

# PICK & PLACE SOLUTIONS

Sysmac Robotics



# Delta Robot Solution

## The fastest picking system integrated in the Sysmac platform

The combination of the high performance Sysmac NJ controller and G5 servo motors with the addition of the delta robot kinematics, allows you to achieve the maximum throughput in your pick and place applications. The NJ robotics controller precisely controls all the motion devices on the machine, including single axis, groups of axes and robot control by providing independent, coordinated and synchronized motion.

The robot synchronization with the multiple conveyors can be easily programmed thanks to a powerful command developed specially for pick and place applications.

### NJ Robotics

Number of Robots	Cycle time
8 Deltas	2 ms
4 Deltas	1 ms

### Benefits

- Robot control is integrated in the NJ Robotics controller
- Control of up to 8 robots by one controller
- High through-put more than 200 cycle/min per Delta robot

FQ-M Vision Sensor

NJ Robotics

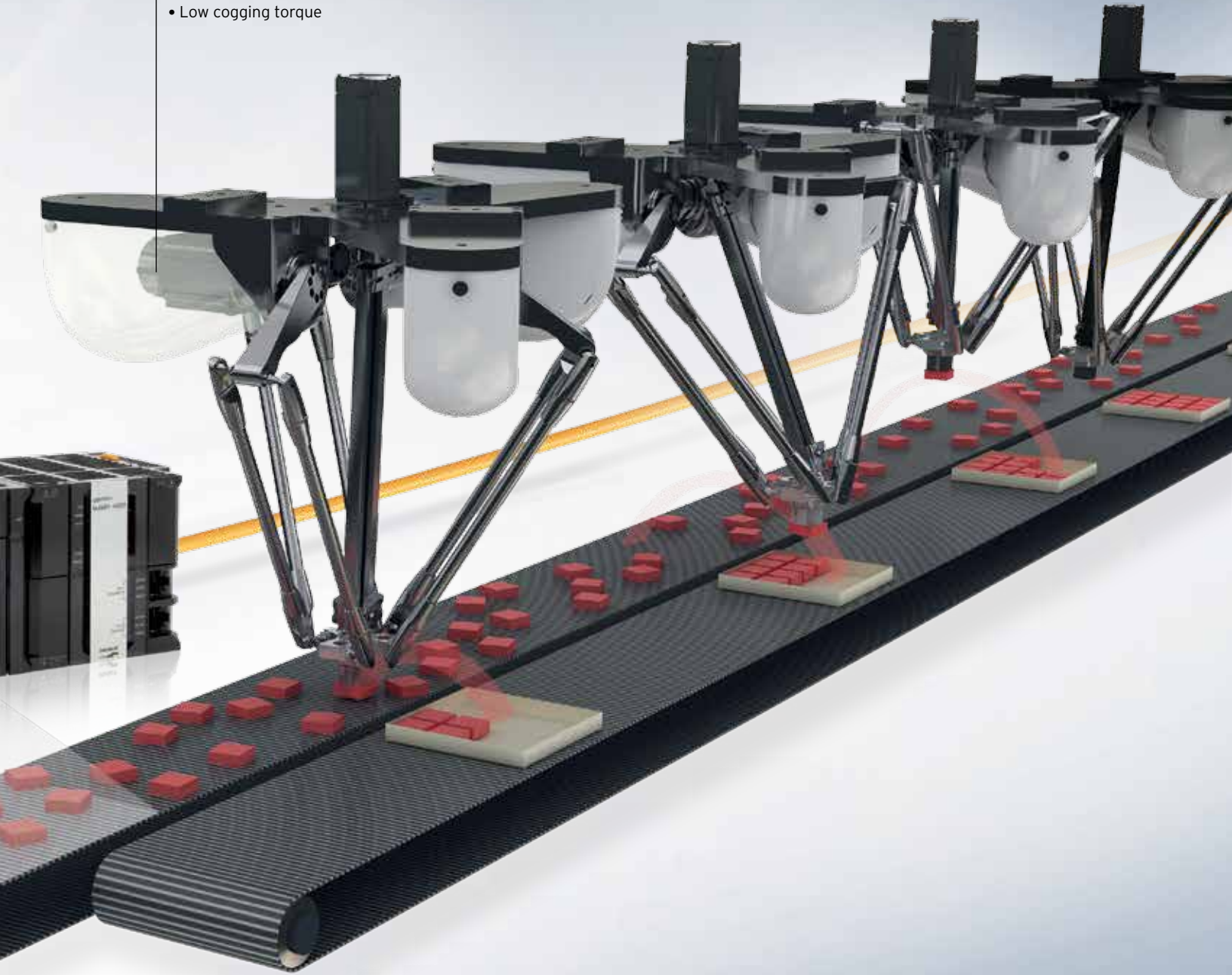
EtherCAT

Encoder feedback

**SYSMAC**  
always in control

### Accurax G5 Servo Motors

- High frequency response of 2 kHz
- 17 bit absolute encoder
- Low cogging torque



### Delta Robot Series



#### Delta Robot

- Rated working range:  
Ø 1100 x 250mm
- Max. Payload: 2Kg
- Cycle time 25/305/25mm (0.1Kg):  
Up to 150 cycle/min.



