Cat. No. I155E-EN-02

SCARA Robots
YRC Series

R6Y - XG series

INSTALLATION MANUAL

OMRON

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Before using the robot (Be sure to read the following notes.) i

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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 OMRON industrial 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.

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 OMRON robots, please take appropriate safety measures as required by the user's individual system.

To use OMRON 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.

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 ACIDENT.

- 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 “7.1 Movement range” in “Safety instructions” for details on the robot’s movement range.

1. Warning label 1 (SCARA robots)

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

2. Warning label 2 (SCARA robots)

WARNING

MOVING PARTS CAN PINCH OR CRUSH HANDS.
KEEP HANDS AWAY FROM THE MOVABLE PARTS OF THE ROBOT.

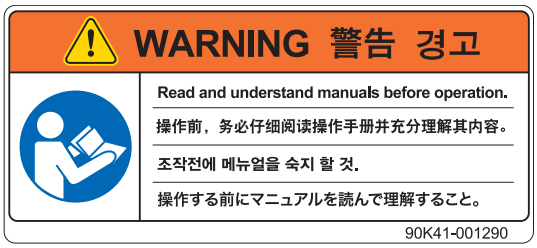
Instructions on this label
Use caution to prevent hands and fingers from being pinched or crushed by the movable parts of the robot when transporting or moving the robot or during teaching.

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.

3. Warning label 3 (SCARA robots)

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.



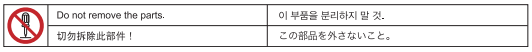
Instructions on this label
• Be sure to read the warning label and this manual carefully to make you completely understand the contents before attempting installation and operation of the robot. • Before starting the robot operation, even after you have read through this manual, read again the corresponding procedures and "Safety instructions" in this manual. • 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.

4. Warning label 4 (SCARA robots)

CAUTION

Do not remove the parts on which Warning label 4 is attached.
Doing so may damage the ball screw.

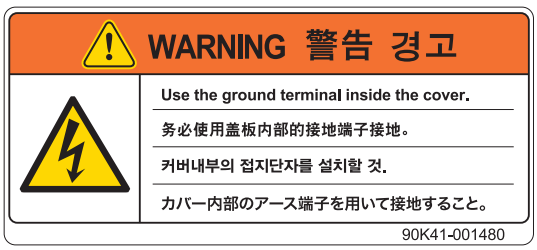


Instructions on this label
The Z-axis ball screw will be damaged if the upper end mechanical stopper on the Z-axis spline is removed or moved. Never attempt to remove or move it.

5. Warning label 5 (Controller)

WARNING

GROUND THE CONTROLLER TO PREVENT ELECTRICAL SHOCK.
GROUND TERMINAL IS LOCATED INSIDE THIS COVER.
READ THE MANUAL FOR DETAILS.



Instructions on this label
• High voltage section inside • To prevent electrical shock, always ground the robot using the ground terminal located inside the cover.

Potential hazard to human body	Electrical shock
To avoid hazard	Ground the controller.

6. "Read instruction manual" label (Controller)*

* This label is attached to the front panel.

CAUTION

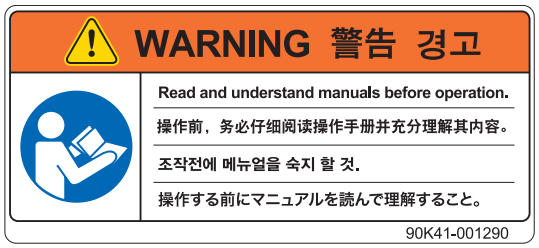
Refer to the manual.

	Instructions on this label
	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 have an orientation. Insert each connector in the correct direction.

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.

		SCARA robots
Warning label 1		●*1 ○
Warning label 2		●*1
Warning label 3		●*1

*1: See "Part names" in each SCARA robot manual for label positions.

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 OMRON 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
	This indicates a high voltage is present. Touching the terminal block or connector may cause electrical shock.

2. High temperature hazard symbol

WARNING

MOTORS, HEATSINKS, AND REGENERATIVE UNITS BECOME HOT, SO DO NOT TOUCH THEM.

	Instructions by this symbol
	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.

3. Caution symbol

CAUTION

Always read the manual carefully before using the controller.

	Instructions by this symbol
	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.

4. Major precautions for each stage of use

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

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

DANGER

OMRON 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 handle the robot such as for teaching, programming, movement check, inspection, adjustment, and repair must receive appropriate training and also have the skills needed to perform the job correctly and safely. They must 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 standards for industrial robots.

WARNING

- THE ROBOT MUST BE OPERATED ONLY BY PERSONS WHO HAVE RECEIVED SAFETY AND OPERATION TRAINING. OPERATION BY AN UNTRAINED PERSON IS EXTREMELY HAZARDOUS.
- ADJUSTMENT AND MAINTENANCE BY REMOVING A COVER REQUIRE SPECIALIZED TECHNICAL KNOWLEDGE AND SKILLS, AND MAY ALSO INVOLVE HAZARDS IF ATTEMPTED BY AN UNSKILLED PERSON. THESE TASKS MUST BE PERFORMED ONLY BY PERSONS WHO HAVE ENOUGH ABILITY AND QUALIFICATIONS IN ACCORDANCE WITH LOCAL LAWS AND REGULATIONS. FOR DETAILED INFORMATION, PLEASE CONTACT YOUR DISTRIBUTOR WHERE YOU PURCHASED THE PRODUCT.

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 “7.1 Movement range” in “Safety instructions” 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.

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
- OMRON ROBOTS ARE NOT DESIGNED TO BE EXPLOSION-PROOF.
- DO NOT USE THE ROBOTS IN LOCATIONS EXPOSED TO EXPLOSIVE OR INFLAMMABLE 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" in "Safety instructions."

2. Take safety measures when moving the robot

To ensure safety when moving a SCARA robot with an arm length of 500mm or more, use the eyebolts that come supplied with the robot.
Refer to the Robot Manual for details.

■ 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 ATEMPTED BY AN UNSKILLED PERSON. THESE TASKS MUST BE PERFORMED ONLY BY PERSONS WHO HAVE ENOUGH ABILITY AND QUALIFICATIONS IN ACORDANCE WITH LOCAL LAWS AND REGULATIONS. FOR DETAILED INFORMATION, PLEASE CONTACT YOUR DISTRIBUTOR WHERE YOU PURCHASED THE PRODUCT.

4.3.2 Precautions for robot controllers

■ Installation environment

1. Installation environment

WARNING

OMRON 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 FOR THE L-SHAPED BRACKETS USED 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 CONTROLLER USING THE GROUND TERMINAL ON THE POWER TERMINAL BLOCK. 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" in "Safety instructions."

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 “7.1 Movement range” in “Safety instructions” 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 “7.1 Movement range” in “Safety instructions” 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" IN "SAFETY INSTRUCTIONS") 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 “7.1 Movement range” in “Safety instructions” 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 “7.1 Movement range” in “Safety instructions” 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

Origin position setting	**SCARA robots**	Follow the precautions and procedure described in "2. Adjusting the origin" in Chapter 3.
Standard coordinate setting	**SCARA robots**	Follow the precautions and procedure described in "4. Setting the standard coordinates" in Chapter 3.
Soft limit settings	**SCARA robots**	Follow the precautions and procedure described in "3. Setting the soft limits" in Chapter 3.

Work with power turned on

Teaching	**SCARA robots**	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 “7.1 Movement range” in “Safety instructions” 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	Loads fall 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. Be careful of Z-axis movement when the controller is turned off or emergency stop is triggered (air-driven Z-axis)

WARNING

THE Z-AXIS STARTS MOVING UPWARD WHEN POWER TO THE CONTROLLER OR PLC IS TURNED OFF, THE PROGRAM IS RESET, EMERGENCY STOP IS TRIGGERED, OR AIR IS SUPPLIED TO THE SOLENOID VALVE FOR THE Z-AXIS AIR CYLINDER.

- DO NOT LET HANDS OR FINGERS GET CAUGHT AND SQUEEZED BY ROBOT PARTS MOVING ALONG THE Z-AXIS.
- KEEP THE USUAL ROBOT POSITION IN MIND SO AS TO PREVENT THE Z-AXIS FROM HANGING UP OR BINDING ON OBSTACLES DURING RAISING OF THE Z-AXIS EXCEPT IN CASE OF EMERGENCY STOP.

5. Take protective measures when the Z-axis interferes with peripheral equipment (air-driven Z-axis)

WARNING

WHEN THE Z-AXIS COMES TO A STOP DUE TO OBSTRUCTION FROM PERIPHERAL EQUIPMENT, THE Z-AXIS MAY MOVE SUDDENLY AFTER THE OBSTRUCTION IS REMOVED, CAUSING INJURY SUCH AS PINCHED OR CRUSHED HANDS.

- TURN OFF THE CONTROLLER AND REDUCE THE AIR PRESSURE BEFORE ATTEMPTING TO REMOVE THE OBSTRUCTION.
- BEFORE REDUCING THE AIR PRESSURE, PLACE A SUPPORT UNDER THE Z-AXIS BECAUSE THE Z-AXIS WILL DROP UNDER ITS OWN WEIGHT.

6. Be careful of Z-axis movement when air supply is stopped (air-driven Z-axis)

WARNING

THE Z-AXIS WILL SLIDE DOWNWARD WHEN THE AIR PRESSURE TO THE Z-AXIS AIR CYLINDER SOLENOID VALVE IS REDUCED, CREATING A HAZARDOUS SITUATION.
TURN OFF THE CONTROLLER AND PLACE A SUPPORT UNDER THE Z-AXIS BEFORE CUTTING OFF THE AIR SUPPLY.

7. 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.

8. If the X-axis, Y-axis or R-axis rotation angle is small

CAUTION

If the X-axis, Y-axis or R-axis rotation angle is set smaller than 5 degrees, then it will always move within the same position. This restricted position makes it difficult for an oil film to form on the joint support bearing, and so may possibly damage the bearing. In this type of operation, add a range of motion so that the joint moves through 90 degrees or more, about 5 times a day.

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. FOR DETAILED INFORMATION, PLEASE CONTACT YOUR DISTRIBUTOR WHERE YOU PURCHASED THE PRODUCT.

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 LEAST 30 MINUTES FOR THE YRC SERIES 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. Be careful when removing the Z-axis motor (SCARA robots)

WARNING

THE Z-AXIS WILL SLIDE DOWNWARD WHEN THE Z-AXIS MOTOR IS REMOVED, CAUSING A HAZARDOUS SITUATION.

- TURN OFF THE CONTROLLER AND PLACE A SUPPORT UNDER THE Z-AXIS BEFORE REMOVING THE Z-AXIS MOTOR.
- BE CAREFUL NOT TO LET YOUR BODY GET CAUGHT BY THE DRIVING UNIT OF THE Z-AXIS OR BETWEEN THE Z-AXIS DRIVE UNIT AND THE INSTALLATION BASE.

2. Do not remove the Z-axis upper limit mechanical stopper

CAUTION

Warning label 4 is attached to each SCARA robot. (For details on warning labels, see "3. Warning labels" in "Safety instructions.") Removing the upper limit mechanical stopper installed to the Z-axis spline or shifting its position will damage the Z-axis ball screw. Never attempt to remove it.

3. Use caution when handling a robot that contains powerful magnets

WARNING

POWERFUL MAGNETS ARE INSTALLED INSIDE THE ROBOT. DO NOT DISASSEMBLE THE ROBOT SINCE THIS MAY CAUSE INJURY. DEVICES THAT MAY MALFUNCTION DUE TO MAGNETIC FIELDS MUST BE KEPT AWAY FROM THIS ROBOT.

See "6. Cautions regarding strong magnetic fields" in "Safety instructions" for detailed information on strong magnetic fields.

4. Use the following caution items when disassembling or replacing the pneumatic equipment.

WARNING

AIR OR PARTS MAY FLY OUTWARD IF PNEUMATIC EQUIPMENT IS DISASSEMBLED OR PARTS REPLACED WHILE AIR IS STILL SUPPLIED.

- DO SERVICE WORK AFTER TURNING OFF THE CONTROLLER, REDUCING THE AIR PRESSURE, AND EXHAUSTING THE RESIDUAL AIR FROM THE PNEUMATIC EQUIPMENT.
- BEFORE REDUCING THE AIR PRESSURE, PLACE A SUPPORT STAND UNDER THE Z-AXIS SINCE IT WILL DROP UNDER ITS OWN WEIGHT.

5. Use caution to avoid contact with the controller cooling fan

WARNING

- TOUCHING THE ROTATING FAN MAY CAUSE INJURY.
- IF REMOVING THE FAN COVER, FIRST TURN OFF THE CONTROLLER AND MAKE SURE THE FAN HAS STOPPED.

6. 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.
- Do not insert any SD memory card other than specified into the SD memory card slot in the programming box. Malfunction or breakdown may result if the wrong memory card is inserted.

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.

3. Strong magnet

WARNING

STRONG MAGNETS ARE INSTALLED IN THE ROBOT. BE CAREFUL WHEN DISPOSING OF THE ROBOT.

See "6. Cautions regarding strong magnetic fields" in "Safety instructions" for detailed information on strong magnetic fields.

5. Emergency action when a person is caught by robot

If a person should get caught between the robot and a mechanical part such as the installation base, then release the axis.

■ Emergency action

Release the axis while referring to the following section in the manual for the robot controller.

Controller	Refer to:
YRC	Section 1, "Freeing a person caught by the robot" in Chapter 1

NOTE

Make a printout of the relevant page in the manual and post it a conspicuous location near the controller.

6. Cautions regarding strong magnetic fields

Some OMRON robots contain parts generating strong magnetic fields which may cause bodily injury, death, or device malfunction. Always comply with the following instructions.

- Persons wearing ID cards, purses, or wristwatches must keep away from the robot.
- Do not bring tools close to the magnet inside the robot.

7. Using the robot safely

7.1 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 (Figure A) to include the areas taken up by movement of the tool and workpiece attached to the manipulator tip (Figure B).
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 robot arms, the tool and workpiece attached to the manipulator tip, and the solenoid valves attached to the robot arms move.
To make the robot motion easier to understand, the figures below only show the movement ranges of the tool attachment section, tool, and workpiece.
Please note that during actual operation, the movement range includes all areas where the robot arms and any other parts move along with the robot.

Movement range

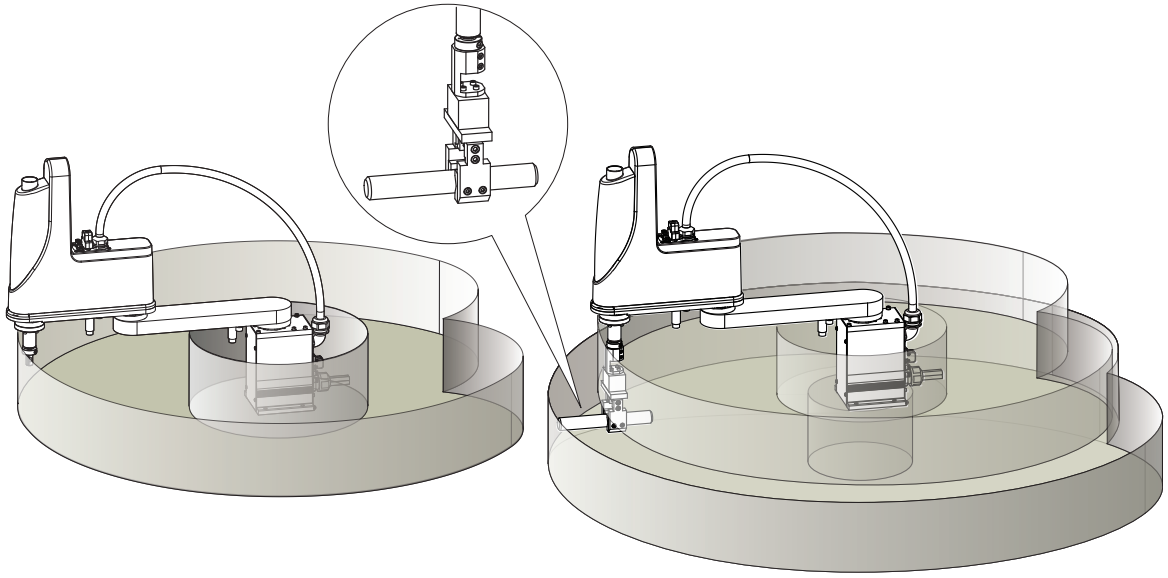


Figure A: Movement range of robot itself

Figure B: Movement range when tool and workpiece are attached to manipulator tip

CAUTION

To make the robot motion easier to understand, the above figures only show the movement ranges of the tool attachment section, tool, and workpiece. In actual operation, the movement range includes all areas where the robot arms and any other parts move along with the robot.

7.2 Robot protective functions

Protective functions for OMRON 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 operation after return-to-origin and during automatic operation. 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.

SCARA robots	• The X and Y axes have mechanical stoppers that are installed at both ends of the maximum movement range. Some robot models have a standard feature that allows changing the mechanical stopper positions. On some other models, the mechanical stopper positions can also be changed by using option parts. • The Z-axis has a mechanical stopper at the upper end and lower end. The stopper positions can be changed by using option parts. • No mechanical stopper is provided on the R-axis.

WARNING

AXIS MOVEMENT DOES NOT STOP IMMEDIATELY AFTER THE SERVO IS TURNED OFF BY EMERGENCY STOP OR OTHER PROTECTIVE FUNCTIONS, SO USE CAUTION.

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.

7.3 Residual risk

To ensure safe and correct use of OMRON robots and controllers, System integrators and/or end users implement machinery safety design that conforms to ISO12100.
Residual risks for OMRON robots and controllers are described in the DANGER or WARNING instructions provided in each chapter and section. Read them carefully.

7.4 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 “7.1 Movement range” in “Safety instructions” for details on the robot’s movement range.

Warranty

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

■ Warranty description

If a failure or breakdown occurs due to defects in materials or workmanship in the genuine parts constituting this OMRON robot and/or related product within the warranty period, then OMRON shall supply free of charge the necessary replacement/ repair parts.

■ Warranty period

The warranty period ends 24 months after the date of manufacturing as shown on the products.

■ Exceptions to the warranty

This warranty will not apply in the following cases:

1. Fatigue arising due to the passage of time, natural wear and tear occurring during operation (natural fading of painted or planted surfaces, deterioration of parts subject to wear, etc.)
2. Minor natural phenomena that do not affect the capabilities of the robot and/or related product (noise from computers, motors, etc.)
3. Programs, point data and other internal data were changed or created by the user.

Failures resulting from the following causes are not covered by warranty.

1. Damage due to earthquakes, storms, floods, thunderbolt, fire or any other natural or man-made disaster.
2. Troubles caused by procedures prohibited in this manual.
3. Modifications to the robot and/or related product not approved by OMRON or OMRON sales representative.
4. Use of any other than genuine parts and specified grease and lubricant.
5. Incorrect or inadequate maintenance and inspection.
6. Repairs by other than authorized dealers.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NONINFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUERIMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE OR INAPPROPIATE MODIFICATION OR REPAIR.

Introduction

Contents

Before using the robot (Be sure to read the following notes.) i
Introduction v

Before using the robot (Be sure to read the following notes.)

At this time, our thanks for your purchase of this OMRON XG series SCARA robot.

1. Please be sure to perform the following tasks before using the robot.

Failing to perform the tasks below will require re-teaching of the robot since the origin position cannot be set to the same previous position. Robot malfunctions (vibration, noise) may also occur.

The origin position of the XG series robots is adjusted to the robot arm extended position at the factory prior to shipment, so the reference or standard coordinates are temporarily set. The customer should set the origin position before any other job. There are 2 types of origin position settings as shown below.

[1]Setting the robot arm extended position (the origin position adjusted at the factory prior to shipment) as the origin position (When setting the origin position with the robot arm extended, you must check that there will not be any interference from any peripheral equipment during the next absolute reset.)

[2]Setting a position OTHER than the robot arm extended position (the origin position adjusted at the factory prior to shipment) as the origin position

---

[1]To set the robot arm extended position (the origin position adjusted at the factory prior to shipment) as the origin position

Absolute Reset

The XG series robots only require the absolute reset to be performed once when the robot is introduced. Once the absolute reset is performed, you do not need to reperform it when the power is turned on next time. Set the origin position while referring to absolute reset methods in "2. Adjusting the origin" in Chapter 3 of this manual and in "Absolute Reset" of the "OMRON Robot Controller User's Manual". Setting of standard coordinates is not required in the above case. To set the standard coordinates with high accuracy, refer to "4. Setting the standard coordinates" in Chapter 3 of this manual and "Setting the Standard Coordinates" in the "OMRON Robot Controller User's Manual". If the standard coordinate settings are incorrect, robot malfunctions (vibration, excessive noise) may occur.

CAUTION

Never enter the robot movement range once the robot servo is turned on as this is extremely hazardous.

[2]To set a position OTHER than the robot arm extended position (the origin position adjusted at the factory prior to shipment) as the origin position

1.Absolute reset

The XG series robots only require the absolute reset to be performed once when the robot is introduced. Once the absolute reset is performed, you do not need to reperform it when the power is turned on next time. Set the origin position while referring to absolute reset methods in "2. Adjusting the origin" in Chapter 3 of this manual and in "Absolute Reset" of the "OMRON Robot Controller User's Manual". Set the origin position with the absolute reset.

CAUTION

Never enter the robot movement range once the robot servo is turned on as this is extremely hazardous.

2.Affixing the origin position sticker

Set in emergency stop when absolute reset is complete, and immediately affix the origin point sticker according to instructions in "5. Affixing stickers for origin positions, movement directions and axis names" in Chapter 3 of this manual.

3.Setting the reference coordinates

Set the reference coordinates while referring to instructions in "4. Setting the reference coordinates" in Chapter 3 of this manual and also to "Setting the Reference Coordinates" in the "OMRON Robot Controller User's Manual". Robot malfunctions (vibration, noise) may occur if the reference coordinates are not set correctly.

Even though there is no problem with the robot, the following error messages are issued when the robot and controller are connected and power first turned on. (Actual error messages may differ according to how the robot and controller are connected.)

Error messages issued when robot & controller are connected (YRC)

17.81 : D?.ABS.battery wire breakage

17.83 : D?.Backup position data error 1

17.85 : D?.Backup position data error 2

17.92 : D?.Resolver disconnected during power off

17.93 : D?.Position backup counter overflow

etc.

2. Repetitive positioning accuracy

"Repetitive positioning accuracy" is not guaranteed under the following conditions.

[1] Factors related to absolute accuracy

- If the accuracy between the coordinate positions (command positions) inside the robot controller and the real space positions (moving positions) is required.

[2] Motion pattern factors

- If a motion approaching to the teaching point from a different direction is included during repetitive operation.
- If the power is turned off or the robot is stopped before completing the motion or the moving speed is changed even when approaching to the teaching point from the same direction.
- If the robot is moved to the teaching point using a hand system different from the hand system (right-handed or left-handed system) used for the teaching.

[3] Temperature factors

- If the ambient temperature environment changes significantly.
- If the temperature of the robot main body changes.

[4] Load variation factors

- If load conditions vary during operation (the load varies depending on whether or not the workpiece is present, etc.).

3. If the X-axis, Y-axis or R-axis rotation angle is small.

If the X-axis, Y-axis or R-axis rotation angle is smaller than 5° so that it moves in almost the same position, an oil film is difficult to be formed on the joint support bearing, possibly leading to damage to the bearing. In this type of operation, add a movement so that the joint moves through 90° or more, about 5 times a day.

4. Do not remove the Z-axis upper-end mechanical stopper

Removing or moving the upper-end mechanical stopper attached to the Z-axis spline can damage the Z-axis ball screw. Never remove or move it.

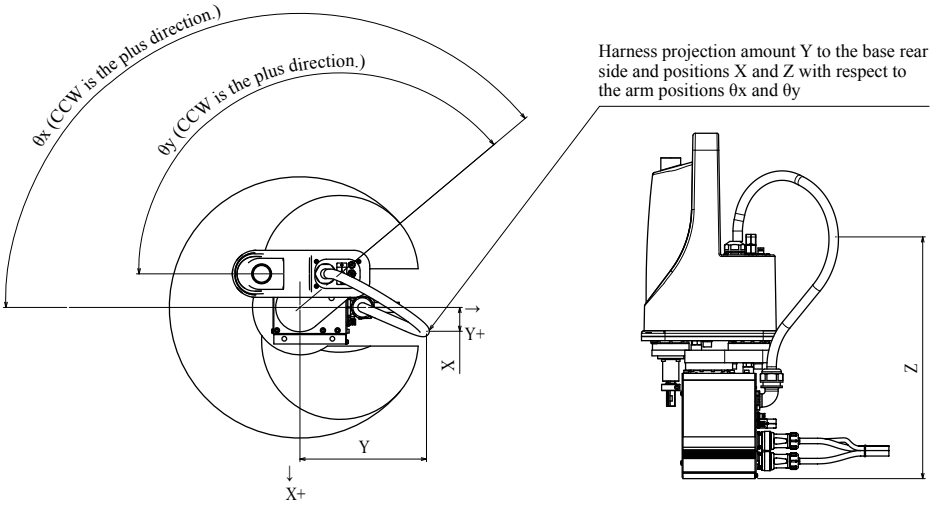
5. If the Z-axis spline vibrates.

The Z-axis spline of the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400 tends to vibrate in a Z-axis operation speed range of 20% to 40%. If the Z-axis spline vibrates, operate it beyond this operation speed range.

6. If the machine harness projects toward the base rear side.

In the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500 and R6YXGL600, the machine harness may project toward the base rear side according to the arm position.
The projection amount by arm position is described in "1.2 External view and dimensions" in Chapter 8. So, refer to this section for further information.

Projection of the machine harness toward the base rear side (Example: R6YXGL250)



CAUTION

The positions shown below are reference data. So, if there is an interference object on the base rear side, be sure to keep a sufficient space.

The harness projection amount Y and position Z at the symmetrical position of the arm to the Y-axis plus axis are the same values as those stated in the tables below. The X value at the symmetrical position of the arm to the Y-axis plus axis is the value stated in the table below, the sign of which is inverted.

X(mm)

		θ_X(°)					
		0	-30	-60	-90	-120	-140
θ_Y(°)	-144	65	0	0	0	0	0
	-120	80	0	0	0	0	0
	-90	70	0	0	0	0	0
	-60	50	70	0	0	0	0
	-30	10	50	0	60	0	0
	0	0	25	50	0	0	0
	30	-10	10	20	40	80	100
	60	-50	-15	15	45	95	95
	90	-70	-40	5	20	65	80
	120	-80	-60	-40	-10	30	65
	144	-65	-100	-70	-40	15	20

Y(mm)

		θ_X(°)					
		0	-30	-60	-90	-120	-140
θ_Y(°)	-144	155	136	136	136	136	136
	-120	160	136	136	136	136	136
	-90	170	136	136	136	136	136
	-60	165	136	136	136	136	136
	-30	160	136	136	136	136	136
	0	160	145	135	145	136	136
	30	160	160	160	155	145	136
	60	165	175	160	165	170	160
	90	170	180	185	200	185	190
	120	160	165	185	210	230	230
	144	155	170	190	225	245	280

Z(mm)

		θ_X(°)					
		0	-30	-60	-90	-120	-140
θ_Y(°)	-144	350	300	300	300	300	300
	-120	350	300	300	300	300	300
	-90	410	300	300	300	300	300
	-60	420	300	300	300	300	300
	-30	460	400	300	300	300	300
	0	460	410	470	370	300	300
	30	460	430	410	450	435	440
	60	420	450	450	455	460	460
	90	410	410	460	470	480	475
	120	350	410	430	450	470	480
	144	350	390	420	460	470	480

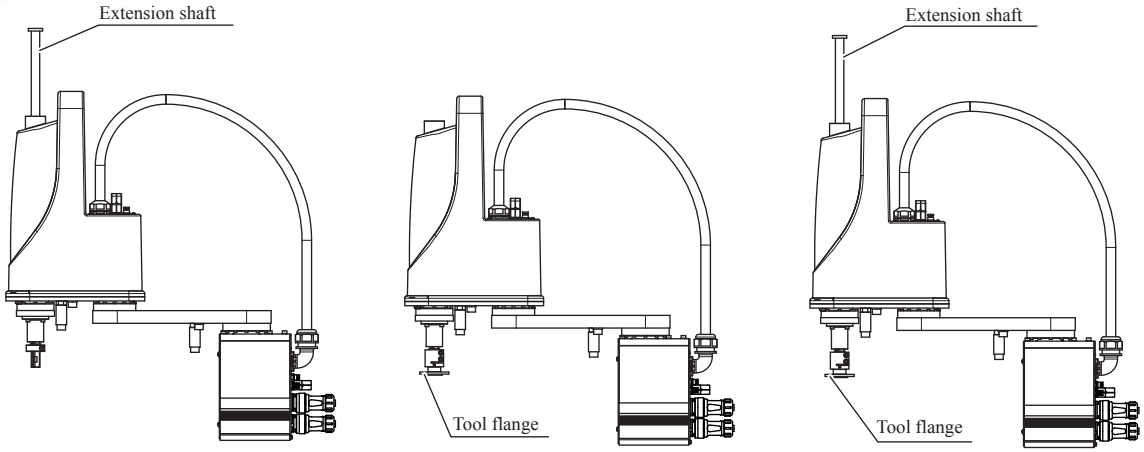
7. Set the tip mass parameter of the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400.

When the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400 has any of three specifications with the extension shaft or tool flange installed as shown in the Fig. below, set the tip mass parameter as follows.

Tip mass parameter = Actual tip mass + 1 (kg)

Failure to make this setting may shorten the service life of the drive unit.

Setting the tip mass parameter of the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500 and R6YXGL600

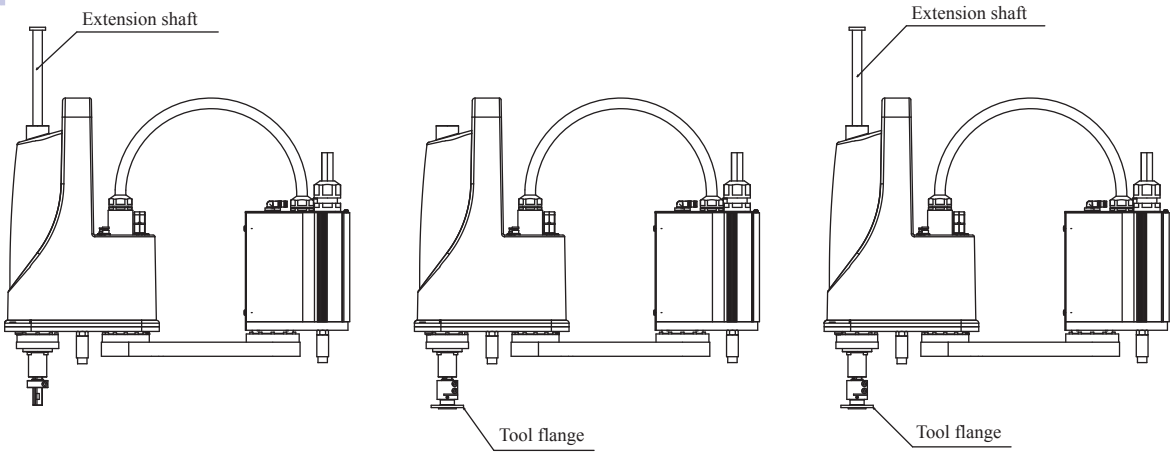


User wiring/tubing through spline type

Tool flange mount type

User wiring/tubing through spline and tool flange mount type

Setting the tip mass parameter of the R6YXGS300 and R6YXGS400



User wiring/tubing through spline type

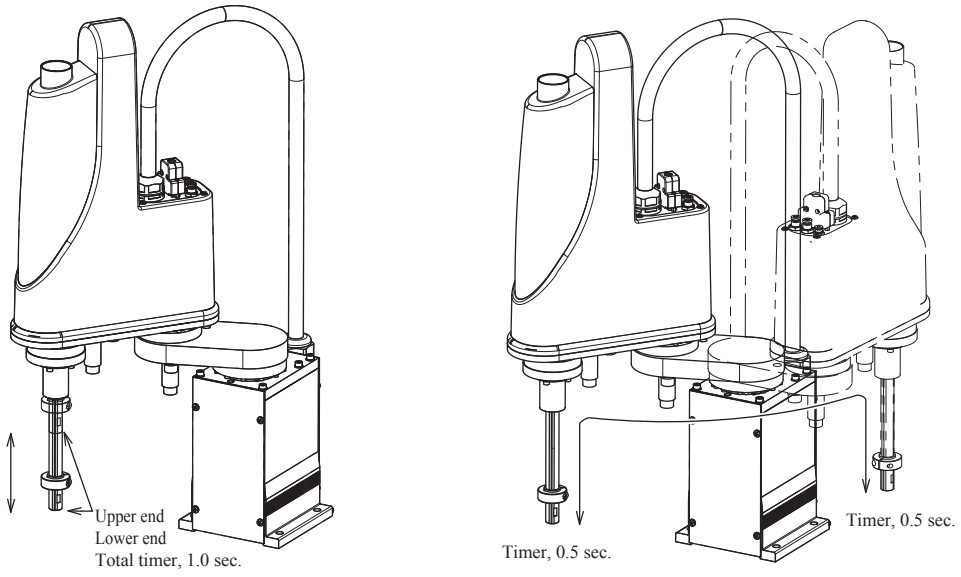
Tool flange mount type

User wiring/tubing through spline and tool flange mount type

8. Put timer during Z-axis operation of the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400.

If the tip load attached to the spline tip exceeds 3kg, the Z-axis may be overloaded according to the operation pattern.
In this case, put a timer during operation as shown in the Fig. below to prevent overload of the Z-axis. The reference timer values are shown below. Furthermore, the maximum payload is 5kg. If the tip load exceeds this maximum payload, the Z-axis may be overloaded easily. So, do not operate the robot with a tip load exceeding 5kg.

Putting timer during Z-axis operation



Only Z-axis operates

All axes operate

9. Detach the Y-axis arm cover of the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400.

In the user wiring/tubing through spline type, the cover cannot be detached unless the Z-axis is moved down to the lower end.

10. Z-axis lower end additional stopper of the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400.

The Z-axis lower end additional stopper cannot be used in the user wiring/tubing through spline type.

11. Z-axis pushing action of the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400.

Because a tip load weight of 5kg or greater could cause unstable control during a pushing action, do not perform pushing actions under such conditions.

Introduction

The XG series robots have a two-joint manipulator consisting of an X-axis arm and a Y-axis arm, and are further equipped with a vertical axis (Z-axis) and a rotating axis (R-axis) at the tip of the manipulator. The XG series robots can be used for a wide range of assembly applications such as installation and insertion of various parts, application of sealant, and packing operations.

This user's manual describes the safety measures, handling, adjustment and maintenance of XG 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 user's 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.

This manual describes the following robot models.

Standard model	R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000
Wall-mount model / Wall-mount inverse model	R6YXGS300, R6YXGS400,R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

For details about actual robot operation and programming, refer to the "OMRON Robot Controller User's Manual".

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 HAVE ENOUGH ABILITY AND QUALIFICATIONS IN ACCORDANCE WITH LOCAL LAWS AND REGULATIONS, BY REFERRING TO THE SEPARATE MAINTENANCE MANUAL.
FOR DETAILED INFORMATION, PLEASE CONTACT YOUR DISTRIBUTOR WHERE YOU PURCHASED THE PRODUCT.

NOTES

- The contents of this manual are subject to change without prior notice.
- Information furnished by OMRON in this manual is believed to be reliable.
  However, if you find any part unclear or inaccurate in this manual, please contact your distributor.

OMRON EUROPE, B.V.

Chapter 1 Functions

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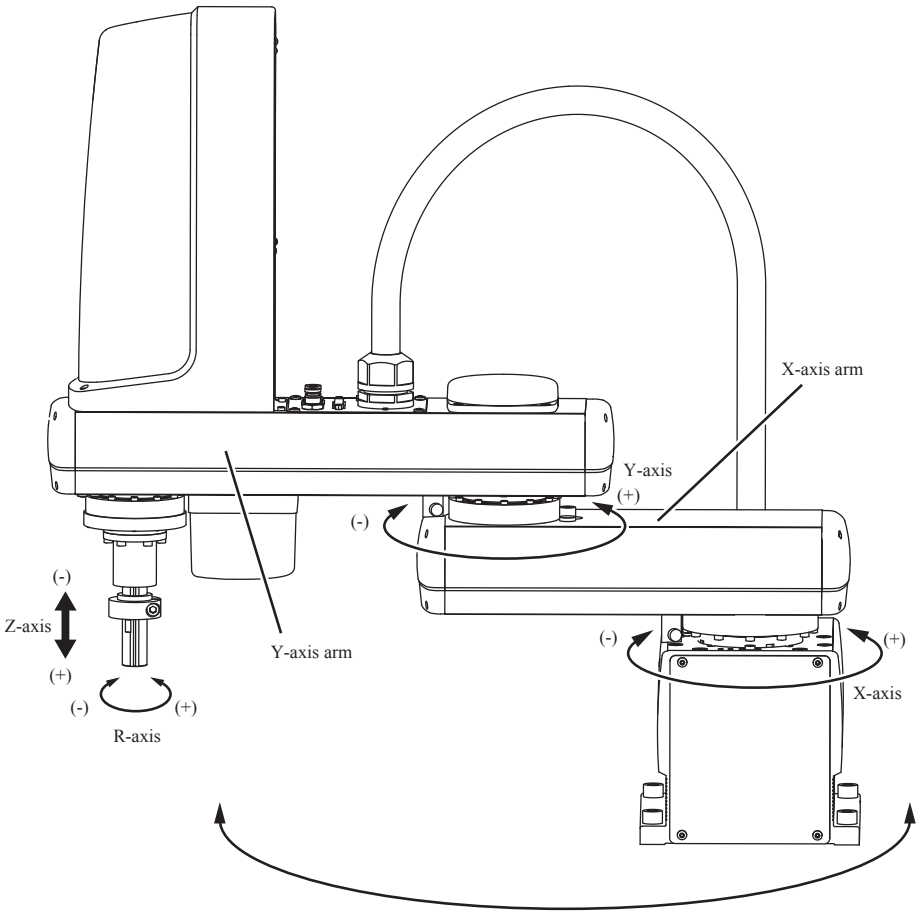
1. Robot manipulator

1.1 Manipulator movement

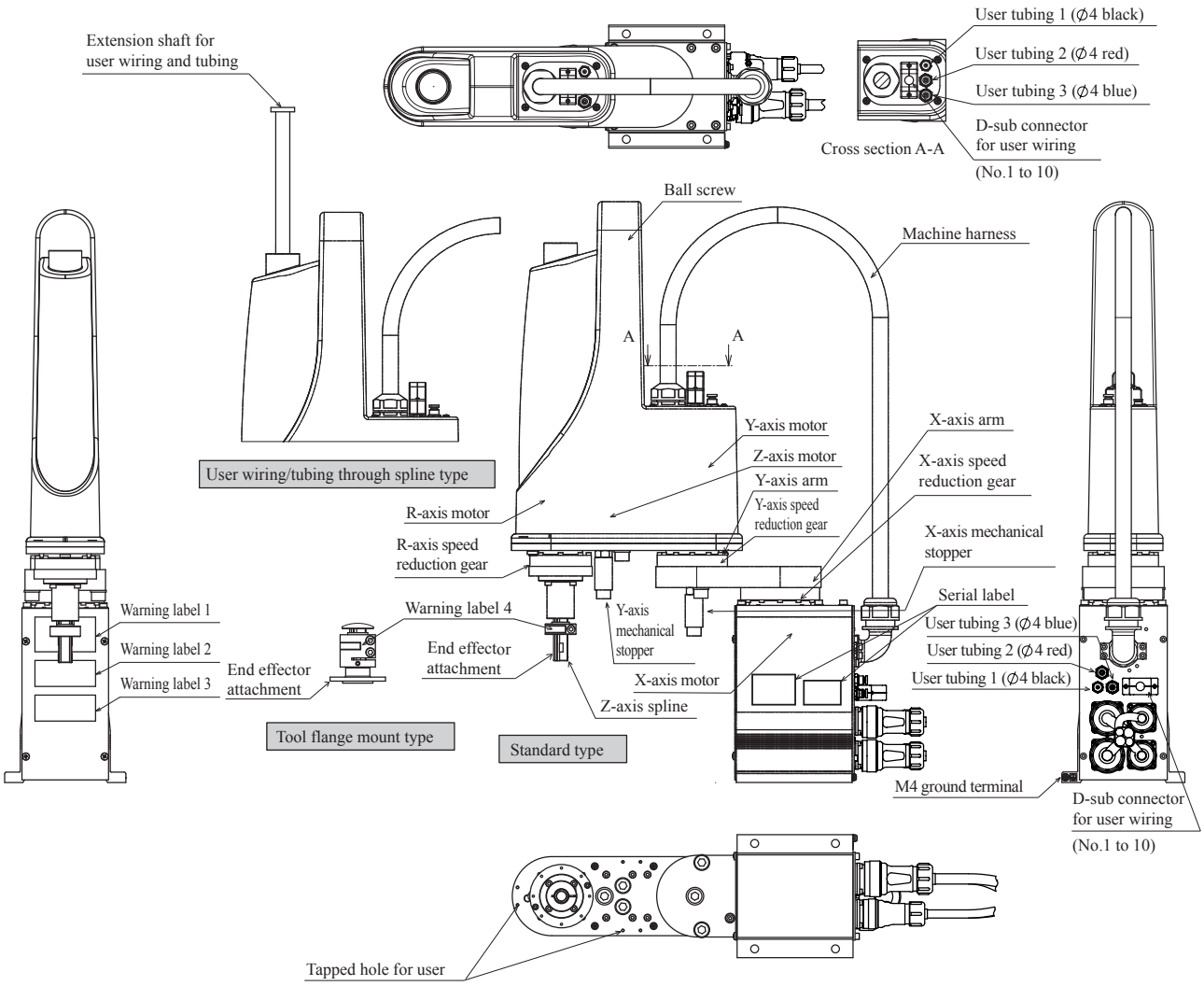
The XG series robots are available in 4-axis models having an X/Y-axis arm (equivalent to human arm) and a Z/R-axis (equivalent to human wrist). With these 4 axes, the XG series robots can move as shown in the Fig. below. By attaching different types of end effector (gripper) to the end of the arm, a wide range of tasks can be performed with high precision at high speeds. The (+) and (-) signs show the direction of axis movement when the jog keys on the programming box are pressed (standard setting at the factory).

Manipulator movement

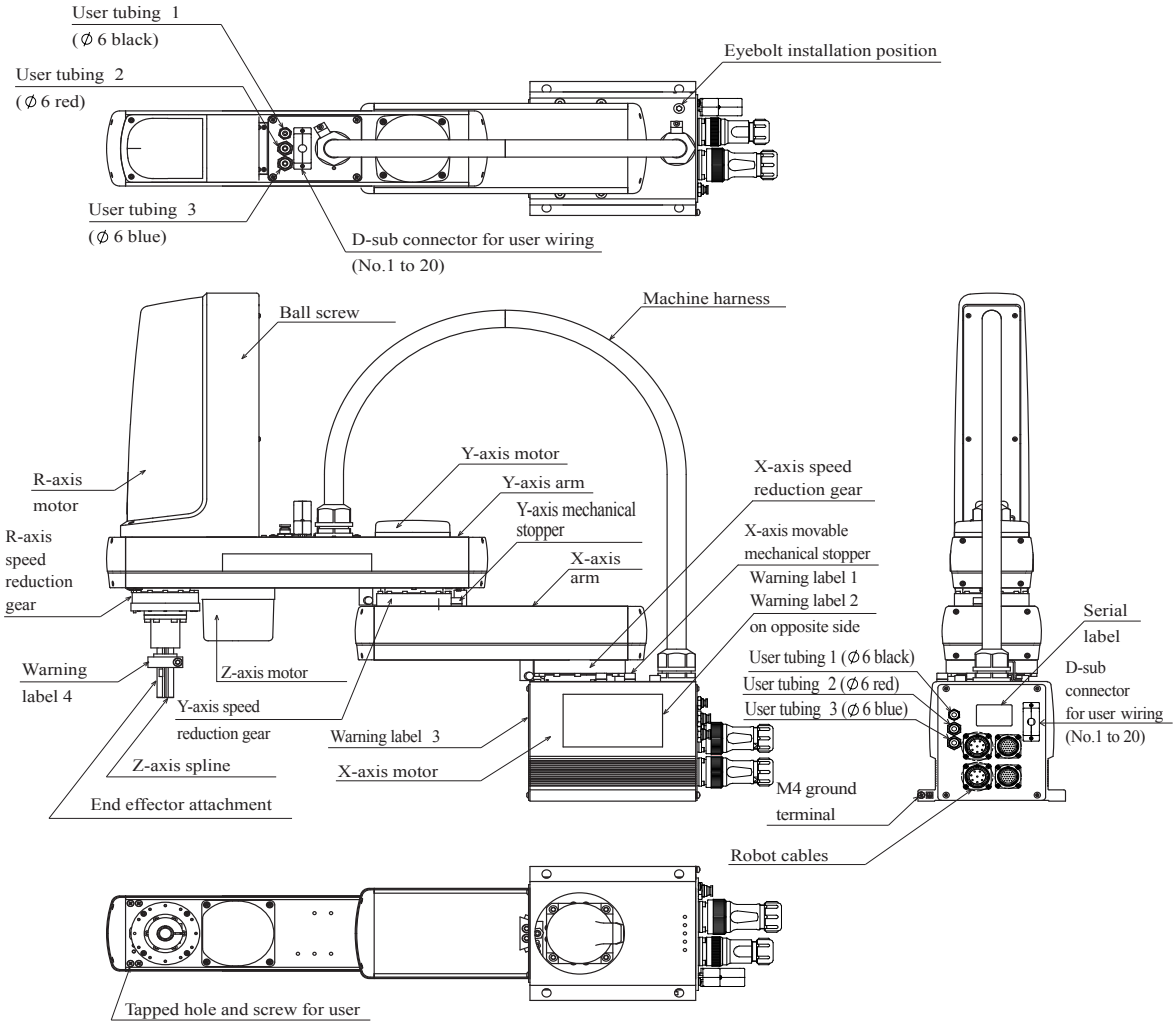


1.2 Part names

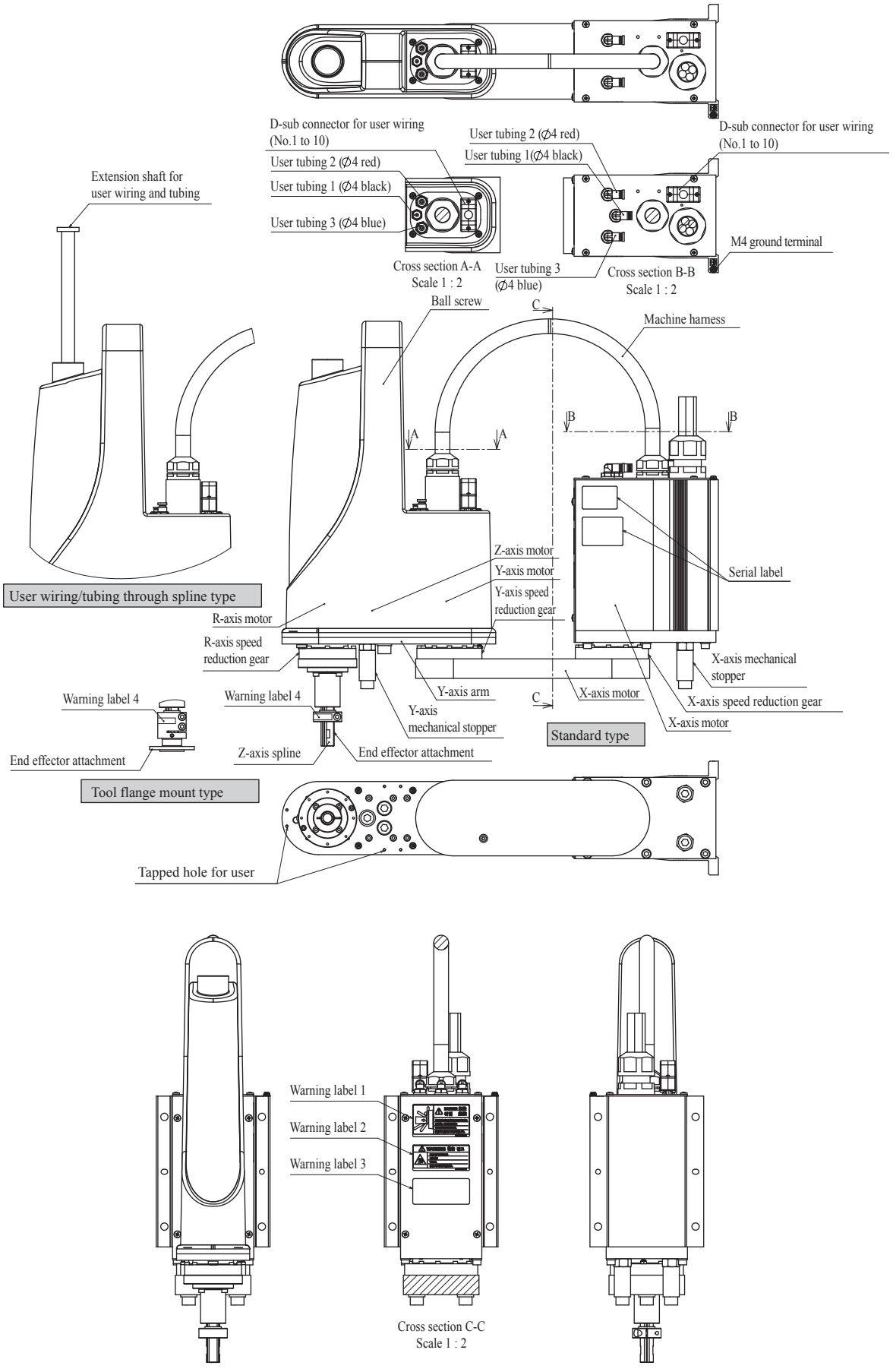
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600



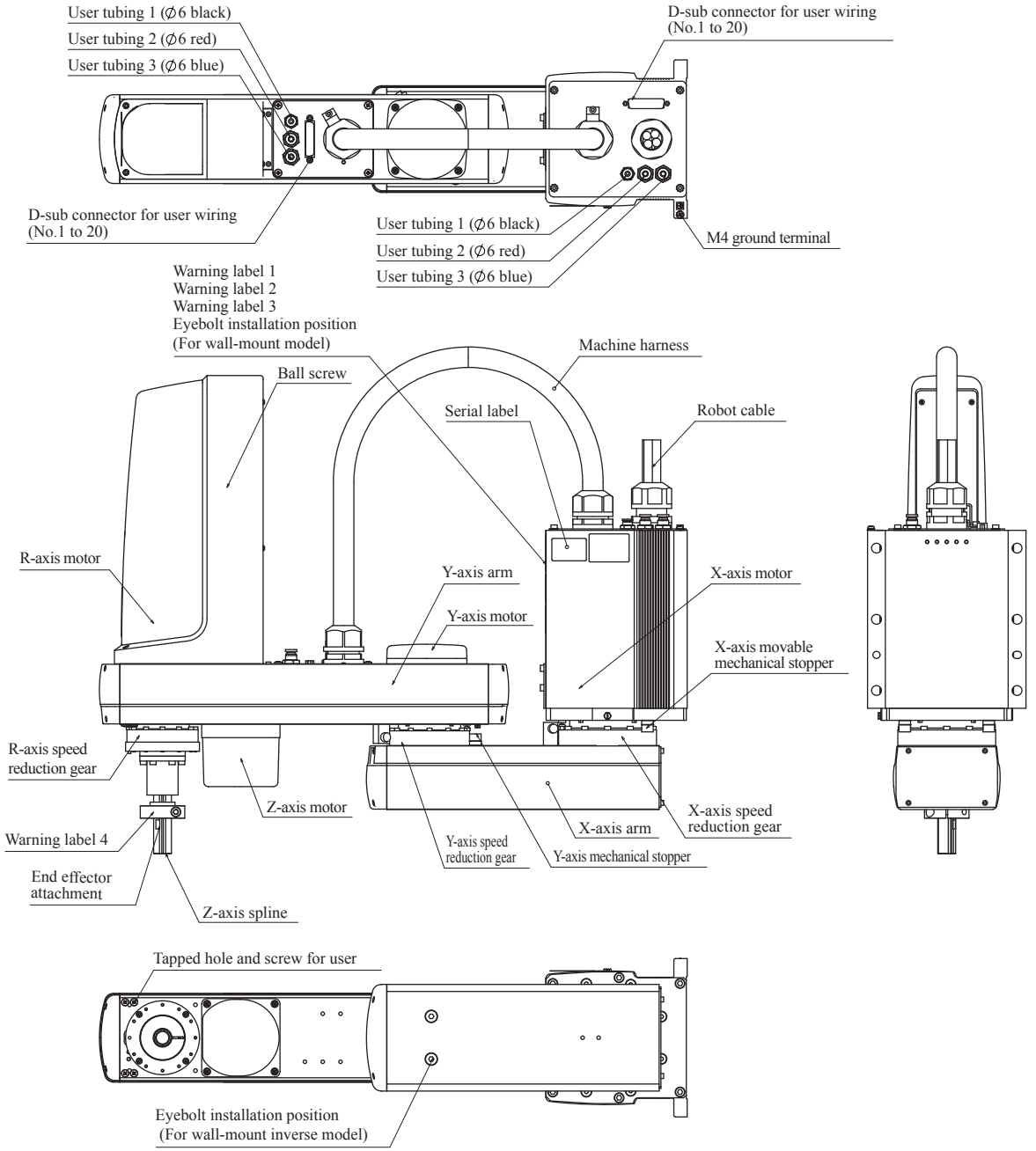
R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000



R6YXGS300, R6YXGS400



R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

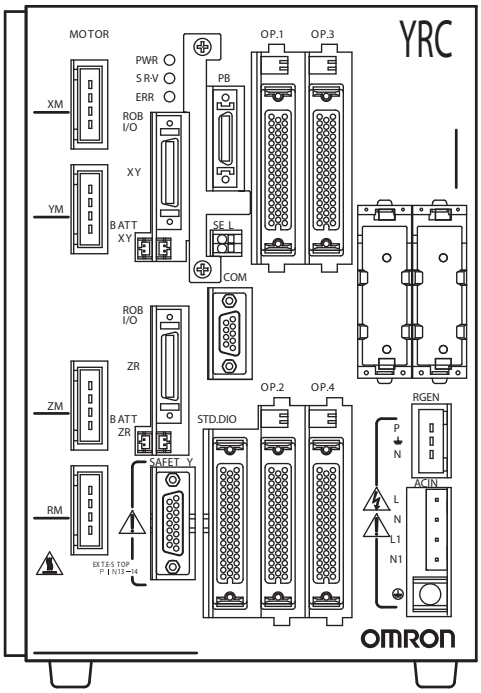


* For the wall-mount inverse model, the installation orientation shown in the Fig. above becomes upside down.

2. Robot controller

The XG series robot comes supplied with a robot controller YRC. For more details, refer to the separate "OMRON Robot Controller User's Manual".

Robot controller



YRC v.1

3. Robot initialization number list

The XG series robots are initialized for optimum setting (default setting) according to the robot model prior to shipping. The robot controllers do not have to be reinitialized during normal operation. However, if for some reason the controller must be reinitialized, proceed while referring to the list below.

CAUTION

- Absolute reset must be performed after reinitializing the controller. Before reinitializing the controller, read the descriptions in " 2. Adjusting the origin" in Chapter 3 and make sure you thoroughly understand the procedure.
- When the controller is initialized, the "ARM LENGTH" and "OFFSET PULSE" settings in the axis parameters will be erased, making the standard coordinate settings invalid. (For details on standard coordinates, see "4. Setting the standard coordinates" in Chapter 3.) If you do not want to change the origin position by initializing, make a note of the "ARM LENGTH" and "OFFSET PULSE" settings before initializing, and re-enter their settings after initialization is complete.

Robot initialization number	Model name
2135	R6YXGL250
2136	R6YXGL350
2137	R6YXGL400
2138	R6YXGL500
2139	R6YXGL600
2117	R6YXG500 200
2118	R6YXG500 300
2119	R6YXG600 200
2120	R6YXG600 300
2121	R6YXGH600 200
2122	R6YXGH600 400
2123	R6YXG700 200
2124	R6YXG700 400
2125	R6YXG800 200
2126	R6YXG800 400
2127	R6YXG900 200
2128	R6YXG900 400
2129	R6YXG1000 200
2130	R6YXG1000 400

Robot initialization number	Model name
2224	R6YXGSW300
2225	R6YXGSU300
2226	R6YXGSW400
2227	R6YXGSU400
2200	R6YXGSW500 200
2201	R6YXGSU500 200
2202	R6YXGSW500 300
2203	R6YXGSU500 300
2204	R6YXGSW600 200
2205	R6YXGSU600 200
2206	R6YXGSW600 300
2207	R6YXGSU600 300
2208	R6YXGSW700 200
2209	R6YXGSU700 200
2210	R6YXGSW700 400
2211	R6YXGSU700 400
2212	R6YXGSW800 200
2213	R6YXGSU800 200
2214	R6YXGSW800 400
2215	R6YXGSU800 400
2216	R6YXGSW900 200
2217	R6YXGSU900 200
2218	R6YXGSW900 400
2219	R6YXGSU900 400
2220	R6YXGSW1000 200
2221	R6YXGSU1000 200
2222	R6YXGSW1000 400
2223	R6YXGSU1000 400

Chapter 2 Installation

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1. Robot installation conditions

1.1 Installation environments

Be sure to install the robot in the following environments.

Setting environments	Specifications
Allowable ambient temperature	0 to 40°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 or liquid.
	Avoid installation near objects causing electromagnetic interference, electrostatic discharge or radio frequency interference.
Vibration	Do not subject to impacts or vibrations.
Air supply pressure, etc.	Below 0.58MPa (6.0kgf/cm^2); clean dry air not containing deteriorated compressor oil; filtration 40μm or less
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 "OMRON Robot Controller User's Manual".

WARNING

- AVOID INSTALLING THE ROBOT IN LOCATIONS WHERE THE AMBIENT CONDITIONS MAY EXCEED THE ALLOWABLE TEMPERATURE OR HUMIDITY, OR IN ENVIRONMENTS WHERE WATER, CORROSIVE GASES, METALLIC POWDER OR DUST ARE GENERATED. MALFUNCTION, FAILURE 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. MALFUNCTION 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.

1.2 Installation base

Prepare a sufficiently rigid and stable installation base, taking account of the robot weight including the end effector (gripper), workpiece and reaction force while the robot is operating.

WARNING

- BE SURE TO INSTALL THE ROBOT ON A HORIZONTAL SURFACE WITH THE BASE MOUNT SECTION FACING DOWN. INSTALL THE WALL-MOUNT OR WALL-MOUNT INVERSE MODEL ROBOT WITH THE BASE MOUNT SECTION FACING SIDEWARD. IF THE ORIENTATION OF THE BASE MOUNT SECTION IS NOT OBSERVED WHEN INSTALLING THE ROBOT, THE GREASE OF THE SPEED REDUCTION UNIT MAY LEAK.
- DO NOT PLACE THE ROBOT ON A MOVING INSTALLATION BASE. EXCESSIVE LOADS WILL BE APPLIED TO THE ROBOT ARM BY MOVEMENT OF THE INSTALLATION BASE, RESULTING IN DAMAGE TO THE ROBOT.

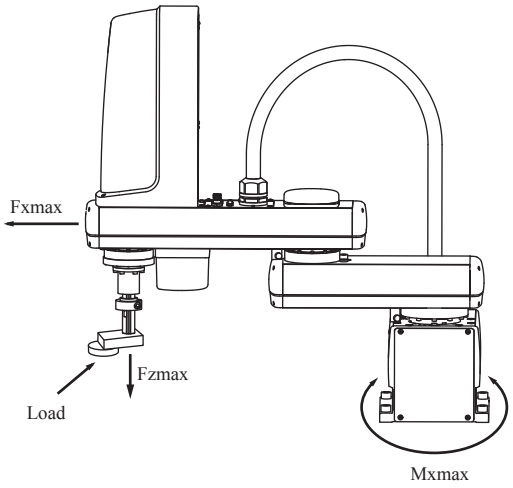
CAUTION

- The manipulator positioning might decrease if the installation surface precision is insufficient.
- If the installation base is not sufficiently rigid and stable or a thin metallic plate is attached to the installation base, vibration (resonance) during operation, causing detrimental effects on the manipulator work.

1 *Prepare a robot installation base.*

The maximum reaction force applied to the X-axis and Z-axis of each robot during operation is shown in the Table below. These values are instantaneous force values applied to the robot during operation and do not indicate the load resistant values.

Maximum reaction force during robot operation



Robot Model	Fxmax		Mxmax		Fzmax	
	N	kgf	Nm	kgfm	N	kgf
R6YXGL250	686	70	96	9.8	108	11
R6YXGL350 R6YXGS300	598	61	96	9.8	108	11
R6YXGL400 R6YXGS400	588	60	96	9.8	108	11
R6YXGL500	402	41	96	9.8	108	11
R6YXGL600	363	37	96	9.8	108	11
R6YXG500 R6YXGS500	1416	144	178	18	134	14
R6YXG600 R6YXGS600	1476	150	178	18	134	14
R6YXGH600	2125	217	395	40	205	21
R6YXG700 R6YXGS700	2479	253	395	40	239	24
R6YXG800 R6YXGS800	2561	261	395	40	239	24
R6YXG900 R6YXGS900	2494	254	395	40	165	17
R6YXG1000 R6YXGS1000	2427	248	395	40	165	17

The flatness of the robot installation base surface must be machined within a precision of ± 0.05mm/500mm.

2 *Tap holes into the installation surface of the base.*

NOTE

For details about machining dimensions and positions, see "1.2 External view and dimensions" in Chapter 8.

3 *Securely fix the installation base on the floor.*

Securely fix the installation base with the anchor bolts so that it does not move.

2. Installation

2.1 Unpacking

WARNING

THE ROBOT AND CONTROLLER ARE HEAVY. TAKE SUFFICIENT CARE NOT TO DROP THEM DURING MOVING OR UNPACKING AS THIS MAY DAMAGE THE EQUIPMENT OR CAUSE BODILY INJURY.

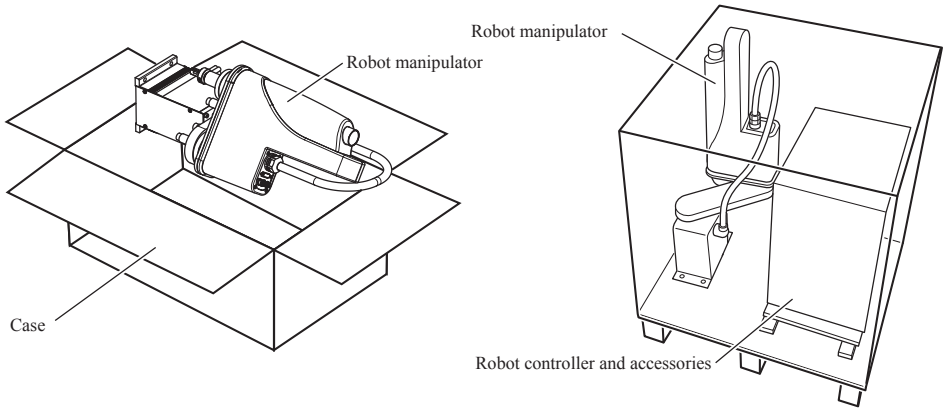
CAUTION

When moving the robot or controller by equipment such as a folklift that require a license, only properly qualified personnel may operate it. The equipment and tools used for moving the robot should be serviced daily.

The XG series robot comes packed with a robot controller and accessories, according to the order specifications. Using a carrying cart (dolly) or forklift, move the package to near the installation base. Take sufficient care not to apply shocks to the equipment when unpacking it.

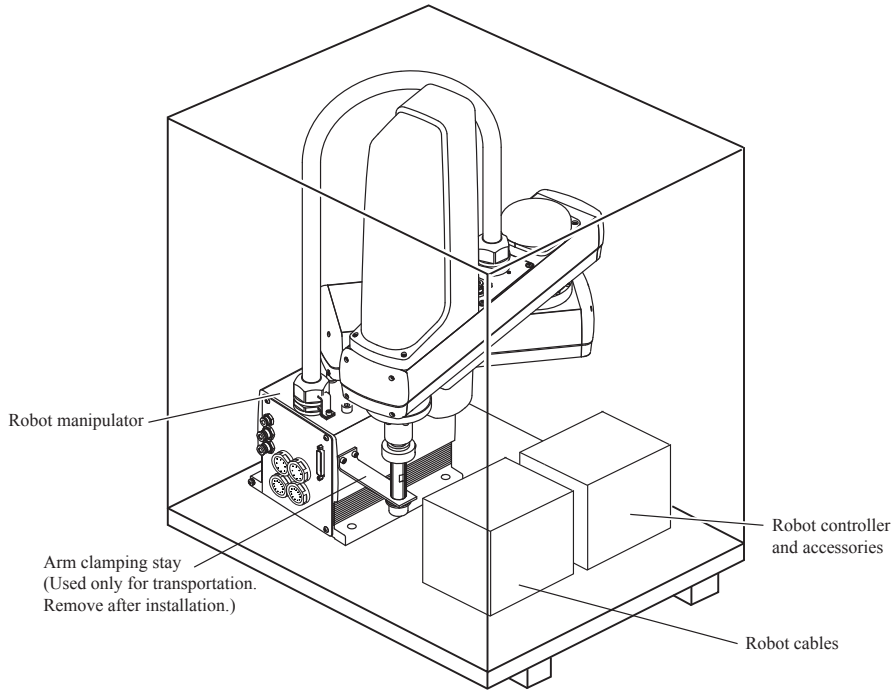
Packed state

R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400



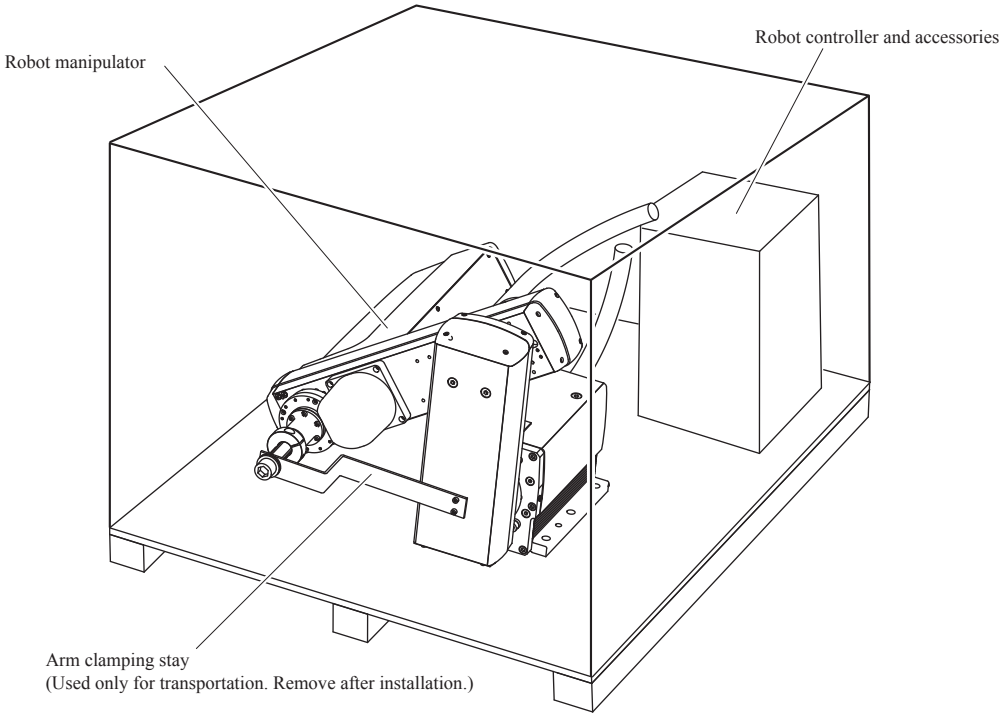
Packed state

R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000



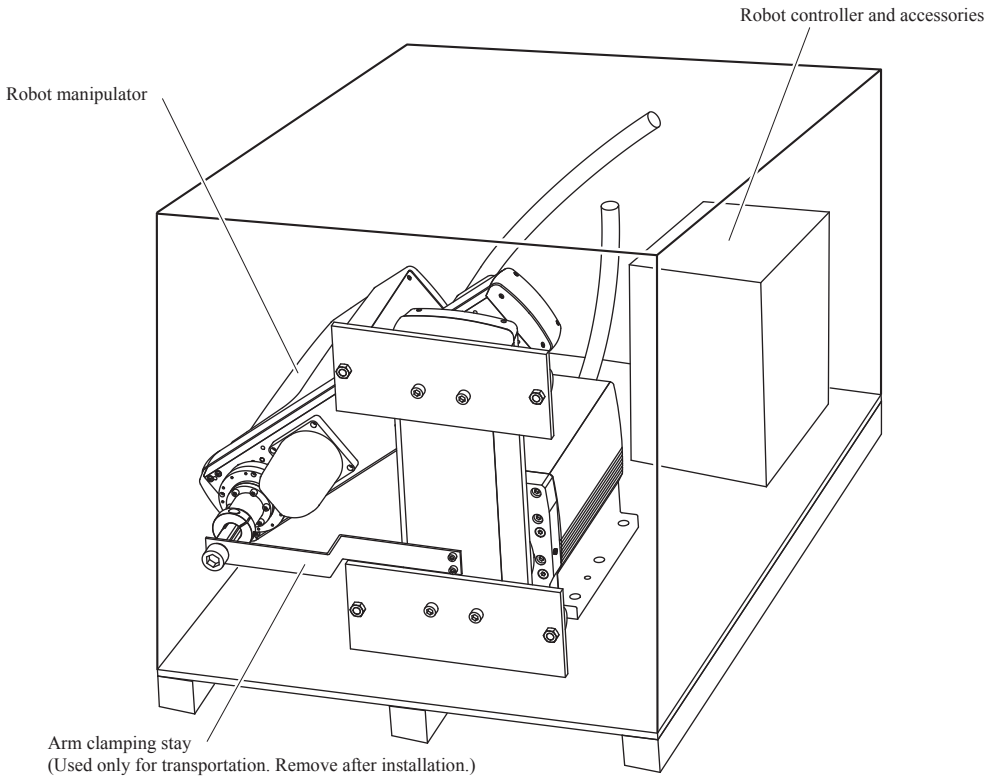
Packed state

R6YXGS500, R6YXGS600



Packed state

R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000



2.2 Checking the product

After unpacking, check the product configuration and conditions.
The following configurations are typical examples, so please check that the product is as specified in your order.

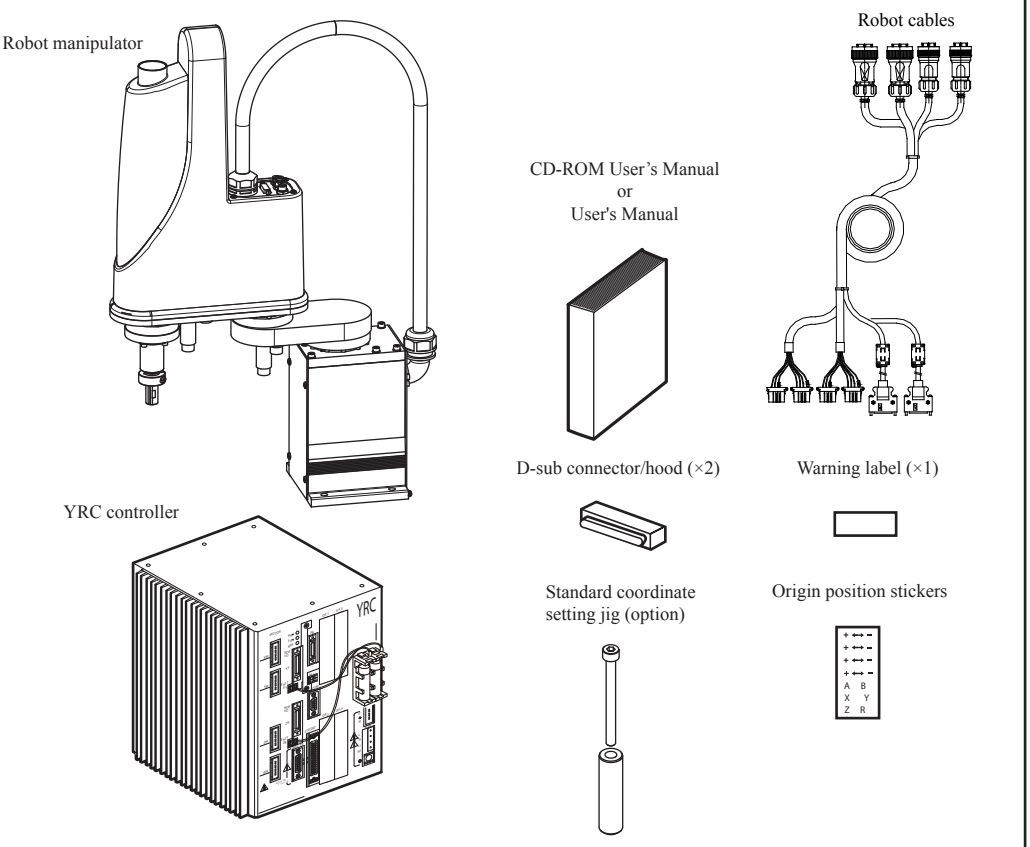
CAUTION

If there is any damage due to transportation or insufficient parts, please notify your distributor immediately.

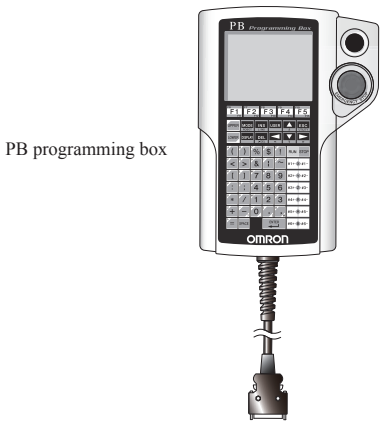
- Controller : YRC
  Robot : R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600

Product configurations

Standard



Option

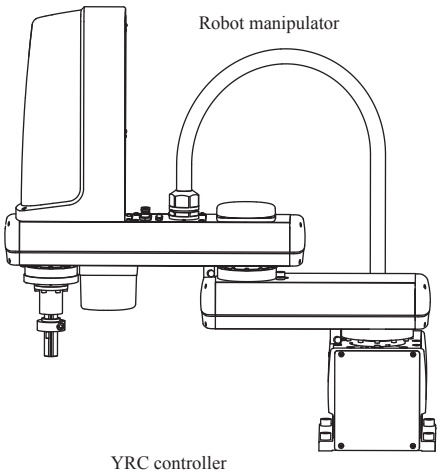


● Controller : YRC
Robot : R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800,R6YXG900, R6YXG1000

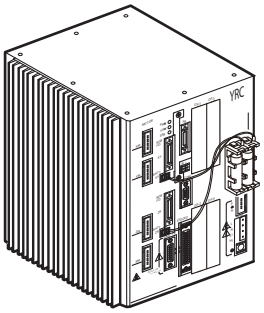
Product configurations

Standard

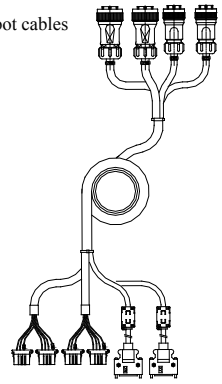
Robot manipulator



YRC controller



Robot cables



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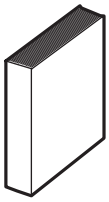
User's Manual



Stopper (×1)
* This stopper is used when changing the Y-axis mechanical stopper positions.

Washers (×2)
* These washers are used when moving the robot using the eyebolts or when changing the Y-axis mechanical stopper positions.

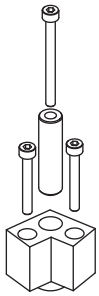
Option

PB programming box

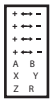
D-sub connector/hood (×2)

Warning label (×1)

Standard coordinate setting jig (option)



Origin position stickers



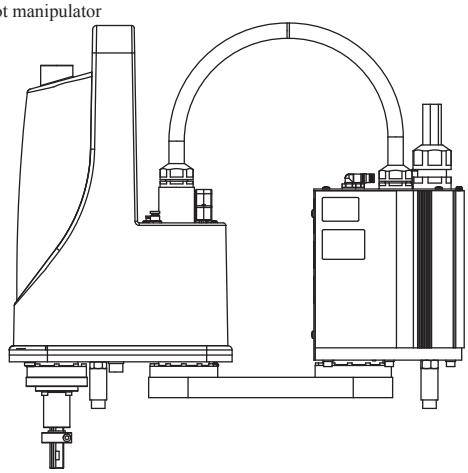
Eyebolts (×2)

● Controller : YRC
Robot : R6YXGS300, R6YXGS400

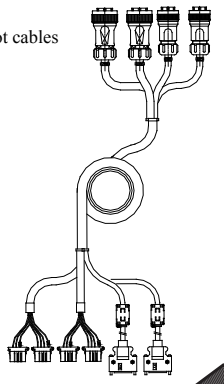
Product configurations

Standard

Robot manipulator



Robot cables



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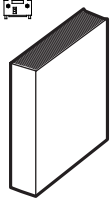
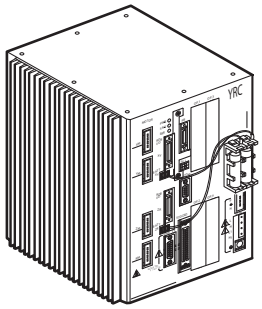
or
User's Manual



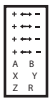
YRC controller



Warning label (×1)

D-sub connector/hood (×2)

Origin position stickers



Standard coordinate setting jig (option)

Option

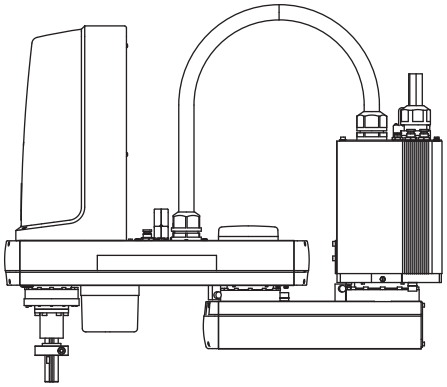
PB programming box

● Controller : YRC
Robot : R6YXGS500, R6YXGS600

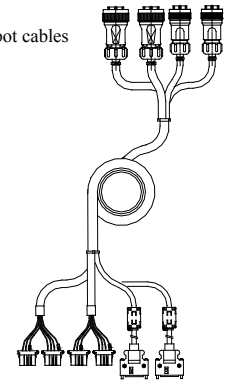
Product configurations

Standard

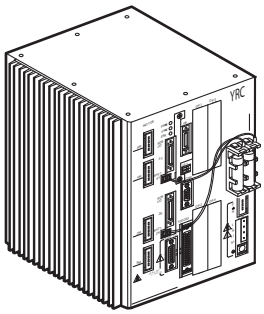
Robot manipulator



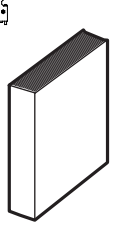
Robot cables



YRC controller



CD-ROM User's Manual
or
User's Manual



Stopper (×2)
* These stoppers are used when changing the mechanical stopper positions.

Spring washers (×2)

Washers (×2)

* These washers are used when securing the eyebolts.

Washers (×2)

* These washers are used when changing the mechanical stopper positions.

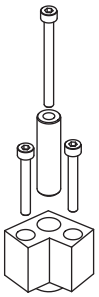
Option

PB programming box

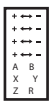
D-sub connector/hood (×2)

Warning label (×1)

Standard coordinate setting jig (option)



Origin position stickers



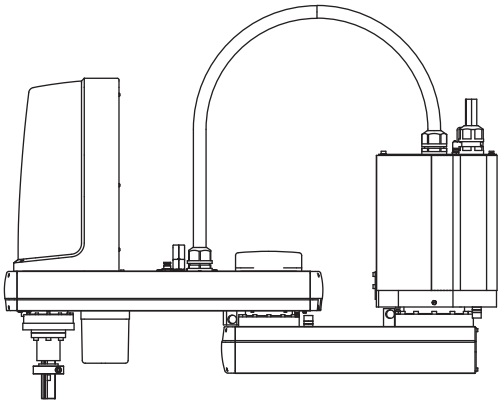
Eyebolts (×2)

● Controller : YRC
Robot : R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

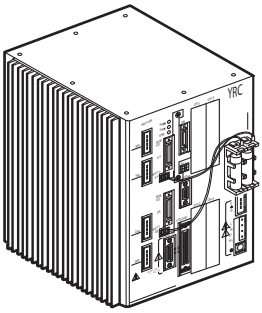
Product configurations

Standard

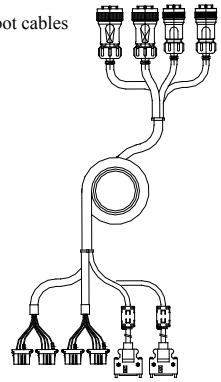
Robot manipulator



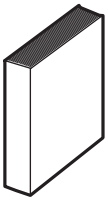
YRC controller



Robot cables



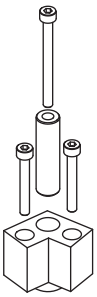
CD-ROM User's Manual
or
User's Manual



Stopper (×2)
* These stoppers are used when changing the mechanical stopper positions.

Washers (×2)
* These washers are used when changing the mechanical stopper positions.

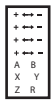
Standard coordinate setting jig (option)



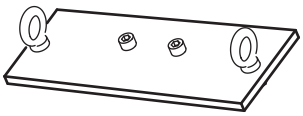
Warning label (×1)

D-sub connector/hood (×2)

Origin position stickers



Transportation jig (with eyebolts) (2 pcs.)



Option

PB programming box

2.3 Moving the robot

WARNING

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

- DO NOT ALLOW ANY PART OF YOUR BODY TO ENTER THE AREA BENEATH THE ROBOT DURING WORK.
- ALWAYS WEAR A HELMET, SAFETY SHOES AND GLOVES DURING WORK.

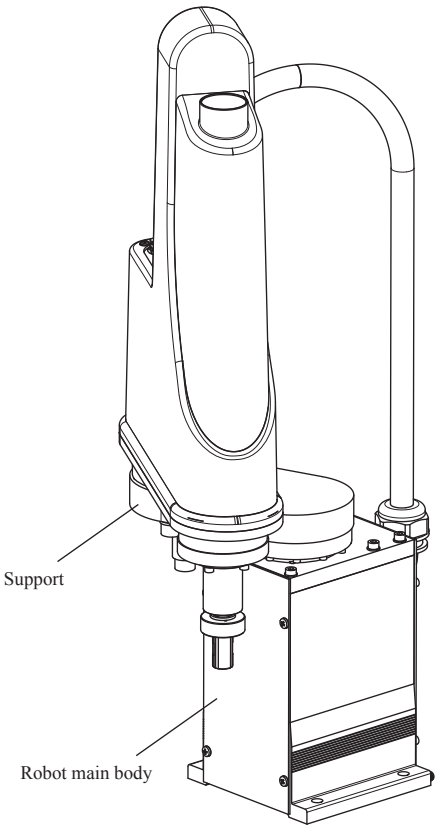
To check the mass of each robot, refer to "1.1 Basic specification" in Chapter 8.

2.3.1 Moving the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500 and R6YXGL600

1 ***Fold the arms.***

Take out the robot from the case or remove it from the pallet. Fold the arms while referring to the Fig. below.

Moving the robot



2 ***Place the robot on the base.***

One work person holds the support of the robot main body with both hands and other work person holds the robot cable to place the robot on the base.

3 ***Temporarily secure the robot by tightening the bolts.***

NOTE

For details about tightening torque to secure the robot firmly, see "2.4 Installing the robot".

2.3.2 Moving the R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900 and R6YXG1000

WARNING

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

- CHECK THAT THERE ARE NO CRACKS AND CORROSION ON THE EYEBOLT INSTALLATION. IF FOUND, DO NOT USE EYEBOLTS TO MOVE THE ROBOT.
- SCREW THE EYEBOLTS SECURELY INTO THE TAPPED HOLES UNTIL THE BEARING SURFACE OF EYEBOLT MAKES TIGHT CONTACT WITH THE BEARING SURFACE ON THE ARM.
- 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 MAY LOSE BALANCE WHILE BEING CARRIED, AND TOPPLE OVER CAUSING ACCIDENTS.

CAUTION

- When moving the robot by equipment such as cranes that require a license, only properly qualified personnel may operate it.
- The equipment and tools used for moving the robot should be serviced daily.

The following describes how to correctly and safely move the robot using the R6YXG500 as an example. Move also the R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900 and R6YXG1000 in the same manner.

1 ***Lower the Z-axis from the origin position.***

For the R6YXG500 and R6YXG600, lower the Z-axis approximately 24mm from its origin position.
For the R6YXGH600, R6YXG700, R6YXG800, R6YXG900 and R6YXG1000, lower the Z-axis approximately 33mm from its origin position.

NOTE

The Z-axis is secured to the base with the arm clamp stay at shipment from the factory.

2 ***Turn off the controller.***

3 ***Disconnect the robot cable from the controller.***

4 ***Remove the bolts from the upper portion of the X-axis arm.***

5 ***Clamp the arm.***

Clamp the arm with the arm clamp stay, bolts, and washers (2 washers for R6YXG500 and R6YXG600, 1 washer for R6YXGH600, R6YXG700, R6YXG800, R6YXG900 and R6YXG1000) that come with the robot.
If the arm position shown in the Fig. below cannot be obtained due to the X-axis and Y-axis additional mechanical stoppers, remove the X-axis and Y-axis additional mechanical stoppers.

NOTE

Since the mechanical stoppers are installed to provide the maximum working envelope at shipment from the factory, the arm position shown in the Fig. below can be obtained.

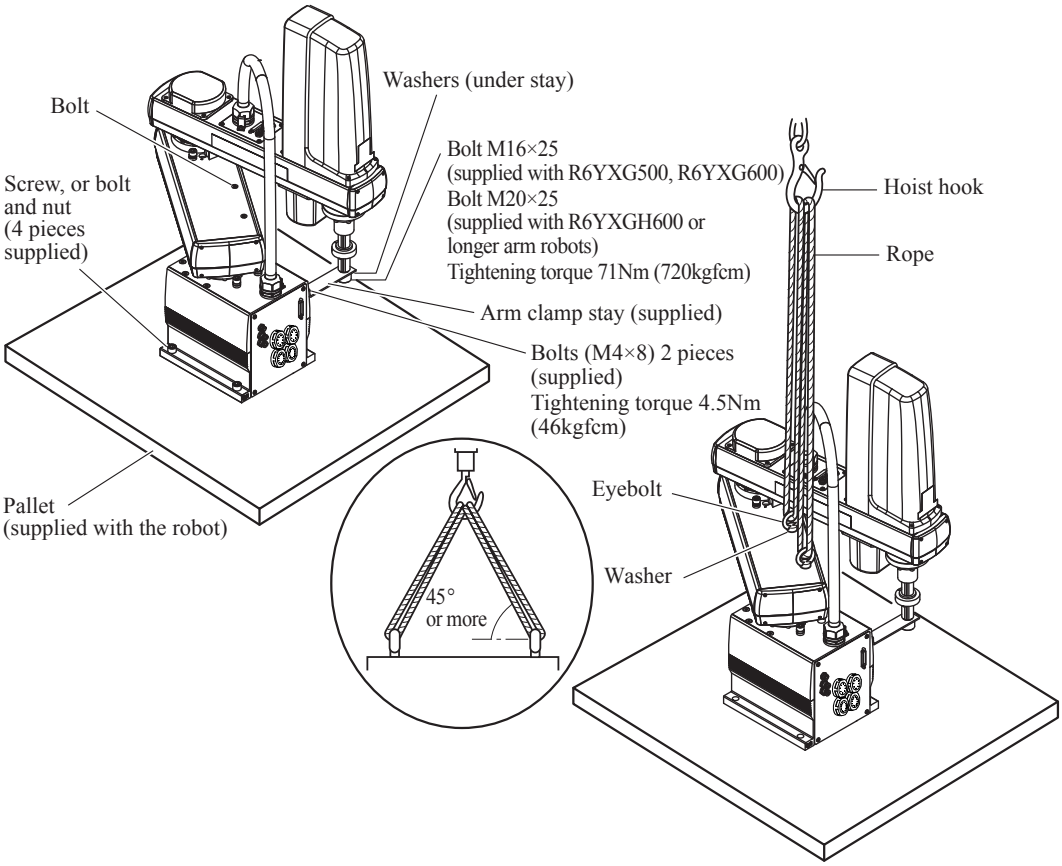
6 ***Tighten two eyebolts.***

Tighten two eyebolts through washers into the upper portion of the X-axis arm. (The washers are also used when changing the Y-axis mechanical stopper positions. So, if they are used, remove the washers and place them underneath the eyebolts.)

7 ***Secure the robot cable.***

Wind the robot cable around the upper portion of the robot base so that it does not hinder the base mount, and then fasten the cable end with adhesive tapes.

Moving the robot



8 ***Pass two ropes through the eyebolts and hang them on the hoist.***

Use looped ropes with the same length to allow a good lifting balance.

9 ***Hold the robot and remove the mounting bolts.***

Slightly lift the hoist so that the tension is lightly applied to each rope to hold the robot. In this state, remove the mounting bolts from the supplied pallet or installation base (if the robot is moved to another installation base).

10 ***Move the robot.***

Using caution to keep the balance of the robot and avoid subjecting it to any strong vibrations and shocks, operate the hoist carefully to gently move the robot to the installation base. At this time, the angle between each rope and the arm surface should be kept at 45° or more.

11 ***Temporarily secure the robot to the base by tightening the bolts.***

NOTE

For details about tightening torque to secure the robot firmly, see "2.4 Installing the robot".

12 ***Remove the ropes, eyebolts, washers, and arm clamp stay.***

13 ***Screw the bolts into the upper portion of the X-axis.***

NOTE

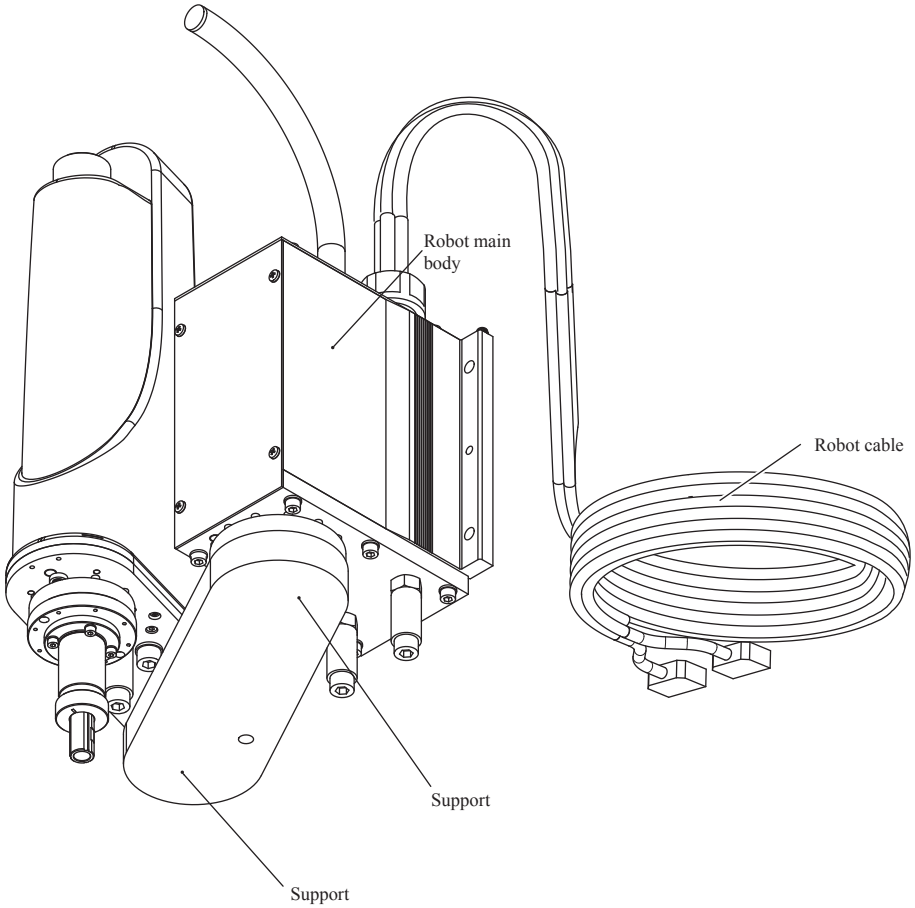
Always attach these bolts to protect the tapped holes for the eyebolts.
Be sure to keep the eyebolts, arm clamp stay, bolts, and pallet since they may be used to move the robot again.

2.3.3 Moving the R6YXGS300 and R6YXGS400

1 ***Fold the arms.***

Take out the robot from the case or remove it from the pallet. Fold the arms while referring to the Fig. below.

Moving the robot



2 ***Place the robot on the base.***

One work person holds the support of the robot main body with both hands and other work person holds the robot cable to place the robot on the base.

3 ***Temporarily secure the robot by tightening the bolts.***

NOTE

For details about tightening torque to secure the robot firmly, see "2.4 Installing the robot".

2.3.4 Moving the R6YXGS500 and R6YXGS600

WARNING

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

- CHECK THAT THERE ARE NO CRACKS AND CORROSION ON THE EYEBOLT INSTALLATION. IF FOUND, DO NOT USE EYEBOLTS TO MOVE THE ROBOT.
- 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 MAY LOSE BALANCE WHILE BEING CARRIED, AND TOPPLE OVER CAUSING ACCIDENTS.

CAUTION

- When moving the robot by equipment such as cranes that require a license, only properly qualified personnel may operate it.
- The equipment and tools used for moving the robot should be serviced daily.

The following describes how to correctly and safely move the robot using the R6YXGS500 as an example.
Move also the R6YXGS600 in the same manner.

1 ***Lower the Z-axis from its origin position.***

For the R6YXGS500 and R6YXGS600, lower the Z-axis approximately 5mm from its origin position.

NOTE

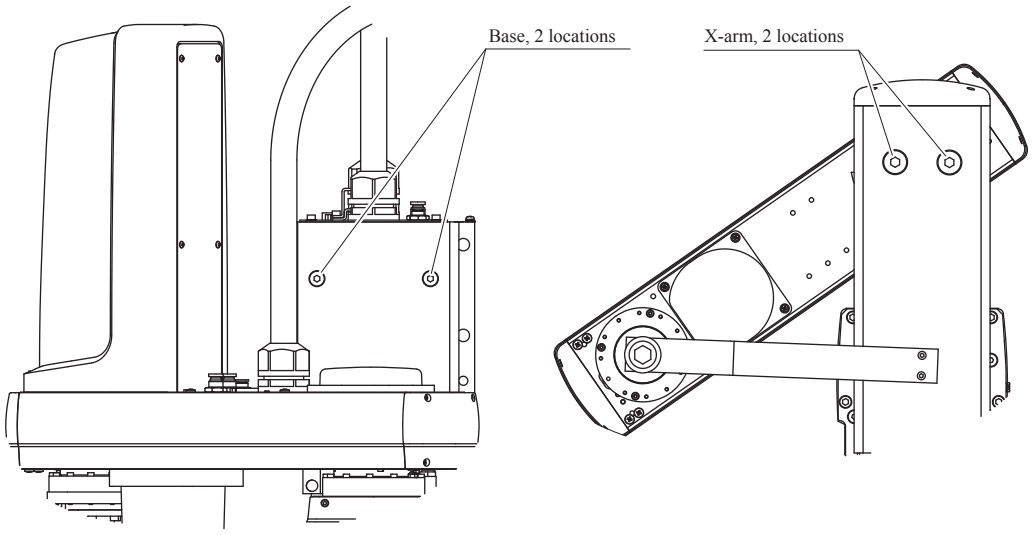
The Z-axis is secured to the X-arm with the arm clamp stay at shipment from the factory.

2 ***Turn off the controller.***

3 ***Disconnect the robot cable from the controller.***

4 ***Remove the bolts from the eyebolt clamp holes.***

Removing the bolts



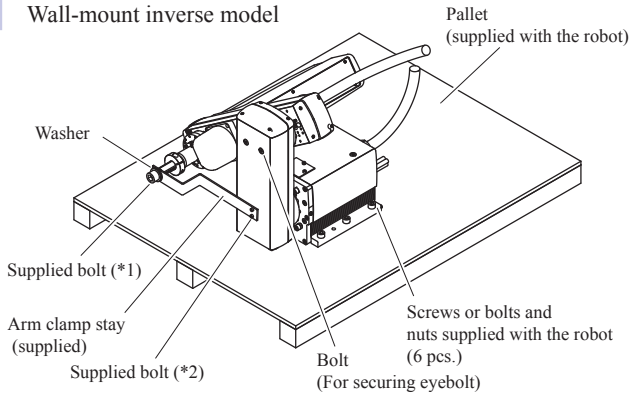
Wall-mount model　　Wall-mount inverse model

5 *Clamp the Y-axis arm.*

Secure the arm with the arm clamp stay, bolts, and washers that come with the robot.
If the arm position shown in the Fig. below cannot be obtained due to the Y-axis mechanical stoppers, remove them.

Securing the Y-axis arm

Wall-mount inverse model



***1:**

Robot Model	Supplied bolt	Tightening torque
R6YXGS500 R6YXGS600	M16×25	71Nm (720kgfcm)

***2:**

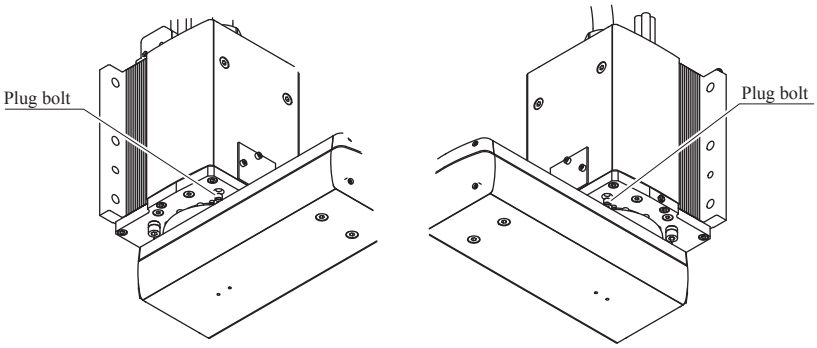
Robot Model	Supplied bolt	Tightening torque
R6YXGS500 R6YXGS600	M4×8, 2 pcs.	4.5Nm (46kgfcm)

6 *Install the stoppers to prevent turning of the X-axis.*

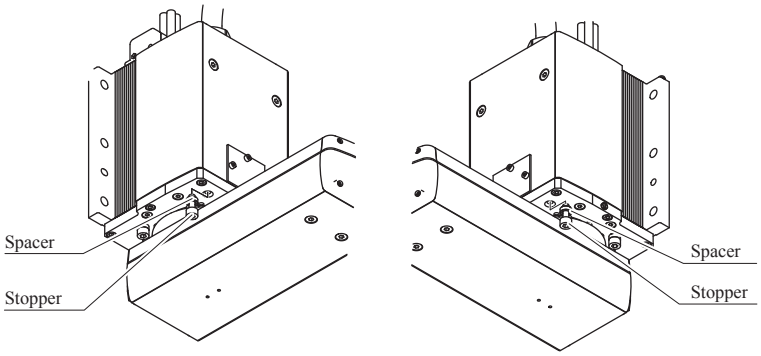
NOTE
The stoppers are installed at shipment from the factory.

