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COLLABORATIVE ROBOT

INTELLIGENCE CHANGES THE WORLD COLLABORATION CREATES THE FUTURE



DECELER



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www.aubo-cobot.com



COMPANY PROFILE

Provider of Collaborative Robots

Established in 2015, AUBO Robotics is a national high-tech enterprise specialized in the research & development, production and sale of collaborative robots.

As a global leading provider of collaborative robots, AUBO has developed products with complete intellectual property rights, realizing full localization of core parts. AUBO collaborative robots have successively passed the certification of EN ISO 13849-1:2015(PL=d, CAT 3), CE, UL, KCs, SEMI S2, Cleanliness class 5, etc. Featured by safety, stability and simple programming, the products are widely applied in the fields such as 3C, automobile, hardware and household appliances, sanitary appliances for kitchens and bathrooms, medical health, scientific research and education, catering, new retail, chemical products for daily use, and logistics.

Looking forward to the future, with the body of collaborative robots as the core and ecological products as the link, AUBO will provide customers with "plug and play" one-stop solutions, build an ecological innovation system of the robot industry, and collaborate the upstream and downstream enterprises to boost the development of the collaborative robot industry.











INTELLIGENCE CHANGES THE WORLD

COLLABORATION CREATES THE FUTURE

AUBO

DEVELOPMENT **HISTORY**

2010

Commencement of R&D

The research and development of AUBO collaborative robot commenced

2012

Establishment of a R&D Center

Established a R&D center for independent research and development

2014

The team was formally established

The professional team was formally established

2016

Putting into production

Jiangsu Changzhou Production Base was put into production

AUBO was approved to be National High-Tech Enterprise

AUBO-i5 collaborative robots were produced in batches

2018

The first enterprise in China to pass (PL=d, CAT 3) security certification

The first enterprise in China to pass the security certification of EN ISO 13849-1:2015(PL= D, CAT 3) in the field of collaborative robot industry

Approved National High-end Equipment Manufacturing Standardized Enterprise

2020

The domestic first intelligent and flexible production line of collaborative robots was released

The first massage robot was released in China

2022

AUBO i20 collaborative robot was launched globally

2011

Appearance of conceptual machine

The conceptual machine of AUBO collaborative robot appeared

2013

Debut of the first-generation product

The first-generation AUBO collaborative robots appeared

2015

Establishment of the Chinese company

AUBO (Beijing) Robotics Technology Co., Ltd. was established The angel round investment of RMB60 million was obtained Subsidiaries in the USA, Germany, and offices in Shenzhen and Shanghai were established

AUBO-i5 collaborative robot was launched globally

2017

Academician Ni Guangnan as the chief scientist of AUBO

Round-A financing of RMB60 million was obtained

New collaborative robots i3, i7 and i10 were launched globally

The products passed the certification of CE, UL, KCs $\,$

2019

the

Undertaking of projects under the National Key R&D Program

The "Working Group on Collaborative Robots of National Standard Commission" was established

Two "intelligent robot" projects under the National Key R&D Program were undertaken

AUBO i16 collaborative robot was launched globally

2021

Sales exceeded 10,000 units

Sales exceeded 10,000 units
Products passed SEMI S2, Cleanliness

class 5 certification











Intellectual Property

(as at the date of March 2022)

100

Effectively authorized patents

58

models

Authorized patents for inventions

Authorized patents for utility

• National High-Tech Enterprise

The best-selling cobot of the year (2017/2018/2019/2020/2021) in China*

• IEEE Global Most Potential Collaborative Robot Enterprise

OUALIFICATION HONOR

scientific research results, and won a number of honors.

• The First Prize of Award for Scientific and Technological Progress in Machinery Industry

As a pioneer in the field of collaborative robot, AUBO has always focused on the needs in the field

of collaborative robots, constantly improved its ability of innovation, promoted the application of

• National Pilot Unit for Standardization of High-End Equipment Manufacturing

• Drafting Unit of National Standard for Collaborative Robots (GB/T36008-2018)

• Secretariat Unit of the Working Group on Collaborative Robots of the National **Automation Standards Commission**

 Member of Expert Group on the International Standard for Robot Modularization ISO-TC299/WG10

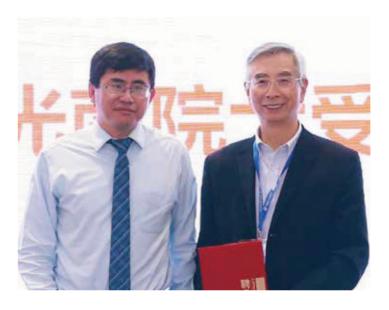
Appearance patents

Software copyrights



R&D AND INNOVATION

Technical innovation is the core competitiveness of the enterprise. AUBO has always followed the road of being independent and controllable, and R&D and innovation. It has built an excellent technical innovation team, and established a normative product development process system. At present, more than 70% of team members are medium- and high-level technical and management talents.



