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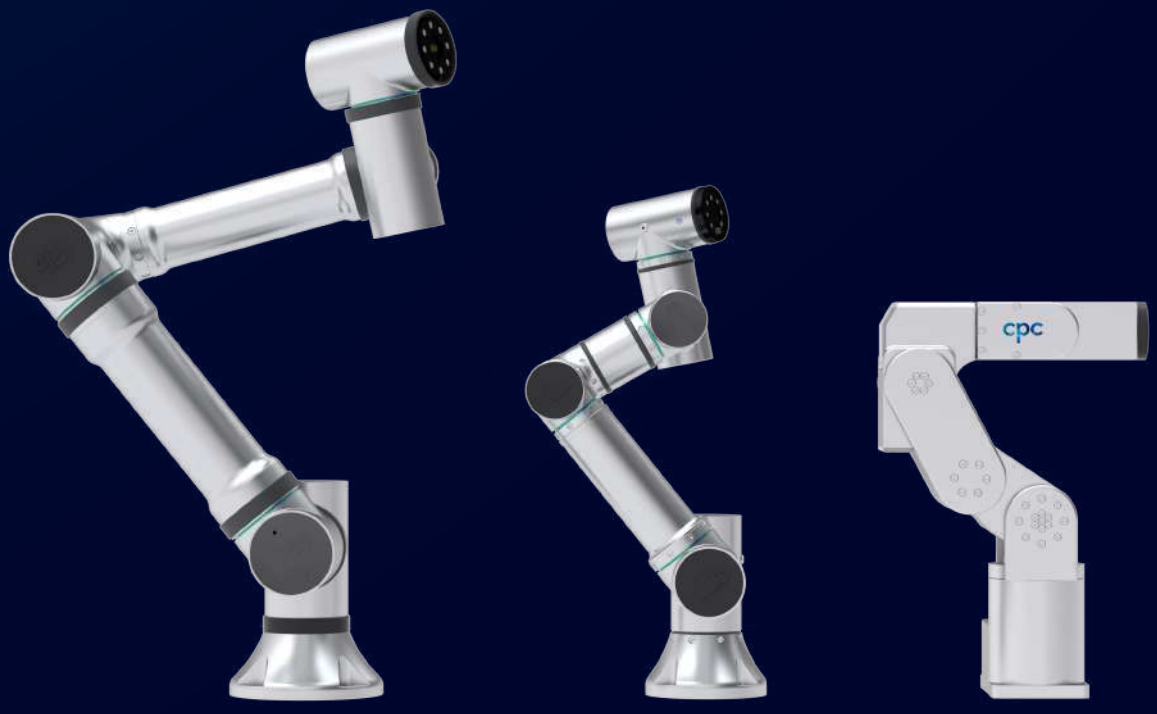
cpcRobot

miniature 6-axis robot



cpc CHIEFTEK PRECISION CO., LTD.

cpcRobot

miniature 6-axis robot

S1 / S0 / DB0

The current five significant trends in the robotics industry are
1. Smart learning.
2. Autonomous movement.
3. Implement into new markets.
4. Energy saving.
5. Reduce reliance on labor.

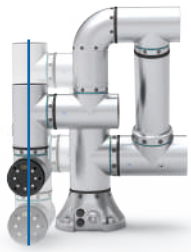
cpc Chieftek Precision Co., Ltd. has always been an essential player in the industrial supply chain. cpc uses self-developed DD motors, mechanical components, drives, and encoders to provide small-sized robotic arms in the market to achieve automation goals in energy saving, mobility, and new market applications.

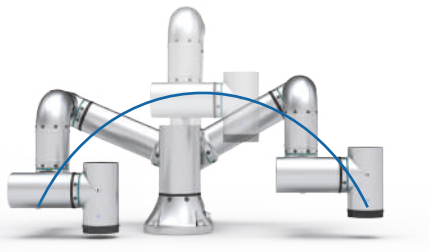
Tired of the unchangeable production lines?
Rearranging production lines anytime you want to?
Executing multiple different commands at the same time?

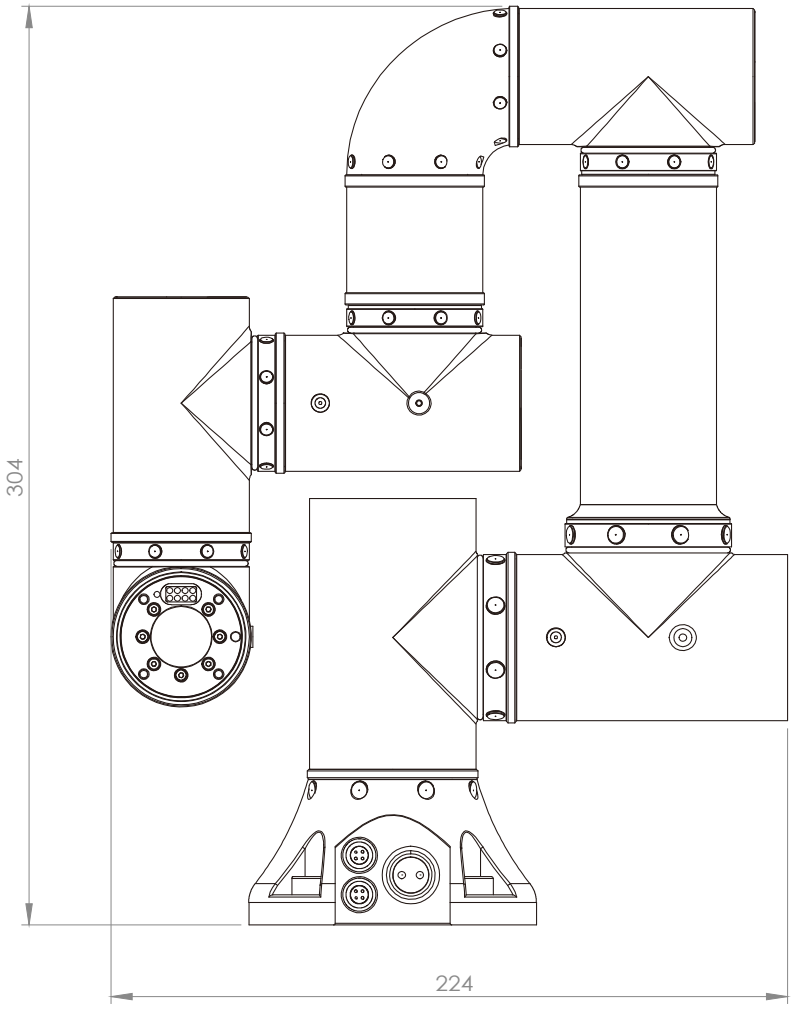
Let cpc's miniature robots help you!
Super small & super light! Your best choice to maximize the flexibility and efficiency of your production lines!

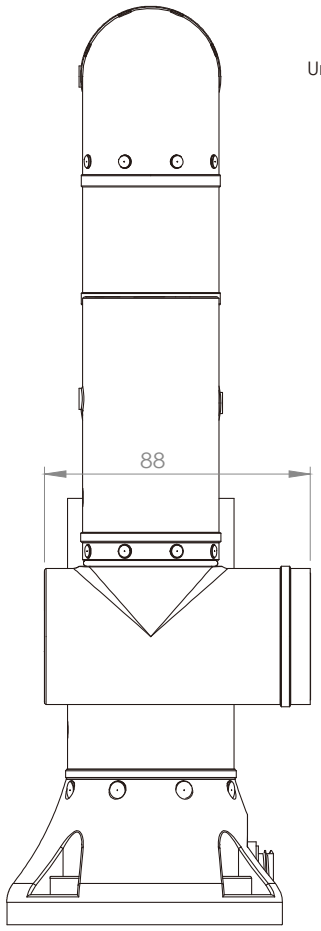
S0 6 - axis robot

- Small footprint
- Lightweight
- Class-leading repeatability
- Collaborative
- Folding design
- Low noise
- Class-leading torque motor
- High performance servo drive
- High resolution optical absolute encoder
- Brakes in all axes
- Internal cable arrangement
- Tool I/O port
- Side connection / Bottom connection









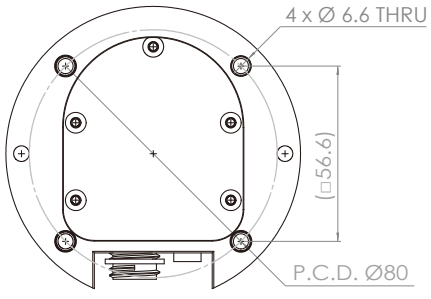
Unit: mm

The S0 is the smallest collaborative robotic arm on the market today, with an arm weight of just 4kg and a maximum payload of 1 kg. The small size and light weight allow S0 to move flexibly even in the narrow space and can change the best mode and position at any time to meet the needs of the production line. The unique folding design creates multiple path planning opportunities for greater movement efficiency.

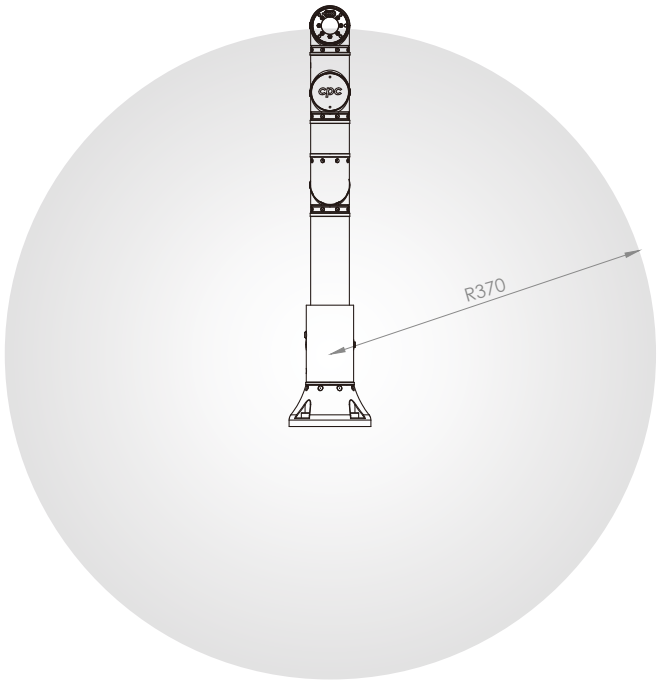
Specifications

Item		Unit	S0
Rated payload		kg	0.5
***Max. payload		kg	1
Reach	Vertical	mm	446
	Horizontal	mm	370
*Repeatability		μm	+/- 10
Weight		kg	4
Power supply		V,A	48 Vdc, 5A
Brakes		Axis	1,2,3,4,5,6
Communication			TCP/IP, Modbus TCP to controller/ EtherCAT to robot
Max. motion range		J1 (Base)	+/- 360°
		J2 (Shoulder)	+/- 360°
		J3 (Elbow)	+/- 360°
		J4 (Wrist)	+/- 360°
		J5 (Wrist)	+/- 360°
		J6 (Wrist)	Infinite
**Max. speed		J1 (Base)	180°/sec
		J2 (Shoulder)	154°/sec
		J3 (Elbow)	180°/sec
		J4 (Wrist)	288°/sec
		J5 (Wrist)	324°/sec
		J6 (Wrist)	324°/sec
*Max. TCP speed		mm/s	600
IP protection rating		IP54	
Materials		Aluminium , Plastic , Steel	
ISO 14644-1 Class Cleanroom		ISO Class 5	
Product Safety Certification		EN ISO 12100 EN ISO 10218-1 EN 60204-1 EN ISO 13849-1 ISO/TS 15066 ISO/DIS 10218-1.2	

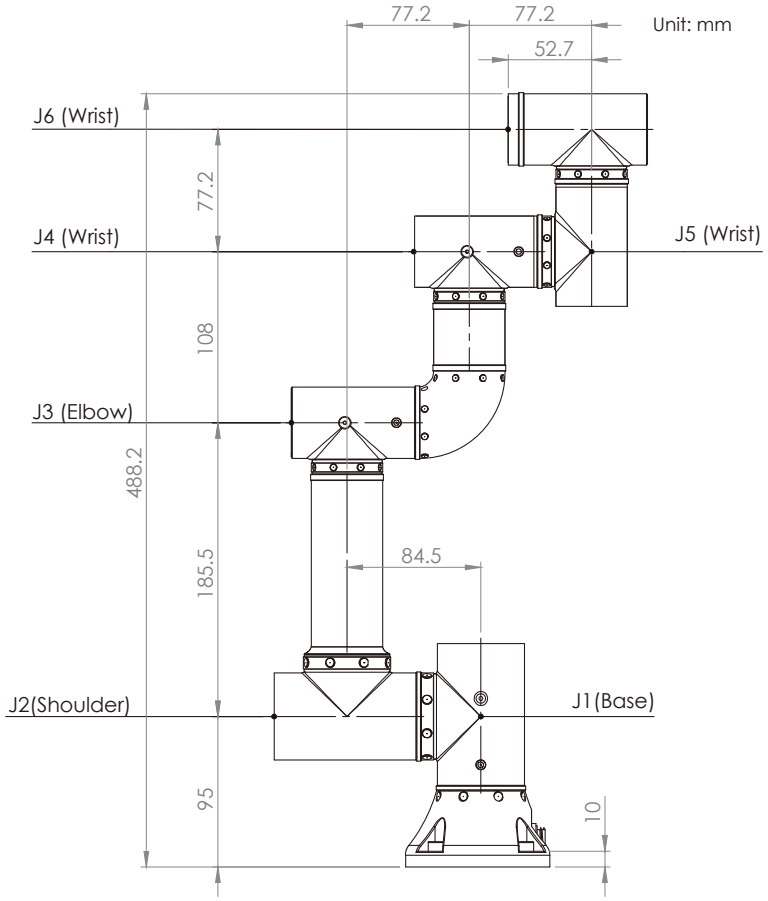
* When the temperature of the robot is constant.
** The maximum speed depends on the center of mass offset.
*** Available to 80% motion area.



