

# PRODUCT MANUAL

产品手册





▼  
**R3MT**



▼  
**R3**



▼  
**R5**



▼  
**R10**



▼  
**R16**



▼  
**R20**



▼  
**R30**



根据不同的负载能力和参数范围,法奥协作机器人产品 R 系列拥有六个型号:

R3、R5、R10、R16、R20和 R30。

协作机器人 R 系列产品生产通过了ISO 9001质量管理体系认证

产品认证:CR, CE, KCs, NRTL, RoHS 2.0, NSF, SEMI, IP65

ISO功能安全认证:ISO 10218, ISO 13849, ISO 15066

智能人机系统解决方案

Intelligent human-robot cooperation system solutions

According to different payload and parameter, FAIRINO collaborative robots R series are divided into six models: R3, R5, R10, R16, R20 and R30.

Quality Management System: ISO 9001

Product Certification: CR, CE, KCs, NRTL, RoHS 2.0, NSF, SEMI, IP65

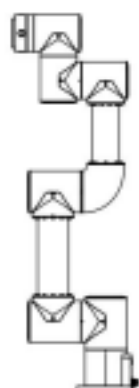
ISO Functional Safety Certification: ISO 10218, ISO 13849, ISO 15066

R3MT

有效负载  
Payload  
3kg(瞬时5kg)

工作半径  
Reach  
622mm

重复定位精度  
Repeatability  
±0.05mm

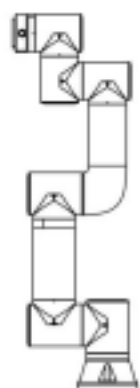


R3

有效负载  
Payload  
3kg

工作半径  
Reach  
622mm

重复定位精度  
Repeatability  
±0.02mm

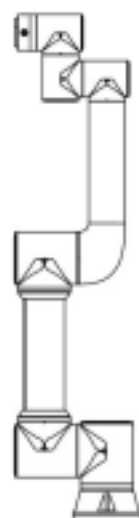


R5

有效负载  
Payload  
5kg

工作半径  
Reach  
922mm

重复定位精度  
Repeatability  
±0.02mm

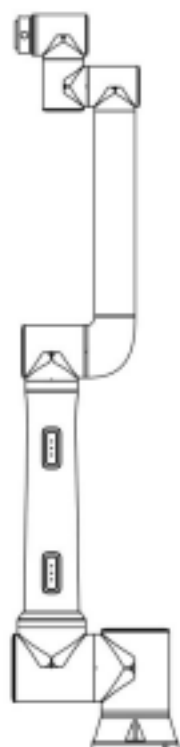


R10

有效负载  
Payload  
10kg

工作半径  
Reach  
1400mm

重复定位精度  
Repeatability  
±0.05mm

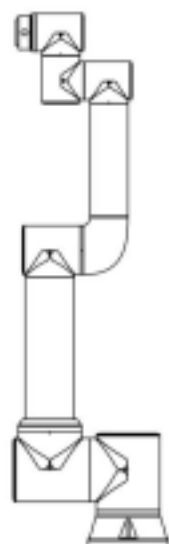


R16

有效负载  
Payload  
16kg

工作半径  
Reach  
1034mm

重复定位精度  
Repeatability  
±0.03mm

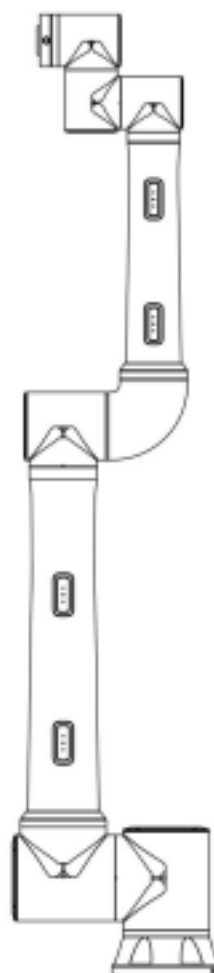


R20

有效负载  
Payload  
20kg

工作半径  
Reach  
1854mm

重复定位精度  
Repeatability  
±0.1mm

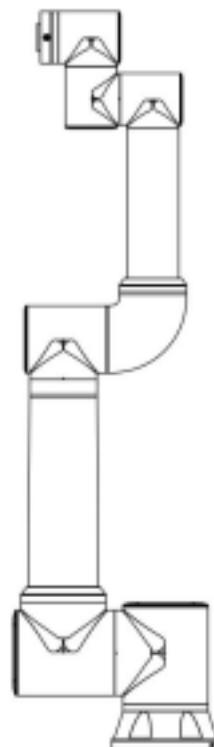


R30

有效负载  
Payload  
30kg

工作半径  
Reach  
1403mm

重复定位精度  
Repeatability  
±0.1mm



# ROBOT ARM TECHNICAL SPECIFICATION

## 机械臂规格参数

	R3MT	R3	R5	R10	R16	R20	R30							
有效负载(Payload)	3kg(瞬时5kg) (Instantaneous 5kg)	3kg	5kg	10kg	16kg	20kg	30kg							
工作半径(Reach)	622mm	622mm	922mm	1400mm	1034mm	1854mm	1403mm							
自由度(Degrees of freedom)	6个旋转关节 6 rotating joints	6个旋转关节 6 rotating joints	6个旋转关节 6 rotating joints	6个旋转关节 6 rotating joints	6个旋转关节 6 rotating joints	6个旋转关节 6 rotating joints	6个旋转关节 6 rotating joints							
人机交互(HMI)	10.1 英寸示教器或移动终端 Web App 10.1 inch teach pendant or mobile terminal Web App				10.1 英寸示教器或移动终端 Web App 10.1 inch teach pendant or mobile terminal Web App									
符合ISO 9283的位姿可重复性 (Pose repeatability per ISO 9283)	±0.05mm	±0.02mm	±0.03mm	±0.05mm	±0.03mm	±0.1mm	±0.1mm							
轴移动(Axis movement)	工作范围(Working range)	最大速度(Maximum speed)	工作范围(Working range)	最大速度(Maximum speed)	工作范围(Working range)	最大速度(Maximum speed)	工作范围(Working range)	最大速度(Maximum speed)	工作范围(Working range)	最大速度(Maximum speed)	工作范围(Working range)	最大速度(Maximum speed)	工作范围(Working range)	最大速度(Maximum speed)
底座(Base)	±175°	±150°/s	±175°	±180°/s	±175°	±180°/s	±175°	±120°/s	±175°	±120°/s	±175°	±120°/s	±175°	±120°/s
肩部(Shoulder)	+ 85°/ - 265°	±150°/s	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±120°/s	+ 85°/ - 265°	±120°/s	+ 85°/ - 265°	±120°/s	+ 85°/ - 265°	±120°/s
肘部(Elbow)	±150°	±150°/s	±150°	±180°/s	±160°	±180°/s	±160°	±180°/s	±160°	±180°/s	±160°	±120°/s	±160°	±120°/s
腕部 1(Wrist 1)	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±180°/s	+ 85°/ - 265°	±180°/s
腕部 2(Wrist 2)	350°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s
腕部 3(Wrist 3)	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s	±175°	±180°/s
典型 TCP 速度(Typical TCP speed)	1m/s		1m/s		1m/s		1.5m/s		1m/s		2m/s		2m/s	
防护等级(IP classification)	IP54 (可选 IP65)	(IP65 Optional)	IP54 (可选 IP65)	(IP65 Optional)	IP54 (可选 IP65)	(IP65 Optional)	IP54 (可选 IP65)	(IP65 Optional)	IP54 (可选 IP65)	(IP65 Optional)	IP54 (可选 IP65)	(IP65 Optional)	IP54 (可选 IP65)	(IP65 Optional)
噪音(Noise)	<65dB		<65dB		<65dB		<65dB		<65dB		<70dB		<70dB	
安装方向(Robot mounting)	任何方向 Any orientation		任何方向 Any orientation		任何方向 Any orientation		任何方向 Any orientation		任何方向 Any orientation		任何方向 Any orientation		任何方向 Any orientation	
I/O端口(I/O Ports)	数字输入(DI) 2 数字输出(DO) 2		数字输入(DI) 2 数字输出(DO) 2		数字输入(DI) 2 数字输出(DO) 2		数字输入(DI) 2 数字输出(DO) 2		数字输入(DI) 2 数字输出(DO) 2		数字输入(DI) 2 数字输出(DO) 2		数字输入(DI) 2 数字输出(DO) 2	
	模拟输入(AI) 1 模拟输出(AO) 1		模拟输入(AI) 1 模拟输出(AO) 1		模拟输入(AI) 1 模拟输出(AO) 1		模拟输入(AI) 1 模拟输出(AO) 1		模拟输入(AI) 1 模拟输出(AO) 1		模拟输入(AI) 1 模拟输出(AO) 1		模拟输入(AI) 1 模拟输出(AO) 1	
工具I/O电源(Tool I/O power supply)	24V/1.5A		24V/1.5A		24V/1.5A		24V/1.5A		24V/1.5A		24V/1.5A		24V/1.5A	
底座直径(Footprint)	125mm		128mm		149mm		190mm		190mm		240mm		240mm	
整机重量(Weight)	≈10kg		≈15kg		≈22kg		≈40kg		≈40kg		≈85kg		≈85kg	
工作温度(Operating temperature)	0-45°C		0-45°C		0-45°C		0-45°C		0-45°C		0-45°C		0-45°C	
工作湿度(Operating humidity)	90%RH(non-condensing)		90%RH(non-condensing)		90%RH(non-condensing)		90%RH(non-condensing)		90%RH(non-condensing)		90%RH(non-condensing)		90%RH(non-condensing)	
设备材料(Materials)	铝、钢 Aluminium, Steel		铝、钢 Aluminium, Steel		铝、钢 Aluminium, Steel		铝、钢 Aluminium, Steel		铝、钢 Aluminium, Steel		铝、钢 Aluminium, Steel		铝、钢 Aluminium, Steel	

