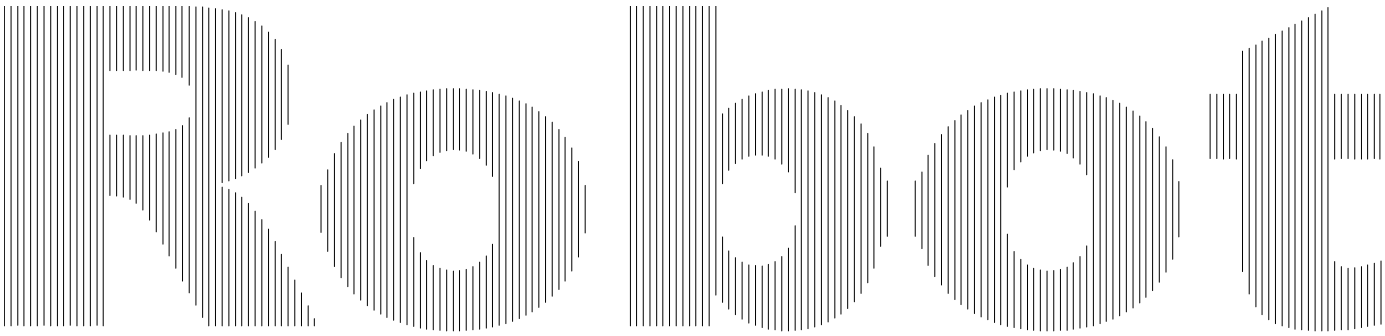
Simple and friendly

Kawasaki

Kawasaki Robot
KJ Series

Installation and Connection Manual



Kawasaki Heavy Industries, Ltd.

90202-1204DEB

Preface

This manual describes the installation and connection of Kawasaki Painting Robot KJ series.

Read and understand the contents of this and the separate “Safety Manual” thoroughly and strictly observe all rules for safety before proceeding with any operation.

This manual describes only the installation and connection of KJ series robot arm. For installation and connection of the controller and cables, see the separate manual “Installation and Connection Manual” for the controller for explosion-proof robot.

Kawasaki will not take any responsibility for any accidents and/or damages caused by operations that are based on only a limited reading of this manual.

This manual is applicable to the following KJ series robot models.

KJ314	:model with left-hand rear arm	“KJ314■-D0” “KJ314■-D4”:
	:model with right-hand rear arm	“KJ314■-D1” “KJ314■-D5”
KJ264/244/194	:model with left-hand rear arm	“KJ264■-B0” “KJ264■-B4” “KJ244■-B0” “KJ244■-B4”
(Floor mounted specification)		“KJ194■-B0” “KJ194■-B4”
	:model with right-hand rear arm	“KJ264■-B1” “KJ264■-B5” “KJ244■-B1” “KJ244■-B5”
		“KJ194■-B1” “KJ194■-B5”
KJ264/244/194	:model with left-hand rear arm	“KJ264■-D0” “KJ264■-D4” “KJ244■-D0” “KJ244■-D4”
(Wall mounted (left) specification)		“KJ194■-D0” “KJ194■-D4”
	:model with right-hand rear arm	“KJ264■-D1” “KJ264■-D5” “KJ244■-D1” “KJ244■-D5”
		“KJ194■-D1” “KJ194■-D5”
KJ264/244/194	:model with left-hand rear arm	“KJ264■-F0” “KJ264■-F4” “KJ244■-F0” “KJ244■-F4”
(Wall mounted (right) specification)		“KJ194■-F0” “KJ194■-F4”
	:model with right-hand rear arm	“KJ264■-F1” “KJ264■-F5” “KJ244■-F1” “KJ244■-F5”
		“KJ194■-F1” “KJ194■-F5”
KJ264/244/194	:model with left-hand rear arm	“KJ264■-H0” “KJ264■-H4” “KJ244■-H0” “KJ244■-H4”
(Shelf mounted specification)		“KJ194■-H0” “KJ194■-H4”
	:model with right-hand rear arm	“KJ264■-H1” “KJ264■-H5” “KJ244■-H1” “KJ244■-H5”
		“KJ194■-H1” “KJ194■-H5”

(■: J=Japan explosion-specification C=China explosion-specification
U=North America explosion-specification
E=Europe explosion-specification (Type-E)
P= Europe explosion-specification (Type-P))
Refer to "Standard specifications" for robot shape.

1. This manual does not constitute a guarantee of the systems in which the robot is utilized. Accordingly, Kawasaki is not responsible for any accidents, damages, and/or problems relating to industrial property rights as a result of using the system.
2. It is recommended that all personnel assigned for activation of operation, teaching, maintenance or inspection of the robot attend the necessary education/training course(s) prepared by Kawasaki, before assuming their responsibilities.
3. Kawasaki reserves the right to change, revise, or update this manual without prior notice.
4. This manual may not, in whole or in part, be reprinted or copied without the prior written consent of Kawasaki.
5. Store this manual with care and keep it available for use at any time. If the robot is reinstalled or moved to a different site or sold off to a different user, attach this manual to the robot without fail. In the event the manual is lost or damaged severely, contact Kawasaki.

Symbols

The items that require special attention in this manual are designated with the following symbols.

Ensure proper and safe operation of the robot and prevent physical injury or property damage by complying with the safety matters given in the boxes with these symbols.

⚠ DANGER

Failure to comply with indicated matters can result in imminent injury or death.

⚠ WARNING

Failure to comply with indicated matters may possibly lead to injury or death.

⚠ CAUTION

Failure to comply with indicated matters may lead to physical injury and/or mechanical damage.

[NOTE]

Denotes precautions regarding robot specification, handling, teaching, operation, and maintenance.

⚠ WARNING

1. **The accuracy and effectiveness of the diagrams, procedures, and detail explanations given in this manual cannot be confirmed with absolute certainty. Accordingly, it is necessary to give one's fullest attention when using this manual to perform any work. Should any unexplained questions or problems arise, please contact Kawasaki.**
2. **Safety related contents described in this manual apply to each individual work and not to all robot work. In order to perform every work in safety, read and fully understand the separate "Safety Manual," all pertinent laws, regulations and related materials as well as all the safety explanations described in each chapter, and prepare safety measures suitable for actual work.**

Table of Contents

1 Precautions

This chapter only describes safety precautions during installation and connection of the robot arm. For all other safety matters, refer to the separate "Safety Manual."

1.1 Precautions during Transportation and Storage

When transporting the Kawasaki Robot to its installation site, strictly observe the following cautions.

⚠ WARNING

1. **When the robot arm is to be transported by using a crane or forklift, never support the robot arm by hand.**
2. **During transportation, never climb on the robot arm or stay under the hoisted robot arm.**

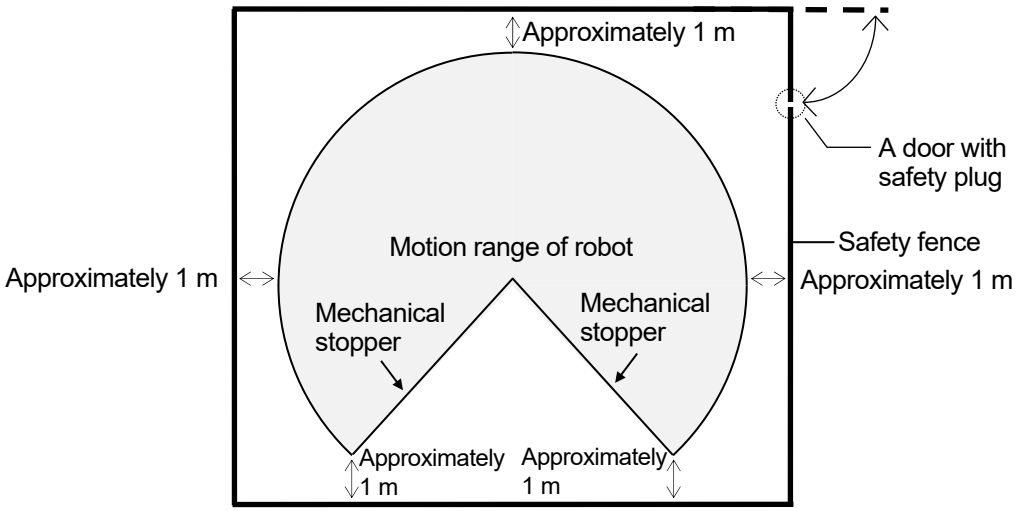
⚠ CAUTION

1. **Since the robot arm is composed of precision parts, be careful not to apply excessive shocks during transportation.**
2. **When transporting the robot arm using a crane or forklift, remove all obstacles prior to installation and clear a passage to the installation area so the installation is carried out smoothly and safely.**
3. **During transportation and storage,**
   - **(1) Keep the ambient temperature within the range of minus 10 to 60°C,**
   - **(2) Keep the relative humidity within the range of 35 to 85% RH without dew condensation,**
   - **(3) Keep free from excessively strong vibration and shock.**

1.2 Installing Environments of Robot Arm

The robot arm must be installed in a place that satisfies all the following environmental conditions:

1. When robot is installed on the floor, the levelness must be within ±5°.
2. Be sure that the installation floor/pedestal has sufficient rigidity.
3. Secure a flatness to prevent undue force applied to the installation section. (If sufficient flatness is unobtainable, insert liners and adjust the flatness within 0.3 mm of the surface.)
4. Keep the ambient temperature during operation within the range of 0 to 40°C. (Deviation or overload error may occur due to high viscosity of grease/oil when starting operation at low temperatures. In this case, move the robot at low speed before regular operation.)
5. Keep the relative humidity during operation within the range of 35 to 85%RH without dew condensation.
6. The robot installing place should be free from dust, dirt, smoke, water, and other foreign matters.
7. The robot installing place should be free from excessively strong vibration.
8. The robot installing place should be free from electric noise interference.
9. The robot installing place should be sufficiently larger than the motion range of robot arm.
   (1) Set up a safety fence around the robot providing adequate space for the robot's maximum motion range and without causing any interference to the tools on the robot arm.
   (2) Provide an entrance door with a safety plug for the safety fence.
   (3) Follow national/local standards regarding safety fence construction/function. (e.g. ISO 14120, ISO 13857, ISO 13854, ISO 14119)



[NOTE]

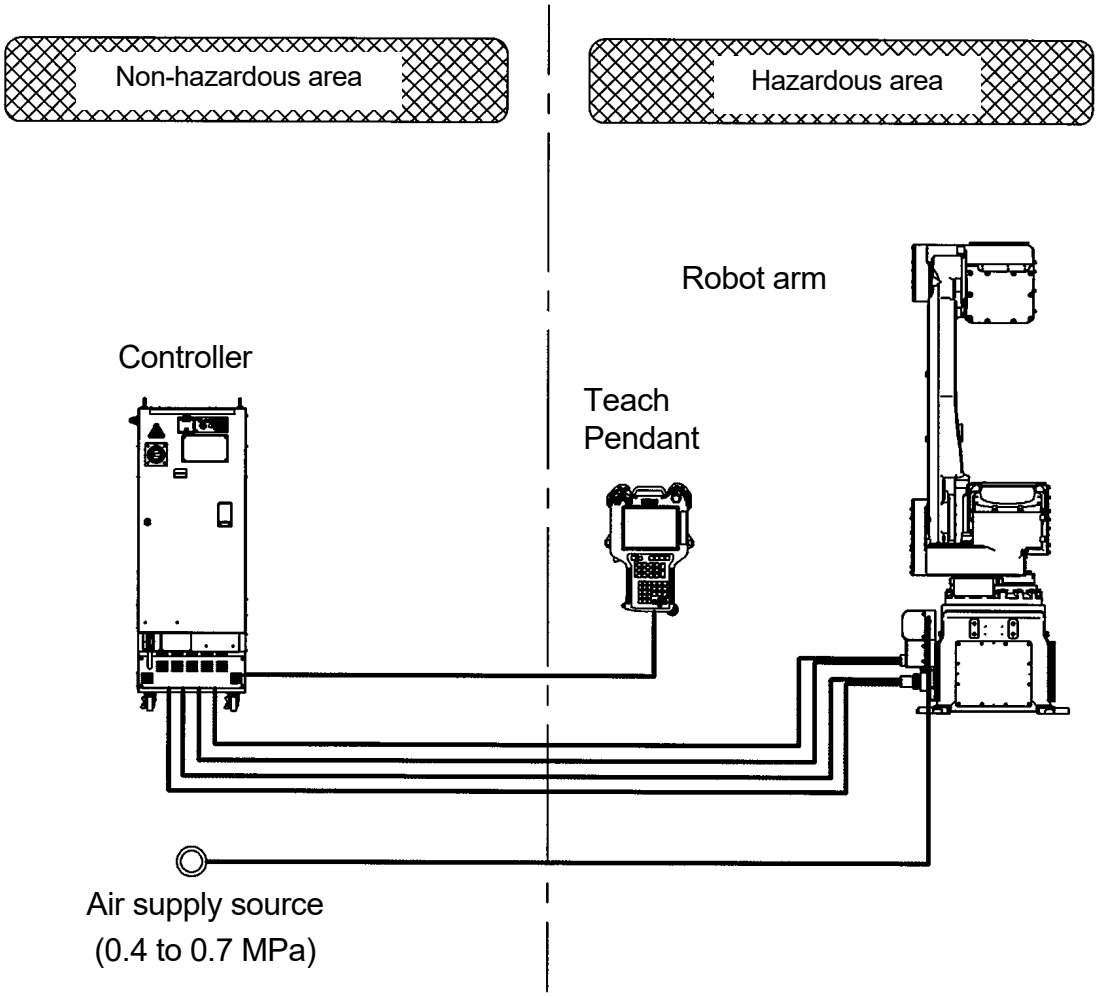
Protect sealed joints, etc. on the robot arm axes with vinyl sheets, etc. to prevent paint mist/foreign materials from entering.

1.3 Cautionary Instructions for Explosion-Proof

KJ series are explosion-proof specified robots protected by pressurized and intrinsically safe structures. Strictly observe the following instructions for safe operation.

⚠ DANGER

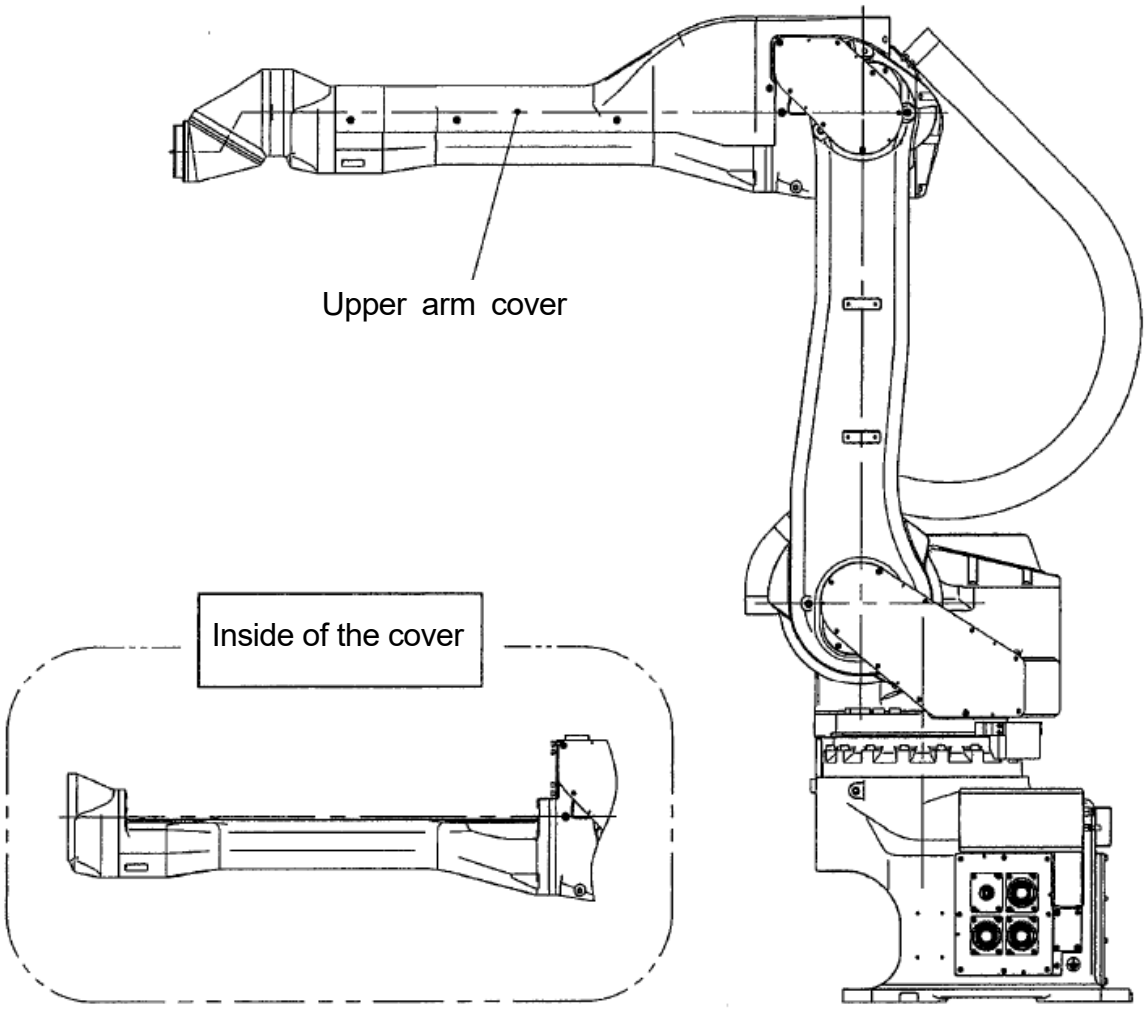
1. **This painting robot has pressurized enclosures for explosion-proof specifications. Before loosening the bolts from any pressurized enclosure, always follow instructions from the person in charge.**
   - **(1) Do not loosen tightening bolts of pressurized enclosures without instructions from the person in charge.**
   - **(2) Do not open the cover of a pressurized enclosure while electricity is supplied to robot.**
2. **Install controller in a non-hazardous area where there is no possibility of explosion. Before accessing the robot for maintenance and inspection of the robot, or for making adjustments to painting system, always turn OFF controller power switch and external power switch , close the air supply valve and confirm there is no residual pressure.**



The upper arm cover for KJ series robot is made of FRP, and the flexible tube for protecting paint piping/wiring is made of polyamide plastic. For safety, pay attention to the followings when working in a hazardous area where there is possibility of explosion.

⚠ WARNING

1. **If static electricity is charged in plastic part, it may spark and cause ignition. Conduct working after discharging static electricity using neutralizing apparatus, etc.**
2. **During maintenance/inspection, use only anti-static tools to prevent electrification of robot parts.**



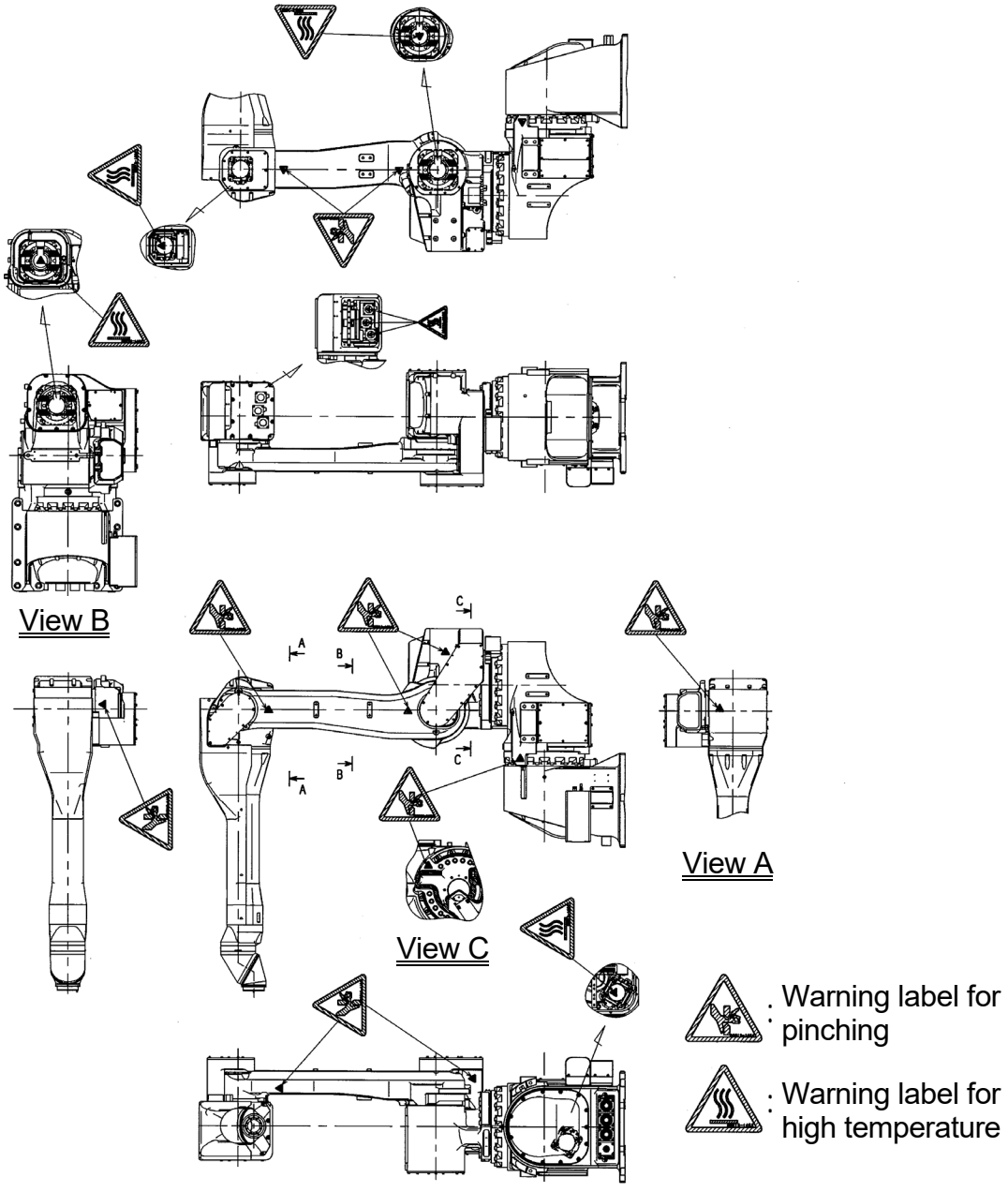
1.4 Residual Risks

KJ314

(The shape and residual risk places of models with right-hand rear arm are mirror symmetry of models with left-hand rear arm.)

⚠ WARNING

While at work, pay attention to the risks remained in places where warning labels are attached in the drawings below.



KJ264/244/194 (Floor mounted specification)

(The shape and residual risk places of models with right-hand rear arm are mirror symmetry of models with left-hand rear arm.)

⚠ WARNING

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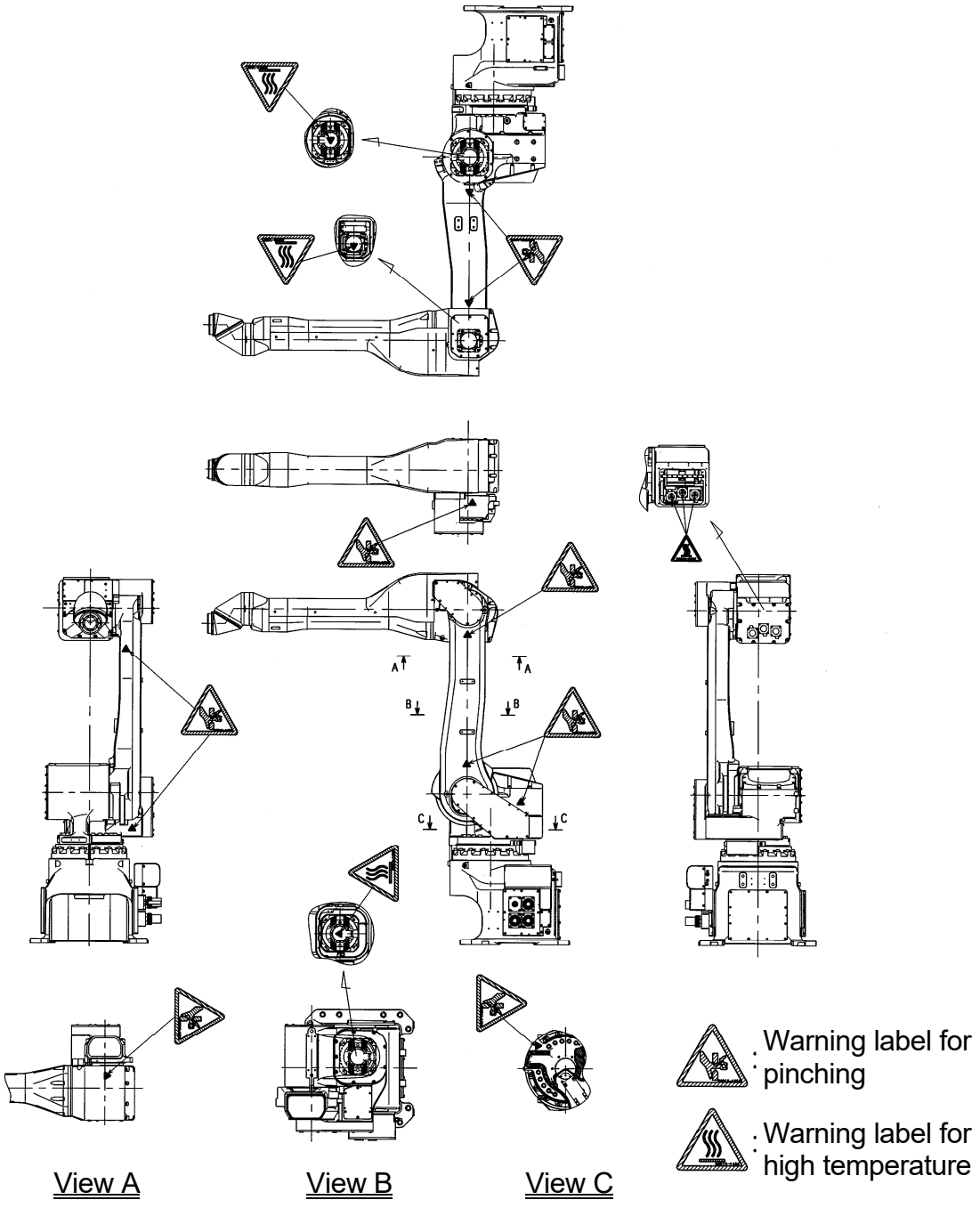
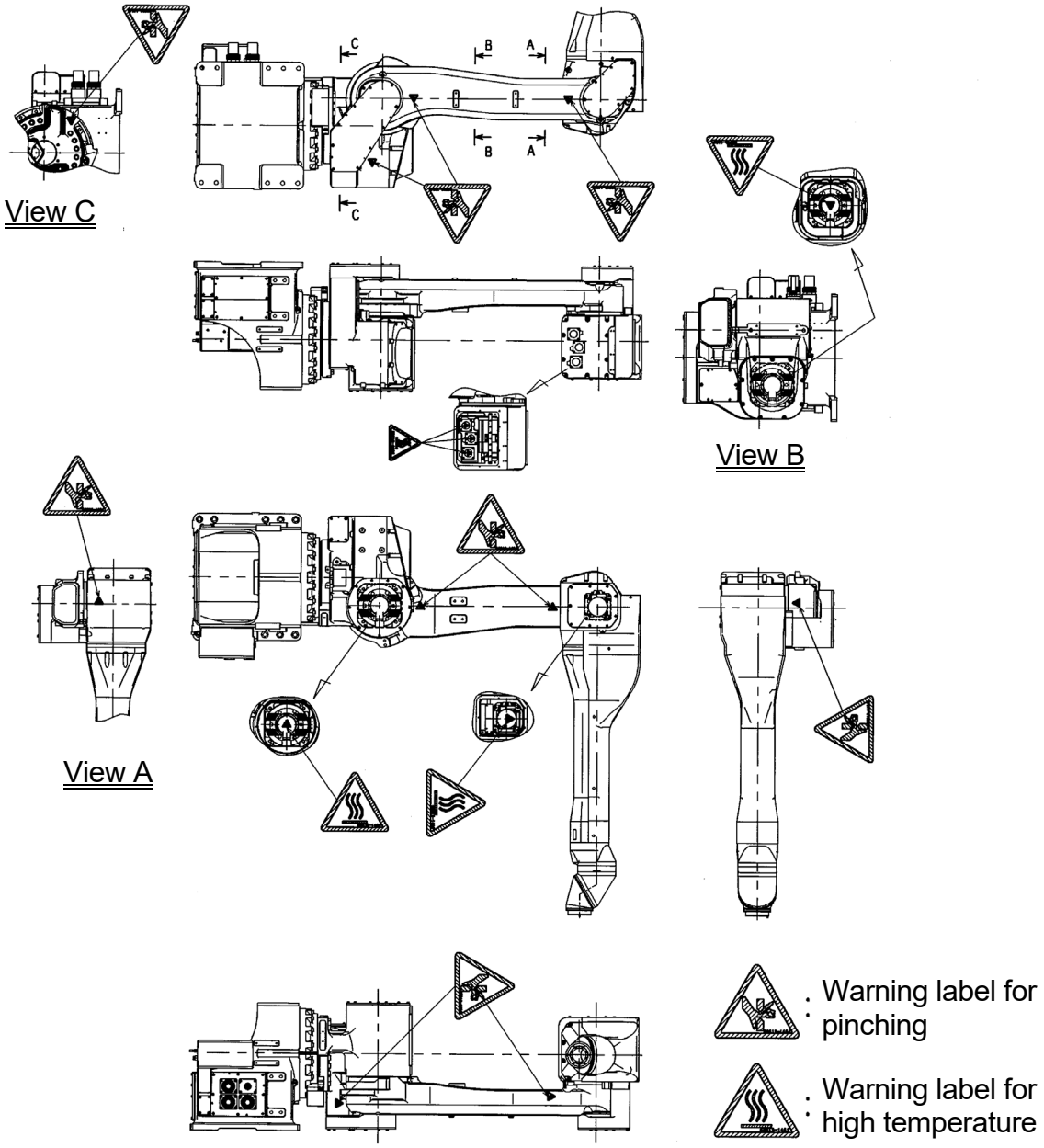


KJ264/244/194 (Wall mounted (left) specification)

(The shape and residual risk places of models with right-hand rear arm are mirror symmetry of models with left-hand rear arm.)

⚠ WARNING

While at work, pay attention to the risks remained in places where warning labels are attached in the drawings below.

