1. Safety instructions

1.1 Introduction

Robotic arm users should fully understand the risks, must read this manual carefully before use, and strictly comply with the specifications and requirements in the manual. Unitree Technology is committed to providing excellent products, but due to the high risk of robotic arms, even if all operations are used in accordance with the instructions in the manual, there is no guarantee that it will not cause damage to persons and property, Unitree Technology is not responsible for this.

1.2 Cautions

1. Be sure to follow the requirements in this manual to install the robot arm and connect the cables

2. Ensure that the robot arm does not collide with people or other objects within its range of activity to avoid accidents

3. Before use, need professional personnel to debug

4. When using the SDK, make sure the input parameters and operation process are correct

5. The robot arm will generate heat during operation, please do not touch the robot arm when it is running or just stopped.

6. Please pay attention to the operation speed of the robot arm, and be careful when it is too fast.

7. Please be sure to disconnect the power after the arm is used.

8. Avoid using the arm in wet or dusty environment.

9. Please make sure to store and install the arm in a place where children cannot touch it to avoid danger.
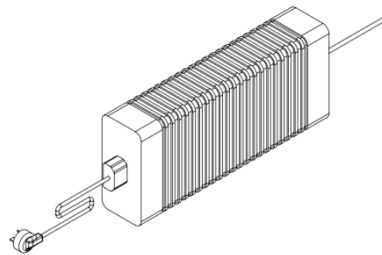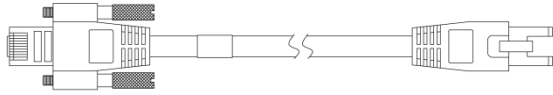
2. Hardware Installation

2.1 Hardware Components

- Gripper（选配）
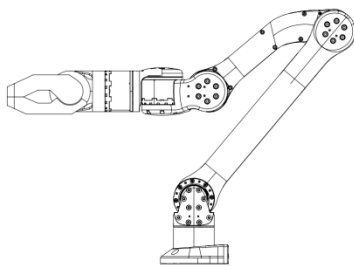
ARM   Power adapter

ETH

2.2 Technical Specifications

2.2.1Product parameters

Product	Z1	
Dof	6	
height	4.5kg	
Max-load (air)	2kg	
Max-load (pro)	3-5kg	
Max-arm span	730mm	
Power supply	Voltage 24V Current >20A	
Repeat positioning accuracy	~0.1mm	
Range of motion of joints	J1	$\pm150°$
	J2	$0—180°$
	J3	$-165°—0$
	J4	$\pm80°$
	J5	$\pm85°$
	J6	$\pm160°$
Max-speed of joints	180°/s	
Maxi-torque of joints	33N·m	
Peak power	500w	
Base interface	Ethernet	
Material	Aluminum alloy	
system	Ubuntu	

