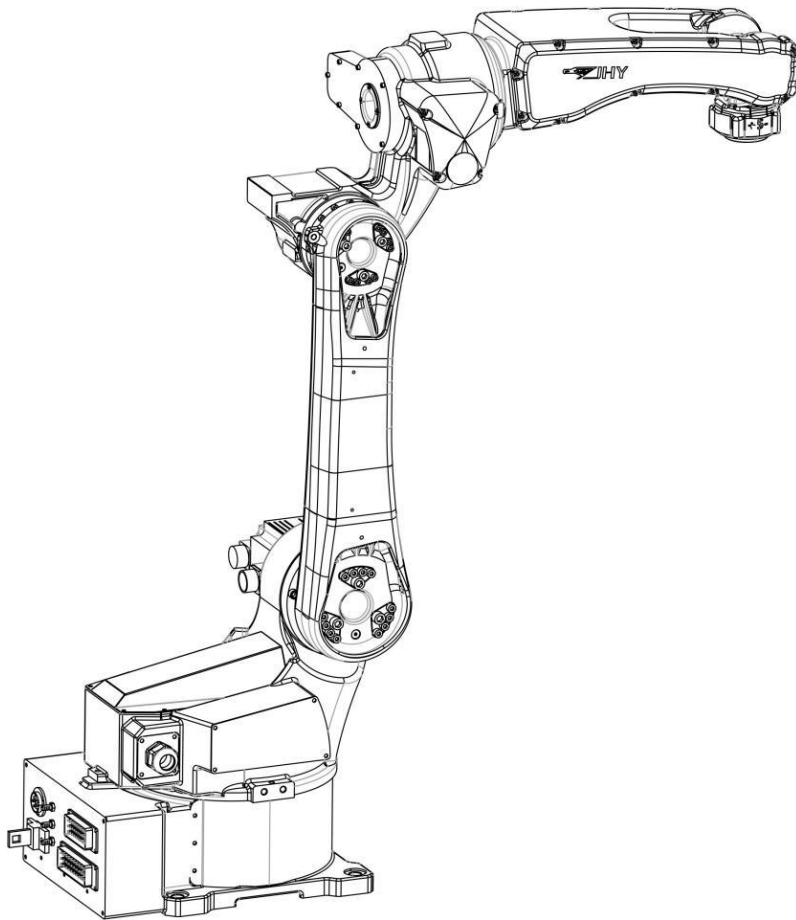


JHY welding robot series

USER MANUAL INSTRUCTIONS



Wuxi Jihoyen Industrial Automation Co.,Ltd.

www.jhyrobotic.com

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Thank you very much for choosing our products!



- Before using the robot, please read this manual in detail and follow all instructions on safety matters and the body.
 - As for the installation, operation and maintenance of robots, only those who have received relevant training and assessment from our company are required to do so.
 - When using this robot, we must abide by the laws and regulations of various countries concerning industrial robots and safety.
 - Be sure to deliver this instruction to the actual operator.
 - The relevant manuals of this system should be properly kept so that they can be consulted when needed.
 - If the equipment needs to be handed over, please forward the relevant information to the other party!
-

Chapter 1. Instructions for using JHY series robots

1.1. Safety Precautions




1.1.1. Applicable criteria

Robot system design meets the following requirements:

Standard	Describe
GB 5226.1-2002	Mechanical Safety, Mechanical Safety, Mechanical Safety, Electrical Equipment Part 1: General Technical Conditions(IEC 60204-1: 2000, IDT)
GB 11291-1997	Industrial Robot, Safety Specification(eqv ISO10218: 1992)
GB/T 12644-2001	Industrial Robot, Characteristic Representation (eqv ISO9946: 1999)
GB 14048(All parts)	Low Voltage Switch gear and Control Equipment
GB/T 15706.1-1995	Mechanical Safety, Basic Concepts and Design Principles, Part 1: Basic Terminology, Methodology(eqv ISO/TR 12100-1: 1992)
GB/T 15706.2-1995	Mechanical Safety, Basic Concepts and Design Principles Part 2: Technical Principles and Specifications(eqv ISO/TR 12100- 2: 1992)
GB/T 16856-1997	Mechanical Safety, Principles of Risk Assessment (eqv PREN1050: 1994)

1.1.2. Safety terminology

Use the following signs to record safety precautions. Be sure to read them.

Sign	Explain
 Danger	Indicates that if the logo is ignored and misused, it can lead to death or serious injury, etc.
 Attention	Misoperation is dangerous and may cause moderate injury or minor injury accidents and equipment failure.
 Compulsion	Matters that must be observed.



Prohibition

Prohibited matters.



- Even the contents recorded in "Attention" will have serious consequences because of different situations. Therefore, any precautions are extremely important. Please strictly abide by them.
- Even where "attention" or "danger" is not marked, it is something that users must strictly observe.

1.2. Safety-related instructions

1.2.1. Danger

▲ The electrical or mechanical debugging and maintenance of industrial robots are only allowed to be carried out by professional personnel, and all personnel working on the robot must have accepted training in the use of the robot.

▲ Wrong installation (such as overload) or mechanical damage (such as brake failure) can cause the robot or the additional axis to sink. If you are working on a robot system that has been turned off, you must first drive the robot and the additional axis to a state where it will not move on its own regardless of load or no load. If there is no such possibility, the robot and additional axis must be protected accordingly.

▲ During maintenance, especially after operations such as replacing motors, drives, and batteries, the robot must be reset to zero before it can automatically run the program, otherwise accidents may occur.

1.2.2. Attention


⚠ Please pay attention to the rotation axis of the robot body. Keep a distance from the axis to prevent hair or clothing from being stalked. At the same time, please be aware of any hazards that may be caused by rotating tools or other devices installed on the robot or in the unit.


⚠ Under no circumstances should you stand under any axis of the robot.

⚠ Protective gloves must be worn if the disassembly and other operations are performed immediately after the control system is powered off and stopped, so as to avoid scalds caused by the high temperature of the radiator surface or motor.


⚠ When replacing the battery on the robot body, pay attention to the occurrence of short-circuit


between the positive and negative electrodes of the battery.


 Visually inspect the robot to make sure it is not damaged. Do not install robots that are damaged or missing parts, otherwise there is a danger of serious accidents and personal injury.


 Before moving the robot, please check the stability of the robot to avoid the danger of tilting.


1.2.3. Compulsion


 The emergency shutdown button is a safety device used in emergency situations. It is strictly forbidden to use it frequently without purpose, which will affect the service life of the robot-related components (motor brakes, etc.). In particular, it is forbidden to repeatedly turn off the robot during high-speed operation.


 Temporary short-circuiting is allowed during switch inspection and maintenance, but at this time, it is strictly forbidden to work on live parts of the control system to avoid accidents.


 Operators of all robotic systems should participate in the training of the system, learn safety measures and use the functions of robots.

 Before starting the operation of the robot, make sure that there are no abnormal or dangerous conditions around the robot and peripheral equipment.


 Turn off the power supply or press the emergency button before entering the operation area, even if the robot is not running.

 When programming in the working range of the robot, set up corresponding guards to ensure that the robot can stop quickly in an emergency. Do not operate with gloves when teaching robots, try to operate at low speed when teaching robots, and effectively control the robot to stop in case of abnormal circumstances.


 It is necessary to remember the position of the emergency stop buttons on the robot controller and peripheral control equipment so that they can be pressed accurately in an emergency.

 Never assume that a robot's program has been completed when it is in a stop state. Because the robot is probably waiting for the input signal to keep it moving.

1.2.4. Prohibition

 When the power of the robot is connected, it is forbidden to unplug any electrical connector.

 It is forbidden to use any method to connect safety devices.

 It is forbidden to operate and use robots by personnel who have not passed safety training and safety assessment.



- ⊘ No drunken work.
- ⊘ Dis-assembly and modification of any parts of the controller is prohibited. If any unauthorized modification results in damage to any equipment and personnel, JHY will not bear any responsibility.
- ⊘ The operation of the robot controller must designate a dedicated operator, and the operator must undergo safety training and pass the examination before he can take up his post.
- ⊘ Safety fence should be set around the range of motion of the robot.
- ⊘ Man-machine separation: In the process of robot movement (automatic, manual), no one is allowed to enter the scope defined by the safety fence of the robot.
- ⊘ If there are several operators working together in the robot application system, it is necessary for all operators and their related person to know that the robot has been enabled before starting the robot.


1.3. Safety labels

In this manual, the contents of the following symbols should be given special attention.

To ensure proper and safe operation of the robot, to prevent personal injury and property damage, please observe the safety information shows on the safety labels in the table below:

	<p>Warning</p> <p>!! Do not enter the robot working range as main power on. Please read the manual carefully.</p>
	<p>Warning</p> <p>!! Please read the carefully when handling or installing the equipment. Improper operation may result in damage to the equipment or accidents.</p> <p>!! Overturning could happen when removing or installing the set screws, which may cause serious injury. Please fix the equipment before operation.</p>

 <p>主电源开启时，切勿进入机器人的工作范围。请仔细阅读使用说明书。 Do not enter the robot working range as main power on. Please read the manual carefully.</p>	<p>Warning</p> <p>!! Do not enter the robot working range as main power on. Please read the manual carefully.</p>
 <p>擅自改动或改装产品可能引发火灾、产品失效或故障从而造成人身伤害或设备损坏。 Unauthorized modification may cause fire or product failure then result in personal injury or equipment damage.</p> <p>改装产品不在保修范围内。 The modified product is not covered by the warranty.</p> <p>勿将手、手指、头发或着衣服靠近冷却风扇及送料机的旋转部。 Keep hands, fingers, hair or clothing away from the rotating parts of the cooling fan and wire feeder.</p> <p>关闭电源1分钟内勿触碰电器元器件，接触带电部位会引起致命电击或烧伤。 Do not touch electrical components in one minute after power off, otherwise can cause fatal shocks or burns.</p> <p>请试用合适的外部保护装置并正确配线。 Please use appropriate external protection device and wire it correctly.</p>	<p>Warning</p> <p>!! Please turn off the power before opening the box.</p> <p>Unauthorized modification may cause fire or product failure then result in personal injury or equipment damage.</p> <p>!! The modified product is not covered by the warranty.</p> <p>Keep hands, fingers, hair or clothing away from the rotating parts of the cooling fan and wire feeder.</p> <p>!! Do not touch electrical components in one minute after power off, otherwise can cause fatal shocks or burns.</p> <p>!! Please use appropriate external protection device and wire it correctly.</p>
 <p>电源必须接地 The power supply must be grounded</p> <p>接入电源220V Input Power: 220V</p>	<p>Warning</p> <p>!! The power supply must be grounded.</p> <p>!! Input power: 220v</p>
	<p>Attention</p> <p>!! Caution, high temperature.</p>

	<p>CAREFUL</p> <p>!! As the robot moves in high-speed, be careful to remove or release a brake.</p>
---	---

1.4. Cases unpacking check



- Visually inspect the robot to make sure it is not damaged. Robots that are damaged or lack parts must not be installed, otherwise heavy damage and personal injury may occur.
- Before moving the robot, please check the stability of the robot to avoid the danger of tilting.
- Cable packaging is susceptible to mechanical damage. The cable packaging, especially the connector, must be handled carefully to avoid damage. Otherwise, the robot cannot operate normally.

When unpacking, please carefully confirm: Whether there is any damage during transportation; whether the model and specifications of the nameplate of the machine are consistent with the order requirements. If you find that the model does not match or the device is missing, please contact the manufacturer or supplier as soon as possible.

1.5. Use environment.

The working environment of the robot is 0° C~45° C and no direct sunlight.

Note:

- JHY robot products can be used normally in the environment of 13°C~45°C; in the environment of 0°C~13°C, the robot can be used normally after preheating. It is not recommended to use the robot in the environment below 0°C and above 45°C; otherwise, it may cause equipment damage;
- JHY robot products preheating method: when running between 10°C~13°C, the J3 axis needs to be preheated at a speed below 60% for more than 5 minutes; when running between 5°C~10°C, the J3 axis needs to be preheated at a speed below 50% for more than 5 minutes; when operating between 0°C and 5°C, the J3 axis need to be preheated at a speed below 20% for 5

minutes, and then preheat at a speed of 40% for more than 5 minutes, at the same time, make the J2 axis to be preheated at a speed of 60% or less than 5 minutes .

Chapter 2. Welding robot overview

2.1. Preface

This chapter describes technical specifications, dimensions and motion ranges of our JHY series welding robot (BR-1510/BR-1810/BR-2010).