Ni, Guangnan Chief Scientist

Academician of Chinese Academy of Engineering

Wei, Hongxing Chairman

Member of the Institute of Electrical and Electronic Engineers (IEEE) Member of Association for Computing Machinery (ACM)

Member of National Subcommittee for Robots and Robotic Devices

Head of Working Group on National Standards for Robot Modularization

Undertaken many projects in the field of robotics under National 863 and

Won 5 provincial and ministerial level awards and Beijing New Star in Science and Technology

More than 100 papers, 2 monographs and 2 teaching materials

Setter of National Standard for Collaborative Robots

Relying on outstanding strength in technical R&D and distinctive status in the industry, AUBO has participated in the formulation of 21 national and industrial standards for robots, including 3 national standards it organized to formulate. AUBO has undertaken 6 projects under the National Key R&D Program, including 2 projects it organized to declare.

Titles of national standards it organized to formulate

《Design Specification of Industrial Robots for Human-Computer Collaboration》GB/T 39402-2020

《Universal Module Interface for Industrial Robots》 GB/T 38560-2020

《Code for Detection of Multidimensional Force / Torque Sensor for Robot》 20203656-T-604

Names of projects under the National Key Research & Development Program it organized to declare

《R&D and Integration Verification of Integrated Joints for Collaborative Robots》

《Application Demonstration of Collaborative Robot System for Typical Auto Parts Assembly》

Organized to formulate 3 national standards

Participated in the formulation of 18 national and industrial standards

Organized 2 projects under the National Key R&D Program of the Ministry of Science and Technology

Participated in 4 projects under the National Key R&D Program of the Ministry of Science and Technology

PRODUCTION CAPACITY

AUBO Production Base is located in Changzhou City, covers an area of 12,000 m², and has an annual production capacity of 10,000 sets. In virtue of vertical integrated production capacity and complete supporting systems of the industry chain, AUBO can deliver high-quality products on schedule to meet customers' needs.

Production, process, quality, and supply chain integration of collaborative robots

Incoming Inspection

27 testing sections

Support for three-dimensional measurements
Full-size, full-function and total-quantity test coverage
of key materials

Testing of Components

354 testing standards

126 kinds of testing equipment and tools

Testing of whole machine assembly

163 testing items

76 kinds of testing equipment and tools

Inspection of Finished Products

58 testing sections

21 kinds of testing equipment

Vibration test, high-temperature aging test, Dynalog repeatability test, noise test, and Leica laser calibration



Collaborative robots testing hall



The first intelligent and flexible production line of collaborative robots in China

PRODUCT **GUARANTEE**

AUBO is committed to providing safe and reliable collaborative robot products for customers. The products have passed the certification of EN ISO 13849-1:2015(PL=d, CAT 3), CE, UL, KCs, SEMI S2, Cleanliness class 5, etc., guaranteeing the safety and reliability of the products throughout the life cycle.

The First Enterprise Passing Security Certification of PL=d, CAT 3 in China







EN ISO 13849-1:2015(PL=d, CAT 3)

CE

UL









KCs CR SEMI S2 Cleanliness class 5

















COLLABORATIVE ROBOT ADVANTAGES



Flexible Deployment

- Light, compact and small footprint.
- It takes only half a day in average to deploy the robot to execute new tasks.



Flexible Production

• With quick changeover of multiple function scenarios, human-machine collaboration, dual-machine collaboration and multi-machine collaboration, etc. can be adopted to realize flexible production.



Simple Programming

- It is available to master the programming method in half an hour, and complete simple programming in 1 hour.
- Dragging teaching and visualized programming to make the operation simple and efficient, you can operate robots easily without being proficient in programming language.