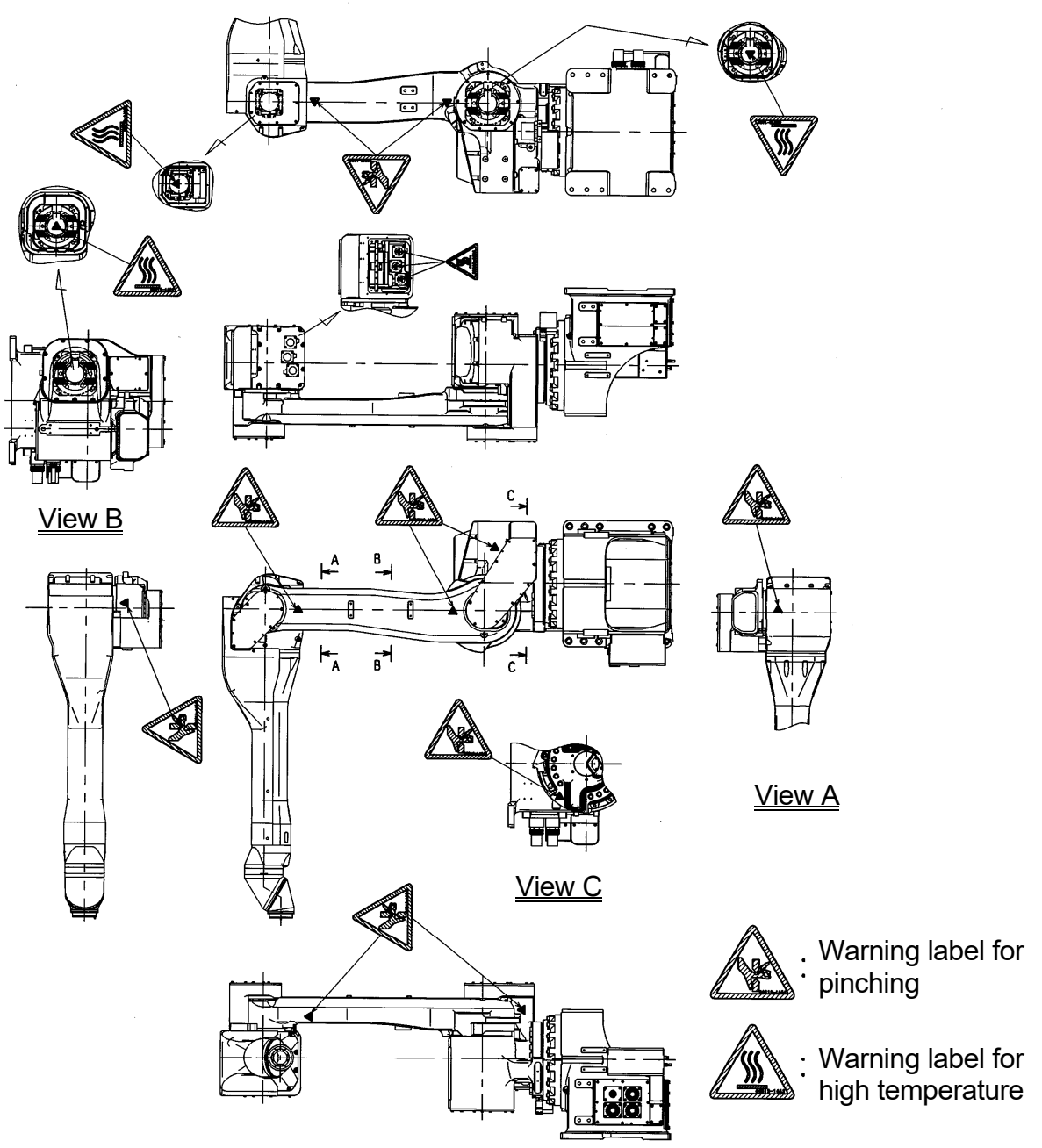


KJ264/244/194 (Wall mounted (right) specification)

(The shape and residual risk places of models with right-hand rear arm are mirror symmetry of models with left-hand rear arm.)

⚠ WARNING

While at work, pay attention to the risks remained in places where warning labels are attached in the drawings below.

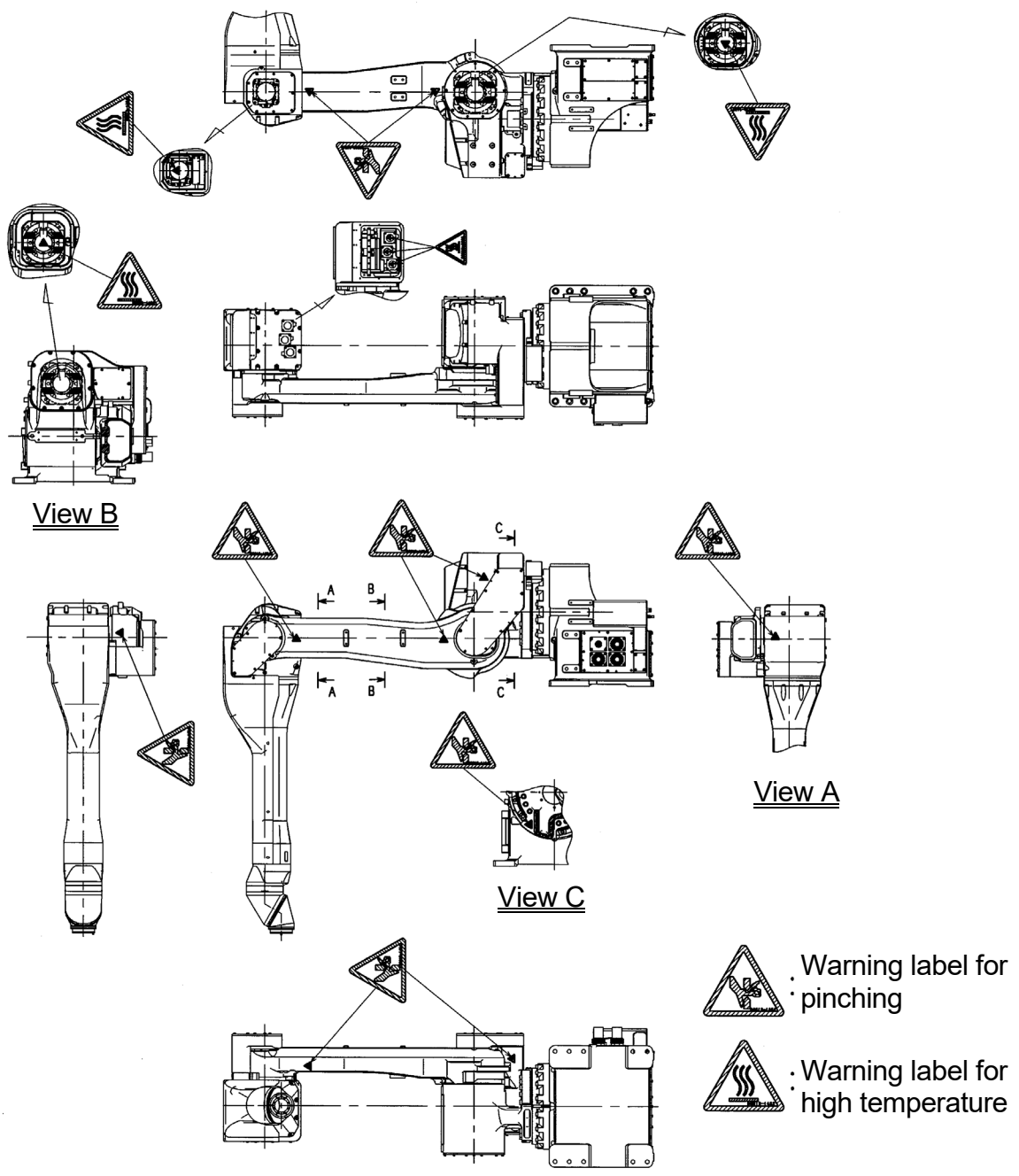


KJ264/244/194 (Shelf mounted specification)

(The shape and residual risk places of models with right-hand rear arm are mirror symmetry of models with left-hand rear arm.)

⚠ WARNING

While at work, pay attention to the risks remained in places where warning labels are attached in the drawings below.



2 Motion Range and Specifications of Robot

Determination of safety fence installation location based on motion range of the robot.

KJ314

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)

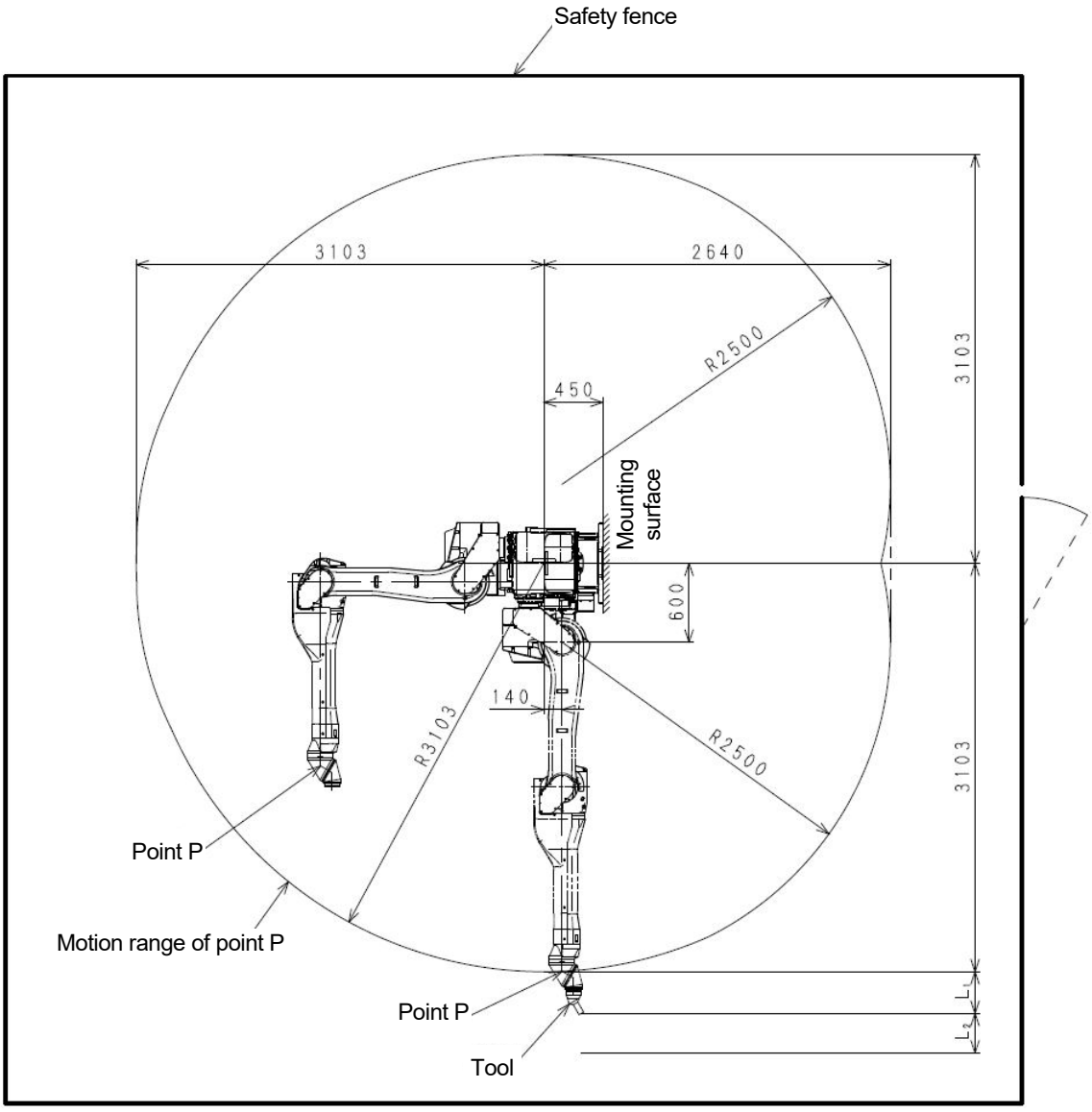
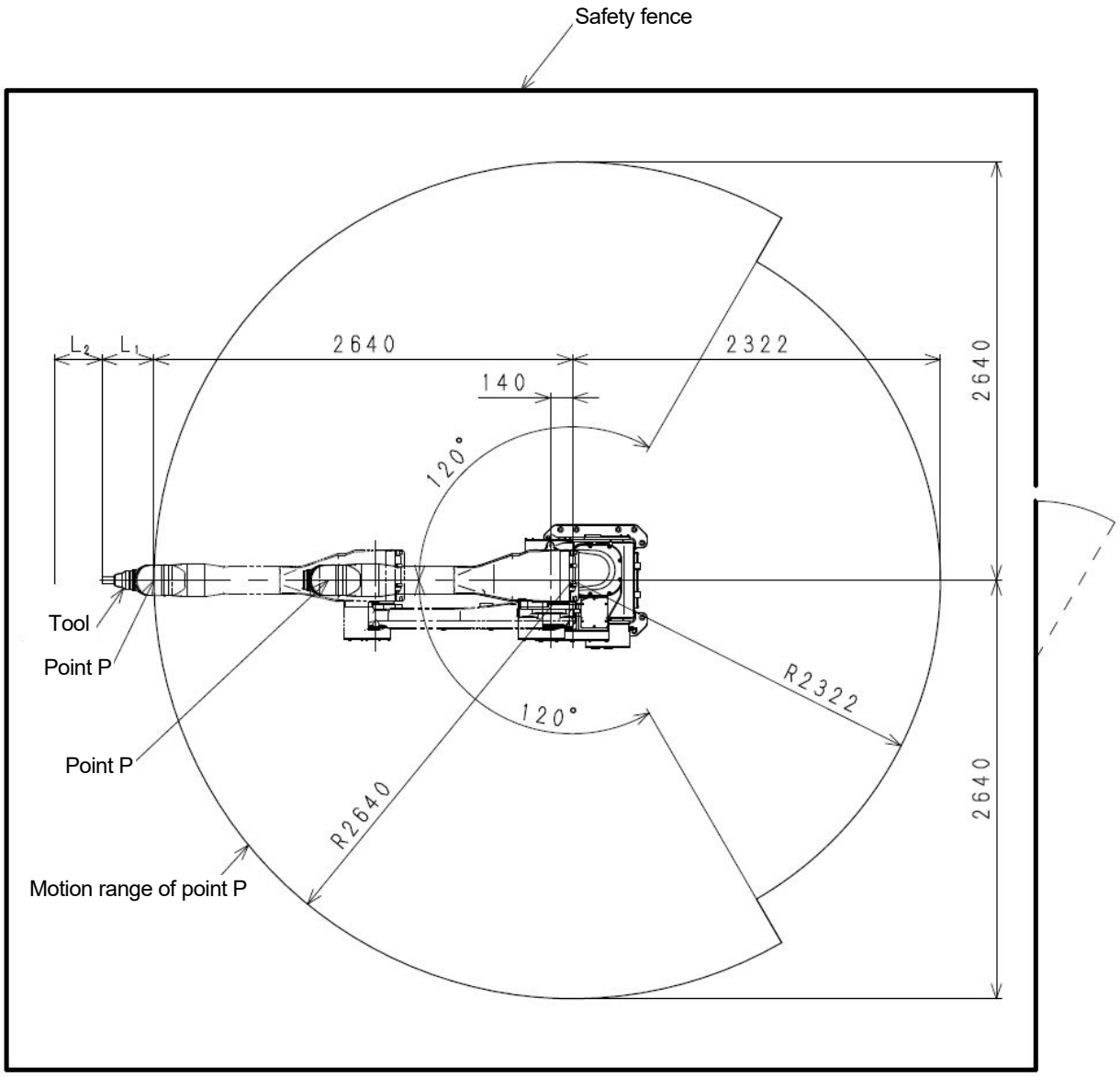


Figure above shows the top view of the robot. The maximum motion range of the robot is indicated based on the point P. Safety fence dimension must be larger than total dimension calculated as: maximum motion range of robot + L_1+L_2, where L_1 is maximum distance from the point P to tool tip, and L_2 is distance for safety allowance.

KJ264 (Floor mounted specification)

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)



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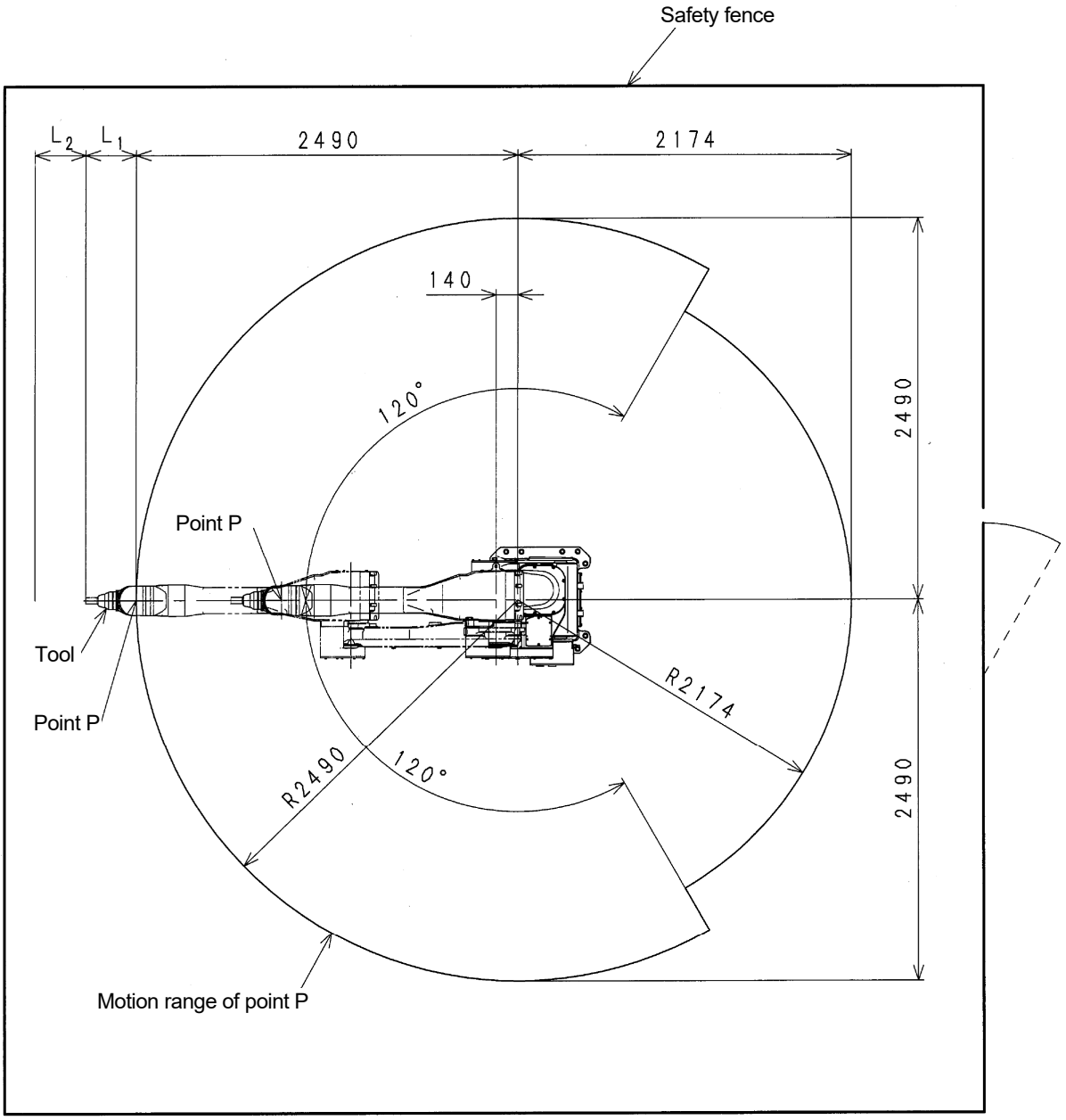
KJ244 (Floor mounted specification)

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)



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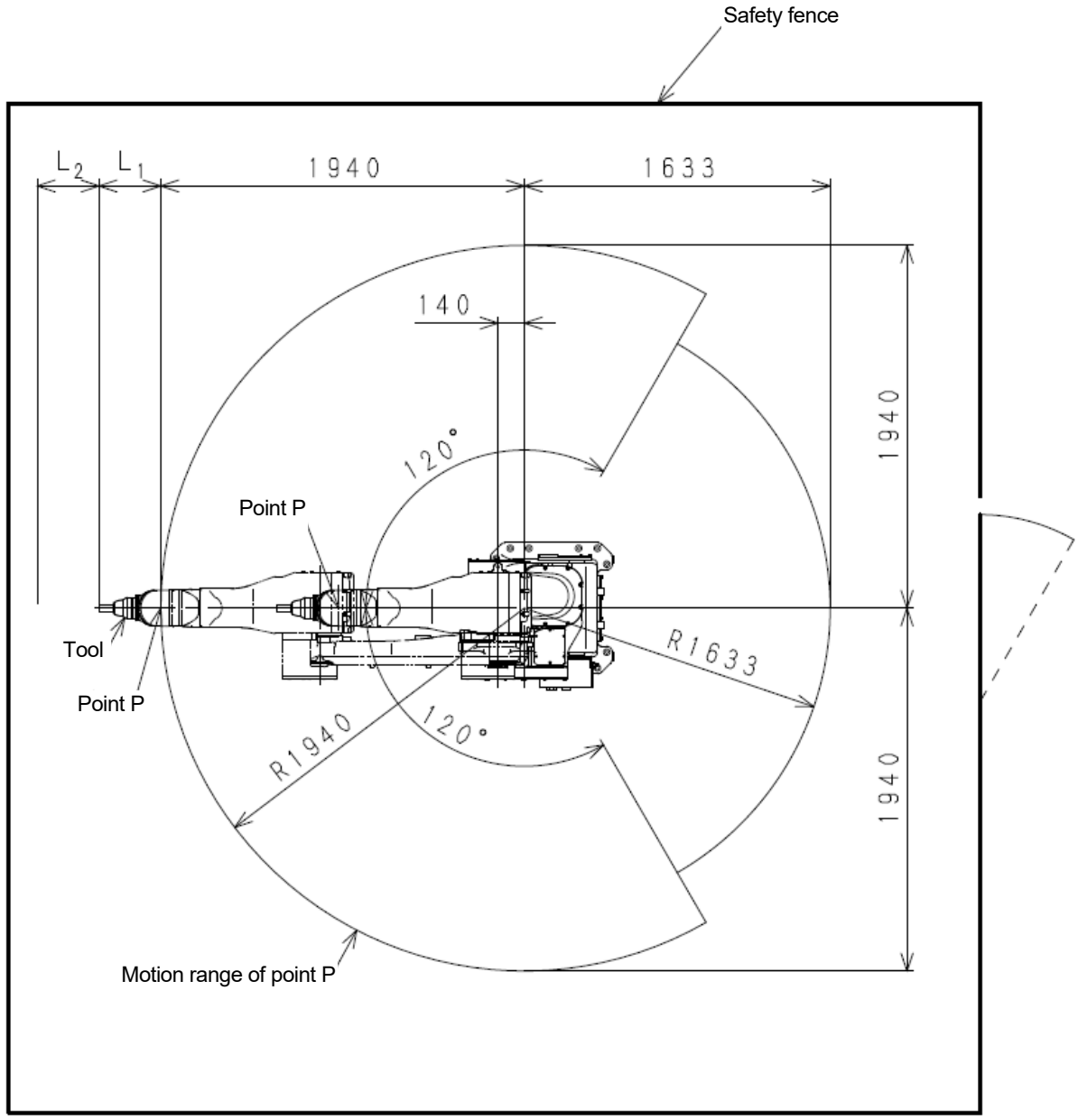
KJ194 (Floor mounted specification)

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)



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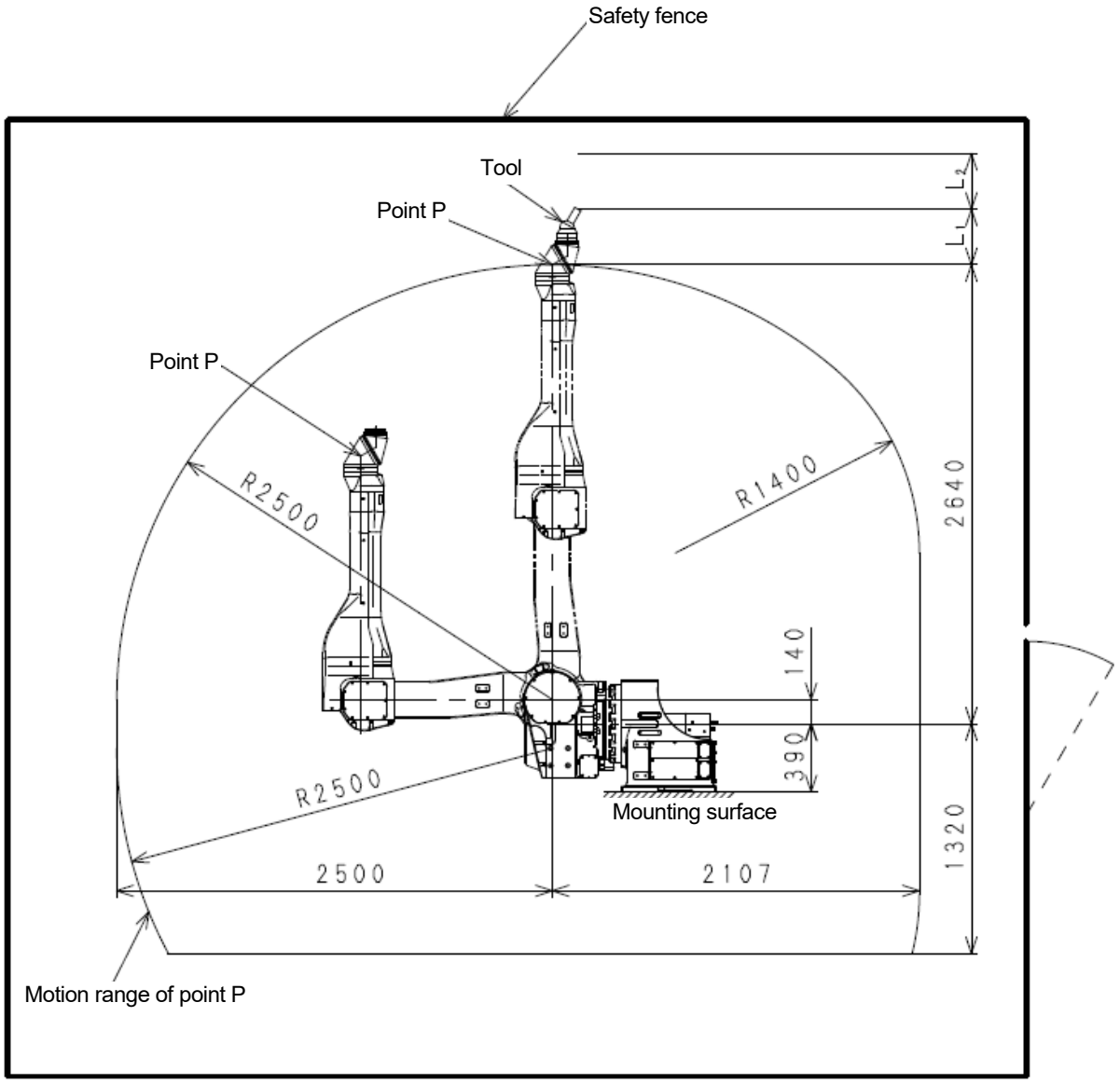
KJ264 (Wall mounted (left) specification)

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)



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KJ244 (Wall mounted (left) specification)

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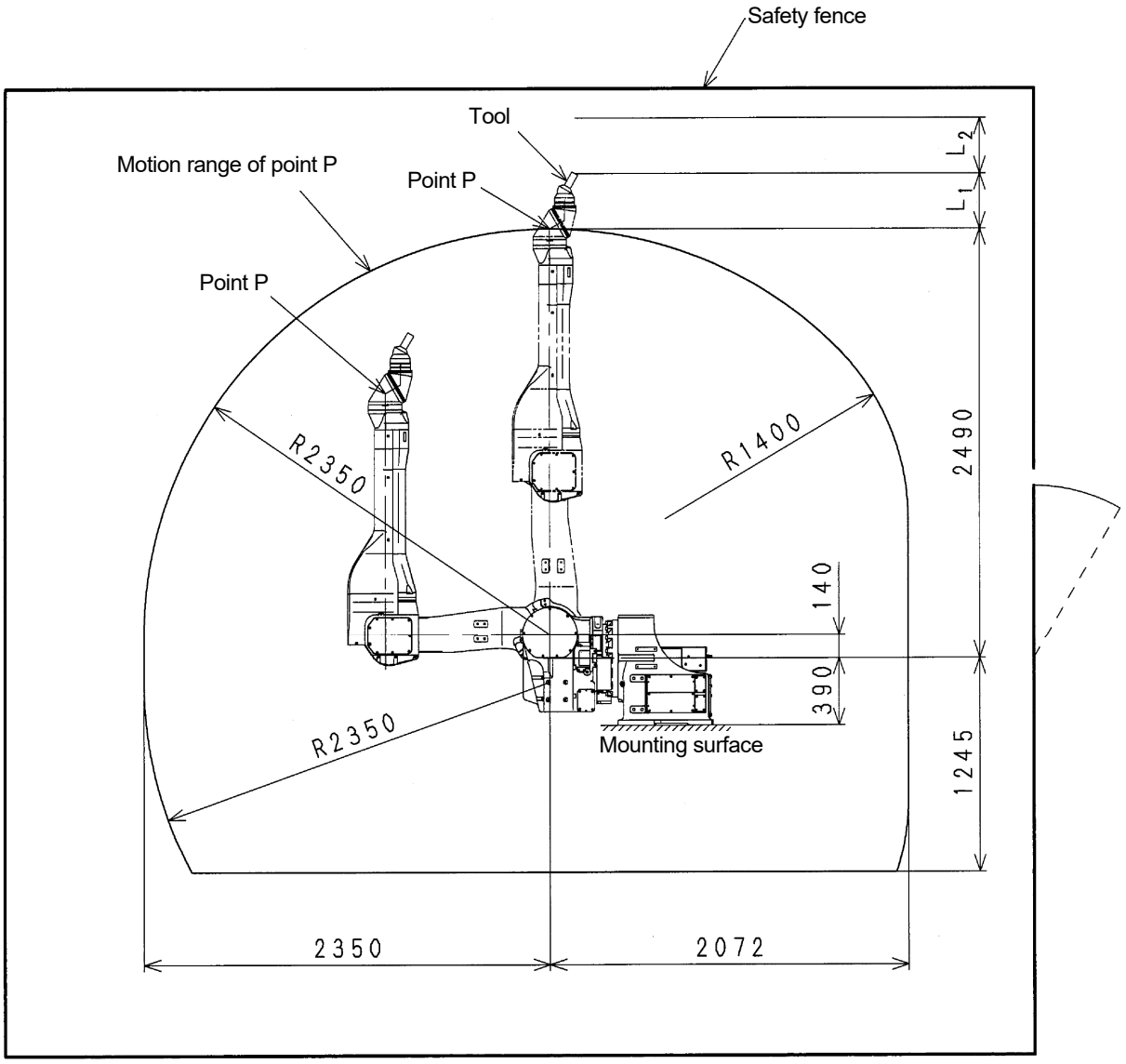

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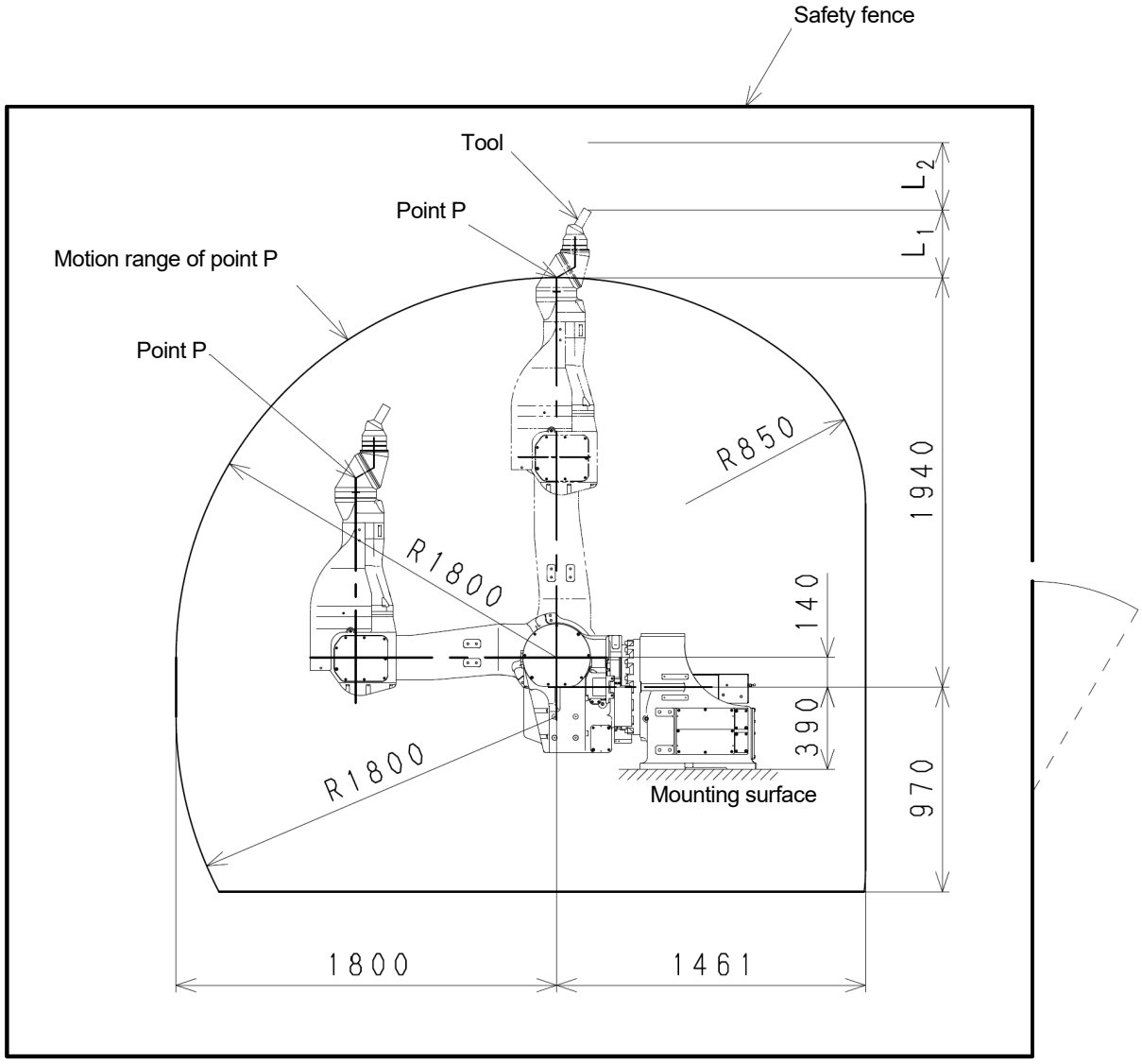
KJ194 (Wall mounted (left) specification)

