
Black (AWG26)	Blue (AWG26)	VPS	18
Yellow (AWG26)	Pink (AWG26)	LS+	8
Light blue (AWG26)	Black (AWG26)	BK+	20
Orange (AWG26)	Brown (AWG26)	BK-	2
Gray (AWG26)	White (AWG26)	VCC	21
Red (AWG26)	Yellow (AWG26)	GND	7
Brown (AWG26)	Red (AWG26)	LS-	14
Green (AWG26)	Green (AWG26)	LS_GND	13
—	—	—	19
Pink (AWG26)	Orange (AWG26)	CF_VCC	22
—	—	—	23
Black (AWG26)	Green (AWG26)	FG	24

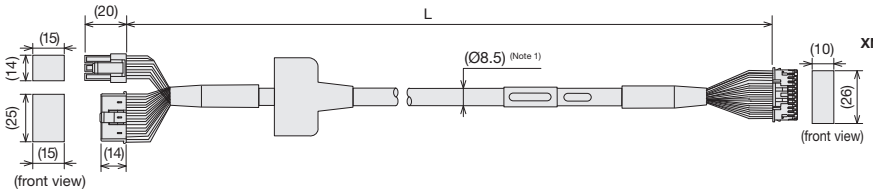
PADP-24V-1-S (J.S.T. MFG. Co., Ltd.)

Pin No.	Signal name
1	ØA
2	VMM
3	ØB
4	VMM
5	Ø_A
6	Ø_B
11	SA[mABS]
12	SB[mABS]
13	A+
14	A-
15	B+
16	B-
18	VPS
7	LS+
9	BK+
10	BK-
17	VCC
19	GND
8	LS-
20	LS_GND
22	—
21	CF_VCC
23	—
24	FG

Standard: Purple (AWG26)
Robot: Gray (AWG26)

Model CB-CFA-MPA□□□/CB-CFA-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: r = 80mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is longer than 3m, it will be Ø9.1.

SLP-06V (J.S.T. Mfg. Co., Ltd.)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Blue (AWG22/19)	Blue (AWG22/19)	ØA	1
Orange (AWG22/19)	Orange (AWG22/19)	VMM	2
Brown (AWG22/19)	Brown (AWG22/19)	ØB	4
Gray (AWG22/19)	Gray (AWG22/19)	VMM	5
Green (AWG22/19)	Green (AWG22/19)	Ø/A	3
Red (AWG22/19)	Red (AWG22/19)	Ø/B	6

XMP-18V (J.S.T. MFG. Co., Ltd.)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Light Blue (AWG26)	–	NC	5
(Orange (AWG26))	–	NC	6
Green (AWG26)	Green (AWG26)	LS+	1
Brown (AWG26)	Brown (AWG26)	LS-	2
Gray (AWG26)	Gray (AWG26)	A+	3
Red (AWG26)	Red (AWG26)	A-	4
Black (AWG26)	Black (AWG26)	B+	11
Yellow (AWG26)	Yellow (AWG26)	B-	13
Light blue (AWG26)	Light blue (AWG26)	BK+	16
Orange (AWG26)	Orange (AWG26)	BK-	17
(Green (AWG26))	(Green (AWG26))	(LS_GND)	10
Brown (AWG26)	Brown (AWG26)	LS-	14
Gray (AWG26)	Gray (AWG26)	VCC	12
Red (AWG26)	Red (AWG26)	GND	9
Black	Shield	FG	18
–	–	NC	15
–	–	NC	7
–	–	NC	8

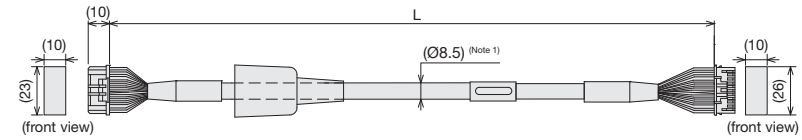
PADP-24V-1-S (J.S.T. Mfg. Co., Ltd.)

Pin No.	Signal name	Color	
		Standard cable	Robot cable
1	ØA	Blue (AWG22/19)	Blue (AWG22/19)
2	VMM	Orange (AWG22/19)	Orange (AWG22/19)
3	ØB	Brown (AWG22/19)	Brown (AWG22/19)
4	VMM	Gray (AWG22/19)	Gray (AWG22/19)
5	Ø/A	Green (AWG22/19)	Green (AWG22/19)
6	Ø/B	Red (AWG22/19)	Red (AWG22/19)
11	NC	(Light Blue (AWG26))	—
12	NC	(Orange (AWG26))	–
13	LS+	Green (AWG26)	Green (AWG26)
14	LS-	Brown (AWG26)	Brown (AWG26)
15	A+	Gray (AWG26)	Gray (AWG26)
16	A-	Red (AWG26)	Red (AWG26)
18	B+	Black (AWG26)	Black (AWG26)
7	B-	Yellow (AWG26)	Yellow (AWG26)
9	BK+	Light blue (AWG26)	Light blue (AWG26)
10	BK-	Orange (AWG26)	Orange (AWG26)
20	(LS_GND)	(Green (AWG26))	(Green (AWG26))
8	LS-	Brown (AWG26)	Brown (AWG26)
21	VCC	Gray (AWG26)	Gray (AWG26)
19	GND	Red (AWG26)	Red (AWG26)
24	FG	Black	Shield
17	NC	–	–
22	NC	–	–
23	NC	–	–

Actuator/Controller Connection Cable Detailed View

Model CB-CFA2-MPA□□□/CB-CFA2-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Actuator side | Minimum bending R: r = 68mm or more (Dynamic bending condition) | Controller side

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is longer than 3m, it will be Ø9.1.

1-1827863-1 (AMP)

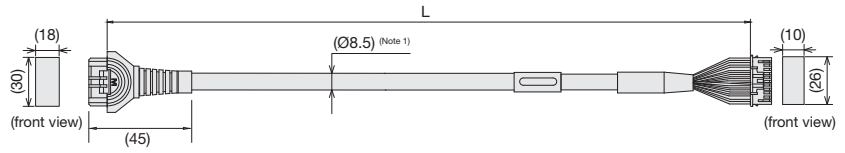
Color	Signal name	Pin No.
Blue (AWG22/19)	ØA	A1
Orange (AWG22/19)	VMM	B1
Green (AWG22/19)	Ø_A	A2
Brown (AWG22/19)	ØB	B2
Gray (AWG22/19)	VMM	A3
Red (AWG22/19)	Ø_B	B3
(Light Blue (AWG26))	—	A6
(Orange (AWG26))	—	B6
Green (AWG26)	A+	A7
Brown (AWG26)	A-	B7
Gray (AWG26)	B+	A8
Red (AWG26)	B-	B8
Black (AWG26)	VPS	B9
Yellow (AWG26)	LS+	A4
Light blue (AWG26)	BK+	A5
Orange (AWG26)	BK-	B5
Green (AWG26)	LS_GND	A9
Brown (AWG26)	LS-	B4
Gray (AWG26)	VCC	A10
Red (AWG26)	GND	B10
—	—	A11
Black	FG	B11

PADP-24V-1-S (J.S.T. Mfg. Co., Ltd.)

Pin No.	Signal name	Color
1	ØA	Blue (AWG22/19)
2	VMM	Orange (AWG22/19)
5	Ø_A	Green (AWG22/19)
3	ØB	Brown (AWG22/19)
4	VMM	Gray (AWG22/19)
6	Ø_B	Red (AWG22/19)
11	—	(Light Blue (AWG26))
12	—	(Orange (AWG26))
13	A+	Green (AWG26)
14	A-	Brown (AWG26)
15	B+	Gray (AWG26)
16	B-	Red (AWG26)
18	VPS	Black (AWG26)
7	LS+	Yellow (AWG26)
9	BK+	Light blue (AWG26)
10	BK-	Orange (AWG26)
20	LS_GND	Green (AWG26)
8	LS-	Brown (AWG26)
21	VCC	Gray (AWG26)
19	GND	Red (AWG26)
17	—	—
22	—	—
23	—	—
24	FG	Black

Model CB-CFA3-MPA□□□/CB-CFA3-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Actuator side | Minimum bending R: 3m or less r= 68mm or more (Dynamic bending condition)
More than 3m r= 73mm or more (Dynamic bending condition) | Controller side

* The robot cable is designed for flex-resistance.
Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is longer than 3m, it will be Ø9.1.

9-1827863-1 (AMP)

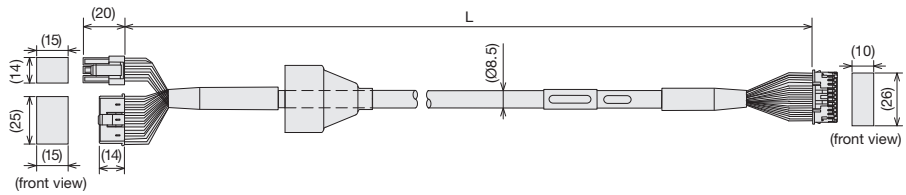
Color		Signal name	Pin No.
Standard cable	Robot cable		
Blue (AWG22/19)	Black (AWG22/19)	ØA	A1
Orange (AWG22/19)	White (AWG22/19)	VMM	B1
Green (AWG22/19)	Green (AWG22/19)	Ø_A	A2
Brown (AWG22/19)	Yellow (AWG22/19)	ØB	B2
Gray (AWG22/19)	Brown (AWG22/19)	VMM	A3
Red (AWG22/19)	Red (AWG22/19)	Ø_B	B3
Light blue (AWG26)	White (AWG26)	SA(mABS)	A6
Orange (AWG26)	Yellow (AWG26)	SB(mABS)	B6
Green (AWG26)	Red (AWG26)	A+	A7
Brown (AWG26)	Green (AWG26)	A-	B7
Gray (AWG26)	Black (AWG26)	B+	A8
Red (AWG26)	Brown (AWG26)	B-	B8
Black (AWG26)	Blue (AWG26)	VPS	B9
Yellow (AWG26)	Pink (AWG26)	LS+	A4
Light blue (AWG26)	Black (AWG26)	BK+	A5
Orange (AWG26)	Brown (AWG26)	BK-	B5
Green (AWG26)	White (AWG26)	LS_GND	A9
Brown (AWG26)	Yellow (AWG26)	LS-	B4
Gray (AWG26)	Red (AWG26)	VCC	A10
Red (AWG26)	Green (AWG26)	GND	B10
—	—	—	A11
Black (AWG26)	Green (AWG26)	FG	B11

PADP-24V-1-S (J.S.T. Mfg. Co., Ltd.)

Pin No.	Signal name	Color	
		Standard cable	Robot cable
1	ØA	Blue (AWG22/19)	Black (AWG22/19)
2	VMM	Orange (AWG22/19)	White (AWG22/19)
5	Ø_A	Green (AWG22/19)	Green (AWG22/19)
3	ØB	Brown (AWG22/19)	Yellow (AWG22/19)
4	VMM	Gray (AWG22/19)	Brown (AWG22/19)
6	Ø_B	Red (AWG22/19)	Red (AWG22/19)
11	SA(mABS)	Light blue (AWG26)	White (AWG26)
12	SB(mABS)	Orange (AWG26)	Yellow (AWG26)
13	A+	Green (AWG26)	Red (AWG26)
14	A-	Brown (AWG26)	Green (AWG26)
15	B+	Gray (AWG26)	Black (AWG26)
16	B-	Red (AWG26)	Brown (AWG26)
18	VPS	Black (AWG26)	Blue (AWG26)
7	LS+	Yellow (AWG26)	Pink (AWG26)
9	BK+	Light blue (AWG26)	Black (AWG26)
10	BK-	Orange (AWG26)	Brown (AWG26)
20	LS_GND	Green (AWG26)	White (AWG26)
8	LS-	Brown (AWG26)	Yellow (AWG26)
21	VCC	Gray (AWG26)	Red (AWG26)
19	GND	Red (AWG26)	Green (AWG26)
17	—	—	—
22	—	—	—
23	—	—	—
24	FG	Black (AWG26)	Green (AWG26)

Model CB-PSEP-MPA□□□ *Robot cable is standard.

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Actuator side | Minimum bending R: r = 68mm or more (Dynamic bending condition) | Controller side

SLP-06V (J.S.T. Mfg. Co., Ltd.)

Cable color	Signal name	Pin name
Black (AWG22)	ØA	1
White (AWG22)	VMM	2
Brown (AWG22)	Ø/A	3
Red (AWG22)	ØB	4
Green (AWG22)	VMM	5
Yellow (AWG22)	Ø/B	6

XMP-18V (J.S.T. MFG. Co., Ltd.)

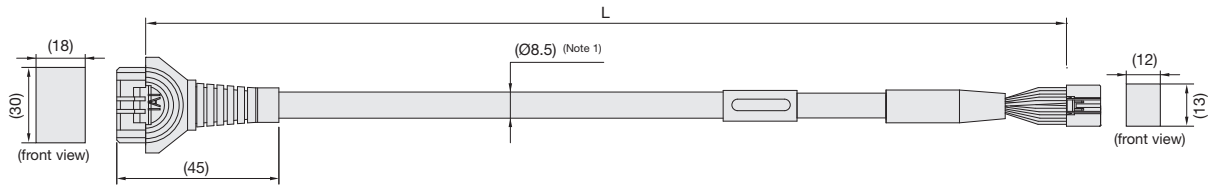
Cable color	Signal name	Pin name
White (AWG25)	A+	1
Yellow (AWG25)	A-	2
Red (AWG25)	B+	3
Green (AWG25)	B-	4
	N.C.	5
	N.C.	6
	N.C.	7
	N.C.	8
Red (AWG25)	GND	9
White (AWG25)	VCC	10
Yellow (AWG25)	VPS	11
Green (AWG25)	(Reserved)	12
Black (AWG25)	LS+	13
Brown (AWG25)	LS-	14
	N.C.	15
Orange (AWG25)	BK+	16
Gray (AWG25)	BK-	17
Shield (AWG25)	F.G	18

PADP-24V-1-S (J.S.T. Mfg. Co., Ltd.)

Pin name	Signal name	Cable color
1	ØA	Black (AWG22)
2	VMM	White (AWG22)
3	ØB	Red (AWG22)
4	VMM	Green (AWG22)
5	Ø/A	Brown (AWG22)
6	Ø/B	Yellow (AWG22)
7	LS+	Black (AWG25)
8	LS-	Brown (AWG25)
9	BK-	Orange (AWG25)
10	BK-	Gray (AWG25)
11	N.C.	
12	N.C.	
13	A+	White (AWG25)
14	A-	Yellow (AWG25)
15	B+	Red (AWG25)
16	B-	Green (AWG25)
17	VCC	White (AWG25)
18	VPS	Yellow (AWG25)
19	GND	Red (AWG25)
20	(Reserved)	Green (AWG25)
21	N.C.	
22	N.C.	
23	N.C.	
24	FG	Shield (AWG25)

Model CB-RCAPC-MPA□□□/CB-RCAPC-MPA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 030 = 3m, maximum 20m



Actuator side

Minimum bending R: 3m or less r = 68mm or more (Dynamic bending condition)
3m or longer r = 73mm or more (Dynamic bending condition)

Controller side

* The robot cable is designed for flex-resistance. Please use the robot cable if the cable needs to be installed through a cable carrier.

(Note 1) If the cable length is over 3m, Ø9.1 cable diameter applies.

9-1827863-1 (AMP)

Color		Signal name			Pin No.
Standard cable	Robot cable	DC	AC	PC	
Blue (AWG22/19)	Black (AWG22/19)	U	U	ØA	A1
Orange (AWG22/19)	White (AWG22/19)	V	V	VMM	B1
Brown (AWG22/19)	Green (AWG22/19)	-	-	ØB	B2
Gray (AWG22/19)	Yellow (AWG22/19)	-	-	VMM	A3
Green (AWG22/19)	Brown (AWG22/19)	W	W	Ø_A	A2
Red (AWG22/19)	Red (AWG22/19)	-	-	Ø_B	B3
Light blue (AWG26)	White (AWG26)	A+	A+	SA[mABS]	A6
Orange (AWG26)	Yellow (AWG26)	A-	A-	SB[mABS]	B6
Green (AWG26)	Red (AWG26)	B+	B+	A+	A7
Brown (AWG26)	Green (AWG26)	B-	B-	A-	B7
Gray (AWG26)	Black (AWG26)	HS1_IN	Z+/SA[mABS]	B+	A8
Red (AWG26)	Brown (AWG26)	HS2_IN	Z-/SB[mABS]	B-	B8
Black (AWG26)	Blue (AWG26)	-	VPS/BAT-	VPS	B9
Yellow (AWG26)	Pink (AWG26)	-	BK+	LS+	A4
Light blue (AWG26)	Black (AWG26)	-	LS+	BK+	A5
Orange (AWG26)	Brown (AWG26)	-	LS-	BK-	B5
Gray (AWG26)	White (AWG26)	VCC	VCC	VCC	A10
Red (AWG26)	Yellow (AWG26)	GND	GND	GND	B10
Brown (AWG26)	Red (AWG26)	-	BK-	LS-	B4
Green (AWG26)	Green (AWG26)	HS3_IN	LS_GND	LS_GND	A9
-	-	-	-	-	A11
-	-	-	-	-	-
-	-	-	-	-	-
Black (AWG26)	Green (AWG26)	FG	FG	FG	B11

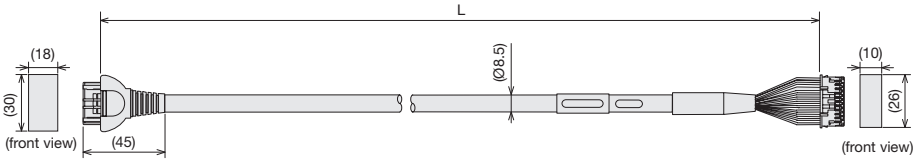
Purple (AWG26)
Pink (AWG26)

DF62DL-24S-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name			Color	
	PC	AC	DC	Standard cable	Robot cable
3	ØA	U	U	Blue (AWG22/19)	Black (AWG22/19)
5	VMM	V	V	Orange (AWG22/19)	White (AWG22/19)
10	ØB	-	-	Brown (AWG22/19)	Green (AWG22/19)
9	VMM	-	-	Gray (AWG22/19)	Yellow (AWG22/19)
4	Ø_A	W	W	Green (AWG22/19)	Brown (AWG22/19)
15	Ø_B	-	-	Red (AWG22/19)	Red (AWG22/19)
12	SA[mABS]	A+	A+	Light blue (AWG26)	White (AWG26)
17	SB[mABS]	A-	A-	Orange (AWG26)	Yellow (AWG26)
1	A+	B+	B+	Green (AWG26)	Red (AWG26)
6	A-	B-	B-	Brown (AWG26)	Green (AWG26)
11	B+	Z+/SA[mABS]	HS1_IN	Gray (AWG26)	Black (AWG26)
16	B-	Z-/SB[mABS]	HS2_IN	Red (AWG26)	Brown (AWG26)
18	VPS	VPS/BAT-	-	Black (AWG26)	Blue (AWG26)
8	LS+	BK+	-	Yellow (AWG26)	Pink (AWG26)
20	BK+	LS+	-	Light blue (AWG26)	Black (AWG26)
2	BK-	LS-	-	Orange (AWG26)	Brown (AWG26)
21	VCC	VCC	VCC	Gray (AWG26)	White (AWG26)
7	GND	GND	GND	Red (AWG26)	Yellow (AWG26)
14	LS-	BK-	-	Brown (AWG26)	Red (AWG26)
13	LS-GND	LS-GND	HS3_IN	Green (AWG26)	Green (AWG26)
19	-	-	-	-	-
22	CF_VCC	BAT+	-	Gray (AWG26)	White (AWG26)
23	-	-	-	-	-
24	FG	FG	FG	Black (AWG26)	Green (AWG26)

Model CB-RPSEP-MPA□□□ *Robot cable is standard.

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Actuator side

Minimum bending R: r = 68mm or more (Dynamic bending condition)

Controller side

1-1827863-1 (AMP)

Color	Signal name	Pin No.
Black (AWG22)	ØA	A1
White (AWG22)	VMM	B1
Brown (AWG22)	Ø_A	A2
Green (AWG22)	ØB	B2
Yellow (AWG22)	VMM	A3
Red (AWG22)	Ø_B	B3
Orange (AWG26)	LS+	A6
Gray (AWG26)	LS-	B6
Red (AWG26)	A+	A7
Green (AWG26)	A-	B7
Black (AWG26)	B+	A8
Brown (AWG26)	B-	B8
—	—	B4
—	—	A11
Black (AWG26)	BK+	A5
Brown (AWG26)	BK-	B5
Green (AWG26)	LS_GND	A9
Red (AWG26)	VPS	B9
White (AWG26)	VCC	A10
Yellow (AWG26)	GND	B10
—	—	A4
Shield	FG	B11

PADP-24V-1-S (J.S.T. Mfg. Co., Ltd.)

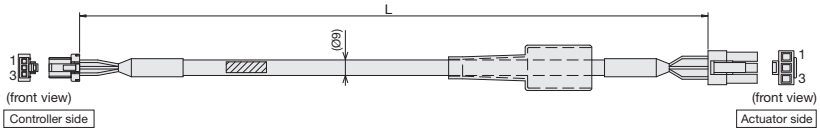
Pin No.	Signal name	Color
1	ØA	Blue (AWG22)
2	VMM	Orange (AWG22)
5	Ø_A	Green (AWG22)
3	ØB	Brown (AWG22)
4	VMM	Gray (AWG22)
6	Ø_B	Red (AWG22)
7	LS+	Light blue (AWG26)
8	LS-	Orange (AWG26)
13	A+	Green (AWG26)
14	A-	Brown (AWG26)
15	B+	Gray (AWG26)
16	B-	Red (AWG26)
11	—	Black (AWG26)
12	—	Yellow (AWG26)
9	BK+	Light blue (AWG26)
10	BK-	Orange (AWG26)
20	LS_GND	Green (AWG26)
18	VPS	Brown (AWG26)
17	VCC	Gray (AWG26)
19	GND	Red (AWG26)
21	—	—
22	—	—
23	—	—
24	FG	Shield

Actuator/Controller Connection Cable Detailed View

■ Motor Cables

Model CB-ACS-MA□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



DF1E-3S-2.5C (HIROSE ELECTRIC CO., LTD.)

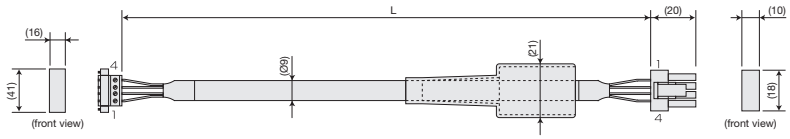
Wiring	Color	Signal	No.
AWG22 (crimped)	Red	U	1
	White	V	2
	Black	W	3

SLP-03V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	U	Red	AWG22 (crimped)
2	V	White	
3	W	Black	

Model CB-RCC-MA□□□/CB-RCC-MA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 30m



Controller side — Minimum bending R: r=51mm or more (Dynamic bending condition) — Actuator side

* Please use the robot cable if the cable needs to be installed through the cable carrier.

GIC2.5/4-STF-7.62 (Phoenix)

Wiring	Color	Signal	No.
0.75sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

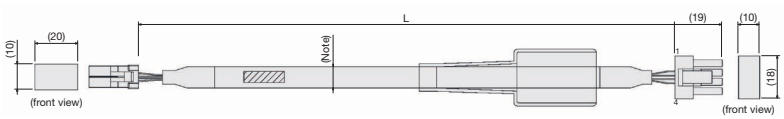
SLP-04V (J.S.T. Mfg. Co., Ltd.)

No.	Signal	Color	Wiring
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Model CB-RCC1-MA□□□/CB-X2-MA□□□

*CB-X2-MA□□□ is a robot cable as standard.

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 30m



Controller side — Minimum bending R: r=51mm or more (Dynamic bending condition) — Actuator side

* Please use the robot cable if the cable needs to be installed through the cable carrier.

(Note) Ø8.5 for robot cable. (Ø7.6 for non-robot cable)

F35FDC-04V-K (J.S.T. MFG. Co., Ltd.)

Wiring	Color	Signal	No.
0.75sq (crimped)	Red	U	B1
	White	V	B2
	Black	W	A1
	Green	PE	A2

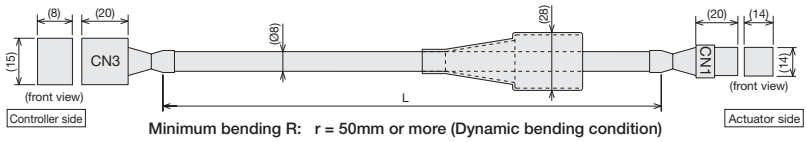
SLP-04V (J.S.T. Mfg. Co., Ltd.)

No.	Signal	Color	Wiring
1	U	Red	0.75sq (crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Model CB-RCP2-MA□□□/CB-RFA-MA□□□

*This motor cable is a robot cable as standard.

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



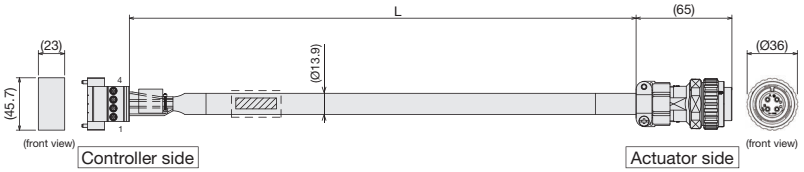
Minimum bending R: r = 50mm or more (Dynamic bending condition)

CN3 — M cable — CN1

CN3			M cable	CN1			
I-1318119-3 (AMP)	Orange	Ā	A1	1	A	Yellow	SLP-06V (J.S.T. MFG. Co., Ltd.)
	Grey	VMM	A2	2	VMM	Grey	
	White	B̄	A3	3	Ā	Orange	
	Yellow	A	B1	4	B	Yellow (Green)	
	Pink	VMM	B2	5	VMM	Pink	
	Yellow (Green)	B	B3	6	B̄	White	

Model CB-RCS3-MA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 30m



Minimum bending R: r=83.4mm or more (Dynamic bending condition)

IPC5/4-STF-7.62 (Phoenix)

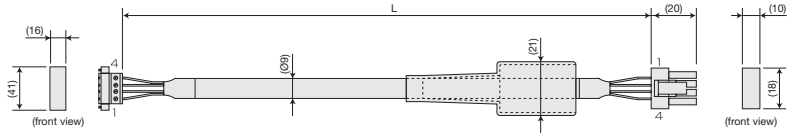
Wiring	Color	Signal	No.
AWG12	Green/Yellow	PE	1
	Black 1	U	2
	Black 2	V	3
	Black 3	W	4

JL10-6A18-10SE-EB (JAE)

No.	Signal	Color	Wiring
A	U	Black 1	AWG12 (Solder)
B	V	Black 2	
C	W	Black 3	
D	PE	Green/Yellow	

Model CB-X-MA□□□

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m



Controller side | Minimum bending R: r=51mm or more (Dynamic bending condition) | Actuator side
* Robot cable is standard.

GIC2.5/4-STF-7.62 (Phoenix)

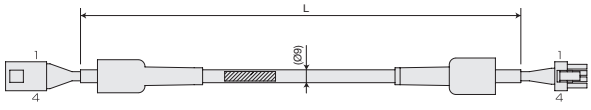
Wiring	Color	Signal	No.
0.75sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

SLP-04V (J.S.T. Mfg. Co., Ltd.)

No.	Signal	Color	Wiring
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Model CB-X-MA□□□-JY1

*Please indicate the cable length (L) in □□□,
e.g.) 010 = 1m, maximum 2m



Controller side | Minimum bending R: r=51mm or more (Dynamic bending condition) | Actuator side
* Robot cable is standard.

SLP-04V (J.S.T. Mfg. Co., Ltd.)

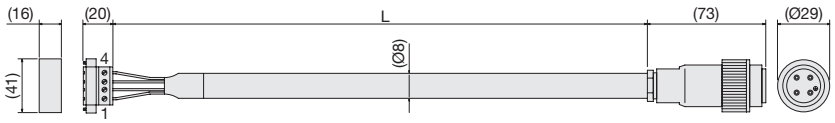
Wiring	Color	Signal	No.
0.75sq (Crimped)	U	Red	1
	V	White	2
	W	Black	3
	FG	Green	4

SLP-04V (J.S.T. Mfg. Co., Ltd.)

No.	Signal	Color	Wiring
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	FG	Green	

Model CB-XEU-MA□□□

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m



Controller side | Minimum bending R: r=48mm or more (Dynamic bending condition) | Actuator side
* Robot cable is standard.

Plug
GIC2.5/4-STF-7.62 (Phoenix)

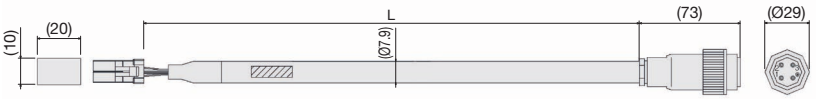
Wiring	Color	Signal	No.
0.75sq	Green/Yellow	PE	1
	Black with white text 1	U	2
	Black with white text 2	V	3
	Black with white text 3	W	4

Plug connector
99-4222-00-04 (BINDER)

No.	Signal	Color	Wiring
⊕	PE	Green/Yellow	0.75sq (Crimped)
1	U	Black with white text 1	
2	V	Black with white text 2	
3	W	Black with white text 3	

Model CB-XEU1-MA□□□

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m



Controller side | Minimum bending R: r=48mm or more (Dynamic bending condition) | Actuator side
* Robot cable is standard.

F35FDC-04V-K (J.S.T. MFG. Co., Ltd.)

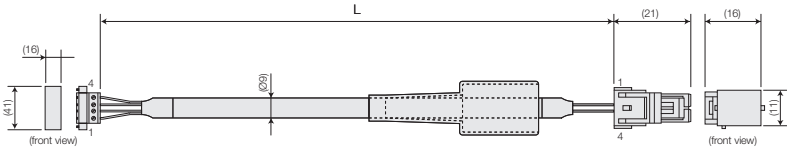
Wiring	Color	Signal	No.
0.75sq (Crimped)	Black with white text 1	U	B1
	Black with white text 2	V	B2
	Black with white text 3	W	A1
	Green/Yellow	PE	A2

99-4222-00- 04 (binder)

No.	Signal	Color	Wiring
1	U	Black with white text 1	0.75sq (Crimped)
2	V	Black with white text 2	
3	W	Black with white text 3	
⊕	PE	Green/Yellow	

Model CB-XMC-MA□□□

*Please indicate the cable length (L) in □□□, e.g. 080 = 8m
Maximum length: SCON/SSEL: 20m, XSEL: 30m



Controller side | Minimum bending R: r=55mm or more (Dynamic bending condition) | Actuator side
* Robot cable is standard.

GIC2.5/4-STF-7.62
(Phoenix)

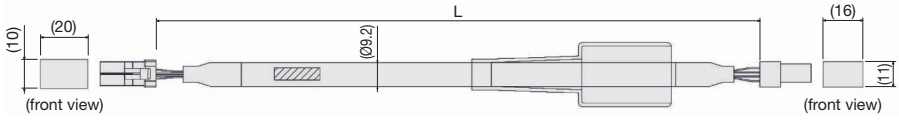
Wiring	Color	Signal	No.
1.25sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

YLP-04V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	U	Red	1.25sq (crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Model CB-XMC1-MA□□□

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m



Controller side | Minimum bending R: r=55mm or more (Dynamic bending condition) | Actuator side
* Robot cable is standard.

F35FDC-04V-K (J.S.T. MFG. Co., Ltd.)

Wiring	Color	Signal	No.
1.25sq (crimped)	Red	U	B1
	White	V	B2
	Black	W	A1
	Green	PE	A2

SLP-04V (J.S.T. Mfg. Co., Ltd.)

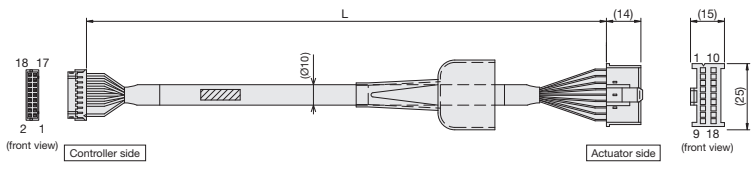
No.	Signal	Color	Wiring
1	U	Red	1.25sq (crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Actuator/Controller Connection Cable Detailed View

■ Encoder Cables

Model CB-ACS-PA□□□/CB-ACS-PA□□□-RB

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 20m



PHDR-18VR (J.S.T. MFG. Co., Ltd.)

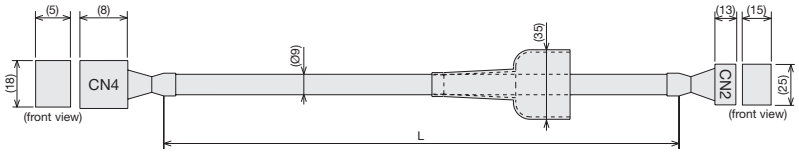
Cable color		Pin No.	Signal abbreviation
Robot cable	Standard cable		
White/Purple	Blue	LS+	18
White/Gray	Orange	LS-	17
Yellow	Green	BK+	16
Blue	Brown	BK-	15
White/Blue	Grey	A+	14
White/Yellow	Red	A-	13
White/Red	Black	B+	12
White/Black	Yellow	B-	11
Orange	Pink	SD/Z+	10
Green	Purple	SD/Z-	9
Purple	White	BAT+	8
Grey	Blue/Red	BAT-	7
Red	Orange/White	VCC	6
Black	Green/White	GND	5
-	-	-	4
-	-	-	3
-	-	-	2
Drain	Drain	F.G	1

XMP-18V (J.S.T. MFG. Co., Ltd.)

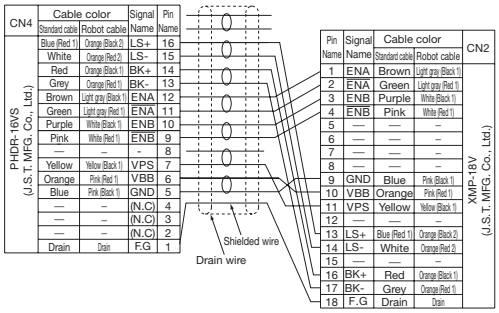
Pin No.	Signal abbreviation	Cable color	
		Standard cable	Robot cable
1	A+	Grey	White/Blue
2	A-	Red	White/Yellow
3	B+	Black	White/Red
4	B-	Yellow	White/Black
5	-	-	-
6	-	-	-
7	LS+	Blue	White/Purple
8	-	-	-
9	FG	Drain	Drain
10	SD/Z+	Pink	Orange
11	SD/Z-	Purple	Green
12	BAT+	White	Purple
13	BAT-	Blue/Red	Grey
14	VCC	Orange/White	Red
15	GND	Green/White	Black
16	LS-	Orange	White/Gray
17	BK-	Brown	Blue
18	BK+	Green	Yellow

Model CB-RCP2-PB□□□/CB-RCP2-PB□□□-RB

* The standard encoder cable is a normal cable, but a robot cable can be selected as an option.
* Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: r=50mm or more (Dynamic bending condition)
* Please use the robot cable if the cable needs to be installed through the cable carrier.

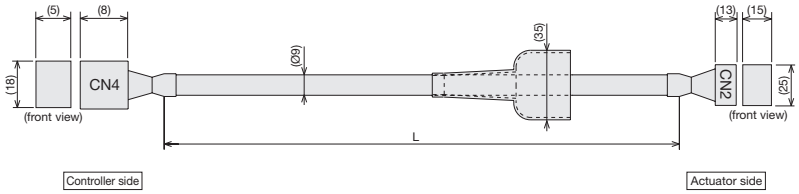


CN4 Cable color		Signal Name	Pin
Standard cable	Robot cable		
Blue (Red 1)	Orange (Black 2)	LS+	16
White	Orange (Red 2)	LS-	15
Red	Orange (Black 1)	BK+	14
Grey	Orange (Red 1)	BK-	13
Brown	Light gray (Black 1)	ENA	12
Green	Light gray (Red 1)	ENA	11
Purple	White (Black 1)	ENB	10
Pink	White (Red 1)	ENB	9
—	-		8
Yellow	Yellow (Black 1)	VPS	7
Orange	Pink (Red 1)	VBB	6
Blue	Pink (Black 1)	GND	5
—	-	(N.C)	4
—	-	(N.C)	3
—	-	(N.C)	2
Drain	Drain	F.G	1

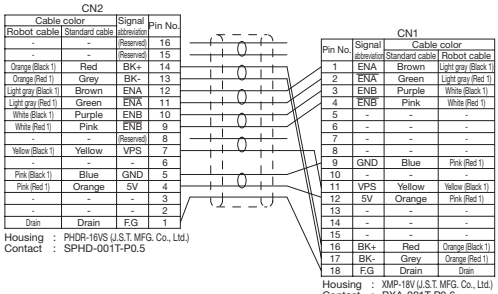
Pin Name	Signal Name	Cable color		CN2
		Standard cable	Robot cable	
1	ENA	Brown	Light gray (Black 1)	
2	ENA	Green	Light gray (Red 1)	
3	ENB	Purple	White (Black 1)	
4	ENB	Pink	White (Red 1)	
5	—	—	-	
6	—	—	-	
7	—	—	-	
8	—	—	-	
9	GND	Blue	Pink (Black 1)	
10	VBB	Orange	Pink (Red 1)	
11	VPS	Yellow	Yellow (Black 1)	
12	—	—	-	
13	LS+	Blue (Red 1)	Orange (Black 2)	
14	LS-	White	Orange (Red 2)	
15	—	—	-	
16	BK+	Red	Orange (Black 1)	
17	BK-	Grey	Orange (Red 1)	
18	F.G	Drain	Drain	

Model CB-RFA-PA□□□/CB-RFA-PA□□□-RB

* The standard encoder cable is a normal cable, but a robot cable can be selected as an option.
* Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Minimum bending R: r = 50mm or more (Dynamic bending condition)
*Please use the robot cable if the cable needs to be installed through the cable carrier.



CN2

Cable color		Signal abbreviation	Pin No.
Robot cable	Standard cable		
-	-	(Reserved)	16
-	-	(Reserved)	15
Orange (Black 1)	Red	BK+	14
Orange (Red 1)	Grey	BK-	13
Light gray (Black 1)	Brown	ENA	12
Light gray (Red 1)	Green	ENA	11
White (Black 1)	Purple	ENB	10
White (Red 1)	Pink	ENB	9
-	-	(Reserved)	8
Yellow (Black 1)	Yellow	VPS	7
-	-	-	6
Pink (Black 1)	Blue	GND	5
Pink (Red 1)	Orange	5V	4
-	-	-	3
-	-	-	2
Drain	Drain	F.G	1

Housing : PHDR-16VS (J.S.T. MFG. Co., Ltd.)
Contact : SPHD-001T-P0.5

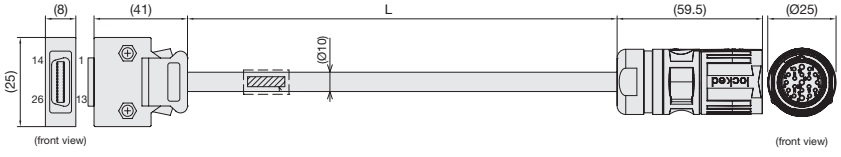
CN1

Pin No.	Signal abbreviation	Cable color	
		Standard cable	Robot cable
1	ENA	Brown	Light gray (Black 1)
2	ENA	Green	Light gray (Red 1)
3	ENB	Purple	White (Black 1)
4	ENB	Pink	White (Red 1)
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	GND	Blue	Pink (Red 1)
10	-	-	-
11	VPS	Yellow	Yellow (Black 1)
12	5V	Orange	Pink (Red 1)
13	-	-	-
14	-	-	-
15	-	-	-
16	BK+	Red	Orange (Black 1)
17	BK-	Grey	Orange (Red 1)
18	F.G	Drain	Drain

Housing : XMP-18V (J.S.T. MFG. Co., Ltd.)
Contact : BXA-001T-P0.6
Retainer : MS-09V

Model CB-RCS3-PLA□□□-RB

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m



10126-3000PE (Sumitomo 3M)

Wiring	Color	Signal	No.
AWG26 (soldered)	-	-	11
	White/Orange	E24V	12
	White/Green	E24G	13
	Brown/Blue	LS	26
	Brown/Yellow	CLEEP	25
	Brown/Red	OT	24
	Brown/Black	RSV	23
	White/Blue	LC_SRD+	9
	White/Yellow	LC_SRD-	10
	White/Red	LC_VCC	18
	White/Black	LC_GND	19
	-	-	1
	-	-	2
	-	-	3
	-	-	4
	-	-	5
	-	-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Grey	BAT-	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	-	-	22

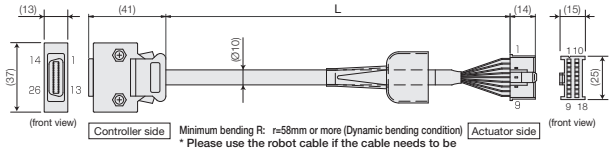
Shield is clamp connected to the hood

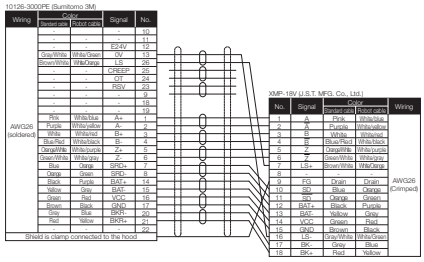
CA-19S1N1280DNS (Phoenix)

No.	Signal	Color	Wiring
1	LS	Brown/Blue	AWG26 (soldered)
2	CLEEP	Brown/Yellow	
3	OT	Brown/Red	
4	RSV	Brown/Black	
5	BAT+	Purple	
6	VCC	Red	
7	LC_SRD+	White/Blue	
8	LC_SRD-	White/Yellow	
9	LC_VCC	White/Red	
10	BKR+	Yellow	
11	BKR-	Blue	
12	FG	Drain	
13	E24V	White/Orange	
14	BAT-	Grey	
15	SRD+	Orange	
16	SRD-	Green	
17	LC_GND	White/Black	
18	E24G	White/Green	
19	GND	Black	

Model CB-RCS2-PA□□□ (for RCS2/RCS3) /CB-X3-PA□□□ (for NS/RCS2/RCS3)

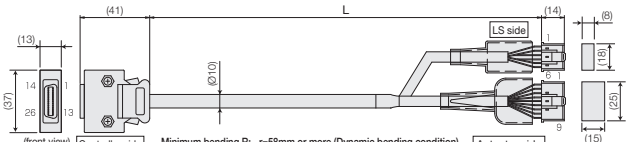
*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 30m

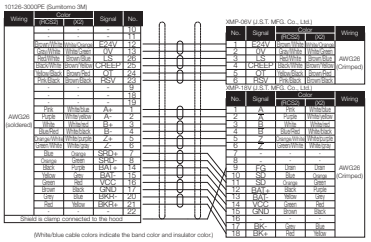




Model CB-RCS2-PLA□□□ (for RCS2rotary) /CB-X2-PLA□□□ (specification with NS LS / for RCS2 rotary)

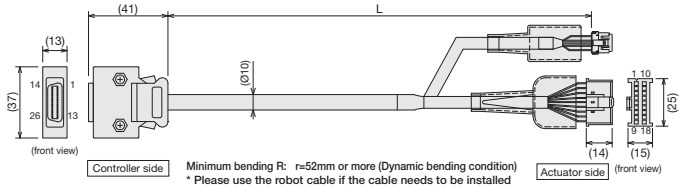
*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 30m

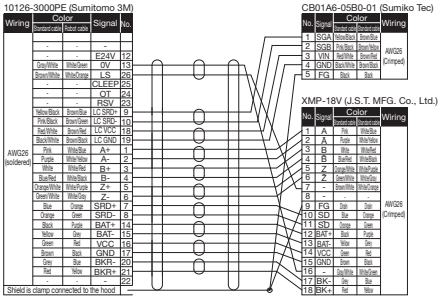




Model CB-RCS2-PLDA□□□/CB-RCS2-PLDA□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 30m



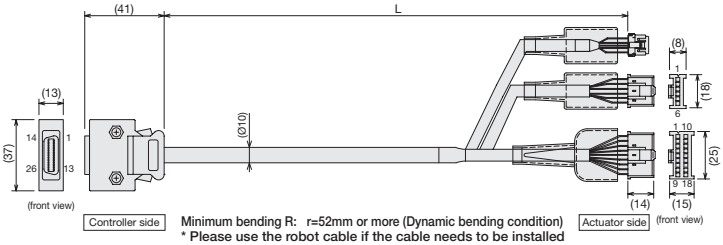


Actuator/Controller Connection Cable Detailed View

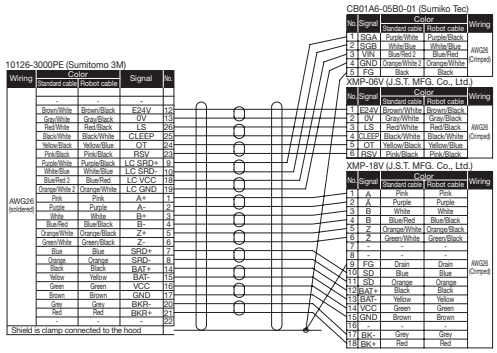
■ Encoder Cables

Model CB-RCS2-PLLA□□□/CB-RCS2-PLLA□□□-RB

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m

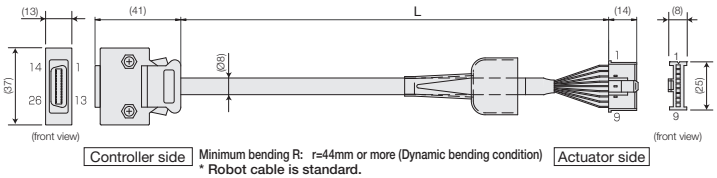


Minimum bending R: r=52mm or more (Dynamic bending condition)
* Please use the robot cable if the cable needs to be installed through the cable carrier.

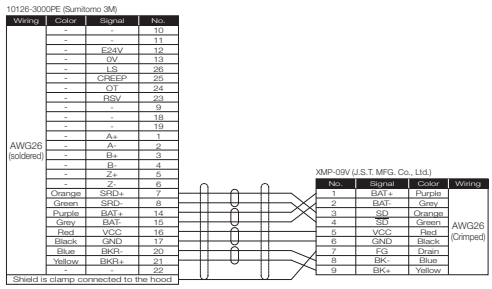


Model CB-X1-PA□□□

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 20m

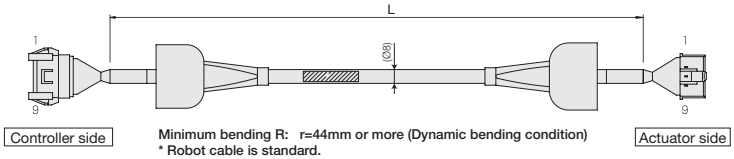


Minimum bending R: r=44mm or more (Dynamic bending condition)
* Robot cable is standard.

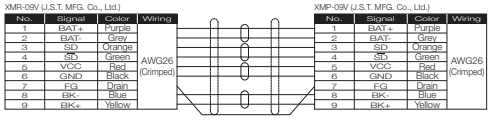


Model CB-X1-PA□□□-JY1

*Please indicate the cable length (L) in □□□,
e.g.) 010 = 1m, maximum 2m

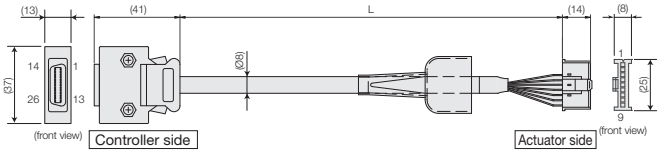


Minimum bending R: r=44mm or more (Dynamic bending condition)
* Robot cable is standard.

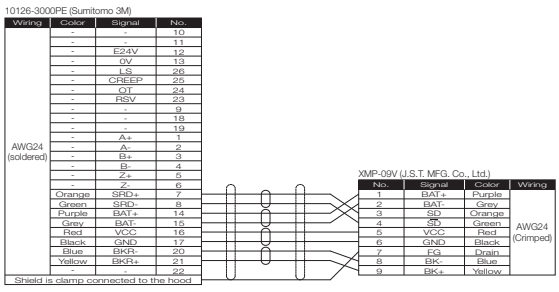


Model CB-X1-PA□□□-AWG24

*Please indicate the cable length (L) in □□□,
e.g.) 210 = 21m, maximum 30m

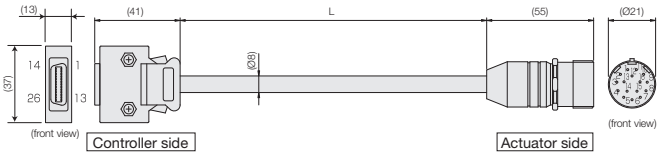


Minimum bending R: r=44mm or more (Dynamic bending condition)
* Robot cable is standard.



Model CB-X1-PA□□□-WC

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m



Minimum bending R: r=44mm or more (Dynamic bending condition)
* Robot cable is standard.

10126-3000PE (Sumitomo 3M)

Wiring	Color	Signal	No.
	-	-	10
	-	-	11
	-	E24V	12
	-	0V	13
	-	LS	26
	-	CREEP	25
	-	OT	24
	-	RSV	23
	-	-	9
	-	-	18
	-	-	19
	-	A+	1
AWG26 (soldered)	-	A-	2
	-	B+	3
	-	B-	4
	-	Z+	5
	-	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Grey	BAT-	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	-		22

Shield is clamp connected to the hood

99-4630-00-16 (BINDER)

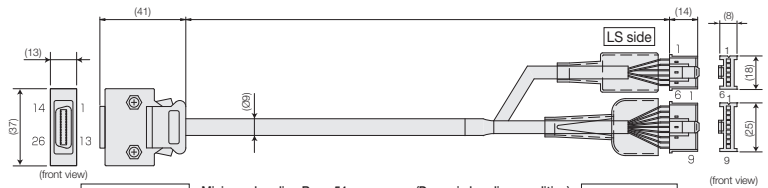
No.	Signal	Color	Wiring
1	SD	Orange	
2	SD	Green	
3	-	-	
4	-	-	
5	-	-	
6	-	-	
7	-	-	AWG26 (soldered)
8	-	-	
9	-	-	
10	VCC	Red	
11	GND	Black	
12	BAT+	Purple	
13	BAT-	Grey	
14			
15	BK-	Blue	
16	BK+	Yellow	

Shield is connected to the ground sleeve

(White/blue cable colors indicate the band color and insulator color.)

Model CB-X1-PLA□□□

*Please indicate the cable length (L) in □□□,
e.g.) 080 = 8m, maximum 30m



Minimum bending R: r=54mm or more (Dynamic bending condition)
* Robot cable is standard.

10126-3000PE (Sumitomo 3M)

Wiring	Color	Signal	No.
	-	-	10
	-	-	11
White/blue	E24V		12
White/yellow	0V		13
White/red	LS		26
White/black	CREEP		25
White/purple	OT		24
White/gray	RSV		23
	-	-	9
	-	-	18
	-	-	19
	-	A+	1
AWG26 (soldered)	-	A-	2
	-	B+	3
	-	B-	4
	-	Z+	5
	-	Z-	6
Orange	SRD+		7
Green	SRD-		8
Purple	BAT+		14
Grey	BAT-		15
Red	VCC		16
Black	GND		17
Blue	BKR-		20
Yellow	BKR+		21
	-		22

Shield is clamp connected to the hood

XMP-06V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	E24V	White/blue	
2	0V	White/yellow	
3	LS	White/red	AWG26 (Crimped)
4	CREEP	White/black	
5	OT	White/purple	
6	RSV	White/gray	

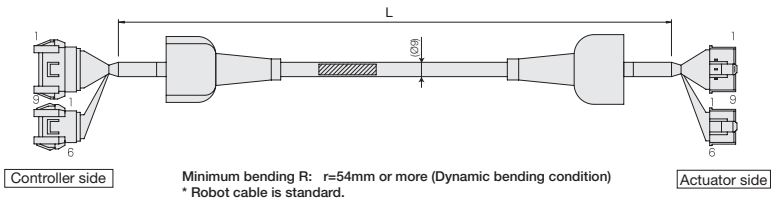
XMP-09V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	BAT+	Purple	
2	BAT-	Grey	
3	SD	Orange	
4	SD	Green	AWG26 (Crimped)
5	VCC	Red	
6	GND	Black	
7	FG	Drain	
8	BK-	Blue	
9	BK+	Yellow	

(White/blue cable colors indicate the band color/insulator color)

Model CB-X1-PLA□□□-JY1

*Please indicate the cable length (L) in □□□,
e.g.) 010 = 1m, maximum 2m



Minimum bending R: r=54mm or more (Dynamic bending condition)
* Robot cable is standard.

XMR-06V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	E24V	White/blue	
2	0V	White/yellow	
3	LS	White/red	AWG26 (Crimped)
4	CREEP	White/black	
5	OT	White/purple	
6	RSV	White/gray	

XMP-06V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	E24V	White/blue	
2	0V	White/yellow	
3	LS	White/red	AWG26 (Crimped)
4	CREEP	White/black	
5	OT	White/purple	
6	RSV	White/gray	

XMR-09V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	BAT+	Purple	
2	BAT-	Grey	
3	SD	Orange	
4	SD	Green	AWG26 (Crimped)
5	VCC	Red	
6	GND	Black	
7	FG	Drain	
8	BK-	Blue	
9	BK+	Yellow	

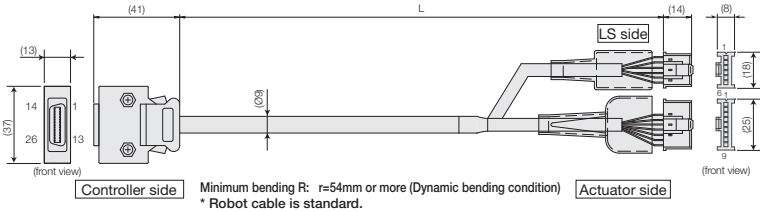
XMP-09V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	BAT+	Purple	
2	BAT-	Grey	
3	SD	Orange	
4	SD	Green	AWG26 (Crimped)
5	VCC	Red	
6	GND	Black	
7	FG	Drain	
8	BK-	Blue	
9	BK+	Yellow	

(White/blue cable colors indicate the band color and insulator color.)

Model CB-X1-PLA□□□-AWG24

*Please indicate the cable length (L) in □□□,
e.g.) 210 = 21m, maximum 30m



Minimum bending R: r=54mm or more (Dynamic bending condition)
* Robot cable is standard.

10126-3000PE (Sumitomo 3M)

Wiring	Color	Signal	No.
	-	-	10
	-	-	11
White/blue	E24V		12
White/yellow	0V		13
White/red	LS		26
White/black	CREEP		25
White/purple	OT		24
White/gray	RSV		23
	-	-	9
	-	-	18
	-	-	19
	-	A+	1
AWG24 (soldered)	-	A-	2
	-	B+	3
	-	B-	4
	-	Z+	5
	-	Z-	6
Orange	SRD+		7
Green	SRD-		8
Purple	BAT+		14
Grey	BAT-		15
Red	VCC		16
Black	GND		17
Blue	BKR-		20
Yellow	BKR+		21
	-		22

Shield is clamp connected to the hood

XMP-06V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	E24V	White/blue	
2	0V	White/yellow	
3	LS	White/red	AWG24 (Crimped)
4	CREEP	White/black	
5	OT	White/purple	
6	RSV	White/gray	

XMP-09V (J.S.T. MFG. Co., Ltd.)

No.	Signal	Color	Wiring
1	BAT+	Purple	
2	BAT-	Grey	
3	SD	Orange	
4	SD	Green	AWG24 (Crimped)
5	VCC	Red	
6	GND	Black	
7	FG	Drain	
8	BK-	Blue	
9	BK+	Yellow	

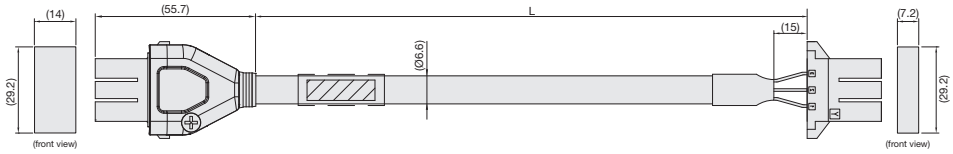
(White/blue cable colors indicate the band color/insulator color)

Actuator/Controller Connection Cable Detailed View

■ ELECYLINDER Cables

Model CB-EC-PW□□□-RB

*Please indicate the cable length (L) in □□□,
e.g.) 030 = 3m, maximum 10m



Actuator side

Minimum bending R: r=40mm or more (Dynamic bending condition)
* Robot cable is standard.

PSA-200 side

F32FSS-03V-KY (JST)

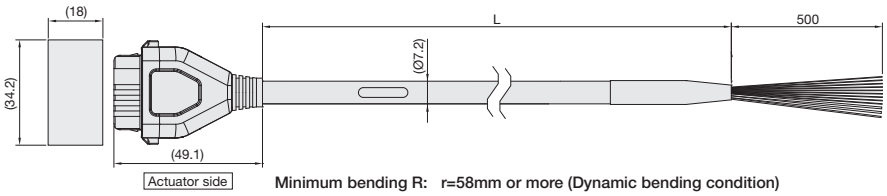
Color	Signal name	Pin No.
Red (AWG18)	MP	1
Black (AWG18)	MN	2
Green / Yellow (AWG18)	PE	3

F32FSS-03V-KY (JST)

Pin No.	Signal name	Color
1	MP	Red (AWG18)
2	MN	Black (AWG18)
3	PE	Green / Yellow (AWG18)

Model CB-EC-PWBIO□□□-RB

*Please indicate the cable length (L) in □□□,
e.g.) 030 = 3m, maximum 10m

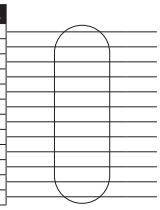


Actuator side

Minimum bending R: r=58mm or more (Dynamic bending condition)
* Robot cable is standard.

3-1871946-6

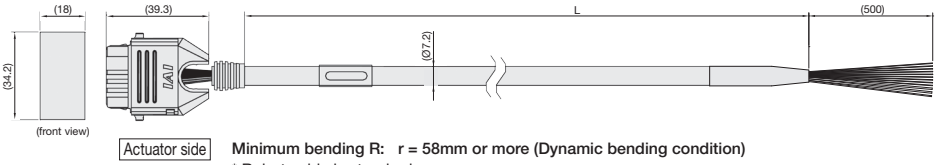
Color	Signal name	Pin No.
Black (AWG18)	0V	A1
Red (AWG18)	24V	B1
Light blue (AWG22)	(Reserved) (Note 1)	A2
Orange (AWG26)	IN0	B3
Yellow (AWG26)	IN1	B4
Green (AWG26)	IN2	B5
Pink (AWG26)	(Reserved)	B6
Blue (AWG26)	OUT0	A3
Purple (AWG26)	OUT1	A4
Gray (AWG26)	OUT2	A5
White (AWG26)	(Reserved)	A6
Brown (AWG26)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



(Note 1) When the dual power supply specification (TMD2) is selected, the voltage is 24V (control).
(Note 2) The yellow-green and light gray wires are unused. (Pre-cut inside the shrink tube)

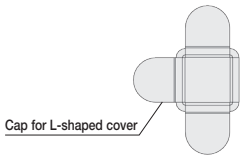
Model CB-EC2-PWBIO□□□-RB

*Please indicate the cable length (L) in □□□,
e.g.) 030 = 3m, maximum 9m

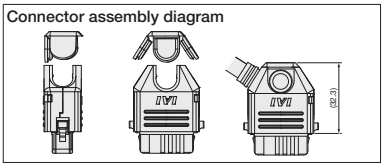


Actuator side

Minimum bending R: r = 58mm or more (Dynamic bending condition)
* Robot cable is standard.

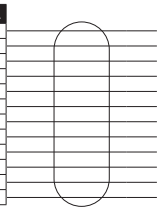


Connector assembly diagram



1-1871940-6

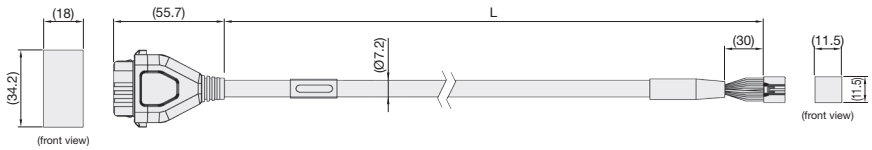
Color	Signal name	Pin No.
Black (AWG18)	0V	A1
Red (AWG18)	24V	B1
Light blue (AWG22)	(Reserved) (Note 1)	A2
Orange (AWG26)	IN0	B3
Yellow (AWG26)	IN1	B4
Green (AWG26)	IN2	B5
Pink (AWG26)	(Reserved)	B6
Blue (AWG26)	OUT0	A3
Purple (AWG26)	OUT1	A4
Gray (AWG26)	OUT2	A5
White (AWG26)	(Reserved)	A6
Brown (AWG26)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



(Note 1) When the dual power supply specification (TMD2) is selected, the voltage is 24V (control).
(Note 2) The yellow-green and light gray wires are unused. (Pre-cut inside the shrink tube)

Model CB-REC-PWBIO□□□-RB

*Please indicate the cable length (L) in □□□,
e.g.) 030 = 3m, maximum 10m



Actuator side Minimum bending R: r = 58mm or more (Dynamic bending condition) Controller side
* Robot cable is standard.

1-1871940-6

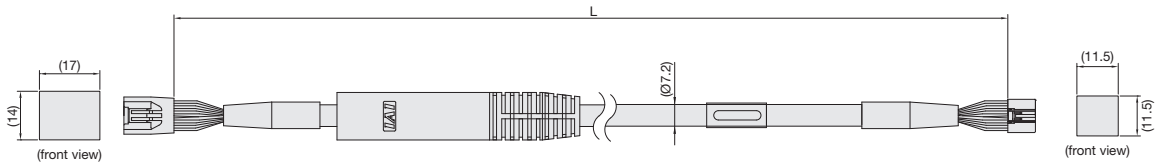
Color	Signal name	Pin No.
Black (AWG18)	0V	A1
Red (AWG18)	24V (MP)	B1
Light blue (AWG22)	24V (CP)	A2
Orange (AWG26)	IN0	B3
Yellow (AWG26)	IN1	B4
Green (AWG26)	IN2	B5
Yellow (AWG26)	SD+	B6
Light gray (AWG26)	SD-	A6
Blue (AWG26)	OUT0	A3
Purple (AWG26)	OUT1	A4
Gray (AWG26)	OUT2	A5
Brown (AWG26)	BKRLS	B2

DF62E-13S-2.2C (18)

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

Model CB-REC-PWBIO□□□-RB-JY

*Please indicate the cable length (L) in □□□,
e.g.) 030 = 3m, maximum 9m



Actuator side Minimum bending R: r = 58mm or more (Dynamic bending condition) Controller side
* Robot cable is standard.

DF62B-13EP-2.2C (18)

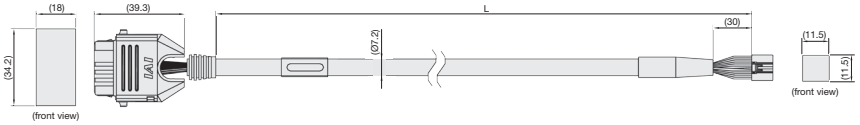
Color	Signal name	Pin No.
Black (AWG18)	0V	2
Red (AWG18)	24V (MP)	1
Light blue (AWG22)	24V (CP)	12
Orange (AWG26)	OUT0	7
Yellow (AWG26)	OUT1	8
Green (AWG26)	OUT2	9
Yellow (AWG26)	SD+	6
Light gray (AWG26)	SD-	10
Blue (AWG26)	IN0	3
Purple (AWG26)	IN1	4
Gray (AWG26)	IN2	5
Brown (AWG26)	BKRLS	11
Green (AWG26)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

DF62E-13S-2.2C (18)

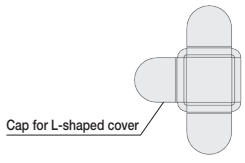
Pin No.	Signal name	Color
2	0V	Black (AWG18)
1	24V (MP)	Red (AWG18)
12	24V (CP)	Light blue (AWG22)
7	OUT0	Orange (AWG26)
8	OUT1	Yellow (AWG26)
9	OUT2	Green (AWG26)
6	SD+	Yellow (AWG26)
10	SD-	Light gray (AWG26)
3	INO	Blue (AWG26)
4	IN1	Purple (AWG26)
5	IN2	Gray (AWG26)
11	BKRLS	Brown (AWG26)
13	FG	Green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

Model CB-REC2-PWBIO□□□-RB

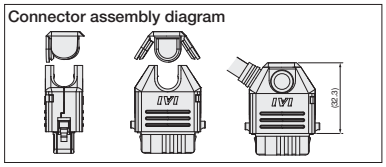
*Please indicate the cable length (L) in □□□,
e.g.) 030 = 3m, maximum 9m



Actuator side Minimum bending R: r = 58mm or more (Dynamic bending condition) Controller side
* Robot cable is standard.



Connector assembly diagram



1-1871940-6

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

DF62E-13S-2C (18)

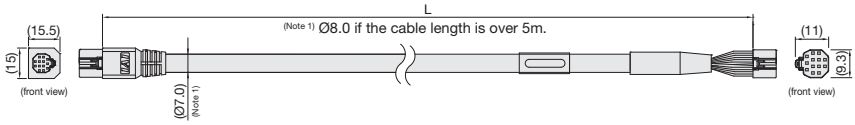
Pin No.	Signal name	Color
2	0V	Black (AWG22)
1	24V (MP)	Red (AWG22)
12	24V (CP)	Light blue (AWG22)
7	OUT0	Orange (AWG26)
8	OUT1	Yellow (AWG26)
9	OUT2	Green (AWG26)
6	SD+	Yellow (AWG26)
10	SD-	Light gray (AWG26)
3	INO	Blue (AWG26)
4	IN1	Purple (AWG26)
5	IN2	Gray (AWG26)
11	BKRLS	Brown (AWG26)
13	FG	Green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

Actuator/Controller Connection Cable Detailed View

■ RCP6S Cables

Model CB-RCP6S-PWBIO□□□/CB-RCP6S-PWBIO□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Actuator side | Minimum bending R: 5m or less r= 56mm or more (Dynamic bending condition) / Longer than 5m r= 64mm or more (Dynamic bending condition) | Gateway unit side

* The robot cable is designed for flex-resistance. Please use the robot cable if the cable needs to be installed through a cable carrier.

DF62E-13S-2.2C (HIROSE ELECTRIC CO., LTD.)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Gray (AWG22/18)	Gray (AWG22/18)	CP	1
Blue (AWG22/18)	Blue (AWG22/18)	MP	8
Orange (AWG22/18)	Orange (AWG22/18)	MP	9
Green (AWG22/18)	Green (AWG22/18)	GND	10
Brown (AWG22/18)	Brown (AWG22/18)	GND	11
Orange (AWG26)	Orange (AWG26)	AM_SD+	6
Light blue (AWG26)	Light blue (AWG26)	AM_SD-	2
Red (AWG26)	Red (AWG26)	CT_SD+	7
Gray (AWG26)	Gray (AWG26)	CT_SD-	3
Green (AWG26)	Green (AWG26)	BK	4
Brown (AWG26)	Brown (AWG26)	EMGS	5
–	—	NC	13
Black (AWG26)	Green (AWG26)	FG	12

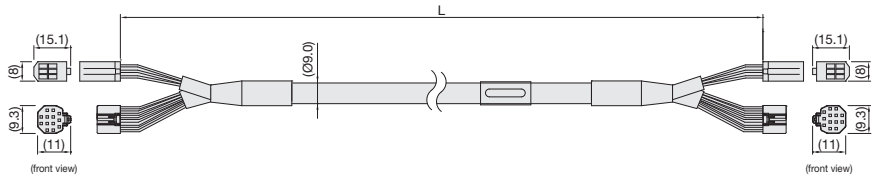
Center Interposition

DF62E-13S-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name	Color	
		Standard cable	Robot cable
1	CP	Gray (AWG22/18)	Gray (AWG22/18)
8	MP	Blue (AWG22/18)	Blue (AWG22/18)
9	MP	Orange (AWG22/18)	Orange (AWG22/18)
10	GND	Green (AWG22/18)	Green (AWG22/18)
11	GND	Brown (AWG22/18)	Brown (AWG22/18)
6	AM_SD+	Orange (AWG26)	Orange (AWG26)
2	AM_SD-	Light blue (AWG26)	Light blue (AWG26)
7	CT_SD+	Red (AWG26)	Red (AWG26)
3	CT_SD-	Gray (AWG26)	Gray (AWG26)
4	BK	Green (AWG26)	Green (AWG26)
5	EMGS	Brown (AWG26)	Brown (AWG26)
13	NC	—	—
12	FG	Black (AWG26)	Green (AWG26)

Model CB-RCP6S-RLY□□□/CB-RCP6S-RLY□□□-RB

*Please indicate the cable length (L) in □□□, e.g.) 030 = 3m, maximum 10m



Hub unit side | Minimum bending R: r=72mm or more (Dynamic bending condition) | Gateway unit side

* The robot cable is designed for flex-resistance. Please use the robot cable if the cable needs to be installed through a cable carrier.

* Please contact IAI if the cable length other than above is needed.

J11DF-06V-KX (S.T.MFG.CO.,LTD.)

Color	Signal name	Pin No.
Brown (AWG18)	MP	B1
Gray (AWG18)	MP	B2
Red (AWG18)	MP	B3
Blue (AWG18)	GND	A1
Orange (AWG18)	GND	A2
Green (AWG18)	GND	A3

J11DF-06-KX (J.S.T. Mfg. Co.,Ltd.)

Pin No.	Signal name	Color
B1	MP	Brown (AWG18)
B2	MP	Gray (AWG18)
B3	MP	Red (AWG18)
A1	GND	Blue (AWG18)
A2	GND	Orange (AWG18)
A3	GND	Green (AWG18)

DF62E-13S-2.2C (HIROSE ELECTRIC CO., LTD.)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Blue (AWG22)	Blue (AWG22)	CP	1
—	—	NC	8
—	—	NC	9
Orange (AWG22)	Orange (AWG22)	GND	10
Green (AWG22)	Green (AWG22)	GND	11
Brown (AWG26)	Brown (AWG26)	AM_SD+	6
Green (AWG26)	Green (AWG26)	AM_SD-	2
Red (AWG26)	Red (AWG26)	CT_SD+	7
Gray (AWG26)	Gray (AWG26)	CT_SD-	3
Light blue (AWG26)	Light blue (AWG26)	NC	4
Orange (AWG26)	Orange (AWG26)	EMGS	5
—		NC	13
Black (AWG26)	Green (AWG26)	FG	12

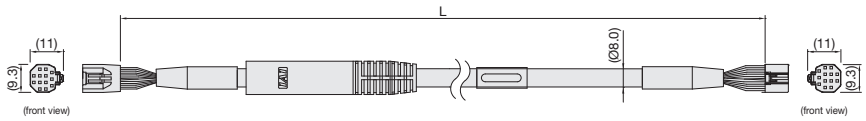
Center Interposition

DF62E-13S-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name	Color	
		Standard cable	Robot cable
1	CP	Blue (AWG22)	Blue (AWG22)
8	NC	—	—
9	NC	—	—
10	GND	Orange (AWG22)	Orange (AWG22)
11	GND	Green (AWG22)	Green (AWG22)
6	AM_SD+	Brown (AWG26)	Brown (AWG26)
2	AM_SD-	Green (AWG26)	Green (AWG26)
7	CT_SD+	Red (AWG26)	Red (AWG26)
3	CT_SD-	Gray (AWG26)	Gray (AWG26)
4	NC	Light blue (AWG26)	Light blue (AWG26)
5	EMGS	Orange (AWG26)	Orange (AWG26)
13	NC	—	—
12	FG	Black (AWG26)	Green (AWG26)

Model CB-RCP6S-PWBIO□□□-JY1/CB-RCP6S-PWBIO□□□-JY1-RB

*Please indicate the cable length (L) in □□□, e.g.) 030 = 3m, maximum 5m



Actuator side | Minimum bending R: r=64mm or more (Dynamic bending condition) | Controller side

* The robot cable is designed for flex-resistance. Please use the robot cable if the cable needs to be installed through a cable carrier.

* Please contact IAI if the cable length other than above is needed.

DF62B-13EP-2.2C (HIROSE ELECTRIC CO., LTD.)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Gray (AWG18)	Gray (AWG18)	CP	1
Blue (AWG18)	Blue (AWG18)	MP	8
Orange (AWG18)	Orange (AWG18)	MP	9
Green (AWG18)	Green (AWG18)	GND	10
Brown (AWG18)	Brown (AWG18)	GND	11
Orange (AWG26)	Orange (AWG26)	AM_SD+	6
Light blue (AWG26)	Light blue (AWG26)	AM_SD-	2
Red (AWG26)	Red (AWG26)	CT_SD+	7
Gray (AWG26)	Gray (AWG26)	CT_SD-	3
Green (AWG26)	Green (AWG26)	BK	4
Brown (AWG26)	Brown (AWG26)	EMGS	5
—	—	NC	13
Black (AWG26)	Green (AWG26)	FG	12

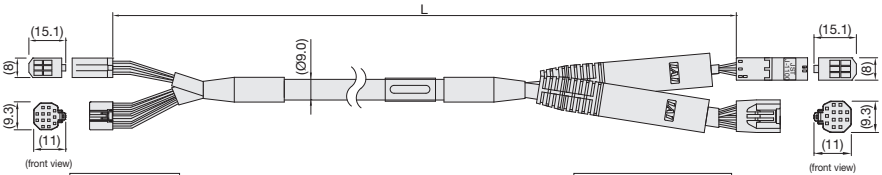
Center Interposition

DF62E-13S-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name	Color	
		Standard cable	Robot cable
1	CP	Gray (AWG18)	Gray (AWG18)
8	MP	Blue (AWG18)	Blue (AWG18)
9	MP	Orange (AWG18)	Orange (AWG18)
10	GND	Green (AWG18)	Green (AWG18)
11	GND	Brown (AWG18)	Brown (AWG18)
6	AM_SD+	Orange (AWG26)	Orange (AWG26)
2	AM_SD-	Light blue (AWG26)	Light blue (AWG26)
7	CT_SD+	Red (AWG26)	Red (AWG26)
3	CT_SD-	Gray (AWG26)	Gray (AWG26)
4	BK	Green (AWG26)	Green (AWG26)
5	EMGS	Brown (AWG26)	Brown (AWG26)
13	NC	—	—
12	FG	Black (AWG26)	Green (AWG26)

Model CB-RCP6S-RLY□□□-JY1/CB-RCP6S-RLY□□□-JY1-RB

*Please indicate the cable length (L) in □□□, e.g.) 030 = 3m, maximum 5m



Hub unit side | Gateway unit side

Minimum bending R: r=72mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance. Please use the robot cable if the cable needs to be installed through a cable carrier.

* Please contact IAI if the cable length other than above is needed.

J11DF-06V-KX (S.T.MFG.CO.,LTD.)

Color	Signal name	Pin No.
Brown (AWG18)	MP	B1
Gray (AWG18)	MP	B2
Red (AWG18)	MP	B3
Blue (AWG18)	GND	A1
Orange (AWG18)	GND	A2
Green (AWG18)	GND	A3

J11DFM-06-KX (J.S.T. Mfg. Co.,Ltd.)

Pin No.	Signal name	Color
B1	MP	Brown (AWG18)
B2	MP	Gray (AWG18)
B3	MP	Red (AWG18)
A1	GND	Blue (AWG18)
A2	GND	Orange (AWG18)
A3	GND	Green (AWG18)

DF62E-13S-2.2C (HIROSE ELECTRIC CO., LTD.)

Color		Signal name	Pin No.
Standard cable	Robot cable		
Blue (AWG22)	Blue (AWG22)	CP	1
—	—	NC	8
—	—	NC	9
Orange (AWG22)	Orange (AWG22)	GND	10
Green (AWG22)	Green (AWG22)	GND	11
Brown (AWG26)	Brown (AWG26)	AM_SD+	6
Green (AWG26)	Green (AWG26)	AM_SD-	2
Red (AWG26)	Red (AWG26)	CT_SD+	7
Gray (AWG26)	Gray (AWG26)	CT_SD-	3
Light blue (AWG26)	Light blue (AWG26)	NC	4
Orange (AWG26)	Orange (AWG26)	EMGS	5
—		NC	13
Black (AWG26)	Green (AWG26)	FG	12

Center Interposition

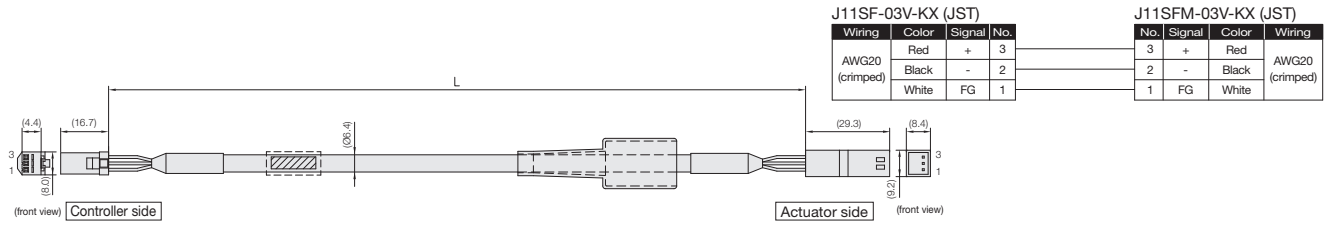
DF62B-13EP-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name	Color	
		Standard cable	Robot cable
1	CP	Blue (AWG22)	Blue (AWG22)
8	NC	—	—
9	NC	—	—
10	GND	Orange (AWG22)	Orange (AWG22)
11	GND	Green (AWG22)	Green (AWG22)
6	AM_SD+	Brown (AWG26)	Brown (AWG26)
2	AM_SD-	Green (AWG26)	Green (AWG26)
7	CT_SD+	Red (AWG26)	Red (AWG26)
3	CT_SD-	Gray (AWG26)	Gray (AWG26)
4	NC	Light blue (AWG26)	Light blue (AWG26)
5	EMGS	Orange (AWG26)	Orange (AWG26)
13	NC	—	—
12	FG	Black (AWG26)	Green (AWG26)

■ Brake Cables

Model CB-DDB-BK□□□

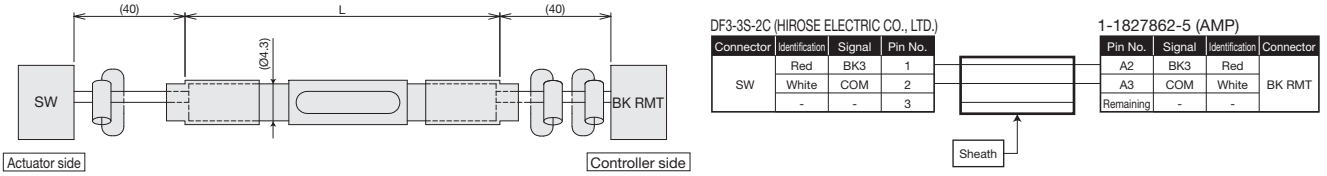
*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 20m



Model CB-IXA-BK □□□ -1

(For IXA-□NNN30/□NNN45)

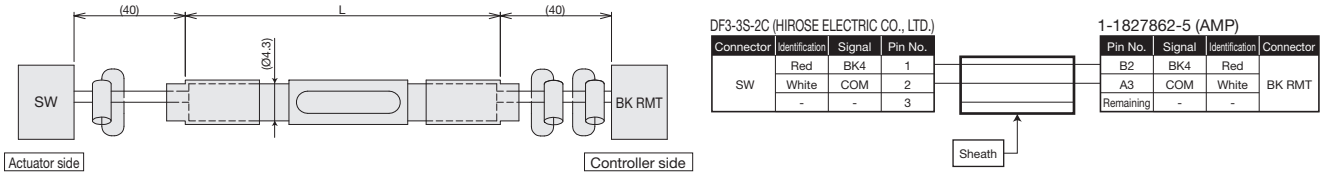
*Please indicate the cable length (L) in □□□, e.g.) 050 = 5m, maximum 15m



Model CB-IXA-BK □□□ -2

(For IXA-□NNN60)

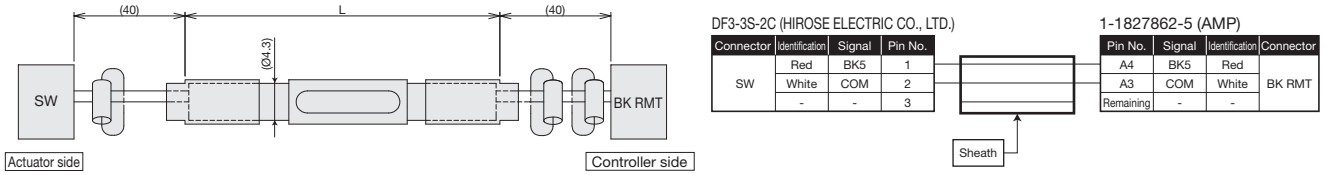
*Please indicate the cable length (L) in □□□, e.g.) 050 = 5m, maximum 15m



Model CB-IXA-BK □□□ -3

(For IXA-4NNN80/4NNN100/□NSN30/□NSN45/□NSN60/ 4NSN80/4NSN100/4NHN10040/4NHN12040)

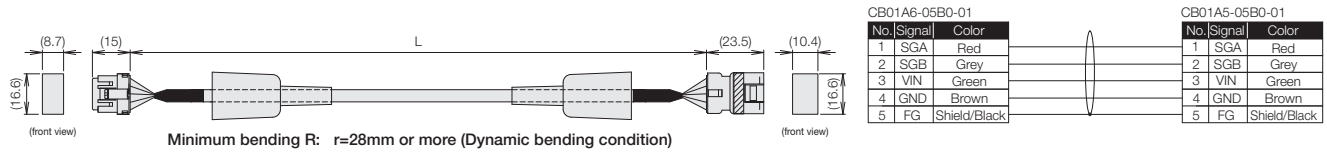
*Please indicate the cable length (L) in □□□, e.g.) 050 = 5m, maximum 15m



■ Load Cell-controller Connection Cables

Model CB-LDC-CTL□□□-JY

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 30m



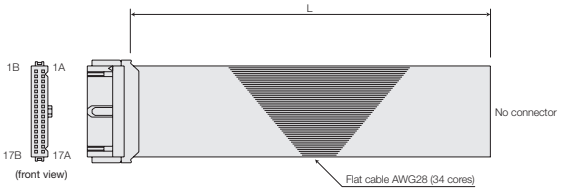
Minimum bending R: r=28mm or more (Dynamic bending condition)

Actuator/Controller Connection Cable Detailed View

■ PIO Cables

Model CB-DS-PIO□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m

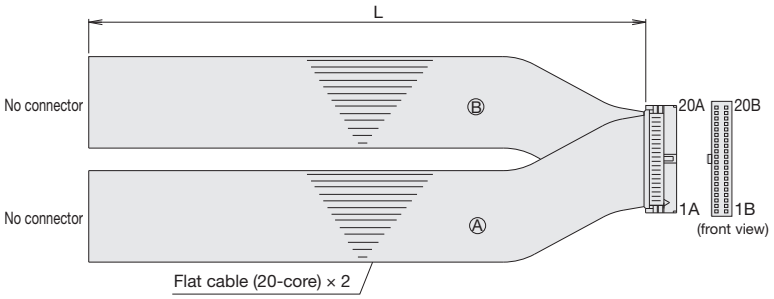


HIF3BA-34D-2.54R (HIROSE ELECTRIC CO., LTD.)

No.	Color	Wiring	No.	Color	Wiring
1A	Brown 1	Flat cable (pressure-welded)	9B	Gray 2	Flat cable (pressure-welded)
1B	Red 1		10A	White 2	
2A	Orange 1		10B	Black 2	
2B	Yellow 1		11A	Brown-3	
3A	Green 1		11B	Red 3	
3B	Blue 1		12A	Orange 3	
4A	Purple 1		12B	Yellow 3	
4B	Gray 1		13A	Green 3	
5A	White 1		13B	Blue 3	
5B	Black 1		14A	Purple 3	
6A	Brown-2		15A	White 3	
6B	Red 2		15B	Black 3	
7A	Orange 2		16A	Brown-4	
7B	Yellow 2		16B	Red 4	
8A	Green 2		17A	Orange 4	
8B	Blue 2		17B	Yellow 4	
9A	Purple 2				

Model: CB-PAC-PIO□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m

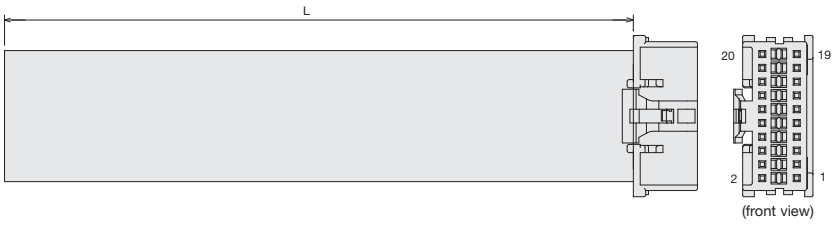


HIF6-40D-1.27R (HIROSE ELECTRIC CO., LTD.)

No.	Signal name	Cable color	Wiring	No.	Signal name	Cable color	Wiring
1A	24V	Brown-1	Flat cable Ⓐ (pressure-welded) AWG28	1B	OUT0	Brown-3	Flat cable Ⓑ (pressure-welded) AWG28
2A	24V	Red-1		2B	OUT1	Red-3	
3A	—	Orange-1		3B	OUT2	Orange-3	
4A		Yellow-1		4B	OUT3	Yellow-3	
5A	IN0	Green-1		5B	OUT4	Green-3	
6A	IN1	Blue-1		6B	OUT5	Blue-3	
7A	IN2	Purple-1		7B	OUT6	Purple-3	
8A	IN3	Gray-1		8B	OUT7	Gray-3	
9A	IN4	White-1		9B	OUT8	White-3	
10A	IN5	Black-1		10B	OUT9	Black-3	
11A	IN6	Brown-2		11B	OUT10	Brown-4	
12A	IN7	Red-2		12B	OUT11	Red-4	
13A	IN8	Orange-2		13B	OUT12	Orange-4	
14A	IN9	Yellow-2		14B	OUT13	Yellow-4	
15A	IN10	Green-2		15B	OUT14	Green-4	
16A	IN11	Blue-2		16B	OUT15	Blue-4	
17A	IN12	Purple-2		17B	—	Purple-4	
18A	IN13	Gray-2		18B		Gray-4	
19A	IN14	White-2		19B	0V	White-4	
20A	IN15	Black-2		20B	0V	Black-4	

Model CB-PAD-PIO□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m

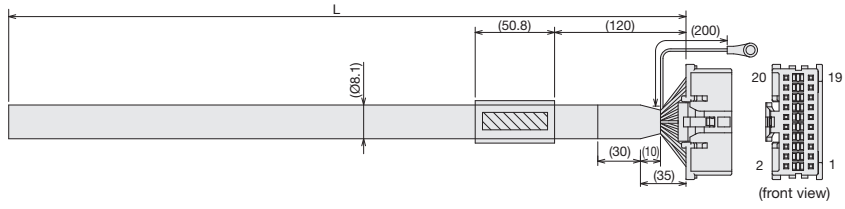


51353-2000 (MOLEX)

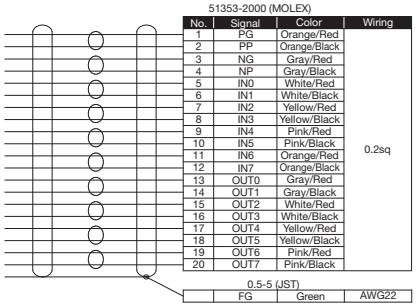
No.	Signal name	Cable color	Wiring	No.	Signal name	Cable color	Wiring
1	—	Brown-1	Flat cable AWG28	11	IN6	Brown-2	Flat cable AWG28
2	—	Red-1		12	IN7	Red-2	
3	—	Orange-1		13	OUT0	Orange-2	
4	—	Yellow-1		14	OUT1	Yellow-2	
5	IN0	Green-1		15	OUT2	Green-2	
6	IN1	Blue-1		16	OUT3	Blue-2	
7	IN2	Purple-1		17	OUT4	Purple-2	
8	IN3	Gray-1		18	OUT5	Gray-2	
9	IN4	White-1		19	OUT6	White-2	
10	IN5	Black-1		20	OUT7	Black-2	

Model CB-PAD-PIOS□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m



(Note) The maximum length for PCON-POB is 2m.



51353-2000 (MOLEX)

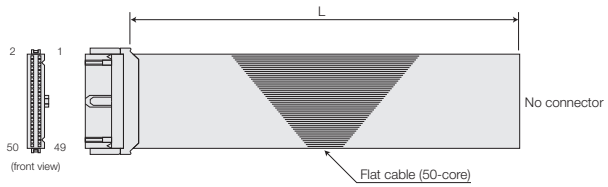
No.	Signal	Color	Wiring
1	PG	Orange/Red	0.2sq
2	PP	Orange/Black	
3	NG	Gray/Red	
4	NP	Gray/Black	
5	IN0	White/Red	
6	IN1	White/Black	
7	IN2	Yellow/Red	
8	IN3	Yellow/Black	
9	IN4	Pink/Red	
10	IN5	Pink/Black	
11	IN6	Orange/Red	
12	IN7	Orange/Black	
13	OUT0	Gray/Red	
14	OUT1	Gray/Black	
15	OUT2	White/Red	
16	OUT3	White/Black	
17	OUT4	Yellow/Red	
18	OUT5	Yellow/Black	
19	OUT6	Pink/Red	
20	OUT7	Pink/Black	

0.5-5 (JST)

	FG	Green	AWG22

Model CB-X-PIO□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m

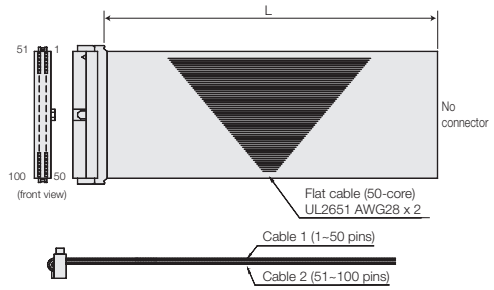


XG4M-5030-T (Omron)

No.	Color	Wiring	No.	Color	Wiring	No.	Color	Wiring
1	Brown-1	Flat cable pressure-welded	18	Gray-2	Flat cable pressure-welded	35	Green-4	Flat cable pressure-welded
2	Red-1		19	White-2		36	Blue-4	
3	Orange-1		20	Black-2		37	Purple-4	
4	Yellow-1		21	Brown-3		38	Gray-4	
5	Green-1		22	Red-3		39	White-4	
6	Blue-1		23	Orange-3		40	Black-4	
7	Purple-1		24	Yellow-3		41	Brown-5	
8	Gray-1		25	Green-3		42	Red-5	
9	White-1		26	Blue-3		43	Orange-5	
10	Black-1		27	Purple-3		44	Yellow-5	
11	Brown-2		28	Gray-3		45	Green-5	
12	Red-2		29	White-3		46	Blue-5	
13	Orange-2		30	Black-3		47	Purple-5	
14	Yellow-2		31	Brown-4		48	Gray-5	
15	Green-2		32	Red-4		49	White-5	
16	Blue-2		33	Orange-4		50	Black-5	
17	Purple-2		34	Yellow-4				

Model CB-X-PIOH□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m



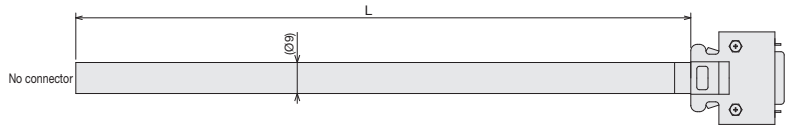
HIF6-100D1.27R (HIROSE ELECTRIC CO., LTD.)

Cable 1										Cable 2									
Classification	Pin No.	Color	Port No.	Function	Classification	Pin No.	Color	Port No.	Function	Classification	Pin No.	Color	Port No.	Function	Classification	Pin No.	Color	Port No.	Function
-	1	Brown -1	-	External power supply (24VDC) for the pin No.2~25, 51~74	-	26	Blue -3	-	External power supply (24VDC) for the pin No.27~50, 76~99		51	Brown -1	300	Alarm output		76	Blue -3	324	General-purpose output
	2	Red -1	000	Program start		27	Purple -3	004	General-purpose input		52	Red -1	301	Ready output		77	Purple -3	325	General-purpose output
	3	Orange -1	001	General-purpose input		28	Gray -3	005	General-purpose input		53	Orange -1	302	Emergency stop output		78	Gray -3	326	General-purpose output
	4	Yellow -1	002	General-purpose input		29	White -3	006	General-purpose input		54	Yellow -1	303	General-purpose output		79	White -3	327	General-purpose output
	5	Green -1	003	General-purpose input		30	Black -3	007	General-purpose input		55	Green -1	304	General-purpose output		80	Black -3	328	General-purpose output
	6	Blue -1	004	General-purpose input		31	Brown -4	010	General-purpose input		56	Blue -1	305	General-purpose output		81	Brown -4	329	General-purpose output
	7	Purple -1	005	General-purpose input		32	Red -4	011	General-purpose input		57	Purple -1	306	General-purpose output		82	Red -4	330	General-purpose output
	8	Gray -1	006	General-purpose input		33	Orange -4	012	General-purpose input		58	Gray -1	307	General-purpose output		83	Orange -4	331	General-purpose output
	9	White -1	007	Program designation (PRG No.1)		34	Yellow -4	013	General-purpose input		59	White -1	308	General-purpose output		84	Yellow -4	332	General-purpose output
	10	Black -1	008	Program designation (PRG No.2)		35	Green -4	014	General-purpose input		60	Black -1	309	General-purpose output		85	Green -4	333	General-purpose output
	11	Brown -2	009	Program designation (PRG No.4)		36	Blue -4	015	General-purpose input		61	Brown -2	310	General-purpose output		86	Blue -4	334	General-purpose output
	12	Red -2	010	Program designation (PRG No.8)		37	Purple -4	016	General-purpose input	Output	62	Red -2	311	General-purpose output	Output	87	Purple -4	335	General-purpose output
	13	Orange -2	011	Program designation (PRG No.10)		38	Gray -4	017	General-purpose input		63	Orange -2	312	General-purpose output		88	Gray -4	336	General-purpose output
Input	14	Yellow -2	012	Program designation (PRG No.20)	Input	39	White -4	018	General-purpose input		64	Yellow -2	313	General-purpose output		89	White -4	337	General-purpose output
	15	Green -2	013	Program designation (PRG No.40)		40	Black -4	019	General-purpose input		65	Green -2	314	General-purpose output		90	Black -4	338	General-purpose output
	16	Blue -2	014	General-purpose input		41	Brown -5	020	General-purpose input		66	Blue -2	315	General-purpose output		91	Brown -5	339	General-purpose output
	17	Purple -2	015	General-purpose input		42	Red -5	021	General-purpose input		67	Purple -2	316	General-purpose output		92	Red -5	340	General-purpose output
	18	Gray -2	016	General-purpose input		43	Orange -5	022	General-purpose input		68	Gray -2	317	General-purpose output		93	Orange -5	341	General-purpose output
	19	White -2	017	General-purpose input		44	Yellow -5	023	General-purpose input		69	White -2	318	General-purpose output		94	Yellow -5	342	General-purpose output
	20	Black -2	018	General-purpose input		45	Green -5	024	General-purpose input		70	Black -2	319	General-purpose output		95	Green -5	343	General-purpose output
	21	Brown -3	019	General-purpose input		46	Blue -5	043	General-purpose input		71	Brown -3	320	General-purpose output		96	Blue -5	344	General-purpose output
	22	Red -3	020	General-purpose input		47	Purple -5	044	General-purpose input		72	Red -3	321	General-purpose output		97	Purple -5	345	General-purpose output
	23	Orange -3	021	General-purpose input		48	Gray -5	045	General-purpose input		73	Orange -3	322	General-purpose output		98	Gray -5	346	General-purpose output
	24	Yellow -3	022	General-purpose input		49	White -5	046	General-purpose input		74	Yellow -3	323	General-purpose output		99	White -5	347	General-purpose output
	25	Green -3	023	General-purpose input		50	Black -5	047	General-purpose input	-	75	Green -3	-	External power supply (0V) for the pin No.2~25, 51~74	-	100	Black -5	-	External power supply (0V) for the pin No.27~50/76~99

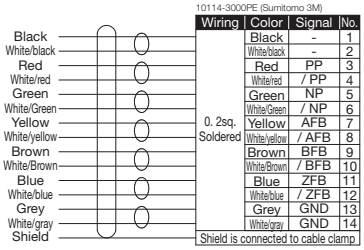
■ Pulse Train Control Cables

Model CB-SC-PIOS□□□

*Please indicate the cable length (L) in □□□, e.g.) 080 = 8m, maximum 10m



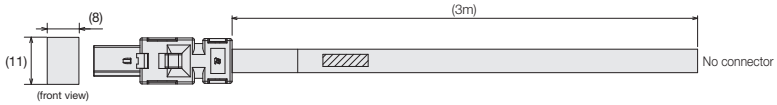
10114-3000PE (Sumitomo 3M)



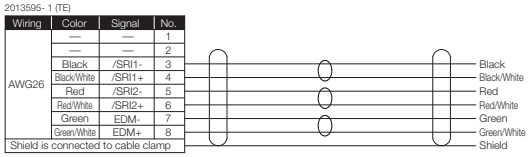
Wiring	Color	Signal	No.
0. 2sq. Soldered	Black	-	1
	White/black	-	2
	Red	PP	3
	White/red	/ PP	4
	Green	NP	5
	White/Green	/ NP	6
	Yellow	AFB	7
	White/yellow	/ AFB	8
	Brown	BFB	9
	White/Brown	/ BFB	10
	Blue	ZFB	11
	White/blue	/ ZFB	12
	Grey	GND	13
	White/gray	GND	14
Shield is connected to cable clamp			

■ I/O Cables for Driver Stop and Safety Functions

Model CB-SC-STO 030



2013595- 1 (TE)



Wiring	Color	Signal	No.
AWG26	—	—	1
	—	—	2
	Black	/SRI1-	3
	Black/White	/SRI1+	4
	Red	/SRI2-	5
	Red/White	/SRI2+	6
	Green	EDM-	7
	Green/White	EDM+	8
Shield is connected to cable clamp			

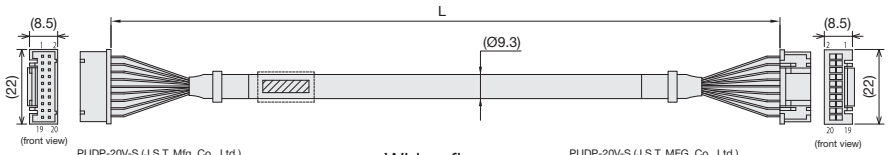
*Wire colour indication: e.g. Black/white has a white line on a black insulator.

Actuator/Controller Connection Cable Detailed View

■ RCON-EXT Connection Cables

Model CB-RE-CTL□□□

*Please indicate the cable length (L) in □□□,
e.g.) 030 = 3m, maximum 3m



Wiring fig.

PUDP-20V-S (J.S.T. Mfg. Co., Ltd.)

Wiring	Color	Signal	No.
7–12 pins AWG26 (Crimped)	Black	24V	1
	Yellow	0V	2
	Pink	DRV_DY	3
	White	DRV_RA	4
	Purple	DRV_DZ	5
	Blue/Red	DRV_RB	6
	Orange/White 1 lines of dots	AM_SD+	7
	Green/White	AM_SD-	8
	Brown/White	ACT_PULSE+	9
	Gray/White	ACT_PULSE-	10
	Red/White	SYNC_PULSE+	11
	Black/White	SYNC_PULSE-	12
	Yellow/Black	RTC_1Hz	13
	Pink/Black	CONE_IN	14
	Purple/White	STOP	15
	White/Blue	ENABLE	16
	-	-	17
	Orange/White 2 lines of dots	GW_RESET_IN	18
	Drain	FG	19
	-	-	20

UL1061 AWG26 (Black)

PUDP-20V-S (J.S.T. MFG. Co., Ltd.)

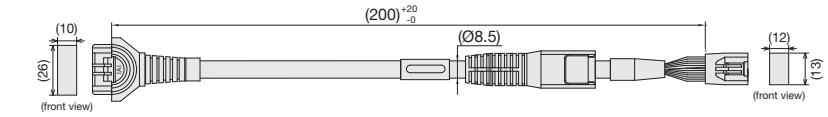
No.	Signal	Color	Wiring
1	24V	Black	7–12 pins AWG26 (Crimped)
2	0V	Yellow	
3	DRV_DY	Pink	
4	DRV_RA	White	
5	DRV_DZ	Purple	
6	DRV_RB	Blue/Red	
7	AM_SD+	Orange/White 1 lines of dots	
8	AM_SD-	Green/White	
9	ACT_PULSE+	Brown/White	
10	ACT_PULSE-	Gray/White	
11	SYNC_PULSE+	Red/White	
12	SYNC_PULSE-	Black/White	
13	RTC_1Hz	Yellow/Black	
14	CONE_IN	Pink/Black	
15	STOP	Purple/White	
16	ENABLE	White/Blue	
17	-	-	
18	GW_RESET_IN	Orange/White 2 lines of dots	
19	FG	Drain	
20	-	-	

(Wire colors blue/red refer to insulation color/dot color)

UL1061 AWG26 (Black)

■ Conversion Cables

Model CB-CAN-AJ002



Actuator side

Minimum bending R: 3m or less r= 68mm or more
(Dynamic bending condition)

Controller side

9-1827863-1 (AMP)

Color	Signal name PC	AC	DC	Pin No.
Black (AWG22)	ØA	U	U	A1
White (AWG22)	VMM	V	V	B1
Green (AWG22)	ØB	-	-	B2
Yellow (AWG22)	VMM	-	-	A3
Brown (AWG22)	Ø_A	W	W	A2
Red (AWG22)	Ø_B	-	-	B3
White (AWG26)	SA[mABS]	A+	A+	A6
Yellow (AWG26)	SB[mABS]	A-	A-	B6
Red (AWG26)	A+	B+	B+	A7
Green (AWG26)	A-	B-	B-	B7
Black (AWG26)	B+	Z+/SA[mABS]	HS1_IN	A8
Brown (AWG26)	B-	Z-/SB[mABS]	HS2_IN	B8
Blue (AWG26)	VPS	VPS/BAT-	-	B9
Pink (AWG26)	LS+	BK+	-	A4
Black (AWG26)	BK+	LS+	-	A5
Brown (AWG26)	BK-	LS-	-	B5
White (AWG26)	VCC	VCC	VCC	A10
Yellow (AWG26)	GND	GND	GND	B10
Red (AWG26)	LS-	BK	-	B4
Green (AWG26)	LS_GND	LS_GND	HS3_IN	A9
-	-	-	-	A11
Green (AWG26)	FG	FG	FG	B11

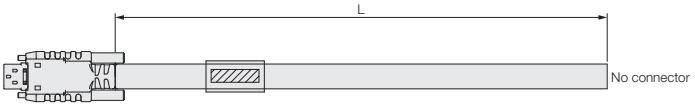
DF62B-24EP-2.2C (HIROSE ELECTRIC CO., LTD.)

Pin No.	Signal name PC	AC	DC	Color
3	ØA	U	U	Black (AWG22)
5	VMM	V	V	White (AWG22)
10	ØB	-	-	Green (AWG22)
9	VMM	-	-	Yellow (AWG22)
4	Ø_A	W	W	Brown (AWG22)
15	Ø_B	-	-	Red (AWG22)
12	SA[mABS]	A+	A+	White (AWG26)
17	SB[mABS]	A-	A-	Yellow (AWG26)
1	A+	B+	B+	Red (AWG26)
6	A-	B-	B-	Green (AWG26)
11	B+	Z+/SA[mABS]	HS1_IN	Black (AWG26)
16	B-	Z-/SB[mABS]	HS2_IN	Brown (AWG26)
18	VPS	VPS/BAT-	-	Blue (AWG26)
8	LS+	BK+	-	Pink (AWG26)
20	BK+	LS+	-	Black (AWG26)
2	BK-	LS-	-	Brown (AWG26)
21	VCC	VCC	VCC	White (AWG26)
7	GND	GND	GND	Yellow (AWG26)
14	LS-	BK	-	Red (AWG26)
13	LS_GND	LS_GND	HS3_IN	Green (AWG26)
19	-	-	-	-
22	CF_VCC	BAT+	-	White (AWG26)
23	-	-	-	-
24	FG	FG	FG	Green (AWG26)

■ Multifunction Connector Cables

Model CB-SC2-MFC□□□

*Please indicate the cable length (L) in □□□,
e.g.) 050 = 5m, maximum 10m



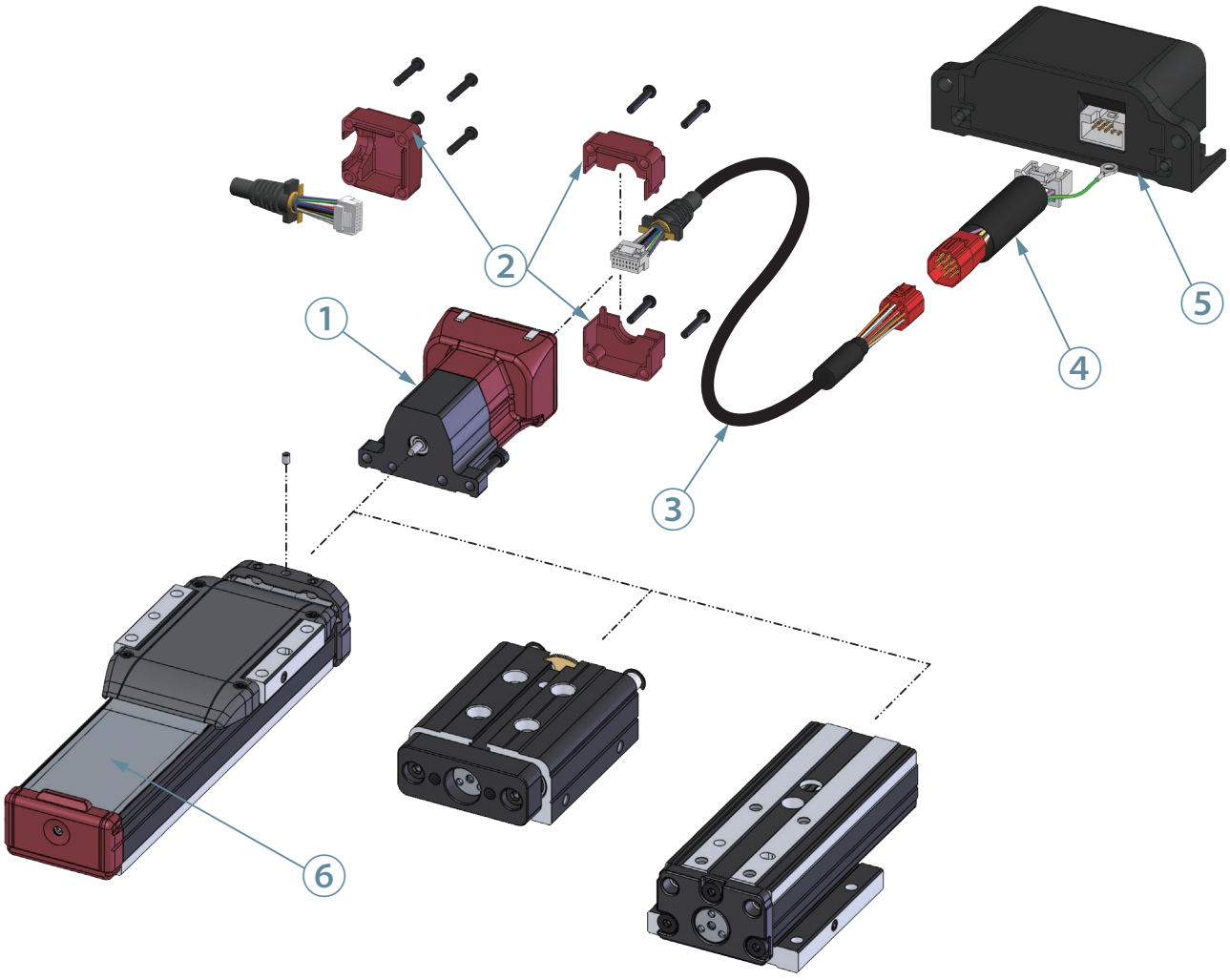
HDR-E14MSG1+

Wiring	Color	Signal	No.	
AWG28	Orange/Red 1	IOUT	1	Orange/Red 1
	Orange/Black 1	GND	2	Orange/Black 1
	Light gray/Red 1	PP	3	Light gray/Red 1
	Light gray/Black 1	PG	4	Light gray/Black 1
	White/Red 1	NP	5	White/Red 1
	White/Black 1	NG	6	White/Black 1
	Yellow/Red 1	AFB	7	Yellow/Red 1
	Yellow/Black 1	/AFB	8	Yellow/Black 1 No connector side
	Pink/Red 1	BFB	9	Pink/Red 1
	Pink/Black 1	/BFB	10	Pink/Black 1
	Orange/Red 2	ZFB	11	Orange/Red 2
	Orange/Black 2	/ZFB	12	Orange/Black 2
	Light gray/Red 2	GND	13	Light gray/Red 2
	Light gray/Black 2	GND	14	Light gray/Black 2
Shield is connected to cable clamp				Shield

MEMO

Illustrations of Maintenance Parts: EC

SL3/GDS3/GDB3/T3



① Motor unit
② Actuator cable mounting box
③ Actuator cable assembly
④ Interface box conversion cable
⑤ Interface box
⑥ Stainless steel sheet

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

SL3/GDS3/GDB3/T3

① Motor unit

(Included: Bolts, screws, hex wrench)

Type	Brake	Model
SL3 GDS3 GDB3 T3	No	EC-MUSLTGD3 (-WL2)
	Yes	EC-MUSLTGD3-B (-WL2)

*When selecting the wireless axis operation compatible specification (model: WL2), enter "-WL2" at the end.

② Actuator cable mounting box

(Included: Screws)

Type	Cable exit direction	Model
SL3 GDS3 GDB3 T3	Back	EC-CASBR-SLTGD3
	Side	EC-CASBS-SLTGD3

③ Actuator cable assembly

Type	Model
SL3 GDS3 GDB3 T3	CB-EC-SLTGD3-MPA○○○-AS

*○○○ is the cable length
Up to 10m (up to 9 m through the interface box)

④ Interface box conversion cable

Type	Model
SL3 GDS3 GDB3 T3	CB-CVN-BJ002

⑤-1 Interface box

Type	Wireless	I/O	Model
SL3 GDS3 GDB3 T3	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑤-2 Interface box for dual power supply

Type	Wireless	I/O	Model
SL3 GDS3 GDB3 T3	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑤-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

Type	Wireless	I/O	Model
SL3 GDS3 GDB3 T3	WL WL2	NPN _REC	ECW-CVNWL-CB-ACR

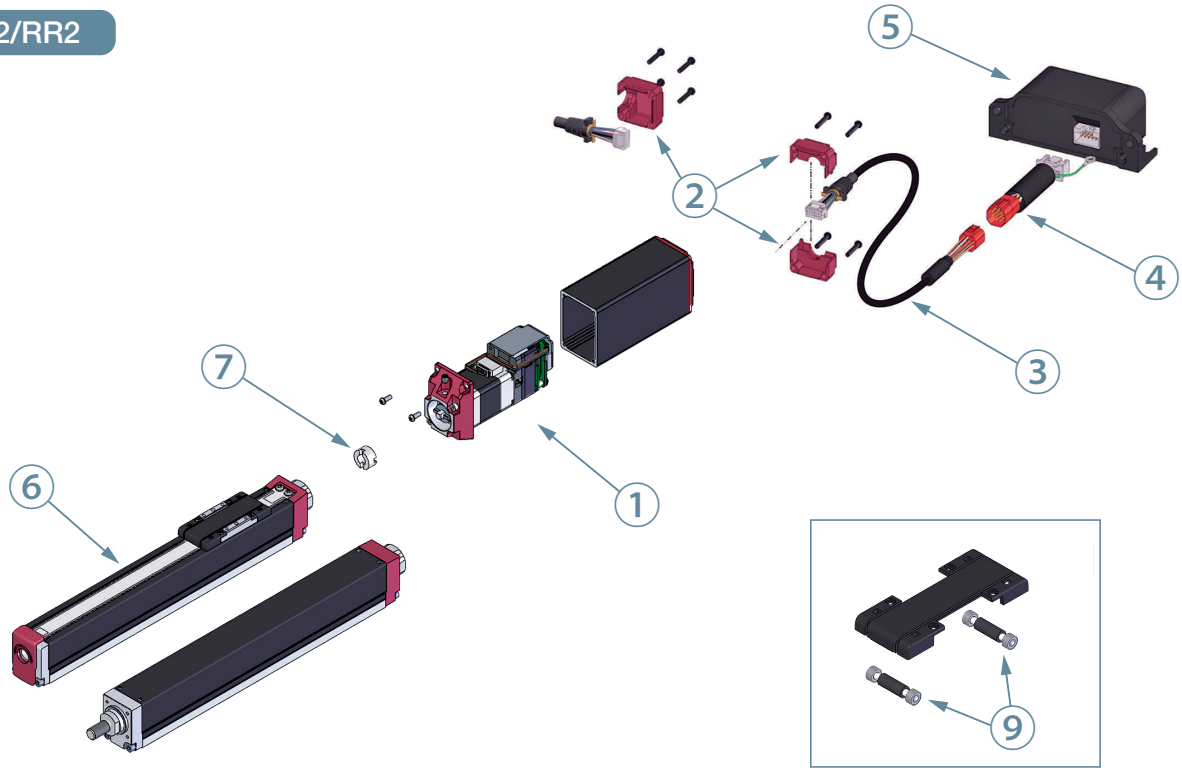
⑥ Stainless steel sheet

Type	Model
SL3	ST-EC-SL3-○○○

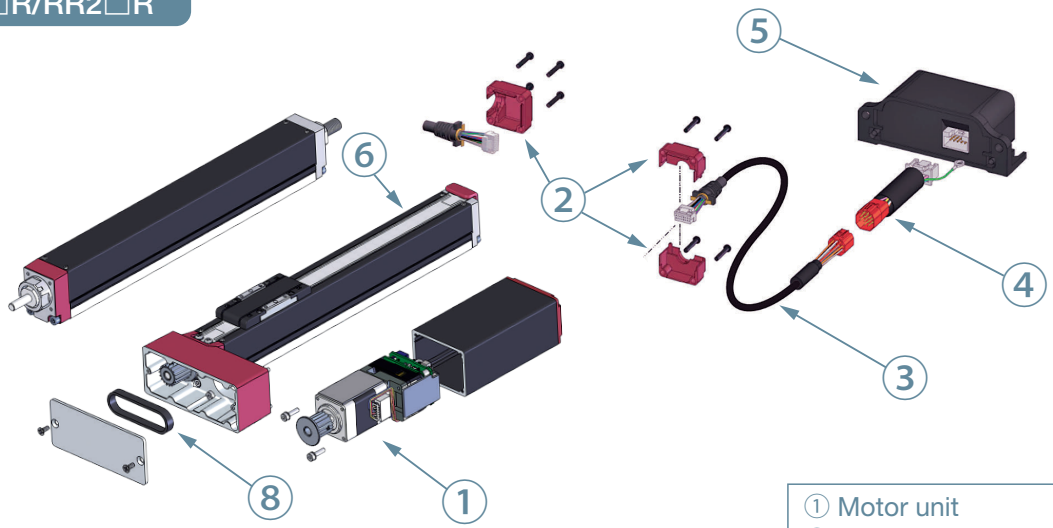
*○○○ is the stroke

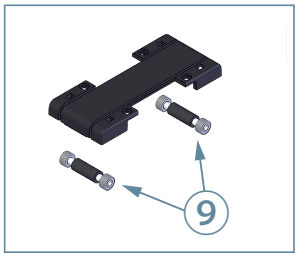
Illustrations of Maintenance Parts: EC

S2/RR2



S2□R/RR2□R





① Motor unit
② Actuator cable mounting box
③ Actuator cable assembly
④ Interface box conversion cable
⑤ Interface box
⑥ Stainless steel sheet
⑦ Coupling spacer
⑧ Timing belt
⑨ Slider roller assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

S2/RR2
S2□R/RR2□R

① Motor unit

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

*When selecting the wireless axis operation compatible specification (model: WL2), enter "-WL2" at the end.

② Actuator cable mounting box (Included parts: Screws)

Type	Cable exit direction	Model
S2(□R) RR2 (□R)	Back	EC-CASBR-SLTGD3
	Side	EC-CASBS-SLTGD3

③ Actuator cable assembly

Type	Model
S2(□R) RR2 (□R)	CB-EC-SRR2-MPA○○○-AS

*○○○ is the cable length
Up to 10m (up to 9 m through the interface box)

④ Interface box conversion cable

Type	Model
S2(□R) RR2 (□R)	CB-CVN-BJ002

⑤-1 Interface box

Type	Wireless	I/O	Model
S2(□R) RR2(□R)	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑤-2 Interface box for dual power supply

Type	Wireless	I/O	Model
S2(□R) RR2(□R)	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑤-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

Type	Wireless	I/O	Model
S2(□R) RR2(□R)	WL WL2	NPN _REC	ECW-CVNWL-CB-ACR

⑥ Stainless steel sheet

Type	Model
S2(□R)	ST-EC-S2-○○○

*○○○ is the stroke

⑦ Coupling spacer

Type	Model
S2 RR2	CPG-EC-SRR2

⑧ Timing belt

Type	Model
S2□R RR2□R	TB-EC-SRR2R

⑨ Slider roller assembly

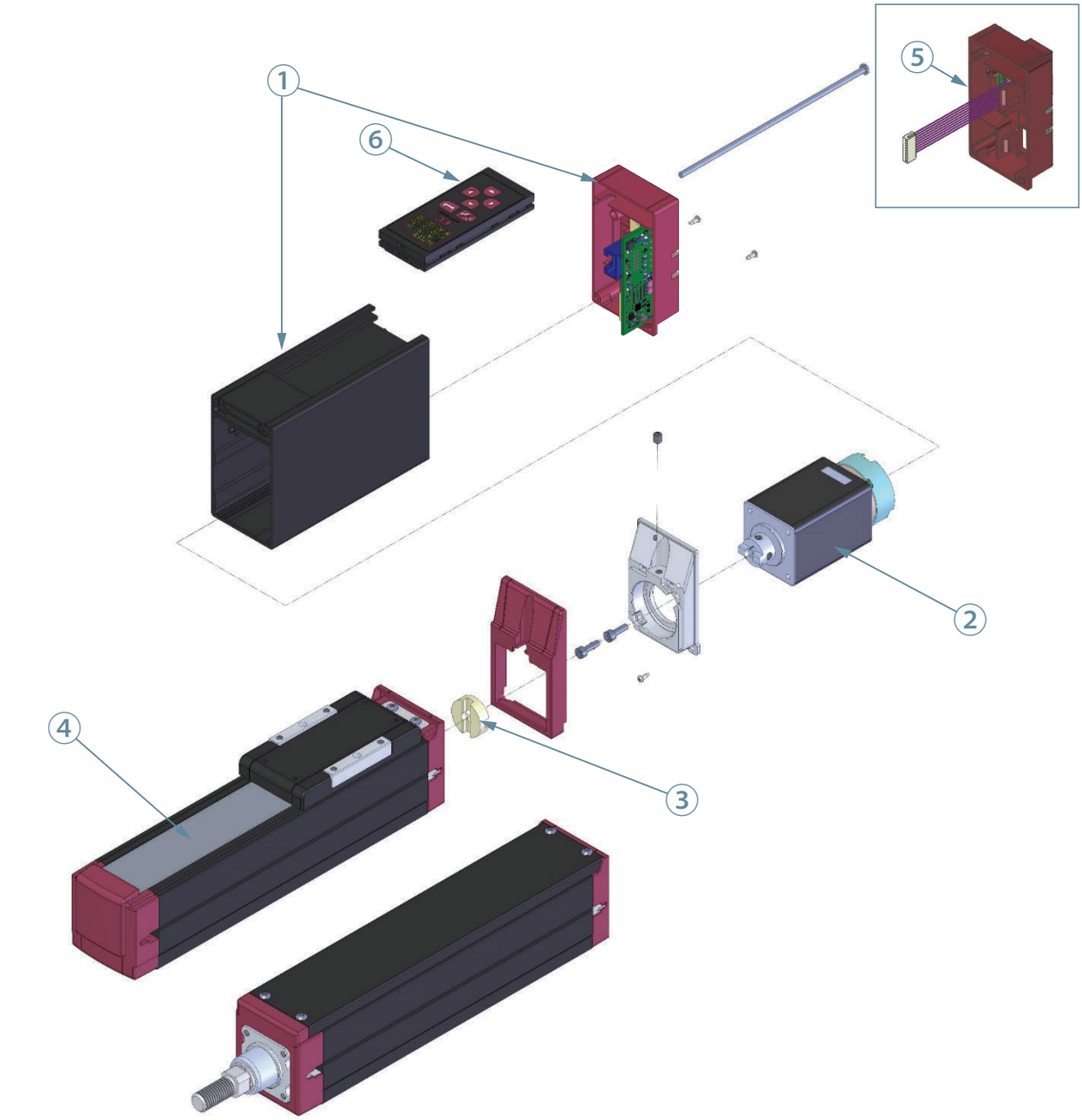
Type	Model
S2(□R)	EC-SR-S2

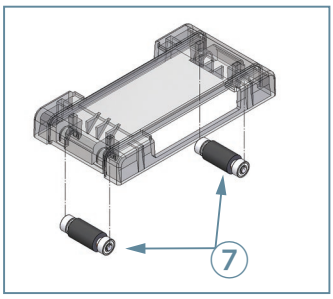
*The above model is for one unit.
Order two sets for one axis.

Illustrations of Maintenance Parts: EC

(D)S3(□A)/(D)S4(□A)
(D)S3□(A)CR/(D)S4□(A)CR
(D)RR3/(D)RR4

*The diagram below shows a schematic of a model equipped with a digital speed controller.
For models not equipped with a digital speed controller, the external view of the top surface of the controller assembly ① may differ.





① Controller assembly
(Motor cover / End cover / Cable between circuit boards)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
(with Wireless communication circuit board cable)
⑥ Digital speed controller
⑦ Slider roller assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)S3(□A)/(D)S4(□A)
(D)S3□(A)CR/(D)S4□(A)CR
(D)RR3/(D)RR4

(Example)
When digital speed controller specifications, TMD2, and WL2 are selected:
MWB-EC-DSRR3-TMD2-WL2

① Controller assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Encoder	Brake	I/O	Basic model number Add "D" when selecting the digital speed controller specification	RCON-EC connection specifications* Model: ACR	Dual power supply system specifications* Model: TMD2	Wireless axis operation specifications Model: WL2
(D)S3 (D)RR3	Incremental	No	NPN	MWB-EC-(D)SRR3	ACR (I/O is NPN only)	TMD2	WL2
			PNP	MWB-EC-(D)SRR3-P			
		Yes	NPN	MWB-EC-(D)SRR3-B			
			PNP	MWB-EC-(D)SRR3-B-P			
	Battery-less absolute	No	NPN	MWB-EC-(D)SRR3-WA			
			PNP	MWB-EC-(D)SRR3-WA-P			
		Yes	NPN	MWB-EC-(D)SRR3-WA-B			
			PNP	MWB-EC-(D)SRR3-WA-B-P			
(D)S4 (D)RR4	Incremental	No	NPN	MWB-EC-(D)SRR4			
			PNP	MWB-EC-(D)SRR4-P			
		Yes	NPN	MWB-EC-(D)SRR4-B			
			PNP	MWB-EC-(D)SRR4-B-P			
	Battery-less absolute	No	NPN	MWB-EC-(D)SRR4-WA			
			PNP	MWB-EC-(D)SRR4-WA-P			
		Yes	NPN	MWB-EC-(D)SRR4-WA-B			
			PNP	MWB-EC-(D)SRR4-WA-B-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Brake	Model
(D)S3 (D)RR3	Incremental	No	EC-MUSRR3
		Yes	EC-MUSRR3-B
	Battery-less absolute	No	EC-MUSRR3-WA
		Yes	EC-MUSRR3-WA-B
(D)S4 (D)RR4	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B

③ Coupling spacer

Type	Model
(D)S3 (D)RR3	CPG-EC-SRR3
(D)S4 (D)RR4	CPG-EC-SRR4

④ Stainless steel sheet

Type	Model
(D)S3	ST-EC-S3-○○○
(D)S4	ST-EC-S4-○○○

*○○○ represents stroke.

⑤ End cover assembly

Type	Model Add "D" when selecting the digital speed controller specification
(D)S3 (D)RR3	EWB-EC-(D)SRR3
(D)S4 (D)RR4	EWB-EC-(D)SRR4

(Note) Comes with wireless communication circuit board cable.
For non-wireless specifications, please contact our sales representative.

⑥ Digital speed controller

Type	Model
DS3/DS4 DRR3/DRR4	DSC-01

⑦ Slider roller assembly

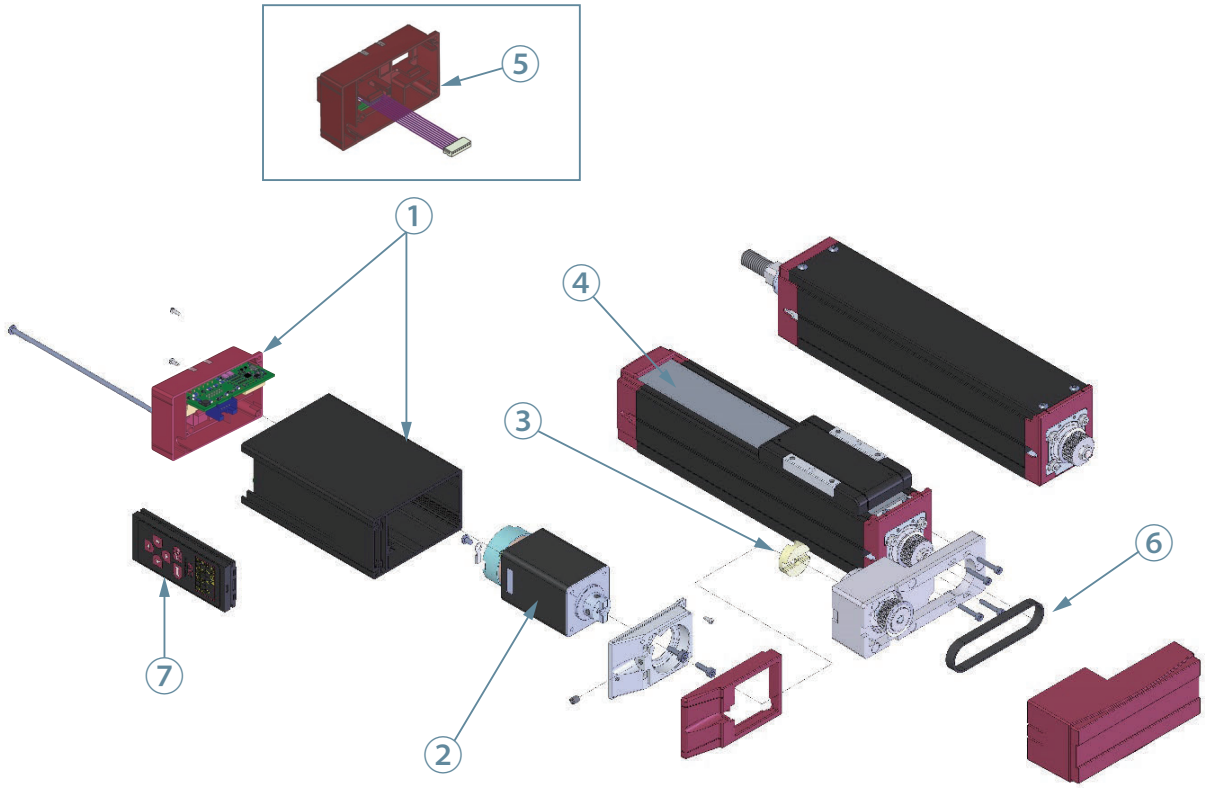
Type	Model
(D)S3	EC-SR-S3
(D)S4	EC-SR-S467

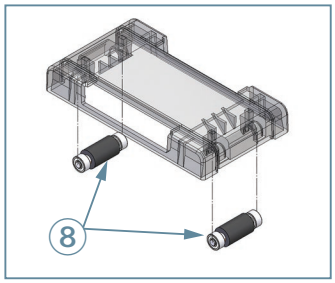
* The above model is for one set.
Order two sets for one axis.

Illustrations of Maintenance Parts: EC

(D)S3□(A)R/(D)S4□(A)R
(D)RR3□R/(D)RR4□R

*The diagram below shows a schematic of a model equipped with a digital speed controller.
For models not equipped with a digital speed controller, the external view of the top surface of the controller assembly ① may differ.





① Controller assembly
(Motor cover / End cover / Cable between circuit boards)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
(with Wireless communication circuit board cable)
⑥ Timing belt
⑦ Digital speed controller
⑧ Slider roller assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)S3□(A)R/(D)S4□(A)R (D)RR3□R/(D)RR4□R

(Example)
When digital speed controller specifications, TMD2, and WL2 are selected:
MWB-EC-DSRR3-TMD2-WL2

① Controller assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Encoder	Brake	I/O	Basic model number Add "D" when selecting the digital speed controller specification	RCON-EC connection specifications* Model: ACR	Dual power supply system specifications* Model: TMD2	Wireless axis operation specifications Model: WL2
(D)S3□(A)R (D)RR3□R	Incremental	No	NPN	MWB-EC-(D)SRR3	ACR (I/O is NPN only)	TMD2	WL2
			PNP	MWB-EC-(D)SRR3-P			
		Yes	NPN	MWB-EC-(D)SRR3-B			
			PNP	MWB-EC-(D)SRR3-B-P			
	Battery-less absolute	No	NPN	MWB-EC-(D)SRR3-WA			
			PNP	MWB-EC-(D)SRR3-WA-P			
		Yes	NPN	MWB-EC-(D)SRR3-WA-B			
			PNP	MWB-EC-(D)SRR3-WA-B-P			
(D)S4□(A)R (D)RR4□R	Incremental	No	NPN	MWB-EC-(D)SRR4			
			PNP	MWB-EC-(D)SRR4-P			
		Yes	NPN	MWB-EC-(D)SRR4-B			
			PNP	MWB-EC-(D)SRR4-B-P			
	Battery-less absolute	No	NPN	MWB-EC-(D)SRR4-WA			
			PNP	MWB-EC-(D)SRR4-WA-P			
		Yes	NPN	MWB-EC-(D)SRR4-WA-B			
			PNP	MWB-EC-(D)SRR4-WA-B-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Brake	Model
(D)S3□(A)R (D)RR3□R	Incremental	No	EC-MUSRR3
		Yes	EC-MUSRR3-B
	Battery-less absolute	No	EC-MUSRR3-WA
		Yes	EC-MUSRR3-WA-B
(D)S4□(A)R (D)RR4□R	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B

③ Coupling spacer

Type	Model
(D)S3□(A)R (D)RR3□R	CPG-EC-SRR3
(D)S4□(A)R (D)RR4□R	CPG-EC-SRR4

④ Stainless steel sheet

Type	Model
(D)S3□(A)R	ST-EC-S3-○○○
(D)S4□(A)R	ST-EC-S4-○○○

* ○○○ represents stroke.

⑤ End cover assembly

Type	Model Add "D" when selecting the digital speed controller specification
(D)S3□(A)R (D)RR3□R	EWB-EC-(D)SRR3
(D)S4□(A)R (D)RR4□R	EWB-EC-(D)SRR4

(Note) Comes with wireless communication circuit board cable.
For non-wireless specifications, please contact our sales representative.

⑥ Timing belt

Type	Model
(D)S3□(A)R (D)RR3□R	TB-RCP6-STRA4R
(D)S4□(A)R (D)RR4□R	TB-RCP5-SA4R

⑦ Digital speed controller

Type	Model
DS3□(A)R/DS4□(A)R DRR3□R/DRR4□R	DSC-01

⑧ Slider roller assembly

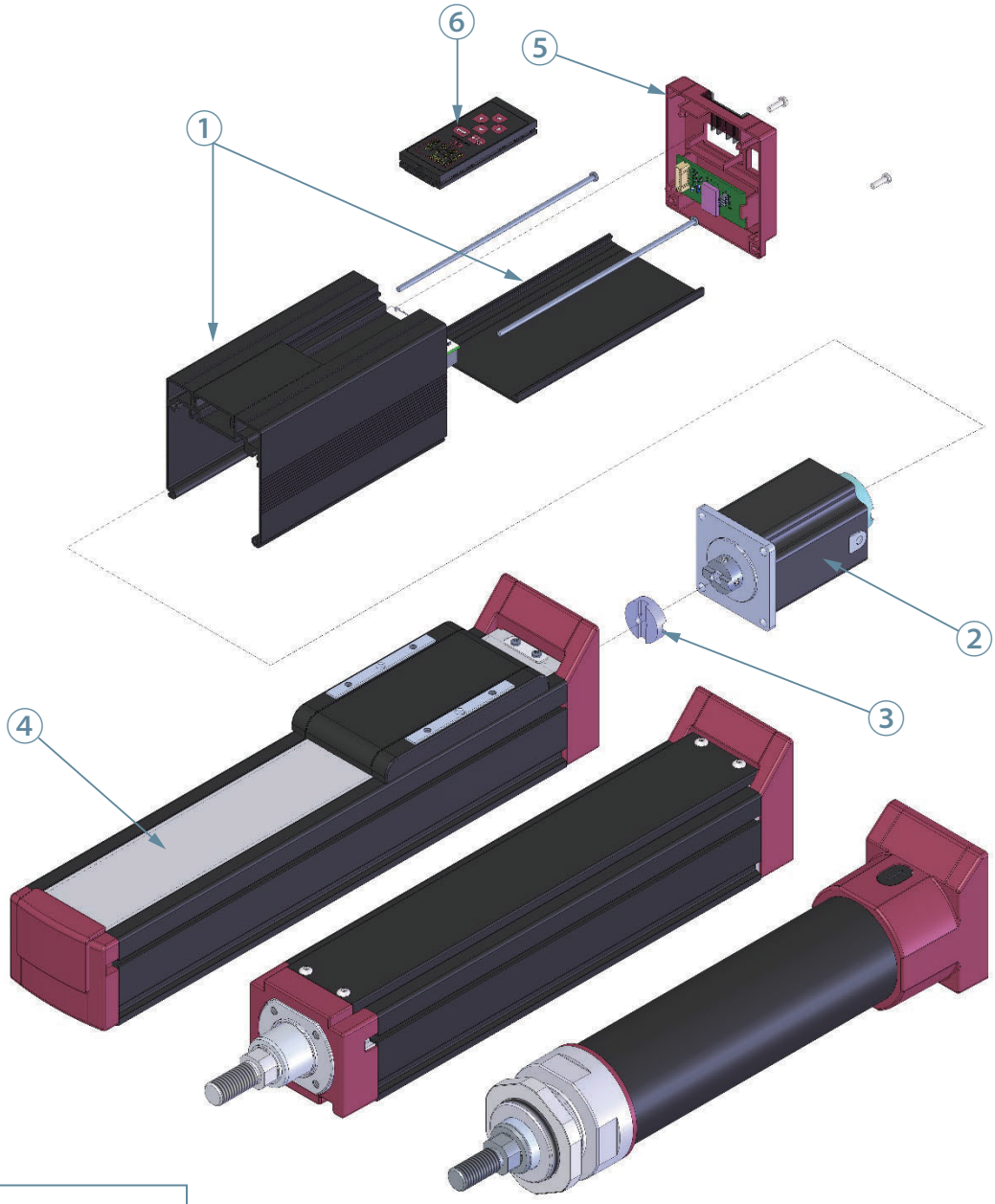
Type	Model
(D)S3□(A)R	EC-SR-S3
(D)S4□(A)R	EC-SR-S467

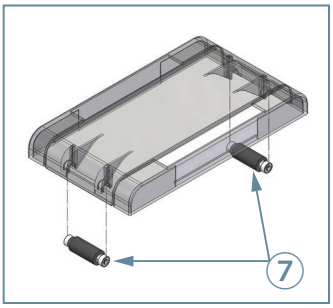
* The above model is for one set.
Order two sets for one axis.

Illustrations of Maintenance Parts: EC

(D)S6(□A)/(D)S7(□A)
(D)S6□(A)CR/(D)S7□(A)CR
(D)R6/(D)R7
(D)RR6/(D)RR7

*The diagram below shows a schematic of a model equipped with a digital speed controller.
For models not equipped with a digital speed controller, the external view of the top surface of the controller assembly ① may differ.





① Motor cover assembly (including Controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
(with Wireless communication circuit board cable)
⑥ Digital speed controller
⑦ Slider roller assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)S6(□A)/(D)S7(□A)
(D)S6□(A)CR/(D)S7□(A)CR
(D)R6/(D)R7
(D)RR6/(D)RR7

(Example)
When digital speed controller specifications, TMD2, and WL2 are selected:
MWB-EC-DSR6-TMD2-WL2

① Motor cover assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Brake	I/O	Basic model number Add "D" when selecting the digital speed controller specification	RCON-EC connection specifications* Model: ACR	Dual power supply system specifications* Model: TMD2	Wireless axis operation specifications Model: WL2
(D)S6 (D)R6 (D)RR6	No	NPN	MWB-EC-(D)SR6	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-EC-(D)SR6-P			
	Yes	NPN	MWB-EC-(D)SR6-B			
		PNP	MWB-EC-(D)SR6-B-P			
(D)S7 (D)R7 (D)RR7	No	NPN	MWB-EC-(D)SR7			
		PNP	MWB-EC-(D)SR7-P			
	Yes	NPN	MWB-EC-(D)SR7-B			
		PNP	MWB-EC-(D)SR7-B-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Brake	Model
(D)S6 (D)R6 (D)RR6	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
(D)S7	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
(D)R7 (D)RR7	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
(D)S6 (D)R6 (D)RR6	CPG-EC-SR6
(D)S7 (D)R7 (D)RR7	CPG-EC-SR7

④ Stainless steel sheet

Type	Model	
	Single slider	Double slider
(D)S6	ST-EC-S6-○○○	ST-EC-S6D-○○○
(D)S7	ST-EC-S7-○○○	ST-EC-S7D-○○○

*○○○ indicates the stroke in the model name

⑤ End cover assembly

Type	Model Add "D" when selecting the digital speed controller specification
(D)S6 (D)R6 (D)RR6	EWB-EC-(D)SR6
(D)S7 (D)R7 (D)RR7	EWB-EC-(D)SR7

(Note) Comes with wireless communication circuit board cable.
For non-wireless specifications, please contact our sales representative.

⑥ Digital speed controller

Type	Model
DS6/DS7 DR6/DR7 DRR6/DRR7	DSC-01

⑦ Slider roller assembly

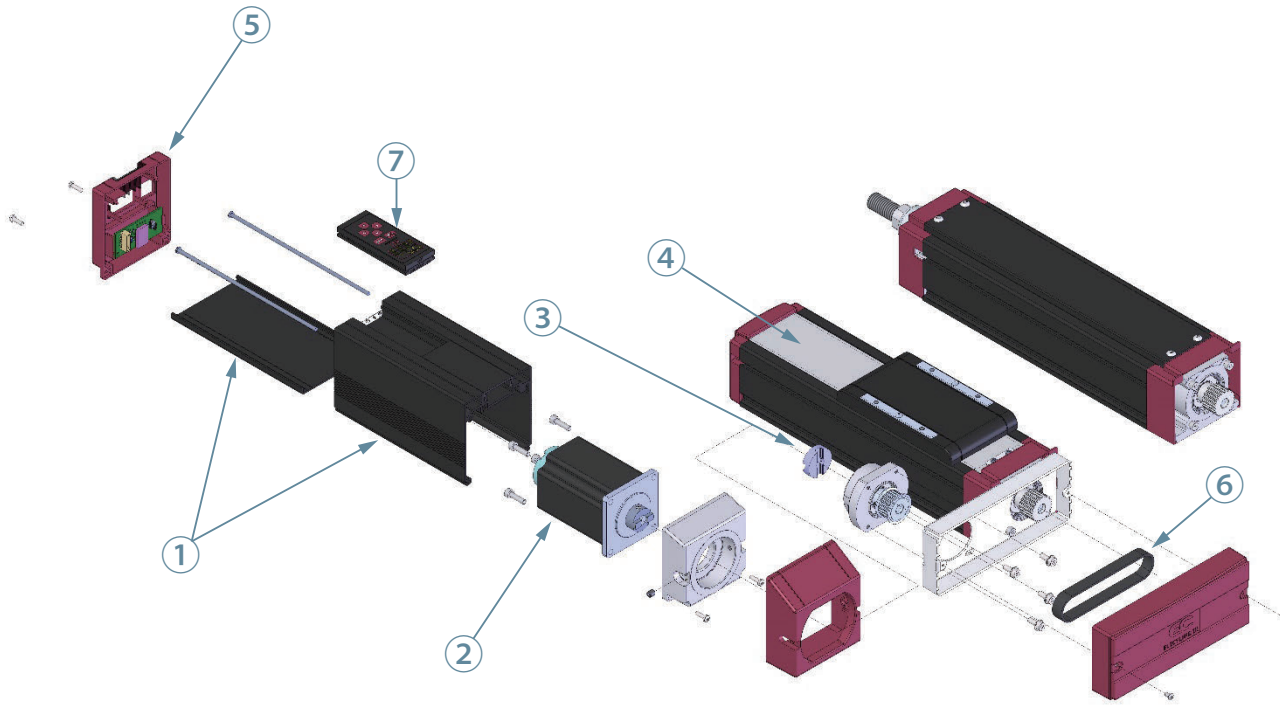
Type	Model
(D)S6 (D)S7	EC-SR-S467

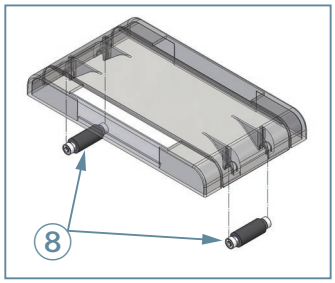
* The above model is for one set.
Order two sets for one axis.

Illustrations of Maintenance Parts: EC

(D)S6□(A)R/(D)S7□(A)R
(D)RR6□R/(D)RR7□R

*The diagram below shows a schematic of a model equipped with a digital speed controller.
For models not equipped with a digital speed controller, the external view of the top surface of the controller assembly ① may differ.





① Motor cover assembly
(including Controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
(with Wireless communication circuit board cable)
⑥ Timing belt
⑦ Digital speed controller
⑧ Slider roller assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)S6□(A)R/(D)S7□(A)R (D)RR6□R/(D)RR7□R

(Example)
When digital speed controller specifications, TMD2, and WL2 are selected:
MWB-EC-DSR6-TMD2-WL2

① Motor cover assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Brake	I/O	Basic model number Add "D" when selecting the digital speed controller specification	RCON-EC connection specifications* Model: ACR	Dual power supply system specifications* Model: TMD2	Wireless axis operation specifications Model: WL2
(D)S6□(A)R (D)RR6□R	No	NPN	MWB-EC-(D)SR6	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-EC-(D)SR6-P			
	Yes	NPN	MWB-EC-(D)SR6-B			
		PNP	MWB-EC-(D)SR6-B-P			
(D)S7□(A)R (D)RR7□R	No	NPN	MWB-EC-(D)SR7			
		PNP	MWB-EC-(D)SR7-P			
	Yes	NPN	MWB-EC-(D)SR7-B			
		PNP	MWB-EC-(D)SR7-B-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Brake	Model
(D)S6□(A)R (D)RR6□R	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
(D)S7□(A)R	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
(D)RR7□R	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
(D)S6□(A)R (D)RR6□R	CPG-EC-SR6
(D)S7□(A)R (D)RR7□R	CPG-EC-SR7

④ Stainless steel sheet

Type	Model	
	Single slider	Double slider
(D)S6□(A)R	ST-EC-S6-○○○	ST-EC-S6D-○○○
(D)S7□(A)R	ST-EC-S7-○○○	ST-EC-S7D-○○○

*○○○ indicates the stroke in the model name

⑤ End cover assembly

Type	Model Add "D" when selecting the digital speed controller specification
(D)S6□(A)R (D)RR6□R	EWB-EC-(D)SR6
(D)S7□(A)R (D)RR7□R	EWB-EC-(D)SR7

(Note) Comes with wireless communication circuit board cable.
For non-wireless specifications, please contact our sales representative.

⑥ Timing belt

Type	Model
(D)S6□(A)R (D)RR6□R	TB-EC-SRR6R
(D)S7□(A)R (D)RR7□R	TB-EC-SRR7R

⑦ Digital speed controller

Type	Model
DS6□(A)R/DS7□(A)R DRR6□R/DRR7□R	DSC-01

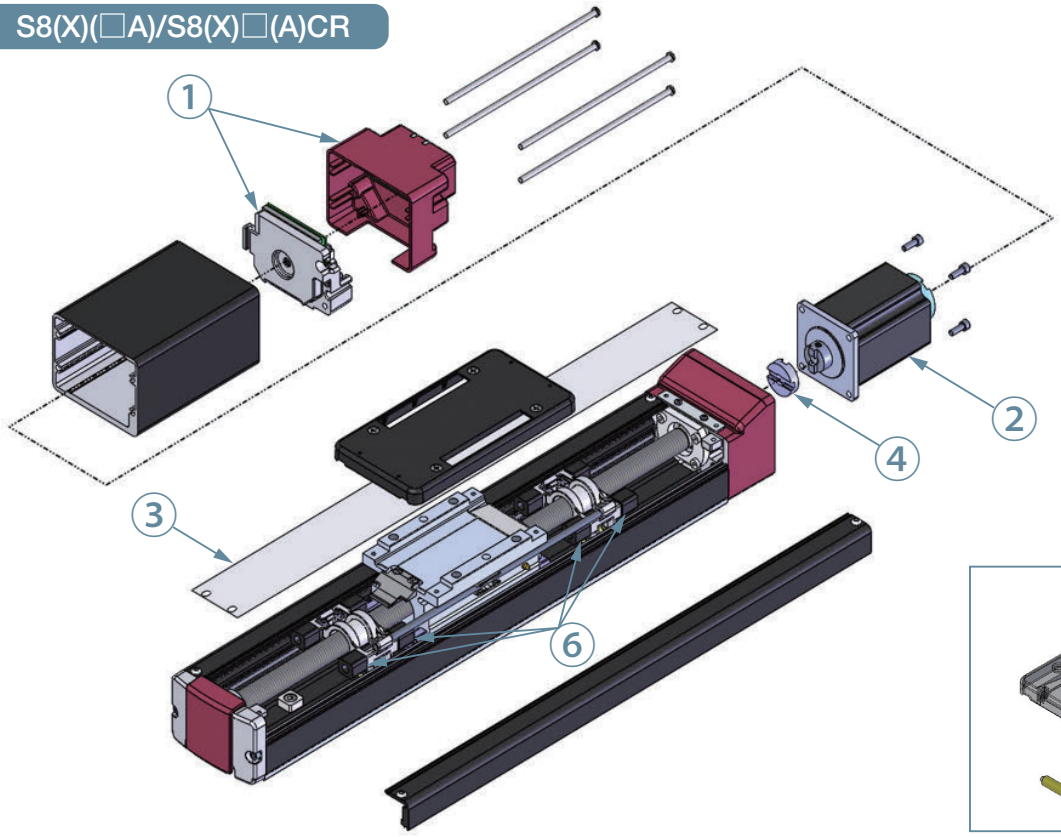
⑧ Slider roller assembly

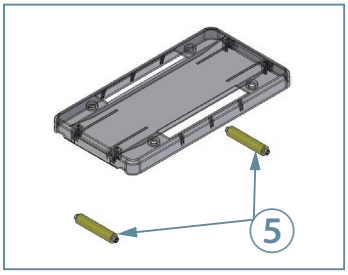
Type	Model
(D)S6□(A)R (D)S7□(A)R	EC-SR-S467

* The above model is for one set.
Order two sets for one axis.

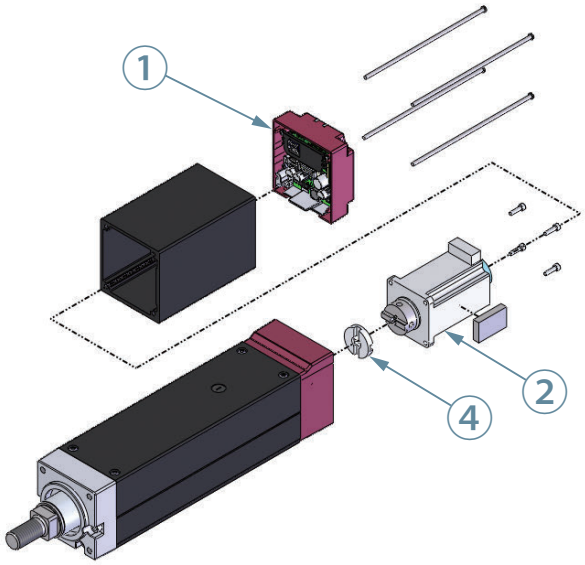
Illustrations of Maintenance Parts: EC

S8(X)(□A)/S8(X)□(A)CR

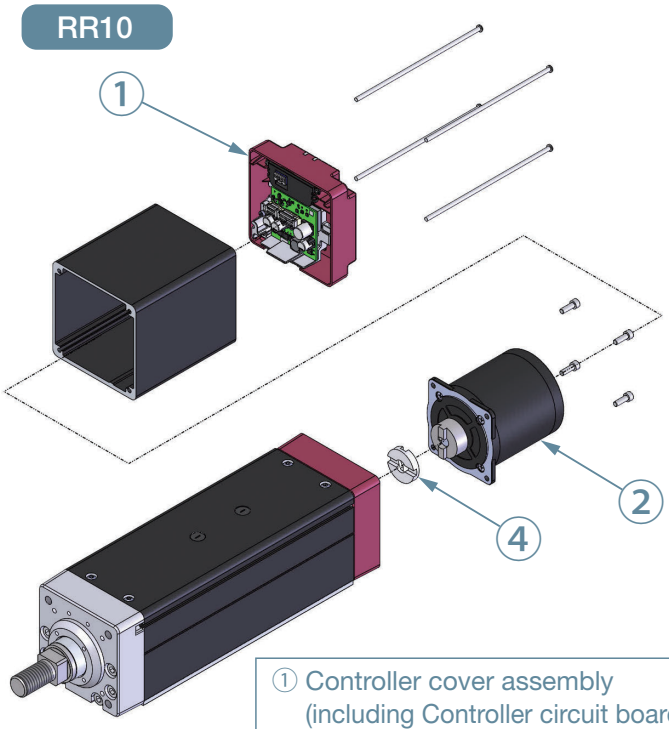




RR8



RR10



① Controller cover assembly (including Controller circuit board)
② Motor unit
③ Stainless steel sheet
④ Coupling spacer
⑤ Slider roller assembly
⑥ Intermediate support cushion

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

S8(X)(□A)/S8(X)□(A)CR
RR8/RR10

(Example)
When TMD2/WL2 is selected:
CCA-EC-S8-TMD2-WL2

① Controller cover assembly
[Model configuration] Basic model - (when ACR is selected) - (when TMD2 is selected) - (when WL/WL2 is selected)

Type	I/O	Basic model number	RCON-EC Connection specifications* Model: ACR	Dual power supply specification* Model: TMD2	Wireless compatibility Model: WL/WL2
S8(X)	NPN	CCA-EC-S8	ACR (I/O is NPN only)	TMD2	WL (Wireless communication specification) / WL2 (Wireless axis operation compatible specification)
	PNP	CCA-EC-S8-P			
RR8	NPN	CCA-EC-RRB8			
	PNP	CCA-EC-RRB8-P			
RR10	NPN	CCA-EC-RR10			
	PNP	CCA-EC-RR10-P			

*ACR and TMD2 cannot be selected at the same time.

② Motor unit

Type	Encoder	Brake	Model
S8(X)	Incremental	No	EC-MUS8
		Yes	EC-MUS8-B
	Battery-less absolute	No	EC-MUS8-WA
		Yes	EC-MUS8-WA-B
RR8	Incremental	No	EC-MURR8
		Yes	EC-MURR8-B
	Battery-less absolute	No	EC-MURR8-WA
		Yes	EC-MURR8-WA-B
RR10*	Incremental	No	EC-MURR10
		Yes	EC-MURR10-B
	Battery-less absolute	No	RCP5-MURA10A
		Yes	RCP5-MURA10A-B

*Coupling spacer is included.

③ Stainless steel sheet

Type	Model	
	Single slider	Double slider
S8	ST-6A8-○○○	ST-6A8D-○○○
S8X	ST-EC-S8X-○○○	

* ○○○ indicates the stroke in the model name.

④ Coupling spacer

Type	Model
S8(X)	CPG-RCP6-M
RR8	CPG-RCP6-L
RR10	

⑤ Slider roller assembly

Type	Model
S8(X)	EC-SR-WS1012

*The above model is for one unit.
If another axis is required, please order two.

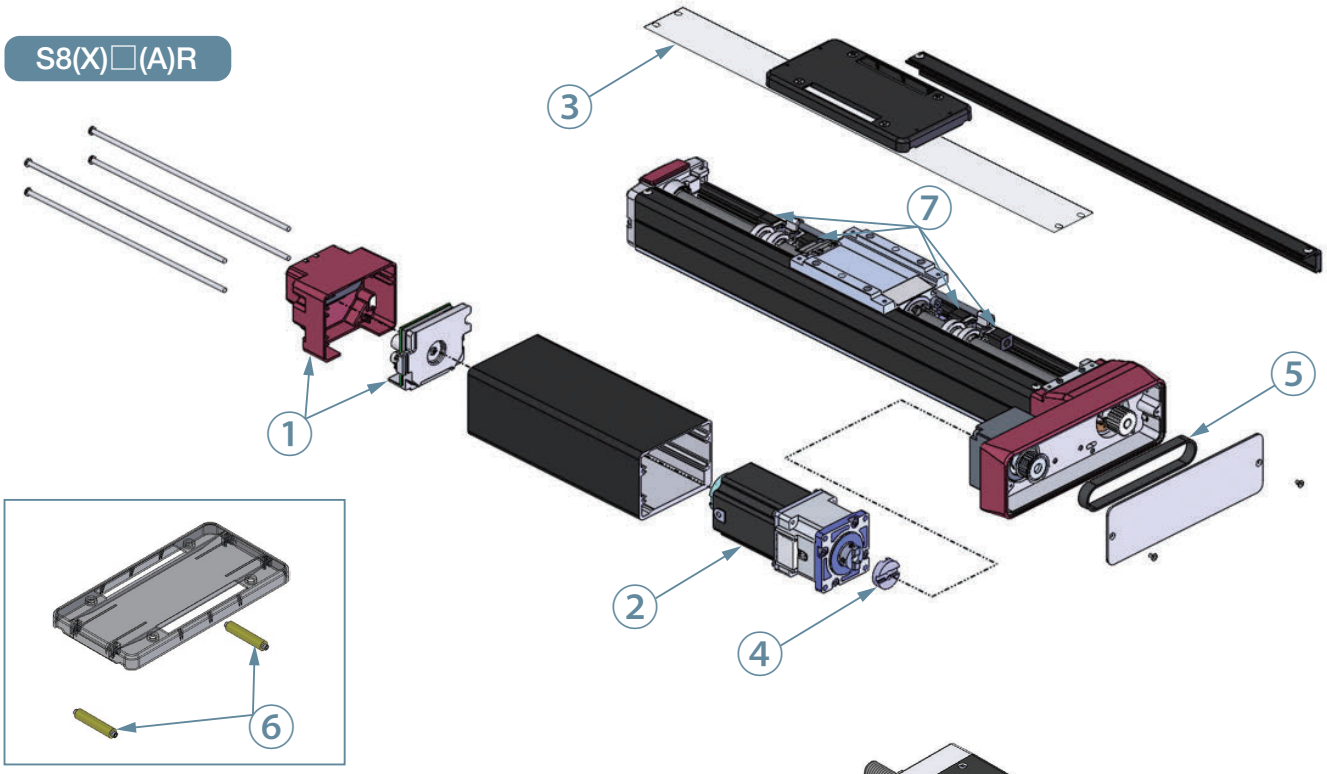
⑥ Intermediate support cushion

Type	Model
S8X	IMSC-EC-S6S7

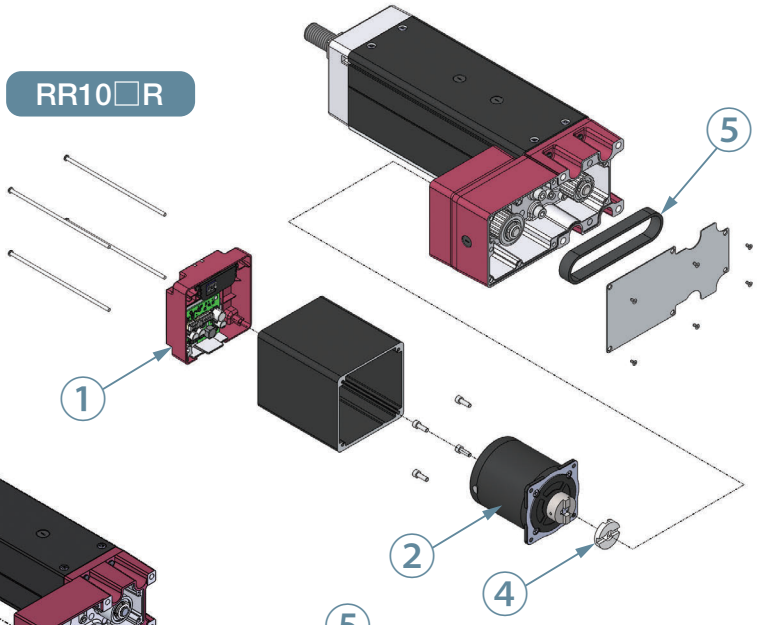
*The above model is for one unit.
When 1 axis worth is required, prepare eight items.
One rolled bushing is included per model.

Illustrations of Maintenance Parts: EC

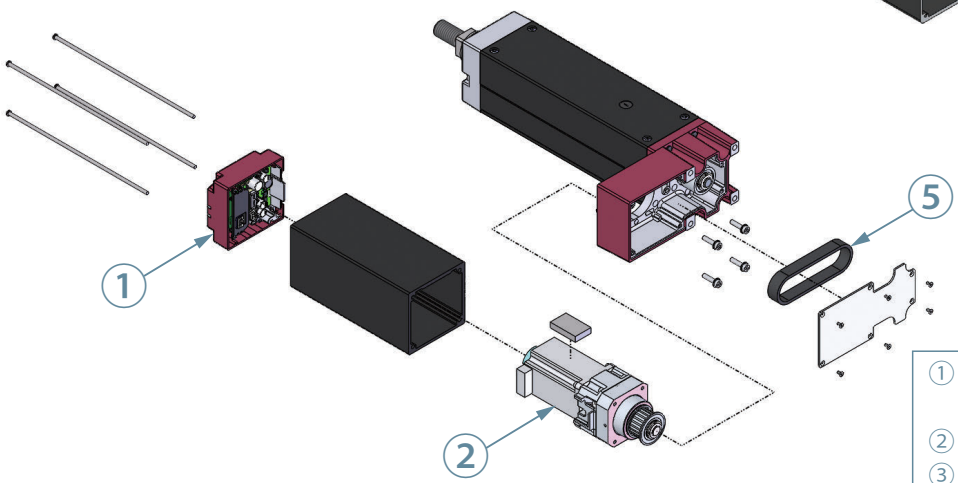
S8(X)□(A)R



RR10□R



RR8□R



① Controller cover assembly (including Controller circuit board)
② Motor unit
③ Stainless steel sheet
④ Coupling spacer
⑤ Timing belt
⑥ Slider roller assembly
⑦ Intermediate support cushion

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

S8(X)□(A)R
RR8□R/RR10□R

(Example)
When TMD2/WL2 is selected:
CCA-EC-S8-TMD2-WL2

① Controller cover assembly
[Model configuration] Basic model - (when ACR is selected) - (when TMD2 is selected) - (when WL/WL2 is selected)

Type	I/O	Basic model number	RCON-EC Connection specifications* Model: ACR	Dual power supply specification* Model: TMD2	Wireless compatibility Model: WL/WL2
S8(X)□R	NPN	CCA-EC-S8	ACR (I/O is NPN only)	TMD2	WL (Wireless communication specification) / WL2 (Wireless axis operation compatible specification)
	PNP	CCA-EC-S8-P			
RR8□R	NPN	CCA-EC-RRB8			
	PNP	CCA-EC-RRB8-P			
RR10□R	NPN	CCA-EC-RR10			
	PNP	CCA-EC-RR10-P			

*ACR and TMD2 cannot be selected at the same time.

② Motor unit

Type	Encoder	Brake	Model
S8(X)□R	Incremental	No	EC-MUS8R
		Yes	EC-MUS8-B
	Battery-less absolute	No	EC-MUS8R-WA
		Yes	EC-MUS8-WA-B
RR8□R	Incremental	No	EC-MURR8R
		Yes	EC-MURR8R-B
	Battery-less absolute	No	EC-MURR8R-WA
		Yes	EC-MURR8R-WA-B
RR10□R*	Incremental	No	EC-MURR10
		Yes	EC-MURR10-B
	Battery-less absolute	No	RCP5-MURA10A
		Yes	RCP5-MURA10A-B

*Coupling spacer is included.

③ Stainless steel sheet

Type	Model	
	Single slider	Double slider
S8□R	ST-6A8-○○○	ST-6A8D-○○○
S8X□R	ST-EC-S8X-○○○	

* ○○○ indicates the stroke in the model name.

④ Coupling spacer

Type	Model
S8(X)□R*	CPG-RCP6-M
RR10□R	CPG-RCP6-L

*Used only for specifications with brakes.

⑤ Timing belt

Type	Model
S8(X)□R	TB-EC-S8R
RR8□R	TB-RCP6-RA8R
RR10□R	TB-EC-RR10

⑥ Slider roller assembly

Type	Model
S8(X)□R	EC-SR-WS1012

*The above model is for one unit.
If another axis is required, please order two.