#### Mini Delta Robot

- Rated working range:  
Ø 500 x 155mm / Ø 450 x 135mm  
(with rotational axis)
- Max. Payload: 1Kg
- Cycle time 25/305/25mm (0.1Kg):  
Up to 200 cycle/min.

# Delta Robot Solution

The NJ Robotics controller is the core of this system architecture and is based on the EtherCAT network, providing the highest motion performance for demanding pick and place applications. The delta robot arms use the G5 servo motors to reduce the settling time thanks in part to the high frequency response of 2KHz of this high-end servo, representing the best choice for positioning tasks. The FQ-M vision sensor is designed specifically for motion applications and is able to detect the position of several pieces moving on a conveyor at very high speeds, increasing the overall through-put of the machine.



# Product overview

## Robot

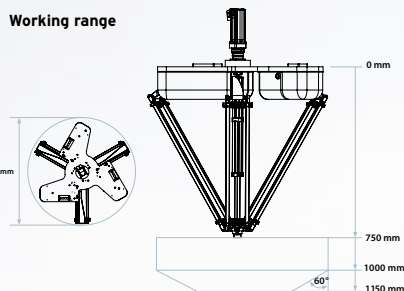
### Delta Robot

#### Specifications

- Degrees of freedom: 3+1 (rotation optional)
- Rated working range:  $\varnothing$  1100 x 250mm
- Max. Payload: 2Kg
- Position repeatability X,Y,Z =  $\pm$  0.3mm
- Angular repeatability Rz =  $\pm$  0.4°
- Cycle time 25/305/25mm (0.1Kg): Up to 150 cycle/min.
- Weight: 65Kg
- IP65



#### Working range



230 V	480 V	Description
CR-UGD4-R	CR-UGD4C-R	3 axes + 1 rotating axis
CR-UGD4-NR	CR-UGD4C-NR	3 axis (no rotation)

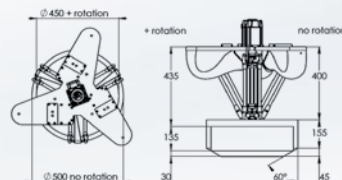
### Mini Delta Robot

#### Specifications

- Degrees of freedom: 3+1 (rotation optional)
- Rated working range:  $\varnothing$  500 x 155mm /  $\varnothing$  450 x 135mm (with rotational axis)
- Max. Payload: 1Kg
- Position repeatability X,Y,Z =  $\pm$  0.2mm
- Angular repeatability Rz =  $\pm$  0.3°
- Cycle time 25/305/25mm (0.1Kg): Up to 200 cycle/min.
- Weight: 25Kg
- IP65



#### Working range



230 V	Description
CR-UGD4MINI-R	3 axes + 1 rotating axis
CR-UGD4MINI-NR	3 axis (no rotation)

## Controller



### NJ Robotics

- Up to 64 axes motion control
- Scalable control: CPUs for 16, 32 and 64 axes
- Up to 8 Delta robots
- EtherCAT and EtherNet/IP ports built-in
- Conforms to IEC 61131-3 standards

Reference list	Description
NJ501-4500	64 axes
NJ501-4400	32 axes
NJ501-4300	16 axes
NJ501-4310	16 axes (Control of 1 Delta Robot)

## Servo system

### Accurax G5 Servo Drives



- High frequency response of 2 kHz
- Safety conforming to ISO13849-1
- Advanced tuning algorithms

### Accurax G5 Servo Motors

#### For Delta

- 17 bit absolute encoder
- 230 VAC 1kW servo motor with brake
- Low cogging torque



#### For Mini Delta

- 17 bit absolute encoder
- 230 VAC 400W servo motor with brake
- Low cogging torque

## Vision

### FQ-M Series



- Camera, vision and connectivity in one
- Compact vision sensor
- Designed for high speed pick and place
- Encoder tracking and smart calibration function
- Fast and powerful object recognition

