SP Series Robot Instruction Manual

Product Series: Full range of SP series
Publication Status: Standard
Revision: A-0001

Foreword

Before using the robot, read carefully the instruction manual of the STEP Robot and use the robot on the base of understanding this manual.

Abstract

This manual provides complete and comprehensive description about the installation, use, parameter setting and maintenance of SP series robot. This manual can be used as the reference document by system integrators when they use our company's SP series robot for the system design of user workstation or as the guidance for system installation, commissioning and maintenance.

In order to ensure proper installation and use of SP series robot, you shall read this manual carefully before using the robot.

Target Readers

System integrator

Onsite technical support staff

Equipment maintenance personnel

After sales service personnel

Contents

This manual is subject to supplementation and change. Check our website for any updates. Our website: www.steprobots.com.

Main Features

a) Large working space;

b) Stable performance

c) Fast operation speed;

d) Excellent general performance;

e) Modular mechanical structure design.

Description of safety-related marks

The manual includes relevant safety notes for ensuring personal safety and preventing system damage. They are labeled with "Danger", "Caution" or "Important" based on their importance. Before using the robot, the user shall be familiar with the safety notes and strictly follow them.

Danger

It may cause hazardous conditions or personal death if it is used improperly.

Caution

It may cause danger, minor or serious personal injury and equipment damage if it is used improperly.

Important

The part that the user needs to observe and pay attention.

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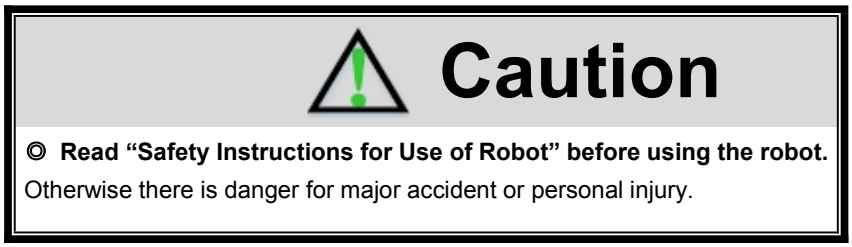
Chapter I Notice for Use

1.1 Scope of Application

The robot is mainly used in material handling, stacking, packaging and other applications where manual operation is replaced totally or partially.

1.2 Unpacking Inspection



During unpacking, check if there is any damage from shipping and the model and specifications on the nameplate are consistent with the order requirements. If any model discrepancy or parts missing is found, contact the manufacturer or supplier immediately.

Chapter II Technical Data

2.1 Robot structure diagram

The SP200/SP275 robot structure is shown in fig.2-1.