■ 典型功率测试负载设置, 根据机器人型号设置不同的负载, 负载配置参数如下:

Typical power test payload settings, different loads are set according to robot models, payload configuration parameters are as follows :

FR3MT负载设置:3kg, Z轴:18

FR3MT payload setting: 3kg, Z-axis: 18

FR3负载设置:3kg, Z轴:18

FR3 payload setting: 3kg, Z-axis: 18

FR5负载设置:5kg, Z轴:30

FR5 payload setting: 5kg, Z-axis: 30

FR10负载设置:10kg, Z轴:60

FR10 payload setting: 10kg, Z-axis: 60

FR16负载设置:16kg, Z轴:96

FR16 payload setting: 16kg, Z-axis: 96

FR20负载设置:20kg, Z轴:120

FR20 payload setting: 20kg, Z-axis: 120

FR30负载设置:30kg, Z轴:200

FR30 payload setting: 30kg, Z-axis: 200

选用老化测试程序, 机器人总电源接入功率计, 机器人设置自动模式, 全局速度设置为100, 点击运行, 运行两个周期无异常则开始持续测试, 持续24小时。24小时后分别统计功率计的峰值和平均功率, 依次对各个型号进行统计:

Select aging test program, connect robot's total power to power meter, set robot to automatic mode, set global speed to 100, click run, if there are no abnormalities after running two cycles, start continuous testing for 24 hours. After 24 hours, respectively, record the peak and average power of the power meter, and then statistically analyze each model :

典型平均功率(Typical average power)

198W

224W

261W

294W

315W

624W

594W

典型峰值功率(Typical peak power)

231W

276W

314W

503W

410W

806W

909W

# CONTROLLER TECHNICAL SPECIFICATION

## 控制箱规格参数



直流mini控制箱

mini控制箱2kw

控制箱4kw

控制箱6kw

### 设备特性 Features

防护等级(IP classification)	IP54	IP54	IP54	IP54
工作温度(Operating temperature)	0-45°C	0-45°C	0-45°C	0-45°C
工作湿度(Operating humidity)	90%RH(non-condensing)	90%RH(non-condensing)	90%RH(non-condensing)	90%RH(non-condensing)
I/O端口(I/O Ports)	数字输入(DI) 16 数字输出(DO) 16 模拟输入(AI) 2 模拟输出(AO) 2 高速脉冲输入(High speed pulse input) 2	数字输入(DI) 16 数字输出(DO) 16 模拟输入(AI) 2 模拟输出(AO) 2 高速脉冲输入(High speed pulse input) 2	数字输入(DI) 16 数字输出(DO) 16 模拟输入(AI) 2 模拟输出(AO) 2 高速脉冲输入(High speed pulse input) 2	数字输入(DI) 16 数字输出(DO) 16 模拟输入(AI) 2 模拟输出(AO) 2 高速脉冲输入(High speed pulse input) 2
I/O电源(I/O power supply)	24V/1.5A	24V/1.5A	24V/1.5A	24V/1.5A
标配通讯(Standard communication)	I/O、TCP/IP、Modbus_TCP/RTU	I/O、TCP/IP、Modbus_TCP/RTU	I/O、TCP/IP、Modbus_TCP/RTU	I/O、TCP/IP、Modbus_TCP/RTU
可选通讯(Optional communication)	CC-Link、Profinet、Ethernet/IP、EtherCAT	CC-Link、Profinet、Ethernet/IP、EtherCAT	CC-Link、Profinet、Ethernet/IP、EtherCAT	CC-Link、Profinet、Ethernet/IP、EtherCAT
软件开发包(Software development kit)	C#/C++/Python/ROS/ROS2	C#/C++/Python/ROS/ROS2	C#/C++/Python/ROS/ROS2	C#/C++/Python/ROS/ROS2
尺寸参数(L*W*H)	245*180*44.5mm (不含凸出物)	245*180*44.5mm (不含凸出物)	245*180*89mm (不含凸出物)	320*183*100mm (不含凸出物)
设备重量(Weight)	2.1kg (不含线重量)	2.5kg (不含线重量)	3.6kg (不含线重量)	6.5kg (不含线重量)
设备材料(Materials)	镀锌板 Galvanized plate	镀锌板 Galvanized plate	镀锌板 Galvanized plate	镀锌板 Galvanized plate
供电电源(Power supply)	30-60VDC	176-264VAC ~ 50-60Hz 100-240VAC ~ 50-60Hz	100-240VAC ~ 50-60Hz	176-264VAC ~ 50-60Hz

### 物理性能 Physical

## 示教器

[ Optional ]



操作尽在掌心  
All operations are gathered in the hand

示教器、电脑、平板或手机与WebAPP系统连接, 从而实现对协作机器人的操控。

The teach pendant, computer, tablet or mobile phone is connected to the WebAPP system to realize the operation of the collaborative robot.

