

**Kawasaki Robot  
BXP Series**

**Installation and  
Connection Manual**

**Robot**

Kawasaki Heavy Industries, Ltd.

## Preface

This manual explains the installation and connection procedures for the Kawasaki Robot BXP Series.

Be sure to fully understand the content of this manual and pay attention to the safety items in this manual and the separate "Safety Manual" when performing an operation. Note that this manual only provides descriptions of the installation and connection procedures for the arm. Also see the "Installation and Connection Manual" for the controller. For arc-welding robots, also consult the "Installation and Connection Manual" for the Arc Welding Application.

Again, do not perform any kind of work until you fully understand all of the contents of this manual. Also, Kawasaki is not responsible for damages or problems that occur as a result of performing work after referring to specific pages only.

### [NOTE]

The explanations in this manual are applicable to the following robots.  
BXP110S, BXP110L, BXP135X, BXP165L, BXP210L

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1. This manual does not guarantee the operation of the system with which the robot is used. 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 that the manual is lost or damaged, contact Kawasaki.
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## 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, operation and maintenance.

 **WARNING**

- 1. The accuracy and effectiveness of the diagrams, procedures, and detailed explanations given in this manual cannot be confirmed with absolute certainty. Therefore, should any unexplained questions or problems with work arise, please contact your nearest Kawasaki.**
- 2. Safety related contents described in this manual apply to the specific matters described and not to all robot work. They are not applicable to other general items or other matters. In order to perform all work safely, read and fully understand the "Safety Manual," all pertinent laws, regulations, and related materials, as well as all the safety explanations in each chapter, and prepare safety measures suitable for actual work.**

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## 1 Precautions

### 1.1 Precautions during Transportation, Installation, and Storage

When transporting the Kawasaki Robot to the installation location, observe the following precautions for transportation, installation, and storage.



#### WARNING

1. When transporting the robot by crane or forklift, never allow a person to support it.
2. During transportation, never allow a person to ride on the robot, and never allow a person to get under it when it is suspended.
3. Before starting installation, be sure to turn OFF the controller power and external power switches, and after clearly displaying that "inspection and maintenance is in progress," lock out and tag out the external power switch so that an operator or third party does not accidentally turn ON the power, causing an unexpected situation such as electric shock.
4. When operating the robot, be sure to confirm safety points and absence of problems regarding robot installation before turning the motor power ON, and moving the robot arm to the designated position. Take care not to approach the arm and become accidentally caught when doing so. After setting the arm to the desired position, turn OFF the controller power and external power again as mentioned above, clearly indicate that "inspection and maintenance is in progress," and lock out and tag out the external power switch before starting work.



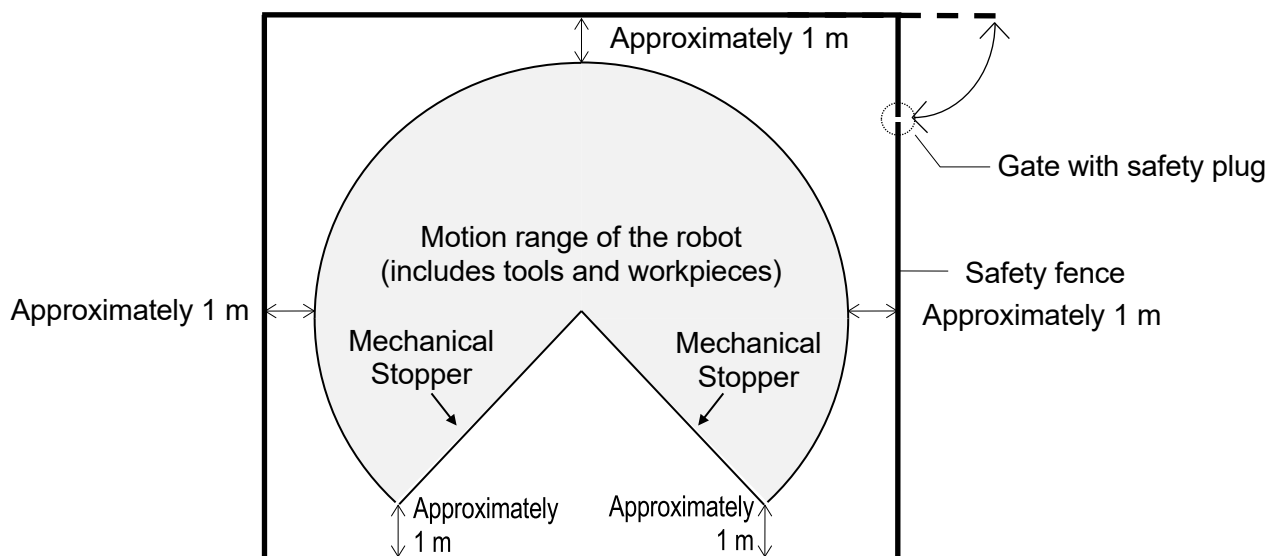
#### CAUTION

1. The robot is made of precision parts. Be careful not to subject it to impact or shock during transport.
2. When transporting the robot, clear away obstructions, etc. in advance so that it can be transported safely to the installation location.
3. Please pay attention to the following points when transporting or storing the robot.
  - (1) Maintain an ambient temperature within the  $-10^{\circ}\text{C}$  to  $60^{\circ}\text{C}$  range.
  - (2) Maintain a relative humidity within the 35% to 85% RH range (without any condensation).
  - (3) Avoid large vibrations or shocks.

## 1.2 Robot Arm Installation Environment

Install the robot arm in a location that satisfies the following conditions.

1. For floor-standing installation, the location must be capable of maintaining a horizontal surface within  $\pm 5^\circ$ .
2. The floor and frame must have adequate hardness.
3. The location must be able to maintain flatness so that excess force is not exerted on the installed part.  
(If flatness cannot be ensured, adjust with a liner. Flatness of setting surface: under 0.3)
4. The ambient operating temperature must be between  $0^\circ\text{C}$  and  $45^\circ\text{C}$ .  
(Starting in low temperatures increases the viscosity of grease and oil, which can lead to deviation errors and excess loads. In such cases, move the robot at low speeds before operating.)
5. Relative humidity must be 35% to 85% RH. In addition, there must not be any condensation.
6. The location must have little dirt, dust, oil, smoke or water, etc.
7. The location must have no flammable or corrosive fluids or gases.
8. The location must not be subject to large vibrations. (0.5 G or less)
9. The location must be well protected against electrical noise.
10. The location must safeguard a space that is larger than the robot arm's motion range.
  - (1) Install a safety fence around the robot, and make sure that it does not interfere with surrounding equipment, even when the arm has tools or workpieces mounted and is extended to its maximum motion range.
  - (2) Minimize the number of entrance gates in the safety fence (only one is best) and equip the entrance gate with a safety plug. Enter and exit the fence from here.
  - (3) For details concerning safety fences, observe the ISO 10218 requirements.

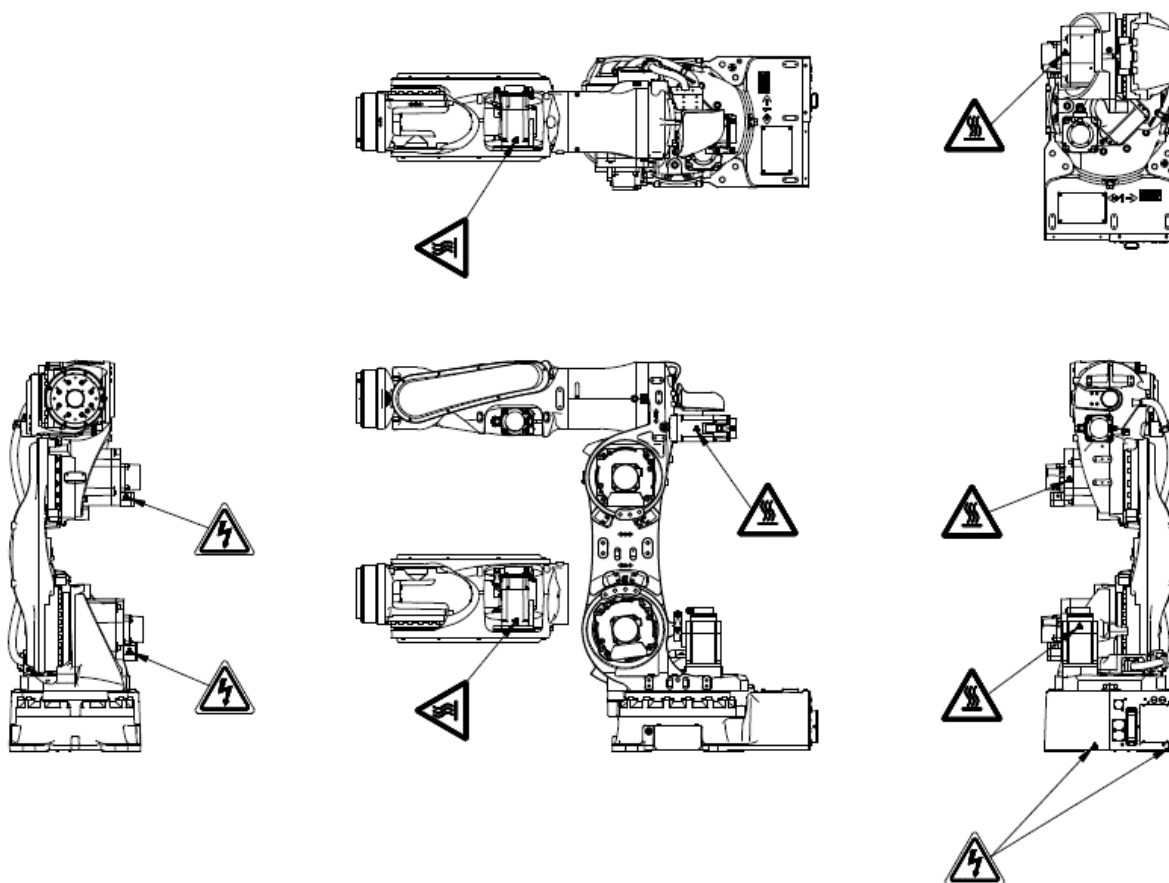


### 1.3 Residual Risk when Operating

**! WARNING**  
Pay attention to the residual risk areas described in the figures below during operation.

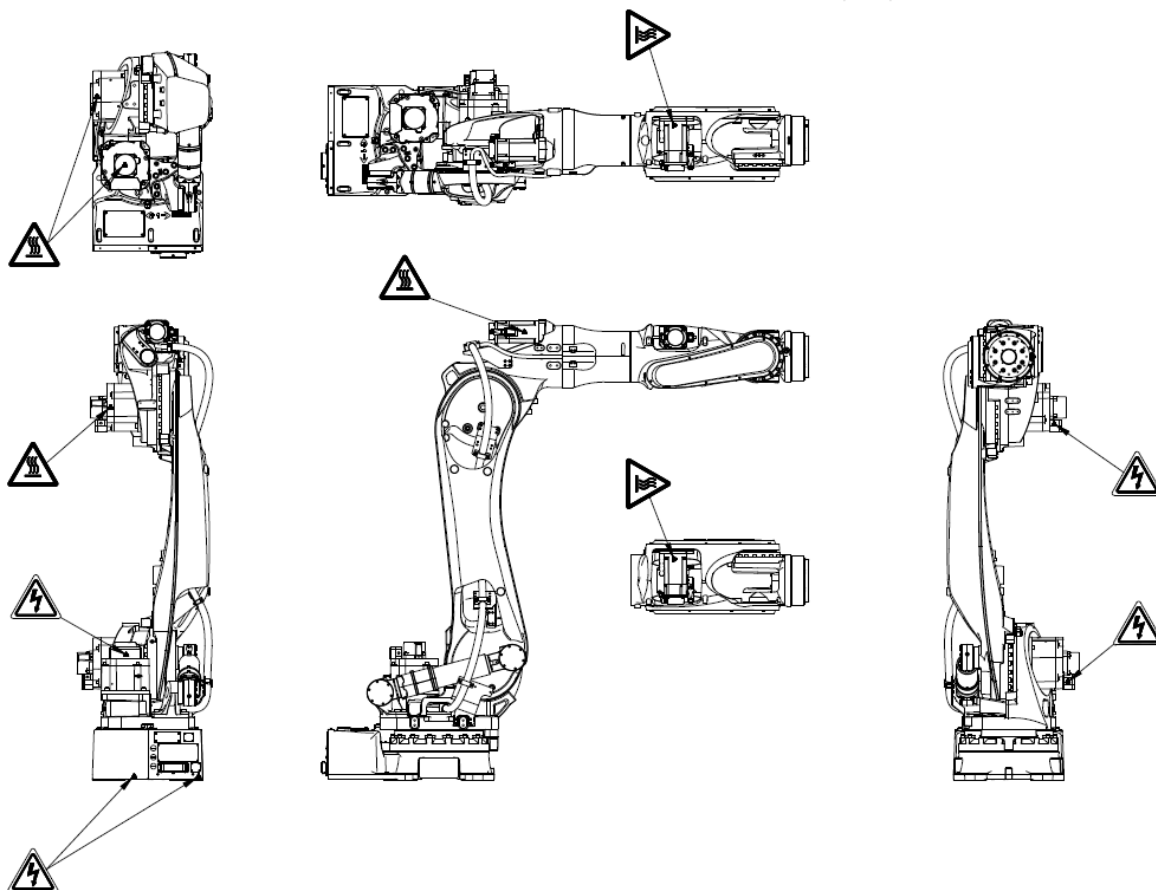
#### ■ High-temperature and electric shock danger areas (BXP110S)

