

MISUMI SINGLE-AXIS ROBOT

RS Series

User's Manual

RS1 / RS2 / RS3
RSD1 / RSD2 / RSD3
RSDG1 / RSDG2 / RSDG3
RSF4
RSH1 / RSH2 / RSH3 / RSH4 / RSH5
RSB1 / RSB2

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Safety Instructions

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1. Safety Information

Industrial robots are highly programmable, mechanical devices that provide a large degree of freedom when performing various manipulative tasks. To ensure safe and correct use of robots and controllers*, carefully read and comply with the safety instructions and precautions in this "Safety Instructions" guide. Failure to take necessary safety measures or incorrect handling may result in trouble or damage to the robot and controller, and also may cause personal injury (to installation personnel, robot operator or service personnel) including fatal accidents.

* The descriptions about the controller stated in this manual also include the contents of the robot driver.

Before using this product, read this manual and related manuals and take safety precautions to ensure correct handling.

The precautions listed in this manual relate to this product. To ensure safety of the user's final system that includes robots, please take appropriate safety measures as required by the user's individual system.

To use robots and controllers safely and correctly, always comply with the safety rules and instructions.

- For specific safety information and standards, refer to the applicable local regulations and comply with the instructions.
- Warning labels attached to the robots are written in English, Japanese, Chinese and Korean. This manual is available in English or Japanese (or some parts in Chinese). Unless the robot operators or service personnel understand these languages, do not permit them to handle the robot.
- Cautions regarding the official language of EU countries
For equipment that will be installed in EU countries, the language used for the manuals, warning labels, operation screen characters, and CE declarations is English only.
Warning labels only have pictograms or else include warning messages in English. In the latter case, messages in Japanese or other languages might be added.

It is not possible to list all safety items in detail within the limited space of this manual. So please note that it is essential that the user have a full knowledge of safety and also make correct judgments on safety procedures.

Refer to the manual by any of the following methods when installing, operating or adjusting the robot and controller.

1. Install, operate or adjust the robot and controller while referring to the printed version of the manual (available for an additional fee).
2. Install, operate or adjust the robot and controller while viewing the disc version of the manual on your computer screen.
3. Install, operate or adjust the robot and controller while referring to a printout of the necessary pages from the disc version of the manual.

2. Signal words used in this manual

This manual uses the following safety alert symbols and signal words to provide safety instructions that must be observed and to describe handling precautions, prohibited actions, and compulsory actions. Make sure you understand the meaning of each symbol and signal word and then read this manual.



DANGER

This indicates an immediately hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

This indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or damage to the equipment.



NOTE

Explains the key point in the operation in a simple and clear manner.

3. Warning labels

Warning labels shown below are attached to the robot body and controller to alert the operator to potential hazards. To ensure correct use, read the warning labels and comply with the instructions.

3.1 Warning labels



WARNING

If warning labels are removed or difficult to see, then the necessary precautions may not be taken, resulting in an accident.

- Do not remove, alter or stain the warning labels on the robot body.
- Do not allow warning labels to be hidden by devices installed on the robot by the user.
- Provide proper lighting so that the symbols and instructions on the warning labels can be clearly seen from outside the safety enclosure.

3.1.1 Warning label messages on robot and controller

Word messages on the danger, warning and caution labels are concise and brief instructions. For more specific instructions, read and follow the "Instructions on this label" described on the right of each label shown below. See "5.1 Movement range" for details on the robot's movement range.

■ Warning label 1



DANGER

Serious injury may result from contact with a moving robot.

- Keep outside of the robot safety enclosure during operation.
- Press the emergency stop button before entering the safety enclosure.

Instructions on this label	
	<ul style="list-style-type: none"> • Always install a safety enclosure to keep all persons away from the robot movement range and prevent injury from contacting the moving part of the robot. • Install an interlock that triggers emergency stop when the door or gate of the safety enclosure is opened. • The safety enclosure should be designed so that no one can enter inside except from the door or gate equipped with an interlock device. • Warning label 1 that comes supplied with a robot should be affixed to an easy-to-see location on the door or gate of the safety enclosure.
Potential hazard to human body	Serious injury may result from contact with a moving robot.
To avoid hazard	<ul style="list-style-type: none"> • Keep outside of the robot safety enclosure during operation. • Press the emergency stop button before entering the safety enclosure.

90K41-001470

■ Warning label 2



WARNING

Moving parts can pinch or crush hands.

Keep hands away from the movable parts of the robot.

Instructions on this label	
	<p>Use caution to prevent hands and fingers from being pinched or crushed by the movable parts of the robot when transporting or moving the robot or during teaching.</p>
Potential hazard to human body	Moving parts can pinch or crush hands.
To avoid hazard	Keep hands away from the movable parts of the robot.

90K41-001460

■ Warning label 3



WARNING

Improper installation or operation may cause serious injury.

Before installing or operating the robot, read the manual and instructions on the warning labels and understand the contents.

Instructions on this label	
	<ul style="list-style-type: none"> • Be sure to read the warning label and this manual carefully to make you completely understand the contents before attempting installation and operation of the robot. • Before starting the robot operation, even after you have read through this manual, read again the corresponding procedures and "Safety Instructions". • Never install, adjust, inspect or service the robot in any manner that does not comply with the instructions in this manual.
Potential hazard to human body	Improper installation or operation may cause serious injury.
To avoid hazard	Before installing or operating the robot, read the manual and instructions on the warning labels and understand the contents.

90K41-001290

■ Warning label 4 (controllers C21/C22)



WARNING

- Before touching the terminals or connectors on the outside of the controller, turn off the power and wait at least 10 minutes to avoid burns or electrical shock.
- Motors and heatsinks become hot during and shortly after operation, so do not touch them.



CAUTION

- Before using the controller, be sure to read the manual thoroughly.
- Be sure to ground the ground terminal.

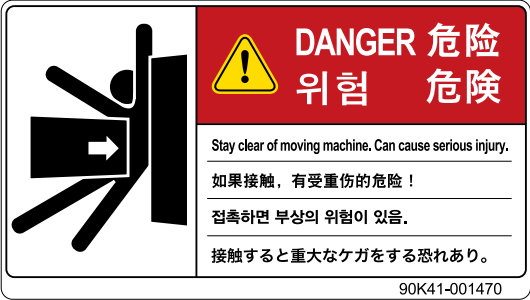

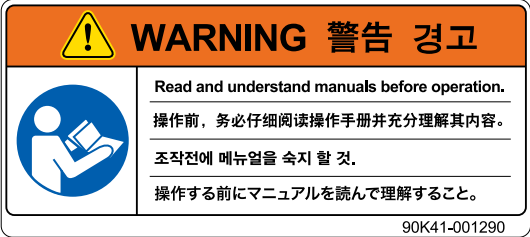
Instructions on this label	
	<ul style="list-style-type: none"> • This indicates a high voltage is present. Touching the terminal block or connector may cause electrical shock. • This indicates the area around this symbol may become very hot. Motors and heatsinks become hot during and shortly after operation. Do not touch them to avoid burns. • This indicates important information that you must know is described in the manual. Before using the controller, be sure to read the manual thoroughly. When adding external safety circuits or connecting a power supply to the controller, read the manual carefully and make checks before beginning the work. • Be sure to ground the ground terminal to avoid electrical shock.
Potential hazard to human body	To avoid hazard
Electrical shock	Do not touch the terminal section for 10 minutes after power-off.
Do not touch them to avoid burns.	Do not touch the motors and heatsinks during power-on.
Improper installation or operation may cause serious injury.	Before installing or operating the robot, read the manual and instructions on the warning labels and understand the contents.
Electrical shock	Be sure to ground the ground terminal.

90K41-000950

3.1.2 Supplied warning labels

Some warning labels are not affixed to robots but included in the packing box. These warning labels should be affixed to an easy-to-see location.

- Warning label is attached to the robot body.
- Warning label comes supplied with the robot and should be affixed to an easy-to-see location on the door or gate of the safety enclosure.
- ◎ Warning label comes supplied with the robot and should be affixed to an easy-to-see location.

		RS1/RS2/RS3/RSD1/ RSD2/RSD3/RSDG1/ RSDG2/RSDG3	RSH1/RSH2/RSH3/ RSH4/RSH5/RSF4/ RSB1/RSB2
Warning label 1		○	○
Warning label 2		○	●
Warning label 3		○	◎

3.2 Warning symbols

Warning symbols shown below are indicated on the robots and controllers to alert the operator to potential hazards. To use the robot safely and correctly always follow the instructions and cautions indicated by the symbols.

1. Electrical shock hazard symbol



WARNING

Touching the terminal block or connector may cause electrical shock, so use caution.

	Instructions by this symbol
	<p>This indicates a high voltage is present. Touching the terminal block or connector may cause electrical shock.</p>

93006-X0-00

2. High temperature hazard symbol



WARNING

Motors, heatsinks, and regenerative units become hot, so do not touch them.

	Instructions by this symbol
	<p>This indicates the area around this symbol may become very hot. Motors, heatsinks, and regenerative units become hot during and shortly after operation. To avoid burns be careful not to touch those sections.</p>

93008-X0-00

3. Caution symbol



CAUTION

Always read the manual carefully before using the controller.

	Instructions by this symbol
	<p>This indicates important information that you must know and is described in the manual. Before using the controller, be sure to read the manual thoroughly. When adding external safety circuits or connecting a power supply to the controller, read the manual carefully and make checks before beginning the work. Connectors must be attached while facing a certain direction, so insert each connector in the correct direction.</p>

93007-X0-00

4. Important precautions for each stage of the robot life cycle

This section describes major precautions that must be observed when using robots and controllers. Be sure to carefully read and comply with all of these precautions even if there is no alert symbol shown.

4.1 Precautions for using robots and controllers

General precautions for using robots and controllers are described below.

1. Applications where robots cannot be used

Robots and robot controllers are designed as general-purpose industrial equipment and cannot be used for the following applications.



DANGER

Robot controllers and robots are designed as general-purpose industrial equipment and cannot be used for the following applications.

- In medical equipment systems which are critical to human life
- In systems that significantly affect society and the general public
- In equipment intended to carry or transport people
- In environments which are subject to vibration such as onboard ships and vehicles.

2. Qualification of operators/workers

Operators or persons who perform tasks for industrial robots (such as teaching, programming, movement check, inspection, adjustment, and repair) must receive appropriate training and also have the skills needed to perform the tasks correctly and safely.

Those tasks must be performed by qualified persons who meet requirements established by local regulations and standards for industrial robots. They must also read the manual carefully and understand its contents before attempting the robot operation or maintenance.



WARNING

- It is extremely hazardous for persons who do not have the above qualifications to perform tasks for industrial robots.
- Adjustment and maintenance that require removing a cover must be performed by persons who have the above qualifications. Any attempt to perform such tasks by an unqualified person may cause an accident resulting in serious injury or death.

4.2 Design

4.2.1 Precautions for robots

1. Restricting the robot moving speed



WARNING

Restriction on the robot moving speed is not a safety-related function. To reduce the risk of collision between the robot and workers, the user must take the necessary protective measures such as enable devices according to risk assessment by the user.

2. Restricting the movement range

See “5.1 Movement range” for details on the robot’s movement range.



WARNING

Soft limit function is not a safety-related function intended to protect the human body. To restrict the robot movement range to protect the human body, use the mechanical stoppers installed in the robot (or available as options).



CAUTION

If the robot moving at high speed collides with a mechanical stopper installed in the robot (or available as option), the robot may be damaged.

3. Provide safety measures for end effector (gripper, etc.)



WARNING

- End effectors must be designed and manufactured so that they cause no hazards (such as a loose workpiece or load) even if power (electricity, air pressure, etc.) is shut off or power fluctuations occur.
- If the object gripped by the end effector might possibly fly off or drop, then provide appropriate safety protection taking into account the object size, weight, temperature, and chemical properties.

4. Provide adequate lighting

Provide enough lighting to ensure safety during work.

5. Install an operation status light



WARNING

Install a signal light (signal tower) at an easy-to-see position so that the operator will be aware of the robot stop status (temporarily stopped, emergency stop, error stop, etc.).

4.2.2 Precautions for robot controllers

1. Emergency stop input terminal



DANGER

Each robot controller has an emergency stop input terminal to trigger emergency stop. Using this terminal, install a safety circuit so that the system including the robot controller will work safely. For the robot driver without emergency stop input terminal, construct a safety circuit including the emergency stop function using an external circuit.

2. Maintain clearance



CAUTION

Do not bundle control lines or communication cables together or in close to the main power supply or power lines. Usually separate these by at least 100mm. Failure to follow this instruction may cause malfunction due to noise.

4.3 Moving and installation

4.3.1 Precautions for robots

■ Installation environment

1. Do not use in strong magnetic fields

**WARNING**

Do not use the robot near equipment or in locations that generate strong magnetic fields. The robot may BREAK DOWN or malfunction if used in such locations.

2. Do not use in locations subject to possible electromagnetic interference, etc.

**WARNING**

Do not use the robot in locations subject to electromagnetic interference, electrostatic discharge or radio frequency interference. The robot may malfunction if used in such locations creating hazardous situations.

3. Do not use in locations exposed to flammable gases

**WARNING**

- Robots are not designed to be explosion-proof.
- Do not use the robots in locations exposed to explosive or flammable gases, dust particles or liquid. Failure to follow this instruction may cause serious accidents involving injury or death, or lead to fire.

■ Moving

1. Use caution to prevent pinching or crushing of hands or fingers

**WARNING**

Moving parts can pinch or crush hands or fingers.
Keep hands away from the movable parts of the robot.

As instructed in Warning label 2, use caution to prevent hands or fingers from being pinched or crushed by movable parts when transporting or moving the robot. For details on warning labels, see "3. Warning labels".

2. Take measures to prevent the robot from falling

When moving the robot by lifting it with equipment such as a hoist or crane, wear personal protective gear and be careful not to move the robot at higher than the required height.
Make sure that there are no persons on paths used for moving the robot.

**WARNING**

A robot falling from a high place and striking a worker may cause death or serious injury. When moving the robot, wear personal protective gear such as helmets and make sure that no one is within the surrounding area.

■ Installation

1. Protect electrical wiring and hydraulic/pneumatic hoses

Install a cover or similar item to protect the electrical wiring and hydraulic/pneumatic hoses from possible damage.

■ Wiring

1. Protective measures against electrical shock

**WARNING**

Always ground the robot to prevent electrical shock.

■ Adjustment

1. Adjustment that requires removing a cover



WARNING

Adjustment by removing a cover require specialized technical knowledge and skills, and may also involve hazards if attempted by an unskilled person. This adjustment must be performed only by persons who have the required qualifications described in “2. Qualification of operators/workers” in section 4.1 of this “Safety Instructions”.

4.3.2 Precautions for robot controllers

■ Installation environment

1. Installation environment



WARNING

Robots are not designed to be explosion-proof. Do not use the robots and controllers in locations exposed to explosive or inflammable gases, dust particles or liquid such as gasoline and solvents. Failure to follow this instruction may cause serious accidents involving injury or death, and lead to fire.



WARNING

- Use the robot controller in locations that support the environmental conditions specified in this manual. Operation outside the specified environmental range may cause electrical shock, fire, malfunction or product damage or deterioration.
- The robot controller and programming box must be installed at a location that is outside the robot safety enclosure yet where it is easy to operate and view robot movement.
- Install the robot controller in locations with enough space to perform work (teaching, inspection, etc.) safely. Limited space not only makes it difficult to perform work but can also cause injury.
- Install the robot controller in a stable, level location and secure it firmly. Avoid installing the controller upside down or in a tilted position.
- Provide sufficient clearance around the robot controller for good ventilation. Insufficient clearance may cause malfunction, breakdown or fire.

■ Installation

To install the robot controller, observe the installation conditions and method described in the manual.

1. Installation



WARNING

Securely tighten the screws to install the robot controller. If not securely tightened, the screws may come loose causing the controller to drop.

2. Connections



WARNING

- Always shut off all phases of the power supply externally before starting installation or wiring work. Failure to do this may cause electrical shock or product damage.
- Never directly touch conductive sections and electronic parts other than the connectors, rotary switches, and DIP switches on the outside panel of the robot controller. Touching them may cause electrical shock or breakdown.
- Securely install each cable connector into the receptacles or sockets. Poor connections may cause the controller or robot to malfunction.

■ Wiring

1. Connection to robot controller

The controller parameters are preset at the factory before shipping to match the robot model. Check the specified robot and controller combination, and connect them in the correct combination.

Since the software detects abnormal operation such as motor overloads, the controller parameters must be set correctly to match the motor type used in the robot connected to the controller.

2. Wiring safety points



WARNING

Always shut off all phases of the power supply externally before starting installation or wiring work. Failure to do this may cause electrical shock or product damage.



CAUTION

- Make sure that no foreign matter such as cutting chips or wire scraps get into the robot controller. Malfunction, breakdown or fire may result if these penetrate inside.
- Do not apply excessive impacts or loads to the connectors when making cable connections. This might bend the connector pins or damage the internal PC board.
- When using ferrite cores for noise elimination, be sure to fit them onto the power cable as close to the robot controller and/or the robot as possible, to prevent malfunction caused by noise.

3. Wiring method



WARNING

Securely install the connectors into the robot controller and, when wiring the connectors, make the crimp, press-contact or solder connections correctly using the tool specified by the connector manufacturer.



CAUTION

When disconnecting the cable from the robot controller, detach by gripping the connector itself and not by tugging on the cable. Loosen the screws on the connector (if fastened with the screws), and then disconnect the cable. Trying to detach by pulling on the cable itself may damage the connector or cables, and poor cable contact will cause the controller or robot to malfunction.

4. Precautions for cable routing and installation



CAUTION

- Always store the cables connected to the robot controller in a conduit or clamp them securely in place. If the cables are not stored in a conduit or properly clamped, excessive play or movement or mistakenly pulling on the cable may damage the connector or cables, and poor cable contact will cause the controller or robot to malfunction.
- Do not modify the cables and do not place any heavy objects on them. Handle them carefully to avoid damage. Damaged cables may cause malfunction or electrical shock.
- If the cables connected to the robot controller may possibly become damaged, then protect them with a cover, etc.
- Check that the control lines and communication cables are routed at a gap sufficiently away from main power supply circuits and power lines, etc. Bundling them together with power lines or close to power lines may cause faulty operation due to noise.

5. Protective measures against electrical shock



WARNING

Be sure to ground the ground terminals of the robot and controller. Poor grounding may cause electrical shock.

4.4 Safety measures

4.4.1 Safety measures

1. Referring to warning labels and manual



WARNING

- Before starting installation or operation of the robot, be sure to read the warning labels and this manual, and comply with the instructions.
- Never attempt any repair, parts replacement and modification unless described in this manual. These tasks require specialized technical knowledge and skills and may also involve hazards. Please contact your distributor for advice.



NOTE

For details on warning labels, see "3. Warning labels".

2. Draw up "work instructions" and make the operators/workers understand them



WARNING

Decide on "work instructions" in cases where personnel must work within the robot safety enclosure to perform startup or maintenance work. Make sure the workers completely understand these "work instructions".

Decide on "work instructions" for the following items in cases where personnel must work within the robot safety enclosure to perform teaching, maintenance or inspection tasks. Make sure the workers completely understand these "work instructions".

1. Robot operating procedures needed for tasks such as startup procedures and handling switches
2. Robot speeds used during tasks such as teaching
3. Methods for workers to signal each other when two or more workers perform tasks
4. Steps that the worker should take when a problem or emergency occurs
5. Steps to take after the robot has come to a stop when the emergency stop device was triggered, including checks for cancelling the problem or error state and safety checks in order to restart the robot.
6. In cases other than above, the following actions should be taken as needed to prevent hazardous situations due to sudden or unexpected robot operation or faulty robot operation as listed below.
 - Place a display sign on the operator panel
 - Ensure the safety of workers performing tasks within the robot safety enclosure
 - Clearly specify position and posture during work
 - Specify a position and posture where worker can constantly check robot movements and immediately move to avoid trouble if an error/problem occurs
 - Take noise prevention measures
 - Use methods for signaling operators of related equipment
 - Use methods to decide that an error has occurred and identify the type of error

Implement the "work instructions" according to the type of robot, installation location, and type of work task.

When drawing up the "work instructions", make an effort to include opinions from the workers involved, equipment manufacturer technicians, and workplace safety consultants, etc.

3. Take safety measures



DANGER

- Never enter the robot movement range while the robot is operating or the main power is turned on. Failure to follow this warning may cause serious accidents involving injury or death. Install a safety enclosure or a gate interlock with an area sensor to keep all persons away from the robot movement range.
- When it is necessary to operate the robot while you are within the robot movement range such as for teaching or maintenance/inspection tasks, always carry the programming box with you so that you can immediately stop the robot operation in case of an abnormal or hazardous condition. Install an enable device in the external safety circuit as needed. Also set the robot moving speed to 3% or less. Failure to follow these instructions may cause serious accidents involving injury or death.

See "5.1 Movement range" for details on the robot's movement range.

**WARNING**

- During startup or maintenance tasks, display a sign "WORK IN PROGRESS" on the programming box and operation panel in order to prevent anyone other than the person for that task from mistakenly operating the start or selector switch. If needed, take other measures such as locking the cover on the operation panel.
- Always connect the robot and robot controller in the correct combination. Using them in an incorrect combination may cause fire or breakdown.

4. Install system

When configuring an automated system using a robot, hazardous situations are more likely to occur from the automated system than the robot itself. So the system manufacturer should install the necessary safety measures required for the individual system. The system manufacturer should provide a proper manual for safe, correct operation and servicing of the system.

**WARNING**

To check the robot controller operating status, refer to this manual and to related manuals. Design and install the system including the robot controller so that it will always work safely.

5. Precautions for operation

**WARNING**

- Do not touch any electrical terminal. Directly touching these terminals may cause electrical shock, equipment damage, and malfunction.
- Do not touch or operate the robot controller or programming box with wet hands. Touching or operating them with wet hands may result in electrical shock or breakdown.

6. Do not disassemble and modify

**WARNING**

Never disassemble and modify any part in the robot, controller, and programming box. Do not open any cover. Doing so may cause electrical shock, breakdown, malfunction, injury, or fire.

4.4.2 Installing a safety enclosure

Be sure to install a safety enclosure to keep anyone from entering within the movement range of the robot. The safety enclosure will prevent the operator and other persons from coming in contact with moving parts of the robot and suffering injury.

See "5.1 Movement range" for details on the robot's movement range.

**DANGER**

Serious injury may result from contact with a moving robot.

- Keep outside of the robot safety enclosure during operation.
- Press the emergency stop button before entering the safety enclosure.

**WARNING**

- Install an interlock that triggers emergency stop when the door or gate of the safety enclosure is opened.
- The safety enclosure should be designed so that no one can enter inside except from the door or gate equipped with an interlock device.
- Warning label 1 (See "3. Warning labels") that comes supplied with a robot should be affixed to an easy-to-see location on the door or gate of the safety enclosure.

4.5 Operation

When operating a robot, ignoring safety measures and checks may lead to serious accidents. Always take the following safety measures and checks to ensure safe operation.



DANGER

Check the following points before starting robot operation.

- No one is within the robot safety enclosure.
- The programming unit is in the specified location.
- The robot and peripheral equipment are in good condition.

4.5.1 Trial operation

After installing, adjusting, inspecting, maintaining or repairing the robot, perform trial operation using the following procedures.

1. If a safety enclosure has not yet been provided right after installing the robot:

Then rope off or chain off the movement range around the robot in place of the safety enclosure and observe the following points.

See "5.1 Movement range" for details on the robot's movement range.



DANGER

Place a "Robot is moving - KEEP AWAY!" sign to keep the operator or other personnel from entering within the movement range of the robot.



WARNING

- Use sturdy, stable posts which will not fall over easily.
- The rope or chain should be easily visible to everyone around the robot.

2. Check the following points before turning on the controller.

- Is the robot securely and correctly installed?
- Are the electrical connections to the robot wired correctly?
- Are items such as air pressure correctly supplied?
- Is the robot correctly connected to peripheral equipment?
- Have safety measures (safety enclosure, etc.) been taken?
- Does the installation environment meet the specified standards?

3. After the controller is turned on, check the following points from outside the safety enclosure.

- Does the robot start, stop and enter the selected operation mode as intended?
- Does each axis move as intended within the soft limits?
- Does the end effector move as intended?
- Are the correct signals being sent to the end effector and peripheral equipment?
- Does emergency stop function?
- Are teaching and playback functions normal?
- Are the safety enclosure and interlocks functioning as intended?

4. Working inside safety enclosures

Before starting work within the safety enclosure, **always confirm from outside the enclosure that each protective function is operating correctly (see the previous section 2.3).**



DANGER

Never enter within the movement range while within the safety enclosure.

See "5.1 Movement range" for details on the robot's movement range.



WARNING

When work is required within the safety enclosure, place a sign "Work in progress" in order to keep other persons from operating the controller switch or operation panel.



WARNING

When work within the safety enclosure is required, always turn off the controller power except for the following cases:

Exception

Work with power turned on, but robot in emergency stop

Soft limit settings	Follow the precautions and procedure described in "Soft limit" in controller manual.
----------------------------	--------------------------------------------------------------------------------------

Work with power turned on

Teaching	Refer to "5. Teaching within safety enclosure" described below.
-----------------	-----------------------------------------------------------------

5. Teaching within the safety enclosure

When performing teaching within the safety enclosure, check or perform the following points **from outside the safety enclosure.**



DANGER

Never enter within the movement range while within the safety enclosure.

See "5.1 Movement range" for details on the robot's movement range.



WARNING

- Make a visual check to ensure that no hazards are present within the safety enclosure.
- Check that the programming box or handy terminal operates correctly.
- Check that no failures are found in the robot.
- Check that emergency stop works correctly.
- Select teaching mode and disable automatic operation.

4.5.2 Automatic operation

Check the following points when operating the robot in AUTO mode. Observe the instructions below in cases where an error occurs during automatic operation. Automatic operation described here includes all operations in AUTO mode.

1. Checkpoints before starting automatic operation

Check the following points before starting automatic operation.



DANGER

- Check that no one is within the safety enclosure.
- Check the safety enclosure is securely installed with interlocks functional.



WARNING

- Check that the programming box / handy terminal and tools are in their specified locations.
- Check that the signal tower lamps or other alarm displays installed for the system are not lit or flashing, indicating no error is occurring on the robot and peripheral devices.

2. During automatic operation and when errors occur

After automatic operation starts, check the operation status and the signal tower to ensure that the robot is in automatic operation.



DANGER

Never enter the safety enclosure during automatic operation.



WARNING

If an error occurs in the robot or peripheral equipment, observe the following procedure before entering the safety enclosure.

- 1) Press the emergency stop button to set the robot to emergency stop.
- 2) Place a sign on the start switch, indicating that the robot is being inspected in order to keep other persons from restarting the robot.

4.5.3 Precautions during operation

1. When the robot is damaged or an abnormal condition occurs



WARNING

- If unusual odors, noise or smoke occur during operation, immediately turn off power to prevent possible electrical shock, fire or breakdown. Stop using the robot and contact your distributor.
- If any of the following damage or abnormal conditions occurs the robot, then continuing to operate the robot is dangerous. Immediately stop using the robot and contact your distributor.

Damage or abnormal condition	Type of danger
Damage to machine harness or robot cable	Electrical shock, robot malfunction
Damage to robot exterior	Damaged parts fly off during robot operation
Abnormal robot operation (position deviation, vibration, etc.)	Robot malfunction
Z-axis (vertical axis) or brake malfunction	Z-axis unit falls off

2. High temperature hazard



WARNING

- Do not touch the robot controller and robot during operation. The robot controller and robot body are very hot during operation, so burns may occur if these sections are touched.
- The motor and speed reduction gear casing are very hot shortly after operation, so burns may occur if these are touched. Before touching those parts for inspections or servicing, turn off the controller, wait for a while and check that their temperature has cooled.

3. Use caution when releasing the Z-axis (vertical axis) brake

**WARNING**

The vertical axis will slide downward when the brake is released, causing a hazardous situation. Take adequate safety measures in consideration by taking the weight and shape into account.

- Before releasing the brake after pressing the emergency stop button, place a support under the vertical axis so that it will not slide down.
- Be careful not to let your body get caught between the vertical axis and the installation base when performing tasks (direct teaching, etc.) with the brake released.

4. Make correct parameter settings

**CAUTION**

The robot must be operated with the correct tolerable moment of inertia and acceleration coefficients that match the manipulator tip mass and moment of inertia. Failure to follow this instruction will lead to a premature end to the drive unit service life, damage to robot parts, or cause residual vibration during positioning.

4.6 Inspection and maintenance

Always perform daily and periodic inspections and make a pre-operation check to ensure there are no problems with the robot and related equipment. If a problem or abnormality is found, then promptly repair it or take other measures as necessary.

Keep a record of periodic inspections or repairs and store this record for at least 3 years.

4.6.1 Before inspection and maintenance work

1. Do not attempt any work or operation unless described in this manual.

Never attempt any work or operation unless described in this manual.

If an abnormal condition occurs, please be sure to contact your distributor. Our service personnel will take appropriate action.



WARNING

Never attempt inspection, maintenance, repair, and part replacement unless described in this manual. These tasks require specialized technical knowledge and skills and may also involve hazards. Please be sure to contact your distributor for advice.

2. Precautions during repair and parts replacement



WARNING

When it is necessary to repair or replace parts of the robot or controller, please be sure to contact your distributor and follow the instructions they provide. Inspection and maintenance of the robot or controller by an unskilled, untrained person is extremely hazardous.

Adjustment, maintenance and parts replacement require specialized technical knowledge and skills, and also may involve hazards. These tasks must be performed only by persons who have enough ability and qualifications required by local laws and regulations.



WARNING

Adjustment and maintenance by removing a cover require specialized technical knowledge and skills, and may also involve hazards if attempted by an unskilled person. This adjustment must be performed only by persons who have the required qualifications described in “2. Qualification of operators/workers” in section 4.1 of this “Safety Instructions”.

3. Shut off all phases of power supply



WARNING

Always shut off all phases of the power supply externally before cleaning the robot and controller or securely tightening the terminal screws etc. Failure to do this may cause electrical shock or product damage or malfunction.

4. Allow a waiting time after power is shut off (Allow time for temperature and voltage to drop)



WARNING

- When performing maintenance or inspection of the robot controller under your distributor's instructions, wait at the 10 minutes or more after turning the power off. Some components in the robot controller are very hot or still retain a high voltage shortly after operation, so burns or electrical shock may occur if those parts are touched.
- The motor and speed reduction gear casing are very hot shortly after operation, so burns may occur if they are touched. Before touching those parts for inspections or servicing, turn off the controller, wait for a while and check that the temperature has cooled.

5. Precautions during inspection of controller



WARNING

- When you need to touch the terminals or connectors on the outside of the controller during inspection, always first turn off the controller power switch and also the power source in order to prevent possible electrical shock.
- Do not disassemble the controller. Never touch any internal parts of the controller. Doing so may cause breakdown, malfunction, injury, or fire.

4.6.2 Precautions during service work

1. Precautions when removing a motor (Vertical mount single-axis robots)



WARNING

The vertical axis will slide down when the motor is removed, causing a hazardous situation.

- Turn off the controller and place a support under the vertical axis before removing the motor.
- Be careful not to let your body get caught by the driving unit of the vertical axis or between the vertical axis and the installation base.

2. Precautions for robot controllers



CAUTION

- Back up the robot controller internal data on an external storage device. The robot controller internal data (programs, point data, etc.) may be lost or deleted for unexpected reasons. Always make a backup of this data.
- Do not use thinner, benzene, or alcohol to wipe off the surface of the programming box. The surface sheet may be damaged or printed letters or marks erased. Use a soft, dry cloth and gently wipe the surface.
- Do not use a hard or pointed object to press the keys on the programming box. Malfunction or breakdown may result if the keys are damaged. Use your fingers to operate the keys.

4.7 Disposal

When disposing of robots and related items, handle them carefully as industrial wastes. Use the correct disposal method in compliance with your local regulations, or entrust disposal to a licensed industrial waste disposal company.

1. Disposal of lithium batteries

When disposing of lithium batteries, use the correct disposal method in compliance with your local regulations, or entrust disposal to a licensed industrial waste disposal company. We do not collect and dispose of the used batteries.

2. Disposal of packing boxes and materials

When disposing of packing boxes and materials, use the correct disposal method in compliance with your local regulations. We do not collect and dispose of the used packing boxes and materials.

5. Using the robot safely

5.1 Movement range

When a tool or workpiece is attached to the robot manipulator tip, the actual movement range enlarges from the movement range of the robot itself to include the areas taken up by movement of the tool and workpiece attached to the manipulator tip.

The actual movement range expands even further if the tool or workpiece is offset from the manipulator tip. The movement range here is defined as the range of robot motion including all areas through which the tool and workpiece attached to the manipulator tip.

5.2 Robot protective functions

Protective functions for robots are described below.

1. Overload detection

This function detects an overload applied to the motor and turns off the servo.

If an overload error occurs, take the following measures to avoid such errors:

1. Insert a timer in the program.
2. Reduce the acceleration.

2. Overheat detection

This function detects an abnormal temperature rise in the driver inside the controller and turns off the servo.

If an overheat error occurs, take the following measures to avoid the error:

1. Insert a timer in the program.
2. Reduce the acceleration.

3. Soft limits

Soft limits can be set on each axis to limit the working envelope in manual (jog) operation and automatic operation after return-to-origin. The working envelope is the area limited by soft limits.



WARNING

Soft limit function is not a safety-related function intended to protect the human body.

To restrict the robot movement range to protect the human body, use the mechanical stoppers installed in the robot (or available as options).

4. Mechanical stoppers

If the servo is turned off by emergency stop operation or protective function while the robot is moving, then these mechanical stoppers prevent the axis from exceeding the movement range. The movement range is the area limited by the mechanical stoppers.



CAUTION

If the robot moving at high speed collides with a mechanical stopper installed in the robot (or available as option), the robot may be damaged.

5. Z-axis (vertical axis) brake

An electromagnetic brake is installed on the Z-axis to prevent the Z-axis from sliding downward when the servo is OFF. This brake is working when the controller is OFF or the Z-axis servo power is OFF even when the controller is ON. The Z-axis brake can be released by the programming unit / handy terminal or by a command in the program when the controller is ON.



WARNING

The vertical axis will slide downward when the brake is released, causing a hazardous situation. Take adequate safety measures in consideration by taking the weight and shape into account.

- Before releasing the brake after pressing the emergency stop button, place a support under the vertical axis so that it will not slide down.
- Be careful not to let your body get caught between the vertical axis and the installation base when performing tasks (direct teaching, etc.) with the brake released.

5.3 Residual risk

To ensure safe and correct use of robots and controllers, System integrators and/or end users implement machinery safety design that conforms to ISO12100.

Residual risks for robots and controllers are described in the DANGER or WARNING instructions provided in each chapter and section. Read them carefully.

5.4 Special training for industrial robot operation

Operators or persons who handle the robot for tasks such as for teaching, programming, movement checks, inspections, adjustments, and repairs must receive appropriate training and also have the skills needed to perform the job correctly and safely. They must also read the manual carefully to understand its contents before attempting the robot operation or maintenance.

Tasks related to industrial robots (teaching, programming, movement check, inspection, adjustment, repair, etc.) must be performed by qualified persons who meet requirements established by local regulations and safety standards for industrial robots.

Comparison of terms used in this manual with ISO

This manual	ISO 10218-1	Note
Maximum movement range	maximum space	Area limited by mechanical stoppers.
Movement range	restricted space	Area limited by movable mechanical stoppers.
Working envelope	operational space	Area limited by software limits.
Within safety enclosure	safeguarded space	

See "5.1 Movement range" in for details on the robot's movement range.

Warranty

The MISUMI robot and/or related product you have purchased are warranted against defects or malfunctions as described below.

■ Warranty description:

This warranty conforms to the "warranty description" listed at the end of the MISUMI "FA Mechanical Standard Components" catalog.

The following cases are not covered under the warranty:

- (1) Products whose serial number or production date (month & year) cannot be verified.
- (2) Changes in software or internal data such as programs or points that were created or changed by the customer.
- (3) Products whose trouble cannot be reproduced or identified by MISUMI.
- (4) Products utilized, for example, in radiological equipment, biological test equipment applications or for other purposes whose warranty repairs are judged as hazardous by MISUMI.

■ Warranty Period:

The warranty period ends when any of the following applies:

- (1) After one year has elapsed from the date of installation
- (2) After 2,400 hours of operation



Introduction

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Introduction

The MISUMI SINGLE AXIS ROBOT RS series are family of single-axis industrial robots that offer improved ease of use, resistance to environmental conditions, and maintenance workability. A wide variety of product lineup allows you to select the desired robot model that best matches your application.

This manual describes the safety measures, handling, adjustment and maintenance of RS series robots for correct, safe and effective use. Be sure to read this manual carefully before installing the robot. Even after you have read this manual, keep it in a safe and convenient place for future reference.

- This manual should be used with the robot and considered an integral part of it.
When the robot is moved, transferred or sold, send this manual to the new user along with the robot. Be sure to explain to the new user the need to read through this manual.
- Specifications of robot models other than standard models may be omitted in this manual if they are common to those of standard models. In this case, refer to the specifications of standard models.
- For details on specific operation of the robot, refer to the separate user's manual for the robot controller being used.

The manual describes the robots listed below.

Type name	Model name
RS Series	RS1/RS2/RS3
RSD Series	RSD1/RSD2/RSD3
RSDG Series	RSDG1/RSDG2/RSDG3
RSF Series	RSF4
RSH Series	RSH1/RSH2/RSH3/RSH4/RSH5
RSB Series	RSB1/RSB2



WARNING

THE ADJUSTMENT AND MAINTENANCE WORK WITH THE COVER REMOVED NEEDS THE SPECIAL KNOWLEDGE AND SKILL. IF UNSKILLED WORK PERSON PERFORMS SUCH WORK, THIS MAY INVOLVE RISK. THESE TASKS MUST BE PERFORMED ONLY BY PERSONS WHO MEET REQUIREMENTS ESTABLISHED BY LOCAL REGULATIONS AND SAFETY STANDARDS FOR INDUSTRIAL ROBOTS.

NOTES

- The contents of this manual are subject to change without prior notice.
- While every effort has been made to ensure the contents of this manual are correct, please contact us if you find any part of this manual to be unclear, confusing or inaccurate.

Before using RSF/RSH/RSB series (Be sure to read the following notes.)

Thanks for your purchasing the single-axis robot RSF/RSH/RSB Series.
Before using this robot, read the following notes and set the origin position.

The RSF/RSH/RSB single-axis robots use an incremental type or absolute type position detector. The absolute type does not require an origin search (return-to-origin) after turning the controller power back on. However, when the controller power is turned on in the following cases, return-to-origin must be performed just the very first time.

1. When robot cable was first connected after delivery from MISUMI.
2. When robot cable was disconnected from the controller and then reconnected.
3. When no absolute battery is connected.
4. When a motor or cable was replaced.

In such cases described above, any of the following errors occurs immediately after the controller power has been turned on, but this is not a malfunction. The controller will operate normally by restarting.

82 ENCODER ERROR
83 ABS. ENCODER ERR.
8A ABS. BATTERY ERR.
8B ABS. COUNT ERROR
8D ABS. OVERFLOW ERR.
....etc.

■ Setting the origin position

Set the origin position while referring to the following section in the robot controller user's manual.

See "6.2 Origin search (return-to-origin)" in "6. Operating the robot" of the "H1 Operation Guide" section.



CAUTION

Changing the origin position to the opposite side of the initial position may cause a position shift or robot breakdowns, so use caution.

Avoid changing the origin detection method since it is dangerous in some cases. If the origin position must be changed, please consult your distributor.

Chapter 1

Installation and connections

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1. Checking the product

After unpacking, make sure that all components and accessories are included (as specified in your order). Also check the product for any damage on the exterior which might have occurred during transportation. If there are any missing parts or damage due to transportation, please notify your distributor immediately.



WARNING

- TO REMOVE THE ROBOT UNIT FROM THE PACKING CASE, GRASP THE UNIT WITH BOTH HANDS (AT THE BOTTOM FACE) NEAR THE TWO ENDS. THE ROBOT SHOULD BE CARRIED IN AN UPRIGHT (SLIDER AT TOP) POSTURE.
- WHEN UNPACKING, CAREFULLY HOLD THE ROBOT NOT TO DROP IT. IF THE ROBOT FALLS, SERIOUS INJURY MAY OCCUR OR THE ROBOT MAY BE DAMAGED.



CAUTION

Make sure that the product you have received is that you ordered. If an incorrect product is installed, this may cause personal injury or damage.

2. Precautions

2.1 Cautions common to all models

1. Use the robot within the maximum operable stroke.

If the robot is used with a stroke exceeding the maximum stroke, this may cause the main unit to break. For details about maximum strokes, see the specifications of each robot.

2. When the robot is reciprocated repeatedly by micro stroke, perform the full stroke operation at least once a day or once every 1,000 reciprocations. Failure to do so may cause grease run-out.

3. Do not apply any excessive external force or impact force to the robot during operation.

Doing so may cause the main unit to break. Each part including the motor is manufactured with a precise tolerance. So, even a slight deformation or positional deviation may cause malfunction.



WARNING

- **BE SURE TO CAREFULLY READ THE MANUALS (THIS MANUAL AND CONTROLLER: C1/C21/C22 USER'S MANUAL).** NEVER ATTEMPT TO PERFORM HANDLING NOT STATED IN THE MANUAL OR OPERATION BEYOND THE SPECIFICATION RANGE. OTHERWISE, THIS MAY CAUSE BREAKAGE OR MALFUNCTION. YAMAHA SHALL NOT BE HELD RESPONSIBLE FOR ANY DEFECT ARISING FROM ANY OPERATION NOT STATED IN THE MANUAL OR BEYOND THE SPECIFICATION RANGE.
- **THE ROBOT HAS A POTENTIAL HAZARD THAT IT PERFORMS AN IMPACT OPERATION AT A SPEED EXCEEDING THE SETTING IF THE FORCE CHANGES AS THE MACHINE SLIDING PART IS PRIED.** SUCH OPERATION MAY CAUSE PERSONAL INJURY, SUCH AS YOUR HAND OR FOOT GET CAUGHT IN OR DAMAGE TO THE MACHINE. SO, MAKE THE ADJUSTMENT SO THAT THE MACHINE PERFORMS THE MOTION SMOOTHLY AND DESIGN THE ROBOT SO THAT ANY PERSONAL INJURY DOES NOT OCCUR.
- **INSTALL AN APPROPRIATE PROTECTIVE COVER IN A PORTION WHERE IS HAZARD TO THE HUMAN BODY.** IF ANY OBJECT TO BE DRIVEN AND ROBOT MOVABLE PART ARE PARTICULARLY HAZARD TO THE HUMAN BODY, DESIGN THE STRUCTURE SO THAT NO HUMAN BODY IS IN CONTACT WITH SUCH PARTS.
- **MAKE THE CONNECTIONS FIRMLY SO THAT THE ROBOT SECURED PORTION OR CONNECTION PORTION DOES NOT BECOME LOOSE.** IN PARTICULAR, WHEN THE OPERATION FREQUENCY IS HIGH OR WHEN THE ROBOT IS USED IN A PLACE WHERE MANY VIBRATIONS EXIST, USE SECURE CONNECTION METHODS.
- **TAKE THE POSSIBILITY OF DRIVE POWER SOURCE FAILURE INTO CONSIDERATION .** TAKE APPROPRIATE MEASURES SO THAT THE HUMAN BODY OR EQUIPMENT IS NOT DAMAGED EVEN WHEN A FAILURE OCCURS IN THE DRIVE POWER SOURCE.
- **TAKE THE BEHAVIOR IN CASE OF AN EQUIPMENT EMERGENCY STOP INTO CONSIDERATION.** DESIGN THE EQUIPMENT SO THAT THE ROBOT MOTION DOES NOT CAUSE DAMAGE TO THE HUMAN BODY, UNIT, AND EQUIPMENT EVEN WHEN THE MACHINE STOPS AS THE EMERGENCY STOP OF THE EQUIPMENT IS ACTIVATED OR THE SAFETY DEVICE IS ACTIVATED IN CASE OF A SYSTEM FAILURE, SUCH AS POWER FAILURE.
- **TAKE THE BEHAVIOR WHEN RESTARTING THE EQUIPMENT AFTER EMERGENCY STOP OR ERROR STOP INTO CONSIDERATION.** DESIGN THE EQUIPMENT SO THAT RESTARTING THE EQUIPMENT WILL NOT CAUSE DAMAGE TO THE HUMAN BODY OR EQUIPMENT.

4. Perform the following inspections before starting the operation.

- Check the electric power cables and signal cables for damage.
- Check the power and signal cable connectors for play or looseness.
- Check the installation portions for play or looseness.
- Check for operation failure.
- Check the emergency stop of the equipment.

5. When multiple personnel perform the work, determine the work procedures, communication signs, actions to be taken in case of a failure, and restoring procedures from failure state before starting the work, and assign a person other than work personnel who supervises the work.

6. The actual speed may not satisfy the set speed depending on the load and resistance conditions. When selecting a robot model, check the selection method and specifications.

7. Do not apply any load, impact, or resistance other than the transfer load during return-to-origin. Otherwise, the origin position may deviate when the push return-toorigin is used.

8. Do not remove the nameplate.

9. Check the robot operation at a low speed. After checking that there is no problem, operate the robot at a specified speed.



WARNING

IF ANY NOISE OR VIBRATION IS FOUND, IMMEDIATELY STOP THE OPERATION.

IF ANY NOISE OR VIBRATION OCCURS, THE PRODUCT INSTALLATION MAY BE FAULTY. IF THE OPERATION CONTINUES, THE EQUIPMENT MAY BE BROKEN.

2.2 The "Emergency Stop" stopping distance (RS1/RS2/RS3)

The maximum stopping distance is 195mm (RS3: payload of 6kg, operation speed of 1m/sec) when the "emergency stop" button is pressed, or when power to the controller is shut off.

2.3 RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3

1. Perform the following inspections before starting the operation.

Strictly observe the specified payload. (For details regarding the payload, refer to "1. Robot specifications" in Chapter 5.)

2. Input appropriate parameters.

(For details about parameters, refer to the C1/C21/C22 User's Manual.)

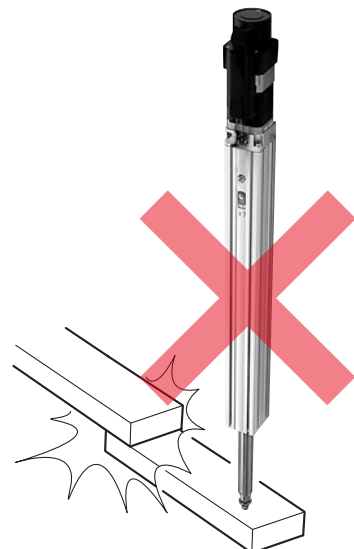
3. Take appropriate measures so that the robot does not interfere with an external object during return-to-origin.



CAUTION

- In the robot with lead 02, the return-to-origin cannot be performed on the non-motor side.
- If there is any interference during return-to-origin, this might cause the position to deviate.

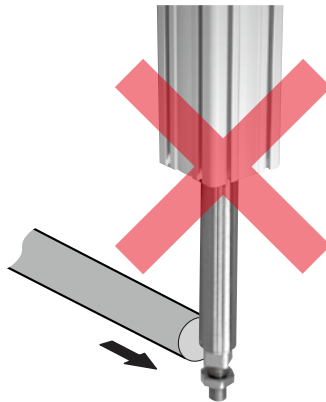
63101-AM-00



4. Cautions on installation

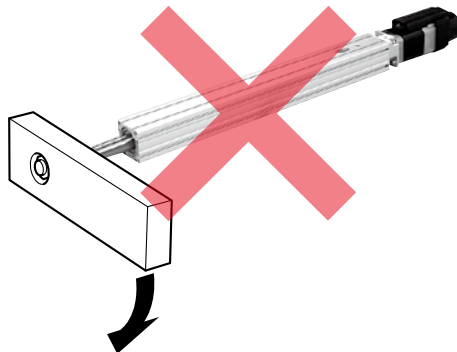
- Install the robot so that any radial load is not applied to the rod.

63102-AM-00

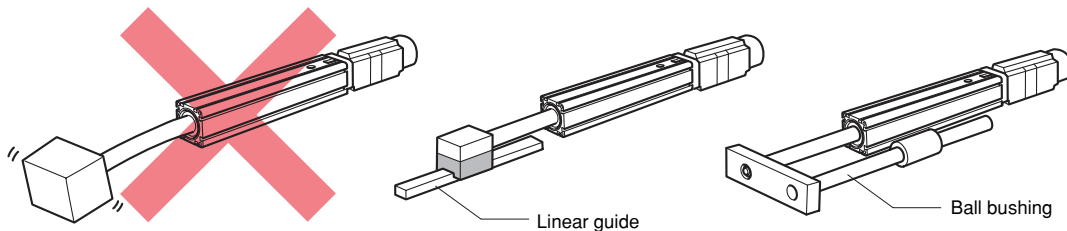


- Do not apply any rotational moment to the rod.

63103-AM-00



- When installing the main unit horizontally, support the load by the external guide such as the linear guide or bushing.
- When fastening the external guide or rod, adjust the alignment so that such parts are not pried or caught in, and put a universal joint to prevent such parts from becoming a load during operation.



63104-AM-00



CAUTION

If the robot is operated with any radial load or moment applied to the rod, this might cause operation fault, shortened service life, or malfunctions.

3. Moving the robot

3.1 Moving the robot with hoist or cart

Using a hoist, carrying cart (dolly) or forklift is recommended for moving a single-axis robot or controller. Use sufficient caution when moving robot models with a long stroke or designed for large payload, since they are heavy.



WARNING

SERIOUS INJURY MAY OCCUR IF THE ROBOT FALLS AND PINS SOMEONE UNDER IT.

- USE A HOIST AND ROPE WITH CARRYING CAPACITY STRONG ENOUGH TO SUPPORT THE ROBOT WEIGHT.
- MAKE SURE THE ROPE STAYS SECURELY ON THE HOIST HOOK.
- REMOVE ALL LOADS ATTACHED TO THE ROBOT MANIPULATOR END. IF ANY LOAD IS STILL ATTACHED, THE ROBOT BALANCE MIGHT SHIFT WHILE BEING CARRIED, AND THE ROBOT TOPPLE OVER CAUSING ACCIDENTS.
- ALWAYS WEAR A SAFETY HELMET, SHOES AND GLOVES DURING WORK.
- WHEN MOVING THE ROBOT BY EQUIPMENT SUCH AS A FORKLIFT THAT REQUIRES A LICENSE, ONLY PROPERLY QUALIFIED PERSONNEL MAY OPERATE SUCH EQUIPMENT. THE EQUIPMENT AND TOOLS USED FOR MOVING THE ROBOT SHOULD BE SERVICED DAILY.

3.2 Moving the robot by work personnel

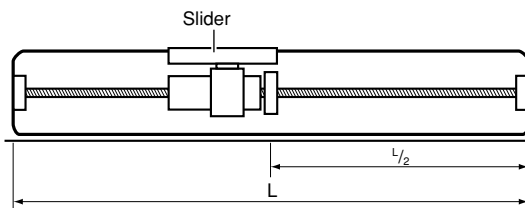
Be sure to move the robot by a reasonable number of work personnel. Each work person holds the bottom close to the both ends of the robot and moves the robot while keeping its balance. At this time, move the robot so that it faces upward (slider is located at the top).



WARNING

ALWAYS OBSERVE THE FOLLOWING PRECAUTIONS WHEN CARRYING THE ROBOT.

- REMOVE ANY AND ALL OBJECTS SUCH AS HANDS AND GRIPPERS ATTACHED TO THE ROBOT SLIDER BEFORE MOVING THE ROBOT. THE SLIDER WILL LOSE BALANCE IF MOVED WITH OBJECTS STILL ATTACHED AND CAUSE INJURIES.
- KEEP THE ROBOT BALANCED AND DON'T LET IT TILT WHILE MOVING IT. IF THE ROBOT TILTS, THE SLIDER MAY MOVE UNDER ITS OWN WEIGHT CAUSING SERIOUS INJURIES SUCH AS CRUSHED FINGERS.
- MOVE THE SLIDER SO THAT BALL NUT SECTION IS POSITIONED IN THE NEAR CENTER OF THE ROBOT BEFORE CARRYING THE ROBOT. FAILURE TO DO SO MAY CAUSE THE BALL SCREW TO SWING OR VIBRATE LARGELY WHILE CARRYING THE ROBOT.



• NEVER ATTEMPT TO HOLD THE ROBOT IN ANY OF THE FOLLOWING MANNERS .

(NEVER TRY THIS WHEN MOVING!)

- DO NOT CARRY BY HOLDING THE SLIDER.
- DO NOT CARRY BY GRIPPING THE END COVER.
- DO NOT CARRY BY HOLDING THE CABLE.
- DO NOT CARRY BY HOLDING THE UPPER COVER.



CAUTION

- When moving or carrying the robot by hand, avoid placing your hand or fingers on the shutter at the top of the robot. Pressing down on the shutter, even by a little force, may cause the shutter to warp or deform, resulting in a premature life end of the related parts.
- Wear safety shoes and gloves before starting the work.

4. Installation environments

Be sure to install the robot in the following environments.

Items	Specifications	
	RS1/RS2/RS3/RSD1/RSD2/RSD3 RSDG1/RSDG2/RSDG3	RSF4/RSH1/RSH2/RSH3/RSH4/RSH5/ RSB1/RSB2
Allowable ambient temperature	0 to 40°C	0 to 45°C
Allowable ambient humidity	35 to 85% RH (non condensation)	
Altitude	0 to 1000 meters above sea level	
Ambient environments	Avoid installing near water, cutting water, oil, dust, metallic chips and organic solvent. Avoid installation near corrosive gas and corrosive materials. Avoid installation in atmosphere containing inflammable gas, dust and liquid. Avoid installation near objects causing electromagnetic interference, electrostatic discharge and radio frequency interference. The environment must be free of coolant.	
Vibration	Do not subject to impacts or vibrations.	
Working space	Allow sufficient space margin to perform jobs (teaching, inspection, repair, etc.)	

For detailed information on how to install the robot controller, refer to the separate "C1/C21/C22 User's Manual".



WARNING

AVOID USING THE ROBOT IN THE FOLLOWING ATMOSPHERE WHERE;

1. A LARGE AMOUNT OF DUST OR DIRT EXISTS OR CUTTING CHIPS ENTER EASILY.
2. THE AMBIENT TEMPERATURE EXCEEDS THE ALLOWABLE AMBIENT TEMPERATURE OF EACH MODEL.
3. THE AMBIENT HUMIDITY EXCEEDS THE ALLOWABLE AMBIENT RELATIVE HUMIDITY OF EACH MODEL.
4. CORROSIVE GAS, FLAMMABLE GAS, SEAWATER, WATER, OR STEAM EXISTS OR STICKS.
5. STRONG MAGNETIC FIELD OR STRONG ELECTRIC FIELD IS GENERATED.
6. VIBRATION OR SHOCK TRANSMITS DIRECTLY.
7. A LARGE AMOUNT OF DUST EXISTS, OR WATER DROPLETS OR OIL DROPS SPLASH.
8. THE ROBOT IS EXPOSED TO THE DIRECT SUNLIGHT (ULTRAVIOLET RAY).