Motion area

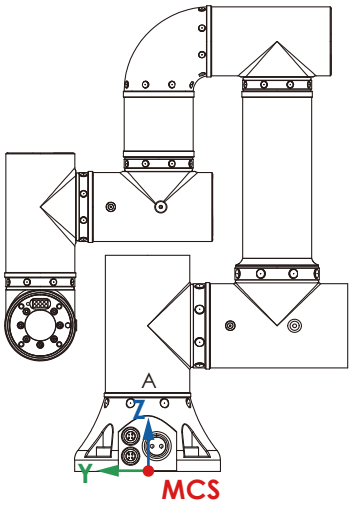


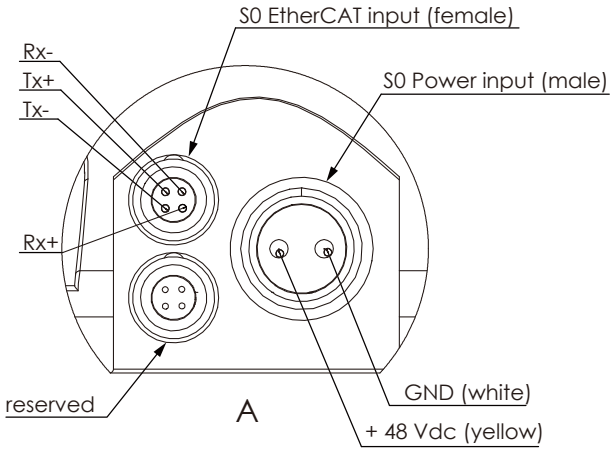
Dimensions



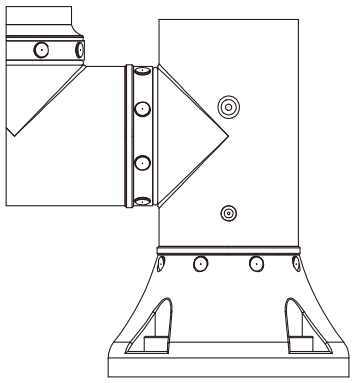
S0 power/signal input and MCS Coordinate System

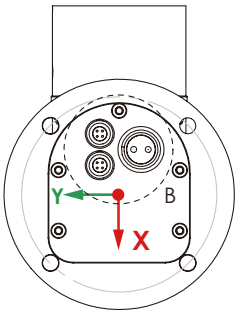
Side connection



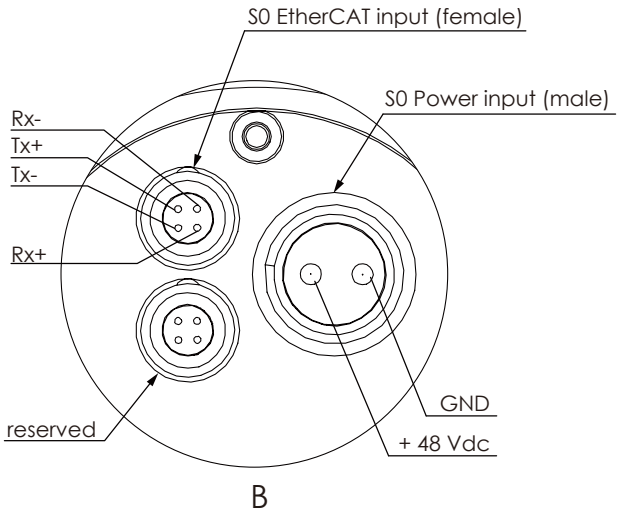


Bottom connection



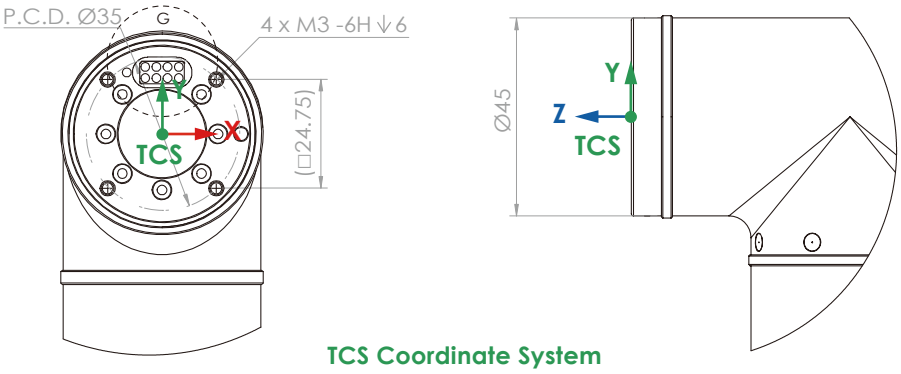


MCS Coordinate System



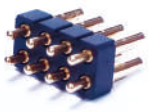
S0 end connection dimensions and TCS coordinate System

Unit : mm

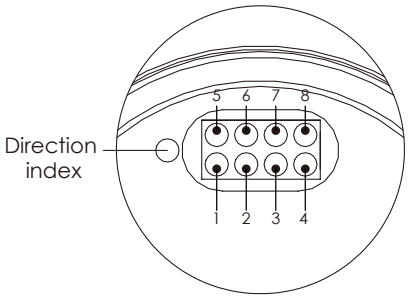


TCS Coordinate System

Tool I/O port



Corresponding pogo pin connector attached



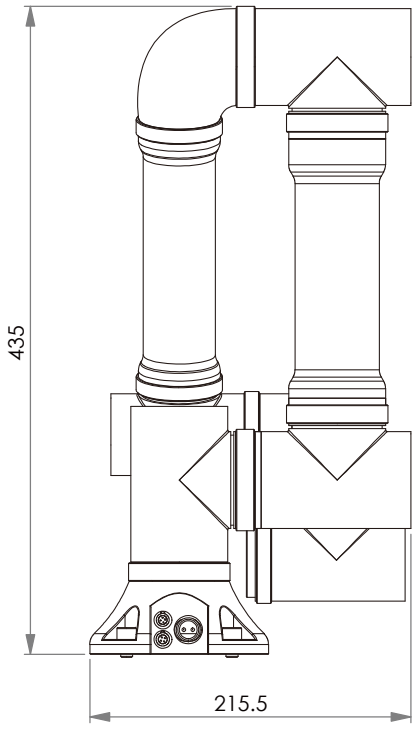
Pin definition

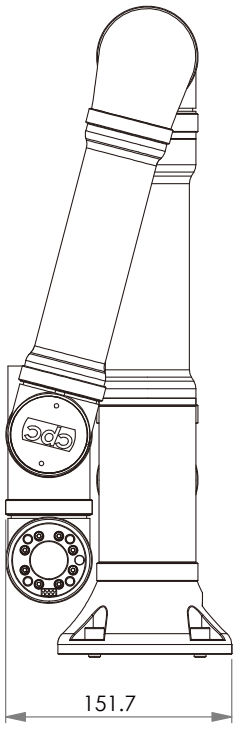
Number	Definition	Description
1	Grounding	Grounding
2	AI-0	analog input (0~10V)
3	DI-0	digital input
4*	DO-0 or power or ground	Digital output or 0/12/24 V or ground
5	Power	0/12/24 V
6	AI-1	analog input (0~10V)
7	DI-1	digital input
8*	DO-1 or power or ground	Digital output or 0/12/24 V or ground

* The user can set the output signal as PNP, NPN, or pull/push via the interface.

S1 6 - axis robot

- Small footprint
- Lightweight
- Class-leading repeatability
- Collaborative
- Low noise
- Class-leading torque motor
- High performance servo drive
- High resolution optical absolute encoder
- Brakes in all axes
- Internal cable arrangement
- Tool I/O port
- Side connection / Bottom connection





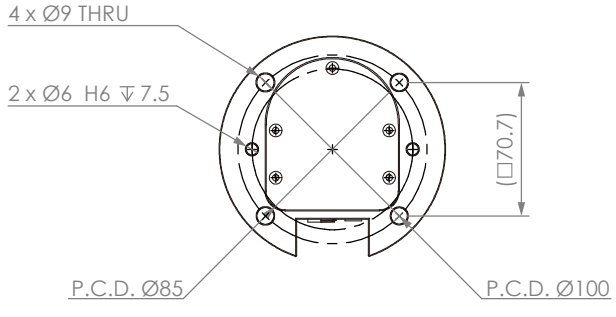
Unit: mm

The cpcRobot series continues to address evolving market needs with the introduction of the new S1 robotic arm, designed with a 2 kg payload capacity and a 650 mm reach—precisely aligned with the specifications demanded by practical applications. This new model expands the applicability of cpc's micro robotic arms in precision automation and lightweight operational environments, delivering enhanced efficiency and flexibility for end users.

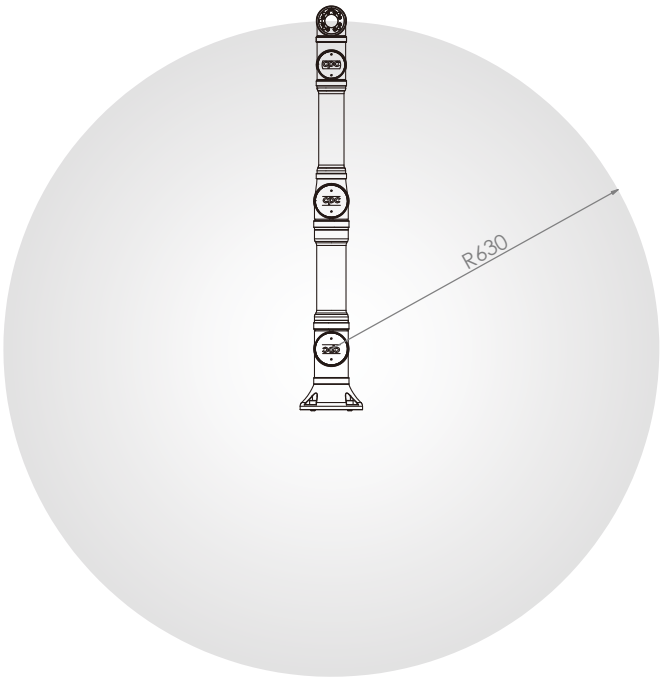
Specifications

Item		Unit	S1
Rated payload		kg	2
Reach	Vertical	mm	650
	Horizontal	mm	630
*Repeatability		μm	+/- 10
Weight		kg	7.5
Power supply		V,A	48 Vdc, 6A
Brakes		Axis	1,2,3,4,5,6
Communication			TCP/IP, Modbus TCP to controller/ EtherCAT to robot
Max. motion range		J1 (Base)	+/- 360°
		J2 (Shoulder)	+/- 360°
		J3 (Elbow)	+/- 360°
		J4 (Wrist)	+/- 360°
		J5 (Wrist)	+/- 360°
		J6 (Wrist)	Infinite
**Max. speed		J1 (Base)	180°/sec
		J2 (Shoulder)	180°/sec
		J3 (Elbow)	180°/sec
		J4 (Wrist)	360°/sec
		J5 (Wrist)	360°/sec
		J6 (Wrist)	360°/sec
*Max. TCP speed		mm/s	1000
IP protection rating (TBC)		IP54	
ISO 14644-1 Class Cleanroom (TBC)		ISO Class 5	
Materials		Aluminium , Plastic , SteelMaterials	
Product Safety Certification (TBC)		EN ISO 12100 EN ISO 10218-1 EN 60204-1 EN ISO 13849-1 ISO/TS 15066 ISO/DIS 10218-1.2	

* When the temperature of the robot is constant.
** The maximum speed depends on the center of mass offset.
*** Available to 80% motion area.