-  High-temperature danger areas
-  Electric shock danger areas



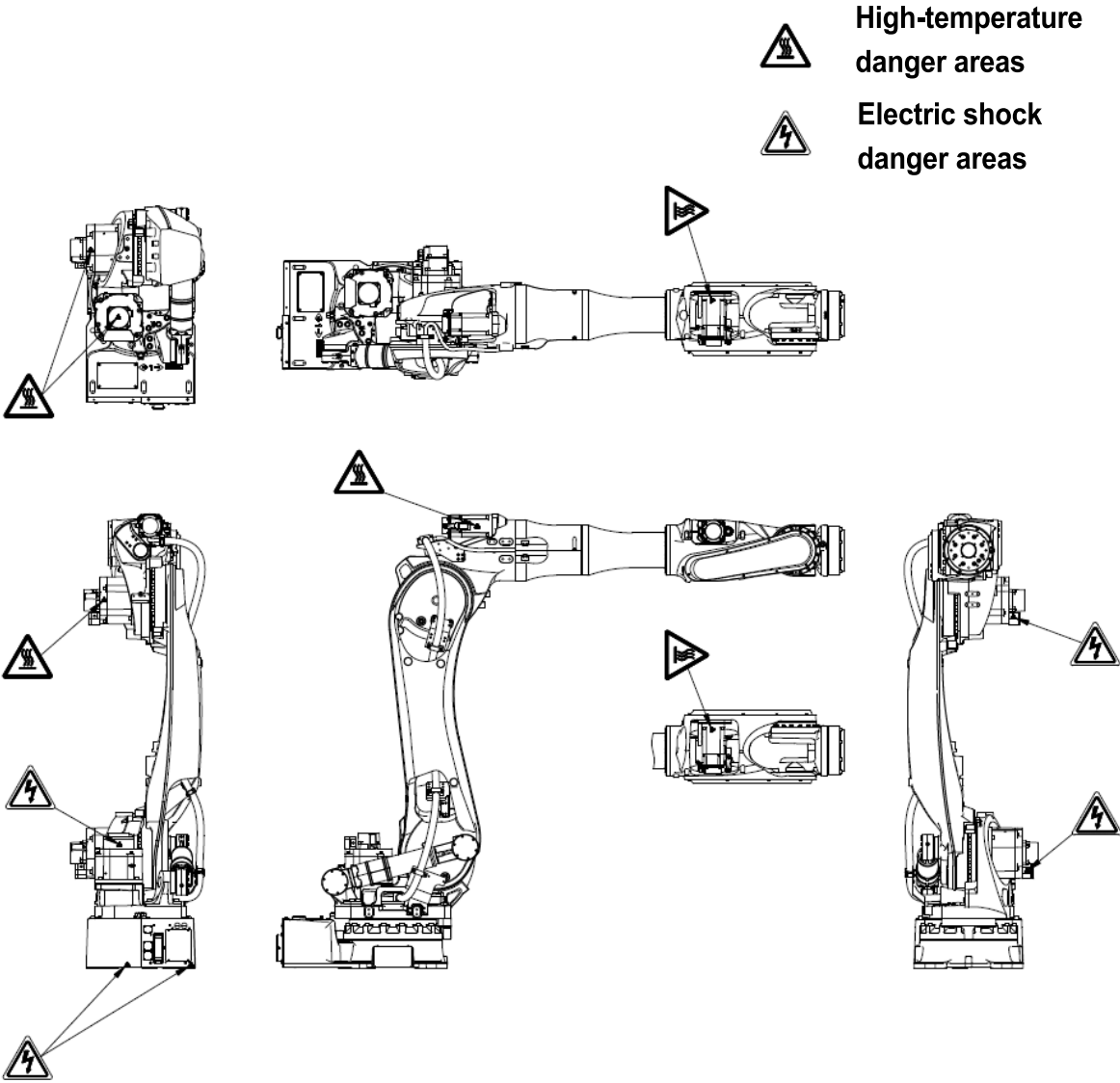
■ High temperature and electric shock danger areas (BXP110L, BXP165L, BXP210L)

-  High-temperature danger areas
-  Electric shock danger areas



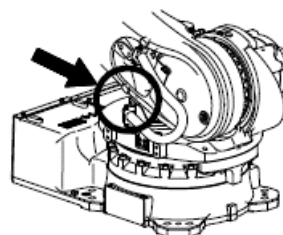
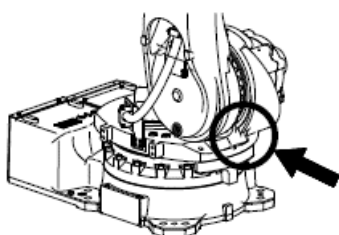
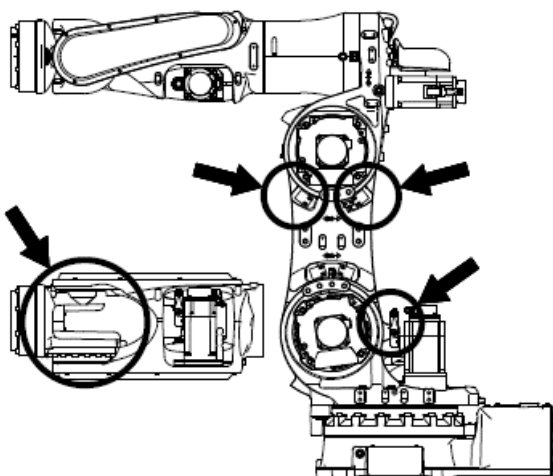
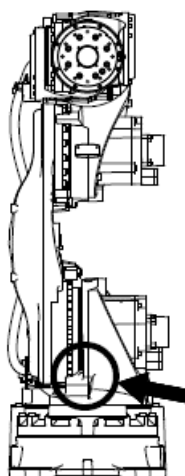
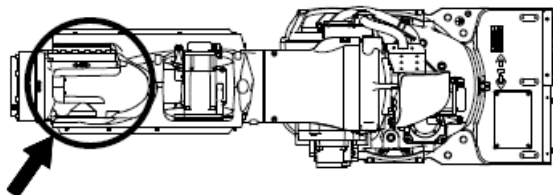


■ High-temperature and electric shock danger areas (BXP135X)



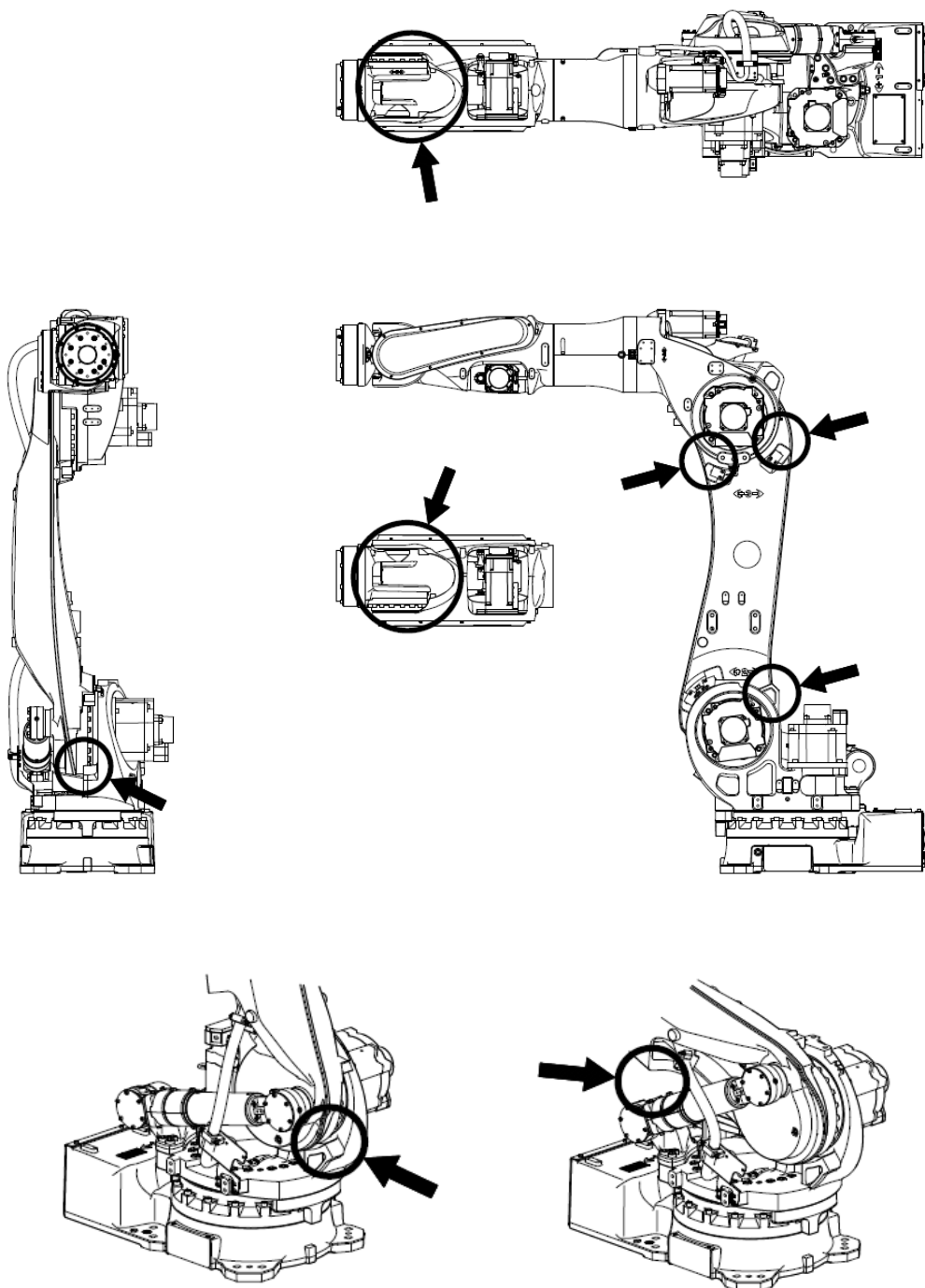
■ Catching danger areas (BXP110S)

○ Catching danger areas



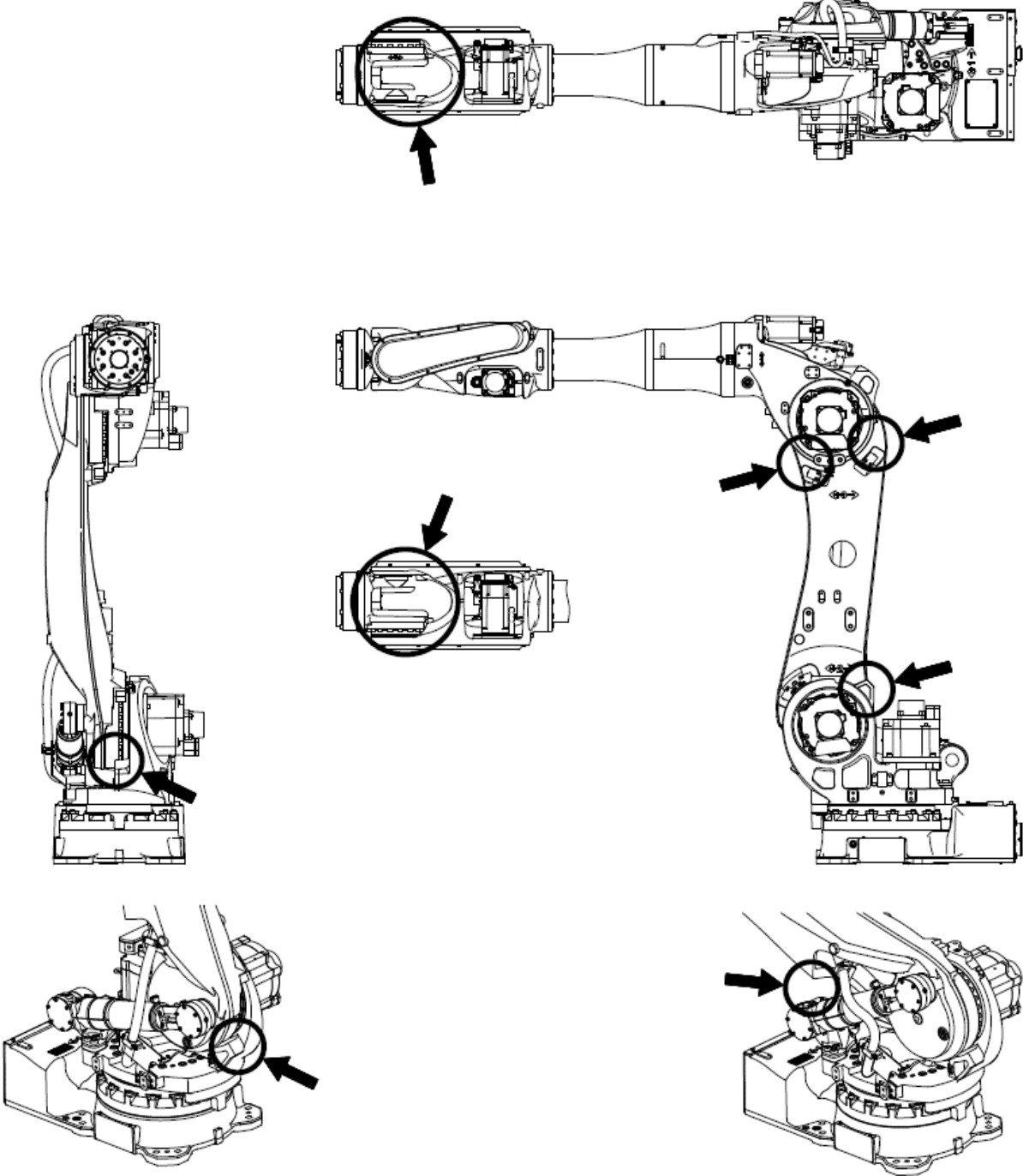
■ Catching danger areas (BXP110L, BXP165L, BXP210L)

○ Catching danger areas



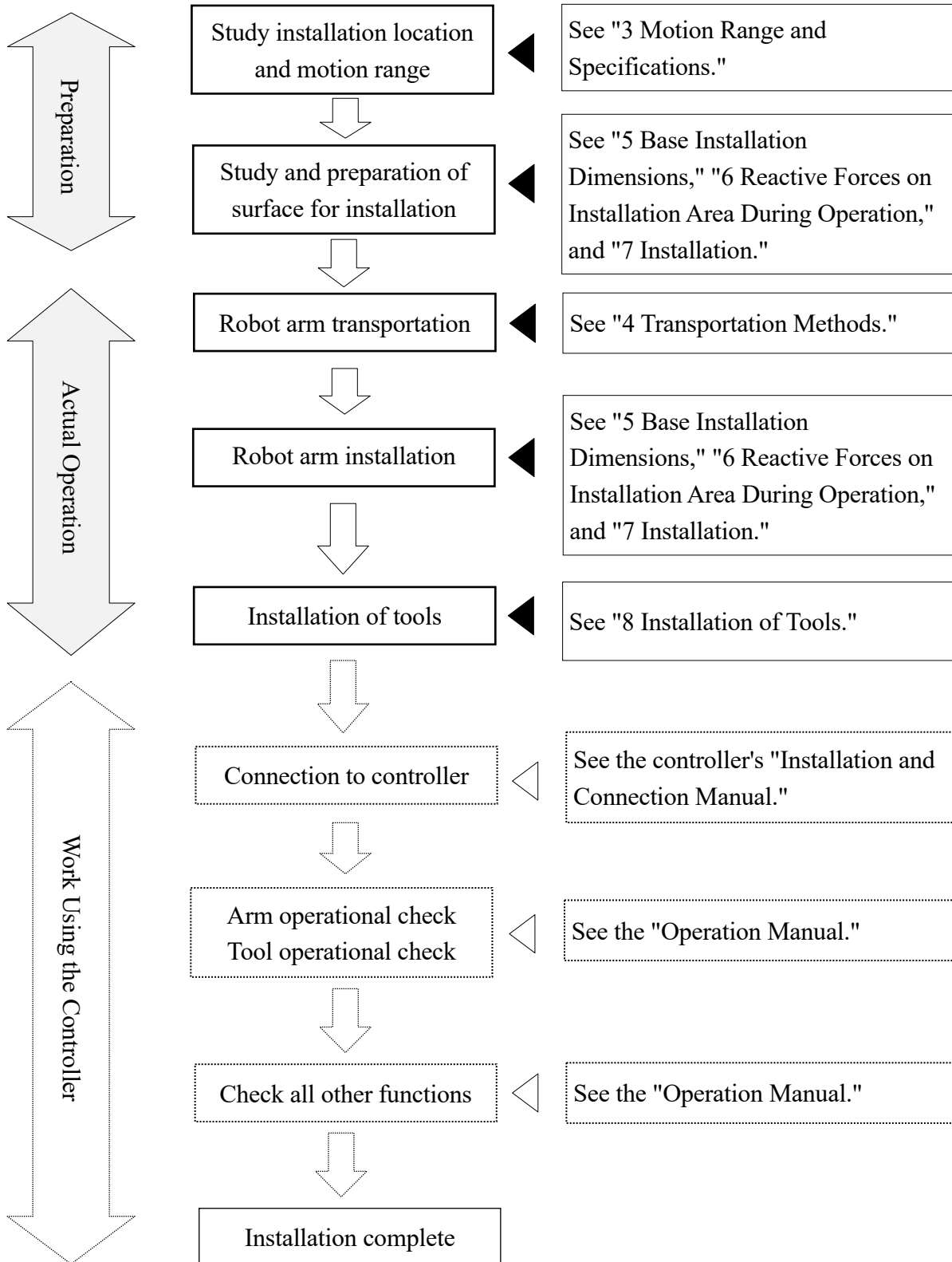
■ Catching danger areas (BXP135X)