Remove two base plug bolts and install the stoppers at these two locations.

Removing the plug bolts



Installing the stoppers

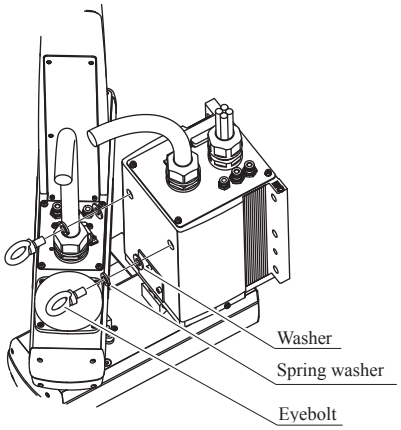


NOTE
The stoppers will be removed during operation. So, it is accepted to tighten the stoppers temporarily.

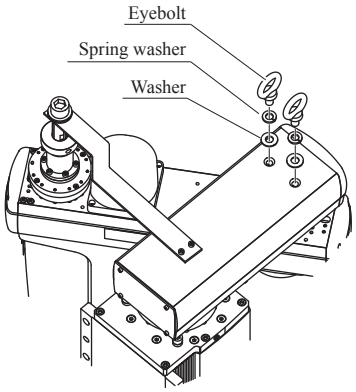
7 *Tighten the eyebolts.*

Tighten two eyebolts through washers and spring washers into the positions where the bolts have been removed in Step 4.

Tightening the eyebolts



Wall-mount model

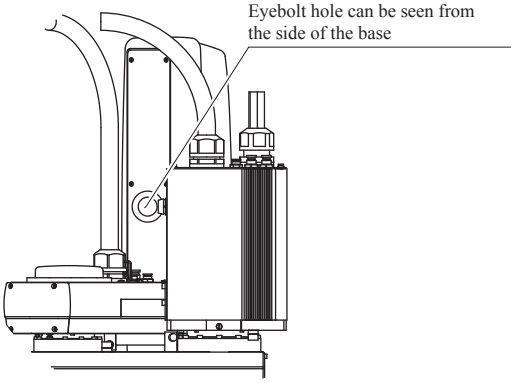


Wall-mount inverse model

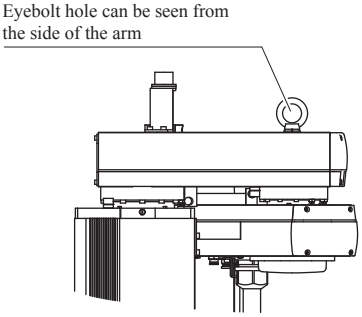
NOTE

If the eyebolt is tightened excessively, this may cause the tapped hole to break. Always tighten the eyebolt by hand. After that, if the position where the eyebolt is no longer tightened does not meet the position shown in the Fig. below, loosen the eyebolt slightly so that it must be correctly installed at the position shown in the Fig. below.

Cautions on eyebolt installation



Wall-mount model

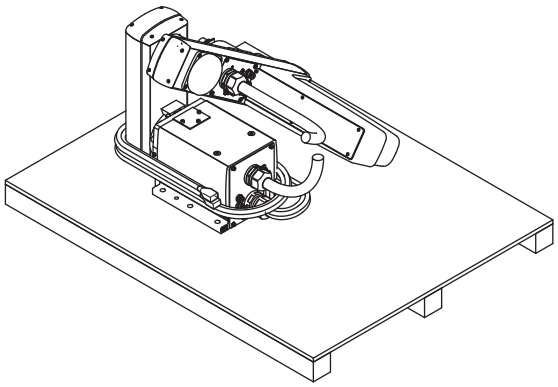


Wall-mount inverse model

8 *Secure the robot cable.*

Wind the robot cable around the side of the robot base so that it does not run on the installation portion of the base, and then secure the cable with adhesive tapes.

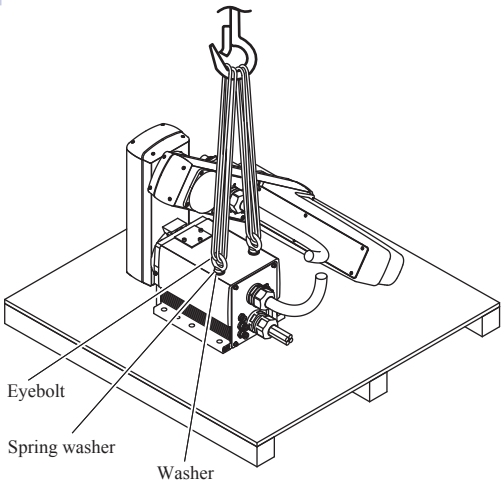
Winding the robot cable



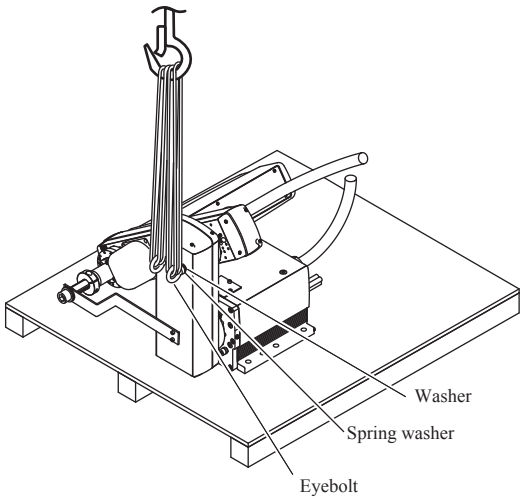
9 ***Pass two ropes through the eyebolts and hang them on the hoist.***

Use looped ropes with the same length to allow a good lifting balance.

Passing ropes through the eyebolts



Wall-mount model



Wall-mount inverse model

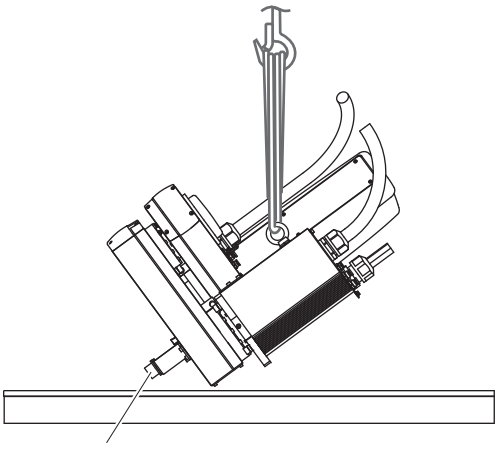
10 ***Hold the robot and remove the mounting bolts.***

Slightly lift the hoist so that the tension is lightly applied to each rope to hold the robot. In this state, remove the mounting bolts from the supplied pallet or installation base (if the robot is moved to another installation base).

11 ***Move the robot.***

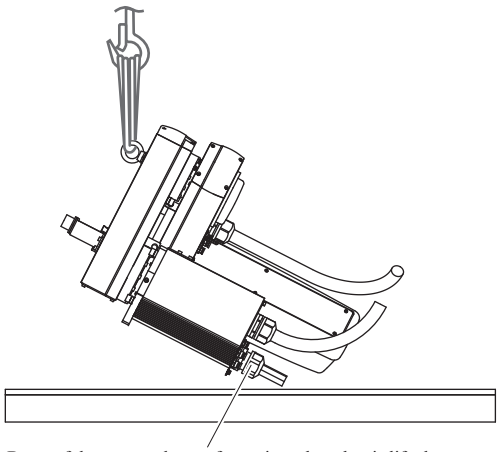
Using caution to keep the balance of the robot and avoid subjecting it to any strong vibrations and shocks, operate the hoist carefully to gently move the robot to the installation base.

Moving the robot



Be careful not to apply any force since the robot is lifted using the top end of the spline as a fulcrum.

Wall-mount model



Be careful not to apply any force since the robot is lifted using a portion around the connector of the robot cable as a fulcrum.

Wall-mount inverse model

NOTE

The top end of the spline becomes a fulcrum. So, hold the robot by hand so that the robot's own weight is not applied to the top end of the spline. (For the wall-mount inverse model, a portion around the connector of the robot cable becomes a fulcrum.)

12 ***Temporarily secure the robot to the base by tightening the bolts.***

NOTE

- For details about tightening torque to secure the robot firmly, see "2.4 Installing the robot".
- When installing the robot, the positioning pins can be used. For details about positions and dimensions, see "1.2 External view and dimensions" in Chapter 8.

13 ***Remove the ropes, eyebolts, washers, and arm clamp stay.***

14 ***Remove the X-axis mechanical stoppers.***

Remove the X-axis mechanical stoppers that have been installed in Step 6.

15 ***Screw the bolts into the eyebolt clamp holes and mechanical stopper clamp holes.***

NOTE

Always attach these bolts to protect the tapped holes.
Be sure to keep the eyebolts, arm clamp stay, bolts, and pallet since they may be used to move the robot again.

2.3.5 Moving the R6YXGS700, R6YXGS800, R6YXGS900 and R6YXGS1000

WARNING

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

- CHECK THAT THERE ARE NO CRACKS AND CORROSION ON THE EYEBOLT INSTALLATION. IF FOUND, DO NOT USE EYEBOLTS TO MOVE THE ROBOT.
- 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 MAY LOSE BALANCE WHILE BEING CARRIED, AND TOPPLE OVER CAUSING ACCIDENTS.

CAUTION

- When moving the robot by equipment such as cranes that require a license, only properly qualified personnel may operate it.
- The equipment and tools used for moving the robot should be serviced daily.

The following describes how to correctly and safely move the robot using the R6YXGS700 as an example.
Move also the R6YXGS800, R6YXGS900 and R6YXGS1000 in the same manner.

1 ***Lower the Z-axis from its origin position.***

For the R6YXGS700, R6YXGS800, R6YXGS900 and R6YXGS1000, lower the Z-axis approximately 5mm from its origin position.

NOTE

The Z-axis is secured to the X-arm with the arm clamp stay at shipment from the factory.

2 ***Turn off the controller.***

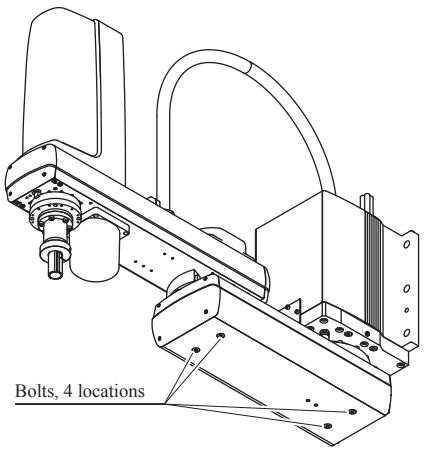
3 ***Disconnect the robot cable from the controller.***

4 ***Remove the bolts from the jig clamping holes.***

NOTE

Since the jig is installed at shipment from the factory, this work is not needed.

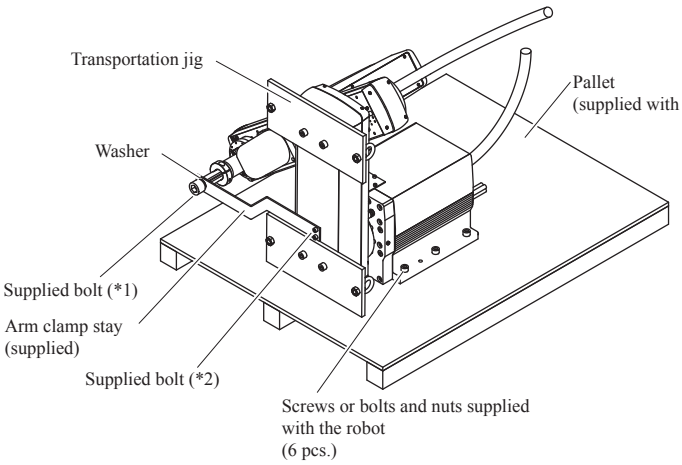
Removing the bolts from the jig clamping holes



5 *Secure the Y-axis arm.*

Secure the arm with the arm clamp stay, bolts, and washers that come with the robot.
If the arm position shown in the Fig. below cannot be obtained due to the Y-axis mechanical stoppers, remove them.

Securing the Y-axis arm



***1:**

Robot Model	Supplied bolt	Tightening torque
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M20×25	71Nm (720kgfcm)

***2:**

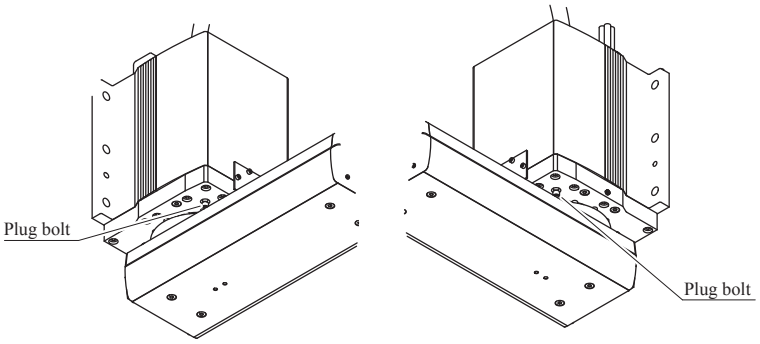
Robot Model	Supplied bolt	Tightening torque
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M6×16, 2 pcs.	15.3Nm (156kgfcm)

6 *Install the stoppers to prevent turning of the X-axis.*

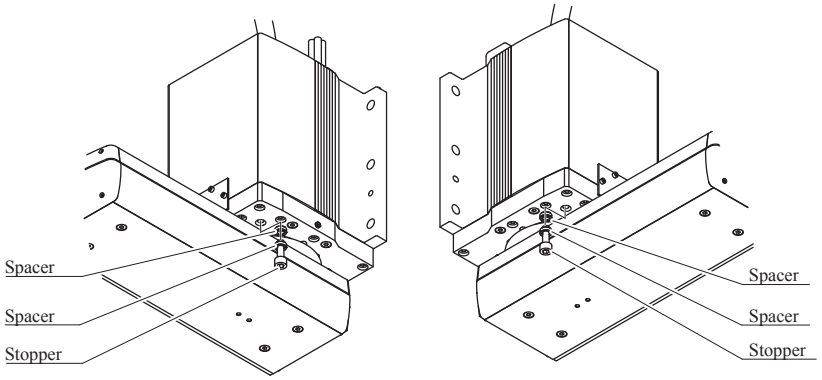
NOTE
The stoppers are installed at shipment from the factory.

Remove two base plug bolts and install the stoppers at these two locations.

Removing the plug bolts



Installing the stoppers

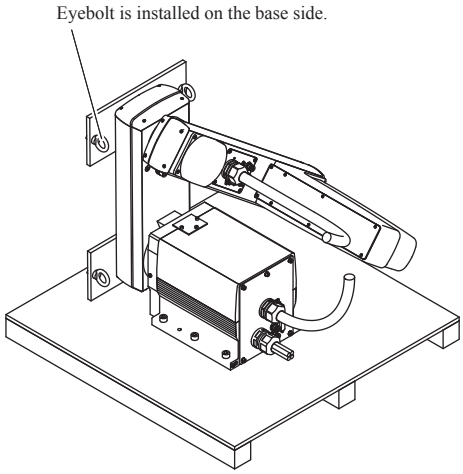


NOTE
The stoppers will be removed during operation. So, it is accepted to tighten the stoppers temporarily.

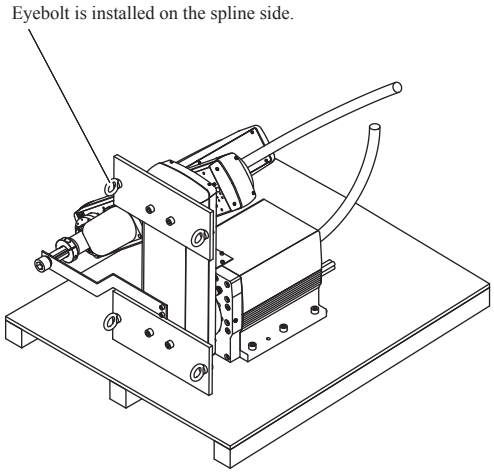
7 ***Secure two transportation jigs.***

Secure two transportation jigs to the top of the X-axis arm.

Securing the transportation jigs



Wall-mount model

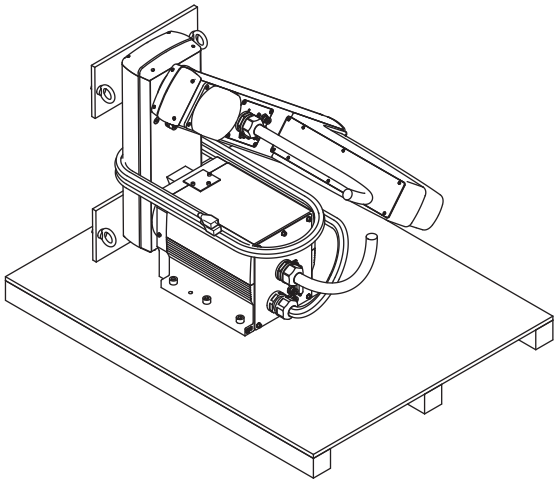


Wall-mount inverse model

8 ***Secure the robot cable.***

Wind the robot cable around the side of the robot base so that it does not run on the installation portion of the base, and then secure the cable with adhesive tapes.

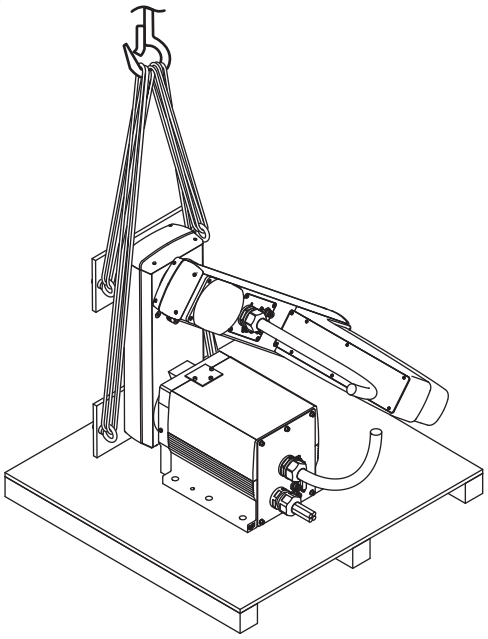
Winding the robot cable



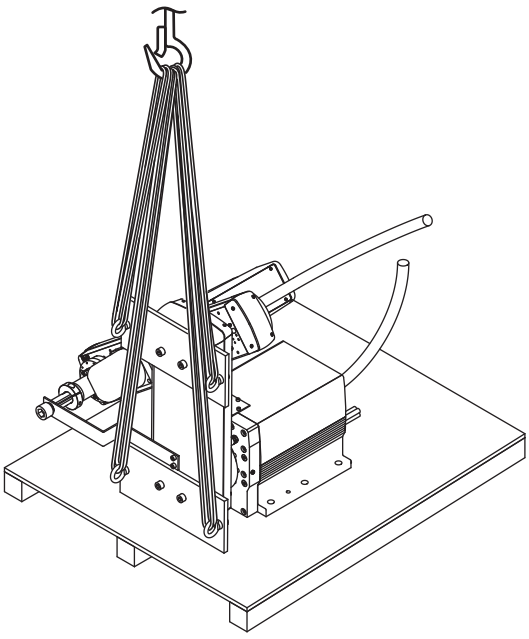
9 ***Pass four ropes through the eyebolts and hang them on the hoist.***

Use looped ropes with the same length to allow a good lifting balance.

Passing ropes through the eyebolts



Wall-mount model



Wall-mount inverse model

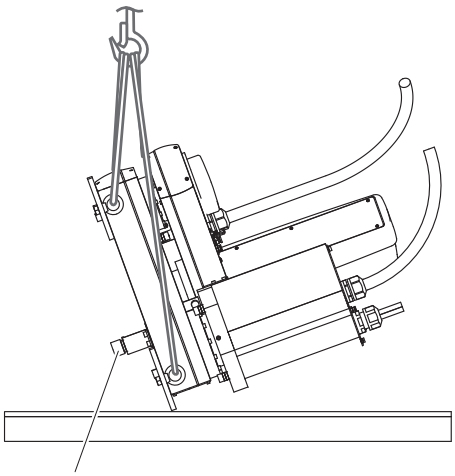
10 ***Hold the robot and remove the mounting bolts.***

Slightly lift the hoist so that the tension is lightly applied to each rope to hold the robot. In this state, remove the mounting bolts from the supplied pallet or installation base (if the robot is moved to another installation base).

11 ***Move the robot.***

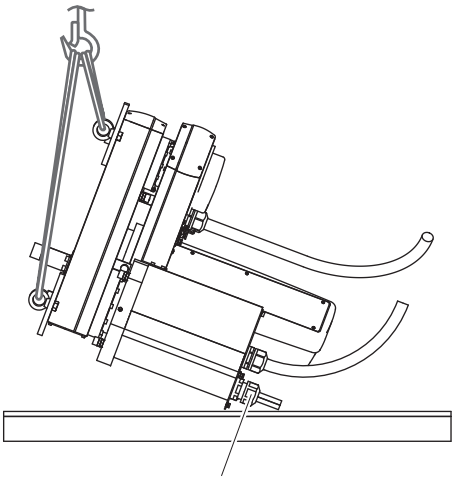
Using caution to keep the balance of the robot and avoid subjecting it to any strong vibrations and shocks, operate the hoist carefully to gently move the robot to the installation base.

Moving the robot



Be careful not to apply any force since the robot is lifted using the top end of the spline as a fulcrum.

Wall-mount model



Be careful not to apply any force since the robot is lifted using a portion around the connector of the robot cable as a fulcrum.

Wall-mount inverse model

NOTE

The top end of the spline becomes a fulcrum. So, hold the robot by hand so that the robot's own weight is not applied to the top end of the spline. (For the wall-mount inverse model, a portion around the connector of the robot cable becomes a fulcrum.)

12 ***Temporarily secure the robot to the base by tightening the bolts.***

NOTE

- For details about bolt tightening torque, see "2.4 Installing the robot" in this Chapter.
- When installing the robot, the positioning pins can be used. For details about positions and dimensions, see "1.2 External view and dimensions" in Chapter 8.

13 ***Remove the ropes, transportation jigs, and arm clamp stay.***

14 ***Remove the X-axis mechanical stoppers.***

Remove the X-axis mechanical stoppers that have been installed in Step 6.

15 ***Attach the bolts to the X-axis arm.***

NOTE

Always attach these bolts to protect the tapped holes.
Be sure to keep the transportation jigs, arm clamp stay, bolts, and pallet since they may be used to move the robot again.

2.4 Installing the robot

Install the robot securely with the four hex socket head bolts (six bolts for wall-mount model/wall-mount inverse model) as shown in the Fig. below.

WARNING

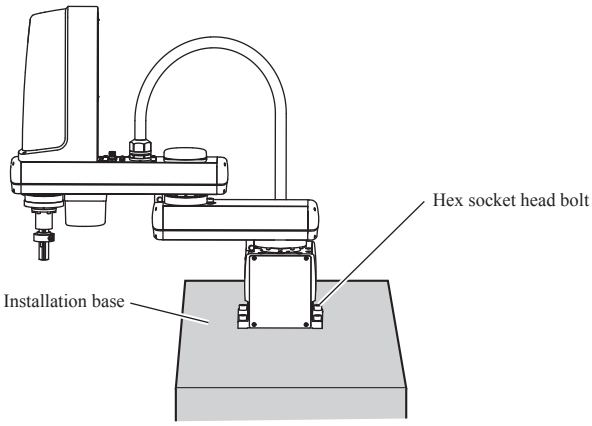
WHEN INSTALLING THE ROBOT, BE SURE TO USE THE SPECIFIED SIZE AND QUANTITY OF BOLTS THAT MATCH THE DEPTH OF TAPPED HOLES IN THE INSTALLATION BASE, AND SECURELY TIGHTEN THE BOLTS TO THE CORRECT TORQUE. IF THE BOLTS ARE NOT TIGHTENED CORRECTLY, THE ROBOT MIGHT FALL OVER DURING OPERATION CAUSING A SERIOUS ACCIDENT.

Tightening torque

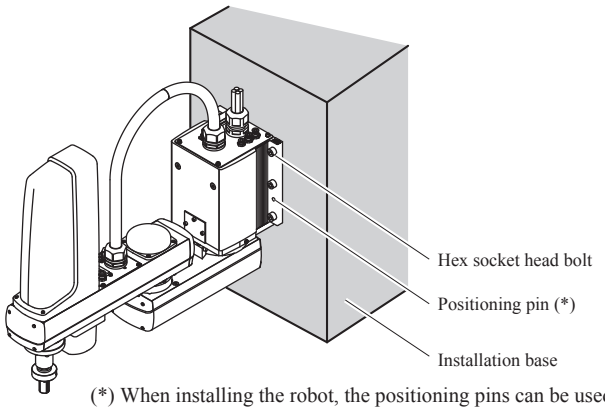
Robot Model	Bolts Used	Tightening torque
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600	M8	37Nm (380kgfcm)
R6YXG500, R6YXG600	M10	71Nm (720kgfcm)
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000	M12	128Nm (1310kgfcm)
R6YXGS300, R6YXGS400	M8	37Nm (380kgfcm)
R6YXGS500, R6YXGS600	M10	71Nm (720kgfcm)
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M12	128Nm (1310kgfcm)

Depth of tapped holes in installation base:
Iron installation base : Bolt diameter × 1.5 or more
Aluminum installation base : Bolt diameter × 3 or more
Recommended bolt : JIS B 1176 hex socket head bolt, or equivalent
Strength class JIS B 1051 12.9, or equivalent

Installing the robot



Installing the robot (Wall-mount model / Wall-mount inverse model)



(*) When installing the robot, the positioning pins can be used. For details about positions and dimensions, see “1.2 External view and dimensions” in Chapter 8.

NOTE

The positioning pins are useful to minimize positional deviation caused by vibration of detachment or attachment of the robot during maintenance work.

3. Protective bonding

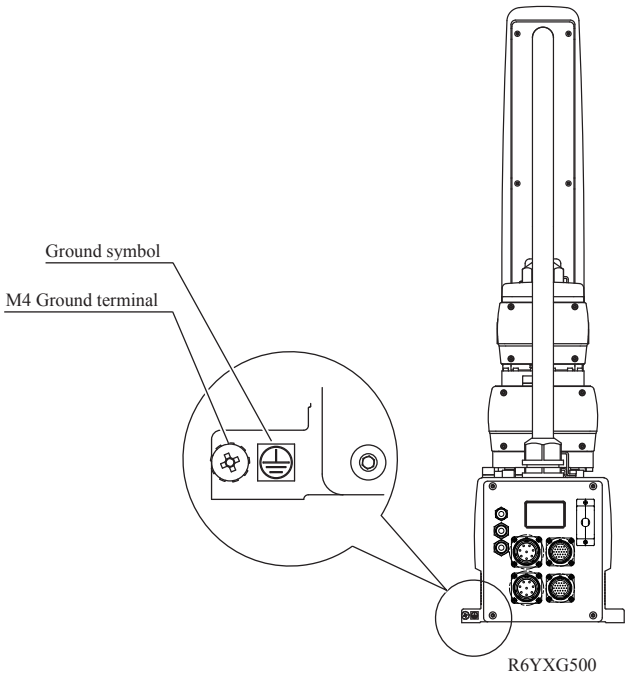
WARNING

- BE SURE TO GROUND THE ROBOT AND CONTROLLER TO PREVENT ELECTRICAL SHOCK.
- TURN OFF THE CONTROLLER BEFORE GROUNDING THE ROBOT.

Provide a terminal marked "PE" for the protective conductor of the entire system and connect it to an external protective conductor. In addition, securely connect the ground terminal on the robot pedestal to the same protective conductor.
(See the Fig. below.)

(Symbol 417-IEC-5019)

Example of grounding



R6YXG500

Use a ground cable with a conductor wire cross section of at least 2.0mm^2 and a length within 1 meter.

CAUTION

When the end effector uses an electrical device which, if it malfunctions, might make contact with the power supply, the user must provide proper grounding on his own responsibility. The XG series robots do not have a ground terminal for this purpose.

NOTE

For details on protective bonding on the robot body to comply with CE Marking, follow the instructions on protective bonding explained in the "OMRON Robot Controller User's Manual".

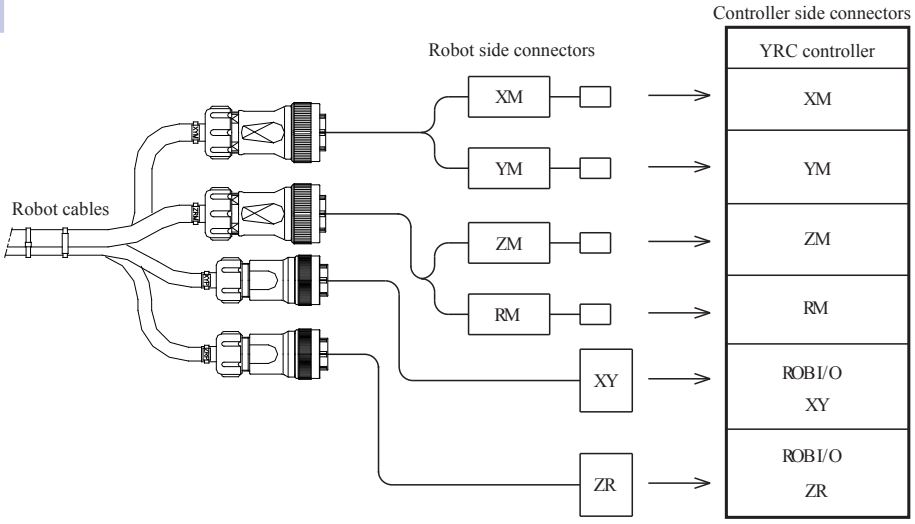
4. Robot cable connection

The robot cable is pre-connected to the XG series robot. For details on connections to the robot controller, refer to the Fig. below and the "OMRON Robot Controller User's Manual". After making connections, check the operation while referring to the section "4.5.1 Trial Operation" in Chapter “Safety Instructions” of this manual.

WARNING

- BEFORE CONNECTING THE CABLES, CHECK THAT THERE ARE NO BENDS OR BREAKS IN THE CONNECTOR PINS OF THE ROBOT CABLE AND THAT THE CABLES ARE NOT DAMAGED. BENT OR BROKEN PINS OR CABLE DAMAGE MAY CAUSE MALFUNCTION OF THE ROBOT.
- ENSURE THAT THE CONTROLLER IS OFF BEFORE CONNECTING THE ROBOT CABLE TO THE CONTROLLER.
- IN THE YRC CONTROLLER, THE MOTOR CONNECTORS XM AND ZM, AND YM AND RM EACH HAVE IDENTICAL SHAPES. IN ADDITION, THE PI CONNECTORS XY AND ZR HAVE IDENTICAL SHAPES. DO NOT CONFUSE THESE CONNECTORS WHEN MAKING CONNECTIONS. WRONG CONNECTIONS MAY RESULT IN MALFUNCTION AND HAZARDOUS SITUATIONS.
- IF THE CONNECTOR INSTALLATION IS INADEQUATE OR IF THERE ARE CONTACT FAILURES IN THE PINS, THE ROBOT MAY MALFUNCTION CAUSING A HAZARDOUS SITUATION. RECONFIRM THAT EACH CONNECTOR IS SECURELY INSTALLED BEFORE TURNING ON THE CONTROLLER.
- TO ATTACH THE PI CONNECTOR SECURELY, TIGHTEN THE SCREWS SUPPLIED WITH THE ROBOT.
- TAKE CAUTION NOT TO APPLY AN EXCESSIVE LOAD TO THE CONNECTORS DUE TO STRESS OR TENSION ON THE CABLES.
- LAY OUT THE CABLES SO THAT THEY DO NOT OBSTRUCT THE MOVEMENT OF THE MANIPULATOR. DETERMINE THE ROBOT WORK AREA IN WHICH THE ROBOT CABLES WILL NOT INTERFERE WITH THE LOAD OR WORKPIECE PICKED UP BY THE MANIPULATOR. IF THE ROBOT CABLES INTERFERE WITH THE MOVABLE PARTS OF THE ROBOT, THE CABLES MAY BE DAMAGED CAUSING MALFUNCTION AND HAZARDOUS SITUATIONS. REFER TO "1.2 EXTERNAL VIEW AND DIMENSIONS" IN CHAPTER 8.
- LAY OUT THE ROBOT CABLES SO AS TO KEEP THE OPERATOR OR ANY OTHER PERSON FROM TRIPPING ON THEM. BODILY INJURY MAY RESULT IF SOMEONE TRIPS ON THE CABLES.

Robot cable connections



5. User wiring and user tubing

WARNING

ALWAYS TURN OFF THE CONTROLLER AND SHUT OFF AIR SUPPLY BEFORE ATTEMPTING WIRING AND PIPING WORK. IF AIR OR POWER IS SUPPLIED DURING THIS WORK, THE MANIPULATOR MAY MOVE ERRONEOUSLY CAUSING A HAZARDOUS SITUATION.

The XG series robots are equipped with user wires and air tubes in the machine harness. The table below shows the number of wires and air tubes available for each robot model.

Robot Model	User wiring	User tubing
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400	10 wires	∅4, 3 tubes
R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	20 wires	∅6, 3 tubes

* Robot models for custom specifications may have different wiring or tubing.

The specifications of the user wires and air tubes are shown below. Always observe the specifications.

User Wiring

Rated voltage	30V
Allowable current	1.5A
Nominal cross-section area of conductor	0.2mm^2
Shield	Yes

User Tubing

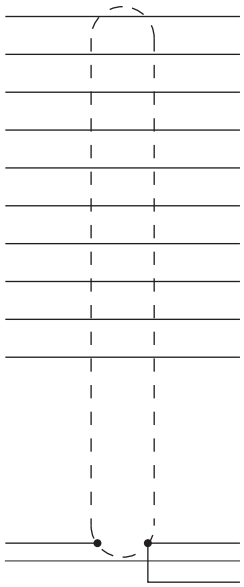
Maximum pressure	0.58MPa (6Kgf/cm^2)
Outer diameter × inner diameter	∅4mm × ∅2.5mm
	∅6mm × ∅4mm
Fluid	Dry clean air not containing deteriorated compressor oil; filtration 40μm or less

A D-sub connector for user wiring and a bulkhead union for user tubing are provided one each on the arm side and pedestal side. For the locations, refer to "1.2 External view and dimensions" in Chapter 8.

■ Signal wiring connections in the machine harness

- R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600

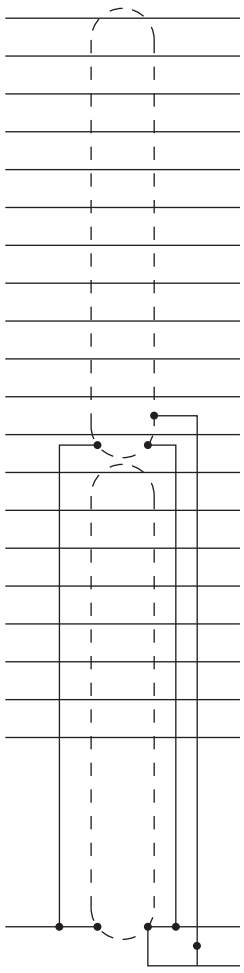
  Connector pins 1 to 10 can be used. Pin 15 is connected to a shield wire and cannot be used as a signal wire.

Signal	Connector	NO	Connection	NO	Connector	Color
User signal line	I O (Arm side)	1		1	I O (Base side)	Brown
		2		2		Red
		3		3		Orange
		4		4		Blue
		5		5		Violet
		6		6		Grey
		7		7		White
		8		8		Brown
		9		9		Red
		10		10		Orange
		11		11		
		12		12		
		13		13		
		14		14		
Flame Ground		15		15		Grey
Flame Ground				1	FG	Grey

* Robots models with non-standard specifications may have different wiring colors.

- R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000
  R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

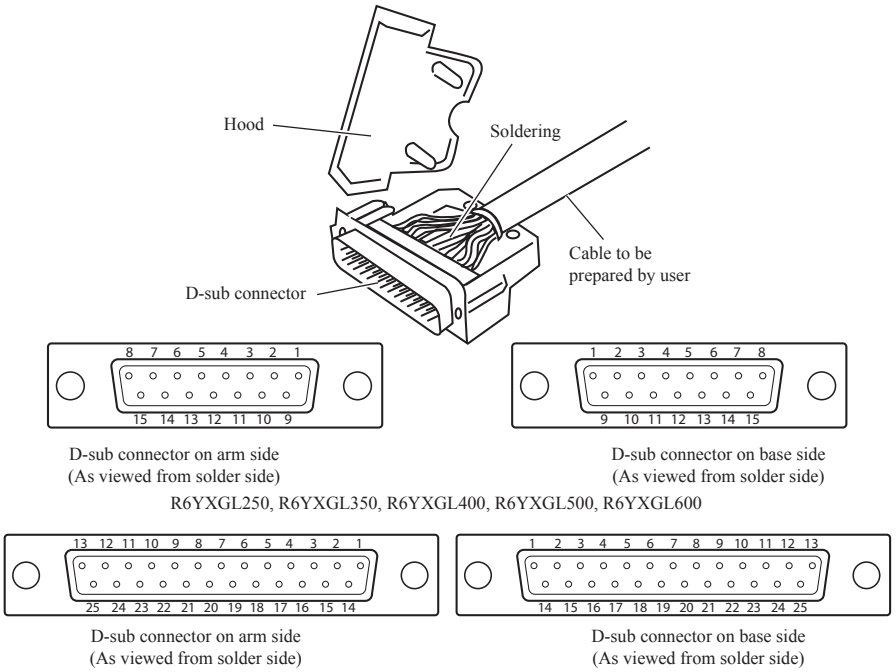
  Connector pins 1 to 20 can be used. Pin 25 is connected to a shield wire and cannot be used as a signal wire.

Signal	Connector	NO	Connection	NO	Connector	Color
User signal line	I O (Arm side)	1		1	I O (Base side)	Brown
		2		2		Red
		3		3		Orange
		4		4		Blue
		5		5		Violet
		6		6		Grey
		7		7		White
		8		8		Black
		9		9		Brown
		10		10		Red
		11		11		Orange
		12		12		Blue
		13		13		Brown
		14		14		Red
		15		15		Orange
		16		16		Blue
		17		17		Violet
		18		18		Grey
		19		19		White
		20		20		Black
		21		21		
		22		22		
		23		23		
		24		24		
Flame Ground		25		25		Green
Flame Ground				1	FG	Green

* Robots models with non-standard specifications may have different wiring colors.

As shown in Fig. below, solder the user cable wires to the D-sub connector (supplied with the robot). Reattach the hood to the D-sub connector after soldering, then plug it into the user wiring connector.
The connector pinouts as viewed from the solder side are shown below.

D-sub connector connections and pin assignments



WARNING

- THE USER CABLE WIRES SHOULD HAVE A SHIELD WIRE. CONNECT IT TO THE SAME NO. PIN IN THE D-SUB CONNECTOR ON THE ROBOT SIDE, WHICH ALSO CONNECTS TO THE SHIELD WIRE. IF THIS TASK IS OMITTED, NOISE MAY CAUSE MALFUNCTION OF THE ROBOT.
- SECURELY ATTACH THE D-SUB CONNECTOR (SUPPLIED WITH THE ROBOT) INTO THE D-SUB CONNECTOR ON THE ROBOT SIDE, BY TIGHTENING THE SCREWS ON THE CONNECTOR HOOD. IF THIS CONNECTOR COMES LOOSE OR COMES OFF, MALFUNCTION MAY RESULT.
- MAKE SURE THAT THE USER CABLE ATTACHED TO THE D-SUB CONNECTOR FOR USER WIRING AND THE TUBE ATTACHED TO THE BULKHEAD UNION FOR USER TUBING WILL NOT INTERFERE WITH THE ROBOT MOVEMENT, ENTANGLE AROUND THE ROBOT OR FLAP AROUND DURING OPERATION. WIRING AND TUBING MIGHT THEN BE DAMAGED CAUSING MALFUNCTION OF THE ROBOT.
- LAY OUT THE USER CABLE ATTACHED TO THE D-SUB CONNECTOR FOR USER WIRING AND THE TUBE ATTACHED TO THE BULKHEAD UNION FOR USER TUBING SO THAT THEY DO NOT OBSTRUCT THE MOVEMENT OF THE OPERATOR OR ANY OTHER PERSONS. BODILY INJURY MAY RESULT IF ANYONE TRIPS ON THE CABLE OR AIR TUBE.

CAUTION

- The D-sub connector supplied with the robot should be connected to the arm side by pin contact, and to the pedestal side by socket contact. Use caution at these points when soldering.
- Be sure to use the D-sub connector and hood which are supplied with the robot. Using other types may result in contact failure.

NOTE

Fasten user cable or tube newly with the machine harness while referring to "11. Installing the user wiring and tubing newly" in this Chapter.

D-sub connectors (supplied with robot)

R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400

Part Name	OMRON Part No.	Part No.	Quantity
Base side D-sub connector	K58-M4872-101	DA-15S-NR (Japan Aviation Electronics Industry,Limited)	1
Arm side D-sub connector	K58-M4871-101	DA-15P-NR (Japan Aviation Electronics Industry,Limited)	1
Hood	K58-M4839-001	DA-C1-J10R (Japan Aviation Electronics Industry,Limited)	2

R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000
R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

Part Name	OMRON Part No.	Part No.	Quantity
Base side D-sub connector	KN0-M4872-002	DB-25S-NR (Japan Aviation Electronics Industry,Limited)	1
Arm side D-sub connector	KN0-M4871-002	DB-25P-NR (Japan Aviation Electronics Industry,Limited)	1
Hood	KN0-M4839-001	DB-C2-J9R (Japan Aviation Electronics Industry,Limited)	2

To check the operation and signal transmission between the end effector and the controller or peripheral equipment after making connections, refer to the section "4.5.1 Trial Operation" in Chapter “Safety Instructions” of this manual.

6. Attaching the end effector

6.1 R-axis tolerable moment of inertia and acceleration coefficient

The moment of inertia of a load (end effector and workpiece) that can be attached to the R-axis is limited by the strength of the robot drive unit and residual vibration during positioning. It is therefore necessary to reduce the acceleration coefficient in accordance with the moment of inertia.

The R-axis tolerable moment of inertia and the acceleration coefficient versus R-axis moment of inertia for each robot model are shown in "6.1.1 to 6.1.11 Acceleration coefficient vs. moment of inertia".
The symbols A_X, A_Y, A_Z, and A_R in each Fig. respectively indicate the acceleration coefficients of the X-axis, Y-axis, Z-axis, and R-axis. The symbol I_R (J_R) indicates the moment of inertia of the load around the R-axis and the symbol m indicates the tip mass.
It is necessary only for the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400 to reduce the Z-axis acceleration according to the moment of inertia around the R-axis so as to ensure the service life of the spline. This is shown in "6.1.6 Acceleration coefficient vs. moment of inertia (R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400)".

Example: R6YXG500 (See also "6.1.7 Acceleration coefficient vs. moment of inertia (R6YXG500, R6YXGS500)".)
Assume that the mass of the load installed to the R-axis is 1.5kg and the moment of inertia around the R-axis is 0.1kgm^2 (1.0kgfcmsec^2). When the tip mass parameter is set to 2kg, the robot can be operated by reducing the X, Y and R-axis acceleration coefficients to 62%, as can be seen from "6.1.7 Acceleration coefficient vs. moment of inertia (R6YXG500, R6YXGS500)". Be sure to select an optimum tip mass and acceleration coefficient parameters that meet the mass of the load and moment of inertia before using the robot. To make settings for the tip mass and acceleration coefficient, refer to the separate "OMRON Robot Controller User's Manual".

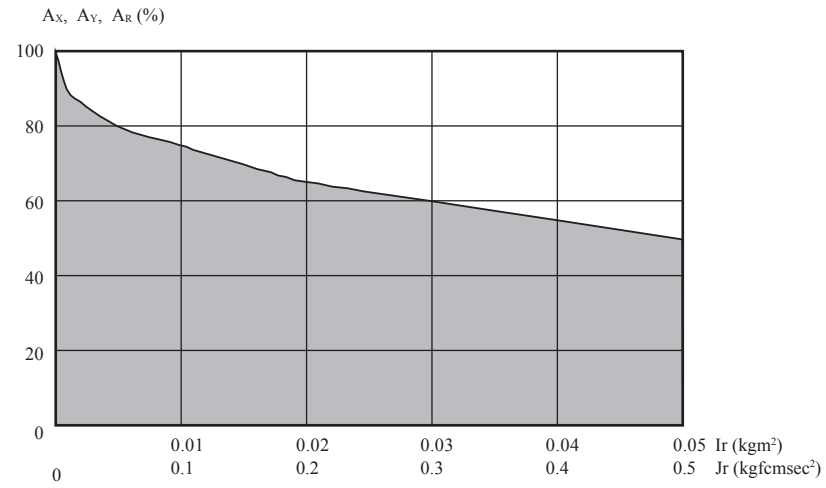
Methods for calculating the moment of inertia of the load are shown in "6.2 Equation for moment of inertia calculation" and "6.3 Example of moment of inertia calculation". However, it is not easy to precisely figure out these values. If a calculated value smaller than the actual moment of inertia is set, residual vibrations may occur. If this happens, reduce the acceleration coefficient parameter further.

CAUTION

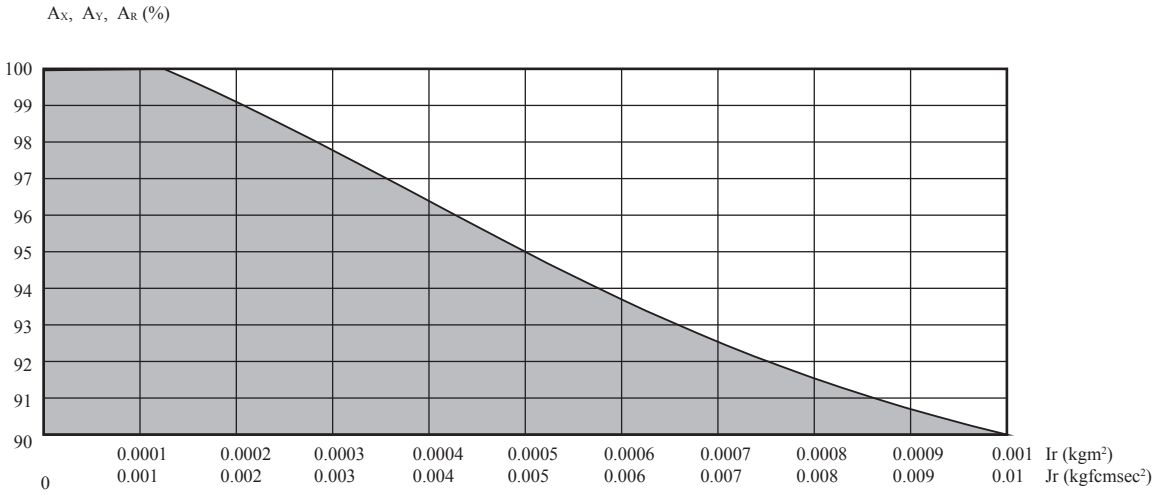
- The robot must be operated with correct tolerable moment of inertia and acceleration coefficients according to the manipulator tip mass and moment of inertia. If this is not observed, premature end to the life of the drive units, damage to the robot parts or residual vibration during positioning may result.
- Depending on the Z-axis position, vibration may occur when the X, Y or R-axis moves. If this happens, reduce the X, Y or R-axis acceleration to an appropriate level.
- If the moment of inertia is too large, vibration may occur on the Z-axis depending on its operation position. If this happens, reduce the Z-axis acceleration to an appropriate level.

6.1.1 Acceleration coefficient vs. moment of inertia (R6YXGL250)

m=1 to 5kg

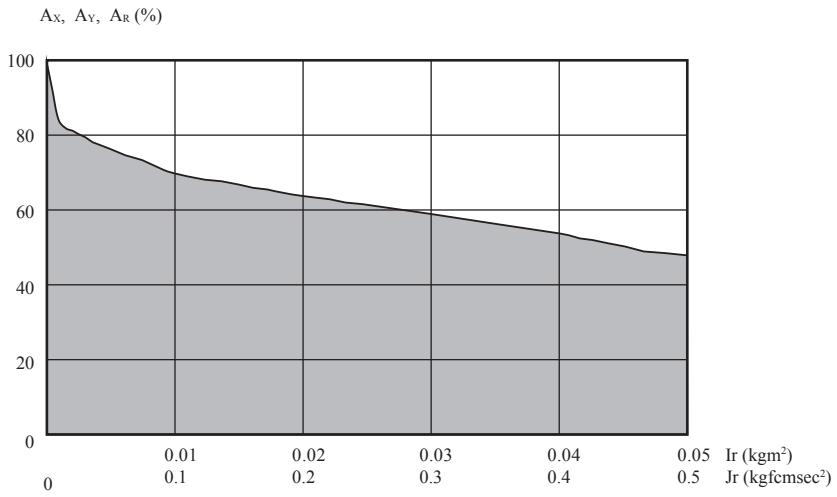


m=1 to 5kg

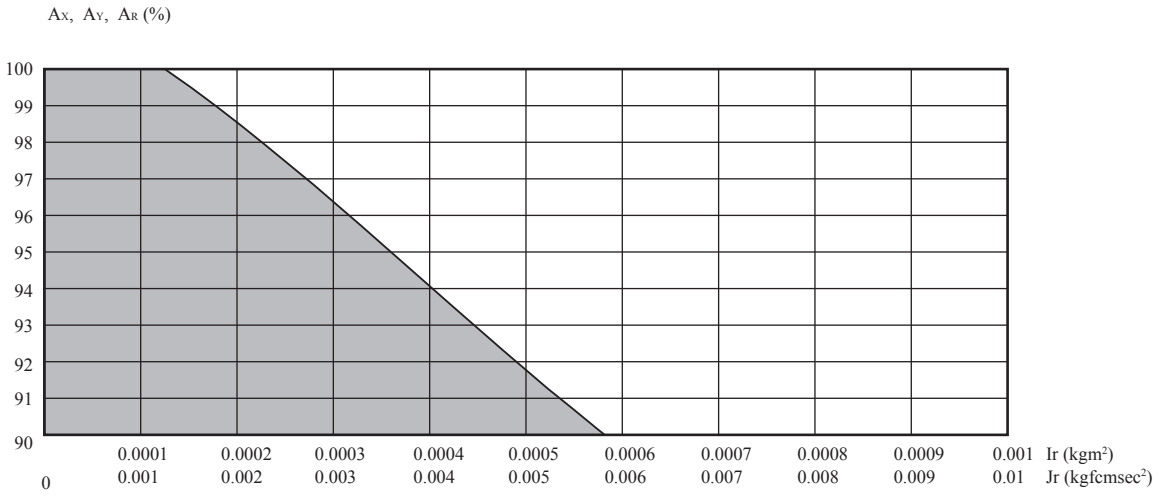


6.1.2 Acceleration coefficient vs. moment of inertia (R6YXGL350, R6YXGS300)

m=1 to 5kg

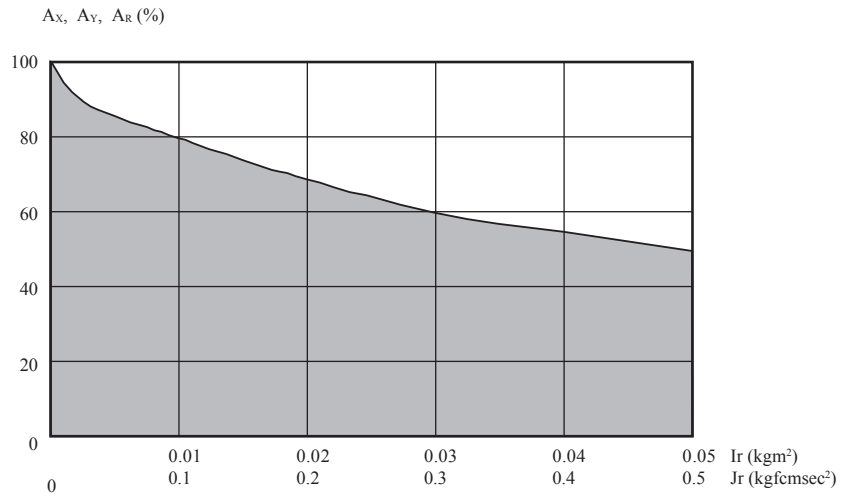


m=1 to 5kg

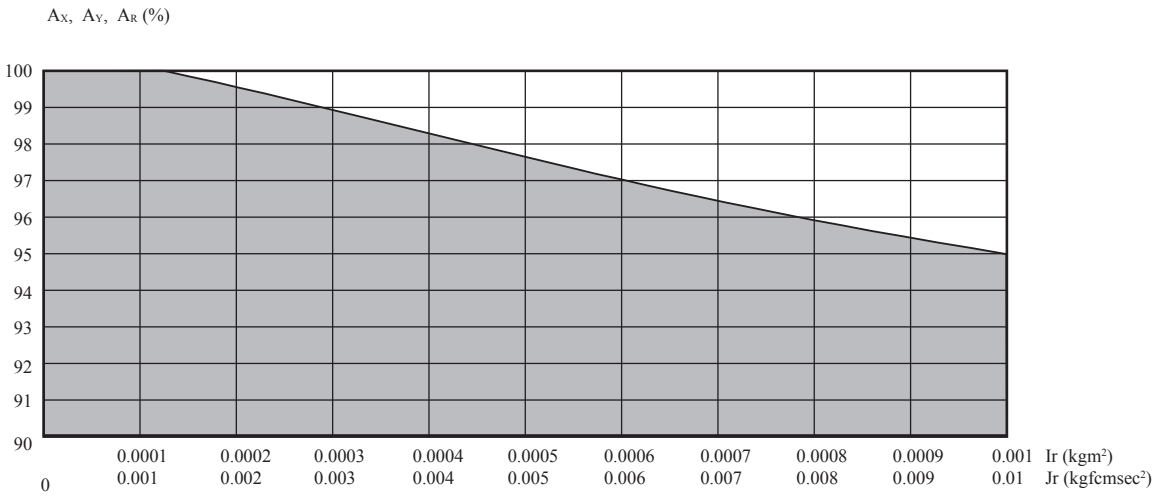


6.1.3 Acceleration coefficient vs. moment of inertia (R6YXGL400, R6YXGS400)

m=1 to 5kg

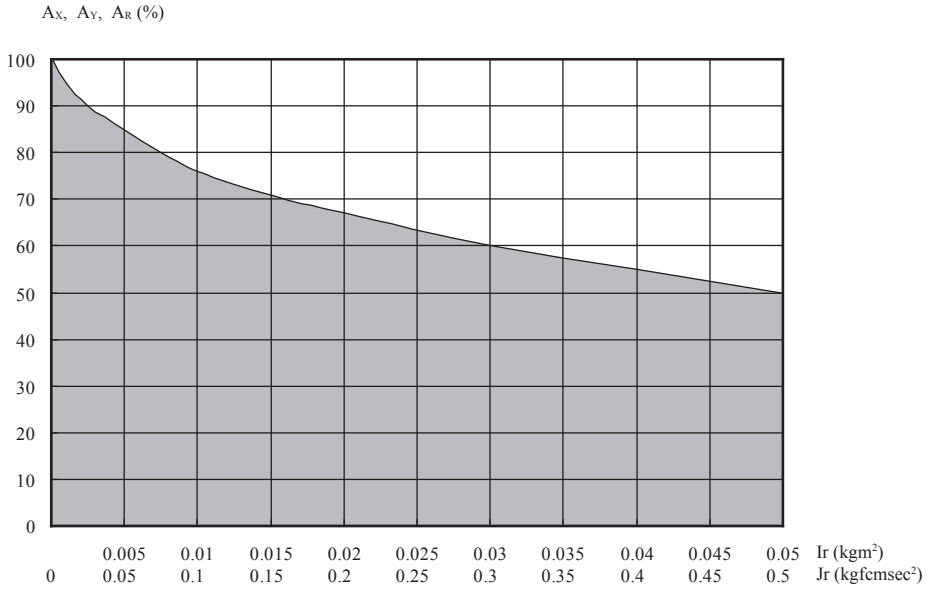


m=1 to 5kg

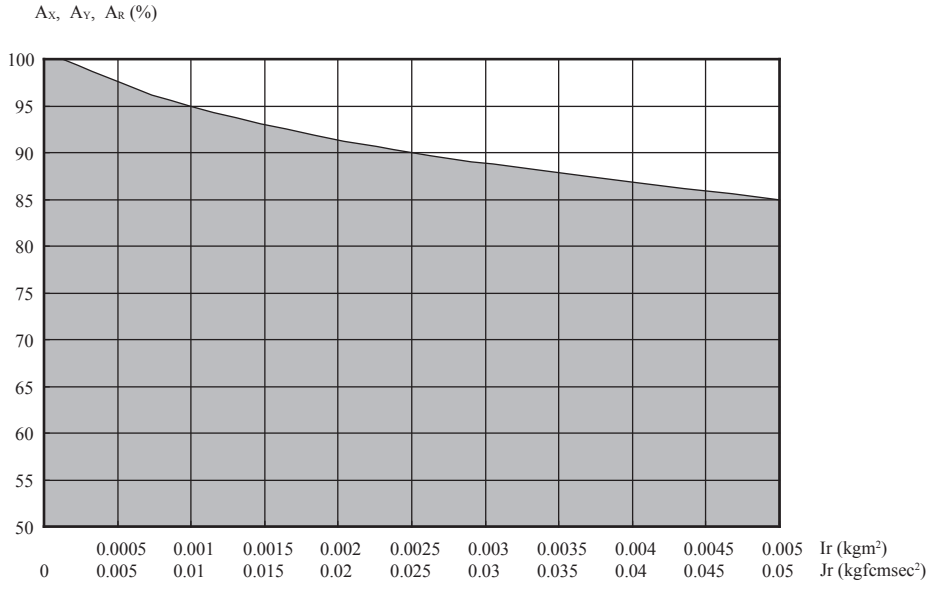


6.1.4 Acceleration coefficient vs. moment of inertia (R6YXGL500)

m=1 to 5kg



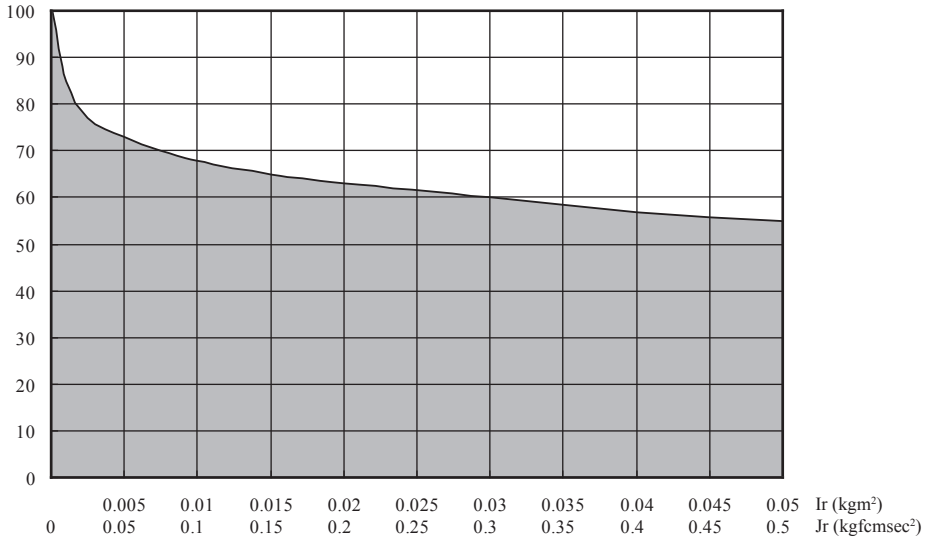
m=1 to 5kg



6.1.5 Acceleration coefficient vs. moment of inertia (R6YXGL600)

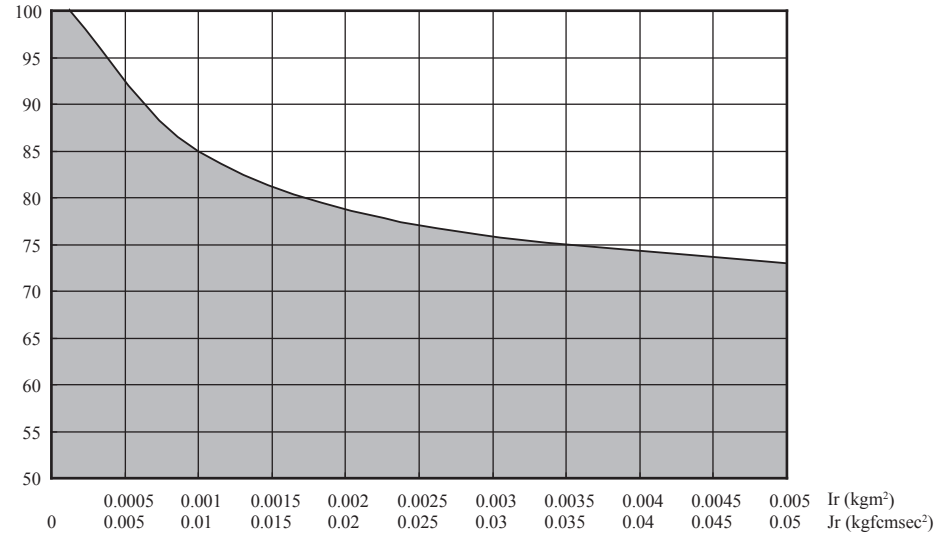
m=1 to 5kg

A_X, A_Y, A_R (%)



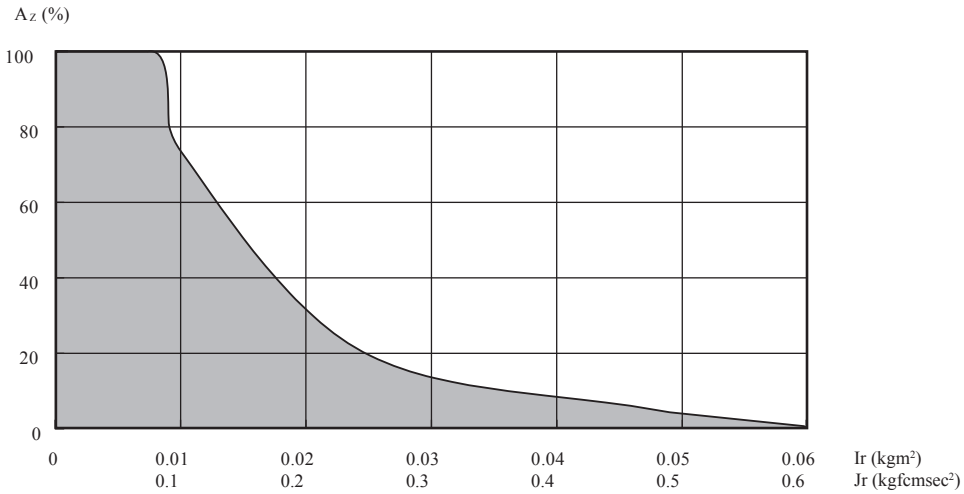
m=1 to 5kg

A_X, A_Y, A_R (%)



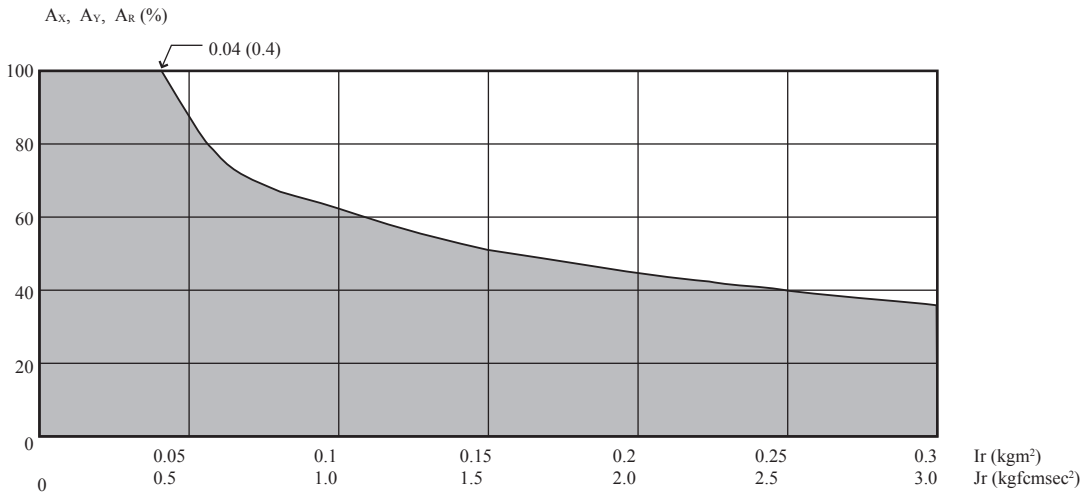
6.1.6 Acceleration coefficient vs. moment of inertia (R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400)

m=1 to 5kg



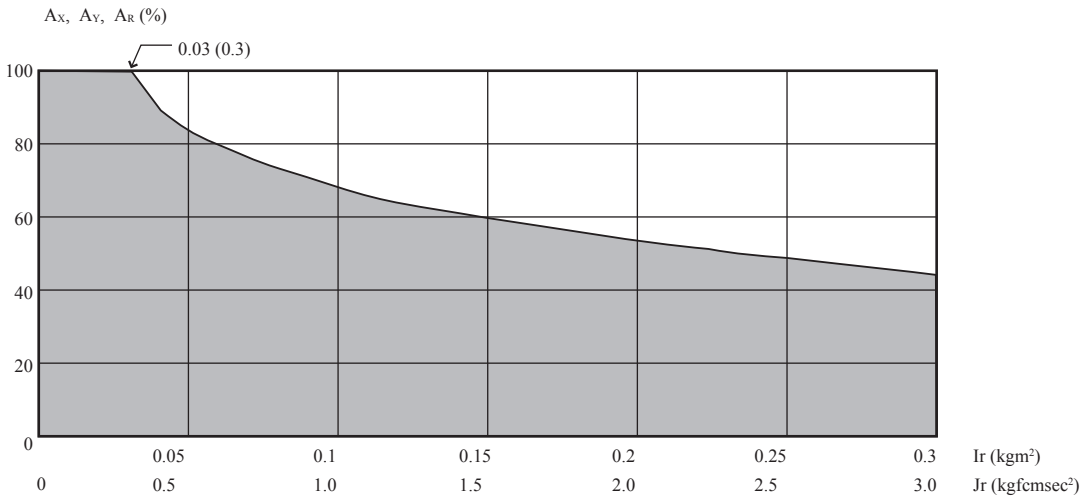
6.1.7 Acceleration coefficient vs. moment of inertia (R6YXG500, R6YXGS500)

m=1 to 10kg



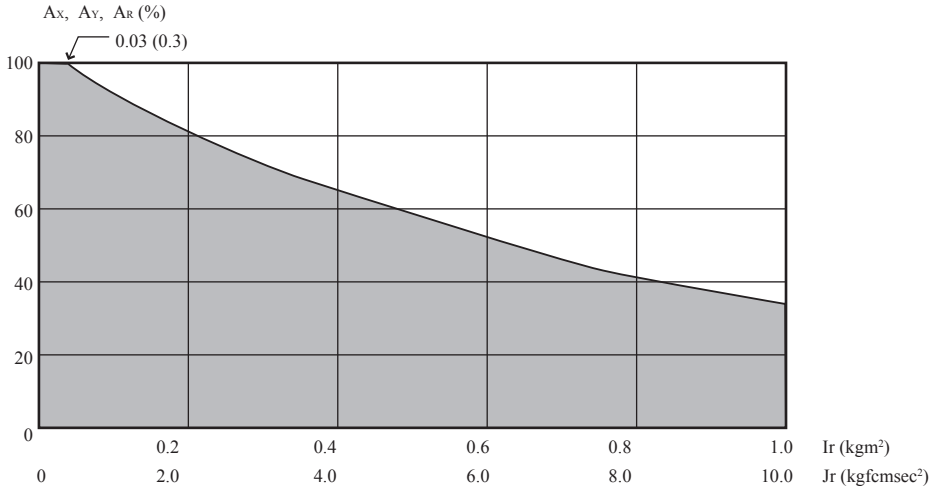
6.1.8 Acceleration coefficient vs. moment of inertia (R6YXG600, R6YXGS600)

m=1 to 10kg



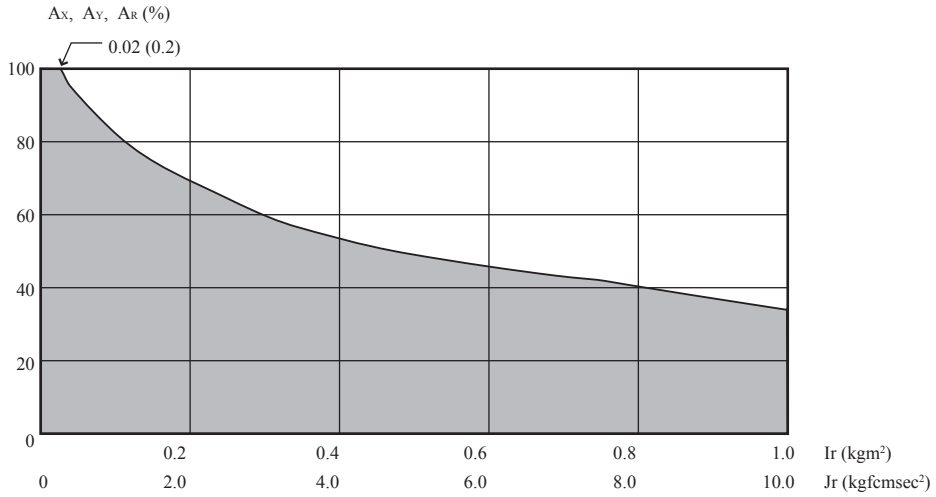
6.1.9 Acceleration coefficient vs. moment of inertia (R6YXGH600)

m=1 to 20kg



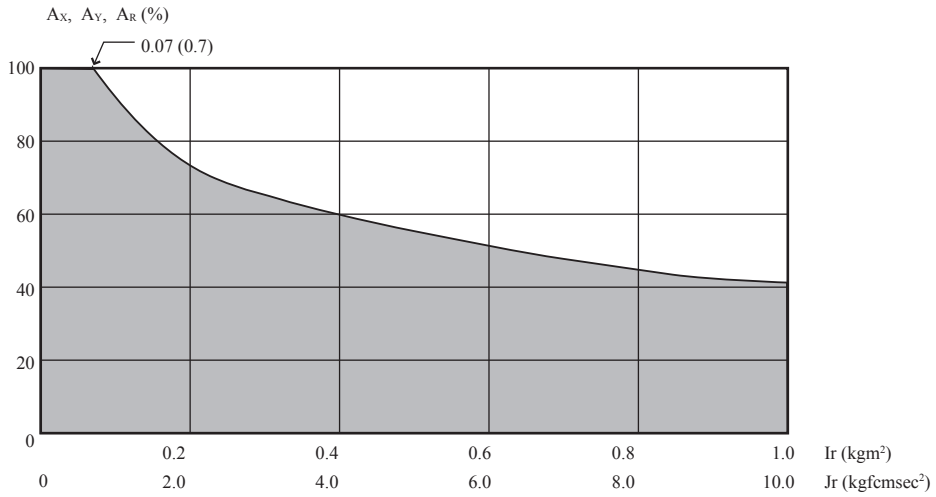
6.1.10 Acceleration coefficient vs. moment of inertia (R6YXG700, R6YXG800, R6YXGS700, R6YXGS800)

m=1 to 20kg



6.1.11 Acceleration coefficient vs. moment of inertia (R6YXG900, R6YXG1000, R6YXGS900, R6YXGS1000)

m=1 to 20kg



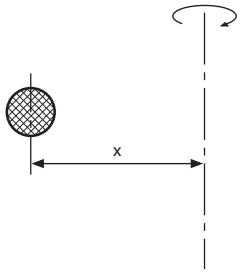
6.2 Equation for moment of inertia calculation

Usually the R axis load is not a simple form, and the calculation of the moment of inertia is not easy. As a method, the load is replaced with several factors that resemble a simple form for which the moment of inertia can be calculated. The total of the moment of inertia for these factors is then obtained.
The objects and equations often used for the calculation of the moment of inertia are shown below. Incidentally, there is the following relation: J (kgfcmsec^2) = I (kgm^2) × 10.2.

1) Moment of inertia for material particle

The equation for the moment of inertia for a material particle that has a rotation center such as shown in the Fig. below is as follows:
This is used as an approximate equation when x is larger than the object size.

Moment of inertia for material particle



$$I = mx^2 \ (kgm^2)$$

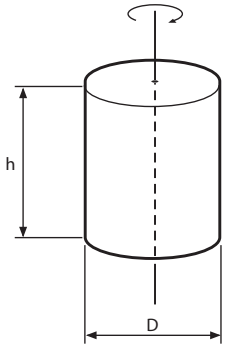
$$J = \frac{Wx^2}{g} \ (kgfcmsec^2) \quad \text{... (1)}$$

g : Gravitational acceleration (cm/sec^2)
m : Mass of material particle (kg)
W : Weight of material particle (kgf)

2) Moment of inertia for cylinder (part 1)

The equation for the moment of inertia for a cylinder that has a rotation center such as shown in the Fig. below is given as follows.

Moment of inertia for cylinder (part 1)



$$I = \frac{\rho \pi D^4 h}{32} = \frac{mD^2}{8} \ (kgm^2)$$

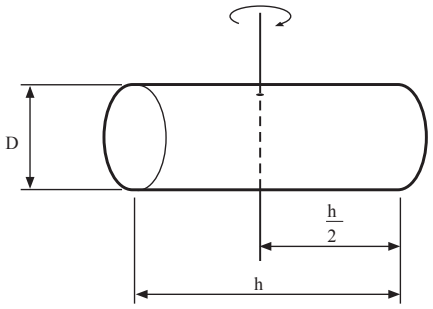
$$J = \frac{\rho \pi D^4 h}{32g} = \frac{WD^2}{8g} \ (kgfcmsec^2) \quad \text{... (2)}$$

r : Density (kg/m^3, kg/cm^3)
g : Gravitational acceleration (cm/sec^2)
m : Mass of cylinder (kg)
W : Weight of cylinder (kgf)

3) Moment of inertia for cylinder (part 2)

The equation for the moment of inertia for a cylinder that has a rotation center such as shown in the Fig. below is given as follows.

Moment of inertia for cylinder (part 2)



$$I = \frac{rp\ D^2h}{16}\left(\frac{D^2}{4}+\frac{h^2}{3}\right) = \frac{m}{4}\left(\frac{D^2}{4}+\frac{h^2}{3}\right)\ (kgm^2)$$

$$J = \frac{rp\ D^2h}{16g}\left(\frac{D^2}{4}+\frac{h^2}{3}\right) = \frac{W}{4g}\left(\frac{D^2}{4}+\frac{h^2}{3}\right)\ (kgfcmsec^2)$$

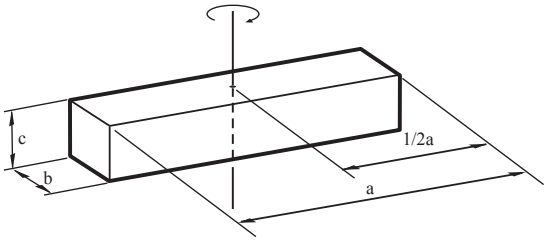
... (3)

r : Density (kg/m^3, kg/cm^3)
g : Gravitational acceleration (cm/sec^2)
m : Mass of cylinder (kg)
W : Weight of cylinder (kgf)

4) Moment of inertia for prism

The equation for the moment of inertia for a prism that has a rotation center as shown in the Fig. below is given as follows.

Moment of inertia for prism



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

$$J = \frac{rabc(a^2+b^2)}{12g} = \frac{W(a^2+b^2)}{12g}\ (kgfcmsec^2)$$

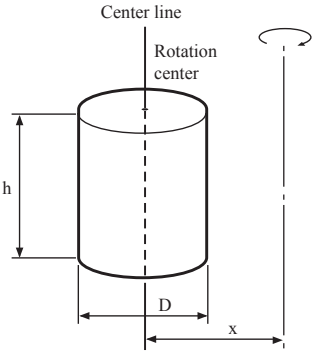
... (4)

r : Density (kg/m^3, kg/cm^3)
g : Gravitational acceleration (cm/sec^2)
m : Mass of prism (kg)
W : Weight of prism (kgf)

5) When the object's center line is offset from the rotation center.

The equation for the moment of inertia, when the center of the cylinder is offset by the distance "x" from the rotation center as shown in the Fig. below is given as follows.

When the object's center line is offset from the rotation center.



$$I = \frac{rpD^4h}{32} + \frac{rpD^2hx^2}{4} = \frac{mD^2}{8} + mx^2\ (kgm^2)$$

$$J = \frac{rpD^4h}{32g} + \frac{rpD^2hx^2}{4g}$$

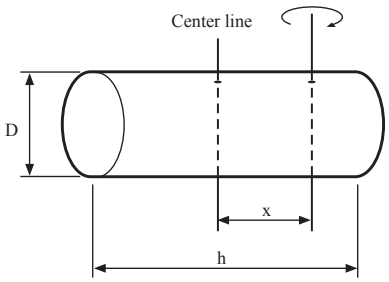
$$= \frac{WD^2}{8g} + \frac{Wx^2}{g}\ (kgfcmsec^2)$$

... (5)

r : Density (kg/m^3, kg/cm^3)
g : Gravitational acceleration (cm/sec^2)
m : Mass of cylinder (kg)
W : Weight of cylinder (kgf)

In the same manner, the moment of inertia of a cylinder as shown in the Fig. below is given by

Moment of inertia of a cylinder



$$I = \frac{\rho\pi D^2 h}{16}\left(\frac{D^2}{4} + \frac{h^2}{3}\right) + \frac{\rho\pi D^2 h\, x^2}{4}$$

$$= \frac{m}{4}\left(\frac{D^2}{4} + \frac{h^2}{3}\right) + mx^2 \quad (kgm^2)$$

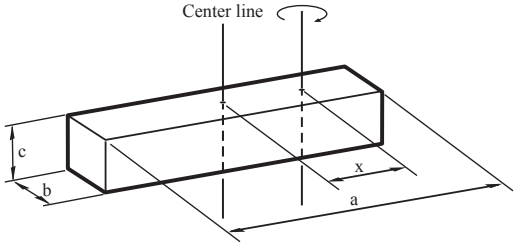
$$J = \frac{\rho\pi D^2 h}{16g}\left(\frac{D^2}{4} + \frac{h^2}{3}\right) + \frac{\rho\pi D^2 h\, x^2}{4g}$$

$$= \frac{W}{4g}\left(\frac{D^2}{4} + \frac{h^2}{3}\right) + \frac{Wx^2}{g} \quad (kgfcmsec^2)$$

... (6)

In the same manner, the moment of inertia of a prism as shown in the Fig. below is given by

Moment of inertia of a prism



$$I = \frac{\rho abc(a^2 + b^2)}{12} + \rho abcx^2 = \frac{m(a^2+b^2)}{12} + mx^2 \quad (kgm^2)$$

$$J = \frac{\rho abc(a^2 + b^2)}{12g} + \frac{\rho abcx^2}{g}$$

$$= \frac{W(a^2 + b^2)}{12g} + \frac{Wx^2}{g} \quad (kgfcmsec^2)$$

... (7)

m : Mass of prism (kg)

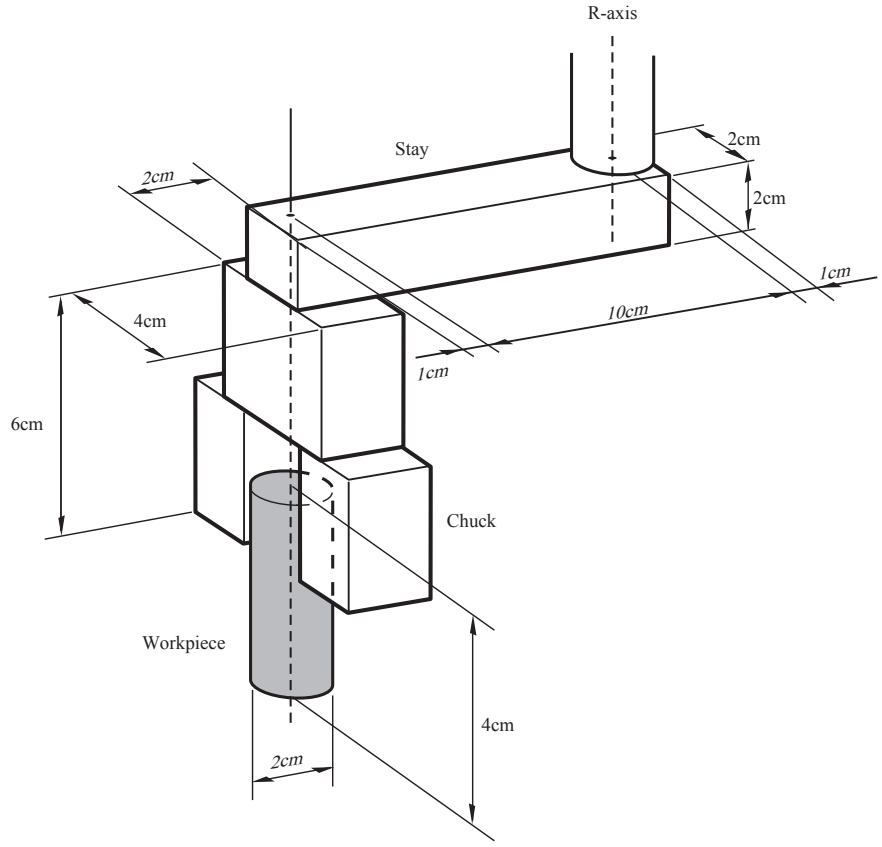
W : Weight of prism (kgf)

6.3 Example of moment of inertia calculation

Let's discuss an example in which the chuck and workpiece are at a position offset by 10cm from the R-axis by the stay, as shown in the Fig. below. The moment of inertia is calculated with the following three factors, assuming that the load material is steel and its density ρ is 0.0078kg/cm^3.

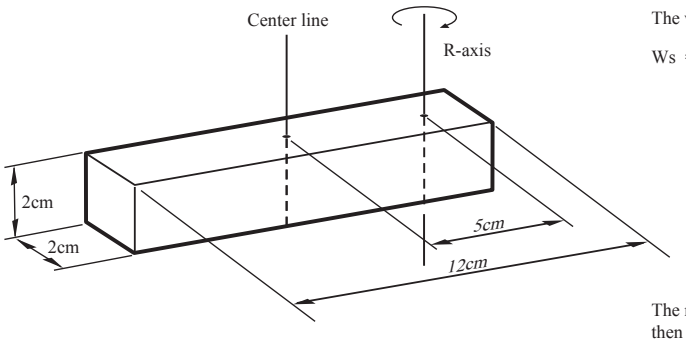
Example of moment of inertia calculation

(The chuck and workpiece are at a position offset by 10 cm from the R-axis by the stay.)



1. Moment of inertia of the stay

Moment of inertia of the stay



The weight of the stay (Ws) is given as follows:

Ws = rabc = 0.0078 × 12 × 2 × 2

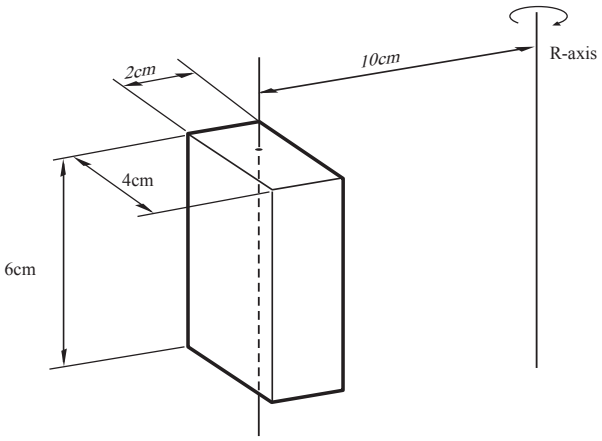
= 0.37 (kgf)

The moment of inertia of the stay (Js) is then calculated from Eq. (7).

$$Js = \frac{0.37 \times (12^2+2^2)}{12 \times 980} + \frac{0.37 \times 5^2}{980} = 0.014 \ (kgfcmsec^2)$$

2. Moment of inertia of the chuck

Moment of inertia of the chuck



When the chuck form resembles that shown in figure, the weight of the chuck (Wc) is

$Wc = 0.0078 \times 2 \times 4 \times 6$

$= 0.37$ (kgf)

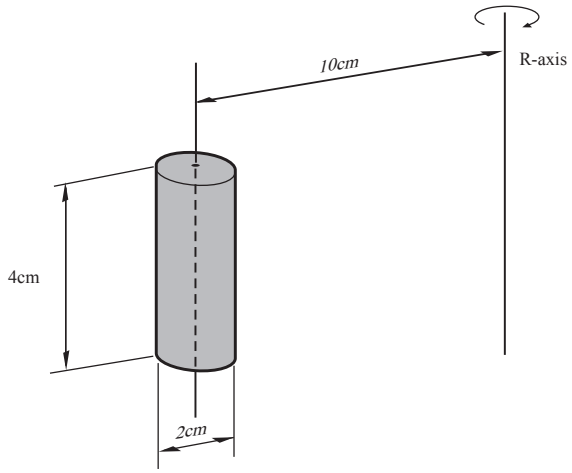
The moment of inertia of the chuck (Jc) is then calculated from Eq. (7).

$$Jc = \frac{0.37 \times (2^2+4^2)}{12 \times 980} + \frac{0.37 \times 10^2}{980}$$

$= 0.038$ (kgfcmsec^2)

3. Moment of inertia of workpiece

Moment of inertia of workpiece



When the workpiece form resembles that shown in figure, the weight of the workpiece (Ww) is

$$Ww = \frac{rpD^2h}{4} = \frac{0.0078p \times 2^2 \times 4}{4}$$

$= 0.098$ (kgf)

The moment of inertia of the workpiece (Jw) is then calculated from Eq. (5).

$$Jw = \frac{0.097 \times 2^2}{8 \times 980} + \frac{0.097 \times 10^2}{980}$$

$= 0.010$ (kgfcmsec^2)

4. Total weight
The total weight (W) is calculated as follows: W = Ws + Wc + Ww = 0.84 (kgf)

5. Total moment of inertia
The total moment of inertia (J) is then obtained as follows: J = Js + Jc + Jw = 0.062 (kgfcmsec^2)

6.4 Attaching the end effector

It is necessary to prepare the user's end effector attaching part to the robot that has adequate strength and rigidity, as well as gripping force to prevent positioning errors.

WARNING

- BEFORE ATTACHING THE END EFFECTOR, BE SURE TO TURN OFF THE CONTROLLER.
- WHEN THE END EFFECTOR IS ATTACHED USING THE SLOT CLAMPING, ALWAYS OBSERVE THE CONDITIONS LISTED IN THE TABLE, "MAXIMUM LOAD APPLIED TO END EFFECTOR ATTACHMENT". IF THESE ARE IGNORED, THE END EFFECTOR MAY COME LOOSE AND FLY OFF DURING ROBOT OPERATION, RESULTING IN AN ACCIDENT OR INJURY.
- IN CASES WHERE OTHER ATTACHMENT METHODS ARE USED, BE SURE THAT THE END EFFECTOR WILL NOT COME OFF EVEN WHEN THE LOADS LISTED IN THE TABLE, "MAXIMUM LOAD APPLIED TO END EFFECTOR ATTACHMENT" ARE APPLIED.

NOTE

When checking end effector operation, refer to the section "4.5.1 Trial Operation" in Chapter “Safety Instructions” of this manual.

The following shows the maximum load that can be applied to the end effector attachment of each robot model.

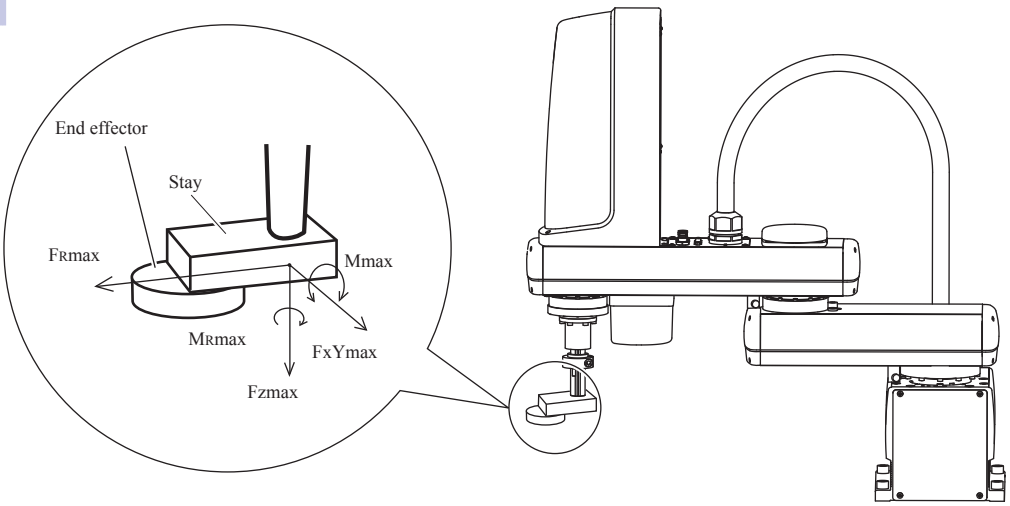
WARNING

- THE END EFFECTOR ATTACHMENT MUST HAVE ADEQUATE STRENGTH TO WITHSTAND THE LOADS LISTED IN THE TABLE BELOW. IF THE STRENGTH IS INSUFFICIENT, THE ATTACHMENT MAY BREAK DURING ROBOT OPERATION AND FRAGMENTS FLY OFF, CAUSING ACCIDENTS OR INJURIES.
- THE END EFFECTOR ATTACHMENT MUST HAVE SUFFICIENT RIGIDITY TO THE LOADS LISTED IN THE TABLE BELOW. IF THIS RIGIDITY IS INADEQUATE, THE END EFFECTOR MAY VIBRATE DURING ROBOT OPERATION, CAUSING ADVERSE EFFECTS ON THE WORK.

Maximum load applied to end effector attachment

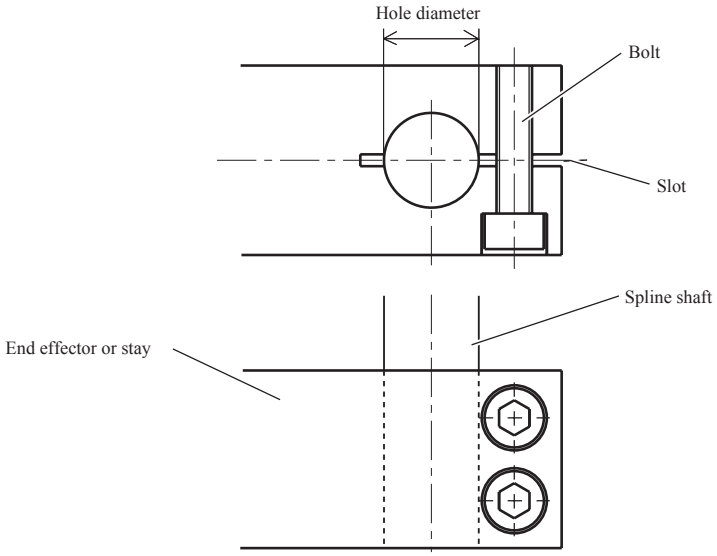
Robot Model	$F_{XY}max$		F_Zmax		F_Rmax		M_Rmax		Mmax	
	N	kgf	N	kgf	N	kgf	Nm	kgfm	Nm	kgfm
R6YXGL250	125	13	108	11	382	39	18	1.8	29	3.0
R6YXGL350, R6YXGS300	88	9	108	11	294	30	18	1.8	25	2.6
R6YXGL400, R6YXGS400	75	8	108	11	265	27	18	1.8	23	2.4
R6YXGL500	68	6.9	108	11	117	18	18	1.8	19	1.9
R6YXGL600	60	6.1	108	11	147	15	18	1.8	9	1.0
R6YXG500, R6YXGS500	173	18	134	14	506	52	24	2.6	15	1.5
R6YXG600, R6YXGS600	173	18	134	14	506	52	24	2.6	15	1.5
R6YXGH600	489	49	214	22	696	71	56	5.7	26	2.7
R6YXG700, R6YXGS700	489	49	214	22	696	71	56	5.7	26	2.7
R6YXG800, R6YXGS800	489	49	191	19	696	71	56	5.7	24	2.4
R6YXG900, R6YXGS900	443	46	191	19	696	71	56	5.7	24	2.4
R6YXG1000, R6YXGS1000	443	46	191	19	696	71	56	5.7	24	2.4

Maximum load applied to end effector attachment



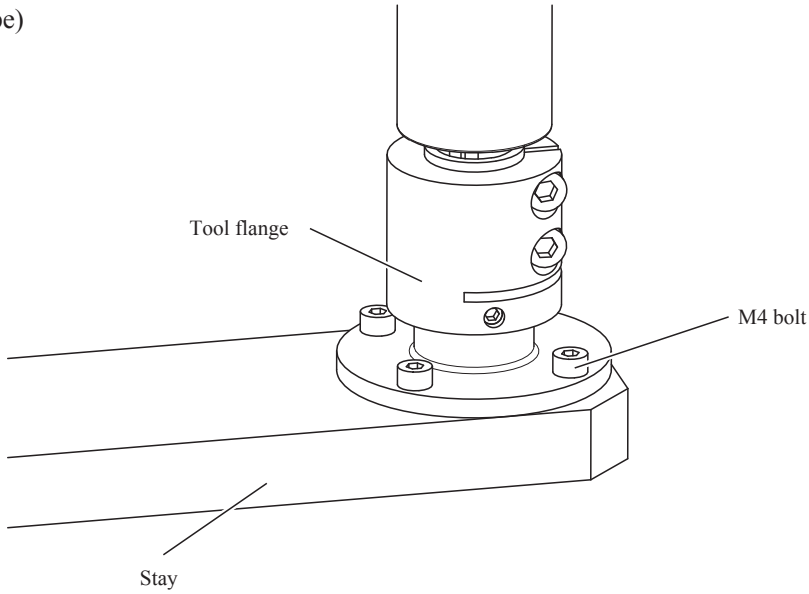
Next, the following shows the recommended end effector attaching method.

Attaching the end effector



Attaching the end effector

R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400 (Tool flange mount type)



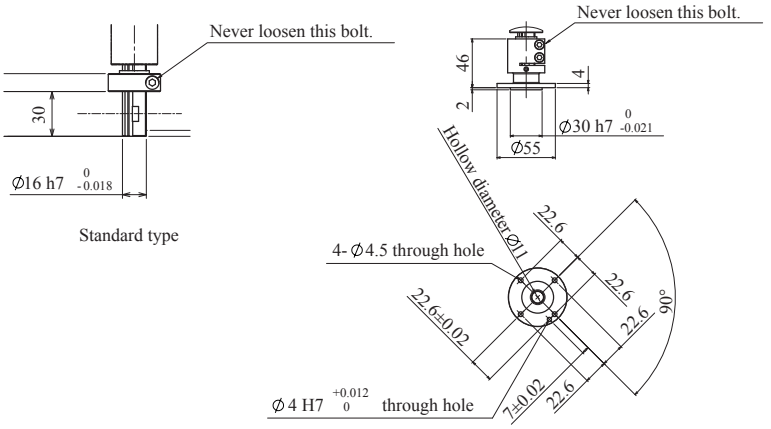
Robot Model	Bolts used	Number of bolts	Tightening torque		Hole diameter (mm)
			Nm	kgfcm	
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400	M5 or more	2 or more	9	92	16 $^{+0.018}_{0}$
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400 (Tool flange mount type)	M4	4	4.5	46	–
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M6 or more	2 or more	15.3	156	20 $^{+0.021}_{0}$
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M8 or more	2 or more	37.0	380	25 $^{+0.021}_{0}$

The following shows the details of the end effector attachment of each robot.

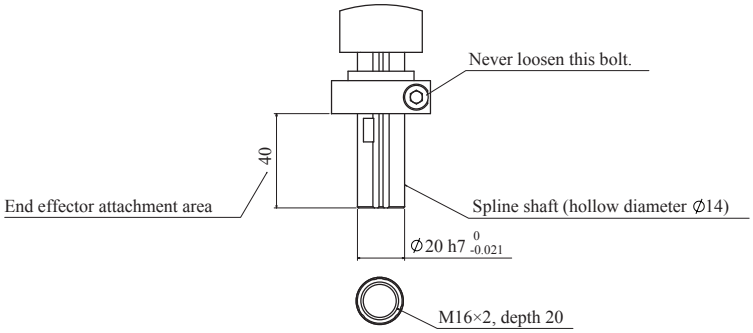
WARNING

- THE TAPPED HOLE (SHOWN IN THE FIG. BELOW) PROVIDED AT THE LOWER PORTION OF THE END EFFECTOR ATTACHMENT SHOULD BE USED ONLY FOR PREVENTING THE END EFFECTOR FROM COMING LOOSE.
- DO NOT FASTEN THE END EFFECTOR JUST BY USING THIS TAPPED HOLE. IF THE END EFFECTOR IS FASTENED ONLY WITH THIS TAPPED HOLE, IT MAY COME LOOSE FROM THE ATTACHMENT DURING ROBOT OPERATION AND FLY OFF, RESULTING IN ACCIDENTS OR INJURIES.