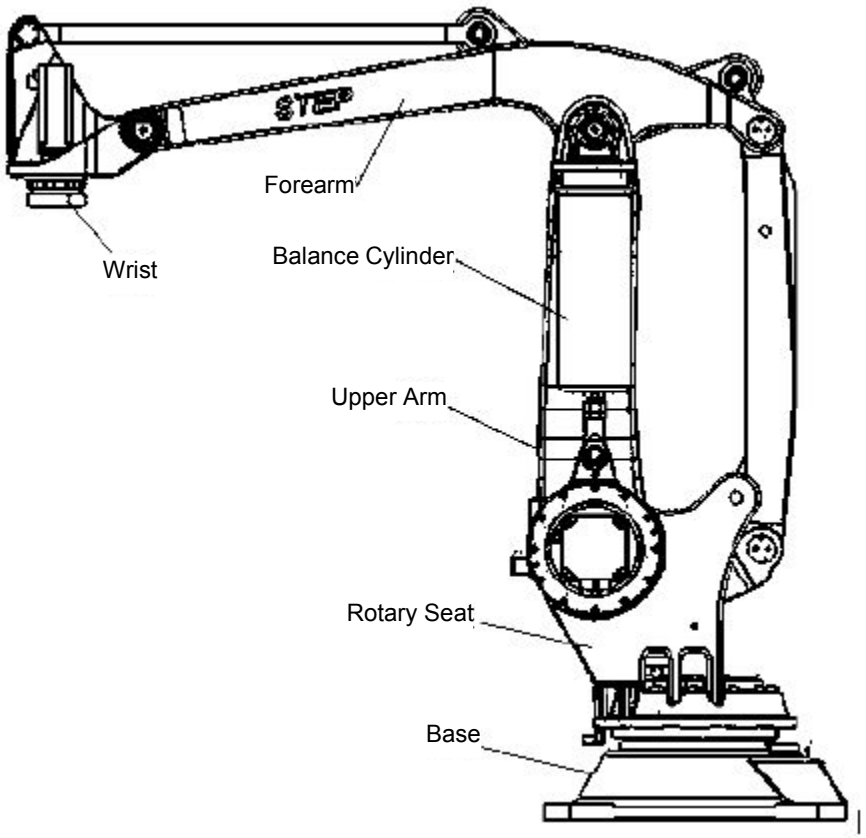


Figure 2-1 SP200/SP275 Robot Structure

2.2 Mechanical data

SP200 robot's mechanical data is listed in table 2-1.

Table 2-1 SP200 Robot's Mechanical Data

Model	SP200
Max. payload weight (wrist joint) (kg)	200
Max. turning radius (mm)	3039
Total weight (kg)	1815

SP275 robot's mechanical data is listed in table 2-2.

Table 2-2 SP275 Robot's Mechanical Data

Model	SP275
Max. payload weight (wrist joint) (kg)	275
Max. turning radius (mm)	3039
Total weight (kg)	1850

2.3 Load data

SP200 robot's load data is listed in table 2-3.

Table 2-3 SP200 Robot's Load Data

Robot model	Wrist joint load (kg)
SP200	200

SP275 robot's load data is listed in table 2-4.

Table 2-4 SP275 Robot's Load Data

Robot model	Wrist joint load (kg)
SP275	275

The relationship between SP200/SP275 wrist load mass and center of gravity is shown in fig.2-2. L=200mm，Z=300mm。

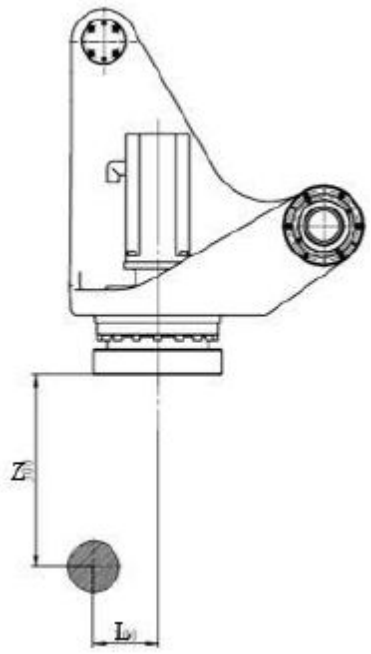


Figure 2-2 Relationship between SP200/SP275's Wrist Load Mass and Center of Gravity

2.4 Motion data

The motion data of each joint of SP200 robot (wrist load 200kg) is shown in table 2-5.

Table 2-5 Motion Data of Each Joint of SP200 Robot

Joint	Rotation range (controlled by program)	Joint speed

J1	±180°	120°/S
J2	+75°～-40°	120°/S
J3	+115°～-20°	120°/S
J4	±360°	300°/S

The motion data of each joint of SP275 robot (wrist load 275kg) is shown in table 2-6.

Table 2-6 Motion Data of Each Joint of SP275 Robot

Joint	Rotation range (controlled by program)	Joint speed
J1	±180°	80°/S
J2	+75°～-40°	80°/S
J3	+115°～-20°	80°/S
J4	±360°	200°/S

The motion of each joint of SP200/SP275 robot is shown in fig.2-3.