○ Catching danger areas



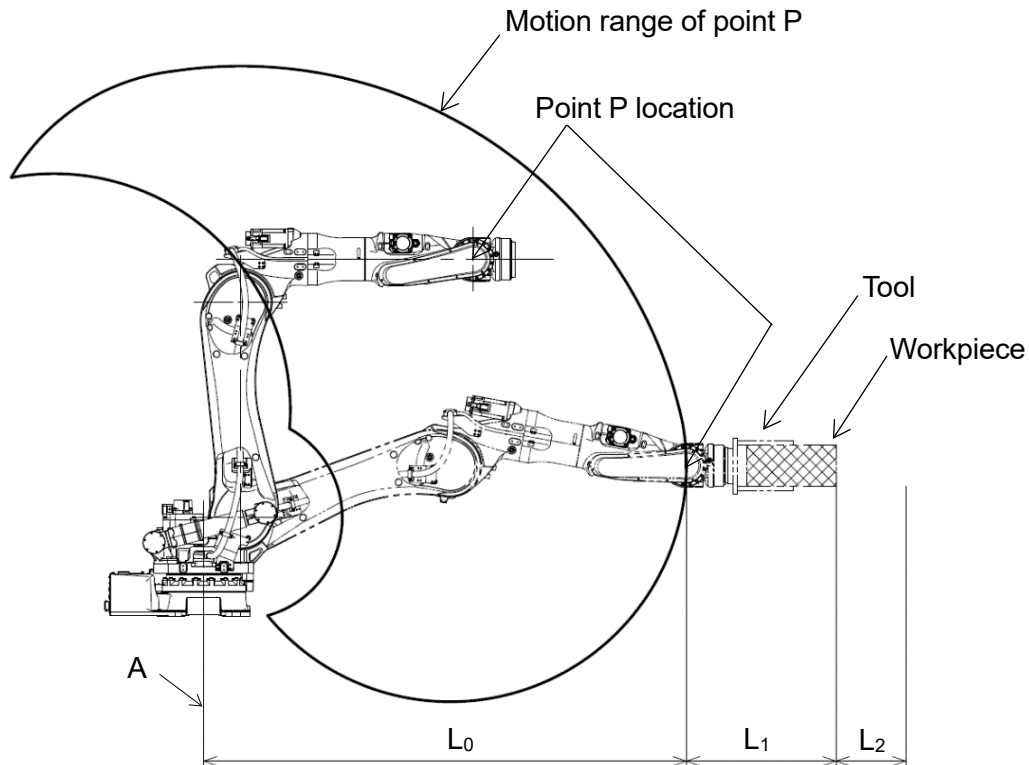
## 2 Arm Installation and Connection Work Flow

The work flow described here is for the robot arm only. See the controller's "Installation and Connection Manual" for more information regarding the controller.

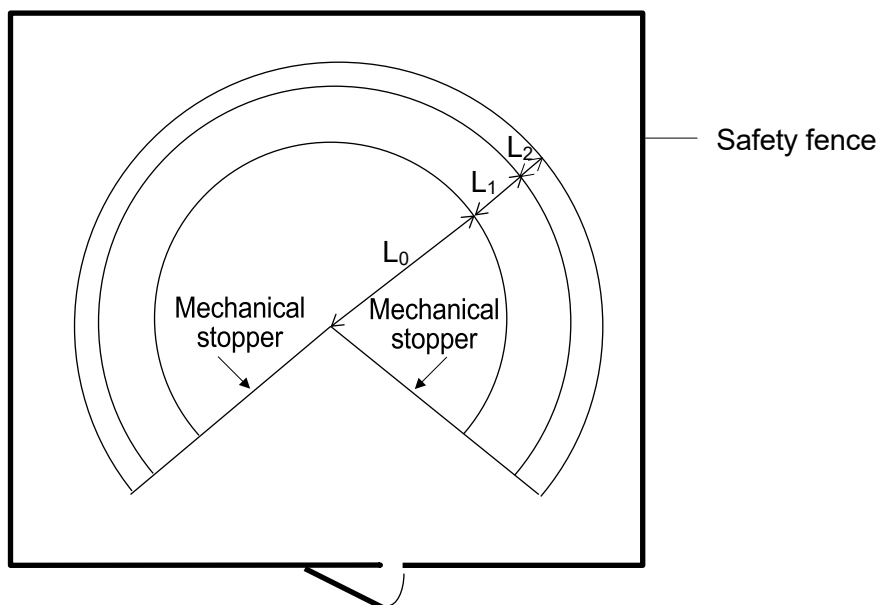


### 3 Motion Range and Specifications

#### 3.1 Determination of Safety Fence Installation Location from Motion Range

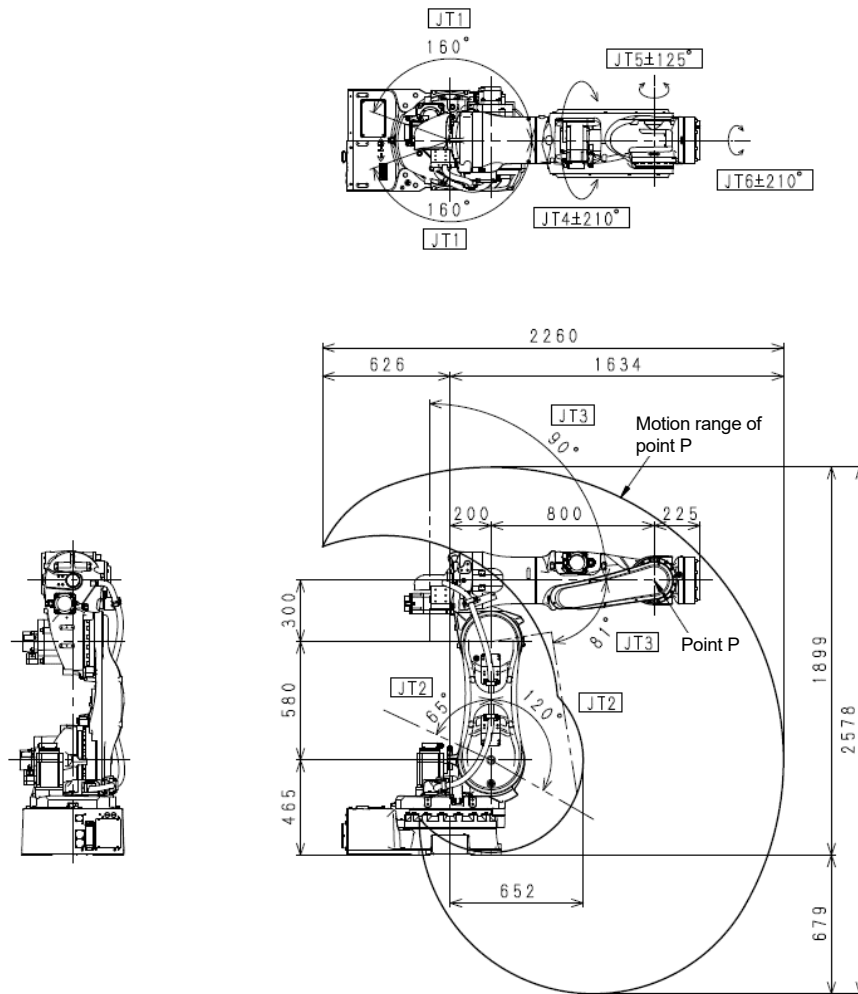


The motion range of the robot described below is represented by the motion range of point P in the figure. Therefore, as shown in the figure below, the safety fence needs to be ensured outside the circle whose radius is  $L_0+L_1+L_2$ , where  $L_0$  is the length from the center line of the arm (point A shown in the figure),  $L_1$  is the total length from the wrist flange to the outer edge of the largest workpiece held by any tool, and  $L_2$  is the safety margin. For the length of  $L_0$ , see "3.2 Motion Range and Specifications."



### 3.2 Motion Range and Specifications

#### ■ BXP110S

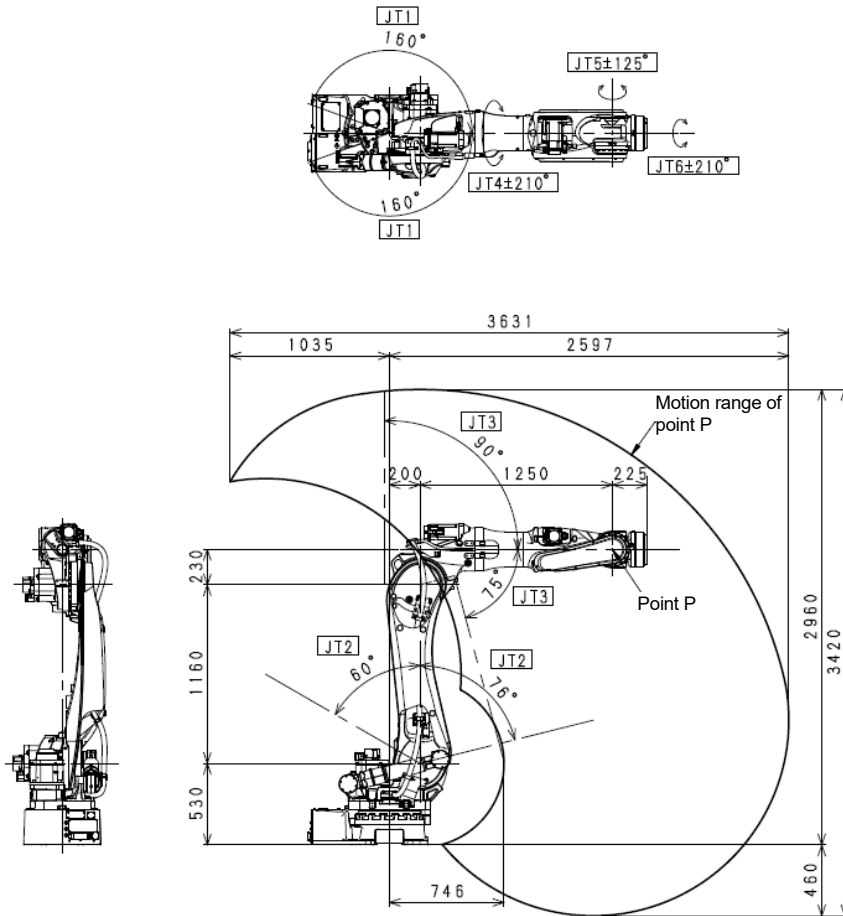


<b>Model</b>	Vertically articulated robot		
<b>Degree of freedom of motion</b>	6		
<b>Motion range and speed</b>	JT	Motion range	Maximum speed
	1	±160°	140°/s
	2	+120° to -65°	130°/s
	3	+90° to -81°	170°/s
	4	±210°	220°/s
	5	±125°	185°/s
<b>Maximum payload</b>	110 kg		
<b>Wrist load capacity</b>	JT	Torque	Moment of inertia
	4	855 N·m	90 kg·m <sup>2</sup>
	5	855 N·m	90 kg·m <sup>2</sup>
<b>Repeated positional accuracy</b>	±0.06 mm		
<b>Mass</b>	700 kg		
<b>Acoustic noise</b>	<80 dB (A) <sup>*1</sup>		

- \*1 Measurement conditions
- Robot tightly fixed to a flat floor surface
  - Point 4,600 mm from the center of JT1 axis

( Noise level varies situationally. )