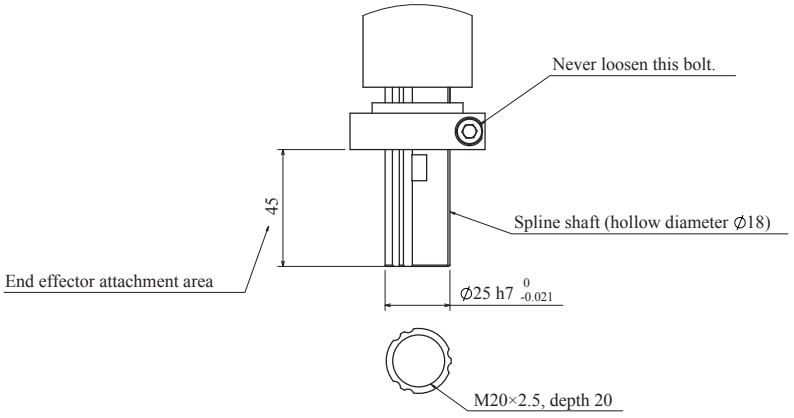
Details of end effector attachment



R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400



R6YXG500, R6YXG600, R6YXGS500, R6YXGS600



R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

For details about the depth of the tapped hole and recommended bolt, see the Table below.

Depth of tapped hole	Iron material base	Bolt diameter × 1.5 or more
	Aluminum material base	Bolt diameter × 3.0 or more
Recommended bolt	JIS B 1176 Hex socket head bolt, or equivalent (Strength class: JIS B 1051 12.9, or equivalent)	

6.5 Gripping force of end effector

The gripping force of the end effector must have a sufficient extra margin of strength versus the workpiece weight and reaction force applied to the workpiece during robot operation. The reaction force applied to the workpiece during operation can be calculated from the acceleration applied to the end effector attachment. The maximum acceleration on the end effector attachment of each robot model is listed in the table below. When the workpiece position is offset to the end effector attachment, the accelerations Amax and AXYmax become larger by an amount equal to the offset versus the arm length. When the R-axis rotates during operation, this acceleration ARmax must be taken into account.

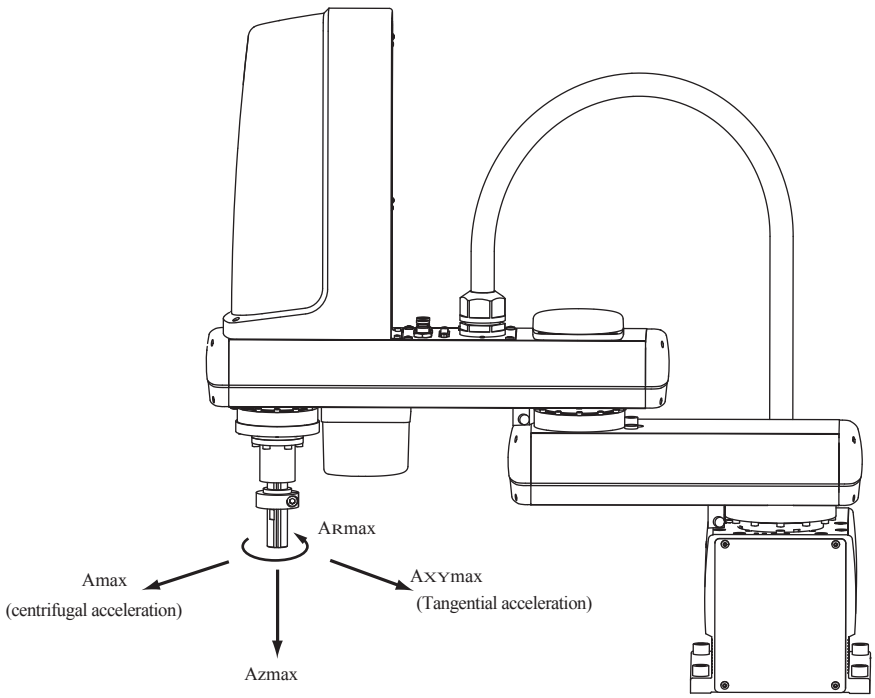
WARNING

THE GRIPPING FORCE OF THE END EFFECTOR MUST HAVE A SUFFICIENT EXTRA MARGIN OF STRENGTH TO PREVENT THE WORKPIECE FROM COMING LOOSE AND FLYING OFF DURING ROBOT OPERATION. IF THE GRIPPING FORCE IS TOO WEAK, THE WORKPIECE MAY COME LOOSE AND FLY OFF CAUSING ACCIDENTS OR INJURIES.

Maximum acceleration during robot operation

Robot Model	Amax(m/sec^2)	AXYmax(m/sec^2)	AZmax(m/sec^2)	ARmax(rad/sec^2)
R6YXGL250	88	47	23	110
R6YXGL350, R6YXGS300	108	35	23	110
R6YXGL400, R6YXGS400	98	24	23	110
R6YXGL500	62	22	23	110
R6YXGL600	54	16	23	110
R6YXG500, R6YXGS500	98	48	57	280
R6YXG600, R6YXGS600	104	41	57	280
R6YXGH600	78	60	38	176
R6YXG700, R6YXGS700	96	60	38	176
R6YXG800, R6YXGS800	101	51	38	176
R6YXG900, R6YXGS900	95	51	38	176
R6YXG1000, R6YXGS1000	95	51	38	176

Maximum acceleration on end effector attachment



7. Limiting the movement range with X-axis and Y-axis mechanical stoppers

WARNING

ALWAYS TURN OFF THE CONTROLLER BEFORE CHANGING THE MOVEMENT RANGE WITH MECHANICAL STOPPERS.

CAUTION

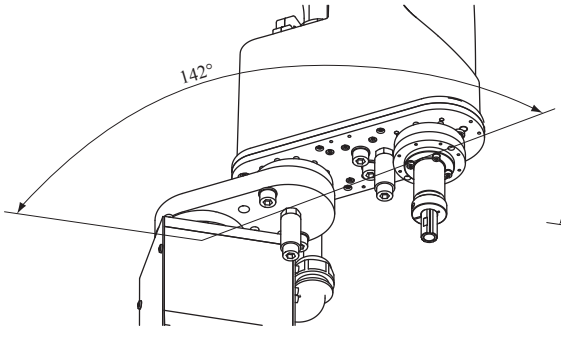
When the mechanical stopper positions are changed, the soft limits must be set to a point inside the mechanical stopper positions. (Refer to "3. Setting the soft limits" in Chapter 3.)

If the working envelope during robot work is smaller than the maximum working envelope range or if the robot interferes with peripheral units, the movement range is limited. (When the robot is shipped from factory, the movement range is set to the maximum level.)
The movement range can be limited by shifting the X-axis and Y-axis mechanical stopper positions. Follow the steps below to limit the movement range.

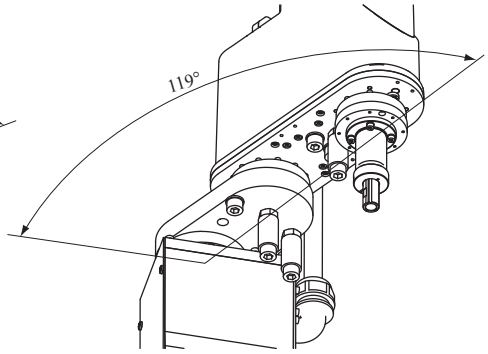
7.1 R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400

The following shows the mechanical stopper positions and movement range.

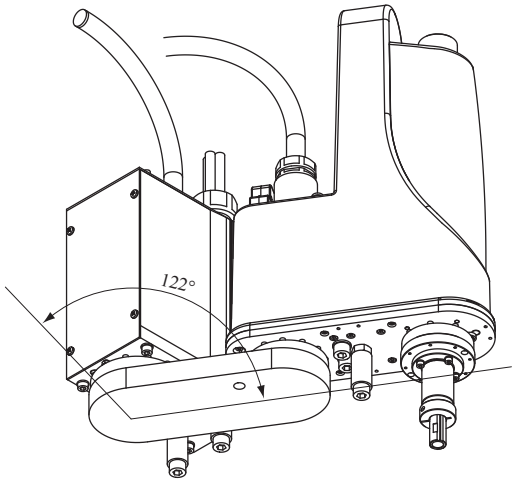
Mechanical stopper position and maximum movement position



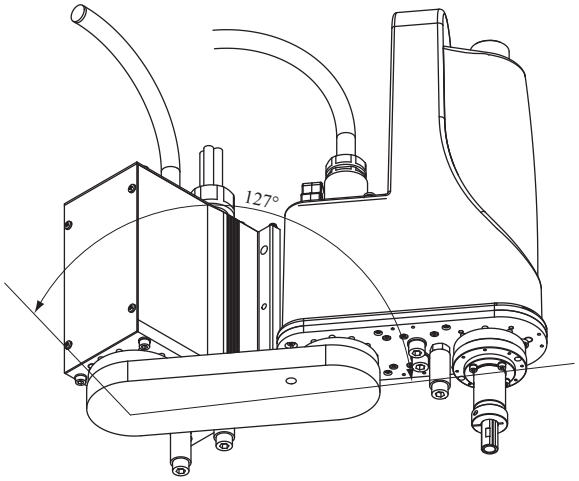
X-axis standard stopper position
(R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600)



X-axis additional stopper
(R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600)

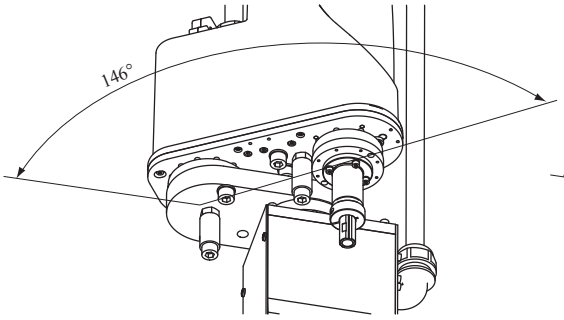


X-axis standard stopper position (R6YXGS300)
Additional stopper cannot be installed on the X-axis of the R6YXGS300.

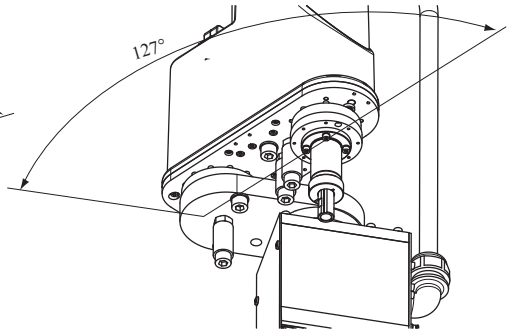


X-axis standard stopper position (R6YXGS400)
Additional stopper cannot be installed on the X-axis of the R6YXGS400.

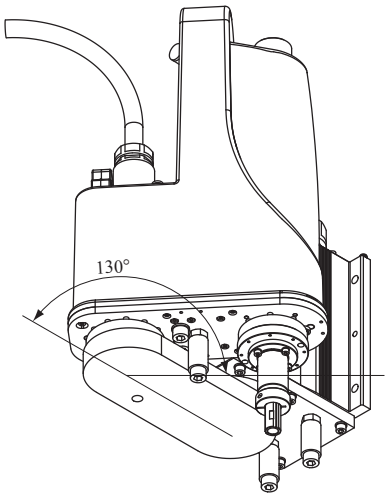
Mechanical stopper position and maximum movement position



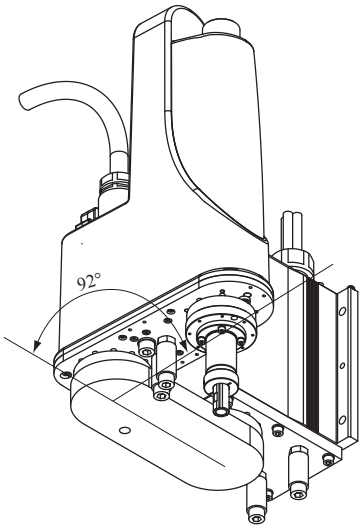
Y-axis standard stopper position
(R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600)



Y-axis additional stopper
(R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600)



Y-axis standard stopper position (R6YXGS300)



Y-axis additional stopper (R6YXGS300)

As option parts are ordered, and then they are installed, the movement ranges of the X-axis and Y-axis can be narrowed.

NOTE

Note that the stopper position may slightly deviate due to the part machining accuracy and mounting position.

After changing the mechanical stopper positions, set the soft limits to the values shown below.

Soft limits

R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600

	Standard stopper	Additional stopper
Stopper position in X-axis plus or minus direction	142°	119°
Maximum movement position in X-axis plus or minus direction	140°	117°
Stopper position in Y-axis plus or minus direction	146°	127°
Maximum movement position in Y-axis plus or minus direction	144°	125°

R6YXGS300

	Standard stopper	Additional stopper
Stopper position in X-axis plus or minus direction	122°	-
Maximum movement position in X-axis plus or minus direction	120°	-
Stopper position in Y-axis plus or minus direction	130°	92°
Maximum movement position in Y-axis plus or minus direction	130°	90°

R6YXGS400

	Standard stopper	Additional stopper
Stopper position in X-axis plus or minus direction	127°	-
Maximum movement position in X-axis plus or minus direction	125°	-
Stopper position in Y-axis plus or minus direction	146°	127°
Maximum movement position in Y-axis plus or minus direction	144°	125°

■ Soft limits after setting additional stopper

X-axis	Soft limit (pulses)	Working envelope
Working envelope in X-axis plus direction	425984	117°
Working envelope in X-axis minus direction	-425984	-117°
Y-axis	**Soft limit (pulses)**	**Working envelope**
Working envelope in Y-axis plus direction	455111	125°
Working envelope in Y-axis minus direction	-455111	-125°
Working envelope in Y-axis plus direction	327680	90°
Working envelope in Y-axis minus direction	-327680	-90°

7.1.1 Installing the X-axis/Y-axis additional mechanical stoppers

Follow the steps below to install the X-axis/Y-axis additional mechanical stoppers.
Use the bolts and nuts listed below to install optional mechanical stoppers.

	No.	Part No.	Q'ty	Remarks
Additional mechanical stopper parts in either one direction of X-axis plus or minus direction or both directions (*1)	1	KCY-M2197-000	1	Stopper damper
	2	90112-10J055	1	Bolt
	3	90189-02J106	1	Nut
Additional mechanical stopper parts in either one direction of Y-axis plus or minus direction or both directions (*1)	4	KCY-M2197-000	1	Stopper damper
	5	90112-10J055	1	Bolt
	6	90189-02J106	1	Nut

*1 : The quantity of each part shown above is 1 even when the stopper in either plus or minus direction or the stopper in both directions is added. (When adding the stopper in both directions, the existing stopper is also used after moving it.)

■ Torque wrench, etc.

CAUTION

Use accurately calibrated torque screwdrivers and torque wrenches.

	Name	Part No.	Manufacturer	Remarks
A	Torque wrench	N670SPK 17	KANON (Nakamura Mfg. Co., Ltd.)	Width across flats: 17mm. Tightening torque: 42Nm (428kgf/cm)

The X-axis and Y-axis mechanical stoppers can be individually installed in the X-axis and Y-axis plus and minus directions.
The following describes how to install the mechanical stopper using the stopper in the X-axis and Y-axis plus direction as an example. (The stopper in the minus direction can also be installed in the same manner.)
Prepare a hex wrench set.

CAUTION

When adding the stopper in one direction of the X-axis or Y-axis, do not remove the standard stopper. If this stopper is removed, the stopper on the opposite side is also lost.
(The X-axis standard stopper functions as a stopper in both the plus and minus directions.)

1 ***Turn off the controller.***

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.

3 ***Enter the safety enclosure.***

4 ***Remove the bolts and washers.***

Remove the tapped-hole plug bolts and washers from the X-axis arm.

5 ***Sandwich the damper between the bolt and nut to secure the parts.***

1. Sandwich the damper (1) between the bolt (2) and nut (3).
   At this time, use the bolt and nut listed in the Table above.
2. Secure the parts to the arm by tightening the nut to the specified torque (42Nm (428kgfcm)).

CAUTION

- When adding the stopper in one direction of the X-axis, do not remove the standard stopper. If this stopper is removed, the stopper on the opposite side is also lost.
- When installing the additional stopper in both directions of the X-axis, remove the standard stopper.

6 ***Check that the movement range is limited.***

7 ***Go out of the safety enclosure.***

8 ***Turn on the controller.***

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

9 ***Set the X-axis soft limits in the plus direction.***

When the stopper is installed in the minus direction, set the soft limits in the minus direction.

CAUTION

Whether or not the X-axis stops at a position before the stopper limited by the soft limit must be checked from the outside of the safety enclosure.

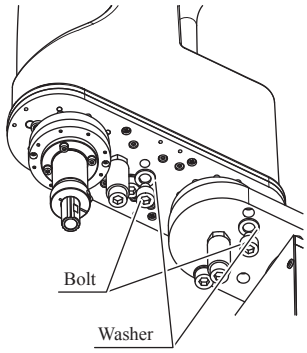
10 ***Check that the X-axis stops firmly.***

Whether or not the X-axis stops at a position before the stopper limited by the maximum soft limit must be checked from the outside of the safety enclosure.

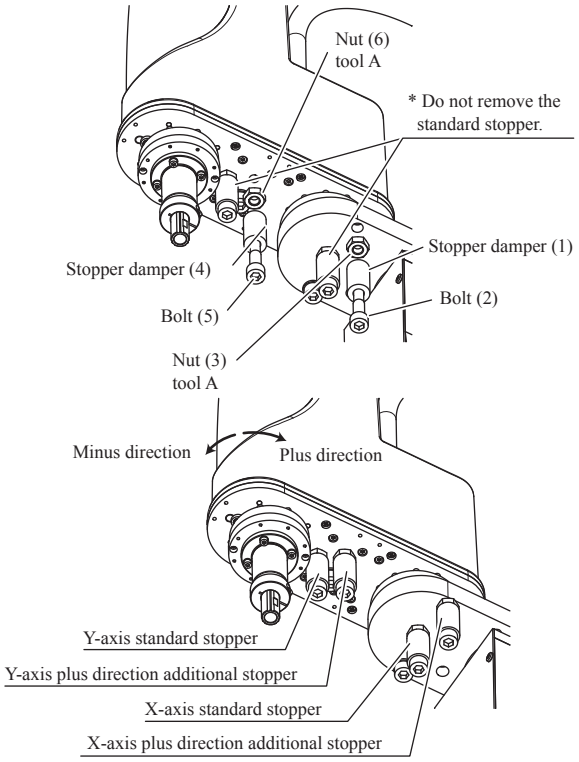
NOTE

The X-axis may not stop at a position before the stopper due to the stopper part accuracy or position. If this happens, decrease the value while referring to the Table "n Soft limits" described previously.

Step 4 Removing the tapped-hole plug bolts and washers



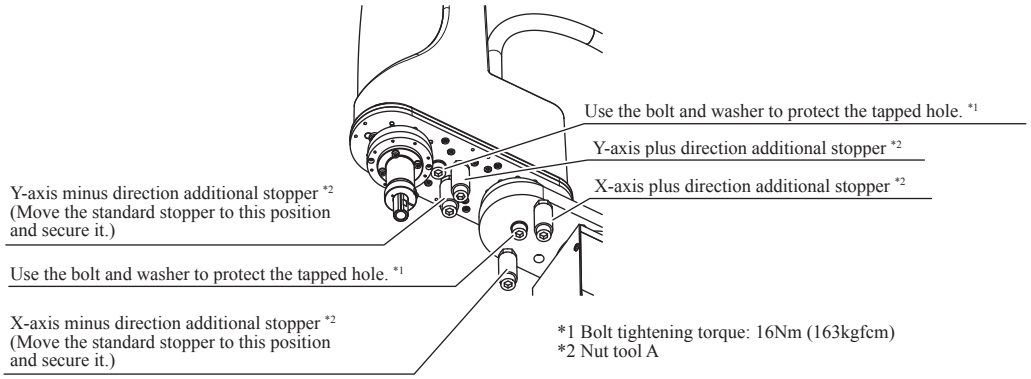
Step 5 Installing to the standard stopper



Installing the additional stoppers in both the plus and minus directions

Install the additional stoppers in both the plus and minus directions while referring to the Fig. below.

Installing the additional stoppers in both the plus and minus directions



7.1.2 Robot overrun during impacts with X-axis or Y-axis mechanical stopper

A urethane damper is installed to absorb the shock when an impact occurs with the mechanical stopper, so a certain amount of overrun occurs when the robot strikes the mechanical stopper. Use caution and take overrun into account since the end effector may interfere with the robot body and peripheral equipment or the robot body may interfere with the peripheral equipment.
Maximum overrun amounts are listed below (for normal operation, maximum payload, maximum speed).

X-axis	Y-axis
8°	4°

Note: Here, ° (deg.) is the overrun angle at the X-axis and Y-axis joints.

CAUTION

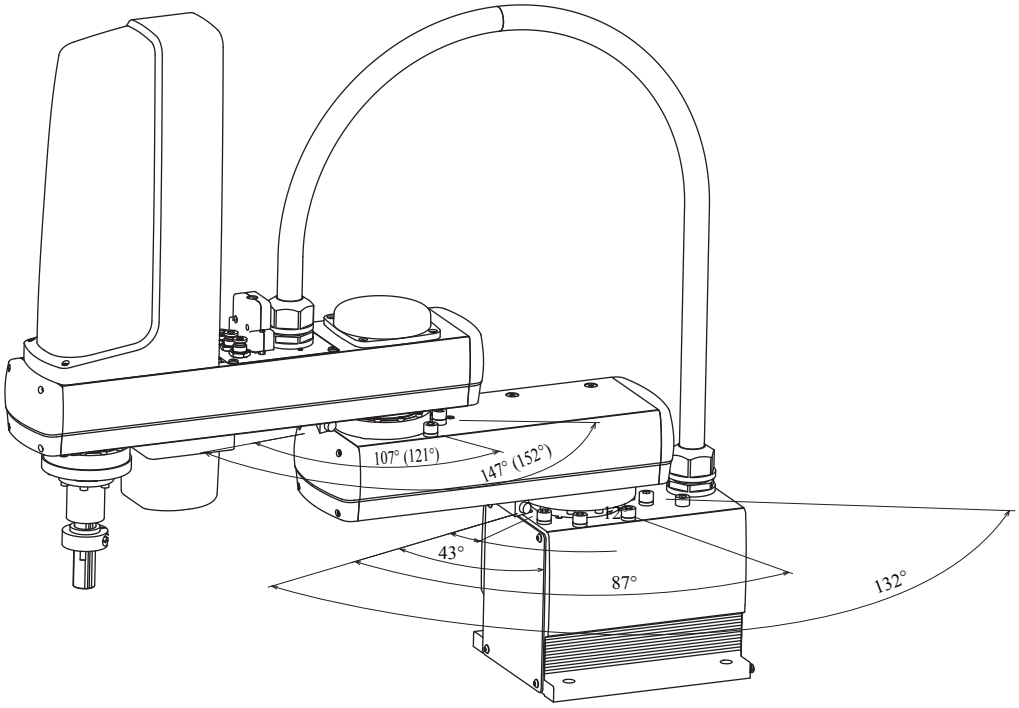
- If the X-axis or Y-axis mechanical stopper is deformed or damaged due to an impact on the stopper, please contact your distributor. Continued use of the deformed or damaged stopper is very dangerous, and so it must be replaced.
- When the robot strikes the X-axis or Y-axis mechanical stopper or another object, or when the R-axis collides with an object, the speed reduction gears are locked while being meshed if the collision impact is large. If this happens, please contact your distributor.

7.2 R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

The following shows the movement ranges.

Stopper position in plus direction

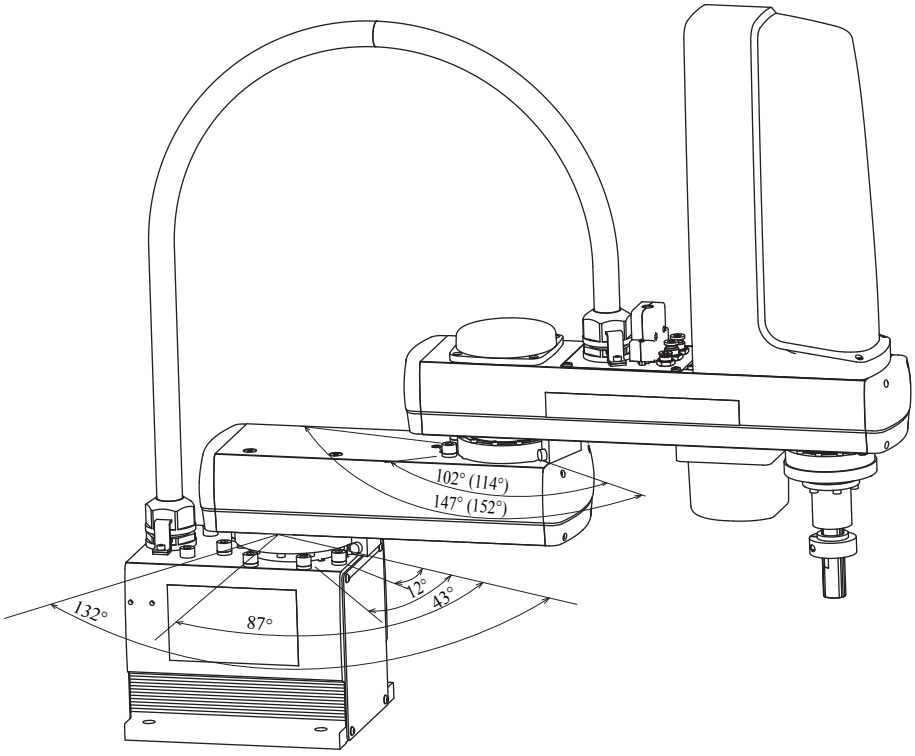
R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000



* Values in parentheses apply to the R6YXGH600, R6YXG700, R6YXG800, R6YXG900 and R6YXG1000.

Stopper position in minus direction

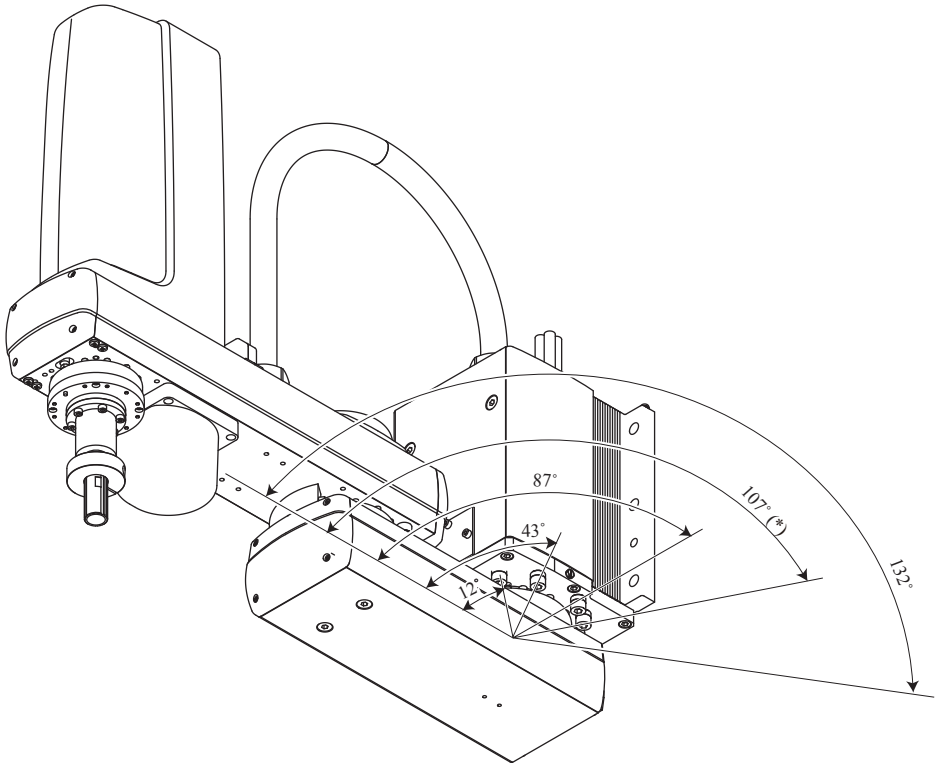
R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000



* Values in parentheses apply to the R6YXGH600, R6YXG700, R6YXG800, R6YXG900 and R6YXG1000.

Stopper position in X-axis plus direction

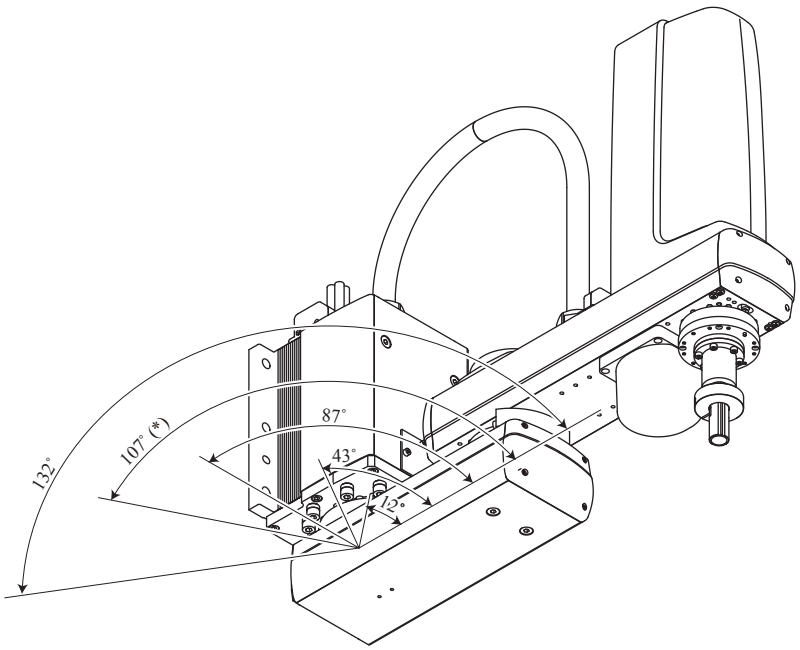
R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000



(*) R6YXGS500 and R6YXGS600 only

Stopper position in X-axis minus direction

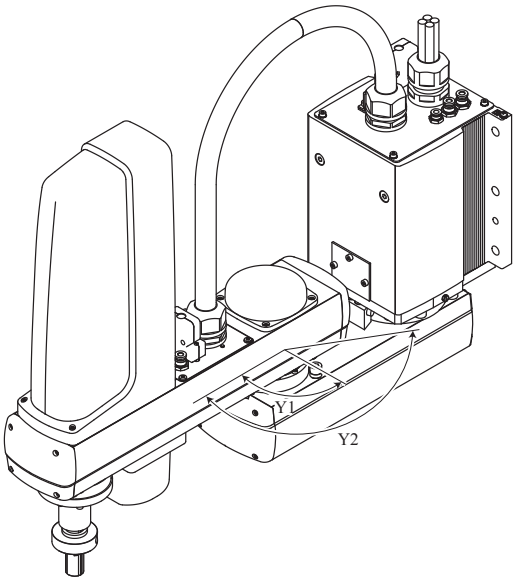
R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000



(*) R6YXGS500 and R6YXGS600 only

Stopper position in Y-axis plus direction

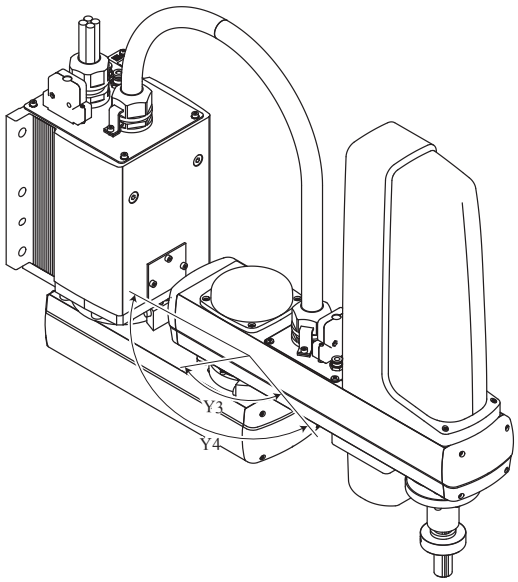
R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000



	Y1	Y2
R6YXGS500	87°	127°
R6YXGS600	107°	147°
R6YXGS700	101°	132°
R6YXGS800	116°	147°
R6YXGS900 R6YXGS1000	121°	152°

Stopper position in Y-axis minus direction

R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000



	Y3	Y4
R6YXGS500	82°	127°
R6YXGS600	102°	147°
R6YXGS700	94°	132°
R6YXGS800	109°	147°
R6YXGS900 R6YXGS1000	114°	152°

The X-axis stopper position can be changed by shifting the existing stopper position.
The Y-axis stopper position can be changed by installing the supplied parts. The following describes the necessary procedures.

NOTE

Note that the mechanical stopper position may slightly deviate due to the part machining accuracy.

Additionally, set the soft limits to the values shown below after the mechanical stopper position has been changed.

■ Soft limits

R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000

X-axis stopper position	Soft limit (pulses)	Working envelope
±12°	±32768	±9°
±43°	±145635	±40°
±87°	±305834	±84°
±132° (maximum working envelope position)	±473315	±130°

R6YXGS500, R6YXGS600

X-axis stopper position	Soft limit (pulses)	Working envelope
±12°	±32768	±9°
±43°	±145635	±40°
±87°	±305834	±84°
±107° (maximum working envelope position for R6YXGS500)	±382294	±105°
±132° (maximum working envelope position for R6YXGS600)	±473315	±130°

R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

X-axis stopper position	Soft limit (pulses)	Working envelope
±12°	±32768	±9°
±43°	±145635	±40°
±87°	±305834	±84°
±132° (maximum working envelope position)	±473315	±130°

R6YXG500, R6YXG600

Y-axis stopper position	Soft limit (pulses)	Working envelope
±147° (maximum working envelope position)	±527928	±145°
+107°	+378652	+104°
-102°	-360448	-99°

R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000

Y-axis stopper position	Soft limit (pulses)	Working envelope
±152° (maximum working envelope position)	±546133	±150°
+121°	+429264	+118°
-114°	-415061	-111°

R6YXGS500

Y-axis stopper position	Soft limit (pulses)	Working envelope
±127° (maximum working envelope position)	±455112	±125°
+87°	+305835	+84°
-82°	-287631	-79°

R6YXGS600

Y-axis stopper position	Soft limit (pulses)	Working envelope
±147° (maximum working envelope position)	±527928	±145°
+107°	+378652	+104°
-102°	-360448	-99°

R6YXGS700

Y-axis stopper position	Soft limit (pulses)	Working envelope
±132° (maximum working envelope position)	±473316	±130°
+101°	+356808	+98°
-94°	-331321	-91°

R6YXGS800

Y-axis stopper position	Soft limit (pulses)	Working envelope
±147° (maximum working envelope position)	±527929	±145°
+116°	+411421	+113°
-109°	-385935	-106°

R6YXGS900, R6YXGS1000

Y-axis stopper position	Soft limit (pulses)	Working envelope
±152° (maximum working envelope position)	±546133	±150°
+121°	+429264	+118°
-114°	-415061	-111°

7.2.1 Changing the X-axis mechanical stopper position

The X-axis mechanical stopper position can be changed by shifting the existing stopper position. Follow the steps below to change the position.

The following describes how to change the X-axis mechanical stopper position from the maximum working envelope position (132°) to the 87°-position.
Prepare a hex wrench set.

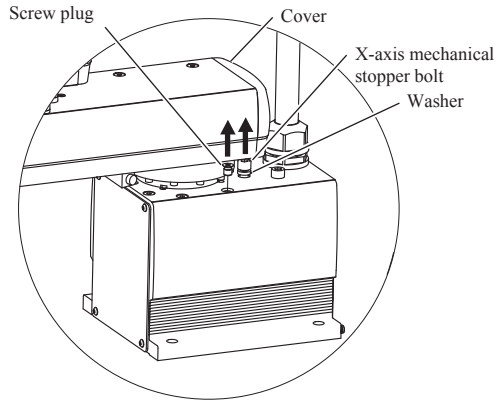
1 ***Turn off the controller.***

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.

3 ***Enter the safety enclosure.***

4 ***Remove the screw plug, mechanical stopper bolt, and washer.***
Remove the screw plug, X-axis mechanical stopper bolt, and washer as shown in the Fig. on the right.
On the following models, the cover must be detached in order to remove the bolt: R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000.

▶ **Step 4** **Remove the screw plug, mechanical stopper bolt, and washer.**



5 ***Move the mechanical stopper bolt and washer.***

Move the X-axis mechanical stopper bolt and washer to a position you want to narrow the movement range.

[Number of washers]

R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	1 pc.
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	2 pcs.

6 ***Tighten the mechanical stopper bolt and washer.***

The specified tightening torque is shown in the Table on the right.

7 ***Install the screw plug.***

Install the screw plug that has been removed at the position where the X-axis mechanical stopper has been installed before moving.

8 ***Check that the movement range is limited.***

Check that the movement range is limited by the mechanical stopper that has been moved.

9 ***Go out of the safety enclosure.***

10 ***Turn on the controller.***

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

11 ***Set the soft limits.***

CAUTION

Whether or not the X-axis stops at a position before the stopper limited by the soft limit must be checked from the outside of the safety enclosure.

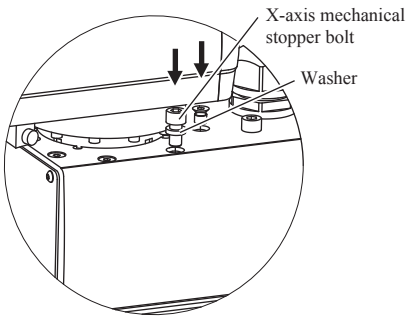
12 ***Check that the X-axis stops firmly.***

Check that the X-axis stops at a position before the stopper limited by the soft limit.

NOTE

The X-axis may not stop at a position before the stopper due to the stopper part accuracy or position. If this happens, decrease the value while referring to the Table "n Soft limits" described previously.

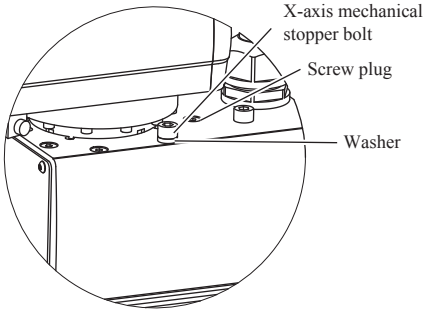
Step 5 Moving the mechanical stopper bolt and washer



Robot model	Bolt size	Tightening torque (kgfcm)	Tightening torque (Nm)
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M8	380	37.2
R6YXGH600, R6YXG700, R6YXG800,R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M10	459	45.0

* Be sure to use the bolts supplied by OMRON.

Step 6-7 Installing the mechanical stopper and washer



7.2.2 Changing the Y-axis mechanical stopper position

The Y-axis mechanical stopper position is changed by installing the supplied parts.

■ Supplied parts

R6YXG500, R6YXG600

	No.	Part No.	Q'ty	Remarks (supplied)
Additional mechanical stopper parts in either one direction of Y-axis plus or minus direction (*1)	1	KBF-M1123-001	1	Washer (*2)
	2	91312-08016	1	Bolt

R6YXGS500, R6YXGS600

	No.	Part No.	Q'ty	Remarks (supplied)
Additional mechanical stopper parts in either one direction of Y-axis plus or minus direction (*1)	1	KBF-M1123-001	2	Washer (*2)
	2	91312-08016	2	Bolt

*1 : Since the X-axis has two stoppers as standard, no additional stopper will be needed for changing the X-axis stopper position.
To change the Y-axis stopper position in the plus or minus direction or even in both directions, use one each of the above stopper parts.
(When the stopper in both directions is added, the existing stopper is also used after moving it.)

*2 : Washers are also used when moving the robot using the eyebolts. After having moved the robot, use the washers to change the stopper position.
If the washers are needed again to move the robot using the eyebolts, remove the washers from the stopper and then place them underneath the eyebolts.

R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000

	No.	Part No.	Q'ty	Remarks (supplied)
Additional mechanical stopper parts in either one direction of Y-axis plus or minus direction (*1)	1	KBP-M1123-001	2	Washer (*2)
	2	90112-10J025	1	Bolt

R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

	No.	Part No.	Q'ty	Remarks (supplied)
Additional mechanical stopper parts in either one direction of Y-axis plus or minus direction (*1)	1	KBP-M1123-001	4	Washer (*2)
	2	90112-10J025	2	Bolt

*1 : Since the X-axis has two stoppers as standard, no additional stopper will be needed for changing the X-axis stopper position.
To change the Y-axis stopper position in the plus or minus direction or even in both directions, use one each of the above stopper parts.
(When the stopper in both directions is added, the existing stopper is also used after moving it.)

*2 : Washers are also used when moving the robot using the eyebolts. After having moved the robot, use the washers to change the stopper position.
If the washers are needed again to move the robot using the eyebolts, remove the washers from the stopper and then place them underneath the eyebolts.

■ Changing in plus or minus direction (one direction only)

The Y-axis mechanical stopper position can be changed in either plus or minus direction (one direction only) using the supplied washers and bolt.

1 ***Remove the tapped-hole plug screw.***

CAUTION

Do not remove the standard stopper. If this stopper is removed, the stopper on the opposite side is also lost.

2 ***Install the washer (1) and bolt (2).***

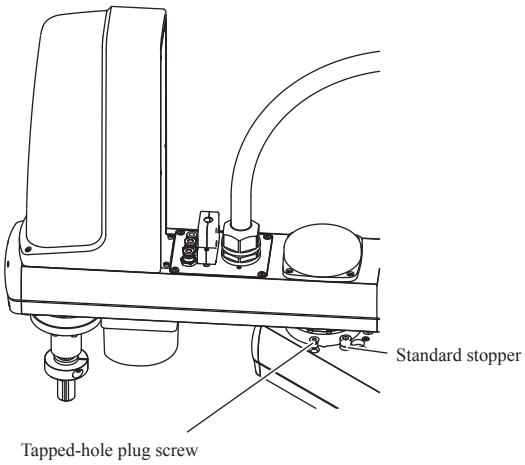
[Number of washers]

R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	1 pc.
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	2 pcs.

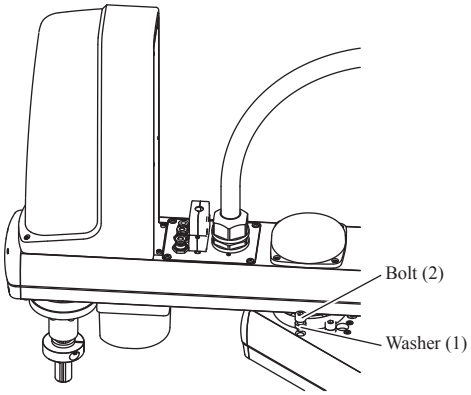
3 ***Tighten to the specified torque.***

The specified tightening torque is shown in the Table on the right.

▶ Step 1 Removing the tapped-hole plug screw



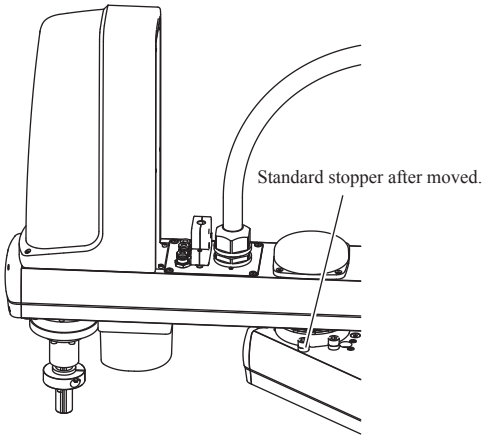
▶ Step 2 Installing the washer and bolt (1)



Robot model	Bolt size	Tightening torque (kgfcm)	Tightening torque (Nm)
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M8	380	37.2
R6YXGH600, R6YXG700, R6YXG800,R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900,R6YXGS1000	M10	459	45.0

* Be sure to use the bolts supplied by OMRON.

▶ Step 3 Installing the washer and bolt (2)



■ Changing in both directions (plus and minus directions)

When changing the Y-axis mechanical stopper position in both directions, use also the standard stopper after removing it.

1 ***Remove the tapped-hole plug screw.***

2 ***Remove the standard stopper.***

3 ***Move the tapped-hole plug screw.***

4 ***Move the standard stopper.***

Install the washer and bolt.

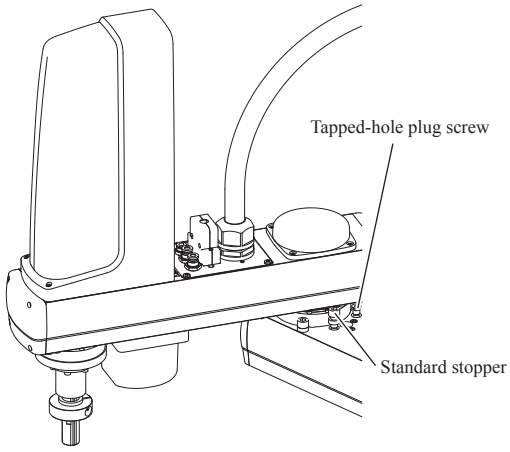
[Number of washers]

R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	1 pc.
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	2 pcs.

5 ***Tighten to the specified torque.***

The specified tightening torque is shown in the Table on the right.

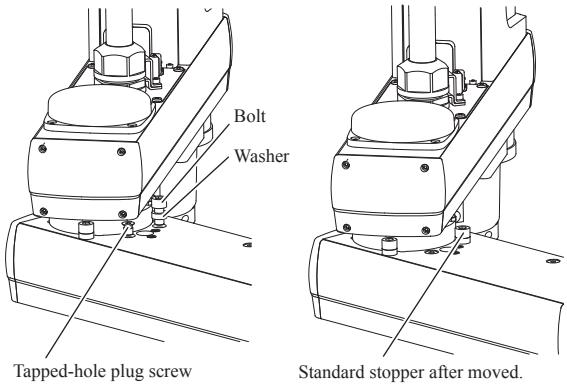
▶ Step 1-2 Removing the tapped-hole plug screw and standard stopper



Robot model	Bolt size	Tightening torque (kgfcm)	Tightening torque (Nm)
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M8	380	37.2
R6YXGH600, R6YXG700, R6YXG800,R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900,R6YXGS1000	M10	459	45.0

* Be sure to use the bolts supplied by OMRON.

▶ Step 3-5 Changing the tapped-hole plug screw and standard stopper position



7.2.3 Robot overrun during impacts with X-axis or Y-axis mechanical stopper

A urethane damper is installed to absorb the shock when an impact occurs with the mechanical stopper, so a certain amount of overrun occurs when the robot strikes the mechanical stopper. Use caution and take overrun into account since the end effector may interfere with the robot body and peripheral equipment or the robot body may interfere with the peripheral equipment.
Maximum overrun amounts are listed below (for normal operation, maximum payload, maximum speed).

Robot model	X-axis	Y-axis
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	9°	16°
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	9°	16°

Note: Here, ° (deg.) is the overrun angle at the X-axis and Y-axis joints.

CAUTION

- If the X-axis or Y-axis mechanical stopper is deformed or damaged due to an impact on the stopper, please contact your distributor. Continued use of the deformed or damaged stopper is very dangerous, and so it must be replaced.
- When the robot strikes the X-axis or Y-axis mechanical stopper or another object, or when the R-axis collides with an object, the speed reduction gears are locked while being meshed if the collision impact is large. If this happens, please contact your distributor.

8. Limiting the movement range with Z-axis mechanical stopper

As option parts are ordered, and then they are installed, the Z-axis movement range can be narrowed.

WARNING

BEFORE STARTING THE WORK, THOROUGHLY READ "13. DETACHING OR ATTACHING THE COVERS" IN THIS CHAPTER.

WARNING

ALWAYS TURN OFF THE CONTROLLER BEFORE CHANGING THE MOVEMENT RANGE WITH MECHANICAL STOPPERS.

WARNING

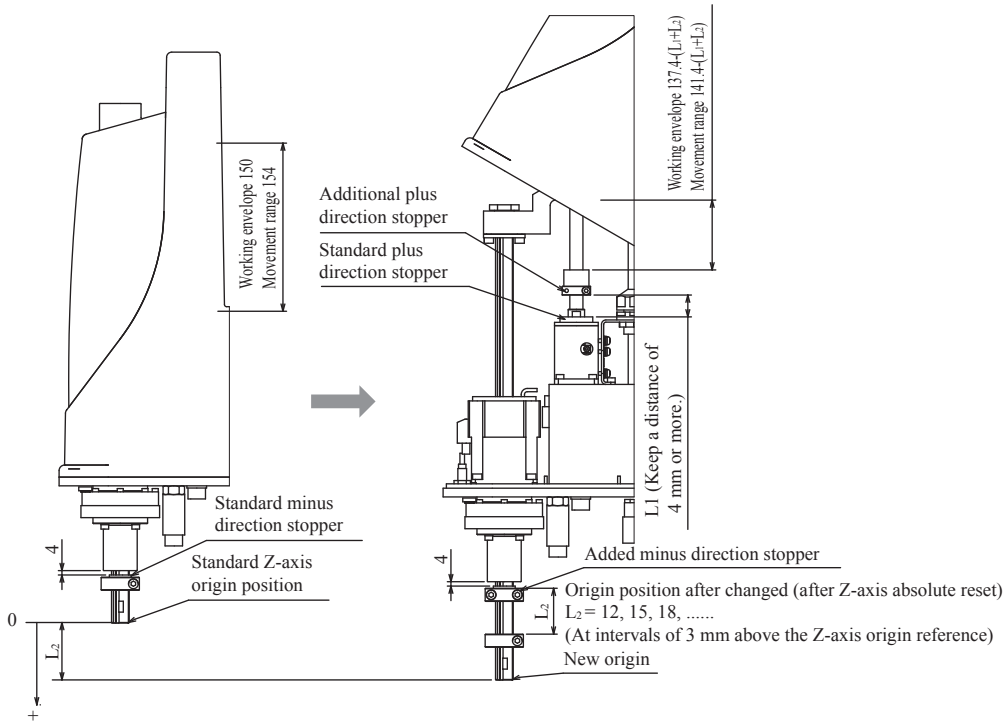
WHEN INSTALLING THE PLUS DIRECTION STOPPER ON THE R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000, R6YXGS700, R6YXGS800, R6YXGS900 OR R6YXGS1000, THE Z-AXIS ACCELERATION MAY NEED TO DECREASE. FOR DETAILS, SEE "8.2.2 INSTALLING THE PLUS DIRECTION STOPPER".

CAUTION

After the mechanical stopper positions are changed, the soft limits must be set to a point inside the mechanical stopper positions.

8.1 R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400

Limiting the movement range using Z-axis mechanical stopper



Z-axis stopper positions

	Standard stopper	Additional stopper
Stopper position in Z-axis plus direction (*1)	154mm	141.4-L_1mm
Maximum movement position in Z-axis plus direction (*1)	150mm	137.4-L_1mm
Stopper position in Z-axis minus direction (*1)	-4mm	L_2-4mm
Maximum movement position in Z-axis minus direction (origin position) (*1)	0mm	L_2mm (*2)

*1 : The Z-axis movement range and working envelope indicate the positions when the downward direction relative to the initial Z-axis origin position is set as the plus direction.
The actual origin position is lowered by L_2 and the movement range and stroke are reduced by $L_1 + L_2$.

*2 : Depending on the relation to the Z-axis machine reference adjustment, L_2 will be a position at 3mm intervals, such as approximately 12mm, 15mm, etc.

NOTE

Note that the stopper position may slightly deviate due to the part machining accuracy and mounting position.

After installing the mechanical stoppers, set the soft limits to the values shown below.

■ Soft limits after installing additional stoppers

	Soft limit (pulses)	Working envelope
Working envelope in Z-axis plus direction	16384 (137.4-(L_1+L_2)) /12	137.4-(L_1+L_2)mm
Working envelope in Z-axis minus direction	-683	-0.5mm

L_1 minimum value = 11, L_2 minimum value = 12

The following shows the additional parts (option).

■ Additional parts

	No.	Part No.	Q'ty	Remarks
Additional mechanical stopper parts in Z-axis plus direction	1	KBE-M1780-000	1	Stopper block
	2	KCY-M1789-000	1	Damper
	3	91312-04012	2	Bolt

	No.	Part No.	Q'ty	Remarks
Additional mechanical stopper parts in Z-axis minus direction	4	KN3-M183A-100	1	Stopper block (supplied bolt)

8.1.1 Installing the minus direction stopper

Follow the steps below to install the additional mechanical stopper in the Z-axis minus direction.
Prepare a hex wrench set and torque wrench.

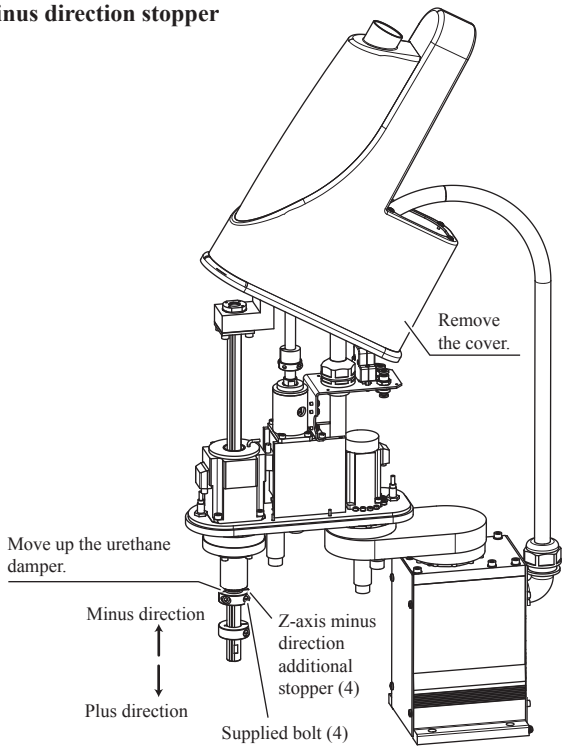
1 ***Turn off the controller.***

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.

3 ***Enter the safety enclosure.***

4 ***Remove the Y-axis arm cover and move up the urethane damper.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

Installing the minus direction stopper



5 ***Install the additional stopper.***

Install the additional stopper (4) to the spline shaft by tightening the supplied bolts to the specified torque.
• Tightening torque: 9 Nm (92 kgfcm)
Alternately tighten the bolts a little at a time.

NOTE

For the minus direction stopper position, depending on the relation to the Z-axis origin reference adjustment, L_2 stated in the "■ Z-axis stopper positions" table described previously will be a position at 3mm intervals, such as approximately 12mm, 15mm, etc.

6 ***Go out of the safety enclosure.***

7 ***Turn on the controller.***

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

8 ***Perform the Z-axis absolute reset.***

NOTE

For details about how to perform the Z-axis absolute reset, see "2.3 Absolute reset procedures" in Chapter 3.

9 ***Make a note of the Z-axis machine reference value.***

CAUTION

When adjusting the machine reference value, always follow the steps below to check the adjustment machine reference value.

1. Press the MODE key.
2. Press the F3 key to enter MANUAL mode.
3. Press the F13 (LOWER + F3) key to select "ABS Reset".
4. After the Z-axis absolute reset is completed, press the F10 (UPPER + F5) key to display the adjustment machine reference value (%).

When the machine reference is within the allowable range (between 30 and 70%), proceed to step 16.
When the machine reference is beyond the allowable range, proceed to step 11.

10 ***Turn off the controller.***

11 ***Enter the safety enclosure.***

12 ***Put a mark at the additional stopper position.***

13 ***Loosen the stopper bolt.***

Machine reference value < 30%: Move the additional stopper in the plus direction.
Machine reference value > 70%: Move the additional stopper in the minus direction.
As an approximate guide, a 3mm-movement equals 100%.

14 ***Check the machine reference value again.***

Repeat the same procedure from step 5) until the machine reference is within the allowable range.

When the machine reference is set within the allowable range,

15 ***Go out of the safety enclosure.***

16 ***Turn on the controller.***

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

17 ***Set the soft limits.***
See the Table "n Soft limits after installing additional stoppers".
The soft limit in the minus direction is already set by default to the value shown in the Table "n Soft limits after installing additional stoppers".

18 ***Check that Z-axis stops firmly.***
Whether or not the Z-axis stops at a position before the stopper by the soft limit must be checked from the outside of the safety enclosure.

NOTE
The X-axis may not stop at a position before the stopper due to the stopper part accuracy or position. If this happens, increase the value while referring to the Table "n Soft limits after installing additional stoppers" described previously.

19 ***Check that the movement range is limited.***

20 ***Turn off the controller.***

21 ***Enter the safety enclosure.***

22 ***Reattach the Y-axis arm cover.***

8.1.2 Installing the plus direction stopper

Follow the steps below to install the additional stopper in the Z-axis plus direction.
Prepare a hex wrench set and torque wrench.

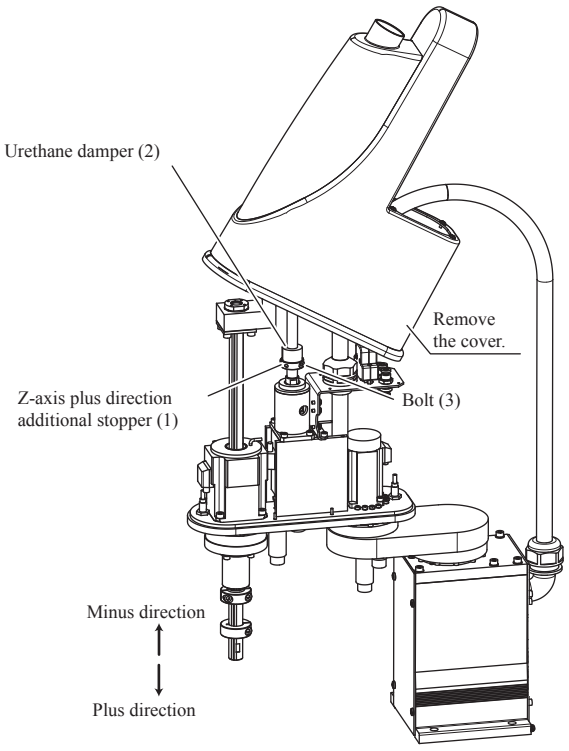
1 ***Turn off the controller.***

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.

3 ***Enter the safety enclosure.***

4 ***Remove the Y-axis arm cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

Installing the plus direction stopper



5 ***Install the additional stopper.***

Install the additional stopper (1) to the ball screw by tightening the bolts (3) to the specified torque shown below.

• Tightening torque: 4.5 Nm (46 kgfcm)

Alternately tighten the bolts a little at a time.

The stopper position in the plus direction L_1 must be 4mm or more.

6 ***Secure the urethane damper.***

Widen the notch part of the urethane damper (2), pass it through the ball screw shaft, and bond it onto the additional stopper (1) in the Z-axis plus direction using adhesive. Use ThreeBond 1739 instant adhesive as the adhesive. Fully degrease the bonding surfaces before applying the adhesive.

7 ***Go out of the safety enclosure.***

8 ***Turn on the controller.***

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

9 ***Set the soft limits.***

Set the soft limits in the plus direction while referring to the calculation values shown in the Table "nSoft limits after installing additional stoppers" described previously.

10 ***Check that Z-axis stops firmly.***

Whether or not the Z-axis stops at a position before the stopper by the soft limit must be checked from the outside of the safety enclosure.

NOTE

The Z-axis may not stop at a position before the stopper due to the stopper part accuracy or position. If this happens, decrease the value while referring to the Table "nSoft limits after installing additional stoppers" described previously.

11 ***Check that the movement range is limited.***

12 ***Turn off the controller.***

13 ***Enter the safety enclosure.***

14 ***Reattach the Y-axis arm cover.***

8.1.3 Overrun amounts during impacts with Z-axis additional mechanical stopper

A urethane damper is installed to absorb the shock when an impact occurs with the mechanical stopper, so a certain amount of overrun occurs when the robot strikes the mechanical stopper. Use caution and take overrun into account since the end effector may interfere with the robot body and peripheral equipment or the robot body may interfere with the peripheral equipment. Maximum overrun amounts are listed below (for normal operation, maximum payload, maximum speed).

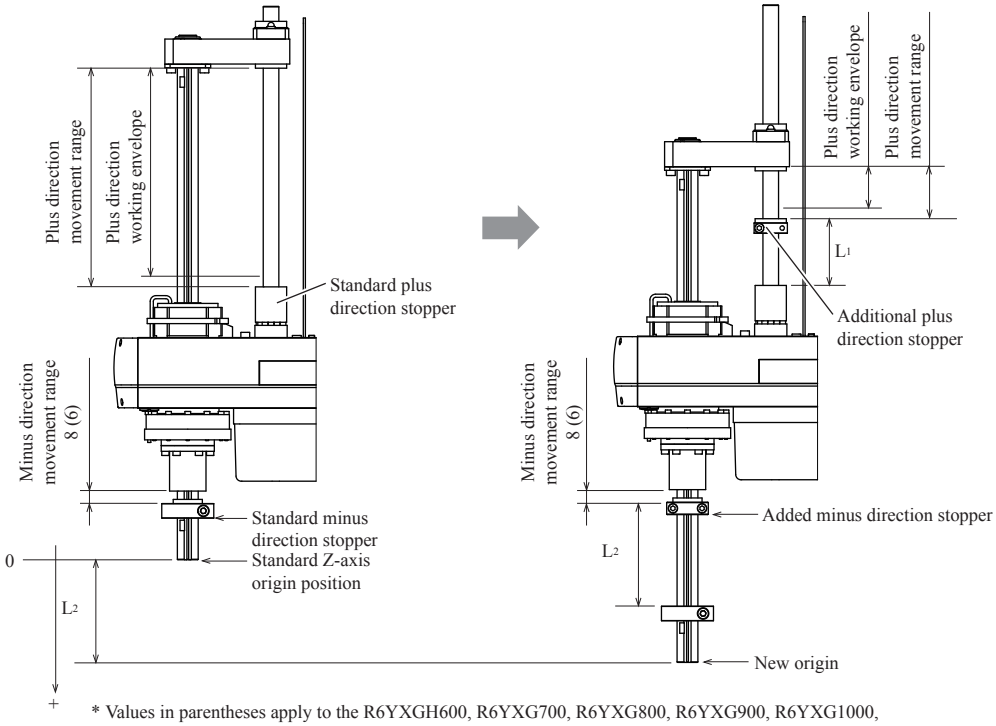
Upper end	Lower end
1mm	1mm

CAUTION

After the robot strikes the Z-axis mechanical stopper, the stopper position may shift, and so check the stopper position. If shifted, move the stopper to the correct position and refasten it securely by following the assembly procedure.

8.2 R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

Limiting the movement range using Z-axis mechanical stopper



* Values in parentheses apply to the R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000, R6YXGS700, R6YXGS800, R6YXGS900 and R6YXGS1000.

■ Z-axis stopper positions

R6YXG500, R6YXG600, R6YXGS500, R6YXGS600 Z=200mm stroke type

	Standard stopper	Additional stopper
Stopper position in Z-axis plus direction (*1)	210mm	210-L_1mm
Maximum movement position in Z-axis plus direction (*1)	200mm	200-L_1mm
Stopper position in Z-axis minus direction (*1)	-8mm	L_2-8mm
Maximum movement position in Z-axis minus direction (origin position) (*1)	0mm	L_2mm (*2)

R6YXG500, R6YXG600, R6YXGS500, R6YXGS600 Z=300mm stroke type

	Standard stopper	Additional stopper
Stopper position in Z-axis plus direction (*1)	310mm	310-L_1mm
Maximum movement position in Z-axis plus direction (*1)	300mm	300-L_1mm
Stopper position in Z-axis minus direction (*1)	-8mm	L_2-8mm
Maximum movement position in Z-axis minus direction (origin position) (*1)	0mm	L_2mm (*2)

R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 Z=200mm stroke type
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000 Z=200mm stroke type

	Standard stopper	Additional stopper
Stopper position in Z-axis plus direction (*1)	212mm	212-L_1mm
Maximum movement position in Z-axis plus direction (*1)	200mm	200-L_1mm
Stopper position in Z-axis minus direction (*1)	-6mm	L_2-6mm
Maximum movement position in Z-axis minus direction (origin position) (*1)	0mm	L_2mm (*2)

R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 Z=400mm stroke type
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000 Z=400mm stroke type

	Standard stopper	Additional stopper
Stopper position in Z-axis plus direction (*1)	412mm	412-L_1mm
Maximum movement position in Z-axis plus direction (*1)	400mm	400-L_1mm
Stopper position in Z-axis minus direction (*1)	-6mm	L_2-6mm
Maximum movement position in Z-axis minus direction (origin position) (*1)	0mm	L_2mm (*2)

*1 : The Z-axis movement range and working envelope indicate the positions when the downward direction relative to the initial Z-axis origin position is set as the plus direction.
The actual origin position is lowered by L_2 and the movement range and stroke are reduced by $L_1 + L_2$.
*2 : Depending on the relation to the Z-axis machine reference adjustment, L_2 will be a position at 5mm intervals, such as approximately 15mm, 20mm, etc.

After installing the mechanical stoppers, set the soft limits to the values shown below.

■ Soft limits after installing additional stoppers

Z=200mm stroke type

	Soft limit (pulses)	Working envelope
Working envelope in Z-axis plus direction	16384 (200- (L_1+L_2)) /20	200- (L_1+L_2)mm
Working envelope in Z-axis minus direction	-819	-1mm

Z=300mm stroke type

	Soft limit (pulses)	Working envelope
Working envelope in Z-axis plus direction	16384 (300- (L_1+L_2)) /20	300- (L_1+L_2)mm
Working envelope in Z-axis minus direction	-819	-1mm

Z=400mm stroke type

	Soft limit (pulses)	Working envelope
Working envelope in Z-axis plus direction	16384 (400- (L_1+L_2)) /20	400- (L_1+L_2)mm
Working envelope in Z-axis minus direction	-819	-1mm

L_1 minimum value = 14, L_2 minimum value = 15

NOTE
Note that the stopper position may slightly deviate due to the part machining accuracy and mounting position.

The following shows the additional parts (option).

■ Additional parts

	No.	Part No.	Q'ty	Remarks
Additional mechanical stopper parts in Z-axis plus direction	1	KBF-M1781-000	1	Stopper block
	2	KBF-M1788-100	1	Damper
	3	91312-05016	2	Bolt

R6YXG500, R6YXG600, R6YXGS500, R6YXGS600

	No.	Part No.	Q'ty	Remarks
Additional mechanical stopper parts in Z-axis minus direction	4	KBF-M183A-000	1	Stopper block (supplied bolt)

R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

	No.	Part No.	Q'ty	Remarks
Additional mechanical stopper parts in Z-axis minus direction	4	KBP-M183A-000	1	Stopper block (supplied bolt)

8.2.1 Installing the minus direction stopper

Follow the steps below to install the additional mechanical stopper in the Z-axis minus direction.
Prepare a hex wrench set.

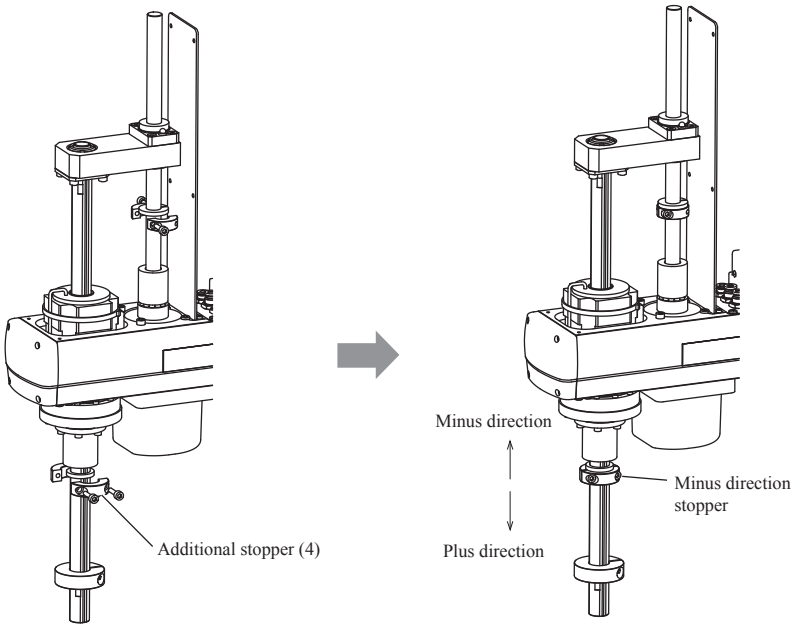
1 ***Turn off the controller.***

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.

3 ***Enter the safety enclosure.***

4 ***Remove the Y-axis arm cover and move up the urethane damper.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

Installing the minus direction stopper



5 ***Degrease the spline.***
Be sure to degrease the inner diameter cylindrical surface of the additional stopper and the spline where the stopper is to be installed.

6 ***Install the additional stopper.***
Install the additional stopper (4) to the spline shaft by tightening the supplied bolts to the specified torque.
• Tightening torque: 15.3 Nm (156 kgfcm)
Alternately tighten the bolts a little at a time.

NOTE
For the minus direction stopper position, depending on the relation to the Z-axis origin reference adjustment, L_2 stated in the "■ Z-axis stopper positions" table described previously will be a position at 5mm intervals, such as approximately 15mm, 20mm, etc.

7 ***Go out of the safety enclosure.***

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

9 ***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 and operation panel.

10 ***Perform the Z-axis absolute reset.***

NOTE
For details about how to perform the Z-axis absolute reset, see "2.3 Absolute reset procedures" in Chapter 3.

11 ***Make a note of the Z-axis machine reference value.***

CAUTION

When adjusting the machine reference value, always follow the steps below to check the adjustment machine reference value.

1. Press the MODE key.
2. Press the F3 key to enter MANUAL mode.
3. Press the F13 (LOWER + F3) key to select "ABS Reset".
4. After the Z-axis absolute reset is completed, press the F10 (UPPER + F5) key to display the adjustment machine reference value (%).

When the machine reference is within the allowable range (between 26 and 74%), proceed to step 17.
When the machine reference is beyond the allowable range, proceed to step 12.

12 ***Turn off the controller.***

13 ***Enter the safety enclosure.***

14 ***Put a mark at the additional stopper position.***

15 ***Loosen the stopper bolt.***

Machine reference value < 26%: Move the additional stopper in the plus direction.
Machine reference value > 74%: Move the additional stopper in the minus direction.
As an approximate guide, a 5mm-movement equals 100%.

16 ***Check the machine reference value again.***

Repeat the same procedure from step 5) until the machine reference is within the allowable range.

When the machine reference is set within the allowable range,

17 ***Go out of the safety enclosure.***

18 ***Turn on the controller.***

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

19 ***Set the soft limits.***

See the Table "nSoft limits after installing additional stoppers".
The soft limit in the minus direction is already set by default to the value shown in the Table "nSoft limits after installing additional stoppers".

20 ***Check that Z-axis stops firmly.***

Whether or not the Z-axis stops at a position before the stopper by the soft limit must be checked from the outside of the safety enclosure.

NOTE

The X-axis may not stop at a position before the stopper due to the stopper part accuracy or position. If this happens, increase the value while referring to the Table "nSoft limits after installing additional stoppers" described previously.

21 ***Check that the movement range is limited.***

22 ***Turn off the controller.***

23 ***Enter the safety enclosure.***

24 ***Reattach the Y-axis arm cover.***

8.2.2 Installing the plus direction stopper

Follow the steps below to install the additional stopper in the Z-axis plus direction.
Prepare a hex wrench set.

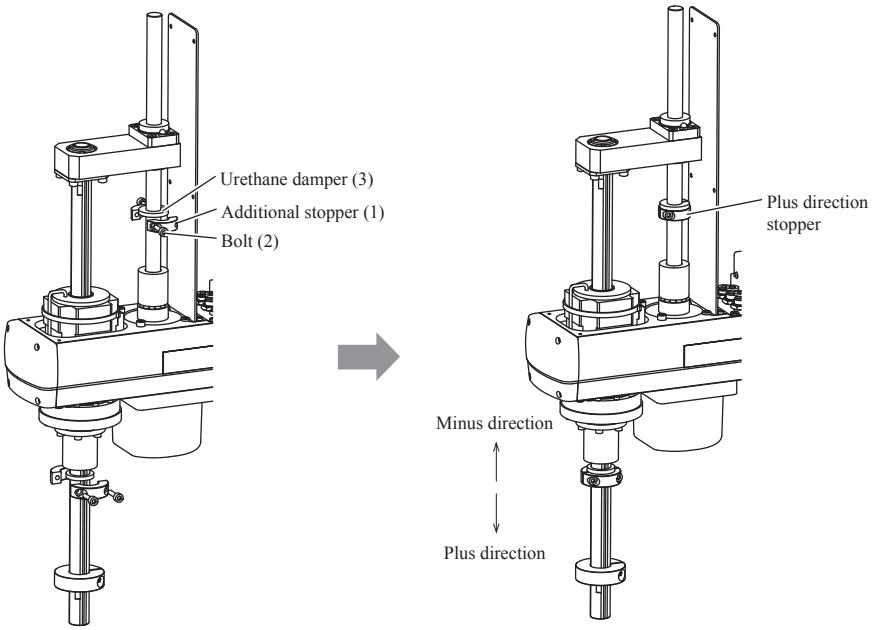
1 ***Turn off the controller.***

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.

3 ***Enter the safety enclosure.***

4 ***Remove the Y-axis arm cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

Installing the plus direction stopper



5 ***Degrease the ball screw.***
Be sure to degrease the inner diameter cylindrical surface of the additional stopper and the ball screw where the stopper is to be installed.

6 ***Install the additional stopper.***
Install the additional stopper (1) to the ball screw by tightening the bolts (2) to the specified torque shown below.
• Tightening torque: 11.8 Nm (120 kgfcm)
Alternately tighten the bolts a little at a time.
There is no restriction on the stopper position in the plus direction.

7 ***Secure the urethane damper.***
Open the urethane damper (3), fit it onto the ball screw, and bond it to the upper surface of (1) using adhesive. Use ThreeBond 1739 instant adhesive as the adhesive. Fully degrease the bonding surfaces before applying the adhesive.

8 ***Go out of the safety enclosure.***

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

10 ***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 and operation panel.

11 ***Set the soft limits.***

Set the soft limits in the plus direction while referring to the calculation values shown in the Table "nSoft limits after installing additional stoppers" described previously.

12 ***Check that Z-axis stops firmly.***

Whether or not the Z-axis stops at a position before the stopper by the soft limit must be checked from the outside of the safety enclosure.

NOTE

The Z-axis may not stop at a position before the stopper due to the stopper part accuracy or position. If this happens, decrease the value while referring to the Table "nSoft limits after installing additional stoppers" described previously.

13 ***Check that the movement range is limited.***

14 ***Turn off the controller.***

15 ***Enter the safety enclosure.***

16 ***Reattach the Y-axis arm cover.***

WARNING

IN THE CASE OF THE R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000, R6YXGS700, R6YXGS800, R6YXGS900 AND R6YXGS1000, THE PLUS DIRECTION STOPPER WILL BECOME A LOAD, AND SO IF THE TIP LOAD IS 0KG OR 1KG, THE Z-AXIS ACCELERATION MUST BE REDUCED AS SHOWN BELOW. IF NOT REDUCED, THE SERVICE LIFE OF THE Z-AXIS DRIVE UNIT WILL DECREASE.

Tip load	0kg	1kg
Z-axis acceleration	90%	80%

8.2.3 Overrun amounts during impacts with Z-axis additional mechanical stopper

A urethane damper is installed to absorb the shock when an impact occurs with the mechanical stopper, so a certain amount of overrun occurs when the robot strikes the mechanical stopper. Use caution and take overrun into account since the end effector may interfere with the robot body and peripheral equipment or the robot body may interfere with the peripheral equipment. Maximum overrun amounts are listed below (for normal operation, maximum payload, maximum speed).

Robot model	**Z-axis**	
	Upper end	**Lower end**
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	5mm	5mm
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	5mm	5mm

CAUTION

After the robot strikes the Z-axis mechanical stopper, the stopper position may shift, and so check the stopper position. If shifted, move the stopper to the correct position and refasten it securely by following the assembly procedure.

9. Working envelope and mechanical stopper positions for maximum working envelope

Working envelope of each robot and mechanical stopper positions for the maximum working envelope are shown in "1.2 External view and dimensions" in Chapter 8.
Here, those are described using the R6YXG500 as an example. Other robot models are the same.

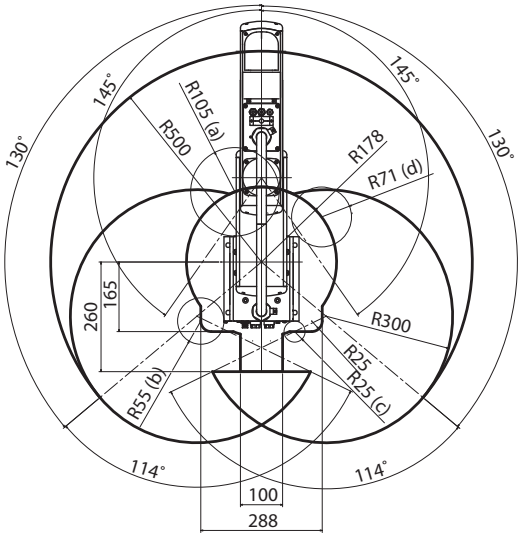
■ X and Y axes

1. Do not attempt operation outside the working envelope. On the XG series, the origin can be set at a discrete position. The working envelope described in this manual is an area with the robot frontal reference when no load is applied.
2. Interference positions where a load may touch the robot within the working envelope and their radii are shown in the figure.

CAUTION

- Be careful not to allow the robot load to interfere with any part of the robot.
- The Z-axis spline may touch the base or the Y-axis arm may touch the wire harness before the robot strikes the X-axis or Y-axis mechanical stoppers, so use caution.

Interference positions and radii in working envelope



Working envelope

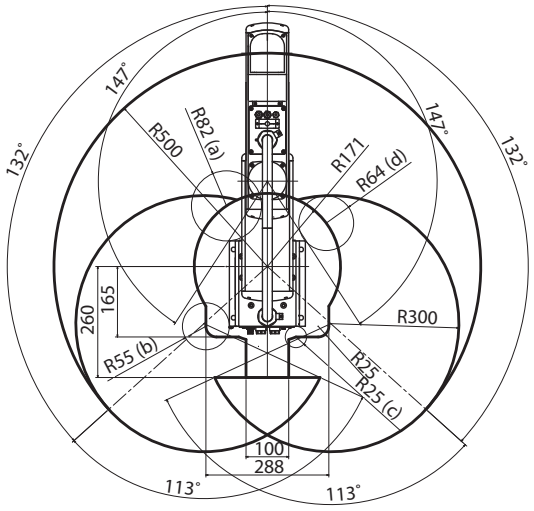
Interference position
(a) Base front panel
(b) Base side panel
(c) Base rear panel
(d) Base corners

3. Interference positions where a load might touch the robot within the maximum movement range and their radii are shown in the figure.

CAUTION

The Z-axis spline may touch the base or the Y-axis arm may touch the wire harness before the robot strikes the X-axis or Y-axis mechanical stoppers, so use caution.

Interference positions and radii in movement range



Maximum movement range
X-axis mechanical stopper: 132°
Y-axis mechanical stopper: 147°
*Do not operate the robot in an area outside the working envelope.

Interference position
(a) Base front panel
(b) Base side panel
(c) Base rear panel
(d) Base corners

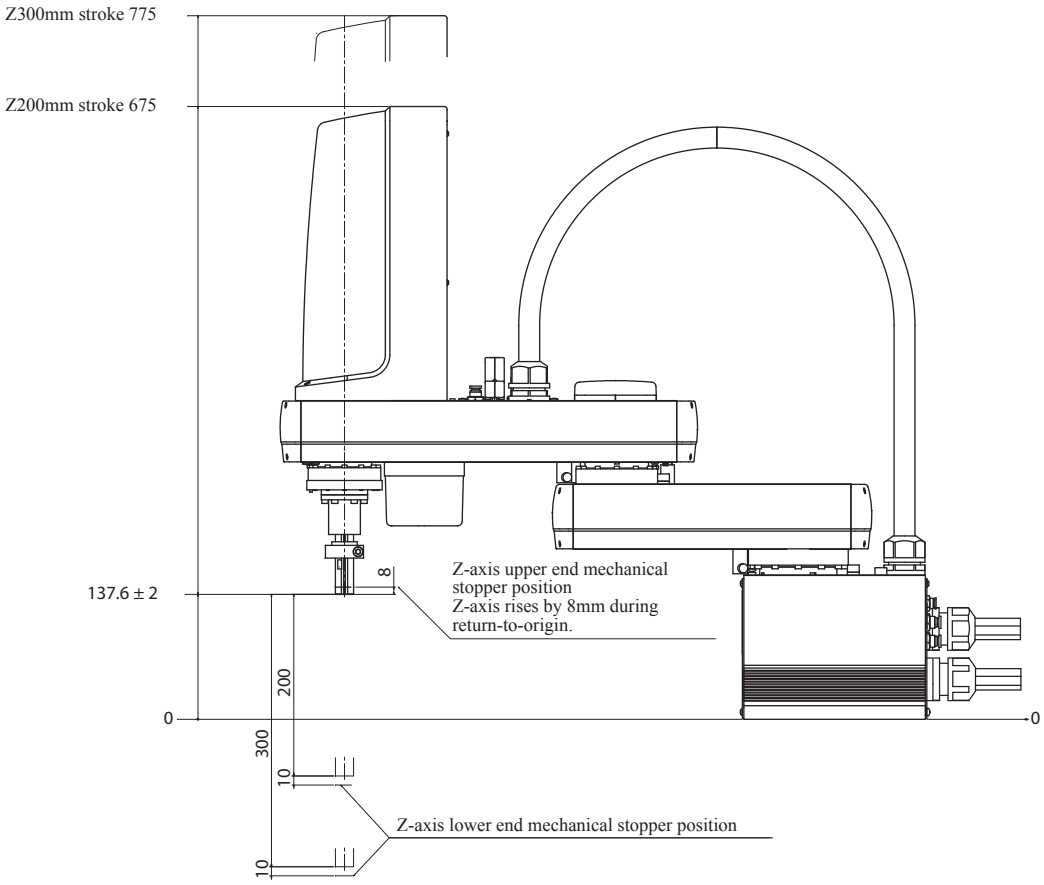
Z-axis

Do not attempt work outside the working envelope. In particular, do not attempt work in the area between the working envelope and mechanical stopper position. Mechanical stoppers are installed at both the upper and lower ends of the movement range.

WARNING

THE ROBOT CABLE, USER WIRING OR TUBING MAY BE DAMAGED IF THE ROBOT LOAD INTERFERES WITH THEM RESULTING IN HAZARDOUS ROBOT MALFUNCTIONS. DO NOT OPERATE AT POINTS WHERE THE LOAD MAY INTERFERE WITH THE ROBOT CABLE, USER WIRING OR TUBING.

Z-axis mechanical stopper position



R-axis

The R-axis has no mechanical stoppers.

CAUTION

Since the R-axis has no mechanical stoppers, make certain that the end effector wiring and tubing do not become entangled during operation.

Robot overrun during impacts with mechanical stopper

A urethane damper is installed to absorb the shock when an impact occurs with the mechanical stopper, so a certain amount of overrun occurs when the robot strikes the mechanical stopper. Use caution and take overrun into account since the end effector may interfere with the robot body and peripheral equipment or the robot body may interfere with the peripheral equipment. Maximum overrun amounts are listed below (for normal operation, maximum payload, maximum speed).

Robot model	X-axis	Y-axis	Z-axis	
			Upper end	Lower end
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400	8°	4°	1mm	1mm
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	9°	12°	5mm	5mm
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	9°	12°	5mm	5mm

Note: Here, ° (deg.) is the overrun angle at the X-axis and Y-axis joints.

CAUTION

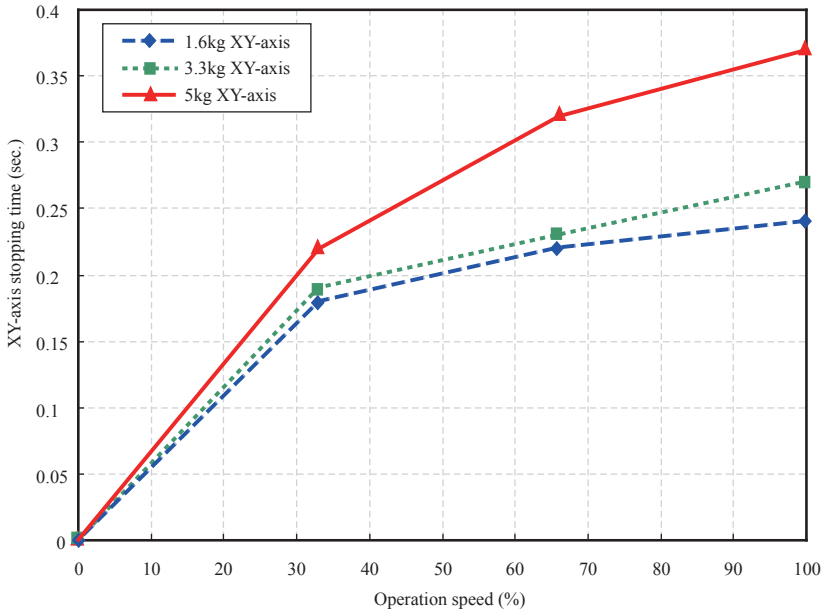
- If the X-axis, Y-axis or Z-axis mechanical stopper is deformed or damaged by impacts, please contact your distributor. Using the deformed or damaged mechanical stopper is dangerous, so it must be replaced.
- When the robot strikes the X-axis or Y-axis mechanical stopper or another object, or when the R-axis collides with an object, speed reduction gears are locked while being meshed if the collision impact is large. If this happens, please contact your distributor.
- After the robot strikes the Z-axis mechanical stopper, the stopper position may shift, and so check the stopper position. If shifted, move the stopper to the correct position and refasten it securely by following the assembly procedure.

10. Stopping time and stopping distance at emergency stop

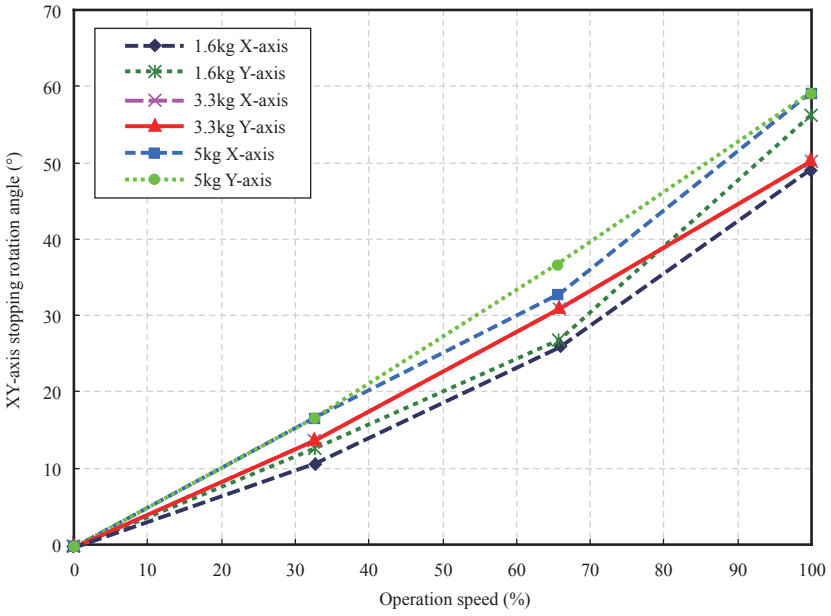
When the emergency stop button is pressed during robot operation or the power supply to the controller is turned off, the stopping time and stopping distance or angle of the main 3 axes change depending on the operation speed as shown below. The following figures show typical time and distance or angle needed for each axis to come to a stop after a stop signal is initiated when the robot arms are fully extended while 3 types of tip mass (33%, 66% and 100% of maximum payload) are loaded.