⑦ Intermediate support cushion

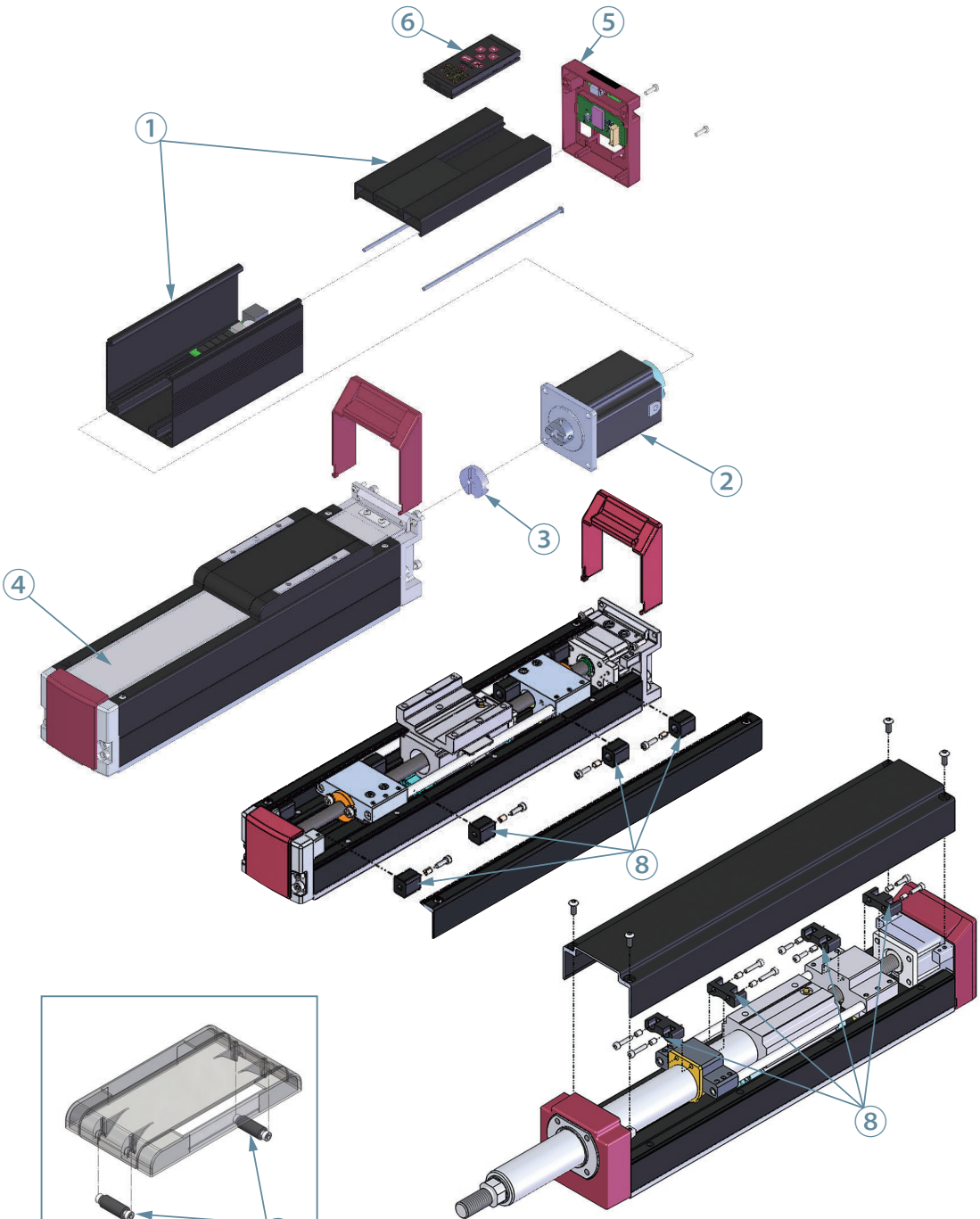
Type	Model
S8X□R	IMSC-EC-S6S7

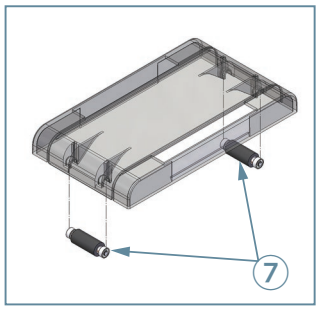
*The above model is for one unit.
When 1 axis worth is required, prepare eight items.
One rolled bushing is included per model.

Illustrations of Maintenance Parts: EC

(D)S6(X)□AH(CR)/(D)S7(X)□AH(CR)
(D)RR6(X)□AH/(D)RR7(X)□AH

*The diagram below shows a schematic of a model equipped with a digital speed controller. For models not equipped with a digital speed controller, the external view of the top surface of the controller assembly ① may differ.





① Motor cover assembly (including Controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly (with Wireless communication circuit board cable)
⑥ Digital speed controller
⑦ Slider roller assembly
⑧ Intermediate support cushion

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)S6(X)□AH(CR)/(D)S7(X)□AH(CR) (D)RR6(X)□AH/(D)RR7(X)□AH

(Example)
When digital speed controller specifications, TMD2, and WL2 are selected:
MWB-ECH-DSRR6-TMD2-WL2

① Motor cover assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Brake	I/O	Basic model number Add "D" when selecting the digital speed controller specification	RCON-EC connection specifications* Model: ACR	Dual power supply system specifications* Model: TMD2	Wireless axis operation specifications Model: WL2
(D)S6(X)□AH (D)RR6(X)□AH	No	NPN	MWB-ECH-(D)SRR6	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-ECH-(D)SRR6-P			
	Yes	NPN	MWB-ECH-(D)SRR6-B			
		PNP	MWB-ECH-(D)SRR6-B-P			
(D)S7(X)□AH (D)RR7(X)□AH	No	NPN	MWB-ECH-(D)SRR7			
		PNP	MWB-ECH-(D)SRR7-P			
	Yes	NPN	MWB-ECH-(D)SRR7-B			
		PNP	MWB-ECH-(D)SRR7-B-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Brake	Model
(D)S6(X)□AH (D)RR6(X)□AH	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
(D)S7(X)□AH	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
(D)RR7(X)□AH	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
(D)S6(X)□AH (D)RR6(X)□AH	CPG-EC-SR6
(D)S7(X)□AH (D)RR7(X)□AH	CPG-EC-SR7

④ Stainless steel sheet

Type	Model	
	Single slider	Double slider
(D)S6□AH	ST-ECH-S6-○○○	ST-ECH-S6D-○○○
(D)S7□AH	ST-ECH-S7-○○○	ST-ECH-S7D-○○○
(D)S6X□AH	ST-ECXH-S6-○○○	
(D)S7X□AH	ST-ECXH-S7-○○○	

*○○○ indicates the stroke in the model name

⑤ End cover assembly

Type	Model Add "D" when selecting the digital speed controller specification
(D)S6(X)□AH (D)RR6(X)□AH	EWB-ECH-(D)SRR6
(D)S7(X)□AH (D)RR7(X)□AH	EWB-ECH-(D)SRR7

(Note) Comes with wireless communication circuit board cable.
For non-wireless specifications, please contact our sales representative.

⑥ Digital speed controller

Type	Model
DS6(X)□AH/DS7(X)□AH DRR6(X)□AH/DRR7(X)□AH	DSC-01

⑦ Slider roller assembly

Type	Model
(D)S6(X)□AH (D)S7(X)□AH	EC-SR-S467

* The above model is for one set.
Order two sets for one axis.

⑧ Intermediate support cushion

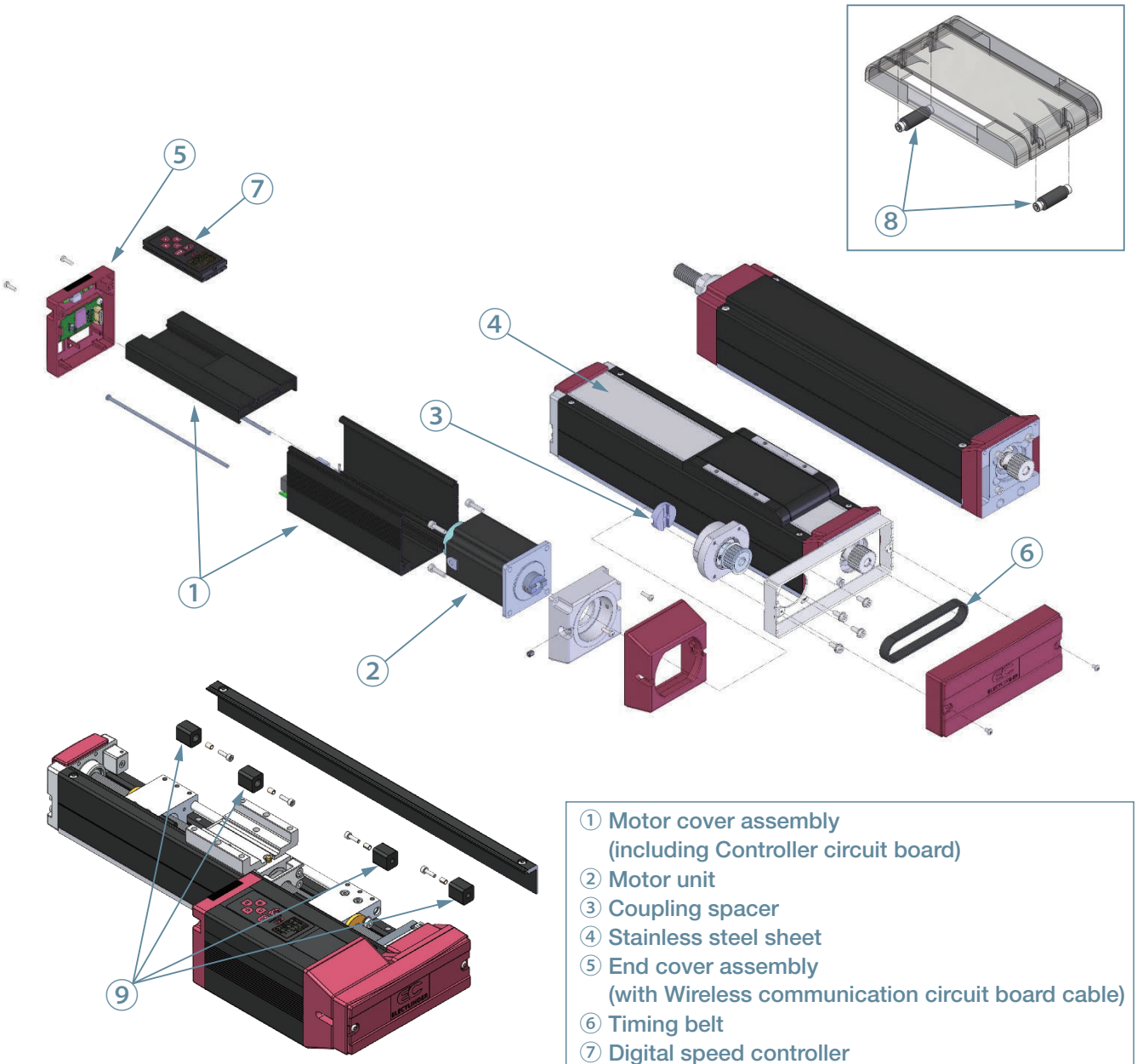
Type	Model
(D)S6X□AH (D)S7X□AH	IMSC-EC-S6S7 *1
(D)RR6X□AH (D)RR7X□AH	IMSC-EC-RR6RR7 *2

*1 The above model is for one unit. When 1 axis worth is required, prepare eight items. One roll bush is included per model.
*2 The above model is for one unit. Order four sets for one axis.
One model set comes with two rolled bushings.

Illustrations of Maintenance Parts: EC

(D)S6(X)□AHR/(D)S7(X)□AHR
(D)RR6□AHR/(D)RR7□AHR

*The diagram below shows a schematic of a model equipped with a digital speed controller. For models not equipped with a digital speed controller, the external view of the top surface of the controller assembly ① may differ.



① Motor cover assembly
(including Controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
(with Wireless communication circuit board cable)
⑥ Timing belt
⑦ Digital speed controller
⑧ Slider roller assembly
⑨ Intermediate support cushion

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)S6(X)□AHR/(D)S7(X)□AHR (D)RR6□AHR/(D)RR7□AHR

(Example)
When digital speed controller specifications, TMD2, and WL2 are selected:
MWB-ECH-DSRR6-TMD2-WL2

① Motor cover assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Brake	I/O	Basic model number Add "D" when selecting the digital speed controller specification	RCON-EC connection specifications* Model: ACR	Dual power supply system specifications* Model: TMD2	Wireless axis operation specifications Model: WL2
(D)S6(X)□AHR (D)RR6□AHR	No	NPN	MWB-ECH-(D)SRR6	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-ECH-(D)SRR6-P			
	Yes	NPN	MWB-ECH-(D)SRR6-B			
		PNP	MWB-ECH-(D)SRR6-B-P			
(D)S7(X)□AHR (D)RR7□AHR	No	NPN	MWB-ECH-(D)SRR7			
		PNP	MWB-ECH-(D)SRR7-P			
	Yes	NPN	MWB-ECH-(D)SRR7-B			
		PNP	MWB-ECH-(D)SRR7-B-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Brake	Model
(D)S6(X)AHR (D)RR6□AHR	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
(D)S7(X)□AHR	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
(D)RR7□AHR	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
(D)S6(X)□AHR (D)RR6□AHR	CPG-EC-SR6
(D)S7(X)□AHR (D)RR7□AHR	CPG-EC-SR7

④ Stainless steel sheet

Type	Model	
	Single slider	Double slider
(D)S6□AHR	ST-ECH-S6-○○○	ST-ECH-S6D-○○○
(D)S7□AHR	ST-ECH-S7-○○○	ST-ECH-S7D-○○○
(D)S6X□AHR	ST-ECXH-S6-○○○	
(D)S7X□AHR	ST-ECXH-S7-○○○	

*○○○ indicates the stroke in the model name

⑤ End cover assembly

Type	Model Add "D" when selecting the digital speed controller specification
(D)S6(X)□AHR (D)RR6□AHR	EWB-ECH-(D)SRR6
(D)S7(X)□AHR (D)RR7□AHR	EWB-ECH-(D)SRR7

(Note) Comes with wireless communication circuit board cable.
For non-wireless specifications, please contact our sales representative.

⑥ Timing belt

Type	Model
(D)S6(X)□AHR (D)RR6□AHR	TB-EC-SRR6R
(D)S7(X)□AHR (D)RR7□AHR	TB-EC-SRR7R

⑦ Digital speed controller

Type	Model
DS6(X)□AHR/DS7(X)□AHR DRR6□AHR/DRR7□AHR	DSC-01

⑧ Slider roller assembly

Type	Model
(D)S6(X)□AHR (D)S7(X)□AHR	EC-SR-S467

* The above model is for one set.
Order two sets for one axis.

⑨ Intermediate support cushion

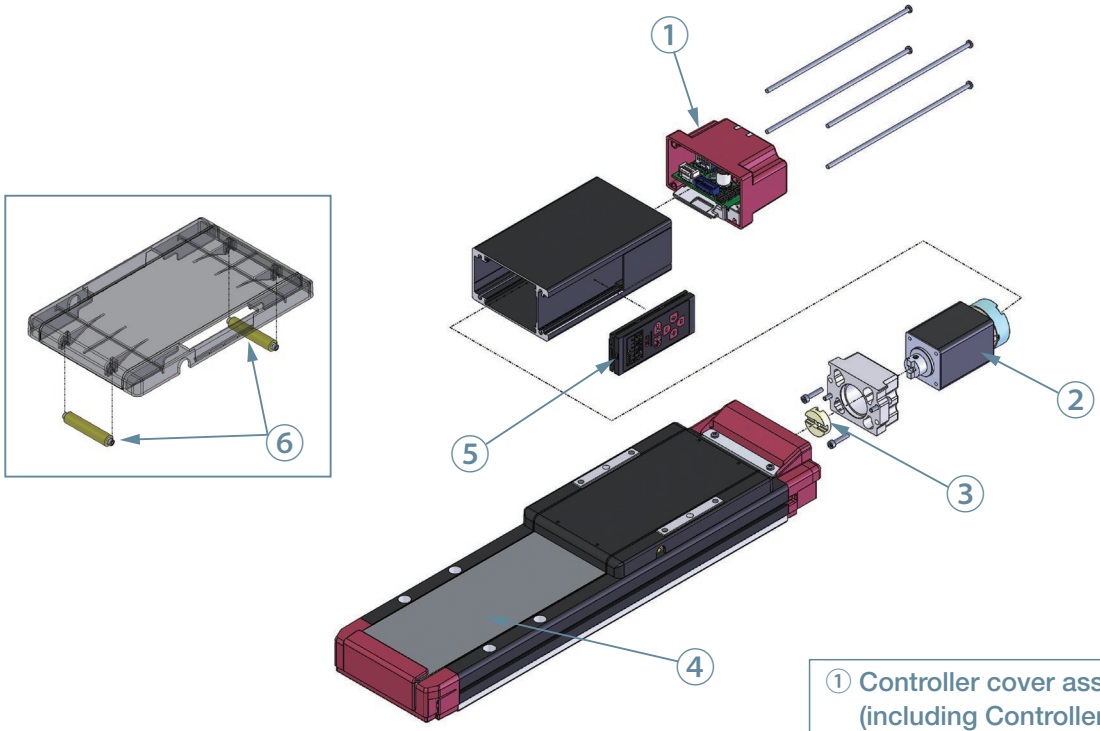
Type	Model
(D)S6X□AHR (D)S7X□AHR	IMSC-EC-S6S7

* The above model is for one set.
Order eightsets for one axis.
One model set comes with two rolled bushings.

Illustrations of Maintenance Parts: EC

(D)WS10□(CR)/(D)WS12□(CR)

*The diagram below shows a schematic of a model equipped with a digital speed controller. For models not equipped with a digital speed controller, the external view of the side surface of the motor cover may differ.



① Controller cover assembly (including Controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ Digital speed controller
⑥ Slider roller assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)WS10□(CR)/(D)WS12□(CR)

①-1 Controller cover assembly

Type	I/O	Wireless	Model
(D)WS10	NPN	No	CCA-EC-WS10
		WL	CCA-EC-WS10-WL
		WL2	CCA-EC-WS10-WL2
	PNP	No	CCA-EC-WS10-P
		WL	CCA-EC-WS10-P-WL
		WL2	CCA-EC-WS10-P-WL2
(D)WS12	NPN	No	CCA-EC-WS12
		WL	CCA-EC-WS12-WL
		WL2	CCA-EC-WS12-WL2
	PNP	No	CCA-EC-WS12-P
		WL	CCA-EC-WS12-P-WL
		WL2	CCA-EC-WS12-P-WL2

①-2 Controller cover assembly for dual power supply

Type	I/O	Wireless	Model
(D)WS10	NPN	No	CCA-EC-WS10-TMD2
		WL	CCA-EC-WS10-TMD2-WL
		WL2	CCA-EC-WS10-TMD2-WL2
	PNP	No	CCA-EC-WS10-P-TMD2
		WL	CCA-EC-WS10-P-TMD2-WL
		WL2	CCA-EC-WS10-P-TMD2-WL2
(D)WS12	NPN	No	CCA-EC-WS12-TMD2
		WL	CCA-EC-WS12-TMD2-WL
		WL2	CCA-EC-WS12-TMD2-WL2
	PNP	No	CCA-EC-WS12-P-TMD2
		WL	CCA-EC-WS12-P-TMD2-WL
		WL2	CCA-EC-WS12-P-TMD2-WL2

①-3 Controller cover assembly for dual power supply of RCON-EC connection specification (optional model: ACR)

Type	I/O	Wireless	Model
(D)WS10	NPN-REC	No	CCA-EC-WS10-ACR
		WL	CCA-EC-WS10-ACR-WL
		WL2	CCA-EC-WS10-ACR-WL2
(D)WS12	NPN-REC	No	CCA-EC-WS12-ACR
		WL	CCA-EC-WS12-ACR-WL
		WL2	CCA-EC-WS12-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
(D)WS10	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B
(D)WS12	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B

③ Coupling spacer

Type	Model
(D)WS10 (D)WS12	CPG-EC-SR6

④ Stainless steel sheet

Type	Model
(D)WS10	ST-6WA10-○○○
(D)WS12	ST-EC-WS12-○○○

* ○○○ represents stroke.

⑤ Digital speed controller

Type	Model
DWS10/DWS12	DSC-01

⑥ Slider roller assembly

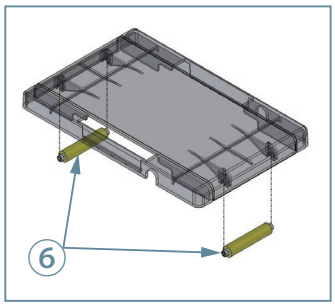
Type	Model
(D)WS10 (D)WS12	EC-SR-WS1012

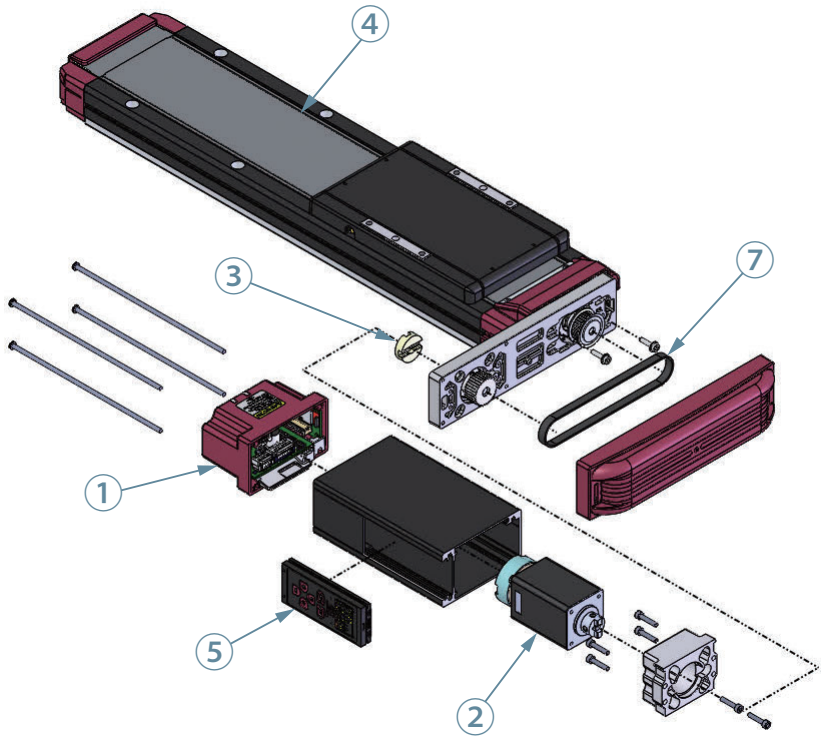
* The above model is for one set.
Order two sets for one axis.

Illustrations of Maintenance Parts: EC

(D)WS10□R/(D)WS12□R

*The diagram below shows a schematic of a model equipped with a digital speed controller.
For models not equipped with a digital speed controller, the external view of the side surface of the motor cover may differ.





① Controller cover assembly (including Controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ Digital speed controller
⑥ Slider roller assembly
⑦ Timing belt

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)WS10□R/(D)WS12□R

①-1 Controller cover assembly

Type	I/O	Wireless	Model
(D)WS10□R	NPN	No	CCA-EC-WS10
		WL	CCA-EC-WS10-WL
		WL2	CCA-EC-WS10-WL2
	PNP	No	CCA-EC-WS10-P
		WL	CCA-EC-WS10-P-WL
		WL2	CCA-EC-WS10-P-WL2
(D)WS12□R	NPN	No	CCA-EC-WS12
		WL	CCA-EC-WS12-WL
		WL2	CCA-EC-WS12-WL2
	PNP	No	CCA-EC-WS12-P
		WL	CCA-EC-WS12-P-WL
		WL2	CCA-EC-WS12-P-WL2

①-2 Controller cover assembly for dual power supply

Type	I/O	Wireless	Model
(D)WS10□R	NPN	No	CCA-EC-WS10-TMD2
		WL	CCA-EC-WS10-TMD2-WL
		WL2	CCA-EC-WS10-TMD2-WL2
	PNP	No	CCA-EC-WS10-P-TMD2
		WL	CCA-EC-WS10-P-TMD2-WL
		WL2	CCA-EC-WS10-P-TMD2-WL2
(D)WS12□R	NPN	No	CCA-EC-WS12-TMD2
		WL	CCA-EC-WS12-TMD2-WL
		WL2	CCA-EC-WS12-TMD2-WL2
	PNP	No	CCA-EC-WS12-P-TMD2
		WL	CCA-EC-WS12-P-TMD2-WL
		WL2	CCA-EC-WS12-P-TMD2-WL2

①-3 Controller cover assembly for dual power supply of RCON-EC connection specification (optional model: ACR)

Type	I/O	Wireless	Model
(D)WS10□R	NPN-REC	No	CCA-EC-WS10-ACR
		WL	CCA-EC-WS10-ACR-WL
		WL2	CCA-EC-WS10-ACR-WL2
(D)WS12□R	NPN-REC	No	CCA-EC-WS12-ACR
		WL	CCA-EC-WS12-ACR-WL
		WL2	CCA-EC-WS12-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
(D)WS10□R	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B
(D)WS12□R	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B

③ Coupling spacer

Type	Model
(D)WS10□R (D)WS12□R	CPG-EC-SR6

④ Stainless steel sheet

Type	Model
(D)WS10□R	ST-6WA10-○○○
(D)WS12□R	ST-EC-WS12-○○○

* ○○○ represents stroke.

⑤ Digital speed controller

Type	Model
DWS10□R DWS12□R	DSC-01

⑥ Slider roller assembly

Type	Model
(D)WS10□R (D)WS12□R	EC-SR-WS1012

* The above model is for one set.
Order two sets for one axis.

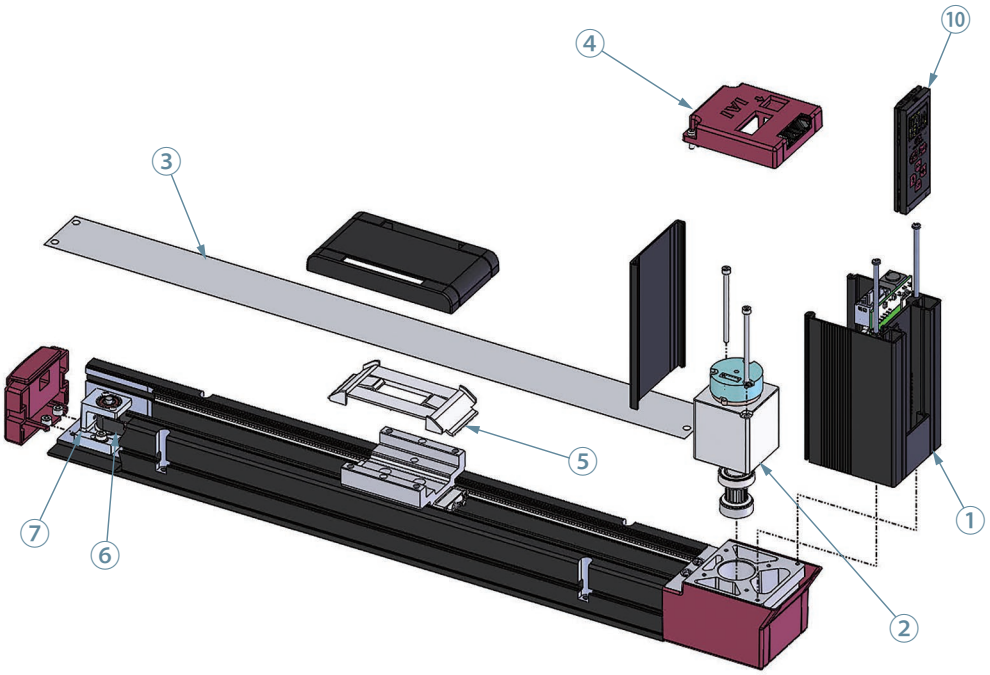
⑦ Timing belt

Type	Model
(D)WS10□R (D)WS12□R	TB-EC-WS10R12R

Illustrations of Maintenance Parts: EC

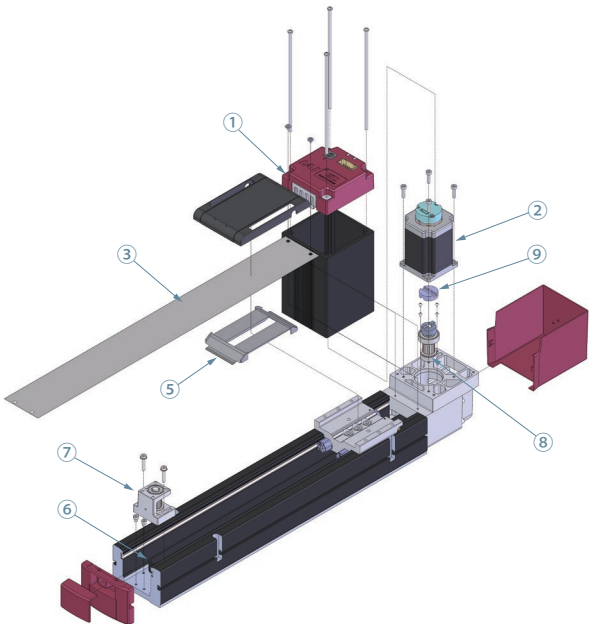
(D)B6S(U)/(D)B7S(U)

*The diagram below shows a schematic of a model equipped with a digital speed controller.
For models not equipped with a digital speed controller, the external view of the side surface of the motor cover may differ.



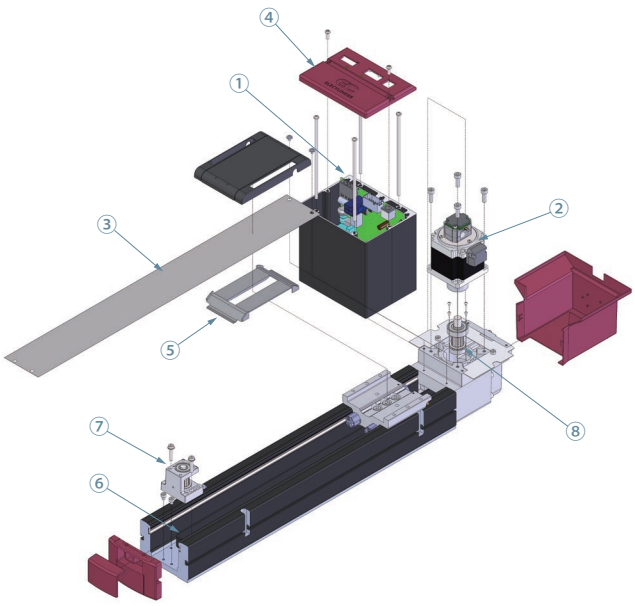
① Motor cover assembly (including Controller circuit board)
② Motor unit
③ Stainless steel sheet
④ End cover assembly (with Wireless communication circuit board cable)
⑤ Sheet of slider
⑥ Long belt (Slider/drive belt)
⑦ Driven pulley assembly
⑩ Digital speed controller

B8S(U)



① Controller cover assembly (including Controller circuit board)
② Motor unit
③ Stainless steel sheet
⑤ Sheet of slider
⑥ Long belt (Slider/drive belt)
⑦ Driven pulley assembly
⑧ Drive pulley assembly
⑨ Coupling spacer

B8SS(U)



① Motor cover assembly (including Controller circuit board)
② Motor unit
③ Stainless steel sheet
④ End cover assembly (with Wireless communication circuit board cable)
⑤ Sheet of slider
⑥ Long belt (Slider/drive belt)
⑦ Driven pulley assembly
⑧ Drive pulley assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

(D)B6S(U)/(D)B7S(U)/B8S(U)/B8SS(U)

(Example)
When digital speed controller specifications, TMD2, and WL2 are selected:
MWB-EC-DSR6-TMD2-WL2

①-1 Motor cover assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Brake	I/O	Basic model number Add "D" when selecting the digital speed controller specification	RCON-EC connection specifications* Model: ACR	Dual power supply system specifications* Model: TMD2	Wireless axis operation specifications Model: WL2
(D)B6S	No	NPN	MWB-EC-(D)SR6	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-EC-(D)SR6-P			
	Yes	NPN	MWB-EC-(D)SR6-B			
		PNP	MWB-EC-(D)SR6-B-P			
(D)B7S	No	NPN	MWB-EC-(D)SR7			
		PNP	MWB-EC-(D)SR7-P			
	Yes	NPN	MWB-EC-(D)SR7-B			
		PNP	MWB-EC-(D)SR7-B-P			
B8SS	No	NPN	MWB-EC-B8S			
		PNP	MWB-EC-B8S-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

①-2 Controller cover assembly

Type	I/O	Wireless	Model		
			Standard	When TMD2 is selected	When ACR is selected
B8S	NPN	No	CCA-EC-RRB8	CCA-EC-RRB8-TMD2	CCA-EC-RRB8-ACR
		WL	CCA-EC-RRB8-WL	CCA-EC-RRB8-TMD2-WL	CCA-EC-RRB8-ACR-WL
		WL2	CCA-EC-RRB8-WL2	CCA-EC-RRB8-TMD2-WL2	CCA-EC-RRB8-ACR-WL2
	PNP	No	CCA-EC-RRB8-P	CCA-EC-RRB8-P-TMD2	
		WL	CCA-EC-RRB8-P-WL	CCA-EC-RRB8-P-TMD2-WL	
		WL2	CCA-EC-RRB8-P-WL2	CCA-EC-RRB8-P-TMD2-WL2	

② Motor unit

Type	Encoder	Brake	Model
(D)B6S	Incremental	No	EC-MUB6
		Yes	EC-MUB6-B
	Battery-less absolute	No	EC-MUB6-WA
		Yes	EC-MUB6-WA-B
(D)B7S	Incremental	No	EC-MUB7
		Yes	EC-MUB7-B
	Battery-less absolute	No	EC-MUB7-WA
		Yes	EC-MUB7-WA-B
B8S	Incremental	No	EC-MUSB8
	Battery-less absolute		EC-MUSB8-WA
B8SS	Battery-less absolute	No	EC-MUS13

③ Stainless steel sheet

Type	Model
(D)B6S	ST-EC-B6-○○○
(D)B7S	ST-EC-B7-○○○
B8S/B8SS	ST-EC-B8-○○○

* ○○○ represents stroke.

④ End cover assembly

Type	Model Add "D" when selecting the digital speed controller specification
(D)B6S	EWB-EC-(D)SR6
(D)B7S	EWB-EC-(D)SR7
B8SS	EWB-EC-B8S

(Note) Comes with wireless communication circuit board cable. For non-wireless specifications, please contact our sales representative.

⑤ Sheet of slider

Type	Model
(D)B6S	SHS-EC-B6
(D)B7S	SHS-EC-B7
B8S/B8SS	SHS-EC-B8

⑥ Long belt (Slider/drive belt)

Type	Model
(D)B6S	LB-EC-B6-○○○
(D)B7S	LB-EC-B7-○○○
B8S/B8SS	LB-EC-B8-○○○

* ○○○ represents stroke.

⑦ Driven pulley assembly

Type	Model
(D)B6S	PLY-EC-B6
(D)B7S	PLY-EC-B7
B8S/B8SS	PLY-EC-B8

⑧ Drive pulley assembly

Type	Model
B8S	DPLY-EC-B8
B8SS	DPLY-EC-B8S

⑨ Coupling spacer

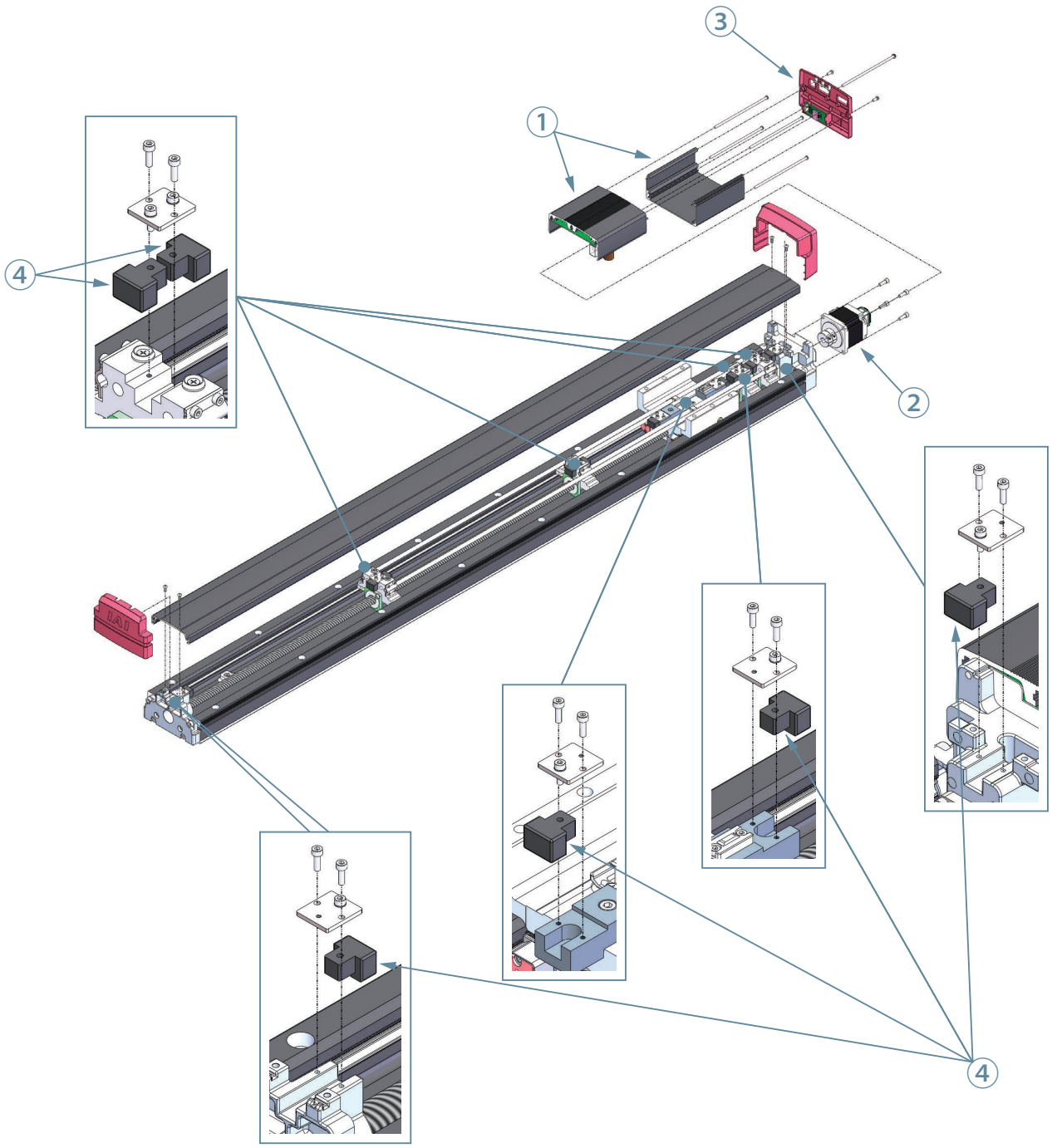
Type	Model
B8S	CPG-EC-SR7

⑩ Digital speed controller

Type	Model
DB6S/DB7S	DSC-01

Illustrations of Maintenance Parts: EC

S10(X)/S13(X)/S15(X)/S18(X)



① Motor cover assembly (including Controller circuit board)
② Motor unit
③ End cover assembly (with Wireless communication circuit board cable)
④ Intermediate support cushion

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

S10(X)/S13(X)/S15(X)/S18(X)

(Example)
When TMD2 and WL2 are selected:
MWB-EC-S10-TMD2-WL2

① Motor cover assembly

[Model configuration] Basic model - (When ACR is selected) - (When TMD2 is selected) - (When WL2 is selected)

Type	Brake	I/O	Basic model number	RCON-EC connection specifications*	Dual power supply system specifications*	Wireless axis operation specifications
				Model: ACR	Model: TMD2	Model: WL2
S10(X)	No	NPN	MWB-EC-S10	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-EC-S10-P			
	Yes	NPN	MWB-EC-S10B			
		PNP	MWB-EC-S10B-P			
S13(X)	No	NPN	MWB-EC-S13			
		PNP	MWB-EC-S13-P			
	Yes	NPN	MWB-EC-S13BS15			
		PNP	MWB-EC-S13BS15-P			
S15(X)	No	NPN	MWB-EC-S13BS15			
		PNP	MWB-EC-S13BS15-P			
	Yes	NPN	MWB-EC-S15B			
		PNP	MWB-EC-S15B-P			
S18(X)	No/Yes	NPN	MWB-EC-S18			
		PNP	MWB-EC-S18-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) Wireless communication circuit board is not included.

② Motor unit

Type	Brake	Payload specifications	Model
S10(X)	No	—	EC-MUS10
	Yes		EC-MUS10-B
S13(X)	No	—	EC-MUS13
	Yes		EC-MUS13-B
S15(X)	No	—	EC-MUS15
	Yes		EC-MUS15-B
S18(X)	No/Yes	Standard	EC-MUS18
		High payload [LP]	EC-MUS18P

③ End cover assembly

Type	Model
S10(X)	EWB-EC-S10
S13(X)/S15(X)	EWB-EC-S13S15
S18(X)	EWB-EC-S18

(Note) Comes with wireless communication circuit board cable.
For non-wireless specifications, please contact our sales representative.

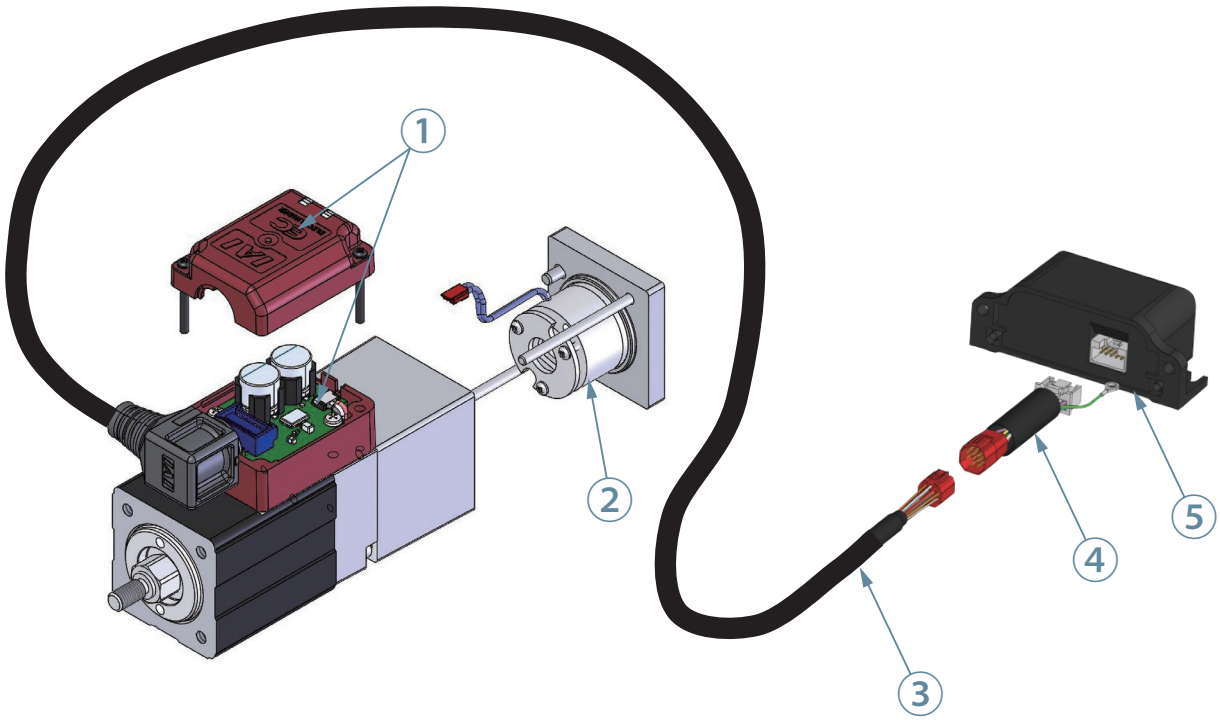
④ Intermediate support cushion

Type	Model	Necessary quantity
S10X	IMSC-EC-S13S15	8 pieces (all strokes)
S13X		8 pieces (800-1000mm stroke) 12 pieces (1050-2000mm stroke)
S15X		8 pieces (1000-1200mm stroke) 12 pieces (1250-2500mm stroke)
S18X		8 pieces (750-1350mm stroke) 12 pieces (1400-2800mm stroke)

*The above model comes with 12 pieces.
Please keep the extra pieces.

Illustrations of Maintenance Parts: EC

CRP3/CRP5
CGD3/CGD5
CTC3/CTC5



① Controller cover assembly
② Brake unit
③ Actuator cable assembly
④ Interface box conversion cable
⑤ Interface box

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

CRP3/CRP5 CGD3/CGD5 CTC3/CTC5

① Controller cover assembly

Type	Wireless	Model
CRP3/CGD3/CTC3 CRP5/CGD5/CTC5	No/WL	CCA-EC-C35
	WL2	CCA-EC-C35WL2

② Brake unit

Type	Model
CRP3/CGD3/CTC3	EC-BKU-C3
CRP5/CGD5/CTC5	EC-BKU-C5

③ Actuator cable assembly

Type	Model
CRP3/CGD3/CTC3 CRP5/CGD5/CTC5	CB-EC-C35-MPA○○○-AS

* ○○○ is the cable length
Up to 10m (up to 9m through the interface box)

④ Interface box conversion cable

Type	Model
CRP3/CGD3/CTC3 CRP5/CGD5/CTC5	CB-CVN-BJ002

⑤-1 Interface box

Type	Wireless	I/O	Model
CRP3/CGD3/ CTC3 CRP5/CGD5/ CTC5	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑤-2 Interface box for dual power supply

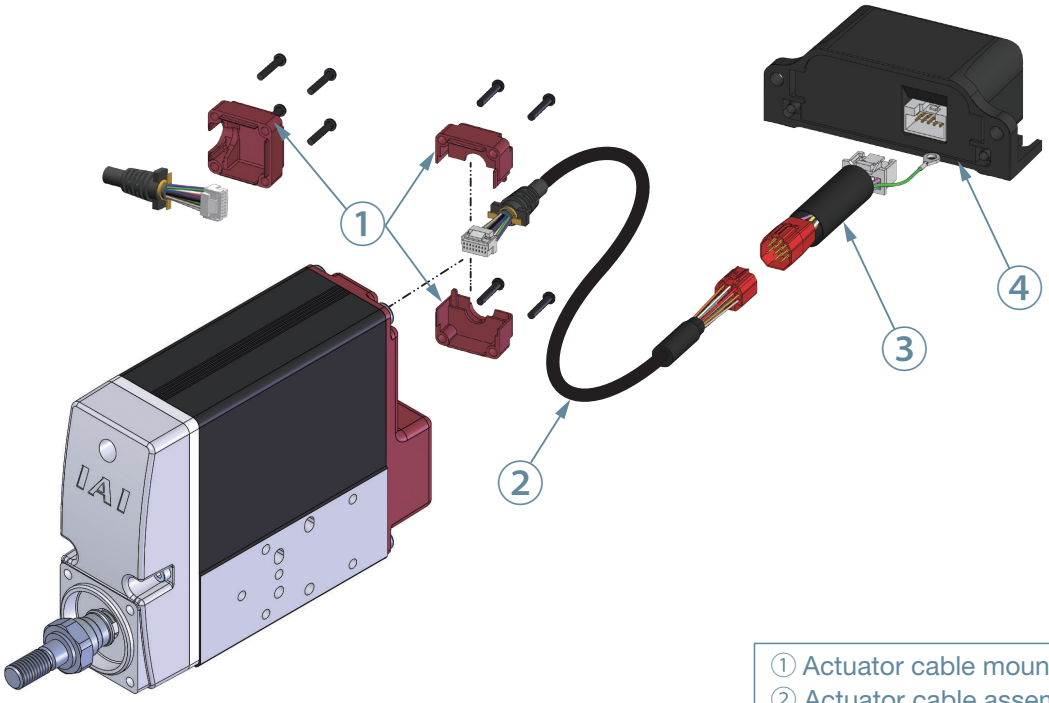
Type	Wireless	I/O	Model
CRP3/CGD3/ CTC3 CRP5/CGD5/ CTC5	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑤-3 Interface box for dual power supply of RCON-EC connection specifications

Type	Wireless	I/O	Model
CRP3/CGD3/CTC3 CRP5/CGD5/CTC5	WL WL2	NPN	ECW-CVNWL-CB-ACR
		REC	

Illustrations of Maintenance Parts: EC

RP3/GD3/TC3/TW3



① Actuator cable mounting box
② Actuator cable assembly
③ Interface box conversion cable
④ Interface box

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

RP3/GD3/TC3/TW3

① Actuator cable mounting box

(Included: Screws)

Type	Cable exit direction	Model
RP3 GD3 TC3 TW3	Back	EC-CASBR-SLTGD3
	Side	EC-CASBS-SLTGD3

② Actuator cable assembly

Type	Model
RP3 GD3 TC3 TW3	CB-EC-GR367-MPA○○○-AS

* ○○○ is the cable length
Up to 10m (up to 9m through the interface box)

③ Interface box conversion cable

Type	Model
RP3 GD3 TC3 TW3	CB-CVN-BJ002

④-1 Interface box

Type	Wireless	I/O	Model
RP3 GD3 TC3 TW3	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

④-2 Interface box for dual power supply

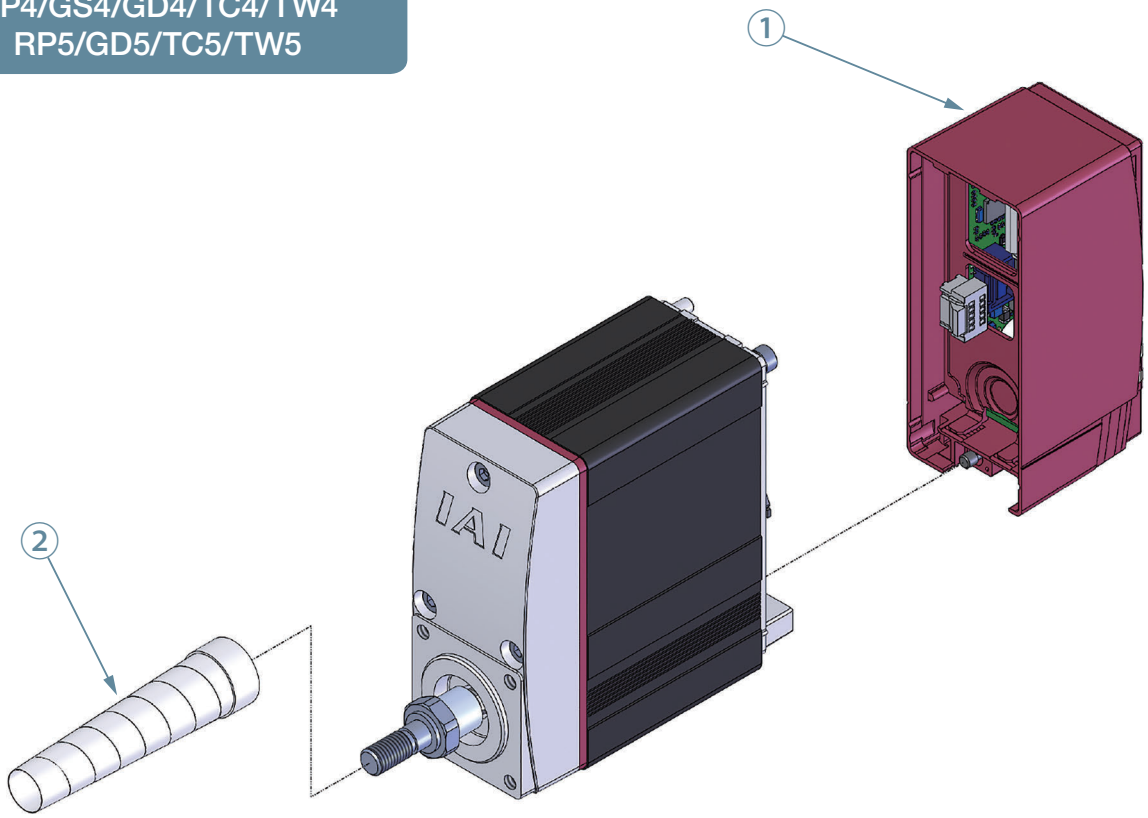
Type	Wireless	I/O	Model
RP3 GD3 TC3 TW3	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

④-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

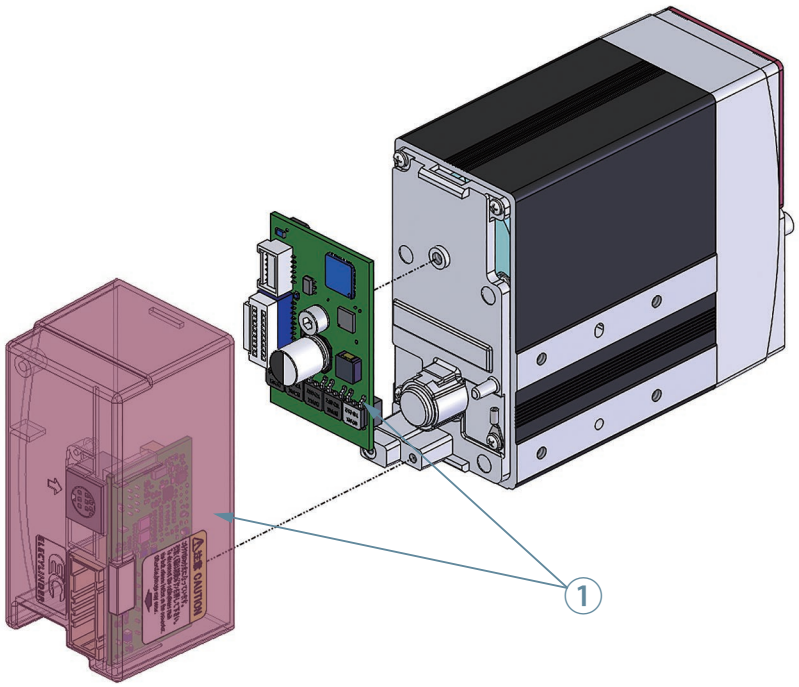
Type	Wireless	I/O	Model
RP3 GD3 TC3 TW3	WL WL2	NPN _REC	ECW-CVNWL-CB-ACR

Illustrations of Maintenance Parts: EC

RP4/GS4/GD4/TC4/TW4
RP5/GD5/TC5/TW5



Drawing: RP4



Drawing: RP5

① Controller cover assembly
② Spiral cover

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

RP4/GS4/GD4/TC4/TW4
RP5/GD5/TC5/TW5

①-1 Controller cover assembly

Type	I/O	Wireless	Model
RP4/GS4/GD4 TC4/TW4	NPN	No	CCA-EC-N
		WL	CCA-EC-NWL
		WL2	CCA-EC-NWL2
	PNP	No	CCA-EC-P
		WL	CCA-EC-PWL
		WL2	CCA-EC-PWL2
RP5/GD5 TC5/TW5	NPN	No	CCA-EC-N5
		WL	CCA-EC-N5WL
		WL2	CCA-EC-N5WL2
	PNP	No	CCA-EC-P5
		WL	CCA-EC-P5WL
		WL2	CCA-EC-P5WL2

①-2 Controller cover assembly for dual power supply

Type	I/O	Wireless	Model
RP4/GS4/GD4 TC4/TW4	NPN	No	CCA-EC-N-TMD2
		WL	CCA-EC-NWL-TMD2
		WL2	CCA-EC-NWL2-TMD2
	PNP	No	CCA-EC-P-TMD2
		WL	CCA-EC-PWL-TMD2
		WL2	CCA-EC-PWL2-TMD2
RP5/GD5 TC5/TW5	NPN	No	CCA-EC-N5-TMD2
		WL	CCA-EC-N5WL-TMD2
		WL2	CCA-EC-N5WL2-TMD2
	PNP	No	CCA-EC-P5-TMD2
		WL	CCA-EC-P5WL-TMD2
		WL2	CCA-EC-P5WL2-TMD2

①-3 Controller cover assembly for dual power supply of RCON-EC connection specification (optional model: ACR)

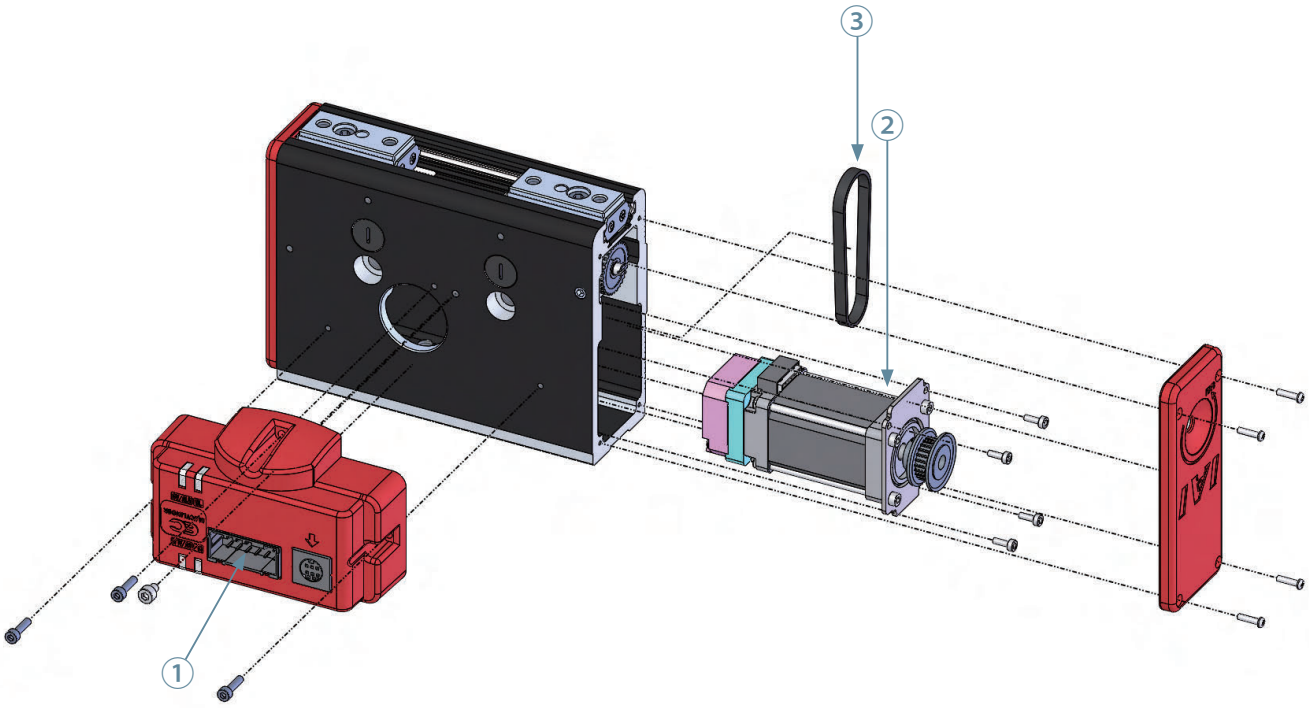
Type	I/O	Wireless	Model
RP4/GS4/GD4 TC4/TW4	NPN_REC	No	CCA-EC-N-ACR
		WL	CCA-EC-NWL-ACR
		WL2	CCA-EC-NWL2-ACR
RP5/GD5 TC5/TW5	NPN_REC	No	CCA-EC-N5-ACR
		WL	CCA-EC-N5WL-ACR
		WL2	CCA-EC-N5WL2-ACR

② Spiral cover

Type	Model
RP4/GS4/GD4 TC4/TW4	RCA2-SPC-50

Illustrations of Maintenance Parts: EC

GRB8/GRB10/GRB13



① Controller cover assembly
② Motor unit
③ Timing belt

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

GRB8/GRB10/GRB13

①-1 Controller cover assembly

Type	I/O	Wireless	Model
GRB8	NPN	No	CCA-EC-GRB8
		WL	CCA-EC-GRB8-WL
		WL2	CCA-EC-GRB8-WL2
	PNP	No	CCA-EC-GRB8-P
		WL	CCA-EC-GRB8-P-WL
		WL2	CCA-EC-GRB8-P-WL2
GRB10 GRB13	NPN	No	CCA-EC-GRB1013
		WL	CCA-EC-GRB1013-WL
		WL2	CCA-EC-GRB1013-WL2
	PNP	No	CCA-EC-GRB1013-P
		WL	CCA-EC-GRB1013-P-WL
		WL2	CCA-EC-GRB1013-P-WL2

①-2 Controller cover assembly for dual power supply

Type	I/O	Wireless	Model
GRB8	NPN	No	CCA-EC-GRB8-TMD2
		WL	CCA-EC-GRB8-TMD2-WL
		WL2	CCA-EC-GRB8-TMD2-WL2
	PNP	No	CCA-EC-GRB8-P-TMD2
		WL	CCA-EC-GRB8-P-TMD2-WL
		WL2	CCA-EC-GRB8-P-TMD2-WL2
GRB10 GRB13	NPN	No	CCA-EC-GRB1013-TMD2
		WL	CCA-EC-GRB1013-TMD2-WL
		WL2	CCA-EC-GRB1013-TMD2-WL2
	PNP	No	CCA-EC-GRB1013-P-TMD2
		WL	CCA-EC-GRB1013-P-TMD2-WL
		WL2	CCA-EC-GRB1013-P-TMD2-WL2

①-3 Controller cover assembly for dual power supply of RCON-EC connection specification (optional model: ACR)

Type	I/O	Wireless	Model
GRB8	NPN_REC	No	CCA-EC-GRB8-ACR
		WL	CCA-EC-GRB8-ACR-WL
		WL2	CCA-EC-GRB8-ACR-WL2
GRB10 GRB13	NPN_REC	No	CCA-EC-GRB1013-ACR
		WL	CCA-EC-GRB1013-ACR-WL
		WL2	CCA-EC-GRB1013-ACR-WL2

② Motor unit

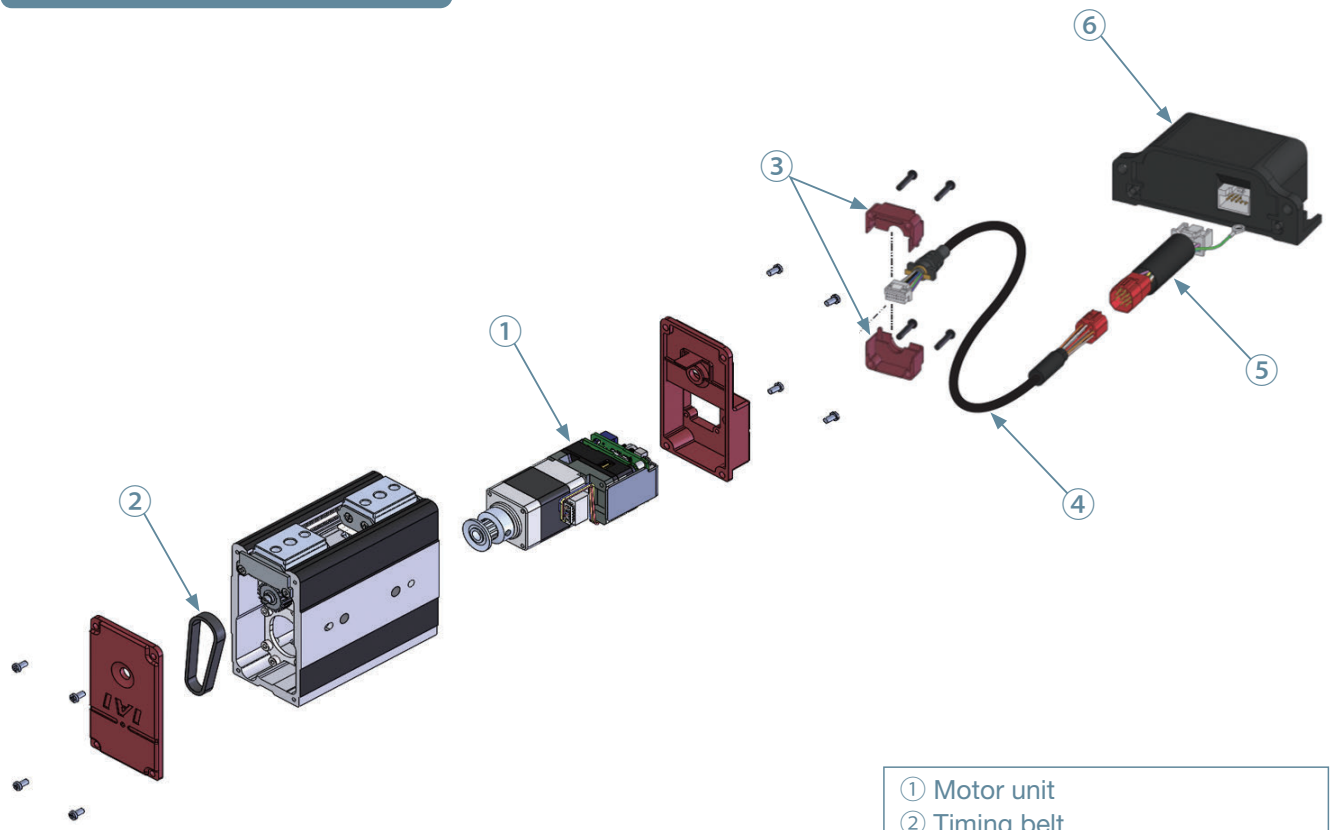
Type	Reduction ratio	Encoder	Model
GRB8	M	Incremental	EC-MUGRB8
GRB10	M	Incremental	EC-MUGRB10
		Battery-less absolute	EC-MUGRB10-WA
GRB13	L	Incremental	EC-MUGRB13L
		Battery-less absolute	EC-MUGRB13L-WA
	M	Incremental	EC-MUGRB13M
		Battery-less absolute	EC-MUGRB13M-WA

③ Timing belt

Type	Reduction ratio	Model
GRB8	M	TB-EC-GRB8
GRB10	M	TB-EC-GRB10
GRB13	L	TB-EC-GRB13L
	M	TB-EC-GRB13M

Illustrations of Maintenance Parts: EC

GRBP8/GRBP10/GRBP13



① Motor unit
② Timing belt
③ Actuator cable mounting box
④ Actuator cable assembly
⑤ Interface box conversion cable
⑥ Interface box

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

GRBP8/GRBP10/GRBP13

① Motor unit

Type	Encoder	Reduction ratio	Model
GRBP8	Incremental	M	EC-MUGRST6(-WL2)
	Battery-less absolute		EC-MUGRST6-WA(-WL2)
GRBP10	Incremental	M	EC-MUGRBP10(-WL2)
	Battery-less absolute		EC-MUGRBP10-WA(-WL2)
GRBP13	Incremental	M	EC-MUGRBP13(-WL2)
		L	EC-MUGR37S(-WL2)
	Battery-less absolute	M	EC-MUGRBP13-WA(-WL2)
		L	EC-MUGR37S-WA(-WL2)

*When selecting the wireless axis operation compatible specification (model: WL2), enter "-WL2" at the end.

② Timing belt

Type	Reduction ratio	Model
GRBP8	M	TB-EC-GRBP8
GRBP10	M	TB-EC-GRBP10
GRBP13	M	TB-EC-GRBP13M
	L	TB-EC-GRBP13L

③ Actuator cable mounting box

(Included: Screws)

Type	Cable exit direction	Model
GRBP8 GRBP10 GRBP13	Back	EC-CASBR-SLTGD3
	Side	EC-CASBS-SLTGD3

④ Actuator cable assembly

Type	Model
GRBP8	CB-EC-GRBP8-MPA○○○-AS
GRBP10 GRBP13	CB-EC-GRBP1013-MPA○○○-AS

* ○○○ is the cable length
Up to 10m (up to 9m through the interface box)

⑤ Interface box conversion cable

Type	Model
GRBP8 GRBP10 GRBP13	CB-CVN-BJ002

⑥-1 Interface box

Type	Wireless	I/O	Model
GRBP8 GRBP10 GRBP13	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑥-2 Interface box for dual power supply

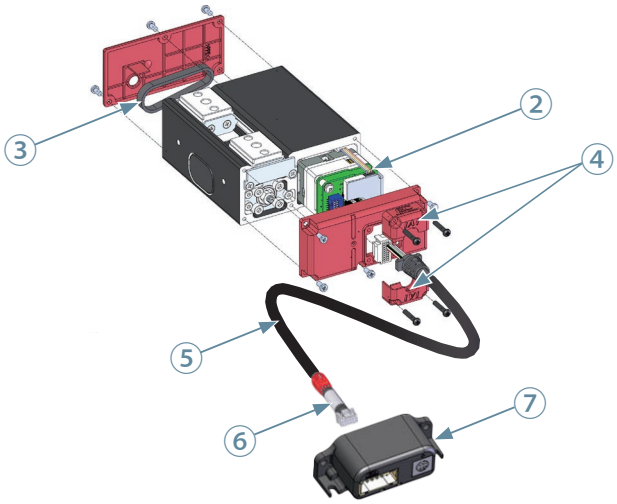
Type	Wireless	I/O	Model
GRBP8 GRBP10 GRBP13	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑥-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

Type	Wireless	I/O	Model
GRBP8 GRBP10 GRBP13	WL WL2	NPN _REC	ECW-CVNWL-CB-ACR

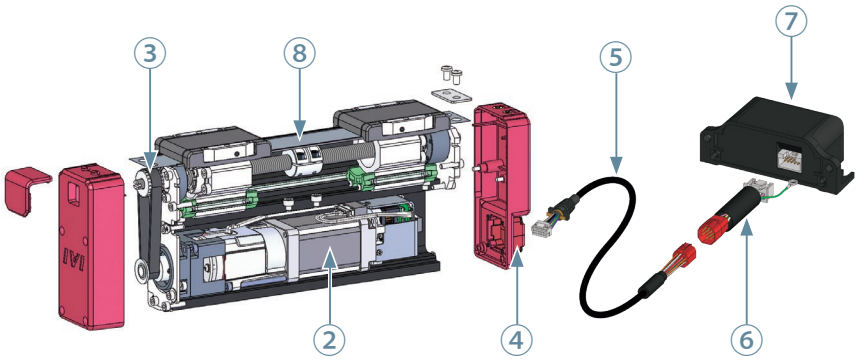
Illustrations of Maintenance Parts: EC

GRC6/GRC7



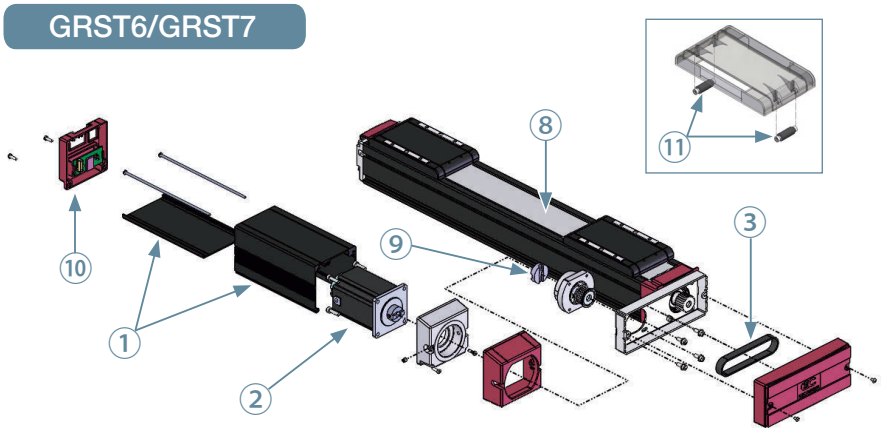
② Motor unit
③ Timing belt
④ Actuator cable mounting box
⑤ Actuator cable assembly
⑥ Interface box conversion cable
⑦ Interface box

GRST3



② Motor unit
③ Timing belt
④ Actuator cable mounting box
⑤ Actuator cable assembly
⑥ Interface box conversion cable
⑦ Interface box
⑧ Stainless steel sheet

GRST6/GRST7



① Motor cover assembly
② Motor unit
③ Timing belt
⑧ Stainless steel sheet
⑨ Coupling spacer
⑩ End cover assembly
⑪ Slider roller assembly

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

GRC6/GRC7/GRST3/GRST6/GRST7

① Motor cover assembly

[Model configuration] Basic model - (when ACR is selected) - (when TMD2 is selected) - (when WL2 is selected)

Type	Brake	I/O	Basic model number	RCON-EC Connection specification*	Dual power supply specification*	Wireless axis operation specification
				Model: ACR	Model: TMD2	Model: WL2
GRST6	No	NPN	MWB-EC-SR6	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-EC-SR6-P			
	Yes	NPN	MWB-EC-SR6-B			
		PNP	MWB-EC-SR6-B-P			
GRST7	No	NPN	MWB-EC-SR7			
		PNP	MWB-EC-SR7-P			
	Yes	NPN	MWB-EC-SR7-B			
		PNP	MWB-EC-SR7-B-P			

*Also common when selecting wireless communication specification (model number: WL).
(Note) The wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Reduction ratio	Brake	Model
GRC6	Incremental	M	No	EC-MUGRST6(-WL2)
	Battery-less absolute			EC-MUGRST6-WA(-WL2)
GRC7 GRST3	Incremental	M	No	EC-MUGR37(-WL2)
			Yes	EC-MUGR37-B(-WL2)
		L	No	EC-MUGR37S(-WL2)
			Yes	EC-MUGR37S-B(-WL2)
	Battery-less absolute	M	No	EC-MUGR37-WA(-WL2)
			Yes	EC-MUGR37-WA-B(-WL2)
		L	No	EC-MUGR37S-WA(-WL2)
			Yes	EC-MUGR37S-WA-B(-WL2)
GRST6	Incremental	Common for M/L	No	EC-MUSR6
			Yes	EC-MUSR6-B
	Battery-less absolute		No	EC-MUSR6-WA
			Yes	EC-MUSR6-WA-B
GRST7	Incremental		No	EC-MUR7
			Yes	EC-MUGRST7-B
	Battery-less absolute		No	EC-MUR7-WA
			Yes	EC-MUGRST7-WA-B

*When selecting the GRC6/GRC7/GRST3 wireless axis operation compatible specification (model: WL2), enter "-WL2" at the end.

③ Timing belt

Type	Reduction ratio	Model
GRC6	M	TB-EC-GRC6
GRC7	M	TB-EC-GRC7M
	L	TB-EC-GRC7L
GRST3	M	TB-EC-GRST3M
	L	TB-EC-GRST3L
GRST6	M	TB-EC-SRR6R
	L	TB-EC-GRST6L
GRST7	M	TB-EC-SRR7R
	L	TB-EC-GRST7L

④ Actuator cable mounting box

Type	Cable exit direction	Model
GRC6/GRC7 GRST3	Back	EC-CASBR-SLTGD3
	Side	EC-CASBS-SLTGD3

(Included: Screws)

⑤ Actuator cable assembly

Type	Internal wiring method	Model
GRC6/GRC7 GRST3	Relay connection	CB-EC-GR367-MPA○○○-AS
	Motor direct connection	CB-EC-GR367D-MPA○○○-AS

* ○○○ indicates cable length
*Up to 10m (up to 9m through the interface box)
*Directly connected to motor ... GRC6M/GRC7L 20mm stroke
GRC7L with brake, 40mm stroke

⑥ Interface box conversion cable

Type	Model
GRC6/GRC7 GRST3	CB-CVN-BJ002

⑦ Interface box

Type	Wireless	I/O	Model		
			Standard	When TMD2 is selected	When ACR is selected
GRC6 GRC7 GRST3	No	NPN	ECW-CVN-CB	ECW-CVN-CB-TMD2	
		PNP	ECW-CVP-CB	ECW-CVP-CB-TMD2	
	WL/WL2	NPN	ECW-CVNWL-CB	ECW-CVNWL-CB-TMD2	ECW-CVNWL-CB-ACR
		PNP	ECW-CVPWL-CB	ECW-CVPWL-CB-TMD2	

⑧ Stainless steel sheet

Type	Model
GRST3	ST-EC-GRST3-○○○
GRST6	ST-EC-S6D-○○○
GRST7	ST-EC-S7D-○○○

* ○○○ indicates the stroke

⑨ Coupling spacer

Type	Model
GRST6	CPG-EC-SR6
GRST7	CPG-EC-SR7

⑩ End cover assembly

Type	Model
GRST6	EWB-EC-SR6
GRST7	EWB-EC-SR7

(Note) Wireless communication circuit board cable is included.
Please contact our sales department for non-wireless specifications.

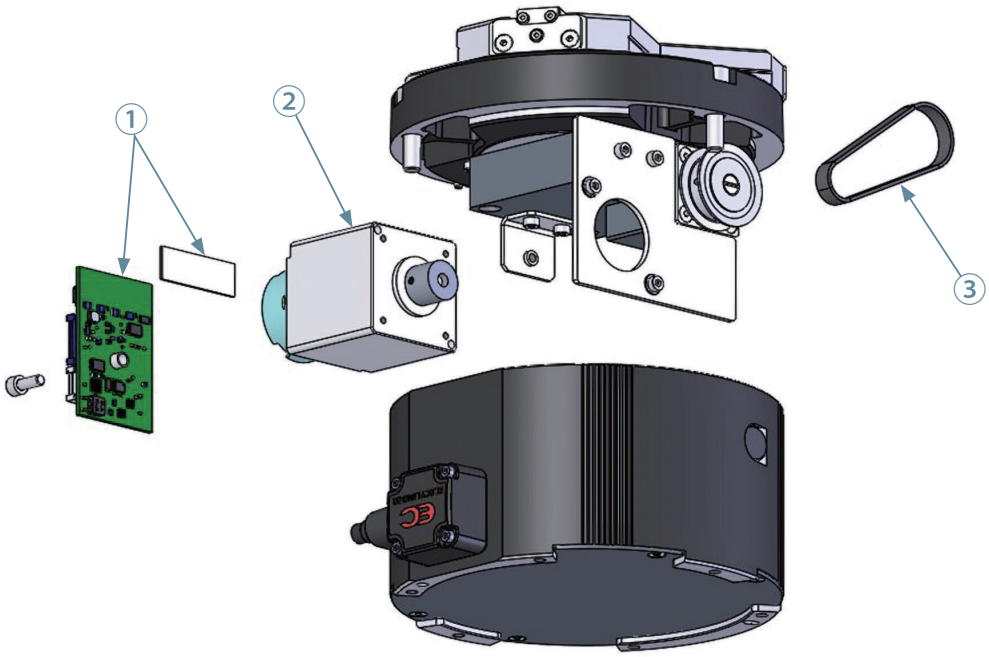
⑪ Slider roller assembly

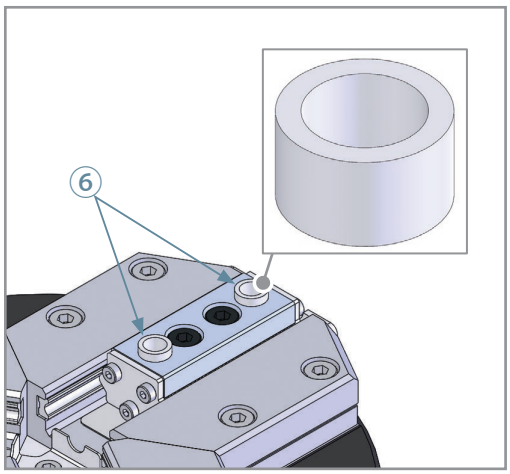
Type	Model
GRST6 GRST7	EC-SR-S467

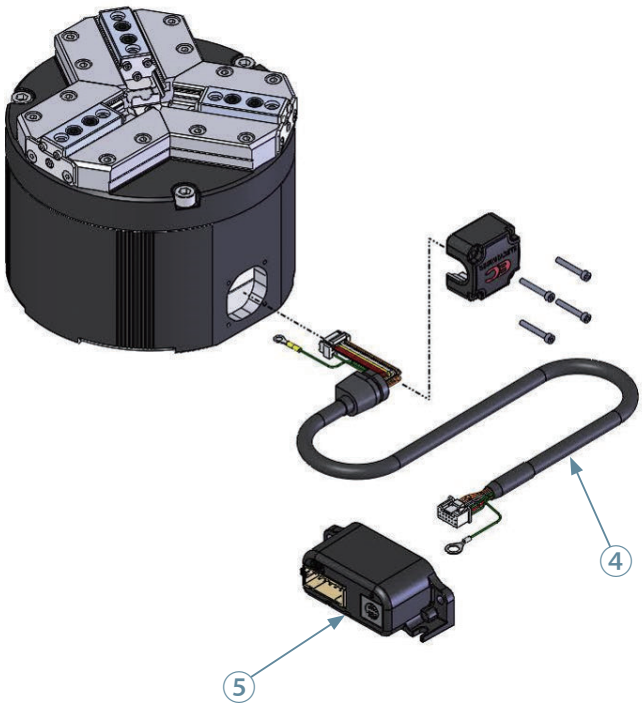
*The above model is for one unit. Order two sets for one axis.

Illustrations of Maintenance Parts: EC

GRTR14M







① Controller board
(with Heat dissipation sheet attached)
② Motor unit
③ Timing belt
④ Actuator cable assembly
⑤ Interface box
⑥ Positioning collar

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

GRTR14M

① Controller board (with Heat dissipation sheet attached)

Type	Wireless	Model
GRTR14	No/WL	MB-EC-GRTR14
	WL2	MB-EC-GRTR14-WL2

*ACR/TMD2 specifications are also common.

② Motor unit

Type	Encoder	Model
GRTR14	Incremental	EC-MUGRTR14M
	Battery-less absolute	EC-MUGRTR14M-WA

③ Timing belt

Type	Model
GRTR14	TB-EC-GRTR14M

④ Actuator cable assembly

Type	Model
GRTR14	CB-EC-GRTR14-MPA○○○-AS

* ○○○ is the cable length
Up to 9m (selected so that the total length of the power supply and I/O cable is 10m or less)

⑤-1 Interface box

Type	Wireless	I/O	Model
GRTR14	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑤-2 Interface box for dual power supply

Type	Wireless	I/O	Model
GRTR14	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑤-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

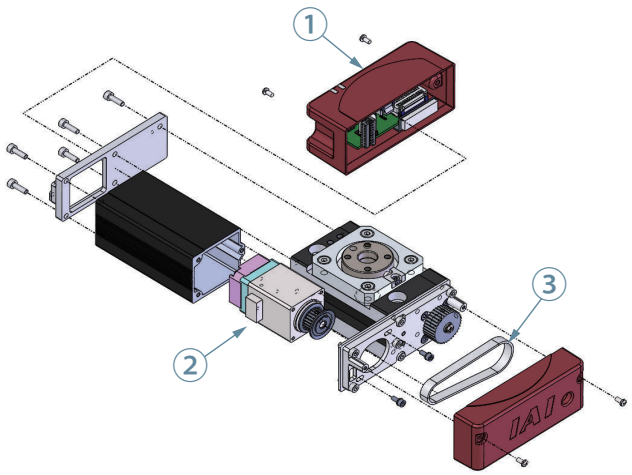
Type	Wireless	I/O	Model
GRTR14	No	NPN _REC	ECW-CVN-CB-ACR
	WL WL2		ECW-CVNWL-CB-ACR

⑥ Positioning collar (set of 6)

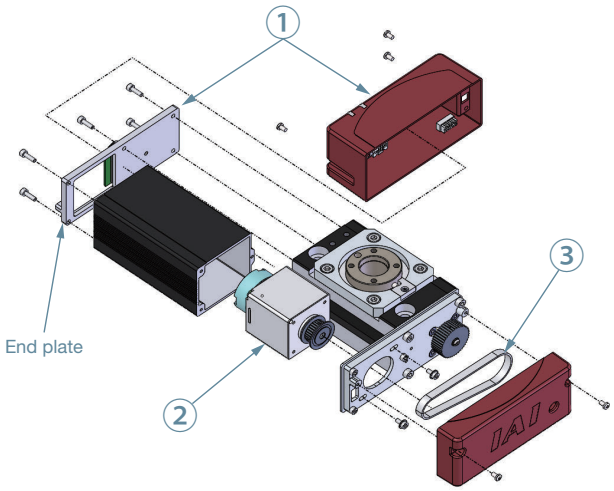
Type	Model
GRTR14	CL-EC-GRTR14

Illustrations of Maintenance Parts: EC

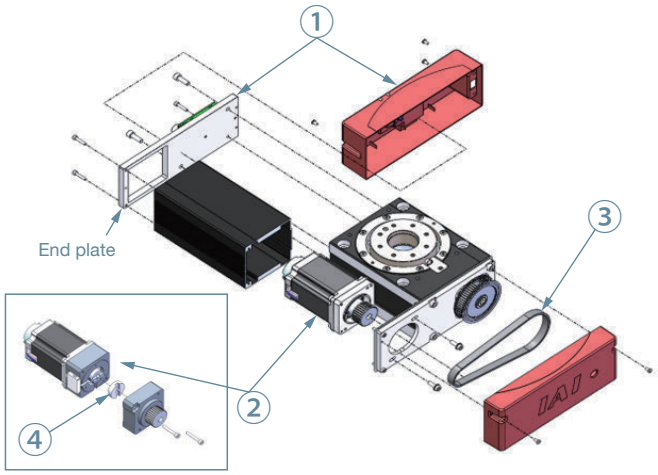
RTC9



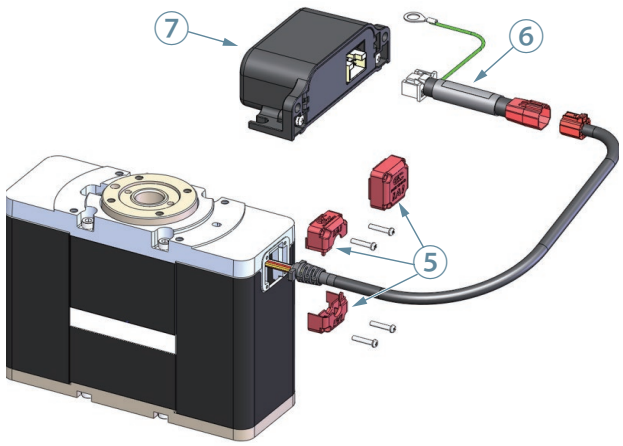
RTC12



RTC18



RTB4



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

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

①-1 Controller cover assembly

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

①-2 Controller cover assembly for dual power supply (optional model: TMD2)

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

①-3 Controller cover assembly for dual power supply of RCON-EC connection specification (optional model: ACR)

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

② Motor unit

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

*If the motor unit with a brake needs to be replaced, please contact our sales representative.

③ Timing belt

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

*If the timing belt needs to be replaced for a specification with a brake, please contact our sales representative.

④ Coupling spacer

Type	Model
RTC18	CPG-EC-SR7

⑤ Actuator cable mounting box

Type	Cable exit direction	Model
RTB4	Back	EC-CASBR-RTB4
	Side	EC-CASBS-RTB4

*The included screws are “cross recessed pan head machine screw M2 x 10”.

⑥ Interface box conversion cable

Type	Model
RTB4	CB-CVN-BJ002

⑦-1 Interface box

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

⑦-2 Interface box for dual power supply (optional model: TMD2)

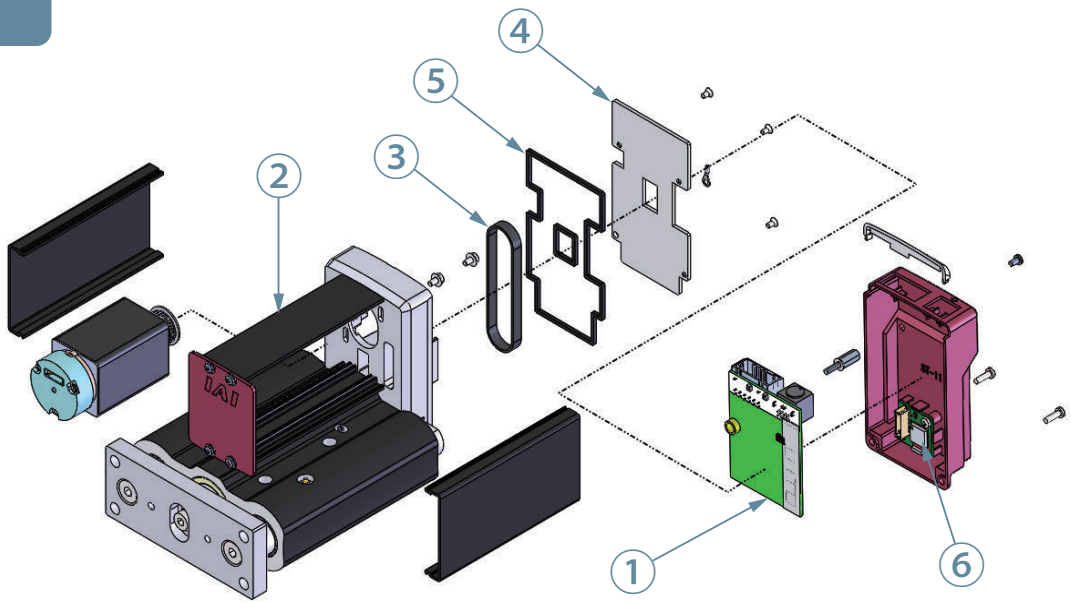
Type	Wireless	I/O	Model
RTB4	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑦-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

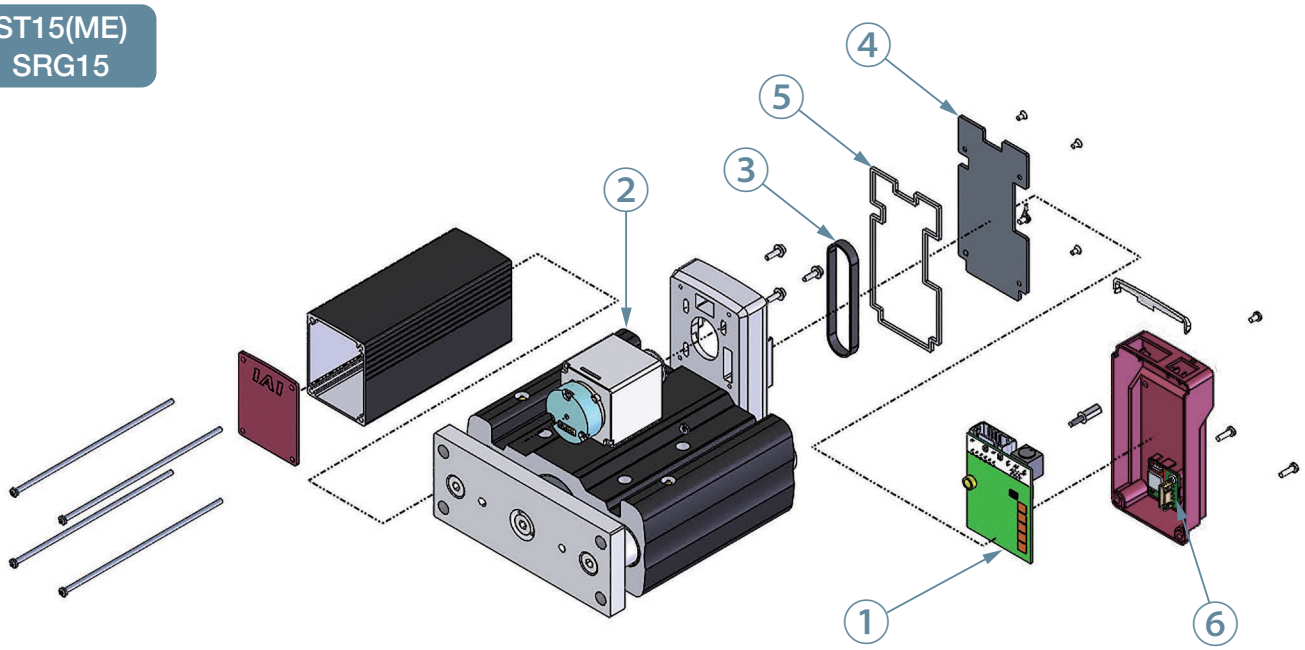
Type	Wireless	I/O	Model
RTB4	WL WL2	NPN _REC	ECW-CVNWL-CB-ACR

Illustrations of Maintenance Parts: EC

ST11
SRG11



ST15(ME)
SRG15



① Controller board
② Motor unit
③ Timing belt
④ Side-mounted cover
⑤ Gasket
⑥ Controller cover (End cover assembly)

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

ST11/ST15 SRG11/SRG15

①-1 Controller board*

Type	I/O	Wireless	Model
ST11/SRG11 ST15/SRG15	NPN	No/WL	MB-EC-ST15
		WL2	MB-EC-ST15-WL2
	PNP	No/WL	MB-EC-ST15-P
		WL2	MB-EC-ST15-P-WL2

①-2 Controller board for dual power supply*

Type	I/O	Wireless	Model
ST11/SRG11 ST15/SRG15	NPN	No/WL	MB-EC-ST15-TMD2
		WL2	MB-EC-ST15-TMD2-WL2
	PNP	No/WL	MB-EC-ST15-P-TMD2
		WL2	MB-EC-ST15-P-TMD2-WL2

①-3 Controller board for dual power supply for RCON-EC connection specification (optional model: ACR)*

Type	I/O	Wireless	Model
ST11/SRG11 ST15/SRG15	NPN_ REC	No/WL	MB-EC-ST15-ACR
		WL2	MB-EC-ST15-ACR-WL2

*Wireless communication circuit board is not included.

② Motor unit

Type	Encoder	Brake	Model
ST11/ SRG11	Incremental	No	EC-MUST11
		Yes	EC-MUST11-B
	Battery-less absolute	No	EC-MUST11-WA
		Yes	EC-MUST11-WA-B
ST15/ SRG15	Incremental	No	EC-MUST15
		Yes	EC-MUST15-B
	Battery-less absolute	No	EC-MUST15-WA
		Yes	EC-MUST15-WA-B

③ Timing belt

Type	Model
ST11/SRG11 ST15/SRG15	TB-EC-ST15

④ Side-mounted cover

Type	Model
ST11/SRG11	PT-EC-ST11
ST15/SRG15	PT-EC-ST15

⑤ Gasket

Type	Model
ST11/SRG11	ECST-GK-ST11
ST15/SRG15	ECST-GK-ST15

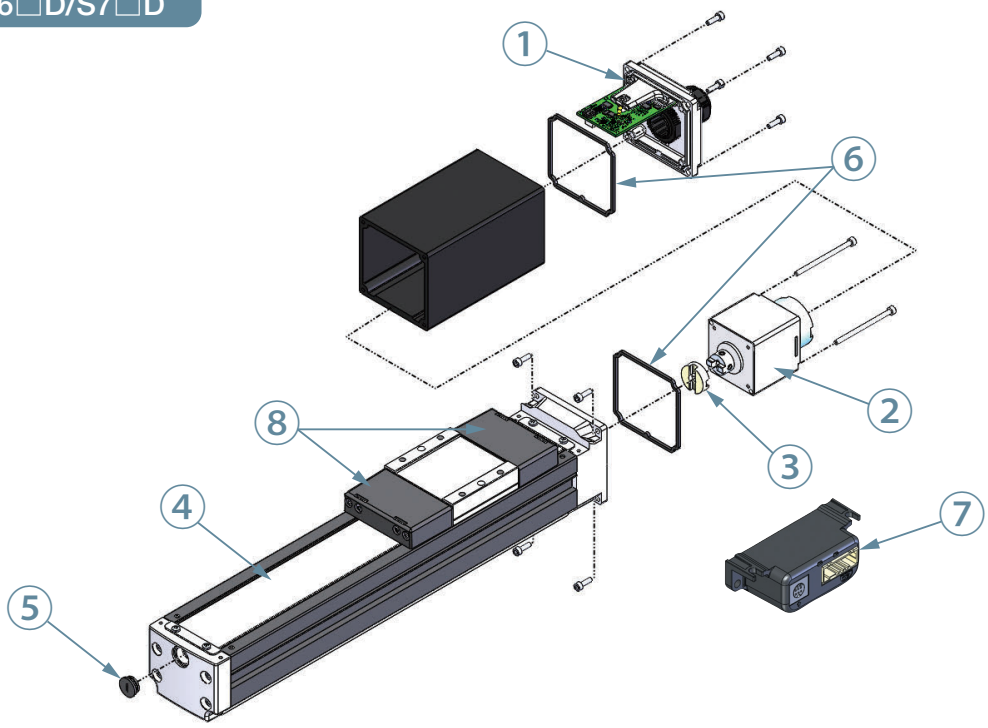
⑥ Controller cover (End cover assembly)

Type	Model
ST11/SRG11	EWB-EC-ST11
ST15/SRG15	EWB-EC-ST15

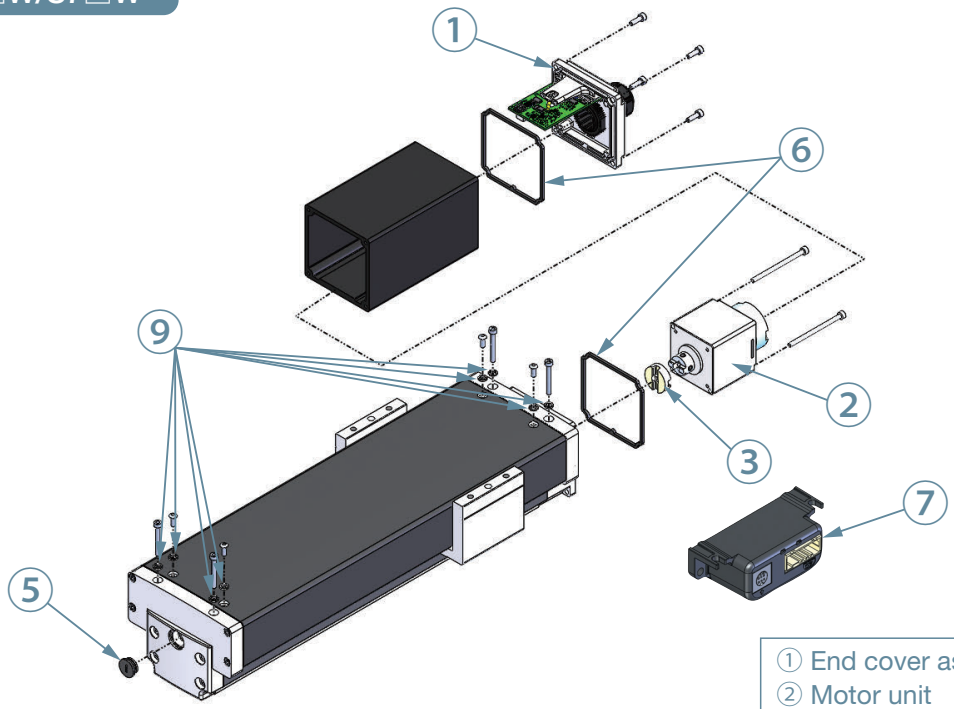
(Note) Wireless communication circuit board cable is included. For non-wireless specifications, please contact our sales representative.

Illustrations of Maintenance Parts: EC

S6□D/S7□D



S6□W/S7□W



① End cover assembly
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ Cap
⑥ Gasket (2-piece set)
⑦ Interface box
⑧ Slider cover assembly (2-piece set)
⑨ Seal washer

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

S6□D/S7□D
S6□W/S7□W

①-1 End cover assembly (same for WL specification)*

Type	Actuator cable length	Model
S6□D S6□W	2m (standard)	EWB-ECW-R6
	5m (AC5 option)	EWB-ECW-R6-AC5
S7□D S7□W	2m (standard)	EWB-ECW-R7
	5m (AC5 option)	EWB-ECW-R7-AC5

①-2 End cover assembly (Wireless axis operation specification WL2)*

Type	Actuator cable length	Model
S6□D S6□W	2m (standard)	EWB-ECW-R6-WL2
	5m (AC5 option)	EWB-ECW-R6-AC5-WL2
S7□D S7□W	2m (standard)	EWB-ECW-R7-WL2
	5m (AC5 option)	EWB-ECW-R7-AC5-WL2

*Wireless communication circuit board is not included.
ACR/TMD2 specifications are also common.

② Motor unit

Type	Encoder	Brake	Model
S6□D S6□W	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
S7□D S7□W	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B

⑦-1 Interface box

Type	Wireless	I/O	Model
S6□D S6□W S7□D S7□W	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL/WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑦-2 Interface box for dual power supply

Type	Wireless	I/O	Model
S6□D S6□W S7□D S7□W	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL/WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑦-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

Type	Wireless	I/O	Model
S6□D S6□W S7□D S7□W	No	NPN_ REC	ECW-CVN-CB-ACR
	WL/WL2		ECW-CVNWL-CB-ACR

③ Coupling spacer

Type	Model
S6□D S6□W	CPG-EC-SR6
S7□D S7□W	CPG-EC-SR7

④ Stainless steel sheet

Type	Model
S6□D	ST-EC-S6W-○○○
S7□D	ST-EC-S7W-○○○

* ○○○ indicates the stroke

⑤ Cap

Type	Model
S6□D S6□W S7□D S7□W	RCP5W-CS-RA

⑥ Gasket (2-piece set)

Type	Model
S6□D S6□W	ECW-GK-R6
S7□D S7□W	ECW-GK-R7

⑧ Slider cover assembly (2-piece set)

Type	Model
S6□D	SC-ECW-S6
S7□D	SC-ECW-S7

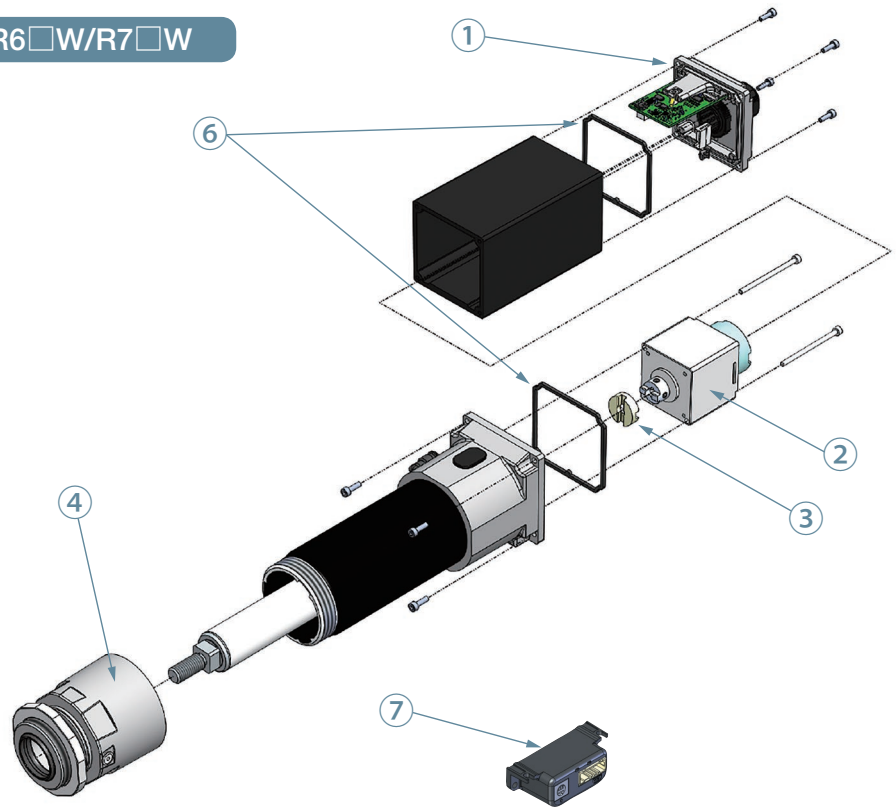
⑨ Seal washer

Type	Model
S6□W S7□W	RCP6W-SLW-RA4

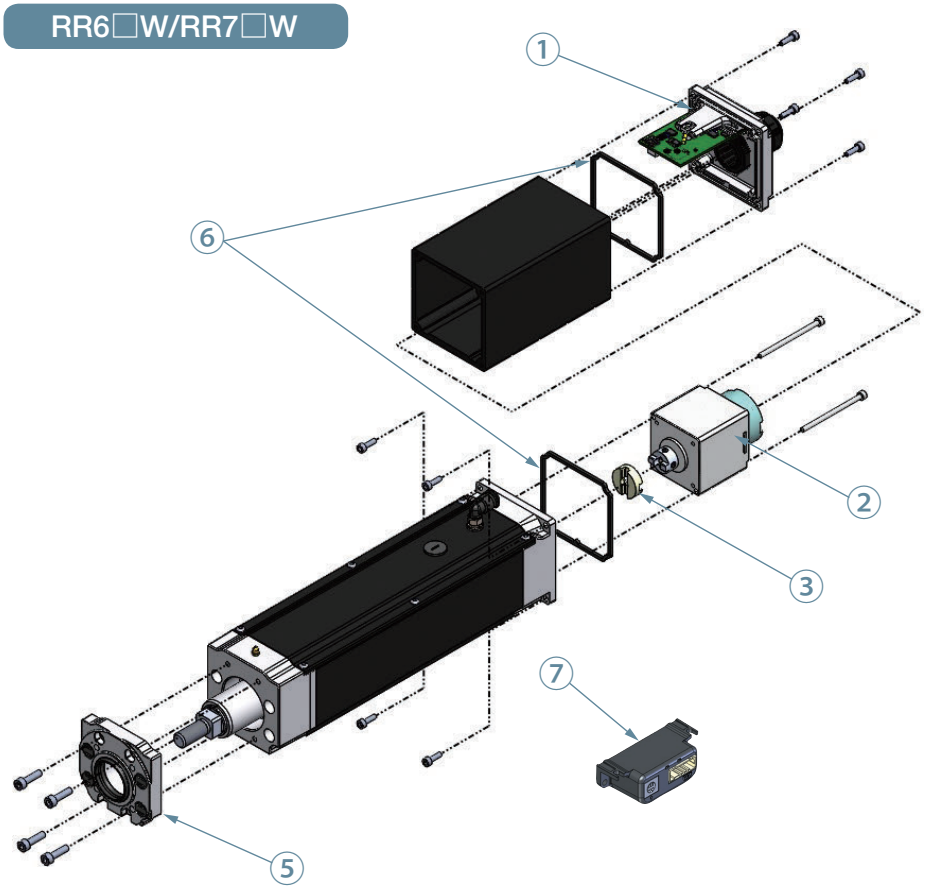
*The above model is for one unit.
Order eight sets for one axis.

Illustrations of Maintenance Parts: EC

R6□W/R7□W



RR6□W/RR7□W



① End cover assembly
② Motor unit
③ Coupling spacer
④ Front bracket assembly
⑤ Scraper case assembly
⑥ Gasket (2-piece set)
⑦ Interface box

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

R6□W/R7□W/ RR6□W/RR7□W

①-1 End cover assembly (same for WL specification)*

Type	Actuator cable length		Seal part	Model
R6□W RR6□W	Standard (2m)		Standard	EWB-ECW-R6
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-SLF
	5m (option: AC5)		Standard	EWB-ECW-R6-AC5
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-AC5-SLF
	Fluororubber Covered cable	2m (option: ACF2)	Fluororubber seal specification (option: ACF2)	EWB-ECW-R6-ACF2
		5m (option: ACF5)	Fluororubber seal specification (option: ACF5)	EWB-ECW-R6-ACF5
R7□W RR7□W	Standard (2m)		Standard	EWB-ECW-R7
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-SLF
	5m (option: AC5)		Standard	EWB-ECW-R7-AC5
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-AC5-SLF
	Fluororubber Covered cable	2m (option: ACF2)	Fluororubber seal specification (option: ACF2)	EWB-ECW-R7-ACF2
		5m (option: ACF5)	Fluororubber seal specification (option: ACF5)	EWB-ECW-R7-ACF5

①-2 End cover assembly (Wireless axis operation specification WL2)*

Type	Actuator cable length		Seal part	Model
R6□W RR6□W	Standard (2m)		Standard	EWB-ECW-R6-WL2
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-SLF-WL2
	5m (option: AC5)		Standard	EWB-ECW-R6-AC5-WL2
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-AC5-SLF-WL2
	Fluororubber Covered cable	2m (option: ACF2)	Fluororubber seal specification (option: ACF2)	EWB-ECW-R6-ACF2-WL2
		5m (option: ACF5)	Fluororubber seal specification (option: ACF5)	EWB-ECW-R6-ACF5-WL2
R7□W RR7□W	Standard (2m)		Standard	EWB-ECW-R7-WL2
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-SLF-WL2
	5m (option: AC5)		Standard	EWB-ECW-R7-AC5-WL2
			Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-AC5-SLF-WL2
	Fluororubber Covered cable	2m (option: ACF2)	Fluororubber seal specification (option: ACF2)	EWB-ECW-R7-ACF2-WL2
		5m (option: ACF5)	Fluororubber seal specification (option: ACF5)	EWB-ECW-R7-ACF5-WL2

*Wireless communication circuit board is not included. ACR/TMD2 specifications are also common.

② Motor unit

Type	Encoder	Brake	Model
R6□W RR6□W	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
R7□W RR7□W	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
R6□W/RR6□W	CPG-EC-SR6
R7□W/RR7□W	CPG-EC-SR7

④ Front bracket assembly

Type	Option	Model
R6□W	No	ECW-FBA-R6
	SLF, ACF2, ACF5	ECW-FBA-R6-SLF
R7□W	No	ECW-FBA-R7
	SLF, ACF2, ACF5	ECW-FBA-R7-SLF

⑤ Scraper case assembly

Type	Option	Model
RR6□W	No	ECW-FBA-RR6
	SLF, ACF2, ACF5	ECW-FBA-RR6-SLF
RR7□W	No	ECW-FBA-RR7
	SLF, ACF2, ACF5	ECW-FBA-RR7-SLF

⑥ Gasket (2-piece set)

Type	Option	Model
R6□W RR6□W	No	ECW-GK-R6
	SLF, ACF2, ACF5	ECW-GK-R6-SLF
R7□W RR7□W	No	ECW-GK-R7
	SLF, ACF2, ACF5	ECW-GK-R7-SLF

⑦-1 Interface box

Type	Wireless	I/O	Model
R6□W R7□W RR6□W RR7□W	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL/WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑦-2 Interface box for dual power supply

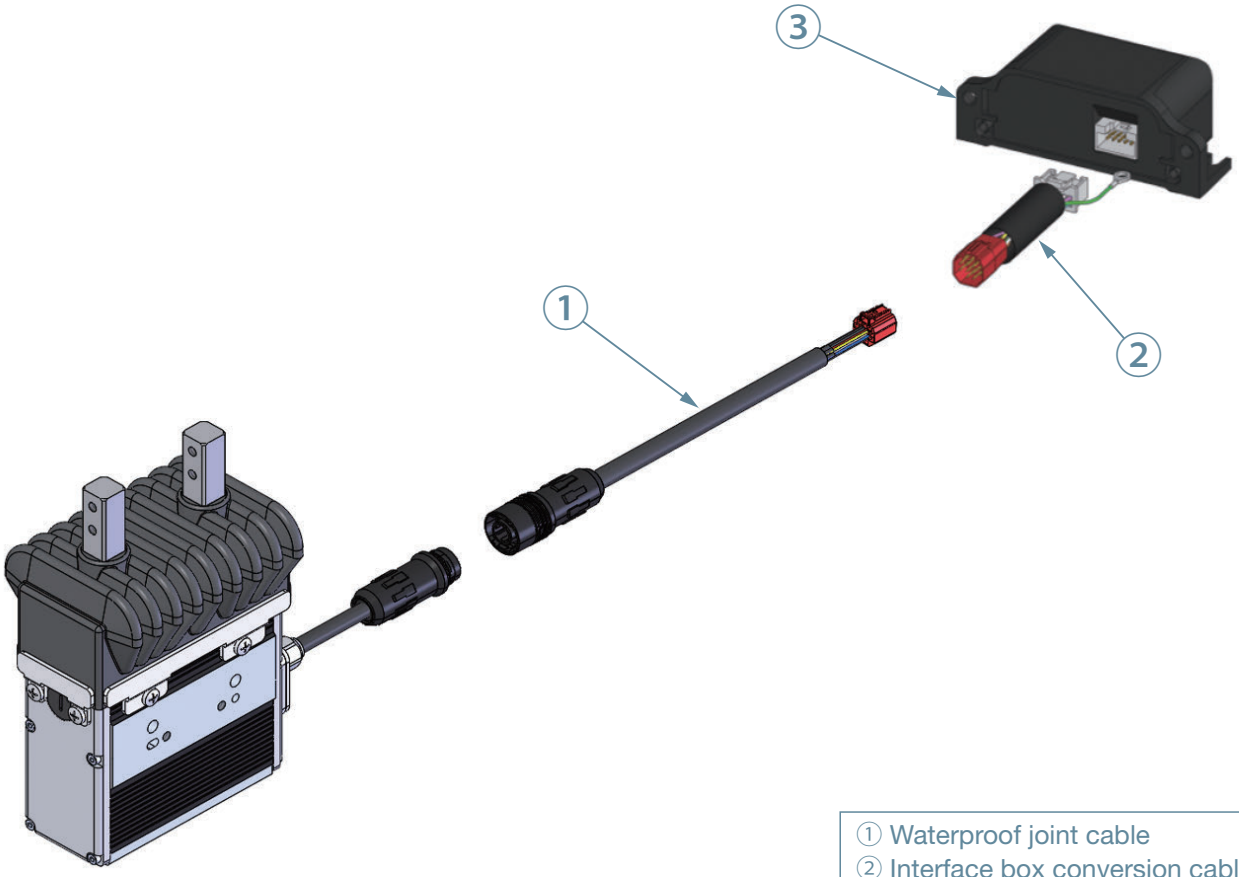
Type	Wireless	I/O	Model
R6□W R7□W RR6□W RR7□W	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL/WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑦-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

Type	Wireless	I/O	Model (tentative)
R6□W R7□W RR6□W RR7□W	No	NPN_ REC	ECW-CVN-CB-ACR
	WL/WL2		ECW-CVNWL-CB-ACR

Illustrations of Maintenance Parts: EC

GRBP8MW/GRBP10MW/GRBP13□W



① Waterproof joint cable
② Interface box conversion cable
③ Interface box

List of Maintenance Parts: EC

Maintenance video is available on our website.
intelligentactuator.com/maintenance/

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.
(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

GRBP8MW/GRBP10MW/GRBP13□W

① Waterproof joint cable (Used only when JYW option is selected)

Type	Model
GRBP8MW GRBP10MW GRBP13□W	CB-EC-PWSIOJ○○○-WC

* ○○○ is the cable length
Up to 10m (up to 9m through the interface box)

② Interface box conversion cable

Type	Model
GRBP8MW GRBP10MW GRBP13□W	CB-CVN-BJ002

③-1 Interface box

Type	Wireless	I/O	Model
GRBP8MW GRBP10MW GRBP13□W	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

③-2 Interface box for dual power supply

Type	Wireless	I/O	Model
GRBP8MW GRBP10MW GRBP13□W	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

③-3 Interface box for dual power supply of RCON-EC connection specifications (optional model: ACR)

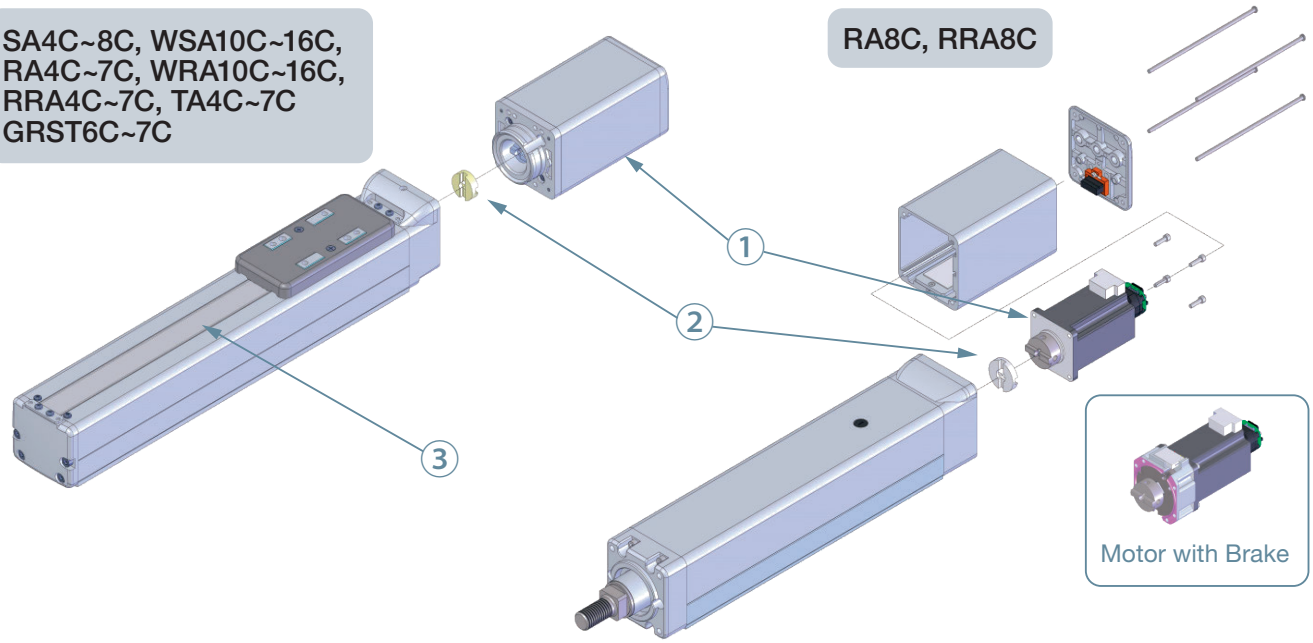
Type	Wireless	I/O	Model
GRBP8MW GRBP10MW GRBP13□W	WL WL2	NPN _REC	ECW-CVNWL-CB-ACR

Illustrations of Maintenance Parts: RCP6(CR)

Straight Motor Type

SA4C~8C, WSA10C~16C,
RA4C~7C, WRA10C~16C,
RRA4C~7C, TA4C~7C
GRST6C~7C

RA8C, RRA8C

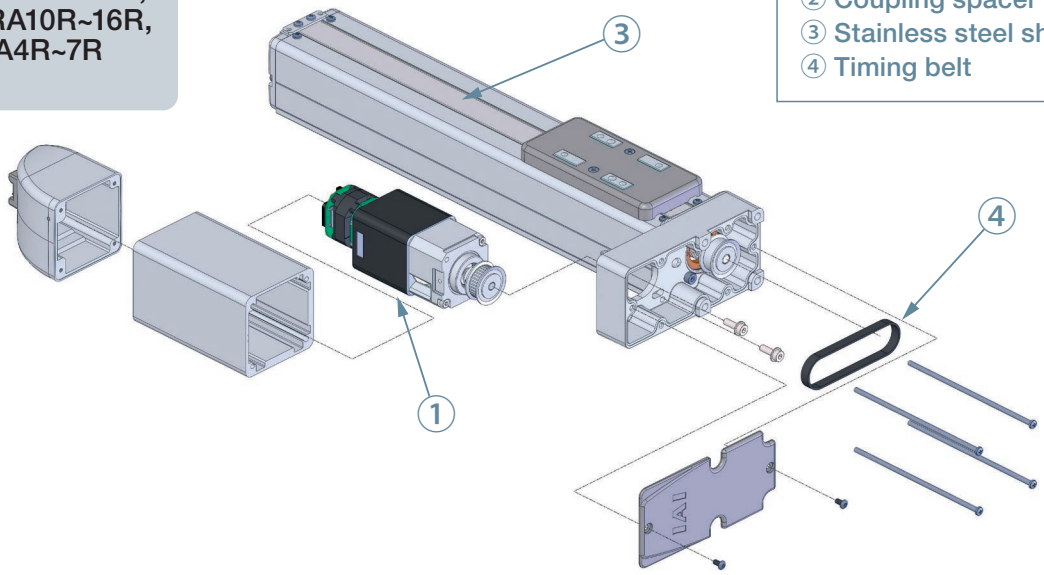


* If an option for cable exit direction is selected, refer to the product catalog for the direction and dimensions.

Side-mounted Motor Type

SA4R~8R, WSA10R~16R,
RA4R~8R, WRA10R~16R,
RRA4R~8R, TA4R~7R
GRST6R~7R

① Motor unit
② Coupling spacer
③ Stainless steel sheet
④ Timing belt



* If an option for cable exit direction is selected, refer to the product catalog for the direction and dimensions.

List of Maintenance Parts: RCP6(CR)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part name	SA4C	SA6C/GRST6C	SA7C/GRST7C	SA8C
①	Motor unit *1	M1	M2	M3	M4
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-M
③	Stainless steel sheet *2	ST-6A4(D)-(stroke)	ST-6A6(D)-(stroke)	ST-6A7(D)-(stroke)	ST-6A8(D)-(stroke)

No.	Part name	SA4R	SA6R/GRST6R	SA7R/GRST7R	SA8R
①	Motor unit *1	M5	M6	M7	M8
③	Stainless steel sheet *2	ST-6A4(D)-(stroke)	ST-6A6(D)-(stroke)	ST-6A7(D)-(stroke)	ST-6A8(D)-(stroke)
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R	TB-RCP6-SA8R

No.	Part name	WSA10C	WSA12C	WSA14C	WSA16C
①	Motor unit *1	M9	M10	M11	M12
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L
③	Stainless steel sheet *2	ST-6WA10-(stroke)	ST-6WA12-(stroke)	ST-6WA14-(stroke)	ST-6WA16-(stroke)

No.	Part name	WSA10R	WSA12R	WSA14R	WSA16R
①	Motor unit *1	M5	M6	M7	M19
③	Stainless steel sheet *2	ST-6WA10-(stroke)	ST-6WA12-(stroke)	ST-6WA14-(stroke)	ST-6WA16-(stroke)
④	Timing belt	TB-RCP6-WSRA10R	TB-RCP6-WSRA12R	TB-RCP6-WSRA14R	TB-RCP6-WSRA16R

No.	Part name	RA4C	RA6C	RA7C	RA8C
①	Motor unit *1	M1	M2	M13	M14
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L

No.	Part name	RA4R	RA6R	RA7R	RA8R
①	Motor unit *1	M5	M6	M15	M16
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R	TB-RCP6-RA8R

No.	Part name	WRA10C	WRA12C	WRA14C	WRA16C
①	Motor unit *1	M9	M10	M17	M18
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L

No.	Part name	WRA10R	WRA12R	WRA14R	WRA16R
①	Motor unit *1	M5	M6	M15	M16
④	Timing belt	TB-RCP6-WSRA10R	TB-RCP6-WSRA12R	TB-RCP6-WSRA14R	TB-RCP6-WSRA16R

No.	Part name	RRA4C	RRA6C	RRA7C	RRA8C
①	Motor unit *1	M1	M2	M13	M14
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L

No.	Part name	RRA4R	RRA6R	RRA7R	RRA8R
①	Motor unit *1	M5	M6	M15	M16
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R	TB-RCP6-RA8R

No.	Part name	TA4C	TA6C	TA7C
①	Motor unit *1	M1	M2	M3
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M

No.	Part name	TA4R	TA6R	TA7R
①	Motor unit *1	M5	M6	M7
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R

(Note) The above parts are common with the clean specification (RCP6CR).

*1 Motor unit model

Model name composition: Base model number–(Choice of brake option*)–(Cable exit direction*)–(Others)
Please choose options in the parentheses. Components marked with asterisk are chosen in setting options.

Type No.	Base Model Number	Brake	When Cable Exit Direction chosen		Note
			Cable Exit Direction		
			Straight	Side-mounted	
M1	RCP6-MUSRTA4C	Blank (without brake) B (with brake)	CJT/CJR CJL/CJB	–	Blank (Straight/with coupling) PU (Side-mounted/with pulley)
M2	RCP6-MUSRTA6C				
M3	RCP6-MUSTA7C				
M4	RCP6-MUSA8C				
M5	RCP6-MUSRTA4WSRA10R *3				
M6	RCP6-MUSRTA6WSRA12R *3				
M7	RCP6-MUSTA7WSA14R *3				
M8	RCP6-MUSA8R *3				
M9	RCP6-MUWSRA10C				
M10	RCP6-MUWSRA12C				
M11	RCP6-MUWSA14C				
M12	RCP6-MUWSA16C				
M13	RCP6-MURA7C				
M14	RCP6-MURA8C *3				
M15	RCP6-MURA7WRA14R *3				
M16	RCP6-MURA8WRA16R *3				
M17	RCP6-MUWRA14C				
M18	RCP6-MUWRA16C				
M19	RCP6-MUWSA16R *3				

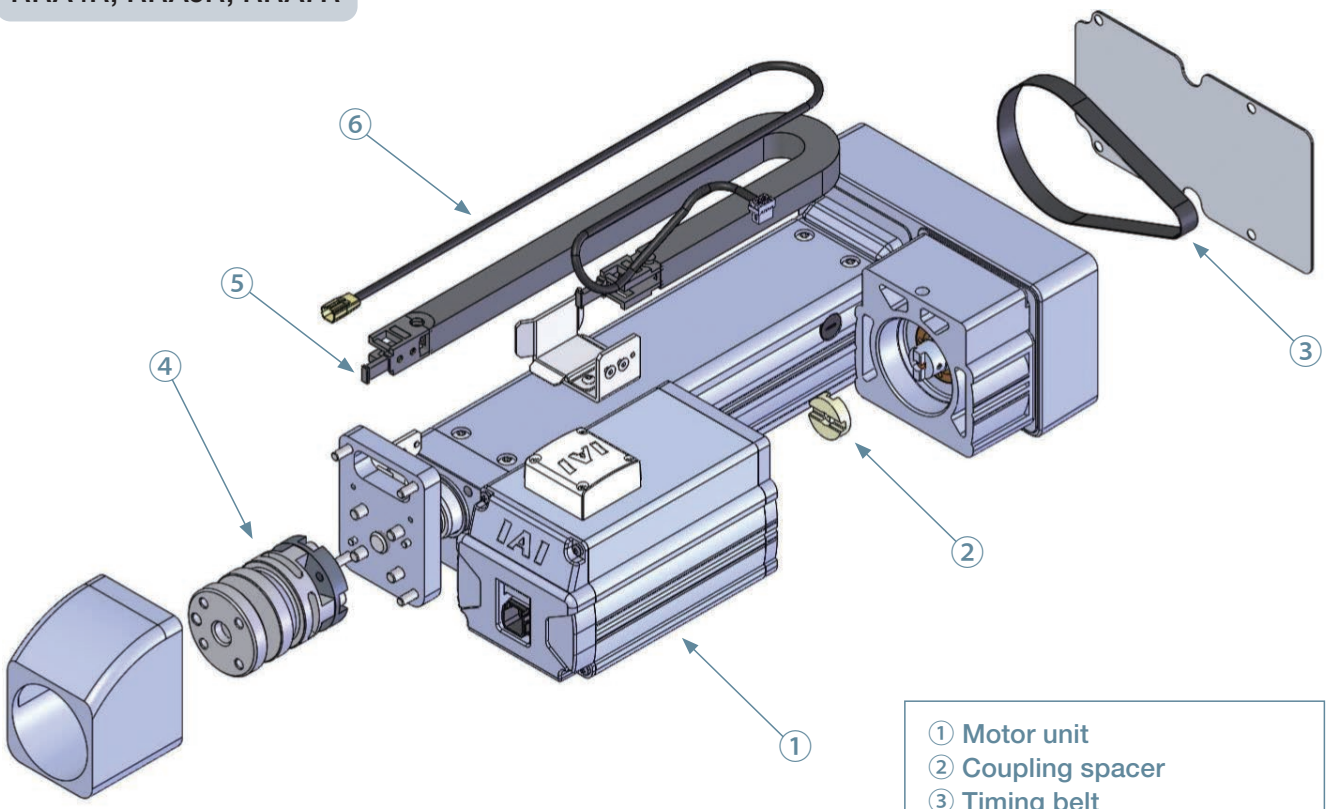
*2 Stroke size:
Please apply the same stroke number/size from your actuator. For double slider specifications and RCP6-GRST6□/GRST7□, add "D".

*3 Motor unit:
Type is not indicated because of motor/encoder only.

Illustrations of Maintenance Parts: RCP6(Pulse press)

Load Cell Mounted Type

RRA4R, RRA6R, RRA7R



① Motor unit
② Coupling spacer
③ Timing belt
④ Load cell unit
⑤ Cable carrier assembly
⑥ Load cell cable assembly

*If an option for cable exit direction is selected, refer to the product catalog for the direction and dimensions.

List of Maintenance Parts: RCP6(Pulse press)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

① Motor unit

Type	Side-mounted Direction	Cable Exit Direction	Model	
			Without Brake	With Brake
RRA4R	Common in right-left	Not specified	RCP6-MUPP4R	RCP6-MUPP4R-B
	Left side	Bottom side	RCP6-MUPP4R-CJB-ML	RCP6-MUPP4R-B-CJB-ML
		Outer side	RCP6-MUPP4R-CJO-ML	RCP6-MUPP4R-B-CJO-ML
		Upper side	RCP6-MUPP4R-CJT-ML	RCP6-MUPP4R-B-CJT-ML
	Right side	Bottom side	RCP6-MUPP4R-CJB-MR	RCP6-MUPP4R-B-CJB-MR
		Outer side	RCP6-MUPP4R-CJO-MR	RCP6-MUPP4R-B-CJO-MR
		Upper side	RCP6-MUPP4R-CJT-MR	RCP6-MUPP4R-B-CJT-MR
RRA6R	Left side	Not specified	RCP6-MUPP6R-ML	RCP6-MUPP6R-B-ML
		Bottom side	RCP6-MUPP6R-CJB-ML	RCP6-MUPP6R-B-CJB-ML
		Outer side	RCP6-MUPP6R-CJO-ML	RCP6-MUPP6R-B-CJO-ML
		Upper side	RCP6-MUPP6R-CJT-ML	RCP6-MUPP6R-B-CJT-ML
	Right side	Not specified	RCP6-MUPP6R-MR	RCP6-MUPP6R-B-MR
		Bottom side	RCP6-MUPP6R-CJB-MR	RCP6-MUPP6R-B-CJB-MR
		Outer side	RCP6-MUPP6R-CJO-MR	RCP6-MUPP6R-B-CJO-MR
		Upper side	RCP6-MUPP6R-CJT-MR	RCP6-MUPP6R-B-CJT-MR
RRA7R	Left side	Not specified	RCP6-MUPP7R-ML	RCP6-MUPP7R-B-ML
		Bottom side	RCP6-MUPP7R-CJB-ML	RCP6-MUPP7R-B-CJB-ML
		Outer side	RCP6-MUPP7R-CJO-ML	RCP6-MUPP7R-B-CJO-ML
		Upper side	RCP6-MUPP7R-CJT-ML	RCP6-MUPP7R-B-CJT-ML
	Right side	Not specified	RCP6-MUPP7R-MR	RCP6-MUPP7R-B-MR
		Bottom side	RCP6-MUPP7R-CJB-MR	RCP6-MUPP7R-B-CJB-MR
		Outer side	RCP6-MUPP7R-CJO-MR	RCP6-MUPP7R-B-CJO-MR
		Upper side	RCP6-MUPP7R-CJT-MR	RCP6-MUPP7R-B-CJT-MR

② Coupling spacer

Type	Model
RRA4R	CPG-RCP6-S
RRA6R	
RRA7R	CPG-RCP6-M

③ Timing belt

Type	Model
RRA4R	TB-RCS3-RA4R
RRA6R	TB-RCS3-RA6R
RRA7R	TB-RCS3-RA7R

④ Load cell unit

Type	Model
RRA4R	K-TIAI/600N1-1-PT
RRA6R	
RRA7R	K-TIAI/2KN1-1-PT

(Note) Sold only for the purpose of replacing the load cell unit.

⑤ Cable carrier assembly

Type	Stroke	Model
RRA4R	110mm	CVR-P6PP-16
	160mm	CVR-P6PP-18
	210mm	CVR-P6PP-23
	260mm	CVR-P6PP-28
	310mm	CVR-P6PP-31
RRA6R	115mm	CVR-P6PP-18
	165mm	
	215mm	CVR-P6PP-23
	265mm	CVR-P6PP-28
	315mm	CVR-P6PP-33
RRA7R	120mm	CVR-P6PP-18
	170mm	CVR-P6PP-23
	220mm	
	270mm	CVR-P6PP-28
	320mm	CVR-P6PP-33

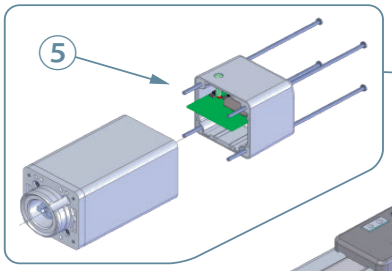
⑥ Load cell cable assembly

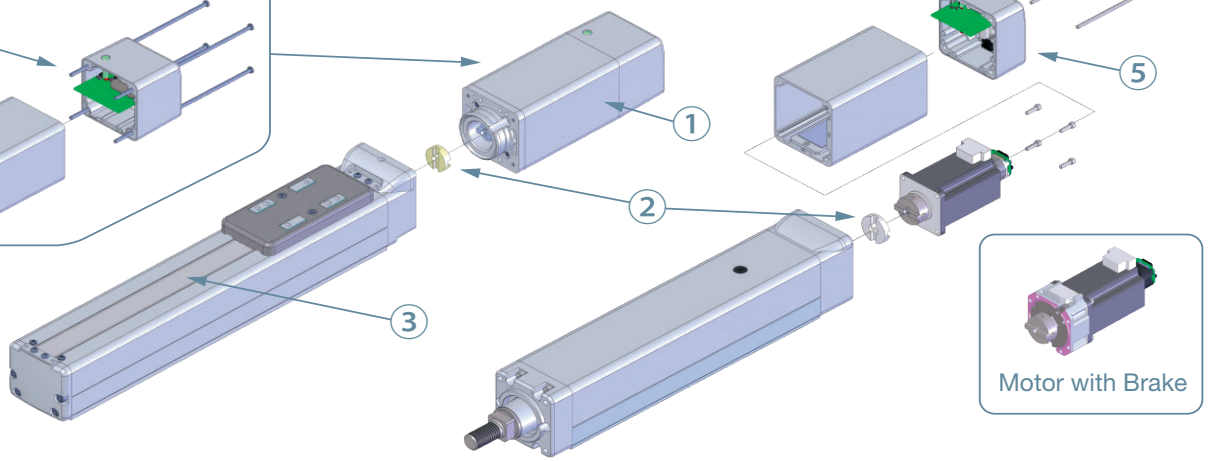
Type	Stroke	Model
RRA4R	110mm	CB-P6PP-LDC006
	160mm	CB-P6PP-LDC007
	210mm	CB-P6PP-LDC008
	260mm	CB-P6PP-LDC009
	310mm	CB-P6PP-LDC010
RRA6R	115mm	CB-P6PP-LDC006
	165mm	CB-P6PP-LDC007
	215mm	CB-P6PP-LDC008
	265mm	CB-P6PP-LDC009
	315mm	CB-P6PP-LDC010
RRA7R	120mm	CB-P6PP-LDC006
	170mm	CB-P6PP-LDC008
	220mm	
	270mm	CB-P6PP-LDC009
	320mm	CB-P6PP-LDC010

Illustrations of Maintenance Parts: RCP6S(CR)

Straight Motor Type

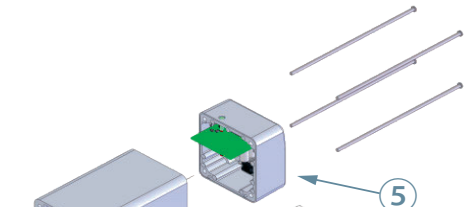
SA4C~8C, WSA10C~16C,
RA4C~7C, WRA10C~16C,
RRA4C~7C, TA4C~7C
GRST6C~7C





① Motor unit (including ⑤ End cover assembly)
② Coupling spacer
③ Stainless steel sheet
④ Timing belt
⑤ End cover assembly (including Controller circuit board)

RA8C, RRA8C

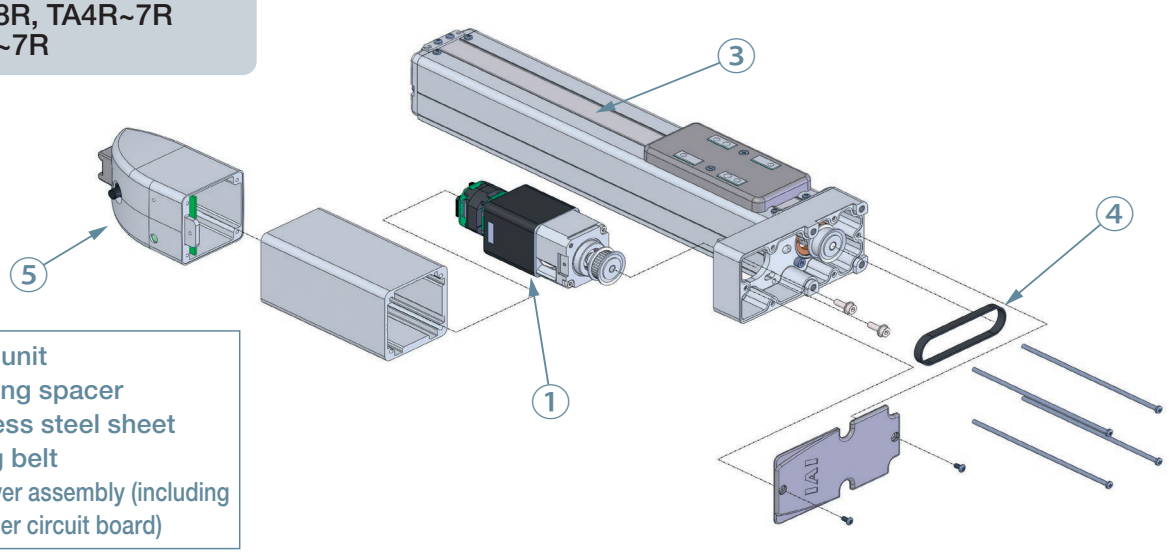


① Motor unit
② Coupling spacer
③ Stainless steel sheet
④ Timing belt
⑤ End cover assembly (including Controller circuit board)

* If option for cable exit direction is selected, refer to the product catalog for the direction and dimensions.

Side-mounted Motor Type

SA4R~8R, WSA10R~16R,
RA4R~8R, WRA10R~16R,
RRA4R~8R, TA4R~7R
GRST6R~7R



① Motor unit
② Coupling spacer
③ Stainless steel sheet
④ Timing belt
⑤ End cover assembly (including Controller circuit board)

* If an option for cable exit direction is selected, refer to the product catalog for the direction and dimensions.

List of Maintenance Parts: RCP6S(CR)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part name	SA4C	SA6C/GRST6C	SA7C/GRST7C	SA8C
①	Motor unit *1	M1	M2	M3	M4
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L
③	Stainless steel sheet *2	ST-6A4(D)-(stroke)	ST-6A6(D)-(stroke)	ST-6A7(D)-(stroke)	ST-6A8(D)-(stroke)
⑤	End cover assembly *4	EWB-RCP6S-SRTA4C(-CJ□)	EWB-RCP6S-SRTA6C(-CJ□)	EWB-RCP6S-SRTA7C(-CJ□)	EWB-RCP6S-SA8C(-CJ□)

No.	Part name	SA4R	SA6R//GRST6R	SA7R/GRST7R	SA8R
①	Motor unit *1	M5	M6	M7	M8
③	Stainless steel sheet *2	ST-6A4(D)-(stroke)	ST-6A6(D)-(stroke)	ST-6A7(D)-(stroke)	ST-6A8(D)-(stroke)
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R	TB-RCP6-SA8R
⑤	End cover assembly *4	EWB-RCP6S-SRTA4WSRA10R(-CJO)	EWB-RCP6S-SRTA6R(-CJO)	EWB-RCP6S-SRTA7R(-CJO)	EWB-RCP6S-SA8R(-CJO)

No.	Part name	WSA10C	WSA12C	WSA14C	WSA16C
①	Motor unit *1	M9	M10	M11	M12
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L
③	Stainless steel sheet *2	ST-6WA10-(stroke)	ST-6WA12-(stroke)	ST-6WA14-(stroke)	ST-6WA16-(stroke)
⑤	End cover assembly *4	EWB-RCP6S-WSRA10C(-CJ□)	EWB-RCP6S-WSRA12C(-CJ□)	EWB-RCP6S-WSRA14C(-CJ□)	EWB-RCP6S-WSRA16C(-CJ□)

No.	Part name	WSA10R	WSA12R	WSA14R	WSA16R
①	Motor unit *1	M5	M6	M7	M19
③	Stainless steel sheet *2	ST-6WA10-(stroke)	ST-6WA12-(stroke)	ST-6WA14-(stroke)	ST-6WA16-(stroke)
④	Timing belt	TB-RCP6-WSRA10R	TB-RCP6-WSRA12R	TB-RCP6-WSRA14R	TB-RCP6-WSRA16R
⑤	End cover assembly *4	EWB-RCP6S-SRTA4WSRA10R(-CJO)	EWB-RCP6S-WSRA12R(-CJO)	EWB-RCP6S-WSRA14R(-CJO)	EWB-RCP6S-WSRA16R(-CJO)

No.	Part name	RA4C	RA6C	RA7C	RA8C
①	Motor unit *1	M1	M2	M13	M14
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L
⑤	End cover assembly *4	EWB-RCP6S-SRTA4C(-CJ□)	EWB-RCP6S-SRTA6C(-CJ□)	EWB-RCP6S-SRTA7C(-CJ□)	EWB-RCP6S-RA8C(-CJ□)

No.	Part name	RA4R	RA6R	RA7R	RA8R
①	Motor unit *1	M5	M6	M15	M16
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R	TB-RCP6-RA8R
⑤	End cover assembly *4	EWB-RCP6S-SRTA4WSRA10R(-CJO)	EWB-RCP6S-RA6R(-CJO)	EWB-RCP6S-RA7R(-CJO)	EWB-RCP6S-RA8R(-CJO)

No.	Part name	WRA10C	WRA12C	WRA14C	WRA16C
①	Motor unit *1	M9	M10	M17	M18
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L
⑤	End cover assembly *4	EWB-RCP6S-WSRA10C(-CJ□)	EWB-RCP6S-WSRA12C(-CJ□)	EWB-RCP6S-WSRA14C(-CJ□)	EWB-RCP6S-WSRA16C(-CJ□)

No.	Part name	WRA10R	WRA12R	WRA14R	WRA16R
①	Motor unit *1	M5	M6	M15	M16
④	Timing belt	TB-RCP6-WSRA10R	TB-RCP6-WSRA12R	TB-RCP6-WSRA14R	TB-RCP6-WSRA16R
⑤	End cover assembly *4	EWB-RCP6S-SRTA4WSRA10R(-CJO)	EWB-RCP6S-WSRA12R(-CJO)	EWB-RCP6S-WSRA14R(-CJO)	EWB-RCP6S-WSRA16R(-CJO)

No.	Part name	RRA4C	RRA6C	RRA7C	RRA8C
①	Motor unit *1	M1	M2	M13	M14
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M	CPG-RCP6-L
⑤	End cover assembly *4	EWB-RCP6S-SRTA4C(-CJ□)	EWB-RCP6S-SRTA6C(-CJ□)	EWB-RCP6S-SRTA7C(-CJ□)	EWB-RCP6S-RA8C(-CJ□)

No.	Part name	RRA4R	RRA6R	RRA7R	RRA8R
①	Motor unit *1	M5	M6	M15	M16
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R	TB-RCP6-RA8R
⑤	End cover assembly *4	EWB-RCP6S-SRTA4WSRA10R(-CJO)	EWB-RCP6S-SRTA6R(-CJO)	EWB-RCP6S-SRTA7R(-CJO)	EWB-RCP6S-RA8R(-CJO)

No.	Part name	TA4C	TA6C	TA7C
①	Motor unit *1	M1	M2	M3
②	Coupling spacer	CPG-RCP6-S	CPG-RCP6-S	CPG-RCP6-M
⑤	End cover assembly *4	EWB-RCP6S-SRTA4C(-CJ□)	EWB-RCP6S-SRTA6C(-CJ□)	EWB-RCP6S-SRTA7C(-CJ□)

No.	Part name	TA4R	TA6R	TA7R
①	Motor unit *1	M5	M6	M7
④	Timing belt	TB-RCP6-STRA4R	TB-RCP6-STRA6R	TB-RCP6-STRA7R
⑤	End cover assembly *4	EWB-RCP6S-SRTA4WSRA10R(-CJO)	EWB-RCP6S-SRTA6R(-CJO)	EWB-RCP6S-SRTA7R(-CJO)

(Note) The above parts are common with the clean specification (RCP6SCR).

*1 Motor unit model

Model name composition: Base model number–(Choice of brake option*)–(Cable exit direction*)–(Others)
Please choose options in the parentheses. Components marked with asterisk are chosen in setting options.

Type No.	Base Model Number	Brake	When Cable Exit Direction chosen: Cable Exit Direction: Straight	When Cable Exit Direction chosen: Cable Exit Direction: Side-mounted	Note
M1	RCP6S-MUSRTA4C *4	Blank (without brake) B (with brake)	CJT/CJR CJL/CJB	–	Blank (Straight/with coupling) PU (Side-mounted/with pulley)
M2	RCP6S-MUSRTA6C *4				
M3	RCP6S-MUSTA7C *4				
M4	RCP6S-MUSA8C *4				
M5	RCP6-MUSRTA4WSRA10R *3				
M6	RCP6-MUSRTA6WSRA12R *3				
M7	RCP6-MUSTA7WSA14R *3				
M8	RCP6-MUSA8R *3				
M9	RCP6S-MUWSRA10C *4				
M10	RCP6S-MUWSRA12C *4				
M11	RCP6S-MUWSA14C *4				
M12	RCP6S-MUWSA16C *4				
M13	RCP6S-MURA7C *4				
M14	RCP6-MURA8C *3				
M15	RCP6-MURA7WRA14R *3				
M16	RCP6-MURA8WRA16R *3				
M17	RCP6S-MUWRA14C *4				
M18	RCP6S-MUWRA16C *4				
M19	RCP6-MUWSA16R *3				

*2 Stroke size:
Please apply the same stroke number/size from your actuator. For double slider specifications and RCP6S-GRST6□/GRST7□, add "D".

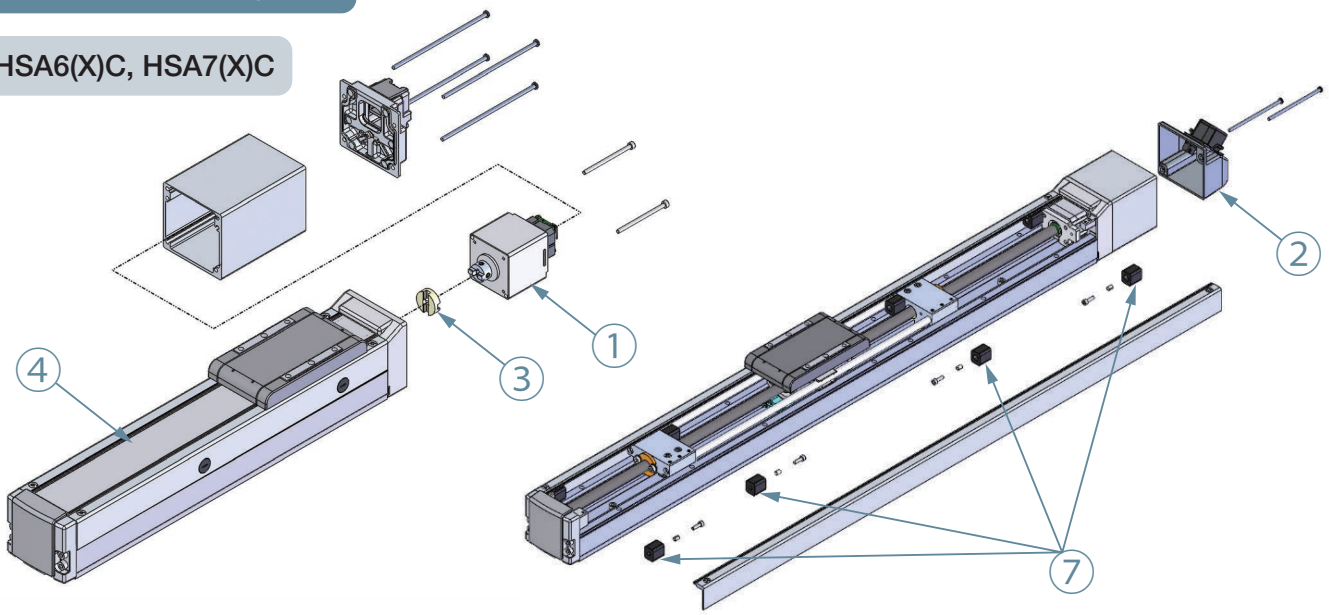
*3 Motor unit:
Type is not indicated because of motor/encoder only.

*4 When ordering and using maintenance parts including Controller Board, parameter setting for the connected actuator is necessary.

Illustrations of Maintenance Parts: RCP6(High-rigidity 4-row guide)

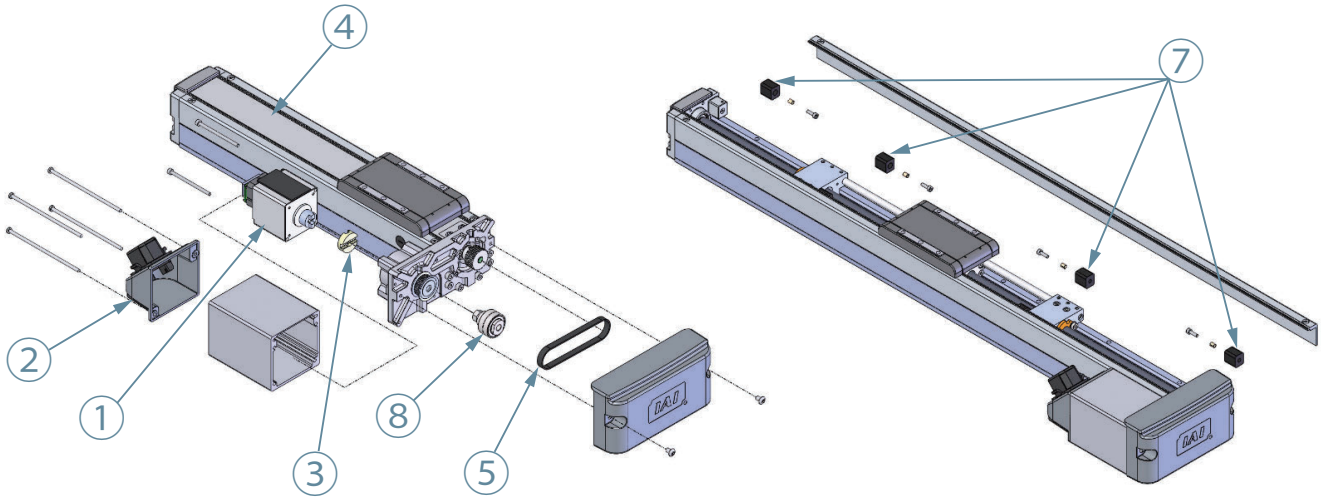
Coupled motor type

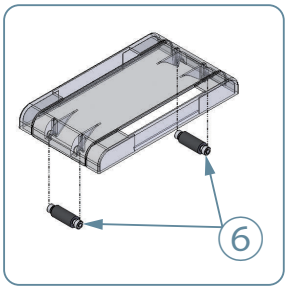
HSA6(X)C, HSA7(X)C



Side-mounted motor type

HSA6(X)R, HSA7(X)R





① Motor unit
② End cover assembly
③ Coupling spacer
④ Stainless steel sheet
⑤ Timing belt
⑥ Slider roller assembly
⑦ Intermediate support cushion
⑧ Idler assembly

List of Maintenance Parts: RCP6(High-rigidity 4-row guide)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

HSA6(X)C, HSA7(X)C, HSA6(X)R, HSA7(X)R

① Motor unit

Type	Brake	Model
HSA6C HSA6XC	No	RCP6-MUHSA6C
	Yes	RCP6-MUHSA6C-B
HSA6R HSA6XR	No	RCP6-MUHSA6R
	Yes	RCP6-MUHSA6R-B
HSA7C HSA7XC	No	RCP6-MUHSA7C
	Yes	RCP6-MUHSA7C-B
HSA7R HSA7XR	No	RCP6-MUHSA7R
	Yes	RCP6-MUHSA7R-B

② End cover assembly

Type	Model
HSA6R HSA6X□	EWB-RCP6-HSA6
HSA7R HSA7X□	EWB-RCP6-HSA7

③ Coupling spacer

Type	Model
HSA6(X)□	CPG-RCP6-S
HSA7(X)□	CPG-RCP6-M

④ Stainless steel sheet

Type	Model	
	Single slider	Double slider
HSA6C	ST-ECH-S6-(stroke)	ST-ECH-S6D-(stroke)
HSA6XC	ST-ECXH-S6-(stroke)	
HSA7C	ST-ECH-S7-(stroke)	ST-ECH-S7D-(stroke)
HSA7XC	ST-ECXH-S7-(stroke)	
HSA6R	ST-6HA6R-(stroke)	ST-6HA6RD-(stroke)
HSA6XR	ST-6HA6XR-(stroke)	
HSA7R	ST-6HA7R-(stroke)	ST-6HA7RD-(stroke)
HSA7XR	ST-6HA7XR-(stroke)	

⑤ Timing belt

Type	Model
HSA6(X)R	TB-RCP6-HSA6R
HSA7(X)R	TB-RCP6-HSA7R

⑥ Slider roller assembly (SR options only)

Type	Model
HSA6(X)□ HSA7(X)□	EC-SR-S467

*The above model is for one unit.
If another axis is required, please order two.

⑦ Intermediate support cushion

Type	Model
HSA6X□ HSA7X□	IMSC-EC-S6S7

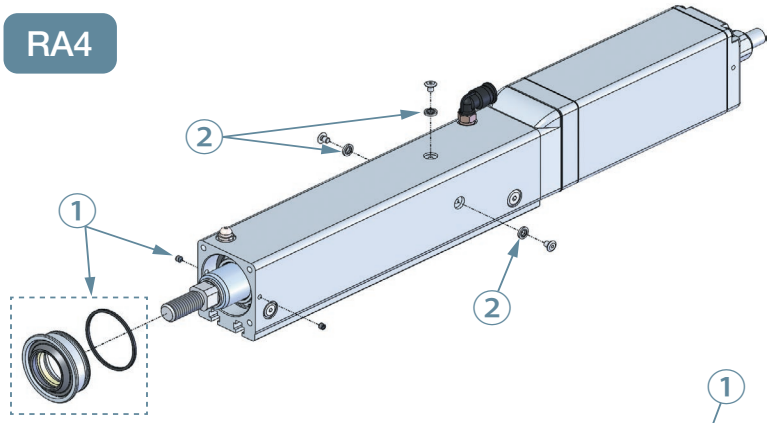
*The above model is for one unit.
If another axis is required, please order eight.
One roll bushing is included with each model.