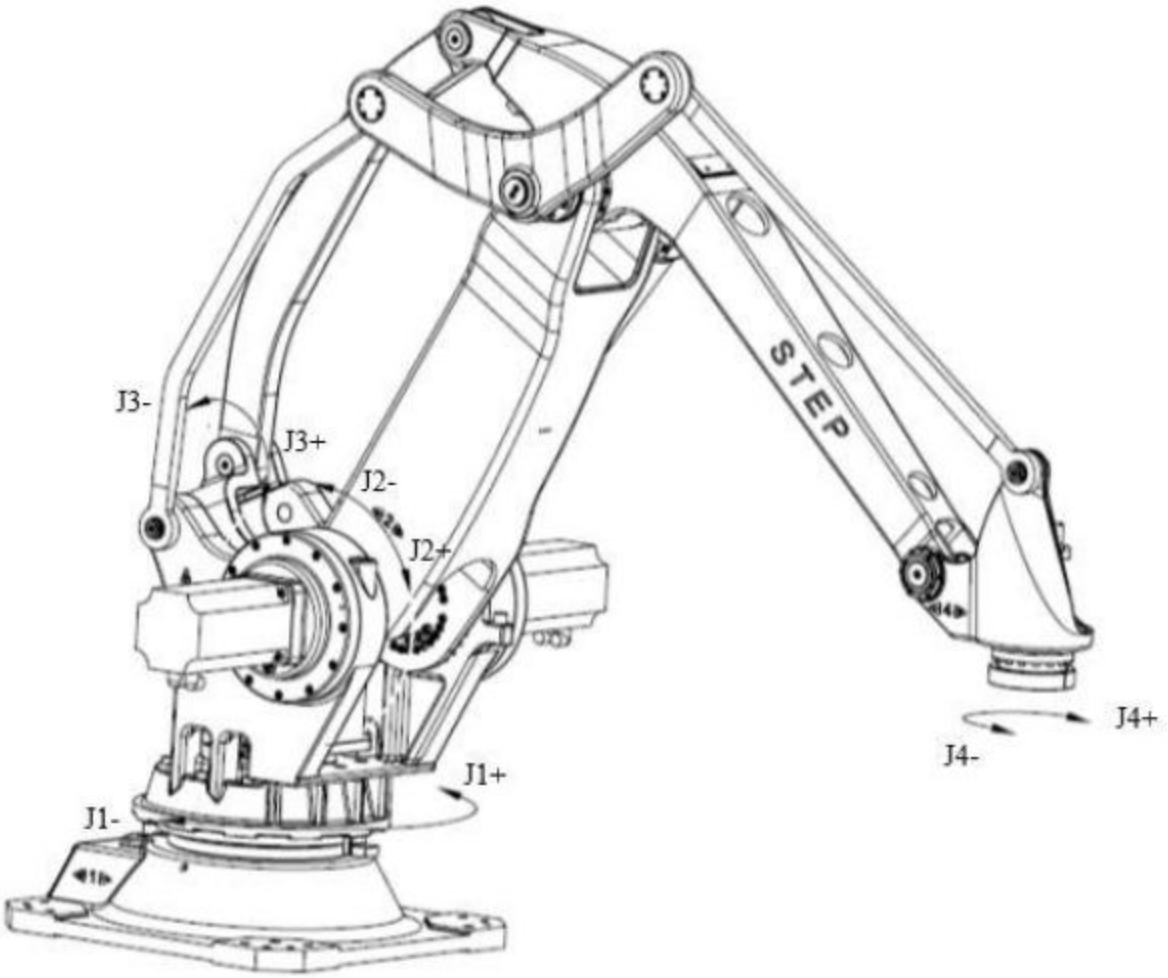


Figure 2-7 Motion of Each Joint of SA1400 Robot

2.5 Working space

The working space refers to the zero point and working range of mechanical system, which is slightly different with that defined in the mechanical system's instruction manual. The working space defined in mechanical system's instruction manual must be followed when using the robot, or else errors will occur.