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)



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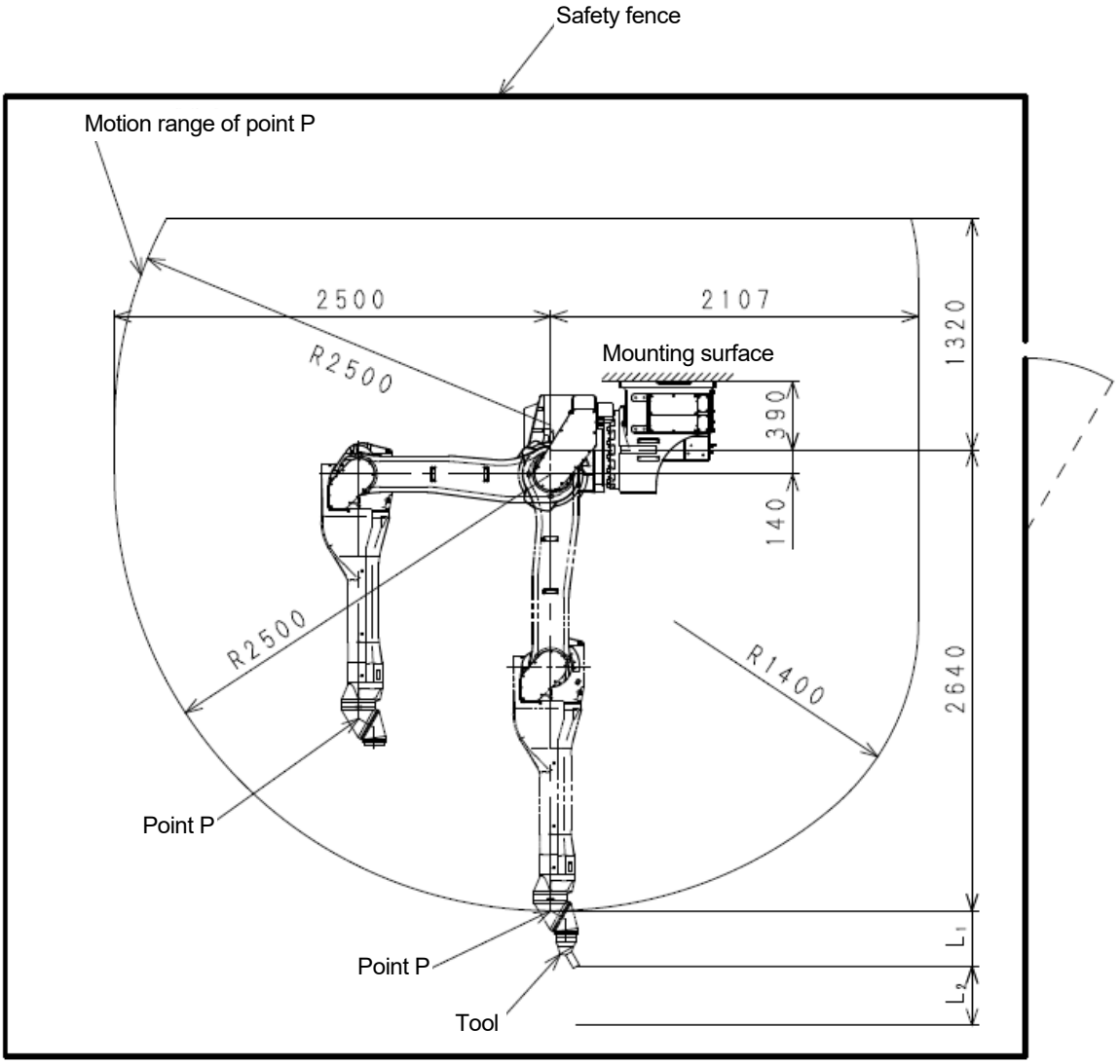
KJ264 (Wall mounted (right) specification)

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)



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KJ244 (Wall mounted (right) specification)

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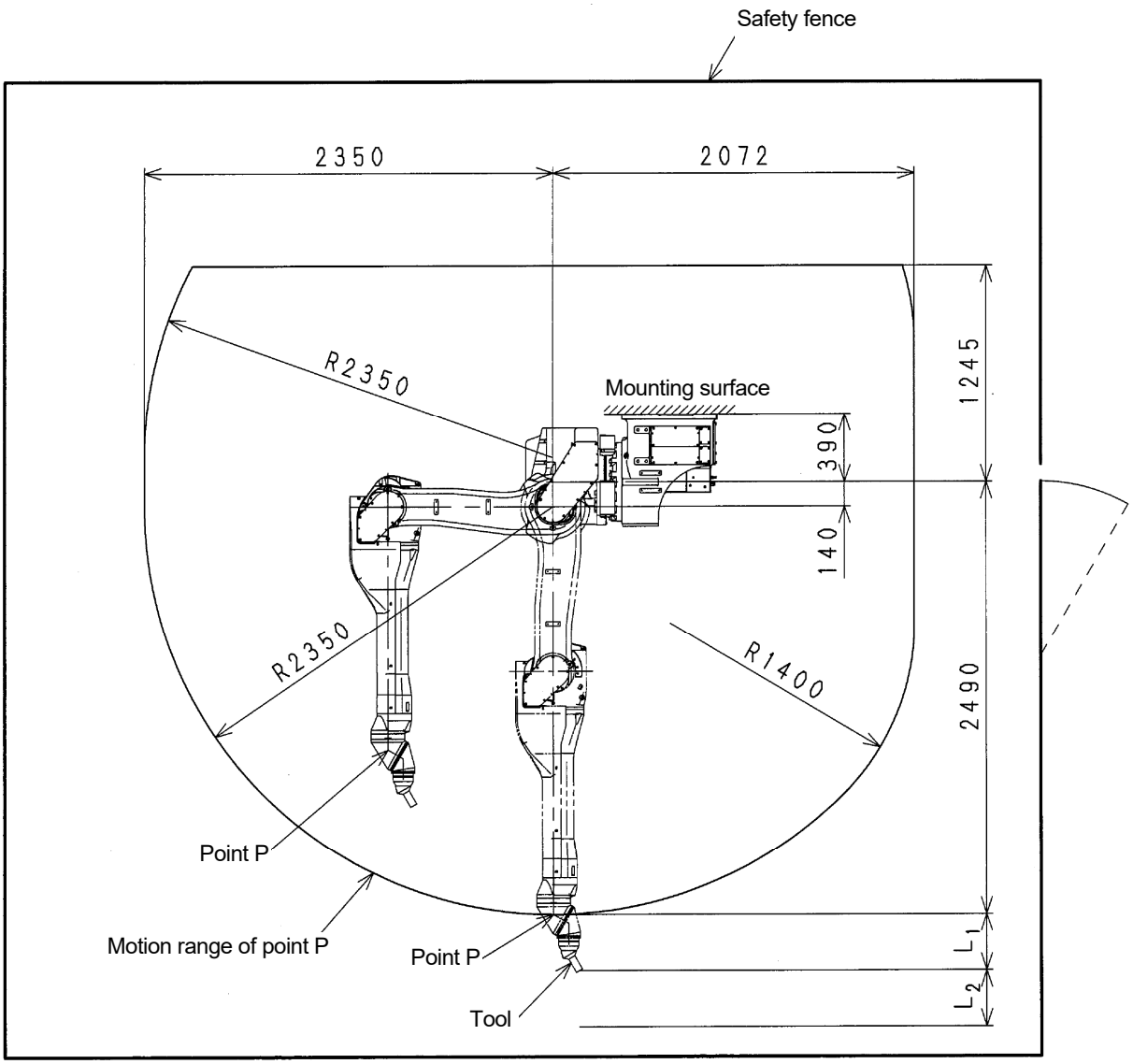

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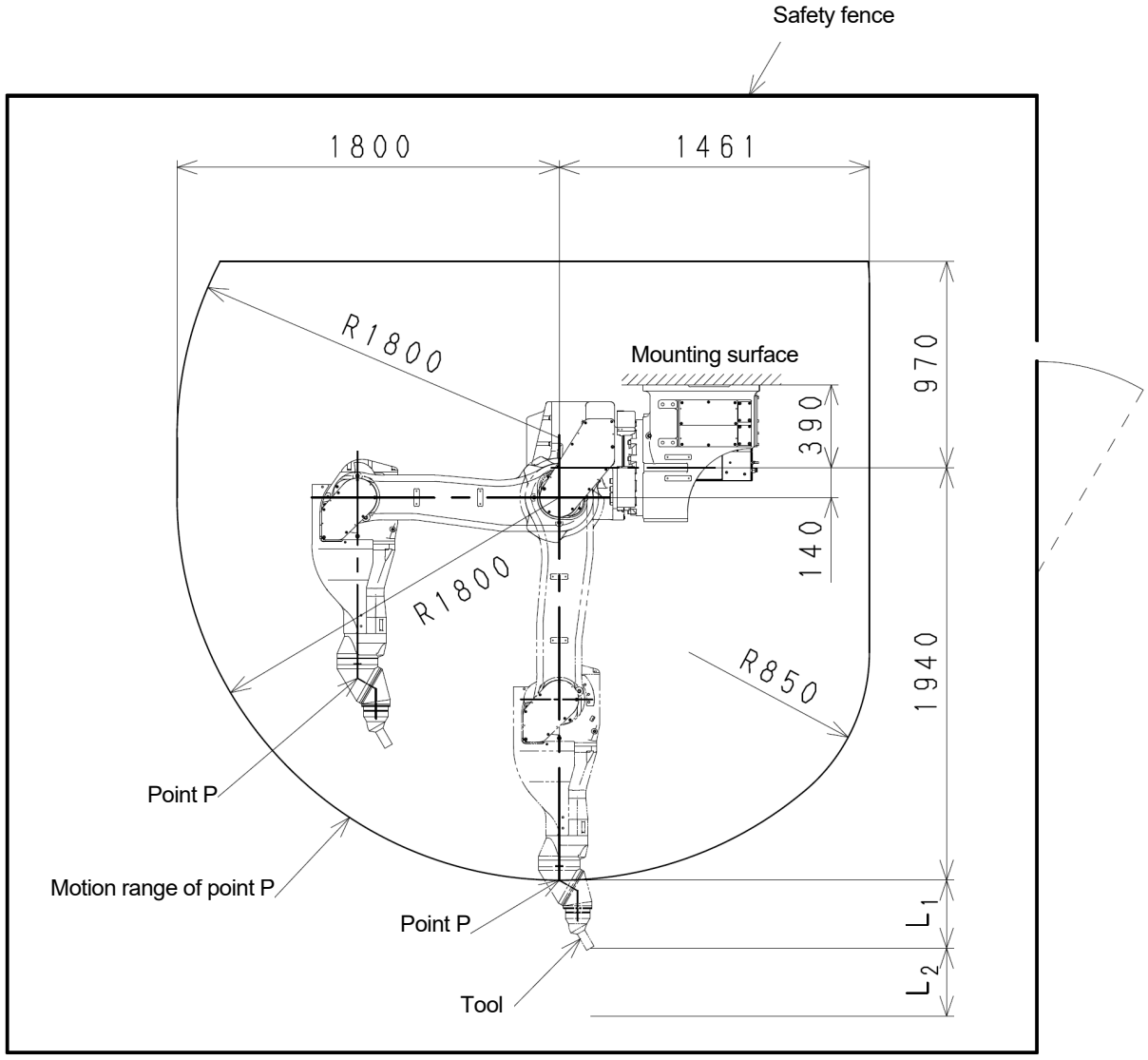

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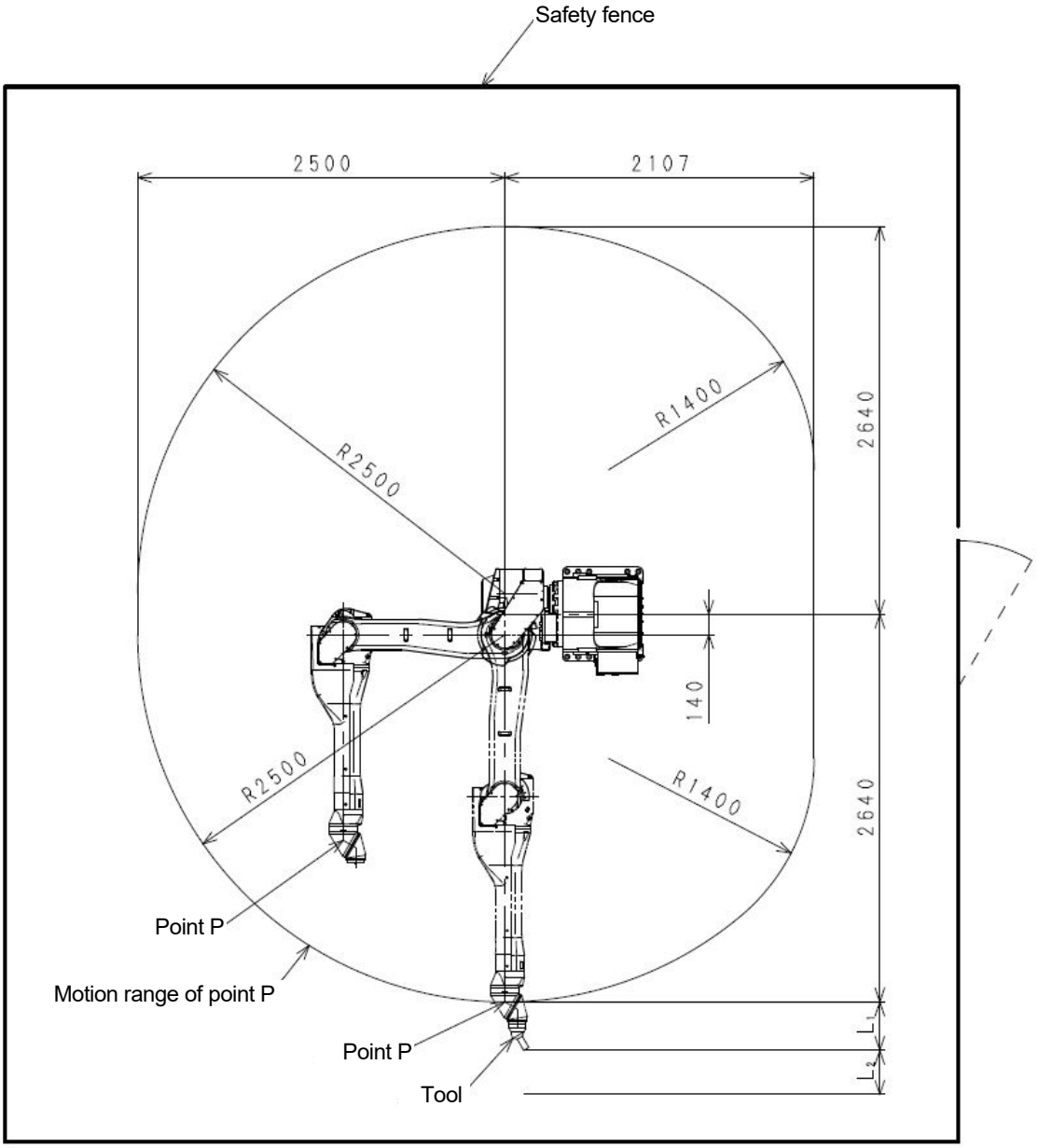
KJ264 (Shelf mounted specification)

(There are no differences in the motion range between models with left-hand and right-hand rear arms.)



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KJ244 (Shelf mounted specification)

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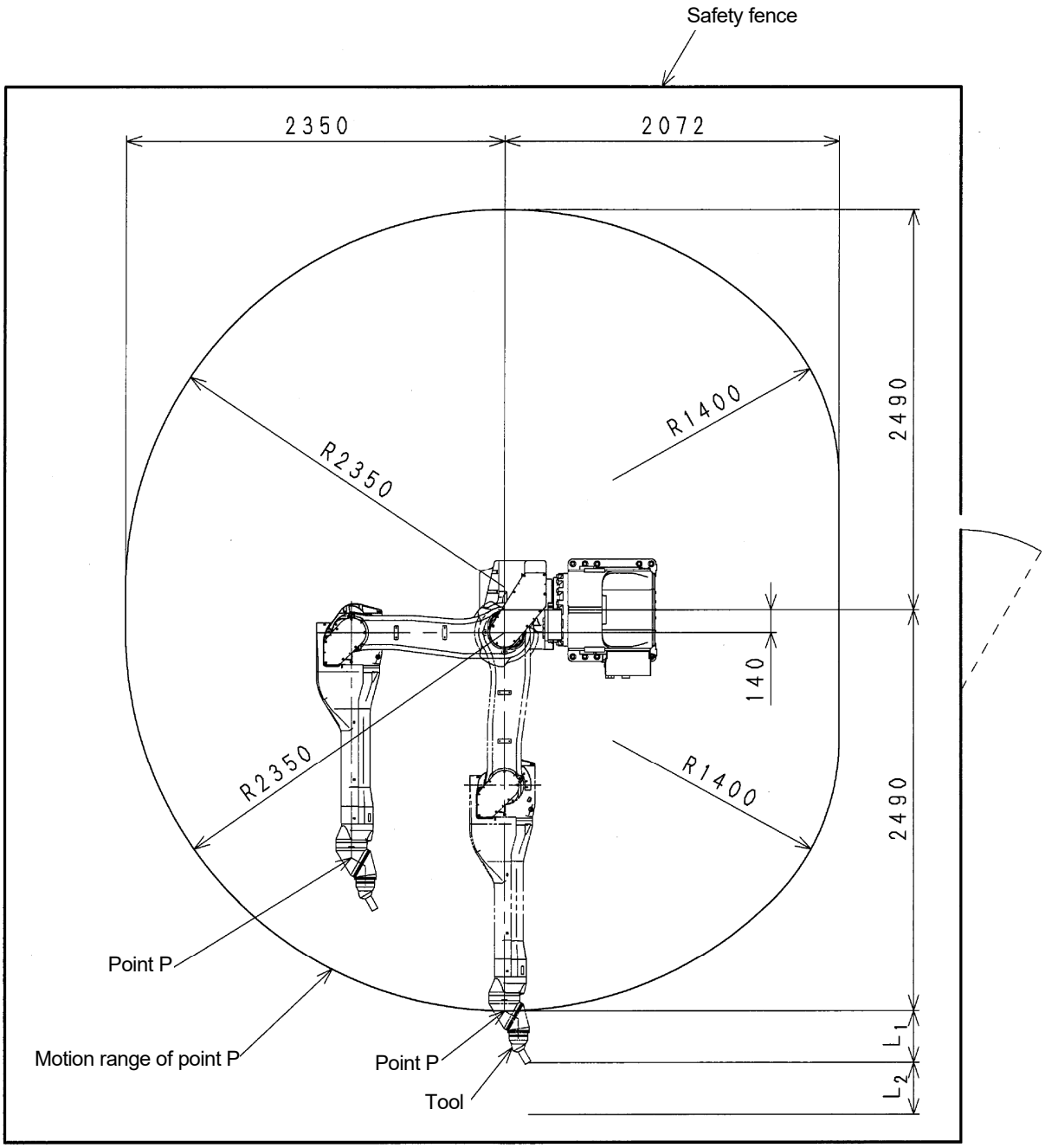

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KJ194 (Shelf mounted specification)

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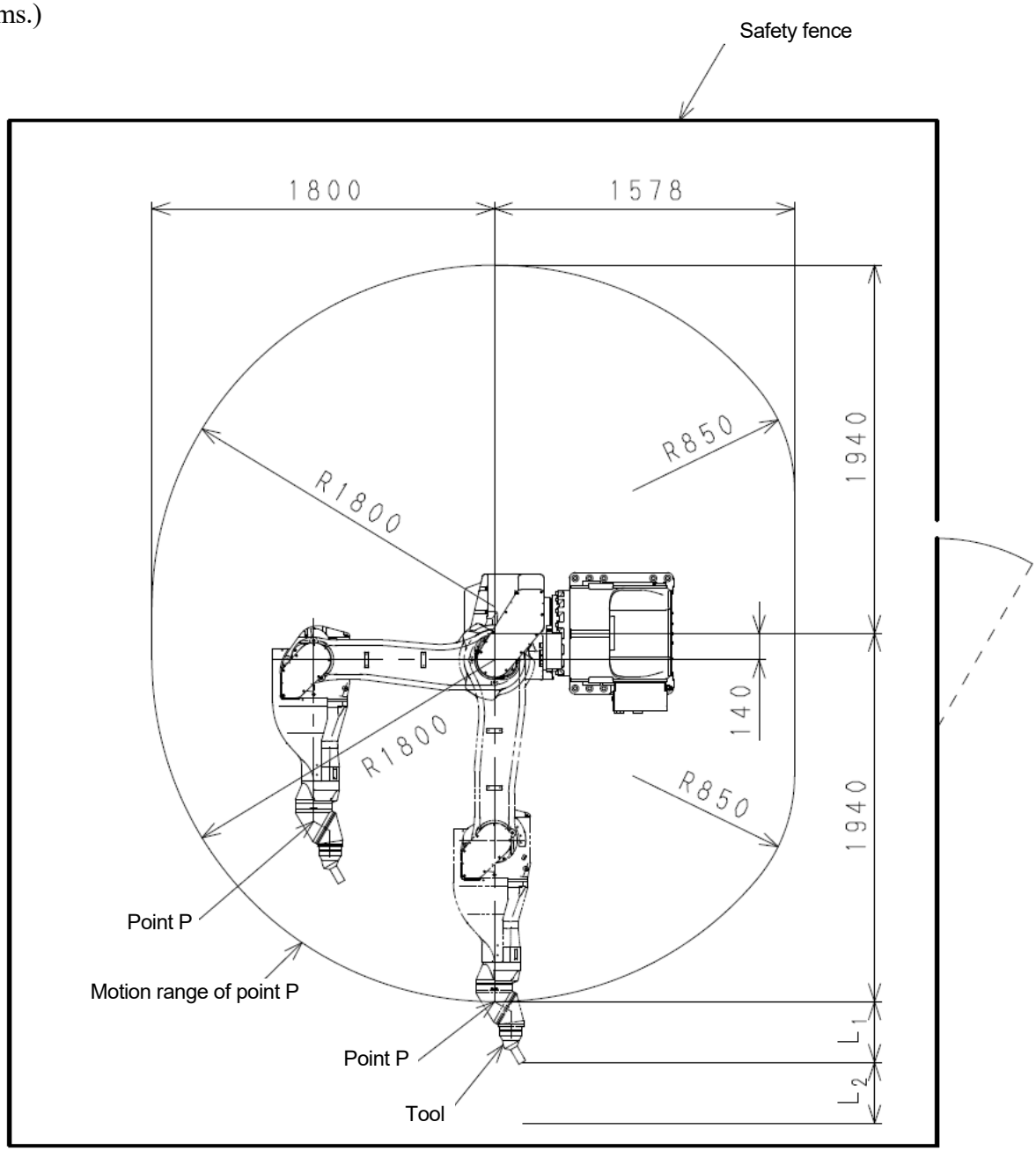

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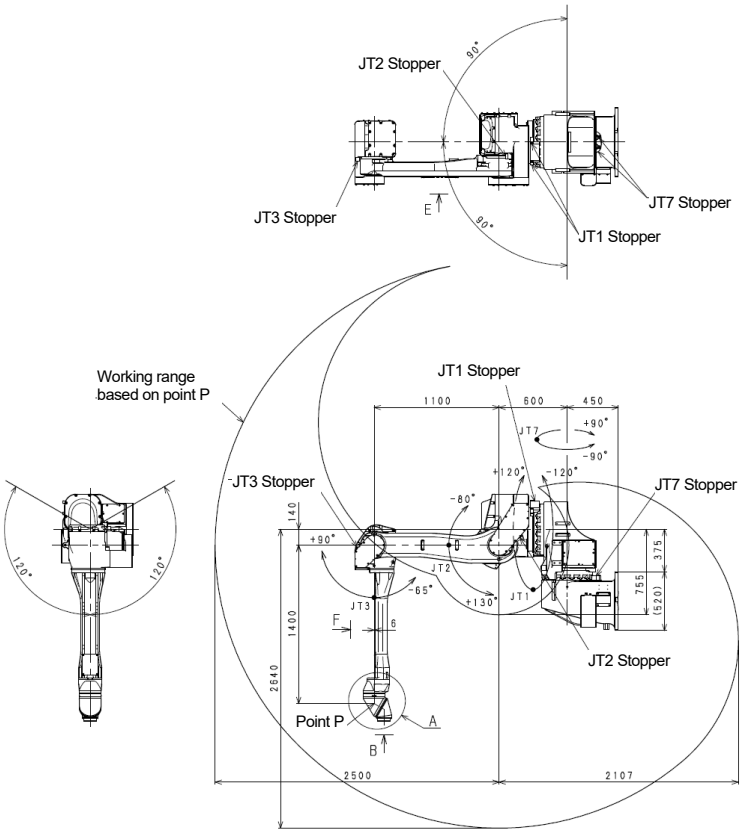
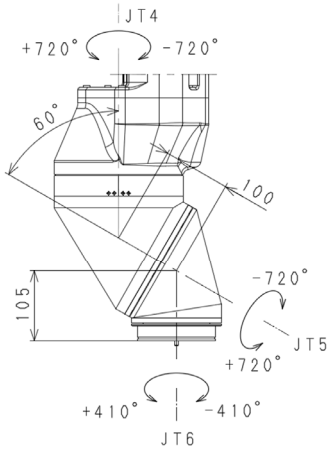
KJ314

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	7		
Motion range	JT	Motion range	
	1	+120° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
	7	±90°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 720 kg		
Acoustic noise	79 dB (A)*		



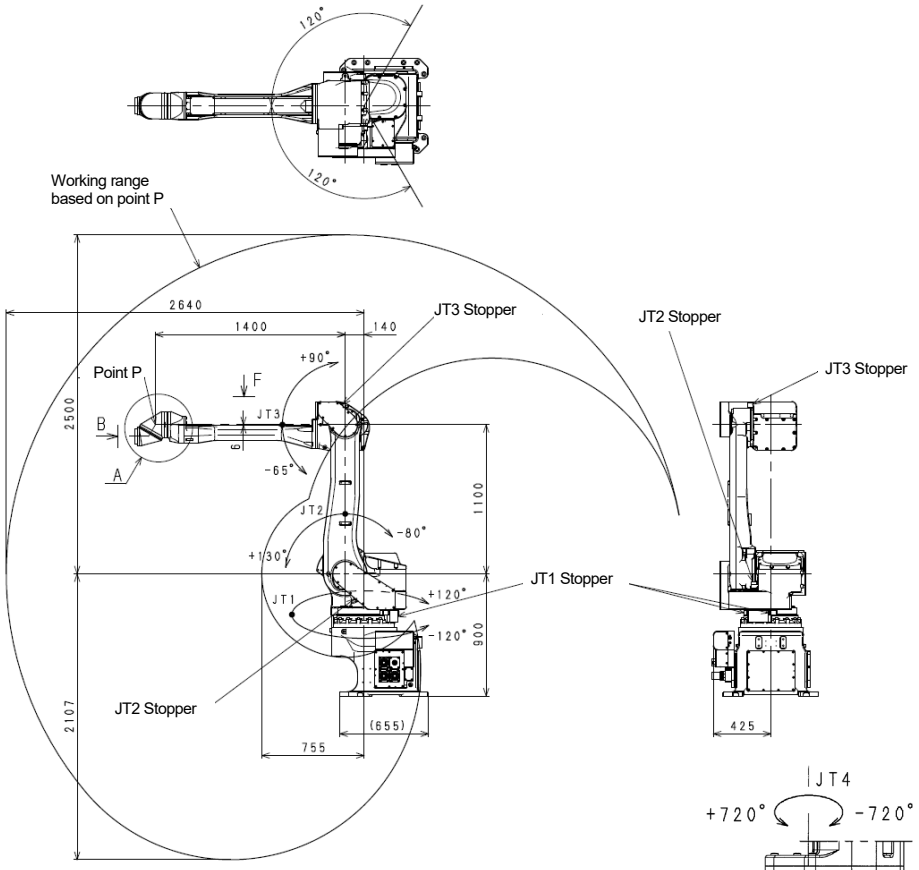
Detail A

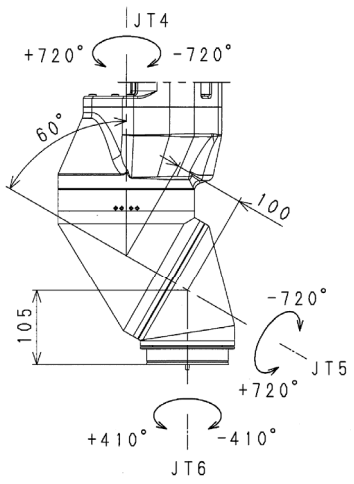
Note* Measured condition:

- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range (The noise level depends on the conditions.)