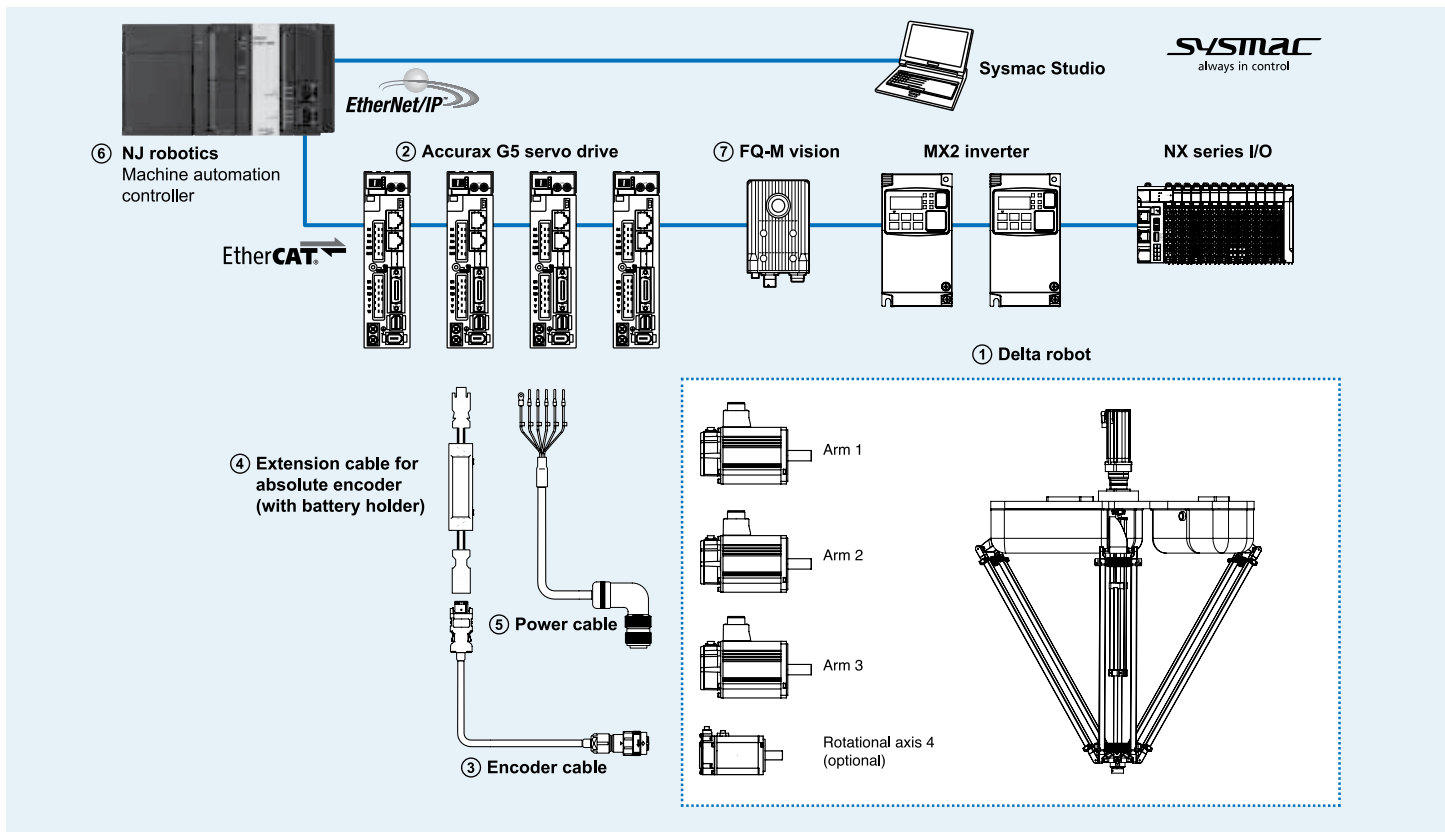


### FH Series

- Stable measurements under changing conditions
- Wide variety of positioning measurement methods
- Simple auto calibration
- Flexible camera installation

# Delta Robot

## Delta Robot System Configuration



Note: Servo motors included in the Delta robot.

