DENSO

DENSO Robotics® General Product Catalog

DENSO Robotics®

General Product Catalog

DENSO

www.denso-wave.com/en/robot/

C-ROB-E 201912


DENSO

Create a people-oriented bright society with our refined robot technology.

DENSO is pursuing the creation of environments where people can work in a manner befitting human beings and productivity. Our concept of production with the focus on human beings is the starting point for the development of robots. We apply our experience of production technologies at in-house production sites in our continuing effort to create high-performance robots that are easy to use. As we are approaching the 52th anniversary since we began development, we have sold approximately 110 thousand robots. DENSO robots will continue to work and prove their worth in the future.

To enable people to work in environments befitting human beings

Aluminium die-casting operation robot

In 1967, DENSO began development of DENSO robots with the aim of freeing employees from the burden of dangerous work and working in adverse environments. Appearing in 1969, the first practical unit was a robot designed for aluminum die-casting work. This freed workers from exposure to the heat produced by die-casting processes and led to improved quality through repeated robot movements and enhanced productivity through unmanned operation.

Introduction of robot technology to the world

Mid-sized 4-axis robot HM
(1st generation)

Based on the ambition of "making major contributions to the world with robot technologies refined in-house," DENSO launched fully-fledged outside sales in 1991. We have taken on board customer needs obtained directly from production sites to improve performance and add new functions. As a result, DENSO robots are now widely used not only in the auto-industry, but also electrical and electronic industries, food processing and pharmaceuticals.

Provision of safety and quality in the fields of food processing and medical treatment

Medical and
pharmaceutical
robot VS-S2 series

The year 2014 saw the development of VS050S2, a robot compatible with sterile environments. It is now possible to automate drug dispensing and discovery processes and prevent exposure of workers to hazardous substances and other dangers. The Fraunhofer-Gesellschaft research institute has verified the high level of hygiene of VS050S2. (Report No.DE1409-725)

Continuing refinement at in-house factories

Mid-sized 4-axis robot

In pursuit of improved productivity, DENSO Robotics' practical implementation of horizontally and vertically-articulated robots for in-house auto-parts assembly processes has progressed since around 1985. We have reflected the experience gained through the introduction of robots on production lines with stringent quality, delivery and cost requirements to realize dramatic evolution in robot performance. At the present time, DENSO has introduced more than 20,000 robots in its in-house factories.

Greater ease of handling

Teaching pendant with GUI

1998 saw the adoption of the world's first use of Graphical User Interface (GUI) in teaching pendant control panels in the robot industry (*). The resulting intuitive easy-to-understand UI has improved user operability and reduced the time consumed by robot introduction, adjustment and maintenance. The GUI has further evolved into the current RC8 controller. *According to our research

Achievement of the ultimate basic performance

DENSO 4-axis robot
HSR series

Robot performance may not be estimated with catalog values. Fully committed to on-site "usability," in 2016, DENSO Robotics developed the HSR Series, a lineup of new high-speed SCARA robots in pursuit of the basic performance elements of "quick accelaration", "runs continuously", and "stops precisely" DENSO Robotics will continue to meet the challenge of going beyond the limits of performance.

For more creative work

COBOTTA, our first industrial compact collaborative robot, was released In 2018. Do you need that extra hand? Do you want to leave simple tasks to robots, and make more time for creative work? COBOTTA will open infinite possibilities to address your needs, and realize creative, new ideas.

CONTENTS

DENSO Robotics Lineup

Supported Robot Controllers

RC8A ▶P.46 RC8 ▶P.48

5- AND 6-AXIS ROBOTS

VP Series RC8A RC8

VP-5243 / 6242

▶P.08

VS Series RC8A RC8

VS050 / 060

▶P.12

VS068 / 087

▶P.14

	VP-5243 / 6242	VS050 / 060	VS068 / 087
Maximum arm reach	430 / 432 mm	505 / 605 mm	710 / 905 mm
Maximum payload	3 [1] / 2.5 [2] kg	4 kg	7 kg
Position repeatability [3]	±0.02 mm	±0.02 mm	±0.02 to ±0.03 mm
Cycle time [4]	0.99 sec (for 1 kg payload)	0.35 sec (for 1 kg payload)	0.31 / 0.34 sec (for 1 kg payload)
Options	● Standard type	● Standard type ● Protected type (IP67) ● Dust & splash proof type (wrist: IP65, unit: IP54) ● Cleanroom type (ISO Class 3/5) ● UL specifications	● Standard type ● Protected type (IP67) ● Dust & splash proof type (wrist: IP65, unit: IP54) ● Cleanroom type (ISO Class 3/5) ● UL specifications

4-AXIS ROBOTS

HSR® Series RC8A

HSR®048 / 055 / 065

▶P.28

HS-A1 Series RC8A

HS-035A1 / 045A1 / 055A1

▶P.30

HM Series RC8A RC8

HM-40∗∗∗ / 4A∗∗∗

▶P.32

	HSR®048 / 055 / 065	HS-035A1 / 045A1 / 055A1	HM-40∗∗∗ / 4A∗∗∗
Arm reach	480 / 550 / 650 mm	350 / 450 / 550 mm	600 / 700 / 850 / 1,000 mm
Vertical stroke	100 / 200 / 320 / 510 mm	100 / 150 / 200 / 320 mm	100 / 150 / 200 / 300 / 400 mm
Maximum payload	8 kg	5 kg	10 / 20 kg
Position repeatability [3]	±0.01 to ±0.012 mm	±0.01 mm	±0.02 to ±0.025 mm
Cycle time [4]	0.28 - 0.31 sec (for 2 kg payload)	0.29 sec (for 2 kg payload)	0.29 - 0.31 sec (for 2 kg payload)
Options	● Standard type ● Bellows type ● Dust & splash proof type (IP65) ● Cleanroom type (ISO Class 3) [7] ● UL specifications ● Ceiling type ● H1 Grease type (IP65) ● Metal-detecting® bellows type ● Dust and splash proof type (IP65 / metal-detecting® bellows)	● Standard type ● Bellows type ● Dust & splash proof type (IP65) ● Cleanroom type (ISO Class 3) [7] ● UL specifications [7] ● Ceiling type	● Standard type ● Dust & splash proof type (IP65) ● UL specifications [8] ● Ceiling type

VM Series RC8A RC8

VM-6083 / 60B1

▶P.18

1,021 / 1,298 mm	
13 kg [6]	
±0.05 to ±0.07 mm	
0.89 / 0.95 sec (for 5 kg payload)	
● Standard type ● Dust & splash proof type (wrist: IP65, unit: IP54) ● Cleanroom type (Class 100)	

Pharmaceutical/ Medical Robots RC8A RC8

VS050S2

▶P.20

520 mm	
4 kg	
±0.02 mm	
0.35 sec (for 1 kg payload)	
● H_2O_2-resistant ● UL specifications	

COMPACT GANTRY ROBOTS

XR Series RC8A RC8

XR-43***

▶P.34

Arm reach	200 / 250 / 300 mm
X-Axis stroke	450 / 760 / 1060 mm
Maximum payload	5 kg
Position repeatability [3]	±0.015 mm
Cycle time [4]	0.56 sec (for 3 kg payload)
Options	● Standard type

COLLABORATIVE ROBOTS

COBOTTA®

CVR038

▶P.38

Total arm length (No. 1 arm + No. 2 arm)	342.5 (165+177.5) mm
Rated payload (Maximum payload)	0.5 kg (0.7 kg within ±10 degrees with the wrist angled downward) *Without electric gripper
Position repeatability [3]	±0.05 mm
Software	● Standard version ● OSS version

1: If wrist and neck downward movement exceed ± 45°, the maximum payload is 2.5 kg.

2: If wrist and neck downward movement exceed ± 45°, the maximum payload is 2 kg.

3: Position repeatability (center of tool mounting face) is the precision at constant ambient temperature.

4: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm.

5: If wrist and neck downward movement exceed ± 45°, the maximum payload is 6 kg.

6: If the payload exceeds 11 kg, flange downward movement is limited to ±10°.

7: Floor type only.

8: Standard type/Dust- and splash proof type

5- AND 6-AXIS ROBOTS

High-speed continuous movement to improve productivity.
Slim body for economy of equipment space.
The "VP," "VS" and "VM" Series realize both.

Main Features

Model	VP		VS									VM	
	5243	6242	050	060	068	087	6556 [7]		6577 [7]		050S2	6083	60B1
							Standard	With brake	Standard	With brake	(Medical and Pharmaceutical)		
Maximum arm reach	430mm	432mm	505mm	605mm	710mm	905mm	653mm		854mm		520mm	1,021mm	1,298mm
Maximum payload	3kg [3]	2.5kg [4]	4kg		7kg		7kg [5]				4kg	13kg [6]	
Cycle time [1]	0.99sec (for 1 kg payload)		0.35sec (for 1 kg payload)		0.31sec (for 1 kg payload)	0.34sec (for 1 kg payload)	0.49sec (for 1 kg payload)		0.59sec (for 1 kg payload)		0.35sec (for 1 kg payload)	0.89sec (for 5 kg payload)	0.95sec (for 5 kg payload)
Position repeatability [2]	±0.02mm		±0.02mm		±0.02mm	±0.03mm	±0.02mm		±0.03mm		±0.02mm	±0.05mm	±0.07mm
Standard type	√	√	√	√	√	√	√	√	√	√	—	√	√
Protected type (IP67)	—	—	√	√	√	√	—	—	—	—	—	—	—
Dust & splash proof type (wrist: IP65 / unit: IP54)	—	—	√	√	√	√	√	√	√	√	—	√	√
Cleanroom type	—	—	√ (ISO class 3 / 5)	√ (ISO class 3 / 5)	√ (ISO class 3 / 5)	√ (ISO class 3 / 5)	√ (Class 10 / 100)	√ (Class 10 / 100)	√ (Class 10 / 100)	√ (Class 10 / 100)	—	√ (Class 100)	√ (Class 100)
UL specifications	—	—	√	√	√	√	—	—	—	—	√	—	—
H_2O_2-resistant	—	—	—	—	—	—	—	—	—	—	√	—	—

1: One cycle is the time taken to move an object at a height of 25 mm between two points 300 mm apart. 2: Position repeatability (center of tool mounting surface) is the precision at constant ambient temperature.
3: If wrist downward movement exceeds ±45°, the maximum payload is 2.5 kg. 4: If wrist downward movement exceeds ±45°, the maximum payload is 2kg.
5: If wrist downward movement exceeds ±45°, the maximum payload is 6 kg. 6: If the payload exceeds 11 kg, flange downward movement is limited to ±10°.
7: Standard: J2 - J4 with brakes / With brakes: J2 - J6 with brakes 8: All axes (single axis - 6-axis) with brakes

Robot list

Standard type

This type is used in standard environments.

Protected type (IP67)

Usable in places requiring environmental resistance and suitable for work in the environments where equipment might be exposed to water (equivalent to IP67)

Dust & splash proof type (wrist: IP65 / unit: IP54)

Suitable for the work environments where equipment may be exposed to dust or water droplets, and the wrist has the dust & splash proof performance of IP65, while the body, IP54.
Also usable in the vicinity of the processing machine, where equipment might be exposed to oil or mist.

Cleanroom type

Specification best suitable for automated and energy-saving production system in clean room, and ideal for electronic parts, food, and medical device-related work in clean room to realize the dust proof by highly-sealed structure as well as high cleanliness and high performance.

UL specifications

UL/cUL certified products

H_2O_2-resistant

Robot with sterility control for use in sterile environments and clean environments that employ H_2O_2 gas 35% density (dry/wet) and UV exposure.

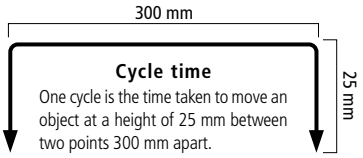
VP SERIES

Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

VP-5243 / 6242

The VP series 5243/ 6242 is the most compact of all DENSO robots, and perfect for installation where motion space is limited.

Maximum arm reach	430 / 432mm
Maximum payload	2.5 / 3kg
Cycle time	0.99sec
Position repeatability	±0.02mm



Cycle time
One cycle is the time taken to move an object at a height of 25 mm between two points 300 mm apart.

VP-6242

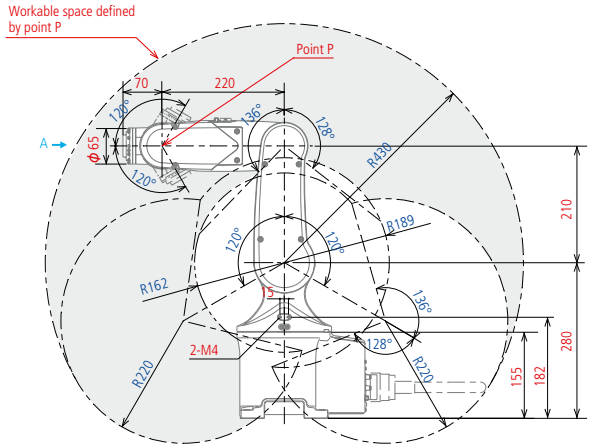
Specifications

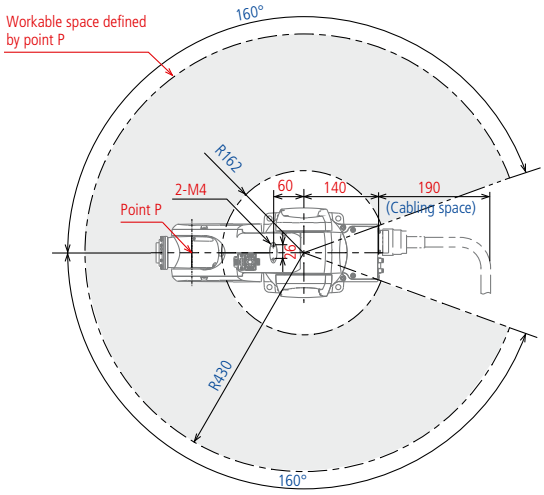
Term		Specifications	
Model		VP-5243	VP-6242
Axes		5	6
Position detection method		Absolute encoder	
Drive motor / brake		All-axis servo motor / all-axis with brakes	
Total arm length (No. 1 arm + No. 2 arm)		430 (210+220) mm	420 (210+210) mm
Arm offset	J3 (forearm)	—	75mm
Maximum motion area (Point P)		430mm	432mm
Motion range	J1 (No.1 axis)	±160°	
	J2 (No.2 axis)	±120°	
	J3 (No.3 axis)	+136°, –128°	+160°, +19°
	J4 (No.4 axis)	—	±160°
	J5 (No.5 axis)	±120°	
	J6 (No.6 axis)	±360°	
Maximum payload		3 kg (Wrist downward movement is within ±45°) [3]	2.5 kg (Wrist downward movement is within ±45°) [4]
Maximum joint speed	J1	270deg/sec	
	J2	202.5deg/sec	
	J3	270deg/sec	
	J4 [5]	—	324deg/sec
	J5	324deg/sec	
	J6	324deg/sec	
Cycle time [1]		0.99sec	
Position repeatability (center of end-effector mounting face) [2]		±0.02mm	
Maximum allowable moment of inertia	J4,J5	0.04kgm² [5]	0.03kgm²
	J6	0.01kgm²	0.007kgm²
User air pipe		4 systems (φ4×4)	
User signal line		9 (for proximity sensor signals, etc.)	
Air source	Normal pressure	0.10 to 0.39MPa	
	Maximum allowable pressure	0.49MPa	
Airborne noise (equivalent continuous A-weighted sound pressure level)		80 dB or less	
Weight		Approx. 13 kg	Approx. 15 kg

1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm. 2: Position repeatability is the precision at constant ambient temperature.
3: If wrist downward movement exceeds ±45°, the maximum payload is 2.5 kg. 4: If wrist downward movement exceeds ±45°, the maximum payload is 2 kg. 5: VP-5243 has no J4.

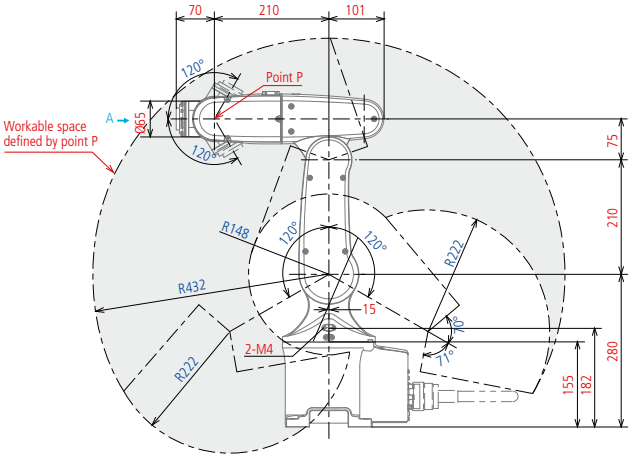
External dimensions and workable space Unit : mm

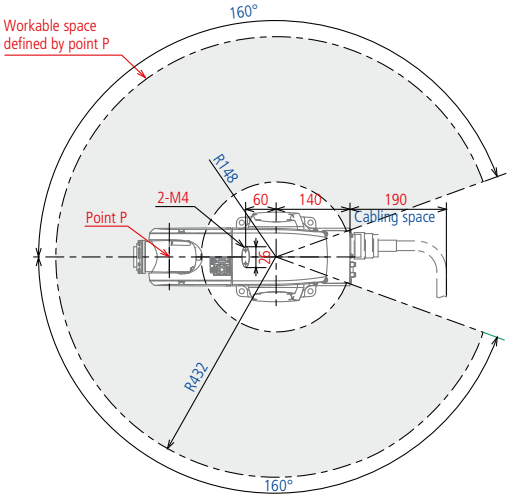
VP-5243



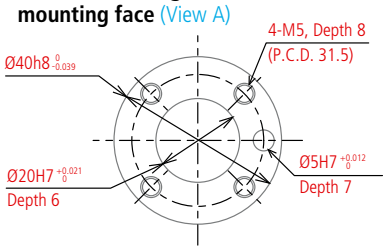


VP-6242

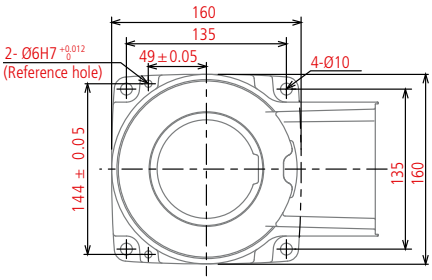




Detailed drawing of end-effector mounting face (View A)



Detailed drawing of base mounting face (Top view)



Legend

V P - □ 2 □□

Model :	Axes :	Standard payload :	Total arm length :
VP: Mini 5- and 6-axis robot	5: 5-axis 6: 6-axis	2: 2 kg (6-axis) 2.5 kg (5-axis) *The maximum payload is 2.5 kg (6-axis) or 3 kg (5-axis)	42: 420 mm 43: 430 mm

The data listed on this page is for the standard type.

VS SERIES

Features of VS050 / 060 / 068 / 087

More speedy, more compact, and easier to use.

Slim design robots featuring top-performing speed in its class with significantly-improved eases of use.

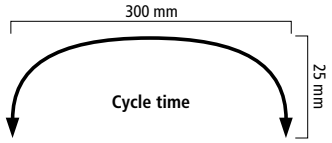
Series Lineup

	VS050	VS060	VS068	VS087
Maximum arm reach	505 mm	605 mm	710 mm	905 mm
Maximum payload	4kg	4kg	7kg	7kg

Speed = Improved Productivity

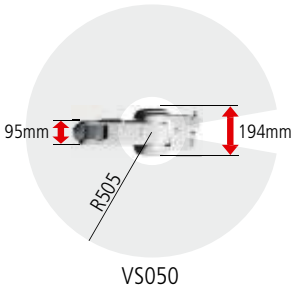
	VS050	VS068
Cycle time [sec] For 1kg (measurement)	0.35	0.31

Time required for a robot to lift an object to a height of 25 mm and move back and forth between two locations 300 mm apart.

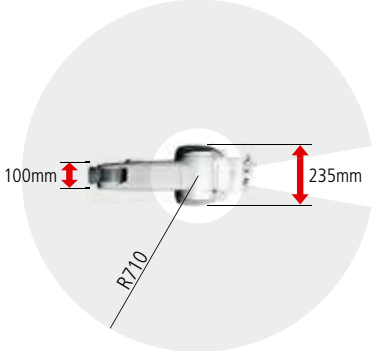


Fits into Compact Equipment

Arm width / Wrist width / Workable space



VS050



VS068

Improved Usability and Maintainability

Embedded internally up to end-of-flange, wires are prevented from becoming entangled and broken (when communication interface flange-A is selected).

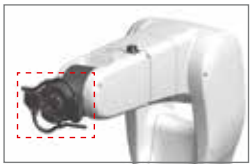
Options

Connector panel

Rear connector panel | Bottom connector panel

Choose from two mounting orientations when connecting cables (motor & encoder cable, etc.) to the robot for increased flexibility to accommodate the robot installation conditions.

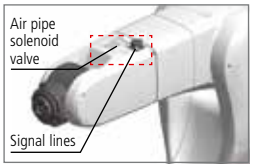
Flange



Communication interface flange-A

Plate mechanical interface has connectors for electrical signal lines and EtherNet, allowing wiring to be embedded in the robot unit.

Signal lines / Air pipe solenoid valve



Signal lines and air pipe solenoid valves are embedded in the top of the second arm. Three varieties are available for VS068 / 087 and one for VS050 / 060.

Paint / Surface finish

Standard type | Clean, IP54 | IP67

"If the protected type (IP67) is selected, the unit is left as aluminum. Standard paint is available in the special specification (option) when selecting IP67."

User Options

External battery extension unit

Encoder backup battery installed outside the robot. Facilitates replacement of batteries and improves maintainability.

Brake release unit

A switch that allows you to release the brake of each axis (the wiring of this switch is directly connected to the brake release signal of each axis).

Air purge unit

The protected type (IP67) maintains an IP67 protect grade by air pressure produced inside the robot.

Second arm cover (Right-hand, with tapped holes)

This cover has tapped holes to secure wires for the robot's second arm.

Category	Part Name / Specification / Type	VS050 / 060 Standard	VS050 / 060 Protected (IP67)	VS050 / 060 Dust & splash proof (Wrist: IP65 Unit: IP54)	VS050 / 060 Cleanroom (ISO class 5)	VS050 / 060 Cleanroom (ISO class 3)	VS068 / 087 Standard	VS068 / 087 Protected (IP67)	VS068 / 087 Dust & splash proof (Wrist: IP65 Unit: IP54)	VS068 / 087 Cleanroom (ISO class 5)	VS068 / 087 Cleanroom (ISO class 3)
Connector panel	Rear connector panel	√	√	√	√	√	√	√	√	√	√
	Bottom connector panel	√	√	√	√	√	√	√	√	√	√
Flange	Standard flange	√	√	√	√	√	√	√	√	√	√
	Communication interface flange-A	√	—	—	—	—	√	—	—	—	—
Signal lines / Air pipe solenoid valve	2 x solenoid valves (2 position, double solenoid)	√	√	√	√	√	—	—	—	—	—
	3 x solenoid valves (2 position, double solenoid)	—	—	—	—	—	√	√	√	√	√
	3 x solenoid valves (3 position, exhaust center solenoid)	—	—	—	—	—	√	√	√	√	√
	3 x solenoid valves (3 position, closed center solenoid)	—	—	—	—	—	√	√	√	√	√
User Options	Air purge unit	—	√	—	—	—	—	√ [3]	—	—	—
	Brake release unit [1]	√	√	√	√	√	√	√	√	√	√
	External battery extension unit	√	√	√	√	√	√	√	√	√	√
	Motor & encoder cable angle	√	√	√	√	√	√	√	√	√	√
	Second arm cover (Right-hand, with tapped holes) [2]	√	—	—	—	—	√	—	—	—	—

1: The brake release unit is connection area IP67 with the robot or unit IP54

2: This cover is already mounted on the protected type, dust & splash proof type, and cleanroom type when shipped.
The cover is an option on the standard type.

3: An air purge unit is necessary to keep the protection level, IP65.

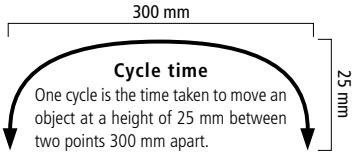
VS SERIES

Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

VS050 / 060

The new VS series VS050/ 060 is equipped with exceptional power and speed in a compact body, contributing to automation of small parts assembly/transportation processes.