- 用户界面更直观
- The user interface is more intuitive
- 工艺包种类更齐全
- Wide range of technological packages
- 云端部署更便捷
- Cloud deployment provides greater convenience

设备特性 Features	防护等级(IP classification)	IP54
	工作湿度(Operating humidity)	90%RH(non-condensing)
	显示分辨率(Display resolution)	1280 x 800 pixels
物理性能 Physical	尺寸参数(L*W*H)	268*210*88mm
	设备重量(Weight)	1.6kg
	设备材料(Materials)	ABS、PP
	线缆长度(Cable length)	5m

## SAFTY BOX 按钮盒



人机交互工具, 可实现基础交互功能。通过RJ45接口可与电脑、平板等设备链接, 直接登录到web示教界面。

Human-cobot interaction tools for basic interaction functions. It can be linked with computers, tablets and other devices through the RJ45 interface, and directly log in to the Web App teaching interface.

- 简单易用
- 操作方便
- 灵活部署
- Simple to use
- Easy to operate
- Flexible to deploy

设备特性 Features	防护等级(IP classification)	IP54
	按钮功能(Button function)	手动/自动、拖动、点记录、是否配合按钮盒、开始/停止、关机 Manual/Auto, Drag, Point Record, Match or Not with Safety Button Box, Start/Stop, Shutdown
	协议类型(Communication)	TCP/IP
	网络传输速率(Network transfer rate)	100M
	供电(Power over ethernet)	标准POE Standard POE
物理性能 Physical	尺寸参数(L*W*H)	136*60*66mm (不含凸出物) (No protrusions)
	设备重量(Weight)	490g (带线重量) (Cable weight included)
	设备材料(Materials)	ABS
	线缆长度(Cable length)	5m
	按键次数(Number of keys)	≥20W 次

# INDUSTRY APPLICATIONS



## 上下料解决方案

上下料机器人能够提高生产效率、质量和安全性，降低劳动强度，并提供灵活适应性，为企业带来更高的效益和竞争优势。

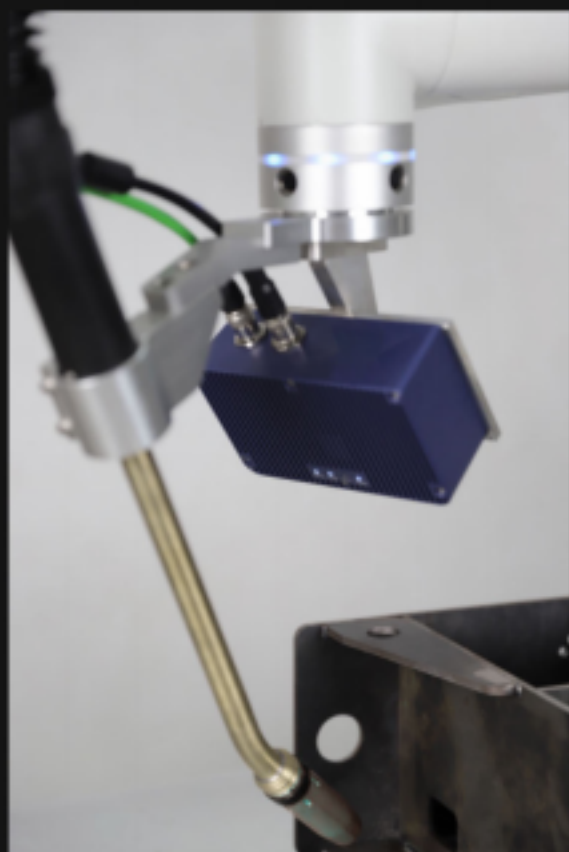
## Pick And Place Solution

Material handling robots can improve production efficiency, quality and safety, reduce labor intensity and provide flexibility and adaptability, bringing higher benefits and competitive advantages to businesses.

## Welding Robot 焊接机器人

丰富的焊接工艺包，具备多种焊接工艺，包含有点焊、段焊、直焊、摆动焊、圆弧焊、多层多道焊，并且具备焊丝寻位、焊缝追踪的智能焊接技术，显著提升焊接效率，保障焊接品质。

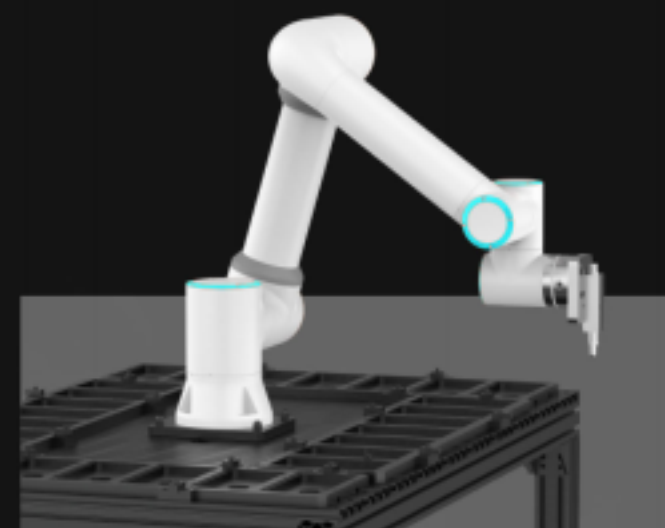
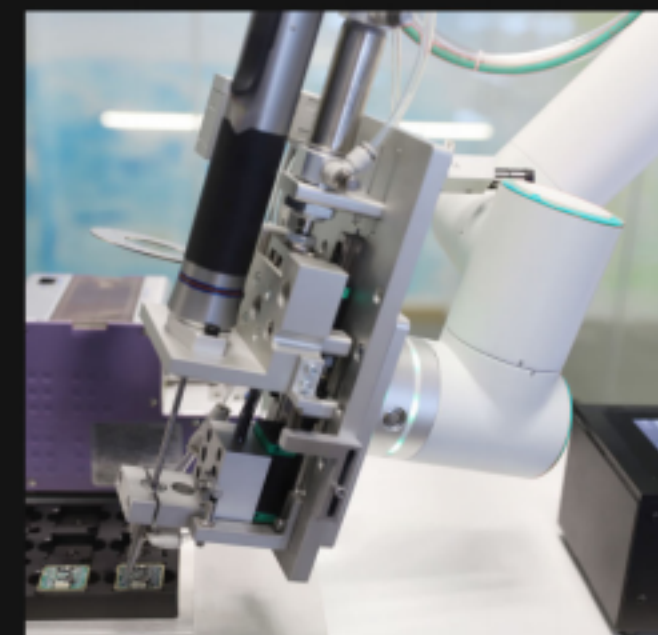
Abundant welding process kits, with a variety of welding technologies such as spot welding, seam welding, straight welding, oscillating welding, arc welding, and multi-layer multi-pass welding. It also incorporates intelligent welding technologies for wire positioning and weld seam tracking, significantly enhancing welding efficiency and ensuring welding quality.



## Screw Tightening Robot 螺丝锁付机器人

搭配末端智能拧紧装置，实现了扭矩可调、可控、可编辑，适合各种场景下的螺丝锁付，能够稳定、高效、准确完成生产过程，极大减少工人重复性劳动，支持数据溯源。

Combined with the end intelligent tightening device, it achieves adjustable, controllable, and programmable torque, making it suitable for screw locking in various scenarios. It can stably, efficiently, and accurately complete the production process, greatly reducing repetitive labor for workers and supporting data traceability.