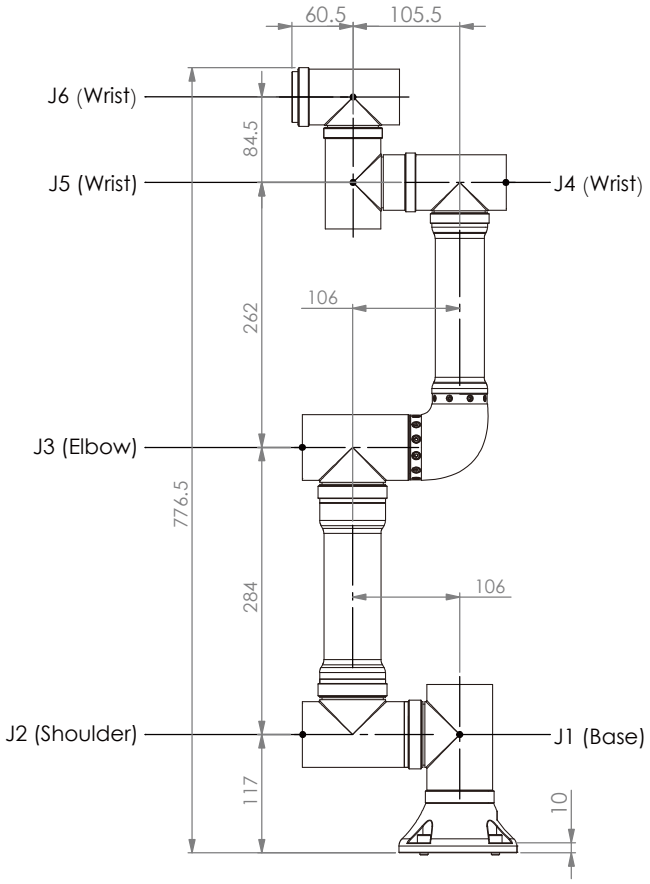


Motion area



Dimensions

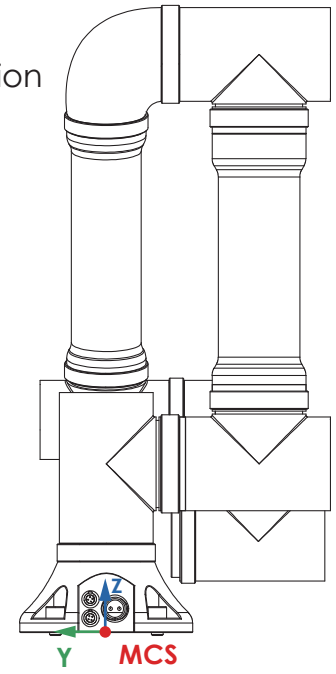
Unit: mm

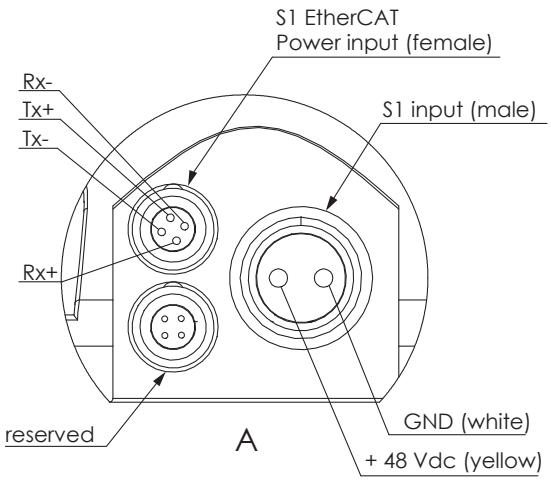


S1 6 - axis robot

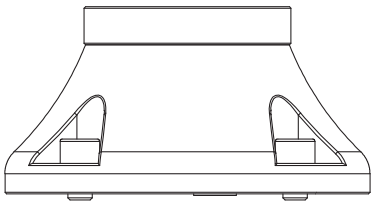
S1power/signal input and MCS Coordinate System

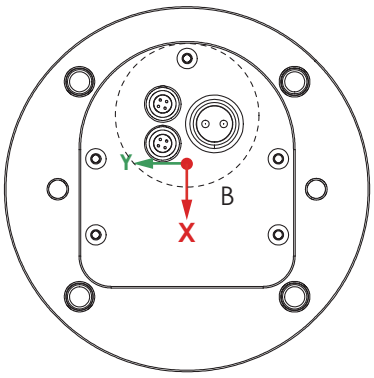
Side connection

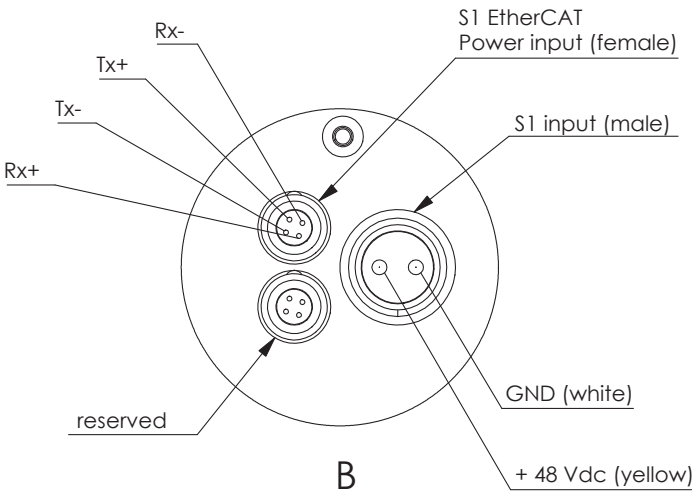




Bottom connection



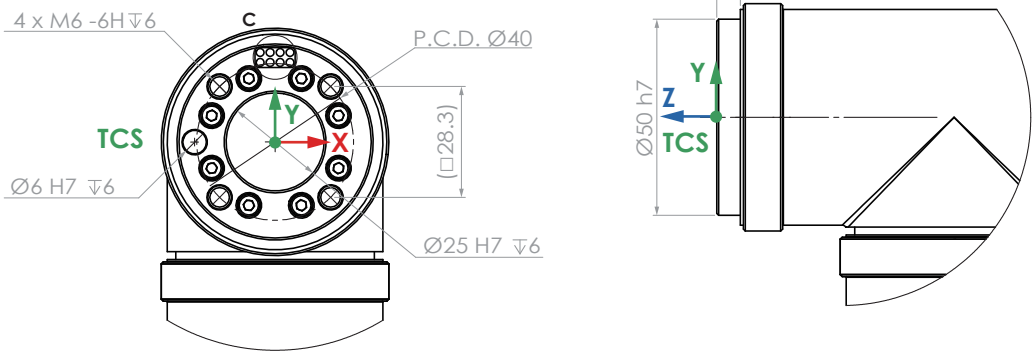




MCS Coordinate System

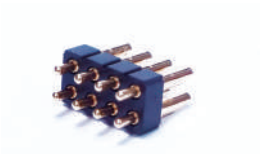
S1 end connection dimensions and TCS coordinate System

Unit : mm

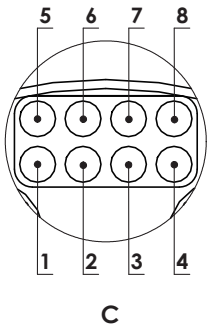


TCS Coordinate System

Tool I/O port



Corresponding pogo pin connector attached



Pin definition

Number	Definition	Description
1	Grounding	Grounding
2	AI-0	analog input (0~10V)
3	DI-0	digital input
4*	DO-0 or power or ground	Digital output or 0/12/24 V or ground
5	Power	0/12/24 V
6	AI-1	analog input (0~10V)
7	DI-1	digital input
8*	DO-1 or power or ground	Digital output or 0/12/24 V or ground

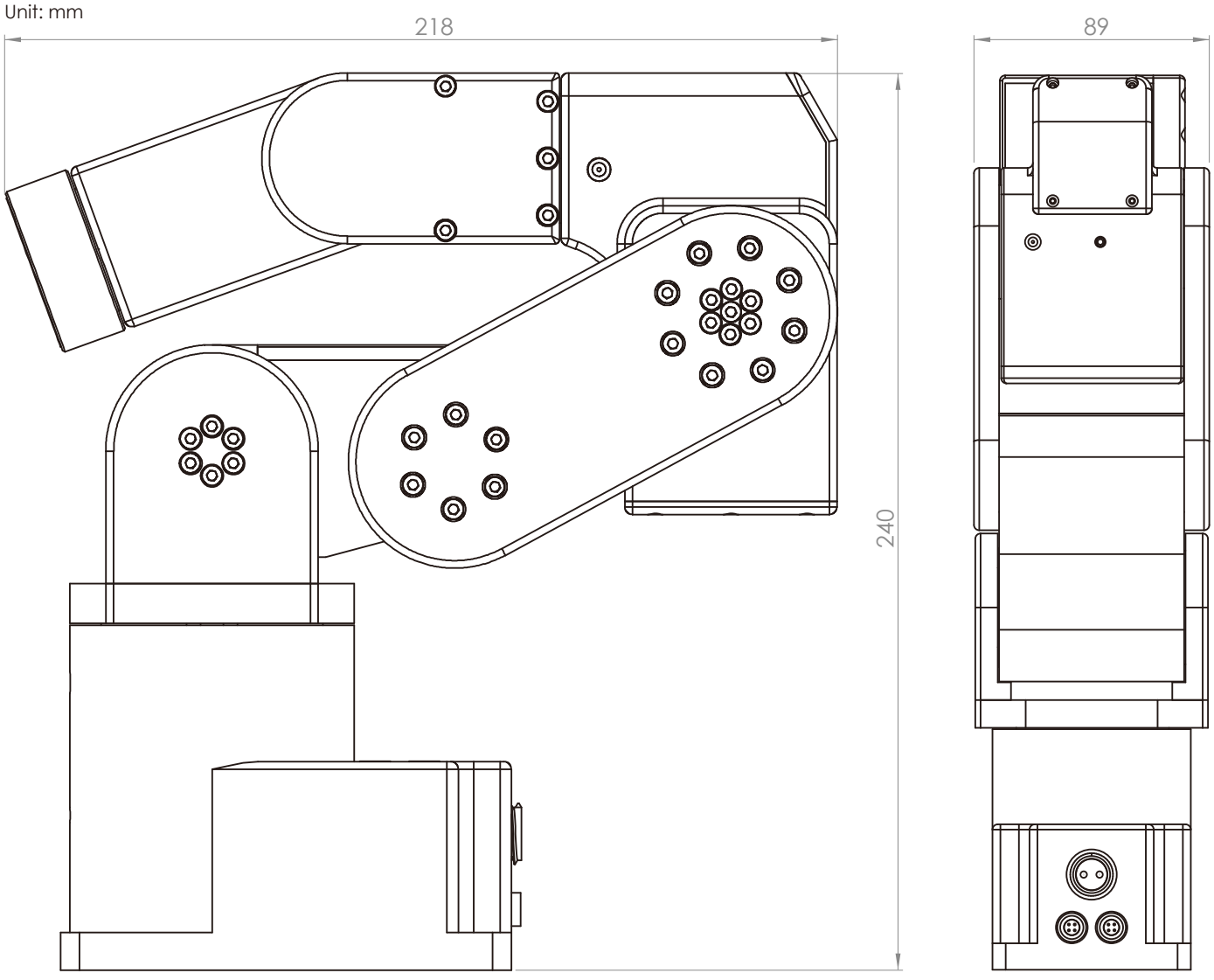
* The user can set the output signal as PNP, NPN, or pull/push via the interface.