2.2. Robot body parts installation

2.2.1. JHY robot body structure

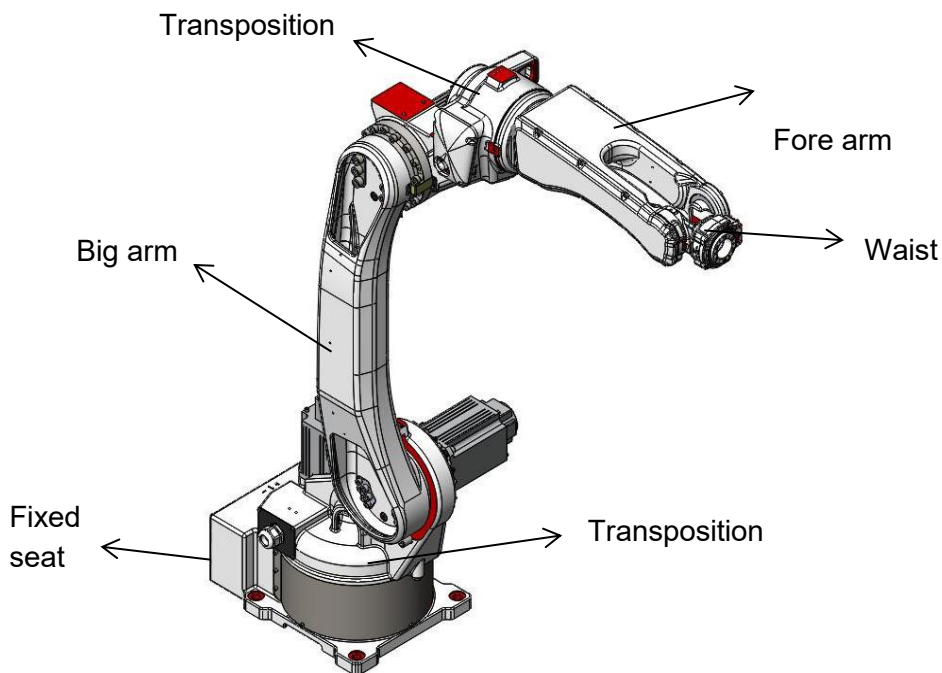


Figure 2.2.1.1 BR-1510 robot body structure

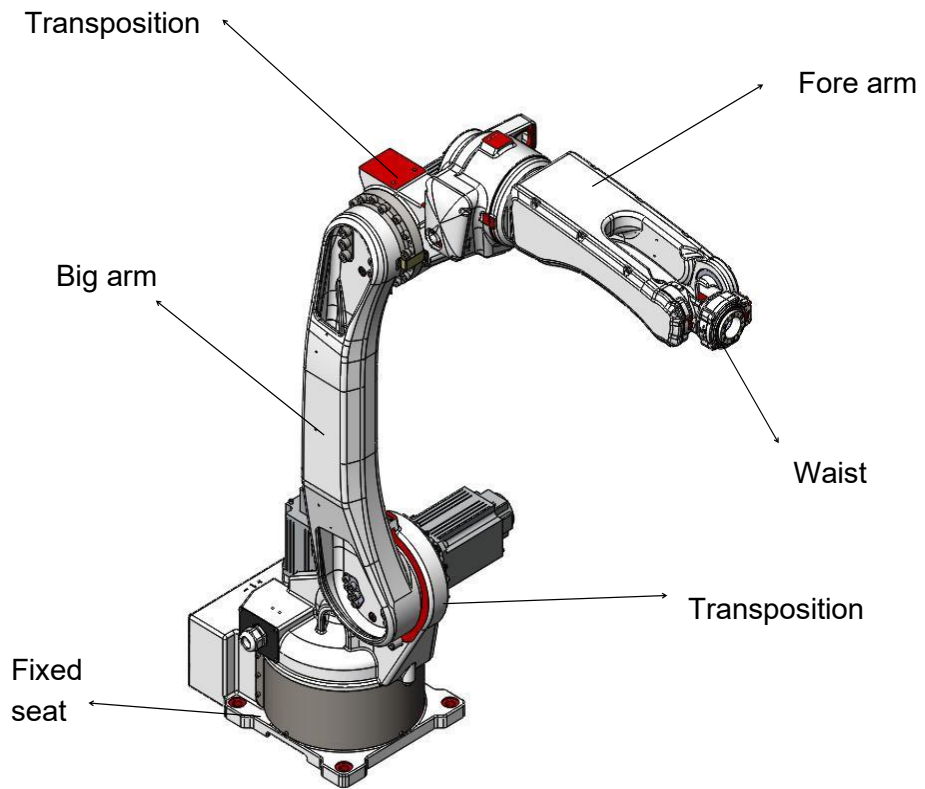


Figure 2.2.1.2 BR-1810 robot body structure

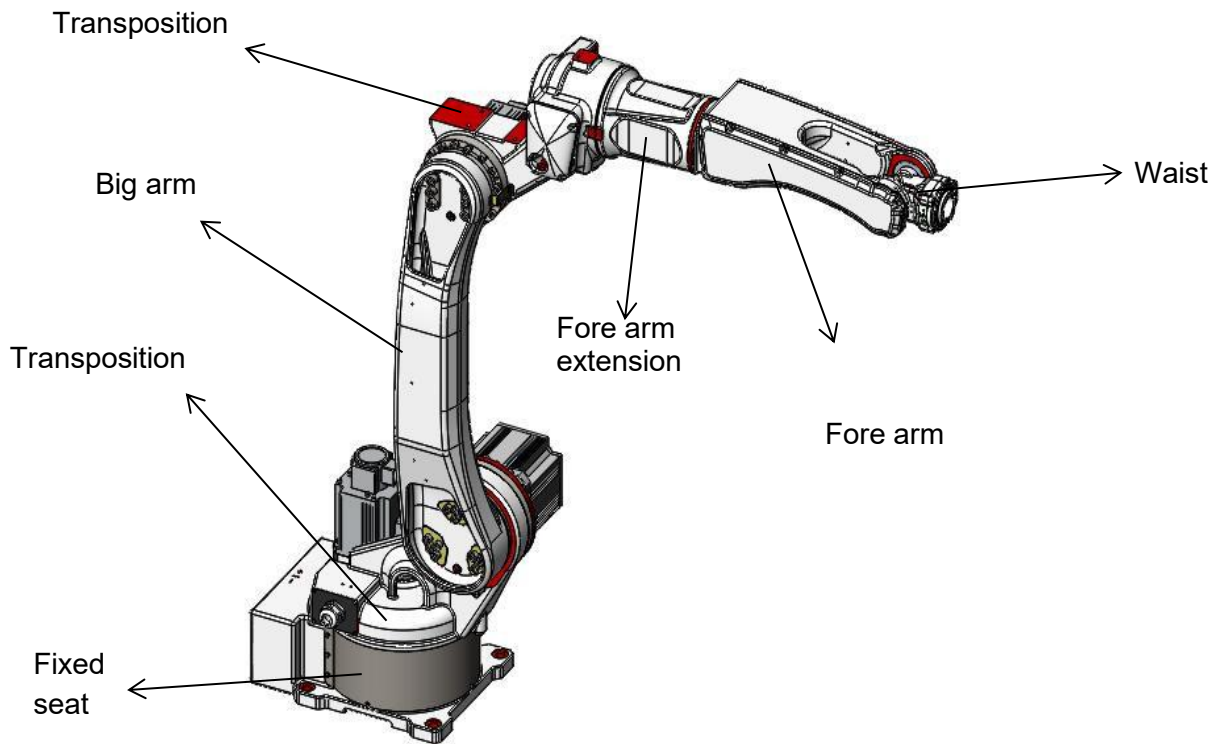
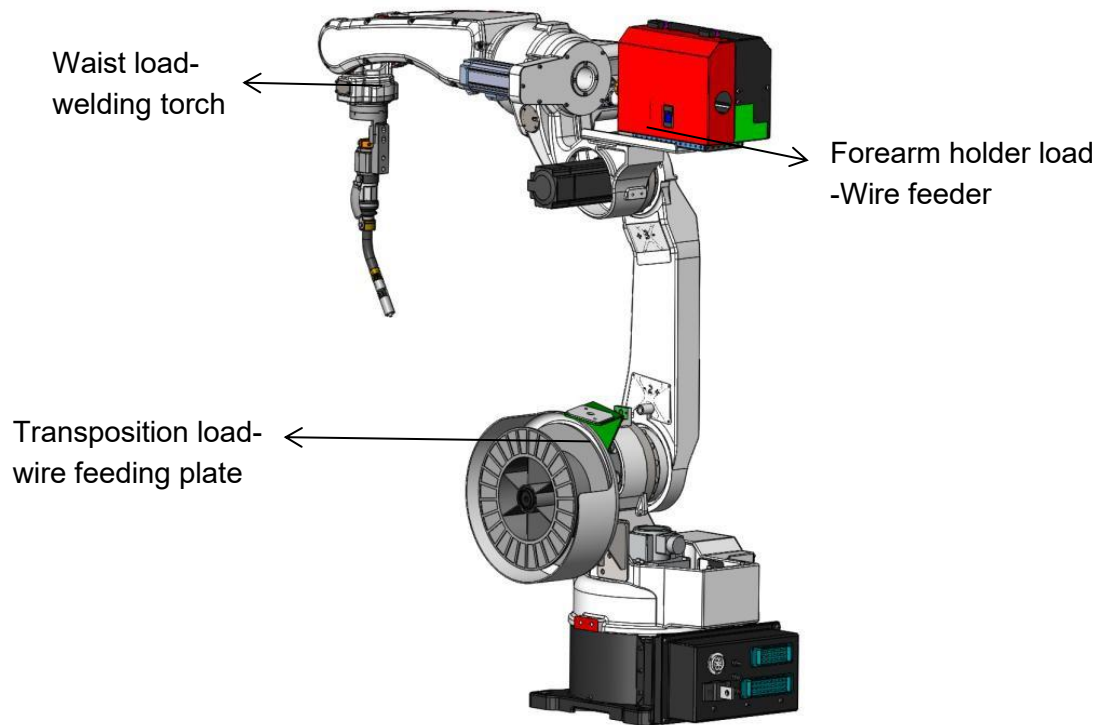


Figure 2.2.1.3 BR-2010 robot body structure

2.2.2. JHY robot parts installation parameter

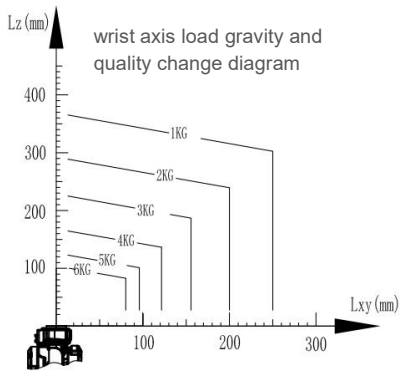
Robot model	Waist payload	Wire feeder installation(max payload)	Wire feeding plate installation(max payload)
BR-1510	6kg	15kg	20kg
BR-1810			
BR-2010			

JHY robot parts installation positions as the figure shown below:

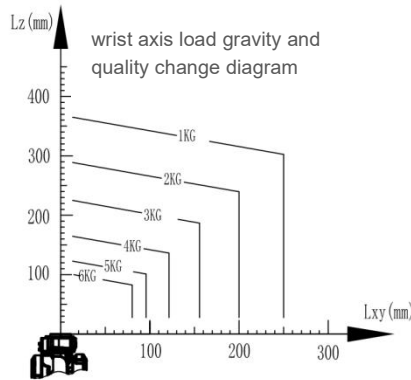


2.2.3. Wrist axial load value

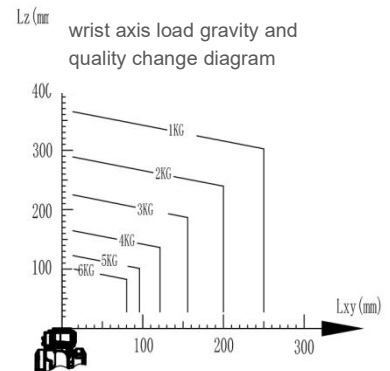
Although there is a fixed movable weight of wrist axis (including workpiece) for each model (see the parameter table of each model), due to the limitation of torque and the inertia moment, the following requirements shall be met when using it.



BR-1510



BR-1810



BR-2010

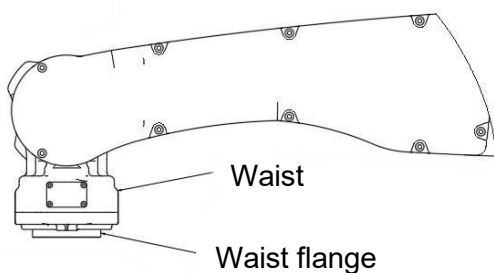
2.2.4. Wrist flange



When installing the arm and other tools, please be sure to disconnect the power supply of the controller and the external power switch, set up a striking sign "in the process of installation", and lock or hang the sign of the external power supply switch to prevent the operation personnel or other people from accidentally turning on the power supply to avoid the occurrence of unpredictable electric shock and other accidents.

Install a tool suitable for the outer diameter (55H7) or inner diameter (45H7) of the flange size to make it accurately positioned. Use 6-M4 screw torque = 4.9Nm (default screw grade 12.9) to fix the tool.

The length of the selected M4 bolt must not exceed the depth of the threaded hole on the flange (10mm).