## Delta Robot Specifications

Supply voltage		230 V		480 V		
Model		CR-UGD4-R	CR-UGD4-NR	CR-UGD4C-R	CR-UGD4C-NR	
Working volume	X, Y axis (stroke)	Ø 1100 mm				
	Z axis (stroke)*1	250 mm (maximum Ø 1100 mm) / 400 mm (center Ø 580 mm)				
	Θ axis (rotation angle)	±180 deg (default setting, it can be changed)	–	±180 deg (default setting, it can be changed)	–	
Servo motor	Arm 1, 2, 3	Model	R88M-K1K030T-BS2		R88M-K1K030C-BS2	
		Capacity	1000 W			
	Rotational axis 4	Model	R88M-K1K030T-BS2	–	R88M-K1K030C-BS2	–
		Capacity	1000 W	–	1000 W	–
Repeatability*2	X, Y, Z axis	±0.3 mm				
	Θ axis	±0.4 deg	–	±0.4 deg	–	
Maximum payload		2 kg				
Maximum throughput*3		150 CPM*4				
Θ axis maximum torque		According to the servo motor	–	According to the servo motor	–	
User tubing (outer diameter)		Ø 8*5				
Travel limit		1. Soft limit, 2. Mechanical stopper (X, Y, Z axis)				
Noise level		< 68 dB (A)				
Ambient temperature		5°C to 45°C				
Relative humidity		Max. 90%				
Protection class		IP65				
Weight (kg)		65 kg				

\*1 For further details please check the dimensional drawing in the next section.

\*2 This is the value at a constant ambient temperature.

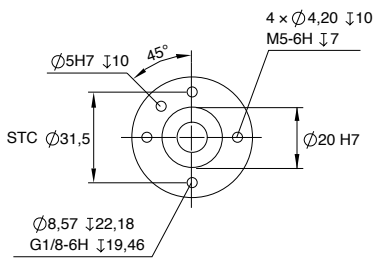
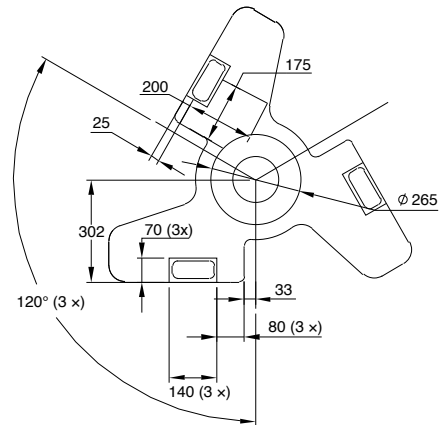
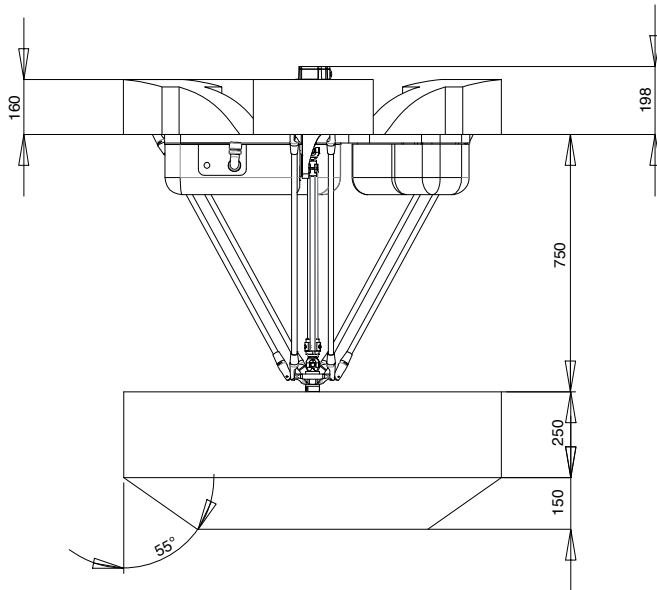
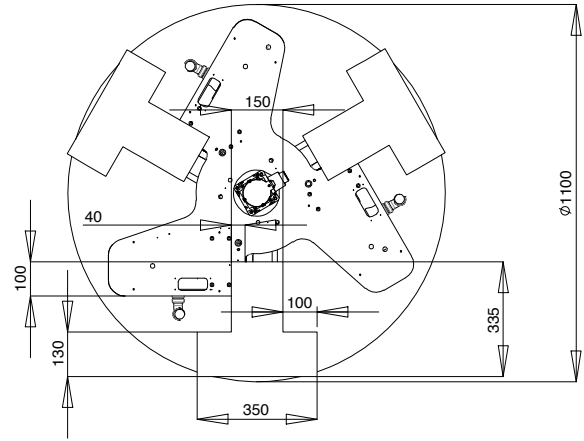
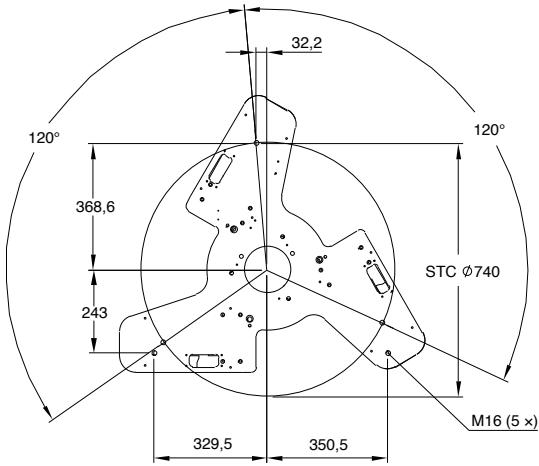
\*3 With 0.1 kg payload. When reciprocating 305 mm in horizontal and 25 mm in vertical directions.