DB0 6 - axis robot

- Small footprint
- Lightweight
- Class-leading repeatability
- Industrial
- Folding design
- Low noise
- Class-leading torque motor
- High performance servo drive
- High resolution optical absolute encoder
- Brakes in J1, J2, J3 and J4 axes
- Internal cable arrangement
- High rigidity
- Tool I/O port
- Side connection / Bottom connection

#&$% !(* +$* &)

Unit: mm



DB0 is a compact, 4.7 kg weight 6-axis robot arm with high rigidity. These features create high precise motion and operate in limited space with optimal usage. 5 μm repeatability makes higher precision mission to be done. DB0 also provides a guided panel to complete the path planning easily.

Specifications

Item		Unit	DB0
Payload		kg	0.5
Reach	Vertical	mm	465
	Horizontal	mm	327
*Repeatability		μm	+/- 5
Weight		kg	4.7
Power supply		V,A	48 Vdc, 5A
Brakes		Axis	1,2,3,4
Communication			TCP/IP, Modbus TCP to controller/ EtherCAT to robot
IP protection rating		IP40	
Product Safety Certification		EN ISO 12100 EN ISO 10218-1 EN 60204-1 EN ISO 13849-1 ISO/DIS 10218-1.2	

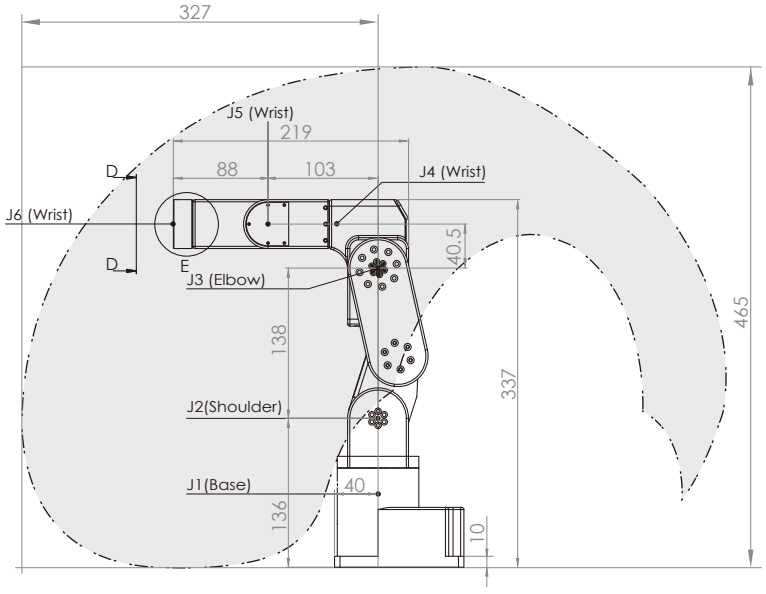
Item	Unit	DB0
Max. motion range	J1 (Base)	+ 175° / - 175°
	J2 (Shoulder)	+ 160° / - 15°
	J3 (Elbow)	+ 145° / - 80°
	J4 (Wrist)	+ 175° / - 175°
	J5 (Wrist)	+ 90° / - 90°
	J6 (Wrist)	Infinite
**Max. speed	J1 (Base)	180°/sec
	J2 (Shoulder)	180°/sec
	J3 (Elbow)	180°/sec
	J4 (Wrist)	360°/sec
	J5 (Wrist)	360°/sec
	J6 (Wrist)	360°/sec
*Max. TCP speed	mm/s	1000

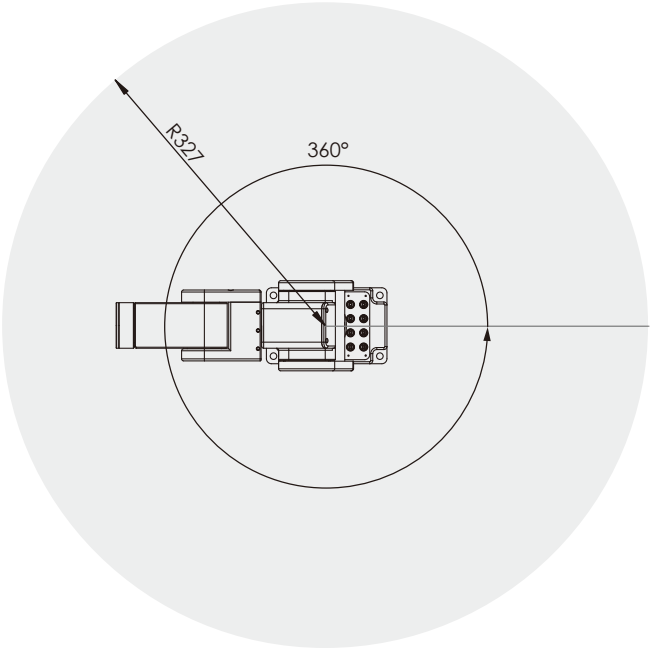
* When the temperature of the robot is constant.
** The maximum speed depends on the center of mass offset.

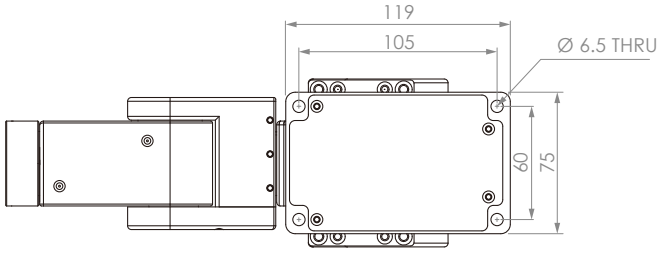
Dimensions

Motion area

Unit: mm





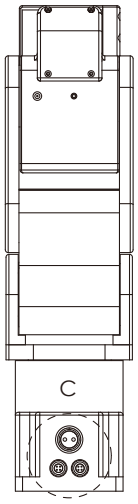


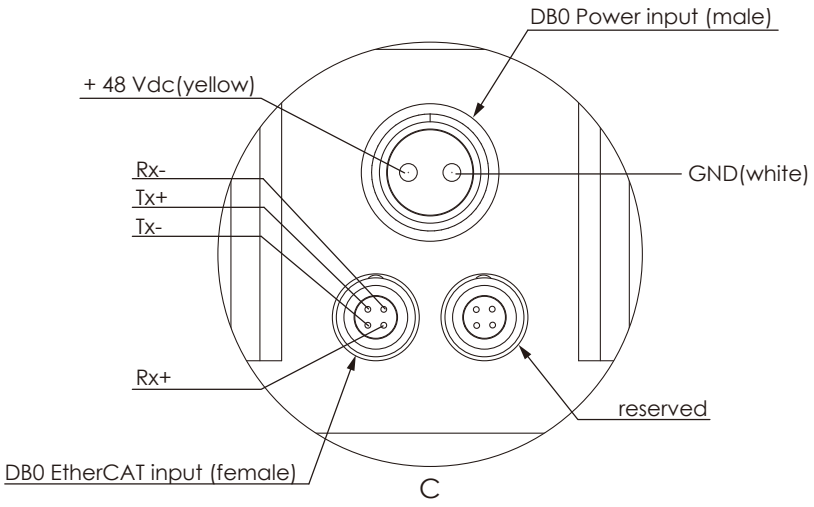
Base mounting hole

DB0 6 - axis robot

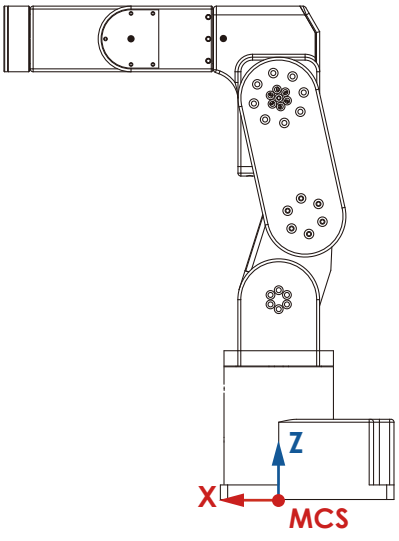
DB0 power/signal input and MCS Coordinate System

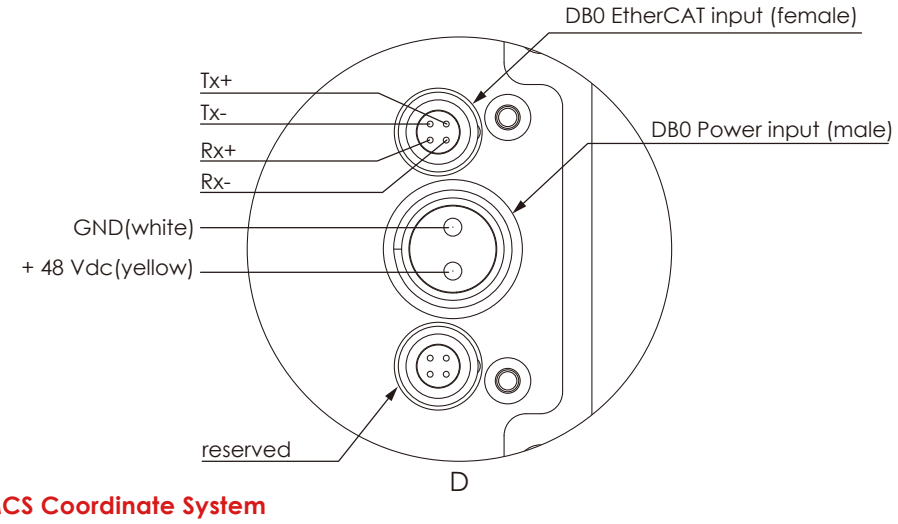
Side connection





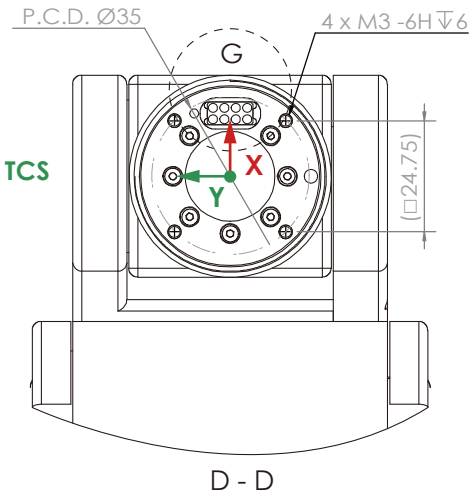
Bottom connection





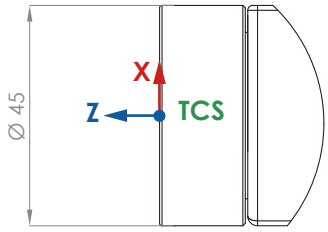
MCS Coordinate System

DB0 end connection dimensions and TCS coordinate System



D - D

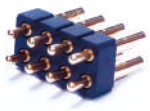
Unit : mm



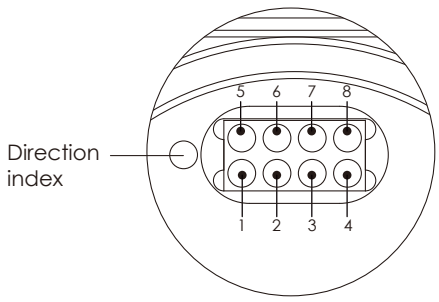
E

TCS Coordinate System

Tool I/O port



Corresponding pogo pin connector attached



G

Pin definition

Number	Definition	Description
1	Grounding	Grounding
2	AI-0	analog input (0~10V)
3	DI-0	digital input
4*	DO-0 or power or ground	Digital output or 0/12/24 V or ground
5	Power	0/12/24 V
6	AI-1	analog input (0~10V)
7	DI-1	digital input
8*	DO-1 or power or ground	Digital output or 0/12/24 V or ground

* The user can set the output signal as PNP, NPN, or pull/push via the interface.