BR-1510/BR-1810/BR-2010

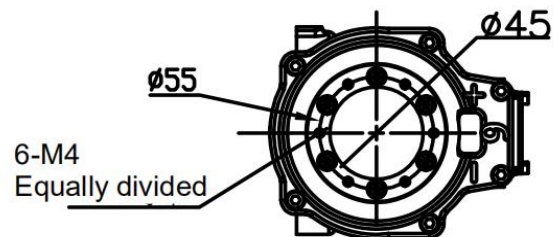


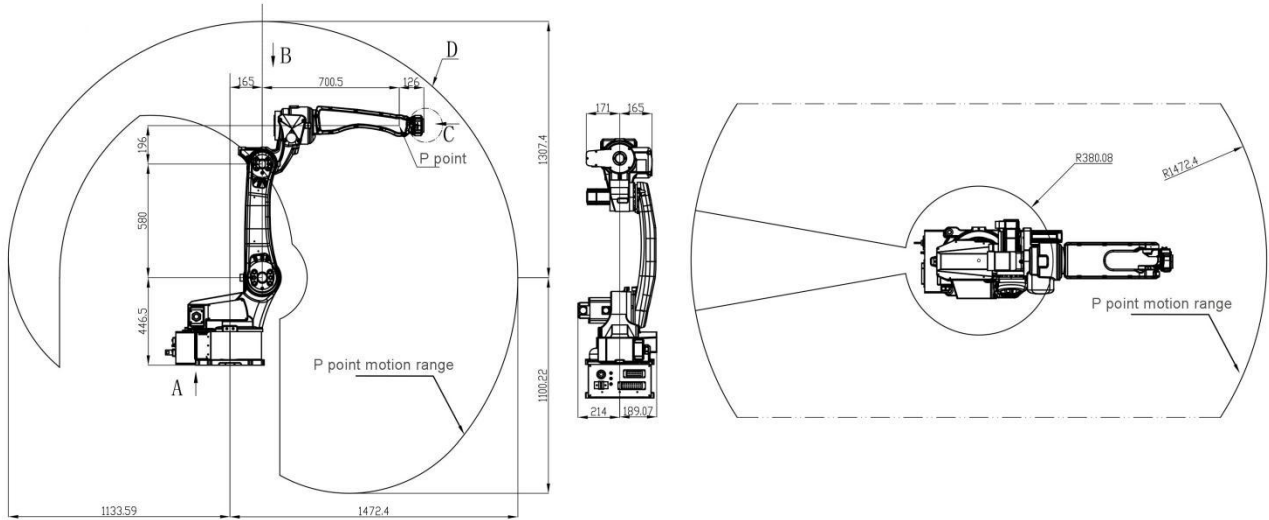
Figure 2.2.4.1 waist flange dimensions

2.3. Robot motion range and specification

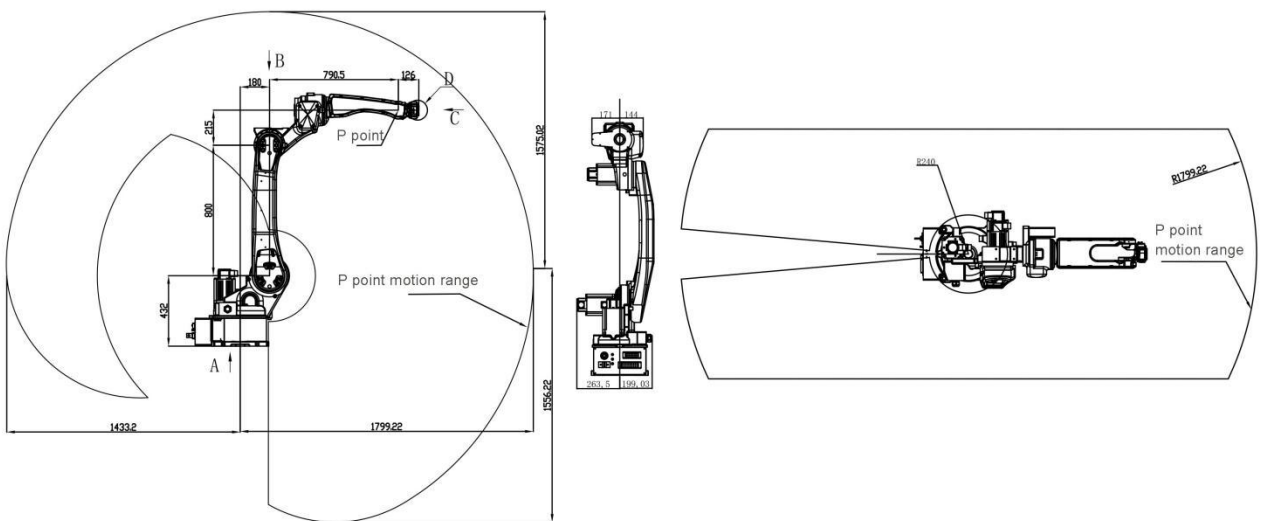
Model		BR-1510	BR-1810	BR-2010
Axis		6		
Payload		6kg		
Repeat-ability		±0.08mm		
Reach		About1500mm	About 1800mm	About2000mm
Motion range	J1	±170°	±175°	±175°
	J2	+155°~ -42°	+175°~ -60°	+175°~ -60°
	J3	±80°	+170°~ -85°	+170°~ -85°
	J4	±150°	±150°	±150°
	J5	+105°~-130°	+105°~-130°	+105°~-130°
	J6	±220°	±220°	±220°
Motion speed	J1	259.3°/s	172.1°/s	172.1°/s
	J2	160°/s	138.8°/s	135.1°/s
	J3	296.3°/s	259.3°/s	259.3°/s
	J4	294.1°/s	294.1°/s	294.1°/s
	J5	294.1°/s	294.1°/s	294.1°/s
	J6	426.7°/s	426.7°/s	426.7°/s
Input Voltage		Single-phase 220V±10% 50/60Hz		
Use Environment		0-45°C,20-80% RH(No condensation)		
Protection Class		IP65		
Weight		172kg	200kg	230kg
<p>*Measuring condition</p> <p>The robot must be firmly fixed to a flat surface.</p> <p>Noise level changes according to conditions.</p>				

2.3.1. BR-1510/BR-1810/BR-2010 robot technical parameter

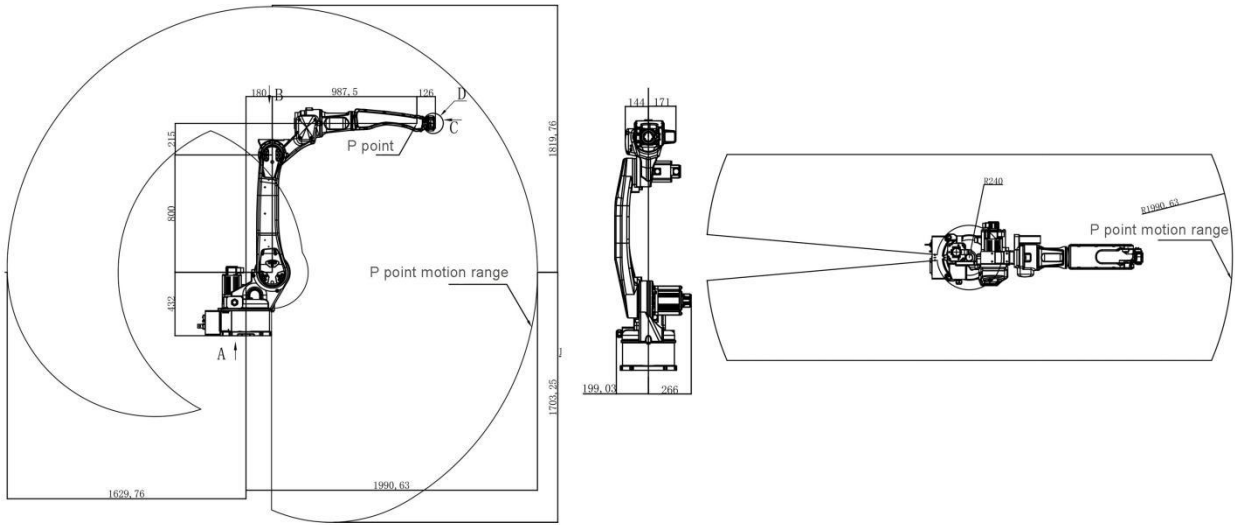
2.3.2. BR-1510 robot motion range and dimensions



2.3.3. BR-1810 robot motion range and dimensions



2.3.4. BR-2010 robot motion range and dimension



2.3.5. Joint movement directions

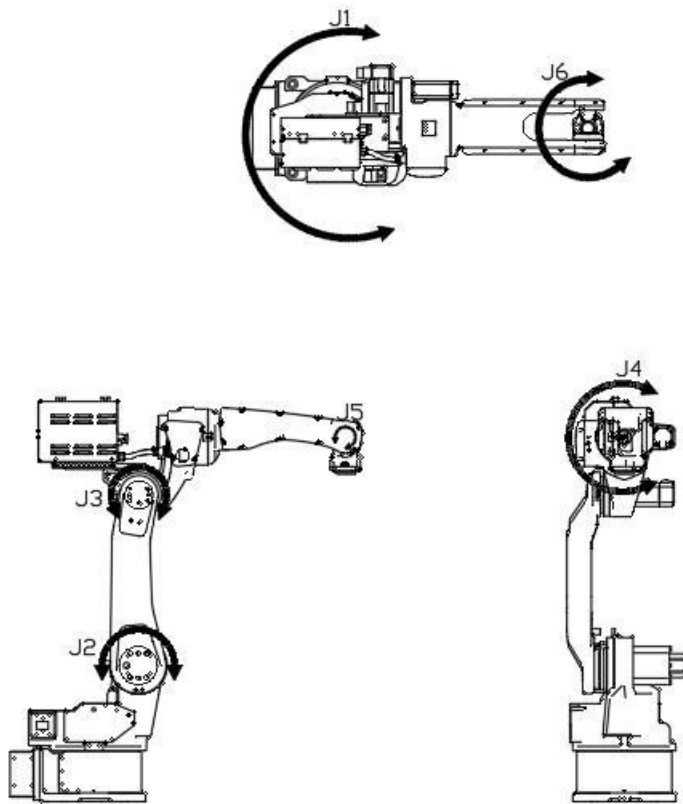


Figure 2.3.4.1 JHY robot joints movement directions

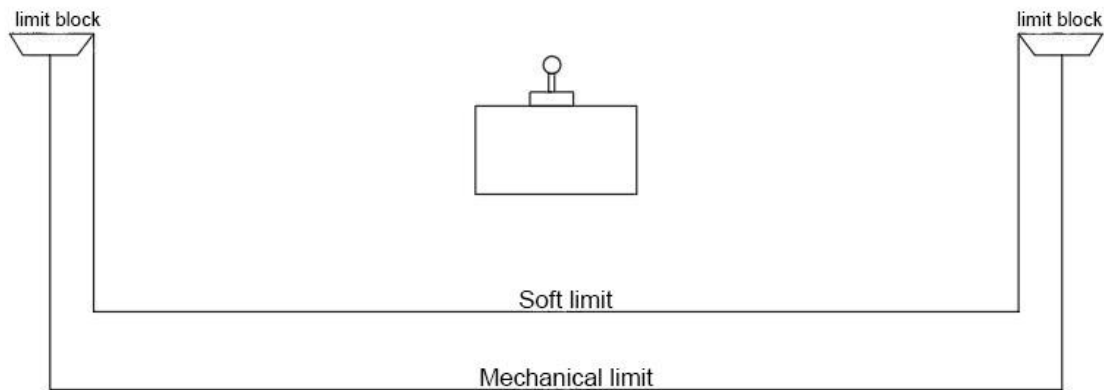
2.3.6. Limitation of the motion range

Both the robot and its controller are equipped with functions to limit the motion range of each axis. When the limit of the motion range is set by the program in the robot controller, it is called "soft limit". In case the robot exceeds the motion range of the soft limit, mechanical limit is also provided.

The operating range limits are shown in Table 2.3.5.1 below.

Table 2.3.5.1 limitation of the motion range of each axis

	Soft limit	Mechanical limit
J1	●	●
J2	●	●
J3	●	●
J4	●	×
J5	●	×
J6	●	×



Chapter 3. Transporting and installation

3.1. Preface

This chapter describes the transporting and installation of the JHY standard series robot.

Please read and fully understand the contents of this manual and the safety manual before proceeding with any operation, and please strictly abide by all safety regulations. This manual only describes the installation and connection of the robot arm. For operating, programming of the robot, please refer to other related manuals.

It is emphasized here that you should not do anything before you fully understand the entire contents of this book. The company will not be liable for any accident or damage caused by only operating in accordance with a part of this manual.

3.2. Precautions

3.2.1. Precautions for transporting, installation and storage

When transporting the robot to its installation location, the following precautions must be strictly observed for handling and installation.