WARNING

- **DO NOT USE THE ROBOT IN AN ENVIRONMENT WHERE THE FLUID, SUCH AS CUTTING OIL DIRECTLY SPLASHES ONTO IT.**
IF THE ROBOT IS USED IN AN ENVIRONMENT WHERE THE CUTTING OIL, COOLANT, OR OIL MIST STICKS TO IT, THIS MAY CAUSE MALFUNCTION OR SLIDING RESISTANCE TO INCREASE.
- **INSTALL A COVER, ETC. WHEN THE ROBOT IS USED IN A PLACE WHERE FOREIGN OBJECTS, SUCH AS DUST, DIRT, CUTTING CHIP, AND SPATTER DIRECTLY SPLASH TO IT.**
OTHERWISE, RATTLE MAY OCCUR OR SLIDING RESISTANCE MAY INCREASE.
- **BLOCK THE SUNLIGHT IN A PLACE WHERE THE ROBOT IS EXPOSED TO THE DIRECT SUNLIGHT.**
- **BLOCK THE HEAT SOURCE WHEN IT EXISTS AROUND THE ROBOT.**
IF THE HEAT SOURCE EXISTS AROUND THE ROBOT, THE TEMPERATURE OF THE ROBOT INCREASES BY THE RADIANT HEAT. THE OPERATING TEMPERATURE INCREASES AND EXCEEDS THE ALLOWABLE AMBIENT TEMPERATURE. SO, BLOCK THE HEAT SOURCE WITH AN APPROPRIATE COVER.
- **IT MAY BE PROMOTED TO DECREASE THE GREASE BASE OIL ACCORDING TO THE EXTERNAL ENVIRONMENT AND OPERATING CONDITIONS. THIS MAY LOWER THE LUBRICATION PERFORMANCE OR MAY ADVERSELY AFFECT THE SERVICE LIFE OF THE ROBOT.**

**WARNING**

- AVOID INSTALLING THE ROBOT IN LOCATIONS WHERE THE AMBIENT CONDITIONS MAY EXCEED THE ALLOWABLE TEMPERATURE OR HUMIDITY, OR IN ENVIRONMENTS WHERE EXCESSIVE MOISTURE, CORROSIVE GASES, METALLIC POWDER OR DUST ARE GENERATED. MALFUNCTIONS, FAILURES OR SHORT CIRCUITS MAY OTHERWISE RESULT.
- THIS ROBOT WAS NOT DESIGNED FOR OPERATION IN ENVIRONMENTS WHERE INFLAMMABLE OR EXPLOSIVE SUBSTANCES ARE PRESENT.
- DO NOT USE THE ROBOT IN ENVIRONMENTS CONTAINING INFLAMMABLE GAS, DUST OR LIQUIDS. EXPLOSIONS OR FIRE COULD OTHERWISE RESULT.
- AVOID USING THE ROBOT IN LOCATIONS SUBJECT TO ELECTROMAGNETIC INTERFERENCE, ELECTROSTATIC DISCHARGE OR RADIO FREQUENCY INTERFERENCE. MALFUNCTIONS MAY OTHERWISE OCCUR.
- DO NOT USE THE ROBOT IN LOCATIONS SUBJECT TO EXCESSIVE VIBRATION. ROBOT INSTALLATION BOLTS MAY OTHERWISE BECOME LOOSE CAUSING THE MANIPULATOR TO FALL OVER.

■ Regarding the side mounted motor type's timing belt:

The tension of the side mounted motor type's timing belt will vary according to the ambient temperature. In cases where the ambient temperature is changed significantly at some point after the robot installation, the timing belt tension should be checked and adjusted if necessary (if outside the prescribed tension range).

For details, see "3. Checking the timing belt tension" "4. Adjusting the timing belt tension" in Chapter 3.

5. Installation base

To mount the robot, use an installation base that satisfies the following conditions.

1. The installation base is subjected to a great deal of stress while the robot is in operation. Prepare a sufficiently rigid and stable installation base, taking into account the robot weight including the end effector (gripper) and workpiece.



WARNING

IF THE INSTALLATION BASE IS NOT SUFFICIENTLY RIGID AND STABLE, VIBRATION (RESONANCE) MAY OCCUR DURING OPERATION, CAUSING ADVERSE EFFECTS ON THE ROBOT WORK.

2. The installation base surface must be machined within a flatness of $\pm 0.05\text{mm}/500\text{mm}$.

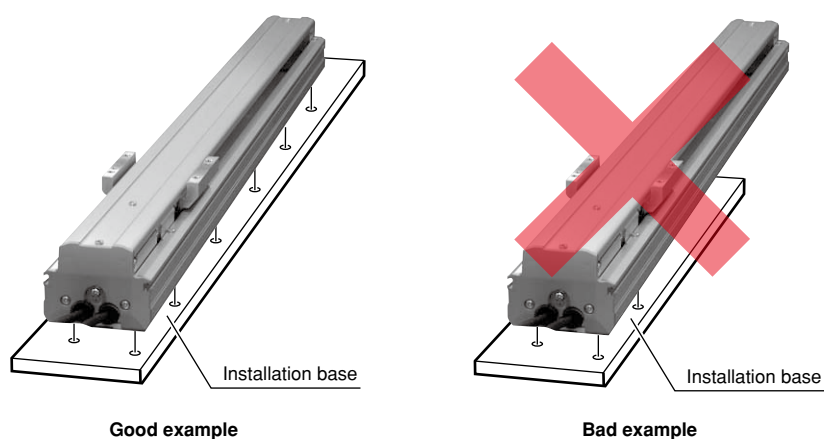


CAUTION

The robot positioning accuracy and service life might decrease if the installation surface precision is insufficient.

3. Use an installation base of sufficient size to match the robot body so that the robot can be installed with the specified number of bolts. Avoid installing the robot with less than the specified number of bolts or installing the robot closer to one end as shown at the lower right.

Example of installation base



23203-A0-00



WARNING

WHEN INSTALLING THE ROBOT, ALWAYS USE ALL THE MOUNTING HOLES DRILLED IN THE BOTTOM OF THE ROBOT. WHEN INSTALLING THE RSD2/RSDG2 OR RSD3/RSDG3, ALWAYS USE THE SPECIFIED NUMBER OF BOLTS. USING LESS THAN THE SPECIFIED NUMBER OF BOLTS TO INSTALL THE ROBOT MAY CAUSE VIBRATION AND POOR POSITIONING ACCURACY. THIS MAY ALSO RESULT IN POSITIONING ERRORS AND REDUCED SERVICE LIFE IN THE WORST CASES.



NOTE

Positions of robot mounting holes differ according to the stroke length of each robot. For details, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

6. Installing the robot



WARNING

THE INSTALLATION WORK WITH THE COVER REMOVED REQUIRES SPECIALIZED TECHNICAL KNOWLEDGE AND SKILLS, AND ALSO MAY INVOLVE HAZARDS. THESE TASKS MUST BE PERFORMED ONLY BY PERSONS WHO MEET REQUIREMENTS ESTABLISHED BY LOCAL REGULATIONS AND SAFETY STANDARDS FOR INDUSTRIAL ROBOTS.



WARNING

- BEFORE INSTALLING THE ROBOT, ALWAYS MAKE SURE THAT THE ROBOT CONTROLLER IS NOT CONNECTED TO THE ROBOT OR THE POWER TO THE CONTROLLER IS OFF. SERIOUS ACCIDENTS MAY OCCUR IF THE ROBOT STARTS TO OPERATE DURING INSTALLATION.
- BE SURE TO USE THE BOLTS OF THE SPECIFIED SIZE AND LENGTH AND TIGHTEN THEM SECURELY TO THE CORRECT TORQUE IN THE CORRECT POSITIONS. FAILURE TO FOLLOW THIS INSTRUCTION MAY CAUSE ROBOT VIBRATIONS, POSITION ERRORS AND SERIOUS ACCIDENTS. DO NOT USE A BOLT LONGER THAN THE SPECIFIED LENGTH SINCE IT MAY INTERFERE WITH THE INTERNAL PARTS OF THE ROBOT AND CAUSE MALFUNCTIONS.



WARNING

- **DO NOT MAKE ANY ADDITIONAL MACHINING OF THE PRODUCT.**
IF THE PRODUCT IS MACHINED ADDITIONALLY, THE STRENGTH MAY BECOME INSUFFICIENT, CAUSING PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT OR UNIT.
- **MAKE THE CONNECTION SO THAT THE ROD AXIS CENTER IS ALWAYS ALIGNED WITH THE LOAD TRANSFER DIRECTION.**
IF NOT ALIGNED, THE FEED SCREW IS PRIED, CAUSING WEAR OR BREAKAGE.
- **WHEN USING AN EXTERNAL GUIDE, CONNECT THE ROBOT MOVABLE PART AND LOAD SO THAT NO PART IS NOT PRIED OVER THE STROKE.**
DO NOT HIT ANY OBJECT AGAINST THE SLIDING PART, BODY, PISTON ROD SLIDING PART, OR TABLE SO THAT IT IS NOT DAMAGED OR DENT. EACH PART IS MANUFACTURED WITH A PRECISE TOLERANCE. SO, EVEN A SLIGHT DEFORMATION MAY CAUSE MALFUNCTION.
- **APPLY THE GREASE TO THE ROTATING PART (PIN, ETC.) TO PREVENT SEIZURE.**
- **DO NOT USE THE ROBOT UNTIL THE PROPER OPERATION OF THE EQUIPMENT IS CONFIRMED.**
AFTER COMPLETION OF THE INSTALLATION OR REPAIR WORK, CONNECT THE ELECTRIC POWER AND PERFORM THE PROPER FUNCTIONAL INSPECTION TO CHECK THAT THE INSTALLATION IS CORRECT.
- **WHEN INSTALLING THE ROBOT MAIN UNIT OR WORKPIECE, DO NOT APPLY ANY IMPACT OR EXCESSIVE MOMENT.**
IF AN EXTERNAL FORCE EXCEEDING THE ALLOWABLE MOMENT IS APPLIED, THIS MAY CAUSE RATTLE TO OCCUR IN THE GUIDE OR SLIDING RESISTANCE TO INCREASE.
- **KEEP A SUFFICIENT MAINTENANCE SPACE.**
KEEP A SUFFICIENT SPACE NECESSARY FOR THE MAINTENANCE AND INSPECTION WORK.



CAUTION

Be sure to wear gloves before starting the work. If you touch any steel material portion directly by your bare hand, this may cause rust.

6.1 RS1/RS2/RS3

Drill holes into the surface of the installation base as shown in the figure below, and secure the robot with the prescribed bolts which are inserted from the installation base's bottom face. The bolts and tightening torques are shown below.

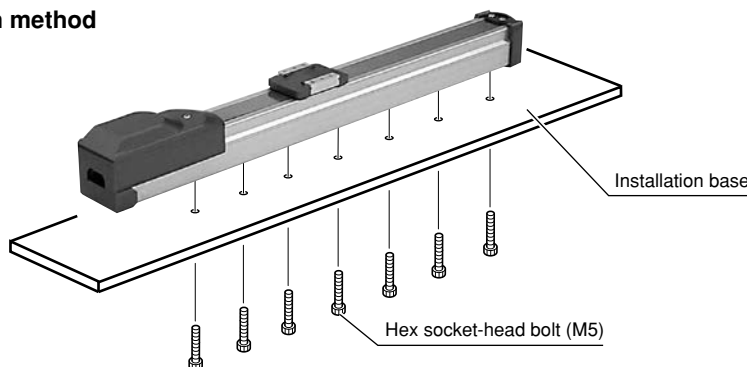


CAUTION
Do not pull the motor cable. Doing so might cause faulty wiring.

■ RS1

Robot	Installation bolt	Tightening torque
RS1	Hex socket-head bolt (M5), Strength: 8.8T Length: Installation base thickness + 8mm (maximum)	60 to 90kgf•cm

Installation method



63205-AM-00

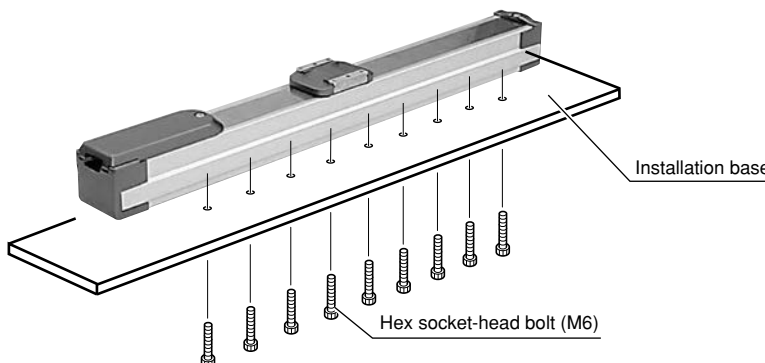


NOTE
For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

■ RS2/RS3

Robot	Installation bolt	Tightening torque
RS2/RS3	Hex socket-head bolt (M6), Strength: 8.8T Length: Installation base thickness + 8mm (maximum)	100 to 130kgf•cm

Installation method



63206-AM-00



NOTE
For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

6.2 RSD1/RSD2/RSD3



CAUTION

- Do not pull the motor cable. Doing so might cause faulty wiring.
- Never loosen the mechanical stopper clamp bolt. Doing so might cause malfunctions.

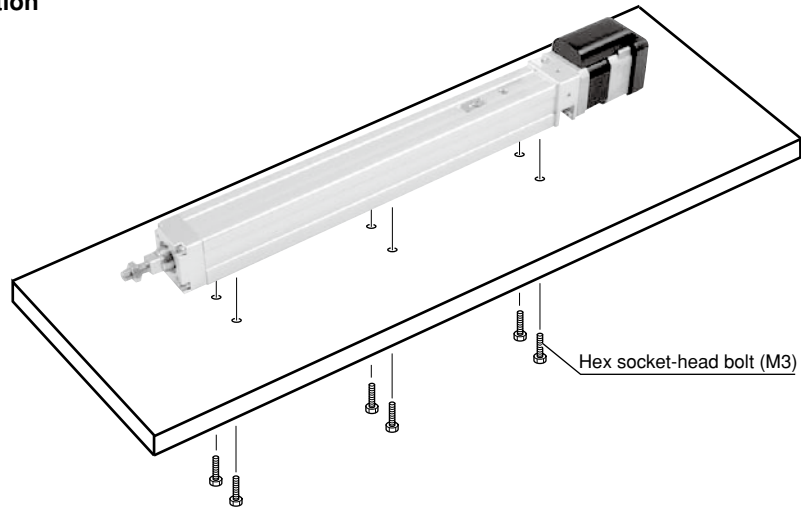
6.2.1 Installing the bottom of the robot main unit

■ RSD1/RSDG1

Drill holes into the surface of the installation base as shown in the figure below, and secure the robot with the prescribed bolts which are inserted from the installation base's bottom face. The bolts and tightening torques are shown below. For details regarding the mounting hole positions of the robot, refer to the dimensional outline drawings in "1. Robot specifications" of Chapter 5.

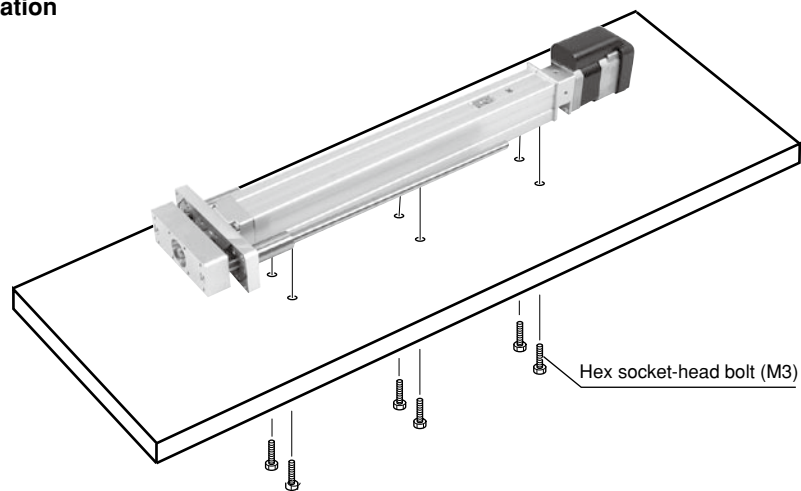
Robot	Installation bolt	Tightening torque
RSD1/RSDG1	Hex socket-head bolt (M3), Strength: 8.8T or more Length: Installation base thickness + 4 mm	20kgf·cm

RSD1 Installation



63207-AM-00

RSDG1 Installation



63208-AM-00



NOTE

For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

■ RSD2/RSD3/RSDG2/RSDG3

Drill holes into the robot installation surface of the base as shown in the figure below, and use the specified bolts which are inserted from the bottom of the base and the T-slots on the side surface of the main unit to secure the robot. Use square nuts supplied with the robot for the installation nuts. If the number of nuts is insufficient, use generally available square nuts (raw material: iron or SUS).



WARNING

ALWAYS USE IRON OR SUS SQUARE NUTS FOR THE INSTALLATION NUTS. IF NUTS MADE OF OTHER MATERIAL OR HEX NUTS ARE USED, SCREW THREADS MAY BE CHIPPED OR BEARING SURFACE MAY BE SUNK. AS A RESULT, SUFFICIENT FASTENING MAY NOT BE OBTAINED, CAUSING A HAZARDOUS SITUATION.

Robot	Installation bolt	Tightening torque
RSD2/RSDG2	Hex socket-head bolt (M3), Strength: 8.8T or more Length: Installation base thickness + 4mm or more and 5mm or less.	20kgf•cm
RSD3/RSDG3	Hex socket-head bolt (M4), Strength: 8.8T or more Length: Installation base thickness + 5mm or more and 6mm or less.	38kgf•cm



WARNING

ALWAYS USE TWO T-SLOTS AND THREE OR MORE BOLTS FOR EACH SLOT (SIX OR MORE BOLTS IN TOTAL) TO FASTEN THE ROBOT.

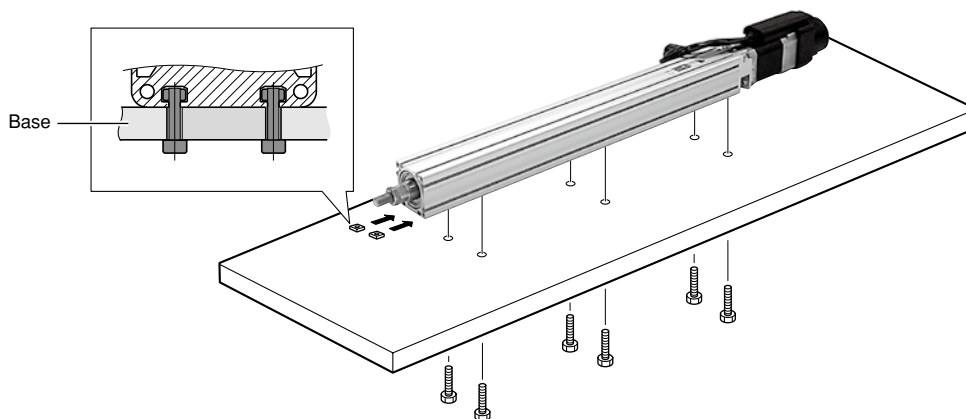
Select an installation bolt with an appropriate nominal length that maintains a sufficient screw thread fit portion to the nut while referring to the dimensional outline drawings in "1. Robot specifications" of Chapter 5.



WARNING

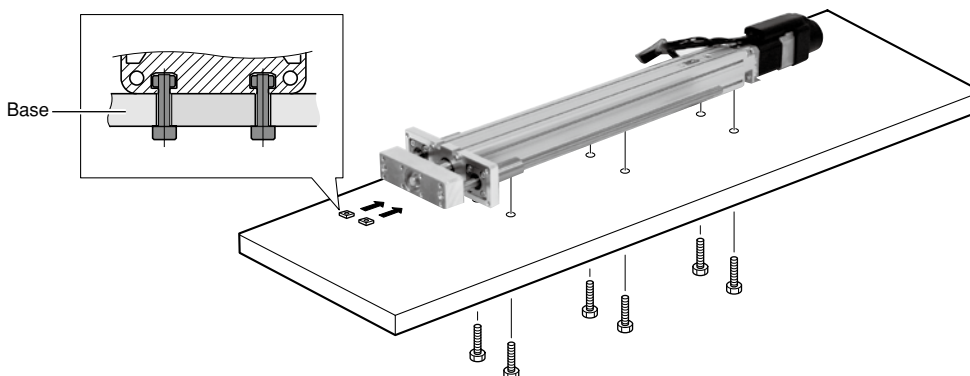
IF THE SCREW THREAD FIT PORTION OF THE BOLT TO THE NUT IS SHORT, LOOSE BOLT OR SCREW THREAD CRUSH MAY OCCUR. AS A RESULT, SUFFICIENT FASTENING MAY NOT BE OBTAINED, CAUSING A HAZARDOUS SITUATION.

RSD2/RSD3



63209-AM-00

RSDG2/RSDG3



63210-AM-00



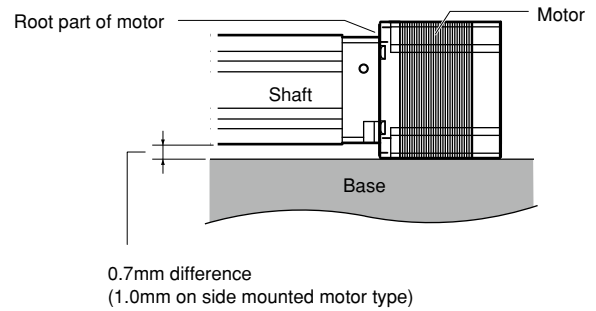
NOTE

For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

**WARNING**

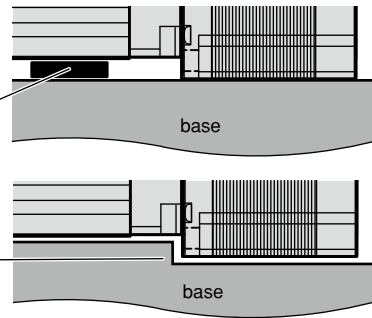
AS SHOWN IN THE FIGURE AT RIGHT, THE MOTOR PART OF THE RSD3 (INCLUDING SIDE MOUNTED MOTOR TYPE)/RSDG3 IS WIDER THAN THE ROBOT BODY. WHEN INSTALLING THE ROBOT ON A FLAT SURFACE, THE MAIN UNIT IS INCLINED AND AN EXCESSIVE LOAD IS APPLIED TO THE ROOT PART OF THE MOTOR, RESULTING IN BREAKAGE. SO, TAKE APPROPRIATE MEASURES, SUCH AS RELIEF OF THE MOTOR (REFER TO THE FIGURE BELOW) OR USE OF OPTIONAL FOOT. (FOR DETAILS REGARDING THE FOOT, REFER TO "6.2.3. INSTALLING THE ROBOT USING THE FEET (OPTION)" OF THIS CHAPTER.)

63211-AM-00

**Example of corrective measures during installation of RSD3/RSDG3**

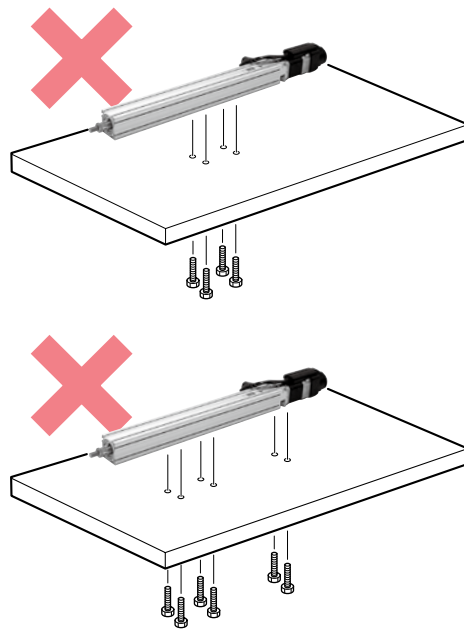
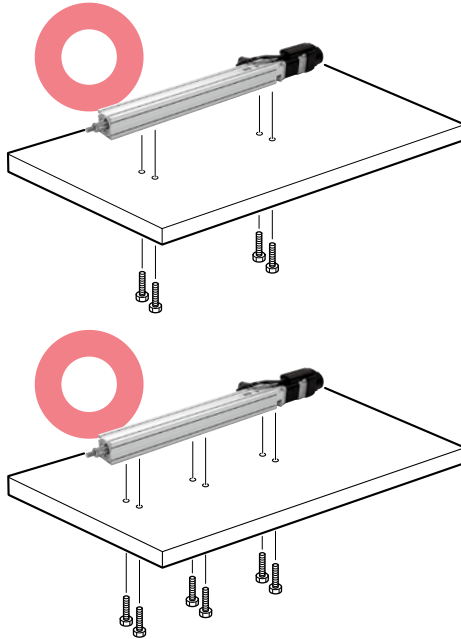
Install a plate with a thickness of 0.7mm (1.0mm on side mounted motor type) or more on the base.

Cut out 0.7mm or more (1.0mm or more on side mounted motor type) from the base.



63212-AM-00

Lay out the outermost installation bolts close to both ends of the T sots. Additionally, keep the installation pitch of each bolt constant.

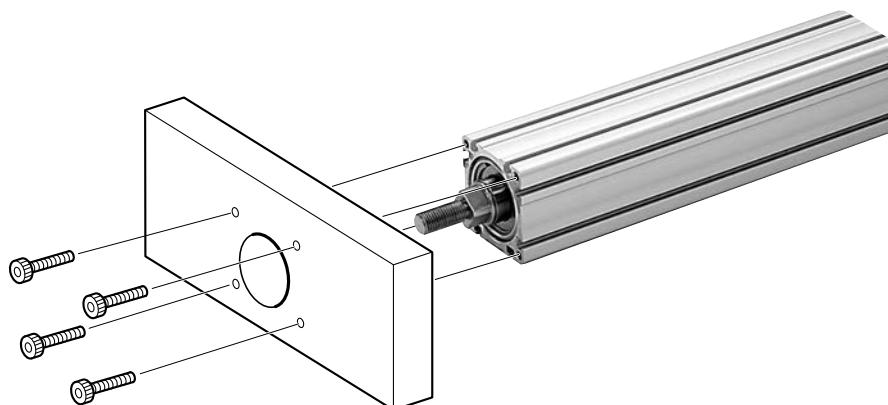
Example of robot installation

63213-AM-00

6.2.2 Installing the robot using the main unit installation taps (End face installation)

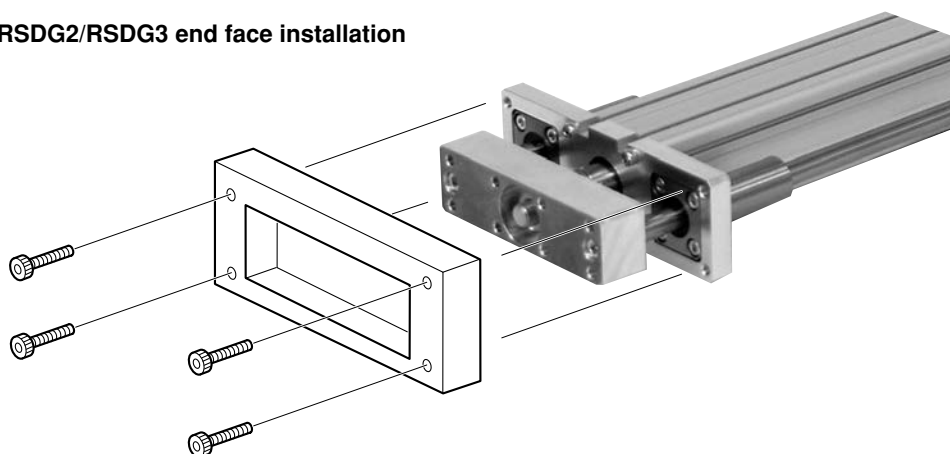
Use the main unit installation taps (4 locations) in the end face of the main unit to install the robot.

RSD2/RSD3 end face installation



63214-AM-00

RSDG2/RSDG3 end face installation



63215-AM-00

Robot	Installation bolt	Tightening torque	Nominal length of installation bolt
RSD1/ RSDG1	Hex socket-head bolt (M4) Strength: 8.8T or more	38kgf•cm	Installation tap depth: 10mm * Select a nominal length of the bolt so that the screw thread fit length is 6mm or more and 10mm or less.
RSD2	Hex socket-head bolt (M4) Strength: 8.8T or more	38kgf•cm	
RSDG2	Hex socket-head bolt (M5) Strength: 8.8T or more	60 to 90kgf•cm	Installation tap depth: 12mm * Select a nominal length of the bolt so that the screw thread fit length is 8mm or more and 12mm or less.
RSD3	Hex socket-head bolt (M5) Strength: 8.8T or more	60 to 90kgf•cm	
RSDG3	Hex socket-head bolt (M6) Strength: 8.8T or more	100 to 130kgf•cm	Installation tap depth: 10.5mm * Select a nominal length of the bolt so that the screw thread fit length is 6mm or more and 10.5mm or less.



CAUTION

Use all the installation taps to install the robot. Using less than the specified number of installation taps may cause poor rigidity.

6.2.3 Installing the robot using the feet (option)

Use optional feet to install the robot.

For details regarding how to install the feet, refer to the dimensional outline drawings in "1. Robot specifications" of Chapter 5.

Step 1 Installing the foot on the robot.

For the RSD1/RSDG1, use installation bolts to install the foot on the robot.

For the RSD2/RSD3/RSDG2/RSDG3, pass the square nut supplied with the robot through the T-slot on the side surface of the main unit and use the bolts to install the foot on the robot.

Robot	Installation bolt	Tightening torque	Notes
RSD1/ RSDG1	Hex socket-head bolt (M3) Strength: 8.8T or more Length: 10mm	20kgf•cm	Use two hex socket-head bolts (M3) for each foot.
RSD2/ RSDG2	Hex socket-head bolt (M3) Strength: 8.8T or more Length: 10mm	20kgf•cm	Use six square nuts and six hex socket-head bolts (M3) for each foot.
RSD3/ RSDG3	Hex socket-head bolt (M4) Strength: 8.8T or more Length: 12mm	38kgf•cm	Use four square nuts and four hex socket-head bolts (M4) for each foot.

Foot installation



63216-AM-00



WARNING

ALWAYS USE TWO OR MORE FEET.

USE THE SPECIFIED NUMBER OF BOLTS TO INSTALL THE FOOT ON THE ROBOT MAIN UNIT. USING LESS THAN THE SPECIFIED NUMBER OF BOLTS TO INSTALL THE FOOT ON THE ROBOT MAY CAUSE VIBRATION AND POOR POSITIONING ACCURACY. THIS MAY ALSO RESULT IN POSITIONING ERRORS AND REDUCED SERVICE LIFE IN THE WORST CASES.

Step 2 *Installing the robot main unit with the feet installed on the base.*

Drill holes into the robot installation surface of the base as shown in the figure below, and secure the robot main unit with the feet installed using the specified bolts. The bolts and tightening torques are shown below.

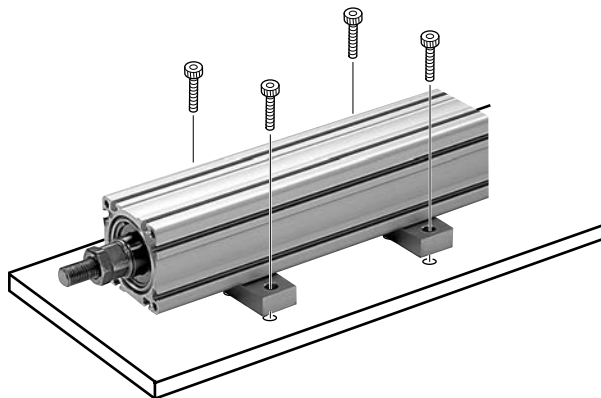
Robot	Installation bolt	Tightening torque	Nominal length of installation bolt
RSD1/ RSDG1	Hex socket-head bolt (M5) Strength: 8.8T or more	60 to 90kgf•cm	10mm + Base securing length
RSD2/ RSDG2	Hex socket-head bolt (M6) Strength: 8.8T or more	100 to 130kgf•cm	10mm + Base securing length
RSD3/ RSDG3	Hex socket-head bolt (M6) Strength: 8.8T or more	100 to 130kgf•cm	12mm + Base securing length



WARNING

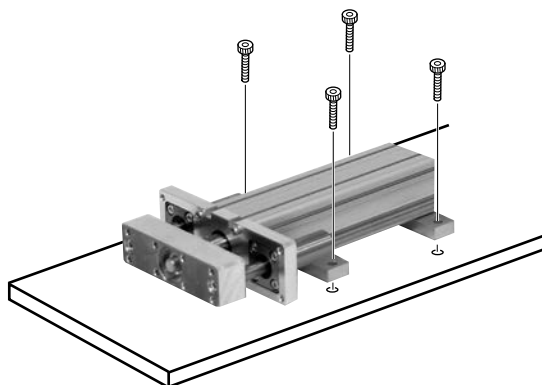
WHEN INSTALLING THE ROBOT ON THE INSTALLATION BASE, ALWAYS USE ALL THE HOLES IN THE FEET. USING LESS THAN THE SPECIFIED NUMBER OF BOLTS TO INSTALL THE ROBOT MAY CAUSE VIBRATION AND POOR POSITIONING ACCURACY. THIS MAY ALSO RESULT IN POSITIONING ERRORS AND REDUCED SERVICE LIFE IN THE WORST CASES.

Installing the RSD1/ RSD2/ RSD3 on the installation base.



63217-AM-00

Installing the RSDG1/ RSDG2/ RSDG3 on the installation base.



63218-AM-00

6.2.4 Installing the robot using the flange (option)

Use an optional flange to install the robot.

For details regarding how to install the flange, refer to the dimensional outline drawings "1. Robot specifications" of Chapter 5.

Step 1 Installing the flange on the robot main unit.

Use the installation bolts (4 pcs.) to install the flange on the robot main unit.

The bolts and tightening torques are shown below.

Robot	Installation bolt	Tightening torque	Nominal length of installation bolt
RSD1	Hex socket-head bolt (M3) Strength: 8.8T or more	20kgf•cm	Length under head, 12mm or more and 16mm or less
RSD2	Hex socket-head bolt (M4) Strength: 8.8T or more	38kgf•cm	
RSD3	Hex socket-head bolt (M5) Strength: 8.8T or more	60 to 90kgf•cm	

Flange installation



63219-AM-00

Flange part Nos

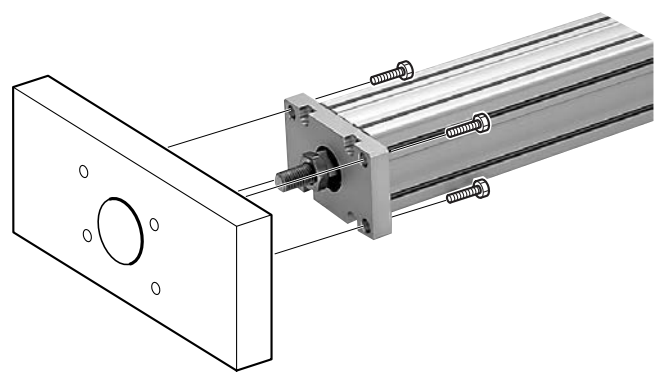
Robot	Part No.	Part Name	Notes
RSD1	EXRS-VP1	FLANGE	Flange (for attachment at rod protruding face)
RSD2	EXRS-VP2	FLANGE	
RSD3	EXRS-VP3	FLANGE	

Step 2 Installing the robot main unit with the flange installed on the base.

Use the main unit mounting holes in the end face of the main unit to install the flange on the base.

Robot	Installation bolt	Tightening torque	Nominal length of installation bolt
RSD1	Hex socket-head bolt (M4) Strength: 8.8T or more	38kgf•cm	Length under head, 10mm + Base securing length
RSD2	Hex socket-head bolt (M6) Strength: 8.8T or more	100 to 130kgf•cm	
RSD3	Hex socket-head bolt (M6) Strength: 8.8T or more	100 to 130kgf•cm	

Installation on base



63220-AM-00

6.3 RSF4

To install the RSF4 robot, use either of the following two methods.

Method A: Drill holes through the installation base and secure the robot to the base with M8 bolts from the bottom.

(M8 tapped holes are already machined on the bottom of the robot frame.)

Method B: Tap holes into the installation base and secure the robot to the base with M6 bolts from inside of the robot frame.



WARNING

BEFORE INSTALLING THE ROBOT, ALWAYS MAKE SURE THAT THE ROBOT CONTROLLER IS NOT CONNECTED TO THE ROBOT OR THE POWER TO THE CONTROLLER IS OFF. SERIOUS ACCIDENTS MAY OCCUR IF THE ROBOT STARTS TO OPERATE DURING INSTALLATION.



CAUTION

Be sure to wear safety gloves before starting the installation work. If you touch any steel material part by bare hand, this may cause rust.

■ Installation method A

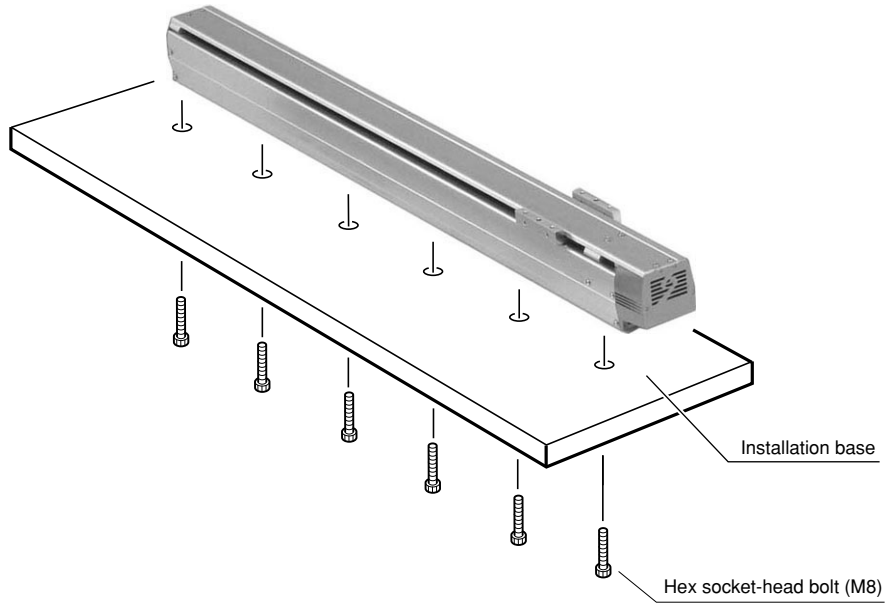
Drill holes through the installation base where the robot is to be secured. Then secure the robot with the specified bolts from the bottom. The bolts and tightening torque are shown below.

Robot	Bolt	Tightening torque
RSF4	Hex socket-head bolt (M8), Strength: 8.8T Length: installation base thickness + 12mm (maximum)	230 to 370kgf·cm



WARNING

- BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.
- IF A BOLT WITH A LENGTH EXCEEDING THE SPECIFIED LENGTH IS USED, IT MAY INTERFERE WITH AN INTERNAL UNIT, CAUSING MALFUNCTION. BE SURE TO USE A BOLT WITH THE SPECIFIED LENGTH.

Installation method A

63106-AM-00

**NOTE**

For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

■ Installation method B

Step 1 Tap M6 holes in the installation base where the robot is to be secured.



NOTE
For details about machining dimensions and positions, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

Step 2 Remove the robot side cover (on one side).

Remove the screws securing the side cover of the robot and remove the side cover (on one side).
(When necessary, remove also the upper cover.)
Be careful not to drop any screw.

23202-A4-00

Step 3 Move the slider.

Move the slider to a position where the installation holes in the bottom of the robot are not hidden.

63107-AM-00

Step 4 Secure the robot body.

Secure the robot body to the installation base with the specified bolts.



WARNING
BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.

The bolts and tightening torque are shown below.

Robot	Bolt	Tightening torque
RSF4	Hex socket-head bolt (M6) Strength: 8.8T Length: longer than 25mm	100 to 130kgf·cm

23204-A4-00

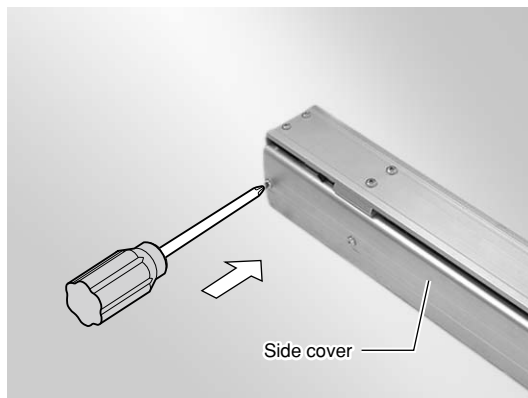


WARNING
BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.

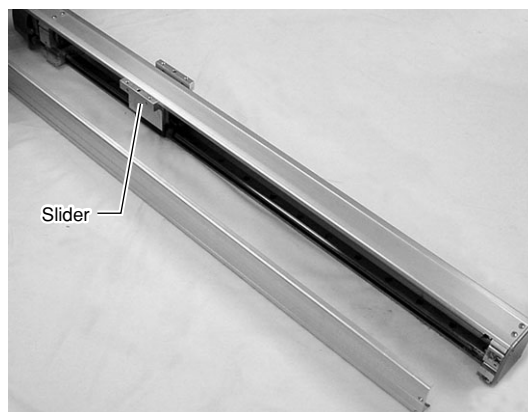
Step 5 Reattach the side covers after installing the robot.

Be sure to tighten all the bolts securely.

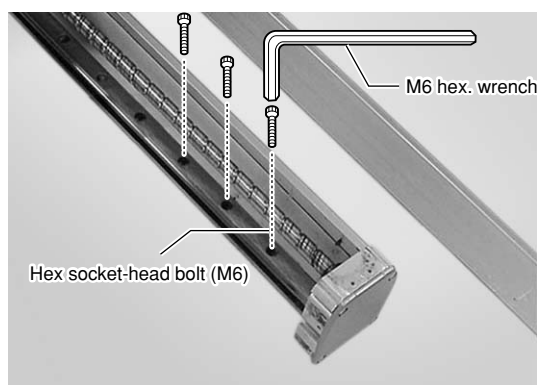
▶ **Step 2** Removing the side cover



▶ **Step 3** Moving the slider



▶ **Step 4** Installing the robot



■ Protective bonding

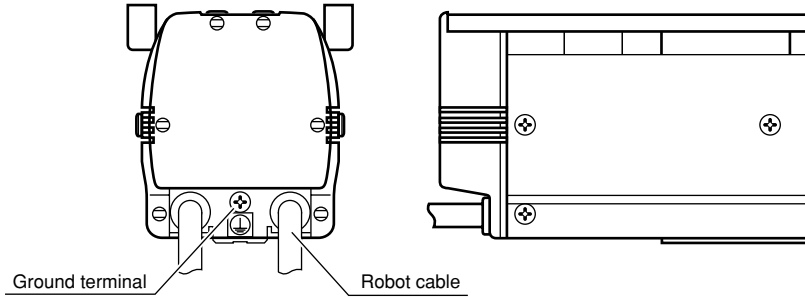


WARNING

ALWAYS GROUND THE ROBOT AND CONTROLLER UNIT TO PREVENT ELECTRICAL SHOCK.

Always use the ground terminal (M4 screw) on the robot unit to make ground connection. The ground terminal location is shown below.

Ground terminal position



23205-A4-00



CAUTION

- A secure ground connection (less than 100-ohm resistance to ground) is recommended.
- Use electrical wire thicker than AWG14 (2mm²) as the ground wire.

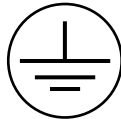


WARNING

ALWAYS TURN OFF THE POWER TO THE CONTROLLER BEFORE MAKING THE GROUND CONNECTION.

Provide a terminal marked "PE" as the protective conductor for the entire system, and connect it to an external protective conductor. Also securely connect the ground terminal on the robot frame to the protective conductor.

Grounding



(In conformity with 417-IEC-5019)

23204-A0-00

6.4 RSH1/RSH2/RSH3

To install the RSH1/RSH2/RSH3 robot, tap holes in the installation base and secure the robot to the base with M5 bolts from the inside of the robot frame.



WARNING

- BEFORE INSTALLING THE ROBOT, ALWAYS MAKE SURE THAT THE ROBOT CONTROLLER IS NOT CONNECTED TO THE ROBOT OR THE POWER TO THE CONTROLLER IS OFF. SERIOUS ACCIDENTS MAY OCCUR IF THE ROBOT STARTS TO OPERATE DURING INSTALLATION.
- BE SURE TO USE THE BOLTS OF THE SPECIFIED SIZE AND LENGTH AND TIGHTEN THEM SECURELY TO THE CORRECT TORQUE IN THE CORRECT POSITIONS. FAILURE TO FOLLOW THIS INSTRUCTION MAY CAUSE ROBOT VIBRATIONS, POSITION ERRORS AND SERIOUS ACCIDENTS.
DO NOT USE A BOLT LONGER THAN THE SPECIFIED LENGTH SINCE IT MAY INTERFERE WITH THE INTERNAL PARTS OF THE ROBOT AND CAUSE MALFUNCTIONS.



CAUTION

Be sure to wear safety gloves before starting the installation work. If you touch any steel material part by bare hand, this may cause rust.

■ Installation method

Step 1 Tap M5 holes in the installation base where the robot is to be secured.



NOTE

For details about machining dimensions and positions, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

Step 2 Remove the upper cover of the robot.

Remove the screws (3 pcs.) securing the upper cover of the robot and remove the upper cover.

Be careful not to drop any screw.

Move the slider to a position where the installation holes in the bottom of the robot are not hidden.

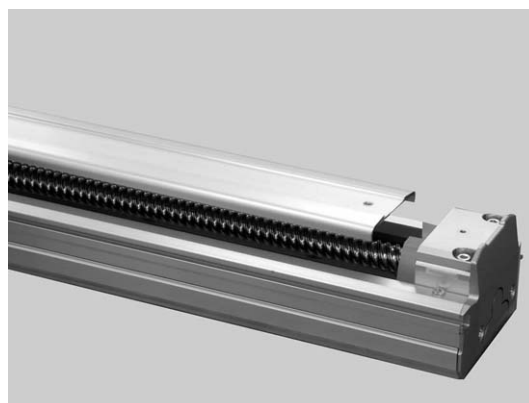
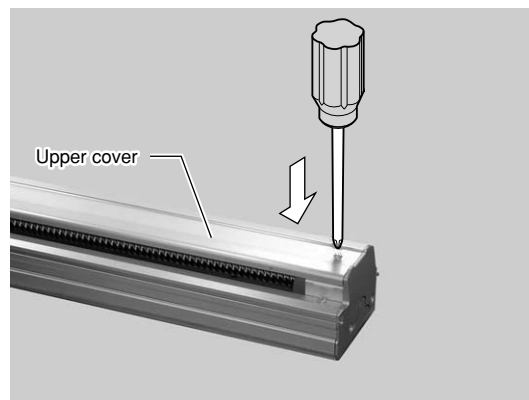
<In the case of robot with brake>

After connecting to the controller and releasing the brake, move the slider.

When the moving is completed, Be sure to turn off the controller power.

23201-A5-00

▶ Step 2 Removing the upper cover



Step 3 Secure the robot body.

Secure the robot body to the installation base with the specified bolts.

**WARNING**

BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.

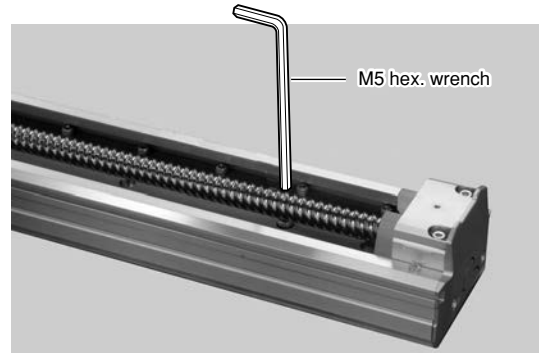
The bolts and tightening torque are shown below.

Robot	Bolt	Tightening torque
RSH1	Hex socket-head bolt (M5)	60 to 90kgf•cm
RSH2	Strength: 8.8T	
RSH3	Length: longer than 20mm	

**WARNING**

BE SURE TO TIGHTEN THE BOLT TO THE CORRECT TORQUE. THE WRONG TORQUE MAY NOT ONLY CAUSE ROBOT POSITION ERRORS BUT ALSO LEAD TO SERIOUS ACCIDENTS.

23202-A5-00

Step 3 Installing the robot**Step 4** Reattach the upper covers after installing the robot.

Be sure to tighten all the bolts securely.

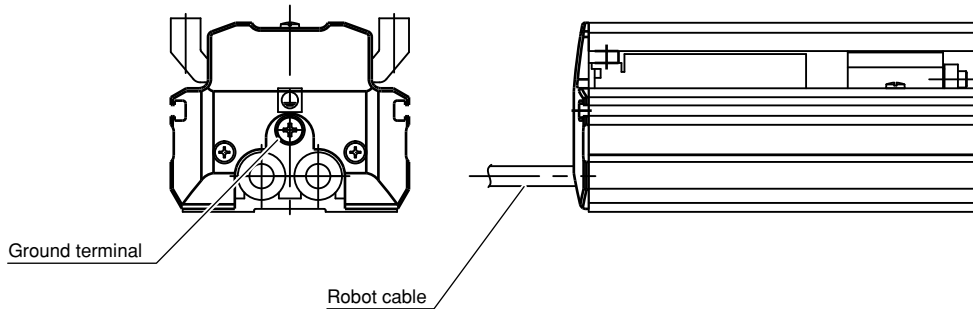
■ Protective bonding

**WARNING**

ALWAYS GROUND THE ROBOT AND CONTROLLER UNIT TO PREVENT ELECTRICAL SHOCK.

Always use the ground terminal (M4 screw) on the robot unit to make ground connection. The ground terminal location is shown below.

Ground terminal position



23203-A5-00

**CAUTION**

- A secure ground connection (less than 100-ohm resistance to ground) is recommended.
- Use electrical wire thicker than AWG14 (2mm²) as the ground wire.

**WARNING**

ALWAYS TURN OFF THE POWER TO THE CONTROLLER BEFORE MAKING THE GROUND CONNECTION.

Provide a terminal marked "PE" as the protective conductor for the entire system, and connect it to an external protective conductor. Also securely connect the ground terminal on the robot frame to the protective conductor.

Grounding



(In conformity with 417-IEC-5019)

23204-A0-00

6.5 RSH4

To install the RSH4 robot, use either of the following two methods.

Method A: Drill holes through the installation base and secure the robot to the base with M5 bolts from the bottom.

(M5 tapped holes are already machined on the bottom of the robot frame.)

Method B: Tap holes into the installation base and secure the robot to the base with M5 bolts from inside of the robot frame.



WARNING

BEFORE INSTALLING THE ROBOT, ALWAYS MAKE SURE THAT THE ROBOT CONTROLLER IS NOT CONNECTED TO THE ROBOT OR THE POWER TO THE CONTROLLER IS OFF. SERIOUS ACCIDENTS MAY OCCUR IF THE ROBOT STARTS TO OPERATE DURING INSTALLATION.



CAUTION

Be sure to wear safety gloves before starting the installation work. If you touch any steel material part by bare hand, this may cause rust.

■ Installation method A

Drill holes through the installation base where the robot is to be secured. Then secure the robot with the specified bolts from the bottom. The bolts and tightening torque are shown below.

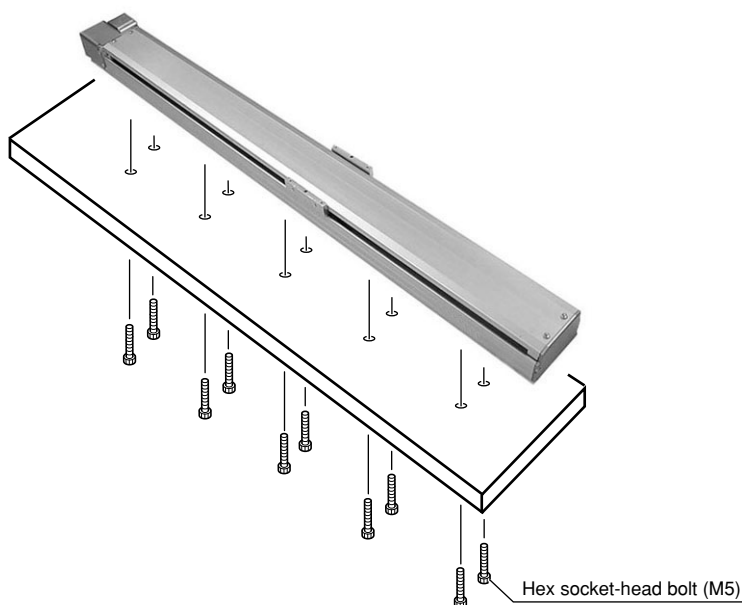
Robot	Bolt	Tightening torque
RSH4	Hex socket-head bolt (M5), Strength: 8.8T Length: installation base thickness + 9mm (maximum)	60 to 90kgf•cm



WARNING

- BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.
- IF A BOLT WITH A LENGTH EXCEEDING THE SPECIFIED LENGTH IS USED, IT MAY INTERFERE WITH AN INTERNAL UNIT, CAUSING MALFUNCTION. BE SURE TO USE A BOLT WITH THE SPECIFIED LENGTH.

Installation method A



63108-AM-00



CAUTION

The robot frame is made of aluminum so be careful not to damage the screw threads when tightening the bolt.



NOTE

For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

■ Installation method B

Step 1 Tap M5 holes in the installation base where the robot is to be secured.



NOTE

For details about machining dimensions and positions, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

Step 2 Remove the upper cover of the robot.

Remove the screws securing the upper cover of the robot and remove the upper cover.

Be careful not to drop any screw.

63109-AM-00

Step 3 Move the slider.

Move the slider to a position where the installation holes in the bottom of the robot are not hidden.

<In the case of robot with brake>

After connecting to the controller and releasing the brake, move the slider.

When the moving is completed, Be sure to turn off the controller power.

63110-AM-00

Step 4 Secure the robot body.

Secure the robot body to the installation base with the specified bolts.



WARNING

BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.

The bolts and tightening torque are shown below.

Robot	Bolt	Tightening torque
RSH4	Hex socket-head bolt (M5) Strength: 8.8T Length: longer than 20mm	60 to 90kgf·cm



WARNING

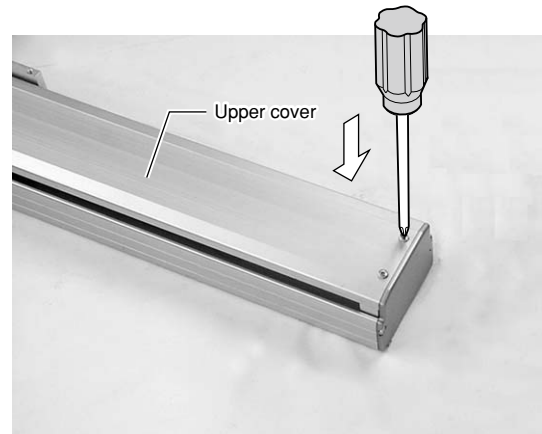
BE SURE TO TIGHTEN THE BOLT TO THE CORRECT TORQUE. THE WRONG TORQUE MAY NOT ONLY CAUSE ROBOT POSITION ERRORS BUT ALSO LEAD TO SERIOUS ACCIDENTS.

63111-AM-00

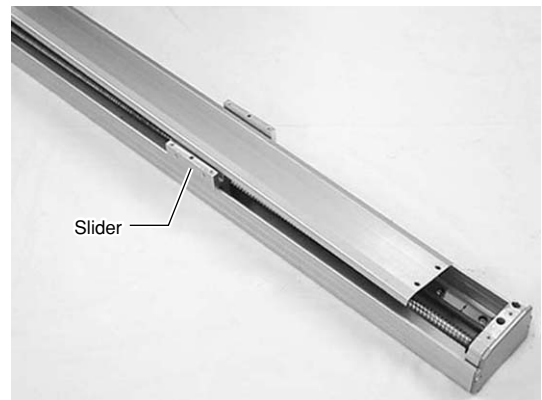
Step 5 Reattach the upper covers after installing the robot.

Be sure to tighten all the bolts securely.

▶ Step 2 Removing the upper cover



▶ Step 3 Moving the slider



▶ Step 4 Installing the robot



Protective bonding

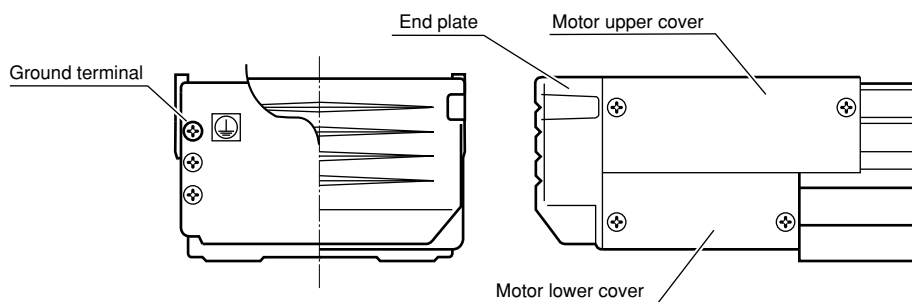


WARNING

ALWAYS GROUND THE ROBOT AND CONTROLLER UNIT TO PREVENT ELECTRICAL SHOCK.

Always use the ground terminal (M4 screw) inside the robot unit to make ground connection. The ground terminal location is shown below. (When you remove the upper and lower covers for the motor and also the end plate, you will see the ground terminal as shown.)