S1/S0/DB0 Robot Ordering information

S	0	N	03	S	G	J	
						Customization	
					Tool I/O Signal: G: Typical I/O EC： EtherCAT		
				The rotation angle of the final axis: M: unlimited S: ±360°			
			Cable length: 03:3 m 12:12 m				
		Connection direction: N- side direction B- bottom direction					
	Size： 0, 1						
Product type： DB：Industrial S：Collaborative							

Accessories

IPC Controller
(Lex SKY2 2I640DW)

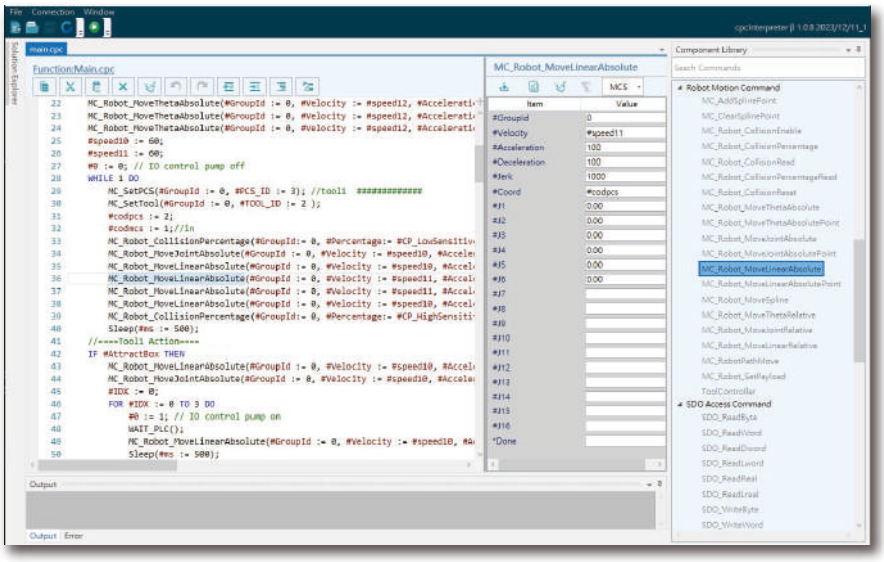
Power Supplier: 10A@48VDC

E-stop

cpcRobot Features

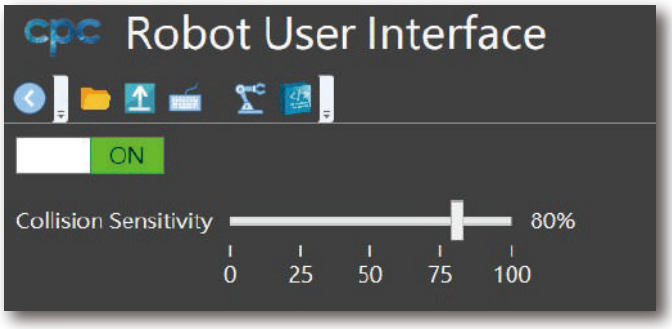
Interpreter

The robotic arm interpreter is a specialized editor for crafting motion programs.
Developers can expedite programming and streamline motion verification by simply clicking instructions, configuring settings, and inserting code.



Collision Detection

The cpc robotic arm collision detection system employs mathematical models to sense collision during execution of tasks, eliminating the need for external sensors. It covers both the arm and the tool, with sensitivity adjustments available on a dedicated interface for ease of use and configuration.

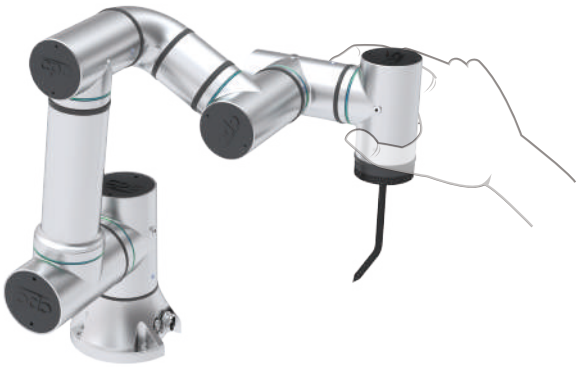


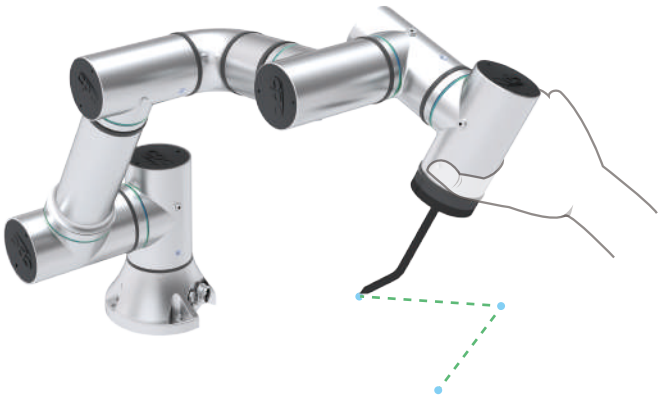
Dimensional Dragging Constraints

In zero-gravity mode, dimensions for free dragging can be specified, including lines and planes.

Hand-Guided Teaching

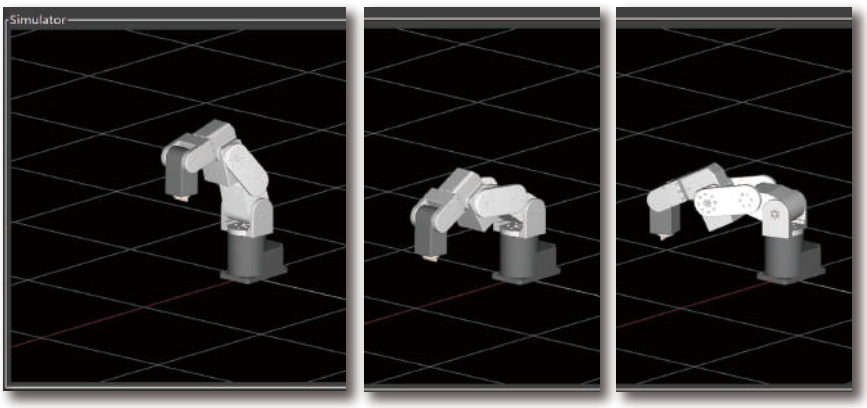
Hand-guided teaching is an intuitive method for editing robotic arm paths, bypassing the need for complex programming languages. By manually moving the robotic arm, required actions are recorded in real-time, empowering non-technical personnel to effectively employ robotic arms for diverse tasks.





Simulator

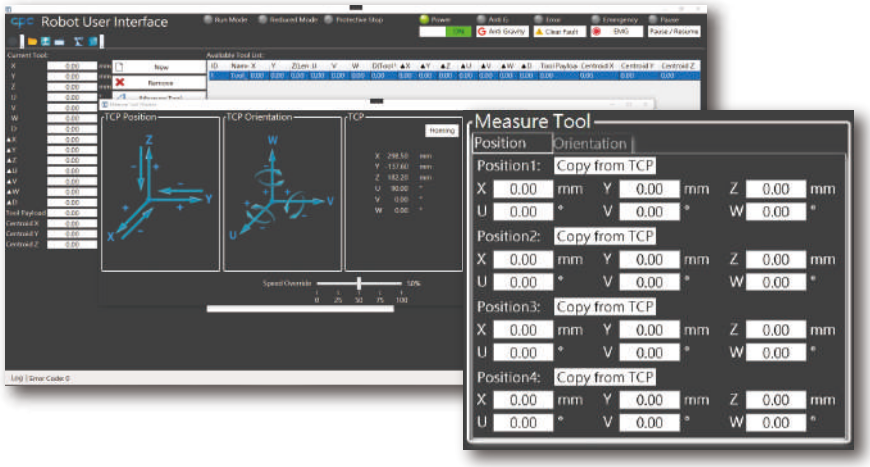
The simulator faithfully reproduces robotic arm motion, enabling users to test, verify, and optimize tasks without impacting the physical arm. It offers single-joint operation and Speed Override features, serving as a safe and efficient simulation tool for developing and testing robotic arm applications.



cpcRobot Features

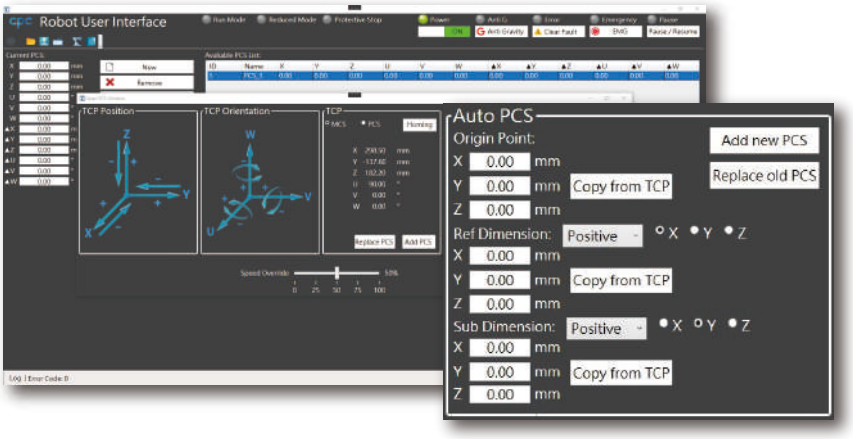
Automated Tool Dimension Calculation

The automated tool dimension calculation feature automatically calculates end-of-arm tool dimensions, reducing manual input, minimizing errors, and enhancing user experience in robotic arm applications.



Automatic PCS Coordinate System Configuration

The automatic PCS Coordinate System Configuration feature automatically calculates and sets the robotic arm's coordinate system, including reference points, directions, and related parameters. This simplifies adaptation to various work scenarios and tasks while reducing operator configuration workload.

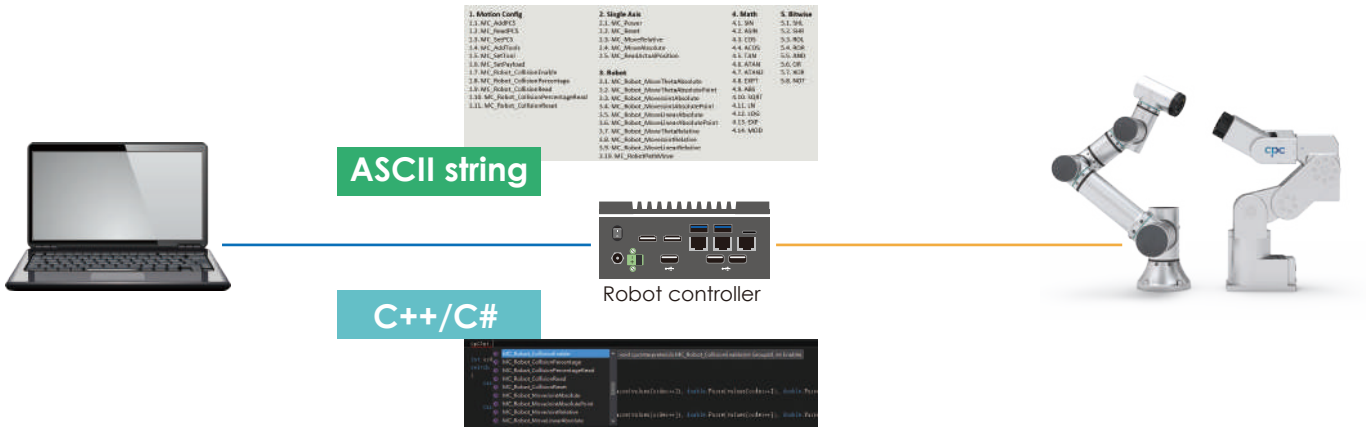


EtherCAT Automatic Configuration

EtherCAT automatic configuration automatically recognizes and configures specified devices on EtherCAT, saving time, simplifying the process, and ensuring configuration accuracy.