2.2.2 Size
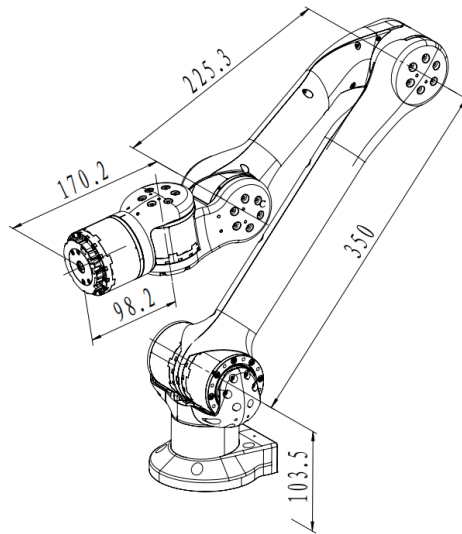
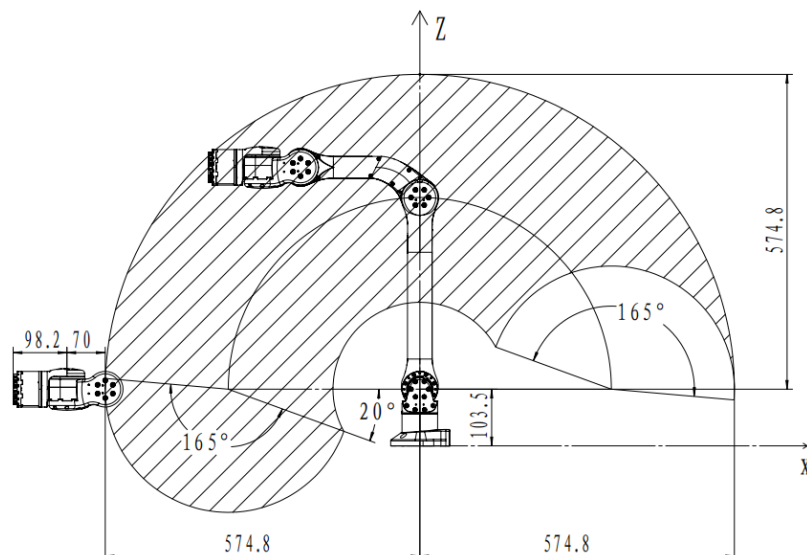
2.3　　　installation

2.3.1　　environment

Do not use the arm in wet and dusty environments

Be sure to check the tightness of the bolts for installation

2.3.2　　Installation of Z1 robot arm

2.3.2.1　Be sure to consider the range of motion of the robot arm

　　When installing the robotic arm, consider the range of motion of the arm to avoid unnecessary damage. The range of motion of the robot arm is shown in the figure


2.3.2.2　Installation of robotic arm

When fixing the robot arm, users can design their own mounting table according to the size of the robot arm base hole and the real environment. The fixed table of the robot arm needs to bear not only the weight of the robot arm itself, but also the instantaneous dynamic force during

the maximum acceleration movement. Four M6 bolts are used for the arm, and the arm is mounted with an Allen wrench. Attention is required.

Ensure that no collision occurs during the movement of the robotic arm.

Ensure that there is no human activity within the arm's range of action to prevent unnecessary danger.

The installation diagram of the base is as follows
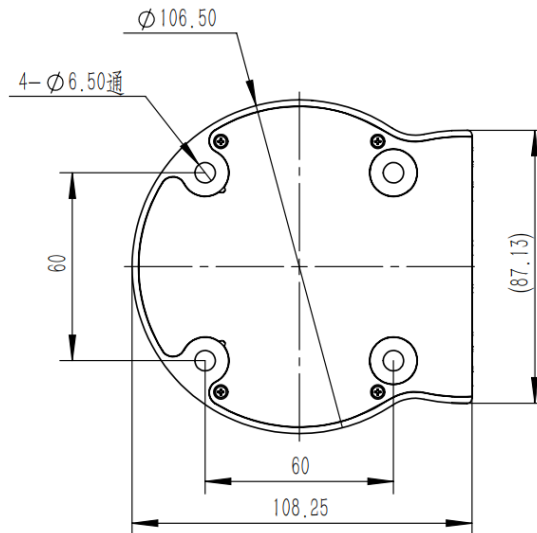
2.3.2.3 Cable Connection