⑧ Idler assembly

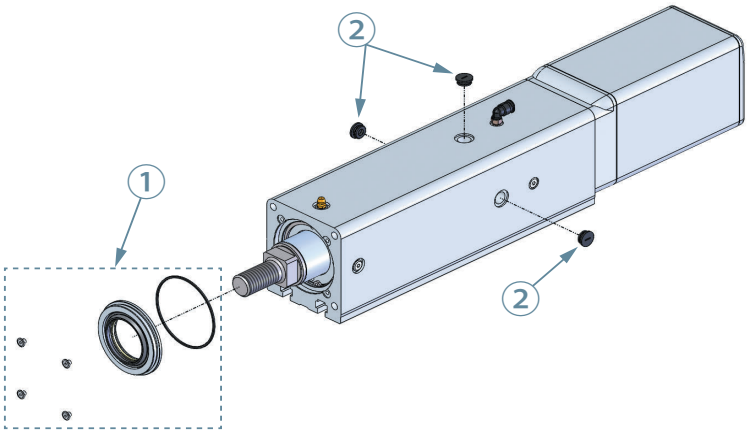
Type	Model
HSA6(X)R HSA7(X)R	IDR-RCP6-HSA67

Illustrations of Maintenance Parts: RCP6(S)W-RA

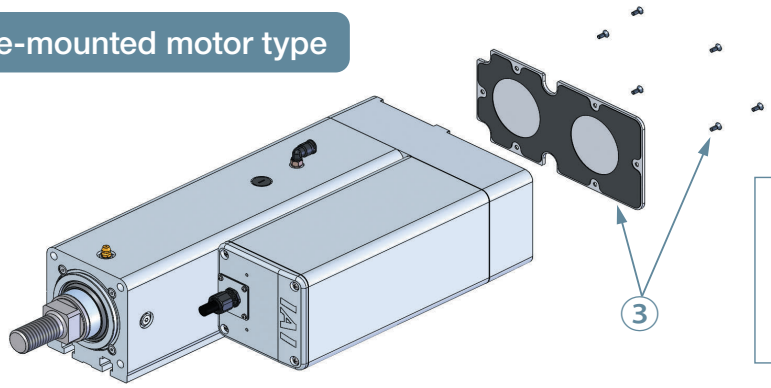
RA4



RA6/7/8



Side-mounted motor type



① Rod seal assembly
② Seal washer / Cap
③ Pulley cover gasket assembly

List of Maintenance Parts: RCP6(S)W-RA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Splash-proof rod type (RCP6(S)W-RA4C/RA4R)

No.	Part name	RCP6W-RA4(C/R)	RCP6SW-RA4(C/R)
①	Rod seal assembly	RCP6W-SLA-RA4	
②	Seal washer	RCP6W-SLW-RA4	
③	Pulley cover gasket assembly	RCP6W-PCA-RA4R	RCP6SW-PCA-RA4R

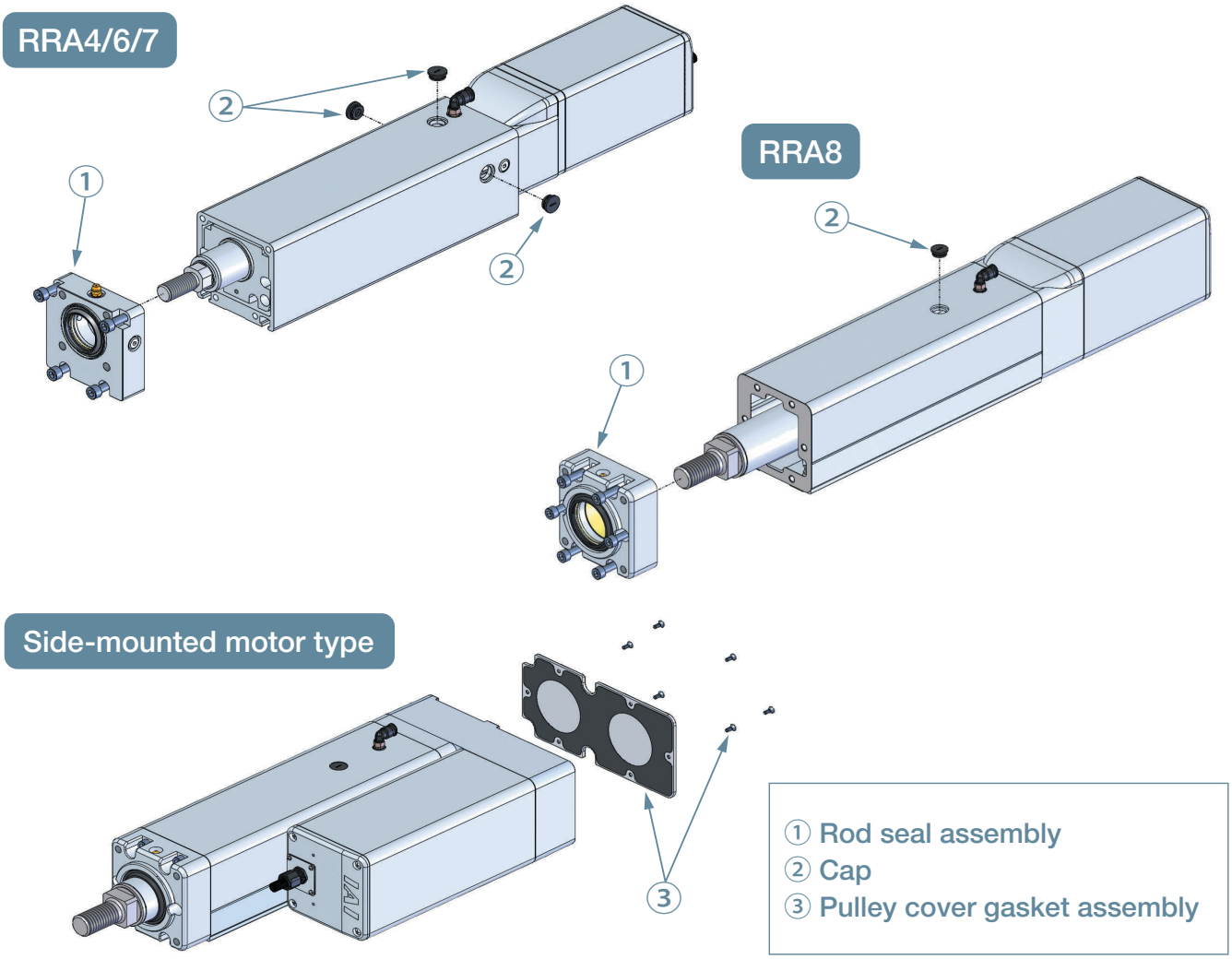
Contact us if you need to replace the motor and belt to ensure IP65 performance.
One set of component including the above part numbers is supplied.
For ②, the quantity per axis varies depending on the model.
RA4C: 3pieces, RA4R: 2pieces

Splash-proof rod type (RCP6(S)W-RA6/RA7/RA8)

No.	Part name	RA6(C/R)	RA7(C/R)	RA8(C/R)
①	Rod seal assembly	RCP6W-SLA-RA6	RCP6W-SLA-RA7	RCP6W-SLA-RA8
②	Cap	RCP5W-CS-RA		
③	Pulley cover gasket assembly	RCP6W-PCA-RA6R	RCP6W-PCA-RA7R	RCP6W-PCA-RA8R

Contact us if you need to replace the motor and belt to ensure IP65 performance.
One set of components including the above part numbers is supplied.
For ②, the quantity per axis varies depending on the model.
RA6C/7C/8C: 3pieces, RA6R/7R/8R: 2pieces

Illustrations of Maintenance Parts: RCP6(S)W-RRA



List of Maintenance Parts: RCP6(S)W-RRA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Splash-proof rod type (RCP6(S)W-RRA4/RRA6/RRA7/RRA8)

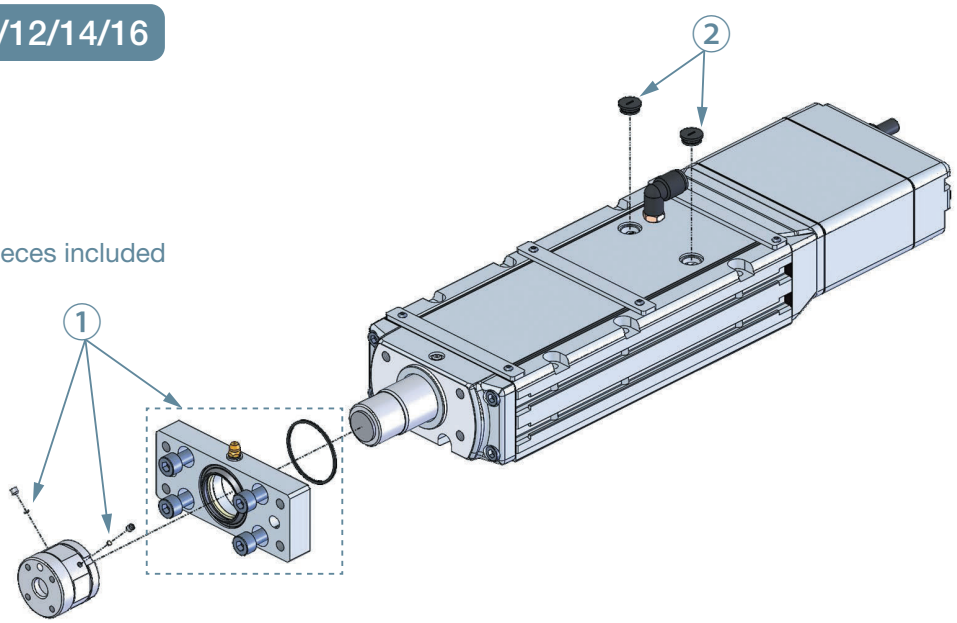
No.	Part name	RCP6W-RRA4(C/R)	RCP6SW-RRA4(C/R)	RRA6(C/R)	RRA7(C/R)	RRA8(C/R)
①	Rod seal assembly	RCP6W-FBA-RRA4		RCP6W-FBA-RRA6	RCP6W-FBA-RRA7	RCP6W-FBA-RRA8
②	Cap	RCP6W-CS-RRA4		RCP5W-CS-RA		
③	Pulley cover gasket assembly	RCP6W-PCA-RA4R	RCP6SW-PCA-RA4R	RCP6W-PCA-RA6R	RCP6W-PCA-RA7R	RCP6W-PCA-RA8R

Contact us if you need to replace the motor and belt to ensure IP65 performance.
One set of component including the above part numbers is supplied.
For ②, the quantity per axis varies depending on the model.
PRA4C/6C/7C: 3pieces, PRA4R/6R/7R: 2pieces, PRA8C/PRA8R: 1piece

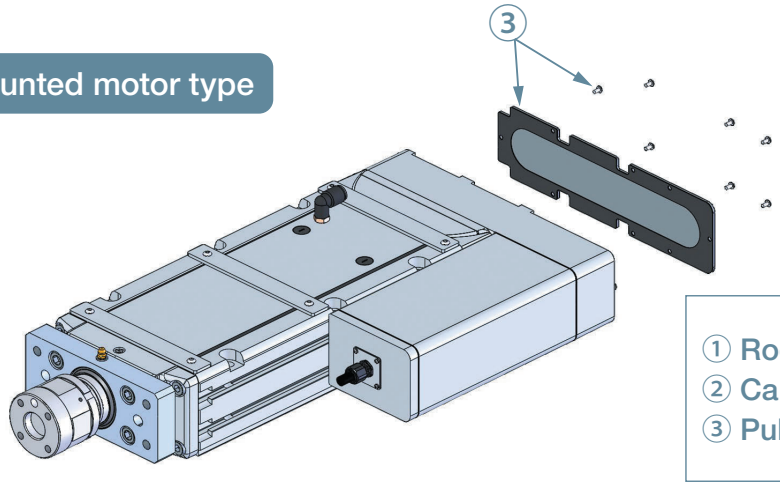
Illustrations of Maintenance Parts: RCP6(S)W-WRA

WRA10/12/14/16

* Setting pieces included



Side-mounted motor type



① Rod seal assembly
② Cap
③ Pulley cover gasket assembly

List of Maintenance Parts: RCP6(S)W-WRA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

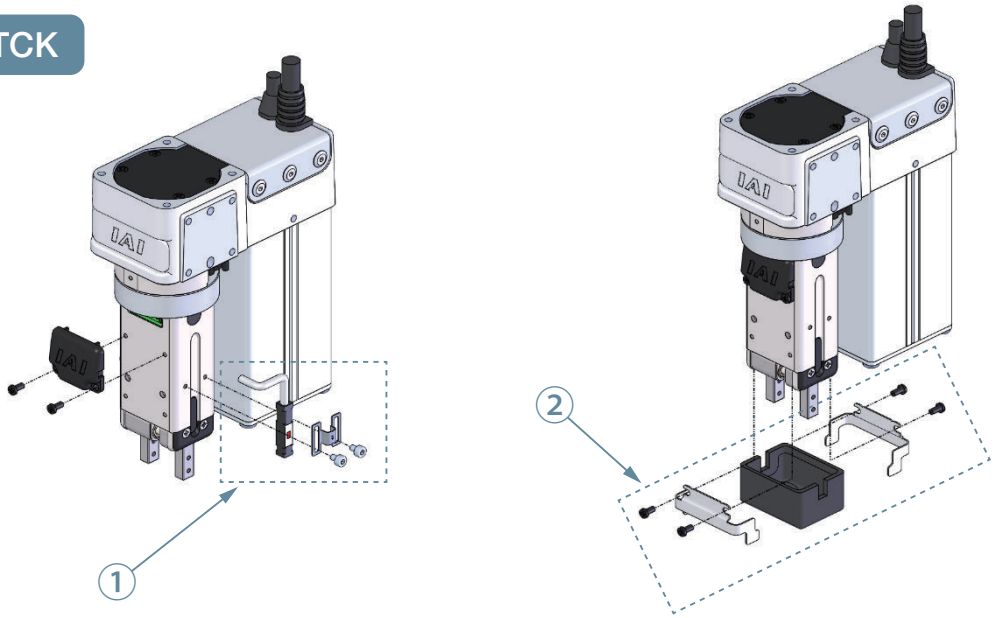
Splash-proof rod type (RCP6(S)W-WRA10/WRA12/WRA14/WRA16)

No.	Part Name	RCP6W-WRA10(C/R)	RCP6SW-WRA10(C/R)	WRA12(C/R)	WRA14(C/R)	WRA16(C/R)
①	Rod seal assembly	RCP6W-FBA-WRA10		RCP6W-FBA-WRA12	RCP6W-FBA-WRA14	RCP6W-FBA-WRA16
②	Cap	RCP5W-CS-RA				
③	Pulley cover gasket assembly	RCP6W-PCA-WRA10R	RCP6SW-PCA-WRA10R	RCP6W-PCA-WRA12R	RCP6W-PCA-WRA14R	RCP6W-PCA-WRA16R

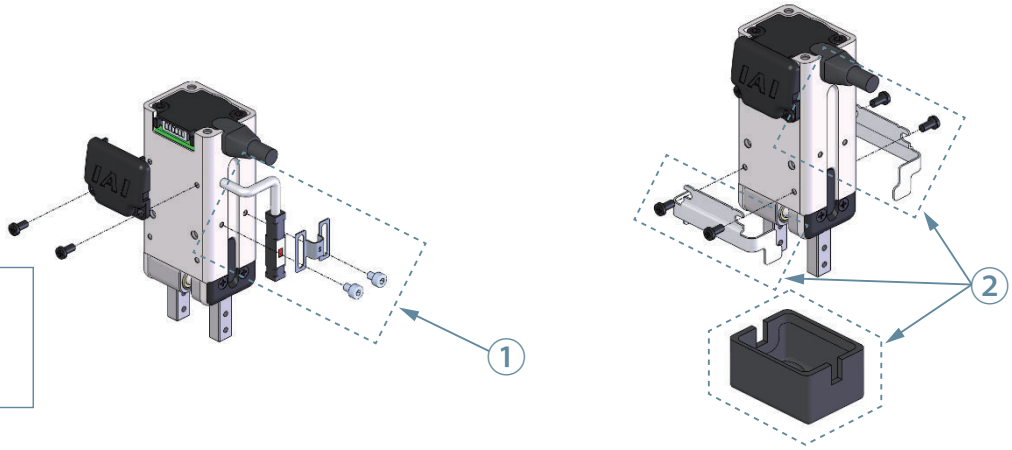
Contact us if you need to replace the motor and belt to ensure IP65 performance.
One set of components including the above part numbers is supplied.
For ②, the quantity per axis is as follows:
WRA10/WRA12/WRA14/WRA16: 2pieces

Illustrations of Maintenance Parts: RCP6-RTCK/GRS

RTCK



GRS



① Sensor
② Rubber cover

List of Maintenance Parts: RCP6-RTCK/GRS

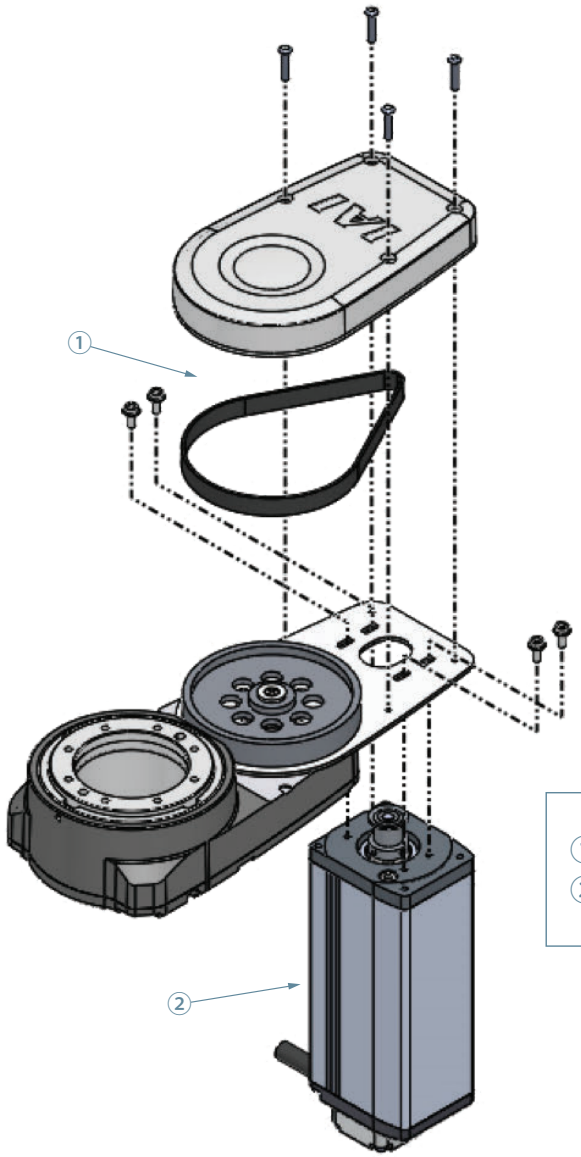
The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Applicable model	Sensor specification	Number of sensors	① Sensor model
RCP6-RTCKS□□ GRS-S□□	NPN	1 pc.	GRS-S1N-S
		2 pcs.	GRS-S2N-S
	PNP	1 pc.	GRS-S1P-S
		2 pcs.	GRS-S2P-S
RCP6-RTCKM□□ GRS-M□□	NPN	1 pc.	GRS-S1N-M
		2 pcs.	GRS-S2N-M
	PNP	1 pc.	GRS-S1P-M
		2 pcs.	GRS-S2P-M

Applicable model	Rubber cover material	② Rubber cover model
RCP6-RTCKS□□ GRS-S□□	RCH (Chloroprene rubber)	GRS-RCH-S
RCP6-RTCKM□□ GRS-M□□		GRS-RCH-M
RCP6-RTCKS□□ GRS-S□□	RSL (Silicon rubber)	GRS-RSL-S
RCP6-RTCKM□□ GRS-M□□		GRS-RSL-M

Illustrations of Maintenance Parts: RCP6-RTFML

RTFML



① 1st-stage Timing belt
② Motor unit

List of Maintenance Parts: RCP6

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

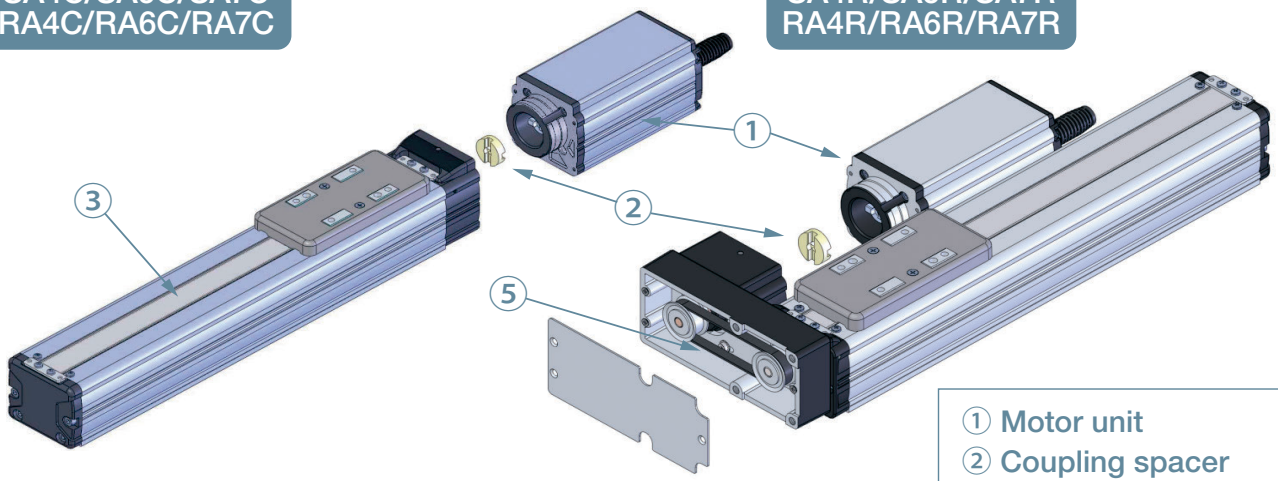
No.	Part name		Model	Remarks
①	1st-stage Timing belt		TB-RCP6-RTFML-1	2nd-stage Timing belt cannot be changed by the customer.
②	Motor unit	Without brake	RCP6-MURTFML	The customer can change the cable exit direction (upper, right or left side). Contact IAI representative for the procedure.
		With brake	RCP6-MURTFMLB	

MEMO

Illustrations of Maintenance Parts: RCP5(CR)

SA4C/SA6C/SA7C
RA4C/RA6C/RA7C

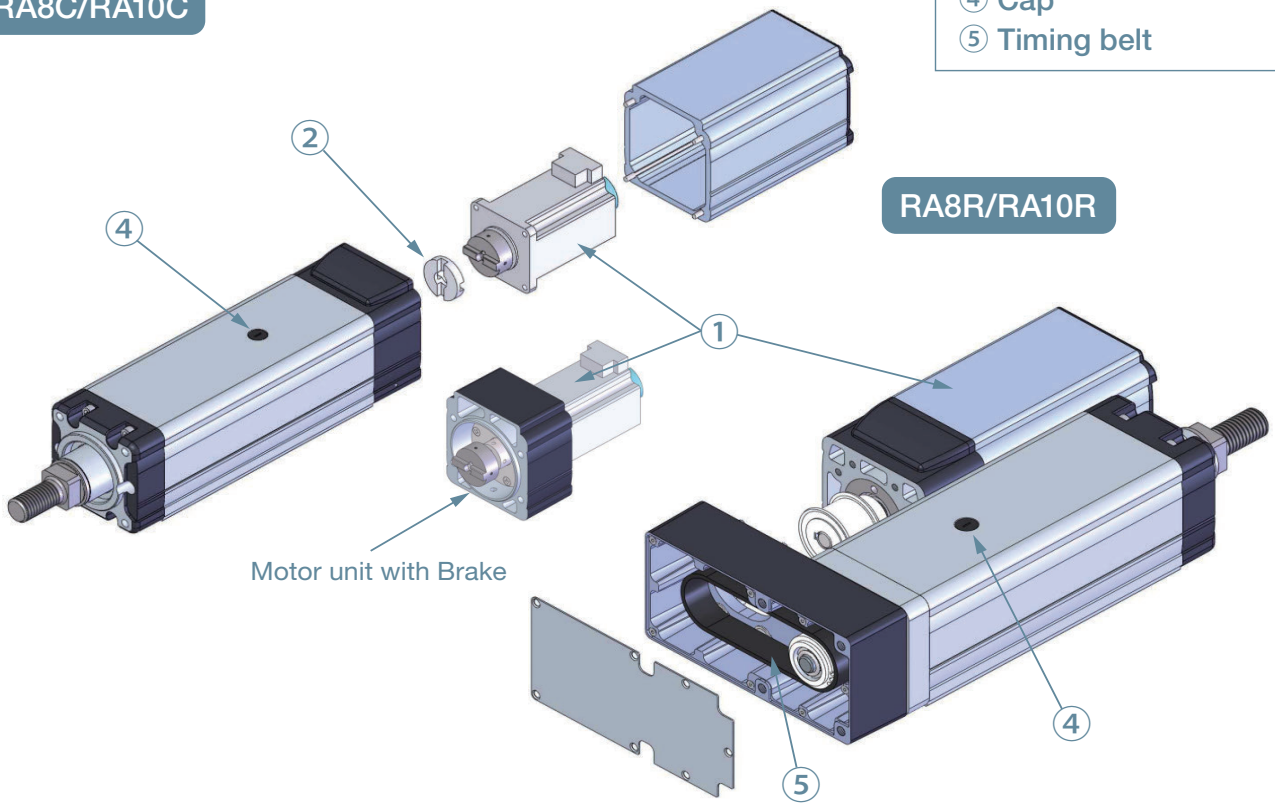
SA4R/SA6R/SA7R
RA4R/RA6R/RA7R



① Motor unit
② Coupling spacer
③ Stainless steel sheet
④ Cap
⑤ Timing belt

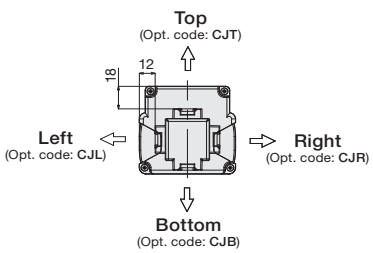
RA8C/RA10C

RA8R/RA10R

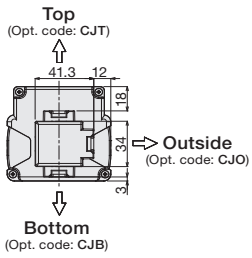


■Cable Exit Direction (Optional)

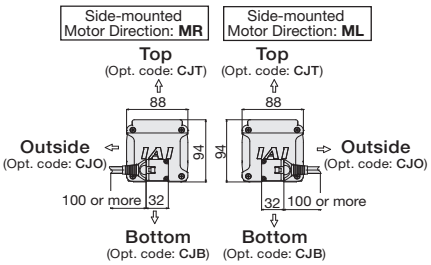
(SA4C~SA7C, RA4C~RA7C)



(SA4R~SA7R, RA4R~RA7R)



(RA8R, RA10R)



List of Maintenance Parts: RCP5(CR)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Slider Type (RCP5(CR)-SA)

No.	Part Name	SA4C	SA6C	SA7C
①	Motor unit *1	I	II	III
②	Coupling spacer	CPG-RCP5-SA46		CPG-RCP5-SA7
③	Stainless steel sheet *2	ST-5A4-(stroke)	ST-5A6-(stroke)	ST-5A7-(stroke)

No.	Part Name	SA4R	SA6R	SA7R
①	Motor unit *1	I	II	III
②	Coupling spacer	CPG-RCP5-SA46		CPG-RCP5-SA7
③	Stainless steel sheet *2	ST-5A4-(stroke)	ST-5A6-(stroke)	ST-5A7-(stroke)
⑤	Timing belt	TB-RCP5-SA4R	TB-RCP5-SA6R	TB-RCP5-SA7R

Rod Type (RCP5-RA)

No.	Part Name	RA4C	RA6C	RA7C
①	Motor unit *1	I	II	IV
②	Coupling spacer	CPG-RCP5-RA46		CPG-RCP5-RA7

No.	Part Name	RA4R	RA6R	RA7R
①	Motor unit *1	I	II	IV
②	Coupling spacer	CPG-RCP5-RA46		CPG-RCP5-RA7
⑤	Timing belt	TB-RCP5-RA4R	TB-RCP5-RA6R	TB-RCP5-RA7R

No.	Part Name	RA8C	RA10C
①	Motor unit *1	V	VI
②	Coupling spacer	CPG-RCP5-RA810	
④	Cap	RCP5-CS-RA810	

No.	Part Name	RA8R	RA10R
①	Motor unit *1	V	VI
④	Cap	RCP5-CS-RA810	
⑤	Timing belt	TB-RCP5-RA8R	TB-RCP5-RA10R

*1 Motor unit model

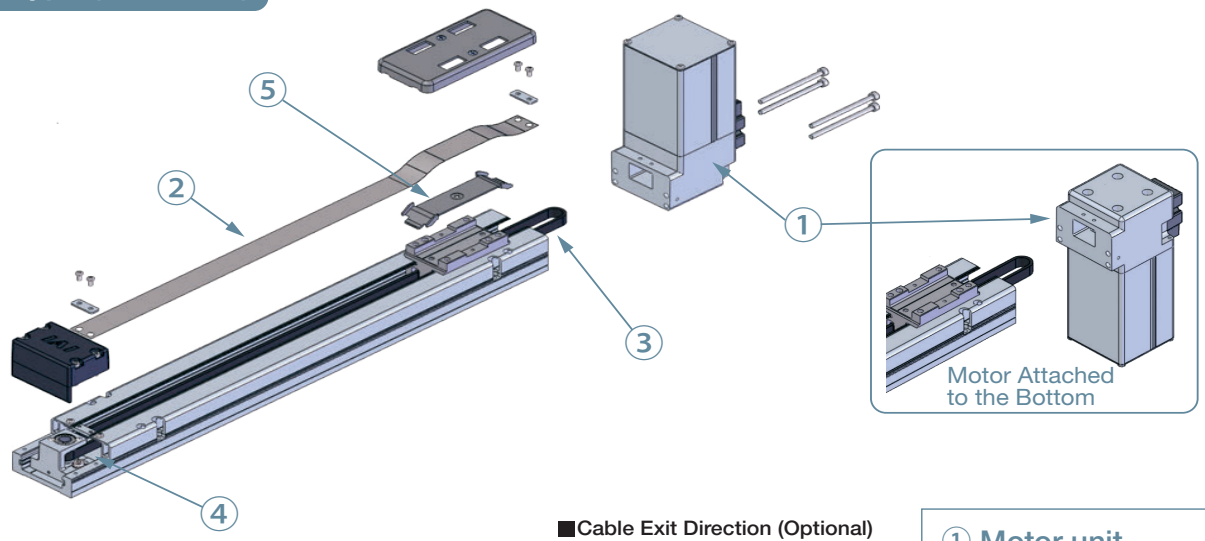
Model name composition: Base model number–(Choice of brake option*)–(Cable exit direction*)–(Motor setting direction)–[PU]
Please choose options in the parentheses, but in the brackets for RA8R/RA10R only. Components marked with asterisk are chosen in setting options.

Type No.	Base Model Number	Brake	When Cable Exit Direction Chosen		Motor Setting Direction	Pulley
			Cable Exit Direction			
			Straight	Side-mounted		
I	RCP5-MUSRA4A	Blank (without brake)	CJT/CJL CJR/CJB	CJT/CJB/CJO	Blank (Straight) ML/MR (Side-mounted)	Blank (with coupling)
II	RCP5-MUSRA6A					
III	RCP5-MUSA7A					
IV	RCP5-MURA7A					
V	RCP5-MURA8A	B (with brake)				PU (Side-mounted motor / with pulley)
VI	RCP5-MURA10A					

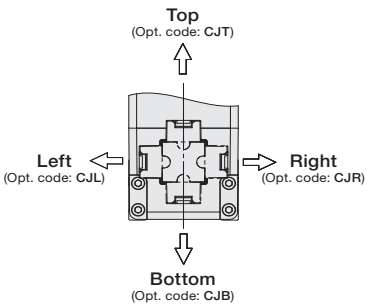
*2 Stroke size: Please apply the same stroke number/size from your actuator.

Illustrations of Maintenance Parts: RCP5

Belt Type (RCP5-BA)

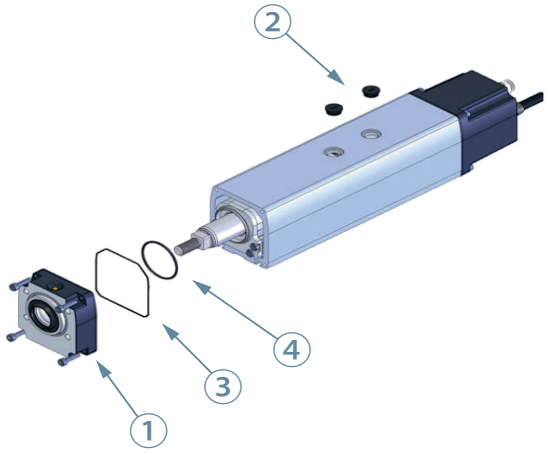


■Cable Exit Direction (Optional)

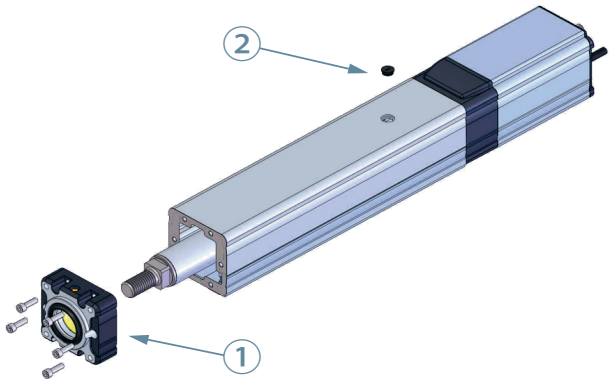


① Motor unit
② Stainless steel sheet
③ Long belt (Slider/drive belt)
④ Pulley assembly
⑤ Sheet of slider

Dust-proof/Splash-proof Rod Type (RCP5W-RA6/RA7)



Dust-proof/Splash-proof Rod Type (RCP5W-RA8/RA10)



① Front bracket assembly
② Cap
③ O-ring (RCP5W-OR1-□)
④ O-ring (RCP5W-OR2-□)

List of Maintenance Parts: RCP5

Belt Type (RCP5-BA)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part Name	BA4(U)	BA6(U)	BA7(U)
①	Motor unit *1	I	II	III
②	Stainless steel sheet *2	ST-5BA4-(stroke)	ST-5BA6-(stroke)	ST-5BA7-(stroke)
③	Long belt (Slider/drive belt)	LB-RCP5-BA4-(stroke)	LB-RCP5-BA6-(stroke)	LB-RCP5-BA7-(stroke)
④	Pulley assembly	PLY-RCP5-BA4	PLY-RCP5-BA6	PLY-RCP5-BA7
⑤	Sheet of slider	SHS-RCP5-BA4	SHS-RCP5-BA6	SHS-RCP5-BA7

*1 Motor unit model

Model name composition: Base model number–(Choice of brake option*)–(Cable exit direction)–(Motor Setting Direction)–PU
Please choose options in the parentheses. Component marked with asterisk is chosen in setting options.

Type No.	Base Model Number	Brake	Cable Exit Direction	Motor Setting Direction	Note
I	RCP5-MUBA4A	Blank (without brake) B (with brake)	CJT/CJL CJR/CJB	Blank (Motor attached to the top) U (Motor attached to the bottom)	PU (with pulley)
II	RCP5-MUBA6A				
III	RCP5-MUBA7A				

*2 Stroke size: Please apply the same stroke number/size from your actuator.

Dust-proof/Splash-proof Rod Type (RCP5W-RA6/RA7)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part Name	RA6C	RA7C
①	Front bracket assembly	RCP5W-FBA-RA6	RCP5W-FBA-RA7
②	Cap	RCP5W-CS-RA	
③	O-ring	RCP5W-OR1-RA6	RCP5W-OR1-RA7
④	O-ring	RCP5W-OR2-RA6	RCP5W-OR2-RA7

For ②, the quantity per axis is as follows:
RA6C/RA7C: 2 pcs
Contact us if you need to replace the motor and surrounding gaskets to ensure IP67 performance.

Dust-proof/Splash-proof Rod Type (RCP5W-RA8/RA10)

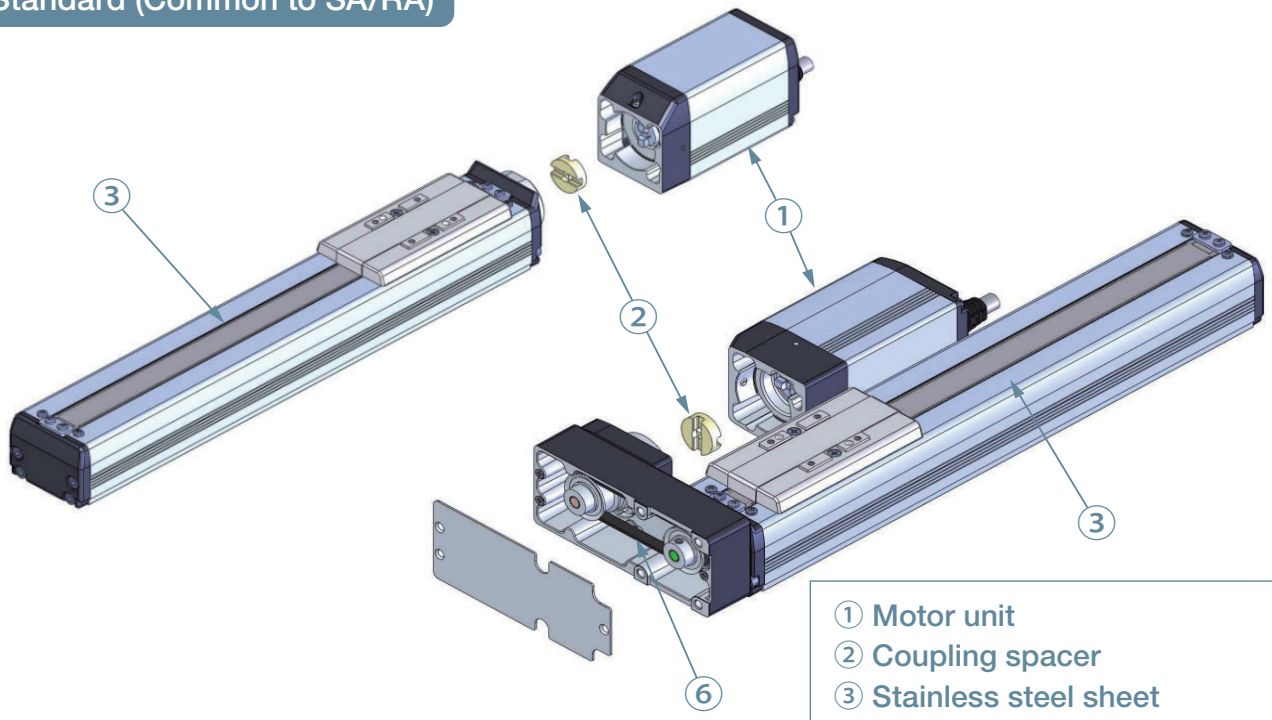
The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part Name	RA8C	RA10C
①	Front bracket assembly	RCP5W-FBA-RA8	RCP5W-FBA-RA10
②	Cap	RCP5W-CS-RA	

Contact us if you need to replace the motor and surrounding gaskets to ensure IP65 performance.

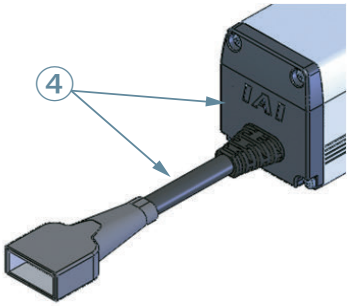
Illustrations of Maintenance Parts: RCP4(CR)

Standard (Common to SA/RA)

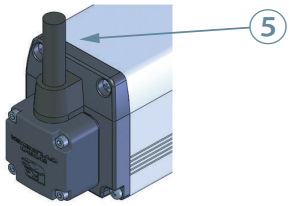


① Motor unit
② Coupling spacer
③ Stainless steel sheet
④ Actuator pigtail cable assembly (standard specification)
⑤ Actuator cable (CJ□ option)
⑥ Timing belt

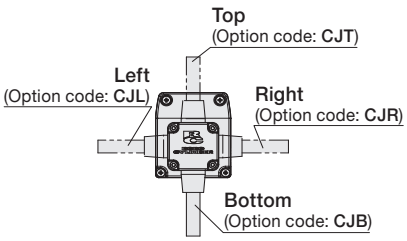
Standard Specification



Cable Exit Direction (Optional)

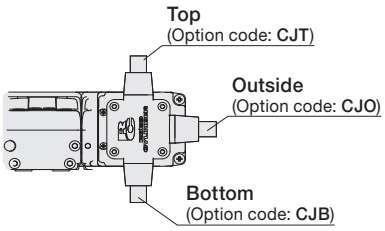


(Motor Coupled Type)



View from the rear of the actuator (motor side)

(Side-mounted Motor Type)



View from the front of the actuator

List of Maintenance Parts: RCP4(CR)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Slider Type (RCP4(CR)-SA)

No.	Part Name	SA3(C/R)	SA5(C/R)	SA6(C/R)	SA7(C/R)
①	Motor unit *1	SA3C: I SA3R: I	SA5C: V SA5R: III	SA6C: V SA6R: III	SA7C: VI SA7R: VI
②	Coupling spacer	CPG-RCP4-SA3	CPG-RCP4-SA56		CPG-RCP4-SA7
③	Stainless steel sheet *2	ST-4A3-(stroke)	ST-4A5(D)-(stroke)	ST-4A6(D)-(stroke)	ST-4A7(D)-(stroke)
④	Actuator pigtail cable assembly (standard specification)		CB-RCP4-SA56-MPA-AS		CB-RCP4-SA7-MPA-AS
⑤	Actuator cable (CJ□ option)		CB-RCP4-SA567-MPA-ASCJ		
⑥	Timing belt	TB-RCP4-SA3R	TB-RCP4-SA5R	TB-RCP4-SA6R	TB-RCP4-SA7R

Rod Type (RCP4-RA)

No.	Part Name	RA3(C/R)	RA5(C/R)	RA6(C/R)
①	Motor unit *1	RA3C: II RA3R: II	RA5C: III RA5R: III High-thrust: VII	RA6C: IV RA6R: IV High-thrust: VIII
②	Coupling spacer	CPG-RCP4-RA3	CPG-RCP4-RA5	CPG-RCP4-RA6
④	Actuator pigtail cable assembly (standard specification)		CB-RCP4-RA5-MPA-AS	RA6C: CB-RCP4-RA6C-MPA-AS RA6R: CB-RCP4-RA6R-MPA-AS High-thrust: CB-RCP4-RA6F-MPA-AS
⑤	Actuator cable (CJ□ option)		CB-RCP4-RA5-MPA-ASCJ	CB-RCP4-RA6CR-MPA-ASCJ High-thrust: CB-RCP4-RA6S-MPA-ASCJ
⑥	Timing belt	TB-RCP4-RA3R	TB-RCP4-RA5R	TB-RCP4-RA6R

*1 Motor unit Model

Model name composition: Base model number–(Choice of brake option*)+(Choice of cable exit direction*)+(Home check sensor*)+(Choice of motor setting direction)
Please choose options in the parentheses. Components marked with asterisk are chosen in setting options

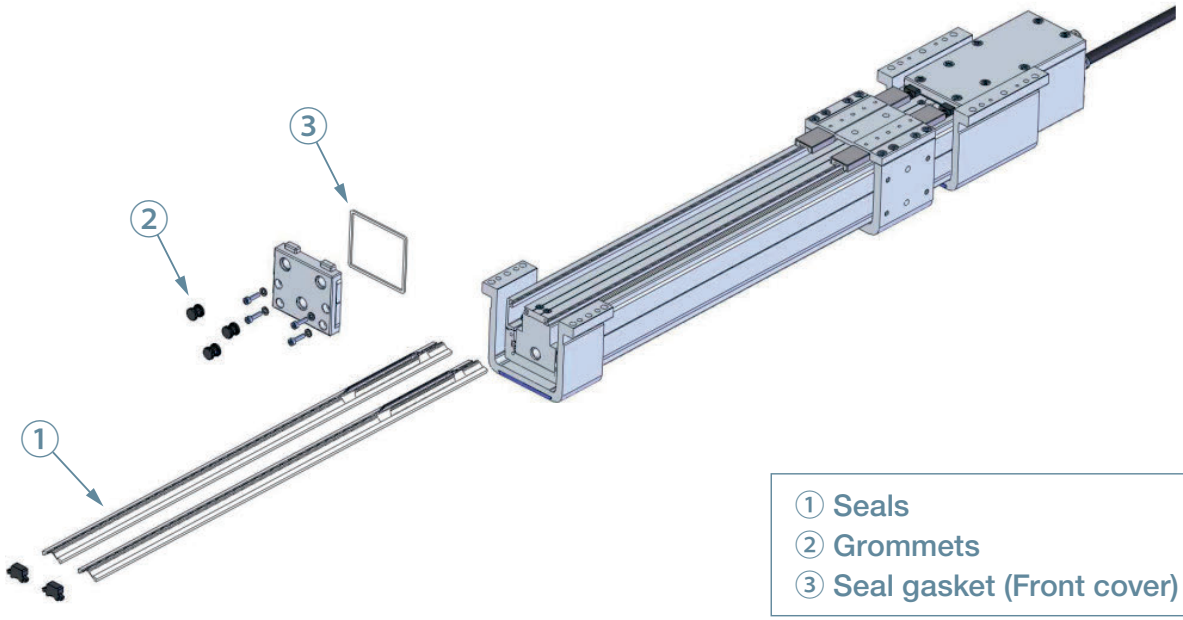
Type No.	Base Model Number	Brake	When Cable Exit Direction chosen		Home Check Sensor	Motor Setting Direction
			Cable Exit Direction			
			Straight	Side-mounted		
I	RCP4-MUSA3	Blank (without brake) B (with brake)	–		HSL/HSR *3	Blank (Straight) ML/MR (Side-mounted)
II	RCP4-MURA3		–		HS	
III	RCP4-MURA5		CJT/CJL CJR/CJB	CJT/CJB/CJO	–	
IV	RCP4-MURA6					
V	RCP4-MUSA56					
VI	RCP4-MUSA7					
VII	RCP4-MURA5S					
VIII	RCP4-MURA6S					

*2 Stroke size: Please apply the same stroke number/size from your actuator. For double slider specification, add "D".

*3 SA3R: Please choose HSR for ML, HSL for MR.

Illustrations of Maintenance Parts: RCP4W

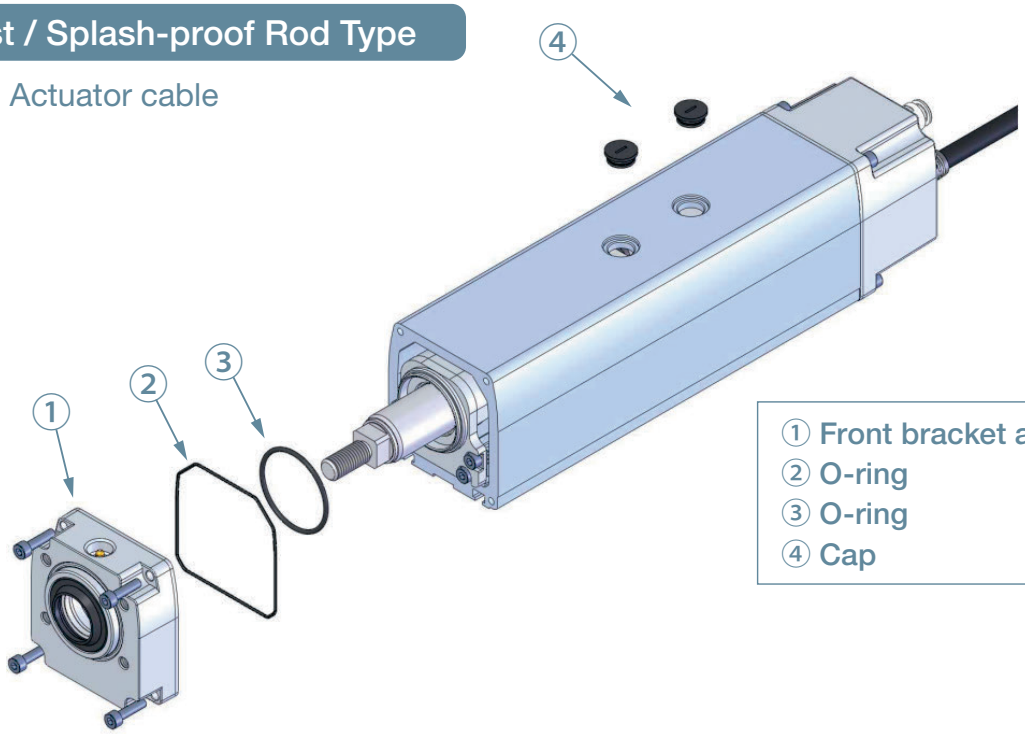
Dust / Splash-proof Slider Type



① Seals
② Grommets
③ Seal gasket (Front cover)

Dust / Splash-proof Rod Type

With Actuator cable



① Front bracket assembly
② O-ring
③ O-ring
④ Cap

List of Maintenance Parts: RCP4W

Dust / Splash-proof Slider Type (RCP4W-SA)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part Name	SA5C	SA6C	SA7C
①	Seals (4 pcs/axis) *1	SLE-RCP4W-SA5-(stroke)	SLE-RCP4W-SA6-(stroke)	SLE-RCP4W-SA7-(stroke)
②	Grommets (3 pcs/axis)	GRT-RCP4W-SA567		
③	Seal gasket (Front cover)	PKF-RCP4W-SA5	PKF-RCP4W-SA6	PKF-RCP4W-SA7

The table above shows how many of each part is needed for one axis.
Contact us if you need to replace the motor and surrounding gaskets to ensure IP67 performance.
*1 Stroke size: Please apply the same stroke number/size from your actuator.

Dust / Splash-proof Rod Type (RCP4W-RA)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

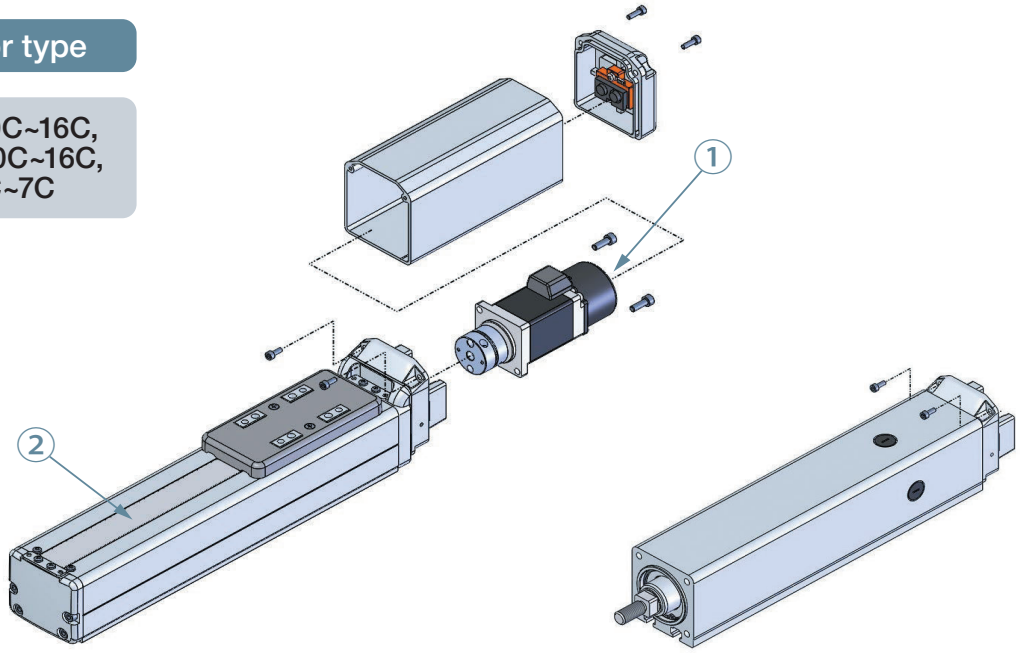
No.	Part Name	RA6C	RA7C
①	Front bracket assembly	RCP4W-FBA-RA6	RCP4W-FBA-RA7
②	O-ring	RCP4W-OR1-RA6	RCP4W-OR1-RA7
③	O-ring	RCP4W-OR2-RA6	RCP4W-OR2-RA7
④	Cap	RCP4W-CS-RA	

The quantity ordered for the above model is one axis.
Contact us if you need to replace the motor and surrounding gaskets to ensure IP67 performance.

Illustrations of Maintenance Parts: RCS4(CR)

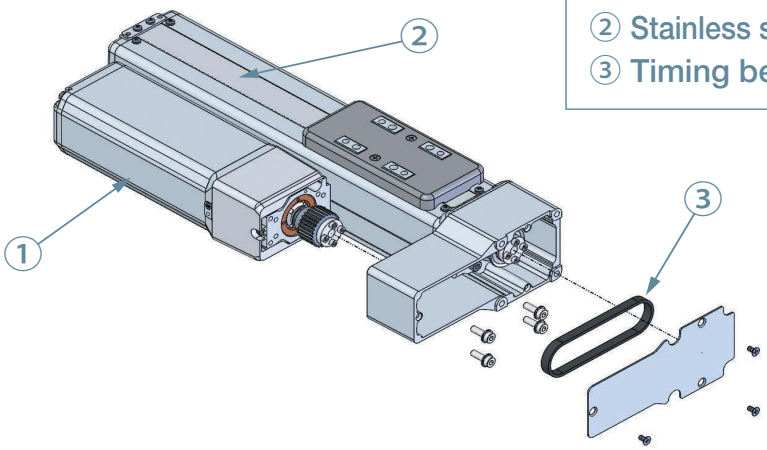
Coupled motor type

SA4C~8C, WSA10C~16C,
RA4C~8C, WRA10C~16C,
RRA4C~8C, TA4C~7C



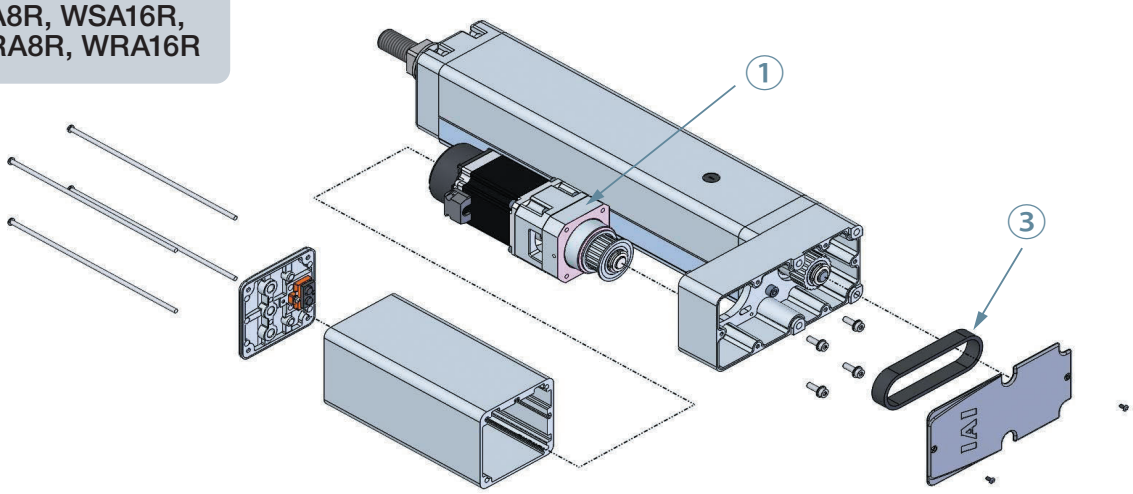
Side-mounted Type

SA4R~8R, WSA10R~14R,
RA4R~7R, WRA10R~14R,
RRA4R~7R, TA4R~7R



① Motor unit
② Stainless steel sheet
③ Timing belt

RA8R, WSA16R,
RRA8R, WRA16R



*For the direction and dimensions when the cable exit direction option is selected, refer to the dimensions on each product page.

List of Maintenance Parts: RCS4(CR) (*Motor unit, Coupling spacer and Stainless steel sheet are compatible with RCS4CR.)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part Name	SA4C	SA6C	SA7C	SA8C
①	Motor unit *1	M1	M2	M3	M4
②	Stainless steel sheet *2	ST-6A4(D)-(Stroke)	ST-6A6(D)-(Stroke)	ST-6A7(D)-(Stroke)	ST-6A8(D)-(Stroke)

No.	Part Name	SA4R	SA6R	SA7R	SA8R
①	Motor unit *1	M9	M10	M11	M12
②	Stainless steel sheet *2	ST-6A4(D)-(Stroke)	ST-6A6(D)-(Stroke)	ST-6A7(D)-(Stroke)	ST-6A8(D)-(Stroke)
③	Timing belt	TB-RCS4-STRA4R	TB-RCS4-STRA6R	TB-RCS4-STRA7R	TB-RCS4-SA8R

No.	Part Name	WSA10C	WSA12C	WSA14C	WSA16C
①	Motor unit *1	M5	M6	M7	M8
②	Stainless steel sheet *2	ST-6WA10-(Stroke)	ST-6WA12-(Stroke)	ST-6WA14-(Stroke)	ST-6WA16-(Stroke)

No.	Part Name	WSA10R	WSA12R	WSA14R	WSA16R
①	Motor unit *1	M9	M10	M11	M13
②	Stainless steel sheet *2	ST-6WA10-(Stroke)	ST-6WA12-(Stroke)	ST-6WA14-(Stroke)	ST-6WA16-(Stroke)
③	Timing belt	TB-RCS4-WSRA10R	TB-RCS4-WSRA12R	TB-RCS4-WSRA14R	TB-RCP6-WSRA16R

No.	Part Name	RA4C	RA6C	RA7C	RA8C
①	Motor unit *1	M1	M2	M3	M4

No.	Part Name	RA4R	RA6R	RA7R	RA8R
①	Motor unit *1	M9	M10	M11	M13
③	Timing belt	TB-RCS4-STRA4R	TB-RCS4-STRA6R	TB-RCS4-STRA7R	TB-RCS4-RA8R

No.	Part Name	WRA10C	WRA12C	WRA14C	WRA16C
①	Motor unit *1	M5	M6	M7	M8

No.	Part Name	WRA10R	WRA12R	WRA14R	WRA16R
①	Motor unit *1	M9	M10	M11	M13
③	Timing belt	TB-RCS4-WSRA10R	TB-RCS4-WSRA12R	TB-RCS4-WSRA14R	TB-RCP6-WSRA16R

No.	Part Name	RRA4C	RRA6C	RRA7C	RRA8C
①	Motor unit *1	M1	M2	M3	M4

No.	Part Name	RRA4R	RRA6R	RRA7R	RRA8R
①	Motor unit *1	M9	M10	M11	M13
③	Timing belt	TB-RCS4-STRA4R	TB-RCS4-STRA6R	TB-RCS4-STRA7R	TB-RCS4-RA8R

No.	Part Name	TA4C	TA6C	TA7C
①	Motor unit *1	M1	M2	M3

No.	Part Name	TA4R	TA6R	TA7R
①	Motor unit *1	M9	M10	M11
③	Timing belt	TB-RCS4-STRA4R	TB-RCS4-STRA6R	TB-RCS4-STRA7R

(Note) The above parts are common with the clean specification (RCP6CR).

*1 Motor unit Model

[Model number configuration] Basic model – (*Brake specified) – (*Direction of cable extraction) – (Side-mounted motor on Left/Right) - (Others)
Please choose options in the parentheses. * Components marked with asterisk are chosen in setting options.

Type No.	Base Model Number	Brake	Direction of cable extraction (optional)	Motor side-mounted direction	Others
			Cable exit direction		
M1	RCS4-MUSRTA4C	Blank (without brake)			
M2	RCS4-MUSRTA6C				
M3	RCS4-MUSRTA7C				
M4	RCS4-MUSRA8C				
M5	RCS4-MUWSRA10C				
M6	RCS4-MUWSRA12C				
M7	RCS4-MUWSRA14C				
M8	RCS4-MUWSRA16C				
M9	RCS4-MUSRTA4WSRA10R	B (with brake)			
M10	RCS4-MUSRTA6WSRA12R		CJT/CJB/CJO	ML/MR *3	PU
M11	RCS4-MUSRTA7WSRA14R				
M12	RCS4-MUSA8R				
M13	RCS4-MURA8WSRA16R				PU

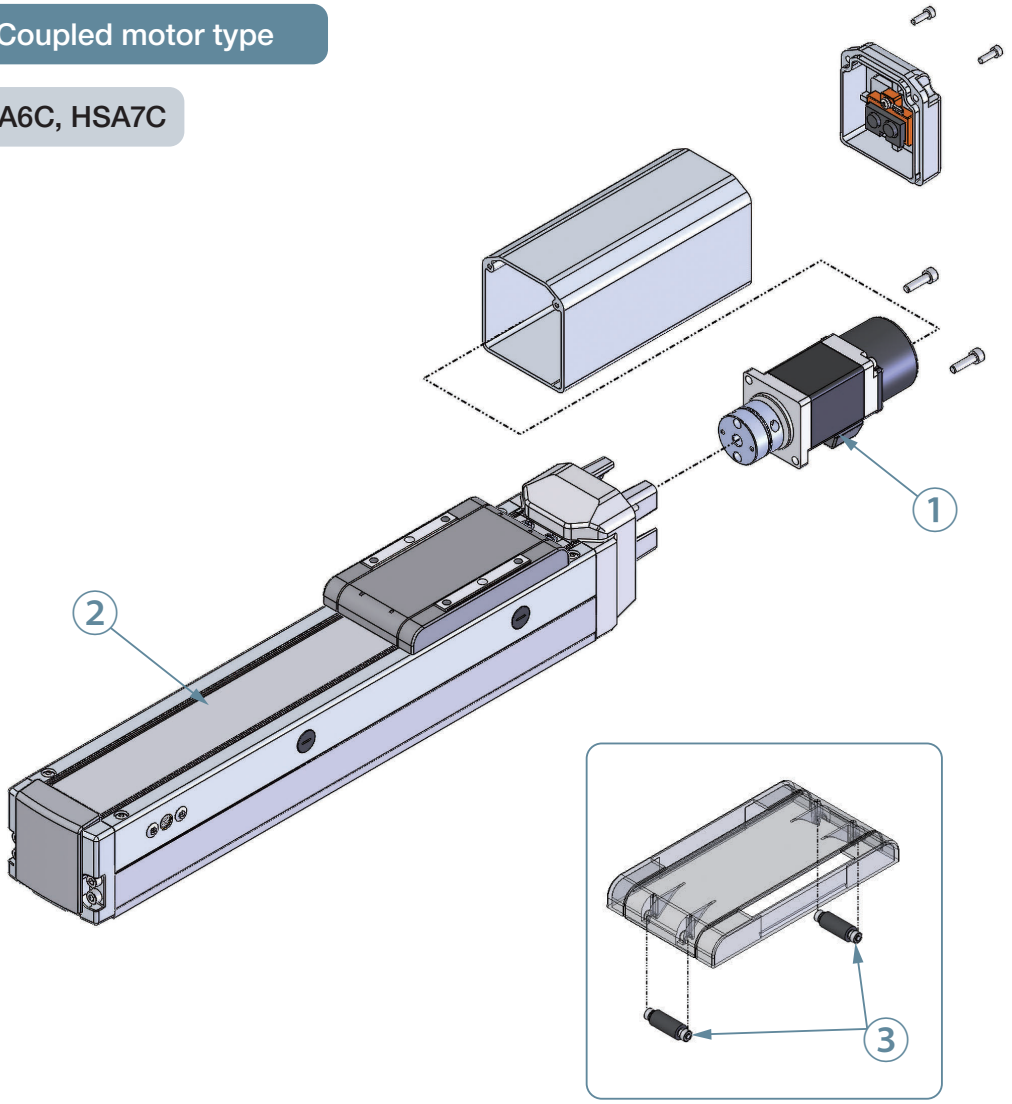
*2 Description of the stroke
Use the stroke value described in the actuator model.
For double slider specification, add "D".

*3 Make sure to specify ML/MR

Illustrations of Maintenance Parts: RCS4(High-rigidity 4-row guide)

Coupled motor type

HSA6C, HSA7C



① Motor unit
② Stainless steel sheet
③ Slider roller assembly

List of Maintenance Parts: RCS4(High-rigidity 4-row guide)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

① Motor unit

Type	Brake	Model
HSA6C	No	RCS4-MUHSA6C
	Yes	RCS4-MUHSA6C-B
HSA7C	No	RCS4-MUHSA7C
	Yes	RCS4-MUHSA7C-B

② Stainless steel sheet

Type	Model	
	Single slider	Double slider
HSA6C	ST-6HA6-(Stroke)	ST-6HA6D-(Stroke)
HSA7C	ST-6HA7-(Stroke)	ST-6HA7D-(Stroke)

③ Slider roller assembly (SR options)

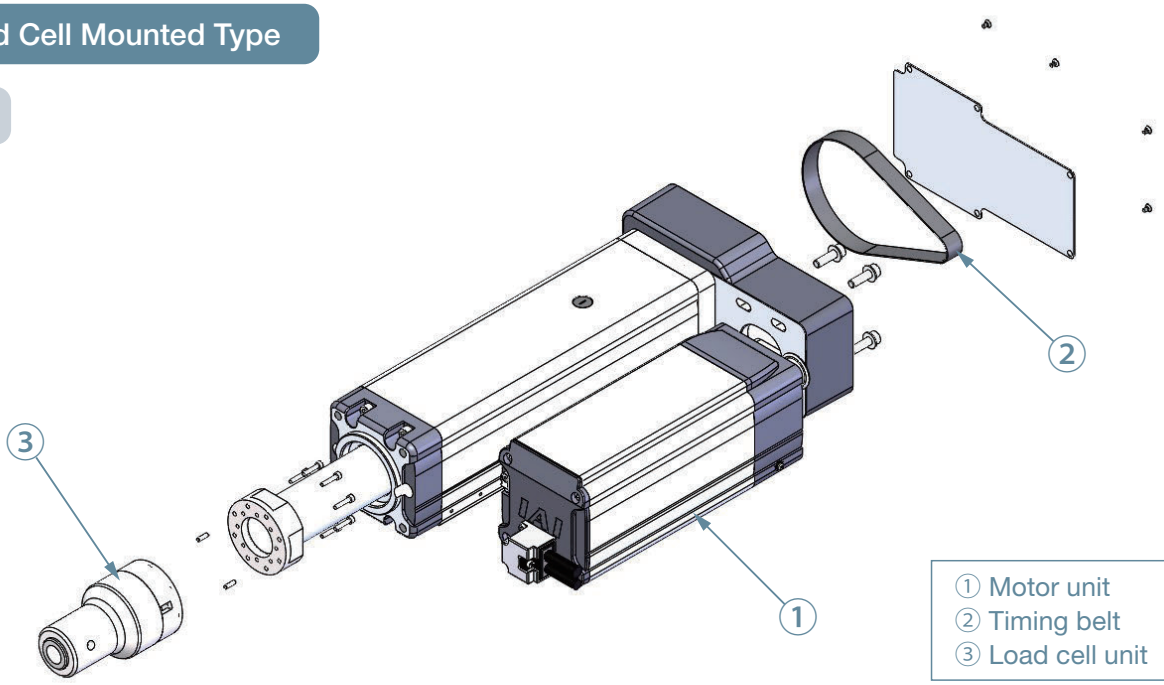
Type	Model
HSA6C	EC-SR-S467
HSA7C	

*The above model is for one unit.
Order two sets for one axis.

Illustrations of Maintenance Parts: RCS3(Servo Press)

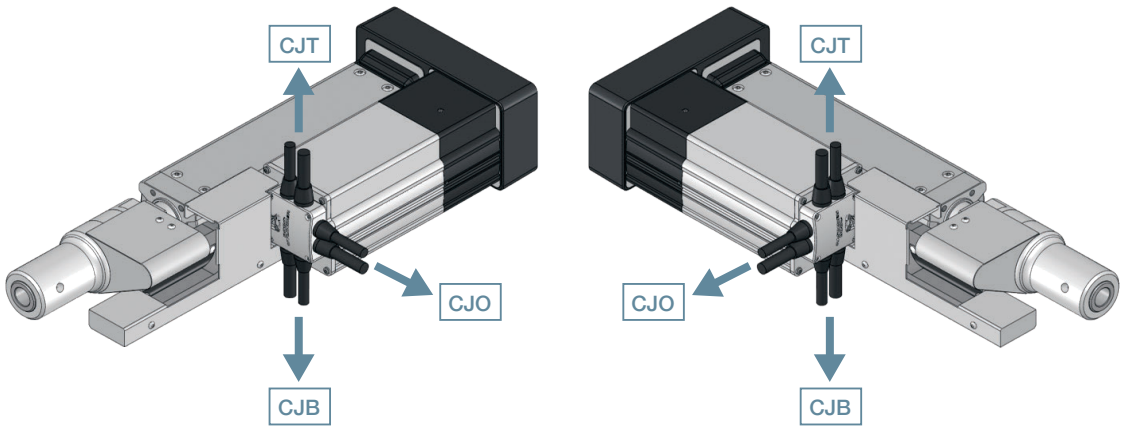
Load Cell Mounted Type

RA□R

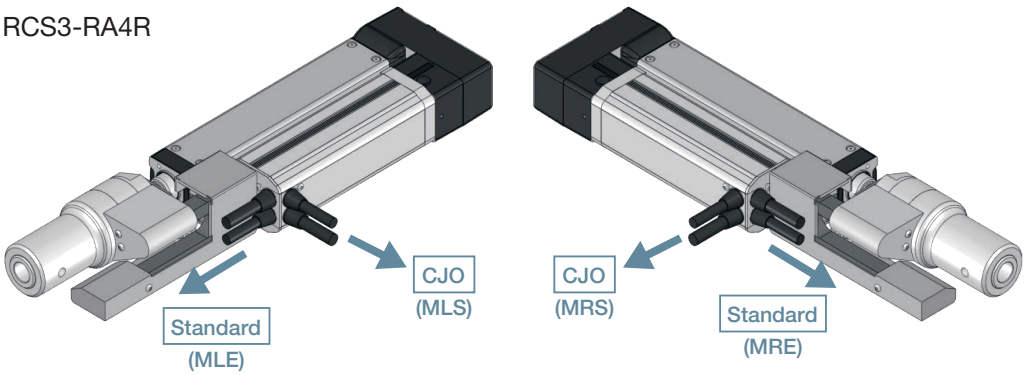


■Cable Exit Direction

◆RCS3-RA6R/RA7R/RA8R/RA10R



◆RCS3-RA4R



List of Maintenance Parts: RCS3(Servo Press)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

① Motor unit

Type	Motor (W)	Encoder Type	Cable Exit Direction	Model with Actuator Cable *		Note
				Without Brake	With Brake	
RA4R	30W	Absolute	Standard	RCS3-MU4R-30-TA-☐E-PU	RCS3-MU4R-30-TA-B-☐E-PU	* ☐ represents the sidemounted motor direction (ML/MR) * RA6R~RA10R correspond to CE by default. Please add "-CE" at the end of motor unit model number for RA4R.
			Outside	RCS3-MU4R-30-TA-☐S-PU	RCS3-MU4R-30-TA-B-☐S-PU	
		Incremental	Standard	RCS3-MU4R-30-TC-☐E-PU	RCS3-MU4R-30-TC-B-☐E-PU	
			Outside	RCS3-MU4R-30-TC-☐S-PU	RCS3-MU4R-30-TC-B-☐S-PU	
		Battery-less absolute	Standard	RCS3-MU4R-30-WA-☐E-PU	RCS3-MU4R-30-WA-B-☐E-PU	
			Outside	RCS3-MU4R-30-WA-☐S-PU	RCS3-MU4R-30-WA-B-☐S-PU	
RA6R	60W	Absolute	Top	RCS3-MU6R-60-TA-CJT-☐-PU	RCS3-MU6R-60-TA-B-CJT-☐-PU	
			Outside	RCS3-MU6R-60-TA-CJO-☐-PU	RCS3-MU6R-60-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU6R-60-TA-CJB-☐-PU	RCS3-MU6R-60-TA-B-CJB-☐-PU	
		Incremental	Top	RCS3-MU6R-60-TA-CJT-☐-PU	RCS3-MU6R-60-TA-B-CJT-☐-PU	
			Outside	RCS3-MU6R-60-TA-CJO-☐-PU	RCS3-MU6R-60-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU6R-60-TA-CJB-☐-PU	RCS3-MU6R-60-TA-B-CJB-☐-PU	
		Battery-less absolute	Top	RCS3-MU6R-60-WA-CJT-☐-PU	RCS3-MU6R-60-WA-B-CJT-☐-PU	
			Outside	RCS3-MU6R-60-WA-CJO-☐-PU	RCS3-MU6R-60-WA-B-CJO-☐-PU	
			Bottom	RCS3-MU6R-60-WA-CJB-☐-PU	RCS3-MU6R-60-WA-B-CJB-☐-PU	
RA7R	100W	Absolute	Top	RCS3-MU7R-100-TA-CJT-☐-PU	RCS3-MU7R-100-TA-B-CJT-☐-PU	
			Outside	RCS3-MU7R-100-TA-CJO-☐-PU	RCS3-MU7R-100-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU7R-100-TA-CJB-☐-PU	RCS3-MU7R-100-TA-B-CJB-☐-PU	
		Incremental	Top	RCS3-MU7R-100-TA-CJT-☐-PU	RCS3-MU7R-100-TA-B-CJT-☐-PU	
			Outside	RCS3-MU7R-100-TA-CJO-☐-PU	RCS3-MU7R-100-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU7R-100-TA-CJB-☐-PU	RCS3-MU7R-100-TA-B-CJB-☐-PU	
		Battery-less absolute	Top	RCS3-MU7R-100-WA-CJT-☐-PU	RCS3-MU7R-100-WA-B-CJT-☐-PU	
			Outside	RCS3-MU7R-100-WA-CJO-☐-PU	RCS3-MU7R-100-WA-B-CJO-☐-PU	
			Bottom	RCS3-MU7R-100-WA-CJB-☐-PU	RCS3-MU7R-100-WA-B-CJB-☐-PU	
RA8R	200W	Absolute	Top	RCS3-MU8R-200-TA-CJT-☐-PU	RCS3-MU8R-200-TA-B-CJT-☐-PU	
			Outside	RCS3-MU8R-200-TA-CJO-☐-PU	RCS3-MU8R-200-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU8R-200-TA-CJB-☐-PU	RCS3-MU8R-200-TA-B-CJB-☐-PU	
		Incremental	Top	RCS3-MU8R-200-TA-CJT-☐-PU	RCS3-MU8R-200-TA-B-CJT-☐-PU	
			Outside	RCS3-MU8R-200-TA-CJO-☐-PU	RCS3-MU8R-200-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU8R-200-TA-CJB-☐-PU	RCS3-MU8R-200-TA-B-CJB-☐-PU	
		Battery-less absolute	Top	RCS3-MU8R-200-WA-CJT-☐-PU	RCS3-MU8R-200-WA-B-CJT-☐-PU	
			Outside	RCS3-MU8R-200-WA-CJO-☐-PU	RCS3-MU8R-200-WA-B-CJO-☐-PU	
			Bottom	RCS3-MU8R-200-WA-CJB-☐-PU	RCS3-MU8R-200-WA-B-CJB-☐-PU	
RA10R	400W	Absolute	Top	RCS3-MU10R-400-TA-CJT-☐-PU	RCS3-MU10R-400-TA-B-CJT-☐-PU	
			Outside	RCS3-MU10R-400-TA-CJO-☐-PU	RCS3-MU10R-400-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU10R-400-TA-CJB-☐-PU	RCS3-MU10R-400-TA-B-CJB-☐-PU	
		Incremental	Top	RCS3-MU10R-400-TA-CJT-☐-PU	RCS3-MU10R-400-TA-B-CJT-☐-PU	
			Outside	RCS3-MU10R-400-TA-CJO-☐-PU	RCS3-MU10R-400-TA-B-CJO-☐-PU	
			Bottom	RCS3-MU10R-400-TA-CJB-☐-PU	RCS3-MU10R-400-TA-B-CJB-☐-PU	
		Battery-less absolute	Top	RCS3-MU10R-400-WA-CJT-☐-PU	RCS3-MU10R-400-WA-B-CJT-☐-PU	
			Outside	RCS3-MU10R-400-WA-CJO-☐-PU	RCS3-MU10R-400-WA-B-CJO-☐-PU	
			Bottom	RCS3-MU10R-400-WA-CJB-☐-PU	RCS3-MU10R-400-WA-B-CJB-☐-PU	

② Timing belt

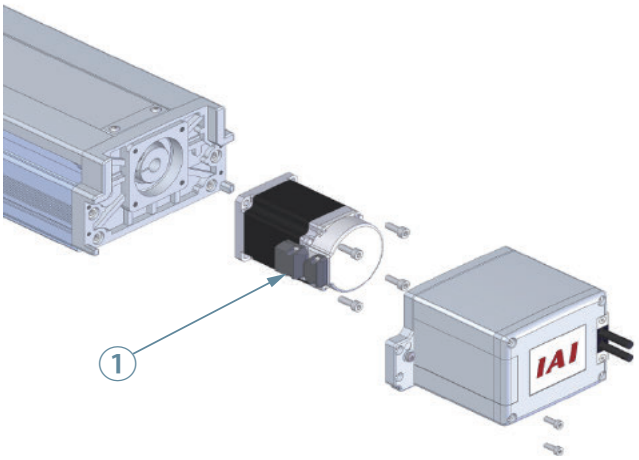
Type	Model
RA4R	TB-RCS3-RA4R
RA6R	TB-RCS3-RA6R
RA7R	TB-RCS3-RA7R
RA8R	TB-RCS3-RA8R
RA10R	TB-RCS3-RA10R

③ Load cell unit

Type	Model	Note
RCS3-RA4R	VLC-200N-291-FR	Includes frame and flange
RCS3-RA6R	VLC-600N-291-FR	Includes frame and flange
RCS3-RA7R	VLC-2KN-271-FR	Includes frame and flange
RCS3-RA8R	VLC-2KN-271-FR	Includes frame and flange
RCS3-RA10R	VLC-6KN-082B2-FR	Includes frame and flange
RCS3-RA15R	VLC-50KN-338-FR	Includes frame
RCS3-RA20R	VLC-50KN-338-FR	Includes frame

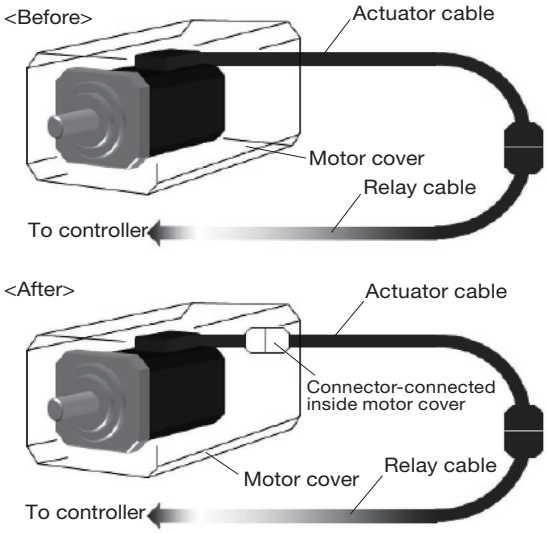
* RCS3-RA15R, RCS3-RA20R, and RCS2-RA13R require special tools for replacement. Please contact us to safely replace a motor or Belt.

Illustrations of Maintenance Parts: IS(P)B/IS(P)DB (Except for WXM/WXMX)

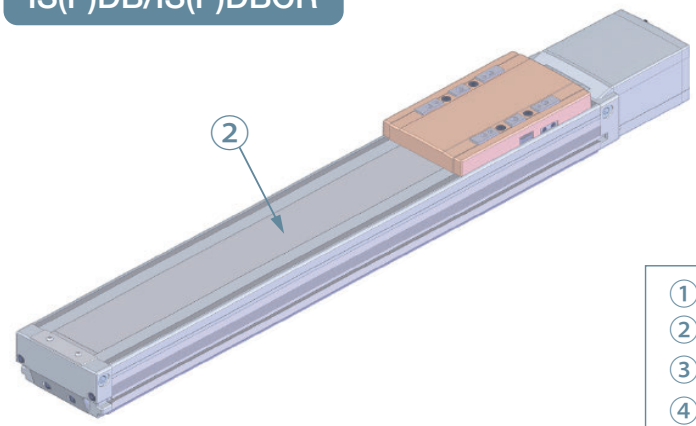


For customers who purchase the replacement parts for IS(P)B/IS(P)DB Series.

We changed the motor wiring for easier maintenance. We guarantee compatibility of replacement parts.

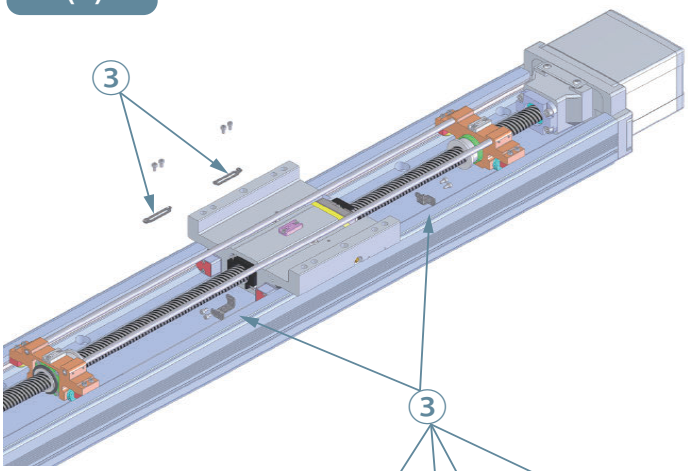


IS(P)DB/IS(P)DBCR

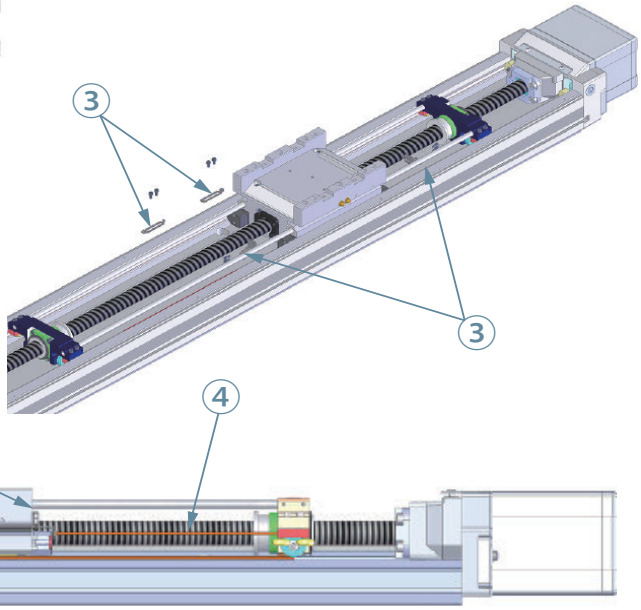


① Motor unit
② Stainless steel sheet
③ Support hooks
④ Tension wires

IS(P)B



IS(P)DB/IS(P)DBCR



List of Maintenance Parts: IS(P)B/IS(P)DB (Except for WXM/WXMX)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Series/Type	Motor (W)	Encoder Type	Cable Exit Direction	① Motor unit (with Actuator cable)*	
				Without Brake	With Brake
IS(P)B-SXM/SXL IS(P)DB/IS(P)DBCR-S	60	Battery-less Absolute	A1E, A1S	M-ISB-TMA060-WA-CO-A1	M-ISB-TMA060-WA-B-CO-A1
			A3E, A3S	M-ISB-TMA060-WA-CO-A3	M-ISB-TMA060-WA-B-CO-A3
		Absolute	A1E, A1S	M-ISB-TMA060-TA-CO-A1	M-ISB-TMA060U-TA-B-CO-A1*
			A3E, A3S	M-ISB-TMA060-TA-CO-A3	M-ISB-TMA060U-TA-B-CO-A3*
		Incremental	A1E, A1S	M-ISB-TMA060-TC-CO-A1	M-ISB-TMA060U-TC-B-CO-A1*
			A3E, A3S	M-ISB-TMA060-TC-CO-A3	M-ISB-TMA060U-TC-B-CO-A3*
	100	Battery-less Absolute	A1E, A1S	M-ISB-TMA100S-WA-CO-A1	M-ISB-TMA100S-WA-B-CO-A1
			A3E, A3S	M-ISB-TMA100S-WA-CO-A3	M-ISB-TMA100S-WA-B-CO-A3
IS(P)B-MXM/MXL/MXMX IS(P)DB/IS(P)DBCR-M/MX	100	Battery-less Absolute	A1E, A1S	M-ISB-TMA100-WA-CO-A1	M-ISB-TMA100-WA-B-CO-A1
			A3E, A3S	M-ISB-TMA100-WA-CO-A3	M-ISB-TMA100-WA-B-CO-A3
		Absolute	A1E, A1S	M-ISB-TMA100-TA-CO-A1	M-ISB-TMA100U-TA-B-CO-A1*
			A3E, A3S	M-ISB-TMA100-TA-CO-A3	M-ISB-TMA100U-TA-B-CO-A3*
		Incremental	A1E, A1S	M-ISB-TMA100-TC-CO-A1	M-ISB-TMA100U-TC-B-CO-A1*
			A3E, A3S	M-ISB-TMA100-TC-CO-A3	M-ISB-TMA100U-TC-B-CO-A3*
	200	Battery-less Absolute	A1E, A1S	M-ISB-TMA200-WA-CO1-A1	M-ISB-TMA200-WA-B-CO1-A1
			A3E, A3S	M-ISB-TMA200-WA-CO1-A3	M-ISB-TMA200-WA-B-CO1-A3
		Absolute	A1E, A1S	M-ISB-TMA200-TA-CO1-A1	M-ISB-TMA200U-TA-B-CO1-A1*
			A3E, A3S	M-ISB-TMA200-TA-CO1-A3	M-ISB-TMA200U-TA-B-CO1-A3*
		Incremental	A1E, A1S	M-ISB-TMA200-TC-CO1-A1	M-ISB-TMA200U-TC-B-CO1-A1*
			A3E, A3S	M-ISB-TMA200-TC-CO1-A3	M-ISB-TMA200U-TC-B-CO1-A3*
	400	Battery-less Absolute	A1E, A1S	M-ISB-TMA400M-WA-CO-A1	M-ISB-TMA400M-WA-B-CO-A1
			A3E, A3S	M-ISB-TMA400M-WA-CO-A3	M-ISB-TMA400M-WA-B-CO-A3
IS(P)B-LXM/LXL/LXMX/LXUWX IS(P)DB/IS(P)DBCR-L/LX	200	Battery-less Absolute	A1E, A1S	M-ISB-TMA200-WA-CO2-A1	M-ISB-TMA200-WA-B-CO2-A1
			A3E, A3S	M-ISB-TMA200-WA-CO2-A3	M-ISB-TMA200-WA-B-CO2-A3
		Absolute	A1E, A1S	M-ISB-TMA200-TA-CO2-A1	M-ISB-TMA200U-TA-B-CO2-A1*
			A3E, A3S	M-ISB-TMA200-TA-CO2-A3	M-ISB-TMA200U-TA-B-CO2-A3*
		Incremental	A1E, A1S	M-ISB-TMA200-TC-CO2-A1	M-ISB-TMA200U-TC-B-CO2-A1*
			A3E, A3S	M-ISB-TMA200-TC-CO2-A3	M-ISB-TMA200U-TC-B-CO2-A3*
	400	Battery-less Absolute	A1E, A1S	M-ISB-TMA400-WA-CO-A1	M-ISB-TMA400-WA-B-CO-A1
			A3E, A3S	M-ISB-TMA400-WA-CO-A3	M-ISB-TMA400-WA-B-CO-A3
		Absolute	A1E, A1S	M-ISB-TMA400-TA-CO-A1	M-ISB-TMA400U-TA-B-CO-A1*
			A3E, A3S	M-ISB-TMA400-TA-CO-A3	M-ISB-TMA400U-TA-B-CO-A3*
		Incremental	A1E, A1S	M-ISB-TMA400-TC-CO-A1	M-ISB-TMA400U-TC-B-CO-A1*
			A3E, A3S	M-ISB-TMA400-TC-CO-A3	M-ISB-TMA400U-TC-B-CO-A3*

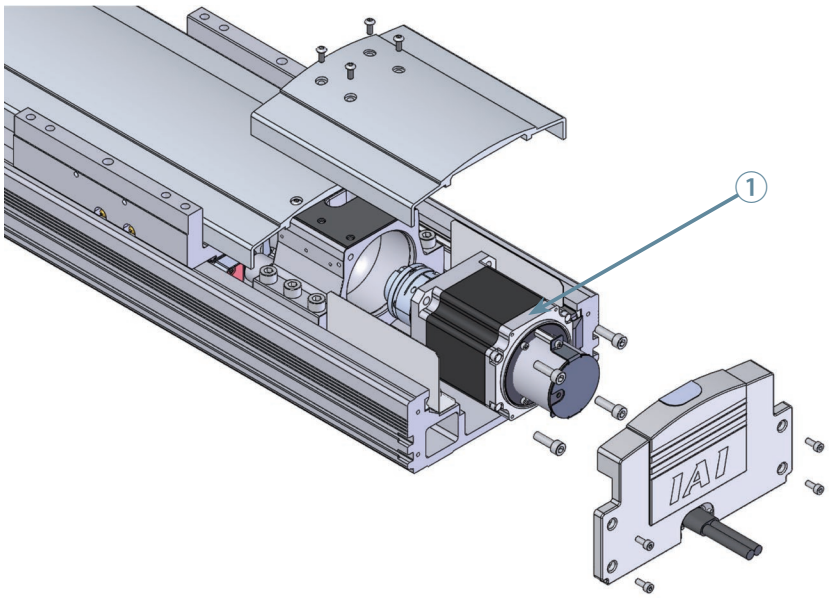
Series	Type	② Stainless steel sheet*1
IS(P)DB	S	ST-SB1-(Stroke)
	M	ST-MB1-(Stroke)
	MX	ST-MXB1-(Stroke)
	L	ST-LB1-(Stroke)
	LX	ST-LXB1-(Stroke)
IS(P)DBCR	S	ST-SB2-(Stroke)
	M	ST-MB2-(Stroke)
	MX	ST-MXB2-(Stroke)
	L	ST-LB2-(Stroke)
	LX	ST-LXB2-(Stroke)

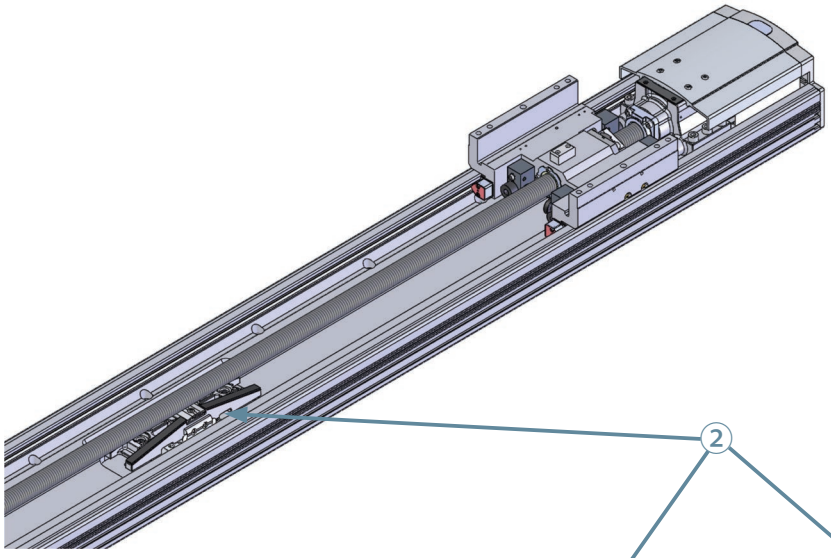
Series	Type	Mid-support Parts	
		③ Support hooks (for 1 axis: 2 pcs each for slider and base mounting)	④ Tension wires*1, *2 (for 1 axis: 2-piece set)
IS(P)B	MXMX	WF-1	WR-MXMB-(Stroke)
	LXMX		WR-LXMB-(Stroke)
	LXUWX		WR-LXUB-(Stroke)
IS(P)DB	MX	WF-4	WR-MXB1-(Stroke)
	LX	WF-7	WR-LXB1-(Stroke)
IS(P)DBCR	MX	WF-4	WR-MXB1-(Stroke)
	LX	WF-7	WR-LXB1-(Stroke)

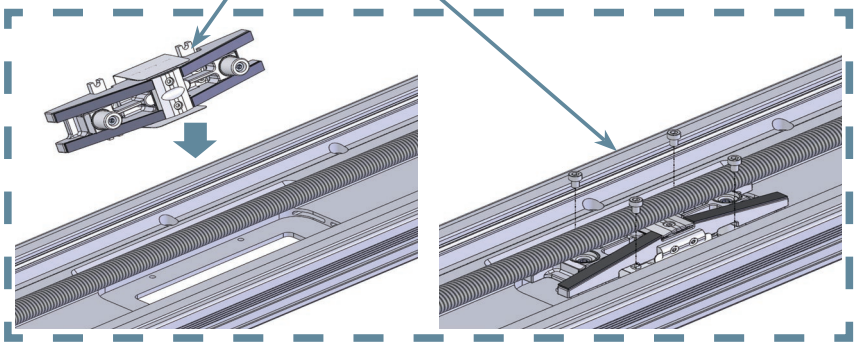
*1 Stroke size: Use the stroke value described in the actuator model. For double slider specifications, please contact our sales representative.
*2 The length of the tension wire is different for the special specification "without motor". Please contact our sales representative.

Illustrations of Maintenance Parts: IS(P)B-WXM/WXMX

IS(P)B







① Motor unit
② Intermediate support assembly

List of Maintenance Parts: IS(P)B-WXM/WXMX

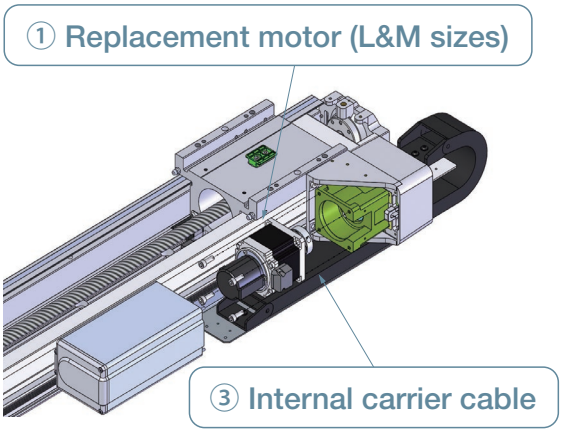
The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

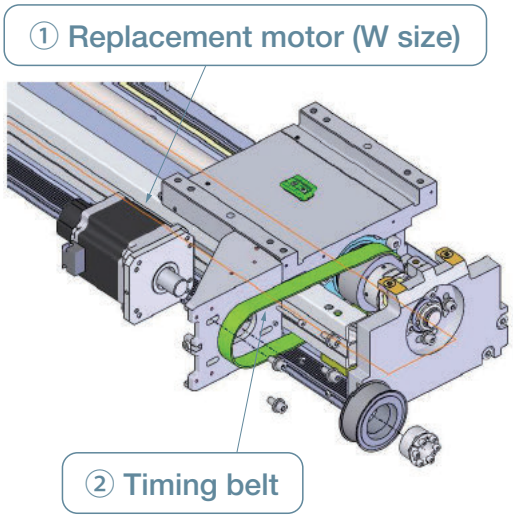
Series/Type	① Motor unit	
	Without Brake	With Brake
IS(P)B-WXM/WXMX	M-ISB-TMA750-WA-CO	M-ISB-TMA750-WA-BT-CO

Series/Type	② Intermediate support assembly
IS(P)B-WXMX	IMS-ISB-WXM

Illustrations of Maintenance Parts: NSA

NSA





List of Maintenance Parts: NSA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

① Replacement motor

Size	Model	Note
M	NSA-MUM-CO	With coupling, without brake
L	NSA-MUL-CO	With coupling, without brake
W	NSA-MUW	Without coupling, without brake

② Timing belt

Size	Model	Note
M	TB-NSA-M	
L	TB-NSA-L	
W	TB-NSA-W	

* The customer cannot replace LXMXS, LXMXM, WXMXS, WXMXM belts.
If there is any abnormality, contact IAI representatives.

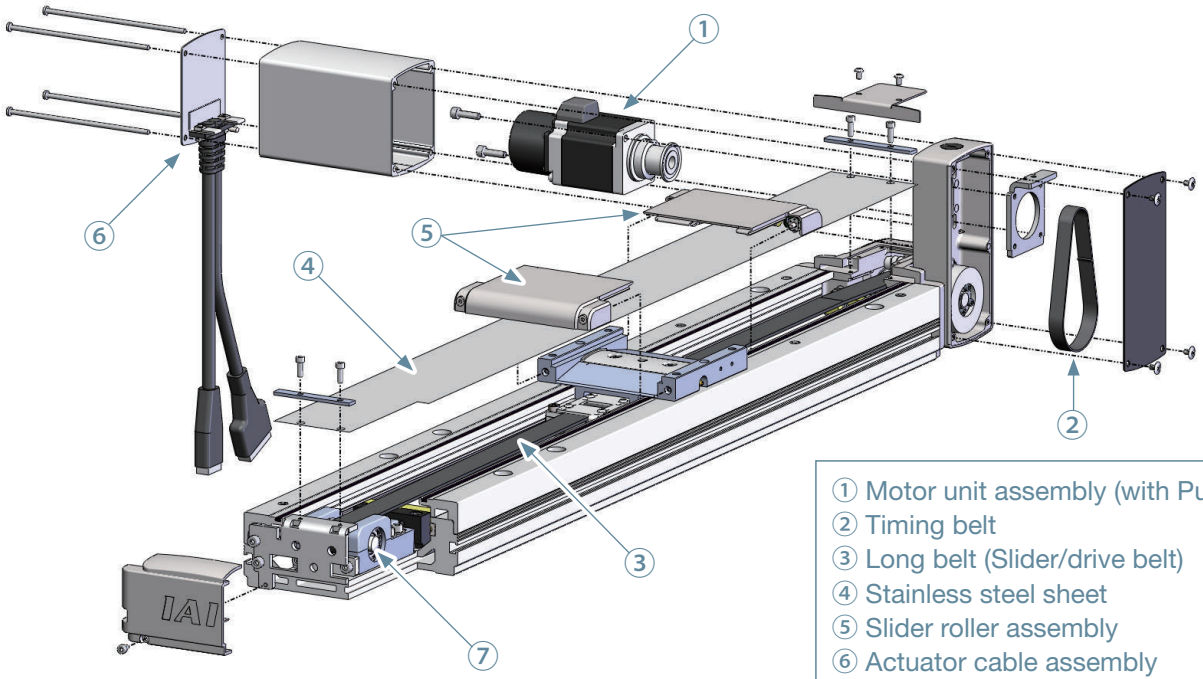
③ Internal carrier cable

Size	Model	Note
M	CB-NSAM-AST Stroke	For standard cable carrier (CT3, CT4) / For user cable carrier (UM3, UM4)
	CB-NSAM-AST Stroke-ET	For extended cable carrier (ET5, ET6, ET7, ET8)
	CB-NSAM-AST Stroke-NT	For specifications without cable carrier (NT3, NT4)
L	CB-NSAL-AST Stroke	For standard cable carrier (CT3, CT4) / For user cable carrier (UM3, UM4)
	CB-NSAL-AST Stroke-ET	For extended cable carrier (ET5, ET6, ET7, ET8)
	CB-NSAL-AST Stroke-NT	For specifications without cable carrier (NT3, NT4)
W	CB-NSAW-AST Stroke	For standard cable carrier (CT3, CT4) / For user cable carrier (UM3, UM4)
	CB-NSAW-AST Stroke-ET	For extended cable carrier (ET5, ET6, ET7, ET8)
	CB-NSAW-AST Stroke-NT	For specifications without cable carrier (NT3, NT4)

*The stroke value in the actuator model is used as it is.

Illustrations of Maintenance Parts: IFA

IFA



① Motor unit assembly (with Pulley)
② Timing belt
③ Long belt (Slider/drive belt)
④ Stainless steel sheet
⑤ Slider roller assembly
⑥ Actuator cable assembly
⑦ Driven pulley assembly

List of Maintenance Parts: IFA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

① Motor unit assembly (with Pulley)

Type	Motor wattage (W)	Model
SA	100	M-IFA-TMA100-WA-PU
MA	200	M-IFA-TMA200-WA-PU
	400	M-IFA-TMA400-WA-PU

② Timing belt

Type	Model
SA	TB-IFA-SA
MA	TB-IFA-MA

③ Long belt (Slider/drive belt)

Type	Model
SA	LB-IFA-SA-○○○
MA	LB-IFA-MA-○○○

*○○○ indicates the stroke

④ Stainless steel sheet

Type	Model	
	Single slider	Double slider
SA	ST-IFA-SA-○○○	ST-IFA-SAD-○○○
MA	ST-IFA-MA-○○○	ST-IFA-MAD-○○○

*○○○ indicates the stroke in the model name.

⑤ Slider roller assembly

Type	Model
SA	SR-IFA-SA
MA	SR-IFA-MA

*The above model is for one side.
Order two sets for one axis.

⑥ Actuator cable (pigtail cable) assembly

Type	Model
SA	CB-IFA-SA-MPA-AS
MA	CB-IFA-MA-MPA-AS

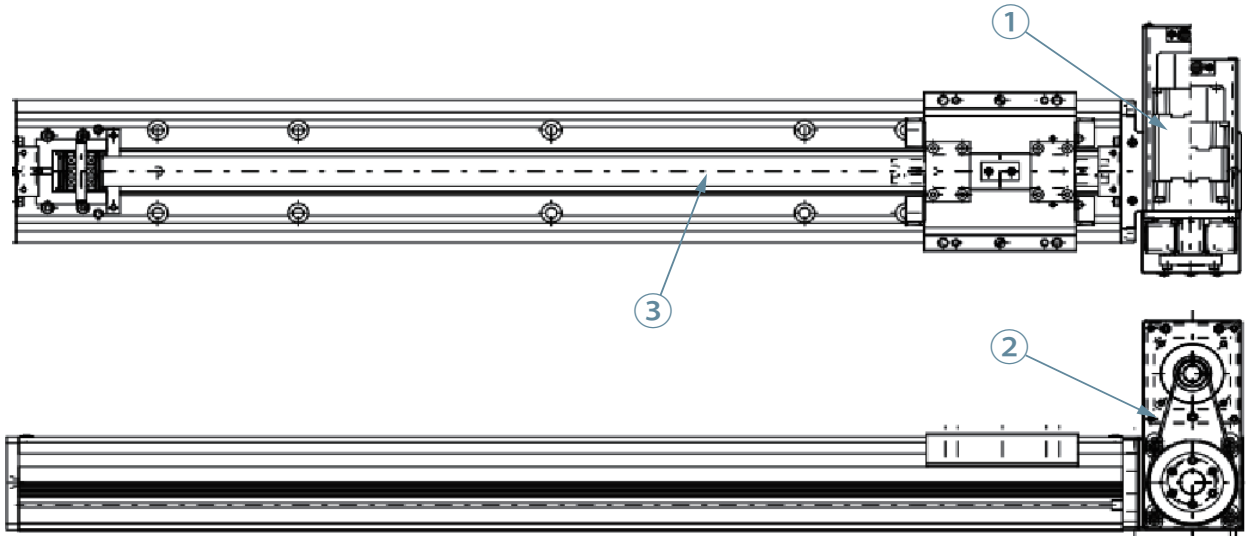
⑦ Driven pulley assembly

Type	Model
SA	PLY-IFA-SA
MA	PLY-IFA-MA

Illustration / List of Maintenance Parts: IF Series

IF

*IF body is no longer produced.



① Motor unit
② Timing belt
③ Long belt (Slider/drive belt)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

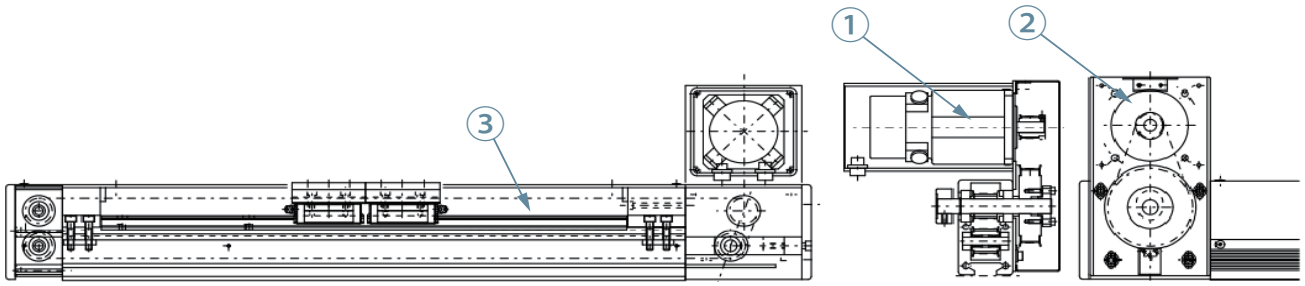
Model	Motor (w)	Encoder Type	① Motor unit (with Pulley)	② Timing belt	③ Long belt *1 (Slider/drive belt)
IF-SA□□	60	Absolute	M-IF-IAA060-TA-PU	TB-IF-SA	LB-IF-SA-(Stroke)
		Incremental	M-IF-IAA060-TC-PU		
	100	Absolute	M-IF-IAA100-TA-PU		
		Incremental	M-IF-IAA100-TC-PU		
IF-MA□□	200	Absolute	M-IF-IAA200-TA-PU	TB-IF-MA	LB-IF-MA-(Stroke)
		Incremental	M-IF-IAA200-TC-PU		
	400	Absolute	M-IF-IAA400-TA-PU		
		Incremental	M-IF-IAA400-TC-PU		

*1 Notation of the stroke: Use the stroke value described in the actuator model.

Illustration / List of Maintenance Parts: FS Series

FS

*FS body is no longer produced.



① Motor unit
② Timing belt
③ Long belt (Slider/drive belt)

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Model	Motor (w)	Encoder Type	① Motor unit (with Pulley)	② Timing belt	③ Long belt *1*2 (Slider/drive belt)
FS-□□NM	60	Absolute	M-FN-IAA060-TA-PU	TB-FS-NM-(Wattage) TB-FS-NM-(Wattage)-U *3	LB-FS-□□NM-(Stroke)
		Incremental	M-FN-IAA060-TC-PU		
	100	Absolute	M-FN-IAA100-TA-PU		
		Incremental	M-FN-IAA100-TC-PU		
FS-□□WM	100	Absolute	M-FW-IAA100-TA-PU	TB-FS-WM TB-FS-WM-U *3	LB-FS-□□WM-(Stroke)
		Incremental	M-FW-IAA100-TC-PU		
	200	Absolute	M-FW-IAA200-TA-PU		
		Incremental	M-FW-IAA200-TC-PU		
FS-□□LM	400	Absolute	M-FL-IAA400-TA-PU	TB-FS-LM	LB-FS-□□LM-(Stroke)
		Incremental	M-FL-IAA400-TC-PU		
FS-□□HM		Absolute	M-FL-IAA400-TA-PU	TB-FS-HM	LB-FS-□□HM-(Stroke)
		Incremental	M-FL-IAA400-TC-PU		

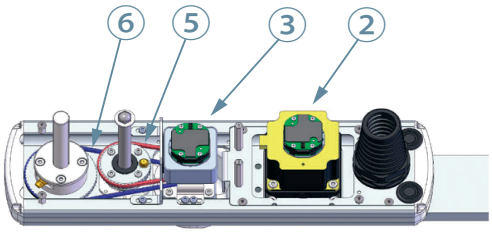
*1 Description of the stroke: Use the stroke value described in the actuator model.

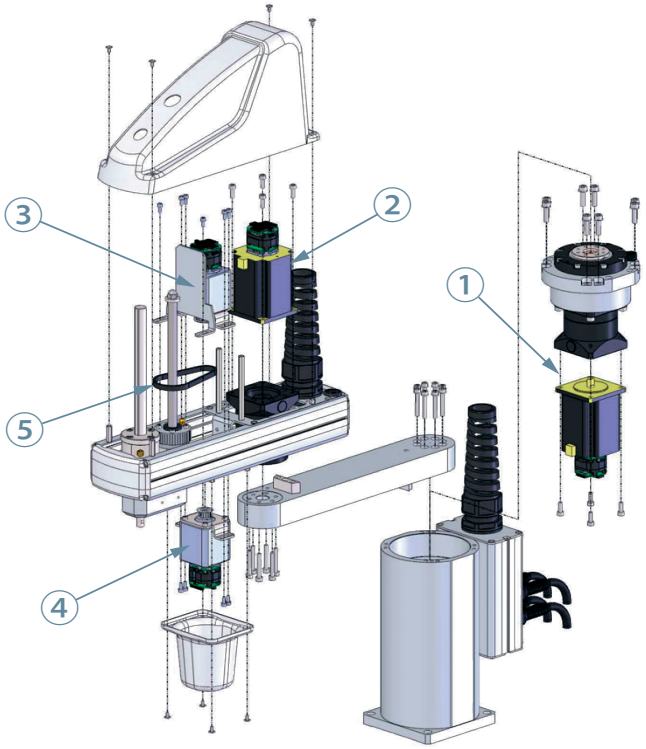
*2 If the D2 option is selected for FS-12NM/WM, add "-D2" at the end.

*3 When U (motor attached to the bottom) is chosen.

Illustrations of Maintenance Parts: IXP Series

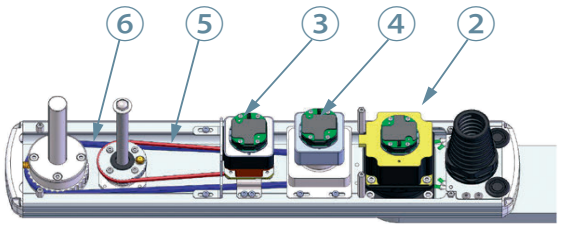
IXP-□N35/45

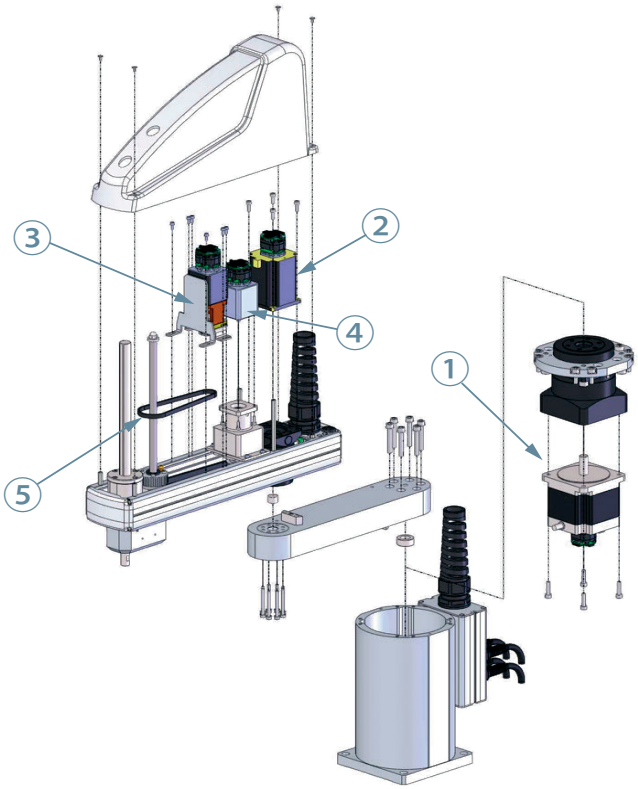




① 1st axis motor unit
② 2nd axis motor unit
③ 3rd axis motor unit
④ 4th axis motor unit
⑤ Timing belt (for vertical axis)
⑥ Timing belt (for rotary axis)

IXP-□N55/65





List of Maintenance Parts: IXP Series

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

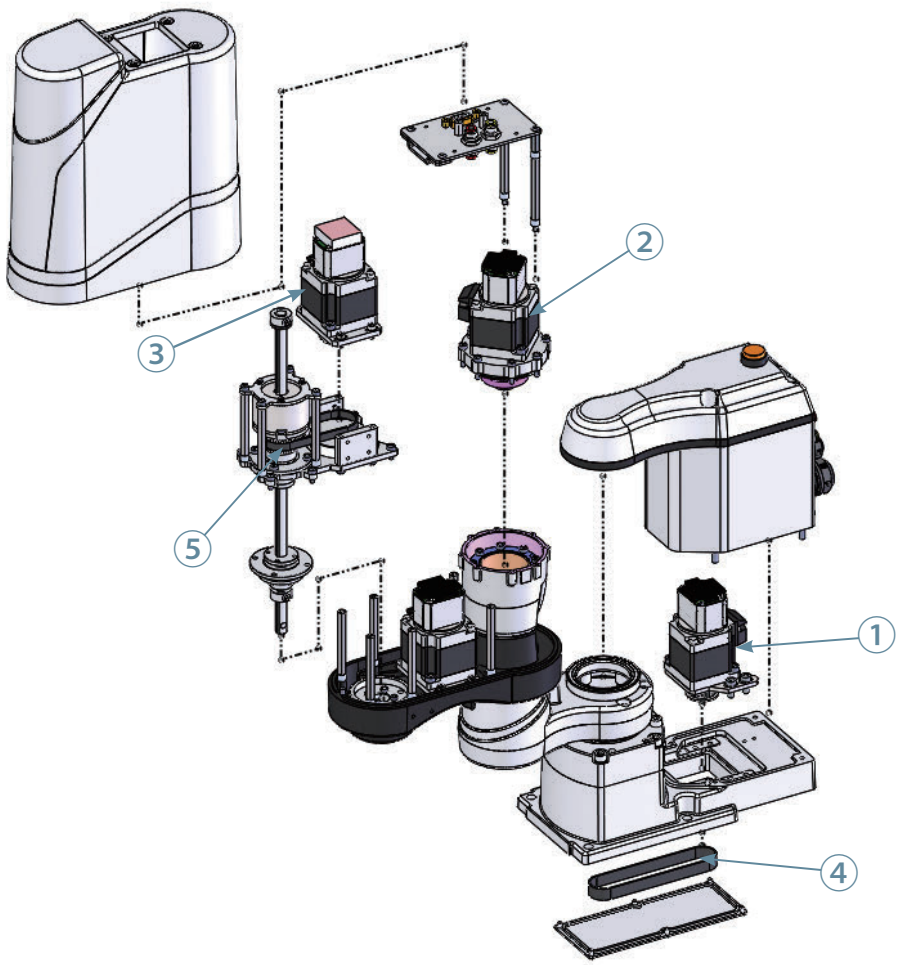
Type	Shaft No. of Motor	Model	Note
IXP-□N35/45	① 1st axis	M-IXP-N35-1	
	② 2nd axis	M-IXP-N35-2	
	③ 3rd axis (without brake)	M-IXP-N35-3–PU	with bracket and pulley
	④ 4th axis	M-IXP-N35-4–PU	with bracket and pulley
IXP-□N55/65	① 1st axis	M-IXP-N55-1	
	② 2nd axis	M-IXP-N55-2	
	③ 3rd axis (without brake)	M-IXP-N55-3-PU	with bracket and pulley, without brake
	③ 3rd axis (with brake)	M-IXP-N55-3-B-PU	with bracket and pulley, and brake
	④ 4th axis	M-IXP-N55-4-PU	with bracket and pulley

Type	⑤ Timing belt (for vertical axis)	⑥ Timing belt (for rotary axis)
IXP-□N35/45	TB-IXP-N35-3	TB-IXP-N35-4
IXP-□N55/65	TB-IXP-N55-3	TB-IXP-N55-4

*Contact us for cleanroom and dust-proof/splash-proof specifications.

Illustrations of Maintenance Parts: IXA

IXA-□NNN1805



① 1st axis motor unit
② 2nd axis motor unit
③ 3rd axis motor unit
④ Timing belt (for 1st axis)
⑤ Timing belt (for vertical axis)

List of Maintenance Parts: IXA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

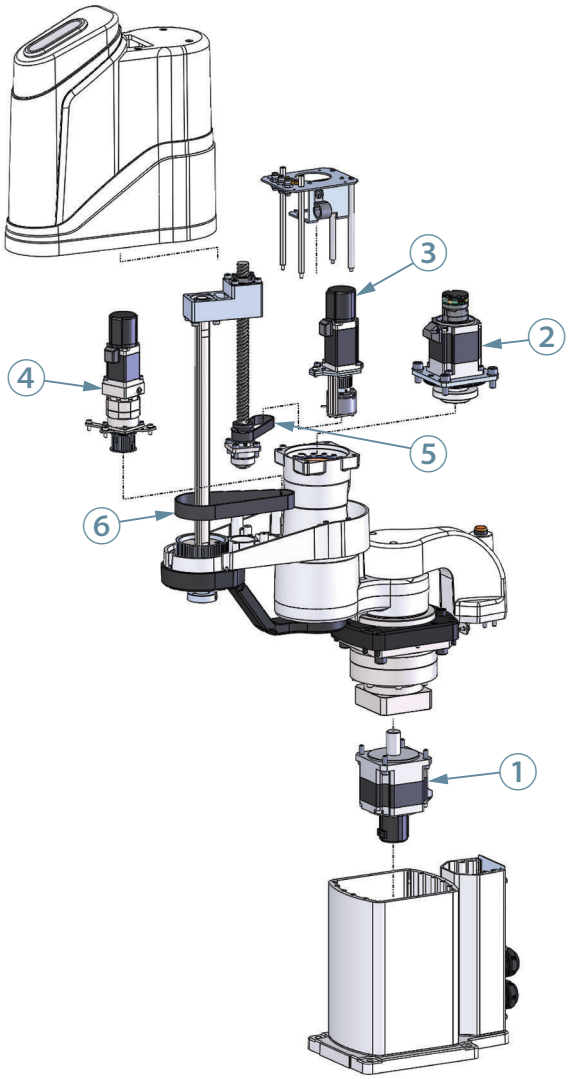
Type	Motor Axis No.	Model	Note
IXA-□NNN1815	① 1st axis	M-IXA-N18-1-PU	with pulley
	② 2nd axis	M-IXA-N18-2	
	③ 3rd axis	M-IXA-N18-3-PU	with pulley

Type	④ Timing belt (for 1st axis)	⑤ Timing belt (for vertical axis)
IXA-□NNN1815	TB-IXA-18-1	TB-IXA-18-3

* The motor and timing Belt for the 4th axis (turning axis) cannot be changed by the customer.

Illustrations of Maintenance Parts: IXA

IXA-□NNN3015
IXA-□NSN3015



① 1st axis motor unit
② 2nd axis motor unit
③ 3rd axis motor unit
④ 4th axis motor unit
⑤ Timing belt (for vertical axis)
⑥ Timing belt (for rotary axis)

List of Maintenance Parts: IXA

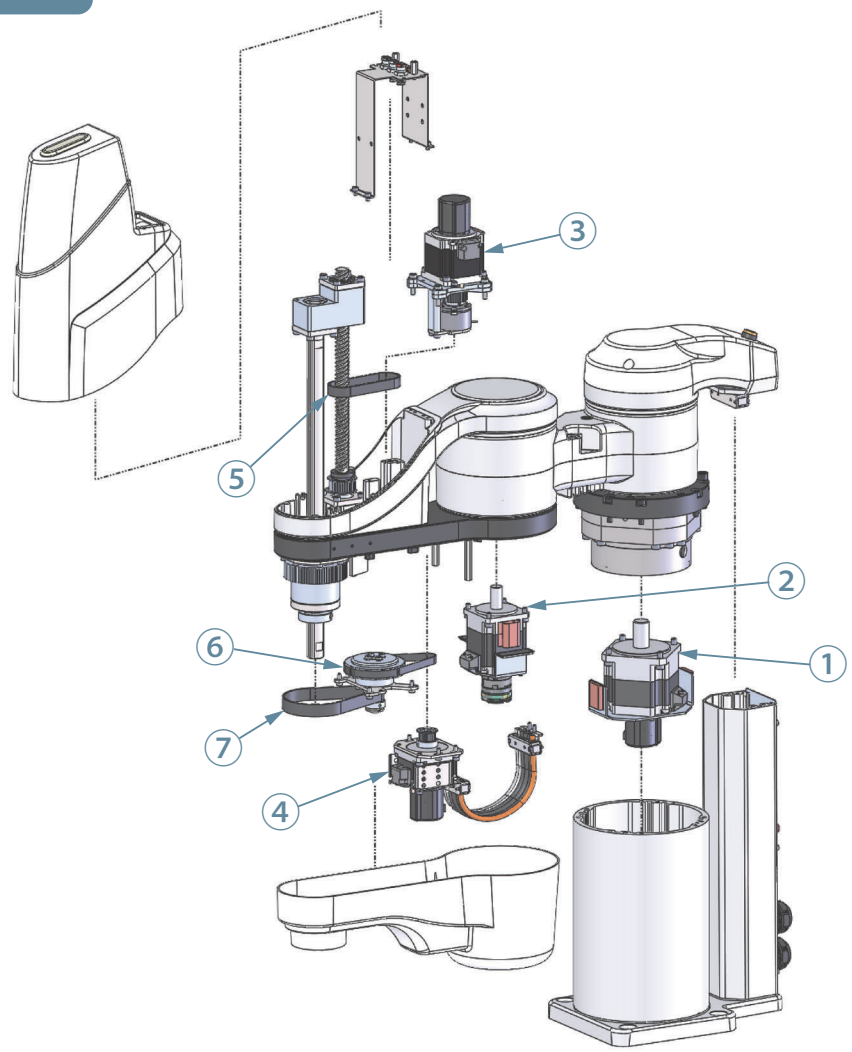
The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Type	Motor Axis No.	Model	Note
IXA-□NNN3015	① 1st axis	M-IXA-N30-1	
	② 2nd axis	M-IXA-N30-2	
	③ 3rd axis	M-IXA-N30-3-PU	with pulley
	④ 4th axis	M-IXA-N30-4	
IXA-□NSN3015	① 1st axis	M-IXA-S30-1	
	② 2nd axis	M-IXA-S30-2	
	③ 3rd axis	M-IXA-S30-3-PU	with pulley
	④ 4th axis	M-IXA-S30-4	

Type	⑤ Timing belt (for vertical axis)	⑥ Timing belt (for rotary axis)
IXA-□NNN3015	TB-IXA-30-3	TB-IXA-30-4
IXA-□NSN3015		

Illustrations of Maintenance Parts: IXA

IXA-□NNN45□□
IXA-□NSN45□□
IXA-□NNN60□□
IXA-□NSN60□□



① 1st axis motor unit
② 2nd axis motor unit
③ 3rd axis motor unit
④ 4th axis motor unit
⑤ Timing belt (for vertical axis)
⑥ Timing belt (for rotary axis, 1st stage)
⑦ Timing belt (for rotary axis, 2nd stage)

List of Maintenance Parts: IXA

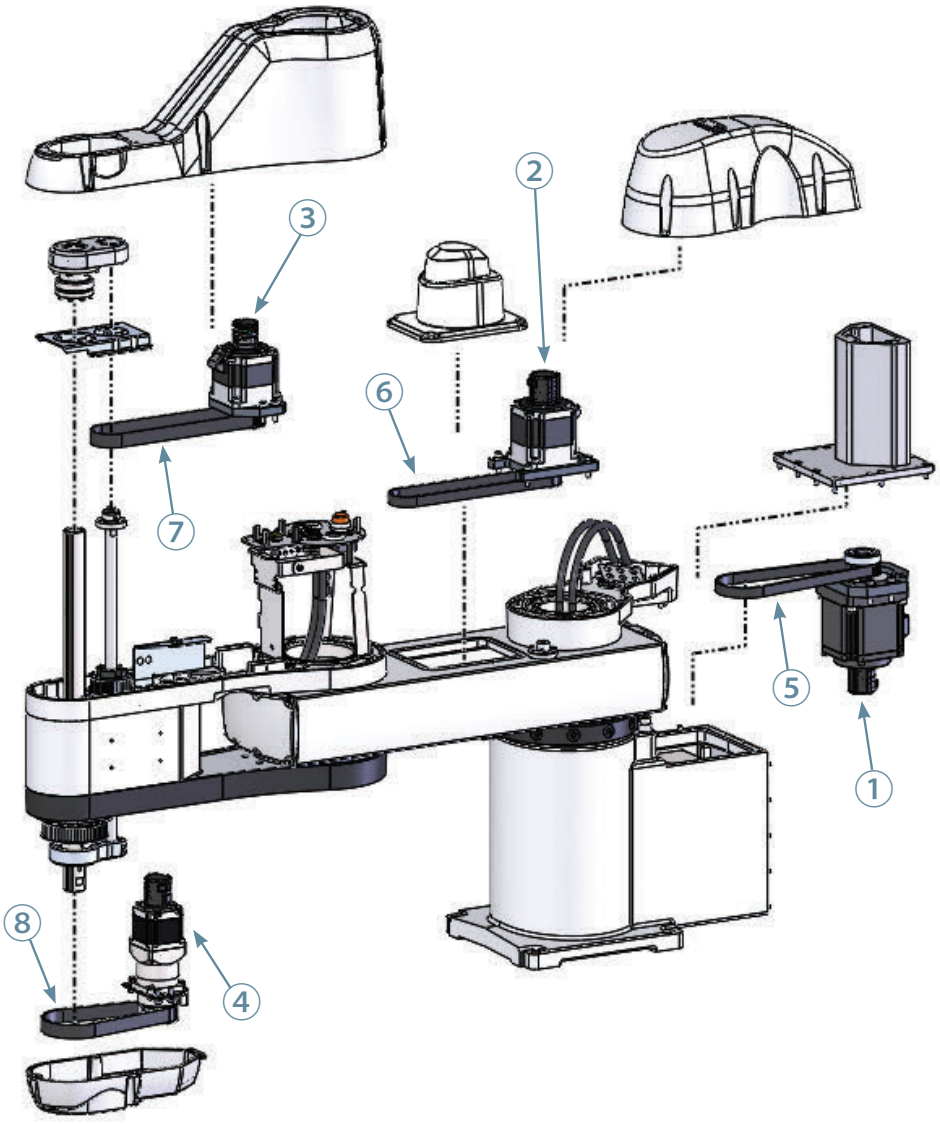
The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Type	Motor Axis No.	Model	Note
IXA-□NNN45□□	① 1st axis	M-IXA-N45-1	
	② 2nd axis	M-IXA-N45-2	
	③ 3rd axis	M-IXA-N45-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-N45-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	④ 4th axis	M-IXA-N45-4-PU	With pulley
IXA-□NSN45□□	① 1st axis	M-IXA-S45-1	
	② 2nd axis	M-IXA-S45-2	
	③ 3rd axis	M-IXA-S45-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-S45-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	④ 4th axis	M-IXA-S45-4-PU	With pulley
IXA-□NNN60□□	① 1st axis	M-IXA-N60-1	
	② 2nd axis	M-IXA-N60-2	
	③ 3rd axis	M-IXA-N60-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-N60-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	④ 4th axis	M-IXA-N60-4-PU	With pulley
IXA-□NSN60□□	① 1st axis	M-IXA-S60-1	
	② 2nd axis	M-IXA-S60-2	
	③ 3rd axis	M-IXA-S60-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-S60-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	④ 4th axis	M-IXA-S60-4-PU	With pulley

Type	⑤ Timing belt (for vertical axis)	⑥ Timing belt (for rotary axis, 1st stage)	⑦ Timing belt (for rotary axis, 2nd stage)
IXA-□NNN45□□	TB-IXA-4560-3	TB-IXA-4560-4-1	TB-IXA-4560-4-2
IXA-□NNN60□□			
IXA-□NSN45□□			
IXA-□NSN60□□			

Illustrations of Maintenance Parts: IXA

IXA-4NNN80□□
IXA-4NSN80□□
IXA-4NNN100□□
IXA-4NSN100□□
IXA-4NHN10040
IXA-4NHN12040



① 1st axis motor unit
② 2nd axis motor unit
③ 3rd axis motor unit
④ 4th axis motor unit
⑤ 1st axis timing belt
⑥ 2nd axis timing belt
⑦ 3rd axis timing belt
⑧ 4th axis timing belt

List of Maintenance Parts: IXA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

Motor model for replacement

Type	Motor Axis No.	Model	Note
IXA-4NNN80□□	① 1st axis	M-IXA-N80-1-PU	with pulley
	② 2nd axis	M-IXA-N80-2-PU	with pulley
	③ 3rd axis	M-IXA-N80-3-PU	with pulley
	④ 4th axis	M-IXA-N80-4	
IXA-4NNN100□□	① 1st axis	M-IXA-N100-1-PU	with pulley
	② 2nd axis	M-IXA-N100-2-PU	with pulley
	③ 3rd axis	M-IXA-N100-3-PU	with pulley
	④ 4th axis	M-IXA-N100-4	
IXA-4NSN80□□	① 1st axis	M-IXA-S80-1-PU	with pulley
	② 2nd axis	M-IXA-S80-2-PU	with pulley
	③ 3rd axis	M-IXA-S80-3-PU	with pulley
	④ 4th axis	M-IXA-S80-4	
IXA-4NSN100□□	① 1st axis	M-IXA-S100-1-PU	with pulley
	② 2nd axis	M-IXA-S100-2-PU	with pulley
	③ 3rd axis	M-IXA-S100-3-PU	with pulley
	④ 4th axis	M-IXA-S100-4	
IXA-4NHN10040	① 1st axis	M-IXA-H100-1-PU	with pulley
	② 2nd axis	M-IXA-H100-2-PU	with pulley
	③ 3rd axis	M-IXA-H100-3-PU	with pulley
	④ 4th axis	M-IXA-H100-4	
IXA-4NHN12040	① 1st axis	M-IXA-H120-1-PU	with pulley
	② 2nd axis	M-IXA-H120-2-PU	with pulley
	③ 3rd axis	M-IXA-H120-3-PU	with pulley
	④ 4th axis	M-IXA-H120-4	

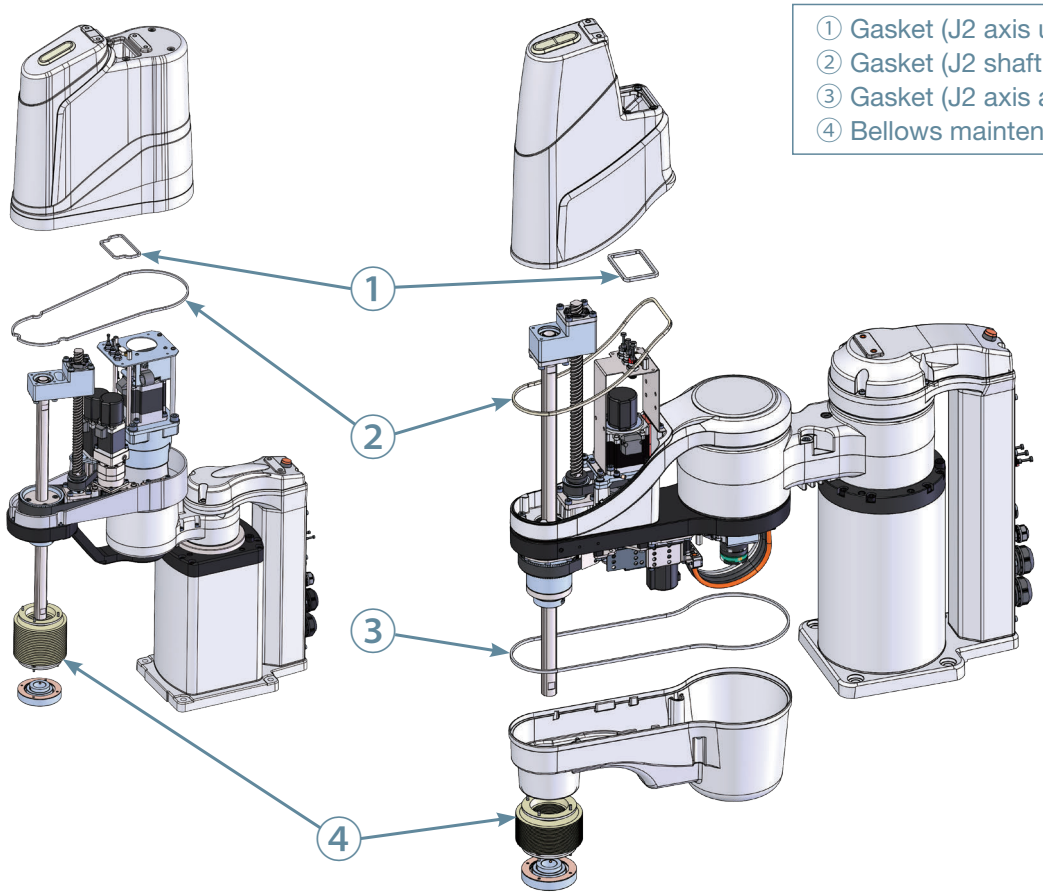
Timing Belt model for replacement

<table>
<tr><th>Type</th><th>⑤ Timing belt
(for 1st axis)</th><th>⑥ Timing belt
(for 2nd axis)</th><th>⑦ Timing belt
(for vertical axis)</th><th>⑧ Timing belt
(for rotary axis)</th></tr>
<tr><td>IXA-4NNN80□□</td><td>TB-IXA-80-1-N</td><td>TB-IXA-80-2-N</td><td rowspan="2">TB-IXA-80100-3-N</td><td rowspan="6">TB-IXA-80100-4</td></tr>
<tr><td>IXA-4NNN100□□</td><td>TB-IXA-100-1-N</td><td>TB-IXA-100-2-N</td></tr>
<tr><td>IXA-4NSN80□□</td><td rowspan="2">TB-IXA-80100-1-S</td><td>TB-IXA-80-2-S</td><td rowspan="2">TB-IXA-80100-3-S</td></tr>
<tr><td>IXA-4NSN100□□</td><td rowspan="3">TB-IXA-100-2-S</td></tr>
<tr><td>IXA-4NHN10040</td><td rowspan="2">TB-IXA-100-1-N</td><td rowspan="2">TB-IXA-100120-3-H</td></tr>
<tr><td>IXA-4NHN12040</td></tr>
</table>

Illustrations of Maintenance Parts: IXA

IXA-4NSC3015

IXA-4NSC45□□
IXA-4NSC60□□



① Gasket (J2 axis user panel)
② Gasket (J2 shaft spline cover)
③ Gasket (J2 axis arm cover)
④ Bellows maintenance assembly

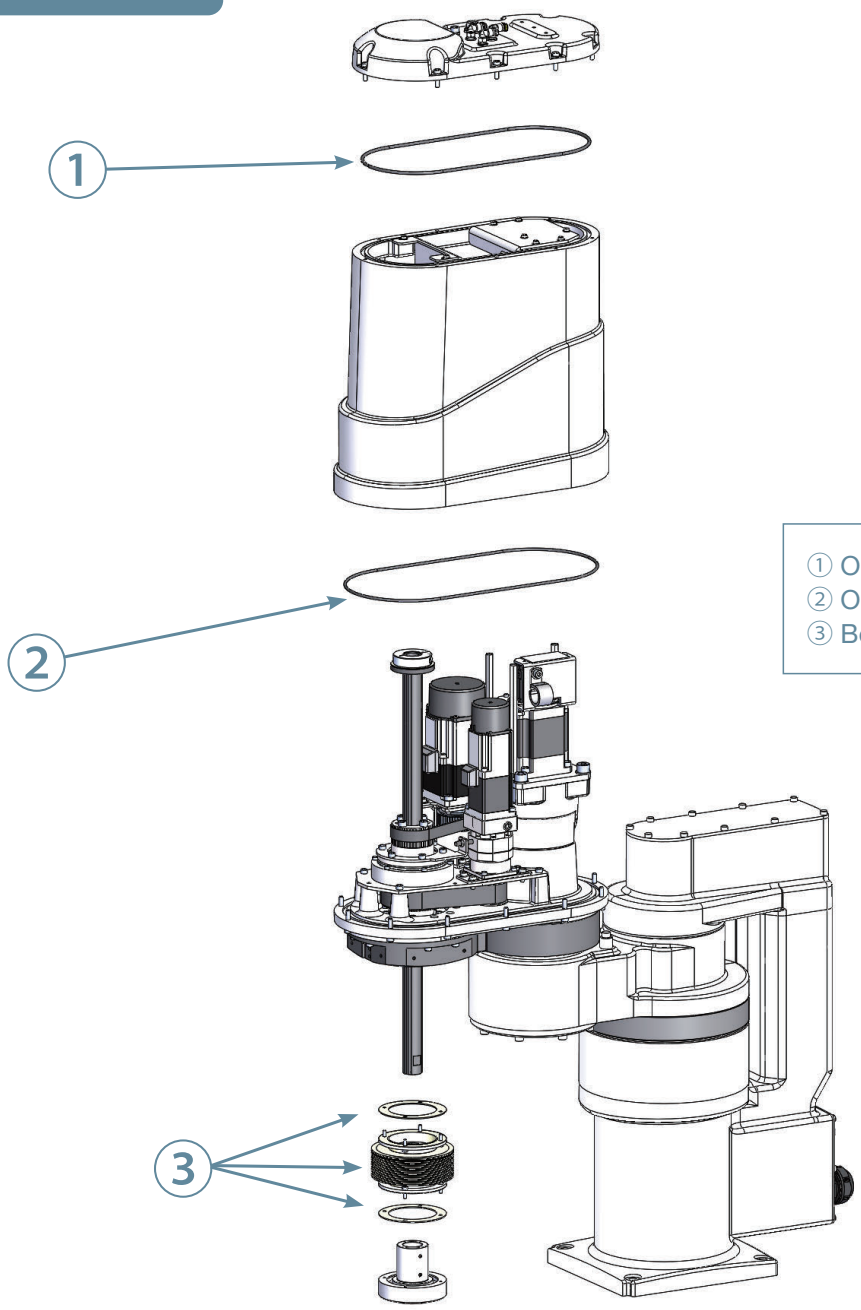
List of Maintenance Parts: IXA

The numbers in the table correspond to those in the schematics.

No.	Part name	Type	Model	Note
①	Gasket (J2 axis user panel)	IXA-4NSC3015	IXAC-PK1-30-2	
		IXA-4NSC45□□ IXA-4NSC60□□	IXAC-PK1-4560-2	
②	Gasket (J2 shaft spline cover)	IXA-4NSC3015	IXAC-PK2-30-2	
		IXA-4NSC45□□ IXA-4NSC60□□	IXAC-PK2-4560-2	
③	Gasket (J2 axis arm cover)	IXA-4NSC45□□ IXA-4NSC60□□	IXAC-PK3-4560-2	
④	Bellows maintenance assembly	IXA-4NSC3015	IXAC-JBA-304560-180	
		IXA-4NSC4518 IXA-4NSC6018	IXAC-JBA-304560-180	At vertical axis stroke of 180mm
		IXA-4NSC4533 IXA-4NSC6033	IXAC-JBA-304560-330	At vertical axis stroke of 330mm

Illustrations of Maintenance Parts: IXA

IXA-□NSW3015



① O-ring (J2 axis spline cover)
② O-ring (J2 axis arm cover)
③ Bellows maintenance assembly

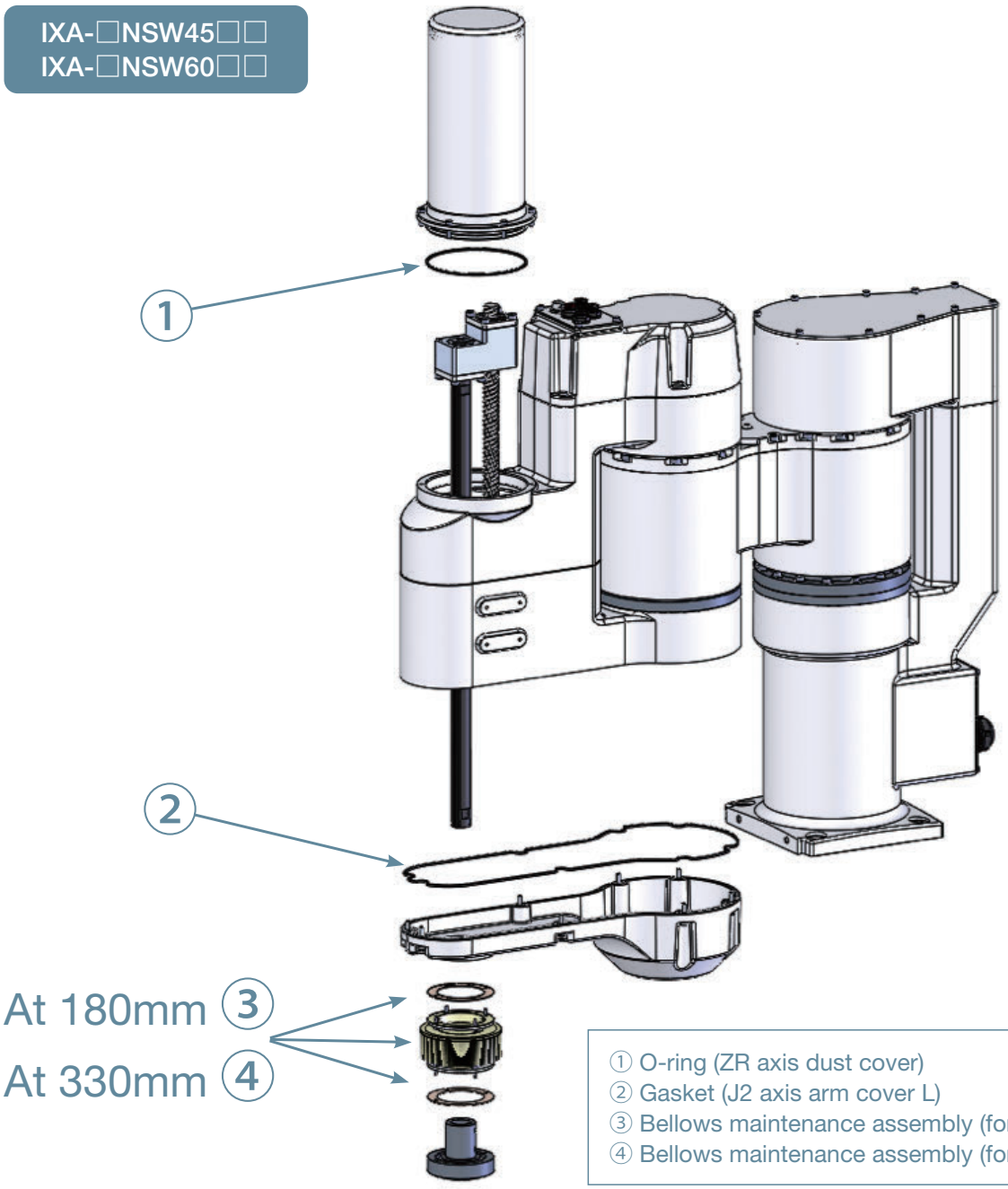
List of Maintenance Parts: IXA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

NO.	Part name	Model	Note
①	O-ring (J2 axis spline cover)	IXAW-OR1-30-2	
②	O-ring (J2 axis arm cover)	IXAW-OR2-30-2	
③	Bellows maintenance assembly	IXAW-JBA-304560-180	

Illustrations of Maintenance Parts: IXA

IXA-□NSW45□□
IXA-□NSW60□□



① O-ring (ZR axis dust cover)
② Gasket (J2 axis arm cover L)
③ Bellows maintenance assembly (for 180mm stroke)
④ Bellows maintenance assembly (for 330mm stroke)

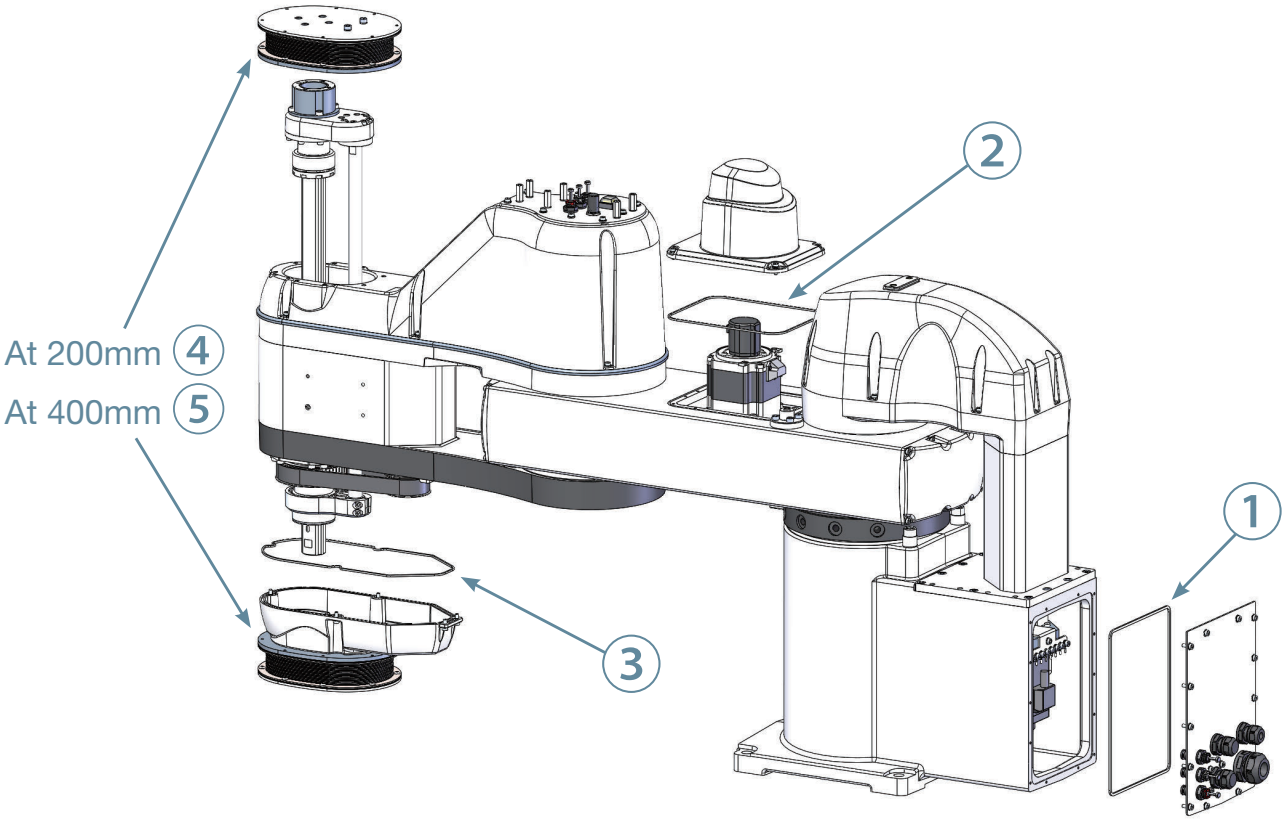
List of Maintenance Parts: IXA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

NO.	Part name	Model	Note
①	O-ring (ZR axis dust cover)	IXAW-OR-4560-34	
②	Gasket (J2 axis arm cover L)	IXAW-PK-4560-2	
③	Bellows maintenance assembly	IXAW-JBA-304560-180	At vertical axis stroke of 180mm
④	Bellows maintenance assembly	IXAW-JBA-4560-330	At vertical axis stroke of 330mm

Illustrations of Maintenance Parts: IXA

IXA-4NSW80□□
IXA-4NSW100□□
IXA-4NHW12040



① Gasket (External wiring panel)
② Gasket (J2 axis motor cover)
③ Gasket (J2 axis arm cover)
④ Bellows maintenance assembly (for 200mm stroke)
⑤ Bellows maintenance assembly (for 400mm stroke)

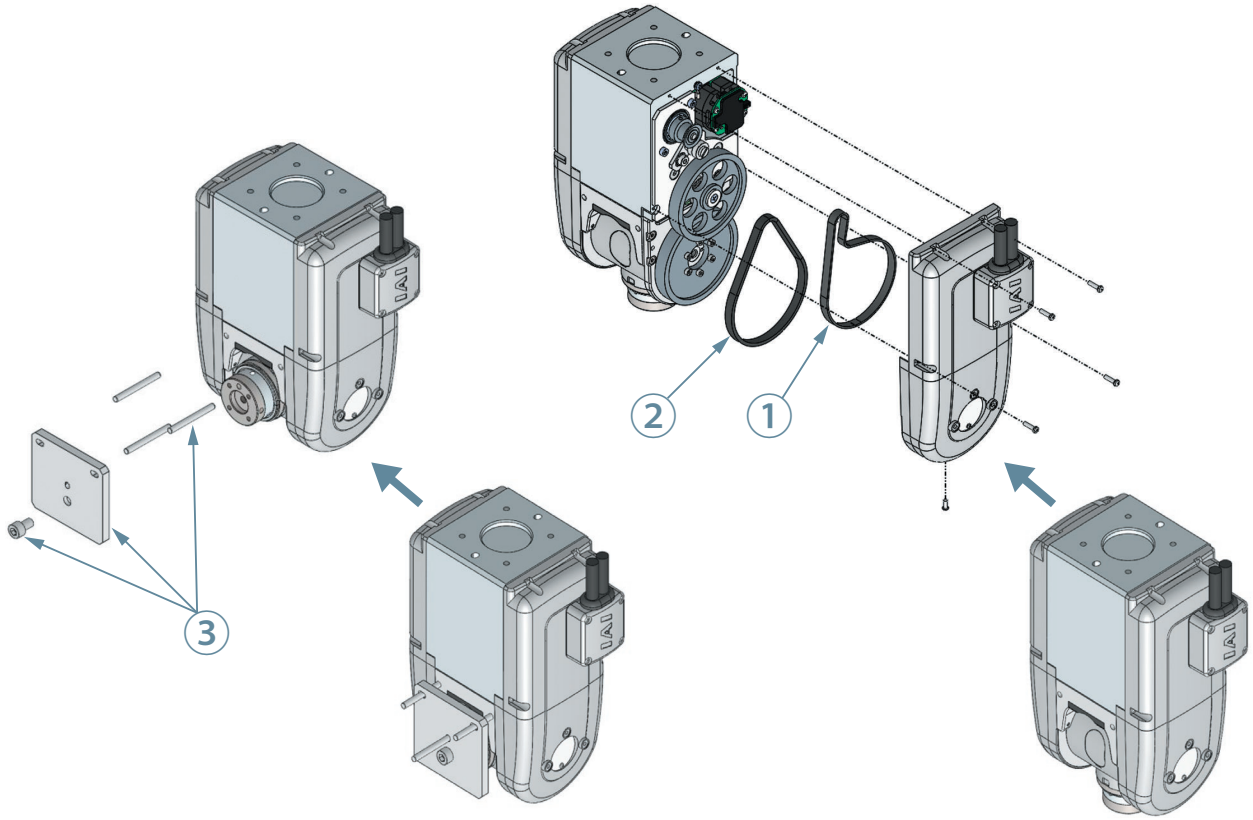
List of Maintenance Parts: IXA

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

No.	Part name	Seal type	Model	Note
①	Gasket (External wiring panel)	Standard (NBR)	IXAW-PK1-80100120	
		Fluororubber (FKM)	IXAW-PK1-80100120-SLF	
②	Gasket (J2 axis motor cover)	Standard (NBR)	IXAW-PK2-80100120-2	
		Fluororubber (FKM)	IXAW-PK2-80100120-2-SLF	
③	Gasket (J2 axis arm cover)	Standard (NBR)	IXAW-PK3-80100120-2	
		Fluororubber (FKM)	IXAW-PK3-80100120-2-SLF	
④	Bellows maintenance assembly	Standard (NBR)	IXAW-JBA-80100120-200	At vertical axis stroke of 200mm
		Fluororubber (FKM)	IXAW-JBA-80100120-200-SLF	
⑤	Bellows maintenance assembly	Standard (NBR)	IXAW-JBA-80100120-400	At vertical axis stroke of 400mm
		Fluororubber (FKM)	IXAW-JBA-80100120-400-SLF	

Illustrations of Maintenance Parts: WU (wrist unit)

WU



① Timing belt
② Timing belt
③ Absolute reset jig

List of Maintenance Parts: WU (wrist unit)

The numbers in the table correspond to those in the schematics.

NO.	Part name	Type	Model	Note
①	Timing belt	WU-S	TB-WU-S1	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
			TB-WU-S2	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
		WU-M	TB-WU-M1	
②	Timing belt	WU-S	Not exchangeable	
		WU-M		
③	Absolute reset jig	WU-S	JG-WUS	
		WU-M	JG-WUM	

MEMO

List of Maintenance Parts: EC

①-1 Controller assembly

(Example) When digital speed controller specification, TMD2, WL2 is selected: MWB-EC-DSRR3-TMD2-WL2

[Model configuration] Basic model - (when ACR is selected) - (when TMD2 is selected) - (when WL2 is selected)

Type	Encoder	Brake	I/O	Basic model number Add "D" for digital speed controller specification	RCON-EC connection spec.* Model: ACR	Dual power supply spec.* Model: TMD2	Wireless axis operation spec. Model: WL2
(D)S3□(A)(R) (D)RR3(□R)	Incremental	No	NPN	MWB-EC-(D)SRR3	ACR (I/O is NPN only)	TMD2	WL2
			PNP	MWB-EC-(D)SRR3-P			
		Yes	NPN	MWB-EC-(D)SRR3-B			
			PNP	MWB-EC-(D)SRR3-B-P			
	Battery-less absolute	No	NPN	MWB-EC-(D)SRR3-WA			
			PNP	MWB-EC-(D)SRR3-WA-P			
		Yes	NPN	MWB-EC-(D)SRR3-WA-B			
			PNP	MWB-EC-(D)SRR3-WA-B-P			
(D)S4□(A)(R) (D)RR4(□R)	Incremental	No	NPN	MWB-EC-(D)SRR4			
			PNP	MWB-EC-(D)SRR4-P			
		Yes	NPN	MWB-EC-(D)SRR4-B			
			PNP	MWB-EC-(D)SRR4-B-P			
	Battery-less absolute	No	NPN	MWB-EC-(D)SRR4-WA			
			PNP	MWB-EC-(D)SRR4-WA-P			
		Yes	NPN	MWB-EC-(D)SRR4-WA-B			
			PNP	MWB-EC-(D)SRR4-WA-B-P			

*Also common when selecting wireless communication specification (model number: WL). (Note) The wireless communication circuit board is not included.

①-2 Motor cover assembly

(Example) When digital speed controller specification, TMD2, WL2 is selected: MWB-EC-DSR6-TMD2-WL2

[Model configuration] Basic model - (when ACR is selected) - (when TMD2 is selected) - (when WL2 is selected)

Type	Brake	I/O	Basic model number Add "D" for digital speed controller specification	RCON-EC connection spec.* Model: ACR	Dual power supply spec.* Model: TMD2	Wireless axis operation spec. Model: WL2
(D)S6□(A)(R) (D)B6 (D)R6 (D)RR6(□R) GRST6	No	NPN	MWB-EC-(D)SR6	ACR (I/O is NPN only)	TMD2	WL2
		PNP	MWB-EC-(D)SR6-P			
	Yes	NPN	MWB-EC-(D)SR6-B			
		PNP	MWB-EC-(D)SR6-B-P			
(D)S7□(A)(R) (D)B7 (D)R7 (D)RR7(□R) GRST7	No	NPN	MWB-EC-(D)SR7			
		PNP	MWB-EC-(D)SR7-P			
	Yes	NPN	MWB-EC-(D)SR7-B			
		PNP	MWB-EC-(D)SR7-B-P			
(D)S6(X)AH(R) (D)RR6(X)AH (D)RR6□AHR	No	NPN	MWB-ECH-(D)SRR6			
		PNP	MWB-ECH-(D)SRR6-P			
	Yes	NPN	MWB-ECH-(D)SRR6-B			
		PNP	MWB-ECH-(D)SRR6-B-P			
(D)S7(X)AH(R) (D)RR7(X)□AH (D)RR7□AHR	No	NPN	MWB-ECH-(D)SRR7			
		PNP	MWB-ECH-(D)SRR7-P			
	Yes	NPN	MWB-ECH-(D)SRR7-B			
		PNP	MWB-ECH-(D)SRR7-B-P			
B8SS	No	NPN	MWB-EC-B8S			
		PNP	MWB-EC-B8S-P			
S10(X)	No	NPN	MWB-EC-S10			
		PNP	MWB-EC-S10-P			
	Yes	NPN	MWB-EC-S10B			
		PNP	MWB-EC-S10B-P			
S13(X)	No	NPN	MWB-EC-S13			
		PNP	MWB-EC-S13-P			
	Yes	NPN	MWB-EC-S13BS15			
		PNP	MWB-EC-S13BS15-P			
S15(X)	No	NPN	MWB-EC-S13BS15			
		PNP	MWB-EC-S13BS15-P			
	Yes	NPN	MWB-EC-S15B			
		PNP	MWB-EC-S15B-P			
S18(X)	No/Yes	NPN	MWB-EC-S18			
		PNP	MWB-EC-S18-P			

*Also common when selecting wireless communication specification (model number: WL). (Note) The wireless communication circuit board is not included.

①-3 Controller cover assembly

Type	I/O	Wireless	Model		
			Standard	When TMD2 is selected	When ACR is selected
S8(X)□(A)(R)	NPN	No	CCA-EC-S8	CCA-EC-S8-TMD2	CCA-EC-S8-ACR
		WL	CCA-EC-S8-WL	CCA-EC-S8-TMD2-WL	CCA-EC-S8-ACR-WL
		WL2	CCA-EC-S8-WL2	CCA-EC-S8-TMD2-WL2	CCA-EC-S8-ACR-WL2
	PNP	No	CCA-EC-S8-P	CCA-EC-S8-P-TMD2	
		WL	CCA-EC-S8-P-WL	CCA-EC-S8-P-TMD2-WL	
		WL2	CCA-EC-S8-P-WL2	CCA-EC-S8-P-TMD2-WL2	
(D)WS10(□R)	NPN	No	CCA-EC-WS10	CCA-EC-WS10-TMD2	CCA-EC-WS10-ACR
		WL	CCA-EC-WS10-WL	CCA-EC-WS10-TMD2-WL	CCA-EC-WS10-ACR-WL
		WL2	CCA-EC-WS10-WL2	CCA-EC-WS10-TMD2-WL2	CCA-EC-WS10-ACR-WL2
	PNP	No	CCA-EC-WS10-P	CCA-EC-WS10-P-TMD2	
		WL	CCA-EC-WS10-P-WL	CCA-EC-WS10-P-TMD2-WL	
		WL2	CCA-EC-WS10-P-WL2	CCA-EC-WS10-P-TMD2-WL2	
(D)WS12(□R)	NPN	No	CCA-EC-WS12	CCA-EC-WS12-TMD2	CCA-EC-WS12-ACR
		WL	CCA-EC-WS12-WL	CCA-EC-WS12-TMD2-WL	CCA-EC-WS12-ACR-WL
		WL2	CCA-EC-WS12-WL2	CCA-EC-WS12-TMD2-WL2	CCA-EC-WS12-ACR-WL2
	PNP	No	CCA-EC-WS12-P	CCA-EC-WS12-P-TMD2	
		WL	CCA-EC-WS12-P-WL	CCA-EC-WS12-P-TMD2-WL	
		WL2	CCA-EC-WS12-P-WL2	CCA-EC-WS12-P-TMD2-WL2	
B8S RR8(□R)	NPN	No	CCA-EC-RRB8	CCA-EC-RRB8-TMD2	CCA-EC-RRB8-ACR
		WL	CCA-EC-RRB8-WL	CCA-EC-RRB8-TMD2-WL	CCA-EC-RRB8-ACR-WL
		WL2	CCA-EC-RRB8-WL2	CCA-EC-RRB8-TMD2-WL2	CCA-EC-RRB8-ACR-WL2
	PNP	No	CCA-EC-RRB8-P	CCA-EC-RRB8-P-TMD2	
		WL	CCA-EC-RRB8-P-WL	CCA-EC-RRB8-P-TMD2-WL	
		WL2	CCA-EC-RRB8-P-WL2	CCA-EC-RRB8-P-TMD2-WL2	
RR10(□R)	NPN	No	CCA-EC-RR10	CCA-EC-RR10-TMD2	CCA-EC-RR10-ACR
		WL	CCA-EC-RR10-WL	CCA-EC-RR10-TMD2-WL	CCA-EC-RR10-ACR-WL
		WL2	CCA-EC-RR10-WL2	CCA-EC-RR10-TMD2-WL2	CCA-EC-RR10-ACR-WL2
	PNP	No	CCA-EC-RR10-P	CCA-EC-RR10-P-TMD2	
		WL	CCA-EC-RR10-P-WL	CCA-EC-RR10-P-TMD2-WL	
		WL2	CCA-EC-RR10-P-WL2	CCA-EC-RR10-P-TMD2-WL2	
RP4 GS4 GD4 TC4 TW4	NPN	No	CCA-EC-N	CCA-EC-N-TMD2	CCA-EC-N-ACR
		WL	CCA-EC-NWL	CCA-EC-NWL-TMD2	CCA-EC-NWL-ACR
		WL2	CCA-EC-NWL2	CCA-EC-NWL2-TMD2	CCA-EC-NWL2-ACR
	PNP	No	CCA-EC-P	CCA-EC-P-TMD2	
		WL	CCA-EC-PWL	CCA-EC-PWL-TMD2	
		WL2	CCA-EC-PWL2	CCA-EC-PWL2-TMD2	
RP5 GD5 TC5 TW5	NPN	No	CCA-EC-N5	CCA-EC-N5-TMD2	CCA-EC-N5-ACR
		WL	CCA-EC-N5WL	CCA-EC-N5WL-TMD2	CCA-EC-N5WL-ACR
		WL2	CCA-EC-N5WL2	CCA-EC-N5WL2-TMD2	CCA-EC-N5WL2-ACR
	PNP	No	CCA-EC-P5	CCA-EC-P5-TMD2	
		WL	CCA-EC-P5WL	CCA-EC-P5WL-TMD2	
		WL2	CCA-EC-P5WL2	CCA-EC-P5WL2-TMD2	
CRP3/CRP5 CGD3/CGD5 CTC3/CTC5	NPN PNP	No/WL	CCA-EC-C35		
		WL2	CCA-EC-C35WL2		

List of Maintenance Parts: EC

①-3 Controller cover assembly

Type	I/O	Wireless	Model		
			Standard	When TMD2 is selected	When ACR is selected
GRB8	NPN	No	CCA-EC-GRB8	CCA-EC-GRB8-TMD2	CCA-EC-GRB8-ACR
		WL	CCA-EC-GRB8-WL	CCA-EC-GRB8-TMD2-WL	CCA-EC-GRB8-ACR-WL
		WL2	CCA-EC-GRB8-WL2	CCA-EC-GRB8-TMD2-WL2	CCA-EC-GRB8-ACR-WL2
	PNP	No	CCA-EC-GRB8-P	CCA-EC-GRB8-P-TMD2	
		WL	CCA-EC-GRB8-P-WL	CCA-EC-GRB8-P-TMD2-WL	
		WL2	CCA-EC-GRB8-P-WL2	CCA-EC-GRB8-P-TMD2-WL2	
GRB10 GRB13	NPN	No	CCA-EC-GRB1013	CCA-EC-GRB1013-TMD2	CCA-EC-GRB1013-ACR
		WL	CCA-EC-GRB1013-WL	CCA-EC-GRB1013-TMD2-WL	CCA-EC-GRB1013-ACR-WL
		WL2	CCA-EC-GRB1013-WL2	CCA-EC-GRB1013-TMD2-WL2	CCA-EC-GRB1013-ACR-WL2
	PNP	No	CCA-EC-GRB1013-P	CCA-EC-GRB1013-P-TMD2	
		WL	CCA-EC-GRB1013-P-WL	CCA-EC-GRB1013-P-TMD2-WL	
		WL2	CCA-EC-GRB1013-P-WL2	CCA-EC-GRB1013-P-TMD2-WL2	
RTC9	NPN	No	CCA-EC-RTC9	CCA-EC-RTC9-TMD2	CCA-EC-RTC9-ACR
		WL	CCA-EC-RTC9-WL	CCA-EC-RTC9-TMD2-WL	CCA-EC-RTC9-ACR-WL
		WL2	CCA-EC-RTC9-WL2	CCA-EC-RTC9-TMD2-WL2	CCA-EC-RTC9-ACR-WL2
	PNP	No	CCA-EC-RTC9-P	CCA-EC-RTC9-P-TMD2	
		WL	CCA-EC-RTC9-P-WL	CCA-EC-RTC9-P-TMD2-WL	
		WL2	CCA-EC-RTC9-P-WL2	CCA-EC-RTC9-P-TMD2-WL2	
RTC12	NPN	No	CCA-EC-RTC12	CCA-EC-RTC12-TMD2	CCA-EC-RTC12-ACR
		WL	CCA-EC-RTC12-WL	CCA-EC-RTC12-TMD2-WL	CCA-EC-RTC12-ACR-WL
		WL2	CCA-EC-RTC12-WL2	CCA-EC-RTC12-TMD2-WL2	CCA-EC-RTC12-ACR-WL2
	PNP	No	CCA-EC-RTC12-P	CCA-EC-RTC12-P-TMD2	
		WL	CCA-EC-RTC12-P-WL	CCA-EC-RTC12-P-TMD2-WL	
		WL2	CCA-EC-RTC12-P-WL2	CCA-EC-RTC12-P-TMD2-WL2	
RTC18	NPN	No	CCA-EC-RTC18	CCA-EC-RTC18-TMD2	CCA-EC-RTC18-ACR
		WL	CCA-EC-RTC18-WL	CCA-EC-RTC18-TMD2-WL	CCA-EC-RTC18-ACR-WL
		WL2	CCA-EC-RTC18-WL2	CCA-EC-RTC18-TMD2-WL2	CCA-EC-RTC18-ACR-WL2
	PNP	No	CCA-EC-RTC18-P	CCA-EC-RTC18-P-TMD2	
		WL	CCA-EC-RTC18-P-WL	CCA-EC-RTC18-P-TMD2-WL	
		WL2	CCA-EC-RTC18-P-WL2	CCA-EC-RTC18-P-TMD2-WL2	

①-4 Controller board

Type	Wireless	I/O	Model		
			Standard	When TMD2 is selected	When ACR is selected
ST11 SRG11 ST15 SRG15	No/WL	NPN	MB-EC-ST15	MB-EC-ST15-TMD2	MB-EC-ST15-ACR
		PNP	MB-EC-ST15-P	MB-EC-ST15-P-TMD2	
	WL2	NPN	MB-EC-ST15-WL2	MB-EC-ST15-TMD2-WL2	MB-EC-ST15-ACR-WL2
		PNP	MB-EC-ST15-P-WL2	MB-EC-ST15-P-TMD2-WL2	
GRTR14	No/WL	NPN PNP	MB-EC-GRTR14		
	WL2		MB-EC-GRTR14-WL2		

② Motor unit *(-WL2): When selecting the wireless axis operation compatible specification (model: WL2), enter "-WL2" at the end.

Type	Encoder	Brake	Model
SL3 GDS3 GDB3 T3	Incremental	No	EC-MUSLTGD3 (-WL2)
		Yes	EC-MUSLTGD3-B (-WL2)
S2 RR2	Incremental	No	EC-MUSRR2 (-WL2)
		Yes	EC-MUSRR2-B (-WL2)
	Battery-less absolute	No	EC-MUSRR2-WA (-WL2)
		Yes	EC-MUSRR2-WA-B (-WL2)
S2□R RR2□R	Incremental	No	EC-MUSRR2R
		Yes	EC-MUSRR2R-B
	Battery-less absolute	No	EC-MUSRR2R-WA
		Yes	EC-MUSRR2R-WA-B
(D)S3□(A)(R) (D)RR3(□R)	Incremental	No	EC-MUSRR3
		Yes	EC-MUSRR3-B
	Battery-less absolute	No	EC-MUSRR3-WA
		Yes	EC-MUSRR3-WA-B
(D)S4□(A)(R) (D)WS10(□R) (D)RR4(□R)	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B
(D)S6□(A)(R) (D)S6(X)AH(R) (D)WS12(□R) (D)R6 (D)RR6(□R) (D)RR6(X)□AH(R) GRST6 S6□D S6□W R6□W RR6□W	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
(D)S7□(A)(R) (D)S7(X)AH(R) S7□D S7□W	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
S8(X)□(A)	Incremental	No	EC-MUS8
		Yes	EC-MUS8-B
	Battery-less absolute	No	EC-MUS8-WA
		Yes	EC-MUS8-WA-B
S8(X)□(A)R	Incremental	No	EC-MUS8R
		Yes	EC-MUS8-B
	Battery-less absolute	No	EC-MUS8R-WA
		Yes	EC-MUS8-WA-B
(D)R7 (D)RR7(□R) (D)RR7(X)□AH(R) R7□W RR7□W	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B
(D)B6	Incremental	No	EC-MUB6
		Yes	EC-MUB6-B
	Battery-less absolute	No	EC-MUB6-WA
		Yes	EC-MUB6-WA-B
(D)B7	Incremental	No	EC-MUB7
		Yes	EC-MUB7-B
	Battery-less absolute	No	EC-MUB7-WA
		Yes	EC-MUB7-WA-B
B8S	Incremental	No	EC-MUSB8
	Battery-less absolute		EC-MUSB8-WA
B8SS	Battery-less absolute	No	EC-MUS13
S10(X)	Battery-less absolute	No	EC-MUS10
		Yes	EC-MUS10-B
S13(X)		No	EC-MUS13
		Yes	EC-MUS13-B
S15(X)		No	EC-MUS15
		Yes	EC-MUS15-B
S18(X)		No/Yes	EC-MUS18
S18(X)LP (High payload specification)		No/Yes	EC-MUS18P
RR8	Incremental	No	EC-MURR8
		Yes	EC-MURR8-B
	Battery-less absolute	No	EC-MURR8-WA
		Yes	EC-MURR8-WA-B
RR8□R	Incremental	No	EC-MURR8R
		Yes	EC-MURR8R-B
	Battery-less absolute	No	EC-MURR8R-WA
		Yes	EC-MURR8R-WA-B
RR10(□R)	Incremental	No	EC-MURR10
		Yes	EC-MURR10-B
	Battery-less absolute	No	RCP5-MURA10A
		Yes	RCP5-MURA10A-B
GRB8	Incremental		EC-MUGRB8
GRB10	Incremental		EC-MUGRB10
	Battery-less absolute		EC-MUGRB10-WA
GRB13 (Reduction ratio M)	Incremental		EC-MUGRB13M
	Battery-less absolute		EC-MUGRB13M-WA
GRB13 (Reduction ratio L)	Incremental		EC-MUGRB13L
	Battery-less absolute		EC-MUGRB13L-WA
GRBP8	Incremental		EC-MUGRST6(-WL2)
	Battery-less absolute		EC-MUGRST6-WA(-WL2)
GRBP10	Incremental		EC-MUGRBP10(-WL2)
	Battery-less absolute		EC-MUGRBP10-WA(-WL2)
GRBP13 (Reduction ratio M)	Incremental		EC-MUGRBP13(-WL2)
	Battery-less absolute		EC-MUGRBP13-WA(-WL2)
GRBP13 (Reduction ratio L)	Incremental		EC-MUGR37S(-WL2)
	Battery-less absolute		EC-MUGR37S-WA(-WL2)

(Note) Refer to P1-152 for 'GRST7' type model numbers.

List of Maintenance Parts: EC

② Motor unit *(-WL2): When selecting the wireless axis operation compatible specification (model: WL2), enter "-WL2" at the end.