10.1 R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400

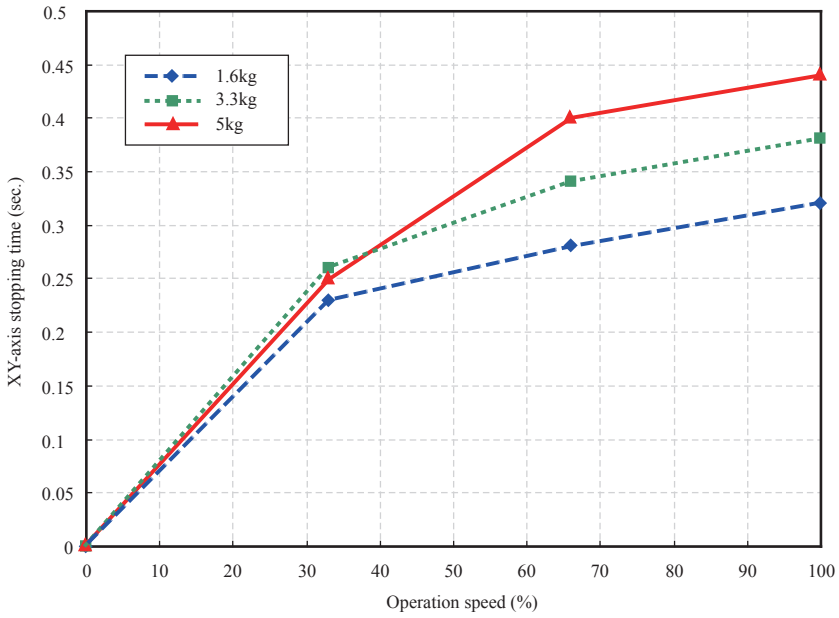
XY-axis stopping time for R6YXGL250



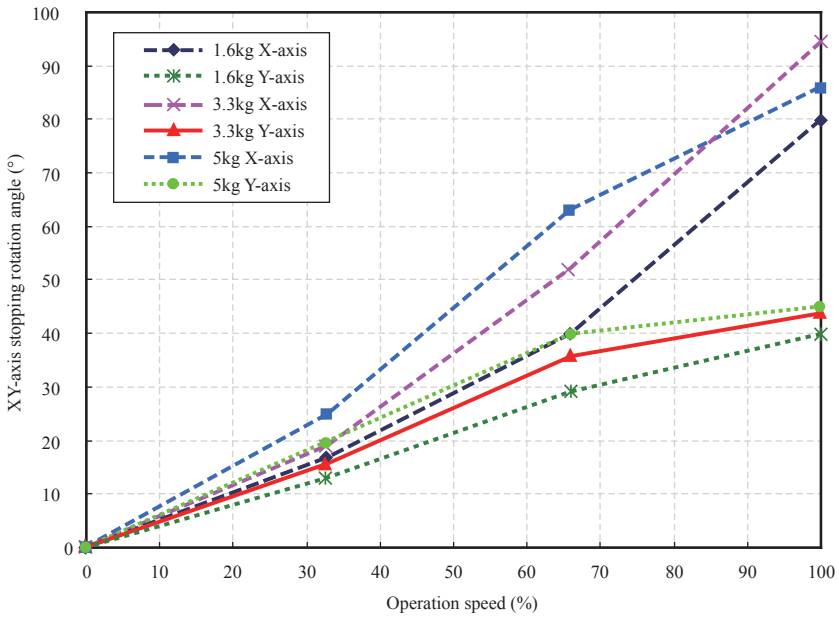
XY-arm stopping rotation angle for R6YXGL250



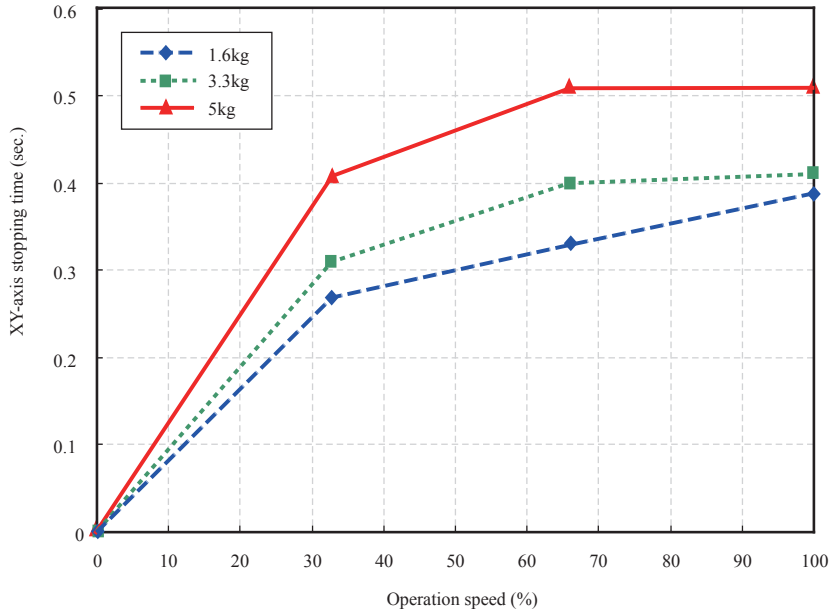
XY-axis stopping time for R6YXGL350 and R6YXGS300



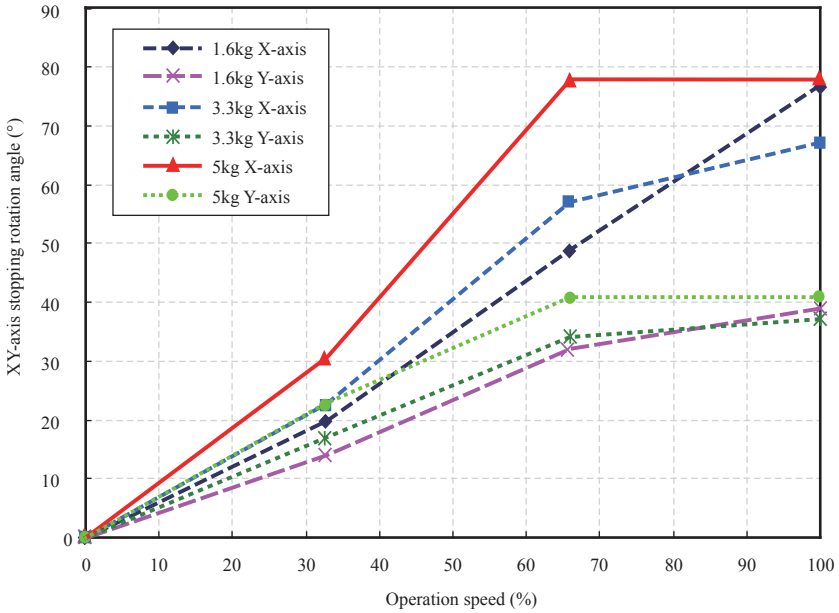
XY-arm stopping rotation angle for R6YXGL350 and R6YXGS300



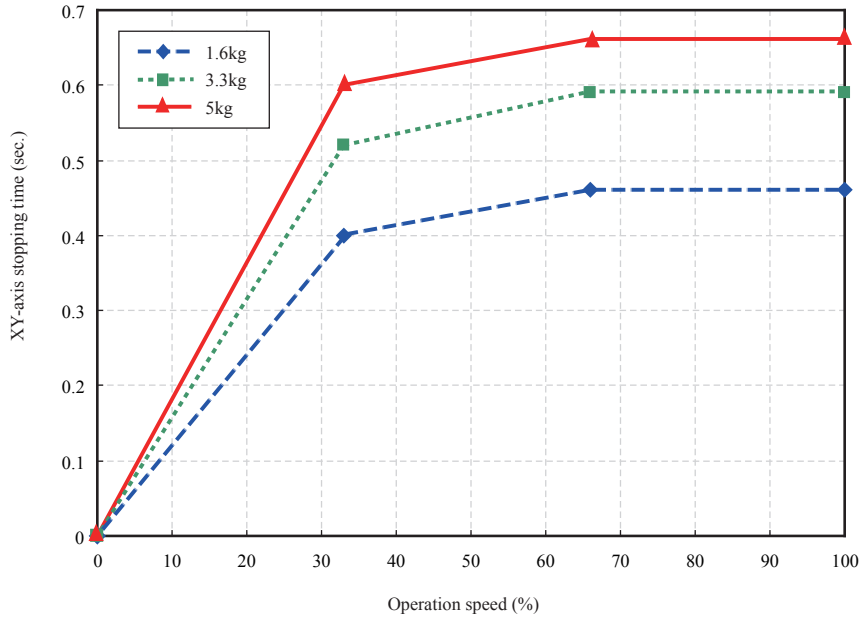
XY-axis stopping time for R6YXGL400 and R6YXGS400



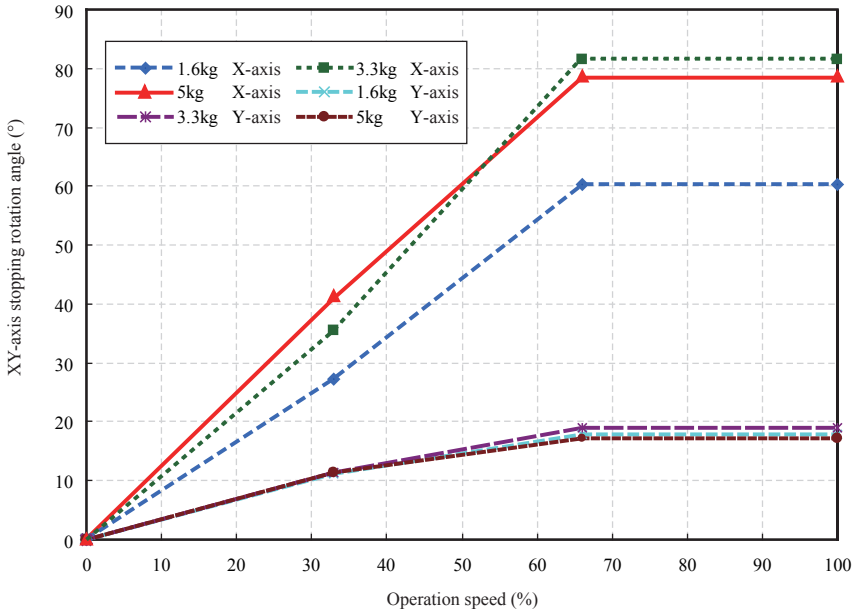
XY-arm stopping rotation angle for R6YXGL400 and R6YXGS400



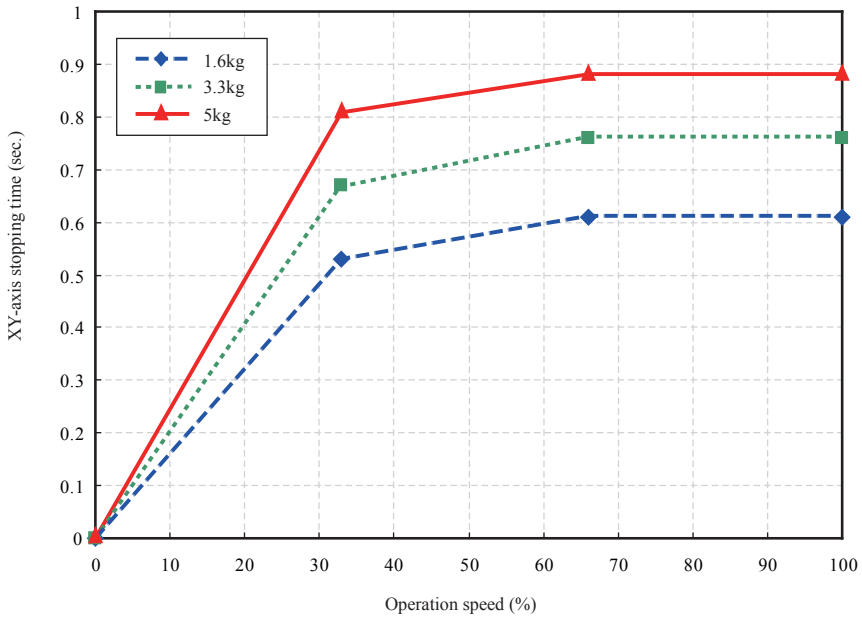
XY-axis stopping time for R6YXGL500



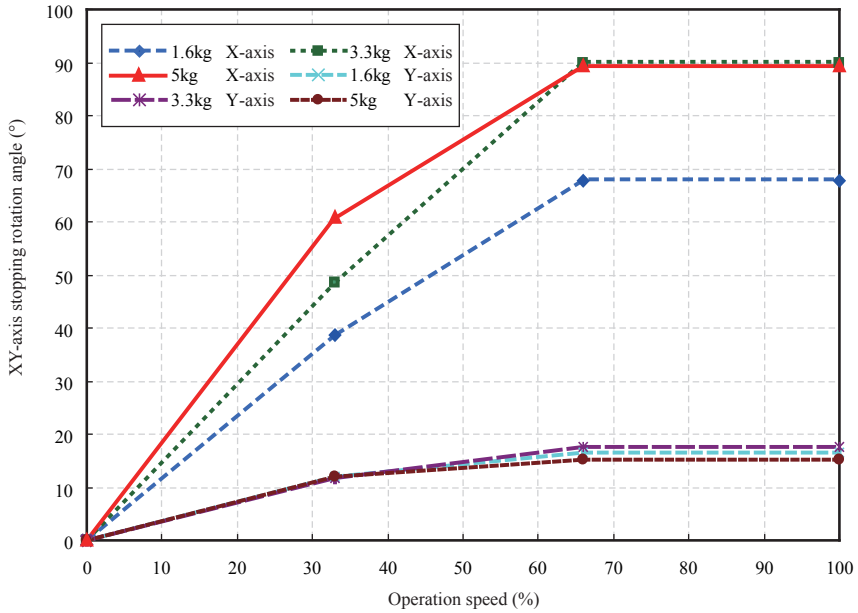
XY-arm stopping rotation angle for R6YXGL500



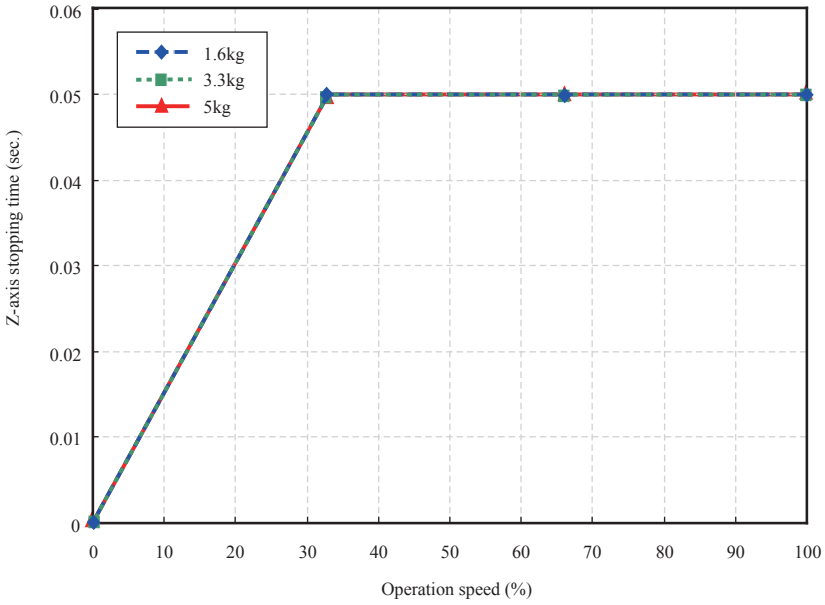
XY-axis stopping time for R6YXGL600



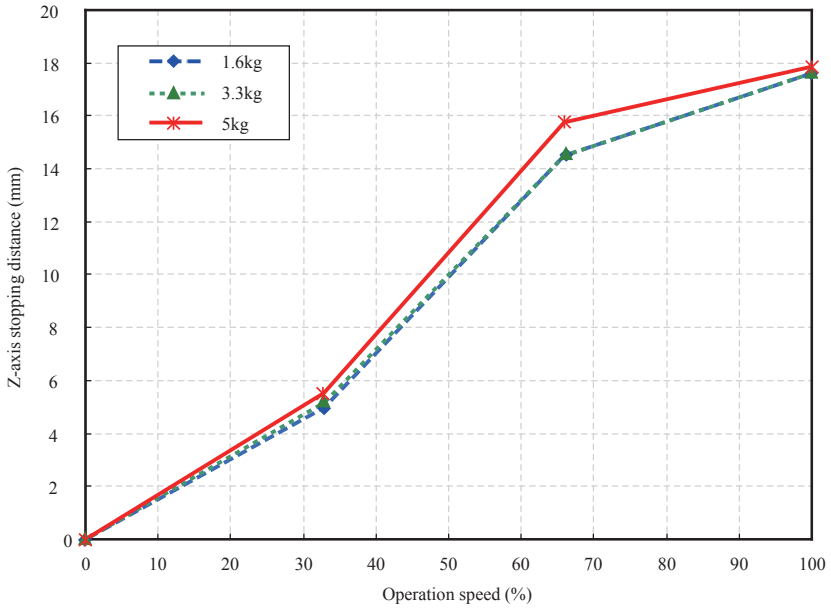
XY-arm stopping rotation angle for R6YXGL600



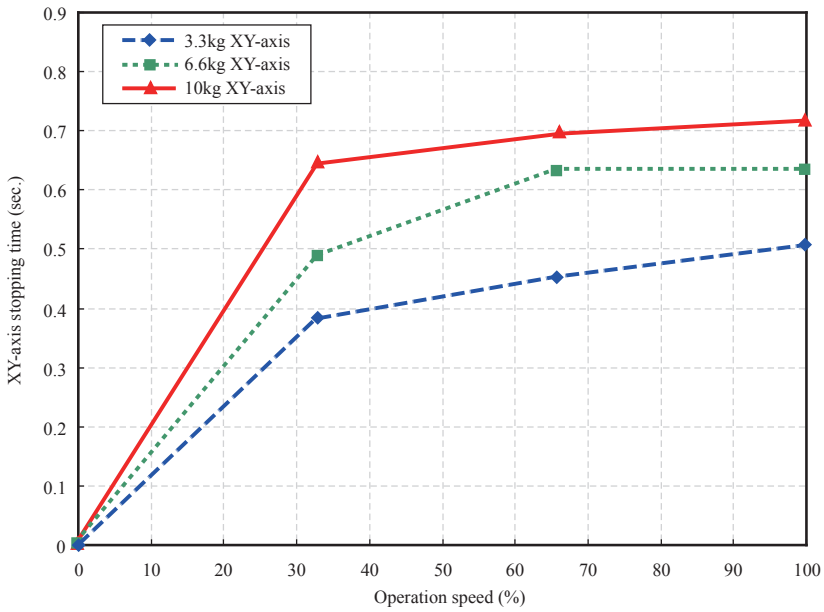
Z-axis stopping time for R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400



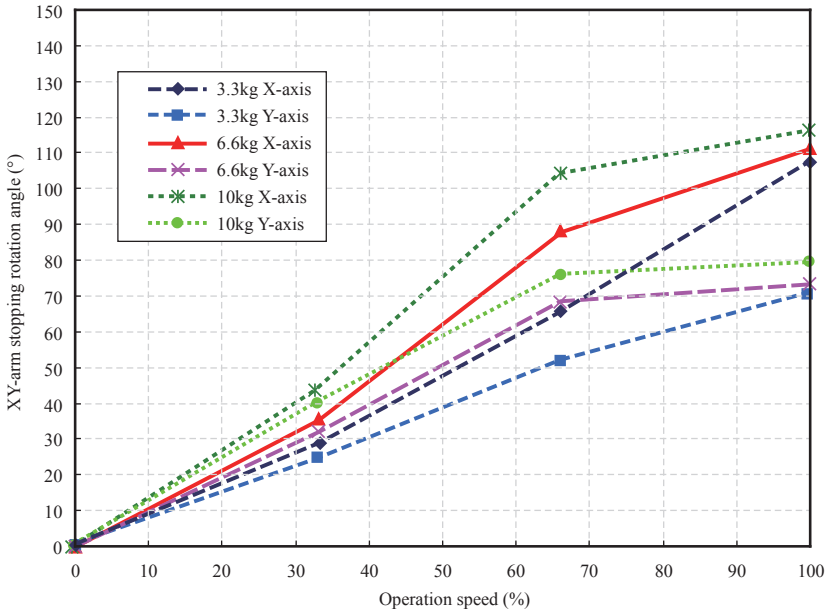
Z-axis stopping distance for R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400



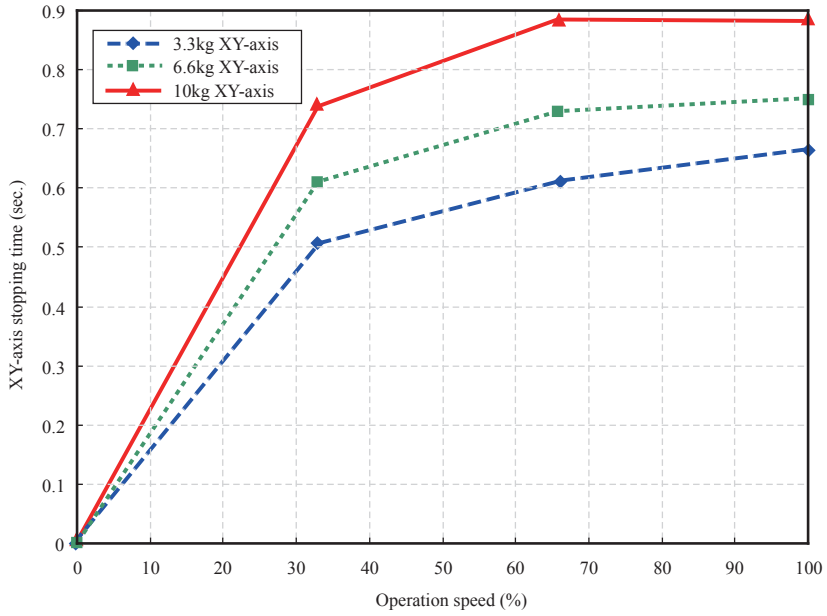
XY-axis stopping time for R6YXG500 and R6YXGS500



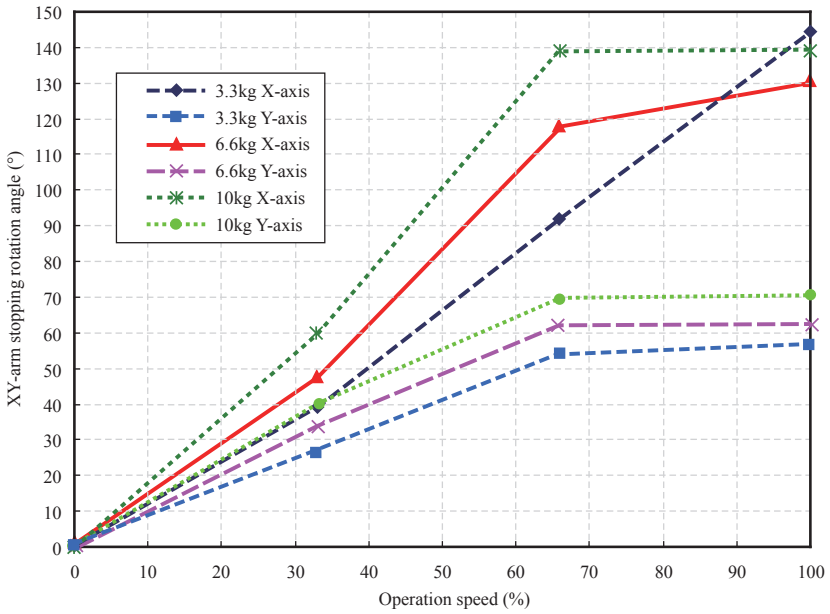
XY-arm stopping rotation angle for R6YXG500 and R6YXGS500



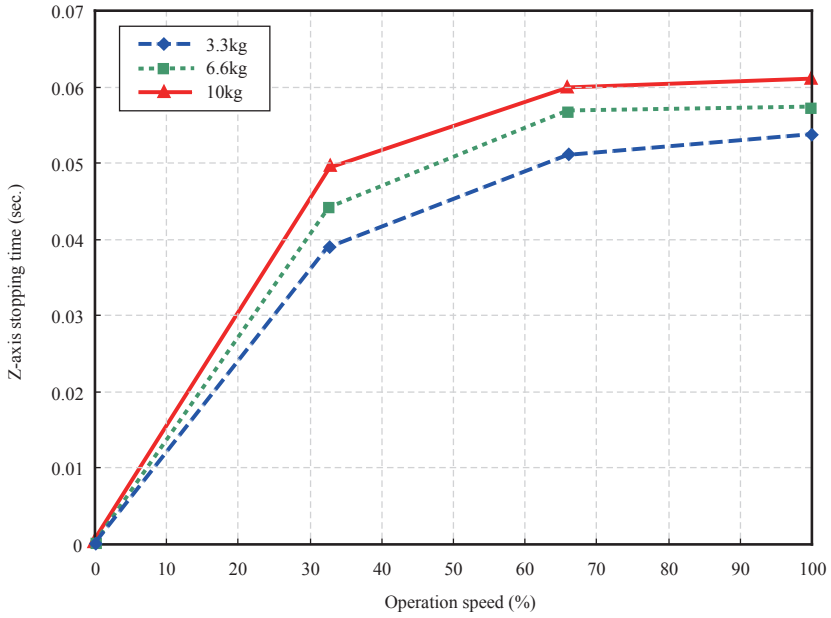
XY-axis stopping time for R6YXG600 and R6YXGS600



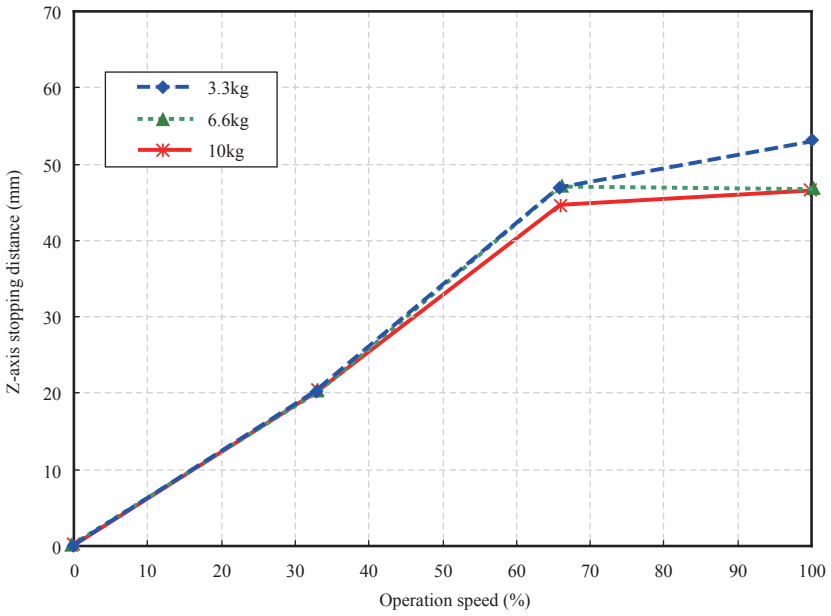
XY-arm stopping rotation angle for R6YXG600 and R6YXGS600



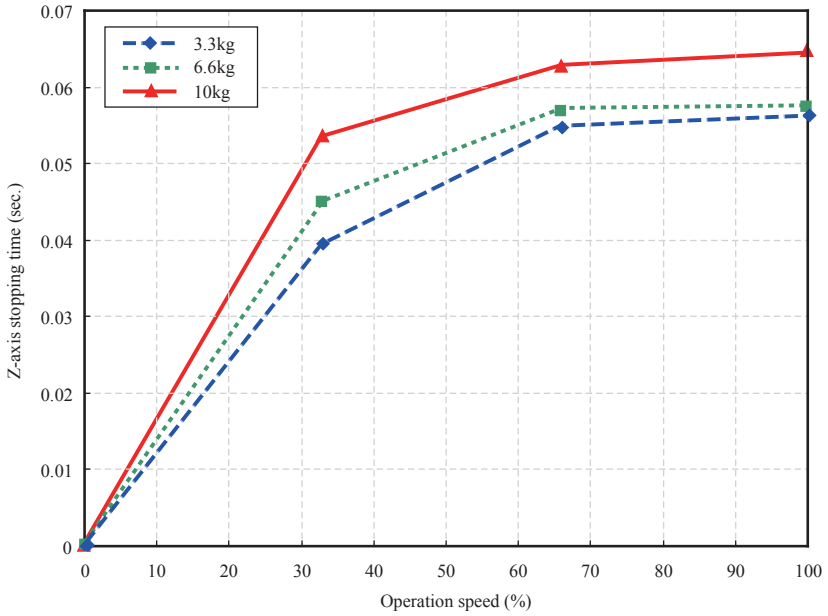
Z-axis stopping time for R6YXG500 and R6YXGS500 Z200



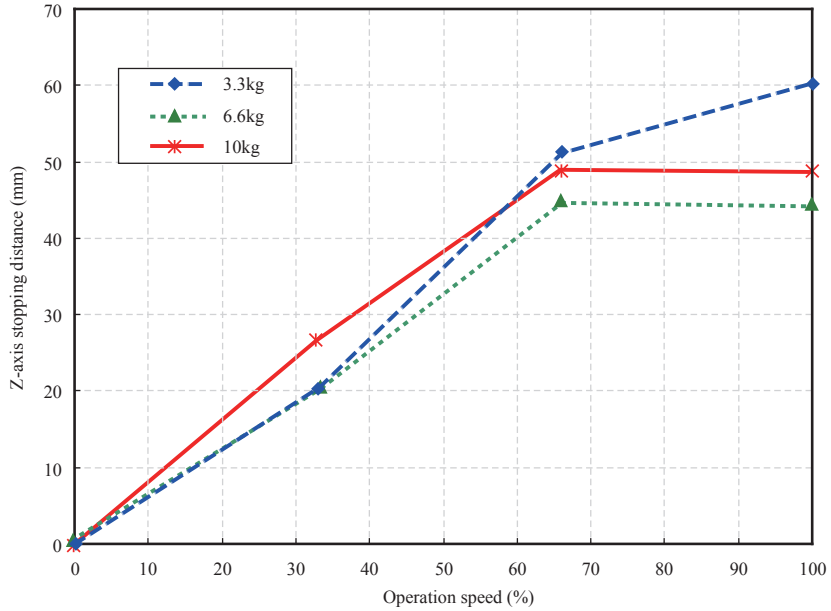
Z-axis stopping distance for R6YXG500 and R6YXGS500 Z200



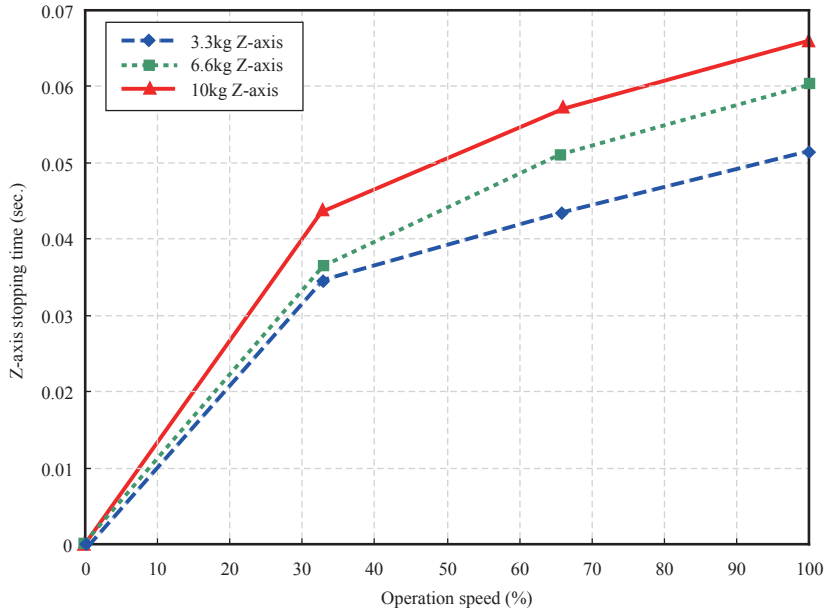
Z-axis stopping time for R6YXG600 and R6YXGS600 Z200



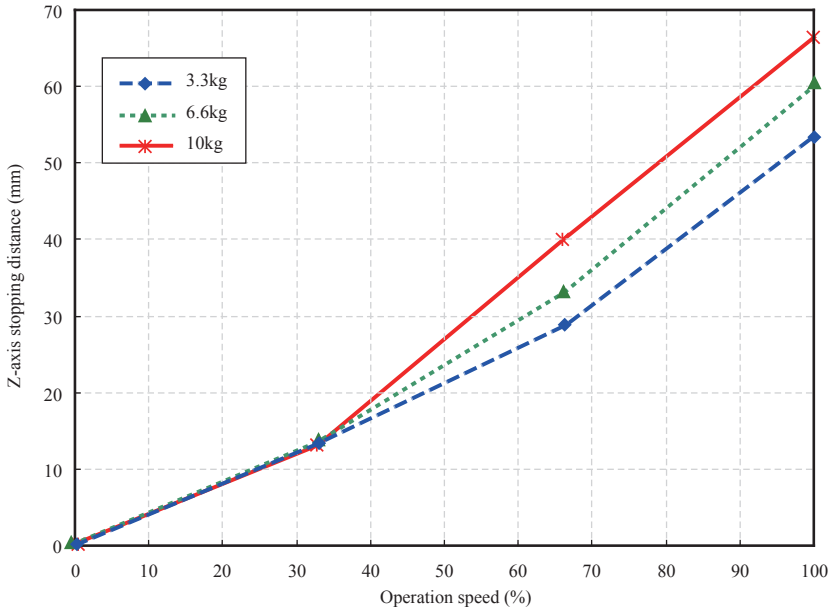
Z-axis stopping distance for R6YXG600 and R6YXGS600 Z200



Stopping time for R6YXG500, R6YXG600, R6YXGS500 and R6YXGS600 Z300

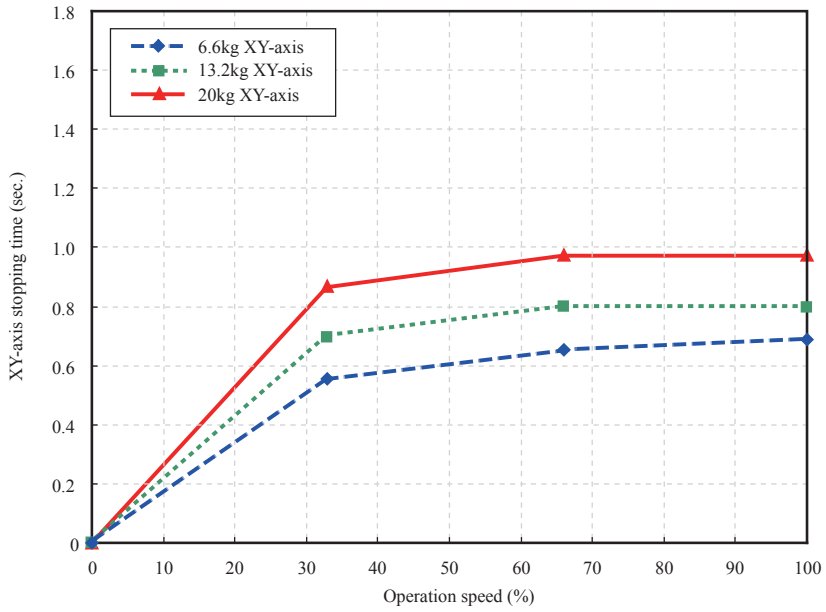


Stopping distance for R6YXG500, R6YXG600, R6YXGS500 and R6YXGS600 Z300

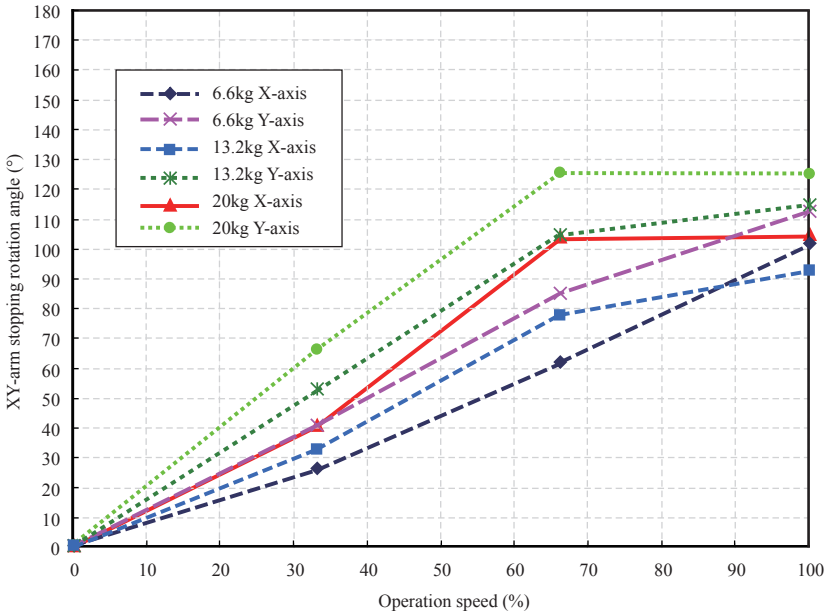


10.3 R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

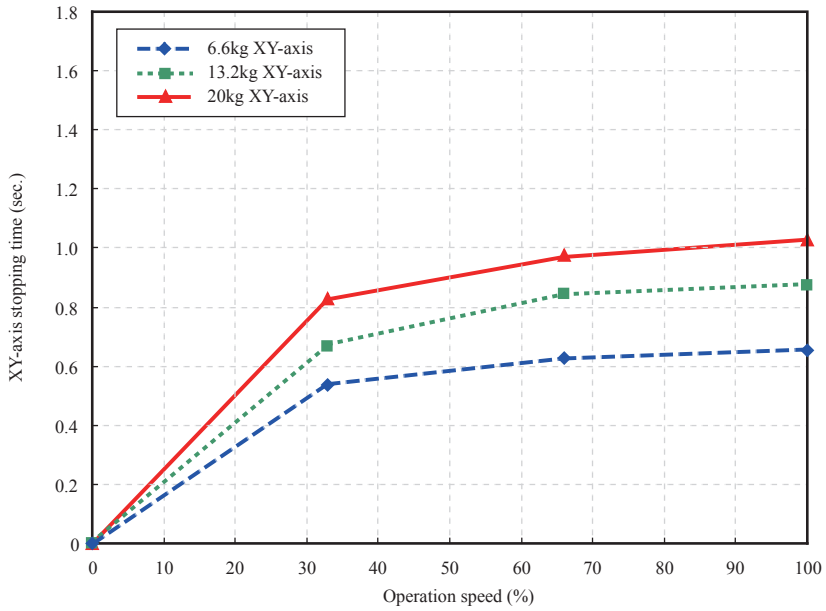
XY-axis stopping time for R6YXGH600



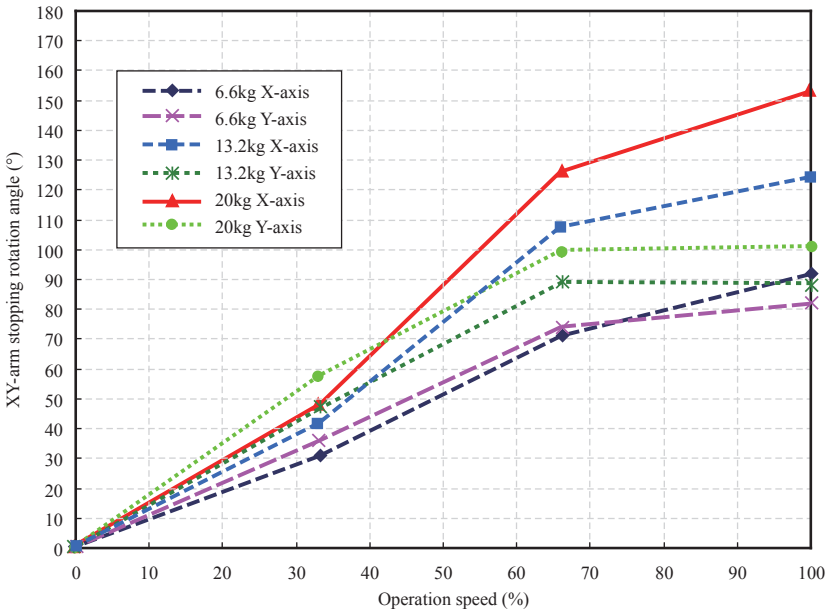
XY-arm stopping rotation angle for R6YXGH600



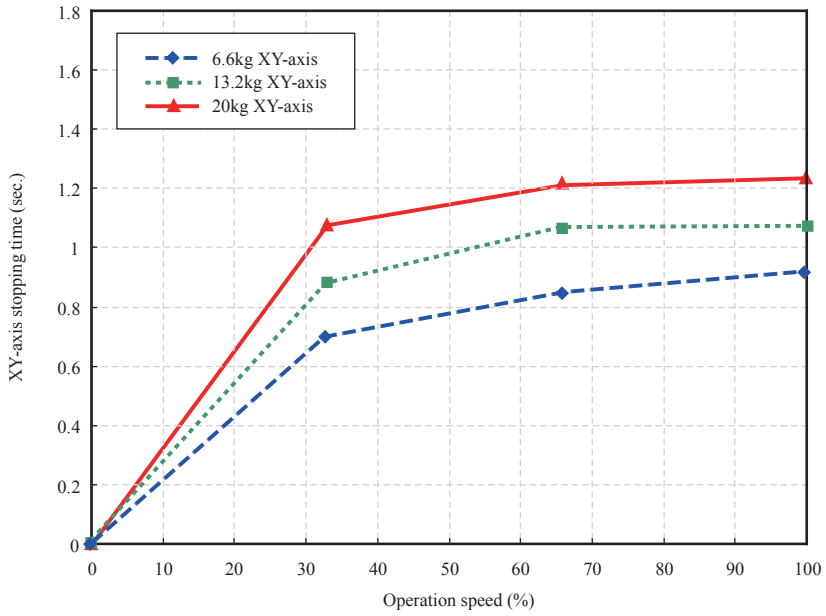
XY-axis stopping time for R6YXG700 and R6YXGS700



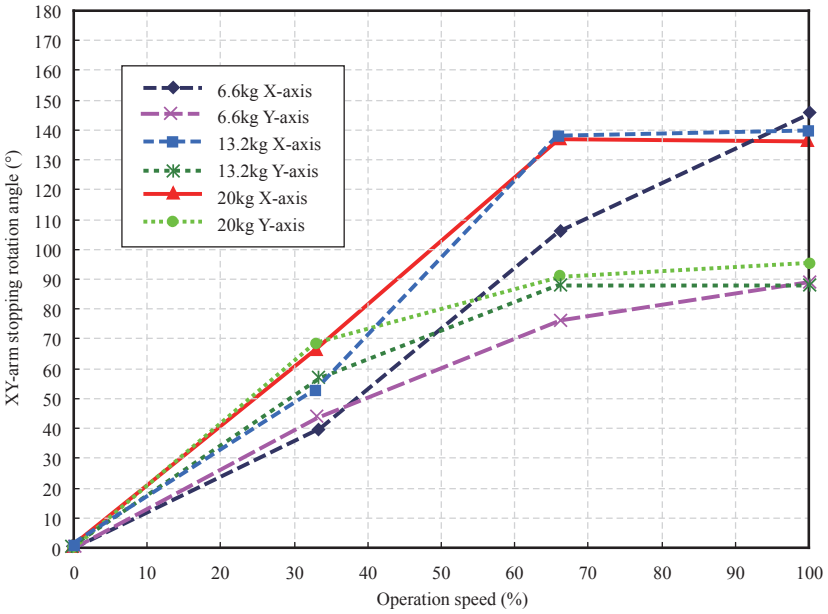
XY-arm stopping rotation angle for R6YXG700 and R6YXGS700



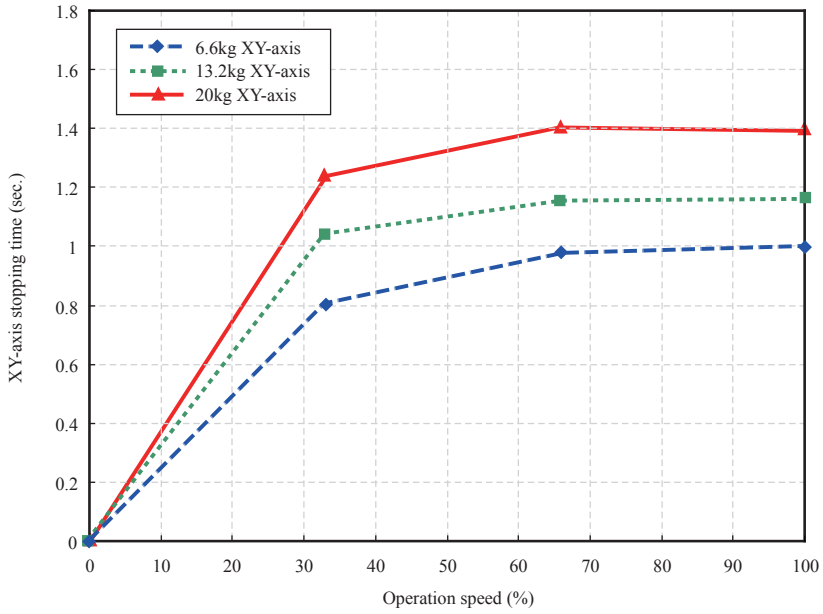
XY-axis stopping time for R6YXG800 and R6YXGS800



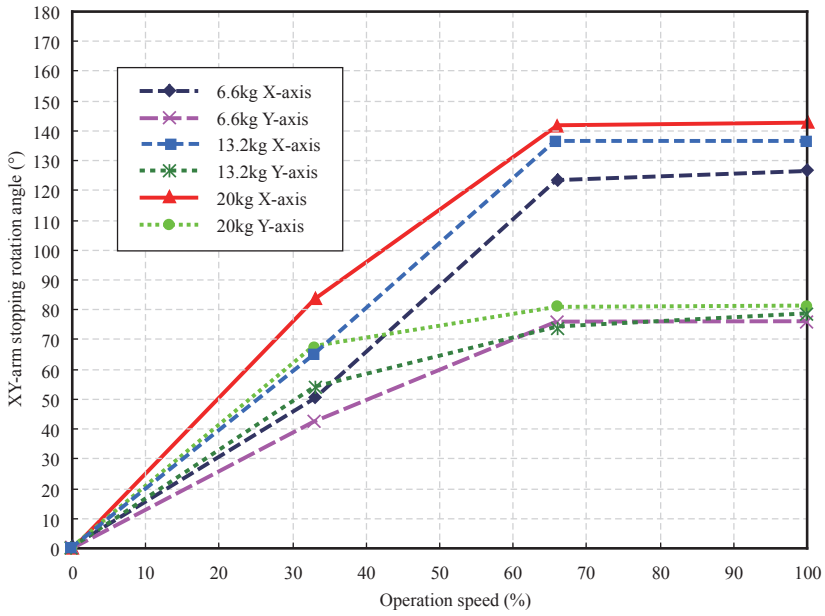
XY-arm stopping rotation angle for R6YXG800 and R6YXGS800



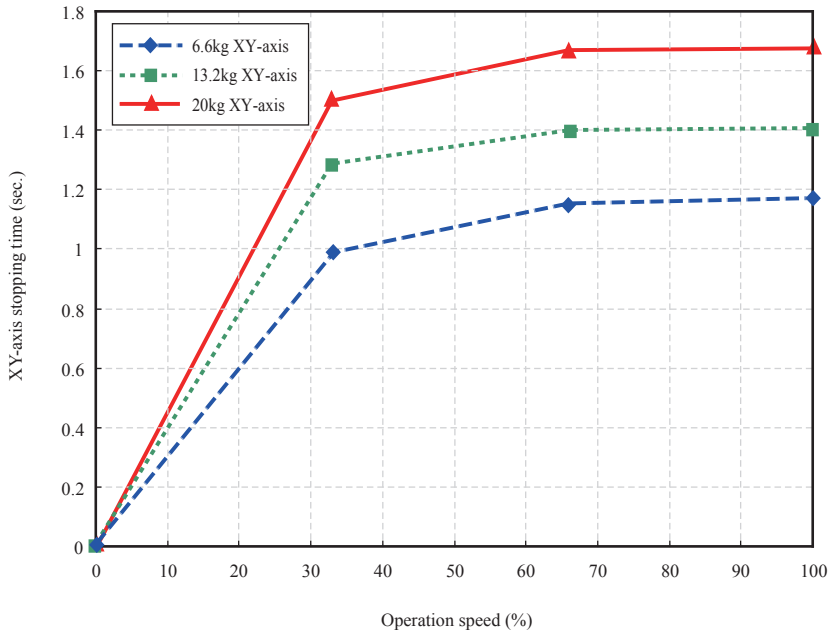
XY-axis stopping time for R6YXG900 and R6YXGS900



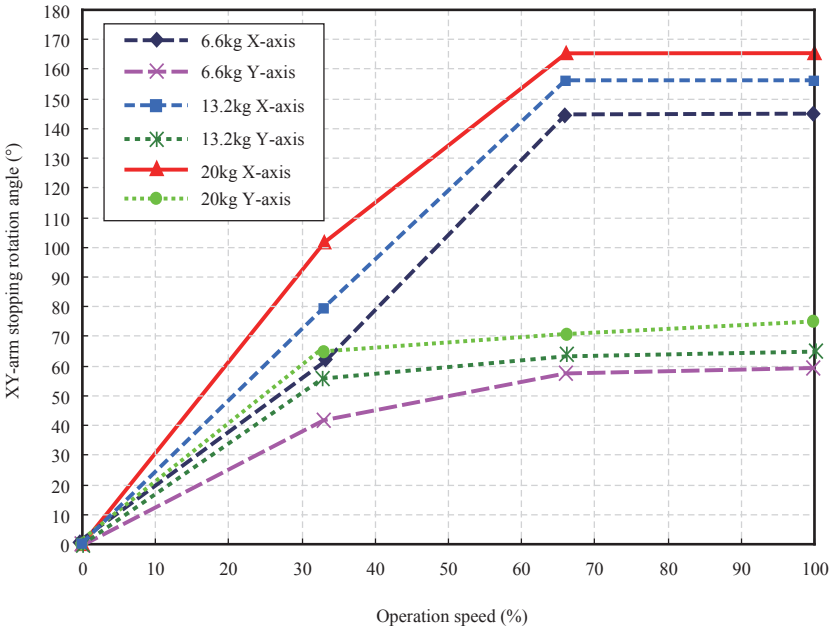
XY-arm stopping rotation angle for R6YXG900 and R6YXGS900



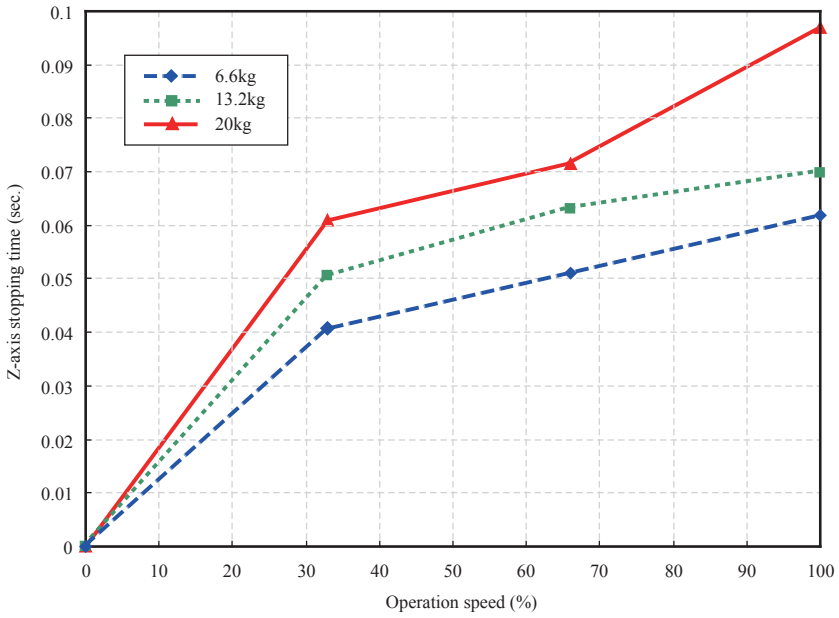
XY-axis stopping time for R6YXG1000 and R6YXGS1000



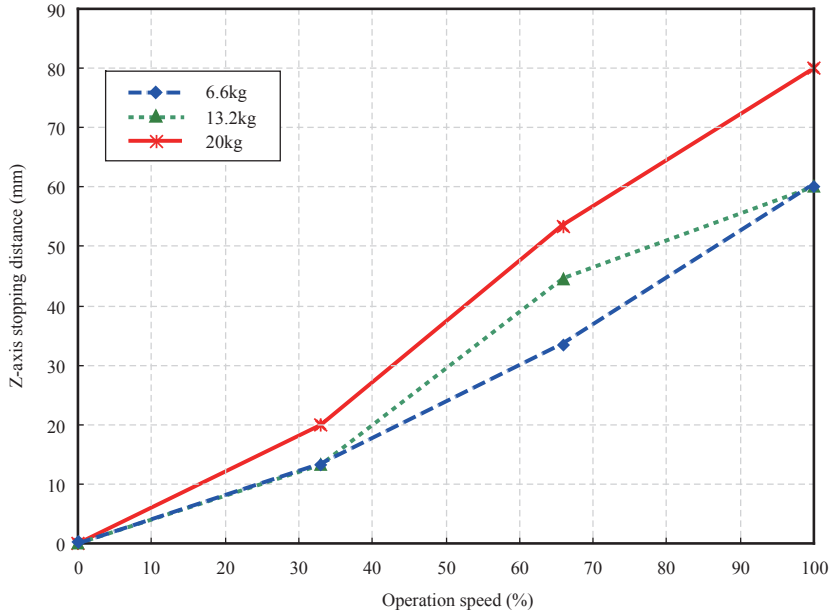
XY-arm stopping rotation angle for R6YXG1000 and R6YXGS1000



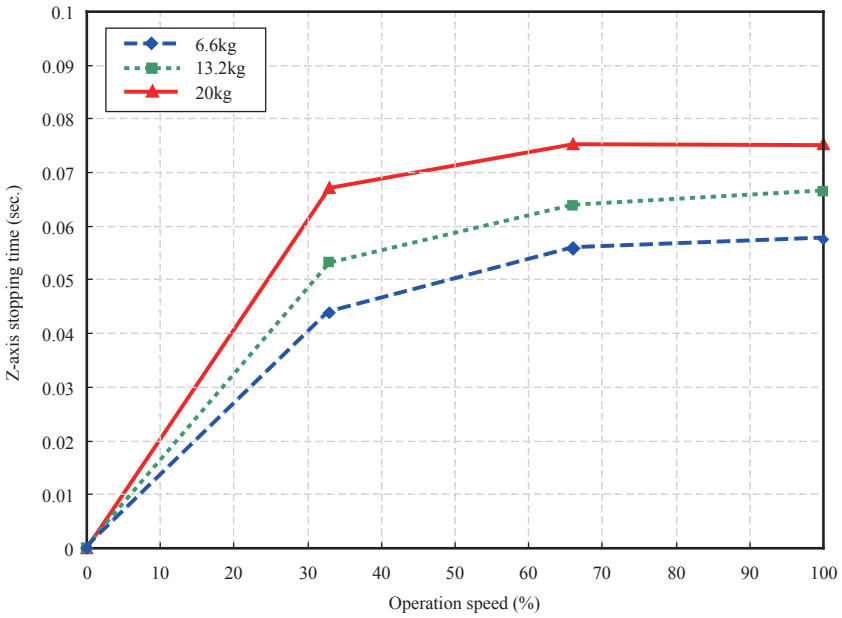
Z-axis stopping time for R6YXGH600 Z400



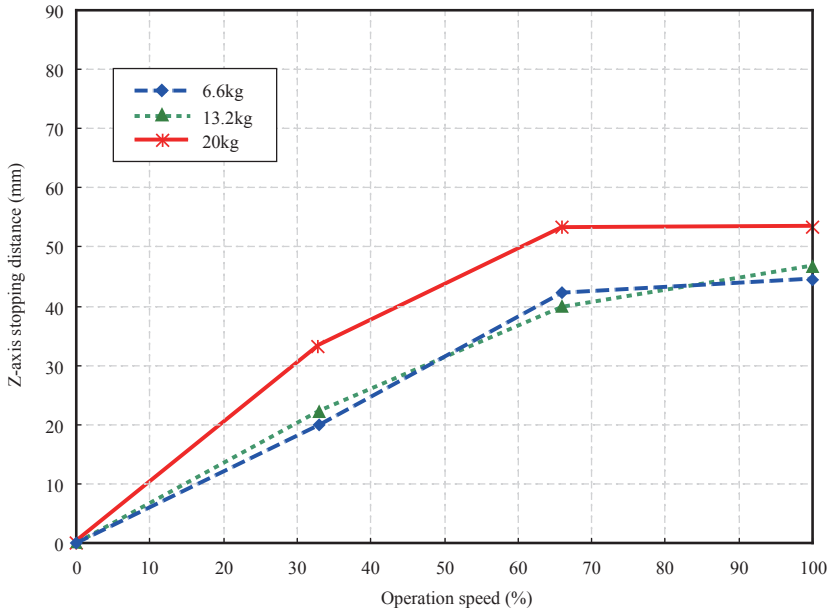
Z-axis stopping distance for R6YXGH600 Z400



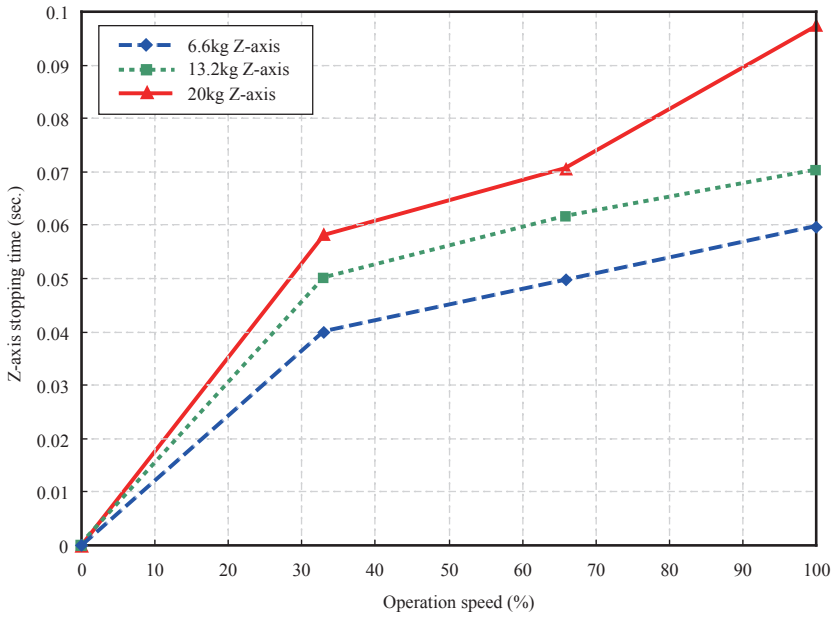
Z-axis stopping time for R6YXG700 and R6YXGS700 Z200



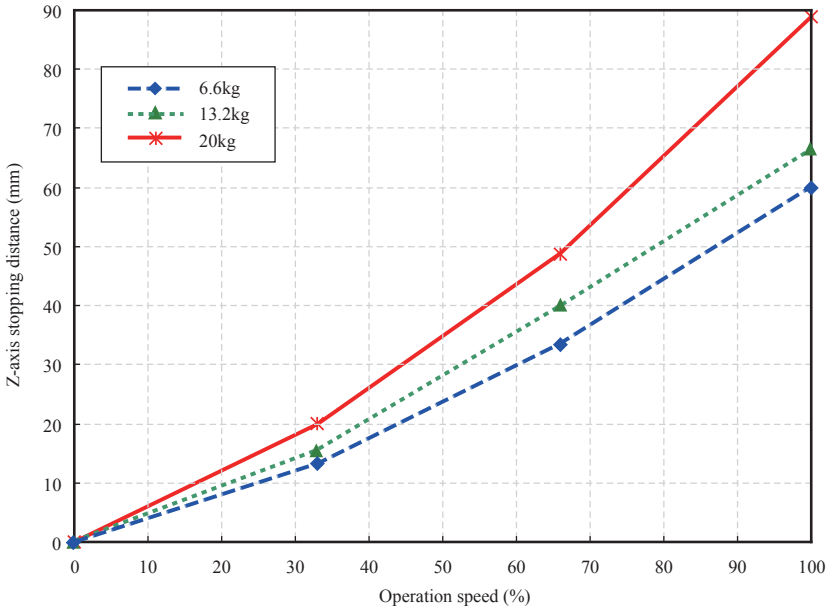
Z-axis stopping distance for R6YXG700 and R6YXGS700 Z200



Z-axis stopping time for R6YXG700 and R6YXGS700 Z400

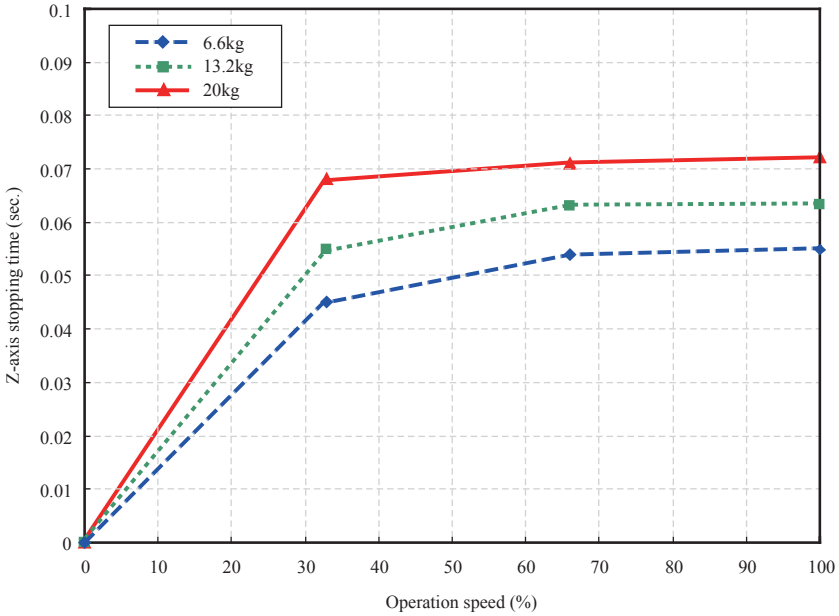


Z-axis stopping distance for R6YXG700 and R6YXGS700 Z400



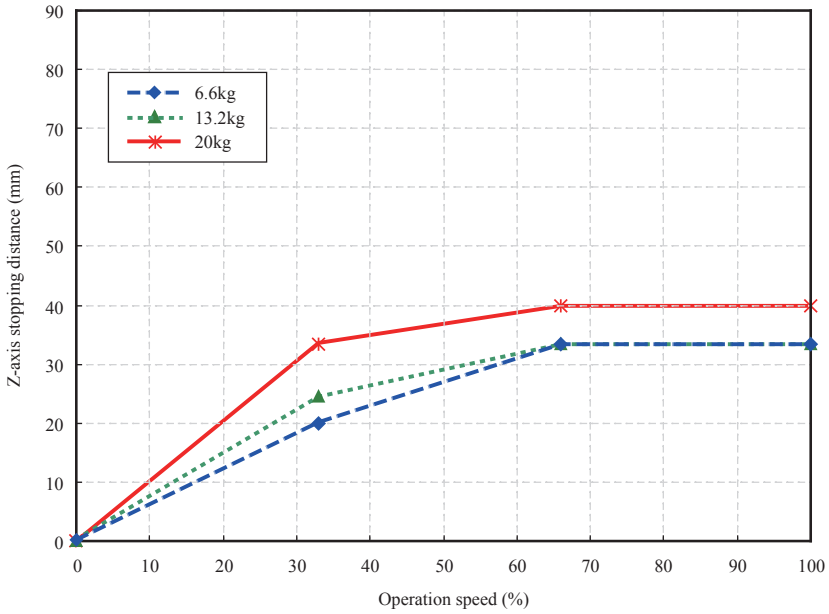
Z-axis stopping time for R6YXGH600 Z200, R6YXG800, R6YXG900 and R6YXG1000

Z-axis stopping time for R6YXGS800, R6YXGS900 and R6YXGS1000



Z-axis stopping distance for R6YXGH600 Z200, R6YXG800, R6YXG900 and R6YXG1000

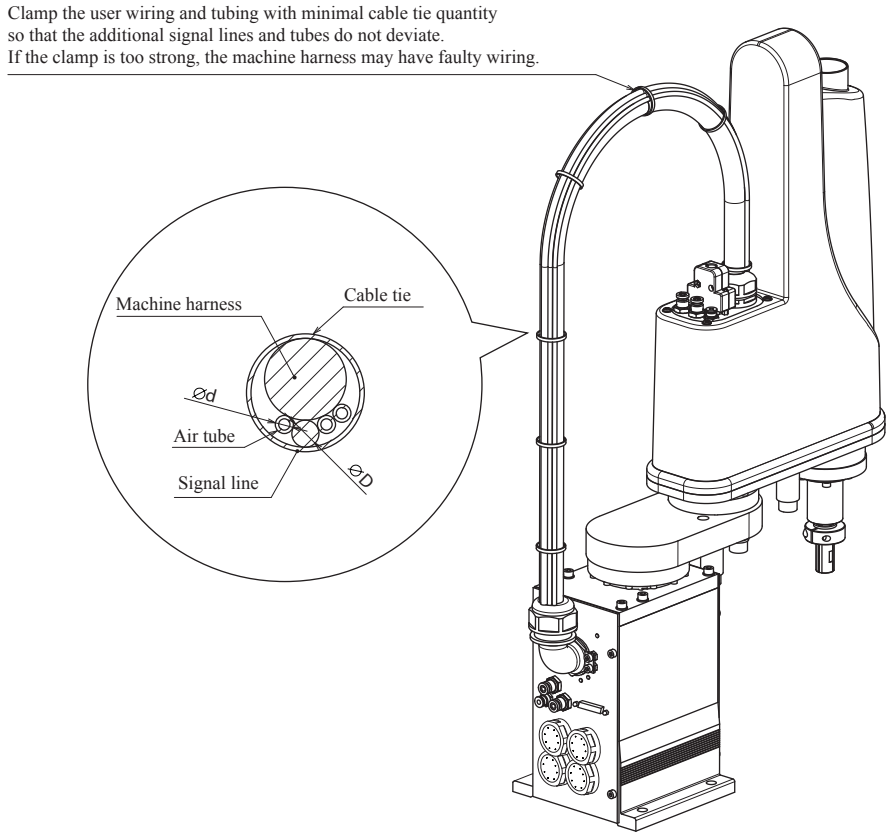
Z-axis stopping distance for R6YXGS800, R6YXGS900 and R6YXGS1000



11. Installing the user wiring and tubing newly

Use the user wiring and tubing in the machine harness as much as possible by considering the durability of the machine harness.
If the user wiring and tubing incorporated into the machine are insufficient, add new user wiring and tubing using tie bands.
The following shows the outside diameters and quantities that can be added by considering the durability of the machine harness.

Installing the user wiring and tubing newly

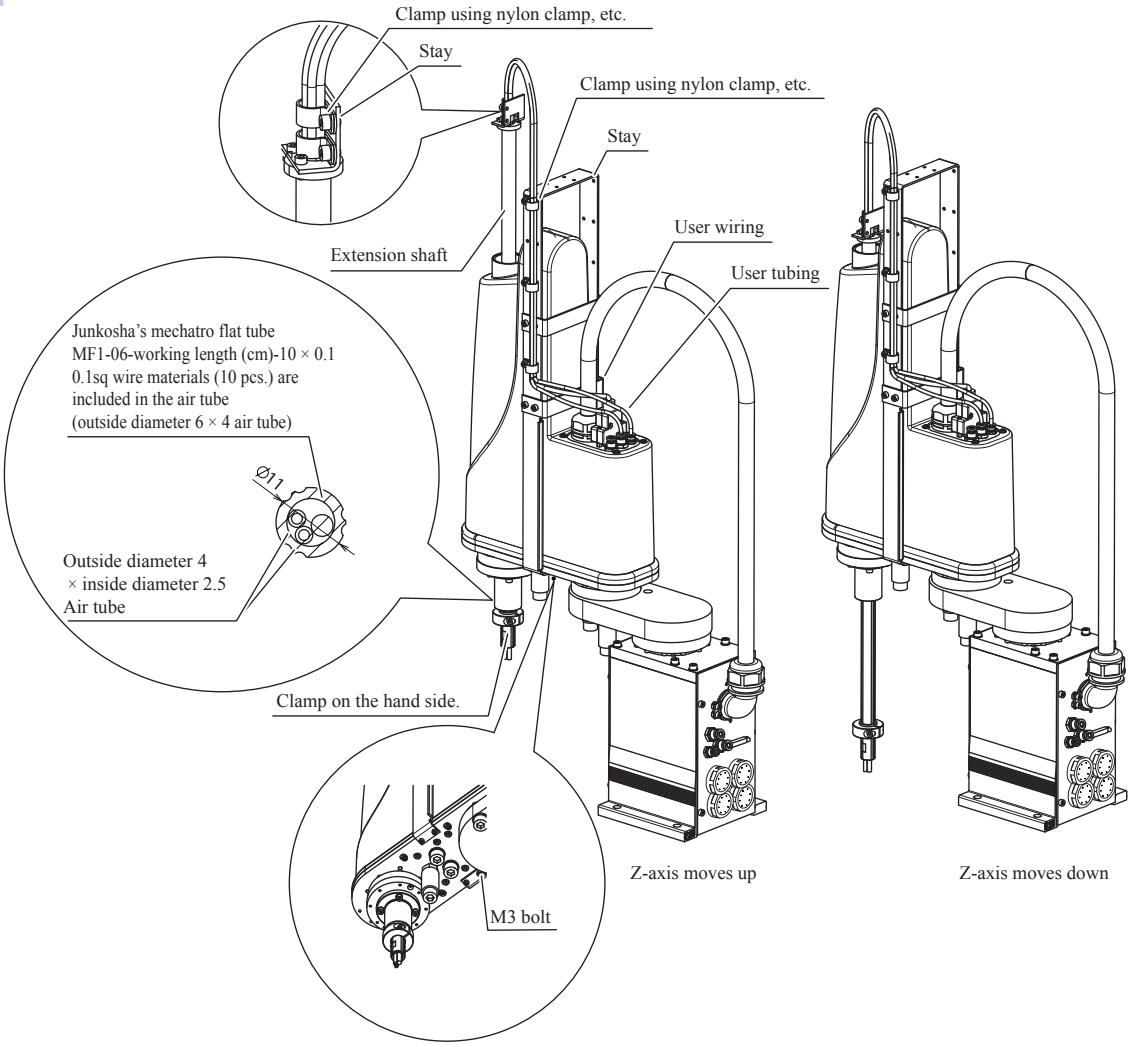


Robot model	Signal line outside diameter ∅ D (mm) × quantity	Tube outside diameter ∅ d (mm) × quantity
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400	∅6 × 1 pc.	∅4 × 3 pcs.
R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	∅10 × 1 pc.	∅6 × 3 pcs.

12. Passing the wiring and tubing in the user wiring/tubing through spline type

In the R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300 and R6YXGS400 with the user wiring/tubing through spline type, the user wiring and tubing can be passed through the spline.
The following Fig. shows a reference example.
The wiring at the top end of the spline can be detached or attached easily when replacing the spline, R-axis speed reduction unit, or R-axis motor. Use an appropriate connector that passes through the spline with an inside diameter of ⌀11.

Example of how to pass the wiring and tubing



13. Detaching or attaching the covers

To detach the covers, remove the bolts and screws shown in the Fig. below.

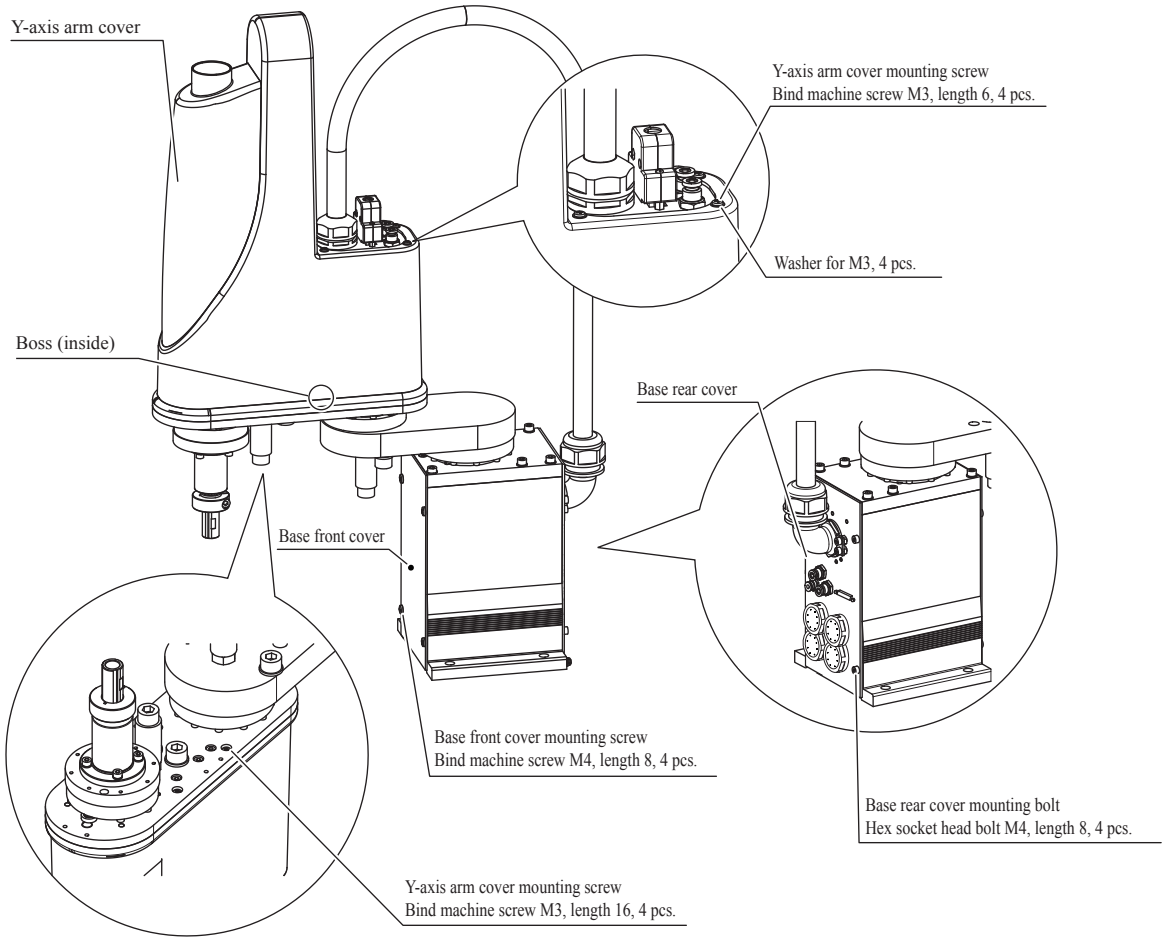
WARNING

WHEN THE COVERS HAVE BEEN REMOVED FOR THE MAINTENANCE WORK, BE SURE TO RETURN THE COVERS TO THEIR ORIGINAL POSITIONS USING THE SCREWS AND BOLTS THAT HAVE SECURED THEM.
IF ANY SCREW IS LOST, USE THE SPECIFIED SCREWS AND QUANTITIES TO SECURE THE COVERS WHILE REFERRING TO THE FIG. BELOW.
IF THE COVERS ARE NOT SECURED FIRMLY, NOISE MAY OCCUR, THE COVER MAY DROP AND FLY OUT, YOUR HAND MAY BE ENTANGLED IN THE DRIVE UNIT DURING TEACHING, OR YOUR HAND MAY BE IN CONTACT THE HOT DRIVE UNIT, CAUSING BURN. TO PREVENT SUCH TROUBLES, STRICTLY OBSERVE THIS CAUTION.

CAUTION

In the user wiring/tubing through spline type, the cover cannot be detached unless the Z-axis is moved down to the lower end.

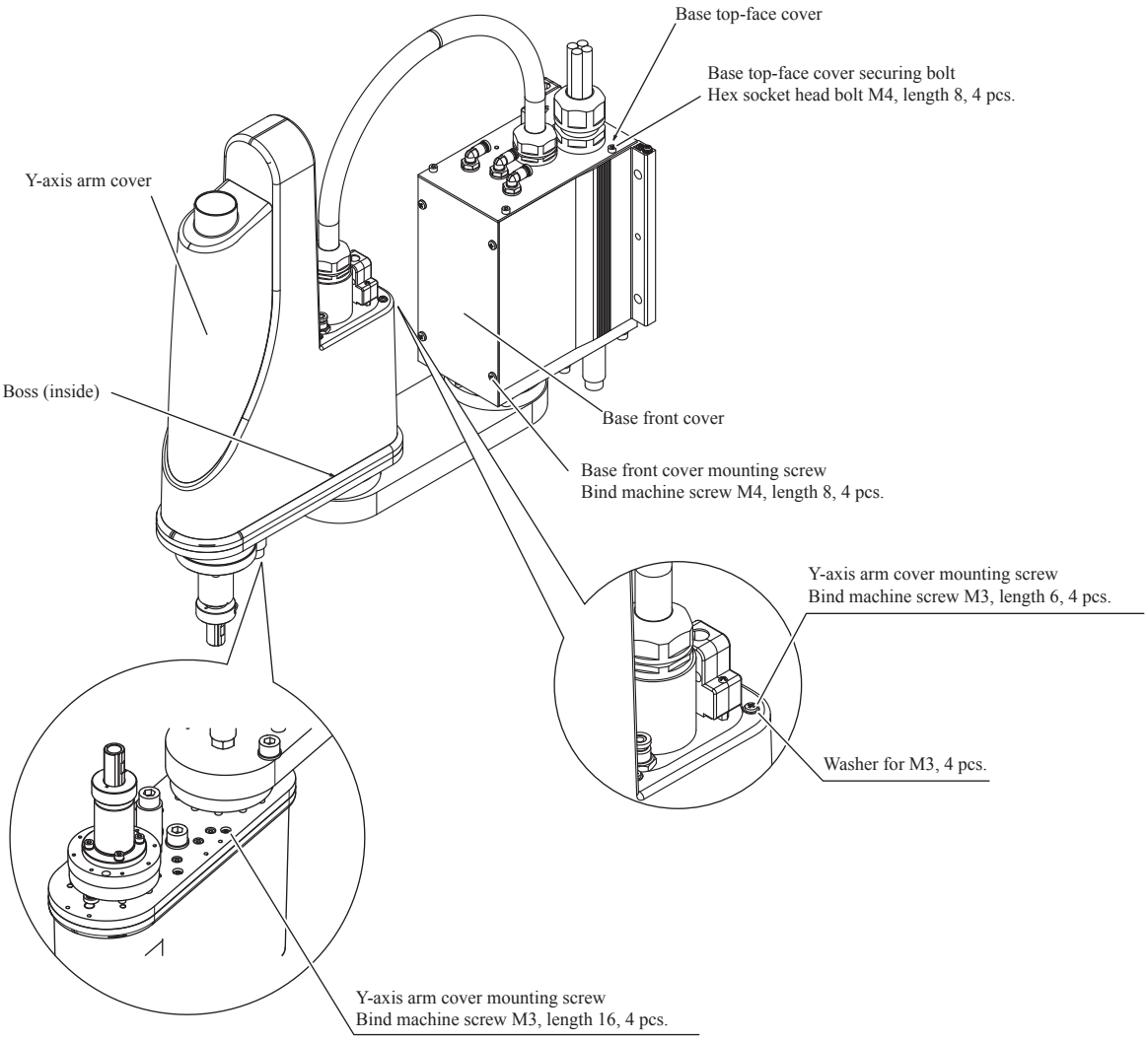
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600



CAUTION

When detaching or attaching the cover, the boss inside the cover may be in contact with the internal stay. In this case, attach the cover while widening or moving it slightly.

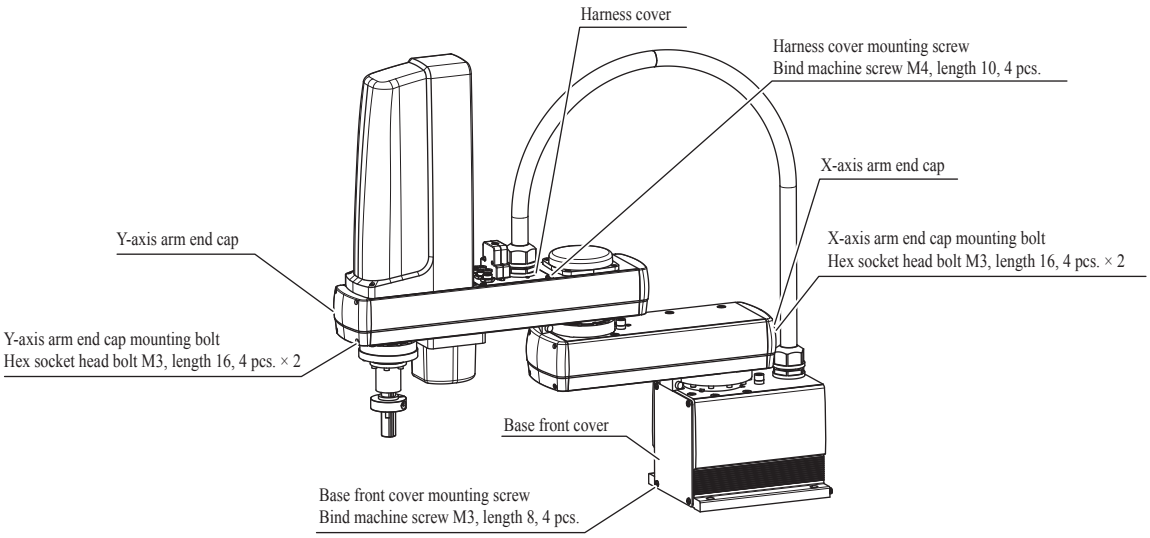
R6YXGS300, R6YXGS400

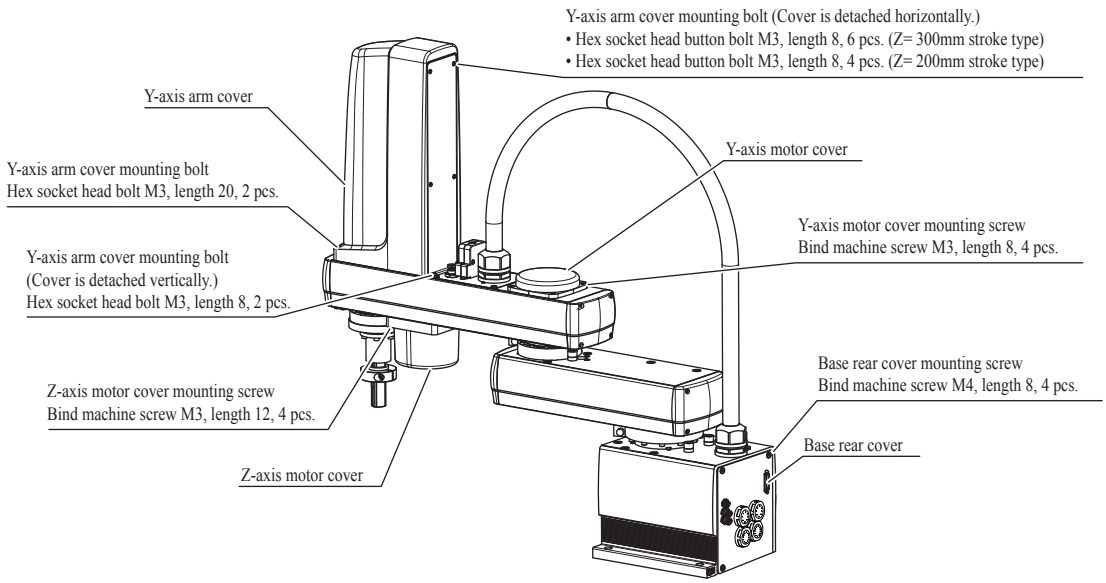


CAUTION

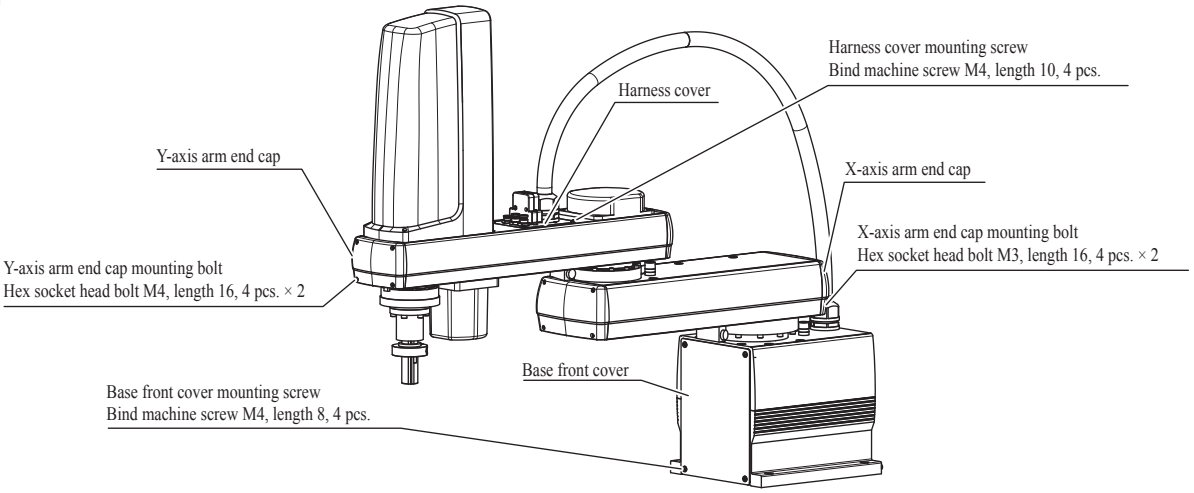
When detaching or attaching the cover, the boss inside the cover may be in contact with the internal stay. In this case, attach the cover while widening or moving it slightly.

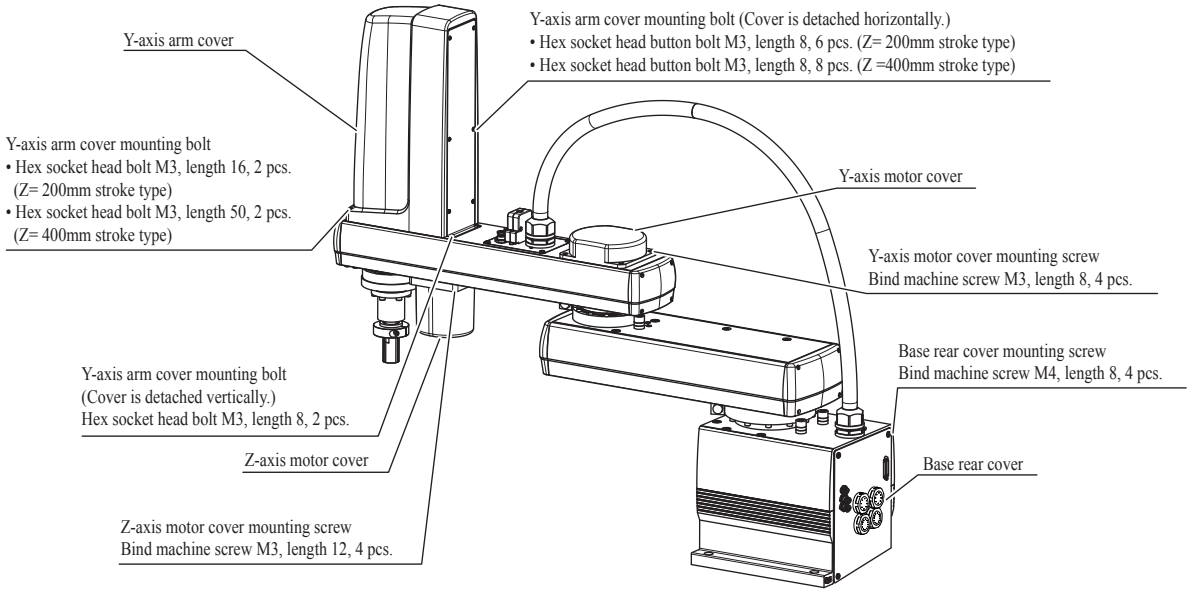
R6YXG500, R6YXG600



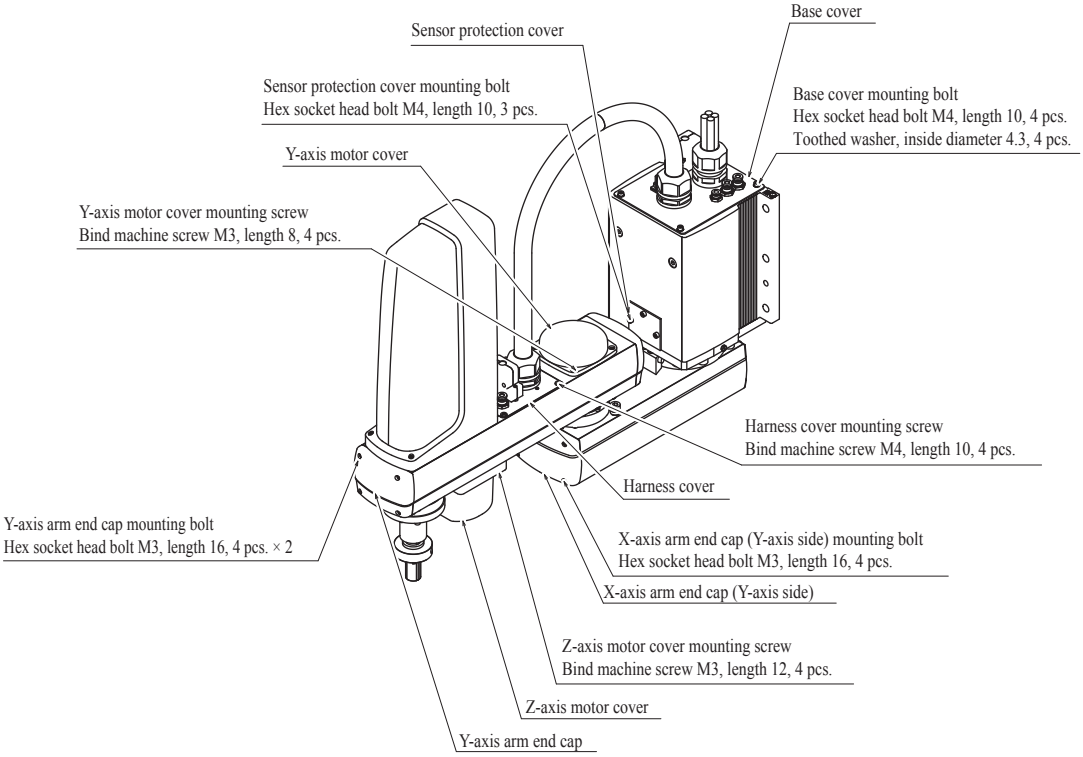


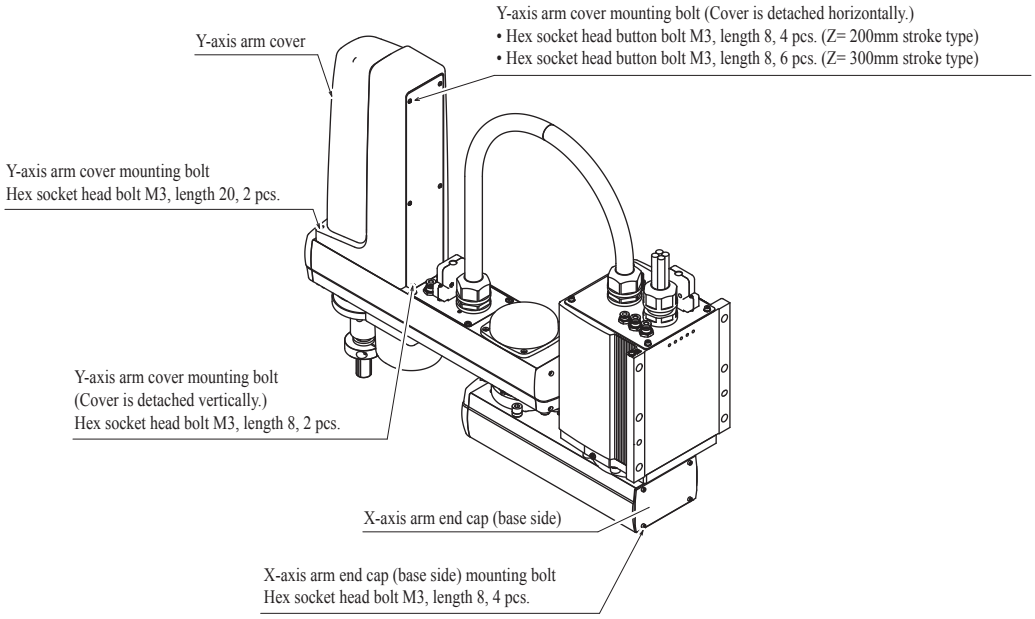
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000



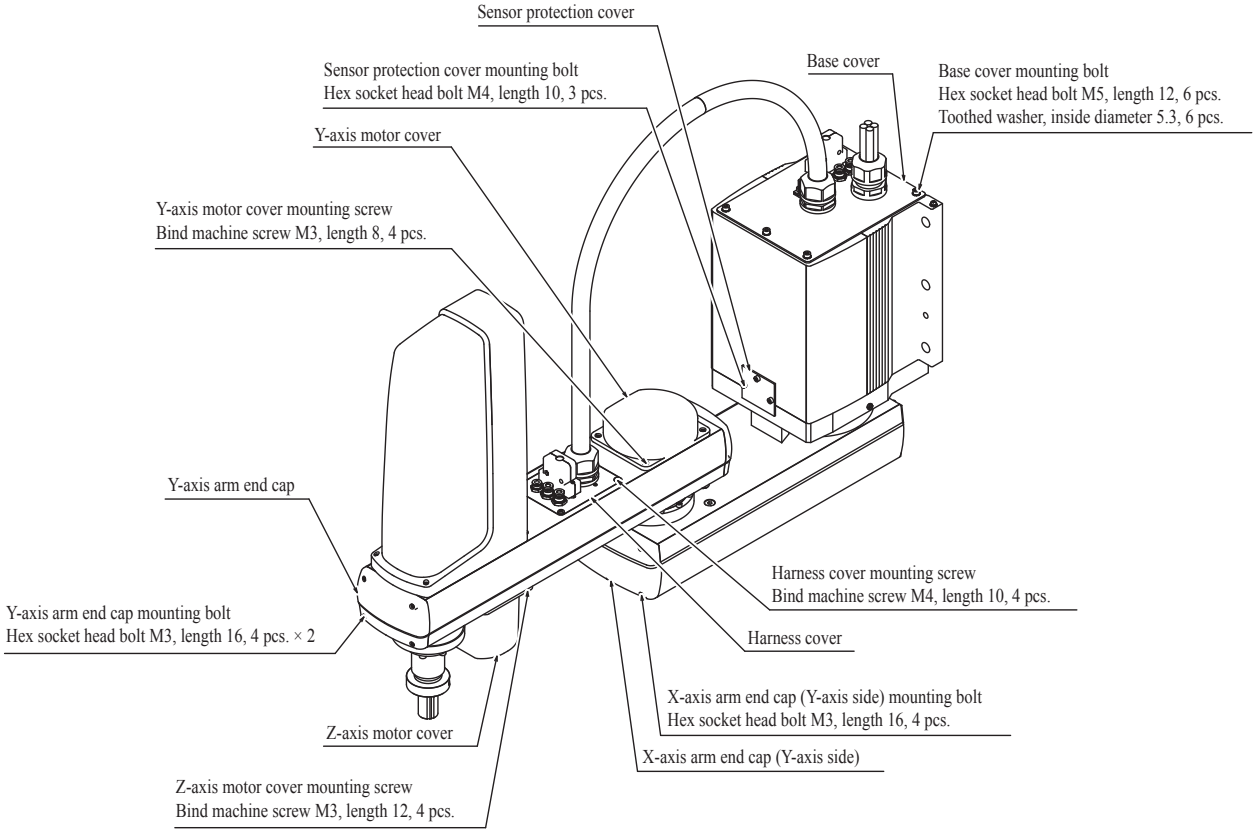


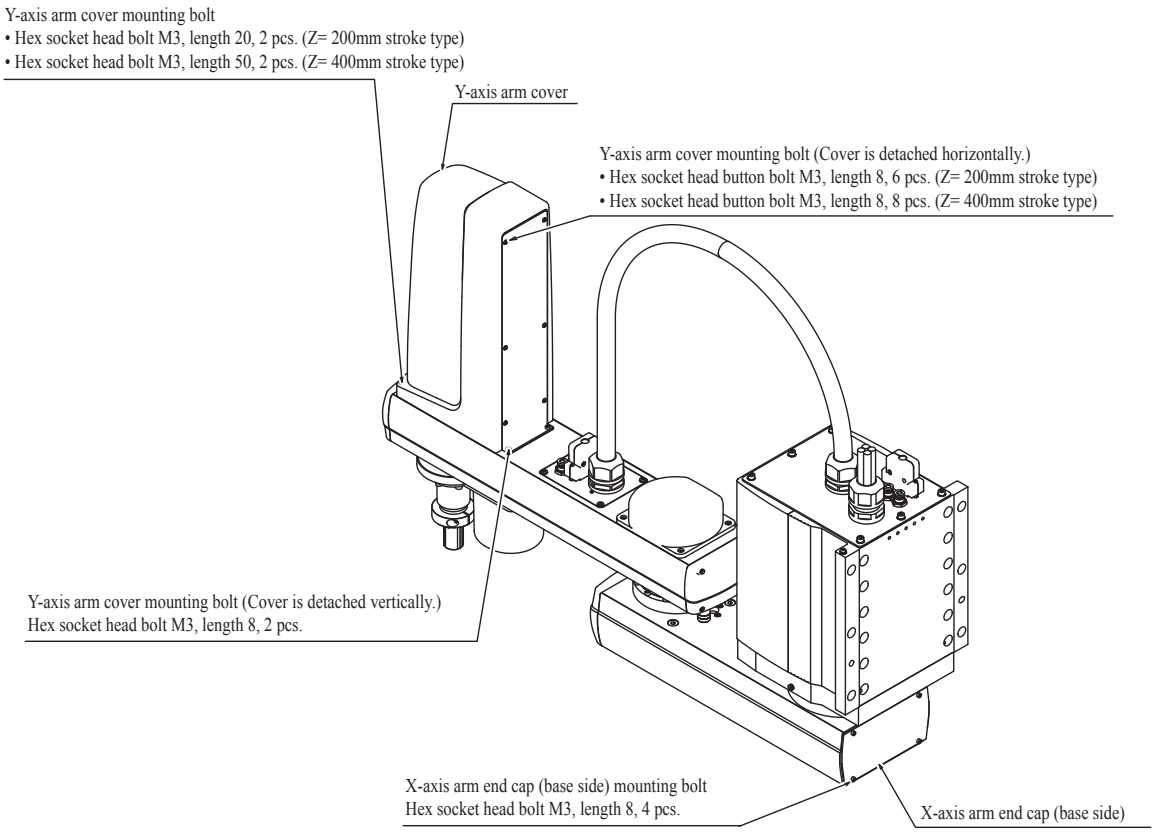
R6YXGS500, R6YXGS600





R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000





14. Installing the extension shaft (for user wiring/ tubing through spline type)

WARNING

BEFORE STARTING THE WORK, THOROUGHLY READ "13. DETACHING OR ATTACHING THE COVERS" IN THIS CHAPTER.

The extension shaft necessary to pass the user wiring and tubing through the spline can be retrofitted.
The following option parts are needed.

No.	Part No.	Q'ty	Remarks
1	KCY-M1872-000	1	Extension shaft
2	91312-03010	4	Bolt

CAUTION

When the extension shaft is installed, set the tip mass parameter as follows.

Tip mass parameter = Actual tip mass + 1 (kg)

Failure to make this setting may shorten the service life of the drive unit.

1 ***Turn off the controller.***

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

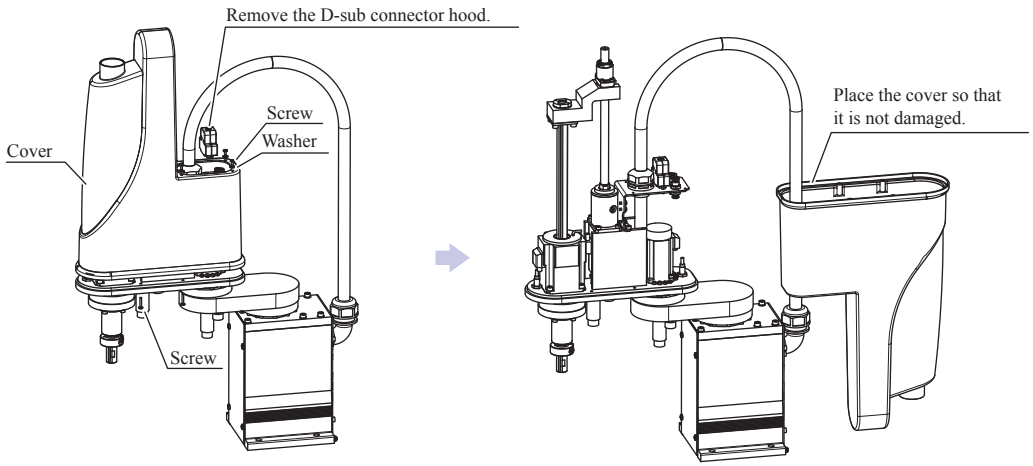
Place a sign indicating the robot is being adjusted, to keep others from operating the controller and operation panel.

3 ***Enter the safety enclosure.***

4 ***Remove the Y-axis arm cover.***

Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

Removing the cover

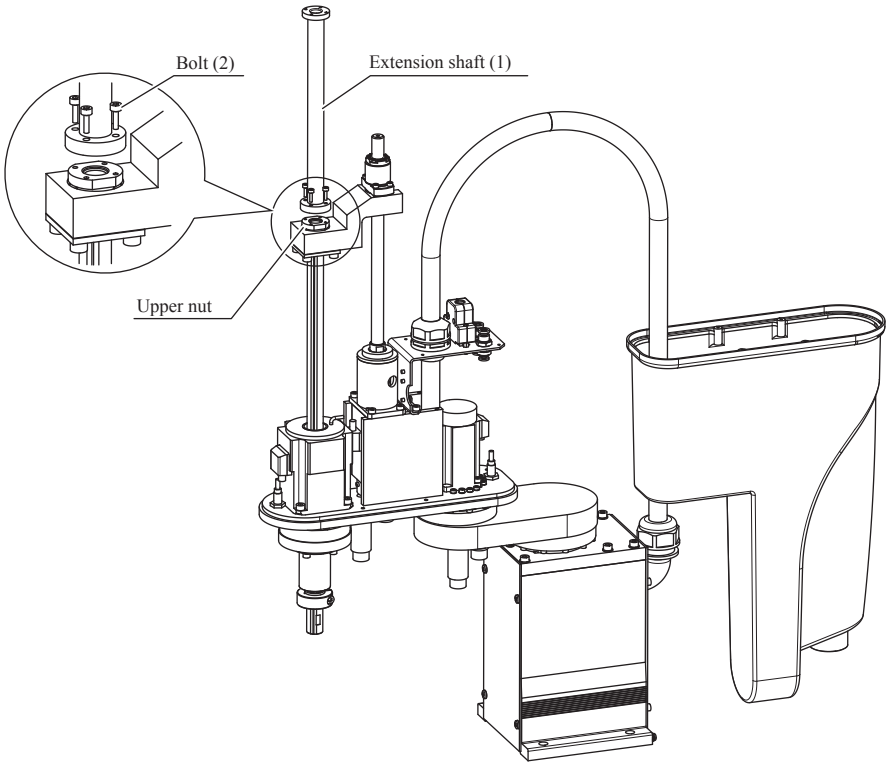


5 ***Install the extension shaft.***

Install the extension shaft (1) to the upper nut by tightening the bolts (2) to the specified torque. At this time, be sure to use the specified bolts. If a bolt other than that specified is used, the upper nut may become loose.

• Tightening torque : 2Nm (20kgfcm)

Installing the extension shaft



6 ***Go out of the safety enclosure.***

15. Installing the tool flange

The tool flange can be retrofitted.
The following option parts are needed.

No.	Part No.	Q'ty	Remarks
1	KCY-M1790-000	1	Tool flange
2	91312-05014	2	Bolt
3	92A08-05308	1	Set screw
4	90K41-001490	1	Warning label

CAUTION

When the tool flange is installed, set the tip mass parameter as follows.

Tip mass parameter = Actual tip mass + 1 (kg)

Failure to make this setting may shorten the service life of the drive unit.

1 ***Turn off the controller.***

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 and operation panel.

3 ***Enter the safety enclosure.***

4 ***Remove the bolt, and then the stopper.***

5 ***Install the tool flange.***

Align the orientation of the tapped hole for the tool flange set screw with that of the width across flat part of the spline, and then insert the tool flange all the way inside.

6 ***Install the tool flange with the bolt (2).***

Secure that tool flange after it has been inserted all the way inside.

• Tightening torque: 9Nm (92kgfcm)

Apply the grease to the bolt thinly to make the tightening torque stable.

7 ***Tighten the set screw (3).***

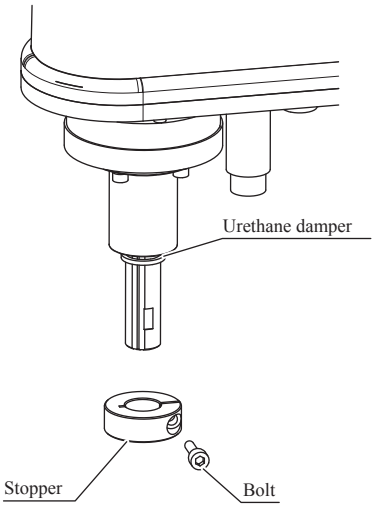
• Tightening torque: 3.5Nm (36kgfcm)

Apply Loctite 262 (Henkel Japan) to the set screw.