Wide Application

 The products have been applied in batches in the fields such as 3C, automobile, hardware and household appliances, sanitary appliances for kitchens and bathrooms, medical health, scientific research and education, catering, new retail, chemical products for daily use, and logistics.



Safety and Stability

- The products have passed the certification of EN ISO 13849-1:2015(PL=d, CAT 3), CE, UL, KCs, SEMI S2, Cleanliness class 5, etc.
- Level-10 collision detection and sensor safety testing are supported.
- The end does not drop in case of power failure, so the robots are safe and stable.
- 16 safe I/O interfaces are provided, so the safety function does not lose in case of single failure.



System Opening

- Connection of multi-language environments, multiple communication protocols, and deep integration with third-party plug-ins.
- Communication protocols: TCP/IP, Modbus-RTU/TCP, Profinet.
- Interface and openness: SDK (supporting the development of C/C++/C#/Lua/Python), API.
- Supporting Linux, Windows and Robot Operating System (ROS).



Modularization

- It's available to realize fast dismantlement and replacement within 15 minutes.
- The repair and maintenance are quicker and more convenient.



High Return on Investment

- Key and core components are 100% manufactured in China.
- The investment cost can be recovered within 6~12 months on average.



High Precision

- Millisecond-level system response ensures repeatability.
- The repeatability can be up to ± 0.02 mm.



AUBO i series collaborative robots with payload capacity of 3 to 20KG, which can cover different applications in each industry, and quickly adapt to the needs of application scenarios in various industries by means of abundant configuration options. They are ideal choices for improving the production efficiency and implementing the low-cost operation.

FEATURES AND

BENEFITS

- Safer The products have passed the certification of EN ISO 13849-1:2015(PL=d, CAT 3), CE, UL, KCs, SEMI S2, Cleanliness class 5, etc., all core parts are localized, and level-10 collision detection and sensor safety testing are supported, so no safety protection is required.
- **More open** The open system platform supports multiple communication methods:SDK and API, and can establish communication with multiple peripheral equipment such as end-of-arm tooling, vision and mobile robots.
- **More precise** With repeatability of ± 0.02 mm, high-precision work can be completed continuously for a long time, thus greatly enhancing the production yield.
- **Simpler** Robots can be operated by many methods including dragging teaching, coordinate positioning, path planning and offline programming. The visual interface is simple and easy to learn.
- Wider The whole series products with payload capacity of 3 to 20KG, which can cover different applications in each industry and have a wide range of applications.

Applicable Fields

3C, automobile, hardware and household appliances, sanitary appliances for kitchens and bathrooms, medical health, scientific research and education, catering, new retail, chemical products for daily use, and logistics.

Payload:3kg Weight:16kg Repeatability: ±0.02mm Reach:625mm

AUBO-i5/i7

Payload:5kg/7kg Weight:24kg Repeatability: ±0.02mm Reach: 886.5mm/786.5mm

AUBO-i10/i12

Payload:10kg/12kg Weight: 38.5kg/40kg Repeatability: ±0.03mm Reach:1350mm/1250mm

AUBO-i16

Payload:16kg Weight:38kg Repeatability: ±0.03mm Reach:967.5mm

AUBO-i20

Payload: 20kg Weight:63kg Repeatability: ±0.1mm Reach:1650mm



RECOMMENDED INDUSTRIES

AUBO collaborative robots are designed for a variety of industrial processes and can be operated with simple training.











3C

Automobile

Hardware and Household Appliances

Machining

Sanitary Appliances for Kitchens and Bathrooms



Chemical Products

for Daily Use





New Retail









Catering

Agriculture





Scientific Research and Education



Others

TYPICAL **PROCESS**

Industrial	Pick & Place Injection Molding	, 50 5		Polishing & grinding	
New-retail	Ice Cream Maker	Beverage Maker	Liquor Maker	Catering Robot	Smart Kitchen
Healthcare	Massage Robot	Auxiliary Puncture	Scanning	Moxibustion	
Mobile Cobot	Logistics Sorting	Pick & Place	Inspection	Patrol Robot	
Research and Education	Intelligent Production Line	Scientific Research and Development	Discipline Construction	Education Platform	