## 涂胶解决方案 Glue Dispensing Solution

搭配末端智能出胶装置，精细化作业，适合多场景下的精细化涂胶、点胶工作，能够稳定、高效、准确完成涂胶过程，保证涂胶效果，极大减少工人重复性劳动，保护工人健康。

Paired with an intelligent dispensing device at the end effector, it enables precise operations and is suitable for precise gluing and dispensing tasks in various scenarios. It can achieve stable, efficient, and accurate adhesive application, ensuring the quality of the adhesive work. This greatly reduces repetitive labor for workers and protects their health.

## 传送带解决方案 Conveyor Belt Solution



- 提升工作安全性 Enhance work safety
- 实时监控与反馈 Real-time monitoring and feedback
- 降低错误率和损耗 Reduce error rate and losses
- 提高生产效率 Improve production efficiency
- 数据记录与溯源 Data recording and traceability
- 精确追踪与识别 Accurate tracking and identification

# COMMERCIAL APPLICATIONS

## 茶饮机器人

### Automated Tea Robot

节约人力成本, 替代人工, 提高工作效率; 冲泡茶饮口感一致, 改善不同人操作、不同时间点操作而带来的差异性; 具有表演性, 给消费者带来乐趣, 而员工可以去完成更有成就感、待遇更高的工作; 成本低, 快速回本, 经济效益好; 占地面积小, 坪效更高, 能适应多种新颖的创业模式。

协作机器人可以应用在多类型的新零售场景, 并且根据不同场景需求, 进行个性化定制。

Collaborative robots can be applied in various types of new retail scenarios and can be customized according to different scenario requirements. Benefits include:

**Cost-saving:** They replace manual labor, reducing manpower costs while increasing work efficiency.

**Consistent tea brewing:** They ensure consistent taste regardless of different operators or different time points, eliminating variations caused by human factors.

**Entertainment value:** The robotic performance brings enjoyment to consumers, while employees can focus on more fulfilling and higher-paying jobs.

**Cost-effective:** They have low costs and provide a quick return on investment, resulting in good economic benefits.

**Small footprint:** They occupy less space, resulting in higher space utilization and adaptability to various innovative business models.



## 康复解决方案

### Rehabilitation Solution

实现了上肢康复与下肢锻炼的一体化, 通过运动轨迹的复现, 降低了使用门槛。通过实时记录反馈数据, 显著提升安全性能。多种模式设定, 让康复治疗更有针对性, 显著提升康复效率。

It has achieved integration of upper limb rehabilitation and lower limb exercise, reducing the barrier to entry through the reproduction of motion trajectories. By recording real-time feedback data, it significantly enhances safety performance. With various mode settings, it makes rehabilitation treatment more targeted, leading to a significant improvement in rehabilitation efficiency.



## 艾灸解决方案

### Moxibustion Solution

完整复刻五大灸法, 提供悬停灸、雀啄灸、回旋灸、往复灸和循经灸, 降低艾灸门槛。经过最新认证, 搭配末端碰撞检测、温控、红外测距, 三重防护保障艾灸安全。内置吸入装置, 避免艾灸过程烟尘吸入。

- 极致安全
- 部署灵活
- 门槛降低
- 高效艾灸

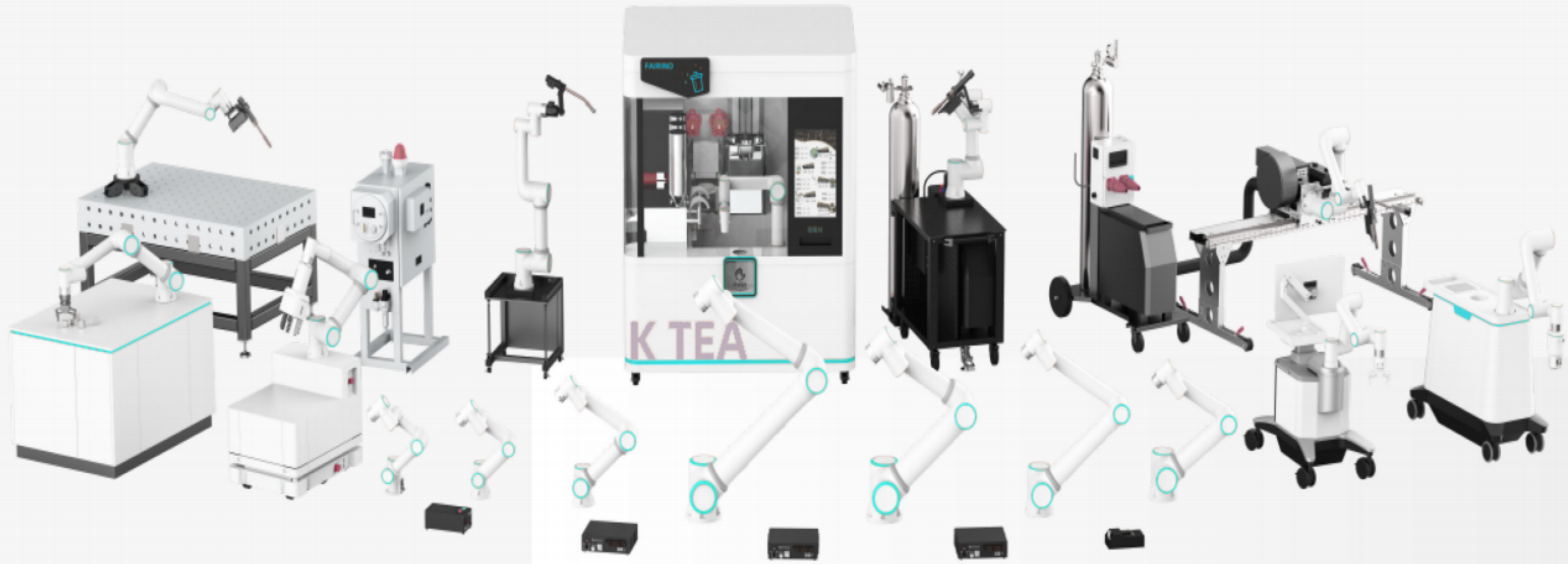
It fully replicates the five major moxibustion techniques, offering hovering moxibustion, sparrow pecking moxibustion, rotating moxibustion, reciprocating moxibustion, and meridian moxibustion, thus reducing the barrier to entry for moxibustion. With the latest certifications, it is equipped with end collision detection, temperature control, and infrared distance measurement, providing triple protection to ensure the safety of moxibustion.

It also has a built-in suction device to prevent inhalation of smoke and dust during the moxibustion process.