The working space of SP200 robot is shown in fig.2-4. The mechanical CAD drawing can be downloaded from STEP's website: www.steprobots.com .

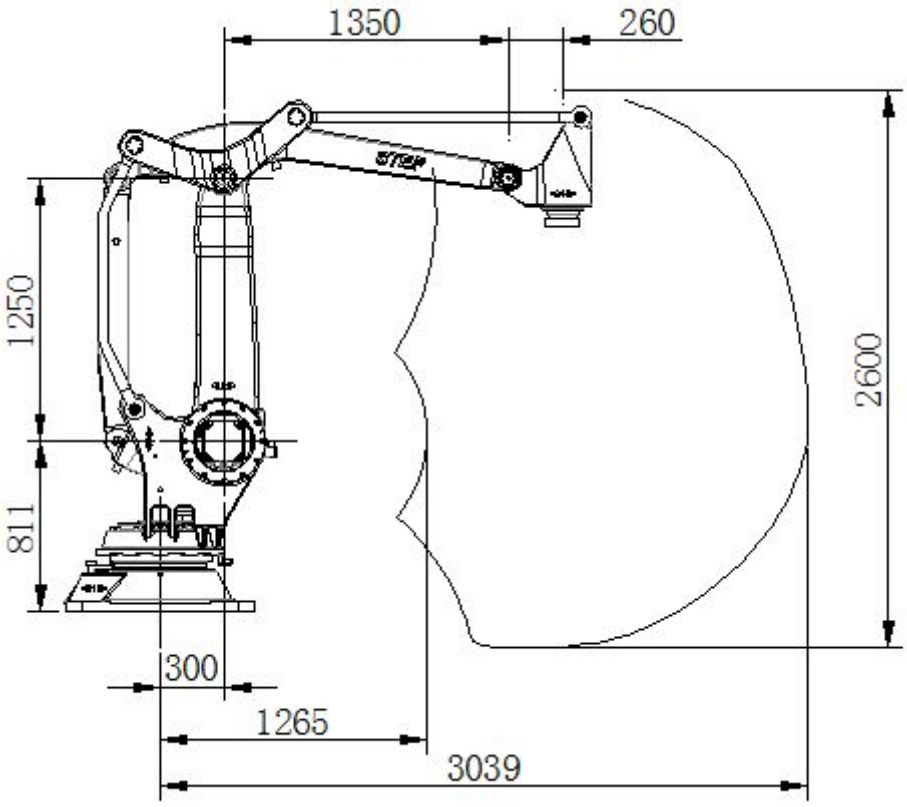


Figure 2-4 SP200 Robot's Working Space

The working space of SP275 robot is shown in fig.2-5. The mechanical CAD drawing can be downloaded from STEP's website:

www.steprobots.com

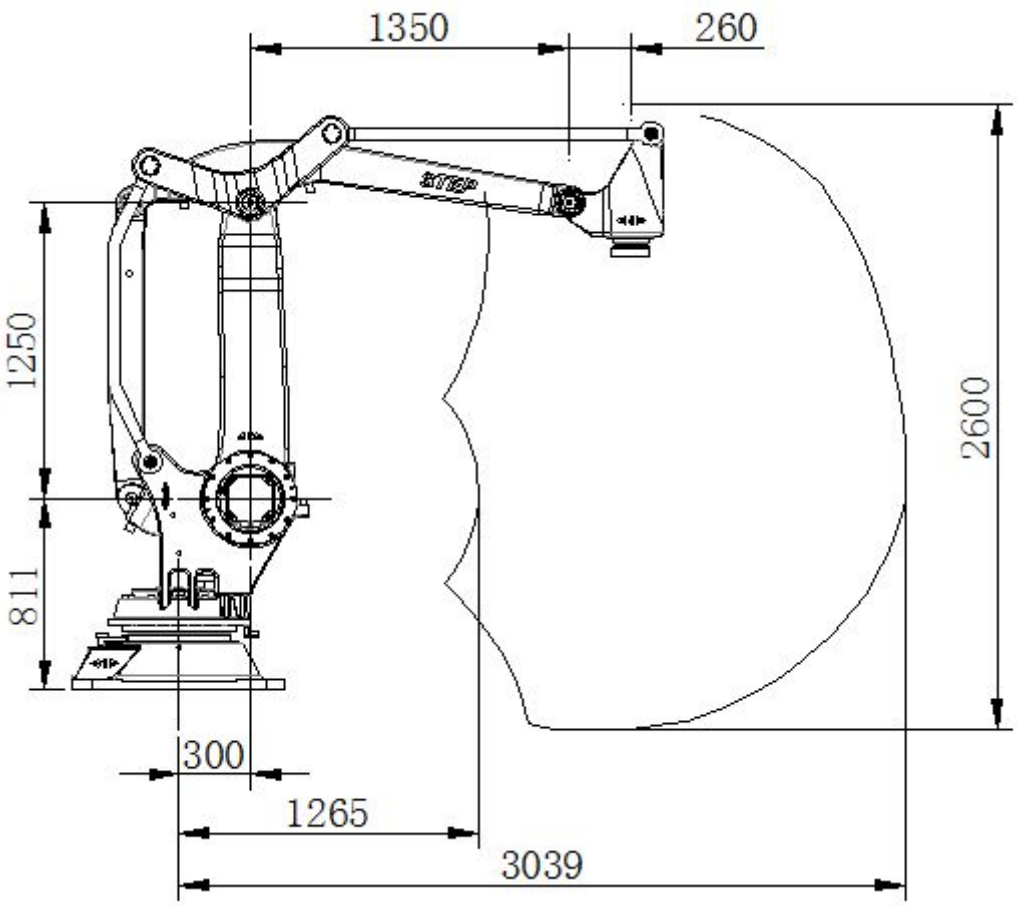


Figure 2-5 SP275 Robot's Working Space

Chapter III Handling and Installation

3.1 Handling

The robot shall be moved using a fork lift. When using a fork lift to move the robot, the base of the robot shall be installed with two fork pocket tooling, which are the accessories of the robot. In each transportation, make sure that the fork pocket tooling is securely installed and the robot is adjusted to transportation posture.

The transportation posture of SP200 robot is shown in fig.3-1.