Maximum arm reach	505 / 605mm
Maximum payload	4kg
Cycle time	0.35sec
Position repeatability	±0.02mm



Patent No. 1414606 VS060

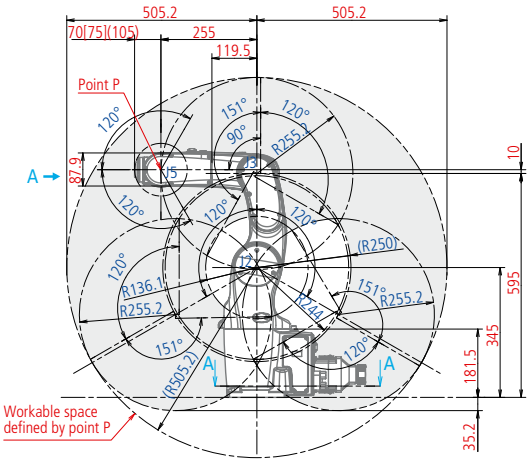
Specifications

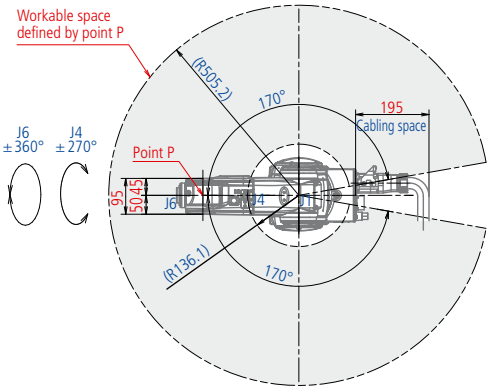
Term		Specifications	
Model		VS050	VS060
Axes		6	
Position detection method		Absolute encoder	
Drive motor / brake		All-axis servo motor / all-axis brake	
Total arm length (No. 1 arm + No. 2 arm)		505 (250+255)mm	605 (305+300)mm
Maximum motion area (Point P)		505mm	605mm
Motion range	J1 (No.1 axis)	±170° [4]	
	J2 (No.2 axis)	±120°	
	J3 (No.3 axis)	+151°, –120°	+155°, –125°
	J4 (No.4 axis)	±270°	
	J5 (No.5 axis)	±120° [5]	
	J6 (No.6 axis)	±360°	
Maximum payload		4kg	
Maximum joint speed	J1	425deg/sec	
	J2	340deg/sec	283.33deg/sec
	J3	385.72deg/sec	309.35deg/sec
	J4	425deg/sec	
	J5	327.01deg/sec	
	J6	680deg/sec	
Cycle time [1]		0.35sec	
Position repeatability (center of end-effector mounting face) [2]		±0.02mm	
Maximum allowable moment of inertia	J4,J5	0.2kgm²	
	J6	0.05kgm²	
Maximum allowable moment	J4,J5	6.66Nm	
	J6	3.13Nm	
Signal line / Air pipe solenoid valve (option)	Signal lines	10 (for proximity sensor signals, etc.) [6,7]	
	Air pipe solenoid valve [3]	5 systems (φ4 × 4, φ4 × 1) 2 × solenoid valves (2 position, double solenoid)	
Communication interface flange-A (option)		17 (power wire for cameras, etc.) [7]	
		LAN×1 (1000BASE-T) [8]	
Air source	Normal pressure	0.20 to 0.39MPa	
	Maximum allowable pressure	0.49MPa	
Airborne noise (equivalent continuous A-weighted sound pressure level)		65dB or less	
Protection grade		Protected type : IP67 [9] (option) Dust & splash proof type : wrist IP65 / unit IP54 (option) Cleanroom type : ISO class 3 / 5 (option)	
Weight		Approx. 27kg	Approx. 28kg

1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm. 2: Position repeatability is the precision at constant ambient temperature.
3: Controllable by use of the embedded solenoid valve only for φ4×4. 4: Limited motion range when wall mounted. For details, please contact our sales representative.
5: When communication interface flange-A is selected, the motion range of J5 is +120 and –110. 6: There are 4 of these lines (proximity sensors or other signal lines) when selected together with communication interface flange-A.
7: Allowable current is limited. 8: The LAN cable to connect to the connector panel is 20 m or shorter.
9: The robot interior is air-pressurized to maintain protective class IP67. Use the air-purge unit to remove air. Do not use the robot underwater.

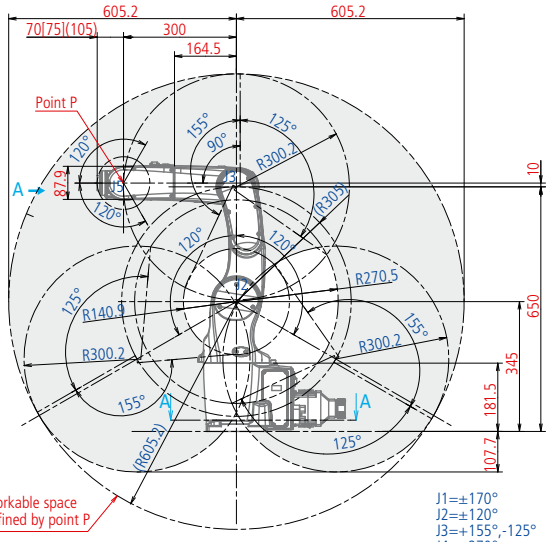
External dimensions and workable space Unit : mm

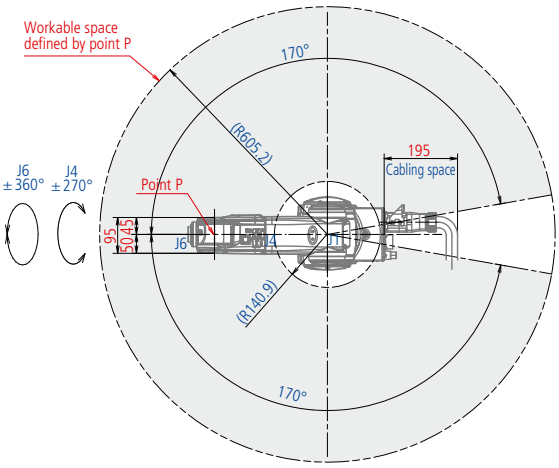
VS050



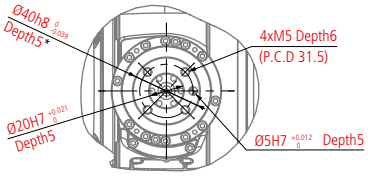


VS060



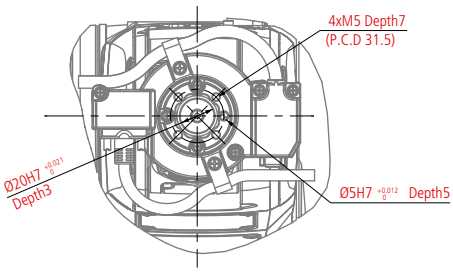


Detailed drawing of end-effector mounting face (Standard Flange) (View A)

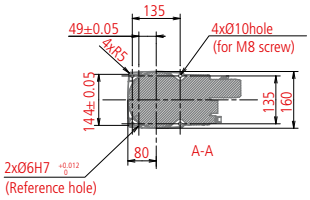


*These external dimensions cannot be used with hand tools to fix or determine position on any robot except standard type.

Detailed drawing of end-effector mounting face (Communication Interface Flange-A) (View A)



Detailed drawing of base mounting face (Top view)



The values in brackets [ ] are of the cleanroom type (ISO class 3 / 5) The values in parentheses ( ) indicate communication interface flange-A

Legend

VS □□□□□ - A V6 - □□□ - □□ N □ N - □ NNN

Model : VS: DENSO 5- and 6-axis robots

Total arm length : 050 A3 : 505mm; 060 A3 : 605mm

Mounting orientation : A: All directions

Axes : V6: 6-axis

Compliant standard: N: Standard specification; U: UL specification

Protected : NN: Standard type W7: Protected type (IP67); W4: Dust & splash proof type (wrist: IP65, unit: IP54); C3: Cleanroom type (ISO class 3); C5: Cleanroom type (ISO class 5)

Flange : N: Standard flange; A: Communication interface flange-A [1]

Connector panel : N: Rear connector panel; A: Bottom connector panel

Signal lines / Air pipe solenoid valve : A: 2 x solenoid valves (2 position, double solenoid); N: Specification without signal lines / air pipe solenoid valve

Paint / Surface finish : N: DENSO standard colors [2]; A: Unpainted [3]

1: Available when standard type is selected 2 : When standard type is selected 3 : When protected type (IP67) is selected (DENSO standard colors are a special specification (option).) For details, please contact our sales representative.

The data listed on this page is for the standard type. For other options, see our webpage.

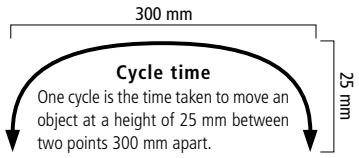
VS SERIES

Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

VS068 / 087

Boasts top-performing speed in its class to greatly improve productivity. Slim arm of wide movable range enables various types of robot layouts.

Maximum arm reach	710 / 905mm
Maximum payload	7kg
Cycle time	0.31 / 0.34 sec
Position repeatability	±0.02 / 0.03mm



Design registration No. 1414924

VS087

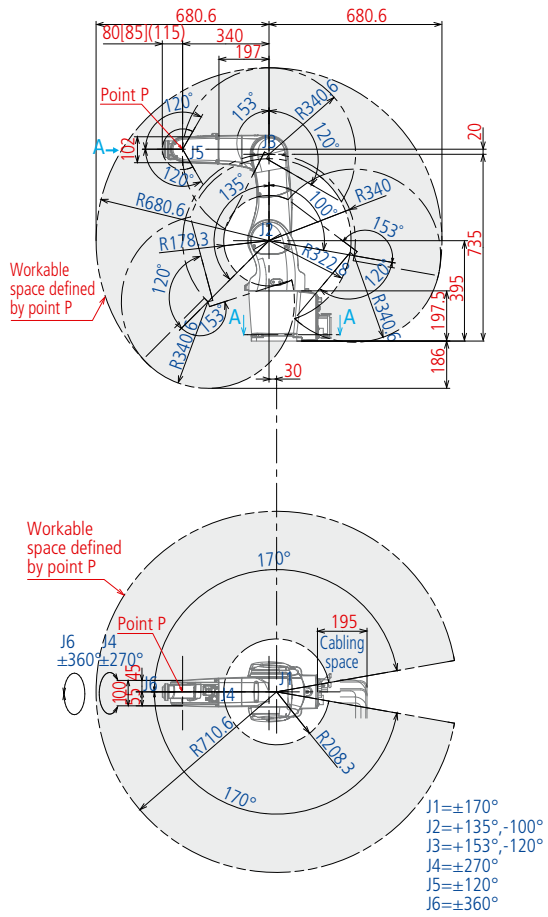
Specifications

Term		Specifications	
Model		VS068	VS087
Axes		6	
Position detection method		Absolute encoder	
Drive motor / brake		All-axis servo motor / all-axis brake	
Total arm length (No. 1 arm + No. 2 arm)		680 (340+340)mm	875 (445+430)mm
Maximum motion area (Point P)		710mm	905mm
Motion range	J1 (No.1 axis)	±170° [4]	
	J2 (No.2 axis)	+135°, −100°	
	J3 (No.3 axis)	+153°, −120°	+153°, −136°
	J4 (No.4 axis)	±270°	
	J5 (No.5 axis)	±120°	
	J6 (No.6 axis)	±360°	
Maximum payload		7kg	
Maximum joint speed	J1	356.25deg/sec	285deg/sec
	J2	303deg/sec	252.5deg/sec
	J3	378.75deg/sec	303deg/sec
	J4	475deg/sec	378.75deg/sec
	J5	475deg/sec	378.75deg/sec
	J6	760deg/sec	606deg/sec
Cycle time (*1)		0.31sec	0.34sec
Position repeatability (center of end-effector mounting face) [2]		±0.02mm	±0.03mm
Maximum allowable moment of inertia	J4,J5	0.45kgm²	
	J6	0.1kgm²	
Maximum allowable moment	J4,J5	16.2Nm	
	J6	6.86Nm	
Signal line / Air pipe solenoid valve (option)	Signal lines	10 (for proximity sensor signals, etc.) [5,6]	
	Air pipe solenoid valve [3]	7 systems (ϕ4 × 6, ϕ6 × 1) [solenoid valves can be selected from 1 to 3] 1. 3 × solenoid valves (2 position, double solenoid) 2.3 × solenoid valves (3 position, exhaust center solenoid) 3. 3 × solenoid valves (3 position, closed center solenoid)	
Communication interface flange-A (option)		17 (power wire for cameras, etc.) [6]	
		LAN×1(1000BASE-T) [7]	
Air source	Normal pressure	0.20 to 0.39MPa	
	Maximum allowable pressure	0.49MPa	
Airborne noise (equivalent continuous A-weighted sound pressure level)		65dB or less	
Protection grade		Protected type : IP67 [8] (option) Dust & splash proof type : wrist IP65 / unit IP54 (option) Cleanroom type : ISO class 3 / 5 (option)	
Weight		Approx. 49kg	Approx. 51kg

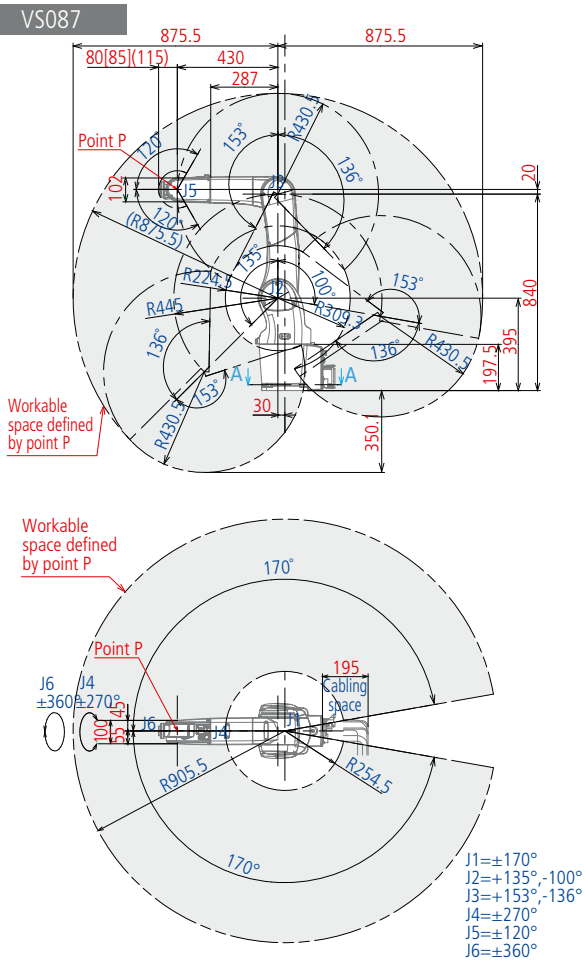
1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm. 2: Position repeatability is the precision at constant ambient temperature.
3: Controllable by use of the embedded solenoid valve only for ϕ4×6. 4: Limited motion range when wall mounted. For details, please contact our sales representative.
5: There are 4 of these lines (proximity sensors or other signal lines) when selected together with communication interface flange-A. 6: Allowable current is limited.
7: The LAN cable to connect to the connector panel is 20 m or shorter. 8: The robot interior is air-pressurized to maintain protective class IP67. Use the air-purge unit to remove air. Do not use the robot underwater.

External dimensions and workable space Unit : mm

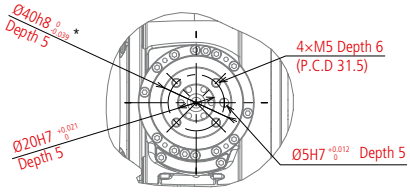
VS068



VS087

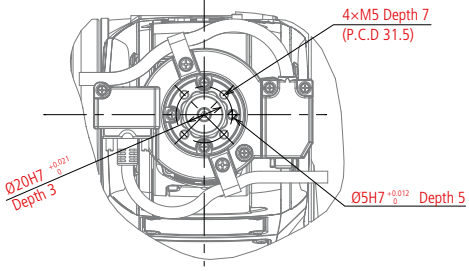


Detailed drawing of end-effector mounting face (Standard Flange) (View A)

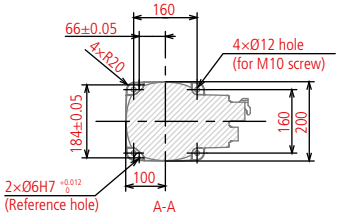


*These external dimensions cannot be used with hand tools to fix or determine position on any robot except standard type.

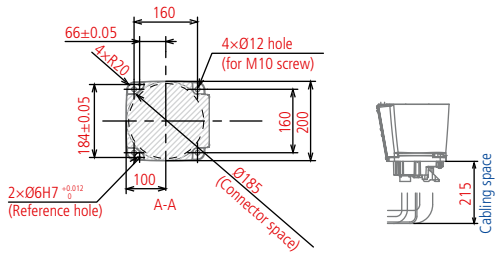
Detailed drawing of end-effector mounting face (Communication Interface Flange-A) (View A)



Detailed drawing of base mounting face – Rear connector panel (Top view)



Detailed drawing of base mounting face – Bottom connector panel (Top view)



The values in brackets [ ] are of the cleanroom type (ISO class 3 / 5) The values in parentheses ( ) ( ) indicate communication interface flange-A

Legend

VS □□□□□ - A V6 - □□□ - □□ N □ N - □ NNN

Model :
VS: DENSO 5- and 6-axis robots

Total arm length :
068 A4 : 680mm
087 A4 : 875mm

Mounting orientation :
A: All directions

Protected :
NN: Standard type W7: Protected type (IP67)
W4: Dust & splash proof type (wrist: IP65, unit: IP54)
C3: Cleanroom type (ISO class 3)
C5: Cleanroom type (ISO class 5)

Axes :
V6: 6-axis

Compliant standard:
N: Standard specification
U: UL specification

Connector panel :
N: Rear connector panel
A: Bottom connector panel

Flange :
N: Standard flange
A: Communication interface flange-A [1]

Signal lines / Air pipe solenoid valve :
B: 3 x solenoid valves (2 position, double solenoid)
C: 3 x solenoid valves (3 position, exhaust center solenoid)
D: 3 x solenoid valves (3 position, closed center solenoid)
N: Specification without signal lines / air pipe solenoid valve

Paint / Surface finish :
N: DENSO standard colors [2]
A: Unpainted [3]

1: Available when standard type is selected 2: When standard type is selected 3: When protected type (IP67) is selected (DENSO standard colors are a special specification (option).) For details, please contact our sales representative.

The data listed on this page is for the standard type. For other options, see our webpage.

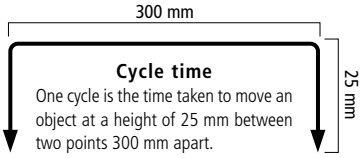
VS SERIES

Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

VS-6556 / 6577

The VS series 6556 / 6577 provides high speed and high power in a compact, slim body. A wide range of options are also available that allow operation in a wide range of environments.

Maximum arm reach	653 / 854mm
Maximum payload	7kg
Cycle time	0.49 / 0.59 sec
Position repeatability	±0.02 / 0.03mm



Cycle time
One cycle is the time taken to move an object at a height of 25 mm between two points 300 mm apart.

VS-6556-B

Specifications

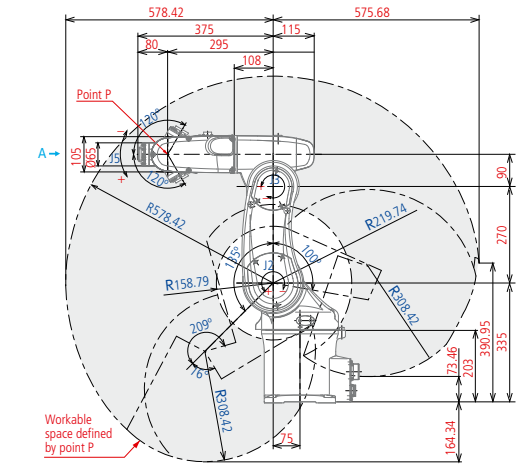
Term		Specifications	
Model		VS-6556	VS-6577
Axes		6	
Position detection method		Absolute encoder	
Drive motor / brake		All-axis AC servo motor / J2 to J4 with brakes (Brake expansion type: J2 to J6 with brakes)	
Total arm length (No. 1 arm + No. 2 arm)		565(270+295)mm	770(365+405)mm
Arm offset	J1 (Rotation)	75mm	
	J3 (Forearm)	90mm	
Maximum motion area (Point P)		653mm	854mm
Motion range	J1 (No.1 axis)	±170°	
	J2 (No.2 axis)	+135°, −100°	
	J3 (No.3 axis)	+166°, −119°	+169°, −119°
	J4 (No.4 axis)	±190°	
	J5 (No.5 axis)	±120°	
	J6 (No.6 axis)	±360°	
Maximum payload		7 kg (Within a downward wrist angle of movement of ±45°) [4]	
Maximum joint speed	J1	262.5deg/sec	175deg/sec
	J2	240deg/sec	200deg/sec
	J3	300deg/sec	200deg/sec
	J4	300deg/sec	
	J5	300deg/sec	
	J6	480deg/sec	
Cycle time [1]		0.49sec	0.59sec
Position repeatability (center of end-effector mounting face) [1,2]		±0.02mm	±0.03mm
Maximum allowable moment of inertia	J4,J5	0.413kgm^2	
	J6	0.063kgm^2	
User air pipe [3]		7 systems (ϕ4 × 6, ϕ6 × 1) Solenoid valve (2 position, double solenoid) × 3	
User signal line		10 (for proximity sensor signals, etc.)	
Air source	Normal pressure	0.10 to 0.39MPa	
	Maximum allowable pressure	0.49MPa	
Airborne noise (equivalent continuous A-weighted sound pressure level)		80dB or less	
Protection grade		Dust & splash proof type : wrist IP65 / unit IP54 (option) Cleanroom type: class 10/100 (Option)	
Weigt		Approx. 35kg	Approx. 36kg

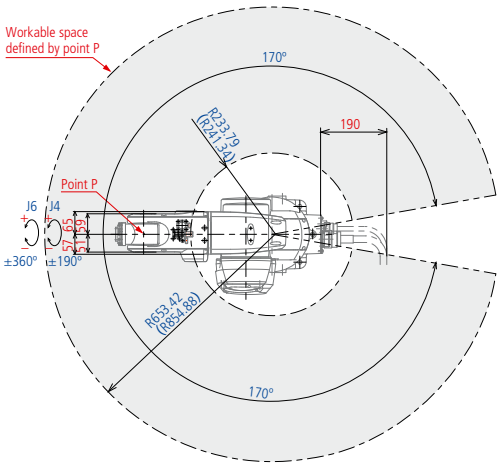
1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm.
2: Position repeatability is the precision at constant ambient temperature. 3: Controllable by use of the embedded solenoid valve only for ϕ4×6. 4: If wrist downward movement exceeds ±45°, the maximum payload is 6 kg.