Ground terminal position



23205-A6-00



CAUTION

- A secure ground connection (less than 100-ohm resistance to ground) is recommended.
- Use electrical wire thicker than AWG14 (2mm²) as the ground wire.



WARNING

ALWAYS TURN OFF THE POWER TO THE CONTROLLER BEFORE MAKING THE GROUND CONNECTION.

Provide a terminal marked "PE" as the protective conductor for the entire system, and connect it to an external protective conductor. Also securely connect the ground terminal on the robot frame to the protective conductor.

Grounding



(In conformity with 417-IEC-5019)

23204-A0-00

6.6 RSH5

To install the RSH5 robot, use either of the following two methods.

Method A: Drill holes through the installation base and secure the robot to the base with M6 bolts from the bottom.

(M6 tapped holes are already machined on the bottom of the robot frame.)

Method B: Tap holes into the installation base and secure the robot to the base with M6 bolts from inside of the robot frame.



WARNING

BEFORE INSTALLING THE ROBOT, ALWAYS MAKE SURE THAT THE ROBOT CONTROLLER IS NOT CONNECTED TO THE ROBOT OR THE POWER TO THE CONTROLLER IS OFF. SERIOUS ACCIDENTS MAY OCCUR IF THE ROBOT STARTS TO OPERATE DURING INSTALLATION.



CAUTION

Be sure to wear safety gloves before starting the installation work. If you touch any steel material part by bare hand, this may cause rust.

■ Installation method A

Drill holes through the installation base where the robot is to be secured. Then secure the robot with the specified bolts from the bottom. The bolts and tightening torque are shown below.

Robot	Bolt	Tightening torque
RSH5	Hex socket-head bolt (M6), Strength: 8.8T Length: installation base thickness + 10mm (maximum) is recommended*	100 to 130kgf·cm

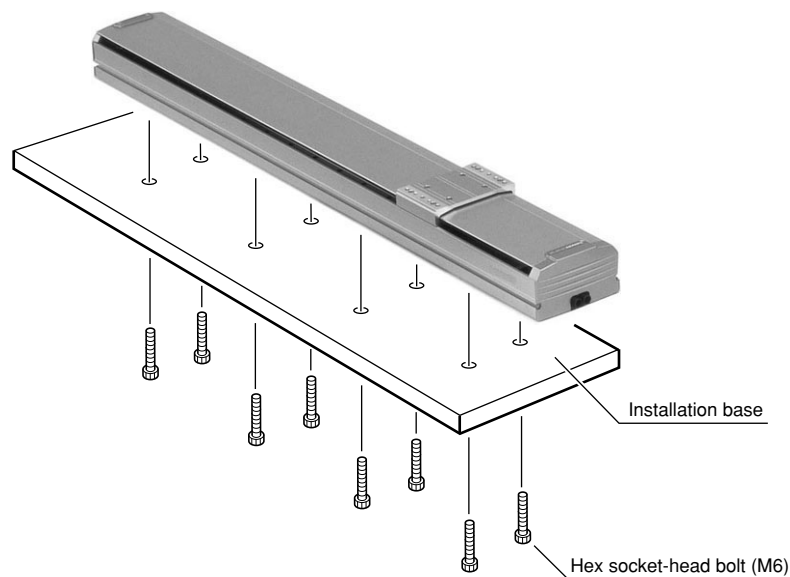
* A bolt size of installation base thickness +20mm (maximum) can be used since the robot frame interior is hollow. Even in this case, the screw thread length that actually engages is 10mm.



WARNING

- **BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.**
- **IF A BOLT WITH A LENGTH EXCEEDING THE SPECIFIED LENGTH IS USED, IT MAY INTERFERE WITH AN INTERNAL UNIT, CAUSING MALFUNCTION. BE SURE TO USE A BOLT WITH THE SPECIFIED LENGTH.**

Installation method A



63112-AM-00



CAUTION

The robot frame is made of aluminum so be careful not to damage the screw threads when tightening the bolt.



NOTE

For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

■ Installation method B

Step 1 Tap M6 holes in the installation base where the robot is to be secured.



NOTE

For details about machining dimensions and positions, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

Step 2 Remove the upper cover of the robot.

Remove the screws securing the upper cover of the robot and remove the upper cover.

Be careful not to drop any screw.

63113-AM-00

Step 3 Move the slider.

Move the slider to a position where the installation holes in the bottom of the robot are not hidden.

<In the case of robot with brake>

After connecting to the controller and releasing the brake, move the slider. When the moving is completed, Be sure to turn off the controller power.

63114-AM-00

Step 4 Secure the robot body.

Secure the robot body to the installation base with the specified bolts.



WARNING

BE SURE TO SECURE THE ROBOT BODY TO THE INSTALLATION BASE WITH THE SPECIFIED BOLT, BOLT QUANTITY, AND TIGHTENING TORQUE. IF THESE ARE NOT OBSERVED, THE ROBOT MAY DROP, CAUSING SERIOUS PERSONAL INJURY.

The bolts and tightening torque are shown below.

Robot	Bolt	Tightening torque
RSH5	Hex socket-head bolt (M6) Strength: 8.8T Length: longer than 20mm	100 to 130kgf·cm



WARNING

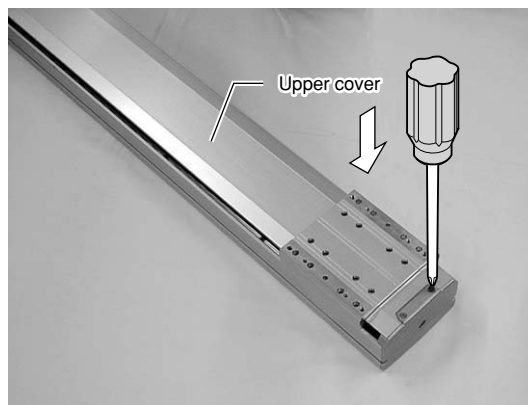
BE SURE TO TIGHTEN THE BOLT TO THE CORRECT TORQUE. THE WRONG TORQUE MAY NOT ONLY CAUSE ROBOT POSITION ERRORS BUT ALSO LEAD TO SERIOUS ACCIDENTS.

63115-AM-00

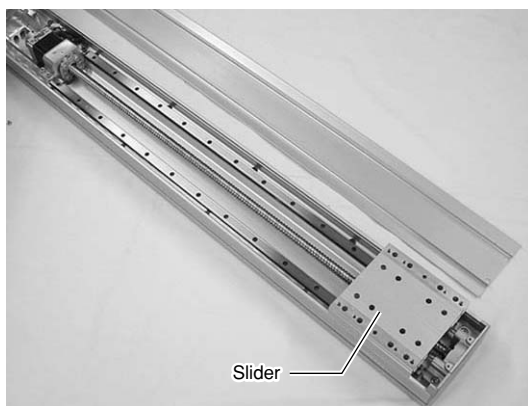
Step 5 Reattach the upper covers after installing the robot.

Be sure to tighten all the bolts securely.

▶ Step 2 Removing the upper cover



▶ Step 3 Moving the slider



▶ Step 4 Installing the robot



■ Protective bonding

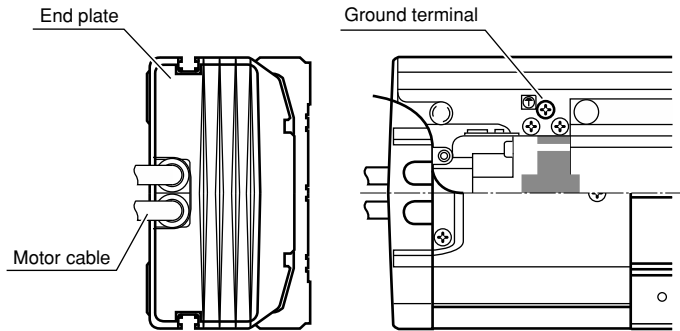


WARNING

ALWAYS GROUND THE ROBOT AND CONTROLLER UNIT TO PREVENT ELECTRICAL SHOCK.

Always use the ground terminal (M4 screw) inside the robot unit to make ground connection. The ground terminal location is shown below.

Ground terminal position



23205-A7-00



CAUTION

- A secure ground connection (less than 100-ohm resistance to ground) is recommended.
- Use electrical wire thicker than AWG14 (2mm²) as the ground wire.



WARNING

ALWAYS TURN OFF THE POWER TO THE CONTROLLER BEFORE MAKING THE GROUND CONNECTION.

Provide a terminal marked "PE" as the protective conductor for the entire system, and connect it to an external protective conductor. Also securely connect the ground terminal on the robot frame to the protective conductor.

Grounding



(In conformity with 417-IEC-5019)

23204-A0-00

6.7 RSB1/RSB2



WARNING

BEFORE INSTALLING THE ROBOT, ALWAYS MAKE SURE THAT THE ROBOT CONTROLLER IS NOT CONNECTED TO THE ROBOT OR THE POWER TO THE CONTROLLER IS OFF. SERIOUS ACCIDENTS MAY OCCUR IF THE ROBOT STARTS TO OPERATE DURING INSTALLATION.



CAUTION

Be sure to wear safety gloves before starting the installation work. If you touch any steel material part by bare hand, this may cause rust.

■ Installation method

Drill holes through the installation base where the robot is to be secured. Then secure the robot with the specified bolts from the bottom. The bolts and tightening torque are shown below.

Robot	Bolt	Tightening torque
RSB1	Hex socket-head bolt (M5), Strength: 8.8T Length: installation base thickness + 10mm (maximum)	60 to 90kgf•cm
RSB2	Hex socket-head bolt (M6), Strength: 8.8T Length: installation base thickness + 10mm (maximum)	100 to 130kgf•cm



WARNING

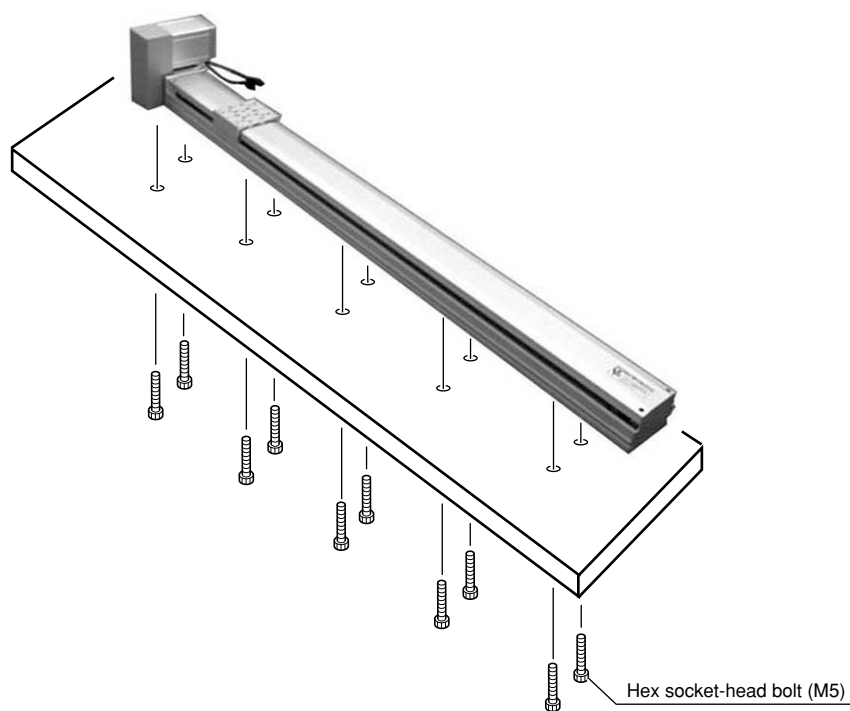
- BE SURE TO TIGHTEN THE BOLT TO THE CORRECT TORQUE. THE WRONG TORQUE MAY NOT ONLY CAUSE ROBOT POSITION ERRORS BUT ALSO LEAD TO SERIOUS ACCIDENTS.
- IF A BOLT WITH A LENGTH EXCEEDING THE SPECIFIED LENGTH IS USED, IT MAY INTERFERE WITH AN INTERNAL UNIT, CAUSING MALFUNCTION. BE SURE TO USE A BOLT WITH THE SPECIFIED LENGTH.



CAUTION

The robot frame is made of aluminum so be careful not to damage the screw threads when tightening the bolt.

Installation method



63116-AM-00



NOTE

For details about hole and bolt machining dimensions and positions of the robot installation base surface, see the external view and dimensions stated in "1. Robot specifications" of Chapter 5.

■ Protective bonding

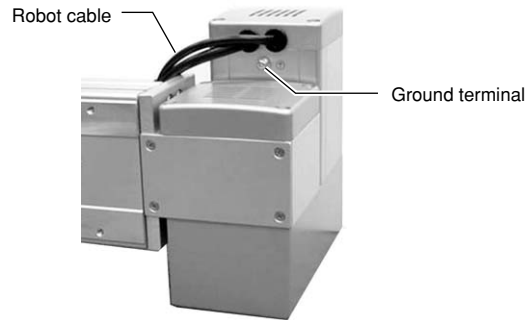


WARNING

ALWAYS GROUND THE ROBOT AND CONTROLLER UNIT TO PREVENT ELECTRICAL SHOCK.

Always use the ground terminal (M4 screw) of the robot unit to make ground connection. The ground terminal location is shown below.

Ground terminal position



23202-AC-00



CAUTION

- A secure ground connection (less than 100-ohm resistance to ground) is recommended.
- Use electrical wire thicker than AWG14 (2mm²) as the ground wire.

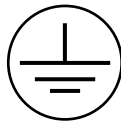


WARNING

ALWAYS TURN OFF THE CONTROLLER BEFORE MAKING THE GROUND CONNECTION.

Provide a terminal marked "PE" as the protective conductor for the entire system, and connect it to an external protective conductor. Also securely connect the ground terminal on the robot frame to the protective conductor.

Grounding



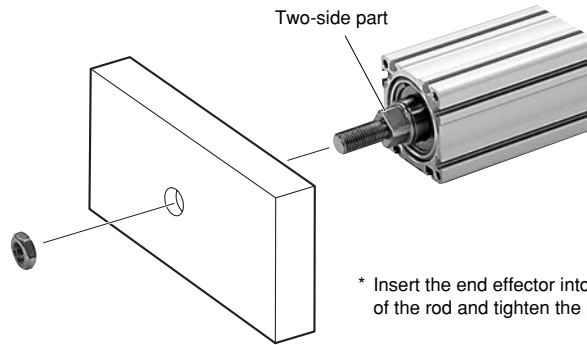
(In conformity with 417-IEC-5019)

23204-A0-00

7. Installing the end effector (RSD1/RSD2/RS3D/RSDG1/RSDG2/RSDG3)

Drill holes into the end effector and install the end effector.

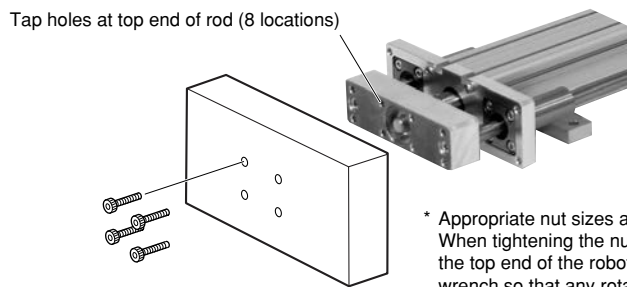
RSD1/RSD2/RSD3



* Insert the end effector into the tap at the top end of the rod and tighten the nut to secure the end effector.

63221-AM-00

RSDG1/RSDG2/RSDG3 (Tap holes (4 locations) are used.)



Robot	Nut size
RSDG1	M8×1.25
RSDG2	M10×1.25
RSDG3	M12×1.25

* Appropriate nut sizes are shown in the right table. When tightening the nut, grip the two-side part at the top end of the robot shaft with an open-end wrench so that any rotational force is not applied to the robot main unit.

63222-AM-00

When installing the main unit vertically, lay out the units so that the gravity center points of the end effector and workpiece are aligned with the center of the rod. If this layout is impossible, use the bushing or linear guide to support the offset load so that any moment is not applied to the rod directly.

When installing the main unit horizontally, use the busing or linear guide to support the load so that any moment is not applied to the rod directly.



WARNING

TAKE APPROPRIATE LOOSE PREVENTION MEASURES FOR THE NUT. IF APPROPRIATE LOOSE PREVENTION MEASURES ARE NOT TAKEN, THE END EFFECTOR MAY FALL DOWN DURING OPERATION, CAUSING A SERIOUS TROUBLE.

Robot	Installation bolt	Tightening torque	Nominal length of installation bolt
RSDG1	Hex socket-head bolt (M4) Strength: 8.8T or more	38kgf•cm	Installation tap depth: 10mm
RSDG2	Hex socket-head bolt (M5) Strength: 8.8T or more	60 to 90kgf•cm	Installation tap depth: 10mm
RSDG3	Hex socket-head bolt (M5) Strength: 8.8T or more	60 to 90kgf•cm	Installation tap depth: 12mm

8. Connections

8.1 Connecting the robot to the controller

Follow the steps below to connect the robot cables of the robot main body to the mating connectors on the controller. For details about connection connectors on the controller side, see the C1/C21/C22 User's Manual.



WARNING

- BEFORE CONNECTING THE CABLES, CHECK THAT THERE ARE NO BENDS OR BREAKS IN THE ROBOT CABLE CONNECTOR PINS AND THAT THE CABLES ARE NOT DAMAGED. CONTACT FAILURE MAY CAUSE ROBOT MALFUNCTIONS.
- ALWAYS MAKE SURE THAT THE POWER TO THE ROBOT CONTROLLER IS OFF BEFORE CONNECTING THE ROBOT CABLES TO THE CONTROLLER.



WARNING

- IF ANY CONNECTOR IS CONNECTED INCOMPLETELY AND ANY PIN HAS FAULTY CONTACT, THE ROBOT MAY MALFUNCTION, LEADING TO HAZARDOUS SITUATION. BEFORE TURNING ON THE CONTROLLER POWER, MAKE SURE THAT EACH CONNECTOR IS CONNECTED SECURELY.
- TAKE APPROPRIATE MEASURES SO THAT NO LOAD IS APPLIED TO THE CONNECTOR EVEN WHEN THE ROBOT CABLE IS STRETCHED.



WARNING

- ARRANGE THE ROBOT CABLES SO THAT THEY DO NOT HINDER THE ROBOT OPERATION. ADDITIONALLY, DO NOT USE AN AREA WHERE ANY ROBOT CABLE INTERFERES WITH THE LOAD ATTACHED TO THE ROBOT TIP AS WORK AREA. IF ANY CABLE INTERFERES WITH THE ROBOT MOVABLE PART, THIS MAY CAUSE THE ROBOT TO MALFUNCTION, LEADING TO HAZARDOUS SITUATION.
- ARRANGE THE ROBOT CABLES SO THAT THE CONNECTED CABLES DO NOT HINDER A WORK PERSON. IF A WORK PERSON STUMBLES OVER ANY ROBOT CABLE AND FALLS DOWN, THIS MAY CAUSE PERSONAL INJURY.



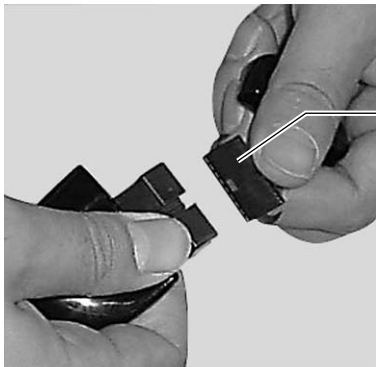
CAUTION

- After connecting the relay connectors on the robot cables, fit the connector hoods together securely.
- The standard robot cables are not movable cables. So, connect the cables so that the motor power cable and signal cable connectors of the robot cables do not move.

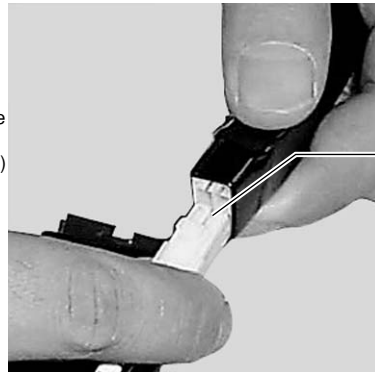
■ Connections

Step 1 Connect the robot cables (motor and signal wires) to the mating connectors coming out from the robot.

Connecting the power cable and signal cable



Robot cable connector (signal wire)

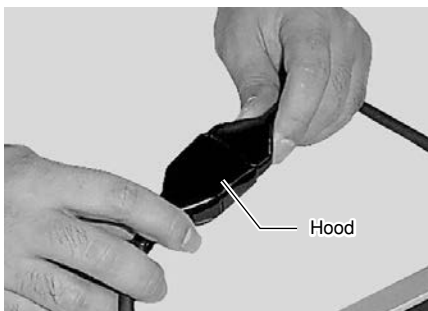


Robot cable connector (motor wire)

23205-A0-00

Step 2 After making the connections, fit the connector hoods together securely.

Connecting the hoods



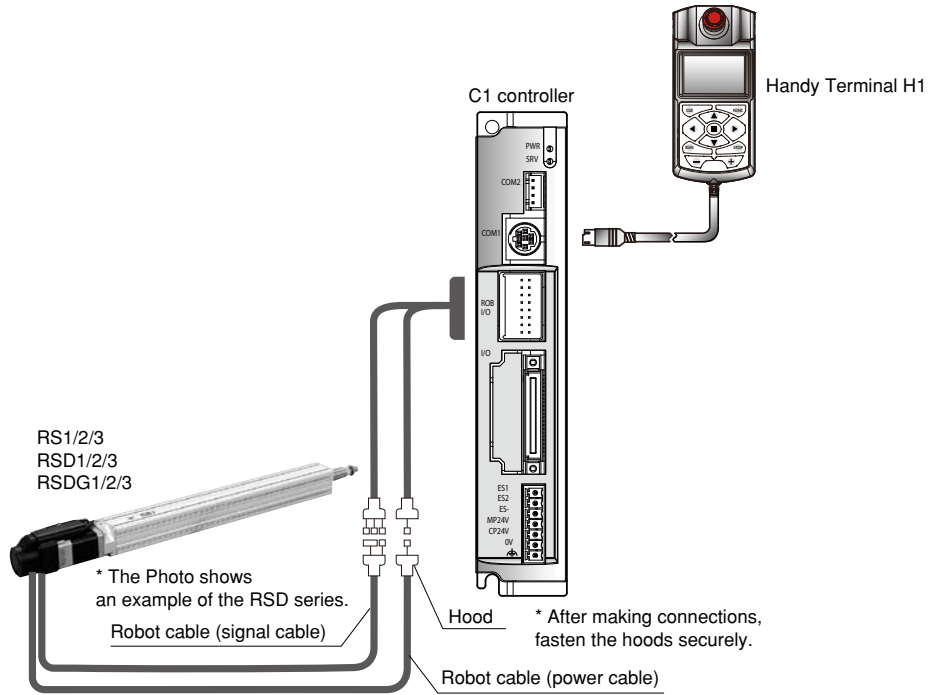
Hood

23206-A0-00

8.2 Robot cable connections

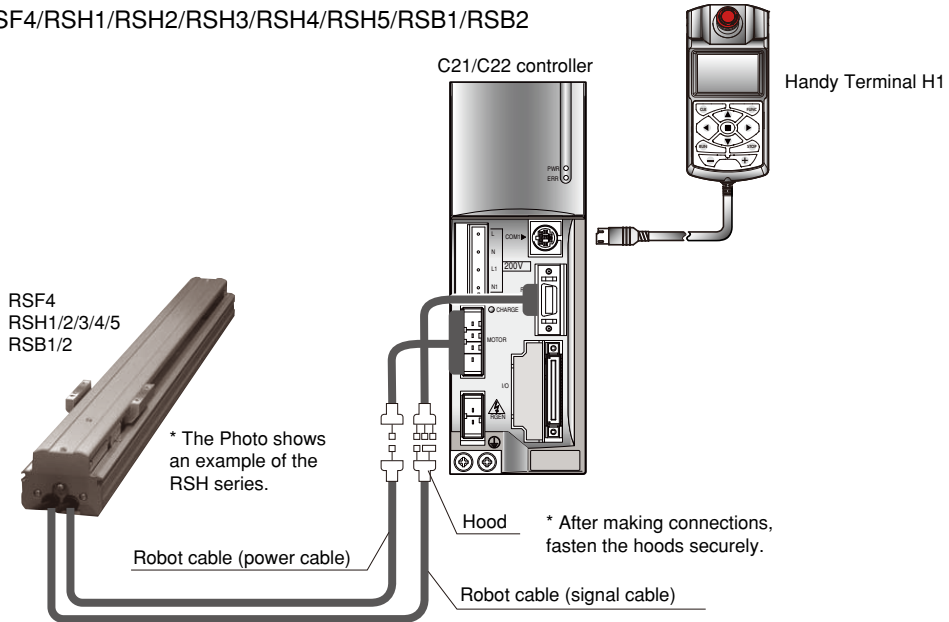
Robot cable connections

RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3



Robot cable connections

RSF4/RSH1/RSH2/RSH3/RSH4/RSH5/RSB1/RSB2



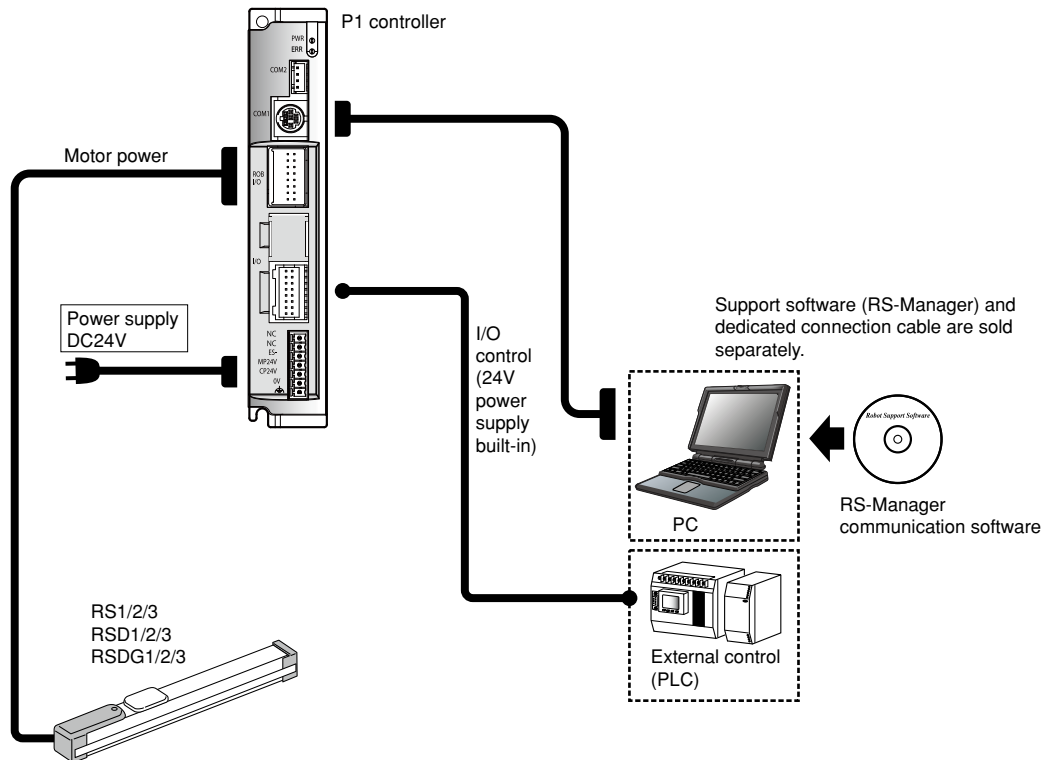
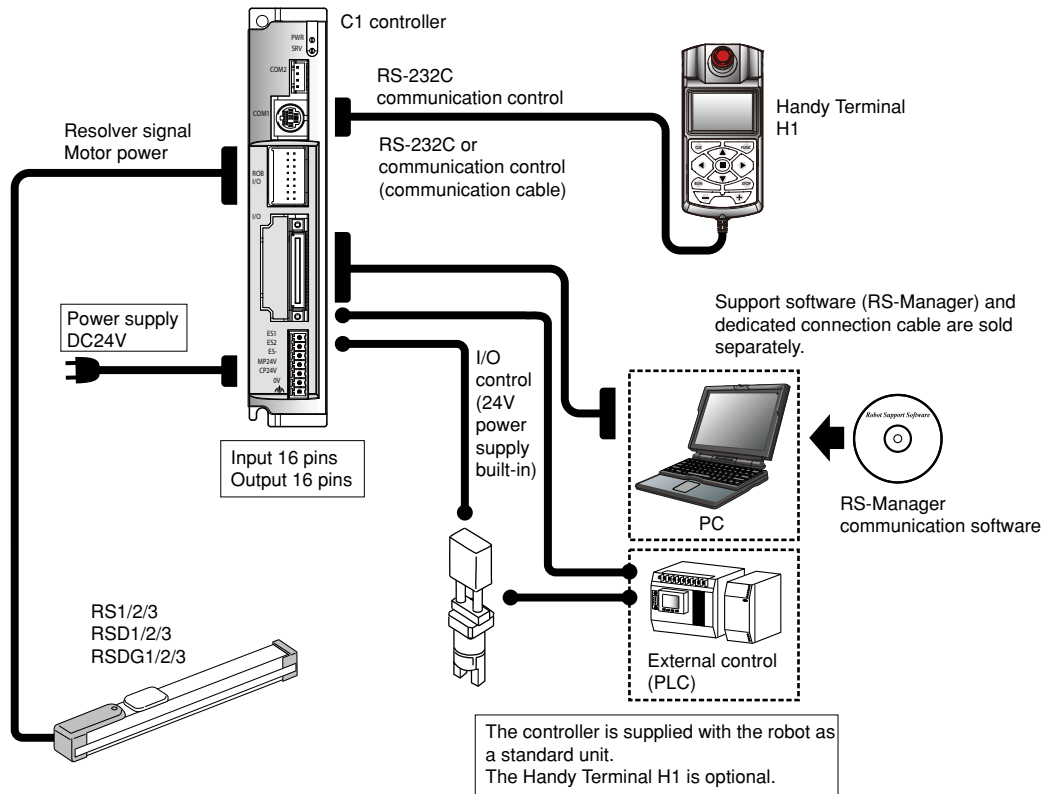
63223-AM-00

8.3 Robot system configuration drawing

1

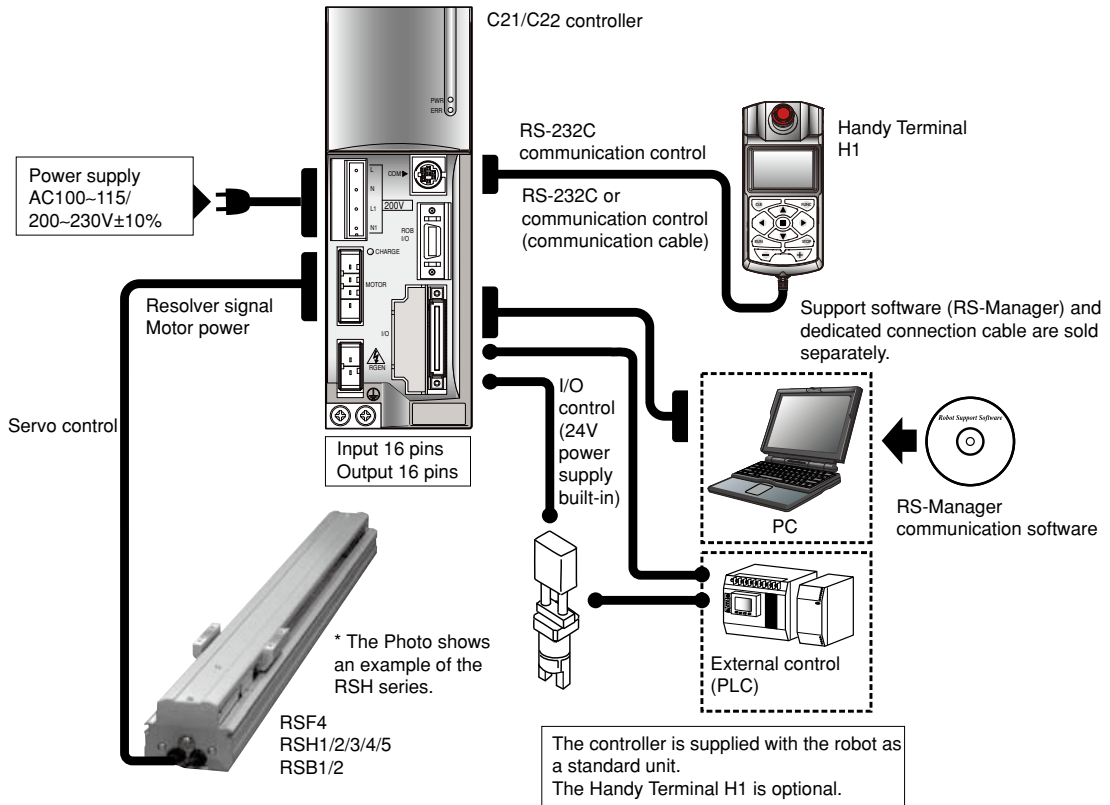
Robot system configuration drawing

RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3



Robot system configuration drawing

RSF4/RSH1/RSH2/RSH3/RSH4/RSH5/RSB1/RSB2



63224-AM-02

8.4 Changing the cable routing direction



WARNING
BEFORE STARTING THE WORK, BE SURE TO TURN OFF THE CONTROLLER POWER.



WARNING
THE ADJUSTMENT WORK WITH THE COVER REMOVED REQUIRES SPECIALIZED TECHNICAL KNOWLEDGE AND SKILLS, AND ALSO MAY INVOLVE HAZARDS. THESE TASKS MUST BE PERFORMED ONLY BY PERSONS WHO MEET REQUIREMENTS ESTABLISHED BY LOCAL REGULATIONS AND SAFETY STANDARDS FOR INDUSTRIAL ROBOTS.

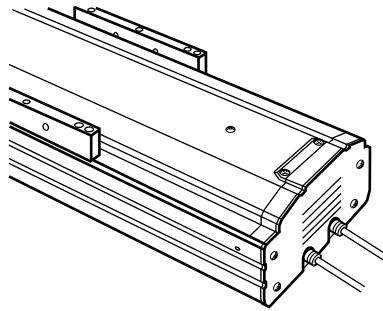


CAUTION
Be sure to wear safety gloves before starting the installation work. If you touch any steel material part by bare hand, this may cause rust.

8.4.1 RSH4/RSH5

The cable in the robots (RSH4, RSH5) can be run out (extracted) in any direction. Limits on wiring directions have been eliminated and vertical or horizontal installations are made possible for efficient use of space. Methods for changing the cable extraction direction are shown below. (The standard cable extraction slot is on the rear side when shipped from the factory.)

Standard cable extraction direction



23206-A6-00

Step 1 Turn off the controller.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from touching the controller switch.

Step 3 Enter the safety enclosure.

Step 4 Remove the upper cover and motor endplate.

On the RSH4, remove both upper and lower motor covers and endplate.
At this time, be careful not to drop any screw.

Step 5 Remove the robot cable from the endplate.

Step 6 Change the cable extraction (routing) direction.

Extraction direction	Procedure
Top extraction	Clip the endplate cable installation slot with wire nippers or similar tool, fit a robot cable grommet into that slot and route the cable out through that slot.
Side extraction	Fit a robot cable grommet into the side routing bracket and route the cable out through that slot.

* Side extraction is not possible on the RSH4.

23207-A6-00



NOTE

When routing the cable from the opposite side, you must change the clamping position of the cable routing bracket. (Change the ground wire installation position to the opposite side at this time.)

Step 7 Reattach the endplate and upper cover (or motor upper and lower covers) back to their original positions.

Be careful not to forget to tighten any screw.

8.4.2 RSB1/RSB2

The cable in the robots (RSB1, RSB2) can be run out (extracted) in any direction. Limits on wiring directions have been eliminated so available space can be efficiently used. Methods for changing the cable routing (extraction) direction are shown below.

Step 1 Turn off the controller.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from touching the controller switch.

Step 3 Enter the safety enclosure.

■ When rotating 180 degrees

Step 4 Remove the four screws securing the motor cover.

At this time, be careful not to drop any screw.

23203-AC-00

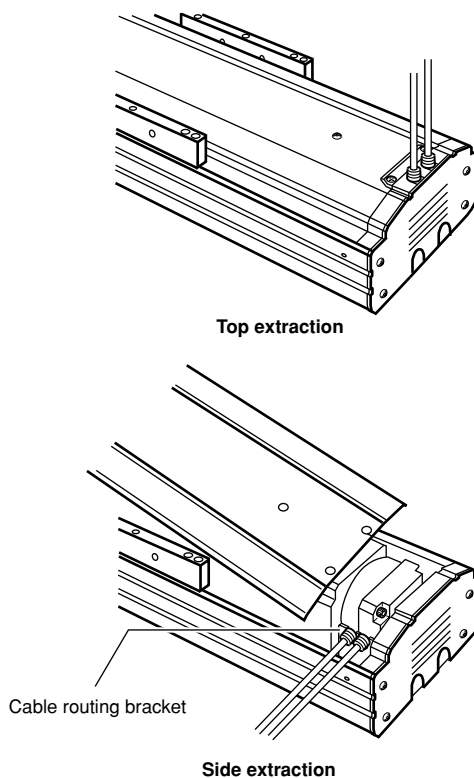
Step 5 Remove the motor cover and rotate it 180 degrees.

23204-AC-00

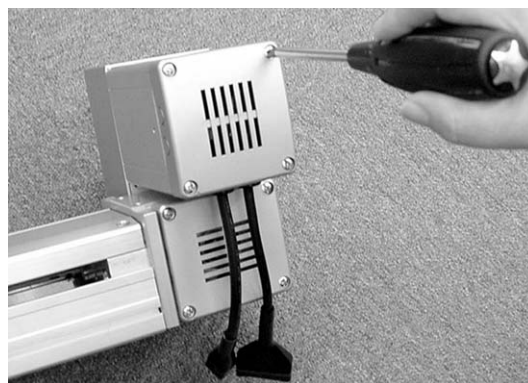
Step 6 Reattach the motor cover and tighten the four screws to secure the motor cover and cables.

Be careful not to forget to tighten any screw.

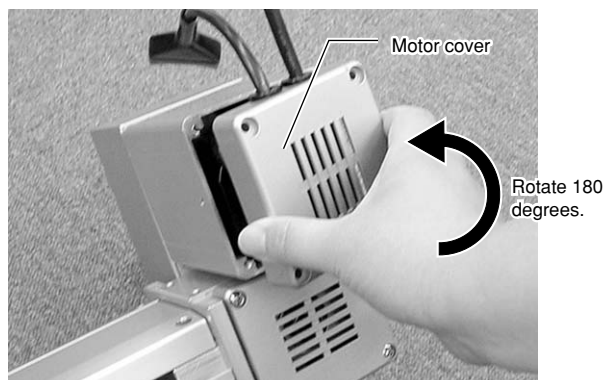
Step 6 Top extraction and side extraction



Step 4 Removing the motor cover



Step 5 Rotating 180 degrees



■ When rotating 90 degrees

Step 4 Remove the four screws securing the motor cover and remove the motor cover.

At this time, be careful not to drop any screw.

Step 5 Remove the cables from the motor cover.

Step 6 Trim the unused cable extraction slots with wire nippers or similar tool.

23205-AC-00

Step 7 Fit the robot cable grommets.

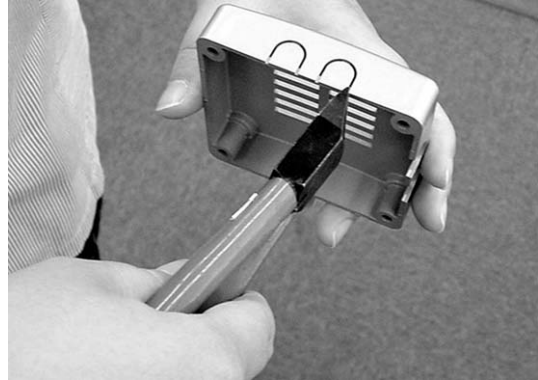
Fit the robot cable grommets into the trimmed cable extraction slots.

23206-AC-00

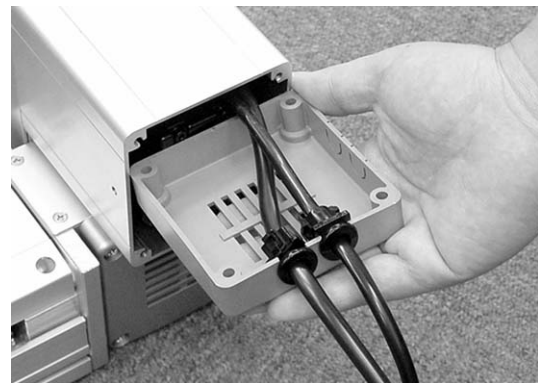
Step 8 Reattach the motor cover and tighten the four screws to secure the motor cover and cables.

Be careful not to forget to tighten any screw.

▶ **Step 6** Trimming with wire nippers



▶ **Step 7** Fitting the robot cable grommets



8.5 Changing the motor orientation (RSB1/RSB2)

A desired motor orientation in the robots (RSB1, RSB2) can be selected freely. If the motor case is hanging up on an object and hampers installation of the robot, use the following method to change the motor orientation.

Step 1 Turn off the controller.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from touching the controller switch.

Step 3 Enter the safety enclosure.

Step 4 Remove the screws securing the belt cover and remove the belt cover.

23207-AC-00

▶ **Step 4** Removing the cover



Step 5 Remove the motor plate bolts (4 pieces).

23208-AC-00

Step 6 Tighten the motor plate bolts temporarily.

Install the motor case at necessary installation position and secure it with the motor plate bolts (4 pcs.) temporarily. Now shift the motor case towards the large pulley as shown by the arrow.

23209-AC-00

Step 7 First fit the belt onto the small pulley and then onto the large pulley.

23210-AC-00



CAUTION

Check that the belt teeth correctly mesh with the large pulley teeth. A poor intermesh may cause positioning errors or shorten the belt service life.

Step 8 Tighten the motor plate bolts temporarily.

Tighten the motor plate bolts temporarily while pulling the motor case.

23211-AC-00

Step 9 Adjust the belt tension.



NOTE

For details about how to adjust the speed reduction belt tension, see the separate Maintenance Manual for FLIP-X series.



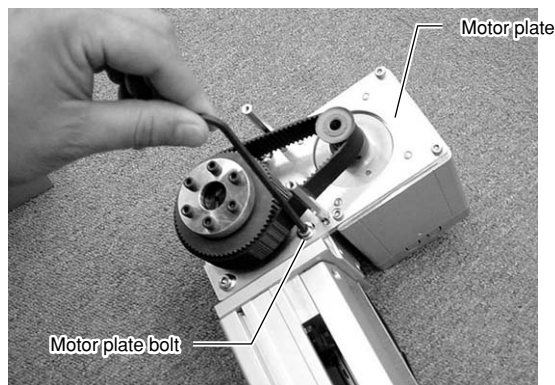
CAUTION

Since a positional shift occurs after adjusting the belt tension, absolute reset, and the point data.

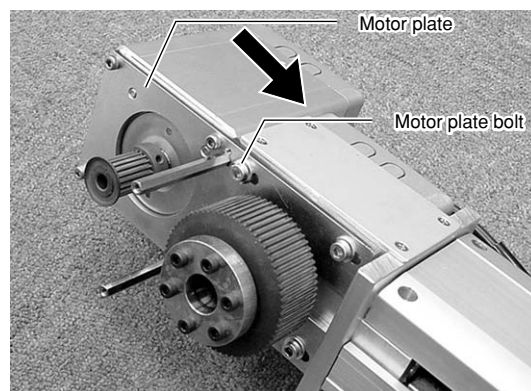
Step 10 Reattach the belt cover.

Be careful not to forget to tighten any screw.

Step 5 Removing the bolts



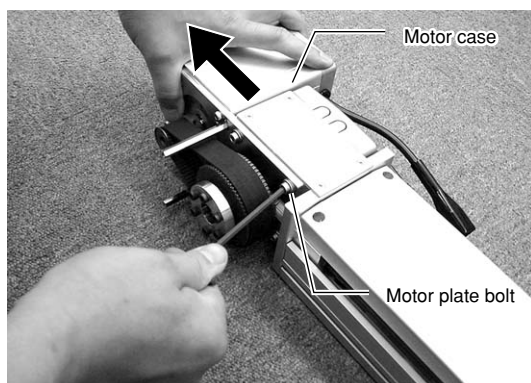
Step 6 Tightening the bolts temporarily



Step 7 Fitting the belt



Step 8 Tightening the bolts temporarily



9. Setting the operating conditions

9.1 Payload

Optimal acceleration for the MISUMI single-axis robots is automatically determined by setting the controller payload parameter. Set the total weight of the workpiece and the end effectors such as grippers attached to the robot slider in the payload parameter as shown below.



CAUTION

Be sure to enter an accurate value when making this setting, since a mistake will cause troubles such as vibration or a shorter machine service life span.

■ To set the payload parameter

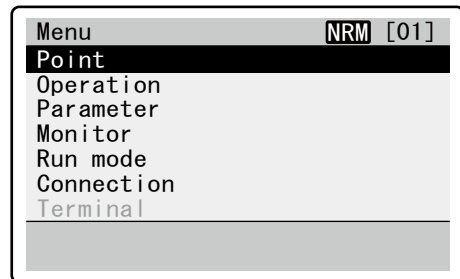
Use the following method when setting the payload parameter on the C21/C22 controller. For how to set the parameter, refer to the "H1 Operation Guide" section in the "C21/C22 Controller User's Manual".

Step 1 Connect the Handy Terminal to the controller and turn on the power to the controller.

The main menu screen appears as shown below.

64225-AM-00

▶ **Step 1** Main menu

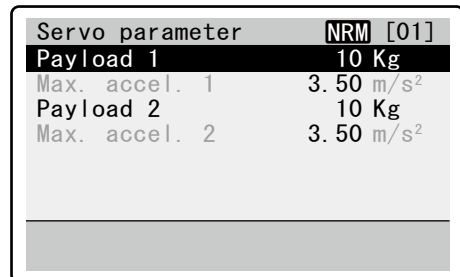
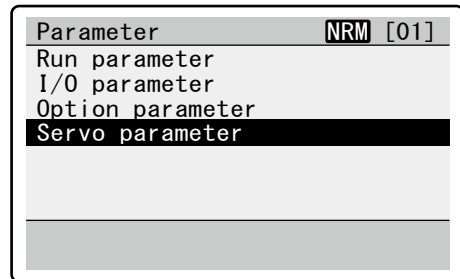


Step 2 On the main menu screen, select "Parameter".

The "Parameter" menu screen opens showing selectable menu items.

64226-AM-00

▶ **Step 3** Servo Parameter



Step 4 Move the cursor to "Payload 1" and press **■**. ▶ **Step 4** Payload

The selected parameter can now be changed.

64227-AM-00

Servo parameter	NRM [01]	
Payload 1	10	Kg
Max. accel. 1	3.50	m/s ²
Payload 2	10	Kg
Max. accel. 2	3.50	m/s ²

Step 5 Change the parameter value.**Step 6** Press **■** to enable the change.

Use the same procedure to change "Payload 2" if needed.

Step 7 Press [CLR].

This returns to the "Parameter" menu screen.

The RS/RSD/RSDG series robot use a step motor. In particular, the RSD/RSDG series have characteristics that the torque decreases during high-speed rotation. Set the operating conditions while referring to "Speed vs. payload graph" in "1. Robot specifications" in Chapter 5.

Additionally, if an external force is applied or the operating resistance is large (the robot is installed together with the external guide or operated in a low-temperature environment), "overload" or "over-voltage" error may occur. In this case, make the adjustment, such as decreasing of the acceleration or speed.

9.2 Maximum speed setting

In operation of a single-axis robot with a long stroke ball screw, resonance of the ball screw may occur. In this case, the maximum speed must be reduced to an appropriate level.

Refer to Chapter 5, "1. Robot specifications" for information on how to set the maximum speed according to the stroke length.

If the maximum speed does not reach a hazardous level, reducing the speed is unnecessary even when the robot has a long stroke axis.

**CAUTION**

Do not operate the robot if the ball screw is vibrating. The ball screw may otherwise wear out prematurely.

9.3 Duty

To achieve maximum service life for the MISUMI single-axis robots, it is recommended to operate the robot within the allowable duty (50%). The duty is calculated as follows:

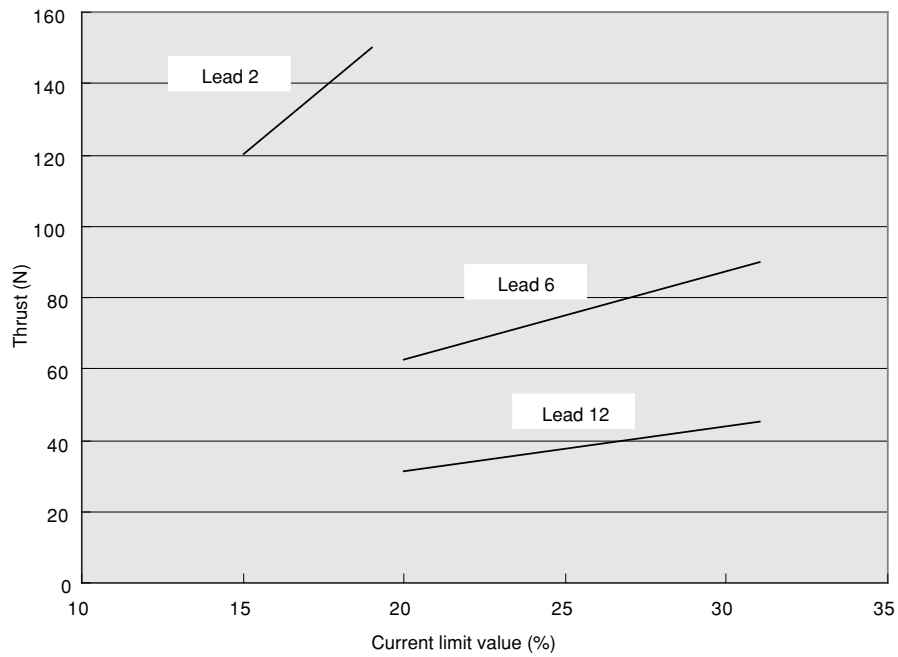
$$\text{Duty (\%)} = \frac{\text{Operation time}}{\text{Operation time} + \text{Non-operation time}} \times 100$$

If the robot duty is too high, an error such as "overload" or "overheat" may occur. In this case, increase the stop time to reduce the duty.

9.4 Push force vs. current limit value during stop

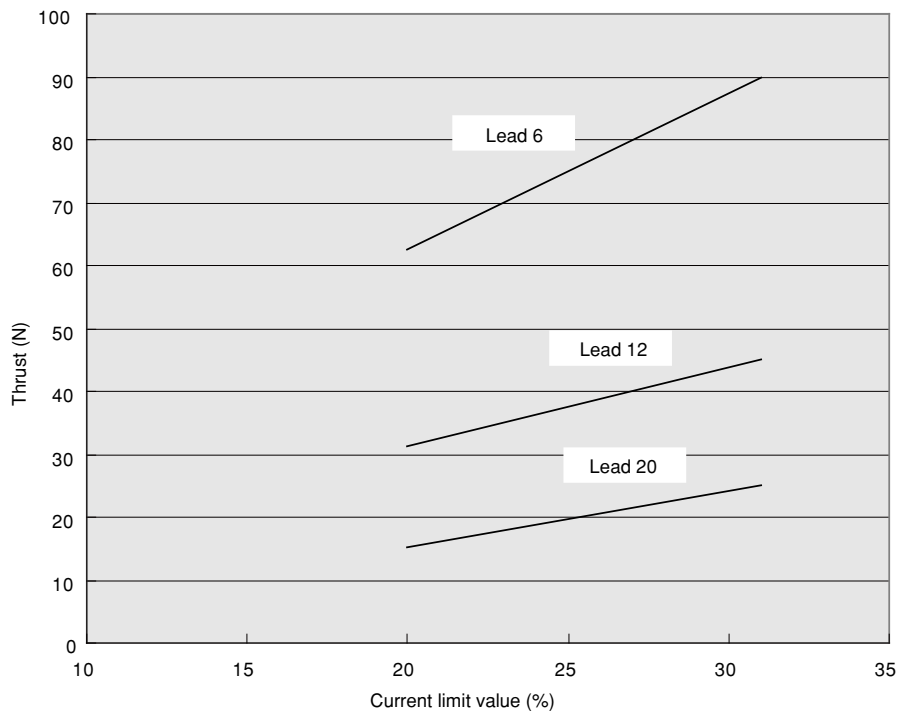
9.4.1 RS1/RS2/RS3

■ RS1 push thrust



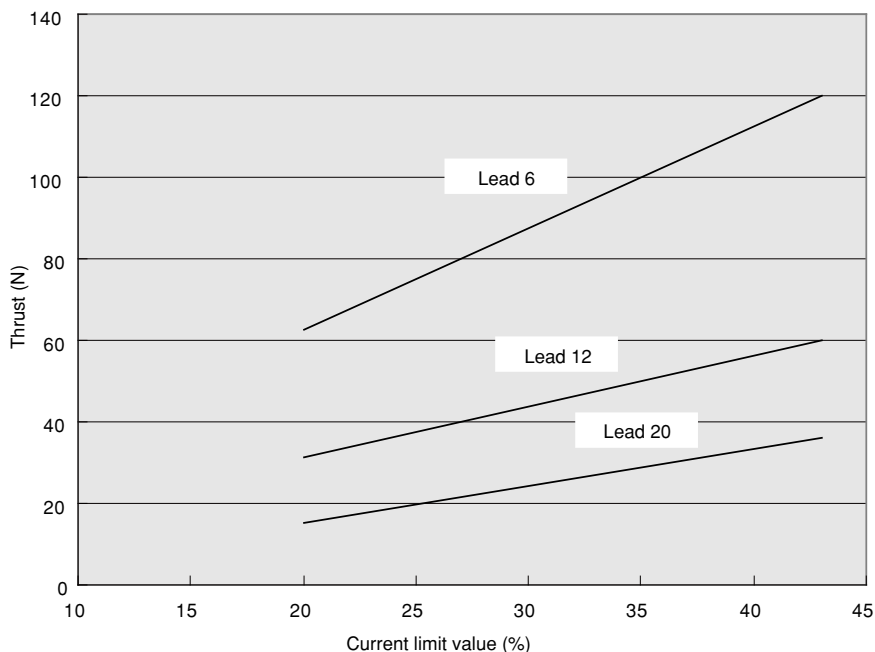
63225-AM-000

■ RS2 push thrust



63226-AM-000

■ RS3 push thrust



63227-AM-00

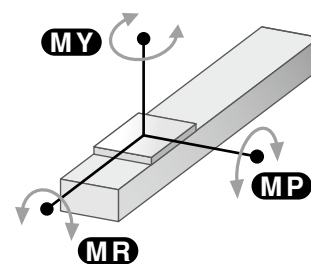
The values in the above graph are not a guarantee of the push force accuracy during stop. Use these values for reference.

- If the push force is too small or the push speed is too low, the push operation may become unstable so use caution.
- Up to 20mm/s can be set for the speed during pushing. However, it is recommended to set the speed during pushing to a level of 10mm/s or less by taking the shock during pushing or load stability into consideration.
- The sliding resistance, tool weight, or pushing position may affect the pushing load. So, when an accurate pushing load is required, it is absolutely necessary to actually measure and check the pushing load under conditions to be used.
- Determine an offset amount and thrust so that the pushing moment will be smaller than the allowable static load of each model.
- The values shown in the above graphs are for horizontal use robots.
For vertical use robots, the push force values vary according to the weight of the tool and workpiece.