Type	Encoder	Brake	Model
GRC6	Incremental	No	EC-MUGRST6(-WL2)
	Battery-less absolute		EC-MUGRST6-WA(-WL2)
GRC7 GRST3 (Reduction ratio M)	Incremental	No	EC-MUGR37(-WL2)
		Yes	EC-MUGR37-B(-WL2)
	Battery-less absolute	No	EC-MUGR37-WA(-WL2)
		Yes	EC-MUGR37-WA-B(-WL2)
GRC7 GRST3 (Reduction ratio L)	Incremental	No	EC-MUGR37S(-WL2)
		Yes	EC-MUGR37S-B(-WL2)
	Battery-less absolute	No	EC-MUGR37S-WA(-WL2)
		Yes	EC-MUGR37S-WA-B(-WL2)
GRTR14	Incremental		EC-MUGRTR14M
	Battery-less absolute		EC-MUGRTR14M-WA
RTC9	Incremental	No	EC-MURTC9
	Battery-less absolute	No	EC-MURTC9-WA
RTC12	Incremental	No	EC-MURTC12
	Battery-less absolute	No	EC-MURTC12-WA
RTC18	Incremental	No	EC-MURTC18
		Yes	EC-MURTC18-B
	Battery-less absolute	No	EC-MURTC18-WA
		Yes	EC-MURTC18-WA-B
ST11 SRG11	Incremental	No	EC-MUST11
		Yes	EC-MUST11-B
	Battery-less absolute	No	EC-MUST11-WA
		Yes	EC-MUST11-WA-B
ST15 SRG15	Incremental	No	EC-MUST15
		Yes	EC-MUST15-B
	Battery-less absolute	No	EC-MUST15-WA
		Yes	EC-MUST15-WA-B

③ Stainless steel sheet

Type	Model	
	Single slider	Double slider
SL3	ST-EC-SL3-○○○	
S2□(R)	ST-EC-S2-○○○	
(D)S3□(A)(R)	ST-EC-S3-○○○	
(D)S4□(A)(R)	ST-EC-S4-○○○	
(D)S6□(A)(R)	ST-EC-S6-○○○	ST-EC-S6D-○○○
(D)S7□(A)(R)	ST-EC-S7-○○○	ST-EC-S7D-○○○
S8□(A)(R)	ST-6A8-○○○	ST-6A8D-○○○
S8X□A(R)	ST-EC-S8X-○○○	
(D)S6□AH(R)	ST-ECH-S6-○○○	ST-ECH-S6D-○○○
(D)S7□AH(R)	ST-ECH-S7-○○○	ST-ECH-S7D-○○○
(D)S6X□AH(R)	ST-ECXH-S6-○○○	
(D)S7X□AH(R)	ST-ECXH-S7-○○○	
(D)WS10(□R)	ST-6WA10-○○○	
(D)WS12(□R)	ST-EC-WS12-○○○	
(D)B6	ST-EC-B6-○○○	
(D)B7	ST-EC-B7-○○○	
B8S/B8SS	ST-EC-B8-○○○	
GRST3		ST-EC-GRST3-○○○
GRST6		ST-EC-S6D-○○○
GRST7		ST-EC-S7D-○○○
S6□D	ST-EC-S6W-○○○	
S7□D	ST-EC-S7W-○○○	

*○○○ indicates the stroke in the model name.

④ End cover assembly

Type	Model Add "D" for digital speed controller specification
(D)S3□(A)(R) (D)RR3(□R)	EWB-EC-(D)SRR3
(D)S4□(A)(R) (D)RR4(□R)	EWB-EC-(D)SRR4
(D)S6□(A)(R) (D)R6 (D)RR6(□R) GRST6	EWB-EC-(D)SR6
(D)S7□(A)(R) (D)R7 (D)RR7(□R) GRST7	EWB-EC-(D)SR7
(D)S6(X)□AH(R) (D)RR6(X)□AH(R)	EWB-ECH-(D)SRR6
(D)S7(X)□AH(R) (D)RR7(X)□AH(R)	EWB-ECH-(D)SRR7
(D)B6	EWB-EC-(D)SR6
(D)B7	EWB-EC-(D)SR7
B8SS	EWB-EC-B8S
S10(X)	EWB-EC-S10
S13(X)/S15(X)	EWB-EC-S13S15
S18(X)	EWB-EC-S18

(Note) Wireless communication circuit board cable is included.
For non-wireless specifications, please contact our sales representative.

List of Maintenance Parts: RCP Series

① Replacement stainless steel sheet

Series	Type		Stainless steel sheet *1	
	Coupled Motor	Side-mounted Motor	Single Slider	Double Slider
RCP6(CR) RCP6S(CR)	SA4C	SA4R	ST-6A4-(Stroke)	ST-6A4D-(Stroke)
	SA6C	SA6R	ST-6A6-(Stroke)	ST-6A6D-(Stroke)
	SA7C	SA7R	ST-6A7-(Stroke)	ST-6A7D-(Stroke)
	SA8C	SA8R	ST-6A8-(Stroke)	ST-6A8D-(Stroke)
	WSA10C	WSA10R	ST-6WA10-(Stroke)	—
	WSA12C	WSA12R	ST-6WA12-(Stroke)	—
	WSA14C	WSA14R	ST-6WA14-(Stroke)	—
	WSA16C	WSA16R	ST-6WA16-(Stroke)	—
	GRST6C	GRST6R	—	ST-6A6D-(Stroke)
	GRST7C	GRST7R	—	ST-6A7D-(Stroke)
	HSA6C		ST-ECH-S6-(Stroke)	ST-ECH-S6D-(Stroke)
	HSA6XC		ST-ECXH-S6-(Stroke)	—
	HSA7C		ST-ECH-S7-(Stroke)	ST-ECH-S7D-(Stroke)
	HSA7XC		ST-ECXH-S7-(Stroke)	—
RCP5(CR)	SA4C	SA4R	ST-5A4-(Stroke)	—
	SA6C	SA6R	ST-5A6-(Stroke)	—
	SA7C	SA7R	ST-5A7-(Stroke)	—
	BA4		ST-5BA4-(Stroke)	—
	BA6		ST-5BA6-(Stroke)	—
	BA7		ST-5BA7-(Stroke)	—
RCP4	SA3C	SA3R	ST-4A3-(Stroke)	—
	SA5C	SA5R	ST-4A5-(Stroke)	ST-4A5D-(Stroke)
	SA6C	SA6R	ST-4A6-(Stroke)	ST-4A6D-(Stroke)
	SA7C	SA7R	ST-4A7-(Stroke)	ST-4A7D-(Stroke)
	SS8C	SS8R	ST-SM1-(Stroke)	ST-SM1D-(Stroke)
RCP4CR	SA3C		ST-4A3-(Stroke)	—
	SA5C		ST-4A5-(Stroke)	ST-4A5D-(Stroke)
	SA6C		ST-4A6-(Stroke)	ST-4A6D-(Stroke)
	SA7C		ST-4A7-(Stroke)	ST-4A7D-(Stroke)
	SS8C		ST-SM2-(Stroke)	ST-SM2D-(Stroke)
RCP3	SA3C	SA3R	ST-3A3-(Stroke)	—
	SA4C	SA4R	ST-3A4-(Stroke)	—
	SA5C	SA5R	ST-3A5-(Stroke)	—
	SA6C	SA6R	ST-3A6-(Stroke)	—
RCP2	SA5C	SA5R	ST-2A5-(Stroke)	ST-2A5D-(Stroke)
	SA6C	SA6R	ST-2A6-(Stroke)	ST-2A6D-(Stroke)
	SA7C	SA7R	ST-2A7-(Stroke)	ST-2A7D-(Stroke)
	SS7C	SS7R	ST-SS1-(Stroke)	ST-SS1D-(Stroke)
	SS8C/HS8C	SS8R/HS8R	ST-SM1-(Stroke)	ST-SM1D-(Stroke)
RCP2CR	SA5C	SA5R	ST-2A5-(Stroke)	ST-2A5D-(Stroke)
	SA6C	SA6R	ST-2A6-(Stroke)	ST-2A6D-(Stroke)
	SA7C	SA7R	ST-2A7-(Stroke)	ST-2A7D-(Stroke)
	SS7C	SS7R	ST-SS2-(Stroke)	ST-SS2D-(Stroke)
	SS8C/HS8C	SS8R/HS8R	ST-SM2-(Stroke)	ST-SM2D-(Stroke)

*1 Stroke size: Use the stroke value described in the actuator model.

② Replacement motor

○ : Available

Series	Type		Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Encoder		Without Brake	With Brake			
RCP6(CR)	SA4C	Battery-less Absolute	Top Right Left Bottom	RCP6-MUSRTA4C-△	RCP6-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	SA6C/GRST6C			RCP6-MUSRTA6C-△	RCP6-MUSRTA6C-B-△	○		
	SA7C/GRST7C			RCP6-MUSTA7C-△	RCP6-MUSTA7C-B-△	○		
	SA8C			RCP6-MUSA8C-△	RCP6-MUSA8C-B-△	○		
	WSA10C			RCP6-MUWSRA10C-△	RCP6-MUWSRA10C-B-△	○		
	WSA12C			RCP6-MUWSRA12C-△	RCP6-MUWSRA12C-B-△	○		
	WSA14C			RCP6-MUWSA14C-△	RCP6-MUWSA14C-B-△	○		
	WSA16C			RCP6-MUWSA16C-△	RCP6-MUWSA16C-B-△	○		
RCP6	SA4R		–	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	SA6R/GRST6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	SA7R/GRST7R			RCP6-MUSTA7WSA14R-PU	RCP6-MUSTA7WSA14R-B-PU		○	
	SA8R			RCP6-MUSA8R-PU	RCP6-MUSA8R-B-PU		○	
	WSA10R			RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	
	WSA12R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	WSA14R			RCP6-MUSTA7WSA14R-PU	RCP6-MUSTA7WSA14R-B-PU		○	
	WSA16R			RCP6-MUWSA16R-PU	RCP6-MUWSA16R-B-PU		○	
	HSA6(X)C			RCP6-MUHSA6C	RCP6-MUHSA6C-B	○		
	HSA7(X)C			RCP6-MUHSA7C	RCP6-MUHSA7C-B	○		
	HSA6(X)R			RCP6-MUHSA6R	RCP6-MUHSA6R-B		○	
	HSA7(X)R			RCP6-MUHSA7R	RCP6-MUHSA7R-B		○	
	RA4C		Top Right Left Bottom	RCP6-MUSRTA4C-△	RCP6-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	RA6C			RCP6-MUSRTA6C-△	RCP6-MUSRTA6C-B-△	○		
	RA7C			RCP6-MURA7C-△	RCP6-MURA7C-B-△	○		
	RA8C			RCP6-MURA8C	RCP6-MURA8C-B	○		Motor/encoder only
	RA4R		–	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	
	RA6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	RA7R			RCP6-MURA7WRA14R-PU	RCP6-MURA7WRA14R-B-PU		○	
	RA8R			RCP6-MURA8WRA16R-PU	RCP6-MURA8WRA16R-B-PU		○	
	WRA10C		Top Right Left Bottom	RCP6-MUWSRA10C-△	RCP6-MUWSRA10C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	WRA12C			RCP6-MUWSRA12C-△	RCP6-MUWSRA12C-B-△	○		
	WRA14C			RCP6-MUWRA14C-△	RCP6-MUWRA14C-B-△	○		
	WRA16C			RCP6-MUWRA16C-△	RCP6-MUWRA16C-B-△	○		
	WRA10R		–	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	WRA12R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	WRA14R			RCP6-MURA7WRA14R-PU	RCP6-MURA7WRA14R-B-PU		○	
	WRA16R			RCP6-MURA8WRA16R-PU	RCP6-MURA8WRA16R-B-PU		○	
	RRA4C		Top Right Left Bottom	RCP6-MUSRTA4C-△	RCP6-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	RRA6C			RCP6-MUSRTA6C-△	RCP6-MUSRTA6C-B-△	○		
	RRA7C			RCP6-MURA7C-△	RCP6-MURA7C-B-△	○		
	RRA8C			RCP6-MURA8C	RCP6-MURA8C-B	○		Motor/encoder only
	RRA4R		–	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	
	RRA6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	RRA7R			RCP6-MURA7WRA14R-PU	RCP6-MURA7WRA14R-B-PU		○	
	RRA8R			RCP6-MURA8WRA16R-PU	RCP6-MURA8WRA16R-B-PU		○	
	TA4C		Top Right Left Bottom	RCP6-MUSRTA4C-△	RCP6-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	TA6C			RCP6-MUSRTA6C-△	RCP6-MUSRTA6C-B-△	○		
	TA7C			RCP6-MUSTA7C-△	RCP6-MUSTA7C-B-△	○		
	TA4R		–	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	TA6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	TA7R			RCP6-MUSTA7WSA14R-PU	RCP6-MUSTA7WSA14R-B-PU		○	

List of Maintenance Parts: RCP Series

② Replacement motor

Series	Type	Side-mounted Motor Direction	Cable Exit Direction	Motor Model Number		Note
				Without Brake	With Brake	
RCP6 (Pulse press)	RRA4R	Common in right-left	Not specified	RCP6-MUPP4R	RCP6-MUPP4R-B	
		Left side	Bottom side	RCP6-MUPP4R-CJB-ML	RCP6-MUPP4R-B-CJB-ML	
			Outer side	RCP6-MUPP4R-CJO-ML	RCP6-MUPP4R-B-CJO-ML	
			Upper side	RCP6-MUPP4R-CJT-ML	RCP6-MUPP4R-B-CJT-ML	
		Right side	Bottom side	RCP6-MUPP4R-CJB-MR	RCP6-MUPP4R-B-CJB-MR	
			Outer side	RCP6-MUPP4R-CJO-MR	RCP6-MUPP4R-B-CJO-MR	
			Upper side	RCP6-MUPP4R-CJT-MR	RCP6-MUPP4R-B-CJT-MR	
	RRA6R	Left side	Not specified	RCP6-MUPP6R-ML	RCP6-MUPP6R-B-ML	
			Bottom side	RCP6-MUPP6R-CJB-ML	RCP6-MUPP6R-B-CJB-ML	
			Outer side	RCP6-MUPP6R-CJO-ML	RCP6-MUPP6R-B-CJO-ML	
			Upper side	RCP6-MUPP6R-CJT-ML	RCP6-MUPP6R-B-CJT-ML	
		Right side	Not specified	RCP6-MUPP6R-MR	RCP6-MUPP6R-B-MR	
			Bottom side	RCP6-MUPP6R-CJB-MR	RCP6-MUPP6R-B-CJB-MR	
			Outer side	RCP6-MUPP6R-CJO-MR	RCP6-MUPP6R-B-CJO-MR	
			Upper side	RCP6-MUPP6R-CJT-MR	RCP6-MUPP6R-B-CJT-MR	
	RRA7R	Left side	Not specified	RCP6-MUPP7R-ML	RCP6-MUPP7R-B-ML	
			Bottom side	RCP6-MUPP7R-CJB-ML	RCP6-MUPP7R-B-CJB-ML	
			Outer side	RCP6-MUPP7R-CJO-ML	RCP6-MUPP7R-B-CJO-ML	
			Upper side	RCP6-MUPP7R-CJT-ML	RCP6-MUPP7R-B-CJT-ML	
		Right side	Not specified	RCP6-MUPP7R-MR	RCP6-MUPP7R-B-MR	
			Bottom side	RCP6-MUPP7R-CJB-MR	RCP6-MUPP7R-B-CJB-MR	
			Outer side	RCP6-MUPP7R-CJO-MR	RCP6-MUPP7R-B-CJO-MR	
			Upper side	RCP6-MUPP7R-CJT-MR	RCP6-MUPP7R-B-CJT-MR	
RCP6	RTFML	Common in right-left	Not specified Upper side Right side Left side	RCP6-MURTFML	RCP6-MURTFMLB	The customer can change the cable exit direction. Contact IAI representatives for the procedure.

② Replacement motor

○ : Available

Series	Type		Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Encoder		Without Brake	With Brake			
RCP6S(CR)	SA4C	Battery-less Absolute	Top Right Left Bottom	RCP6S-MUSRTA4C-△	RCP6S-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	SA6C/GRST6C			RCP6S-MUSRTA6C-△	RCP6S-MUSRTA6C-B-△	○		
	SA7C/GRST7C			RCP6S-MUSTA7C-△	RCP6S-MUSTA7C-B-△	○		
	SA8C			RCP6S-MUSA8C-△	RCP6S-MUSA8C-B-△	○		
	WSA10C			RCP6S-MUWSRA10C-△	RCP6S-MUWSRA10C-B-△	○		
	WSA12C			RCP6S-MUWSRA12C-△	RCP6S-MUWSRA12C-B-△	○		
	WSA14C			RCP6S-MUWSA14C-△	RCP6S-MUWSA14C-B-△	○		
	WSA16C			RCP6S-MUWSA16C-△	RCP6S-MUWSA16C-B-△	○		
RCP6S	SA4R		Outside	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	SA6R/GRST6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	SA7R/GRST7R			RCP6-MUSTA7WSA14R-PU	RCP6-MUSTA7WSA14R-B-PU		○	
	SA8R			RCP6-MUSA8R-PU	RCP6-MUSA8R-B-PU		○	
	WSA10R			RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	
	WSA12R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	WSA14R			RCP6-MUSTA7WSA14R-PU	RCP6-MUSTA7WSA14R-B-PU		○	
	WSA16R			RCP6-MUWSA16R-PU	RCP6-MUWSA16R-B-PU		○	
	RA4C		Top Right Left Bottom	RCP6S-MUSRTA4C-△	RCP6S-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	RA6C			RCP6S-MUSRTA6C-△	RCP6S-MUSRTA6C-B-△	○		
	RA7C			RCP6S-MURA7C-△	RCP6S-MURA7C-B-△	○		
	RA8C			RCP6-MURA8C	RCP6-MURA8C-B	○		
	RA4R		Outside	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	RA6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	RA7R			RCP6-MURA7WRA14R-PU	RCP6-MURA7WRA14R-B-PU		○	
	RA8R			RCP6-MURA8WRA16R-PU	RCP6-MURA8WRA16R-B-PU		○	
	WRA10C		Top Right Left Bottom	RCP6S-MUWSRA10C-△	RCP6S-MUWSRA10C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	WRA12C			RCP6S-MUWSRA12C-△	RCP6S-MUWSRA12C-B-△	○		
	WRA14C			RCP6S-MUWRA14C-△	RCP6S-MUWRA14C-B-△	○		
	WRA16C			RCP6S-MUWRA16C-△	RCP6S-MUWRA16C-B-△	○		
	WRA10R		Outside	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	WRA12R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	WRA14R			RCP6-MURA7WRA14R-PU	RCP6-MURA7WRA14R-B-PU		○	
	WRA16R			RCP6-MURA8WRA16R-PU	RCP6-MURA8WRA16R-B-PU		○	
	RRA4C		Top Right Left Bottom	RCP6S-MUSRTA4C-△	RCP6S-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	RRA6C			RCP6S-MUSRTA6C-△	RCP6S-MUSRTA6C-B-△	○		
	RRA7C			RCP6S-MURA7C-△	RCP6S-MURA7C-B-△	○		
	RRA8C			RCP6-MURA8C	RCP6-MURA8C-B	○		
	RRA4R		Outside	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	RRA6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	RRA7R			RCP6-MURA7WRA14R-PU	RCP6-MURA7WRA14R-B-PU		○	
	RRA8R			RCP6-MURA8WRA16R-PU	RCP6-MURA8WRA16R-B-PU		○	
	TA4C		Top Right Left Bottom	RCP6S-MUSRTA4C-△	RCP6S-MUSRTA4C-B-△	○		Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified.
	TA6C			RCP6S-MUSRTA6C-△	RCP6S-MUSRTA6C-B-△	○		
	TA7C			RCP6S-MUSTA7C-△	RCP6S-MUSTA7C-B-△	○		
	TA4R		Outside	RCP6-MUSRTA4WSRA10R-PU	RCP6-MUSRTA4WSRA10R-B-PU		○	Motor/encoder only
	TA6R			RCP6-MUSRTA6WSRA12R-PU	RCP6-MUSRTA6WSRA12R-B-PU		○	
	TA7R			RCP6-MUSTA7WSA14R-PU	RCP6-MUSTA7WSA14R-B-PU		○	

List of Maintenance Parts: RCP Series

② Replacement motor

○ : Available

Series	Type		Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Encoder		Without Brake	With Brake			
RCP5(CR)	SA4C	Battery-less Absolute	Top Right Left Bottom	RCP5-MUSRA4A-△	RCP5-MUSRA4A-B-△	○		Motor unit model * With motor cover. * In the△, the direction of the cable extraction is specified (either one of Blank: Standard, CJT: Top, CJR: Right, CJL: Left, CJB: Bottom, or CJO: Outside). * In the□, the motor specification is specified (ML: Left side-mounted or MR: Right side-mounted).
	SA6C			RCP5-MUSRA6A-△	RCP5-MUSRA6A-B-△	○		
	SA7C			RCP5-MUSA7A-△	RCP5-MUSA7A-B-△	○		
RCP5	SA4R		Top Bottom Outside	RCP5-MUSRA4A-△-□	RCP5-MUSRA4A-B-△-□	○		
	SA6R			RCP5-MUSRA6A-△-□	RCP5-MUSRA6A-B-△-□	○		
	SA7R			RCP5-MUSA7A-△-□	RCP5-MUSA7A-B-△-□	○		
	RA4C		Top Right Left Bottom	RCP5-MUSRA4A-△	RCP5-MUSRA4A-B-△	○		
	RA6C			RCP5-MUSRA6A-△	RCP5-MUSRA6A-B-△	○		
	RA7C			RCP5-MURA7A-△	RCP5-MURA7A-B-△	○		
	RA8C		–	RCP5-MURA8A	RCP5-MURA8A-B	○		Motor/encoder only
	RA10C		–	RCP5-MURA10A	RCP5-MURA10A-B	○		
	RA4R		Top Bottom Outside	RCP5-MUSRA4A-△-□	RCP5-MUSRA4A-B-△-□	○		Motor unit model * With motor cover. * In the△, the direction of the cable extraction is specified (either one of Blank: Standard, CJT: Top, CJR: Right, CJL: Left, CJB: Bottom, or CJO: Outside). * In the▲, the direction of the cable extraction is specified (CJT/CJR/CJL/CJB). * In the□, the motor specification is specified (ML: Left side-mounted or MR: Right side-mounted).
	RA6R			RCP5-MUSRA6A-△-□	RCP5-MUSRA6A-B-△-□	○		
	RA7R			RCP5-MURA7A-△-□	RCP5-MURA7A-B-△-□	○		
	RA8R			RCP5-MURA8A-△-□-PU	RCP5-MURA8A-B-△-□-PU		○	
	RA10R			RCP5-MURA10A-△-□-PU	RCP5-MURA10A-B-△-□-PU		○	
	BA4		Top Right Left Bottom	RCP5-MUBA4A-▲-PU	RCP5-MUBA4A-B-▲-PU		○	
	BA4U			RCP5-MUBA4A-▲-U-PU	RCP5-MUBA4A-B-▲-U-PU		○	
	BA6			RCP5-MUBA6A-▲-PU	RCP5-MUBA6A-B-▲-PU		○	
	BA6U			RCP5-MUBA6A-▲-U-PU	RCP5-MUBA6A-B-▲-U-PU		○	
	BA7			RCP5-MUBA7A-▲-PU	RCP5-MUBA7A-B-▲-PU		○	
	BA7U			RCP5-MUBA7A-▲-U-PU	RCP5-MUBA7A-B-▲-U-PU		○	
RCP4	SA3C	Incremental	–	RCP4-MUSA3-◎	RCP4-MUSA3-B-◎	○		Motor unit model * With motor cover. * In the△, the direction of the cable extraction is specified (either one of Blank: Standard, CJT: Top, CJR: Right, CJL: Left, CJB: Bottom, or CJO: Outside). * In the□, the motor specification is specified (ML: Left side-mounted or MR: Right side-mounted). * In the◎, home position check sensor (HSL: home position check sensor for left, HSR: home position check sensor for right) for SA3 is specified. In case of SA3R, the direction of the home position check sensor is fixed (ML=HSR, MR=HSL) according to the direction of the motor side. * In the●, home position check sensor (HS) for RA3 is specified.
	SA5C		Top Right Left Bottom	RCP4-MUSA56-△	RCP4-MUSA56-B-△	○		
	SA6C			RCP4-MUSA56-△	RCP4-MUSA56-B-△	○		
	SA7C			RCP4-MUSA7-△	RCP4-MUSA7-B-△	○		
	SS8C		–	RCP4-MUSS8-CO		○		
	SA3R			RCP4-MUSA3-◎-□	RCP4-MUSA3-B-◎-□	○		
	SA5R		Top Bottom Outside	RCP4-MURA5-△-□	RCP4-MURA5-B-△-□	○		
	SA6R			RCP4-MURA5-△-□	RCP4-MURA5-B-△-□	○		
	SA7R			RCP4-MUSA7-△-□	RCP4-MUSA7-B-△-□	○		
	SS8R		–	RCP4-MUSS8-□-PU			○	
	RA3C			RCP4-MURA3-●	RCP4-MURA3-B-●	○		
	RA5C		Top Right Left Bottom	RCP4-MURA5-△	RCP4-MURA5-B-△	○		
	RA5C High-thrust			–	RCP4-MURA5S-B-△	○		
	RA6C			RCP4-MURA6-△	RCP4-MURA6-B-△	○		
	RA6C High-thrust			–	RCP4-MURA6S-B-△	○		
	RA6CQ		–	RCP4-MURAQ6		○		
	RGS6CQ					○		
	RGD6CQ					○		
	RA3R			RCP4-MURA3-●-□	RCP4-MURA3-B-●-□	○		
	RA5R		Top Bottom Outside	RCP4-MURA5-△-□	RCP4-MURA5-B-△-□	○		
	RA6R			RCP4-MURA6-△-□	RCP4-MURA6-B-△-□	○		
RCP4CR	SA3C	Incremental	–	RCP4-MUSA3-◎	RCP4-MUSA3-B-◎	○		
	SA5C		Top Right Left Bottom	RCP4-MUSA56-△	RCP4-MUSA56-B-△	○		
	SA6C			RCP4-MUSA56-△	RCP4-MUSA56-B-△	○		
	SA7C			RCP4-MUSA7-△	RCP4-MUSA7-B-△	○		
	SS8C		–	RCP4-MUSS8-CO		○		

② Replacement motor

○: Available

Series	Type		Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Encoder		Without Brake	With Brake			
RCP4W	RA6CQ	Incremental	—	RCP4-MURAQ6		○		
RCP3	SA2AC	Incremental	—	RCP3-MU00A	–	○		Motor unit model * With motor cover. * In the△, the direction of the cable extraction is specified (either one of Blank: Standard, CJT: Top, CJR: Right, CJL: Left, CJB: Bottom, or CJO: Outside). * In the□, the motor specification is specified (ML: Left side-mounted or MR: Right side-mounted).
	SA2BC		—	RCP3-MU00A	–	○		
	SA3C		Top Right Left Bottom	RCP3-MU1A-△	RCP3-MU1A-B-△	○		
	SA4C			RCP3-MU2A-△	RCP3-MU2A-B-△	○		
	SA5C			RCP3-MU3A-△	RCP3-MU3A-B-△	○		
	SA6C			RCP3-MU3A-△	RCP3-MU3A-B-△	○		
	SA2AR		—	RCP3-MU00B	–		○	
	SA2BR		—	RCP3-MU00B	–		○	
	SA3R		Top Bottom Outside	RCP3-MU1B-△-□	RCP3-MU1B-B-△-□		○	
	SA4R			RCP3-MU2B-△-□	RCP3-MU2B-B-△-□		○	
	SA5R			RCP3-MU3B-△-□	RCP3-MU3B-B-△-□		○	
	SA6R			RCP3-MU3B-△-□	RCP3-MU3B-B-△-□		○	
	RA2AC		—	RCP3-MU00A	RCP3-MU00A-B	○		
	RA2AC High-thrust		—	RCP3-MU00SA	RCP3-MU00SA-B	○		
	RA2BC		—	RCP3-MU00A	RCP3-MU00A-B	○		
	RA2BC High-thrust		—	RCP3-MU00SA	RCP3-MU00SA-B	○		
	RA2AR		—	RCP3-MU00B	RCP3-MU00B-B		○	
	RA2AR High-thrust		—	RCP3-MU00SB	RCP3-MU00SB-B		○	
	RA2BR		—	RCP3-MU00B	RCP3-MU00B-B		○	
	RA2BR High-thrust		—	RCP3-MU00SB	RCP3-MU00SB-B		○	
	TA3C		—	RCP3-MU0A	RCP3-MU0A-B	○		
	TA4C		Top Right Left Bottom	RCP3-MU1A-△	RCP3-MU1A-B-△	○		
	TA5C			RCP3-MU2A-△	RCP3-MU2A-B-△	○		
	TA6C			RCP3-MU3A-△	RCP3-MU3A-B-△	○		
	TA7C			RCP3-MU3A-△	RCP3-MU3A-B-△	○		
	TA3R		—	RCP3-MU0B	RCP3-MU0B-B		○	
	TA4R		Top Bottom Outside	RCP3-MU1B-△-□	RCP3-MU1B-B-△-□		○	
	TA5R			RCP3-MU2B-△-□	RCP3-MU2B-B-△-□		○	
	TA6R			RCP3-MU3B-△-□	RCP3-MU3B-B-△-□		○	
	TA7R			RCP3-MU3B-△-□	RCP3-MU3B-B-△-□		○	
RCP2(CR)	SA5C	Incremental	—	M-P2SA5C-IAP42N-MB-CO		○		Motor/encoder only * □ represents the side-mounted motor direction (ML: left/ MR: right). (Note 1) Production ended in July 2024. If this unit is required, contact our sales representative.
	SA6C		—	M-P2SA6C-IAP42N-MB-CO		○		
	SA7C (Note 1)		—	M-P2SA7C-IAP56N-MB-CO		○		
	SS7C		—	M-P2SS7C-IAP42N-MB-CO		○		
	SS8C (Note 1)		—	M-P2SS8C-IAP56N-MB-CO		○		
	HS8C		—	M-P2HS8C-IAP56N-MB-CO		○		
RCP2	SA5R		—	M-P2SA5R-IAP42N-MB-PU			○	
	SA6R		—	M-P2SA6R-IAP42N-MB-PU			○	
	SA7R (Note 1)		—	M-P2SA7R-IAP56U-MB-PU			○	
	SS7R		—	M-P2SS7R-IAP42U-MB-□-PU			○	
	SS8R (Note 1)		—	M-P2SS8R-IAP56U-MB-□-PU			○	
	HS8R		—	M-P2HSMR-IAP56U-MB-□-PU			○	
	BA6		—	M-P2BA6-IAP42-MB-PU			○	
	BA6U		—	M-P2BA6U-IAP42U-MB				
	BA7		—	M-P2BA7-IAP42-MB-PU			○	
	BA7U		—	M-P2BA7U-IAP42U-MB				
	RA2C		—	M-P2R2C-IAP20-MB-PU			○	
	RA3C RGD3C		—	M-P2R3C-IAP28-MB-CO		○		
	RA4C RGS4C RGD4C		—	M-P2R4C-IAP42-MB-CO		○		
	RA6C RGS6C RGD6C (Note 1)		—	M-P2R6C-IAP56-MB-CO		○		
	RA8C		—	M-P2R8C-IAP60-MB-CO	M-P2R8C-IAP60U-MB-B-CO	○		
	RA10C		—	M-P2R10C-IAP86-MB-CO	M-P2R10C-IAP86U-MB-B-CO	○		
	SRA4R SRGS4R SRGD4R		—	Please contact to us.			○	
	RA8R		—	M-P2R8R-IAP60U-MB-PU	M-P2R8R-IAP60U-MB-B-PU		○	

List of Maintenance Parts: RCP Series

③ Replacement belt

Series	Type	Timing Belt	Slider Belt *1	Note
RCP6 RCP6S	SA4R	TB-RCP6-STRA4R	–	
	SA6R/GRST6R	TB-RCP6-STRA6R	–	
	SA7R/GRST7R	TB-RCP6-STRA7R	–	
	SA8R	TB-RCP6-SA8R	–	
	WSA10R	TB-RCP6-WSRA10R	–	
	WSA12R	TB-RCP6-WSRA12R	–	
	WSA14R	TB-RCP6-WSRA14R	–	
	WSA16R	TB-RCP6-WSRA16R	–	
	HSA6(X)R	TB-RCP6-HSA6R	–	
	HSA7(X)R	TB-RCP6-HSA7R	–	
	RA4R	TB-RCP6-STRA4R	–	
	RA6R	TB-RCP6-STRA6R	–	
	RA7R	TB-RCP6-RA7R	–	
	RA8R	TB-RCP6-RA8R	–	
	WRA10R	TB-RCP6-WSRA10R	–	
	WRA12R	TB-RCP6-WSRA12R	–	
	WRA14R	TB-RCP6-WSRA14R	–	
	WRA16R	TB-RCP6-WSRA16R	–	
	RRA4R	TB-RCP6-STRA4R	–	
	RRA6R	TB-RCP6-STRA6R	–	
	RRA7R	TB-RCP6-STRA7R	–	
	RRA8R	TB-RCP6-RA8R	–	
	TA4R	TB-RCP6-STRA4R	–	
	TA6R	TB-RCP6-STRA6R	–	
	TA7R	TB-RCP6-STRA7R	–	
RCP6 (Pulse press)	RRA4R	TB-RCS3-RA4R	–	
	RRA6R	TB-RCS3-RA6R	–	
	RRA7R	TB-RCS3-RA7R	–	
RCP5	SA4R	TB-RCP5-SA4R	–	
	SA6R	TB-RCP5-SA6R	–	
	SA7R	TB-RCP5-SA7R	–	
	RA4R	TB-RAC5-RA4R	–	
	RA6R	TB-RCP5-RA6R	–	
	RA7R	TB-RCP5-RA7R	–	
	RA8R	TB-RCP5-RA8R	–	
	RA10R	TB-RCP5-RA10R	–	
	BA4	–	LB-RCP5-BA4-(Stroke)	
	BA6	–	LB-RCP5-BA6-(Stroke)	
	BA7	–	LB-RCP5-BA7-(Stroke)	
RCP4	SA3R	TB-RCP4-SA3R	–	
	SA5R	TB-RCP4-SA5R	–	
	SA6R	TB-RCP4-SA6R	–	
	SA7R	TB-RCP4-SA7R	–	
	RA3R	TB-RCP4-RA3R	–	
	RA5R	TB-RCP4-RA5R	–	
	RA6R	TB-RCP4-RA6R	–	
RCP3	SA2AR	TB-RCP3-SA2AR	–	
	SA2BR	TB-RCP3-SA2BR	–	
	SA3R	TB-RCP3-SA3R	–	
	SA4R	TB-RCP3-SA4R	–	
	SA5R	TB-RCP3-SA5R	–	
	SA6R	TB-RCP3-SA6R	–	
	RA2AR	TB-RCP3-RA2AR	–	
	RA2BR	TB-RCP3-RA2BR	–	
	TA3R	TB-RCP3-TA3R	–	
	TA4R	TB-RCP3-TA4R	–	
	TA5R	TB-RCP3-TA5R	–	
	TA6R	TB-RCP3-TA6R	–	
	TA7R	TB-RCP3-TA7R	–	

*1 Stroke size: Use the stroke value described in the actuator model.

③ Replacement belt

Series	Type	Timing Belt	Slider Belt *1	Note
RCP2	SA5R	TB-RCP2-SA5R	–	
	SA6R	TB-RCP2-SA6R	–	
	SA7R	TB-RCP2-SA7R	–	
	SS7R	TB-RCP2-SS7R	–	
	SS8R	TB-RCP2-SS8R	–	
	HS8R	TB-RCP2-HS8R	–	
	BA6	–	LB-RCP2-BA6-(Stroke)	
	BA7	–	LB-RCP2-BA7-(Stroke)	
	SRA4R SRGS4R SRGD4R	TB-RCP2-SRA4R	–	
	RA8R	TB-RCP2-RA8R	–	

*1 Stroke size: Use the stroke value described in the actuator model.

List of Maintenance Parts: ERC Series

① Replacement stainless steel sheet

Series	Type	Stainless steel sheet*1
ERC3D ERC3CR	SA5C	ST-4A5-(stroke)
	SA7C	ST-4A7-(stroke)

*1 Stroke size: Use the stroke value described in the actuator model.

② Replacement motor

○ : Available

Series	Type				Motor Model Number		With Coupling
	Size	Encoder	I/O Type	Controller Type	Without Brake	With Brake	
ERC3 ERC3D ERC3CR	SA5C	Incremental	NP	CN	ERC3-MUSA5I-NP-CN	ERC3-MUSA5I-NP-CN-B	○
				MC	ERC3-MUSA5I-NP-MC	ERC3-MUSA5I-NP-MC-B	○
			PN	CN	ERC3-MUSA5I-PN-CN	ERC3-MUSA5I-PN-CN-B	○
				MC	ERC3-MUSA5I-PN-MC	ERC3-MUSA5I-PN-MC-B	○
			SE	CN	ERC3-MUSA5I-SE-CN	ERC3-MUSA5I-SE-CN-B	○
				MC	ERC3-MUSA5I-SE-MC	ERC3-MUSA5I-SE-MC-B	○
			PLN	CN	ERC3-MUSA5I-PLN-CN	ERC3-MUSA5I-PLN-CN-B	○
			PLP	CN	ERC3-MUSA5I-PLP-CN	ERC3-MUSA5I-PLP-CN-B	○
		Simple Absolute	SE	CN	ERC3-MUSA5A-SE-CN	ERC3-MUSA5A-SE-CN-B	○
				MC	ERC3-MUSA5A-SE-MC	ERC3-MUSA5A-SE-MC-B	○
	SA7C	Incremental	NP	CN	ERC3-MUSA7I-NP-CN	ERC3-MUSA7I-NP-CN-B	○
				MC	ERC3-MUSA7I-NP-MC	ERC3-MUSA7I-NP-MC-B	○
			PN	CN	ERC3-MUSA7I-PN-CN	ERC3-MUSA7I-PN-CN-B	○
				MC	ERC3-MUSA7I-PN-MC	ERC3-MUSA7I-PN-MC-B	○
			SE	CN	ERC3-MUSA7I-SE-CN	ERC3-MUSA7I-SE-CN-B	○
				MC	ERC3-MUSA7I-SE-MC	ERC3-MUSA7I-SE-MC-B	○
			PLN	CN	ERC3-MUSA7I-PLN-CN	ERC3-MUSA7I-PLN-CN-B	○
			PLP	CN	ERC3-MUSA7I-PLP-CN	ERC3-MUSA7I-PLP-CN-B	○
		Simple Absolute	SE	CN	ERC3-MUSA7A-SE-CN	ERC3-MUSA7A-SE-CN-B	○
				MC	ERC3-MUSA7A-SE-MC	ERC3-MUSA7A-SE-MC-B	○

② Replacement motor

○ : Available

Series	Type				Motor Model Number		With Coupling
	Size	Encoder	I/O Type	Controller Type	Without Brake	With Brake	
ERC3	RA4C	Incremental	NP	CN	ERC3-MURA4I-NP-CN	ERC3-MURA4I-NP-CN-B	○
				MC	ERC3-MURA4I-NP-MC	ERC3-MURA4I-NP-MC-B	○
			PN	CN	ERC3-MURA4I-PN-CN	ERC3-MURA4I-PN-CN-B	○
				MC	ERC3-MURA4I-PN-MC	ERC3-MURA4I-PN-MC-B	○
			SE	CN	ERC3-MURA4I-SE-CN	ERC3-MURA4I-SE-CN-B	○
				MC	ERC3-MURA4I-SE-MC	ERC3-MURA4I-SE-MC-B	○
			PLN	CN	ERC3-MURA4I-PLN-CN	ERC3-MURA4I-PLN-CN-B	○
			PLP	CN	ERC3-MURA4I-PLP-CN	ERC3-MURA4I-PLP-CN-B	○
		Simple Absolute	SE	CN	ERC3-MURA4A-SE-CN	ERC3-MURA4A-SE-CN-B	○
				MC	ERC3-MURA4A-SE-MC	ERC3-MURA4A-SE-MC-B	○
	RA6C	Incremental	NP	CN	ERC3-MURA6I-NP-CN	ERC3-MURA6I-NP-CN-B	○
				MC	ERC3-MURA6I-NP-MC	ERC3-MURA6I-NP-MC-B	○
			PN	CN	ERC3-MURA6I-PN-CN	ERC3-MURA6I-PN-CN-B	○
				MC	ERC3-MURA6I-PN-MC	ERC3-MURA6I-PN-MC-B	○
			SE	CN	ERC3-MURA6I-SE-CN	ERC3-MURA6I-SE-CN-B	○
				MC	ERC3-MURA6I-SE-MC	ERC3-MURA6I-SE-MC-B	○
			PLN	CN	ERC3-MURA6I-PLN-CN	ERC3-MURA6I-PLN-CN-B	○
			PLP	CN	ERC3-MURA6I-PLP-CN	ERC3-MURA6I-PLP-CN-B	○
		Simple Absolute	SE	CN	ERC3-MURA6A-SE-CN	ERC3-MURA6A-SE-CN-B	○
				MC	ERC3-MURA6A-SE-MC	ERC3-MURA6A-SE-MC-B	○

Series	Type			Motor Model Number		With Coupling
	Size	Encoder	I/O Type	Without Brake	With Brake	
ERC2	SA6C	Incremental	NP	ERC2-MU6A	ERC2-MU6A-BS	○
			PN	ERC2-MU6PN	ERC2-MU6PN-BS	○
			SE	ERC2-MU6SE	ERC2-MU6SE-BS	○
	SA7C	Incremental	NP	ERC2-MU7A	ERC2-MU7A-BS	○
			PN	ERC2-MU7PN	ERC2-MU7PN-BS	○
			SE	ERC2-MU7SE	ERC2-MU7SE-BS	○
	RA6C RGS6C RGD6C	Incremental	NP	ERC2-MU6A	ERC2-MU6A-BR	○
			PN	ERC2-MU6PN	ERC2-MU6PN-BR	○
			SE	ERC2-MU6SE	ERC2-MU6SE-BR	○
	RA7C RGS7C RGD7C	Incremental	NP	ERC2-MU7A	ERC2-MU7A-BR	○
			PN	ERC2-MU7PN	ERC2-MU7PN-BR	○
			SE	ERC2-MU7SE	ERC2-MU7SE-BR	○
ERC	SA6	Incremental	Standard	ERC-MU6A	ERC-MU6A-BS	○
			EN	ERC-MU6EN	ERC-MU6EN-BS	○
			EP	ERC-MU6EP	ERC-MU6EP-BS	○
	SA7	Incremental	Standard	ERC-MU7A	ERC-MU7A-BS	○
			EN	ERC-MU7EN	ERC-MU7EN-BS	○
			EP	ERC-MU7EP	ERC-MU7EP-BS	○
	RA54	Incremental	Standard	ERC-MU6A	ERC-MU6A-BR	○
			EN	ERC-MU6EN	ERC-MU6EN-BR	○
			EP	ERC-MU6EP	ERC-MU6EP-BR	○
	RA64	Incremental	Standard	ERC-MU7A	ERC-MU7A-BR	○
			EN	ERC-MU7EN	ERC-MU7EN-BR	○
			EP	ERC-MU7EP	ERC-MU7EP-BR	○

(Note) The ERC2/ERC motor unit is no longer produced. If this unit is required, contact our sales representative.

List of Maintenance Parts: RCA/RCL Series

① Replacement stainless steel sheet

Series	Type			Stainless steel sheet *1	
				Single Slider	Double Slider
RCA2	SA3C	SA3R		ST-3A3-(stroke)	–
	SA4C	SA4R		ST-3A4-(stroke)	–
	SA5C	SA5R		ST-3A5-(stroke)	–
	SA6C	SA6R		ST-3A6-(stroke)	–
RCA	SA4C	SA4D	SA4R	ST-SA4-(stroke)	–
	SA5C	SA5D	SA5R	ST-SA5-(stroke)	ST-SA5D-(stroke)
	SA6C	SA6D	SA6R	ST-SA6-(stroke)	ST-SA6D-(stroke)
	SS4D			ST-SS4-(stroke)	–
	SS5D			ST-SS5-(stroke)	–
	SS6D			ST-SS6-(stroke)	–
RCACR	SA4C			ST-SA4-(stroke)	–
	SA5C	SA5D		ST-SA5-(stroke)	ST-SA5D-(stroke)
	SA6C	SA6D		ST-SA6-(stroke)	ST-SA6D-(stroke)
RCL	SA1L			ST-SA1L-(stroke)	–
	SA2L			ST-SA2L-(stroke)	–
	SA3L			ST-SA3L-(stroke)	–
	SA4L			ST-SA4L-(stroke)	–
	SA5L			ST-SA5L-(stroke)	–
	SA6L			ST-SA6L-(stroke)	–
	SM4L			ST-SM4L-(stroke)	–
	SM5L			ST-SM5L-(stroke)	–
	SM6L			ST-SM6L-(stroke)	–

*1 Stroke size: Use the stroke value described in the actuator model.

② Replacement Motor

○ : Available

Series	Type		Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Encoder		Without Brake	With Brake			
RCA2	SA2AC	Incremental	–	RCA2-MU00A	–	○		Motor unit model * With motor cover. * In the□, the motor specification is specified (ML: Left side-mounted or MR: Right side-mounted). * In the△, the motor specification is specified (ML: Left side-mounted, MR: Right side-mounted or MT: Top side-mounted).
	SA3C	Incremental	–	RCA2-MU1A	RCA2-MU1A-B	○		
			Top	RCA2-MU1A-CJT	RCA2-MU1A-B-CJT	○		
			Right	RCA2-MU1A-CJR	RCA2-MU1A-B-CJR	○		
			Left	RCA2-MU1A-CJL	RCA2-MU1A-B-CJL	○		
			Bottom	RCA2-MU1A-CJB	RCA2-MU1A-B-CJB	○		
	SA4C	Incremental	–	RCA2-MU2A	RCA2-MU2A-B	○		
			Top	RCA2-MU2A-CJT	RCA2-MU2A-B-CJT	○		
			Right	RCA2-MU2A-CJR	RCA2-MU2A-B-CJR	○		
			Left	RCA2-MU2A-CJL	RCA2-MU2A-B-CJL	○		
			Bottom	RCA2-MU2A-CJB	RCA2-MU2A-B-CJB	○		
	SA5C	Incremental	–	RCA2-MU3A	RCA2-MU3A-B	○		
			Top	RCA2-MU3A-CJT	RCA2-MU3A-B-CJT	○		
			Right	RCA2-MU3A-CJR	RCA2-MU3A-B-CJR	○		
			Left	RCA2-MU3A-CJL	RCA2-MU3A-B-CJL	○		
			Bottom	RCA2-MU3A-CJB	RCA2-MU3A-B-CJB	○		
	SA6C	Incremental	–	RCA2-MU4A	RCA2-MU4A-B	○		
			Top	RCA2-MU4A-CJT	RCA2-MU4A-B-CJT	○		
			Right	RCA2-MU4A-CJR	RCA2-MU4A-B-CJR	○		
			Left	RCA2-MU4A-CJL	RCA2-MU4A-B-CJL	○		
			Bottom	RCA2-MU4A-CJB	RCA2-MU4A-B-CJB	○		
	SA2AR	Incremental	–	RCA2-MU00B-□	–		○	
	SA3R	Incremental	–	RCA2-MU1B-□	RCA2-MU1B-B-□		○	
			Top	RCA2-MU1B-CJT-□	RCA2-MU1B-B-CJT-□		○	
			Outside	RCA2-MU1B-CJO-□	RCA2-MU1B-B-CJO-□		○	
			Bottom	RCA2-MU1B-CJB-□	RCA2-MU1B-B-CJB-□		○	
	SA4R	Incremental	–	RCA2-MU2B-□	RCA2-MU2B-B-□		○	
			Top	RCA2-MU2B-CJT-□	RCA2-MU2B-B-CJT-□		○	
			Outside	RCA2-MU2B-CJO-□	RCA2-MU2B-B-CJO-□		○	
			Bottom	RCA2-MU2B-CJB-□	RCA2-MU2B-B-CJB-□		○	
	SA5R	Incremental	–	RCA2-MU3B-□	RCA2-MU3B-B-□		○	
			Top	RCA2-MU3B-CJT-□	RCA2-MU3B-B-CJT-□		○	
			Outside	RCA2-MU3B-CJO-□	RCA2-MU3B-B-CJO-□		○	
			Bottom	RCA2-MU3B-CJB-□	RCA2-MU3B-B-CJB-□		○	
	SA6R	Incremental	–	RCA2-MU4B-□	RCA2-MU4B-B-□		○	
			Top	RCA2-MU4B-CJT-□	RCA2-MU4B-B-CJT-□		○	
			Outside	RCA2-MU4B-CJO-□	RCA2-MU4B-B-CJO-□		○	
			Bottom	RCA2-MU4B-CJB-□	RCA2-MU4B-B-CJB-□		○	
	RA2AC	Incremental	–	RCA2-MU00A	–	○		
	RA2AR	Incremental	–	RCA2-MU00B-△	–		○	
	TA4C	Incremental	–	RCA2-MU1A	RCA2-MU1A-B	○		
			Top	RCA2-MU1A-CJT	RCA2-MU1A-B-CJT	○		
			Right	RCA2-MU1A-CJR	RCA2-MU1A-B-CJR	○		
			Left	RCA2-MU1A-CJL	RCA2-MU1A-B-CJL	○		
			Bottom	RCA2-MU1A-CJB	RCA2-MU1A-B-CJB	○		
	TA5C	Incremental	–	RCA2-MU2A	RCA2-MU2A-B	○		
			Top	RCA2-MU2A-CJT	RCA2-MU2A-B-CJT	○		
			Right	RCA2-MU2A-CJR	RCA2-MU2A-B-CJR	○		
			Left	RCA2-MU2A-CJL	RCA2-MU2A-B-CJL	○		
			Bottom	RCA2-MU2A-CJB	RCA2-MU2A-B-CJB	○		
	TA6C	Incremental	–	RCA2-MU3A	RCA2-MU3A-B	○		
			Top	RCA2-MU3A-CJT	RCA2-MU3A-B-CJT	○		
			Right	RCA2-MU3A-CJR	RCA2-MU3A-B-CJR	○		
			Left	RCA2-MU3A-CJL	RCA2-MU3A-B-CJL	○		
			Bottom	RCA2-MU3A-CJB	RCA2-MU3A-B-CJB	○		
	TA7C	Incremental	–	RCA2-MU4A	RCA2-MU4A-B	○		
			Top	RCA2-MU4A-CJT	RCA2-MU4A-B-CJT	○		
			Right	RCA2-MU4A-CJR	RCA2-MU4A-B-CJR	○		
			Left	RCA2-MU4A-CJL	RCA2-MU4A-B-CJL	○		
			Bottom	RCA2-MU4A-CJB	RCA2-MU4A-B-CJB	○		
	TA4R	Incremental	–	RCA2-MU1B-□	RCA2-MU1B-B-□		○	
			Top	RCA2-MU1B-CJT-□	RCA2-MU1B-B-CJT-□		○	
			Outside	RCA2-MU1B-CJO-□	RCA2-MU1B-B-CJO-□		○	
			Bottom	RCA2-MU1B-CJB-□	RCA2-MU1B-B-CJB-□		○	
	TA5R	Incremental	–	RCA2-MU2B-□	RCA2-MU2B-B-□		○	
			Top	RCA2-MU2B-CJT-□	RCA2-MU2B-B-CJT-□		○	
			Outside	RCA2-MU2B-CJO-□	RCA2-MU2B-B-CJO-□		○	
			Bottom	RCA2-MU2B-CJB-□	RCA2-MU2B-B-CJB-□		○	
	TA6R	Incremental	–	RCA2-MU3B-□	RCA2-MU3B-B-□		○	
			Top	RCA2-MU3B-CJT-□	RCA2-MU3B-B-CJT-□		○	
			Outside	RCA2-MU3B-CJO-□	RCA2-MU3B-B-CJO-□		○	
			Bottom	RCA2-MU3B-CJB-□	RCA2-MU3B-B-CJB-□		○	
	TA7R	Incremental	–	RCA2-MU4B-□	RCA2-MU4B-B-□		○	
			Top	RCA2-MU4B-CJT-□	RCA2-MU4B-B-CJT-□		○	
			Outside	RCA2-MU4B-CJO-□	RCA2-MU4B-B-CJO-□		○	
			Bottom	RCA2-MU4B-CJB-□	RCA2-MU4B-B-CJB-□		○	

List of Maintenance Parts: RCA/RCL Series

② Replacement motor

○ : Available

Series	Type		Home Check Sensor	Motor Model Number		With Coupling	With Pulley	Note
	Size	Encoder		Without Brake	With Brake			
RCA	SA4C	Battery-less Absolute	Not applicable because it is mounted in the actuator main body.	M-ASA4C-IAA020-WA-CO	M-ASA4C-IAA020-WA-B-CO	○		Motor/ encoder only
		Absolute		M-ASA4C-IAA020-TA-CO	M-ASA4C-IAA020-TA-B-CO	○		
		Incremental		M-ASA4C-IAA020-OB-CO	M-ASA4C-IAA020-OB-B-CO	○		
	SA5C	Battery-less Absolute		M-ASA5C-IAA020-WA-CO	M-ASA5C-IAA020-WA-B-CO	○		
		Absolute		M-ASA5C-IAA020-TA-CO	M-ASA5C-IAA020-TA-B-CO	○		
		Incremental		M-ASA5C-IAA020-OB-CO	M-ASA5C-IAA020-OB-B-CO	○		
	SA6C	Battery-less Absolute		M-ASA6C-IAA030-WA-CO	M-ASA6C-IAA030-WA-B-CO	○		
		Absolute		M-ASA6C-IAA030-TA-CO	M-ASA6C-IAA030-TA-B-CO	○		
		Incremental		M-ASA6C-IAA030-OB-CO	M-ASA6C-IAA030-OB-B-CO	○		
	SA4R	Battery-less Absolute		M-ASA4R-IAA020-WA-PU	M-ASA4R-IAA020-WA-B-PU		○	
		Absolute		M-ASA4R-IAA020-TA-PU	M-ASA4R-IAA020-TA-B-PU		○	
		Incremental		M-ASA4R-IAA020-OB-PU	M-ASA4R-IAA020-OB-B-PU		○	
	SA5R	Battery-less Absolute		M-ASA5R-IAA020-WA-PU	M-ASA5R-IAA020-WA-B-PU		○	
		Absolute		M-ASA5R-IAA020-TA-PU	M-ASA5R-IAA020-TA-B-PU		○	
		Incremental		M-ASA5R-IAA020-OB-PU	M-ASA5R-IAA020-OB-B-PU		○	
	SA6R	Battery-less Absolute		M-ASA6R-IAA030-WA-PU	M-ASA6R-IAA030-WA-B-PU		○	
		Absolute		M-ASA6R-IAA030-TA-PU	M-ASA6R-IAA030-TA-B-PU		○	
		Incremental		M-ASA6R-IAA030-OB-PU	M-ASA6R-IAA030-OB-B-PU		○	
	RA3C/RGS3C/ RGD3C	Incremental	N	M-ARA3C-IAA020S-OB-CO	M-ARA3C-IAA020S-OB-B-CO	○		
			Y	M-ARA3C-IAA020S-OB-CO-HS	M-ARA3C-IAA020S-OB-B-CO-HS	○		
	RA4C RGS4C RGD4C 20W	Absolute	N	M-ARA4C-IAA020-TA-CO	M-ARA4C-IAA020-TA-B-CO	○		
			Y	M-ARA4C-IAA020-TA-CO-HS	M-ARA4C-IAA020-TA-B-CO-HS	○		
		Incremental	N	M-ARA4C-IAA020-OB-CO	M-ARA4C-IAA020-OB-B-CO	○		
			Y	M-ARA4C-IAA020-OB-CO-HS	M-ARA4C-IAA020-OB-B-CO-HS	○		
	RA4C RGS4C RGD4C 30W	Absolute	N	M-ARA4C-IAA030-TA-CO	M-ARA4C-IAA030-TA-B-CO	○		
			Y	M-ARA4C-IAA030-TA-CO-HS	M-ARA4C-IAA030-TA-B-CO-HS	○		
		Incremental	N	M-ARA4C-IAA030-OB-CO	M-ARA4C-IAA030-OB-B-CO	○		
			Y	M-ARA4C-IAA030-OB-CO-HS	M-ARA4C-IAA030-OB-B-CO-HS	○		
	RA3R RGD3R	Incremental	N	M-ARA3R-IAA020S-OB-PU	M-ARA3R-IAA020S-OB-B-PU		○	
			Y	M-ARA3R-IAA020S-OB-HS-PU	M-ARA3R-IAA020S-OB-B-HS-PU		○	
	RA4R RGD4R 20W	Absolute	N	M-ARA4R-IAA020-TA-PU	M-ARA4R-IAA020-TA-B-PU		○	
			Y	M-ARA4R-IAA020-TA-HS-PU	M-ARA4R-IAA020-TA-B-HS-PU		○	
		Incremental	N	M-ARA4R-IAA020-OB-PU	M-ARA4R-IAA020-OB-B-PU		○	
			Y	M-ARA4R-IAA020-OB-HS-PU	M-ARA4R-IAA020-OB-B-HS-PU		○	
	RA4R RGD4R 30W	Absolute	N	M-ARA4R-IAA030-TA-PU	M-ARA4R-IAA030-TA-B-PU		○	
			Y	M-ARA4R-IAA030-TA-HS-PU	M-ARA4R-IAA030-TA-B-HS-PU		○	
		Incremental	N	M-ARA4R-IAA030-OB-PU	M-ARA4R-IAA030-OB-B-PU		○	
			Y	M-ARA4R-IAA030-OB-HS-PU	M-ARA4R-IAA030-OB-B-HS-PU		○	
	SRA4R/SRGS4R/ SRGD4R	Incremental	Not applicable because it is mounted in the actuator main body.	M-ASR4R-IAA020-OB-PU	M-ASR4R-IAA020-OB-B-PU		○	
	A4R	Absolute		–	M-AA4R-IAA020U-TA-BT-PU		○	
		Incremental		–	M-AA4R-IAA020U-OB-BT-PU		○	
	A5R	Absolute		–	M-AA5R-IAA020U-TA-BT-PU		○	
		Incremental		–	M-AA5R-IAA020U-OB-BT-PU		○	
	A6R	Absolute		–	M-AA6R-IAA030U-TA-BT-PU		○	
		Incremental		–	M-AA6R-IAA030U-OB-BT-PU		○	
RCACR	SA4C	Battery-less Absolute		M-ASA4C-IAA020-WA-CO	M-ASA4C-IAA020-WA-B-CO	○		
		Absolute		M-ASA4C-IAA020-TA-CO	M-ASA4C-IAA020-TA-B-CO	○		
		Incremental		M-ASA4C-IAA020-OB-CO	M-ASA4C-IAA020-OB-B-CO	○		
	SA5C	Battery-less Absolute		M-ASA5C-IAA020-WA-CO	M-ASA5C-IAA020-WA-B-CO	○		
		Absolute		M-ASA5C-IAA020-TA-CO	M-ASA5C-IAA020-TA-B-CO	○		
		Incremental		M-ASA5C-IAA020-OB-CO	M-ASA5C-IAA020-OB-B-CO	○		
	SA6C	Battery-less Absolute		M-ASA6C-IAA030-WA-CO	M-ASA6C-IAA030-WA-B-CO	○		
		Absolute		M-ASA6C-IAA030-TA-CO	M-ASA6C-IAA030-TA-B-CO	○		
		Incremental		M-ASA6C-IAA030-OB-CO	M-ASA6C-IAA030-OB-B-CO	○		
RCAW	RA3C	Incremental	N	M-AWRA3C-IAA020S-OB-CO	M-AWRA3C-IAA020S-OB-B-CO	○		
			Y	M-AWRA3C-IAA020S-OB-CO-HS	M-AWRA3C-IAA020S-OB-B-CO-HS	○		
	RA4C 20W	Absolute	N	M-ARA4C-IAA020-TA-CO	M-ARA4C-IAA020-TA-B-CO	○		
			Y	M-ARA4C-IAA020-TA-CO-HS	M-ARA4C-IAA020-TA-B-CO-HS	○		
		Incremental	N	M-ARA4C-IAA020-OB-CO	M-ARA4C-IAA020-OB-B-CO	○		
			Y	M-ARA4C-IAA020-OB-CO-HS	M-ARA4C-IAA020-OB-B-CO-HS	○		
	RA4C 30W	Absolute	N	M-ARA4C-IAA030-TA-CO	M-ARA4C-IAA030-TA-B-CO	○		
			Y	M-ARA4C-IAA030-TA-CO-HS	M-ARA4C-IAA030-TA-B-CO-HS	○		
		Incremental	N	M-ARA4C-IAA030-OB-CO	M-ARA4C-IAA030-OB-B-CO	○		
			Y	M-ARA4C-IAA030-OB-CO-HS	M-ARA4C-IAA030-OB-B-CO-HS	○		
	RA3R	Incremental	N	M-AWRA3R-IAA020S-OB-PU	M-AWRA3R-IAA020S-OB-B-PU		○	
			Y	M-AWRA3R-IAA020S-OB-HS-PU	M-AWRA3R-IAA020S-OB-B-HS-PU		○	
	RA4R 20W	Absolute	N	M-AWRA4R-IAA020-TA-PU	M-AWRA4R-IAA020-TA-B-PU		○	
			Y	M-AWRA4R-IAA020-TA-HS-PU	M-AWRA4R-IAA020-TA-B-HS-PU		○	
		Incremental	N	M-AWRA4R-IAA020-OB-PU	M-AWRA4R-IAA020-OB-B-PU		○	
			Y	M-AWRA4R-IAA020-OB-HS-PU	M-AWRA4R-IAA020-OB-B-HS-PU		○	
	RA4R 30W	Absolute	N	M-AWRA4R-IAA030-TA-PU	M-AWRA4R-IAA030-TA-B-PU		○	
			Y	M-AWRA4R-IAA030-TA-HS-PU	M-AWRA4R-IAA030-TA-B-HS-PU		○	
		Incremental	N	M-AWRA4R-IAA030-OB-PU	M-AWRA4R-IAA030-OB-B-PU		○	
			Y	M-AWRA4R-IAA030-OB-HS-PU	M-AWRA4R-IAA030-OB-B-HS-PU		○	

③ Replacement belt

Series	Type	Timing Belt	Note
RCA2	SA2AR	TB-RCA2-SA2AR	
	SA3R	TB-RCA2-SA3R	
	SA4R	TB-RCA2-SA4R	
	SA5R	TB-RCA2-SA5R	
	SA6R	TB-RCA2-SA6R	
	RA2AR	TB-RCA2-RA2AR	
	TA4R	TB-RCA2-TA4R	
	TA5R	TB-RCA2-TA5R	
	TA6R	TB-RCA2-TA6R	
	TA7R	TB-RCA2-TA7R	

Series	Type	Timing Belt	Note
RCA	SA4R	TB-RCA-SA4R	
	SA5R	TB-RCA-SA5R	
	SA6R	TB-RCA-SA6R	
	RA3R/RGD3R	TB-RCA-RA3R	
	RA4R/RGD4R	TB-RCA-RA4R	
	SRA4R/SRGS4R/SRGD4R	TB-RCA-SRA4R	
	A4R	TB-RCA-A4R	
	A5R	TB-RCA-A5R	
	A6R	TB-RCA-A6R	

List of Maintenance Parts: RCS Series

① Replacement stainless steel sheet

Series	Type			Stainless steel sheet *1	
				Single Slider	Double Slider
RCS4 (CR)	SA4C		SA4R	ST-6A4-(stroke)	ST-6A4D-(stroke)
	SA6C		SA6R	ST-6A6-(stroke)	ST-6A6D-(stroke)
	SA7C		SA7R	ST-6A7-(stroke)	ST-6A7D-(stroke)
	SA8C		SA8R	ST-6A8-(stroke)	ST-6A8D-(stroke)
	WSA10C		WSA10R	ST-6WA10-(stroke)	–
	WSA12C		WSA12R	ST-6WA12-(stroke)	–
	WSA14C		WSA14R	ST-6WA14-(stroke)	–
	WSA16C		WSA16R	ST-6WA16-(stroke)	–
RCS4	HSA6C			ST-6HA6-(stroke)	ST-6HA6D-(stroke)
	HSA7C			ST-6HA7-(stroke)	ST-6HA7D-(stroke)
RCS3	SS8C		SS8R	ST-SS8-(stroke)	ST-SS8D-(stroke)
RCS3CR	SA8C			ST-SA8-(stroke)	ST-SA8D-(stroke)
	SS8C			ST-SS8-(stroke)	ST-SS8D-(stroke)
RCS2	SA4C	SA4D	SA4R	ST-SA4-(stroke)	–
	SA5C	SA5D	SA5R	ST-SA5-(stroke)	ST-SA5D-(stroke)
	SA6C	SA6D	SA6R	ST-SA6-(stroke)	ST-SA6D-(stroke)
	SA7C		SA7R	ST-SA7-(stroke)	ST-SA7D-(stroke)
	SS7C		SS7R	ST-SS1-(stroke)	ST-SS1D-(stroke)
	SS8C		SS8R	ST-SM1-(stroke)	ST-SM1D-(stroke)
RCS2CR	SA4C			ST-SA4-(stroke)	–
	SA5C	SA5D		ST-SA5-(stroke)	ST-SA5D-(stroke)
	SA6C	SA6D		ST-SA6-(stroke)	ST-SA6D-(stroke)
	SA7C			ST-SA7-(stroke)	ST-SA7D-(stroke)
	SS7C			ST-SS2-(stroke)	ST-SS2D-(stroke)
	SS8C			ST-SM2-(stroke)	ST-SM2D-(stroke)

*1 Stroke size: Use the stroke value described in the actuator model.

List of Maintenance Parts: RCS Series

② Replacement Motor

○ : Available

Series	Type		Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Encoder		Without Brake	With Brake			
RCS4 (CR)	SA4C	Battery-less Absolute	—	RCS4-MUSRTA4C	RCS4-MUSRTA4C-B	○		Motor/encoder only
	SA6C			RCS4-MUSRTA6C	RCS4-MUSRTA6C-B	○		
	SA7C			RCS4-MUSRTA7C	RCS4-MUSRTA7C-B	○		
	SA8C			RCS4-MUSRA8C	RCS4-MUSRA8C-B	○		
	WSA10C			RCS4-MUWSRA10C	RCS4-MUWSRA10C-B	○		
	WSA12C			RCS4-MUWSRA12C	RCS4-MUWSRA12C-B	○		
	WSA14C			RCS4-MUWSRA14C	RCS4-MUWSRA14C-B	○		
	WSA16C			RCS4-MUWSRA16C	RCS4-MUWSRA16C-B	○		
RCS4	SA4R		Top Bottom Outside	RCS4-MUSRTA4WSRA10R-△-□-PU	RCS4-MUSRTA4WSRA10R-B-△-□-PU		○	Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified. * Specify the side-mounted motor direction (ML: left side motor, MR: right side motor) in □.
	SA6R			RCS4-MUSRTA6WSRA12R-△-□-PU	RCS4-MUSRTA6WSRA12R-B-△-□-PU		○	
	SA7R			RCS4-MUSRTA7WSRA14R-△-□-PU	RCS4-MUSRTA7WSRA14R-B-△-□-PU		○	
	SA8R			RCS4-MUSA8R-△-□-PU	RCS4-MUSA8R-B-△-□-PU		○	
	WSA10R			RCS4-MUSRTA4WSRA10R-△-□-PU	RCS4-MUSRTA4WSRA10R-B-△-□-PU		○	
	WSA12R			RCS4-MUSRTA6WSRA12R-△-□-PU	RCS4-MUSRTA6WSRA12R-B-△-□-PU		○	
	WSA14R			RCS4-MUSRTA7WSRA14R-△-□-PU	RCS4-MUSRTA7WSRA14R-B-△-□-PU		○	
	WSA16R		—	RCS4-MURA8WSRA16R-PU	RCS4-MURA8WSRA16R-B-PU		○	Motor/encoder only
	HSA6C			RCS4-MUHSA6C	RCS4-MUHSA6C-B	○		
	HSA7C			RCS4-MUHSA7C	RCS4-MUHSA7C-B	○		
	RA4C			RCS4-MUSRTA4C	RCS4-MUSRTA4C-B	○		
	RA6C			RCS4-MUSRTA6C	RCS4-MUSRTA6C-B	○		
	RA7C			RCS4-MUSRTA7C	RCS4-MUSRTA7C-B	○		
	RA8C			RCS4-MUSRA8C	RCS4-MUSRA8C-B	○		
	RA4R		Top Bottom Outside	RCS4-MUSRTA4WSRA10R-△-□-PU	RCS4-MUSRTA4WSRA10R-B-△-□-PU		○	Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified. * Specify the side-mounted motor direction (ML: left side motor, MR: right side motor) in □.
	RA6R			RCS4-MUSRTA6WSRA12R-△-□-PU	RCS4-MUSRTA6WSRA12R-B-△-□-PU		○	
	RA7R			RCS4-MUSRTA7WSRA14R-△-□-PU	RCS4-MUSRTA7WSRA14R-B-△-□-PU		○	
	RA8R		—	RCS4-MURA8WSRA16R-PU	RCS4-MURA8WSRA16R-B-PU		○	Motor/encoder only
	WRA10C			RCS4-MUWSRA10C	RCS4-MUWSRA10C-B	○		
	WRA12C			RCS4-MUWSRA12C	RCS4-MUWSRA12C-B	○		
	WRA14C			RCS4-MUWSRA14C	RCS4-MUWSRA14C-B	○		
	WRA16C			RCS4-MUWSRA16C	RCS4-MUWSRA16C-B	○		
	WRA10R		Top Bottom Outside	RCS4-MUSRTA4WSRA10R-△-□-PU	RCS4-MUSRTA4WSRA10R-B-△-□-PU		○	Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified. * Specify the side-mounted motor direction (ML: left side motor, MR: right side motor) in □.
	WRA12R			RCS4-MUSRTA6WSRA12R-△-□-PU	RCS4-MUSRTA6WSRA12R-B-△-□-PU		○	
	WRA14R			RCS4-MUSRTA7WSRA14R-△-□-PU	RCS4-MUSRTA7WSRA14R-B-△-□-PU		○	
	WRA16R		—	RCS4-MURA8WSRA16R-PU	RCS4-MURA8WSRA16R-B-PU		○	Motor/encoder only
	RRA4C			RCS4-MUSRTA4C	RCS4-MUSRTA4C-B	○		
	RRA6C			RCS4-MUSRTA6C	RCS4-MUSRTA6C-B	○		
	RRA7C			RCS4-MUSRTA7C	RCS4-MUSRTA7C-B	○		
	RRA8C			RCS4-MUSRA8C	RCS4-MUSRA8C-B	○		
	RRA4R		Top Bottom Outside	RCS4-MUSRTA4WSRA10R-△-□-PU	RCS4-MUSRTA4WSRA10R-B-△-□-PU		○	Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified. * Specify the side-mounted motor direction (ML: left side motor, MR: right side motor) in □.
	RRA6R			RCS4-MUSRTA6WSRA12R-△-□-PU	RCS4-MUSRTA6WSRA12R-B-△-□-PU		○	
	RRA7R			RCS4-MUSRTA7WSRA14R-△-□-PU	RCS4-MUSRTA7WSRA14R-B-△-□-PU		○	
	RRA8R		—	RCS4-MURA8WSRA16R-PU	RCS4-MURA8WSRA16R-B-PU		○	Motor/encoder only
	TA4C			RCS4-MUSRTA4C	RCS4-MUSRTA4C-B	○		
	TA6C			RCS4-MUSRTA6C	RCS4-MUSRTA6C-B	○		
	TA7C			RCS4-MUSRTA7C	RCS4-MUSRTA7C-B	○		
	TA4R		Top Bottom Outside	RCS4-MUSRTA4WSRA10R-△-□-PU	RCS4-MUSRTA4WSRA10R-B-△-□-PU		○	Motor unit model * With motor cover. * Cable exit direction specified△ (Not specified: Standard CJT: Top, CJR: Right CJL: Left, CJB: Bottom) Either one is to be specified. * Specify the side-mounted motor direction (ML: left side motor, MR: right side motor) in □.
	TA6R			RCS4-MUSRTA6WSRA12R-△-□-PU	RCS4-MUSRTA6WSRA12R-B-△-□-PU		○	
	TA7R			RCS4-MUSRTA7WSRA14R-△-□-PU	RCS4-MUSRTA7WSRA14R-B-△-□-PU		○	

② Replacement motor

○ : Available

Series	Type			Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Motor(W)	Encoder		Without Brake	With Brake			
RCS3(P)	CT8C	400	Absolute	–	M-S3CT8C-TMA400-TA-CO	–	○		Motor unit model * With motor cover. * In the□, the motor specification is specified (ML: Left side-mounted or MR: Right side-mounted). (Note 1) Prior to May 2023, "TA" of the model name was "NA". (Mounting compatible. However, you may need to change the parameters. Contact our sales representative for details.) (Note 2) A common encoder is used for the incremental and absolute types. *For the CE specification, specify "-CE" at end of the model number. (RCS3-CT3C/CTZ5C/RA6R/RA7R/RA8R and RA10R are compatible with CE as standard)
	CTZ5C	50	Absolute	–	–	M-S3CTZ5C-TMA050-TA-B-CO	○		
	SA8C SS8C	100	Battery-less Absolute	Rear (left)	RCS3-MU8C-100-WA-A1E-CO	RCS3-MU8C-100-WA-A1E-B-CO	○		
				Side (left)	RCS3-MU8C-100-WA-A1S-CO	RCS3-MU8C-100-WA-A1S-B-CO	○		
				Rear (right)	RCS3-MU8C-100-WA-A3E-CO	RCS3-MU8C-100-WA-A3E-B-CO	○		
				Side (right)	RCS3-MU8C-100-WA-A3S-CO	RCS3-MU8C-100-WA-A3S-B-CO	○		
			Absolute (Note 1)	Rear (left)	RCS3-MU8C-100-TA-A1E-CO	RCS3-MU8C-100-TA-A1E-B-CO	○		
				Side (left)	RCS3-MU8C-100-TA-A1S-CO	RCS3-MU8C-100-TA-A1S-B-CO	○		
				Rear (right)	RCS3-MU8C-100-TA-A3E-CO	RCS3-MU8C-100-TA-A3E-B-CO	○		
				Side (right)	RCS3-MU8C-100-TA-A3S-CO	RCS3-MU8C-100-TA-A3S-B-CO	○		
			Incremental	Rear (left)	RCS3-MU8C-100-TC-A1E-CO	RCS3-MU8C-100-TC-A1E-B-CO	○		
				Side (left)	RCS3-MU8C-100-TC-A1S-CO	RCS3-MU8C-100-TC-A1S-B-CO	○		
				Rear (right)	RCS3-MU8C-100-TC-A3E-CO	RCS3-MU8C-100-TC-A3E-B-CO	○		
				Side (right)	RCS3-MU8C-100-TC-A3S-CO	RCS3-MU8C-100-TC-A3S-B-CO	○		
		150	Battery-less Absolute	Rear (left)	RCS3-MU8C-150-WA-A1E-CO	RCS3-MU8C-150-WA-A1E-B-CO	○		
				Side (left)	RCS3-MU8C-150-WA-A1S-CO	RCS3-MU8C-150-WA-A1S-B-CO	○		
				Rear (right)	RCS3-MU8C-150-WA-A3E-CO	RCS3-MU8C-150-WA-A3E-B-CO	○		
				Side (right)	RCS3-MU8C-150-WA-A3S-CO	RCS3-MU8C-150-WA-A3S-B-CO	○		
			Absolute (Note 1)	Rear (left)	RCS3-MU8C-150-TA-A1E-CO	RCS3-MU8C-150-TA-A1E-B-CO	○		
				Side (left)	RCS3-MU8C-150-TA-A1S-CO	RCS3-MU8C-150-TA-A1S-B-CO	○		
				Rear (right)	RCS3-MU8C-150-TA-A3E-CO	RCS3-MU8C-150-TA-A3E-B-CO	○		
				Side (right)	RCS3-MU8C-150-TA-A3S-CO	RCS3-MU8C-150-TA-A3S-B-CO	○		
			Incremental	Rear (left)	RCS3-MU8C-150-TC-A1E-CO	RCS3-MU8C-150-TC-A1E-B-CO	○		
				Side (left)	RCS3-MU8C-150-TC-A1S-CO	RCS3-MU8C-150-TC-A1S-B-CO	○		
				Rear (right)	RCS3-MU8C-150-TC-A3E-CO	RCS3-MU8C-150-TC-A3E-B-CO	○		
				Side (right)	RCS3-MU8C-150-TC-A3S-CO	RCS3-MU8C-150-TC-A3S-B-CO	○		
	SA8R SS8R	100	Battery-less Absolute	Rear	RCS3-MU8R-100-WA-□E-PU	RCS3-MU8R-100-WA-B-□E-PU		○	
				Side	RCS3-MU8R-100-WA-□S-PU	RCS3-MU8R-100-WA-B-□S-PU		○	
			Absolute (Note 1)	Rear	RCS3-MU8R-100-TA-□E-PU	RCS3-MU8R-100-TA-B-□E-PU		○	
				Side	RCS3-MU8R-100-TA-□S-PU	RCS3-MU8R-100-TA-B-□S-PU		○	
			Incremental	Rear	RCS3-MU8R-100-TC-□E-PU	RCS3-MU8R-100-TC-B-□E-PU		○	
				Side	RCS3-MU8R-100-TC-□S-PU	RCS3-MU8R-100-TC-B-□S-PU		○	
		150	Battery-less Absolute	Rear	RCS3-MU8R-150-WA-□E-PU	RCS3-MU8R-150-WA-B-□E-PU		○	
				Side	RCS3-MU8R-150-WA-□S-PU	RCS3-MU8R-150-WA-B-□S-PU		○	
			Absolute (Note 1)	Rear	RCS3-MU8R-150-TA-□E-PU	RCS3-MU8R-150-TA-B-□E-PU		○	
				Side	RCS3-MU8R-150-TA-□S-PU	RCS3-MU8R-150-TA-B-□S-PU		○	
			Incremental	Rear	RCS3-MU8R-150-TC-□E-PU	RCS3-MU8R-150-TC-B-□E-PU		○	
				Side	RCS3-MU8R-150-TC-□S-PU	RCS3-MU8R-150-TC-B-□S-PU		○	
	RA4R	30	Battery-less Absolute	Rear	RCS3-MU4R-30-WA-□E-PU	RCS3-MU4R-30-WA-B-□E-PU		○	
				Side	RCS3-MU4R-30-WA-□S-PU	RCS3-MU4R-30-WA-B-□S-PU		○	
			Absolute	Rear	RCS3-MU4R-30-TA-□E-PU	RCS3-MU4R-30-TA-B-□E-PU		○	
				Side	RCS3-MU4R-30-TA-□S-PU	RCS3-MU4R-30-TA-B-□S-PU		○	
			Incremental	Rear	RCS3-MU4R-30-TC-□E-PU	RCS3-MU4R-30-TC-B-□E-PU		○	
				Side	RCS3-MU4R-30-TC-□S-PU	RCS3-MU4R-30-TC-B-□S-PU		○	
	RA6R	60	Battery-less Absolute	Top	RCS3-MU6R-60-WA-CJT-□-PU	RCS3-MU6R-60-WA-B-CJT-□-PU		○	
				Outside	RCS3-MU6R-60-WA-CJO-□-PU	RCS3-MU6R-60-WA-B-CJO-□-PU		○	
				Bottom	RCS3-MU6R-60-WA-CJB-□-PU	RCS3-MU6R-60-WA-B-CJB-□-PU		○	
			Absolute (Note 2)	Top	RCS3-MU6R-60-TA-CJT-□-PU	RCS3-MU6R-60-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU6R-60-TA-CJO-□-PU	RCS3-MU6R-60-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU6R-60-TA-CJB-□-PU	RCS3-MU6R-60-TA-B-CJB-□-PU		○	
			Incremental (Note 2)	Top	RCS3-MU6R-60-TA-CJT-□-PU	RCS3-MU6R-60-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU6R-60-TA-CJO-□-PU	RCS3-MU6R-60-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU6R-60-TA-CJB-□-PU	RCS3-MU6R-60-TA-B-CJB-□-PU		○	
	RA7R	100	Battery-less Absolute	Top	RCS3-MU7R-100-WA-CJT-□-PU	RCS3-MU7R-100-WA-B-CJT-□-PU		○	
				Outside	RCS3-MU7R-100-WA-CJO-□-PU	RCS3-MU7R-100-WA-B-CJO-□-PU		○	
				Bottom	RCS3-MU7R-100-WA-CJB-□-PU	RCS3-MU7R-100-WA-B-CJB-□-PU		○	
			Absolute (Note 2)	Top	RCS3-MU7R-100-TA-CJT-□-PU	RCS3-MU7R-100-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU7R-100-TA-CJO-□-PU	RCS3-MU7R-100-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU7R-100-TA-CJB-□-PU	RCS3-MU7R-100-TA-B-CJB-□-PU		○	
			Incremental (Note 2)	Top	RCS3-MU7R-100-TA-CJT-□-PU	RCS3-MU7R-100-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU7R-100-TA-CJO-□-PU	RCS3-MU7R-100-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU7R-100-TA-CJB-□-PU	RCS3-MU7R-100-TA-B-CJB-□-PU		○	

List of Maintenance Parts: RCS Series

② Replacement Motor

○ : Available

Series	Type			Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Motor(W)	Encoder		Without Brake	With Brake			
RCS3(P)	RA8R	200	Battery-less Absolute	Top	RCS3-MU8R-200-WA-CJT-□-PU	RCS3-MU8R-200-WA-B-CJT-□-PU		○	Motor unit model * With motor cover. * In the□, the motor specification is specified (ML: Left side-mounted or MR: Right side-mounted). (Note 1) A common encoder is used for the incremental and absolute types. *For the CE specification, specify "-CE" at end of the model number. (RCS3-CT3C/CTZ5C/RA6R/RA7R/RA8R and RA10R are compatible with CE as standard)
				Outside	RCS3-MU8R-200-WA-CJO-□-PU	RCS3-MU8R-200-WA-B-CJO-□-PU		○	
				Bottom	RCS3-MU8R-200-WA-CJB-□-PU	RCS3-MU8R-200-WA-B-CJB-□-PU		○	
			Absolute (Note 1)	Top	RCS3-MU8R-200-TA-CJT-□-PU	RCS3-MU8R-200-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU8R-200-TA-CJO-□-PU	RCS3-MU8R-200-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU8R-200-TA-CJB-□-PU	RCS3-MU8R-200-TA-B-CJB-□-PU		○	
			Incremental (Note 1)	Top	RCS3-MU8R-200-TA-CJT-□-PU	RCS3-MU8R-200-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU8R-200-TA-CJO-□-PU	RCS3-MU8R-200-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU8R-200-TA-CJB-□-PU	RCS3-MU8R-200-TA-B-CJB-□-PU		○	
	RA10R	400	Battery-less Absolute	Top	RCS3-MU10R-400-WA-CJT-□-PU	RCS3-MU10R-400-WA-B-CJT-□-PU		○	
				Outside	RCS3-MU10R-400-WA-CJO-□-PU	RCS3-MU10R-400-WA-B-CJO-□-PU		○	
				Bottom	RCS3-MU10R-400-WA-CJB-□-PU	RCS3-MU10R-400-WA-B-CJB-□-PU		○	
			Absolute (Note 1)	Top	RCS3-MU10R-400-TA-CJT-□-PU	RCS3-MU10R-400-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU10R-400-TA-CJO-□-PU	RCS3-MU10R-400-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU10R-400-TA-CJB-□-PU	RCS3-MU10R-400-TA-B-CJB-□-PU		○	
			Incremental (Note 1)	Top	RCS3-MU10R-400-TA-CJT-□-PU	RCS3-MU10R-400-TA-B-CJT-□-PU		○	
				Outside	RCS3-MU10R-400-TA-CJO-□-PU	RCS3-MU10R-400-TA-B-CJO-□-PU		○	
				Bottom	RCS3-MU10R-400-TA-CJB- □ -PU	RCS3-MU10R-400-TA-B-CJB- □ -PU		○	
RCS3(P) CR	SA8C SS8C	100	Battery-less Absolute	Rear (left)	RCS3CR-MU8C-100-WA-A1E-CO	RCS3CR-MU8C-100-WA-A1E-B-CO	○		Motor unit model * With motor cover. (Note 1) Prior to May 2023, "TA" of the model name was "NA". (Mounting compatible. However, you may need to change the parameters. Contact our sales representative for details.) *For the CE specification, specify "-CE" at end of the model number.
				Side (left)	RCS3CR-MU8C-100-WA-A1S-CO	RCS3CR-MU8C-100-WA-A1S-B-CO	○		
				Rear (right)	RCS3CR-MU8C-100-WA-A3E-CO	RCS3CR-MU8C-100-WA-A3E-B-CO	○		
				Side (right)	RCS3CR-MU8C-100-WA-A3S-CO	RCS3CR-MU8C-100-WA-A3S-B-CO	○		
				Rear (left) L-shaped vacuum joint	RCS3CR-MU8C-100-WA-A1E-CO-VL	RCS3CR-MU8C-100-WA-A1E-B-CO-VL	○		
				Side (left) L-shaped vacuum joint	RCS3CR-MU8C-100-WA-A1S-CO-VL	RCS3CR-MU8C-100-WA-A1S-B-CO-VL	○		
				Rear (right) L-shaped vacuum joint	RCS3CR-MU8C-100-WA-A3E-CO-VL	RCS3CR-MU8C-100-WA-A3E-B-CO-VL	○		
				Side (right) L-shaped vacuum joint	RCS3CR-MU8C-100-WA-A3S-CO-VL	RCS3CR-MU8C-100-WA-A3S-B-CO-VL	○		
			Absolute (Note 1)	Rear (left)	RCS3CR-MU8C-100-TA-A1E-CO	RCS3CR-MU8C-100-TA-A1E-B-CO	○		
				Side (left)	RCS3CR-MU8C-100-TA-A1S-CO	RCS3CR-MU8C-100-TA-A1S-B-CO	○		
				Rear (right)	RCS3CR-MU8C-100-TA-A3E-CO	RCS3CR-MU8C-100-TA-A3E-B-CO	○		
				Side (right)	RCS3CR-MU8C-100-TA-A3S-CO	RCS3CR-MU8C-100-TA-A3S-B-CO	○		
				Rear (left) L-shaped vacuum joint	RCS3CR-MU8C-100-TA-A1E-CO-VL	RCS3CR-MU8C-100-TA-A1E-B-CO-VL	○		
				Side (left) L-shaped vacuum joint	RCS3CR-MU8C-100-TA-A1S-CO-VL	RCS3CR-MU8C-100-TA-A1S-B-CO-VL	○		
				Rear (right) L-shaped vacuum joint	RCS3CR-MU8C-100-TA-A3E-CO-VL	RCS3CR-MU8C-100-TA-A3E-B-CO-VL	○		
				Side (right) L-shaped vacuum joint	RCS3CR-MU8C-100-TA-A3S-CO-VL	RCS3CR-MU8C-100-TA-A3S-B-CO-VL	○		
			Incremental	Rear (left)	RCS3CR-MU8C-100-TC-A1E-CO	RCS3CR-MU8C-100-TC-A1E-B-CO	○		
				Side (left)	RCS3CR-MU8C-100-TC-A1S-CO	RCS3CR-MU8C-100-TC-A1S-B-CO	○		
				Rear (right)	RCS3CR-MU8C-100-TC-A3E-CO	RCS3CR-MU8C-100-TC-A3E-B-CO	○		
				Side (right)	RCS3CR-MU8C-100-TC-A3S-CO	RCS3CR-MU8C-100-TC-A3S-B-CO	○		
				Rear (left) L-shaped vacuum joint	RCS3CR-MU8C-100-TC-A1E-CO-VL	RCS3CR-MU8C-100-TC-A1E-B-CO-VL	○		
				Side (left) L-shaped vacuum joint	RCS3CR-MU8C-100-TC-A1S-CO-VL	RCS3CR-MU8C-100-TC-A1S-B-CO-VL	○		
				Rear (right) L-shaped vacuum joint	RCS3CR-MU8C-100-TC-A3E-CO-VL	RCS3CR-MU8C-100-TC-A3E-B-CO-VL	○		
				Side (right) L-shaped vacuum joint	RCS3CR-MU8C-100-TC-A3S-CO-VL	RCS3CR-MU8C-100-TC-A3S-B-CO-VL	○		

② Replacement motor

○ : Available

Series	Type			Cable Exit Direction	Motor Model Number		With Coupling	With Pulley	Note
	Size	Motor(W)	Encoder		Without Brake	With Brake			
RCS3(P)CR	SA8C SS8C	150	Battery-less Absolute	Rear (left)	RCS3CR-MU8C-150-WA-A1E-CO	RCS3CR-MU8C-150-WA-A1E-B-CO	○		Motor unit model * With motor cover. (Note 1) Prior to May 2023, "TA" of the model name was "NA". (Mounting compatible. However, you may need to change the parameters. Contact our sales representative for details.) *For the CE specification, specify "-CE" at end of the model number.
				Side (left)	RCS3CR-MU8C-150-WA-A1S-CO	RCS3CR-MU8C-150-WA-A1S-B-CO	○		
				Rear (right)	RCS3CR-MU8C-150-WA-A3E-CO	RCS3CR-MU8C-150-WA-A3E-B-CO	○		
				Side (right)	RCS3CR-MU8C-150-WA-A3S-CO	RCS3CR-MU8C-150-WA-A3S-B-CO	○		
				Rear (left) L-shaped vacuum joint	RCS3CR-MU8C-150-WA-A1E-CO-VL	RCS3CR-MU8C-150-WA-A1E-B-CO-VL	○		
				Side (left) L-shaped vacuum joint	RCS3CR-MU8C-150-WA-A1S-CO-VL	RCS3CR-MU8C-150-WA-A1S-B-CO-VL	○		
				Rear (right) L-shaped vacuum joint	RCS3CR-MU8C-150-WA-A3E-CO-VL	RCS3CR-MU8C-150-WA-A3E-B-CO-VL	○		
				Side (right) L-shaped vacuum joint	RCS3CR-MU8C-150-WA-A3S-CO-VL	RCS3CR-MU8C-150-WA-A3S-B-CO-VL	○		
			Absolute (Note 1)	Rear (left)	RCS3CR-MU8C-150-TA-A1E-CO	RCS3CR-MU8C-150-TA-A1E-B-CO	○		
				Side (left)	RCS3CR-MU8C-150-TA-A1S-CO	RCS3CR-MU8C-150-TA-A1S-B-CO	○		
				Rear (right)	RCS3CR-MU8C-150-TA-A3E-CO	RCS3CR-MU8C-150-TA-A3E-B-CO	○		
				Side (right)	RCS3CR-MU8C-150-TA-A3S-CO	RCS3CR-MU8C-150-TA-A3S-B-CO	○		
				Rear (left) L-shaped vacuum joint	RCS3CR-MU8C-150-TA-A1E-CO-VL	RCS3CR-MU8C-150-TA-A1E-B-CO-VL	○		
				Side (left) L-shaped vacuum joint	RCS3CR-MU8C-150-TA-A1S-CO-VL	RCS3CR-MU8C-150-TA-A1S-B-CO-VL	○		
				Rear (right) L-shaped vacuum joint	RCS3CR-MU8C-150-TA-A3E-CO-VL	RCS3CR-MU8C-150-TA-A3E-B-CO-VL	○		
				Side (right) L-shaped vacuum joint	RCS3CR-MU8C-150-TA-A3S-CO-VL	RCS3CR-MU8C-150-TA-A3S-B-CO-VL	○		
			Incremental	Rear (left)	RCS3CR-MU8C-150-TC-A1E-CO	RCS3CR-MU8C-150-TC-A1E-B-CO	○		
				Side (left)	RCS3CR-MU8C-150-TC-A1S-CO	RCS3CR-MU8C-150-TC-A1S-B-CO	○		
				Rear (right)	RCS3CR-MU8C-150-TC-A3E-CO	RCS3CR-MU8C-150-TC-A3E-B-CO	○		
				Side (right)	RCS3CR-MU8C-150-TC-A3S-CO	RCS3CR-MU8C-150-TC-A3S-B-CO	○		
				Rear (left) L-shaped vacuum joint	RCS3CR-MU8C-150-TC-A1E-CO-VL	RCS3CR-MU8C-150-TC-A1E-B-CO-VL	○		
				Side (left) L-shaped vacuum joint	RCS3CR-MU8C-150-TC-A1S-CO-VL	RCS3CR-MU8C-150-TC-A1S-B-CO-VL	○		
				Rear (right) L-shaped vacuum joint	RCS3CR-MU8C-150-TC-A3E-CO-VL	RCS3CR-MU8C-150-TC-A3E-B-CO-VL	○		
				Side (right) L-shaped vacuum joint	RCS3CR-MU8C-150-TC-A3S-CO-VL	RCS3CR-MU8C-150-TC-A3S-B-CO-VL	○		

List of Maintenance Parts: RCS Series

② Replacement motor

○ : Available

Series	Type			Home Check Sensor	Motor Model Number		With Coupling	With Pulley	Note
	Size	Motor(W)	Encoder		Without Brake	With Brake			
RCS2 RCS2CR	SA4C	20	Battery-less Absolute	—	M-S2SA4C-IAA020U-WA-CO	M-S2SA4C-IAA020U-WA-B-CO	○		BS: Brake wires only * Brake unit is not included. BT: Only parameter for brake option included * Brake unit is not included. (Note 1) Prior to May 2023, "TA" of the model name was "NA". (Mounting compatible. However, you may need to change the parameters. Contact our sales representative for details.) (Note 2) For products produced before October 14, 2010, "CO1" in the model name is "CO" (the coupling is different). *For the CE specification, specify "-CE" at end of the model number.
			Absolute	—	M-S2SA4C-IAA020U-TA-CO	M-S2SA4C-IAA020U-TA-B-CO	○		
			Incremental	—	M-S2SA4C-IAA020U-TC-CO	M-S2SA4C-IAA020U-TC-B-CO	○		
	SA5C		Battery-less Absolute	—	M-S2SA5C-IAA020U-WA-CO	M-S2SA5C-IAA020U-WA-B-CO	○		
			Absolute	—	M-S2SA5C-IAA020U-TA-CO	M-S2SA5C-IAA020U-TA-B-CO	○		
			Incremental	—	M-S2SA5C-IAA020U-TC-CO	M-S2SA5C-IAA020U-TC-B-CO	○		
	SA6C	30	Battery-less Absolute	—	M-S2SA6C-IAA030U-WA-CO	M-S2SA6C-IAA030U-WA-B-CO	○		
			Absolute	—	M-S2SA6C-IAA030U-TA-CO	M-S2SA6C-IAA030U-TA-B-CO	○		
			Incremental	—	M-S2SA6C-IAA030U-TC-CO	M-S2SA6C-IAA030U-TC-B-CO	○		
	SA7C	60	Battery-less Absolute	—	M-S2SA7C-IAA060U-WA-CO	M-S2SA7C-IAA060U-WA-BS-CO	○		
			Absolute(Note 1)	—	M-S2SA7C-IAA060U-TA-CO	M-S2SA7C-IAA060U-TA-BS-CO	○		
			Incremental	—	M-S2SA7C-IAA060U-TC-CO	M-S2SA7C-IAA060U-TC-BS-CO	○		
	SS7C		Battery-less Absolute	—	M-S2SS7C-IAA060U-WA-CO	M-S2SS7C-IAA060U-WA-BT-CO	○		
			Absolute(Note 1)	—	M-S2SS7C-IAA060U-TA-CO	M-S2SS7C-IAA060U-TA-BT-CO	○		
			Incremental	—	M-S2SS7C-IAA060U-TC-CO	M-S2SS7C-IAA060U-TC-BT-CO	○		
	SS8C (Note 2)	100	Absolute(Note 1)	—	M-S2SS8C-IAA100-TA-CO1	M-S2SS8C-IAA100-TA-BT-CO1	○		
			Incremental	—	M-S2SS8C-IAA100-TC-CO1	M-S2SS8C-IAA100-TC-BT-CO1	○		
		150	Absolute(Note 1)	—	M-S2SS8C-IAA150-TA-CO1	M-S2SS8C-IAA150-TA-BT-CO1	○		
			Incremental	—	M-S2SS8C-IAA150-TC-CO1	M-S2SS8C-IAA150-TC-BT-CO1	○		
RCS2	SA4R	20	Battery-less Absolute	—	M-S2SA4R-IAA020U-WA-PU	M-S2SA4R-IAA020U-WA-B-PU		○	BS: Brake wires only * Brake unit is not included. BT: Only parameter for brake option included * Brake unit is not included. (Note 1) Prior to May 2023, "TA" of the model name was "NA". (Mounting compatible. However, you may need to change the parameters. Contact our sales representative for details.) *For the CE specification, specify "-CE" at end of the model number.
			Absolute	—	M-S2SA4R-IAA020U-TA-PU	M-S2SA4R-IAA020U-TA-B-PU		○	
			Incremental	—	M-S2SA4R-IAA020U-TC-PU	M-S2SA4R-IAA020U-TC-B-PU		○	
	SA5R		Battery-less Absolute	—	M-S2SA5R-IAA020U-WA-PU	M-S2SA5R-IAA020U-WA-B-PU		○	
			Absolute	—	M-S2SA5R-IAA020U-TA-PU	M-S2SA5R-IAA020U-TA-B-PU		○	
			Incremental	—	M-S2SA5R-IAA020U-TC-PU	M-S2SA5R-IAA020U-TC-B-PU		○	
	SA6R	30	Battery-less Absolute	—	M-S2SA6R-IAA030U-WA-PU	M-S2SA6R-IAA030U-WA-B-PU		○	
			Absolute	—	M-S2SA6R-IAA030U-TA-PU	M-S2SA6R-IAA030U-TA-B-PU		○	
			Incremental	—	M-S2SA6R-IAA030U-TC-PU	M-S2SA6R-IAA030U-TC-B-PU		○	
	SA7R	60	Battery-less Absolute	—	M-S2SA7R-IAA060U-WA-PU	M-S2SA7R-IAA060U-WA-BS-PU		○	
			Absolute(Note 1)	—	M-S2SA7R-IAA060U-TA-PU	M-S2SA7R-IAA060U-TA-BS-PU		○	
			Incremental	—	M-S2SA7R-IAA060U-TC-PU	M-S2SA7R-IAA060U-TC-BS-PU		○	
	SS7R		Battery-less Absolute	—	M-S2SS7R-IAA060-WA-PU	M-S2SS7R-IAA060-WA-BT-PU		○	
			Absolute(Note 1)	—	M-S2SS7R-IAA060-TA-PU	M-S2SS7R-IAA060-TA-BT-PU		○	
			Incremental	—	M-S2SS7R-IAA060-TC-PU	M-S2SS7R-IAA060-TC-BT-PU		○	
	SS8R	100	Absolute(Note 1)	—	M-S2SS8R-IAA100-TA-PU	M-S2SS8R-IAA100-TA-BT-PU		○	
			Incremental	—	M-S2SS8R-IAA100-TC-PU	M-S2SS8R-IAA100-TC-BT-PU		○	
		150	Absolute(Note 1)	—	M-S2SS8R-IAA150-TA-PU	M-S2SS8R-IAA150-TA-BT-PU		○	
			Incremental	—	M-S2SS8R-IAA150-TC-PU	M-S2SS8R-IAA150-TC-BT-PU		○	
	RA4C RGS4C RGD4C	20	Absolute	N	M-S2RA4C-IAA020-TA-CO	M-S2RA4C-IAA020-TA-B-CO	○		
				Y	M-S2RA4C-IAA020-TA-CO-HS	M-S2RA4C-IAA020-TA-B-CO-HS	○		
			Incremental	N	M-S2RA4C-IAA020-TC-CO	M-S2RA4C-IAA020-TC-B-CO	○		
				Y	M-S2RA4C-IAA020-TC-CO-HS	M-S2RA4C-IAA020-TC-B-CO-HS	○		
		30	Absolute	N	M-S2RA4C-IAA030-TA-CO	M-S2RA4C-IAA030-TA-B-CO	○		
				Y	M-S2RA4C-IAA030-TA-CO-HS	M-S2RA4C-IAA030-TA-B-CO-HS	○		
			Incremental	N	M-S2RA4C-IAA030-TC-CO	M-S2RA4C-IAA030-TC-B-CO	○		
				Y	M-S2RA4C-IAA030-TC-CO-HS	M-S2RA4C-IAA030-TC-B-CO-HS	○		
	RA5C RGS5C RGD5C	60	Battery-less Absolute	—	M-S2RA5C-IAA060-WA-CO	M-S2RA5C-IAA060-WA-BT-CO	○		
			Absolute(Note 1)	—	M-S2RA5C-IAA060-TA-CO	M-S2RA5C-IAA060-TA-BT-CO	○		
			Incremental	—	M-S2RA5C-IAA060-TC-CO	M-S2RA5C-IAA060-TC-BT-CO	○		
		100	Battery-less Absolute	—	M-S2RA5C-IAA100-WA-CO	M-S2RA5C-IAA100-WA-BT-CO	○		
			Absolute(Note 1)	—	M-S2RA5C-IAA100-TA-CO	M-S2RA5C-IAA100-TA-BT-CO	○		
			Incremental	—	M-S2RA5C-IAA100-TC-CO	M-S2RA5C-IAA100-TC-BT-CO	○		
	RA4R RGD4R	20	Absolute	N	M-S2RA4R-IAA020-TA-PU	M-S2RA4R-IAA020-TA-B-PU		○	
				Y	M-S2RA4R-IAA020-TA-HS-PU	M-S2RA4R-IAA020-TA-B-HS-PU		○	
			Incremental	N	M-S2RA4R-IAA020-TC-PU	M-S2RA4R-IAA020-TC-B-PU		○	
				Y	M-S2RA4R-IAA020-TC-HS-PU	M-S2RA4R-IAA020-TC-B-HS-PU		○	
		30	Absolute	N	M-S2RA4R-IAA030-TA-PU	M-S2RA4R-IAA030-TA-B-PU		○	
				Y	M-S2RA4R-IAA030-TA-HS-PU	M-S2RA4R-IAA030-TA-B-HS-PU		○	
			Incremental	N	M-S2RA4R-IAA030-TC-PU	M-S2RA4R-IAA030-TC-B-PU		○	
				Y	M-S2RA4R-IAA030-TC-HS-PU	M-S2RA4R-IAA030-TC-B-HS-PU		○	
	RA5R	60	Battery-less Absolute	—	M-S2RA5R-IAA060-WA-PU	M-S2RA5R-IAA060-WA-BT-PU		○	
			Absolute(Note 1)	—	M-S2RA5R-IAA060-TA-PU	M-S2RA5R-IAA060-TA-BT-PU		○	
			Incremental	—	M-S2RA5R-IAA060-TC-PU	M-S2RA5R-IAA060-TC-BT-PU		○	
	A4R	20	Absolute	—	—	M-S2A4R-IAA020U-TA-BT-PU		○	
			Incremental	—	—	M-S2A4R-IAA020U-TC-BT-PU		○	
	A5R		Absolute	—	—	M-S2A5R-IAA020U-TA-BT-PU		○	
			Incremental	—	—	M-S2A5R-IAA020U-TC-BT-PU		○	
	A6R	30	Absolute	—	—	M-S2A6R-IAA030U-TA-BT-PU		○	
			Incremental	—	—	M-S2A6R-IAA030U-TC-BT-PU		○	

② Replacement motor

○ : Available

Series	Type			Home Check Sensor	Motor Model Number		With Coupling	With Pulley	Note
	Size	Motor(W)	Encoder		Without Brake	With Brake			
RCS2W	RA4C	20	Absolute	N	M-S2WRA4C-IAA020-TA-CO	M-S2WRA4C-IAA020-TA-B-CO	○		*For the CE specification, specify "-CE" at end of the model number.
				Y	M-S2WRA4C-IAA020-TA-CO-HS	M-S2WRA4C-IAA020-TA-B-CO-HS	○		
			Incremental	N	M-S2WRA4C-IAA020-TC-CO	M-S2WRA4C-IAA020-TC-B-CO	○		
				Y	M-S2WRA4C-IAA020-TC-CO-HS	M-S2WRA4C-IAA020-TC-B-CO-HS	○		
		30	Absolute	N	M-S2WRA4C-IAA030-TA-CO	M-S2WRA4C-IAA030-TA-B-CO	○		
				Y	M-S2WRA4C-IAA030-TA-CO-HS	M-S2WRA4C-IAA030-TA-B-CO-HS	○		
			Incremental	N	M-S2WRA4C-IAA030-TC-CO	M-S2WRA4C-IAA030-TC-B-CO	○		
				Y	M-S2WRA4C-IAA030-TC-CO-HS	M-S2WRA4C-IAA030-TC-B-CO-HS	○		
	RA4R	20	Absolute	N	M-S2WRA4R-IAA020-TA-PU	M-S2WRA4R-IAA020-TA-B-PU		○	
				Y	M-S2WRA4R-IAA020-TA-HS-PU	M-S2WRA4R-IAA020-TA-B-HS-PU		○	
			Incremental	N	M-S2WRA4R-IAA020-TC-PU	M-S2WRA4R-IAA020-TC-B-PU		○	
				Y	M-S2WRA4R-IAA020-TC-HS-PU	M-S2WRA4R-IAA020-TC-B-HS-PU		○	
		30	Absolute	N	M-S2WRA4R-IAA030-TA-PU	M-S2WRA4R-IAA030-TA-B-PU		○	
				Y	M-S2WRA4R-IAA030-TA-HS-PU	M-S2WRA4R-IAA030-TA-B-HS-PU		○	
			Incremental	N	M-S2WRA4R-IAA030-TC-PU	M-S2WRA4R-IAA030-TC-B-PU		○	
				Y	M-S2WRA4R-IAA030-TC-HS-PU	M-S2WRA4R-IAA030-TC-B-HS-PU		○	

③ Replacement belt

Series	Type	Timing Belt	Note
RCS3	SA8R	TB-RCS3-SA8R	
	SS8R	TB-RCS3-SS8R	
	RA4R	TB-RCS3-RA4R	
	RA6R	TB-RCS3-RA6R	
	RA7R	TB-RCS3-RA7R	
	RA8R	TB-RCS3-RA8R	
	RA10R	TB-RCS3-RA10R	
RCS2	SA4R	TB-RCS2-SA4R	
	SA5R	TB-RCS2-SA5R	
	SA6R	TB-RCS2-SA6R	
	SA7R	TB-RCS2-SA7R	
	SS7R	TB-RCS2-SS7R	
	SS8R	TB-RCS2-SS8R	
	RA4R	TB-RCS2-RA4R	
	RA5R	TB-RCS2-RA5R	
	A4R	TB-RCS2-A4R	
	A5R	TB-RCS2-A5R	
	A6R	TB-RCS2-A6R	

④ Load cell unit

Series	Type	Load Cell	Note
RCS3	RA4R	VLC-200N-291-FR	With frame & flange
	RA6R	VLC-600N-291-FR	With frame & flange
	RA7R	VLC-2KN-271-FR	With frame & flange
	RA8R	VLC-2KN-271-FR	With frame & flange
	RA10R	VLC-6KN-082B2-FR	With frame & flange
	RA15R	VLC-50KN-338-FR	With frame
	RA20R	VLC-50KN-338-FR	With frame
RCS2	RA13R	VLC-20KN-082-FR	With frame & flange

(Note) Load cell unit is sold as a replacement unit for existing actuator only.

List of Maintenance Parts: ISB Series

① Replacement stainless steel sheet

Series	Type	Stainless steel sheet *1
ISD	S	ST-S1-(stroke)
	M	ST-M1-(stroke)
	MX	ST-MX1-(stroke)
	L	ST-L1-(stroke)
	LX	ST-LX1-(stroke)
IS(P)DA	S	ST-SA1-(stroke)
	M	ST-MA1-(stroke)
	MX	ST-MXA1-(stroke)
	L	ST-LA1-(stroke)
	LX	ST-LXA1-(stroke)
IS(P)DB	S	ST-SB1-(stroke)
	M	ST-MB1-(stroke)
	MX	ST-MXB1-(stroke)
	L	ST-LB1-(stroke)
	LX	ST-LXB1-(stroke)
IS(P)DCR	S	ST-S2-(stroke)
	M	ST-M2-(stroke)
	MX	ST-MX2-(stroke)
	L	ST-L2-(stroke)
	LX	ST-LX2-(stroke)

Series	Type	Stainless steel sheet *1
IS(P)DCR	W(600W)	ST-W1-(stroke)
	W(750W)	ST-W2-(stroke)
	WX(600W)	ST-WX1-(stroke)
	WX(750W)	ST-WX2-(stroke)
IS(P)DACR	S	ST-SA2-(stroke)
	M	ST-MA2-(stroke)
	MX	ST-MXA2-(stroke)
	L	ST-LA2-(stroke)
	LX	ST-LXA2-(stroke)
	W(600W)	ST-WA1-(stroke)
	W(750W)	ST-WA2-(stroke)
	WX(600W)	ST-WXA1-(stroke)
	WX(750W)	ST-WXA2-(stroke)
IS(P)DBCR	S	ST-SB2-(stroke)
	M	ST-MB2-(stroke)
	MX	ST-MXB2-(stroke)
	L	ST-LB2-(stroke)
	LX	ST-LXB2-(stroke)
SSPDACR	S	ST-SB3-(stroke)
	M	ST-MB3-(stroke)
	L	ST-LB3-(stroke)

*1 Stroke size: Use the stroke value described in the actuator model.

② Replacement motor

○ : Available

Series	Type			Cable Exit Direction	Motor model Number		With Coupling	Note
	Size	Moter(W)	Encoder		Without Brake	With Brake		
IS(P)B IS(P)DB IS(P)DBCR	S	60	Battery-less Absolute (other than Lead 36)	A1E, A1S	M-ISB-TMA060-WA-CO-A1	M-ISB-TMA060-WA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA060-WA-CO-A3	M-ISB-TMA060-WA-B-CO-A3	○	
			Absolute (other than Lead 36)	A1E, A1S	M-ISB-TMA060-TA-CO-A1	M-ISB-TMA060U-TA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA060-TA-CO-A3	M-ISB-TMA060U-TA-B-CO-A3	○	
			Incremental (other than Lead 36)	A1E, A1S	M-ISB-TMA060-TC-CO-A1	M-ISB-TMA060U-TC-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA060-TC-CO-A3	M-ISB-TMA060U-TC-B-CO-A3	○	
		100	Battery-less Absolute (Lead Wire 36)	A1E, A1S	M-ISB-TMA100S-WA-CO-A1	M-ISB-TMA100S-WA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA100S-WA-CO-A3	M-ISB-TMA100S-WA-B-CO-A3	○	
	M	100	Battery-less Absolute (other than Lead 48)	A1E, A1S	M-ISB-TMA100-WA-CO-A1	M-ISB-TMA100-WA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA100-WA-CO-A3	M-ISB-TMA100-WA-B-CO-A3	○	
			Absolute (other than Lead 48)	A1E, A1S	M-ISB-TMA100-TA-CO-A1	M-ISB-TMA100U-TA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA100-TA-CO-A3	M-ISB-TMA100U-TA-B-CO-A3	○	
			Incremental (other than Lead 48)	A1E, A1S	M-ISB-TMA100-TC-CO-A1	M-ISB-TMA100U-TC-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA100-TC-CO-A3	M-ISB-TMA100U-TC-B-CO-A3	○	
		200	Battery-less Absolute (other than Lead 48)	A1E, A1S	M-ISB-TMA200-WA-CO1-A1	M-ISB-TMA200-WA-B-CO1-A1	○	
				A3E, A3S	M-ISB-TMA200-WA-CO1-A3	M-ISB-TMA200-WA-B-CO1-A3	○	
			Absolute (other than Lead 48)	A1E, A1S	M-ISB-TMA200-TA-CO1-A1	M-ISB-TMA200U-TA-B-CO1-A1	○	
				A3E, A3S	M-ISB-TMA200-TA-CO1-A3	M-ISB-TMA200U-TA-B-CO1-A3	○	
			Incremental (other than Lead 48)	A1E, A1S	M-ISB-TMA200-TC-CO1-A1	M-ISB-TMA200U-TC-B-CO1-A1	○	
				A3E, A3S	M-ISB-TMA200-TC-CO1-A3	M-ISB-TMA200U-TC-B-CO1-A3	○	
		400	Battery-less Absolute (Lead Wire 48)	A1E, A1S	M-ISB-TMA400M-WA-CO-A1	M-ISB-TMA400M-WA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA400M-WA-CO-A3	M-ISB-TMA400M-WA-B-CO-A3	○	
	L	200	Battery-less Absolute	A1E, A1S	M-ISB-TMA200-WA-CO2-A1	M-ISB-TMA200-WA-B-CO2-A1	○	
				A3E, A3S	M-ISB-TMA200-WA-CO2-A3	M-ISB-TMA200-WA-B-CO2-A3	○	
			Absolute	A1E, A1S	M-ISB-TMA200-TA-CO2-A1	M-ISB-TMA200U-TA-B-CO2-A1	○	
				A3E, A3S	M-ISB-TMA200-TA-CO2-A3	M-ISB-TMA200U-TA-B-CO2-A3	○	
			Incremental	A1E, A1S	M-ISB-TMA200-TC-CO2-A1	M-ISB-TMA200U-TC-B-CO2-A1	○	
				A3E, A3S	M-ISB-TMA200-TC-CO2-A3	M-ISB-TMA200U-TC-B-CO2-A3	○	
		400	Battery-less Absolute	A1E, A1S	M-ISB-TMA400-WA-CO-A1	M-ISB-TMA400-WA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA400-WA-CO-A3	M-ISB-TMA400-WA-B-CO-A3	○	
			Absolute	A1E, A1S	M-ISB-TMA400-TA-CO-A1	M-ISB-TMA400U-TA-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA400-TA-CO-A3	M-ISB-TMA400U-TA-B-CO-A3	○	
			Incremental	A1E, A1S	M-ISB-TMA400-TC-CO-A1	M-ISB-TMA400U-TC-B-CO-A1	○	
				A3E, A3S	M-ISB-TMA400-TC-CO-A3	M-ISB-TMA400U-TC-B-CO-A3	○	
	W	750	Battery-less Absolute	—	M-ISB-TMA750-WA-CO	M-ISB-TMA750-WA-BT-CO	○	
SSPA SSPDACR	S	200	Absolute	A1E, A1S	M-SSPA-TMA200-TA-CO-A1	M-SSPA-TMA200U-TA-B-CO-A1	○	
				A3E, A3S	M-SSPA-TMA200-TA-CO-A3	M-SSPA-TMA200U-TA-B-CO-A3	○	
			Incremental	A1E, A1S	M-SSPA-TMA200-TC-CO-A1	M-SSPA-TMA200U-TC-B-CO-A1	○	
				A3E, A3S	M-SSPA-TMA200-TC-CO-A3	M-SSPA-TMA200U-TC-B-CO-A3	○	
	M	400	Absolute	A1E, A1S	M-SSPA-TMA400-TA-CO-A1	M-SSPA-TMA400U-TA-B-CO-A1	○	
				A3E, A3S	M-SSPA-TMA400-TA-CO-A3	M-SSPA-TMA400U-TA-B-CO-A3	○	
			Incremental	A1E, A1S	M-SSPA-TMA400-TC-CO-A1	M-SSPA-TMA400U-TC-B-CO-A1	○	
				A3E, A3S	M-SSPA-TMA400-TC-CO-A3	M-SSPA-TMA400U-TC-B-CO-A3	○	
	L	750	Absolute	A1E, A1S	M-SSPA-TMA750-TA-CO-A1	M-SSPA-TMA750-TA-B-CO-A1	○	
				A3E, A3S	M-SSPA-TMA750-TA-CO-A3	M-SSPA-TMA750-TA-B-CO-A3	○	
			Incremental	A1E, A1S	M-SSPA-TMA750-TC-CO-A1	M-SSPA-TMA750-TC-B-CO-A1	○	
				A3E, A3S	M-SSPA-TMA750-TC-CO-A3	M-SSPA-TMA750-TC-B-CO-A3	○	

② Replacement motor

○ : Available

Series	Type			Motor Model Number		With Coupling	Note
	Size	Motor(W)	Encoder	Without Brake	With Brake		
IS(P)A	S	60	Absolute	M-ISA-IAA060-TA-CO	M-ISA-IAA060-TA-BT-CO	○	
			Incremental	M-ISA-IAA060-TC-CO	M-ISA-IAA060-TC-BT-CO	○	
	M	100	Absolute	M-ISA-IAA100-TA-CO	M-ISA-IAA100-TA-BT-CO	○	
			Incremental	M-ISA-IAA100-TC-CO	M-ISA-IAA100-TC-BT-CO	○	
		200	Absolute	M-ISA-IAA200M-TA-CO	M-ISA-IAA200M-TA-BT-CO	○	
			Incremental	M-ISA-IAA200M-TC-CO	M-ISA-IAA200M-TC-BT-CO	○	
	L	200	Absolute	M-ISA-IAA200L-TA-CO	M-ISA-IAA200L-TA-BT-CO	○	
			Incremental	M-ISA-IAA200L-TC-CO	M-ISA-IAA200L-TC-BT-CO	○	
		400	Absolute	M-ISA-IAA400-TA-CO	M-ISA-IAA400-TA-BT-CO	○	
			Incremental	M-ISA-IAA400-TC-CO	M-ISA-IAA400-TC-BT-CO	○	
	W	600	Absolute	M-ISA-IAA600-TA-CO	M-ISA-IAA600-TA-BT-CO	○	
			Incremental	M-ISA-IAA600-TC-CO	M-ISA-IAA600-TC-BT-CO	○	
		750	Absolute	M-ISA-IAA750-TA-CO	M-ISA-IAA750-TA-BT-CO	○	
			Incremental	M-ISA-IAA750-TC-CO	M-ISA-IAA750-TC-BT-CO	○	
ISDA ISPDACR	S	60	Absolute	M-ISDA-IAA060-TA-CO	M-ISDA-IAA060-TA-BT-CO	○	
			Incremental	M-ISDA-IAA060-TC-CO	M-ISDA-IAA060-TC-BT-CO	○	
	M	100	Absolute	M-ISDA-IAA100-TA-CO	M-ISDA-IAA100-TA-BT-CO	○	
			Incremental	M-ISDA-IAA100-TC-CO	M-ISDA-IAA100-TC-BT-CO	○	
		200	Absolute	M-ISDA-IAA200M-TA-CO	M-ISDA-IAA200M-TA-BT-CO	○	
			Incremental	M-ISDA-IAA200M-TC-CO	M-ISDA-IAA200M-TC-BT-CO	○	
	L	200	Absolute	M-ISDA-IAA200L-TA-CO	M-ISDA-IAA200L-TA-BT-CO	○	
			Incremental	M-ISDA-IAA200L-TC-CO	M-ISDA-IAA200L-TC-BT-CO	○	
		400	Absolute	M-ISDA-IAA400-TA-CO	M-ISDA-IAA400-TA-BT-CO	○	
			Incremental	M-ISDA-IAA400-TC-CO	M-ISDA-IAA400-TC-BT-CO	○	
	W	600	Absolute	M-ISDA-IAA600-TA-CO	M-ISDA-IAA600-TA-BT-CO	○	
			Incremental	M-ISDA-IAA600-TC-CO	M-ISDA-IAA600-TC-BT-CO	○	
		750	Absolute	M-ISDA-IAA750-TA-CO	M-ISDA-IAA750-TA-BT-CO	○	
			Incremental	M-ISDA-IAA750-TC-CO	M-ISDA-IAA750-TC-BT-CO	○	

③ Mid-support parts

Series	Type	Mid-support parts	
		Support hooks (for 1 axis: 2 pcs each for slider and base mounting)	Tension wires *1 (for 1 axis: 2-piece set)
IS(P)B	MXMX	WF-1	WR-MXMB-(stroke)
	LXMX		WR-LXMB-(stroke)
	LXUWX		WR-LXUB-(stroke)
	WXMX	IMS-ISB-WXM (* Intermediate support assembly)	
IS(P)A	MXMX	WF-1	WR-MXMA-(stroke)
	LXMX	WF-2	WR-LXMA-(stroke)
	LXUWX		WR-LXUA-(stroke)
	WXMX(600W)	WF-3	WR-WXMA1-(stroke)
	WXMX(750W)		WR-WXMA2-(stroke)
IS(P)DA	MX	WF-1	WR-MXA1-(stroke)
	LX	WF-2	WR-LXA1-(stroke)
IS(P)DB	MX	WF-4	WR-MXB1-(stroke)
	LX	WF-7	WR-LXB1-(stroke)
IS(P)DCR	MX	WF-1	WR-MX1-(stroke)
	LX	WF-2	WR-LX1-(stroke)
	WX(600W)	WF-3	WR-WX1-(stroke)
	WX(750W)		WR-WX2-(stroke)
IS(P)DACR	MX	WF-1	WR-MXA1-(stroke)
	LX	WF-2	WR-LXA1-(stroke)
	WX(600W)	WF-3	WR-WXA1-(stroke)
	WX(750W)		WR-WXA2-(stroke)
IS(P)DBCR	MX	WF-4	WR-MXB1-(stroke)
	LX	WF-7	WR-LXB1-(stroke)

*1 Stroke size: Use the stroke value described in the actuator model.

List of Maintenance Parts: LSA Sries

① Replacement stainless steel sheet / Internal carrier cable assembly

Series	Type		Stainless steel sheet *2	Model for Internal carrier cable assembly *1 *2	OD of Cable (mm)
LSA	Shaft type	S6SS	ST-S6SS(-Stroke)	CB-LSAS6SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		S6SM	ST-S6SM(-Stroke)	CB-LSAS6SM-AST(Stroke)	
		S8SS	ST-S8SS(-Stroke)	CB-LSAS8SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		S8SM	ST-S8SM(-Stroke)	CB-LSAS8SM-AST(Stroke)	
		S8HS	ST-S8HS(-Stroke)	CB-LSAS8HS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		S8HM	ST-S8HM(-Stroke)	CB-LSAS8HM-AST(Stroke)	
		S10SS	ST-S10SS(-Stroke)	CB-LSAS10SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		S10SM	ST-S10SM(-Stroke)	CB-LSAS10SM-AST(Stroke)	
		S10HS	ST-S10HS(-Stroke)	CB-LSAS10HS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		S10HM	ST-S10HM(-Stroke)	CB-LSAS10HM-AST(Stroke)	
	Small type	H8SS	ST-H8SS(-Stroke)	CB-LSAH8SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		H8SM	ST-H8SM(-Stroke)	CB-LSAH8SM-AST(Stroke)	
		H8HS	ST-H8HS(-Stroke)	CB-LSAH8HS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		H8HM	ST-H8HM(-Stroke)	CB-LSAH8HM-AST(Stroke)	
	Flat type	L15SS	N/A	CB-LSAL15SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		L15SM		CB-LSAL15SM-AST(Stroke)	
	Medium type	N10SS	ST-N10SS(-Stroke)	CB-LSAN10SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø5.5
		N10SM	ST-N10SM(-Stroke)	CB-LSAN10SM-AST(Stroke)	
		N15SS	ST-N15SS(-Stroke)	CB-LSAN15SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø5.5
		N15SM	ST-N15SM(-Stroke)	CB-LSAN15SM-AST(Stroke)	
		N15HS	ST-N15HS(-Stroke)	CB-LSAN15HS-AST(Stroke)	
		N15HM	ST-N15HM(-Stroke)	CB-LSAN15HM-AST(Stroke)	
		N19SS	ST-N19SS(-Stroke)	CB-LSAN19SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø7.2
		N19SM	ST-N19SM(-Stroke)	CB-LSAN19SM-AST(Stroke)	
	Large type	W21SS	ST-W21SS(-Stroke)	CB-LSAW21SS-AST(Stroke)	Motor cable: Ø8.4 Encoder cable: Ø8.2
		W21SM	ST-W21SM(-Stroke)	CB-LSAW21SM-AST(Stroke)	
		W21HS	ST-W21HS(-Stroke)	CB-LSAW21HS-AST(Stroke)	Motor cable: Ø8.4 Encoder cable: Ø8.2
		W21HM	ST-W21HM(-Stroke)	CB-LSAW21HM-AST(Stroke)	
LSAS	Medium type	N10SS	ST-N10SS(-Stroke)	CB-LSASN10SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø5.5
		N10SM	ST-N10SM(-Stroke)	CB-LSASN10SM-AST(Stroke)	
		N15SS	ST-N15SS(-Stroke)	CB-LSASN15SS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø5.5
		N15SM	ST-N15SM(-Stroke)	CB-LSASN15SM-AST(Stroke)	
		N15HS	ST-N15HS(-Stroke)	CB-LSASN15HS-AST(Stroke)	
		N15HM	ST-N15HM(-Stroke)	CB-LSASN15HM-AST(Stroke)	

*1 One cable for each slider
*2 Stroke size: Use the stroke value described in the actuator model.

List of Maintenance Parts: NS Series

① Mid-support parts

Series	Type	Mid-support parts	
		Support hooks (for 1 axis: 2 pcs each for slider and base mounting)	Tension wires *3 (for 1 axis: 2-piece set)
NS	MXMXS(A)	WF-5	WR-NMX-(Stroke)
	LXMXS(A)	WF-6	WR-NLX-(Stroke)

② Replacement internal carrier cable

Series	Type		Model for Internal carrier cable assembly *2*3	OD of Cable (mm)
NS	Small type	SXMS(A)	CB-SXMS-AST(Stroke)	Motor cable: Ø5.7 Encoder cable: Ø8.2
		SXMM(A)	CB-SXMM-AST(Stroke)	
		SZMS(A)	CB-SZMS-AST(Stroke)	
		SZMM(A)	CB-SZMM-AST(Stroke)	
	Medium type	MXMS(A)	CB-MXMS-AST(Stroke)	Motor cable: Ø7.6 Encoder cable: Ø6.7
		MXMM(A)	CB-MXMM-AST(Stroke)	
		MXMXS(A)	CB-MXMXS-AST(Stroke)	
		MZMS(A)	CB-MZMS-AST(Stroke)	
		MZMM(A)	CB-MZMM-AST(Stroke)	
	Large type	LXMS(A)	CB-LXMS-AST(Stroke)	Motor cable: Ø7.6 Encoder cable: Ø6.7
		LXMM(A)	CB-LXMM-AST(Stroke)	
		LXMXS(A)	CB-LXMXS-AST(Stroke)	
		LZMS(A)	CB-LZMS-AST(Stroke)	
		LZMM(A)	CB-LZMM-AST(Stroke)	
	Large type (Option: L (LL) / C (CL))*1	LXMS(A)	CB-LXMS-AST(Stroke)-LS	Motor cable: Ø7.6 Encoder cable: Ø8.2
		LXMM(A)	CB-LXMM-AST(Stroke)-LS	
		LXMXS(A)	CB-LXMXS-AST(Stroke)-LS	
		LZMS(A)	CB-LZMS-AST(Stroke)-LS	
		LZMM(A)	CB-LZMM-AST(Stroke)-LS	
	Large type (Option: ET)*1	LXMS(A)	CB-LXMS-AST(Stroke)-ET	Motor cable: Ø7.6 Encoder cable: Ø6.7
		LXMM(A)	CB-LXMM-AST(Stroke)-ET	
		LXMXS(A)	CB-LXMXS-AST(Stroke)-ET(A) *Products manufactured after March 2022 will end with "-ETA".	
		LZMS(A)	CB-LZMS-AST(Stroke)-ET	
		LZMM(A)	CB-LZMM-AST(Stroke)-ET	
	Large type (Option: L (LL) / C (CL), ET)*1	LXMS(A)	CB-LXMS-AST(Stroke)-LS-ET	Motor cable: Ø7.6 Encoder cable: Ø8.2
		LXMM(A)	CB-LXMM-AST(Stroke)-LS-ET	
		LXMXS(A)	CB-LXMXS-AST(Stroke)-LS-ET(A) *Products manufactured after March 2022 will end with "-ETA".	
		LZMS(A)	CB-LZMS-AST(Stroke)-LS-ET	
		LZMM(A)	CB-LZMM-AST(Stroke)-LS-ET	

*1 L (LL) ••• With home limit switch C (CL) ••• With creep sensor ET ••• Extended cable carrier specification
*2 Each cable is for one slider.
*3 Stroke size: Use the stroke value described in the actuator model.

List of Maintenance Parts: NSA Sries

① Replacement motor

Series	Size	Model	Note
NSA	M	NSA-MUM-CO	With coupling, without brake
	L	NSA-MUL-CO	With coupling, without brake
	W	NSA-MUW	Without coupling, without brake

② Replacement belt

Series	Size	Model	Note
NSA	M	TB-NSA-M	
	L	TB-NSA-L	
	W	TB-NSA-W	

* The customer cannot replace LXMXS、LXMXM、WXMXS、WXMXM Belts.
If there is any abnormality, contact IAI representatives.

③ Replacement internal carrier cable

Series	Size	Model	Note	OD of Cable
NSA	M	CB-NSAM-AST(Stroke)	For standard cable carrier (CT3, CT4) / For user cable carrier (UM3, UM4)	Motor cable: Ø7.6 Encoder cable: Ø6.3
		CB-NSAM-AST(Stroke)-ET	For extended cable carrier (ET5, ET6, ET7, ET8)	
		CB-NSAM-AST(Stroke)-NT	For specifications without cable carrier (NT3, NT4)	
	L	CB-NSAL-AST(Stroke)	For standard cable carrier (CT3, CT4) / For user cable carrier (UM3, UM4)	Motor cable: Ø7.6 Encoder cable: Ø6.3
		CB-NSAL-AST(Stroke)-ET	For extended cable carrier (ET5, ET6, ET7, ET8)	
		CB-NSAL-AST(Stroke)-NT	For specifications without cable carrier (NT3, NT4)	
	W	CB-NSAW-AST(Stroke)	For standard cable carrier (CT3, CT4) / For user cable carrier (UM3, UM4)	Motor cable: Ø7.6 Encoder cable: Ø6.3
		CB-NSAW-AST(Stroke)-ET	For extended cable carrier (ET5, ET6, ET7, ET8)	
		CB-NSAW-AST(Stroke)-NT	For specifications without cable carrier (NT3, NT4)	

List of Maintenance Parts: IXP Series

① Replacement motor

Type	Shaft Number of Motor Axis	Model	Note
IXP-□N35/45	1st	M-IXP-N35-1	
	2nd	M-IXP-N35-2	
	3rd (without brake)	M-IXP-N35-3–PU	With metal fittings & pulley
	4th	M-IXP-N35-4–PU	With metal fittings & pulley
IXP-□N55/65	1st	M-IXP-N55-1	
	2nd	M-IXP-N55-2	
	3rd (without brake)	M-IXP-N55-3–PU	With metal fittings & pulley, without brake
	3rd (with brake)	M-IXP-N55-3-B–PU	With metal fittings, pulley, and brake
	4th	M-IXP-N55-4	

*Contact us for □N18/25, cleanroom specification, and dust-proof/splash-proof specification.

② Replacement belt

Type	Timing Belt (for Vertical Shaft)	Timing Belt (for Rotating Shaft)
IXP-□N35/45	TB-IXP-N35-3	TB-IXP-N35-4
IXP-□N55/65	TB-IXP-N55-3	TB-IXP-N55-4

*Contact us for □N18/25, cleanroom specification, and dust-proof/splash-proof specification.

③ Relay cable connected to RCP4-GRS□ □ for IXP

Type	Cable
IXP-3N25	CB-IXP2-AT006-AS
IXP-3N35/45/55/65	CB-IXP-AT008-AS

List of Maintenance Parts: IXA Sries

① Replacement motor

Type	No. of Motor axis	Model	Note
IXA-□NNN1805	1st axis	M-IXA-N18-1-PU	with pulley
	2nd axis	M-IXA-N18-2	
	3rd axis	M-IXA-N18-3-PU	with pulley
	4th axis	—	Cannot be replaced by the customer
IXA-□NNN3015	1st axis	M-IXA-N30-1	
	2nd axis	M-IXA-N30-2	
	3rd axis	M-IXA-N30-3-PU	with pulley
	4th axis	M-IXA-N30-4	
IXA-□NSN3015	1st axis	M-IXA-S30-1	
	2nd axis	M-IXA-S30-2	
	3rd axis	M-IXA-S30-3-PU	with pulley
	4th axis	M-IXA-S30-4	
IXA-□NNN45□□	1st axis	M-IXA-N45-1	
	2nd axis	M-IXA-N45-2	
	3rd axis	M-IXA-N45-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-N45-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	4th axis	M-IXA-N45-4-PU	with pulley
IXA-□NSN45□□	1st axis	M-IXA-S45-1	
	2nd axis	M-IXA-S45-2	
	3rd axis	M-IXA-S45-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-S45-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	4th axis	M-IXA-S45-4-PU	with pulley
IXA-□NNN60□□	1st axis	M-IXA-N60-1	
	2nd axis	M-IXA-N60-2	
	3rd axis	M-IXA-N60-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-N60-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	4th axis	M-IXA-N60-4-PU	with pulley
IXA-□NSN60□□	1st axis	M-IXA-S60-1	
	2nd axis	M-IXA-S60-2	
	3rd axis	M-IXA-S60-3-PU	With pulley and the serial number is not suffixed with V1. (Ex.) SERIAL No. B00567400
		M-IXA-S60-3-PU-V1	With pulley and the serial number is suffixed with V1. (Ex.) SERIAL No. B00534640 V1
	4th axis	M-IXA-S60-4-PU	with pulley
IXA-4NNN80□□	1st axis	M-IXA-N80-1-PU	with pulley
	2nd axis	M-IXA-N80-2-PU	with pulley
	3rd axis	M-IXA-N80-3-PU	with pulley
	4th axis	M-IXA-N80-4	
IXA-4NSN80□□	1st axis	M-IXA-S80-1-PU	with pulley
	2nd axis	M-IXA-S80-2-PU	with pulley
	3rd axis	M-IXA-S80-3-PU	with pulley
	4th axis	M-IXA-S80-4	
IXA-4NNN100□□	1st axis	M-IXA-N100-1-PU	with pulley
	2nd axis	M-IXA-N100-2-PU	with pulley
	3rd axis	M-IXA-N100-3-PU	with pulley
	4th axis	M-IXA-N100-4	
IXA-4NSN100□□	1st axis	M-IXA-S100-1-PU	with pulley
	2nd axis	M-IXA-S100-2-PU	with pulley
	3rd axis	M-IXA-S100-3-PU	with pulley
	4th axis	M-IXA-S100-4	
IXA-4NHN10040	1st axis	M-IXA-H100-1-PU	with pulley
	2nd axis	M-IXA-H100-2-PU	with pulley
	3rd axis	M-IXA-H100-3-PU	with pulley
	4th axis	M-IXA-H100-4	
IXA-4NHN12040	1st axis	M-IXA-H120-1-PU	with pulley
	2nd axis	M-IXA-H120-2-PU	with pulley
	3rd axis	M-IXA-H120-3-PU	with pulley
	4th axis	M-IXA-H120-4	

② Replacement belt (Timing belt)

Type	for 1st axis	for 2nd axis	for 3rd axis (vertical axis)	for 4th axis (rotational axis)
IXA-□NNN1805	TB-IXA-18-1	—	TB-IXA-18-3	Cannot be replaced by the customer
IXA-□NNN3015 IXA-□NSN3015	—	—	TB-IXA-30-3	TB-IXA-30-4
IXA-□NNN45□□ IXA-□NNN60□□ IXA-□NSN45□□ IXA-□NSN60□□	—	—	TB-IXA-4560-3	TB-IXA-4560-4-1 (1st step) TB-IXA-4560-4-2 (2nd step)
IXA-4NNN80□□	TB-IXA-80-1-N	TB-IXA-80-2-N	TB-IXA80100-3-N	TB-IXA80100-4
IXA-4NSN80□□	TB-IXA-80100-1-S	TB-IXA-80-2-S	TB-IXA80100-3-S	
IXA-4NNN100□□	TB-IXA-100-1-N	TB-IXA-100-2-N	TB-IXA80100-3-N	
IXA-4NSN100□□	TB-IXA-80100-1-S	TB-IXA-100-2-S	TB-IXA80100-3-S	
IXA-4NHN10040 IXA-4NHN12040	TB-IXA-100-1-N	TB-IXA-100-2-S	TB-IXA-100120-3-H	TB-IXA-80100-4

③ Others

Type	Part name		Model	Note
IXA-4NSC3015	Gasket (J2 axis user panel)		IXAC-PK1-30-2	
	Gasket (J2 axis spline cover)		IXAC-PK2-30-2	
	Bellows maintenance assembly		IXAC-JBA-304560-180	
IXA-4NSC45□□	Gasket (J2 axis user panel)		IXAC-PK1-4560-2	
IXA-4NSC60□□	Gasket (J2 axis spline cover)		IXAC-PK2-4560-2	
	Gasket (J2 axis arm cover)		IXAC-PK3-4560-2	
	Bellows maintenance assembly		IXAC-JBA-304560-180	At vertical axis stroke of 180mm
	Bellows maintenance assembly		IXAC-JBA-304560-330	At vertical axis stroke of 330mm
IXA-4NSW3015	O-ring (J2 axis spline cover)		IXAW-OR1-30-2	
	O-ring (J2 axis arm cover)		IXAW-OR2-30-2	
	Bellows maintenance assembly		IXAW-JBA-304560-180	
IXA-4NSW45□□ 4NSW60□□	O-ring (ZR axis dust cover)		IXAW-OR-4560-34	
	Gasket (J2 axis arm cover L)		IXAW-PK-4560-2	
	Bellows maintenance assembly		IXAW-JBA-304560-180	At vertical axis stroke of 180mm
	Bellows maintenance assembly		IXAW-JBA-4560-330	At vertical axis stroke of 330mm
IXA-4NSW80□□ 4NSW100□□ 4NHW12040	Gasket (External wiring panel)	Standard (NBR)	IXAW-PK1-80100120	
		Fluororubber (FKM)	IXAW-PK1-80100120-SLF	
	Gasket (J2 motor cover)	Standard (NBR)	IXAW-PK2-80100120-2	
		Fluororubber (FKM)	IXAW-PK2-80100120-2-SLF	
	Gasket (J2 arm cover)	Standard (NBR)	IXAW-PK3-80100120-2	
		Fluororubber (FKM)	IXAW-PK3-80100120-2-SLF	
	Bellows maintenance assembly	Standard (NBR)	IXAW-JBA-80100120-200	At Z-axis stroke of 200mm
		Fluororubber (FKM)	IXAW-JBA-80100120-200-SLF	
	Bellows maintenance assembly	Standard (NBR)	IXAW-JBA-80100120-400	At Z-axis stroke of 400mm
		Fluororubber (FKM)	IXAW-JBA-80100120-400-SLF	

List of Maintenance Parts: IK Series (Combinations of RCP6)

① Replacement cable assembly for cable carrier

Series	Type	Axis for mounting cable carrier	Replacement cable assembly for cable carrier	Note	
				X-axis stroke	Y-axis stroke
IK2	P6XBB1	for Y-axis (between axes 1 and 2)	CB-P6XBB1Y-AST(X-axis stroke)	50-1100	-
	P6XBB2	for Y-axis (between axes 1 and 2)	CB-P6XBB2Y-AST(X-axis stroke)	50-1100	-
	P6XBB3	for Y-axis (between axes 1 and 2)	CB-P6XBB3Y-AST(X-axis stroke)	50-1100	-
	P6XBC1	for Y-axis (between axes 1 and 2)	CB-P6XBC1Y-AST(X-axis stroke)	50-800	-
	P6XBC2	for Y-axis (between axes 1 and 2)	CB-P6XBC2Y-AST(X-axis stroke)	50-800	-
	P6XBC3	for Y-axis (between axes 1 and 2)	CB-P6XBC3Y-AST(X-axis stroke)	50-800	-
	P6XBD1	for Y-axis (between axes 1 and 2)	CB-P6XBD1Y-AST(X-axis stroke)	50-800	-
	P6XBD2	for Y-axis (between axes 1 and 2)	CB-P6XBD2Y-AST(X-axis stroke)	50-800	-
	P6XBD3	for Y-axis (between axes 1 and 2)	CB-P6XBD3Y-AST(X-axis stroke)	50-800	-
	P6XBE1	for Y-axis (between axes 1 and 2)	CB-P6XBE1Y-AST(X-axis stroke)	50-1100	-
	P6XBE2	for Y-axis (between axes 1 and 2)	CB-P6XBE2Y-AST(X-axis stroke)	50-1100	-
	P6XBE3	for Y-axis (between axes 1 and 2)	CB-P6XBE3Y-AST(X-axis stroke)	50-1100	-
	P6XBF1	for Y-axis (between axes 1 and 2)	CB-P6XBF1Y-AST(X-axis stroke)	50-800	-
	P6XBF2	for Y-axis (between axes 1 and 2)	CB-P6XBF2Y-AST(X-axis stroke)	50-800	-
	P6XBF3	for Y-axis (between axes 1 and 2)	CB-P6XBF3Y-AST(X-axis stroke)	50-800	-
IK2	P6YBB1	for Z-axis (between axes 1 and 2)	CB-P6YBB1Z-AST(Y-axis stroke)	50-1100	-
	P6YBB2	for Z-axis (between axes 1 and 2)	CB-P6YBB2Z-AST(Y-axis stroke)	50-1100	-
	P6YBB3	for Z-axis (between axes 1 and 2)	CB-P6YBB3Z-AST(Y-axis stroke)	50-1100	-
	P6YBC1	for Z-axis (between axes 1 and 2)	CB-P6YBC1Z-AST(Y-axis stroke)	50-800	-
	P6YBC2	for Z-axis (between axes 1 and 2)	CB-P6YBC2Z-AST(Y-axis stroke)	50-800	-
	P6YBC3	for Z-axis (between axes 1 and 2)	CB-P6YBC3Z-AST(Y-axis stroke)	50-800	-
	P6YBD1	for Z-axis (between axes 1 and 2)	CB-P6YBD1Z-AST(Y-axis stroke)	50-800	-
	P6YBD2	for Z-axis (between axes 1 and 2)	CB-P6YBD2Z-AST(Y-axis stroke)	50-800	-
	P6YBD3	for Z-axis (between axes 1 and 2)	CB-P6YBD3Z-AST(Y-axis stroke)	50-800	-
	P6YBG1	for Z-axis (between axes 1 and 2)	CB-P6YBG1Z-AST(Y-axis stroke)	50-1100	-
	P6YBG2	for Z-axis (between axes 1 and 2)	CB-P6YBG2Z-AST(Y-axis stroke)	50-1100	-
	P6YBG3	for Z-axis (between axes 1 and 2)	CB-P6YBG3Z-AST(Y-axis stroke)	50-1100	-
	P6YBH1	for Z-axis (between axes 1 and 2)	CB-P6YBH1Z-AST(Y-axis stroke)	50-800	-
	P6YBH2	for Z-axis (between axes 1 and 2)	CB-P6YBH2Z-AST(Y-axis stroke)	50-800	-
	P6YBH3	for Z-axis (between axes 1 and 2)	CB-P6YBH3Z-AST(Y-axis stroke)	50-800	-
	P6YBI1	for Z-axis (between axes 1 and 2)	CB-P6YBI1Z-AST(Y-axis stroke)	50-800	-
	P6YBI2	for Z-axis (between axes 1 and 2)	CB-P6YBI2Z-AST(Y-axis stroke)	50-800	-
	P6YBI3	for Z-axis (between axes 1 and 2)	CB-P6YBI3Z-AST(Y-axis stroke)	50-800	-
IK3	P6BBB1	for Y-axis (between axes 1 and 2)	CB-P6BBB1Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBB1Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-250(HSL), 50-400(other than HSL)
	P6BBB2	for Y-axis (between axes 1 and 2)	CB-P6BBB2Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBB2Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-250(HSL), 50-400(other than HSL)
	P6BBB3	for Y-axis (between axes 1 and 2)	CB-P6BBB3Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBB3Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-250(HSL), 50-400(other than HSL)
	P6BBC1	for Y-axis (between axes 1 and 2)	CB-P6BBC1Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBC1Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-250(HHL), 50-400(other than HHL)
	P6BBC2	for Y-axis (between axes 1 and 2)	CB-P6BBC2Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBC2Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-250(HHL), 50-400(other than HHL)
	P6BBC3	for Y-axis (between axes 1 and 2)	CB-P6BBC3Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBC3Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-250(HHL), 50-400(other than HHL)

① Replacement cable assembly for cable carrier

Series	Type	Axis for mounting cable carrier	Replacement cable assembly for cable carrier	Note	
				X-axis stroke	Y-axis stroke
IK3	P6BBE1	for Y-axis (between axes 1 and 2)	CB-P6BBE1Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBE1Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-500
	P6BBE2	for Y-axis (between axes 1 and 2)	CB-P6BBE2Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBE2Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-500
	P6BBE3	for Y-axis (between axes 1 and 2)	CB-P6BBE3Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBE3Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-500
	P6BBF1	for Y-axis (between axes 1 and 2)	CB-P6BBF1Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBF1Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
	P6BBF2	for Y-axis (between axes 1 and 2)	CB-P6BBF2Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBF2Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
	P6BBF3	for Y-axis (between axes 1 and 2)	CB-P6BBF3Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBF3Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
	P6BBG1	for Y-axis (between axes 1 and 2)	CB-P6BBG1Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBG1Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-250
	P6BBG2	for Y-axis (between axes 1 and 2)	CB-P6BBG2Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBG2Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-250
	P6BBG3	for Y-axis (between axes 1 and 2)	CB-P6BBG3Y-AST(X-axis stroke)	50-1100	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBG3Z-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-250
	P6BBH1	for Y-axis (between axes 1 and 2)	CB-P6BBH1Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBH1Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-200
	P6BBH2	for Y-axis (between axes 1 and 2)	CB-P6BBH2Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBH2Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-200
	P6BBH3	for Y-axis (between axes 1 and 2)	CB-P6BBH3Y-AST(X-axis stroke)	50-800	-
		for Z-axis (between axes 1, 2 and 3)	CB-P6BBH3Z-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-200
IK4	P6BBB1	for Y-axis (between axes 1 and 2)	CB-P6BBB1Y-AST(X-axis stroke)	50-1100	-
		for ZR-axis (between axes 1, 2 and Z)	CB-P6BBB1Z4-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-300
		for ZR-axis (between axes 1, 2 and R)	CB-P6BBB1R-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-300
	P6BBB2	for Y-axis (between axes 1 and 2)	CB-P6BBB2Y-AST(X-axis stroke)	50-1100	-
		for ZR-axis (between axes 1, 2 and Z)	CB-P6BBB2Z4-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-300
		for ZR-axis (between axes 1, 2 and R)	CB-P6BBB2R-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-300
	P6BBB3	for Y-axis (between axes 1 and 2)	CB-P6BBB3Y-AST(X-axis stroke)	50-1100	-
		for ZR-axis (between axes 1, 2 and Z)	CB-P6BBB3Z4-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-300
		for ZR-axis (between axes 1, 2 and R)	CB-P6BBB3R-AST (X-axis stroke)-(Y-axis stroke)	50-1100	50-300
	P6BBF1	for Y-axis (between axes 1 and 2)	CB-P6BBF1Y-AST(X-axis stroke)	50-800	-
		for ZR-axis (between axes 1, 2 and Z)	CB-P6BBF1Z4-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
		for ZR-axis (between axes 1, 2 and R)	CB-P6BBF1R-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
	P6BBF2	for Y-axis (between axes 1 and 2)	CB-P6BBF2Y-AST(X-axis stroke)	50-800	-
		for ZR-axis (between axes 1, 2 and Z)	CB-P6BBF2Z4-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
		for ZR-axis (between axes 1, 2 and R)	CB-P6BBF2R-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
	P6BBF3	for Y-axis (between axes 1 and 2)	CB-P6BBF3Y-AST(X-axis stroke)	50-800	-
		for ZR-axis (between axes 1, 2 and Z)	CB-P6BBF3Z4-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400
		for ZR-axis (between axes 1, 2 and R)	CB-P6BBF3R-AST (X-axis stroke)-(Y-axis stroke)	50-800	50-400

List of Maintenance Parts: TTA Series

① Replacement timing belt

TTA Model	Axis	Lead	Encoder	Single product model number	Manufacturer model	Manufacturer
TTA-A□ Pulse type	X-axis	-	I/WA	TB-TTA-PA-X-02	243-3GT-6	Gates Unitta Asia
	Y-axis	-	I/WA	TB-TTA-PAC-XY-02	318-3GT-6	
	Z-axis	-	I/WA	TB-TTA-PAC-Z-02	244-2GT-6	
	R-axis	-	I	TB-TTA-PAC-RI-02	276-3GT-6	
		-	WA	TB-TTA-PSAC-RWA-02	280-2GT-6	
TTA-A□S Servo Type	X-axis	L/H	WA	TB-TTA-SA-X-01	225-3GT-6	
	Y-axis	L/H	WA	TB-TTA-SAC-XYL-01	300-3GT-6	
	Z-axis	L	WA	TB-TTA-SAC-ZL-01	232-2GT-6	
		H	WA	TB-TTA-SAC-ZH-01	226-2GT-6	
	R-axis	L/H	WA	TB-TTA-PSAC-RWA-02	280-2GT-6	
TTA-C□ Pulse Type	X-axis	-	I/WA	TB-TTA-PAC-XY-02	318-3GT-6	
	Y-axis	-	I/WA	TB-TTA-PAC-XY-02	318-3GT-6	
	Z-axis	-	I/WA	TB-TTA-PAC-Z-02	244-2GT-6	
	R-axis	-	I	TB-TTA-PAC-RI-02	276-3GT-6	
		-	WA	TB-TTA-PSAC-RWA-02	280-2GT-6	
TTA-C□S Servo Type	X-axis	L	WA	TB-TTA-SAC-XYL-01	300-3GT-6	
		H	WA	TB-TTA-SC-XYH-01	297-3GT-6	
	Y-axis	L	WA	TB-TTA-SAC-XYL-01	300-3GT-6	
		H	WA	TB-TTA-SC-XYH-01	297-3GT-6	
	Z-axis	L	WA	TB-TTA-SAC-ZL-01	232-2GT-6	
		H	WA	TB-TTA-SAC-ZH-01	226-2GT-6	
	R-axis	L/H	WA	TB-TTA-PSAC-RWA-02	280-2GT-6	
[Old type*] TTA-A□Pulse type TTA-C□Pulse type	X-axis	-	I	TB-TTA-PAC-X-01	100S3M243R	Bando Chemical Industries, Ltd.
	Y-axis	-	I	TB-TTA-PAC-Y-01	100S3M318R	
	Z-axis	-	I	TB-TTA-PAC-Z-01	60S3M243R	

*For products manufactured before January 31, 2016. Stock is limited, so please contact our sales representative if you would like to purchase.

② Replacement fan

TTA Model	Model	Installation
All models	MGT4024YB-O10(TTA)	Connector connection

MEMO

List of Maintenance Parts: Controller

① Replacement battery

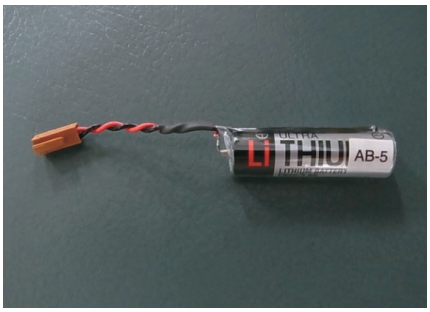
Series/Type	Battery type	Model	Installation	Method	Battery life	Charging time	Note
RCS-C	System memory	-		-	-	-	-
	Absolute battery	AB-1	Connector	Non-chargeable	20000 hours	-	Assuming the battery at full capacity
RCP2-C	System memory	-		-	-	-	-
	Absolute battery	AB-4	Connector	Rechargeable	3 years	48 hours	Retains memory for approx. 250 hours on a full charge
E-CON	System memory	-		-	-	-	-
	Absolute battery	AB-1	Connector	Non-chargeable	20000 hours	-	Assuming the battery at full capacity
PCON-C/CY/SE	System memory	-		-	-	-	-
	Absolute battery	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
PCON-CA/CB (Pulse trains are excluded)	System memory	-		-	-	-	-
	Absolute battery	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
ACON-C/CY/SE	System memory	-		-	-	-	-
	Absolute battery	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
ACON-CA/CB DCON-CB (Pulse trains are excluded)	System memory	-		-	-	-	-
	Absolute battery (Absolute specification)	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
	Absolute battery (Simple absolute specification)	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
MSEP/MCON	System memory	-		-	-	-	-
	Absolute battery	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
MSCON	System memory	-		-	-	-	-
	Absolute battery	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
SCON-C/CA/CB/LC	System memory	-		-	-	-	-
	Absolute battery	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
SCON2	System memory	-		-	-	-	-
	Absolute battery	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
RCON	Absolute battery (Simple absolute specification)	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
PSEL	System memory	AB-5	Connector	Non-chargeable	5 years	-	Assuming the battery at full capacity
	Absolute battery	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
ASEL	System memory	AB-5	Connector	Non-chargeable	5 years	-	Assuming the battery at full capacity
	Absolute battery (Absolute specification)	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
SSEL	System memory	AB-5	Connector	Non-chargeable	5 years	-	Assuming the battery at full capacity
	Absolute battery	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
MSEL	Absolute battery	AB-7	Connector	Rechargeable	3 years	72 hours	Retains memory for approx. 5 - 20 days on a full charge
XSEL-J/K	System memory	CR2032	Battery holder	Non-chargeable	1.5 years	-	Assuming the battery at full capacity
	Absolute battery	IA-XAB-BT	Connector	Non-chargeable	1 years	-	Assuming the battery at full capacity
XSEL-R/S/RA/SA	System memory	-		-	-	-	-
	Absolute battery	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
XSEL-P/Q	System memory	CR2032	Battery holder	Non-chargeable	1.5 years	-	Assuming the battery at full capacity
	Absolute battery	AB-5	Connector	Non-chargeable	2 years	-	Assuming the battery at full capacity
SCARA (IX-12/15/18)	System memory	-		-	-	-	-
	Absolute battery	AB-6	Connector	Non-chargeable	3 years	-	Assuming the battery at full capacity
SCARA (other than IX-12/15/18)	System memory	-		-	-	-	-
	Absolute battery	AB-3	Connector	Non-chargeable	3 years	-	Assuming the battery at full capacity
TB-03	Drive Battery	AB-7	Connector	Rechargeable	Cycle Endurance 300 times	3 hours (When AC adaptor is connected)	-
TBD-1WL (Wireless Teaching Controller)	Drive Battery	AB-8	Connector	Rechargeable	Cycle Endurance 300 times	8 hours	-

■ AB-1

■ AB-3

■ AB-4

■ AB-5



■ AB-6

■ AB-7

■ AB-8

■ IA-XAB-BT

■ CR2032

List of Maintenance Parts: Controllers

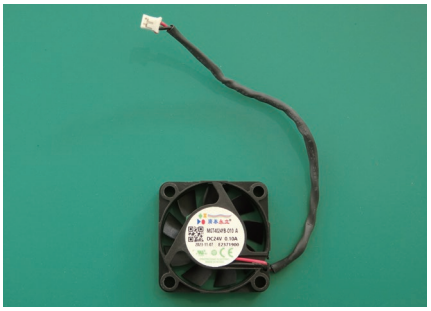
② Replacement fan

Series/Type		Ordered model	Installation	Note
RCP2-CF		MGA4024YB-A10 (CON)	Connector connection	-
SCON-C/CA (400W or more)		MGA4024LB-O10	Connector connection	(Note 1)
SCON-CB/LC (400-750W)		MGT4024LB-O10	Connector connection	(Note 1)
SCON-CB/LC (3000-3300W)		MGT6024HB-O10 (SCON-CB)	Connector connection	-
SCON-CAL		SCON-FU	Dedicated unit	(Reference) Model number on the main unit: MGT3005ZB-O10
XSEL-J/K		F412R-24MB (XSEL)	Connector connection	-
XSEL-P/Q		MGA4024YB-A10 (SEL)	Connector connection	-
XSEL-R/S/RA/SA		MGT4024YB-O10 (XSEL)	Connector connection	-
SSEL		MGA4024YB-A10 (SEL)	Connector connection	-
MSEL		MGT4024YB-O10 (MSEL)	Connector connection	-
MSEP/MCON		MSEP-FU	Dedicated unit	(Reference) Model number on the main unit: MGT6024YB-O10
MSCON		MSCON-FU	Connector connection	(Reference) Model number on the main unit: MGT4024YB-O10
RACON/RPCON		D03X-05TM	Connector connection	-
PCON-CF		MGA4024YB-A10 (CON)	Connector connection	-
PCON-CFA/CFB		PCON-FU	Dedicated unit	-
MEC		MGT6024HB-O10 (MEC)	Connector connection	Discontinued product
TT		MGA4024YB-A10 (SEL)	Connector connection	-
TTA		MGT4024YB-O10 (TTA)	Connector connection	-
RCON/RSEL	Gateway unit 24V driver unit 200V power supply unit	RCON-FU	Dedicated unit	-
	200V driver unit	RCON-FUH		
SCON2		SCON2-FU	Dedicated unit	-

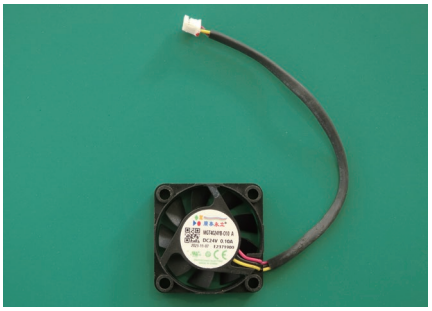
(Note 1) Refer to the operation manual of SCON before purchasing the product, since there is a risk of accidents due to electric shock or damage to electronic components due to static electricity or impact caused by contact.
We also accept exchanges at our company.

■ MGA4024YB-A10(CON)

■ MGA4024LB-O10

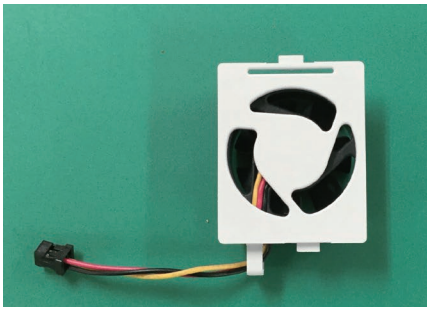


■ MGT4024LB-O10



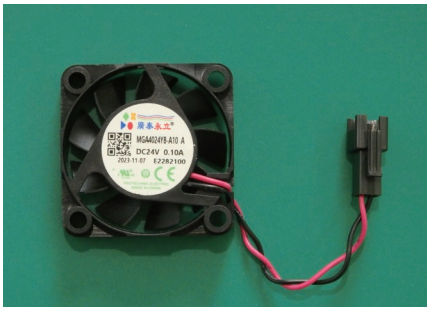
■ MGT6024HB-O10 (SCON-CB)

■ SCON-FU

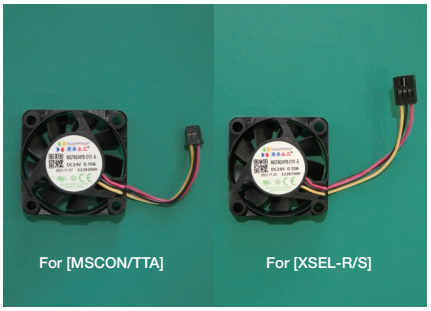


■ F412R-24MB(XSEL)

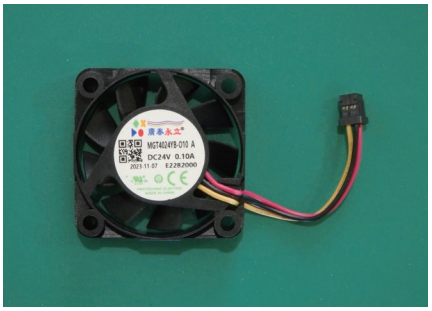
■ MGA4024YB-A10(SEL)



■ MGT4024YB-O10

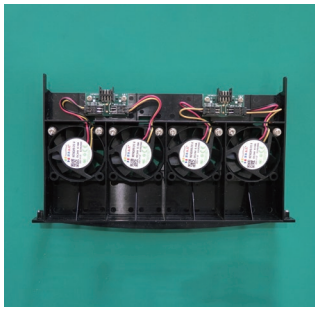


■ MGT4024YB-O10(MSEL)



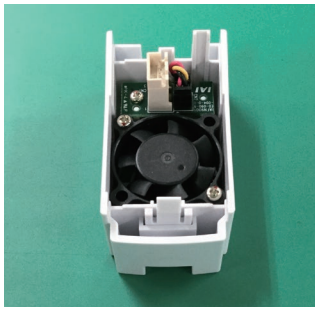
■ MSEP-FU

■ MSCON-FU

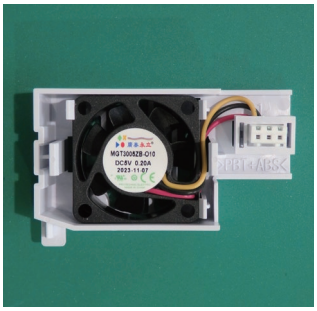


■ D03X-05TM

■ PCON-FU



■ SCON2-FU



■ MGT6024HB-O10(MEC)

■ RCON-FU

■ RCON-FUH

List of Maintenance Parts: Controllers

③ Replacement driver circuit board

*If you change the circuit board, you will need to change the parameters.

■ MCON

Motor type	High-output setting	Encoder type	Number of axes	Ordered model
For stepper motor	High-output Setting Enabled	Battery-less absolute / incremental	For 1-axis	MCON-PPD1-W
		Simple absolute	For 1-axis	MCON-PPD1-A
	High-output Setting Disabled	Battery-less absolute / incremental	For 1-axis	MCON-PD1-W
			For 2-axis	MCON-PD2-W
		Simple absolute	For 1-axis	MCON-PD1-A
			For 2-axis	MCON-PD2-A
For AC servo motors	—	Battery-less absolute / incremental	For 1-axis	MCON-AD1-W
			For 2-axis	MCON-AD2-W
		Simple absolute	For 1-axis	MCON-AD1-A
			For 2-axis	MCON-AD2-A
For DC brush-less motors	—	Incremental	For 1-axis	MCON-DD1-I
			For 2-axis	MCON-DD2-I

*For SSCNET/MECHATROLINK-III specifications, it will be MCON-M□□□(□)-□.
(Example) For stepper motor / high-output setting enabled / battery-less absolute 1-axis type: MCON-MPPD1-W

■ MSEP

Motor type	High-output setting	Encoder type	Number of axes	Ordered model
For stepper motor	High-output Setting Enabled	Battery-less absolute / incremental	For 1-axis	MSEP-PPD1-W
		Simple absolute	For 1-axis	MSEP-PPD1-A
	High-output Setting Disabled	Battery-less absolute / incremental	For 1-axis	MSEP-PD1-W
			For 2-axis	MSEP-PD2-W
		Simple absolute	For 1-axis	MSEP-PD1-A
			For 2-axis	MSEP-PD2-A
For AC servo motors	—	Incremental	For 1-axis	MSEP-AD1-I
			For 2-axis	MSEP-AD2-I
		Simple absolute	For 1-axis	MSEP-AD1-A
			For 2-axis	MSEP-AD2-A
For DC brush-less motors	—	Incremental	For 1-axis	MSEP-DD1-I
			For 2-axis	MSEP-DD2-I

MEMO

Precautions

Please be sure to read these Safety Precautions carefully before selecting a model or using a product, to ensure the proper use of the product.
The cautions listed below are meant to ensure that the product is used safely and correctly, and to prevent injury to the user, injury to others, and damage to property.
Make sure also to comply with JIS B 8433 (Manipulating industrial robots - Safety) safety regulations.