APPLICATION **CASES**

INDUSTRIAL **FIELD**









Inspection of parts



mobile phone camera detection



Appearance inspection of auto parts



Inspection of circuit boards



Instrument assembly



Assembly and screwing of white household appliances



Rubber assembly of auto electronic control systems



Intelligent assembly of auto parts



Welding



Gluing of vehicle windows



Palletizing



Vacuum cup stretching line



Frame coating



Machine Tending



Machine Tending

A B O

APPLICATION CASES



NEW RETAIL / SERVICES



Latte art robot



Beauty mystery box picking



Milk tea workstation



HEALTHCARE



Massage robot



Surgical robot



Reagent testing



MOBILE COBOT



Inspection robot



Intelligent archives



5G Patrol robot



RESEARCH AND EDUCATION



Robot with digital twin technology



Music box assembly line



Education and training platform



OTHER FIELDS



Agricultural picking



High-voltage distribution cabinet operation



Hygiene & cleaning

APPLICATION CASES

Automobile

Glass Gluing & Sealing

This is the window glass gluing & sealing project customized for a well-known automobile company. Industrial robots or manual gluing is adopted on the traditional production lines. Due to safety restrictions, traditional industrial robots need to be separated from workers by guardrails, and the utilization rate of the production line is limited. It is difficult for manual gluing to control the accuracy and quality.

Quick deployment and small footprint with human-machine collaboration. Uniform gluing speed and glue type control precision of ± 0.5 mm.

Continuous Efficient Operation

Since being put into use in August 2019, the cobot has been running efficiently in good condition for 16 hours a day, and can completely replace manual labor.



Automobile

Engine Screwing

This is the engine assembly line renovation project of a well-known automobile company. Previously, the screw locking operation was mainly completed by manual labor. Manual operation is labor-intensive, assembly quality is not consistent enough, and it is difficult to improve the yield of finished products. The workshop space is relatively narrow, and the volume and freedom are highly limited. In addition, the screwing has a fixed sequence, the screws are divided into 5 categories and more than 100 sub-models, requiring visual identification of common features. Precise screw torque and high positioning repeatability are required.

The terminal screwing device adopts a screw gun with controllable torque, and it has compact structure and high torque control accuracy. The "eye-to-hand" vision system is selected, and the vision sensor is independently fixed on the bracket to ensure high positioning repeatability.

Reduced Manpower and Increased Productivity

Since operation in April 2019, the production efficiency has been increased by 18%, the product yield has been increased by 12%, the number of personnel has been reduced by 50%, and the labor cost has been reduced by 30%.

30

Mobile Phone Camera Testing

This is the camera function testing process of a well-known mobile phone manufacturer. Previously, the testing operation was performed by manual labor. The testing environment is divided into indoor and outdoor, and a variety of products, statuses and angles are involved, which are difficult to control for manual labor. The testing is cumbersome and labor-intensive, needs long continuous operation time.

AUBO adopts the mobile cobot solution (AGV + collaborative robot) to work in the live-action studio according to the specified shooting angles.

Stable and Efficient

24-hour operation is possible, and more comparative data can be captured in the same time period, so the efficiency is significantly improved.



Machining

Machine Tending

This is the machining production line renovation project of a well-known company. The company mainly produces precision machinery parts, such as various industrial sewing machine parts, power tool parts and auto parts. With the growth of business volume, manual operation can no longer meet the production demands.

There are a wide range of products, and one person can only handle 2 machines for original production equipment, cannot accurately complete all tasks. Problems such as on-site environment and equipment noise have led to a series of common problems in traditional manufacturing industry, such as labor shortage and increasing labor cost.

Flexible Deployment

The reach of the collaborative robot used in this solution can be up to 1350mm, and the customer can directly deploy on the original factory without changing the layout of the production line. Flexible pick & place of parts is achieved in the narrow working space, and one robot is working for 2 machines. In the original production process, one person can operate up to 2 machines at the same time. After the deployment of collaborative robots, two persons can handle 12 machines at the same time. In this way, the production scale has tripled, while the personnel have not undergone major changes.



Medical Health

Massage Robot

Traditional Chinese Medical Massage has always been one of the first choices for people to carry out cervical and lumbar care or pain management. But the shortage of professional massagist has been a major problem in the industry. AUBO developed the massage therapy robot together with our partner, committed to proving safe, temperature-controlled, efficient and standard services in the full process of massage.