Insert the robot arm power supply cable into the robot arm power supply interface, the connector has the anti-dull function, insert one end of the network cable into the corresponding network port of the robot arm and lock it, and connect the other end to the computer.
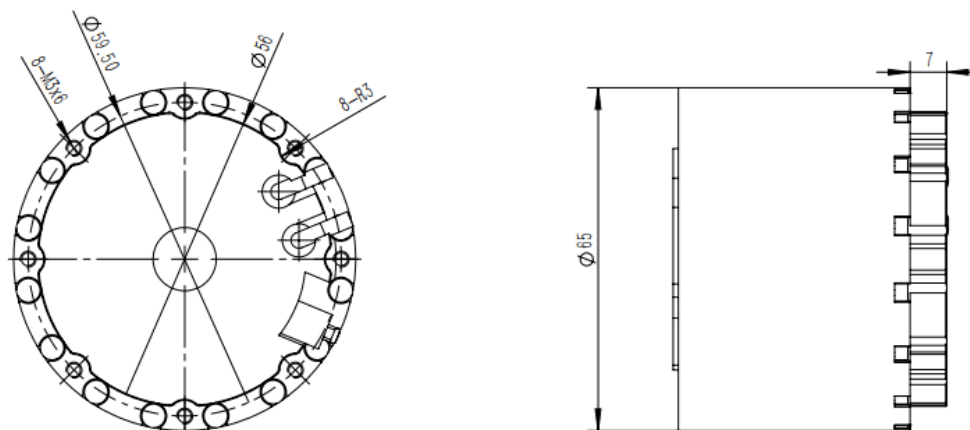
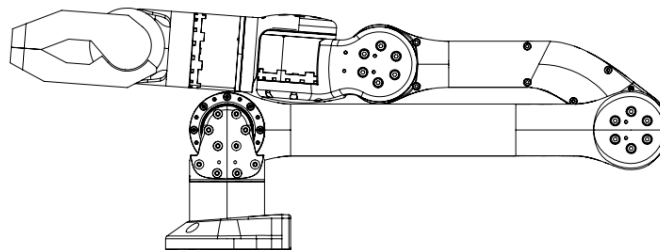The cable layout diagram is as follows：
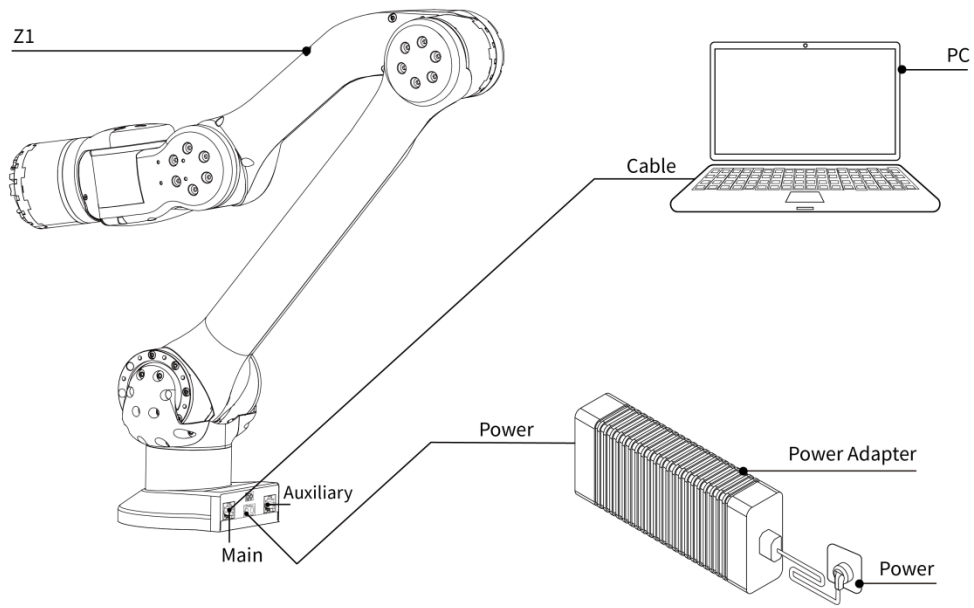
2.4 Description of each joint
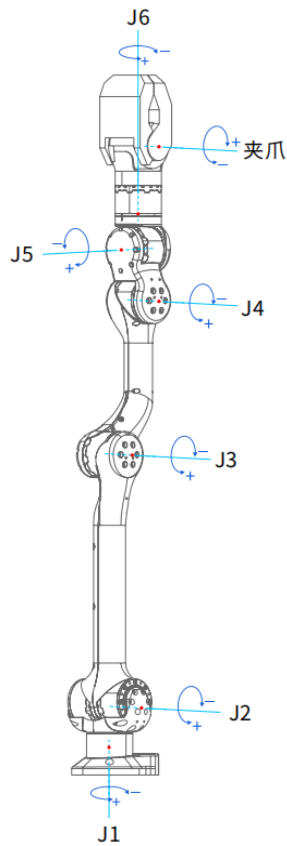
2.5 End flange size

3.Prepare for use

3.1Robotic arm zero position

The zero position posture of the robot arm is as follows, the lines on both sides of the J1 and J6 joint gaps correspond exactly, and other joints can be placed in place

It should be noted that each joint of the robot arm is turned to zero position before each use, which is to make the theoretical zero position in the control algorithm coincide with the actual mechanical zero position. In addition, the black and white power cable of the motor at the end of the robot arm has DC24V electricity, if not, please make sure to fix the black and white power cable by wrapping it with insulating tape to prevent the danger of short circuit, etc.

3.2 SDK

The main control board of the base has main and auxiliary network ports, the main network port control frequency is 300Hz, the auxiliary network port control frequency is 100Hz, and the default IP is 192.168.123.110.

SDK please refer to "Unitree Z1 Robotic Arm SDK Instructions".