Designated items are classified into one of several danger levels based on the degree of injury or harm they could cause: "Danger," "Warning," "Caution," and "Request."

⚠ Danger	This indicates a hazardous situation where improper handling would result in danger leading to death or serious injury.
⚠ Warning	This indicates a situation where improper handling could result in death or serious injury.
⚠ Caution	This indicates a situation where improper handling could result in injury or property damage.
ⓘ Request	This does not indicate any possibility of injury, but indicates an instruction that should be followed to ensure the product is used appropriately.

Products are designed and manufactured as general industrial machine parts.

Products must be handled by someone with sufficient knowledge and experience (such as the system designer or other individual responsible for selecting and handling the device), only after that individual has read the "Catalog" and "Instruction Manual" (specifically, the included "Safety Guide"). It is dangerous to handle products incorrectly.
Make sure to read the instruction manuals for all devices that will be used, such as the product itself and controller.
It is the customer's responsibility to use a product only after verifying and determining that the product is compatible with applicable systems.
After reading the "Catalog" and "Instruction Manual," store them in a safe place so that the individual using the product can refer to them at any time.
If transferring ownership or lending a product to someone else, be sure to attach the applicable "Catalog" and "Instruction Manual" to the product itself in such a way that it is noticeable, to ensure that the product is used safely and correctly by the new owner/user.
The danger/warning/caution items listed in this section do not cover all situations. Make sure to read the "Catalog" and "Instruction Manual" for each individual device to ensure that it is handled safely and correctly.

⚠ Danger

General

- Do not use for the following applications.
  1. Medical instruments 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
  3. Machinery components essential for safety

These products are not planned or designed for applications requiring an especially high level of safety.
These products cannot guarantee safety in applications involving risk to human life.
Warranties apply only to the product that is delivered.

Installation

- Do not use in locations with dangerous substances such as incendiary, ignitable, or explosive materials. Doing so could cause a fire, ignition, or explosion.
  Install safety measures (such as a safety fence) to prevent individuals from entering the mobile range of the robot during operation or when the robot is in a state where it could operate. Making contact with the robot during operation could cause death or serious injury.
- When installing a product, make sure to use reliable supports and mounts (including for the part). If the product tips over, falls, or otherwise operates abnormally, it could result in injury or could damage the product or part.
- Avoid use in locations where the product itself or controller will be exposed to liquids such as water or oil droplets.
- Never cut and reconnect a cable to extend or shorten the product cabling. Doing so could cause a fire.

Operation

- Do not enter the mobile range of the machine when operating the product or when the product is in a state where it could operate.
  The actuator could move or otherwise operate suddenly, resulting in injury.
- People with medical devices, such as pacemakers, may be affected, so stay away from our products. Our products contain powerful magnets, which could cause pacemakers, or other medical devices, to malfunction.
- Only splash-proof specification products may be exposed to water. Exposing a product to water, cleaning it, or using it in water could cause a malfunction, which could cause an accident such as injury, electric shock, or a fire.

Maintenance, inspection, repair

- Never modify the product. Doing so could cause a malfunction, which could cause an accident such as injury, electric shock, or a fire.
- Do not disassemble or assemble the product inappropriately with regard to its basic structure, performance, or functions. Doing so could cause an accident such as injury, electric shock, or a fire.

⚠ Warning

General

- Do not use outside of the product specifications. Use outside of specifications could cause product failure, function stoppage, or damage.
  The product's operating life could also be drastically reduced. Be especially careful to never exceed the maximum payload, maximum speed, and maximum acceleration/deceleration specifications.

Installation

- Design a safety circuit or safety measures to prevent damage to the system or an accident resulting in injury or death if the machine stops during a system malfunction (such as an emergency stop or power outage).
- Be sure to install class D grounding (formerly referred to as class 3 grounding, with grounding resistance of 100 or less) on actuators and controllers, in order to prevent electric shock, prevent electrostatic charging, improve noise resistance performance, and suppress unnecessary electromagnetic radiation.
  Electrical leaks could cause electric shock or a malfunction.
- Be sure to confirm safety within the operation range of the device prior to supplying power to the product or operating it.
  Supplying power suddenly could result in electric shock or injury caused by contact with moving parts.
- When wiring the product, refer to the "Instruction Manual" to ensure wiring is connected correctly.
  Ensure that cables and connectors are connected tightly without any looseness. Otherwise, the product could malfunction and cause a fire.

Operation

- Do not touch the terminal block or any of the setting switches with the power turned on.
  Doing so could cause electric shock or a malfunction.
- When moving the moving parts of the product by hand (such as during manual positioning), first confirm that the servo is turned off (using the teaching pendant).
  Doing otherwise may cause injury.
- Do not damage the cables. Damaging cables, bending them excessively, pulling them, wrapping them, placing them under heavy objects, or stuffing them into narrow spaces could result in electrical leaking or conduction defects, which could cause accidents such as fire, electric shock, or a malfunction.
- Turn the power off during power outages. Otherwise, the product could start suddenly when power is restored, resulting in injury or damage to the product. Implement some means of preventing parts from being dropped in such a situation.
- If the product is generating abnormal heat, smoke, or odors, turn the power off immediately.
  Continuing use could damage the product or cause a fire.
- If the product is making abnormal noises or vibrates excessively, stop operation immediately.
  Continuing use could damage the product or cause a malfunction or other accident resulting in injury.
- If a product protection system (alarm) operates, turn the power off immediately.
  Otherwise, the product could malfunction and cause injury, the product could be damaged, or injury may occur. After turning the power off, investigate the cause of the issue, resolve the issue, and then turn the power back on.
- If the product LEDs do not turn on even after turning the power on, turn the power off immediately.
- Do not climb on the product, stand on it, or place objects on it.
  Doing so could cause the product to tip over or fall and cause injury, the product could be damaged, or the product could malfunction and cause injury.
- Do not use if parameters related to motor output, maximum speed, maximum acceleration/deceleration, or encoder pulses have been modified. Doing so could damage actuator components.

Maintenance, inspection, repair

- Make sure to completely shut down power supplied to the product prior to performing a maintenance inspection, servicing the product, or replacing parts.
  Follow the instructions below when doing this work.
  1. Post a sign ("Work in progress, do not turn power on") or other indication in a highly visible area while working, to ensure that someone does not inadvertently turn the power on.
  2. When multiple workers are performing a maintenance inspection, first clarify who is the main worker and who are the assistants.
     When turning the power on and off or moving an axis, always call out to indicate what is being done and check for safety.

Disposal

- Do not throw the product into a fire. The product could crack and release toxic gas.

Precautions

⚠ Caution

Installation

- Do not use in locations exposed to radiant heat from large heat sources, or in locations with an ambient temperature outside of the range of 0 to 40°C. Doing so could reduce the operation life of the product.
- Do not use in locations exposed to direct sunlight (ultraviolet light), salty environments, highly humid environments, or in environments that contain organic solvents or phosphate ester-based hydraulic oils. Doing so could result in short-term loss of functionality or could cause a sudden reduction in performance or reduction to operation life.
  it could also cause the product to malfunction.
- Do not use in environments containing corrosive gases or similar substances (such as sulfuric acid or hydrochloric acid). Doing so could create rust, which could cause significant deterioration.
- When using our products in any of the following locations, be sure to provide sufficient shielding or else they may malfunction.
  1. Locations subject to high currents or strong magnetic fields
  2. Welding stations and other locations subject to arc discharge
  3. Locations in which noise is generated due to static electricity, etc.
  4. Locations which could be exposed to radiation
- Install the product body and controller in a location with minimal dirt and dust that is free from iron powder. Installing in a dirty or dusty location, or in a location with iron powder, could cause a malfunction.
- Do not install in locations subject to major vibration or shocks (4.9 m/s² or greater). Major vibration or shocks could cause a malfunction.
- Make sure to have an emergency stop device installed in a location where it can be activated immediately in the event of a dangerous situation occurring during operation. If no safety precautions are taken, injuries may occur.
- Install the product so that there is sufficient space to perform maintenance work.
  If not enough space is provided, it could prevent work such as daily inspections and maintenance from being performed, which could result in system stoppages, damage to the product, or injury while working.
- When transporting or installing the product, use caution to ensure the safety of workers, such as using reliable lifts and supports or having this work performed by multiple individuals.
- When using a crane or other similar equipment, never attach a load that exceeds the rated load of the equipment.
- Use hoisting accessories that are appropriate for the load. Ensure that the cutting load and other parameters of hoisting accessories are safe.
  Confirm that hoisting accessories are not damaged.
- Do not hold the product by its moving parts or cables when installing it. Doing so may cause injury.
- Use only genuine IAI cables between actuators and controllers.
  Use only genuine IAI parts for components such as actuators, controllers, and teaching tools.
- The braking mechanism is meant to prevent parts such as the slider and rod from dropping when the vertical axis is turned off.
  Do not use it as a safety brake or for any other purpose (for braking).
- When performing work such as installation and adjustment, display a sign ("Work in progress, do not turn power on") or other indication to ensure that the power is not inadvertently turned on.
  If the power is inadvertently turned on, the actuator could operate suddenly and cause injury.

Operation

- When turning the power on, do so in order from higher devices downward. Otherwise, the product could start suddenly, resulting in injury or damage to the product.
- Do not insert your fingers or any objects into the openings on the product. Doing so may cause fire, electric shock, or injury.
- Do not bring magnetic media such as magnetic cards within 1 meter of the product.
  Internal magnets may erase data stored on the magnetic card.

Maintenance, inspection, repair

- Wear protective glasses when adding grease to actuators.
  Grease could fly off and enter your eyes, causing inflammation.
- If any grease enters your eyes, immediately seek appropriate treatment from a doctor.
- When turning the power off and opening the product to replace the battery or perform a similar task, do not touch any terminals connected to capacitors in the product (for 30 seconds) after turning the power off.
  Doing so may result in electric shock due to residual voltage.
- When performing an insulation resistance test, do not touch the terminals. Doing so may result in electric shock.
  (Do not perform dielectric strength voltage tests on products that use DC power.)

! Request

General

- If you are planning on using our product in conditions or environments outside of those described in the catalog or user's manual, such as in aviation facilities, explosion-proof settings, entertainment equipment, cleanrooms, safety equipment, or any other environment that would require special safety considerations, such as those that are expected to have major impacts on human life or property, make sure to implement sufficient safety measures. These include adding in fail-safes and using the actuators with a margin of error beyond its catalog ratings and specifications. Make sure to consult our sales representatives if you have any concerns.

Request

Installation

- Do not place any obstructions around the controller that could prevent ventilation. Doing so may damage the controller.
- When the product is vertically mounted, please make sure to add in the brake option, to prevent the actuator from crashing in the event of a power loss.
- Use a protective cover or similar means to isolate the moving parts of the machinery and quipment to prevent direct contact with the human body.
- Do not configure controls that would cause the part to drop during a power outage. Configure controls that prevent parts such as the slider, rod, and part from dropping when there is a power outage or the machinery and system are stopped in an emergency.
- Take the following instructions into consideration to improve the straightforward accuracy of parts such as the slider and table, and to ensure that the ball screw and linear guide operate smoothly.
  1. Process the installation surface of the product body to within a flatness of 0.05mm.
  2. Ensure that the installation surface will provide sufficient actuator rigidity.
- Select an environment that meets the following conditions to install the actuator/controller.
  -Must not be exposed to direct sunlight.
  -The machine body must not be exposed to radiant heat from a large heat source such as a heat-treating furnace.
  -Ambient temperature of 0 to 40°C.
  -Humidity of 85% or less with no condensation.
  -No corrosive gas or combustible gas.
  -Must be a standard assembly work environment with minimal dirt and dust. (Does not apply to dust-proof/ splash-proof specification products.)
  -Must not be exposed to oil mist or cutting fluid.
  -Must be free from excessive electromagnetic waves, ultraviolet light, and radiation.
  -These products were not designed with chemical resistance in mind.
  The installation environment must be one in which workers can generally work without protective gear or protective clothing.
- Do not remove the manufacturing number sticker attached to the product. You will need this information when contacting IAI.

Storage

- Ensure that no condensation will occur during long term storage. Condensation could create rust which could cause a malfunction.
- Although the product can withstand storage temperatures up to 60°C over a short period of time, it can only be stored in temperatures up to 50°C when stored for one month or longer. Changes in the composition of grease could cause a malfunction or reduce the operation life of the product.
- Store the product horizontal on a flat surface. When storing it boxed, follow any orientation indications provided. Otherwise, the product shape may deform.

Installation, operation, maintenance

- When handling the product, wear protective gear such as protective gloves, protective glasses, and safety shoes as required, to ensure safety.
- Only use the specified grease on the ball screw during maintenance. In particular, if a flourine based grease and lithium based grease are mixed, the effectiveness of the grease may deteriorate and damage the machine. Additionally, if the incorrect type of grease is used, it may decrease the actuator's performance and specifications.
- Actuators must be lubricated to function sufficiently. Insufficient lubrication can increase wear around rolling parts and could cause premature damage. Lubricate regularly based on the following guidelines. Grease lubrication guidelines
  -These guidelines assume 8 hours of operation per day.
  -Lubricate more often if used in a high workload environment, such as continuous operation during the day and night.
  -Lubricate when the operation distance or number of operation months is reached, whichever is sooner.

Usage speed (mm/sec)	Lubrication guidelines	
	Operation distance	Number of months
From more than 0 to 750	625km	6 months
From more than 750 to 1500	1,250km	
From more than 1500 to 2500	2,500km	

(Note) The values above will vary depending on the actuator. Refer to the instruction manual for details.

Warranty

- The warranty period lasts until either of the following is reached, whichever is sooner.
  -18 months after shipment from IAI
  -12 months after delivery to the specified location
  -2500 operation hours
  Any failures that occur under appropriate usage conditions during this period or any failures that are clearly the responsibility of IAI will be repaired at no charge. However, this warranty does not cover issues caused through use under conditions or in environments not described in the catalog/instruction manual.
  This warranty covers only the product supplied by IAI, and any ancillary damage caused by failures in supplied products is not covered by this warranty. Repairs will be performed on-site.
  Refer to the instruction manual for details.

Disposal

- If the product can no longer be used or will no longer be used, dispose of it properly as industrial waste.
- Some controllers use batteries. Be sure to remove them when disposing of the controller. Contact our sales representative for assistance.

Other notes

- We will not be liable for a failure to adhere to all of our "safety precautions."
- For product inquiries or service requests, contact your sales representative.

Precautions in product handling [common to all models]

Contents

1. Speed 1-265
2. Acceleration/Deceleration 1-265
3. Duty Ratio 1-266
4. Products with Sliding Screws 1-266
5. Home 1-266
6. Encoder Type 1-266
7. Encoder Pulse Number 1-267
8. Motor 1-267
9. Installation Position 1-267
10. Positioning Repeatability / Lost Motion 1-268
11. Static Permissible Moment / Dynamic Permissible Moment 1-268
12. Overhang Load Length 1-268
13. Operation Life 1-269
14. Body Accuracy 1-269
15. Rod Type (Rod Tip Runout) 1-269
16. Use in Vertical Installation 1-269
17. Actuator Cables / Motor Encoder Cables 1-270
18. Splash-proof Actuators 1-270
19. Compliance with Overseas Standards 1-270

1. Speed

Speed refers to the speed set when moving the slider (or rod, arm, or output shaft) on the actuator. The slider accelerates from a stationary state until the set speed is reached. Once the desired speed is reached, the slider will continue at that rate until immediately before reaching the target position (specified position), where the slider will then decelerate to a stop.

Important notes

❶ For models equipped with stepper motors (RCP6, RCP5, RCP4, RCP3, RCP2, TTA), the maximum speed varies according to the mass of the transported object. When selecting a model, please refer to "Correlation Diagrams of Speed and Payload" (found on the reference page for each model).
❷ If moving a short distance, the product may not reach the set speed. This is true for axes with short strokes as well as axes with long strokes.
❸ Longer strokes may cause the maximum speed to decrease due to the critical rotational speed. For details, please refer to the "Stroke and Max Speed" table on the reference page for each model.
❹ RCP5 belt type may cause vibration or resonance when operating at low speed. Be sure to use it at 100mm/sec or more.
❺ The minimum speed of the position controller (PCON-□/ACON-□/SCON-□/DCON-□/RCON/RCP6S) is set for each actuator. For details, refer to the owner's manual of each controller.
❻ When calculating the travel time, it is necessary to consider the acceleration, deceleration and convergence times as well as the travel time for the set speed. The detailed movement time can be calculated using the Cycle Time Calculator software. (Download cycle time calculation software from here →https://www.intelligentactuator.com/cycle-time-calculation-software/

2. Acceleration/Deceleration

Acceleration refers to the rate at which the speed increases from a stationary state until the set speed is reached. Deceleration refers to the rate at which the speed decreases from the set speed until the part comes to a stop. Both are specified as "G" in programs (1G≒9807mm/s^2).
*Rotary is 1G ≒ 9807degrees/s^2

Important notes

● As the acceleration (deceleration) increases, it becomes a sudden acceleration (sudden deceleration) and the travel time is shortened. Please set the acceleration/deceleration below the appropriate level for the transportable weight.
● Please refer to the reference page of each model for the rated acceleration (deceleration).

3. Duty Ratio

Duty ratio is the percentage of the actuator's active operation time in each cycle.
Overload errors can occur if the duty ratio is too high relative to the load, speed, or acceleration applied to the actuator. The product should only be used within the duty ratio range based on the conditions of use.

$$\text{Duty ratio} = \frac{\text{Operating time}}{\text{Operating time + stationary time}} \%$$

<Stepper motor>
Actuators that use stepper motors can operate at a duty ratio of 100%.
Applicable models: EC*1, RCP2, RCP3, RCP4, RCP5, RCP6*1, WU, TTA, IXP
*1: Some RCP6S and EC models limit the duty ratio in order to reduce heat generation of the motor. For details, see page 1-326.

<Servo Motor>
For actuators using servo motors, the duty ratio is limited by operating conditions. Refer to P1-328 for how to calculate the servo motor duty.

4. Products with Lead Screws

When using a screw type actuator (RCP3-SA2□□/RA2□□, RCA2-□□3NA/□□4NA, RCD Series), be aware of the following.

Important notes

- Suitable for applications with low operating frequency. (As a rough guide, the operational life is about 5 years when it is operated every 10 seconds for 24 hours and 240 days a year.)
- Suitable for applications with low transport weight and required load. (1kg or less)
- Use for applications that do not require repetitive positioning accuracy of less than ±0.05mm.
- Install the actuator in a location that is easy to maintain.

5. Home

Home refers to a coordinate reference point used when positioning. If the home is misaligned, the position will also be misaligned an equivalent amount.

Important notes

❶ During home return motion, the moving part moves to the mechanical end and then reverses. Be careful of interference with the surroundings.
❷ The standard for the home is on the motor side (the opening side for a gripper or the left rotation side looking from above for a rotary). As an option, the home can be reversed (anti-motor side). However, please note that if the home direction is changed after delivery, it may need to be return it to our company for adjustment.
❸ Note that the model for which reverse specification of home (symbol NM) is not set as an option cannot have the non-motor end specification.
❹ The home for the home return motion is determined with the mechanical end as reference. Therefore, if the operation becomes impossible due to an external factor during the homing operation, it is possible to deviate from the mechanical end by the distance obstructed.

6. Encoder Type

There are four types of encoders installed in the actuator.

Incremental type	Since home position data is not retained, home return operation is required every time the power is turned on.
Absolute type	Even if the power is turned off, the data of the home position is held by the battery. Therefore, the device can be operated without performing home return when the power is turned on. However, please note that the device will no longer operate when the data holding battery runs out. Refer to 1-255 (Maintenance Parts List-Replacement Batteries) for the approximate battery life.
Pseudo absolute type	Home return is required every time the power is turned on. When the home return command is executed, the slider moves approximately 16mm from the current position, confirms the current position, and then operation can commence from that position. Absolute battery is not required because position data is not stored when the power is off.
Battery-less absolute type	Even if the power is turned off, the battery-less absolute encoder (patented) retains the home position data, so it is not necessary to perform home return when the power is turned on. In addition, the battery for holding the home position data is not required.

Important notes

In addition to the four types above, there is also the "simple absolute type." This type connects a dedicated simple absolute unit to the controller of an actuator equipped with an incremental type encoder. In the "simple absolute type," the home position data is retained even if the power is turned off, so there is no need to perform home return when the power is turned on.
Therefore, the simple absolute type actuator (encoder) is an incremental type, not an absolute type.

7. Number of Encoder Pulses

The number of encoder pulses will vary depending on the actuator. Refer to the following table for the pulse count for each actuator.

Series	Type	Number of encoder pulses
RCP6	All models	8192
RCP5	All models	800
RCP4		
RCP3		
RCP2		
RCA2	□□3NA/□□4NA	1048
	Other than the above models	800
RCA	Incremental type	800
	Absolute type	16384
RCD	RA1DA/GRSNA	480
RCS4	All models	16384
RCS3		
RCS2	□□5N (Incremental)	1600
	□□5N (Absolute)	16384
	SR□7BD	3072
	Other than the above models	16384
WU	All models	8192
TTA	All models with stepper motor specification	8192
TTA-S	All models with servo motor specification	16384

Series	Type	Number of encoder pulses
ISB ISDB	Battery-less absolute	131072
	Incremental type	16384
	Absolute type	
SSPA	All models	16384
ISA		
ISDA		
IF/IFA		
RS		
NSA	All models	131072
NS	S□M□ (Incremental)	2400
	Other than the above models	16384
LSA LSAS	All models	Resolution 0.001mm
DD/DDA	□18S	131072
	□18P	1048576
IXA-NNN IXA-NSW	All models	16384
IXA-NSN IXA-NHN IXA-NSC	All models	131072
IX IXP	All models	16384 8192

Important notes

The speed of the RCP6, TTA, and IXP is controlled by 800 pulses while the speed of the positioning is controlled by 8192 pulses.
Calculate the electronic gear for pulse train control of RCP6 with 8192 pulses.

8. Motor

The motors used vary depending on the series.

- RCP6/RCP5/RCP4/RCP3/RCP2/WU/TTA/IXP: Stepper motor
- RCD: DC brush-less motor
- RCA/RCA2/TTA-S: Servo motor (24VDC)
- RCS4/RCS3/RCS2/ISB/ISDB(CR)/ISA/ISDA(CR)/NS/NSA/IF/RS/DDA/IX/IXA: Servo Motor (200VAC)
- LSA/LSAS: Linear servo motor (200VAC)

Important notes

Stepper motors (except RCP6) and 24V servo motors may vibrate when the servo is turned on for the first time after the power is turned on.

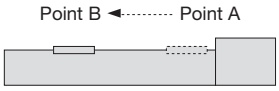
9. Mounting Orientation

Stepper mounting orientation varies depending on the model. For details, see P1-307.

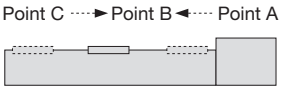
10. Positioning Repeatability/Lost Motion

This indicates the positioning repeatability when moving repeatedly to the preset position. This is not the same as "absolute positioning accuracy."

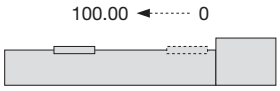
<Positioning repeatability>
Variation in stop position accuracy when positioning is performed repeatedly from the same point in the same direction.



<Lost motion>
Variation in the accuracy of the stop position when repeatedly positioning from positive and negative directions to the same point.



<Absolute positioning accuracy>
The difference between the coordinate value and actual measurement when positioning is performed at a given positioning point specified as a coordinate value.



Important notes

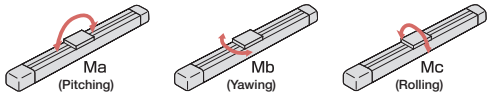
The accuracy of "positioning repeatability" is not guaranteed under the following conditions.
❶ The power is shut down while repeating an operation, and then the home is reacquired.
❷ Even when approaching the teaching point from the same direction, the power is cut off or the stop operation is performed. (SCARA robot)
❸ When moving to the teaching point with a different arm system (right or left arm system) than when teaching. (SCARA robot)
❹ When the ambient temperature environment changes significantly.
❺ When the temperature of the actuator body changes.
❻ When the load conditions vary during operation.

11. Allowable Static Moment/Allowable Dynamic Moment (Ma, Mb, Mc)

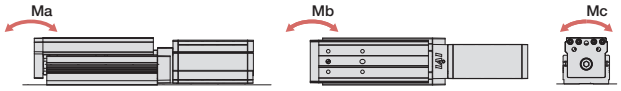
The allowable static moment is the number of moments that the actuator can temporarily tolerate in a stationary state. The allowable dynamic moment is the numerical value of the allowable moment when the operational life of the actuator is set to 5,000km or 10,000km*.
For details, refer to the technical documentation on P1-275.

* The set operation life varies depending on the model. Please refer to the reference page of each model for details.

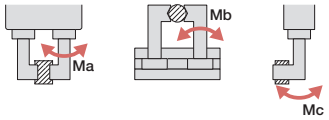
<Slider type moment direction>



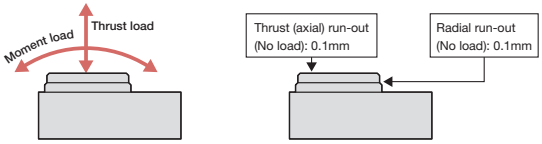
<Table type moment direction>



<Gripper type moment direction>

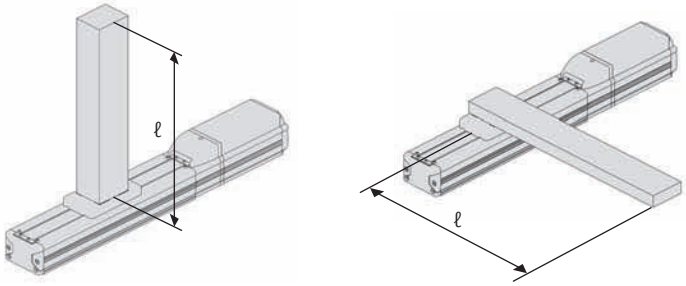


<Rotary type moment direction>



12. Overhang Load Length (ℓ)

This is the approximate offset at which the actuator can operate smoothly even when the workpiece or bracket is offset from the slider. Vibration or other factors could cause failure if the approximate length is greatly exceeded. The product should therefore be used within the approximate length. Please refer to the reference page of each model for detailed figures.

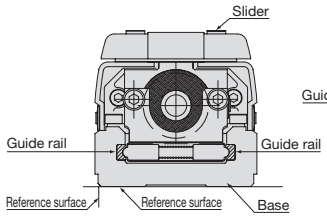


13. Operation Life

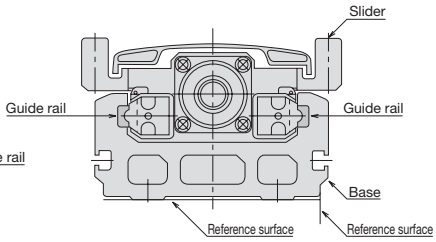
The life of the actuator is the life of its components (guide, ball screw, motor, slide screw, bearing, bush, reduction gear, etc.). The operation life of a part will vary drastically depending on its usage conditions.
For example, the guide has a dynamic permissible load moment (see P1-275), but if the guide is used at half of the dynamic permissible load moment, it will have a life of 8 times the set operational life.
If used sparingly, it can be used for more than 10 years. Therefore, we recommend that you select a model with some leeway.

14. Body Accuracy

The main body accuracy of the slider type is as follows (except for the rotary shaft).
In addition, since the base side and the lower side of the main body serve as reference surfaces for the movement of the slider, please use them as a reference when mounting the main body.



RC series cross section



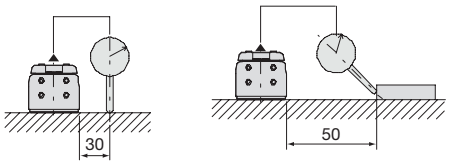
IS series cross section

Degree of parallelism when mounting the frame (when fixed on a smooth surface*1)

RCP3-SA2AC/SA2BC Top/Bottom 0.5mm/Full stroke
Left/Right 0.1mm/Full stroke

RCP4W 0.1 to 0.18mm or Less
(The degree of parallelism depends on the stroke. Refer to the operation manual for details.)

Other models 0.05mm/m or below



Conditions: ·The above values are for 20°C.
·When the reference surface of the actuator is pressed against that of the frame.
*For details, refer to the actuator's instruction manual.

*1 Flatness: 0.05mm or less.

15. Rod Type (Rod Tip Runout)

Guideless rod types do not consider rod tip runout and withstand load (the rod non-rotation precision listed in the actuator specification is the factory default value, so the guide amount will increase with motion). Use the type with a guide or use an external guide together if the rod swing width is limited or non-rotating accuracy is required, or if force is applied from a direction other than linear.
Rod type with guide: RCP6-RRA/WRA, RCP5-RA, RCP4-RA, RC□□-RGS/RGD/SRGS/SRGD

Important notes

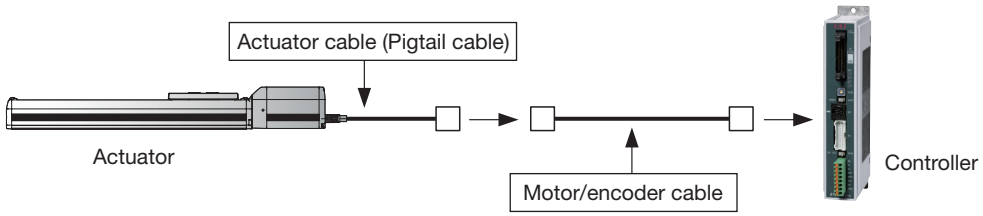
For securing radial cylinder types with an external guide, we recommend using a floating joint. For non-guide rod types (non-rotating rod types), we recommend securing them rigidly.
See "Precautions When Using in Conjunction with Rod Type Guides" on P1-299 for more information.

16. Vertical Usage

When the actuator is used in a vertical installation, specify the brake (optional) so that the moving part does not fall and damage the device when the power is turned off or an emergency stop occurs. However, for the type with brake, the moving part will not move unless it is connected to the controller and the brake is released.

17. Actuator Cables / Motor Encoder Cables

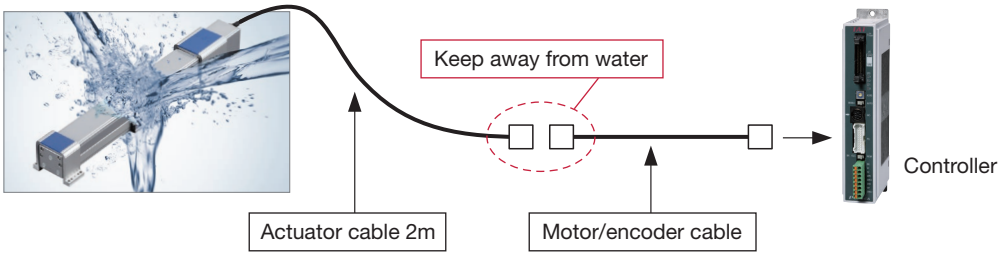
The cable coming out from the rear of the actuator motor is the actuator cable. If force is applied to the actuator cable, malfunction may occur. Fix the actuator cable so that it does not move.



The cable that connects the actuator cable connector to the controller is the motor encoder cable. Depending on the type of actuator, there are models in which the motor cable and encoder cable are either separated or integrated.
There are two types of cables: standard cable and robot cable with excellent bending resistance. When passing the cable through the cable carrier, be sure to use the robot cable specification and the minimum bend radius of each cable or more (the minimum bend radius is indicated on the page of each cable). To check the cable model for each model, refer to "List of Actuator Controller Cable Models" on P1-81.

18. Splash-proof Specification Actuators

The ingress protection includes the cable, but the cable end connector is not splash-proof and therefore is not covered by the protection structure (except for the ISWA series). Therefore, do not use it in any way that could cause water to come in contact with the end of the cable.



19. Compliance with Overseas Standards

Refer to "Revised RoHS/CE Mark/UL Standards" on P1-283 for products that comply with overseas standards. You can also check the icons on the pages of each model for products compatible with overseas standards.

<Overseas standard icons>

CE Standard

RoHS Directive

UL Standard

Technical Data

Technical Data (IAI Products)

About Industrial Robots	1-273
Allowable Moment	1-275
Operational Life	1-276
Structure and Principles of Movement of a Single-Axis Robot/ Ball screw Accuracy	1-278
Intermediate Support Structure	1-279
Types of Robot Feedback Control	1-280
Overseas Standard	1-281
Compliant Product Table for Revised RoHS Directive/ CE Marking/UL Standard	1-283
Double Slider Specifications	1-293
Caution when Using a Guide with a Rod Type	1-299
Caution when Using a Guide with a Slider Type	1-301
Actuator Mounting Methods	1-303
Actuator Mounting Orientation	1-307
RCP4W-SA Mounting Orientations	1-311
Caution for Mounting (DDA·DDW·RCS3-CT8C)	1-312
RCD Rod Type Mounting Method	1-313
Mini Rod Type Anti-Rotation Mounting Method	1-314
Pressing Operation	1-315
Force Control Function (Pulse press/Servo press)	1-316
Cautions on Push Force by Slider Type and Table Type	1-317
Cautions on Push Motion by Servo Press Cautions on Push Force Motion by Rod Type	1-319
Information on Moment Selection (RCS3·RCS2)	1-325
About Duty Ratio	1-326
Special Specification	1-331
Dust/Splash-proof Specification: Solvent Resistance of Materials Used	1-333
EC Dust/Splash-proof Specification: Exterior Component Materials	1-334
RCP6W Exterior Components Material of each part	1-337
IXP Dust- and Splash-proof Main part materials	1-343
IXA Dust- and Splash-proof Main part materials	1-345
Introduction to SEL Language	1-349
Sample Program	1-353
Explanation of Terms	1-357
Models not listed in General Catalog 2024	1-367
Discontinued and Replacement Models	1-375
Old Model Conversion Table	1-379

Technical Data (General)

International System of Unit SI	1-387
Illustration Method of Geometric Tolerances	1-389
Normal Tolerance of Processing Dimensions	1-392
Symbol of Quantity and Unit : Name and Symbol of Chemical Element	1-393
Method of Calculating Properties/ Volume/Weight of Metal Material	1-394
Second Moment of Cross-Section, Other Calculation Method	1-395
Foundation of Fit Selection	1-396
Dimensional Tolerance of Used for Most Fit Holes	1-397
Surface Roughness	1-401
Diagrammatic Representation of Plane Surface	1-402
Metric Coarse Thread	1-403
Metric Fine Thread	1-404
Unified Coarse Thread/Fine Thread	1-405
Parallel Thread for Pipe	1-406
Taper Thread for Pipe	1-407
Hardness Conversion Table	1-408
Hexagon Socket Head Cap Screw	1-409
Hexagon Socket Set Screw	1-411
Hexagon Bolt	1-412
Hexagon Nut	1-413
Split Pin	1-414
C Type Snap Ring	1-415
Spring Pin/E Type Snap Ring	1-417
Spring Calculation	1-418
Key and Key Groove	1-419
Surface Treatment	1-421
Mechanical Materials	1-423
Deflection Calculation Formula	1-424
Classification and Features of Plastics	1-425
Material - Steel	1-427
Material - Stainless Steel	1-429
Material - Aluminum Alloy	1-431
Material - Resin/Rubber	1-433
Electric Wire	1-435

About Industrial Robots

Laws and regulations on industrial robots

For safety measures of machinery, ISO stipulates the following four items in ISO/DIS12100 "Safety of Machinery" as a general guideline.

Safety measures
- Intrinsic safety designing
- Safeguard ·····safety measures, etc.
- Additional safety measures·····emergency stop device, etc.
- Additional safety measures ·····Additional safety measures - emergency stop device, etc.

Based on these, various ISO/IEC standards are constructed by class. The safety standards of industrial robots are as follows:

Standard for Type C (individual safety standard) → ISO10218 (Manipulating industrial robots - Safety)
→ JIS B 8433 (industrial manipulating robots - safety)

In addition, **laws in Japan** for industrial robots are stipulated as follows.

Industrial Safety and Health Law Article 59

A mandatory special education is required for workers who are engaged in dangerous or hazardous works.

Ordinance on Industrial Safety and Health

Article 36·····Works that need a special education
- Clause 31 (teaching, etc.) ·····Teaching works, etc. for industrial robots (exceptions exist).
- Clause 32 (inspection, etc.)·····Inspections, repairs, adjustments, etc. of industrial robots (exceptions exist).

Clause 150·····Actions that industrial robot operators should take

Requirements by the Ordinance on Industrial Safety and Health for industrial robots

Work area	Working conditions	Shutoff of the driving force	Action	Regulation
Out of working range	During automatic operation	No to shutoff	Signals for operation start	Clause 104
			Installation of a fence and an enclosure	Clause 150, Item 4
Inside the working range	During teaching, etc.	Shut off (including operation stop)	Display of under working etc.	Clause 150, Item 3
		Not to shut off	Establishing work regulations	Clause 150, Item 3
			Action for an immediate operation stop	Clause 150, Item 3
			Display of under working, etc.	Clause 150, Item 3
			Conducting a special education	Clause 36, Item 31
			Checking before operation start, etc.	Clause 151
	During working for inspection, etc.	Shut off	Shut off after operation stop	Clause 150, Item 5
			Display of under working, etc.	Clause 150, Item 5
		Not to shut off (in case of inevitable work during operation)	Establishing work regulations	Clause 150, Item 5
			Action for an immediate operation stop	Clause 150, Item 5
			Display of working now, etc.	Clause 150, Item 5
			Conducting a special education (except for cleaning and lubrication)	Clause 36, Item 32

About Industrial Robots

(As of August 2021)

IAI products that fall under the category of industrial robots

In accordance with the Ministry of Labor Notification No.51 and the Director-General of the Labor Standards Bureau of the Ministry of Labor Notification No.340, the following items are excluded from industrial robots.

(1) Single-axis actuators with a motor wattage of 80W or less

In cases of multi-axis Cartesian robots with more than two motors, and multi-axis robots such as SCARAs, each motor must have a maximum wattage of 80W or less.

(2) If the strokes of the X, Y, and Z axes of a Cartesian system, and the range of motion of a rotary axis are all less than 300mm.

(3) Transfer equipment that moves based on the information of a fixed sequence control device and that moves only horizontally and vertically with a vertical operation range of 100mm or smaller.

(4) An articulated robot, such as a SCARA, whose arm length is 300mm or less.

(5) Machinery where the manipulator's end effector performs only simple, repetitive linear motion. (This excludes products that fall under condition (3).)

Among the products listed in our catalogs, the following models are classified as industrial robots.
However, if a device using a single-axis actuator meets the criteria of "(5) Machinery where the manipulator's end effector performs only simple, repetitive linear motion," it is excluded from being classified as an industrial robot.

[Single-axis actuator]

The following actuators have strokes exceeding 300mm and motor wattages over 80W.

EC-B8SS/S10(X)/S13(X)/S15(X)/S18(X), RCS2(CR)-SS8□, RCS3(P)(CR), RCS4(CR),IS(P)A, IS(P)DA(CR), IS(P)WA, IS(P)B, IS(P)DB(CR), SSPA, SSPDACR, NS, NSA, IF, IFA, LSA

(Note) The stepper motors used in both the EC-RR10□ and the RCP5-RA10□ have a maximum output over 80W. Therefore, when they are used in multi-axis robots, those systems may be considered industrial robots.

[Cartesian robot]

Any multi-axis system that uses any of the above-mentioned actuators, even if only as a single axis.

[SCARA robot (IX/IXA)]

All the models with the arm length of over 300mm.

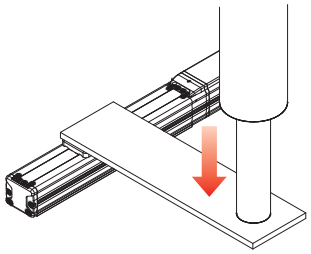
(All the models except for IXA-3NNN1805/4NNN1805, 3NNN3015/4NNN3015, 3NS□3015/4NS□3015, IX-NN□1205/1505/1805/2515H, TNN3015H, UNN3015H)

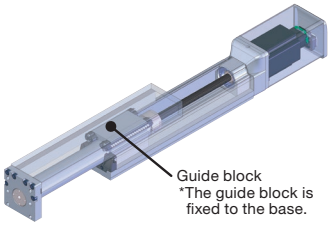
Allowable Moment

The allowable moment of a single-axis actuator represents the load capability of the built-in linear guide, and there are the 2 types indicated below, the allowable static moment and the allowable dynamic moment.

Static allowable moment

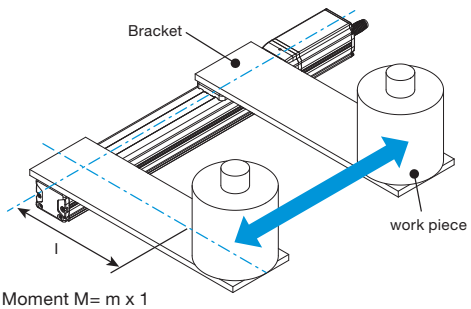
The allowable static moment is an index for damage and is the maximum moment that can be applied to a single-axis actuator at rest.
This index is calculated based on the condition where an indentation is made on the track of the built-in linear guide (basic rated static load) and the durability of used parts. If a moment greater than this value acts on the actuator, movement defects and damages can occur. Since our allowable static moment also takes into account the durability of the parts, it cannot be compared to a moment that is calculated only based on the basic rated static load (static rated moment). The durability of the parts is inspected by testing and analyzing them, so the product can be used safely if the allowable value is not exceeded.
However, please avoid excessive vibrations and impacts to the product.
(Cautions for Table Types)
The allowable static moment for the table type is the linear guide's allowable value at the top of the table, directly above the guide block.
"Directly above the guide block" refers to the position directly above the allowable moment offset reference position.
Please refer to the individual product pages for the specific offset reference position.
If the force is offset too far from the guide block, the table may deflect, twist, or get damaged.





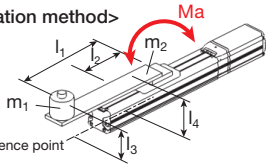
Dynamic allowable moment

The allowable dynamic moment is an index for operational life and is the value through which our standard rated life of a single-axis actuator is calculated. Our company has set the standard rated life of a ROBO Cylinder as 5,000km and the standard rated life of a single-axis robot as 10,000km (excludes some models).
This index is calculated based on the condition where the track of the built-in linear guide flakes due to wear (basic rated dynamic load). If a moment greater than this value acts on the actuator, operational life can become less than the standard value.
Our allowable dynamic moment takes into account our standard rated life expectancy and the point where a reduction in life span due to operating conditions may begin to occur. As such, it cannot be compared equally to a moment calculated sole on the basic rated dynamic load (dynamic rated moment).
There are 3 directions, Ma (pitching), Mb (yawing), Mc (rolling), on which moments act on a single-axis actuator, and allowable moments are calculated for each direction.

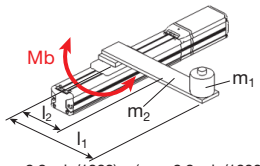


Moment M= m x l
m : Load weight (include work piece and bracket)
l : Load length (he center of gravity including work piece and length)

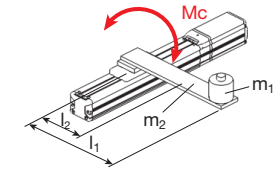
<Moment calculation method>



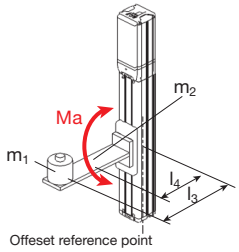
Ma = $(m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)$
$+a\{(m_1 \times 9.8 \times l_3/1000) + (m_2 \times 9.8 \times l_4/1000)\}$



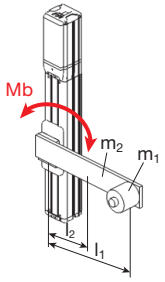
Mb = $a\{(m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)\}$



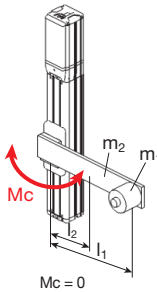
Mc = $(m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)$



Ma = $(m_1 \times 9.8 \times l_3/1000) + (m_2 \times 9.8 \times l_4/1000)$
$+a\{(m_1 \times 9.8 \times l_3/1000) + (m_2 \times 9.8 \times l_4/1000)\}$



Mb = $(m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)$
$+a\{(m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)\}$



Mc = 0

a : acceleration (G)
m_1 : mass of work (kg)
m_2 : mass of bracket (kg)
l_1 : Distance from center of slider to center of gravity of work (mm)
l_2 : Distance from center of slider to center of gravity of bracket (mm)
l_3 : Distance from offset reference point to center of gravity of work (mm)
l_4 : Distance from offset reference point to center of gravity of bracket (mm)

Operational Life

The operational life of a linear guide is the total distance that can be reached without flaking (separation of the track surface) with a 90% probability of survival when a group of products are individually operated under the same conditions. The operational life calculation method is as follows.

Operational life calculation method

Operational life of a linear guide can be calculated with the following formula using the allowable dynamic moment that is determined for each model.

$$L = \left(\frac{C_M}{M}\right)^3 \cdot \text{URL (SRL: Standard rated life)}$$

L: Operational life (km), C_M: Allowable dynamic moment (N·m),
M: Acting moment (N·m), URL: Standard rated life (km)

For applications where the operational life may be decreased from vibrations and installation conditions, the operational life is calculated with the following formula.

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{WS}}{f_W} \cdot \frac{1}{f_\alpha}\right)^3 \cdot \text{URL (SRL: Standard rated life)}$$

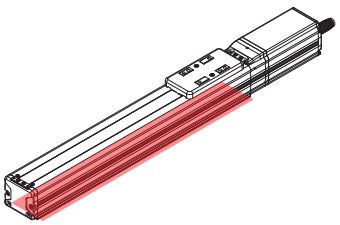
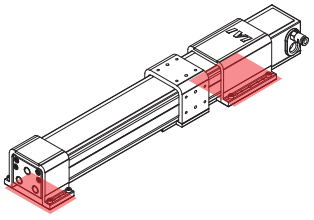
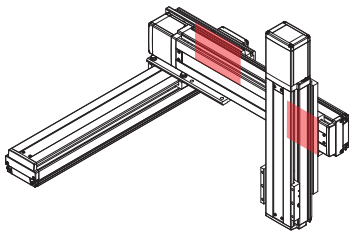
L: Operational life (km), C_M: Allowable dynamic moment (N·m), M: Acting moment (N·m),
f_{WS}: Standard load factor, f_W: Load factor, f_α: Attachment factor, URL: Standard rated life

The load factor f_W is used to determine the life expectancy of an actuator, depending on operating conditions. The Standard load factor f_{WS} is predetermined for each model and is the normal value of the load factor of the actuator. As a general rule, this factor is 1.2, but if it is other than 1.2, please refer to the "Load Factor" table below. The attachment factor f_α is a factor for taking into account the decrease in life from the attachment condition of the actuator.

Load Factor

Operating Condition	Load factor f_W	Acceleration/Deceleration Guideline
Little vibration/impact, slow operation	1.0-1.5	(Less than 1.0G)
Moderate vibration/impact, sudden braking/acceleration	1.5-2.0	1.0G-2.0G
Large vibration/impact with sudden acceleration/deceleration	2.0-3.0	(Greater than 2.0G)

Mounting Factor

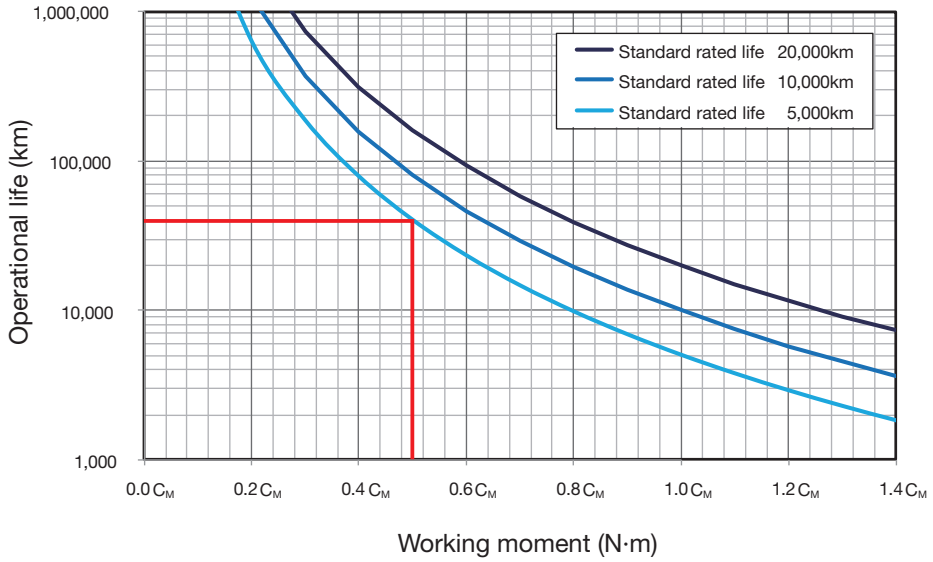
Mounting Condition	 Mounting the entire surface	 Mounting only at both ends	 Mounting only some sections
Mounting factor F_α	1.0	1.2	1.5

* As a general rule, please use every tapped hole on the mounting surface.
* Even when mounting the entire surface, please use the attachment factor of 1.2 or 1.5 depending on the length of the mounting bolts.

Operational Life

The formula shows that the operational life depends on the acting moment. With a light load, the operational life will be longer than the standard rated life. For example, when a moment of 0.5C_M (half of the allowable dynamic moment) acts on a model with a standard rated life of 5,000km, the diagram below shows that the operational life becomes 40,000km, which is 8 times the standard rated life.

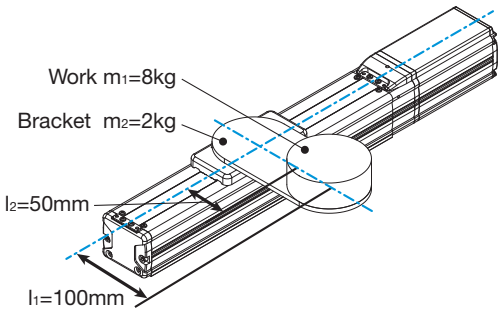
Relationship between working moment and operational life



* It is assumed that f_{WS}=f_W and $f\alpha$=1.0, and C_M indicates allowable dynamic moment.

Example calculation of operational life

An example operational life will be calculated using the operation conditions below.



Model	RCP5-SA6C-WA-42P-6
Installation Condition	Horizontal Installation
Attachment Condition	Mounting the entire surface
Controller	PCON-CB
Acceleration/Deceleration	0.5G

m1: mass of work
m2: mass of bracket
l1: Distance to the center of gravity of the work
l2: Distance to the center of gravity of the bracket

Since moment acting in the Mc direction of the actuator is the dominant one, calculation will be made using the moment acting in the Mc direction. Moment acting in the Mc direction is calculated as follows.

$$M = \left(m_1 \times 9.8 \times \frac{l_1}{1{,}000}\right) + \left(m_2 \times 9.8 \times \frac{l_2}{1{,}000}\right) = \left(8 \times 9.8 \times \frac{100}{1{,}000}\right) + \left(2 \times 9.8 \times \frac{50}{1{,}000}\right) = 8.82\text{N·m}$$

In this case, the load factor is 1.25 because the acceleration/deceleration is 0.5G. The attachment factor will be 1.0 since the actuator has been fully secured to the mounting surface. For this actuator, the allowable dynamic moment in the Mc direction is 24.6N·m, the standard rated life is 5,000km, and the standard load factor is 1.2. Therefore, the operational life is calculated as follows.

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{WS}}{f_W} \cdot \frac{1}{f_\alpha}\right)^3 \cdot \text{URL} = \left(\frac{24.6\text{N·m}}{8.82\text{N·m}} \times \frac{1.2}{1.25} \times \frac{1}{1}\right)^3 \times 5{,}000\text{km} = 95{,}980\text{km}$$

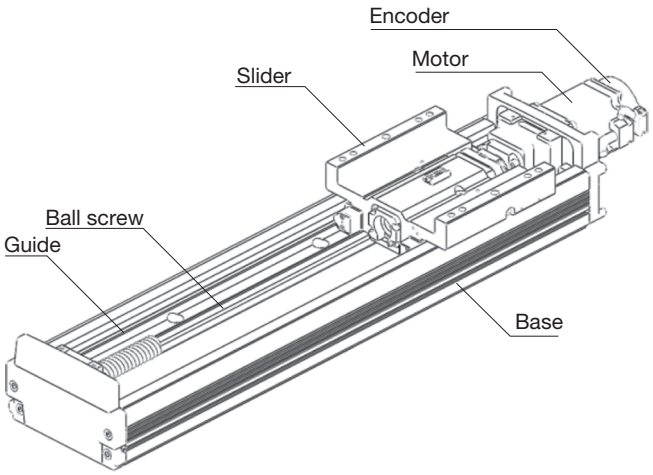
This shows that the operational life for the above operation conditions is 95,980km.

Structure and Principles of Movement of a Single-Axis Robot

The actuator has the structure as shown in the figure below.

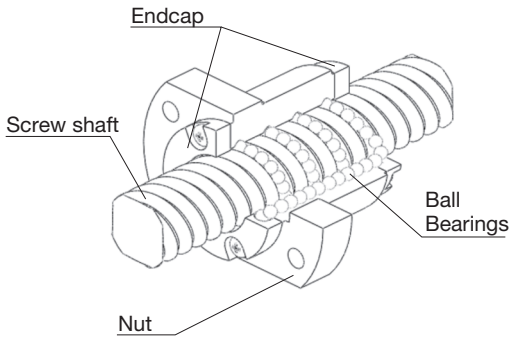
The ball screw rotates when the motor rotates, and this causes the slider to move.

The amount of movement and speed are detected by the encoder, positioning is performed by controlling the rotation of the motor (ball screw).



■ Ball screw

Since the screw and the slider are in contact with the ball bearings as shown in the figure below, the ball screw can rotate with less frictional resistance like a bearing.



Ball Screw Accuracy

The lead accuracy of IAI's ball screw is equivalent to the accuracy class C5 or C10 of JIS standard (JIS B 1192).

The accuracy of C10 is defined as ± 210μm for the typical transfer amount error (see figure below) for 300mm.

The accuracy of the C5 (the typical transfer amount error and the allowance value of the variation) is as follows.

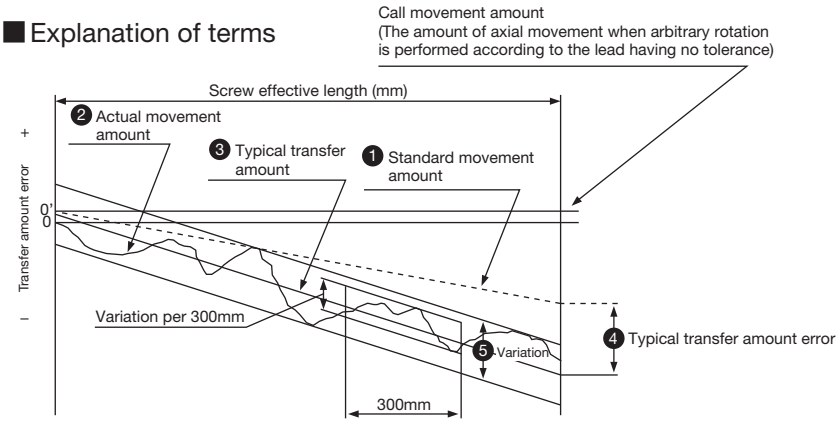
Note: The numbers in the table below are reference values, and absolute positioning accuracy is not guaranteed.

■ Typical transfer amount error

Units: μm

Items		Typical transfer amount error	Variation
Screw effective length (mm)			
Over	Below		
—	315	23	18
315	400	25	20
400	500	27	20
500	630	30	23
630	800	35	25
800	1000	40	27
1000	1250	46	30
1250	1600	54	35
1600	2000	65	40
2000	2500	77	46
2500	3150	93	54

■ Explanation of terms



1 Standard movement amount: The amount of movement in the axis direction when a standard lead (lead without tolerance) is rotated an arbitrary number of times.

2 Actual movement amount: The measured value of actual movement in the axis direction

3 Typical transfer amount: A straight line representing the trend of the actual movement amount. It is determined by the least squares method from the curve showing the actual moving amount.

4 Typical transfer amount error: Difference between the typical movement amount and the standard movement amount.

5 Variation: The maximum width of the actual movement amount curve between two straight lines parallel to the typical movement amount line.

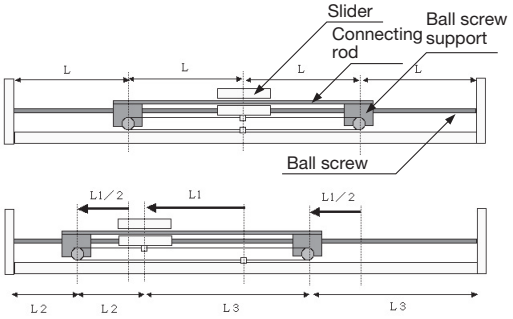
Intermediate Support Structure

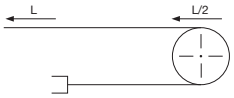
The intermediate support mechanism suppresses the deflection and vibration of the ball screws by supporting them at the intermediate point. As a result, the speed of the long-stroke actuator, which was limited due to the critical rotational speed, can be operated at a higher speed.

Intermediate support models
IS(P)B-MXMX/LXMX/LXUWX IS(P)A-MXMX/LXMX/LXUWX/WXMX IS(P)DB-MX/LX NS-MXMXS/LXMXS

Wire type intermediate support

The wire type intermediate support is a mechanism that supports the ball screw using two ball screw supports, a connecting rod, and a wire. The connecting rod is passed through the slider, and is attached to a ball screw support on each end. The wire is wrapped around a pulley on each of the ball screw supports.
With this mechanism, the ball screw support moves 1/2 of the actuator's full stroke, supporting the screw at the intermediate position between the slider and the end of stroke. As a result, ball screw runout is suppressed.





(Note) Due to its structure, the intermediate support mechanism is designed for horizontal use.
If the main unit is installed vertically or on its side, the wire may become disconnected. Therefore, do not install the unit in any orientation other than horizontally.

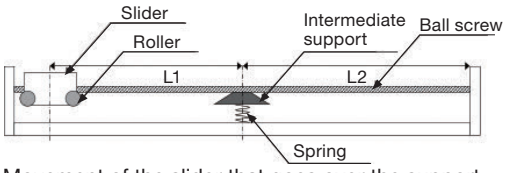
Spring-type intermediate support (Patent pending)

The spring type intermediate mechanism supports the ball screw by using spring force.
When the slider moves on the spring support, the rollers installed on the slider push down the spring and the slider goes over the support part.
The number of supports is determined by the stroke length.
The intermediate support is a single unit so that the whole unit can be removed and replaced.
Operations with high-acceleration/deceleration are possible, which was limited for the wire type support.
* The actuator can be operated faster when the maximum supporting distance of the ball screw, L2, is shorter.

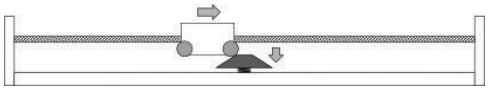
Stroke (mm)	900-1550	1600-2550	2600-3000
Number of supports	1 set	2 sets	3 sets

Models that employ the spring-type intermediate support
IS(P)B-WXMX

Structure of the spring-type intermediate support



Movement of the slider that goes over the support

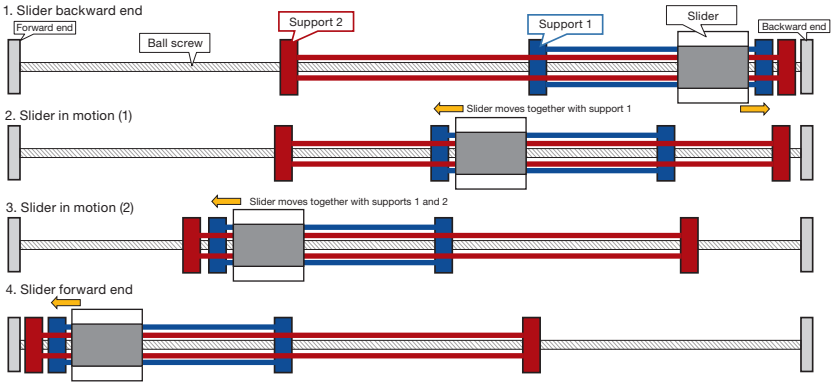


Free-support type intermediate support (Patent pending)

Adding an intermediate support mechanism (ball screw support mechanism that moves together with the slider) reduces vibration even for the long-stroke ball screw and greatly increases the maximum speed.
The intermediate support comprises of a connecting rod that goes through the slider and a support block.

Models that employ the free-type intermediate support
EC-S10X/S13X/S15X/S18X/(D)S6X/(D)S7X/S8X/ (D)RR6X/(D)RR7X/RCP6-HSA6X/HSA7X

Conceptual image of the intermediate support (free support structure) using 2 supports



Types of Robot Feedback Control

Feedback control are used to check if the robot is moving as commanded and to correct if there are any deviations in the movement. There are a few methods to do this.

IAI's single-axis robots, ROBO Cylinders, ELECYLINDERs, SCARA robots, and Cartesian robots use the semi-closed loop control. This is a general servo control method, and the actuator movement is detected by the encoder and fed back.

In contrast to this, the open loop control and the full closed loop control have the following characteristics.

Open loop control

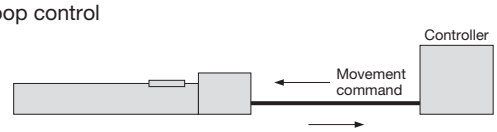
This is a general stepper motor method, and is inexpensive since there is no encoder, but cannot make corrections when there are deviations between the operation commands and the movement because it is not a feedback control.

Full closed loop control

The slider position can be determined accurately because the absolute position of the slider is measured and fed back. (Due to actuator accuracy errors, for semi-closed loop, there will be errors within a set range between the actual actuator position and the position information that is fed back from the encoder.)

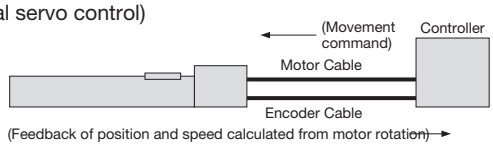
Types of feedbacks

■Open loop control



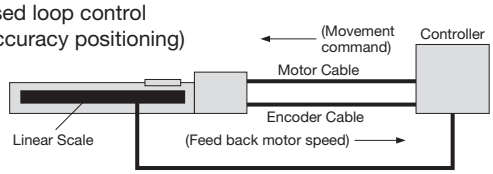
No signals that are returned to the controller
(It can not be corrected even if the position is shifted.)

■Semi-closed control
(General servo control)



(Feedback of position and speed calculated from motor rotation)

■Full closed loop control
(High accuracy positioning)



Feedback Cable
(Feed back the absolute position of the slider)

Overseas Standard

1. RoHS Directive

RoHS Directive (2002/95/EC) was enacted on July 1, 2006 to regulate the use of certain hazardous substances for electric and electronic equipment in EU.
The Official Journal of the European Union published directive (EU) 2015/863 on June 4, 2015, which amended RoHS directive 2011/65/EU, which defines the substances restricted by RoHS, and became effective on July 22, 2019 (July 22, 2021 for Category 9).
As a result, in addition to the six previously restricted substances, four new substances (DEHP, BBP, DBP, and DIBP) have been added, making the total number of restricted substances ten (see the table below).

	[RoHS Directive (2011/65/EU)]	[Revised RoHS Directive (2011/65/EU) + (EU) 2015/863]
Restricted substances	Lead	Lead
	Mercury	Mercury
	Cadmium	Cadmium
	Hexavalent chromium	Hexavalent chromium
	Polybrominated biphenyls (PBB)	Polybrominated biphenyls (PBB)
	Polybrominated diphenyl ether (PBDE)	Polybrominated diphenyl ether (PBDE)
		Bis(2-ethylhexyl) phthalat (DEHP)
		Butyl benzyl phthalate (BBP)
		Dibutyl phthalate (DBP)
		Diisobutyl phthalate (DIBP)

IAI products belong to Category 9 (monitoring and control equipment).
With the exception of special specifications and some old products, the change was completed by July 22, 2021.
Please refer to the list of compatible products below for further details on compatibility.

2. CE Marking

Products distributed within the European Union (EU) are required to bear the CE marking.
CE markings indicate compliance with the mandatory safety requirements of the EU Directive and are affixed by the manufacturer at its own risk.
When the New Approach Directive was adopted in 1985, directives such as the EMC directive, the Low Voltage Directive, and the Machine Directive were established as essential safety requirements.
For each product to demonstrate compliance with the directive, it must meet the relevant harmonized standards selected by the manufacturer.

(1) EMC Directive

This directive relates to products that emit electromagnetic waves or may have their functions affected by external electromagnetic waves.
To be compliant with this directive, a design that neither emits strong electromagnetic waves, nor would be affected by strong electromagnetic waves is necessary.
We only declare our compliance with this directive only when the electromagnetic interference measures described in our Overseas Standards Compliance manual have been implemented. (Please check https://www.intelligentactuator.com/rohs-ce-mark-ul-listed-compliance-table/ for further details). We also ask that you check the entire machine to ensure compliance.

(2) Low Voltage Directive

This directive concerns the safety of products that are powered by 50 to 1000VAC and 75 to 1500VDC.
All of our relevant actuators (see the compatibility list), are designed to be compliant with this directive in combination with their respective controllers.
For 200VAC actuators, use the methods described in our Overseas Standards Compliance manual in order to be compliant with this directive. (Please check https://www.intelligentactuator.com/rohs-ce-mark-ul-listed-compliance-table/ for further details.)
This directive does not apply to 24V actuators.

(3) Machinery Directive

This directive applies mainly to industrial machinery and general products whose moving parts are found to be dangerous. It is a directive relating to the safety of machine products.
We define actuators and controllers (hereinafter referred to as our components) as components that are embedded into the customer's equipment (embedded devices).
As a result, although our components are declared as "semi-finished" in compliance with the Machinery Directive 2006/42/EC for some products, this does not guarantee that your equipment will comply with the EU Directive.
Before either shipping our components to Europe or using equipment with our components embedded in Europe, you must verify compliance with this directive.
The safety category TTA units, IX, IXP, and IXA SCARA series all fully comply with the Machinery Directive.
All other products do not comply with the Machinery Directive. (As of June 2024)

In order for your equipment to meet the Machinery Directive, our components must comply with the Low Voltage Directive "Directive 2014/35/EU" and the EMC Directive "Directive 2014/30/EU".

(4) Language Support

A CE mark requires that the instruction manuals, caution labels, and warning labels are all written in a language understandable in the country where the product is being used. We use English as the default language for all of these.

If you require support in a language other than English, please contact our sales representative.

When further explanatory text is included as part of a caution or warning label, we may also have the explanations in Japanese, in addition to English.

3. UKCA Marking

The UKCA mark is a certification that indicates compliance with specific requirements on applicable products sold in the United Kingdom.
It was introduced in place of the previous CE marking when UK left the EU. We ship some products with the UKCA marking.
However, there are no plans to increase the number of products to be shipped with the UKCA marking in the future.
This is because, although the CE marking was originally set to expire in the UK at the end of 2024, its acceptability in the UK has been extended indefinitely.
Since most our products are already shipped with CE marking, we will not be increasing the number of products with the UKCA marking added.

4. UL Standard

UL (Underwriters Laboratories Inc.) is a non-profit organization founded in 1894 by the American Fire Insurers Association. It now consists of two non-profit organizations and one for-profit company that conducts research, tests and inspections to protect lives and property from fire, disaster, theft and other accidents.
UL standard is a product safety standard for functions and safety established by UL. UL tests and evaluates samples of the product, and if UL determines that the product meets the requirements of UL standard, it can be shipped with the UL certification marking.
UL classifies its certified products as either 'listed' or 'recognized.' 'Listed' products are fully tested as complete systems, while 'recognized' products are tested only as components of a larger system. All of our products that have received UL certification are tested as parts of the final machine (components), and therefore are approved under the 'recognized' category.

UL Listed Mark

Published in the Product List (Green Book)

UL Recognized Mark

Published in the List of Registered Parts (Yellow Book)

5. US TSCA Regulations

As of November 1, 2024, the US TSCA regulations have been revised to prohibit exporting products containing 5 PBT substances to the United States, as well as the processing and commercial distribution of those products within the United States.
We have confirmed that some of our products contain one of these restricted PBT products, namely tris (isopropylphenyl) phosphate, in components such as connector and fuse covers.
We identified all of the products and parts that contain tris (isopropylphenyl) phosphate, and changes to those components were completed by the end of October 2023. All of the products shipped since November 2023 have been TSCA compliant, except for special specifications and some of our older products.
For details on which products are TCSA compliant, please refer to the list of supported products below.

6. KCs Marking

As of March 1, 2013, industrial robots have been included in South Korea's Autonomous Safety Confirmation Declaration System, imposing restrictions on products used in South Korea or exported from Japan to South Korea.
Our products can only be used in equipment delivered to South Korea via IA KOREA.
KCs defines an industrial robot as a fixed robot with three or more axes. This includes Cartesian robots and those equipped with a manipulator (actuators, control devices including teaching pendants, and communication interfaces) that can be programmed and automatically controlled using a dedicated control device.
In order to export all applicable models under this definition, it is necessary to apply in advance for registration with KOSHA (Korea Occupational Safety and Health Agency).

Compliant Product Table for Revised RoHS Directive/CE Marking/UL Standard

■ Actuators

(as of June 2024 production)

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
ELECYLINDER	EC	Slider (ultra-compact)	SL3	◎	◎	×	◎
		Slider (standard)	S2/(D)S3(□A)/(D)S4(□A)/(D)S6(□A)/(D)S7(□A)/S8(X)(□A)	◎	◎	×	◎
			S2□R/(D)S3□(A)R/(D)S4□(A)R/(D)S6□(A)R/(D)S7□(A)R/S8(X)(□A)R	◎	◎	×	◎
		Slider (wide)	(D)WS10/(D)WS12	◎	◎	×	◎
			(D)WS10□R/(D)WS12□R	◎	◎	×	◎
		Slider (high rigidity)	(D)S6(X)□AH/(D)S7(X)□AH	◎	◎	×	◎
			(D)S6(X)□AHR/(D)S7(X)□AHR	◎	◎	×	◎
		Slider (belt-driven)	(D)B6/(D)B7/B8S/B8SS	◎	◎	×	◎
		Slider (large)	S10(X)/S13(X)/S15(X)/S18(X)	◎	◎	×	◎
		Rod (ultra-small)	GDB3	◎	◎	×	◎
		Rod (thin)	CRP3/CRP5/CGD3/CGD5	In preparation	In preparation	×	In preparation
		Rod (standard)	(D)R6/(D)R7	◎	◎	×	◎
		Rod (short length)	RP3/RP4/GS4/GD3/GD4/RP5/GD5	◎	◎	×	◎
		Rod (double guide specification)	SRG11/SRG15	◎	◎	×	◎
		Radial cylinder (standard)	RR2/(D)RR3/(D)RR4/(D)RR6/(D)RR7/RR8/RR10	◎	◎	×	◎
			RR2□R/(D)RR3□R/(D)RR4□R/(D)RR6□R/(D)RR7□R/RR8□R/RR10□R	◎	◎	×	◎
		Radial cylinder (high rigidity)	(D)RR6(X)□AH/(D)RR7(X)□AH	◎	◎	×	◎
			(D)RR6□AHR/(D)RR7□AHR	◎	◎	×	◎
		Table (ultra-compact)	T3	◎	◎	×	◎
		Table (thin)	CTC3/CTC5	In preparation	In preparation	×	In preparation
		Table (short length)	TC3/TC4/TC5/TW3/TW4/TW5	◎	◎	×	◎
		Gripper	GRB(P)8/GRB(P)10/GRB(P)13/GRC6/GRC7/GRST3/GRST6/GRST7/GRTR14	In preparation	In preparation	×	In preparation
		Rotary	RTB4/RTC9/RTC12/RTC18	◎	◎	×	◎
		Stopper cylinder	GDS3/ST11/ST15/ST15ME	◎	◎	×	◎
	EC (cleanroom specifications)	Slider (standard)	(D)S3□(A)CR/(D)S4□(A)CR/(D)S6□(A)CR/(D)S7□(A)CR/S8(X)□(A)CR	◎	◎	×	◎
		Slider (high rigidity)	(D)S6(X)□AHCR/(D)S7(X)□AHCR	◎	◎	×	◎
		Slider (wide)	(D)WS10□CR/(D)WS12□CR	◎	◎	×	◎
	EC (dust-proof/ splash-proof specification)	Slider (standard)	S6□D/S6□W/S7□D/S7□W	◎	◎	×	◎
		Rod (standard)	R6□W/R7□W	◎	◎	×	◎
		Rod (high rigidity)	RR6□W/RR7□W	◎	◎	×	◎
		Gripper	GRBP8□W/GRBP10□W/GRBP13□W	In preparation	In preparation	×	In preparation
ROBO Cylinder	RCP6(S)	Slider (standard)	SA4C/SA6C/SA7C/SA8C	◎	◎	×	◎
			SA4R/SA6R/SA7R/SA8R	◎	◎	×	◎
		Slider (wide)	WSA10C/WSA12C/WSA14C/WSA16C	◎	◎	×	◎
			WSA10R/WSA12R/WSA14R/WSA16R	◎	◎	×	◎
		Slider (high rigidity)	HSA6(X)C/HSA7(X)C	In preparation	In preparation	×	In preparation
			HSA6(X)□R/HSA7(X)□R	In preparation	In preparation	×	In preparation
		Rod (standard)	RA4C/RA6C/RA7C/RA8C	◎	◎	×	◎
			RA4R/RA6R/RA7R/RA8R	◎	◎	×	◎
		Rod (radial cylinder)	RRA4C/RRA6C/RRA7C/RRA8C	◎	◎	×	◎
			RRA4R/RRA6R/RRA7R/RRA8R	◎	◎	×	◎
		Rod (wide)	WRA10C/WRA12C/WRA14C/WRA16C	◎	◎	×	◎
			WRA10R/WRA12R/WRA14R/WRA16R	◎	◎	×	◎
		Table	TA4C/TA6C/TA7C	◎	◎	×	◎
			TA4R/TA6R/TA7R	◎	◎	×	◎
		Gripper	GRST6C/GRST7C	◎	◎	×	◎
			GRST6R/GRST7R	◎	◎	×	◎
			GRT7A/GRT7B	◎	◎	×	◎
		Rotary Chuck	RTCKSPE/RTCKMPE	◎	◎	×	◎
			RTCKSPI/RTCKMPI	◎	◎	×	◎
			RTCKSRE/RTCKMRE	◎	◎	×	◎
			RTCKSRI/RTCKMRI	◎	◎	×	◎
		Hollow Rotary	RTFML	◎	◎	×	◎
	RCP6(S)CR	Slider (standard)	SA4C/SA6C/SA7C/SA8C	◎	◎	×	◎
		Slider (wide)	WSA10C/WSA12C/WSA14C/WSA16C	◎	◎	×	◎
	RCP6(S)W	Rod (standard)	RA4C/RA6C/RA7C/RA8C	◎	◎	×	◎
			RA4R/RA6R/RA7R/RA8R	◎	◎	×	◎
		Rod (radial cylinder)	RRA4C/RRA6C/RRA7C/RRA8C	◎	◎	×	◎
			RRA4R/RRA6R/RRA7R/RRA8R	◎	◎	×	◎
		Rod (wide)	WRA10C/WRA12C/WRA14C/WRA16C	◎	◎	×	◎
			WRA10R/WRA12R/WRA14R/WRA16R	◎	◎	×	◎

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
ROBO Cylinder	RCP5	Slider (standard)	SA4C/SA6C/SA7C	◎	◎	×	◎
			SA4R/SA6R/SA7R	◎	◎	×	◎
		Slider (belt-driven)	BA4/BA6/BA7/BA4U/BA6U/BA7U	◎	◎	×	◎
		Rod	RA4C/RA6C/RA7C/RA8C/RA10C	◎	◎	×	◎
			RA4R/RA6R/RA7R/RA8R/RA10R	◎	◎	×	◎
	RCP5CR	Slider	SA4C/SA6C/SA7C	◎	◎	×	◎
	RCP5W	Rod	RA6C/RA7C/RA8C/RA10C	◎	◎	×	◎
	RCP4	Slider	SA3C/SA5C/SA6C/SA7C/SS8C	◎	◎	×	◎
			SA3R/SA5R/SA6R/SA7R/SS8R	◎	◎	×	◎
		Rod	RA3C/RA5C/RA6C/RA6CQ/RGD6CQ/RGS6CQ	◎	◎	×	◎
			RA3R/RA5R/RA6R	◎	◎	×	◎
		Gripper	GRSML/GRSLL/GRSWL/GRLM/GRLL/GRLW	◎	◎	×	◎
		Stopper cylinder	ST68E/ST615E/ST4525E	◎	◎	×	◎
	RCP4CR	Slider	SA3C/SA5C/SA6C/SA7C/SS8C	◎	◎	×	◎
	RCP4W	Slider	SA5C/SA6C/SA7C	◎	◎	×	◎
		Rod	RA6C/RA7C/RA6CQ	◎	◎	×	◎
	RCP3	Slider	SA2AC/SA2BC/SA3C/SA4C/SA5C/SA6C	◎	◎	×	◎
			SA2AR/SA2BR/SA3R/SA4R/SA5R/SA6R	◎	◎	×	◎
		Rod	RA2AC/RA2BC	◎	◎	×	◎
			RA2AR/RA2BR	◎	◎	×	◎
		Table	TA3C/TA4C/TA5C/TA6C/TA7C	◎	◎	×	◎
			TA3R/TA4R/TA5R/TA6R/TA7R	◎	◎	×	◎
	RCP2	Slider (standard)	SA5C/SA6C/SS7C	◎	◎	×	◎
			SA5R/SA6R/SS7R	◎	◎	×	◎
		Slider (high speed)	HS8C/HS8R	◎	◎	×	◎
		Rod (standard)	RA2C/RA3C/RA4C/RA8C/RA10C	◎	◎	×	◎
			RA3R/RA4R/RA8R/SRA4R	◎	◎	×	◎
		Rod (with guide)	RGS4C/RGD3C/RGD4C	◎	◎	×	◎
			SRGS4R/SRGD4R	◎	◎	×	◎
		Gripper	GRLS/GRSS/GRS/GRM/GRHM/GRHB	◎	◎	×	◎
			GR3LM/GR3LS/GR3SM/GR3SS	◎	◎	×	◎
			GRST	◎	◎	×	◎
		Rotary	RTBS/RTBSL/RTB/RTBL/RTBB/RTBBL	◎	◎	×	◎
			RTCS/RTCSL/RTC/RTCL/RTCB/RTCBL	◎	◎	×	◎
	RCP2CR	Slider	SA5C/SA6C/SS7C/HS8C	◎	◎	×	◎
		Gripper	GRSS/GRLS/GRS/GRM/GR3SS/GR3SM	◎	◎	×	◎
		Rotary	RTBS/RTBSL/RTCS/RTCSL/RTB/RTBL/RTC/RTCL/ RTBB/RTBBL/RTCB/RTCBL	◎	◎	×	◎
	RCP2W	Rod (standard)	RA4C	◎	◎	×	◎
		Rod (high thrust)	RA10C	◎	◎	×	◎
		Gripper	GRSS/GRLS/GRS/GRM/GR3SS/GR3SM	◎	◎	×	◎
		Rotary	RTBS/RTBSL/RTCS/RTCSL/RTB/RTBL/RTC/RTCL/ RTBB/RTBBL/RTCB/RTCBL	◎	◎	×	◎
	ERC3	Slider	SA5C/SA7C	◎	◎	×	◎
		Rod	RA4C/RA6C	◎	◎	×	◎
	ERC3D	Slider	SA5C/SA7C	◎	◎	×	◎
	ERC3CR	Slider	SA5C/SA7C	◎	◎	×	◎
	RCD	Rod	RA1DA/RA1D	◎	◎	×	◎
		Gripper	GRSNA/GRSN	◎	◎	×	◎
	RCA2	Slider	SA3C/SA4C/SA5C/SA6C	◎	◎	×	◎
			SA3R/SA4R/SA5R/SA6R	◎	◎	×	◎
		Rod	RN3N/RN4N/RP3N/RP4N	◎	◎	×	◎
			RN3NA/RN4NA/RP3NA/RP4NA/GS3NA/GS4NA/ GD3NA/GD4NA/SD3NA/SD4NA	◎	◎	×	◎
		Table (short length)	TCA3NA/TCA4NA/TWA3NA/TWA4NA/TFA3NA/ TFA4NA	◎	◎	×	◎
		Table (standard)	TA4C/TA5C/TA6C/TA7C	◎	◎	×	◎
			TA4R/TA5R/TA6R/TA7R	◎	◎	×	◎
	RCA2CR	Rod	RN3NB/RN4NB/RP3NB/RP4NB/GS3NB/GS4NB/ GD3NB/GD4NB/SD3NB/SD4NB	◎	◎	×	◎
	RCA2W	Rod	RN3NB/RN4NB/RP3NB/RP4NB/GS3NB/GS4NB/ GD3NB/GD4NB/SD3NB/SD4NB	◎	◎	×	◎

Compliant Product Table for Revised RoHS Directive/CE Marking/UL Standard

(as of June 2024 production)

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
ROBO Cylinder	RCA	Slider (standard)	SA4C/SA5C/SA6C	◎	◎	×	◎
			SA4R/SA5R/SA6R	◎	◎	×	◎
		Slider (directly connected to motor)	SA4D/SA5D/SA6D/SS4D/SS5D/SS6D	◎	◎	×	◎
		Rod (standard)	RA3C/RA4C/RA3D/RA4D/RA3R/RA4R/SRA4R	◎	◎	×	◎
		Rod (with guide)	RGS3C/RGS4C/RGS3D/RGS4D/SRGS4R	◎	◎	×	◎
			RGD3C/RGD4C/RGD3D/RGD4D	◎	◎	×	◎
			RGD3R/RGD4R/SRGD4R	◎	◎	×	◎
	RCACR	Slider (standard)	SA4C/SA5C/SA6C	◎	◎	×	◎
		Slider (directly connected to motor)	SA5D/SA6D	◎	◎	×	◎
	RCAW	Rod	RA3C/RA3D/RA3R/RA4C/RA4D/RA4R	◎	◎	×	◎
	RCS4	Slider (standard)	SA4C/SA6C/SA7C/SA8C SA4R/SA6R/SA7R/SA8R	◎	◎	×	◎
		Slider (wide)	WSA10C/WSA12C/WSA14C/WSA16C WSA10R/WSA12R/WSA14R/WSA16R	◎	◎	×	◎
		Slider (high rigidity)	HSA6C/HSA7C	◎	◎	×	◎
		Rod (standard)	RA4C/RA6C/RA7C/RA8C/RA4R/RA6R/RA7R/RA8R	◎	◎	×	◎
		Rod (radial cylinder)	RRA4C/RRA6C/RRA7C/RRA8C/RRA4R/RRA6R/ RRA7R/RRA8R	◎	◎	×	◎
		Rod (wide)	WRA10C/WRA12C/WRA14C/WRA16C WRA10R/WRA12R/WRA14R/WRA16R	◎	◎	×	◎
		Table	TA4C/TA6C/TA7C/TA4R/TA6R/TA7R	◎	◎	×	◎
	RCS4CR	Slider (standard)	SA4C/SA6C/SA7C/SA8C	◎	◎	×	◎
		Slider (wide)	WSA10C/WSA12C/WSA14C/WSA16C	◎	◎	×	◎
	RCS3	Slider (high speed)	CT8C	◎	◎	×	◎
		Rod (servo press)	RA4R	◎	○	×	◎
			RA6R/RA7R/RA8R/RA10R/RA15R/RA20R	◎	◎	×	◎
		Table (high speed)	CTZ5C	◎	◎	×	◎
	RCS3(P)	Slider	SA8C/SS8C (*1)	◎	○	×	◎
			SA8R/SS8R (*1)	◎	○	×	◎
	RCS3(P)CR	Slider	SA8C/SS8C (*1)	◎	○	×	◎
	RCS2	Slider (standard)	SA4C/SA5C/SA6C/SA7C/SS7C (*1)	◎	○	×	◎
			SA4R/SA5R/SA6R/SA7R/SS7R (*1)	◎	○	×	◎
		Slider (directly connected to motor)	SA4D/SA5D/SA6D	◎	○	×	◎
		Rod (standard)	RN5N/RP5N/RA4C/RA5C/RA4D/RA4R/RA5R (*1)	◎	○	×	◎
			SRA7BD	◎	×	×	◎
		Rod (servo press)	RA13R	◎	◎	×	◎
		Rod (with guide)	GS5N/GD5N/SD5N	◎	○	×	◎
			RGS4C/RGS4D/RGD4C	◎	○	×	◎
			RGD4D/RGD4R	◎	○	×	◎
			RGS5C/RGD5C (*1)	◎	○	×	◎
			SRGS7BD/SRGD7BD	◎	×	×	◎
		Table	TCA5N/TWA5N/TFA5N	◎	○	×	◎
		Gripper	GR8	◎	○	×	◎
		Rotary	RT6/RT6R/RT7R/RTC8L/RTC8HL/RTC10L/RTC12L	◎	○	×	◎
	RCS2CR	Slider (standard)	SA4C/SA5C/SA6C/SA7C/SS7C (*1)	◎	○	×	◎
		Slider (directly connected to motor)	SA5D/SA6D	◎	○	×	◎
		Rod	RN5NB/RP5NB/GS5NB/GD5NB/SD5NB	◎	○	×	◎
	RCS2W	Rod	RN5NB/RP5NB/GS5NB/GD5NB/SD5NB	◎	○	×	◎
			RA4C/RA4R/RA4D	◎	○	×	◎
Single Axis Robot	IS(P)B	Standard	SXM/SXL/MXM/MXL/MXMX/LXM/LXL/LXMX/ LXUWX/WXM/WXMX	◎	◎	×	◎
	IS(P)DB	Simple dust proof	S/M/MX/L/LX	◎	◎	×	◎
	IS(P)DBCR	Clean	S/M/MX/L/LX	◎	◎	×	◎
	SSPA	High rigidity (iron base)	SXM/MXM/LXM	◎	◎	×	◎
	SSPDACR	Cleanroom high rigidity (iron base)	S/M/L	◎	◎	×	◎
	IS(P)A	Standard	SXM/SYM/SZM/MXM/MYM/MZM/MXMX/ LXM/LYM/LZM/LXMX/LXUWX/WXM/WXMX	◎	◎	×	◎
	IS(P)DA	Simple dust proof	S/M/MX/L/LX	◎	◎	×	◎
	IS(P)DACR	Cleanroom	S/M/MX/L/LX/W/WX	◎	◎	×	◎
	IS(P)WA	Dust/splash-proof	S/M/L	◎	◎	×	◎

(*1) The incremental absolute encoder specifications of the following models are no longer in production. Only battery-less absolute encoder specifications.
RCS2(CR)-SA7/SS7/SS8/RA5/RGS5/RGD5
RCS3(P)(CR)-SA8/SS8

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
Single Axis Robot	NSA	Standard	MXMS/MXMM	◎	◎	×	◎
			LXMS/LXMM/LXMXS/LXMXM	◎	◎	×	◎
			WXMS/WXMM/WXMXS/WXMXM	◎	◎	×	◎
	NS	Standard	SXMSA/SXMMA/SZMSA/SZMMA	◎	◎	×	◎
			MXMSA/MXMMA/MXMXSA/MZMSA/MZMMA	◎	◎	×	◎
			LXMSA/LXMMA/LXMXSA/LZMSA/LZMMA	◎	◎	×	◎
	IF	Standard	SA*L/SA*R/MA*L/MA*R (*:1 or 2 or 3)	◎	×	×	◎
	IFA	Standard	SA/MA	◎	◎	×	◎
	RS	Rotational axis	30/60	◎	×	×	◎
	ZR	Vertical/rotary integrated type	S/M	◎	×	×	◎
Direct drive motor	DDA	Standard	LT18C□A/LH18C□A	◎	◎	×	◎
	DDACR	Cleanroom	LT18C□A/LH18C□A	◎	◎	×	◎
	DDW	Dust- and splash-proof	LH18C□A	◎	◎	×	◎
Linear	LSA LSAS	Medium type	N	◎	×	×	◎
		Large	W	◎	×	×	◎
		Shaft	S	◎	×	×	◎
Cartesian Robot	ICS(P)A	-	-	◎	×	×	◎
	ICS(P)B	-	-	◎	×	×	◎
	IK	-	-	◎	×	×	◎
Cartesian 6-Axis Robot	CRS	-	-	◎	×	×	◎
Tabletop	TTA	-	TTA-A2(G)/A3□(G)/A4□(G)/C2□(G)/C3□(G)/C4□(G)	◎	◎ (*2)	×	◎
SCARA	IXA	Standard	3NNN1805/4NNN1805	◎	◎	×	◎
			3NNN3015/4NNN3015	◎	◎	×	◎
			3NNN45□□/4NNN45□□	◎	◎	×	◎
			3NNN60□□/4NNN60□□	◎	◎	×	◎
			4NNN80□□	◎	◎	×	◎
			4NNN100□□	◎	◎	×	◎
		High-speed	3NSN3015/4NSN3015	◎	◎	×	◎
			3NSN45□□/4NSN45□□	◎	◎	×	◎
			3NSN60□□/4NSN60□□	◎	◎	×	◎
			4NSN80□□	◎	◎	×	◎
			4NSN100□□	◎	◎	×	◎
		High payload	4NHN10040	◎	◎	×	◎
			4NHN12040	◎	◎	×	◎
		Cleanroom	4NSC3015	◎	◎	×	◎
			4NSC4518/4533	◎	◎	×	◎
			4NSC6018/6033	◎	◎	×	◎
		Dust- and splash-proof	4NSW3015	◎	◎	×	◎
			4NSW45□□	◎	◎	×	◎
			4NSW60□□	◎	◎	×	◎
			4NSW80□□	◎	◎	×	◎
			4NSW100□□	◎	◎	×	◎
			4NHW12040	◎	◎	×	◎
	IXP	Standard	3N1808/3N2508/4N1808/4N2508	◎	◎	×	◎
			3N3515/3N4515/4N3515/4N4515	◎	◎	×	◎
			3N5520/4N5520/3N6520/4N6520	◎	◎	×	◎
		With gripper	3N2508GM/3N3515GM/3N4515GM/3N3510GL/3N4510GL	◎	◎	×	◎
			3N5515GL/3N5515GW/3N6515GL/3N6515GW	◎	◎	×	◎
		Cleanroom	3C3515/4C3515/3C4515/4C4515/	◎	◎	×	◎
			3C5520/4C5520/3C6520/4C6520	◎	◎	×	◎
		Dust- and splash-proof	3W3515/4W3515/3W4515/4W4515	×	×	×	◎
			3W5520/4W5520/3W6520/4W6520	×	×	×	◎
	IX	Standard (NNN)	2515H/3515H	◎	○	×	◎
			50□□H/60□□H/70□□H/80□□H	◎	○	×	◎
		Cleanroom / dust-proof / splash-proof, ceiling-mounted, high-speed, wall-mounted	2515H/3515H/3015H/50□□H/60□□H/70□□H/80□□H	◎	○	×	◎
Wrist Unit	WU	-	S/M	◎	◎	×	◎
Solenoid gripper	GRS	-	SEG/MEG	◎	◎	×	◎
		-	SIG/MIG	◎	◎	×	◎

(*2) Limited to Safety category compliant specification.

Compliant Product Table for Revised RoHS Directive/CE Marking/UL Standard

■ Controller

(as of June 2024 production)

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
Controller for ROBO Cylinder	MSEP	-	C/LC	◎	◎	◎	◎
	MCON	-	C/CG/LC/LCG	◎	◎ (*1)	◎	◎
	R-unit	Master unit	RCON-GW/GWG	◎	◎	◎	◎
			RSEL-G	◎	◎	◎	◎
			REC-GW	◎	◎	◎	◎
		Driver Unit	RCON-PC-1/RCON-PC-2	◎	◎	◎	◎
			RCON-PCF-1	◎	◎	◎	◎
			RCON-AC-1/RCON-AC-2	◎	◎	◎	◎
			RCON-DC-1/RCON-DC-2	◎	◎	◎	◎
			RCON-SC-1	◎	◎	◎	◎
		Power supply unit	RCON-PS2-3	◎	◎	◎	◎
		EC connection unit	RCON-EC-4	◎	◎	◎	◎
		Simple absolute unit	RCON-ABU-P	◎	◎	◎	◎
			RCON-ABU-A	◎	◎	◎	◎
		Expansion unit	RCON-EXT	◎	◎	◎	◎
			RCON-EXT-NP/PN	◎	◎	◎	◎
			RCON-NP/PN	◎	◎	◎	◎
	PCON	-	CB/CGB/CFB/CGFB	◎	◎ (*2)	◎	◎
		For pulse press only	CBP/CGBP	◎	◎ (*2)	◎	◎
		-	CYB/PLB/POB	◎	◎	◎	◎
	ACON	-	CB/CGB	◎	◎ (*2)	◎	◎
		-	CYB/PLB/POB	◎	◎	◎	◎
	DCON	-	CB/CGB	◎	◎ (*2)	◎	◎
		-	CYB/PLB/POB	◎	◎	◎	◎
	SCON	-	CB/CGB/LC/LCG	◎	◎ (*3)	◎ (*4)	◎
		For servo press only	CB-F/LC-F	◎	◎ (*3)	◎ (*4)	◎
	SCON2	-	CG	◎	◎	◎	◎
	RCM-P6	RCM-P6PC	-	◎	◎	◎	◎
		RCM-P6AC	-	◎	◎	◎	◎
		RCM-P6DC	-	◎	◎	◎	◎

(*1) CC-Link IE Field is not supported.
(*2) CC-Link IE Field and MECHATROLINK-I/II are not supported.
(*3) MECHATROLINK-I/II is not supported.
(*4) 3000 and 3300 W types are not supported.

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
Single axis / Cartesian / Controller for SCARA	SSEL	-	CS	◎	◎	×	◎
	MSEL	Standard	PC	◎	◎	×	◎
		Safety category specification	PG	◎	◎	×	◎
		56SP/60P/86P Motor-compatible type	PCF	◎	◎	×	◎
		Safety category compliant 56SP/60P/86P Motor-compatible type	PGF	◎	◎	×	◎
	MSEL (for SCARA)	Standard	PCX3/PCX4	◎	×	×	◎
		Safety category specification	PGX3/PGX4	◎	◎	×	◎
	XSEL-RA/SA	Standard	RA/RAX/RAXD8	◎	◎	×	◎
		Safety category specification	SA/SAX/SAXD8	◎	◎	◎	◎
	XSEL-R/S	Standard	RX/RXD8	×	×	×	×
		Safety category specification	SX/SXD8	×	×	×	×
	XSEL-P/Q	Standard	P/PX	◎	◎	×	◎
		Safety category specification	Q	◎	◎	◎	◎
			QX	◎	◎	×	◎
Driver box	GRS	-	GRS-DB	◎	◎	×	◎

Compliant Product Table for Revised RoHS Directive/CE Marking/UL Standard

■ Options

(as of June 2024 production)

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
Teaching tool	Position Controller / Program Controller	Standard	TB-01(D)	◎	◎	×	◎
			TB-02(D)	◎	◎	×	◎
			TB-03	◎	◎	×	◎
	EC	Wired Teaching Controller	TBD-1	◎	◎	×	◎
		Wireless Teaching Controller	TBD-1WL	◎	◎	×	◎
	For EC (24V) / RCP	Teaching pendant with power supply unit	TB-03E/03P	◎	◎	×	◎
			TB-02E/02P	◎	◎	×	◎
		Actuator drive power supply unit	ADTB	◎	◎	×	◎
Quick teach	ERC3	RCM-PST	-	◎	×	×	◎
Motor/Encoder cables	EC (200V)	Motor cable	CB-EC-PW***-RB	◎	◎	×	◎
	IXP/RCP6/RCP5/RCP4-SA3/RA3/RCP2/RCD	Motor/Encoder Integrated cable	CB-CAN(2)-MPA***(-RB)	◎	◎	×	◎
			CB-ADPC(2)-MPA***(-RB)	◎	◎	×	◎
	RCP6/RCP5	Motor/Encoder Integrated cable	CB-CFA3-MPA	◎	◎	×	◎
	RCP4	Motor/Encoder Integrated cable	CB-CFA2-MPA***(-RB)	◎	◎	×	◎
	RCP2	Motor/Encoder Integrated cable	CB-CFA-MPA***(-RB)	◎	◎	×	◎
	RCP4/RCD	Motor/Encoder Integrated cable	CB-CA-MPA***(-RB)	◎	◎	×	◎
	RCP3/RCP2/ RCA2/RCA/RCL	Motor/Encoder Integrated cable	CB-APSEP-MPA	◎	◎	×	◎
			CB-RCAPC-MPA***(-RB)	◎	◎	×	◎
	RCP3/RCP2	Motor/Encoder Integrated cable	CB-PCS-MPA	◎	◎	×	◎
	RCP2	Motor/Encoder Integrated cable	CB-PSEP-MPA	◎	◎	×	◎
		Motor/Encoder Integrated cable (For small rotary only)	CB-RPSEP-MPA	◎	◎	×	◎
		Motor cable	CB-RCP2-MA	◎	◎	×	◎
		Encoder cable	CB-RCP2-PA***(-RB)	◎	◎	×	◎
			CB-RFA-PA***(-RB)	◎	◎	×	◎
	RCA2	Motor/Encoder Integrated cable	CB-ACS-MPA	◎	◎	×	◎
	RCA2/RCA/RCL	Motor/Encoder Integrated cable	CB-ASEP-MPA	◎	◎	×	◎
			CB-ASEP2-MPA	◎	◎	×	◎
		Motor cable	CB-ACS-MA	◎	◎	×	◎
		Encoder cable	CB-ACS-PA***(-RB)	◎	◎	×	◎
	RCS3-RA15R/20R	Motor cable	CB-RCS3-MA***-RB	◎	◎	×	◎
		Encoder cable	CB-RCS3-PLA***-RB	◎	◎	×	◎
	RCS3/RCS2	Motor cable	CB-RCC-MA***(-RB)	◎	◎	×	◎
		Encoder cable	CB-RCS2-PA	◎	◎	×	◎
			CB-RCS2-PLA	◎	◎	×	◎
			CB-RCBC-PA	◎	◎	×	◎
			CB-RCS2-PLDA***(-RB)	◎	◎	×	◎
			CB-RCS2-PLLA (RA13R / with load cell)	◎	◎	×	◎
			CB-RCBC-PA***-RB	◎	◎	×	◎
	XSEL	Motor cable	CB-X-MA	◎	◎	×	◎
			CB-XMC-MA	◎	◎	×	◎
			CB-XEU-MA	◎	◎	×	◎
		Encoder cable	CB-X-PA	◎	◎	×	◎
			CB-X1-PA/PLA	◎	◎	×	◎
			CB-X2-PA/PLA	◎	◎	×	◎
			CB-X1-PA***-WC	◎	◎	×	◎
			CB-X3-PA	◎	◎	×	◎
		Limit switch cable	CB-X-LC	◎	◎	×	◎
	R-unit	Motor cable	CB-X2-MA□□□	◎	◎	×	◎
			CB-RCC1-MA***	◎	◎	×	◎
Brake cable	IXA	-	CB-IXA-BK***	◎	◎	×	◎
Power · I/O cable	EC	-	CB-EC(2)-PWBIO***-RB	◎	◎	×	◎

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
RCON-EC connection cable	EC	-	CB-REC(2)-PWBIO***-RB	◎	◎	×	◎
I/O cable	MSEP	Standard	CB-MSEP-PIO	◎	◎	×	◎
		For LC	CB-PAC-PIO	◎	◎	×	◎
	PCON/ACON/ DCON	Standard (For C/CA/CB/CG/CGB types)	CB-PAC-PIO	◎	◎	×	◎
		For solenoid valve type (CY type)	CB-PACY-PIO	◎	◎	×	◎
		For solenoid valve type (CYB type)	CB-PAD-PIO	◎	◎	×	◎
		For pulse-train control (PL/PO type)	CB-PACPU-PIO	◎	◎	×	◎
		For pulse-train control (PLB/POB type)	CB-PAD-PIOS	◎	◎	×	◎
	SCON2/SCON/ MSEL	Standard	CB-PAC-PIO	◎	◎	×	◎
	PSEL/ASEL/ SSEL	Standard	CB-DS-PIO	◎	◎	×	◎
	XSEL	Standard	CB-X-PIO	◎	◎	×	
	ERC3	PIO type power supply	CB-ERC3P-PWBIO	◎	◎	×	◎
		SIO type power supply	CB-ERC3S-PWBIO	◎	◎	×	◎
	ERC2	PIO type power supply	CB-ERC-PWBIO***(-RB)	◎	◎	×	◎
		Power · I/O cable	CB-ERC-PWBIO***-H6	◎	◎	×	◎
			CB-ERC-PWBIO***-RB-H6	◎	◎	×	◎
		SIO type power supply	CB-ERC2-PWBIO***(-RB)	◎	◎	×	◎
SIO communication cable	ERC3	-	CB-PST-SIO050	◎	◎	×	◎
Other products	EC	Interface box conversion cable	CB-CVN-BJ002	◎	◎	×	◎
	RCON/RSEL	SCON connection cable	CB-RE-CTL***	◎	◎	×	◎
	RC types	Teaching software for PC	RCM-101-MW	◎	×	×	◎
			RCM-101-USB	◎	×	×	◎
			IA-OS-C	◎	×	×	◎
		External communication cable	CB-RCA-SIO***	◎	◎	×	◎
		RS232C conversion cable	RCB-CV-MW	◎	×	×	◎
		USB cable	CB-SEL-USB***	◎	◎	×	◎
		USB conversion adapter	RCB-CV-USB	◎	×	×	◎
		Link cable	CB-RCB-CTL***	◎	◎	×	◎
		Unit link cable	CB-REXT-SIO***	◎	◎	×	◎
		Controller connection cable	CB-REXT-CTL***	◎	◎	×	◎
		TP adapter ~ Controller connection cable	CB-CON-LB005	◎	◎	×	◎
		Conversion cable	CB-CAN-AJ002	◎	◎	×	◎
		Conversion connector	RCM-CV-APCS	◎	×	×	◎
		TP adapter	RCB-LB-TGS	◎	◎	×	◎
	SCON2/SCON						◎
		Pulse train control cable	CB-SC-PIOS	◎	◎	×	◎
		Safety function I/O cable	CB-SC-STO030	◎	◎	×	◎
	SCON2	Multi-function connector cable	CB-SC2-MFC***	◎	◎	×	◎
	RCP6S	Connection cable (between axis and GW)	CB-RCP6S-PWBIO□□□(-RB)	◎	◎	×	◎
		Connection cable (between GW and hub)	CB-RCP6S-PLY□□□(-RB)	◎	◎	×	◎
	ERC2	PC cable	CB-ERC2-SIO***	◎	◎	×	◎
		Network connection cable	CB-ERC2-CTL***	◎	◎	×	◎
	MSEL (included with MSEL-ABB)	Connection cable	CB-MSEL-AB***	◎	◎	×	◎
	SEL types	TP adapter	IA-LB-TGS	◎	◎	×	◎
		Teaching software for PC (Cable + EMG BOX)	IA-101-X-MW	◎	×	×	◎
			IA-101-XA-MW	◎	×	×	◎
			IA-101-X-USBS	◎	×	×	◎
			IA-101-X-USBMW	◎	×	×	◎
			EMG SW BOX	◎	×	×	◎
		PC cable (sold separately)	CB-ST-E1MW***	◎	◎	×	◎
			CB-ST-A2MW***	◎	◎	×	◎
			CB-SEL-USB***	◎	◎	×	◎
		USB conversion adapter	IA-CV-USB	◎	×	×	◎
		Joint cable	CB-ST-232J001/CB-ST-422J010	◎	◎	×	◎
		SEL-TG connection cable	CB-SEL25-LBS***	◎	◎	×	◎
		Brake box ~ Controller connection cable	CB-XBB-PA030/050-CS	◎	◎	×	◎

Compliant Product Table for Revised RoHS Directive/CE Marking/UL Standard

(as of June 2024 production)

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
Other products	SEL types	Brake box Release switch cable	CB-XBB-SW020	◎	◎	×	◎
		Connection cable (included with EIOU-4)	CB-RS-IAN020	◎	×	×	◎
	DDA	For brake box/machines Connection cable	CB-DDB-BK***	◎	◎	×	◎
	SEL types	Panel unit	PU-1	◎	×	×	◎
		Connector conversion cable	CB-SEL-SJS***	◎	◎	×	◎
	TTA	Teaching software for PC	IA-101-TTA-USB	◎	×	×	◎
Simple absolute battery unit	ACON-CB/CGB	SEP-ABU/ABUS	-	◎	◎	×	◎
24VDC power supply	-	PSA-24(L)	-	◎	◎	◎	◎
EC motor Drive DC power supply	-	PSA-200	-	◎	◎	×	◎
PLC Connection unit	RCP6S	RCB-P6PLC	-	◎	◎	◎	◎
Hub unit	RCP6S	RCM-P6HUB	-	◎	◎	◎	◎
Gateway unit	RCP6S	RCM-P6GW	-	◎	◎	◎	◎
	ERC3	RCM-EGW	-	◎	×	×	◎
RC gateway (Dedicated cable for connecting to communication ports)	XSEL-P/Q	Communication cable	CB-RCB-SIO***	◎	◎	×	◎
	XSEL-R/S	Controller link cable	CB-RCB-CTL***	◎	◎	×	◎
Expansion I/O unit	SSEL/MSEL/TTA	EIOU-1	-	◎	×	×	◎
	XSEL	EIOU-4	-	◎	×	×	◎
Regenerative resistance unit	EC 200V specifications R-unit (RCON-PS2-3) SCON2/SCON MSCON SSEL/XSEL	RESU-1 RESUD-1	-	◎	◎	×	◎
	R-unit (RCON-PS2-3) SCON2/SCON MSCON SSEL	RESU-2 RESUD-2	-	◎	◎	×	◎
	SCON (For RCS3-RA20R)	RESU-35T	-	◎	◎	×	◎
	MSEP/MCON	RER-1	-	◎	×	×	◎
Functional safety unit	SCON2	SU-S	-	◎	◎	◎	◎
Absolute battery	RCS-C/ECON	AB-1	-	*1	×	×	◎
	IX SCARA (For 250 to 800)	AB-3	-		×	×	◎
	RCP2	AB-4	-		×	×	◎
	XSEL-P/Q/R/S/RA/SA	AB-5	-		×	×	◎
	ASEL						◎
	ACON						◎
	SCON						◎
	MSCON						◎
	SSEL						◎
	IX SCARA (For 120 to 180)	AB-6	-		×	×	◎
	PCON-ABU	AB-7	-		×	×	◎
	ACON-ABU						◎
	MCON						◎
	MSEL						◎
Driving battery	TBD-1WL (Wireless Teaching Controller)	AB-8	-	◎	×	×	◎
Absolute battery box	MSEP/MCON	MSEP-ABB	-	◎	◎	×	◎
	MSEL	MSEL-ABB	-	◎	◎	×	◎

(*1) EU Battery Directive (2006/66/E) is applied, so RoHS Directive is not applicable.

◎: Standard / ○: Optional / ×: No plan

Product structure	Series name	Type	Model	Revised RoHS Directive	CE Marking	UL Standard	TSCA
Dummy plug	XSEL	DP-2	-	◎	◎	×	◎
	PSEL/ASEL SSEL MSEL	DP-4S	-	◎	◎	×	◎
	MCON ACON-CGB DCON-CGB SCON2-CG SCON-CGB/CGBL/CAL	DP-5	-	◎	◎	×	◎
	RCON-SC SCON2	DP-6		◎	◎	×	◎
Brake release box	—	BKR-01	-	◎	×	×	◎
Brake box	RCS2-RA13R	RCB-110-RA13-0	-	◎	×	×	◎
	DDA	IA-110-DD-4	-	◎	◎	×	◎
Driver circuit board	MSEP (for stepper motors)	MSEP-PPD1/PD1/PD2	-	◎	×	×	◎
	MSEP (for AC servo motors)	MSEP-AD1/AD2	-	◎	×	×	◎
	MSEP (for DC brush-less motors)	MSEP-DD1/DD2	-	◎	×	×	◎
	MCON (for stepper motors)	MCON-PPD1/PD1/PD2	-	◎	×	×	◎
	MCON (for AC servo motors)	MCON-AD1/AD2	-	◎	×	×	◎
	MCON (For DC brush-less motors)	MCON-DD1/DD2	-	◎	×	×	◎
Fan unit	RCON	RCON-FU	-	◎	×	×	◎
		RCON-FUH	-	◎	×	×	◎
	PCON	PCON-FU	-	◎	×	×	◎
	MSEP	MSEP-FU	-	◎	×	×	◎
	MSCON	MSCON-FU	-	◎	×	×	◎
	SCON2	SCON2-FU	-	◎	×	×	◎
	SCON	SCON-FU	-	◎	×	×	◎
	PSA-24L	PSA-FU	-	◎	×	×	◎
PIO converter	ERC3	RCB-CV	-	◎	×	×	◎
PIO terminal block	-	RCB-TU-PIO-A/B	-	◎	×	×	◎
SIO converter	-	RCB-TU-SIO-A/B	-	◎	×	×	◎
RS232 conversion unit	RCS	-	RCB-CV-MW	◎	×	×	◎
	XSEL	RCB-CV-GW	-	◎	×	×	◎
Pulse converter	ACON/SCON	AK-04	-	◎	×	×	◎
	SCON-CB	JM-08	-	◎	×	×	◎
SIO isolator	-	-	RCB-ISL-SIO	×	×	×	×

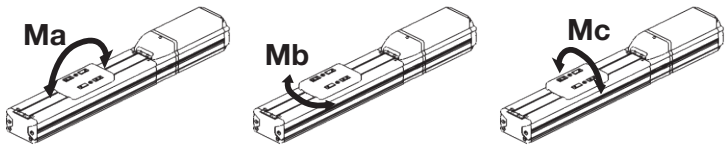
Double Slider Specifications

Double slider (addition of a second slider carriage) can be chosen as an option for the following models. The allowable dynamic moment and the overhang load length vary depending on the span between the sliders. A representative example follows after the specifications tables, so please use it for reference.

Allowable dynamic moment direction diagram

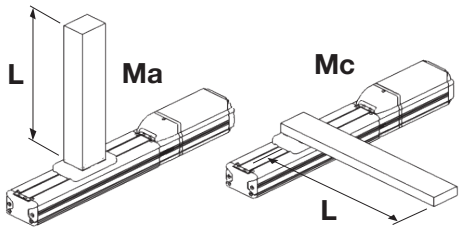
The value of the allowable dynamic moment assumes a standard rated life.
Please note that when using beyond the moment specification value, the life of the guide will decrease.

Moment direction



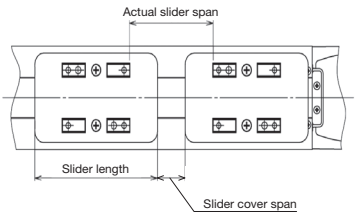
Overhang load length diagram

When using beyond the overhanging allowance value, vibration may occur, so please be sure to use within the allowable value.

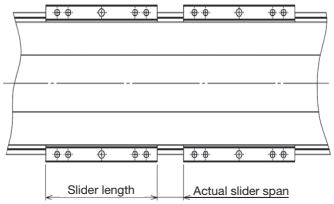


Double slider specification diagram

● With slider cover

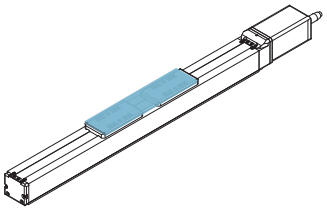


● Without slider cover



Slider coupling part (image)

At shipping, the driven slider and free slider are not coupled. Please connect the sliders at the customer end.



■ How to Order

(1) Be sure to specify the effective stroke upon ordering.

Example: RCP6-SA4C-WA-35P-10-450-P3-M-W (effective stroke: 350mm)

(2) When the double slider option is specified, calculate the effective stroke (actually operable stroke) by subtracting Ⓐ (slider length + slider actual span or slider cover span) from the nominal stroke (stroke shown as the model number).
Make sure to select a stroke that is greater than the necessary stroke plus Ⓐ .
The "necessary stroke" should be greater than the minimum effective stroke for the double slider.

Nominal stroke ≧ Effective stroke + Ⓐ
(Stroke shown as the model number) (Actually operable stroke)

Example: RCP6-SA4C
Necessary stroke: 350mm Ⓐ : 100mm
350mm + 100mm = 450mm → Place an order for the model of 450mm.

Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
50 ~ 400 (Nominal stroke: 150 ~ 500)	100
50 ~ 650 (Nominal stroke: 200 ~ 800)	150

[EC Double slider specification table] For details of specification values and external view, please refer to each product page.

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Allowable dynamic moment						Overhang load length (mm)	Slider mass (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider actual span / Cover span (mm)
		Standard rated life (km)	Slider span (mm) Actual slider span	Slider span (mm) Slider cover span	Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Ma/Mb/Mc direction				
EC	(D)S6	5000	90	40	106	152	37.9	440	0.27	110	50 ~ 250 (Nominal stroke: 200 ~ 400)	150
	(D)S6□A										100 ~ 650 (Nominal stroke: 250 ~ 800)	
	(D)S7	5000	73	24	119	171	56.7	560	0.45	126	50 ~ 350 (Nominal stroke: 200 ~ 500)	150
	(D)S7□A										200 ~ 650 (Nominal stroke: 350 ~ 800)	
	S8	5000	120	35	449	449	188	800	0.79	165	50 ~ 400 (Nominal stroke: 250 ~ 600)	200
	S8□A										150 ~ 900 (Nominal stroke: 350 ~ 1100)	
	(D)S6□AH	5000	90	40	167	199	89.8	600	0.43	110	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
	(D)S7□AH	5000	73	24	316	376	218	600	0.73	126	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
	S10	10000	40	—	268	268	191	780	1.5	110	100 ~ 950 (Nominal stroke: 250 ~ 1100)	150
	S10X		45	—	279	279	191	795			545 ~ 1845 (Nominal stroke: 700 ~ 2000)	155
	S13	10000	80	—	592	592	406	960	1.7	120	100 ~ 900 (Nominal stroke: 300 ~ 1100)	200
	S13X		35	—	439	439	406	825			645 ~ 1845 (Nominal stroke: 800 ~ 2000)	155
	S15	10000	50	—	691	691	624	1050	2.8	150	100 ~ 1100 (Nominal stroke: 300 ~ 1300)	200
	S15X		55	—	711	711	624	1065			795 ~ 2295 (Nominal stroke: 1000 ~ 2500)	205
	S18	10000	70	—	962	962	845	1290	4.0	180	150 ~ 1350 (Nominal stroke: 400 ~ 1600)	250
	S18X		60	—	919	919	845	1260			510 ~ 2560 (Nominal stroke: 750 ~ 2800)	240

*The motor side-mounted specification is the same.

[Double slider selection availability list]

Type name	Lead (mm)	Double slider selection availability	
		Horizontal mounting	Vertical mounting
(D)S6(□A)	S	×	×
	H	○	×
	M	○	○
	L	○	○
(D)S7(□A)	S	×	×
	H	○	×
	M	○	○
	L	○	○
S8(□A)	S	×	×
	H	○	×
	M	○	○
	L	○	○
(D)S6□AH	S	×	×
	H	○	×
	M	○	○
	L	○	○
(D)S7□AH	S	×	×
	H	○	×
	M	○	○
	L	○	○

*The motor side-mounted specification is the same.

Type name	Lead (mm)	Double slider selection availability	
		Horizontal mounting	Vertical mounting
S10(X)	S	○	×
	H	○	×
	M	○	○
	L	○	○
S13(X)	S	○	×
	H	○	○
	M	○	○
	L	○	○
S15(X)	H	○	○
	M	○	○
	L	○	○
S18(X)	H	○	○
	M	○	○
	L	○	○

Legend:
○ : Compatible
× : Incompatible

Double slider specifications

[RCP6(S) Double slider specification table]

For details of specification values and external view, please refer to each product page.

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Lead (mm)	Allowable dynamic moment: Standard rated life (km)	Slider span (mm): Actual slider span	Slider span (mm): Slider cover span	Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Overhang load length (mm): Ma/Mb/Mc direction	*1 Conveying mass compensation value A (kg)	*1 Conveying mass compensation value B (kg)	*1 Conveying mass compensation speed (mm/s)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
RCP6 (S)	SA4C(R)	10	5000	60	24	44.6	63.6	15.7	420	0.6	2	350	76	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
		5										215			
		2.5										105			
	SA6C(R)	12	5000	90	40	106	152	40	630	1.2	2	320	110	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
		6										280			
		3										140			
	SA7C(R)	16	5000	70	20	285	285	145	810	1.7	5	280	130	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
		8										140			
		4										70			
	SA8C(R)	20	5000	120	35	565	565	237	1200	7 (*2)	-	-	165	50 ~ 900 (Nominal stroke: 250 ~ 1100)	200
		10										-			
		5										-			
	HSA6C(R)	12	5000	90	40	167	199	89.8	600	-	-	-	110	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
		6										-			
		3										-			
	HSA7C(R)	16	5000	73	24	316	376	218	600	-	-	-	126	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
		8										-			
		4										-			

[RCP6 (S) CR Double slider specification table]

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Lead (mm)	Allowable dynamic moment: Standard rated life (km)	Slider span (mm): Actual slider span	Slider span (mm): Slider cover span	Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Overhang load length (mm): Ma/Mb/Mc direction	Cleanroom specification suction volume (Nℓ/min)	*1 Conveying mass compensation value A (kg)	*1 Conveying mass compensation value B (kg)	*1 Conveying mass compensation speed (mm/s)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
RCP6 (S)CR	SA4C	10	5000	60	24	44.6	63.6	15.7	420	60	0.6	2	350	76	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
		5								30			215			
		2.5								20			105			
	SA6C	12	5000	90	40	106	152	40	630	110	1.2	2	320	110	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
		6								60			280			
		3								35			140			
	SA7C	16	5000	70	20	285	285	145	810	100	1.7	5	280	130	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
		8								50			140			
		4								40			70			
	SA8C	20	5000	120	35	565	565	237	1200	170	7 (*2)	-	-	165	50 ~ 900 (Nominal stroke: 250 ~ 1100)	200
		10								90			-			
		5								40			-			

(Note) The suction amount does not include the effect of piping resistance.
Pipe resistance is caused by pipe length and pipe diameter, which causes loss of flow.

[Double slider selection availability list]

Series name	Type name	Lead (mm)	Double slider specification availability: Horizontal mounting	Double slider specification availability: Vertical mounting
RCP6 (S)	SA4C(R)	16	×	×
		10	○	×
	SA6C(R)	20	×	×
		12	○	×
	SA7C(R)	24	×	×
		16	○	×
	SA8C(R)	30	×	×
		20	○	×
	HSA6C	20	×	×
		12	○	×
	HSA7C	24	×	×
		16	○	×
RCP6(S)CR	SA4C	16	×	×
		10	○	×
	SA6C	20	×	×
		12	○	×
	SA7C	24	×	×
		16	○	×
	SA8C	30	×	×
		20	○	×

Legend:
○ : Compatible
×: Incompatible

*1 In the double slider specification (except RCP6(CR)-SA8), to obtain the allowable payload of the actuator when traveling at speeds up to the payload compensation speed, subtract the value in payload compensation weight A from the standard payload rating of the actuator.
When traveling at speeds that exceed the payload compensation speed, subtract the value in payload compensation weight B from the standard payload rating of the actuator in order to obtain the allowable payload of the actuator.
As to the maximum speed, refer to the nominal stroke specification value (stroke for the single slider).

*2 In the double slider specification of RCP6(CR)-SA8, to obtain the allowable payload of the actuator when traveling at any speed, subtract the value in payloads compensation weight A from the standard payload rating of the actuator.
As to the maximum speed, refer to the nominal stroke specification value (stroke for the single slider).

(Note) When selecting double slider specification and reverse homing specification at the same time, make sure to perform a home return operation after connecting the drive slider and the free slider.

[RCS4 Double slider specification table] For details of specification values and external view, please refer to the product page.

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Lead (mm)	Allowable dynamic moment: Standard rated life (km)	Slider span (mm): Actual slider span	Slider span (mm): Slider cover span	Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Overhang load length (mm): Ma/Mb/Mc direction	* Conveying mass compensation value (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
RCS4	SA4C(R)	16 10 5 2.5	5000	60	24	44.6	63.6	15.7	420	1	76	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
	SA6C(R)	20 12 6 3	5000	90	40	106	152	40	630	2	110	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
	SA7C(R)	24 16 8 4	5000	70	20	285	285	145	810	2	130	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
	SA8C(R)	30 20 10 5	5000	120	35	565	565	237	1200	2.5	165	50 ~ 900 (Nominal stroke: 250 ~ 1100)	200
	HSA6C	16 8 4	5000	90	40	167	199	89.8	600	6 6 6	110	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
	HSA7C	20 10 5	5000	73	24	316	376	218	600	6 6 6	126	50 ~ 850 (Nominal stroke: 200 ~ 1000)	150

[RCS4CR double slider specification table]

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Lead (mm)	Allowable dynamic moment: Standard rated life (km)	Slider span (mm): Actual slider span	Slider span (mm): Slider cover span	Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Overhang load length (mm): Ma/Mb/Mc direction	Cleanroom specification suction volume (Nℓ/min)	* Conveying mass compensation value (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
RCS4CR	SA4C	10 5 2.5	5000	60	24	44.6	63.6	15.7	420	60 30 20	1	76	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
	SA6C	12 6 3	5000	90	40	106	152	40	630	110 60 35	2	110	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
	SA7C	16 8 4	5000	70	20	285	285	145	810	100 50 40	2	130	50 ~ 650 (Nominal stroke: 200 ~ 800)	150
	SA8C	10 5	5000	120	35	565	565	237	1200	120 50	2.5	165	50 ~ 900 (Nominal stroke: 250 ~ 1100)	200

*In the double slider specification, the payload specification is the value obtained by subtracting the payload compensation value from the standard specification payload.
*The suction amount does not include the effect of piping resistance.
Pipe resistance is caused by pipe length and pipe diameter, which causes loss of flow.
(Note) The lead not listed in the table does not have a double slider setting.

[Double slider selection availability list]

Series name	Type name	Lead (mm)	Double slider specification availability: Horizontal mounting	Double slider specification availability: Vertical mounting
RCS4	SA6C(R)	30	×	×
	SA7C(R)	36	×	×
	SA8C(R)	48	×	×
	HSA6C	24	×	×
		16	○	×
	HSA7C	30	×	×
		20	○	×
RCS4CR	SA4C	16	×	×
	SA6C	20	×	×
	SA7C	24	×	×
	SA8C	20	×	×

Legend:
○ : Compatible
×: Incompatible

Double slider specifications

[IS(P)B/IS(P)DB Double slider specification table] For details of specification values and external view, please refer to the product page.

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Allowable dynamic moment: Standard rated life (km)	Slider span (mm): Actual slider span	Slider span (mm): Slider cover span	Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Overhang load length (mm): Ma/Mb/Mc direction	Slider mass (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider actual span / Cover span (mm)
IS(P)B	SXM	10000	Min. 30	-	140	200	125	1050	1.5	90	100 ~ 980 (Nominal stroke: 250 ~ 1100)*	120
			Max. 90	-	228	325	125	1350			100 ~ 920 (Nominal stroke: 250 ~ 1100)*	180
	SXL		Min. 30	-	188	269	145	1250		110	130 ~ 940 (Nominal stroke: 280 ~ 1080)*	140
			Max. 90	-	286	409	145	1550			130 ~ 880 (Nominal stroke: 280 ~ 1080)*	200
	MXM	10000	Min. 35	-	332	475	307	1375	2.5	120	100 ~ 1145 (Nominal stroke: 300 ~ 1300)*	155
			Max. 120	-	561	801	307	1800			100 ~ 1060 (Nominal stroke: 300 ~ 1300)*	240
	MXL		Min. 35	-	481	687	368	1675		150	120 ~ 1085 (Nominal stroke: 320 ~ 1270)*	185
			Max. 120	-	743	1060	368	2100			120 ~ 1000 (Nominal stroke: 320 ~ 1270)*	270
	LXM	10000	Min. 35	-	481	687	473	1675	3.5	150	100 ~ 1115 (Nominal stroke: 300 ~ 1300)	185
			Max. 150	-	845	1210	473	2250			100 ~ 1000 (Nominal stroke: 300 ~ 1300)	300
	LXL		Min. 35	-	616	880	532	1975		180	105 ~ 1055 (Nominal stroke: 320 ~ 1270)	215
			Max. 150	-	1010	1450	532	2550			105 ~ 940 (Nominal stroke: 320 ~ 1270)	330
	WXM	10000	Min. 35	-	616	880	739	1975	3.0	180	100 ~ 1085 (Nominal stroke: 350 ~ 1300)	215
			Max. 180	-	1130	1610	739	2700			140 ~ 940 (Nominal stroke: 500 ~ 1300)	360
	WXMX	10000	Min. 35	-	616	880	739	1975	3.0	180	540 ~ 2785 (Nominal stroke: 900 ~ 3000)	215
			Max. 180	-	1130	1610	739	2700			540 ~ 2640 (Nominal stroke: 900 ~ 3000)	360
IS(P)DB	S	10000	110	46	259	370	125	1050	1.5	154	100 ~ 600 (Nominal stroke: 300 ~ 800)	200
	M		Min. 80	6	448	640	307	1375	2.5	194	100 ~ 900 (Nominal stroke: 300 ~ 1100)	200
			Max. 120	46	561	801	307	1800			100 ~ 860 (Nominal stroke: 300 ~ 1100)	240
	L		Min. 100	26	678	968	473	1675	3.5	224	100 ~ 1050 (Nominal stroke: 350 ~ 1300)	250
			Max. 150	76	845	1210	473	2250			100 ~ 1000 (Nominal stroke: 350 ~ 1300)	300

*The maximum stroke varies depending on the motor wattage.

[IS(P)DBCR/IS(P)DACR Double slider specification table]

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Allowable dynamic moment: Standard rated life (km)	Slider span (mm): Actual slider span	Slider span (mm): Slider cover span	Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Overhang load length (mm): Ma/Mb/Mc direction	Cleanroom maximum speed (mm/sec)	Cleanroom specification suction volume (Nℓ/min)	Slider mass (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
IS(P) DBCR (-ESD)	S	10000	110	46	259	370	125	1050	960	110	1.5	154	100 ~ 600 (Nominal stroke: 300 ~ 800)	200
	M		Min. 80	6	448	640	307	1375	1000	180	2.5	194	100 ~ 900 (Nominal stroke: 300 ~ 1100)	200 ~ 240
			Max. 120	46	561	801	307	1800						
	L		Min. 100	26	678	968	473	1675	1000	200	3.5	224	100 ~ 1050 (Nominal stroke: 350 ~ 1300)	250 ~ 300
			Max. 150	76	845	1210	473	2250						
IS(P)DACR	W	10000	Min. 90	30	683	976	678	2050	1000	100	4.0	220	100 ~ 1050 (Nominal stroke: 300 ~ 1300)	250 ~ 320
			Max. 160	100	922	1320	678	2250						

*The suction amount does not include the effect of piping resistance.
Pipe resistance is caused by pipe length and pipe diameter, which causes loss of flow.
*The maximum payload of the double slider is the catalog specification value minus the slider mass to be added.

[IFA Double slider specification table] For details of specification values and external view, please refer to the product page.

Model	Allowable dynamic moment						Overhang load length (mm)	Slider mass (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
	Standard rated life (km)	Slider span (mm)		Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Ma/ Mb/Mc direction				
		Actual slider span	Slider cover span								
IFA-SA	10000	Min. 60	2	182	260	125	1200	0.7	148	200 ~ 2450 (Nominal stroke: 350 ~ 2600)	150
		Max. 90	32	228	325	125	1350			220 ~ 2420 (Nominal stroke: 400 ~ 2600)	180
IFA-MA	10000	Min. 80	10	448	640	307	1600	1.5	190	200 ~ 3000 (Nominal stroke: 400 ~ 3200)	200
		Max. 120	50	561	801	307	1800			210 ~ 2960 (Nominal stroke: 450 ~ 3200)	240

[Other models Double slider specification table (standard specifications)]

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Allowable dynamic moment						Overhang load length (mm)	Slider mass (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider actual span / Cover span (mm)
		Standard rated life (km)	Slider span (mm)		Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Ma/ Mb/Mc direction				
			Actual slider span	Slider cover span								
RCP4	SA5C(R)	5000	60	6	52.6	75.2	24.1	450	0.6	94	50 ~ 700 (Nominal stroke: 150 ~ 800)	100
RCA	SA5C(R)	5000	60	6	52.6	75.2	24.1	450	0.6	94	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
	SA6C(R)		90	35	106	152	40.0	660	1	115	50 ~ 450 (Nominal stroke: 200 ~ 600)	150
RCS3(P)	SA8C(R)	10000	72		174	249	103	1140	1.5	78	50 ~ 950 (Nominal stroke: 200 ~ 1100)	150
	SS8C(R)		110	30	342	342	148	1350	2.5	170	50 ~ 800 (Nominal stroke: 250 ~ 1000)	200
RCS2	SA5C(R)	5000	60	6	52.6	75.2	24.1	450	0.6	94	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
	SA6C(R)		90	35	106	152	40.0	660	1	115	50 ~ 450 (Nominal stroke: 200 ~ 600)	150
	SA7C(R)		90	24	187	268	92.1	690	1	126	50 ~ 650 (Nominal stroke: 200 ~ 800)	150

*The maximum payload of the double slider is the catalog specification value minus the slider mass to be added.

[Other models Double slider specification table (cleanroom specifications)]

Effective stroke: actually operable stroke
Nominal stroke: stroke shown as the model number

Series name	Type name	Allowable dynamic moment						Overhang load length (mm)	Cleanroom maximum speed (mm/sec)	Cleanroom specification suction volume (Nℓ/min)	Slider mass (kg)	Slider length (mm)	Selectable effective stroke for double slider (mm)	Ⓐ Slider length + Slider cover span (mm)
		Standard rated life (km)	Slider span (mm)		Ma direction (N·m)	Mb direction (N·m)	Mc direction (N·m)	Ma/Mb/Mc direction						
			Actual slider span	Slider cover span										
RCP4CR	SA5C	5000	60	10	52.6	75.2	24.1	450	1000	80	0.6	90	50 ~ 700 (Nominal stroke: 150 ~ 800)	100
RCACR	SA5C	5000	60	10	52.6	75.2	24.1	450	1000	85	0.6	90	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
	SA6C		90	35	106	152	40.0	660	1000	90	1	115	50 ~ 450 (Nominal stroke: 200 ~ 600)	150
RCS3(P) CR	SA8C	10000	84	18	174	249	103	1140	1000	200	1.5	132	50 ~ 950 (Nominal stroke: 200 ~ 1100)	150
	SS8C		110	30	342	342	148	1350	1000	165	2.5	170	50 ~ 800 (Nominal stroke: 250 ~ 1000)	200
RCS2CR	SA5C	5000	60	10	52.6	75.2	24.1	450	1000	85	0.6	90	50 ~ 400 (Nominal stroke: 150 ~ 500)	100
	SA6C		90	35	106	152	40.0	660	1000	90	1	115	50 ~ 450 (Nominal stroke: 200 ~ 600)	150
	SA7C		90	22	187	268	92.1	690	800	110	1	128	50 ~ 650 (Nominal stroke: 200 ~ 800)	150

*The suction amount does not include the effect of piping resistance.
Pipe resistance is caused by pipe length and pipe diameter, which causes loss of flow.
*The maximum payload of the double slider is the catalog specification value minus the slider mass to be added.

Caution when Using a Guide with a Rod Type

Rod type actuators are classified into two main categories of “Radial cylinder type” and “Anti-rotation” type. Depending on the type, methods for dealing with radial loads and cautionary notes will be different, as indicated below.

Radial Cylinder Type

• A ball-rotating linear guide mechanism is built inside the actuator.
It can manage radial load without an external guide.
<Applicable Models>
• EC-(D)RR□(W)
• RCP4(W)-RA□
• RCP6(W)-RRA□
• RCS4-RRA□
• RCP5(W)-RA□
• RCS3-RA15R/RA20R

Radial load

Radial load < Allowable radial load
External guide unnecessary

Radial load > Allowable radial load
Use an external guide

Anti-rotation Rod Type

• An anti-rotation mechanism is built inside the actuator.
An external guide needs to be used if radial load is to be applied.
<Applicable models>
• EC-(D)R□(W)
• RCS4-RA□
• RCP6(W)-RA□
• RCS2-RA□
• RCP3-RA□
• RCP2-RA10□
• RCA-RA□

Radial load

Use an external guide

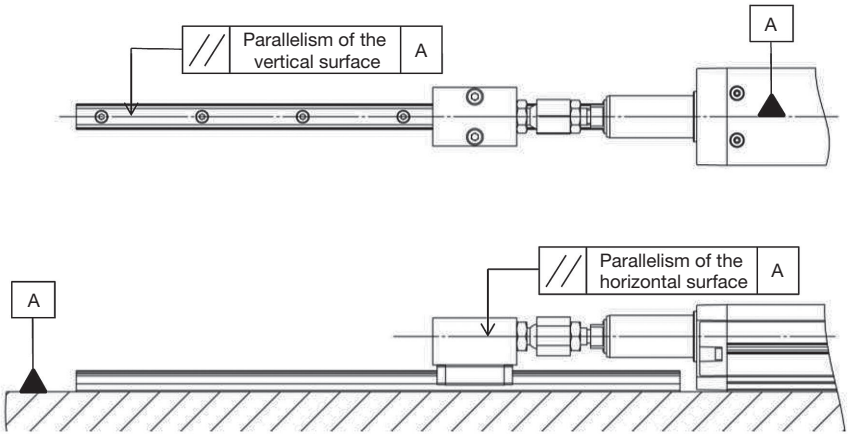
[Caution when using an external guide with a rod type]

• Parallelism of the actuator and the external guide

When using an external guide, if there is a deviation in the level of parallelism between the actuator and the external guide (either the horizontal or vertical surfaces), operation defects or early actuator damage may occur.

When the external guide is attached, adjustments have to be made to align the actuators and the guides. Then the uniformity of the sliding resistance throughout the entire stroke has to be checked.

This is done by checking the uniformity of the current value through the current monitoring function of the controller.



• External guide mounting method

The method for mounting the external guide differs by type.

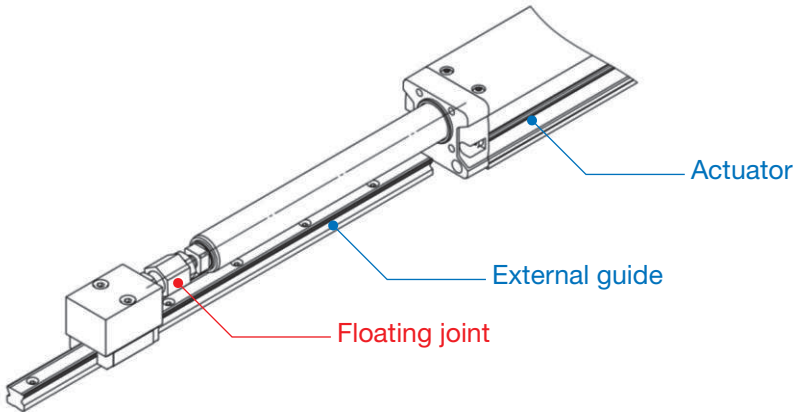
Even if the parallelism between the guide and the actuator could be adjusted, please be careful as there is a danger of accidental damage of the actuator with the incorrect mounting method.

Radial cylinder type

For mounting the external guide for a radial cylinder type, a floating joint mount is recommended.

The floating joint compensates for the deviation in the parallelism of the built-in guide and the external guide, and this makes adjustments easy.

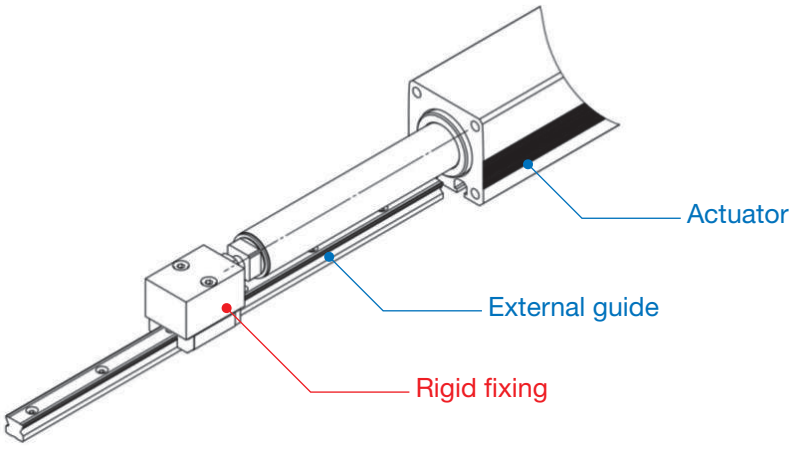
With rigid mounting, adjusting the parallelism of the built-in guide and the external guide is difficult, and even a slight deviation causes stress on the guide and can lead to early damaging.



Anti-rotation rod type

For mounting the external guide for an anti-rotation rod type, rigid mounting is recommended. Since the anti-rotation rod type cannot handle force in the rod rotation direction, it is necessary to regulate the rod rotation direction.

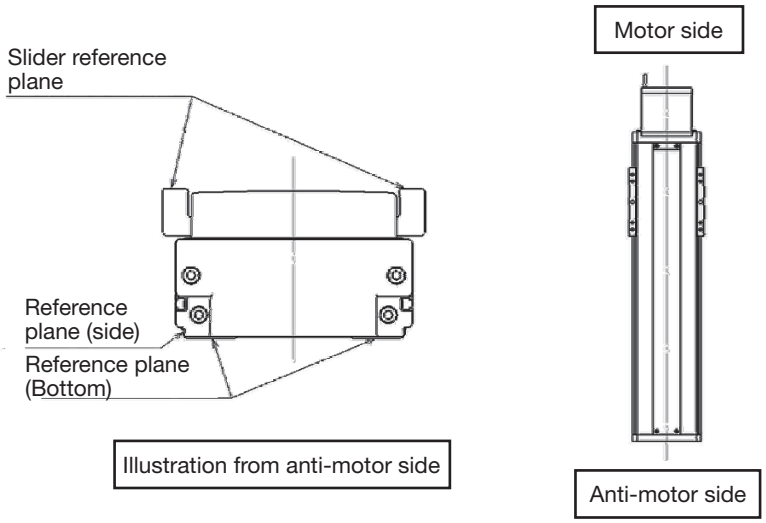
The rod rotation direction is not regulated with the floating joint, so force in the rod rotation direction could be applied to the anti-rotation mechanism during actuator operation, and this could cause early wearing of the anti-rotation mechanism.



Caution when Using a Guide with a Slider Type

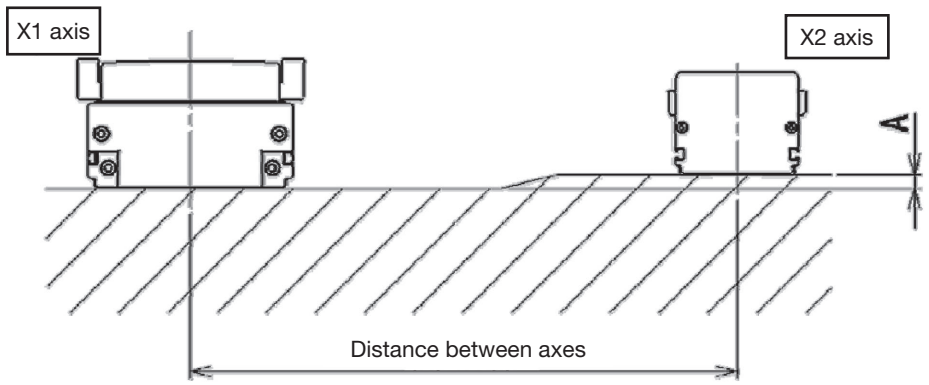
Installation reference surface of X-axis

When installing an actuator, please mount by using the reference surface below.



Height of the attaching surface of the X1 and X2 axes

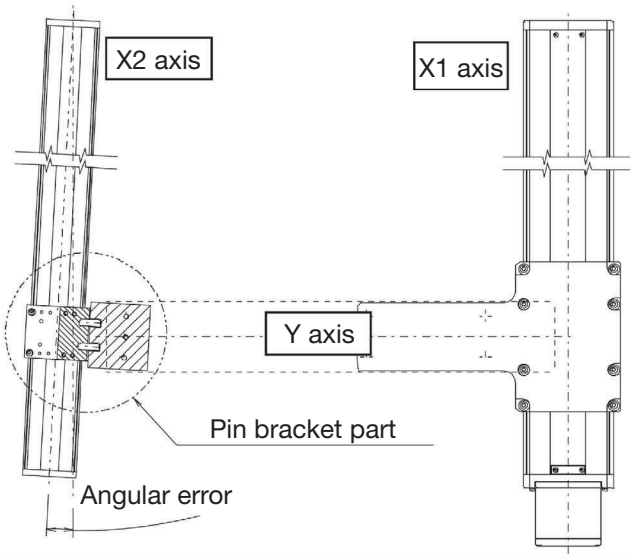
Please keep the height difference of the mounting surfaces for the X1 and X2 axes below 0.05mm per 500mm distance between the axes (measurement A on the diagram below).



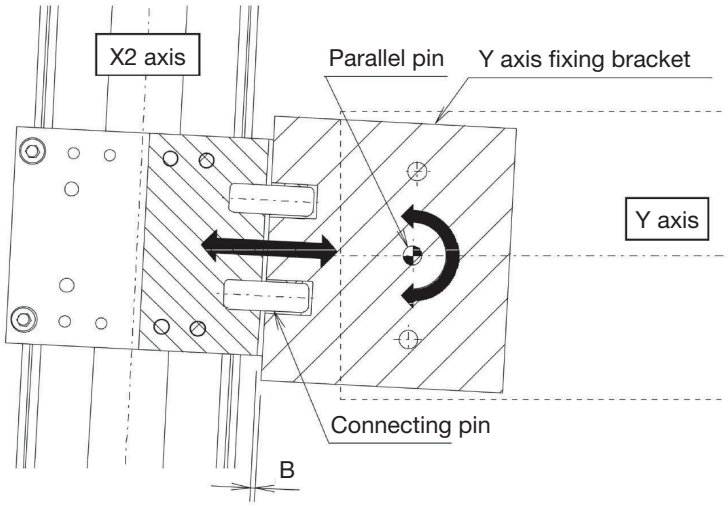
Parallelism when X1 and X2 axes are installed

The connection between the X2 axis and the Y axis is a pin bracket structure (*1). The base-installing parallelism of the X1 and X2 axes should be within 2+/-1mm over the entire stroke (measurement B on the diagram below).

<Gantry assembly top view>



<Pin bracket section details>



*1 Pin bracket structure

This structure absorbs any parallelism errors between the X1 axis and X2 axis.

- X1 axis and Y axis are rigidly fixed.
- The Y axis mounting bracket is positioned with the center of the Y-axis using 1 parallel pin, and this allows adjustment in the rotation direction, which makes it possible to absorb the angle deviation between the X1 and X2 axes.
- The Y-axis and the X2-axis are linked with 2 connecting pins, and this allows sliding in the direction of the axes, which absorbs the variations in the distance between the X1-axis slider and the X2-axis slider.

Actuator Mounting Methods

The mounting methods varies depending on the model of the actuator. The following table shows the mounting methods for each model.
* For mounting using options, refer to each product page.

○: Compatible △: See notes —: Incompatible

Classification	Series	Type	Threaded mounting holes on the bottom of the base	Counterbored through holes on the base	T-slot mounting	Mounting holes on the front of the main body	Mounting holes on the main body's side	Mounting holes on the back of the main unit
Slider Type	EC	SL3	○	○	—	—	—	—
		S2	○	—	—	—	—	—
		(D)S3/(D)S4/(D)S6/(D)S7	—	—	○	—	—	—
		S8	○	○	—	—	—	—
		(D)WS10/(D)WS12	—	○	—	—	—	—
		(D)S6□AH/(D)S7□AH	○	○	—	—	—	—
		(D)B6/(D)B7/B8	—	○	—	—	—	—
		S10(X)/S13(X)/S15(X)/S18(X)	—	○	—	—	—	—
	RCP6(S)	SA4/SA6/SA7	○	○	—	—	—	○ (side-mounted)
		SA8	○	—	—	—	—	○ (side-mounted)
		WSA	—	○	—	—	—	○ (side-mounted)
		HSA6(X)/HSA7(X)	○	○	—	—	—	—
	RCP5	BA	—	○	—	—	—	—
	RCP4	SA	○	○	—	—	—	○ (side-mounted-OP*)
	RCP3	SA	○	—	—	—	—	—
	RCA	SA4/SA5	○	△ (*1)	—	—	—	—
		SA6	○	—	—	—	—	—
	RCS4	SA4/SA6/SA7	○	○	—	—	—	○ (side-mounted)
		SA8	○	—	—	—	—	○ (side-mounted)
		WSA	—	○	—	—	—	○ (side-mounted)
		HSA6C/HSA7C	○	—	—	—	—	—
	RCS3/RCS3P	SA8/SS8	○	—	—	—	—	—
		CT8	○	—	—	—	—	—
	RCS2	SA4/SA5	○	△ (*1)	—	—	—	—
		SA6	○	—	—	—	—	—
		SA7	○	○	—	—	—	—
	ISB/ISPB	SXM/SXL/MXM/MXL/LXM/LXL	○	○	—	—	—	—
		MXMX/LXMX/LXUWX	—	○	—	—	—	—
		WXM	—	○	—	—	—	—
		WXMX	—	○	—	—	—	—
	SSPA	S/M/L	○	○	—	—	—	—
	ISDB/ISPDB	S/M/L	○	—	—	—	—	—
		MX/LX	○	—	—	—	—	—
	NSA	All models	—	○	—	—	—	—
	IFA	SA/MA	—	○	—	—	—	—
Rod Type	EC	GRB3	○	○	—	—	○	—
		RR2	○	—	—	○	—	—
		(D)R6/(D)R7	—	—	—	○	—	—
		(D)RR3/(D)RR4/(D)RR6/(D)RR7	—	—	○	○	—	—
		RR8	○	—	—	○	—	○ (side-mounted)
		RR10	○	—	—	○	—	—
		(D)RR6(X)□AH/(D)RR7(X)□AH	○	○	—	○	—	—
		CRP3/CRP5	—	—	—	○	△ (3 faces- Using option)	—
		CGD3/CGD5	○	○	—	○	—	—
		RP3	○	—	—	○	○	—
		RP4	—	—	—	1-314	—	—
		RP5	○	—	—	○	○	—
		GD3/GS4/GD4/GD5	○	—	—	—	○ (GS)	—
		SRG11	○	○	—	—	—	—
		SRG15	○	○	○	—	○	—
	RCP6(S)	RA	—	—	○	○	—	○ (side-mounted)
		RRA	○	○	—	○	—	○ (side-mounted)
		WRA	—	○	○ (Side)	○	—	○ (side-mounted)
	RCP5	RA10	○	—	—	○	—	○ (side-mounted)
	RCP4	RA	○	○	—	○	—	○ (side-mounted-OP*)
	RCP3	RA2	○	—	—	○	—	—
	RCP2	SR	○	—	—	○	○	○
	RCD	RA	—	—	—	1-313	—	—
	RCA2	RN/RP	—	—	—	1-314	—	○ (without B)
		GS/GD	—	—	—	—	○ (4 faces)	○ (without B)
		SD	—	—	—	—	○ (3 faces)	—
	RCA	RA	—	—	—	○	—	○ (side-mounted)
	RCS4	RA	—	—	○	○	—	○ (side-mounted)
		RRA	○	○	—	○	—	○ (side-mounted)
		WRA	—	○	○ (Side)	○	—	○ (side-mounted)
	RCS3	RA15/RA20 (without load cell)	—	—	—	○	—	—
	RCS2	RA5	—	—	○	○	—	—
		RN/RP	—	—	—	1-314	—	○ (without B)
		GS/GD	—	—	—	—	○ (4 faces)	○ (without B)
		SD	—	—	—	—	○ (3 faces)	—
		RGS/RGD	—	—	○	○	—	—
		SRA/SRGD/SRGS	○	—	—	○	—	○
Table type	EC	T3	○	○	—	—	—	—
		TC3/TW3/TC4/TW4/TC5/TW5	○	—	—	—	○(TC)	—
		CTC3/CTC5	○	—	—	—	○	—
	RCP6(S)	TA	○	○	—	—	—	○ (side-mounted)
	RCP3	TA	○	—	—	—	—	—
	RCA2	TCA/TWA/TFA	○	—	—	—	—	○ (without B)
	RCS4	TA	○	○	—	—	—	○ (side-mounted)
	RCS3/RCS3P	CTZ5C	○	○	—	—	—	—
	RCS2	TCA/TWA/TFA	○	—	—	—	—	○ (without B)

*OP: Option (RP).

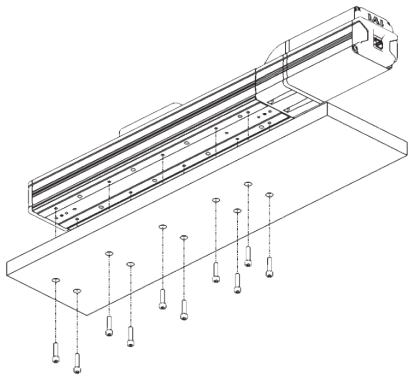
○: Compatible △: See notes —: Incompatible

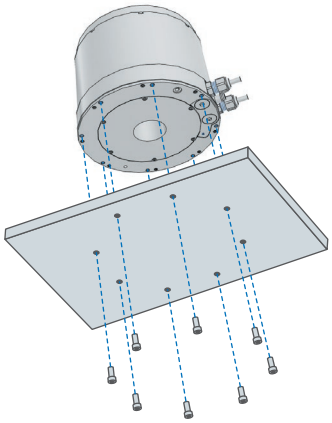
Classification	Series	Type	Threaded mounting holes on the bottom of the base	Counterbored through holes on the base	T-slot mounting	Mounting holes on the front of the main body	Mounting holes on the main body's side	Mounting holes on the back of the main unit
Linear servo	LSA	S6/S8/S10	○	—	—	—	—	—
		N10/N15	○	—	—	—	—	—
		W21	○	○	—	—	—	—
	LSAS	N10/N15	○	—	—	—	—	—
Pulse press	RCP6	RRA4/RRA6/RRA7	○	○	—	○	—	○
Servo press	RCS3	RA4/RA6/RA7	○	○	—	○	—	○
		RA8/RA10	○	—	—	○	—	○
		RA15/RA20	—	—	—	○	—	—
	RCS2	RA13	○	—	—	○	—	—
Gripper	EC	GRB(P)	○	○	—	—	○	—
		GRC6/GRC7/GRST3	○	—	—	—	○	—
		GRST6/GRST7	—	—	○	—	—	—
		GRTR14	○	—	—	—	—	—
	RCP6	GRST	○	—	—	—	—	○ (side-mounted)
		GRT	○	—	—	—	○	—
	RCP4	GR	○	—	—	—	○	—
	RCP2	GR	○	—	—	—	○	—
	RCD	GRSNA	○	○	—	—	—	—
Solenoid gripper	GRS	SEG/MEG	○	—	—	—	○	—
		SIG/MIG	○	—	—	—	○	—
Rotary chuck	RCP6	RTCKSPE/RTCKMPE	○	—	—	○	○	—
		RTCKSPI/RTCKMPI	○	—	—	○	○	—
		RTCKSRE/RTCKMRE	○	—	—	—	○	—
		RTCKSRI/RTCKMRI	○	—	—	—	○	—
Rotary	EC	RTB/RTC	○	○	—	—	—	—
	RCP6	RTFML	○	—	—	—	—	—
	RCP2	RT	○	—	—	○	○ (2 faces)	—
	RCS2	RTC	○	—	—	—	○	—
Direct drive motor	DDA	LT/LH	○	—	—	—	—	—
Rotary	RS		—	—	—	—	—	1-306
Stopper cylinder	EC	GDS3	○	○	—	—	○	—
		ST11	○	○	—	—	—	—
		ST15	○	○	○	—	—	○
		ST15ME	○	—	—	—	—	—
	RCP4	ST	△ (Using option)	○	—	—	—	—
Vertical/Rotary	ZR	S/M	—	—	—	—	—	1-306
Cleanroom	EC	(D)S3□CR/(D)S4□CR/(D)S6□CR/(D)S7□CR	—	—	○	—	—	—
		S8□(X)(A)CR	○	○	—	—	—	—
		(D)S6□AHCR/(D)S7□AHCR	○	○	—	—	—	—
		(D)WS10/(D)WS12	—	○	—	—	—	—
	RCP6CR(S)	SA	○	○	—	—	—	—
		WSA	—	○	—	—	—	—
	RCP4CR	SA	○	○	—	—	—	—
	RCP2CR	GR	○	—	—	—	○	—
		RT	○	—	—	—	○	—
	RCA2CR	RN/RP	—	—	—	1-314	—	—
		GS/GD	—	—	—	—	○ (4 faces)	—
		SD	—	—	—	—	○ (3 faces)	—
	RCACR	SA4/SA5	○	△ (*1)	—	—	—	—
		SA6	○	—	—	—	—	—
	RCS4CR	SA	○	○	—	—	—	—
		WSA	—	○	—	—	—	—
	RCS3CR	SA/SS	○	—	—	—	—	—
	RCS2CR	SA/SS	○	—	—	—	—	—
		RN/RP	—	—	—	1-314	—	—
		GS/GD	—	—	—	—	○ (4 faces)	—
		SD	—	—	—	—	○ (3 faces)	—
	DDACR	LT/LH	○	—	—	—	—	—
	ISDBCR/	S/M/L	○	—	—	—	—	—
	ISPDBCR	MX/LX	○	—	—	—	—	—
	SSPDACR	S/M/L	○	—	—	—	—	—
	ISDACR/	W	○	—	—	—	—	—
	ISPDACR	WX	○	—	—	—	—	—
Dust-proof and splash-proof	EC	S6□D/S6□W/S7□D/S7□W	○	—	—	—	—	—
		R6□W/R7□W	—	—	—	○	—	—
		RR6□W/RR7□W	○	—	—	○	—	—
		GRBP□W	○	○	—	—	○	—
	RCP6W	RA	—	—	○	○	—	○ (side-mounted)
		RRA4/RRA6/RRA7	—	—	○	○	—	○ (side-mounted)
		RRA8	○	—	—	○	—	○ (side-mounted)
		WRA	—	○	○ (Side)	○	—	○ (side-mounted)
	RCP5W	RA10	○	—	—	○	—	—
	RCP4W	SA(1-240)	○ (Using option)	○ (Using option)	—	—	—	—
	RCP2W	GR	○	—	—	—	○	—
		RT	○	—	—	○	○	—
	RCA2W	RN/RP	—	—	—	1-314	—	—
		GS/GD	—	—	—	—	○ (4 faces)	—
		SD	—	—	—	—	○ (3 faces)	—
	RCS2W	RN/RP	—	—	—	1-314	—	—
		GS/GD	—	—	—	—	○ (4 faces)	—
		SD	—	—	—	—	○ (3 faces)	—
	DDW	LH	○	—	—	—	—	—
	ISWA/ISPWA	S/M/L	○	—	—	—	—	—

(*1) SA4's stroke should be less than 200mm stroke and SA5's should be less than 300mm.

Actuator Mounting Methods

Threaded mounting holes on the bottom of the base

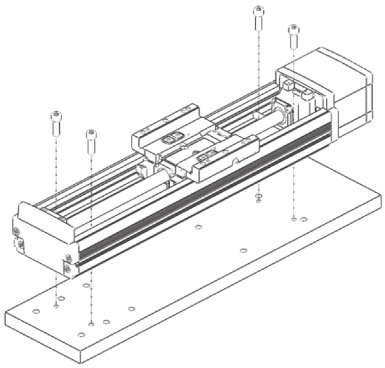




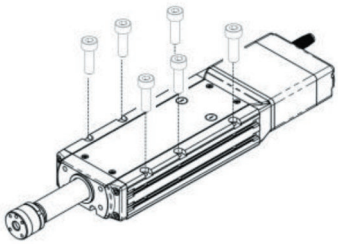
*Refer to the dimensions diagram of the product page for the sizes of the screw holes.

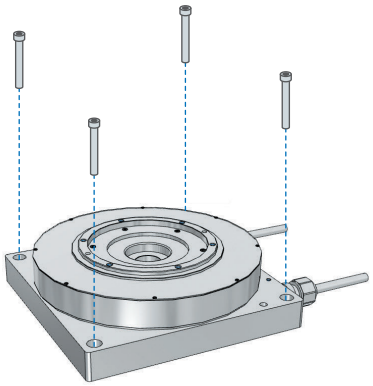
Mounted using the counterbored through holes on the top of the base

Installing from the top removing the cover



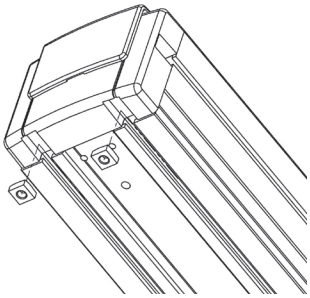
Installing from the top without removing the cover

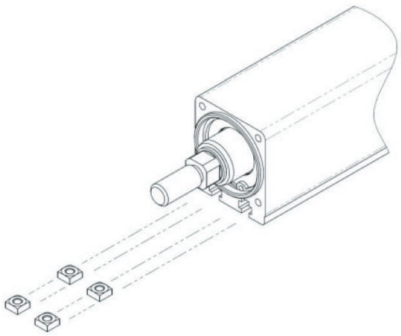


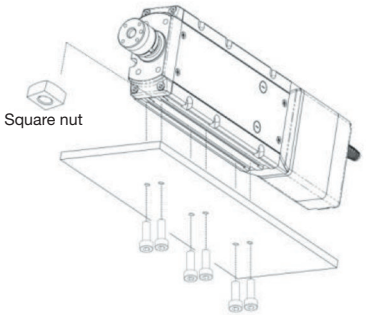


*Refer to the dimensions diagram of the product page for the sizes of the screw holes.

Mounted using the T-slot



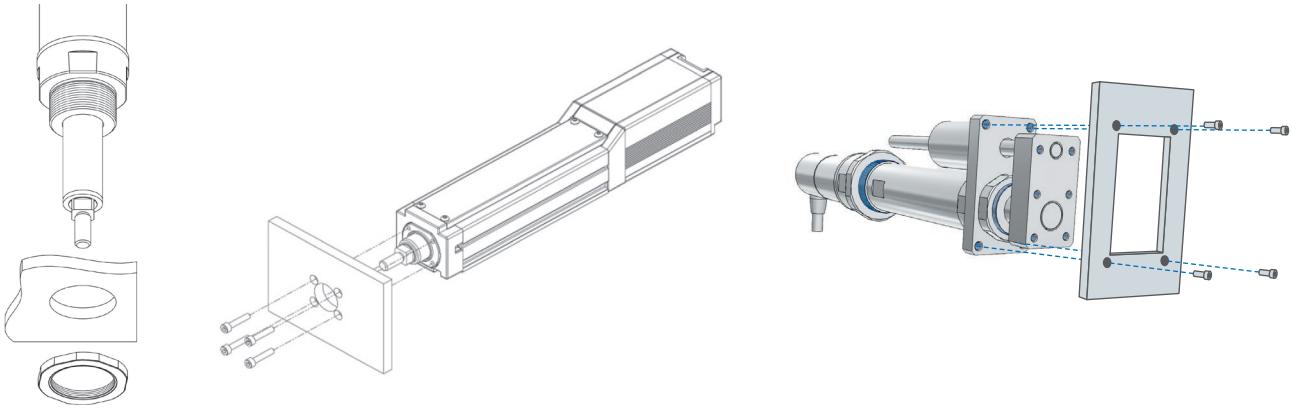




*Refer to the dimensions diagram of the product page for the sizes of the T-slots.

Fixed at the main unit front

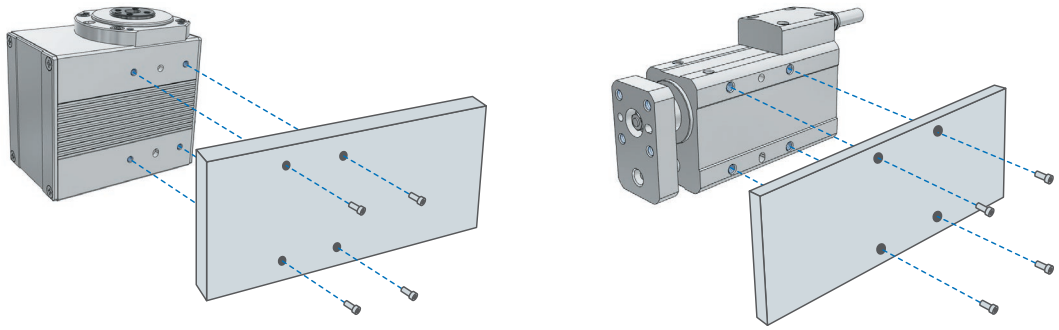
It is possible to fix using the tapped holes of the bracket.



*Refer to the dimensions diagram of the product page for the sizes of the screw holes.

Fixed the main unit side

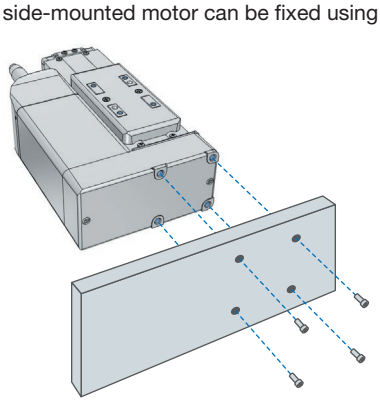
Actuator side mounting is possible.



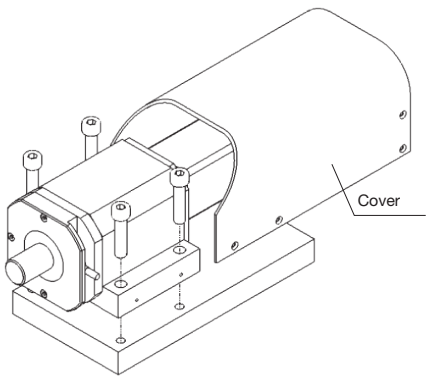
*Refer to the dimensions diagram of the product page for the sizes of the screw holes.

Fixed the main unit rear

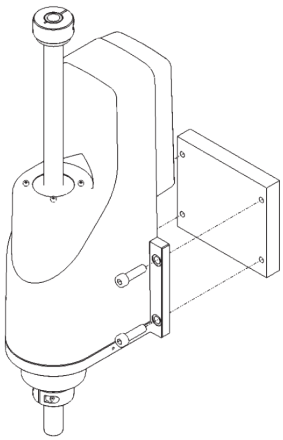
The side-mounted motor can be fixed using the tap holes on the bracket.



*Refer to the dimensions diagram of the product page for the sizes of the screw holes.



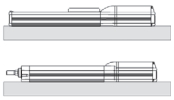
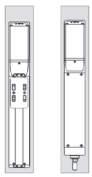
*Refer to the dimensions diagram of the product page for the sizes of the through holes.