- When transporting a robot using a crane or forklift, it is absolutely impossible to manually support the robot body. Never carry on the robot or under the lifted robot during transport.
 - Be sure to disconnect the controller power and main power before starting the installation. Set an 'installing' eye-catching sign, lock or hang the external power switch to prevent the operator or others from accidentally turning on the power to avoid accidents such as unpredictable electric shock.
 - When starting the robot, be sure to turn on the motor power after confirming that the installation status is normal, etc, and adjust the arm of the robot to the specified posture. Be careful not to approach the arm and squeeze it.
-



- Because the robot body is made up of precision parts, it is important to avoid excessive shock and vibration of the robot during transporting.
- When transporting the robot with a crane or a forklift, remove obstacles first to ensure safe transportation to the installation position.
- Avoid excessive vibration and shock.

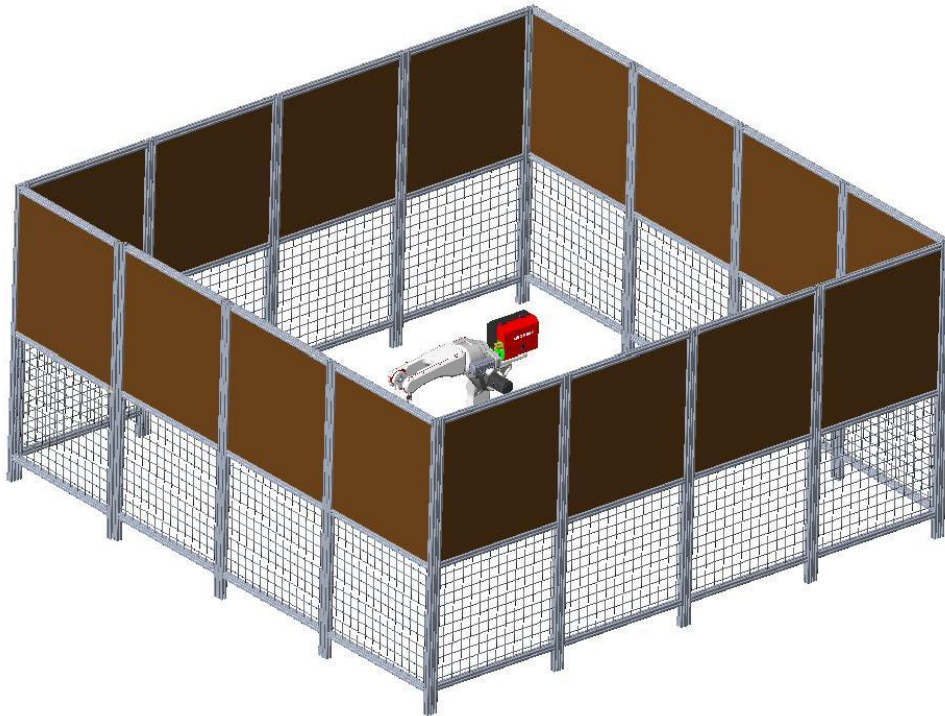
3.2.2. Robot arm installation environment

- Please install the robot arm in a place that meets the following conditions.
- When installing on the ground, please ensure that the level of the ground is within $\pm 5^\circ$.
- Ensure that the floor and the mount are sufficiently rigid.
- Ensure flatness to avoid extra force on the base of the robot. (If the flatness is not achieved, use a pad to adjust the flatness.)
- The working environment temperature must be between 0°C and 45°C . (If start-up with low temperature, grease and gear oil are too viscous, and there will be abnormal deviation or overload. In this case, please perform low-speed (about half of the normal starting speed) warm-up operation (5-10 minutes).
- The relative humidity must be between 20% and 80 % RH without condensation.
- Ensure that the installation location is rarely exposed to dust, smoke and water.
- Ensure that there are no flammable, corrosive liquids or gases in the installation location.
- Ensure that the installation location is not affected by excessive vibration. (0.5G or less)
- Ensure that the installation location is minimal electromagnetic interference.
- Make sure there is enough space for robot movement in the installation location.
- Set a safety fence around the robot to ensure that the robot's maximum movement space, even if the welding torch are attached to the arm, will not interfere with the surrounding machines.
- Set up service door with a safety pin at the safety fence (if possible, set up only one service door and go in and out the safety fence).

3.3. Safety fence

During automatic running of industrial robot, operators and the surrounding staff may get injured by touching the robot. To avoid staff injury and equipment damage in robot operation, please be

sure to set safety fence or relevant protections.



3.4. Transporting

When unpacking or installing the robot, a forklift or hydraulic car must be used. The original posture from its factory must be maintained during transportation, as shown in Figure 3.4.1 to 3.4.4

When using a forklift to transport, the robot is fixed on the pallet shown in Figure 3.4.1 to 3.4.4 to prevent it from tipping over.

In addition, the monomer weight of BR-1510 is 172Kg; the monomer weight of BR-1810 is 200Kg; the monomer weight of BR-2010A is 230Kg.

A pallet that can withstand these weights should be used.

The transfer posture of BR-1510 robot is shown in Figure 3.4.1 and Figure 3.4.2. The transfer posture of BR-1810 robot is shown in Figure 3.4.3. The transfer posture of the BR-2010 robot is shown in Figure 3.4.4.

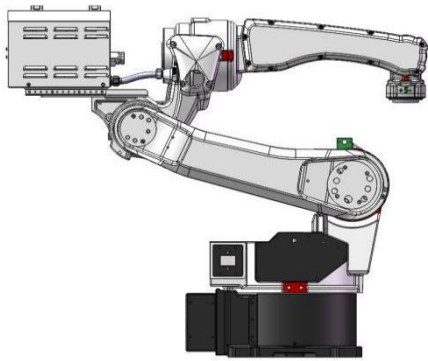


Figure 3.4.1 BR-1510 transfer posture

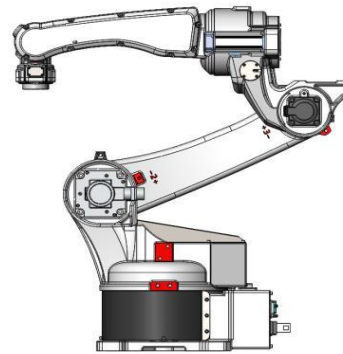


Figure 3.4.2 BR-1510 transfer posture

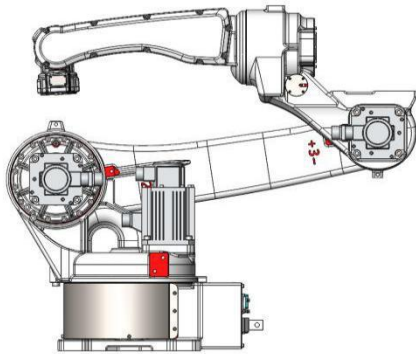


Figure 3.4.3 BR-1810 transfer posture

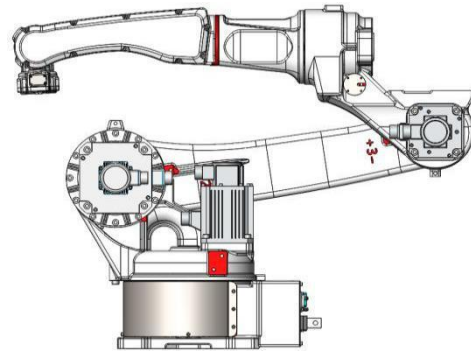


Figure 3.4.4 BR-2010 transfer posture

When the BR-1510, BR-1810, BR-2010 robots are in the transfer posture, the angle of each joint is shown in the table below:

	Angle (°)		
	BR-1510	BR-1810	BR-2010
J1	0	0	0
J2	-55	-55	-55
J3	+78	+68	+78
J4	0	0	0
J5	+115	+115	+115
J6	0	0	0