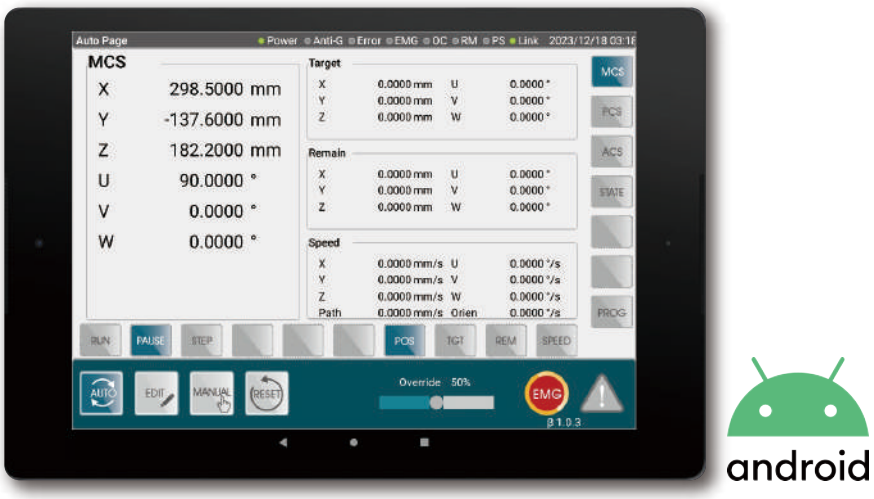
API and SDK Support

The robotic arm system supports API (Application Programming Interface) and SDK (Software Development Kit),
enabling developers to write functions using C, C++, and custom languages. By offering APIs and SDKs, it becomes an open and flexible platform, simplifying robotic arm integration into developers' applications.

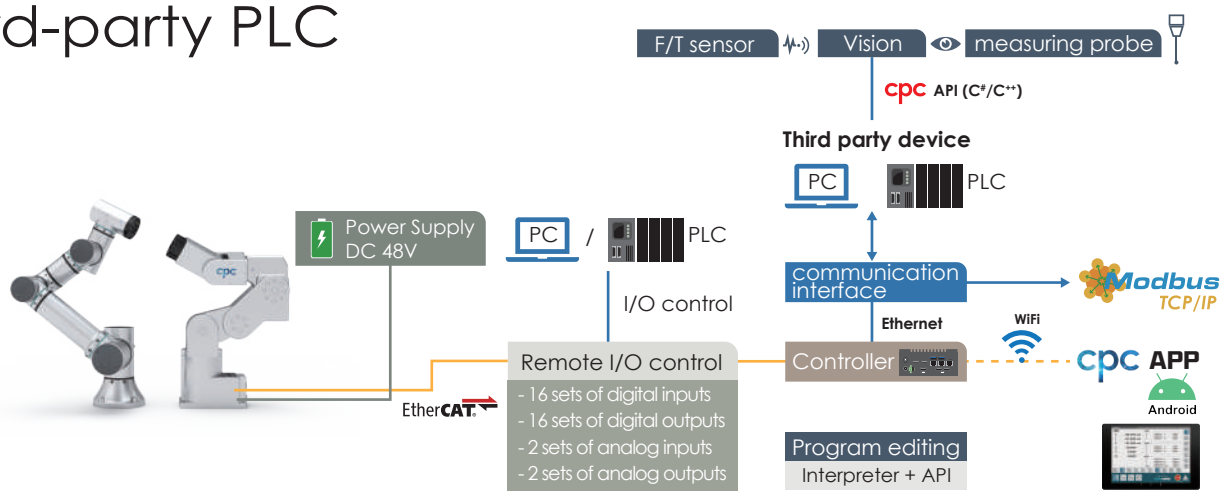


Tablet App

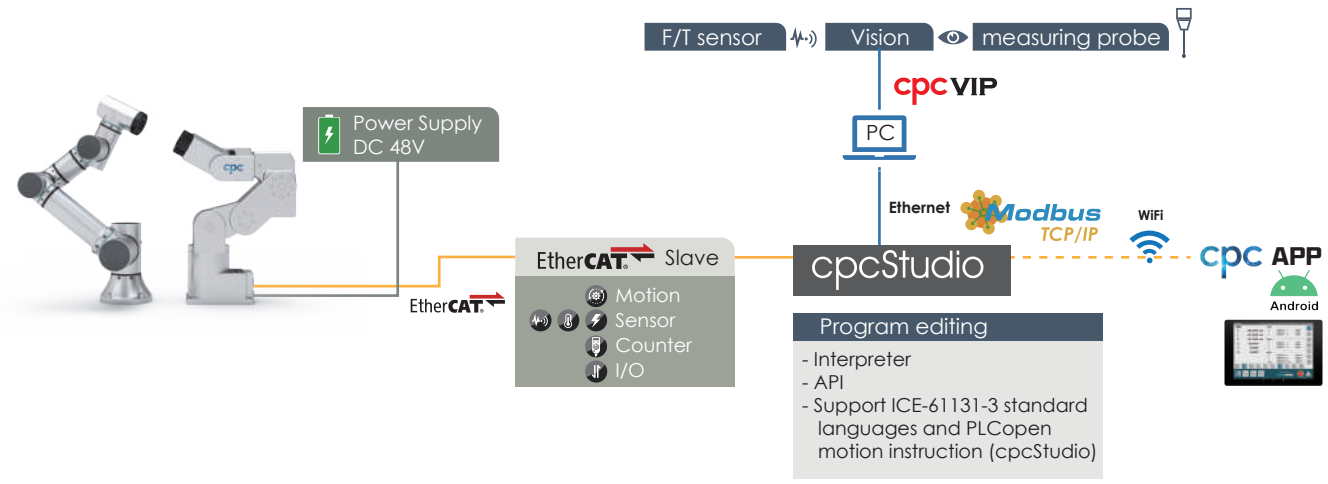
cpcRobot offers an Android app for remote operation, functioning as a teaching tool for users to perform tasks including program editing, numerical monitoring, manual operations, and teaching.

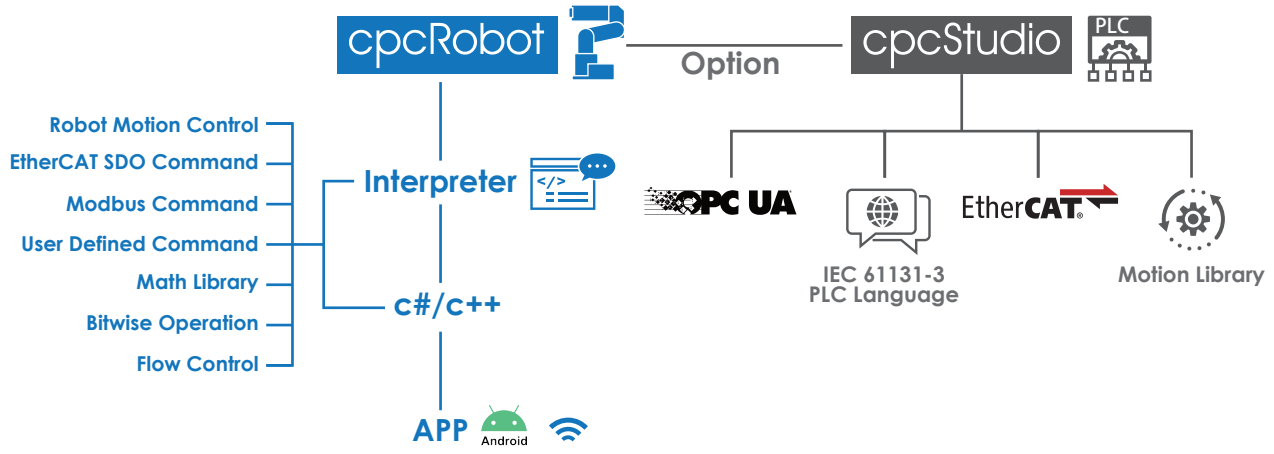


Collaborate with a third-party PLC



Using cpcStudio





Package selection S1/S0/DBO

controller	Interpreter	c#/c++ API	Android APP	IEC 61131-3 PLC Language	EtherCAT	OPC UA	Motion Library
Controller *1 Power cable 3m *1 EtherCAT cable 3m*1 Power supplier *1	Robot Motion Control EtherCAT SDO Command Modbus Command User Defined Command Math Library Bitwise Operation Flow Control	Support to c#/C++ programming	Wifi APP	Follow IEC 61131-3	Free configuration EtherCAT slave	Support to OPC-UA	One/Multiple Axes.

A PACKAGE

controller + Interpreter + c#/c++ API + Android APP

B PACKAGE

A PACKAGE + cpcStudio: IEC 61131-3 PLC Language

C PACKAGE

A PACKAGE + cpcStudio: EtherCAT

D PACKAGE

A PACKAGE + cpcStudio: OPC UA

Package selection S1 / S0 / DBO

E PACKAGE

A PACKAGE + cpcStudio EtherCAT + cpcStudio Motion Library

F PACKAGE

A PACKAGE + cpcStudio IEC 61131-3 PLC Language + cpcStudio EtherCAT

G PACKAGE

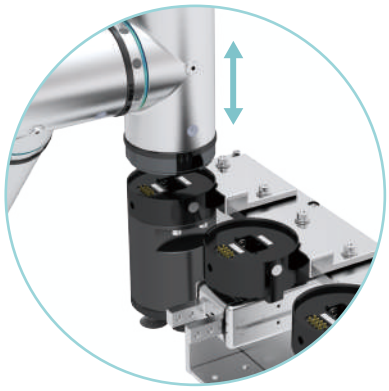
A PACKAGE + cpcStudio IEC 61131-3 PLC Language + cpcStudio OPC UA

H PACKAGE

A PACKAGE + cpcStudio IEC 61131-3 PLC Language + cpcStudio EtherCAT + cpcStudio Motion Library

I PACKAGE

A PACKAGE + cpcStudio IEC 61131-3 PLC Language + cpcStudio OPC UA + cpcStudio EtherCAT + cpcStudio Motion Library



ATC Automatic Tool Changer System

ATC Automatic tool change system

In the process of automation, robot arms are increasingly required to perform multitasking to optimize the use of simple design and space efficiency. Therefore, automatic tool change can greatly reduce downtime and tool change time in the robot system. It is seen as an essential requirement to increase production capacity. Direct Technology has launched an automatic tool change system for micro-robots, including the holder, tool/robot joint, and various connectors.
Its unique patented design is purely mechanically combined, so it brings the following main feature:

1. Quick and easy

No external air pressure and power are needed, and the tool exchange can be completed during the movement of the robot arm, which simplifies the entire tool change system and saves the time for tool exchange.

2. High reliability

Because it does not rely on extra power sources, there is no need to worry about the instability of the source and can keep the reliability and integration accuracy of the entire tool changer.

3. Lightweight

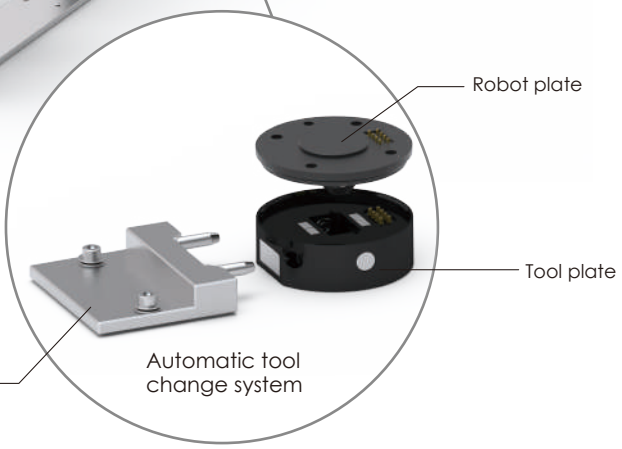
Compare to the same class, because of no extra adapters; it will not increase the excessive load consumption of the robot arm.

4. Magnet support guiding：all directions mechanical fixing

Using the permanent magnet to fix the connecting plate and the tool holder greatly reduces the risk of mechanical wear.

5. Provide electrical connector interface / Customization

Provide customized air pressure and electrical connectors to suit the various tools of the different applications.