Actuator Mounting Orientation

Depending on the actuator model, there are mounting orientations that cannot be used or require caution.
Please check the details of the mounting orientations of each model on the table below before using.

○: Can be installed　△: Required daily checking　×: Can not install

Classification	Series	Type	Mounting Orientation: Horizontal mounting	Vertical mounting (*1)	Sideways mounting	Ceiling mounting
						
Slider Type	EC	SL3	○	○	△ (*2)	△ (*2)
		S2/(D)S3/(D)S4/(D)S6/(D)S7/S8	○	○	△ (*2)	△ (*2)
		(D)WS10/(D)WS12	○	○ (Not available when the CS option and Lead S or H are selected)	△ (*2) (Not available when the CS option is selected)	△ (*2) (Not available when the CS option is selected)
		(D)S6□AH/(D)S7□AH	○	○	△ (*2)	△ (*2)
		(D)B6/(D)B7/B8	○	×	△ (*2)	△ (*2)
		S10(X)/S13(X)/S15(X)/S18(X)	○	○	△ (*6)	△ (*7)
	RCP6(S)	SA/WSA/HSA	○	○	△ (*2)	△ (*2)
		HSA6(X)/HSA7(X)	○	○	△ (*2)	△ (*2)
	RCP5	BA	○	×	△ (*2) (*3) (Only for strokes less than 1000mm)	△ (*2) (*3) (Only for strokes less than 1000mm)
	RCP4	SA	○	○	△ (*2)	△ (*2)
	RCP3	SA2	○	×	×	×
		SA3	○	○	○	△ (*2)
		SA4/SA5/SA6	○	○	△ (*2)	△ (*2)
	RCA	SA	○	○	△ (*2)	△ (*2)
	RCS4	SA/WSA/HSA	○	○	△ (*2)	△ (*2)
		HSA6C/HSA7C	○	○	△ (*2)	△ (*2)
	RCS3/RCS3P	SA	○	○	○ (*4)	○ (*4)
		SS	○	○	△ (*2)	△ (*2)
		CT8	○	×	×	○
	RCS2	SA4	○	○	○	△ (*2)
		SA5/SA6SA7	○	○	△ (*2)	△ (*2)
	ISB/ISPB	SXM/SXL/MXM/ MXL/LXM/LXL	○	○	○ (*6)	○ (*7)
		MXMX/LXMX/ LXUWX	○	×	×	△ (*7) (Only for strokes less than 1300mm)
		WXM	○	○	○ (*6)	○ (*6)
		WXMX	○	○	×	×
	SSPA	S/M/L	○	○	○ (*6)	○ (*7)
	ISDB/ISPDB	S/M/L	○	○	△ (*2)	△ (*2)
		MX/LX	○	×	×	×
	NSA	MXMS/MXMM/ LXMS/LXMM/ WXMS/WXMM/ LXMXS/LMXM/ WXMXS/WXMXM	○	×	○ (Only with ET5/6 options)	○ (Only with ET7/8 options)
	IFA	SA/MA	○	×	△ (*2) (Only with CSM option)	△ (*2) (Only with CSM option)
Rod Type	EC	GDB3	○	○	○	○
		(D)R6/(D)R7	○	○	○	○
		RR2/(D)RR3/(D) RR4/(D)RR6/(D)RR7	○	○	○	○
		RR8/RR10	○	○	○	○
		(D)RR6(X)□AH/(D) RR7(X)□AH	○	○	○	○
		CRP3/CRP5/ CGD3/CGD5	○	○	○	○
		RP3/RP4/RP5	○	○	○	○
		GD3/GS4/GD4/GD5	○	○	○	○
		SRG11/SRG15	○	○	○	○
	RCP6(S)	RA/RRA/WRA	○	○	○	○
	RCP5	RA	○	○	○	○
	RCP4	RA (*10)	○	○	○	○
	RCP3	RA2	○	○	○	○
	RCP2	SR	○	○	○	○
	RCD	RA	○	○	○	○
	RCA2	RN/RP/GS/GD	○	○	○	○
		SD	○	○ (*11)	○	○
	RCA	RA	○	○	○	○
	RCS4	RA/RRA/WRA	○	○	○	○
	RCS3	RA15/RA20 (without load cell)	○	○	○	○
	RCS2	RA/RN/RP/GS/ GD/SR/RG	○	○	○	○
		SD (*12)	○	○ (*11)	○	○

Please refer to P.309 for precautions.

Please refer to P.309 for precautions.

○: Can be installed　△: Required daily checking　×: Can not install

Classification	Series	Type	Horizontal mounting	Vertical mounting (*1)	Sideways mounting	Ceiling mounting
Table Type	EC	T3	○	○	○	○
		TC3/TW3/TC4/TW4/TC5/TW5	○	○	○	○
		CTC3/CTC5	○	○	○	○
	RCP6(S)	TA (*13)	○	○	○	○
	RCP3	TA	○	○	○	○
	RCA2	TCA/TWA/TFA	○	○	○	○
	RCS4	TA	○	○	○	○
	RCS3/RCS3P	CTZ5C	○	○	×	×
	RCS2	TCA/TWA/TFA	○	○	○	○
Linear servo	LSA	S6/S8/S10	○	×	○	×
		N10/N15	○	×	×	×
		W21	○	×	×	×
	LSAS	N10/N15	○	×	×	×
Pulse press	RCP6	RRA4/RRA6/RRA7 (*13)	○	○	○	×
Servo press	RCS3	RA4/RA6/RA7/ RA8/RA10 (*13)	○	○	○	×
		RA15/RA20 (*13)	○	○	×	×
	RCS2	RA13 (*13)	○	○	○	○
Gripper	EC	GRB(P)/GRC/GRST3	○	○	○	○
		GRST6/GRST7	○	○	△ (*2)	△ (*2)
		EC-GRTR14	○	○	○	○
	RCP6	GRST	○	○	△ (*2)	△ (*2)
		GRT	○	○	○	○
	RCP4	GR	○	○	○	○
	RCP2	GR	○	○	○	○
	RCD	GRSNA	○	○	○	○
Solenoid gripper	GRS	SEG/MEG	○	○	○	○
		SIG/MIG	○	○	○	○
Rotary chuck	RCP6	RTCKSPE/RTCKMPE	○	○	○	○
		RTCKSPI/RTCKMPI	○	○	○	○
		RTCKSRE/RTCKMRE	○	○	○	○
		RTCKSRI/RTCKMRI	○	○	○	○
Rotary	EC	RTB/RTC	○	○	○	○
	RCP6	RTFML	○	○	○	○
	RCP2	RT	○	○	○	○
	RCS2	RTC	○	○	○	×
Direct drive motor	DDA	LT/LH	○	○	○	○
Rotation	RS		○	○	○	○
Stopper cylinder	EC	GDS3/ST15/ST15ME	○	○	○	○
	RCP4	ST	×	○ (Only rod up)	×	×
Vertical/Rotation	ZR	S/M	×	○ (Refer to 1-310)	×	×
Cleanroom	EC	(D)S3□(A)CR/(D)S4□(A)CR/(D)S6□(A)CR/ (D)S7□(A)CR/S8(X)□(A)CR	○	○	△ (*2)	△ (*2) ((D)S3□ACR and (D)S4□ACR not supported)
		(D)S6□AHCR/(D)S7□AHCR	○	○	△ (*2)	△ (*2)
		(D)WS10/(D)WS12	○	○ (Not available when the CS option and Lead S or H are selected)	△ (*2) (Not available when the CS option is selected)	△ (*2) (Not available when the CS option is selected)
	RCP6CR(S)	SA/WSA	○	○	△ (*2) (*9)	△ (*2) (*9)
	RCP4CR	SA	○	○	△ (*2) (*9)	△ (*2) (*9)
	RCP2CR	GR	○	○	○	○
		RT	○	○	○	○
	RCACR	SA	○	○	△ (*2) (*9)	△ (*2) (*9)
	RCA2CR	RN/RP/GS/GD	○	○	○	○
		SD	○	○ (*11)	○	○
	RCS4CR	SA/WSA	○	○	△ (*2) (*9)	△ (*2) (*9)
	RCS3CR	SA/SS	○	○	△ (*2) (*9)	△ (*2) (*9)
	RCS2CR	SA/SS	○	○	△ (*2) (*9)	△ (*2) (*9)
		RN/RP/GS/GD	○	○	○	○
		SD (*12)	○	○ (*11)	○	○
	DDACR	LT/LH	○	○	○	○
	ISDBCR/ ISPDBCR	S/M/L	○	○	△ (*2) (Only for strokes less than 400mm)	△ (*2) (Only for strokes less than 400mm)
		MX/LX	○	×	×	×
	SSPDACR	S/M/L	○	—	—	—
	ISDACR/ ISPDACR	W	○	○	△ (*2) (Only for strokes less than 400mm)	△ (*2) (Only for strokes less than 400mm)
		WX	○	×	×	×
Dust-proof and splash-proof	EC	S6□D/S7□D	○	○	△ (*2)	△ (*2)
		S6□W/S7□W	○	×	×	×
		R6□W/R7□W	○	○	○	○
		RR6□W/RR7□W	○	○	○	○
		GRBP□W	○	○	○	○
	RCP6W	RA/RRA/WRA	○	○	○	○
	RCP5W	RA	○	○	○	○
	RCP4W	SA	○	×	○ (*5)	○ (*5)
	RCP2W	GR	○	○	○	○
		RT	○	○	○	○
	RCA2W	RN/RP/GS/GD	○	○	○	○
		SD	○	○ (*11)	○	○
	RCS2W	RN/RP/GS/GD	○	○	○	○
		SD (*12)	○	○ (*11)	○	○
	ISWA/ISPWA	S/M/L	○	×	×	×
	DDW	LH	○	○	○	×

Actuator Mounting Orientation

Cautions about mounting orientation

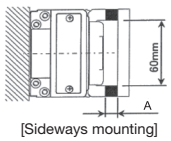
(*1) When vertically mounting an actuator with an in-line motor, motor top mounting is recommended.
If the actuator has a built-in controller, be sure to mount a cap on the teaching port if it is facing upward. This prevents dirt or foreign matter from clogging the port and causing malfunctions.

(*2) While sideways or ceiling mounting is possible, this may cause the stainless steel sheet to sag or become misaligned. Continued use in this configuration may lead to malfunctions like broken stainless steel sheets. Therefore, perform daily inspections and make adjustments if the stainless steel sheet is sagging or misaligned.

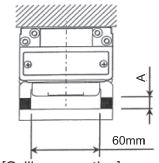
(*3) Sideways and ceiling mounting are available as options for the RCP5 belt type.
Models with horizontal/ceiling-mounting specifications cannot be mounted sideways, and vice versa.
Do not mount slanted or vertically, as this will lead to misoperation.

(*4) Sideways or ceiling mounting of the RCS3-SA8C/SA8R may cause the screw cover to sag and interfere with the workpiece mounted on the slider. Therefore, keep the slider mounting surface and the workpiece apart at the distance shown in the table below.

Stroke	Distance between slider mounting surface and work
At least 400mm, less than 800mm	At least 5mm
At least 800mm, less than 1100mm	At least 7mm
At least 1100mm (for custom order)	At least 10mm



[Sideways mounting]



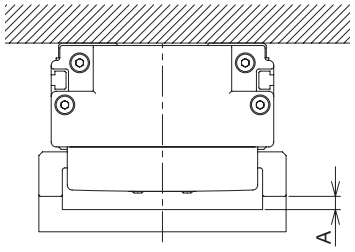
[Ceiling mounting]

(*5) An optional mounting bracket is required for sideways or ceiling mounting of the RCP4W slider type.
The IP rating cannot be guaranteed if a standard mounting bracket is used when the actuator is sideways or ceiling mounted. Be sure to specify the correct mounting bracket in this case. Refer to P1-311 for the bracket options and their corresponding mounting orientations.

(*6) If base oil separates from the grease, it may drip through the openings on the sides of the actuator.
It is also possible that parts dropped from inside the machine may drop into the opening on the actuator's sides.
If necessary, please attach protective coverings.

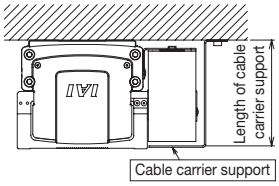
(*7) When the screw cover type actuator is ceiling mounted, the screw cover may sag and interfere with the workpiece mounted on the slider. Therefore, mount the workpiece with enough clearance from the slider seating surface.

Series	Stroke	Distance A
IS(P)B IS(P)A	At least 600mm, less than 1000mm	At least 5mm
	At least 1000mm, less than 1300mm	At least 10mm
SSPA	At least 800mm, less than 1500mm	At least 5mm
IF	At least 900mm, less than 1400mm	At least 5mm
	At least 1400mm, less than 2100mm	At least 10mm
	At least 2100mm, less than 2400mm	At least 15mm
	At least 2400mm, less than 2500mm	At least 20mm



(*8) When the NS series is ceiling mounted, the cable carrier may droop and become damaged. Ceiling mounting is possible with a cable carrier support mounted. For the standard cable carrier specifications for the LXMSA and LXMMA, ceiling mounting is not possible, because the cable wiring box protrudes beyond the cable carrier. When using the LXMSA or LXMMA with ceiling mounting, use the extended cable carrier option.

Type	Cable carrier support size (units: mm)
SXMSA, SXMMA	89
MXMSA, MXMMA	109
LXMSA, LXMMA (Extended cable carrier OP)	155



(*9) In sideways or ceiling mounting, sagging or misalignment of the stainless steel sheet may prevent the unit from maintaining a cleanroom rating of class 2.5 to 3.5 (ISO 14644-1 standard). Therefore, perform daily inspections and make adjustments if the stainless steel sheet is sagging or misaligned.

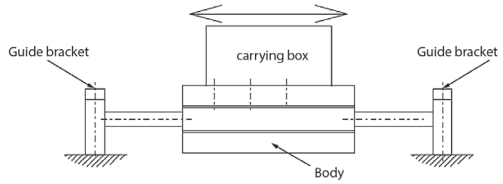
(*10) Motor types 42SP and 56SP are vertical mounting only models.

(*11) There are two ways to mount the slide unit type: mounting the main unit and mounting the guide bracket. Note that vertical mounting is not possible when brackets are used.

(*12) When brackets are used for mounting, payload will be reduced by 1.5kg.

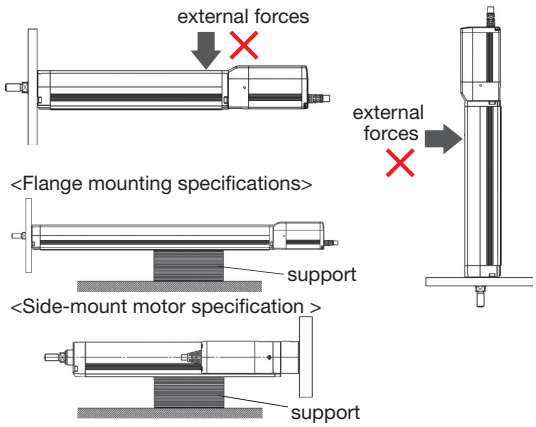
(*13) When using the side-mounted bracket mounting holes, external force, bending moment, and vibration may cause damage to parts or malfunction depending on the installation condition and operating conditions. Therefore, secure the base frame body with a support base, etc.

<Installing the guide bracket>



<Caution when installing a rod type>

When installing using the front mounting holes or a flange (option), please make sure no external force acts on the actuator. (External forces may cause malfunctions or damage the parts.)
When there will be external forces or if the actuator is going to be combined with something like a Cartesian robot, please use the mounting holes on the actuator to secure it.
Install a support block for front or back mounting in a horizontal orientation.
Depending on the mounting and operation conditions, vibration may lead to actuator body damage.

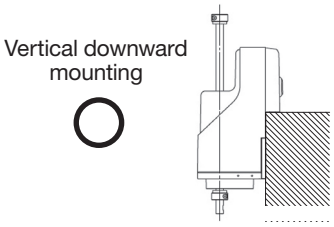


<Cautions on installation of pulse press and servo press>

Customer's tooling is to be installed on the load cell.
Please provide guides to the outside so that radial load and moment load will not be applied to the load cell.
When the side-mounted bracket mounting holes are used, external force, bending moment, and vibration may cause damage depending on the installation condition and operating conditions. Therefore, secure the body with a support base, etc.

<ZR mounting orientation>

The ZR series can only be used for vertical downward mounting.



RCP4W-SA Mounting Orientations

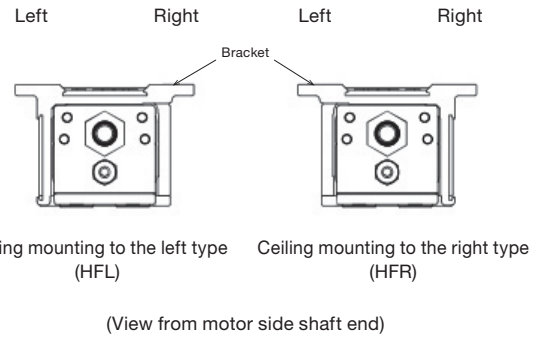
Illustration when optional ceiling mounting is selected (Model TFL/HFR).

When the optional ceiling mounting (Model HFL / HFR) is selected, or when lateral wall mounting (Model TFL / TFR) is selected, the direction of the actuator body is horizontal.

Please refer to the following for mounting orientation.

RCP4W-SA Ceiling mounting specification

Installing with the bracket option for ceiling mounting (Model HFL/HFR).

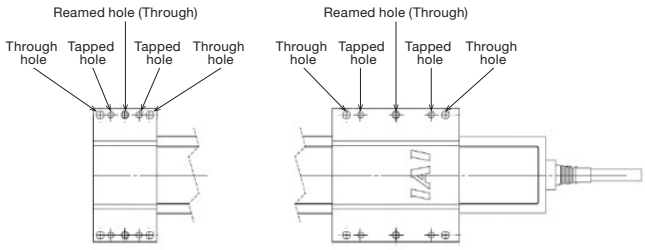


Ceiling mounting to the left type (HFL)

Ceiling mounting to the right type (HFR)

(View from motor side shaft end)

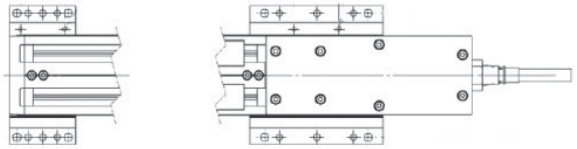
☆Top view



Bracket (front)

Bracket (rear)

☆Bottom view

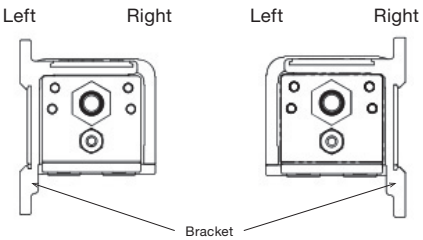


Bracket (front)

Bracket (rear)

RCP4W-SA Wall mounting specification

Installing with the bracket option for wall mounting (Model TFL / TFR).

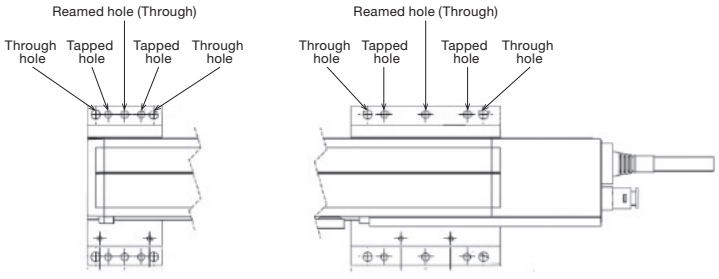


Left wall mounting specification (TFL)

Right wall mounting specification (TFR)

(View from motor side shaft end)

☆Side view



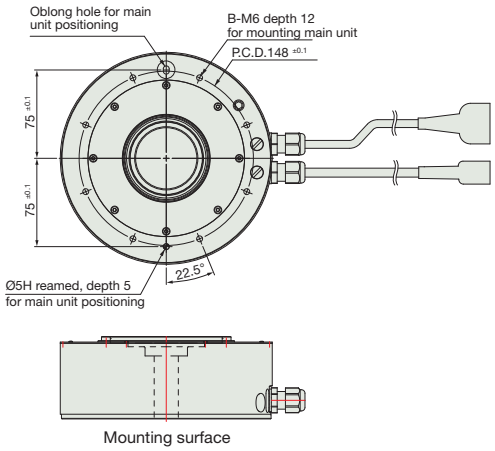
Bracket (front)

Bracket (rear)

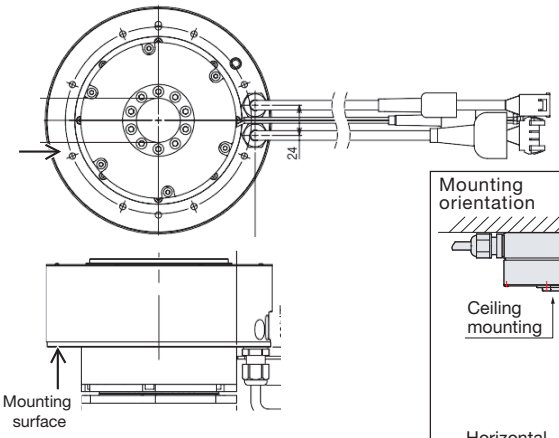
Caution for Mounting (DDA·DDW·RCS3-CT8C)

Direct drive motor

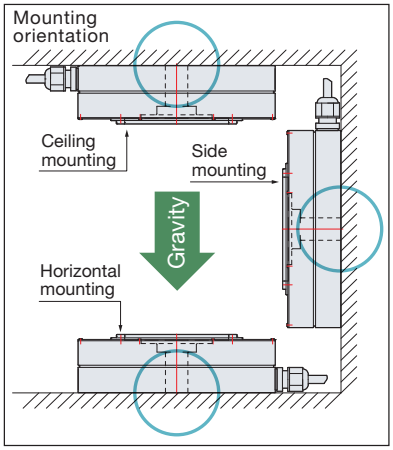
■DDA·DDW



■DDA (with brake)



* For brake option and cable exit downward direction option, a hole or holes for the room for those items.



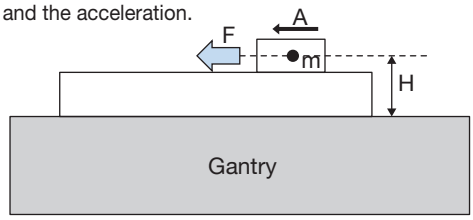
Note) Please use this product by mounting it to a surface that has heat dissipation characteristics equivalent to w450 x d450 x t12 aluminum plate. Consult IAI if this causes poor heat dissipation in your machine.

■RCS3-CT8C

Secure the high-speed type ROBO Cylinder by preparing a sufficiently rigid rack and mount it so that the gantry does not move when operating the ROBO Cylinder.

- The reaction force during ROBO Cylinder operation is determined by the mass of the moving part and the acceleration.

Reaction force: F = mA m: Mass of moving part A: Acceleration



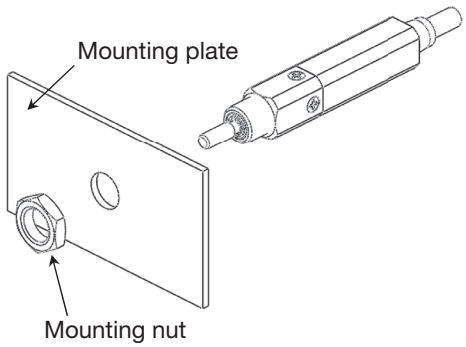
- Moment load due to the above reaction force and the height H to the center of gravity position is added to the mount.

Moment load: M = FH = mAH
H: Distance from gantry to movable part center of gravity

Consider the rigidity against this load moment.

RCD Rod Type Mounting Method

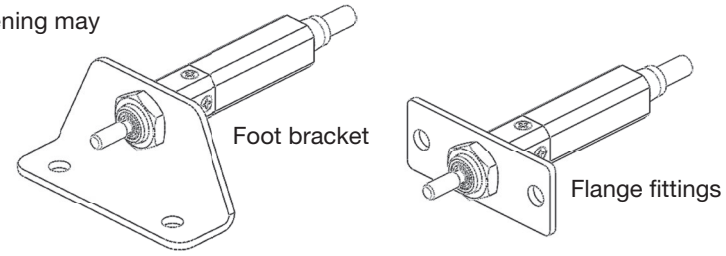
■ RCD series mounting method



- The mounting hardware is a structure with sufficient rigidity so that vibration exceeding 0.3G is not transmitted.
- Please set up a space where maintenance work can be done. Fit and fix the main body into the through hole (Ø10) of a smooth plate with a thickness of 1 to 3mm. The installation posture can be either horizontal installation or vertical mounting.
- The base of the body of the male thread (m10×1.0) is a tolerance h8, so please use it as an in-row.
- When tightening with the attached mount nut etc., the maximum tightening torque should be 9.0N·m. Excessive tightening may damage the actuator.

The following general-purpose products can be used for foot brackets and flange fittings.

For foot brackets and flange fittings, please contact the manufacturer directly.



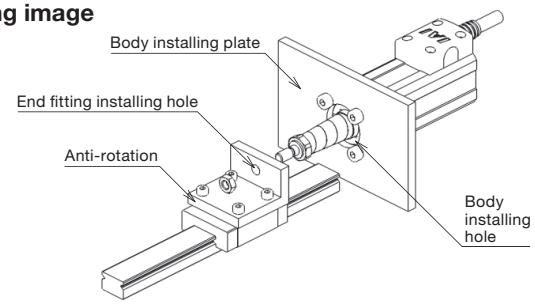
Mini Rod Type Anti-Rotation Mounting Method

■ Thin and small rod type anti-rotation

In the following models, there is no anti-rotation of the ball screw inside the main body, so be sure to set the anti-rotation on the outside when using. When installing the anti-rotation, please install according to the following installation conditions. If you operate in a state where the anti-rotation mechanism is not installed, the ball screw idles, the rod does not move back and forth, and the rotation speed of the encoder and the actual movement distance can not be matched and the position may be misaligned.

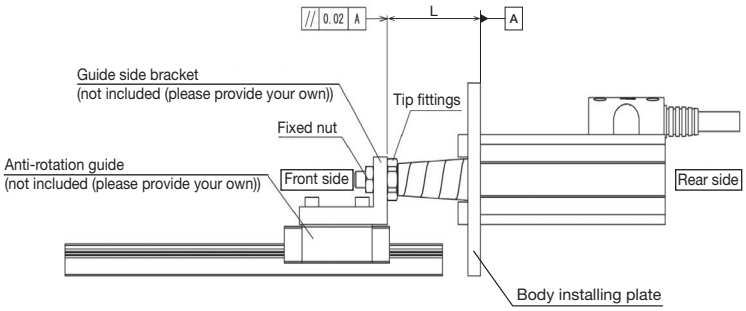
Applicable model **RCA2-RN3NA / RN4NA / RP3NA / RP4NA / RCA2CR / W-RN3NB / RN4NB / RP3NB / RP4NB / RCS2-RN5N / RP5N / RCS2CR / W-RN5NB / RP5NB, EC-GDS3 / GDB3 / RP3 / RP4 / RP5**

Mounting image

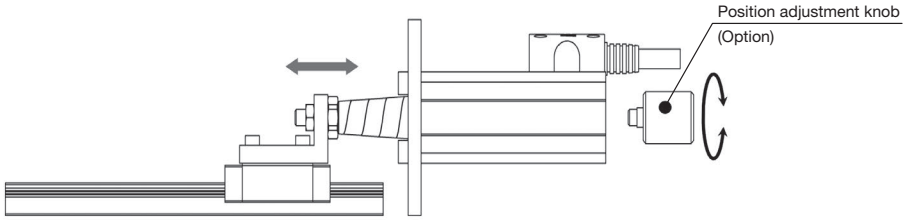


Please do not connect the tip of the actuator rod and the anti-rotation with the floating joint.
Radial load due to eccentricity is applied to the screw shaft, leading to malfunction of the actuator and premature failure.

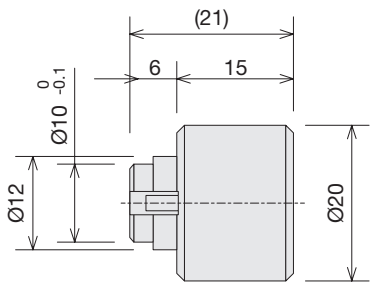
Mounting method, condition The body installing hole of the fixed plate and the coaxial level of the tip bracket installing hole of the guide side brackets should be within 0.05mm. The degree of parallelism should be within 0.02mm.



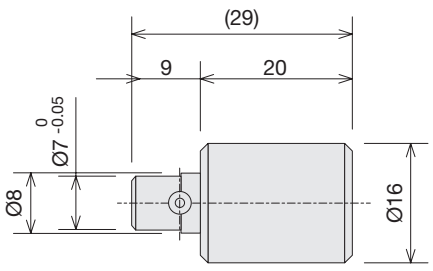
When moving the rod part of the actuator, please use the optional position adjustment knob.



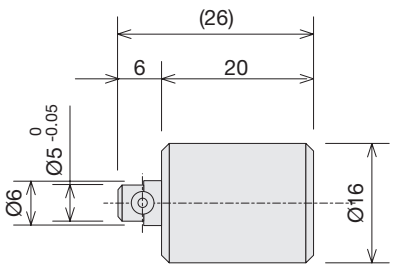
<Position adjustment knob>



For 5 Series
Model: RCS2-AK-R5



For 4 Series
Model: RCA2-AK-R4



For 3 Series
Model: RCA2-AK-R3

Pressing Operation

As with pneumatic cylinders, push force motion is a function to keep holding rods and sliders pressed against workpiece etc.
Please make sure the following usage instructions and notes.

[Compatible with push motion]

Legend: ◎: Compatible ○: Possible △: See notes ×: Incompatible

Motor type	Series	Model	Compatibility	Notes
Stepper Motor	EC/RCP6/ RCP5/RCP4 RCP3/RCP2	Slider type Table type	○	Push motion is possible. (See note 1 below)
		Rod type	◎	Designed for pushing operation. (See note 2 below)
	EC/RCP5/RCP2	Belt type	×	Since the push force of the belt is not stable, it can not be pushed.
Servo motor (DC24V)	EC-CRP/CGD/ CTC/RCA2/RCA	All model	△	See notes 2 below
Servo motor (AC100/200V)	EC	S10(X)/S13(X)/ S15(X)/S18(X)	×	Push motion is not supported.
	RCS4	All model	△	See notes 2 below
	RCS3	Servo presses (RA4R/RA6R/RA7R/ RA8R/RA10R/ RA15R/RA20R)	◎	Designed for pushing operation.
		Other models	△	See notes 2 below
	RCS2	Servo presses (RA13R)	◎	Designed for pushing operation.
		Other models	△	See notes 2 below

[Notes]

1. When pushing with the slider type and the table type, it is necessary to consider the allowable dynamic moment of the guide. For details, refer to the correlation diagram page of push force and current limit value on P.1-317 to 318.

2. We recommend using either the stepper motor (RCP□) or servo press series for pushing applications.
The stepper motor series are able to press and hold for longer and can provide higher pressing forces than equivalently sized servo motor (RCA□/RCS□) actuators. The servo motor actuators are also capable of pushing, however, aside from the servo press (RCS3-RA□R) series, the force will vary significantly depending on the actuator's ending position. We do not recommend using regular servo motor actuators for pushing applications. If you need to use a servo motor actuator in a pushing application, please consult our sales representatives.

[Adjustment of push force]

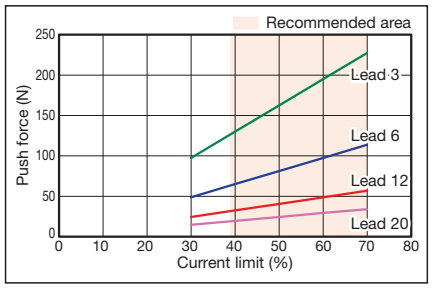
- The pushing force (push force) can be adjusted by changing the current limit value of the controller.
- Check the push force of each model referring to the "Correlation Diagram of Push force and Current Limit Value" for each product and select the model that suits the condition.

[Selection method of lead]

- Select a lead whose desired push force is in the recommended area (colored zone in the graph) of the current limit value.
In the case of EC-(D)WS10 type, if the push force of 100N is desired, lead 6 is suitable. Lead 3 has a limited adjusting range.

(Example:)

EC-(D)WS10



<Correlation diagram of push force and current limit value>

Caution

The correlation diagram of the push force and the current limit value shows the lower limit of the push force at each current limit value.

- Even if the current limit value is the same, the push force could be about 40% higher than the lower limit due to individual differences of motors and the variation of the mechanical efficiency.
- When accurate push force is required, use an actuator equipped with the load cell function that can control force.
(Refer to 6-9 for pulse press and 6-11 for servo press for the details of the actuators with load cell function)

Force Control Function (Pulse press/Servo press)

The force control function enables highly accurate push control compared to conventional push motion by taking feedback of push force with a dedicated load cell attached to the actuator.

Pulse press

24 V stepper motor

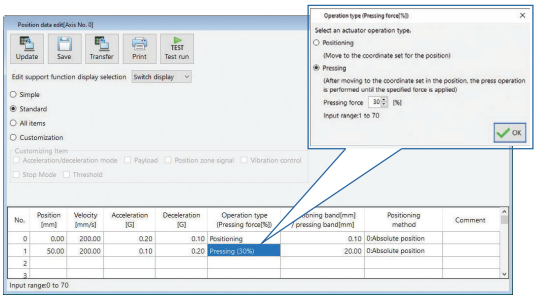
Point 1: Supports tensile load

● Supports 60 to 2,000N of push force and tensile load.

RCP6-RRA7R	200 to 2,000N
RCP6-RRA6R	60 to 600N
RCP6-RRA4R	60 to 300N

Point 2: Easy setting

● Setting of push force by entering % only.



Point 3: Low cost

● A low cost is achieved by employing a stepper motor.

Note

· When operating in the pulse-train mode, the force control function cannot be used.

Servo press

200 V AC servo motor

Point 1: Full lineup

● Supports 20 to 50,000N (5t) of thrust force.

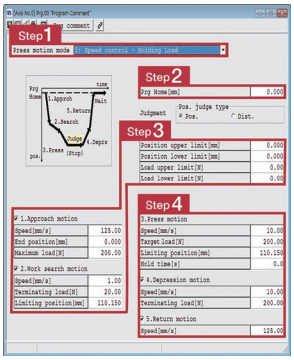
RCS3-RA20R(Note)	5,000 to 50,000N
RCS3-RA15R(Note)	5,000 to 30,000N
RCS2-RA13R(Note)	2,000 to 19,600N (1t, 2t type)
RCS3-RA10R	600 to 6,000N
RCS3-RA8R	200 to 2,000N
RCS3-RA7R	200 to 1,200N
RCS3-RA6R	60 to 600N
RCS3-RA4R	20 to 200N

(Note) Thrust force of the servo press specification.

Point 2: Operable by a dedicated program

● The position, speed, acceleration, load, etc. of each press operation can be operated by simply inputting four steps into the press program input sheet of the teaching software for PC.

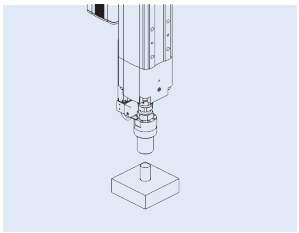
Step 1: Selection of operating mode
Step 2: Input of the home position
Step 3: Input of position, load and speed
Step 4: Input of judgement condition of press force



Note

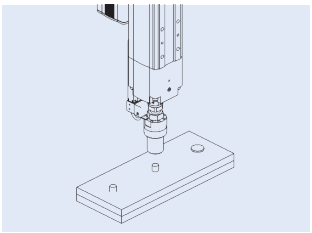
· Dedicated to push force. Force control of the tensile direction cannot be controlled.
· When operating in the pulse-train mode, the force control function cannot be used.
· Time for continuous push motion is limited by the setting load value. See P.1-319 for details.

■ Use applications



Used for press-fitting pins

It is possible to manage accurate pressing power. Even when the pin to be press-fitted is thin and loose, it is possible to confirm the failure judgment by setting the threshold value.



Crimping

A detailed push force setting is possible for each product, and it is also possible to check whether the crimping completion position has been reached.

Cautions on Push Force by Slider Type and Table Type

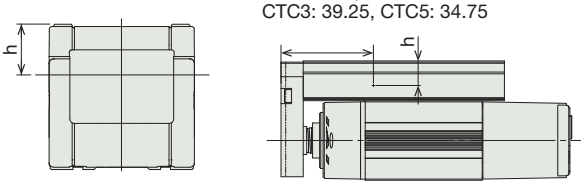
EC Series　Slider type / Table type　*Same as CR/D/W

When performing push moves with slider or table type actuators, adjust the current limit to ensure that the reaction moment caused by the push force does not exceed the allowable dynamic moments (Ma, Mb) in the catalog.
Refer to the figures below, which show the working point of the guide moment, for help with calculating the moment. When doing so, take the offset amount of the torque working point into consideration.
Note that applying excessive force that exceeds the dynamic allowable moment may damage the guide and reduce its operation life. Select a push current that is safely within its limits.

* "offset amount"=The "h" dimensions

Slider type　Table type

T3:19.8 (10st), 24.8 (20st), 29.8 (30st and higher)
TC3: 57.5, TW3: 49.5
TC4: 39.5, TC5: 70.5
T W4: 38.5, TW5: 62
CTC3: 39.25, CTC5: 34.75



Guide moment working point

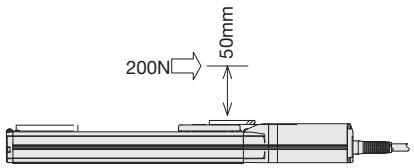
h dimensions			
Slider type		Table type	
SL3	13.5	T3	11.5
S2□(R)	22.5	TC3	8.7
(D)S3□(A)(R)	16	TW3	8.5
(D)S4□(A)(R)	18	TC4	10.5
(D)S6□(A)(R)	22	TW4	10.5
(D)S7□(A)(R)	22	TC5	12
S8(X)□(A)(R)	45.5	TW5	16
(D)S6(X)□AH(R)	50.5	CTC3	10.5
(D)S7(X)□AH(R)	58	CTC5	12
(D)WS10/(D)WS10□R	22.5		
(D)WS12/(D)WS12□R	30		

* Unit: mm

Calculation example:

When a 200N push force operation is performed with **EC-S7** type at the position shown in the figure to the right, the moment applied to the guide is:

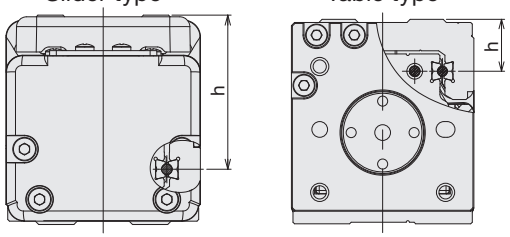
Ma = (22 + 50) × 200 = 14400 (N·mm)
= 14. 4 (N·m)



The allowable dynamic moment of EC-S7 is Ma = 17 (N·m). Therefore it is OK because it is 17 > 14.4.
When Mb's moment is generated by push force, it is calculated from the overhang amount.
Make sure that it is within the allowable dynamic moment as well.

RCP6 Series　Slider type / Table type　*Same as CR

Slider type　Table type



Operating position of guide moment

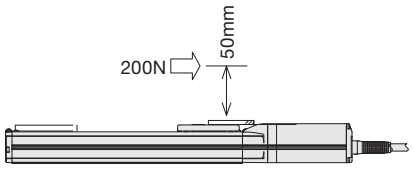
h dimensions			
Slider type		Table type	
SA4	36	TA4	12
SA6	46	TA6	16.5
SA7	48	TA7	19.5
SA8	45.5		
HSA6(X)	50.5		
HSA7(X)	58		
WSA10	26.5		
WSA12	32		
WSA14	36		
WSA16	38.5		

* Unit: mm

Calculation example:

With **RCP6-SA7C** type, when push force 200N at the position on the right figure
The moment the guide receives is

Ma= (48 + 50) × 200 = 19600 (N·mm)
= 19.6 (N·m).



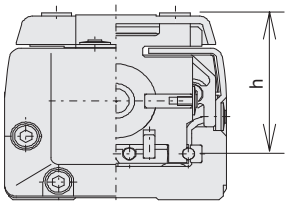
The allowable dynamic moment of SA7C is Ma = 44 (N·m). Therefore it is OK because it is 44 > 19.6.
When Mb's moment is generated by push force, it is calculated from the overhang amount.
Make sure that it is within the allowable dynamic moment as well.

RCP4 Series Slider type *Same as CR

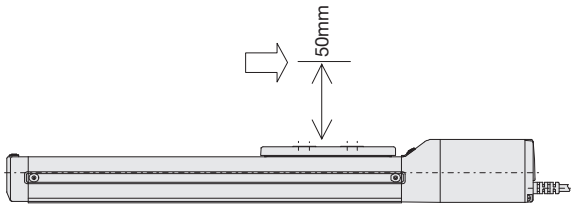
Calculation example:

With the **RCP4-SA5C** type, when push force 50N at the position on the right figure, the moment applied to the guide is

Ma= (39 + 50) × 50 = 4450 (N·mm)
= 4.45 (N·m).



SA3C: h=29.5mm
SA5C: h=39mm
RCP4W-SA5C: h=22.5mm
RCP4W-SA7C: h=26mm
RCP4W-SA6C: h=27.5mm



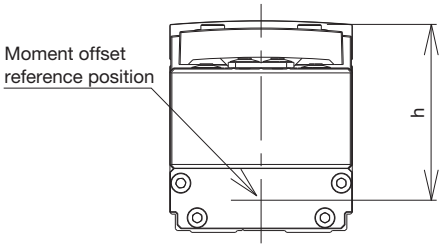
The allowable dynamic moment of SA5C is Ma = 5 (N·m).
Hence it is OK because it is 5>4.45.
When Mb's moment is generated by push force, it is calculated from the overhang amount.
Make sure that it is within the allowable dynamic moment as well.

RCP3 Series Slider type

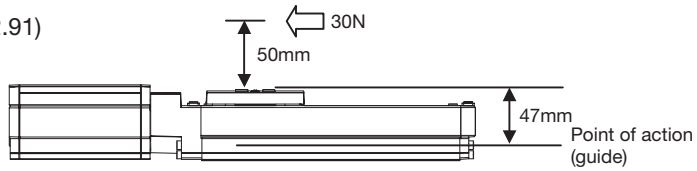
Calculation example:

With **RCP3-SA6C** (Lead 12) type, when push force 30N at the position of 50mm from the upper surface of the slider, the moment the guide receives is

Ma= (14 + 50) × 30 = 2910 (N·mm)
= 2.91 (N·m).



SA3C: h=29.5mm
SA4C: h=36.5mm
SA5C: h=43.5mm
SA6C: h=47.0mm



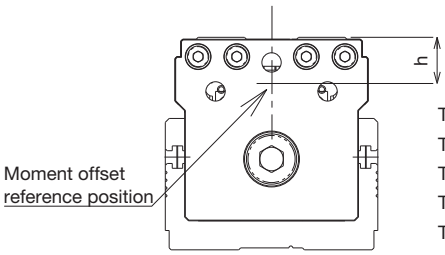
The allowable dynamic moment (Ma) of SA6C is 5 (N·m).
Therefore it is OK because it is greater than the moment load (2.91) applied to the guide actually.

RCP3 Series Table type

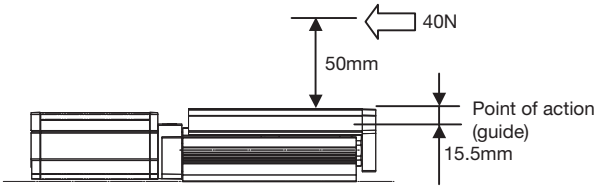
Calculation example:

With **RCP3-TA6C** (Lead 12) type, when push force 40N at the position on the figure, the moment the guide receives is

Ma= (15.5 + 50) × 40 = 2620 (N·mm)
= 2.62 (N·m).



TA3 □: h = 10.5mm
TA4 □: h = 11.5mm
TA5 □: h = 13.5mm
TA6 □: h = 15.5mm
TA7 □: h = 17.5mm



The allowable dynamic moment (Ma) of TA6C is 8 (N·m).
Therefore it is OK because it is greater than the moment load (2.62) applied to the guide actually.

Cautions on Push Motion by Servo Press

RCS3-RCS2 Series | Servo press specification (with load cell)

When using this machine, it is necessary to clear the following three conditions.

Condition 1. The pressing time is shorter than the fixed time

Condition 2. The continuous operation thrust of one cycle is less than the permissible thrust of continuous operation of actuator

Condition 3. One push operation must be performed within one cycle

Selection method

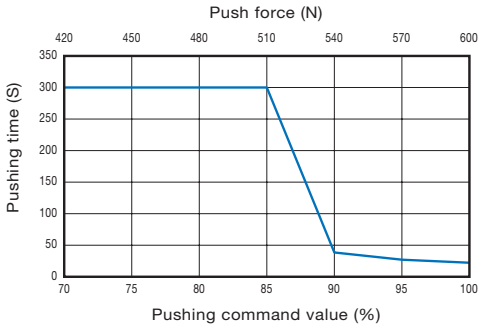
Condition 1. Pushing time

The maximum pushing time for each push command value is determined as shown in the table below. Please ensure that no push moves exceed the specified times below.
Please be aware that malfunction may occur in the actuator if you use it without following the table below.
There is no limit on the continuous push time for RA4R.

RCS3

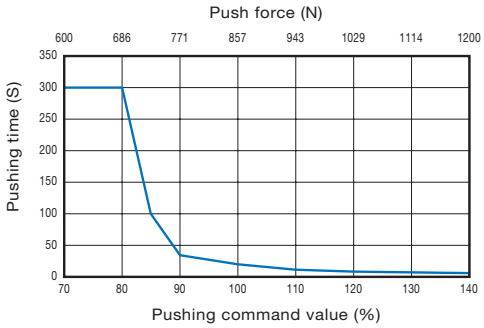
RA6R

Push command value (%)	Maximum pressing time (S)
70 or less	Capable of continuous pushing
85	300
90	38
95	27
100	21



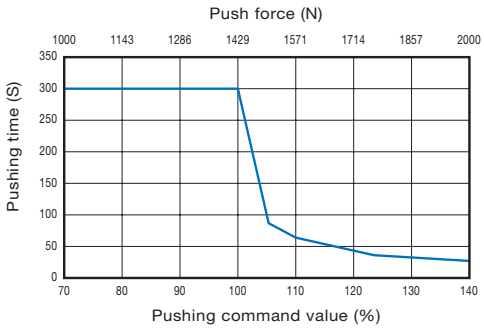
RA7R

Push command value (%)	Maximum pressing time (S)
70 or less	Capable of continuous pushing
80	300
85	94
90	33
95	24
100	18
105	15
110	12
115	11
120	9
125	8
130	7
135	6
140	5



RA8R

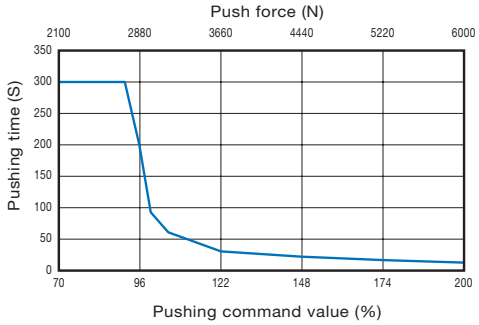
Push command value (%)	Maximum pressing time (S)
70 or less	Capable of continuous pushing
100	300
105	92
110	67
115	54
120	44
125	38
130	33
135	29
140	25



RCS3·RCS2 Series Servo press specification (with load cell)

RA10R

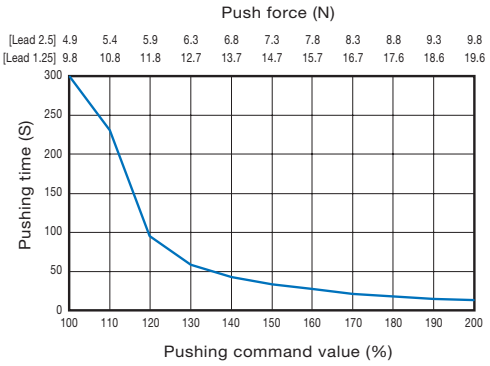
Push command value (%)	Maximum pressing time (S)
70 or less	Capable of continuous pushing
90	300
95	210
100	95
105	70
110	56
115	46
120	39
125	34
130	30
135	26
140	24
145	21
150	19
155	17
160	16
165	14
170	13
175	12
180	11
185	10
190	9
195	9
200	8



RCS2

RA13R

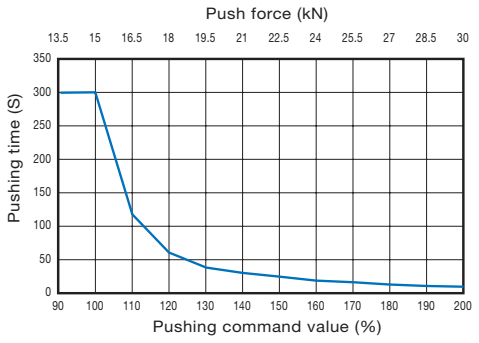
Push command value (%)	Maximum pressing time (S)
70 or less	(Capable of continuous pushing)
71-100	300
110	230
120	95
130	58
140	43
150	33
160	27
170	21
180	18
190	15
200	13



RCS3

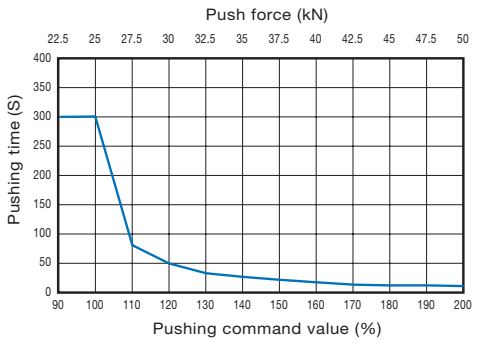
RA15R

Push command value (%)	Maximum pressing time (S)
90 or less	Capable of continuous pushing
91-100	300
110	118
120	58
130	40
140	30
150	25
160	20
170	16
180	13
190	10
200	9



RA20R

Push command value (%)	Maximum pressing time (S)
90 or less	Capable of continuous pushing
91-100	300
110	80
120	50
130	36
140	28
150	22
160	18
170	15
180	13
190	11
200	10

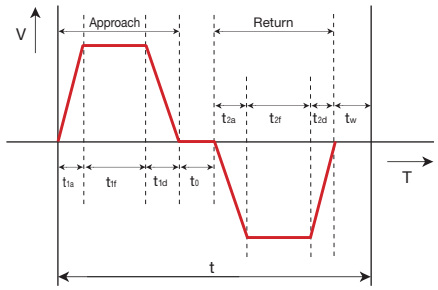


Cautions on Push Motion by Servo Press

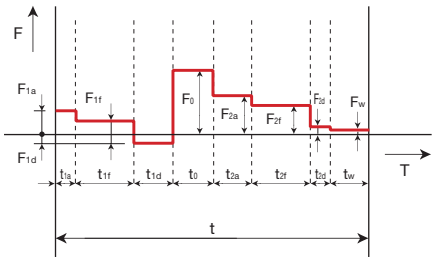
RCS3-RCS2 Series | **Servo press specification (with load cell)**

Condition 2. Continuous operation thrust

It is confirmed that the continuous operation of the one cycle with load and duty is less than the continuous operation allowable thrust of the actuator. The push operation should be performed once in one cycle.



Regarding the driving pattern on the left, When rewritten with the vertical axis as thrust,



t	: Operating time of one cycle (s)	t_{2a}	: Acceleration time 2
t_{1a}	: Acceleration time 1	t_{2f}	: Constant speed movement time 2
t_{1f}	: Constant speed movement time 1	t_{2d}	: Deceleration time 2
t_{1d}	: Deceleration time 1	t_w	: Standby time
t_0	: Push operation time * within the range of condition 1		

F_{1a}	: Thrust required for acceleration 1	F_{2a}	: Thrust required for acceleration 2
F_{1f}	: Thrust required for constant speed movement 1	F_{2f}	: Thrust required for constant speed movement 2
F_{1d}	: Thrust required for deceleration 1	F_{2d}	: Thrust required for deceleration 2
F_0	: Thrust required for pressing operation	F_w	: Thrust required for standby

Calculate the continuous operation thrust Ft of one cycle from the following calculation formula.

$$F_t = \sqrt{\frac{F_{1a}^2 \times t_{1a} + F_{1f}^2 \times t_{1f} + F_{1d}^2 \times t_{1d} + F_0^2 \times t_0 + F_{2a}^2 \times t_{2a} + F_{2f}^2 \times t_{2f} + F_{2d}^2 \times t_{2d} + F_w^2 \times t_w}{t}}$$

- Since F_{1a} / F_{2a} / F_{1d} / F_{2d} varies depending on the direction of motion, calculate by the following formula.

In case of horizontal use (common for acceleration/deceleration)	$F_{1a} = F_{1d} = F_{2a} = F_{2d} = (M + m) \times d + F_S$
Horizontal use for constant speed movement	$F_{1f} = F_{2f} = f + F_S$
Horizontal use for standby state	$F_w = 0$
Horizontal use case of acceleration during descent	$F_{1a} = (M + m) \times 9.8 - (M + m) \times d + F_S$
Vertical use case of constant speed movement during descent	$F_{1f} = (M + m) \times 9.8 + \alpha$ (*1) $+ F_S$
Vertical use case of deceleration during descent	$F_{1d} = (M + m) \times 9.8 + (M + m) \times d + F_S$
Vertical use case of acceleration during ascent	$F_{2a} = (M + m) \times 9.8 + (M + m) \times d + F_S$
Vertical use case of constant-speed movement during descent	$F_{2f} = (M + m) \times 9.8 + \alpha$ (*1) $+ F_S$
Vertical use case of deceleration during descent	$F_{2d} = (M + m) \times 9.8 - (M + m) \cdot d + F_S$
Vertical use case of standby state	$F_w = (M + m) \times 9.8$

Actuator
Mass of moving part:
RA6R : 2.5kg
RA7R : 3.5kg
RA8R : 4kg
RA10R : 5kg
RA13R : 9kg
RA15R : 10kg
RA20R : 18kg

RCS3-RA15R		RCS3-RA20R	
Speed [mm/s]	Fs [N]	Speed [mm/s]	Fs [N]
0 ~ 180	0	0 ~ 40	0
181 ~ 190	625	41 ~ 50	1875
191 ~ 200	1250	51 ~ 60	3750
201 ~ 210	1875	61 ~ 70	5625
211 ~ 220	2500	71 ~ 80	7500
221 ~ 230	3125	81 ~ 90	9375
231 ~ 240	3750	91 ~ 100	11250
		101 ~ 110	13125
		111 ~ 120	15000
		121 ~ 130	16875
		131 ~ 140	18750
		141 ~ 150	20625
		151 ~ 160	22500
		161 ~ 170	24375
		171 ~ 180	26250
		181 ~ 220	27500

M: Weight of moving part (kg)
m: Load weight (kg)
d: Command acceleration/deceleration (m/s²)
α: Thrust considering running resistance of the external guide
f: Running resistance (N) generated when an external guide or the like is attached
Fs: For RA15R, 20R only Please calculate the thrust for each speed from the table left.

* 1 When installing an external guide etc., it is necessary to consider running resistance f.

RCS3-RCS2 Series Servo press specification (with load cell)

- t□a is the acceleration time, but the calculation method differs depending on the ① trapezoidal pattern ② triangular pattern of the motion pattern.
  The difference between the trapezoidal pattern and the triangular pattern can be judged by operating the moving distance at the set speed, depending on whether the arrival speed is higher or lower than the set speed.

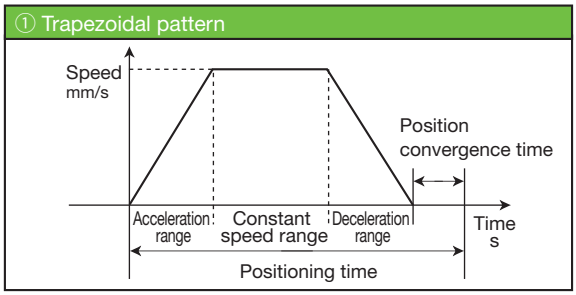
  Reaching speed (Vmax) $= \sqrt{\text{moving distance (m)} \times \text{set acceleration (m/s}^2\text{)}}$

  Set speed < Arrival speed → ① Trapezoidal pattern

  Set speed > Arrival speed → ② Triangular pattern

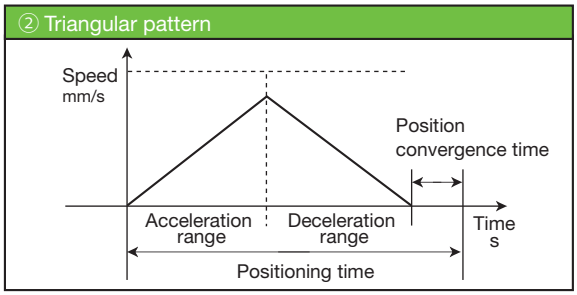
① In case of trapezoidal pattern

t□a = Vs/a Vs: set speed (m/s) a: command acceleration (m/s²)



② In case of triangular pattern

t□a = Vt/a Vt: arrival speed (m/s) a: command acceleration (m/s²)



- t□f is the constant-speed movement time. Calculate by calculating the constant speed moving distance.

  t□f = Lc/V Lc : Constant speed moving distance (m) V: Command speed (m/s)

  * Constant speed movement distance = movement distance - acceleration distance - deceleration distance
  acceleration distance (deceleration distance) = $V^2/2a$

- t□d is the deceleration time, but it is the same as the acceleration time if the acceleration and deceleration are the same.

  t□d = V/a V: Set speed (trapezoidal pattern) or arrival speed (triangular pattern) (m/s) a: Command deceleration (m/s²)

[RCS3-RA15R/RA20R only]

- Calculate average speed. The average speed is given by the following equation.

$$vt = \frac{0.5 \cdot v_1 \cdot t_{1a} + v_1 \cdot t_{1f} + 0.5 \cdot v_1 \cdot t_{1d} + 0.5 \cdot v_2 \cdot t_{2a} + v_2 \cdot t_{2f} + 0.5 \cdot v_2 \cdot t_{2d}}{t}$$

v_1 : Constant velocity speed at approach
v_2 : Constant velocity at return (during trapezoidal pattern)
Arrival speed (in triangular pattern)

Then, calculate the final continuous operation thrust from the calculated continuous operation thrust F_t and average speed v_t.

$$F = F_t + v_t \cdot K$$

The coefficient K is selected from the table below.

Model	Coefficient K
RA15R	150
RA20R	412.5

Please confirm that the calculated continuous operation thrust F_t (F in the case of RA15R, 20R, calculated by the above formula) is smaller than the continuous operation allowable thrust.
The permissible thrust of continuous operation of this product is as follows.

Model	Allowable continuous thrust force [N]
RA6R-LCT	420
RA7R-LCT	600
RA8R-LCT	1000
RA10R-LCT	2100
RA13R-LCT/LCN(*2)	Lead 2.5 5100
	Lead 1.25 10200
RA15R-LCT	13500
RA20R-LCT	22500

*2 The RCS2-RA13R must be used with a duty ratio of 50% or lower.

If conditions can not be satisfied, take measures such as shortening the pressing time or prolonging the waiting time.

Cautions on Push Force Motion by Rod Type

RCS3-RCS2 Series Rod type (without load cell)

RCS2

RA13R This is the same condition as the rod type with load cell for servo press.
See P1-319 to P1-322.

RCS3

It is required to meet the following two conditions bellow when using this model.

Condition 1. Push force time must be less than or equal to the specified time.

Condition 2. Operation duty is less than usable duty ratio depending on the operating conditions (Payload, speed).

Condition 3. The push force operation should be performed once in one cycle.

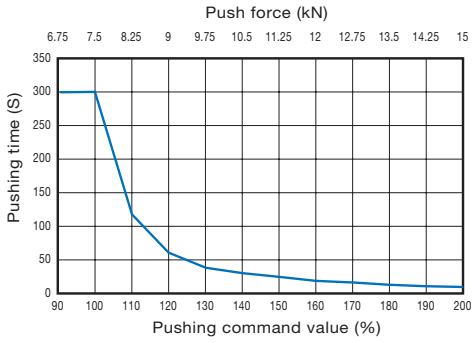
Selection method

Condition 1. Push force time

The maximum push force time for each push command value is determined as shown in the table below. Please ensure that no push moves exceed the specified times below.
Please pay attention that malfunction may occur in the actuator if you use it without following the table below.

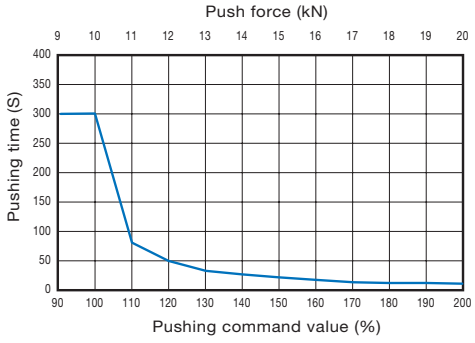
RA15R

Push command value (%)	Maximum pressing time (S)
90 or less	Capable of continuous pushing
91-100	300
110	118
120	58
130	40
140	30
150	25
160	20
170	16
180	13
190	10
200	9



RA20R

Push command value (%)	Maximum pressing time (S)
90 or less	Capable of continuous pushing
91-100	300
110	80
120	50
130	36
140	28
150	22
160	18
170	15
180	13
190	11
200	10



RCS3-RCS2 Series Rod type (without load cell)

Condition 2. Duty ratio

Duty ratio refers to the operating rate of the actuator (the time during which the actuator is operating during one cycle).
The standard of the usable duty ratio varies depending on the operating conditions (conveying mass, acceleration/deceleration etc.).
From the combination of the maximum speed and the payload within one cycle, check the following graphs for the usable duty ratio, and operate below the usable duty ratio.

<Example>
If the speed and payload change in reciprocating motion, check with a large value.

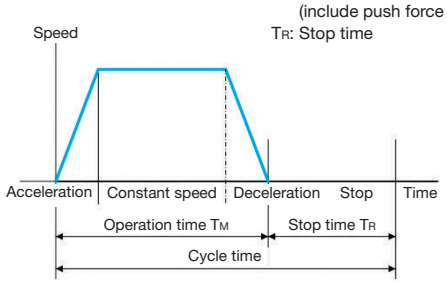
	Forward	Backward
Speed	Small value	Large value
Payload quantity	Large value	Small value

Please check from the following graph with this combination of values.

[Duty ratio]

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

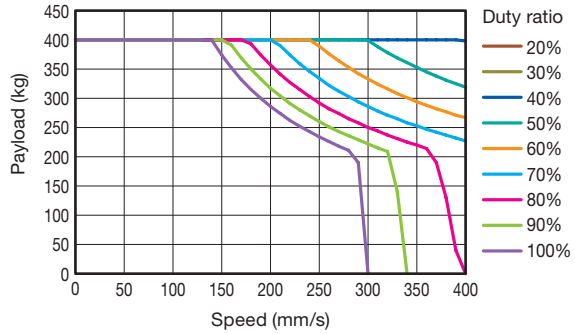
D: Duty ratio
T_M: Operating time (include push force time)
T_R: Stop time



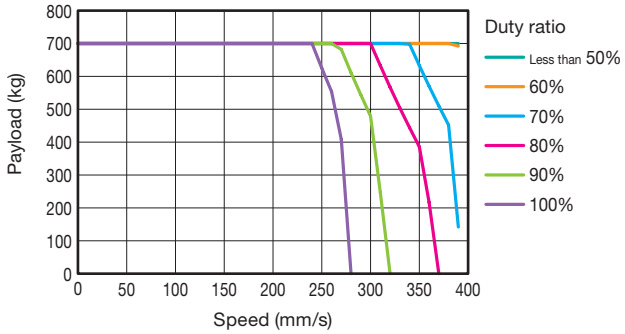
RCS3

RA15R

[Vertical installation]



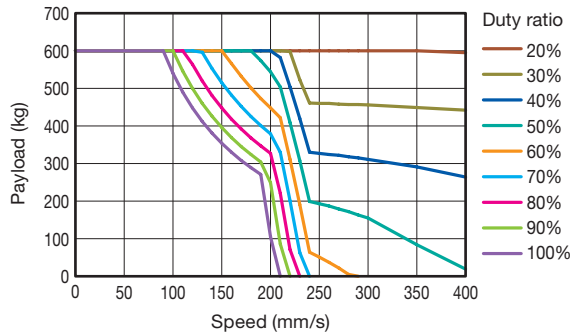
[Horizontal installation]



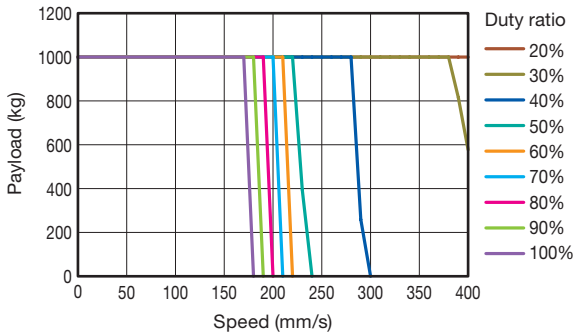
* The graph above shows the case where two external regenerative resistors are installed.
The number of regenerative resistance units (RESU-35T) can be reduced by payload, speed, and duty ratio.
Please contact our sales department for details.

RA20R

[Vertical installation]



[Horizontal installation]



* The graph above shows the case where two external regenerative resistors are installed.
The number of regenerative resistance units (RESU-35T) can be reduced by payload, speed, and duty ratio.
Please contact our sales department for details.

Information on Moment Selection (RCS3·RCS2)

RCS3-RCS2 Series Rod type (without load cell)

RCS2

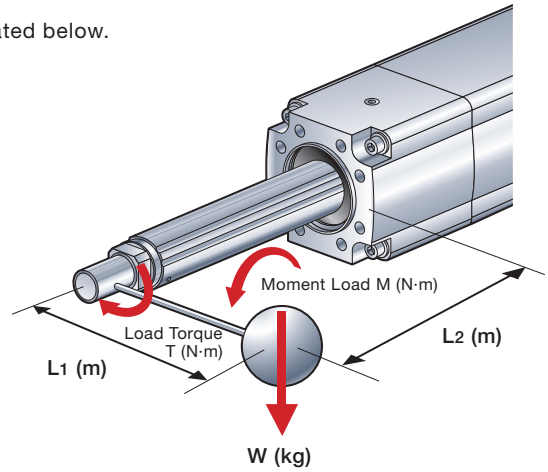
RA13R This can apply a load on the rod within the range of conditions calculated below.

RCS2-RA13R (without load cell) can apply a load on the rod within the range of conditions calculated below.

M + T ≦ 120 (N·m)
Moment Load M = Wg × L2
Load Torque T = Wg × L1

* g = Gravitational acceleration 9.8
* L1 = Distance from rod center to work center of gravity
* L2 = Distance from actuator mounting surface to work center of gravity + 0.07

If the above conditions are not satisfied, please pay attention so that no load is applied to the rod by providing external guides.



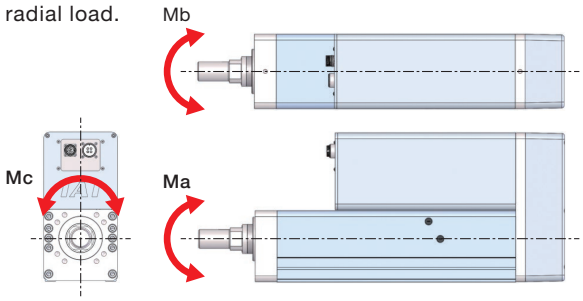
RCS3

RCS3-RA15R/RA20R The load can be applied to the rod within the following two conditions.

Condition 1. The radial load applied is less than the allowable maximum radial load.
Condition 2. The moment applied should meet the following formula.

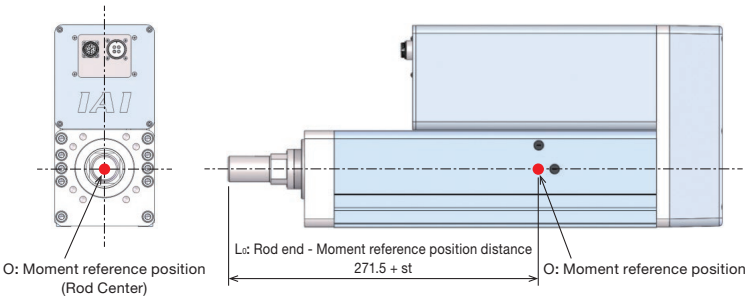
$M \geqq Ma + Mb + K \cdot Mc$

M: Allowable moment (see table below)
Ma, Mb, Mc: Load moment (see the right figure)
K: Equivalent coefficient
RCS3-RA15R: 0.36
RCS3-RA20R: 0.37



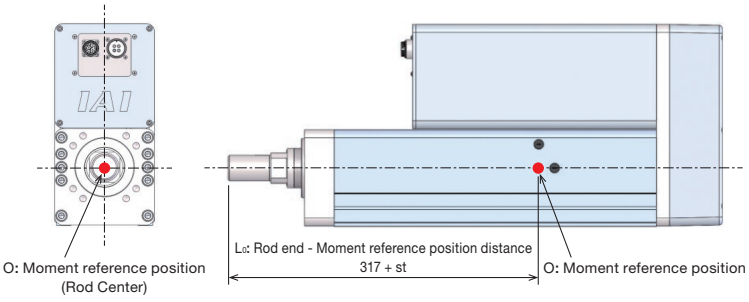
■ RCS3-RA15R

Stroke (mm)	100	200	300	400	500
Maximum allowable Radial load (N)	392				
Allowable moment (Nm)	140	135	130	125	120



■ RCS3-RA20R

Stroke (mm)	100	200	300	400	500
Maximum allowable Radial load (N)	540				
Allowable moment (Nm)	230	220	210	200	190



About Duty Ratio

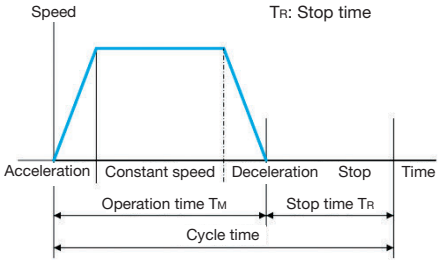
Duty ratio refers to the operating rate of the actuator (the time during which the actuator is operating for one cycle).
Note that the calculation method of the duty ratio is different between the stepper motor type and the AC servo motor type actuator.

<Stepper motor>
The stepper motor can be operated at the duty ratio of 100%.
For models that require duty ratio restrictions, see the following.

[Duty ratio]

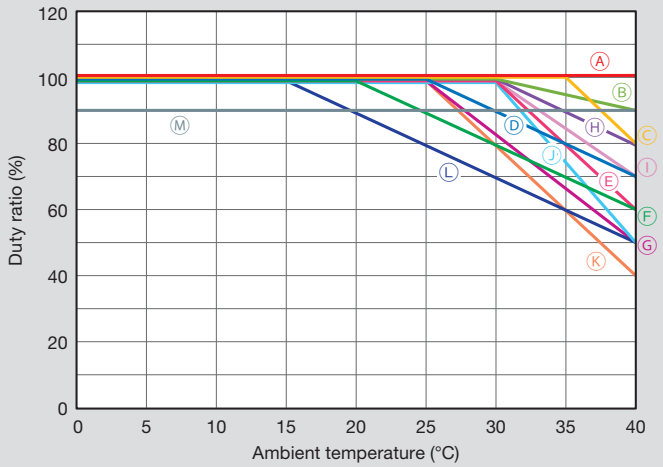
$$D = \frac{T_M}{T_M + T_R} \times 100\ (\%)$$

D: Duty ratio
TM: Operating time (include push force time)
TR: Stop time



In the case of EC

■ Relationship between ambient temperature and duty ratio



Ⓐ SL3, S2(□R), (D)S3□(A)(R), (D)S4(□A), (D)WS10(□R), (D)B6, (D)B7, B8S, GDS3, GDB3, RR2(□R), (D)RR3(□R), RR8(□R), RR10(□R), (D)RR4, RP, GS, GD, SRG, T3, TC, TW, GRB(P)8(MW), GRB(P)10(MW), GRB13, GRC, RTB, RTC, ST
Ⓑ GRST7
Ⓒ (D)S6(□AH), (D)S7(□AH), (D)R6, (D)R7, (D)RR6(X)(□AH), (D)RR7(X)(□AH), R6□W, R7□W
Ⓓ (D)S6□A, (D)S6X□AH, S6□D, S6□W
Ⓔ GRBP13(□W), GRST6
Ⓕ (D)S4□R, (D)S6□(AH)R, (D)S7□A, (D)S7X□AH, (D)S7□(AH)R, (D)WS12(□R), (D)RR4□R, (D)RR6□(AH)R, (D)RR7□(AH)R, S7□D, S7□W
Ⓖ GRST3
Ⓗ S8(□A)
Ⓘ S8X□A
Ⓙ S8□(A)R
Ⓚ S8X□AR
Ⓛ (D)S6□AR, (D)S7□AR, (D)S6X□AHR, (D)S7X□AHR
Ⓜ GRTR14

*The cleanroom actuators have the same limitations as their standard environment counterparts.

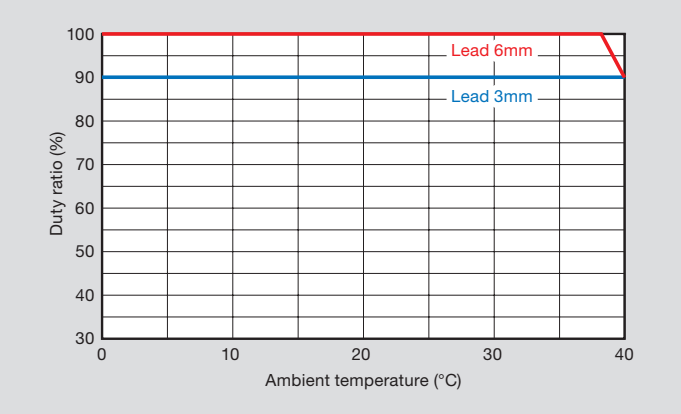
In the case of RSP6S(CR/W)

Duty ratio by type

RCP6S series	Duty ratio
□35 Stepper motor type SA4 / RRA4 / RA4 / TA4 / WSA10 / WRA10 (Common in straight motor type / motor side-mounted type)	100%
□42 Stepper motor type SA6 / HSA6 / RRA6 / RA6 / TA6 / WSA12 / WRA12 (Common in straight motor type / motor side-mounted type)	See graph on P1-327
□56 Stepper motor type SA7 / HSA7 / RRA7 / RA7 / TA7 / WSA14 / WRA14 (Common in straight motor type / motor side-mounted type)	See graph on P1-327
□56 High thrust stepper motor type SA8 / WSA16 (Common in straight motor type / motor side-mounted type)	100%
□60 High thrust stepper motor type RRA8 / RA8 / WRA16 (Common in straight motor type / motor side-mounted type)	70%

About Duty Ratio

■ Relationship between ambient temperature and duty ratio of 42 stepper motor type.



□42 Stepper motor type

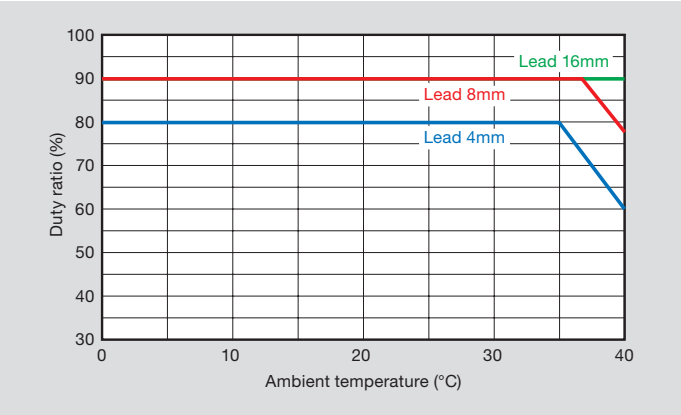
SA6/RRA6/RA6/TA6/WSA12/WRA12

(Common in straight motor type / motor side-mounted type)

Lead	3mm	6mm	12mm/20mm
Limit on duty ratio	90% or less	38°C or less 100% 40°C 90% or less	100%

(Note) There is no 20mm for RCP6W.

■ Relationship between ambient temperature and duty ratio of 56 stepper motor type (except for high-thrust motor).



□56 Stepper motor type

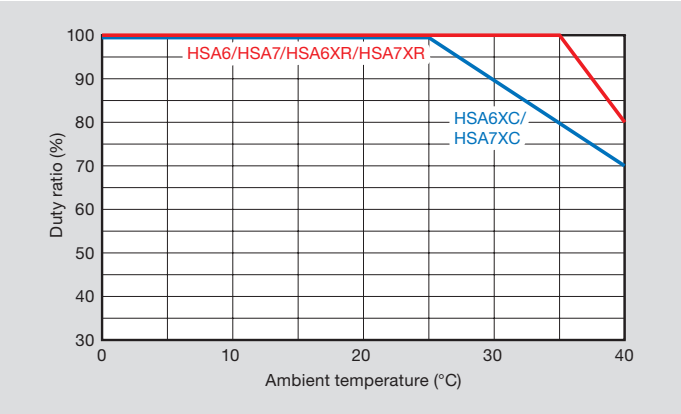
SA7/RRA7/RA7/TA7/WSA14/WRA14

(Common in straight motor type / motor side-mounted type)

Lead	4mm	8mm	16mm	24mm
Limit on duty ratio	35°C or less 80% 40°C 60% or less	37°C or less 90% 40°C 78% or less	90% or less	100%

(Note) There is no 24mm for RCP6W.

■ Relationship between ambient temperature and duty ratio of the high rigidity RCP6 sliders.



High rigidity RCP6 sliders

HSA6/HSA7/HSA6X/HSA7X

(Straight motor type / motor side-mounted type)

Type	HSA6/HSA7/HSA6XR/HSA7XR	HSA6XC/HSA7XC
Limit on duty ratio	35°C or Less 100% 40°C 80% or Less	25°C or Less 100% 40°C 70% or Less

<AC servomotor>

Since the guideline of the usable duty ratio varies depending on the operating conditions (payload, acceleration/deceleration etc.), calculate the load factor, LF, and the acceleration/deceleration time ratio: tod, from the following calculation formula and obtain it from the graph.

❶ Calculate the load factor LF from the following formula.

The load factor LF calculation formula varies depending on the model. Please check the target model and calculate the load factor.

1 RCA/RCA2/RCS2 series

$$\text{Ⓐ Load factor: LF①} = \frac{M \times \alpha}{M_1 \times \alpha_1} \ (\%)$$

- Payload capacity at rated acceleration : M1
- Rated acceleration/deceleration : $\alpha 1$
- Actual carrying mass : M (M ≦ M1)
- Command acceleration/deceleration : α ($\alpha \leqq \alpha 1$)

(Note) Please refer to model / spec table of each model for payload capacity and rated acceleration/deceleration at rated acceleration/deceleration.

When operating under the following operating conditions, the load factor is as follows.

<Example 1>		<Example 2>		<Example 3>	
Actual conveying mass	: 5kg	Actual conveying mass	: 2.5kg	Actual conveying mass	: 5kg
Command acc./dec.	: 0.3G	Command acc./dec.	: 0.3G	Command acc./dec.	: 0.15G
Load capacity at rated acc./dec.	: 5kg	Load capacity at rated acc./dec.	: 5kg	Load capacity at rated acc./dec.	: 5kg
Rated acc./dec.	: 0.3G	Rated acc./dec.	: 0.3G	Rated acc./dec.	: 0.3G
Load factor: LF ①	= 100%	Load factor: LF ①	= 50%	Load factor: LF ①	= 50%

2 200VAC EC/IS(P)B/SSPA/IS(P)DB/NSA/IFA/IS(P)DBCR/SSPDACR/IS(P)DACR/RCS4/RCS3/TTA Series

Acceleration/deceleration above the rating is set for the above compatible models.
Depending on command acceleration/deceleration, the calculation formula to be used is different.

(1) When the commanded acceleration/deceleration is less than the rated values, use the above formula Ⓐ.

(2) When the commanded acceleration/deceleration exceeds the rated acceleration/deceleration, use formula Ⓑ.

$$\text{Ⓑ Load factor: LF②} = \frac{M \times \alpha}{M_2 \times \alpha} = \frac{M}{M_2} \ (\%)$$

- Actual conveying mass : M
- Command acceleration/deceleration : α
- Payload quantity of command acceleration/deceleration : M2 (M ≦ M2)

(Note) For payload capacity corresponding to acceleration/deceleration and acceleration/deceleration of each model, please refer to the acceleration weighted payload quantity table of each model.

When operating under the following operating conditions, the load factor is as follows.
As an example, we will use the acceleration weighted payload table of "RCS3-SA8C 150W Lead 30".

Model	Type	Motor output	Lead [mm]	Payload quantity by acceleration [kg]			
				0.3G	0.5G	0.7G	1G
RCS3	SA8C	150W	30	12	10	6	2

(Note) When horizontal use low speed acceleration/deceleration 0.3G

<Example 1>		<Example 2>		<Example 3>	
Actual conveying mass	: 2kg	Actual conveying mass	: 5kg	Actual conveying mass	: 12kg
Command acc./dec.	: 1.0G	Command acc./dec.	: 0.5G	Command acc./dec.	: 0.3G
Payload quantity of command acc./dec.	: 2kg	Payload quantity of command acc./dec.	: 10kg	Payload quantity of command acc./dec.	: 12kg
Load factor: LF ②	= 100%	Load factor: LF ②	= 50%	(Note) Use load factor calculation method Ⓐ.	

About Duty Ratio

3 RCA, RCS2 For high acceleration/deceleration option use model

Calculate the load factor LF ③ from the calculation formula Ⓒ. Even in case of high acceleration/deceleration specification, the rated acceleration is the same value as the standard specification.

$$\text{Ⓒ Load factor: LF③} = \frac{M \times \alpha_2}{M_1 \times \alpha_1} (\%)$$

- Actual conveying mass : M
- Command acceleration/deceleration : α_2
- Payload quantity at rated acceleration/deceleration : M1
- Rated acceleration/deceleration : α_1(0.3G)

<Example 1>

Actual conveying mass	: 2kg
Command acc./dec.	: 0.6G
Load capacity at rated acc./dec.	: 2kg
Rated acc./dec.	: 0.3G
Load factor: LF ③	= 200%

<Example 2>

Actual conveying mass	: 1kg
Command acc./dec.	: 0.9G
Load capacity at rated acc./dec.	: 2kg
Rated acc./dec.	: 0.3G
Load factor: LF ③	= 150%

Maximum acc./dec. by model: α max
($M \leqq M_1$, $\alpha_1 < \alpha_2 \leqq \alpha$ max)

α max (maximum acc./dec. by model) list

Model	Lead	α max
RCA/RCS2-SA4C	10	1
	5	1
RCA/RCS2-SA5C	12	0.8
	6	0.8
RCA/RCS2-SA6C	12	1
	6	1
RCS2-SA7C	16	1
	8	0.8
RCA-RA3C	10	1
	5	1
RCA-RA4C 30W	12	1
	6	1
RCS2-RA5C 100W	16	1
	8	1

❷ Calculate the acceleration/deceleration time ratio tod from the following calculation formula.

* Calculation is not needed for the NSA series. Skip ② and ③. Go to ④.

$$\text{Acceleration/deceleration time ratio: } t_{od} = \frac{\text{Acceleration time} + \text{Deceleration time}}{\text{Operating time}} \%$$

$$\text{Acceleration time} = \frac{\text{Speed (mm/s)}}{\text{Acceleration (mm/s}^2\text{)}} \text{(sec)}$$

Acceleration (mm/s²) =Acceleration (G) × 9,800mm/s²

$$\text{Deceleration time} = \frac{\text{Speed (mm/s)}}{\text{Deceleration (mm/s}^2\text{)}} \text{(sec)}$$

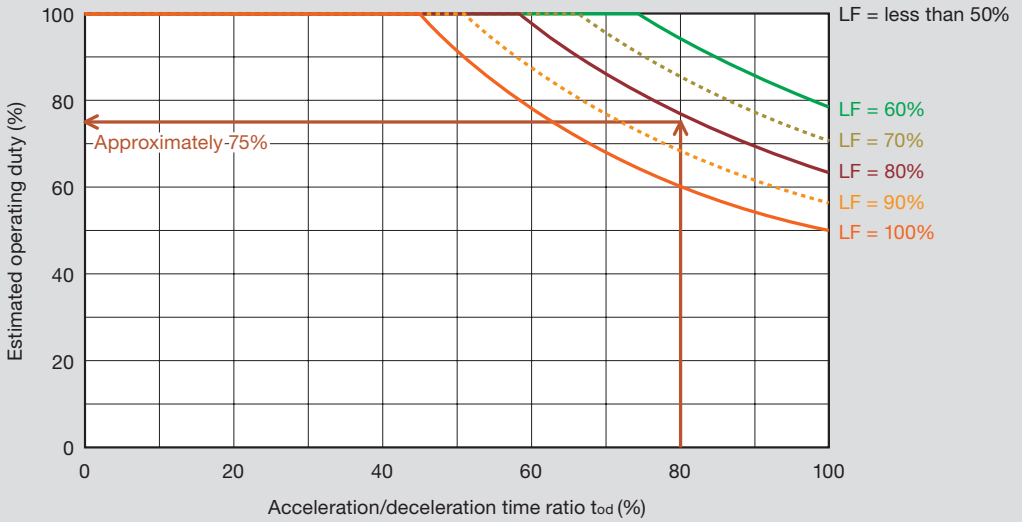
Deceleration (mm/s²) = Deceleration (G) × 9,800mm/s²

❸ Read the guideline of duty ratio from the calculated "load factor" and "acceleration/deceleration time ratio."

For RCA and RCS2 high acceleration/deceleration option use models, use "Duty ratio guide 2 (for high acceleration/deceleration specification)".

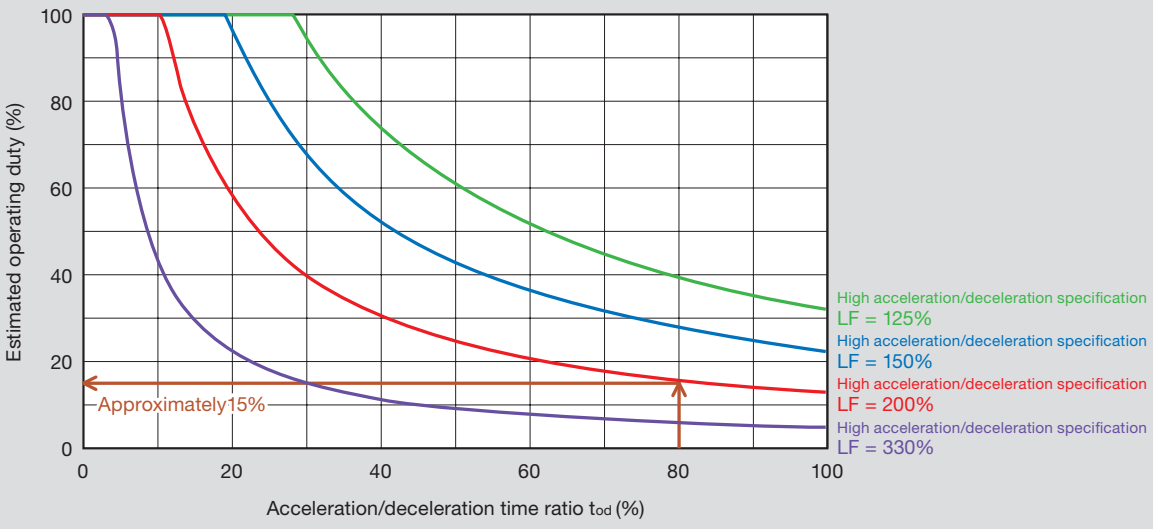
Duty ratio measure guide 1 (for standard use)

Example: When the load factor is 80% and the acceleration/deceleration time ratio is 80%, the guideline for the duty ratio is approximately 75%.



Duty ratio guide 2 (for high acceleration/deceleration specification)

Example: When the load factor is 200% and the acceleration/deceleration time ratio is 80%, the guideline for the duty ratio is approximately 15%.



❹ [NSA series] Confirm the guide duty ratio from the calculated "load factor."

The guide duty ratio of the NSA series is determined according to the load factor, LF, as specified in the table below.

Load factor LF	100%	90%	80%	70%	60%	50% or less
Duty ratio	50%	56%	63%	70%	78%	100%

Note: M size lead 30 is operated at duty ratio of 50% regardless of the conditions such as load factor.

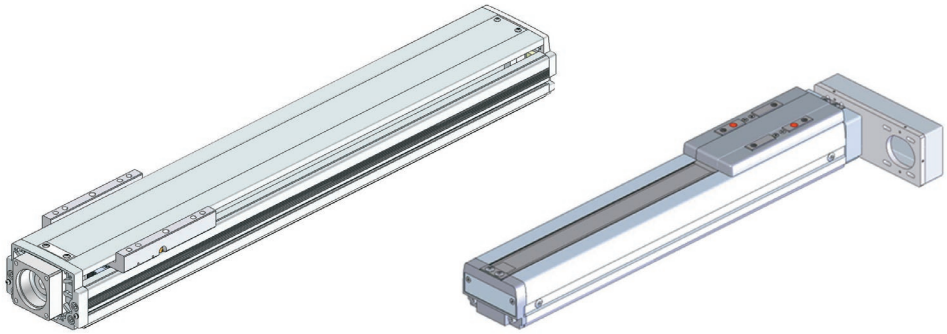
Special Specification

In addition to the standard products listed in the catalog, we also support a variety of special options.
If we do not have your desired product, please feel free to contact our sales offices.

Special Product Examples

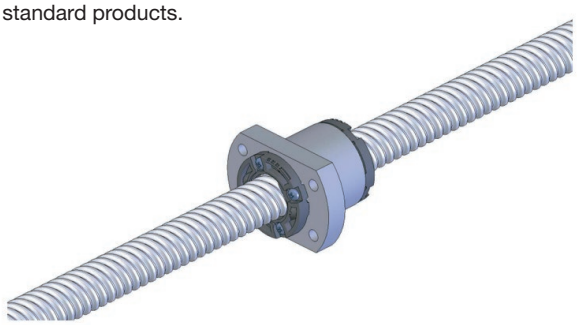
No motor / Special motor

When customer prepares motor and driver, only actuator without motor can be shipped.
In addition, we can ship it with a non-standard motor specified by the customer.



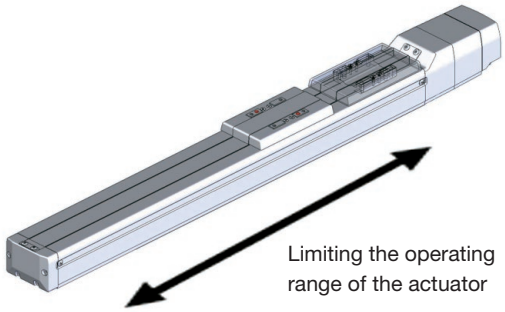
Special ball screw lead

It is possible to use ball screw leads that are not available in standard products.



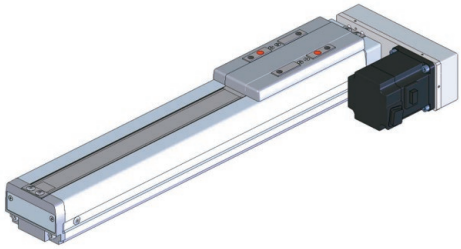
Special home position

It is possible to change the home position.(mechanical end)



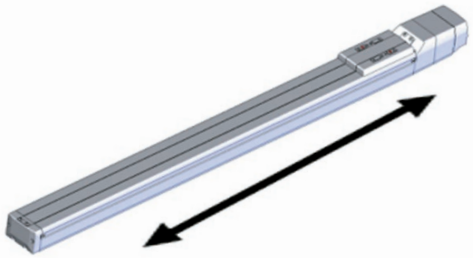
Side-mounted motor

Side-mounted motor actuators can be made, even for those series which do not have them in their standard lineup.



Special stroke

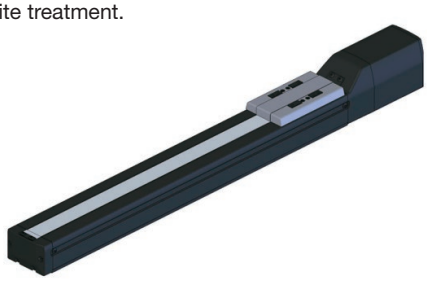
Non-standard strokes can be made.



Special Product Examples

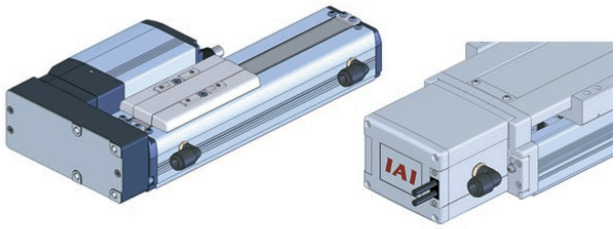
Surface treatment

Surface treatment can be changed by black alumite treatment or hard alumite treatment.



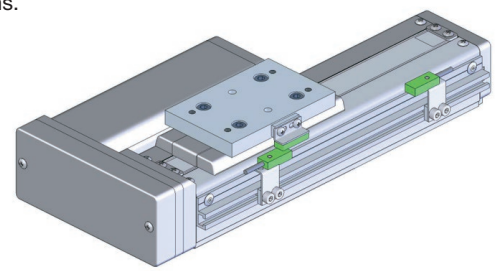
Air purge specification

By air purge, it is possible to make it harder for foreign matter to enter the inside of the actuator and the motor part than standard parts.



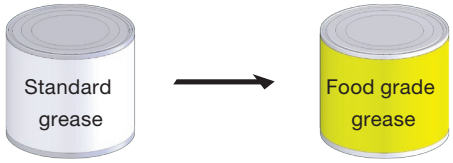
Sensor specifications

Sensors can be installed on models that do not have sensor options.

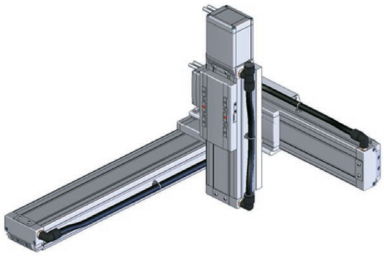


Grease

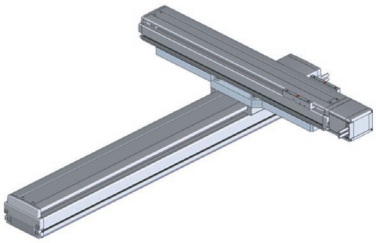
It is possible to change grease such as food grade grease, low dust grease, and customer specified grease.



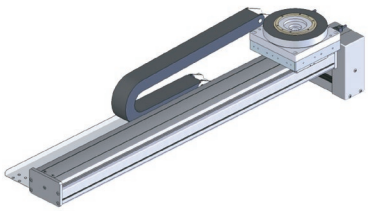
Special Cartesian robot combination



Cleanroom specification product combination



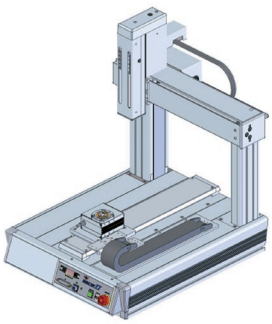
XY table combination



Xθ combination

Special table top type robot combination

Table top robot + rotary shaft



Dust/Splash-proof Specification: Solvent Resistance of Materials Used

Name		NBR (nitrile rubber)	PVC (polyvinyl chloride)	FKM (fluoro-rubber)
		Standard specification	Standard specification	Option
Water-soluble cutting oil		○	○	△
Water-insoluble cutting oil		△	○	○
Cleaning fluid		○	○	○
Lubricating oil	Engine oil	○	○	○
	Gear oil	○	○	○
	Torque converter oil	○		○
	Brake oil (glycol-based)	△		×
	Brake oil (silicone-based)	○		○
	Machine oil	○		○
	Spindle oil	○		○
	Refrigerant oil (mineral-based)	○		○
	Cap grease	○		○
	Lithium grease	○	○	○
	Silicon grease	○	○	○
Hydraulic oil	Standard petroleum oil-based	○	○	○
	Low temperature petroleum oil-based	○	○	○
	Fatty acid ester-based	○		○
	Phosphate ester-based	×		△
	Water/glycol-based	○	○	△
	Water/oil emulsion-based	○	○	△
	Type II turbine oil	○		○
	Silicone-based	○		○
	Brake oil	△		△
Chemicals	10% hydrochloric acid fluid	○	○	○
	30% sulphuric acid fluid	△		△
	10% nitric acid fluid	×		△
	40% sodium hydroxide fluid	○		×
	Benzene	×	×	×
	Alcohol	○		○
	Methyl ethyl ketone	×	×	×
	Trichlene	×	×	△
	Ethylene glycol	○	×	○
	Acetone	×	×	×
Other	Gasoline	△	×	○
	Light oil/kerosene	△		○
	Fuel oil	○		○
	Antifreeze (ethylene glycol-based)	○		×
	Cold/warm water	○	○	○
	Saltwater	○		○

Rating	Effect on solvent sealing materials
○	Minor effect, can be used
△	Moderate effect, use must be confirmed
×	Major effect, use not recommended

*1 Rating may differ by brand.

*2 Resistance table created based on internal IAI evaluations and standard evaluations. Use this data as a selection guideline.

*3 Rating may differ by environmental conditions and operating conditions. Select solutions only after confirming any effects they may have.

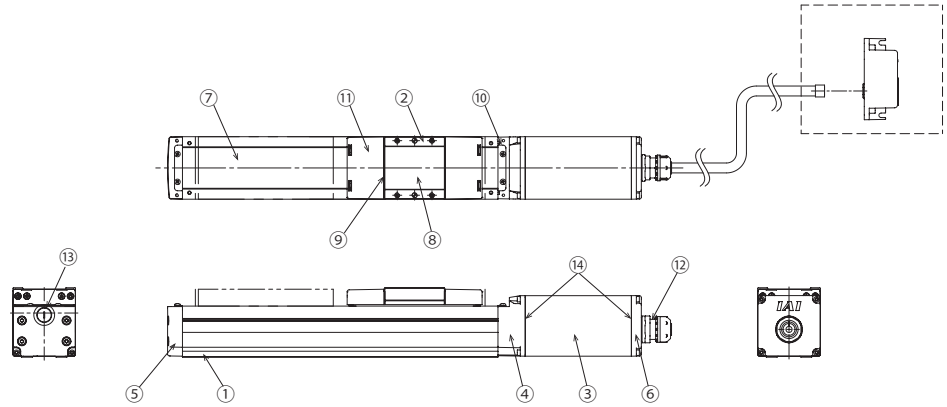
*4 We can conduct resistance tests for specified solutions. Please contact us for details.

EC Dust/Splash-proof Specification: Exterior Component Materials

■ EC-S□D

	Item	Material	Treatment
Exterior components	① Base	Dedicated aluminum extruded material (A6063SS-T5 equivalent)	Black alumite
	② Slider	Dedicated aluminum extruded material (A6063SS-T5 equivalent)	White alumite
	③ Motor cover	Dedicated aluminum extruded material (A6063SS-T5 equivalent)	Black alumite
	④ Bare housing	Aluminum die cast (ADC12)	
	⑤ Front bracket	Aluminum die cast (ADC12)	
	⑥ Motor end cover	Aluminum die cast (ADC12)	
	⑦ Stainless steel sheet	Special stainless steel	
	⑧ Sheet cover	Stainless steel (SUS304)	
	⑨ Gasket	NBR	
	⑩ Sheet retainer	Stainless steel (SUS304)	
	⑪ Slider cover	Resin (POM)	
	⑫ Cable clamp	Body: Resin (PA66), Seal: NBR	
	⑬ Cap	NBR	
	⑭ Gasket	NBR	

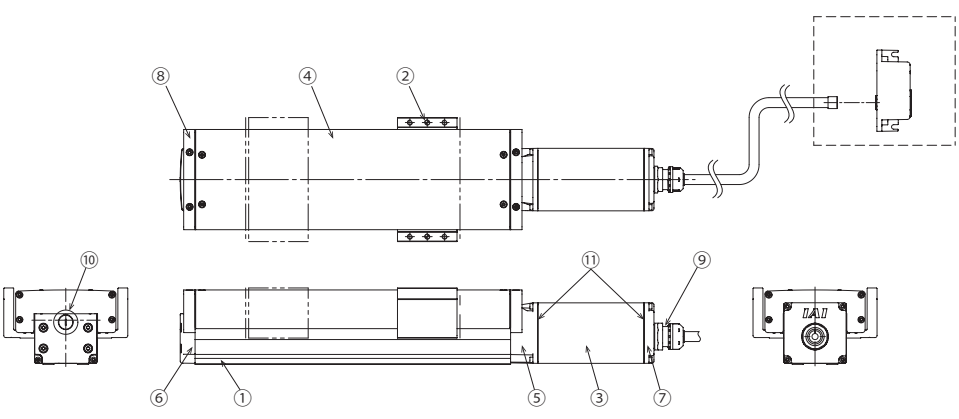
S□D



■ EC-S□W

	Item	Material	Treatment
Exterior components	① Base	Dedicated aluminum extruded material (A6063SS-T5 equivalent)	Black alumite
	② Slider	Dedicated aluminum extruded material (A6063SS-T5 equivalent)	White alumite
	③ Motor cover	Dedicated aluminum extruded material (A6063SS-T5 equivalent)	Black alumite
	④ Top cover	Dedicated aluminum extruded material (A6063SS-T5 equivalent)	Black alumite
	⑤ Bare housing	Aluminum die cast (ADC12)	
	⑥ Front bracket	Aluminum die cast (ADC12)	
	⑦ Motor end cover	Aluminum die cast (ADC12)	
	⑧ End cover	Aluminum (A5052)	White alumite
	⑨ Cable clamp	Body: Resin (PA66), Seal: NBR	
	⑩ Cap	NBR	
	⑪ Gasket	NBR	

S□W

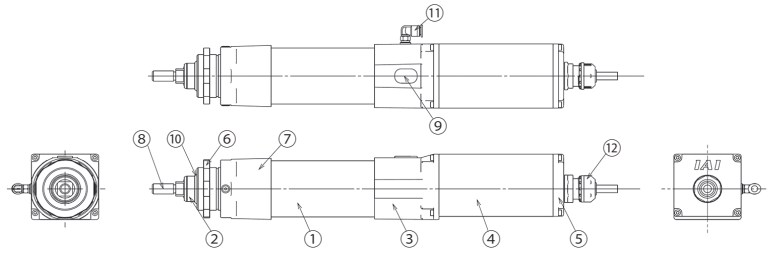


EC Dust/Splash-proof Specification: Exterior Component Materials

■ EC-R6□W/R7□W

	Item			Material	Treatment
Exterior components	① Frame			Extruded aluminum	Black alumite
	② Rod			Drawn aluminum	Hard alumite
	③ Rear bracket			Aluminum die cast	
	④ Motor cover			Extruded aluminum	Black alumite
	⑤ End cover			Aluminum die cast	
	⑥ Front fixing nut			Steel	Trivalent chromate
	⑦ Front bracket			Aluminum die cast	
	⑧ Tip bracket			Stainless steel	
	⑨ Rubber cap (greasing port)		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑩ Scraper		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑪ Exhaust/intake port		Standard	NBR + resin (PBT/POM) + brass	Nickel plated
			Option	FKM + resin (PBT/POM) + brass	Nickel plated
	⑫ Actuator cable	Cable gland	Standard	Rubber (NBR) + PBT resin + nylon	
			Option	Rubber (FKM) + PBT resin + PP	
		Cable sheath	Standard	Vinyl chloride (PVC)	
			Option	Rubber (FKM)	
	Exterior bolts			Stainless steel	
	Sealing materials		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	

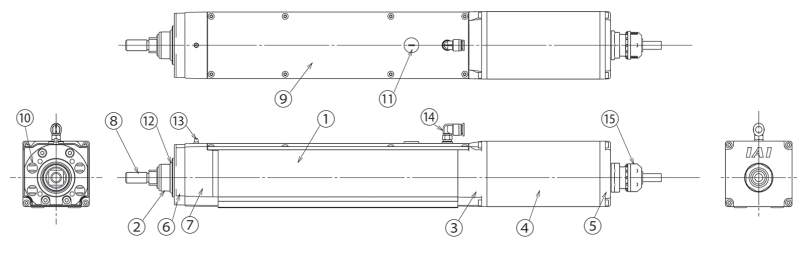
R□W



■ EC-RR6□W/RR7□W

	Item			Material	Treatment
Exterior components	① Base			Extruded aluminum	Black alumite
	② Rod			Drawn aluminum	Hard alumite
	③ Bare housing			Aluminum die cast	
	④ Motor cover			Extruded aluminum	Black alumite
	⑤ End cover			Aluminum die cast	
	⑥ Scraper case			Aluminum die cast	
	⑦ Front bracket			Aluminum die cast	
	⑧ Tip bracket			Stainless steel	
	⑨ Frame cover			Extruded aluminum	Black alumite
	⑩ Cap		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑪ Rubber cap (greasing port)		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑫ Scraper		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑬ Grease port		Standard	Brass (C3604)	
			Option	Stainless steel	
	⑭ Exhaust/intake port		Standard	NBR + resin (PBT/POM) + brass	Nickel plated
			Option	FKM + resin (PBT/POM) + brass	Nickel plated
	⑮ Actuator cable	Cable gland	Standard	Rubber (NBR) + PBT resin + nylon	
			Option	Rubber (FKM) + PBT resin + PP	
		Cable sheath	Standard	Vinyl chloride (PVC)	
			Option	Rubber (FKM)	
	Exterior bolts			Stainless steel	
	Sealing materials		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	

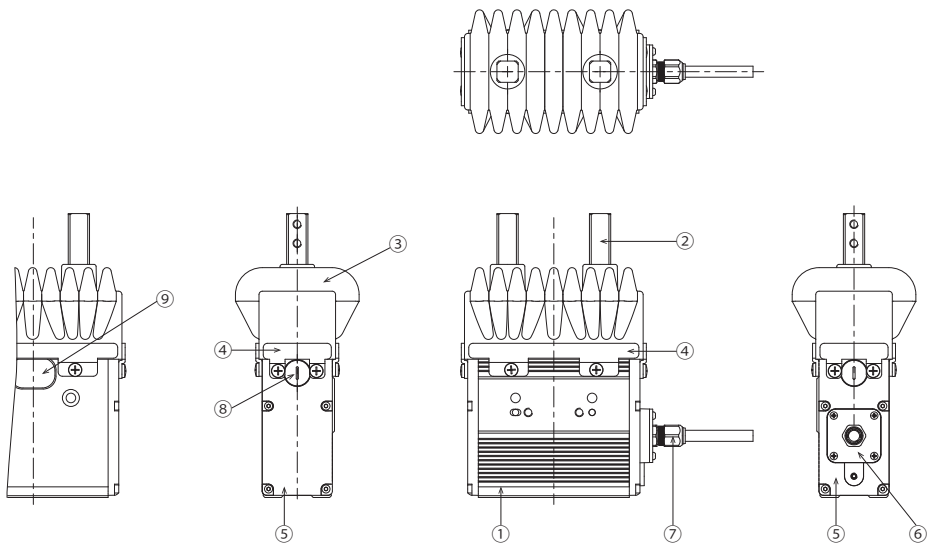
RR□W



■ EC-GRBP□W

	Item		Material	Treatment
Exterior components	① Frame	GRBP8W	Special aluminum extrusion material (A6063SS-T5)	Black alumite
		GRBP10W/13W	Special aluminum extrusion material (A6063SS-T6)	Black alumite
	② Finger attachment		Stainless steel (SCS13)	Solution heat treatment
	③ Rubber cover	RCH	Rubber (chloroprene)	
		RSL	Rubber (silicone)	
	④ Fixing bracket		Stainless steel (SUS304)	
	⑤ End cover		Aluminum die cast (ADC12)	
	⑥ Cable gland plate		Stainless steel (SUS304)	
	⑦ Cable gland		Metal parts: Brass (nickel plated)	
	⑧ Cap		Rubber (NBR)	
	⑨ Grease lubrication cap		Rubber (NBR)	
	Grease	Trapezoidal screw	Kyodo Yushi Multemp AC-D or equivalent	
		Guide	Kyodo Yushi Multemp PS No.2 or equivalent	

GRBP□W



RCP6W Exterior Components Material of each part

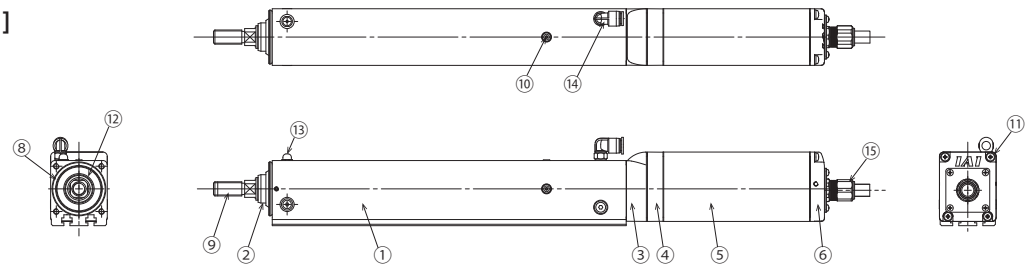
■ RCP6W-RA4

○: Standard

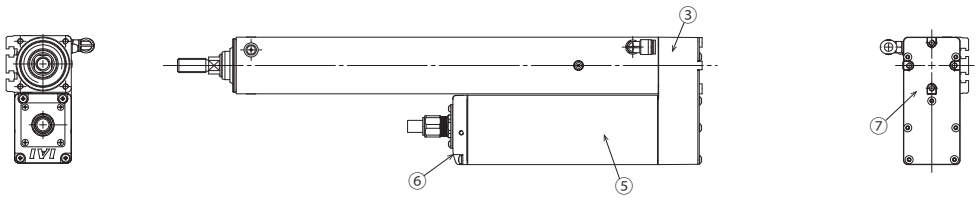
	Component		Material	Processing	Finishing	RA4C	RA4R
Exterior components	① Body frame		Aluminum extruded material	White alumite		○	○
	② Rod		Aluminum drawing material	Hard alumite	Buffing finish	○	○
	③ Rear bracket		Aluminum die cast	Decorative surface paint		○	○
	④ Motor bracket		Aluminum die cast	Decorative surface paint		○	
	⑤ Motor cover		Aluminum extruded material	White alumite		○	○
	⑥ End cover		Aluminum die cast	Decorative surface paint		○	○
	⑦ Pulley cover		Stainless steel				○
	⑧ Rod seal housing IP		Aluminum	White alumite		○	○
	⑨ Tip bracket		Stainless steel			○	○
	⑩ Cap		Stainless steel			○	○
	⑪ Bolts and screws of the exterior part		Stainless steel			○	○
	⑫ Dust seal		Rubber (NBR)			○	○
	⑬ Grease nipple		Brass (C3604)	Electroless nickel plating		○	○
	⑭ Intake and exhaust port		Resin (PBT, POM), Brass Nickel plating processing			○	○
	⑮ Actuator cable	Cable ground	Rubber (NBR) Resin (PBT, POM), Brass Nickel plating processing			○	○
		Cable Sheath	Vinyl chloride (PVC)			○	○
	Hexagon nut		Stainless steel			○	○
	Square nut		Stainless steel			○	○
	Each part gasket		Rubber (NBR)			○	○

RA4

[Coupled motor type]



[Side-mounted type]



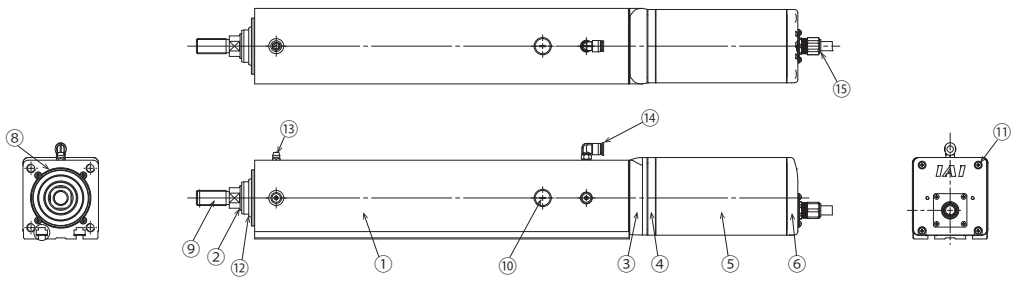
RCP6W-RA6/RA7/RA8

○: Standard

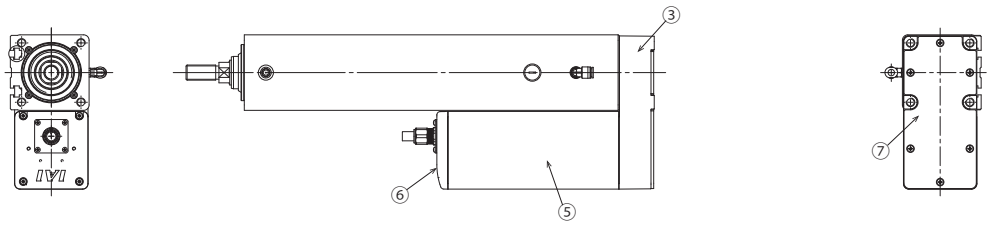
	Component		Material	Processing	Finishing	RA6C	RA6R	RA7C	RA7R	RA8C	RA8R
Exterior components	① Body frame		Aluminum extruded material	White alumite		○	○	○	○	○	○
	② Rod		Aluminum drawing material	Hard alumite	Buffing finish	○	○	○	○	○	○
	③ Rear bracket		Aluminum die cast	Decorative surface paint		○	○	○	○	○	○
	④ Motor bracket		Aluminum die cast	Decorative surface paint		○		○			
	⑤ Motor cover		Aluminum extruded material	White alumite		○	○	○	○	○	○
	⑥ End cover		Aluminum die cast	Decorative surface paint		○	○	○	○	○	○
	⑦ Pulley cover		Stainless steel				○		○		○
	⑧ Rod seal housing IP		Aluminum	White alumite		○	○	○	○	○	○
	⑨ Tip bracket		Stainless steel			○	○	○	○	○	○
	⑩ Cap		Stainless steel			○	○	○	○	○	○
	⑪ Bolts and screws of the exterior part		Stainless steel			○	○	○	○	○	○
	⑫ Dust seal		Rubber (NBR)			○	○	○	○	○	○
	⑬ Grease nipple		Brass (C3604)	Electroless nickel plating		○	○	○	○	○	○
	⑭ Intake and exhaust port		Resin (PBT, POM), Brass Nickel plating processing			○	○	○	○	○	○
	⑮ Actuator cable	Cable ground	Rubber (NBR) Resin (PBT, POM), Brass Nickel plating processing			○	○	○	○	○	○
		Cable Sheath	Vinyl chloride (PVC)			○	○	○	○	○	○
	Hexagon nut		Stainless steel			○	○	○	○	○	○
	Square nut		Stainless steel			○	○	○	○	○	○
	Each part gasket		Rubber (NBR)			○	○	○	○	○	○

RA6/7

[Coupled motor type]

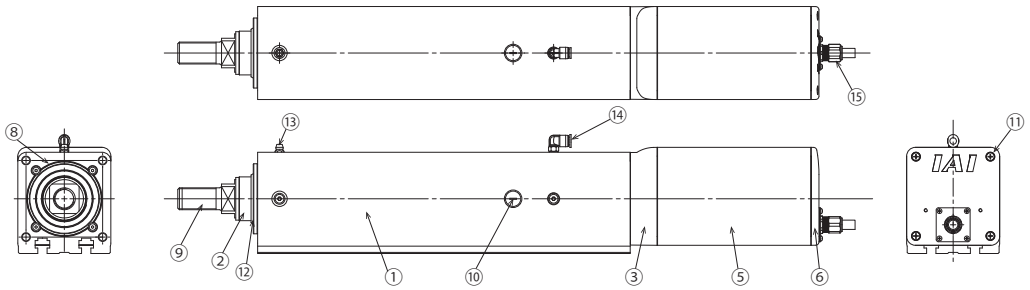


[Side-mounted type]

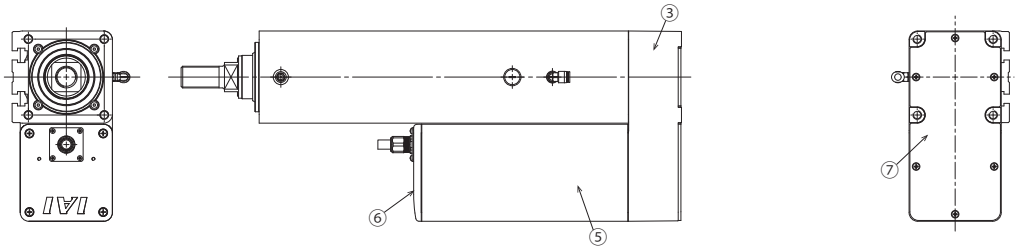


RA8

[Coupled motor type]



[Side-mounted type]



RCP6W Exterior Components Material of each part

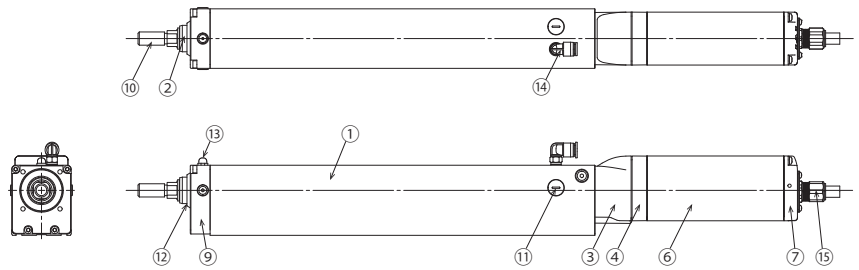
RCP6W-RRA4/RRA6/RRA7

○: Standard

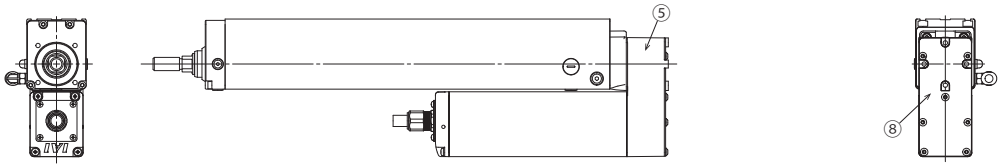
	Component		Material	Processing	Finishing	RRA4C	RRA4R	RRA6C	RRA6R	RRA7C	RRA7R
Exterior components	① Frame		Aluminum extruded material	White alumite		○	○	○	○	○	○
	② Rod		Aluminum drawing material	Hard alumite	Buffing finish	○	○	○	○	○	○
	③ Rear bracket		Aluminum die cast	Decorative surface paint		○	○	○	○	○	○
	④ Motor bracket		Aluminum die cast	Decorative surface paint		○		○		○	
	⑤ Reverse bracket		Aluminum die cast	Decorative surface paint			○		○		○
	⑥ Motor cover		Aluminum extruded material	White alumite		○	○	○	○	○	○
	⑦ End cover		Aluminum die cast	Decorative surface paint		○	○	○	○	○	○
	⑧ Pulley cover		Stainless steel				○		○		○
	⑨ Front bracket IP		Aluminum	White alumite		○	○	○	○	○	○
	⑩Rod tip bracket		Stainless steel			○	○	○	○	○	○
	⑪ Hole cap (Filler port)		Rubber (NBR)			○	○	○	○	○	○
	⑫ Dust seal		Rubber (NBR)			○	○	○	○	○	○
	⑬ Grease nipple		Brass (C3604)	Electroless nickel plating		○	○	○	○	○	○
	⑭ Intake and exhaust port		Resin (PBT, POM), Brass Nickel plating processing			○	○	○	○	○	○
	⑮ Actuator cable	Cable ground	Rubber (NBR) Resin (PBT, POM), Brass Nickel plating processing			○	○	○	○	○	○
		Cable Sheath	Vinyl chloride (PVC)			○	○	○	○	○	○
	Bolts and screws of the exterior part Stainless steel		Stainless steel			○	○	○	○	○	○
	Hexagon nut		Stainless steel			○	○	○	○	○	○
	Square nut		Stainless steel			○	○	○	○	○	○
	Each part gasket		Rubber (NBR)			○	○	○	○	○	○

RRA4

[Coupled motor type]

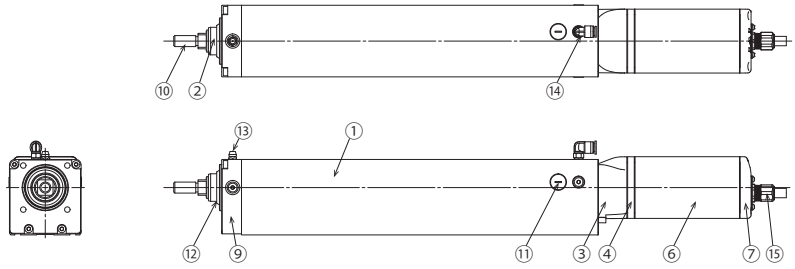


[Side-mounted type]

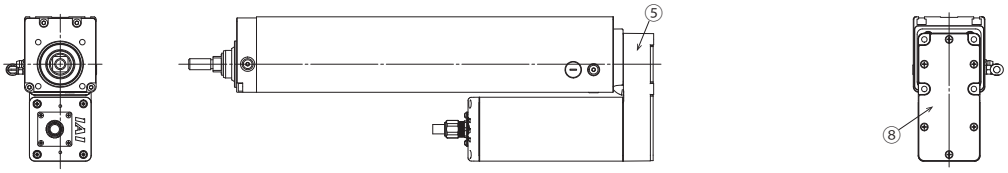


RRA6/7

[Coupled motor type]



[Side-mounted type]



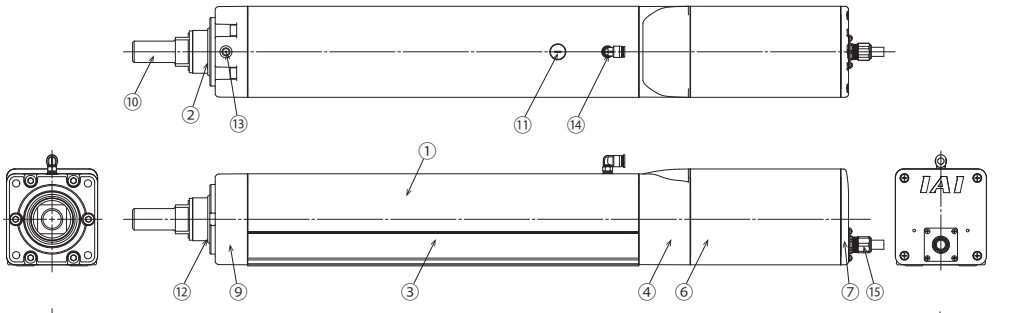
RCP6W-RRA8

○: Standard

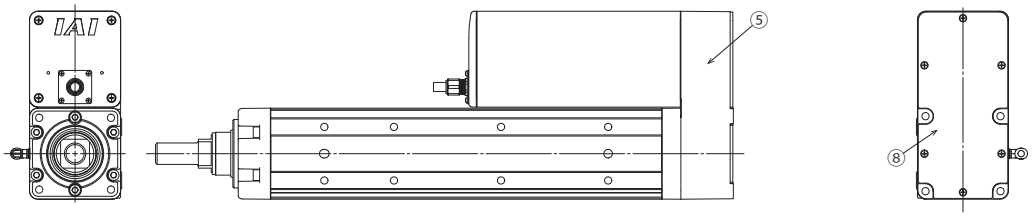
	Component		Material	Processing	Finishing	RRA8C	RRA8R
Exterior components	① Frame		Aluminum extruded material	White alumite		○	○
	② Rod		Aluminum drawing material	Hard alumite	Buffing finish	○	○
	③ Rear bracket		Aluminum die cast	White alumite		○	○
	④ Motor bracket		Aluminum die cast	Decorative surface paint		○	○
	⑤ Reverse bracket		Aluminum die cast	Decorative surface paint			○
	⑥ Motor cover		Aluminum extruded material	White alumite		○	○
	⑦ End cover		Aluminum die cast	Decorative surface paint		○	○
	⑧ Pulley cover		Stainless steel				○
	⑨ Front bracket IP		Aluminum die cast	Decorative surface paint		○	○
	⑩ Rod tip bracket		Stainless steel			○	○
	⑪ Hole cap (Filler port)		Rubber (NBR)			○	○
	⑫ Dust seal		Rubber (NBR)			○	○
	⑬ Grease nipple		Brass (C3604)	Electroless nickel plating		○	○
	⑭ Intake and exhaust port		Resin (PBT, POM), Brass Nickel plating processing			○	○
	⑮ Actuator cable	Cable ground	Rubber (NBR) Resin (PBT, POM), Brass Nickel plating processing			○	○
		Cable sheath	Vinyl chloride (PVC)			○	○
	Bolts and screws of the exterior part Stainless steel		Stainless steel			○	○
	Hexagon nut		Stainless steel			○	○
	Each part gasket		Rubber (NBR)			○	○

RRA8

[Coupled motor type]



[Side-mounted type]



RCP6W Exterior Components Material of each part

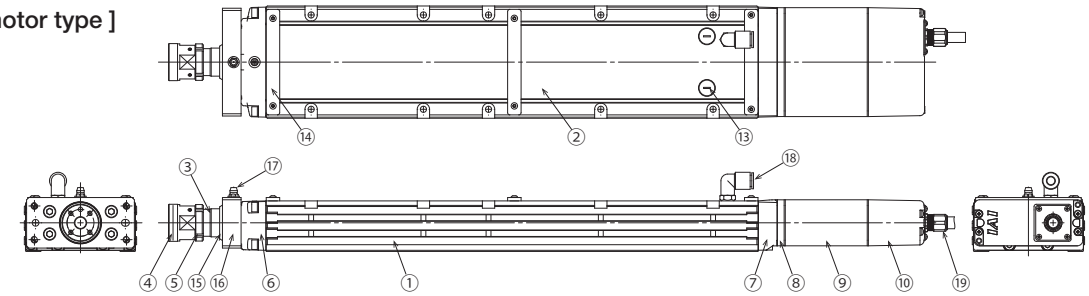
RCP6W-WRA10

○: Standard

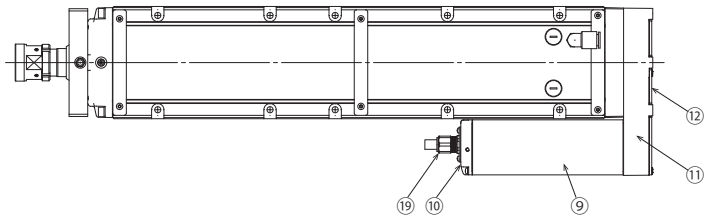
	Component		Material	Processing	Finishing	WRA10C	WRA10R
Exterior components	① Base		Aluminum extruded material	White alumite		○	○
	② Frame cover		Aluminum extruded material	White alumite		○	○
	③ Rod		Stainless steel pipe	Hard chrome plating	Buffing finish	○	○
	④ Tip bracket		Stainless steel			○	○
	⑤ Lock nut		Stainless steel			○	○
	⑥ Front bracket		Aluminum die cast	Decorative surface paint		○	○
	⑦ Rear bracket		Aluminum die cast	Decorative surface paint		○	○
	⑧ Motor bracket		Aluminum die cast	Decorative surface paint		○	
	⑨ Motor cover		Aluminum extruded material	White alumite		○	○
	⑩ Motor end cover		Aluminum die cast	Decorative surface paint		○	○
	⑪ Reverse bracket		Aluminum die cast	Decorative surface paint			○
	⑫ Pulley cover		Stainless steel				○
	⑬ Cap		Rubber (NBR)			○	○
	⑭ Frame cover holder		Aluminum	White alumite		○	○
	⑮ Dust seal		Rubber (NBR)			○	○
	⑯ Dust seal housing		Aluminum	White alumite		○	○
	⑰ Grease nipple		Brass (C3604)	Electroless nickel plating		○	○
	⑱ Intake and exhaust port		Resin (PBT, POM), Brass Nickel plating processing			○	○
	⑲ Actuator cable	Cable ground	Rubber (NBR) Resin (PBT, POM), Brass Nickel plating processing			○	○
		Cable sheath	Vinyl chloride (PVC)			○	○
	Bolts and screws of the exterior part Stainless steel		Stainless steel			○	○
	Each part gasket		Rubber (NBR)			○	○

WRA10

[Coupled motor type]



[Side-mounted type]



RCP6W-WRA12/WRA14/WRA16

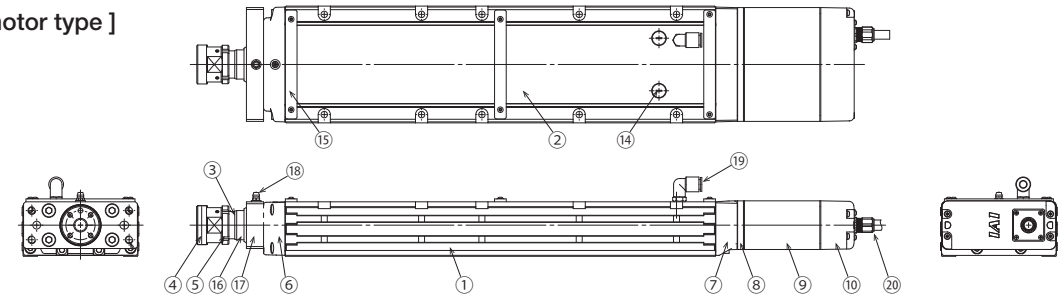
○: Standard

Exterior components

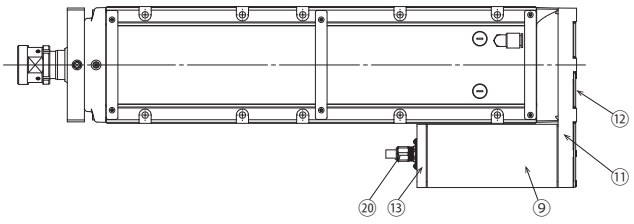
Component		Material	Processing	Finishing	WRA12C	WRA12R	WRA14C	WRA14R	WRA16C	WRA16R
① Base		Aluminum extruded material	White alumite		○	○	○	○	○	○
② Frame cover		Aluminum extruded material	White alumite		○	○	○	○	○	○
③ Rod		Stainless steel pipe	Hard chrome plating	Buffing finish	○	○	○	○	○	○
④ Tip bracket		Stainless steel			○	○	○	○	○	○
⑤ Lock nut		Stainless steel			○	○	○	○	○	○
⑥ Front bracket		Aluminum die cast	Decorative surface paint		○	○	○	○	○	○
⑦ Rear bracket		Aluminum die cast	Decorative surface paint		○	○	○	○	○	○
⑧ Motor bracket		Aluminum die cast	Decorative surface paint		○		○		○	
⑨ Motor cover		Aluminum extruded material	White alumite		○	○	○	○	○	○
⑩ Motor end cover (Coupling)		Aluminum die cast	Decorative surface paint		○		○		○	
⑪ Reverse bracket		Aluminum die cast	Decorative surface paint			○		○		○
⑫ Pulley cover		Stainless steel				○		○		○
⑬ Motor end cover (Folded)		Aluminum	White alumite			○		○		○
⑭ Cap		Rubber (NBR)			○	○	○	○	○	○
⑮ Frame cover holder		Aluminum	White alumite		○	○	○	○	○	○
⑯ Dust seal		Rubber (NBR)			○	○	○	○	○	○
⑰ Dust seal housing		Aluminum	White alumite		○	○	○	○	○	○
⑱ Grease nipple		Brass (C3604)	Electroless nickel plating		○	○	○	○	○	○
⑲ Intake and exhaust port		Resin (PBT, POM), Brass Nickel plating processing			○	○	○	○	○	○
⑳ Actuator cable	Cable ground	Rubber (NBR) Resin (PBT, POM), Brass Nickel plating processing			○	○	○	○	○	○
	Cable sheath	Vinyl chloride (PVC)			○	○	○	○	○	○
Bolts and screws of the exterior part Stainless steel		Stainless steel			○	○	○	○	○	○
Each part gasket		Rubber (NBR)			○	○	○	○	○	○

WRA12/14/16

[Coupled motor type]

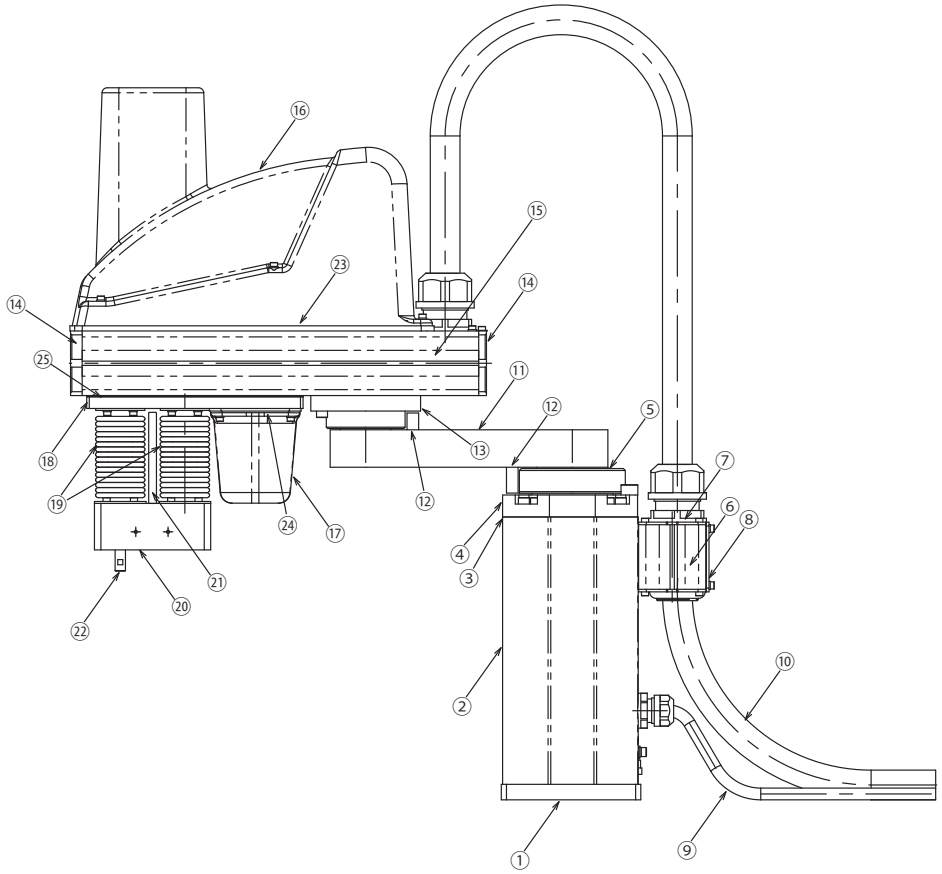


[Side-mounted type]



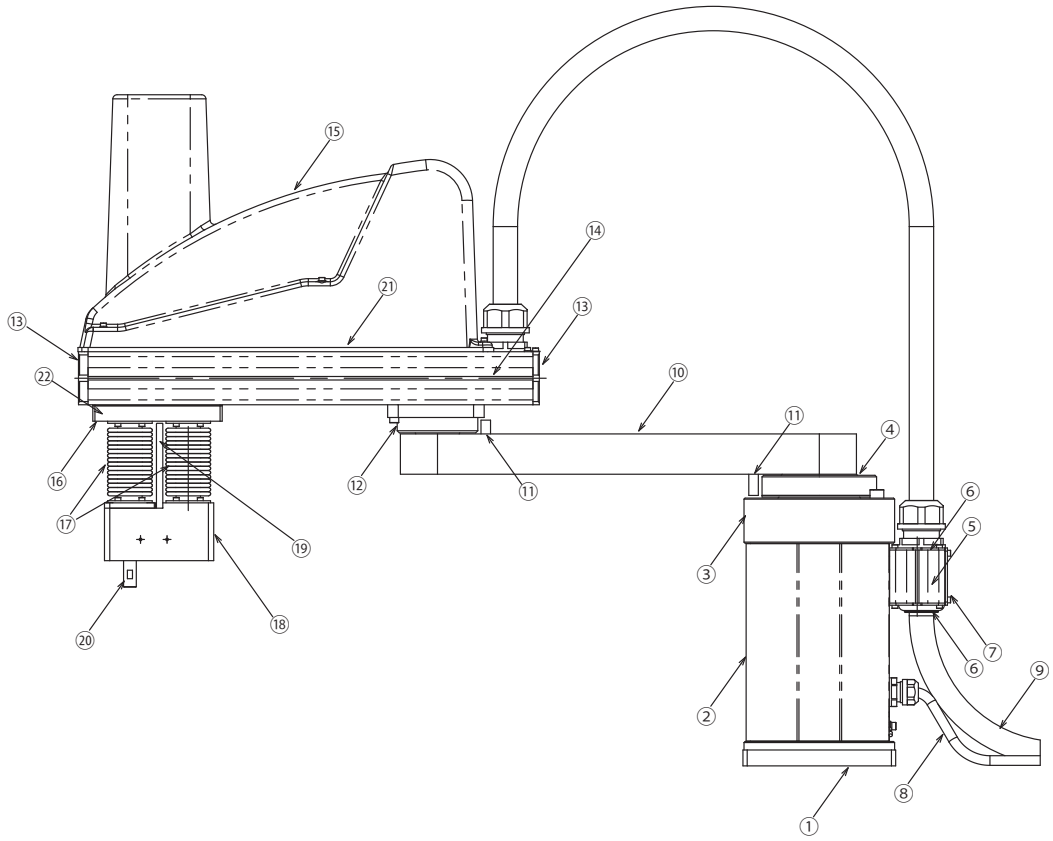
IXP Dust- and Splash-proof Main part materials

IXP-3W3515/4W3515/3W4515/4W4515 Main parts materials



No.	Part Name	Material	Surface treatment
①	Base plate	Aluminium (A2017-T451)	White alumite treatment
②	Base pipe	Extruded aluminium (A6NO1S-T5)	White alumite treatment
③	Base flange (Lower)	Aluminium (A2017-T451)	White alumite treatment
④	Base flange (Upper)	Carbon steel (S45C)	Hard chromium plating after electroless nickel plating
⑤	Base cover	Aluminium (A2017-T451)	White alumite treatment
⑥	Cable fixing bracket	Extruded aluminium (A6NO1S-T5)	White alumite treatment
⑦	Cable stay	Aluminium (A5052P)	White alumite treatment
⑧	Cable fixing bracket cover	Aluminium (A5052P)	White alumite treatment
⑨	MPG1 cable	Polyvinyl chloride (PVC)	
⑩	MPG composite cable	Polyvinyl chloride (PVC)	
⑪	1st arm	Aluminium (A2017-T451)	White alumite treatment
⑫	Stopper block	Carbon steel (S45C)	Electroless nickel plating
⑬	Seal housing	Aluminium (A2017-T451)	White alumite treatment
⑭	Side cover	Aluminium (A5052P)	White alumite treatment
⑮	2nd arm	Extruded aluminium (A6NO1S-T5)	White alumite treatment
⑯	Arm cover	Resin (ABS)	
⑰	Motor cover	Resin (ABS)	
⑱	Bellow fixing plate	Aluminium (A5052P)	White alumite treatment
⑲	Bellow	Nitrile rubber (NBR)	
⑳	Joint bracket	Aluminium (A5052P)	White alumite treatment
㉑	Z stopper	Aluminium (A5052P)	White alumite treatment
㉒	Tip axis	High carbon chromium bearing steel (SUJ2)	Low temperature black chrome plating
㉓	Gasket (Arm cover)	Chloroprene rubber (CR)	
㉔	Gasket (Motor cover)	Chloroprene rubber (CR)	
㉕	Gasket (Bellow fixing plate)	Ethylen-propylene rubber (EPDM)	

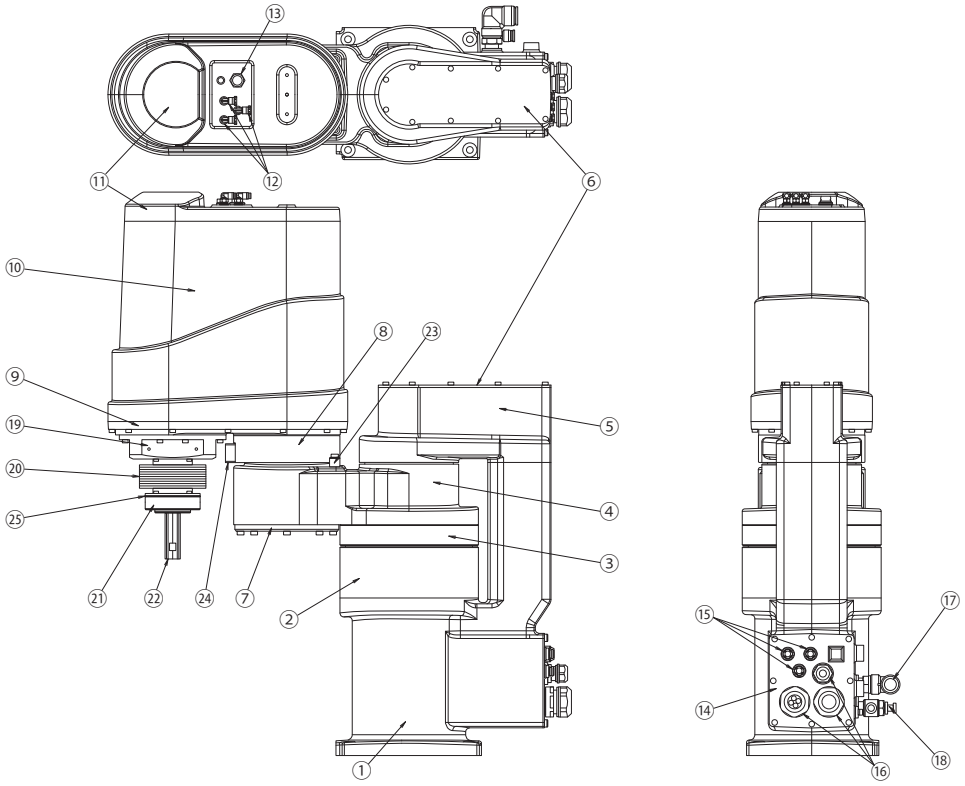
IXP-3W5520/4W5520/3W6520/4W6520 Main parts materials



No.	Part Name	Material	Surface treatment
①	Base plate	Aluminium (A2017-T451)	White alumite treatment
②	Base pipe	Extruded aluminium (A6NO1S-T5)	White alumite treatment
③	Base flange	Carbon steel (S45C)	Hard chromium plating after electroless nickel plating
④	Base cover	Aluminium (A2017-T451)	White alumite treatment
⑤	Cable fixing bracket	Extruded aluminium (A6NO1S-T5)	White alumite treatment
⑥	Cable stay	Aluminium (A5052P)	White alumite treatment
⑦	Cable fixing bracket cover	Aluminium (A5052P)	White alumite treatment
⑧	MPG1 cable	Polyvinyl chloride (PVC)	
⑨	MPG composite cable	Polyvinyl chloride (PVC)	
⑩	1st arm	Aluminium (A2017-T451)	White alumite treatment
⑪	Stopper block	Carbon steel (S45C)	Eelectroless nickel plating
⑫	Seal housing	Aluminium (A2017-T451)	White alumite treatment
⑬	Side cover	Aluminium (A5052P)	White alumite treatment
⑭	2nd arm	Extruded aluminium (A6NO1S-T5)	White alumite treatment
⑮	Arm cover	Resin (ABS)	
⑯	Bellow fixing plate	Aluminium (A5052P)	White alumite treatment
⑰	Bellow	Nitrile rubber (NBR)	
⑱	Joint bracket	Aluminium (A5052P)	White alumite treatment
⑲	Z stopper	Aluminium (A5052P)	White alumite treatment
⑳	Tip axis	High carbon chromium bearing steel (SUJ2)	Low temperature black chrome plating
㉑	Gasket (Arm cover)	Chloroprene rubber (CR)	
㉒	Gasket (Bellow fixing plate)	Ethylen-propylene rubber (EPDM)	

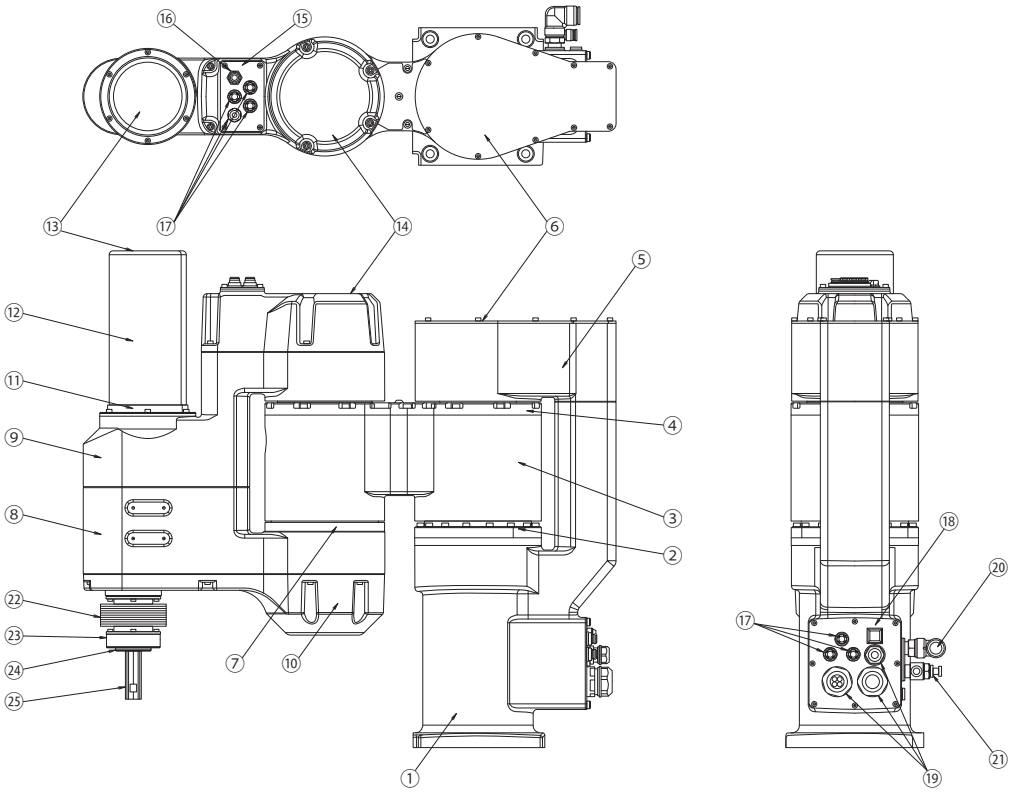
IXA Dust- and Splash-proof Main part materials

XA-4NSW3015



	No.	Part Name	Material	Surface treatment
Exterior component	①	J1 Base	Aluminum diecast	Decorative surface paint
	②	J1 Base flange	Aluminum	Decorative surface paint
	③	J1 Flange cover	Carbon steel	Low temperature black chromium plating
	④	J1 Arm	Aluminum diecast	Decorative surface paint
	⑤	J1 Joint bracket	Aluminum diecast	Decorative surface paint
	⑥	J1 JB cover	Stainless steel	Decorative surface paint
	⑦	J2 Under cover	Aluminum	White alumite
	⑧	J2 OS housing	Aluminum	Black alumite
	⑨	J2 Main arm	Aluminum diecast	Decorative surface paint
	⑩	J2 Arm cover	Aluminum diecast	Decorative surface paint
	⑪	J2 Spline cover	Aluminum diecast	Decorative surface paint
	⑫	One-touch joint elbow	Resin (PBT, POM), Brass nickel plating processing	
	⑬	Metal round connector	Zinc nickel plating, Rubber (CR)	
	⑭	External wiring panel	Stainless steel	
	⑮	One-touch joint, Partition union pea	Resin (PBT, POM), Rubber (CR) Brass nickel plating processing	
	⑯	Cable ground	Resin (nylon 66), Rubber (NBR)	
		Cable sheath	Vinyl chloride (PVC)	
	⑰	One-touch joint elbow	Resin (PBT, POM), Brass nickel plating processing	
	⑱	Speed controller	Resin (PBT, POM), Brass nickel plating processing	
	⑲	Bellows flange	Aluminum	Black alumite
	⑳	Bellows	Urethane	
	㉑	Bearing case B	Aluminum	White alumite
	㉒	Ball screw spline	High-carbon chromium bearing steel	Low temperature black chromium plating
	㉓	Stopper ring	Stainless steel	
	㉔	Movable stopper	Carbon steel	Low temperature black chromium plating
	㉕	Plate A (Bellows)	Stainless steel	
Bolt and screw for exterior parts			Stainless steel	
Each part gasket (O-ring, gasket)			Rubber (NBR)	
Each part oil seal			Rubber (FKM)	

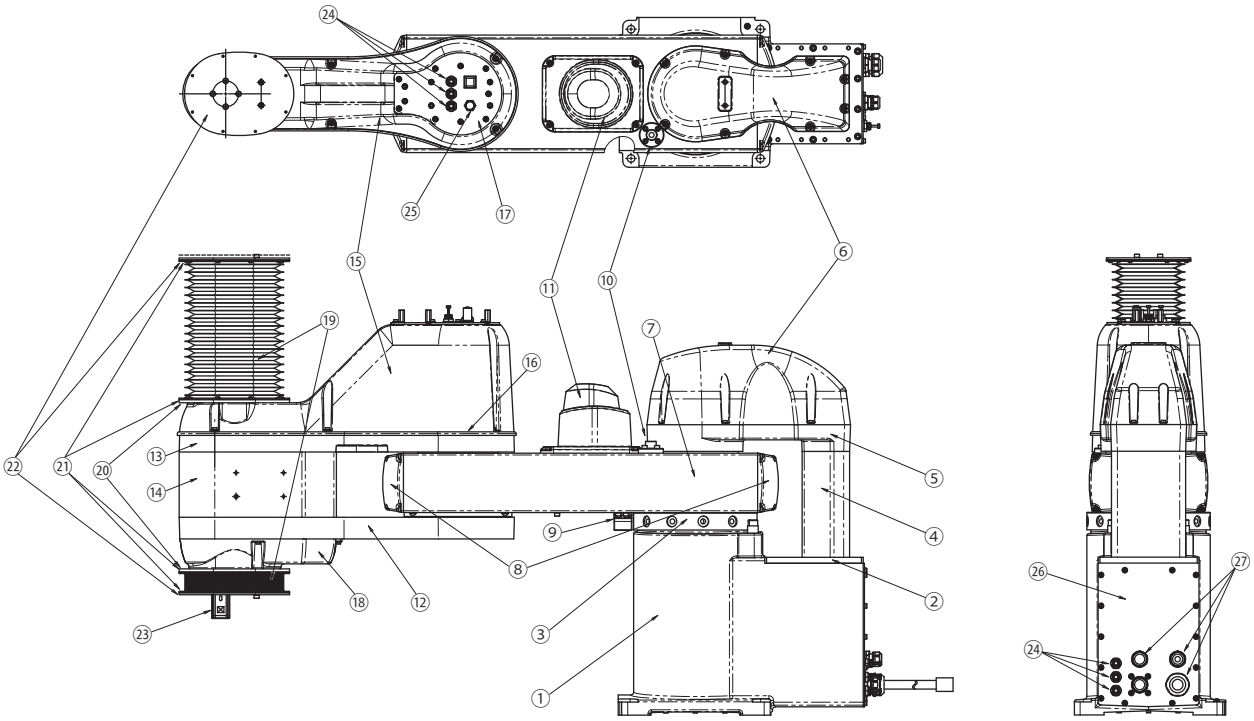
IXA-4NSW45□□/4NSW60□□



	No.	Part Name	Material	Surface treatment
Exterior component	①	J1 Base	Aluminum diecast	Decorative surface paint
	②	J1 Base flange	Aluminum	Black alumite
	③	J1 Arm L/L-600	Aluminum diecast	Decorative surface paint
	④	J1 Arm U/L-600	Aluminum	Decorative surface paint
	⑤	J1 Joint bracket	Aluminum diecast	Decorative surface paint
	⑥	J1 JB cover	Stainless steel	Decorative surface paint
	⑦	J2 Under cover	Aluminum	Black alumite
	⑧	J2 Main arm	Aluminum diecast	Decorative surface paint
	⑨	J2 Joint bracket	Aluminum diecast	Decorative surface paint
	⑩	J2 Arm cover	Aluminum diecast	Decorative surface paint
	⑪	J2 ZR DC flange	Aluminum	Decorative surface paint
	⑫	ZR Dust cover	Aluminum drawing round pipe	Decorative surface paint
	⑬	ZR DC cap	Aluminum	Decorative surface paint
	⑭	J2 Cover U	Aluminum diecast	Decorative surface paint
	⑮	J2 User panel	Stainless steel	Decorative surface paint
	⑯	Metal round connector	Zinc nickel plating, Rubber (CR)	
		One-touch joint, Partition union pea	Resin (PBT, POM), Rubber (CR), Brass nickel plating processing	
	⑰	External wiring panel	Stainless steel	Decorative surface paint
	⑱	Cable ground	Resin (nylon 66), Rubber (NBR)	
	⑲	Cable sheath	Vinyl chloride (PVC)	
	⑳	One-touch joint elbow	Resin (PBT, POM), Brass nickel plating	
	㉑	Speed controller	Resin (PBT, POM), Brass nickel plating	
	㉒	Bellows	Urethane	
	㉓	Bearing case B	Aluminum	White alumite
	㉔	Set collar	Aluminum	White alumite
	㉕	Ball Spline	High-carbon chromium bearing steel	Low temperature black chromium plating
Bolt and screw for exterior parts			Stainless steel	
Each part gasket (O-ring, gasket)			Rubber (NBR)	
Each part oil seal			Rubber (FKM)	

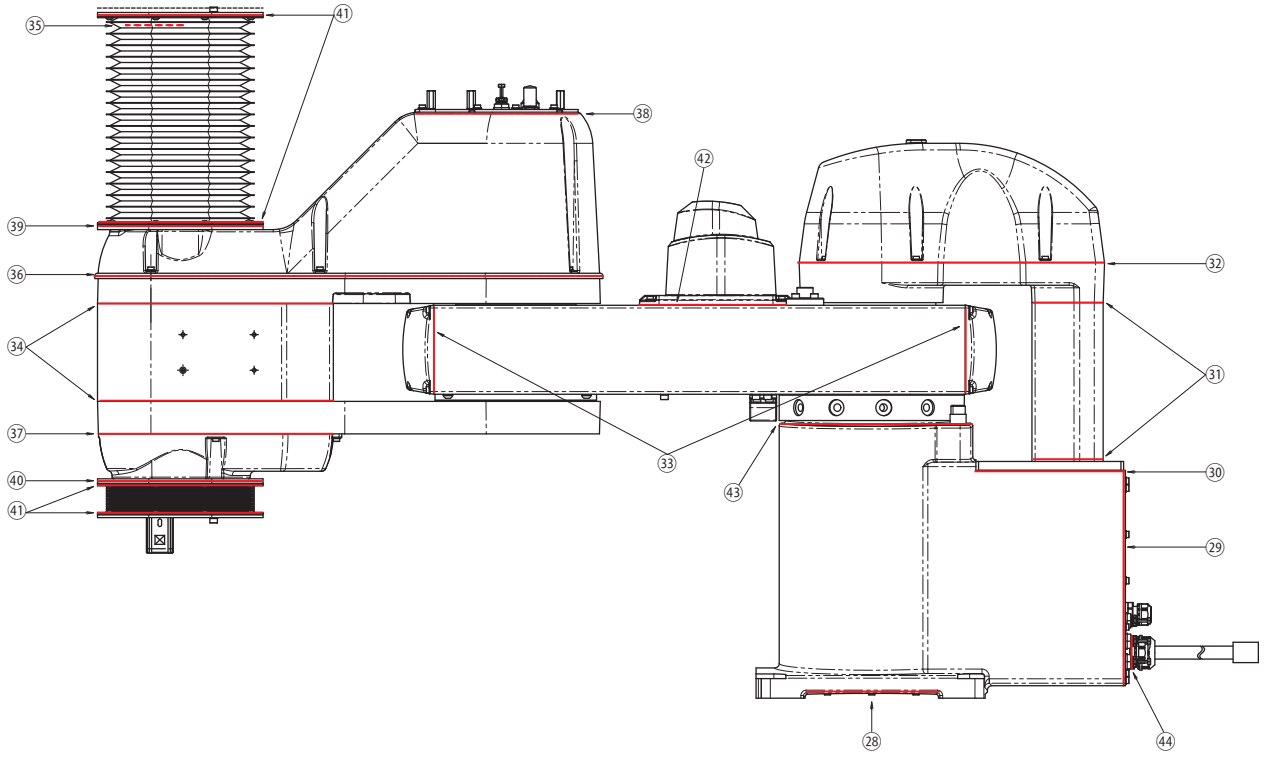
IXA Dust- and Splash-proof Main part materials

IXA-4NSW80□□/4NSW100□□/4NHW12040



	No.	Part name	Material	Surface treatment
Exterior components	①	J1 Base	Aluminum casting	Decorative surface paint
	②	J1 Base flange	Aluminum	White alumite
	③	J1 Reinforced flange	Aluminum	Black alumite
	④	J1 Cable box	Aluminum	Decorative surface paint
	⑤	J1 Joint bracket	Aluminum die cast	Decorative surface paint
	⑥	J1 JB cover	Resin (ABS)	Decorative surface paint [plating]
	⑦	J1 Arm	Aluminum	Decorative surface paint
	⑧	J1 Arm end cover	Resin (ABS)	Decorative surface paint [plating]
	⑨	J1 Stopper block	Stainless steel casting	
	⑩	Bolt adapter	Carbon steel	Trivalent chromate
	⑪	J2 Motor cover	Resin (ABS)	Decorative surface paint [plating]
	⑫	J2 Main arm	Aluminum die cast	Decorative surface paint
	⑬	J2 Sub arm	Aluminum die cast	Decorative surface paint
	⑭	J2 Cover M	Aluminum	Decorative surface paint
	⑮	J2 Arm cover U	Resin (ABS)	Decorative surface paint [plating]
	⑯	J2 Arm cover spacer	Aluminum	White alumite
	⑰	J2 User panel	Aluminum	White alumite
	⑱	J2 Arm cover L	Resin (ABS)	Decorative surface paint [plating]
	⑲	Bellows	Urethane	
	⑳	Bellows base plate U/L	Aluminum	White alumite
	㉑	Bellows fixing plate	Stainless steel	
	㉒	Bellows top plate U/L	Aluminum	White alumite
	㉓	Ball spline	High-carbon chromium bearing steel	Low-temperature black chrome plating
	㉔	One-touch fitting, bulkhead union pipe	Resin (PBT, POM), brass nickel plating	
	㉕	VCP cap	Vinyl chloride (PVC)	
	㉖	External wiring panel	Aluminum	White alumite
	㉗	Cable gland	Resin (Nylon 66), Rubber (NBR)	
		Cable sheath	Vinyl chloride (PVC)	
	㉘ to ㊹	Gaskets for each part (O-rings, Gasket)	Rubber (NBR/FKM) See the next page for details.	
	Exterior bolts/screws		Stainless steel	
	Oil seals for each part		1st axis: Rubber (FKM) / 2nd axis: Rubber (NBR)	

*[ ] indicates when option "COP (nickel-plated resin cover specification)" is selected.



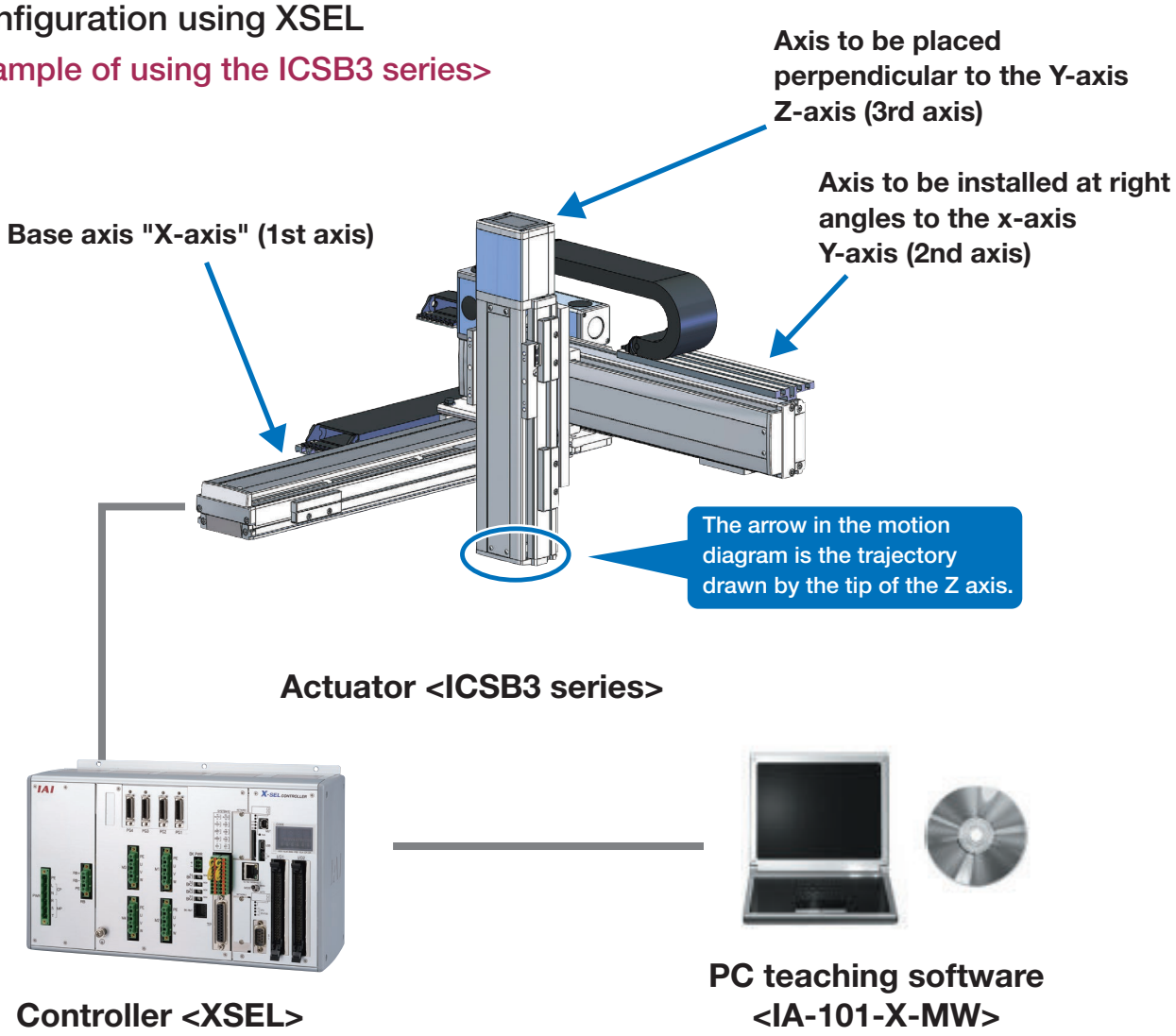
○: Available

	No.	Part name	Material		Quantity
			Standard specification (NBR)	Fluororubber seal specification (FKM) *Option name: SLF	
Gaskets	㉘	J1 Undercover gasket	○		-
	㉙	J1 External wiring panel gasket	○	○	1
	㉚	J1 Base flange gasket	○	○	1
	㉛	J1 Cable box gasket	○	○	2
	㉜	J1 Joint bracket gasket	○	○	1
	㉝	J1 Arm end cover gasket	○	○	2
	㉞	J2 Cover M gasket	○	○	2
	㉟	Bellows plate gasket	○	○	2
	㊱	J2 Arm cover spacer gasket	○		-
	㊲	J2 Arm cover L gasket	○	○	1
	㊳	J2 User panel gasket	○	○	1
	㊴	Bellows base plate U gasket	○	○	1
	㊵	Bellows base plate L gasket	○	○	1
	㊶	Bellows gasket (oval)	○	○	4
	㊷	J2 Motor cover gasket	○	○	1
	㊸	J1 Gearbox gasket	○		-
	㊹	Capcon flange gasket	○	○	1

Introduction to SEL Language

■ Configuration using XSEL

<Example of using the ICSB3 series>



* The RSEL, SSEL, MSEL, and XSEL controllers and the TTA tabletop robot series all use the SEL language.