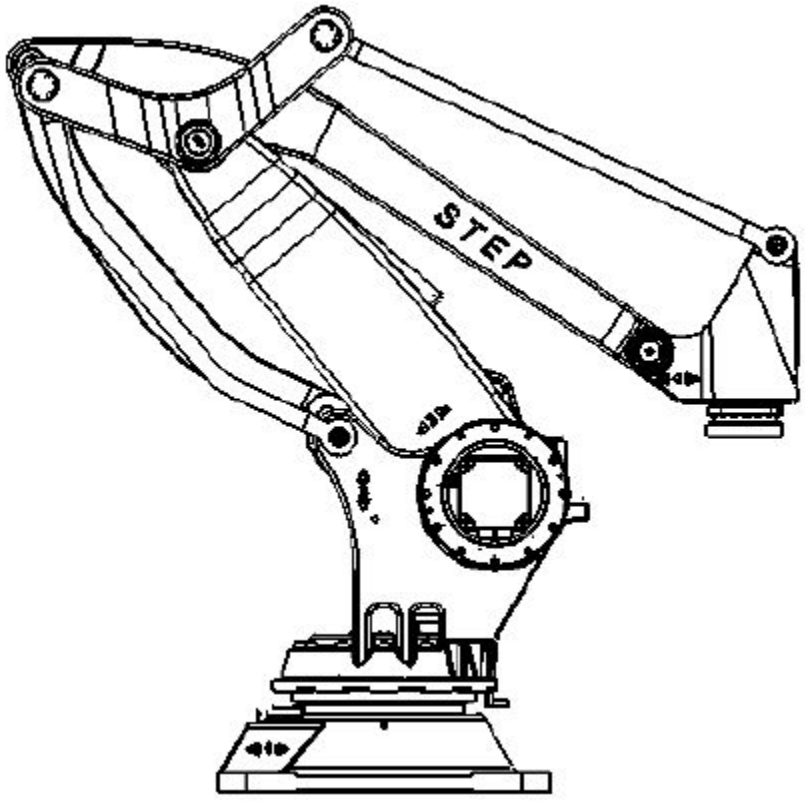


Figure 3-1 SP200 Robot Transportation Posture

The joint angle in SP200 robot transportation posture is listed in table 3-1.

Table 3-1 Joint Angle in SP200 Robot Transportation Posture

Joint	J1	J2	J3	J4
Angle	0	-40	+25	0

The joint angle in SP275 robot transportation posture is listed in table 3-2.

Table 3-2 Joint Angle in SP275 Robot Transportation Posture

Joint	J1	J2	J3	J4
Angle	0	-40	+25	0

3.2 Installation

There are 3 installation methods for the robot, such as ground installation, ceiling installation and wall installation.