■ Static loading moment

(Unit: N·m)

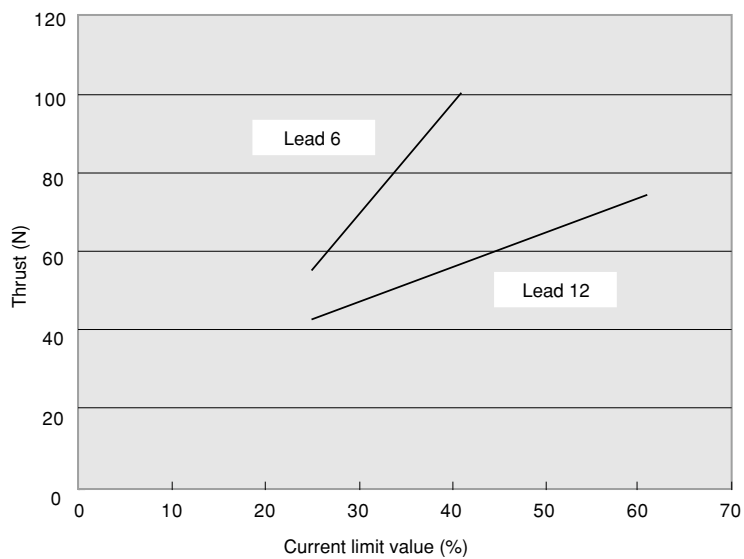
Model	MY	MP	MR
RS1	16	19	17
RS2	25	33	30
RS3	32	38	34



63228-AM-00

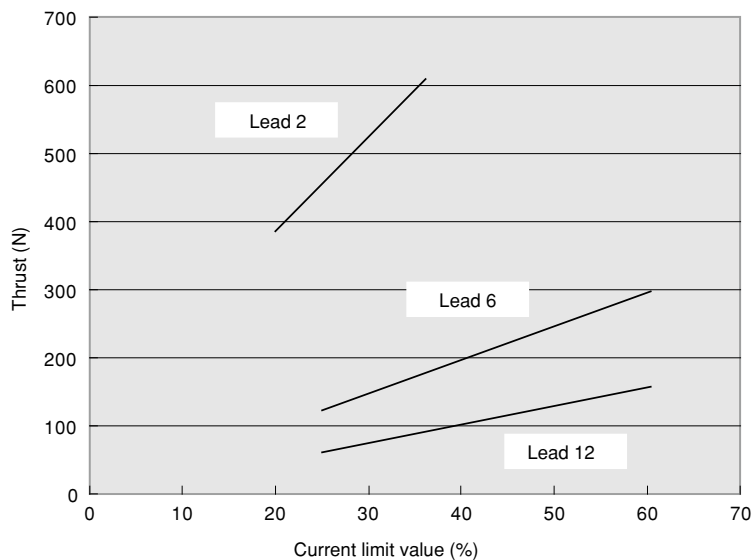
9.4.2 RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3

■ RSD1/RSDG1 push thrust



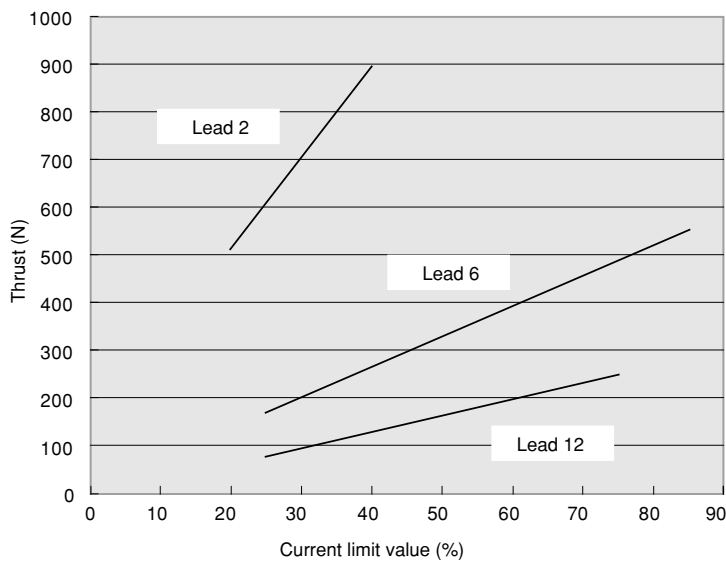
63229-AM-000

■ RSD2/RSDG2 push thrust



63230-AM-000

■ RSD3/RSDG3 push thrust



63231-AM-000

The values in the above graph are not a guarantee of the push force accuracy during stop. Use these values for reference.

- If the push force is too small or the push speed is too low, the push operation may become unstable so use caution.
- Up to 20mm/s can be set for the speed during pushing. However, it is recommended to set the speed during pushing to a level of 10mm/s or less by taking the shock during pushing or load stability into consideration.
- The sliding resistance, tool weight, or pushing position may affect the pushing load. So, when an accurate pushing load is required, it is absolutely necessary to actually measure and check the pushing load under conditions to be used.
- The values shown in the above graphs are for horizontal use robots.
For vertical use robots, the push force values vary according to the weight of the tool and workpiece.

Chapter 2

Periodic inspection

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3.5 RSB1/RSB2	2-12

1. Before beginning work

Periodic inspection and maintenance are essential to ensure safe and efficient operation of robots. Before beginning the work, thoroughly read the safety precautions described below and "Using the Robot Safely" to strictly observe the instructions.

■ Safety precautions



DANGER

IF THE INSPECTION OR MAINTENANCE PROCEDURE CALLS FOR OPERATION OF THE ROBOT, STAY OUT OF THE WORKING AREA OF THE ROBOT DURING OPERATION. KEEP WATCHING THE ROBOT MOVEMENT AND SURROUNDING AREA SO THAT THE OPERATOR CAN PRESS THE EMERGENCY STOP BUTTON IF ANY DANGER OCCURS.



WARNING

- THE ADJUSTMENT AND MAINTENANCE WORK WITH THE COVER REMOVED NEEDS THE SPECIAL KNOWLEDGE AND SKILL. IF UNSKILLED WORK PERSON PERFORMS SUCH WORK, THIS MAY INVOLVE RISK. THESE TASKS MUST BE PERFORMED ONLY BY PERSONS WHO MEET REQUIREMENTS ESTABLISHED BY LOCAL REGULATIONS AND SAFETY STANDARDS FOR INDUSTRIAL ROBOTS.
- WHEN THE ROBOT DOES NOT NEED TO BE OPERATED DURING ADJUSTMENT OR MAINTENANCE, ALWAYS TURN OFF THE CONTROLLER AND THE EXTERNAL SWITCH BOARD.
- WHEN YOU NEED TO TOUCH THE TERMINALS OR CONNECTORS ON THE OUTSIDE OF THE CONTROLLER DURING INSPECTION, ALWAYS FIRST TURN OFF THE CONTROLLER POWER SWITCH AND ALSO THE POWER SOURCE IN ORDER TO PREVENT POSSIBLE ELECTRICAL SHOCK.
- NEVER TOUCH INTERNAL PARTS OF THE CONTROLLER.
- WHEN ONLY MAKING ELECTRICAL INSPECTIONS AND REQUIRING NO MECHANICAL MOVEMENT OF THE ROBOT, KEEP THE EMERGENCY STOP BUTTON PRESSED.
- BE CAREFUL NOT TO NEGLECT TIGHTENING SCREWS OR BOLTS. IF ANY COVER IS NOT SECURED FIRMLY, THIS MAY CAUSE NOISE, COVER DROPPING AND FLYING, HAND ENTANGLEMENT IN DRIVE UNIT DURING TEACHING, OR BURN DUE TO HAND IN CONTACT WITH HOT SURFACE. SO, BE SURE TO TIGHTEN ALL THE SCREWS AND BOLTS SECURELY.
- BE SURE TO USE THE LUBRICANT SPECIFIED BY YOUR DISTRIBUTOR.
- DO NOT MODIFY ANY PARTS ON THE ROBOT OR CONTROLLER. MODIFICATION MAY RESULT IN UNSATISFACTORY SPECIFICATIONS OR THREATEN OPERATOR SAFETY.
- WHEN ADJUSTMENT OR MAINTENANCE IS COMPLETE, RETIGHTEN THE BOLTS AND SCREWS SECURELY.
- PLACE A SIGN INDICATING THE ROBOT IS BEING ADJURED OR INSPECTED TO KEEP OTHERS FROM OPERATING THE CONTROLLER POWER SWITCH, HANDY TERMINAL, OR OPERATION PANEL. WHEN NECESSARY, INSTALL AN APPROPRIATE SWITCH KEY LOCK MECHANISM OR ARRANGE A WATCHER.



CAUTION

- Never attempt to perform inspection, adjustment, repair, or part replacement work of the robot and controller other than those described in this manual. Such work requires special knowledge and may involve risk.
- Before starting each adjustment work, thoroughly read this Chapter to fully understand its contents.
- If a safety enclosure has not yet been provided right after installation of the robot, rope off or chain off the movement area around the manipulator in place of a safety enclosure, and observe the following points.
 1. Use stable posts which will not fall over easily.
 2. The rope or chain should be easily visible by everyone around the robot.
 3. Place a conspicuous sign prohibiting the operator or other personnel from entering the movement area of the manipulator.
- To check the operation after the adjustment has been made, see "6 Trial operation" in "Using the Robot Safely".
- Be sure to wear safety gloves before starting the work. If you touch any steel material part by bare hand, this may cause rust.
- Be careful not to drop any screw or bolt during cover removal work.
- For details about cautions on controller, see the User's Manual for controller.

2. Periodic inspection

2.1 Daily inspection

The following is an inspection list that must be performed every day before and after operating the robot.

■ Inspection to be performed with the controller turned off

Step 1 Turn off the controller.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being inspected, to keep others from operating the controller switch.

Step 3 Perform the daily inspection.

Enter the safety enclosure and check the following points.

Checkpoints	Procedure	Remarks
Cables	Check for damage, dent and excessively tight bends.	<ul style="list-style-type: none">• Make the adjustment so that any stress is not applied to the cables.• If any damage is found, replace the defective cable according to the conditions.
Shutter	<ul style="list-style-type: none">• Check for scratches, dents, and excessively tight bends.• Check for flow-up (clearance).• Check the shutter top surface for contamination (*1).	See "1. Adjusting the shutter looseness" in Chapter 3. When the shutter replacement is needed, contact your distributor.
Ball screw, bearing	Check for unusual vibration or noise.	If any trouble is found, contact your distributor.
Motor	Check for unusual vibration and noise, and for abnormal temperature rise.	Check with the load factor monitor that the load factor is 100% or less. (*2)

*1: According to the robot working conditions, stripe marks caused by contamination may be produced on the shutter top surface close to the stop point. If this occurs, clean the shutter top surface with a cloth rag moistened with alcohol cleaning agent. If this trouble occurs frequently, contact your distributor.

*2: Some robot controller models cannot monitor the load factor.

■ Inspection to be performed with the controller turned on



WARNING

THE ROBOT CONTROLLER MUST BE INSTALLED OUTSIDE THE SAFETY ENCLOSURE, TO PREVENT A HAZARDOUS SITUATION IN WHICH YOU OR ANYONE ENTER THE SAFETY ENCLOSURE TO INSPECT THE CONTROLLER WHILE IT IS TURNED ON.

Step 1 Turn on the controller.

Check that no one is inside the safety enclosure, and then turn on the controller.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being inspected, to keep others from operating the controller, programming box or operation panel.

Step 3 Perform the daily inspection.

Check the following points from outside the safety enclosure.

Checkpoint	Procedure	Remarks
Safety enclosure	Check if the safety enclosure is in place. Check if emergency stop is triggered when the door is opened. Check if warning labels are affixed at the entrance and clearly visible.	
Emergency stop device	Press the emergency stop button to check if it works.	
Robot movement	Check for abnormal movement and excessive vibration and noise.	If any abnormal operation is found, contact your distributor.
Z-axis brake operation (*1)	Check if the brake works to stop the Z-axis from dropping more than 3mm from the stationary point.	If any abnormal operation is found, contact your distributor.

*1: Visually check the Z-axis movement when you press the emergency stop button from outside the safety enclosure and also when you turn off the controller.

■ Adjustment and parts replacement



WARNING

- AFTER INSPECTION, IF YOU NOTICE ANY ADJUSTMENT IS NEEDED, FIRST TURN OFF THE CONTROLLER AND THEN ENTER THE SAFETY ENCLOSURE TO PERFORM THE NECESSARY WORK.
- AFTER THE ADJUSTMENT HAS BEEN COMPLETED, INSPECT THE CHECKPOINTS STATED IN "DAILY INSPECTION" IN THIS SECTION.
- IF THE REPAIR OR PART REPLACEMENT OF THE ROBOT OR CONTROLLER IS REQUIRED, CONTACT YOUR DISTRIBUTOR.

2.2 Three-month inspection

Take the following precautions when performing 3-month inspection.



WARNING

WHEN THE BRAKE OF THE VERTICAL AXIS IS RELEASED, THE SLIDER AXIS MAY DROP, LEADING TO HAZARDOUS SITUATION. WHEN APPLYING THE GREASE TO THE VERTICAL AXIS PARTS, DO NOT RELEASE THE BRAKE.

Step 1 Turn off the controller.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being inspected, to keep others from operating the controller switch.

Step 3 Perform the daily inspection.

Enter the safety enclosure and check the following points.

Checkpoint	Procedure	Remarks
Manipulator bolts and screws (Only for major bolts and screws exposed externally)	Check for looseness and tighten if necessary. (*1)	
Controller	<ul style="list-style-type: none"> • Check for looseness at each terminal and connector on the panel. 	
Ball screw, Linear guide	<ul style="list-style-type: none"> • Check for dirt or grime. If dirt or grime is found, clean the part. Apply grease after cleaning. • Apply grease if the items checked are dry or do not have enough grease. <p>Recommended grease</p> <p>RS1/2/3 : Alvania No.2 (Showa Shell) : Daphne Eponex No. 2 (Idemitsu)</p> <p>RSD1/2/3/RSDG 1/2/3 : AFF (THK)</p> <p>RSF4/RSH1/2/3/4/5 : Alvania grease S2 (Showa Shell) : Alvania No.2 (Showa Shell) : Daphne Eponex No. 2 (Idemitsu)</p> <p>RSB1/2 : AFB (THK)</p>	See "3. Applying the grease" in this Chapter.
Shutter	<ul style="list-style-type: none"> • Check for looseness. • Check for flow-up (clearance). 	See "1. Adjusting the shutter looseness" in Chapter 3.
Coupling	Check if the bolts are loose. Tighten if necessary.	When any replacement is needed, contact your distributor.
Belt	<ul style="list-style-type: none"> • Check the timing belt for wear, cracks or cuts. • Check the timing belt tension. 	See "3. Checking the timing belt tension" in Chapter 3.

*1: Bolt tightening torque

Bolt size	Tightening torque (kgfcm)	Tightening torque (Nm)
M3 button head bolt	14	1.4
M3	20	2.0
M4	46	4.5
M5	92	9.0
M6	156	15.3
M8	380	37
M10	720	71
M12	1310	128

**CAUTION**

- If the grease recommended by your distributor is not used, this may cause the service life of the ball screw or linear guide to shorten.
- If the belt (consumable part) is cut off, the table slide may drop.

2.3 Six-month inspection

Take the following precautions when performing 6-month inspection.

**WARNING**

WHEN THE BRAKE OF THE VERTICAL AXIS IS RELEASED, THE SLIDER AXIS MAY DROP, LEADING TO HAZARDOUS SITUATION. WHEN APPLYING THE GREASE TO THE VERTICAL AXIS PARTS, DO NOT RELEASE THE BRAKE.

Step 1 Turn off the controller.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign showing that the robot is being inspected, to keep others from operating the controller switch.

Step 3 Perform the daily inspection.

Enter the safety enclosure and check the following points.

Checkpoint	Procedure	Remarks
Major bolts and screws on exterior of robot main unit	Check for looseness and tighten if necessary. (*1)	
Ball screw and linear guide	<ul style="list-style-type: none"> • Check for looseness in the ball screw and linear guide. Tighten if necessary. • Check for vibration during operation. Tighten drive section, and X and Y axis installation bolts if necessary. • Check for wear and backlash. If any abnormality is found, contact your distributor. 	If problem is not solved or wear and backlash are found, please contact your distributor.
Controller	<ul style="list-style-type: none"> • Check for loose terminals. • Check for loose connectors. 	
Application of grease to ball screw/nut and linear guide	Apply grease to the ball screw nut and linear guide every 6 months. RS1/2/3 : Alvania No.2 (Showa Shell) : Daphne Eponex No. 2 (Idemitsu) RSD1/2/3/RSDG 1/2/3 : AFF (THK) RSF4/RSH1/2/3/4/5 : Alvania grease S2 (Showa Shell) : Alvania No.2 (Showa Shell) : Daphne Eponex No. 2 (Idemitsu) RSB1/2 : AFB (THK)	See "3. Applying the grease" in this Chapter.
Greasing to support shaft (RSD1/2/3/RSDG1/2/3)	After the old grease has been removed with a cloth rag, apply AFB or AFF (THK) to the inside of the ball bushing and the shaft.	
Belt	<ul style="list-style-type: none"> • Check the timing belt for fault (scratch or crack). • Check the tension of the timing belt. 	See "3. Checking the timing belt tension" in Chapter 3.
Slider	Check for unusual wear or damage.	<ul style="list-style-type: none"> • If the friction is the cause of the trouble, make the adjustment so that the interference between the mating part and slider is eliminated. • If the slider is broken, contact your distributor.
Coupling	Check if the bolts are loose. Tighten if necessary.	When any replacement is needed, contact your distributor.

*1: Bolt tightening torque

Bolt size	Tightening torque (kgfcm)	Tightening torque (Nm)
M3 button head bolt	14	1.4
M3	20	2.0
M4	46	4.5
M5	92	9.0
M6	156	15.3
M8	380	37
M10	720	71
M12	1310	128

**CAUTION**

- If the grease recommended by your distributor is not used, this may cause the service life of the ball screw or linear guide to shorten.
- If the belt (consumable part) is cut off, the table slide may drop.

2.4 Three-year inspection

Inspect the following points once every three years, and contact us if any problem is found.
Set an earlier inspection interval if parts are subject to long-term or frequent usage.

Checkpoint	Procedure	Remarks
Ball screw nut sections and linear guides	Check for wear and looseness in the ball screw, nut and linear guide.	If any abnormality is found, contact your distributor.

3. Applying the grease

To apply the grease in accordance with the periodic inspection, follow the steps below. Before applying the grease, thoroughly read the cautions stated in "Using the Robot Safely" and "1. Before beginning work" in this Chapter to strictly observe the instructions.

When applying grease to the ball screws and linear guide, take the following precautions.



WARNING

PRECAUTIONS WHEN HANDLING GREASE:

- INFLAMMATION MAY OCCUR IF THIS GETS IN THE EYES.
BEFORE HANDLING THE GREASE, WEAR YOUR SAFETY GOGGLES TO ENSURE THE GREASE WILL NOT COME IN CONTACT WITH THE EYES.
- INFLAMMATION MAY OCCUR IF THE GREASE COMES INTO CONTACT WITH SKIN. BE SURE TO WEAR PROTECTIVE GLOVES TO PREVENT CONTACT WITH SKIN.
- DO NOT TAKE ORALLY OR EAT. (EATING WILL CAUSE DIARRHEA AND VOMITING.)
- HANDS AND FINGERS MIGHT BE CUT WHEN OPENING THE CONTAINER, SO USE PROTECTIVE GLOVES.
- KEEP OUT OF THE REACH OF CHILDREN.
- DO NOT HEAT THE GREASE OR PLACE NEAR AN OPEN FLAME SINCE THIS COULD LEAD TO SPARKS AND FIRES.

EMERGENCY TREATMENT:

- IF THIS GREASE GETS IN THE EYES, WASH LIBERALLY WITH PURE WATER FOR ABOUT 15 MINUTES AND CONSULT A PHYSICIAN FOR TREATMENT.
- IF THIS GREASE COMES IN CONTACT WITH THE SKIN, WASH AWAY COMPLETELY WITH SOAP AND WATER.
- IF TAKEN INTERNALLY, DO NOT INDUCE VOMITING BUT PROMPTLY CONSULT A PHYSICIAN FOR TREATMENT.



WARNING

DISPOSING OF GREASE AND THE CONTAINER:

- PROPER DISPOSAL IS COMPULSORY UNDER FEDERAL, STATE AND LOCAL REGULATIONS. TAKE APPROPRIATE MEASURES IN COMPLIANCE WITH LEGAL REGULATIONS.
- DO NOT PRESSURIZE THE EMPTY CONTAINER. PRESSURIZING MAY CAUSE THE CONTAINER TO RUPTURE.
- DO NOT ATTEMPT TO WELD, HEAT UP, DRILL HOLES OR CUT THIS CONTAINER. THIS MIGHT CAUSE THE CONTAINER TO EXPLODE AND THE REMAINING MATERIALS INSIDE IT TO IGNITE.



WARNING

WHEN THE BRAKE OF THE VERTICAL AXIS IS RELEASED, THE SLIDER AXIS MAY DROP, LEADING TO HAZARDOUS SITUATION. WHEN APPLYING THE GREASE TO THE VERTICAL AXIS PARTS, DO NOT RELEASE THE BRAKE.



CAUTION

Be sure to wear safety gloves before starting the work. If you touch any steel material part by bare hand, this may cause rust.

3.1 RS1/RS2/RS3

Prepare the tools necessary for the work.

- Phillips screwdriver
- Brush (for grease application)

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Pull off Covers.

Remove the robot's end cover, then pull off the side cover.

Step 5 Wipe off the contaminated grease.

Wipe off the contaminated grease with a clean cloth rag.



CAUTION

Do not put your finger in the slider movement range to prevent your finger from being caught in if the slider is moved by hand accidentally.

Step 6 Apply the grease.

Apply an adequate amount of grease to the ball screw or linear guide so that it does not scatter surroundings.

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Step 7 Spread the grease.

Move the slider back and forth to spread the grease.



CAUTION

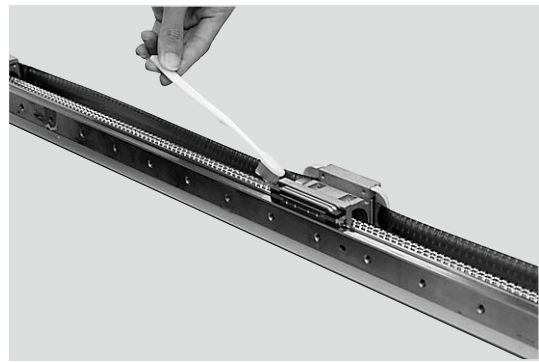
When the robot is mounted vertically, go outside the safety enclosure once. Check that no one is inside the safety enclosure, and then turn on the controller power. After that, slowly move the slider two or three times in the manual mode and turn off the controller power. Enter the safety enclosure again and continue the work.

Step 8 Wipe off the excess grease.

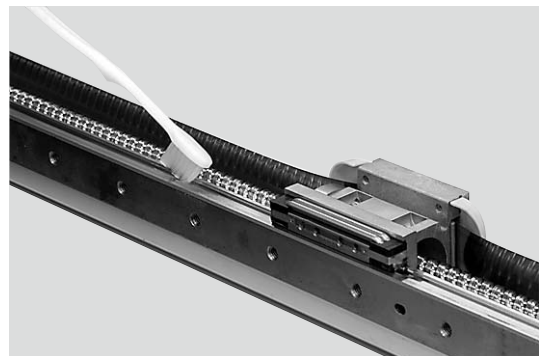
Finally, wipe off the excess grease with a clean cloth rag.

Step 9 Reattach the side covers.

▶ **Step 6** Applying grease to the ball screw



▶ **Step 6** Applying grease to the linear guide



3.2 RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3



CAUTION

Never loosen the mechanical stopper clamp bolt. Doing so might cause malfunctions.

Prepare the tools necessary for the work.

Phillips screwdriver

Grease gun

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Pull out the shaft.

Manually pull out the shaft from the origin position.

23302-AM-00

The pull-out dimensions necessary to apply grease

Robot	Pull-out dimension
RSD1/RSDG1	73mm or more
RSD2/RSDG2	75mm or more
RSD3/RSDG3	83mm or more

For details, refer to the positions described on the dimensional outline drawings in "1. Robot specifications" in Chapter 5.

Step 5 Open the greasing port cover.

Loosen the screw and detach the plate so that the greasing port can be seen.

RSD1/RSDG1

Side mounted motor type

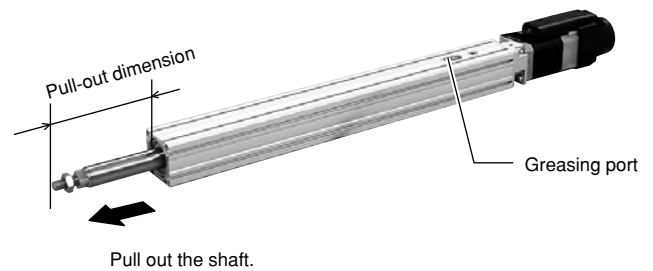
Upper motor mount with brake

Use an Allen wrench (1.5mm) to loosen the screw, then detach the plate and open the greasing port cover.

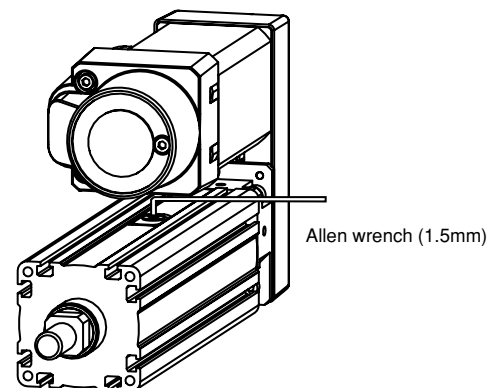
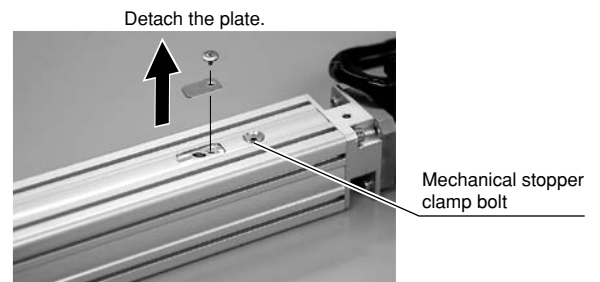
Use care to avoid dropping the bolt at this time.

23303-AM-00

Step 4 Pull-out the shaft



Step 5 Opening the greasing port cover



RSD1/RSDG1
Side mounted motor type
Upper motor mount with brake

Step 6 Apply the grease.

Apply grease to the ball screw shaft with a grease gun. Several cc may be adequate.

RSD1/RSDG1

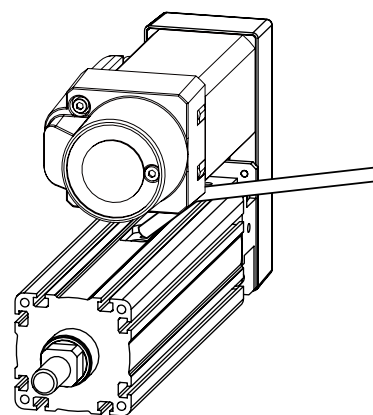
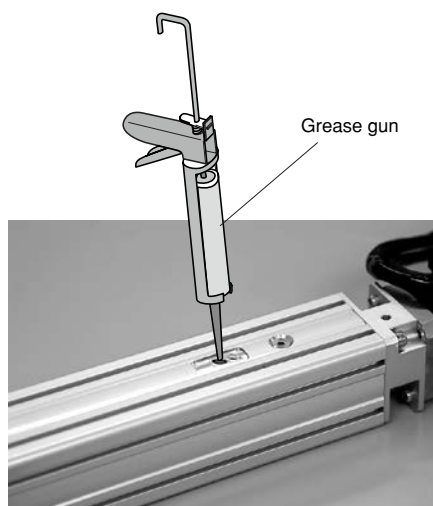
Side mounted motor type

Upper motor mount with brake

Apply grease with a grease gun with the tip bent. When the nozzle recommended by MISUMI is used or the grease can be applied, any tip nozzle shape can be used.

23304-AM-00

Step 6 Applying the grease

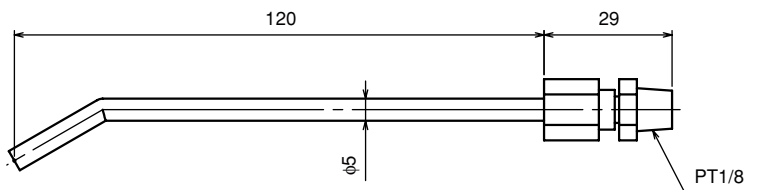


**RSD1/RSDG1
Side mounted motor type
Upper motor mount with brake**

Recommended tip nozzle for the side mounted motor types

When applying the grease to the ball screw, use the grease gun with the tip bent for the RSD1/RSDG1 upper motor mount with brake.

Tip nozzle for lubrication (recommended by MISUMI)



Part No.: EXRS-NZ1

* This nozzle can be attached to general-purpose, commercially available grease guns.

23307-AM-00

This nozzle tube is even usable when there is little space around the grease port.

For example, when the RSD2 and RSD3 side mounted motor type is used with the motor facing up, the grease port is positioned on the side of the robot body. This may make it difficult to refill grease depending on the positions of other robots or peripheral units.

3.3 RSH1/RSH2/RSH3

Prepare the tools necessary for the replacement work.

- Phillips screwdriver
- Grease gun
- Brush (for grease application)



CAUTION

- Select a grease gun suitable for the cartridge grease you have purchased.
- Tip nozzle, $\phi 10$ (inside diameter, $\phi 7$)

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Wipe off the contaminated grease.

First, wipe off the contaminated grease with a clean cloth rag wound on the stick.



CAUTION

Do not put your finger in the slider movement range to prevent your finger from being caught in if the slider is moved by hand accidentally.

Apply grease by either of the following methods.

■ Linear guide

Step 5 Apply the grease.

When using the grease nipples, apply grease into the two grease nipples on the left and right side of the slider (4 grease nipples for RSH3). Then move the table slider back and forth to help spread the grease around.

23301-A5-00

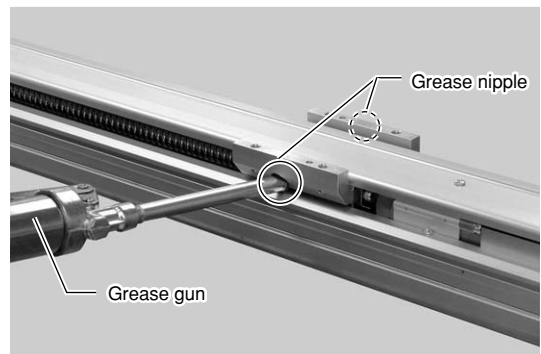
■ Ball screw

Step 5 Apply the grease.

Apply an adequate amount of grease to the ball screw so that it does not scatter surroundings. Move the table slider back and forth to spread the grease.

23302-A5-00

Step 5 Applying the grease to the linear guide.



Step 5 Applying the grease to the ball screw.



3.4 RSF4/RSH4/RSH5

Prepare the tools necessary for the replacement work.

- Phillips screwdriver
- Grease gun
- Brush (for grease application)



CAUTION

- Select a grease gun suitable for the cartridge grease you have purchased.
- Tip nozzle, $\phi 10$ (inside diameter, $\phi 7$)

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Wipe off the contaminated grease.

First, wipe off the contaminated grease with a clean cloth rag wound on the stick.



CAUTION

Do not put your finger in the slider movement range to prevent your finger from being caught in if the slider is moved by hand accidentally.

Apply grease by either of the following methods.

■ Linear guide

Step 5 Apply the grease.

Use the grease gun to apply the grease to the grease nipple of the linear guide through the clearance between the upper cover and frame.

23301-A4-00

▶ **Step 5** Applying the grease to the linear guide.



■ Ball screw

Step 5 Apply the grease.

Apply the grease to the screw thread roots thinly and uniformly with the brush. Move the slider back and forth to spread the grease.

23302-A4-00

▶ **Step 5** Applying the grease to the ball screw.



CAUTION

When the robot is mounted vertically, go outside the safety enclosure once. Check that no one is inside the safety enclosure, and then turn on the controller power. After that, slowly move the slider two or three times in the manual mode and turn off the controller power. Enter the safety enclosure again and continue the work.

3.5 RSB1/RSB2

Apply grease to the linear guide every 3 months.

Prepare the tools necessary for the replacement work.

- Phillips screwdriver
- Grease gun
- Brush (for grease application)



CAUTION

- Select a grease gun suitable for the purchased cartridge grease.
- Tip nozzle, $\phi 10$ (inside diameter, $\phi 7$)

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Wipe off the contaminated grease.

First, wipe off the contaminated grease with a clean cloth rag wound on the stick.



CAUTION

Do not put your finger in the slider movement range to prevent your finger from being caught in if the slider is moved by hand accidentally.

Step 5 Apply the grease.

Use the grease gun to apply the grease to the grease nipple of the linear guide through the clearance between the upper cover and frame.

Chapter 3 Adjustment

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1. Adjusting the shutter looseness (RS1/RS2/RS3)

The shutter may elongate with continued use. In such cases, adjust as follows.



CAUTION

- Be sure to wear safety gloves before starting the work. If you touch any steel material part by bare hand, this may cause rust.
- When the robot is installed vertically, slowly move the robot at a JOG speed to check the position where the shutter becomes loose mostly before entering the safety enclosure.

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Loosen the screw lightly.

Slightly loosen the screw which secures the shutter at the end cover side. (At this time, do not remove the screws.)



NOTE

Do not remove the screws.

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Step 5 Secure the shutter.

While stretching the shutter by fingers, tighten the screws to secure the shutter so that it does not become loose.

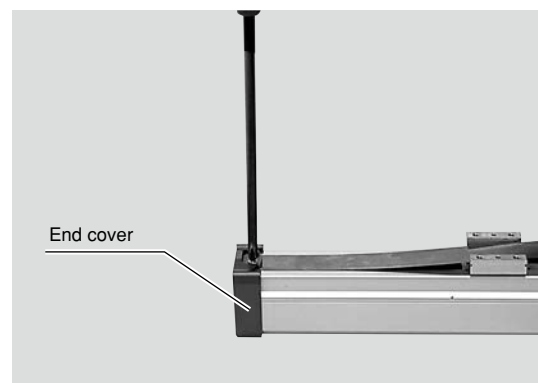


CAUTION

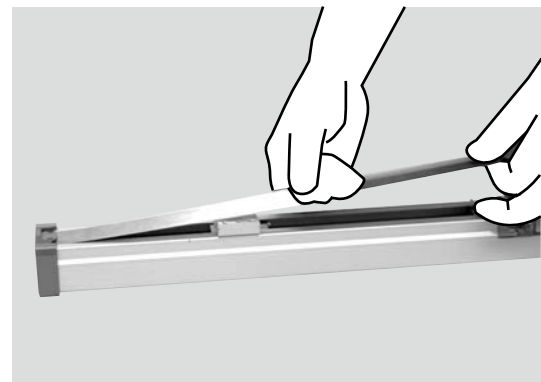
Do not press down on the shutter with excessive force. Pressing down hard on the shutter may cause the shutter to warp.

63404-AM-00

Step 4 Loosen the screws securing the shutter.



Step 5 Secure the shutter.



2. Adjusting the alignment (RSB1/RSB2)

On robot models having a long stroke, a slider travel guide (U groove) is provided inside the upper cover. The slider must be aligned with this U groove when attaching the upper cover.



WARNING

- BEFORE STARTING THE WORK, BE SURE TO DISCONNECT THE ROBOT FROM THE CONTROLLER OR TURN OFF THE CONTROLLER POWER. IF THE ROBOT OPERATES DURING WORK, THIS MAY CAUSE SERIOUS ACCIDENT.
- ADJUSTMENT BY REMOVING A COVER REQUIRE SPECIALIZED TECHNICAL KNOWLEDGE AND SKILLS, AND MAY ALSO INVOLVE HAZARDS IF ATTEMPTED BY AN UNSKILLED PERSON. THIS ADJUSTMENT MUST BE PERFORMED ONLY BY PERSONS WHO MEET REQUIREMENTS ESTABLISHED BY LOCAL REGULATIONS AND SAFETY STANDARDS FOR INDUSTRIAL ROBOTS.
- BE CAREFUL NOT TO NEGLECT TIGHTENING SCREWS OR BOLTS. IF ANY COVER IS NOT SECURED FIRMLY, THIS MAY CAUSE NOISE, COVER DROPPING AND FLYING, HAND ENTANGLEMENT IN DRIVE UNIT DURING TEACHING, OR BURN DUE TO HAND IN CONTACT WITH HOT SURFACE. SO, BE SURE TO TIGHTEN ALL THE SCREWS AND BOLTS SECURELY.



CAUTION

- If the slider and upper cover alignment is poor, the slider may wear out prematurely. Insert the slider into the U groove correctly so that the slider is not worn away or damaged by the edge of the upper cover.
- Be sure to wear safety gloves before starting the work. If you touch any steel material part by bare hand, this may cause rust.
- Be careful not to drop any screw or bolt during cover removal work.

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Insert the slider.

Insert the slider into the U-shape groove at the center of the upper cover. At this time, put the upper cover parallel with the axis movement direction.

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Step 5 Secure the upper cover mounting screws temporarily.

Secure the upper cover mounting screws (four screws) temporarily and move the table from the motor side to the end of the non-motor side.

Step 6 Retighten the screws on the non-motor side.

Retighten the screws on the non-motor side and move the table to the motor side again.

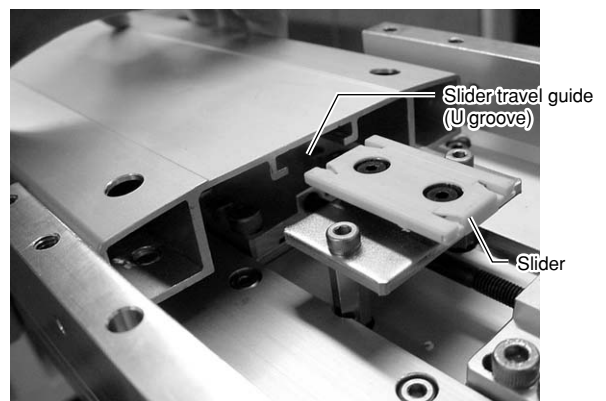
Step 7 Retighten the upper cover mounting screws (two screws) on the motor side.

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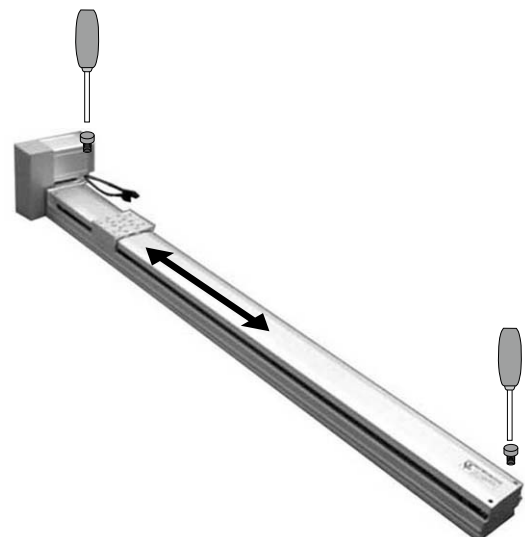
Step 8 Check the table movement.

Move the table by hand to check that the table movement is not heavy.

Step 4 Inserting the slider



Step 7 Reattaching the upper cover



3. Checking the timing belt tension

Timing belts are used on the side mounted motor type. The timing belt tension should be checked every 3 months.



WARNING

- BEFORE STARTING THE WORK, BE SURE TO DISCONNECT THE ROBOT FROM THE CONTROLLER OR TURN OFF THE CONTROLLER POWER. IF THE ROBOT OPERATES DURING WORK, THIS MAY CAUSE SERIOUS ACCIDENT.
- ADJUSTMENT AND MAINTENANCE BY REMOVING A COVER REQUIRE SPECIALIZED TECHNICAL KNOWLEDGE AND SKILLS, AND MAY ALSO INVOLVE HAZARDS IF ATTEMPTED BY AN UNSKILLED PERSON. THIS ADJUSTMENT MUST BE PERFORMED ONLY BY PERSONS WHO MEET REQUIREMENTS ESTABLISHED BY LOCAL REGULATIONS AND SAFETY STANDARDS FOR INDUSTRIAL ROBOTS.
- BE CAREFUL NOT TO NEGLECT TIGHTENING SCREWS OR BOLTS. IF ANY COVER IS NOT SECURED FIRMLY, THIS MAY CAUSE NOISE, COVER DROPPING AND FLYING, HAND ENTANGLEMENT IN DRIVE UNIT DURING TEACHING, OR BURN DUE TO HAND IN CONTACT WITH HOT SURFACE. SO, BE SURE TO TIGHTEN ALL THE SCREWS AND BOLTS SECURELY.



WARNING

- THE MOTOR AND SPEED REDUCTION GEAR CASING ARE EXTREMELY HOT AFTER AUTOMATIC OPERATION , SO BURNS MAY OCCUR IF THESE ARE TOUCHED. BEFORE TOUCHING THESE PARTS , TURN OFF THE CONTROLLER, WAIT FOR A WHILE AND CHECK THAT THE PARTS HAVE COOLED.
- INJURY CAN OCCUR IF HANDS OR FINGERS ARE SQUEEZED BETWEEN THE DRIVE PULLEY AND BELT. ALWAYS TURN OFF THE CONTROLLER AND USE CAUTION WHEN HANDLING THESE PARTS .



CAUTION

- Be sure to wear safety gloves before starting the work. If you touch any steel material part by bare hand, this may cause rust.
- Be careful not to drop any screw or bolt during cover removal work.
- If the belt (consumable part) is cut off, the table slide may drop.

3.1 RS1/RS2/RS3

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Detach the shutter holder cover.

Remove the 2 M4 screws, then detach the shutter holder cover.

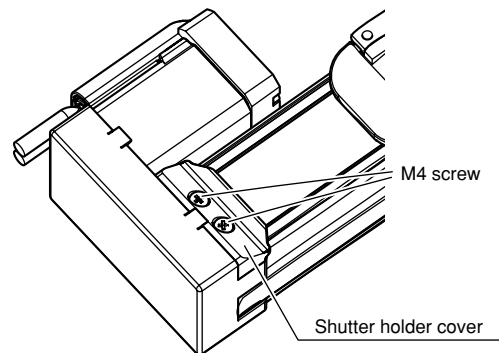
63451-AM-00

Step 5 Detach the belt cover.

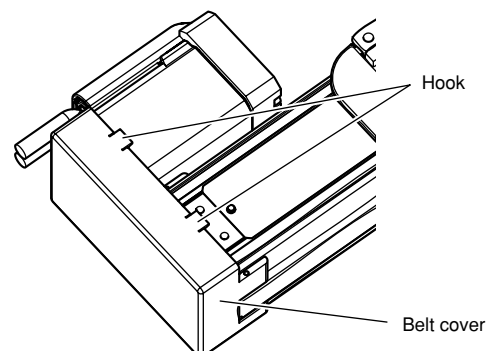
Release the 2 belt cover hooks, then detach the belt cover.

63452-AM-00

Step 4 Removing the shutter holder cover



Step 5 Removing the belt cover



Step 6 Use either of the two methods shown below to measure the timing belt tension.

1. Adjusting drive belt tension with a tension meter

We recommend using a tension meter to adjust the belt tension more accurately.

Recommended tension meter : U-505 (Made by UNITTA)

Measurement method

Pluck the belt at the load application position in the Fig. below to adjust the belt tension to the value shown below.

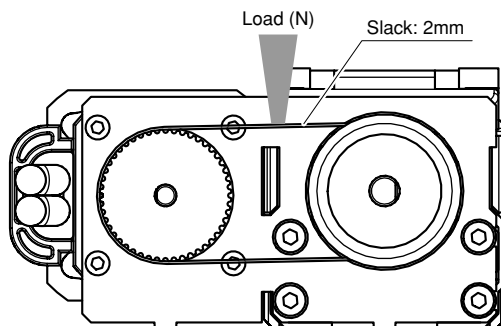
For details on how to use the tension meter, refer to the tension meter Instruction Manual.

Model	Frequency (Hz)	Span Length (mm)	Belt width (mm)	Weight (g/mm width x m length)
RS1/RS2/RS3	300 to 340	50	6	1.3

2. The push-pull belt tension gauge method (When a tension meter is unavailable, etc.)

Press the push-pull gauge against the center of the belt span and find the load range where the belt's outer periphery slack is 2.0mm.

Model	Load (N)	Slack (mm)
RS1/RS2/RS3	3.9 to 11.7	2



63453-AM-00

- When the timing belt tension is within the specified value range:

Go to Step7.

- When the timing belt tension is beyond the specified value range:

Adjust the timing belt tension.

For details, see "4. Adjusting the timing belt tension" in this Chapter.



NOTE

The timing belt tension must be adjusted if it is not within the prescribed tension range.
For details, see section "4. Adjusting the timing belt tension" in this Chapter.

Step 7 Attach the shutter holder cover and the belt cover by reversing their detachment procedures.

3.2 RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Release the 2 belt cover hooks, then detach the belt cover.

Release (upward and downward) the hooks which secure the belt cover, then detach the belt cover.

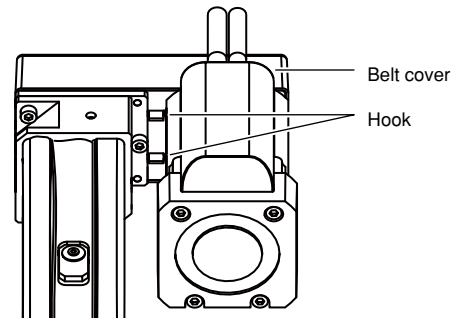


NOTE

This procedure is easier if the upper hook is released first by pressing it from above with a rod-shaped tool.

63454-AM-00

Step 4 Removing the belt cover



Step 5 Use either of the two methods shown below to measure the timing belt tension.

1. Adjusting drive belt tension with a tension meter

We recommend using a tension meter to adjust the belt tension more accurately.

Recommended tension meter : U-505 (Made by UNITTA)

Measurement method

Pluck the belt at the load application position in the Fig. below to adjust the belt tension to the value shown below.

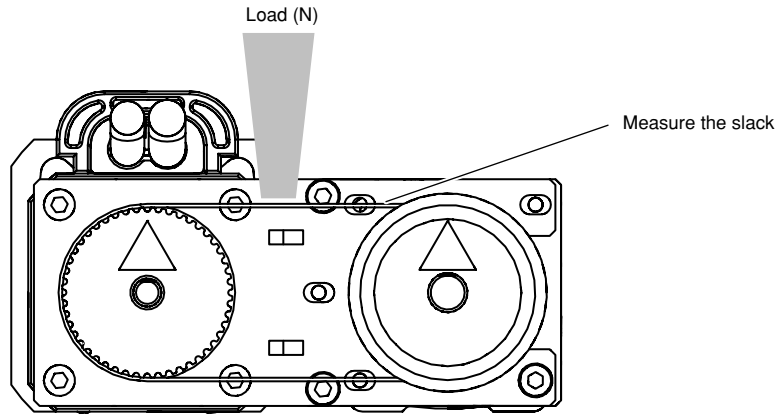
For details on how to use the tension meter, refer to the tension meter Instruction Manual.

Model	Frequency (Hz)	Span Length (mm)	Belt width (mm)	Weight (g/mm width × m length)
RSD1/RSDG1	300 to 370	53	6	1.3
RSD2/RSDG2	286 to 350	56	6	1.3
RSD3/RSDG3	255 to 323	70	6	1.3

2. The push-pull belt tension gauge method (When a tension meter is unavailable, etc.)

Press the push-pull gauge against the center of the belt span and find the load range where the belt's outer periphery slack is 2.0mm.

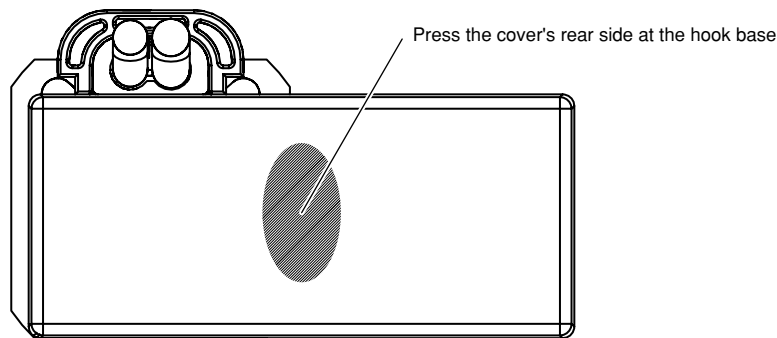
Model	Load (N)	Slack (mm)
RSD1/RSDG1	3.4 to 4.9	2
RSD2/RSDG2	3.4 to 4.9	2
RSD3/RSDG3	3.9 to 7.3	3



63455-AM-00

Step 6 Attach the belt cover.

Verify that the belt cover's hooks are securely engaged. Also press the belt cover from its rear side where the hook base is located to ensure that the cover is firmly attached.



63456-AM-00

- When the timing belt tension is within the specified value range:

Go to Step 7.

- When the timing belt tension is beyond the specified value range:

Adjust the timing belt tension.

For details, see "4. Adjusting the timing belt tension" in this Chapter.



NOTE

The timing belt tension must be adjusted if it is not within the prescribed tension range. For details, see section "4. Adjusting the timing belt tension" in this Chapter.

Step 7 Attach the shutter holder cover and the belt cover by reversing their detachment procedures.

4. Adjusting the timing belt tension

The timing belt tension must be adjusted if it is not within the prescribed tension range.



WARNING

- BEFORE STARTING THE WORK, BE SURE TO DISCONNECT THE ROBOT FROM THE CONTROLLER OR TURN OFF THE CONTROLLER POWER. IF THE ROBOT OPERATES DURING WORK, THIS MAY CAUSE SERIOUS ACCIDENT.
- ADJUSTMENT AND MAINTENANCE BY REMOVING A COVER REQUIRE SPECIALIZED TECHNICAL KNOWLEDGE AND SKILLS, AND MAY ALSO INVOLVE HAZARDS IF ATTEMPTED BY AN UNSKILLED PERSON. THIS ADJUSTMENT MUST BE PERFORMED ONLY BY PERSONS WHO MEET REQUIREMENTS ESTABLISHED BY LOCAL REGULATIONS AND SAFETY STANDARDS FOR INDUSTRIAL ROBOTS.
- BE CAREFUL NOT TO NEGLECT TIGHTENING SCREWS OR BOLTS. IF ANY COVER IS NOT SECURED FIRMLY, THIS MAY CAUSE NOISE, COVER DROPPING AND FLYING, HAND ENTANGLEMENT IN DRIVE UNIT DURING TEACHING, OR BURN DUE TO HAND IN CONTACT WITH HOT SURFACE. SO, BE SURE TO TIGHTEN ALL THE SCREWS AND BOLTS SECURELY.



WARNING

- THE MOTOR AND SPEED REDUCTION GEAR CASING ARE EXTREMELY HOT AFTER AUTOMATIC OPERATION , SO BURNS MAY OCCUR IF THESE ARE TOUCHED. BEFORE TOUCHING THESE PARTS , TURN OFF THE CONTROLLER, WAIT FOR A WHILE AND CHECK THAT THE PARTS HAVE COOLED.
- INJURY CAN OCCUR IF HANDS OR FINGERS ARE SQUEEZED BETWEEN THE DRIVE PULLEY AND BELT. ALWAYS TURN OFF THE CONTROLLER AND USE CAUTION WHEN HANDLING THESE PARTS .



CAUTION

- Be sure to wear safety gloves before starting the work. If you touch any steel material part by bare hand, this may cause rust.
- Be careful not to drop any screw or bolt during cover removal work.

4.1 RS1/RS2/RS3

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Detach the shutter holder cover.

Remove the 2 M4 screws, then detach the shutter holder cover.

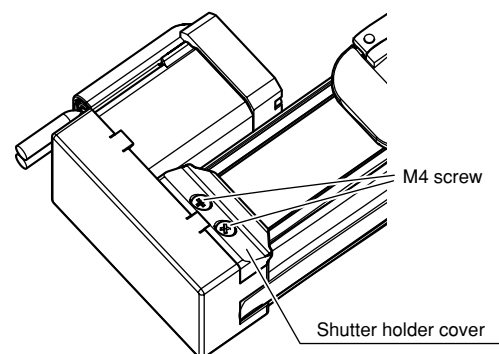
63451-AM-00

Step 5 Detach the belt cover.

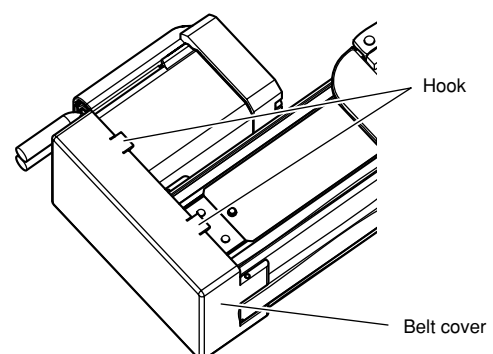
Release the 2 belt cover hooks, then detach the belt cover.

63452-AM-00

Step 4 Removing the shutter holder cover



Step 5 Removing the belt cover



Step 6 Loosen the bolts to move the plate motor slightly.

Align the triangular labels so that they face upward, then partially loosen the 4 M4 bolts to the point where the plate motor can be slightly moved.

61457-AM-00

Step 7 Use a push-pull gauge to push the plate motor in the horizontal direction as shown below.



CAUTION

Be sure to adjust the timing belt to its prescribed tension. Operating the robot with the tension outside the prescribed range can cause equipment failure.

Model	Pushing Load (N)
RS1	9.6
RS2/RS3	11.7

Step 8 While applying pressure with the push-pull gauge, tighten the 4 M4 bolts which were loosened at Step 6 above.

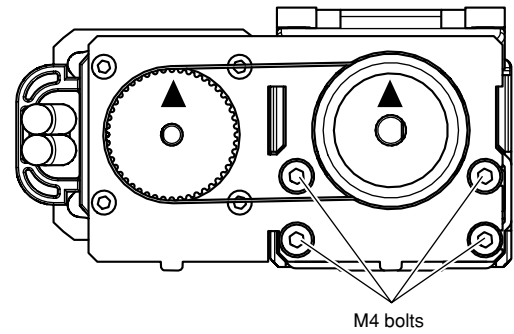
63458-AM-00

Step 9 Measure the timing belt tension.

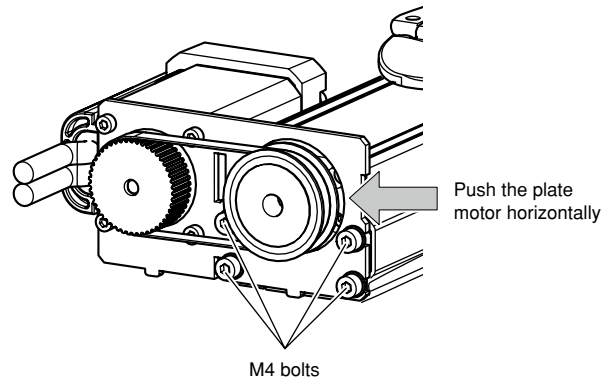
If the belt tension is outside the prescribed range, repeat Steps 6 to 8 above to readjust the tension.

Step 10 Reattach the shutter holder cover and the belt cover by reversing their detachment procedures.

Step 6 Loosening the motor plate



Step 8 Retightening the plate motor



4.2 RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Release the 2 belt cover hooks, then detach the belt cover.

Release (upward and downward) the hooks which secure the belt cover, then detach the belt cover.



NOTE

This procedure is easier if the upper hook is released first by pressing it from above with a rod-shaped tool.

63454-AM-00

Step 5 Loosen the bolts to move the plate motor slightly.

Align the triangular labels so that they face upward, then partially loosen the 3 bolts shown below.

■ **RSD1/RSD2**

M3 bolts

■ **RSD3**

M4 bolts



NOTE

The bolts should be loosened only enough (half-turn) to permit slight plate motor movement.

63459-AM-00

Step 6 Use a push-pull gauge to push the plate motor in the horizontal direction.

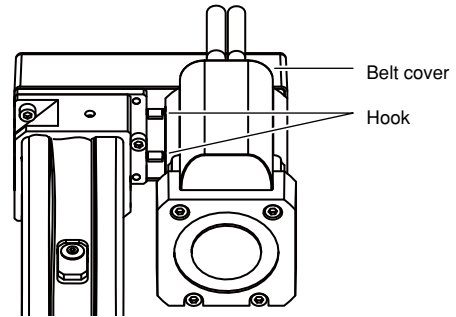
When pushing the motor plate with the push-pull gauge, either push simultaneously at the plate motor's top and bottom notches, or place a steel plate against the notches and push the center of the steel plate.