External dimensions and workable space

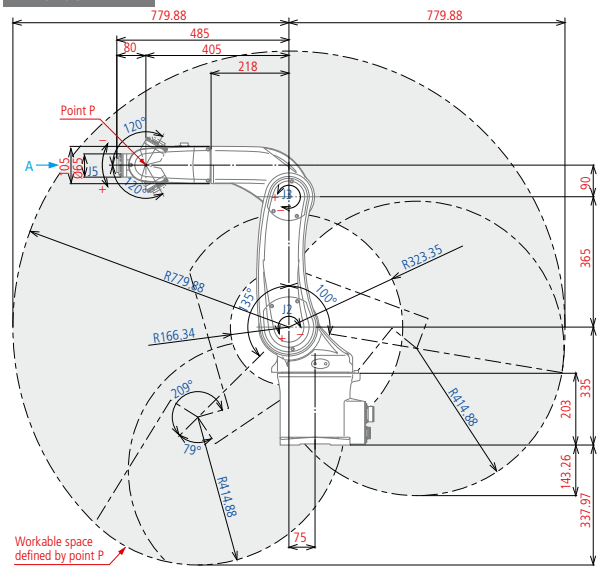
Unit : mm

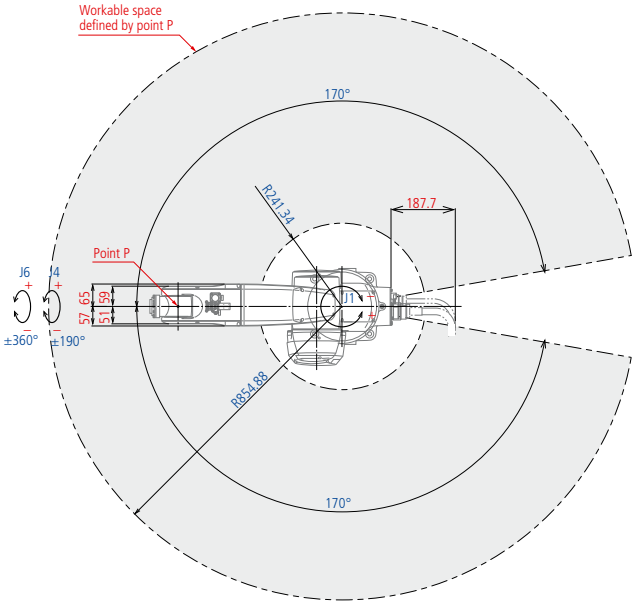
VS-6556-B



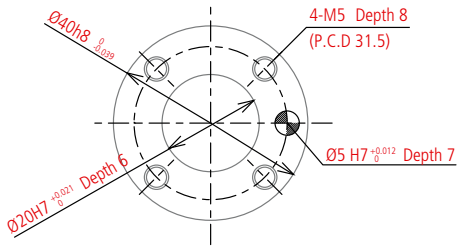


VS-6577-B

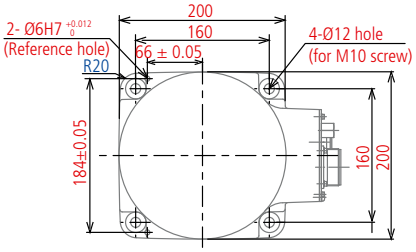




Detailed drawing of end-effector mounting face (View A)



Detailed drawing of base mounting face (Top view)



Legend

VS - 6 5 □ □ - □

Model :	Axes :	Standard payload :	Total arm length :	Options :
VS: Small 5- and 6-axis type robot	6: 6-axis	5: 6kg *The maximum payload is 7 kg	56: 565mm 77: 770mm	None: Standard type B: With brakes W: Dust & splash proof type (wrist: IP65, unit: IP54) BW: Dust & splash proof type with brake P: Cleanroom type: (class 10/100) BP: Cleanroom type with brake

The data listed on this page is for the standard type. For other options, see our webpage.

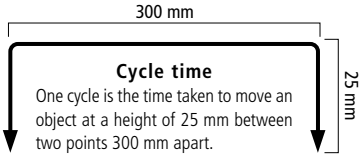
VM SERIES

Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

VM-6083 / 60B1

The VM series feature both the longest arm reach of all DENSO 5- and 6-axis robots and the highest maximum payload.

Maximum arm reach	1,021 / 1,298mm
Maximum payload	13kg [4]
Cycle time	0.89 / 0.95 sec
Position repeatability	±0.05 / 0.07mm



Cycle time
One cycle is the time taken to move an object at a height of 25 mm between two points 300 mm apart.

VM-60B1

Specifications

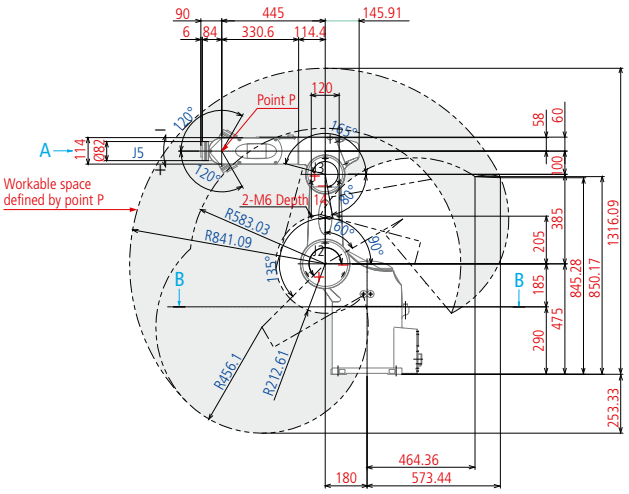
Term		Specifications	
Model		VM-6083	VM-60B1
Axes		6	
Position detection method		Absolute encoder	
Drive motor / brake		All-axis AC servo motor / J2 to J6 with brakes	
Total arm length (No. 1 arm + No. 2 arm)		830(385+445)mm	1,110(520+590)mm
Arm offset	J1(Rotation)	180mm	
	J3 (forearm)	100mm	
Maximum motion area (Point P)		1,021mm	1,298mm
Motion range	J1 (No.1 axis)	±170°	
	J2 (No.2 axis)	+135°, −90°	
	J3 (No.3 axis)	+165°, −80°	+168°, −80°
	J4 (No.4 axis)	±185°	
	J5 (No.5 axis)	±120°	
	J6 (No.6 axis)	±360°	
Maximum payload		13kg [4]	
Maximum joint speed	J1	180deg/sec	150deg/sec
	J2	150deg/sec	112.5deg/sec
	J3	200deg/sec	150deg/sec
	J4	262.5deg/sec	
	J5	262.5deg/sec	
	J6	420deg/sec	
Cycle time [1]		0.89sec	0.95sec
Position repeatability (center of end-effector mounting face) [2]		±0.05mm	±0.07mm
Maximum allowable moment of inertia	J4,J5	0.36kgm²	
	J6	0.064kgm²	
User air pipe [3]		7 systems (φ4×6, φ6×1), 3 x solenoid valves (2 position, double solenoid)	
User signal line		10 (for proximity sensor signals, etc.)	
Air source	Normal pressure	0.10 - 0.39MPa	
	Maximum allowable pressure	0.49MPa	
Airborne noise (equivalent continuous A-weighted sound pressure level)		80dB or less	
Protection grade		Dust & splash proof type : wrist IP65 / unit IP54 (option) Cleanroom tyle : class100	
Weight		Approx. 82kg	

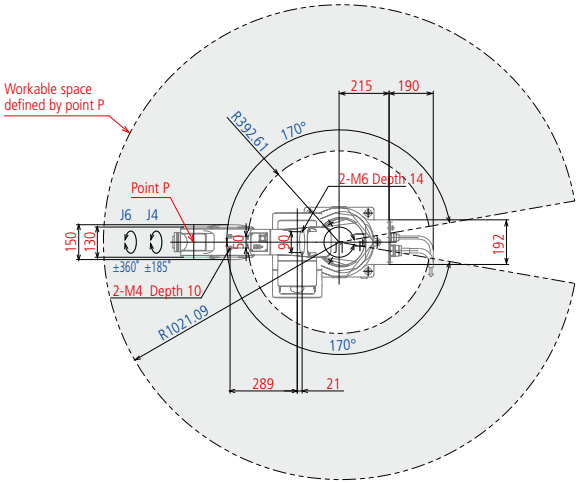
1: Time required for a robot to move 5 kg payload between two points 300 mm apart at a height of 25 mm.
2. Position repeatability is the precision at constant ambient temperature. 3: Controllable by use of the embedded solenoid valve only for φ4×6.
4: If the payload exceeds 11 kg, wrist downward movement is limited to ±10°.

External dimensions and workable space

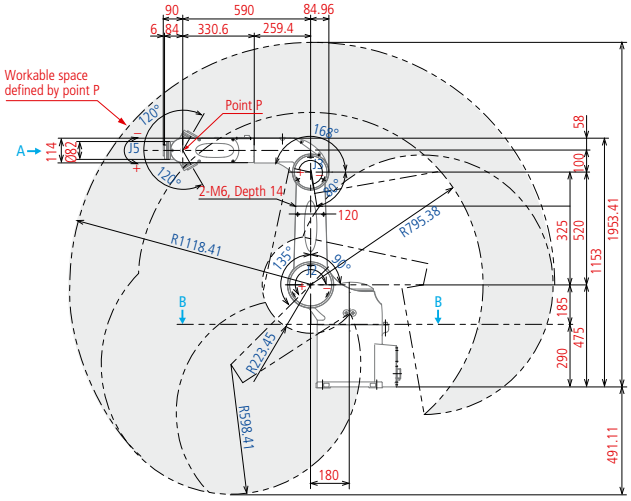
Unit : mm

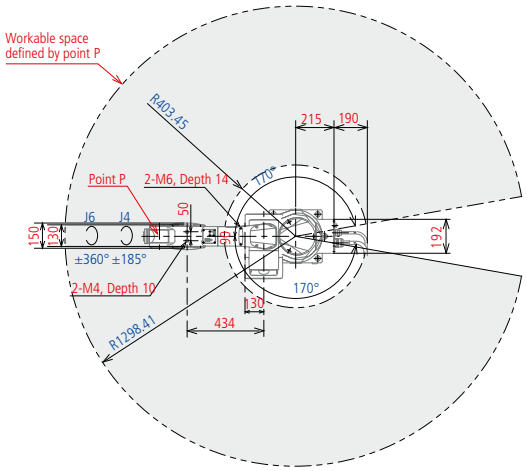
VM-6083



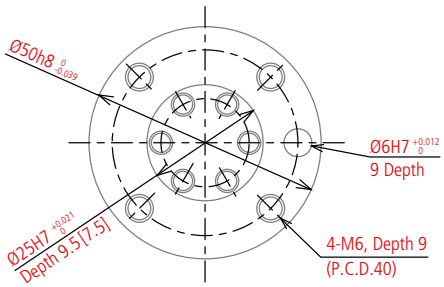


VM-60B1

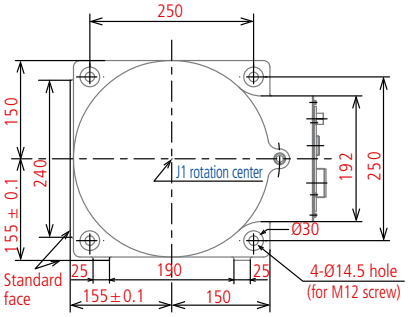




Detailed drawing of end-effector mounting face (View A)



Detailed drawing of base mounting face (B-B view)



The values in brackets [ ] are of the cleanroom type (class 100)

Legend

VM - 6 0 □□ - □

Model :
VM: Mid-sized 4-axis robot

Axes :
6: 6-axis

Maximum payload
0: 13kg

Total arm length :
83: 830mm
B1: 1110mm

Options :
None: Standard type, W: Dust & splash proof type (Wrist: IP65, unit: IP54)
P: Cleanroom type (class 100)

The data listed on this page is for the standard type. For other options, see our webpage.

Medical and Pharmaceutical Robots

VS050S2 (features)

DENSO contributes to automation in medical device / medical product manufacturing and drug preparation.

DENSO delivers a robot that meets the strict demands of the pharmaceutical and medical industry. Automation in clean environments prevents the hazards of foreign matter contamination from manual tasks, human error, and operator exposure.

Sterile environment resistance

Robot for use in sterile environments and clean environments that employ H_2O_2 gas 35% density (dry / wet) and UV exposure.

Resists Contamination

Smooth surface prevents adherence of dust and dirt. The robot arm is constructed without external screws to maintain high sanitation levels.

Cleanliness : ISO Class 5
Protection level : Wrist IP67 / Unit IP65

Patent No. 6240956

Authentication

- Design compliant with GMP* (product management and quality control standard).
  *GMP grade A
- cUL certified products (UL standard / Canada CSA standard) also available.
- Hygiene proven through testing by the Fraunhofer Institute (Report No. DE 1409-725).

Fraunhofer IPA TESTED® DEVICE
DENSO WAVE Inc.
Robot VS050S2-AV6-R1
Report No. DE 1409-725

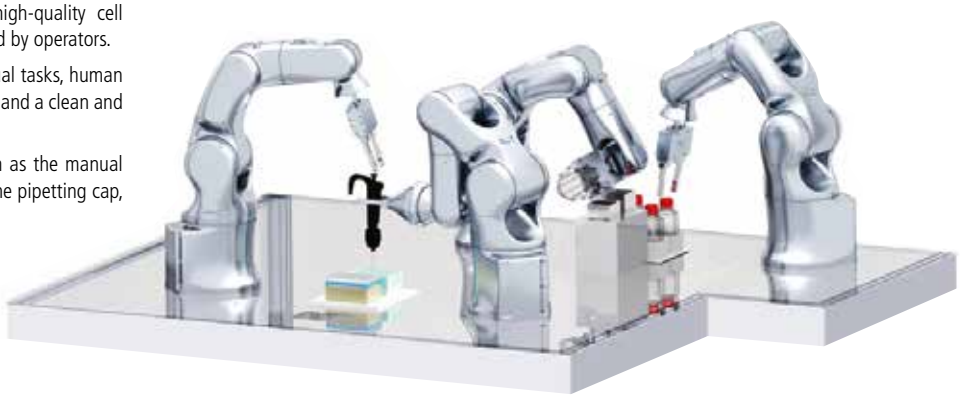
Isolation (suitability for sealed environments)

Cables and other connector panels are positioned on the bottom for compatible installation in sealed and quarantine environments.

Examples of Applications

Automation of cell culture

- The movements of skilled workers are reproduced by robots to realize the automation of high-quality cell culture without variation in quality caused by operators.
- The hazards of foreign matter from manual tasks, human error, and operator exposure are avoided, and a clean and safe system is realized.
- Robots can reproduce the same function as the manual operation by operator, such as opening the pipetting cap, using general-purpose tools.



Options

Electric gripper connection flange specification-A

Internal mount with a gripper cable up to the flange. Suitable for clean environments, eliminates interference with peripherals.

External mount battery

Optional external mount battery for improved maintainability and battery replacement.

Medical and Pharmaceutical Robot Hands (option)

Features

Electric gripper

Electric gripper cover kit

- Sterility resistance :
  H_2O_2 gas (35% density) and UV exposure compliance
- Cleanliness :
  ISO Class 4 (GMP Grade A/B)*
- Made with FDA-certified material

*Mounting on the robot depends on the robot specification.

Specifications

Term	Specifications
Grip force	60 N
Switch stroke	2 × 3 mm
Power supply	24 V ±10%
Protect grade	IP65
Cleanliness	ISO Class 4 (GMP Grade A/B)
I/O type	NPN / PNP selection
Unit weight	480 g (Hand unit / cover)*

※The weight does not include the chuck. Prepare the chuck by yourself.

Medical and Pharmaceutical Robots

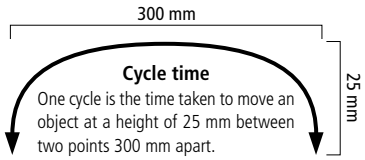
Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

VS050S2

Winner of the 2014 Good Design Grand Award

DENSO 5- AND 6-AXIS ROBOTS VS-050S2 meets the strict hygienic demands of the medical and pharmaceutical industries.

Maximum arm reach	520mm
Maximum payload	4kg
Cycle time	0.35 sec



Design registration
No. 1507944 / No. 1508175 / No. 1508203 /
No. 1518034 / No. 1518035 / No. 1518225

VS050S2

Specifications

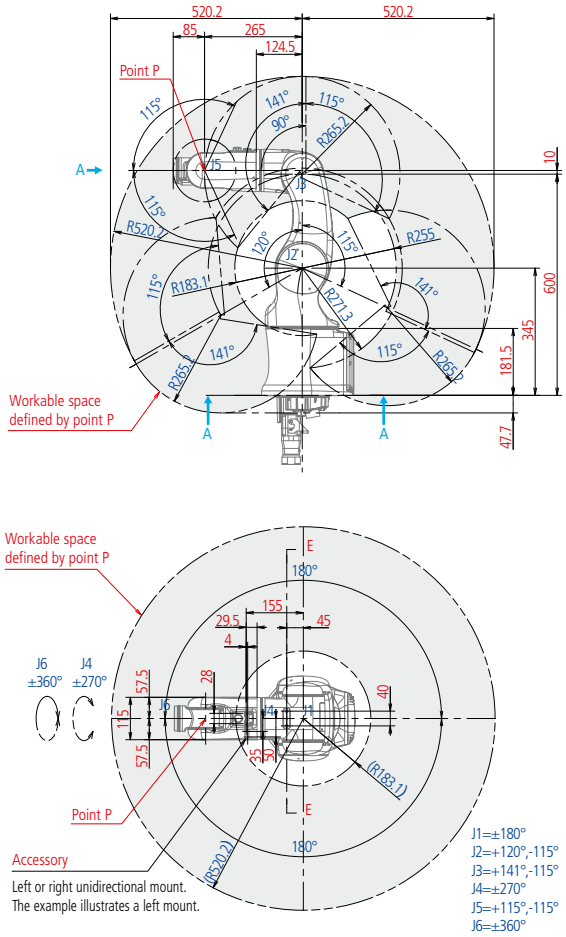
Term		Specifications
Model		VS050S2
Axes		6
Position detection method		Absolute encoder
Drive motor / brake		All-axis servo motor / all-axis brake
Total arm length (No. 1 arm + No. 2 arm)		520 (255+265) mm
Maximum motion area (Point P)		520mm
Minimum motion radius (Point P)		183.5mm
Motion range	J1 (No.1 axis)	±180° [3]
	J2 (No.2 axis)	+120°, −115°
	J3 (No.3 axis)	+141°, −115°
	J4 (No.4 axis)	±270°
	J5 (No.5 axis)	±115° [4]
	J6 (No.6 axis)	±360°
Maximum payload		4kg
Maximum joint speed	J1	425deg/sec
	J2	283.33deg/sec
	J3	309.35deg/sec
	J4	425deg/sec
	J5	272.96deg/sec
	J6	680deg/sec
Cycle time [1]		0.35sec
Position repeatability (center of end-effector mounting face) [2]		±0.02mm
Maximum allowable moment of inertia	J4,J5	0.2kgm^2
	J6	0.05kgm^2
Maximum allowable moment	J4,J5	6.66Nm
	J6	3.13Nm
Signal line / Air pipe solenoid valve (option)	Signal lines	10 Cores [5,6]
	Air pipe solenoid valve	Solenoid valve (2 position, double solenoid) × 2
Electric gripper connection flange specification-A (Option)		25 Cores (17+8) [6]
Air source	Normal pressure	0.20 to 0.39MPa
	Maximum allowable pressure	0.49MPa
Noise (A weighed equivalent continuous sound pressure level)		65dB or less
Environmental resistance	Hydrogen peroxide environment	35% hydrogen peroxide steam (dry / wet)
	Protection grade	Wrist IP67 / Unit IP65
	Cleanliness	ISO Class 5
Weight		Approx. 34kg

1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm. 2: Position repeatability is the precision at constant ambient temperature.
3: Motion range is limited when mounted to a wall. Inquire for details. 4: When electric gripper connection flange specification-A is selected, the J5 motion range is +110, −102.
5: This wire (proximity sensor or other signal wire) is 4-core if electric gripper connection flange specification-A is also selected. 6: Allowable current is limited.

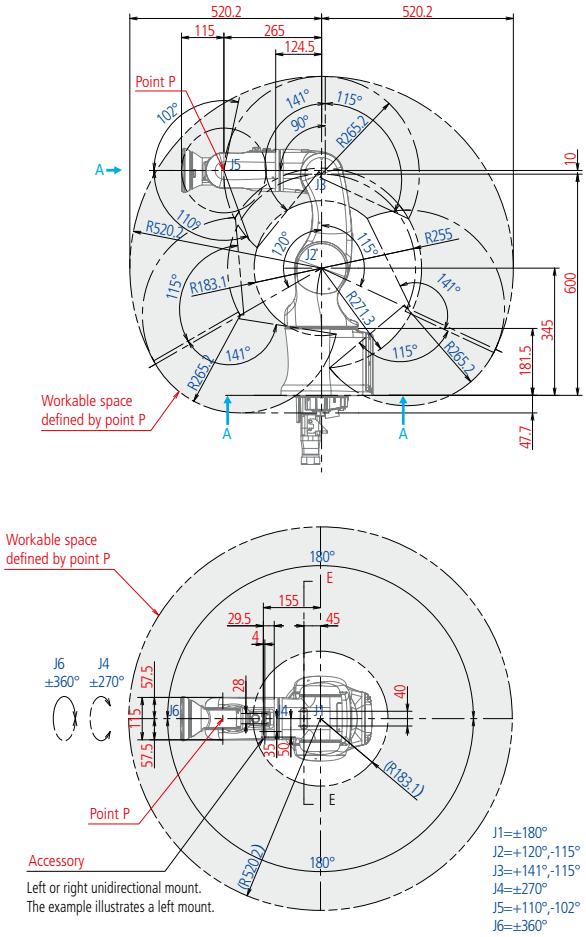
External dimensions and workable space Unit : mm

VS050S2

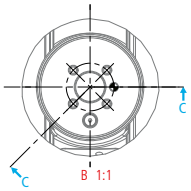
Standard flange



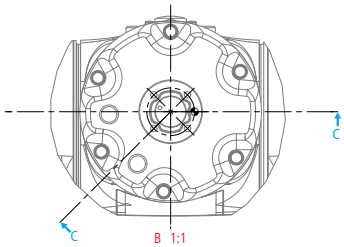
Electric gripper connection flange specification-A



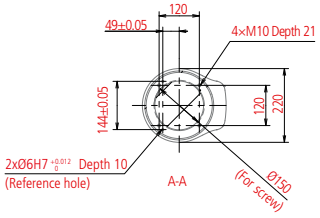
Detailed drawing of end-effector mounting face (Standard Flange) (View A)



Detailed drawing of end-effector mounting face (Electric gripper connection flange specification-A) (View A)



Detailed drawing of base mounting face (Top view)



Legend

VS 050S2 - A V6 - R1 □ - A □ N □ N - A NNN

- **Model :** VS: DENSO 5- and 6-axis robots
- **Total arm length :** 050S2: 505mm, H_2O_2 -resistant, RC8 compliant
- **Mounting orientation :** A: All directions
- **Axes :** 6: 6-axis
- **Protected :** R1: Clean type (ISO class 5) (Wrist; IP67, Body: IP65)
- **Compliant standard:** N: Standard specification U: UL specification
- **Connector panel :** A: Bottom connector panel
- **Flange :** N: Standard flange A: Electric gripper connection flange specification-A
- **Signal lines / Air pipe solenoid valve :** A: 2 x solenoid valves (2 position, double solenoid) N: Specification without signal lines / air pipe solenoid valve
- **Paint / Surface finish :** A: Unpainted

The data listed on this page is for the standard type. For other options, see our web page.

4-AXIS ROBOTS

Standard model "HS-A1" and "HSR" capable of high-speed, high-precision continuous operation. "HM" features outstanding rigidity and transportability. A wide-ranging lineup is available matched to processes and applications.