- **Forklift transporting**

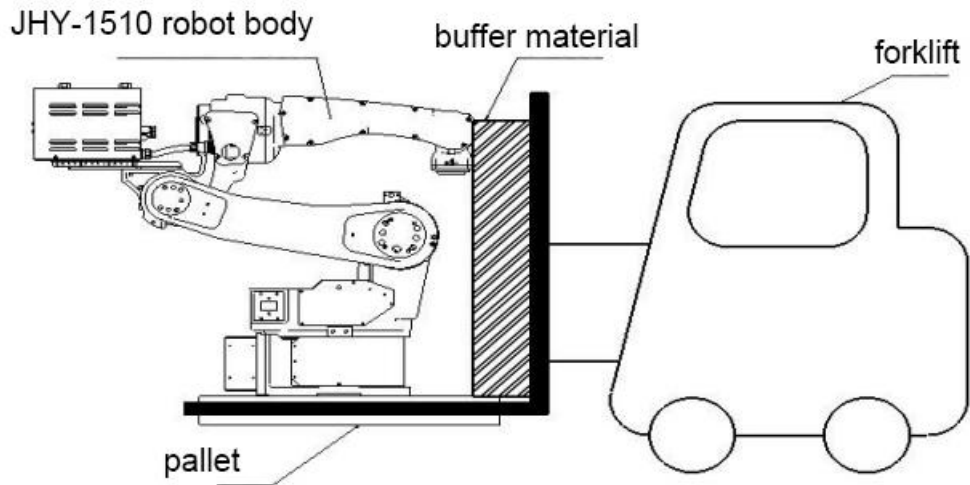


Figure 3.4.5 BR-1510 forklift transporting way

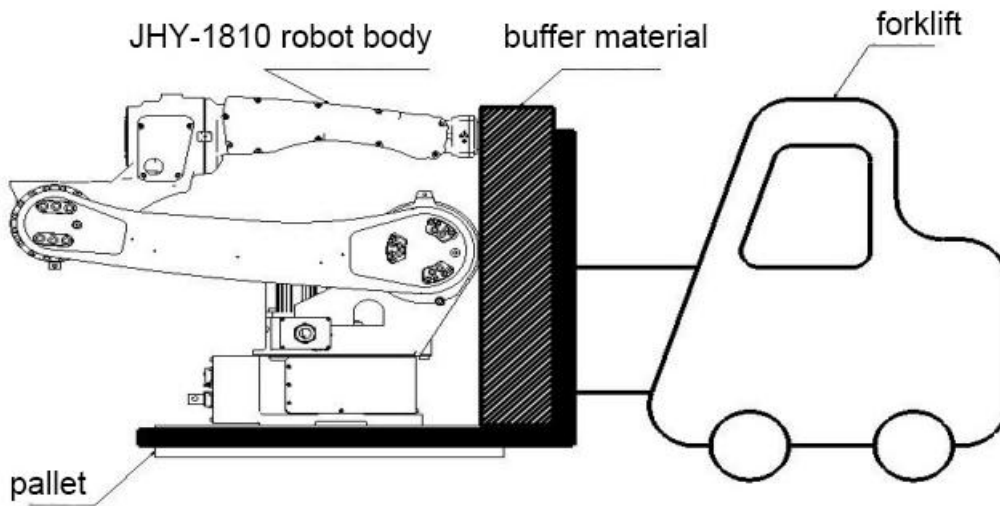


Figure 3.4.6 BR-1810 forklift transporting way

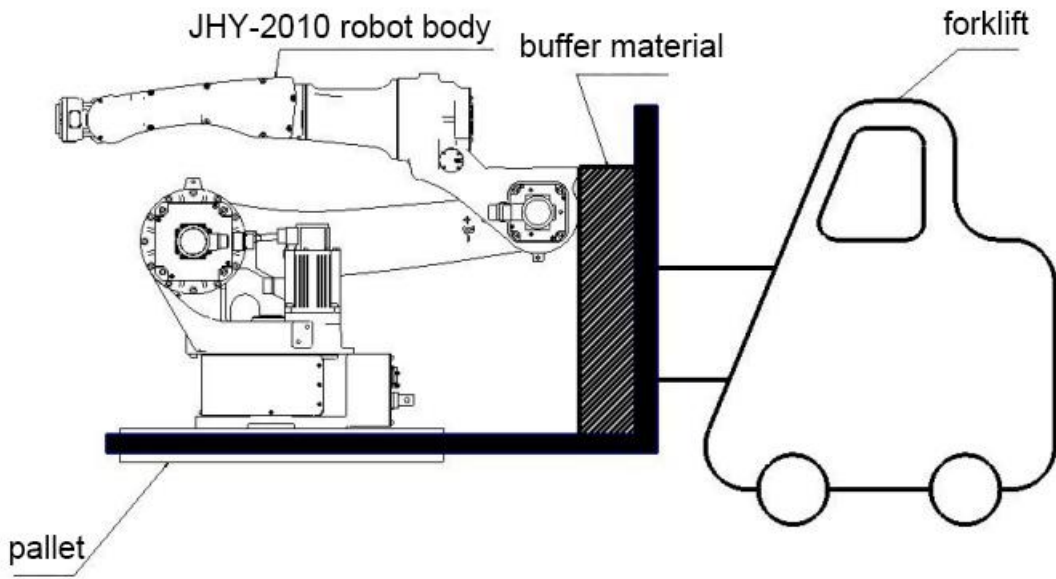


Figure 3.4.7 BR-2010 forklift transporting way

- Hydraulic car transporting

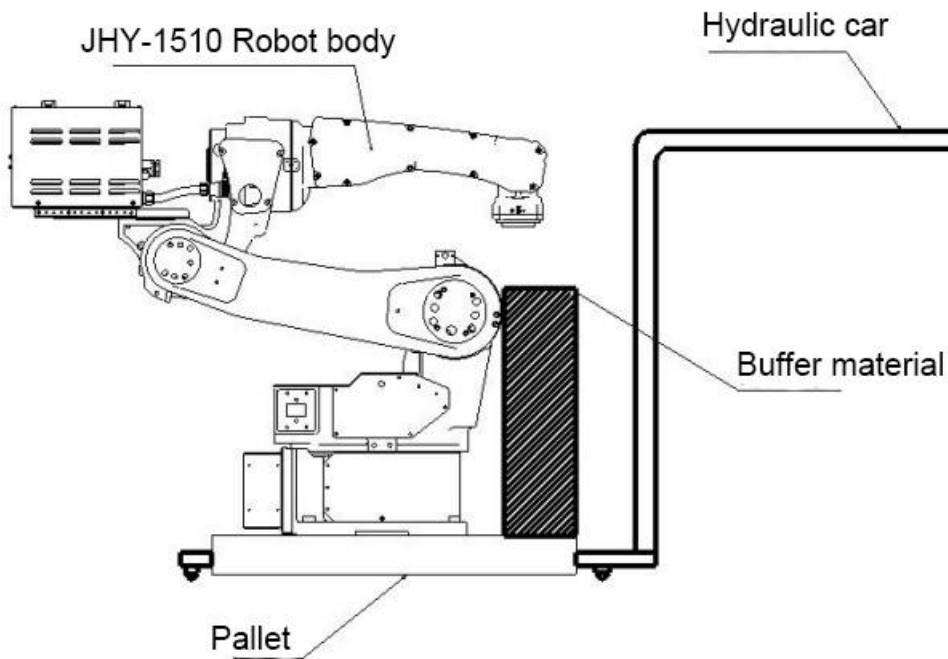


Figure 3.4.8 BR-1510 hydraulic car transporting

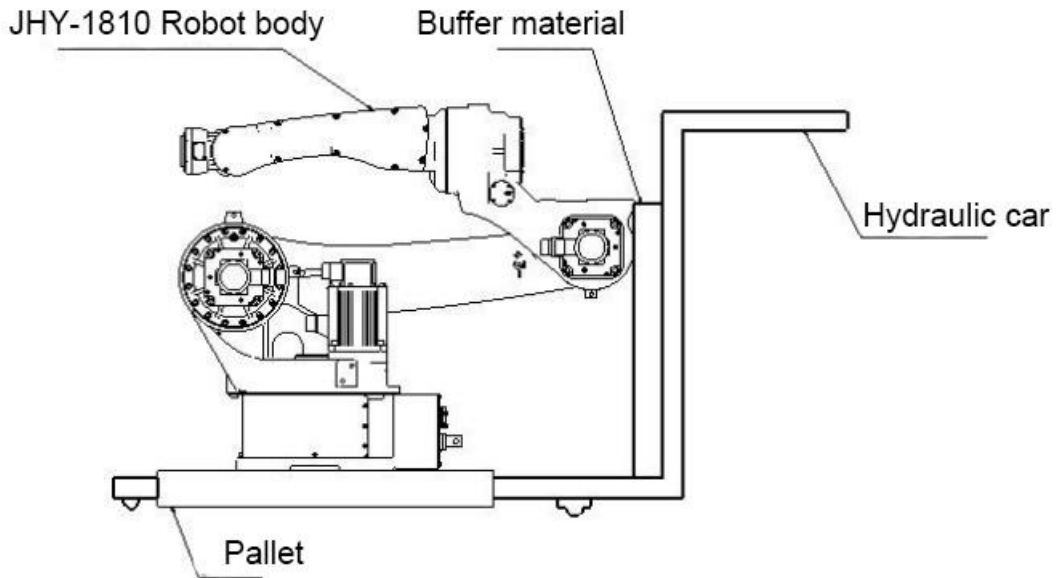


Figure 3.4.9 BR-1810 hydraulic car transporting

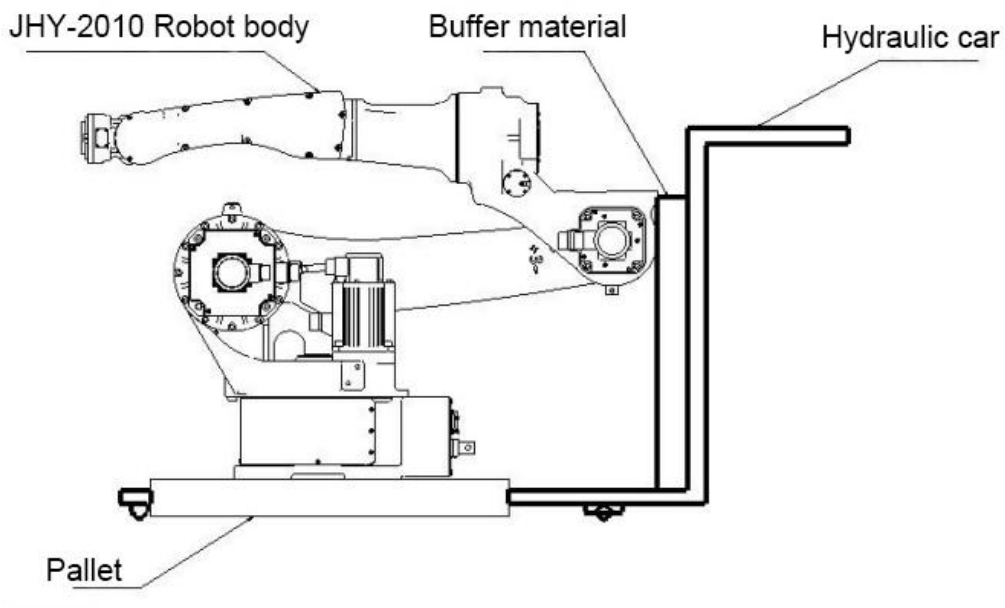


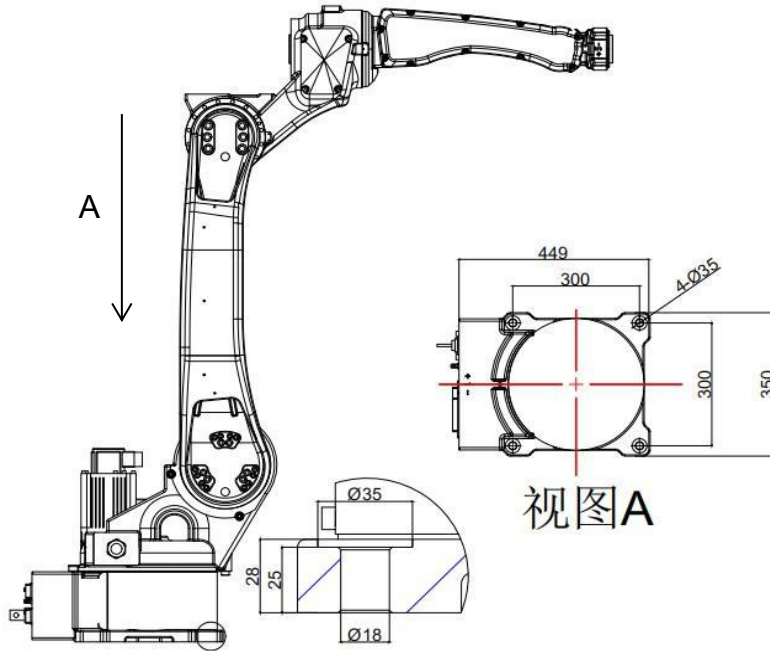
Figure 3.4.10 BR-2010 hydraulic car transporting

3.5. Installation

3.5.1. Fixing the robot to the base

When the robot adjusts its speed and moves, the rotating base will receive huge reaction forces from all directions. The base not only needs to withstand the static load, but also needs to withstand the reaction force generated under the adjusted speed. Therefore, the robot and its

mounting base should be stable.



Because the robot in operation will generate huge inertial force, the base for installation must be very strong. Therefore, when the robot and the fixture are to be installed on the same base, the thickness of the base must exceed 20mm, and 4 hexagon socket head screws (M16) and flat washers must be used to securely fix the robot with a torque of 216 Nm.

The installation method of the robot base is shown in Figure 3.5.1.1

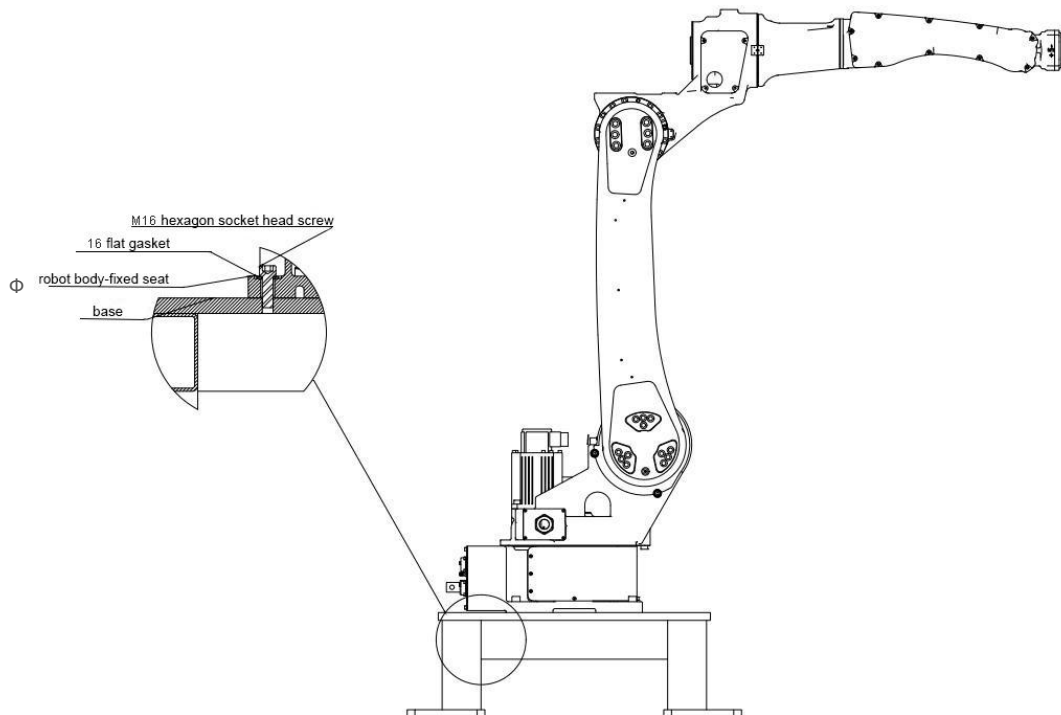


Figure 3.5.1.1

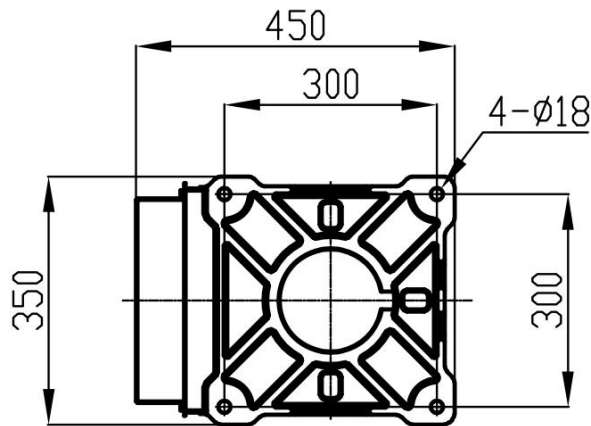
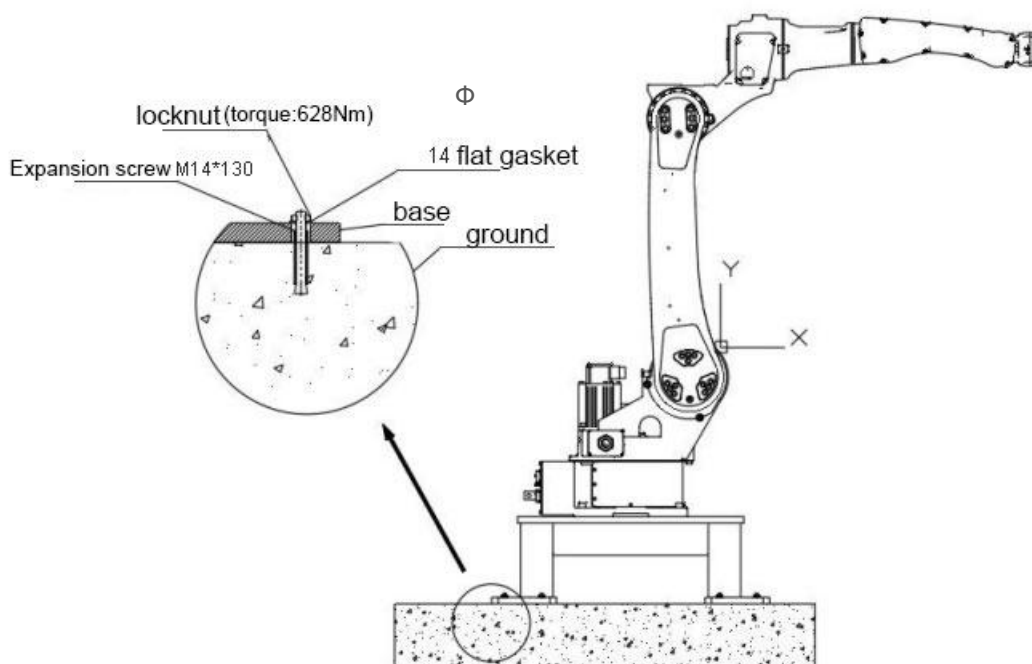