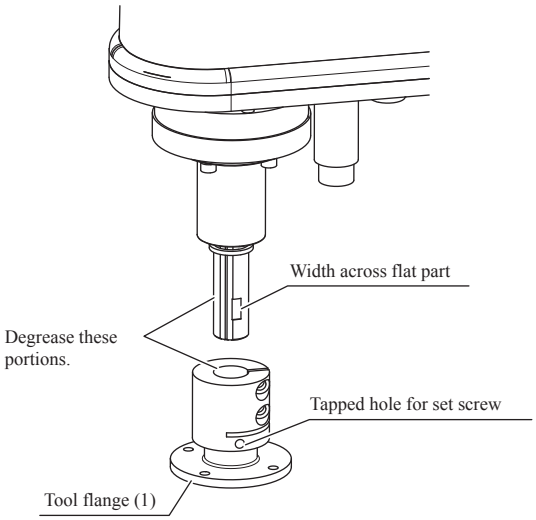
8 ***Affix the warning label (4).***

9 ***Go out of the safety enclosure.***

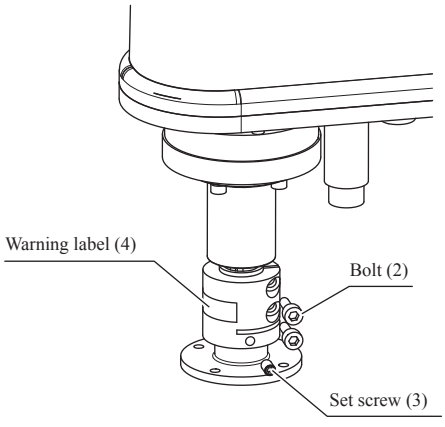
Step 4 Removing the stopper



Step 5 Installing the tool flange



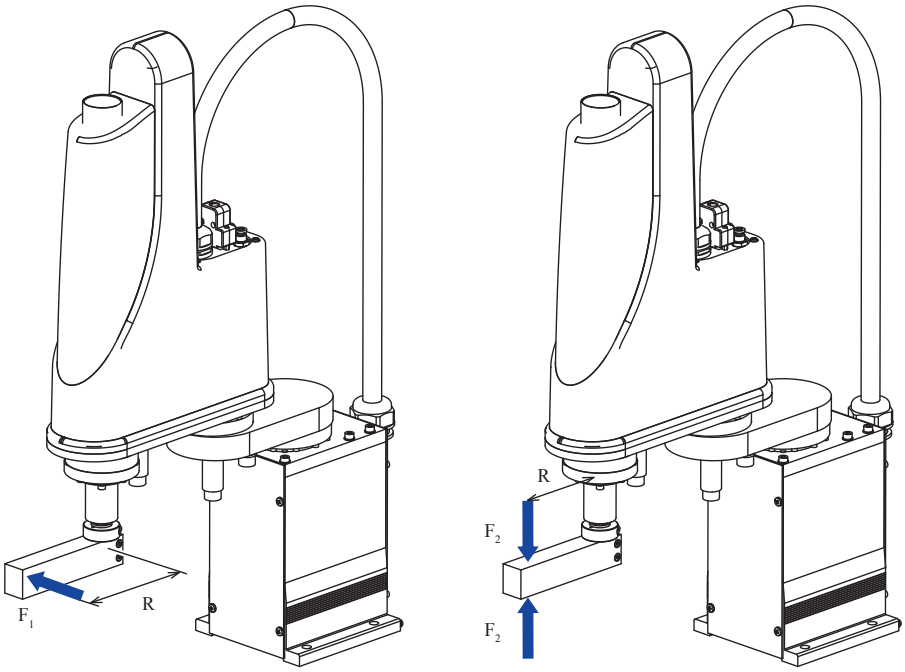
Step 6-8 Installing the tool flange

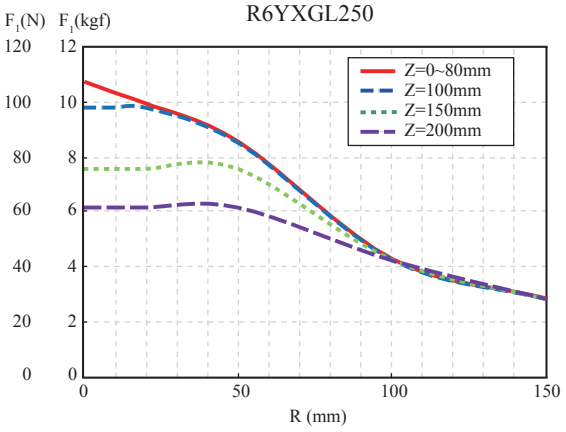


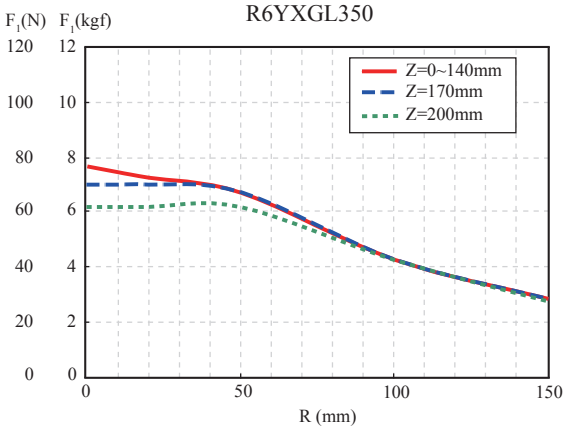
16. Permissible spline load

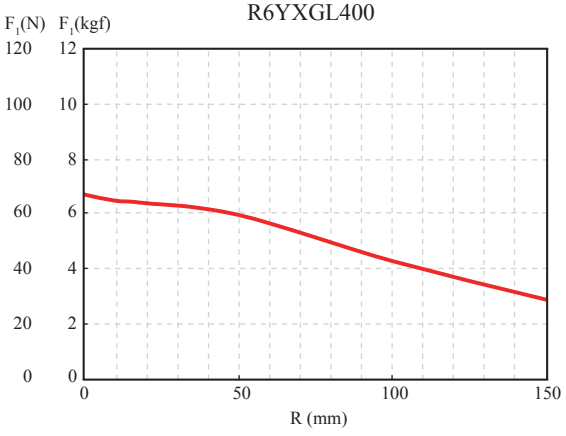
Due to the strength factors of the spline, and the X,Y,Z,R axes, do not apply loads which exceed those shown below during an all-axis servo hold status, or during ultra-slow-speed operations.
"F_2" includes the load of the tip load's weight.

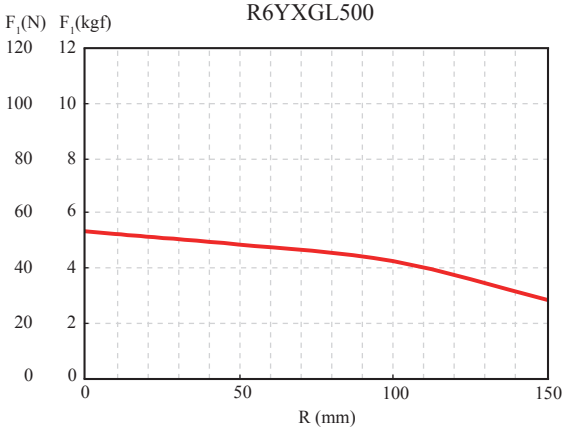
Permissible spline loads





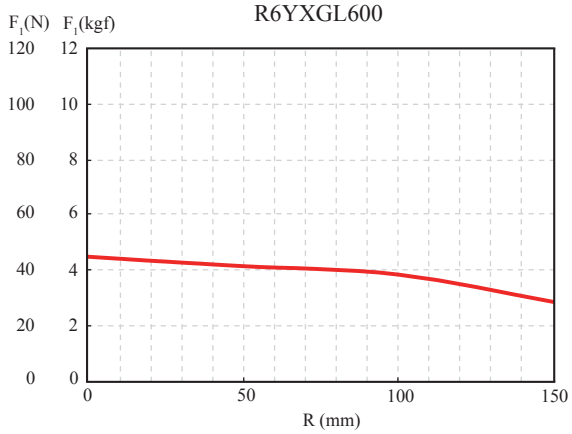




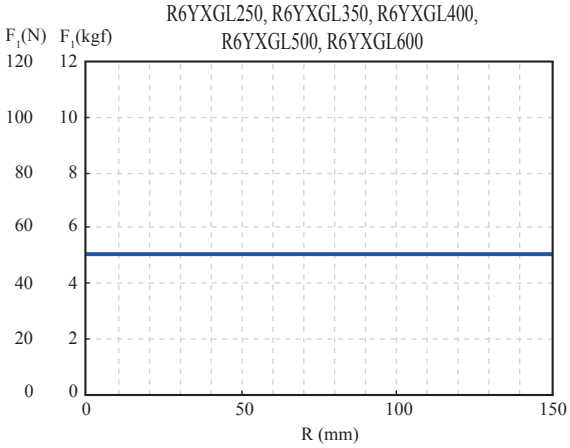


* The vertical distance from the Z-axis origin position to the load must not exceed 200mm.

R6YXGL600

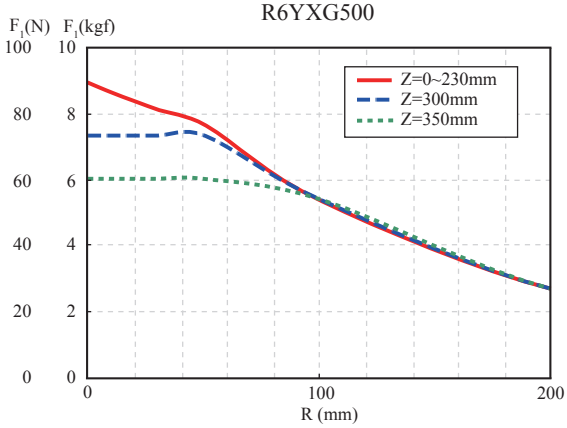


R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600

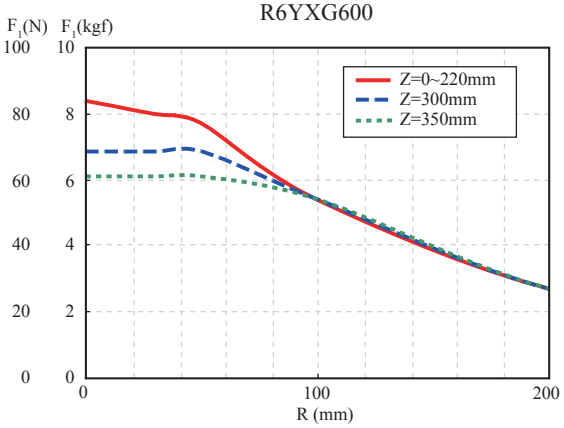


* The vertical distance from the Z-axis origin position to the load must not exceed 200mm.

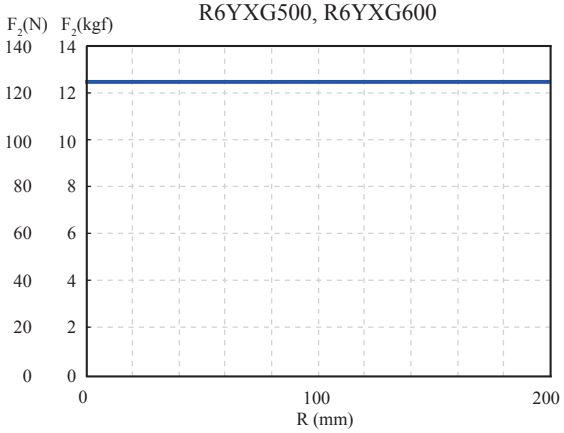
R6YXG500



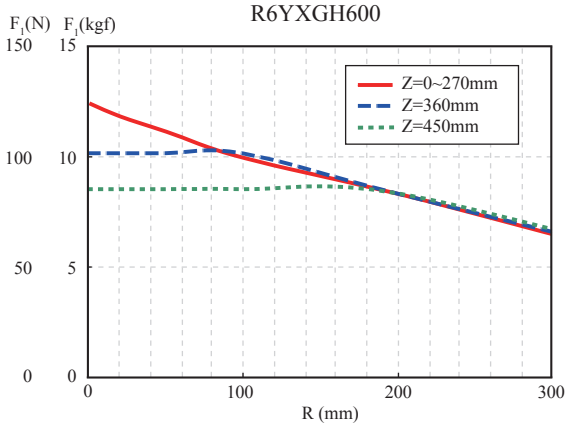
R6YXG600

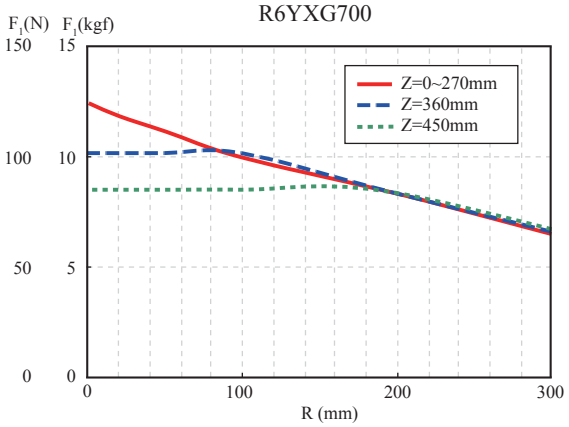


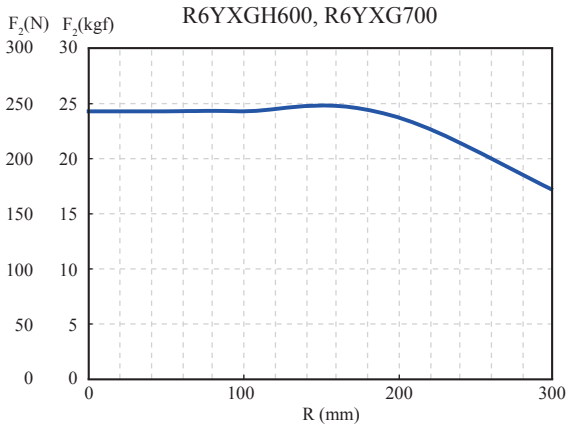
R6YXG500, R6YXG600



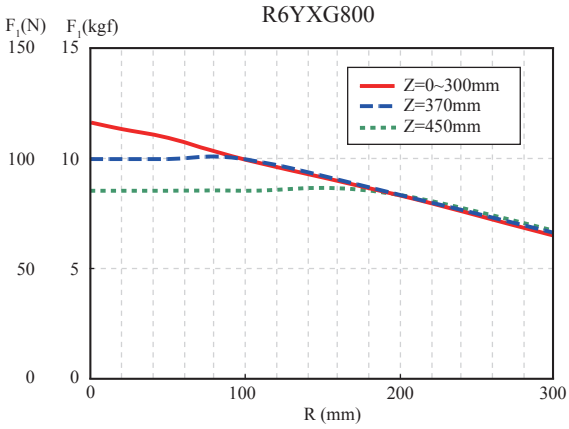
* The vertical distance from the Z-axis origin position to the load must not exceed 350mm.

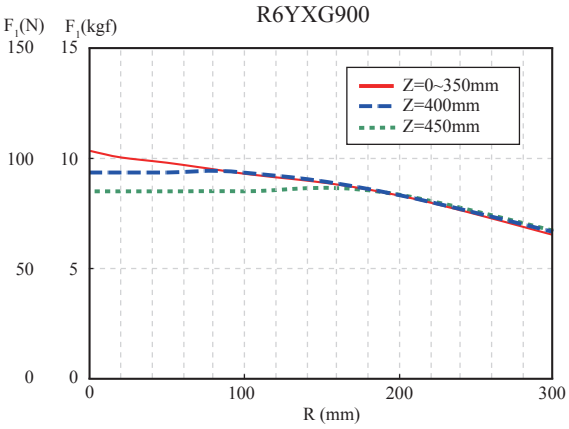


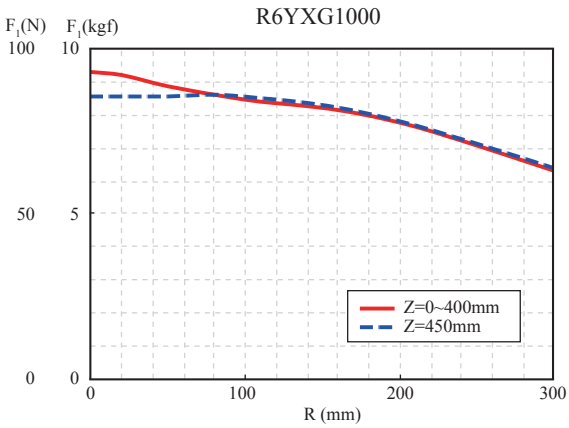


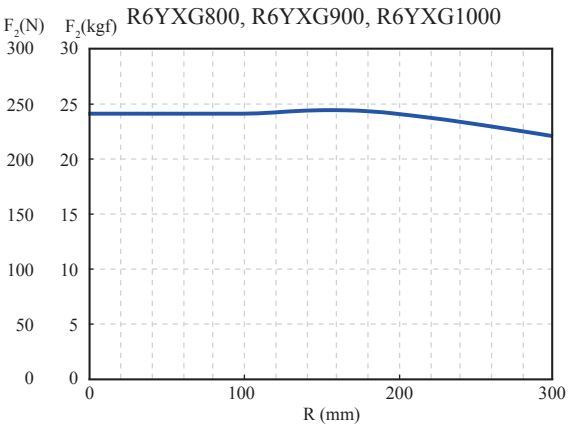


* The vertical distance from the Z-axis origin position to the load must not exceed 450mm.









* The vertical distance from the Z-axis origin position to the load must not exceed 450mm.

Chapter 3 Robot settings

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1. Overview

Various settings have been completely made at the factory or by your distributor before shipment, including the origin position setting. If the operating conditions are changed and the robot needs to be set again, then follow the procedures described in this chapter.

The following describes the safety precautions to be observed when making various settings.

CAUTION

- Read and understand the contents of this chapter completely before attempting to set the robot.
- Place a conspicuous sign indicating the robot is being adjusted, to prevent others from touching the controller switch, programming box or operation panel.
- If a safety enclosure has not yet been provided right after installation of the robot, rope off or chain off the movement range 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 range of the manipulator.
- To check the operation after the settings have been made, refer to the section "4.5.1 Trial Operation" in Chapter “Safety Instructions” of this manual.

2. Adjusting the origin

All models of the XG series robots use an absolute type position detector. The origin position (zero pulse point) can be determined by absolute reset. Once absolute reset is performed, you do not have to repeat absolute reset when turning the power on next time. However, absolute reset is required if any of the following cases occur. The robot is shipped from the factory in condition "3." (below), so please perform absolute reset after installing the robot. For more details on absolute reset, refer to "Absolute Reset" in Chapter 4 of the "OMRON Robot Controller User's Manual".

1. Absolute-related error occurred on the axis.
2. Power drop was detected in the absolute battery for the driver installed inside the robot controller.
3. Cable connecting the robot unit to the controller was disconnected. (This is the status when shipped from the factory.)
4. Robot generation was changed.
5. Parameters were initialized.
6. Axis parameters "Origin shift", "Origin method", "Origin direction" or "Motor direction" were changed.
7. Motor was replaced. (Motor wiring connector was removed.)
8. Data in the ALL data file (extension: ALL) or parameter file (extension: PRM) was written into the controller by way of the RS-232C.

The following sections explain how to perform absolute reset.

CAUTION

- If any of the above cases occur after installing the robot, absolute reset must be performed again. To perform absolute reset, move the robot arms back to their origin positions where the robot does not interfere with peripheral equipment after the setup is complete.
- After performing absolute reset, move the robot to a known point to check whether the origin position is correctly set. When doing this check, move the robot at the slowest possible speed.
- The standard coordinate and point data must be reset when the origin position is changed.
- Make point data setting after changing the origin position. After changing the origin position, do not use the previous point data.

There are three absolute reset methods for the XG series: the sensor method, mark method and stroke end method. The X-axis, Y-axis and R-axis use the sensor method as the initial setting, while the Z-axis uses the stroke end method.

2.1 Absolute reset method

2.1.1 Sensor method (X-axis, Y-axis and R-axis)

In the sensor method, the target axis is automatically operated for the absolute reset, and the absolute reset is performed at the position where the proximity sensor provided on the target axis detects the detection area (dog). The absolute reset in the sensor method can be executed with the programming box (PB), RS-232C communication, and dedicated input.

WARNING

SERIOUS INJURY MIGHT OCCUR FROM PHYSICAL CONTACT WITH THE ROBOT DURING OPERATION. NEVER ENTER WITHIN THE ROBOT MOVEMENT RANGE DURING ABSOLUTE RESET.

CAUTION

The origin cannot be detected in any axis which is not positioned on the plus side from the origin (see the Fig. stated in step 6 of "2.3.1 Sensor method (X-axis, Y-axis, and R-axis)" in this Chapter) before starting the return-to-origin operation. (Factory setting at shipment.)

In this case, press the STOP key to interrupt the return-to-origin operation, move the target axis to the plus side of the origin, and reperform the origin return operation. If the return-to-origin operation is not interrupted, the robot will continue the operation and may collide with the mechanical stopper or a peripheral device. Since a mechanical stopper is not provided in the R-axis, the wiring and piping installed on the end effecter may be wound up by the operation.

2.1.2 Stroke end method (Z-axis)

In the stroke end method, absolute reset is performed at a position slightly backed off from the stroke end, after the Z-axis contacts the mechanical stopper and stroke end is detected.

WARNING

SERIOUS INJURY MIGHT OCCUR FROM PHYSICAL CONTACT WITH THE ROBOT DURING OPERATION. NEVER ENTER WITHIN THE ROBOT MOVEMENT RANGE DURING ABSOLUTE RESET.

2.2 Machine reference

The XG series position detectors are resolvers that have four positions where absolute reset can be performed per motor revolution. If the sensor method is used for the absolute reset, the origin position will be set at the positions where absolute reset can be performed soon after the origin sensor reacts to the dog (the origin signal is detected). The machine reference means the position relationship of the position where the robot detects the origin signal to the position where the absolute reset can be performed soon after detection (see the Fig. below). The machine reference is expressed with the ratio of interval A to interval B shown in the Fig. below. Interval A is the minimum distance between the positions where absolute reset can be performed and interval B is the distance between the position where the origin signal is detected and the position where absolute reset can be performed soon after the origin signal detection. The machine reference value (unit: %) is displayed on the optional PB screen.

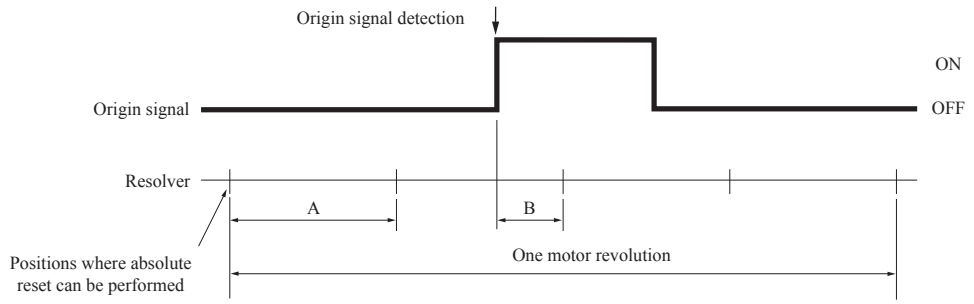
Machine reference value = B/A × 100(%)

CAUTION

The machine reference must be adjusted within a specified range to keep the repeatability precision of the absolute reset position (The machine reference is factory-adjusted prior to shipping). If the origin position is changed, the machine reference must be readjusted. For information on how to adjust the machine reference, refer to "2. Adjusting the origin" in this Chapter. When the temperature of the robot joint sections is high immediately after the robot has been operated, the machine reference value might be outside the specified range (40 to 60%). When checking or adjusting the machine reference value, always make sure that the temperature of the robot joint sections has returned to room temperature.

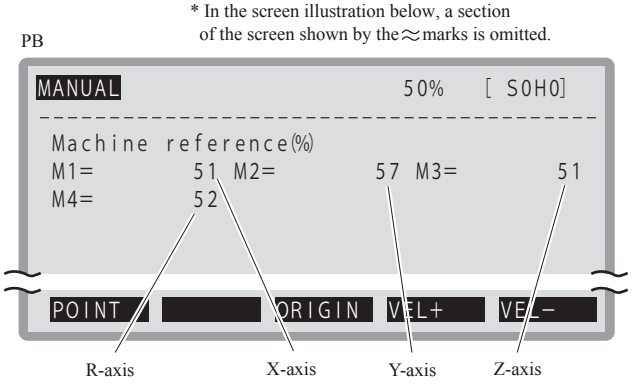
Recommended machine reference value: 40 to 60%

Machine reference



Machine reference display on PB screen

* In the screen illustration below, a section of the screen shown by the ≈ marks is omitted.



2.3 Absolute reset procedures

2.3.1 Sensor method (X-axis, Y-axis and R-axis)

WARNING

SERIOUS INJURY MIGHT OCCUR FROM PHYSICAL CONTACT WITH THE ROBOT DURING OPERATION. NEVER ENTER WITHIN THE ROBOT MOVEMENT RANGE DURING ABSOLUTE RESET.

The operation procedure using the PB is described below.

NOTE

- To return to the previous operation step, press the ESC key.
- For details about how to operate the robot controller, see the "OMRON Robot Controller User's Manual".

1 ***Turn on the controller.***

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

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.

3 ***Enter the manual mode using the PB screen.***

4 ***Select "RST.ABS".***

Press the F13 (LOWER + F3) key to select "RST.ABS".

5 ***Select an axis for absolute reset. (X-axis: M1, Y-axis: M2, R-axis: M4)***

To select the X-axis, press the F1 (M1) key.

To perform the absolute reset of all axes, press the F11 (LOWER + F1) key to select "ALL".

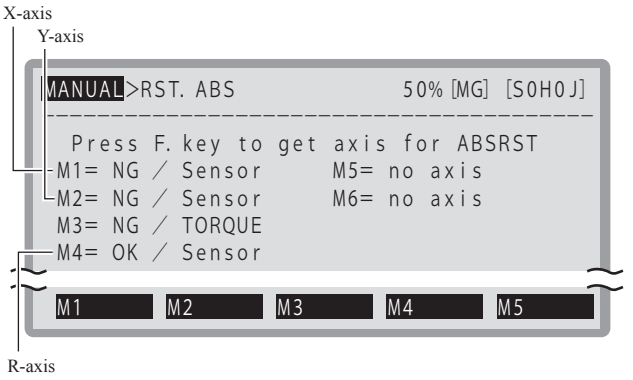
CAUTION

The Z-axis of the stroke end method first rises during the absolute reset of all axes (default setting). Be careful that your fingers do not get pinched or crushed by any sudden movement.

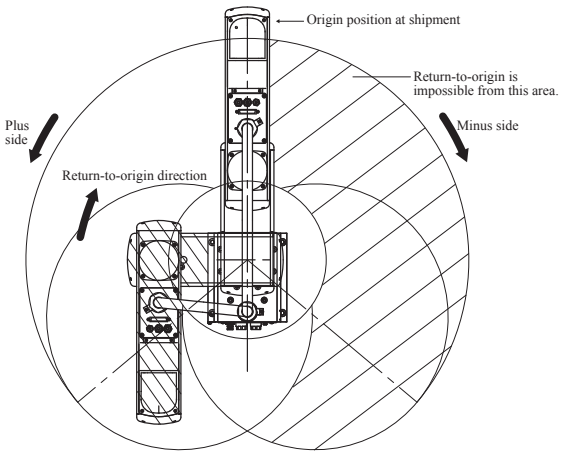
6 ***Check the axis position.***

Check that the absolute reset axis must be positioned at the plus side of the origin. (See the Fig. on the right.) If it is not at the plus side, then press the jog key to move the target axis to the plus side.

Step 3-5 Absolute reset mode screen



Step 6 Absolute reset possible range



7 ***Perform the absolute reset.***

The message "Reset ABS OK?" appears on the PB screen.

8 ***Press the F4 (Yes) key.***

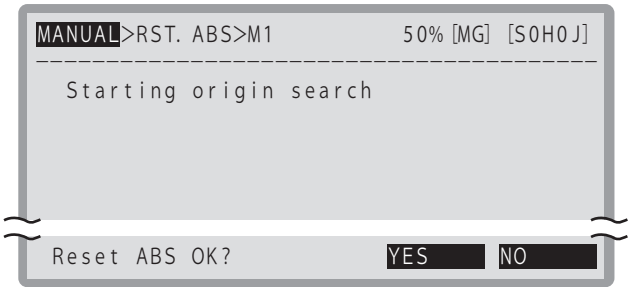
Check that there are no obstacles in the robot movement range, and then press the F4 key (YES).

To cancel the absolute reset, press the F5 (NO) key.

9 ***Check the machine reference value.***

After the absolute reset has been completed, check that the machine reference value displayed on the PB is between 40 and 60 (recommended range). (For R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500 and R6YXGL600, the recommended ange is between 30 and 70.)
If the machine reference value is outside the recommended range, then the next absolute reset may not be properly performed. In this case, make the necessary adjustments while referring to "2. Adjusting the origin" in this chapter.

Step 7-8 Performing the absolute reset of the X-axis



2.3.2 Stroke end method (Z-axis)

WARNING

SERIOUS INJURY MAY OCCUR FROM PHYSICAL CONTACT WITH THE ROBOT DURING OPERATION. NEVER ENTER WITHIN THE ROBOT MOVEMENT RANGE DURING ABSOLUTE RESET.

The operation procedure using the PB is described below.

NOTE

- To return to the previous operation step, press the ESC key.
- For details about how to operate the robot controller, see the "OMRON Robot Controller User's Manual".

1 ***Turn on the controller.***

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

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.

3 ***Enter the manual mode using the PB screen.***

4 ***Select "RST.ABS".***

Press the F13 (LOWER + F3) key to select "RST.ABS".

5 ***Select "M3" that corresponds to the Z-axis.***

Press the F3 (M3) key.

6 ***Perform the absolute reset.***

The message "Reset ABS OK?" appears on the PB screen.

7 ***Press the F4 (YES) key.***

Check that there are no obstacles in the robot movement range, and then press the F4 key (YES).

To cancel the absolute reset, press the F5 (NO) key.

8 ***Check the machine reference value.***

After the absolute reset has been completed, check that the machine reference value displayed on the PB is within the absolute reset tolerance range (25 to 75). (For R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500 and R6YXGL600, the recommended range is between 30 and 70.)

CAUTION

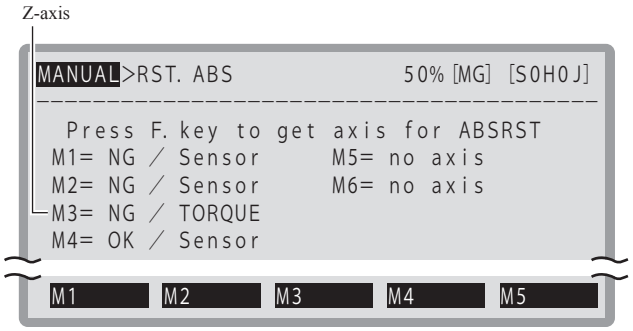
When adjusting the machine reference value, be sure to check the adjustment machine reference value.

■ Machine reference value checking procedure

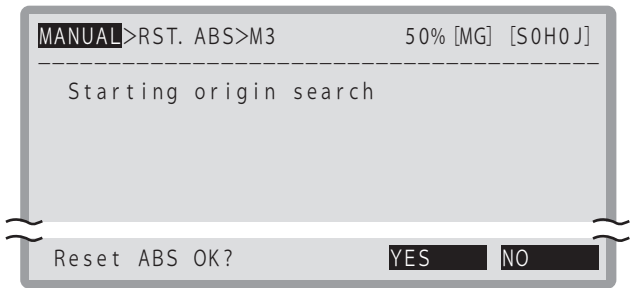
1. Press the MODE key.
2. Press the F3 key to enter the manual mode.
3. Press the F13 key (LOWER + F3) to select "RST.ABS".
4. After the Z-axis absolute reset is complete, press the F10 (UPPER + F5) key to display the adjustment machine reference value (%).

If the machine reference value is outside the absolute reset tolerance range, then the next absolute reset may not be properly performed. In this case, make the necessary adjustments while referring to "2. Adjusting the origin" in this Chapter.

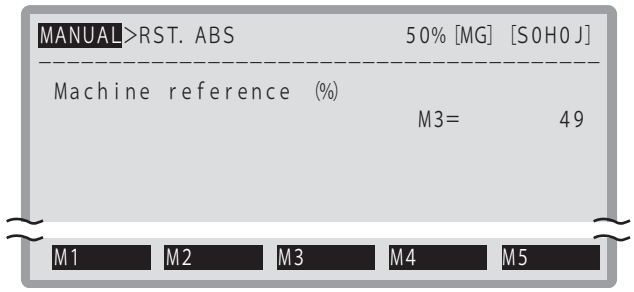
Step 3-5 Absolute reset mode screen



Step 6 Performing the absolute reset of the Z-axis



Step 8 Machine reference value



2.4 Changing the origin position and adjusting the machine reference

This section describes how to change the origin position and adjust the machine reference.

WARNING

BEFORE STARTING THE WORK, THOROUGHLY READ "13. DETACHING OR ATTACHING THE COVERS" IN CHAPTER 2.

CAUTION

- If the origin position has been changed, then the absolute reset must be performed, the machine reference must be adjusted, and the standard coordinate and point data must be reset.
- If any machine reference is adjusted, the origin position may change. Before the adjustment, mark off the reference mark at the current origin position on the main body of the robot. After the machine reference is adjusted, be sure to check that the origin position has not deviated. If the origin position changes after the machine reference has been adjusted, then the standard coordinate and point data must be reset.

2.4.1 Sensor method (R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400)

■ Adjusting the X-axis machine reference

CAUTION

- The origin position may change due to machine reference adjustment. If it occurs, you must set point data again.
- When the return-to-origin direction is reversed, the origin position may not be the base front. When using the standard soft limit, the axis may collide with the mechanical stopper. At this time, set the soft limit 2° or more inward from the mechanical stopper while referring to "3. Setting the soft limits".

Follow the steps below to adjust the X-axis machine reference value.
Prepare a wrench for a width across flat of 13 mm.

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

2 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

3 ***Check the machine reference value.***
If the machine reference value displayed on the PB is not in the range between 30 and 70 (recommended range) after the absolute reset has been completed, follow the steps below to adjust the machine reference value.

4 ***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.

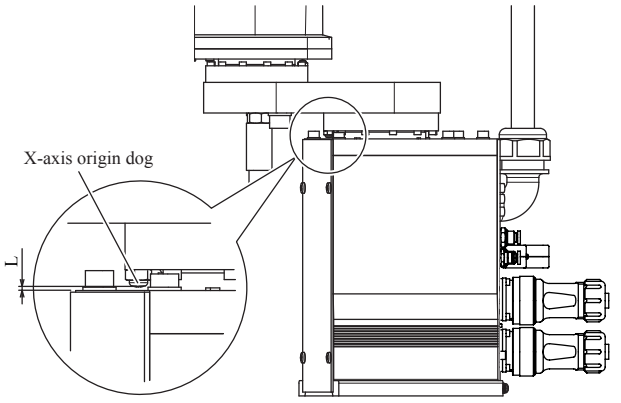
5 ***Turn off the controller.***

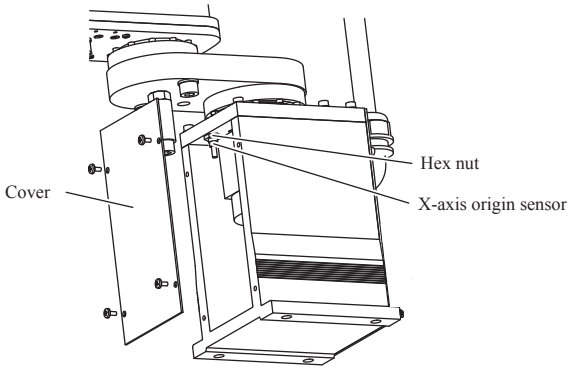
6 ***Enter the safety enclosure.***

7 ***Put a mark at the origin position.***
Scribe a mark at the current origin position on the X-axis joint area of the robot.
At this time, be careful to prevent the origin position from deviating since the X-axis arm is touched.

8 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

▶ **Step 8-15** **Adjusting the X-axis machine reference value (R6YXGL250 to R6YXGL600)**





9 ***Loosen the hex nut.***

Using the wrench, loosen the hex nut that secures the X-axis origin sensor.

CAUTION

It is enough to loosen the nut. Do not remove the nut completely.

10 ***Move the X-axis origin sensor.***

Move the X-axis origin sensor as follows.

Determine the distance between the sensor and dog (L) to 0.2 to 0.8 mm so that the sensor does not collide with the dog.

To decrease the X-axis machine reference value, move the sensor away from the dog.

To increase the X-axis machine reference value, put the sensor close the dog.

11 ***Secure the sensor with the hex nut.***

Secure the X-axis origin sensor with the hex nut.

Tightening torque	5Nm (50kgfcm)
Tool	KANON (Nakamura Mfg. Co., Ltd.)
Torque wrench	N190SPK 13

12 ***Turn on the controller.***

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

13 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.

14 ***Check the machine reference value.***

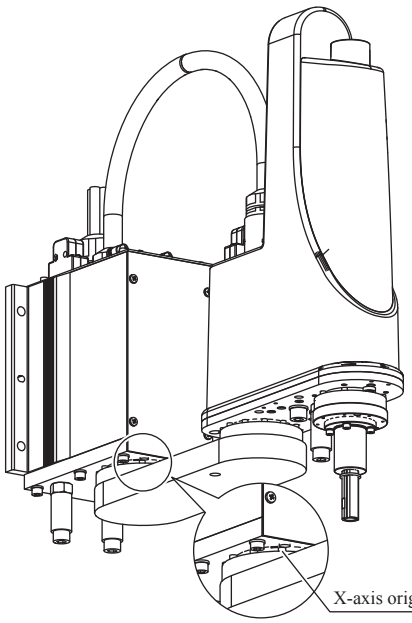
1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. When the machine reference value is in the range between 30 and 70 (recommended range) and the X-axis arm position is within ± 1° or less from the front of the base, then the machine reference has been completely adjusted.
3. If it is outside the recommended range, then repeat the procedure from step 4 again to readjust it.

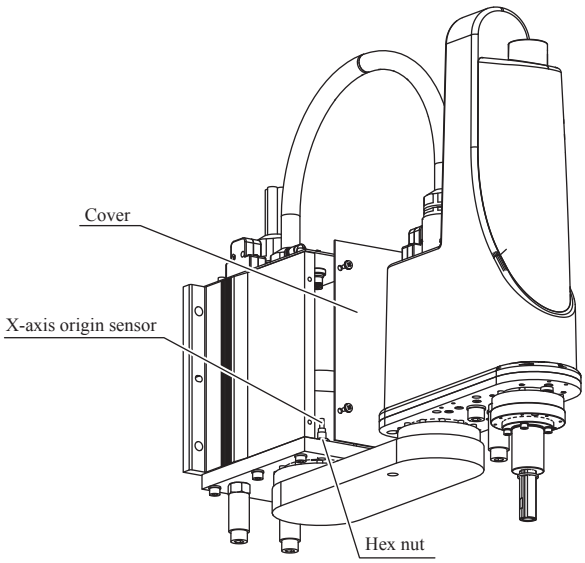
15 ***Turn off the controller.***

16 ***Enter the safety enclosure.***

17 ***Reattach the cover.***

Step 8-15 Adjusting the X-axis machine reference value (R6YXGS300, R6YXGS400)





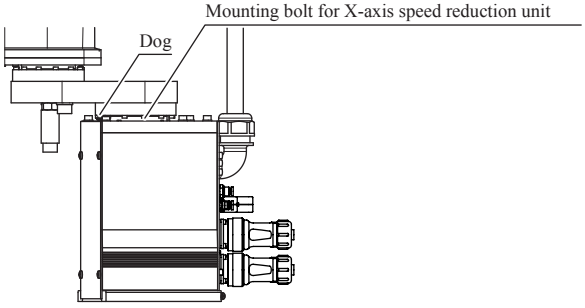
■ Changing the X-axis origin position

The X-axis origin position can be changed to any position in the range from the base front position of the X-axis to a maximum of 120° clockwise and counterclockwise at 30° intervals, by changing the positions of the dog and the mounting bolt for the X-axis speed reduction unit as shown below.

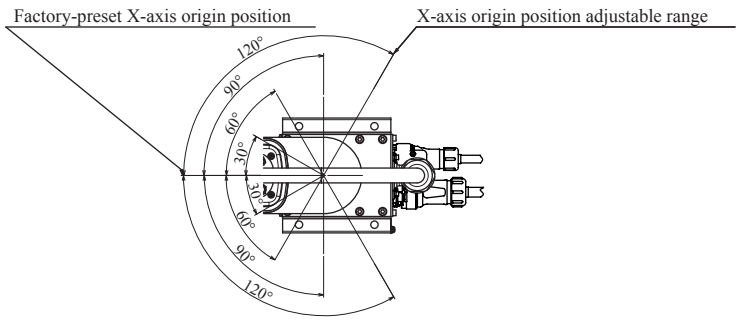
CAUTION

If the origin position has been changed, then the absolute reset must be performed, the machine reference must be adjusted, and the standard coordinate and point data must be reset.

Dog and mounting bolt for X-axis speed reduction unit



X-axis origin position adjustable range



The following describes how to change the X-axis origin position, for example, to a position 90° counterclockwise.
Prepare the tools listed below.

• Hex wrench set • Torque wrench • Phillips screwdriver • Hex bit • Phillips screwdriver bit

1 ***Turn on the controller.***

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

2 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

3 ***Place a sign indicating that the robot is being adjusted.***

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

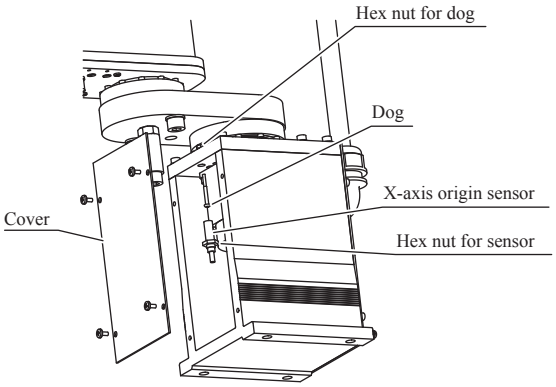
4 ***Turn off the controller.***

5 ***Enter the safety enclosure.***

6 ***Remove the cover.***

Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

▶ **Step 6-9** **Removing the cover, connector, X-axis origin sensor, and dog.**



7 ***Disconnect the connector of the X-axis origin sensor wire XORG.***

8 ***Remove the sensor.***
Loosen the hex nut of the X-axis origin sensor to remove the sensor.

9 ***Remove the dog.***
Remove the dog through the tapped hole for the sensor. Leave the hex nut on the base.

10 ***Turn the X-axis arm 90° counterclockwise.***

11 ***Remove the bolt located opposite to the tapped hole for the sensor.***

12 ***Secure the hex nut and dog.***
Secure the hex nut and dog to the tapped hole, and then tighten to the specified torque.

13 ***Return the X-axis arm to its original origin position.***

14 ***Tighten the bolt.***
Insert the bolt into the tapped hole where the dog was attached, and tighten to the specified torque.

15 ***Secure the X-axis origin sensor with the hex nut.***
Secure the X-axis origin sensor with the hex nut so that the distance between the sensor and dog is 0.2 to 0.8 mm while referring to the "n Adjusting the X-axis machine reference value" described previously.

CAUTION
Pay special attention so that the sensor does not collide with the dog.

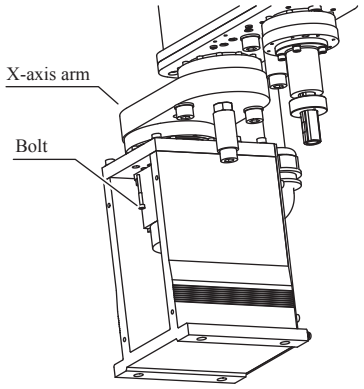
16 ***Turn on the controller.***
Check that no one is inside the safety enclosure, and then turn on the controller.

17 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.

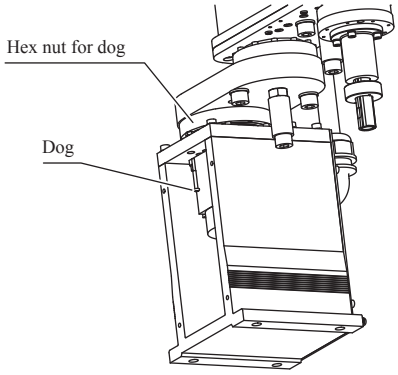
18 ***Check the machine reference value.***
1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. If the machine reference value is in the range between 30 and 70 (recommended range), then the machine reference value has been completely adjusted.

NOTE
If it is outside the recommended range, adjust the machine reference value while referring to "n Adjusting the X-axis machine reference value" described previously.

Step 10-11 Removing the bolt

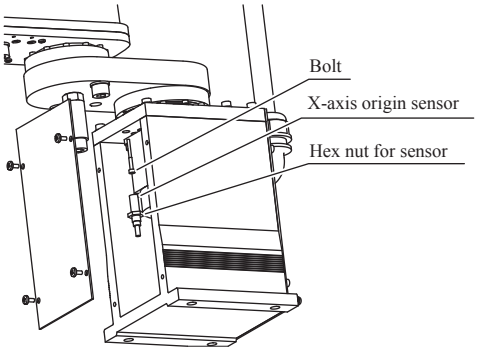


Step 12 Securing the hex nut and dog



Dog	Tightening torque (kgfcm)	Tightening torque (Nm)
M3×30	9	90

Step 13-14 Tightening the bolt



Bolt	Tightening torque (kgfcm)	Tightening torque (Nm)
M3×30	20	2.0

Use only OMRON genuine bolts or JIS B 1176 hex socket head bolts (strength class: JIS B 1051 12.9).

19 ***Tighten the hex nut of the X-axis origin sensor.***

Tightening torque	5Nm (50kgfcm)
Tool	KANON (Nakamura Mfg. Co., Ltd.)
Torque wrench	N190SPK 13

20 ***Turn off the controller.***

21 ***Enter the safety enclosure.***

22 ***Reattach the cover.***

■ Adjusting the Y-axis machine reference

CAUTION

The origin position may change due to machine reference adjustment. If it occurs, you must set point data again.

Follow the steps below to adjust the Y-axis machine reference value.
Prepare a wrench for a width across flat of 13 mm.

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

2 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

3 ***Check the machine reference value.***
If the machine reference value displayed on the PB is not in the range between 30 and 70 (recommended range) after the absolute reset has been completed, follow the steps below to adjust the machine reference value.

4 ***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.

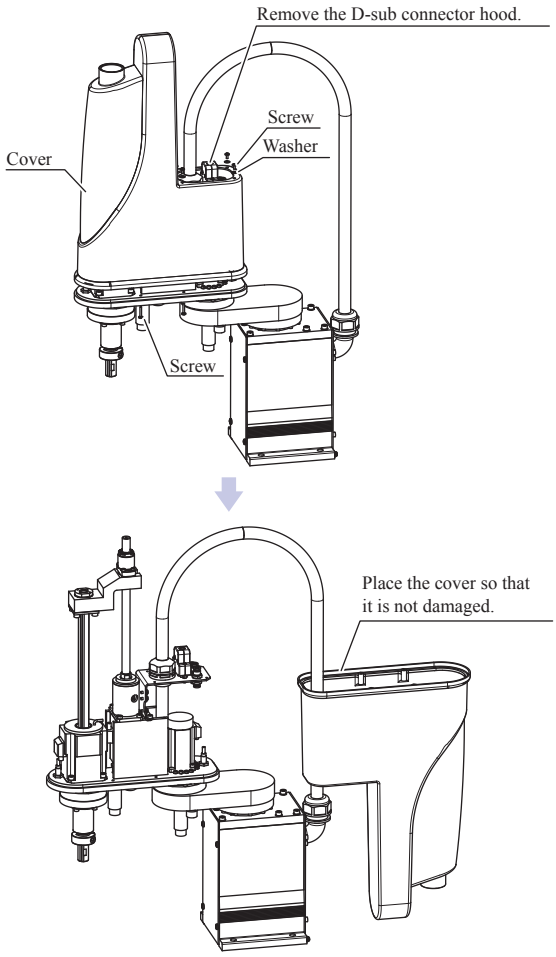
5 ***Turn off the controller.***

6 ***Enter the safety enclosure.***

7 ***Put a mark at the origin position.***
Scribe a mark at the current origin position on the Y-axis joint area of the robot.
At this time, be careful to prevent the origin position from deviating since the Y-axis arm is touched.

8 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

▶ **Step 8** **Removing the cover**



9 ***Loosen the hex nut.***

Using the wrench, loosen the hex nut that secures the Y-axis origin sensor.

CAUTION

It is enough to loosen the nut. Do not remove the nut completely.

10 ***Move the Y-axis origin sensor.***

Move the Y-axis origin sensor as follows. Determine the distance between the sensor and dog (L) to 0.2 to 0.8 mm.

To decrease the Y-axis machine reference value, move the sensor away from the dog.

To increase the Y-axis machine reference value, put the sensor close the dog.

CAUTION

Pay special attention so that the sensor does not collide with the dog.

11 ***Secure the sensor with the hex nut.***

Secure the Y-axis origin sensor with the hex nut.

Tightening torque	5Nm (50kgfcm)
Tool	KANON (Nakamura Mfg. Co., Ltd.)
Torque wrench	N190SPK 13

12 ***Turn on the controller.***

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

13 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure..

14 ***Check the machine reference value.***

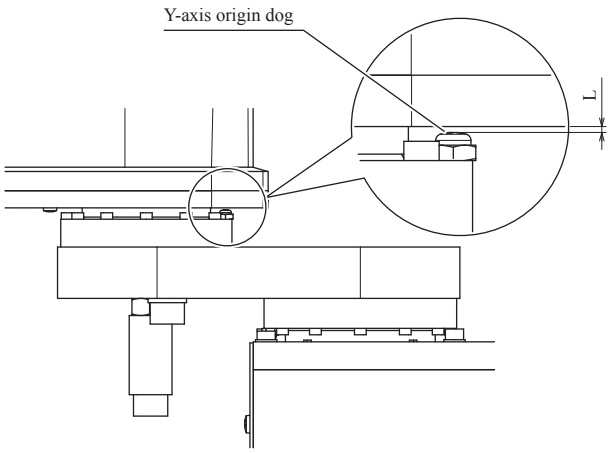
1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. When the machine reference value is in the range between 30 and 70 (recommended range) and the Y-axis arm position is in parallel with the X-axis arm position within ± 1° or less, then the machine reference value has been completely adjusted.
3. If it is outside the recommended range, then repeat the procedure from step 4 again to readjust it.

15 ***Turn off the controller.***

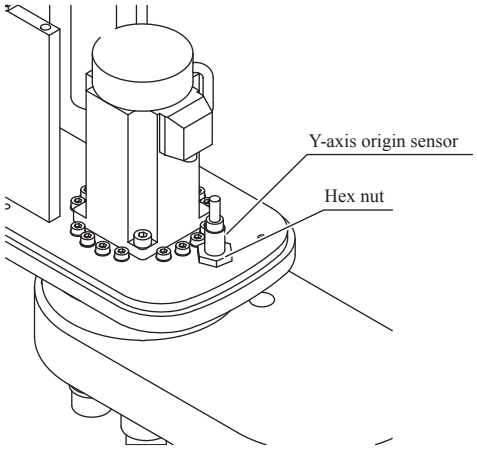
16 ***Enter the safety enclosure.***

17 ***Reattach the cover.***

Step 9-11 Moving the Y-axis origin sensor



Step 9-11 Moving the Y-axis origin sensor



■ Adjusting the R-axis machine reference

CAUTION

As the machine reference value is adjusted, the origin position may change. In this case, it is necessary to set the point data again after the machine reference value has been adjusted.

Follow the steps below to adjust the R-axis machine reference value.
Prepare a wrench for a width across flat of 13 mm.

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

2 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

3 ***Check the machine reference value.***
If the machine reference value displayed on the PB is not in the range between 30 and 70 (recommended range) after the absolute reset has been completed, follow the steps below to adjust the machine reference value.

4 ***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.

5 ***Turn off the controller.***

6 ***Enter the safety enclosure.***

7 ***Put a mark at the origin position.***
Scribe a mark at the current origin position on the R-axis of the robot.
At this time, be careful to prevent the origin position from deviating since the tip tool is touched.

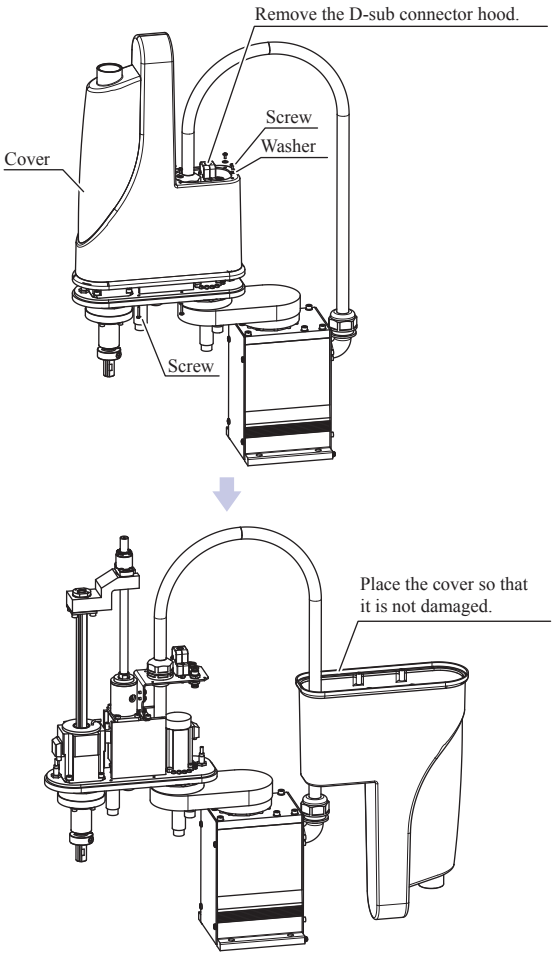
8 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

9 ***Loosen the hex nut.***
Using the wrench, loosen the hex nut that secures the R-axis origin sensor.

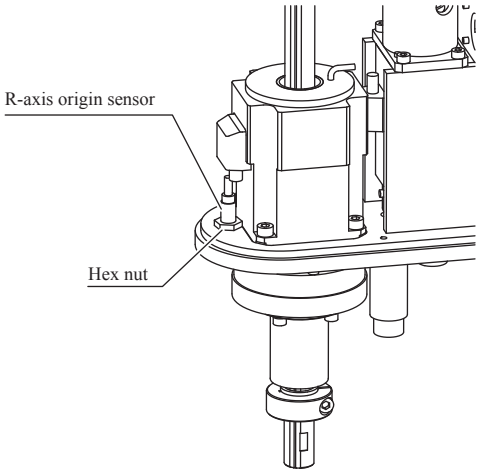
CAUTION

It is enough to loosen the nut. Do not remove the nut completely.

Step 8 **Removing the cover**



Step 9-11 **Moving the R-axis origin sensor**



10 ***Move the R-axis origin sensor.***

Move the R-axis origin sensor as follows. Determine the distance between the sensor and dog (L) to 0.2 to 0.8 mm.

To decrease the R-axis machine reference value, move the sensor away from the dog.

To increase the R-axis machine reference value, put the sensor close the dog.

CAUTION

Pay special attention so that the sensor does not collide with the dog.

11 ***Secure the sensor with the hex nut.***

Secure the R-axis origin sensor with the hex nut.

Tightening torque	5Nm (50kgfcm)
Tool	KANON (Nakamura Mfg. Co., Ltd.)
Torque wrench	N190SPK 13

12 ***Turn on the controller.***

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

13 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.

14 ***Check the machine reference value.***

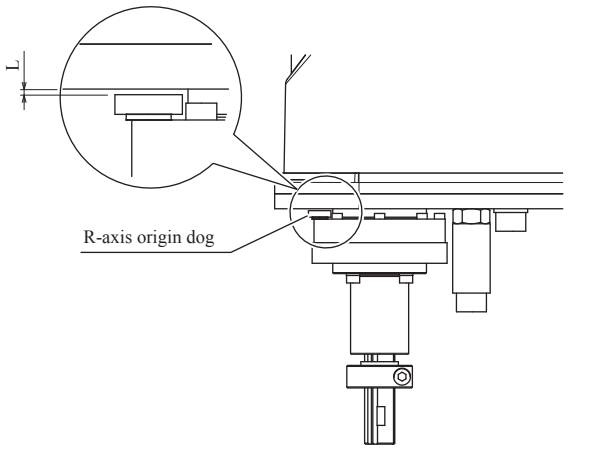
1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. When the machine reference value is in the range between 30 and 70 (recommended range), then the machine reference value has been completely adjusted.
3. If it is outside the recommended range, then repeat the procedure from step 4 again to readjust it.

15 ***Turn off the controller.***

16 ***Enter the safety enclosure.***

17 ***Reattach the cover.***

Step 10 **R-axis origin dog**



2.4.2 Sensor method
(R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000)
(R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000)

■ Adjusting the X-axis machine reference

CAUTION

The origin position may change due to machine reference adjustment. If it occurs, you must set point data again.

Follow the steps below to adjust the X-axis machine reference value.
Prepare a hex wrench set.

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

2 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

3 ***Check the machine reference value.***
If the machine reference value displayed on the PB is not in the range between 40 and 60 (recommended range) after the absolute reset has been completed, follow the steps below to adjust the machine reference value.

4 ***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.

5 ***Turn off the controller.***

6 ***Enter the safety enclosure.***

7 ***Put a mark at the origin position.***
Scribe a mark at the current origin position on the X-axis joint area of the robot.
At this time, be careful to prevent the origin position from deviating since the X-axis arm is touched.

8 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

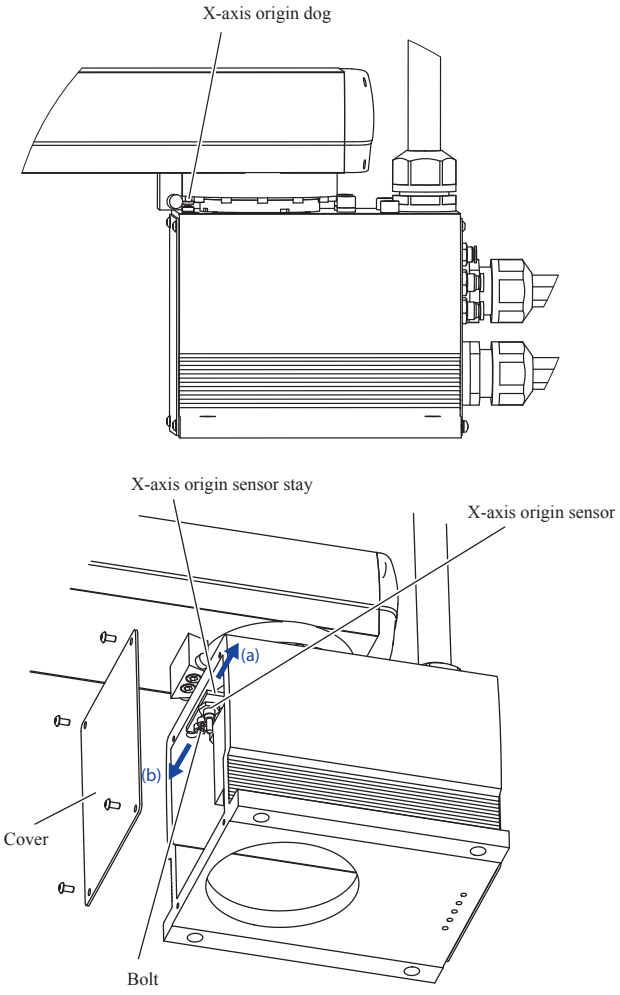
9 ***Scribe a mark at the X-axis origin sensor stay position.***

10 ***Loosen the bolts.***
Using the hex wrench, loosen the bolts (2 pcs.) that secure the X-axis origin sensor stay.

CAUTION

It is enough to loosen the bolt. Do not remove the nut completely.

▶ **Step 8-16** **Adjusting the X-axis machine reference (R6YXG500 to R6YXG1000)**



11 ***Move the X-axis origin sensor stay.***

Move the X-axis origin sensor stay as follows.

As an approximate guide, a 1mm-movement equals 100%.

X-axis machine reference value < 40%: Move the X-axis origin sensor stay toward (a) shown in the Fig.

X-axis machine reference value > 60%: Move the X-axis origin sensor stay toward (b) shown in the Fig.

12 ***Secure the stay with the bolts.***

Secure the X-axis origin sensor stay with the bolts.

13 ***Turn on the controller.***

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

14 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.

15 ***Check the machine reference value.***

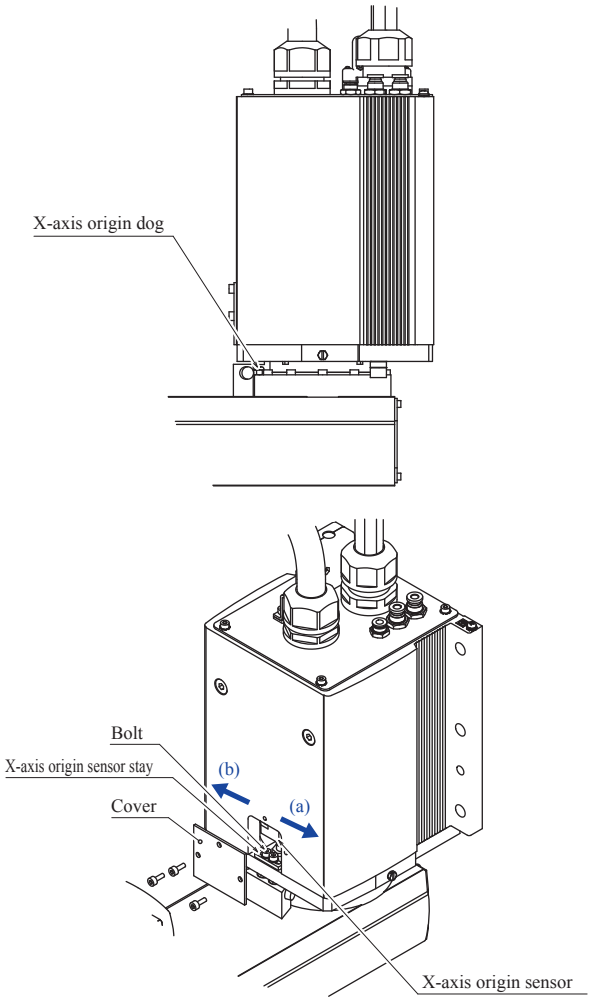
1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. If the machine reference value is in the range between 40 and 60 (recommended range), then the machine reference value has been completely adjusted.
3. If it is outside the recommended range, then repeat the procedure from step 4 again to readjust it.

16 ***Turn off the controller.***

17 ***Enter the safety enclosure.***

18 ***Reattach the cover.***

Step 8-16 Adjusting the X-axis machine reference (R6YXGS500 to R6YXGS1000)



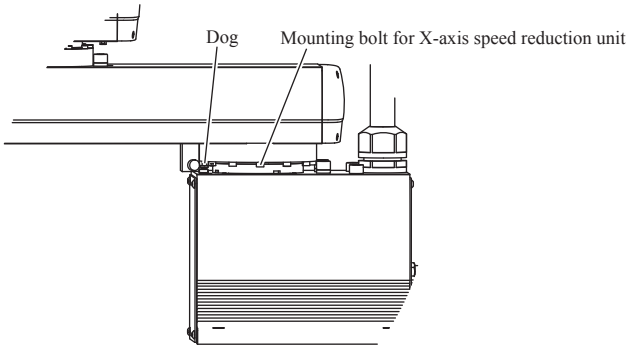
■ Changing the X-axis origin position

The X-axis origin position can be changed to any position in the range from the front position of the X-axis arm base to a maximum of 120° clockwise and counterclockwise at 30° intervals, by changing the positions of the dog and the mounting bolt for the X-axis speed reduction unit as shown below.

CAUTION

If the origin position has been changed, then the absolute reset must be performed, the machine reference must be adjusted, and the standard coordinate and point data must be reset.

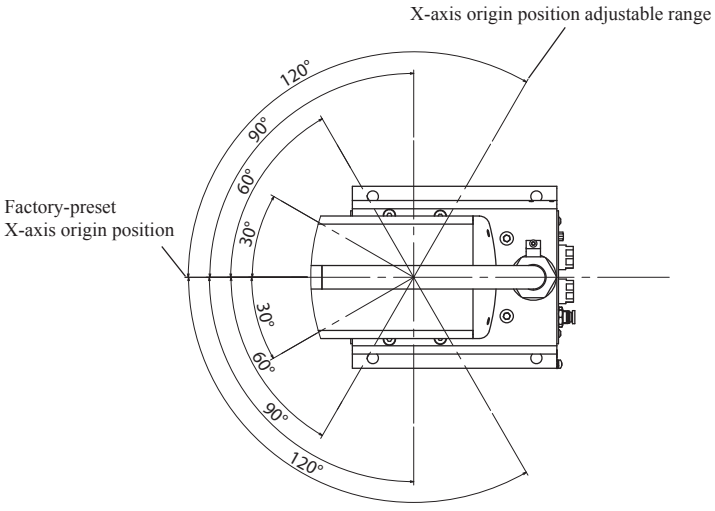
Dog and mounting bolt for X-axis speed reduction unit



CAUTION

For the wall-mount and inverse wall-mount models (R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900 and R6YXGS1000), the X-axis origin position can be changed in the same manner as the standard model. However, the cover removal work may involve risk. So, contact your distributor before changing the X-axis origin position.

X-axis origin position adjustable range



The following describes how to change the X-axis origin position, for example, to a position 90° counterclockwise.
Prepare the tools listed below.
• Hex wrench set • Torque wrench • Phillips screwdriver • Hex bit • Phillips screwdriver bit

1 ***Turn on the controller.***

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

2 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

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

4 ***Turn off the controller.***

5 ***Enter the safety enclosure.***

6 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

7 ***Remove the bolts.***
Using the hex wrench, remove the bolts (2 pcs.) that secure the X-axis origin stay.

8 ***Remove the X-axis origin stay.***

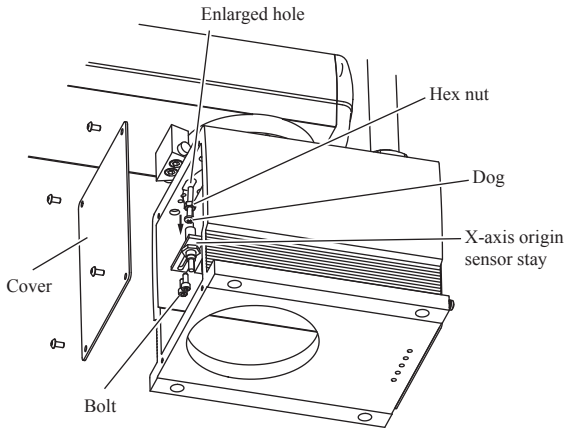
9 ***Remove the dog and hex nut.***
Remove the dog through the enlarged hole. At this time, remove the dog using the hex bit and wrench.

10 ***Turn the X-axis arm 90° counterclockwise.***

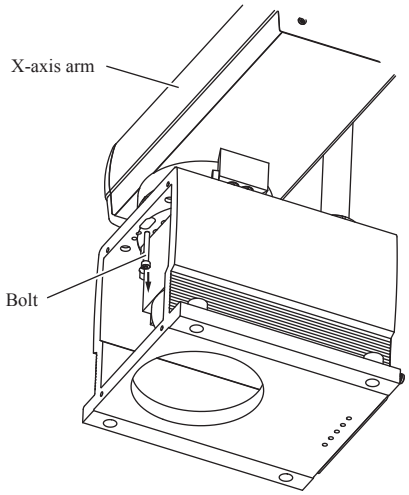
11 ***Remove the bolt located opposite to the enlarged hole hole.***

12 ***Secure the hex nut and dog.***
Secure the hex nut and dog to the tapped hole, and then tighten to the specified torque.

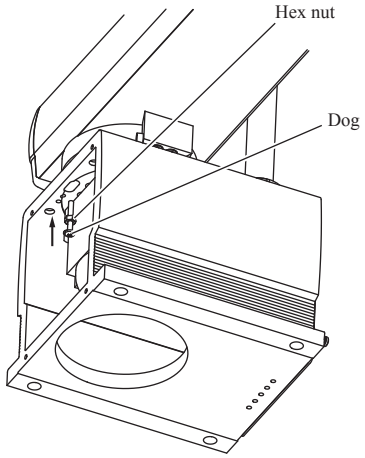
Step 6-9 **Removing the cover, bolt, and X-axis origin sensor stay**



Step 10-11 **Removing the bolt**



Step 12 **Securing the hex nut and dog**



Robot model	Dog	Tightening torque (kgfcm)	Tightening torque (Nm)
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M4×30	16	160
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M5×40	32	320

13 ***Return the X-axis arm to its original origin position.***

14 ***Tighten the bolt.***

Insert the bolt into the tapped hole where the dog was attached, and tighten to the specified torque.

15 ***Secure the X-axis origin sensor stay temporarily with the bolt.***

At this time, turn the X-axis arm manually to check that the sensor does not interfere with other parts.

16 ***Turn on the controller.***

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

17 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.

18 ***Check the machine reference value.***

1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. If the machine reference value is in the range between 40 and 60 (recommended range), then the machine reference value has been completely adjusted.

NOTE

If it is outside the recommended range, adjust the machine reference value while referring to "n Adjusting the X-axis machine reference value" described previously.

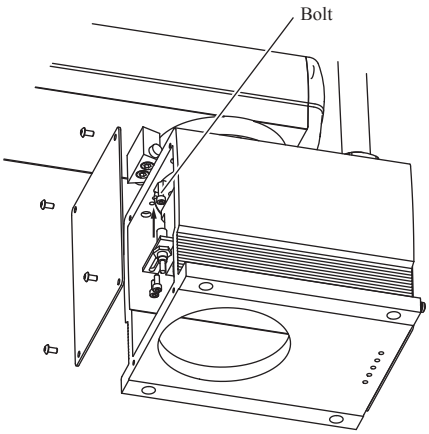
19 ***Tighten the X-axis origin sensor mounting bolt.***

20 ***Turn off the controller.***

21 ***Enter the safety enclosure.***

22 ***Reattach the cover.***

▶ Step 13-14 **Tightening the bolt**



Robot model	Bolt	Tightening torque (kgfcm)	Tightening torque (Nm)
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M4×30	46	4.5
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M5×40	92	9.0

Use only OMRON genuine bolts or JIS B 1176 hex socket head bolts (strength class: JIS B 1051 12.9).

■ Adjusting the Y-axis machine reference

CAUTION

The origin position may change due to machine reference adjustment. If it occurs, you must set point data again.

Follow the steps below to adjust the X-axis machine reference value.
Prepare a hex wrench set.

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

2 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

3 ***Check the machine reference value.***
If the machine reference value displayed on the PB is not in the range between 40 and 60 (recommended range) after the absolute reset has been completed, follow the steps below to adjust the machine reference value.

4 ***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.

5 ***Turn off the controller.***

6 ***Enter the safety enclosure.***

7 ***Put a mark at the origin position.***
Scribe a mark at the current origin position on the Y-axis joint area of the robot.
At this time, be careful to prevent the origin position from deviating since the Y-axis arm is touched.

8 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

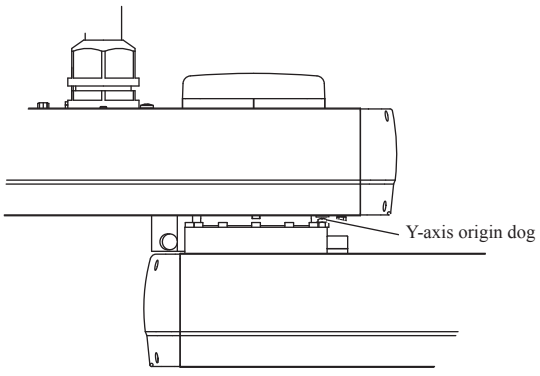
9 ***Scribe a mark at the Y-axis origin sensor stay position.***

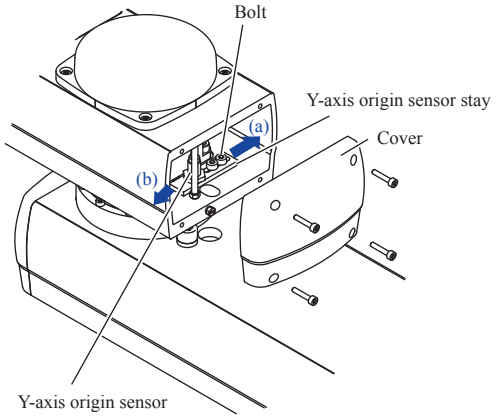
10 ***Loosen the bolts.***
Using the hex wrench, loosen the bolts (2 pcs.) that secure the Y-axis origin sensor stay.

CAUTION

It is enough to loosen the bolt. Do not remove the nut completely.

▶ **Step 8-11** **Adjusting the Y-axis machine reference**





11 ***Move the Y-axis origin sensor stay.***

Move the Y-axis origin sensor stay as follows.
As an approximate guide, a 0.8mm-movement equals 100%.

Y-axis machine reference value < 40%: Move the Y-axis origin sensor stay toward (a) shown in the Fig.

Y-axis machine reference value > 60%: Move the Y-axis origin sensor stay toward (b) shown in the Fig.

12 ***Secure the stay with the bolts.***

Secure the X-axis origin sensor stay with the bolts.

13 ***Turn on the controller.***

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

14 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.

15 ***Check the machine reference value.***

1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. If the machine reference value is in the range between 40 and 60 (recommended range), then the machine reference value has been completely adjusted.
3. If it is outside the recommended range, then repeat the procedure from step 4 again to readjust it.

16 ***Turn off the controller.***

17 ***Enter the safety enclosure.***

18 ***Reattach the cover.***

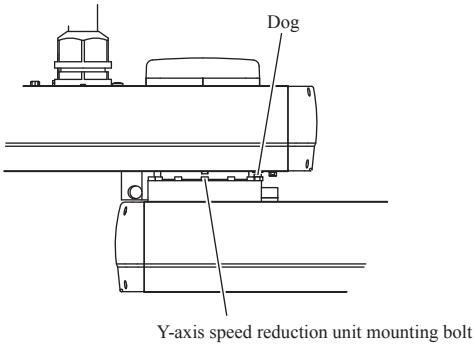
■ Changing the Y-axis origin position

The Y-axis origin position can be changed to any position in the range from the front position of the Y-axis arm and X-axis arm to a maximum of 120° clockwise and counterclockwise at 30° intervals, by changing the positions of the dog and the Y-axis speed reduction unit mounting bolt as shown below.

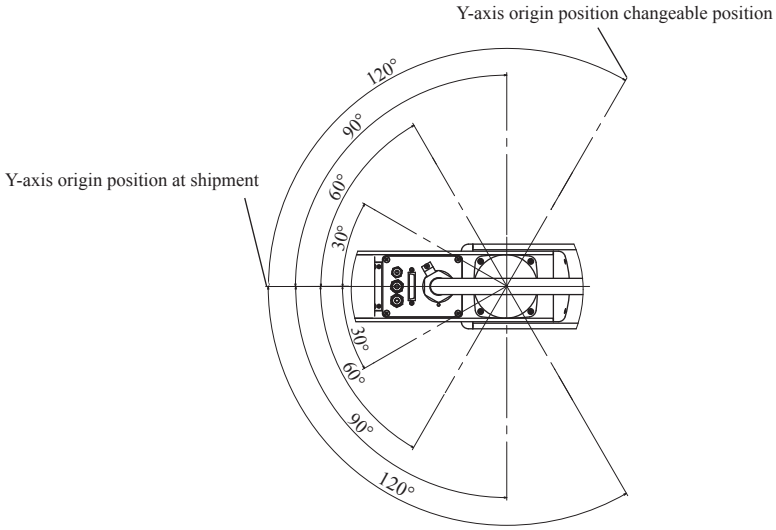
CAUTION

When the origin position has been changed, it is necessary to perform the absolute reset, adjust the machine reference value, and set the standard coordinate and point data again.

Dog and Y-axis speed reduction unit mounting bolt



Y-axis origin position changeable position



The following describes how to change the Y-axis origin position, for example, to a position 90° counterclockwise.
Prepare the tools listed below.
• Hex wrench set • Torque wrench • Phillips screwdriver • Hex bit • Phillips screwdriver bit

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

2 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

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

4 ***Turn off the controller.***

5 ***Enter the safety enclosure.***

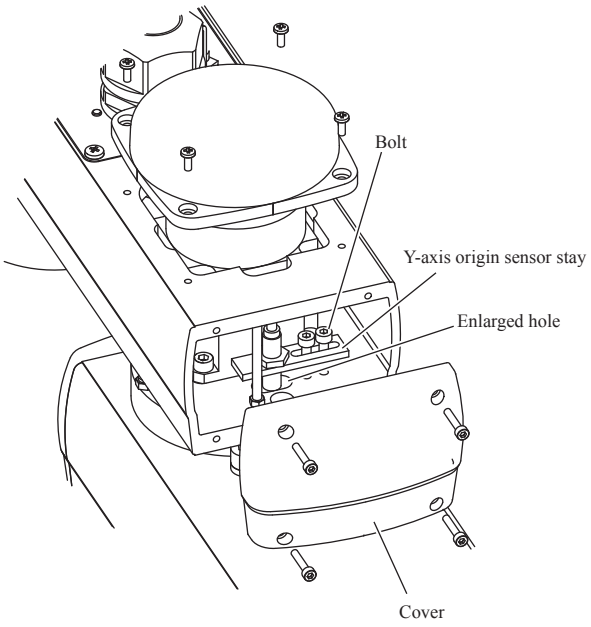
6 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

7 ***Remove the bolts.***
Using the hex wrench, remove the bolts (2 pcs.) that secure the Y-axis origin stay.

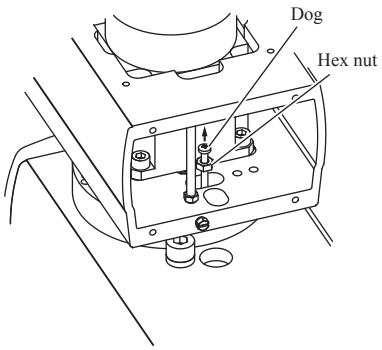
8 ***Remove the Y-axis origin stay.***

9 ***Remove the dog and hex nut.***
Remove the dog through the enlarged hole. At this time, remove the dog using the hex bit and wrench.

Step 6-8 **Removing the cover, bolt, and Y-axis origin sensor stay**



Step 9 **Removing the dog and hex nut.**



10 ***Turn the Y-axis arm 90° counterclockwise.***

11 ***Remove the bolt located opposite to the enlarged hole hole.***

12 ***Secure the hex nut and dog.***
Secure the hex nut and dog into the tapped hole where the bolt was attached, and then tighten to the specified torque.

13 ***Return the Y-axis arm to its original origin position.***

14 ***Tighten the bolt.***
Insert the bolt into the tapped hole where the dog was attached, and tighten to the specified torque.

15 ***Secure the Y-axis origin sensor stay temporarily with the bolt.***
At this time, turn the Y-axis arm manually to check that the sensor does not interfere with other parts.

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

17 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.

18 ***Check the machine reference value.***
1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. When the machine reference value is in the range between 40 and 60 (recommended range), then the machine reference value has been completely adjusted.

NOTE
If it is outside the recommended range, adjust the machine reference value while referring to "nAdjusting the Y-axis machine reference value" described previously.

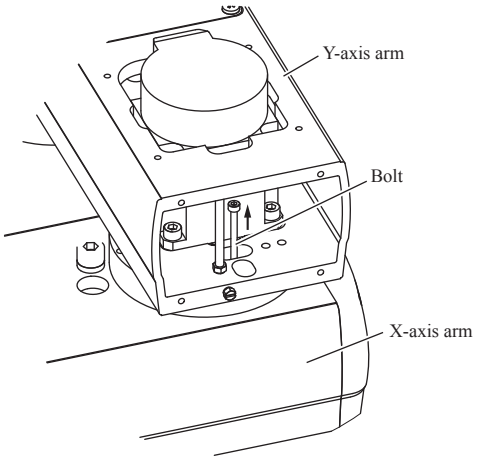
19 ***Tighten the Y-axis origin sensor mounting bolt.***

20 ***Turn off the controller.***

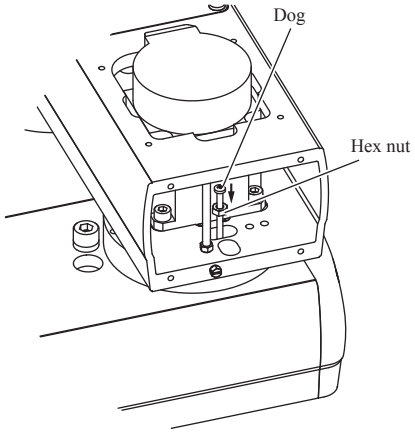
21 ***Enter the safety enclosure.***

22 ***Reattach the cover.***

Step 10-11 Removing the bolt

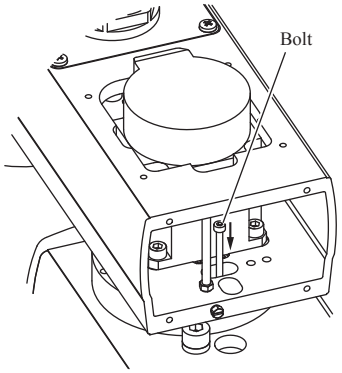


Step 12 Securing the hex nut and bolt



Robot model	Dog	Tightening torque (kgfcm)	Tightening torque (Nm)
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M3×30	9	90
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M4×40	16	160

Step 13-14 Tightening the bolt



Robot model	Bolt	Tightening torque (kgfcm)	Tightening torque (Nm)
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	M3×30	20	2.0
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	M4×40	46	4.5

Use only OMRON genuine bolts or JIS B 1176 hex socket head bolts (strength class: JIS B 1051 12.9).

■ Adjusting the R-axis machine reference

CAUTION

The origin position may change due to machine reference adjustment. If it occurs, you must set point data again.

Follow the steps below to adjust the R-axis machine reference value.
Prepare a hex wrench set.

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

2 ***Perform the absolute reset.***
Perform the absolute reset from outside the safety enclosure.
For details about how to perform the absolute reset, see "2.3 Absolute reset procedures".

3 ***Check the machine reference value.***
If the machine reference value displayed on the PB is not in the range between 40 and 60 (recommended range) after the absolute reset has been completed, follow the steps below to adjust the machine reference value.

4 ***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.

5 ***Turn off the controller.***

6 ***Enter the safety enclosure.***

7 ***Put a mark at the origin position.***
Scribe a mark at the current origin position on the R-axis of the robot.
At this time, be careful to prevent the origin position from deviating since the tip tool is touched.

8 ***Remove the cover.***
Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

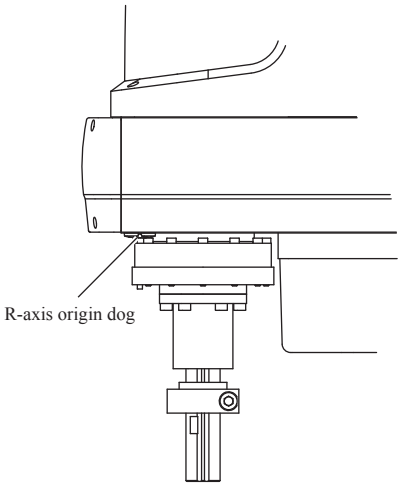
9 ***Scribe a mark at the R-axis origin sensor stay position.***

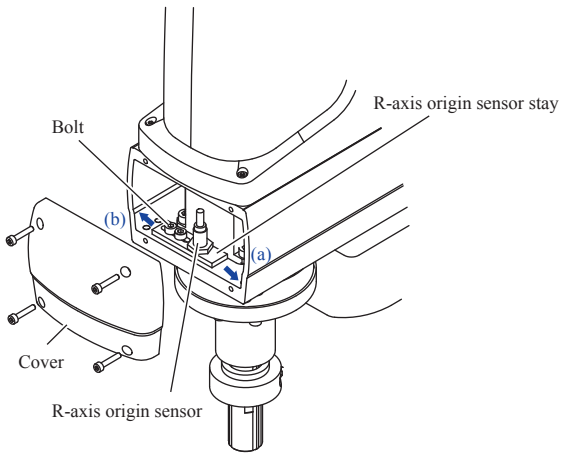
10 ***Loosen the bolts.***
Using the hex wrench, loosen the bolts (2 pcs.) that secure the R-axis origin sensor stay.

CAUTION

It is enough to loosen the bolt. Do not remove the nut completely.

Step 8-16 Adjusting the R-axis machine reference





11 ***Move the R-axis origin sensor stay.***

Move the R-axis origin sensor stay as follows.
As an approximate guide, a 1.9mm-movement equals 100%.

R-axis machine reference value < 40%: Move the R-axis origin sensor stay toward (a) shown in the Fig.

R-axis machine reference value > 60%: Move the R-axis origin sensor stay toward (b) shown in the Fig.

12 ***Secure the stay with the bolts.***

Secure the X-axis origin sensor stay with the bolts.

13 ***Turn on the controller.***

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

14 ***Perform the absolute reset.***

Perform the absolute reset from outside the safety enclosure.

15 ***Check the machine reference value.***

1. After the absolute reset has been completed, read the machine reference value displayed on the PB.
2. If the machine reference value is in the range between 40 and 60 (recommended range), then the machine reference value has been completely adjusted.
3. If it is outside the recommended range, then repeat the procedure from step 4 again to readjust it.

16 ***Turn off the controller.***

17 ***Enter the safety enclosure.***

18 ***Reattach the cover.***

2.5 Adjusting the machine reference value of the stroke end method (Z-axis)

The stroke end method is employed on the XG series robots for the absolute reset of the Z-axis. The origin position of the Z-axis is fixed at the upper end of the Z-axis stroke, and it cannot be changed. The machine reference is factoryadjusted at shipment, and readjustment is not necessary for normal use. The readjustment in the following procedure is required, however, if the machine reference exceeds the tolerance range (25 to 75) of the absolute reset for any reason.

WARNING

BEFORE STARTING THE WORK, THOROUGHLY READ "13. DETACHING OR ATTACHING THE COVERS" IN CHAPTER 2.

CAUTION

The origin position may change due to machine reference adjustment. If it occurs, you must set point data again.

2.5.1 Stroke end method (R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400)

1 ***Turn on the controller.***

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

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.

3 ***Perform the absolute reset of the Z-axis.***

NOTE

For details about how to perform the absolute reset of the Z-axis, see "2.3 Absolute reset procedures".

4 ***Make a note of the Z-axis machine reference value.***

CAUTION

To adjust the machine reference value, be sure to follow the steps below to check the adjustment machine reference value.

1. Press the MODE key.
2. Press the F3 key to enter the manual mode.
3. Press the F13 key (LOWER + F3) to select "ABS Reset".
4. After the absolute reset of the Z-axis has been completed, press the F10 (UPPER + F5) key to display the adjustment machine reference value (%).

5 ***Turn off the controller.***

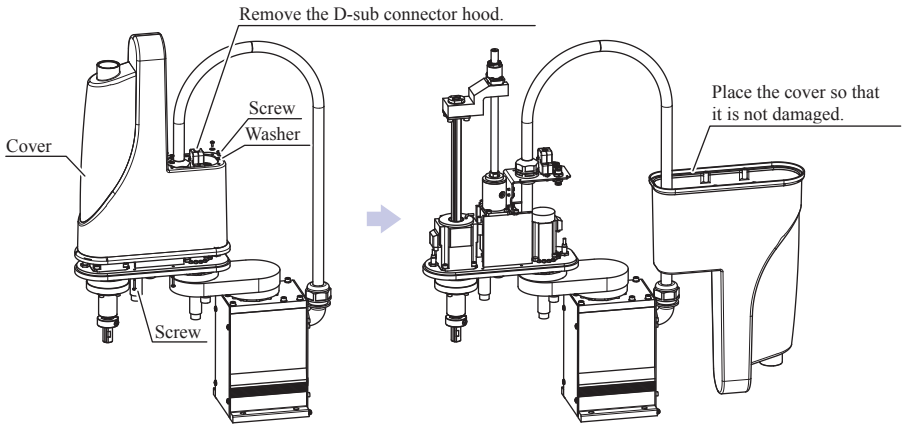
The Z-axis motor brake is now working at the origin position.

6 ***Enter the safety enclosure.***

7 ***Remove the cover.***

Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

Step 7 Removing the cover



WARNING

IF THE Z-AXIS BRAKE IS RELEASED OR THE BOLT SHOWN BELOW IS LOOSENED, THE Z-AXIS MAY DROP, CAUSING SERIOUS ACCIDENT. BE SURE TO PROP THE Z-AXIS WITH A SUPPORT STAND.

8 ***Prop the spline or end effector with a support stand to prevent the Z-axis from dropping.***

9 ***Release the Z-axis brake.***

After checking that appropriate measures are taken to prevent the Z-axis from dropping, release the Z-axis brake.

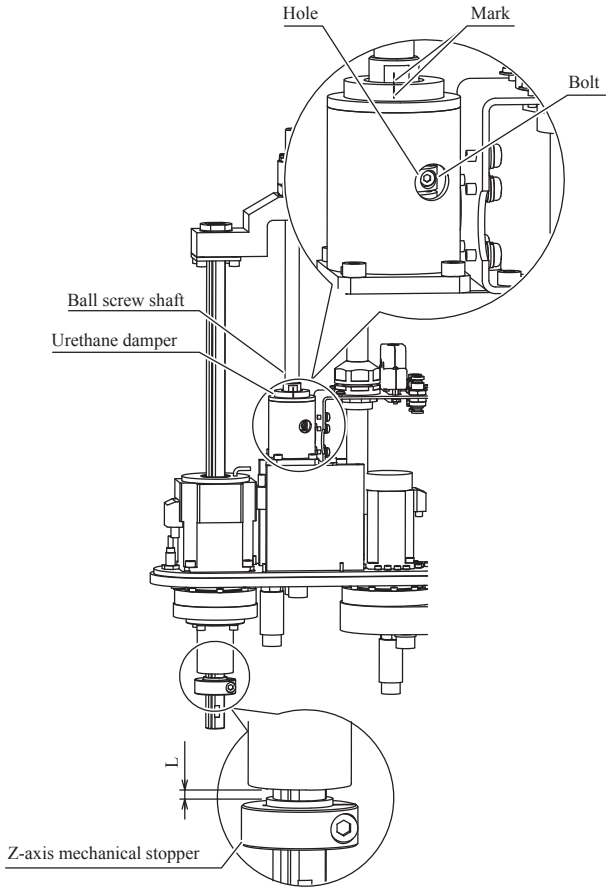
NOTE

For details about how to release the Z-axis brake, see the "OMRON Robot Controller User's Manual".

10 ***Put on the brake.***

Move the Z-axis up or down so that the bolt is located at the center of the hole, and then put on the brake.

Step 10-13 Adjusting the Z-axis machine reference value



11 ***Put a mark on the ball screw and urethane damper.***

12 ***Loosen the bolt.***

Use care to avoid damaging the bolt's fragile hexagon socket head.

13 ***Rotate the ball screw in response to the motor shaft.***

Rotating the ball screw 30° will change the machine reference value 33%.

The machine reference value decreases by rotating the ball screw clockwise as viewed from the top, while it increases by rotating the ball screw counterclockwise.

Determine the ball screw position based on the Z-axis machine reference value you have made a note of in step 4, so that the machine reference value is in the range between 30 and 70.

14 ***Tighten the bolt.***
• Tightening torque: 1.1 Nm (11 kgfcm)
Carefully tighten the bolt since the hex socket cap of the bolt is crushed easily.

15 ***Go out of the safety enclosure.***

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

17 ***Perform the absolute reset of the Z-axis.***

NOTE
For details about how to perform the absolute reset of the Z-axis, see "2.3 Absolute reset procedures".

18 ***Check the Z-axis machine reference value.***
After the absolute reset has been completed, check that the adjustment machine reference value is within the absolute reset tolerance range (30 to 70).
If the adjustment machine reference value is outside the tolerance range (30 to 70), then repeat the procedure from step 5 again to readjust it.

19 ***Turn off the controller.***

20 ***Enter the safety enclosure.***

21 ***Reattach the cover.***
When the machine reference value is within the tolerance range, reattach the cover.

2.5.2 Stroke end method (R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000) (R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000)

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

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.

3 ***Perform the absolute reset of the Z-axis.***

NOTE
For details about how to perform the absolute reset of the Z-axis, see "2.3 Absolute reset procedures".

4 ***Make a note of the Z-axis machine reference value.***

CAUTION
To adjust the machine reference value, be sure to follow the steps below to check the adjustment machine reference value.

1. Press the MODE key.
2. Press the F3 key to enter the manual mode.
3. Press the F13 key (LOWER + F3) to select "ABS Reset".
4. After the absolute reset of the Z-axis has been completed, press the F10 (UPPER + F5) key to display the adjustment machine reference value (%).

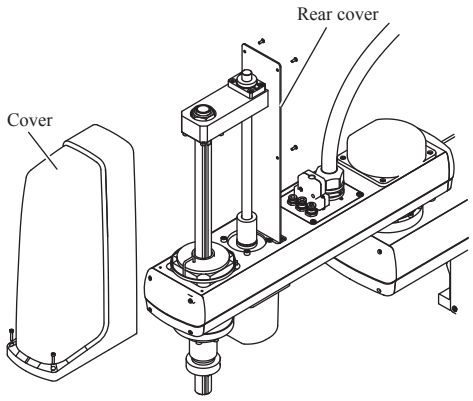
5 ***Turn off the controller.***
The Z-axis motor brake is now working at the origin position.

6 ***Enter the safety enclosure.***

7 ***Remove the cover.***

Remove the cover while referring to "13. Detaching or attaching the covers" in Chapter 2.

Step 7 Removing the cover



WARNING

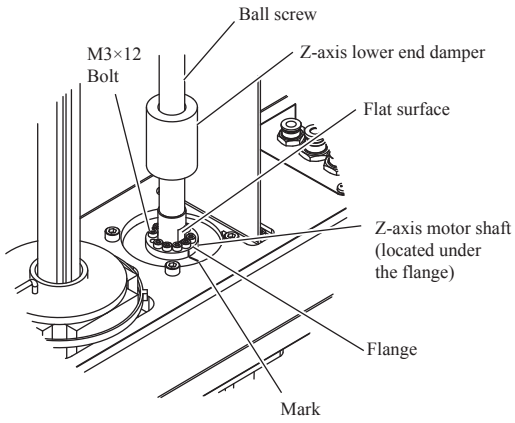
IF THE BALL SCREW COMES OFF THE Z-AXIS MOTOR, THE Z-AXIS DROPS, CAUSING A HAZARDOUS SITUATION.
ALWAYS PROP UP THE Z-AXIS WITH A SUPPORT STAND, ETC.

8 ***Prop the spline or end effector with a support stand to prevent the Z-axis from dropping.***

9 ***Shift the Z-axis lower end damper upward.***

If it is difficult to shift the Z-axis lower end damper, insert a flat blade screwdriver into the portion between the damper and holder and raise the damper by leverage from.

Step 9-11 Adjusting the Z-axis machine reference



*Use only OMRON genuine bolts or JIS B 1176 hex socket head bolts (strength class: JIS B 1051 12.9).

10 ***Put a mark.***

Put a mark so that the current flange position corresponding to the Z-axis motor shaft can be understood.

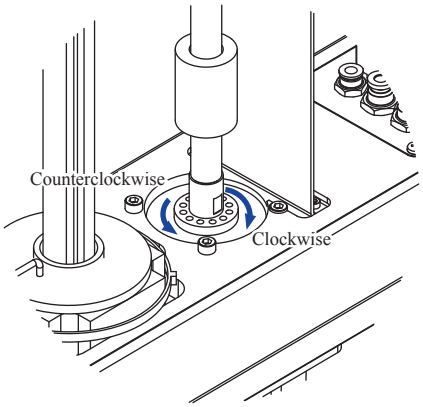
11 ***Remove the bolts.***

Put the wrench on the width across flat part of the flange and loosen the bolts to remove them.
The rotation of the ball screw then becomes free from the Z-axis motor.

12 ***Turn the flange with respect to the motor shaft.***

As the flange is turned 30°, the reference value changes 33%.
Turning the flange clockwise as viewed from the top will decrease the reference value while turning it counterclockwise will increase the reference value.
Determine the flange position based on the Z-axis machine reference value you have made a note of in step 4, so that the machine reference value is in the range between 25 and 75.

Step 12 Adjusting the flange position



13 ***Tighten the bolt.***

Gradually tighten the bolts located at diagonal positions.
• Tightening torque: 2.0Nm (20kgfcm)
The number of bolt installation positions is 10 with respect to 12 through holes.

14 ***Go out of the safety enclosure.***

15 ***Turn on the controller.***

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

16 ***Perform the absolute reset of the Z-axis.***

NOTE
For details about how to perform the absolute reset of the Z-axis, see "2.3 Absolute reset procedures".

17 ***Check the Z-axis machine reference value.***

After the absolute reset has been completed, check that the adjustment machine reference value is within the absolute reset tolerance range (25 to 75).
If the adjustment machine reference value is outside the tolerance range (25 to 75), then repeat the procedure from step 5 again to readjust it.

18 ***Turn off the controller.***

19 ***Enter the safety enclosure.***

20 ***Reattach the cover.***

When the machine reference value enters the absolute reset tolerance range, bring the Z-axis lower end damper tightly in contact the holder and reattach the cover. At this time, be sure to tighten all the screws securely.

3. Setting the soft limits

In the XG Series, the working envelope during manual and automatic operation can be limited by setting the plus soft limit [pulse] and minus soft limit [pulse] on each axis. The origin point (0 [pulse])is used as the reference to set the soft limits. The working envelope can be limited by specifying the number of pulses from the 0 pulse position.

CAUTION

When performing actual checks of the soft limit settings, operate the robot manually from outside the safety enclosure.

NOTE

Refer to the "OMRON Robot Controller User's Manual" for further details.
Also refer to "1.2 External view and dimensions" in Chapter 8 for the working envelope area.

3.1 Setting the X-axis and Y-axis soft limits

The soft limits must be set within the movement range limited by the mechanical stoppers as explained in "7. Limiting the movement range with X-axis and Y-axis mechanical stoppers" in Chapter 2 or within the range where the manipulator does not interfere with the peripheral equipment (but within maximum working envelope).
Similarly, set the soft limits when the origin position has been changed. Likewise, in models where the mechanical stopper position cannot be changed, reduce the soft limits to narrow the working envelope when the actual working envelope of the robot is small or the manipulator interferes with the peripheral equipment.
Follow the steps below to set the soft limits.

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

2 ***Press the emergency stop button.***
Press the emergency stop button on the PB to put the robot in the emergency stop status.

NOTE

For details about emergency stop and how to cancel the emergency stop, see the "OMRON Robot Controller User's Manual".

3 ***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.

4 ***Enter the safety enclosure while holding the PB.***

5 ***Move the X-axis and Y-axis arms by hand.***
Move the X-axis and Y-axis to the mechanical stopper positions or to the point where interference with the peripheral equipment occurs.

6 ***Note the pulse values.***
Read the X-axis and Y-axis plus (+) and minus (-) direction pulses displayed on the PB in step 6 and note them.

CAUTION

- Before cancelling the emergency stop, check from outside the safety enclosure that no one is inside the safety enclosure.
- Set the soft limits from outside the safety enclosure.

7 ***Set the soft limits.***
Set the soft limits to within the figure for the X-axis and Y-axis encoder pulses that you have noted in step 6.

NOTE

For details about how to set the soft limits, see the "OMRON Robot Controller User's Manual".

CAUTION

The origin position factory-adjusted at shipment is not completely aligned with the front face position of the robot. When installing the robot, be sure to set the soft limits with the number of pulses from the origin position (0 pulse position).

3.2 Setting the Z-axis soft limits

CAUTION

Set the Z-axis soft limits from outside the safety enclosure.

The Z-axis has mechanical stoppers fixed at the upper and lower ends of the Z-axis movement range. When the actual working range of the robot is smaller than the maximum working envelope or the manipulator interferes with the peripheral equipment, reduce the Z-axis plus (+) soft limit [pulses] to narrow the working envelope.

3.3 Setting the R-axis soft limit

CAUTION

Set the R-axis soft limits from outside the safety enclosure or after the emergency stop button has been pressed in the same manner as the X-axis and Y-axis soft limits.

The R-axis has no mechanical stoppers. When the actual working range of the R-axis is small or it interferes with the peripheral equipment, reduce the R axis plus (+) soft limit [pulse] and minus (-) soft limit [pulses] to narrow the working envelope.

CAUTION

Overloads may occur if the soft limit is almost near the encoder pulse at the mechanical stopper and the operating point is used at the edge of the movement range. Set the soft limit to the inner side of the mechanical stopper with an ample safety margin.

3.4 Relation between the X, Y, and R-axis movement angle, the Z-axis movement distance and the number of pulses

The tables below are for calculating resolver pulses with respect to the X, Y and R-axis movement angles and to the Z-axis movement distance for each robot. Use these figures as a guide to set the soft limits.