1. The base mounting hole dimensions of SP200/SP275 robot are shown in fig.3-2.

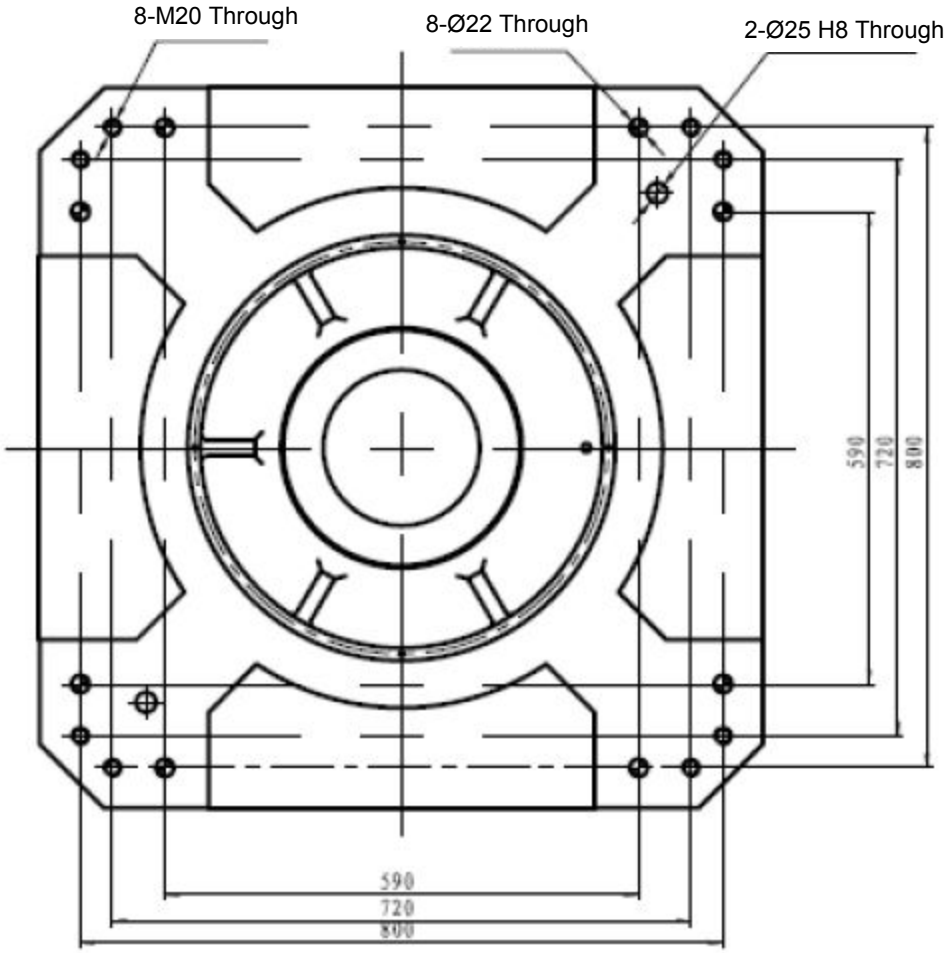


Figure 3-2 Base Mounting Hole Dimensions of SP200/ SP275

2. SP200/SP275 tool flange installation dimensions are shown in fig.3-3.

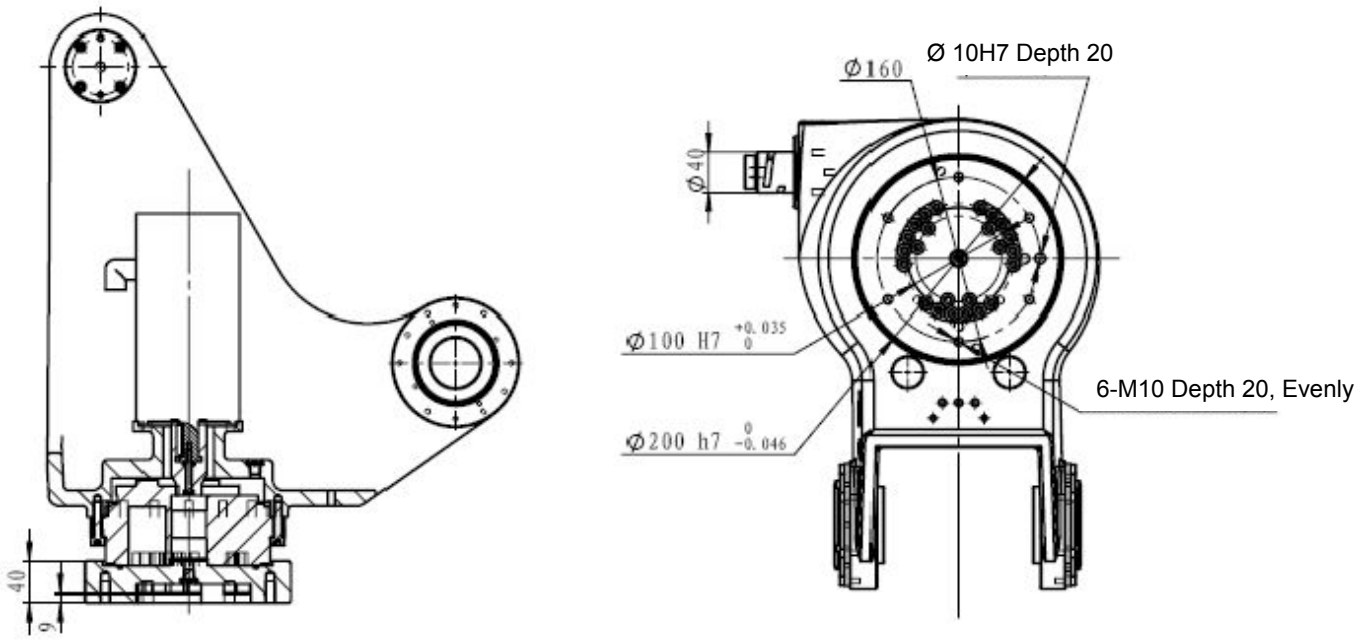


Figure 3-3 SP200/SP275 tool flange installation dimensions

Chapter IV Maintenance

4.1 Lubrication

In order to maximize the robot's performance, VIGOGREASE RE0 grease is used in oil pocket based on the brand of the reduction box of SP series robot. The use of or mixed use with other grease shall be avoided. The grease used for each robot is listed in the following table.

Robot model	Grease	Remarks
SP200	VIGOGREASE RE0 grease is used in J1～J4 oil pocket	
SP275	VIGOGREASE RE0 grease is used in J1～J4 oil pocket	

4.1.1 Filling and drainage hole in each joint

The filling and drainage hole of each axis of SP200 and SP275 is shown in fig.4-1.