Figure 3.5.1.2 BR-1510/BR-1810/BR-2010 base mounting dimensions

3.5.2. Installation method of the base and the ground

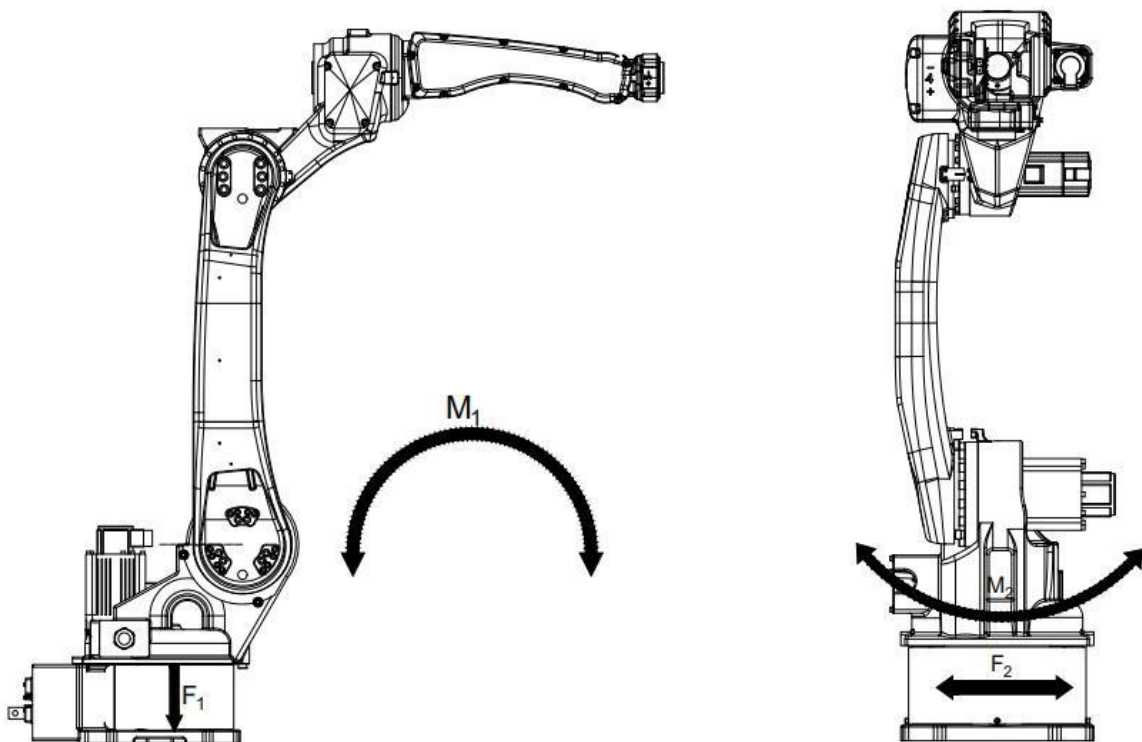
Because the robot in operation will generate huge inertial force, the installation floor must be very strong. When the thickness of the concrete floor exceeds 200mm, use M14*130 expansion screws for installation as shown in Figure 3.2.3.1. If the floor strength is not enough, use J-type anchor bolts for installation, as shown in Figure 3.2.3.1. If the thickness of the concrete floor is less than 200mm, the foundation shall be constructed in advance after thorough examination.



3.5.3. The basement payload

There are three installation methods for the robot: ground installation, vertical installation and hoisting installation.

Figure 3.5.3.1 shows the direction of robot stress, which is valid for all ground-mounted and suspended robots.



Among them: F_1 --force in the vertical direction of the base; F_2 --force in the horizontal direction; M_1 --inclined bending moment; M_2 --torque around the A1 axis.

Note: The following extreme values rarely appear during the robot operation, and these values cannot reach the maximum at the same time:

$F_1=2200\text{N}$; $F_2=1500\text{N}$; $M_1=2300\text{Nm}$; $M_2=1600\text{Nm}$

Chapter 4. Connection

4.1. Preface

This chapter introduces the installation and connection of JHY standard series robot(with Megmeet Ehave CM350 welding machine). Other series are for reference only, please connect according to the actual configuration or consult the supplier.

Be sure to read and understand this and the safety section thoroughly before doing anything, and follow all safety rules. In addition, please refer to the relevant manual if necessary.

In particular, don't do anything until you fully understand the content of this article. The company shall not be liable for any accident or damage caused by the operation of the company only in accordance with a limited part of this article.

Suitable or BR-1510A/BR-1810A/BR-2010A SERIES robot connection

4.2. Equipment details

No.	Item	Model	QTY	Remark
Welding robot equipment				
1	Robot body	BR-1510	1	
2	Welding machine	Megmeet Ehave CM350	1	
3	Wire feeder		1	
4	Wire feeding plate		1	
5	Welding torch		1	
6	Control cabinet		1	
7	Teach pendant		1	
8	Reservation box		2	
Cables				
9	Input power cable	Megmeet Ehave CM350	1	
10	Positive power cable	Megmeet Ehave CM350	1	

11	Negative output cable	Megmeet Ehave CM350	1	
12	Welder communication cable 1	Megmeet Ehave CM350	1	(connected to robot)
13	Welder communication cable 2	Megmeet Ehave CM350	1	(connected to control cabinet)
14	External wire feed tube		1	
15	Integrated power line		1	
16	Integrated coding line		1	

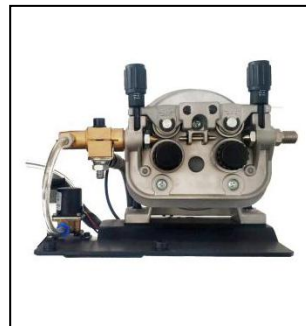
Pictures example:



Pic.1 robot body



c 2. welder(welding machine)



Pic 3. wire feeder



Pic.4 wire feeding plate



Pic.5 welding torch



Pic.6 control cabinet



Pic.7 teach pendant



Pic.8 reservation box



Pic.9 welder power cable



Pic.10 positive power cable



Pic.11 negative power cable



Pic.12 welder control cable 1



Pic.13 welder control cable 2



Pic.14 wire feed tube



Pic.15 integrated power line



Pic.16 integrated coding line

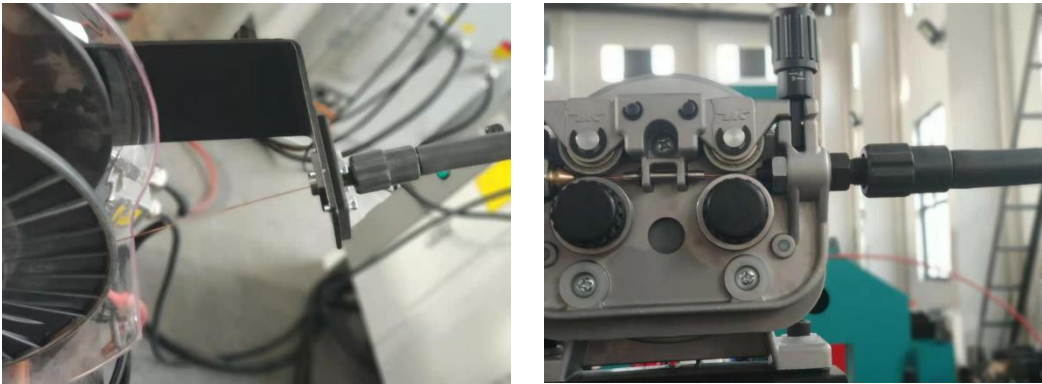
4.3. Installation and connection process

4.3.1. Wire feeding plate installation



4.3.2. External wire feeding tube connection.

One side screw to the wire feeding plate bracket, another side screw to the wire feeder interface.



4.3.3. Welding machine tube and cables connection

(1) Welding machine power line connection

Input voltage: 3phase 380v, 50-60Hz (Refer to the relevant model welding machine manual).



(2) Positive power cable connection

For the *positive power cable*, fasten one side to the positive output terminal of the welding machine and the other side must be fasten to the input terminal of the robot.



(3) Negative power cable connection

For the *negative power cable*, fasten one side to the negative output terminal of welding machine. another side be fasten to the base metal.



(4) Welder to wire feeder connection

Connect the 7-core aviation plug of the *control cable 1* to the 7-core jack on the welder front side;

connect the 14-core aviation plug of the *control cable 1* to the 14-core jack on the robot backside.



(5) Welder to control cabinet connection

Enable every factory to use good robot

For the communication cable between welder and control cabinet ,one end side be connected to the control cabinet jack,another end side be connected to the backside jack of the welder with black cover.



(6) Protective gas tube

(Protective gas tube and gas cylinder need to be prepared by customer.)

One side of the protective tube be connected the backside of robot, another side be connected to the hole of gas cylinder.



(7) Reservation box connection

The end of the reservation box be connected to the control cabinet jack with blue cover.



4.3.4. Control cabinet power connection.

Control cabinet power cable connection:

Electronic control system is powered by voltage AC 220V ± 10%, 50-60Hz



4.3.5. Robot servo motor cables connection.

(1) The integrated power line connection.

One side be connected to the backside jack of the robot. Another side be connected to the jack on the control cabinet.



(2) Integrated coding line connection.

One side be connected to the backside jack of the robot. Another side be connected to the jack

on the control cabinet.



4.4. Debugging and testing process

- (1) The welding gas and welding table need to be prepared before debugging;
- (2) Turn on the power of the robot control cabinet;
- (3) Turn on the power of the welding machine;
- (4) Open the welding gas pressure reducing valve and flow meter, and press the "gas check" on the robot teach pendant to detect the outflow of gas;
- (5) Press the SEND and RETRACT button of the robot teach pendant to check the wire feeding of the wire feeder;
- (6) Fix the test workpiece on the welding table, adjust the welding torch angle and the wire length sticking out of nozzle (about 10 times as the diameter of the wire), set a safe working point and teach a linear program along the workpiece;
- (7) After the teaching work is completed, in the "Teach mode", simulate the work path to check if there is any interference or collision or other situations;
- (8) In the welding settings of the teach pendant, modify the welding parameters;
- (9) Add welding instructions after the "arc on" point and before the "arc off" point;
- (10) Switch to the "automatic mode" of the robot, execute a single cycle, press "Start" on the reservation box, and complete the automatic arc welding work;
- (11) Shake the anti-collision sensor of the welding torch to test whether the robot has an emergency stop and whether the teach pendant screen appears the alarm;

Chapter 5. Inspection and maintenance

5.1.Preface

This chapter mainly introduces about the methods, plans and precautions of the robot's regular inspection and maintenance.

5.2. Precautions

WARNING!

- 1.Before maintenance, please ensure that the robot has completely stopped running and there is no interference within the movement range of the robot that may cause danger.
- 2.During the maintenance, except for the maintenance personnel, no one shall enter the working range of the robot.
- 3.In order to ensure the safety of the maintenance personnel, please take personal protection measures and wear a helmet during the maintenance.
- 4.Before performing each step of the operation, please carefully check the robot for safety hazards such as tipping, swinging joints, etc.

- (1) Be sure to wear helmets, safety shoes, gloves and other safety protection measures necessary to perform robot inspection, maintenance, adjustment, repair or other similar operations in accordance with legal requirements. Make sure to wear clothing suitable for the job.
- (2) Before starting work, press the "emergency stop" button or stop button to check whether the robot system stops immediately. In addition, if the robot system is also equipped with safety pins, safety switches or other protective devices, it must be checked whether they are operating normally. If any failure is detected, stop the inspection work, immediately turn off the main power supply, check the cause of the failure and take necessary countermeasures accordingly.
- (3) Before starting work, place a “maintenance” sign in a conspicuous location so that people around the robot system know that the inspection is in progress.
- (4) Do not use any equipment that may generate electromagnetic noise in or around the place where the inspection is performed.
- (5) Inspection or maintenance work should be performed by at least two workers, one of whom performs the actual work and the other acts as a supervisor.
- (6) Personnel who will perform robot inspection, maintenance, adjustment and/or repair operations should receive guidance and training on robot functions, operation and maintenance. In addition, if the robot system is equipped with special equipment or facilities, the relevant personnel must fully understand the entire organization.
- (7) Only qualified personnel who have received special training can perform robot inspection,

maintenance, adjustment and repair operations. In addition, even if personnel have received such special training, they are not allowed to perform inspection, maintenance, adjustment or repair operations on other machines that they are not fully familiar with.