■ BXP110L



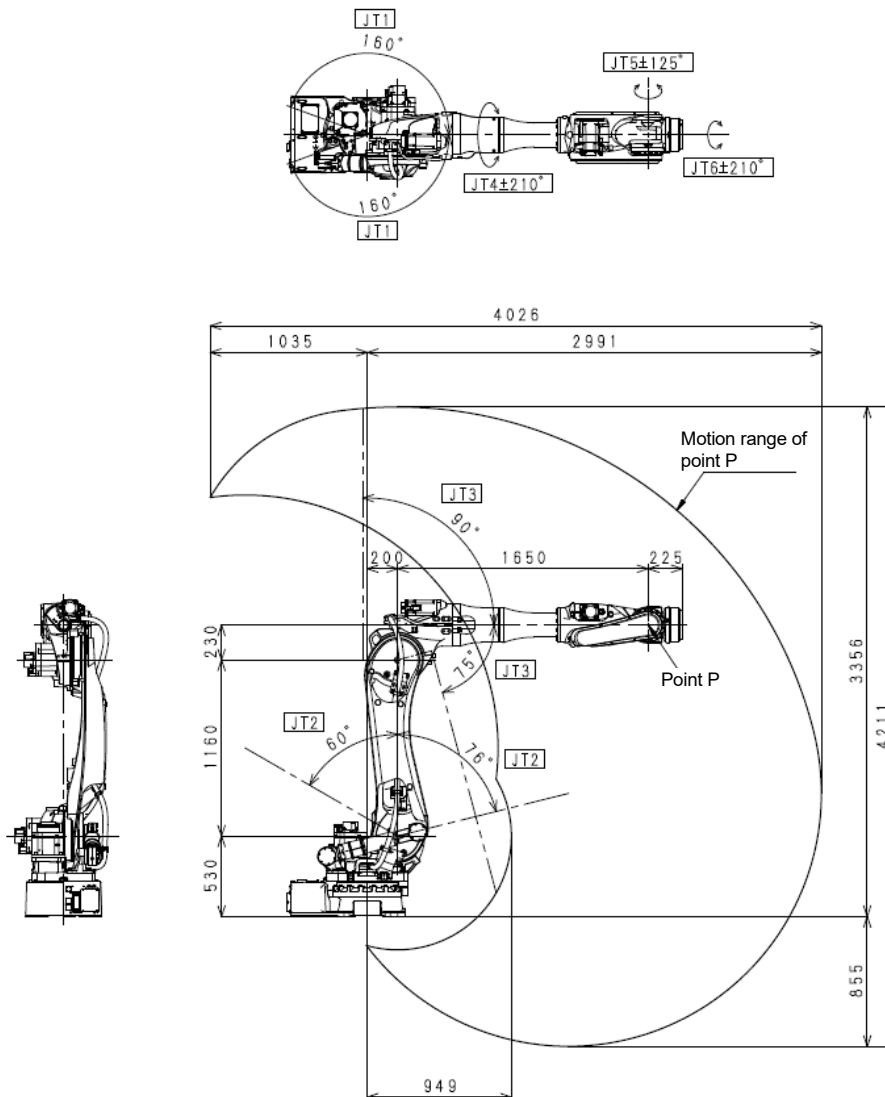
Model	Vertically articulated robot		
Degrees of freedom of motion	6		
Motion range and speed	JT	Motion range	Maximum speed
	1	±160°	140°/s
	2	+76° to -60°	130°/s
	3	+90° to -75°	135°/s
	4	±210°	220°/s
	5	±125°	200°/s
6	±210°	300°/s	
Maximum payload	110 kg		
Wrist load capacity	JT	Torque	Moment of inertia
	4	855 N·m	90 kg·m <sup>2</sup>
	5	855 N·m	90 kg·m <sup>2</sup>
	6	445 N·m	50 kg·m <sup>2</sup>
Repeated positional accuracy	±0.06 mm		
Mass	870 kg		
Acoustic noise	< 80 dB (A) <sup>*1</sup>		

- \*1 Measurement conditions
- Robot tightly fixed to a flat floor surface
  - Point 4,600 mm from the center of JT1 axis

( Noise level varies situationally. )



■ BXP135X



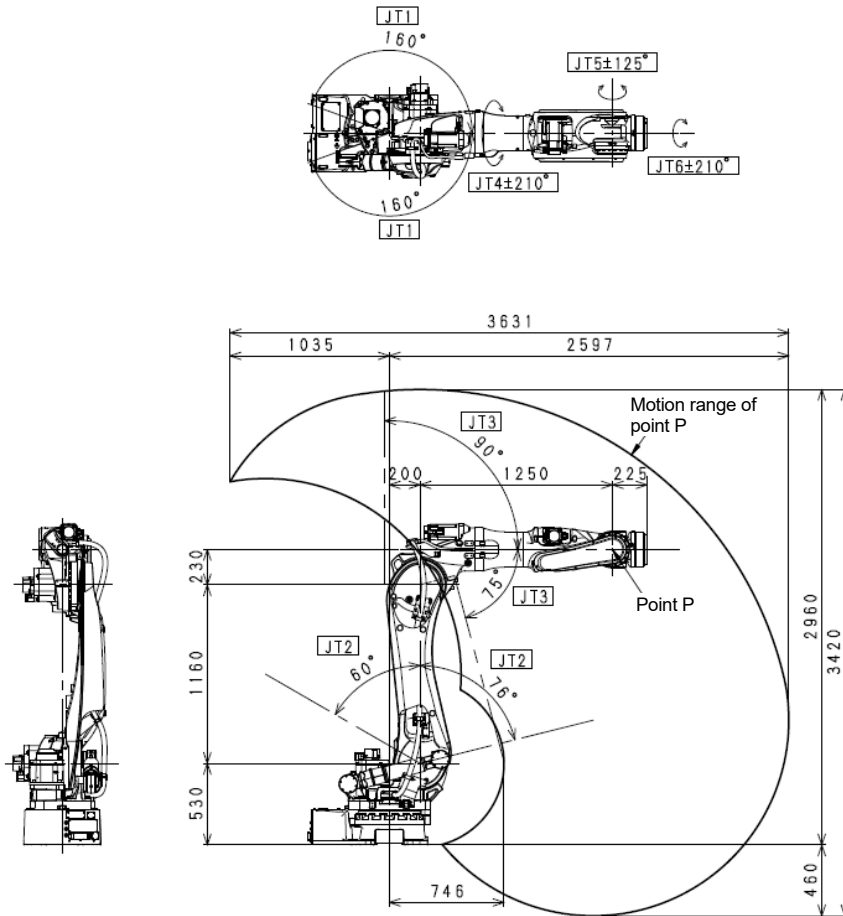
<b>Model</b>	Vertically articulated robot		
<b>Degrees of freedom of motion</b>	6		
<b>Motion range and speed</b>	JT	Motion range	Maximum speed
	1	±160°	140°/s
	2	+76° to -60°	105°/s
	3	+90° to -75°	140°/s
	4	±210°	220°/s
	5	±125°	200°/s
<b>Maximum payload</b>	135 kg		
<b>Wrist load capacity</b>	JT	Torque	Moment of inertia
	4	855 N·m	90 kg·m <sup>2</sup>
	5	855 N·m	90 kg·m <sup>2</sup>
	6	445 N·m	50 kg·m <sup>2</sup>
<b>Repeated positional accuracy</b>	±0.06 mm		
<b>Mass</b>	880 kg		
<b>Acoustic noise</b>	< 80 dB (A) <sup>*1</sup>		

\*1 Measurement conditions

- Robot tightly fixed to a flat floor surface
- Point 4,600 mm from the center of JT1 axis

( Noise level varies situationally. )

■ BXP165L



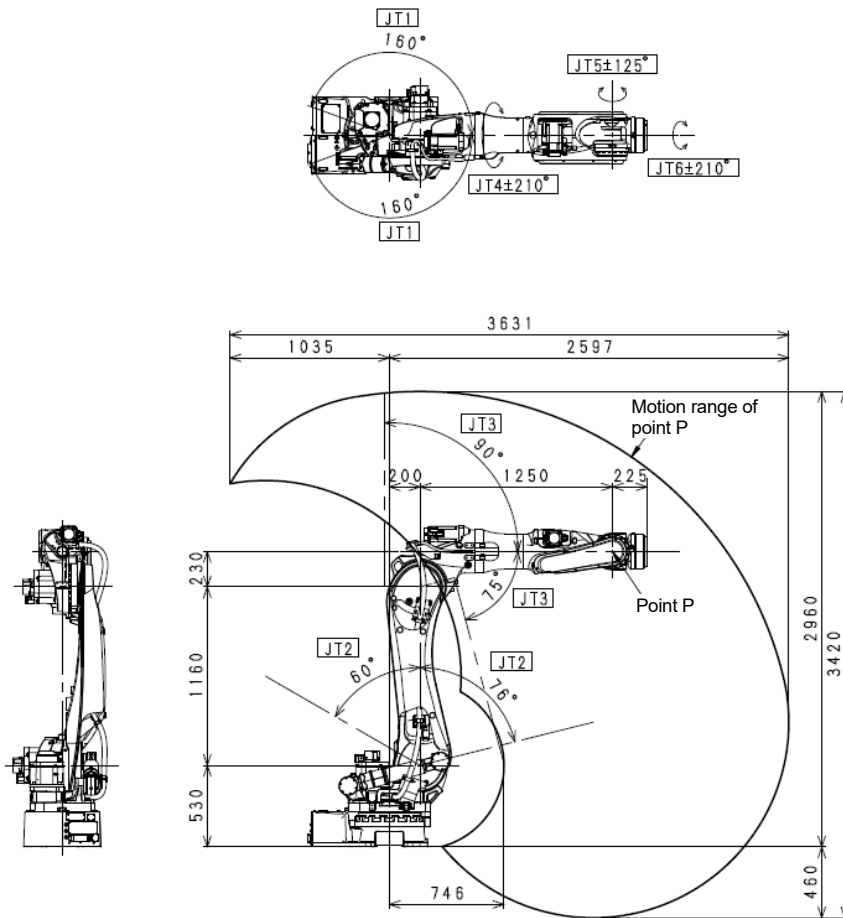
<b>Model</b>	Vertically articulated robot		
<b>Degrees of freedom of motion</b>	6		
<b>Motion range and speed</b>	JT	Motion range	Maximum speed
	1	±160°	140°/s
	2	+76° to -60°	115°/s
	3	+90° to -75°	130°/s
	4	±210°	190°/s
	5	±125°	180°/s
<b>Maximum payload</b>	165 kg		
<b>Wrist load capacity</b>	JT	Torque	Moment of inertia
	4	960 N·m	105 kg·m <sup>2</sup>
	5	960 N·m	105 kg·m <sup>2</sup>
<b>Repeated positional accuracy</b>	±0.06 mm		
<b>Mass</b>	870 kg		
<b>Acoustic noise</b>	< 80 dB (A) <sup>*1</sup>		

\*1 Measurement conditions

- Robot tightly fixed to a flat floor surface
- Point 4,600 mm from the center of JT1

( Noise level varies situationally. )

■ BXP210L



<b>Model</b>	Vertically articulated robot		
<b>Degrees of freedom of motion</b>	6		
<b>Motion range and speed</b>	JT	Motion range	Maximum speed
	1	±160°	140°/s
	2	+76° to -60°	105°/s
	3	+90° to -75°	115°/s
	4	±210°	140°/s
	5	±125°	135°/s
<b>Maximum payload</b>	210 kg		
<b>Wrist load capacity</b>	JT	Torque	Moment of inertia
	4	1,380 N·m	205 kg·m <sup>2</sup>
	5	1,380 N·m	205 kg·m <sup>2</sup>
	6	600 N·m	160 kg·m <sup>2</sup>
<b>Repeated positional accuracy</b>	±0.06 mm		
<b>Mass</b>	870 kg		
<b>Acoustic noise</b>	< 80 dB (A) <sup>*1</sup>		

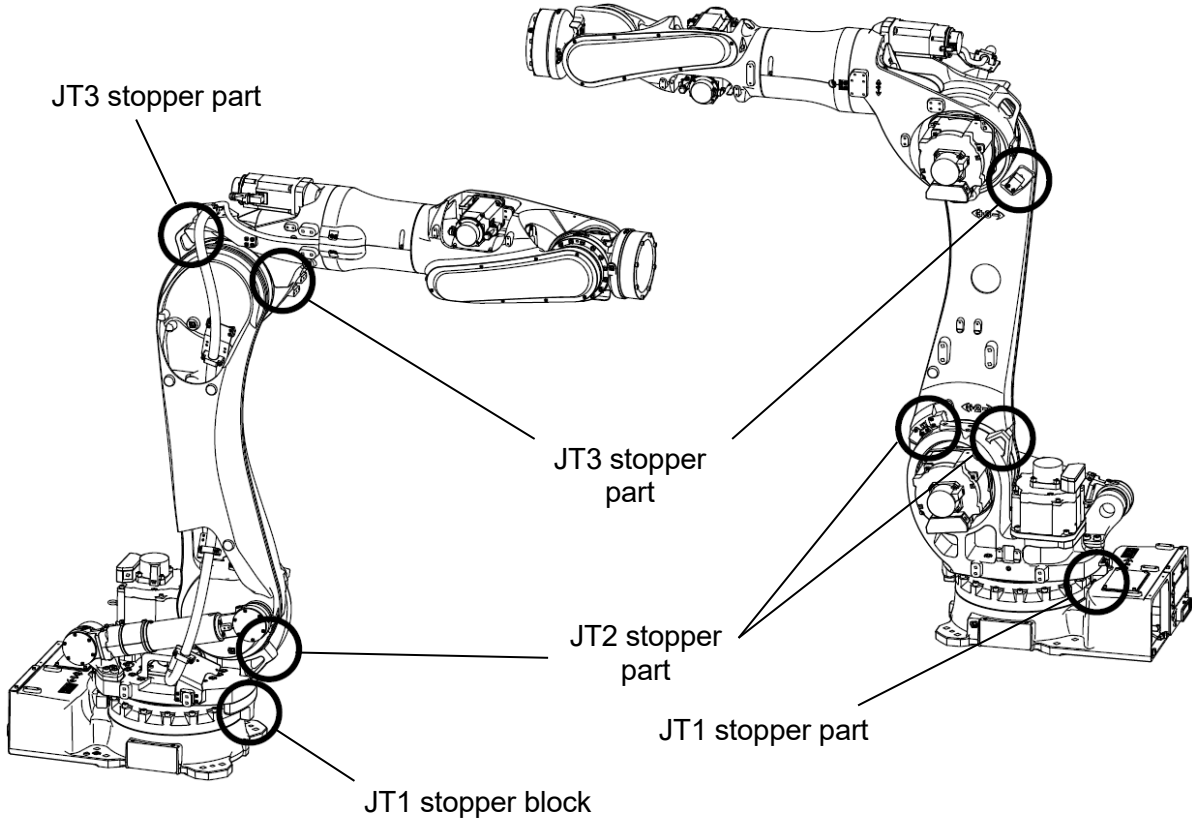
\*1 Measurement conditions

- Robot tightly fixed to a flat floor surface
- Point 4,600 mm from the center of JT1 axis

( Noise level varies situationally. )

### 3.3 Mechanical Stoppers

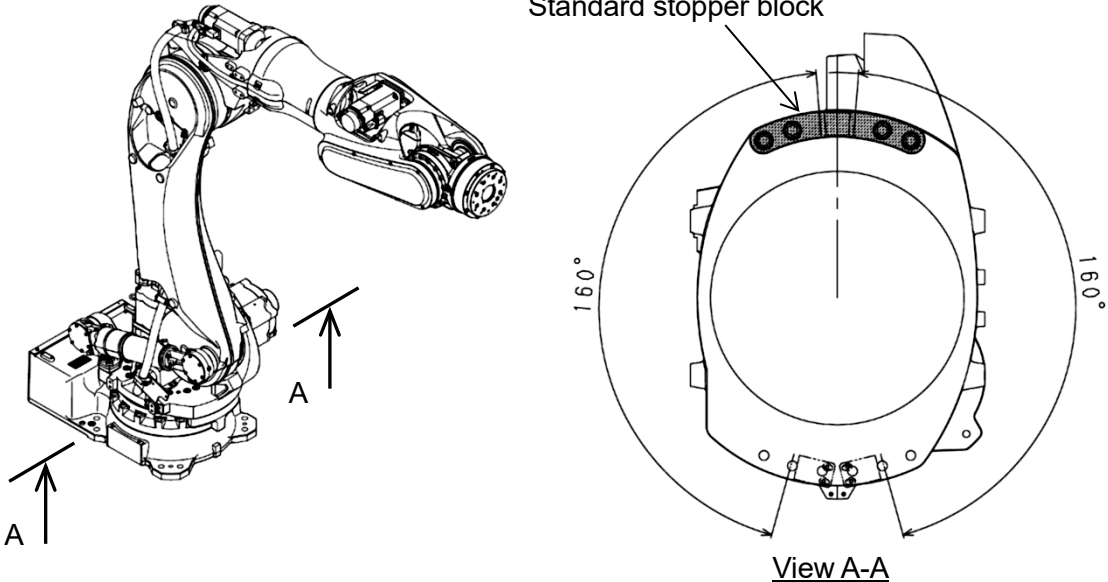
Mechanical stoppers are installed at the points shown in the figure below at JT1, JT2, and JT3 of the base axes.