Main Features

Model		HSR® [3]			HS-A1 [3]			HM [3]							
		048	055	065	035	045	055	4060*	4A60*	4070*	4A70*	4085*	4A85*	40A0*	4AA0*
Arm reach		480mm	550mm	650mm	350mm	450mm	550mm	600mm		700mm		850mm		1,000mm	
Vertical stroke (Z)		100mm [4] 200mm 320mm 510mm [8]			100mm 150mm 200mm 320mm			*=1 : 100mm [5] *=A : 150mm [5] *=2 : 200mm *=3 : 300mm *=4 : 400mm				*=1 : 100mm *=A : 150mm *=2 : 200mm *=3 : 300mm *=4 : 400mm			
Maximum payload		8kg			5kg			10kg	20kg	10kg	20kg	10kg	20kg	10kg	20kg
Cycle time [1]		0.28sec (for 2 kg payload)		0.31sec (for 2 kg payload)	0.29sec (for 2 kg payload)			0.29sec (for 2 kg payload)				0.31sec (for 2 kg payload)			
Position repeatability [2]		±0.01 mm	±0.012 mm		±0.01 mm			±0.02 mm				±0.025 mm			
Standard type	Floor	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Ceiling	√	√	√	—	√	√	—	—	√	√	√	√	—	—
Bellows type	Floor	√	√	√	√	√	√	—	—	—	—	—	—	—	—
	Ceiling	√	√	√	—	√	√	—	—	—	—	—	—	—	—
Dust & splash proof type (IP65)	Floor	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Ceiling	√	√	√	—	√	√	—	—	√	√	√	√	—	—
H1 grease type	Floor	√	√	√	—	—	—	—	—	—	—	—	—	—	—
	Ceiling	√	√	√	—	—	—	—	—	—	—	—	—	—	—
Cleanroom type [6]	Floor	√	√	√	√	√	√	—	—	—	—	—	—	—	—
	Ceiling	—	—	—	—	—	—	—	—	—	—	—	—	—	—
UL specifications	Floor	√	√	√	√	√	√	√ [7]	√ [7]	√ [7]	√ [7]	√ [7]	√ [7]	√ [7]	√ [7]
	Ceiling	√	√	√	—	—	—	—	—	—	—	—	—	—	—
Metal-detecting® bellows type Dust & splash proof type (IP65/Metal-detecting® bellow)	Floor	√	√	√	—	—	—	—	—	—	—	—	—	—	—
	Ceiling	√	√	√	—	—	—	—	—	—	—	—	—	—	—

1: One cycle is the time taken to move an object at a height of 25 mm between two points 300 mm apart. 2: Position repeatability (center of tool mounting surface) is the precision at constant ambient temperature. 3: "*" in the model indicate the Z axis stroke. 4: The Z-axis strokes of 100 mm, 200 mm, 320 mm and 510 mm are available only with the standard type. The Z-axis stroke values available for the dust and splash proof type and bellows type are 170 mm, 290 mm and 450 mm. The Z-axis stroke values available for cleanroom type are 170 mm and 290 mm. The Z-axis stroke values available for the metal-detecting bellows type and dust and splash proof type (IP65 / metal-detecting bellows) are 120 mm and 240 mm. 5: If the Z-axis stroke required is 100 mm or 150 mm, the dust & splash proof type cannot be selected. 6: The HSR® Series and HS-A1 Series are ISO Class 3. 7: Standard/Dust- and splash-proof types

Robot list

Standard type

This is a standard type used in standard environments.

Ceiling type

Ceiling mount strucure eliminates a waste of space, minimnizes the entire equipment space, and expands the workable space

Bellows type / Metal-detecting® bellows type

The Z-axis shaft of the standard type is mounted with a cover.Models of metal-detecting® bellows type are available as well.

*The metal-detecting® bellows type is only available with HSR series models.

Dust & splash proof type (IP65) / H1 grease type

Suitable for the work environments where equipment may be exposed to dust or water droplets, and the dust & splash proof performance of IP65 is provided. Also usable in the vicinity of the processing machine, where equipment might be exposed to oil or mist.

*Only the H1 grease type may be selected for the HSR dust and drip-proof type.

Cleanroom type

Specification best suitable for automated and energy-saving production system in clean room, and ideal for electronic parts, food, and medical device-related work in clean room to realize the dust proof by highly-sealed structure as well as high cleanliness and high performance.

UL specifications

UL/cUL certified products

HSR® SERIES

Features of HSR®048 / HSR®055 / HSR®065

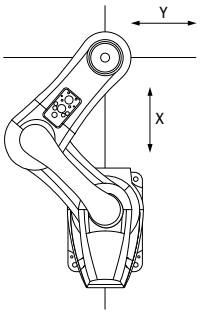
Quick Accelaration, Runs Continuously at High Speed, and Stops Precisely.

In pursuit of the ultimate performance, the HSR® Series features "true high speed," realizing a compact, space-saving, high-speed picking system to handle processes such as conventional components assembly, the packaging of food, pharmaceuticals, or cosmetics, etc. to innovate the work place.

High-speed motion

High acceleration & motion profiles

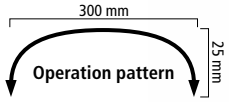
Improved CPM (cycle per minute) allows the robot to move at high speed continuously.



cycle/min

HSR065	X direction	Y direction
	118	149

With a 1kg load



*The CPM changes depending on the coordinates.

Continuous motion

Achieving non-stop continuous motion

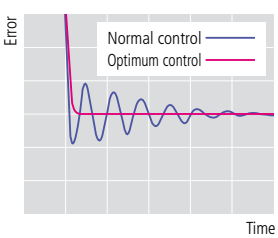
Improved heat dissipation performance at the base unit allows the robot to achieve continuous motion, which is required in actual processes.

Vibration control

Vibration control technique for suppressing vibrations

The robot can suppress vibrations in a short time by actively reflecting the status of the arm to vibration control. This can suppress vibrations that occur with high-speed transfer and residual vibrations, reducing the cycle time.

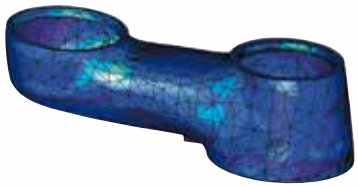
RC8A controller



Light weight

Newly designed, highly rigid, lightweight arm

The combination of between high rigidity and light weight allows the robot to achieve a high payload (8 kg) and high-speed motion at the same time.



Improved flexibility in mounting direction

The mounting direction can be switched

Floor and ceiling mount models available.

Optimum layout

Optimized layout allows the robot to achieve high-speed motion.

A large-capacity motor is integrated into the base unit. Weight reduction at the tip of the arm and optimized arm structure allow the robot to improve its high-speed performance.

Options

Wiring sub-arm protection kit

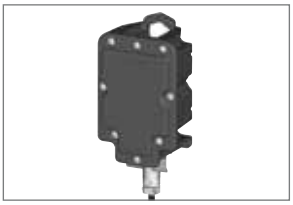
Protects external wiring to prevent cables from becoming unorganized and avoid the risk of broken wires.

Built-in Ethernet

An Ethernet cable is built into the body. Easily connectable to external devices

*Ethernet connectors (sold separately) are available as options.

External battery



The encoder backup battery installed outside the robot facilitates easy replacement of batteries and maintenance.

Stopper with wiring protector

This stopper can protect wiring that is installed through the hole of the bearing located at the top of the Z-axis shaft.

HSR® SERIES

Supported Robot Controllers
RC8A ▶P.46

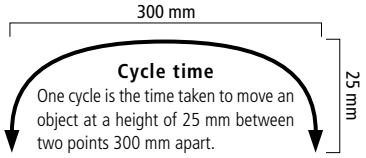
HSR®048 / 055 / 065

Quick Acceleration, runs continuously at high speed, and stops precisely. "True high speed" has been realized in pursuit of this ultimate basic performance. Improved CPM (Cycle Per Minute = Work load per minute) enables high-speed and prolonged motion.

HSR®055

Design registration No. 1558886 / No. 1558887

Arm reach	480 / 550 / 650 mm
Z-Axis stroke	100 / 200 / 320 / 510mm
Maximum payload	8kg
Cycle time	0.28 / 0.31 sec
Position repeatability	±0.01 / 0.012 mm

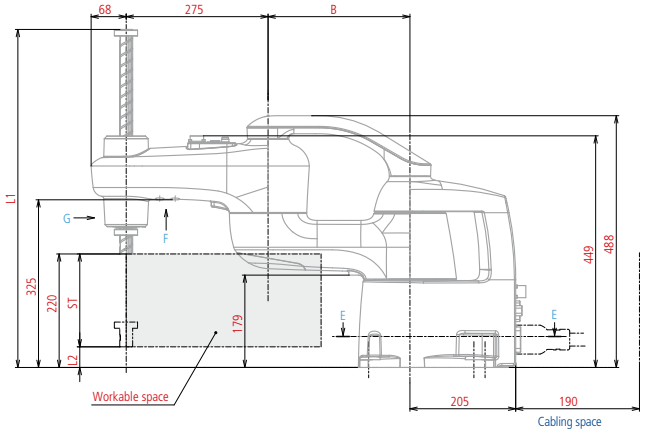


Specifications

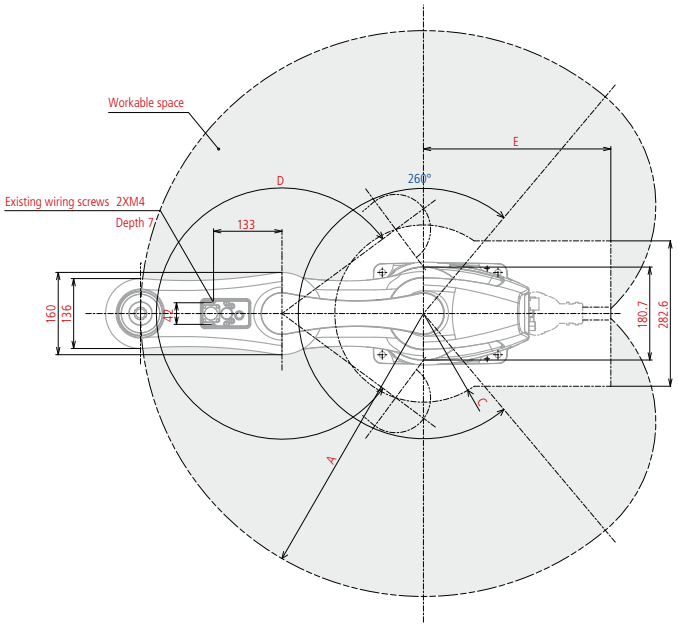
Term		Specifications		
Model [1]		HSR®048A1-N/S*	HSR®055A1-N/S*	HSR®065A1-N/S*
Total arm length (J1: No. 1 arm + J2: No. 2 arm)		205+275=480mm	275+275=550mm	375+275=650mm
Motion range and stroke	J1 (No.1 axis)	±130°		
	J2 (No.2 axis)	±143.5°	±150°	±150°
	Z (No.3 axis) *	*=10 : 100mm		
		*=20 : 200mm		
		*=32 : 320mm		
		*=51 : 510mm		
	T (No.4 axis)	±360°		
Axis combinations		J1 (No.1 axis) + J2 (No.2 axis) + Z (No.3 axis) + T (No.4 axis)		
Maximum payload		8kg		
Cycle time [2]		0.28sec	0.28sec	0.31sec
Maximum joint speed	J1	450deg/sec	450deg/sec	450deg/sec
	J2	785deg/sec	785deg/sec	785deg/sec
	Z	10:1700mm/sec,20:2300mm/sec,32:2475mm/sec		
	T	2500deg/sec		
Position repeatability (center of end-effector mounting face) [3]	J1+J2	±0.01mm	±0.012mm	±0.012mm
	Z	±0.01mm		
	T	±0.004°		
Maximum pressure input (downward)		98N (1 second or less)		
Maximum allowable moment of inertia		0.12kgm²		
Position detection method		Absolute encoder		
Drive motor / brake		All-axis servo motor / Z- and T-axis brake		
User air pipe		4 systems (φ4×2, φ6×2)		
User signal line		19 (for proximity sensor signals, etc.) Ethernet(8) *Option		
Air source	Normal pressure	0.05 to 0.35MPa		
	Maximum allowable pressure	0.59MPa		
Airborne noise		80 dB or less		
Weight		Approx. 31 kg	Approx. 31.5 kg	Approx. 32 kg

1: An asterisk [*] in a model name indicates Z-axis stroke.
2: Time required for a robot to move a 2 kg payload between two points 300 mm apart at a height of 25 mm.
3: Position repeatability is the precision at constant ambient temperature.

External dimensions and workable space Unit : mm



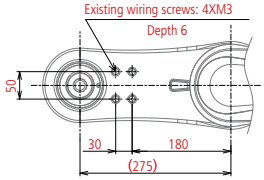
Model	A	B	C	D	E
HSR048A1-N*	480	205	164.4	287°	406.53
HSR055A1-N*	550	275	142.4	300°	364.32
HSR065A1-N*	650	375	194.0	300°	287.62



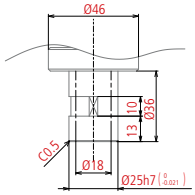
Z-axis stroke : ST (mm)	L1	L2
* =10 : 100	555.2	120
* =20 : 200	655.2	20
* =32 : 320	775.2	-100 Note 1
* =51:510 Note 2	965.2	-290 Note 1

Note 1: Be noted that if Z is 320mm, 510mm the lowest point of the Z-axis will achieve a position lower than the base mounting face.
Note 2: Models with a Z-axis stroke of 510mm will be available in and after 2019.

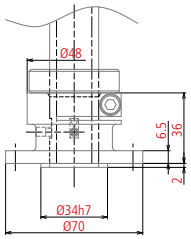
Positions of existing wiring and piping securing screws

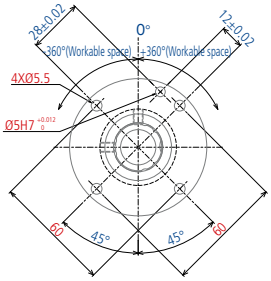


Detailed drawing of end-effector mounting face (View G)

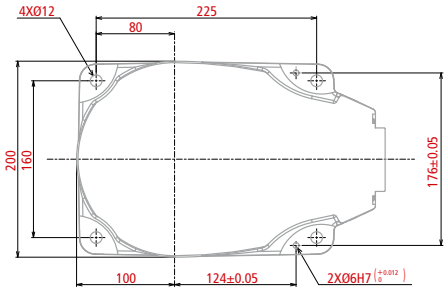


Flange (Option) Mounting Drawing





Base Mounting Dimensions (E-E cross section)



Z-axis stroke correspondence table

Vertical stroke (Z) (mm) *	Standard type	Dust & splash proof type	Cleanroom type	Bellows type	Metal detectable® bellows type	Dust & splash proof type (IP65 / Metal detectable® bellows)
100	○	—	—	—	—	—
120	—	—	—	—	○	○
170	—	○	○	○	—	—
200	○	—	—	—	—	—
240	—	—	—	—	○	○
290	—	○	○	○	—	—
320	○	—	—	—	—	—
450	—	○	—	○	—	—
510	○	—	—	—	—	—

* : Models with a Z-axis stroke of 120, 240, 450, or 510mm will be available in and after 2019.

Legend

H S R □ □ □ A 1 - □ □ □ - □ □ □ - N □ □ N □ - N N N N

Model : HSR: 4-axis robots

Total arm length : 048: 480 mm; 055: 550 mm; 065: 650 mm

Mounting orientation : N: Floor; S: Ceiling

Protected : NN: Standard type WS: Dust & splash proof type (IP65); C3: Cleanroom type (ISO class 3); JN: Bellows type KJ: Metal detectable® bellows type; KW: Dust and splash proof type (IP65 / metal detectable® bellows)

Z-Axis stroke [1]: 10: 100 mm; 20: 200 mm; 32: 320 mm; 51: 510 mm

Compliant standard : N: Standard specification; U: UL specification

Signal line /Ethernet: N: Standard specification; A: Embedded Ethernet Specifications

External battery specifications [2] : N: Without; A: With

Grease [3] : N: Standard; H: H1 grease type

*1: Available standard type Z-axis strokes are 100mm, 200mm, 320mm and 510mm. For other variations, please check the above table. *2: The external battery extension unit is sold separately. *3: Dust and drip-proof types are also available for selection.

The data listed on this page is for the standard type. For other options, see the DENSO Robotics homepage.

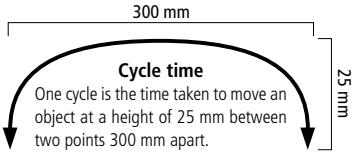
HS-A1 SERIES

Supported Robot Controllers
RC8A ▶P.46

HS035 / 045 / 055

This is a fast high-performance SCARA robot that specializes in high-speed movement in a small installation space and is suited to conveyance and assembly work.

Maximum arm reach	350 / 450 / 550 mm
Maximum payload	5kg
Cycle time	0.29 sec
Position repeatability	±0.015 / 0.02 mm



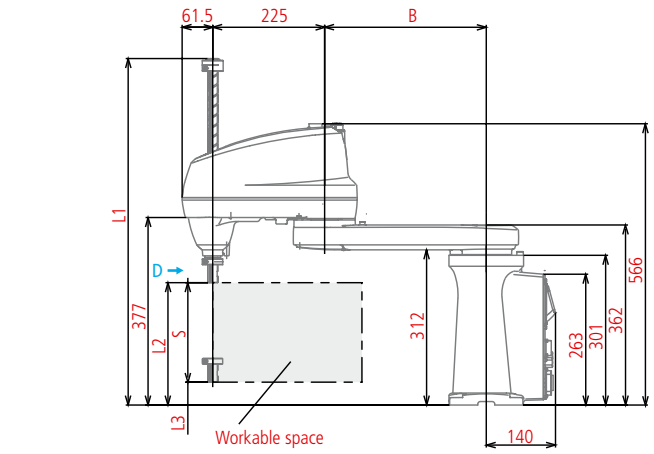
HS045A1

Specifications

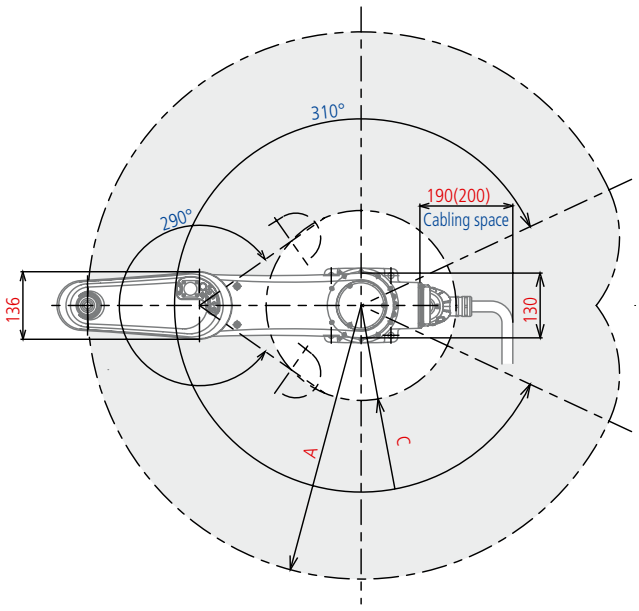
Term		Specifications		
Model [1]		HS035A1-N*	HS045A1-N/S*	HS055A1-N/S*
Axes		4		
Position detection method		Absolute encoder		
Drive motor / brake		All-axis servo motor / Z- and T-axis brake		
Total arm length (No. 1 arm + No. 2 arm)		350 (125+225) mm	450 (225+225) mm	550 (325+225) mm
Motion range and stroke	J1 (No.1 axis)	±155°		
	J2 (No.2 axis)	±145°		
	Z (No.3 axis)	*=10 : 100mm, *=15 : 150mm, *=20 : 200mm, *=32 : 320mm,		
	T (No.4 axis)	±360°		
Maximum payload		5kg		
Maximum composite speed (center of end-effector mounting face)	Arm end	7,200mm/sec	6,300mm/sec	7,100mm/sec
	T	2,400°/sec		
Maximum joint speed	J1	720deg/sec	450deg/sec	
	J2	720deg/sec		
	Z	2000mm/sec		
	T	2400deg/sec		
Cycle time [2]		0.29sec		
Position repeatability (center of end-effector mounting face) [3]	J1+J2	±0.015mm	±0.02mm	
	Z	±0.01mm		
	T	±0.005°		
Maximum pressure input (downward, for up to 1 s)		98N		
Maximum allowable moment of inertia		0.1kgm^2		
User air pipe		4 systems (ϕ4×2, ϕ6×2)		
User signal line		19 (for proximity sensor signals, etc.)		
Air source	Normal pressure	0.05 to 0.35MPa		
	Maximum allowable pressure	0.59MPa		
Airborne noise (equivalent continuous A-weighted sound pressure level)		80 dB or less		
Protect grade		Dust & splash proof type : IP65 (option) Cleanroom type ISO class 3 (option)		
Weight		Approx. 25 kg		

1: An asterisk [*] in a model name indicates Z-axis stroke.
2: Time required for a robot to move a 2 kg payload between two points 300 mm apart at a height of 25 mm.
3: Position repeatability is the precision at constant ambient temperature.

External dimensions and workable space Unit : mm



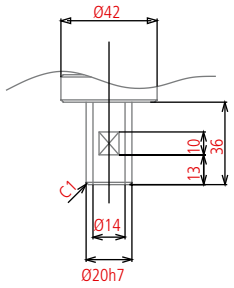
Model	A	B	C
HS035*	350	125	143
HS045*	450	225	136
HS055*	550	325	191



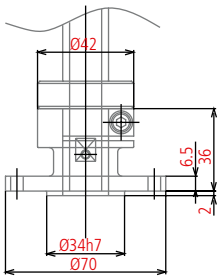
Z-axis stroke : ST(mm)	L1	L2	L3
* =10 : 100	597	246	146
* =15 : 150	647	246	96
* =20 : 200	697	246	46
* =32 : 320	817	246	-74 Note 1

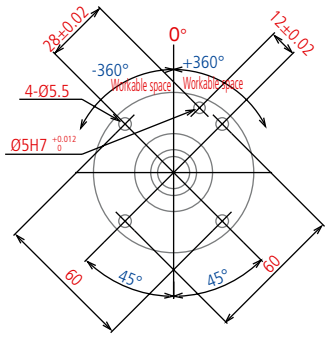
Note 1: Please note that if the Z axis stroke is 320 mm., since when fully lowered, the Z-axis will reach a position lower than the base mounting face, care should be taken to avoid interference with peripheral devices.

Detailed drawing of end-effector mounting face (View D)



Flange (option)

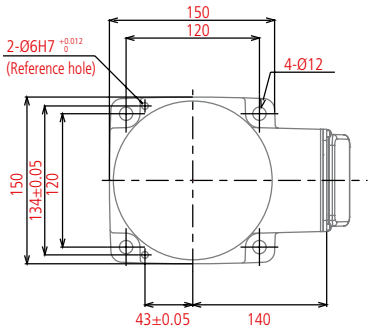




Detailed flange drawing (Option)
(s=1:1)

The values in parentheses ( ) are of the dust & splash proof type

Detailed drawing of base mounting face (Top view)



The values in parentheses ( ) are of the dust & splash proof type

Legend

HS □□□ A1 - □ □□ - □□ □ - N N N N N - N N N N

Model :
HS: 4-axis robots

Total arm length :
035: 350mm
045: 450mm
055: 550mm

Mechanical type:
A1: Arm length 350mm, 450mm, 550mm

Mounting orientation :
N: Standard
S: Ceiling

Z-Axis stroke :
10: 100mm
15: 150mm
20: 200mm
32: 320mm

Protected :
NN: Standard type
W5: Dust & splash proof type (IP65)
C3: Cleanroom type (ISO class 3)
JN: Bellows type

Compliant standard:
N: Standard specification
U: UL specification

Paint / Surface finish :
N: DENSO standard colors

The data listed on this page is for the standard type. For other options, see our web page.

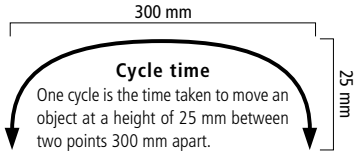
HM SERIES

Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

HM-4060 / 4A60 / 4070 / 4A70 / 4085 / 4A85 / 40A0 / 4AA0

The HM series consists of a rich lineup of models with the maximum arm length and payload among DENSO 4-axis robots to meet specific needs.