- Ultimate safety
- Flexible deployment
- Lower barrier to entry
- Efficient moxibustion



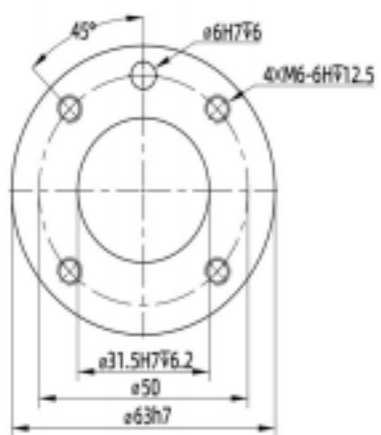




# DRAWINGS

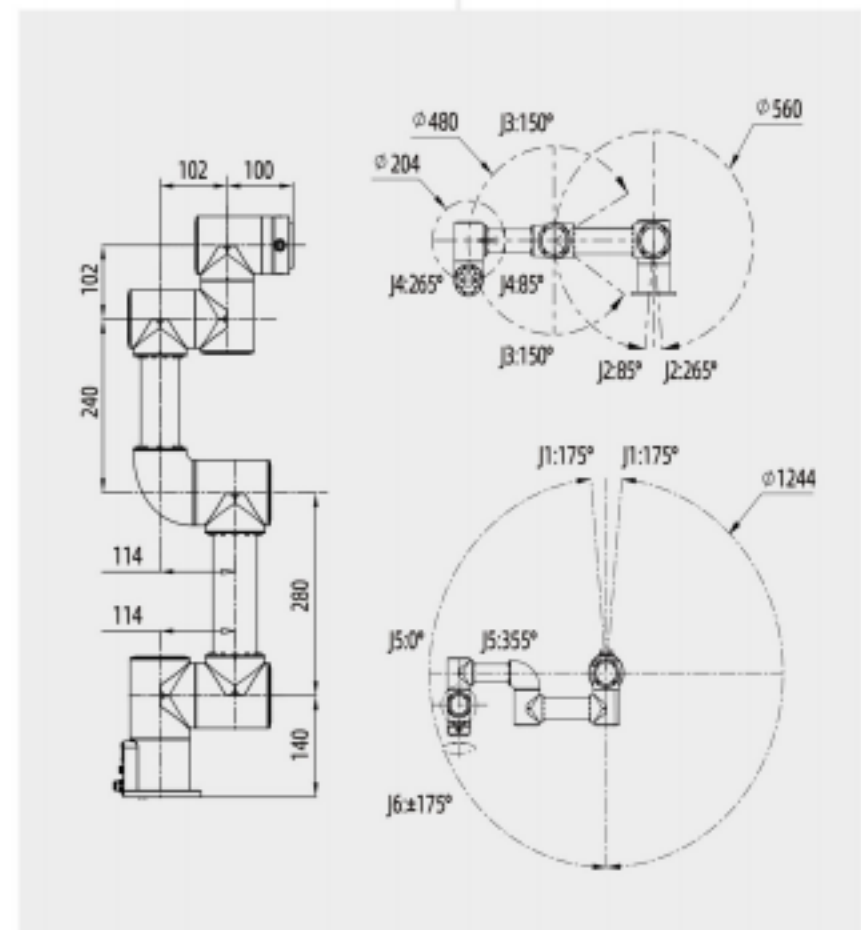
## 技术图纸

单位(Unit) : mm

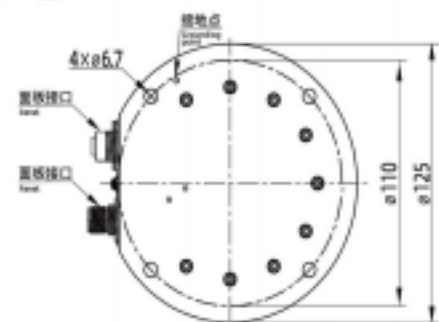


▶ 机器人末端  
均采用国际标准

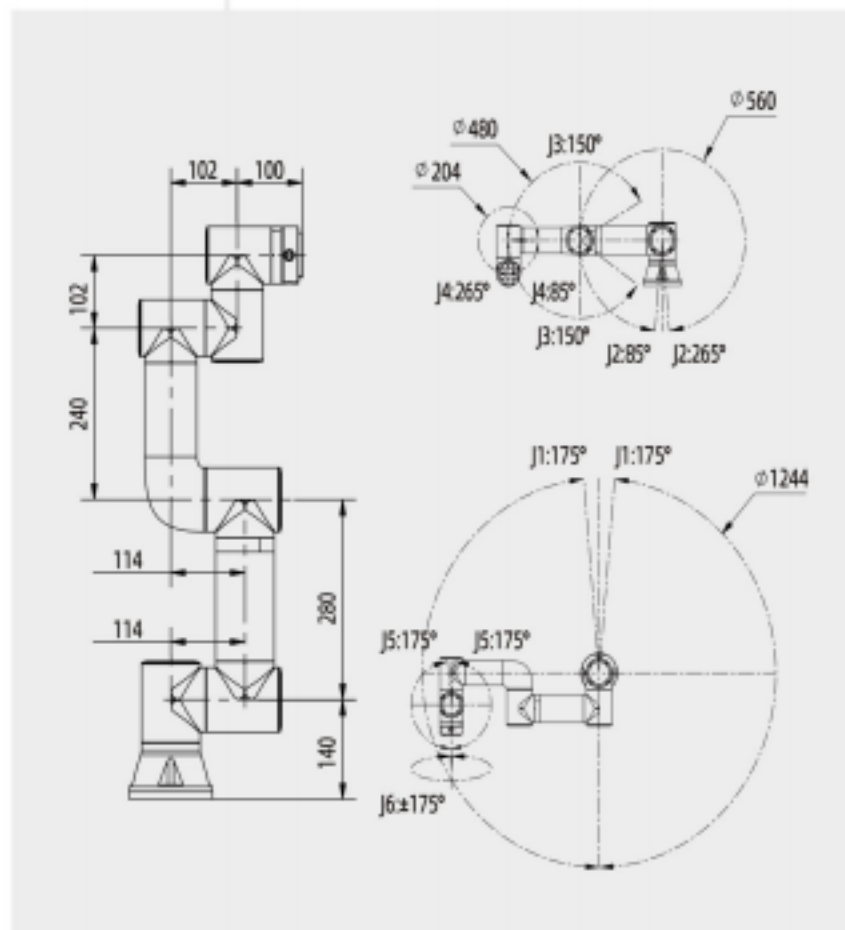
ROBOT END-EFFECTOR COMPATIBLE WITH  
INDUSTRIAL ROBOT END-EFFECTOR CONNECTION METHODS