KJ264 (Floor mounted specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)





Detail A

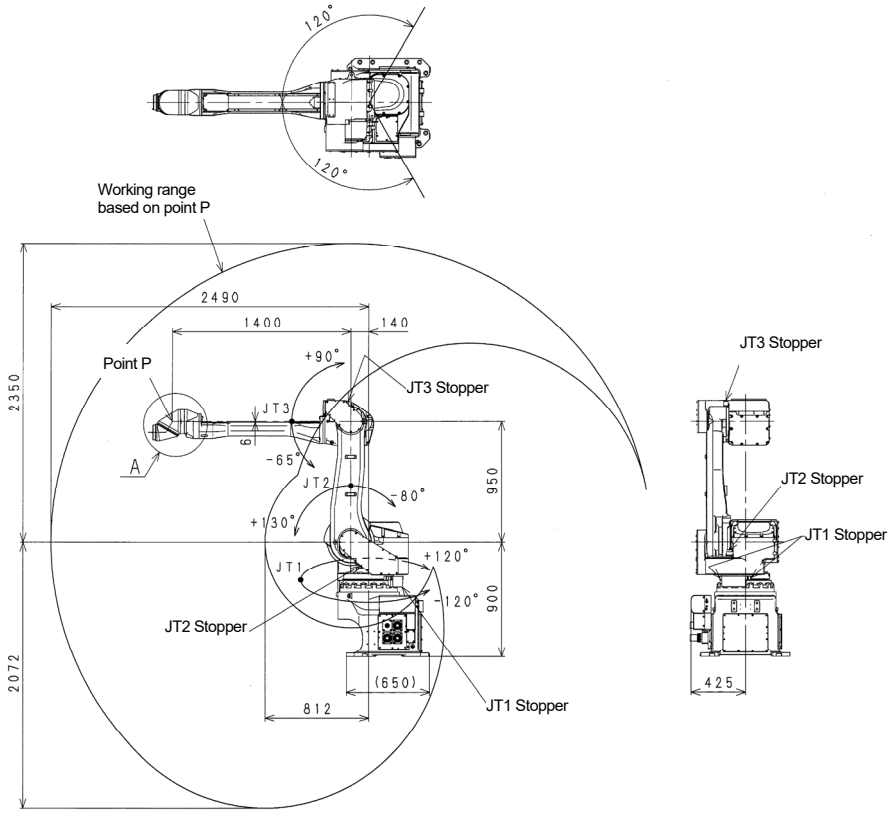
Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 540 kg		
Acoustic noise	79 dB (A)*		

Note* Measured condition:

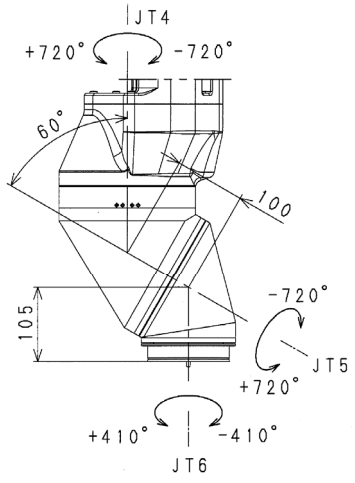
- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ244 (Floor mounted specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 540 kg		
Acoustic noise	79 dB (A)*		



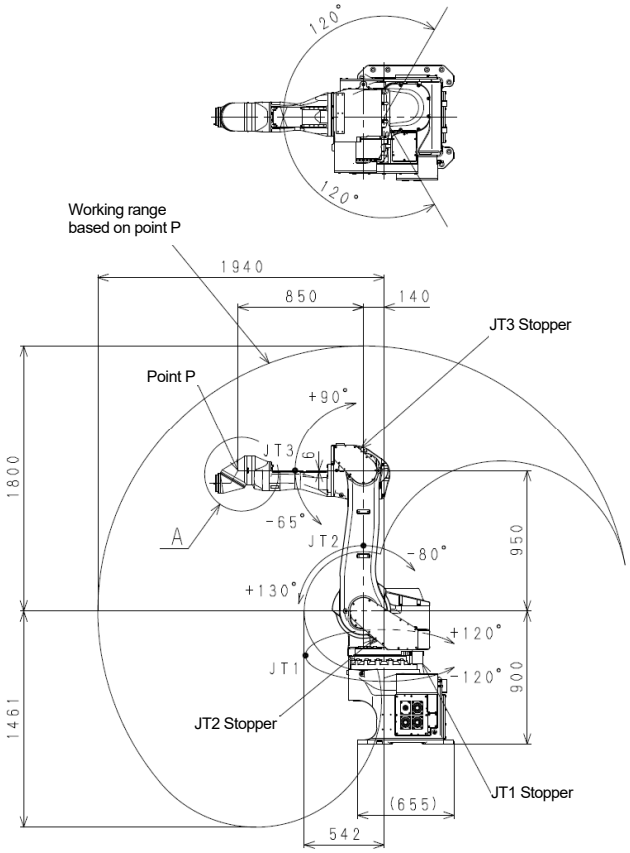
Detail A

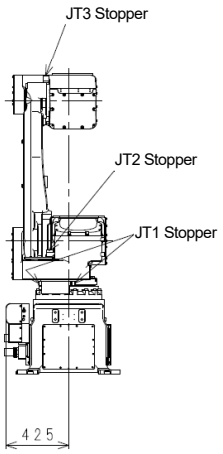
Note* Measured condition:

- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

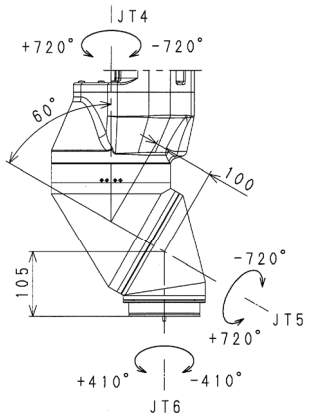
KJ194 (Floor mounted specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)





Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 530 kg		
Acoustic noise	79 dB (A)*		



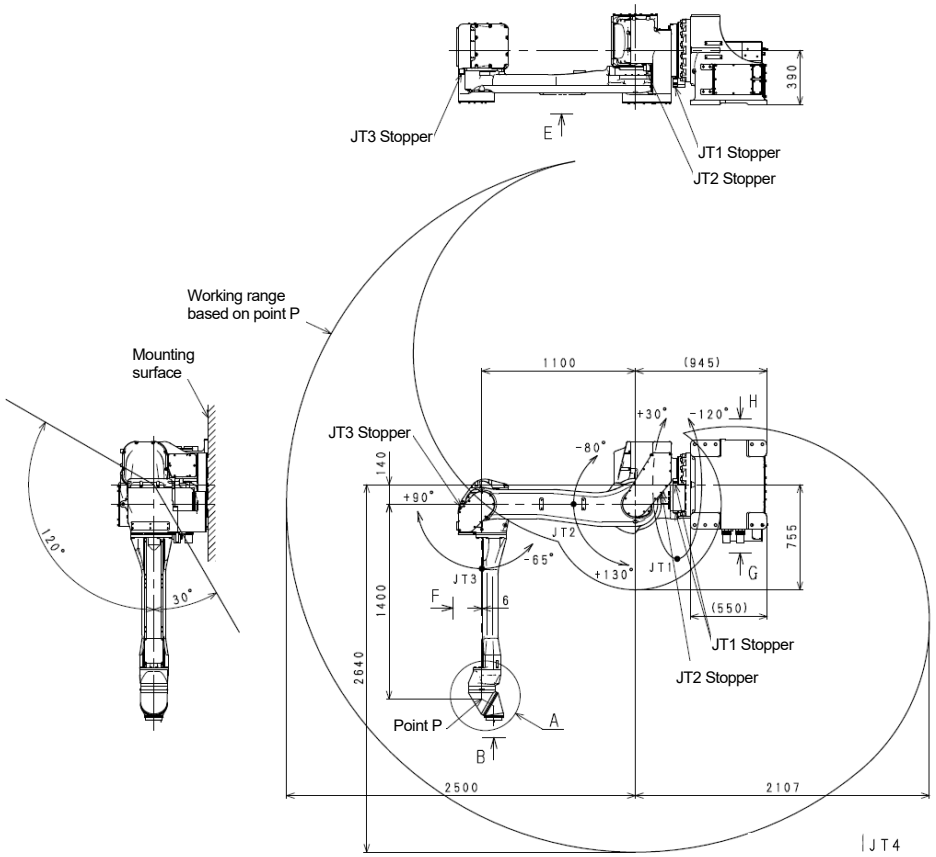
Detail A

Note* Measured condition:

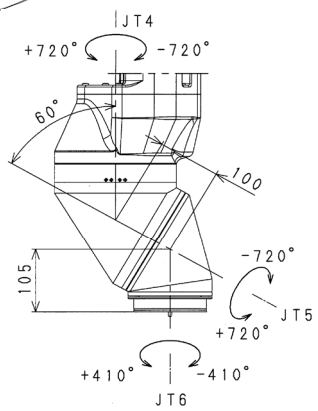
- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ264 (Wall mounted (left) specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -30°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 530 kg		
Acoustic noise	79 dB (A)*		



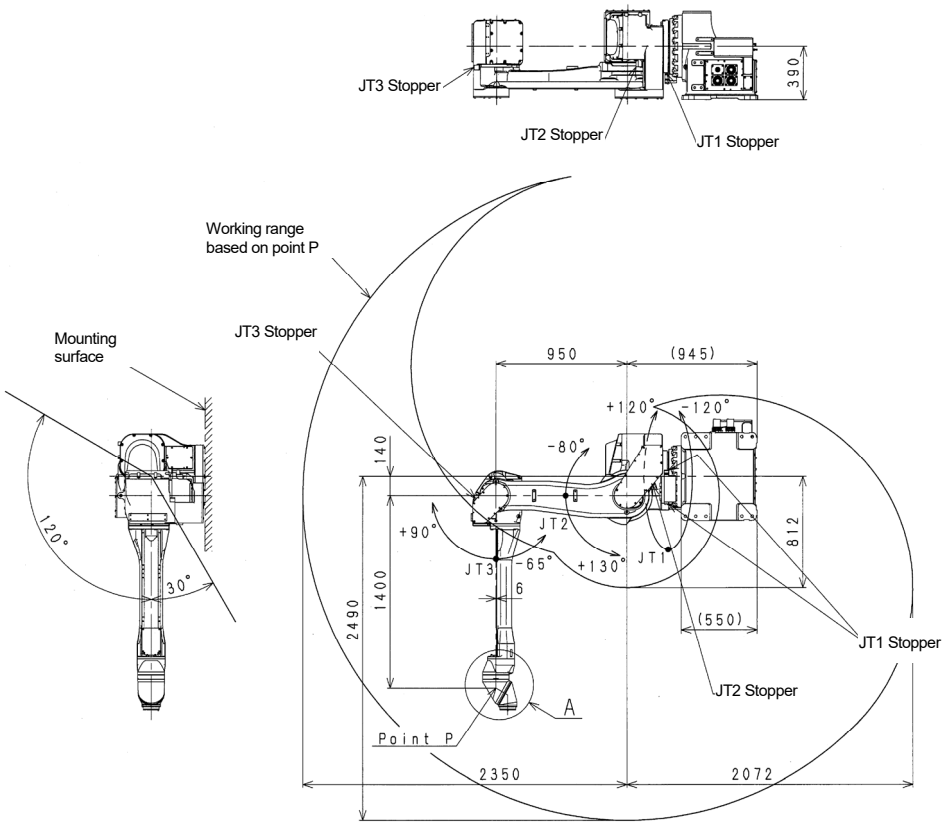
Detail A

Note* Measured condition:

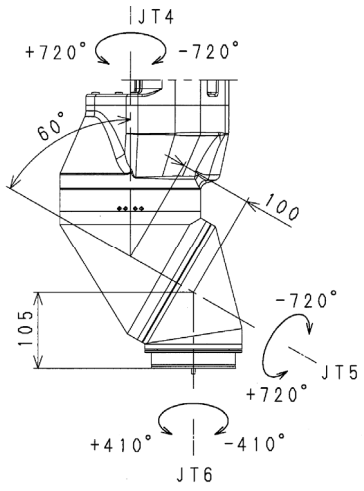
- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ244 (Wall mounted (left) specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -30°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
rist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 530 kg		
Acoustic noise	79 dB (A)*		



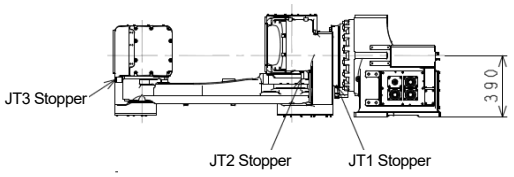
Detail A

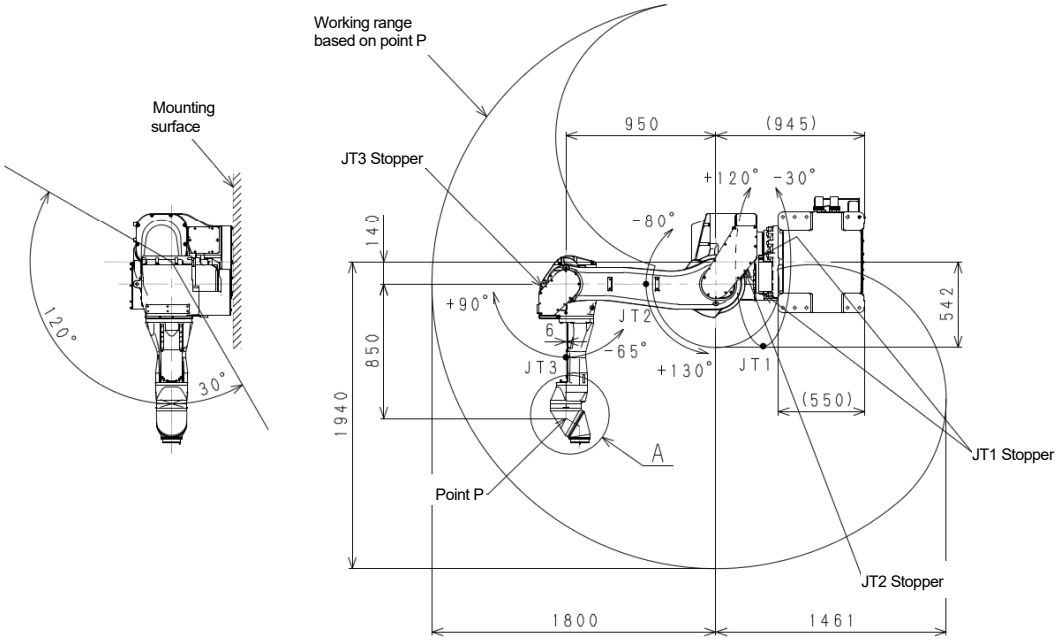
Note* Measured condition:

- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

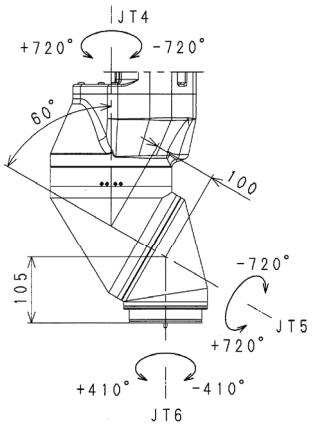
KJ194 (Wall mounted (left) specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)





Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -30°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 520 kg		
Acoustic noise	79 dB (A)*		



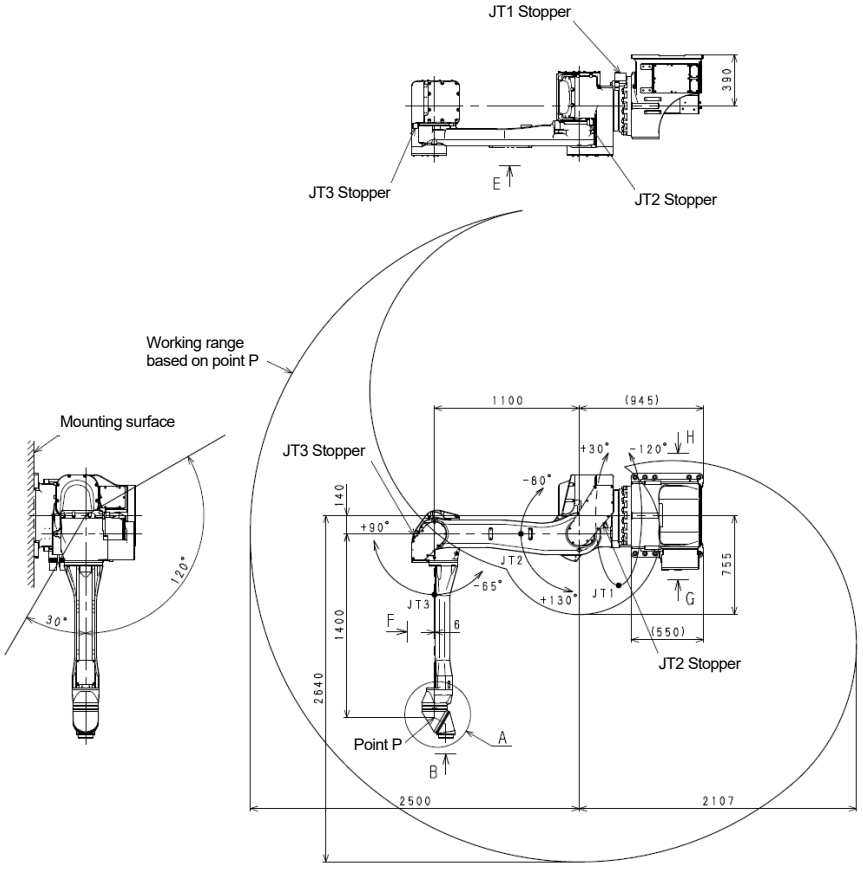
Detail A

Note* Measured condition:

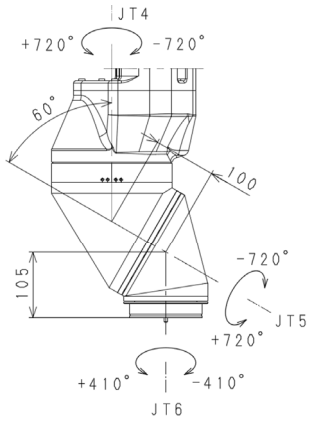
- installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ264 (Wall mounted (right) specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+30° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 530 kg		
Acoustic noise	79 dB (A)*		



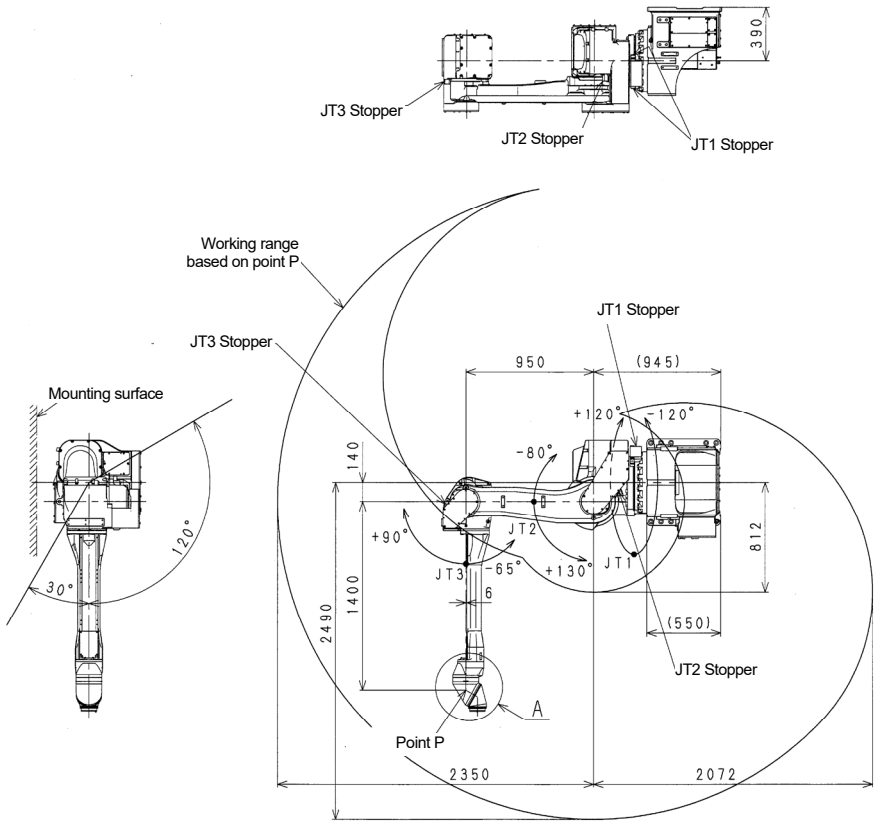
Detail A

Note* Measured condition:

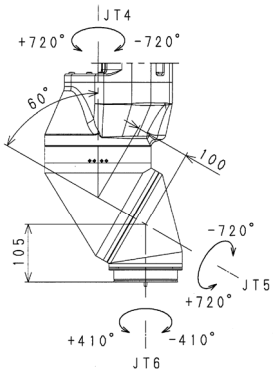
- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ244 (Wall mounted (right) specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+30° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section:15 kg Upper arm section:25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 530 kg		
Acoustic noise	79 dB (A)*		



Detail A

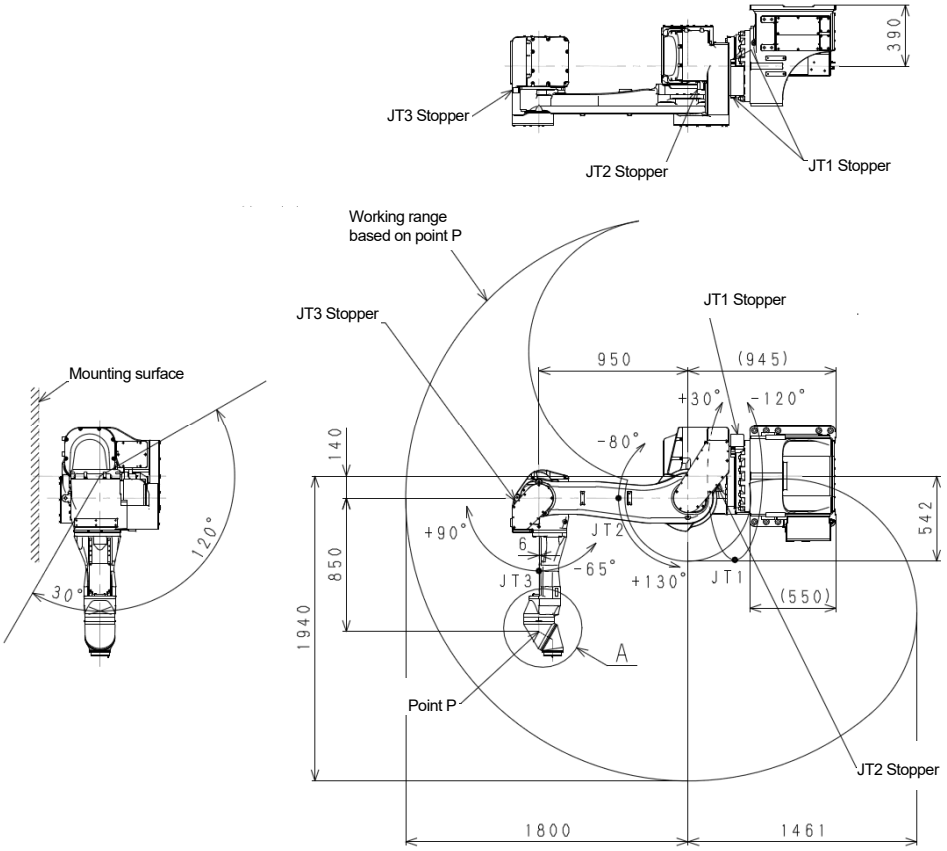
Note* Measured condition:

- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range

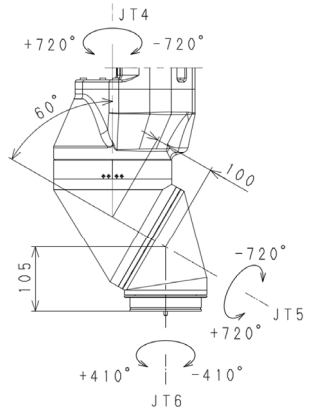
(The noise level depends on the conditions.)

KJ194 (Wall mounted (right) specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+30° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 520 kg		
Acoustic noise	79 dB (A)*		



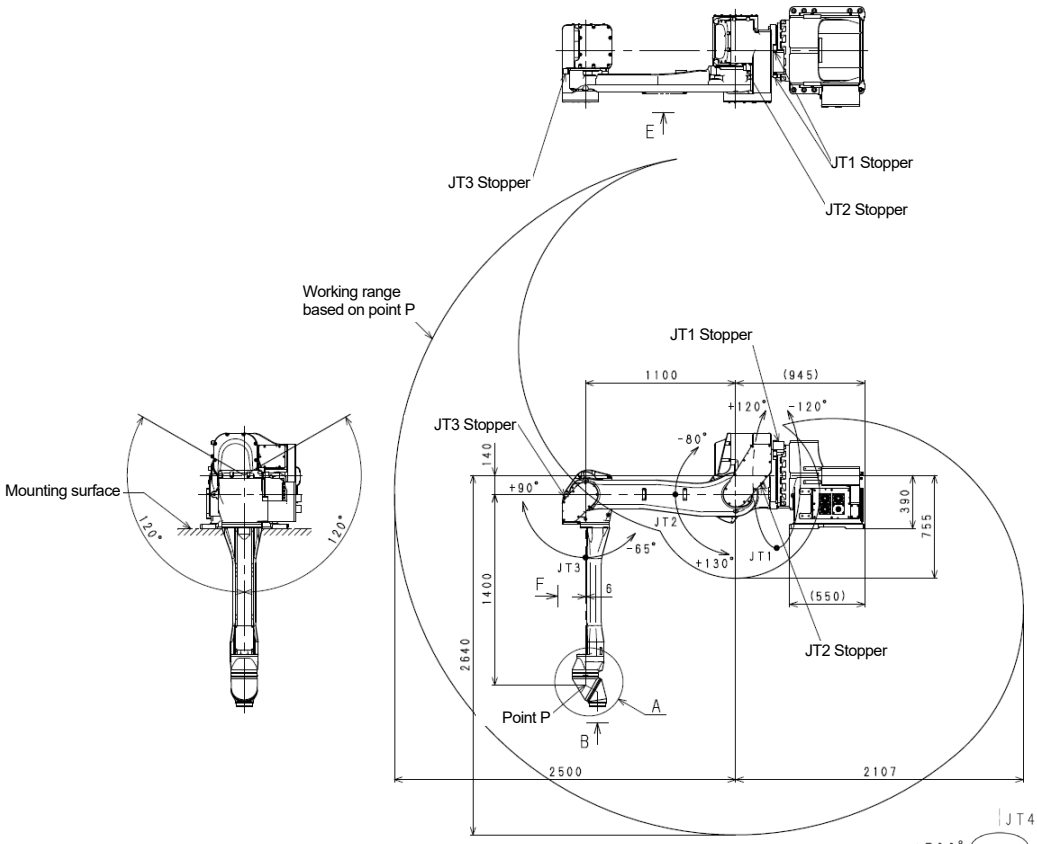
Detail A

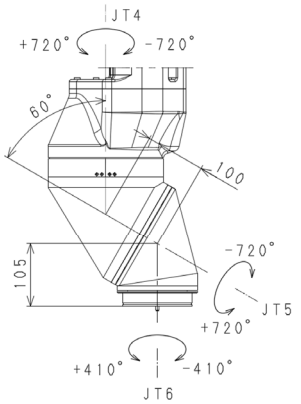
Note* Measured condition:

- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ264 (Shelf mounted specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)





Detail A

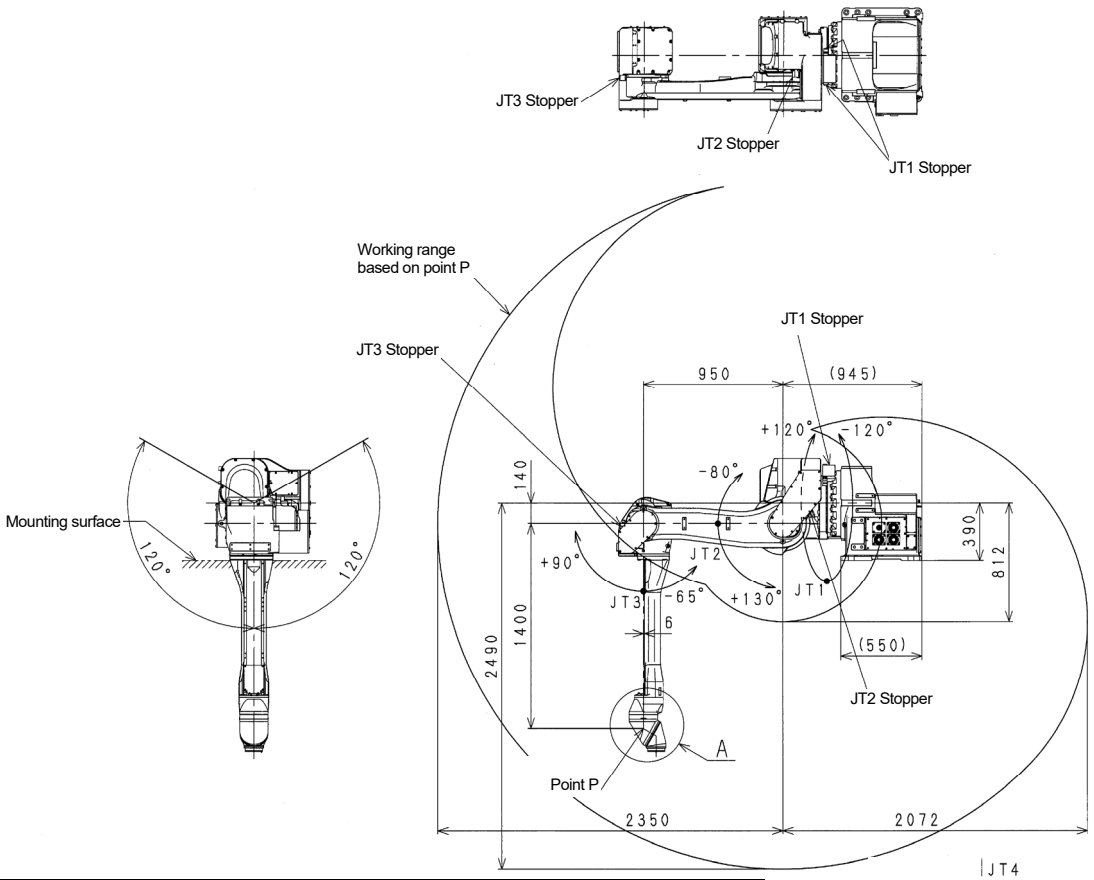
Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 530 kg		
Acoustic noise	79 dB (A)*		

Note* Measured condition:

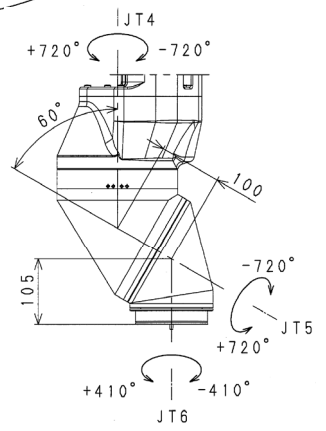
- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ244 (Shelf mounted specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 530 kg		
Acoustic noise	79 dB (A)*		



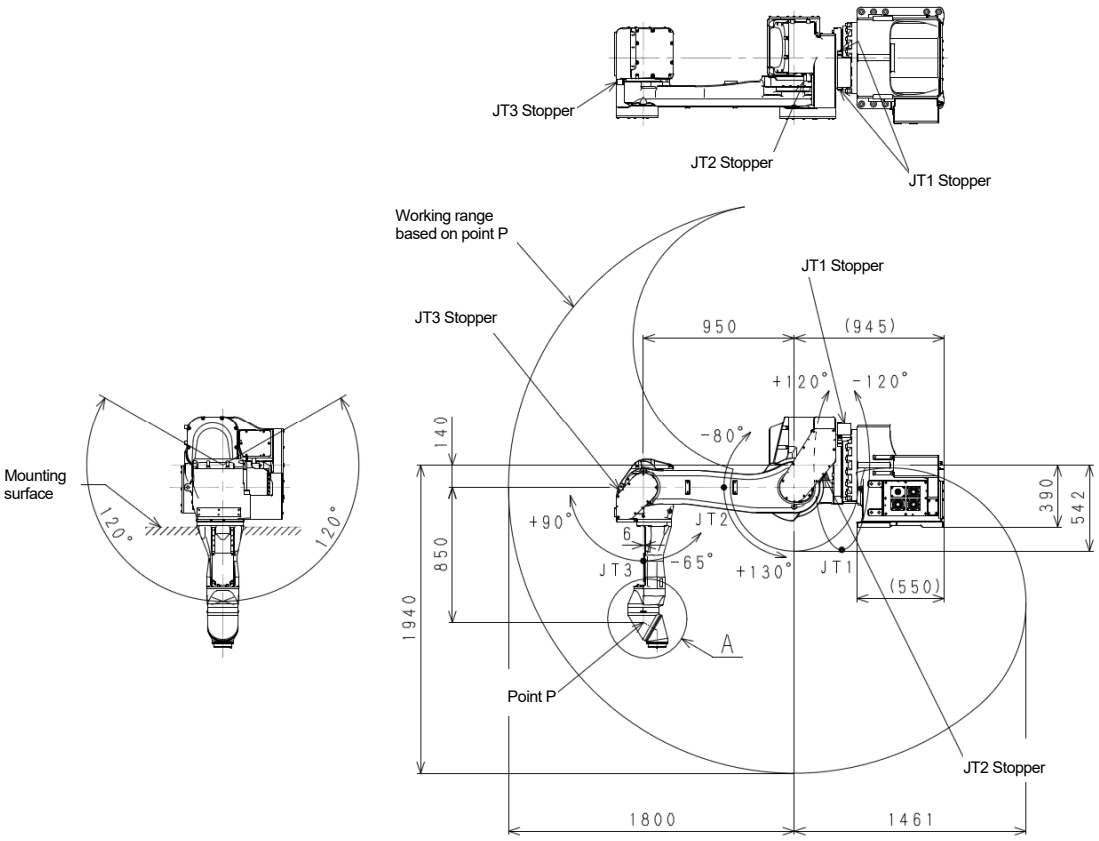
Detail A

Note* Measured condition:

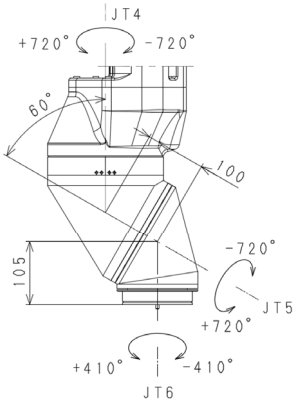
- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

KJ194 (Shelf mounted specification)

(There are no differences in the specifications between models with left-hand and right-hand rear arms.)