Maximum arm reach	600 to 1,000mm
Maximum payload	20kg
Cycle time	0.29 / 0.31 sec
Position repeatability	±0.02 / 0.025 mm



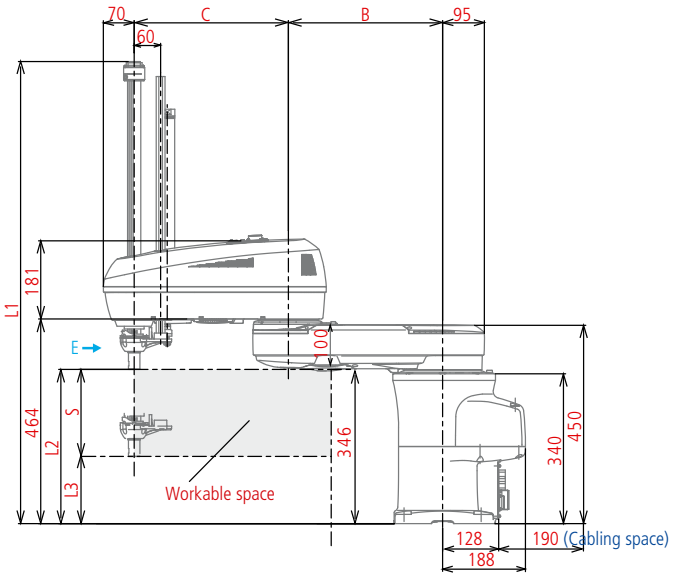
HM-40702

Specifications

Term		Specifications							
Model [1]		HM-4060*	HM-4A60*	HM-4070*	HM-4A70*	HM-4085*	HM-4A85*	HM-40A0*	HM-4AA0*
Axes		4							
Position detection method		Absolute encoder							
Drive motor / brake		All-axis AC servo motor / Z-axis gravity balance air cylinder / Z-axis motor brake							
Total arm length (No. 1 arm + No. 2 arm)		600 (250+350) mm		700 (350+350) mm		850 (350+500) mm		1000 (500+500) mm	
Motion range and stroke	J1 (No.1axs)	±165°							
	J2 (No.2 axis)	±143°		±147°					
	Z (No.3 axis)	*=1 : 100mm, *=A : 150mm, *=2 : 200mm, *=3 : 300mm, *=4 : 400mm							
	T (No.4 axis)	±360°							
Maximum payload		10kg	20kg	10kg	20kg	10kg	20kg	10kg	20kg
Maximum joint speed	J1	449.74deg/sec				412.26deg/sec		374.78deg/sec	
	J2	667.5deg/sec				611.87deg/sec		556.25deg/sec	
	Z	2764.88mm/sec				2764.88mm/sec			
	T	2229.93deg/sec	1544.51deg/sec	2229.93deg/sec	1544.51deg/sec	2229.93deg/sec	1544.51deg/sec	2229.93deg/sec	1544.51deg/sec
Cycle time [2]		0.29sec				0.31sec			
Position repeatability (center of end-effector mounting face) [3]	J1+J2	±0.02mm				±0.025mm			
	Z	±0.01mm							
	T	±0.005°							
Maximum pressure input (downward, for up to 1 s)		98N							
Maximum allowable moment of inertia		0.25kgm²	0.45kgm²	0.25kgm²	0.45kgm²	0.25kgm²	0.45kgm²	0.25kgm²	0.45kgm²
User air pipe		4 systems (φ6)							
User signal line		24 (for proximity sensor signals, etc.)							
Air source	Normal pressure	0.05 to 0.35MPa							
	Maximum allowable pressure	0.59MPa							
Airborne noise (equivalent continuous A-weighted sound pressure level)		80 dB or less							
Protect grade		Dust & splash proof type : IP65 (option)							
Weight [3]		Approx. 53 to 56 kg							

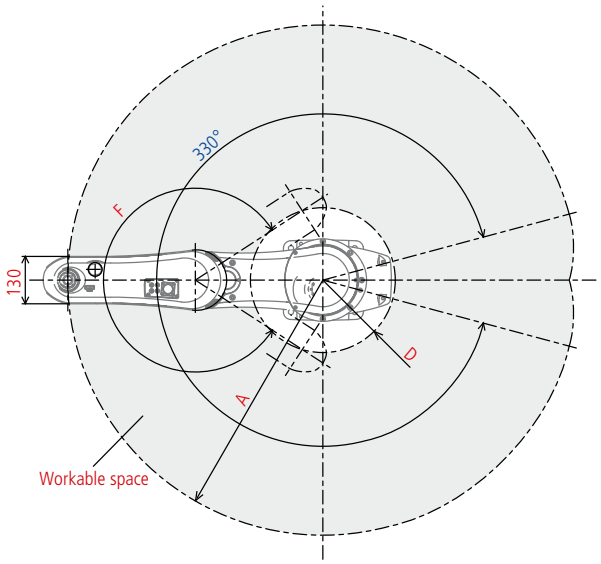
1: An asterisk [*] in a model name indicates Z-axis stroke.
2: Time required for a robot to move a 2 kg payload between two points 300 mm apart at a height of 25 mm.
3: Position repeatability is the precision at constant ambient temperature.

External dimensions and workable space Unit : mm



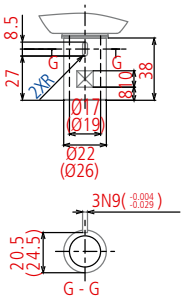
S	L1		L2	L3
(Z-axis stroke)	10kg	20kg	—	—
100	755	749	350	250
150	805	799	350	200
200	855	849	350	150
300	955	949	350	50
400 [1]	1055	1049	350	-50

1: If Z-stroke is 400 mm, the lowest point of the Z-axis will achieve a position lower than the base mounting surface.

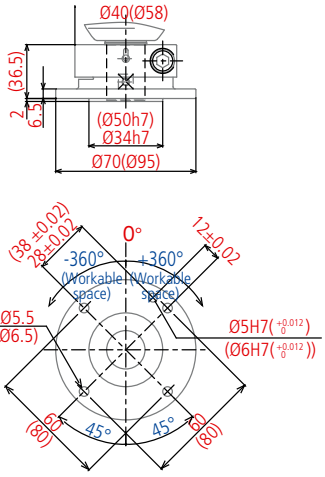


Model	A	B	C	D	F
HM-4060*, HM-4A60*	600	250	350	213	286°
HM-4070*, HM-4A70*	700	350	350	199	294°
HM-4085*, HM-4A85*	850	350	500	281	294°
HM-40A0*, HM-4AA0*	1000	500	500	284	294°

Detailed drawing of end-effector mounting face (View E) [2]

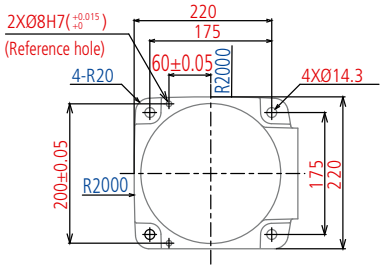


Flange (option) [2]



2: The dimensions shown in the drawing are based on a 10 kg load capacity (HM-40***); the dimensions of the end-effector mounting face and flange (option) in parentheses are based on a 20 kg load capacity (HM-4A***).

Detailed drawing of base mounting face (Top view)



Legend

H M □ - 4 □ □□ □ - □

Model :
HM: Mid-sized 4-axis robot

Robot Type :
None: Floor
S: Ceiling

Axes :
4: 4-axis

Maximum payload :
0: 10kg
A: 20kg

Total arm length :
60: 600mm
70: 700mm
85: 850 mm
A0: 1000mm

Vertical stroke :
1 : 100mm
A : 150mm
2 : 200mm
3 : 300mm
4 : 400mm

Options :
None: Standard type
W: Dust & splash proof type (IP65)
UL: UL specification

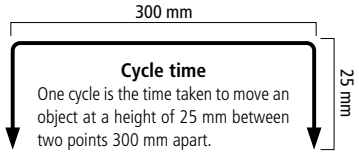
The data listed on this page is for the standard type. For other options, see our web page.

XR SERIES

Supported Robot Controllers
RC8A ▶P.46 RC8 ▶P.48

Ceiling mount made up of a linear-motion axis and pivot-motion axis allows the robot to work under itself while presenting a compact form-factor

Maximum payload	5kg
Cycle time	0.56 sec



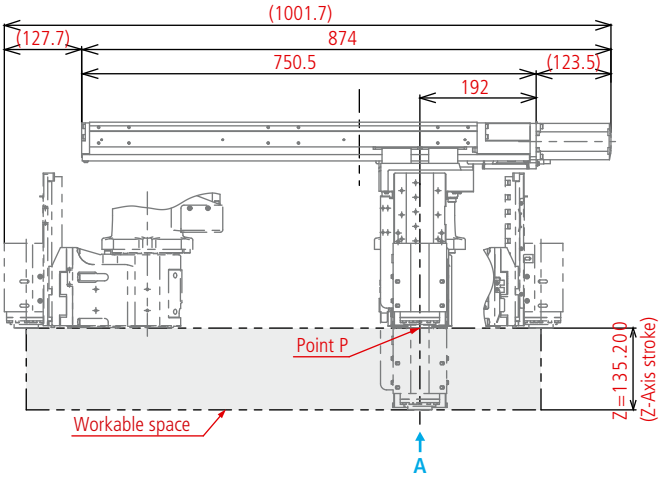
Patent No. 4793376 / No. 5272647

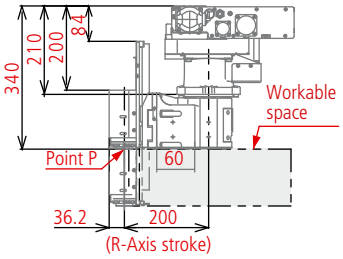
Specifications

Term		Specifications						
Model [1]		XR-4341*	XR-4371*	XR-4372*	XR-4373*	XR-43A1*	XR-43A2*	XR-43A3*
Axes		4						
Position detection method		Absolute encoder						
Drive motor / brake		All-axis AC servo motor / Z-axis brake						
Total arm length (No. 1 arm + No. 2 arm)		200mm		250mm	300mm	200mm	250mm	300mm
Motion range and stroke	X (No. 1 axis)	450mm	760mm			1,060mm		
	R (No. 2 axis)	±168°						
	Z (No. 3 axis)	*=1 : 135mm, *=2 : 200mm						
	T (No. 4 axis)	±360°						
Maximum payload		5kg						
Maximum joint speed	X	1650mm/sec	1600mm/sec			1240mm/sec		
	R	572.94deg/sec		458.35deg/sec	382deg/sec	572.94deg/sec	458.35deg/sec	382deg/sec
	Z	2250mm/sec						
	T	720deg/sec						
Cycle time [2]		0.56sec						
Position repeatability (center of tool mounting face) [3]	X+R	±0.015mm						
	Z	±0.01mm						
	T	±0.005°						
Maximum allowable moment of inertia		0.05kgm²						
User air pipe		1 air supply system (ϕ8) (4 systems (ϕ4 × 8) with optional manifold valve)						
User signal line		10 (for proximity sensor signals, etc.)						
Air source	Normal pressure	0.05 to 0.35MPa						
	Maximum allowable pressure	0.59MPa						
Weight [4]		Approx. 33 kg	Approx. 45 kg	Approx. 46 kg	Approx. 47 kg	Approx. 51 kg	Approx. 52 kg	Approx. 53 kg

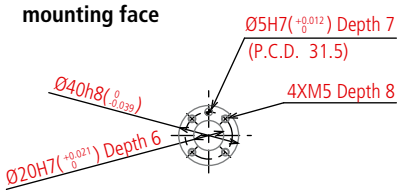
1: An asterisk [*] in a model name indicates Z-axis stroke.
2: Time required for a robot to move a 3 kg payload between two points 300 mm apart at a height of 25 mm.
3: Position repeatability is the precision at constant ambient temperature.
4: Heavy models (Z = 200 mm) are listed.

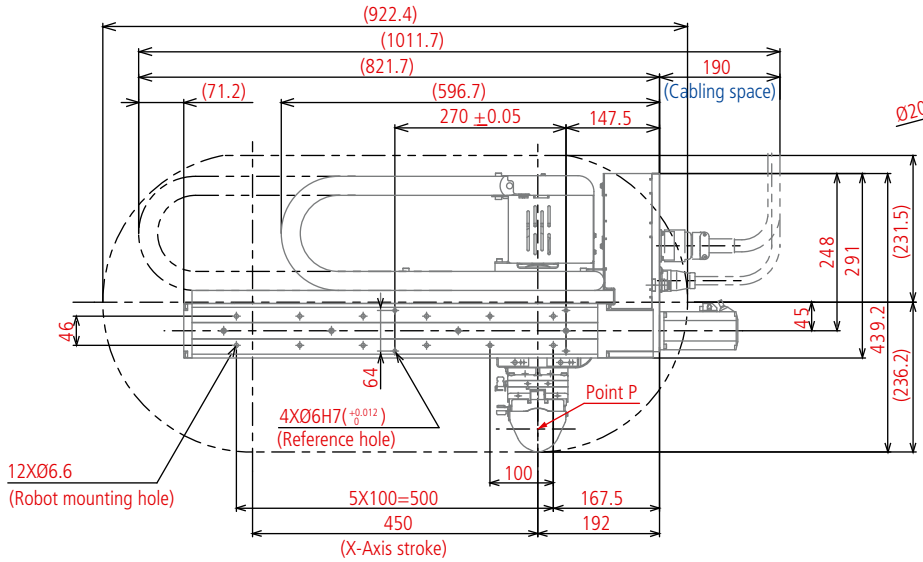
External dimensions and workable space (X-axis=450mm) Unit : mm

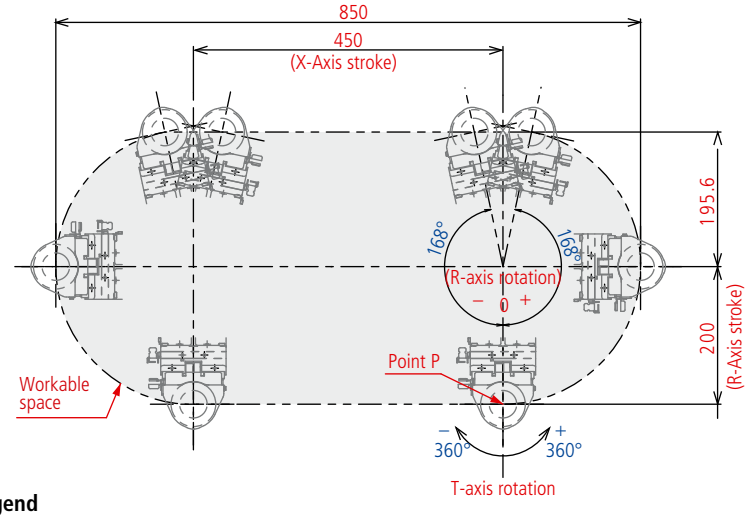




Detailed drawing of end-effector mounting face







Legend

XR-4 3 □ □ □

Model:	Axes:	Maximum payload:	X-Axis stroke:	Total arm length:	Z-Axis stroke:
XR: Built-in robot	4: 4-axis	3: 5kg	4: 450mm 7: 760mm A: 1060mm	1: 200mm 2: 250mm 3: 300mm	1: 135mm 2: 200mm

The data listed on this page is for the standard type.

COBOTTA®

Anywhere, anytime, hassle-free. A robot that collaborates with everyone.

With the initial purpose of increasing the productivity of our own automobile component manufacturing facilities, we have been developing DENSO robots for 50 years. Today, we introduce the new industrial collaborative robot "COBOTTA".

The human-friendly, compact, and portable design allows you to take COBOTTA anywhere, and automate tasks right away. No expert knowledge is required, making operation amazingly easy.

Do you need that extra hand? Do you want to leave simple tasks to robots, and make more time for creative work?

COBOTTA will open infinite possibilities to address your needs, and realize creative, new ideas.

1 safety design

Safe shape and movement

Collaborative robots do not require safety fences. The unique outer contour has no sharp edges, and consists of curves that prevent hands from getting caught. Sensors are built into the six moving parts for constant monitoring of speed and torque, to guarantee safety from a functional aspect (planning to obtain certification from a third-party certification authority).

*See the notes on P.38.

2 portable body

Transportable immediately to sites with staff shortages

The main unit weighs approximately 4 kg providing easy portability, and offers a load capacity of 500 g. The integrated controller not only reduces wiring, but also allows consolidated control with other devices. ORiN is supported as standard.

3 easy to use

Simple teaching with no memorization

Equipped with a direct teaching function and an intuitive GUI for easy programming. An optional camera can be mounted to enable teaching using the camera.
COBOTTA is user-friendly even for those who don't get used to robots.

4 open platform

Infinite possibilities

The integrated controller is open, and COBOTTA's control API is made public, allowing creators to develop their own applications in the environment they choose (*OSS version). The robot is compatible with JAVA, Ruby and other diverse development languages and is connectable to all kinds of devices. COBOTTA is furnished with a high level of expandability to fully satisfy the wishes of professionals.

COBOTTA®

CVR038

Anywhere, anytime, hassle-free.
A robot that collaborates with everyone.
Small portable body with a user-friendly form.
This robot can be easily taken anywhere to automate work immediately.

Maximum arm reach	342.5 mm
Rated payloadt	0.5 kg [2]
Position repeatability	±0.05 mm

[Notes] This product is an industrial robot capable of operating in collaboration with human beings. Before using the product, the user should carry out risk assessment in accordance with regulations and standards including relevant laws and ordinances, notices, guidelines and ISO12100:2010 and perform thorough risk mitigation. In addition, the user should check compliance with laws, ordinances and standards pertaining to the operating environment.

Patent No. 6365113
Design registration No. 1583755 / No. 1583756 / No. 1583757 / No. 1583758

COBOTTA®

Specifications

Term	Specifications
Axes	6 axes (arm unit) + 1 axis (electric gripper unit) [1]
Brake	1, 2, 3, 4 and 5 axes with brake
Total arm length (No. 1 arm + No. 2 arm)	342.5 (165;177.5) mm
Rated payload (Maximum payload)	0.5 kg (0.7 kg within ±10 degrees with the wrist angled downward) [2]
Maximum allowable inertia moment	J4: 0.0065 kgm^2 J5:0.0047 kgm^2 J6:0.0012 kgm^2
Position repeatability acuracy	±0.05 mm [3]
Standard cycle time	4.32 secs. in the factory configuration: 1.6 secs. when set to maximum speed (Reciprocating movement time for 200 mm in the horizontal direction and 25 mm in the vertical direction)
Protection grade	COBOTTA unit : IP30 AC adapter and AC cable : IP20
Software	Standard version: COBOTTA-dedicated software, OSS version: None (*Linux, etc. may be installed by the customer.)
Power supply specification (AC adapter)	Input: Single phase AC100 - 240 V ±10%/ 47 - 63 Hz
External signal	Dedicated input: 12 points/Dedicated output: 11 points General-purpose input: 8 points/General-purpose output: 9 points External emergency stop connection x 1 ch
External communication	Ethernet x 1 line, USB x 2 lines, VGA output x 1 ch
Environmental conditions (During operation)	Temperature: 0 - 40 °C, Humidity: 20 - 80 %RH (with no condensation)
Unit weight	Approx. 4 kg
Safety specifications (*Certification from a third-party certification body scheduled)	Standard version: ISO 10218-1 :2011 ISO / TS 15066:2016 ISO 13849-1 :2015 PL d Cat.3 OSS version: ISO 13849-1 :2015 PL d Cat.3
Noise (Equivalent continuous A-weighted sound pressure level)	55 dB or less (Measured with the rated payload and the maximum speed of the factory default setting)
Defacement (pollution) degree	2
Over-voltage category	II [4]

*1. Options 2. Without electric gripper 3. At fixed ambient temperature or lower 4. Overvoltage category II refers to energy consuming equipment to be supplied from fixed installation(such as outlet)

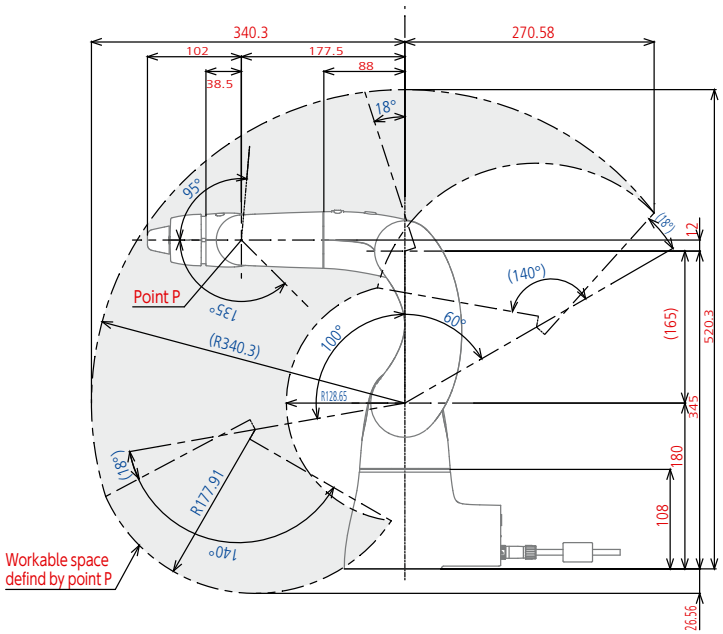
System configuration

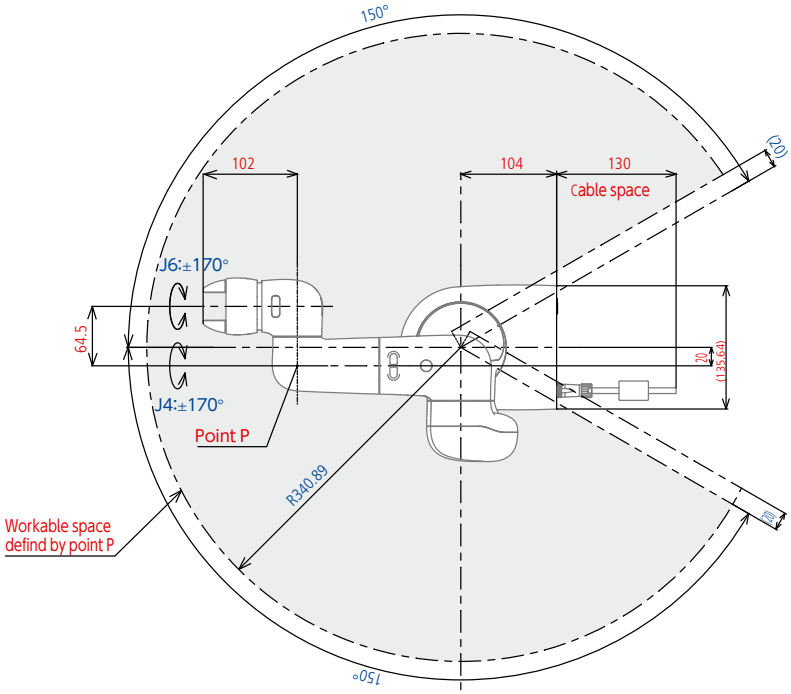
- AC adapter
- AC cable [1]
- Dummy connector (I/O) [2]
- Emergency stop box
- Emergency stop box holder
- Emergency stop box holder for tablet
- Manual disc
- Software DVD for COBOTTA [3, 4]

1. To be selected matched to power outlets in the country of use 2. For use when the optional Mini I/O cable is not used. 3. To be installed in a tablet or PC. 4. Android OS applications can also be downloaded from Google Play.