**3.3.1 JT1 Stopper Block**

**■ Standard stopper block mounting**

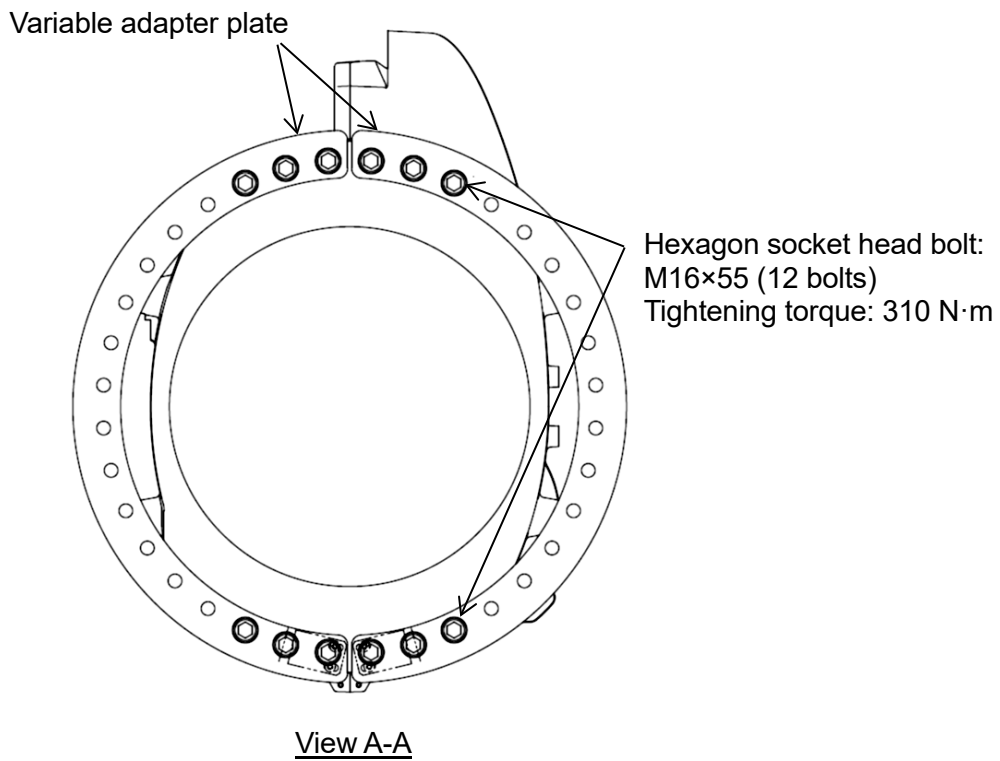
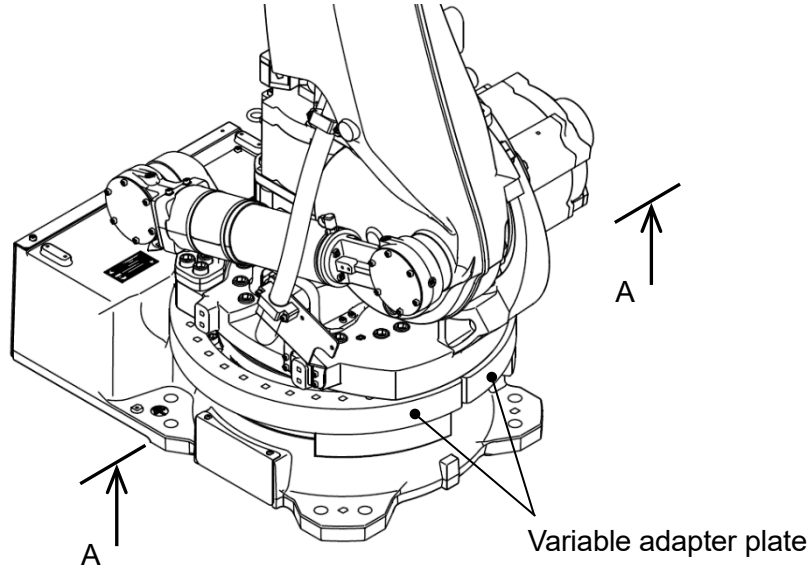
The motion range for the standard stopper is 160° to the positive (+) side and 160° to the negative (-) side.



### ■ Variable stopper block mounting

By mounting a variable adapter plate, the mounting position of the variable stopper block can be changed in increments of 10°.

It is also possible to reduce the motion range by mounting two stopper blocks. Variable stopper blocks are available as an option.

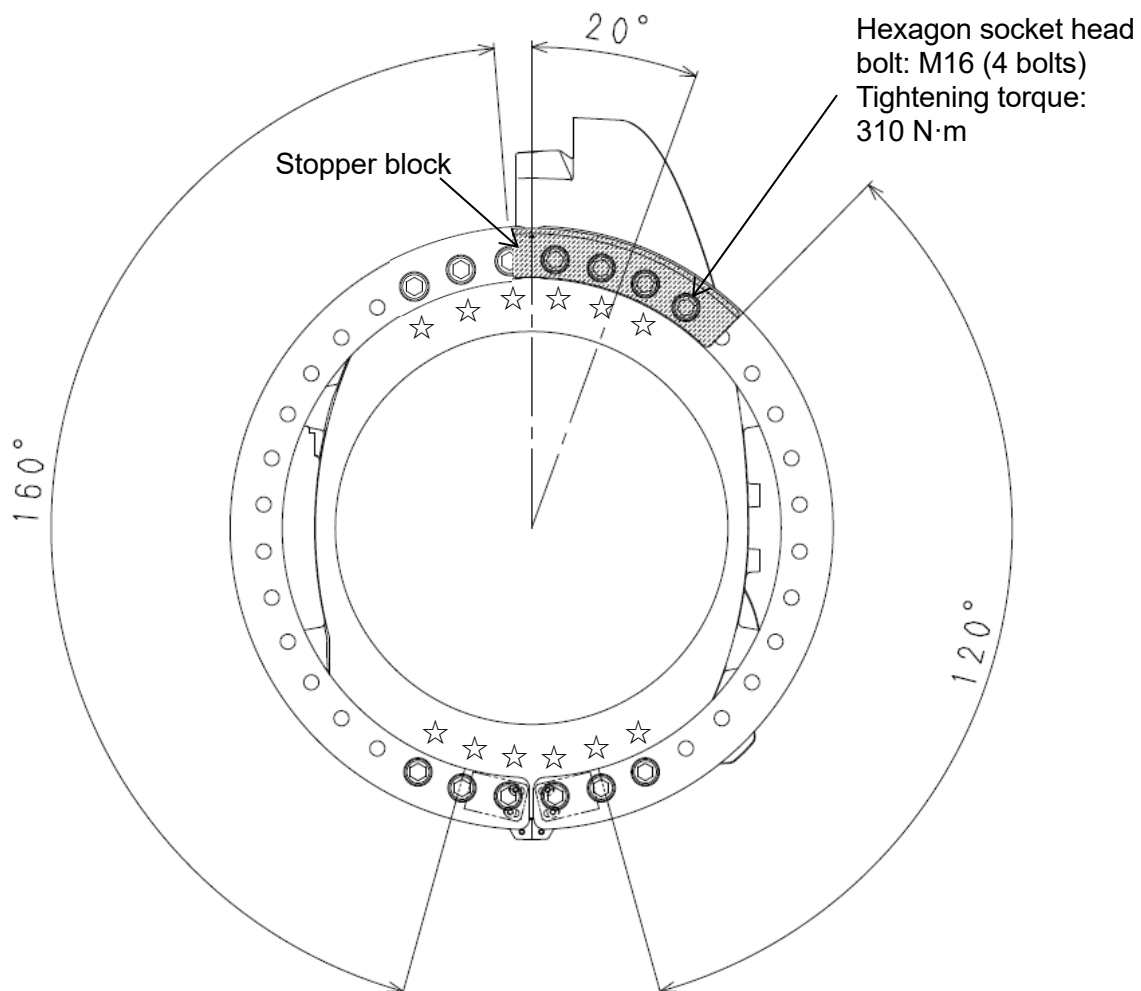


■ When using a single stopper block

The motion range that can be adjusted by changing the stopper block mounting position is limited to up to 180° on both the positive (+) side and the negative (-) sides due to harness treatment and control restrictions. However, the total combined motion range on both sides is 320°.

If a stopper block is mounted as shown in the figure below, the motion range is 180° for the positive (+) side and 140° for the negative (-) side.

The stopper block is secured with M16×55 hexagon socket head bolts (4 bolts). The fixings marked with a "☆" also secure the variable adapter plate, so M16×100 hexagon socket head bolts should be used.

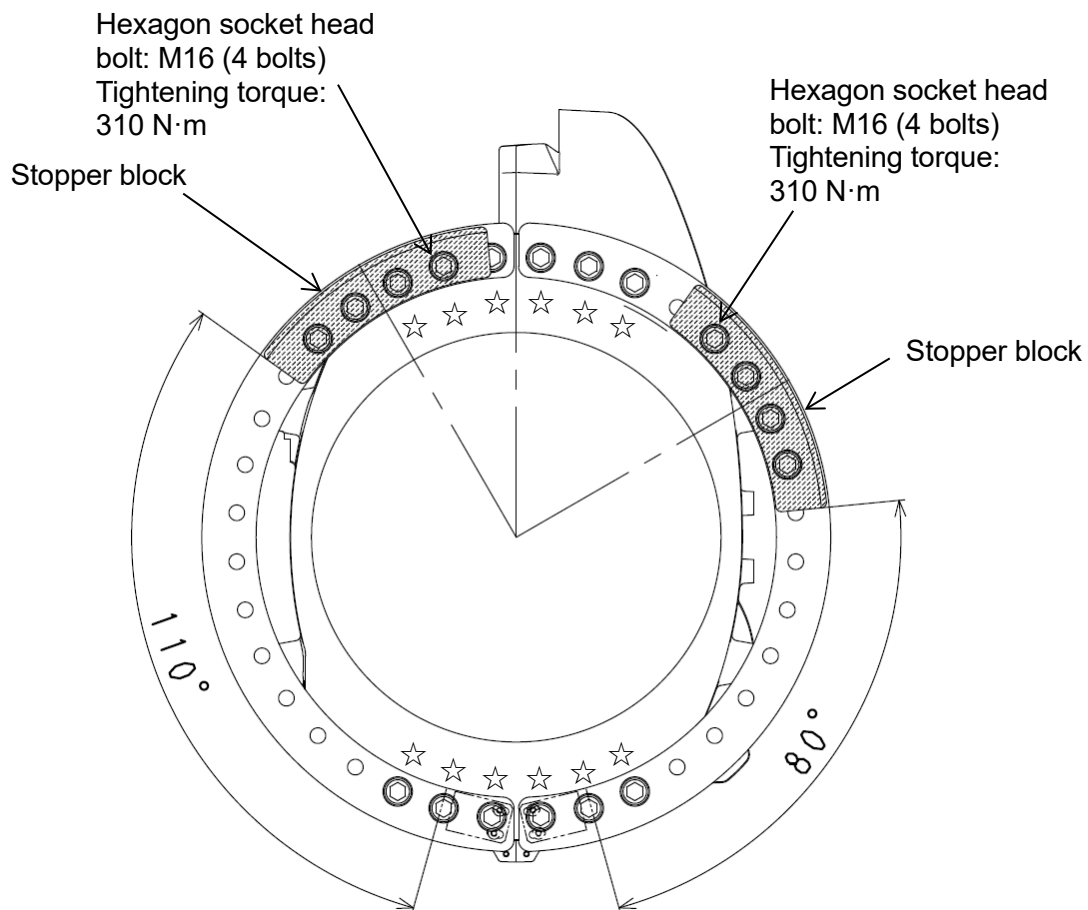


### ■ When using two stopper blocks

The motion range that can be adjusted by changing the stopper block mounting position is limited to up to 180° on both the positive (+) side and the negative (−) sides due to harness treatment and control restrictions. However, the total combined motion range of both sides can be adjusted between 10° and 270°.

If stopper blocks are mounted as shown in the figure below, the motion range is 110° for the positive (+) side and 80° for the negative (−) side.

The stopper blocks are secured with M16×55 hexagon socket head bolts (4 bolts each). The fixings marked with a "☆" also secure the variable adapter plate, so M16×100 hexagon socket head bolts should be used.





## 4 Transportation Methods

### 4.1 Wire Sling Suspension

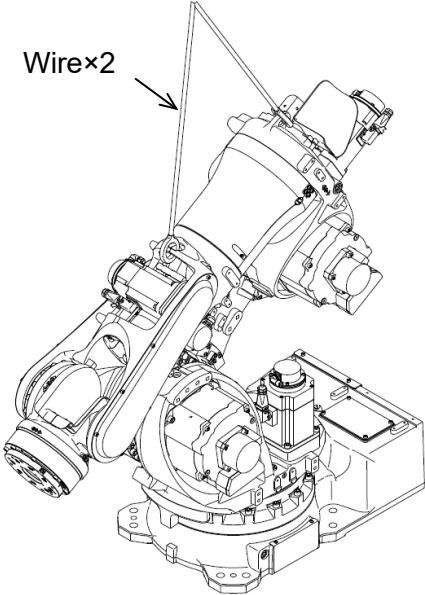
Attach hooks (Manufacturer: TAIYO, Product name: V-hook, Nominal load: 1.25 tons) to the arm in the two locations shown in the figure below, and hoist the arm with wires.

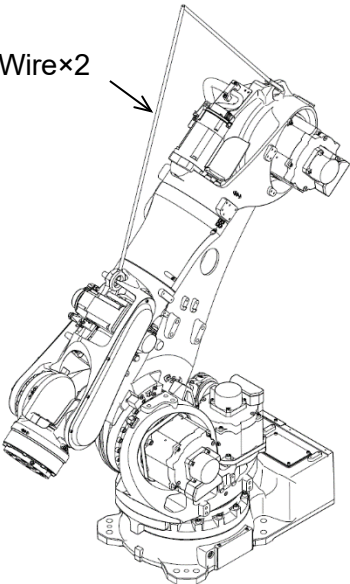
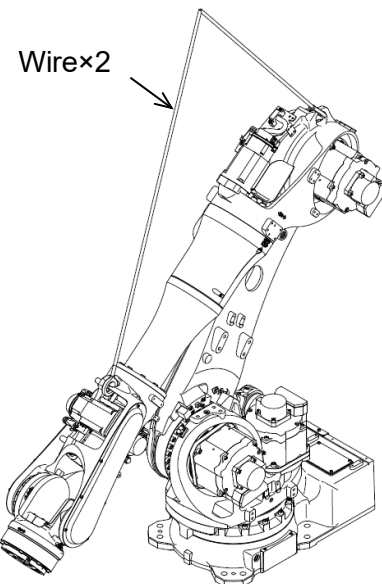
**⚠ WARNING**

There is a risk the robot will fall if suspended via methods other than those prescribed.