Type	Vertical articulated robot		
Degree of freedom	6		
Motion range	JT	Motion range	
	1	+120° to -120°	
	2	+130° to -80°	
	3	+90° to -65°	
	4	±720°	
	5	±720°	
	6	±410°	
Max. payload	Wrist section: 15 kg Upper arm section: 25 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	56.2 N·m	2.19 kg·m^2
	5	43.4 N·m	1.31 kg·m^2
	6	22.0 N·m	0.33 kg·m^2
Repeatability	±0.5 mm (Wrist flange surface)		
Mass	Approximately 520 kg		
Acoustic noise	79 dB (A)*		



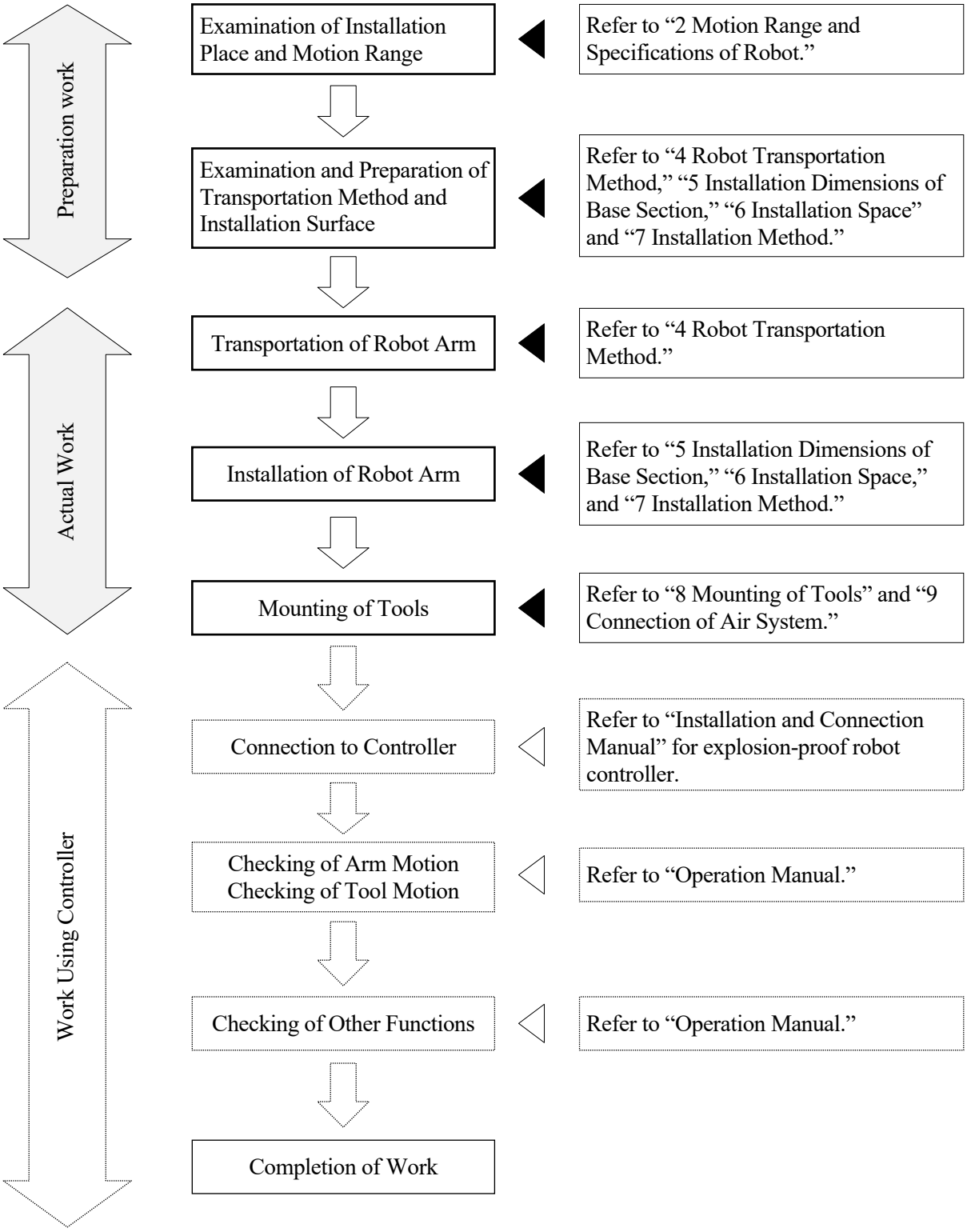
Detail A

Note* Measured condition:

- Installed on the plate rigidly fixed on the floor.
- 2000 mm away from the maximum motion range
  (The noise level depends on the conditions.)

3 Work Flow at Arm Installation and Connection

This workflow describes only the robot arm section. For the controller, refer to "Installation and Connection Manual" for explosion-proof robot controller.



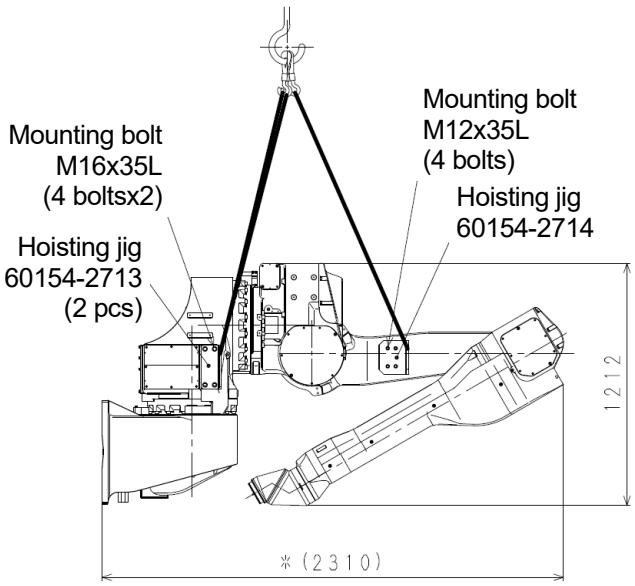
4 Robot Transportation Method

4.1 Using Wire Sling

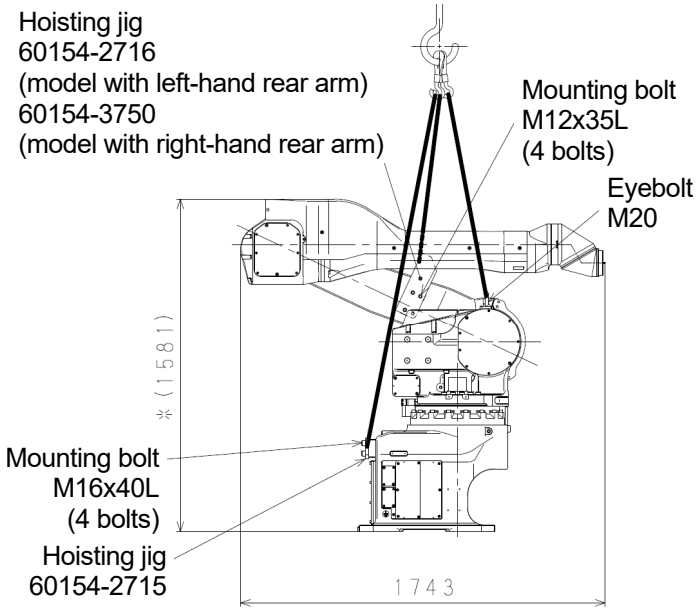
Lift the robot by fastening the wires between the eyebolts (M20) on the robot arm and the hoisting jig as shown in the figure below. Remove the hoisting jig after working.

⚠ WARNING

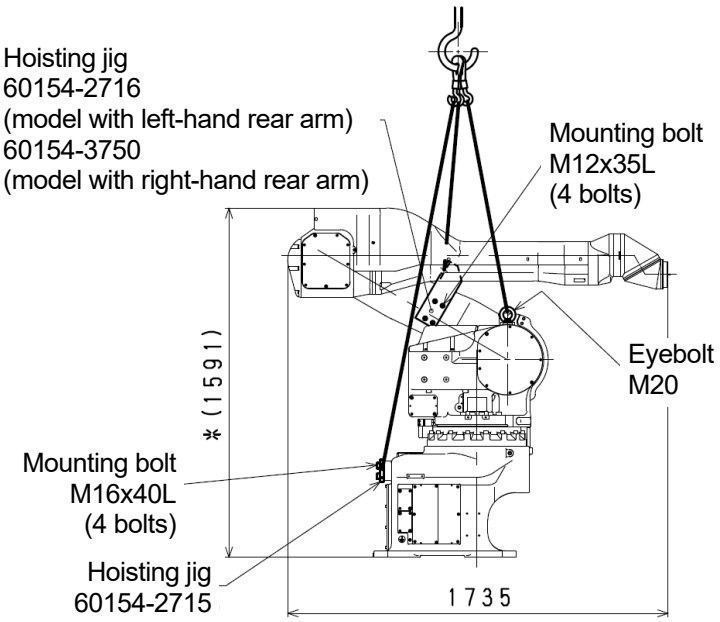
1. **Adjust the length of wire using chain block, etc. because the height of hoisting jig differs from that of eye bolt. Do not hoist the robot using only one hoisting jig.**
2. **When hoisting up robot, be careful as robot may lean forward/backward/ left/right depending on the robot posture. Be sure to hoist the robot in the specified hoisting posture on the following pages, otherwise it may swing excessively or the wire may interfere with other objects, resulting in damage. In places where wire touches the arm, protect arm with board, cloth, etc.**

Model		KJ314 (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	0°
	JT3	-60°
	JT4	0°
	JT5	0°
	JT6	0°
	JT7	0°

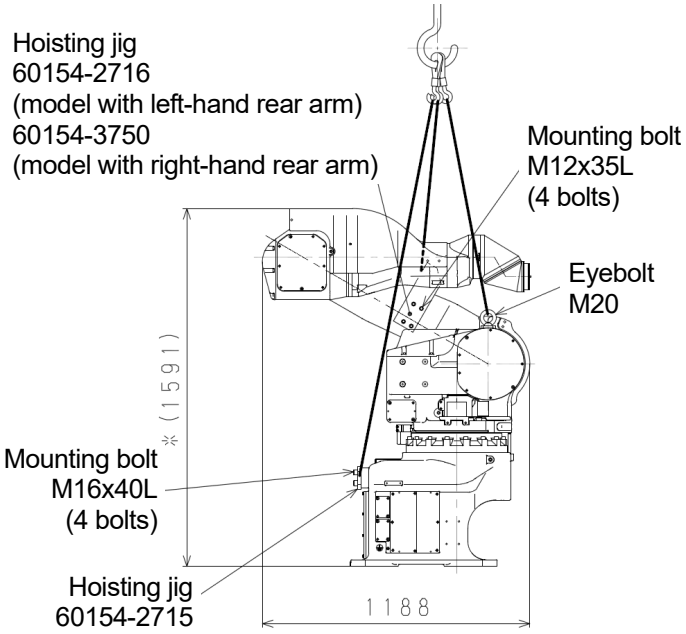
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ264 (Floor mounted specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	-60°
	JT3	-60°
	JT4	0°
	JT5	0°
	JT6	0°

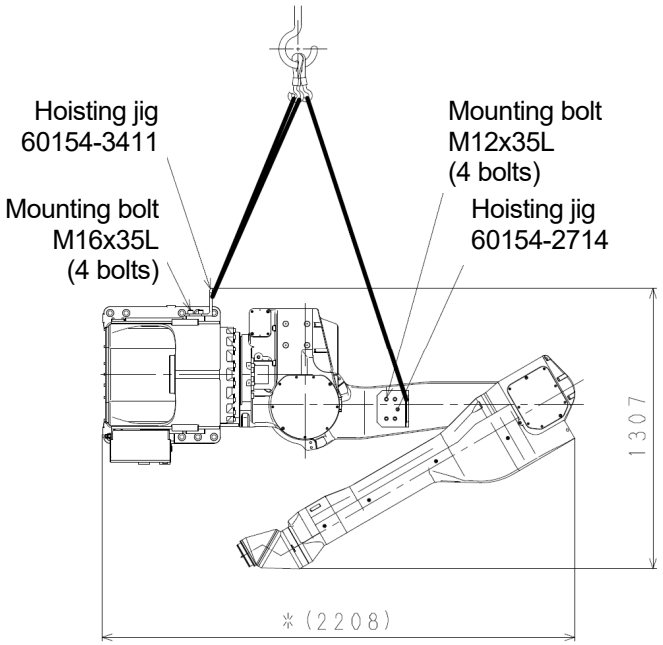
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ244 (Floor mounted specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	-60°
	JT3	-60°
	JT4	0°
	JT5	0°
	JT6	0°

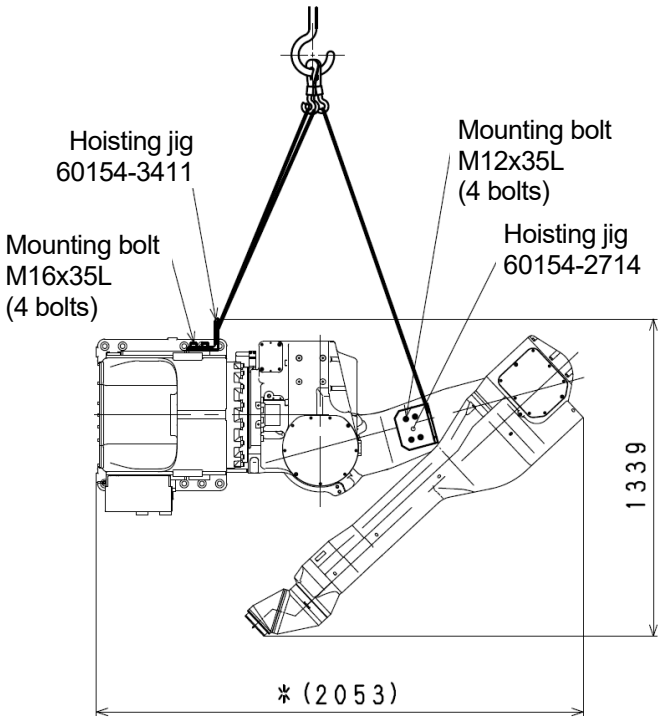
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ194 (Floor mounted specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	-60°
	JT3	-60°
	JT4	0°
	JT5	0°
	JT6	0°

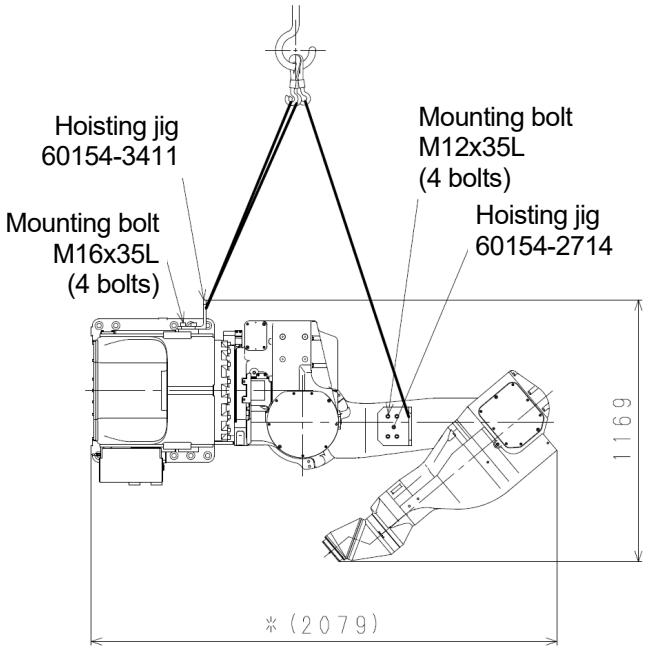
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ264 (Wall mounted (left) specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	0°
	JT3	-60°
	JT4	0°
	JT5	0°
	JT6	0°

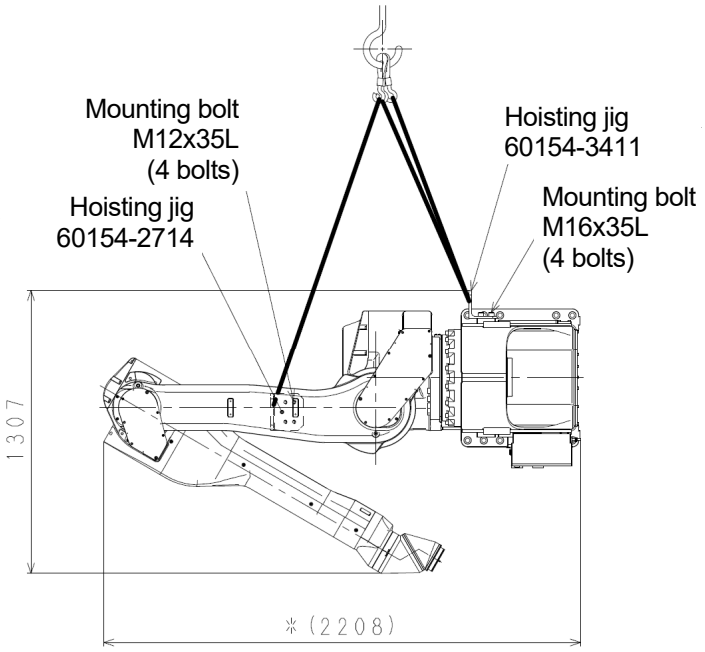
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ244 (Wall mounted (left) specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	-15°
	JT3	-62°
	JT4	0°
	JT5	0°
	JT6	0°

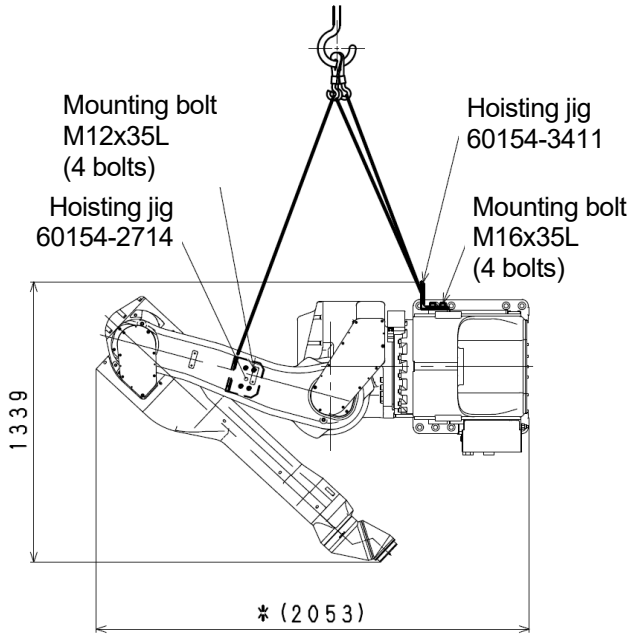
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ194 (Wall mounted (left) specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	0°
	JT3	-50°
	JT4	0°
	JT5	0°
	JT6	0°

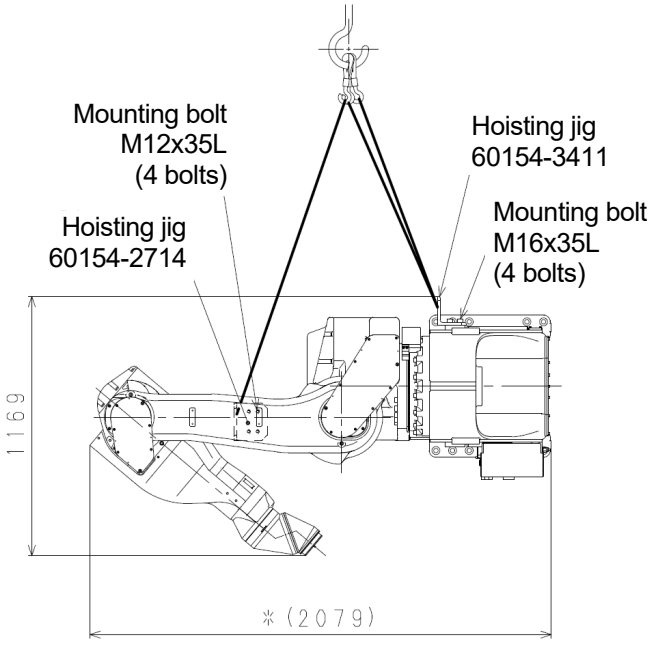
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ264 (Wall mounted (right) specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	0°
	JT3	-60°
	JT4	0°
	JT5	0°
	JT6	0°

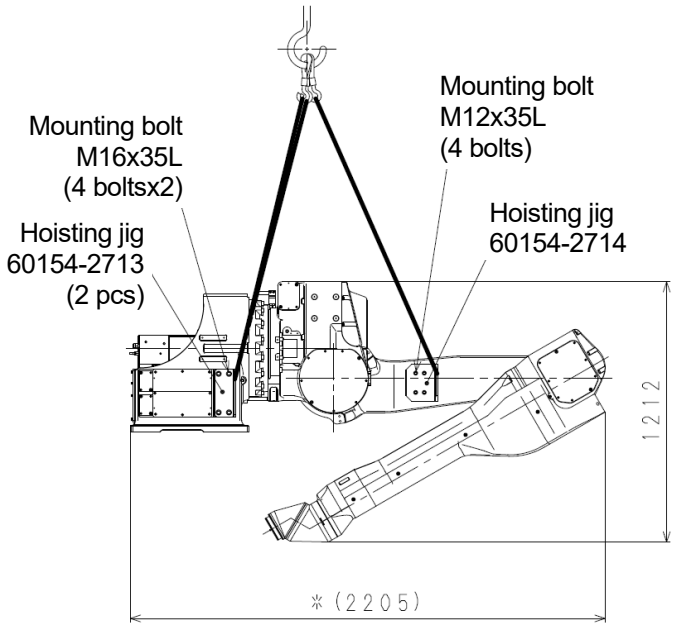
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ244 (Wall mounted (right) specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	-15°
	JT3	-62°
	JT4	0°
	JT5	0°
	JT6	0°

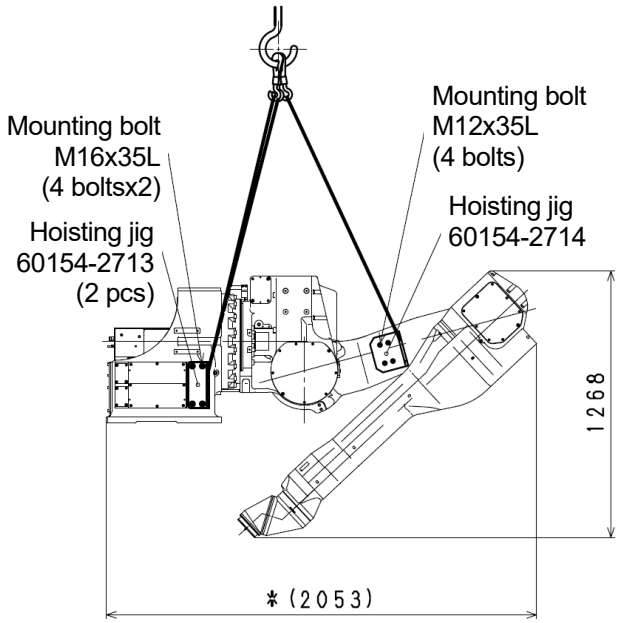
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ194 (Wall mounted (right) specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	0°
	JT3	-50°
	JT4	0°
	JT5	0°
	JT6	0°

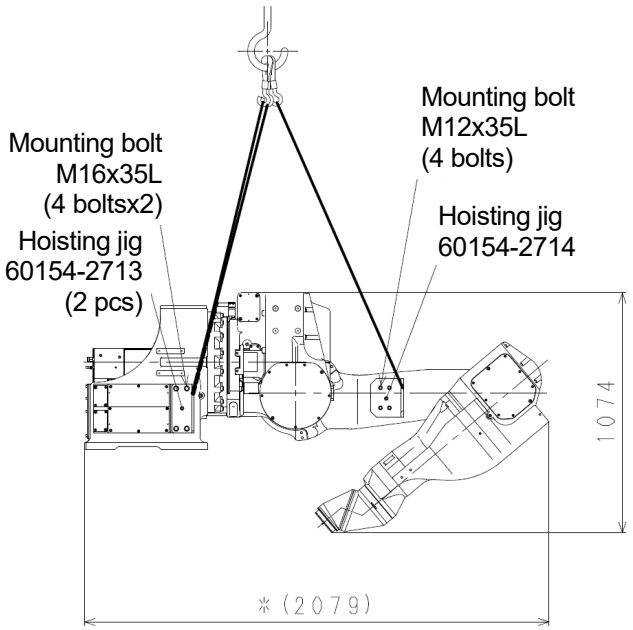
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ264 (Shelf mounted specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	0°
	JT3	-60°
	JT4	0°
	JT5	0°
	JT6	0°

Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ244 (Shelf mounted specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	-15°
	JT3	-62°
	JT4	0°
	JT5	0°
	JT6	0°

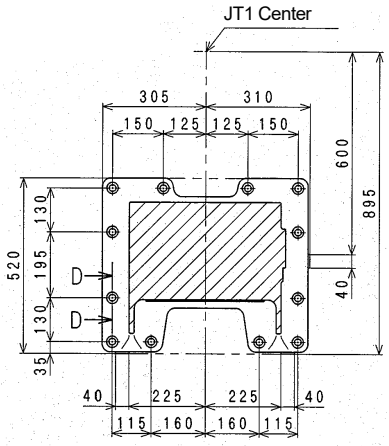
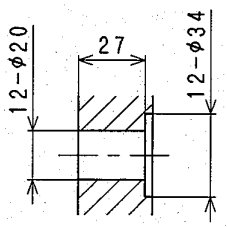
Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

Model		KJ194 (Shelf mounted specification) (There are no differences in the hoisted/hoisting postures between models with left-hand and right-hand rear arms.)
Hoisted posture		 *Dimension differs according to options.
Hoisting posture	JT1	0°
	JT2	0°
	JT3	-50°
	JT4	0°
	JT5	0°
	JT6	0°

Bolt	Tightening torque
M12	98 N·m
M16	235 N·m

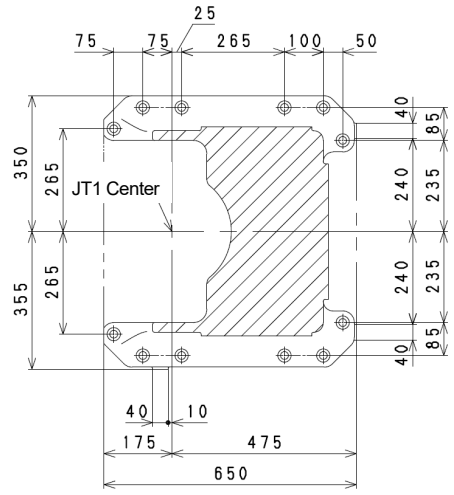
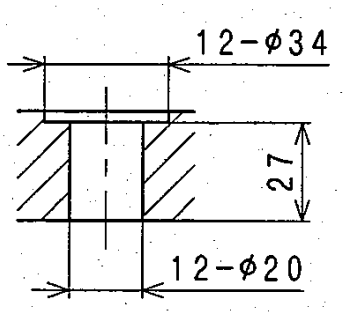
5 Installation Dimensions of Base Section

When installing the robot arm, fix it by using high-tension bolts and plain washers in the bolt holes on the base section.

Model	KJ314 (There are no differences in the installation dimensions between models with left-hand and right-hand rear arms.)
Dimensions of base installation section	
Cross-section of installation bolt hole	
Bolt holes	12- ⌀ 20
High tension bolts	12-M16 Material: SCM435 Strength level: 10.9 or more
Tightening torque	235 N·m
Levelness	Within ±5°
Plain washer	Material: S45CⒽ Hardness: HRC38 to 45 Part No: RHTWM1645

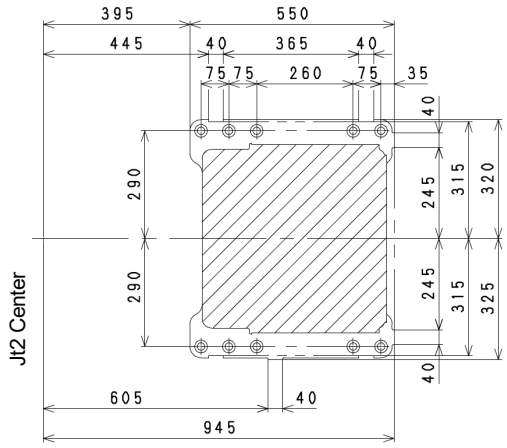
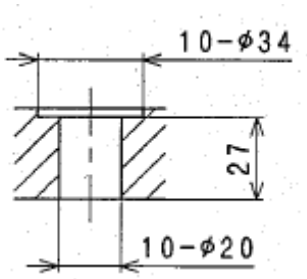
⚠ CAUTION

Be sure to install the robot arm on a surface with flatness of 0.3 mm or less, otherwise robot arm may suffer damage.

Model	KJ264/244/194 (Floor mounted specification) (There are no differences in the installation dimensions between models with left-hand and right-hand rear arms.)
Dimensions of base installation section	
Cross-section of installation bolt hole	
Bolt holes	12- ⌀ 20
High tension bolts	12-M16 Material: SCM435 Strength level: 10.9 or more
Tightening torque	235 N·m
Levelness	Within ±5°
Plain washer	Material: S45CⒽ Hardness: HRC38 to 45 Part No: RHTWM1645

⚠ CAUTION

Be sure to install the robot arm on a surface with flatness of 0.3 mm or less, otherwise robot arm may suffer damage.

Model	KJ264/244/194 (Wall mounted (left) specification) KJ264/244/194 (Wall mounted (right) specification) KJ264/244/194 (Shelf mounted specification) (There are no differences in the installation dimensions between models with left-hand and right-hand rear arms.)
Dimensions of base installation section	
Cross-section of installation bolt hole	
Bolt holes	10- ⌀ 20
High tension bolts	10-M16 Material: SCM435 Strength level: 10.9 or more
Tightening torque	235 N·m
Levelness	Within ±5°
Plain washer	Material: S45CⒽ Hardness: HRC38 to 45 Part No: RHTWM1645

⚠ CAUTION

Be sure to install the robot arm on a surface with flatness of 0.3 mm or less, otherwise robot arm may suffer damage.

6 Installation Space

Secure the installation space for robot arm as below.