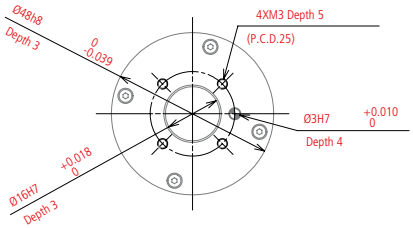
External dimensions and workable space

Unit : mm

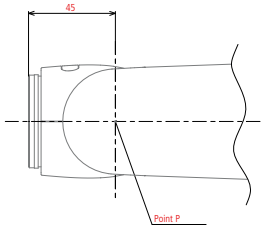




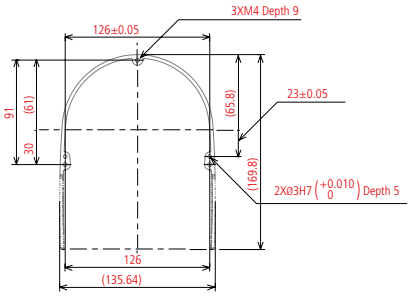
Detailed drawing of end-effector mounting face



Without gripper



Detailed drawing of base mounting face



Legend

CVR 038 A1 - NV6 - NNC - NNN□□ - NNN□

Model :
CVR : Collaborative vertically-articulated robot

Axis specifications :
V6 : 6 axes

Compliant standard :
C : Safety function

I/O :
P : Positive common (PNP)
M : Negative common (NPN)

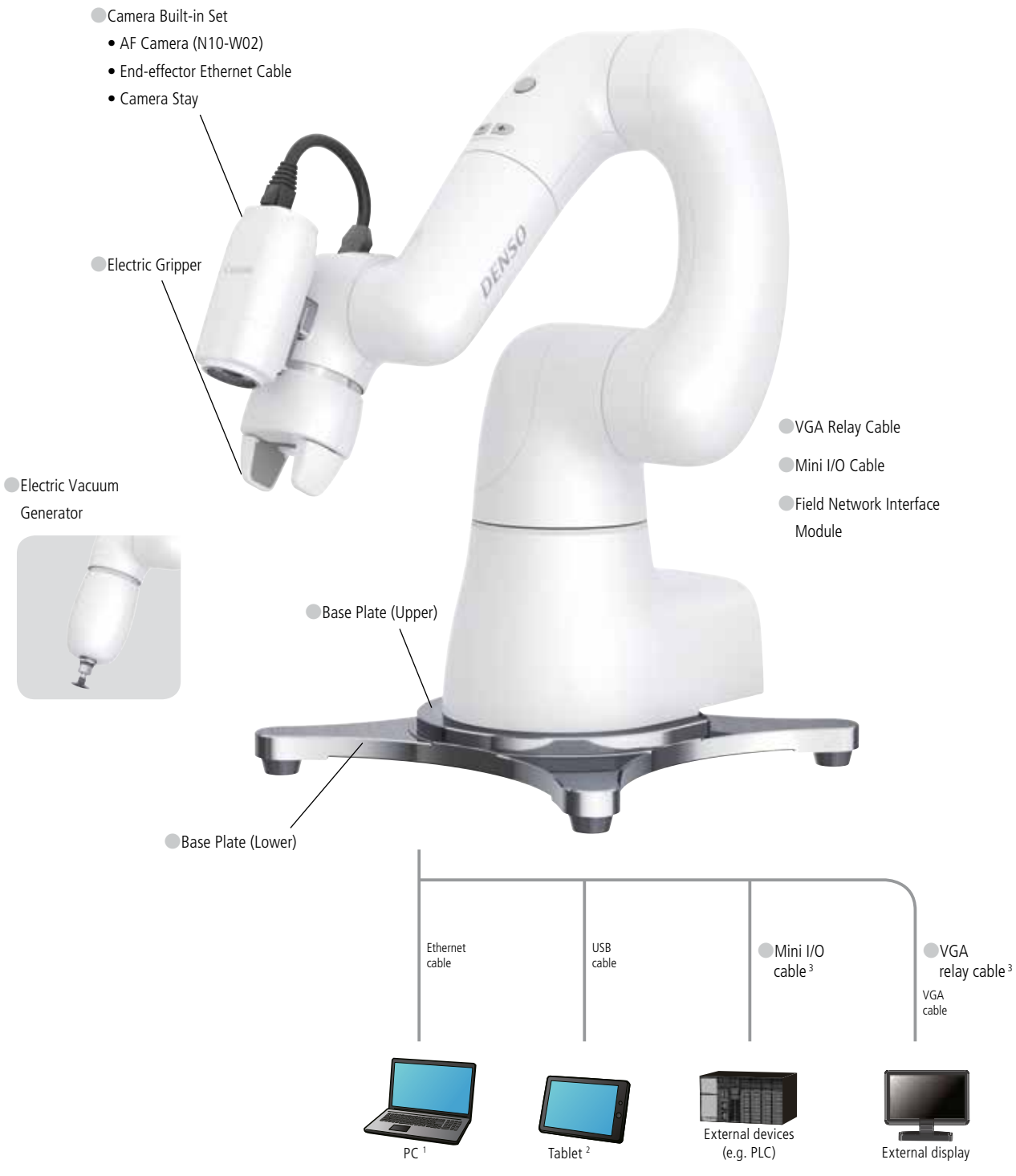
OS :
A : Standard OS version
N : OSS version

Electric gripper :
A : With
N : Without

COBOTTA®

More Convenient

With a design that's easy for people to interact with and a small, portable body that can be carried nearly anywhere, COBOTTA is a collaborative robot that can automate work immediately. Do you need that extra hand? Do you want to leave simple tasks to robots and make more time for creative work? The following are additional options specifically engineered to work with COBOTTA, greatly expanding the range of possible uses.



1. OS: Windows 2. OS: Android, 8-inch or larger size recommended. 3. Optional accessories

Hand tools

Two types of hand tools are available*1. You can also fabricate your own hand tool for use with COBOTTA.

Electric Gripper

This hand tool is ideal for the basic operations of gripping and releasing.

Electric Vacuum Generator

This tool makes it easy to pick up items via suction without providing an external air compressor.

Camera

By attaching a camera designed specifically for use with COBOTTA to the robot's wrist, you can perform work while detecting the position of target objects. Use the factory default calibration to get started quickly without a timely initial setup process.

Camera Built-in Set*2

AF Camera (N10-W02)

This AF camera sets the optimal exposure automatically and eliminates the need to focus manually.

Other options

Base Plate Set

This baseplate allows COBOTTA to operate in a freestanding orientation so that the robot doesn't need to be mounted.
The base plate is divided into two parts, upper side and lower side.

Field Network Interface Module

Use EtherCAT, Ethernet/IP, and PROFINET.

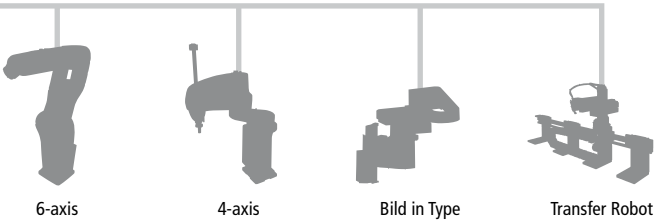
*1: Specify at time of order. *2: The set includes an end-effector Ethernet cable and camera stay. *3: Product launch tentatively scheduled on March 2020. *4: To be supported in 2019.

Robot Controller

High-performance controller with a compact A3-size body that controls the whole robot lineup. Also compatible with integrated control by ORiN, original robot control, measures for equipment with safety functions and all methods of use required by the user.

Robot Controller

RC8A

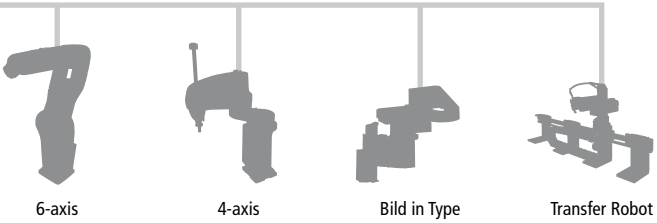


Robot Type

VP / VS / VM / HSR / HS-A1 / HS / HM / XR / SC

Size	W357×D320×H94mm	Weight	10kg

RC8



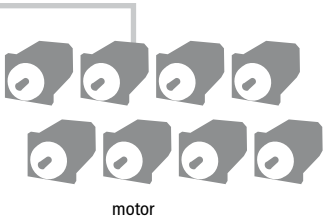
Robot Type

VP / VS / VM / HS / HM / XR / SC

Size	W357×D300×H94mm	Weight	10kg

Motion controller

MC8A/MC8



Motor Type

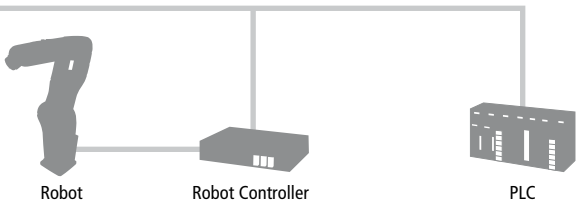
30 / 50 / 100 / 200 / 400 / 750 / 1000W

Size	MC8A : W357×D320×H94mm MC8 : W357×D300×H94mm	Weight	10kg

Industrial Programmable Controller

Limited for use in Japan only.

IPC8



Size	W357×D300×H94mm	Weight	9kg

RC8A / RC8

Robot Controller Development Code No.8

State-of-the-art DENSO robot controller supporting the global standard specifications

Compact size

The world's smallest* lightweight high-performance 8-axis controller that offers a high degree of freedom in installation to save space

Controller	Specifications	Size (mm)	Weight (kg)
RC8A	Standard / Safety I/O-less	356.5 × 319.6 × 96.8	approx 10
RC8	Safety I/O-less	356.5 × 299.6 × 96.6	approx 10

* As of December, 2016, in-house research. For robot controllers supporting 6-axis robots (3 kW class).

Exceptional Usability

Improved GUI for increased efficiency

A comprehensible menu structure and improved functionality.
Improved GUI and functions reduce time required to implement a robot.


I/O viewer


Variable viewer


Servo monitor


Control log


Template


Error log

Compliance with global standards

Open network

ORiN2 (ISO 20242-4 standard)
Open Resource Interface for the Network Version 2

ORiN Version 2

Standards / Authentication

- ISO 10218-1:2011 / CE (standard specification, safety motion specification, UL specifications)
- UL (UL specifications)
- PLe / SIL3 (standard specification, UL specifications)
- PLd / SIL2 (safety motion specification)
- KCs (standard specification, safety motion specification)

TÜVRheinland® Precisely Right.

* Please contact DENSO Robotics for details of acquisition of certification.

Field network

Supporting 80% of the global share of network standards

- Fieldbus

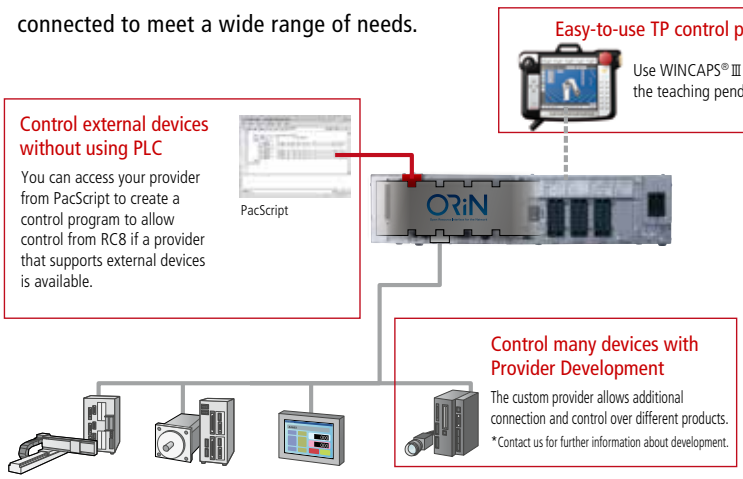
CC-Link PROFIBUS DeviceNet

- Industrial EtherNet

EtherNet/IP EtherCAT PROFINET

Wide Expandability

Many devices can be custom controlled and connected to meet a wide range of needs.



Supported Controllers

Controller	Specifications	Robot
RC8A	Standard	VP, VS, VM, HS, HSR®, HM, XR, SC
	Safety I/O-less	HSR®
	Safety motion	VP, VS, VM, HS, HSR®, HM, XR, SC
RC8	Standard	VP, VS, VM, HM, XR, SC
	Safety I/O-less	

Safety Motion Function

Safety function that allows humans and robots to work in a shared area

Supported controller RC8A

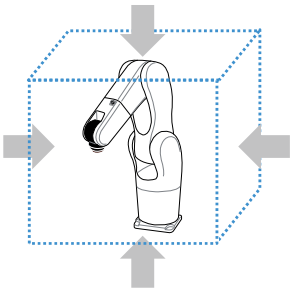
Overview

The safety function monitors and controls the robot operation status to realize safe and highly-productive robot equipment.

1. Monitor the motion area

Robot motion area is limited to monitor the motion is within the limited area.

- Small-sized equipment Mutual access to the work area common to human and robots



2. Monitor the speed

Robot speed is controlled to monitor the robot speed is slower than the speed limit.

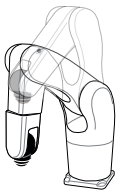
- Continuous motion as maintaining the safe speed is enabled even when human approaches the robot.

Patent No. 6379853

3. Monitor the robot stop

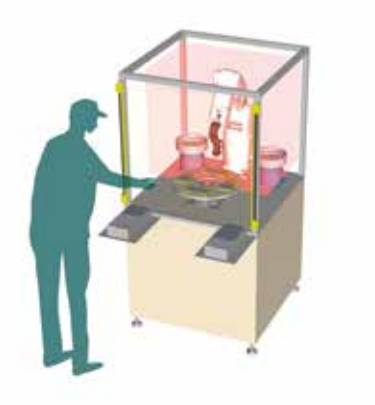
The stop status of the robot is monitored without shutting down the motive power.

- Smooth recovery of robot motion when human leaves the common work area is assured to improve the productivity.



Use scenarios

Robot motion area is limited to enable mutual approach to the work area common to the human and robots.



When entry of a human into the set motion area is detected by devices such as laser scanners, the robot speed is limited to the specified safe speed or less to enable continuous production. The robot stops moving when the human enters the stop area.

Safety Function

Name	Details
STO (Safe Torque Off)	Function for immediate shutdown of the motor power
SS1 (Safe Stop 1)	Function to shut down the motor power after slowing down and stopping the robot
SS2 (Safe Stop 2)	Function to leave the power on after slowing down and stopping the robot
SOS (Safe Operating Stop)	Function to monitor the robot does not move from the stop position
SLP (Safely-Limited Position)	Function to monitor the axes do not exceed the soft limit

Name	Details
RSM (Robot Speed Monitoring)	Function to monitor the robot's specified sections do not exceed the specified speed.
RPM (Robot Position Monitoring)	Function to monitor the robot's specified sections do not exceed the specified motion area
SBC (Safe Brake Control)	Function to turn off the external brake power and lock the brake

*Equipment must be used only after performing risk assessment, implementing safety measures, and checking that hazard to humans is thoroughly prevented.

RC8A

Specifications

Term			Specifications								
Applicable robots			VP -5243/6242 [1]	VS -050/060 /050S2	VS -068/087	VS -6556/6577	VM -6083/60B1	HSR® 048/055/065	HS 035A1/045A1 /055A1	HM -4*****	XR -43***
Power	Power supply		1.00kVA [1]	1.15kVA	2.78kVA	1.80kVA	3.30kVA	1.80kVA	1.80kVA	2.45kVA	1.85kVA
	Input voltage range		Three-phase 200 VAC –15% to 240 VAC +10% (100 V specification also available for the VP series.)								
			Single-phase, 230 VAC –10% to 240 VAC +10% [1]				—	Single-phase, 230 VAC –10% to 240 VAC +10%			
	Power supply frequency		50Hz / 60Hz								
Power cable			5m								
Controllable axes			5 / 6	6				4			
Control method			PTP, CP 3-dimensional linear, 3-dimensional arc (PTP control only for additional axes)								
Drive method			All axes all digital AC servo								
Language used			DENSO Robotics language (PacScript)								
Memory capacity			User area Variable area: 1.75 MB (32,766 points equivalent), file area: 400 MB (5,000 steps × 256 files)								
Teaching system			1) Remote teaching 2) Numerical entry (MDI) 3) Direct teaching (HS series, HM series HSR series)								
External signal (I/O, etc.)	Mini I/O	Standard specification, safety motion specification	Input: User open 8 points + system fix 14 points Output: User open 8 points + system fix 18 points								
		Standard/Safety I/O-less specification	Input: User open 8 points + system fix 13 / Output User open 8 points + system fix 14 points								
	Hand I/O		Input: User open 8 points / Output: User open 8 points								
	Motion I/O (option)		Input: 30 safety circuit signals/Output: 14 safety circuit signals								
	Parallel I/O board for expansion (option)		Expansion slot: PCI Input: 40 points / Output: 48 points								
	CC-Link remote device board (option)		Expansion slot: PCI Express Input: 8192 points max. / Output: 8192 points max., Remote register, Input: 2048 words max. / Output: 2048 words [2]								
	DeviceNet slave board (option)		Expansion slot: PCI Express Input: max. 256 points / Output: max. 256 points								
	DevIceNet master board (option)		Expansion slot: PCI Express Input: 1024 points / Output: 1024 points								
	EtherNet / IP adapter board (option)		Expansion slot: PCI Express Input: max. 4032 points / Output: max. 4032 points								
	PROFIBUS slave board (option)		Expansion slot: PCI Express Input: max. 256 points / Output: max. 256 points								
	PROFINET I/O device board (option)		Expansion slot: PCI Express Input: max. 8129 points / Output: max. 8129 points								
	EtherCAT slave board (option)		Expansion slot: PCI Express Input: max. 2048 points / Output: max. 2048 points								
External communication			RS-232C: 1 line, EtherNet: 1 line (GbE: Gigabit EtherNet), USB: 2 lines, VGA: 1 line (option)								
Expansion slot			· PCI 1 slot · PCI Express 1 slot								
External-diagnosis function			Overrun, servo error, memory error, input error, short circuit detection (user wiring part), etc.								
Environmental condition (in motion)			Temperature: 0 to 40 degree C, Humidity: 20 - 90%RH (no condensation allowed.)								
Safety function			See the "options" on the list below.								
Protect grade			IP20								
Weight			Safety I/O-less specification, Standard specification: Approx. 10kg, Safety motion specification: Approx. 11kg [3]								

1: Power for the 100 VAC specification is "Single-phase 100 VAC –5% to 110 VAC +10% 50/60 Hz, 1 kVA.
2 : For Ver. 2.00 3: Does not include the supplied cables.

4: Specifications must be designated when placing an order.
Specifications cannot be changed after shipment.
Additional axis specifications are available for all controllers.

5: The UL specification is also required for the robot unit.
In addition, a pendant, mini-pendant or emergency stop button box is required.
Please note that for VS-050 / 060 / 068 / 087, a brake release unit is required.

Compliant robot safety standards :
ISO 10218-1: 2011, ANSI/RIA R15.06-1999
UL standards UL1740, CSA Z434, etc.

Options [4]

Controller Type	Safety function	Standard(s)	I/O type
Standard	Safety I/O : PL e/Cat.4, SIL3	CE, KCs	NPN /PNP
Safety motion	Safety I/O : PL e/Cat.4, SIL3 Safety motion : PL d/Cat.3, SIL2	CE, KCs	
Safety I/O-less	—	—	
UL standard (Safety I/O) [5]	Safety I/O : PL e/Cat.4, SIL3	CE, UL	
UL safety motion [5]	Safety I/O : PL e/Cat.4, SIL3 Safety motion : PL d/Cat.3, SIL2	CE, UL	

Legend

RC8A - □□□□ - NN □□ - □□ - NNN

Controller name

Robot type format:
VPA0: VP-5243 / 6242
VSA3: VS050 / 060 / 050S2
VSA4: VS068 / 087
VSA0: VS-6566 / 6577
VMA0: VM series
HSB1: HSR series
HSA1: HS-A1 series
HMA0: HM series
XRA0: XR series
S1A1: SC series (2-axis)
S2A1: SC series (3-axis, 4-axis)

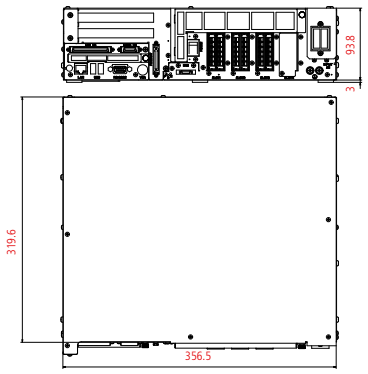
CPU:
N: Standard
E: Standard (In and after June 2020)
*Due to CPU change.
7: High-spec CPU

I/O type:
M: Negative common (NPN)
P: Positive common (PNP)

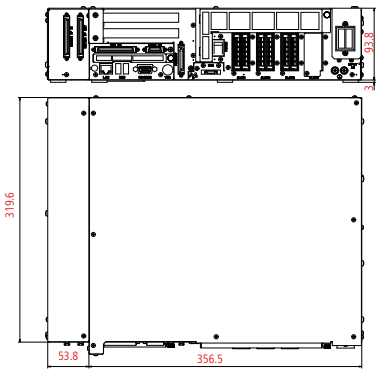
Compliant standard:
NN: Safety-I/O-less specification (safety-I/O-less)
*The RC8A safety I/O-less specification is selectable for the HSR/HS-A1 Series.
NI: Standard specification (safety I/O)
NM: Safety motion specification (safety I/O, Safety motion)
UI: UL specification [5] (safety I/O)
UM: UL specification [5] (safety I/O, Safety motion)

External dimensions Unit : mm

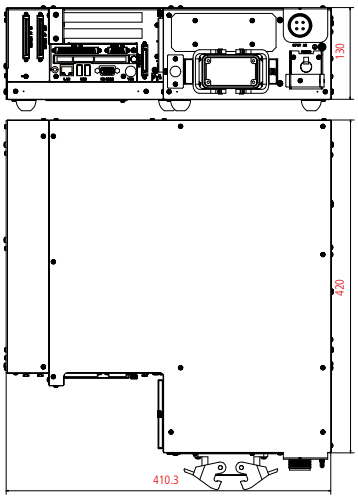
Standard specification / Safety I/O-less specification



Safety motion specification

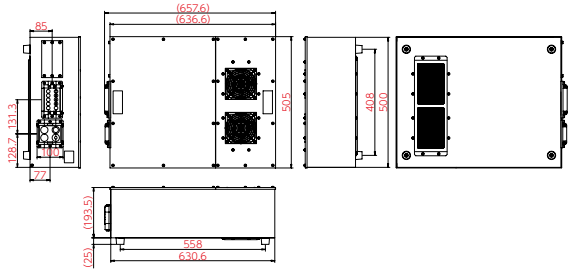


Standard UL specification / Safety motion UL specification

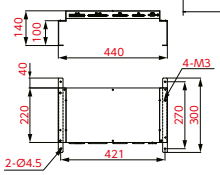


Options

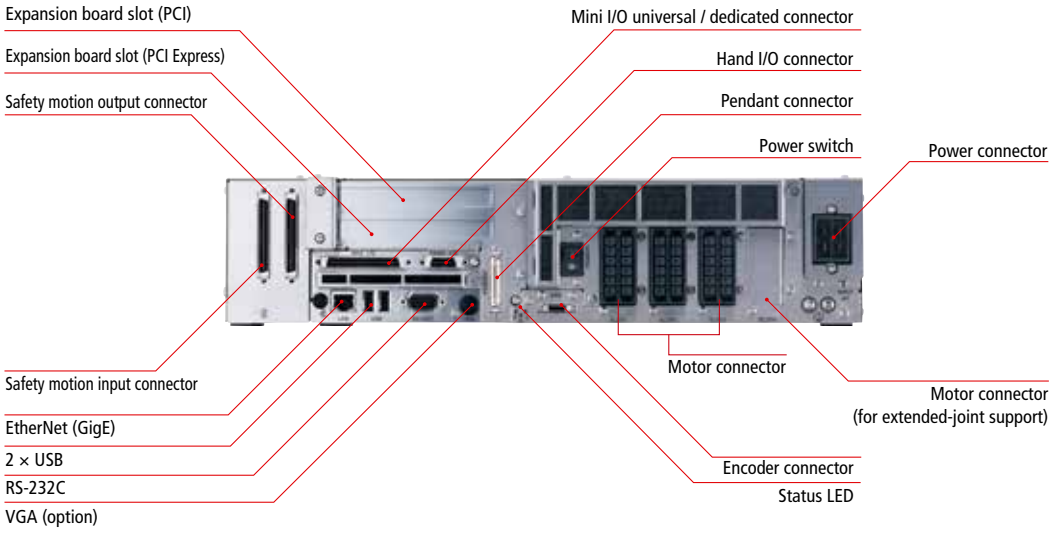
RC8 Controller Protective Box Light



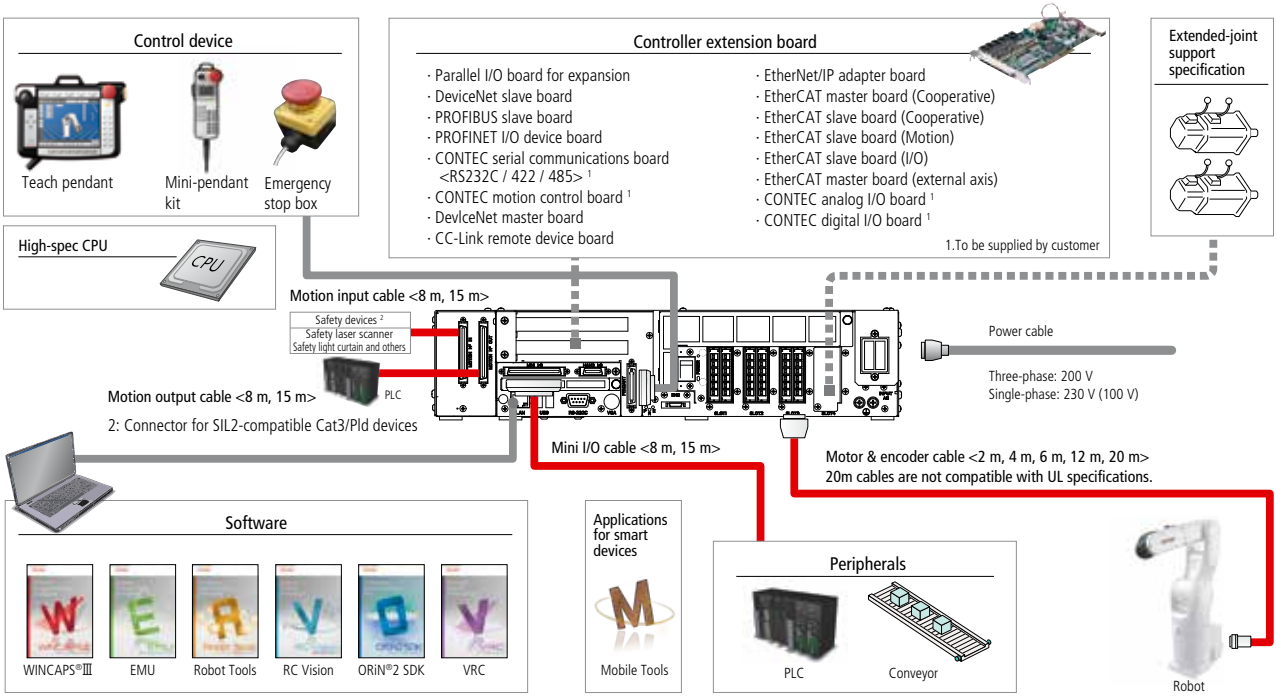
I/O conversion box (RC5 to RC8 / 8A Safety I/O-less specification)