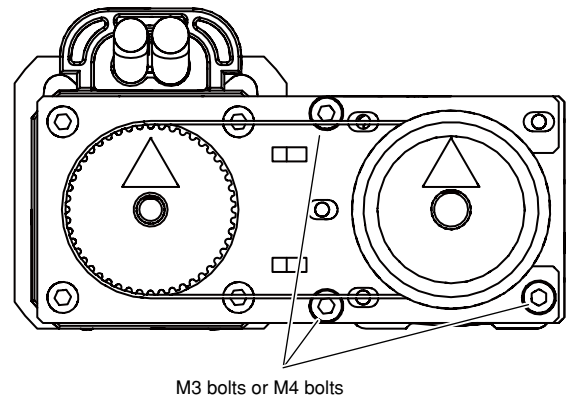
CAUTION

Be sure to adjust the timing belt to its prescribed tension. Operating the robot with the tension outside the prescribed range can cause equipment failure.

▶ **Step 4** Removing the belt cover



▶ **Step 5** Loosening the plate motor



Model	Pushing Load (N)
RSD1/RSDG1	9.6
RSD2/RSDG2	
RSD3/RSDG3	17

Step 7 While applying pressure with the push-pull gauge, tighten the 3 M3 or M4 bolts which were loosened at Step 5.

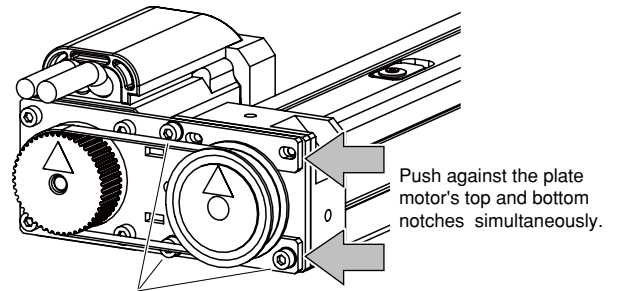
63460-AM-00

Step 8 Measure the timing belt tension. If the belt tension is outside the prescribed range, repeat Steps 5 to 7 above to readjust the tension.

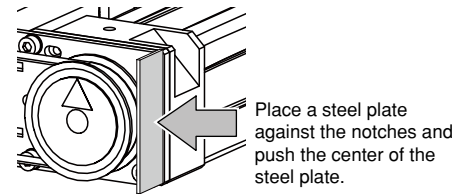
Step 9 Attach the belt cover. Verify that the belt cover's hooks are securely engaged. Also press the belt cover from its rear side where the hook base is located to ensure that the cover is firmly attached.

63461-AM-00

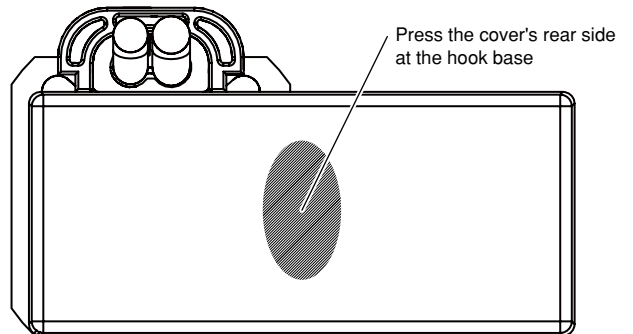
▶ **Step 7 Retightening the plate motor**



M3 bolts or M4 bolts



▶ **Step 9 Reattaching the belt cover**



4.3 RSB1/RSB2

The RSB1, RSB2 robots use a timing belt to move the slider table.
If the tension of the timing belt is weak, follow the steps below to adjust the belt tension.



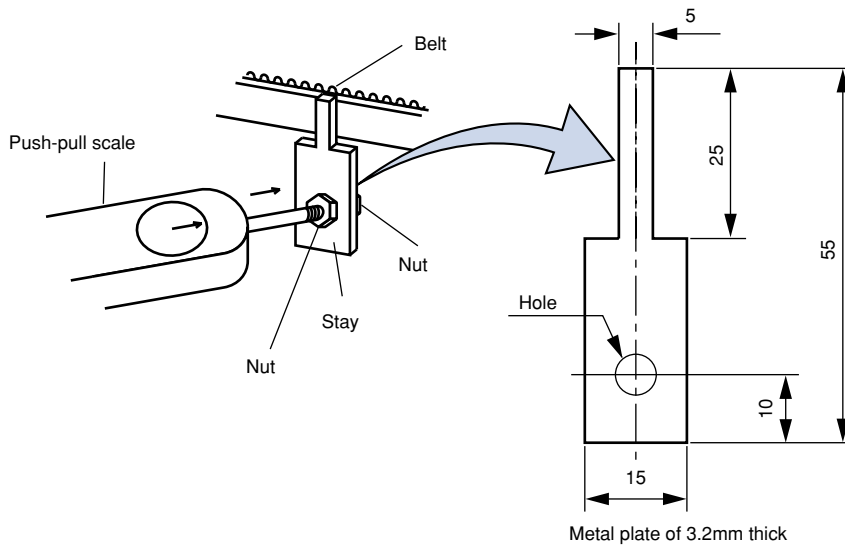
CAUTION

Since a positional shift occurs after adjusting the belt tension, return-to-origin or absolute reset must be performed again and the point data re-specified.

Prepare tools necessary for the adjustment work

- Belt tension adjustment bolt (accessory)
- Push-pull scale
- Stay (The user must manufacture this stay while referring to the Fig. below.)
- Tension meter

Stay (example)



53303-AC-00

4.3.1 Adjusting the drive belt tension

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Take off the end cover.

Step 5 Remove the upper cover.

Remove the upper cover mounting screws and remove the upper cover.



CAUTION

On robot models having a long stroke, the slider is fitted in the travel guide (U groove) inside the upper cover, so remove the upper cover by sliding it along the direction the robot moves.

Step 6 Apply a tension to the belt.

1. Install the belt tension adjustment bolt supplied with the robot.
2. Loosen the belt stay mounting bolts (eight bolts).
3. Turn the adjustment bolt to apply a tension to the belt.

53305-AC-00

Step 7 Apply a load.

Move the slider by hand to a position at which the distance from the slider edge to the base block edge is 150mm. Apply a load to the belt at a position 115mm (RSB1) or 129mm (RSB2) away from the slider edge.

53304-AC-00

53306-AC-00

Step 8 Tighten the belt stay mounting bolts temporarily.

Step 9 Check the slack amount.

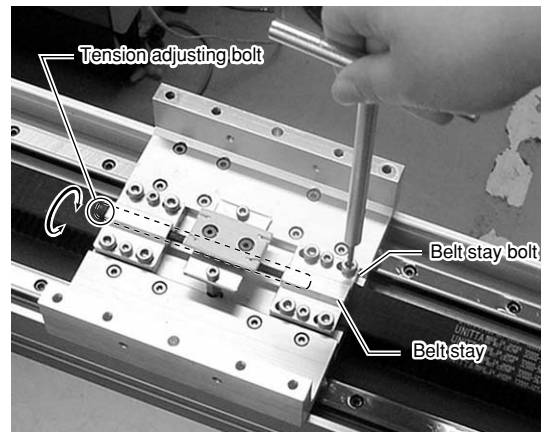
It is accepted that the slack is within the range stated in the table below when the belt is pushed with a specified load. If the slack is beyond the range, repeat Steps 5 and 6 to adjust the belt tension.

Load and slack for drive belt tension

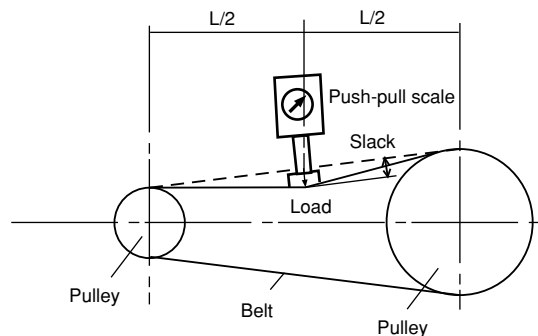
Robot model	Load		Slack (mm)
	(N)	(kgf)	
RSB1	4.9 to 5.9	0.5 to 0.6	2
RSB2	5.9 to 6.9	0.6 to 0.7	2

Step 10 Tighten the belt stay mounting bolts.

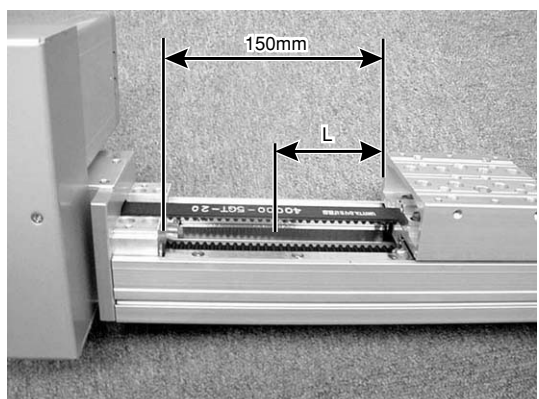
Step 6 Applying a tension



Step 7 Adjusting the speed reduction belt tension



Step 7 Load application position



Step 11 Remove the belt tension adjustment bolt.

Step 12 Reattach the upper cover and end cover.



NOTE
See also "2. Adjusting the alignment (RSB1/RSB2)" in this Chapter.

Reference: Adjusting drive belt tension with a tension meter

We recommend using a tension meter to adjust the belt tension more accurately.

Recommended tension meter : U-505 (Made by UNITTA)

Measurement method

Pluck the belt at the load application position in Step 7 to adjust the belt tension to the value shown below.

For details on how to use the tension meter, refer to the tension meter Instruction Manual.

Robot model	Tension (N)	Frequency (Hz)	Span length (mm)	Belt width (mm)	Unit mass (g/width [mm] length [m])
RSB1	127 to 147	86 to 93	230	20	4.0
RSB2	169 to 188	79 to 84	258	25	4.0

4.3.2 Adjusting the speed reduction belt tension

Step 1 Turn off the controller power.

Step 2 Place a sign indicating the robot is being adjusted.

Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

Step 3 Enter the safety enclosure.

Step 4 Remove the belt cover.

53307-AC-00

Step 5 Measure the slack amount.

Apply the load shown in the table below to the center portion between both pulleys to measure the slack. When the slack is within the range stated in the table, no adjustment is needed.

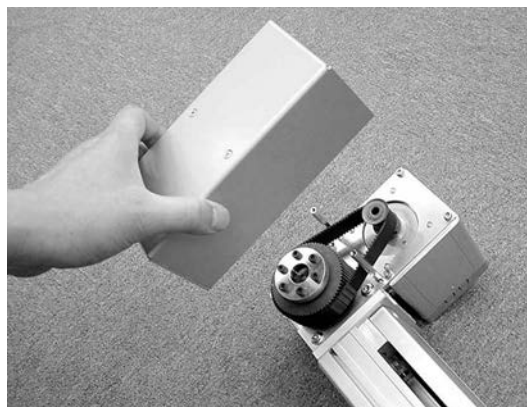
53308-AC-00

Load and slack for speed reduction belt tension

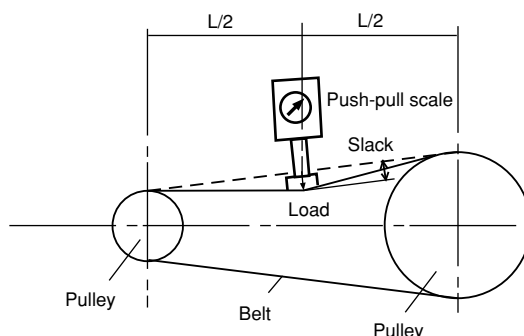
Robot model	Load		Slack (mm)
	(N)	(kgf)	
RSB1	5.9 to 6.9	0.6 to 0.7	3
RSB2	5.9 to 6.9	0.6 to 0.7	3

If the slack is beyond the range stated in the table above, go to the next Step.

Step 4 Removing the belt cover



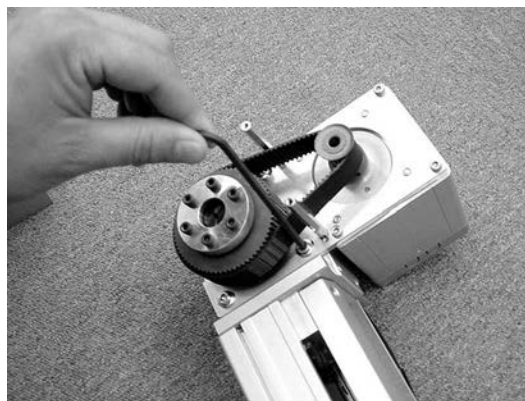
Step 5 Measuring the slack amount



Step 6 Loosen the motor plate mounting bolts.

53309-AC-00

Step 6 Loosening the motor plate mounting bolts

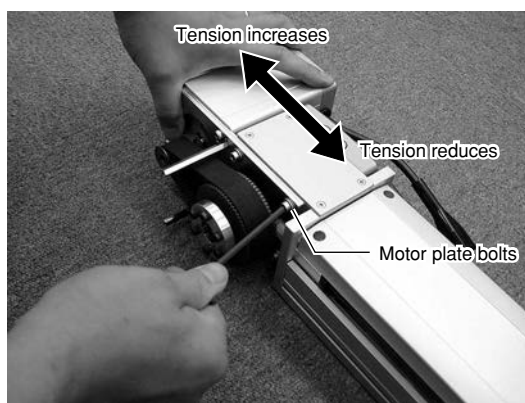


Step 7 Move the motor case to adjust the slack.

If the value that has been measured in Step 5 is smaller than the value shown in the table, move the motor case in the tension increase direction. Conversely, if the measured value is larger than the value shown in the table, move the motor case in the tension decrease direction.

53310-AC-00

Step 7 Adjusting the slack



Step 8 Measure the belt tension again.

Follow Step 4 to measure the belt tension again. When the measured value is within the range shown in the table, the belt tension adjustment is completed. If the measured value is beyond the range, repeat Steps 5 to 7.

Step 9 Tighten the motor plate bolts securely.

Step 10 Reattach the belt cover.

Reference: Adjusting speed reduction belt tension with a tension meter

We recommend using a tension meter to adjust the belt tension more accurately.

Recommended tension meter : U-505 (Made by UNITTA)

Measurement method

Pluck the belt at the load application position while referring to Step 5 so as to adjust the belt tension to the value shown below.

Robot model	Tension (N)	Frequency (Hz)	Span length (mm)	Belt width (mm)	Unit mass (g/width [mm] length [m])
RSB1	44 to 49	180 to 190	82	20	2.5
RSB2	44 to 49	180 to 190	82	20	2.5

Chapter 4 Troubleshooting

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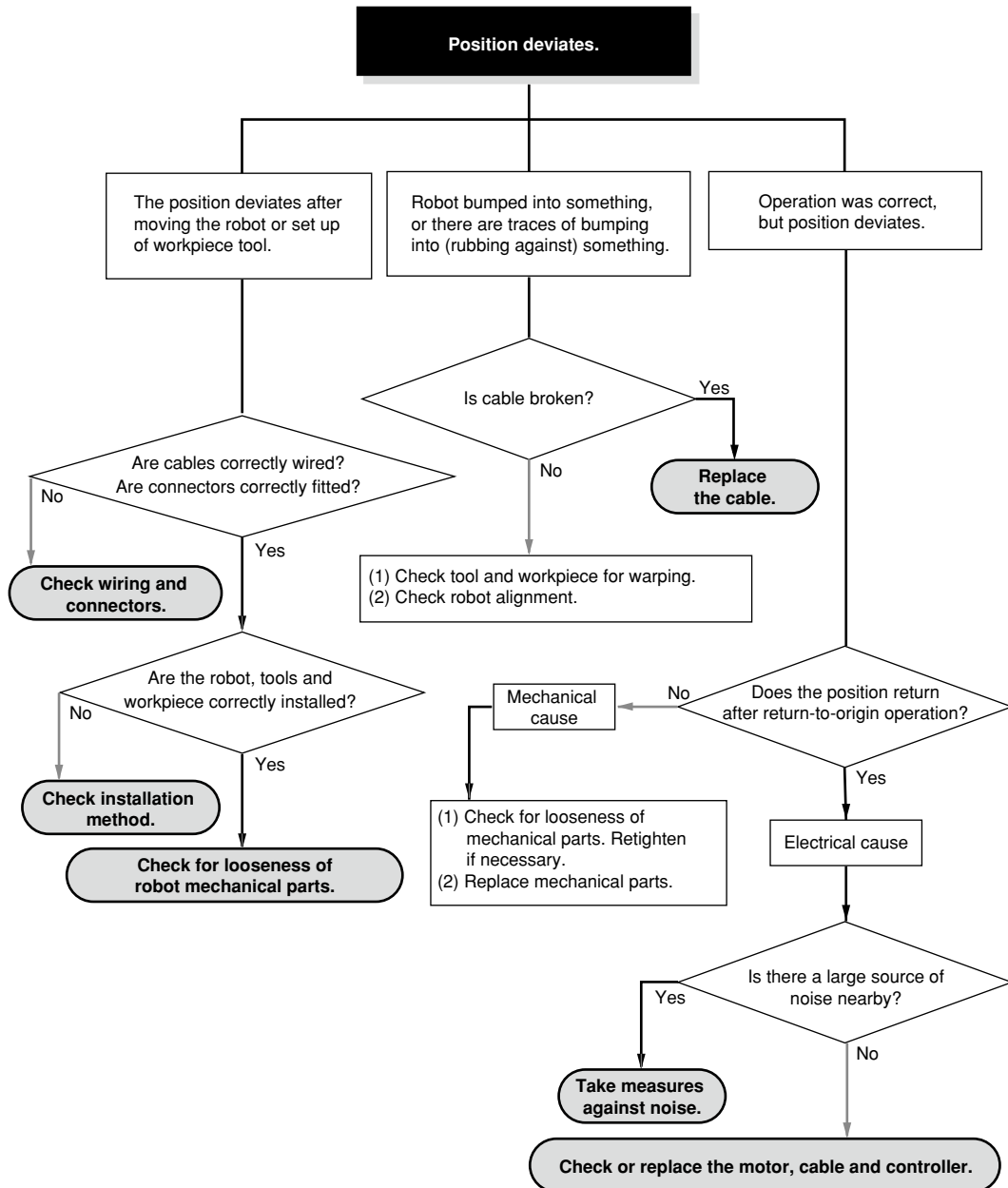
1. If you suspect trouble	4-1
1.1 Positioning error	4-1

1. If you suspect trouble

If an error such as a positioning error or feedback error occurs, check the following points to find the solution before you determine the robot or controller has malfunctioned. If the trouble still exists even after checking these points, please contact your distributor with a detailed description of the trouble.

1.1 Positioning error

Positioning error



23401-A0-00

Chapter 5 Specifications

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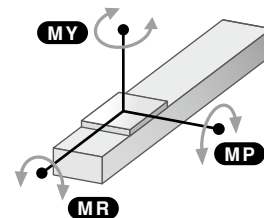
1. Robot specifications

1.1 RS1

■ Specifications

Motor	☐ 42 Step motor			
Resolution (Pulse/rotation)	20480			
Repeatability(mm) ^{Note 1}	±0.02			
Deceleration mechanism	Ball screw φ8(Class C10)			
Maximum motor torque (N•m)	0.27			
Ball screw lead (mm)	2	6	12	
Maximum speed (mm/sec)	100	300	600	
Maximum payload (kg)	Horizontal	6	4	2
	Vertical	4	2	1
Max. pressing force (N)	150	90	45	
Stroke (mm)	50 to 400 (50 pitch)			
Overall length (mm)	Horizontal	Stroke +216		
	Vertical	Stroke +261		
Maximum dimensions of cross section of main unit (mm)	W49×H59			
Cable length (m)	Standard: 1 / Option: 3,5,10			
Controller	C1			
Pulse Train Driver	P1			

■ Static loading moment



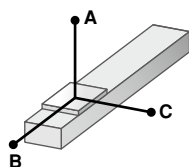
MY	MP	MR
16	19	17

(Unit: N•m)

Note 1. Positioning repeatability in one direction.

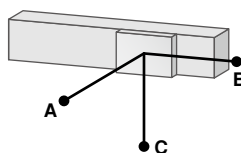
- Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servicelife of 10,000km.
Note. Stroke is 400mm when calculating the service life.

Horizontal installation



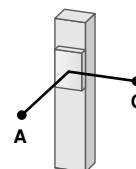
		A	B	C
Lead 12	1kg	807	218	292
	2kg	667	107	152
Lead 6	2kg	687	116	169
	3kg	556	76	112
	4kg	567	56	84
Lead 2	4kg	869	61	92
	6kg	863	40	60

Wall installation



		A	B	C
Lead 12	1kg	274	204	776
	2kg	133	93	611
Lead 6	2kg	149	102	656
	3kg	92	62	516
	4kg	63	43	507
Lead 2	4kg	72	48	829
	6kg	39	26	789

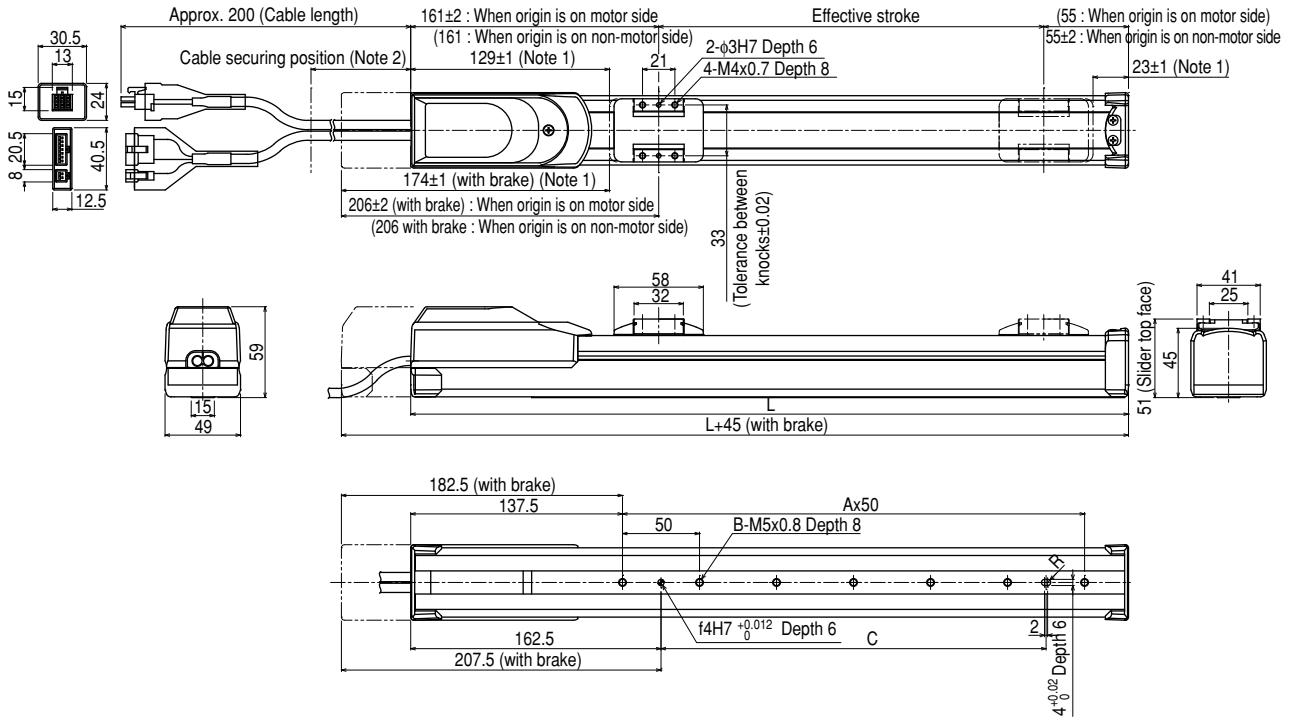
Vertical installation



		A	C
Lead 12	0.5kg	407	408
	1kg	204	204
Lead 6	1kg	223	223
	2kg	107	107
Lead 2	2kg	118	118
	4kg	53	53

(Unit: mm)

■ Dimensions
RS1 STRAIGHT TYPE



63501-AM-00

Note 1. Distance from both ends to the mechanical stopper.

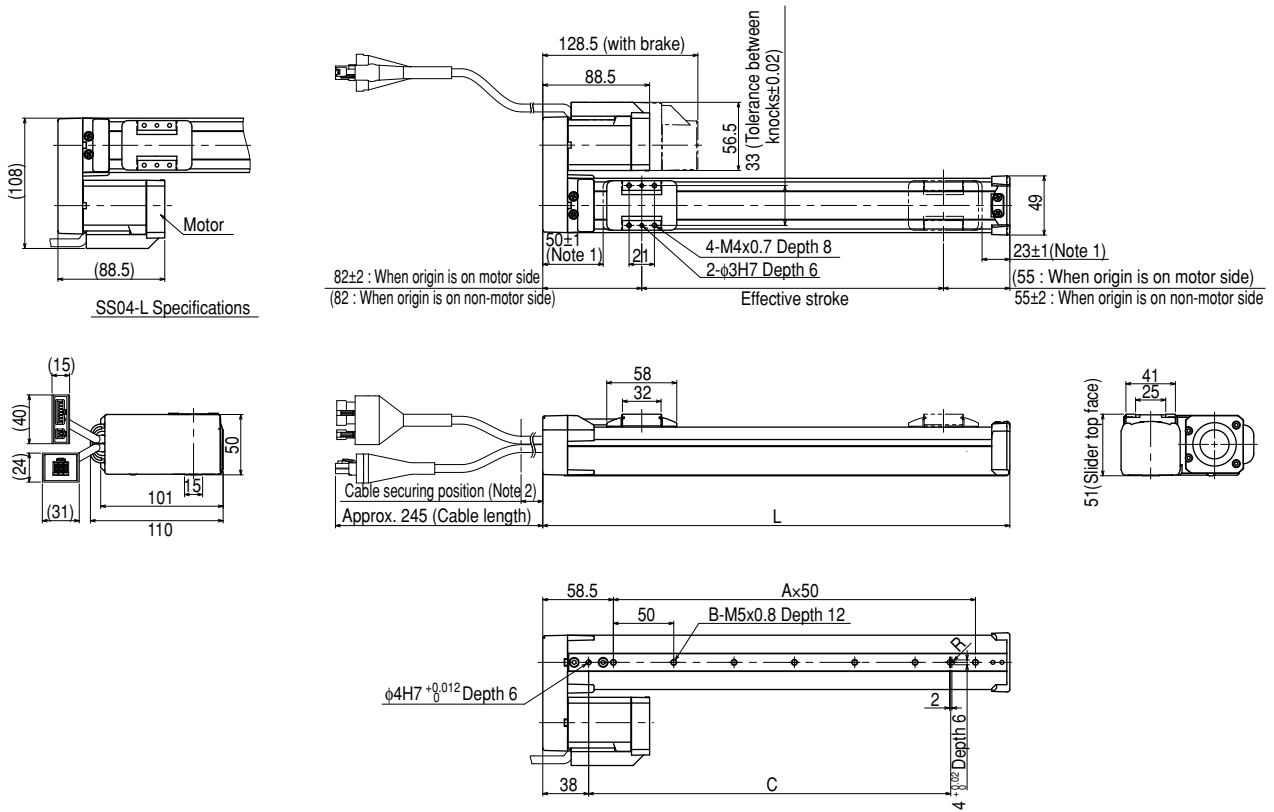
Note 2. Secure the cable with a tie-band 100mm or less from unit's end face to prevent the cable from being subjected to excessive loads.

Note 3. Minimum bend radius of motor cable is R30.

Note 4. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

Effective stroke	50	100	150	200	250	300	350	400
L	266	316	366	416	466	516	566	616
A	2	3	4	5	6	7	8	9
B	3	4	5	6	7	8	9	10
C	50	100	150	200	250	300	350	400
Weight (kg) ^{Note 4}	1.5	1.6	1.7	1.8	2.0	2.1	2.2	2.3

RS1 SIDE MOUNTED MOTOR TYPE



63535-AM-00

- Note 1. Distance from both ends to the mechanical stopper.
- Note 2. Secure the cable with a tie-band 80mm or less from unit's end face to prevent the cable from being subjected to excessive loads.
- Note 3. Minimum bend radius of motor cable is R30.
- Note 4. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 5. The belt cover's left and right sides are asymmetrical. Therefore, if the motor mounting orientation is changed, the cover cannot be attached.

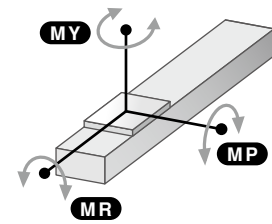
Effective stroke	50	100	150	200	250	300	350	400
L	187	237	287	337	387	437	487	537
A	2	3	4	5	6	7	8	9
B	3	4	5	6	7	8	9	10
C	100	150	200	250	300	350	400	450
Weight (kg) ^{Note 4}	1.2	1.4	1.5	1.6	1.7	1.8	1.9	2.1

1.2 RS2

■ Specifications

Motor	☐ 42 Step motor			
Resolution (Pulse/rotation)	20480			
Repeatability(mm) ^{Note 1}	±0.02			
Deceleration mechanism	Ball screw $\phi 12$ (Class C10)			
Maximum motor torque (N·m)	0.27			
Ball screw lead (mm)	6	12	20	
Maximum speed (mm/sec) ^{Note 2}	300	600	1000	
Maximum payload (kg)	Horizontal	10	6	4
	Vertical	2	1	–
Max. pressing force (N)	90	45	27	
Stroke (mm)	50 to 800 (50 pitch)			
Overall length (mm)	Horizontal	Stroke +230		
	Vertical	Stroke +270		
Maximum dimensions of cross section of main unit (mm)	W55×H56			
Cable length (m)	Standard: 1 / Option: 3,5,10			
Controller	C1			
Pulse Train Driver	P1			

■ Static loading moment



MY	MP	MR
25	33	30

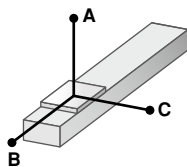
(Unit: N·m)

Note 1. Positioning repeatability in one direction.

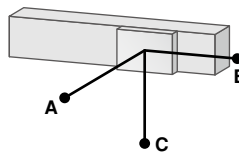
Note 2. If the stroke exceeds 600mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

- Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servicelife of 10,000km.
Note. Stroke is 600mm when calculating the service life.

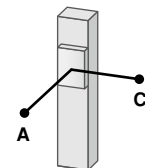
Horizontal installation



Wall installation



Vertical installation



		A	B	C
Lead 20	2kg	413	139	218
	4kg	334	67	120
Lead 12	4kg	347	72	139
	6kg	335	47	95
Lead 6	4kg	503	78	165
	8kg	332	37	79
	10kg	344	29	62

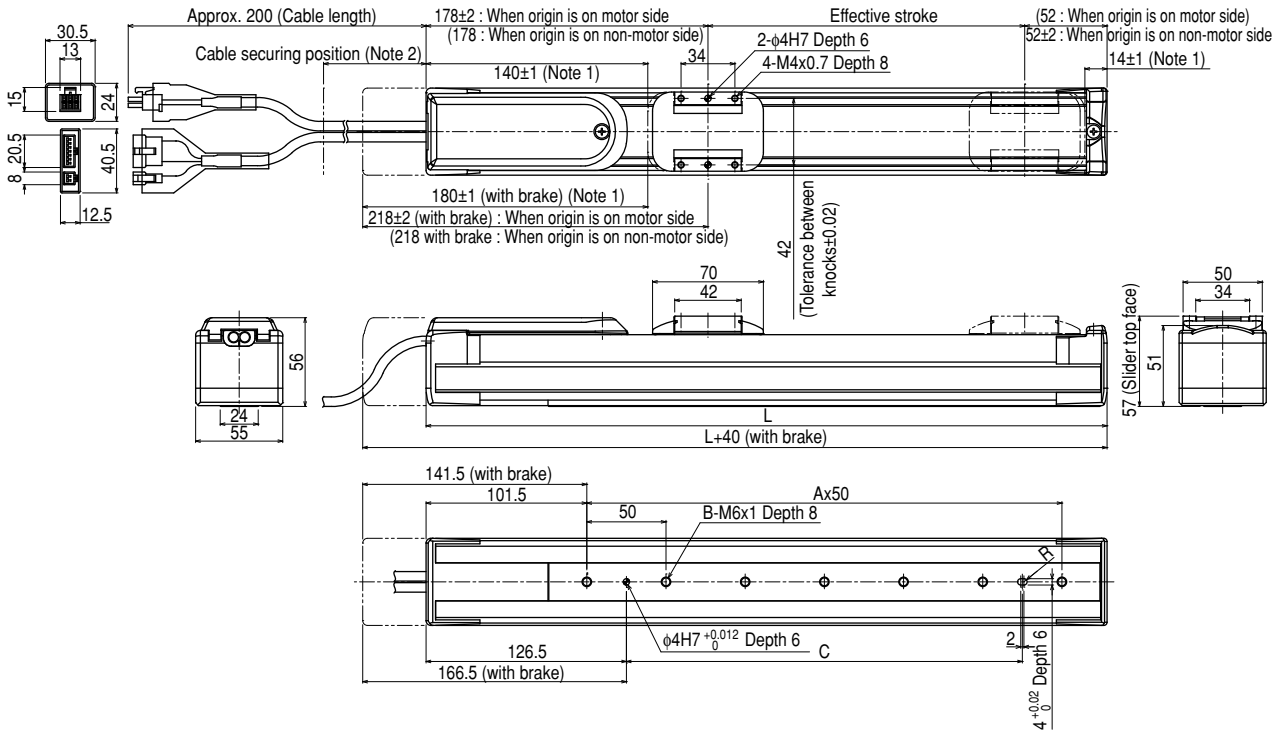
		A	B	C
Lead 20	2kg	192	123	372
	4kg	92	51	265
Lead 12	4kg	109	57	300
	6kg	63	31	263
Lead 6	4kg	134	63	496
	6kg	76	35	377
	8kg	47	22	355

		A	C
Lead 12	0.5kg	578	579
	1kg	286	286
Lead 6	1kg	312	312
	2kg	148	148

(Unit: mm)

■ Dimensions

RS2 STRAIGHT TYPE



63502-AM-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. Secure the cable with a tie-band 100mm or less from unit's end face to prevent the cable from being subjected to excessive loads.

Note 3. Minimum bend radius of motor cable is R30.

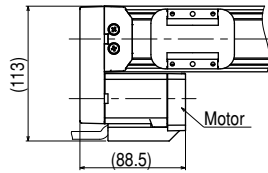
Note 4. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

Note 5. When the stroke is longer than 600mm, resonance of the ball screw may occur depending on the operation conditions (critical speed).

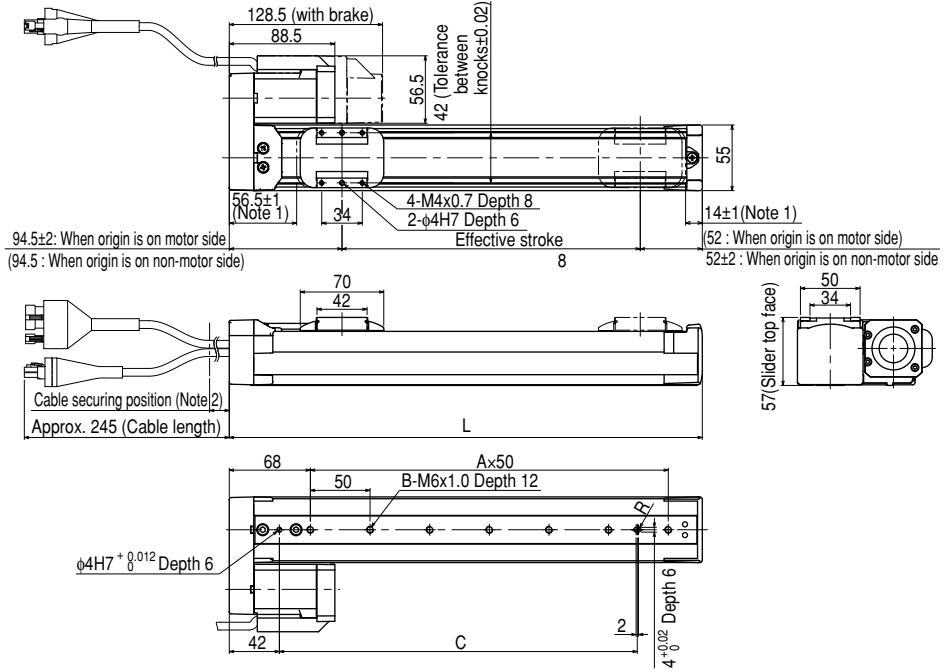
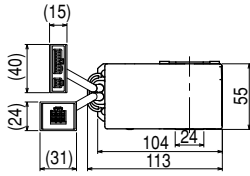
In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table below.

Effective stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
B	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
C	100	150	200	250	300	350	400	450	500	500	500	500	500	500	500	500
Weight (kg) ^{Note 4}	2.1	2.3	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
Maximum speed (mm/sec) ^{Note 5}	Lead 20	1000											933	833	733	633
	Lead 12	600											560	500	440	380
Speed setting	Lead 6	300											280	250	220	190
	Speed setting	-											93%	83%	73%	63%

RS2 SIDE MOUNTED MOTOR TYPE



SS05-L Specifications



63536-AM-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. Secure the cable with a tie-band 80mm or less from unit's end face to prevent the cable from being subjected to excessive loads.

Note 3. Minimum bend radius of motor cable is R30.

Note 4. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

Note 5. When the stroke is longer than 600mm, resonance of the ball screw may occur depending on the operation conditions (critical speed).

In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table below.

Note 6. The belt cover's left and right sides are asymmetrical. Therefore, if the motor mounting orientation is changed, the cover cannot be attached.

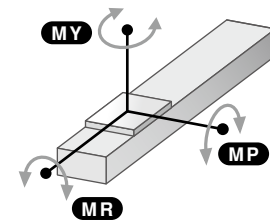
Effective stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	196.5	246.5	296.5	346.5	396.5	446.5	496.5	546.5	596.5	646.5	696.5	746.5	796.5	846.5	896.5	946.5
A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
B	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
C	100	150	200	250	300	350	400	450	500	500	500	500	500	500	500	500
Weight (kg) ^{Note 4}	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5
Maximum speed (mm/sec) ^{Note 5}	Lead 20	1000											933	833	733	633
	Lead 12	600											560	500	440	380
	Lead 6	300											280	250	220	190
	Speed setting	-											93%	83%	73%	63%

1.3 RS3

Specifications

Motor		☐ 42 Step motor		
Resolution (Pulse/rotation)		20480		
Repeatability(mm) ^{Note 1}		±0.02		
Deceleration mechanism		Ball screw φ12(Class C10)		
Maximum motor torque (N•m)		0.47		
Ball screw lead (mm)		6	12	20
Maximum speed (mm/sec) ^{Note 2}	Horizontal	300	600	1000
	Vertical	250	500	–
Maximum payload (kg)	Horizontal	12	8	6
	Vertical	4	2	–
Max. pressing force (N)		120	60	36
Stroke (mm)		50 to 800 (50 pitch)		
Overall length (mm)	Horizontal	Stroke +286		
	Vertical	Stroke +306		
Maximum dimensions of cross section of main unit (mm)		W55×H56		
Cable length (m)		Standard: 1 / Option: 3,5,10		
Controller		C1		
Pulse Train Driver		P1		

Static loading moment



MY	MP	MR
32	38	34

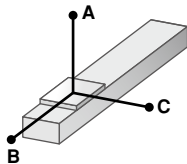
(Unit: N•m)

Note 1. Positioning repeatability in one direction.

Note 2. If the stroke exceeds 600mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

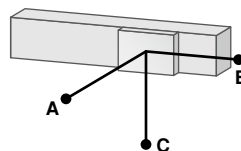
Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servicelife of 10,000km. Note. Stroke is 600mm when calculating the service life.

Horizontal installation



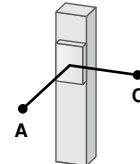
		A	B	C
Lead 20	2kg	599	225	291
	4kg	366	109	148
	6kg	352	71	104
Lead 12	4kg	500	118	179
	6kg	399	76	118
	8kg	403	56	88
Lead 6	6kg	573	83	136
	8kg	480	61	100
	10kg	442	47	78
	12kg	465	39	64

Wall installation



		A	B	C
Lead 20	2kg	262	203	554
	4kg	118	88	309
	6kg	71	49	262
Lead 12	4kg	146	96	449
	6kg	85	55	334
	8kg	55	34	305
Lead 6	6kg	101	62	519
	8kg	64	39	413
	10kg	43	26	355
	12kg	28	17	338

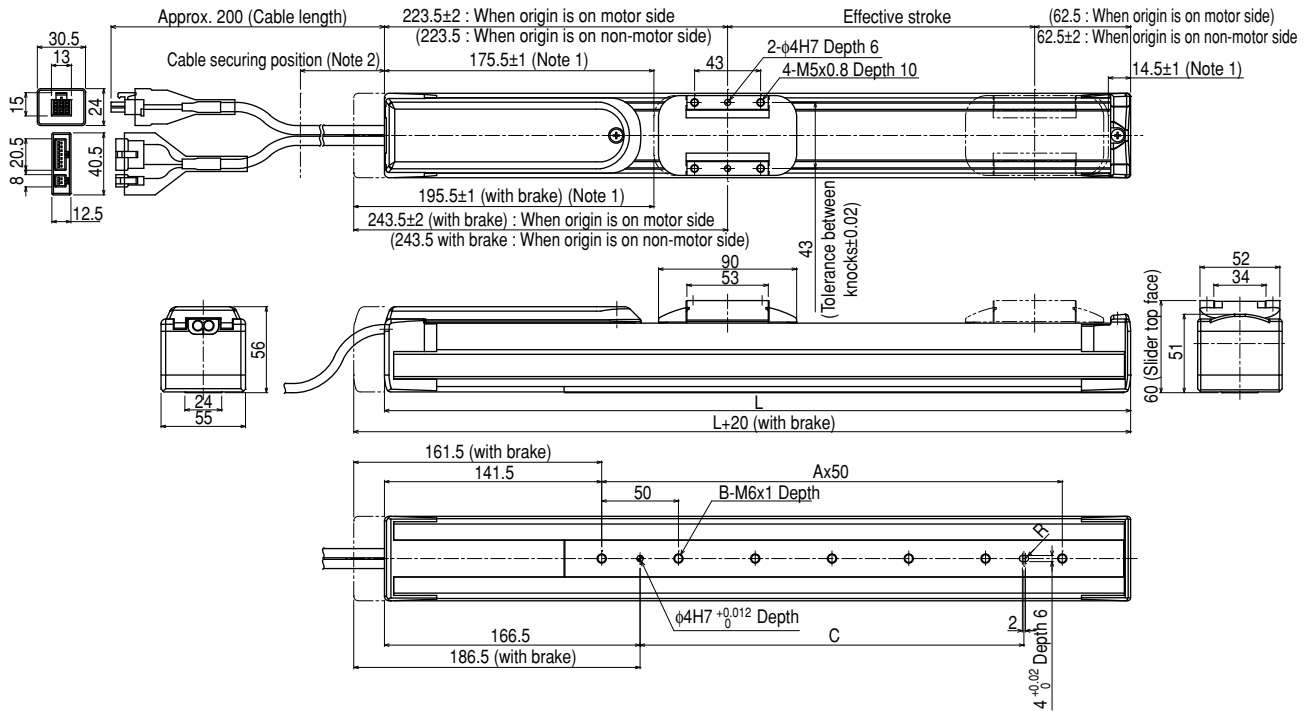
Vertical installation



		A	C
Lead 12	1kg	458	459
	2kg	224	224
Lead 6	2kg	244	245
	4kg	113	113

(Unit: mm)

■ Dimensions
RS3 STRAIGHT TYPE

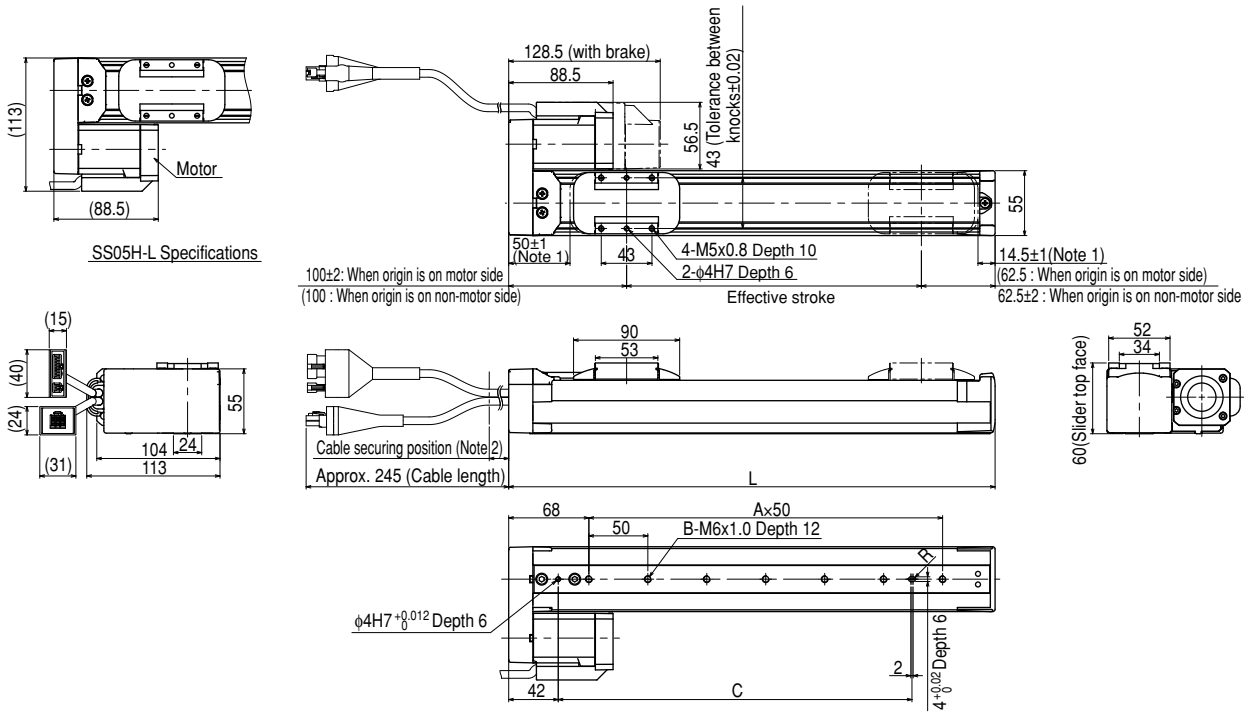


63503-AM-00

- Note 1. Distance from both ends to the mechanical stopper.
 Note 2. Secure the cable with a tie-band 100mm or less from unit's end face to prevent the cable from being subjected to excessive loads.
 Note 3. Minimum bend radius of motor cable is R30.
 Note 4. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
 Note 5. When the stroke is longer than 600mm, resonance of the ball screw may occur depending on the operation conditions (critical speed).
 In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table below.

Effective stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	
L	336	386	436	486	536	586	636	686	736	786	836	886	936	986	1036	1086	
A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
B	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
C	100	150	200	250	300	350	400	450	500	500	500	500	500	500	500	500	
Weight (kg) ^{Note 4}	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.5	4.7	4.9	5.1	5.3	
Maximum speed (mm/sec) ^{Note 5}	Lead 20	1000											933	833	733	633	
	Lead 12 (Horizontal)	600											560	500	440	380	
	Lead 12 (Vertical)	500											440				380
	Lead 6 (Horizontal)	300											280	250	220	190	
	Lead 6 (Vertical)	250											220				190
	Speed setting	-											93%	83%	73%	63%	

RS3 SIDE MOUNTED MOTOR TYPE



63537-AM-00

- Note 1. Distance from both ends to the mechanical stopper.
- Note 2. Secure the cable with a tie-band 80mm or less from unit's end face to prevent the cable from being subjected to excessive loads.
- Note 3. Minimum bend radius of motor cable is R30.
- Note 4. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 5. When the stroke is longer than 600mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above
- Note 6. The belt cover's left and right sides are asymmetrical. Therefore, if the motor mounting orientation is changed, the cover cannot be attached.

Effective stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800		
L	212.5	262.5	312.5	362.5	412.5	462.5	512.5	562.5	612.5	662.5	712.5	762.5	812.5	862.5	912.5	962.5		
A	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
B	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
C	100	150	200	250	300	350	400	450	500	500	500	500	500	500	500	500		
Weight (kg) ^{Note 4}	1.7	1.9	2.1	2.3	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6		
Maximum speed (mm/sec) ^{Note 5}	Lead 20	1000											933	833	733	633		
	Lead 12 (Horizontal)	600											560	500	440	380		
	Lead 12 (Vertical)	500															440	380
	Lead 6 (Horizontal)	300											280	250	220	190		
	Lead 6 (Vertical)	250															220	190
	Speed setting	-											93%	83%	73%	63%		

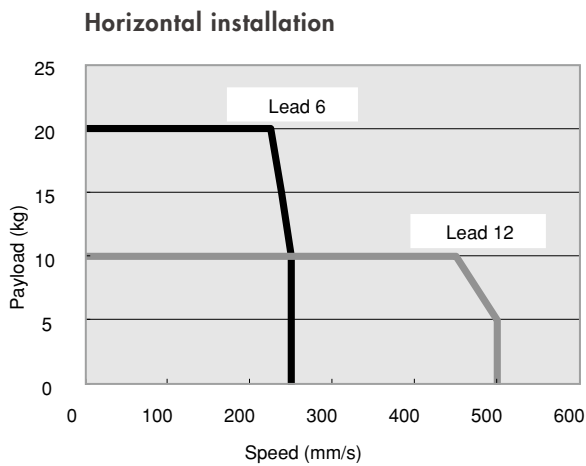
1.4 RSD1

■ Specifications

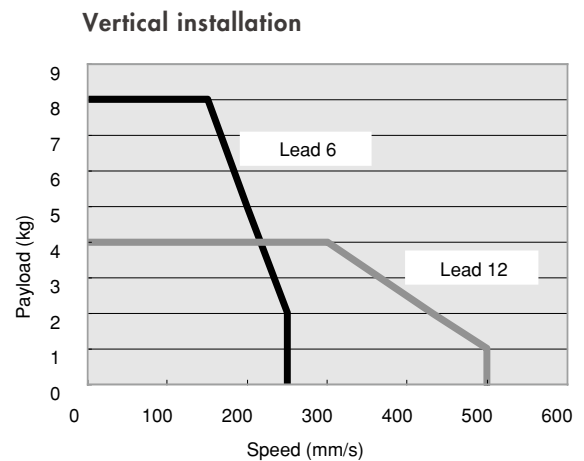
Motor	☐ 42 Step motor	
Resolution (Pulse/rotation)	20480	
Repeatability (mm)	±0.02	
Deceleration mechanism	Ball screw φ8(Class C10)	
Ball screw lead (mm)	6	12
Maximum speed (mm/sec) ^{Note 1}	250	500
Maximum payload (kg)	Horizontal	20
	Vertical	8
Max. pressing force (N)	100	75
Stroke (mm)	50 to 200 (50 pitch)	
Lost motion	0.1mm or less	
Rod non-rotating accuracy (°)	±1.0	
Cable length (m)	Standard: 1 / Option: 3,5,10	
Controller	C1	
Pulse Train Driver	P1	

Note 1. The maximum speed may vary depending on the payload. For details, see "Speed vs. payload graph" shown below.

■ Speed vs. payload graph



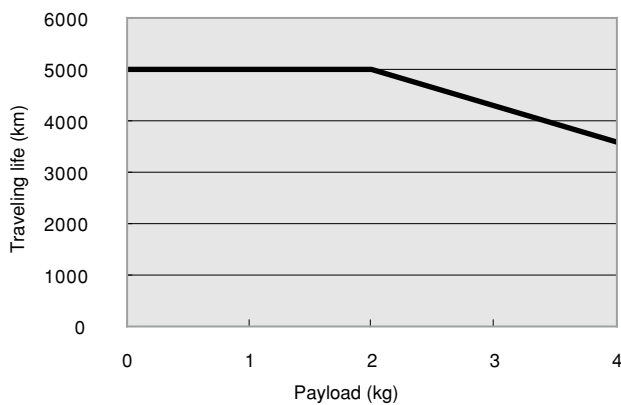
63505-AM-00



63506-AM-00

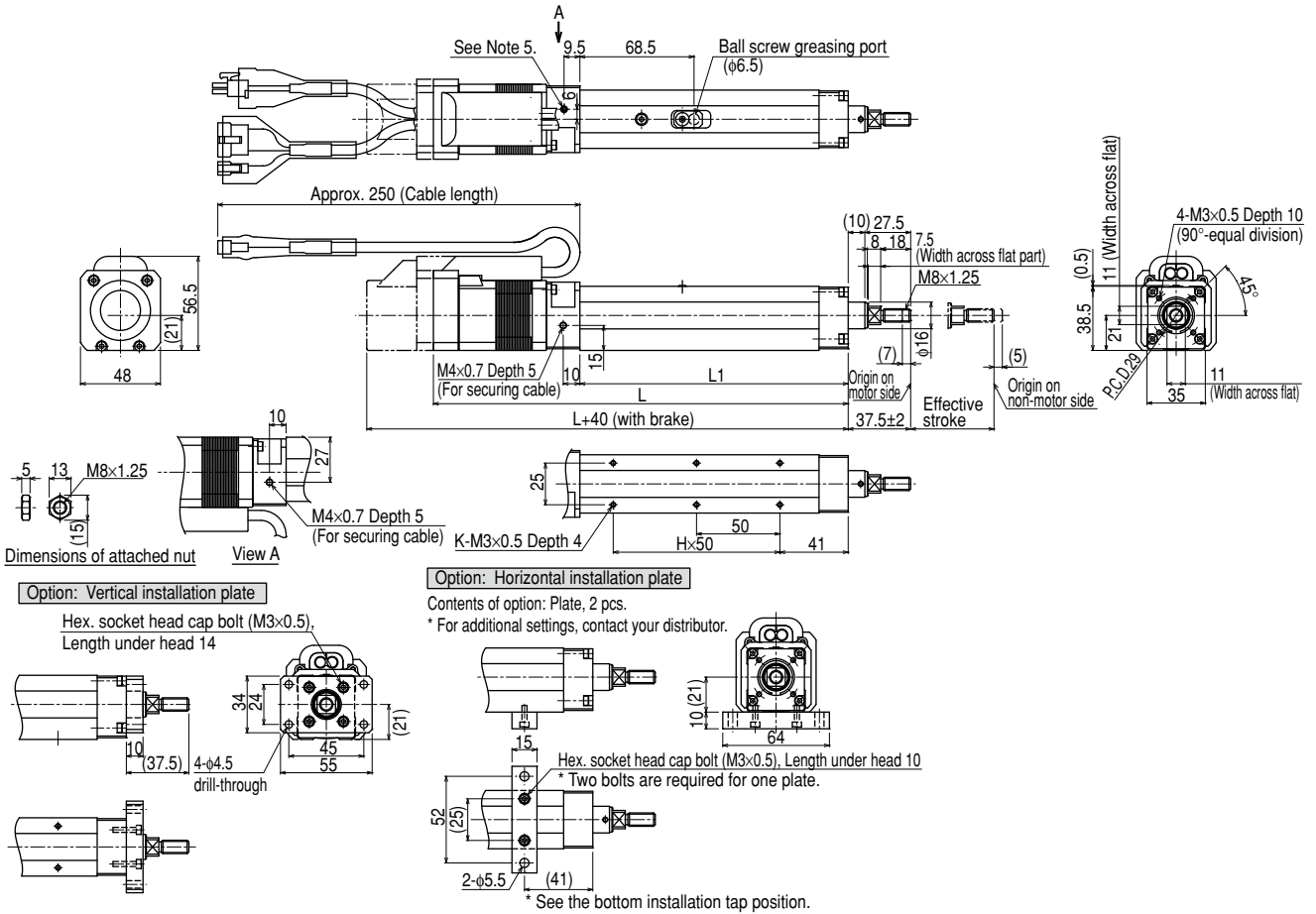
■ **Traveling life** The following describes examples that the traveling life is less than 5000km due to payload.