The end of the cobot is equipped with a force sensor, a 3D vision, a massage head and a thermal imaging, when the robot arm walks the massage track on the human body, it can ensure the safe and stable operation of the robot without hurting the human body accidentally. And there are different types of strengths that can be switched automatically during the massage according to customers' force preference.

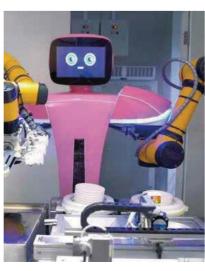


New-retail

Dual-Arm Hamburger Robot

In smart catering industry, AUBO has started business operation officially by cooperating with many restaurants at present. In addition to hamburger robots, the application of robots in restaurants includes stir-fry robots, soup rice robots, drinks robots, frying robots, dessert robots and meals-delivery robots, etc.

In this case, two sets of AUBO i3 cobots are installed inversely, which can be compatible with two collaborative robots to make hamburgers at the same time. After a customer places an order by scanning the QR code, the upper computer sends a signal to the cobots to start the making of hamburger. One cobot mainly grabs bread pieces from the material silo and sends them to the heating furnace, and cooperates with the sauce machine to pour the sauce onto the heated bread pieces; the other cobot takes vegetables and returns the tray. Then, the cobots complete the combination of the upper and lower pieces of bread. After packing, the cobot places the packed hamburger onto the conveyor belt. The customer can scan the QR code to open the pickup window. Here, the purchase process is completed.



Mobile Cobot

Semiconductor Handling

This is the logistics automation renovation project in the packaging and testing workshop of a semiconductor industry. At present, the industry is mainly based on manual labor. Manual handling has problems such as large vibration, being easy to cause particle pollution, discontinuous operation, wrong handling and poor consistency. The workshop has a high level of cleanliness, a complex layout, a narrow space and a wide variety of equipment with discrete production processes and complex technological processes. The industry order demands are flexible, and it is impossible to form a simple and effective flow-line production.

The mobile cobot and the intelligent dispatching logistics control system help the factory realize an intelligent unmanned production workshop. The mobile cobot is based on the hybrid positioning and natural navigation technology of the laser natural navigation. The indoor positioning repeatability of ± 5 mm can be achieved without environment modification while the dust-free operation meets the standard. Equipped with a 360°-scanning dual safety lidar, obstacles can be identified intelligently and avoided actively, ensuring safe, high-speed and smooth operation. Target positions such as cartridge holder and tray can be positioned and captured accurately through Al algorithm, 3D visual positioning, force sensor and collaborative robot.



24-hour Operation and Labor Liberation

The solution realizes the die bond among various processes, and 24-hour continuous operation is possible so as to liberate labor, solve information flow conversion, and realize workshop production visualization and production process operation control.

Electric Power Industry

Distribution Room Inspection

This is the automatic distribution room inspection project of a power industry user. At present, the industry is mainly based on manual inspection. The automation equipment in the distribution room operates all the year round, so the failure rate is high. The inspection frequency is high, the work is cumbersome, and the manual inspection burden is heavy. The switch on the low-voltage side of the distribution room cannot be remotely controlled, and automation cannot be achieved through the equipment in the cabinet.

In cooperation with China Unicom, a dedicated 5G channel ensures safe and stable operation of the robots. The big data image recognition intelligently distinguishes equipment fault signals, and provides intelligent safety monitoring for the robot manipulation equipment to prevent misoperation and faults. The inspection robot can independently complete more than ten functions such as equipment inspection, device panel control, faulty part replacement, device restart, and switch opening & closing. The historical alarm records in the device can be viewed to make up for the shortcomings of the inability to collect alarm information when the equipment in the station malfunctions.



Unmanned Operation

The inspection robot has the characteristics of low cost, high reliability, high safety and strong universality, and can be maturely applied to most scenarios in which unmanned equipment operation is required, such as distribution rooms, computer rooms and industrial enterprises.

Around the global headquarters and manufacturing bases, AUBO has established sales centers in the eastern region, southern region and northern region, etc. of China, and overseas after-sales service centers in the USA and Germany, etc. Now, AUBO has more than 200 distributor partners from more than 50 countries in the world, and can provide efficient and convenient professional services for you.



To provide technology evaluation, accessory selection and debugging services.



To provide product usage To realize real-time trainings to distributors technology answers and free of charge regularly, resource sharing by and cultivate professional technical forum and robot engineers for hotline.