**⚠ CAUTION**

When suspending the robot, care is required as it may tip forward or back depending on its posture or installed options. If the robot is suspended while at an angle, shocks may result in swinging or damage; wires may catch on the harness or piping; and external parts may cause interference resulting in damage.

Model	BXP110S	
<b>Suspended posture</b>		
<b>Hoisting posture</b>	<b>JT1</b>	0°
	<b>JT2</b>	-50°
	<b>JT3</b>	-81°
	<b>JT4</b>	0°
	<b>JT5</b>	0°
	<b>JT6</b>	0°

Model		BXP110L, BXP165L, BXP210L	BXP135X
Suspended posture			
Hoisting posture	JT1	0°	
	JT2	-35°	
	JT3	-75°	
	JT4	0°	
	JT5	0°	
	JT6	0°	

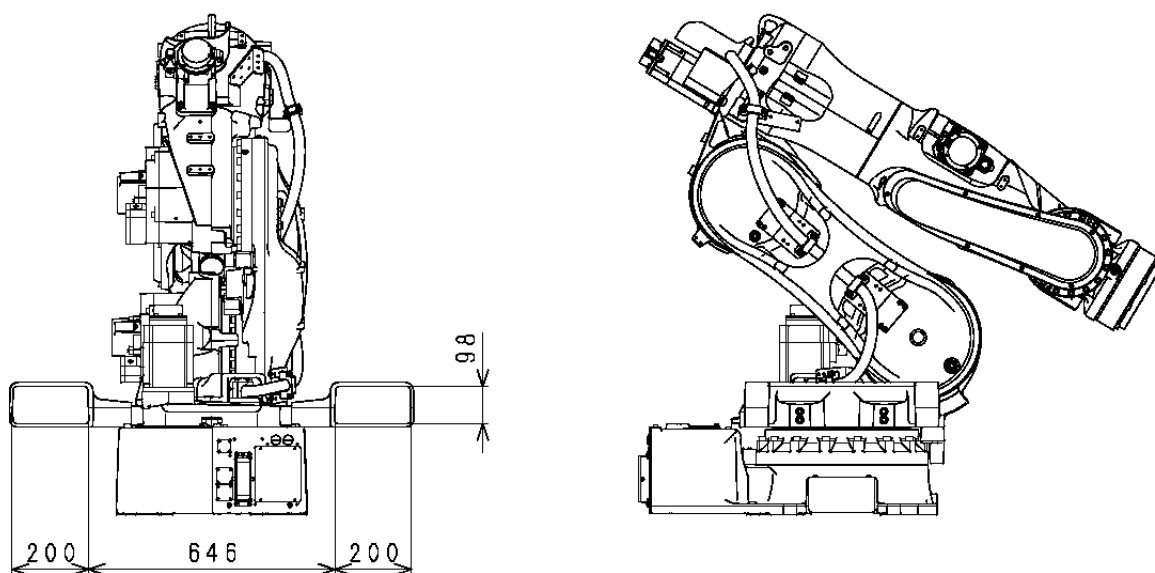
## 4.2 Forklift

Mount a forklift lifting jig to the arm and transport it as shown in the figure below.

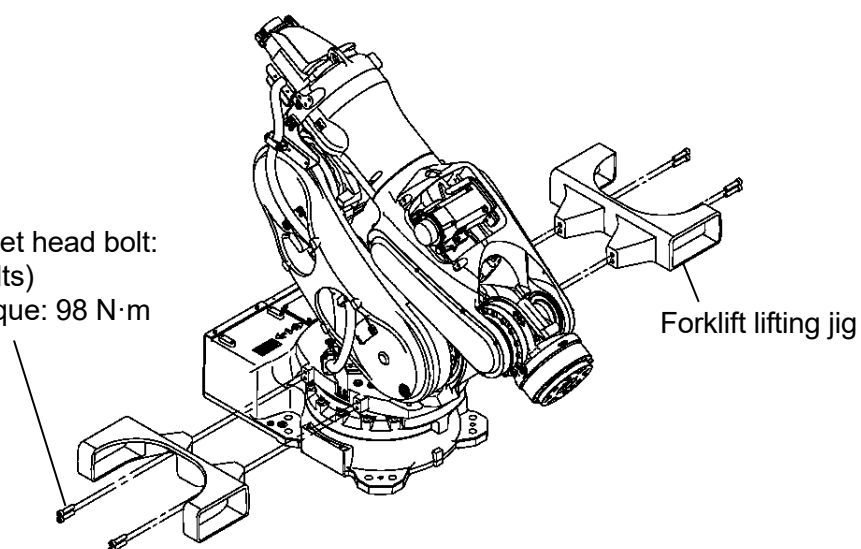
**CAUTION**

1. Always check that the forklift forks are sufficiently engaged with the lifting jig.
2. When transporting, be careful not to overbalance and tip the forklift on sloping ground or uneven road surfaces.
3. After transport is completed, remove the lifting jig from the robot arm.

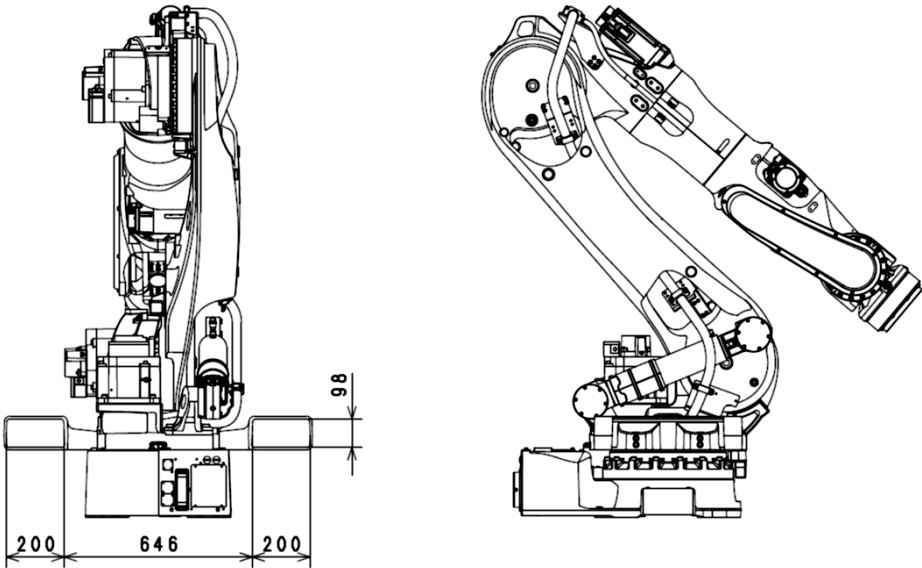
### ■ BXP110S



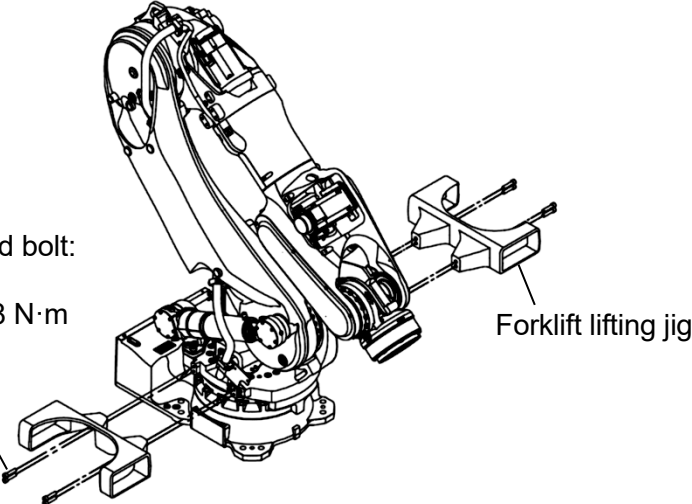
Hexagon socket head bolt:  
M12×50 (8 bolts)  
Tightening torque: 98 N·m



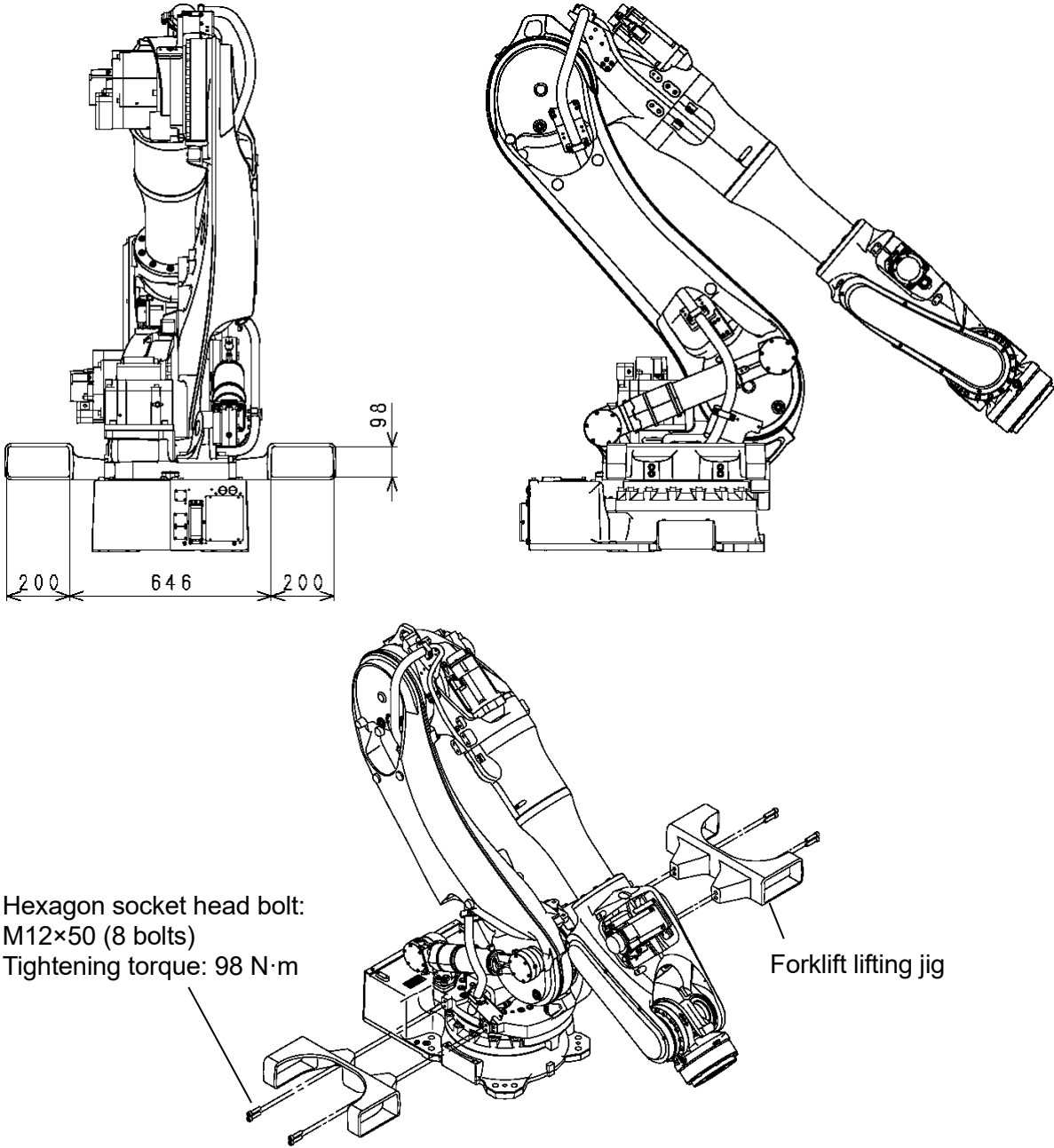
■ BXP110L, BPX165L, BXP210L



Hexagon socket head bolt:  
M12×50 (8 bolts)  
Tightening torque: 98 N·m

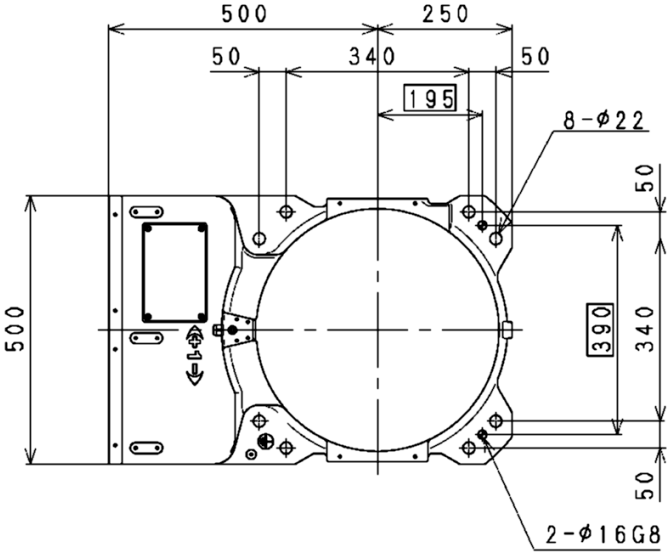
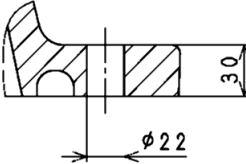


■ BXP135X



### 5 Base Installation Dimensions

Use the bolt holes and fix with high tensile bolts during base installation.

<b>Model</b>	BXP110S, BXP110L, BXP135X, BXP165L, BXP210L
<b>Dimensions of the installed part</b>	
<b>Cross-section figure of the installed part</b>	
<b>Bolt holes</b>	8-φ22
<b>High tensile bolts</b>	8-M20 Material: SCM435 Hardness category: 10.9 or more
<b>Tightening torque</b>	431 N·m
<b>Installation surface angle</b>	±5° or less

## 6 Reactive Forces on Installation Area During Operation

The reactive forces acting on the installation surface during robot operation are shown in the table below. These forces should be taken into consideration during installation.