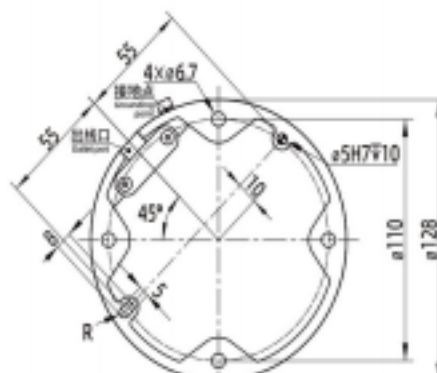
R3MT



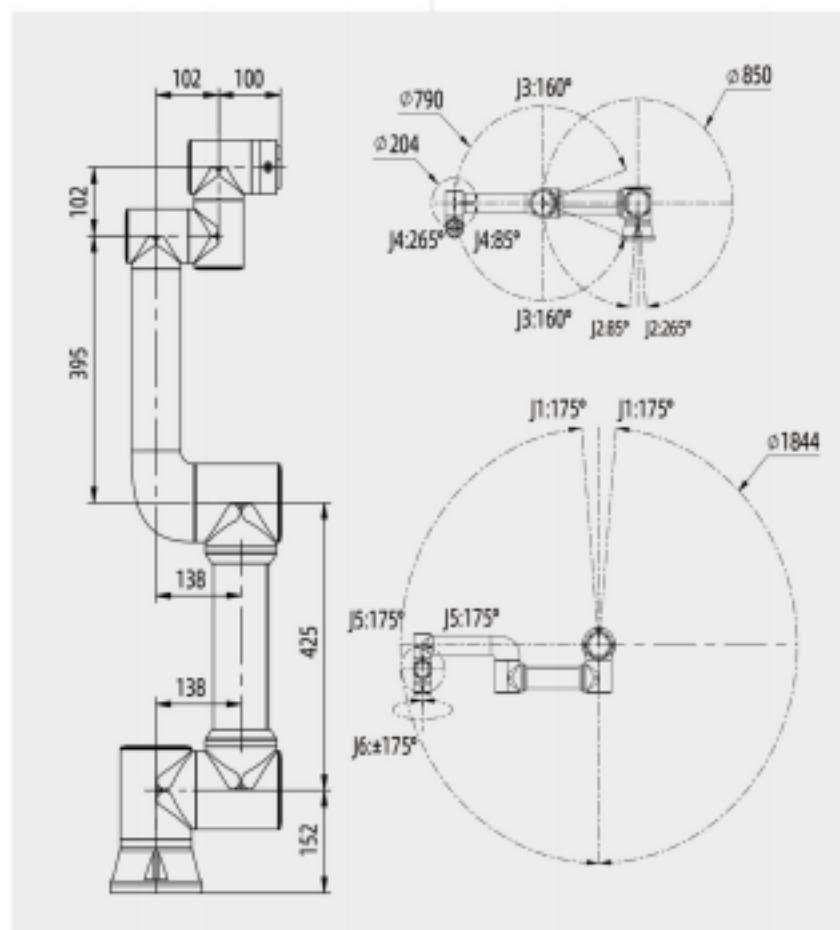
R3MT 基座图  
Pedestal diagram



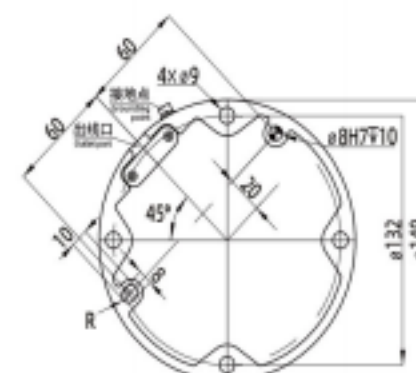
R3



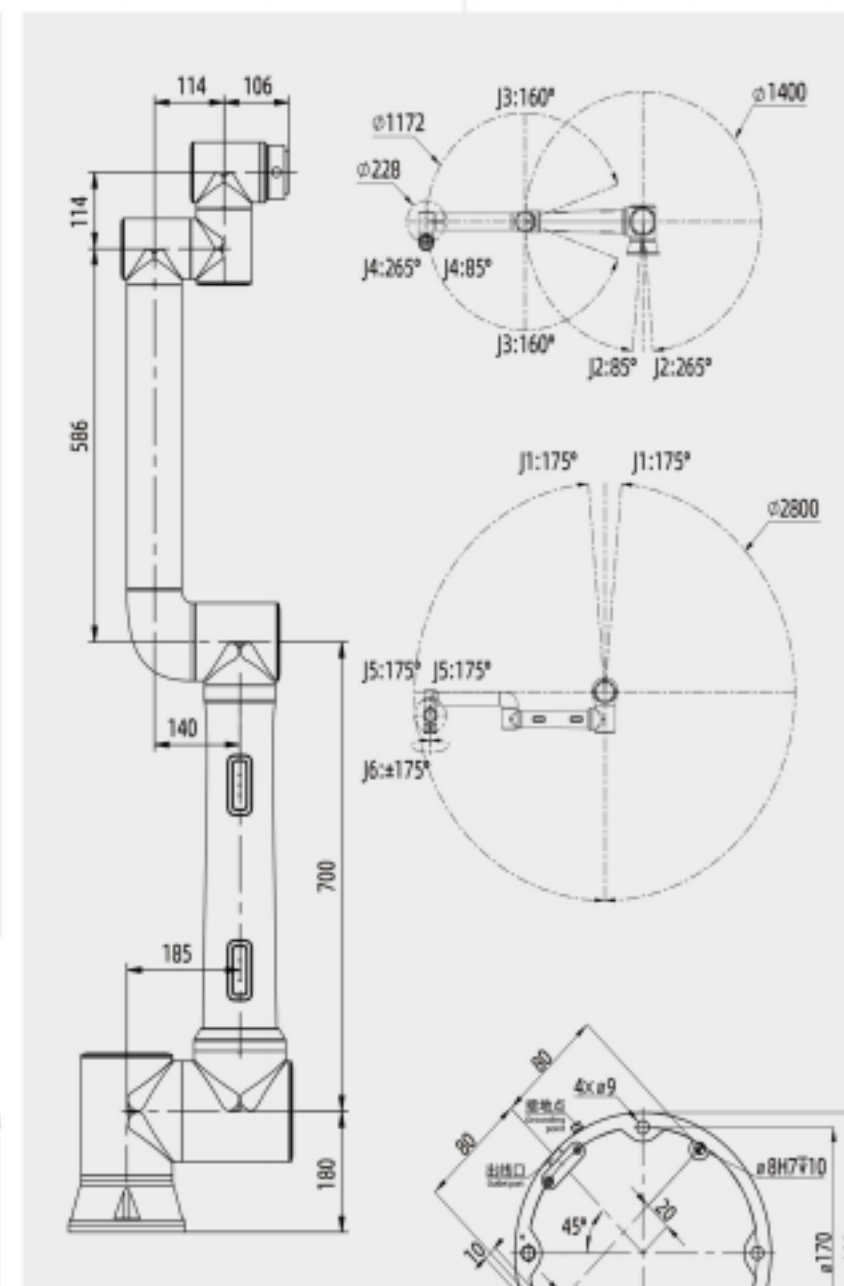
R3 基座图  
Pedestal diagram



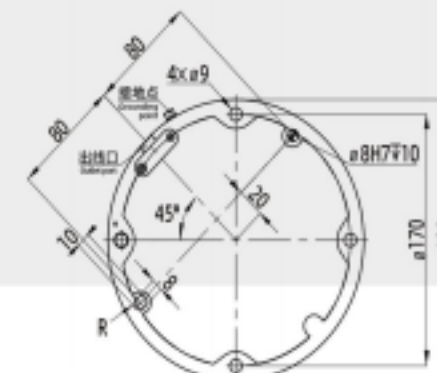
R5



R5 基座图  
Pedestal diagram



R10