Tool changing system specifications

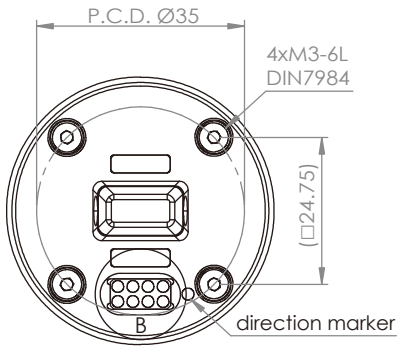
Specification	unit	ACT-45
Max. payload	kg	> 2*
Bending force	N	> 200*
XY axis maximum Static moment	Nm	> 30*
Z axis maximum Static moment	Nm	> 30*
Weight	kg	0.068
Repeatability	mm	+/- 0.01
Electrical I/O	-	8x1A@24 Vdc

* For the maximum value that can be tolerated, please get in touch with cpc team.

ATC mechanical interface
tool / fixture connecting plate 45

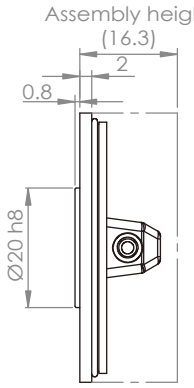
Robot side :

Robot plate dimensions

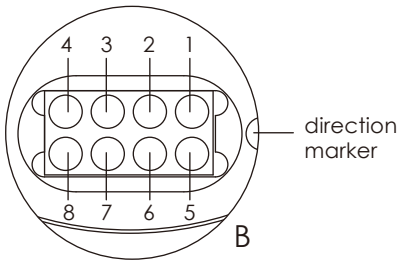


Robot plate connecting plate

Robot plate input interface



Pogo pin



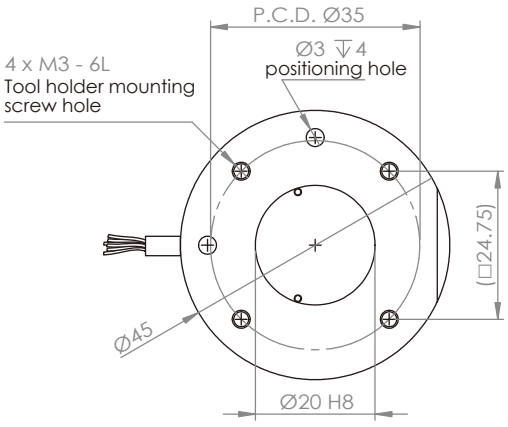
Pogo pin

The relationship between the pins and the wiring

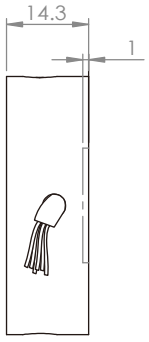
input interface	output interface
Pogo pin / No.	Flying wire / Color
1	brown
2	gray
3	blue
4	yellow
5	red
6	pink
7	green
8	white

Tool side :

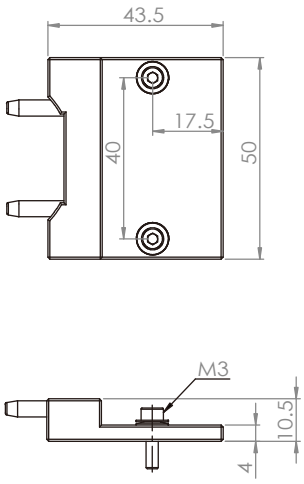
Tool plate dimensions



Tool plate output interface



Tool holder

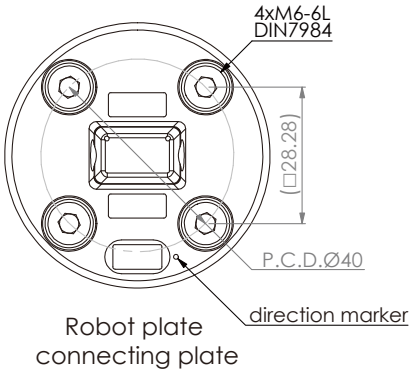


Tool changing mechanism - ATC 55

(Flange interface: ISO 9409-1-40-4-M6)

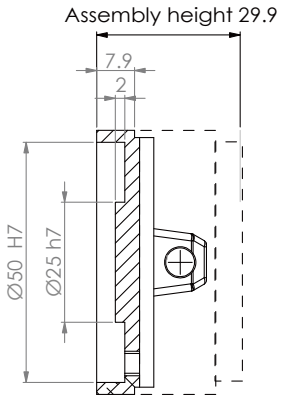
Robot side：

Robot plate dimensions

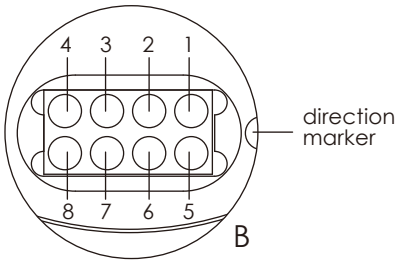


Robot plate
connecting plate

Robot plate input interface



Pogo pin



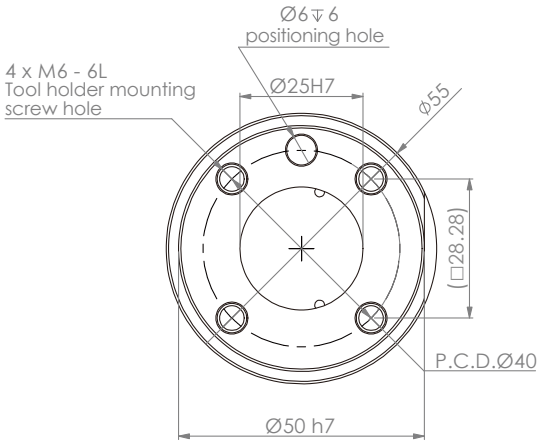
Pogo pin

The relationship between the pins and the wiring

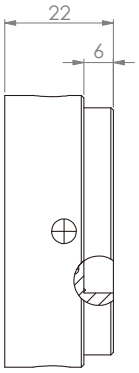
input interface	output interface
Pogo pin / No.	Flying wire / Color
1	brown
2	gray
3	blue
4	yellow
5	red
6	pink
7	green
8	white

Tool side：

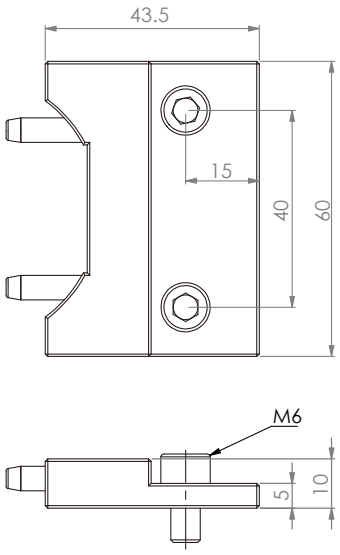
Tool plate dimensions



Tool plate output interface



Tool holder

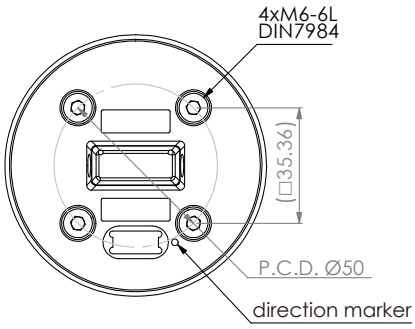


Tool changing mechanism - ATC 80

(Flange interface: ISO 9409-1-50-4-M6)

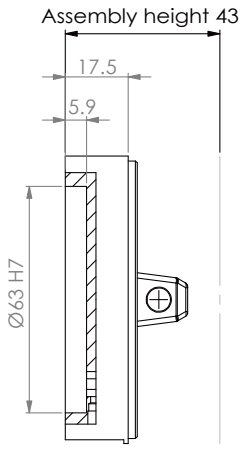
Robot side :

Robot plate dimensions

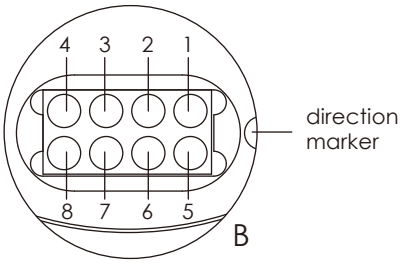


Robot plate
connecting plate

Robot plate input interface



Pogo pin



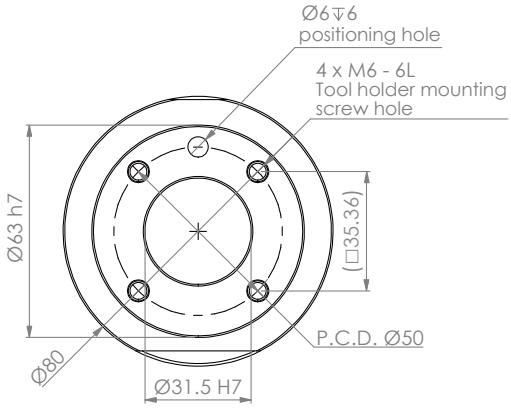
Pogo pin

The relationship between the pins and the wiring

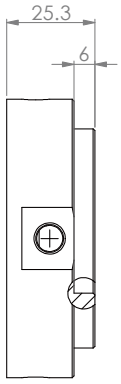
input interface	output interface
Pogo pin / No.	Flying wire / Color
1	brown
2	gray
3	blue
4	yellow
5	red
6	pink
7	green
8	white

Tool side :

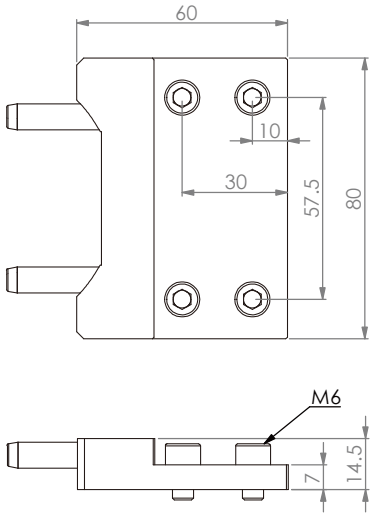
Tool plate dimensions



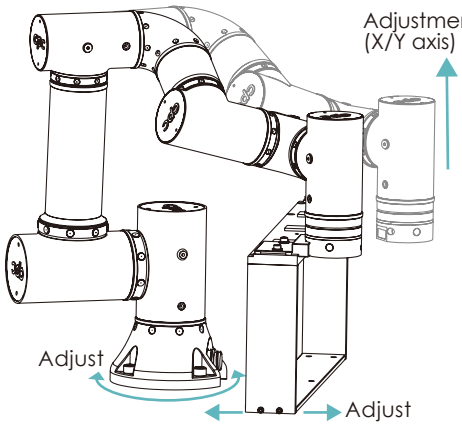
Tool plate output interface



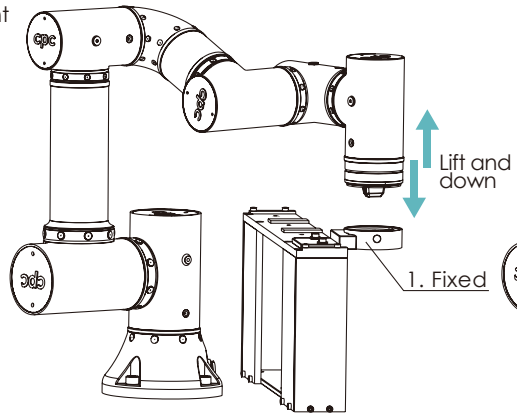
Tool holder



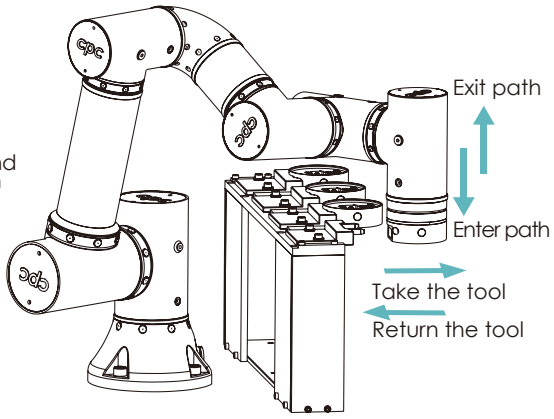
Tool changer installation and setting



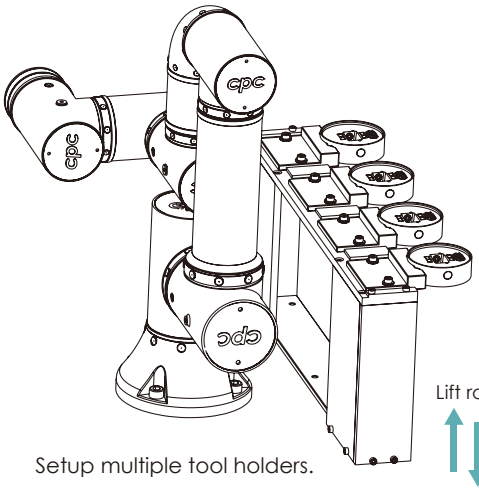
Robot plate and tool plate aligned on the same coordinate to engage.