<b>Model</b>	<b>BXP110S</b>	<b>BXP110L, BXP135X, BXP165L, BXP210L</b>
<b>M (tipping moment)</b>	27,000 N·m	35,000 N·m
<b>T (rotational torque)</b>	10,000 N·m	15,000 N·m

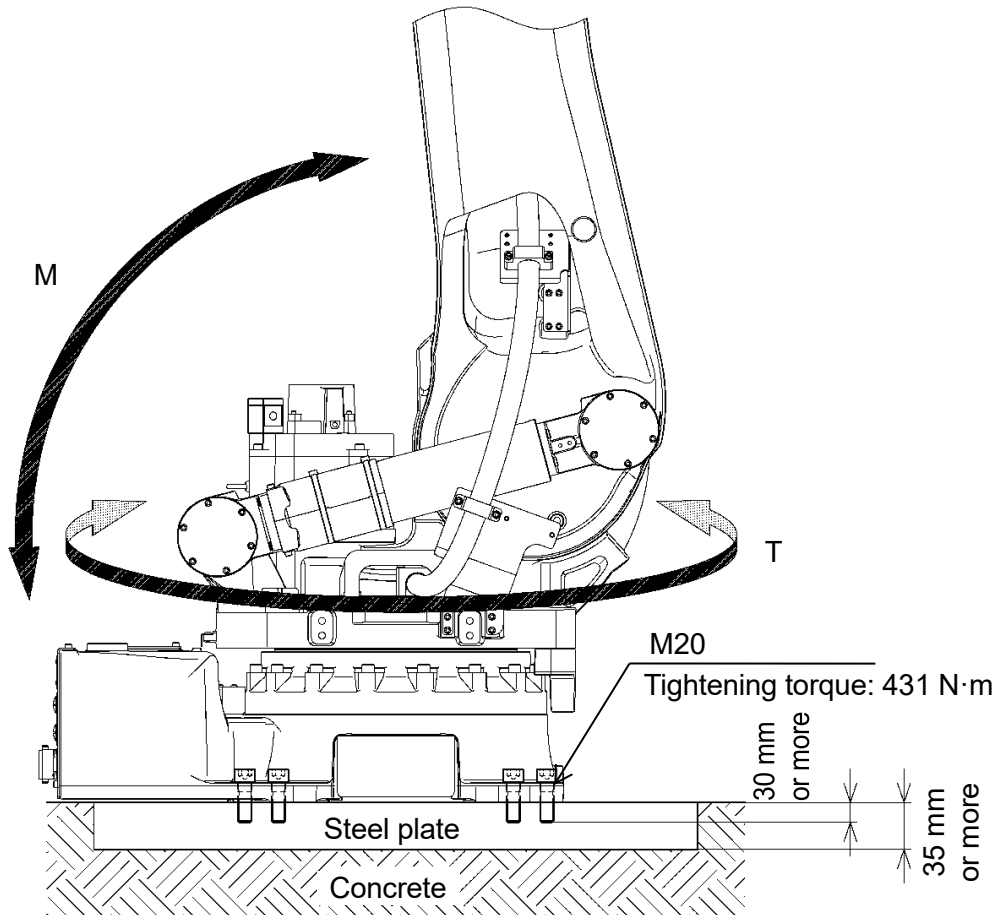
For details of M and T, refer to the following chapter.

## 7 Installation

### 7.1 Installing the Base Directly on the Floor

As shown in the figure below, embed a steel plate with a thickness of at least 35 mm into the concrete floor, or fix with anchors.

Secure the steel plate firmly enough to withstand counterforce from the robot.



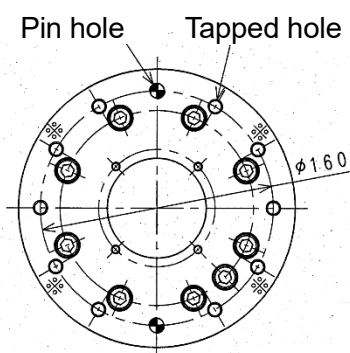


## 8 Mounting of Tools

**⚠ WARNING**

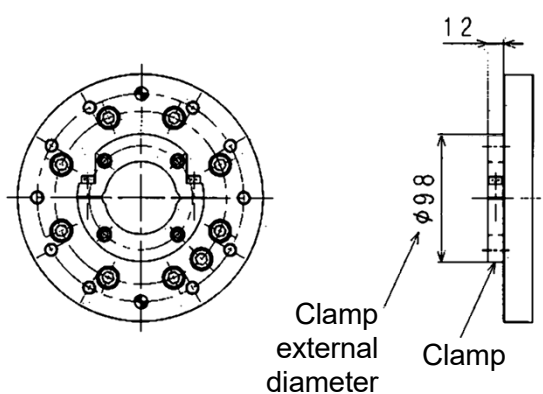
**When mounting a tool, be sure to turn OFF the controller power and external power, and after clearly displaying that "inspection and maintenance is in progress," lock out and tag out the external power so that an operator or third party does not accidentally turn ON the power, causing an unexpected situation such as electric shock.**

### 8.1 Wrist Tip (Flange Surface) Dimensions

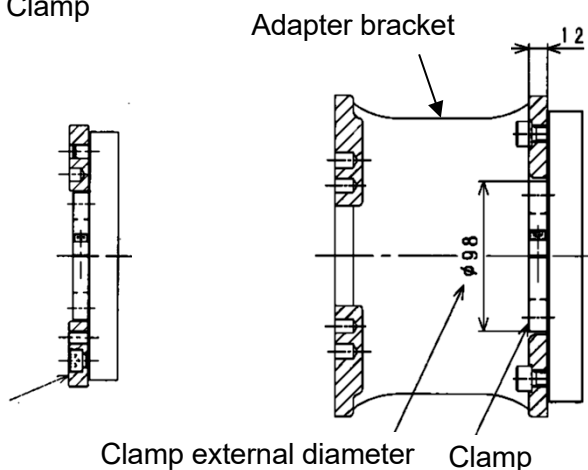
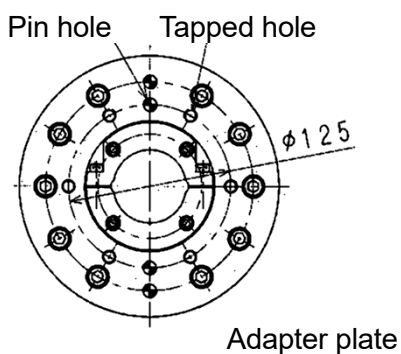


The tip of the robot arm features a flange for mounting tools. Fixing bolts should be bolted through to the tapped holes machined as  $\phi 160$  circumferentially into the flange, as shown in the left figure. Also, use the pin holes to determine tool locations.

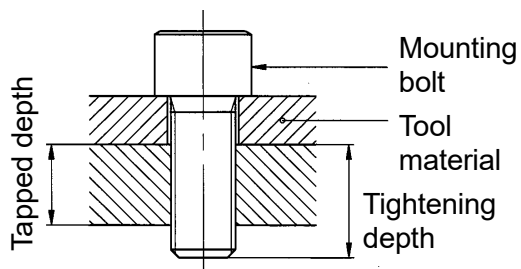
### 8.2 Passing Cables or Hoses through the Wrist Center



When passing cables or hoses through the center of the wrist, a clamp is mounted to the wrist flange surface as shown in the figure to the left. Provide a hole of  $\phi 100$  to the flange on the tool side, or use adapter plate (option) or adapter bracket (option).



### 8.3 Mounting Bolt Specifications



Select mounting bolts of sufficient length according to the thickness of the tool in use, such that they reach the rated tightening depth. Additionally, use high tensile bolts, and tighten to the specified torque.

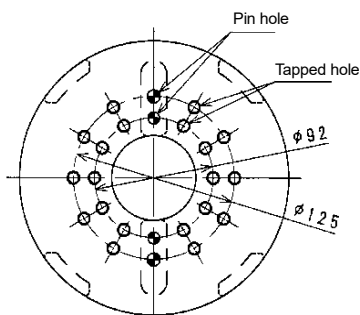
**! CAUTION**

**If the tightening depth is above the rated value, then the mounting bolts will bottom out and the tool may not be secured.**

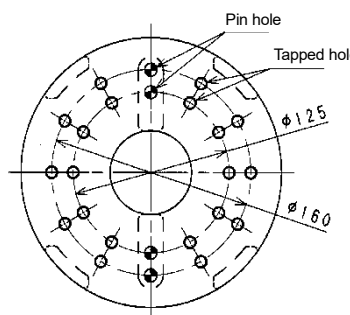
	Standard flange	Optional flange (adapter plate)
<b>Model</b>	BXP series	BXP series
<b>Tapped hole</b>	6-M10	6-M10
<b>øD</b>	ø160	ø125
<b>Pin hole</b>	2-ø10H7, depth 12	2-ø10H7, depth 14
<b>Tapped depth</b>	19 mm	20 mm
<b>Tightening depth</b>	13 to 14 mm	13 to 14 mm
<b>High tensile bolts</b>	SCM435, 10.9 or more	SCM435, 10.9 or more
<b>Tightening torque</b>	56.84 N·m	56.84 N·m

	Optional flange (adapter bracket)		
<b>Model</b>	BXP series		
<b>Tapped hole</b>	10-M10	6-M10 <sup>*1</sup>	6-M10 <sup>*1</sup>
<b>øD</b>	ø92	ø125	ø160
<b>Pin hole</b>	2-ø9H7, depth 12	2-ø10H7, depth 12	2-ø10H7, depth 12
<b>Tapped depth</b>	12 mm through-hole	12 mm through-hole	12 mm through-hole
<b>Tightening depth</b>	13 to 18 mm	13 to 18 mm	13 to 18 mm
<b>High tensile bolts</b>	SCM435, 10.9 or more	SCM435, 10.9 or more	SCM435, 10.9 or more
<b>Tightening torque</b>	56.84 N·m	56.84 N·m	56.84 N·m

\*1 Tapped holes marked with "☆" in the figure below need not be used.



Standard flange



Optional flange

## 8.4 Load Capacity

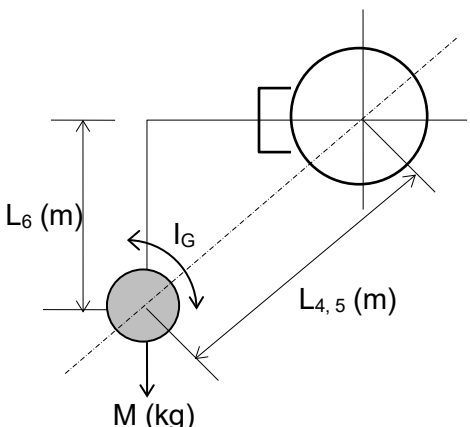
The load mass capacity of the robot, including tool mass, is fixed for each robot type. Additionally, strictly observe the restrictions for load torque and load moment of inertia around each wrist axis (JT4, JT5, JT6) as shown below.

! **CAUTION**

If a load above the specified range is applied to the robot, this can result in deteriorated operational functionality or service life. Load mass includes all tool masses such as any hands, tool changers, and spot weld guns. If an amount other than the rated load will be applied, consult with Kawasaki.

The load torque and moment of inertia can be calculated using the following formula.

Calculation formula



Load mass (including tool):  $M \leq M_{\max}$  (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<sup>2</sup>)

$M_{\max}$ : Maximum load mass: See section 3.2.

$L$ : Distance from center of axis rotation to load center of gravity (Units: m)  
(See diagram)

- $L_{4,5}$ : Distance from JT4 (5) center of rotation to load center of gravity
- $L_6$ : Distance from JT6 center of rotation to load center of gravity
- $I_G$ : Moment of inertia around the center of gravity (Units: kg·m<sup>2</sup>)

When calculating with the load divided between multiple locations (for example, tool and workpiece, etc.), use the total combined values as the load torque and moment of inertia.

Strictly adhere to the following restrictions regarding load of the wrist part.

1. Keep the load mass, including the tool mass, at or below the following values.

Model	Load mass
BXP110L, BXP110S	110 kg
BXP135X	135 kg
BXP165L	165 kg
BXP210L	210 kg

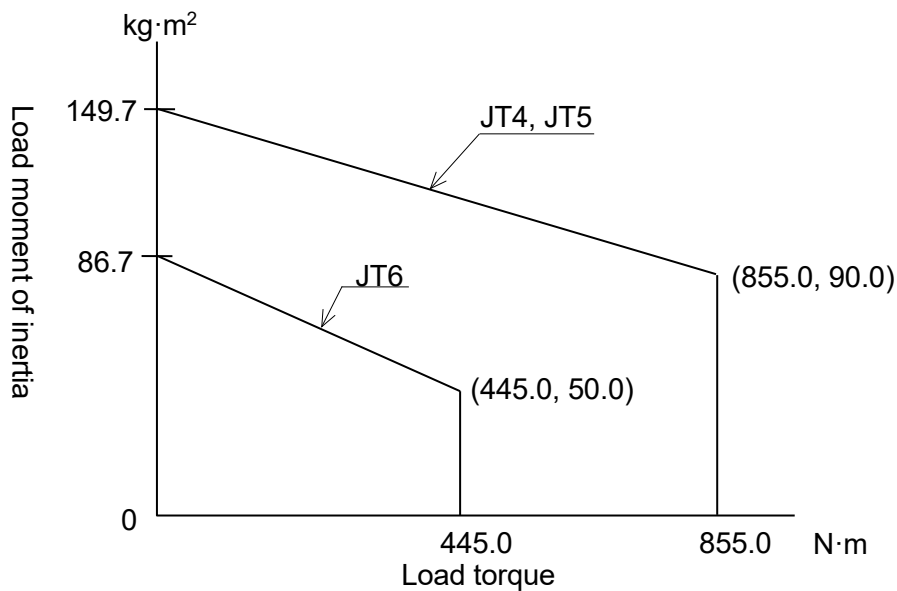
- There are restrictions for the load torque and load moment of inertia around each wrist axis (JT4, JT5, JT6).

Keep the load torque and load moment of inertia around each axis within the allowable ranges shown in the figure below.