X, Y and R-axis speed reduction ratio and Z-axis ball screw lead for each robot

Robot Model	X-axis	Y-axis	Z-axis	R-axis
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600 R6YXGS300, R6YXGS400	80	80	12mm	50
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	80	80	20mm	30
R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	80	80	20mm	30

Operation angle/distance vs. number of resolver pulses

X, Y and R-axis speed reduction ratio

Speed ratio	Number of resolver pulses per turn (360 degrees)
30	491520
50	819200
80	1310720
100	1638400
105	1720320
121	1982464

Z-axis

Lead	Number of resolver pulses per lead movement
10mm	16384
12mm	16384
20mm	16384
30mm	16384

4. Setting the standard coordinates

CAUTION

If the standard coordinate settings are incorrect, the acceleration cannot be optimized to match the arm position. This results in too short a service life, damage to the drive unit, or residual vibration during positioning. In addition, the cartesian coordinate accuracy will be impaired.

Setting the standard coordinates enables the following operations and functions.

1. Optimizes acceleration according to arm position during automatic operation.
2. Allows moving robot arm tip at right angles.
3. Allows using shift coordinates.
4. Enables commands such as linear interpolation and arm switching.

The procedure for setting standard coordinates and cautions are shown below.

1 ***Turn on the controller.***

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

2 ***Check that the soft limits are correctly set.***

If not correctly set, adjust the soft limits while referring to "3. Setting the soft limits".

3 ***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.

4 ***Enter the safety enclosure while holding the PB.***

At this time, stay outside the robot movement range.

CAUTION

Never enter the robot movement range.

5 ***Set the standard coordinates.***

See "Setting the standard coordinates" stated in the "OMRON Robot Controller User's Manual".

NOTE

The next section, "4.1 Standard coordinate setting using a standard coordinate setup jig (option)", describes how to set the standard coordinates more accurately using an optional setup jig.

6 ***Check that the standard coordinates are set correctly.***

1. Check that the robot arm tip can move at right angles in the manual operation (cartesian coordinates).
2. Check that the values nearly equal to the X-axis and Y-axis arm lengths are entered in "Arm length" of the axis parameters.

If points 1 and 2 shown above are not satisfied, the standard coordinate settings are incorrect. So, make the standard coordinate settings again.

4.1 Standard coordinate setting using a standard coordinate setup jig

Use a standard coordinate setup jig (option) to set the standard coordinates more accurately.
The following describes how to set the standard coordinates using the standard coordinate setup jig.

4.1.1 R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600, R6YXGS300, R6YXGS400

Standard coordinate setup jig (option)

	Part No.	Name	Q'ty
1	KCY-M1577-000	Pin	1
2	91312-04065	Bolt	1

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

2 ***Put the robot in the emergency stop status.***
Press the emergency stop button on the PB to put the robot in the emergency stop status.

NOTE
For details about emergency stop and how to cancel the emergency stop, see the "OMRON Robot Controller User's Manual".

3 ***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.

4 ***Enter the safety enclosure while holding the PB.***

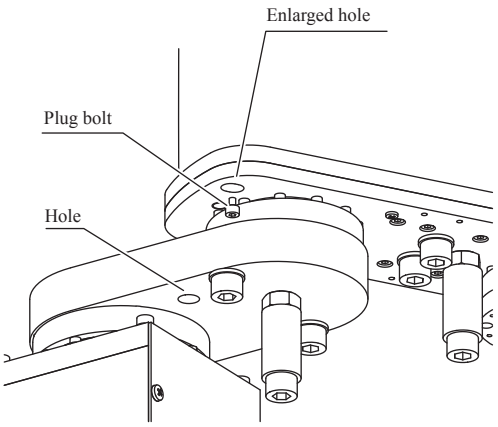
5 ***Remove the plug bolt.***
Put the robot in the arm posture as shown in the Fig. on the right, and then remove the plug bolt.

6 ***Insert the pin (1).***
1. Make the X-axis arm almost in alignment with the Y-axis arm.
2. Adjust the arm positions so that the pin can be inserted into the enlarged hole in the Y-axis arm and the hole in the X-axis arm without jamming, and then insert the pin into the holes.

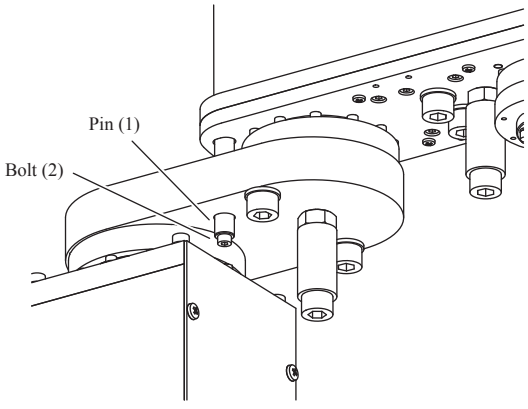
7 ***Secure the pin (1) with the bolt (2).***
Tighten the bolt lightly so that the pin does not move.

8 ***Make a note of the Y-axis position pulse value.***
1. Enter "MANUAL>POINT" mode.
2. Lightly apply a clockwise torque to the Y-axis while holding the X-axis arm.
3. Make a note of the Y-axis position pulse value displayed on [POS] when the torque is unloaded.

Step 5 Removing the plug bolt



Step 6-8 Y-axis position pulse value

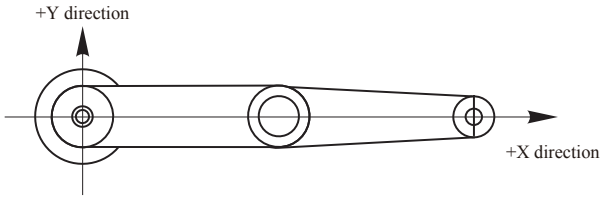


4. Lightly apply a counterclockwise torque to the Y-axis while holding the X-axis arm.
5. Make a note of the Y-axis position pulse value displayed on [POS] when the torque is unloaded.

9 *Determine the + direction of the X-axis.*

Move the X-axis arm in the direction that you want to set as the + direction of the X-axis. At this time, make a note of the X-axis position pulse value displayed on [POS].

Step 9 **X-axis + direction**



10 *Enter the "11. Arm length [mm]" values.*

Enter the following values in M1 and M2 for "11. Arm length [mm]" of axis parameters.

	M1 (X-axis arm length)	M2 (Y-axis arm length)
R6YXGL250	100.00	150.00
R6YXGS300	150.00	150.00
R6YXGL350	200.00	150.00
R6YXGL400, R6YXGS400	250.00	150.00
R6YXGL500	250.00	250.00
R6YXGL600	350.00	250.00

11 *Enter the "12. Offset pulse" values.*

Enter the values shown on the right in "12. Offset pulse" of axis parameters.

Step 11 **Entering the “12. Offset pulse” values**

M1= X-axis position pulse value you have made a note of in step 9

$$M2=\frac{\text{Y-axis position pulse value you have made a note of in step 8 (clockwise)} + \text{Y-axis position pulse value you have made a note of in step 8 (counterclockwise)}}{2}$$

Note: Round off the decimal part of the M2 value.

12 *Reattach the plug bolt.*

1. Remove the pin and bolt.
2. Reattach the plug bolt.

4.1.2 R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

WARNING

BEFORE STARTING THE WORK, THOROUGHLY READ "13. DETACHING OR ATTACHING THE COVERS" IN CHAPTER 2.

Standard coordinate setup jig (option)

	Part No.	Name	Q'ty
1	KBP-M1562-002	Sleeve	1
2	KBP-M1577-001	Pin	1
3	91312-04025	Bolt (R6YXG500, R6YXG600) (R6YXGS500, R6YXGS600)	2
	91312-04030	Bolt (R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000) (R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000)	2
4	91312-04050	Bolt	1

1 *Turn on the controller.*

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

2 *Put the robot in the emergency stop status.*

Press the emergency stop button on the PB to put the robot in the emergency stop status.

NOTE

For details about emergency stop and how to cancel the emergency stop, see the "OMRON Robot Controller User's Manual".

3 ***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.

4 ***Enter the safety enclosure while holding the PB.***

5 ***Remove the bolt.***

Put the robot in the arm posture as shown in the Fig. on the right, and then remove the plug bolt.

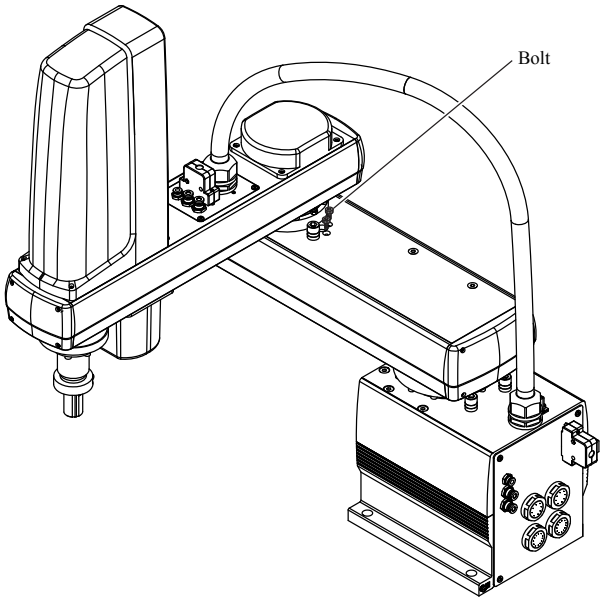
6 ***Secure the sleeve (1) with the bolt (3).***

Position the robot arms so that you can easily insert the sleeve into the hole, and then insert the sleeve into the hole. After that, secure the sleeve with the bolt (3). Tighten the bolt just enough to hold the sleeve.

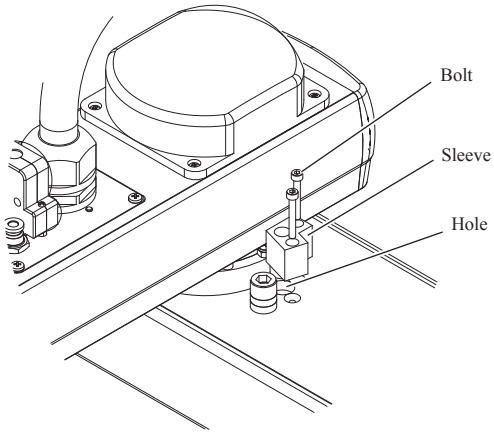
7 ***Remove the cover and plate.***

Make the X-axis arm almost in alignment with the Y-axis arm, and then remove the cover and plate.

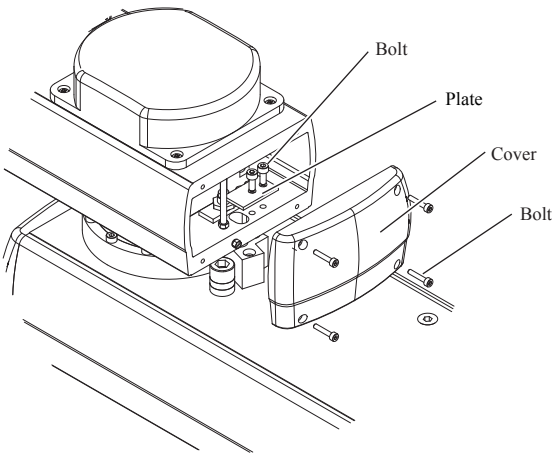
Step 5 **Removing the bolt**



Step 6 **Securing the sleeve**



Step 7 **Removing the cover and plate**



8 *Secure the pin (2) with the bolt (4).*

1. Adjust the arm positions so that the pin can be inserted into the enlarged hole in the Y-axis arm and the sleeve without jamming, and then insert the pin.
2. Secure the pin with the bolt. Tighten the bolt so that the pin does not move.

9 *Make a note of the Y-axis position pulse value.*

1. Enter "MANUAL>POINT" mode.
2. Lightly apply a clockwise torque to the Y-axis while holding the X-axis arm.
3. Make a note of the Y-axis position pulse value displayed on [POS] when the torque is unloaded.
4. Lightly apply a counterclockwise torque to the Y-axis while holding the X-axis arm.
5. Make a note of the Y-axis position pulse value displayed on [POS] when the torque is unloaded.

10 *Determine the + direction of the X-axis.*

Move the X-axis arm in the direction that you want to set as the + direction of the X-axis. At this time, make a note of the X-axis position pulse value displayed on [POS].

11 *Enter the "11. Arm length [mm]" values.*

Enter the following values in M1 and M2 for "11. Arm length [mm]" of axis parameters.

	M1 (X-axis arm length)	M2 (Y-axis arm length)
R6YXG500 R6YXGS500	200.00	300.00
R6YXG600 R6YXGS600	300.00	300.00
R6YXGH600	200.00	400.00
R6YXG700 R6YXGS700	300.00	400.00
R6YXG800 R6YXGS800	400.00	400.00
R6YXG900 R6YXGS900	500.00	400.00
R6YXG1000 R6YXGS1000	600.00	400.00

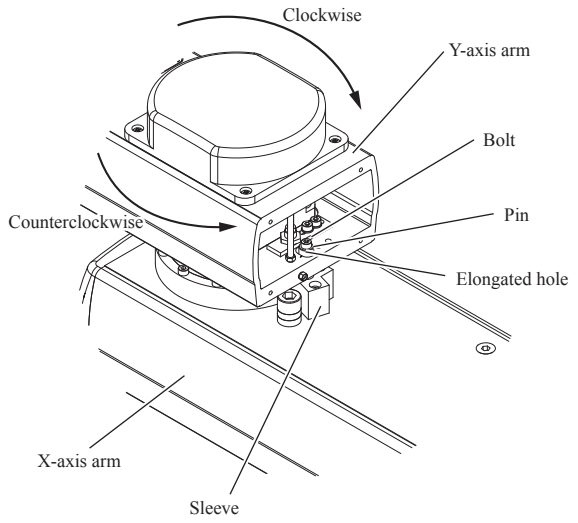
12 *Enter the "12. Offset pulse" values.*

Enter the values shown on the right in "12. Offset pulse" of axis parameters.

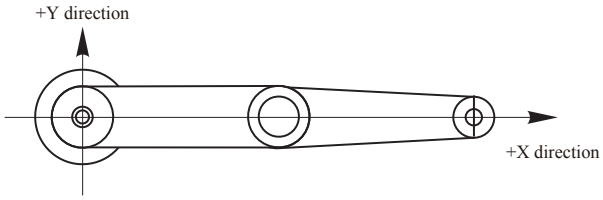
13 *Return the cover and plate to their original positions.*

1. Remove the pin, bolt, and sleeve.
2. Reattach the cover, plate, and bolt

Step 8-9 **Y-axis position pulse value**



Step 10 **X-axis + direction**



Step 12 **Entering the “12. Offset pulse” values**

M1= X-axis position pulse value you have made a note of in step 10

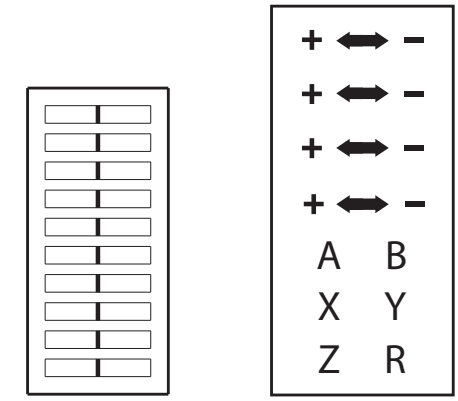
$$M2=\frac{\text{Y-axis position pulse value you have made a note of in step 9 (clockwise)} + \text{Y-axis position pulse value you have made a note of in step 9 (counterclockwise)}}{2}$$

Note: Round off the decimal part of the M2 value.

5. Affixing the stickers for origin positions, movement directions, and axis names

The robot comes packed with stickers showing origin positions, movement directions and axis names. Using the following procedure, attach these stickers in conspicuous points on the robot after changing the origin position and installing peripheral equipment.

Origin position stickers, direction of movement and axis name stickers



Origin position stickers

Direction of movement and axis name stickers

WARNING

AFFIX THE ORIGIN POSITION STICKERS PRECISELY ON THE ORIGIN POSITIONS. ALIGN THE DIRECTION OF MOVEMENT STICKERS WITH THE JOG DIRECTION AND AFFIX THEM CORRECTLY. AFFIX EACH AXIS NAME STICKER ON THE CORRECT AXIS. AFFIXING THE STICKER AT A WRONG LOCATION MAY CAUSE FAULTY OPERATION AND HAZARDOUS SITUATIONS.

1 ***Turn on the controller.***

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

2 ***Move the robot to the 0 pulse position.***

NOTE

For details about how to move the axes to their "0" pulse positions, see "Chapter 4 Point trace function" in the "OMRON Robot Controller User's Manual".

3 ***Turn off the controller.***

4 ***Place a sign indicating the robot is being adjusted.***

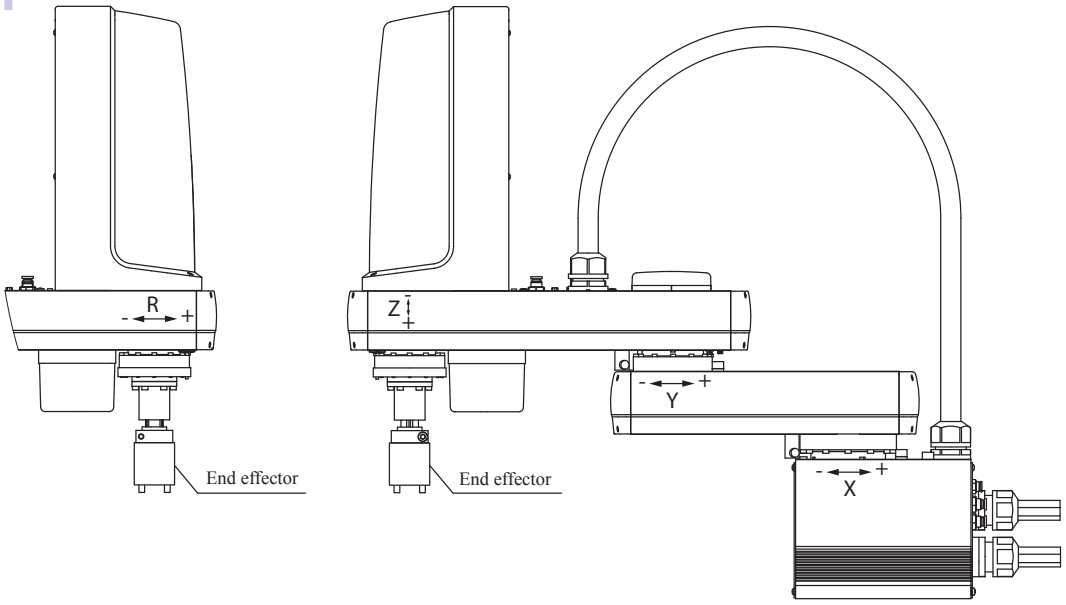
Place a sign indicating the robot is being adjusted, to keep others from operating the controller or operation panel.

5 ***Enter the safety enclosure.***

6 ***Affix the stickers.***

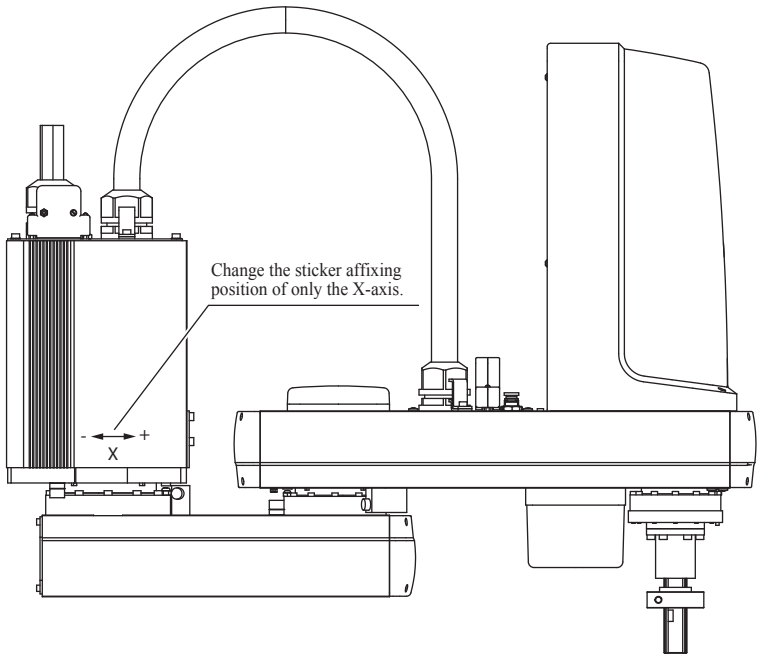
Being careful not to move the origin positions, affix the stickers at legible points on matching sides of components such as the robot arm of each axis, base, and end effector. Affix stickers nearby showing the axis name and movement direction. Use a cloth moistened with alcohol to remove grease from the surface where you will affix the stickers. After the surface is dry, affix the stickers securely.

Sticker affixing positions



Sticker affixing positions (Wall-mount model / Wall-mount inverse model)

(Only the affixing positions different from the standard model are shown.)



Chapter 4 Periodic inspection

Contents

1. Overview 4-1
2. List of inspection items 4-2

1. Overview

Daily and periodic inspection of the OMRON robot is essential in order to ensure safe and efficient operation.
The periodic inspection for XG series consists of daily inspection and 6-month inspection.
Be sure to perform the daily inspection before starting the robot and after completion of the day's work.
For details about inspection items, see "2. List of inspection items" in the next section.
For details about how to perform the periodic inspection, see the separate Maintenance Manual for XG.

Before starting the maintenance work, thoroughly read the following cautions and Safety Instructions to strictly observe the instructions.

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.
- NEVER TOUCH ANY INTERNAL PARTS OF THE CONTROLLER.

■ Cautions on daily inspection

CAUTION

- Periodic inspection must be performed by or in the presence of personnel who have received the Robot Training given by your distributor.
- Do not attempt any inspection, adjustment, repair and parts replacement not described in this manual. This work requires specialized technical knowledge and skill, and may also involve work hazards.
- When inspection is required inside the safety enclosure, always turn off the controller and also the external switch board.
- If the inspection or maintenance procedure calls for operation of the robot, stay outside the safety enclosure.
- Place a sign indicating the robot is being inspected, to keep others from operating the controller switch, programming box or operation panel.
- Use only the lubricants specified by your distributor.
- To check the operation after inspection, refer to "4.5.1 Trial Operation" in Chapter "Safety Instructions" of this manual.

NOTE

For precautions on handling the controller, refer to the "OMRON Robot Controller User's Manual".

■ Cautions on 6-month inspection

WARNING

THE Z-AXIS WILL SLIDE DOWN WHEN THE Z-AXIS BRAKE IS RELEASED, CAUSING A HAZARDOUS SITUATION. DO NOT RELEASE THE BRAKE WHEN LUBRICATING THE Z-AXIS PARTS.

When lubricating the ball screw and spline shaft, observe 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.

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.

CAUTION

Unless grease specified by OMRON is used, the service life of the ball screw and ball spline will shorten.

2. List of inspection items

WARNING

ONLY QUALIFIED ENGINEERS WHO HAVE RECEIVED THE ROBOT TRAINING COURSE CONDUCTED BY YOUR DISTRIBUTOR ARE ALLOWED TO INSPECT THE ITEMS NEEDING THE COVER REMOVAL WORK WHILE REFERRING TO THE SEPARATE MAINTENANCE MANUAL FOR XG SERIES.

●: Conduct. ○: Conduct if trouble is found as a result of inspection. △: Contact your distributor.

Location	Contents	Daily	6-month	Cleaning	Adjustment	Replacement
■ Inspection with the controller turned off						
Machine harness Robot cable	• Check for scratch, dent, or excessive bend.	●			○	
	• Check for damage.	●				△
Cables prepared by user	• Check for scratch, dent, or excessive bend.	●			○	○
Regulator Joint Air tube Solenoid valve Air cylinder	• Check that the air pressure level is correct.	●			○	
	• Check for air leak.	●			○	
	• Check that the drain is discharged.	●			○	
	• Check the air filter for contamination or damage.	●		○		○
Exterior of robot	• Check for damage.	●				△
Major bolts and screws of robot main body (those exposed to the outside)	• Check for looseness. (*1)		●		○	
Detection parts of X-axis, Y-axis, and R-axis origin sensors	• Check for contamination.		●	○		
Controller	• Check the terminal on the outside of the controller for looseness.		●		○	
	• Check the connection connector for looseness. (*2)		●		○	
Application of grease to Z-axis spline and Z-axis ball screw (*3)	• Remove the old grease with a cloth rag and apply Alvania grease S2 (Showa Shell).		●			
Z-axis ball screw and ball spline	• Check for play.		●		○	△
■ Inspection with the controller turned on						
Safeguard enclosure	• Check that the safeguard enclosure is located at its specified position.	●			○	
	• Check that the emergency stop turns on when the safeguard enclosure is open.	●			○	
	• Check that the warning label is affixed to the entrance.	●			○	
Emergency stop button	• Check that the emergency stop turns on when pressed.	●			○	
Robot operation	• Check for unusual operation, vibration, or noise.	●			△	
Functional check of Z-axis brake (*4)	• Drop amount from the Z-axis rest state is 3 mm or less.	●			△	
Air cooling fan on the rear of the controller	• Check that the fan rotates.		●		○	
	• Check for object blocking the fan.		●		○	
	• Check for noise during rotation. (*5)		●		○	△
	• Check the fan cover for contamination.		●	○		△

*1: If any bolt or screw is loose, retighten it. (For details about tightening torque, see the table below.)

*2: For details, see "4. Robot cable connection" in Chapter 2.

*3: For detail about how to apply the grease, see the separate Maintenance Manual.

*4: When the emergency stop button is pressed outside the safeguard enclosure or when the controller power is turned off, visually inspect the Z-axis brake.

*5: If any object is found through the visual inspection, remove it. If noise is heard even when no object is found, contact your distributor.

Bolt tightening torque

Bolt size	Tightening torque (kgfcm)	Tightening torque (Nm)
M3 button head bolt	14	1.4
M4 set screw	20	2.0
M3	20	2.0
M4	46	4.5
M5	92	9.0
M6	156	15.3
M8	380	37
M10	459	45.0
M12	1310	128
M14	2090	205

Chapter 5 Harmonic drive replacement period

Contents

1. Overview 5-1
2. Replacement period 5-2

1. Overview

The XG series robots listed below use a harmonic drive as the speed reduction gear for the X, Y and R axes. Harmonic drives need to be replaced after specified operation hours have elapsed. Use the guideline explained below to determine the replacement period and replace the harmonic drive periodically. Since the XG series robots listed below use long-life harmonic grease, it is not necessary to replace the harmonic grease.

WARNING

ONLY AUTHORIZED ENGINEERS WHO RECEIVED THE ROBOT TRAINING COURSE CONDUCED BY YOUR DISTRIBUTOR MUST REPLACE THE HARMONIC DRIVE WHILE REFERRING TO THE SEPARATE XG SERIES MAINTENANCE MANUAL.

Applicable models: R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600
R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000
R6YXGS300, R6YXGS400, R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800,
R6YXGS900, R6YXGS1000

2. Replacement period

The harmonic drive replacement period is determined by the total number of turns of the wave generator used in the harmonic drive. It is recommended to replace the harmonic drive when the total number of turns has reached 8.4×10^8 (at ambient operating temperatures of 0°C to +40°C). This means that the replacement period will differ depending on the following operating conditions. If the robot operation duty ratio is high or the robot is operated in environments at higher temperatures, the harmonic drive should be replaced earlier.

Replacement period $= 8.4\times10^8/(n\times60\times h\times D\times N\times\theta)$ years

where
- n : Number of axis movements per minute
- θ : Average turn per axis movement
- N : Speed reduction ratio
- h : Operation time per day
- D : Operation days per year

For example, when the robot is used under the following conditions, the replacement period for the X-axis harmonic drive of the R6YXG500 can be calculated as follows.

- n : 10
- θ : 0.25
- N : 80
- h : 24 hours per day
- D : 240 days per year

Replacement period $= 8.4\times10^8/(n\times60\times h\times D\times N\times\theta)$
$= 8.4\times10^8/(10\times60\times24\times240\times80\times0.25)$
$= 12.2$ years

Harmonic drive speed reduction ratio

Robot model	X-axis	Y-axis	R-axis
R6YXG500, R6YXG600 R6YXGS500, R6YXGS600	80	80	30
R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600 R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 R6YXGS300, R6YXGS400, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000	80	80	50

Chapter 6 Increasing the robot operating speed

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1.2 Increasing the speed with the WEIGHT statement 6-3

1.3 Increasing the speed by the tolerance parameter 6-4

1.4 Increasing the speed by the OUT effective position parameter 6-5

1. Increasing the robot operating speed

The robot operating speed can be increased by the following methods. Use these methods as needed when programming.

1.1 Increasing speed by arch motion

[Also refer to:]
Robot controller user's manual
("Controller system settings" in Chapter 7) (2.4 Axis parameters) (7. Arch position)
Programming manual
("Robot Language Lists" in Chapter 8) (6 ARCH)

1. Gate motion

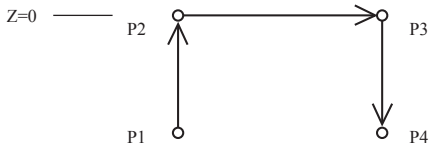
From point P1 to P4 via P2 and P3:

MOVE P, P2

MOVE P, P3

MOVE P, P4

Gate motion



2. Arch motion: Using default arch position: (2000 pulses)

From point P1 to P2:

MOVE P, P2, Z=0

"Axis parameters" – "Arch position"

M1 (X-axis arch position) = 2000 pulses

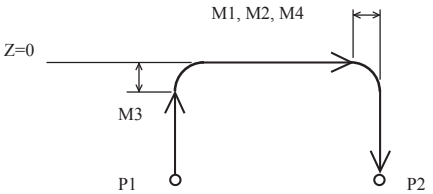
M2 (Y-axis arch position) = 2000 pulses

M3 (Z-axis arch position) = 2000 pulses

M4 (R-axis arch position) = 2000 pulses

Arch motion:

Using default arch position: (2000 pulses)



When the Z-axis moves upward from P1 and enters the M3 arch position range (2000 pulses prior to Z=0), the X, Y, and R axes begin to move. When these 3 axes enter the M1, M2 and M4 arch position range (2000 pulses prior to P2), the Z-axis moves downward to P2. Compared with "1. Gate motion", this arch motion shortens the cycle time approximately 20% by moving the robot arm along an arc.

3. Arch motion: Making the arch position value larger

In "2. Arch motion", making the arch position value larger can further shorten the cycle time. Since the robot arm moves along a larger arc, use caution to avoid obstacles if they are located near the arm movement path. The arch position parameter can be set for each axis.

4. Arch motion: Changing the arch positions in the program

[Example]

From point P1 to P2 and then to P3:

ARCH (1) = 10000 ... X-axis arch position (pulses)

ARCH (2) = 20000 ... Y-axis arch position (pulses)

ARCH (3) = 20000 ... Z-axis arch position (pulses)

ARCH (4) = 20000 ... R-axis arch position (pulses)

Arch position can be set for each axis.

MOVE P, P2, Z=0

ARCH (1) = 2000

ARCH (2) = 2000

ARCH (3) = 2000

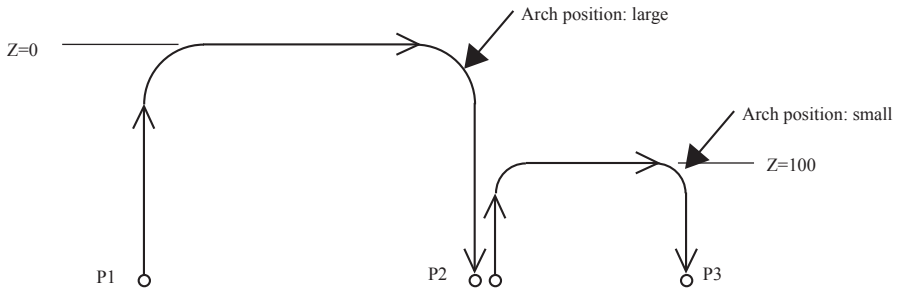
ARCH (4) = 2000

If the same arch position value (pulses) is used for all axes, you can write as "ARCH 2000".

MOVE P, P3, Z=100

Since the arch positions can be changed in the program, optimizing the arch positions can further shorten the cycle time.

Arch motion



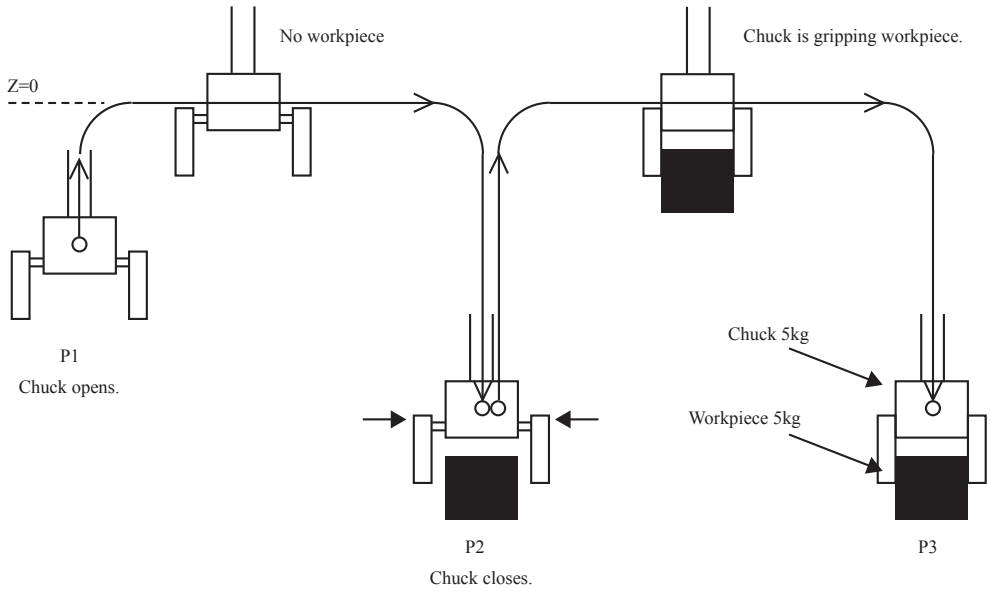
1.2 Increasing the speed with the WEIGHT statement

[Also refer to:]
Robot controller user's manual
("Controller system settings" in Chapter 7) (2.3 Robot parameters) (1. Tip weight)
Programming manual
("Robot Language Lists" in Chapter 8) (116 WEIGHT)

[Example]
From P1 when chuck is open:
WEIGHT 5.....Changes the axis tip weight parameter to 5kg (no workpiece).
MOVE P, P2, Z=0
DO3 (0) = 1 .....Chuck closes.
WEIGHT 10.....Changes the axis tip weight parameter to 10kg (with workpiece).
MOVE P, P3, Z=0

In the above program, the acceleration can be set to a higher level by reducing the axis tip weight parameter to 5kg while the chuck does not grip any workpiece, and then set to a lower level by changing the axis tip weight parameter to 10kg. Compared to programs using an axis tip weight parameter left set at 10kg, this method shortens the cycle time since the acceleration is increased.

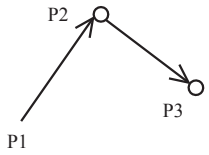
Increasing the speed with the WEIGHT statement



1.3 Increasing the speed by the tolerance parameter

[Also refer to:]
Robot controller user's manual
("Controller system settings" in Chapter 7) (2.4 Axis parameters) (5. Tolerance)
Programming manual
("Robot Language Lists" in Chapter 8) (109 TOLE)

Increasing the speed by the tolerance parameter



[Example]
From P1 to P3 via P2
TOLE (1) = 2048 ... X-axis tolerance (pulses) : Increases the tolerance.
TOLE (2) = 2048 ... Y-axis tolerance (pulses)
TOLE (3) = 2048 ... Z-axis tolerance (pulses)
TOLE (4) = 2048 ... R-axis tolerance (pulses)
MOVE P, P2
TOLE (1) = 80 ..... Returns the tolerance to the default value.
TOLE (2) = 80
TOLE (3) = 80
TOLE (4) = 80
MOVE, P, P3

Tolerance can be set for each axis. If the same tolerance is used for all axes, you can write as "TOLE 2048".

If the same tolerance is used for all axes, you can write as "TOLE 80".

When P2 is an escape point and does not need to be accurately positioned, setting the tolerance parameter to a larger value allows the robot arm to pass through P2 quickly. The larger the tolerance value for the positioning time, the shorter the cycle time will be. The maximum value of the tolerance parameter is 2048 (pulses) and the default is 80 (pulses).

1.4 Increasing the speed by the OUT effective position parameter

[Also refer to:]
Robot controller user's manual
("Controller system settings" in Chapter 7) (2.4 Axis parameters) (6. Out position)
Programming manual
("Robot Language Lists" in Chapter 8) (69 OUTPOS)

[Example]

From P1 when chuck is open:

OUTPOS (1) = 10000... X-axis OUT effective position (pulses) : Increases the OUT effective position.

OUTPOS (2) = 10000... Y-axis OUT effective position (pulses)

OUTPOS (3) = 10000... Z-axis OUT effective position (pulses)

OUTPOS (4) = 10000... R-axis OUT effective position (pulses)

MOVE P, P2, Z=0

DO3 (0) = 1 ..... Chuck closes.

OUTPOS (1) = 2000..... Returns the OUT effective position to the default value.

OUTPOS (2) = 2000

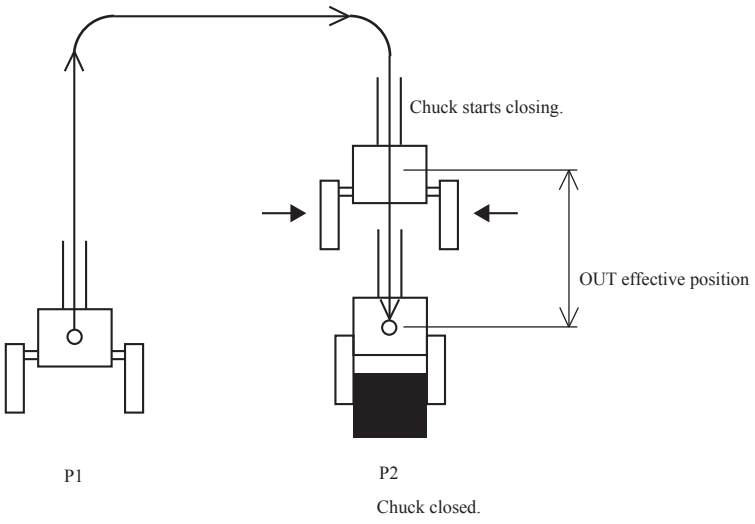
OUTPOS (3) = 2000

OUTPOS (4) = 2000

The OUT effective position can be set for each axis.
If the same OUT effective position is used for all axes, you can write as "OUTPOS 10000".

If the same OUT effective position is used for all axes, you can write as "OUTPOS 2000".

Increasing the speed by the OUT effective position parameter



When all of the X, Y, Z, and R axes enter the OUT effective position (10000 pulses prior to P2), the chuck starts closing. By setting the OUT effective position larger, the chuck starts closing while the robot arm is still moving at an earlier point, so that the chuck can grip the workpiece more quickly. The default value of the OUT effective position is 2000 (pulses).

[Reference]

Relation between X, Y, R-axis rotating angle, Z-axis movement distance and pulse values
The arch position, tolerance and OUT effective position parameters are set in pulses. For the relation between X, Y, R-axis rotating angle, Z-axis movement distance and pulse values, refer to "3.4 Relation between the X, Y, and R-axis movement angle, the Z-axis movement distance and the number of pulses" in Chapter 3.

Chapter 7 Torque limit designated Z-axis pushing action

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1. Torque limit designated Z-axis pushing action

Z-axis pushing action (downward direction) can be executed from program by using the DRIVE statement's torque limit setting.
The table below shows various tip load weights and the corresponding recommended torque limit (%) and torque offset (gravity offset for tip load weight) values relative to the motor's rated torque, and the speed limits (%). Be sure to operate the robot within these limit values.
Failing to observe these limits could shorten the life of the Z-axis drive area and the arm joints.
The pushing force shown in the table is the servo thrust, and it must be added to the load weight in order to obtain the actual pushing force. For example, if the load is 5kg, the added value would be 5 × 9.8 = 49N.
For programming specifics, refer to the separate "YRC series programming manual".

R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600

Tip Load Weight (kg)	Torque Limit Value (%)	Pushing Force (N)	Torque Offset	Speed Limit Value (%)		
				R6YXGL250 R6YXGL350 R6YXGL400	R6YXGL500	R6YXGL600
4kg	55% to 100%	45 to 81	-26	50	40	33
3kg	50% to 100%	41 to 81	-20	50	40	33
2kg	40% to 100%	32 to 81	-14	50	40	33
1kg	30% to 100%	24 to 81	-10	50	40	33
0kg	40% to 100%	36 to 81	-8	50	40	33

* Because a tip load weight of 5kg or greater could cause unstable control during a pushing action, do not perform pushing actions under such conditions.

R6YXG500, R6YXG600, R6YXGS500, R6YXGS600 Z200mm stroke specifications

Tip Load Weight (kg)	Torque Limit Value (%)	Pushing Force (N)	Torque Offset	Speed Limit Value (%)
10kg	60% to 100%	120 to 200	-19	15
9kg	50% to 100%	100 to 200	-17	15
8kg	50% to 100%	100 to 200	-15	14
7kg	40% to 100%	80 to 200	-14	14
6kg	40% to 100%	80 to 200	-12	13
5kg	30% to 100%	60 to 200	-10	12
4kg	30% to 100%	60 to 200	-8	12
3kg	30% to 100%	60 to 200	-8	11
2kg	30% to 100%	60 to 200	-8	10
1kg	30% to 100%	60 to 200	-8	9
0kg	30% to 100%	60 to 200	-8	9

R6YXG500, R6YXG600, R6YXGS500, R6YXGS600 Z300mm stroke specifications

Tip Load Weight (kg)	Torque Limit Value (%)	Pushing Force (N)	Torque Offset	Speed Limit Value (%)
10kg	60% to 100%	120 to 200	-21	21
9kg	50% to 100%	100 to 200	-19	19
8kg	50% to 100%	100 to 200	-17	18
7kg	40% to 100%	80 to 200	-15	16
6kg	40% to 100%	80 to 200	-14	15
5kg	30% to 100%	60 to 200	-12	14
4kg	30% to 100%	60 to 200	-10	13
3kg	30% to 100%	60 to 200	-9	13
2kg	30% to 100%	60 to 200	-9	12
1kg	30% to 100%	60 to 200	-9	12
0kg	30% to 100%	60 to 200	-9	12

R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 Z200mm stroke specifications
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000 Z200mm stroke specifications

Tip Load Weight (kg)	Torque Limit Value (%)	Pushing Force (N)	Torque Offset	Speed Limit Value (%)			
				R6YXGH600 R6YXG700	R6YXG800	R6YXG900	R6YXG1000
20kg	50 to 100%	200 to 400	-21	34	30	26	24
19kg	50 to 100%	200 to 400	-21	33	29	26	23
18kg	50 to 100%	200 to 400	-20	33	29	26	23
17kg	50 to 100%	200 to 400	-19	32	28	25	23
16kg	50 to 100%	200 to 400	-18	32	28	25	22
15kg	50 to 100%	200 to 400	-18	31	27	24	22
14kg	40 to 100%	160 to 400	-16	30	27	24	21
13kg	40 to 100%	160 to 400	-15	30	26	23	21
12kg	40 to 100%	160 to 400	-14	29	26	23	20
11kg	40 to 100%	160 to 400	-13	29	25	22	20
10kg	40 to 100%	160 to 400	-12	28	25	22	20
9kg	30 to 100%	120 to 400	-11	27	24	21	19
8kg	30 to 100%	120 to 400	-10	27	23	21	19
7kg	30 to 100%	120 to 400	-9	26	23	20	18
6kg	20 to 100%	80 to 400	-8	25	22	20	18
5kg	20 to 100%	80 to 400	-7	25	22	19	17
4kg	20 to 100%	80 to 400	-6	24	21	19	17
3kg	20 to 100%	80 to 400	-5	23	20	18	16
2kg	10 to 100%	40 to 400	-4	23	20	18	16
1kg	10 to 100%	40 to 400	-3	22	19	17	15
0kg	10 to 100%	40 to 400	-2	21	19	17	15

R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000 Z400mm stroke specifications
R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000 Z400mm stroke specifications

Tip Load Weight (kg)	Torque Limit Value (%)	Pushing Force (N)	Torque Offset	Speed Limit Value (%)			
				R6YXGH600 R6YXG700	R6YXG800	R6YXG900	R6YXG1000
20kg	60 to 100%	240 to 400	-22	34	30	26	24
19kg	50 to 100%	200 to 400	-21	33	29	26	23
18kg	50 to 100%	200 to 400	-21	33	29	26	23
17kg	50 to 100%	200 to 400	-20	32	28	25	23
16kg	50 to 100%	200 to 400	-19	32	28	25	22
15kg	50 to 100%	200 to 400	-18	31	27	24	22
14kg	40 to 100%	160 to 400	-16	30	27	24	21
13kg	40 to 100%	160 to 400	-15	30	26	23	21
12kg	40 to 100%	160 to 400	-15	29	26	23	20
11kg	40 to 100%	160 to 400	-13	29	25	22	20
10kg	40 to 100%	160 to 400	-13	28	25	22	20
9kg	30 to 100%	120 to 400	-11	27	24	21	19
8kg	30 to 100%	120 to 400	-10	27	23	21	19
7kg	30 to 100%	120 to 400	-9	26	23	20	18
6kg	30 to 100%	120 to 400	-9	25	22	20	18
5kg	20 to 100%	80 to 400	-8	25	22	19	17
4kg	20 to 100%	80 to 400	-6	24	21	19	17
3kg	20 to 100%	80 to 400	-5	23	20	18	16
2kg	10 to 100%	40 to 400	-4	23	20	18	16
1kg	10 to 100%	40 to 400	-3	22	19	17	15
0kg	10 to 100%	40 to 400	-2	21	19	17	15

Chapter 8 Specifications

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1. Manipulator

1.1 Basic specification

1.1.1 R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600

Robot model			R6YXGL250	R6YXGL350	R6YXGL400
Axis specifications	X-axis	Arm length	100mm	200mm	250mm
		Rotation angle	±140°		
	Y-axis	Arm length	150mm		
		Rotation angle	±144°		
	Z-axis	Stroke	150mm		
	R-axis	Rotation angle	±360°		
Motor		X-axis	200W		
		Y-axis	150W		
		Z-axis	50W		
		R-axis	100W		
Maximum speed		XY resultant	4.5m/s	5.6m/s	6.1m/s
		Z-axis	1.1m/s		
		R-axis	1020°/s		
Repeatability (*1)		XY-axes	±0.01mm		
		Z-axis	±0.01mm		
		R-axis	±0.004°		
Payload			Standard specifications 5kg, Option specifications 4kg (*3)		
R-axis tolerable moment of inertia (*2)			0.05kgm^2 (0.5kgfcms^2)		
User wiring			0.2sq×10 cables		
User tubing			∅4×3		
Travel limit			1.Soft limit 2.Mechanical stopper (XYZ-axes)		
Option		Tool flange	R6YACXGLF		
		Open shaft	R6YACXGLS		
Robot cable			3.5m (option: 5m, 10m)		
Weight			18.5kg (*4)	19.0kg (*4)	19.5kg (*4)

*1 At constant ambient temperature (XY)
*2 There are limits to acceleration coefficient settings.
*3 Option specifications … Tool flange mount type
User wiring/tubing through spline type
*4 This is the weight including 10m cable.

* The Z-axis spline may vibrate in a Z-axis operation speed range of 20% to 40% depending on the arm position or Z-axis position. If the Z-axis spline vibrates, operate it beyond this operation speed range.

Robot model			R6YXGL500	R6YXGL600
Axis specifications	X-axis	Arm length	250mm	350mm
		Rotation angle	±140°	
	Y-axis	Arm length	250mm	
		Rotation angle	±144°	
	Z-axis	Stroke	150mm	
	R-axis	Rotation angle	±360°	
Motor		X-axis	200W	
		Y-axis	150W	
		Z-axis	50W	
		R-axis	100W	
Maximum speed		XY resultant	5.1m/s	4.9m/s
		Z-axis	1.1m/s	
		R-axis	1020°/s	
Repeatability (*1)		XY-axes	±0.01mm	
		Z-axis	±0.01mm	
		R-axis	±0.004°	
Payload			Standard specifications 5kg, Option specifications 4kg (*3)	
R-axis tolerable moment of inertia (*2)			$0.05kgm^2$ ($0.5kgfcms^2$)	
User wiring			0.2sq×10 cables	
User tubing			⌀4×3	
Travel limit			1.Soft limit 2.Mechanical stopper (XYZ-axes)	
Option		Tool flange	R6YACXGLF	
		Open shaft	R6YACXGLS	
Robot cable			3.5m (option: 5m, 10m)	
Weight			21.0kg (*4)	22.0kg (*4)

*1 At constant ambient temperature (XY)
*2 There are limits to acceleration coefficient settings.
*3 Option specifications … Tool flange mount type
User wiring/tubing through spline type
*4 This is the weight including the 10m cable.

* The Z-axis spline may vibrate in a Z-axis operation speed range of 20% to 40% depending on the arm position or Z-axis position. If the Z-axis spline vibrates, operate it beyond this operation speed range.

Noise level

Equivalent sound level of robot, Laeq (A) (when there is 10dB or larger difference from the back ground sound pressure level)	Position where the noise level is measured
76.2dB	1.25m apart from the back of the robot, 1.6m height from the floor surface.

Note: The noise level can be higher when the robot is set nearby the objects that cause sound reflection.

1.1.2 R6YXG500, R6YXG600, R6YXGH600, R6YXG700, R6YXG800, R6YXG900, R6YXG1000

Robot model			R6YXG500	R6YXG600
Axis specifications	X-axis	Arm length	200mm	300mm
		Rotation angle	±130°	
	Y-axis	Arm length	300mm	
		Rotation angle	±145°	
	Z-axis	Stroke	200, 300mm	
	R-axis	Rotation angle	±360°	
Motor		X-axis	400W	
		Y-axis	200W	
		Z-axis	200W	
		R-axis	200W	
Maximum speed		XY resultant	7.6m/s	8.4m/s
		Z-axis	2.3m/s (200mm stroke Z-axis) 1.7m/s (300mm stroke Z-axis)	
		R-axis	1700°/s	
Repeatability (*1)		XY-axes	±0.01mm	
		Z-axis	±0.01mm	
		R-axis	±0.004°	
Payload			10kg	
R-axis tolerable moment of inertia (*2)			0.30kgm^2 (3.0kgfcms^2)	
User wiring			0.2sq×20 cables	
User tubing			ϕ6×3	
Travel limit			1.Soft limit 2.Mechanical stopper (XYZ-axes)	
Robot cable			3.5m (option: 5m, 10m)	
Weight			30kg	31kg

*1 At constant ambient temperature (XY)

*2 There are limits to acceleration coefficient settings.

Robot model			R6YXGH600	R6YXG700	R6YXG800	R6YXG900	R6YXG1000
Axis specifications	X-axis	Arm length	200mm	300mm	400mm	500mm	600mm
		Rotation angle	±130°				
	Y-axis	Arm length	400mm				
		Rotation angle	±150°				
	Z-axis	Stroke	200, 400mm				
	R-axis	Rotation angle	±360°				
Motor		X-axis	750W				
		Y-axis	400W				
		Z-axis	400W				
		R-axis	200W				
Maximum speed		XY resultant	7.7m/s	8.4m/s	9.2m/s	9.9m/s	10.6m/s
		Z-axis	2.3m/s (200mm stroke Z-axis) 1.7m/s (400mm stroke Z-axis)				
		R-axis	920°/s				
Repeatability (*1)		XY-axes	±0.02mm				
		Z-axis	±0.01mm				
		R-axis	±0.004°				
Payload			20kg				
R-axis tolerable moment of inertia (*2)			1.0kgm^2 (10.0kgfcms^2)				
User wiring			0.2sq×20 cables				
User tubing			∅6×3				
Travel limit			1.Soft limit 2.Mechanical stopper (XYZ-axes)				
Robot cable			3.5m (option: 5m, 10m)				
Weight			50kg	52kg	54kg	56kg	58kg

*1 At constant ambient temperature (XY)

*2 There are limits to acceleration coefficient settings.

Noise level

Equivalent sound level of robot, Laeq (A) (when there is 10dB or larger difference from the back ground sound pressure level)	Position where the noise level is measured
78.4dB	1m apart from the back of the robot, 1.6m height from the floor surface.

Note: The noise level can be higher when the robot is set nearby the objects that cause sound reflection.

1.1.3 R6YXGS300, R6YXGS400, R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000

Robot model			R6YXGS300	R6YXGS400	R6YXGS500	R6YXGS600
Axis specifications	X-axis	Arm length	150mm	250mm	200mm	300mm
		Rotation angle	±120°	±125°	±105°	±130°
	Y-axis	Arm length	150mm		300mm	
		Rotation angle	±130°	±144°	±125°	±145°
	Z-axis	Stroke	150mm		200, 300mm	
	R-axis	Rotation angle	±360°			
Motor		X-axis	200W		400W	
		Y-axis	150W		200W	
		Z-axis	50W		200W	
		R-axis	100W		200W	
Maximum speed		XY resultant	4.4m/s	6.1m/s	7.6m/s	8.4m/s
		Z-axis	1.1m/s		2.3m/s (200mm stroke Z-axis) 1.7m/s (300mm stroke Z-axis)	
		R-axis	1020°/s (Wall-mount model) 720°/s (Wall-mount inverse model)		1700°/s (Wall-mount model) 800°/s (Wall-mount inverse model)	
Repeatability (*1)		XY-axes	±0.01mm			
		Z-axis	±0.01mm			
		R-axis	±0.004°			
Payload			Standard specifications 5kg, Option specifications 4kg (*3)		10kg	
R-axis tolerable moment of inertia (*2)			0.05kgm^2 (0.5kgfcms^2)		0.30kgm^2 (3.0kgfcms^2)	
User wiring			0.2sq×10 cables		0.2sq×20 cables	
User tubing			ϕ4×3		ϕ6×3	
Travel limit			1.Soft limit 2.Mechanical stopper (XYZ-axes)			
Option		Tool flange	R6YACXGLF		-	
		Open shaft	R6YACXGLS		-	
Robot cable			3.5m (option: 5m, 10m)			
Weight			19.5kg (*4)	20kg (*4)	30kg (*4)	31kg (*4)

*1 At constant ambient temperature (XY-axes)
*2 There are limits to acceleration coefficient settings.
*3 Option specifications … Tool flange mount type
User wiring/tubing through spline type
*4 This is the weight including 10m cable.

* The Z-axis spline may vibrate in a Z-axis operation speed range of 20% to 40% depending on the arm position or Z-axis position. If the Z-axis spline vibrates, operate it beyond this operation speed range.

Robot model			R6YXGS700	R6YXGS800	R6YXGS900	R6YXGS1000
Axis specifications	X-axis	Arm length	300mm	400mm	500mm	600mm
		Rotation angle	±130°			
	Y-axis	Arm length	400mm			
		Rotation angle	±130°	±145°	±150°	
	Z-axis	Stroke	200, 400mm			
	R-axis	Rotation angle	±360°			
Motor		X-axis	750W			
		Y-axis	400W			
		Z-axis	400W			
		R-axis	200W			
Maximum speed		XY resultant	8.4m/s	9.2m/s	9.9m/s	10.6m/s
		Z-axis	2.3m/s (200mm stroke Z-axis) 1.7m/s (300mm stroke Z-axis)			
		R-axis	920°/s (Wall-mount model) 480°/s (Wall-mount inverse model)			
Repeatability (*1)		XY-axes	±0.02mm			
		Z-axis	±0.01mm			
		R-axis	±0.004°			
Payload			20kg			
R-axis tolerable moment of inertia (*2)			1.0kgm^2 (10.0kgfcms^2)			
User wiring			0.2sq×20 cables			
User tubing			⌀6×3			
Travel limit			1.Soft limit 2.Mechanical stopper (XYZ-axes)			
Robot cable			3.5m (option: 5m, 10m)			
Weight			53/55kg (*3)	55/57kg (*3)	57/59kg (*3)	59/61kg (*3)

*1 At constant ambient temperature (XY)
*2 There are limits to acceleration coefficient settings.
*3 This is the weight including 10m cable.

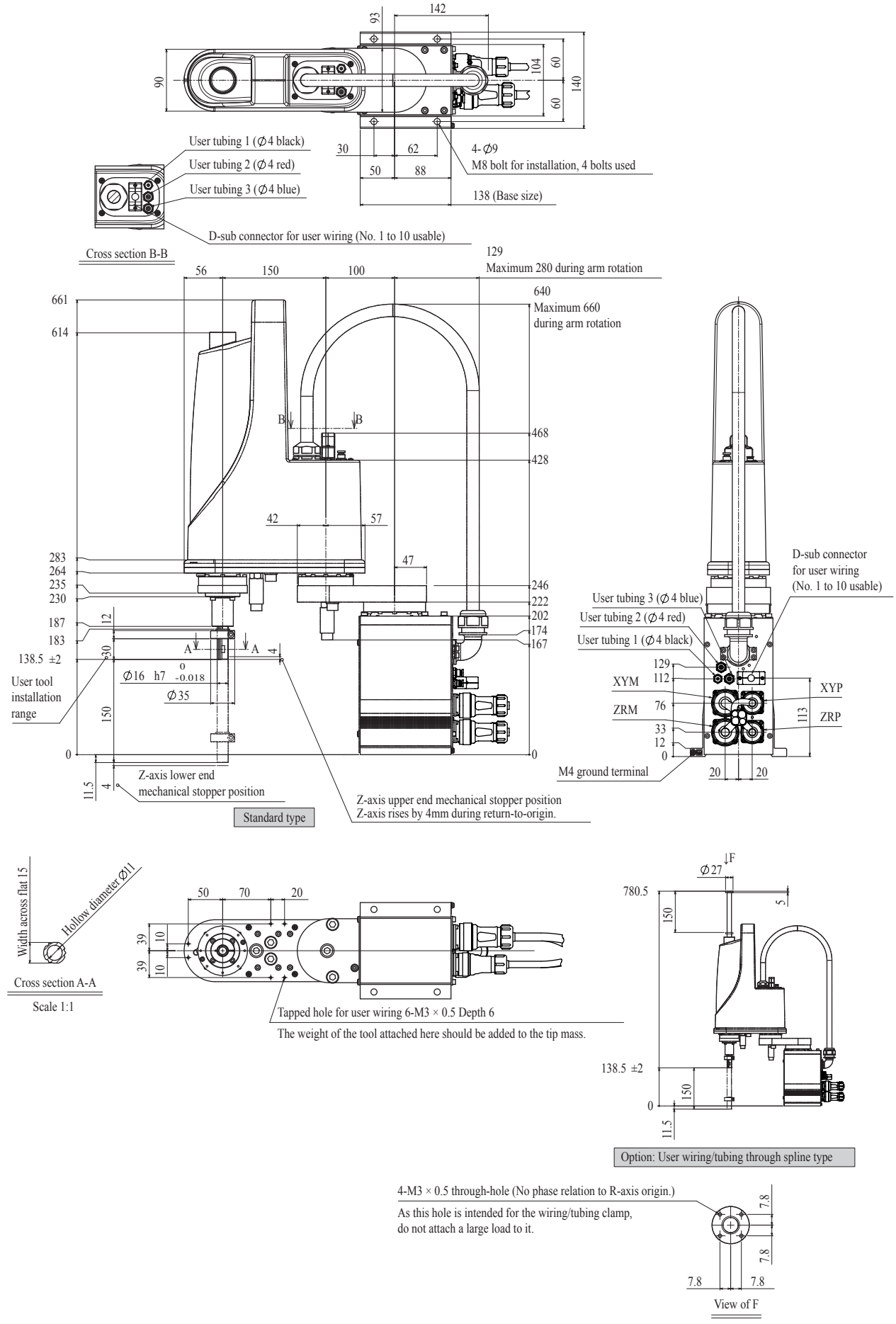
Noise level

Equivalent sound level of robot, Laeq (A) (when there is 10dB or larger difference from the back ground sound pressure level)	Position where the noise level is measured
78.4dB	1m apart from the back of the robot, 1.6m height from the floor surface.

Note: The noise level can be higher when the robot is set nearby the objects that cause sound reflection.

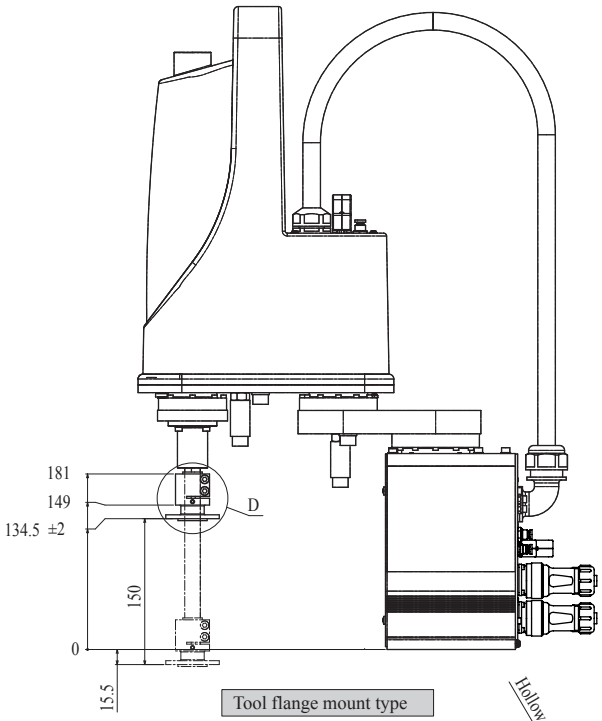
1.2 External view and dimensions

1.2.1 R6YXGL250

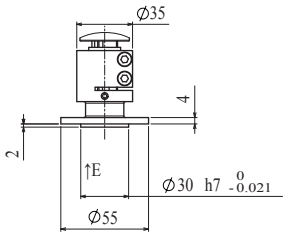


R6YXGL250

Tool flange mount type

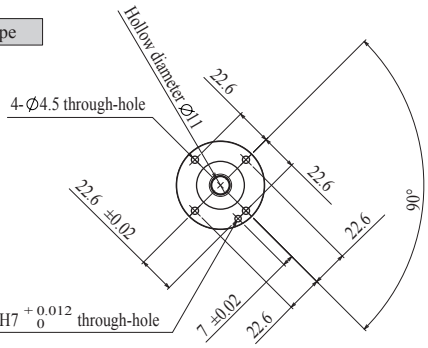


Tool flange mount type

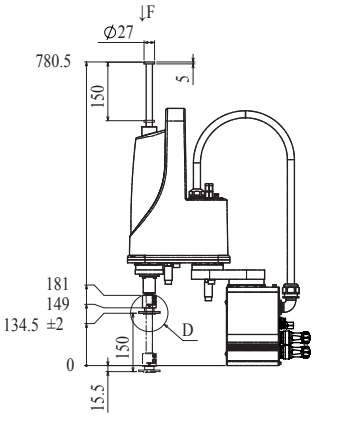


Detailed drawing D

Scale 2:3



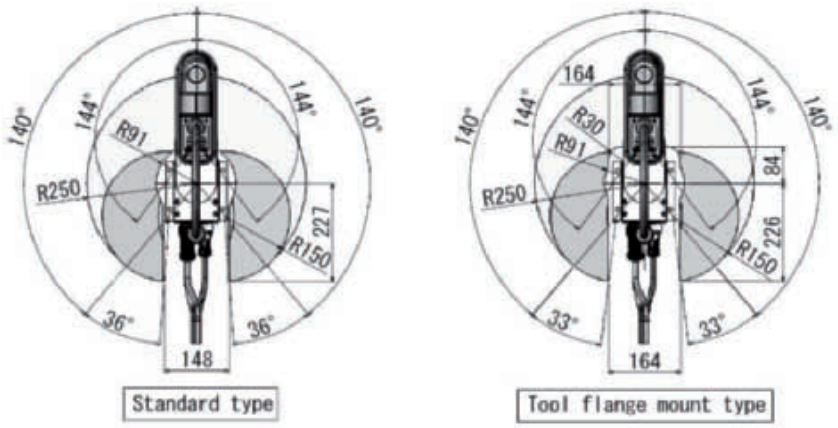
View of E



Option: User wiring/tubing through spline type

R6YXGL250

Working envelope

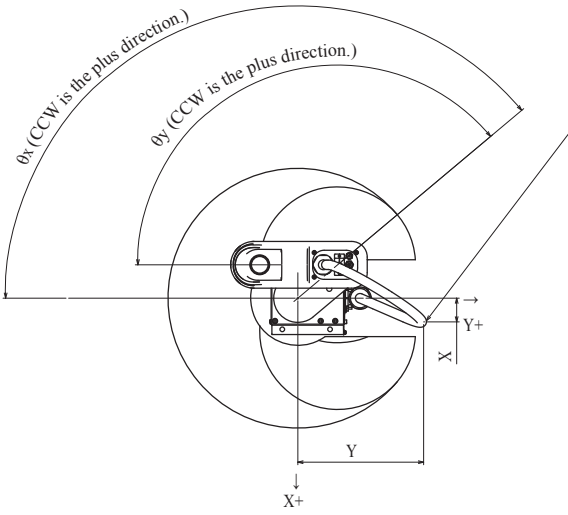


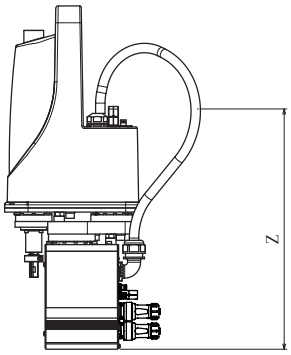
- Note that the robot cannot be used at a position where the base flange, robot cable, spline, and tool flange interfere with each other in the working envelope shown above.
- X-axis mechanical stopper position : 142°
- Y-axis mechanical stopper position : 146°

Option	
X-axis additional stopper	The X-axis mechanical stopper position can be changed to the 119°-position. (Working envelope: 117°)
Y-axis additional stopper	The Y-axis mechanical stopper position can be changed to the 127°-position. (Working envelope: 125°)
Z-axis upper end additional stopper	The Z-axis origin position can be lowered 12mm, 15mm, 18mm, etc. (at intervals of 3mm).
Z-axis lower end additional stopper	The lower end stopper position can be raised 17mm or more (within 4 mm of the working envelope from the additional stopper). (This stopper cannot be used in the user wiring/tubing through spline type.)
Other option	
Reference coordinate setting jig	

R6YXGL250

Projection of the machine harness toward the base rear side





Harness projection amount Y to the base rear side and positions X and Z with respect to the arm positions θx and θy

- The positions shown below are reference data. So, if there is an interference object on the base rear side, be sure to keep a sufficient space.
- The harness projection amount Y and position Z at the symmetrical position of the arm to the Y-axis plus axis are the same values as those stated in the tables below. The X value at the symmetrical position of the arm to the Y-axis plus axis is the value stated in the table below, the sign of which is inverted.

X(mm)

		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	-144	65	0	0	0	0	0
	-120	80	0	0	0	0	0
	-90	70	0	0	0	0	0
	-60	50	70	0	0	0	0
	-30	10	50	0	60	0	0
	0	0	25	50	0	0	0
	30	-10	10	20	40	80	100
	60	-50	-15	15	45	95	95
	90	-70	-40	5	20	65	80
	120	-80	-60	-40	-10	30	65
	144	-65	-100	-70	-40	15	20

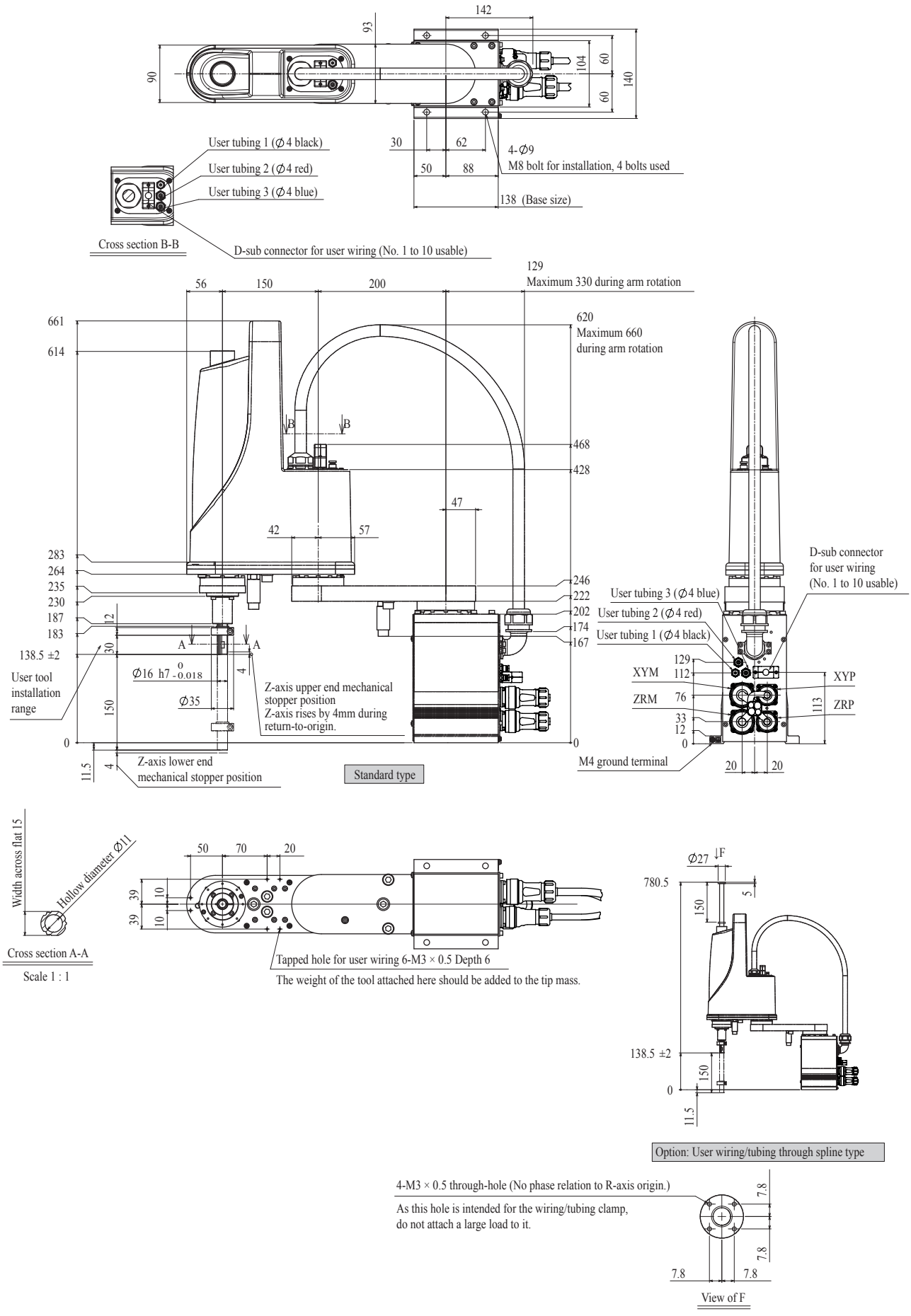
Y(mm)

		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	-144	155	136	136	136	136	136
	-120	160	136	136	136	136	136
	-90	170	136	136	136	136	136
	-60	165	136	136	136	136	136
	-30	160	136	136	136	136	136
	0	160	145	135	145	136	136
	30	160	160	160	155	145	136
	60	165	175	160	165	170	160
	90	170	180	185	200	185	190
	120	160	165	185	210	230	230
	144	155	170	190	225	245	280

Z(mm)

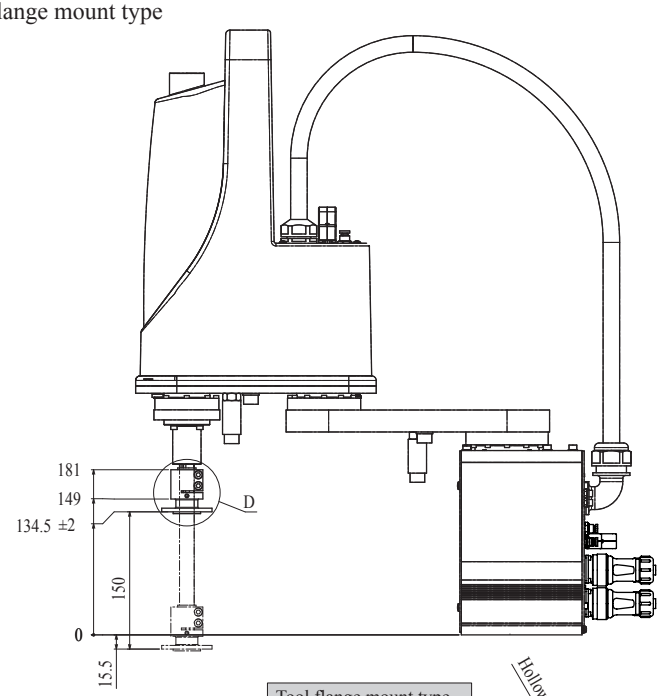
		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	-144	350	300	300	300	300	300
	-120	350	300	300	300	300	300
	-90	410	300	300	300	300	300
	-60	420	300	300	300	300	300
	-30	460	400	300	300	300	300
	0	460	410	470	370	300	300
	30	460	430	410	450	435	440
	60	420	450	450	455	460	460
	90	410	410	460	470	480	475
	120	350	410	430	450	470	480
	144	350	390	420	460	470	480

1.2.2 R6YXGL350

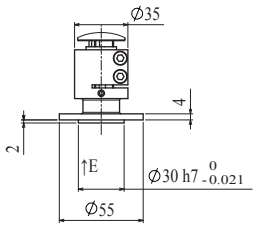


R6YXGL350

Tool flange mount type

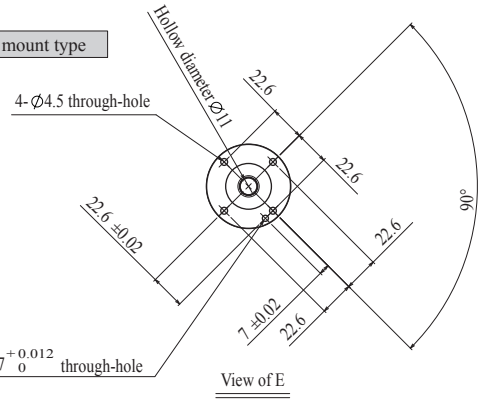


Tool flange mount type

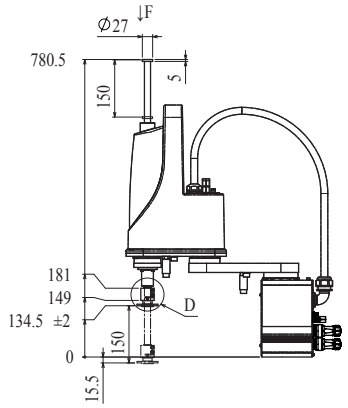


Detailed drawing D

Scale 2 : 3



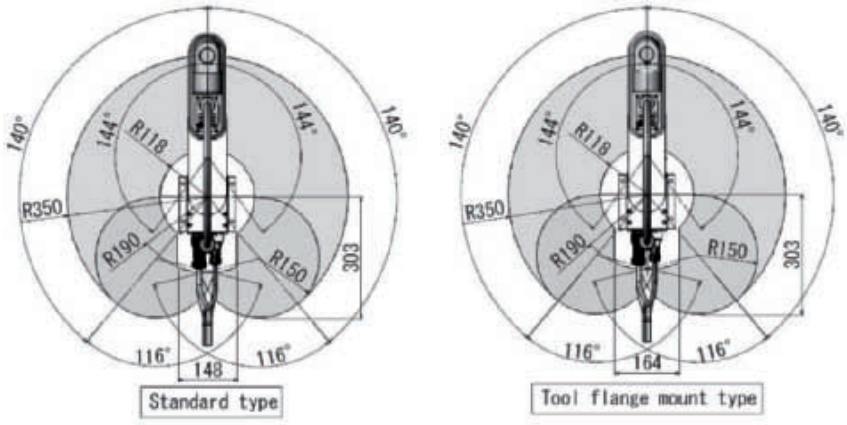
View of E



Option: User wiring/tubing through spline type

R6YXGL350

Working envelope

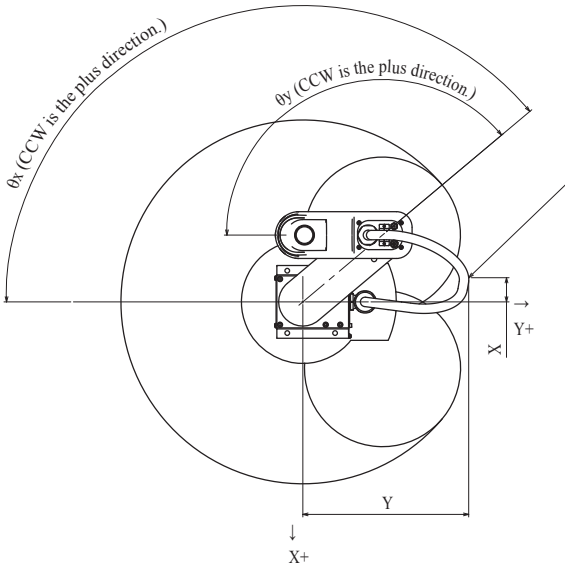


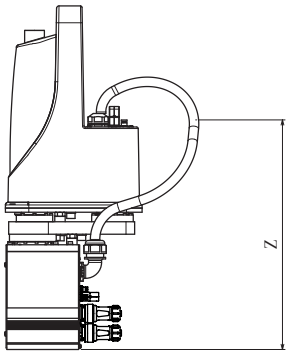
- Note that the robot cannot be used at a position where the base flange, robot cable, spline, and tool flange interfere with each other in the working envelope shown above.
- X-axis mechanical stopper position : 142°
- Y-axis mechanical stopper position : 146°

Option	
X-axis additional stopper	The X-axis mechanical stopper position can be changed to the 119°-position. (Working envelope: 117°)
Y-axis additional stopper	The Y-axis mechanical stopper position can be changed to the 127°-position. (Working envelope: 125°)
Z-axis upper end additional stopper	The Z-axis origin position can be lowered 12mm, 15mm, 18mm, etc. (at intervals of 3mm).
Z-axis lower end additional stopper	The lower end stopper position can be raised 17mm or more (within 4 mm of the working envelope from the additional stopper). (This stopper cannot be used in the user wiring/tubing through spline type.)
Other option	
Reference coordinate setting jig	

R6YXGL350

Projection of the machine harness toward the base rear side





Harness projection amount Y to the base rear side and positions X and Z with respect to the arm positions θx and θy

- The positions shown below are reference data. So, if there is an interference object on the base rear side, be sure to keep a sufficient space.
- The harness projection amount Y and position Z at the symmetrical position of the arm to the Y-axis plus axis are the same values as those stated in the tables below. The X value at the symmetrical position of the arm to the Y-axis plus axis is the value stated in the table below, the sign of which is inverted.

X(mm)

		θX(°)					
		0	-30	-60	-90	-120	-140
θY(°)	-144	0	0	0	0	0	0
	-120	0	0	0	0	0	0
	-90	40	0	0	0	0	0
	-60	40	30	0	0	0	0
	-30	30	25	0	0	0	0
	0	0	0	0	30	65	60
	30	-30	-10	0	30	60	60
	60	-40	-25	0	5	30	50
	90	-40	-60	-60	-50	20	25
	120	0	-90	-60	-80	0	-70
	144	0	-100	-60	-125	-80	-70

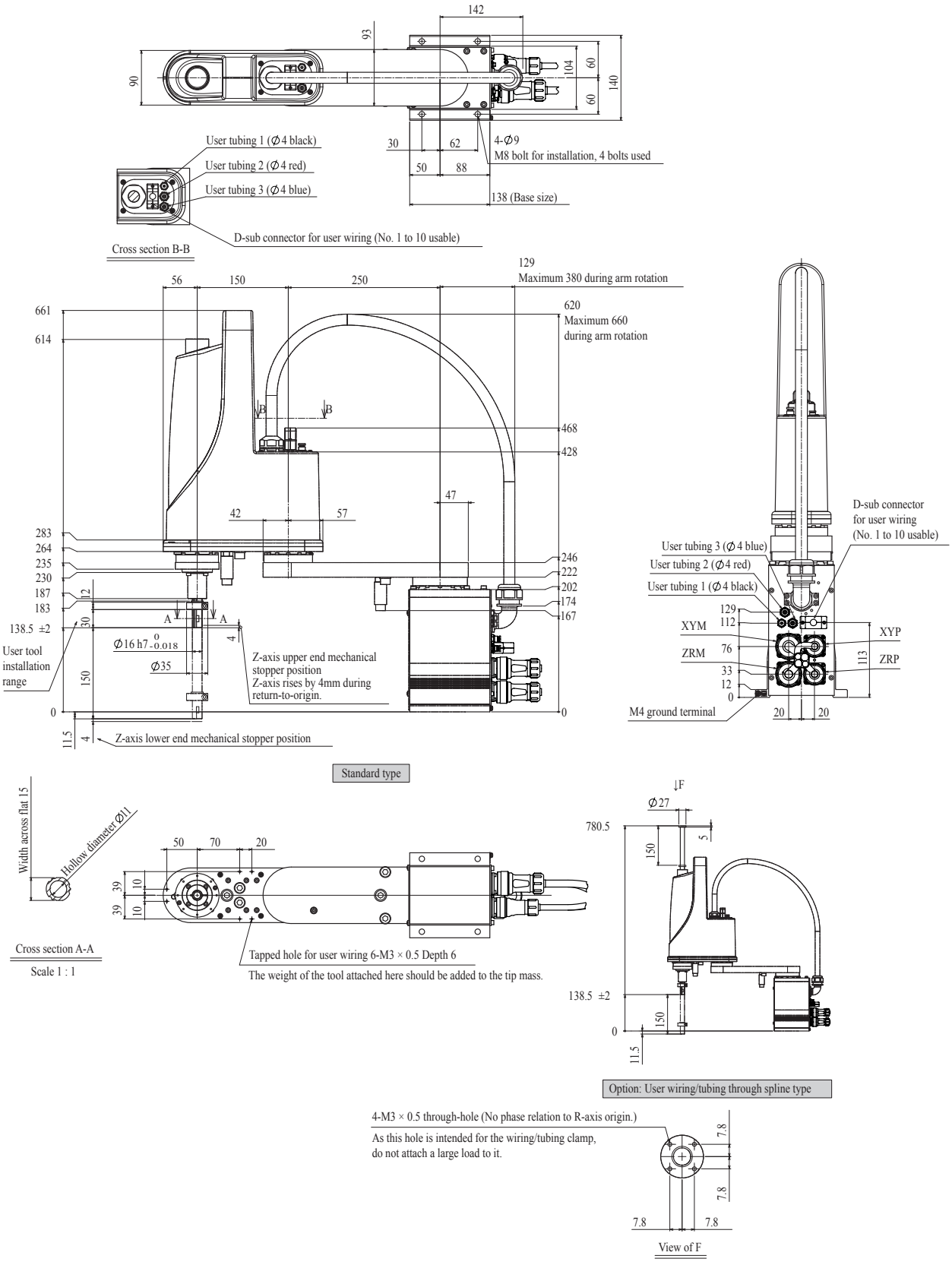
Y(mm)

		θX(°)					
		0	-30	-60	-90	-120	-140
θY(°)	-144	136	136	136	136	136	136
	-120	136	136	136	136	136	136
	-90	136	136	136	136	136	136
	-60	136	136	136	136	136	136
	-30	136	136	136	136	136	136
	0	136	136	136	136	136	136
	30	136	136	140	150	140	136
	60	136	136	150	170	170	210
	90	136	140	165	180	225	240
	120	136	136	160	225	260	270
	144	136	136	170	220	265	330

Z(mm)

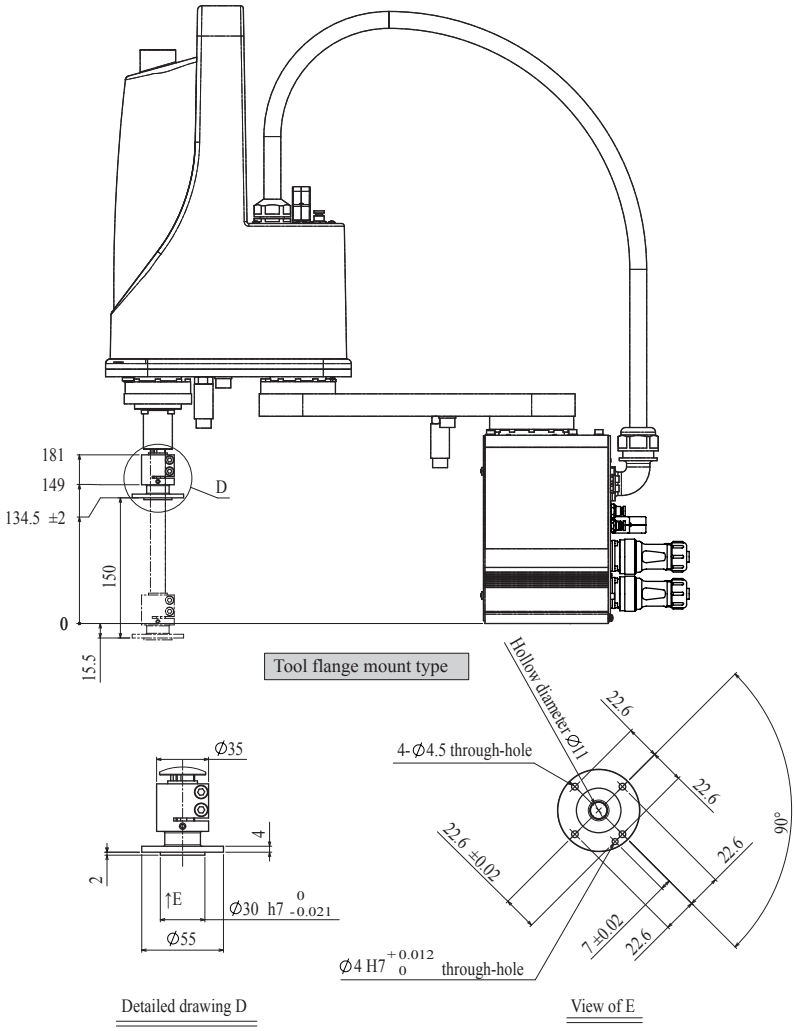
		θX(°)					
		0	-30	-60	-90	-120	-140
θY(°)	-144	400	400	400	400	400	400
	-120	400	400	400	400	400	400
	-90	400	400	400	400	400	400
	-60	400	400	400	400	400	400
	-30	400	400	400	400	400	400
	0	400	400	400	400	470	400
	30	400	400	430	450	460	480
	60	400	400	450	450	490	500
	90	400	400	440	480	520	520
	120	400	430	440	500	520	500
	144	400	400	430	500	510	500

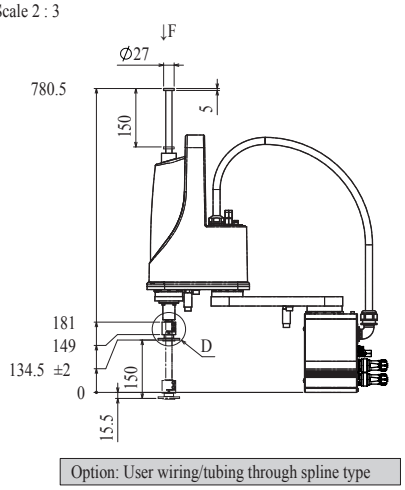
1.2.3 R6YXGL400



R6YXGL400

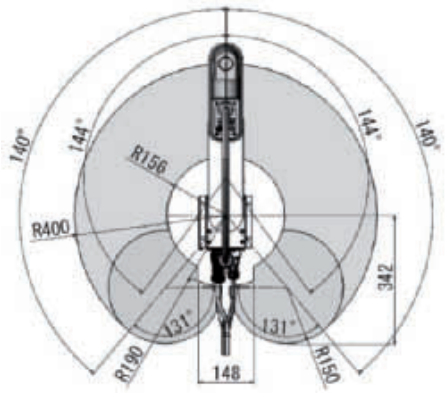
Tool flange mount type





R6YXGL400

Working envelope



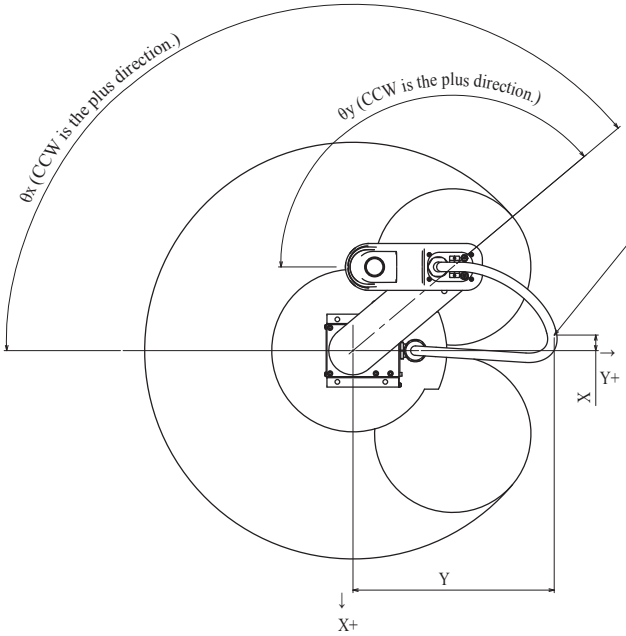
Standard/Tool flange mount type

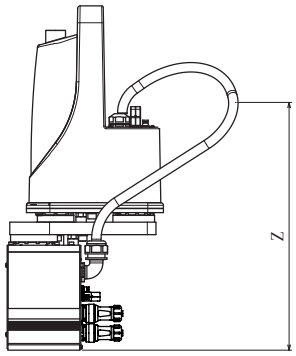
- Note that the robot cannot be used at a position where the base flange, robot cable, spline, and tool flange interfere with each other in the working envelope shown above.
- X-axis mechanical stopper position : 142°
- Y-axis mechanical stopper position : 146°

Option	
X-axis additional stopper	The X-axis mechanical stopper position can be changed to the 119°-position. (Working envelope: 117°)
Y-axis additional stopper	The Y-axis mechanical stopper position can be changed to the 127°-position. (Working envelope: 125°)
Z-axis upper end additional stopper	The Z-axis origin position can be lowered 12mm, 15mm, 18mm, etc. (at intervals of 3mm).
Z-axis lower end additional stopper	The lower end stopper position can be raised 17mm or more (within 4 mm of the working envelope from the additional stopper). (This stopper cannot be used in the user wiring/tubing through spline type.)
Other option	
Reference coordinate setting jig	

R6YXGL400

Projection of the machine harness toward the base rear side





Harness projection amount Y to the base rear side and positions X and Z with respect to the arm positions θx and θy

- The positions shown below are reference data. So, if there is an interference object on the base rear side, be sure to keep a sufficient space.
- The harness projection amount Y and position Z at the symmetrical position of the arm to the Y-axis plus axis are the same values as those stated in the tables below. The X value at the symmetrical position of the arm to the Y-axis plus axis is the value stated in the table below, the sign of which is inverted.

X(mm)

		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	θy<0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	30	0	0	0	35	35	-60
	60	0	0	0	-25	40	-70
	90	0	0	-25	-25	-40	-70
	120	0	0	-25	-30	-40	-70
	144	0	0	-50	-65	-30	-60

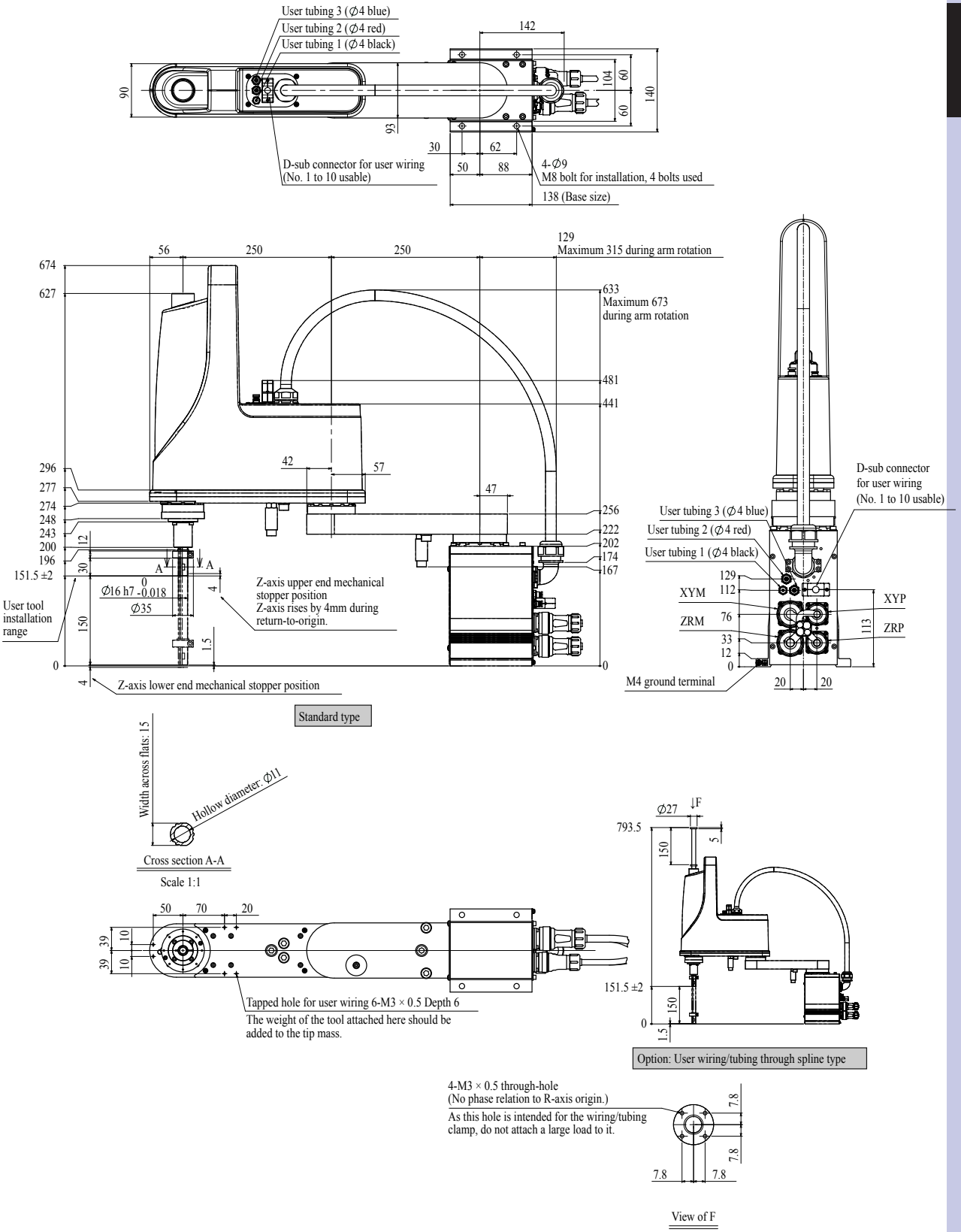
Y(mm)

		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	θy<0	136	136	136	136	136	136
	0	136	136	136	136	136	136
	30	136	136	136	136	136	140
	60	136	136	136	136	136	150
	90	136	136	140	165	180	190
	120	136	136	140	180	220	270
	144	136	136	145	205	260	380

Z(mm)

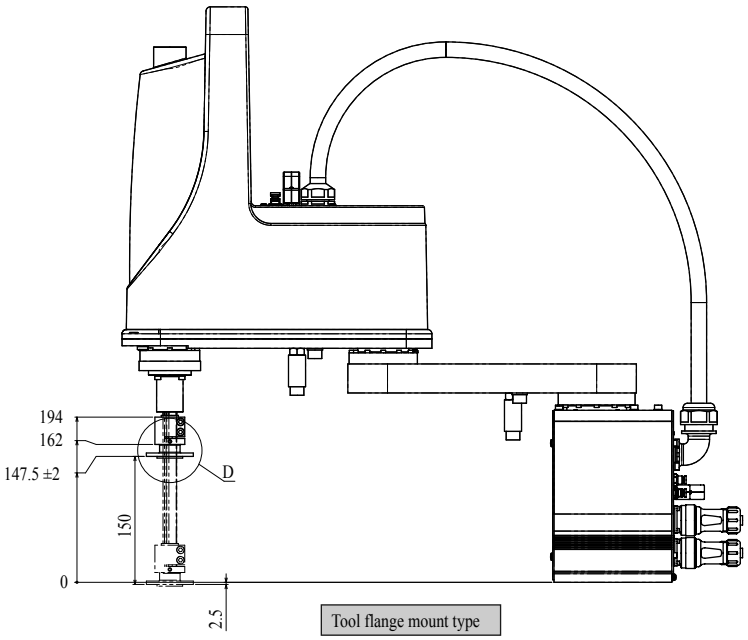
		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	θy<0	300	300	300	300	300	300
	0	300	300	300	300	300	300
	30	300	300	300	440	410	470
	60	300	300	350	430	470	470
	90	300	300	430	465	500	500
	120	300	300	430	460	480	530
	144	300	300	425	470	470	500

1.2.4 R6YXGL500

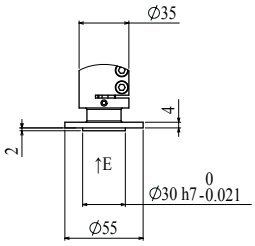


R6YXGL500

Tool flange mount type

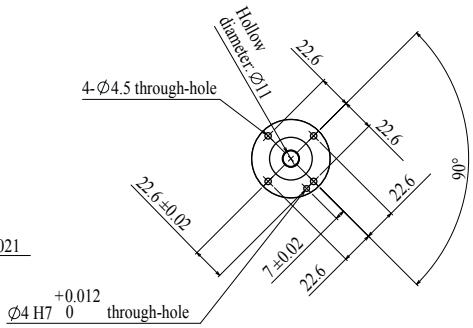


Tool flange mount type

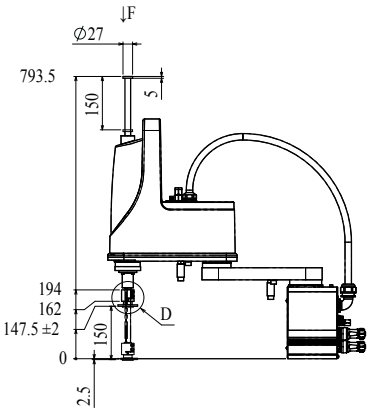


Detailed drawing D

Scale 2 : 3



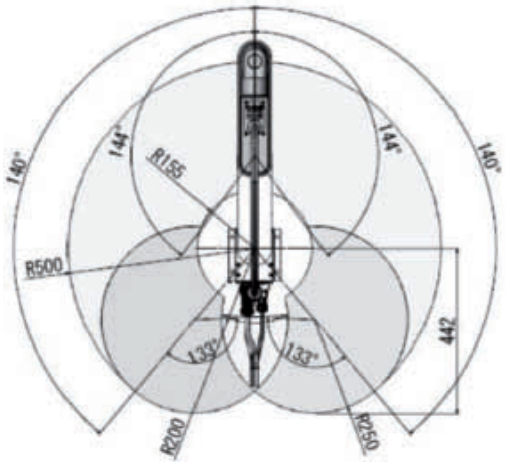
View of E



Option: User wiring/tubing through spline type

R6YXGL500

Working envelope



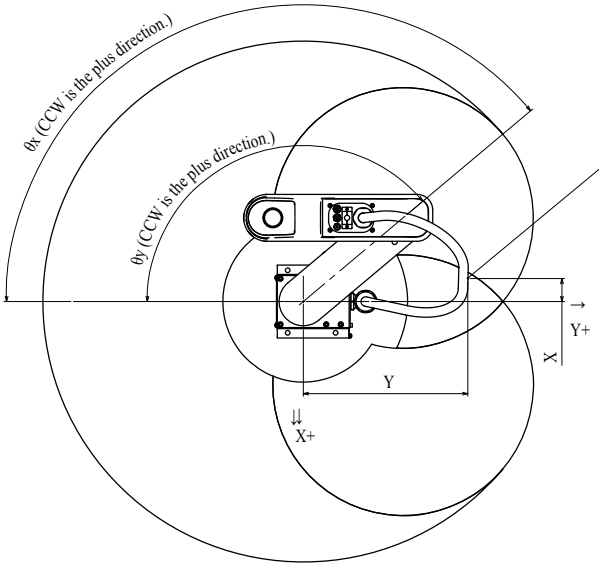
Standard/Tool flange mount type

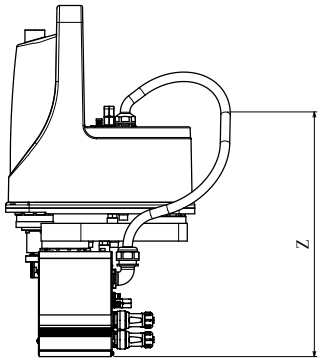
- Note that the robot cannot be used at a position where the base flange, robot cable, spline, and tool flange interfere with each other in the working envelope shown above.
- X-axis mechanical stopper position : 142°
- Y-axis mechanical stopper position : 146°

Option	
X-axis additional stopper	The X-axis mechanical stopper position can be changed to the 119°-position. (Working envelope: 117°)
Y-axis additional stopper	The Y-axis mechanical stopper position can be changed to the 127°-position. (Working envelope: 125°)
Z-axis upper end additional stopper	The Z-axis origin position can be lowered 12mm, 15mm, 18mm, etc. (at intervals of 3mm).
Z-axis lower end additional stopper	The lower end stopper position can be raised 17mm or more (within 4 mm of the working envelope from the additional stopper). (This stopper cannot be used in the user wiring/tubing through spline type.)
Other option	
Reference coordinate setting jig	

R6YXGL500

Projection of the machine harness toward the base rear side





Harness projection amount Y to the base rear side and positions X and Z with respect to the arm positions θx and θy

- The positions shown below are reference data. So, if there is an interference object on the base rear side, be sure to keep a sufficient space.
- The harness projection amount Y and position Z at the symmetrical position of the arm to the Y-axis plus axis are the same values as those stated in the tables below. The X value at the symmetrical position of the arm to the Y-axis plus axis is the value stated in the table below, the sign of which is inverted.