Lead 12 (Vertical installation)



63507-AM-00

■ Dimensions
RSD1 STRAIGHT TYPE

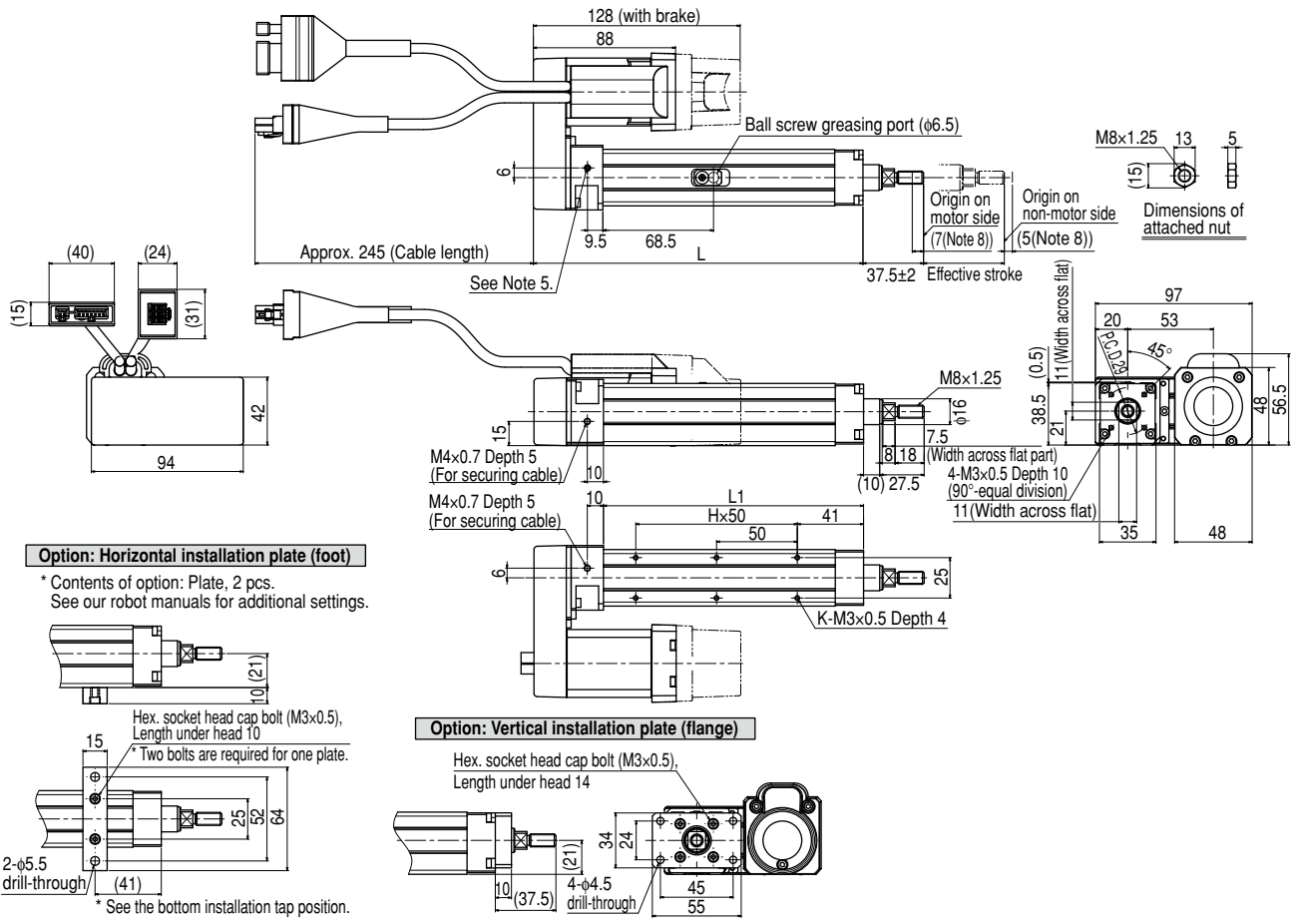


63508-AM-00

- Note 1. It is possible to apply only the axial load.
Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. When running the cables, secure cables so that any load is not applied to them.
- Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 6. Minimum bend radius of motor cable is R30.
- Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 8. Distance to mechanical stopper.

Effective stroke	50	100	150	200
L1	161	211	261	311
L	249	299	349	399
H	2	3	4	5
K	6	8	10	12
Weight (kg) ^{Note 7}	1.1	1.3	1.4	1.6

RSD1 MOTOR MOUNT: RIGHT

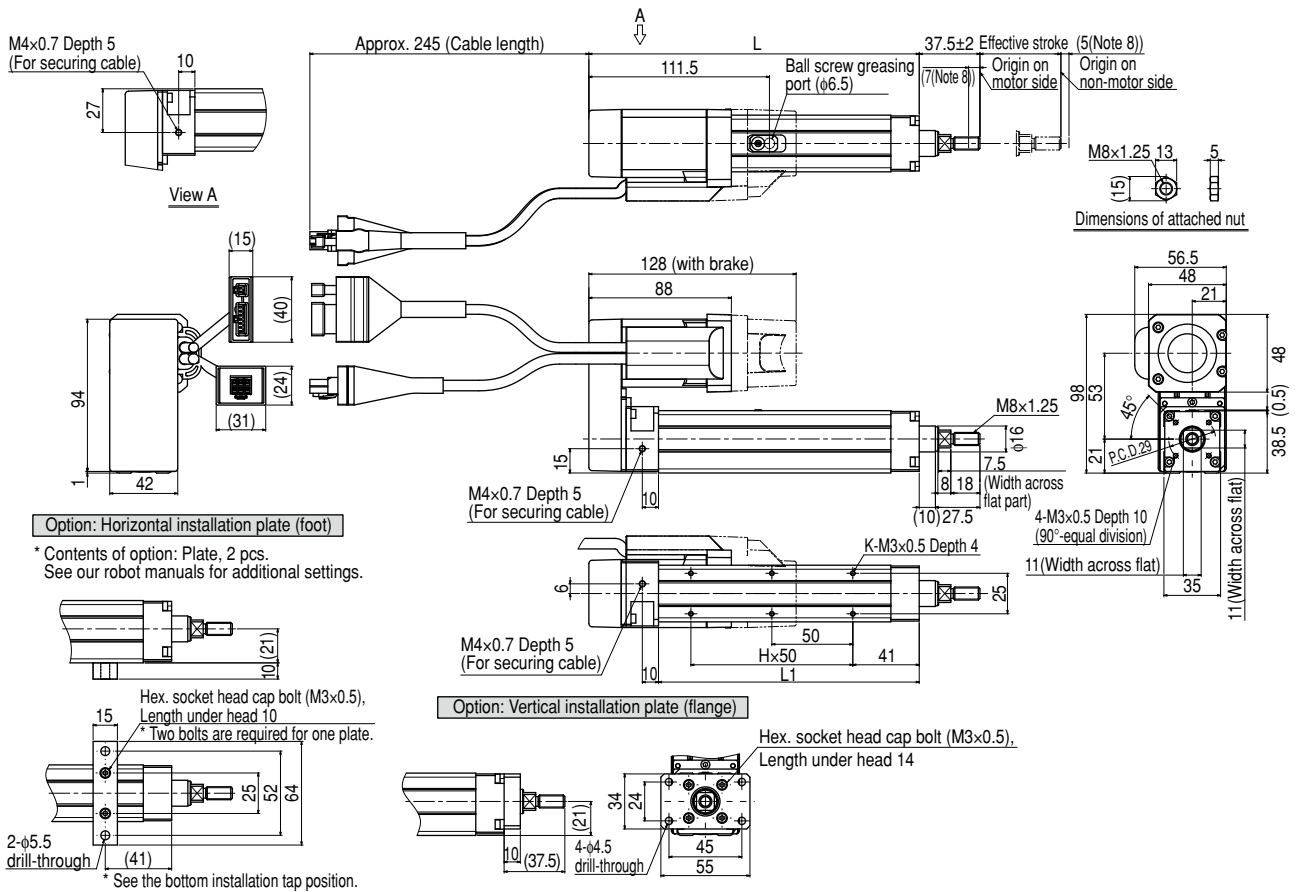


63538-AM-00

- Note 1. It is possible to apply only the axial load.
 Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. When running the cables, secure cables so that any load is not applied to them.
- Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 6. Minimum bend radius of motor cable is R30.
- Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 8. Distance to mechanical stopper.

Effective stroke	50	100	150	200
L1	161	211	261	311
L	204	254	304	354
H	2	3	4	5
K	6	8	10	12
Weight (kg) ^{Note 7}	1.3	1.5	1.6	1.8

RSD1 MOTOR MOUNT: UPPER



- Note 1. It is possible to apply only the axial load.
 Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. When running the cables, secure cables so that any load is not applied to them.
- Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 6. Minimum bend radius of motor cable is R30.
- Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 8. Distance to mechanical stopper.

Effective stroke	50	100	150	200
L1	161	211	261	311
L	204	254	304	354
H	2	3	4	5
K	6	8	10	12
Weight (kg) ^{Note 7}	1.3	1.5	1.6	1.8

63540-AM-00

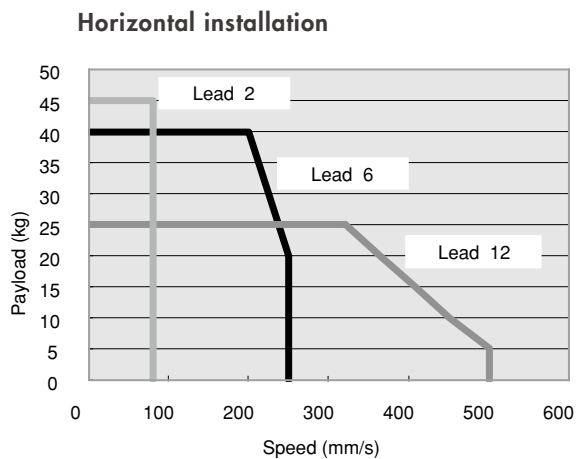
1.5 RSD2

Specifications

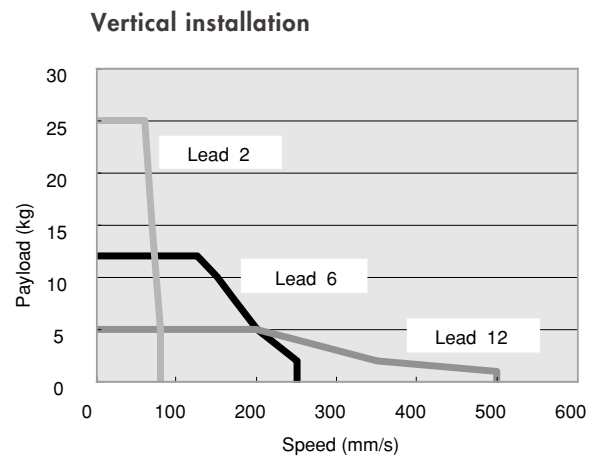
Motor	☐ 42 Step motor			
Resolution (Pulse/rotation)	20480			
Repeatability (mm)	±0.02			
Deceleration mechanism	Ball screw φ10 (Class C10)	Ball screw φ8(Class C10)		
Ball screw lead (mm)	2	6	12	
Maximum speed (mm/sec) ^{Note 1}	80	250	500	
Maximum payload (kg)	Horizontal	45	40	25
	Vertical	25	12	5
Max. pressing force (N)	600	300	150	
Stroke (mm)	50 to 300 (50 pitch)			
Lost motion	0.1mm or less			
Rod non-rotating accuracy (°)	±1.0			
Cable length (m)	Standard: 1 / Option: 3,5,10			
Controller	C1			
Pulse Train Driver	P1			

Note 1. The maximum speed may vary depending on the payload. Additionally, if the stroke is long, the maximum speed may decrease due to critical speed of the ball screw. For details, see "Speed vs. payload graph" shown below and the maximum speed levels shown in the table at the lower portion of the drawing.

Speed vs. payload graph



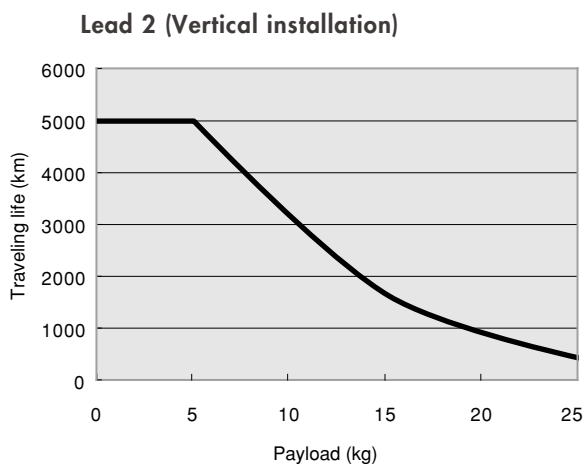
63509-AM-00



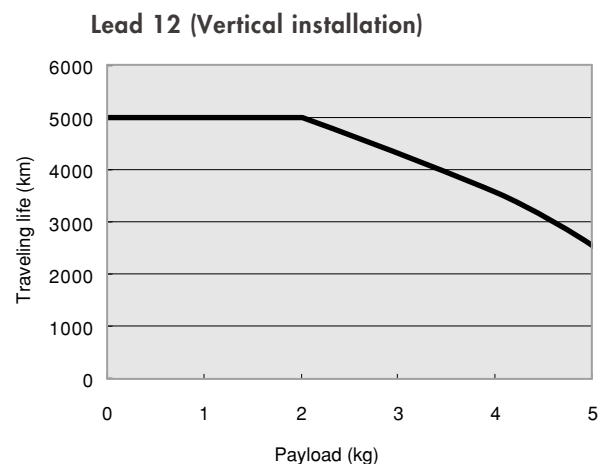
63510-AM-00

Traveling life

The following describes examples that the traveling life is less than 5000km due to payload.

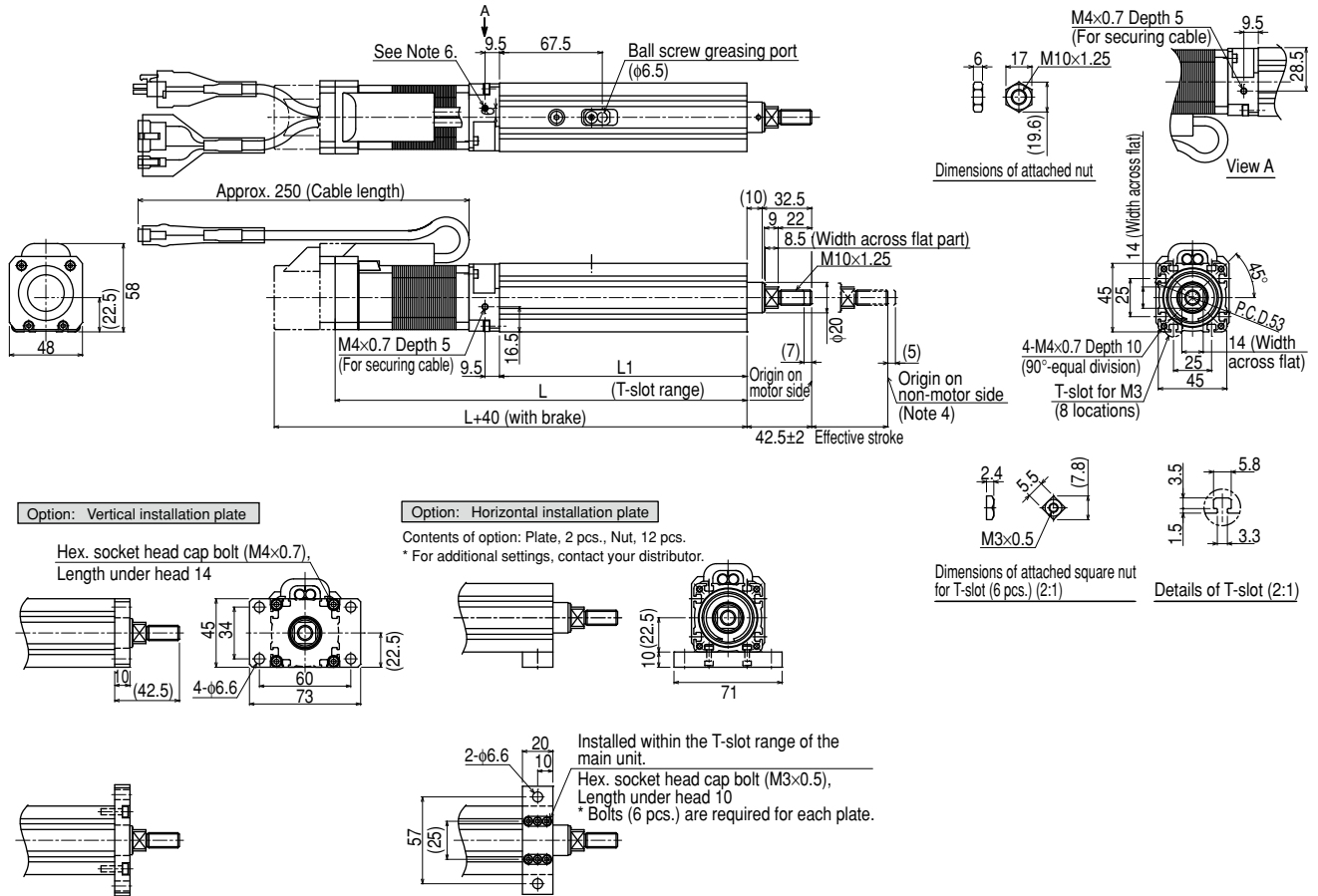


63511-AM-00



63512-AM-00

■ Dimensions
RSD2 STRAIGHT TYPE



63513-AM-00

Note 1. It is possible to apply only the axial load.

Use the external guide together so that any radial load is not applied to the rod.

Note 2. The orientation of the width across flat part is undefined to the base surface.

Note 3. Use the external guide together to maintain the straightness.

Note 4. For lead 2mm specifications, the origin on the non-motor side cannot be set.

Note 5. When running the cables, secure cables so that any load is not applied to them.

Note 6. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)

Note 7. Minimum bend radius of motor cable is R30.

Note 8. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

Note 9. Distance to mechanical stopper.

Effective stroke	50	100	150	200	250	300
L1	162.5	212.5	262.5	312.5	362.5	412.5
L	270.5	320.5	370.5	420.5	470.5	520.5
Weight (kg) ^{Note 8}	1.4	1.7	1.9	2.2	2.4	2.7
Maximum speed (mm/sec)	Lead 12	500			440	320
	Lead 6	250			220	160
	Lead 2	80			72	53

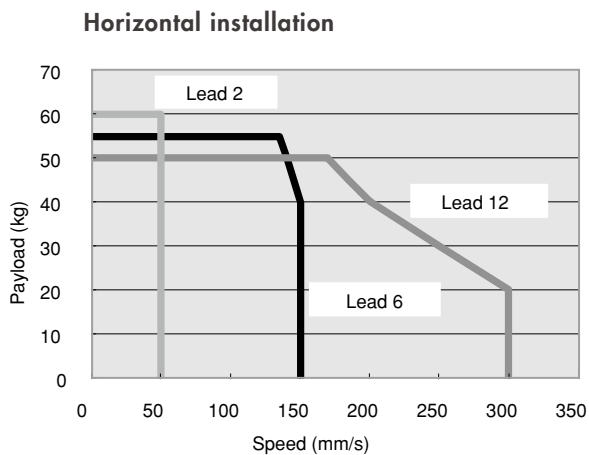
1.6 RSD3

Specifications

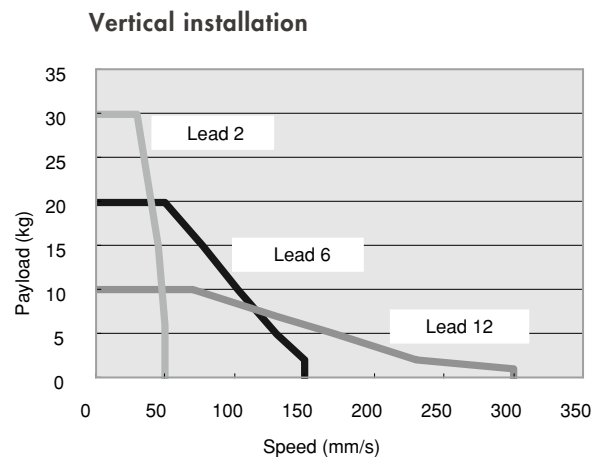
Motor	☐ 56 Step motor			
Resolution (Pulse/rotation)	20480			
Repeatability (mm)	±0.02			
Deceleration mechanism	Ball screw φ12(Class C10)			
Ball screw lead (mm)	2	6	12	
Maximum speed (mm/sec) ^{Note 1}	50	150	300	
Maximum payload (kg)	Horizontal	60	55	50
	Vertical	30	20	10
Max. pressing force (N)	900	550	250	
Stroke (mm)	50 to 300 (50 pitch)			
Lost motion	0.1mm or less			
Rod non-rotating accuracy (°)	±1.0			
Cable length (m)	Standard: 1 / Option: 3,5,10			
Controller	C1			
Pulse Train Driver	P1			

Note 1. The maximum speed may vary depending on the payload. For details, see "Speed vs. payload graph" shown below.

Speed vs. payload graph



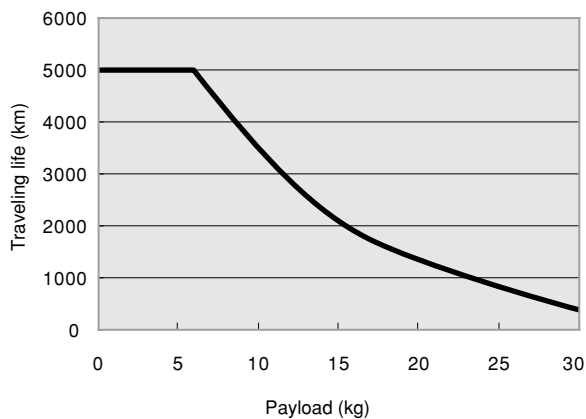
63514-AM-00



63515-AM-00

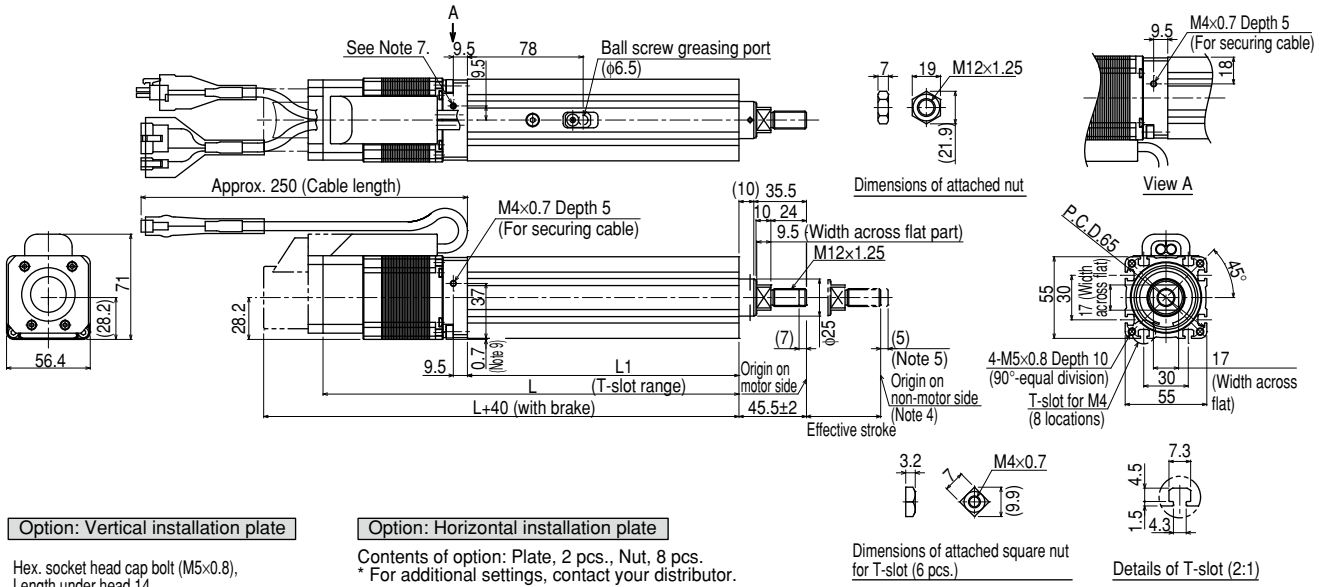
Traveling life The following describes examples that the traveling life is less than 5000km due to payload.

Lead 2 (Vertical installation)



63516-AM-00

■ Dimensions
RSD3 STRAIGHT TYPE

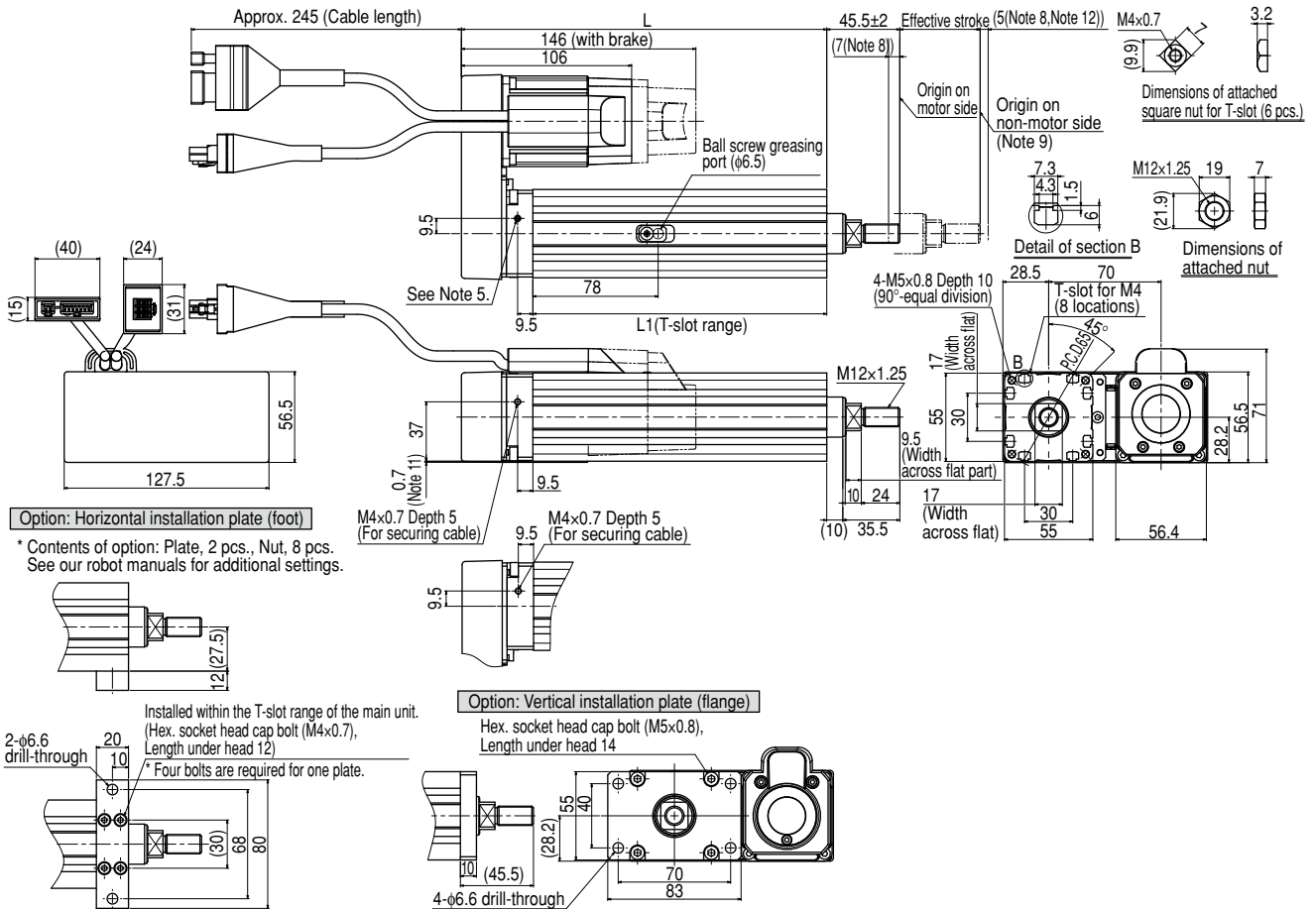


63517-AM-00

- Note 1. It is possible to apply only the axial load.
Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. For lead 2mm specifications, the origin on the non-motor side cannot be set.
- Note 5. When the lead is 2mm, this dimension is 27mm.
- Note 6. When running the cables, secure cables so that any load is not applied to them.
- Note 7. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 8. Minimum bend radius of motor cable is R30.
- Note 9. Take great care as the outer case of the motor projects from the bottom of the main unit.
- Note 10. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 11. Distance to mechanical stopper.

Effective stroke	50	100	150	200	250	300
L1	183	233	283	333	383	433
L	280.5	330.5	380.5	430.5	480.5	530.5
Weight (kg) ^{Note 10}	2.2	2.6	3.0	3.3	3.7	4.1

RSD3 MOTOR MOUNT: RIGHT

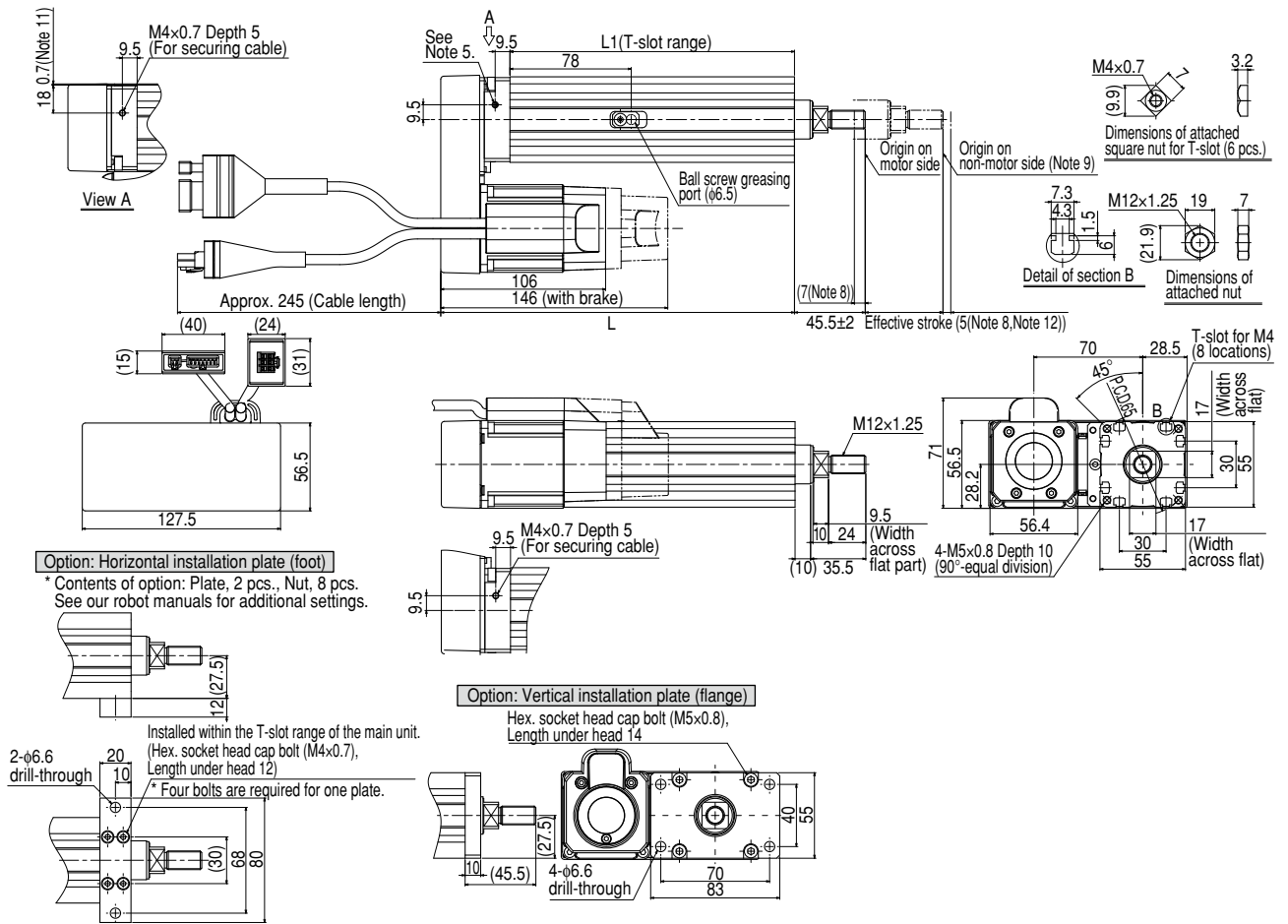


63543-AM-00

- Note 1. It is possible to apply only the axial load.
Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. When running the cables, secure cables so that any load is not applied to them.
- Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 6. Minimum bend radius of motor cable is R30.
- Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 8. Distance to mechanical stopper.
- Note 9. For lead 2mm specifications, the origin on the non-motor side cannot be set.
- Note 10. This unit can be installed with the motor facing up (turned 90 degrees from the position in this drawing).
- Note 11. Take great care as the outer case of the motor and cover belt projects from the bottom of the main unit.
- Note 12. When the lead is 2mm, this dimension is 27mm.

Effective stroke	50	100	150	200	250	300
L1	183	233	283	333	383	433
L	227.5	277.5	327.5	377.5	427.5	477.5
Weight (kg) ^{Note 7}	2.4	2.8	3.2	3.5	3.9	4.3

RSD3 MOTOR MOUNT: LEFT



Option: Horizontal installation plate (foot)
 * Contents of option: Plate, 2 pcs., Nut, 8 pcs.
 See our robot manuals for additional settings.

Option: Vertical installation plate (flange)
 Hex. socket head cap bolt (M5x0.8),
 Length under head 14

Installed within the T-slot range of the main unit.
 (Hex. socket head cap bolt (M4x0.7),
 Length under head 12)
 * Four bolts are required for one plate.

63545-AM-00

- Note 1. It is possible to apply only the axial load.
 Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. When running the cables, secure cables so that any load is not applied to them.
- Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 6. Minimum bend radius of motor cable is R30.
- Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 8. Distance to mechanical stopper.
- Note 9. For lead 2mm specifications, the origin on the non-motor side cannot be set.
- Note 10. This unit can be installed with the motor facing up (turned 90 degrees from the position in this drawing).
- Note 11. Take great care as the outer case of the motor and cover belt projects from the bottom of the main unit.
- Note 12. When the lead is 2mm, this dimension is 27mm.

Effective stroke	50	100	150	200	250	300
L1	183	233	283	333	383	433
L	227.5	277.5	327.5	377.5	427.5	477.5
Weight (kg) ^{Note 7}	2.4	2.8	3.2	3.5	3.9	4.3

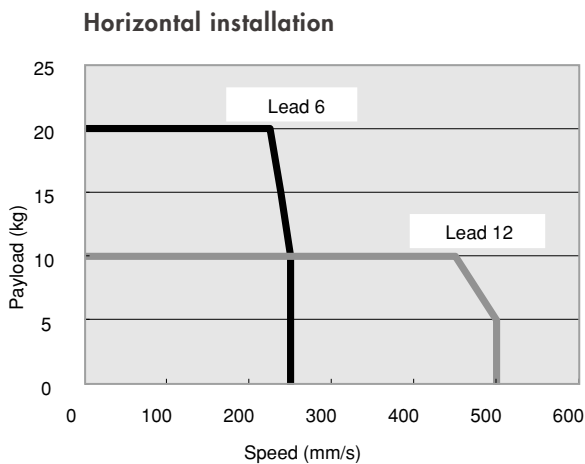
1.7 RSDG1

■ Specifications

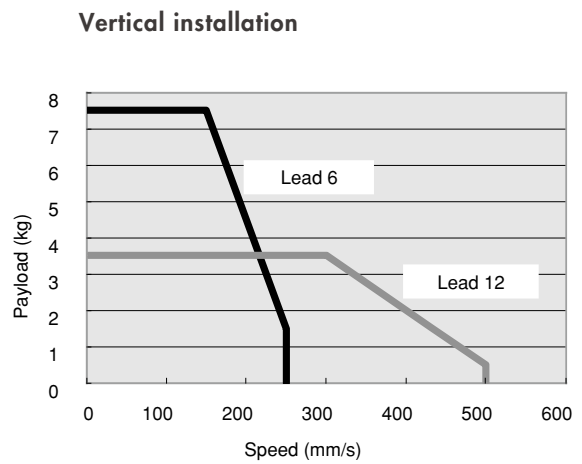
Motor	☐ 42 Step motor	
Resolution (Pulse/rotation)	20480	
Repeatability (mm)	±0.02	
Deceleration mechanism	Ball screw φ8(Class C10)	
Ball screw lead (mm)	6	12
Maximum speed (mm/sec) ^{Note 1}	250	500
Maximum payload (kg)	Horizontal	20
	Vertical	7.5
Max. pressing force (N)	100	75
Stroke (mm)	50 to 200 (50 pitch)	
Lost motion	0.1mm or less	
Rod non-rotating accuracy (°)	±0.05	
Cable length (m)	Standard: 1 / Option: 3,5,10	
Controller	C1	
Pulse Train Driver	P1	

Note 1. The maximum speed may vary depending on the payload. For details, see "Speed vs. payload graph" shown below.

■ Speed vs. payload graph



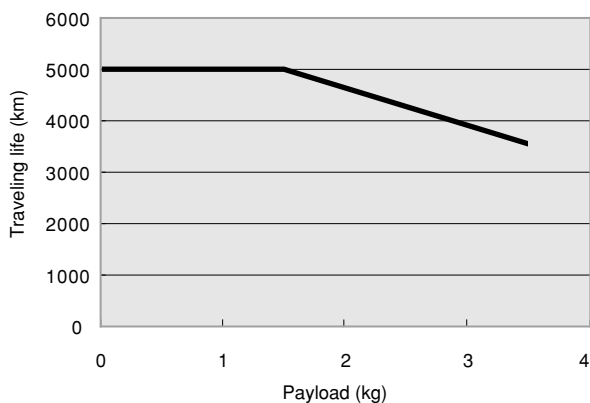
63505-AM-00



63518-AM-00

■ **Traveling life** The following describes examples that the traveling life is less than 5000km due to payload.

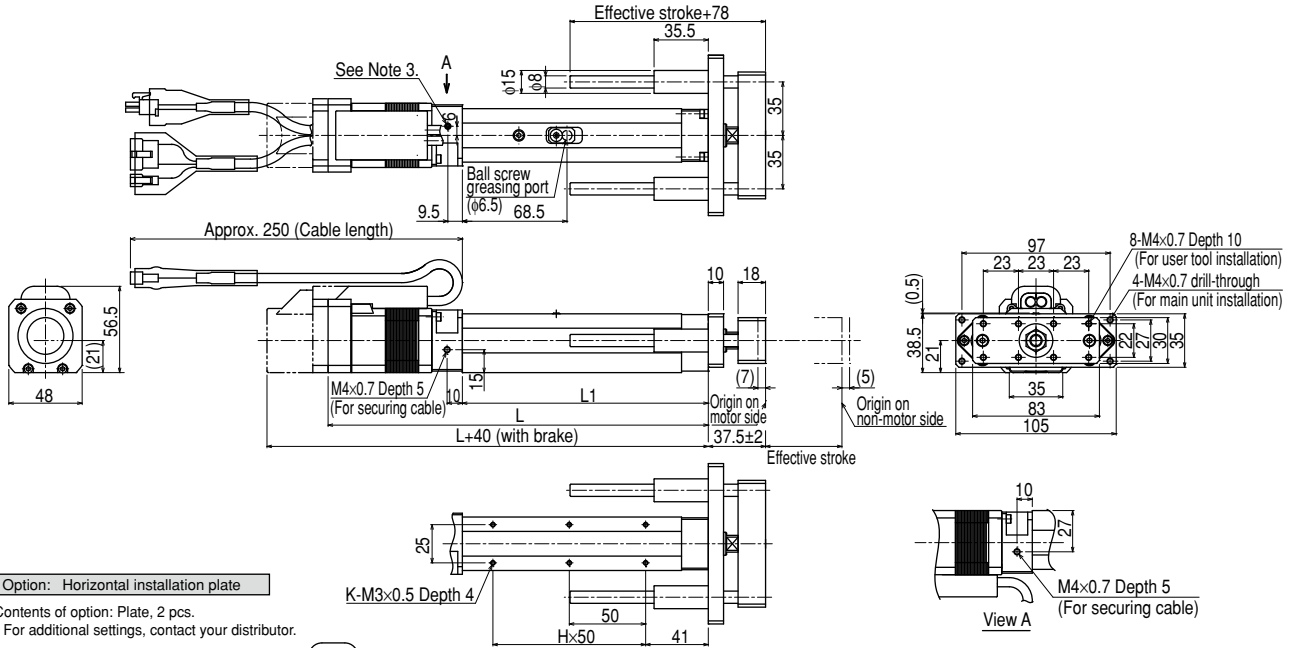
Lead 12 (Vertical installation)



63519-AM-00

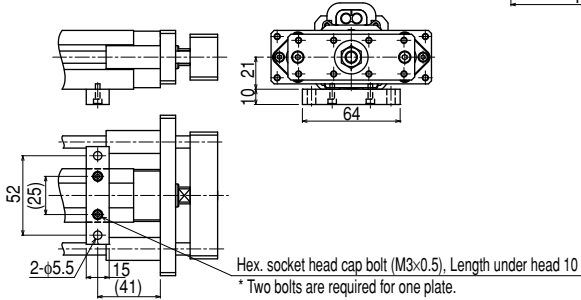
■ Dimensions

RSDG1 STRAIGHT TYPE



Option: Horizontal installation plate

Contents of option: Plate, 2 pcs.
* For additional settings, contact your distributor.



* See the bottom installation tap position.

Note 1. It is possible to apply only the axial load.

Use the external guide together so that any radial load is not applied to the rod.

Note 2. When running the cables, secure cables so that any load is not applied to them.

Note 3. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)

Note 4. Minimum bend radius of motor cable is R30.

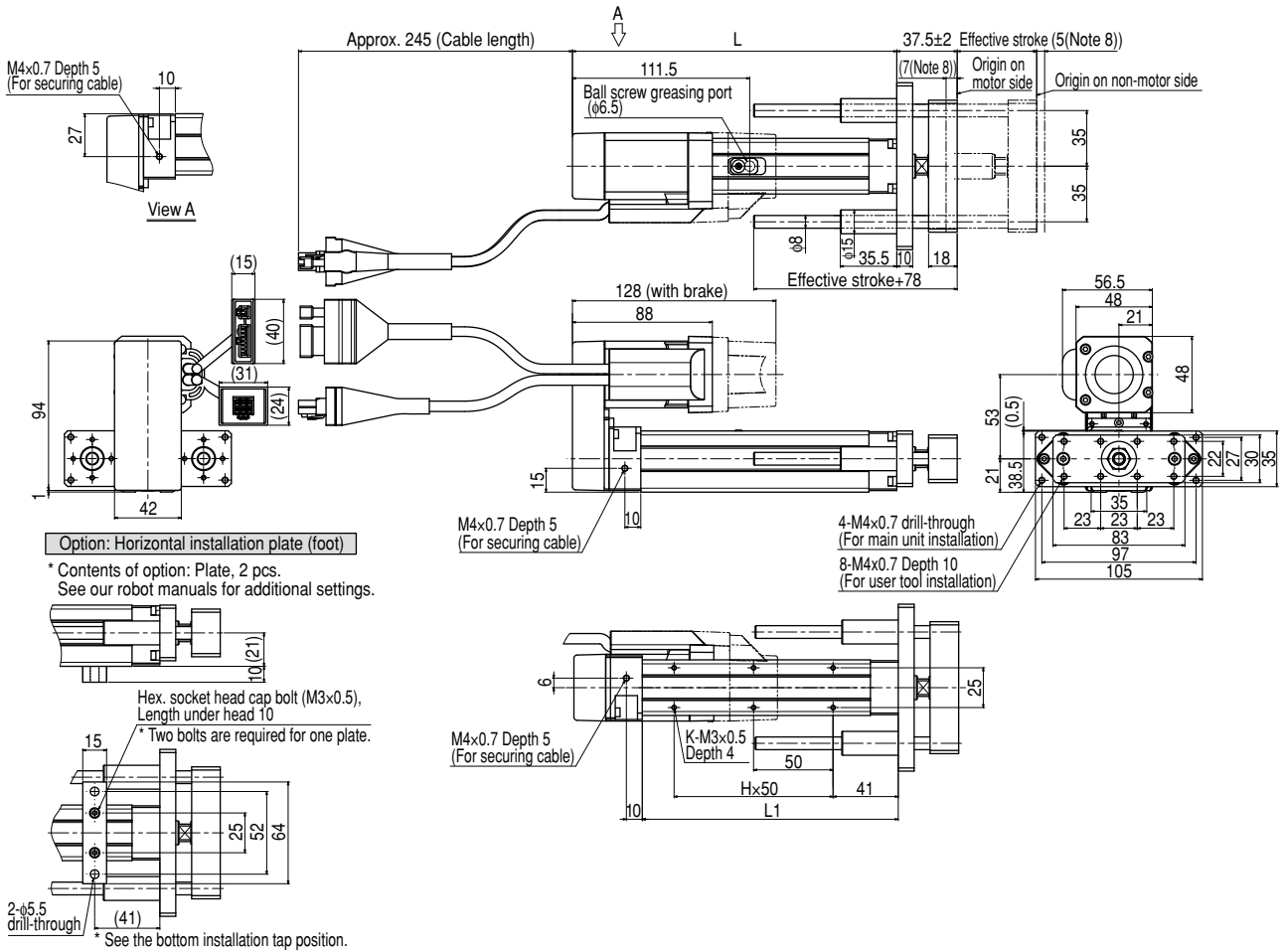
Note 5. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

Note 6. Distance to mechanical stopper.

Effective stroke	50	100	150	200
L1	161	211	261	311
L	249	299	349	399
H	2	3	4	5
K	6	8	10	12
Weight (kg) ^{Note 5}	1.5	1.7	1.9	2.1

63520-AM-00

RSDG1 MOTOR MOUNT: UPPER



63544-AM-00

Note 1. It is possible to apply only the axial load.

Use the external guide together so that any radial load is not applied to the rod.

Note 2. The orientation of the width across flat part is undefined to the base surface.

Note 3. Use the external guide together to maintain the straightness.

Note 4. When running the cables, secure cables so that any load is not applied to them.

Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw pthread depth 5)

Note 6. Minimum bend radius of motor cable is R30.

Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

Note 8. Distance to mechanical stopper.

Effective stroke	50	100	150	200
L1	161	211	261	311
L	204	254	304	354
H	2	3	4	5
K	6	8	10	12
Weight (kg) ^{Note 7}	1.7	1.9	2.1	2.3

1.8 RSDG2

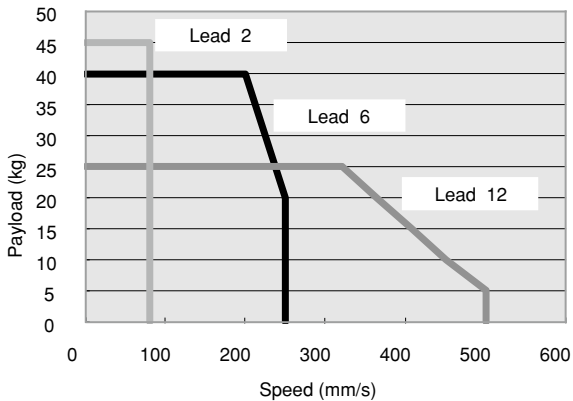
■ Specifications

Motor	☐ 42 Step motor			
Resolution (Pulse/rotation)	20480			
Repeatability (mm)	±0.02			
Deceleration mechanism	Ball screw φ10 (Class C10)	Ball screw φ8(Class C10)		
Ball screw lead (mm)	2	6	12	
Maximum speed (mm/sec) ^{Note 1}	80	250	500	
Maximum payload (kg)	Horizontal	45	40	25
	Vertical	24	11	4
Max. pressing force (N)	600	300	150	
Stroke (mm)	50 to 300 (50 pitch)			
Lost motion	0.1mm or less			
Rod non-rotating accuracy (°)	±0.05			
Cable length (m)	Standard: 1 / Option: 3,5,10			
Controller	C1			
Pulse Train Driver	P1			

Note 1. The maximum speed may vary depending on the payload. Additionally, if the stroke is long, the maximum speed may decrease due to critical speed of the ball screw. For details, see "Speed vs. payload graph" shown below and the maximum speed levels shown in the table at the lower portion of the drawing.

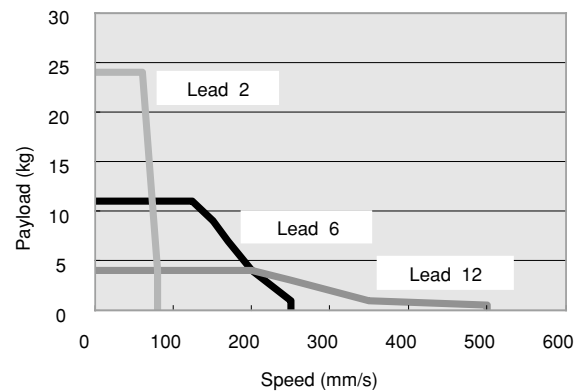
■ Speed vs. payload graph

Horizontal installation



63509-AM-00

Vertical installation

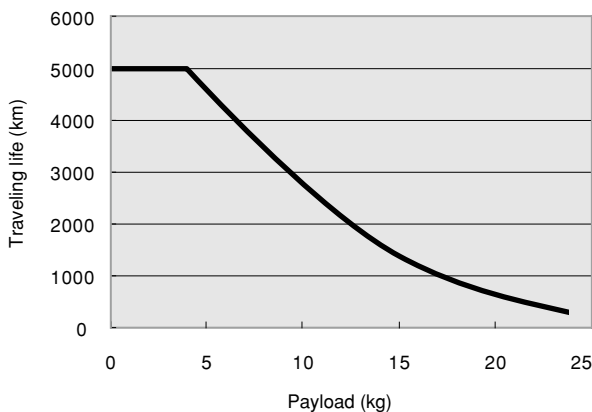


63521-AM-00

■ Traveling life

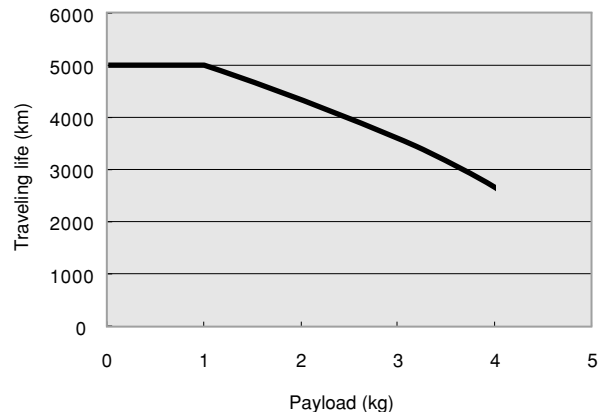
The following describes examples that the traveling life is less than 5000km due to payload.

Lead 2 (Vertical installation)



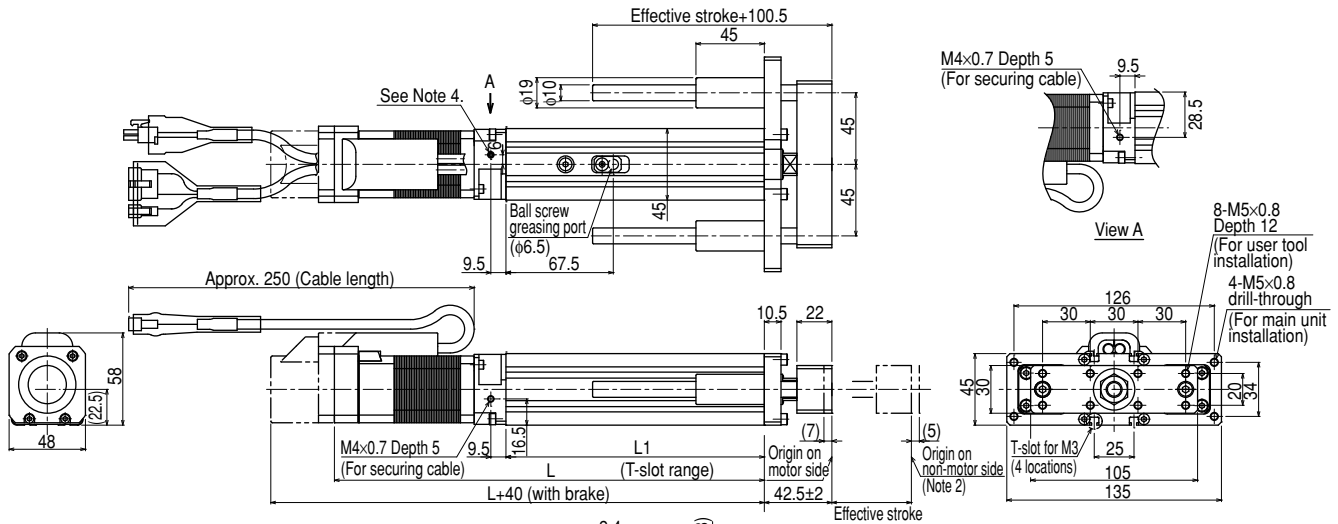
63522-AM-00

Lead 12 (Vertical installation)



63523-AM-00

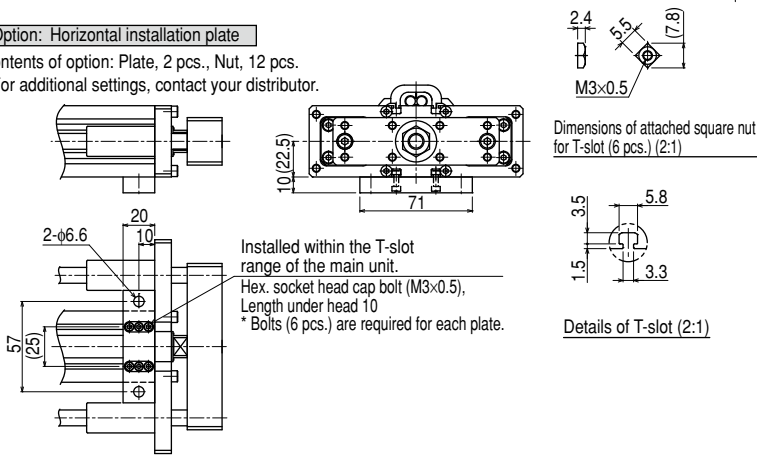
■ Dimensions
RSDG2 STRAIGHT TYPE



Option: Horizontal installation plate

Contents of option: Plate, 2 pcs., Nut, 12 pcs.

* For additional settings, contact your distributor.



63524-AM-00

Note 1. It is possible to apply only the axial load.

Use the external guide together so that any radial load is not applied to the rod.

Note 2. For lead 2mm specifications, the origin on the non-motor side cannot be set.

Note 3. When running the cables, secure cables so that any load is not applied to them.

Note 4. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)

Note 5. Minimum bend radius of motor cable is R30.

Note 6. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

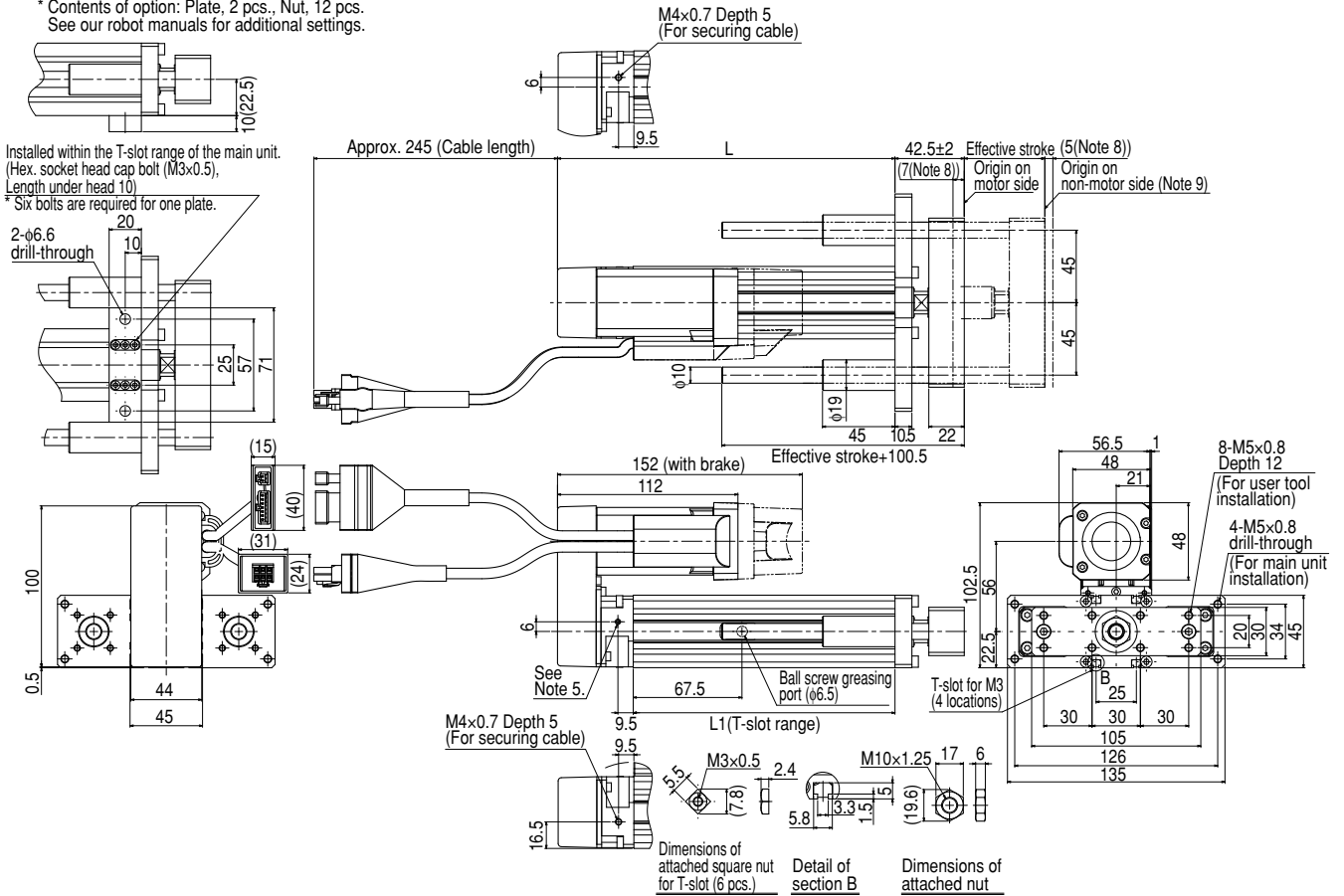
Note 7. Distance to mechanical stopper.