User interface



Optional systems diagram



RC8

Specifications

Term			Specifications						
Applicable robots			VP-5243 / 6242	VS 050 / 060 / 050S2	VS 068 / 087	VS-6556 / 6577	VM-6083 / 60B1	HM-4*****	XR-43***
Power	Power supply		1.00kVA [1]	1.15kVA	2.78kVA	1.80kVA	3.30kVA	2.45kVA	1.85kVA
	Input voltage range		Three-phase 200 VAC −15% to 240 VAC +10% (100 V specification also available for the VP series.)						
			Single-phase, 230 VAC −10% to 240 VAC +10% [1]				—	Single-phase, 230 VAC −10% to 240 VAC +10%	
	Power supply frequency		50Hz / 60Hz						
Power cable			5m						
Controllable axes			5 / 6		6			4	
Control method			PTP, CP 3-dimensional linear, 3-dimensional arc (PTP control only for additional axes)						
Drive method			All axes all digital AC servo						
Language used			DENSO Robotics language (PacScript)						
Memory capacity			User area Variable area: 1.75 MB (32,766 points equivalent), file area: 400 MB (5,000 steps × 256 files)						
Teaching system			1) Remote teaching 2) Numerical entry (MDI) 3) Direct teaching (HS series and HM series only)						
External signal (I/O, etc.)	Universal / dedicated I/O	Mini I/O	Input: User open 8 points + system fix 14 points (the safety I/O less version has system fix 13 points) [2] Output: User open 8 points + system fix 16 points (the safety I/O less version has system fix 12 points)						
		Hand I/O	Input: User open 8 points / Output: User open 8 points						
	Parallel I/O boards (option)		Bus: PCI Input :User open 40 points / Output: User open 48 points						
	DeviceNet slave board (option)		Bus: PCI Express Input: 256 points / Output: 256 points						
	CC-Link remote device board (option)		Bus: PCI Express Input: 128 points / Output: 128 points Remote registers Input: 256 points / Output: 256 points						
	PROFIBUS slave board (option)		Bus: PCI Express Input: 256 points / Output: 256 points						
	EtherNet / IP adapter board (option)		Bus: PCI Express Input: 4,032 points / Output: 4,032 points						
	PROFINET I/O device board (option)		Bus: PCI Express Input: 8192 points / Output: 8192 points						
	EtherCAT slave board (option)		Bus: PCI Express Input: 2048 points / Output: 2048 points						
External communication			RS-232C: 1 line, EtherNet: 1 line (GbE: Gigabit EtherNet), USB: 2 lines, VGA: 1 line (option)						
Expansion slot			· PCI 1 slot · PCI Express 1 slot						
Self diagnosis function			Overrun, servo error, memory error, input error, short circuit detection (user wiring part), etc.						
Environmental condition (in motion)			Temperature: 0 to 40 degree C, Humidity: 20 - 90%RH (no condensation allowed.)						
Safety function			See the "options" on the list below.						
Protect grade			IP20						
Weight			Approx. 10kg [3]						

1: Power for the 100 VAC specification is "Single-phase 100 VAC −5% to 110 VAC +10% 50/60 Hz, 1 kVA.
2: If the built-in safety I/O is not necessary for the standard specification, please specify a safety-I/O-less specification. 3: Does not include the supplied cables.

Options [4]

Controller Type	Safety function	Standard(s)	I/O type
Safety I/O-less	—	—	NPN/PNP

4: Specifications must be designated when placing an order.
Specifications cannot be changed after shipment.
Additional axis specifications are available for all controllers.

Legend

RC8 - □□□□ - NN □□ - □□ - NNN

Controller name

Robot type format:
VPA0: VP-5243 / 6242
VSA3: VS050 / 060 / 050S2
VSA4: VS068 / 087
VSA0: VS-6566 / 6577
VMA0: VM series
HMA0: HM series
XRA0: XR series
S1A1: SC series (2-axis)
S2A1: SC series (3-axis, 4-axis)

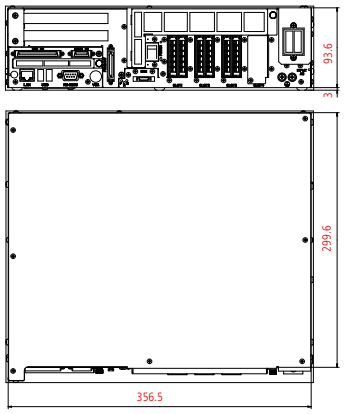
CPU:
N: Standard
E: Standard (In and after June 2020)
*Due to CPU change.
7: High-spec CPU

I/O type:
M: Negative common (NPN)
P: Positive common (PNP)

Compliant standard:
NN: Safety-I/O-less specification (safety-I/O-less)

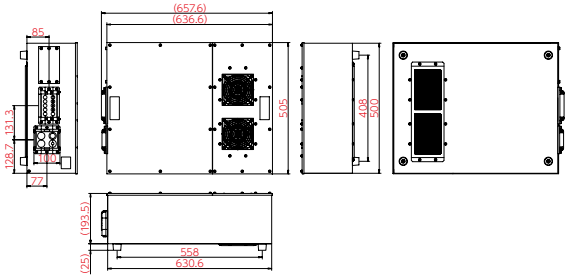
External dimensions Unit : mm

Safety I/O-less specification

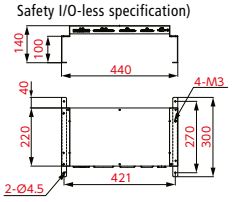


Options

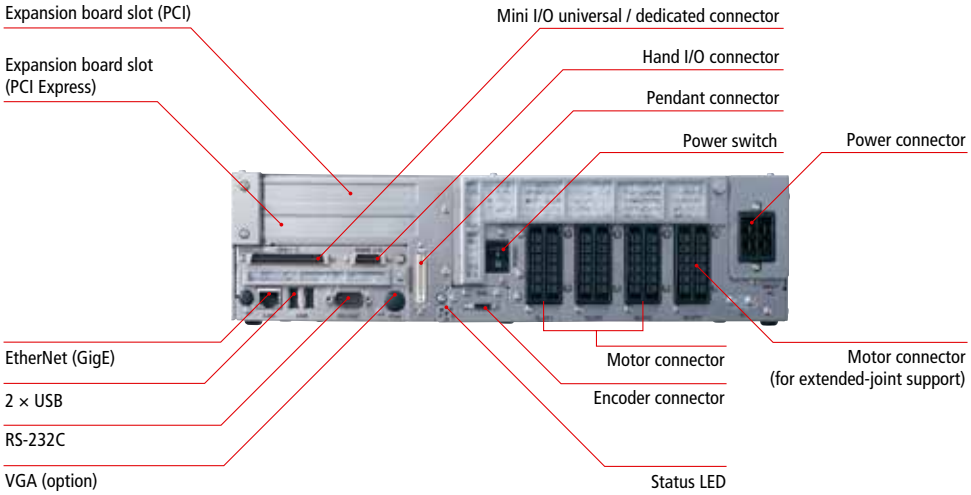
RC8 Controller
Protective Box Light



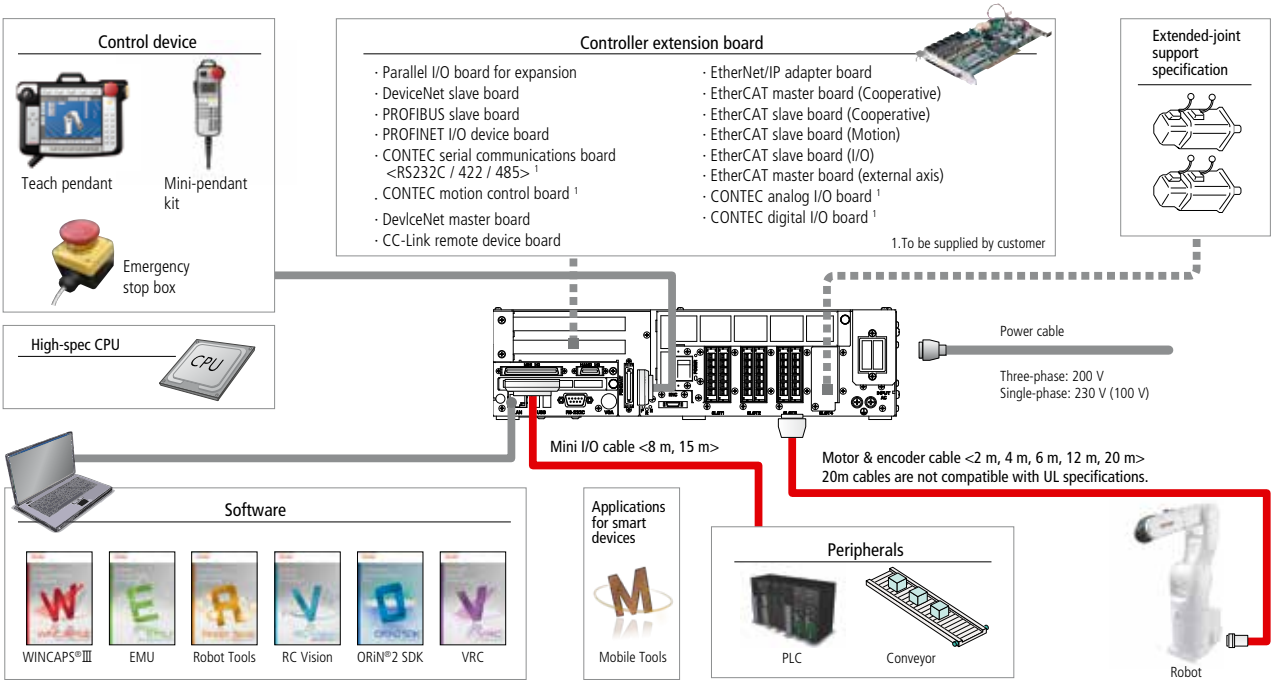
I/O conversion box
(RC5 to RC8 / 8A
Safety I/O-less specification)



User interface



Optional systems diagram



MC8A/MC8

Motion Controller Development Code No.8

Motion controller suited to developing custom robots based on the RC8 robot controller.

Supports the development of custom robots

Allows for designing robots for any stage of production based on the customer's goals, conditions, and environment.


Orthogonal Robot


Cylindrical coordinate Robot


Tabletop Robot


SCARA Robot


Parallel-link Robot


5-and 6-axis Robot

Exceptional Usability

Uses a RC8 interface specially adapted to robot control

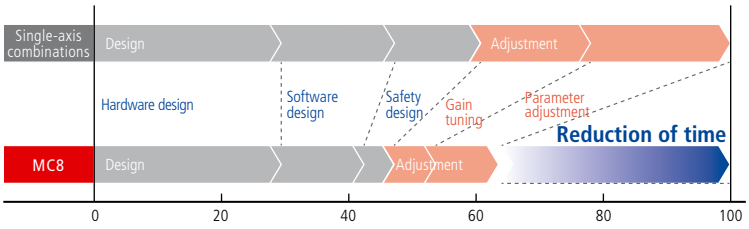

WINCAPS®Ⅲ


ORiN®2 SDK


Teaching pendant

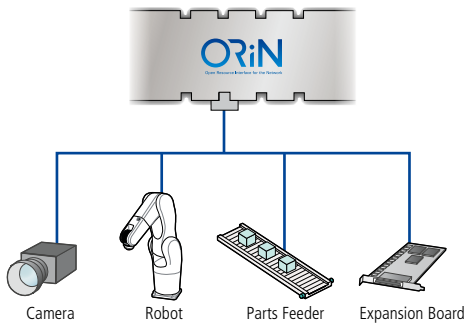
Shorten startup time

- The off-line software and teaching pendant is the same for all current Denso robots. This allows for continued usage of familiar control systems reducing the need for additional training.
- Reduces worktime in the design of emergency stops, etc. by making use of the MC8's safety circuits
- Ease of use: Motor gain tuning can be performed automatically by the controller.



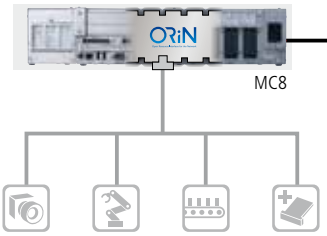
Maximum 8-Axis Control + Wide Expandability

Utilizes an RC8 provider to directly control various FA devices

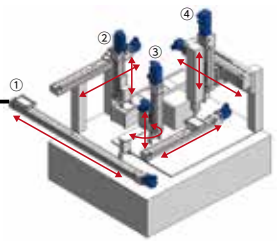


Improving efficiency by integrating control

- Using ORiN allows usage of the RC8 provider functions. This makes integration of various FA devices much simpler. It also allows for control of any application in a standard program language and reduces development costs.
- Uses the same GUI as the RC8 providing greater ease of use.



Coordinates with various FA devices through the RC8 provider for expanded functionality



Controls up to 8 axes at once

① Transport axis	(X) 1 axis
② Part assembly axes	(YZ) 2 axes
③ Workpiece transfer axis	(ZT) 2 axes
④ Tabletop axes	(X-YZ) 3 axes
	Total 8 axes

World-class safety

Joins the RC8 in supporting international safety standards

Standards / Authentication

- CE (Standard specification, Safety motion specification, UL specification)
- PLe / SIL3 (Standard specification) ● UL (UL specification) ● KC (MC standard specification)

IPC8

Industrial Programmable Controller Development Code No.8

Industrial Controller IPC8 Series furnished with the quality standards and expandability of RC8, the world's smallest robot controller

*Available for use in Japan only

Realization of the centralized control of devices

With IPC8, free selection of development environments or system configuration required in PC control is enabled.

OS

Free

Operating systems such as UNIX, Linux or unique real-time OS can be installed on the user side.

Windows Embedded Standard 2009

Pre-installation of **ORiN2 SDK Runtime**

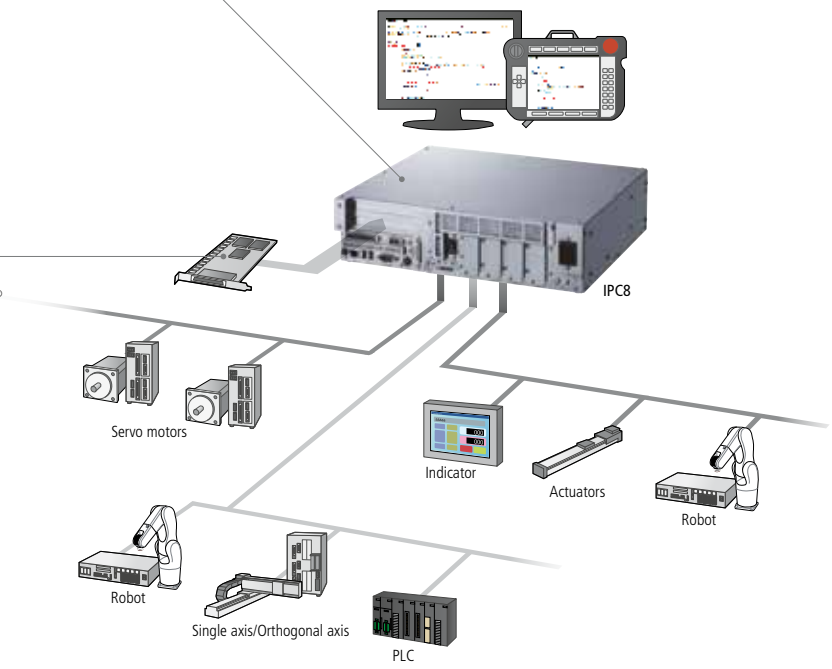
Systems construction in development environments such as Visual Studio or LabVIEW is enabled.

Expansion Board [1]

- Parallel I/O board for expansion
- DeviceNet slave board
- PROFIBUS slave board
- PROFINET I/O device board
- CONTEC serial communications board <RS232C / 422 / 485> [2]
- CONTEC motion control board [2]
- DeviceNet master board
- CC-link remote device board
- EtherNet/IP adapter board
- EtherCAT slave board
- External axis board
- CONTEC analog I/O board [2]
- CONTEC digital I/O board [2]

1: Available only when Windows® Embedded Standard 2009 is selected.

2: To be supplied by customer.



Highly-reliable quality standards

The high-quality, high-reliability design enables PC control system construction that is ideal for FA environments.

● The stable supply of the industrial device identical to the robot controller ensures reliable long-term use.

MC8A/MC8

Specifications

Term			Specifications
Power	Power supply		3kVA
	Input voltage range		Three-phase 200 VAC −15% to 240 VAC +10%
	Power supply frequency		50Hz / 60Hz
Power cable			5m
Controllable axes			8 max.
Control method			PTP, CP 3-dimensional linear, 3-dimensional arc [1]
Drive method			All axes all digital AC servo
Language used			DENSO Robotics language (PacScript)
Memory capacity			User area Variable area: 1.75 MB (32,766 points equivalent), file area: 400 MB (5,000 steps × 256 files)
Teaching system			1) Remote teaching 2) Numerical entry (MDI)
External signal (I/O, etc.)	Mini I/O	Standard specification, safety motion specification	Input: User open 8 points + system fix 14 points Output: User open 8 points + system fix 17 points [2]
		Safety I/O-less specification	Input: User open 8 points + system fix 13 points / Output: User open 8 points + system fix 14 points
	Hand I/O		Input: User open 8 points / Output: User open 8 points
	Motion I/O (option)		Input: 30 safety circuit signals/Output: 14 safety circuit signals
	Parallel I/O boards for expansion (option)		Expansion slot: PCI Input: 40 points / Output: 48 points
	CC-Link remote device board (option)		Expansion slot: PCI Express Input: max. 8192 points / Output: max. 8192 points Remote register Input: 2048 words max. / Output: 2048 words
	DeviceNet slave board (option)		Expansion slot: PCI Express Input: max. 256 points / Output: max. 256 points
	DevIceNet master board (option)		Expansion slot: PCI Express Input: 1024 points / Output: 1024 points
	EtherNet / IP adapter board (option)		Expansion slot: PCI Express Input: max. 4032 points / Output: max. 4032 points
	PROFIBUS slave board (option)		Expansion slot: PCI Express Input: max. 256 points / Output: max. 256 points
	PROFINET I/O device board (option)		Expansion slot: PCI Express Input: max. 8192 points / Output: max. 8192 points
	EtherCAT slave board (option)		Expansion slot: PCI Express Input: max. 2048 points / Output: max. 2048 points
External communication			RS-232C: 1 line, EtherNet: 1 line (GbE: Gigabit EtherNet), USB: 2 lines, VGA: 1 line (option)
Expansion slot			· PCI 1 slot · PCI Express 1 slot
Self diagnosis function			Overrun, servo error, memory error, input error, short circuit detection (user wiring part), etc.
Environmental condition (in motion)			Temperature: 0 to 40 degree C, Humidity: 90%RH or less (no condensation allowed)
Safety function			See the "options" on the list below.
Protect grade			IP20
Weight			MC8A: Standard specification: Approx. 10kg, Safety motion specification: Approx. 11kg [3] MC8: Safety I/O less specification: Approx. 10kg

1: CP 3D linear, 3D arc only possible with orthogonal robots (XY configuration).

2: If the built-in safety I/O is not necessary for the standard specification, please specify a safety-I/O-less specification.

3: Does not include the supplied cables.

MC8A Options

Controller Type	Safety function	Standard(s)	I/O type
Standard	Safety I/O : PL e/Cat.4, SIL3	CE	NPN /PNP
Safety motion	Safety I/O : PL e/Cat.4, SIL3 Safety motion : PL d/Cat.3, SIL2	CE	
UL standard (Safety I/O)	Safety I/O : PL e/Cat.4, SIL3	CE, UL	
UL safety motion	Safety I/O : PL e/Cat.4, SIL3 Safety motion : PL d/Cat.3, SIL2	CE, UL	

MC8 Options

Controller Type	Safety function	Standard(s)	I/O type
Safety I/O-less	—	—	NPN/PNP

Legend

RC8A - MC81 - NN □□ - □□ - NNN
RC8

CPU:
N: Standard
E: Standard (In and after June 2020)
*Due to CPU change.
7: High-spec CPU

I/O type:
M: Negative common (NPN)
P: Positive common (PNP)

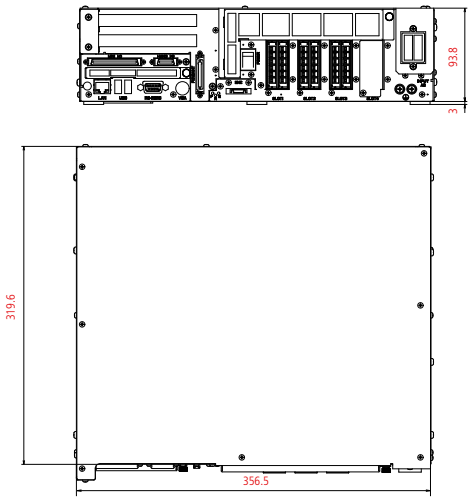
Compliant standard:
NI: Standard specification (safety I/O)
NM: Safety motion specification (safety I/O, Safety motion) [1]
NN: Safety-I/O-less specification (safety-I/O-less) [2]
UI: UL standard specification (safety I/O)
UM: UL safety motion specification (safety I/O, safety motion) [2]

1: Safety motion specifications are available for selection for MC8A.

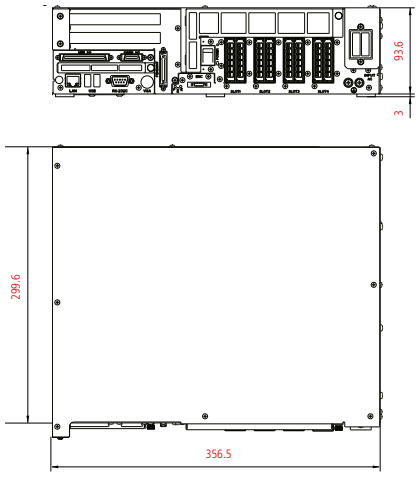
2: Safety I/O-less specifications are available for selection for MC8.

External dimensions Unit : mm

MC8A



MC8



* For safety motion, standard UL and safety motion UL specifications, see external dimensions on P.47.