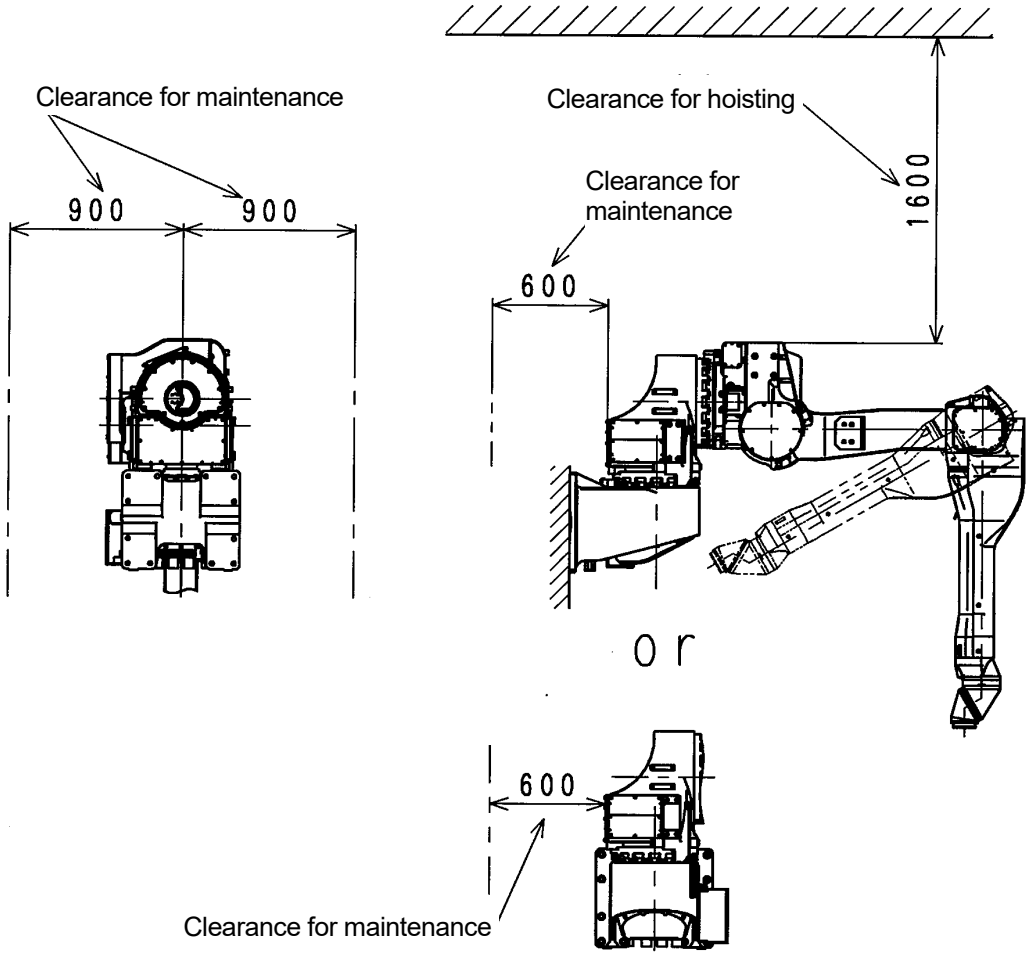
1. For maintenance purposes, leave at least 600 mm clearance behind the robot arm and at least 900 mm from the center of the robot on sides of the base.
2. Leave at least 1600 mm clearance over the robot arm for hoisting up the robot arm.

⚠ CAUTION

Secure the maintenance space shown in the figure below in robot arm installation. For installation space of safety fence, refer to "2 Motion Range and Specifications of Robot."

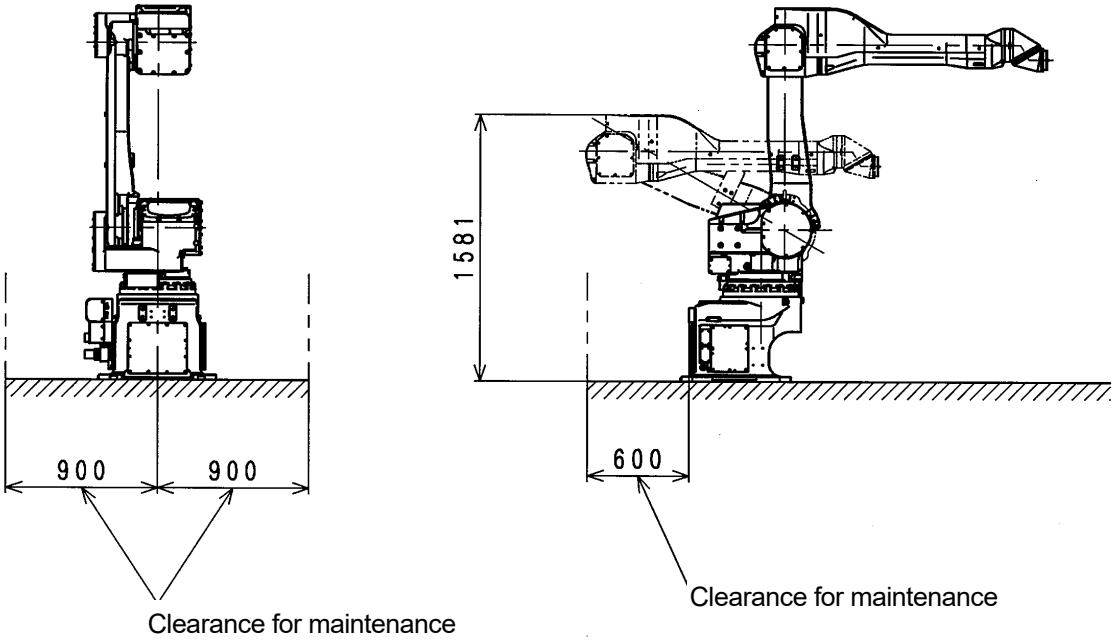
KJ314

(There are no differences in the installation space between models with left-hand and right-hand rear arms.)



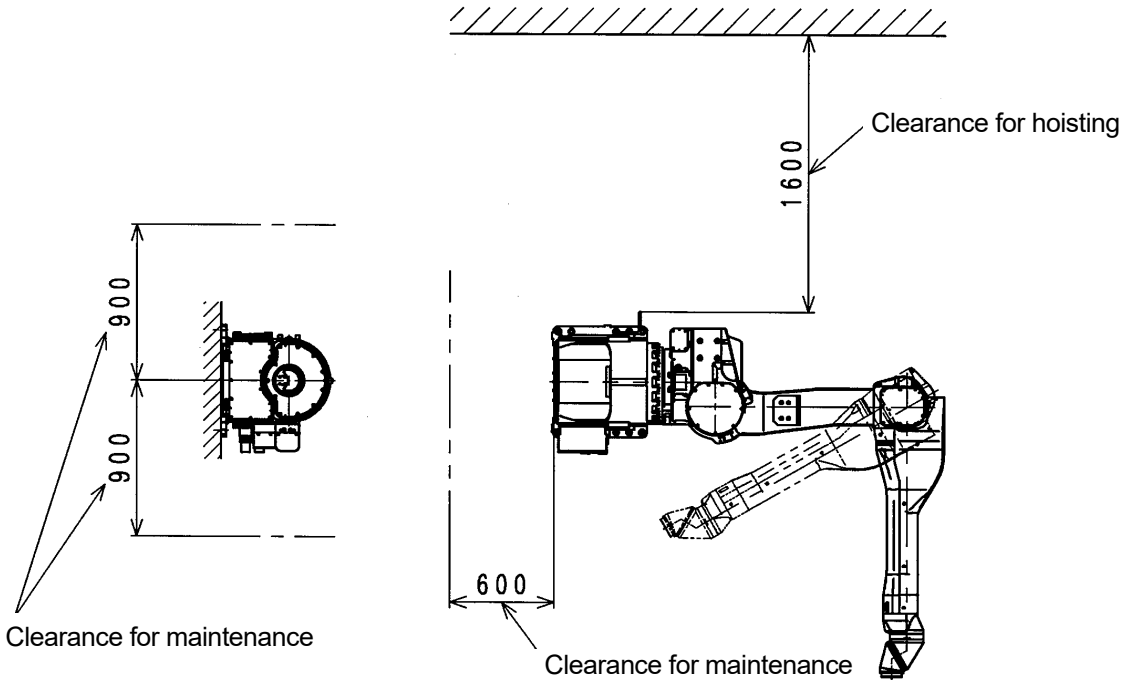
KJ264/244/194 (Floor mounted specification)

(There are no differences in the installation space between models with left-hand and right-hand rear arms.)



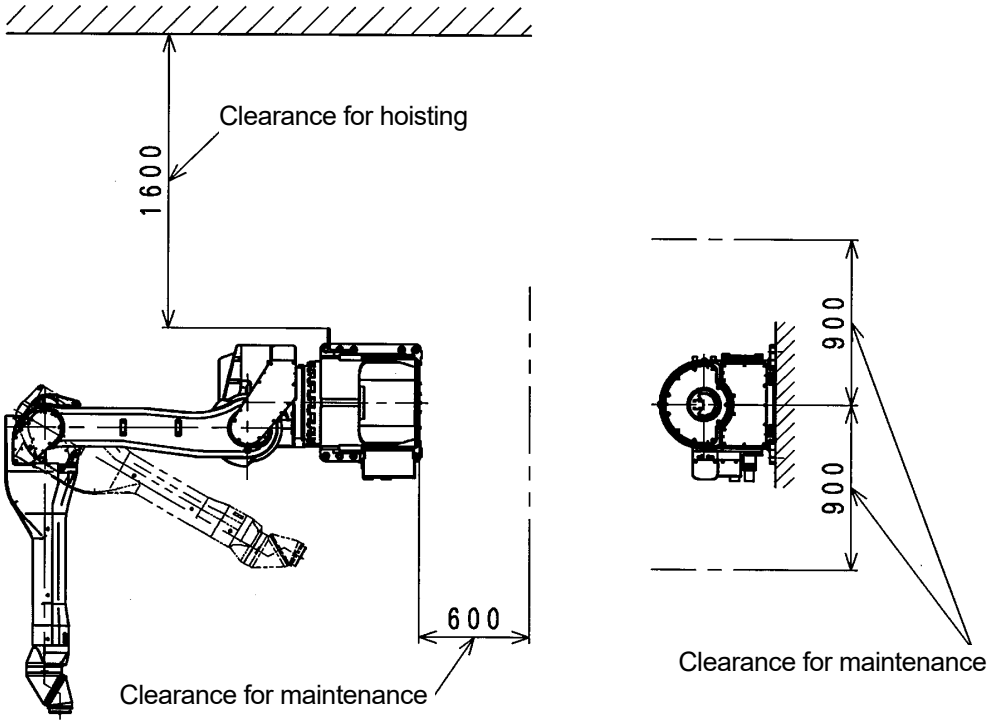
KJ264/244/194 (Wall mounted (left) specification)

(There are no differences in the installation space between models with left-hand and right-hand rear arms.)



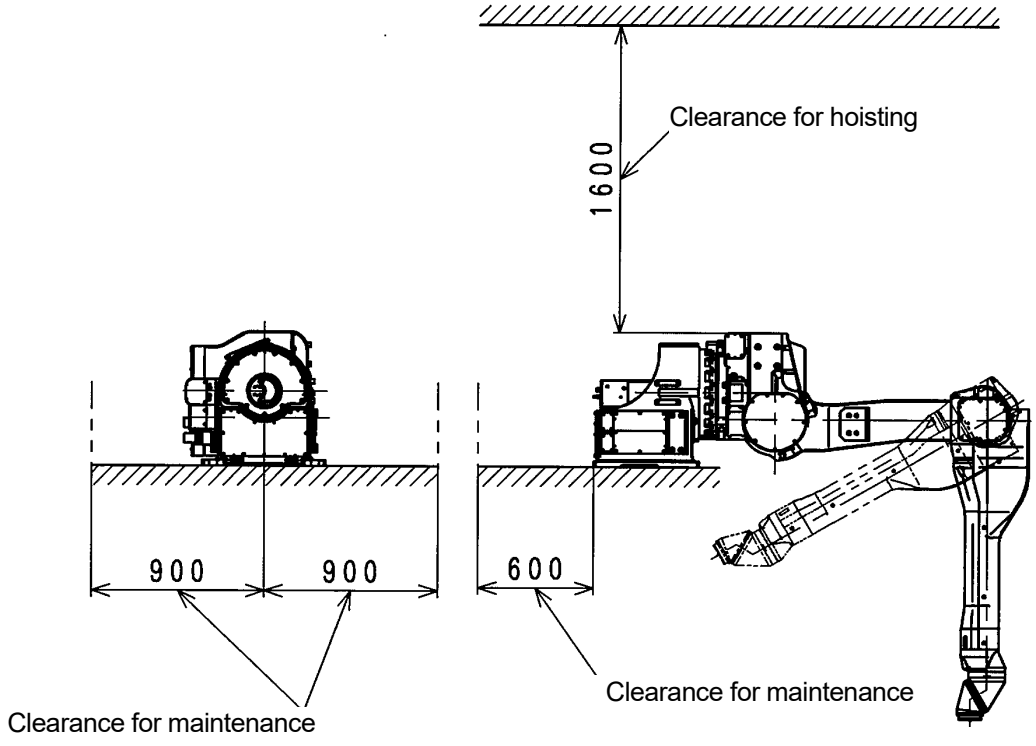
KJ264/244/194 (Wall mounted (right) specification)

(There are no differences in the installation space between models with left-hand and right-hand rear arms.)



KJ264/244/194 (Shelf mounted specification)

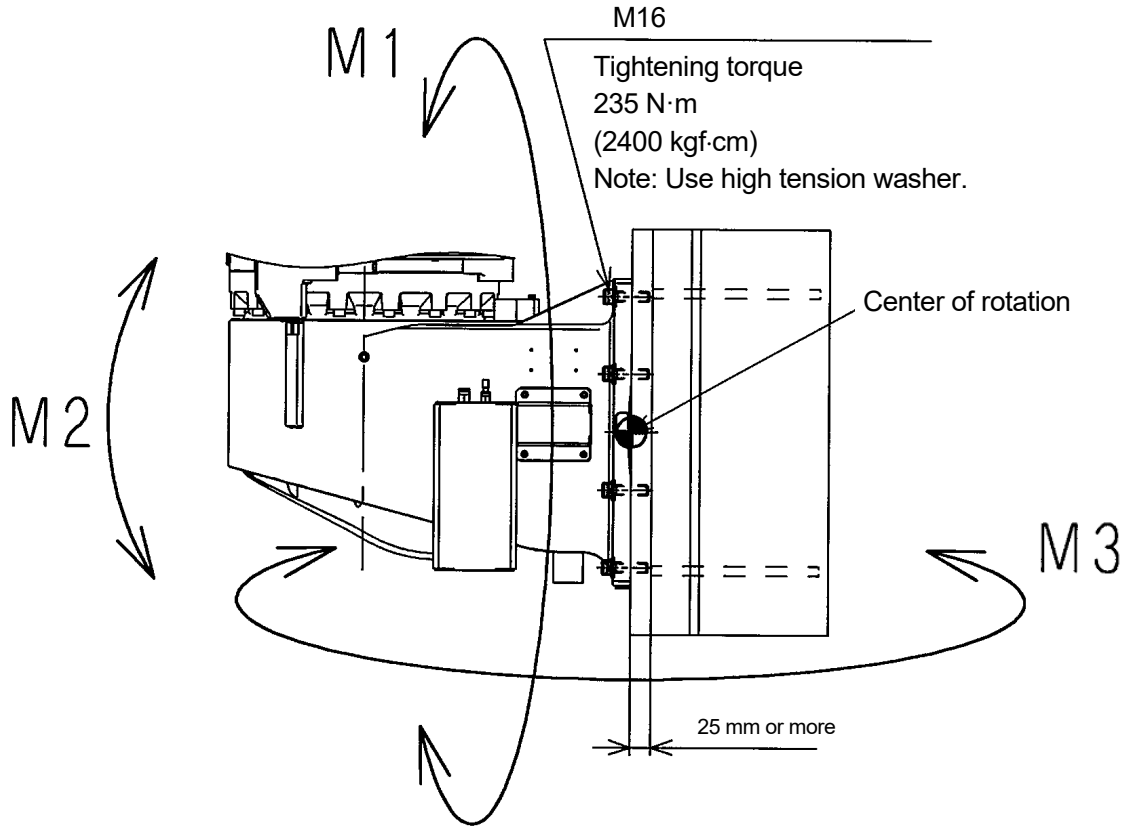
(There are no differences in the installation space between models with left-hand and right-hand rear arms.)



7 Installation Method

When installing the robot arm on the steel pedestal, the thickness of the steel plate must be 25 mm or more. Fix the steel pedestal on the floor as firmly as possible to withstand the reaction forces from the robot arm.

KJ314
(There are no differences in the installation method between models with left-hand and right-hand rear arms.)

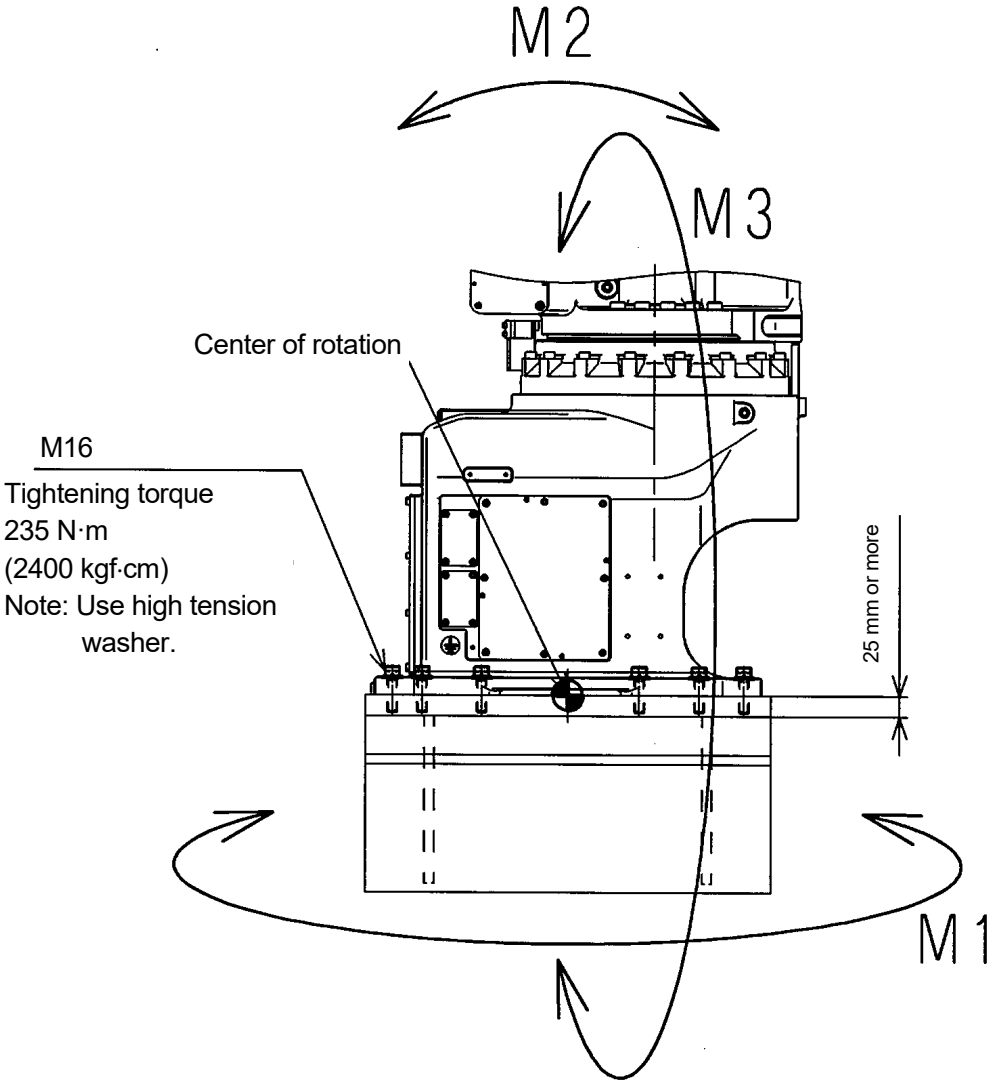


The center of installation surface is the center of rotation for each moment.

Model	KJ314
M1	31000 N·m
M2	33000 N·m
M3	33000 N·m

KJ264/244/194 (Floor mounted specification)

(There are no differences in the installation method between models with left-hand and right-hand rear arms.)

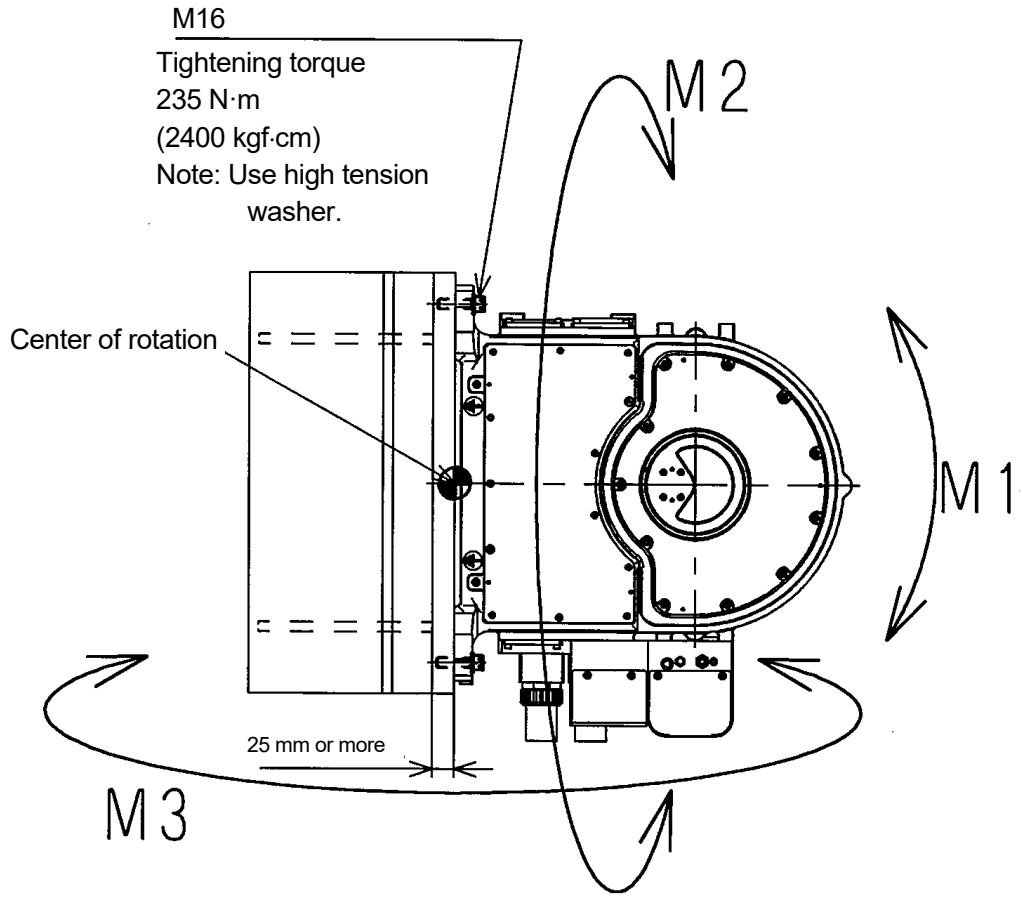


The center of installation surface is the center of rotation for each moment.

Model	KJ264/244/194 (Floor mounted specification)
M1	27000 N·m
M2	31000 N·m
M3	31000 N·m

KJ264/244/194 (Wall mounted (left) specification)

(There are no differences in the installation method between models with left-hand and right-hand rear arms.)

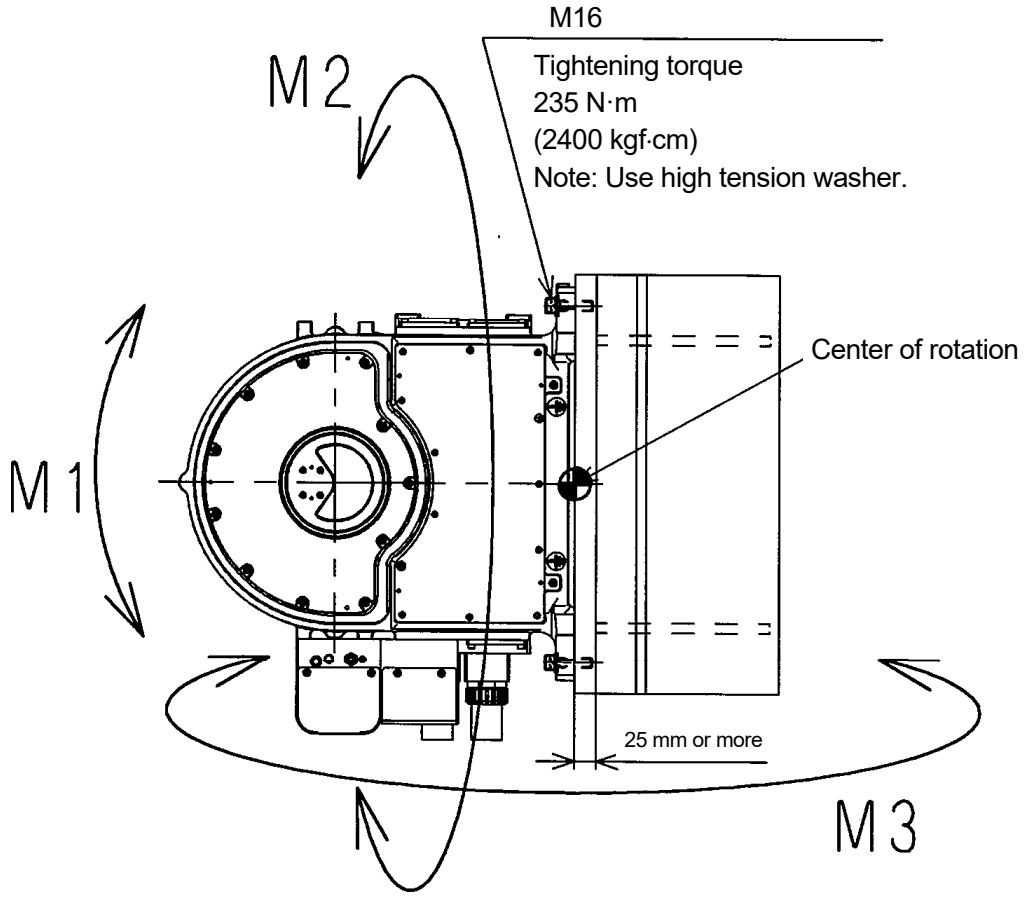


The center of installation surface is the center of rotation for each moment.

Model	KJ264/244/194 (Wall mounted (left) specification)
M1	32000 N·m
M2	28000 N·m
M3	28000 N·m

KJ264/244/194 (Wall mounted (right) specification)

(There are no differences in the installation method between models with left-hand and right-hand rear arms.)

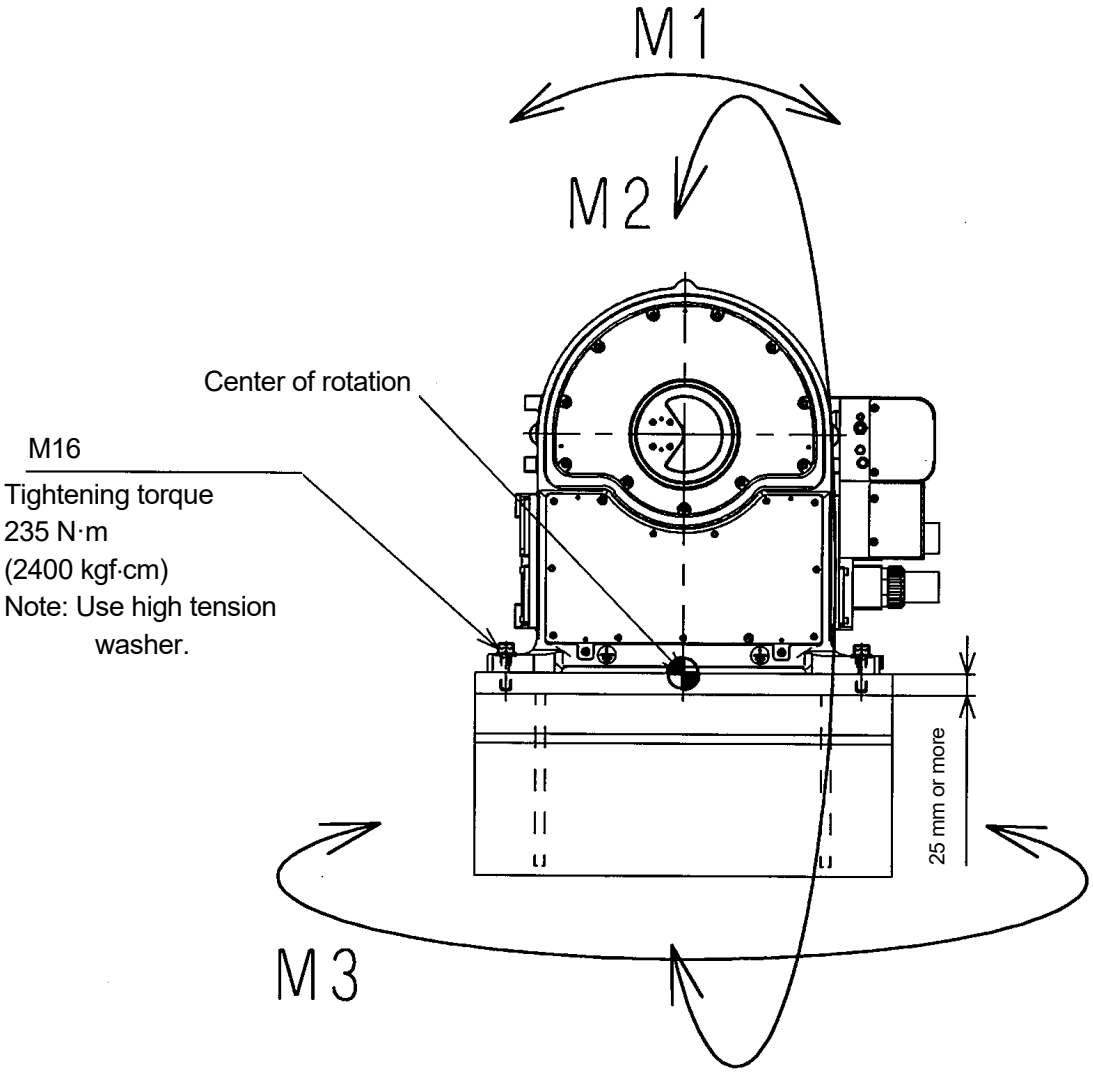


The center of installation surface is the center of rotation for each moment.

Model	KJ264/244/194 (Wall mounted (right) specification)
M1	32000 N·m
M2	28000 N·m
M3	28000 N·m

KJ264/244/194 (Shelf mounted specification)

(There are no differences in the installation method between models with left-hand and right-hand rear arms.)



The center of installation surface is the center of rotation for each moment.

Model	KJ264/244/194 (Shelf mounted specification)
M1	32000 N·m
M2	28000 N·m
M3	28000 N·m

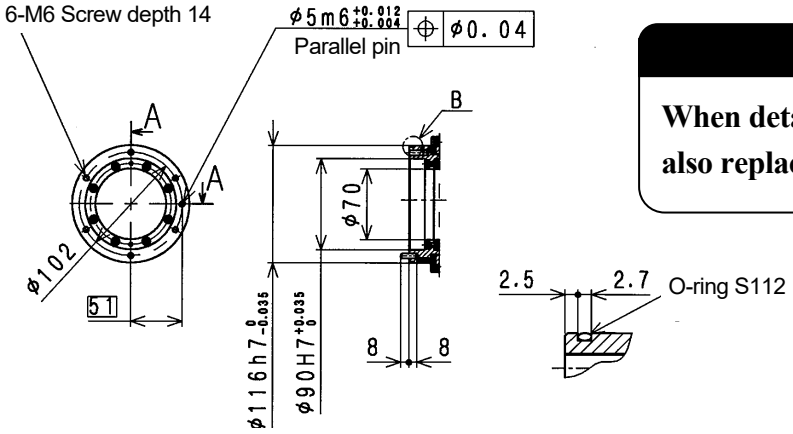
8 Mounting of Tools

⚠ WARNING

Prior to mounting tools on the robot, turn OFF the controller power switch and the external power switch. Display signs indicating clearly "Installation and connection in progress," and lock out/tag out the external power switch to prevent personnel from accidentally turning ON the power.

1. Dimensions of wrist end (flange surface)

In the robot arm end section, a flange is provided on which tools are mounted. Screw the mounting bolts into the tap holes on the circumference of ⌀ 102 on the flange, referring to the figure below. Moreover, position the tool by utilizing the pin hole and the positioning shaft.