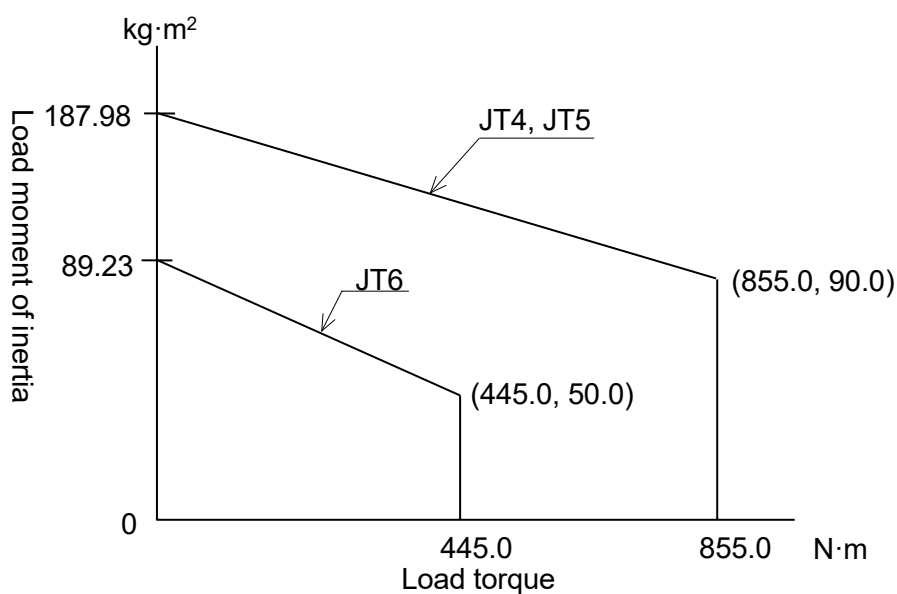
**⚠ CAUTION**

**After tool installation, always make sure to set the load via auxiliary function 0304. Operating the robot with incorrect settings may cause vibrations in motion, degradation of movement performance, and shortening of robot service life.**

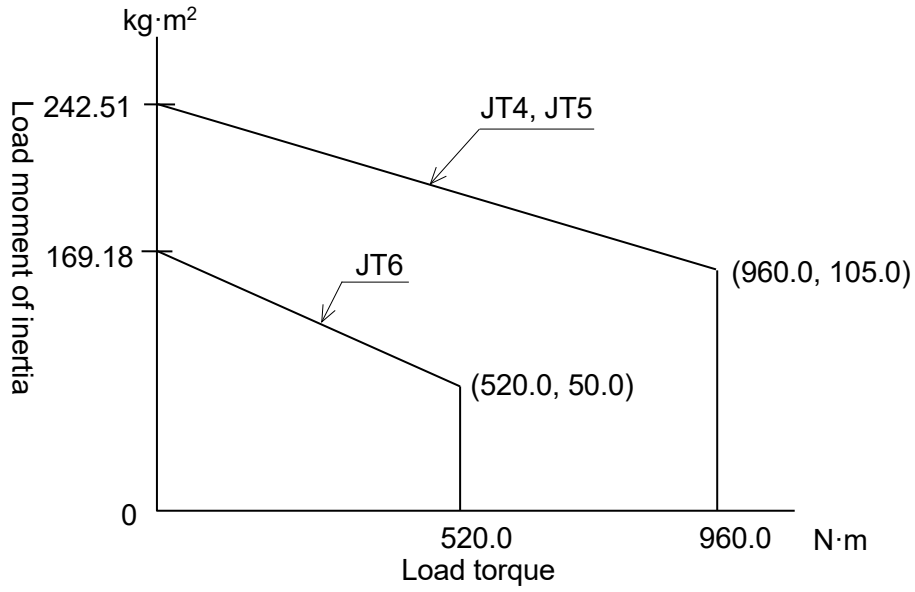
**BXP110L, BXP110S**



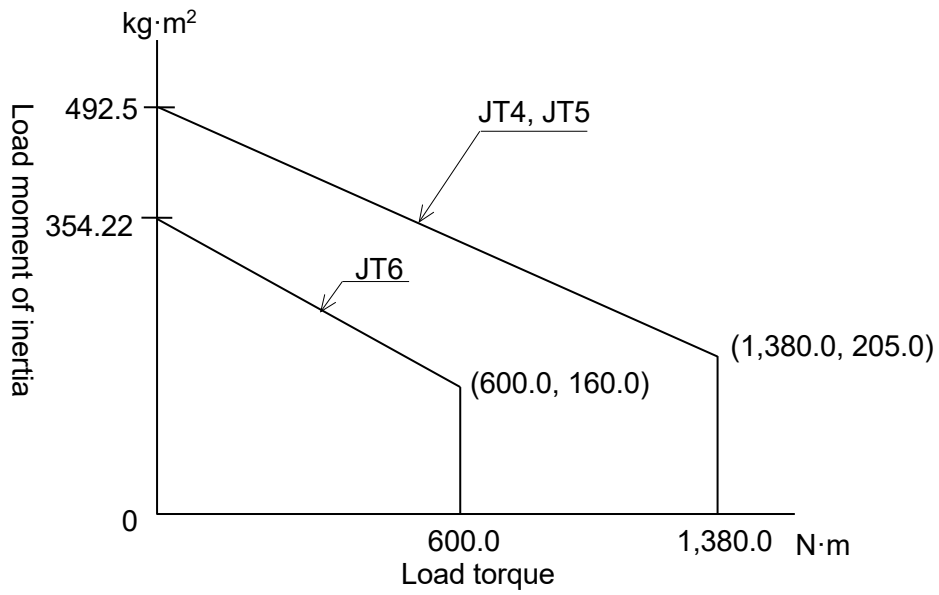
**BXP135X**



**BXP165L**



**BXP210L**



## 9 Mounting of External Devices

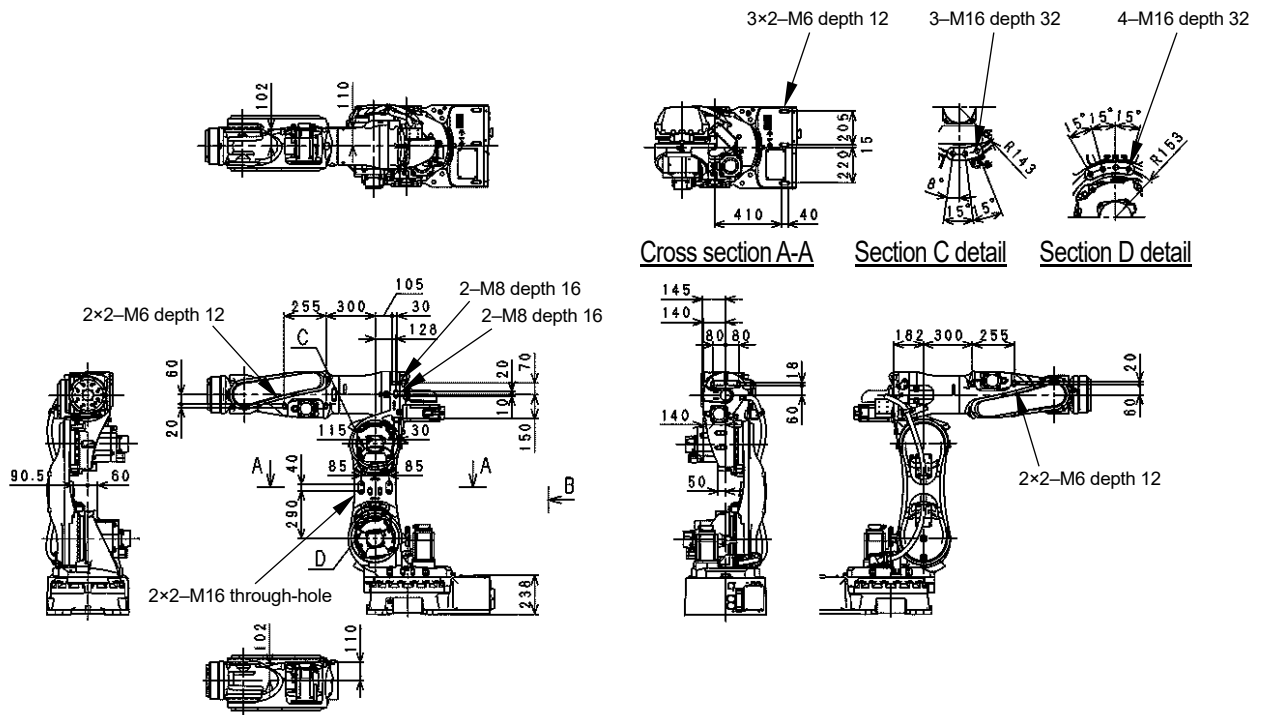
### 9.1 Service Tapped Hole Positions

Service tapped holes, shown in the figure below, are provided on each part of the robot arm for mounting external devices, wiring brackets, arm-fixing jigs, etc.

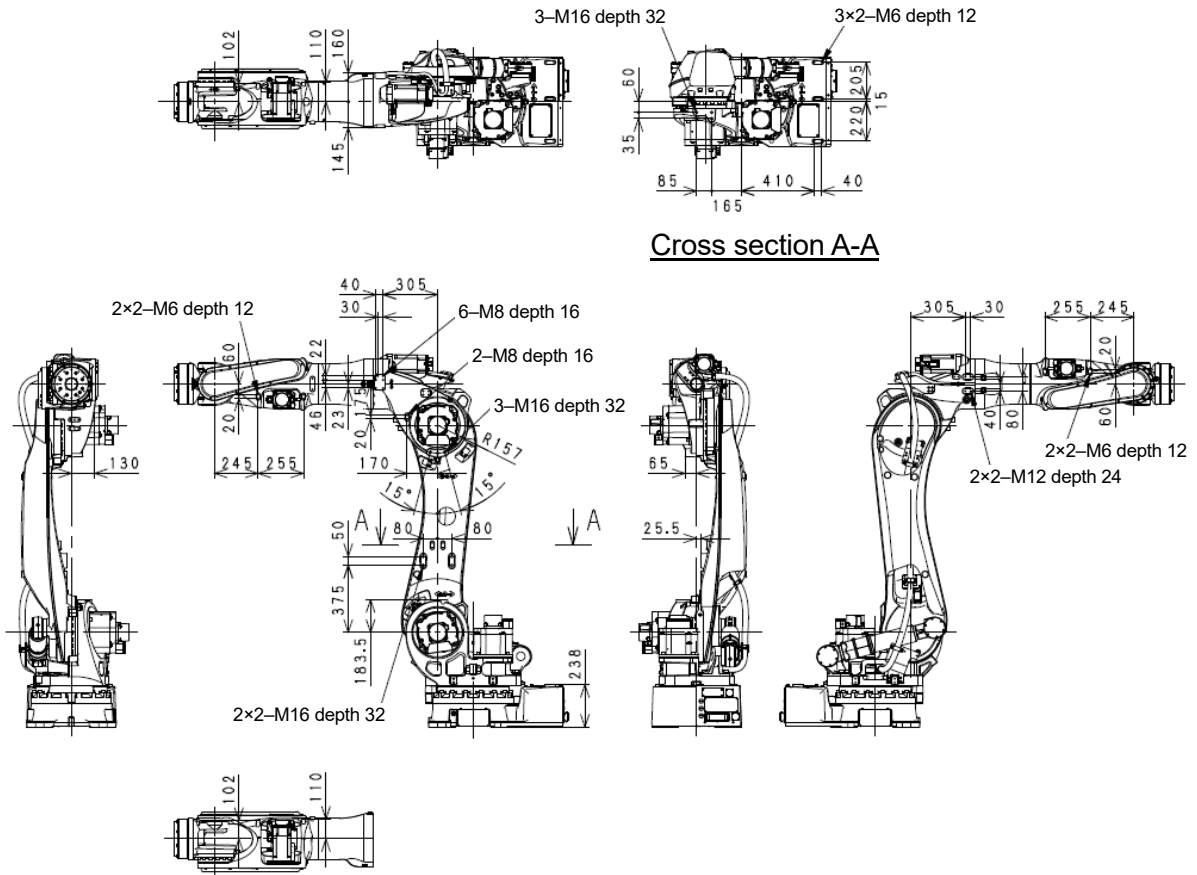
**! CAUTION**

**Perform a thorough operation check to confirm that mounted external devices, brackets, and fixing jigs for arm do not interfere with peripheral equipment or the robot arm itself.**

#### ■ BXP110S



■ BXP110L, BXP135X, BXP165L, BXP210L



## 9.2 Calculation of External Device Load Capacity

The mass load capacity of the robot is fixed for each model. Additionally, strictly observe the restrictions as follows for the allowable load on the arm.

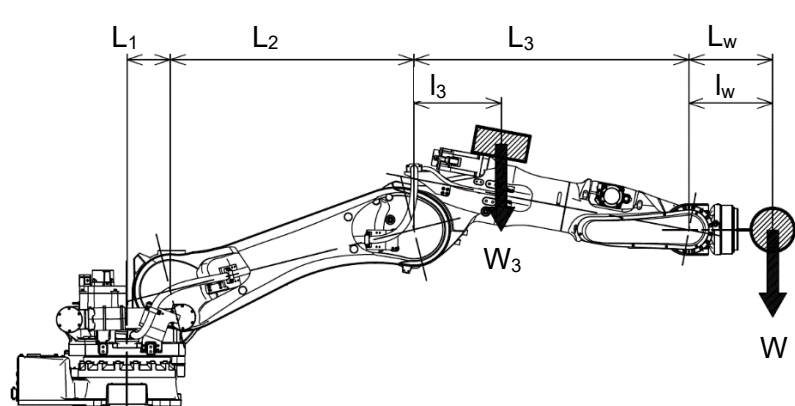
**! CAUTION**

**If a load above the specified range is applied to the robot, this can result in deteriorated operational functionality or service life. If an amount other than the rated load will be applied, consult with Kawasaki.**

For both JT2 and JT3, limit the total load torque on the wrist tip and arm so as not to exceed the maximum allowable load torque. The load torque can be calculated using the formula below.

**Calculation formula**

**BXP110S, BXP110L, BXP135X, BXP165L, BXP210L**



- JT3:  $W(L_3 + l_w) + W_3 \cdot l_3 \leq W_{\max.}(L_3 + L_w)$
- JT2:  $W(L_2 + L_3 + l_w) + W_3(L_2 + l_3) \leq W_{\max.}(L_2 + L_3 + L_w)$

$W_{\max.}$ : Maximum allowable load [kg]

$W$ : Load on wrist tip [kg]

$W_3$ : Total load on upper arm [kg]

$l_w$ : Position of wrist load center of gravity [mm]

$l_3$ : Position of center of gravity of total load on upper arm [mm]



Use the values shown in the table below for the calculation.

	<b>L<sub>1</sub> [mm]</b>	<b>L<sub>2</sub> [mm]</b>	<b>L<sub>3</sub> [mm]</b>	<b>L<sub>w</sub> [mm]</b>	<b>W<sub>max</sub> [kg]</b>
<b>BXP110S</b>	200	580	855	1,063	110
<b>BXP110L</b>	200	1,126	1,271	793	110
<b>BXP135X</b>	200	1,126	1,666	646	135
<b>BXP165L</b>	200	1,126	1,271	680	165
<b>BXP210L</b>	200	1,126	1,271	670	210

However, ensure that the value of  $W_3$  satisfies the following inequality.

$$W (L_1+L_2+L_3+l_w) + W_3 (L_1+L_2+l_3) \leq W_{\max} (L_1+L_2+L_3+L_w)$$



### CAUTION

**When shipped,  $W_3$ ,  $W$ ,  $l_3$ , and  $l_w$  are the default settings. When using the robot for the first time, or when changing the load mass or load center of gravity position, be sure to set  $W_3$ ,  $W$ ,  $l_3$ , and  $l_w$  using the auxiliary functions 0304 and 0404. Operating the robot with incorrect settings may cause vibrations in motion, degradation of movement performance, and shortening of robot service life.**

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Installation and Connection Manual

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