\*4 CPM: Cycle per minutes. Check the note 3 for the cycle definition.

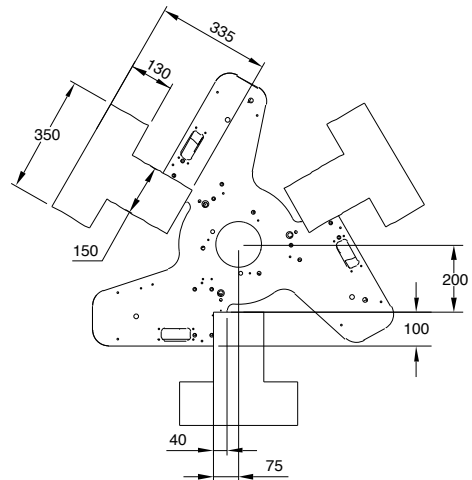
\*5 Only for the air suction. Air injection is not allowed.

# Delta Robot Dimensions

CR-UGD4□-□R

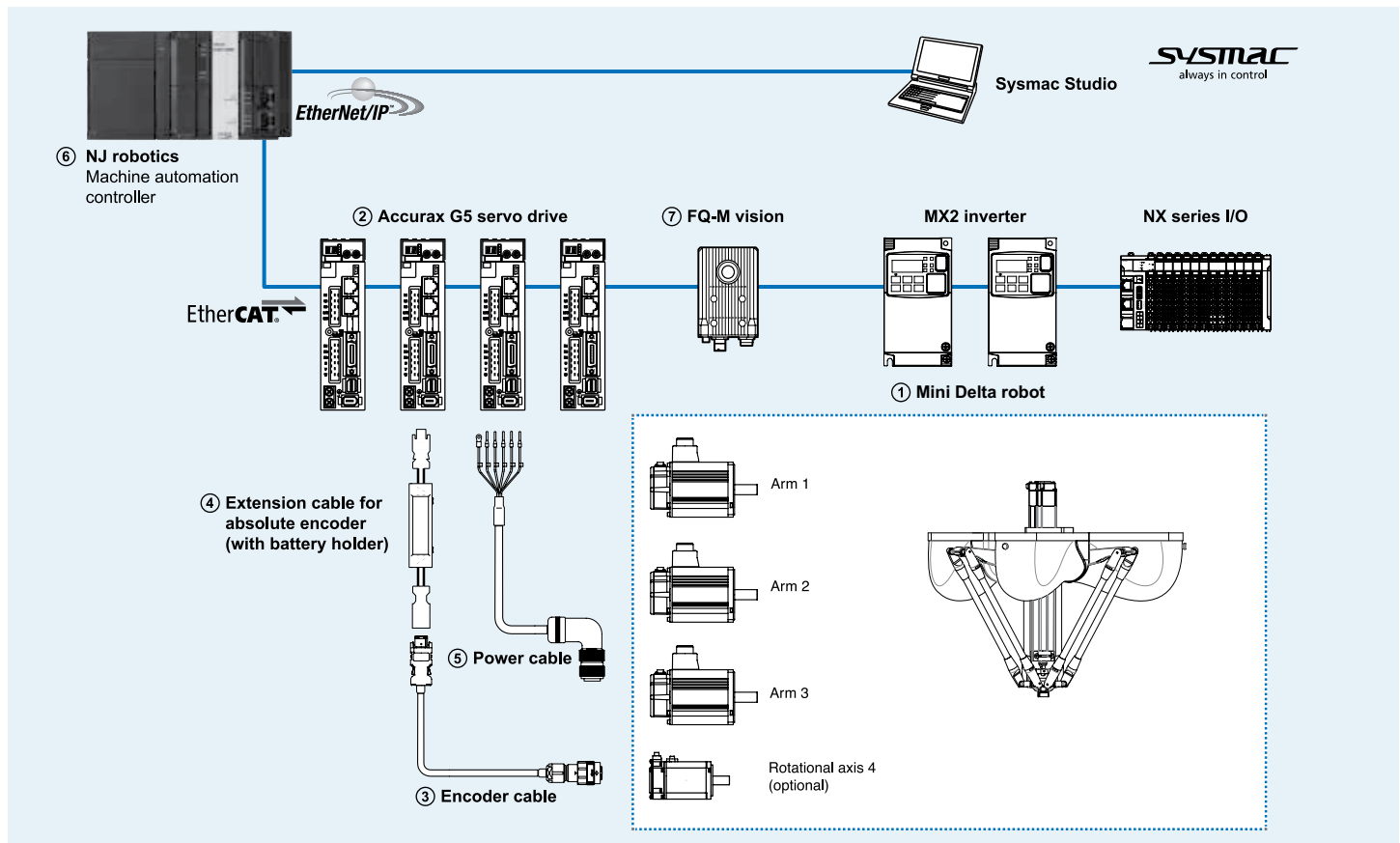


Gripper dimensions



# Mini Delta Robot

## Mini Delta Robot System Configuration



## Mini Delta Robot Specifications

Supply voltage		230 V		
Model		CR-UGD4MINI-R	CR-UGD4MINI-NR	
Working volume	X, Y axis (stroke)	Ø 450 with rotation and 500 without rotation		
	Z axis (stroke)*1	135 mm (maximum Ø 450 mm)		
	θ axis (rotation angle)	±180 deg (default setting, it can be changed)	—	
Servo motor	Arm 1, 2, 3	Model	R88M-K40030T-BS2	
		Capacity	400 W	
	Rotational axis 4	Model	R88M-K40030T-BS2	—
		Capacity	400 W	—
Repeatability*2	X, Y, Z axis	±0.2 mm		
	θ axis	±0.3 deg	—	
Maximum payload		1 kg		
Maximum throughput*3		200 CPM*4		
θ axis maximum torque		According to the servo motor	—	
User tubing (outer diameter)		Ø 8*5		
Travel limit		1. Soft limit, 2. Mechanical stopper (X, Y, Z axis)		
Noise level		< 68 dB (A)		
Ambient temperature		5°C to 45°C		
Relative humidity		Max. 90%		
Protection class		IP65		
Weight (kg)		25 kg		

\*1 For further details please check the dimensional drawing in the next section.

\*2 This is the value at a constant ambient temperature.

\*3 With 0.1 kg payload. When reciprocating 305 mm in horizontal and 25 mm in vertical directions.