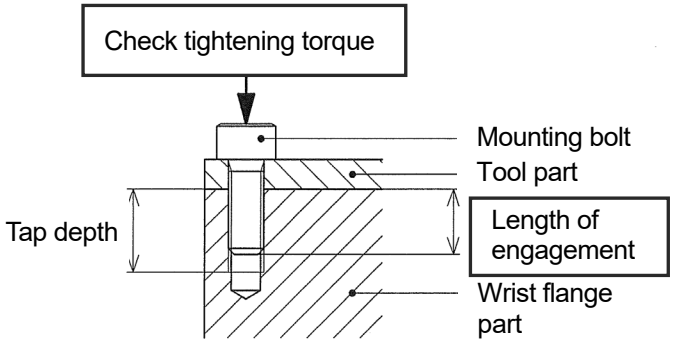


⚠ CAUTION

When detaching or replacing the tools, also replace the o-ring.

2. Specification of mounting bolts

Select mounting bolts with proper length to secure the specified engagement length. Use high tension bolt and tighten them to the specified torque shown below.



Model	KJ series
Tap holes	6-M6
P.C.D. of tap holes	⌀ 102
Pin	⌀ 5m6 Length 8
Positioning shaft	⌀ 116h7
Tap depth	14 mm
Length of engagement	9 to 12 mm
High tension bolts	SCM435, 10.9 or more
Tightening torque	12.0 N·m

⚠ CAUTION

If the engagement length has exceeded the specified value, the mounting bolt might bottom out, and the tool will not be fixed securely.

3. Calculating the load on wrist axis

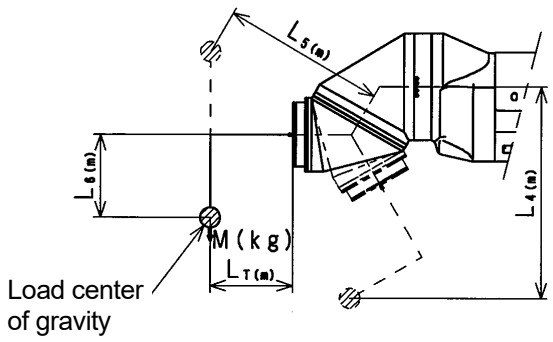
(1) The maximum load capacity of the robot is specified per robot model.
(2) Strictly observe the limiting conditions for load torque and load moment of inertia around each wrist axis (JT4, JT5, JT6) as shown below.

⚠ WARNING

Using the robot beyond its specified load may result in degradation of movement performance and shortening of machine service life. The specified load capacity includes the mass of all attachments such as spray gun, gun bracket, piping/wiring, etc. If using the robot in excess of its load capacity, first contact Kawasaki without fail.

The load torque and the moment of inertia can be calculated by the expression below:

Calculation Expression

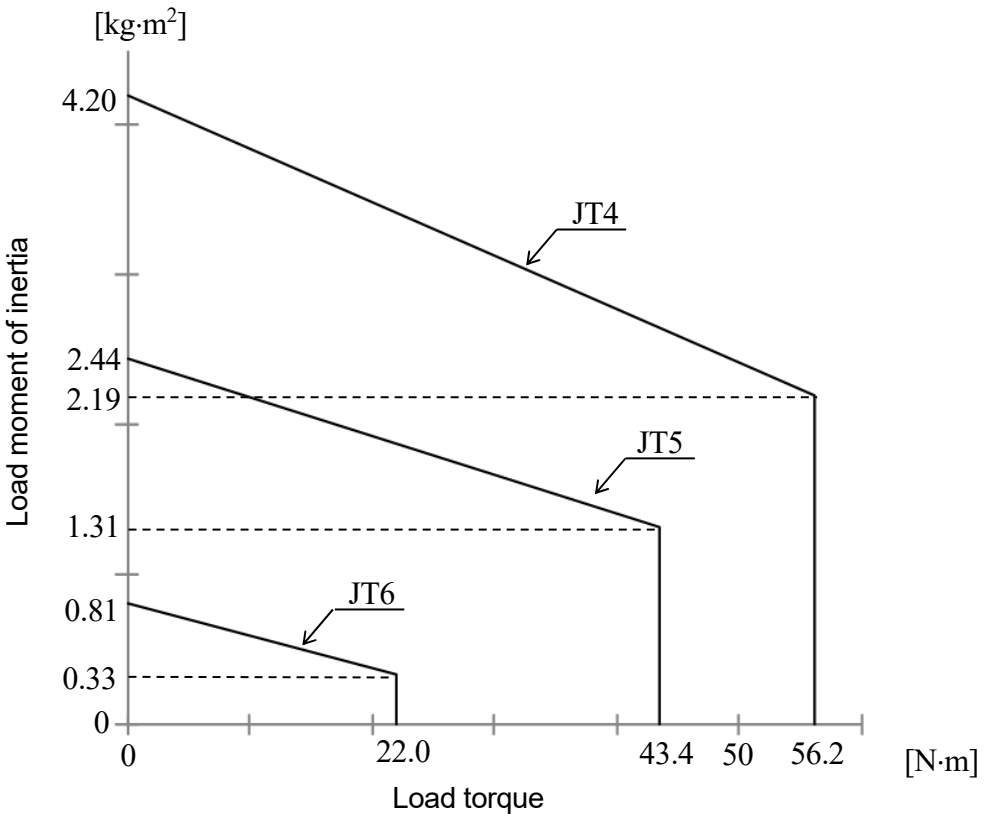


Load mass: $M \leqq Mmax$ (kg)
Load torque: $T=9.8 \cdot M \cdot L$(N·m)
Load moment of inertia: $I=M \cdot L^2+I_G$(kg·m^2)

M: Load capacity
Mmax: 15 kg
I_G: Load moment of inertia around center of gravity
$L_{(4\ to\ 6)}$: Length from axis rotation center to load center of gravity (Unit: m) (See figure left.)
$L_4= L_T \cdot \sin 60° + L_6 \cdot \cos 60° + 0.180$ (m)
$L_5= L_T \cdot \sin 60° + L_6 \cdot \cos 60° + 0.095$ (m)

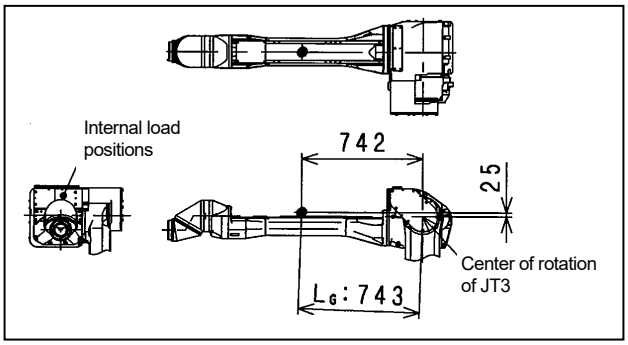
Adhere to the following limiting conditions for the load torque and the load moment of inertia around each wrist axis.

KJ series



4. Load capacity of the upper arm

For load on upper arm, follow below conditions. Load mass of parts mounted inside upper arm is included in specification



Load conditions of the upper arm

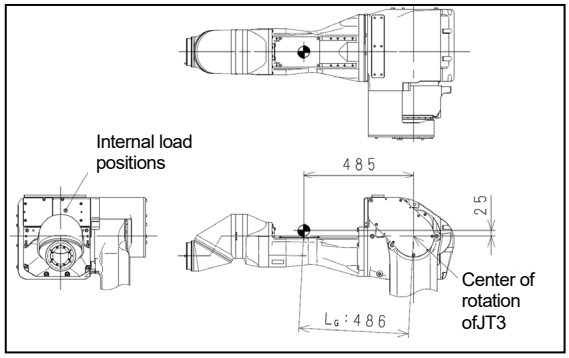
- Load mass: M≦Mmax (kg)
- Load position: M·L≦Mmax·LG

L: Length from center of rotation of JT3 axis (mm)

Mmax: 25 kg

LG: 743 mm

KJ314/264/244



Load conditions of the upper arm

- Load mass: M≦Mmax (kg)
- Load position: M·L≦Mmax·LG

L: Length from center of rotation of JT3 axis (mm)

Mmax: 25 kg

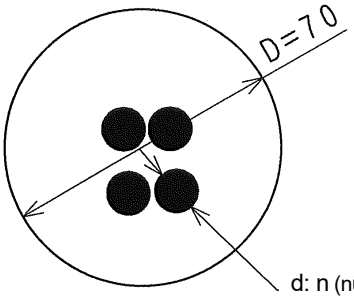
LG: 486 mm

KJ194

5. Paint wiring/piping

5.1. Hose(s) housed in the wrist

(1) Inside diameter of hollow wrist is ⌀ 70.
The recommended volume ratio of the housed hose(s) is less than 25%[*1]. The volume ratio is calculated by the following expression.



$$\text{volume ratio} = \underbrace{\frac{d^2}{4}\pi n}_{\text{Area of hose(s)}} \div \underbrace{\frac{D^2}{4}\pi}_{\text{Area of wrist hollow}} \times 100[\%]$$

⚠ CAUTION

As calculated above, if sum cross-sectional area of the hose(s) exceeds the 25% of cross-sectional area of the wrist hollow, hose lifetime will shorten. Also, even if sum volume ratio is less than 25%, hose lifetime may become short depending on posture/angle of the wrist. Therefore, fully examine and test the hose(s) and their arrangement in wrist before starting operations.

***1** Consult Kawasaki before starting operations if volume ratio exceeds 25% or when using a hose with ⌀ 12 or greater diameter.

(2) Nylon is the recommended material for the enclosed hose.

⚠ CAUTION

Using a non-nylon hose may significantly reduce hose lifetime.

(3) When installing the hose in the wrist, always apply lubricants, such as Vaseline etc., to the entire hose. Inspect the housed hoses regularly[*2] and replace them when any indication of failure or damage is found.
Recommended inspection period: every 500 hours
Replacement period of hoses (estimated): every 10000 hours

***2** Also, whenever hoses are inspected, apply lubricants to the entire housed hoses.

[NOTE]

The above replacement period is a recommended standard and is not meant as a period guaranteeing the life of the hoses.

9 Connection of Air System

Painting robots (KJ series) are explosion-proof robots protected by pressurized and intrinsically safe structures that comply with national laws and safety standards. The following explains the air supply to robot arm.

⚠ CAUTION

1. **Regulator on side of robot arm is adjusted at factory shipment, however, check the regulator setting in installation and change it if necessary. Pilot air for external axis is connected to the pilot air inlet of external axis when an external axis is connected to the robot and is blocked when no external axis is used. Therefore, do not remove tube and plug.**
2. **The Europe explosion-proof specification (Type-P) is equipped with a regulator within the controller, which must be adjusted individually. See "9.5 For Europe Explosion-Proof Specification (Type-P)".**

⚠ CAUTION

Use clean air that meets specifications below.

1. **Solid material..... 0.01 μm or less**
2. **Oil content..... Mist separation: 99.9999% or more**
3. **Humidity ..... Dew point: -17°C or less at atmospheric pressure**
4. **Input pressure ..... 0.4 to 0.7 MPa (4.1 to 7.1 kgf/cm^2)**
5. **Input quantity..... 350 L/min. (nor) (Only at purging)**

Note **See “9.3 For Europe Explosion-Proof Specification (Type-E)” or "9.5 For Europe Explosion-Proof Specification (Type-P)" for Europe**

[NOTE]

When purging completes, the air operated valve set on exhaust port closes. After that, air consumption is minimized to only a little air leakage from various sealed sections.

⚠ CAUTION

When trying to operate the robot with insufficient air pressure (e.g. immediately after a compressor which supplies air is activated), an error occurs due to insufficient inner pressure and robot cannot be operated. Accordingly, operate the robot after sufficient air pressure is obtained.

9.1 Adjustment Method of Regulator

If the setting value of the regulator on the robot arm side deviates from the standard value, adjust it in the procedure below. The standard value differs depending on the installation posture and explosion-proof specification (Japan, China, North America and Europe). Accordingly, adjust the standard value in accordance with each specification.

⚠ CAUTION

Regulator on side of robot arm is adjusted at factory shipment, however, check the regulator setting at time of installation and change it if necessary.

Procedure

1. Turn OFF the controller power.
2. Dismount the air unit cover.
3. Loosen the locknut of the regulator on the robot arm side.
4. Turn the knob to set the regulator on the robot arm side, and adjust the setting value.

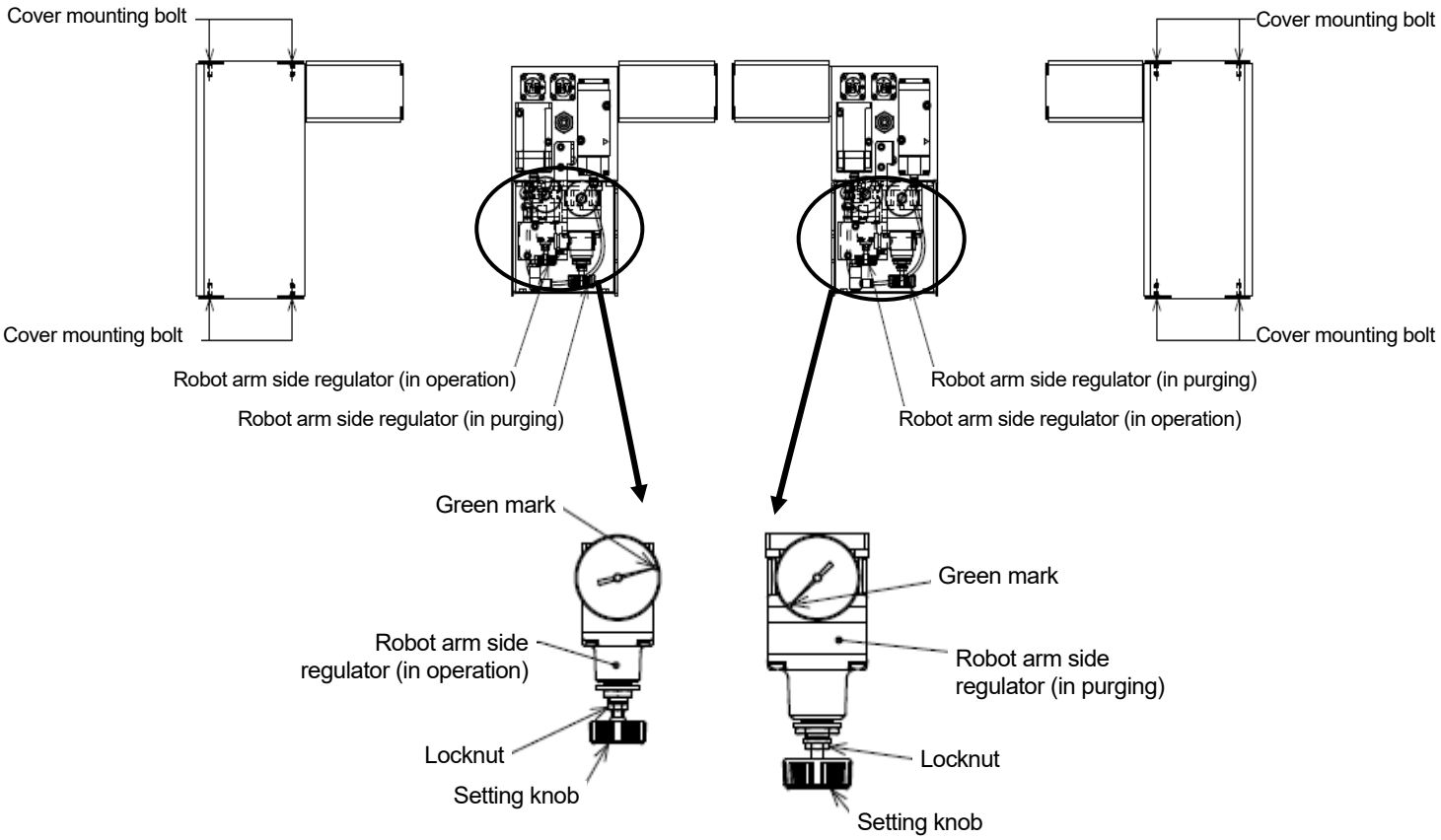
⚠ CAUTION

When adjusting the regulator, turn the knob of the regulator in the direction that the regulator setting increases.

5. Screw the locknut of the regulator on the robot arm side.
6. Wait at least two minutes after the adjustment, and check the setting value again. (Return to step 3 if the setting value deviates.)
7. Turn ON the controller power.
8. Confirm that the purging completes normally.
9. Remount the air unit cover.

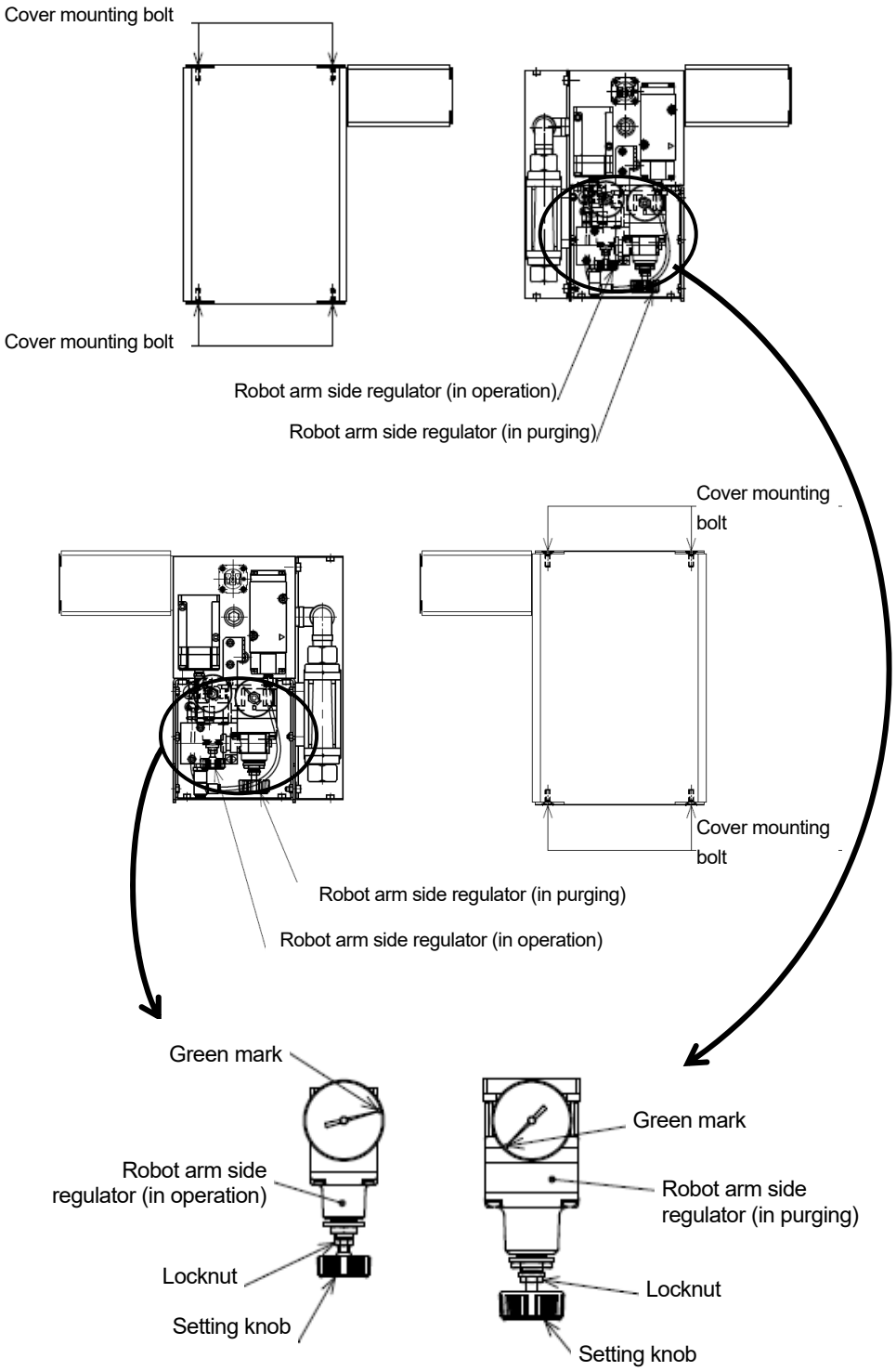
⚠ CAUTION

When trying to operate the robot with insufficient air pressure supplied to the robot (e.g. immediately after a compressor is activated), an error occurs due to insufficient inner pressure and robot cannot be operated. Accordingly, operate the robot after sufficient air pressure is obtained.



Japan/China Explosion-proof specification

Bolt type	Tightening torque [N·m]
M5 hexagon socket flat head bolt	3.4



North America Explosion-proof specification	Bolt type	Tightening torque [N·m]
	M5 hexagon socket flat head bolt	3.4

[NOTE]

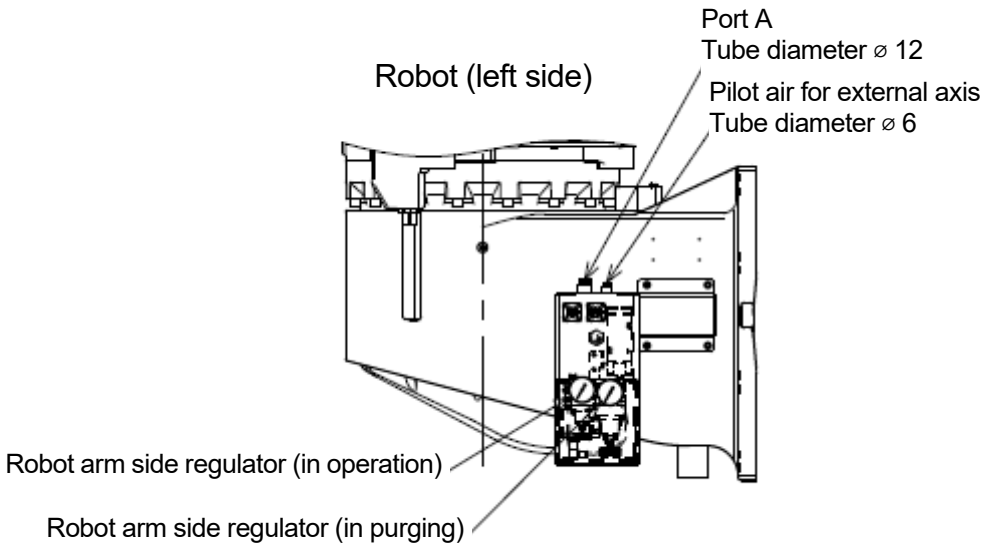
See “9.3 For Europe Explosion-Proof Specification (Type-E)” or “9.5 For Europe Explosion-Proof Specification (Type-P)” for Europe explosion-proof specification.

9.2 For Japan/China/North America Explosion-Proof Specifications

KJ314

(There are no differences between models with left-hand and right-hand rear arms.)

Air connecting port is provided on the swing unit of robot arm. Supply air from the air inlet of port A (tube diameter: ⌀ 12) on the rear of robot arm as shown in the figure below.



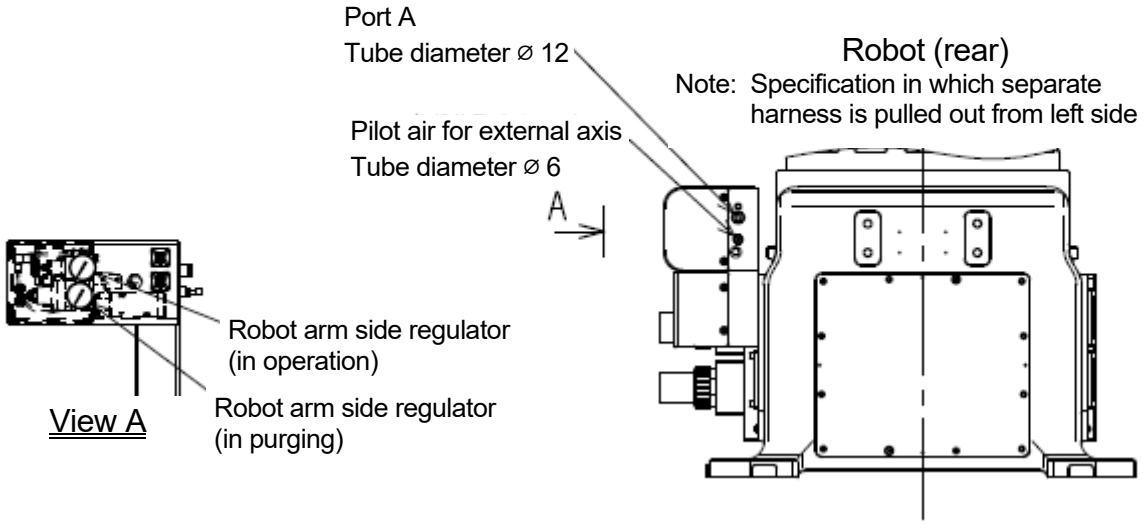
	Regulator on robot arm side (in operation)	Regulator on robot arm side (in purging)
Japan explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
China explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
North America explosion-proof specification	15 [kPa] (0.015 [MPa])	145 [kPa] (0.145 [MPa])

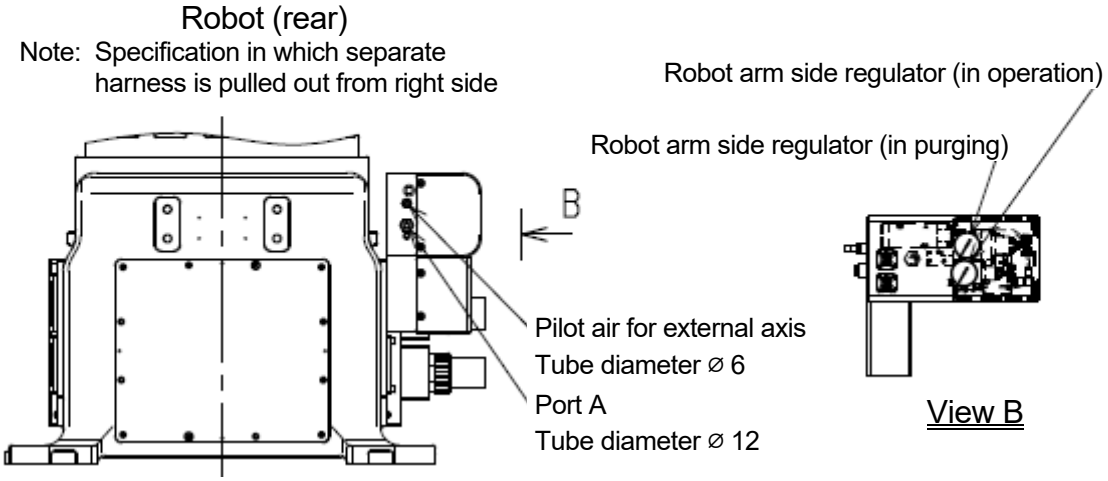
Standard values of regulator

KJ264/244/194 (Floor mounted specification)

(There are no differences between models with left-hand and right-hand rear arms.)

Air connecting port is provided on the base unit of robot arm. Supply air from the air inlet of port A (tube diameter: ⌀ 12) on the rear of robot arm as shown in the figure below.



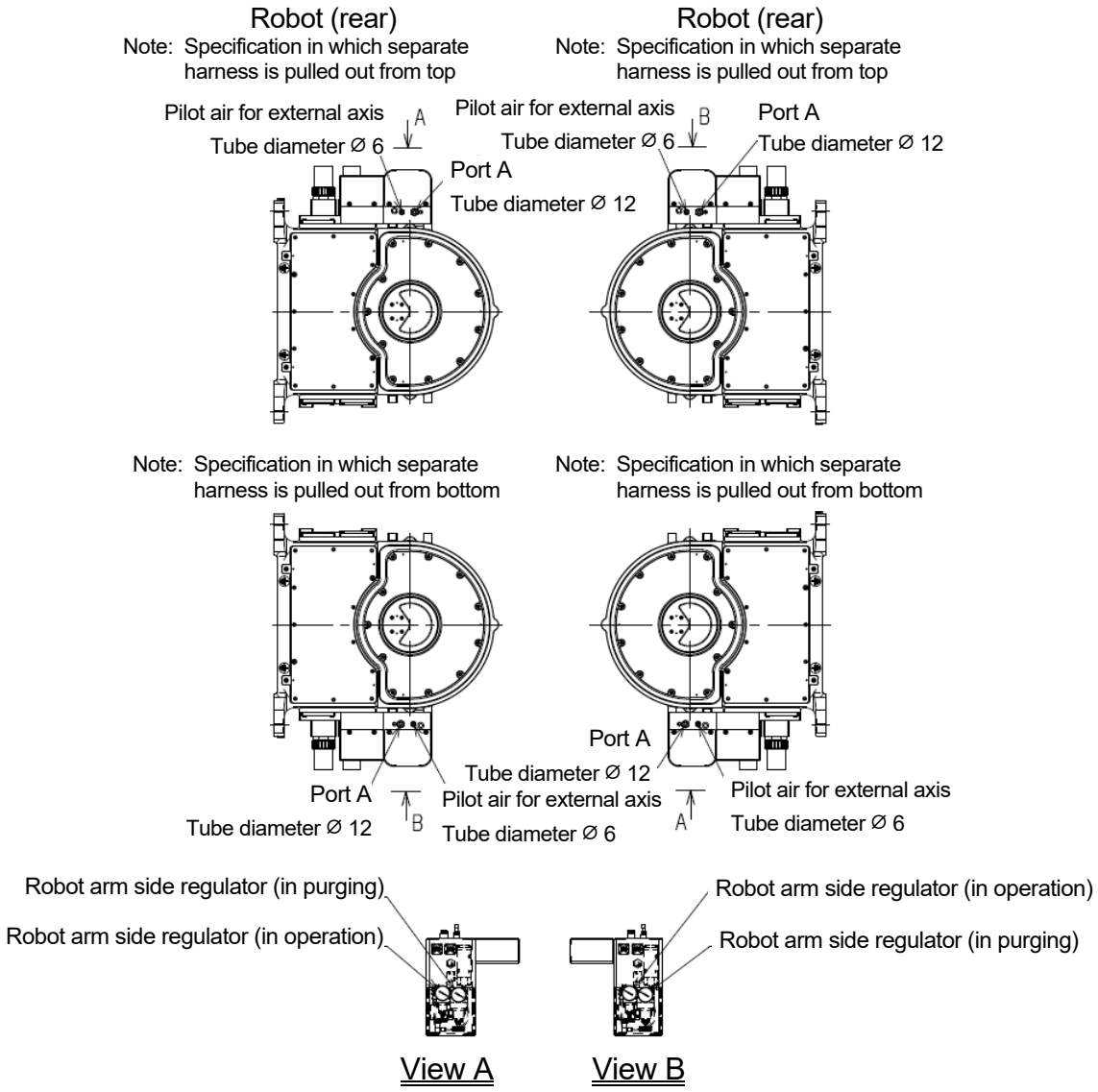


	Regulator on robot arm side (in operation)	Regulator on robot arm side (in purging)
Japan explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
China explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
North America explosion-proof specification	15 [kPa] (0.015 [MPa])	145 [kPa] (0.145 [MPa])

Standard values of regulator

KJ264/244/194 (Wall mounted (left) specification)
(There are no differences between models with left-hand and right-hand rear arms.)
KJ264/244/194 (Wall mounted (right) specification)
(There are no differences between models with left-hand and right-hand rear arms.)

Air connecting port is provided on the base unit of robot arm. Supply air from the air inlet of port A (tube diameter: ⌀ 12) on the rear of robot arm as shown in the figure below.