(8) Any identification provided to workers, supervisors and/or operators of related machines must comply with the customer's safety management standards.

(9) Supervisors must comply with the following requirements. He should:

(A) Stand in a position that overlooks the entire robot's working range and concentrate on the job of supervising the work responsibility.

(B) Always keep your hand on the "emergency stop" button, and immediately in case of any abnormality press the button.

(C) Ensure that people other than workers involved in inspections are not close to the robot's working area.

(10) Workers involved in inspections or other operations must comply with the following requirements.

(A) If the job can be performed outside the robot's working range, determine the job details before starting the job. In any case, be sure to perform tasks outside the robot's operating range.

(B) In principle, perform inspections and other tasks while the robot is stopped. However, if inspections or other tasks are unavoidable during the operation, the situation must be reported to the responsible safety manager. After permission is obtained, the operation will be performed outside the robot's working range.

(C) If the robot is required to be in an operable state when performing inspections or similar operations, determine the details of the operating procedures in advance to effectively perform safe operations. In addition, if there is no special requirement for the robot to be in an operable state, the work is performed with the robot controller, welding power supply, or other input power supplies turned off. If there is no special safety program requirement, be sure to turn off the power supply of the input side of the fixture and peripheral equipment or leave them in a stopped state.

(D) When performing tasks within the working range of the robot, make sure that you are always in the "always ready" posture, and you can immediately press the "emergency stop" button when the robot malfunctions.

(E) Before starting work, carefully check your footing. Be sure to avoid unstable scaffolding or scaffolding that is elevated (over 1.5 meters high).

(F) When you are within the working range of the robot, do not perform tasks with your back to the robot.

(G) When replacing the printed circuit board in the robot controller or teaching box, take anti-static measures, including anti-static boards.

(11) If there is any abnormality during the operation, perform the following procedures carefully.

(A) If any malfunction is found in the robot system, immediately press the "emergency stop" button.

(B) Report the situation to the supervisor immediately and close the power supply of the controller, and then place the "power supply not allowed" sign.

(C) Be sure to check that all related machines have stopped.

Do not turn on the power

(D) When it is necessary to enter the guardrail, the person who is about to enter must personally pull out the safety plug, carry it with them, and then perform related operations.

(E) Even when the robot stops automatically due to a power supply voltage failure of the robot system, hydraulic pressure or air pressure of related equipment, make sure that it is in a completely stopped state, and then investigate the cause to take necessary countermeasures.

(F) If the "emergency stop" button switch or other safety equipment fails to operate, immediately turn off the main power supply, investigate the cause and take necessary countermeasures.

(G) After pressing the "emergency stop" button to stop the robot, if you want to restart the robot, investigate the cause, take necessary countermeasures, return the safety latch to its original position, and restart the robot from outside the guardrail.

(12) At the end of the operation, carefully check that the necessary connectors, shields, panels, etc. have been installed and connected correctly.

5.3. Robot inspection

In order to continuously operate the robot in a safe and effective manner, regular inspections are essential.

The product has been delivered for 6 years or the operation time reaches 30,000 hours (whichever is shorter), and a thorough inspection must be carried out.

The inspection and maintenance cycle is estimated based on the assumption that the robot is only used for arc welding. For higher frequency of use, such as handling work, the above period is shorter. Please contact our company for details.

5.3.1. Daily inspection

1. After the robot stops working, check whether the robot returns to the zero point position and whether all joints of the robot move normally.
2. Clean the dust on the surface of the equipment after normal shutdown.
3. Check whether the positive and negative cables of the power supply are loose. If so, tighten them with a wrench.
4. Check whether the wire feeding wheel of the wire feeding machine is clean. If not clean, please clean it up.
5. Check whether the connection of external wire feeding pipe is loose.
6. Check whether the conductive nozzle is seriously worn or not. If so, please replace it in time.
7. Check whether the connection lines of the equipment are safe and protected.

8. Ensure that the surrounding environment of the equipment meets the operation requirements of the equipment (no rain, no corrosive gas, non-high temperature environment)

5.3.2. Monthly inspection

1. During regular inspection, stop the operation and cut off the power supply.
2. Check whether the voltage of power supply is within the allowed range.
3. Clean the dust on the drive and control board.
4. Inspect the insulation of the cable. If there is any damage, stop using it and replace it immediately.
5. If any connector parts are loose, tighten them before use.
6. the control line and electrical components, if there is damage and affect the normal operation or become trouble in the future, must be repaired.
7. Check whether the copper column of the conductive device is in good contact with the working table and whether the spring is effective.
8. Check whether the wire feeding is smooth. If not, check the internal wire feeding pipe and the external wire feeding pipe, the internal wire feed tube is replaced every three months.

5.4. Robot maintenance

5.4.1. Synchronous belt tension adjustment

Correct and reasonable use of the synchronous belt can not only ensure the smooth progress of production and transmission, but also reduce the failure rate of the device and extend the service life of the synchronous belt.

The synchronous belt is located between the motor and the reducer and is used to drive the J4, J5, and J6 shafts. The synchronous belt must be loaded with proper tension to achieve the requirements of smooth transmission. Follow the instructions below to properly adjust the tension between the shafts. When making adjustments, be careful not to let the transmission pulley idle, because in this case, the origin may shift and need to be re-adjusted.

● J4 axis synchronous belt tension adjustment

- (1) Remove the sealing plate at the tail of the arm holder (viewed from the rear of the robot) and you can see the synchronous belt in Figure 5.1.1.1.
- (2) Loosen the fixed bolt (M5×15) and loose nut on the servo motor, and use the bolt (M4) to adjust

the tension of the timing belt until the tension reaches the estimated value.

(3) After adjustment, use an Allen wrench to tighten the motor fixing bolts, torque = 9.3Nm (bolt grade default is 12.9), and apply thread glue on these bolts to prevent the bolts from loosening.

(4) Re-attach the tail sealing plate of the forearm holder.

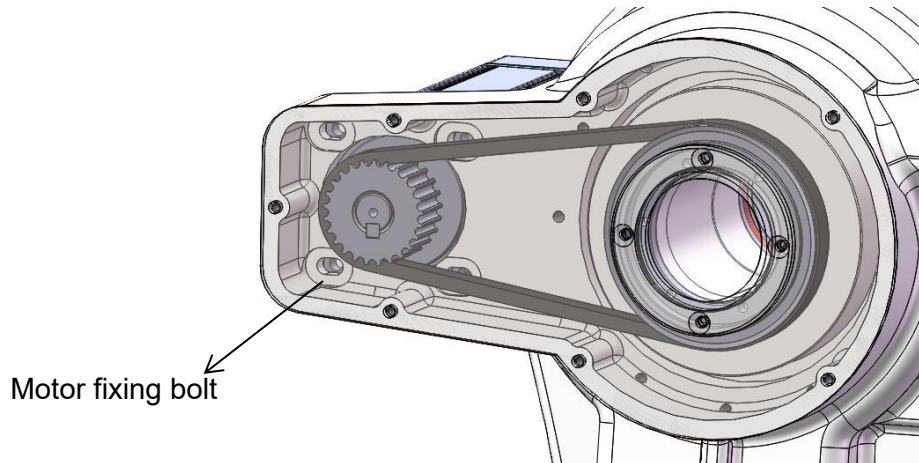


Figure 5.4.1.1 Adjusting the tension of the J4 axis synchronous belt



- Don't be caught by moving parts
- Improper adjustment of belt tension may damage the belt
- Damage to the belt may cause the arm to fall

● J5 axis synchronous belt tension adjustment

(1) Remove the arm side cover L (from the right side of the robot)

(2) Loosen the fixing bolt M4*12 of the motor flange, and use the motor flange to adjust the tension of the timing belt until the tension reaches the estimated value.

(3) After adjustment, tighten the three M4*12 bolts at the motor flange with an Allen wrench, torque = 4.9Nm (bolt grade default is 12.9), and apply thread glue on these bolts to prevent the bolts from loosening.

(4) Reinstall the forearm side cover L.

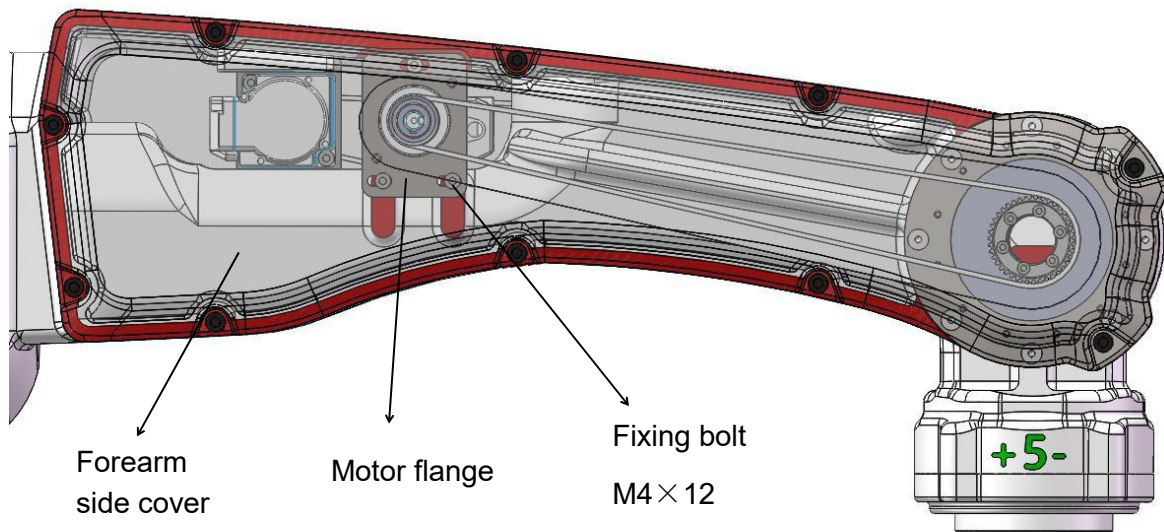


Figure 5.4.2.2 Adjusting the tension of the J5 axis synchronous belt



- Don't be caught by moving parts
- Improper adjustment of belt tension may damage the belt
- Damage to the belt may cause the arm to fall

● J6 axis synchronous belt tension adjustment

- (1) Remove the arm side cover R (from the left side of the robot)
- (2) Loosen the fixing bolts M4*12 of the motor flange first. After loosening the bolts of the bearing seat, adjust the timing belt of the bearing seat first and then tighten the 3-M4*12 bolts with an Allen wrench, torque=4.9 Nm (bolt grade default is 12.9), and apply thread glue on these bolts to prevent the bolts from loosening. After locking, adjust the tension of the synchronous belt at the motor flange until the tension reaches the estimated value.
- (3) After adjusting the timing belt at the motor flange, use an Allen wrench to tighten the 3-M4*12 bolts at the motor flange, torque = 4.9Nm (bolt grade is 12.9 by default), and apply thread glue on these bolts To prevent the bolts from loosening.
- (4) Reinstall the side cover R of the forearm.

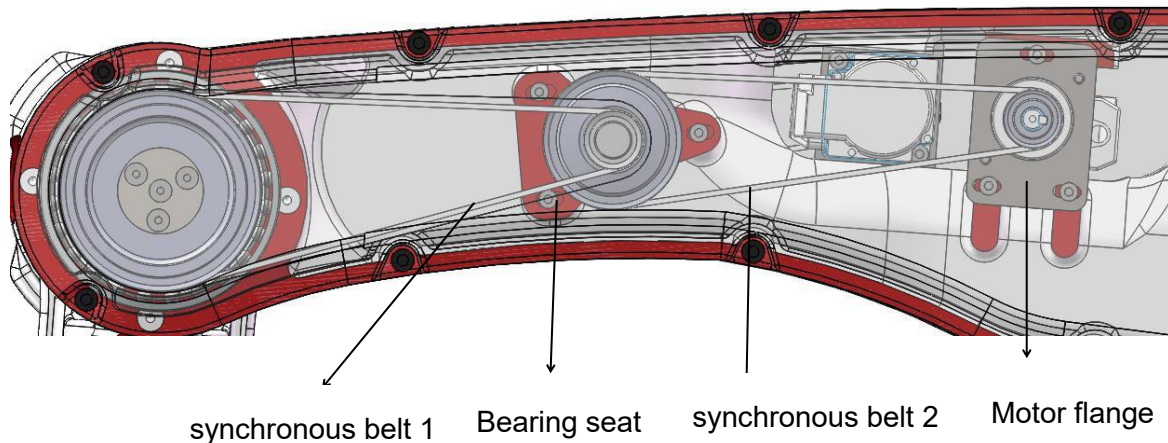


Figure 5.4.2.3 Adjusting the tension of the J6 axis synchronous belt



- Don't be caught by moving parts
- Improper adjustment of belt tension may damage the belt
- Damage to the belt may cause the arm to fall

5.4.2. Maintenance plan

1. The maintenance of the robot is divided into 3 levels. Customers are advised to choose maintenance based on the operating conditions of the purchased robot:

Class A: Grease replacement, waveform detection, iron powder concentration detection, robot body cable replacement, body and control cabinet battery replacement, etc. Through the above operations, the data is obtained, the robot physical examination report is formed, and the robot is pre-judged before the failure, reducing the blindness of spare parts storage.