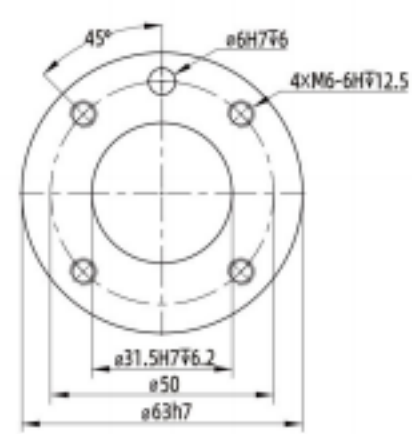


R10 基座图  
Pedestal diagram

# DRAWINGS

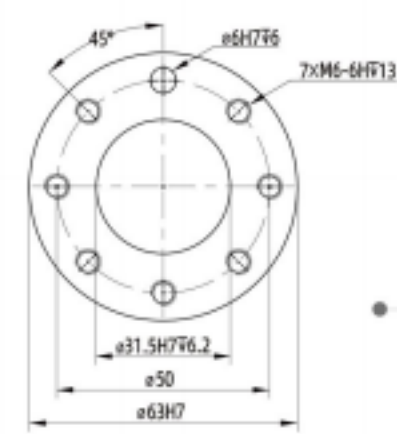
## 技术图纸

单位(Unit) : mm



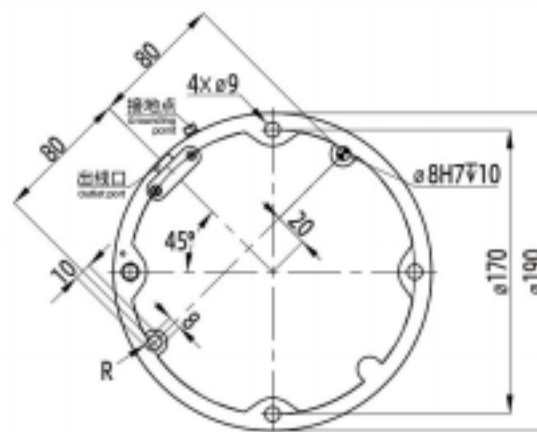
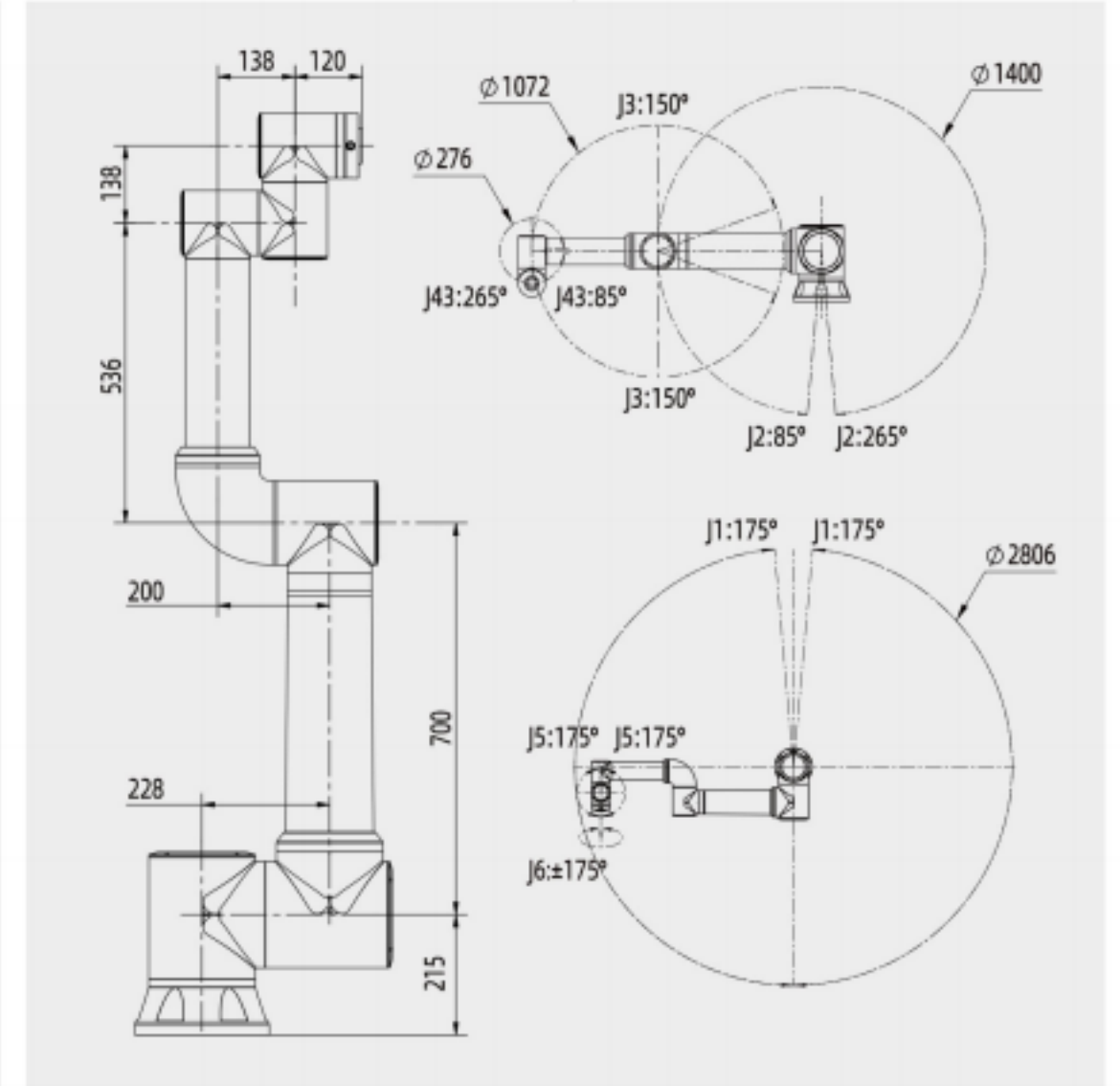
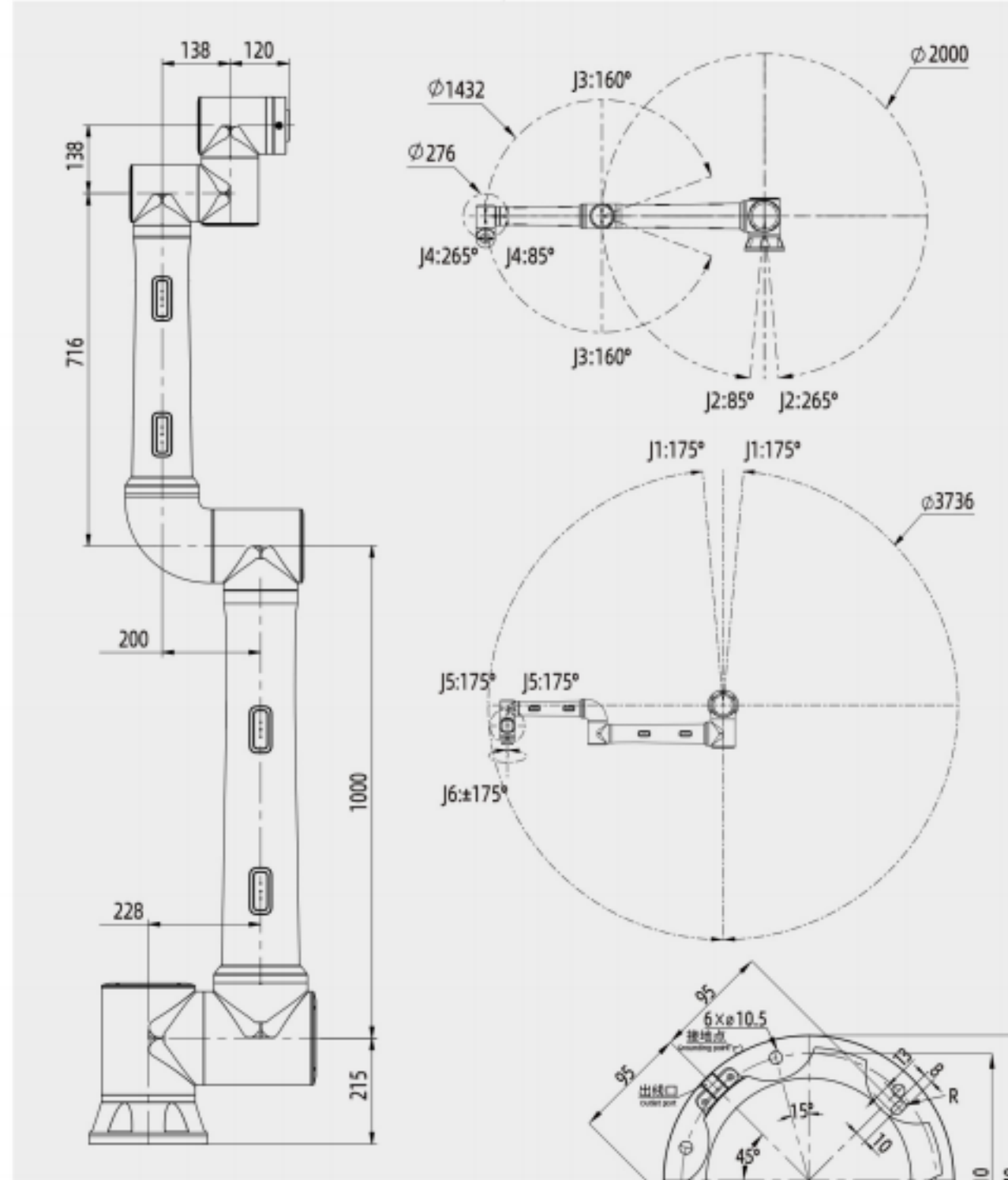
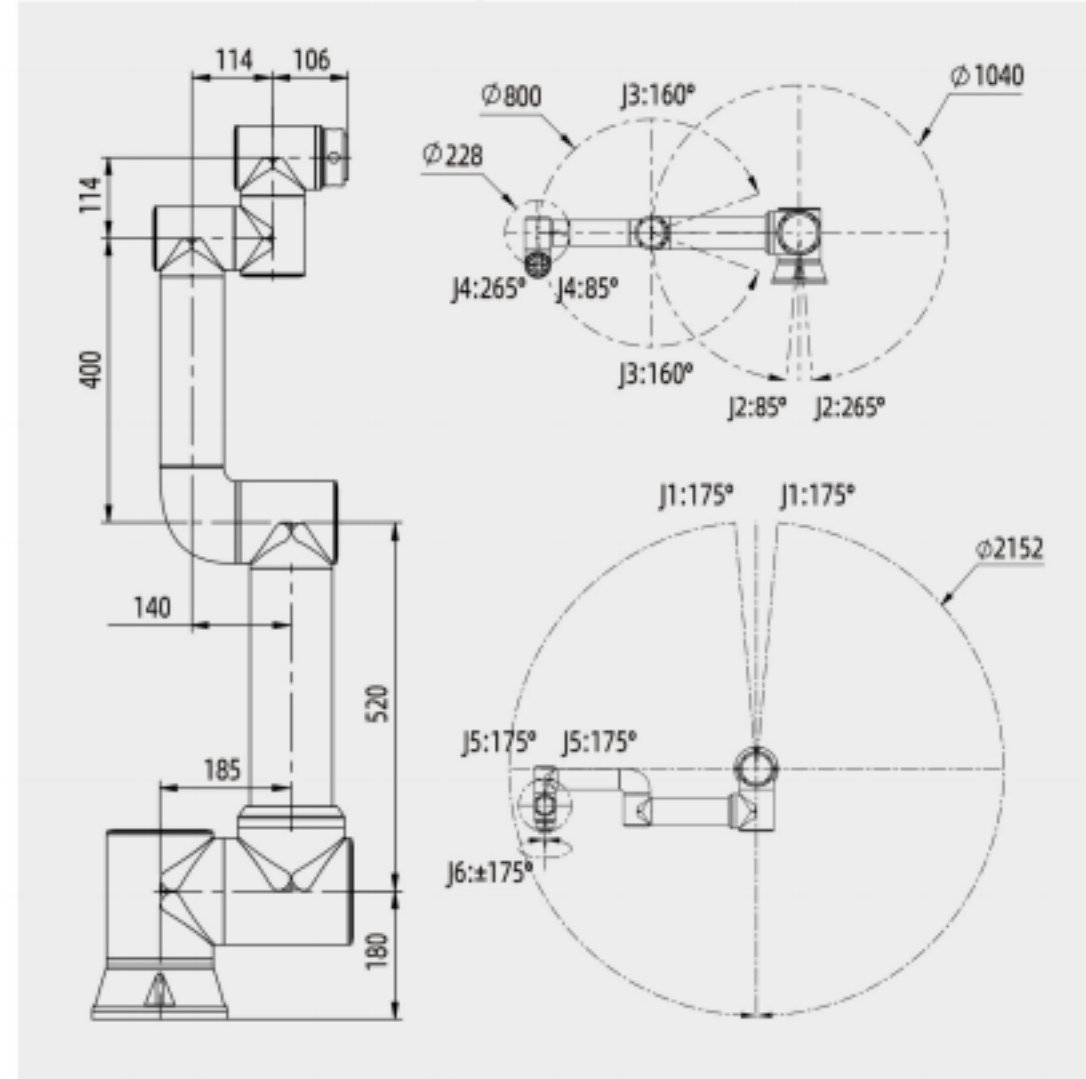
▶ 机器人末端均采用国际标准