To provide lifetime repair and customized maintenance of robots, and provide software upgrading package to customers and instruct them





Model	i3	i5	i7	i10	i12	i16	i20	
Robot Degrees of Freedom	6	6	6	6	6	6	6	
Reach (mm)	625	886.5	786.5	1350	1250	967.5	1650	
Payload (kg)	3	5	7	10	12	16	20	
Weight (kg)	16	24	24	38.5	40	38	63	
Mounting Surface Diameter (mm)	Ø140	Ø172	Ø172	Ø220	Ø220	Ø220	Ø260	
Repeatability (mm)	±0.02	±0.02	±0.02	±0.03	±0.03	±0.03	±0.1	
Linear Velocity (m/s)	€1.9	€3.4	≤3.0	≤4.0	€3.8	≤3.0	≤2.6	
Average Power (W)	150	200	200	500	500	600	1000	
Peak Power (W)	1000	2000	2000	2000	2000	2000	3000	
Ambient Temperature (°)	0-50	0-50	0-50	0-50	0-50	0-50	0-50	
Ambient 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)	
Installation Orientation	Any ceiling, Floor, Wall	Any ceiling, Floor, Wall	Any ceiling, Floor, Wall	Any ceiling, Floor, Wall	Any ceiling, Floor, Wall	Any ceiling, Floor, Wall	Any ceiling, Floor, Wall	
IP Classification	IP54	IP54	IP54	IP54	IP54	IP54	IP54	
ISO 14644-1 Cleanliness Class	5	5	5	5	5	5	5	
Axis Movement	Working Range (°) Maximum Speed (°/s)	Working Range (°) Maximum Speed (°/s)	Working Range (°) Maximum Speed (°/s)	Working Range (°) Maximum Speed (°/s)	Working Range (°) Maximum Speed (°/s)	Working Range (°) Maximum Speed (°/s)	Working Range (°) Maximum Speed (°/s)	
joint 1	±360 178	±360 223	±360 223	±360 178	±360 178	±360 178	±360 93	
joint 2	±360 178	±360 223	±360 223	±360 178	±360 178	±360 178	±360 93	
joint 3	±360 178	±360 223	±360 223	±360 223	±360 267	±360 267	±360 178	
joint 4	±360 237	±360 237	±360 237	±360 178	±360 178	±360 178	±360 178	
joint 5	±360 237	±360 237	±360 237	±360 237	±360 178	±360 178	±360 178	
joint 6	±360 237	±360 237	±360 237	±360 237	±360 178	±360 178	±360 178	
*Each joint has the ability of $\pm 360^\circ$, but limite	*Each joint has the ability of $\pm 360^\circ$, but limited by the application scenario, part of the joints may not be reached.							
Category	C	ontrol Box		Control Box I/O/Tool I/O	Control Box Too	l End		

	Category	Control Box		Control E	Box I/O/Tool I/O	Control Box	Tool End
Control Box	Model	AUBO-CB-M		I/O Port	Digital In	16 (general) /16 (safe)	4 (optional)
	Dimensions	390mm*370mm*265mm/410mm*390mm*285mm (i20)			Digital Out	16 (general) /16 (safe)	4 (optional)
	Weight	15kg/16kg (i20)			Analog In	4	2
	Cabling Connecting the Robot	5m (customizable,up to 8m)			Analog Out	4	-
	Cabling Connecting the Teach Pendant	4m		I/O Power	Output Voltage	24V	0V/12V/24V
	Cabling Connecting the Power	5m			Output Current	3A Max	0.8A
	Communication	100-240VAC, 50-60Hz	E				

AUBO-CB-M

Ethernet, ModBus-RTU/TCP, Profinet (Optional)