Effective stroke		50	100	150	200	250	300
	L1	162.5	212.5	262.5	312.5	362.5	412.5
	L	270.5	320.5	370.5	420.5	470.5	520.5
	Weight (kg) ^{Note 6}	2.0	2.4	2.7	3.0	3.3	3.7
Maximum speed (mm/sec)	Lead 12	500				440	320
	Lead 6	250				220	160
	Lead 2	80				72	53

RSDG2 MOTOR MOUNT: UPPER

Option: Horizontal installation plate (foot)

* Contents of option: Plate, 2 pcs., Nut, 12 pcs.
See our robot manuals for additional settings.



63546-AM-00

- Note 1. It is possible to apply only the axial load.
Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. When running the cables, secure cables so that any load is not applied to them.
- Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 6. Minimum bend radius of motor cable is R30.
- Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 8. Distance to mechanical stopper.
- Note 9. For lead 2mm specifications, the origin on the non-motor side cannot be set.

Effective stroke	50	100	150	200	250	300
L1	162.5	212.5	262.5	312.5	362.5	412.5
L	209.5	259.5	309.5	359.5	409.5	459.5
Weight (kg) ^{Note 7}	2.2	2.6	2.9	3.2	3.5	3.9
Maximum speed (mm/sec)	Lead 12	500			440	320
	Lead 6	250			220	160
	Lead 2	80			72	53

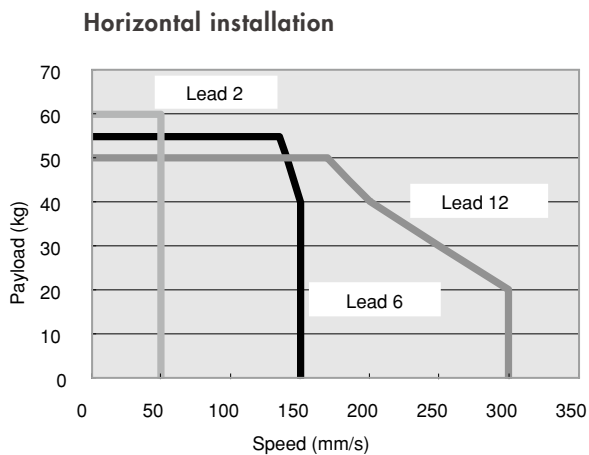
1.9 RSDG3

■ Specifications

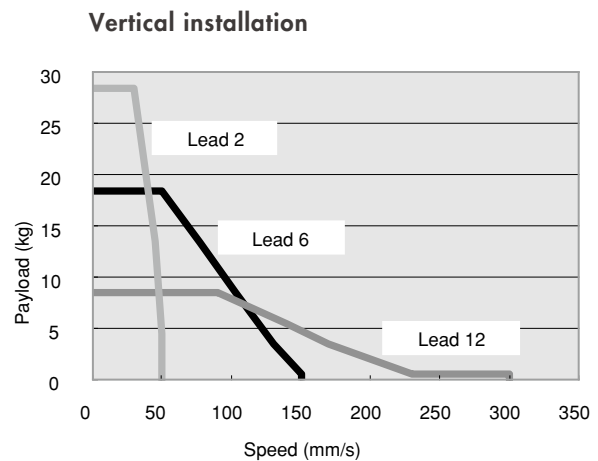
Motor	☐ 56 Step motor			
Resolution (Pulse/rotation)	20480			
Repeatability (mm)	±0.02			
Deceleration mechanism	Ball screw φ12(Class C10)			
Ball screw lead (mm)	2	6	12	
Maximum speed (mm/sec) ^{Note 1}	50	150	300	
Maximum payload (kg)	Horizontal	60	55	50
	Vertical	28.5	18.5	8.5
Max. pressing force (N)	900	550	250	
Stroke (mm)	50 to 300 (50 pitch)			
Lost motion	0.1mm or less			
Rod non-rotating accuracy (°)	±0.05			
Cable length (m)	Standard: 1 / Option: 3,5,10			
Controller	C1			
Pulse Train Driver	P1			

Note 1. The maximum speed may vary depending on the payload. For details, see "Speed vs. payload graph" shown below.

■ Speed vs. payload graph



63514-AM-00

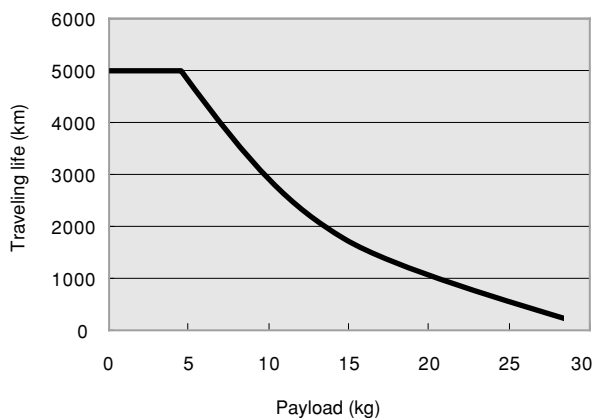


63525-AM-00

■ Traveling life

The following describes examples that the traveling life is less than 5000km due to payload.

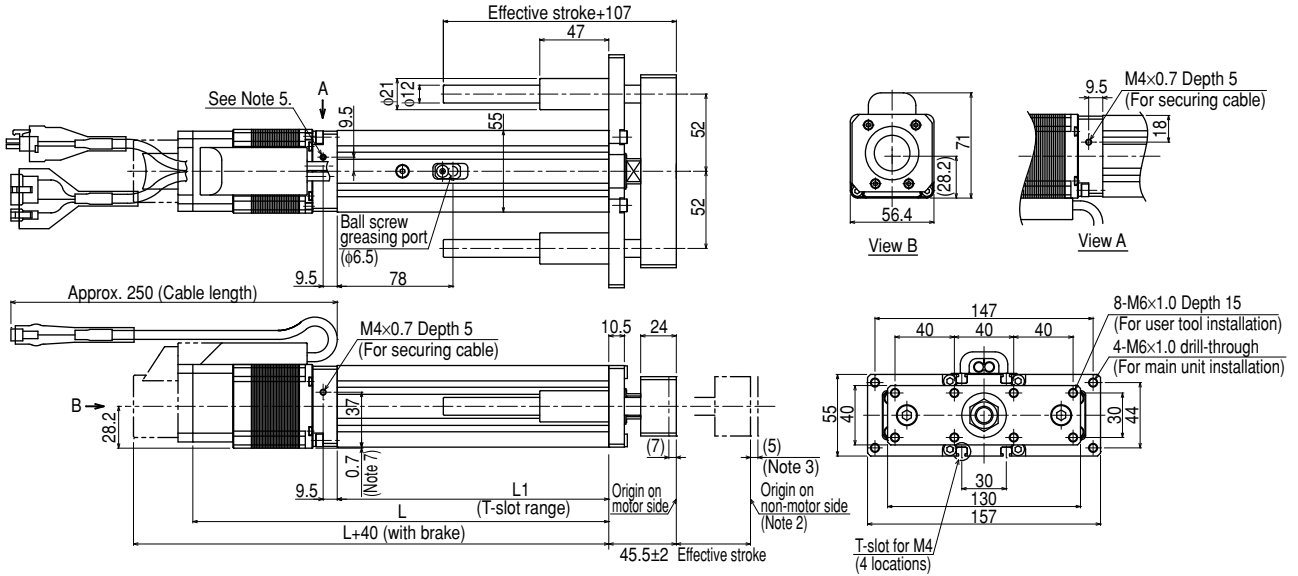
Lead 2 (Vertical installation)



63526-AM-00

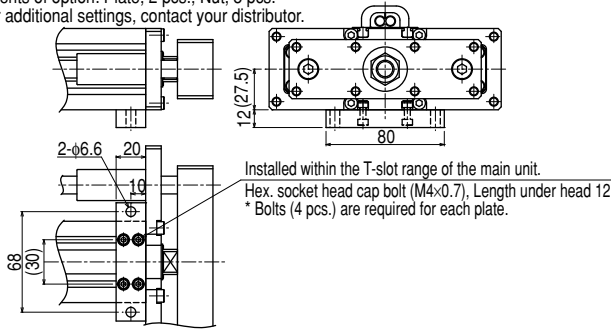
■ Dimensions

RSDG3 STRAIGHT TYPE

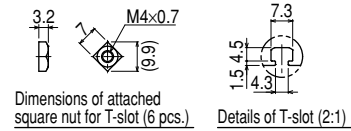


Option: Horizontal installation plate

Contents of option: Plate, 2 pcs., Nut, 8 pcs.
 * For additional settings, contact your distributor.



Installed within the T-slot range of the main unit.
 Hex. socket head cap bolt (M4x0.7), Length under head 12
 * Bolts (4 pcs.) are required for each plate.



63527-AM-00

Note 1. It is possible to apply only the axial load.

Use the external guide together so that any radial load is not applied to the rod.

Note 2. For lead 2mm specifications, the origin on the non-motor side cannot be set.

Note 3. When the lead is 2mm, this dimension is 27mm.

Note 4. When running the cables, secure cables so that any load is not applied to them.

Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)

Note 6. Minimum bend radius of motor cable is R30.

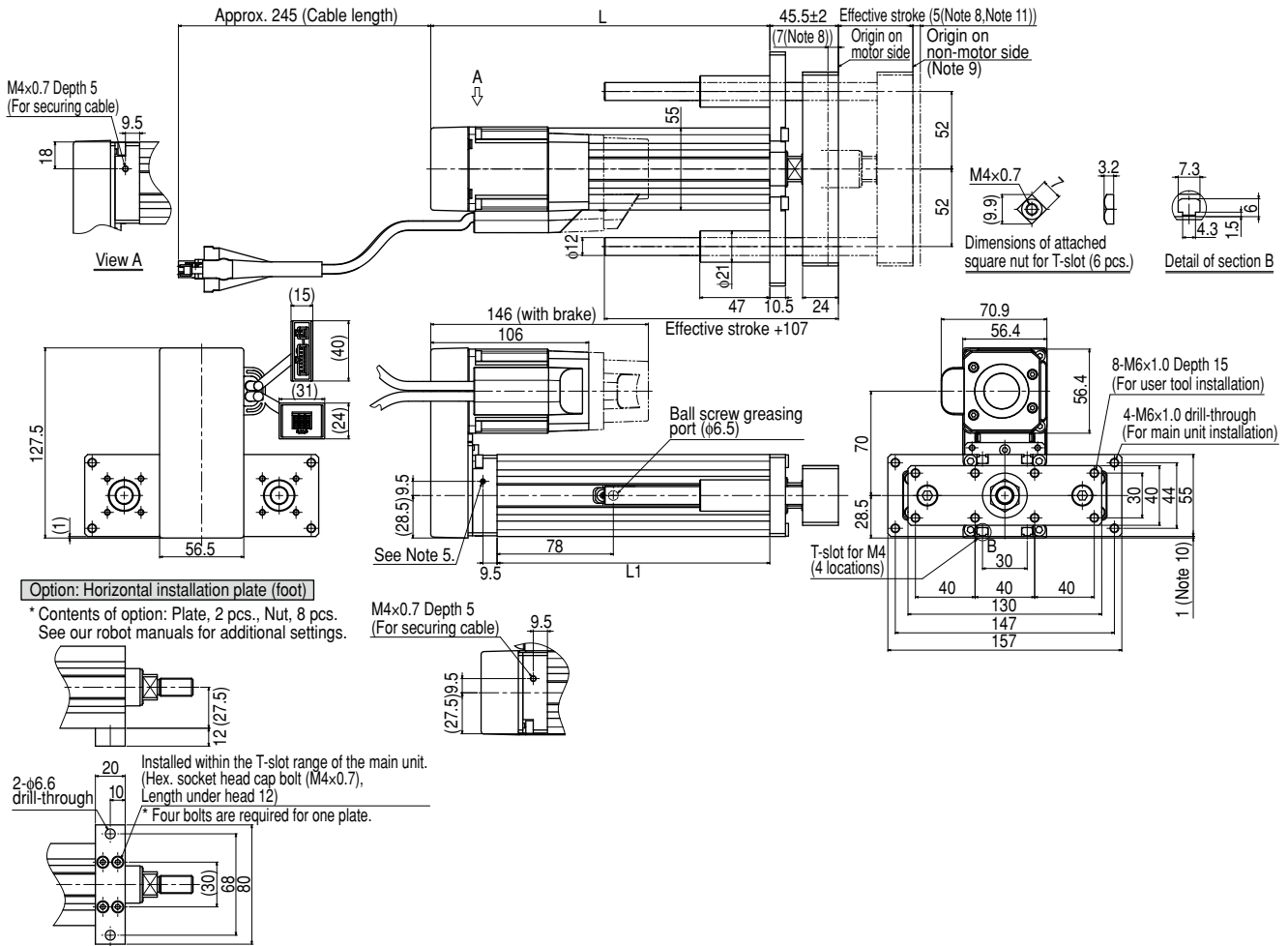
Note 7. Take great care as the outer case of the motor projects from the bottom of the main unit.

Note 8. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.

Note 9. Distance to mechanical stopper.

Effective stroke	50	100	150	200	250	300
L1	183	233	283	333	383	433
L	280.5	330.5	380.5	430.5	480.5	530.5
Weight (kg) ^{Note 8}	3.1	3.6	4.1	4.5	5.0	5.5

RSDG3 MOTOR MOUNT: UPPER



63547-AM-00

- Note 1. It is possible to apply only the axial load.
Use the external guide together so that any radial load is not applied to the rod.
- Note 2. The orientation of the width across flat part is undefined to the base surface.
- Note 3. Use the external guide together to maintain the straightness.
- Note 4. When running the cables, secure cables so that any load is not applied to them.
- Note 5. Remove the M4 hex. socket head cap set bolts and use them to secure the cables. (Effective screw thread depth 5)
- Note 6. Minimum bend radius of motor cable is R30.
- Note 7. Weight of models with no brake. The weight of brake-attached models is 0.2kg heavier than the models with no brake shown in the table.
- Note 8. Distance to mechanical stopper.
- Note 9. For lead 2mm specifications, the origin on the non-motor side cannot be set.
- Note 10. This unit can be installed with the motor facing up (turned 90 degrees from the position in this drawing).
- Note 11. When the lead is 2mm, this dimension is 27mm.

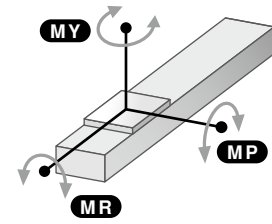
Effective stroke	50	100	150	200	250	300
L1	183	233	283	333	383	433
L	227.5	277.5	327.5	377.5	427.5	477.5
Weight (kg) ^{Note 7}	3.3	3.8	4.3	4.7	5.2	5.7

1.10 RSF4

■ Specifications

AC servo motor output (W)		100			
Repeatability(mm) ^{Note 1}		±0.01			
Deceleration mechanism		Ball screw φ15 (Class C7)			
Ball screw lead (mm)		30	20	10	5
Maximum speed (mm/sec) ^{Note 2}		1800	1200	600	300
Maximum payload (kg)	Horizontal	15	30	55	80
	Vertical	—	4	10	20
Rated thrust (N)		56	84	169	339
Stroke (mm)		150 to 1050 (50mm pitch)			
Overall length (mm)	Horizontal	Stroke+259			
	Vertical	Stroke+289			
Maximum dimensions of cross section of main unit (mm)		W94×H98			
Cable length (m)		Standard: 3.5 / Option: 5,10			
Controller		C21/C22			
Linear guide type		4 rows of circular arc grooves × 1 rail			
Position detector		Resolvers ^{Note 3}			
Resolution (Pulse/rotation)		16384			

■ Static loading moment



MY	MP	MR
86	133	117

(Unit: N·m)

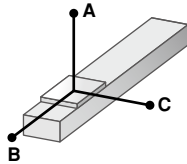
Note 1. Positioning repeatability in one direction.

Note 2. If the stroke exceeds 700mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

Note 3. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

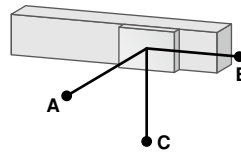
■ Allowable overhang ^{Note}. Distance from center of slider top to center of gravity of object being carried at a guide service life of 10,000km. ^{Note}. Stroke is 600mm when calculating the service life.

Horizontal installation



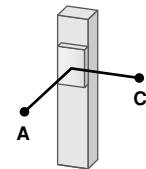
		A	B	C
Lead 30	5kg	864	501	383
	15kg	491	156	140
Lead 20	5kg	1292	505	462
	15kg	572	158	151
	30kg	455	73	75
Lead 10	20kg	617	119	127
	40kg	422	53	59
	55kg	420	36	40
Lead 5	50kg	722	42	47
	60kg	657	33	37
	80kg	577	23	25

Wall installation



		A	B	C
Lead 30	5kg	348	384	776
	15kg	87	40	306
Lead 20	5kg	416	388	1186
	15kg	92	42	386
	30kg	0	0	61
Lead 10	10kg	193	132	910
	20kg	53	0	400
	30kg	0	0	109
Lead 5	10kg	197	133	2360
	20kg	54	0	985
	30kg	0	0	427

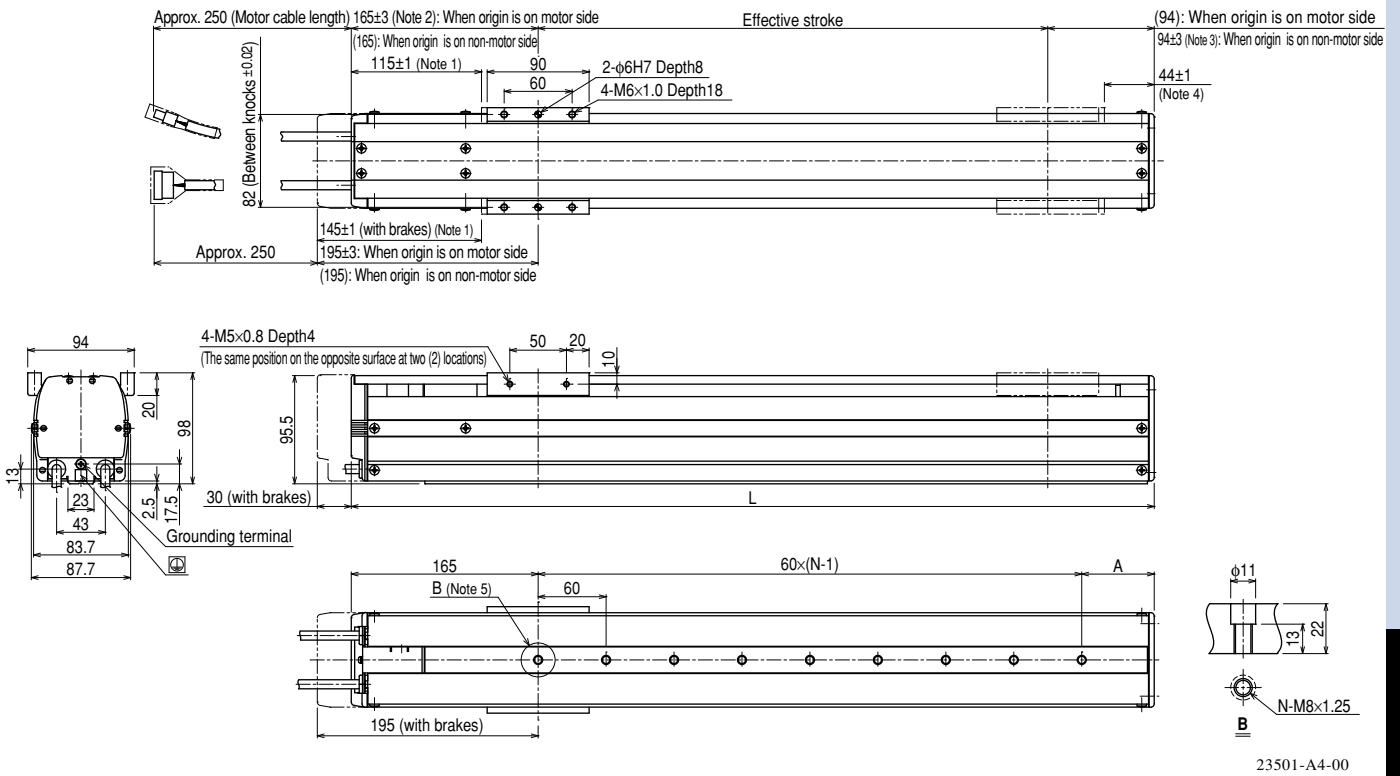
Vertical installation



		A	C
Lead 20	1kg	600	600
	2kg	1098	1098
Lead 10	4kg	545	545
	4kg	594	594
Lead 5	8kg	280	280
	10kg	217	217
Lead 5	10kg	221	221
	15kg	135	135
	20kg	92	92

(Unit: mm)

■ Dimensions



23501-A4-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. 167.5±4 when the high lead specification (Lead 30) is used.

Note 3. 94±4 when the high lead specification (Lead 30) is used.

Note 4. 41.5±1 when the high lead specification (Lead 30) is used.

Note 5. When installing the robot, washers, etc., cannot be used in the φ11 counter bore hole.

Note 6. Minimum bend radius of motor cable is R50.

Note 7. Weight of models with no brake. The weight of brake-attached models is 0.5kg heavier than the models with no brake shown in the table.

Effective stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050
L	409	459	509	559	609	659	709	759	809	859	909	959	1009	1059	1109	1159	1209	1259	1309
A	64	54	44	94	84	74	64	54	44	94	84	74	64	54	44	94	84	74	64
N	4	5	6	6	7	8	9	10	11	11	12	13	14	15	16	16	17	18	19
Weight (kg) ^{Note 7}	5.5	5.9	6.2	6.6	6.9	7.3	7.6	8.0	8.3	8.7	9.0	9.4	9.7	10.0	10.3	10.7	11.0	11.4	11.7
Maximum speed (mm/sec) ^{Note 8}	Lead 30	1800												1440	1170	900	810		
	Lead 20	1200												960	780	600	540		
	Lead 10	600												480	390	300	270		
	Lead 5	300												240	195	150	135		
	Speed setting	-												80%	65%	50%	45%		

Note 8. When the stroke is longer than 700mm, resonance of the ball screw may occur depending on the operation conditions (critical speed).

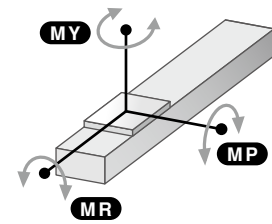
In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above.

1.11 RSH1

■ Specifications

AC servo motor output (W)		100		
Repeatability(mm) ^{Note 1}		±0.02		
Deceleration mechanism		Ball screw φ12 (Class C10)		
Ball screw lead (mm)		20	12	6
Maximum speed (mm/sec) ^{Note 2}		1200	720	360
Maximum payload (kg)	Horizontal	12	20	40
	Vertical	–	4	8
Rated thrust (N)		84	141	283
Stroke (mm)		150 to 800 (50mm pitch)		
Overall length (mm)	Horizontal	Stroke+286		
	Vertical	Stroke+316		
Maximum dimensions of cross section of main unit (mm)		W80×H65		
Cable length (m)		Standard: 3.5 / Option: 5,10		
Controller		C21/C22		
Linear guide type		4 rows of circular arc grooves × 1 rail		
Position detector		Resolvers ^{Note 3}		
Resolution (Pulse/rotation)		16384		

■ Static loading moment



MY	MP	MR
70	95	110

(Unit: N·m)

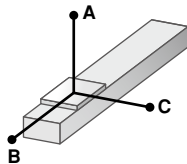
Note 1. Positioning repeatability in one direction.

Note 2. If the stroke exceeds 550mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

Note 3. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

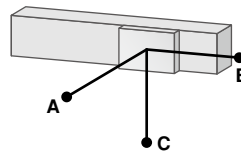
■ Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servicelife of 10,000km.
Note. Stroke is 600mm when calculating the service life.

Horizontal installation



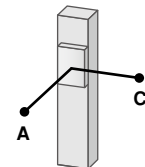
		A	B	C
Lead 20	5kg	197	76	120
	10kg	100	32	54
	12kg	85	25	43
Lead 12	5kg	364	89	188
	10kg	203	39	87
	15kg	139	22	51
	20kg	103	14	33
Lead 6	10kg	403	43	113
	20kg	214	16	43
	30kg	140	6	20
	40kg	113	0	8

Wall installation



		A	B	C
Lead 20	5kg	104	67	174
	10kg	37	23	72
	12kg	27	15	55
Lead 12	5kg	171	81	340
	10kg	69	32	172
	15kg	33	15	100
	20kg	15	6	55
Lead 6	10kg	94	36	369
	20kg	25	9	157
	30kg	0	0	14
	40kg	0	0	0

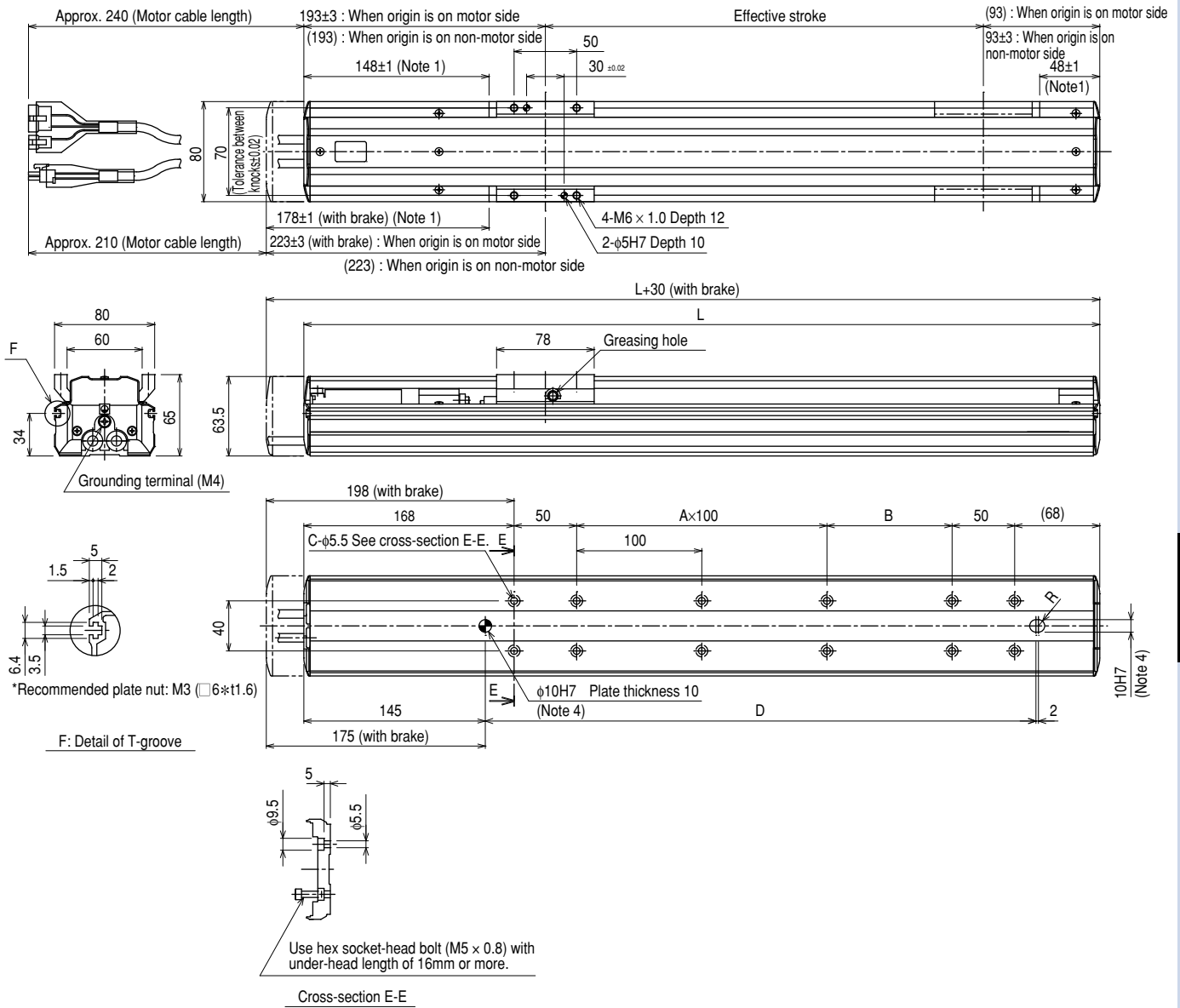
Vertical installation



		A	C
Lead 12	1kg	447	448
	2kg	214	216
	3kg	137	138
	4kg	98	99
Lead 6	2kg	244	245
	4kg	113	113
	6kg	69	69
	8kg	46	46

(Unit: mm)

■ Dimensions



63458-AM-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. When installing the robot, washers, etc., cannot be used in the main unit.

Note 3. Minimum bend radius of motor cable is R50.

Note 4. When using this φ10 knock-pin hole to position the robot body, the knockpin must not protrude more than 10mm inside the robot body.

Note 5. Weight of models with no brake. The weight of brake-attached models is 0.3kg heavier than the models with no brake shown in the table.

Effective stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	436	486	536	586	636	686	736	786	836	886	936	986	1036	1086
A	0	0	1	1	2	2	3	3	4	4	5	5	6	6
B	100	150	100	150	100	150	100	150	100	150	100	150	100	150
C	8	8	10	10	12	12	14	14	16	16	18	18	20	20
D	240	290	340	390	440	490	540	590	640	690	740	790	840	890
Weight (kg) ^{Note 5}	3.6	3.9	4.2	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.4	6.7	7.0	7.3
Maximum speed (mm/sec) ^{Note 6}	Lead 20	1200								1080	900	780	720	600
	Lead 12	720								648	540	468	432	360
	Lead 6	360								324	270	234	216	180
	Speed setting	-								90%	75%	65%	60%	50%

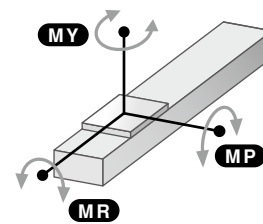
Note 6. When the stroke is longer than 550mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above.

1.12 RSH2

■ Specifications

AC servo motor output (W)		100			
Repeatability(mm) ^{Note 1}		±0.01			
Deceleration mechanism		Ball screw φ15 (Class C7)			
Ball screw lead (mm)		30	20	10	5
Maximum speed (mm/sec) ^{Note 2}		1800	1200	600	300
Maximum payload (kg)	Horizontal	7	20	40	50
	Vertical	–	4	8	16
Rated thrust (N)		56	84	169	339
Stroke (mm)		150 to 1050 (50mm pitch)			
Overall length (mm)	Horizontal	Stroke+300	Stroke+292		
	Vertical	–	Stroke+322		
Maximum dimensions of cross section of main unit (mm)		W80×H65			
Cable length (m)		Standard: 3.5 / Option: 5,10			
Controller		C21/C22			
Linear guide type		4 rows of circular arc grooves × 1 rail			
Position detector		Resolvers ^{Note 3}			
Resolution (Pulse/rotation)		16384			

■ Static loading moment



MY	MP	MR
70	95	110

(Unit: N·m)

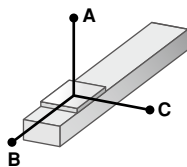
Note 1. Positioning repeatability in one direction.

Note 2. If the stroke exceeds 650mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

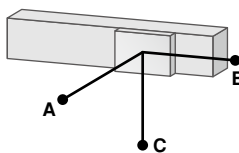
Note 3. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

■ Allowable overhang ^{Note.} Distance from center of slider top to center of gravity of object being carried at a guide servicelife of 10,000km. ^{Note.} Stroke is 600mm when calculating the service life.

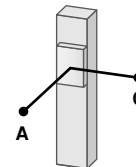
Horizontal installation



Wall installation



Vertical installation



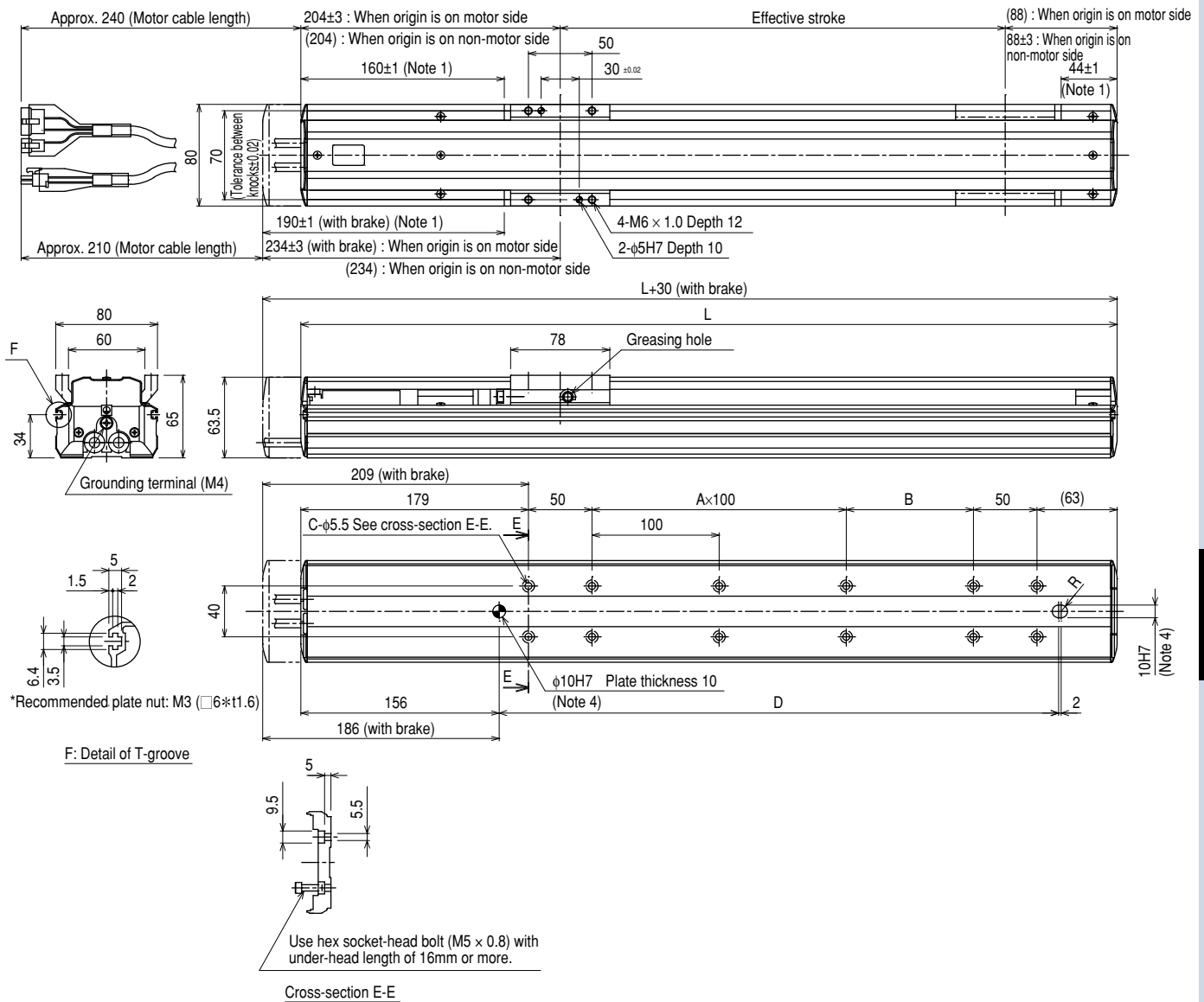
		A	B	C
Lead 30	5kg	112	80	80
	8kg	78	43	49
Lead 20	5kg	211	108	147
	10kg	116	45	69
	15kg	76	24	39
	20kg	58	14	26
Lead 10	10kg	251	56	122
	20kg	121	20	46
	30kg	74	8	20
	40kg	35	0	6
Lead 5	20kg	249	23	62
	30kg	170	10	29
	40kg	138	4	12
	50kg	51	0	0

		A	B	C
Lead 30	5kg	55	57	77
	8kg	21	19	34
Lead 20	5kg	119	89	176
	10kg	38	26	69
	15kg	7	0	16
	20kg	0	0	0
Lead 10	10kg	85	39	202
	20kg	7	0	30
	30kg	0	0	0
	40kg	0	0	0
Lead 5	20kg	19	7	140
	30kg	0	0	0
	40kg	0	0	0
	50kg	0	0	0

		A	C
Lead 20	2kg	236	240
	4kg	106	110
Lead 10	2kg	310	311
	4kg	141	143
	6kg	85	86
	8kg	57	58
Lead 5	5kg	123	124
	10kg	47	48
	15kg	22	22
	16kg	19	19

(Unit: mm)

■ Dimensions



63549-AM-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. When installing the robot, do not use washers inside the robot body.

Note 3. Minimum bend radius of motor cable is R50.

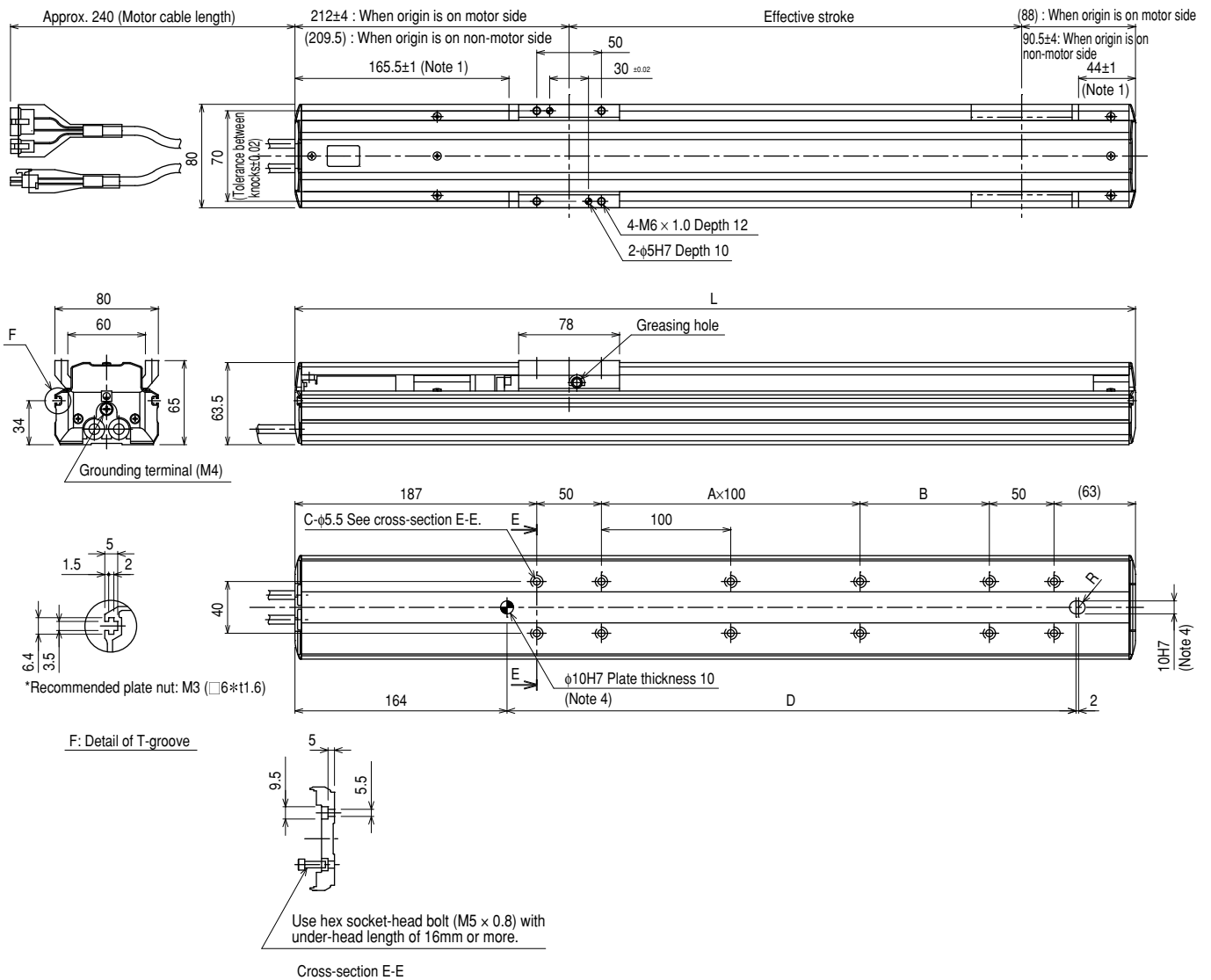
Note 4. When using this φ10 knock-pin hole to position the robot body, the knockpin must not protrude more than 10mm inside the robot body.

Note 5. Weight of models with no brake. The weight of brake-attached models is 0.3kg heavier than the models with no brake shown in the table.

Effective stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	
L	442	492	542	592	642	692	742	792	842	892	942	992	1042	1092	1142	1192	1242	1292	1342	
A	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	
B	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	
C	8	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	
D	240	290	340	390	440	490	540	590	640	690	740	790	840	890	940	990	1040	1090	1140	
Weight (kg) ^{Note 5}	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.2	9.5	
Maximum speed	Lead 20											1200								
	Lead 10											600								
(mm/sec) ^{Note 6}	Lead 5											300								
	Speed setting											-	85%	75%	65%	60%	55%	50%	45%	40%

Note 6. When the stroke is longer than 650mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above.

■ Dimensions (High lead type: Lead 30)



63550-AM-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. When installing the robot, do not use washers inside the robot body.

Note 3. Minimum bend radius of motor cable is R50.

Note 4. When using this φ10 knock-pin hole to position the robot body, the knockpin must not protrude more than 10mm inside the robot body.

Effective stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	
L	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	
A	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	
B	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	
C	8	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	
D	240	290	340	390	440	490	540	590	640	690	740	790	840	890	940	990	1040	1090	1140	
Weight (kg)	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.2	9.5	
Maximum speed (mm/sec) ^{Note 5}	Lead 30	1800											1530	1350	1170	1080	990	900	810	720
	Speed setting	-											85%	75%	65%	60%	55%	50%	45%	40%

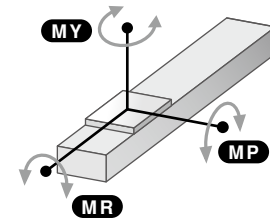
Note 5. When the stroke is longer than 650mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above.

1.13 RSH3

Specifications

AC servo motor output (W)		100		
Repeatability(mm) ^{Note 1}		±0.01		
Deceleration mechanism		Ball screw φ15 (Class C7)		
Ball screw lead (mm)		20	10	5
Maximum speed (mm/sec) ^{Note 2}		1200	600	300
Maximum payload (kg)	Horizontal	30	60	80
Rated thrust (N)		84	169	339
Stroke (mm)		150 to 1050 (50mm pitch)		
Overall length (mm)		Stroke+368		
Maximum dimensions of cross section of main unit (mm)		W80×H65		
Cable length (m)		Standard: 3.5 / Option: 5,10		
Controller		C21/C22		
Linear guide type		4 rows of circular arc grooves × 1 rail		
Position detector		Resolvers ^{Note 3}		
Resolution (Pulse/rotation)		16384		

Static loading moment



MY	MP	MR
128	163	143

(Unit: N·m)

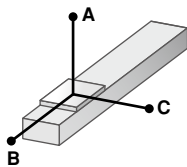
Note 1. Positioning repeatability in one direction.

Note 2. If the stroke exceeds 600mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

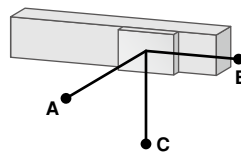
Note 3. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servicelife of 10,000km.
Note. Stroke is 600mm when calculating the service life.

Horizontal installation



Wall installation

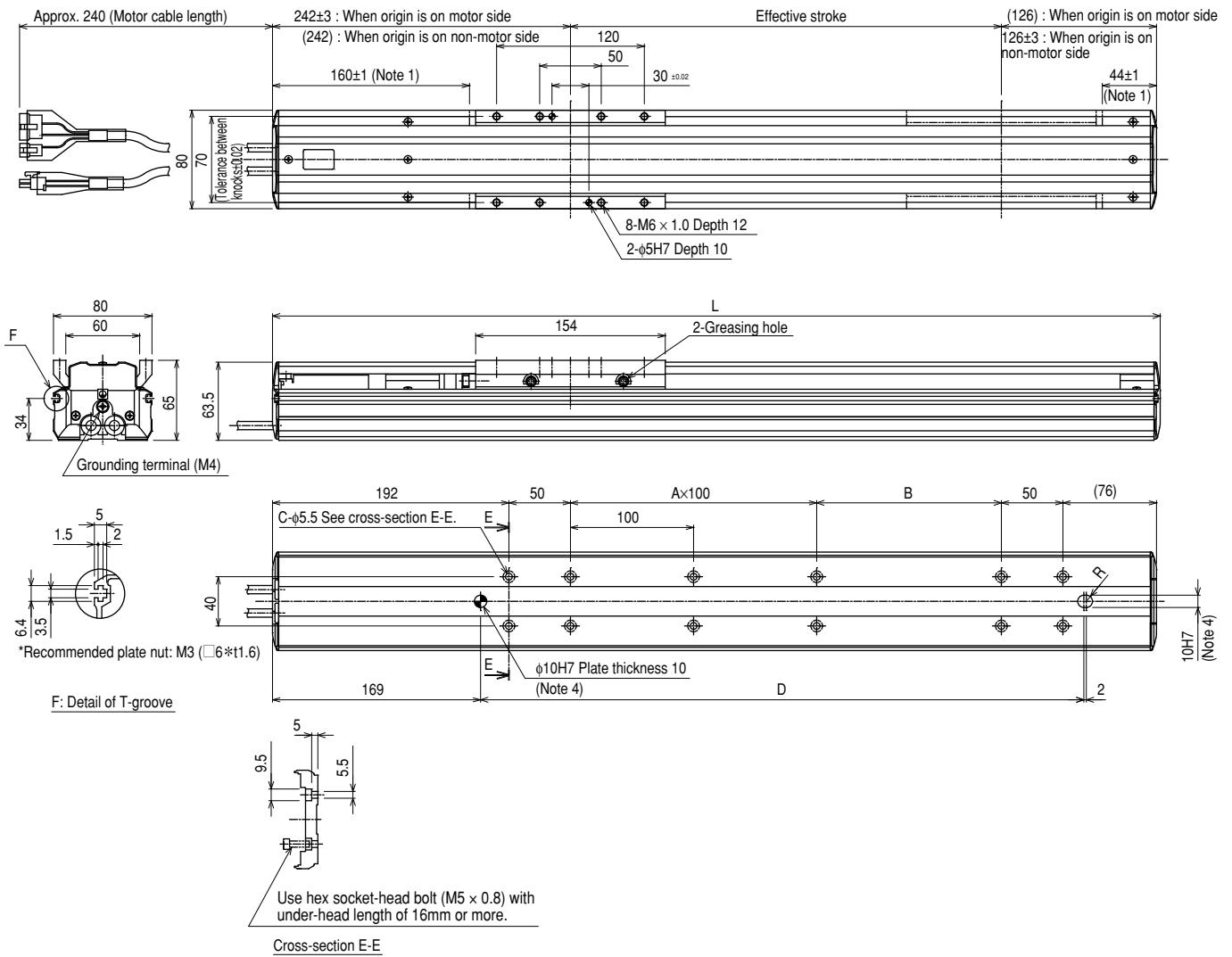


		A	B	C
Lead 20	10kg	573	256	176
	20kg	334	116	81
	30kg	279	70	50
Lead 10	20kg	629	137	111
	40kg	479	57	47
	60kg	382	30	25
Lead 5	20kg	1094	148	127
	40kg	851	63	54
	60kg	714	34	29
	80kg	601	20	17

		A	B	C
Lead 20	10kg	147	215	515
	20kg	53	75	255
	30kg	20	29	160
Lead 10	20kg	80	99	545
	40kg	15	19	270
	60kg	-	-	-
Lead 5	20kg	96	112	1005
	40kg	22	26	604
	60kg	-	-	-
	80kg	-	-	-

(Unit: mm)

■ Dimensions



63551-AM-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. When installing the robot, do not use washers inside the robot body.

Note 3. Minimum bend radius of motor cable is R50.

Note 4. When using this φ10 knock-pin hole to position the robot body, the knockpin must not protrude more than 10mm inside the robot body.

Effective stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	
L	518	568	618	668	718	768	818	868	918	968	1018	1068	1118	1168	1218	1268	1318	1368	1418	
A	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	
B	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	
C	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	
D	290	340	390	440	490	540	590	640	690	740	790	840	890	940	990	1040	1090	1140	1190	
Weight (kg)	4.7	5.0	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.7	10.0	10.3	
Maximum speed (mm/sec) Note 5	Lead 20	1200										1020	900	780	720	660	600	540	480	420
	Lead 10	600										510	450	390	360	330	300	270	240	210
	Lead 5	300										255	225	195	180	165	150	135	120	105
	Speed setting	-										85%	75%	65%	60%	55%	50%	45%	40%	35%

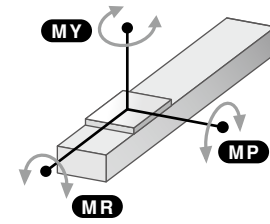
Note 5. When the stroke is longer than 600mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above.

1.14 RSH4

Specifications

AC servo motor output (W)		100			
Repeatability(mm) ^{Note 1}		±0.01			
Deceleration mechanism		Ball screw φ15 (Class C7)			
Ball screw lead (mm)		30	20	10	5
Maximum speed (mm/sec) ^{Note 2}		1800	1200	600	300
Maximum payload (kg)	Horizontal	15	20	40	60
	Vertical	—	4	10	20
Rated thrust (N)		56	84	169	339
Stroke (mm)		150 to 1050 (50mm pitch)			
Overall length (mm)	Horizontal	Stroke+260			
	Vertical	Stroke+290			
Maximum dimensions of cross section of main unit (mm)		W110×H71			
Cable length (m)		Standard: 3.5 / Option: 5,10			
Controller		C21/C22			
Linear guide type		4 rows of circular arc grooves × 1 rail			
Position detector		Resolvers ^{Note 3}			
Resolution (Pulse/rotation)		16384			

Static loading moment



MY	MP	MR
131	131	115

(Unit: N·m)

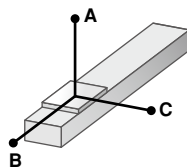
Note 1. Positioning repeatability in one direction.

Note 2. If the stroke exceeds 700mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

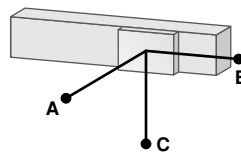
Note 3. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servelife of 10,000km.
Note. Stroke is 600mm when calculating the service life.

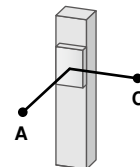
Horizontal installation



Wall installation



Vertical installation



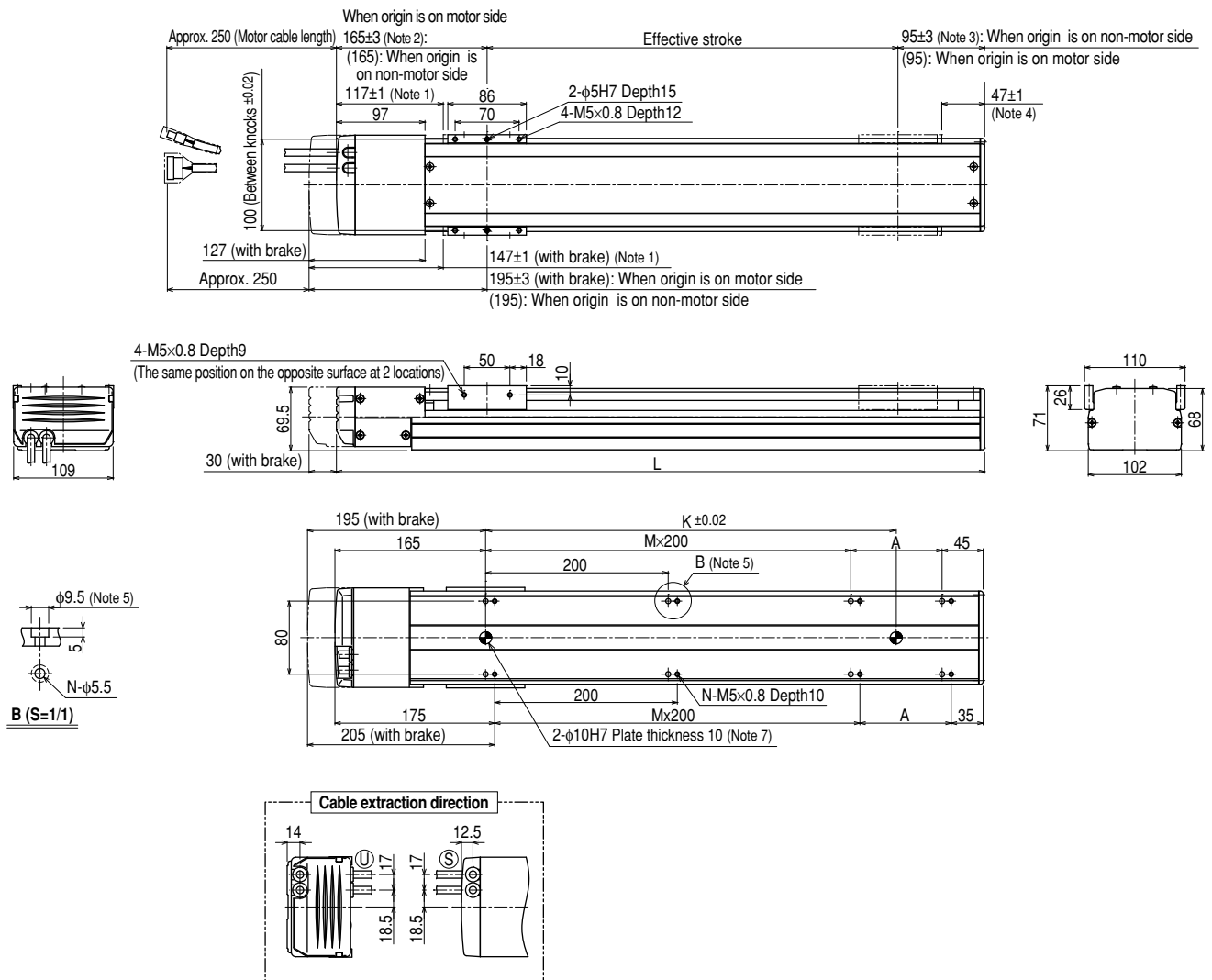
		A	B	C
Lead 30	5kg	491	273	215
	15kg	223	61	63
Lead 20	5kg	937	282	259
	10kg	487	121	116
	20kg	236	40	44
Lead 10	15kg	389	71	74
	30kg	179	17	20
	40kg	106	0	0
Lead 5	30kg	419	19	20
	50kg	0	0	0
	60kg	0	0	0

		A	B	C
Lead 30	5kg	206	209	480
	15kg	45	0	177
Lead 20	5kg	250	213	905
	10kg	99	51	438
	20kg	21	0	149
Lead 10	10kg	105	53	550
	20kg	22	0	230
	30kg	0	0	0
Lead 5	10kg	107	54	1410
	20kg	22	0	540
	30kg	0	0	0

		A	C
Lead 20	1kg	600	600
	2kg	649	691
	4kg	306	347
Lead 10	4kg	338	380
	8kg	142	183
	10kg	102	144
Lead 5	10kg	105	146
	15kg	51	93
	20kg	25	66

(Unit: mm)

■ Dimensions



23501-A6-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. 167.5±4 when the high lead specification (Lead 30) is used.