X(mm)

		θX(°)					
		0	-30	-60	-90	-120	-140
θY(°)	-144	0	0	0	0	0	0
	-120	0	0	0	0	0	0
	-90	0	0	0	0	0	0
	-60	0	0	0	0	0	0
	-30	0	0	0	0	0	0
	0	0	0	0	0	0	0
	30	0	0	0	0	-10	-10
	60	0	0	20	20	0	0
	90	0	0	30	50	10	0
	120	0	0	70	100	50	0
	144	0	0	110	130	70	50

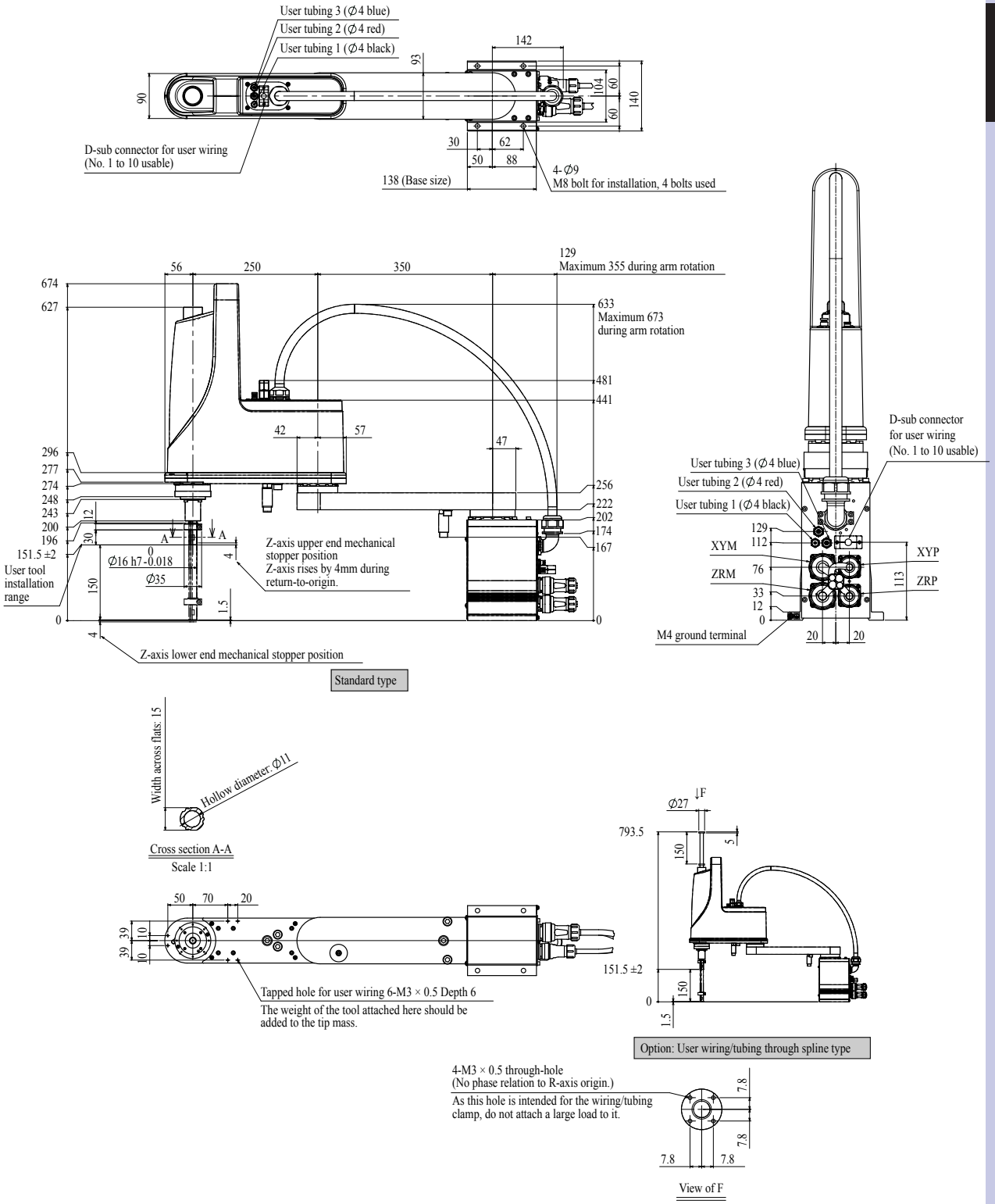
Y(mm)

		θX(°)					
		0	-30	-60	-90	-120	-140
θY(°)	-144	129	129	129	129	129	129
	-120	129	129	129	129	129	129
	-90	129	129	129	129	129	129
	-60	129	129	129	129	129	129
	-30	129	129	129	129	129	129
	0	129	129	129	129	129	129
	30	129	129	129	135	135	145
	60	129	129	129	145	155	185
	90	129	129	135	165	185	225
	120	129	129	140	185	245	255
	144	129	129	145	205	265	315

Z(mm)

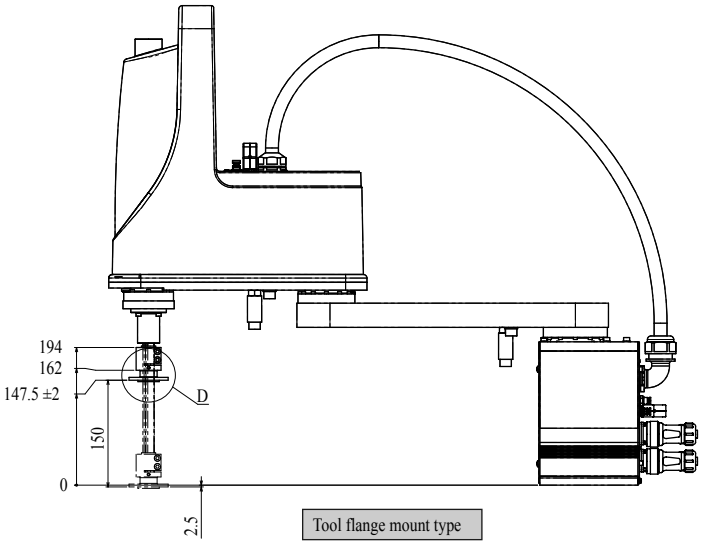
		θX(°)					
		0	-30	-60	-90	-120	-140
θY(°)	-144	200	200	200	200	200	200
	-120	200	200	200	200	200	200
	-90	200	200	200	200	200	200
	-60	200	200	200	200	200	200
	-30	200	200	200	200	200	200
	0	200	200	200	200	200	200
	30	200	200	200	200	200	200
	60	200	200	370	400	520	600
	90	200	200	380	500	550	600
	120	200	200	400	510	550	590
	144	200	200	440	510	550	580

1.2.5 R6YXGL600

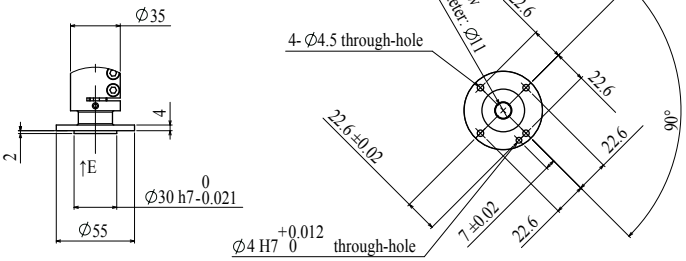


R6YXGL600

Tool flange mount type



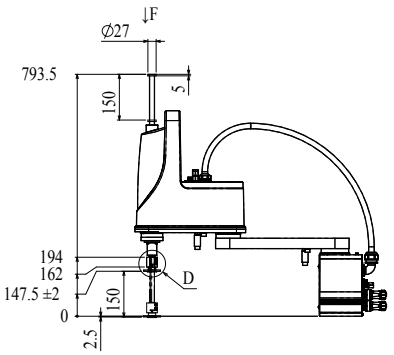
Tool flange mount type



Detailed drawing D

Scale 2 : 3

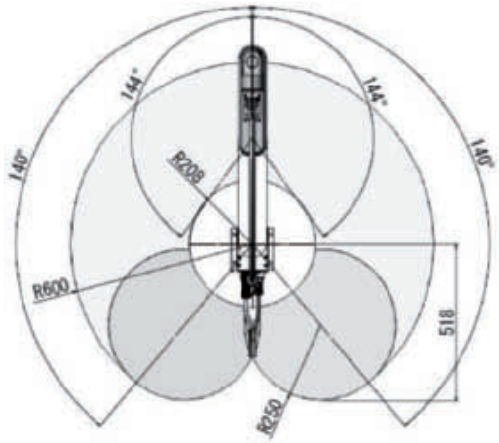
View of E



Option: User wiring/tubing through spline type

R6YXGL600

Working envelope



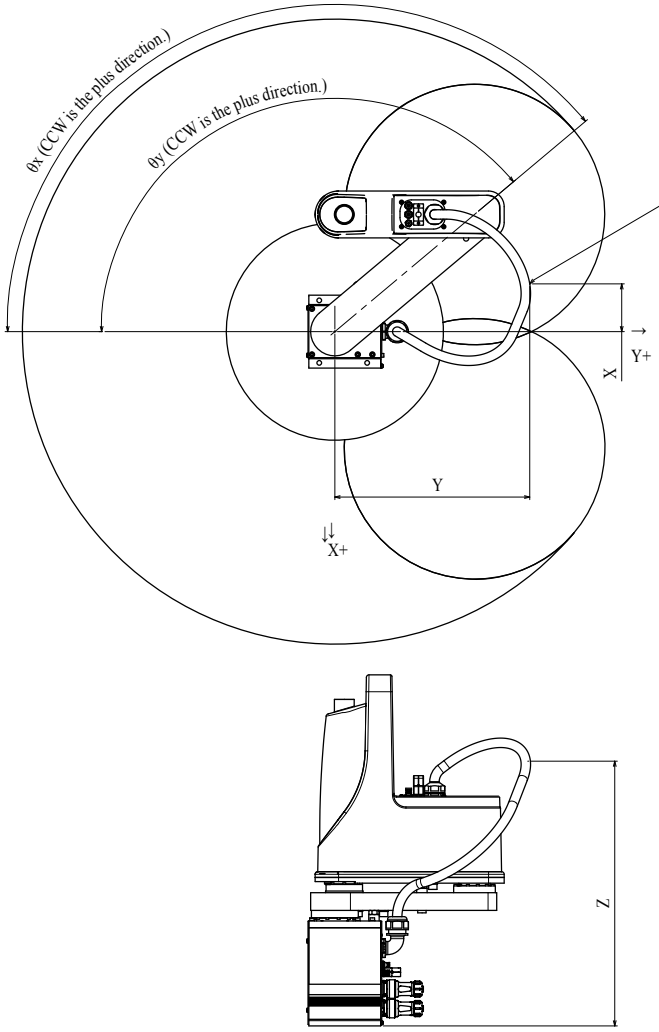
Standard/Tool flange mount type

- Note that the robot cannot be used at a position where the base flange, robot cable, spline, and tool flange interfere with each other in the working envelope shown above.
- X-axis mechanical stopper position : 142°
- Y-axis mechanical stopper position : 146°

Option	
X-axis additional stopper	The X-axis mechanical stopper position can be changed to the 119°-position. (Working envelope: 117°)
Y-axis additional stopper	The Y-axis mechanical stopper position can be changed to the 127°-position. (Working envelope: 125°)
Z-axis upper end additional stopper	The Z-axis origin position can be lowered 12mm, 15mm, 18mm, etc. (at intervals of 3mm).
Z-axis lower end additional stopper	The lower end stopper position can be raised 17mm or more (within 4 mm of the working envelope from the additional stopper). (This stopper cannot be used in the user wiring/tubing through spline type.)
Other option	
Reference coordinate setting jig	

R6YXGL600

Projection of the machine harness toward the base rear side



Harness projection amount Y to the base rear side and positions X and Z with respect to the arm positions θx and θy

- The positions shown below are reference data. So, if there is an interference object on the base rear side, be sure to keep a sufficient space.
- The harness projection amount Y and position Z at the symmetrical position of the arm to the Y-axis plus axis are the same values as those stated in the tables below. The X value at the symmetrical position of the arm to the Y-axis plus axis is the value stated in the table below, the sign of which is inverted.

X(mm)

		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	-144	0	0	0	0	0	0
	-120	0	0	0	0	0	0
	-90	0	0	0	0	0	0
	-60	0	0	0	0	0	0
	-30	0	0	0	0	0	0
	0	0	0	0	0	0	0
	30	0	0	0	0	0	0
	60	0	0	0	0	-120	-70
	90	0	0	-30	-100	-130	-100
	120	0	0	-50	-130	-130	-150
	144	0	0	-70	-100	-150	-150

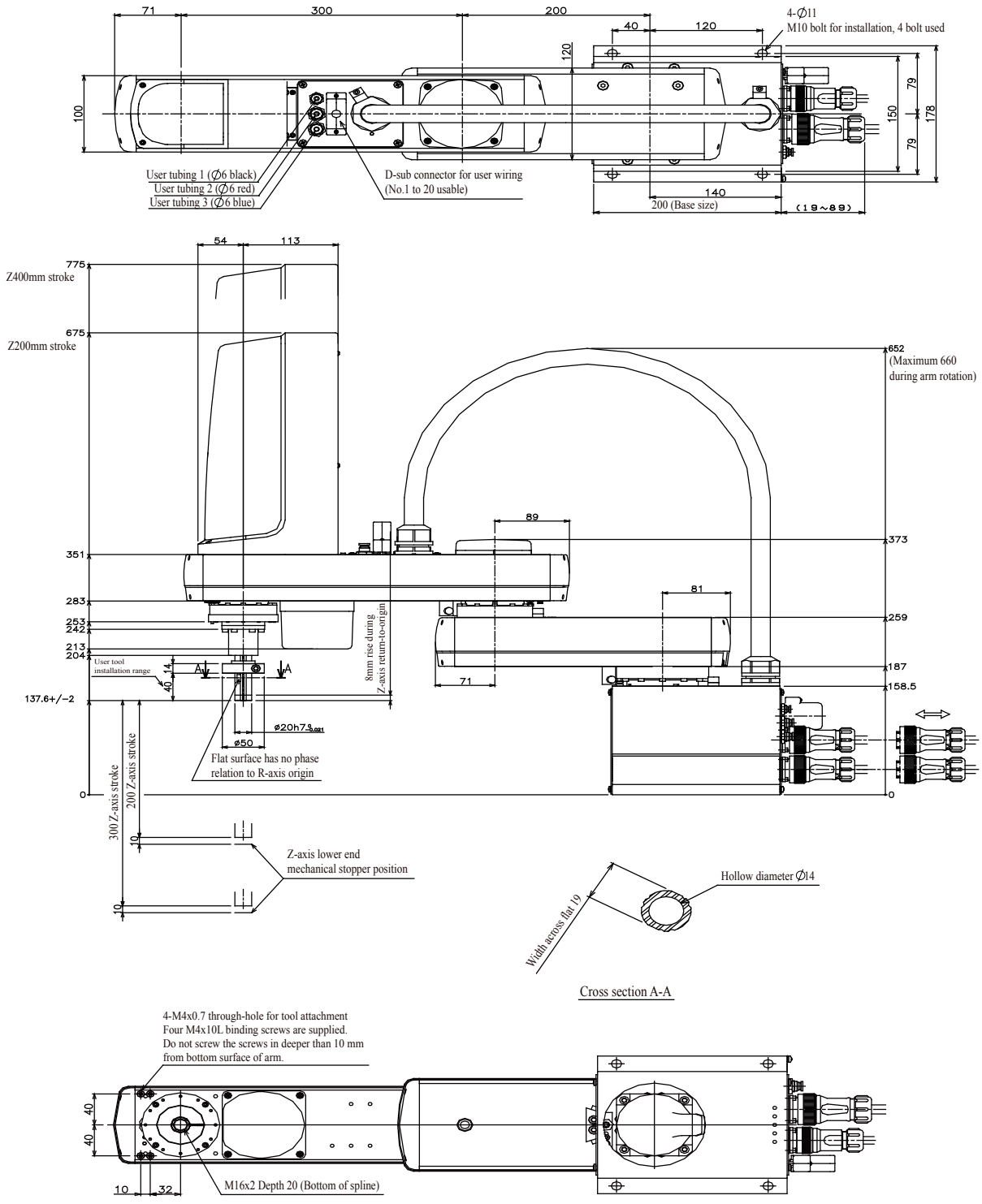
Y(mm)

		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	-144	130	130	130	130	130	130
	-120	130	130	130	130	130	130
	-90	130	130	130	130	130	130
	-60	130	130	130	130	130	130
	-30	130	130	130	130	130	130
	0	130	130	130	130	130	130
	30	130	130	130	130	130	130
	60	130	130	130	130	205	255
	90	130	130	130	175	275	285
	120	130	130	135	195	305	315
	144	130	130	145	215	335	355

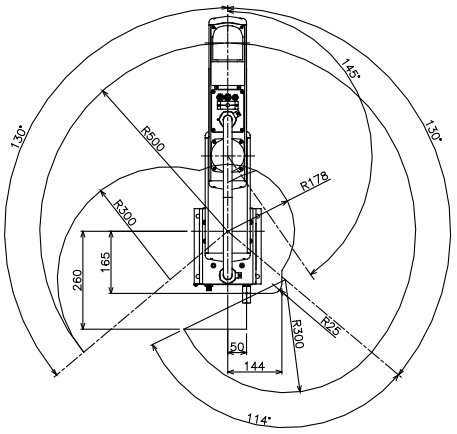
Z(mm)

		θx(°)					
		0	-30	-60	-90	-120	-140
θy(°)	-144	200	200	200	200	200	200
	-120	200	200	200	200	200	200
	-90	200	200	200	200	200	200
	-60	200	200	200	200	200	200
	-30	200	200	200	200	200	200
	0	200	200	200	200	270	270
	30	200	200	270	270	270	270
	60	200	200	270	390	620	650
	90	200	200	370	530	610	650
	120	200	200	420	560	600	630
	144	200	200	450	540	580	620

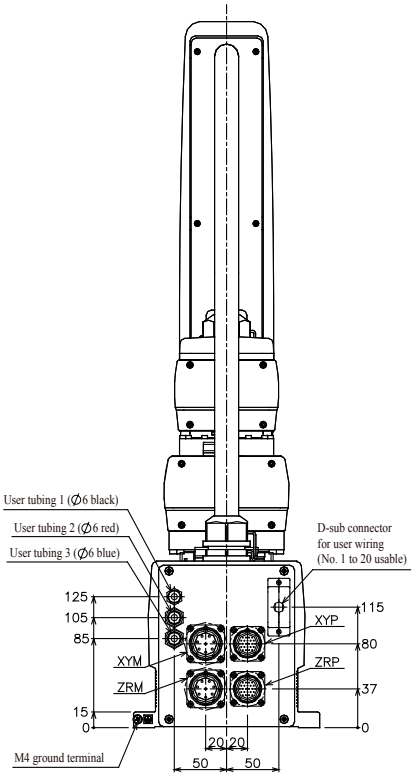
1.2.6 R6YXG500

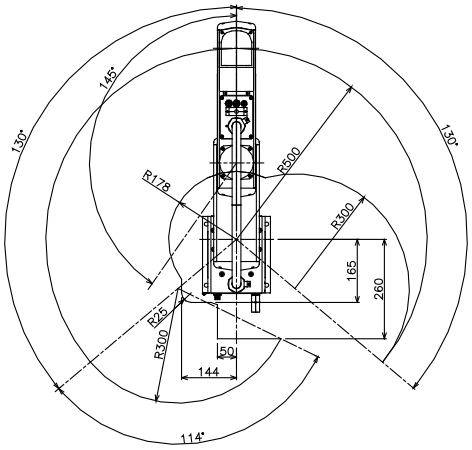


R6YXG500



Working envelope of left-handed system

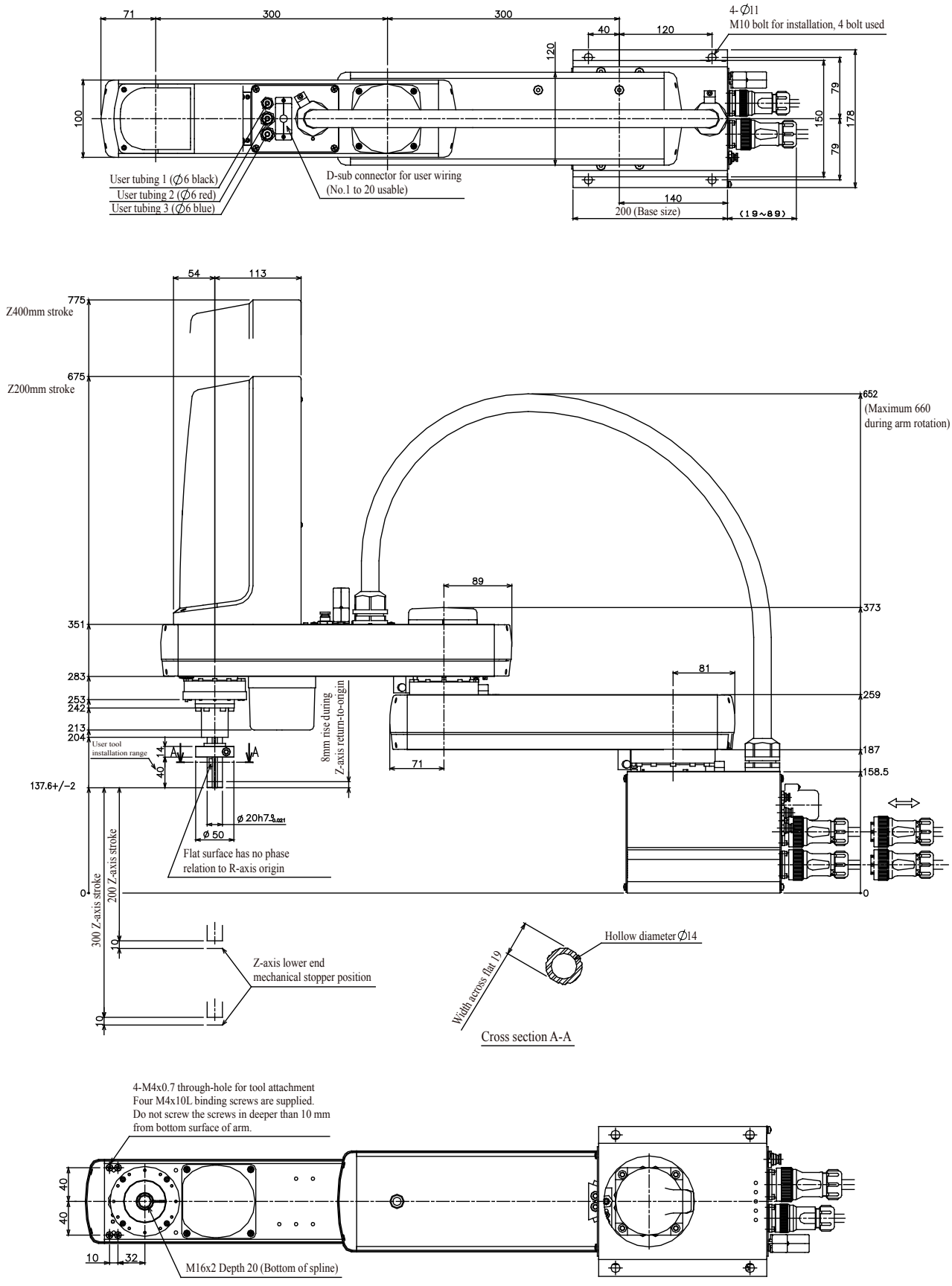




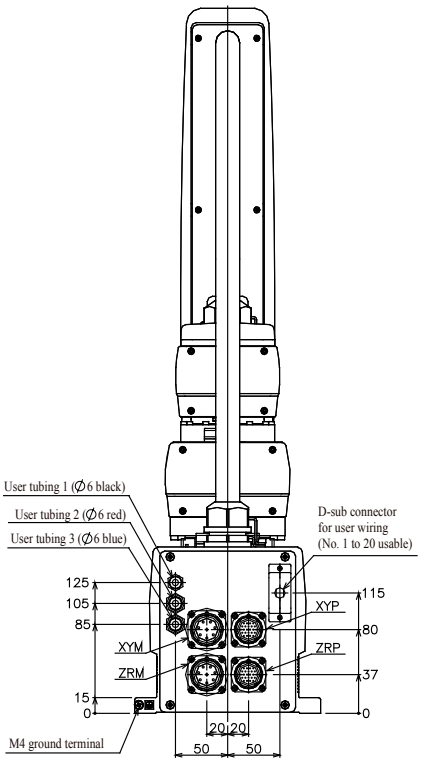
Working envelope of right-handed system

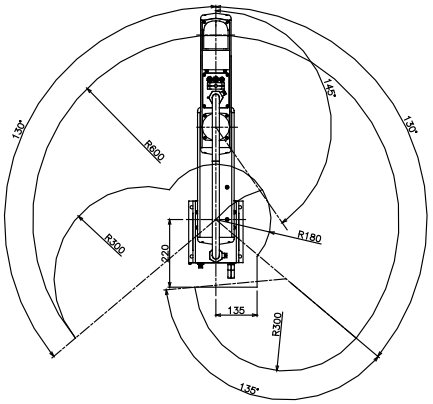
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 147°

1.2.7 R6YXG600

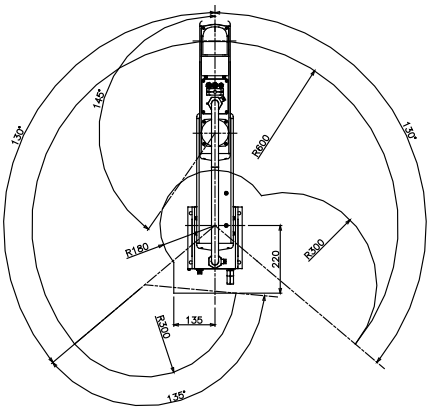


R6YXG600





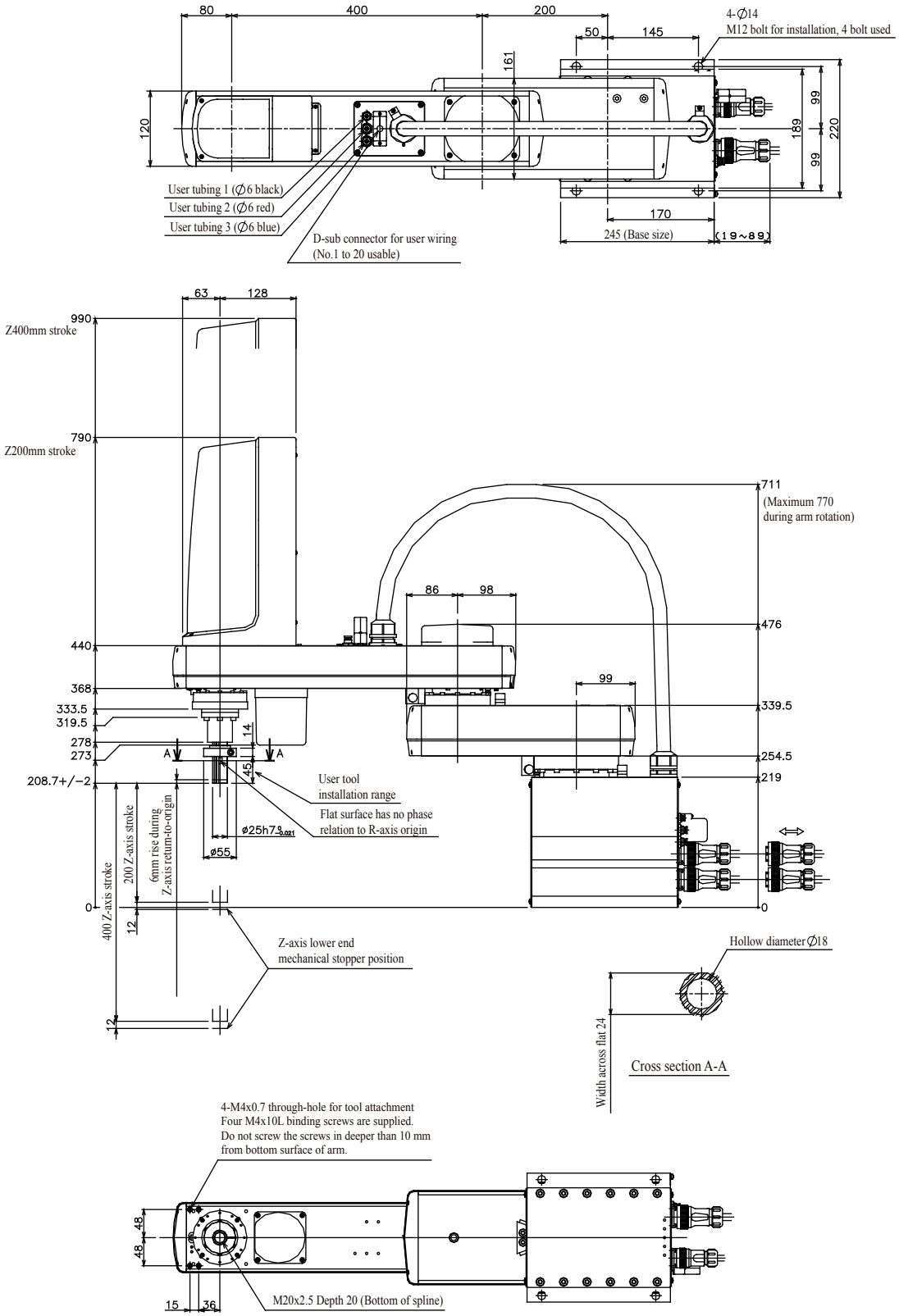
Working envelope of left-handed system



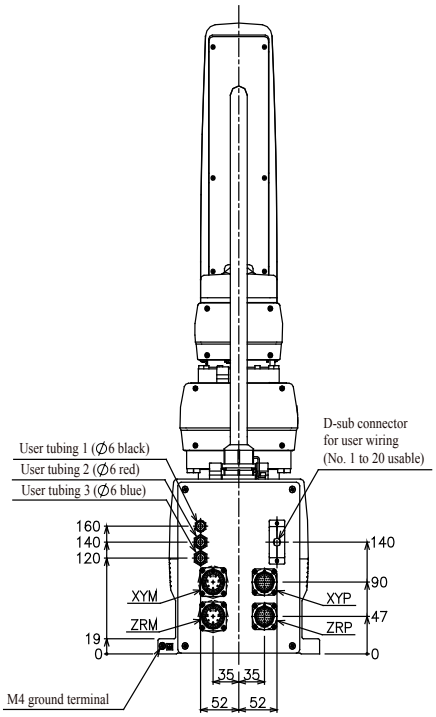
Working envelope of right-handed system

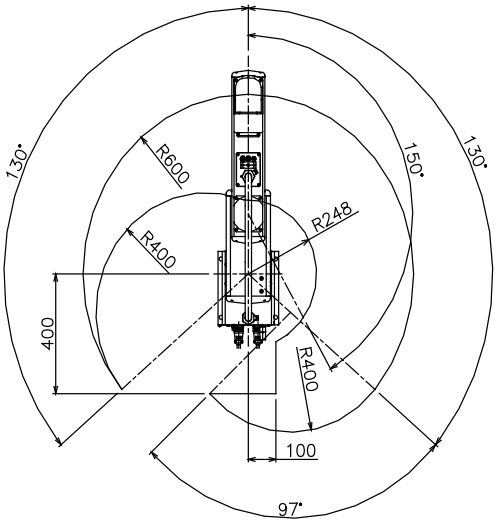
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 147°

1.2.8 R6YXGH600

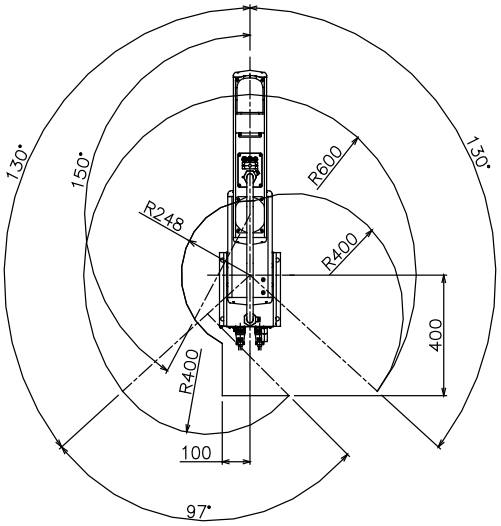


R6YXGH600

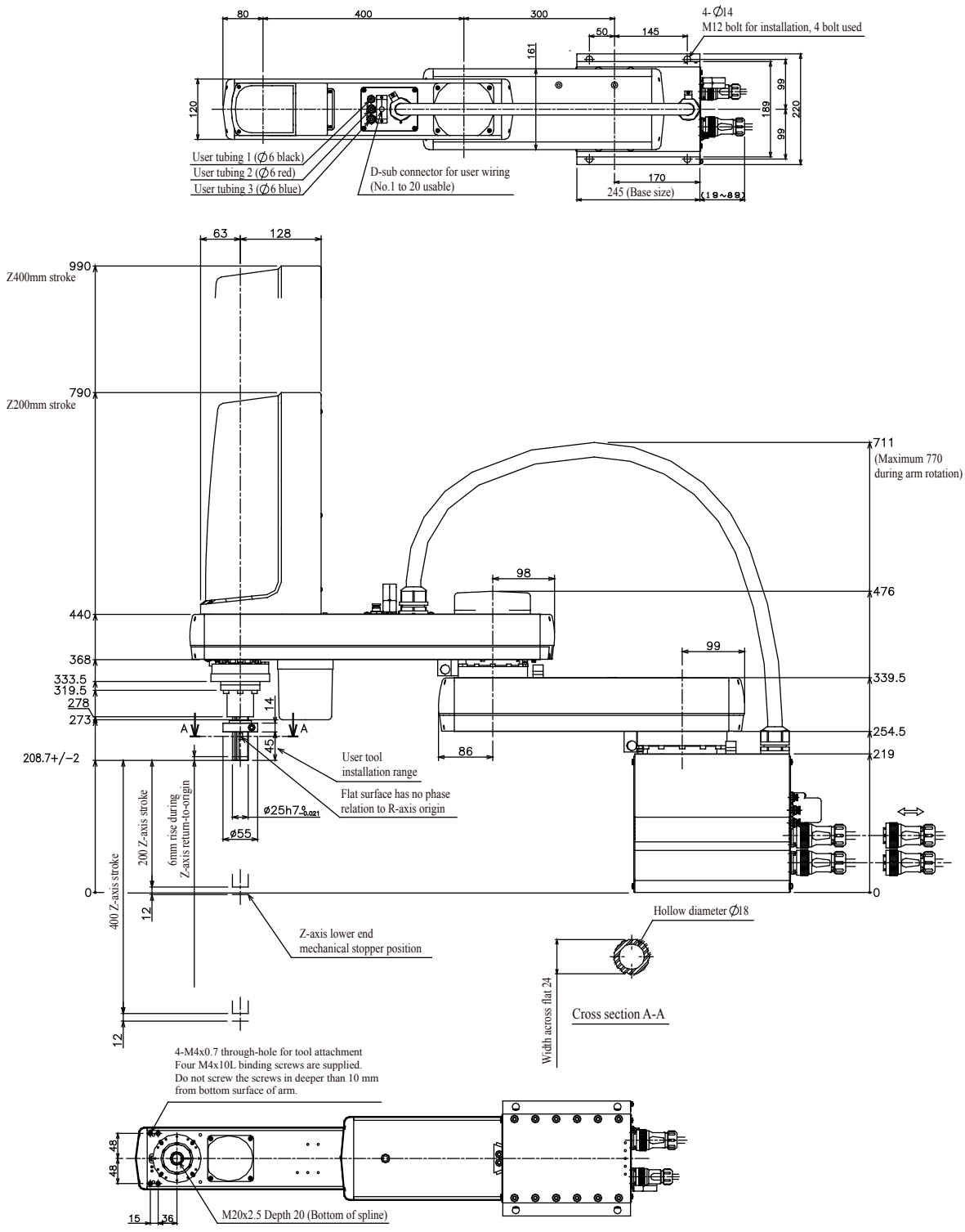




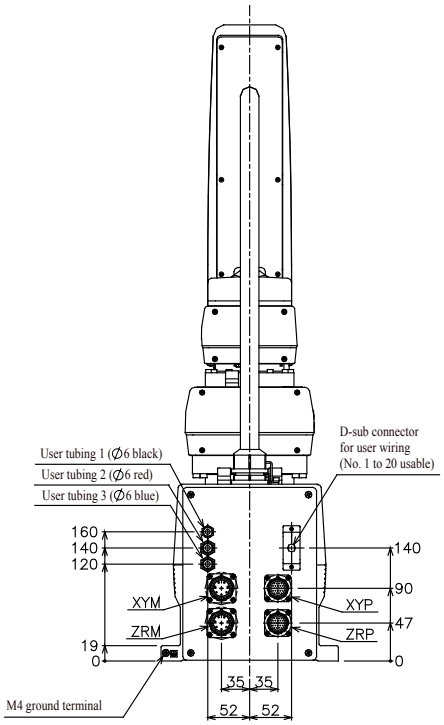
Working envelope of left-handed system

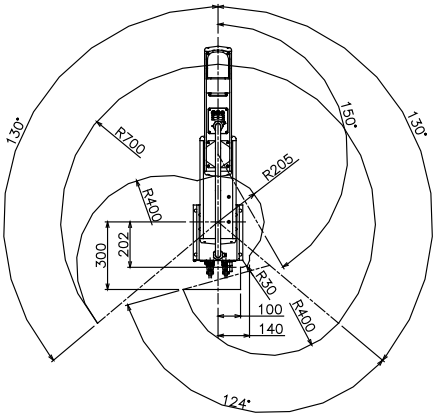


1.2.9 R6YXG700

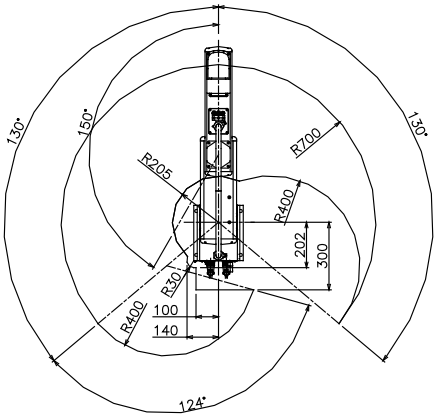


R6YXG700





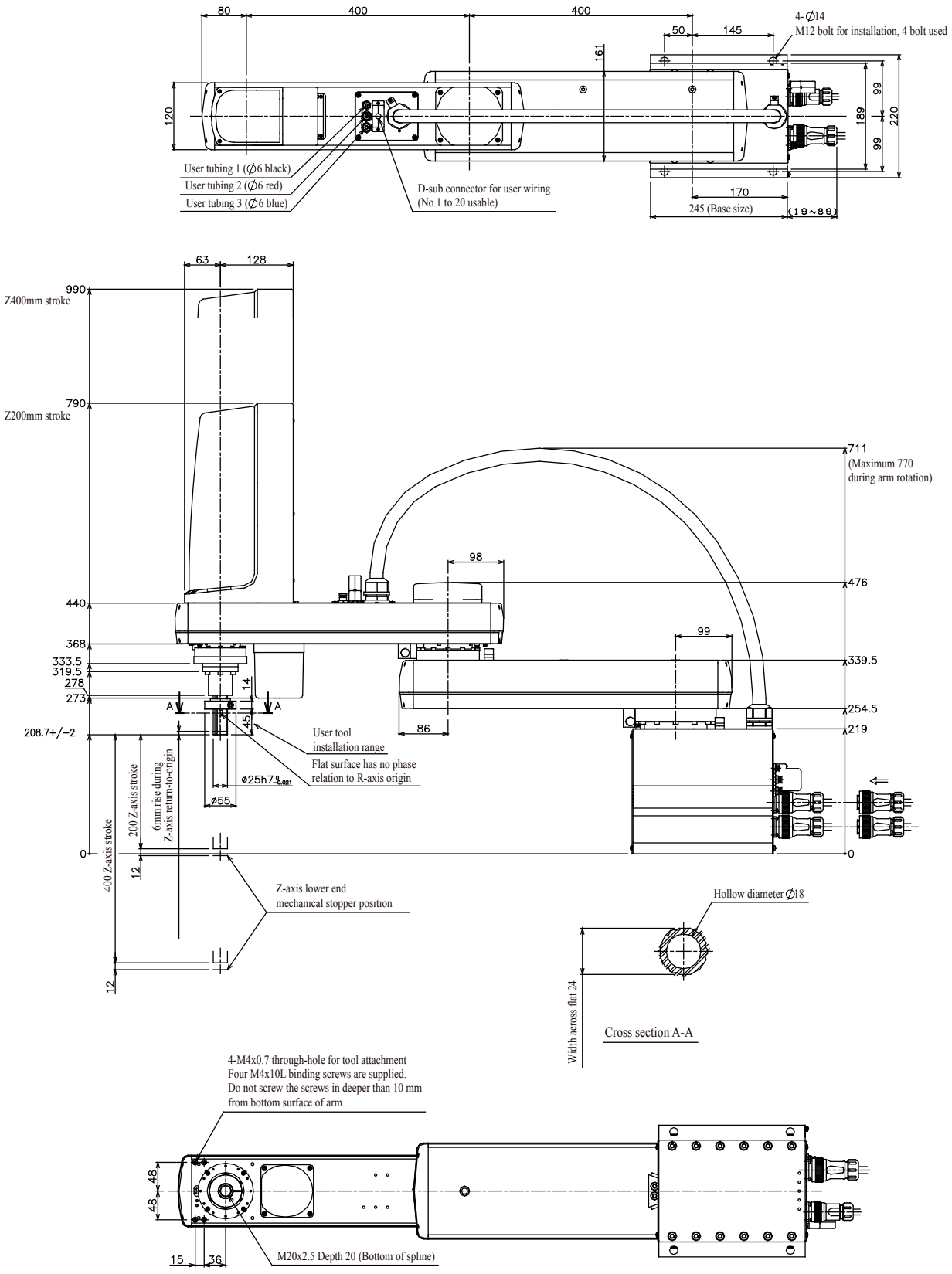
Working envelope of left-handed system



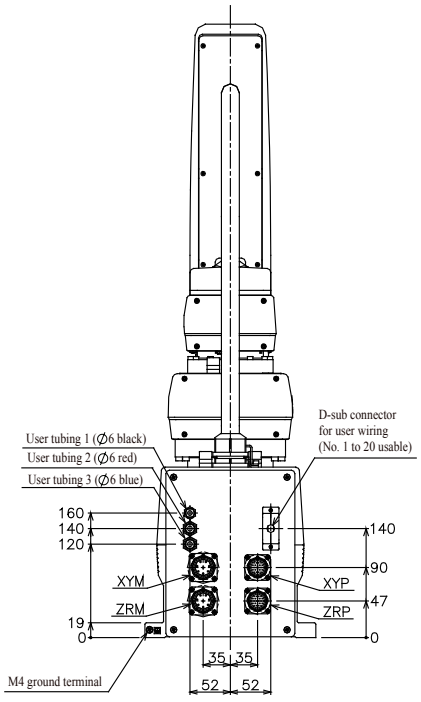
Working envelope of right-handed system

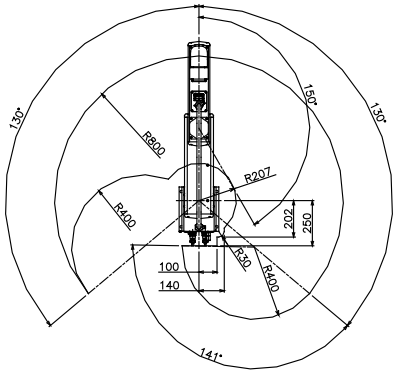
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

1.2.10 R6YXG800

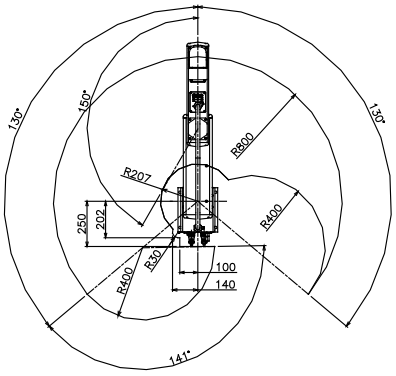


R6YXG800





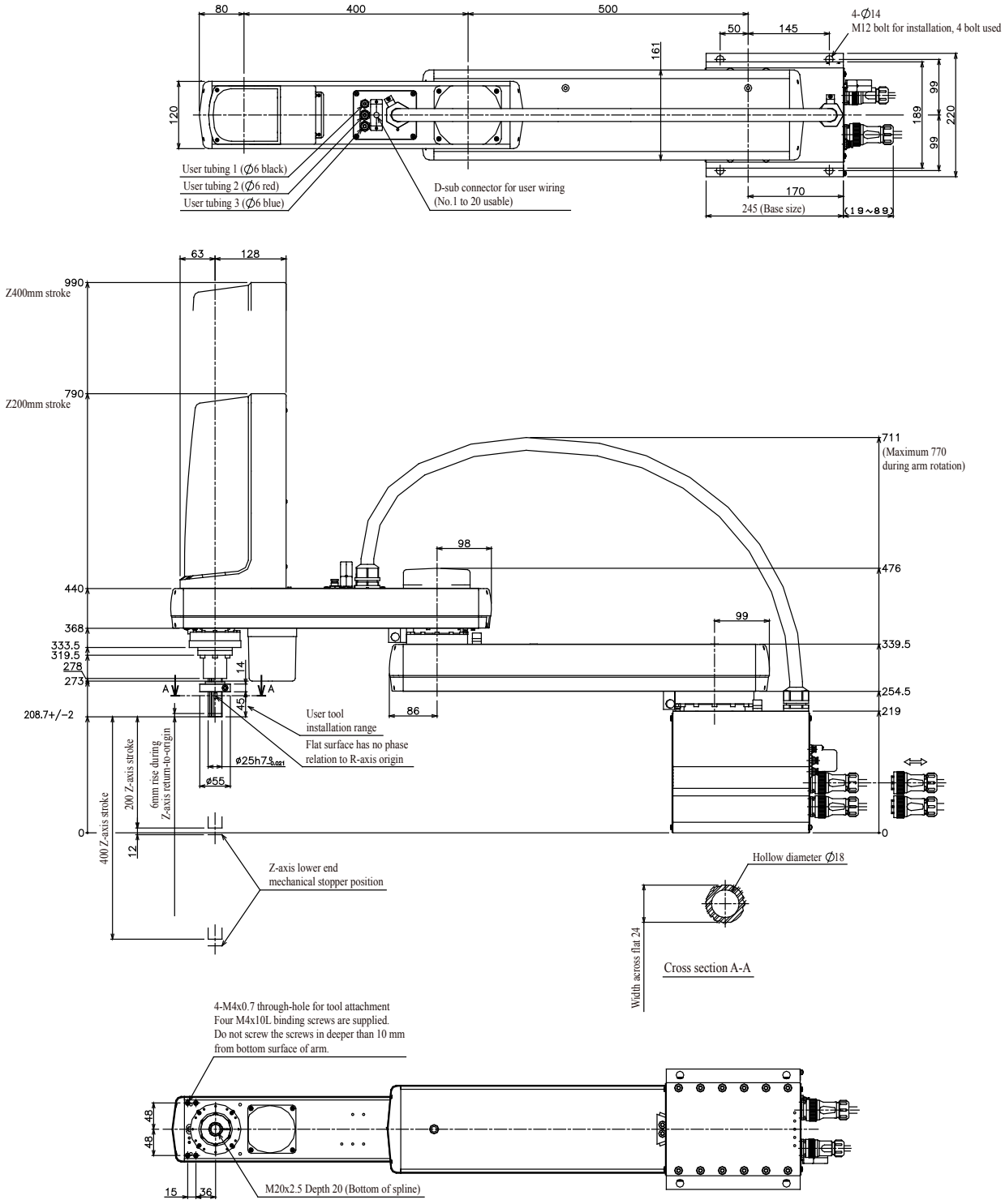
Working envelope of left-handed system



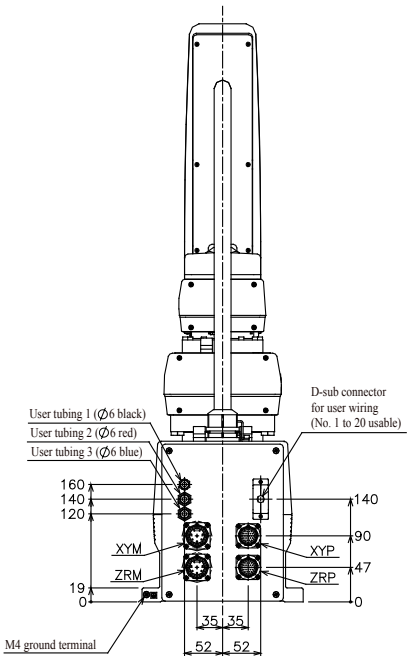
Working envelope of right-handed system

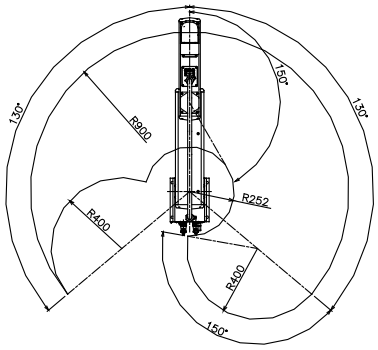
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

1.2.11 R6YXG900

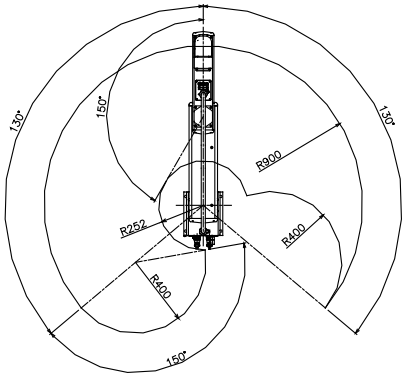


R6YXG900





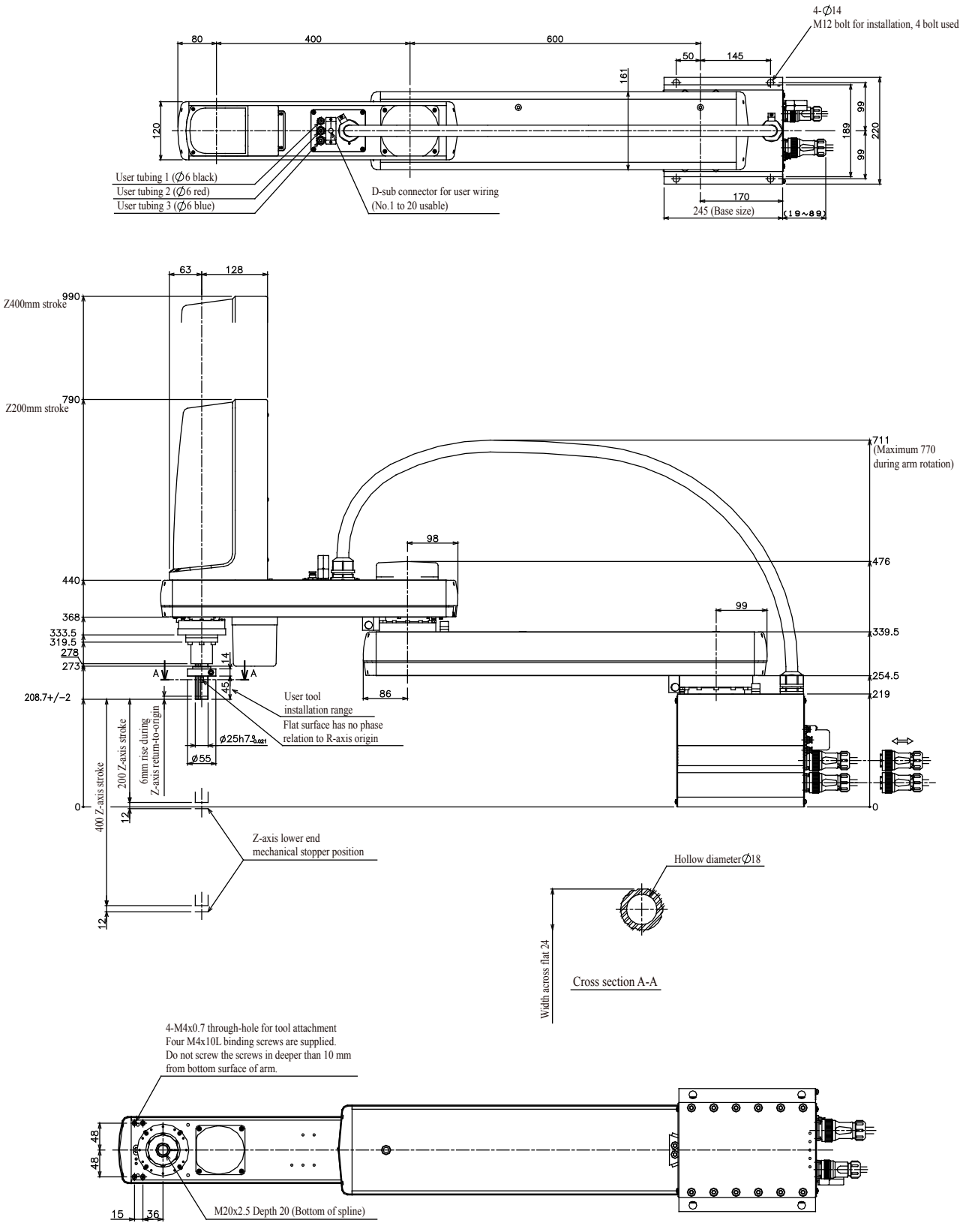
Working envelope of left-handed system



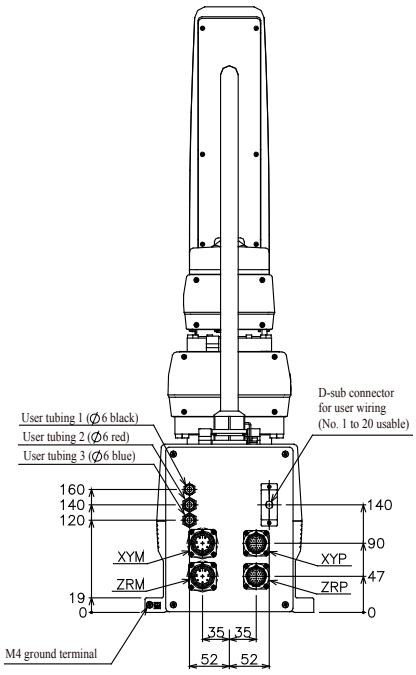
Working envelope of right-handed system

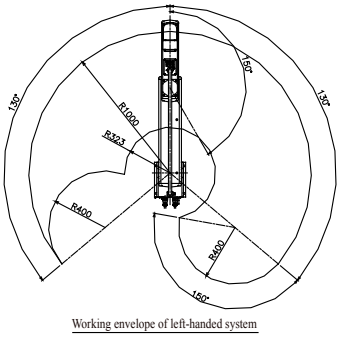
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

1.2.12 R6YXG1000

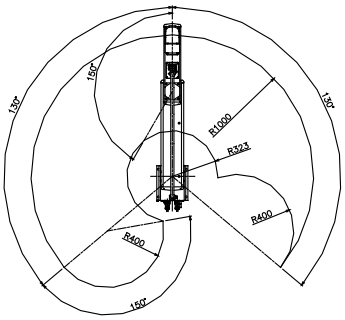


R6YXG1000





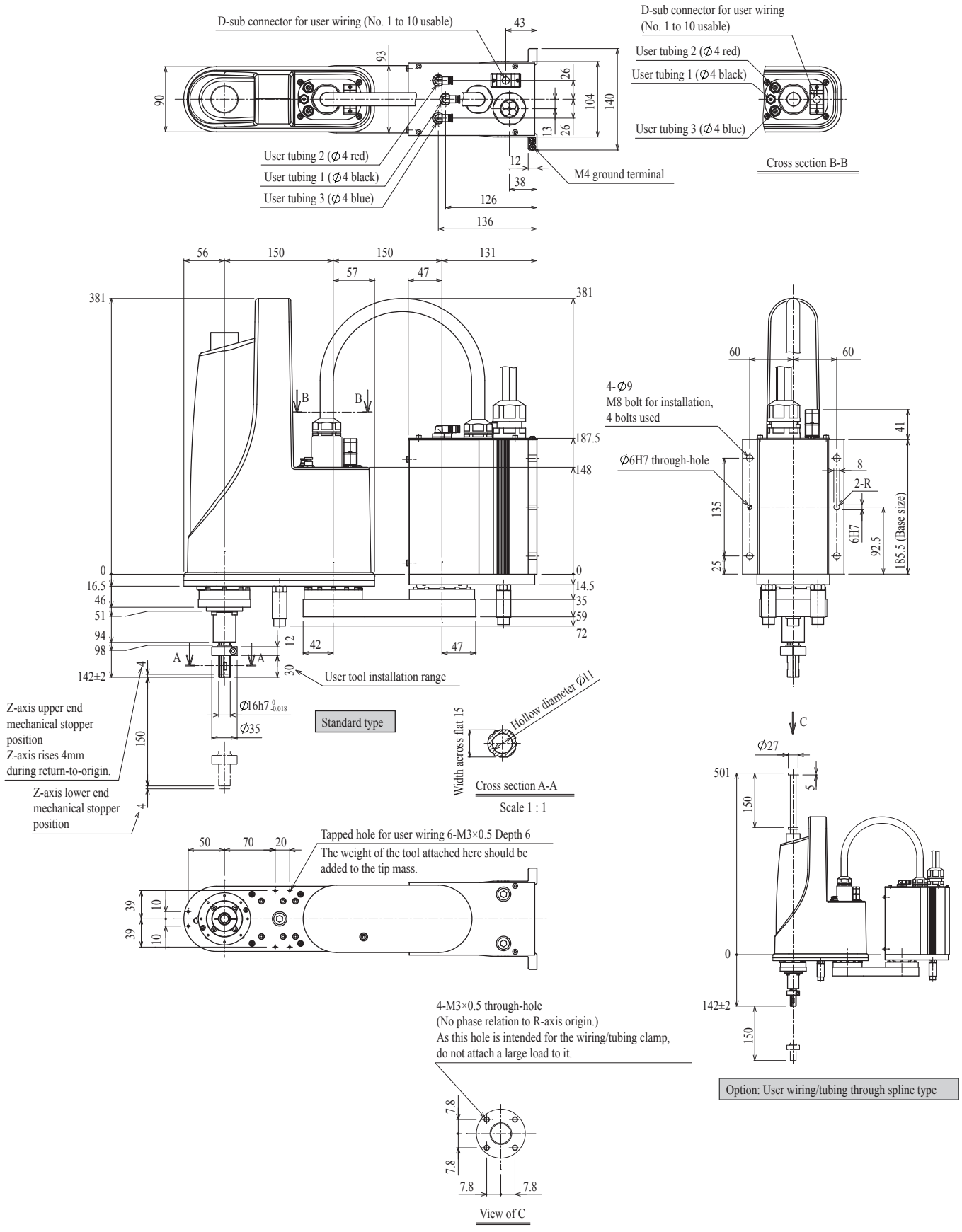
Working envelope of left-handed system



Working envelope of right-handed system

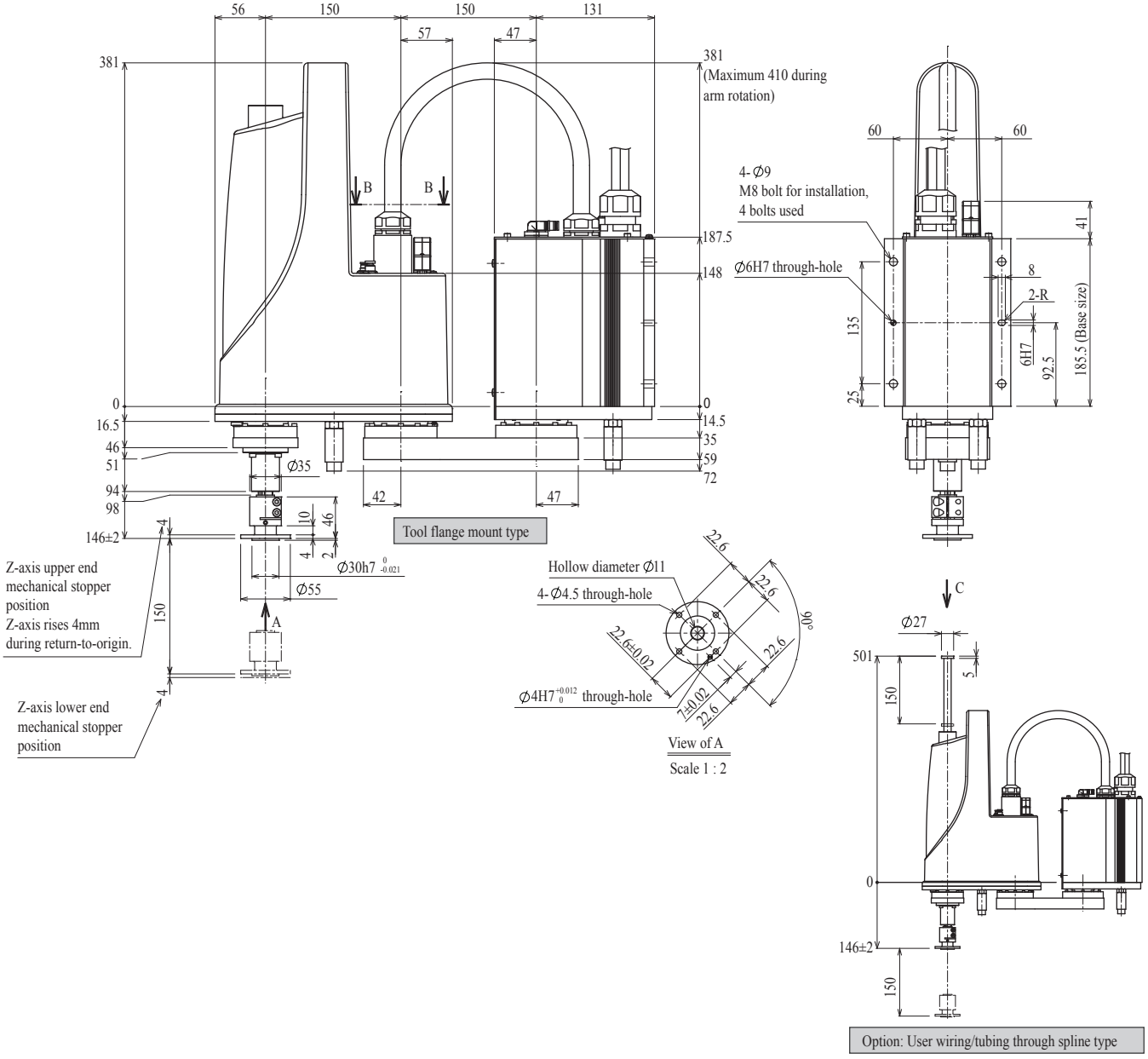
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

1.2.13 R6YXGSW300 (Wall-mount model)



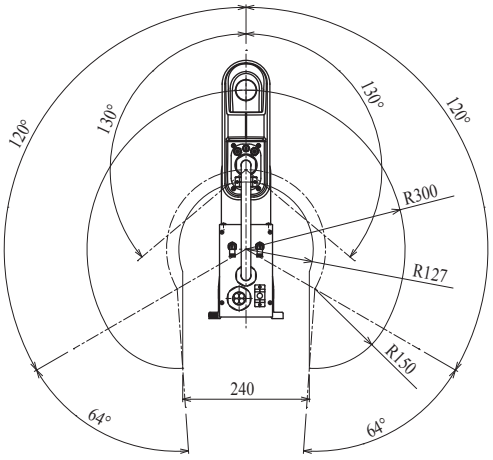
R6YXGSW300

Tool flange mount type



R6YXGSW300

Working envelope

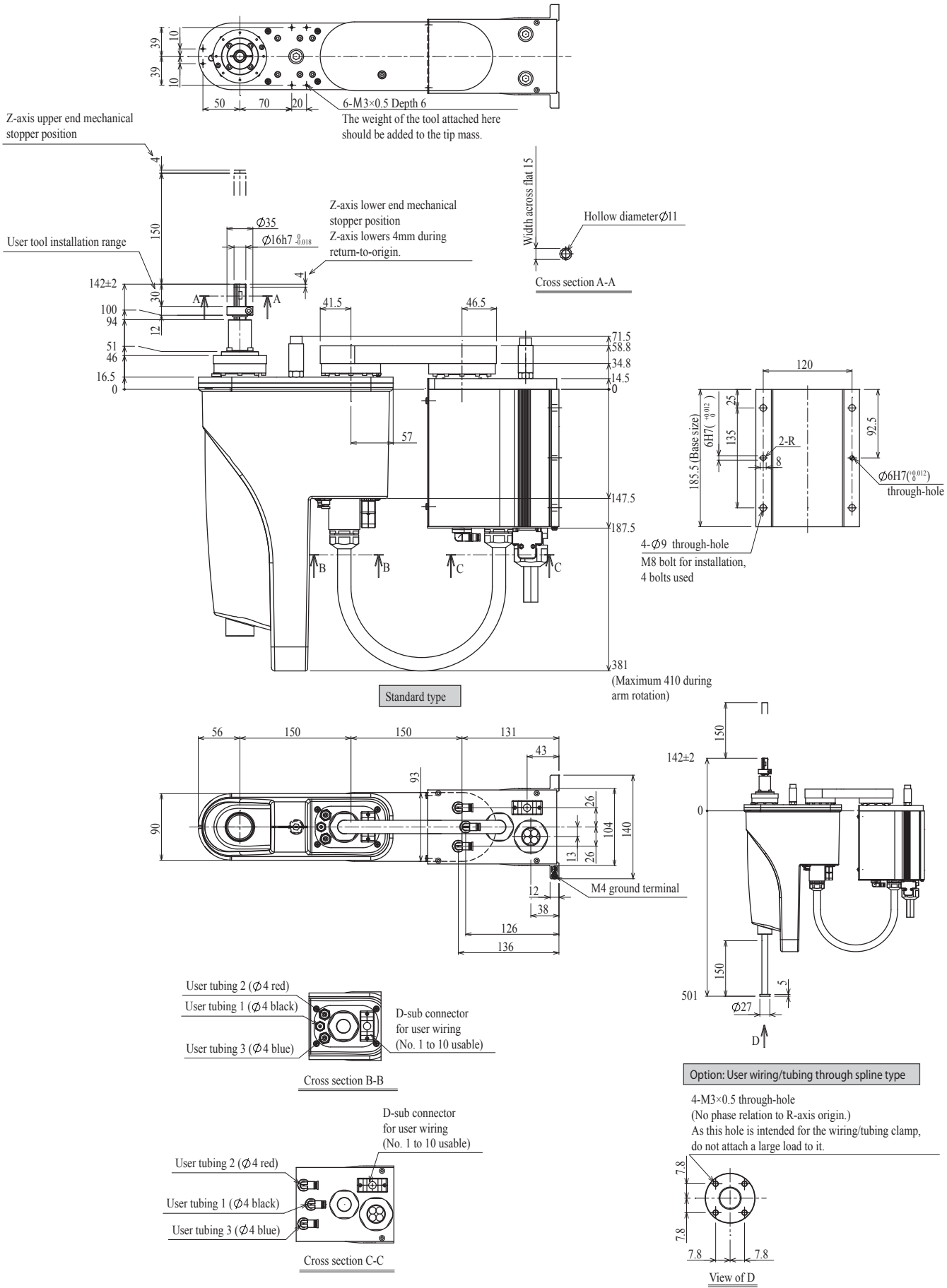


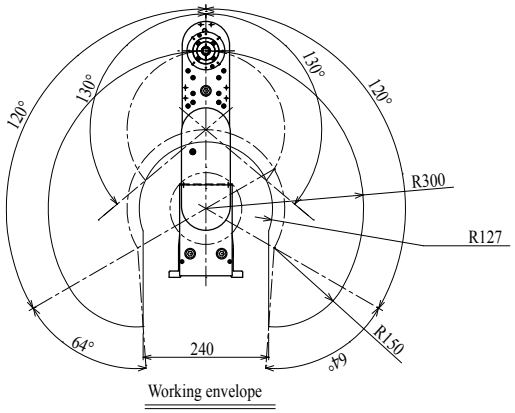
Standard/Tool flange mount type

X-axis mechanical stopper position : 122°
Y-axis mechanical stopper position : 132°

Option	
Z-axis upper end additional stopper	The Z-axis origin position can be lowered 12mm, 15mm, 18mm, etc. (at intervals of 3mm).
Z-axis lower end additional stopper	The lower end stopper position can be raised 17mm or more (within 4mm of the working envelope from the additional stopper). (This stopper cannot be used in the user wiring/tubing through spline type.)

1.2.14 R6YXGSU300 (Wall-mount inverse model)



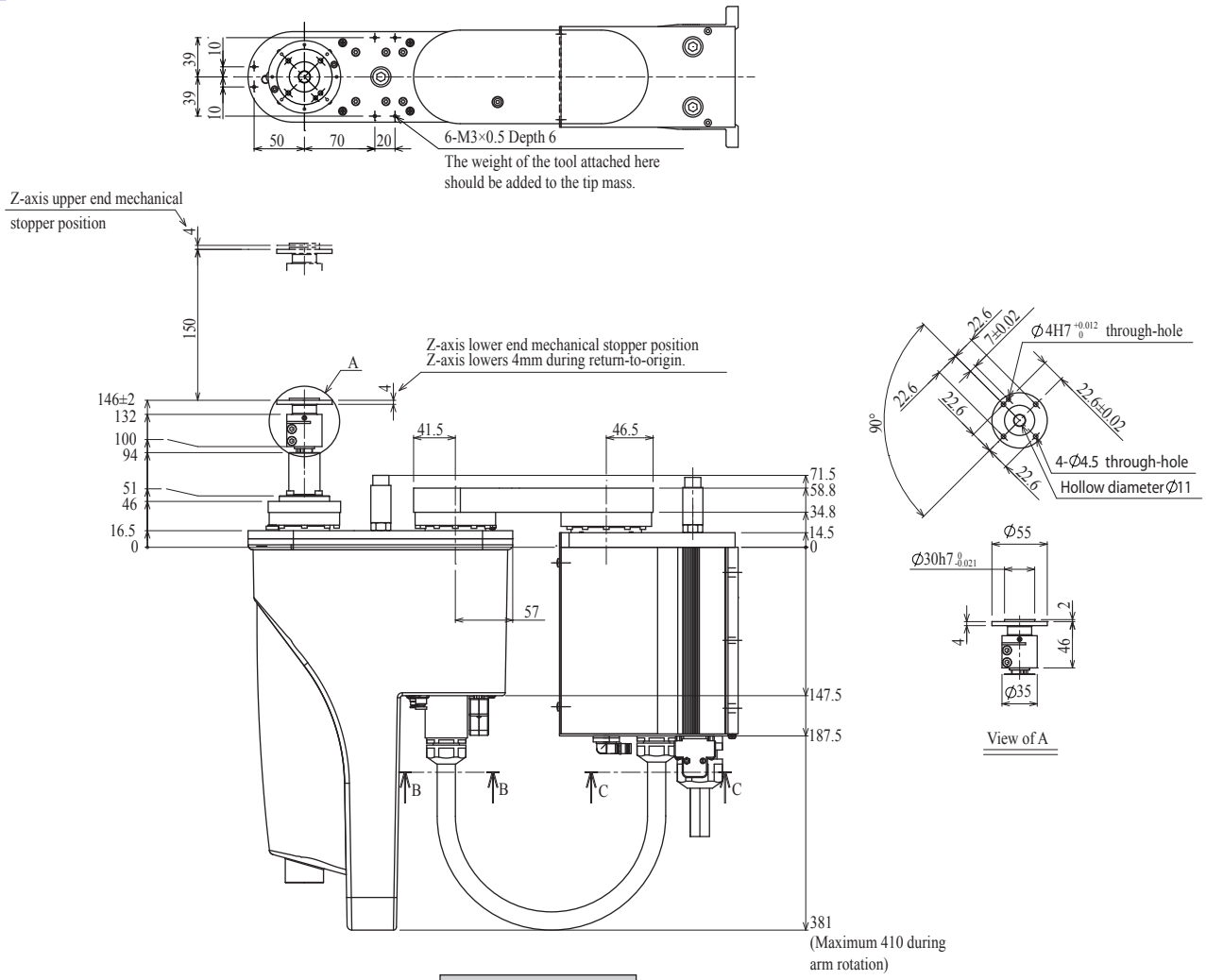


Working envelope

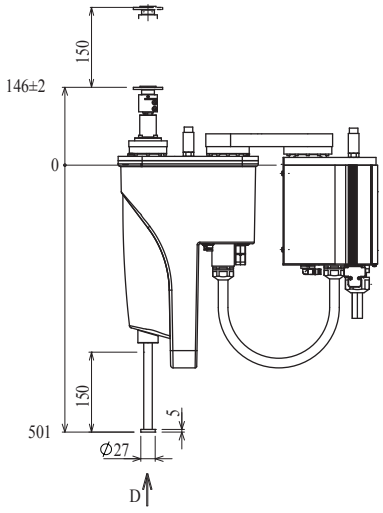
X-axis mechanical stopper position : 122°
Y-axis mechanical stopper position : 132°

R6YXGSU300

Tool flange mount type

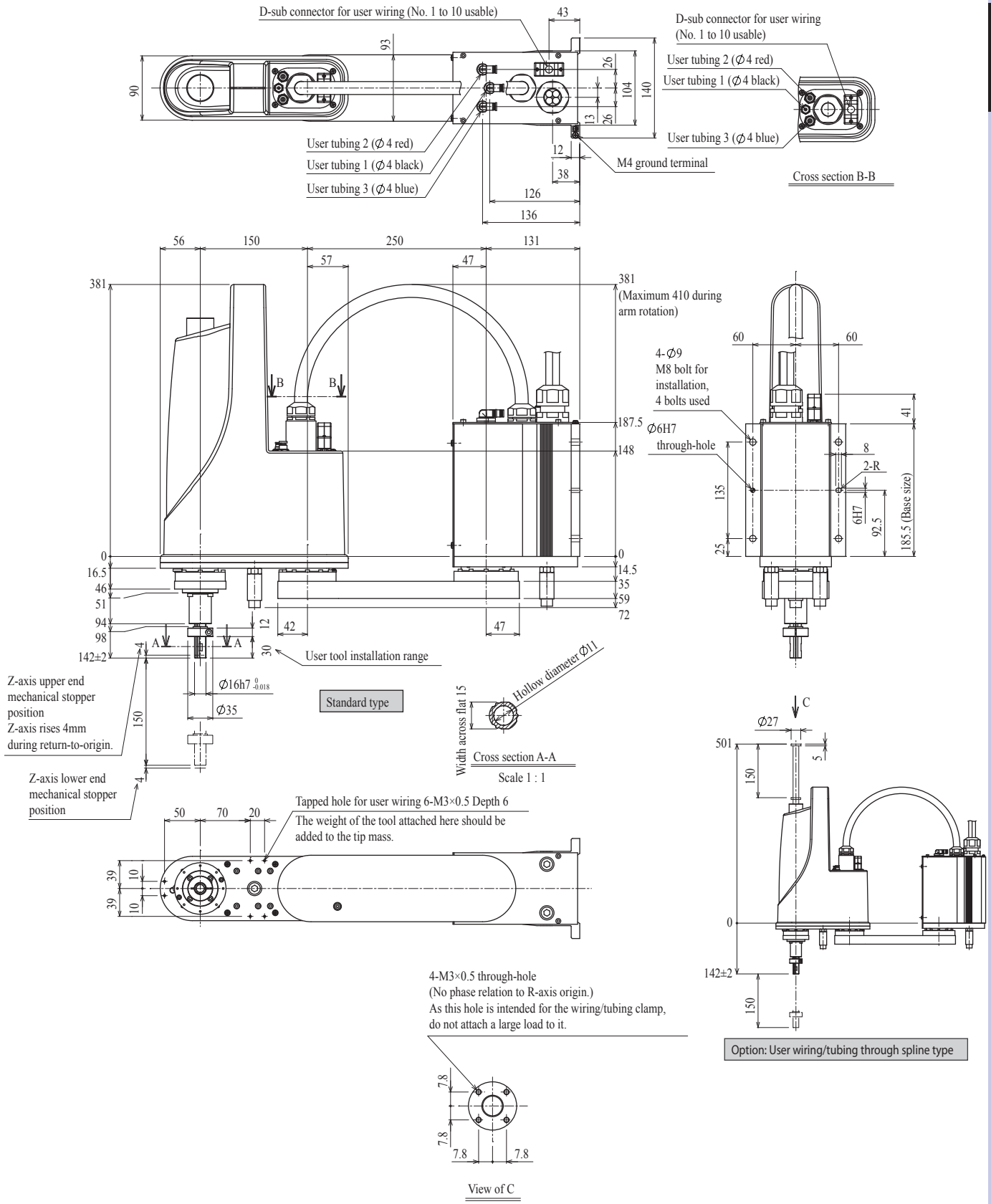


Tool flange mount type



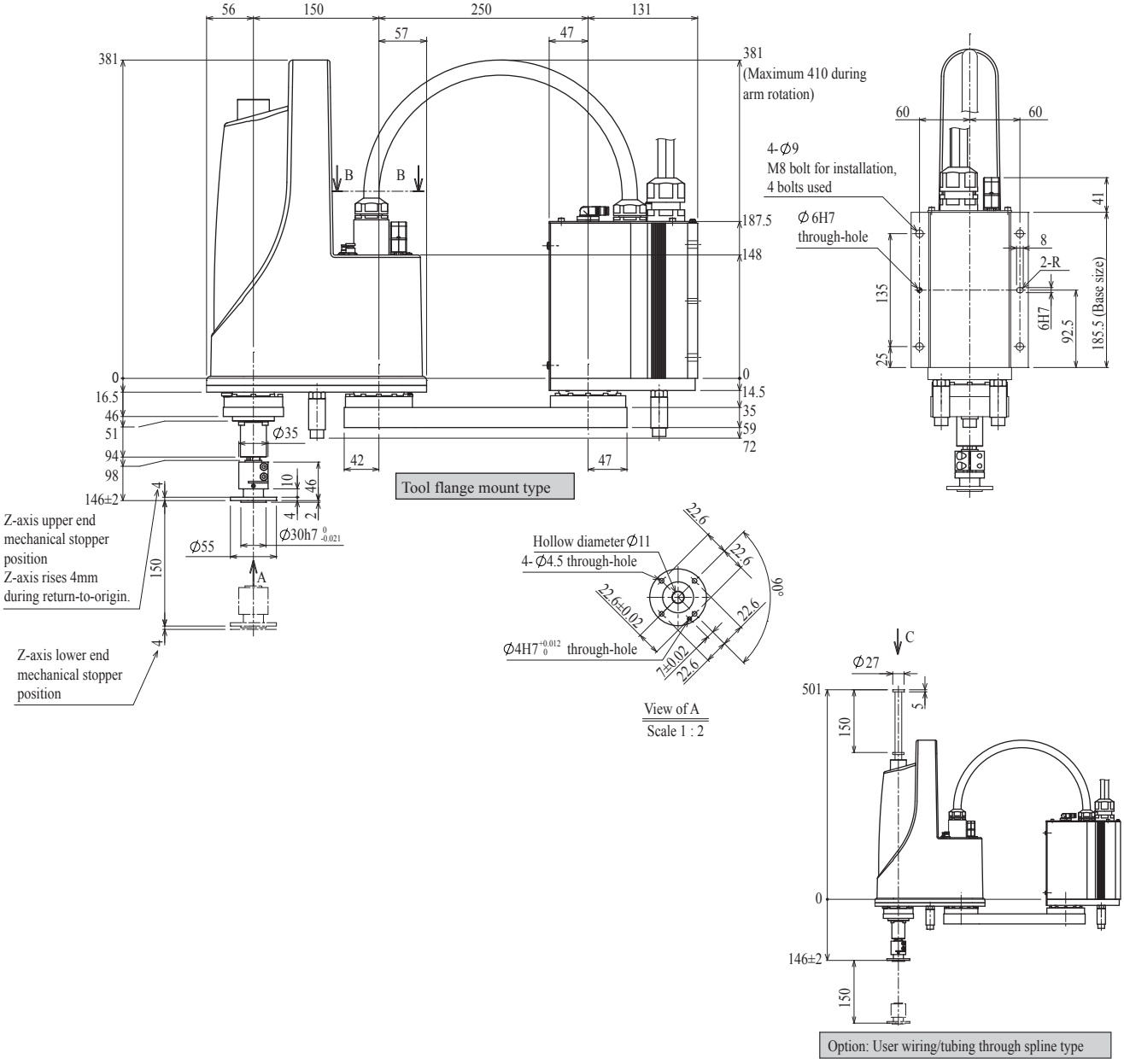
Option: User wiring/tubing through spline type

1.2.15 R6YXGSW400 (Wall-mount model)



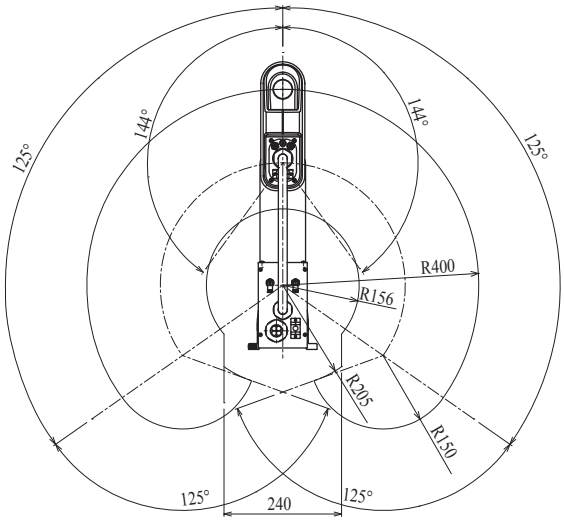
R6YXGSW400

Tool flange mount type



R6YXGSW400

Working envelope

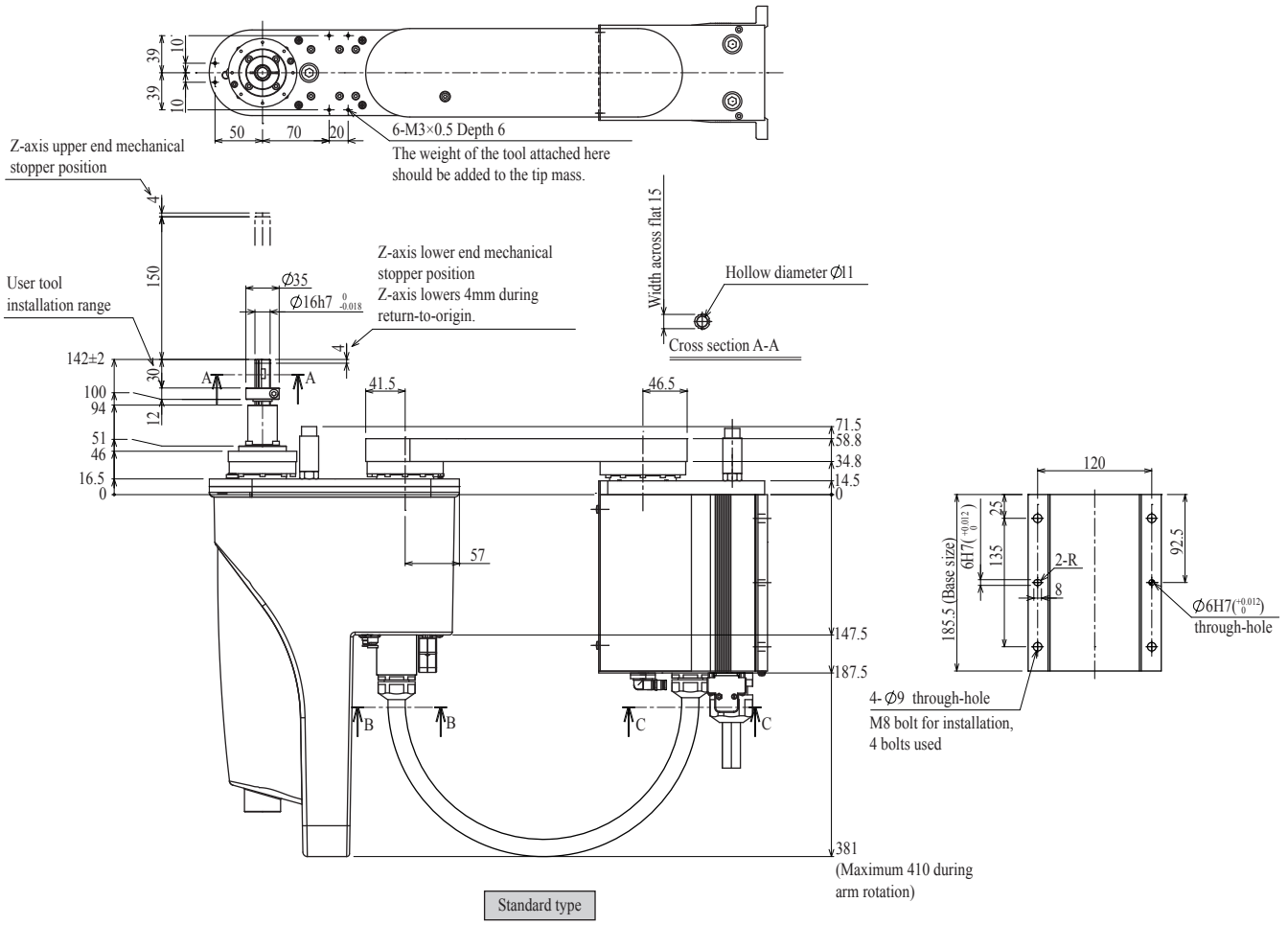


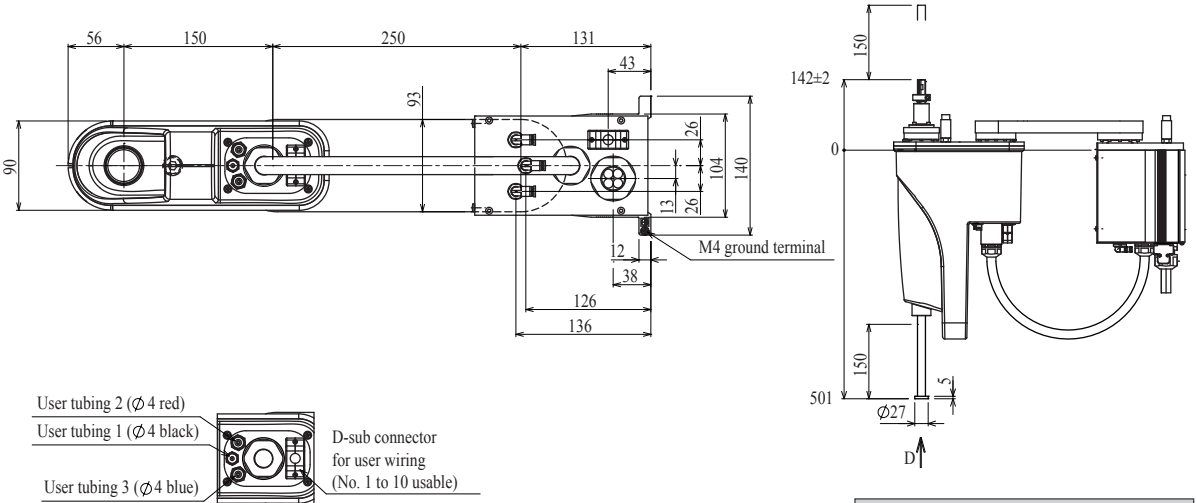
Standard/Tool flange mount type

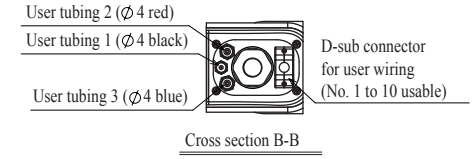
X-axis mechanical stopper position : 127°
Y-axis mechanical stopper position : 146°

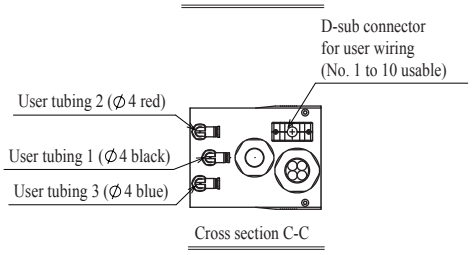
Option	
Z-axis upper end additional stopper	The Z-axis origin position can be lowered 12mm, 15mm, 18mm, etc. (at intervals of 3mm).
Z-axis lower end additional stopper	The lower end stopper position can be raised 17mm or more (within 4mm of the working envelope from the additional stopper). (This stopper cannot be used in the user wiring/tubing through spline type.)