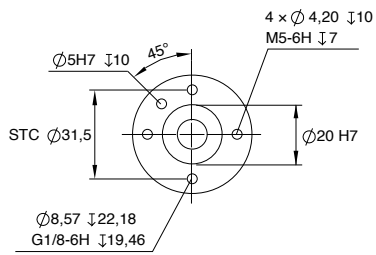
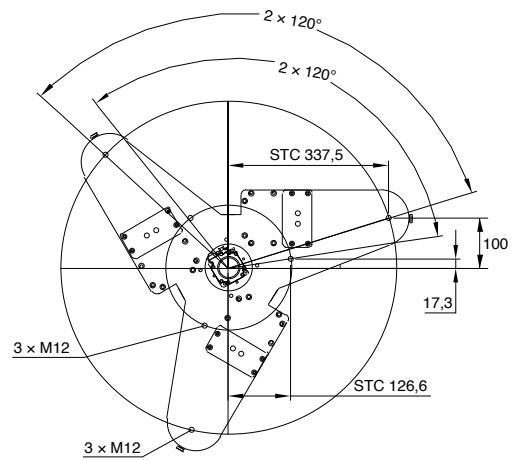
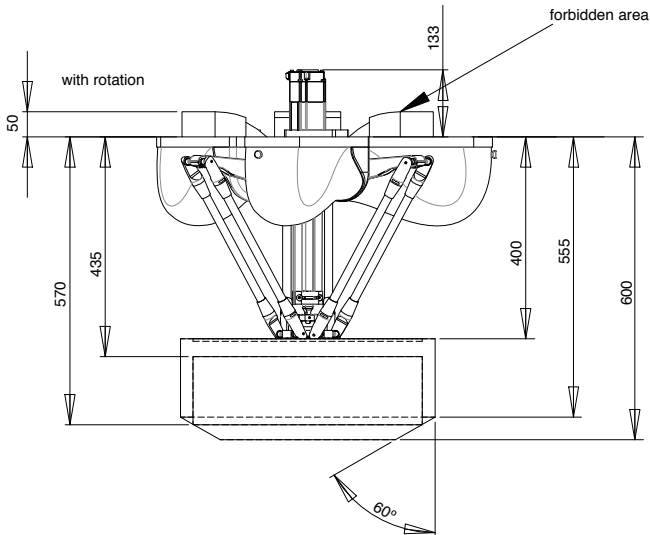
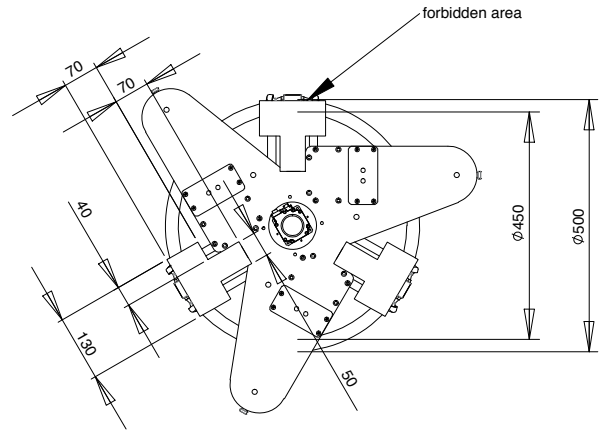
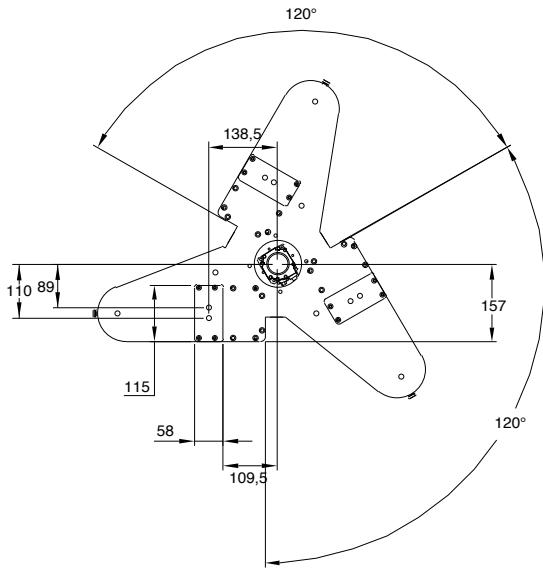
\*4 CPM: Cycle per minutes. Check the note 3 for the cycle definition.

\*5 Only for the air suction. Air injection is not allowed.

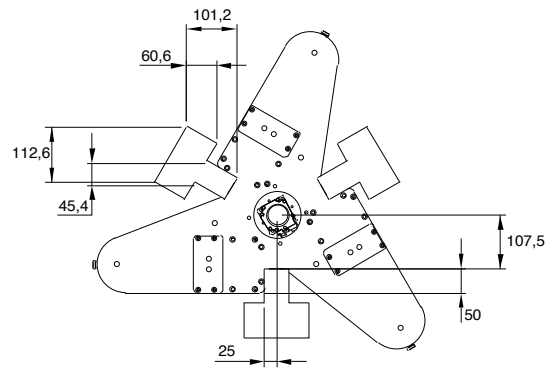


# Mini Delta Robot Dimensions

CR-UGD4MINI□-□R



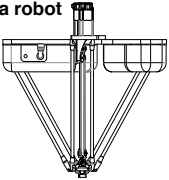
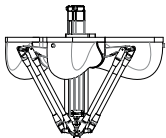
Gripper dimensions



# Ordering Information



## Delta and Mini Delta Robot

The robot includes pre-installed Accurax G5 Servo Motors and gearboxes.  
Order Servo Drives and cables separately.

Symbol	Max. payload	Description	Supply voltage	
			230 V	480 V
① <b>Delta robot</b> 	2 kg	3 axes with rotation axis	CR-UGD4-R	CR-UGD4C-R
		3 axes without rotation axis	CR-UGD4-NR	CR-UGD4C-NR
① <b>Mini Delta robot</b> 	1 kg	3 axes with rotation axis	CR-UGD4MINI-R	—
		3 axes without rotation axis	CR-UGD4MINI-NR	—

## Servo Drives

Order one Servo Drive, Power Cable and Encoder Cable for each axis.