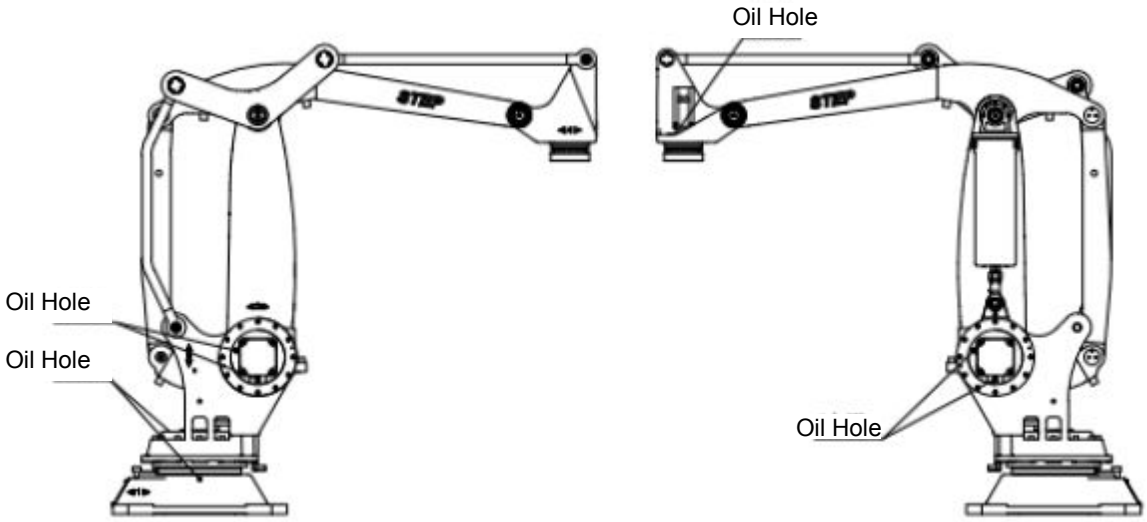


Figure 4-1 Filing and Drainage Hole in Each Axis of SP200 and SP275

The SP robots with balance cylinder is provided with lubrication point. It requires lubrication every half year. The filling is deemed sufficient when the black matters are squeezed out completely. See the part indicated in fig.4-2 as an example.

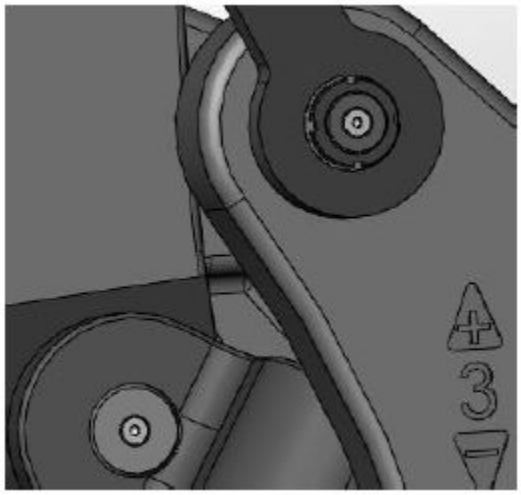


Figure 4-2 Oil Hole Location at Pin

The filling and drainage holes in each axis are determined based on the installation method. In the grease replacement at each axis, the higher oil hole is chosen as grease drainage hole and the lower hole as filling hole.

4.1.2 Lubricant replacement

1. Each axis is filled with grease before delivery. The grease gun is used for replacement.

2. According to the aging condition of the grease, the grease shall be replaced after 20,000 hours since delivery. However, when the surface temperature of the reduction box reaches above 40℃, you shall check the aging and contamination condition of the grease and shorten the replacement cycle.

3. The grease filled shall reach around 90% of the oil pocket. Consult STEP's after sales service staff for specifics.