Level B: Grease replacement, iron powder concentration detection, etc. This maintenance can prolong the service life of the robot and monitor the wear and tear of the reducer of the robot body.

Class C: The most basic maintenance, mainly for the purpose of replacing the grease in the robot reducer, which can extend the service life of the robot reducer.

2. The robot needs to be maintained regularly to ensure its normal function. Table 5.4.2.1 specifies the maintenance activities and time intervals:

maintenance Part		maintenance Interval					Method	maintenance Content
		Daily	Interval 1000h	Interval 6000h	Interval 12000h	Interval 24000h		
1	Zero Point	●					Visual inspection	Check the existence of zero point
2	External cable	●					Visual inspection	Check for stain or damage
3	Overall appearance	●					Visual inspection	Clean dirt and stains, check all parts for any chap.
4	Pedestal bolt		●				Wrench	Check if there's any miss or looseness
5	Cover bolt		●				Wrench	Check if there's any miss or looseness
6	Main bolt		●				Wrench	Check if there's any miss or looseness
7	Aviation Plug		●				Hand touch	Check if there's any looseness and plug In tightly
8	Synchronous belt			●			Hand touch	Check belt tension and friction
9	Battery pack*1					●		Teaching device display alarm
10	Each joint reducer			●				Check for any abnormality (abnormal sound or shake, etc.)
11	Cable			●			Visual inspection	Check if there's any abrasion or breakage
12	End clamp	●					Visual inspection, hand touch	Check if there's any miss or looseness

Table 5.4.2.1 maintenance items and cycle

5.5. Battery replacement

5.5.1. Precautions for battery use

After a period of use, the battery in the robot will run out, then the robot will alarm the user to replace the battery. Contact us for replacement of battery or any doubt.



- Do not short-circuit, charge, puncture, incinerate, crush, soak, forcibly discharge or place the product at a temperature exceeding the specified operating temperature range of the product, as these may cause fire or explosion hazards.
- Wear safety glasses when handling batteries.
- When handling leakage, please wear gloves and chemical protective clothing.
- When dealing with fire situations, please use self-contained breathing apparatus.

5.5.2. Battery replacement

To replace the battery, please notify our company's technicians in advance. It can only be replaced after obtaining written permission from our company. Otherwise, the company will not be responsible for any losses and downtime caused thereby.

5.6. Lubricating grease

5.6.1. J1-J3 joints grease replenishment

In order to give full play to the performance of the robot, according to the different brands of reducer used by different robots, please use the robot reducer grease for lubricating grease.

1. Due to the special grease (Moly White RE00) added in the reducer, it is generally not necessary to refueling, just check the joint axis for oil leakage. The grease needs to be replaced every three years.

2. The motor belt generally needs to be replaced once every 3 years

The grease used for various types of robots is shown in Table 5.6.1

Robot model	The lubricating grease name of each axis	Remark
BR-1510A	J1~J3 Lubricating grease cavity uses robot reducer grease	J4、J5、J6 Maintenance-free
BR-1810A	J1~J3 Lubricating grease cavity uses robot reducer grease	J4、J5、J6 Maintenance-free
BR-2010A	J1~J3 Lubricating grease cavity uses robot reducer grease	J4、J5、J6 Maintenance-free

Table 5.6.1 List of greases used by different types of robots

Figure 5.6.1.1 shows the positions of the grease holes for adding and draining grease on each axis of BR-1510A and the oil filling requirements;

Figure 5.6.1.2 shows the positions of grease holes for adding and draining grease on each axis of BR-1810A and BR-2010A .

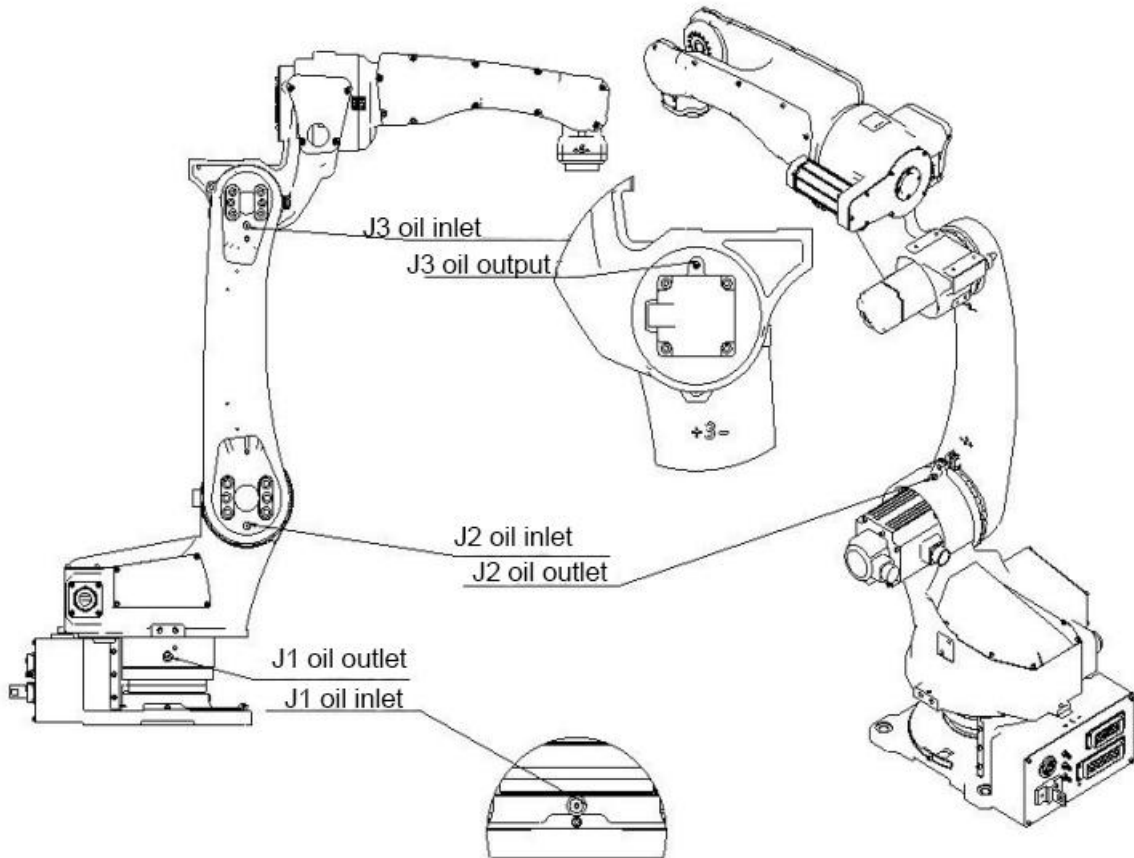


Figure 5.6.1.1. Locations of grease holes and oil filling requirements for each axis of BR-1510A

Note: When filling oil for J1 axis, remove the sheet metal parts near the oil filling holes.

No.	Project	Standard	Inspection method	Grease model
1	J1 axis reducer oil injection volume	Reference value of theoretical oil injection 381ml (343g)	Visual oil injector Meter reading	Robot reducer run Grease
2	J2 axis reducer oil injection volume	Reference value of theoretical oil injection 381ml (343g)	Visual oil injector Meter reading	Robot reducer run Grease
3	J3 axis reducer oil injection volume	Reference value of theoretical oil injection 205.4ml (184.8g)	Visual oil injector Meter reading	Robot reducer run Grease

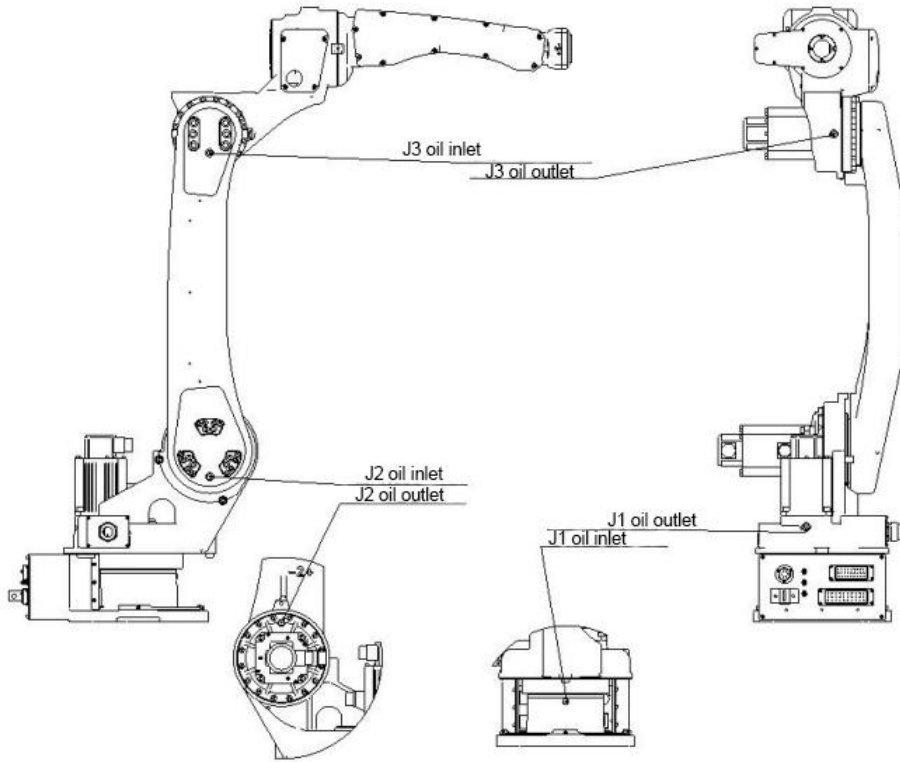


Figure 5.6.1.2. Locations of grease holes and oil filling requirements for each axis of BR-1510/BR-2010.

Note: When filling oil for J1 axis, remove the sheet metal parts near the oil filling holes.

No.	Project	Standard	Inspection method	Grease model
1	J1 axis reducer oil injection volume	Reference value of theoretical oil injection 498ml (448g)	Visual oil injector Meter reading	Robot reducer run Grease
2	J2 axis reducer oil injection volume	Reference value of theoretical oil injection 439ml (395g)	Visual oil injector Meter reading	Robot reducer run Grease
3	J3 axis reducer oil injection volume	Reference value of theoretical oil injection 381ml (343g)	Visual oil injector Meter reading	Robot reducer run Grease



1. Each axis of the robot has been filled with grease when it leaves the factory. When replacing it, use a grease gun to fill it with grease.
2. According to the aging of the grease, please replace the robot grease for a total of 20,000 hours from the date of leaving the factory. However, when the surface temperature of the reducer reaches 40° C or higher during use, please confirm the aging and contamination of the grease, and shorten the grease replacement cycle.
3. The amount of grease added should reach about 90% of the component oil cavity. Please consult our company's after-sales service personnel for specific information.

5.6.2. Replenishment of grease for J6 axis cross roller bearing

Regularly replenish the cross roller bearing with grease as shown in the table below:

Axis	Replenishment cycle
J6	Every year or every 3000 hours of operation, whichever is shorter

5.7. Zero position calibration

The robot has done the mechanical zero proofreading before it leaves the factory. In case the robot loses zero position due to fault, the robot needs to be re-calibrated to the mechanical zero. Detailed operation steps refer to manual "TCP correction".

5.8. Warranty

- 1) Robot body include electric parts are guaranteed for 1 year period
- 2) Teach pendant is guaranteed for 3 months but the screen has no warranty



JHY ROBOT

- 3) Welding machine is guaranteed for 1 year(Without Wearing parts)
- 4) Other Wearing parts are not covered by the warranty

Any damage caused by improper operation or human causes is not covered by the warranty.

Attachment:

During the warranty period, if the product is damaged by improper use of the user, our company will handle it as out-of-warranty period. In out-of-warranty condition, if the products are sent back to our company for maintenance, only the material fee and maintenance fee will be charged. If there is need of field maintenance by engineers of our company, the material fee, travel fee and maintenance fee will be charged. For specific maintenance costs, please consult our After-Sales Service Department.

Wuxi Jihoyen Industrial Automation Co.,Ltd.

Attention:

- 1. The product is protected by copyright. The software and hardware technical data of the product shall not be disclosed to third parties without authorization of our company.
- 2. The software and hardware of this product shall not be disassembled or modified without authorization of our company.
- 3. The purchased model is based on this manual, and subsequent manual version updates will not be notified separately.