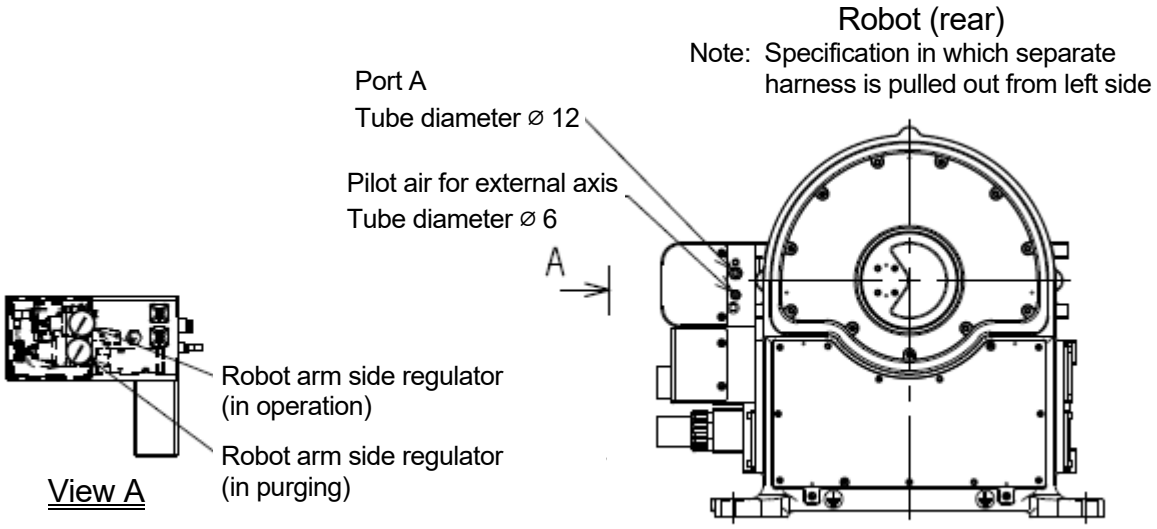
	Regulator on robot arm side (in operation)	Regulator on robot arm side (in purging)
Japan explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
China explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
North America explosion-proof specification	15 [kPa] (0.015 [MPa])	145 [kPa] (0.145 [MPa])

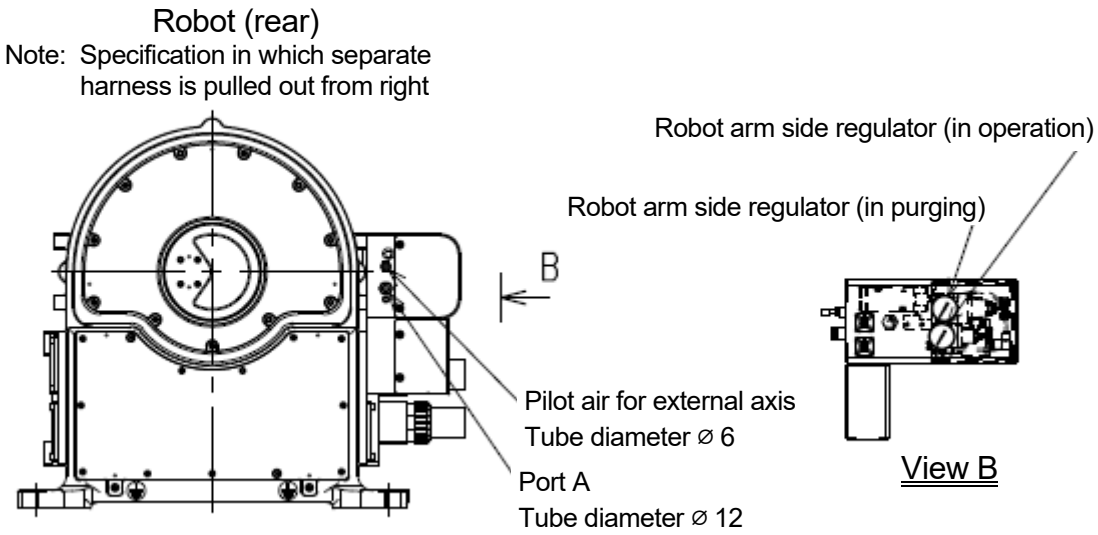
Standard values of regulator

KJ264/244/194 (Shelf mounted specification)

(There are no differences between models with left-hand and right-hand rear arms.)

Air connecting port is provided on the base unit of robot arm. Supply air from the air inlet of port A (tube diameter: ⌀ 12) on the rear of robot arm as shown in the figure below.





	Regulator on robot arm side (in operation)	Regulator on robot arm side (in purging)
Japan explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
China explosion-proof specification	15 [kPa] (0.015 [MPa])	160 [kPa] (0.160 [MPa])
North America explosion-proof specification	15 [kPa] (0.015 [MPa])	145 [kPa] (0.145 [MPa])

Standard values of regulator

9.3 For Europe Explosion-Proof Specification (Type-E)

Air connecting port is provided in base section of robot arm. Supply air from the air inlet of port A (tube diameter: ⌀ 12) on the rear of robot arm as shown in the figure below.

Note Air flow rate leaked from robot arm is approximately 20 L/min. (nor).

⚠ CAUTION

Regulator on side of robot arm is adjusted at factory shipment, however, check the regulator setting in installation and change it if necessary.

Purge control unit
Manufacturer: Gönnheimer Elektronic GmbH
Model: FS850S.6.8.1

Digital solenoid valve
Manufacturer: Gönnheimer Elektronic GmbH
Model: SVP.5

⚠ CAUTION

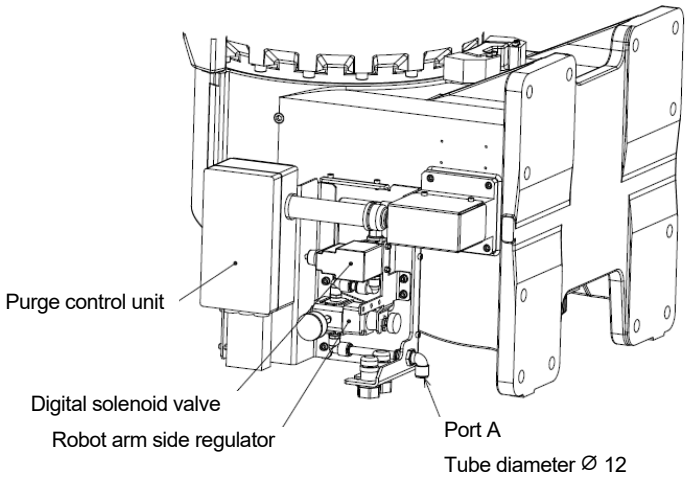
Use clean air that meets specifications below.
1. Solid material.... 0.01 μm or less
2. Oil content..... Mist separation: 99.9999% or more
3. Humidity ..... Dew point: -17°C or less at atmospheric pressure.
4. Input pressure .. 0.4 to 0.7 MPa (4.1 to 7.1 kgf/cm^2)
5. Input quantity... 500 L/min. (nor) (Only at purging)

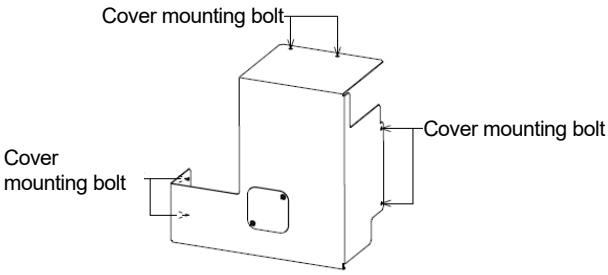
[NOTE]

The digital solenoid valve set on the purging side is changed to the leakage compensation side when purging is completed. After that, air is required to compensate for exhausted cooling air and small air leaks from sealed parts in various places.

KJ314

(There are no differences between models with left-hand and right-hand rear arms.)



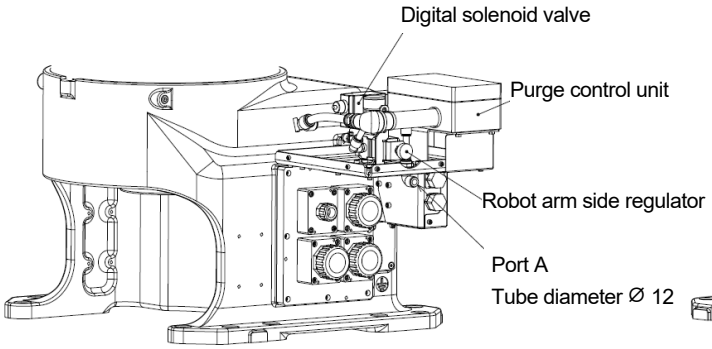


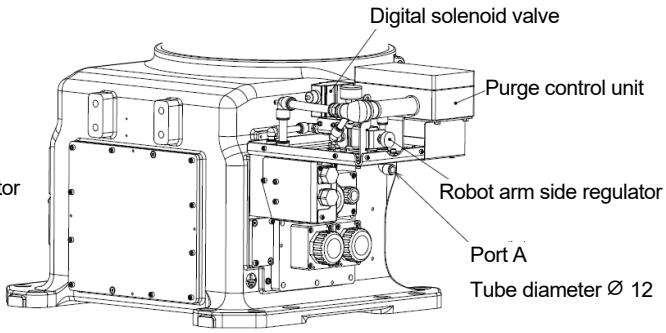
Bolt type	Tightening torque [N·m]
M5 hexagon socket head bolt	6.9

Regulator on robot arm side
400 [kPa] (0.40 [MPa])

KJ264/244/194 (Floor mounted specification)

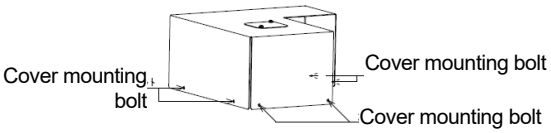
(There are no differences between models with left-hand and right-hand rear arms.)

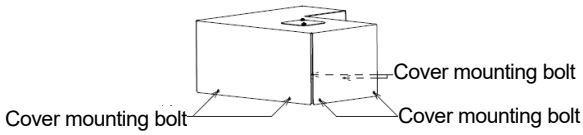




Regulator on robot arm side
400 [kPa] (0.40 [MPa])

Bolt type	Tightening torque [N·m]
M5 hexagon socket head bolt	6.9





KJ264/244/194 (Wall mounted (left) specification)

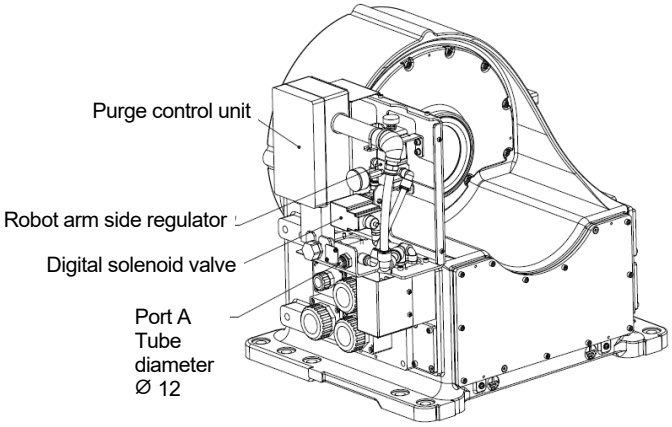
(There are no differences between models with left-hand and right-hand rear arms.)

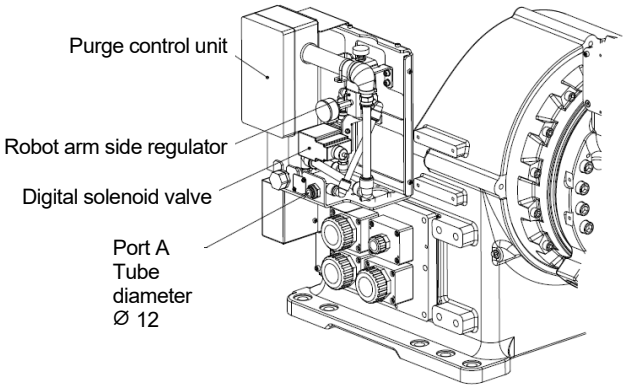
KJ264/244/194 (Wall mounted (right) specification)

(There are no differences between models with left-hand and right-hand rear arms.)

KJ264/244/194 (Shelf mounted specification)

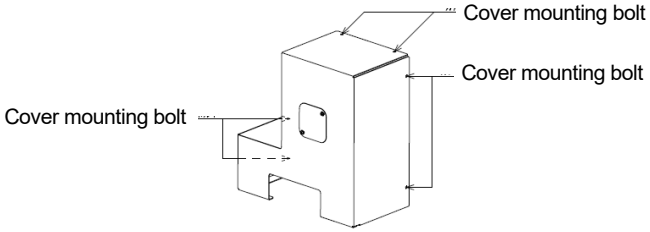
(There are no differences between models with left-hand and right-hand rear arms.)

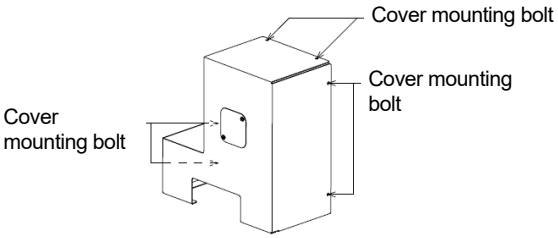




Bolt type	Tightening torque [N·m]
M5 hexagon socket head bolt	6.9

Regulator on robot arm side
400 [kPa] (0.40 [MPa])





9.4 Parameters of Purge Control Unit (Only for Explosion-Proof Specification (Type-E))

The parameters of purge control unit are set as shown below.

1. Pur. Vol.:	7050 L
2. Min. Fl. P.:	4.7 L/s
3. Min. Pres.:	1.5 mbar
4. Max. Pres.:	27 mbar
5. R. Pre. Pu.:	25 mbar
6. Rated Pr.:	3 mbar
7. Sig. Pr.:	2 mbar

Note: These setting values ensure purging flow rate of more than 420 L/min (nor).

WARNING

Do not change the parameters settings certified by the registered institute for explosion-proof certification (ExNB).

9.5 For Europe Explosion-Proof Specification (Type-P)

Air is supplied to the controller and then supplied from the controller to the robot body and external axis, so it is necessary to install a scavenging tube between the controller, robot body, and external axis.

⚠ DANGER

Do not supply air directly to the robot arm and external axis. This could damage the

⚠ CAUTION

1. **The gage is set to 0 MPa before shipment. During installation, connect the scavenging tube between the robot and the controller as instructed in this manual, and calibrate the gage. When the robot is connected to the external axis, the pilot air opening for the external axis is connected to the pilot inlet port for the external axis. When the external axis is not used it is blocked, so do not remove the tubes or plugs.**
2. **Use the clean air specified below.**
   (Explosion proof specification for Europe has different input pressure and input quantity. Refer to "9.2 Explosion-Proof Specification for Europe".)
   - **Solids ..... 0.01 μm or less**
   - **Oil ..... Mist removal At least 99.9999%**
   - **Moisture ..... Under dew-point -17°C at atmospheric pressure**
   - **Input pressure ..... 0.5 to 0.7 MPa (5.1 to 7.1 kgf/cm^2)**
   - **Input quantity ..... 600 L/min. (nor) (only during scavenging)**
3. **Use nylon (incombustible) as material for the scavenging tube mounted between the robot arm and the controller.**
4. **If an attempt is made to operate the robot before the air pressure has risen sufficiently, such as immediately after starting up the compressor for the air supply, errors will occur due to insufficient internal pressure, and it will not be possible to operate the robot. Operate the robot after the air pressure has risen.**

[NOTE]

When scavenging is complete, the air operation valve that is mounted to the exhaust side closes. Therefore only a small amount of the air consumed while running the robot will leak from each of the air seals.

9.5.1 Scavenging Tube Connection (Europe Explosion-Proof Specification (Type-P))

As shown below, connect the scavenging tubes (tube that supplies the air for scavenging, tube for the pilot air, and internal pressure check tube) between the robot arm, controller, and external axis.

DANGER

1. **Do not supply air directly to the robot arm and external axis. This could damage it.**
2. **Attach the orifice (Part number: 50955-0003) on the first external axis for the specification with external axis. Failure to do this could damage it.**

CAUTION

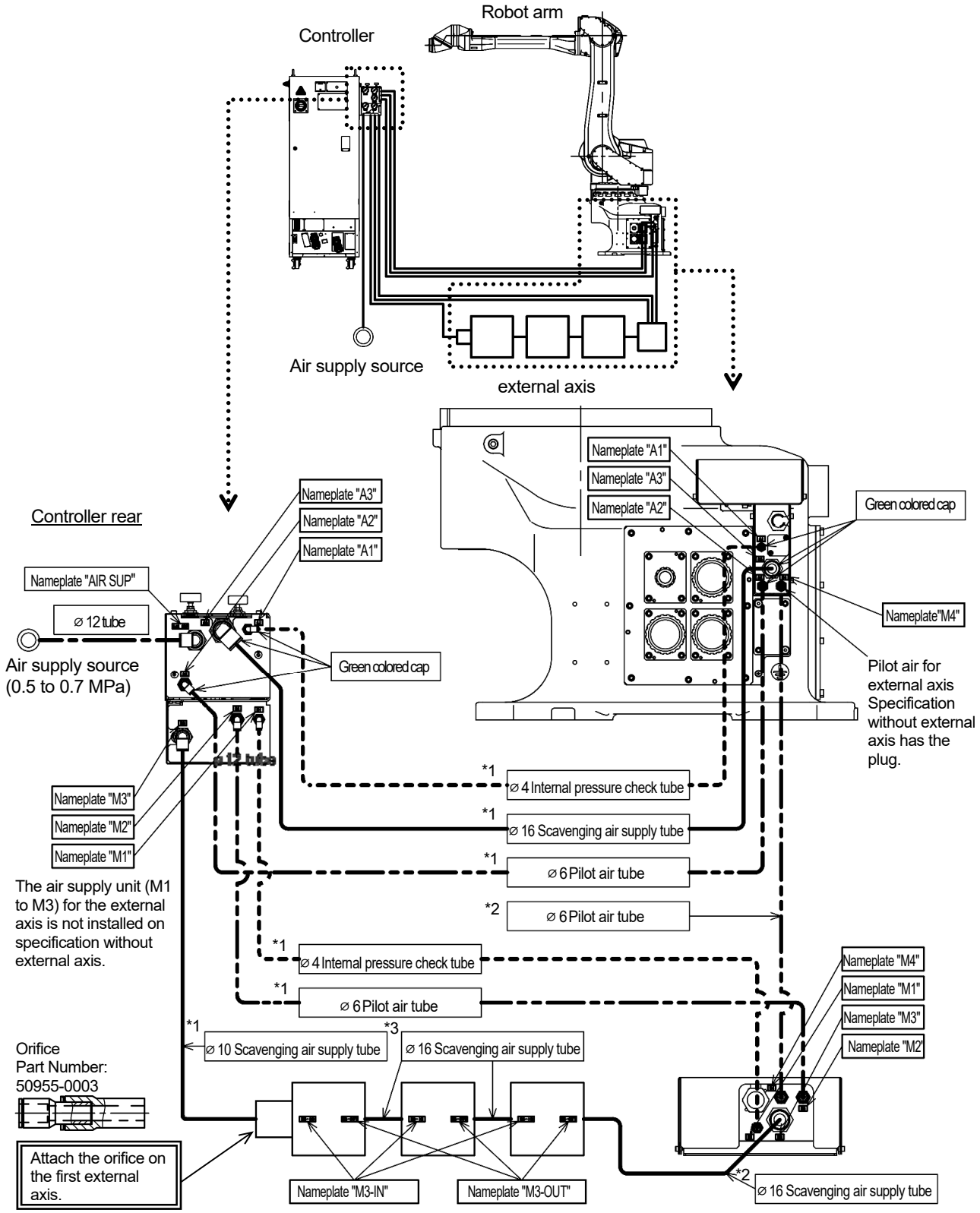
1. **Use nylon (incombustible) as material for the scavenging tube mounted between the robot arm and the controller.**
2. **Scavenging tubes have nameplates and green-colored caps on their connectors to identify them as scavenging tubes. Connect the same nameplates together and the same green-colored caps together.**

[NOTE]

Make sure that the scavenging tubes are not bent during scavenging tube connection work or when moving the controller.

KJ314/264/244/194 (There are no differences between models with left-hand and right-hand rear arms.)
KJ264/244/194 (There are no differences in directions from which separate harness is pulled out.)

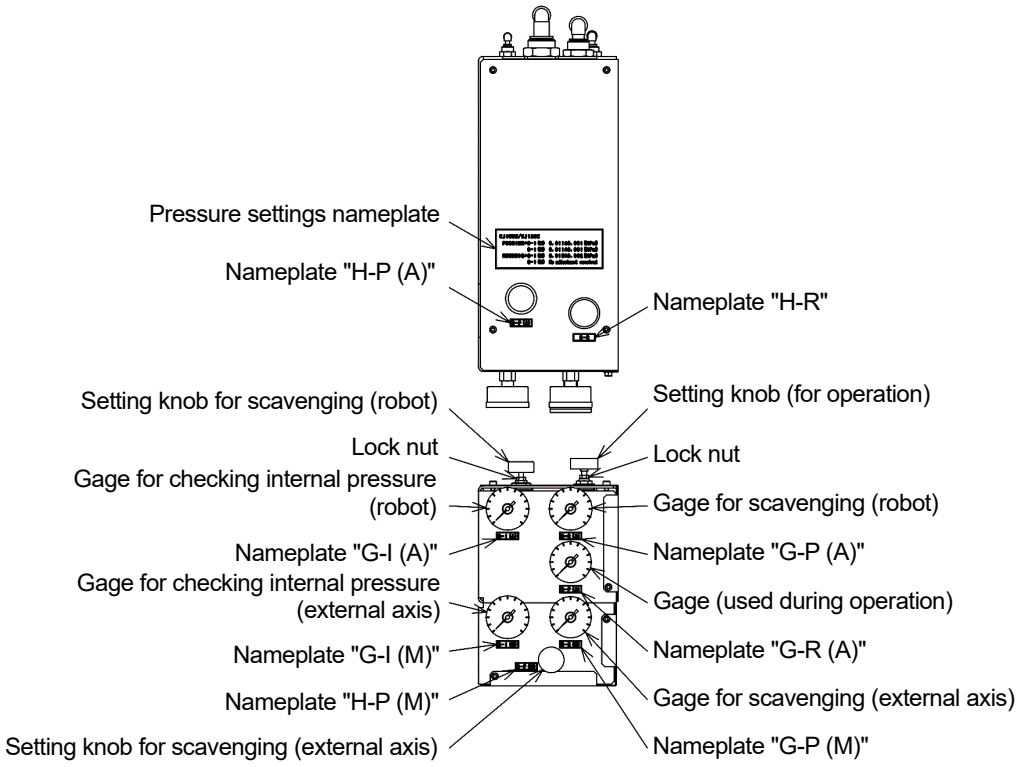
■ Europe explosion-proof specification (Type-P)

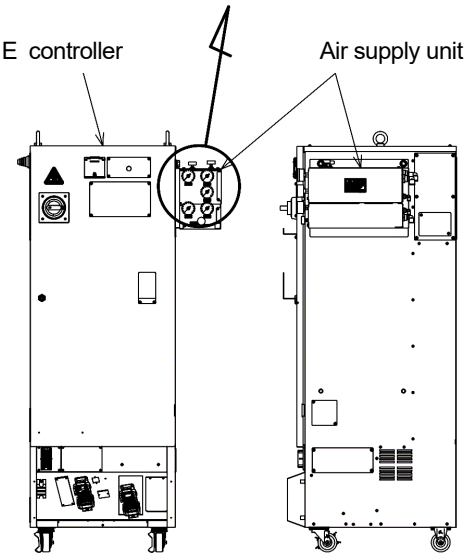


*1 Keep the air tube between the controller and the robot arm, between the controller and the external axis in the same length.
Keep the length of the air tube at or below 40 m.
*2 Keep the length of the air tube at or below 3 m.
*3 Keep the total length of the air tube at or below 20 m.

9.5.2 Gage Calibration Method (Europe Explosion-Proof Specification (Type-P))

Calibrate the gages using the method described below.
Do not press the Error Reset button while performing this work. If the button is pressed, return to Step 1 and perform the operation again from the beginning.
There are five types of gage: a gage (used during operation), a gage for scavenging (robot), a gage for checking internal pressure (robot), a gage for scavenging (external axis) and a gage for checking internal pressure (external axis).
The air supply unit for the external axis is not installed on the specification without external axis. Making adjustment to the external axis is not necessary.





⚠ CAUTION

1. **The gage is set to 0 MPa before shipment. During installation, mount the scavenging tube between the robot and the controller as instructed in this manual, and calibrate the gage.**
2. **If the reading on the gage for checking internal pressure (robot) exceeds 0.040 [MPa] (40 [kPa]) during calibration, shut off the air supply.**
3. **If the reading on the gage for checking internal pressure (external axis) exceeds 0.040 [MPa] (40 [kPa]) during calibration, shut off the air supply.**

[NOTE]

1. When the motor power is ON, the "valve ON/OFF icon" cannot be used. Turn OFF the motor power when performing this work.
2. The controller power must always be turned back ON after this work is completed.

Before recalibrating, set the gage (used during operation), the gage for scavenging (robot) and the gage for scavenging (external axis) to 0 [MPa].

[Procedure]

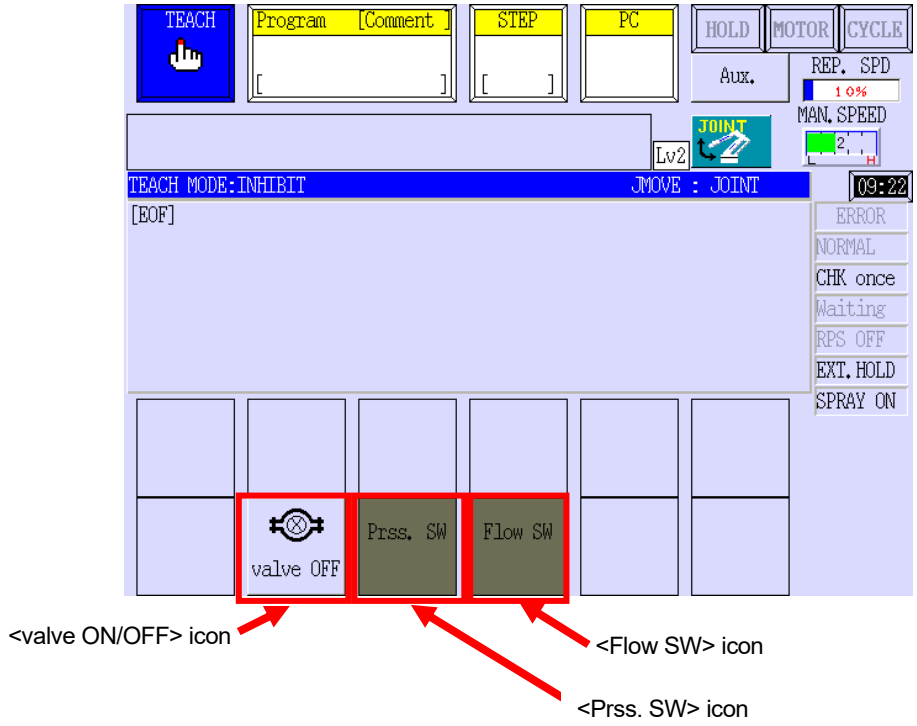
1. Turn OFF the controller power.
2. Supply air to the controller.
3. Check to make sure that each gage is set to 0 [MPa].
   (If the reading on the gage for checking internal pressure (robot) exceeds 0.040 [MPa] (40 [kPa]), shut off the air supply, and check the connections of the scavenging tubes.)
   (If the reading on the gage for checking internal pressure (external axis) exceeds 0.040 [MPa] (40 [kPa]), shut off the air supply, and check the connections of the scavenging tubes.)
   (If internal pressure remains, disconnect the scavenging air supply tube (robot: ⌀16, external axis: ⌀10) and wait until the gage for checking internal pressure (robot) and the gage for checking internal pressure (external axis) read 0 [MPa].)
4. Loosen the lock nuts of the setting knob (for operation) and the setting knob for scavenging (robot).
5. Turn the setting knob (for operation) and adjust until the pressure displayed on the gage for checking internal pressure (robot) is 0.015±0.002 [MPa] (15±2 [kPa]).

⚠ CAUTION

When calibrating the gage, turn the setting knob gradually in the direction that increases the setting values.

6. Tighten the lock nut for the setting knob (for operation).
   After calibration, wait at least two minutes, then check the setting values. (If the setting values are out, loosen the lock nut again and go back to Step 5.)

7. Turn ON the controller power.
   The internal pressure will be abnormally low, so the error message "(E6032) [Purge control board] Pressure within enclosure is low. (during purging)" is displayed.(After about one minute later from the controller power is turned ON, it is displayed when the scavenge control unit starts scavenging.)
8. Press CLOSE while pressing A on the teach pendant.
9. Close the error screen, and make sure that the normal teaching screen is displayed.
   (The error screen closes, but error reset has not been executed yet.)
10. Press → while pressing A on the teach pendant, and the <valve ON/OFF>, <Flow SW>, and <Prss. SW> icons are displayed. (Refer to the figure below.)



   Confirm that the <valve ON/OFF> icon is OFF.
   Confirm that the <Prss. SW> icon has turned yellow.
11. Touch <valve ON/OFF> icon.
    The icon will turn yellow, and the scavenging solenoid valve will turn ON.
    When the scavenging solenoid valve turns ON, the gage (for checking internal pressure) changes.
12. Turn the setting knob for scavenging (robot) to adjust until the setting value on the gage for scavenging (robot) becomes 0.250 [MPa] (250 [kPa]) and tighten the lock nuts on the setting knob for scavenging (robot).
13. If the reading on the gage for checking internal pressure (robot) exceeds 0.040 [MPa] (40 [kPa]), shut off the air supply, and check to make sure that the scavenging tubes are connected.
14. Check to make sure that the pressure displayed on the gage for checking internal pressure (robot) is 0.016±0.001 [MPa] (16.0±1.0 [kPa]). If it is within range, go to Step 16. If it is out of range, go to Step 15.

15. If the pressure displayed on the gage for checking internal pressure (robot) is higher than 0.016±0.001 [MPa] (16.0±1.0 [kPa]), loosen the lock nut on the setting knob for scavenging (robot), and turn the setting knob (for scavenging) to lower the pressure to below the range. Then increase the pressure to within the range and tighten the lock nut.
    If the pressure displayed on the gage for checking internal pressure (robot) is lower than 0.016±0.001 [MPa] (16.0±1.0 [kPa]), loosen the lock nut on the setting knob for scavenging (robot), increase the pressure to within the range by turning the setting knob for scavenging, and tighten the lock nut.
16. For specification without external axis, go to Step 21. For specification with external axis, go to Step 17.
17. Turn the setting knob for scavenging (external axis) to adjust until the setting value on the gage for scavenging (external axis) becomes 0.090 [MPa] (90 [kPa]) and tighten the lock nuts on the setting knob for scavenging (external axis).
18. If the reading on the gage for checking internal pressure (external axis) exceeds 0.040 [MPa] (40 [kPa]), shut off the air supply, and check to make sure that the scavenging tubes are connected.
19. Check to make sure that the pressure displayed on the gage for checking internal pressure (external axis) is 0.011±0.001 [MPa] (11.0±1.0 [kPa]). If it is within range, go to Step 21. If it is out of range, go to Step 20.
20. If the pressure displayed on the gage for checking internal pressure (external axis) is higher than 0.011±0.001 [MPa] (11.0±1.0 [kPa]), loosen the lock nut on the setting knob for scavenging (external axis) and turn the setting knob for scavenging (external axis) to lower the pressure to below the range. Then increase the pressure to within the range and tighten the lock nut.
    If the pressure displayed on the gage for checking internal pressure (external axis) is lower than 0.011±0.001 [MPa] (11.0±1.0 [kPa]), loosen the lock nut on the setting knob for scavenging (external axis), raise the pressure within the range by turning the setting knob for scavenging (external axis), and tighten the lock nut.
21. Confirm that the <Flow SW> and <Prss.SW> have turned yellow.
    Touch <valve ON/OFF>. The scavenging solenoid valve will turn OFF.
22. Turn the controller power OFF, and then ON. Scavenging will begin.
23. Monitor 1 will display [57. Air purge Input Signals monitor].
24. Confirm that [006: EXT. Air purge comp.] has changed to yellow, and turn OFF Monitor 1.

⚠ CAUTION

If an attempt is made to operate the robot before the air pressure has risen sufficiently, such as immediately after starting up the compressor for the air supply, errors will occur due to insufficient internal pressure, and it will not be possible to operate the robot. Operate the robot after the air pressure has risen.

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