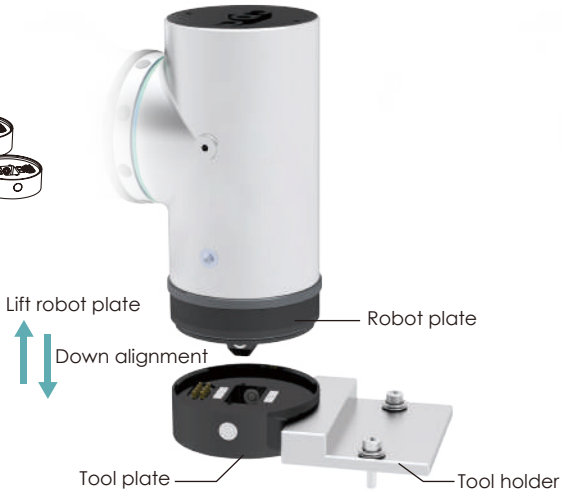
Mounting tool holders and lift / down to align the plate

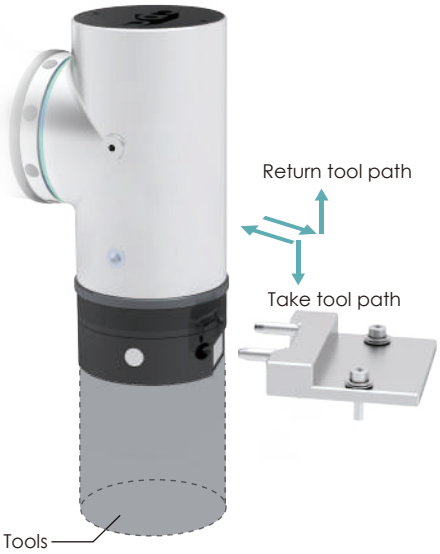


Using a simple process to test the changing cycle. Fine-tune the TCS to the engaging is smooth and exact.



Setup multiple tool holders.





Tool changer ordering information

ATC	45	M	P	F	N	01	J	
								Customization
							Cable length: 01：0.1 m N：none	
						Air pressure connector: N: none		
					Output electrical interface: F: Flying wire C: M8 connector			
				Input electrical interface: P： Pogo pin F： Flying wire C： M8 connector				
			Part: M: Robot plate T: Tool plate H: Tool holder K: Kit					
		Size：45、55、80						
	Product type： ATC Automatic tool change system							

VA Vacuum gripper

VA Vacuum gripper

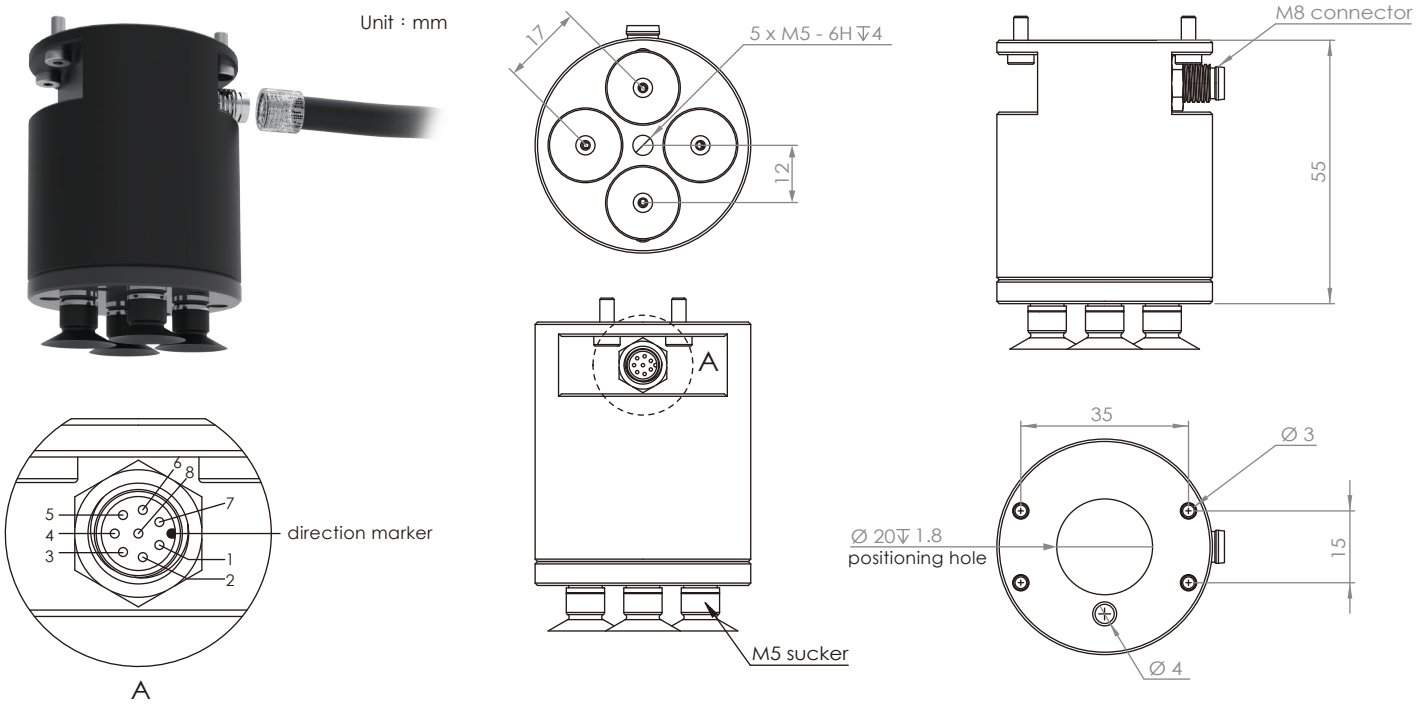
VA is a compact integrated vacuum gripper that includes a vacuum pump, pressure detector, and solenoid valve to form a complete vacuum cycle system. Users don't need to prepare a vacuum source. Since there is no tracheal distribution, using the gripper with the arm will avoid the problem of entanglement in the past.
In addition, the vacuum pump, air pressure detector, and solenoid valve can be controlled independently. The user can determine the optimal process for operating the gripper. The VA vacuum gripper can be installed directly on the cpcRobot and ATC automatic tool changing system to achieve plug-and-play function.

VA Vacuum gripper	
Model	VA-45
Actuation energy	DC power
Weight (kg)	0.23
Maximum suction load (kg)*	0.9
Maximum vacuum pressure (mbar)**	-500
Maximum flow (l/min)**	0.55
Operating temperature (℃)	5-50
Pressure sensor	
Rated pressure range (mbar)	0-1010
Output voltage (V)	1-5

* The suction direction of the standard product is vertical, and the actual use must take into account the diameter of the sucker, the installation direction, and the position of the center of gravity.
** This ideal value will depend on atmospheric pressure conditions.

Features

- Plug and play function
- Built-in vacuum ejector, all-electric supply, no need for external pipes.
- Built-in air pressure sensor.
- The pump operation can be controlled freely; therefore, the pump duty cycle can be used efficiently, and the service life can be increased.
- The M5 air pad can be replaced based on application needs. The unused 5xM5 threaded holes must be sealed with set screws. (Customization)



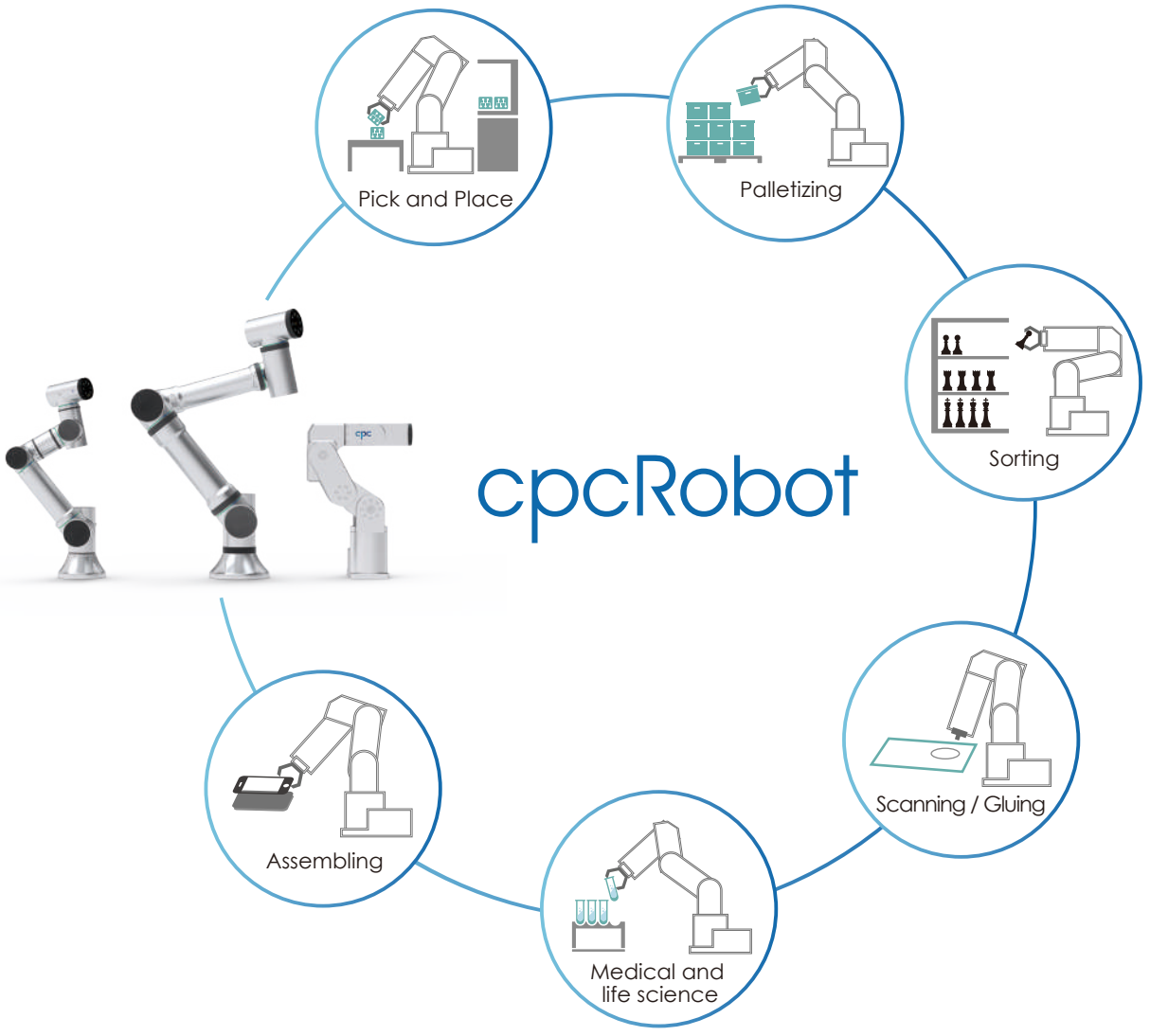
Pin table

Number	Function	Wire diameter	color
1	24V	28 AWG	white
2	DI-1 (Pump switch)	28 AWG	blue
3	DI-0 Vaccum no/off	28 AWG	pink
4	DO-1	28 AWG	gray
5	DO-0	28 AWG	yellow
6	AO-1	28 AWG	green
7	AO-0 (Pressure sensing)	28 AWG	brown
8	GND	28 AWG	red

VA Vacuum gripper ordering information

VA	45	S	15	03	-J	
					Customization*	
				Cable length：03：3m		
			Air pad diameter： Ø8x5 Max. Ø10x4 Max. Ø15x4 Max.			
		Number of Air pad: S: Standard O: None				
	size：45					
Production type: VA Vacuum gripper						

*Note: The user can design the customized mounting hole of the pad and positioning hole on VA gripper.



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