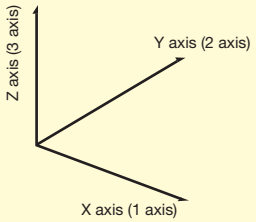
The above actuator combines three linear actuators.

❶ The three actuators are expressed as "1 axis, 2 axis, 3 axis", respectively.

❷ This actuator is called "3 axis orthogonal robot" which uses 3 axes in combination orthogonally.

❸ Each axis is classified into X axis, Y axis, Z axis from its installation status.

- Base axis → <X axis>
- Axis installed at right angles to the X axis → <Y axis>
- Axis installed perpendicular to the Y axis → <Z axis>

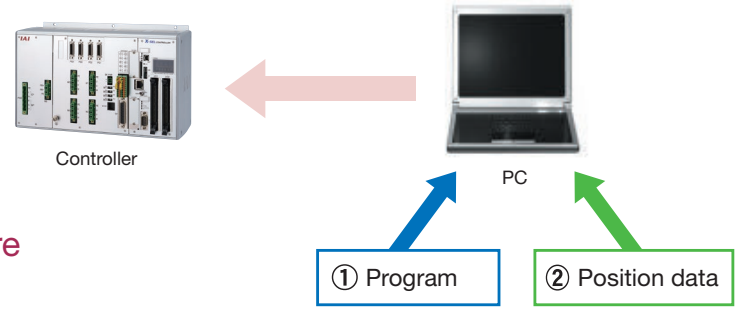


❹ In program data and position data, it is expressed as follows.

- X axis (first axis) = Axis 1
- Y axis (second axis) = Axis 2
- Z axis (third axis) = Axis 3

■ What is necessary for robot operation

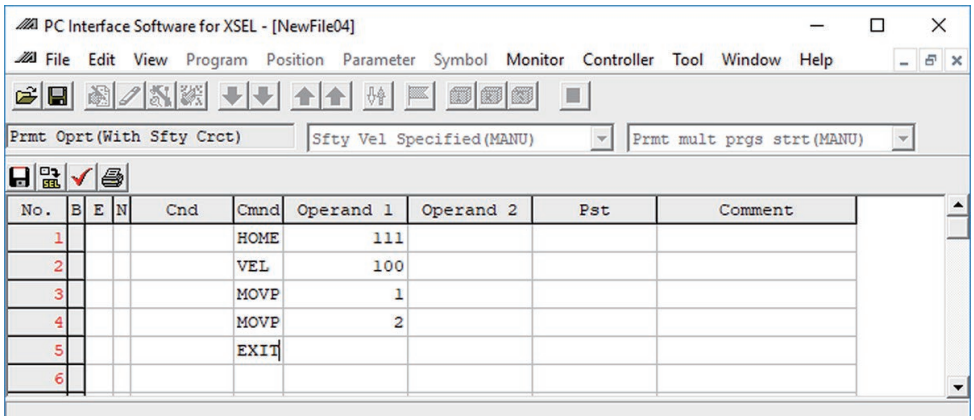
In order to operate the robot,
① Program
② Position data
(position where the robot moves)
Operation is only possible when both are entered into the controller using a PC.



① Program

Enter the appropriate "SEL language" command into the PC interface's program data sheet in order to create a program that will dictate the order of movements and operations of all connected actuators.

* The picture to the right shows an example program in the software.



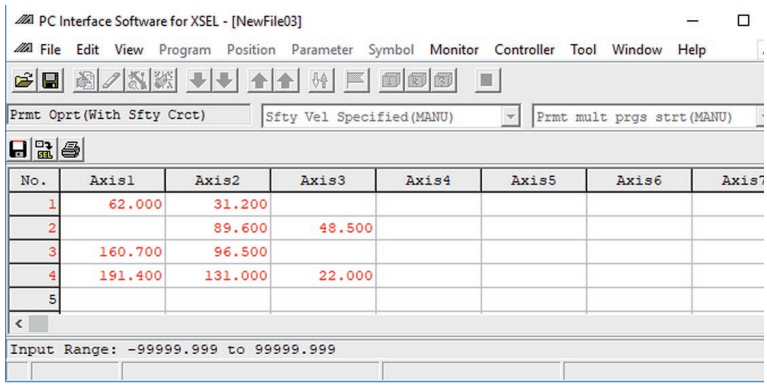
No.	B	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1					HOME	111			
2					VEL	100			
3					MOVP	1			
4					MOVP	2			
5					EXIT				
6									

PC teaching software IA-101-X-MW Program Input screen

② Position data (position where the robot moves)

Specific positions that the connected actuators move to are expressed in coordinates, which are input into the PC interface software's position data sheet.

* The picture to the right shows an example of position data entered in the software.
Data not transferred to the controller will be displayed in red and will be black after transfer.



No.	Axis1	Axis2	Axis3	Axis4	Axis5	Axis6	Axis7
1	62.000	31.200					
2		89.600	48.500				
3	160.700	96.500					
4	191.400	131.000	22.000				
5							

Input Range: -99999.999 to 99999.999

PC teaching software IA-101-X-MW Position Input screen

Introduction to SEL Language

■ Basics of program

Basics of program creation

① Use the command codes in the "Super SEL language" (hereinafter "SEL language") to instruct the operation.
② "SEL language" executes instructions one by one in order from the top to the bottom.
③ Enter the command word in the [Cmnd] field of the program data sheet.
* [Cmnd] stands for Command.
④ In the [Operand 1] [Operand 2] field, enter various numerical values following the command word on the same line. Numeric values are various types, such as position number, axis number, axis pattern, speed, number of seconds.
* [Operand] is a computer term and is "numerical value and variable to be calculated". In SEL language, Operand 1 is called "operation 1" and Operand 2 is called "operation 2".
⑤ The basic program configurations are "move to reference point", "speed specification", "operation designation", and "end declaration".
- Move to reference point ... Return to origin and use the command word "HOME".
- Speed specification ... Specify the moving speed with the command word "VEL (abbreviation for speed translation English)".
  It will not work unless speed is specified. The maximum speed depends on the actuator used.
- Operation specification ... Set various actions.
- End declaration ... Ends the operation. At the end of the program, enter the instruction word "EXIT".
  If this is not entered, repeat the program.

<Example of program>

The following program shows
The X, Y and Z axes return to the reference point of motion and then move from the reference point to position No.1 at a speed of 100mm/s. After that, it moves to No.2 and ends operation.

No.	B	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1					HOME	111			
2					VEL	100			
3					MOVL	1			
4					MOVL	2			
5					EXIT				
6									

Step No. Column for command Column for comment

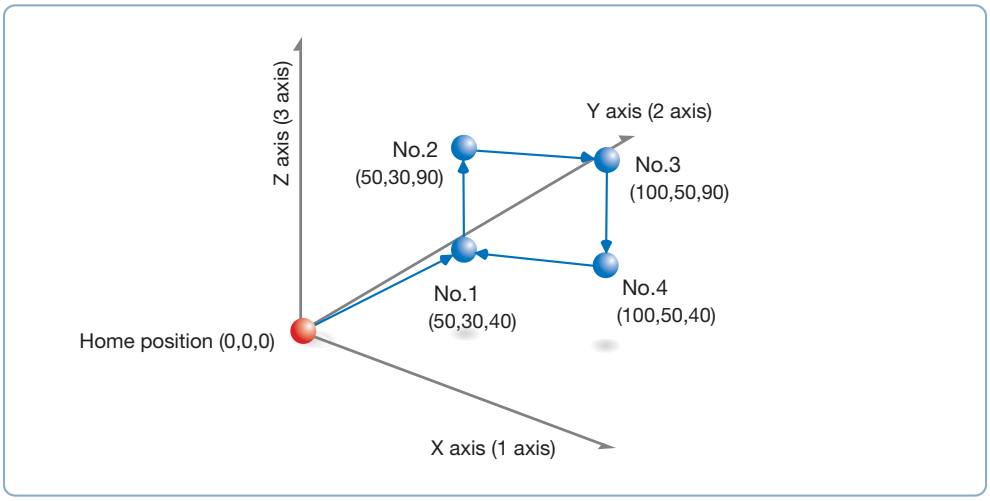
■ Basics of position data

Basics of creating position data

① In the position data sheet, enter the "coordinates" of the position to move.
② Axis 1 = first axis, Axis 2 = second axis, Axis 3 = third axis respectively.
In ICSB 3, Axis 1 = X axis, Axis 2 = Y axis, Axis 3 = Z axis.
③ Even if position data is entered, it will not operate unless a move is instructed by the program.
④ Since the order of moving is set by the program, the order of the position numbers is not related to the moving order.

<Example of Position Data>

Move from No.1 to No.4 by setting the target position to 4 points.



The four three-dimensional coordinates (distance from the origin) are set from position No.1 to No.4.

* The unit is mm.

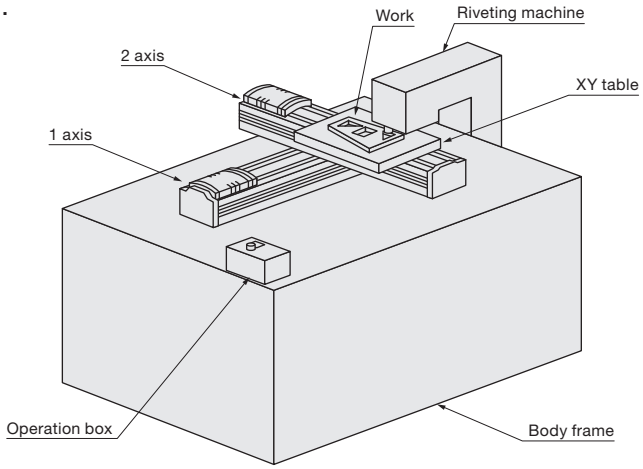
No.	Axis1	Axis2	Axis3
1	50.000	30.000	40.000
2	50.000	30.000	90.000
3	100.000	50.000	90.000
4	100.000	50.000	40.000
5			
6			

Position No.

Sample Program 1: Rivet Stopping Device

Device outline

This device consists of X Y table and riveting machine by 1 axis / 2 axis actuator. This is a rivet stop device that sets a work on the X Y table at the work home position and makes the rivet stop to the specified three points on the work by turning on the start switch.



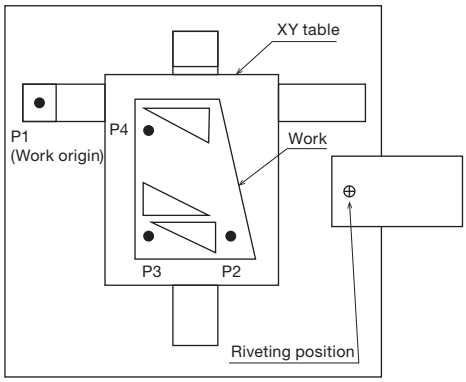
Operation explanation

Describe the operation of this device.

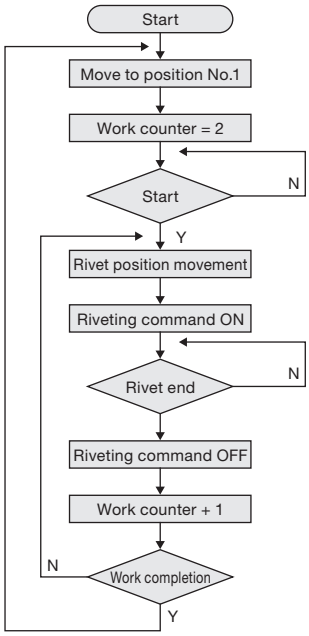
① The XY table moves to the work origin (P1) and waits.
② The operator sets the work on the XY table and turns on the start SW.
③ In the XY table, riveting position No.1 (P2) of the work moves to riveting position and riveting command is outputted to the riveting machine.
④ Riveting operation is completed, the rivet position No.2 (P3), No.3 (P4) is moved to the riveting position in the same operation after the completion signal is entered.
⑤ After returning to riveting on all 3 points, return to the work origin (P1).

Operation position, input / output allocation of external input / output, and operation flowchart are shown below.

Operating position



Operation flowchart



I / O allocation

Classification		I / O No.	Signal name	Specification
XSEL	Enter	16	Start command	Pushbutton SW
		17	Riveting complete	Contact signal
	Output	309	Rivet Command	24VDC
	* Flag used more than 600			

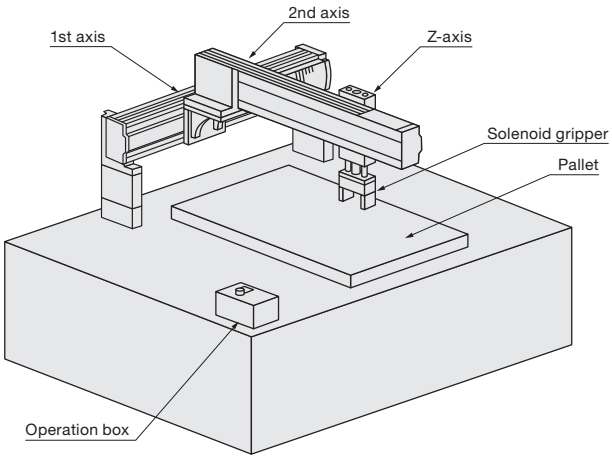
Application Program

Step	Extended condition	Input condition	Cnd	Command	Operation 1	Operation 2	Output condition	Comment
1				HOME	11			XY table home return (servo ON)
2				VEL	400			Speed 400mm/s setting
3				TAG	1			
4				MOVL	1			Move to position No.1 (work origin)
5				LET	1	2		Set 2 to work counter
6				BTOF	600			Clear completion flag
7				WTON	16			Waiting for start command
8				TAG	2			
9				MOVL	*1			Work counter position movement
10				BTON	309			Riveting command ON
11				WTON	17			Waiting for riveting completion
12				BTOF	309			Riveting command OFF
13				ADD	1	1		Work counter + 1
14				CPEQ	1	5	600	Flag ON when work is completed
15		N	600	GOTO	2			If it is not completed jump TAG 2
16				GOTO	1			If it is completed jump TAG 1
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

Sample Program 2: Palletizing Device

Device outline

This device is a palletizing device that consists of 1st, 2nd and Z-axis actuators (controller: ACON-CYB) to grip workpieces from the part feeding point and transfer them sequentially on a pallet (using an offset instruction instead of the palletizing function).



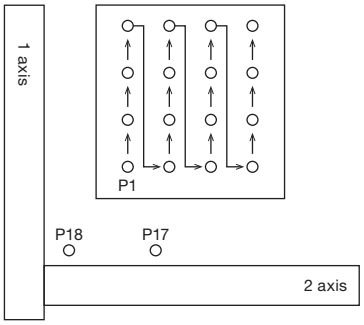
Operation explanation

Describe the operation of this device.

① Move to standby point and wait for start input.
② After starting input, move to the work supply point.
③ The Z-axis descends and the solenoid gripper grips the workpiece.
④ The Z-axis rises and moves onto the pallet.
⑤ The Z-axis descends and the solenoid gripper releases the workpiece.
⑥ The Z-axis rises and moves to the work supply point.
⑦ At the end of the pallet, the pallet completion indication is outputted, after waiting for restart after moving to P18.

Operation position, input/output allocation of external input/output, and operation flowchart are shown below.

Operating position

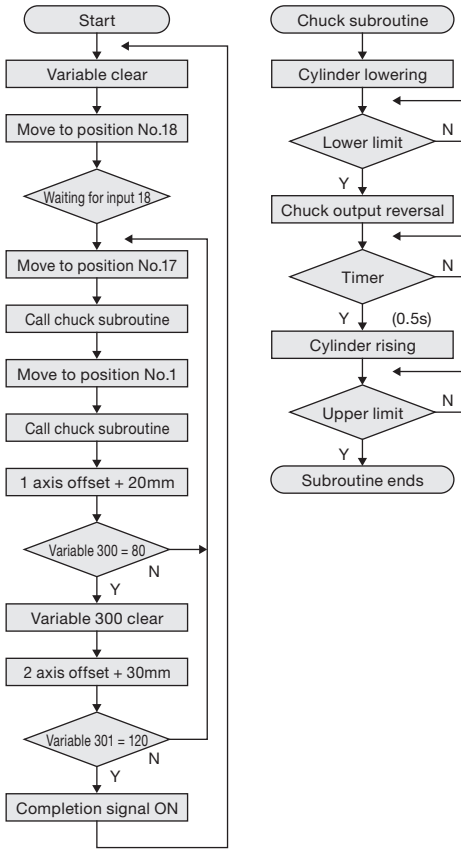


I / O allocation

Classification		I / O No.	Signal name	Specification
XSEL	Enter	16	Z-axis actuator upper limit	Controller complete signal
		17	Z-axis actuator lower limit	Controller complete signal
		18	Start	Pushbutton SW
	Output	309	Z axis actuator	24VDC
		310	Z axis chuck	24VDC
		311	Pallet completion	24VDC
	* Flag used more than 600			

Pallet specification 1 axis direction: 20mm pitch 2 axial direction: 30mm pitch

Operation flowchart



Application Program

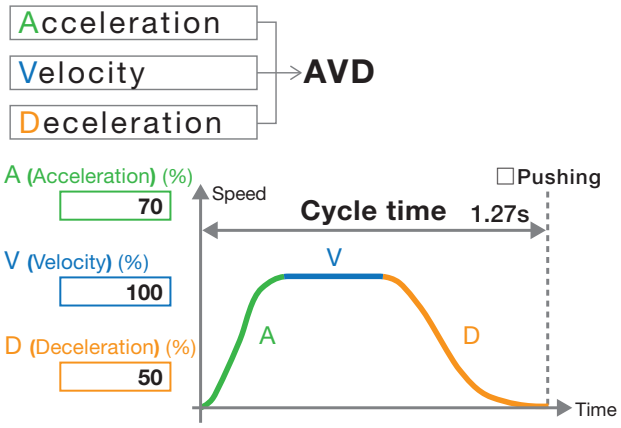
Step	Extended condition	Input condition	Cnd	Command	Operation 1	Operation 2	Output condition	Comment
1				HOME	11			1 · 2 axes home return
2				VEL	100			2 VEL 100 speed 100mm/s setting
3				ACC	0.2			3 ACC 0.2 Acceleration/Deceleration 0.2G
4				TAG	1			
5				LET	300	0		Variable clear
6				LET	301	0		Variable clear
7				OFST	11	0		Offset value clear
8				MOVL	18			Move to position No.18
9				WTON	18			Wait for start input
10				BTOF	311			Output 311 off
11				TAG	2			
12				OFST	11	0		Offset value clear
13				MOVL	17			Move to position No.17
14				EXSR	1			Call chuck subroutine (chuck)
15				OFST	1	* 300		1 axis, value offset for variable 300
16				OFST	10	* 301		2 axis, value offset for variable 301
17				MOVL	1			Move to position No.1 + offset value
18				EXSR	1			Call chuck subroutine (unchuck)
19				ADD	300	20		Add 20 to variable 300
20				CPEQ	300	80	600	If variable 300 = 80, flag 600 on
21		N	600	GOTO	2			If flag 600 is off, jump to TAG 2
22				LET	300	0		Variable 300 clear
23				ADD	301	30		Add 30 to variable 301
24				CPEQ	301	120	601	If variable 301 = 120, flag 601 is on
25		N	601	GOTO	2			If flag 601 is off, jump to TAG 2
26				BTON	311			Output 311 ON
27				GOTO	1			Jump to TAG 1
28				BGSR	1			Start of chuck subroutine
29				BTON	309			Z-axis actuator down
30				WTON	17			Wait for lower limit input
31				BTNT	310			Air chuck output reversal
32				TIMW	0.5			Timer 0.5 seconds
33				BTOF	309			Z-axis actuator up
34				WTON	16			Wait for upper limit input
35				EDSR				Chuck subroutine ends
36								
37								
38								
39								

Explanation of Terms

We are defining these terms specifically as they relate to our products.

AVD

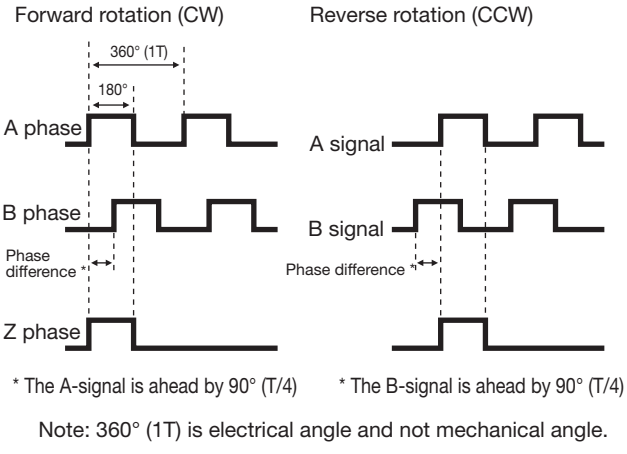
When moving an object, the object will accelerate from the stopped state, reach a constant velocity, decelerate from that constant velocity, and stop.
The operating conditions of acceleration, velocity, and deceleration at that time are abbreviated as AVD, with the initial letters of each English word.
We use "AVD" as an abbreviation for the actuator's operating conditions. Our electric actuators can be individually set to any value (within spec) for their AVD.



A phase (signal) output · B phase (signal) output

The incremental type output judges the forward and reverse rotation of the axis with the phase difference between A phase and B phase. In the case of forward rotation (CW), the A phase precedes the B phase.

■ **Output mode diagram**



Note: 360° (1T) is electrical angle and not mechanical angle.

Absolute battery

Battery to hold encoder information when power is cut off.

Absolute encoder

Encoder with absolute position detection function. Since absolute position can always be grasped, return to home is not required every time power is turned on.

Air purge

To ensure dust-proof and drip-proof properties in dust-proof and drip-proof type actuators, apply air pressure inside the actuator to prevent dust and other substances from entering the inside of the actuator.

Allowable dynamic moment

Indicator for guide life. We base the rated life of our actuators on this specification. For our Robo Cylinders, the rated life is 5,000km. For our more heavy duty single axis actuators, the rated life is 10,000km.

Allowable static moment

Calculated based on the static load rating (N) * 1 that can be added to the slider while the slider is stopped.

*1 When a certain load is applied, a small indentation (the total permanent deformation amount of the guide ball becomes about 1/10000 times the ball diameter) remains on the contact surface between the guide and the ball (steel ball).

Backlash

Gaps between the mechanical elements that move together.

Backup memory

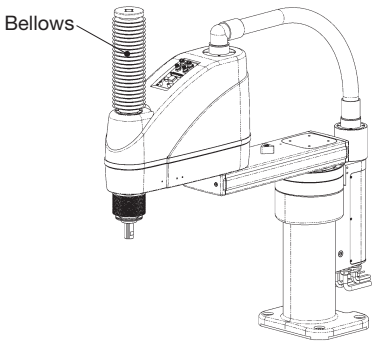
A storage device for storing information necessary for moving the actuator in the controller.

Ball screw

Machine parts where the screw shaft and nut operate through the ball.

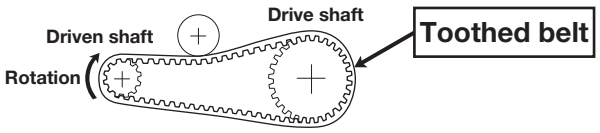
Bellows

A stretched sheet that is mounted for dust-proof or drip-proof purposes.



Belt drive

Drive system that transmits power from drive shaft to driven shaft (driven shaft) with belt. We mainly use toothed belts.



Brake box

A device to be connected between the brake controller.

CCW

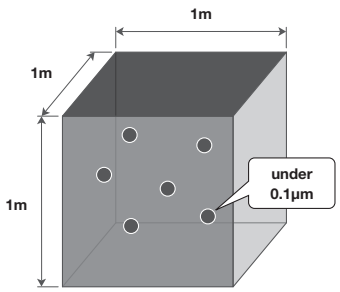
Counter clock wise.
It is used to indicate the direction of rotation of the motor.

Circuit

It is defined as "the one to operate the contact mechanism by using the electromagnetic suction force caused when the current more than the value in the electromagnet is flowed" composed of the electromagnet and the contact mechanism. The contacts are opened and closed by voltage and current (input signal) applied to the coil.

Cleanliness

An indicator as to the total allowable number, and size, of particles within a given volume of air in a cleanroom.



Coil

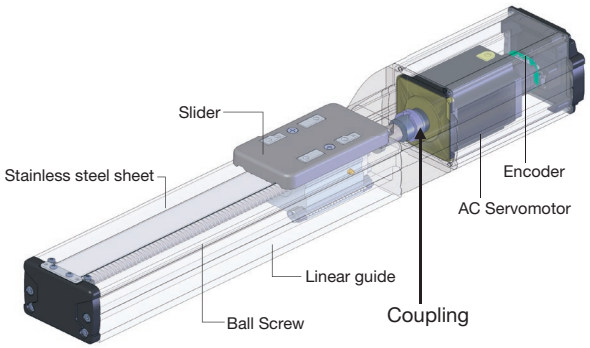
A component that generates an electromotive force proportional to a change in current per unit time when the flowing current changes. There is a property that only high-frequency electric signals are passed through, and only direct current or low-frequency alternating current is passed.

Condenser

Passive element that acts to store electric charge. Also referred to as electrostatic capacity or capacitor.

Coupling

Shaft coupling. Machine element for fastening shaft and shaft.



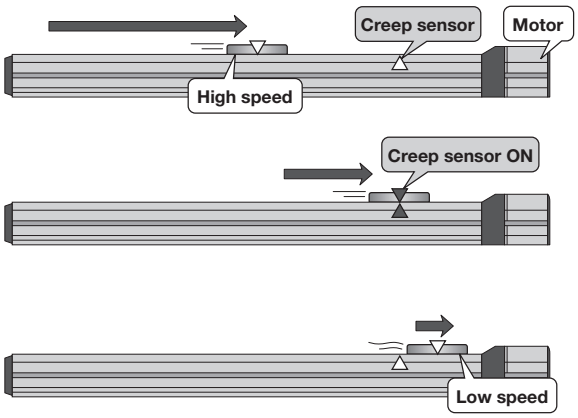
CP control

Control with all orbits or all routes specified. (Continuous Path)

Explanation of Terms

Creep sensor

Sensor for returning to home at high speed.



Critical speed

The speed of the slider where the ball screw resonates. (Ball screw rotation speed)

CT effect (Cycle time / Down time)

By replacing the air cylinder of the facility with an electric actuator, it is possible to shorten the cycle time and reduce down time.
As a result of improved productivity, capital investment and personnel expenses can be suppressed and the benefit of increasing customer profits.

CW

Clockwise (Clock Wise). It is used to indicate the direction of rotation of the motor.

Cycle time

The time taken for one process.

Differential line driver

It is one of the input / output method of the pulse train signal, and has the feature that it is more resistant to noise than the "open collector" method of the same input / output method. On the other hand, it is more expensive than the open collector type.

Diode

A part that makes the flow of electricity one way.
<Type of diode>

1. Switching diode
   It is used most frequently for small signal diodes.
   The shape is also small and it is sealed with glass.
2. Light emitting diode
   LED. It is used for display, infrared remote control etc.

Direct numerical designation control

A control method in which a numerical value is entered from a touch panel or PLC, and is directly reflected on the target position even if the target position is not memorized in the controller in advance.

Dispenser

Equipment that restricts the flow of liquids. It is incorporated into adhesive and sealant coating equipment.

Double slider

A free slider (slider not connected to the ball screw/drive belt) is added separately from the drive slider.

Duty

The ratio between the time the actuator is operating and the elapsed time.

Earth

Connect the equipment casing, the reference potential wiring of the electronic equipment, etc. to the reference potential point. Or the reference potential point itself. It is connected for the purpose of noise countermeasure, electric shock prevention, etc. (Ground, ground)

Emergency stop circuit

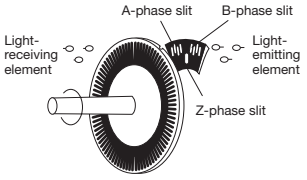
Circuit that stops the device either artificially or automatically if the device is in a hazardous state.

Encoder

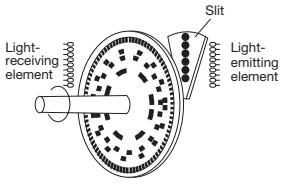
IAI uses three different types of encoders

Sensor that detects the position of the motor.

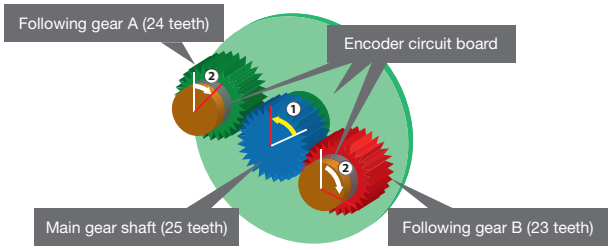
●Incremental



●Absolute



●Battery-less absolute



An incremental encoder

detects the rotational angle and the RPM of the axis from the number of output pulses. To detect the rotational angle and the RPM, a counter is needed to cumulatively add the number of output pulses. An incremental encoder allows you to electrically increase the resolution by using the rise and fall points on the pulse waveform to double or quadruple the pulse generation frequency.

An absolute encoder

detects the rotation angle of the axis from the state of the rotation slit, enabling you to know the absolute position at all times, even when the rotating slit is at rest. Consequently, the rotational position of the axis can always be checked even without a counter.
In addition, since the home position of the input rotation axis is determined at the time it is assembled into the machine, the number of rotations from home can always be accurately expressed, even when turning the power ON during startup or after a power outage or an emergency stop.

A battery-less absolute encoder

detects the current position based on the positional relationship between the three gears mounted on the encoder board. Since it uses a mechanical mechanism to detect the position, there is no need to use a battery backup for the position information.

External operation mode

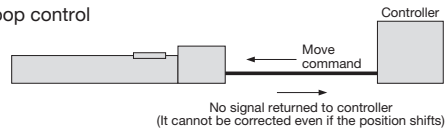
An operation mode activated by a start signal of an external device (PLC etc.). (self-driving)

Feedback control

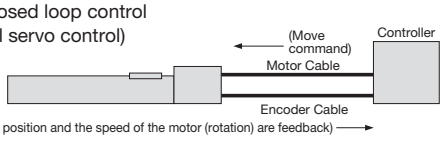
A mechanism to control so that the control results from the controller and the command from the encoder can match.

There are the following types of control of the actuator.

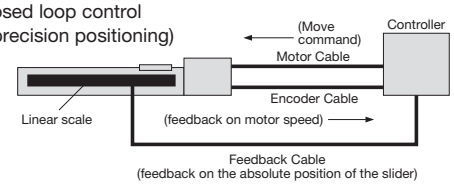
■ Open loop control



■ Semi-closed loop control
(General servo control)

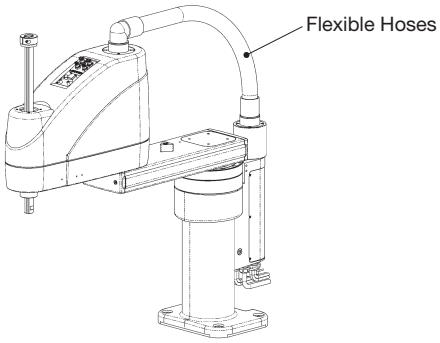


■ Full closed loop control
(High precision positioning)



Flexible hoses

A pipe that is through the motor, encoder cables and user wiring of SCARA robot. Flexible hose, flexible tube and so on.



Frame ground

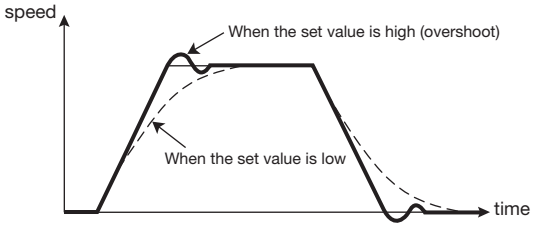
A place with a stable electric potential consisting of a large conductor such as the frame of the equipment.

G

A unit representing the magnitude of acceleration. Non SI unit.
Acceleration is indicated based on standard gravity acceleration.
$1G = 9.807 m/s^2$

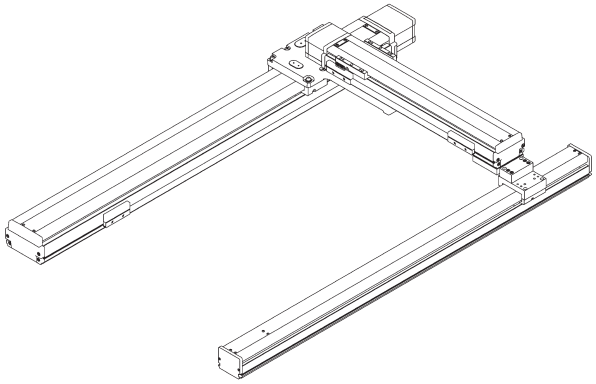
Gain

A numerical value that adjusts the response when the controller controls the servomotor. Generally, the higher the gain, the more quick response is improved.



Gantry

Combination type with a guide for Y axis support attached to XY 2 axis combination.



Explanation of Terms

Global specification

Type of controller and touch panel teaching pendant equipped with functions such as duplex emergency stop circuit and 3-position enable switch so that it can correspond to safety category.

Grease

Suspended thickener in lubricating oil to make it semisolid or solid.

Grease up

Injecting and applying grease to sliding parts.

Grounding wire

A wire that is used to divert excessive electrical charge into a neutral surface, usually the Earth, to avoid circuit damage caused by surges.

<Ground sign>

FG (frame ground)

PE (earth)

Guide module

Guide mechanism with drive mechanism removed from direct acting actuator.

Home

Reference point of actuator operation.

Hunting

The phenomenon in which the response is vibrating near the target value.

I/O

Input / Output. An interface used for sending information, in the form of signals, to and from connected devices.

Incremental encoder

Encoder with the function to detect the relative position. Since only the relative position can be grasped, return to home is required every time the power is turned on.

Indexing accuracy

The difference between the commanded angle and the actual, measured, angle. For the DDA rotaries, the angle difference is measured for one rotation of the motor. The indexing accuracy value is determined by subtracting the minimum measured difference from the maximum measured difference and dividing that by two.

Inertia

As long as no external force acts on the object, it is a property to sustain the current state.

Inertia ratio

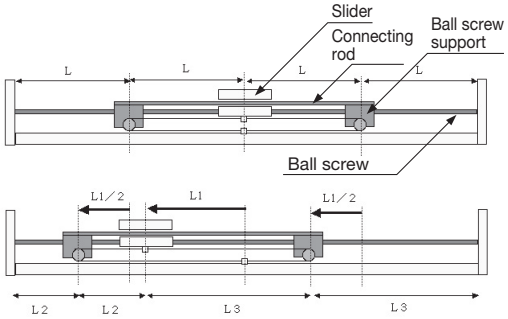
Ratio of load inertia moment to moment of inertia of motor shaft.

Inrush current

Current flowing to charge the capacitor at the moment of power-on. It is much larger than the steady state current.

Intermediate support mechanism

A ball screw support mechanism that moves in conjunction with a slider. A mechanism that greatly improves the maximum speed of the long stroke type, suppressing the runout of the ball screw in the case of long stroke, increasing the band of critical revolution number.



Jog feed

Move the actuator manually at a predetermined feed speed.

Key grooves

The grooves to be machined into the shaft or mounting parts for key mounting. (Key: The part to prevent the position shift in the rotation direction of the shaft and the mounting part.)

Lead

Distance at which the slider moves when the feed screw rotates once. When the lead is large, the speed of the slider is fast, but the thrust is small.

Leak current

It is a small current flowing from a part etc. used in a device using a high voltage power supply (100VAC etc.) to a surrounding conductor (mainly a frame).

Linear encoder

Encoder to detect linear distance.

Linear guide

Mechanism for guiding the slider of the actuator.

Linear motor

Motor that performs linear motion.

Load cell

Sensor that detects the magnitude of force.

Load factor

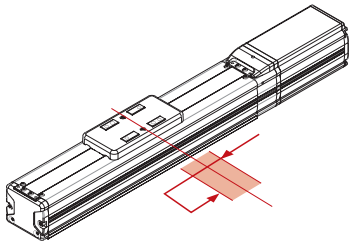
Factor to consider lifetime reduction due to operating conditions in lifetime calculation.

Load factor

The ratio of the load to the rated power of the motor.

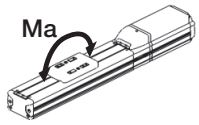
Lost motion

Difference between both stopping positions by positioning in a positive direction to a certain position and positioning in a negative direction.Repeat positioning from positive and negative directions seven times at an arbitrary point, measure the stop position, and find the average difference between the positive and negative measured values. This measurement is performed at the center of the moving distance and almost at both ends, and the largest one of the obtained average differences is taken as the measured value.



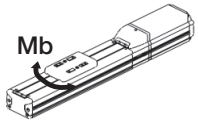
Ma direction

Front-to-rear direction with respect to the traveling direction.



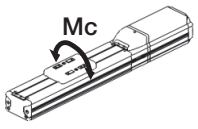
Mb direction

Horizontal direction with respect to the traveling direction.



Mc direction

Rotational direction with respect to the direction of travel.



Mechanical end

Mechanical movable limit position of the slider.

Moment

The power to try to rotate the object.

Moment of inertia

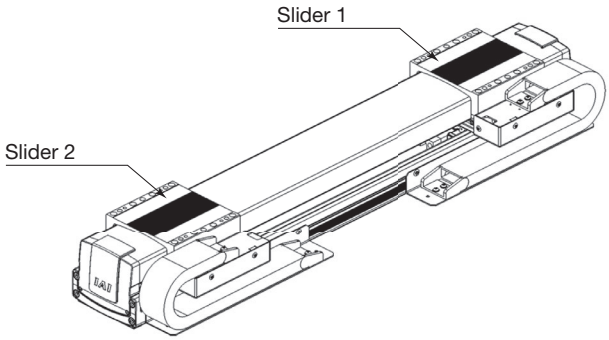
The amount that indicates the degree of difficulty of rotation (difficulty of stopping).

Motor / encoder cable

Cable connecting the actuator and the controller.

Multi slider

Specifications equipped with multiple sliders that can be operated individually.



N

Unit of force in SI unit system. It shows the force to accelerate an object with a mass of 1kg at 1m/s^2. 1kgf = 9.807N

N·m

Unit of force moment (torque) in SI unit system. The moment of force around the center point is 1N·m when 1N force is applied in the direction perpendicular to the center point to the point 1 m away from the center point.

Noise

Distortion of electrical signal caused by unnecessary electromagnetic wave leaked from equipment.

Noise filter

Equipment that prevents leakage or intrusion of noise in power supplies, signals, etc.

Explanation of Terms

Open collector output

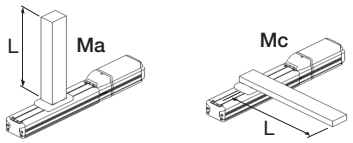
A system with no overload resistance in the voltage output circuit, that outputs signals by sinking the load current. Since this circuit can turn the load current ON/OFF regardless of voltage potential to which the current is connected, it is useful for switching an external load and is widely used as a relay or ramp circuit or the like for switching external loads, etc.

Open loop system

A type of control system. This system only outputs commands and does not take feedback.
A typical example of this is the stepping motor. Since it does not compare each actual value against the commanded value, even if a loss of synchronization (i.e signal error) occurs, the controller would not be able to correct it.

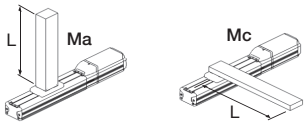
Overhang

The object to be mounted on the actuator protrudes in either front, back, left, right, up or down.



Overhang load length

Estimated maximum length that can be extended from the slider.



Overload check

Check overload. (One of protection functions)

Overshoot

The response goes over the target value too much.

Overvoltage

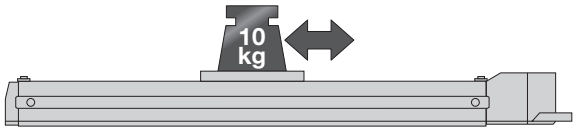
Voltage above the specified value will be applied to the motor.

Parameter

The data that the controller holds to operate the actuator, such as setting the input and output of the signal and how the voltage and current for rotating the motor are changed.

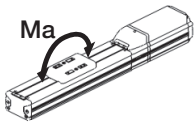
Payload quantity

Mass which can be conveyed by actuator slider / rod / table.



Pitching

It is an angle that shows how far it is inclined in the fore-and-aft direction (Ma direction) with respect to the traveling direction.

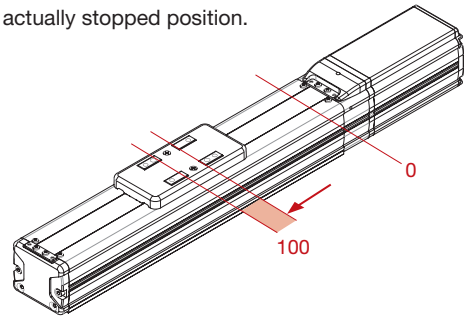


PLC

Abbreviation for Programmable Logic Controller. Programmable controller for controlling production facilities / equipment.

Positioning accuracy

The degree of coincidence between the commanded stop position and the actually stopped position.



Positioning complete width

Width regarded as positioning completion with respect to the coordinates to be positioned. (Pend Band)

Protective structure (IP□□□)

The degree of protection from water, human body and solid foreign matter.
It is based on the standards of IEC (International Electrotechnical Commission), JIS (Japan Industrial Standard) and JEMA (Japan Electric Industry Association).

Protocol

Conventions stipulated mainly when communicating. It decided how to arrange the data and give meaning.

PTP control

Control where pass points on the route are specified intermittently. (Point to Point)

Pulse train control

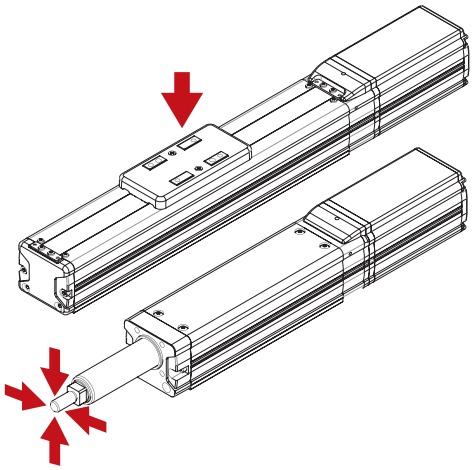
A method that controls the operation of the motor by modulating the pulse train output by the driver.

Push and return to origin

A method of determining the hime position by pushing against a stopper. Return to home is possible without using the home sensor.

Radial load

Load acting perpendicularly to the direction of motion of the direct acting actuator.



Rated thrust

Thrust that can be generated continuously.

Rated torque

Torque that can be generated continuously.

Reference rated life

Standard value of operational life. Our ROBO Cylinders have a standard rated life of 5,000km, and our heavier duty single axis robots have a standard rated life to 10,000km.

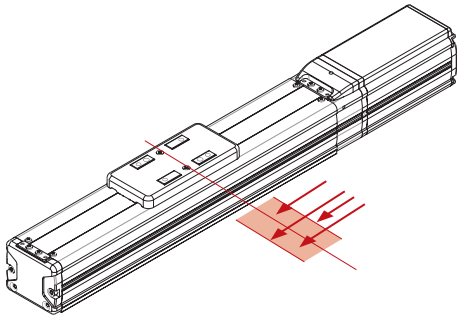
Regenerative resistor

A unit that dissipates the current that's generated when a motor decelerates by converting it into heat.

Repetitive positioning accuracy

Reproducibility when repeatedly positioned by the same command under the same condition.

Repeat positioning from the same direction to an arbitrary point seven times, measure the stop position, and find the maximum difference in reading. This measurement is performed at the center of the moving distance and almost at both ends, and the maximum one of the obtained values is taken as the measured value, and 1/2 of the value is displayed with a sign of ±.



Return to home

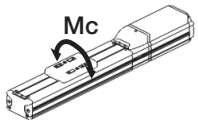
Go back to the point that is the basis of the movement of the actuator.

Robot cable

A cable excellent in resistance to bending and twisting.

Rolling

It is an angle that shows how tilted in the direction of rotation (Mc direction) with respect to the direction of travel.

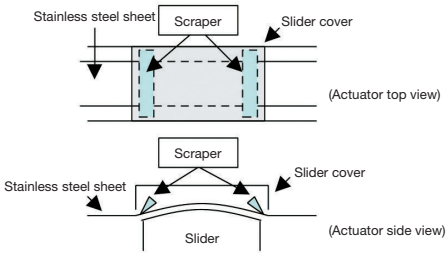


Safety category

It is prescribed by ISO 13849-1 of the international standard and classified as a function (safety function) to ensure safety. Classification is divided into 5 stages of B, 1, 2, 3, and 4 according to safety standards, and the standard (category) 4 indicates the standard with the highest safety.

Scraper

A part for removing foreign objects on the sliding surface and preventing intrusion into the inside of the main body.



Explanation of Terms

SEL language

Abbreviation for Shimizukiden Ecology Language. This is IAI's proprietary programming language.

Serial communication

Use one or two transmission lines to send and receive data.
1bit is a communication method that transmits and receives continuously.

Servo control

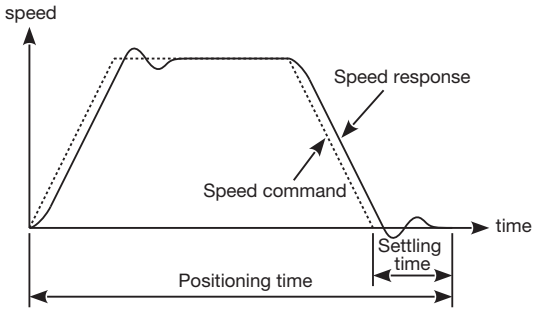
A control method that detects the current speed and position from the motor and compares the actual result against the command value by feeding back the result to the upper side to make the difference as small as possible.

Servo motor

Motor operated by giving feedback.

Settling time

In the positioning operation, it means the time until the speed command value becomes zero and then stops.



Shielded wire

An electric wire structured by covering the core wire with an electrostatic shield (aluminum tape, netting etc). It is less sensitive to noise.

Single phase AC

AC consisting of one phase. It is used for household power supply etc.

Software limit

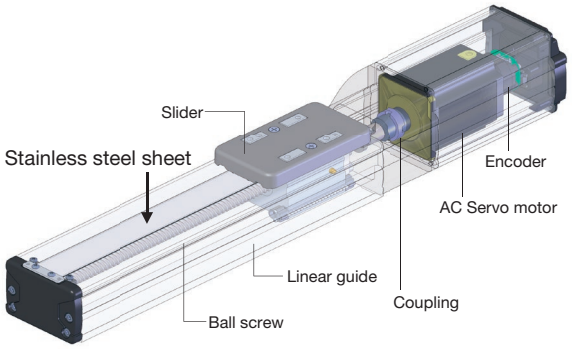
Limit of operating range set on software.

Solenoid valve type

The type of controller that made it possible to operate with the same signal as the signal operating the solenoid valve of the air cylinder.

Stainless steel sheet

Dust-proof sheet used for slider type.



Standard load factor

A constant used to determine the life expectancy of an actuator, depending on operating conditions. Will vary from actuator to actuator, but is always specified by IAI.

Step-out

Synchronization between input pulse signal (command position) and motor rotation (position after movement) is lost due to shock, overload, etc. In the open-loop control, it is impossible to detect step-out, so the operation is continued with the position shift.

Stepping motor

Motor for angular positioning by input pulse signal. Also called a stepper motor.

Stroke

Operating range of the actuator.

Switch

It is made possible to connect and shut off the path of electricity by lever or push button.

<Types of representative switches>

1 Toggle switch (snap switch)
Switch to turn ON/OFF by tilting the lever. There are 2P, 3P, 6P depending on the pin pin number.

2 Momentary switch
A switch that turns ON when the operation part is pushed, and returns to the original when you release the hand.

3 Alternate switch
A switch that holds the ON state even when you release your hand and turns it OFF when you press it again.

Tact time

In the production line, within a certain time, the working time per piece allocated to produce target production quantity. (Planned value)

Teaching

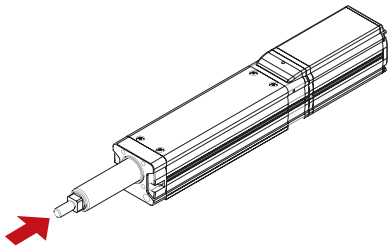
Make the controller store the information necessary for the required work.

Three phase AC

Exchange consisting of three phases. Since it can transmit with less current compared with single phase, it is widely used for power supply.

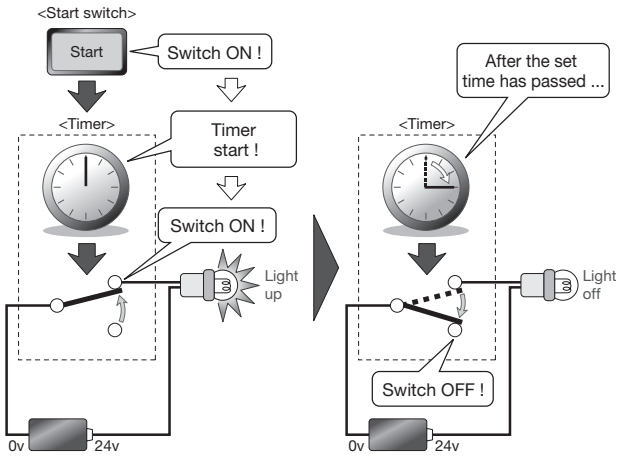
Thrust load

Load applied in the axial direction. (Axial load)



Timer

An electronic component that can be activated after an electrical start signal is given, and can switch circuits after a predetermined time has passed.



Transistor

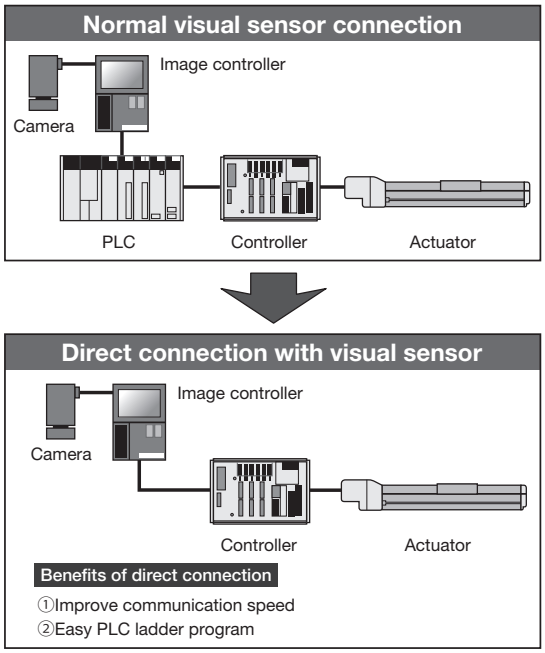
When a small amount of current is passed through the base(B) part, current flows between the collector(C) and the emitter(E), and it functions as a switching element. There are two types, PNP type and NPN type.

Transformer

Electrical equipment or parts that convert AC voltage or current.

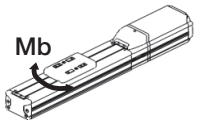
Vision sensor

A device that uses a camera to capture an object (a workpiece), read a position or contour, and send data to a control device.



Yawing

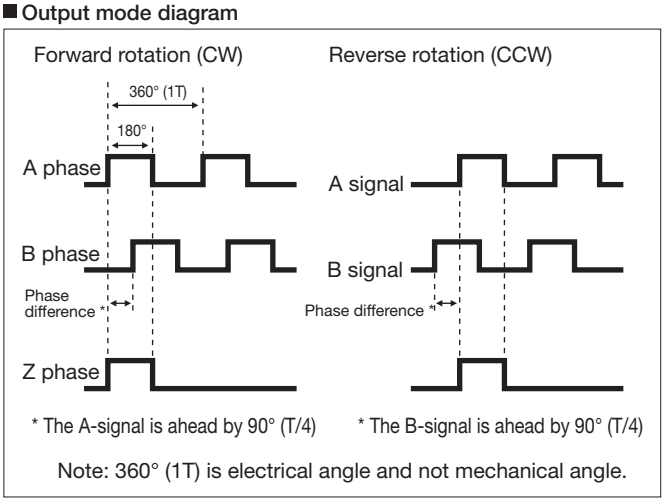
It is an angle that shows how much it tilts in the left-right direction (Mb direction) with respect to the traveling direction.



Z phase

It is a phase (signal) that detects the reference point of the incremental encoder and is used to detect the origin during home return operation. Searching the Z phase signal serving as a reference during the homing operation is called Z phase search.

■ **Output mode diagram**



Models not listed in Vol. 3 (Slider/Linear Servo)

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
Slider type	RCP2-SS7C	Please contact IAI	○
	RCP2-SS7R		
	ERC3-SA5C		
	ERC3-SA7C		
	ERC3D-SA5C		
	ERC3D-SA7C		
	RCP5-SA4C	Please contact IAI	○
	RCP5-SA6C		
	RCP5-SA7C		
	RCP5-SA4R		
	RCP5-SA6R		
	RCP5-SA7R		
	RCP4-SA6C		
	RCP4-SA7C		
	RCP4-SA6R		
	RCP4-SA7R		
	RCA2-SA3C		
	RCA2-SA4C		
	RCA2-SA5C		
	RCA2-SA6C		
	RCA2-SA3R		
	RCA2-SA4R		
	RCA2-SA5R		
	RCA2-SA6R		
	RCA-SA4D		
	RCA-SA5D		
	RCA-SA6D		
	RCS2-SA4D		
	RCS2-SA5D		
	RCS2-SA6D		
	RCS2-SA4C	Please contact IAI	○
	RCS2-SA5C		
	RCS2-SA6C		
	RCS2-SA7C		
	RCS2-SA4R		
	RCS2-SA5R		
	RCS2-SA6R		
	RCS2-SA7R		

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
Slider type	IS(P)A-WXM	Please contact IAI	○
	IS(P)A-WXMX		
	NS-SXMSA		
	NS-SXMMA		
	NS-SZMSA		
	NS-SZMMA		
	NS-MXMSA		
	NS-MXMMA		
	NS-MXMXSA		
	NS-MZMSA		
	NS-MZMMA		
	NS-LXMSA		
	NS-LXMMA		
	NS-LXMXSA		
	NS-LZMSA		
	NS-LZMMA		
	IF-SA		
	IF-MA		

Models not listed in Vol. 4 (Rod, Radial Cylinder®, Table)

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
Rod type	RCP2-RGS4C	Please contact IAI	–
	RCP2-RGD3C		
	RCP2-RGD4C		
	ERC3-RA4C	Please contact IAI	–
	ERC3-RA6C		
	RCP5-RA4C	Please contact IAI	○
	RCP5-RA6C		
	RCP5-RA7C		
	RCP5-RA8C		
	RCP5-RA4R		
	RCP5-RA6R		
	RCP5-RA7R		
	RCP5-RA8R		
	RCP4-RA6C		
	RCP4-RA6R		
	RCP2-RA2C		
	RCP2-RA3C		
	RCP2-RA8C		
	RCP2-RA8R		
	RCA-RA3D		
	RCA-RA4D		
	RCA-SRA4R		
	RCA-RGS3C		
	RCA-RGS4C		
	RCA-RGS3D		
	RCA-RGS4D		
	RCA-SRGS4R		
	RCA-RGD3C		
	RCA-RGD4C		
	RCA-RGD3D		
	RCA-RGD4D		
	RCA-RGD3R		
	RCA-RGD4R		
	RCA-SRGD4R		
	RCS2-RA4C		
	RCS2-RA4D		
	RCS2-RA4R		
	RCS2-RGS4C		
	RCS2-RGS4D		
	RCS2-RGD4C		
	RCS2-RGD4D		
	RCS2-RGD4R		
	RCP2-RA10C	Please contact IAI	○

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
Table type	RCA2-TA4C	Please contact IAI	○
	RCA2-TA5C		
	RCA2-TA6C		
	RCA2-TA7C		
	RCA2-TA4R		
	RCA2-TA5R		
	RCA2-TA6R		
	RCA2-TA7R		

Models not listed in Vol. 5 (Cartesian, Table type, Cartesian 6-axis, SCARA)

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
Cartesian Robot	ICSB2/ICSPB2-BK□H	Please contact IAI	○
	ICSB2/ICSPB2-BK□H		
	ICSB2/ICSPB2-BL□H		
	ICSB2/ICSPB2-BL□M		
	ICSA2/ICSPA2-BP□H		
	ICSA2/ICSPA2-BP□M		
	ICSA2/ICSPA2-BQ□H		
	ICSA2/ICSPA2-BQ□M		
	ICSPA2-B1NA□H		
	ICSPA2-B1NA□M		
	ICSPA2-B2NA□H		
	ICSPA2-B2NA□M		
	ICSPA2-B1L□H		
	ICSB3/ICSPB3-BK□HB3□		
	ICSB3/ICSPB3-BK□HB4H		
	ICSB3/ICSPB3-BK□MB3M		
	ICSB3/ICSPB3-BK□MB4M		
	ICSB3/ICSPB3-BL□HB3□		
	ICSB3/ICSPB3-BL□HB4H		
	ICSB3/ICSPB3-BL□MB3M		
	ICSB3/ICSPB3-BL□MB4M		
	ICSB3/ICSPB3-BK□HS4□		
	ICSB3/ICSPB3-BK□MS4□		
	ICSB3/ICSPB3-BL□HS4□		
	ICSB3/ICSPB3-BL□MS4□		
	ICSPA3-B1NA□HB3□		
	ICSPA3-B1NA□MB3□		
	ICSPA3-B2NA□HB3□		
	ICSPA3-B2NA□MB3□		
	ICSPA3-B1L□HB3□		
	ICSPA3-B1NA□HS3M		
	ICSPA3-B1NA□MS3M		
	ICSPA3-B2NA□HS3M		
	ICSPA3-B2NA□MS3M		
	ICSPA3-B1L□HS3M		
	ICSPA4-B2L1H		
	ICSPA6-B2L1HB3□		
	ICSPA6-B2L1HS3M		
	ICSA4/ICSPA4-BB□HZRS	Please contact IAI	○
	ICSA4/ICSPA4-BE□HZRM		
	ICSPA4-B3NA1H		
	ICSPA4-B3NA1M		
	ICSPA6-B3NA1HB3□		
	ICSPA6-B3NA1MB3□		
	ICSPA6-B3NA1HS3M		
	ICSPA6-B3NA1MS3M		

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
SCARA Robot [Standard type]	IX-NNN2515H	Please contact IAI	○
	IX-NNN3515H		
	IX-NNN50□□H		
	IX-NNN60□□H		
	IX-NNN70□□H		
	IX-NNN80□□H		
SCARA Robot [High-speed type]	IX-NSN5016H		
	IX-NSN6016H		
SCARA Robot [Wall-mount inverse type]	IX-TNN/UNN3015H		
	IX-TNN/UNN3515H		
SCARA Robot [Ceiling-mount inverse type]	IX-HNN/INN5020H		
	IX-HNN/INN6020H		
	IX-HNN/INN70□□H		
	IX-HNN/INN80□□H		

Models not listed in Vol. 6 (Pulse/Servo Press, Gripper, Rotary, Special Purpose)

○: Available

Classification	Type	Latest catalog publication year	Web product information
Gripper	RCS2-GR8	Please contact IAI	○
Rotary Type	RCS2-RT6	Please contact IAI	○

Models not listed in Vol. 7 (Cleanroom, Dust-proof, Splash-proof)

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
Cleanroom specification	RCP2CR-SA5	Please contact IAI	–
	RCP2CR-SA6		
	RCP2CR-SS7C	Please contact IAI	–
	RCP2CR-HS8C		
	RCACR-SA5D		
	RCACR-SA6D		
	RCS2CR-SA5D		
	RCS2CR-SA6D		
	RCP5CR-SA4C	Please contact IAI	○
	RCP5CR-SA6C		
	RCP5CR-SA7C		
	RCP4CR-SA6C		
	RCP4CR-SA7C		
	RCS2CR-SA4C	Please contact IAI	○
	RCS2CR-SA5C		
	RCS2CR-SA6C		
	IX-NNC2515H	Please contact IAI	○
	IX-NNC3515H		
	IX-NNC50□□H		
	IX-NNC60□□H		
	IX-NNC70□□H		
	IX-NNC80□□H		
	RCACR-SA4C	Please contact IAI	○
	RCACR-SA5C		
	RCACR-SA6C		
Dust- and Splash-proof Specification	RCP5W-RA6C	Please contact IAI	○
	RCP5W-RA7C		
	RCP5W-RA8C		
	RCP4W-RA6C		
	RCP4W-RA7C		
	RCP2W-RA4C		
	RCP2W-RA10C		
	RCAW-RA3C/RA3D/RA3R		
	RCAW-RA4C/RA4D/RA4R		
	IX-NNW2515H	Please contact IAI	○
	IX-NNW3515H		
	IX-NNW50□□		
	IX-NNW60□□		
	IX-NNW70□□		
	IX-NNW80□□		

Models not listed in Vol. 8 (Controller)

The following models are not included in the General Catalog 2024, but are still sold.
For product details, please refer to the latest catalog or the product information on our website.

Past General Catalog
https://www.intelligentactuator.com/iai-catalogs-search-index/?table_filter=generalcatalog

Website URL
https://www.intelligentactuator.com/

○: Available

Classification	Type	Latest catalog publication year	Web product information
Controller	ERC3	Please contact IAI	—
	MSEP-C/LC		
	XSEL-RX/RXD8		
	XSEL-SX/SXD8		
	MCON-LC/LCG	Please contact IAI	—
	SCON-LC/LCG		
	MCON-C/CG	Please contact IAI	—
	XSEL-PX/QX	Please contact IAI	—
Controller options	EIOU	Please contact IAI	—
	RCM-101-USB	Integrated into IA-OS-C (Note 1)	—

(Note 1) The teaching software for PC "RCM-101-USB" previously listed has been integrated into "IA-OS-C" in this catalog.
(RCM-101 software is included with IA-OS)

Discontinued and Replacement Models

Classification	Series			Discontinuation date	Successor models (REPLACEMENTS) *
Actuator	Single axis robot	DS	SA4 SA5 SA6 A4□ A5□ A6□	October 2008 (Power supply voltage 24VDC specification) February 2021 (Power supply voltage 100/200VAC specification)	RCA/RCP6 (Power supply voltage 24VDC specification) RCS2/RCS4 (Power supply voltage 100/200VAC specification)
		DSCR	SA5 SA6	February 2021	RCACR (Power supply voltage 24VDC specification) RCS2CR (Power supply voltage 100/200VAC specification)
		SS	S M	February 2021	RCS2/RCS3
		SSCR	S M	February 2021	RCS2CR/RCS3CR
		EX	12EX	August 2007	RCP5-BA
		AS	All models	October 2003	ISB
		E/F	12□	October 2003	ISB/RCA
		IS	T-X-S S-X-M S-Y-M S-Z-M M-X-S M-X-M M-X-MX M-Y-S M-Y-M M-Z-S M-Z-M L-X-S L-X-M L-X-MX L-X-UWX L-Y-S L-Y-M L-Z-S L-Z-M	August 2014	ISB
		ISP	S-X-M S-Y-M S-Z-M M-X-S M-X-M M-X-MX M-Y-S M-Y-M M-Z-S M-Z-M L-X-S L-X-M L-X-MX L-X-UWX L-Y-S L-Y-M L-Z-S L-Z-M W-X-M W-X-MX	September 2015	ISPB
	Single axis robot	ISD	S M MX L LX	September 2015	ISDB ISPDB ISDBCR ISPDBCR
		ISPD	S M MX L LX		
		ISDCR	S M MX L LX		

*Refer to the "Old Model Conversion Table (see P1-383)" or contact our sales representative for compatibility with the succeeding model.

Notice on discontinued models
intelligentactuator.com/discon-list

Classification	Series			Discontinuation date	Successor models (REPLACEMENTS) *
Actuator	Single axis robot	ISPDCR	S M MX L LX W WX	September 2015	ISDB ISPDB ISDBCR ISPDBCR
		FS	All models	August 2021	IF
	High Speed Cartesian Robot	CT4	All models	August 2021	None
	Cartesian robot	IK2	PXBD PXBC PXBB PXZB PYBB SXBD SXBC SXBB SXBA SXZB SYBB	April 2023	New IK2 RCP6 systems (IK□-P6)
		IK3	PBBG SBBG		
		ICSP2		September 2015	ICSB2
		ICSP3			ICSB3
		ICS2		August 2014	ICSB2
		ICS3			ICSB3
	SCARA Robot	IX	NNN1205 NNN1505 NNN1805 NNC1205 NNC1505 NNC1805	April 2023	IXA-NNN1805
			NNN1000 NNN1200	November 2021	IXA-4NHN1000 4NHN1200
	ROBO Cylinder	ERC	All models	June 2021	RCP6S
		ERC2	All models	June 2023	
		RC	—	October 2004	RCP6
		RC-S	—		
		RCP	All models	October 2004	RCP6
		RCP2	HS8C HS8R	June 2023	None
			BA6/BA6U BA7/BA7U	April 2024	RCP5-BA
			SA7/SA7C SA7R SS8C/SM SS8R/SMR RA6C/RMA RGS6C/RMGS RGD6C/RMGD	July 2024	RCP4-SA7C SA7R SS8C SS8R RA6CQ RGS6CQ RGD6CQ
		RCP2CR	SA7/SA7C SS8C/SM	July 2024	RCP4CR-SA7C SS8C
		RCP2W	SA16C	November 2020	RCP4W (Note 1)
			RA6C/RMW	July 2024	RCP4W-RA6CQ
		RCA	A4R A5R A6R	January 2022	RCP6/RCS4
			SS4D SS5D SS6D	February 2025	RCA-SA4D SA5D SA6D
		RCA2	SA2A□ RA2A□	December 2023	RCA2-SA3□
			RN□N/RP□N GS□N/GD□N SD□N	September 2023	RCA2 - RN□NA/RP□NA GS□NA/GD□NA SD□NA
			TC(A)□N/TCN□N TW(A)□N/TWN□N TF(A)□N/TFN□N		RCA2 - TCA□NA TWA□NA TFA□NA

(Note 1) There is no direct replacement for the RCP2W-SA16C. The IP rating for the RCP2W is IP67, while the RCP4W-SA□C is IP65. There are also differences in mounting directions, dimensions, and specifications.

*Refer to the "Old Model Conversion Table (see P1-383)" or contact our sales representative for compatibility with the succeeding model.

Notice on discontinued models
intelligentactuator.com/discon-list

Discontinued and Replacement Models

Classification	Series			Discontinuation date	Successor models (REPLACEMENTS) *
Actuator	ROBO Cylinder	RCS	All models	September 2019	RCS2/RCA
		RCS2	A4R A5R A6R	January 2022	RCP6/RCS4
			SA7-I/A SS7-I/A SS8-I/A RA5-I/A RGS5-I/A RGD5-I/A	April 2023	RCS2 – SA7-WA SS7-WA RA5-WA RGS5-WA RGD5-WA RCS3-SS8-WA
			F5D	November 2023	RCS4-TA
		RCS2CR	SA7-I/A SS7-I/A SS8-I/A	April 2023	RCS2CR – SA7-WA SS7-WA SS8-WA
		RCS3 RCS3P	SA8-I/A SS8-I/A	April 2023	RCS3/RCS3P – SA8-WA SS8-WA
		RCS3CR RCS3PCR	SA8-I/A SS8-I/A	April 2023	RCS3CR/RCS3PCR – SA8-WA SS8-WA
		RCL	SA5L SM5L	June 2022	None
			SA1L SA2L SA3L SA4L SA6L SM4L SM6M RA1L RA2L RA3L	April 2023	RCA/RCP3
	LSA	LSA	H8	May 2024	LSA-S8SS/S8SM
			L15		None
			N19		LSA-N15SS/N15SM
	TA	TA	28	December 2003	RCP3/RCP6
	TX	TX	20 28 35	February 2016	RCP3/RCP6
	DD	DD DDCR	T18□ H18□	December 2019	DDA DDACR
			LT18□ LH18□	August 2022	
Table top robot	TT-300			August 2007	TTA
	TT		All models	September 2023	

*Refer to the "Old Model Conversion Table (see P1-383)" or contact our sales representative for compatibility with the succeeding model.

Notice on discontinued models
intelligentactuator.com/discon-list

Classification	Series		Discontinuation date	Successor models (REPLACEMENTS) *
Controller	DS controller	DS-S-C1	October 2008	R-unit
		SA-C1/C2/C3/C4	December 2001	
		DS-C1/C2/C3/C4		
	Super SEL Controller	S-SEL-F	August 2007	XSEL2, R-unit
		S-SEL-ES-1	April 2005	XSEL2, R-unit
		M-SEL-GS-2~4		XSEL-P/RA, R-unit
		S-SEL-E-1-□ S-SEL-EDS-1-□		XSEL2, R-unit
	Super SEL Controller	M-SEL-G-2~8 M-SEL-GDS-2~8 M-SEL-GID-2~8 M-SEL-GX-2~9	April 2005	XSEL-P/RA, R-unit
		SEL-A-□	October 2003	XSEL-P/RA, R-unit
		SEL-B-□	October 2003	XSEL-P/RA
		SEL-H-2/4 SEL-HAB-2/4	October 2003	XSEL-P/RA
		SEL-D-2	December 2001	XSEL-RA , R-unit
	Multi-controller	SEL-2~4	December 2001	XSEL-P/RA, R-unit
	Single controller	S-SEL-35/60/100/200	October 2003	XSEL-RA , R-unit
		S C-S	December 2001	SCON2/SCON
	Position controller	RCP2-C/CF	May 2014	PCON-CB/CFB
		RCS-C		SCON2/SCON (100V,200V) ACON-CB (24V)
		RCS-E	June 2014	ACON-CB
		ECON	May 2014	SCON2/SCON
		PDR		
		RCP-C-□	October 2004	PCON-CB
		AMEC/PMEC	September 2021	ACON-CYB DCON-CYB PCON-CYB
		ASEP/DSEP/PSEP		
		ACON-C/CG	June 2023	ACON-CB/CGB
		ACON-CY/PL/PO/SE		ACON-CYB/PLB/POB
		ACON-CA	September 2023	ACON-CB/CGB
		DCON-CA	September 2023	DCON-CB/CGB
		PCON-C/CG/CF	June 2023	PCON-CB/CGB/CFB
		PCON-CY/PL/PO/SE		PCON-CYB/PLB/POB
		PCON-CA/CFA	October 2021	PCON-CB/CFB
		SCON-C/CG	June 2023	SCON2/SCON
		SCON-CA	September 2023	
		SCON-CAL/CGAL		
		RCM-GW-CC/DV/PR	June 2023	RCON
		ROBONET (RGW/RPCON/RACON/RABU/REXT)	June 2022	R-unit
		MSCON	September 2023	RCON+RCON-SC
	Controller for TA	TA-C1	December 2003	PCON-CB
	Controller for TX	TX-C1	February 2016	PCON-CB
	Program controller	ASEL-C/CS	June 2023	RSEL+RCON-AC
		PSEL-C/CS		RSEL+RCON-PC
		SSEL-C/CS	February 2025	RSEL+RCON-SC
		XSEL-J/JX	December 2017	XSEL-P(X)/Q(X)/RA(X)/SA(X)
		XSEL-K/KE/KET/KETX/KEX/KT/KX	December 2016	XSEL-P(X)/Q(X)/RA(X)/SA(X)
	XSEL-R/S/RX/SX/RXD/SXD		September 2023	XSEL-RA/SA/RAX/SAX
Display	Touch panel display	RCM-PM-01	December 2013	—
24VDC power source	PS-241/242		October 2022	PSA-24(L)
Simple absolute unit	ACON/PCON	ACON-ABU PCON-ABU	June 2023	—
Teaching box	Simple teaching for RC	RCM-E	March 2014	TB-02
	Data setting device for RC	RCM-P		—
	Standard teaching for RC	RCM-T	August 2008	TB-02
	Teaching for XSEL	IA-T	October 2015	TB-02
	Teaching for position controller	CONT-T/TG/TGS/PT	June 2021	TB-02
		CON-PTA/PDA/PGAS SEP-PT TB-01	June 2023	
	Teaching for program controller	SEL-T/TD/TG	June 2021	TB-02

*Refer to the “Old Model Conversion Table (see P1-383)” or contact our sales representative for compatibility with the succeeding model.

Notice on discontinued models
intelligentactuator.com/discon-list

Old Model Conversion Table (Models with Stopper Motor)

Series	Old models	Catalog listed	Current model (equivalent of old product)	Latest recommended models		
				Model	Installation compatibility with older models	Catalog listed
RCP Slider Type (discontinued)	RCP-SA5-I/A-*	Please contact IAI	RCP2-SA5C-I-42P-*	RCP6-SA6C-WA-42P-*	Incompatible	Please contact IAI
	RCP-SA6-I/A-*		RCP2-SA6C-I-42P-*			
	RCP-SS-I/A-*		RCP2-SS7C-I-42P-*	The model shown on the left is the latest model.	Compatible	Please contact IAI
	RCP-SSR-I/A-*		RCP2-SS7R-I-42P-*			
	RCP-SM-I/A-*		RCP2-SS8C-I-56P-*			
	RCP-SMR-I/A-*		RCP2-SS8R-I-56P-*			
RCP Rod Type (discontinued)	RCP-RSA-I/A-*	Please contact IAI	RCP2-RA4C-I-42P-*	RCP6-RA4C-WA-35P-*	Incompatible	Please contact IAI
	RCP-RSGS-I/A-*		RCP2-RGS4C-I-42P-*	RCP6-RRA4C-WA-35P-* Guide included		
	RCP-RSGD-I/A-*		RCP2-RGD4C-I-42P-*			
	RCP-RMA-I/A-*		RCP2-RA6C-I-56P-*	RCP6-RA7C-WA-56P-*		
	RCP-RMGS-I/A-*		RCP2-RGS6C-I-56P-*	RCP6-RRA7C-WA-56P-* Guide included		
	RCP-RMGD-I/A-*		RCP2-RGD6C-I-56P-*			
	RCP-RSW-I/A-*		RCP2W-RA4C-I-42P-*	RCP6W-RA6C-WA-42P-*		
	RCP-RMW-I/A-*		RCP2W-RA6C-I-56P-*	RCP6W-RA7C-WA-56P-*		
RCP2 Slider Type	RCP2-SA5-I/A-PM-*	Please contact IAI	RCP2-SA5C-I-42P-*	RCP6-SA6C-WA-42P-*	Incompatible	Please contact IAI
	RCP2-SA6-I/A-PM-*		RCP2-SA6C-I-42P-*			
	RCP2-SA7-I/A-PM-*		RCP2-SA7C-I-56P-*	RCP6-SA7C-WA-56P-*		
	RCP2-SS-I/A-PM-*		RCP2-SS7C-I-42P-*	The model shown on the left is the latest model.	Compatible	Please contact IAI
	RCP2-SM-I/A-PM-*		RCP2-SS8C-I-56P-*			
	RCP2-HSM-I-PM-*	Please contact IAI	RCP2-HS8C-I-86P-*			
RCP2 Slider Type Side-mounted	RCP2-SA5R-I/A-PM-*	Please contact IAI	RCP2-SA5R-I-42P-*	RCP6-SA6R-WA-42P-*	Incompatible	Please contact IAI
	RCP2-SA6R-I/A-PM-*		RCP2-SA6R-I-42P-*			
	RCP2-SA7R-I/A-PM-*		RCP2-SA7R-I-56P-*	RCP6-SA7R-WA-56P-*		
	RCP2-SSR-I/A-PM-*		RCP2-SS7R-I-42P-*	The model shown on the left is the latest model.	Compatible	Please contact IAI
	RCP2-SMR-I/A-PM-*		RCP2-SS8R-I-56P-*			
	RCP2-HSMR-I-PM*	Please contact IAI	RCP2-HS8R-I-86P-*			
RCP2 Belt Type	RCP2-BA6-I/A-PM-*	Please contact IAI	RCP2-BA6-I-42P-*	RCP5-BA6-WA-42P-*	Incompatible	Please contact IAI
	RCP2-BA6U-I/A-PM-*		RCP2-BA6U-I-42P-*	RCP5-BA6U-WA-42P-*		
	RCP2-BA7-I/A-PM-*		RCP2-BA7-I-42P-*	RCP5-BA7-WA-56P-*		
	RCP2-BA7U-I/A-PM-*		RCP2-BA7U-I-42P-*	RCP5-BA7U-WA-56P-*		

The past general catalogs are available on our website.
intelligentactuator.com/iai-catalogs-search-index/

Information about discontinued products is available on our website.
intelligentactuator.com/discon-list

Series	Old models	Catalog listed	Current model (equivalent of old product)	Latest recommended models: Model	Installation compatibility with older models	Latest recommended models: Catalog listed
RCP2 Rod Type	RCP2-RPA-I-PM-*	Please contact IAI	RCP2-RA2C-I-20P-*	RCP3-RA2BC-I-28SP-*	Incompatible	Please contact IAI
	RCP2-RXA-I/A-PM-*		RCP2-RA3C-I-28P-*	RCP4-RA3C-I-28P-*		Please contact IAI
	RCP2-RSA-I/A-PM-*		RCP2-RA4C-I-42P-*	RCP6-RA6C-WA-42P-*		Please contact IAI
	RCP2-RMA-I/A-PM-*		RCP2-RA6C-I-56P-*	RCP6-RA7C-WA-56P-*		
	RCP2-RXGD-I/A-PM-*		RCP2-RGD3C-I-28P-*	RCP4-RA3C-I-28P-* Guide included		
	RCP2-RSGS-I/A-PM-*		RCP2-RGS4C-I-42P-*	RCP6-RRA4C-WA-35P-* Guide included		
	RCP2-RSGD-I/A-PM-*		RCP2-RGD4C-I-42P-*			
	RCP2-RMGS-I/A-PM-*		RCP2-RGS6C-I-56P-*	RCP6-RRA7C-WA-56P-* Guide included		
	RCP2-RMGD-I/A-PM-*		RCP2-RGD6C-I-56P-*			
	RCP2-RFA-I-PM-*	Please contact IAI	RCP2-RA10C-I-86P-*	RCP5-RA10C-WA-86P-* Guide included		
RCP2 Gripper Type	RCP2-GRS-I-PM-*	Please contact IAI	RCP2-GRS-I-20P-*	The model shown on the left is the latest model.	Compatible	Please contact IAI
	RCP2-GRM-I-PM-*		RCP2-GRM-I-28P-*			
	RCP2-GR3LS-I-PM-*	Please contact IAI	RCP2-GR3LS-I-28P-*			
	RCP2-GR3LM-I-PM-*		RCP2-GR3LM-I-42P-*			
	RCP2-GR3SS-I-PM-*		RCP2-GR3SS-I-28P-*			
	RCP2-GR3SM-I-PM-*		RCP2-GR3SM-I-42P-*			
RCP2 Rotary Type	RCP2-RTB-I-PM-*	Please contact IAI	RCP2-RTB-I-28P-*	The model shown on the left is the latest model.	Compatible	Please contact IAI
	RCP2-RTC-I-PM-*		RCP2-RTC-I-28P-*			
RCP2CR Slider Type Cleanroom Specification	RCP2CR-SA5-I/A-PM-*	Please contact IAI	RCP2CR-SA5-I-42P-*	RCP6CR-SA6C-WA-42P-*	Incompatible	Please contact IAI
	RCP2CR-SA6-I/A-PM-*		RCP2CR-SA6-I-42P-*			
	RCP2CR-SA7-I/A-PM-*		RCP2CR-SA7-I-56P-*	RCP6CR-SA7C-WA-56P-*		
	RCP2CR-SS-I/A-PM-*		RCP2CR-SS7C-I-42P-*	The model shown on the left is the latest model.	Compatible	Please contact IAI
	RCP2CR-SM-I/A-PM-*		RCP2CR-SS8C-I-56P-*			
	RCP2CR-HSM-I-PM-*	Please contact IAI	RCP2CR-HS8C-I-86P-*			
RCP2 Rod Type Dust-proof Splash-proof Specification	RCP2-RSW-I/A-PM-*	Please contact IAI	RCP2W-RA4C-I-42P-*	RCP6W-RA6C-WA-42P-*	Incompatible	Please contact IAI
	RCP2-RMW-I/A-PM-*		RCP2W-RA6C-I-56P-*	RCP6W-RA7C-WA-56P-*		
	RCP2-RFW-I-PM-*	Please contact IAI	RCP2W-RA10C-I-86P-*	RCP5W-RA10C-WA-86P-* Guide included		Please contact IAI

Old Model Conversion Table (Models with Servo Motor)

Series	Old models	Catalog listed		Latest recommended models		
				Model	Installation compatibility with older models	Catalog listed
RCS Slider Type (discontinued)	RCS-SA4-I/A-20-*	Please contact IAI	➡	RCA-SA4C-WA-20-*	Compatible (Note)	Please contact IAI
	RCS-SA5-I/A-20-*		➡	RCA-SA5C-WA-20-*		
	RCS-SA6-I/A-30-*		➡	RCA-SA6C-WA-30-*		
	RCS-SS-I/A-60-*		➡	RCS2-SS7C-I/A-60-*		Please contact IAI
	RCS-SM-I/A-100-*		➡	RCS2-SS8C-I/A-100-*		
	RCS-SM-I/A-150-*		➡	RCS2-SS8C-I/A-150-*		
	RCS-SSR-I/A-60-*		➡	RCS2-SS7R-I/A-60-*		
	RCS-SMR-I/A-100-*		➡	RCS2-SS8R-I/A-100-*		
	RCS-SMR-I/A-150-*		➡	RCS2-SS8R-I/A-150-*		
RCS Rod Type (discontinued)	RCS-RA35-I-20-GN-*	Please contact IAI	➡	RCA-RA3C-I-20-*	Incompatible	Please contact IAI
	RCS-RA35-I-20-GS-*		➡	RCA-RGS3C-I-20-*		
	RCS-RA35-I-20-GD-*		➡	RCA-RGD3C-I-20-*		
	RCS-RA35R-I-20-GN-*		➡	RCA-RA3R-I-20-*		
	RCS-RA45-I/A-30-GN-*		➡	RCA-RA4C-I/A-30-*		
	RCS-RA45-I/A-30-GS-*		➡	RCA-RGS4C-I/A-30-*		
	RCS-RA45-I/A-30-GD-*		➡	RCA-RGD4C-I/A-30-*		
	RCS-RA45R-I/A-30-GN-*		➡	RCA-RA4R-I/A-30-*		
	RCS-RA55-I/A-60-GN-*		➡	RCS2-RA5C-WA-60-*		Please contact IAI
	RCS-RA55-I/A-60-GS-*		➡	RCS2-RGS5C-WA-60-*		
	RCS-RA55-I/A-60-GD-*		➡	RCS2-RGD5C-WA-60-*		
	RCS-RA55-I/A-60-GN-*		➡	RCS2-RA5R-WA-60-*		
	RCS-RA55-I/A-100-GN-*		➡	RCS2-RA5C-WA-100-*		
	RCS-RA55-I/A-100-GS-*		➡	RCS2-RGS5C-WA-100-*		
	RCS-RA55R-I/A-100-GD-*		➡	RCS2-RGD5C-WA-100-*		
	RCS-RB7525-I-60-GN-*		➡	RCS2-SRA7BD-I-60-*		Please contact IAI
	RCS-RB7525-I-60-GS-*		➡	RCS2-SRGS7BD-I-60-*		
	RCS-RB7525-I-60-GD-*		➡	RCS2-SRGD7BD-I-60-*		
	RCS-RB7530-I-60-GN-*		➡	RCS2-SRA7BD-I-60-*		
	RCS-RB7530-I-60-GS-*		➡	RCS2-SRGS7BD-I-60-*		

(Note) Overall dimensions vary. Please refer to the catalog for details.

The past general catalogs are available on our website.
intelligentactuator.com/iai-catalogs-search-index/

Information about discontinued products is available on our website.
intelligentactuator.com/discon-list

Series	Old models	Catalog listed		Latest recommended models		
				Model	Installation compatibility with older models	Catalog listed
RCS Rod Type (discontinued)	RCS-RB7530-I-60-GD-*	Please contact IAI	➡	RCS2-SRGD7BD-I-60-*	Compatible (Note) (Optional) *The dimensions from the end face of the rod side body to the tip of the rod differ by several mm.	Please contact IAI
	RCS-RB7530-I-100-GN-*		➡	RCS2-SRA7BD-I-100-*		
	RCS-RB7530-I-100-GS-*		➡	RCS2-SRGS7BD-I-100-*		
	RCS-RB7530-I-100-GD-*		➡	RCS2-SRGD7BD-I-100-*		
	RCS-RB7535-I-100-GS-*		➡	RCS2-SRGS7BD-I-100-*	Compatible (Note) (Optional)	
	RCS-RB7535-I-100-GD-*		➡	RCS2-SRGD7BD-I-100-*		
	RCS-RB7535-I-150-GN-*		➡	RCS2-SRA7BD-I-150-*		
	RCS-RB7535-I-150-GS-*		➡	RCS2-SRGS7BD-I-150-*		
	RCS-RB7535-I-150-GD-*		➡	RCS2-SRGD7BD-I-150-*		
RCS Flat Type (discontinued)	RCS-F55-I/A-60-*	Please contact IAI	➡	RCS4-TA4(C/R)-WA-60-*	Incompatible	Please contact IAI
	RCS-F55-I/A-100-*		➡	RCS4-TA6(C/R)-WA-100-*		
RCS Gripper Type (discontinued)	RCS-G20-I-60-5-*	Please contact IAI	➡	RCS2-GR8-I-60-5-*	Compatible	Please contact IAI
RCS Rotary Type (discontinued)	RCS-R10-I-60-18-*	Please contact IAI	➡	RCS2-RT6-I-60-18-*	Compatible	Please contact IAI
	RCS-R20-I-60-18-*		➡	RCS2-RT6R-I-60-18-*		
	RCS-R30-I-60-4-*		➡	RCS2-RT7R-I-60-18-*		
RCS2 Rod Type	RCS2-RA7AD-I-60-*	Please contact IAI	➡	RCS2-SRA7BD-I-60-*	Incompatible	Please contact IAI
	RCS2-RGS7AD-I-60-*		➡	RCS2-SRGS7BD-I-60-*		
	RCS2-RGD7AD-I-60-*		➡	RCS2-SRGD7BD-I-60-*		
	RCS2-RA7AD-I-100-*		➡	RCS2-SRA7BD-I-100-*		
	RCS2-RGS7AD-I-100-*		➡	RCS2-SRGS7BD-I-100-*		
	RCS2-RGD7AD-I-100-*		➡	RCS2-SRGD7BD-I-100-*		
	RCS2-RA7BD-I-100-*		➡	RCS2-SRA7BD-I-100-*	Compatible (Note) (Optional)	
	RCS2-RGS7BD-I-100-*		➡	RCS2-SRGS7BD-I-100-*		
	RCS2-RGD7BD-I-100-*		➡	RCS2-SRGD7BD-I-100-*		
	RCS2-RA7BD-I-150-*		➡	RCS2-SRA7BD-I-150-*		
	RCS2-RGS7BD-I-150-*		➡	RCS2-SRGS7BD-I-150-*		
	RCS2-RGD7BD-I-150-*		➡	RCS2-SRGD7BD-I-150-*		

(Note) Overall dimensions vary. Please refer to the catalog for details.

Old Model Conversion Table (Models with Servo Motor)

Series	Old models	Catalog listed		Latest recommended models		
				Model	Installation compatibility with older models	Catalog listed
DS Slider Type [Power supply voltage: 24VDC*] (discontinued)	DS-SA4-I/A-20-*-*-*-C1-*	Please contact IAI	➡	RCA-SA4C-WA-20-*	Compatible (Note)	Please contact IAI
	DS-SA5-I/A-20-*-*-*-C1-*		➡	RCA-SA5C-WA-20-*		
	DS-SA6-I/A-20-*-*-*-C1-*		➡	RCA-SA6C-WA-30-*		
DS Arm Type [Power supply voltage: 24VDC*] (discontinued)	DS-A4□-I-20-*-*-*-C1-*	Please contact IAI	➡	RCP6-TA4R-WA-35P-*	Incompatible	Please contact IAI
	DS-A5□-I-20-*-*-*-C1-*		➡	RCP6-TA6R-WA-42P-*		
	DS-A6□-I-30-*-*-*-C1-*		➡	RCP6-TA6R-WA-42P-*		
DSCR Slider Type Cleanroom Specification [Power supply voltage: 24VDC*] (discontinued)	DSCR-SA5-I-20-*-*-*-C1-*	Please contact IAI	➡	RCACR-SA5C-WA-20-*	Compatible (Note)	Please contact IAI
	DSCR-SA6-I-30-*-*-*-C1-*		➡	RCACR-SA6C-WA-30-*		
DS Slider Type [Power supply voltage: 100/200VAC*] (discontinued)	DS-SA4-I/A-20-*-*-*-T1-*	Please contact IAI	➡	RCS2-SA4C-WA-20-*	Compatible (Note)	Please contact IAI
	DS-SA5-I/A-20-*-*-*-T1-*		➡	RCS2-SA5C-WA-20-*		
	DS-SA6-I/A-30-*-*-*-T1-*		➡	RCS2-SA6C-WA-30-*		
DS Arm Type [Power supply voltage: 100/200VAC*] (discontinued)	DS-A4□-I/A-20-*-*-*-T1-*	Please contact IAI	➡	RCS4-TA4R-WA-60-*	Incompatible	Please contact IAI
	DS-A5□-I/A-20-*-*-*-T1-*		➡	RCS4-TA6R-WA-100-*		
	DS-A6□-I/A-30-*-*-*-T1-*		➡	RCS4-TA6R-WA-100-*		
DSCR Slider Type Cleanroom Specification [Power supply voltage: 100/200VAC*] (discontinued)	DSCR-SA5-I/A-20-*-*-*-T1-*	Please contact IAI	➡	RCS2CR-SA5C-WA-20-*	Compatible (Note)	Please contact IAI
	DSCR-SA6-I/A-30-*-*-*-T1-*		➡	RCS2CR-SA6C-WA-30-*		
SS Slider Type (discontinued)	SS-S-I/A-60-*	Please contact IAI	➡	RCS2-SS7C-I/A-60-*	Compatible (Note)	Please contact IAI
	SS-M-I/A-100-*		➡	RCS3-SS8C-WA-100-*		Please contact IAI
	SS-M-I/A-150-*		➡	RCS3-SS8C-WA-150-*		
SSCR Slider Type Cleanroom Specification (discontinued)	SSCR-S-I/A-60-*	Please contact IAI	➡	RCS2CR-SS7C-I/A-60-*	Compatible (Note)	Please contact IAI
	SSCR-M-I/A-100-*		➡	RCS3CR-SS8C-WA-100-*		Please contact IAI
	SSCR-M-I/A-150-*		➡	RCS3CR-SS8C-WA-150-*		

(Note) Overall dimensions vary. Please refer to the catalog for details.

*The supply voltage of the DS Series varies depending on the model.
Check the "Applicable Controller" for the model.

Example) DS (Series) - SA4 (Type) - I (Encoder type) - 20 (Motor power) - 10 (Lead) - 200 (Stroke) - T1/C1 (Applicable controller) - S (Cable length) - BE (Option)

Model	Applicable controller	Power supply voltage
C1	DS-S-C1	24VDC
T1	XSEL-J/K/KE, E-Con, P-Driver	100/200VAC

The past general catalogs are available on our website.
intelligentactuator.com/iai-catalogs-search-index/

Information about discontinued products is available on our website.
intelligentactuator.com/discon-list

Series	Old models	Catalog listed	Current model (equivalent of old product)	Latest recommended models: Model	Latest recommended models: Installation compatibility with older models	Latest recommended models: Catalog listed
IS Slider Type (discontinued)	IS-SXM-I/A-60-*	Please contact IAI	ISA-SXM-I/A-60-*	ISB-SXM-WA-60-*	Compatible (Note)	Please contact IAI
	IS-SYM-I/A-60-*		ISA-SYM-I/A-60-*			
	IS-SZM-I/A-60-*		ISA-SZM-I/A-60-*			
	IS-MXS-I/A-100-*		ISA-MXM-I/A-100-*	ISB-MXM-WA-100-*	Incompatible	
	IS-MXM-I/A-100-*		ISA-MXM-I/A-100-*	ISB-MXM-WA-100-*	Compatible (Note)	
	IS-MXM-I/A-200-*		ISA-MXM-I/A-200-*	ISB-MXM-WA-200-*		
	IS-MXMX-I/A-200-*		ISA-MXMX-I/A-200-*	ISB-MXMX-WA-200-*	Compatible (Note) (The home position is different)	
	IS-MYS-I/A-100-*		ISA-MYM-I/A-100-*	ISB-MXM-WA-100-*	Incompatible	
	IS-MYM-I/A-100-*		ISA-MYM-I/A-100-*			
	IS-MYM-I/A-200-*		ISA-MYM-I/A-200-*	ISB-MXM-WA-200-*		
	IS-MZS-I/A-100-*		ISA-MZM-I/A-100-*	ISB-MXM-WA-100-*		
	IS-MZM-I/A-200-*		ISA-MZM-I/A-200-*	ISB-MXM-WA-200-*	Compatible (Note)	
	IS-LXS-I/A-200-*		ISA-LXM-I/A-200-*	ISB-LXM-WA-200-*	Incompatible	
	IS-LXM-I/A-200-*		ISA-LXM-I/A-200-*	ISB-LXM-WA-200-*	Compatible (Note)	
	IS-LXM-I/A-400-*		ISA-LXM-I/A-400-*	ISB-LXM-WA-400-*		
	IS-LXMX-I/A-200-*		ISA-LXMX-I/A-200-*	ISB-LXMX-WA-200-*	Compatible (Note) (The home position is different)	
	IS-LXMX-I/A-400-*		ISA-LXMX-I/A-400-*	ISB-LXMX-WA-400-*		
	IS-LXUWX-I/A-200-*		ISA-LXUWX-I/A-200-*	ISB-LXUWX-WA-200-*		
	IS-LXUWX-I/A-400-*		ISA-LXUWX-I/A-400-*	ISB-LXUWX-WA-400-*		
	IS-LYS-I/A-200-*		ISA-LYM-I/A-200-*	ISB-LXM-WA-200-*	Incompatible	
	IS-LYM-I/A-200-*		ISA-LYM-I/A-200-*	ISB-LXM-WA-200-*	Compatible (Note)	
	IS-LYM-I/A-400-*		ISA-LYM-I/A-400-*	ISB-LXM-WA-400-*		
	IS-LZS-I/A-200-*		ISA-LZM-I/A-200-*	ISB-LXM-WA-200-*	Incompatible	
	IS-LZM-I/A-400-*		ISA-LZM-I/A-400-*	ISB-LXM-WA-400-*	Compatible (Note)	
	ISP-WXM-I/A-600-*		ISPA-WXM-I/A-600-*	ISB-WXM-WA-750-*	Incompatible	Please contact IAI
	ISP-WXM-I/A-750-*		ISPA-WXM-I/A-750-*			
	ISP-WXMX-I/A-600-*		ISPA-WXMX-I/A-600-*	ISB-WXMX-WA-750-*		
	ISP-WXMX-I/A-750-*		ISPA-WXMX-I/A-750-*			

(Note) Overall dimensions vary. Please refer to the catalog for details.

Old Model Conversion Table (Controllers)

The table below provides an overview. Be sure to review the replacement documentation on our website or contact our sales representative for compatibility details.

Legend:
○: Compatible
×: Incompatible

Series	Old models	Catalog listed		Latest recommended models								
				Model	Compatibility					Actuator replacement	Catalog listed
					Dimensions	Power wiring	I/O	Motor/encoder cable	Data		
Position Controller (discontinued)	RCP-C	Please contact IAI	➡	PCON-CB	×	×	×	×	×	Required	Please contact IAI
	RCP2-C	Please contact IAI	➡	PCON-CB	○	○	×	×	△ (Only positions are compatible)	Not required	
	RCP2-CF		➡	PCON-CFB	○	○	×	×	△ (Only positions are compatible)	Not required	
	RCS-C (200V)	Please contact IAI	➡	SCON-CB	○	×	×	△ (Only motor cables are compatible)	△ (Only positions are compatible)	Not required	
	RCS-C (24V)		➡	ACON-CB	×	×	×	×	×	△ Not allowed for rod and flat types.	
	RCS-E		➡	ACON-CB	×	×	×	×	×	△ Not allowed for rod and flat types.	
	ECON		➡	SCON-CB	○	×	×	△ (Only motor cables are compatible)	△ (Only positions are compatible)	Not required	
	P-Driver		➡	SCON-CB	×	×	×	△ (Only motor cables are compatible)	△ (Only positions are compatible)	Not required	
	AMEC	Please contact IAI	➡	ACON-CYB	×	○	×	○	×	Not required	
	PMEC		➡	PCON-CYB	×	○	×	○	×	Not required	
	ASEP	Please contact IAI	➡	ACON-CYB	×	○	×	○	×	Not required	
	DSEP		➡	DCON-CYB	×	○	×	○	×	Not required	
	PSEP		➡	PCON-CYB	×	○	×	○	×	Not required	
	PCON-CA	Please contact IAI	➡	PCON-CB	○	○	○	○	○ (Conversion and transfer required) *1	Not required	
	PCON-CFA		➡	PCON-CFB	○	○	○	○	○ (Conversion and transfer required) *1	Not required	
	ROBONET (RGW/ RPCON/RACON/ RABU/REXT)	Please contact IAI	➡	RCON	×	×	×	×	×	Not required	Please contact IAI
Position Controller	ACON-C/CG	Please contact IAI	➡	ACON-CB/ CGB	○	○	○	×	△ (Only positions are compatible)	Not required	Please contact IAI
	ACON-CY		➡	ACON-CYB	×	○	×	×	△ (Only positions are compatible)	Not required	
	ACON-PL		➡	ACON-PLB	×	○	×	×	△ (Only positions are compatible)	Not required	
	ACON-PO		➡	ACON-POB	×	○	×	×	△ (Only positions are compatible)	Not required	
	ACON-SE		➡	ACON-CYB	×	×	×	×	×	Not required	
	ACON-CA	Please contact IAI	➡	ACON-CB	○	○	○	○	△ (Only positions are compatible)	Not required	
	DCON-CA		➡	DCON-CB	○	○	○	○	△ (Only positions are compatible)	Not required	
	PCON-C/CG	Please contact IAI	➡	PCON-CB/ CGB	○	○	○	×	△ (Only positions are compatible)	Not required	
	PCON-CY	Please contact IAI	➡	PCON-CYB	×	○	×	×	△ (Only positions are compatible)	Not required	
	PCON-PL		➡	PCON-PLB	×	○	×	×	△ (Only positions are compatible)	Not required	
	PCON-PO		➡	PCON-POB	×	○	×	×	△ (Only positions are compatible)	Not required	
	PCON-SE		➡	PCON-CYB	×	×	×	×	×	Not required	
	SCON-C	Please contact IAI	➡	SCON-CB	○	○	○	○	○ (Conversion and transfer required) *1	Not required	
	SCON-CA	Please contact IAI	➡	SCON-CB	○	○	○	○	○ (Conversion and transfer required) *1	Not required	
	SCON-CAL/CGAL	Please contact IAI	➡	SCON-CB	×	○	○	○	△ (Only positions are compatible)	Not required	
	MSEP		➡	RCON	×	×	×	×	×	Not required	
	MCON		➡	RCON	×	×	×	×	×	Not required	
	MSCON		➡	RCON	×	×	×	×	×	Not required	

*1 Use the teaching software "IA-OS" for PC.

The past general catalogs are available on our website.
intelligentactuator.com/iai-catalogs-search-index/

Information about discontinued products is available on our website.
intelligentactuator.com/discon-list

Legend:
○: Compatible
×: Incompatible

Series	Old models	Catalog listed		Latest recommended models							
				Model	Compatibility					Actuator replacement	Catalog listed
					Dimensions	Power wiring	I/O	Motor/encoder cable	Data		
DS Controller (discontinued)	DS-S-C1	Please contact IAI	➡	ASEL-CS	○	×	○	×	△ (Programs and positions are compatible)	Required	Please contact IAI
Super SEL Controller (discontinued)	S-SEL-E	Please contact IAI	➡	SSEL-CS	×	×	×	×	△ (Programs and positions are compatible)	Required	Please contact IAI
	M-SEL-G		➡	SSEL-CS XSEL-P/RA	×	×	×	×	△ (Programs and positions are compatible)	Required	
Program Controller (discontinued)	XSEL-J	Please contact IAI	➡	XSEL-P/Q/ RA/SA	×	×	×	△ (Only motor cables are compatible)	△ (Programs and positions are compatible)	Not required	Please contact IAI
	XSEL-JX		➡	XSEL-PX/QX/ RAX/RAXD8/ SAX/SAXD8	×	×	×	△ (Only motor cables are compatible)	△ (Programs and positions are compatible)	Not required	
	XSEL-K/KE/KET		➡	XSEL-P/Q/ RA/SA	×	×	×	△ (Only motor cables are compatible)	△ (Programs and positions are compatible)	Not required	
	XSEL-KETX/KEX/ KT/KX	Please contact IAI	➡	XSEL-PX/QX/ RAX/RAXD8/ SAXD8	×	×	×	△ (Only motor cables are compatible)	△ (Programs and positions are compatible)	Not required	
	ASEL-C	Please contact IAI	➡	ASEL-CS	○ *3	○	○	○	○	Not required	Please contact IAI
	PSEL-C		➡	PSEL-CS	○ *3	○	○	○	○	Not required	
	SSEL-C	Please contact IAI	➡	SSEL-CS	○ *3	○	○	○	○	Not required	Please contact IAI
Program Controller	XSEL-R/S	Please contact IAI	➡	XSEL-RA/SA	○	○	○	○	△ (Programs and positions are compatible)	Not required	Please contact IAI
	XSEL-RX/SX		➡	XSEL-RAX/ SAX	○	○	○	○	△ (Programs and positions are compatible)	Not required	
	XSEL-RXD8/SXD8		➡	XSEL-RAXD8/ SAXD8	○	○	○	○	△ (Programs and positions are compatible)	Not required	
Tabletop (discontinued)	TT-300	Please contact IAI	➡	TTA	×	×	×	×	×	Required	Please contact IAI

*2 If you would like to obtain an single item catalog (PDF data) of old models, please contact our sales representative.
*3 The shape of the teaching connector is different. Please prepare a dummy plug (DP-4S) or connector conversion cable (CB-SEL-SJS002).

International System of Unit SI Excerpt from JIS Z 8203 (2000)

■ International unit system (SI) and its usage

1. Scope This standard specifies how to use units in the International System of Units (SI) and international unit systems, as well as units used in conjunction with international unit systems and units that may be used together.

2. Terms and Definitions The main terms used in this standard and their definitions shall be as follows.

(1) International System of Units (SI) Consistent unit system adopted and recommended at the International Association of Measurement and Measurement. It consists of basic units, ancillary units and assembly units assembled from them and their integer multiplier of ten.
SI is an abbreviation for the international unit system.

(2) SI unit A general term for basic units, auxiliary units and assembly units in the International Unit System (SI).
- Basic unit The one shown in Table 1 is the basic unit.
- Auxiliary unit The one shown in Table 2 shall be an auxiliary unit.
- Assembled Unit The unit represented by an algebraic method (using multiplicative / divisional mathematical symbols) using the basic unit and auxiliary unit is an assembly unit. Assembly units with unique names are given in Table 4.

Table 1. Basic unit

Amount	Name of unit	Unit symbol	Definition
Length	meters	m	The meter is the length of travel by light in a vacuum in a time of 1 / 299,792,458th of a second.
Mass	kilogram	kg	Kilogram is a unit of mass (neither weight nor force), which is equal to the mass of the international kilogram prototype.
Time	Seconds	s	Seconds is the duration of 9,192,631,770 cycles of radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom.
Current	Ampere	A	Ampere , a constant current that flows through each of the infinitely long two straight conductors that have an infinitely small circular cross-sectional area, placed parallel at a distance of 1 meter in a vacuum, and each of these conductors exert a power of 2×10^{-7} newton per meter long.
Thermodynamic temperature	Kelvin	K	Kelvin is a 273.16 of the thermodynamic temperature of the triple point of water.
Substance quantity	Mol	mol	Mol is the amount of substance in a system composed of a number of element particles or aggregates of element particles (limited to compositions whose composition is clarified) equal to the number of atoms present in 0.012 kilograms of carbon 12. Element particles are used by specifying an aggregate of element particles.
Luminous	candela	cd	Candela emits monochromatic radiation with a frequency of 540×10^{12} Hertz and the intensity in that direction of the light source whose radiation intensity in a given direction is 683 watts per steradian.

Table 2. Auxiliary unit

Amount	Name of unit	Unit symbol	Definition
Plane angle	radian	rad	Radian is a plane angle included between two radii cutting off an arc of a length equal to the length of its radius on the circumference of the circle.
Solid angle	steradian	sr	A steradian is a solid angle in which the center of the sphere is the vertex, and the area equal to the square area of the sphere is cut off on the surface of the sphere.

Table 3. Examples of assembly units

Amount	Name of unit	Unit symbol
Area	square meters	m^2
Volume	cubic meter	m^3
Speed	meter per second	m/s
Acceleration	meter per second per second	m/s^2
Wave number	per meter	m^{-1}
Density	kilogram per cubic meter	kg/m^3
Current density	amperes per square meter	A/m^2
Magnetic field strength	ampere meter per meter	A/m
(amount of substance) Concentration of substance	Mole per cubic meter	mol/m^3
Specific volume	Cubic meters per kilogram	m^3/kg
Luminance	Candela per square meter	cd/m^2

Table 4. Assembly unit with unique name

Amount	Name of unit	Unit symbol	A pair of cubic cubic or other assembly units with basic or supplementary units
frequency	Hertz	Hz	$1Hz=1s^{-1}$
Power	Newton	N	$1N=1kg \cdot m/s^2$
Pressure, stress	Pascal	Pa	$1Pa=1N/m^2$
Energy Work, calorie	Joule	J	$1J=1N \cdot m$
Power factor, power factor, power	Watt	W	1W=1J/s
Electric charge	Coulomb	C	$1C=1A \cdot s$
Potential Voltage	Bolt	V	1V=1J/C
Capacitance capacitance	Farad	F	1F=1C/V
Electric resistance	Ohm	Ω	$1\Omega=1V/A$
Conductance	Siemens	S	$1S=1\Omega^{-1}$
Magnetic flux	Weber	Wb	$1Wb=1V \cdot s$
Magnetic flux density Magnetic induction	Tesla	T	$1T=1Wb/m^2$
Inductance	Henry	H	1H=1Wb/A
Celsius temperature	Celsius degree or degrees C	°C	1t=T-To
Luminous flux	Lumen	lm	$1lm=1cd \cdot sr$
Illuminance	lux	lx	$1lx=1lm/m^2$

3. Integer multiplication of 10 in SI unit

(1) Prefix The multiples and the prefix names and the prefix symbols for constituting the integer multiple of 10 in the SI unit are shown in Table 5.

Table 5. Prefixes

multiple	prefix	symbol	multiple	prefix	symbol	multiple	prefix	symbol
10^{18}	Exa	E	10^{2}	Hecto	h	10^{-9}	Nano	n
10^{15}	Peta	P	10^{1}	Deca	da	10^{-12}	Pico	p
10^{12}	Peta	T	10^{-1}	Digi	d	10^{-15}	Femto	f
10^{9}	Giga	G	10^{-2}	Centimeter	c	10^{-18}	Atto	a
10^{6}	Mega	M	10^{-3}	Milli	m			
10^{3}	Km	k	10^{-6}	Micro	μ			

4. Handling of units not included in SI unit

Units not included in SI are practically important, so the units shown in Table 6 are used in conjunction with SI units.

Table 6. Units used in conjunction with SI units

Amount	Name of unit	Unit symbol	Definition	Amount	Name of unit	Unit symbol	Definition
Time	Minute	min	1min=60s	Plane angle	Degree	°	1°=(π/180)rad
	Hour	h	1h=60min		Minute	′	1′=(1/60)°
	Day	d	1d=24h		Second	″	1″=(1/60)′
Volume	Liter	l, L	1l=7dm^3	Mass	Ton	t	1t=10^3kg

5. Other

Table 7. Conversion table of main SI unit

Amount	SI unit	Weight unit (Units previously used)	Weight unit → SI unit	SI unit → dynamic unit
Mass	kg	Weight (tons)	1t=10^3kg	1kg=10^3t
Power	N (Newton) 〔kg·m/s^2〕	kgf (weight kilogram) dyn (dyne)	1kgf=9.806 65N 1dyn=10^{-5}N	1N=0.101 972kgf 1N=10^5dyn
Torque	N·m (Newton meters)	kgf·m	1kgf·m=9.806 65N·m	1N·m=0.101 972kgf·m
Pressure	Pa (Pascal) 〔N/m^2〕	kgf/cm^2 mmAq(mmH$_2$O) mmHg(Torr) bar (bar)	1kgf/cm^2=9.806 65×10^4Pa 1mmAq=9.806 65Pa 1mmHg=133.322Pa 1bar=10^5Pa	1Pa=1.019 72×10^{-5}kgf/cm^2 1Pa=0.101 972mmAq 1Pa=7.500 6×10^{-2}mmHg 1Pa=10^{-5}bar
Stress	Pa (Pascal) 〔N/m^2〕	kgf/mm^2	1kgf/mm^2=9.806 65×10^4Pa	1Pa=1.019 72×10^{-7}kgf/mm^2
Work, Thermal energy, Generated heat, enthalpy, Electric energy	J(Joule) 〔N·m〕	kcal kgf·m kW·h	1kcal=4.186 05kJ 1kgf·m=9.806 65J 1kW·h=3.6×10^4J	1kJ=0.239kcal 1J=0.101 972×kgf·m 1J=(1/3.6)×10^{-5}kW·h
Heat flow, power, electricity	W (Watt) 〔J/s〕	kcal/h kgf·m/s Ps (French horsepower, metric horsepower)	1kcal/h=1.163W 1kgf·m/s=9.806 65W 1Ps=7.355×10^2W	1W=0.859 8kcal/h 1W=0.101 972kgf·m/s 1W=1.359 6×10^{-2}Ps
Heat flow density	W/m^2	kcal/h·m^2	1kcal/h·m^2=1.163W/m^2	1W/m^2=0.859 8kcal/h·m^2
Heat capacity	J/K	kcal/°C	1kcal/°C=4.186 05kJ/K	1kJ/K=0.239kcal/°C
Specific heat	J/(kg·K)	kcal/kg·°C	1kcal/kg·°C=4.186 05kJ/(kg·K)	1kJ/(kg·K)=0.239kcal/kg·°C
Thermal conductivity	J/kg	kcal/kg	1kcal/kg=4.186 05kJ/kg	1kJ/kg=0.239kcal/kg
Heat passage rate	W/(m·K)	kcal/·h·°C	1kcal/m·h·°C=1.163W/(m·K)	1W/(m·K)=0.859 8kcal/m·h·°C
Thermal conductivity	W/(m^2·K)	kcal/m^2·h·°C	1kcal/m^2·h·°C=1.163W/(m^2·K)	1W/(m^2·K)=0.859 8kcal/m^2·h·°C
Temperature	K(Kelvin)	°C (Celsius degree)	T〔K〕=t〔°C〕+273.15	t〔°C〕=T〔K〕-273.15

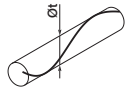
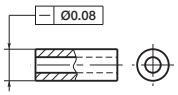
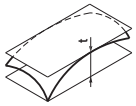
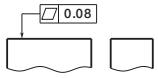
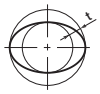
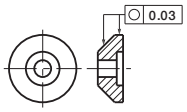
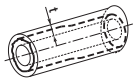
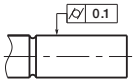
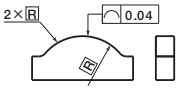
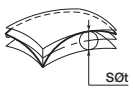
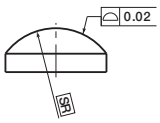
Remarks: (1) In this table, kcal may adopt the calorie method of weighing method. For international calories 1kcal = 4.186 8kJ.

(2) Weight: 1kg (SI unit) = 1 / 9.806 65kgf·s^2/m (unit of gravity)
Weight: 1kg (f gravity unit) = 9.806 65kg·m = s^2 (SI units)
Standard atmospheric pressure: 760mmHg (gravity unit) = 101 325Pa (SI unit)
1 Japan frozen tones: 3 320kcal/h (gravity unit) = 3.816kW (SI unit)
1 USA (country system) frozen tons: 3 024kcal/h (gravity unit) = 3.157kW (SI unit)

(3) In this manual, as a conventional unit, weighing [kgf] instead of weight [kg] is displayed.

Illustration Method of Geometric Tolerances Excerpt from JIS B0021 (1998)

■ Types of geometric tolerances and their symbols

Types of tolerance		Characteristic symbol	Definition of tolerance zone		Illustration and interpretation	
Shape tolerance	Straightness tolerance	—		If the symbol Ø is added before the tolerance value, the tolerance zone is regulated by the cylinder of the diameter t.		The actual (reproduced) axis of the cylinder to which the tolerance is applied must be within the cylindrical tolerance range of diameter 0.08.
	Flatness tolerance	▱		The tolerance zone is regulated by parallel two planes that are separated by a distance t.		The actual (reproduced) surface must be between two parallel planes separated by 0.08.
	Roundness tolerance	○		In the symmetrical cross section, the tolerance zone is regulated by two coaxial circles.		In any cross section of the cylinder and the surface of the cone, the actual (reproduced) radial line must be between two coaxial circles on the common plane, separated by a radius distance of 0.03.
	Cylindrical tolerance	⌭		The tolerance zone is regulated by two coaxial cylinders that are separated by a distance t.		The actual (reproduced) cylindrical surface must be between two coaxial cylinders which are separated by a radius distance of 0.1.
	Line contour tolerance: Line contour tolerance not related to datum (ISO 1660)	⌒		The tolerance zone is regulated by the two envelopes of each circle of diameter t and the centers of these circles lie on the line with theoretically exact geometric shape.		In each section that is parallel to the projection plane in the direction indicated, the actual (reproduced) contour line is 0.04 in diameter, and the center of those circles must be between the two envelopes of the circle located on the line with the ideal geometric shape.
	Surface contour tolerance: Surface contour tolerance not related to datum (ISO 1660)	⌓		The tolerance zone is regulated by the two envelopes of each circle of diameter t and the centers of these circles lie on the line with theoretically exact geometric shape.		The actual (reproduced) surface must be between the enveloping surfaces of each sphere with a diameter of 0.02, the centers of which spheres lie on a surface with a theoretical exact geometric shape.

The lines used in the definition column of the tolerance zone represent the following meanings.
Thick solid line or broken line: Form
Thick dash-dotted line: Datum
Thin solid line or broken line: Tolerance area
Thin dotted line: Center line
Thin two-dot chain line: Supplementary projection plane or section
Thick, two-dot chain line: Projection of feature on supplemental projection plane or section

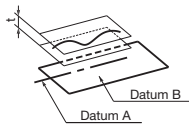
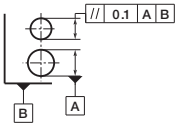
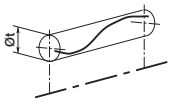
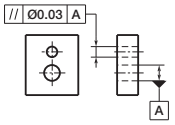
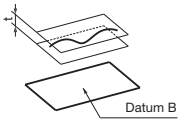
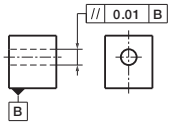
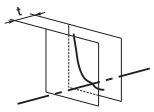
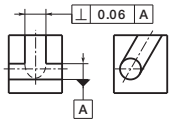
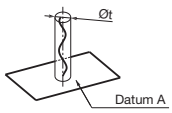
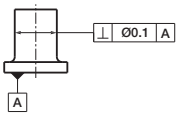
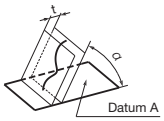
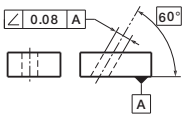
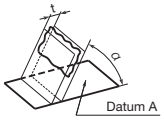
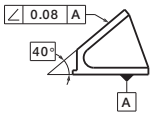
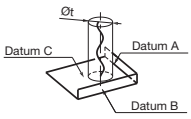
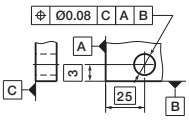
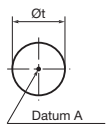
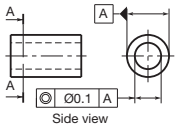
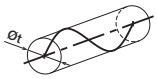
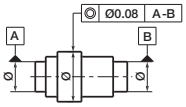
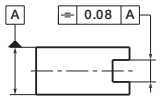
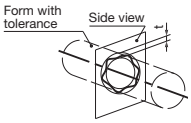
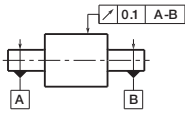
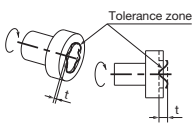
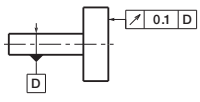
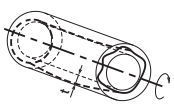
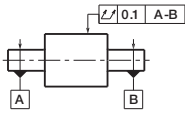
Types of tolerance		Characteristic symbol	Definition of tolerance zone	Illustration and interpretation
Attitude tolerance	Parallelism tolerance	//	1. Parallelism tolerance of lines related to datum straight line	
			 The tolerance zone is regulated by parallel two planes that are separated by a distance t. The planes are parallel to the datum and are in the indicated direction.	 The actual (reconstructed) axes must be separated by 0.1, parallel to datum axis A and between parallel two planes in the indicated direction.
			 If the symbol Ø is added before the tolerance value, the tolerance zone is regulated by a cylinder of diameter t parallel to the datum.	 The actual (reproduced) axis must be within the cylindrical tolerance range 0.03 in diameter parallel to the datum axis straight line A.
			2. Parallelism tolerance of the line associated with the datum plane	
			 The tolerance zone is separated by a distance t and regulated by parallel two planes parallel to datum plane B.	 The actual (reproduced) axes must be 0.01apart and be between parallel two planes parallel to datum plane B.
	Square tolerance	⊥	1. Right angle tolerance of line related to datum axis line	
			 The tolerance zone is separated by a distance t and regulated by parallel two planes parallel to datum plane B.	 The actual (reproduced) axis must be 0.06 apart and be between parallel two planes perpendicular to datum axis line A.
			2. Linear angle tolerance of the line relative to the datum plane	
			 If the symbol Ø is added before the tolerance value, the tolerance zone is regulated by a cylinder of diameter t perpendicular to the datum.	 The actual (reproduced) axis of the cylinder must be within the cylindrical tolerance area of diameter 0.1 perpendicular to datum axis line A.
	Slope tolerance	∠	1. Linear slope tolerance relative to datum plane	
			 The tolerance zone is separated by a distance t and regulated by parallel two planes inclined at a specified angle with respect to the datum.	 The actual (reproduced) axis should be perpendicular to datum A and datum B perpendicular to each other, theoretically exactly 60° tilted with respect to datum plane A, and parallel two planes separated by 0.08 .
			2. Slope tolerance of the plane relative to datum plane	
			 The tolerance zone is separated by a distance t and regulated by parallel two planes inclined at a specified angle with respect to the datum.	 The actual (reproduced) surface should be 0.08 apart and be between parallel two planes which are theoretically exactly 40° inclined with respect to datum plane A.

Illustration Method of Geometric Tolerances Excerpt from JIS B0021 (1998)

■ Types of geometric tolerances and their symbols

Types of tolerance		Characteristic symbol	Definition of tolerance zone	Illustration and interpretation
Position tolerance	Position angle tolerance	⌖	1. Line position angle tolerance  When the tolerance value is marked with the symbol Ø, the tolerance zone is regulated by the cylinder of diameter t. Its axis is positioned with theoretically exact dimensions with respect to datum C, A and B.	 The actual (reconstructed) axis must be within the cylindrical tolerance area with a diameter of 0.08 whose axis is at theoretically exact position with respect to datum planes C, A and B.
	Concentricity tolerance and coaxiality toleranc	◎	 When the tolerance value is marked with the symbol Ø, the tolerance zone is regulated by a circle of diameter t. The center of the circular tolerance zone matches Datum A	 The actual (reproduced) center of the outer circle must be in a circle with diameter 0.1 concentric with datum circle A.
			 When the tolerance value is marked with the symbol Ø, the tolerance zone is regulated by a cylinder of diameter t. The axis of the cylindrical tolerance zone coincides with datum A.	 The actual (reproduced) axis of the inner cylinder must be within the cylindrical tolerance range 0.08 in diameter coaxial to the common datum axis line A-B.
	Symmetry tolerance (Symmetry tolerance of center plane)	⌯	 Tolerance zones are separated by t and are regulated by parallel two planes symmetrical about the datum with respect to the center plane.	 The actual (reproduced) center plane must be between two parallel planes that are 0.08 symmetrical to the datum center plane A.
Runout tolerance	Circumferential deflection tolerance	↗	1. Circumferential runout tolerance - radial direction  The tolerance zone is restricted within an arbitrary transverse plane perpendicular to the axis of two coaxial circles whose radius is t and coincides with the datum axis straight line.	 The actual (reproduced) circumferential deflection should be less than 0.1 in any cross section while making one revolution around the common datum axis line A-B.
			2. Circumferential runout tolerance - axis direction  The tolerance zone is restricted within an arbitrary transverse plane perpendicular to the axis of two coaxial circles whose radius is t and coincides with the datum axis straight line.	 On the cylindrical axis coinciding with the datum axis straight line D, the actual (reproduced) line in the axial direction must be between two circles 0.1 away.
	Full runout tolerance: Total runout tolerance in the circumferential direction	↗↗	 The tolerance zone is separated by t and its axis is regulated by two coaxial cylinders matching the datum.	 The actual (reproduced) surface must be between the coaxial two cylinders with a radius difference of 0.1, whose axis coincides with the common datum axis line A-B.

Normal Tolerance of Processing Dimensions Excerpt from JISB 0405, B0419 (1991)

■ Normal tolerance

1. Tolerance to length dimension excluding chamfer

Unit: mm

Tolerance grade		Classification of reference dimensions							
Symbol	Description	0.5 or more* and less than 3	3 or more and less than 6	6 or more and less than 30	30 or more and less than 120	120 or more and less than 400	400 or more and less than 1000	1000 or more and less than 2000	2000 or more and less than 4000
		tolerance							
f	Precision	±0.05	±0.05	±0.1	±0.15	±0.2	±0.3	±0.5	-
m	Intermediate level	±0.1	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2
c	Coarse level	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3	±4
v	Extremely coarse level	-	±0.5	±1	±1.5	±2.5	±4	±6	±8

* For reference dimensions less than 0.5mm, tolerance is individually indicated following the reference dimension.

2. Tolerance to length dimension of chamfered portion (Roundness of corner and chamfered dimension of corner)

Unit: mm

Tolerance grade		Classification of reference dimensions		
Symbol	Description	0.5 or more* and less than 3	3 or more and less than 6	more than 6
		tolerance		
f	Precision	±0.2	±0.5	±1
m	Intermediate level			
c	Coarse level	±0.4	±1	±2
v	Extremely coarse level			

* For reference dimensions less than 0.5mm, tolerance is individually indicated following the reference dimension.

3. Angular dimension tolerance

Tolerance grade		The division of the length (mm)of the shorter side of the target angle				
Symbol	Description	less than 10	10 or more and less than 50	50 or more and less than 120	120 or more and less than 400	more than 400
		tolerance				
f	Precision	±1°	±30'	±20'	±10'	±5'
m	Intermediate level					
c	Coarse level	±1° 30'	±1°	±30'	±15'	±10'
v	Extremely coarse level	±3°	±2°	±1°	±30'	±20'

4. Normal tolerance of straight angle

Unit: mm

Tolerance grade	Classification of shorter side nominal length			
	less than 100	100 or more and less than 300	300 or more and less than 1000	1000 or more and less than 3000
	Straight angle tolerance			
H	0.2	0.3	0.4	0.5
K	0.4	0.6	0.8	1
L	0.6	1	1.5	2

5. Normal tolerance of circumferential deflection

Unit: mm

Tolerance grade	Tolerance of circumferential deflection
H	0.1
K	0.2
L	0.5

6. Normal tolerance of straightness and flatness

Unit: mm

Tolerance grade	Classification of nominal length					
	less than 10	10 or more and less than 30	30 or more and less than 100	100 or more and less than 300	300 or more and less than 1000	1000 or more and less than 3000
	Straightness tolerance and flatness tolerance					
H	0.02	0.05	0.1	0.2	0.3	0.4
K	0.05	0.1	0.2	0.4	0.6	0.8
L	0.1	0.2	0.4	0.8	1.2	1.6

Symbol of Quantity and Unit : Name and Symbol of Chemical Element Excerpt from JIS Z8202

■ Name and symbol of chemical element

Atomic number	Element name	Element symbol	Atomic number	Element name	Element symbol	Atomic number	Element name	Element symbol
1	Hydrogen	H	36	Krypton	Kr	71	Lutetium	Lu
2	Helium	He	37	Rubidium	Rb	72	Hafnium	Hf
3	Lithium	Li	38	Strontium	Sr	73	Tantalum	Ta
4	Beryllium	Be	39	Yttrium	Y	74	Tungsten	W
5	Boron	B	40	Zirconium	Zr	75	Rhenium	Re
6	Carbon	C	41	Niobium	Nb	76	Osmium	Os
7	Nitrogen	N	42	Molybdenum	Mo	77	Iridium	Ir
8	Oxygen	O	43	technetium	Tc	78	Platinum	Pt
9	Fluorine	F	44	ruthenium	R	79	Gold	Au
10	Neon	Ne	45	rhodium	Rh	80	Mercury	Hg
11	Sodium	Na	46	palladium	Pd	81	Thallium	Tl
12	Magnesium	Mg	47	Silver	Ag	82	Lead	Pb
13	Aluminum	Al	48	Cadmium	Cd	83	Bismuth	Bi
14	Silicon	Si	49	indium	In	84	rhenium	Po
15	Rin	P	50	tin	Sn	85	astatine	At
16	Sulfur	S	51	Antimony	Sb	86	Radon	Rn
17	Chlorine	Cl	52	Tellurium	T	87	francium	Fr
18	Argon	Ar	53	Iodine	I	88	Radium	Ra
19	Potassium	K	54	Xenon	Xe	89	Actinium	Ac
20	Calcium	Ca	55	Cesium	Cs	90	Thorium	Th
21	Scandium	Sc	56	Barium	Ba	91	Protactinium	Pa
22	Titanium	Ti	57	Lanthanum	La	92	Uranium	U
23	Pana	V	58	Cerium	Ce	93	Neptunium	Np
24	Chromium	Cr	59	Praseodymium	Pr	94	Plutonium	Pu
25	Manganese	Mn	60	Neodymium	Nd	95	Americium	Am
26	Iron	Fe	61	Promethium	Pm	96	Curium	Cm
27	Cobalt	Co	62	Samarium	Sm	97	Berklium	Bk
28	Nickel	Ni	63	Eurobium	Eu	98	Californium	Cf
29	Copper	Cu	64	Gadolinium	Gd	99	Einsteinium	Es
30	Zinc	Zn	65	Terbium	Tb	100	Fermium	Fm
31	Gallium	Ga	66	Dysprosium	Dy	101	Mendelebium	Md
32	Germanium	Ge	67	Holmium	Ho	102	Nobelium	No
33	Arsenic	As	68	Erbium	Er	103	Laurenzium	Lr
34	Selenium	Se	69	Thulium	Tm			
35	Bromine	Br	70	Ytterbium	Yb			

Remarks: This table shows Appendix A (element names and symbols) of ISO 31 / 8-1980 (Amount and unit of physicochemical and molecular physics) and Annex C (radioactivity (quantity and unit of atomic physics and nuclear physics) of ISO 31 / 9-1980 Nuclide name and symbol).

■ Quantity symbol · Unit symbol

uppercase letter	Lower case	How to Read	Usual use	uppercase letter	Lower case	How to Read	Usual use
A	α	Alpha	Angle, coefficient	O	o	Omicron	
B	β	Beta	Angle, factor	$\prod$	π	pie	Pi pi (3.14159 ...), Angle (uppercase) product sign
Γ	γ	Gamma	Angle, unit area weight (capital letters) product sign				
Δ	δ	Delta	Micro change, density, displacement	P	ρ	Low	Radius, density
E	ε	Epsilon	Small amount, strain	Σ	σ	Sigma	Stress, standard deviation, (uppercase) Sum of the number
Z	ζ	Geeta	Variable				
H	η	Eta	Variable	T	τ	Tau	Time constant, time, torque
Θ	θ	Theta	Angle, temperature, time	Υ	υ	Epsilon	
I	ι	Eota		Ø	ø	File	Angle, function, diameter
K	κ	Kappa	Turning radius	X	χ	Kai	
Λ	λ	Lambda	Wavelength, Eigenvalue	Ψ	ψ	Psi	Angle, relationship
M	μ	Mu	Coefficient of friction 10^{-6} (micro)	Ω	ω	Omega	Angular velocity = 2πf (capital letters) Ohm = electrical resistance unit
N	ν	New	Frequency				
Ξ	ξ	Qsai	Variable				

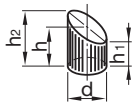
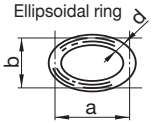
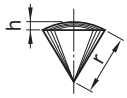
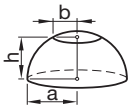
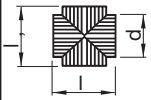
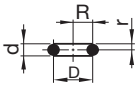
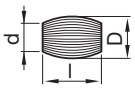
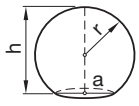
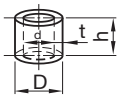
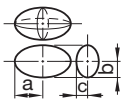
Remarks: Lowercase letters except upper case letters

Method of Calculating Properties / Volume / Weight of Metal Material

■ Properties of metallic materials

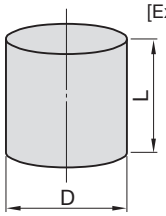
Material	Specific gravity	Coefficient of thermal expansion	Longitudinal elastic modulus	
		×10⁻⁶/°C	N/mm²	{kgf/mm²}
Mild steel	7.85	11.7	205800	{21000}
NAK80	7.8	12.5	200900	{20500}
SKD11	7.85	11.7	205800	{21000}
SKD61	7.75	10.8	205800	{21000}
SKH51	8.2	10.1	218540	{22300}
Carbide V30	14.1	6	548800	{56000}
Carbide V40	13.9	6	529200	{54000}
Cast iron	7.3	9.2 to 11.8	73500 to 102900	{7500 to 10500}
SUS304	8	17.3	193060	{19700}
SUS440C	7.78	10.2	199920	{20400}
Oxygen free copper C1020	8.9	17.6	114660	{11700}
6/4 brass	8.4	20.8	100940	{10300}
Beryllium copper C1720	8.3	17.1	127400	{13000}
Aluminum A1100	2.7	23.6	67620	{6900}
Duralumin A7075	2.8	23.6	70560	{7200}
Titanium	4.5	8.4	103880	{10600}

■ How to calculate volume

Solid	Volume V	Solid	Volume V	Solid	Volume V	Solid	Volume V
Truncated cylinder 	$V = \frac{\pi}{4}d^2h$ $= \frac{\pi}{4}d^2\left(\frac{h_1+h_2}{2}\right)$	Ellipsoidal ring 	$V = \frac{\pi^2}{4}d^2\frac{\sqrt{a^2+b^2}}{2}$	Sphere 	$V = \frac{2}{3}\pi r^2h$ $= 2.0944r^2h$	Spherical zone 	$V = \frac{\pi h}{6}(3a^2 + 3b^2 + h^2)$
Pyramid	$V = \frac{h}{3}$ $A = \frac{h}{6}arn$ A=Base area r=Radius of inscribed circle a=Length of side of regular polygon n=Number of sides of a regular polygon	Crossover Cylinder 	$V = \frac{\pi}{4}d^2(l + l' - \frac{d}{3})$	Torus 	$V = 2\pi^2Rr^2$ $= 19.739Rr^2$ $= \frac{\pi^2}{4}Dd^2$ $= 2.4674Dd^2$	Barrel shape 	When the circumference forms a curvature equal to an arc $V = \frac{\pi L}{12}(2D^2 + d^2)$ When the circumference forms a curvature equal to a parabola $V = 0.209L(2D^2Dd + 1/4d^2)$
Ball crown 	$V = \frac{\pi h^2}{3}(3r - h)$ $= \frac{\pi h}{6}(3a^2 + h^2)$ a is the radius	Hollow cylinder (pipe) 	$V = \frac{\pi}{4}h(D^2 - d^2)$ $= \pi th(D - t)$ $= \pi th(d + t)$	Conical	$V = \frac{\pi}{3}r^2h$ $= 1.0472r^2h$		
Ellipsoid 	$V = \frac{4}{3}\pi abc$ Spheroid $V = \frac{4}{3}\pi ab^2$	Truncated pyramid	$V = \frac{h}{3}(A + a + \sqrt{Aa})$ A,a=Area of both end faces	Ball	$V = \frac{4}{3}\pi r^3 = 4.1888r^3$ $= \frac{\pi}{6}d^3 = 0.5236d^3$		

■ Weight calculation method

Weight W [g] = Volume [cm³] × Specific Gravity



[Example] Material: mild steel

D = Ø16 Weight of 50mm is

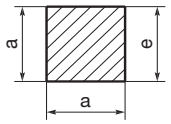
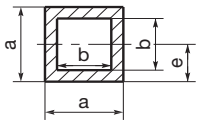
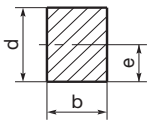
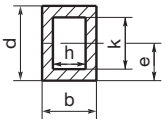
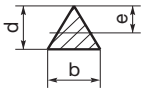
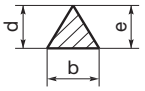
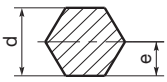
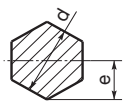
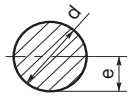
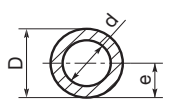
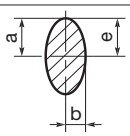
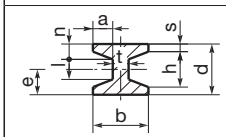
$W = \frac{\pi}{4}D^2 \times L \times$ specific gravity

$= \frac{\pi}{4} \times 1.6^2 \times 5 \times 7.85$

≒ 79 [g]

Second Moment of Cross-Section, Other Calculation Method

■ Correlation table of Cross-sectional shape and cross-sectional area, Secondary moment of area, Section modulus and rotational radius.

Shape area of cross section	Cross section A	Distance from the neutral axis to the farthest position e	Sectional moment of inertia I	Section modulus $Z=\frac{I}{e}$	Turning radius $p=\frac{\sqrt{I}}{A}$
	a^2	a	$\frac{a^4}{3}$	$\frac{a^3}{3}$	$\frac{a}{\sqrt{3}}=0.577a$
	a^2-b^2	$\frac{1}{2}a$	$\frac{a^4-b^4}{12}$	$\frac{a^4-b^4}{6a}$	$\sqrt{\frac{a^2+b^2}{12}}$ $=0.289\sqrt{a^2+b^2}$
	bd	$\frac{1}{2}d$	$\frac{bd^3}{12}$	$\frac{bd^2}{6}$	$\frac{d}{\sqrt{12}}=0.289d$
	$bd-hk$	$\frac{1}{2}d$	$\frac{bd^3-hk^3}{12}$	$\frac{bd^3-hk^3}{6d}$	$\sqrt{\frac{bd^3-hk^3}{12(bd-hk)}}$ $=0.289\sqrt{\frac{bd^3-hk^3}{bd-hk}}$
	$\frac{1}{2}bd$	$\frac{2}{3}d$	$\frac{bd^3}{36}$	$\frac{bd^2}{24}$	$\frac{d}{\sqrt{18}}=0.236d$
	$\frac{1}{2}bd$	d	$\frac{bd^3}{12}$	$\frac{bd^2}{12}$	$\frac{a}{\sqrt{6}}=0.408d$
	$\frac{3d^2\tan30°}{2}=0.866d^2$	$\frac{d}{2}$	$\frac{A}{12}\left[\frac{d^2(1+2\cos^2 30°)}{4\cos^2 30°}\right]$ $=0.6d^4$		$\sqrt{\frac{d^2(1+2\cos^2 30°)}{48\cos^2 30°}}$ $=0.264d$
	$\frac{3d^2\tan30°}{2}=0.866d^2$	$\frac{d}{2\cos30°}=0.577d$	$\frac{A}{12}\left[\frac{d^2(1+2\cos^2 30°)}{4\cos^2 30°}\right]$ $=0.6d^4$	$\frac{A}{6}\left[\frac{d(1+2\cos^2 30°)}{4\cos^2 30°}\right]$ $=0.104d3$	$\sqrt{\frac{d^2(1+2\cos^2 30°)}{48\cos^2 30°}}$ $=0.264d$
	$\frac{\pi d^2}{4}=0.7854d^2$	$\frac{d}{2}$	$\frac{\pi d^4}{64}=0.049d^4$	$\frac{\pi d^3}{32}=0.098d^3$	$\frac{d}{4}$
	$\frac{\pi(D^2-d^2)}{4}$ $=0.7854(D^2-d^2)$	$\frac{d}{2}$	$\frac{\pi(D^4-d^4)}{64}$ $=0.049(D^4-d^4)$	$\frac{\pi(D^4-d^4)}{32D}$ $=0.098\frac{D^4-d^4}{D}$	$\frac{\sqrt{D^4-d^4}}{4}$
	$\pi ab=3.1416ab$	a	$\frac{\pi a^3 b}{4}=0.7854a^3b$	$\frac{\pi a^2 b}{4}=0.7854a^2b$	$\frac{a}{2}$
	$dt+2a(s+n)$	$\frac{d}{2}$	$I=\frac{1}{12}\left[bd^3-\frac{1}{4g}(h^4-l^4)\right]$ Note: g = flange slope	$\frac{1}{6d}\left[bd^3-\frac{1}{4g}(h^4-l^4)\right]$	$\frac{\sqrt{\frac{1}{12}\left[bd^3-\frac{1}{4g}(h^4-l^4)\right]}}{dt+2a(s+n)}$

Foundation of Fit Selection Extract of JIS usage series drafting manual (Accuracy)

■ Standard of Fit selection

			H6	H7	H8	H9	Applicable part	Functional classification		Application example
Parts are moved relatively	Clearance	Relaxation				c9	There may be a large gap, or a moving part that needs a gap. A part that can increase the gap to make assembly easier. A part that needs an appropriate gap even at high temperature.	A part requiring a large gap in terms of function. (Expands, position error is large.) (The fitting length is long.)		· Fitting of piston ring and ring groove loose stop pin
		Light rotation			d9	d9	There is a large clearance, or a part that needs a gap.	Try to lower the cost. (Production cost) (Maintenance cost)		· Crank web and pin bearing (side) · Exhaust valve casing and splash ring slide piston ring and ring groove
				e7	e8	e9	There is a slightly large gap, or a moving part that needs a gap. Slightly large clearance, bearing part with good lubrication. High temperature, high speed, high load bearing part (advanced forced lubrication).	General rotation or sliding parts. (Good lubrication is required) A normal fit part. (Often decomposed)		· Fitting of exhaust valve seat · Main bearing for crankshaft · General sliding section
		Rotation	f6	f7	f7 f8		There is a suitable clearance and fit can be exercised (fine fit). General temperature room bearing part for grease and oil lubrication.			· Cooling type exhaust valve valve box insertion part · General axis and bush · Link device lever and bushing
		Rerotation	g5	g6			Continuous rotating part of light load precision equipment. A fit that allows for small gap movement (spikot, positioning). Precise sliding part.	Part that requires precise exercise without rattling.		· Link device pin and lever · Key and key groove · Precise control valve stem
Parts cannot be moved relatively	Intermediate fit	Sliding	h5	h6	h7 h8	h9	If you use a lubricant you can move by hand (fitting in fine quality). Particularly precise sliding parts. A static part that is not important.	It can disassemble and assemble without damaging parts.	It is impossible to transmit force only by the fitting force of fitting.	· Fits the rim and the boss · Fitting of a gear of a precise gear device
		Driving	h5 h6	js6			There is a slight interference in the mounting part. High precision positioning that prevents mutual movement during use. Fit to the extent that it can stand and disassemble with trees and lead hammers.			· Fitting between joint flanges · Governor way and pin · Fitting of gear rim and boss
		Driving	js5	k6			Fitting to the extent of using iron hammer / hand press for assembly / disassembly (keys and others are necessary to prevent rotation axis between parts). High precision positioning.			· Fastening of gear pump shaft and casing · Reamer bolt
			k5	m6			Assembly / disassembly is the same as above. High precision positioning where little clearance is not allowed.			· Reamer bolt · Hydraulic equipment Piston and shaft fixing · Fitting of fitting flange and shaft
		Light press fitting	m5	n6			It requires considerable force to assemble and disassemble. High precision fixed mounting (Key and others are necessary for transmission of large torque).		It can be transmitted by the coupling force of small fitting force.	· Flexible coupling and gear (passive side) · High accuracy fit · Intake valve, valve guide insertion
	Interference fit	Press fitting	n5 n6	p6			Fitting that requires a large force for assembly / disassembly (key and others are required for transmission of large torque). However, in the case of non-ferrous components, the press-fitting force is lightly pressed. Standard press fitting fixation of iron and iron, bronze and copper.	It is difficult to disassemble without damaging parts.		· Intake valve, valve guide insertion · Fixing the gear and shaft (small torque) · Flexible joint shaft and gear (drive side)
			p5	r6			Assembly / disassembly is the same as above. For large-size parts, sintering, cold fitting, strong press fitting.			· Fitting and shaft
		Strong press fitting, sintering fitting, cold fitting	r5	s6 t6 u6 x6			It is firmly fixed to each other, and the assembly requires sintering, cold fitting, and strong press fitting. It will be a permanent assembly without disassembly. In the case of a light alloy, it is press fit.		A considerable force can be transmitted by the fitting force of the fitting.	· Inserting and fixing of bearing bush · Inlet valve, insertion of valve seat · Fitting flange and shaft fixing (large torque) · Fastening of drive gear rim and boss · Bearing bush fixed in

Dimensional Tolerance of Used for Most Fit Holes Extracted from JIS B0401 (1998)

■ Correlation table of standard dimension classification and hole tolerance area class

Classification of reference dimensions (mm)		Tolerance range class of holes																	
Over	Below	B10	C9	C10	D8	D9	D10	E7	E8	E9	F6	F7	F8	G6	G7	H6	H7	H8	H9	H10
-	3	+180 +140	+85 +60	+100 +60	+34 +20	+45 +20	+60 +20	+24 +14	+28 +14	+39 +14	+12 +6	+16 +6	+20 +6	+8 +2	+12 +2	+6 0	+10 0	+14 0	+25 0	+40 0
3	6	+188 +140	+100 +70	+118 +70	+48 +30	+60 +30	+78 +30	+32 +20	+38 +20	+50 +20	+18 +10	+22 +10	+28 +10	+12 +4	+16 +4	+8 0	+12 0	+18 0	+30 0	+48 0
6	10	+208 +150	+116 +80	+138 +80	+62 +40	+76 +40	+98 +40	+40 +25	+47 +25	+61 +25	+22 +13	+28 +13	+35 +13	+14 +5	+20 +5	+9 0	+15 0	+22 0	+36 0	+58 0
10	14	+220 +150	+138 +95	+165 +95	+77 +50	+93 +50	+120 +50	+50 +32	+59 +32	+75 +32	+27 +16	+34 +16	+43 +16	+17 +6	+24 +6	+11 0	+18 0	+27 0	+43 0	+70 0
14	18																			
18	24	+244 +160	+162 +110	+194 +110	+98 +65	+117 +65	+149 +65	+61 +40	+73 +40	+92 +40	+33 +20	+41 +20	+53 +20	+20 +7	+28 +7	+13 0	+21 0	+33 0	+52 0	+84 0
24	30																			
30	40	+270 +170	+182 +120	+220 +120	+119 +80	+142 +80	+180 +80	+75 +50	+89 +50	+112 +50	+41 +25	+50 +25	+64 +25	+25 +9	+34 +9	+16 0	+25 0	+39 0	+62 0	+100 0
40	50	+280 +180	+192 +130	+230 +130																
50	65	+310 +190	+214 +140	+260 +140	+146 +100	+174 +100	+220 +100	+90 +60	+106 +60	+134 +60	+49 +30	+60 +30	+76 +30	+29 +10	+40 +10	+19 0	+30 0	+46 0	+74 0	+120 0
65	80	+320 +200	+224 +150	+270 +150																
80	100	+360 +220	+257 +170	+310 +170	+174 +120	+207 +120	+260 +120	+107 +72	+126 +72	+159 +72	+58 +36	+71 +36	+90 +36	+34 +12	+47 +12	+22 0	+35 0	+54 0	+87 0	+140 0
100	120	+380 +240	+267 +180	+320 +180																
120	140	+420 +260	+300 +200	+360 +200	+208 +145	+245 +145	+305 +145	+125 +85	+148 +85	+185 +85	+68 +43	+83 +43	+106 +43	+39 +14	+54 +14	+25 0	+40 0	+63 0	+100 0	+160 0
140	160	+440 +280	+310 +210	+370 +210																
160	180	+470 +310	+330 +230	+390 +230																
180	200	+525 +340	+355 +240	+425 +240	+242 +170	+285 +170	+355 +170	+146 +100	+172 +100	+215 +100	+79 +50	+96 +50	+122 +50	+44 +15	+61 +15	+29 0	+46 0	+72 0	+115 0	+185 0
200	225	+565 +380	+375 +260	+445 +260																
225	250	+605 +420	+395 +280	+465 +280																
250	280	+690 +480	+430 +300	+510 +300	+271 +190	+320 +190	+400 +190	+162 +110	+191 +110	+240 +110	+88 +56	+108 +56	+137 +56	+49 +17	+69 +17	+32 0	+52 0	+81 0	+130 0	+210 0
280	315	+750 +540	+460 +330	+540 +330																
315	355	+830 +600	+500 +360	+590 +360	+299 +210	+350 +210	+440 +210	+182 +125	+214 +125	+265 +125	+98 +62	+119 +62	+151 +62	+54 +18	+75 +18	+36 0	+57 0	+89 0	+140 0	+230 0
355	400	+910 +680	+540 +400	+630 +400																
400	450	+1010 +760	+595 +440	+690 +440	+327 +230	+385 +230	+480 +230	+198 +135	+232 +135	+290 +135	+108 +68	+131 +68	+165 +68	+60 +20	+83 +20	+40 0	+63 0	+97 0	+155 0	+250 0
450	500	+1090 +840	+635 +480	+730 +480																

Remarks: For each table, the upper side shows the upper dimensional tolerance and the lower side shows the lower dimensional tolerance.

Units: μm

Classification of reference dimensions (mm)		Tolerance range class of holes														
Over	Below	JS6	JS7	K6	K7	M6	M7	N6	N7	P6	P7	R7	S7	T7	U7	X7
-	3	±3	±5	0 -6	0 -10	-2 -8	-2 -12	-4 -10	-4 -14	-6 -12	-6 -16	-10 -20	-14 -24	-	-18 -28	-20 -30
3	6	±4	±6	+2 -6	+3 -9	-1 -9	0 -12	-5 -13	-4 -16	-9 -17	-8 -20	-11 -23	-15 -27	-	-19 -31	-24 -36
6	10	±4.5	±7	+2 -7	+5 -10	-3 -12	0 -15	-7 -16	-4 -19	-12 -21	-9 -24	-13 -28	-17 -32	-	-22 -37	-28 -43
10	14	±5.5	±9	+2 -9	+6 -12	-4 -15	0 -18	-9 -20	-5 -23	-15 -26	-11 -29	-16 -34	-21 -39	-	-26 -44	-33 -51
14	18															-38 -56
18	24	±6.5	±10	+2 -11	+6 -15	-4 -17	0 -21	-11 -24	-7 -28	-18 -31	-14 -35	-20 -41	-27 -48	-	-33 -54	-46 -67
24	30													-33 -54	-40 -61	-56 -77
30	40	±8	±12	+3 -13	+7 -18	-4 -20	0 -25	-12 -28	-8 -33	-21 -37	-17 -42	-25 -50	-34 -59	-39 -64	-51 -76	-
40	50													-45 -70	-61 -86	
50	65	±9.5	±15	+4 -15	+9 -21	-5 -24	0 -30	-14 -33	-9 -39	-26 -45	-21 -51	-30 -60	-42 -72	-55 -85	-76 -106	-
65	80											-32 -62	-48 -78	-64 -94	-91 -121	
80	100	±11	±17	+4 -18	+10 -25	-6 -28	0 -35	-16 -38	-10 -45	-30 -52	-24 -59	-38 -73	-58 -93	-78 -113	-111 -146	-
100	120											-41 -76	-66 -101	-91 -126	-131 -166	
120	140	±12.5	±20	+4 -21	+12 -28	-8 -33	0 -40	-20 -45	-12 -52	-36 -61	-28 -68	-48 -88	-77 -117	-107 -147	-	-
140	160											-50 -90	-85 -125	-119 -159		
160	180											-53 -93	-93 -133	-131 -171		
180	200	±14.5	±23	+5 -24	+13 -33	-8 -37	0 -46	-22 -51	-14 -60	-41 -70	-33 -79	-60 -106	-105 -151	-	-	-
200	225											-63 -109	-113 -159			
225	250											-67 -113	-123 -169			
250	280	±16	±26	+5 -27	+16 -36	-9 -41	0 -52	-25 -57	-14 -66	-47 -79	-36 -88	-74 -126	-	-	-	-
280	315											-78 -130				
315	355	±18	±28	+7 -29	+17 -40	-10 -46	0 -57	-26 -62	-16 -73	-51 -87	-41 -98	-87 -144	-	-	-	-
355	400											-93 -150				
400	450	±20	±31	+8 -32	+18 -45	-10 -50	0 -63	-27 -67	-17 -80	-55 -95	-45 -108	-103 -166	-	-	-	-
450	500											-109 -172				

Dimensional Tolerance of Used for Most Fit Holes Extracted from JIS B0401 (1998)

■ Correlation table of standard dimension classification and hole tolerance area class

Classification of reference dimensions (mm)		Tolerance range class of holes																
Over	Below	b9	c9	d8	d9	e7	e8	e9	f6	f7	f8	g5	g6	h5	h6	h7	h8	h9
-	3	-140 -165	-60 -85	-20 -34	-20 -45	-14 -24	-14 -28	-14 -39	-6 -12	-6 -16	-6 -20	-2 -6	-2 -8	0 -4	0 -6	0 -10	0 -14	0 -25
3	6	-140 -170	-70 -100	-30 -48	-30 -60	-20 -32	-20 -38	-20 -50	-10 -18	-10 -22	-10 -28	-4 -9	-4 -12	0 -5	0 -8	0 -12	0 -18	0 -30
6	10	-150 -186	-80 -116	-40 -62	-40 -76	-25 -40	-25 -47	-25 -61	-13 -22	-13 -28	-13 -35	-5 -11	-5 -14	0 -6	0 -9	0 -15	0 -22	0 -36
10	14	-150 -193	-95 -138	-50 -77	-50 -93	-32 -50	-32 -59	-32 -75	-16 -27	-16 -34	-16 -43	-6 -14	-6 -17	0 -8	0 -11	0 -18	0 -27	0 -43
14	18																	
18	24	-160 -212	-110 -162	-65 -98	-65 -117	-40 -61	-40 -73	-40 -92	-20 -33	-20 -41	-20 -53	-7 -16	-7 -20	0 -9	0 -13	0 -21	0 -33	0 -52
24	30																	
30	40	-170 -232	-120 -182	-80 -119	-80 -142	-50 -75	-50 -89	-50 -112	-25 -41	-25 -50	-25 -64	-9 -20	-9 -25	0 -11	0 -16	0 -25	0 -39	0 -62
40	50	-180 -242	-130 -192															
50	65	-190 -264	-140 -214	-100 -146	-100 -174	-60 -90	-60 -106	-60 -134	-30 -49	-30 -60	-30 -76	-10 -23	-10 -29	0 -13	0 -19	0 -30	0 -46	0 -74
65	80	-200 -274	-150 -224															
80	100	-220 -307	-170 -257	-120 -174	-120 -207	-72 -107	-72 -126	-72 -159	-36 -58	-36 -71	-36 -90	-12 -27	-12 -34	0 -15	0 -22	0 -35	0 -54	0 -87
100	120	-240 -327	-180 -267															
120	140	-260 -360	-200 -300	-145 -208	-145 -245	-85 -125	-85 -148	-85 -185	-43 -68	-43 -83	-43 -106	-14 -32	-14 -39	0 -18	0 -25	0 -40	0 -63	0 -100
140	160	-280 -380	-210 -310															
160	180	-310 -410	-230 -330															
180	200	-340 -455	-240 -355	-170 -242	-170 -285	-100 -146	-100 -172	-100 -215	-50 -79	-50 -96	-50 -122	-15 -35	-15 -44	0 -20	0 -29	0 -46	0 -72	0 -115
200	225	-380 -495	-260 -375															
225	250	-420 -535	-280 -395															
250	280	-480 -610	-300 -430	-190 -271	-190 -320	-110 -162	-110 -191	-110 -240	-56 -88	-56 -108	-56 -137	-17 -40	-17 -49	0 -23	0 -32	0 -52	0 -81	0 -130
280	315	-540 -670	-330 -460															
315	355	-600 -740	-360 -500	-210 -299	-210 -350	-125 -182	-125 -214	-125 -265	-62 -98	-62 -119	-62 -151	-18 -43	-18 -54	0 -25	0 -36	0 -57	0 -89	0 -140
355	400	-680 -820	-400 -540															
400	450	-760 -915	-440 -595	-230 -327	-230 -385	-135 -198	-135 -232	-135 -290	-68 -108	-68 -131	-68 -165	-20 -47	-20 -60	0 -27	0 -40	0 -63	0 -97	0 -155
450	500	-840 -995	-480 -635															

Remarks : For each table, the upper side shows the upper dimensional tolerance and the lower side shows the lower dimensional tolerance.

Units: μm

Classification of reference dimensions (mm)		Tolerance range class of holes													
Over	Below	js5	js6	js7	k5	k6	m5	m6	n6	p6	r6	s6	t6	u6	x6
-	3	±2	±3	±5	+4 0	+6 0	+6 +2	+8 +2	+10 +4	+12 +6	+16 +10	+20 +14	-	+24 +18	+26 +20
3	6	±2.5	±4	±6	+6 +1	+9 +1	+9 +4	+12 +4	+16 +8	+20 +12	+23 +15	+27 +19	-	+31 +23	+36 +28
6	10	±3	±4.5	±7	+7 +1	+10 +1	+12 +6	+15 +6	+19 +10	+24 +15	+28 +19	+32 +23	-	+37 +28	+43 +34
10	14	±4	±5.5	±9	+9 +1	+12 +1	+15 +7	+18 +7	+23 +12	+29 +18	+34 +23	+39 +28	-	+44 +33	+51 +40
14	18														+56 +45
18	24	±4.5	±6.5	±10	+11 +2	+15 +2	+17 +8	+21 +8	+28 +15	+35 +22	+41 +28	+48 +35	-	+54 +41	+67 +54
24	30												+54 +41	+61 +48	+77 +64
30	40	±5.5	±8	±12	+13 +2	+18 +2	+20 +9	+25 +9	+33 +17	+42 +26	+50 +34	+59 +43	+64 +48	+76 +60	-
40	50												+70 +54	+86 +70	
50	65	±6.5	±9.5	±15	+15 +2	+21 +2	+24 +11	+30 +11	+39 +20	+51 +32	+60 +41	+72 +53	+85 +66	+106 +87	-
65	80										+62 +43	+78 +59	+94 +75	+121 +102	
80	100	±7.5	±11	±17	+18 +3	+25 +3	+28 +13	+35 +13	+45 +23	+59 +37	+73 +51	+93 +71	+113 +91	+146 +124	-
100	120										+76 +54	+101 +79	+126 +104	+166 +144	
120	140	±9	±12.5	±20	+21 +3	+28 +3	+33 +15	+40 +15	+52 +27	+68 +43	+88 +63	+117 +92	+147 +122	-	-
140	160										+90 +65	+125 +100	+159 +134		
160	180										+93 +68	+133 +108	+171 +146		
180	200	±10	±14.5	±23	+24 +4	+33 +4	+37 +17	+46 +17	+60 +31	+79 +50	+106 +77	+151 +122	-	-	-
200	225										+109 +80	+159 +130			
225	250										+113 +84	+169 +140			
250	280	±11.5	±16	±26	+27 +4	+36 +4	+43 +20	+52 +20	+66 +34	+88 +56	+126 +94	-	-	-	-
280	315										+130 +98				
315	355	±12.5	±18	±28	+29 +4	+40 +4	+46 +21	+57 +21	+73 +37	+98 +62	+144 +108	-	-	-	-
355	400										+150 +114				
400	450	±13.5	±20	±31	+32 +5	+45 +5	+50 +23	+63 +23	+80 +40	+108 +68	+166 +126	-	-	-	-
450	500										+172 +132				

Surface Roughness Extracted from JIS B0601 (1994), JIS B0031 (1994)

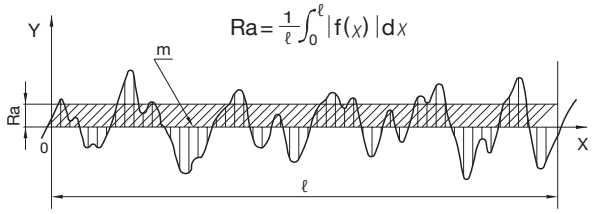
■ Types of Surface Roughness

Parameters representing the surface roughness of industrial products are defined as arithmetic average roughness (Ra), maximum height (Ry), ten-point mean roughness (Rz), average irregularities spacing (Sm), mean spacing of local peaks (S), and load length rate (tp). The surface roughness is the arithmetic mean value of each part randomly extracted from the surface of the object.
[Center line average roughness (Ra_{75}) is defined in the appendix of JIS B 0031 · JIS B 0601.]

How to obtain representative surface roughness

Arithmetic average roughness Ra

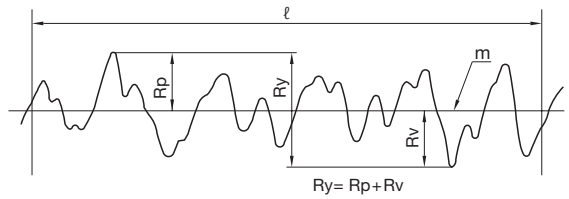
Extract only the reference length from the roughness curve in the direction of the average line and set the X axis in the direction of the average line of the extracted portion and the Y axis in the direction of the longitudinal magnification. Refers to a value obtained by the following equation expressed in micrometers (μm) when a roughness curve is expressed by $y = f(X)$.



Maximum height Ry

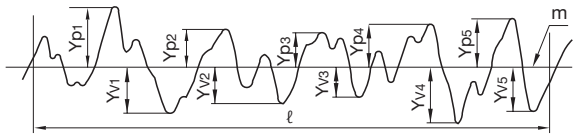
From the roughness curve, extract only the reference length in the direction of the average line, measure the interval between the summit line and the valley line of this extracted portion in the direction of the longitudinal magnification of the roughness curve.

Remarks: In the case of obtaining Ry, it extracts the reference length only from the portion which is out of the ordinary and which has no high mountain and low valley which is regarded as a flaw.



Ten point average roughness Rz

Extract only the reference length from the roughness curve in the direction of the average line. The average value of the absolute values of the altitudes (Yp) of the mountain peaks from the highest peak to the fifth highest measured from the average line of the extracted portion in the direction of the longitudinal magnification and the average value of the altitudes of the valleys at the lowest valley bottom (Yv), and the average of the absolute values of the absolute values. This value is expressed in micrometers (μm).



$$Rz = \frac{|Yp_1 + Yp_2 + Yp_3 + Yp_4 + Yp_5| + |Yv_1 + Yv_2 + Yv_3 + Yv_4 + Yv_5|}{5}$$

$Yp_1Yp_2Yp_3Yp_4Yp_5$ The elevation of the summit from the highest mountain peak to the fifth highest peak in the sampling length with respect to the reference length ℓ

$Yv_1Yv_2Yv_3Yv_4Yv_5$ The elevation of the summit from the lowest mountain peak to the fifth lowest peak in the sampling length with respect to the reference length ℓ

Reference Relation between arithmetic average roughness (Ra) and conventional notation

Arithmetic average roughness Ra			Maximum height Ry	Ten point average roughness Rz	Reference length of Ry · Rz ℓ (mm)	Conventional standard sequence
Standard sequence	Cutoff value entered c (mm)	Illustration of surface skin	Standard sequence			
0.012 a 0.025 a 0.05 a 0.1 a 0.2 a	0.08	0.012 ~ 0.2	0.05 s 0.1 s 0.2 s 0.4 s 0.8 s	0.05 z 0.1 z 0.2 z 0.4 z 0.8 z	0.08	▽▽▽▽
	0.25				0.25	
	0.8				0.8	
0.4 a 0.8 a 1.6 a		0.4 ~ 1.6	1.6 s 3.2 s 6.3 s	1.6 z 3.2 z 6.3 z		▽▽▽
3.2 a 6.3 a	2.5	3.2 ~ 6.3	12.5 s 25 s	12.5 z 25 z	2.5	▽▽
12.5 a 25 a	8	12.5 ~ 25	50 s 100 s	50 z 100 z	8	▽
50 a 100 a	-	50 ~ 100	200 s 400 s	200 z 400 z	-	～

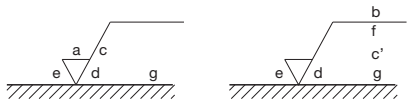
* The three kinds of mutual relations represent relationships for convenience and are not strict.
* Ra: The evaluation length of Ry, Rz is a value obtained by multiplying the cutoff value and the reference length by 5 respectively.