Symbol	Robot model	Servo drives required	Axis	Servo drive supply voltage	
				230 V	480 V
② <b>For Delta robot</b>  Accurax G5 servo drives	CR_UGD4_R	4	Arm 1	R88D-KN15H-ECT	R88D-KN15F-ECT
			Arm 2	R88D-KN15H-ECT	R88D-KN15F-ECT
			Arm 3	R88D-KN15H-ECT	R88D-KN15F-ECT
			Rotational 4	R88D-KN15H-ECT	R88D-KN15F-ECT
	CR_UGD4_NR	3	Arm 1	R88D-KN15H-ECT	R88D-KN15F-ECT
			Arm 2	R88D-KN15H-ECT	R88D-KN15F-ECT
② <b>For Mini Delta robot</b>  Accurax G5 servo drives	CR_UGD4MINI_R	4	Arm 1	R88D-KN04H-ECT	—
			Arm 2	R88D-KN04H-ECT	—
			Arm 3	R88D-KN04H-ECT	—
			Rotational 4	R88D-KN04H-ECT	—
	CR_UGD4MINI_NR	3	Arm 1	R88D-KN04H-ECT	—
			Arm 2	R88D-KN04H-ECT	—
		Arm 3	R88D-KN04H-ECT	—	

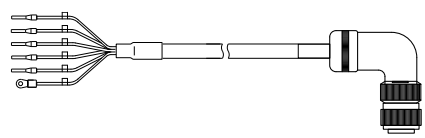
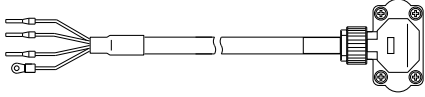

## Encoder Cables

Symbol	Applicable Delta robots	Model	Appearance
③	Delta robot	1.5 m	R88A-CRKC001-5NR-E
		3 m	R88A-CRKC003NR-E
		5 m	R88A-CRKC005NR-E
		10 m	R88A-CRKC010NR-E
		15 m	R88A-CRKC015NR-E
		20 m	R88A-CRKC020NR-E
	Mini Delta robot	1.5 m	R88A-CRKA001-5CR-E
		3 m	R88A-CRKA003CR-E
		5 m	R88A-CRKA005CR-E
		10 m	R88A-CRKA010CR-E
		15 m	R88A-CRKA015CR-E
		20 m	R88A-CRKA020CR-E

Symbol	Specifications	Model	Appearance	
④	Absolute encoder battery cable	Battery not included	0.3 m	R88A-CRGD0R3C
		Battery included	0.3 m	R88A-CRGD0R3C-BS
	Absolute encoder backup battery	2.000 mA.h, 3.6 V	—	R88A-BAT01G

# Ordering Information

## Power Cables

Symbol	Applicable Delta robots			Model	Appearance		
⑤	Delta robot	Arm 1, 2, 3 and rotational axis 4	Power cable with brake	1.5 m	R88A-CAGB001-5BR-E		
				3 m	R88A-CAGB003BR-E		
				5 m	R88A-CAGB005BR-E		
				10 m	R88A-CAGB010BR-E		
				15 m	R88A-CAGB015BR-E		
				20 m	R88A-CAGB020BR-E		
	Mini Delta robot	Arm 1, 2, 3 and rotational axis 4	Power cable	1.5 m	R88A-CAKA001-5SR-E		
				3 m	R88A-CAKA003SR-E		
				5 m	R88A-CAKA005SR-E		
				10 m	R88A-CAKA010SR-E		
				15 m	R88A-CAKA015SR-E		
				20 m	R88A-CAKA020SR-E		
			Brake cable	1.5 m	R88A-CAKA001-5BR-E		
				3 m	R88A-CAKA003BR-E		
				5 m	R88A-CAKA005BR-E		
			10 m	R88A-CAKA010BR-E			
			15 m	R88A-CAKA015BR-E			
			20 m	R88A-CAKA020BR-E			

## Machine Automation Controller

Name		Delta robot	Axes	Model	
⑥ NJ robotics	CPU unit	Control of up to 8 Delta robot depending on the number of axes supported by the CPU	64	NJ501-4500	
			32	NJ501-4400	
			16	NJ501-4300	
		Control of one Delta robot	16	NJ501-4310	
		Power supply unit			
					NJ-PD3001 (24 VDC)

## Vision\*

Name	Type		Model
⑦ FQ-M series	Color	NPN	FQ-MS120-ECT
		PNP	FQ-MS125-ECT
	Monochrome	NPN	FQ-MS120-M-ECT
		PNP	FQ-MS125-M-ECT

\* See Brochure for required cables and accessories.

## Computer Software

Specifications	Model
Sysmac Studio version 1.03 or higher	SYSMAC-SE2□□□

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