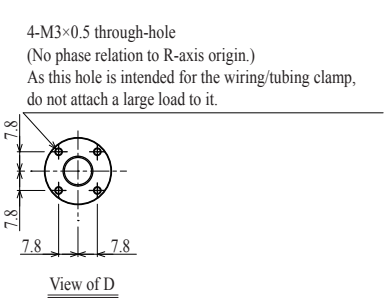
1.2.16 R6YXGSU400 (Wall-mount inverse model)

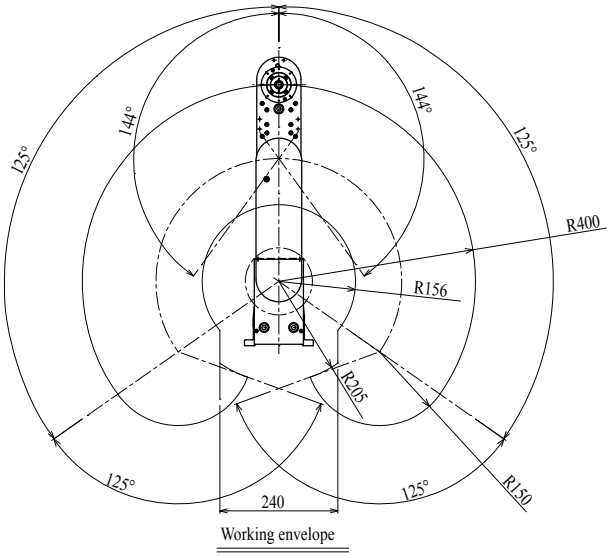










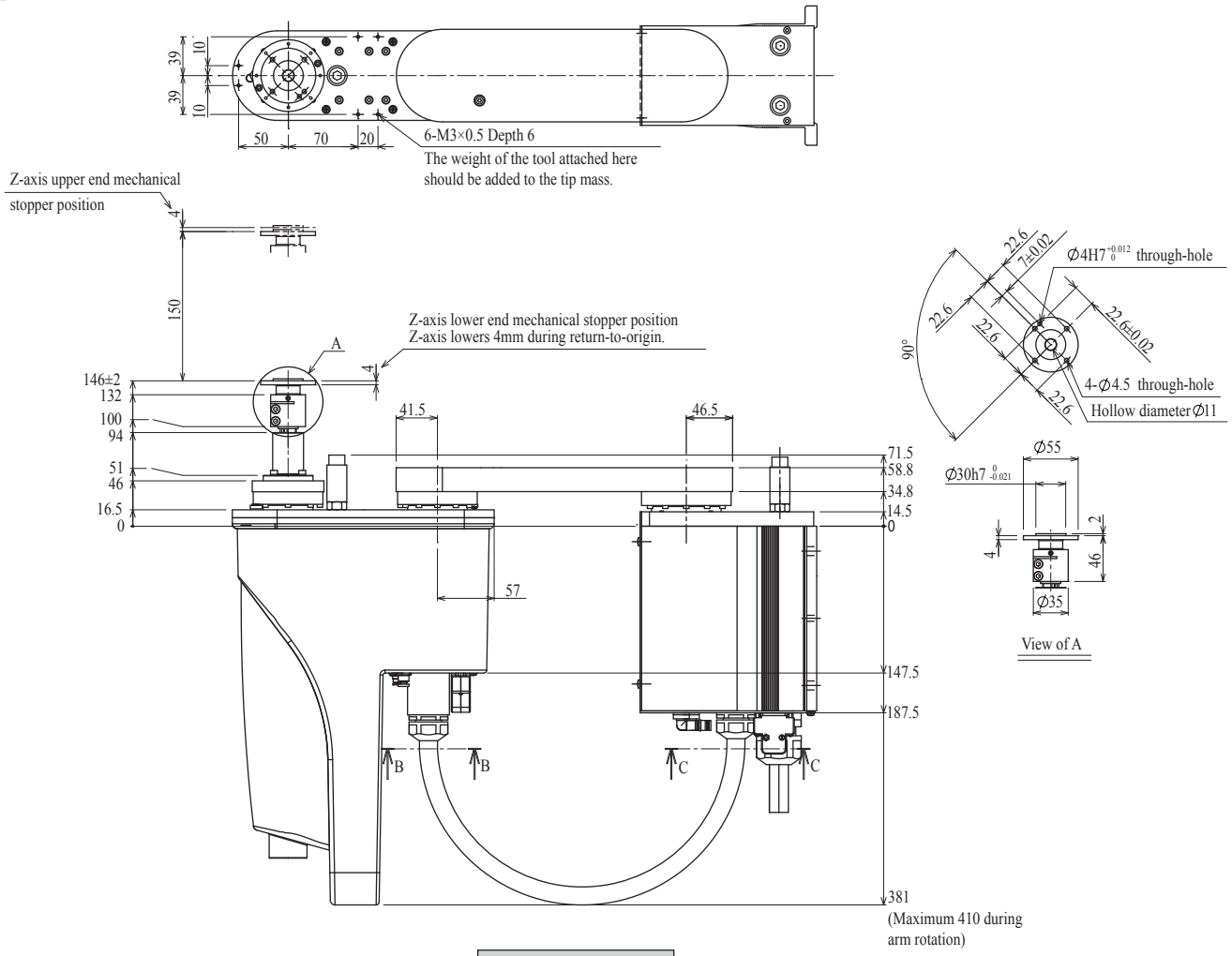


Working envelope

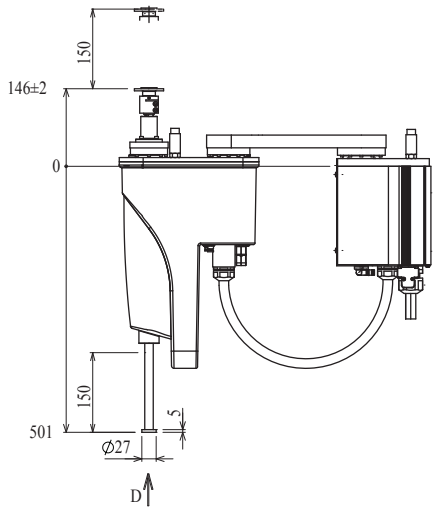
X-axis mechanical stopper position : 127°
Y-axis mechanical stopper position : 146°

R6YXGSU400

Tool flange mount type

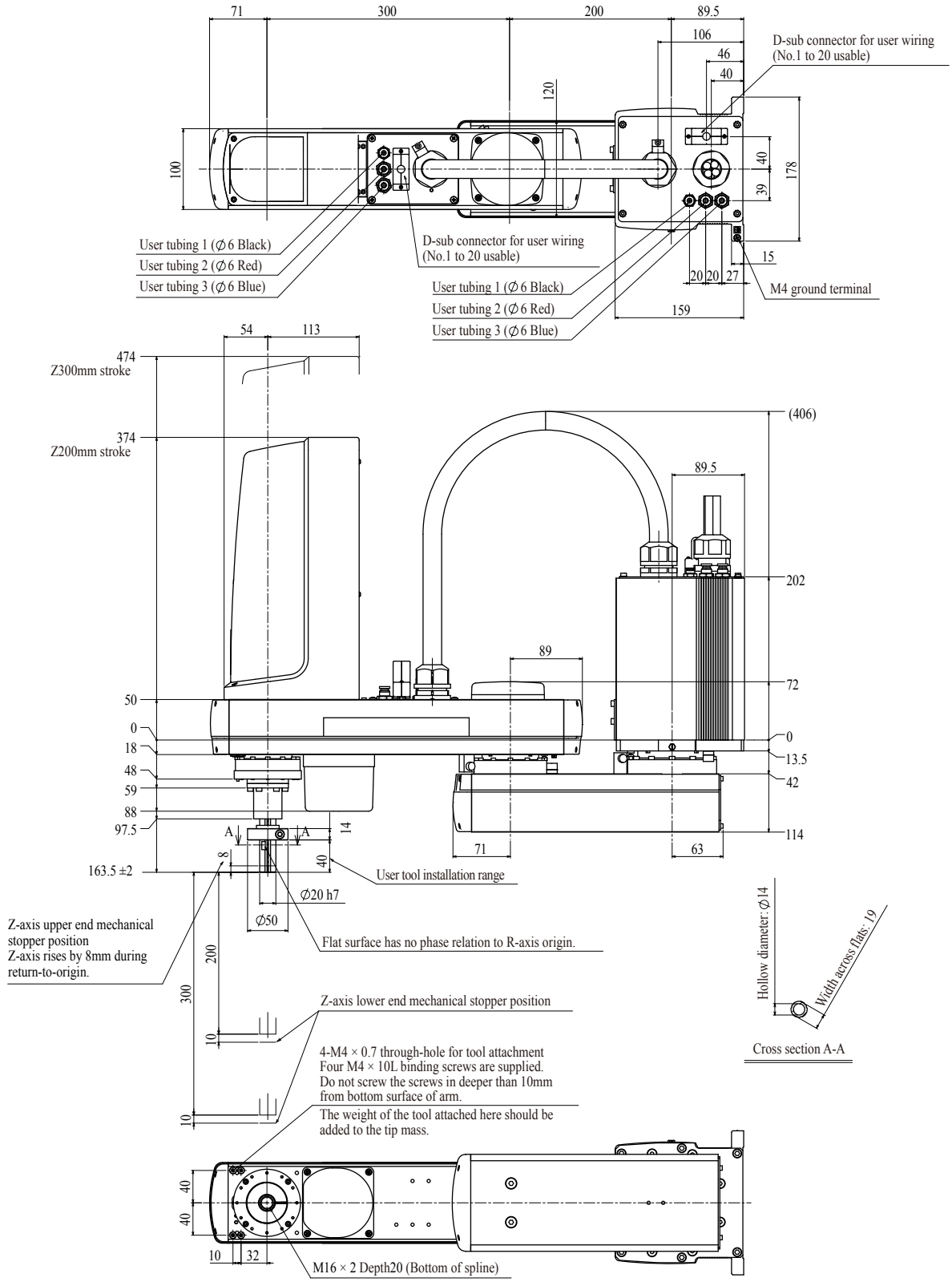


Tool flange mount type

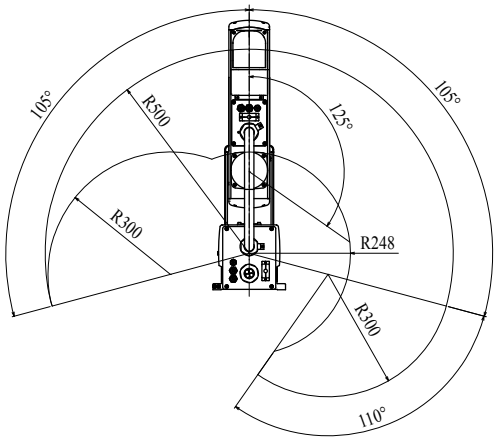


Option: User wiring/tubing through spline type

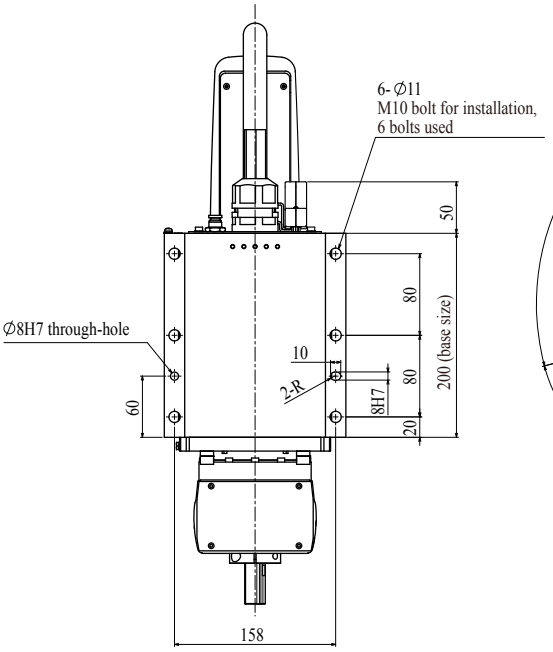
1.2.17 R6YXGSW500 (Wall-mount model)

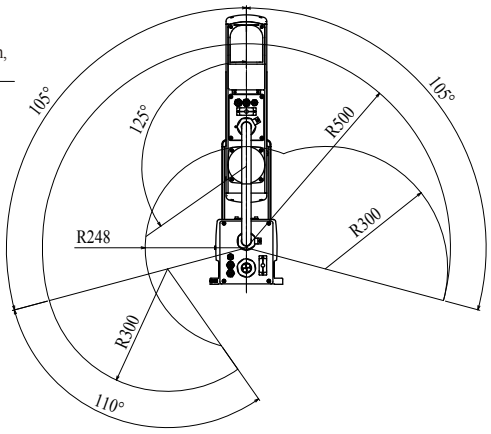


R6YXGSW500



Working envelope of left-handed system

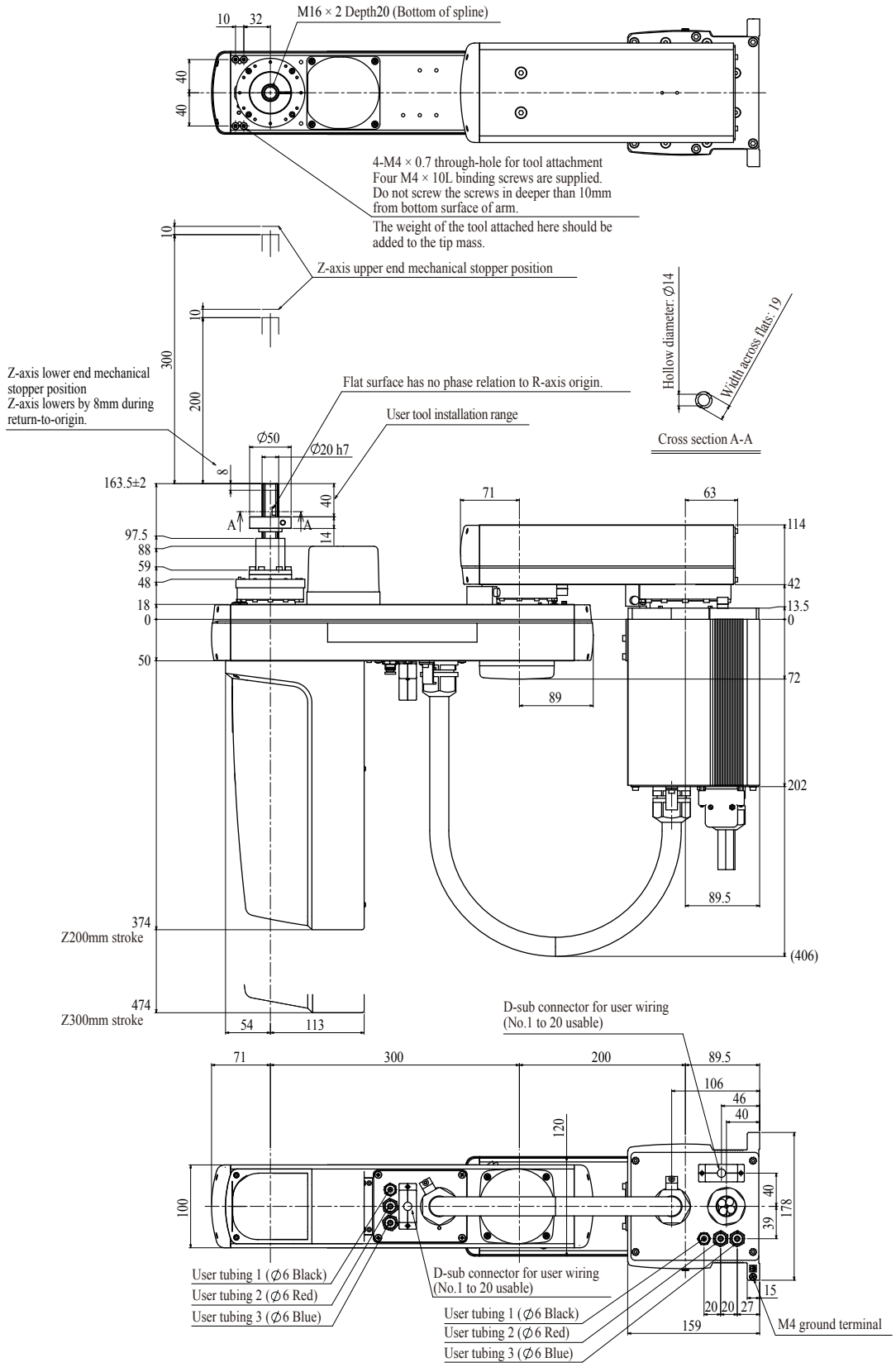




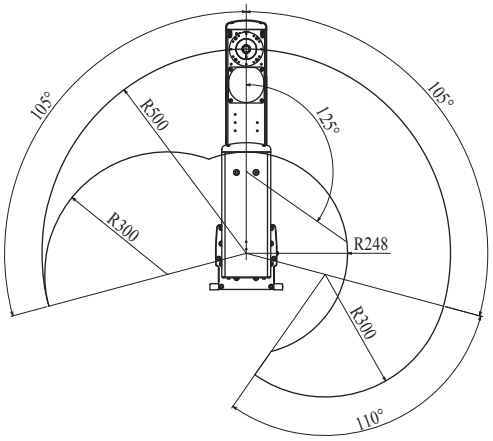
Working envelope of right-handed system

X-axis mechanical stopper position: 107°
Y-axis mechanical stopper position: 127°

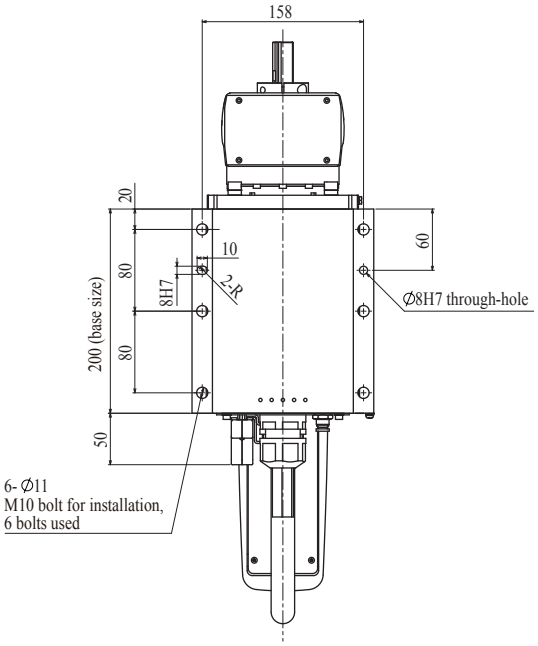
1.2.18 R6YXGSU500 (Wall-mount inverse model)

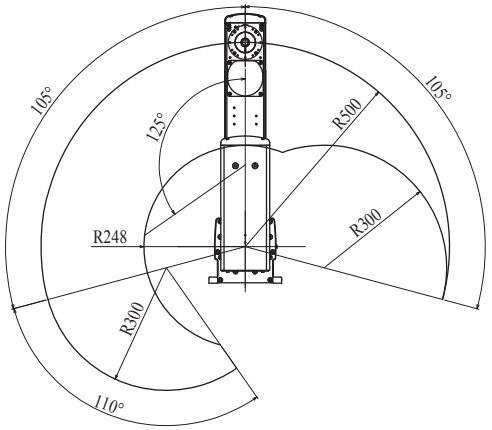


R6YXGSU500



Working envelope of left-handed system

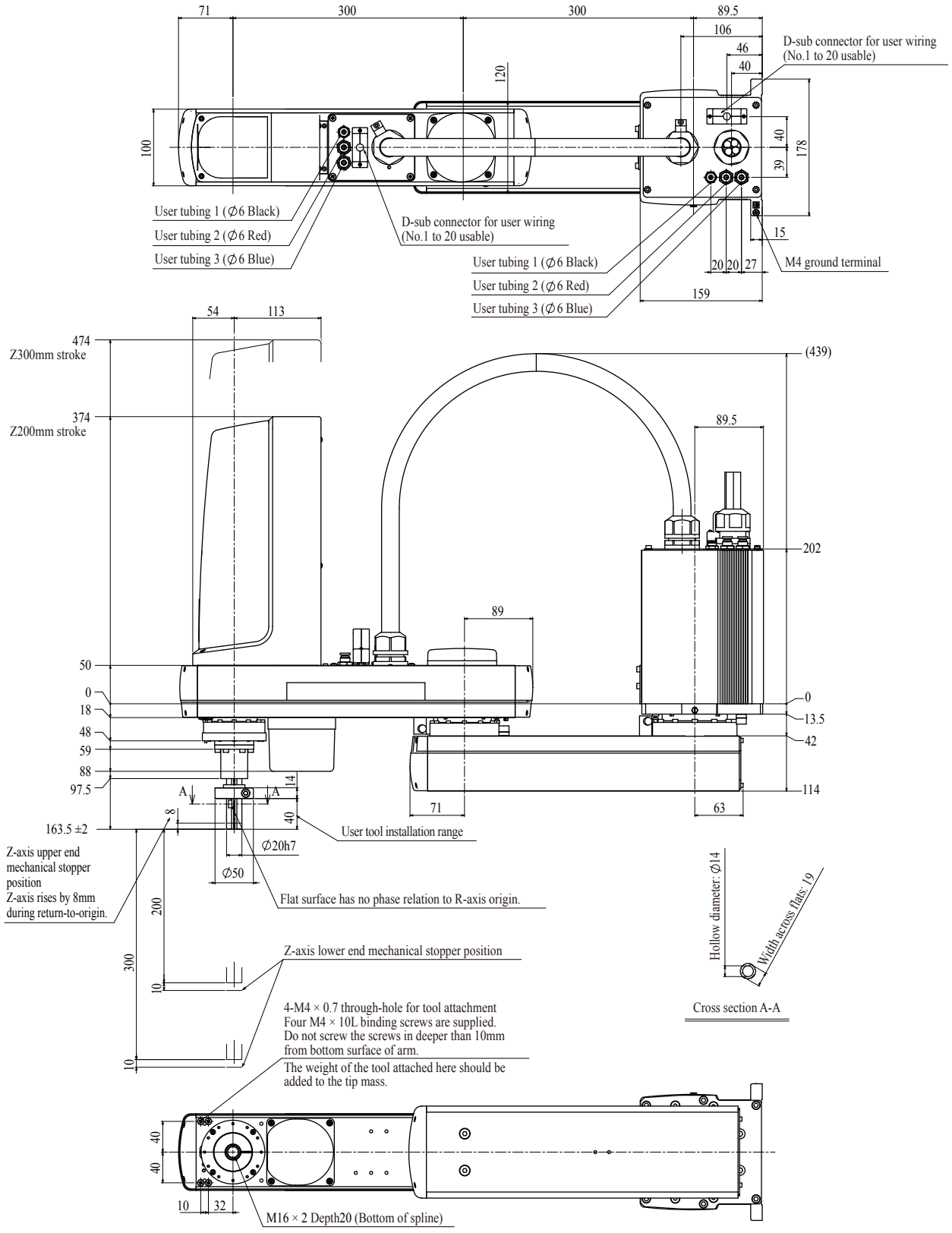




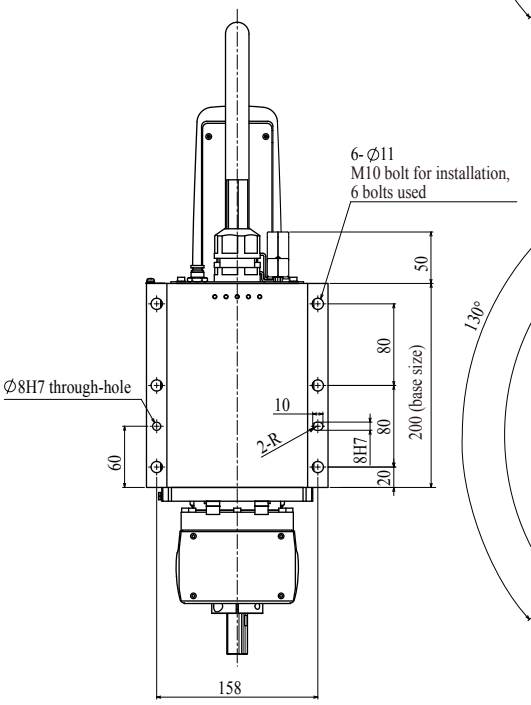
Working envelope of right-handed system

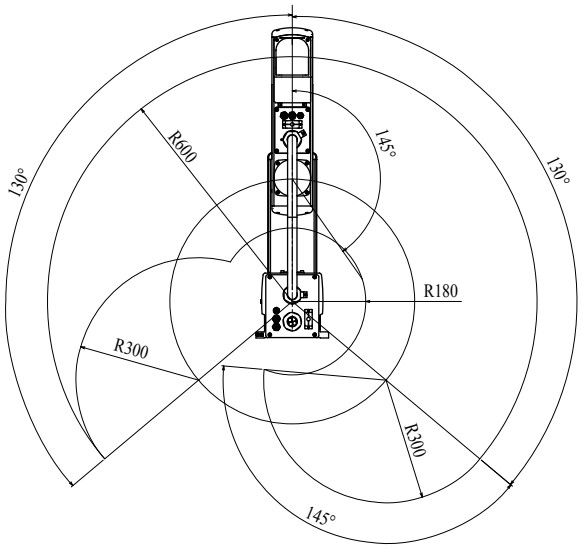
X-axis mechanical stopper position: 107°
Y-axis mechanical stopper position: 127°

1.2.19 R6YXGSW600 (Wall-mount model)

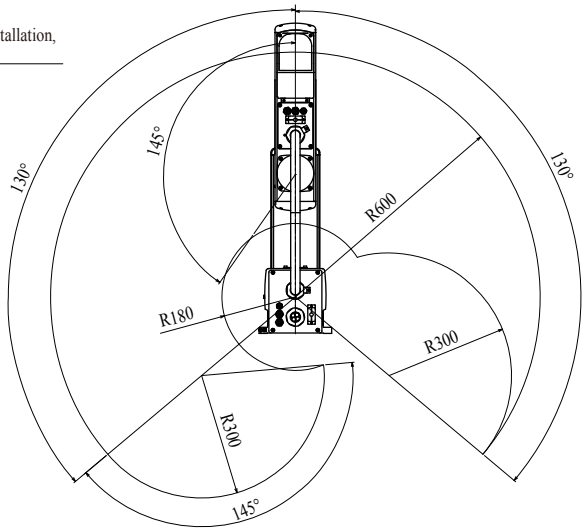


R6YXGSW600





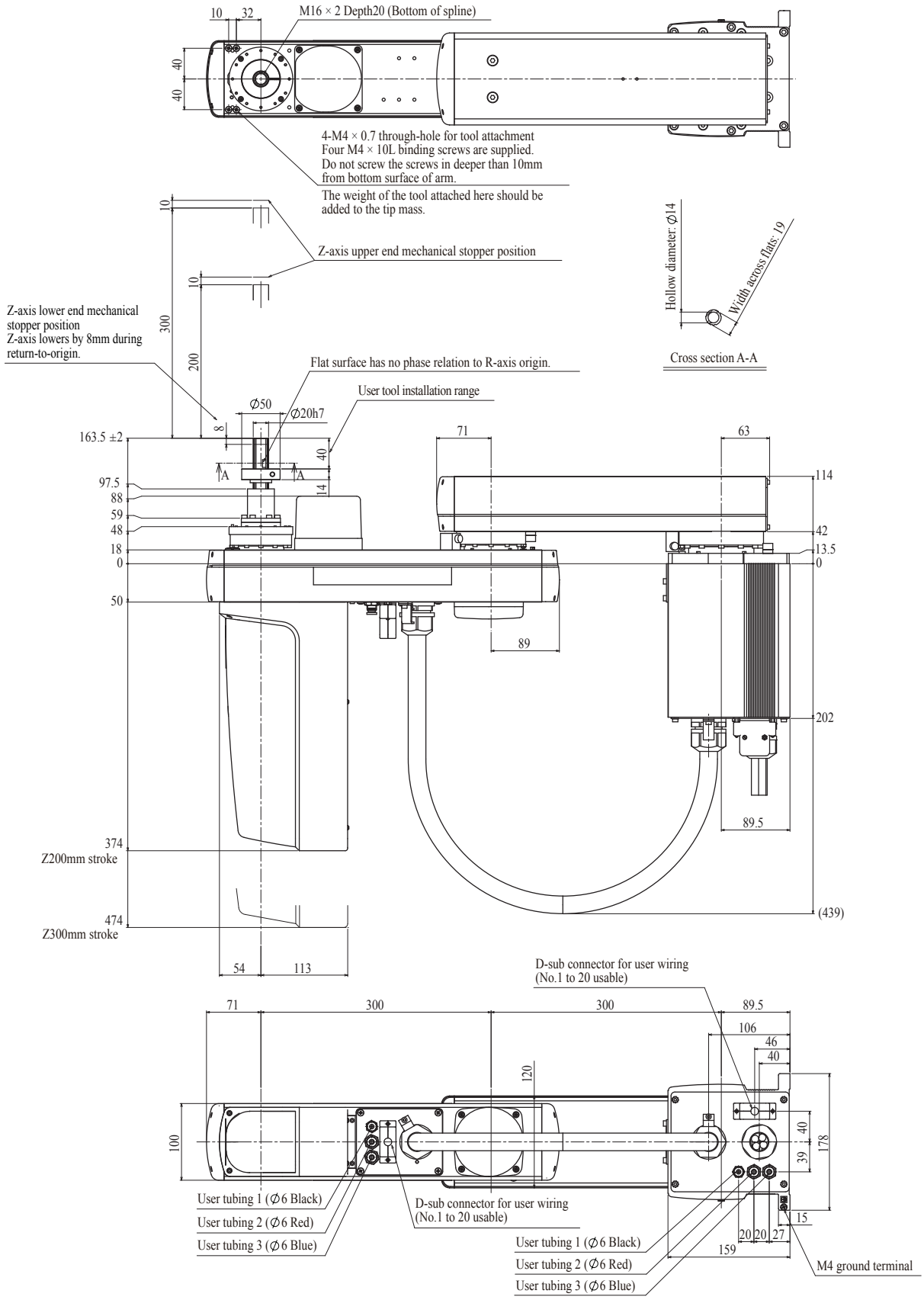
Working envelope of left-handed system



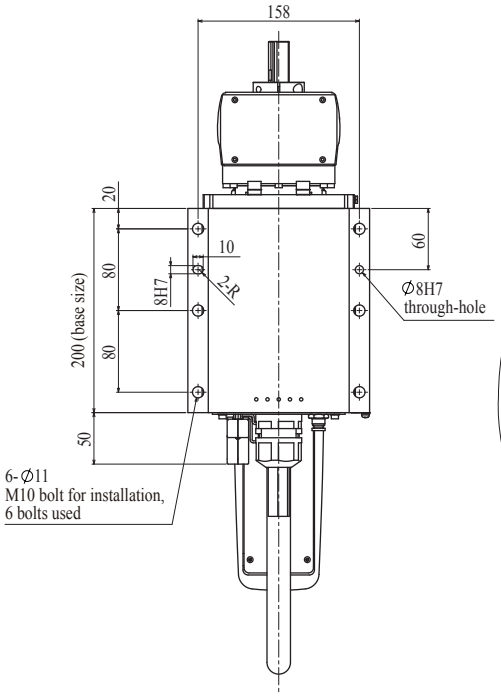
Working envelope of right-handed system

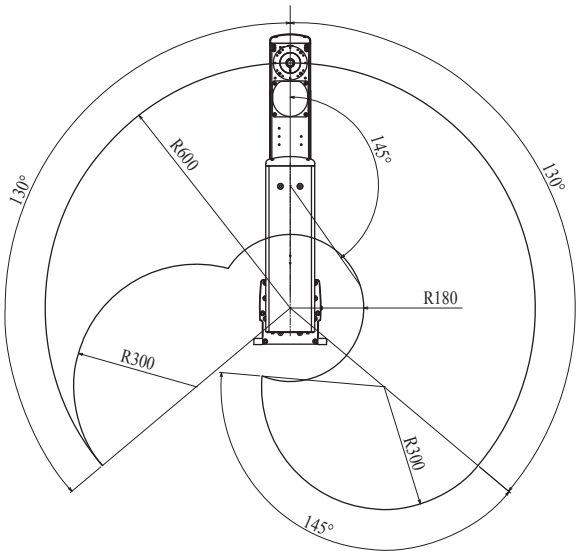
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 147°

1.2.20 R6YXGSU600 (Wall-mount inverse model)

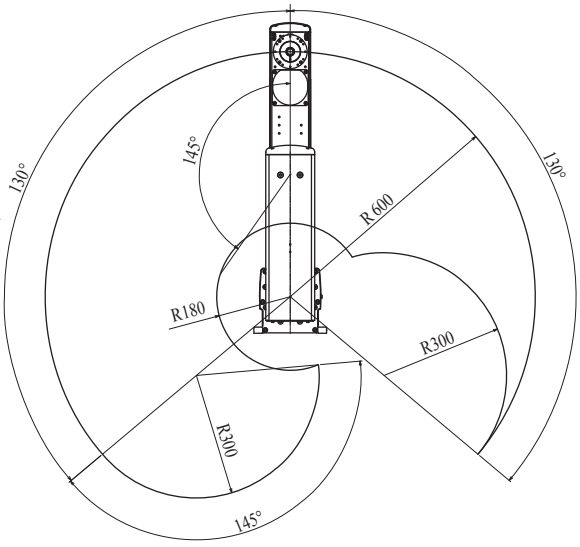


R6YXGSU600





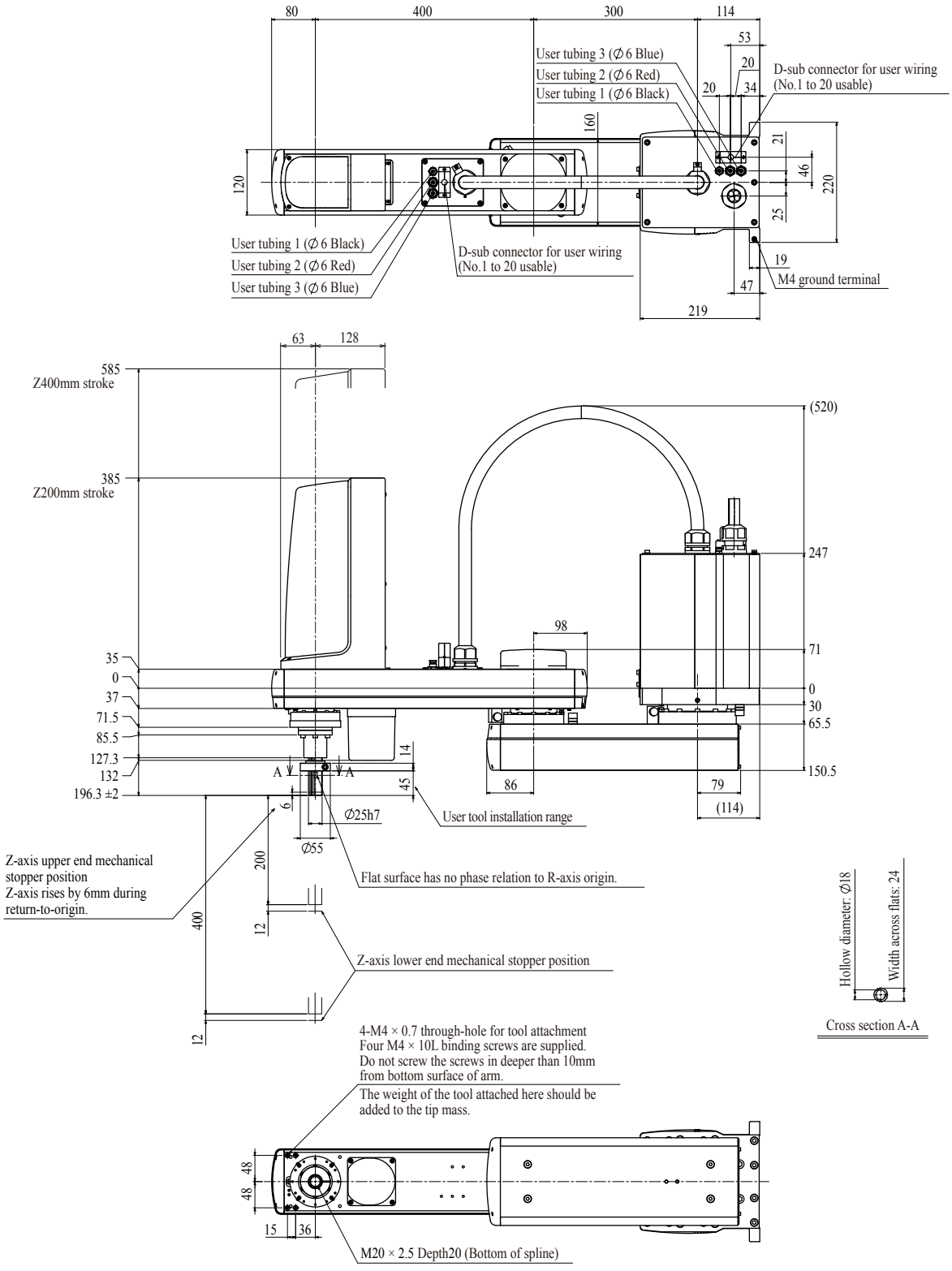
Working envelope of left-handed system



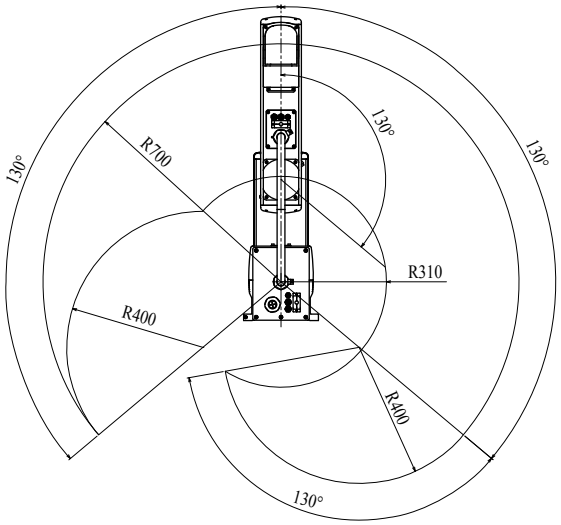
Working envelope of right-handed system

X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 147°

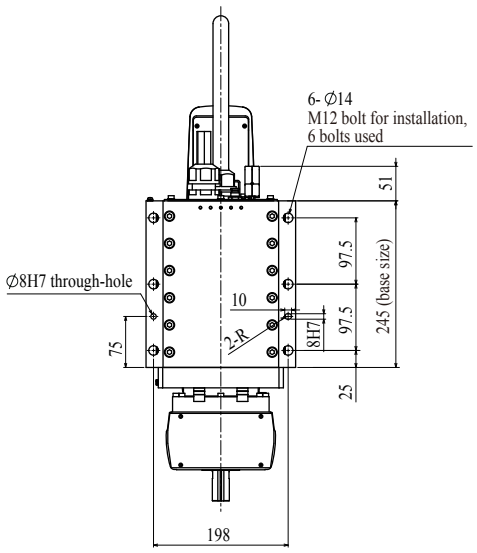
1.2.21 R6YXGSW700 (Wall-mount model)

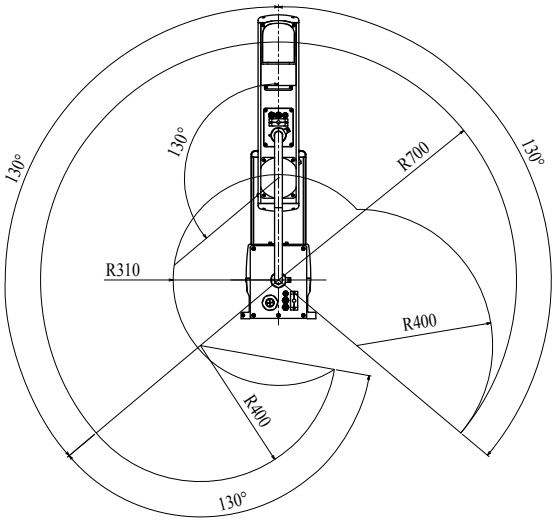


R6YXGSW700



Working envelope of left-handed system

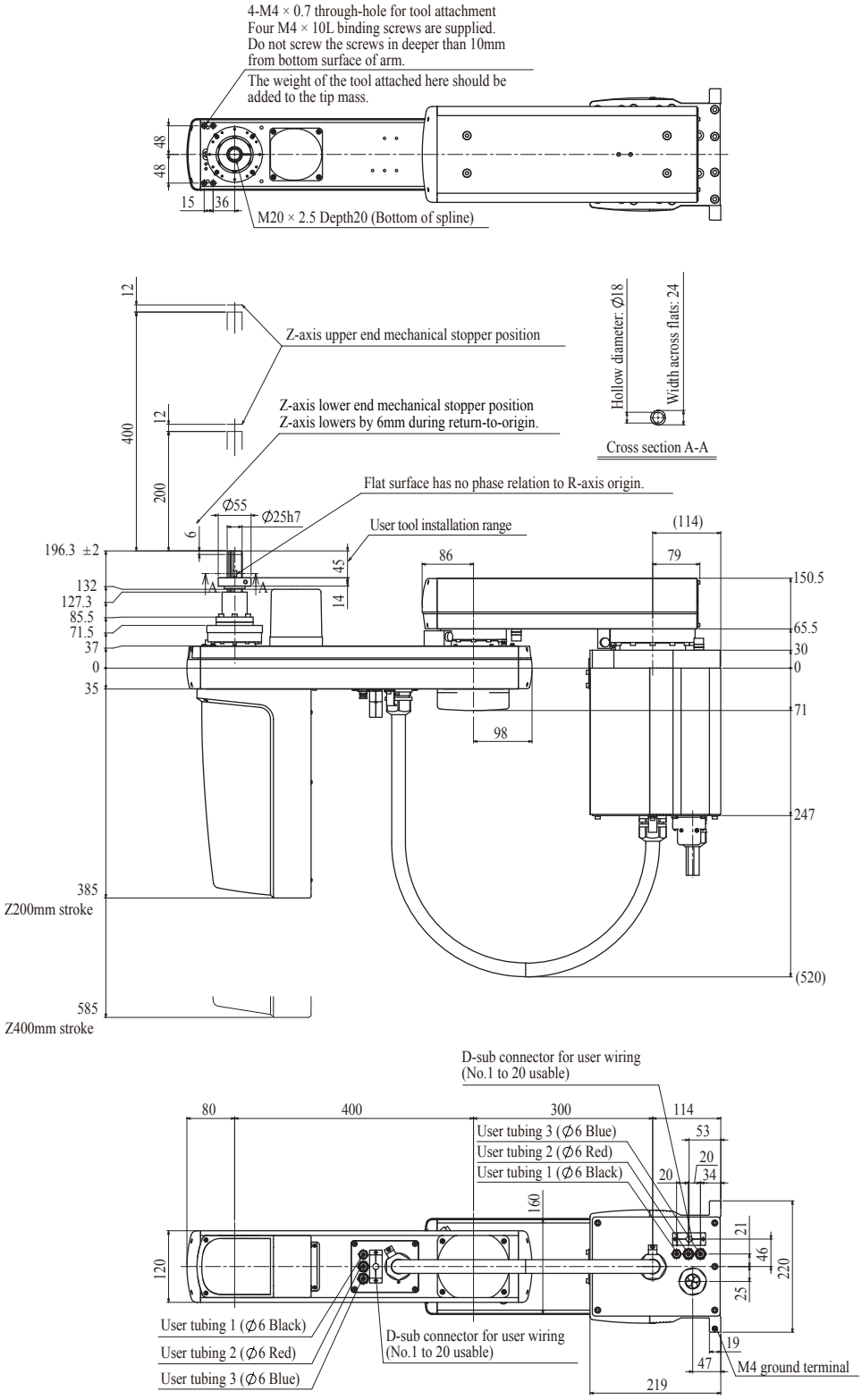




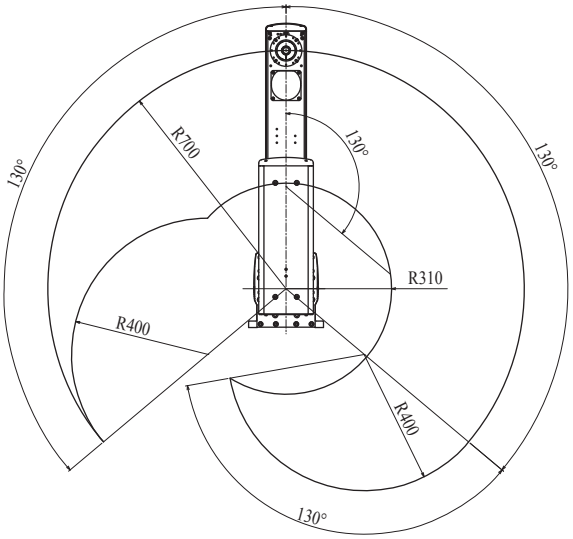
Working envelope of right-handed system

X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 132°

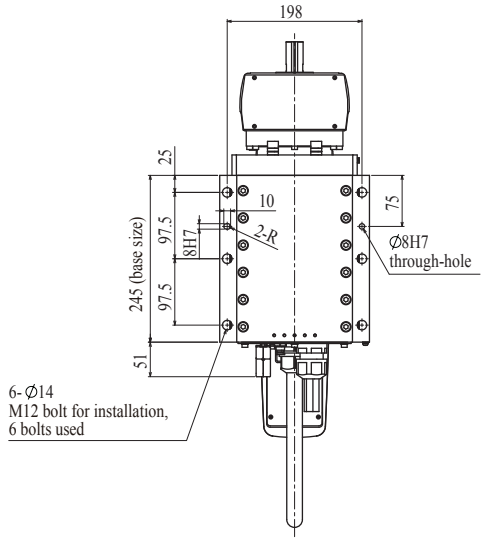
1.2.22 R6YXGSU700 (Wall-mount inverse model)

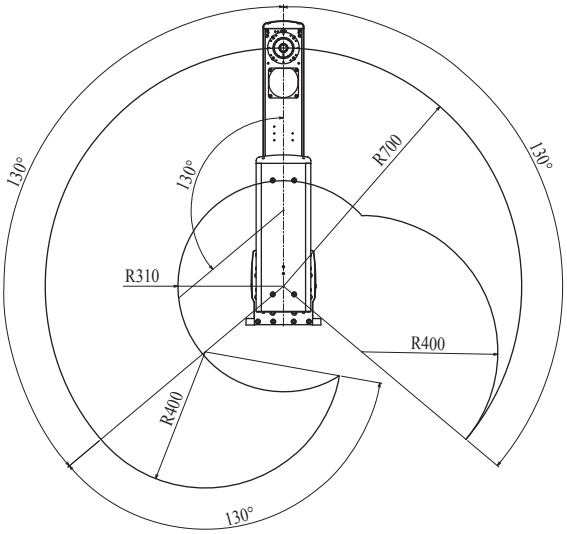


R6YXGSU700



Working envelope of left-handed system

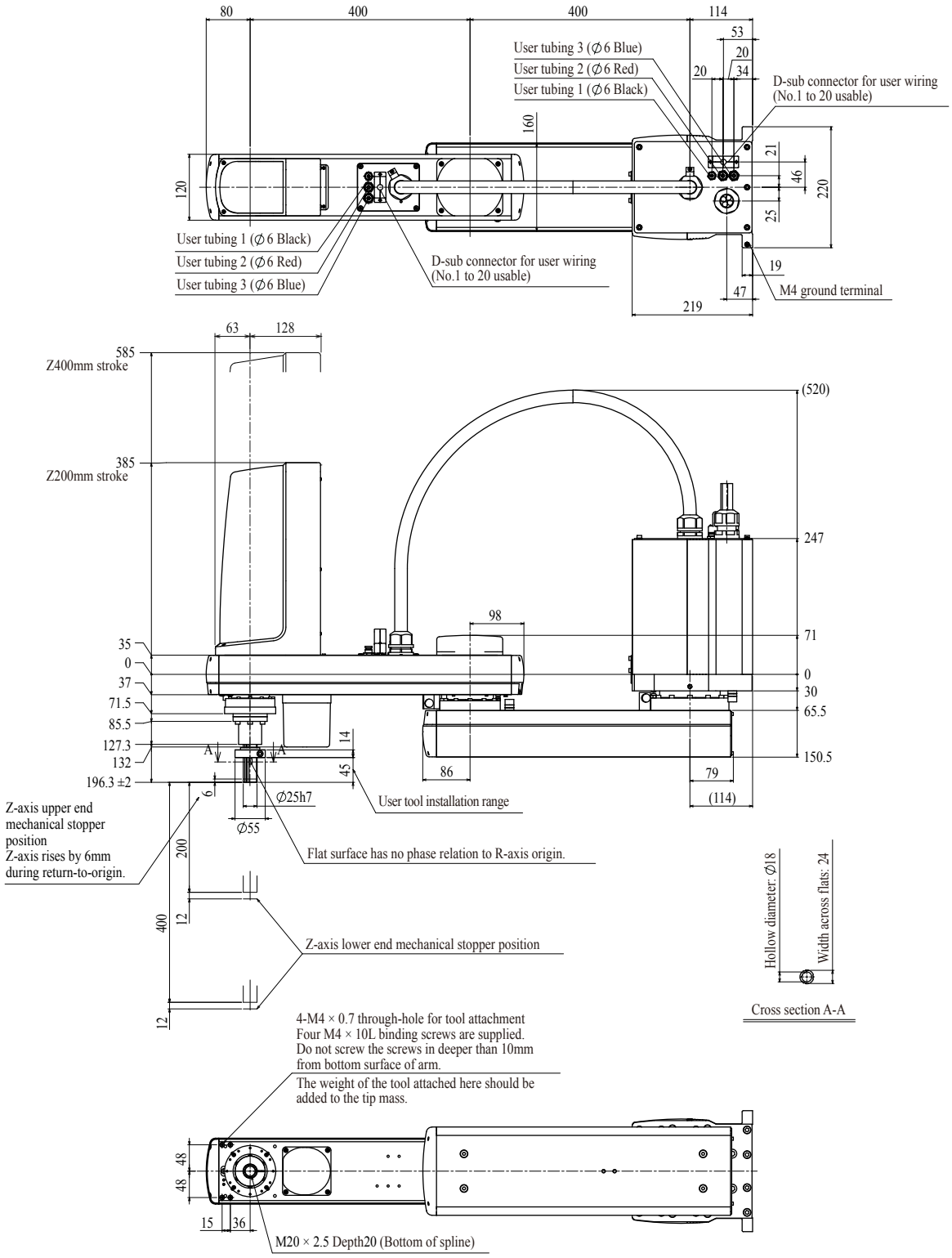




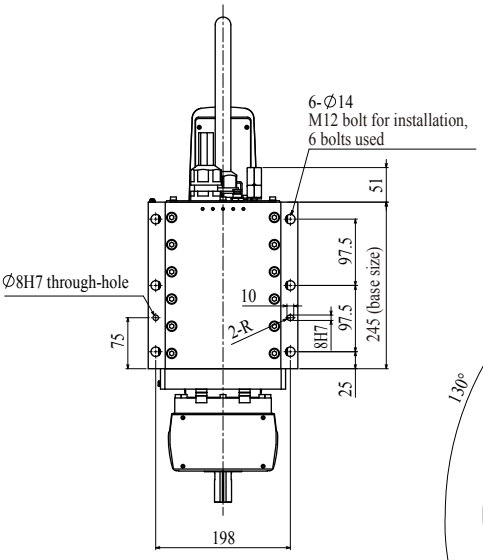
Working envelope of right-handed system

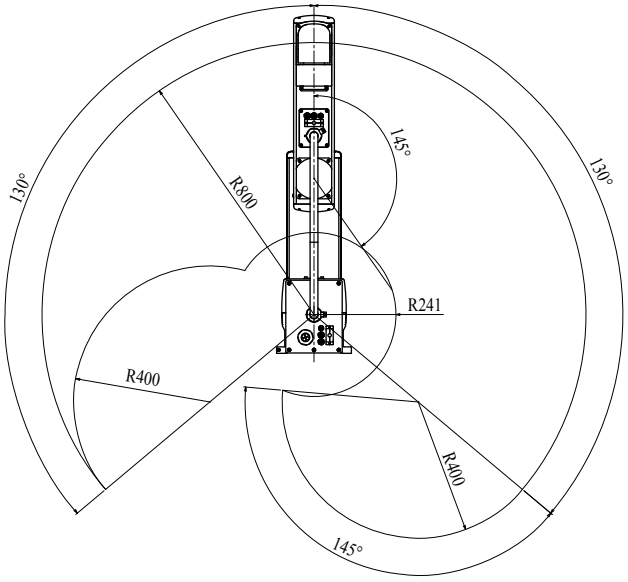
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 132°

1.2.23 R6YXGSW800 (Wall-mount model)

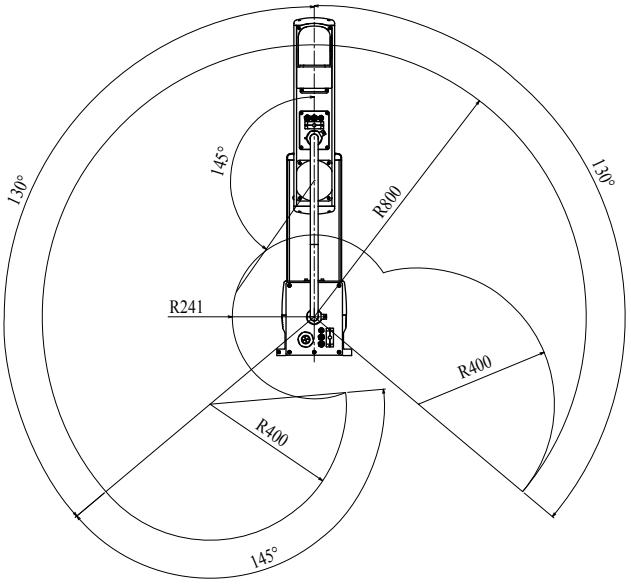


R6YXGSW800





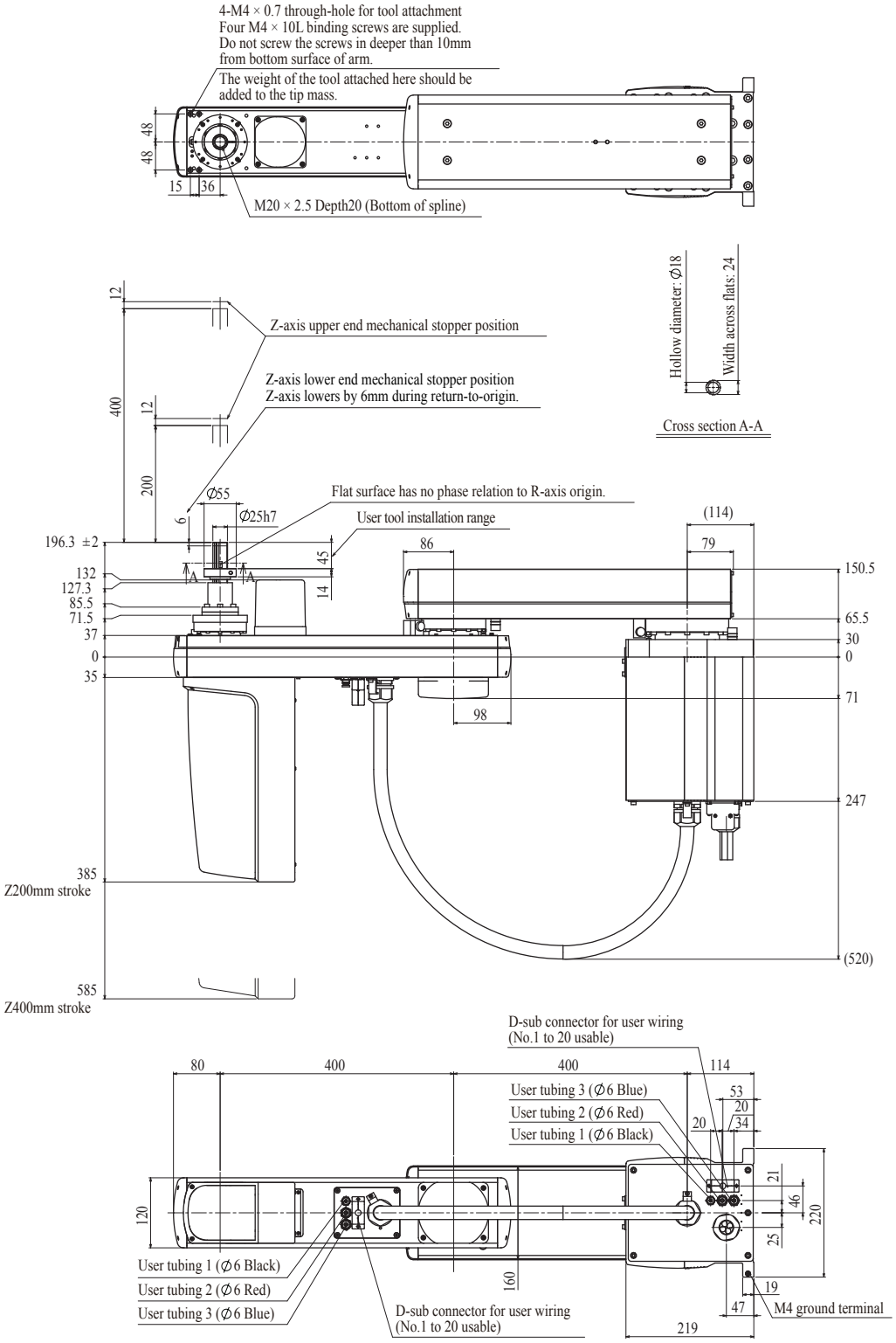
Working envelope of left-handed system



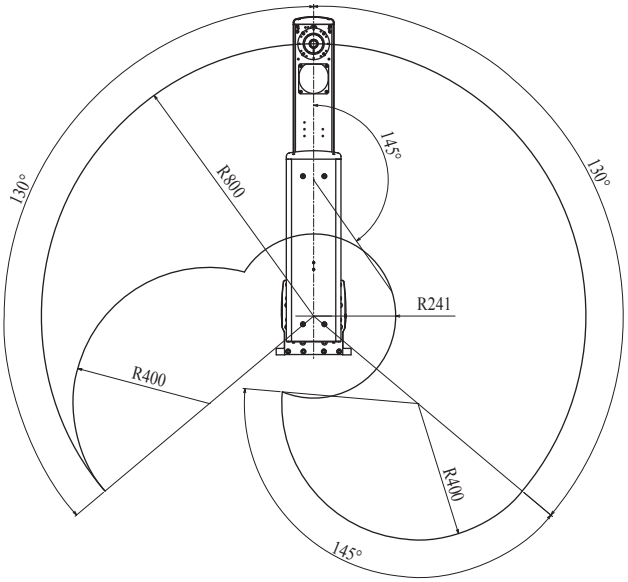
Working envelope of right-handed system

X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 147°

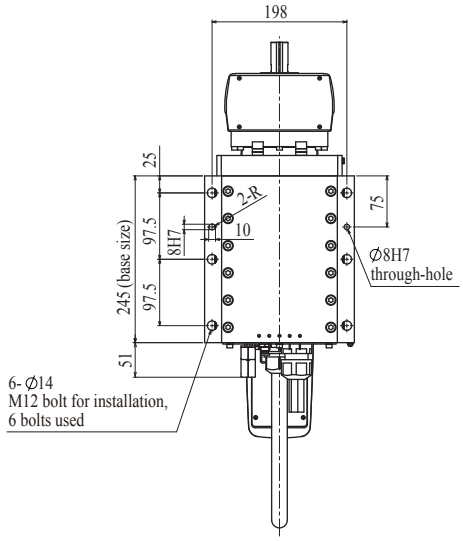
1.2.24 R6YXGSU800 (Wall-mount inverse model)

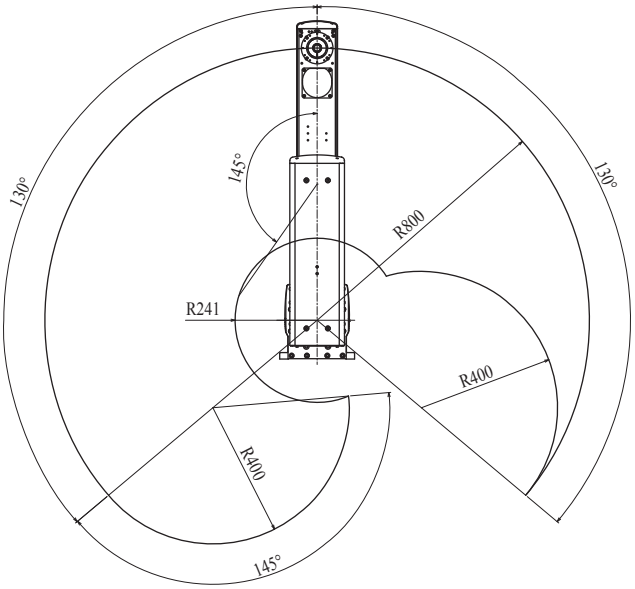


R6YXGSU800



Working envelope of left-handed system

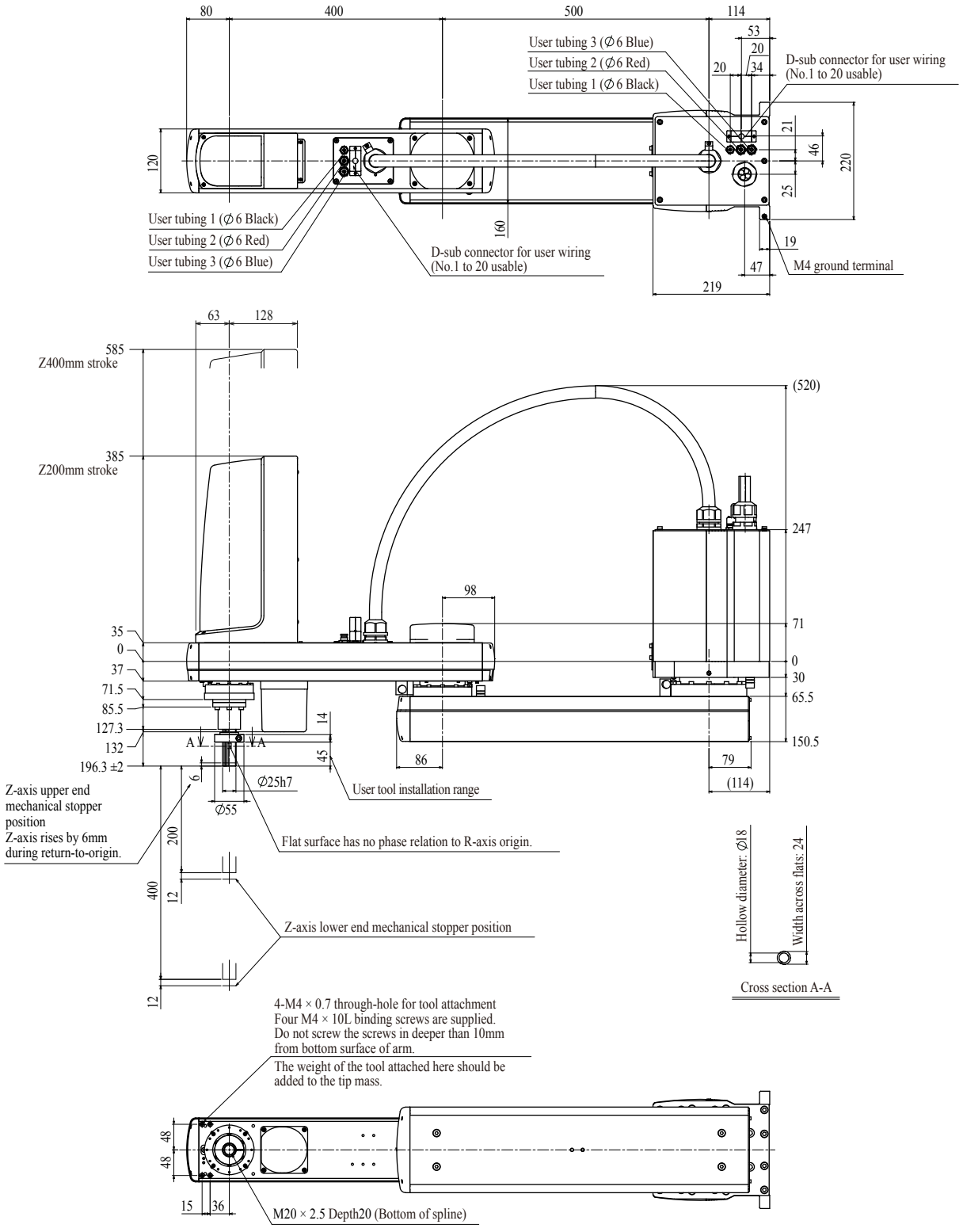




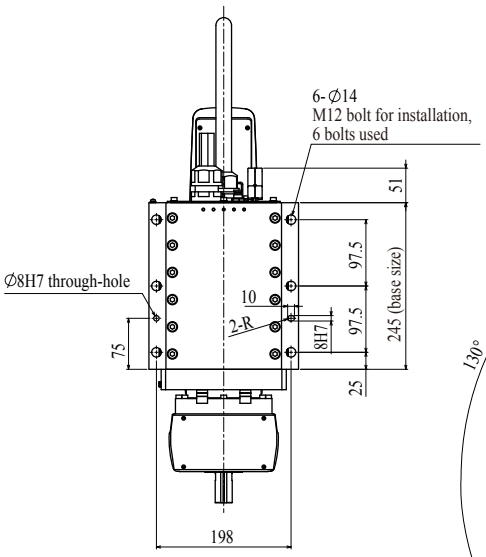
Working envelope of right-handed system

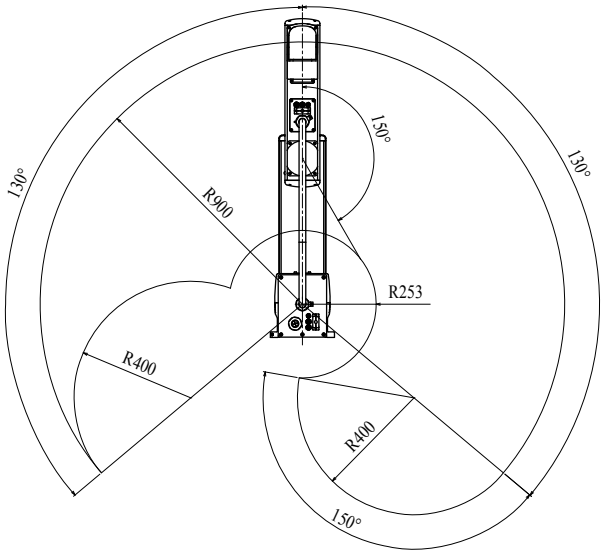
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 147°

1.2.25 R6YXGSW900 (Wall-mount model)

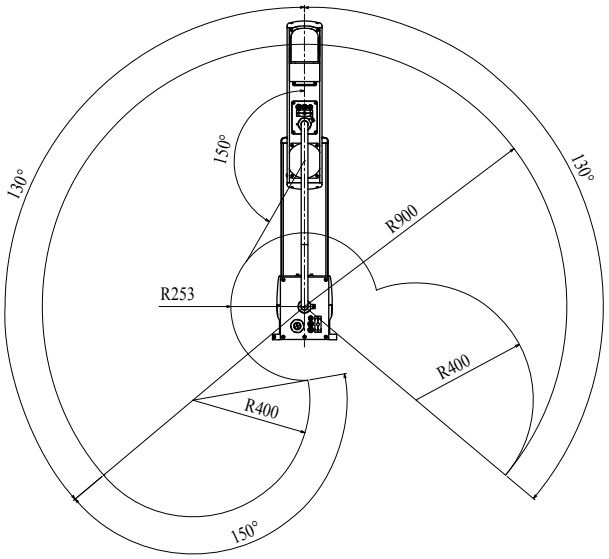


R6YXGSW900





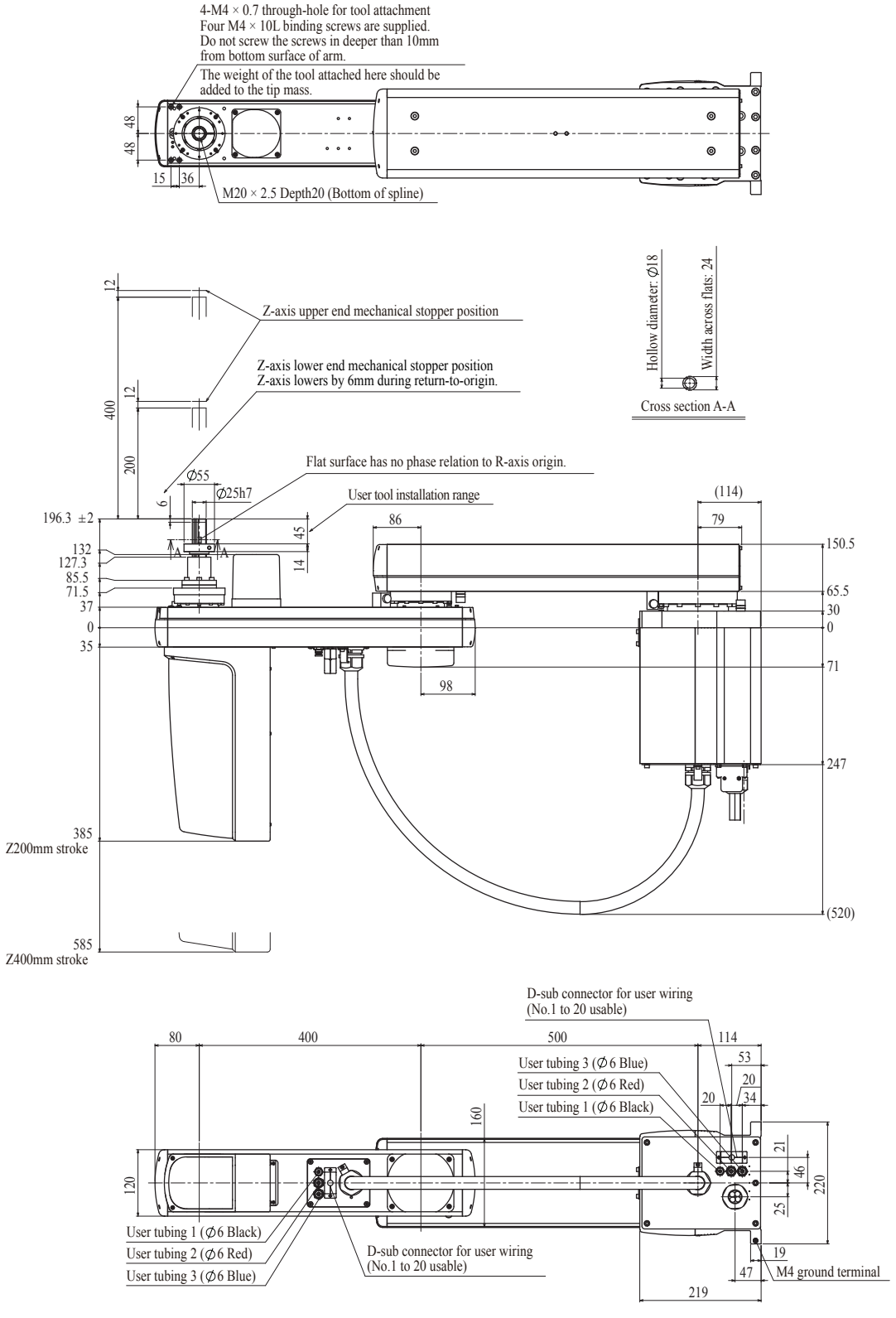
Working envelope of left-handed system



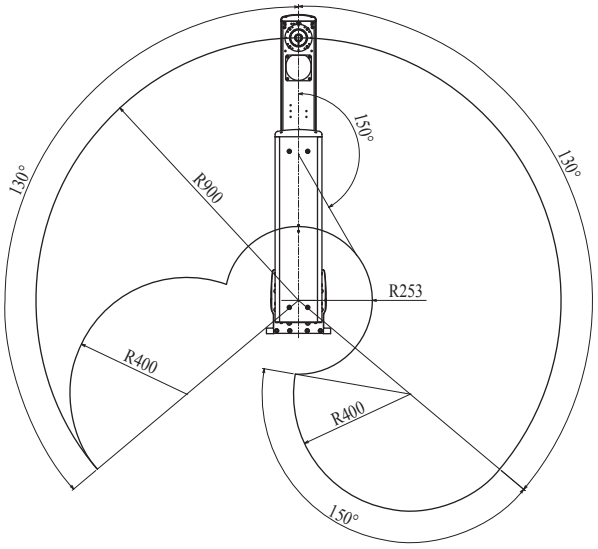
Working envelope of right-handed system

X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

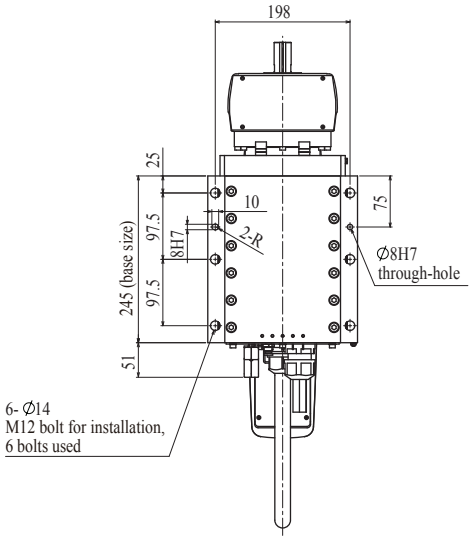
1.2.26 R6YXGSU900 (Wall-mount inverse model)

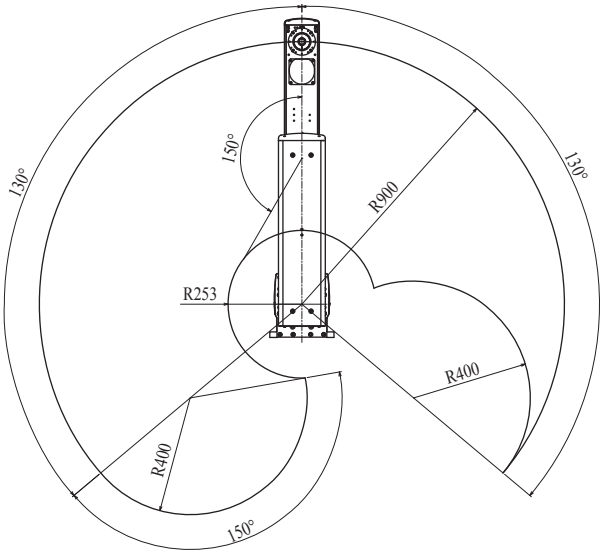


R6YXGSU900



Working envelope of left-handed system

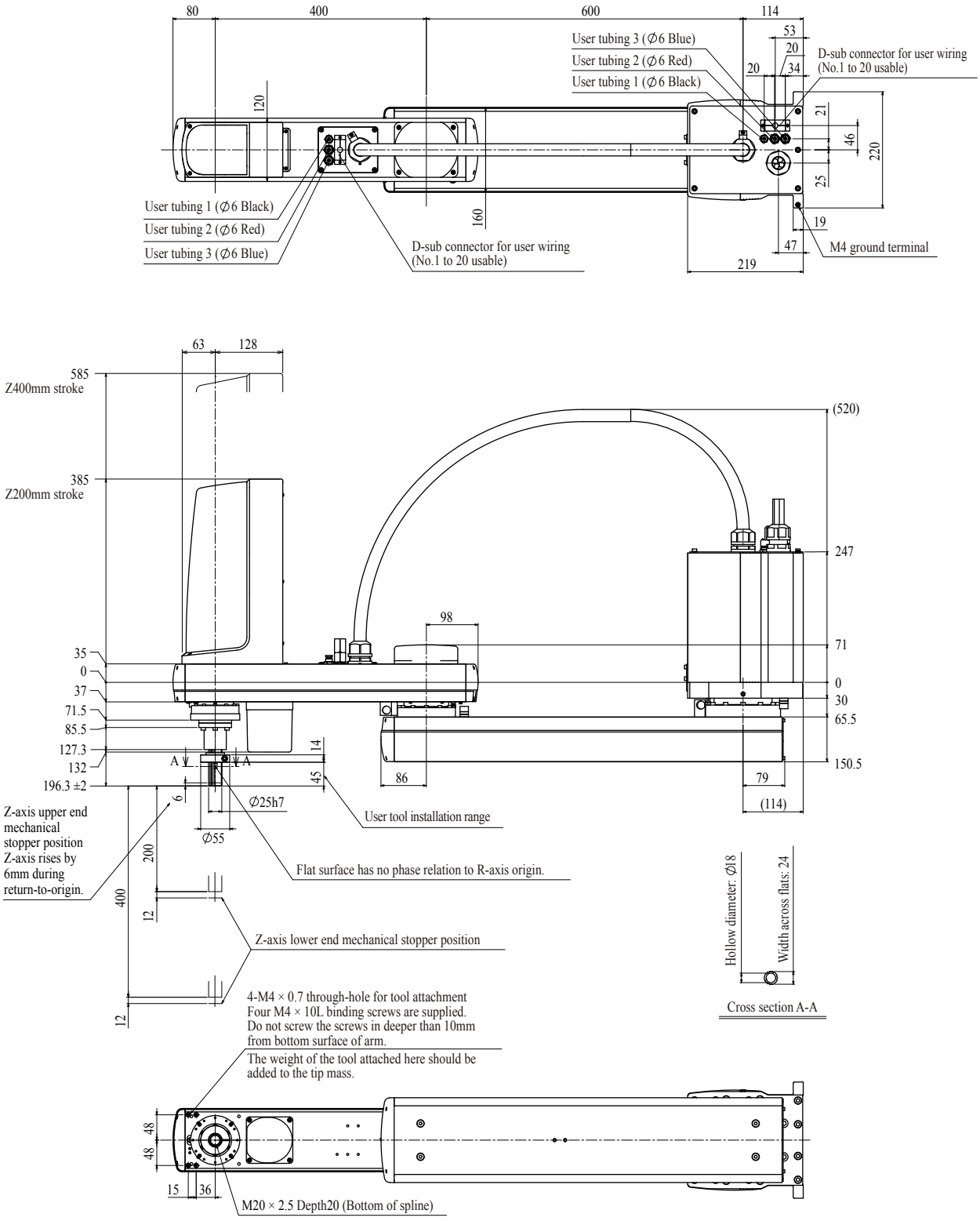




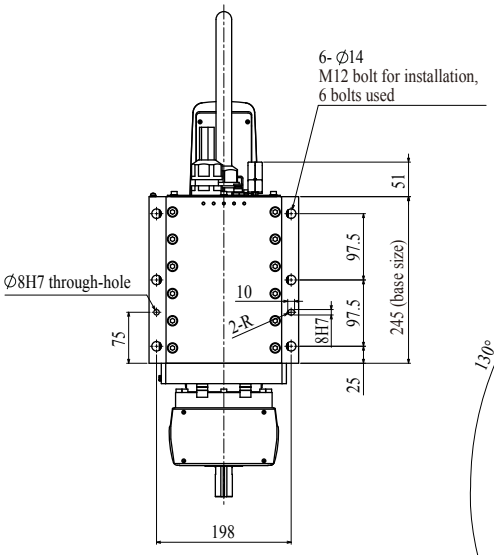
Working envelope of right-handed system

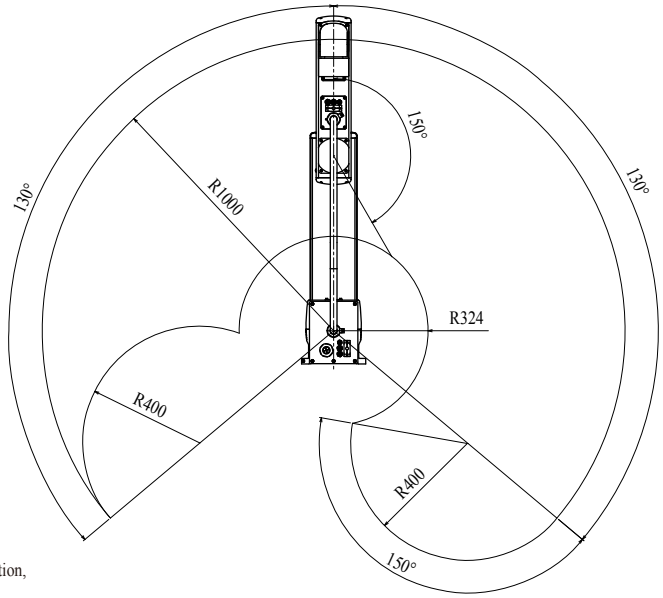
X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

1.2.27 R6YXGSW1000 (Wall-mount model)

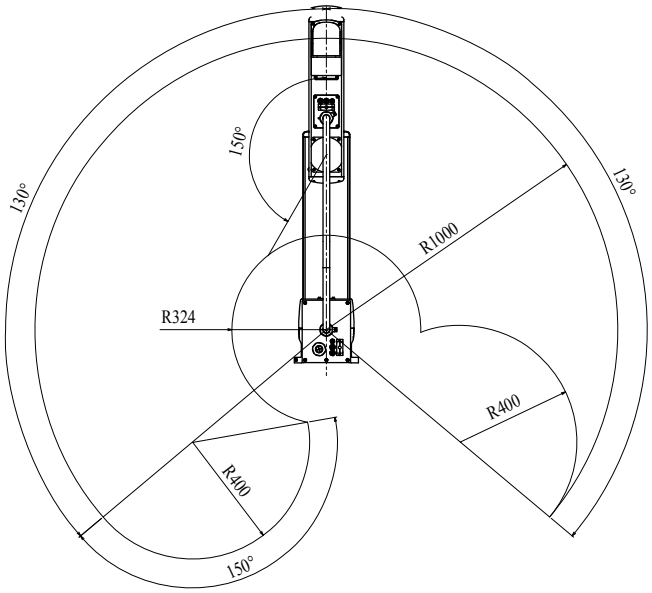


R6YXGSW1000





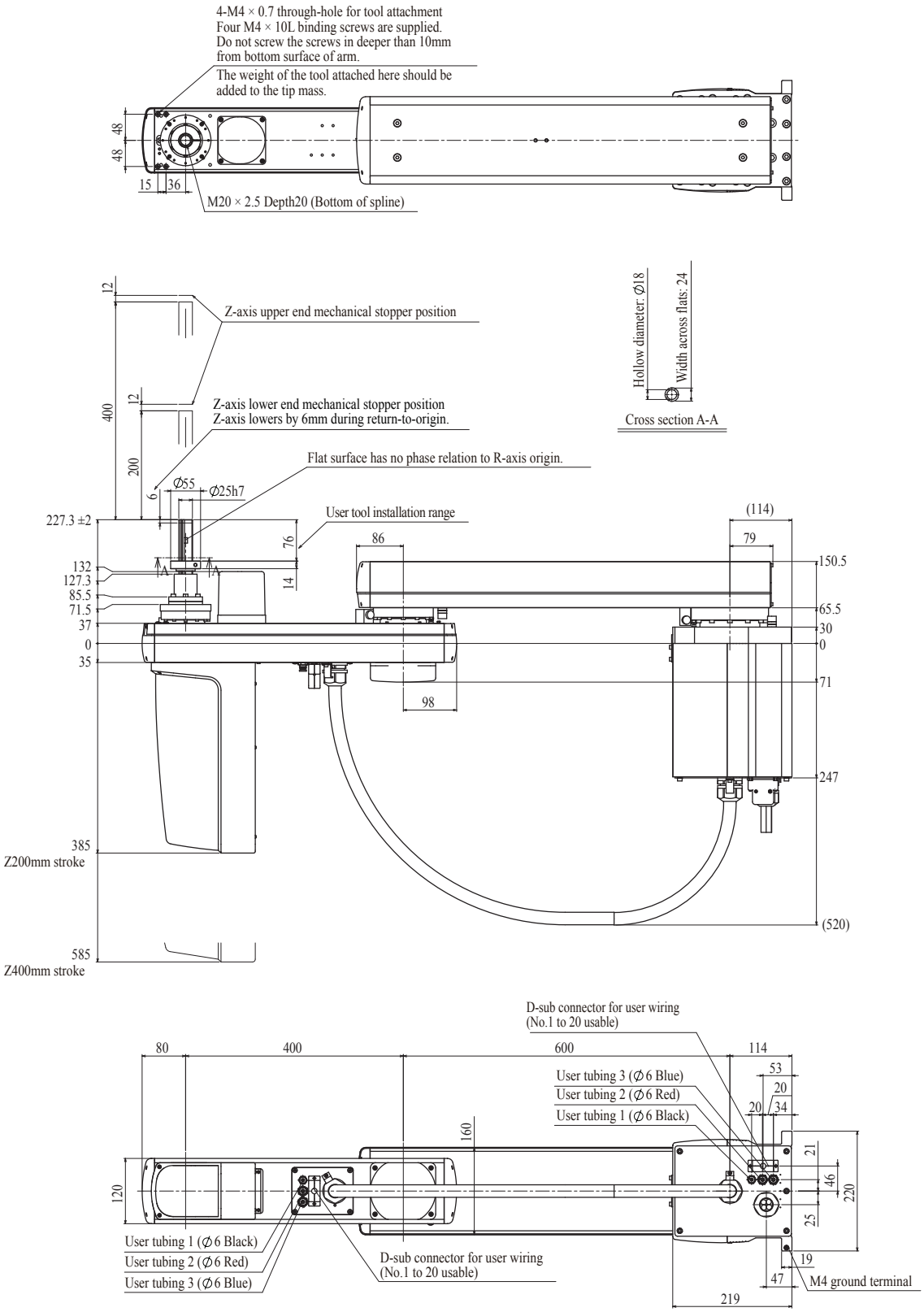
Working envelope of left-handed system



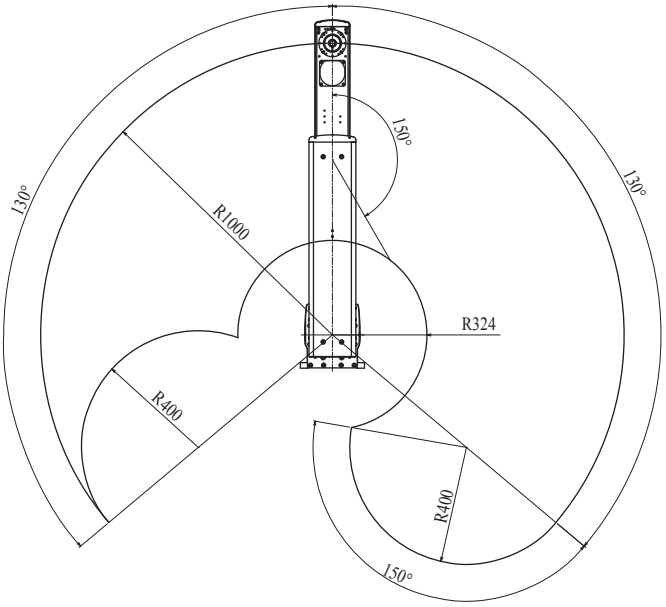
Working envelope of right-handed system

X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

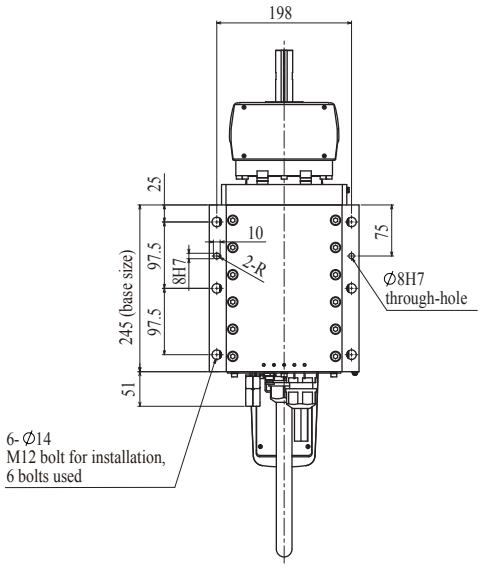
1.2.28 R6YXGSU1000 (Wall-mount inverse model)

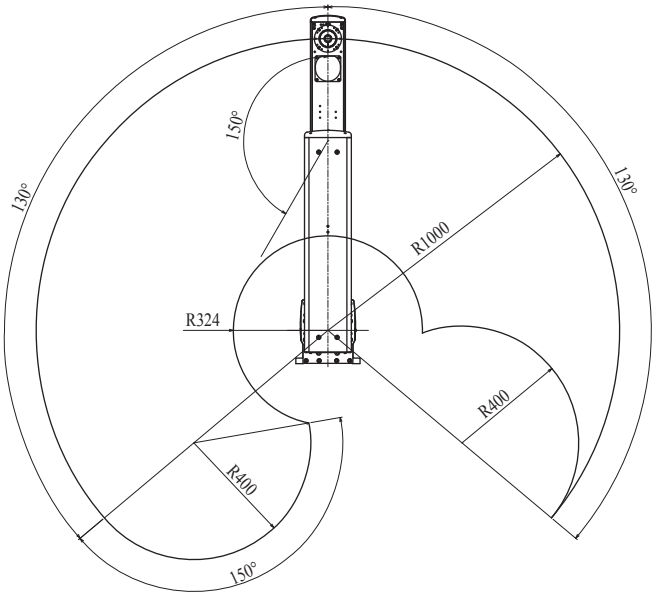


R6YXGSU1000



Working envelope of left-handed system



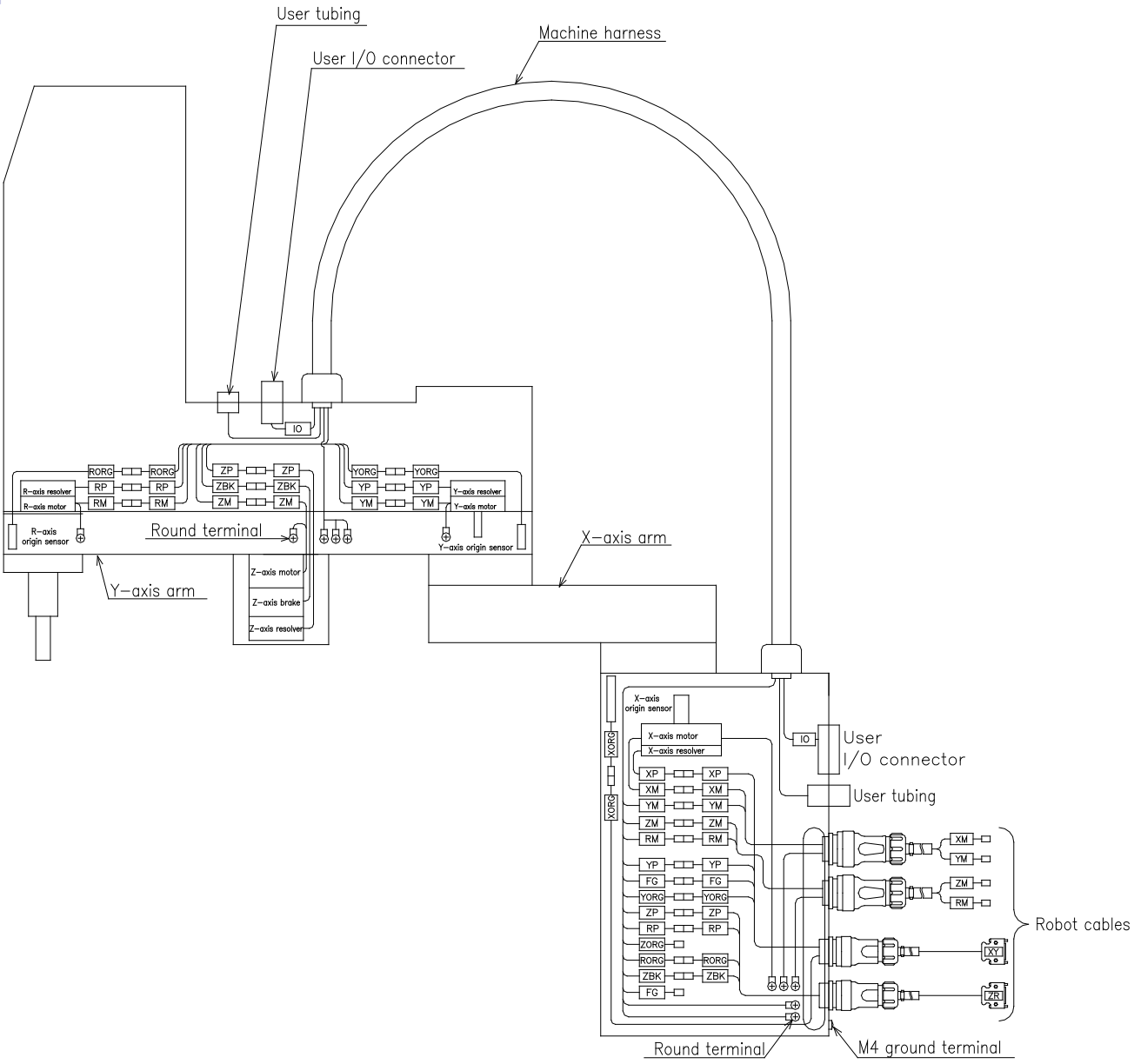


Working envelope of right-handed system

X-axis mechanical stopper position: 132°
Y-axis mechanical stopper position: 152°

1.3 Robot inner wiring diagram

Robot inner wiring diagram (R6YXG500)



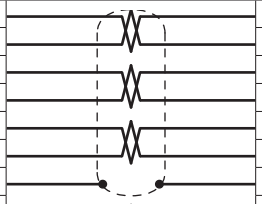
1.4 Wiring table

Robot cable wiring table

Signal	Connector	No.	Connection	No.	Connector	Color/Number	Wire
Resolver S2	XP	1		1	XY	Orange-1-Red	0.15sq
S4		2		2		Orange-1-Black	Twisted pair
S1		3		3		Gray-1-Red	0.15sq
S3		4		4		Gray-1-Black	Twisted pair
R1		5		5		Sky blue-2-Red	0.15sq
R2		6		6		Sky blue-2-Black	Twisted pair
DG		7		7		Gray	0.3sq
Resolver S2	YP	1		19		Orange-2-Red	0.15sq
S4		2		20		Orange-2-Black	Twisted pair
S1		3		21		Bright green-2-Red	0.15sq
S3		4		22		Bright green-2-Black	Twisted pair
R1		5		23		Pink-2-Red	0.15sq
R2		6		24		Pink-2-Black	Twisted pair
DG		7		25		Gray	0.3sq
FG	FG	1		18		Gray-2-Red	0.15sq
				36		Gray-2-Black	0.15sq
HLIM				10		Gray	0.3sq
GND24				11			
HLIM				28		Gray	0.3sq
GND24				29			
Origin Sensor GND	XORG	3		13		Sky blue-3-Red	0.15sq
ORG		2		12		Sky blue-3-Black	Twisted pair
24V		1		9		Pink-3-Red	0.15sq
Origin Sensor 24V	YORG	1		27		Pink-3-Black	Twisted pair
ORG		2		30		Bright green-1-Red	0.15sq
GND		3		31		Bright green-1-Black	Twisted pair
U	XM	1		2	XM	Black	0.75sq
V		2		3		Red	0.75sq
W		3		4		White	0.75sq
FG	Round terminal			1		Gray	0.75sq
U	YM	1		2	YM	Yellow	0.75sq
V		2		3		Brown	0.75sq
W		3		4		Blue	0.75sq

Signal		Connector	No.	Connection	No.	Connector	Color/Number	Wire
Resolver	S2	ZP	1		1	ZR	Orange-1-Red	0.15sq
	S4		2		2		Orange-1-Black	Twisted pair
	S1		3		3		Gray-1-Red	0.15sq
	S3		4		4		Gray-1-Black	Twisted pair
	R1		5		5		Sky blue-2-Red	0.15sq
	R2		6		6		Sky blue-2-Black	Twisted pair
	DG		7		7		Gray	0.3sq
Brake	MB+	ZBK	1		14		Pink-1-Red	0.15sq
	MB–		2		16		Pink-1-Black	Twisted pair
					15		Sky blue-1-Red	0.15sq
					17		Sky blue-1-Black	Twisted pair
Resolver	S2	RP	1		19		Orange-2-Red	0.15sq
	S4		2		20		Orange-2-Black	Twisted pair
	S1		3		21		Bright green-2-Red	0.15sq
	S3		4		22		Bright green-2-Black	Twisted pair
	R1		5		23		Pink-2-Red	0.15sq
	R2		6		24		Pink-2-Black	Twisted pair
	DG		7		25		Gray	0.3sq
	FG	FG	1		18		Gray-2-Red	0.15sq
					36		Gray-2-Black	0.15sq
	HLIM				10		Gray	0.3sq
	GND24				11			
	HLIM				28		Gray	0.3sq
	GND24				29			
Origin Sensor	24V	ZORG	3		13		Sky blue-3-Red	0.15sq
	ORG		2		12		Sky blue-3-Black	Twisted pair
	GND		1		9		Pink-3-Red	0.15sq
Origin Sensor	24V	RORG	1		27		Pink-3-Black	Twisted pair
	ORG		2		30		Bright green-1-Red	0.15sq
	GND		3		31		Bright green-1-Black	Twisted pair
	U	ZM	1		2	ZM	Black	0.75sq
	V		2		3		Red	0.75sq
	W		3		4		White	0.75sq
	FG	Round terminal			1		Gray	0.75sq
	U	RM	1		2	RM	Yellow	0.75sq
	V		2		3		Brown	0.75sq
	W		3		4		Blue	0.75sq

Machine harness wiring table (R6YXGL250, R6YXGL350, R6YXGL400, R6YXGL500, R6YXGL600)

Y-axis arm side					Base side			
Signal		Connector	No.	Connection	No.	Connector	Color	Wire
Y-axis Resolver	S2	YP	1		1	YP	Brown	0.2mm²
	S4		2		2		White	Twisted pair
	S1		3		3		Red	0.2mm²
	S3		4		4		White	Twisted pair
	R1		5		5		Orange	0.2mm²
	R2		6		6		White	Twisted pair
	DG		7		7		Gray	Shield
Z-axis Resolver	S2	ZP	1		1	ZP	Brown	0.2mm²
	S4		2		2		Black	Twisted pair
	S1		3		3		Red	0.2mm²
	S3		4		4		Black	Twisted pair
	R1		5		5		Orange	0.2mm²
	R2		6		6		Black	Twisted pair
	DG		7		7		Gray	Shield
R-axis Resolver	S2	RP	1		1	RP	Brown	0.2mm²
	S4		2		2		Gray	Twisted pair
	S1		3		3		Red	0.2mm²
	S3		4		4		Gray	Twisted pair
	R1		5		5		Orange	0.2mm²
	R2		6		6		Gray	Twisted pair
	DG		7		7		Gray	Shield
Y-axis motor	U	YM	1		1	YM	Brown	0.75mm²
	V		2		2		Red	
	W		3		3		Orange	
Z-axis motor	U	ZM	1		1	ZM	Blue	0.75mm²
	V		2		2		Purple	
	W		3		3		Gray	
R-axis motor	U	RM	1		1	RM	Black	0.75mm²
	V		2		2		Blue	
	W		3		3		Red	
Z-axis brake	1	ZBK	1		1	ZBK	Purple	0.3mm²
Z-axis brake	2		2		2		Gray	
User signal line		IO	1		1	IO	Brown	0.2mm²
			2		2		Red	
			3		3		Orange	
			4		4		Blue	
			5		5		Purple	
			6		6		Gray	
			7		7		White	
			8		8		Brown	0.2mm²
			9		9		Red	
			10		10		Orange	
			11		11			
			12		12			
			13		13			
			14		14			
Frame ground			15		15		Gray	Shield
Frame ground					1	FG	Gray	Shield
Origin Sensor	24V	YORG	1		1	YORG	White	0.2mm²
	ORG		2		2		Purple	
	GND		3		3		Gray	
Origin Sensor	24V	RORG	1		1	RORG	White	0.2mm²
	ORG		2		2		Blue	
	GND		3		3		Gray	
		Round terminal				Round terminal	Yellow/Green	0.75sq
		Round terminal				Round terminal	Blue	0.75sq

Machine harness wiring table (R6YXG500, R6YXG600, R6YXGH600, R6YXG700,R6YXG800, R6YXG900, R6YXG1000)
(R6YXGS500, R6YXGS600, R6YXGS700, R6YXGS800, R6YXGS900, R6YXGS1000)

Y-axis arm side					Base side			
Signal		Connector	No.	Connection	No.	Connector	Color	Wire
Y-axis Resolver	S2	YP	1		1	YP	Brown	0.2mm²
	S4		2		2		White	Twisted pair
	S1		3		3		Red	0.2mm²
	S3		4		4		White	Twisted pair
	R1		5		5		Orange	0.2mm²
	R2		6		6		White	Twisted pair
	DG		7		7		Green	Shield
Z-axis Resolver	S2	ZP	1		1	ZP	Brown	0.2mm²
	S4		2		2		Black	Twisted pair
	S1		3		3		Red	0.2mm²
	S3		4		4		Black	Twisted pair
	R1		5		5		Orange	0.2mm²
	R2		6		6		Black	Twisted pair
	DG		7		7		Green	Shield
R-axis Resolver	S2	RP	1		1	RP	Brown	0.2mm²
	S4		2		2		Gray	Twisted pair
	S1		3		3		Red	0.2mm²
	S3		4		4		Gray	Twisted pair
	R1		5		5		Orange	0.2mm²
	R2		6		6		Gray	Twisted pair
	DG		7		7		Green	Shield
Y-axis motor	U	YM	1		1	YM	Brown	0.75mm²
	V		2		2		Red	
	W		3		3		Orange	
Z-axis motor	U	ZM	1		1	ZM	Blue	0.75mm²
	V		2		2		Purple	
	W		3		3		Gray	
R-axis motor	U	RM	1		1	RM	Black	0.75mm²
	V		2		2		White	
	W		3		3		Brown	
Z-axis brake	1	ZBK	1		1	ZBK	White	0.3mm²
Z-axis brake	2		2		2		Black	
User signal line		IO	1		1	IO	Brown	0.2mm²
			2		2		Red	
			3		3		Orange	
			4		4		Blue	
			5		5		Purple	
			6		6		Gray	
			7		7		White	
			8		8		Black	
			9		9		Brown	
			10		10		Red	
			11		11		Orange	
			12		12		Blue	
			13		13		Brown	0.2mm²
			14		14		Red	
			15		15		Orange	
			16		16		Blue	
			17		17		Purple	
			18		18		Gray	
			19		19		White	
			20		20		Black	
			21		21		Brown	
			22		22		Red	
			23		23		Orange	
			24		24		Blue	
Frame ground			25		25		Green	Shield
Frame ground					1	FG	Green	Shield
Origin Sensor	24V	YORG	1		1	YORG	Brown	0.2mm²
	ORG		2		2		Red	
	GND		3		3		Orange	
Origin Sensor	24V	RORG	1		1	RORG	Brown	0.2mm²
	ORG		2		2		Blue	
	GND		3		3		Orange	
		Round terminal				Round terminal	Yellow/Green	0.75sq
		Round terminal				Round terminal	Black	0.75sq

Motor wiring table

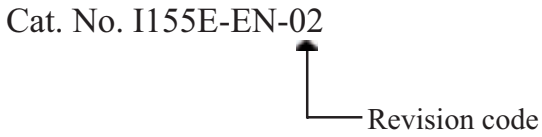
Signal		Color	Connection	No.	Connector
Resolver	S2	Blue		1	XP, YP, ZP, RP
	S4	Blue/Black		2	
	S1	Brown		3	
	S3	Brown/Black		4	
	R1	Red		5	
	R2	Black		6	
	SHIELD	Black		7	
Motor	U	Red		1	XM, YM, ZM, RM
	V	White		2	
	W	Black		3	
	PE	Yellow/Green		1	Round terminal
Brake	BK	Yellow		1	ZBK (Z-axis motor only)
	BK	Blue		2	

Origin sensor wiring table

Signal	Color	Connection	No.	Connector
+24V	Brown		1	XORG, YORG, RORG
ORG	Black		2	
0V	Blue		3	

Revision history

A manual revision code appears as a suffix to the catalog number on the front cover manual.



The following table outlines the changes made to the manual during each revision.

Revision code	Date	Description
01	December 2012	Original production
02	November 2013	Information regarding new models (R6YXGS300 and R6YXGS400) was added

OMRON

Authorized Distributor:

Cat. No. I155E-EN-02

Note: Specifications subject to change without notice.

Printed in Europe