ROBOT END-EFFECTOR COMPATIBLE WITH INDUSTRIAL ROBOT END-EFFECTOR CONNECTION METHODS

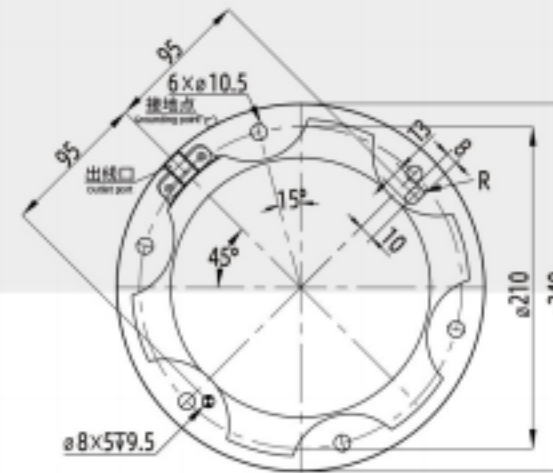


▶ 机器人末端兼容工业机器人末端连接方式

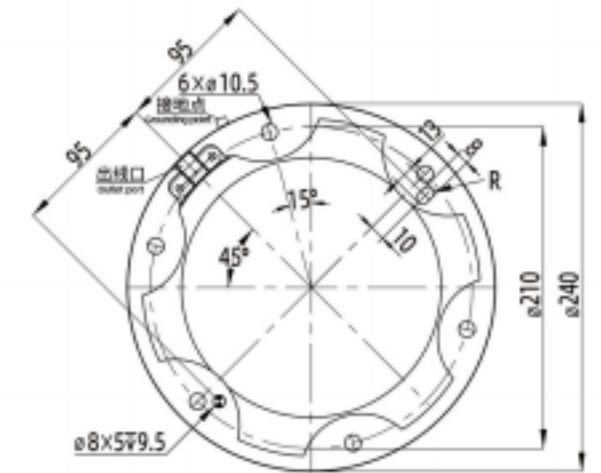
ROBOT END-EFFECTOR COMPATIBLE WITH INDUSTRIAL ROBOT END-EFFECTOR CONNECTION METHODS



R16 基座图  
Pedestal diagram



R20 基座图  
Pedestal diagram



R30 基座图  
Pedestal diagram