Note 3. 95±4 when the high lead specification (Lead 30) is used.

Note 4. 44.5±1 when the high lead specification (Lead 30) is used.

Note 5. When installing the unit, washers, etc., cannot be used in the φ9.5 counter bore hole.

Note 6. Minimum bend radius of motor cable is R50.

Note 7. When using this φ10 knock-pin hole to position the robot body, the knockpin must not protrude more than 10mm inside the robot body.

Note 8. Weight of models with no brake. The weight of brake-attached models is 0.6kg heavier than the models with no brake shown in the table.

Effective stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	
L	410	460	510	560	610	660	710	760	810	860	910	960	1010	1060	1110	1160	1210	1260	1310	
A	200	50	100	150	200	50	100	150	200	50	100	150	200	50	100	150	200	50	100	
M	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	
N	4	6	6	6	6	8	8	8	8	10	10	10	10	12	12	12	12	14	14	
K	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	
Weight (kg) ^{Note 8}	5.5	5.7	5.8	6.2	6.5	6.9	7.3	7.7	8.1	8.5	8.8	9.2	9.6	10.0	10.4	10.8	11.1	11.5	11.9	
Maximum speed (mm/sec) ^{Note 9}	Lead 30	1800											1440		1170		900		810	
	Lead 20	1200											960		780		600		540	
	Lead 10	600											480		390		300		270	
	Lead 5	300											240		195		150		135	
Speed setting	-												80%		65%		50%		45%	

Note 9. When the stroke is longer than 700mm, resonance of the ball screw may occur depending on the operation conditions (critical speed).

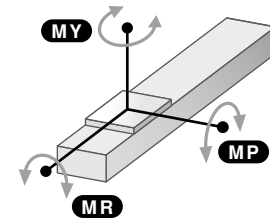
In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above.

1.15 RSH5

Specifications

AC servo motor output (W)		100			
Repeatability(mm) ^{Note 1}		±0.01			
Deceleration mechanism		Ball screw φ15 (Class C7)			
Ball screw lead (mm)		30	20	10	5
Maximum speed (mm/sec) ^{Note 2}		1800	1200	600	300
Maximum payload (kg)	Horizontal	15	30	55	80
	Vertical	—	4	10	20
Rated thrust (N)		56	84	169	339
Stroke (mm)		150 to 1050 (50mm pitch)			
Overall length (mm)	Horizontal	Stroke+255			
	Vertical	Stroke+285			
Maximum dimensions of cross section of main unit (mm)		W136×H83			
Cable length (m)		Standard: 3.5 / Option: 5,10			
Controller		C21/C22			
Linear guide type		4 rows of circular arc grooves × 2 rail			
Position detector		Resolvers ^{Note 3}			
Resolution (Pulse/rotation)		16384			

Static loading moment



MY	MP	MR
232	233	204

(Unit: N·m)

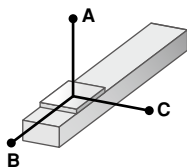
Note 1. Positioning repeatability in one direction.

Note 2. If the stroke exceeds 700mm, resonance may occur in the ball screw depending on the operation area (critical speed). If this occurs, make the adjustment to decrease the operation speed based on the max. speed stated in the table shown at the lower portion of the drawing.

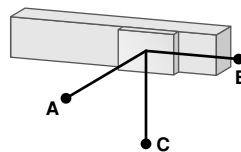
Note 3. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servelife of 10,000km.
Note. Stroke is 600mm when calculating the service life.

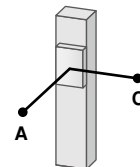
Horizontal installation



Wall installation



Vertical installation



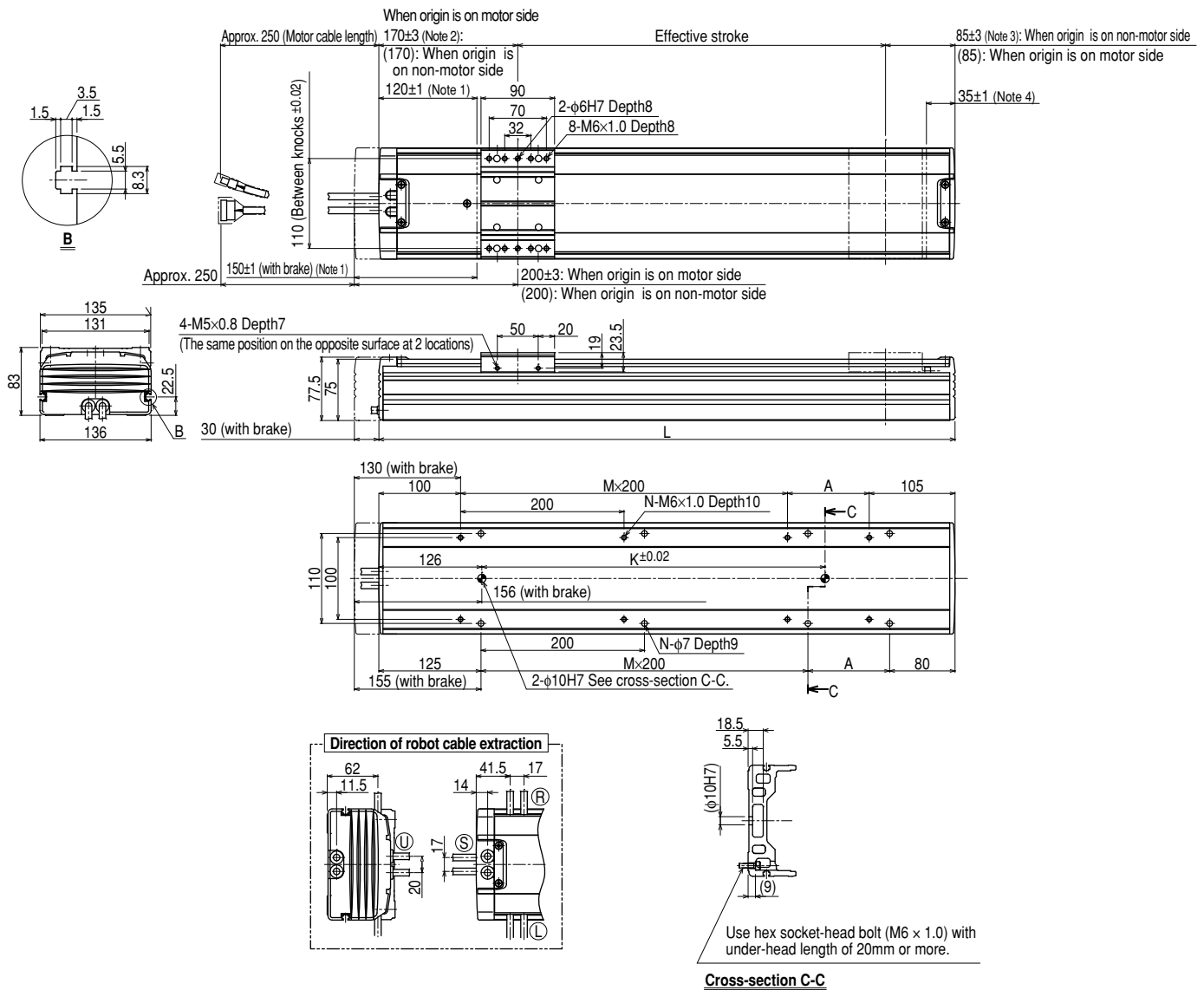
		A	B	C
Lead 30	5kg	1756	1364	863
	15kg	1236	467	438
Lead 20	5kg	2153	1366	980
	15kg	1193	465	430
	30kg	1266	245	294
Lead 10	20kg	1132	353	361
	40kg	872	183	218
	55kg	946	140	184
Lead 5	50kg	1575	158	222
	60kg	1493	135	194
	80kg	1466	107	159

		A	B	C
Lead 30	5kg	951	969	1286
	15kg	408	277	803
Lead 20	5kg	1066	974	1578
	15kg	402	276	775
	30kg	219	105	678
Lead 10	20kg	312	189	690
	40kg	140	57	402
	55kg	92	0	345
Lead 5	30kg	246	107	1095
	40kg	167	64	798
	60kg	88	20	508

		A	C
Lead 20	1kg	600	600
	2kg	1200	1200
	4kg	1154	895
Lead 10	4kg	1232	956
	8kg	634	492
	10kg	499	387
Lead 5	10kg	587	456
	15kg	383	297
	20kg	281	218

(Unit: mm)

■ Dimensions



23501-A7-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. 172.5±4 when the high lead specification (Lead 30) is used.

Note 3. 85±4 when the high lead specification (Lead 30) is used.

Note 4. 32.5±1 when the high lead specification (Lead 30) is used.

Note 5. Minimum bend radius of motor cable is R50.

Note 6. Weight of models with no brake. The weight of brake-attached models is 0.7kg heavier than the models with no brake shown in the table.

Effective stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050
L	405	455	505	555	605	655	705	755	805	855	905	955	1005	1055	1105	1155	1205	1255	1305
A	200	50	100	150	200	50	100	150	200	50	100	150	200	50	100	150	200	50	100
M	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5
N	4	6	6	6	6	8	8	8	8	10	10	10	10	12	12	12	12	14	14
K	240	240	240	240	420	420	420	420	600	600	600	600	780	780	780	780	960	960	960
Weight (kg) ^{Note 6}	6.2	6.9	7.5	8.2	8.8	9.5	10.1	10.8	11.4	12.1	12.6	13.4	13.9	14.6	15.2	15.9	16.5	17.2	17.8
Maximum speed (mm/sec) ^{Note 7}	Lead 30	1800											1440	1170	900	810			
	Lead 20	1200											960	780	600	540			
	Lead 10	600											480	390	300	270			
	Lead 5	300											240	195	150	135			
	Speed setting	-											80%	65%	50%	45%			

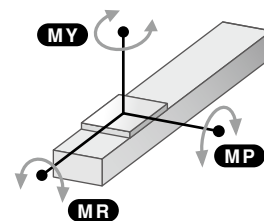
Note 7. When the stroke is longer than 700mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table above.

1.16 RSB1

Specifications

AC servo motor output (W)		100	
Repeatability (mm) ^{Note 1}		±0.04	
Belt (mm)		Equivalent to lead 25	
Maximum speed (mm/sec)		1875	
Maximum payload (kg)		10	
Stroke (mm)		150 to 2550 (100mm pitch)	
Overall length (mm)	Motor installation	L/R type	Stroke+397.5
	Another		Stroke+310
Maximum dimensions of cross section of main unit (mm)		W100×H81	
Cable length (m)		Standard: 3.5 / Option: 5,10	
Controller		C21/C22	
Linear guide type		4 rows of circular arc grooves × 1 rail	
Position detector		Resolvers ^{Note 2}	
Resolution (Pulse/rotation)		16384	

Static loading moment



MY	MP	MR
188	188	165

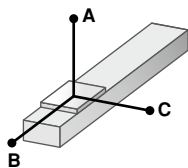
(Unit: N·m)

Note 1. Positioning repeatability in one direction.

Note 2. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

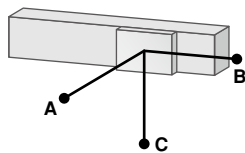
Allowable overhang Note. Distance from center of slider top to center of gravity of object being carried at a guide servelife of 10,000km. Note. Stroke is 600mm when calculating the service life.

Horizontal installation



	A	B	C
3kg	1800	1392	1084
5kg	1574	826	696
8kg	1221	509	474
10kg	1171	403	407

Wall installation

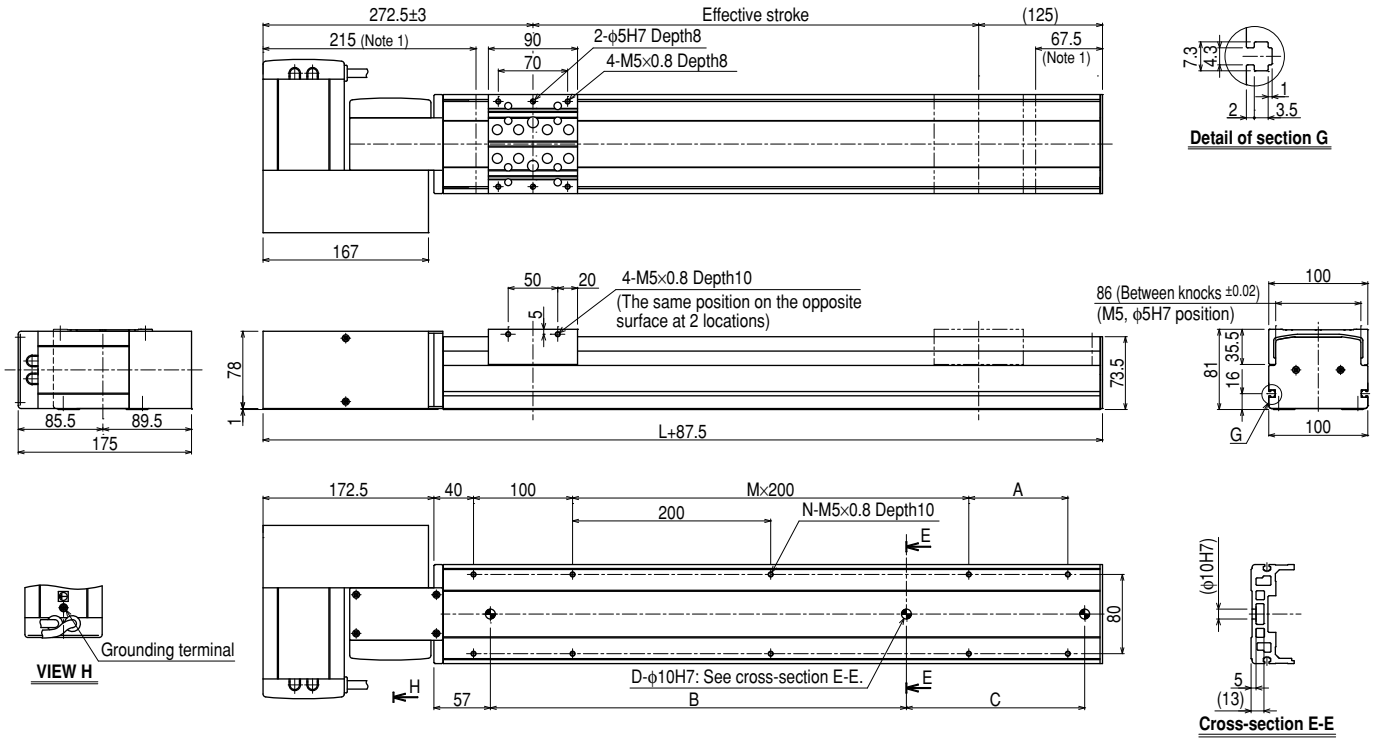


	A	B	C
3kg	1144	1005	1734
5kg	724	576	1199
8kg	493	333	918
10kg	414	254	869

(Unit: mm)

■ Dimensions

RSB1 MOTOR MOUNT: HORIZONTAL RIGHT



23501-AC-00

Note 1. Distance from both ends to the mechanical stopper.

Note 2. Motor can be installed in upward, downward or horizontal positions versus the robot movement axis. (This figure shows the horizontal direction.)

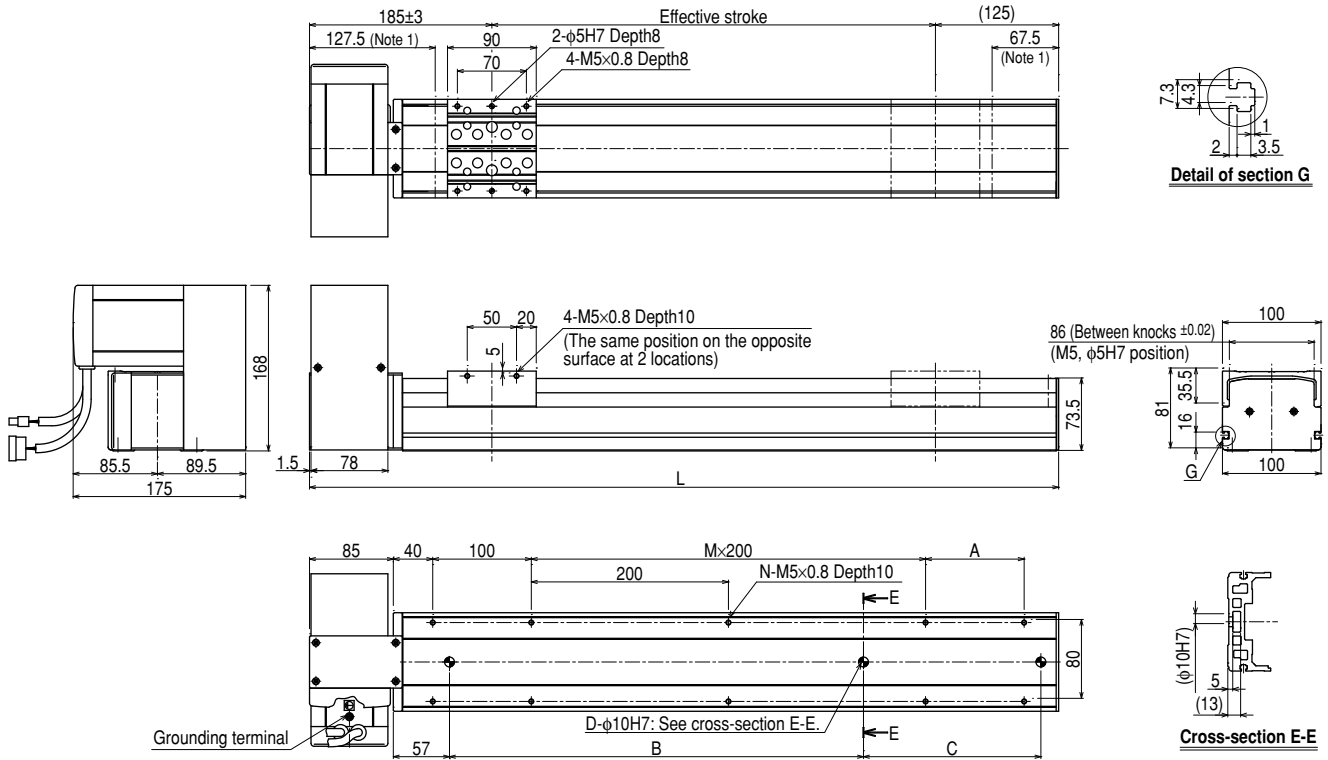
Note 3. Motor can be installed on the right or left side of the robot movement axis. (This figure shows the rightward direction)

Note 4. Cables can be extracted in upward, downward, forward or rearward directions. (This figure shows the forward direction.)

Effective stroke	150	250	350	450	550	650	750	850	950	1050	1150	1250	1350	1450	1550	1650	1750	1850	1950	2050	2150	2250	2350	2450	2550
L	460	560	660	760	860	960	1060	1160	1260	1360	1460	1560	1660	1760	1860	1960	2060	2160	2260	2360	2460	2560	2660	2760	2860
A	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200
B	240	240	420	600	600	780	780	960	960	1140	1140	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320
C	-	-	-	-	-	-	-	-	-	-	-	-	-	240	240	420	420	600	780	780	960	960	1140	1140	1320
D	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
M	-	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
N	6	8	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30
Weight (kg)	7.4	8.2	9.0	9.8	10.5	11.3	12.1	12.9	13.7	14.5	15.3	16.1	16.9	17.7	18.4	19.2	20.0	20.8	21.6	22.4	23.2	24.0	24.8	25.6	26.3

■ Dimensions

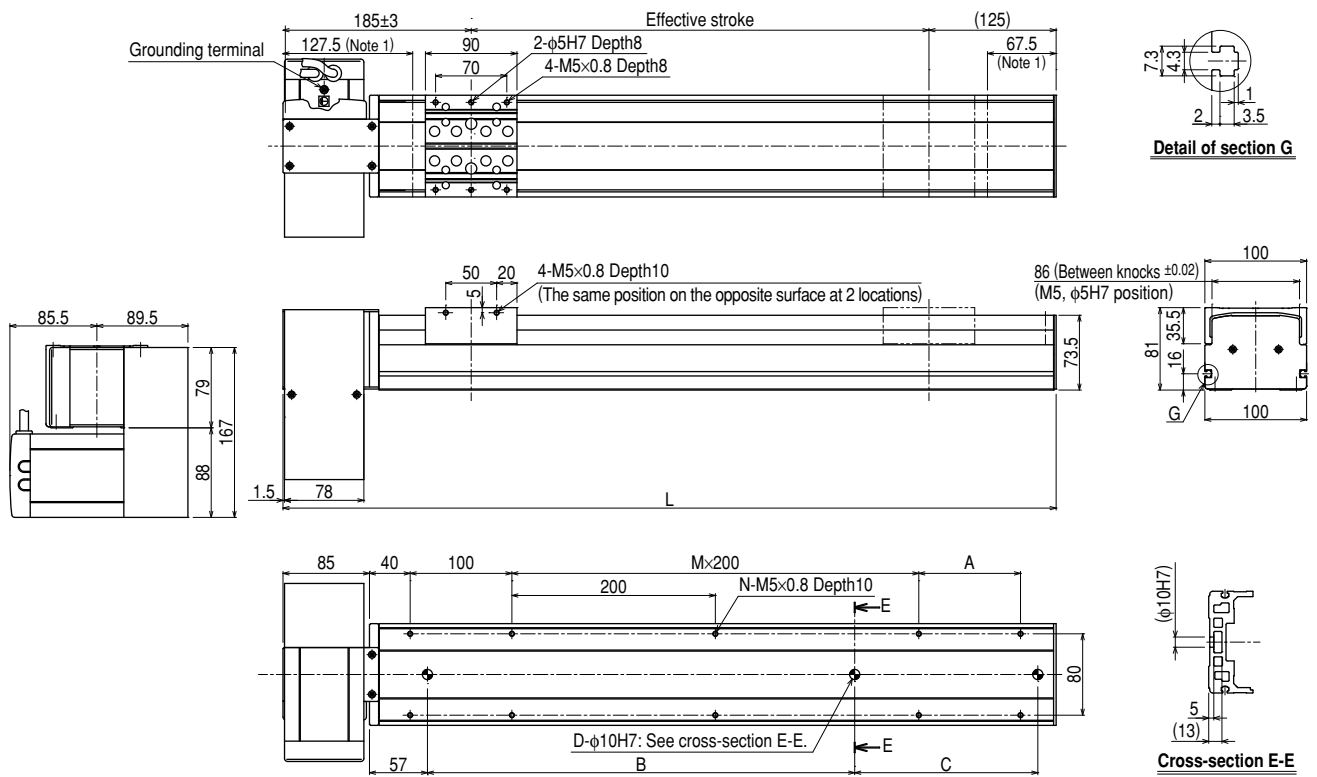
RSB1 MOTOR MOUNT: RIGHT UPPER



23502-AC-00

■ Dimensions

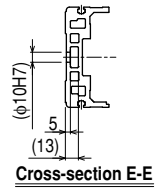
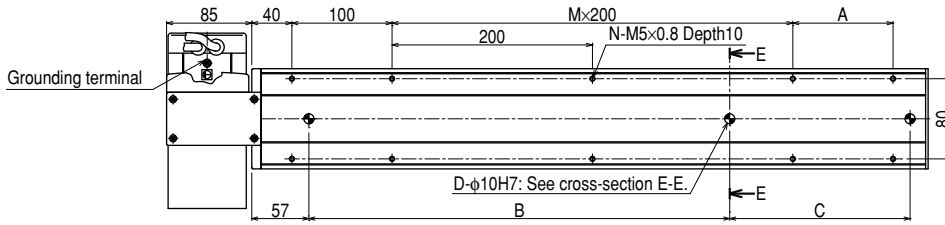
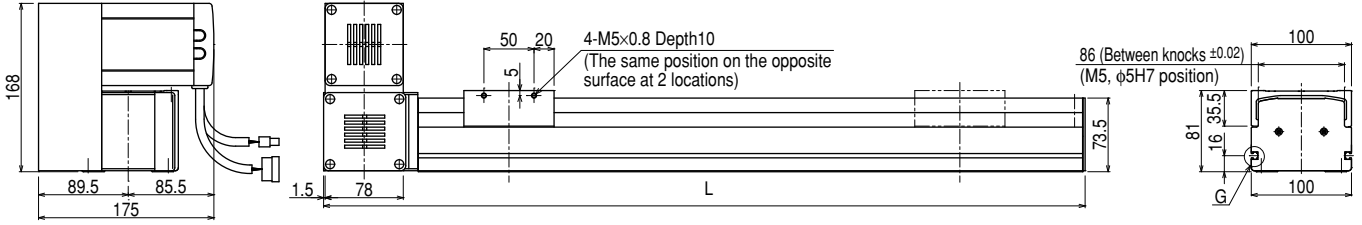
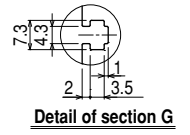
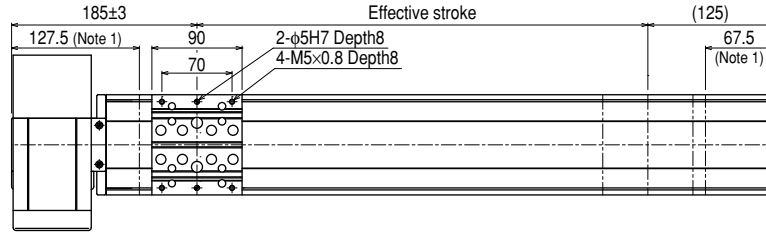
RSB1 MOTOR MOUNT: RIGHT DOWN



23503-AC-00

■ Dimensions

RSB1 MOTOR MOUNT: LEFT UPPER



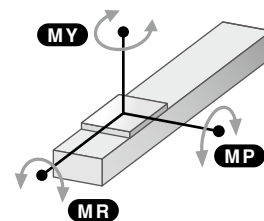
23504-AC-00

1.17 RSB2

■ Specifications

AC servo motor output (W)		100	
Repeatability (mm) ^{Note 1}		±0.04	
Belt (mm)		Equivalent to lead 25mm	
Maximum speed (mm/sec)		1875	
Maximum payload (kg)		20	
Stroke (mm)		150 to 3050 (100mm pitch)	
Overall length (mm)	Motor installation	L/R type	Stroke+425.5
	Another		Stroke+338
Maximum dimensions of cross section of main unit (mm)			W146×H94
Cable length (m)			Standard: 3.5 / Option: 5,10
Controller			C21/C22
Linear guide type			4 rows of circular arc grooves × 2 rail
Position detector			Resolvers ^{Note 2}
Resolution (Pulse/rotation)			16384

■ Static loading moment



MY	MP	MR
226	227	199

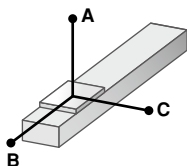
(Unit: N·m)

Note 1. Positioning repeatability in one direction.

Note 2. Position detectors (resolvers) are common to incremental and absolute specifications. If the controller has a backup function then it will be absolute specifications.

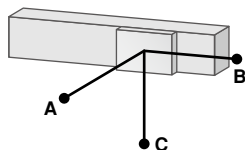
■ **Allowable overhang** Note. Distance from center of slider top to center of gravity of object being carried at a guide servelife of 10,000km.
Note. Stroke is 600mm when calculating the service life.

Horizontal installation



	A	B	C
5kg	2159	1228	943
10kg	1389	623	548
20kg	1102	320	348

Wall installation

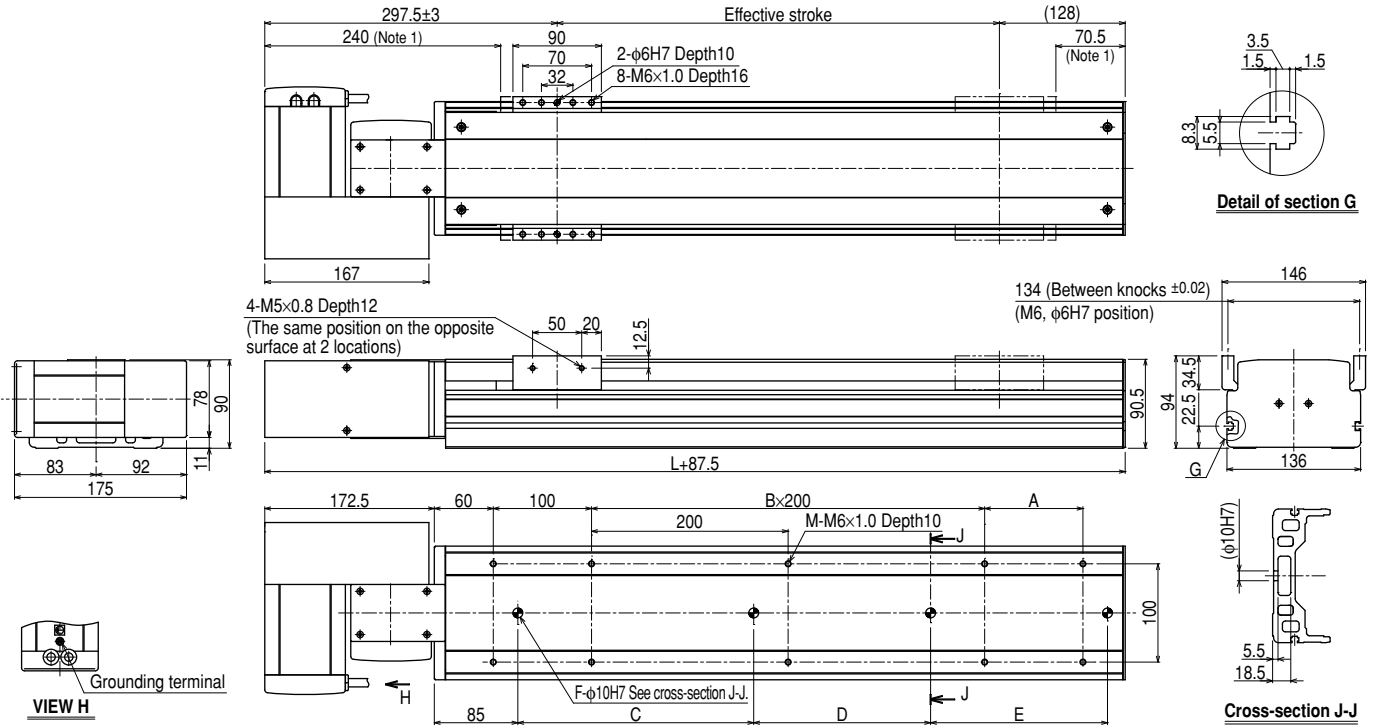


	A	B	C
5kg	1064	816	1468
10kg	564	377	888
20kg	305	156	615

(Unit: mm)

■ Dimensions

RSB2 MOTOR MOUNT: HORIZONTAL RIGHT



- Note 1. Distance from both ends to the mechanical stopper.
- Note 2. Motor can be installed in upward, downward or horizontal positions versus the robot movement axis. (This figure shows the horizontal direction.)
- Note 3. Motor can be installed on the right or left side of the robot movement axis. (This figure shows the rightward direction)
- Note 4. Cables can be extracted in upward, downward, forward or rearward di. (This figure shows the forward direction.)
- Note 5. As the carriage is made of extracted aluminum, its width dimension may slightly differ from the value above.

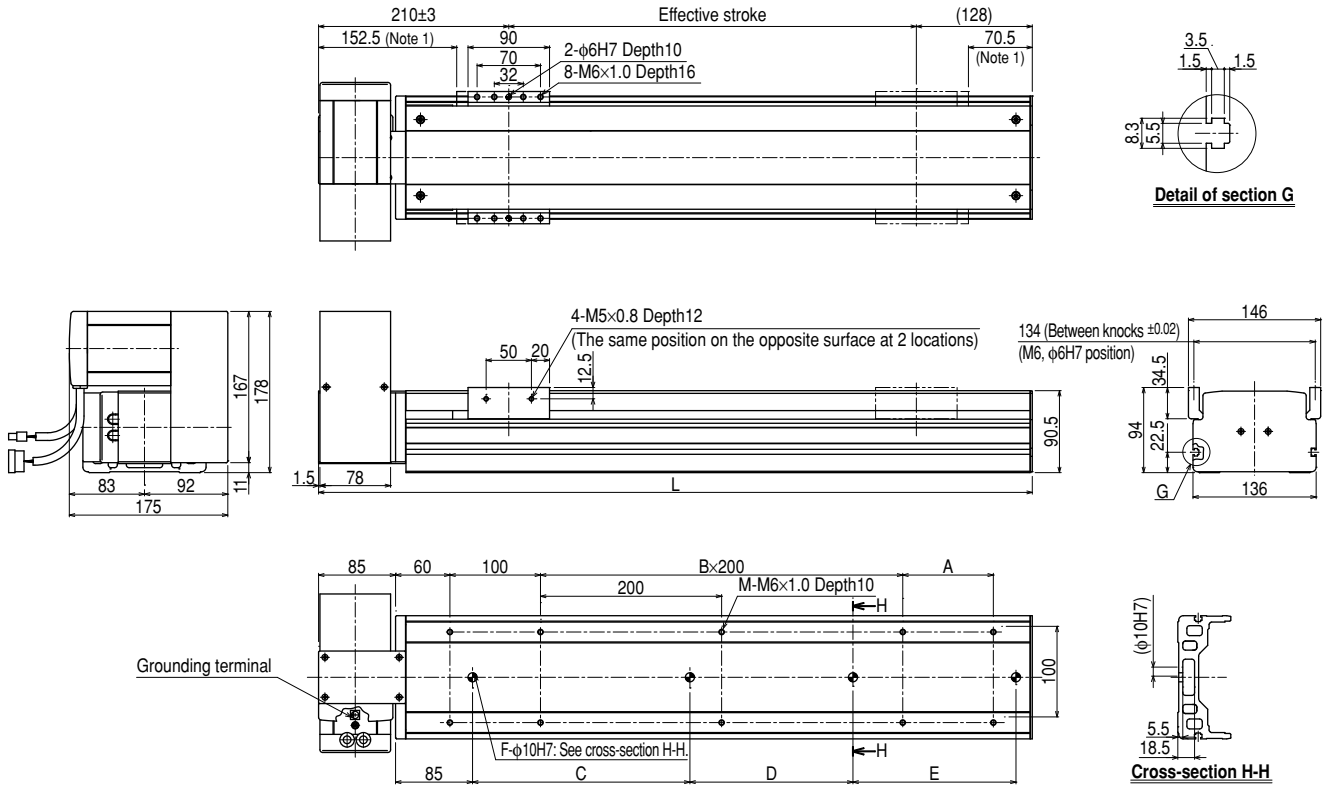
Effective stroke	150	250	350	450	550	650	750	850	950	1050	1150	1250	1350	1450	1550	1650	1750	1850	1950	2050	2150	2250	2350	2450	2550	2650	2750	2850	2950	3050
L	488	588	688	788	888	988	1088	1188	1288	1388	1488	1588	1688	1788	1888	1988	2088	2188	2288	2388	2488	2588	2688	2788	2888	2988	3088	3188	3288	3388
M	6	8	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36
A	-	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100
B	1	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15
C	240	420	420	600	600	780	780	960	960	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140
D	-	-	-	-	-	-	-	-	-	-	-	240	240	420	420	600	600	780	780	960	960	1140	1140	1140	1140	1140	1140	1140	1140	1140
E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	240	240	420	600	600	780	780
F	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4
Weight (kg)	9.6	10.8	12	13.1	14.3	15.5	16.6	17.8	19	20.2	21.3	22.5	23.7	24.8	26	27.2	28.3	29.5	30.7	31.9	33	34.2	35.4	36.5	37.7	38.9	40	41.2	42.4	43.6



23501-AD-00

■ Dimensions

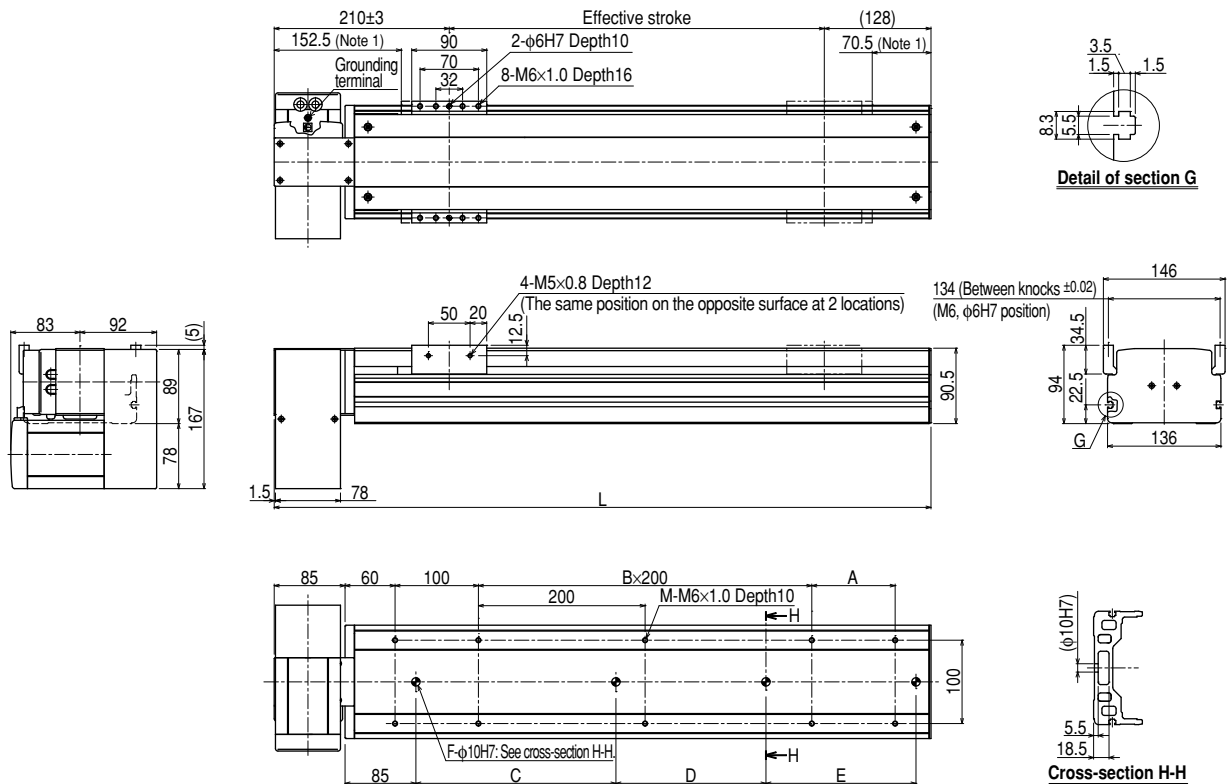
RSB2 MOTOR MOUNT: RIGHT UPPER



23502-AD-00

■ Dimensions

RSB2 MOTOR MOUNT: RIGHT DOWN



23503-AD-00

1.18 About noise level

The maximum sound pressure level is as follows when the RS series robot moves at its maximum speed. (Maximum sound pressure level is measured in accordance with EN 292-2.)

Type	Maximum speed	Maximum sound pressure level
RS1/RS2/RS3	1000 mm/s	70 dB or less
RSD1/RSD2/RSD3 RSDG1/RSDG2/RSDG3	500 mm/s	

2. Motor specifications

2.1 Motor termination

2.1.1 Motor termination

(RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3)

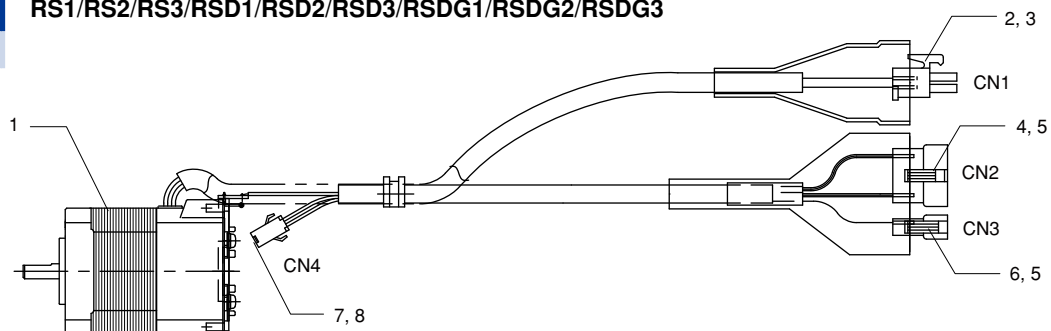
■ Connector specifications

No.	Parts	Type No.	Maker	Qty	Notes
1	Motor			1	
2	Plug housing	176274-1	AMP	1	CN1 (6 polarities)
3	Receptacle	175155-1 or 175151-1	AMP	6	CN1
4	Receptacle housing	SMR-07V-B	JST	1	CN2 (7 polarities)
5	Pin contact	BYM-001T-P0.6 or SYM-001T-P0.6	JST	9	CN2, CN3
6	Receptacle housing	SMR-02V-B	JST	2	CN3 (2 polarities)
7	Plug housing	SMP-02V-BC	JST	1	CN4 (2 polarities)
8	Socket contact	BHF-001T-0.8BS or SHF-001T-0.8BS	JST	2	CN4

■ Connector wiring

Connector	Pin No.	Signal	Wire Color	Connection	
CN1	1	A+	Black		Motor wire
	2	B+	Red		
	3	ACOM	Yellow		
	4	BCOM	White		
	5	A-	Green		
	6	B-	Blue		
CN2	1	S2	Blue	Signal wire	
	2	S4	Orange		
	3	S1	Green		
	4	S3	Brown		
	5	R1	Gray		
	6	R2	Red		
	7	Drain wire	Transparent pshrinkable tube		
CN3	1	BK+	Black	Brake wire CN4	
	2	BK-	Yellow		

RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3



63531-AM-00

2.1.2 AC servo motor termination (RSH1/RSH2/RSH3)

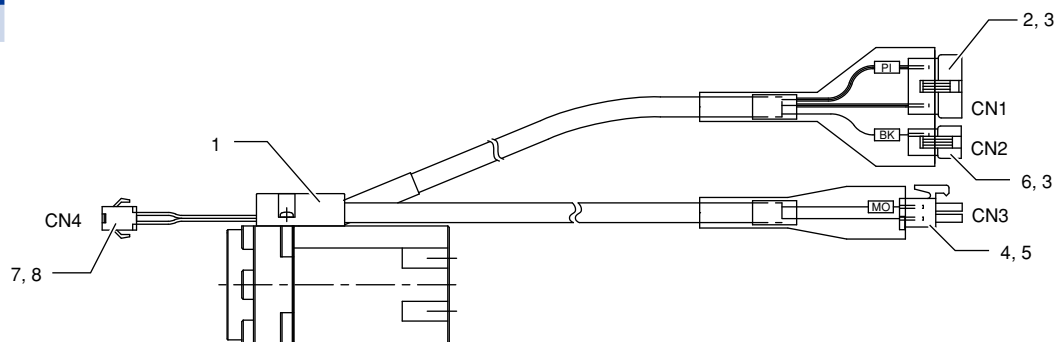
■ Connector specifications

No.	Parts	Type No.	Maker	Qty	Notes
1	Servo motor			1	
2	Receptacle housing	SMR-07V-B	JST	1	CN1 (7 polarities)
3	Pin contact	SYM-001T-P0.6	JST	9	CN1.CN2
4	Receptacle housing	176273-1	AMP	1	CN3 (4 polarities)
5	Receptacle	175156-2	AMP	4	CN3
6	Receptacle housing	SMR-02V-B	JST	1	CN2 (2 polarities)
7	Plug housing	SMP-02V-BC	JST	1	CN4 (2 polarities)
8	Socket contact	SHF-001T-0.8BS	JST	2	CN4

■ Connector wiring

Connector	Pin No.	Signal	Wire Color	Connection	
CN1	1	S2	Yellow		Motor
	2	S4	Blue		
	3	S1	Red		
	4	S3	Black		
	5	R1	White		
	6	R2	Green		
	7	Shield	Grey (Heat shrinkable tube)		
CN2	1	BK	Brown		CN4 1
	2	BK	Grey		CN4 2
CN3	1	U	Red		Motor
	2	V	White		
	3	W	Black		
	4	PE	Yellow/Green		

RSH1/RSH2/RSH3



63552-AM-00

2.1.3 AC servo motor termination (RSF4/RSH4/RSH5)

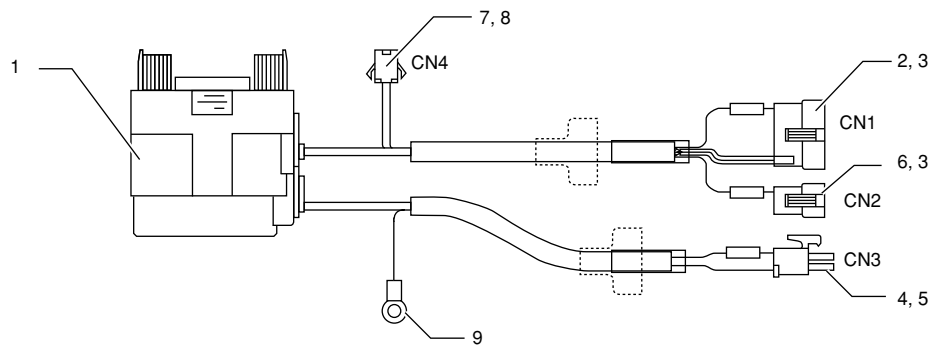
■ Connector specifications

No.	Parts	Type No.	Maker	Qty	Notes
1	Servo motor			1	
2	Receptacle housing	SMR-07V-B	JST	1	CN1 (7 polarities)
3	Pin contact	SYM-001T-P0.6	JST	9	CN1.CN2
4	Receptacle housing	176273-1	AMP	1	CN3 (4 polarities)
5	Receptacle	175156-2	AMP	4	CN3
6	Receptacle housing	SMR-02V-B	JST	1	CN2 (2 polarities)
7	Plug housing	SMP-02V-BC	JST	1	CN4 (2 polarities)
8	Socket contact	SHF-001T-0.8BS	JST	2	CN4
9	Round terminal	R1.25-4		1	

■ Connector wiring

Connector	Pin No.	Signal	Wire Color	Connection	
CN1	1	S2	Yellow		Motor
	2	S4	Blue		
	3	S1	Red		
	4	S3	Black		
	5	R1	White		
	6	R2	Green		
	7	Shield	Grey (Heat shrinkable tube)		
CN2	1	BK	Grey		CN4 1
	2	BK	Brown		CN4 2
CN3	1	U	Red		Motor
	2	V	White		
	3	W	Black		
	4	CG	Yellow/Green		Round terminal

RSF4/RSH4/RSH5



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2.1.4 AC servo motor termination (RSB1/RSB2)

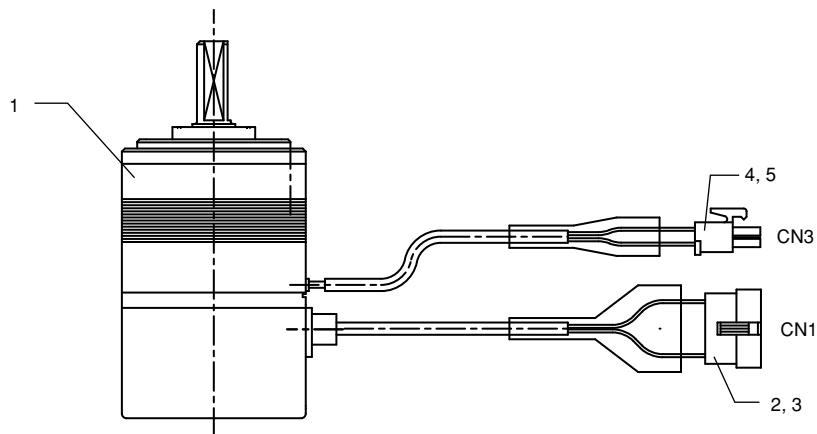
■ Connector specifications

No.	Parts	Type No.	Maker	Qty	Notes
1	Servo motor			1	
2	Receptacle housing	SMR-07V-B	JST	1	CN1 (7 polarities)
3	Pin contact	SYM-001T-P0.6	JST	7	CN1
4	Receptacle housing	176273-1	AMP	1	CN3 (4 polarities)
5	Receptacle	175156-2	AMP	4	CN3

■ Connector wiring

Connector	Pin No.	Signal	Wire Color	Connection	
CN1	1	S2	Yellow		Motor
	2	S4	Blue		
	3	S1	Red		
	4	S3	Black		
	5	R1	White		
	6	R2	Green		
	7	Shield	Grey (Heat shrinkable tube)		
CN3	1	U	Red		Motor
	2	V	White		
	3	W	Black		
	4	PE	Green/Yellow		

RSB1/RSB2



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* This Fig. shows the RSB1 robot.

2.2 Brake cable termination

2.2.1 RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3

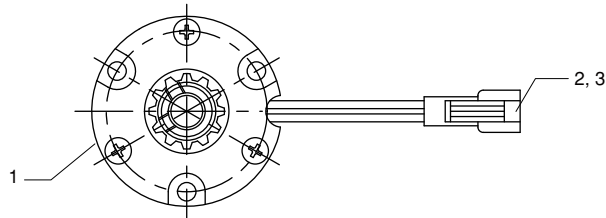
■ Connector specifications

No.	Parts	Type No.	Maker	Qty	Notes
1	Brake			1	
2	Receptacle housing	SMR-02V-B	JST	1	2 polarities
3	Pin contact	BYM-001T-P0.6 or SYM-001T-P0.6	JST	2	Manual tool YC-12

■ Connector wiring

Pin No.	Signal	Wire Color	Connection	
1	BK	Yellow		1
2	BK	Yellow		2

RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3



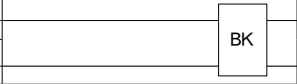
63532-AM-00

2.2.2 RSF4/RSH1/RSH2/RSH3/RSH4/RSH5/RSB1/RSB2

■ Connector specifications

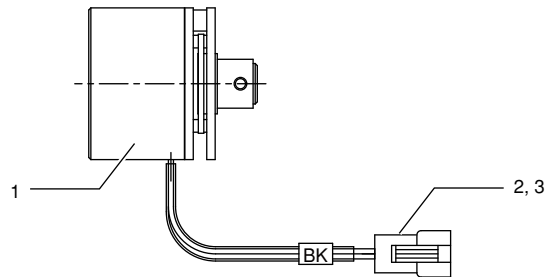
No.	Parts	Type No.	Maker	Qty	Notes
1	Brake parts			1	
2	Receptacle housing	SMR-02V-B	JST	1	CN1
3	Pin contact	SYM-001T-P0.6	JST	2	CN1

■ Connector wiring

Connector	Pin No.	Signal	Wire Color	Connection	
CN1	1	BK	Yellow (Black)		1
	2	BK	Yellow (Black)		2

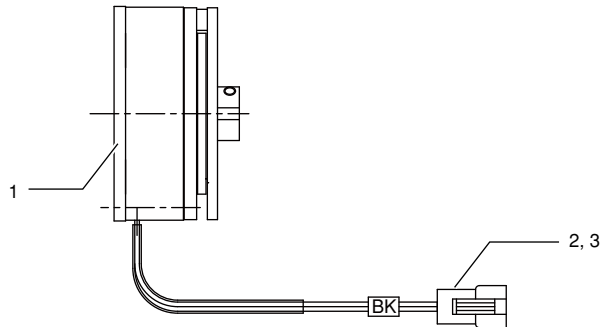
* The wire colors in () show the motor wiring of the RSF4/RSH4/RSH5 robots.

RSH1/RSH2/RSH3



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RSF4/RSH4/RSH5

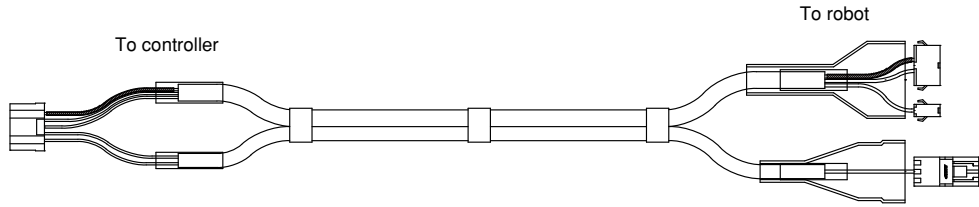


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3. Robot cables

3.1 RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3

RS1/RS2/RS3/RSD1/RSD2/RSD3/RSDG1/RSDG2/RSDG3



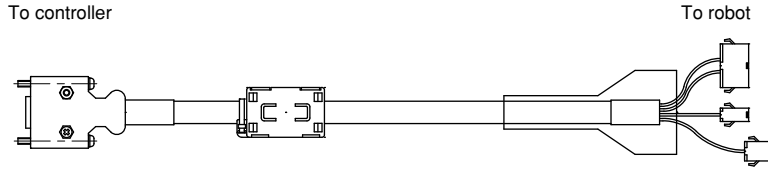
63533-AM-00

Parts	Signal	PIN	Connection	PIN	Parts	Wire	
Controller CN1	D.G	4A		7	Resolver	Drain wire	
	S2	1A		1		0.15sq	Blue
	S4	1B		2			Orange
	S1	2A		3			Green
	S3	2B		4			Brown
	R1	3A		5			Gray
	R2	3B		6			Red
	BK+	5A		1	Brake		Black
	BK-	5B		2			Yellow
	A+	6A		1	Motor	0.3sq	White 1
	B+	6B		2			White 2
	ACOM	7A		3			White 3
	BCOM	7B		4			White 4
	A-	8A		5			White 5
	B-	8B		6			White 6

3.2 RSF4/RSH1/RSH2/RSH3/RSH4/RSH5/RSB1/RSB2

Signal cable

RSF4/RSH1/RSH2/RSH3/RSH4/RSH5/RSB1/RSB2



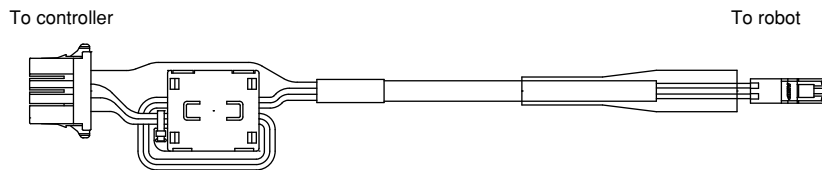
63557-AM-00

Parts	Signal	PIN	Connection	PIN	Parts	Wire	
Controller CN1	S2	1		1	Resolver: P	0.3sq	Blue (Red)
	S4	2		2			Orange (White)
	S1	3		3			Green
	S3	4		4			Brown (White)
	R1	5		5			Grey (Yellow)
	R2	6		6			Red (White)
	FG	7		7			
							Drain wire Grey (Heat shrinkable tube)
	BK+	13		1	Brake: BK		Black (Blue)
	BK-	14		2			Yellow (White)
	ORG	12		2	ORG		Pink (Purple)
	24V	11		1			White (Blue)
	GND24	10		3			Blue Red (Brown)

* The wire colors in () show the flexing cable.

Power cable

RSF4/RSH1/RSH2/RSH3/RSH4/RSH5/RSB1/RSB2



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Parts	Signal	PIN	Connection	PIN	Parts	Wire	
Motor wire	FG	1		4	Motor: M	0.75sq	Gray
	U	2		1			Red
	V	4		2			White
	W	3		3			Black

Revision record

Manual version	Issue date	Description
Ver. 1.00	Apr. 2014	First edition
Ver. 2.00	Jan. 2018	Added the " Safety Instructions" and "warranty" contents, Added and edited the contents in "Introduction", "Chapter 1", "Chapter 2", and "Chapter 3", Corrected errors in "Chapter 5", etc.

User's Manual

Single-axis Robot

RS Series

Jan. 2018

Ver. 2.00

This manual is based on Ver. 2.00 of Japanese manual.

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