SDK (Support C/C++/C#/Lua/Python), Support ROS, API

IP43

Interface

Power Supply

IP Classification

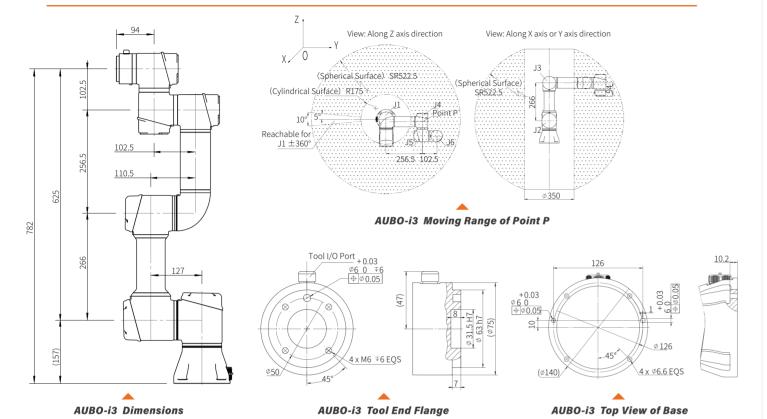
Teach Pendant	Model	AUBO-TP	
• FURO	Dimensions	355mm*235mm*54mm	
	Weight	1.57kg	
	IP Classification	IP43	

Teach Pendant

TECHNICAL DETAILS COMPARISON

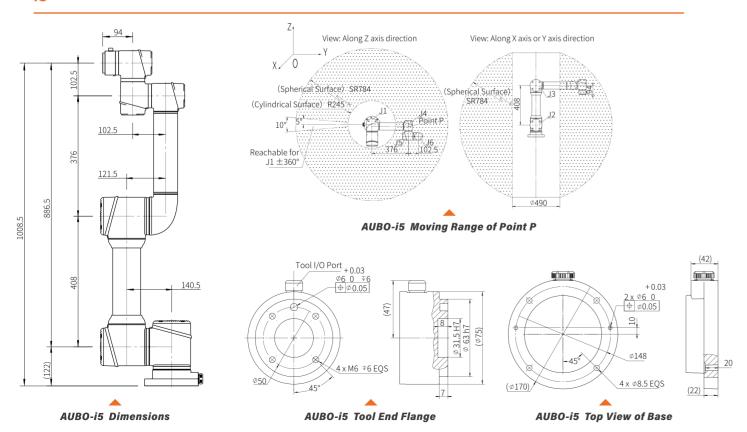
i7

DIMENSIONAL **DRAWINGS**

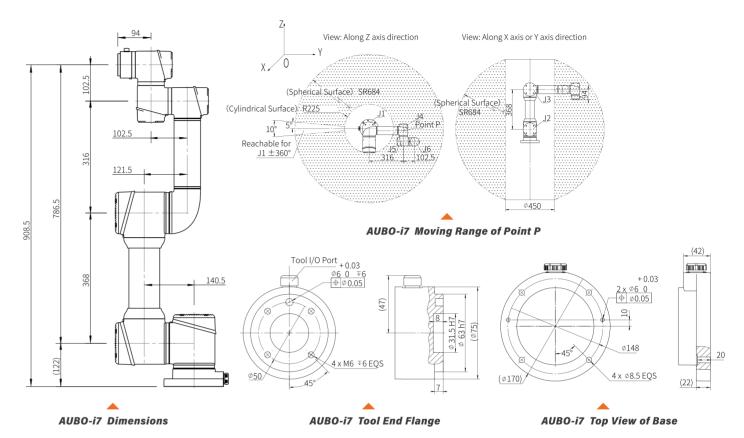


i5

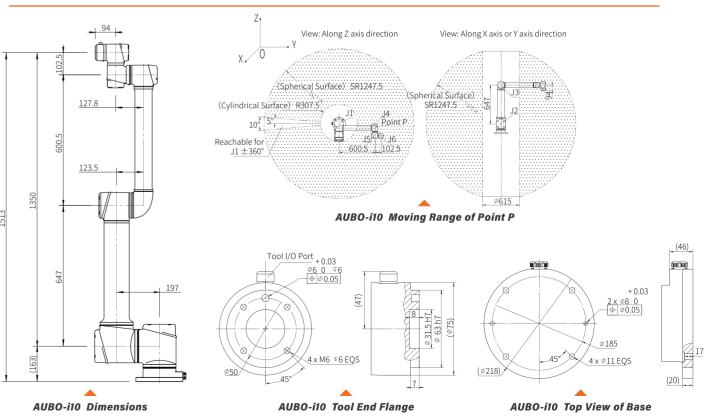
i3



DIMENSIONAL **DRAWINGS**



i10



i20

View: Along X axis direction View: Along X axis or Y axis direction View: Along X ax

DIMENSIONAL **DRAWINGS**

i16