Diagrammatic Representation of Plane Surface Extracted from JIS B0031 (1994)

■ The position of each instruction symbol with respect to the instruction symbol in the figure

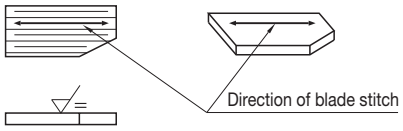
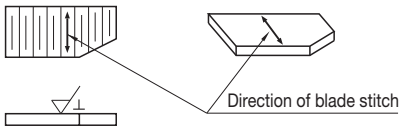
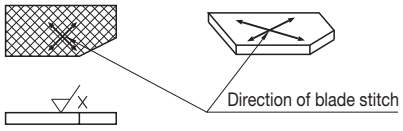
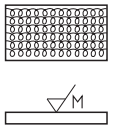
Instruction marks related to the skin of the face are obtained by placing the value of the surface roughness, the cutoff value or the reference length, the processing method, the mark of the line direction, the surface waviness and the like at the position shown in figure 1.

Figure 1. Input position of each instruction symbol



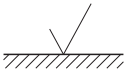
a : Value of Ra
b : Processing method
c : Cutoff value · evaluation length
c ': Reference length / evaluation length
d : Symbol of line direction
f : Parameters other than Ra (parameter / disconnection level when tp)
g : Surface waviness (according to JIS B 0610)
Remarks: Please fill in as necessary except for a or f.

Reference: In the reference e in figure 1, the finishing fee is to be filled in ISO 1302.

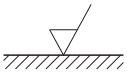
Symbol	Description	Illustration drawing
=	The direction of the stitch of the cutter by processing is parallel to the projection plane of the figure filled with the symbol Example: Shaped surface	
⊥	The direction of the stitch of the cutter by machining is perpendicular to the projection plane of the drawing in which the symbol is written Examples: Shaped surface (side view), Turning, Cylindrical grinding surface	
X	The direction of the stitch of the knife by machining diagonally crosses in two directions on the projection plane of the figure in which the symbol is written Example: Honing surface	
M	Cutting stitch of the cutter by processing intersects or diverges in many directions Examples: Lapped surface, Superfinished surface, Front-face milling with crossfeed, or End mill cutting surface	
C	The stitch of the cutter by machining is almost concentric with the center of the face on which the symbol is written Example: Surface ground surface	
R	Approximately radial shape of the blade stitch by machining against the center of the face on which the symbol is written	

■ Illustrated example of skin of the face

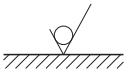
Surface texture symbol



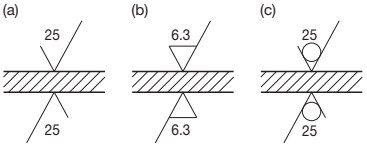
Texture symbol for surface requiring removal processing texture symbol



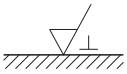
Texture symbol for surface that does not allow removal processing



An example indicating the upper limit of Ra



An example of instructing the line direction

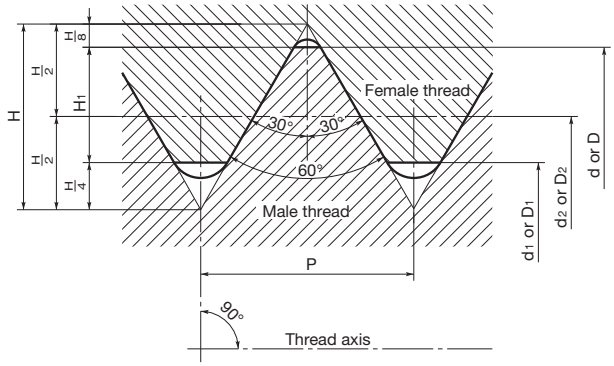


An example showing the upper and lower limits of Ra

Example of instructing processing method

Metric Coarse Thread Extracted from JIS B0205 (1997) (Previous standard)

■ Metric coarse thread reference chevron, official and standard dimensions



$H = 0.866025P$ $H_1 = 0.541266P$

$d_2 = d - 0.649519P$ $d_1 = d - 1.082532P$

$D = d$ $D_2 = d_2$ $D_1 = d_1$

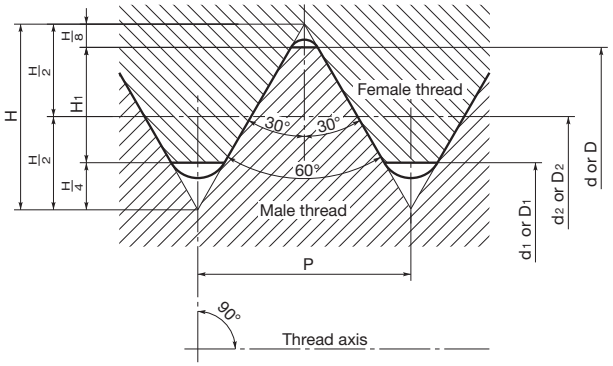
Unit: mm

Thread type*			Pitch P	Height of snag H1	Female thread		
					Diameter of valley D	Effective diameter D_2	Inner diameter D_1
					Male thread		
1 column	2 column	3 column			Outer diameter d	Effective diameter D_2	Diameter of valley d_1
M1			0.25	0.135	1.000	0.838	0.729
	M1.1		0.25	0.135	1.100	0.938	0.829
M1.2			0.25	0.135	1.200	1.038	0.929
	M1.4		0.3	0.162	1.400	1.205	1.075
M1.6			0.35	0.189	1.600	1.373	1.221
	M1.8		0.35	0.189	1.800	1.573	1.421
M2			0.4	0.217	2.000	1.740	1.567
	M2.2		0.45	0.244	2.200	1.908	1.713
M2.5			0.45	0.244	2.500	2.208	2.013
M3			0.5	0.271	3.000	2.675	2.459
	M3.5		0.6	0.325	3.500	3.110	2.850
M4			0.7	0.379	4.000	3.545	3.242
	M4.5		0.75	0.406	4.500	4.013	3.688
M5			0.8	0.433	5.000	4.480	4.134
M6			1	0.541	6.000	5.350	4.917
		M7	1	0.541	7.000	6.350	5.917
M8			1.25	0.677	8.000	7.188	6.647
		M9	1.25	0.677	9.000	8.188	7.647
M10			1.5	0.812	10.000	9.026	8.376
		M11	1.5	0.812	11.000	10.026	9.376
M12			1.75	0.947	12.000	10.863	10.106
	M14		2	1.083	14.000	12.701	11.835
M16			2	1.083	16.000	14.701	13.835
	M18		2.5	1.353	18.000	16.376	15.294
M20			2.5	1.353	20.000	18.376	17.294
	M22		2.5	1.353	22.000	20.376	19.294
M24			3	1.624	24.000	22.051	20.752
	M27		3	1.624	27.000	25.051	23.752
M30			3.5	1.894	30.000	27.727	26.211
	M33		3.5	1.894	33.000	30.727	29.211
M36			4	2.165	36.000	33.402	31.670
	M39		4	2.165	39.000	36.402	34.670
M42			4.5	2.436	42.000	39.077	37.129
	M45		4.5	2.436	45.000	42.077	40.129
M48			5	2.706	48.000	44.752	42.587
	M52		5	2.706	52.000	48.752	46.587
M56			5.5	2.977	56.000	52.428	50.046
	M60		5.5	2.977	60.000	56.428	54.046
M64			6	3.248	64.000	60.103	57.505
	M68		6	3.248	68.000	64.103	61.505

* Select the 1 column preferentially, if necessary, in the 2nd and 3rd columns.

Metric Fine Thread Extracted from JIS B0207 (1982) (Previous standard)

■ Metric fine thread standard chevron, official and standard dimensions



$H = 0.866025P$ $H_1 = 0.541266P$

$d_2 = d - 0.649519P$ $d_1 = d - 1.082532P$

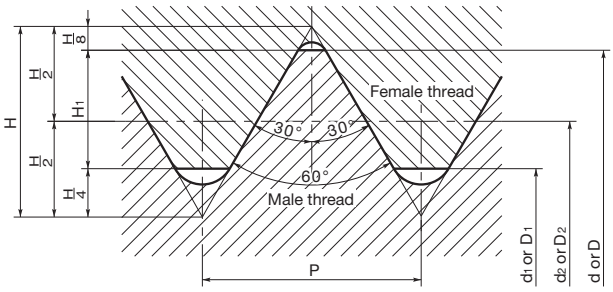
$D = d$ $D_2 = d_2$ $D_1 = d_1$

Unit: mm

Thread type	Pitch P	Height of snag H1	Female thread		
			Diameter of valley D	Effective diameter D_2	Inner diameter D_1
			Male thread		
			Outer diameter d	Effective diameter d_2	Diameter of valley d_1
M1×0.2	0.2	0.108	1.000	0.870	0.783
M1.1×0.2	0.2	0.108	1.100	0.970	0.883
M1.2×0.2	0.2	0.108	1.200	1.070	0.983
M1.4×0.2	0.2	0.108	1.400	1.270	1.183
M1.6×0.2	0.2	0.108	1.600	1.470	1.383
M1.8×0.2	0.2	0.108	1.800	1.670	1.583
M2×0.25	0.25	0.135	2.000	1.838	1.729
M2.2×0.25	0.25	0.135	2.200	2.038	1.929
M2.5×0.35	0.35	0.189	2.500	2.273	2.121
M3×0.35	0.35	0.189	3.000	2.773	2.621
M3.5×0.35	0.35	0.189	3.500	3.273	3.121
M4×0.5	0.5	0.271	4.000	3.675	3.459
M4.5×0.5	0.5	0.271	4.500	4.175	3.959
M5×0.5	0.5	0.271	5.000	4.675	4.459
M5.5×0.5	0.5	0.271	5.500	5.175	4.959
M6×0.75	0.75	0.406	6.000	5.513	5.188
M7×0.75	0.75	0.406	7.000	6.513	6.188
M8×1	1	0.541	8.000	7.350	6.917
M8×0.75	0.75	0.406	8.000	7.513	7.188
M9×1	1	0.541	9.000	8.350	7.917
M9×0.75	0.75	0.406	9.000	8.513	8.188
M10×1.25	1.25	0.677	10.000	9.188	8.647
M10×1	1	0.541	10.000	9.350	8.917
M10×0.75	0.75	0.406	10.000	9.513	9.188
M11×1	1	0.541	11.000	10.350	9.917
M11×0.75	0.75	0.406	11.000	10.513	10.188
M12×1.5	1.5	0.812	12.000	11.026	10.376
M12×1.25	1.25	0.677	12.000	11.188	10.647
M12×1	1	0.541	12.000	11.350	10.917
M14×1.5	1.5	0.812	14.000	13.026	12.376
M14×1.25	1.25	0.677	14.000	13.188	12.647
M14×1	1	0.541	14.000	13.350	12.917
M15×1.5	1.5	0.812	15.000	14.026	13.376
M15×1	1	0.541	15.000	14.350	13.917
M16×1.5	1.5	0.812	16.000	15.026	14.376
M16×1	1	0.541	16.000	15.350	14.917
M17×1.5	1.5	0.812	17.000	16.026	15.376
M17×1	1	0.541	17.000	16.350	15.917
M18×2	2	1.083	18.000	16.701	15.835
M18×1.5	1.5	0.812	18.000	17.026	16.376
M18×1	1	0.541	18.000	17.350	16.917
M20×2	2	1.083	20.000	18.701	17.835
M20×1.5	1.5	0.812	20.000	19.026	18.376
M20×1	1	0.541	20.000	19.350	18.917
M22×2	2	1.083	22.000	20.701	19.835
M22×1.5	1.5	0.812	22.000	21.026	20.376
M22×1	1	0.541	22.000	21.350	20.917
M24×2	2	1.083	24.000	22.701	21.835
M24×1.5	1.5	0.812	24.000	23.026	22.376
M24×1	1	0.541	24.000	23.350	22.917

Unified Coarse Thread/Fine Thread Extracted from JIS B0206 (1973), JIS B0208 (1973)

■ Unified coarse / fine thread standard chevron, official and standard dimensions



$H = \frac{25.4}{n}$ $H = \frac{0.866025}{n} \times 25.4$ $H_1 = \frac{0.541266}{n} \times 25.4$

$d = (d) \times 25.4$ $d_2 = \left(d - \frac{0.649519}{n} \right) \times 25.4$ $d_1 = \left(d - \frac{1.082532}{n} \right) \times 25.4$

$D = d$ $D_2 = d_2$ $D_1 = d_1$

n: 25.4mm of Thread height

Unified coarse thread

Unit: mm

Thread type*			Number of threads (Per 25.4mm) n	Pitch P (reference)	Height of snag H1	Female thread		
						Diameter of valley D	Effective diameter D_2	Inner diameter D_1
1	2	(reference)				Male thread		
						Outer diameter d	Effective diameter d_2	Diameter of valley d_1
	No.1-64 UNC	0.0730-64 UNC	64	0.3969	0.215	1.854	1.598	1.425
No.2 - 56 UNC		0.0860-56 UNC	56	0.4536	0.246	2.184	1.890	1.694
	No.3-48 UNC	0.0990-48 UNC	48	0.5292	0.286	2.515	2.172	1.941
No.4 - 40 UNC		0.1120-40 UNC	40	0.6350	0.344	2.845	2.433	2.156
No.5 - 40 UNC		0.1250-40 UNC	40	0.6350	0.344	3.175	2.764	2.487
No.6 - 32 UNC		0.1380-32 UNC	32	0.7938	0.430	3.505	2.990	2.647
No.8 - 32 UNC		0.1640-32 UNC	32	0.7938	0.430	4.166	3.650	3.307
No.10 - 24 UNC		0.1900-24 UNC	24	1.0583	0.573	4.826	4.138	3.680
	No.12-24 UNC	0.2160-24 UNC	24	1.0583	0.573	5.486	4.798	4.341
1/4 - 20 UNC		0.2500-20 UNC	20	1.2700	0.687	6.350	5.524	4.976
5/16 - 18 UNC		0.3125-18 UNC	18	1.4111	0.764	7.938	7.021	6.411
3/8 - 16 UNC		0.3750-16 UNC	16	1.5875	0.859	9.525	8.494	7.805
7/16 - 14 UNC		0.4375-14 UNC	14	1.8143	0.982	11.112	9.934	9.149
1/2 - 13 UNC		0.5000-13 UNC	13	1.9538	1.058	12.700	11.430	10.584
9/16 - 12 UNC		0.5625-12 UNC	12	2.1167	1.146	14.288	12.913	11.996
5/8 - 11 UNC		0.6250-11 UNC	11	2.3091	1.250	15.875	14.376	13.376
3/4 - 10 UNC		0.7500-10 UNC	10	2.5400	1.375	19.050	17.399	16.299
7/8 - 9 UNC		0.8750- 9 UNC	9	2.8222	1.528	22.225	20.391	19.169
1 - 8 UNC		1.0000- 8 UNC	8	3.1750	1.719	25.400	23.338	21.963
1 1/8 - 7 UNC		1.1250- 7 UNC	7	3.6286	1.964	28.575	26.218	24.648
1 1/8 - 7 UNC		1.2500- 7 UNC	7	3.6286	1.964	31.750	29.393	27.823

* Select the 1 column preferentially, if necessary, in the 2nd. In the reference column, the designation of the screw is shown in decimal form.

Unified fine thread

Unit: mm

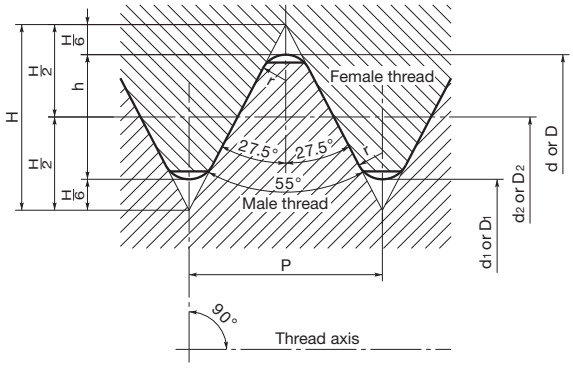
No.0 - 80 UNF		0.0600-80 UNF	80	0.3175	0.172	1.524	1.318	1.181
	No.1-72 UNF	0.0730-72 UNF	72	0.3528	0.191	1.854	1.626	1.473
No.2 - 64 UNF		0.0860-64 UNF	64	0.3969	0.215	2.184	1.928	1.755
	No.3-56 UNF	0.0990-56 UNF	56	0.4536	0.246	2.515	2.220	2.024
No.4 - 48 UNF		0.1120-48 UNF	48	0.5292	0.286	2.845	2.502	2.271
No.5 - 44 UNF		0.1250-44 UNF	44	0.5773	0.312	3.175	2.799	2.550
No.6 - 40 UNF		0.1380-40 UNF	40	0.6350	0.344	3.505	3.094	2.817
No.8 - 36 UNF		0.1640-36 UNF	36	0.7056	0.382	4.166	3.708	3.401
No.10 - 32 UNF		0.1900-32 UNF	32	0.7938	0.430	4.826	4.310	3.967
	No.12-28 UNF	0.2160-28 UNF	28	0.9071	0.491	5.486	4.897	4.503
1/4 - 28 UNF		0.2500-28 UNF	28	0.9071	0.491	6.350	5.761	5.367
5/16 - 24 UNF		0.3125-24 UNF	24	1.0583	0.573	7.938	7.249	6.792
3/8 - 24 UNF		0.3750-24 UNF	24	1.0583	0.573	9.525	8.837	8.379
7/16 - 20 UNF		0.4375-20 UNF	20	1.2700	0.687	11.112	10.287	9.738
1/2 - 20 UNF		0.5000-20 UNF	20	1.2700	0.687	12.700	11.874	11.326
9/16 - 18 UNF		0.5625-18 UNF	18	1.4111	0.764	14.288	13.371	12.761
5/8 - 18 UNF		0.6250-18 UNF	18	1.4111	0.764	15.875	14.958	14.348
3/4 - 16 UNF		0.7500-16 UNF	16	1.5875	0.859	19.050	18.019	17.330
7/8 - 14 UNF		0.8750-14 UNF	14	1.8143	0.982	22.225	21.046	20.262
1 - 12 UNF		1.0000-12 UNF	12	2.1167	1.146	25.400	24.026	23.109
1 1/8 - 12 UNF		1.1250-12 UNF	12	2.1167	1.146	28.575	27.201	26.284

* Select the 1 column preferentially, if necessary, in the 2nd. In the reference column, the designation of the screw is shown in decimal form.

Parallel Thread for Pipe

Extracted from JIS B0202 (1999)

■ Standard chevron shape of parallel threads for pipes, official and standard dimensions



$P = \frac{25.4}{n}$

$H = 0.960491\ P$

$h = 0.640327\ P$

$r = 0.137329\ P$

$d_2 = d - h$ $\quad D_2 = d_2$

$d_1 = d - 2h$ $\quad D_1 = d_1$

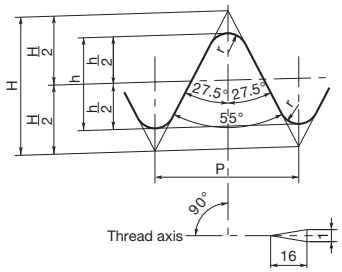
Unit: mm

Thread type	Number of threads (Per 25.4mm) n	Pitch P (reference)	Thread height h	Round of peaks and valleys of mountains r	Male thread		
					Outer diameter d	Effective diameter d_2	Diameter of valley d_1
					Female thread		
					Diameter of valley D	Effective diameter D_2	Inner diameter D_1
G1/16	28	0.9071	0.581	0.12	7.723	7.142	6.561
G1/8	28	0.9071	0.581	0.12	9.728	9.147	8.566
G1/4	19	1.3368	0.856	0.18	13.157	12.301	11.445
G3/8	19	1.3368	0.856	0.18	16.662	15.806	14.950
G1/2	14	1.8143	1.162	0.25	20.955	19.793	18.631
G5/8	14	1.8143	1.162	0.25	22.911	21.749	20.587
G3/4	14	1.8143	1.162	0.25	26.441	25.279	24.117
G7/8	14	1.8143	1.162	0.25	30.201	29.039	27.877
G1	11	2.3091	1.479	0.32	33.249	31.770	30.291
G1 1/8	11	2.3091	1.479	0.32	37.897	36.418	34.939
G1 1/4	11	2.3091	1.479	0.32	41.910	40.431	38.952
G1 1/2	11	2.3091	1.479	0.32	47.803	46.324	44.845
G1 3/4	11	2.3091	1.479	0.32	53.746	52.267	50.788
G2	11	2.3091	1.479	0.32	59.614	58.135	56.656
G2 1/4	11	2.3091	1.479	0.32	65.710	64.231	62.752
G2 1/2	11	2.3091	1.479	0.32	75.184	73.705	72.226
G2 3/4	11	2.3091	1.479	0.32	81.534	80.055	78.576
G3	11	2.3091	1.479	0.32	87.884	86.405	84.926
G3 1/2	11	2.3091	1.479	0.32	100.330	98.851	97.372
G4	11	2.3091	1.479	0.32	113.030	111.551	110.072
G4 1/2	11	2.3091	1.479	0.32	125.730	124.251	122.772
G5	11	2.3091	1.479	0.32	138.430	136.951	135.472
G5 1/2	11	2.3091	1.479	0.32	151.130	149.651	148.172
G6	11	2.3091	1.479	0.32	163.830	162.351	160.872

Taper Thread for Pipe Extracted from JIS B0203 (1999)

■ Standard chevron shape of pipe taper thread, official and standard size

Standard chevron applicable to taper male thread and taper female thread

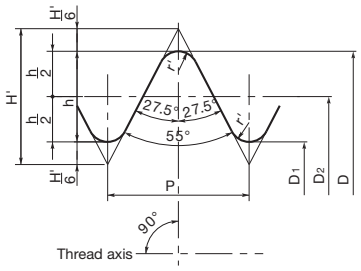


The thick solid line indicates the reference mountain shape.

$P = \frac{25.4}{n}$

H = 0.960 237 P
h = 0.640 327 P
r = 0.137 278 P

Standard chevrons to be applied to parallel internal threads

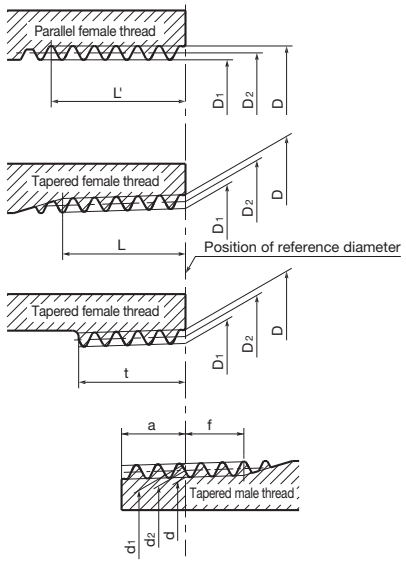


The thick solid line indicates the reference mountain shape.

$P = \frac{25.4}{n}$

H' = 0.960 491 P
h = 0.640 327 P
r' = 0.137 329 P

Fitting of taper thread with tapered female thread or parallel female thread



Unit: mm

*1 Thread type	Thread: Number of threads (Per 25.4mm) n	Thread: Pitch P (reference)	Thread: Mountain height h	Thread: Roundness r or r '	Reference diameter: Male thread: Outer diameter d	Reference diameter: Male thread: Effective diameter d2	Reference diameter: Male thread: Diameter of valley d1	Reference diameter: Female thread: Diameter of valley D	Reference diameter: Female thread: Effective diameter D2	Reference diameter: Female thread: Inner diameter D1	Position of reference diameter: Male thread: From the pipe end: Length of reference a	Position of reference diameter: Male thread: From the pipe end: Axis direction Tolerance b	Position of reference diameter: Female thread: Pipe end: Axis direction Tolerance c	Tolerance of D, D2 and D1 of parallel internal thread	Effective thread length (minimum): Male thread: From the position of the reference diameter toward the larger diameter side, f	Effective thread length (minimum): Female thread: When there is an incomplete thread portion: Taper female thread: From the position of the reference diameter toward the smaller diameter side, l	Effective thread length (minimum): Female thread: When there is an incomplete thread portion: Parallel female thread: From the pipe or pipe joint end l'	Effective thread length (minimum): Female thread: When there is no incomplete thread: Taper female thread, Parallel female thread: *2 t	Dimensions of carbon steel pipe for piping (reference): Outline	Dimensions of carbon steel pipe for piping (reference): Thickness
R1/16	28	0.9071	0.581	0.12	7.723	7.142	6.561				3.97	±0.91	±1.13	±0.071	2.5	6.2	7.4	4.4	-	-
R1/8	28	0.9071	0.581	0.12	9.728	9.147	8.566				3.97	±0.91	±1.13	±0.071	2.5	6.2	7.4	4.4	10.5	2.0
R1/4	19	1.3368	0.856	0.18	13.157	12.301	11.445				6.01	±1.34	±1.67	±0.104	3.7	9.4	11.0	6.7	13.8	2.3
R3/8	19	1.3368	0.856	0.18	16.662	15.806	14.950				6.35	±1.34	±1.67	±0.104	3.7	9.7	11.4	7.0	17.3	2.3
R1/2	14	1.8143	1.162	0.25	20.955	19.793	18.631				8.16	±1.81	±2.27	±0.142	5.0	12.7	15.0	9.1	21.7	2.8
R3/4	14	1.8143	1.162	0.25	26.441	25.279	24.117				9.53	±1.81	±2.27	±0.142	5.0	14.1	16.3	10.2	27.2	2.8
R1	11	2.3091	1.479	0.32	33.249	31.770	30.291				10.39	±2.31	±2.89	±0.181	6.4	16.2	19.1	11.6	34	3.2
R1 1/4	11	2.3091	1.479	0.32	41.910	40.431	38.952				12.70	±2.31	±2.89	±0.181	6.4	18.5	21.4	13.4	42.7	3.5
R1 1/2	11	2.3091	1.479	0.32	47.803	46.324	44.845				12.70	±2.31	±2.89	±0.181	6.4	18.5	21.4	13.4	48.6	3.5
R2	11	2.3091	1.479	0.32	59.614	58.135	56.656				15.88	±2.31	±2.89	±0.181	7.5	22.8	25.7	16.9	60.5	3.8
R2 1/2	11	2.3091	1.479	0.32	75.184	73.705	72.226				17.46	±3.46	±3.46	±0.216	9.2	26.7	30.1	18.6	76.3	4.2
R3	11	2.3091	1.479	0.32	87.884	86.405	84.926				20.64	±3.46	±3.46	±0.216	9.2	29.8	33.3	21.1	89.1	4.2
R4	11	2.3091	1.479	0.32	113.030	111.551	110.072				25.40	±3.46	±3.46	±0.216	10.4	35.8	39.3	25.9	114.3	4.5
R5	11	2.3091	1.479	0.32	138.430	136.951	135.472				28.58	±3.46	±3.46	±0.216	11.5	40.1	43.5	29.3	139.8	4.5
R6	11	2.3091	1.479	0.32	163.830	162.351	160.872				28.58	±3.46	±3.46	±0.216	11.5	40.1	43.5	29.3	165.2	5.0

* 1 This is for taper threads. For tapered female threads and parallel female threads, let R be R or RP.
* 2 The length of the tapered screw from the position of the reference diameter toward the smaller diameter side, and the parallel female thread length from the end of the pipe or pipe joint.

Hardness Conversion Table SAE J417 * Revised in 1983

■ Approximate conversion value for steel Rockwell C hardness (Note 1)

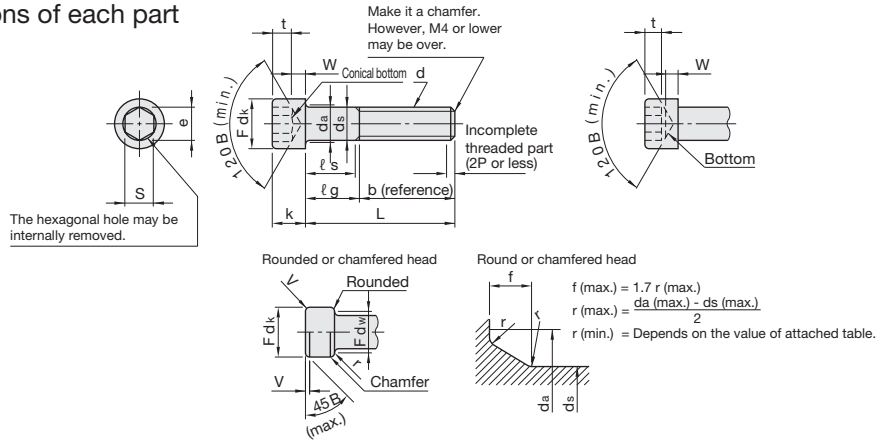
(HRC) Rockwell C scale hardness	(HV) Vickers hardness	Brinell hardness (HB) 10mm ball Load 3000kgf		Rockwell hardness (Note 3)			Rockwell Super Superficial Hardness Diamond conical indenter			(Hs) Shore hardness	Tensile strength (approximate value) MPa (kgf/mm²) (Note 2)	Rockwell C scale hardness (Note 3)
		Standard ball	Tungsten Carbide ball	(HRA) A scale Load 60kgf Diamond conical indenter	(HRB) B scale Load 100kgf Diameter 1.6mm (1/16 in) ball	(HRD) D scale Load 100kgf Diamond conical indenter	15-N scale load 15kgf	30-N scale load 30kgf	45-N scale load 45kgf			
68	940	-	-	85.6	-	76.9	93.2	84.4	75.4	97	-	68
67	900	-	-	85.0	-	76.1	92.9	83.6	74.2	95	-	67
66	865	-	-	84.5	-	75.4	92.5	82.8	73.3	92	-	66
65	832	-	(739)	83.9	-	74.5	92.2	81.9	72.0	91	-	65
64	800	-	(722)	83.4	-	73.8	91.8	81.1	71.0	88	-	64
63	772	-	(705)	82.8	-	73.0	91.4	80.1	69.9	87	-	63
62	746	-	(688)	82.3	-	72.2	91.1	79.3	68.8	85	-	62
61	720	-	(670)	81.8	-	71.5	90.7	78.4	67.7	83	-	61
60	697	-	(654)	81.2	-	70.7	90.2	77.5	66.6	81	-	60
59	674	-	(634)	80.7	-	69.9	89.8	76.6	65.5	80	-	59
58	653	-	615	80.1	-	69.2	89.3	75.7	64.3	78	-	58
57	633	-	595	79.6	-	68.5	88.9	74.8	63.2	76	-	57
56	613	-	577	79.0	-	67.7	88.3	73.9	62.0	75	-	56
55	595	-	560	78.5	-	66.9	87.9	73.0	60.9	74	2075(212)	55
54	577	-	543	78.0	-	66.1	87.4	72.0	59.8	72	2015(205)	54
53	560	-	525	77.4	-	65.4	86.9	71.2	58.5	71	1950(199)	53
52	544	(500)	512	76.8	-	64.6	86.4	70.2	57.4	69	1880(192)	52
51	528	(487)	496	76.3	-	63.8	85.9	69.4	56.1	68	1820(186)	51
50	513	(475)	481	75.9	-	63.1	85.5	68.5	55.0	67	1760(179)	50
49	498	(464)	469	75.2	-	62.1	85.0	67.6	53.8	66	1695(173)	49
48	484	451	455	74.7	-	61.4	84.5	66.7	52.5	64	1635(167)	48
47	471	442	443	74.1	-	60.8	83.9	65.8	51.4	63	1580(161)	47
46	458	432	432	73.6	-	60.0	83.5	64.8	50.3	62	1530(156)	46
45	446	421	421	73.1	-	59.2	83.0	64.0	49.0	60	1480(151)	45
44	434	409	409	72.5	-	58.5	82.5	63.1	47.8	58	1435(146)	44
43	423	400	400	72.0	-	57.7	82.0	62.2	46.7	57	1385(141)	43
42	412	390	390	71.5	-	56.9	81.5	61.3	45.5	56	1340(136)	42
41	402	381	381	70.9	-	56.2	80.9	60.4	44.3	55	1295(132)	41
40	392	371	371	70.4	-	55.4	80.4	59.5	43.1	54	1250(127)	40
39	382	362	362	69.9	-	54.6	79.9	58.6	41.9	52	1215(124)	39
38	372	353	353	69.4	-	53.8	79.4	57.7	40.8	51	1180(120)	38
37	363	344	344	68.9	-	53.1	78.8	56.8	39.6	50	1160(118)	37
36	354	336	336	68.4	(109.0)	52.3	78.3	55.9	38.4	49	1115(114)	36
35	345	327	327	67.9	(108.5)	51.5	77.7	55.0	37.2	48	1080(110)	35
34	336	319	319	67.4	(108.0)	50.8	77.2	54.2	36.1	47	1055(108)	34
33	327	311	311	66.8	(107.5)	50.0	76.6	53.3	34.9	46	1025(105)	33
32	318	301	301	66.3	(107.0)	49.2	76.1	52.1	33.7	44	1000(102)	32
31	310	294	294	65.8	(106.0)	48.4	75.6	51.3	32.7	43	980(100)	31
30	302	286	286	65.3	(105.5)	47.7	75.0	50.4	31.3	42	950(97)	30
29	294	279	279	64.7	(104.5)	47.0	74.5	49.5	30.1	41	930(95)	29
28	286	271	271	64.3	(104.0)	46.1	73.9	48.6	28.9	41	910(93)	28
27	279	264	264	63.8	(103.0)	45.2	73.3	47.7	27.8	40	880(90)	27
26	272	258	258	63.3	(102.5)	44.6	72.8	46.8	26.7	38	860(88)	26
25	266	253	253	62.8	(101.5)	43.8	72.2	45.9	25.5	38	840(86)	25
24	260	247	247	62.4	(101.0)	43.1	71.6	45.0	24.3	37	825(84)	24
23	254	243	243	62.0	100.0	42.1	71.0	44.0	23.1	36	805(82)	23
22	248	237	237	61.5	99.0	41.6	70.5	43.2	22.0	35	785(80)	22
21	243	231	231	61.0	98.5	40.9	69.9	42.3	20.7	35	770(79)	21
20	238	226	226	60.5	97.8	40.1	69.4	41.5	19.6	34	760(77)	20
(18)	230	219	219	-	96.7	-	-	-	-	33	730(75)	(18)
(16)	222	212	212	-	95.5	-	-	-	-	32	705(72)	(16)
(14)	213	203	203	-	93.9	-	-	-	-	31	675(69)	(14)
(12)	204	194	194	-	92.3	-	-	-	-	29	650(66)	(12)
(10)	196	187	187	-	90.7	-	-	-	-	28	620(63)	(10)
(8)	188	179	179	-	89.5	-	-	-	-	27	600(61)	(8)
(6)	180	171	171	-	87.1	-	-	-	-	26	580(59)	(6)
(4)	173	165	165	-	85.5	-	-	-	-	25	550(56)	(4)
(2)	166	158	158	-	83.5	-	-	-	-	24	530(54)	(2)
(0)	160	152	152	-	81.7	-	-	-	-	24	515(53)	(0)

Note: (1) Blue numbers are based on ASTM E 140 Table 1 (SAE, ASM, ASTM jointly adjusted).
(2) Units and numerical values shown with parentheses () are converted from psi by JIS Z 8413 and Z 8438 conversion tables. Note that 1 MPa = 1N/mm²
(3) Parentheses in the table numbers in parentheses () are those which are not used much and are shown as reference.

Hexagon Socket Head Cap Screw Extracted from JIS B 1776 (2006)

■ Correlation table of classification of reference dimension and tolerance range class of axis

1. Dimensions of each part



Unit: mm

Thread type(d) (Note 15)			M3	M4	M5	M6	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24	(M27)	M30
Screw Pitch (P) (Note 14)			0.5	0.7	0.8	1	1.25	1.5	1.75	2	2	2.5	2.5	2.5	3	3	3.5
b	Reference		18	20	22	24	28	32	36	40	44	48	52	56	60	66	72
d_k	Maximum (reference dimension)*		5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
	Maximum**		5.68	7.22	8.72	10.22	13.27	16.27	18.27	21.33	24.33	27.33	30.33	33.39	36.39	40.39	45.39
	Minimum		5.32	6.78	8.28	9.78	12.73	15.73	17.73	20.67	23.67	26.67	29.67	32.61	35.61	39.61	44.61
d_a	Maximum		3.6	4.7	5.7	6.8	9.2	11.2	13.7	15.7	17.7	20.2	22.4	24.4	26.4	30.4	33.4
d_s	Maximum (reference dimension)		3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
	Minimum		2.86	3.82	4.82	5.82	7.78	9.78	11.73	13.73	15.73	17.73	19.67	21.67	23.67	26.67	29.67
e	Minimum		2.87	3.44	4.58	5.72	6.86	9.15	11.43	13.72	16.00	16.00	19.44	19.44	21.73	21.73	25.15
f	Maximum		0.51	0.60	0.60	0.68	1.02	1.02	1.45	1.45	1.45	1.87	2.04	2.04	2.04	2.89	2.89
k	Maximum (reference dimension)		3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
	Minimum		2.86	3.82	4.82	5.70	7.64	9.64	11.57	13.57	15.57	17.57	19.48	21.48	23.48	26.48	29.48
r	Minimum		0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.6	0.6	0.8	0.8	0.8	1	1
s	Type (standard dimension)		2.5	3	4	5	6	8	10	12	14	14	17	17	19	19	22
	Minimum		2.52	3.02	4.02	5.02	6.02	8.025	10.025	12.032	14.032	14.032	17.050	17.050	19.065	19.065	22.065
	Maximum	1st column	2.580	3.080	4.095	5.140	6.140	8.175	10.175	12.212	14.212	14.212	17.230	17.230	19.275	19.275	22.275
		2nd column	2.560	3.080	4.095	5.095	6.095	8.115	10.115	12.142	14.142	14.142					
t	Minimum		1.3	2	2.5	3	4	5	6	7	8	9	10	11	12	13.5	15.5
v	Maximum		0.3	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.7	3
d_w	Minimum		5.07	6.53	8.03	9.38	12.33	15.33	17.23	20.17	23.17	25.87	28.87	31.81	34.81	38.61	43.61
w	Minimum		1.15	1.4	1.9	2.3	3.3	4	4.8	5.8	6.8	7.7	8.6	9.5	10.4	12.1	13.1

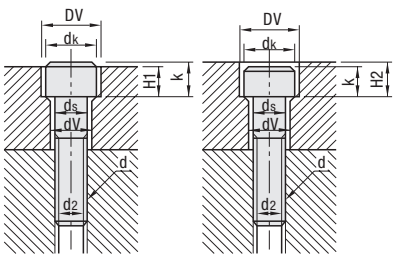
Note(14): The first column of s (maximum) is applied to those of strength classes 8.8 and 10.9 and those of property class A2-50, A2-70, and the second column is applied to those of intensity class 12.9. However, according to the agreement between the delivering parties, one column can be applied to those with an intensity class of 12.9. In addition, s (maximum) of screw nominal M 20 or more is applied to all strength classifications and property classifications.

Note(15): Avoid using the screw sizes in the parentheses.

Remarks: 1. On the side of the head, attach a knurl or a knurled knurl [see JIS B 0951 (knurled eye)]. In this case, dK (maximum) shall be the value of the ** mark shown in this table. Also, if you need something without knurling, the ordering person specifies. However, its dK (maximum) shall be the value of * indicated in this table.

2. Recommended nominal length (ℓ) for screw calls shall be within the bold frame. If ℓ is shorter than the position indicated by the dotted line, all threads shall be used, and the incomplete thread length at the neck lower portion shall be about 3P.

3. ℓg (maximum) and ℓs (minimum) for those whose nominal length (ℓ) is longer than the position indicated by the dotted line are given by the following expressions.
ℓg (maximum) = call length (ℓ) - b
ℓs (minimum) = ℓg (maximum) - 5P



Reference: Dimensions of the hole and bolt holes for hexagon-slotted bolts

Unit: mm

Thread type(d)	M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
d_s	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
dV	3.4	4.5	5.5	6.6	9	11	14	16	18	20	22	24	26	30	33
d_k	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
DV	6.5	8	9.5	11	14	17.5	20	23	26	29	32	35	39	43	48
K	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
H1	2.7	3.6	4.6	5.5	7.4	9.2	11	12.8	14.5	16.5	18.5	20.5	22.5	25	28
H2	3.3	4.4	5.4	6.5	8.6	10.8	13	15.2	17.5	19.5	21.5	23.5	25.5	29	32
d_2	2.6	3.4	4.3	5.1	6.9	8.6	10.4	12.2	14.2	15.7	17.7	19.7	21.2	24.2	26.7

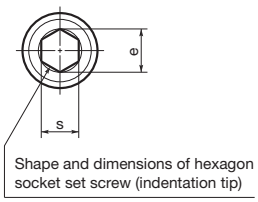
2. L and ℓs and ℓg of hexagon socket head bolts

Unit: mm

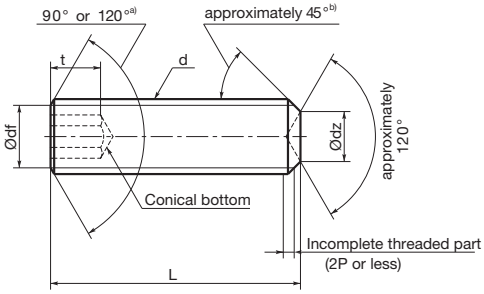
Thread type (d)			M3		M4		M5		M6		M8		M10		M12		(M14)		M16		(M18)		M20		(M22)		M24		(M27)		M30	
L			ℓs (min.) and ℓg (max.)																													
Length	Min.	Max.	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)
5	4.76	5.24																														
6	5.76	6.24																														
8	7.71	8.29																														
10	9.71	10.29																														
12	11.65	12.35																														
16	15.65	16.35																														
20	19.58	20.42																														
25	24.58	25.42	4.5	7																												
30	29.58	30.42	9.5	12	6.5	10	4	8																								
35	34.5	35.5			11.5	15	9	13	6	11																						
40	39.5	40.5			16.5	20	14	18	11	16	5.75	12																				
45	44.5	45.5					19	23	16	21	10.75	17	5.5	13																		
50	49.5	50.5					24	28	21	26	15.75	22	10.5	18																		
55	54.4	55.6							26	31	20.75	27	15.5	23	10.25	19																
60	59.4	60.6							31	36	25.75	32	20.5	28	15.25	24	10	20														
65	64.4	65.6									30.75	37	25.5	33	20.25	29	15	25	11	21	4.5	17										
70	69.4	70.6									35.75	42	30.5	38	25.25	34	20	30	16	26	9.5	22										
80	79.4	80.6									45.75	52	40.5	48	35.25	44	30	40	26	36	19.5	32	15.5	28	11.5	24						
90	89.3	90.7											50.5	58	45.25	54	40	50	36	46	29.5	42	25.5	38	21.5	34	15	30	9	24		
100	99.3	100.7											60.5	68	55.25	64	50	60	46	56	39.5	52	35.5	48	31.5	44	25	40	19	34		
110	109.3	110.7													65.25	74	60	70	56	66	49.5	62	45.5	58	41.5	54	35	50	29	44	20.5	38
120	119.3	120.7													75.25	84	70	80	66	76	59.5	72	55.5	68	51.5	64	45	60	39	54	30.5	48
130	129.2	130.8															80	90	76	86	69.5	82	65.5	78	61.5	74	55	70	49	64	40.5	58
140	139.2	140.8															90	100	86	96	79.5	92	75.5	88	71.5	84	65	80	59	74	60.5	68
150	149.2	150.8																	96	106	89.5	102	85.5	98	81.5	94	75	90	69	84	60.5	78
160	159.2	160.8																	106	116	99.5	112	95.5	108	91.5	104	85	100	79	94	70.5	88
180	179.2	180.8																			119.5	132	115.5	128	111.5	124	105	120	99	114	90.5	108
200	199.05	200.95																					135.5	148	131.5	144	125	140	119	134	110.5	128
220	219.05	220.95																											139	154	130.5	148
240	239.05	240.95																											159	174	150.5	168
260	258.95	261.05																											179	194	170.5	188
280	278.95	281.05																											199	214	190.5	208
300	298.95	301.05																											219	234	210.5	228

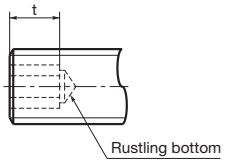
Hexagon Socket Set Screw Extracted from JIS B1177 (2007)

■ Shape and dimensions of hexagon socket set screw (dent tip)



Shape and dimensions of hexagon socket set screw (indentation tip)





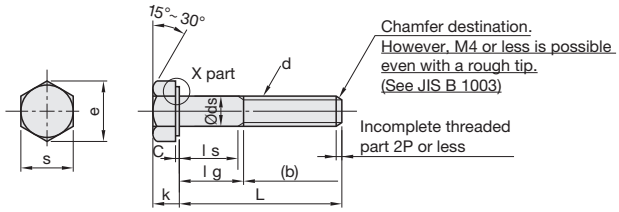
Unit: mm

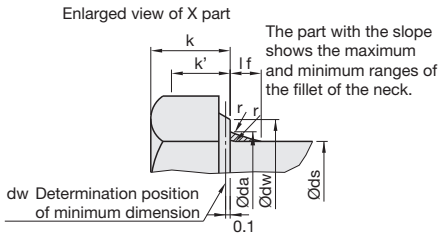
Thread type (d)			M1.6	M2	M2.5	M3	M4	M5	M6	M8	M10	M12	M16	M20	M24
P[c]			0.35	0.4	0.45	0.5	0.7	0.8	1	1.25	1.5	1.75	2	2.5	3
dz	Maximum		0.8	1	1.2	1.4	2	2.5	3	5	6	8	10	14	16
	Minimum		0.55	0.75	0.95	1.15	1.75	2.25	2.75	4.7	5.7	7.64	9.64	13.57	15.57
df			Diameter of approximately the bottom of the screw												
e[d),e)]	Minimum		0.809	1.011	1.454	1.733	2.303	2.873	3.443	4.583	5.723	6.863	9.149	11.42	13.71
s	Type		0.7	0.9	1.3	1.5	2	2.5	3	4	5	6	8	10	12
	Maximum		0.724	0.913	1.300	1.58	2.08	2.58	3.08	4.095	5.14	6.14	8.175	10.17	12.21
	Minimum		0.71	0.887	1.275	1.52	2.02	2.52	3.02	4.02	5.02	6.02	8.025	10.02	12.03
t	Minimum	[f)]	0.7	0.8	1.2	1.2	1.5	2	2	3	4	4.8	6.4	8	10
		[g)]	1.5	1.7	2	2	2.5	3	3.5	5	6	8	10	12	15
L			(reference) Approximate mass per 1000 pieces, unit kg (Density: 7.85kg/dm^3)												
Length	Minimum	Maximum													
2	1.8	2.2	0.019	0.029											
2.5	2.3	2.7	0.025	0.037	0.063										
3	2.8	3.2	0.029	0.044	0.075	0.1									
4	3.76	4.24	0.037	0.059	0.1	0.14	0.23								
5	4.76	5.24	0.046	0.074	0.125	0.18	0.305	0.42							
6	5.76	6.24	0.054	0.089	0.15	0.22	0.38	0.54	0.74						
8	7.71	8.29	0.07	0.119	0.199	0.3	0.53	0.78	1.09	1.88					
10	9.71	10.2		0.148	0.249	0.38	0.68	1.02	1.44	2.51	3.72				
12	11.6	12.3			0.299	0.46	0.83	1.26	1.79	3.14	4.73	6.7			
16	15.6	16.3				0.62	1.13	1.74	2.49	4.4	6.73	9.5	15.7		
20	19.5	20.4					1.4	2.22	3.19	5.66	8.72	12.3	20.9	31.1	
25	24.5	25.4						2.82	4.07	7.24	11.2	15.8	27.4	41.4	55.2
30	29.5	30.4							4.94	8.81	13.7	19.3	33.9	51.7	70.3
35	34.5	35.5								10.4	16.2	22.7	40.4	62	85.3
40	39.5	40.5								12	18.7	26.2	46.9	72.3	100
45	44.5	45.5									21.2	29.7	53.3	82.6	115
50	49.5	50.5									23.6	33.2	59.8	92.6	130
55	54.4	55.6										36.6	66.3	103	145
60	59.4	60.6										40.1	72.8	114	160

Note: The recommended nominal length shall be within the thick line frame.
a) If the nominal length L is shown in the stepwise shading shown in the table above, bear the chamfer of 120°.
b) An angle of about 45° applies to the slope below the diameter of the valley of the external thread.
c) P is the screw pitch.
d) emin = 1.14s min
e) Gauge inspection of e and s is according to JIS B 1016.
f) Apply to shaded nominal threads.
g) Applicable to nominal length screws not shaded.

Hexagon Bolt Extracted from JIS B1180 (1999)

■ Shape and dimensions of hexagon bolt (part class A)





Unit: mm

Thread type (d)		M2	M3	M4	M5	M6	M8	M10	M12	-	M16	M20	M24
	Coarse thread – Column I												
	Column II	-	-	-	-	-	-	-	-	M14	-	-	-
	Coarse pitch P	0.4	0.5	0.7	0.8	1	1.25	1.5	1.75	2	2	2.5	3
	Fine thread – Column I	-	-	-	-	-	M8×1	M10×1	M12×1.5	-	M16×1.5	M20×1.5	M24×2
	Column II	-	-	-	-	-	-	M10×1.25	M12×1.25	M14×1.5	-	M20×2	-
b (reference)	L≦125mm	10	12	14	16	18	22	26	30	34	38	46	54
	125＜L≦150mm	-	-	-	-	-	-	-	-	40	44	52	60
c	Minimum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.2	0.2	0.2
	Maximum	0.25	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.8	0.8	0.8
da	Maximum	2.6	3.6	4.7	5.7	6.8	9.2	11.2	13.7	15.7	17.7	22.4	26.4
ds	Reference dimension = maximum	2	3	4	5	6	8	10	12	14	16	20	24
	Minimum	1.86	2.86	3.82	4.82	5.82	7.78	9.78	11.73	13.73	15.73	19.67	23.67
dw	Minimum	3.07	4.57	5.88	6.88	8.88	11.63	14.63	16.63	*19.64	22.49	28.19	33.61
e	Minimum	4.32	6.01	7.66	8.79	11.05	14.38	17.77	20.03	23.36	26.75	33.53	39.98
l f	Maximum	0.8	1	1.2	1.2	1.4	2	2	3	3	3	4	4
k	Reference dimension = Type	1.4	2	2.8	3.5	4	5.3	6.4	7.5	8.8	10	12.5	15
	Minimum	1.275	1.875	2.675	3.35	3.85	5.15	6.22	7.32	8.62	9.82	12.285	14.785
	Maximum	1.525	2.125	2.925	3.65	4.15	5.45	6.58	7.68	8.98	10.18	12.715	15.215
k'	Minimum	0.89	1.31	1.87	2.35	2.7	3.61	4.35	5.12	6.03	6.87	8.6	10.35
r	Minimum	0.1	0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.6	0.8	0.8
s	Reference dimension = maximum	4	5.5	7	8	10	13	16	18	21	24	30	36
	Minimum	3.82	5.32	6.78	7.78	9.78	12.73	15.73	17.73	20.67	23.67	29.67	35.38

Bolt length (L)			ℓs and ℓg																							
Nominal length (Reference dimension)	Minimum	Maximum	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)	ℓs (min.)	ℓg (min.)
16	15.65	16.35	4	6																						
20	19.58	20.42	8	10	5.5	8																				
25	24.58	25.42			10.5	13	7.5	11	5	9																
30	29.58	30.42			15.5	18	12.5	16	10	14	7	12														
35	34.5	35.5					17.5	21	15	19	12	17														
40	39.5	40.5					22.5	26	20	24	17	22	11.75	18												
45	44.5	45.5							25	29	22	27	16.75	23	11.5	19										
50	49.5	50.5							30	34	27	32	21.75	28	16.5	24	11.25	20								
55	54.4	55.6									32	37	26.75	33	21.5	29	16.25	25								
60	59.4	60.6									37	42	31.75	38	26.5	34	21.25	30	16	26						
65	64.4	65.6											36.75	43	31.5	39	26.25	35	21	31	17	27				
70	69.4	70.6											41.75	48	36.5	44	31.25	40	26	36	22	32				
80	79.4	80.6											51.75	58	46.5	54	41.25	50	36	46	32	42	21.5	34		
90	89.3	90.7													56.5	64	51.25	60	46	56	42	52	31.5	44	21	36
100	99.3	100.7													66.5	74	61.25	70	56	66	52	62	41.5	54	31	46
110	109.3	110.7															71.25	80	66	76	62	72	51.5	64	41	56
120	119.3	120.7															81.25	90	76	86	72	82	61.5	74	51	66
130	129.2	130.8																	80	90	76	86	65.5	78	55	70
140	139.2	140.8																	90	100	86	96	75.5	88	65	80
150	149.2	150.8																			96	106	85.5	98	75	90

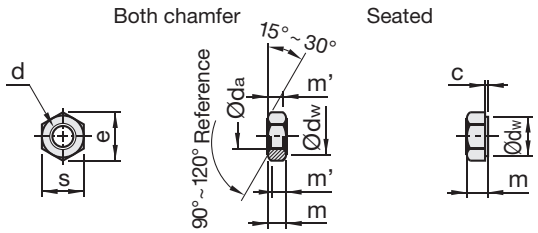
Remarks:
1. The name of the thread shall be given priority in column I. The way of expressing the call of the thread is according to JIS B 0123.
2. Recommended nominal length (L) for screw calls shall be within the bold frame.
3. The tolerance of the screw length (b) of the bolt which is longer than the maximum nominal length in the heavy line frame depends on the agreement between the delivering parties, but it is better in accordance with JIS B 1021.
4. lg maximum and ls minimum are as follows. lg maximum = nominal length (L) - b, ls minimum = lg maximum -5 P (P = coarse pitch)
5. The values of da and r specified in this table are in accordance with JIS B 1005.
6. The "chamfered destination" and "roughness" of the thread tip shape shall conform to JIS B 1003.
7. The numerical values marked with * in the table are the values obtained by correcting the errors of the corresponding international standards.

* Hexagon bolt, hexagonal nut M10 and M12 which are currently circulating are also equipped by Old JIS.

Hexagon Nut Extracted from JIS B1181 (1995)

■ Hexagon nut

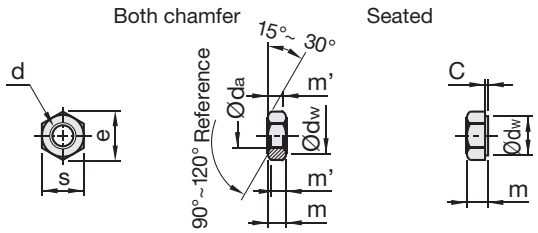
1. Shape and dimensions of hexagonal nut style Ⅰ (part grade A)



Unit: mm

Thread type (d)		M2	M3	M4	M5	M6	M8	M10	M12	(M14)	M16
Pitch Reference (P)		0.4	0.5	0.7	0.8	1	1.25	1.5	1.75	2	2
c	Maximum	0.2	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.8
	Minimum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.2
d_a	Minimum (reference dimension)	2	3	4	5	6	8	10	12	14	16
	Maximum	2.3	3.45	4.6	5.75	6.75	8.75	10.8	13	15.1	17.3
d_w	Minimum	3.07	4.6	5.9	6.9	8.9	11.6	14.6	16.6	19.6	22.5
e	Minimum	4.32	6.01	7.66	8.79	11.05	14.38	17.77	20.03	23.35	26.75
m	Maximum (reference dimension)	1.6	2.4	3.2	4.7	5.2	6.8	8.4	10.8	12.8	14.8
	Minimum	1.35	2.15	2.9	4.4	4.9	6.44	8.04	10.37	12.1	14.1
m*	Minimum	1.08	1.72	2.32	3.52	3.92	5.15	6.43	8.3	9.68	11.28
s	Maximum (reference dimension)	4	5.5	7	8	10	13	16	18	21	24
	Minimum	3.82	5.32	6.78	7.78	9.78	12.73	15.73	17.73	20.67	23.67

2. Shape and dimensions of hexagon nut style Ⅱ (part grade A)



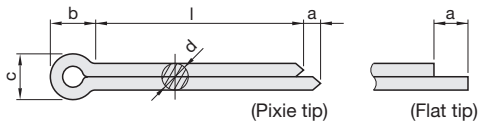
Unit: mm

Thread type (d)		M5	M6	M8	M10	M12	(M14)	M16
Pitch Reference (P)		0.8	1	1.25	1.5	1.75	2	2
c	Maximum	0.5	0.5	0.6	0.6	0.6	0.6	0.8
	Minimum	0.15	0.15	0.15	0.15	0.15	0.15	0.2
d_a	Minimum (reference dimension)	5	6	8	10	12	14	16
	Maximum	5.75	6.75	8.75	10.8	13	15.1	17.3
d_w	Minimum	6.9	8.9	11.6	14.6	16.6	19.6	22.5
e	Minimum	8.79	11.05	14.38	17.77	20.03	23.35	26.75
m	Maximum (reference dimension)	5.1	5.7	7.5	9.3	12	14.1	16.4
	Minimum	4.8	5.4	7.14	8.94	11.57	13.4	15.7
m*	Minimum	3.84	4.32	5.71	7.15	9.26	10.7	12.6
s	Maximum (reference dimension)	8	10	13	16	18	21	24
	Minimum	7.78	9.78	12.73	15.73	17.73	20.67	23.67

Remarks: 1. Do not use screw bracketed with parentheses.
2. The shape of the nut shall be double sided unless otherwise specified and the seating is as specified by the orderer.
Chamfering of the threaded portion of the seat is similar to "double side removal".
* Hexagon bolt, hexagonal nut M10 and M12 which are currently circulating are also equipped by Old JIS.

Split Pin Extracted from JIS B1351 (1987)

■ Shape and size of split pin



Unit: mm

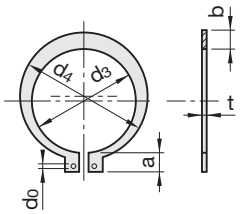
Diameter type			0.6	0.8	1	1.2	1.6	2	2.5	3.2	4	5	6.3	8	10	13	16	20
d		Base dimension	0.5	0.7	0.9	1	1.4	1.8	2.3	2.9	3.7	4.6	5.9	7.5	9.5	12.4	15.4	19.3
		Tolerance	0 -0.1						0 -0.2							0 -0.3		
c		Base dimension	1	1.4	1.8	2	2.8	3.6	4.6	5.8	7.4	9.2	11.8	15	19	24.8	30.8	38.6
		Tolerance	0 -0.1	0 -0.2		0 -0.3	0 -0.4		0 -0.6	0 -0.7	0 -0.9	0 -1.2	0 -1.5	0 -1.9	0 -2.4	0 -3.1	0 -3.8	0 -4.8
b		approximately	2	2.4	3	3	3.2	4	5	6.4	8	10	12.6	16	20	26	32	40
a		approximately	1.6	1.6	1.6	2.5	2.5	2.5	2.5	3.2	4	4	4	4	6.3	6.3	6.3	6.3
Applicable bolt and pin diameter	Bolt	Over	-	2.5	3.5	4.5	5.5	7	9	11	14	20	27	39	56	80	120	170
		Below	2.5	3.5	4.5	5.5	7	9	11	14	20	27	39	56	80	120	170	-
	Clevis pin	Over	-	2	3	4	5	6	8	9	12	17	23	29	44	69	110	160
		Below	2	3	4	5	6	8	9	12	17	23	29	44	69	110	160	-
Pin hole diameter		(Remarks)	0.6	0.8	1	1.2	1.6	2	2.5	3.2	4	5	6.3	8	10	13	16	20
ℓ		4	±0.5															
		5		±0.5														
		6			±0.5													
		8																
		10				±0.5												
		12					±0.8											
		14						±0.8										
		16							±0.8									
		18								±0.8								
		20									±1.2							
		22										±1.2						
		25											±1.2					
		28												±2				
		32													±2			
		36														±2		
		40															±2	
		45																±2
		50																
		56																
		63																
		71																
		80																
		90																
		100																
		112																
		125																
		140																
		160																
		180																
		200																
		224																
		250																
		280																

Remarks: 1. Nominal diameter depends on pin hole diameter.
2. d is a value between the tip and L / 2.
3. The shape of the tip may be either a tip or a flat tip. Please specify if you need one of them.
4. The length (L) is within the frame of the bold line, and the numerical value within the frame indicates the tolerance. However, in the case where r other than this table is particularly required, r specify the type.
5. The head should not lean significantly from the axis.

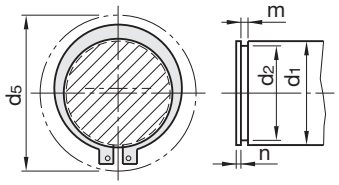
C Type Snap Ring Extracted from JIS B2804 (2001)

■ C type snap ring

[For axis]



The position of the hole of the diameter d_0 should not be hidden in the groove when it is put in the shaft to which the snap ring is applied.



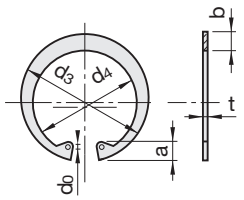
d_5 is the maximum diameter of the outer circumference when fitted to the shaft.

Unit: mm

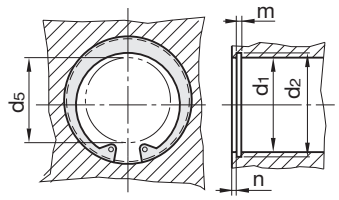
Type (Note 1)	Retaining ring							Applicable wheel (reference)						
	d_3		t		b	a	d_0	d_5	d_1	d_2		m		n
	Base dimension	Tolerance	Base dimension	Tolerance	(approx.)	(approx.)	(min.)			Base dimension	Tolerance	Base dimension	Tolerance	(min.)
10	9.3	±0.15	1	±0.05	1.6	3	1.5	17	10	9.6	0 -0.09	1.15	+0.14 0	1.5
(11)	10.2				1.8	3.1		18	11	10.5	0 -0.11			
12	11.1	±0.18			1.8	3.2	1.5	19	12	11.5				
(13)	12				1.8	3.3		20	13	12.4				
14	12.9				2	3.4	1.7	22	14	13.4				
15	13.8				2.1	3.5		23	15	14.3				
16	14.7				2.2	3.6		24	16	15.2				
17	15.7				2.2	3.7		25	17	16.2				
18	16.5		1.2	±0.06	2.6	3.8		26	18	17		1.35		
(19)	17.5				2.7	3.8	2	27	19	18				
20	18.5	±0.2			2.7	3.9		28	20	19	0 -0.21			
(21)	19.5				2.7	4		30	21	20				
22	20.5				2.7	4.1		31	22	21				
(24)	22.2				3.1	4.2		33	24	22.9				
25	23.2				3.1	4.3		34	25	23.9				
(26)	24.2				3.1	4.4		35	26	24.9				
28	25.9		1.6 (Note 2)		3.1	4.6		38	28	26.6		1.75		
(29)	26.9				3.5	4.7		39	29	27.6				
30	27.9				3.5	4.8		40	30	28.6				
32	29.6				3.5	5	2.5	43	32	30.3	0 -0.25			
(34)	31.5	±0.25			4	5.3		45	34	32.3				
35	32.2				4	5.4		46	35	33				
(36)	33.2		1.8	±0.07	4	5.4		47	36	34		1.95		2
(38)	35.2				4.5	5.6		50	38	36				
40	37	±0.4			4.5	5.8		53	40	38				
(42)	38.5				4.5	6.2		55	42	39.5				
45	41.5				4.8	6.3		58	45	42.5				
(48)	44.5				4.8	6.5		62	48	45.5				
50	45.8		2		5	6.7		64	50	47		2.2		
(52)	47.8				5	6.8		66	52	49				
55	50.8	±0.45			5	7		70	55	52	0 -0.3			
(56)	51.8				5	7		71	56	53				
(58)	53.8				5.5	7.1		73	58	55				
60	55.8				5.5	7.2		75	60	57				
(62)	57.8				5.5	7.2		77	62	59				
(63)	58.8				5.5	7.3		78	63	60				
65	60.8		2.5	±0.08	6.4	7.4		81	65	62		2.7		2.5
(68)	63.5				6.4	7.8		84	68	65				
70	65.5				6.4	7.8		86	70	67				
(72)	67.5				7	7.9		88	72	69				
75	70.5				7	7.9		92	75	72				
(78)	73.5				7.4	8.1		95	78	75				
80	74.5				7.4	8.2		97	80	76.5				

Note (1): Prioritize except ( ), use one of ( ) as necessary.
Note (2): Thickness (t) = 1.6mm can be 1.5mm for the time being. In this case, m is 1.65mm.
Remarks: 1. The minimum width of snap ring annulus shall not be smaller than plate thickness t.
2. The dimensions of the axis to be applied are indicated with reference to the recommended dimensions.
3. The d_4 dimension (mm) is preferably $d_4 = d_3 + (1.4 \text{ to } 1.5)$ b.
Reference: The thickness t is based on Japan Spring Industry Association Standard JSMA No.6-1976 (steel band for spring).

[For holes]



The position of the hole with the diameter d 0 should not get hidden in the groove when put in the hole to which the retaining ring is applied.



d5 is the maximum diameter of the outer circumference when fitted to the shaft.

Unit: mm

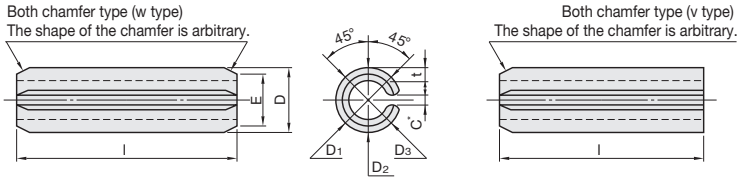
Type (Note 1)	Retaining ring							Applicable wheel (reference)						
	d3		t		b	a	d0	d5	d1	d2		m		n
	Base dimension	Tolerance	Base dimension	Tolerance	(approx.)	(approx.)	(min.)			Base dimension	Tolerance	Base dimension	Tolerance	(min.)
10	10.7	±0.18	1	±0.05	1.8	3.1	1.2	3	10	10.4	+0.11 0	1.15	+0.14 0	1.5
11	11.8				1.8	3.2		4	11	11.4				
12	13				1.8	3.3	1.5	5	12	12.5				
(13)	14.1				1.8	3.5		6	13	13.6				
14	15.1				2	3.6	1.7	7	14	14.6				
15	16.2				2	3.6		8	15	15.7				
16	17.3				2	3.7		8	16	16.8				
(17)	18.3	±0.2			2	3.8		9	17	17.8				
18	19.5				2.5	4		10	18	19	+0.21 0			
19	20.5				2.5	4	2	11	19	20				
20	21.5				2.5	4		12	20	21				
(21)	22.5				2.5	4.1		12	21	22				
22	23.5				2.5	4.1		13	22	23				
(24)	25.9		1.2	±0.06	2.5	4.3		15	24	25.2		1.35		
25	26.9				3	4.4		16	25	26.2				
(26)	27.9				3	4.6		16	26	27.2				
28	30.1	±0.25			3	4.6		18	28	29.4				
30	32.1				3	4.7		20	30	31.4	+0.25 0			
32	34.4				3.5	5.2		21	32	33.7				
(34)	36.5		1.6 (Note 2)		3.5	5.2		23	34	35.7		1.75		2
35	37.8				3.5	5.2		24	35	37				
(36)	38.8				3.5	5.2		25	36	38				
37	39.8				3.5	5.2		26	37	39				
(38)	40.8				4	5.3		27	38	40				
40	43.5	±0.4	1.8	±0.07	4	5.7	2.5	28	40	42.5		1.95		
42	45.5				4	5.8		30	42	44.5				
45	48.5				4.5	5.9		33	45	47.5				
47	50.5	±0.45			4.5	6.1		34	47	49.5				
(48)	51.5				4.5	6.2		35	48	50.5	+0.3 0			
50	54.2		2		4.5	6.5		37	50	53		2.2		
52	56.2				5.1	6.5		39	52	55				
55	59.2				5.1	6.5		41	55	58				
(56)	60.2				5.1	6.6		42	56	59				
(58)	62.2				5.1	6.8		44	58	61				
60	64.2				5.5	6.8		46	60	63				
62	66.2				5.5	6.9		48	62	65				
(63)	67.2				5.5	6.9		49	63	66				
(65)	69.2		2.5	±0.08	5.5	7		50	65	68		2.7		2.5
68	72.5				6	7.4		53	68	71				
(70)	74.5				6	7.4		55	70	73				
72	76.5				6.6	7.4		57	72	75				
75	79.5				6.6	7.8		60	75	78				
(78)	82.5	±0.55			6.6	8		62	78	81	+0.35 0			
80	85.5				7	8		64	80	83.5				

Note (1): Prioritize except ( ), use one of ( ) as necessary.
Note (2): Thickness (t) = 1.6mm can be 1.5mm for the time being. In this case, m is 1.65mm.
Remarks: 1. The minimum width of snap ring annulus shall not be smaller than plate thickness t.
2. The dimensions of the axis to be applied are indicated with reference to the recommended dimensions.
3. The d4 dimension (mm) is preferably $d_4 = d_3 - (1.4 \text{ to } 1.5)\,b$.
Reference: The thickness t is based on Japan Spring Industry Association Standard JSMA No.6-1976 (steel band for spring).

Spring Pin Extracted from JIS B2808 (1995)/E Type Snap Ring Extracted from JIS B2805 (1978)

■ Shape and dimension

Spring pin shape and size



* When clearance C is inserted into the hole to which the spring pin is applied, it must be dimensioned so that the side does not touch.

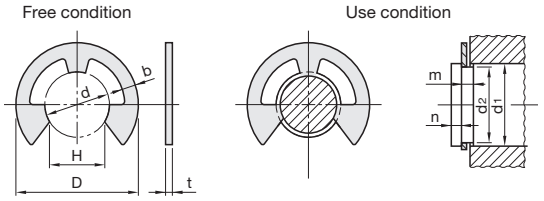
Unit: mm

Diameter type			1	1.2	1.4	1.5	1.6	2	2.5	3	4	5	6	8	10	13
Spring pin	D (Note 1)	Maximum	1.2	1.4	1.6	1.7	1.8	2.25	2.75	3.25	4.4	5.4	6.4	8.6	10.6	13.7
		Minimum	1.1	1.3	1.5	1.6	1.7	2.15	2.65	3.15	4.2	5.2	6.2	8.3	10.3	13.4
	t (reference)	For general use	0.2	0.25	0.28	0.3	0.3	0.4	0.5	0.6	0.8	1	1.2	1.6	2	2.5
		For light load	0.1	0.12	0.15	0.15	0.15	0.2	0.25	0.3	0.4	0.5	0.6	-	-	-
	E	(maximum)	0.9	1.1	1.3	1.4	1.5	1.9	2.4	2.9	3.9	4.8	5.8	7.8	9.8	12.7
	Double shear Load kN {kgf} Minimum value	For general use	0.69 {70}	1.02 {104}	1.35 {138}	1.55 {158}	1.68 {171}	2.76 {281}	4.31 {440}	6.2 {633}	10.8 {1130}	17.25 {1760}	24.83 {2532}	44.13 {4500}	68.94 {7030}	112.78 {11500}
		For light load	0.38 {39}	0.56 {57}	0.8 {82}	0.87 {89}	0.93 {95}	1.55 {158}	2.42 {247}	3.49 {356}	6.21 {633}	9.7 {989}	13.96 {1424}	- -	- -	- -
Applicable hole		Diameter	1	1.2	1.4	1.5	1.6	2	2.5	3	4	5	6	8	10	13
		Dimensional tolerance	+0.08 0					+0.09 0				+0.12 0		+0.15 0		+0.2 0

ℓ	Dimensional tolerance	Diameter type 1	1.2	1.4	1.5	1.6	2	2.5	3	4	5	6	8	10	13
4	+0.5 0	○	○	○	○	○									
5		○	○	○	○	○	○	○							
6		○	○	○	○	○	○	○	○						
8		○	○	○	○	○	○	○	○	○					
10		○	○	○	○	○	○	○	○	○	○				
12	+1.0 0		○	○	○	○	○	○	○	○	○	○			
14				○	○	○	○	○	○	○	○	○	○		
16						○	○	○	○	○	○	○	○		
18							○	○	○	○	○	○	○	○	
20							○	○	○	○	○	○	○	○	
22								○	○	○	○	○	○	○	○
25								○	○	○	○	○	○	○	○
28									○	○	○	○	○	○	○
32									○	○	○	○	○	○	○
36										○	○	○	○	○	○
40										○	○	○	○	○	○
45											○	○	○	○	○
50											○	○	○	○	○
56	+1.5 0											○	○	○	○
63												○	○	○	○
70													○	○	○
80													○	○	○
90														○	○
100														○	○
110															○
125															○
140															○

Note (1): D maximum is the maximum value on the circumference of the pin and D minimum is the average value of D 1, D 2, D 3. Reference value t is according to JSMA No.6 (Japan Spring Industry Association standard).

Shapes and dimensions of E type retaining ring



Remarks Shape shows one example

Type	Retaining ring d (Note 1) Reference dimension	d Tolerance	D Reference dimension	D Tolerance	H Reference dimension	H Tolerance	t Reference dimension	t Tolerance	b approximately	Applicable ring (reference) Classification of d1 Over	Below	d2 Reference dimension	d2 Tolerance	m Reference dimension	m Tolerance	n Minimum
0.8	0.8	0 -0.08	2	±0.1	0.7		0.2	±0.02	0.3	1	1.4	0.8	+0.05 0	0.3		0.4
1.2	1.2		3		1		0.3	±0.025	0.4	1.4	2	1.2		0.4	+0.05 0	0.6
1.5	1.5		4		1.3	0 -0.25	0.4		0.6	2	2.5	1.5	+0.06 0	0.5		0.8
2	2	0 -0.09	5		1.7		0.4	±0.03	0.7	2.5	3.2	2				1
2.5	2.5		6		2.1		0.4		0.8	3.2	4	2.5				
3	3		7		2.6		0.6		0.9	4	5	3		0.7	+0.1 0	
4	4		9		3.5		0.6		1.1	5	7	4	+0.075 0			1.2
5	5	0 -0.12	11	±0.2	4.3	0 -0.3	0.6		1.2	6	8	5				
6	6		12		5.2		0.8	±0.04	1.4	7	9	6		0.9		
7	7		14		6.1		0.8		1.6	8	11	7	+0.09 0			1.5
8	8		16		6.9		0.8		1.8	9	12	8				1.8
9	9	0 -0.15	18		7.8	0 -0.35	0.8		2.0	10	14	9				2
10	10		20		8.7		1.0		2.2	11	15	10		1.15		
12	12	0 -0.18	23		10.4		1.0	±0.05	2.4	13	18	12	+0.11 0			2.5
15	15		29		13	0 -045	1.6 (Note 2)	±0.06	2.8	16	24	15		1.75 (Note 2)	+0.14 0	3
19	19	0 -0.21	37	±0.3	16.5		1.6 (Note 2)		4.0	20	31	19	+0.13 0			3.5
24	24		44		20.8	-8.5	2.0	±0.07	5.0	25	38	24		2.2		4

Note (1): Limit plug gauge is used for measuring d.
Note (2): Thickness (t) = 1.6mm can be 1.5mm for the time being. In this case, m is 1.65mm.

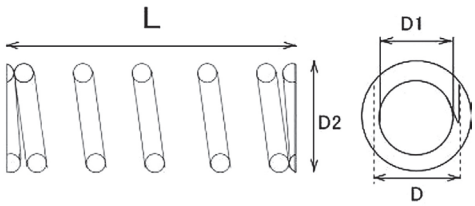
Remarks: The dimensions of the axis to be applied are indicated with reference to the recommended dimensions.

Spring Calculation Extracted from JIS B2704 (2000)

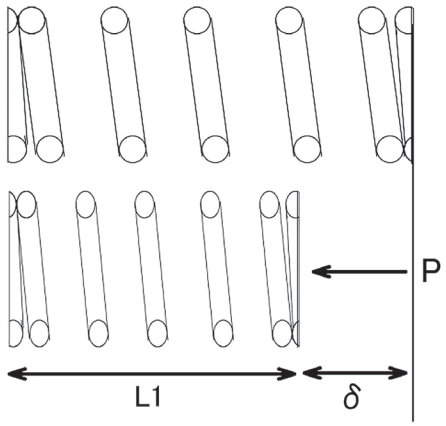
Symbol	Description
d	Wire diameter (Ø)
D1	Coil inner diameter (mm)
D2	Coil outer diameter (mm)
D	Coil average diameter (D1+D2)/2
Na	Effective number of turns
Nt	Total turns
L	Free length (mm)
P	Load N (Kg)
δ	Deflection of spring
k	Spring constant N/mm (Kg/mm)
G	Transverse modulus of elasticity N/mm^2 (Kg/mm^2)
c	Spring index (D/d)

Material	Transverse elastic modulus (N/mm))
Hard steel wire	78500
Piano wire	78500
Oil-tempered wire	78500
Stainless steel wire	68500

Material	Specific gravity (g/cm^3)
Iron (Fe+0.06%C)	7.87
Steel (Fe+0.8%C)	7.84
SUS304 (18Cr-8C)	7.9



* D (Coil average diameter) · · · Dimensions between center and center of line



A. Calculate the weight of the spring

Example » Piano wire Ø2.0 Effective number of turns 5 (Total number of turns 7) Coil diameter Ø15.0

① Find the volume of the spring

Cross section of material × length of spring = volume of spring

Expression » (1.0 * 1.0 * 3.14) * (15.0 * 3.14 * 7) = 3.14 * 329.7 = 1035.258mm^3

② Find the weight of the spring

Weight × specific gravity = weight of spring

Expression » 1035.258mm^3 * 0.00784g/mm^3 = 8.116g

B. Calculate the spring constant

$$k = \frac{Gd4}{8NaD^3}$$

Example » Piano wire Ø2.0 Effective number of turns 5 Coil diameter Ø15.0

Expression » (78,500 * 2.0^4) / (8 * 5 * 15.0^3) = 1256000/135000 = 9.304N/mm

C. Calculate load (compression spring)

$$P = \delta * k$$

Example » When the free length is 30mm and the mounting length is 25mm as the spring characteristic of the spring,

Expression » Calculate spring deflection δ = L - L1 δ = 30 - 25 = 5

5 * 9.304 = 46.52N

D. Calculate spring stress

$$\tau = \frac{8\kappa D}{\pi d^3} \quad P = \frac{\kappa dG}{\pi NaD^2} \quad \delta$$

Example » In the case of the spring characteristics of the above spring,

Expression » Calculate the correction factor c = 7.5

κ = ({4 * 7.5 - 1) / (4 * 7.5 - 4)} + (0.615 / 7.5) = 1.1974

κ (Whar correction coefficient) = {(4c - 1) / 4c - 4} + 0.615 / c) {(8 * 1.1974 * 15.0) / (3.14 * 2.0^3)} * 46.52 = (143.688 / 25.12) * 46.52

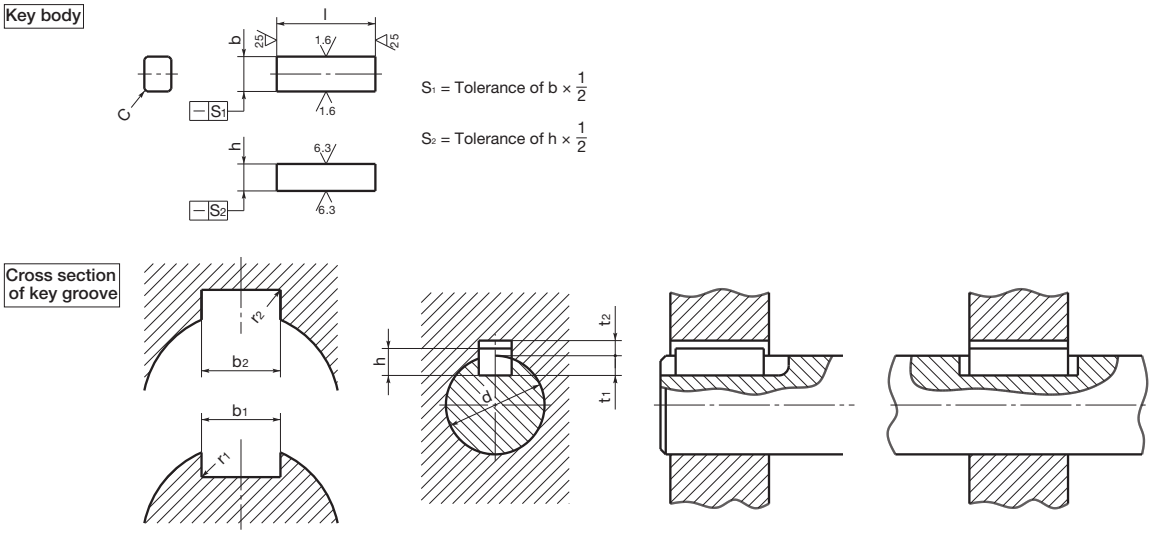
= 266.097N/mm^2

Key and Key Groove

Extracted from JIS B1301 (1996)

■ Key and key groove

1. Shape and dimensions of parallel key and key groove

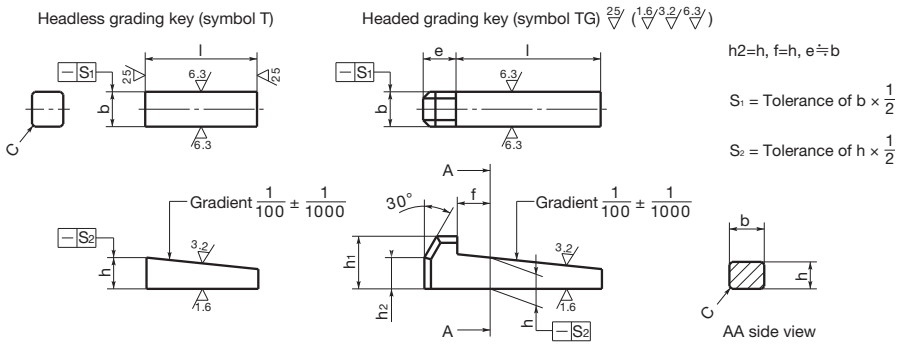


Unit: mm

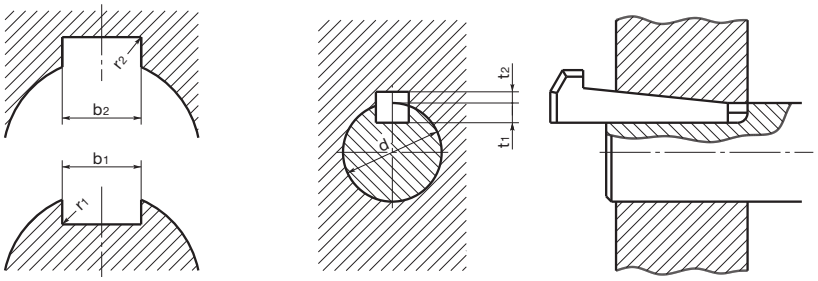
Key Nominal dimensions b×h	Key dimensions					C	l	Size of key groove										Reference
	b		h					Base dimensions b1 and b2	Sliding shape		Normal form		Tightening type	r1 and r2	Base dimensions t1	Base dimensions t2	Tolerance t1 and t2	Applicable shaft diameter d
	Base dimension	Tolerance (h9)	Base dimension	Tolerance					b1 Tolerance (H9)	b2 Tolerance (D10)	b1 Tolerance (N9)	b2 Tolerance (Js9)	b1 and b2 Tolerance (P9)					
2×2	2	0 −0.025	2	0 −0.025	h9	0.16 - 0.25	6 - 20	2	+0.025 0	+0.060 +0.020	−0.004 −0.029	±0.0125	−0.006 −0.031	0.08 - 0.16	1.2	1.0	+0.1 0	6 - 8
3×3	3		3				6 - 36	3							1.8	1.4		8 - 10
4×4	4	0 −0.030	4	0 −0.030			8 - 45	4	+0.030 0	+0.078 +0.030	0 −0.030	±0.0150	−0.012 −0.042		2.5	1.8		10 - 12
5×5	5		5			0.25 - 0.40	10 - 56	5						0.16 - 0.25	3.0	2.3		12 - 17
6×6	6		6				14 - 70	6							3.5	2.8		17 - 22
(7×7)	7	0 −0.036	7	0 −0.036			16 - 80	7	+0.036 0	+0.098 +0.040	0 −0.036	±0.0180	−0.015 −0.051		4.0	3.3	+0.2 0	20 - 25
8×7	8		7	0 −0.090	h11		18 - 90	8							4.0	3.3		22 - 30
10×8	10		8			0.40 - 0.60	22 - 110	10						0.25 - 0.40	5.0	3.3		30 - 38
12×8	12	0 −0.043	8				28 - 140	12	+0.043 0	+0.120 +0.050	0 −0.043	±0.0215	−0.018 −0.061		5.0	3.3		38 - 44
14×9	14		9				36 - 160	14							5.5	3.8		44 - 50
(15×10)	15		10				40 - 180	15							5.0	5.3		50 - 55
16×10	16		10				45 - 180	16							6.0	4.3		50 - 58
18×11	18		11	0 −0.110			50 - 200	18							7.0	4.4		58 - 65
20×12	20	0 −0.052	12			0.60 - 0.80	56 - 220	20	+0.052 0	+0.149 +0.065	0 −0.052	±0.0260	−0.022 −0.074	0.40 - 0.60	7.5	4.9		65 - 75
22×14	22		14				63 - 250	22							9.0	5.4		75 - 85
(24×16)	24		16				70 - 280	24							8.0	8.4		80 - 90
25×14	25		14				70 - 280	25							9.0	5.4		85 - 95
28×16	28		16				80 - 320	28							10.0	6.4		95 - 110
32×18	32	0 −0.062	18				90 - 360	32	+0.062 0	+0.180 +0.080	0 −0.062	±0.0310	−0.026 −0.088		11.0	7.4		110 - 130

2. Shape and dimension of gradient key · headed gradient key and key groove

Key body



Cross section of key groove



Unit: mm

Key Nominal dimensions b×h	Key dimensions							Size of key groove						Reference
	b		h					b1 and b2		r1 and r2	Base dimensions t1	Base dimensions t2	Tolerance t1 and t2	Applicable shaft diameter d
	Base dimension	Tolerance (h9)	Base dimension	Tolerance		h1	C	l	Base dimension	Tolerance (D10)				
2×2	2	0 −0.025	2	0 −0.025	h9	-	0.16 - 0.25	6 - 30	2	+0.060 +0.020	0.08 - 0.16	1.2	0.5	+0.05 0	6 - 8
3×3	3		3			-		6 - 36	3			1.8	0.9		8 - 10
4×4	4	0 −0.030	4	0 −0.030		7		8 - 45	4	+0.078 +0.030		2.5	1.2	+0.1 0	10 - 12
5×5	5		5			8	0.25 - 0.40	10 - 56	5		0.16 - 0.25	3.0	1.7		12 - 17
6×6	6		6			10		14 - 70	6			3.5	2.2		17 - 22
(7×7)	7	0 −0.036	7.2	0 −0.036		10		16 - 80	7	+0.098 +0.040		4.0	3.0		20 - 25
8×7	8		7	0 −0.090	h11	11		18 - 90	8			4.0	2.4	+0.2 0	22 - 30
10×8	10		8			12	0.40 - 0.60	22 - 110	10		0.25 - 0.40	5.0	2.4		30 - 38
12×8	12	0 −0.043	8			12		28 - 140	12	+0.120 +0.050		5.0	2.4		38 - 44
14×9	14		9			14		36 - 160	14			5.5	2.9		44 - 50
(15×10)	15		10.2	0 −0.070	h10	15		40 - 180	15			5.0	5.0	+0.1 0	50 - 55
16×10	16		10	0 −0.090	h11	16		45 - 180	16			6.0	3.4	+0.2 0	50 - 58
18×11	18		11	0 −0.110		18		50 - 200	18			7.0	3.4		58 - 65
20×12	20	0 −0.052	12			20	0.60 - 0.80	56 - 220	20	+0.149 +0.065	0.40 - 0.60	7.5	3.9		65 - 75
22×14	22		14			22		63 - 250	22			9.0	4.4		75 - 85
(24×16)	24		16.2	0 −0.070	h10	24		70 - 280	24			8.0	8.0	+0.1 0	80 - 90
25×14	25		14	0 −0.070	h11	22		70 - 280	25			9.0	4.4	+0.2 0	85 - 95
28×16	28		16			25		80 - 320	28			10.0	5.4		95 - 110
32×18	32	0 −0.062	18			28		90 - 360	32	+0.180 +0.080		11.0	6.4		110 - 130

Surface Treatment Excerpted from Mechanical Engineering Handbook of the Japan Society of Mechanical Engineers

■ Method and type of surface treatment

1. Method of surface treatment

Method	Principle and features	Material	Property
Electroplating	The material is immersed in a plating bath as a cathode, and a metal film is electrodeposited on the surface of the material by direct current.	Materials are metal, plastic (electroplating the surface with electroless plating and electroplating).	For ornamental use 1μm or less, for corrosion prevention, for industrial use 1 - several tens of μm or more, in many cases pinholes are left.
Hot Dip Plating	The material is pulled after dipping into molten metal, solidification and coating the dissolved metal.	Materials are mainly steel materials, Al, Zn, Sn, Pb etc. as coating metal.	A thick coating is possible. Adherence and deformability depend on the properties of the alloy layer formed between the coating layer and the material.
Diffusion plating	Diffuse and infiltrate the metal element into the material surface layer. Since the processing temperature (around 1000°C.) is high, post-heat treatment is required.	Materials are mainly steel materials, Fe group, Ni-based heat resistant alloy and so on.	Coating metals are Al, Cr, Si, etc. The alloy layer thickness is several tens - several hundred μm.
Vapor Deposition Plating	Physical vapor deposition method: Coating by vacuum evaporation, sputtering, ion plating or the like. Chemical vapor deposition method: Coating by decomposition of gas compounds.	Materials are metal, ceramic, plastic, coating material is metal, ceramic.	Physical vapor deposition methods generally have low deposition rates. The chemical vapor deposition method can not pursue high temperature treatment.
Spraying	Powder or particles of a spraying material heated to a molten state are sprayed on the surface of the material to form a film. The material temperature during thermal spraying is about 200°C or lower.	Materials are metals, ceramics, plastics and others, spraying materials are metals, ceramics, plastics or mixtures thereof.	The adhesion strength is relatively low. The film has pores. Practical coating thickness is about 0.6mm or less.
Laminating plate	Rolling pressure welding method, explosion welding method, etc. Processing targets are simple shapes such as board surface and cylinder inner surface.	The material is metal, mostly steel materials. The laminated plate material is metal, alloy.	In explosive welding, the thickness of the laminated plate is about 3mm or less.
Anodization	In an electrolytic solution such as anodic oxidation sulfuric acid or oxalic acid, electrolysis is performed using the material as an anode, and an oxide film is formed on the surface of the material.	The main material is Al and its alloy. Others such as Mg.	The oxide film consists of a dense layer and a porous layer. Usually, a sealing treatment is performed. Good adhesion. Colorable.
Chemical conversion treatment	A phosphoric acid salt or chromate film is formed on the surface of the material by a dipping method or a spraying method.	Materials are steel materials, Al, Zn, etc.	Primarily, a phosphate type coating film is applied to the steel material, and a chromate film is applied to Al.
Carburizing	Diffuse and permeate carbon into the material surface layer. Processing temperature is 850 - 950°C. Perform quenching after treatment.	The material is steel with a C content of 0.2% or less (hardened steel)	The carburized depth is 0.5 - 5mm, the hardness is 700 - 850HV. Beware of material deformation due to quenching after treatment.
Nitriding	Diffusion penetration of nitrogen into the material surface layer. Processing temperature is 475 - 580°C. Heat treatment and machining can be done before processing.	Materials are nitrided steel (containing Cr, Mo, Al, etc.) in gas nitriding. Most of the steel types in ion nitriding.	Nitriding depth is 0.9mm or less. Hardness is 600 - 1150HV. The deformation of the material is small.
Carbonitriding	Simultaneously with carburizing, nitriding is performed. The treatment temperature is 700 - 900°C. Perform quenching after treatment.	The material is the same as for carburizing. It can also be applied to carbon steel.	Carbonitriding depth is 1mm or less. The hardness is about 800HV.
Infiltration	Diffuse and penetrate sulfur into the material surface layer. The treatment temperature is 400 - 600°C.	Materials are steel and steel types.	The friction coefficient decreases from the thickness of the iron sulfide film of 0.2μm.
Sulfonitridation	Simultaneously with the sulfurization, nitriding is performed. The treatment temperature is 560 - 570°C.	The material is the same as nitriding.	The nitrosyl nitrification depth is 0.1 - 0.5mm.
Induction quenching	The induction hardened material surface is rapidly heated by high-frequency induction current - quenched and quenched.	The material is steel materials. Especially medium carbon steel, alloy steel, cast and forged products.	The thickness of the hardened layer is 0.4 - 5mm. Working time is short. The deformation of the material is small.
Flame quenching	Quickly heat the material surface with oxygen-fuel flame - quench and quench.	Same as above	The thickness of the hardened layer is 1 - several mm.
Other surface quenching	Rapid heat-quenching of the material surface with laser beam and electron beam.	There is no particular limitation on the material as long as it has hardenability.	long as it has hardenability. The hardened layer is extremely thin. Local curing is possible.
Plastic lining	Cover material surface by sheet lining method, thermal spraying method, and coating method etc.	Coating materials are polyethylene, vinyl chloride, fluorine resin, rubber and so on.	A thick coating is possible. It may be 1mm or more.
Ceramic coating	Cover material surface by evaporation method, spraying method, baking method and so on.	Glassy ceramic (enamel) as a covering material. Various ceramics.	Adhesion is not very good. Repeated heating and cooling may cause cracks in the film.

Source: Japan Society of Mechanical Engineers, *Mechanical Engineering Handbook: Machining/Machining Equipment*

2. Types of Surface Treatment, Usage Examples, Features

Name	Layer thickness (μm)	Materials that can be processed	Example of use	Purpose / feature	Remarks
Zinc plated	3~20	Steel	Thin Wire	· Anti-rust, low price · No good appearance	-
Chromate plating	1~2	Steel	Sheet metal part bolt and nut	· Anti-rust, low price · Suitable for mass production products · The appearance of nickel-plated fall Alternative	-
Unichrome plating	1~2	Steel	-		
Trivalent Chromate	1~2	Steel	Bolt and nut	· Anti-rust, low price · It does not contain hexavalent chromium	-
Nickel plating	-	Steel Copper Brass	-	· Corrosion resistance improvement, decoration · Chrome plating is more corrosion-resistant in the atmosphere	· Coat copper base plating as necessary · Deep dent is impossible
Electroless Nickel plating	Addressable	Steel Stainless Copper Aluminum alloy Glass Plastic	Parts that can not be plated with nickel	· 10 times more price than nickel plating · Easy film thickness control · Corrosion resistance and abrasion resistance large · Conductivity of nonmetals possible	-
Kanigen plating			Parts to be subjected to hardening treatment after plating	· Same as the feature of electroless nickel plating · It can be hardened by heat treatment after plating	
Chrome-plated	-	Steel Copper Brass	-	· Shiny appearance · Corrosion resistance good · Sliding of chrome plating is easily seizure	· If necessary, base plating of nickel · Deep dent is impossible
Tetraferric oxide film (dye to black)	-	Steel	Bolt Nut Measuring instrument	· Painting base · Appearance (glossy) · Easy to rust than Taft ride	· To produce a tetraferric oxide (black)
Low Temperature Black Chrome-plated	1~2	Steel Copper Stainless	Accuracy required Corrosion resistance is desired more than black dye	· Long-term rust prevention ability · Excellent corrosion resistance · Ultra thin film	· Because of low temperature treatment, there is no influence of heat on the material, and the bonded parts with plastic rubber etc. can be processed as it is.
Alumite White	3~5	Aluminum alloy	-	· Corrosion resistance, abrasion resistance · No electrical conductivity · Heat-resistant	· There are colored alumite which forms a tough oxide film on the surface and colors by utilizing the pores of the oxide film.
Alumite Black	5~10				

Mechanical Materials

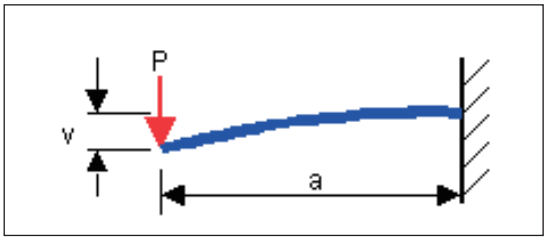
■ Mechanical materials

	Material	Classification	Elastic coefficient	Poisson's ratio	Shear modulus of elasticity	Density	Tensile strength	Coefficient of thermal expansion	Thermal conductivity	Specific heat
			N/m^2		N/m^2	kg/m^3	N/m^2	/K	W(m・K)	J/(kg・K)
1	A1050-0	Aluminum	69x10^9	0.3	25x10^9	2705	75x10^6	2.4x10^-5	231	900
2	A1100-0		69x10^9	0.3	26x10^9	2710	90x10^6	2.36x10^-5	222	904
3	A2011-T3		70x10^9	0.3	26x10^9	2820	380x10^6	2.31x10^-5	152	864
4	A2017-T4		71.6x10^9	0.3	27.2x10^9	2790	425x10^6	2.36x10^-5	134	864
5	A5052-H34		69.3x10^9	0.3	25.9x10^9	2680	260x10^6	2.38x10^-5	137	900
6	A5056-H38		71.7x10^9	0.3	25.9x10^9	2640	415x10^6	2.41x10^-5	112	904
7	A6061-T6		68.3x10^9	0.3	26x10^9	2700	310x10^6	2.36x10^-5	167	896
8	A6063SS-T5		68.3x10^9	0.3	25.8x10^9	2690	185x10^6	2.34x10^-5	209	900
9	A6063SS-T6		68.3x10^9	0.3	25.8x10^9	2690	240x10^6	2.34x10^-5	201	900
10	A6N01SS-T5		68.9x10^9	0.3	25.8x10^9	2700	270x10^6	2.35x10^-5	188	900
11	AC4C-T6		73.5x10^9	0.3	24x10^9	2680	230x10^6	2.15x10^-5	159	963
12	ADC12-F		70x10^9	0.3	26.5x10^9	2680	295x10^6	2.1x10^-5	92	963
13	ADC14-F		81x10^9	0.3	26x10^9	2730	320x10^6	1.8x10^-5	134	963
14	FCD450	Steel material	161x10^9	0.27	63.4x10^9	7100	450x10^6	1.2x10^-5	33.5	544
15	S45C		210x10^9	0.3	80.8x10^9	7800	690x10^6	1.12x10^-5	45	490
16	SCM415		206x10^9	0.3	79.2x10^9	7840	830x10^6	1.23x10^-5	42.7	490
17	SK3		208x10^9	0.3	80x10^9	7840	850x10^6	1.06x10^-5	45	490
19	SS400		210x10^9	0.3	80.8x10^9	7900	400x10^6	1.17x10^-5	51.6	473
22	SUJ2		204x10^9	0.29	79.1x10^9	7810	1570x10^6	1.16x10^-5	46	480
24	SECC-ZC	Steel plate	205x10^9	0.3	78.8x10^9	7860	270x10^6	1.18x10^-5	50	480
26	GIN6	Stainless	204x10^9	0.3	78.5x10^9	7780	735x10^6	1.03x10^-5	25	461
27	QD51		204x10^9	0.3	78.5x10^9	7750	540x10^6	1.02x10^-5	24.3	460
29	SUS13		197x10^9	0.3	75.8x10^9	8030	481x10^6	1.59x10^-5	16.3	499
30	SUS303		197x10^9	0.3	75.8x10^9	7930	520x10^6	1.72x10^-5	16	500
31	SUS304		197x10^9	0.3	75.8x10^9	7930	520x10^6	1.73x10^-5	16.3	500
32	SUS430		204x10^9	0.3	78.5x10^9	7700	450x10^6	1.04x10^-5	25.6	460
33	SUS440		204x10^9	0.3	78.5x10^9	7750	540x10^6	1.02x10^-5	24.3	460
35	C3604BD	Brass	96x10^9	0.32	36.4x10^9	8430	335x10^6	2.05x10^-5	117	377

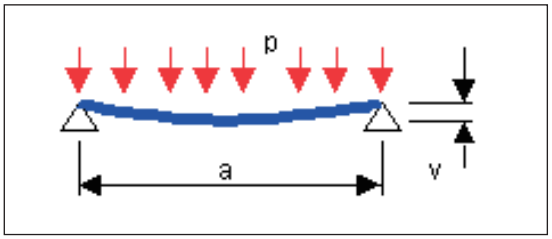
Deflection Calculation Formula

■ Deflection / Cross section second moment calculation formula

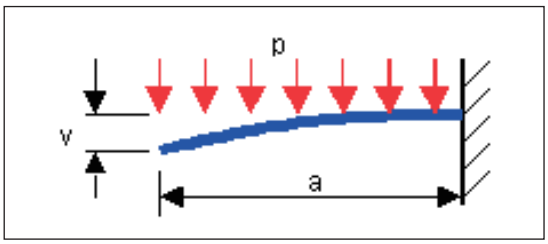
The deflection of a typical beam [V] is recorded. I is the second moment of the cross section *, E is the Young's modulus of each material.
The capital letter P indicates the concentrated load (force), and the lower case p indicates the distributed load (pressure).



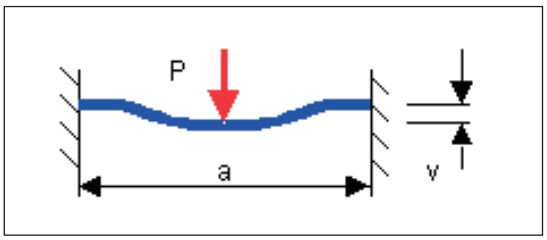
$$v = \frac{Pa^3}{3EI}$$



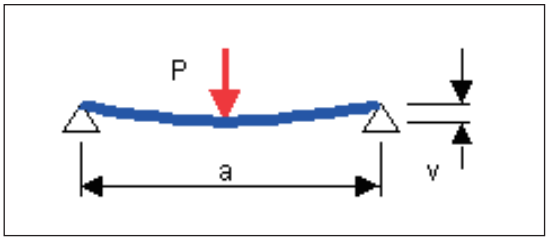
$$v = \frac{5Pa^3}{384EI} \quad (P = pa)$$



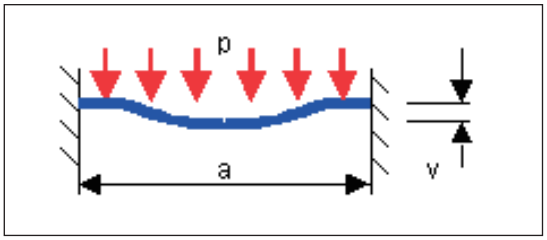
$$v = \frac{Pa^3}{8EI} \quad (P = pa)$$



$$v = \frac{Pa^3}{192EI}$$

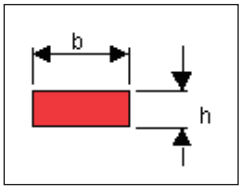


$$v = \frac{Pa^3}{48EI}$$

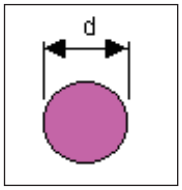


$$v = \frac{Pa^3}{384EI} \quad (P = pa)$$

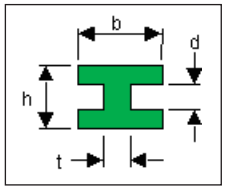
* Second moment of cross section
The second-order moment [I] of a typical cross section is recorded.



$$I = \frac{bh^3}{12}$$



$$I = \frac{\pi d^4}{64}$$



$$I = \frac{bh^3-(b-t)d^3}{12}$$

Classification and Features of Plastics

■ Plastic classification and feature list

Classification			Symbol	Japanese name	Common name
Thermoplastic resin	General purpose plastic		PE	Polyethylene	-
			PVC	PVC	PVC resin, PVC
			PP	Polypropylene	-
			PS	Polystyrene	Styrene resin
			ABS	Acrylonitrile · butadiene · styrene resin	ABS resin
			AS	Acrylonitrile · styrene resin	-
			PMMA	Polymethylmethacrylate	Methacrylic resin, acrylic
			PVA	Polyvinyl alcohol	Poval resin
			PVDC	Polyvinylidene chloride	-
			PBD	Polybutadiene	Butadiene resin
			PET	Polyethylene terephthalate	-
	Engineering plastics	General purpose engineering plastics	PA	Polyamide	Nylon
			POM	Polyacetal	Acetal resin
			PC	Polycarbonate	-
			PPE	Modified polyphenylene ether	Polyphenylene oxide
			PBT	Polybutylene terephthalate	-
			GF-PET	Reinforced polyethylene terephthalate	-
			UHPE	Ultra high molecular weight polyethylene	-
		Super engineering plastic	PSU	Polysulfone	-
			PES	Polyethersulfone	-
			PPS	Polyphenylene sulfide	-
			PAR	Polyarylate	-
			PAI	Polyamide imide	-
			PEI	Polyetherimide	-
			PEEK	Polyether ether ketone	-
			PI	Polyimide	-
			LCP	Liquid crystal polymer	-
			FR	Fluororesin	-
Thermosetting resin			PF	Phenol	-
			UF	Urea	Urea resin
			MF	Melamine	-
			PAK	Polyester alkyd	Alkyd resin
			UP	Unsaturated polyester	-
			EP	Epoxy	-
			DAP	Diallyl phthalate	-
			PUR	Polyurethane	Urethane resin
			SI	Silicone	Silicon resin

Reference

Thermoplastic resin — It softens when heated and becomes processable, and solidifies on cooling. It softens when heated and can be used repeatedly.

Thermosetting resin — It softens when heated and solidifies by chemical reaction. Those once solidified by heating are not dissolved even if they are heated again.

General purpose plastic — The resin price is relatively low, and it is easy to process thermoplastic resin. Heat distortion temperature less than 100°C, tensile strength less than 500kgf/cm^2, impact resistance less than 5kgf·cm/cm. Among them, PE, PP, PVC, and PS are called four general purpose resins.

	Major applications	Major features
	Packaging film · laminate · toy · daily necessities etc.	It is inexpensive, resistant to low temperature, no water absorption and excellent chemical resistance.
	Agricultural film · pipe · hose · wire breakage	Although it is inexpensive and excellent in weather resistance, injection molding is difficult.
	Household kitchenware · film · container	It is inexpensive, has good surface gloss, is strong in thin film state but is weak in low temperature.
	Transparent daily necessities · containers · stationery · high firing products	It is inexpensive, has good moldability and is excellent in electrical insulation, but is weak to heat and brittle.
	Injection molded products such as automobiles · domestic electric appliances · daily necessities	The molding shrinkage ratio is small and well-balanced. It also has good plating properties.
	Automotive parts · electric parts · fan blades · lighter containers	It is strong against mineral oil such as gasoline, and it is not easily scratched.
	Optical fiber · lens · optical disc · tail light	It is perfectly colorless and transparent, the transmittance of light rays is close to 100%, and it does not discolor even when it hits sunlight.
	Films, cosmetic raw materials and pharmaceutical additives, paper processing agents (clear coat)	Easy to handle. Low acetic acid odor and thermal discoloration.
	Household wrapping, food packaging film, food preservation packaging material	It has barrier property (property of blocking gas permeation) against both oxygen and water vapor (moisture).
	Household wrap, laminate film, tube, hose	Excellent flexibility, transparent and light.
	PET Bottle · Recording Tape · Home Appliances Parts	It is tough and has excellent heat resistance, it is non-toxic and has less water absorption, but it is vulnerable to hot water and alkali.
	Gear · pulley · shaft · bobbin with electric parts · machine parts · automobile parts etc.	It is excellent in oil resistance and heat resistance, has a small friction coefficient and is resistant to abrasion, but has water absorption.
	Gears · cam · motor parts · fasteners · valves	Excellent in chemical resistance, good friction and wear characteristics, good rebound resilience.
	Protective wall · Lighting equipment · Signal machine lens · Bin	It is transparent, heat resistant and very strong against impact, but it is inferior in chemical resistance.
	OA equipment, auto parts	It is excellent in mechanical properties, heat resistance and electrical properties, but it has very high heat resistance and difficulty in formability.
	Coil bobbin · connector · carburetor · gas cap	It is tough and has high heat resistance and good formability but it is vulnerable to hot water and alkaline.
	Coil bobbin · electrical components, exterior parts, switches	Excellent in electrical properties, flame retardancy, appearance and light discoloration resistance.
	Lining, battery separator, fiber (fishing line, elastic sheet)	Excellent in impact resistance, abrasion resistance, self lubricity and non water absorption.
	Electronic parts, camera parts, medical equipment	It is excellent in coloring, plating, heat resistance, toughness, dimensional stability, chemical resistance.
	Motor case, battery case, sterilizer · tray	Excellent in high-temperature creep characteristics, dimensional stability, steam resistance.
	Chemical plant · carburetor · piston ring	Excellent heat resistance, abrasion resistance, chemical resistance and high rigidity.
	Switches, floppy disk hub and drive unit	Excellent toughness at high temperature and low temperature, excellent in spring recoverability, heat resistance, dimensional stability, abrasion resistance, chemical resistance.
	Bearing · Gear · Valve	Excellent heat resistance, low wear and good impact resistance.
	Connector · Bobbin · Interior decoration material for aircraft · Medical equipment	It is excellent in heat resistance, chemical resistance, moldability, and is refractory.
	Chemical plant · Copy parts · Hot water resistant products	Excellent in fatigue resistance and abrasion resistance, and withstands steam at 300°C in a short time.
	Coil bobbin · IC socket · piston ring · bush	Excellent impact resistance and heat resistance, little change in characteristics from low temperature to high temperature.
	Connector, Resistor, DVD / CD chassis, micro motor, optical fiber	It is excellent in low water absorption, heat resistance and dimensional stability.
	Wafer carrier, wire coating, gasket, seal	Excellent in heat resistance, chemical resistance, non-sticking and self lubricating properties.
	Electronic component base · socket · handle of the kettle	It has good electrical properties and withstands high temperatures.
	Adhesive · tableware	It is colorless transparent and has good coloring but poor impact resistance. 80% or more for adhesive applications
	Adhesive · paint · tableware · decorative board	It is colorless, corrosion-resistant, durable and beautiful.
	Primers for automobile parts, industrial machinery etc.	It is excellent in corrosion resistance and solvent solubility.
	Fishing boat · boat · yacht · bath tub · tank	Suitable for making large products, FRP mainstream with glass fiber.
	Adhesive · paint · fishing rod · connector cover	It has a small molding shrinkage rate, is excellent in mechanical properties and can be solidified at room temperature.
	Switch, connector, coil bobbin	Excellent tracking resistance, dimensional stability and water absorption.
	Paints, adhesives, shoe products, auto parts	Excellent in elasticity, abrasion resistance, solvent resistance, chemical resistance, and electrical properties.
	Rubber roll · pot parts · sealing materials · condensers	It has excellent heat resistance, oil resistance, water resistance and weather resistance are good.

General purpose engineering plastics — A thermoplastic resin with a thermal deformation temperature of 100°C or higher, a tensile strength of 500kgf/cm^2 or higher, and an impact resistance of 5kgf·cm/cm or higher.

Super engineering plastic — A thermoplastic resin that can be used for a long time even at a heat distortion temperature of 150°C. or higher even higher than general purpose engineering plastics.

Material - Steel

■ Steel

1. Carbon bar steel / wire rod / wire of JIS standard

Bar steel · wire rod			
Standard number	Standard name	Symbol	Symbol Main application
G 3101	Rolled steel for general structure	SS	Bolt, nut, pin
G 4051	Carbon steel steel for machine structural use	S-C	Nut, bolt, shaft, auto parts
G 3108	General steel for polishing steel bar	SGD	Nut, shaft, auto parts
G 4804	Sulfur and sulfur composite free-cutting steel materials	SUM	Precision mechanical parts such as watches and cameras, auto parts
G 4401	Carbon tool steel steel material	SK	Cutting tool, pair file, trowel, stamp
G 3112	Steel bar for reinforced concrete	SR, SD	Reinforcing bar for concrete
G 3123	Polished steel bar	SGD-D	Nut, shaft, auto parts
G 3104	Round steel for rivet	SV	Rivet
G 3105	Round steel for chain	SBC	Chain
G 3109	Steel bar	SBPR	For prestressed concrete

Wire		
Standard number	Standard name	Symbol
G 3505	Soft steel wire rod	SWRM
G 3506	Hard steel wire rod	SWRH
G 3502	Piano Wire	SWRS
G 3507	Carbon steel wire for cold forging	SWRCH
G 3503	Coated arc Wire for welding rod core wire	SWRY

Wire			
Standard number	Standard name	Symbol	Application example
G 3532	Iron wire { Ordinary iron wire / Cast iron wire / Nail wire for nails	SWM-B SWM-A SWM-N	For general use, wire mesh For general use, wire mesh For nails
G 3544	Molten aluminum plated iron wire and steel wire	SWMA	Various wire mesh
G 3521	Hard steel wire	SW	Various wire springs, wire rope, steel cord, Bead wire, spoke wire
G 3538	PC hard steel wire	SWCR SWCD	Prestressed concrete tank · pipe
G 3525	Wire rope		Wire rope
G 3560	Spring oil Tempered wire	SWO-A, B	Various wire spring
G 3537	Galvanized steel wire		Overground ground wire, buried ground wire, butterfly wire
G 3544	Molten aluminum plated iron wire and steel wire	SWHA	Overhead ground wire, butterfly wire, ACSR core wire
G 3522	Piano wire	SWP	Valve spring, music wire, high grade rope, Steel cord
G 3536	PC steel wire and PC steel wire	SWPR SWPD	Prestressed concrete
G 3561	Valve spring oil tempered wire	SWO-V	Valve spring
G 3544	Molten aluminum plated iron wire and steel wire	SWHA	Overhead ground wire, butterfly wire, ACSR core wire
G 3539	Carbon steel wire for cold forging	SWCH	Bolt, nut, small screw, rivet
G 3523	Covered arc welding rod core wire	SWY	Core wire of welding rod

Excerpted and translated from the Japan Society of Mechanical Engineers *Mechanical Engineering Handbook*

2. Main types and mechanical properties of steel materials

Material name	Symbol	Symbol tensile strength (N/mm²)	Yield point (N/mm²)	Hardness	Elongation (%)
Rolled steel for general structure	SS330	330 - 430	195 or more	-	26 or more
	SS400	400 - 510	235 or more	-	21 or more
	SS490	490 - 610	275 or more	-	19 or more
Hot-rolled mild steel plate and steel strip	SPHC	270 or more	-	-	27 - 31 or more
	SPHD	270 or more	-	-	30 - 39 or more
	SPHE	270 or more	-	-	31 - 41 or more
Cold rolled steel sheet and steel strip	SPCC	(270 or more)	-	1/8Hard: 50 - 71HRB, 95 - 130HV 1/4Hard: 65 - 80HRB, 115 - 150HV 1/2Hard: 74 - 89HRB, 135 - 185HV Hard: 85 HRB or more, 170 HV or more	(32 - 39 or more)
	SPCD	270 or more	-		34 - 41 or more
	SPCE	270 or more	-		36 - 43 or more
Carbon steel steel for machine structural use	S25C-N	440 or more	265 or more	123 - 183HB	27 or more
	S35C-N	305 or more	305 or more	149 - 207HB	23 or more
	S35C-H	390 or more	390 or more	167 - 235HB	22 or more
	S45C-N	570 or more	345 or more	167 - 229HB	20 or more
	S45C-H	690 or more	490 or more	201 - 269HB	17 or more
Chrome steel product	SCr430	780 or more	635 or more	229 - 293HB	18 or more
	SCr435	880 or more	735 or more	255 - 321HB	15 or more
	SCr440	930 or more	785 or more	269 - 331HB	13 or more
Chrome molybdenum steel steel material	SCM430	830 or more	685 or more	241 - 302HB	18 or more
	SCM435	930 or more	785 or more	269 - 331HB	15 or more
	SCM440	980 or more	835 or more	285 - 352HB	12 or more
Carbon tool steel steel material	SK3	-	-	Annealing 212 HB or more Quenching and tempering 63 HRC or more	-
High carbon chrome bearing steel steel material	SUJ2	-	-	Spheroidizing annealed less than 201 HB Spheroidizing annealed 94 HRB or less	-
	SUJ3	-	-	Spheroidizing annealed less than 207 HB Spheroidizing annealed 95 HRB or less	-
Carbon steel forged steel goods	SF340A	340 - 440	175 or more	90HB or more	27 or more
	SF440A	440 - 540	225 or more	121HB or more	24 or more
	SF540A	540 - 640	275 or more	152HB or more	20 or more
Carbon steel cast steel products	SC360	360 or more	175 or more	-	23 or more
	SC410	410 or more	205 or more	-	21 or more
	SC450	450 or more	225 or more	-	19 or more
	SC480	480 or more	245 or more	-	17 or more
Gray cast iron item	FC150	150 or more	-	212 HB or less (casting diameter of test material and diameter 30mm)	-
	FC200	200 or more	-	223 HB or less (casting diameter of test material and diameter 30mm)	-
	FC250	250 or more	-	241 HB or less (casting diameter of test material and diameter 30mm)	-
	FC300	300 or more	-	262 HB or less (casting diameter of test material and diameter 30mm)	-
Spherical graphite cast iron product	FCD400	400 or more	250 or more	201HB or less	15 or more
	FCD450	450 or more	280 or more	143 - 217HB	10 or more
	FCD500	500 or more	320 or more	170 - 241HB	7 or more
	FCD600	600 or more	370 or more	192 - 269HB	3 or more
Stainless steel bar	SUS303	520 or more	-	187HB or less	40 or more
	SUS304	520 or more	-	187HB or less	40 or more
	SUS410	540 or more	-	159HB or more	25 or more
	SUS416	540 or more	-	159HB or more	25 or more
	SUS440C	780 or more	-	56HRC or more	15 or less

● The values in the table above are representative values and will vary depending on the thickness of the steel material and heat treatment.

Material - Stainless Steel

■ Stainless steel

1. Stainless steel

Stainless steel refers to alloy steels containing chromium (Cr) · nickel (Ni) in 6 large elements of iron and having a Cr content of about 11% or more. Stainless steel is based on an Fe - Cr alloy containing about 11% or more of Cr, and Ni, Mo, Cu, Al, Si, etc. are added to improve corrosion resistance, mechanical properties, processability and other properties.

From the aspect of Cr and Ni, the main raw material is roughly divided into Cr type and Cr - Ni type, and it is divided into metallic structure, martensite type, ferrite type and austenite type. In addition, there are austenitic ferritic stainless steel and precipitation hardened stainless steel.

● Classification of stainless steel

Classification	Cr series		Cr-Ni series
Metal structure	Martensitic system	Ferrite type	Austenite type
Curability	Quench hardenability	Non hardening curability	Work hardening property

● Effect of each element on performance

Elements		Improved performance
C	Low carbon	Corrosion resistance (intergranular corrosion resistance)
	High carbon	Strength · Hardness
Mo		Corrosion resistance (pitting corrosion resistance)
Cu		Acid resistance
Ti • Nb		Corrosion resistance (intergranular corrosion resistance)
Si • Al		Oxidation resistance
S • Se		Machinability

2. Types and characteristics of stainless steel

Types of symbols	Characteristic
SUS302	Standard type of 18Cr-8Ni steel. Both SUS303 and SUS304 are SUS302 with improvements added. Good corrosion resistance and mechanical properties by Ni addition.
SUS303	S / P added to SUS 302 to improve machinability. However, corrosion resistance is somewhat inferior. Mo is added to improve corrosion resistance.
SUS304 SUS304L	It is an improved type of SUS 302, which has low carbon content and is excellent in corrosion resistance and weldability. The most standard of austenitic stainless steel. SUS304L has a carbon content lower than that of SUS 304 to improve intergranular corrosion resistance and weldability.
SUS310S	By addition of Ni · Cr, corrosion resistance and oxidation resistance are good, as well as high temperature characteristics, it is used as heat resisting steel. The work hardening property by cold working is suppressed and at the same time the magnetism is weakened, and it is also used as a low work hardening steel / non-magnetic steel.
SUS316 SUS316L	By addition of Mo, corrosion resistance (pitting corrosion) · acid resistance is good, high temperature strength is high, and it is used as heat resistant steel. SUS 316 L has a lower carbon content than SUS 316 to improve intergranular corrosion resistance and weldability.
SUSXM7	The work hardening property by cold working is suppressed by adding Cu to SUS 304.
SUS430	Good for cold workability and corrosion resistance with standard type of 18Cr steel. Because it is inexpensive, it is used in many applications.
SUS434	Those which improved Mo corrosion resistance by adding Mo to SUS 430.
SUS410	Representative martensitic stainless steel. It has excellent mechanical properties and corrosion resistance after heat treatment.
SUS403	It has improved the corrosion resistance and the toughness after heat treatment by reducing the component range of Si · Cr. Valves, pump shafts, blades, bolts, nuts, steam turbine blades, jet engine parts, etc. are used.
SUS416	Improved machinability of 13Cr steel by adding S · P. Corrosion resistance is slightly inferior to the standard type.
SUS431	Improved toughness by adding Ni, improved corrosion resistance by adding Cr, corrosion resistance is the best in heat-treatable martensitic systems. It is used for papermaking machines, shafts for ships and aircraft parts.
SUS440C	It has the highest hardness among stainless steels, has excellent wear resistance, and is used for dice and ball bearings and the like.
SUS631J1	It is a precipitation hardening type stainless steel, which is the most heat resistant among JIS steel types, and is used in thin plates and wire springs.

3. Chemical composition and mechanical properties of various stainless steel materials

● Austenite type

Types of symbols	Chemical composition (%)									Mechanical properties		
	C	Si	Mn	P	S	Ni	Cr	Mo	Other	Tensile strength (N/mm^2)	Elongation (%)	Brinel Hardness (HB)
SUS302	0.15 or less	1.00 or less	2.00 or less	0.045 or less	0.03 or less	8.00 - 10.00	17.00 - 19.00	-	-	520 or more	40 or more	187 or less
SUS303	0.15 or less	1.00 or less	2.00 or less	0.20 or less	0.15 or more	8.00 - 10.00	17.00 - 19.00	0.60 or less	-	520 or more	40 or more	187 or less
SUS304	0.08 or less	1.00 or less	2.00 or less	0.045 or less	0.03 or less	8.00 - 10.50	18.00 - 20.00	-	-	520 or more	40 or more	187 or less
SUS304L	0.03 or less	1.00 or less	2.00 or less	0.045 or less	0.03 or less	9.00 - 13.00	18.00 - 20.00	-	-	480 or more	40 or more	187 or less
SUS310S	0.08 or less	1.50 or less	2.00 or less	0.045 or less	0.03 or less	19.00 - 22.00	24.00 - 26.00	-	-	520 or more	40 or more	187 or less
SUS316	0.08 or less	1.00 or less	2.00 or less	0.045 or less	0.03 or less	10.00 - 14.00	16.00 - 18.00	2.00 - 3.00	-	520 or more	40 or more	187 or less
SUS316L	0.03 or less	1.00 or less	2.00 or less	0.045 or less	0.03 or less	12.00 - 15.00	16.00 - 18.00	2.00 - 3.00	-	480 or more	40 or more	187 or less
SUSXM7	0.08 or less	1.00 or less	2.00 or less	0.045 or less	0.03 or less	8.50 - 10.50	17.00 - 19.00	-	Cu: 3.00 - 4.00	480 or more	40 or more	187 or less

● Ferrite type

Types of symbols	Chemical composition (%)									Mechanical properties		
	C	Si	Mn	P	S	Ni	Cr	Mo	Other	Tensile strength (N/mm^2)	Elongation (%)	Brinel Hardness (HB)
SUS430	0.12 or less	0.75 or less	1.00 or less	0.04 or less	0.03 or less	0.60 or less	16.00 - 18.00	-	-	450 or more	22 or more	183 or less
SUS434	0.12 or less	1.00 or less	1.00 or less	0.04 or less	0.03 or less	0.60 or less	16.00 - 18.00	0.75 - 1.25	-	450 or more	22 or more	183 or less

● Martensitic system

Types of symbols	Chemical composition (%)									Mechanical properties		
	C	Si	Mn	P	S	Ni	Cr	Mo	Other	Tensile strength (N/mm^2)	Elongation (%)	Brinel Hardness (HB)
SUS410	0.15 or less	1.00 or less	1.00 or less	0.04 or less	0.03 or less	0.60 or less	11.50 - 13.50	-	-	540 or more	25 or more	159 or more
SUS410	0.15 or less	1.00 or less	1.25 or less	0.06 or less	0.15 or more	0.60 or less	12.00 - 14.00	0.60 or less	-	540 or more	17 or more	159 or more
SUS440C	0.95 - 1.20	1.00 or less	1.00 or less	0.04 or less	0.03 or less	0.60 or less	16.00 - 18.00	0.75 or less	-	780 or more	15 or less	56HRC or more

● The numbers in the table are reference values, not guaranteed values.

Material - Aluminum Alloy

■ Aluminum alloy

1. Types and overview of aluminum alloys

Alloy system	Types of symbols	Overview
Al-Cu type	A2011 A2014 A2017 A2024	2017 · 2024 which is known by the name of duralumin or super duralumin is representative and has strength comparable to steel material. The machinability is good, especially 2011 in which Pb and Bi are added, are often used as mechanical parts as free cutting alloys. In addition, 2014 has wide application as a high strength forged material. Since it contains a relatively large amount of copper, it is inferior in corrosion resistance, and when it is exposed to a corrosive environment, sufficient corrosion protection treatment is required.
Al-Mn type	A3003 A3004	3003 is a representative alloy, the addition of Mn slightly increases the strength without decreasing the workability and corrosion resistance of pure aluminum. It has wide application in containers, building materials, containers, etc.3004 added with about 1% Mg to the alloy corresponding to 3003 is further high in strength, and is often used as a material for aluminum cans, roof boards and door panel materials.
Al-Si type	A4032	4032 is a product obtained by adding about 1% of each of Cu, Ni and Mn to each of which the coefficient of thermal expansion is suppressed and the abrasion resistance is improved by the addition of Si, and the heat resistance is improved. It has good heat resistance and low thermal expansion, so it is suitable for forged piston material.
Al-Mg type	A5005 A5052 A5083	As an alloy with a small addition amount of Mg, 5005 is representative, and it is used for interior ceiling boards for vehicles, building materials, container materials. For medium containing Mg, 5052 is representative and is the most common material with moderate strength. 5083 with a high Mg content is a specific heat treatment alloy and has the best strength as a non-heat treated alloy and has good weldability. Therefore, it is used as a welded structural material for ships, vehicles, chemical plants.
Al-Mg-Si type	A6061 A6063	Alloys of this system are also good in strength and corrosion resistance, and are used as structural materials. 6061 is a material with increased strength by adding a small amount of Cu. Although corrosion resistance decreases a little, it is excellent in forgeability and it is used for rivet materials and small parts of automobiles. With a yield strength of 254N/mm 2 or more, there is an advantage that an allowable stress equivalent to that of SS 400 steel can be obtained. (When design deflection does not become a problem) 6063 is used as a structural material which is low in strength but excellent in extrudability and does not require strength as much as 6061.
Al-Zn type	A7075 A7N01	Among aluminum alloys, it can be classified into Al - Zn - Mg - Cu alloy having the highest strength and Al - Zn - Mg alloy for welding structure not containing Cu. Since the Al - Zn - Mg alloy has a relatively high strength, the heat affected zone after welding also recovers to a strength close to the base metal due to natural aging, so excellent joint efficiency can be obtained. 7N01 is a representative alloy and used as a material for welding construction in railway vehicles.

2. Chemical composition of aluminum alloy

Types of symbols	Chemical composition (%)									
	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al	Other
A2011	0.4 or less	0.7 or less	5.0 - 6.0	-	-	-	0.30 or less	-	The rest	Pb: 0.20 - 0.6
A2014	0.50 - 1.2	0.7 or less	3.9 - 5.0	0.40 - 1.2	0.20 - 0.8	0.10 or less	0.25 or less	-	The rest	Zr+Ti: 0.20 or less
A2017	0.20 - 0.8	0.7 or less	3.5 - 4.5	0.40 - 1.0	0.40 - 0.8	0.10 or less	0.25 or less	-	The rest	Zr+Ti: 0.20 or less
A2024	0.5 or less	0.5 or less	3.8 - 4.9	0.30 - 0.9	1.2 - 1.8	0.10 or less	0.25 or less	-	The rest	Zr+Ti: 0.20 or less
A3003	0.6 or less	0.7 or less	0.05 - 0.20	1.0 - 1.5	-	-	0.10 or less	-	The rest	-
A3004	0.3 or less	0.7 or less	0.25 or less	1.0 - 1.5	0.8 - 1.3	-	0.25 or less	-	The rest	-
A4032	11.0 - 13.5	1.0 or less	0.50 - 1.3	-	0.8 - 1.3	0.10 or less	0.25 or less	-	The rest	Ni: 0.50 - 1.3
A5005	0.3 or less	0.7 or less	0.20 or less	0.20 or less	0.50 - 1.1	0.10 or less	0.25 or less	-	The rest	-
A5052	0.25 or less	0.4 or less	0.10 or less	0.10 or less	2.2 - 2.8	0.15 - 0.35	0.10 or less	-	The rest	-
A5083	0.4 or less	0.4 or less	0.10 or less	0.40 - 1.0	4.0 - 4.9	0.05 - 0.25	0.25 or less	0.15 or less	The rest	-
A6061	0.40 - 0.8	0.7 or less	0.15 - 0.40	0.15 or less	0.8 - 1.2	0.04 - 0.35	0.25 or less	0.15 or less	The rest	-
A6063	0.20 - 0.6	0.35 or less	0.10 or less	0.10 or less	0.45 - 0.9	0.10 or less	0.10 or less	0.10 or less	The rest	-
A7075	0.4 or less	0.5 or less	1.2 - 2.0	0.30 or less	2.1 - 2.9	0.18 - 0.28	5.1 - 6.1	0.20 or less	The rest	Zr+Ti: 0.25

2. Aluminum alloy quality indicator Excerpt from JIS H 0001-1998

Symbol	Definition	Meaning
F	Production as it is	Obtained from a manufacturing process that does not make special adjustment for work hardening or heat treatment.
O	For annealed products	For an expanded material, annealed to obtain the softest condition. For castings, they are annealed for increased elongation or dimensional stability.
H	Work hardened	Strength increased by work hardening with or without additional heat treatment to moderate softness.
T	Heat treated by stable quality other than F · O · H	In order to make it stable by quality, heat treated regardless of additional work hardening.

Subdivision mark	Meaning
H1	Work hardening only: work hardened only without additional heat treatment to obtain predetermined mechanical properties.
H2	Those subjected to moderate softening heat treatment after work hardening: those which have been work hardened to a predetermined value or more and then reduced to a predetermined strength by appropriate heat treatment. For alloys that soften at room temperature, this quality has almost the same strength as H3 quality. For other alloys, this quality has almost the same strength as H1 quality but elongation shows somewhat higher values.
H3	Stabilized after work hardening: A work hardened product stabilized by low temperature heating. As a result, the strength decreases and the elongation increases. This stabilization treatment is applied only to alloys containing magnesium which gradually undergoes age softening at room temperature.
T1	Natural aging after cooling from high-temperature machining: those that have been naturally aged to a sufficiently stable state without actively cold working after cooling from the high-temperature manufacturing process as extruded materials. Therefore, the effect of the cold working is small even if corrected.
T2	After cooling cooling from high-temperature processing, and further natural aging: it performs cold working to increase the cooling strength from the high-temperature manufacturing process as an extrusion material, and further to a sufficiently stable state it is a natural prescription.
T3	The cold working after the solution treatment, and further natural aging: it performs cold working to increase the strength after solution treatment, which was naturally aging to a more stable state.
T4	The natural aging after solution treatment: without cold working after solution treatment, it is a natural prescription to a sufficiently stable state. Therefore, the effect of the cold working is small even if corrected.
T5	After cooling from high-temperature processing, the artificial aging hardening treatment: the one that the artificial aging hardening was treated without actively cold processing after cooling from the manufacturing process of the high temperature like the casting or the extrusion material. Therefore, the effect of the cold working is small even if corrected.
T6	After solution treatment, the artificial aging hardening treatment: without actively cold working after the solution treatment, it is an artificial aging curing treatment. Therefore, the effect of the cold working is small even if corrected.
T7	Stabilization treatment after solution treatment: A solution subjected to excessive aging treatment exceeding artificial age hardening treatment conditions to obtain maximum strength in order to adjust to special properties after solution treatment.
T8	Cold worked after solution treatment and further subjected to artificial age hardening: cold worked to increase the strength after solution treatment, and further subjected to artificial age hardening treatment.
T9	After solution heat treatment, artificial age hardening treatment was carried out and further cold worked: strongly artificial age hardening treatment was carried out after solution treatment and further cold worked to increase the strength.

3. Mechanical Properties of Aluminum Alloys

Type (JIS name)	By quality	Tensile strength (N/mm^2)	Strength (N/mm^2)	Elongation (%)	Brinell hardness (HBS 10/500)	Fatigue strength * (N/mm^2)
A2014	T6	485	415	13	135	125
A2017	O	180	70	22	45	90
A2024	T4	470	325	20	120	140
A3003	O	110	40	30	28	50
A4032	T6	380	315	9	120	110
A5052	H38	290	255	7	77	140
A5083	H116	315	230	16	-	160
A6061	T6	310	275	12	95	95
A6063	T6	240	215	12	73	70
A7075	T6	570	505	11	150	160
A7N01	T5	345	295	15	100	125

* Represents 50 x 107 fatigue strengths due to rotational bending.
● The values in the above table are reference values, not guaranteed values.

Material - Resin/Rubber

■ Resin/Rubber

Characteristic item	Thermoplastic resin						
	FRP	Polyacetal	Polypropylene	Nylon6	Nylon66	Polycarbonate	ABS
Specific gravity	1.5 - 2.1	1.42	0.9 - 1.04	1.12 - 1.14	1.13 - 1.15	1.20	1.04 - 1.07
Hardness (Rockwell)	M70 - 120	M94	R80 - 110	R119	R100 - 118	M78	R90 - 115
Tensile strength (N/mm^2)	98 - 200	69	29 - 38	69 - 81	75 - 82	64 - 79	35 - 59
Compressive strength (N/mm^2)	98 - 200	130	38 - 55	89	110	76	18 - 56
Izod impact value (kJ/m^2)	11 - 100	11	2.7 - 10.9	8	10	90	15 - 50
Flexural strength (N/mm^2)	69 - 270	98	41 - 55	120	120	94	49 - 88
Heat resistant temperature (°C)	150 - 180	90 - 100	120 - 130	80 - 120	80 - 150	120	60 - 95
Flame resistance	Burning	Fire retardant	Slow burning	Extremely slow burning	Extremely slow burning	Self-extinguishing	Slow burning
Weather resistance	Slight discoloration	Slight discoloration	To give rise to cracks	Slight discoloration	Slight discoloration	Be excellent	Discoloring
Weak acid resistance	Good	Endure roughly	Resistance is large	Withstand	Withstand	Good	Good
Strong acid resistance	Endure roughly	Be subjected	Withstand other than oxidizing acids	Be subjected	Be subjected	Endure roughly	Endure roughly
Weak alkaline resistance	Slight change	Endure roughly	Extremely resistant	Constant	Constant	Withstand	Constant
Strong alkaline resistance	Resistance to organic solvent	Endure roughly	Extremely resistant	Constant	Constant	Be subjected	Constant
Organic solvent resistance	Slight change	Having resistance	Under 80°C endure	Having resistance	Having resistance	Be subjected	Be subjected

Characteristic item	Thermosetting resin		
	Phenol resin	Urea resin	Melamine resin
Specific gravity	1.36 - 1.42	1.5	1.47 - 1.52
Hardness (Rockwell)	M110 - 116	M110 - 120	M110 - M125
Tensile strength (N/mm^2)	41 - 52	38 - 69	49 - 90
Compressive strength (N/mm^2)	180 - 210	180 - 260	170 - 294
Izod impact value (kJ/m^2)	1.5 - 5	1.5 - 3.3	1.5 - 3.3
Flexural strength (N/mm^2)	62 - 75	55 - 110	69 - 110
Heat resistant temperature (°C)	150 - 180	77	100
Flame resistance	Extremely slow burning	Extremely slow burning	Self-extinguishing
Weather resistance	Gradual discoloration	Discoloration to gray	Discoloration to gray
Weak acid resistance	Good	Slight change	Constant
Strong acid resistance	Other than being affected by oxidizing acid is good	The surface is eroded	Be subjected
Weak alkaline resistance	Good	Slight change	Constant
Strong alkaline resistance	It is affected by thermal strong alkaline	To decompose	Be subjected
Organic solvent resistance	Having resistance	Slight change	Having resistance

Characteristic item	Rubber					
	Natural rubber (NR)	Synthetic natural rubber (IR)	Styrene rubber (SBR)	Butadiene rubber (BR)	Chloroprene rubber (CR)	Butyl rubber (IIR)
Specific gravity	0.92	0.92 - 0.93	0.93 - 0.94	0.91 - 0.94	1.15 - 1.25	0.91 - 0.93
Tensile strength (N/mm^2)	3 - 30	5 - 20	5 - 20	2 - 20	5 - 25	5 - 15
Elongation (%)	100 - 1000	100 - 1000	100 - 800	100 - 800	100 - 1000	100 - 800
Elasticity elasticity	Excellent	Excellent	Excellent	Excellent	Excellent	Possible
Tear	Excellent	Good	Possible	Good	Good	Good
Abrasion resistance	Excellent	Excellent	Excellent	Excellent	Good	Good
Flexural crack resistance	Excellent	Excellent	Good	Possible	Good	Excellent
Usable temperature (°C)	–70 to 120	–70 to 120	–60 to 120	–73 to 120	–55 to 120	–55 to 120
Aging resistance	Good	Good	Good	Good	Excellent	Excellent
Light fastness	Good	Good	Good	Good	Good	Excellent
Electrical insulating property (Ω • cm)	10^{10} - 10^{15}	10^{10} - 10^{15}	10^{10} - 10^{15}	10^{14} - 10^{15}	10^{10} - 10^{12}	10^{16} - 10^{18}
Gasoline · light oil	Not available	Not available	Not available	Not available	Good	Not available
Benzene · toluene	Not available	Not available	Not available	Not available	Not available	Possible
Alcohol	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Ether	Not available	Not available	Not available	Not available	Not available	Possible
Ethyl acetate	Not available	Not available	Not available	Not available	Not available	Excellent
Water	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Organic acids	Not available	Not available	Not available	Not available	Not available	Possible
High temperature inorganic acid	Not available	Not available	Not available	Not available	Good	Excellent
Low temperature inorganic acid	Good	Good	Good	Good	Excellent	Excellent
Weak alkaline resistance	Good	Good	Good	Good	Excellent	Excellent
Strong alkaline resistance	Good	Good	Good	Good	Excellent	Excellent

Characteristic item	Rubber				
	Nitrile rubber (NBR)	Propylene rubber (EPDM)	Urethane rubber (U)	Silicone rubber (Si)	Fluororubber (FPM)
Specific gravity	1.00 - 1.20	0.86 - 0.87	1.00 - 1.30	0.95 - 0.98	1.80 - 1.82
Tensile strength (N/mm^2)	5 - 25	5 - 20	20 - 45	4 - 10	7 - 20
Elongation (%)	100 - 800	100 - 800	300 - 800	50 - 590	100 - 500
Elasticity elasticity	Good	Good	Excellent	Excellent	Possible
Tear	Good	Possible	Excellent	Not available	Good
Abrasion resistance	Excellent	Good	Excellent	Not available	Excellent
Flexural crack resistance	Good	Good	Excellent	Not available	Good
Usable temperature (°C)	–20 to 110	–50 to 150	–40 to 80	–70 to 200	–30 to 230
Aging resistance	Excellent	Excellent	Good	Excellent	Excellent
Light fastness	Good	Excellent	Excellent	Excellent	Excellent
Electrical insulating property (Ω • cm)	10^{8} - 10^{10}	10^{12} - 10^{15}	10^{9} - 10^{12}	10^{11} - 10^{15}	10^{15} - 10^{18}
Gasoline · light oil	Excellent	Not available	Excellent	Not available	Excellent
Benzene · toluene	Not available	Possible	Not available	Not available • Possible	Excellent
Alcohol	Excellent	Excellent	Possible	Excellent	Excellent
Ether	Not available	Good	Not available	Not available	Not available
Ethyl acetate	Not available	Excellent	Possible	Good	Not available
Water	Excellent	Excellent	Possible	Good	Excellent
Organic acids	Not available	Not available	Not available	Not available	Not available
High temperature inorganic acid	Possible	Good	Not available	Possible	Excellent
Low temperature inorganic acid	Good	Excellent	Possible	Good	Excellent
Weak alkaline resistance	Good	Excellent	Not available	Excellent	Possible
Strong alkaline resistance	Good	Excellent	Not available	Excellent	Not available

(Note) This characteristic list is a reference value as a guide only, so it is not a guarantee. Please be sure to check the actual test with a test specimen.

Electric Wire

■ Permissible Current Formula

The permissible current of the wire is the maximum current value that can be flown at all times without impairing its characteristics. Calculate the permissible current I of an insulated wire by the following formula.

$$I = Ko\sqrt{\frac{T_1-T_2}{\gamma Rth}}$$

I: allowable electricity (A), Ko: allowable current reduction ratio in the case of multi-staged laying, γ : conductor effective resistance (Ω/cm) at T1°C., Rth: total thermal resistance of the wire (°C/W/cm), T1: maximum allowable temperature of the wire (°C), T2: ambient (base) temperature (°C)
γ c: Direct current maximum conductor resistance (Ω/km) at 20°C.
a: Conductor resistance temperature coefficient (0.00393 in copper at 20°C, aluminum 0.0040)

The total thermal resistance Rth of the electric wire is calculated as follows.

$$Rth = R_1+R_2$$

$$R_1 = \frac{P_1}{2\pi}\log_e\frac{d_2}{d_1}$$

$$R_2 = \frac{10P_2}{\pi d_2}$$

R1: thermal resistance of insulator and coating (°C/W/cm)
R2: Thermal resistance of the wire surface (°C/W/cm)
d1: Outside conductor (mm)
d2 Outer diameter of wire (mm)

P1: Insulator specific heat resistance (°C/W/cm)
P2: Surface dissipation thermal resistance (°C/W/cm²)

Table 1. Maximum Allowable Current Reduction Ratio for Multi-story Cable Installation Ko

Conditions	1	2	3	6	4	6	8	9	12
Array Center Interval									
s=d	-	0.85	0.80	0.70	0.70	0.60	-	-	-
s=2d	1.00	0.95	0.95	0.90	0.90	0.90	0.85	0.80	0.85
s=3d	-	1.00	1.00	0.95	0.95	0.95	0.90	0.85	0.85

d = wire outer diameter s = wire center distance

Table 2. Maximum allowable temperature T1

Material	Maximum allowable temperature (°C)
General vinyl	60
Heat resistant vinyl	80, 105
Crosslinked vinyl	105
Polyethylene	75
Crosslinked polyethylene	90, 105
TFE	250
FEP	200
Nylon	90
Silicon rubber	180

Conductor effective resistance γ (Ω/cm)
$\gamma = \gamma_0\{1+a(T1-20)\}\times10^{-5}$

Current reduction coefficient when ambient temperature is different from 30°C

Rated temperature (°C) \ Ambient temperature (°C)	30	40	50	60
60	1.00	0.82	0.57	-
80	1.00	0.90	0.77	0.63
90	1.00	0.92	0.82	0.71
105	1.00	0.93	0.85	0.78
125	1.00	0.95	0.89	0.83
150	1.00	0.96	0.91	0.95
200	1.00	0.97	0.93	0.90

Table 3. Specific Thermal Resistance of Insulator P1

Material	Intrinsic thermal resistance P1(°C/W/cm)
Vinyl	600
Crosslinked vinyl	600
Polyethylene	450
Crosslinked polyethylene	450
TFE	450
FEP	400
Nylon	450
Silicon rubber	500

Table 4. Surface dissipation thermal resistance P2

Material	Surface dissipation thermal resistance P2(°C/W/cm)
Materials shown in Table 3	500+10・d2(d2≦40)
Impregnated braid	400+20・d2(d2≦20)

Allowable current reduction coefficient when wires are bundled

Number of wires	Coefficient	Number of wires	Coefficient
1	1.00	11	0.43
2	0.85	12	0.42
3	0.75	13	0.41
4	0.68	14	0.40
5	0.62	15	0.39
6	0.56	16	0.38
7	0.52	17	0.37
8	0.49	18	0.37
9	0.46	19	0.36
10	0.44	20	0.35

■ Voltage drop

Voltage drop is the voltage drop in the equipment due to the resistance of the wire itself when wiring the equipment with electric wires, causing a voltage drop in the wire.
Voltage drop depends on load power, power factor, AC resistance and inductance of the line. Supposing that the receiving end voltage is Er, the current is I, the power factor angle of the current is Θ, the resistance of the line is R, the reactance of the line is X, and the length of the line is ℓ, the transmitting end voltage Es

$Es = \sqrt{(Ercos\ \Theta + RI\ \ell)^2 + (Ersin\ \Theta + XI\ \ell)^2}$.

Since the above equation can be expressed simply as

$Es = Er + I(R\cos\theta + X\sin\theta)\ \ell$,

the voltage drop of the line is

$Es - Er = I(R\cos\theta + X\sin\theta)\ \ell$.

In the above equation, ignoring the reactance of the circuit and assuming that the power factor can be regarded as 1, the following simplified expression is often used to obtain an approximate value.
In the case of a single-phase two-wire system (Figure B)

$e = Es - Er = R \cdot I \cdot \ell \times 2$

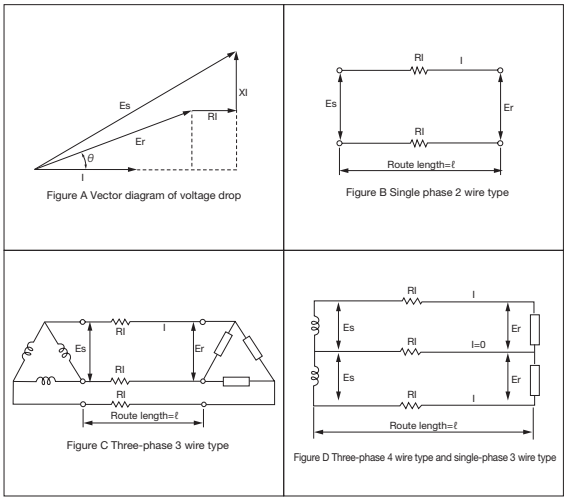
In the case of three-phase three-wire system (Figure C)

$e = Es - Er = R \cdot I \cdot \ell \times \sqrt{3}$

In the case of a single-phase 3-wire system, calculate it as if the load is balanced and the current can not flow to the neutral wire (Figure D)

$e' = Es - Er = R \cdot I \cdot \ell$

Where e' is the voltage drop between the neutral line and the outer line or one phase of each phase.



Gauge			Diameter		Cross Area			Weight kg/km	
mmG	AWG	SWG	mm	mil	mm^2	in^2	CM	Steel	Aluminum
-	6/0	-	14.73	580.1	170.5	0.2643	336.500	1.516	460.4
-	5/0	-	13.12	500.0	135.2	0.2096	266.900	1.202	365.0
-	-	7/0	12.70	516.6	126.7	0.1964	250.000	1.126	342.1
12	-	-	12.00	472.4	113.1	0.1753	223.200	1.005	305.4
-	-	6/0	11.79	464.0	109.1	0.1691	215.300	969.9	294.6
-	4/0	-	11.68	460.0	107.2	0.1662	211.600	953.0	289.4
-	-	5/0	10.97	432.0	94.59	0.1466	186.600	840.9	255.4
-	3/0	-	10.40	409.6	85.04	0.1318	167.800	756.0	229.6
-	-	4/0	10.16	400.0	81.10	0.1257	160.000	721.0	219.0
10	-	-	10.00	393.7	78.54	0.1217	155.000	698.2	212.1
-	-	3/0	9.449	372.0	70.13	0.1087	138.400	623.5	189.4
-	2/0	-	9.266	364.8	67.43	0.1045	133.100	599.5	182.1
9	-	-	9.000	354.3	63.62	0.09961	125.600	565.6	171.8
-	-	2/0	8.839	348.0	61.37	0.09512	121.100	545.6	165.7
-	0	-	8.252	324.9	53.49	0.08291	105.600	475.5	144.4
-	-	0	8.230	324.0	53.20	0.08245	105.000	472.9	143.6
8	-	-	8.000	315.0	50.27	0.07791	99.210	446.9	135.7
-	-	1	7.620	300.0	45.61	0.07069	90.000	405.5	123.1
-	1	-	7.348	289.3	42.41	0.06573	83.690	377.0	114.5
-	-	2	7.010	276.0	38.60	0.05983	76.180	343.2	104.2
7	-	-	7.000	275.6	38.48	0.05964	75.940	342.1	103.9
-	2	-	6.543	257.6	33.63	0.05212	66.380	299.0	90.80
6.5	-	-	6.500	255.9	33.18	0.05143	65.480	295.0	89.59
-	-	3	6.401	252.0	32.18	0.04999	63.500	286.1	86.89
6	-	-	6.000	236.2	28.27	0.04382	55.790	251.3	76.33
-	-	4	5.893	232.0	27.27	0.04227	53.820	242.4	73.63
-	3	-	5.827	229.4	26.67	0.04133	52.820	237.1	72.01
5.5	-	-	5.500	216.5	23.76	0.03693	46.890	211.2	64.15
-	-	5	5.385	212.0	22.78	0.03530	44.940	202.5	61.51
-	4	-	5.189	204.3	21.15	0.03278	41.740	188.0	57.11
5	-	-	5.000	196.9	19.64	0.03041	38.760	174.6	53.03
-	-	6	4.877	192.0	18.68	0.02895	36.880	166.1	50.44
-	5	-	4.620	181.9	16.77	0.02599	33.090	149.0	45.25
4.5	-	-	4.500	177.2	15.90	0.02464	31.380	141.4	42.93
-	-	7	4.470	176.0	15.70	0.02433	30.980	139.6	42.39
-	6	-	4.115	162.0	13.30	0.02061	26.240	118.2	35.91
-	-	8	4.064	160.0	12.97	0.02011	25.600	115.3	35.02
4	-	-	4.000	157.5	12.57	0.01949	24.810	111.7	33.94
-	7	-	3.685	144.3	10.55	0.01635	20.820	93.79	28.49
-	-	9	3.658	144.0	10.51	0.01629	20.740	93.43	28.38
3.5	-	-	3.500	137.8	9.621	0.01491	18.900	85.53	25.98
-	8	-	3.264	128.5	8.368	0.01297	16.510	74.39	22.59
-	-	10	3.251	128.0	8.304	0.01287	16.380	73.82	22.42
3.2	-	-	3.200	126.0	8.042	0.01246	15.870	71.49	21.71
-	-	11	2.946	116.0	6.820	0.01057	13.460	60.63	18.41
-	9	-	2.906	114.4	6.633	0.01029	13.090	58.97	17.91
2.9	-	-	2.900	114.2	6.605	0.01024	13.040	58.72	17.83
-	-	12	2.642	104.0	5.481	0.008495	10.820	48.73	14.80
2.6	-	-	2.600	102.4	5.309	0.008228	10.480	47.20	14.33
-	10	-	2.588	101.9	5.262	0.008155	10.380	46.78	14.21
-	-	13	2.337	92.0	4.289	0.006649	8.464	38.13	11.58
-	11	-	2.304	90.7	4.169	0.006461	8.226	37.06	11.26
2.3	-	-	2.300	90.6	4.155	0.006440	8.200	36.94	11.22
-	12	-	2.052	80.8	3.309	0.005128	6.529	29.42	8.934
-	-	14	2.032	80.0	3.243	0.005027	6.400	28.83	8.756
2.0	-	-	2.000	78.7	3.142	0.004870	6.201	27.93	8.483
-	13	15	1.829	72.0	2.627	0.004072	5.184	23.35	7.093
1.8	-	-	1.800	70.9	2.545	0.003945	5.023	22.63	6.872
-	14	-	1.628	64.1	2.082	0.003227	4.109	18.51	5.621
-	-	16	1.626	64.0	2.076	0.003217	4.096	18.46	5.605
1.6	-	-	1.600	63.0	2.011	0.003117	3.969	17.99	5.430
-	15	-	1.450	57.1	1.652	0.002561	3.260	14.69	4.460
-	-	17	1.422	56.0	1.589	0.002463	3.136	14.13	4.290
1.4	-	-	1.400	55.1	1.539	0.002385	3.037	13.69	4.155
-	16	-	1.290	50.8	1.308	0.002027	2.581	11.63	3.532

Gauge			Diameter		Cross Area			Weight kg/km	
mmG	AWG	SWG	mm	mil	mm^2	in^2	CM	Steel	Aluminum
-	-	18	1.129	48.0	1.168	0.001910	2.304	10.38	3.154
1.2	-	-	1.200	47.2	1.131	0.001753	2.232	10.05	3.054
-	17	-	1.151	45.3	1.040	0.001612	2.052	9.246	2.809
-	18	-	1.024	40.3	0.8233	0.001276	1.624	7.319	2.223
-	-	19	1.016	40.0	0.8110	0.001257	1.600	7.210	2.190
1.0	-	-	1.000	39.4	0.7854	0.001217	1.550	6.982	2.121
-	-	20	0.9144	36.0	0.6568	0.001018	1.296	5.839	1.773
-	19	-	0.9119	35.9	0.6529	0.001012	1.289	5.804	1.763
0.9	-	-	0.8000	35.4	0.6362	0.0009961	1.256	5.656	1.718
-	20	21	0.8128	32.0	0.5189	0.0009042	1.024	4.613	1.401
0.8	-	-	0.8000	34.5	0.5027	0.0007791	992.1	4.469	1.357
-	21	-	0.7239	28.5	0.4116	0.0006379	812.3	3.659	1.111
-	-	22	0.7112	28.0	0.3973	0.0006159	784.0	3.532	1.073
0.7	-	-	0.7000	27.6	0.3848	0.0005964	759.4	3.421	1.039
0.65	-	-	0.6500	25.6	0.3318	0.0005143	854.8	2.950	0.8959
-	22	-	0.6426	25.3	0.3243	0.0005027	640.1	2.883	0.8756
-	-	23	0.6096	24.0	0.2919	0.0004524	576.0	2.595	0.7881
0.60	-		0.6000	23.6	0.2827	0.0004282	557.9	2.513	0.7633
-	23	-	0.5740	22.6	0.2589	0.0004012	510.8	2.302	0.6990
-	-	24	0.5588	22.0	0.2452	0.0003801	484.0	2.180	0.6620
0.55	-	-	0.5500	21.7	0.2376	0.0003683	468.9	2.112	0.6416
-	24	-	0.5105	20.1	0.2047	0.0003173	404.0	1.820	0.5527
-	-	25	0.5090	20.0	0.2027	0.0003142	400.0	1.802	0.5473
0.50	-	-	0.5000	19.7	0.1964	0.0003044	387.6	1.746	0.5393
-	-	26	0.4572	18.0	0.1642	0.0002545	324.0	1.460	0.4483
-	25	-	0.4547	17.9	0.1624	0.0002517	320.4	1.444	0.4385
0.45	-	-	0.4500	17.7	0.1590	0.0002464	313.8	1.414	0.4233
-	-	27	0.4166	16.4	0.1363	0.0002112	269.0	1.212	0.3690
-	26	-	0.4039	15.9	0.1281	0.0001996	252.8	1.139	0.3459
0.40	-	-	0.4000	15.7	0.1257	0.0001948	248.1	1.117	0.3384
-	-	28	0.3759	14.8	0.1110	0.0001720	219.0	0.9868	0.2987
-	27	-	0.3607	14.2	0.1022	0.0001584	201.6	0.9086	0.2769
0.35	-	-	0.3500	13.8	0.09621	0.0001491	189.9	0.8553	0.2598
-	-	29	0.3454	13.6	0.09375	0.0001453	185.0	0.8334	0.2581
-	28	-	0.3200	12.6	0.08046	0.0001247	158.8	0.7153	0.2172
0.32	-	-	0.3200	12.6	0.08042	0.0001246	58.7	0.7149	0.2171
-	-	30	0.3150	12.4	0.07794	0.0001208	153.8	0.6929	0.2104
-	-	31	0.2946	11.6	0.08620	0.0001057	134.6	0.6063	0.1841
0.29	-	-	0.2900	11.4	0.06605	0.0001024	130.4	0.5872	0.1783
-	29	-	0.2870	11.3	0.06471	0.0001003	127.7	0.5753	0.1747
-	-	32	0.2743	10.8	0.05911	0.00009161	116.6	0.5255	0.1596
0.26	-	-	0.2600	10.2	0.05309	0.00008228	104.8	0.4720	0.1433
-	30	33	0.2540	10.0	0.05067	0.00007854	100.0	0.4505	0.1368
-	-	34	0.2337	9.2	0.04289	0.00006648	84.64	0.3813	0.1159
0.23	-	-	0.2300	9.1	0.04155	0.00006440	82.00	0.3694	0.1122
-	31	-	0.2261	8.9	0.04014	0.00006221	79.21	0.3568	0.1084
-	-	35	0.2134	8.4	0.03576	0.00005542	70.56	0.3179	0.09655
-	32	-	0.2032	8.0	0.03243	0.00005027	64.00	0.2883	0.08756
0.20	-	-	0.2000	7.9	0.03142	0.00004870	62.01	0.2793	0.08483
-	-	36	0.1930	7.6	0.02927	0.00004536	57.76	0.2602	0.07933
-	33	-	0.1803	7.1	0.02554	0.00003959	50.41	0.2271	0.06696
0.18	-	-	0.1800	7.1	0.02545	0.00003915	50.23	0.2263	0.06972
-	-	37	0.1727	6.8	0.02343	0.00003632	46.24	0.2083	0.06326
0.16	34	-	0.1600	6.3	0.02011	0.00003117	39.69	0.1788	0.05430
-	-	38	0.1524	6.0	0.01824	0.00002827	36.00	0.1622	0.04925
-	35	-	0.1422	5.6	0.01589	0.00002463	31.36	0.1413	0.04290
0.14	-	-	0.1400	5.5	0.01539	0.00002385	30.37	0.1368	0.04155
-	-	39	0.1321	5.2	0.01370	0.00002124	27.04	0.1218	0.03688
-	36	-	0.1270	5.0	0.01267	0.00001964	25.00	0.1126	0.03421
-	-	40	0.1219	4.8	0.01168	0.00001810	23.04	0.1038	0.03154
0.12	-	-	0.1200	4.7	0.01131	0.00001753	22.32	0.1005	0.03054
-	37	-	0.1143	4.5	0.01026	0.00001590	20.25	0.09121	0.02770
-	-	41	0.1118	4.4	0.009813	0.00001521	19.36	0.08724	0.02650
-	38	42	0.1016	4.0	0.008110	0.00001257	16.0	0.07210	0.02190
0.10	-	-	0.1000	3.9	0.007854	0.00001217	15.50	0.06982	0.02121

Products and **Services** to

satisfy customers' needs and expectations

To manufacture products is to satisfy customers' wishes with user-friendliness and higher quality.
Such products become more attractive when hearty services are provided.
With good hospitality, we are committed to provide the customers with excellent products and services.

For endless evolution, we continue to change.

IAI Corporation responds to customers' requests in many aspects: reduction of CO_2 in the factory, energy- and labor-saving, cost reduction, higher productivity, improved quality and air-less products.

We are committed to promote mainly the following four items to support production.

1 *Development*

Good insight into next steps will create infinite possibility.

IAI launches many new products in the market every year, by anticipating future market needs and aggressively invests in research and development.

2 *Products*

A wide variation of products that best suit production.

Our line of products include ELECYLINDER® for 2-point transfer, high performance ROBO Cylinder®, single-axis robots, Cartesian and SCARA robots to satisfy every need of the customers.

3 *Network capability*

With many offices throughout the country, IAI helps customers strengthen their competitiveness.

With 31 offices throughout Japan, we can respond customers' requests quickly.
In overseas markets, we have a solid network covering 13 counties and regions.

4 *Service capability*

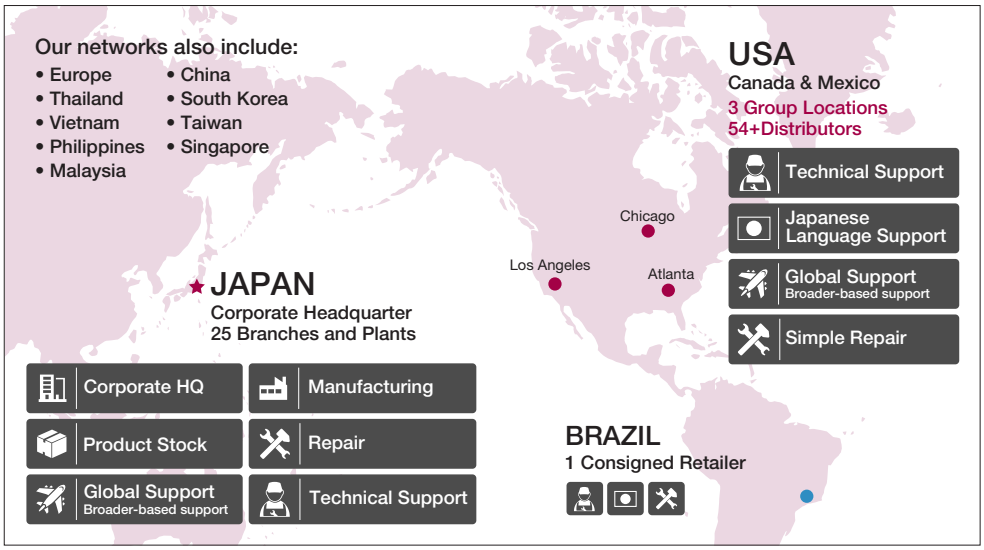
Technology, facility, human resources and environment... all of them are indispensable for production.

We provide good service, have extensive sales records. The state-of-the-art production system ensures high quality products with short delivery time to support and secure customers' innovation.

Support available in 200 locations across 30 countries around the world

A network of authorized representatives in the US is here to serve you.
Support for phase of planning, product selection, quotation, problem solving, maintenance, training, etc.

International Network and Support



Los Angeles
US Headquarters
(310) 891-6015

Chicago
Schaumburg, IL
(847) 908-1400

Atlanta
Marietta, GA
(678) 354-9470

IAI America, Inc.

USA Headquarters & Western Region:
2690 W. 237th Street, Torrance, CA 90505, USA TEL: +1-310-891-6015

Midwest Branch Office:
110 East State Parkway, Schaumburg, IL 60173, USA TEL: +1-847-908-1400

Southeast Branch Office:
1220 Kennestone Circle, Suite 108, Marietta, GA 30066, USA TEL: +1-678-354-9470

www.intelligentactuator.com

IAI Group Headquarters and Main Factory:
1210 Iharacho, Shimizu-ku, Shizuoka-shi, Shizuoka, 424-0114, JAPAN

IAI Industrieroboter GmbH
Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany

IAI Robot (Thailand) Co., Ltd.
825 Phairojkijja Tower 7th Floor, Debaratana Rd.,
Bangna Nuea, Bangna, Bangkok 10260, Thailand

IAI (Shanghai) Co., Ltd.
SHANGHAI JIAHUA BUSINESS CENTER A8-303,
808 Hongqiao Rd. Shanghai 200030, China

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