Driver units

Part name
Driver units (L / S)
Driver units (L / SS)
Driver units (S / S)
Driver units (S / SS)
Driver units (SS / SS)

Supported driver units

Driver unit Single Axis Size	Supported Motors
SS	30w / 50w / 100w
S	200w / 400w
L	750w / 1000w

<Selection example> [4]

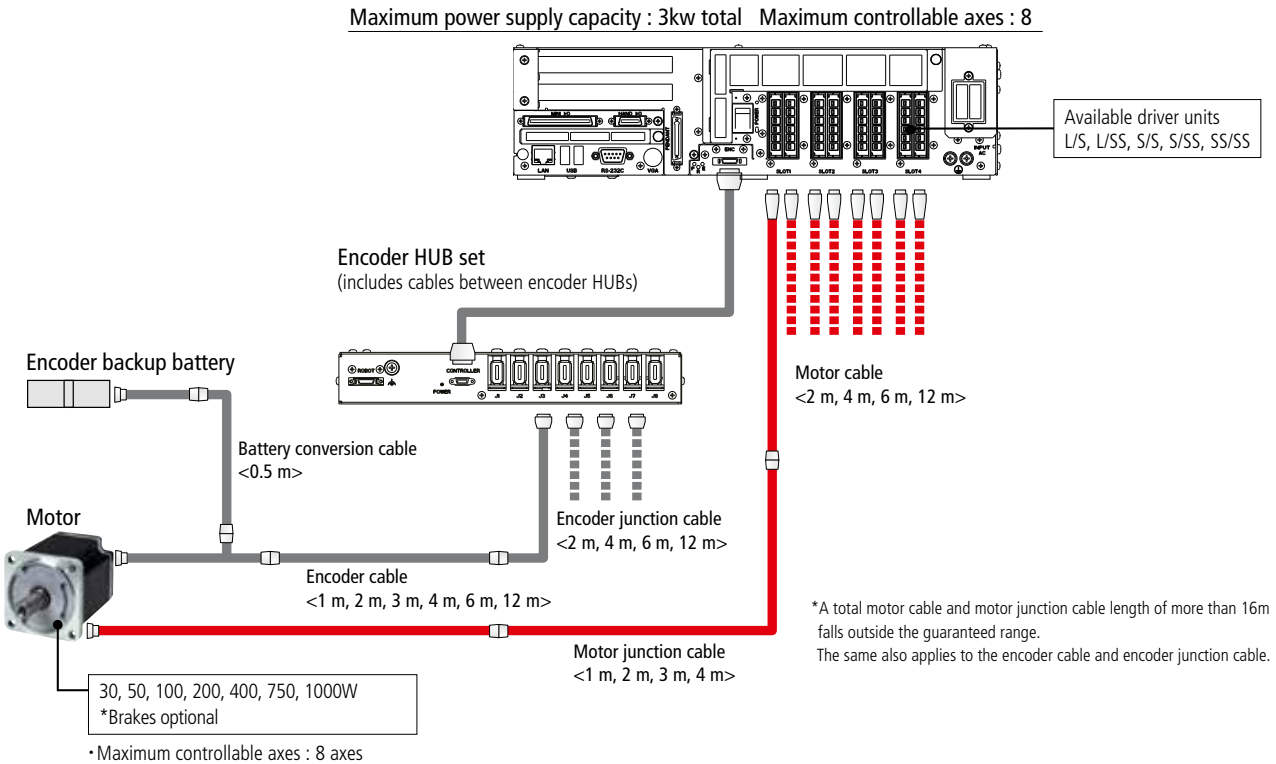
- 750 W motor × 1, 400W motor × 1 = Select L/S
- 400 W motor × 1 = Select S/SS
- 100 W motor × 2 = Select SS/SS

4: Please inform a sales rep of the motor type to be used and the corresponding axis number to allow us to suggest the best driver unit configuration for you.

Motor list

Motor capacity	With/Without brake	With/Without oil seal	Flange aperture dimensions
30W	With/Without	With/Without	□ 40mm
50W	With/Without	With/Without	□ 40mm
100W	With/Without	With/Without	□ 60mm / □ 40mm
200W	With/Without	With/Without	□ 60mm
400W	With/Without	With/Without	□ 80mm / □ 60mm
750W	With/Without	With/Without	□ 100mm / □ 80mm
1000W	With/Without	With/Without	□ 100mm

System configuration diagram



*A total motor cable and motor junction cable length of more than 16m falls outside the guaranteed range.
The same also applies to the encoder cable and encoder junction cable.

IPC8

Limited for use in Japan only.

*Available for use in Japan only

Specifications

Term			Specifications
Power	Power supply		0.25kVA
	Input voltage range		Single-phase, 100 VAC –15% to 240 VAC +10%
	Power supply frequency		50Hz / 60Hz
Power cable			5m
External signal (I/O, etc.)	Universal / dedicated I/O [1, 2]	Mini I/O	Input: 16 points / Output: 16 points
		Hand I/O	Input: 8 points / Output: 8 points
	Parallel I/O boards (option) [2]		Bus : PCI Input: 40 points / Output: 48 points
	DeviceNet slave board (option) [2]		Bus: PCI Express Input: 256 points / Output: 256 points
	CC-Link remote device board (option) [2]		Bus: PCI Express Input: 128 points / Output: 128 points Remote registers Input: 256 points / Output: 256 points
	PROFIBUS slave board (option) [2]		Bus: PCI Express Input: 256 points / Output: 256 points
	EtherNet / IP adapter board (option) [2]		Bus: PCI Express Input: 4032 points / Output: 4032 points
External communication			RS-232C: 1 line, EtherNet: 1 line (GbE: Gigabit EtherNet), USB: 2 lines, VGA: 1 line
Expansion slot			· PCI 1 slot · PCI Express 1 slot
Environmental condition (in motion)			Temperature: 0 to 40 degree C, Humidity: 90% RH or less (no condensation allowed)
Protect grade			IP20
Weight			Approx. 9 kg [3]

1: When Linux is used without optional embedded OS, download the device driver from the DENSO website.

2 : Available only when Windows® Embedded Standard 2009 is selected.

3: Does not include the supplied cables.

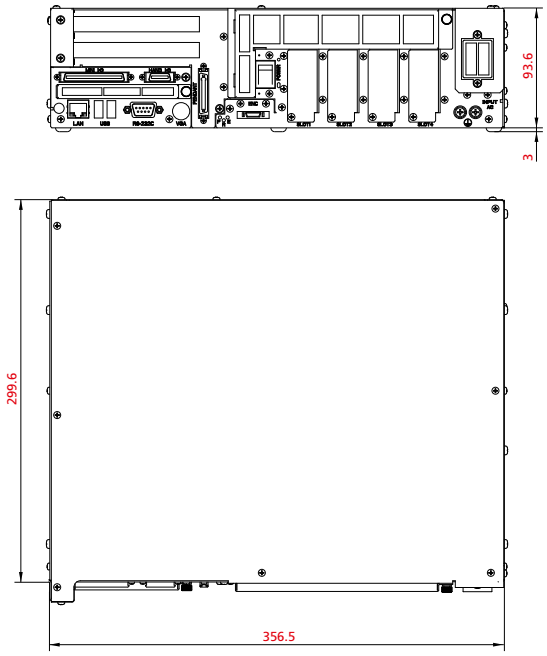
Legend

RC8 - IPC8 - □□ - NN - NNN

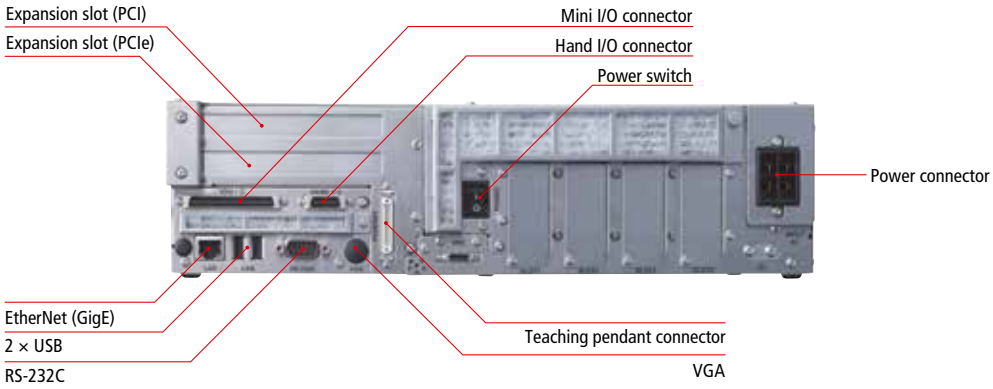
CPU:
N: Intel Atom D525 (1.8GHz)
7: Intel Core i7 2655LE (2.2GHz)

I/O type:
M: Negative common (NPN)
P: Positive common (PNP)

External dimensions Unit : mm



User interface

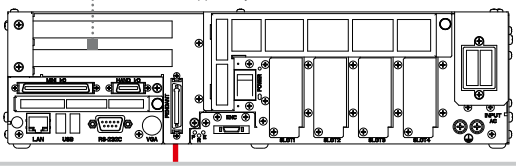


System configuration diagram

Controller extension board [1]

- Parallel I/O board for expansion
- DeviceNet slave board
- PROFIBUS slave board
- PROFINET I/O device board
- CONTEC serial communications board <RS232C / 422 / 485> [2]
- CONTEC motion control board [2]
- DevIceNet master board
- CC-Link remote device board
- EtherNet/IP adapter board
- EtherCAT slave board
- External axis board
- CONTEC analog I/O board [2]
- CONTEC digital I/O board [2]

1: Windows® Embedded Standard 2009ご選択の場合に限ります。
2: To be supplied by customer.



Peripherals

Select the optional embedded OS when placing an order.

Term	Part Name
CFast capacity / OS	CFast (4GB) / Windows® Embedded Standard 2009 + ORiN®2 SDK Runtime
	CFast (8GB) / Windows® Embedded Standard 2009 + ORiN®2 SDK Runtime
	CFast (4GB) / Without OS
	CFast (8GB) / Without OS

Options

Part Name	備　考
Expanded storage mounting kit	Storage: SDD mounting: 2.5-inch type-compatible
Expanded storage mounting plate	Plate only (When 2 storage units are used)
Power output board	For 5V (0.5A) / 12V (1A) / 24V (0.5A) service power

Teaching pendant/mini pendant

These are input and operation devices for teaching, program creation or startup. Use in combination with WINCAPS®Ⅲ enables efficient programming and teaching.

Teaching pendant

Mini-pendant

Features

Embedded with the large touch panel

A 7.5-type TFT is embedded to realize simple visual check and operation with color display and touch panel.

Improved GUI for increased efficiency

Easy-to-view menu configuration and user-friendly operability are realized. With improved GUI or functions, simulation of robot introduction can be checked on the pendant and work time can be reduced.

Mounted with an enable switch

The pendant is mounted with a 3-position enable switch.

The screen can be customized using control panel functions.

Control panel of robot and peripheral devices can customize the teaching pendant screen.

Protect grade

Splash proof equivalent to IP65

Specifications

Term	Multifunction teach pendant	Mini-pendant [1]
Power	DC24V (Supplied from the controller)	
LCD	Liquid crystal display with back light, 7.5-type TFT color LCD, multi-function 640×480 pixels	Liquid crystal display: 128 x 64 pixels
Emergency stop button	4B contact, 4-circuit output (Forced-separation type)	
Dead man's switch (Enable switch)	3-position-type (OFF-ON-OFF), 2-circuit output	
Mode-switching switch	3-position switching with keys (AUTO、MANUAL、TEACHCHECK) Note: Mode is switchable only when using the pendant with keys	
Mounting conditions	Temperature: 0 to 40 degree C, Humidity: 90% RH or less (no condensation allowed)	
Protect grade	IP65	
Weight	1.6 kg or less (Not including the cable)	Approx. 0.3 kg (Not including the connection cable) (Note)
Cable length	4 m、8 m、12 m	

1: The mini-pendant itself cannot create or edit programs. Program creation and editing are performed using the WINCAPS®ⅢLight, a mini-pendant accessory. The maintenance functions below are also furnished.
(1) CALSET operation (2) Motor encoder reset (3) Setting of the calendar and clock built in the robot controller (4) Setting of the date for next battery replacement (5) Brake release and operation

Robot Protective Jacket for Food Processing

Simply fit this jacket over a standard-specification robot to easily and inexpensively automate food manufacturing processes that require cleaning

Compatible robots	VS068 / VS087
Compatible controllers	RC8A , RC8

*It can't be used for Communication Interface Flange-A, UL specifications, and Cleanroom type.

Note: Materials used in parts of this product that may come into contact with food comply with the Specifications and Standards for Food and Food Additives under the Food Sanitation Act (i.e., they meet the requirements set forth in Section 3. Implements, Containers, and Packaging in Ministry of Health and Welfare Notification, No. 370, 1959) (except sewing thread). Materials do not comply with standards in effect in countries outside Japan.

Features

Easily fitted to implement low-cost automation of food manufacturing processes

To fit the jacket, simply place it over the robot and tie the drawstrings to hold it in place. Then remove from the robot for cleaning as necessary. Alternatively, the jacket can be secured to a pedestal with a dedicated plate*. It can also be cleaned while fitted to the robot by spraying with water or wiping with a moist cloth.

*Dedicated plate should be supplied by customers.

Compatible with chemicals used in food manufacturing processing

The jacket is resistant to a variety of chemicals, ensuring that it will remain clean and sanitary at all times.

Chemicals to which the jacket is resistant	• Sodium hypochlorite aqueous solution (alkaline) • Sodium hypochlorite pH conditioning liquid (weakly acidic) • Alcohol • Hot water (40 to 100 degree C)

Stow wiring by using the dedicated mounting flange

Since cables can be routed from inside the robot protective jacket for food processing through holes in the mounting flange, robot hand cables can be stowed inside the jacket.

Specifications

Specifications		Unit	VS068		VS087	
			Standard specifications	Robot fitted with jacket	Standard specifications	Robot fitted with jacket
Total arm length (Including No. 1 arm, No. 2 arm and the distance to arm end)		mm	760 (340+340+80)	830 (340+340+150)	955 (445+430+80)	1025 (445+430+150)
Motion range [2]	J1	°	±170	±120 [1]	±170	±120 [1]
	J2		+135 to -100	+90 to -70 [1]	+135 to -100	+90 to -70 [1]
	J3		+153 to -120	+140 to -20 [1]	+153 to -136	+140 to -20 [1]
	J4		±270	±90 [1]	±270	±90 [1]
	J5		±120	+110 to -100 [1]	±120	+110 to -100 [1]
	J6		±360	±240 [1]	±360	±240 [1]
Maximum payload		kg	7	6	7	6
Operating temperature range		℃	0 to 40	0 to 40 [3]	0 to 40	0 to 40 [3]
Maximum allowable moment of inertia	J4, J5	kgm²	0.45	0.44	0.45	0.44
Maximum allowable moment	J4, J5	Nm	16.2	14.4	16.2	14.4
	J6		6.86	6.69	6.86	6.69
Signal line and air pipe solenoid valves	Air pipe	–	7 circuits (ø4 × 6, ø6 × 1)	Robot: 7 circuits (ø4 × 6, ø6 × 1) Jacket flange ports: Max 6 circuits (ø4 to ø8)	7 circuits (ø4 × 6, ø6 × 1)	Robot: 7 circuits (ø4 × 6, ø6 × 1) Jacket flange ports: Max 6 circuits (ø4 to ø8)
Installation orientation		–	Floor-standing, wall-mounted, ceiling	Floor-standing only	Floor-standing, wall-mounted, ceiling	Floor-standing only
Weight		kg	49	50	51	52

1: Range encompasses composite motions for all axes. Single-axis motion conforms to the motion range indicated in the standard specifications except J5.
2: Varies with the motion range of your robot. You may need to set software limits. 3: Robot temperature will increase more readily when fitted with jacket.

Software / Peripheral Device

Result-oriented and more efficient : Expanded DENSO Robotics Solution.

From the implement decision phase to robot maintenance, a variety of helpful production site and factory floor tools are offered to make DENSO Robotics easy to use.

Software Line up

WINCAPS® Ⅲ

Offline Programming Software

Software for programming DENSO Robotics (PacScript, PAC) and creating simulations on the PC

Robot Tools

Utility Application Software

Software to support optimum maintenance and operation of DENSO Robotics based on running costs and daily maintenance

ORiN®2 SDK

Software Development Kit

Middleware used to develop an application program or provider based on ORiN®2 specification

EMU

Robot Simulation Software

Software that enables simulation of multiple DENSO Robotics

RC Vision

Robot Vision Package

Software that utilizes DENSO Robotics and cameras to support equipment startup

VRC

Virtual Robot Controller

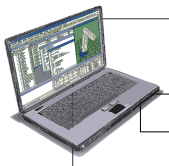
An emulator that creates an image of RC8 (robot controller) itself and provides a virtual RC8 environment on the PC

Mobile Tools

Smart Device Application Software

Smart device software that supports DENSO robot maintenance and operation

Software Positioning



Robot equipment managed by PC

Implementation | Development | Control | Maintenance

Programming

Develop a motion program for a DENSO Robotic

WINCAPS® Ⅲ

Simulation

Create a simulation of multiple DENSO Robotics

EMU

Utility

Supports maintenance and robot handling after DENSO Robotics implementation

Robot Tools

Vision

Uses DENSO Robotics and cameras to support equipment startup

RC Vision

Application

Applications for Smart Devices

Development

Interface to link devices to a PC environment

ORiN®2 SDK

Virtual

Provides an RC8 virtual environment

VRC

WINCAPS®Ⅲ

Offline Programming

WINCAPS®Ⅲ is software used to program DENSO Robotics (RC8 : PacScript) and create simulations on the PC.

Functions

Create a program

Use the Program Edit window for programming. The following functions are available :

- Line No. display
- Color support for commands
- Command input support (displays input suggestions)
- Indent display
- Comment block
- Bookmarks

Panel screen editor

Create a panel screen for a teach pendant on a PC.

Arm 3D view

Displays the robot and peripheral devices in 3D and simulates robot motion on a PC.

- Import 3D graphic data (VRML and Direct X formats)
- Click on an object to move it to a robot end object and obtain that position data [3D view teach]

Online functions

Connect to the robot controller to use the following functions :

[Monitor function]

Monitor robot status

- 3D view display
- Variables
- I/O
- Execution program
- Log data reception and save

[Debug functions]

Execute programs in the robot controller from the PC

- Adjust robot speed
- Reset all programs
- Start / stop supervisory tasks
- Program start
- Step stop / cycle stop / suspend, halt / program reset
- Step feed
- Mock I/O settings of dedicated input and others

Simulation functions

Execute user-created programs on the PC to check cycle time, robot movement, pose and interference.

- Program startup and stop, breakpoint
- Display and edit variables and I/O
- Interference checking
- Measure cycle time
- Display robot path

Simple calibration

The following 3 types of calibration can be used :

CALSET	Corrects the CALSET value. Overwrites a CALSET value with the correct value based on a standard position when a motor is replaced or the CALSET value lost.
TOOL	Corrects the value of the selected TOOL. Use when a hand or other end effector is recreated, replaced, or newly created.
WORK	Corrects the value of the selected WORK. All WORK coordinates that were set when the robot mounting position changed can be corrected at once.

Log function

Users can view the following logs :

- Error log
- Operation log
- Trace log
- Control log [command position of each axis, encoder value, current value, payload rate, etc.]
- Variables [PRO name and variable name, type, written value, write source, etc.]
- I/O log [port, type, status, initial value]
- Servo minor axis data log [speed reference value, actual speed, torque command, deviation angle, absolute current value]

Functions	Full Function Version	Light Version [1]	Trial Version [2]
Create new program / edit program	√	√	[5]
Program bank	√	[3]	[3]
3D CAD data import	√	—	—
3D view teach	√	√	√
Simulation function	√	—	—
Debug function	√	—	—
Monitoring	√	[4]	[4]
Movie save function	√	√	√
Print	√	—	—
Simple calibration	√	√	√

System requirements :
OS: Windows® 7 / 8 / 10
PC: CPU 2 GHz or faster multi-core processor, Memory 2 GB or more, HDD 1 GB or more

Languages supported : 5
Japanese, English, German, Korean, Chinese

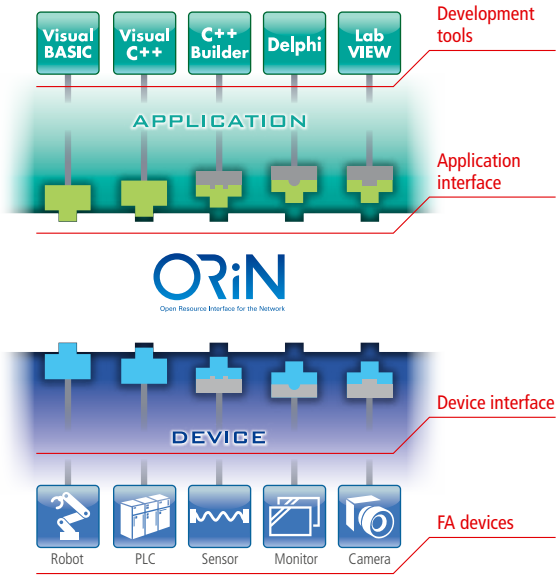
1: Included with purchase of mini pendant. 2: Supplied with robot.
3: There are limits to the number of libraries that can be used.
4: Sampling interval : 1 sec. 5: One program (PRO1) only.

ORiN®2 SDK

Integration Middleware for PC

ORiN®2 SDK is a software tool kit used to develop an application program or provider based on ORiN2 specifi cation.

- It provides a standard communication interface for robots as well as various FA peripherals and databases.
- ORiN®2 SDK is mounted with a variety of functions (including a CAO engine, test program, sample program and skeleton provider auto generate tool) to support development.
- The superior expandability of ORiN®2 supports not only industrial robots, but a variety of devices (including PLC, CNC machine tools, bar code readers and RFID) to enable application development that is independent of manufacturer or model.



Features

Provides a standard interface

ORiN®2 enables easy system development that supports distributed object technologies such as DCOM and SOAP, and provides two standard interfaces : the application interface and device interface.

Recycles applications

Equipped with a gateway to reciprocally connect with different standards (OPC and UPnP) and improve reusability of existing applications.

Development tool options

Use any of the following development tools that support OLE (COM, ActiveX) :

· Visual C++ · C++ Builder · Visual BASIC · Delphi · LabVIEW · Excel and others

Create an original provider

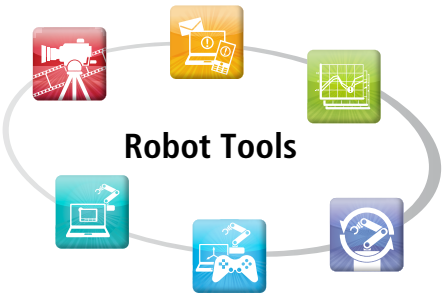
With Provider Wizard, a user can create an original provider to expand functions.

Package Type	ORiN®2 Software Development Kit (ver2.1.21)											
	Provider Development			Runtime + Utilities Set			Runtime			DENSO Products		
Purpose	Provider Development + Execution Environment			Execution Environment + Expanded Components			Execution Environment			Execution Environment (limited to DENSO Products)		
Application	Support	Binary	Source	Support	Binary	Source	Support	Binary	Source	Support	Binary	Source
CAO engine	√	√	—	√	√	—	√	√	—	√	√	—
CAO provider development tools	√	√	—	—	—	—	—	—	—	—	—	—
CAO provider (quantity)	√	√	√	√	√	—	√	√	—	√	√	—
	20	114	59	20	114	0	20	114	0	13	21	0
Test and configuration tools	√	√	—	√	√	—	√	√ [1]	—	√	√ [1]	—
CAO-OPC	√	√	—	√	√	—	—	—	—	—	—	—
CAO-SQL	√	√	—	√	√	—	√	√	—	√	√	—
CAO-UPnP	—	√	—	—	√	—	—	—	—	—	—	—
CAO-Script	—	√	—	—	√	—	—	—	—	—	—	—

1: Only Cao Config, and Cao Tester are offered.

System requirements : OS: Windows® 7 / 8 / 10 **PC:** CPU Pentium® Ⅲ 1 GHz or faster, Memory 512 MB or more, HDD 500 MB or more

Robot Setup / Maintenance Support Tools



Robot Tools is a fully featured suite of utility tools created for optimum maintenance and operation of DENSO Robotics.

- The software streamlines daily maintenance workflow and reduces the running costs of a robot after installation.

Product Features

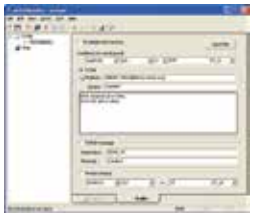
System requirements : OS: Windows® 7 / 8 / 10 **PC:** CPU Pentium® III 1 GHz or faster, Memory 512 MB or more, HDD 500 MB or more

Image Logger

Help to determine causes of sudden errors and incorrect equipment assembly. Takes images before and after problems happen and saves equipment data (I/O, variables, etc.) at the time they happen. Specifies errors caused through image and data validation to help with improving equipment.

Mobile Monitor

Monitors controller operating status and enables quick response to an error by sending an error notification email to a portable device when an operator is offsite.
Contributes to improved maintainability and task efficiency.



Control Log Analyzer

Obtains the control log from a designated controller and automatically displays it in a graph. This graph can be used to analyze robot control status (such as detection of NG waveforms), or the control log can be entered into a database to be compared with past data. Improves maintainability and visualizes (quantifies) an error occurrence.

Virtual TP

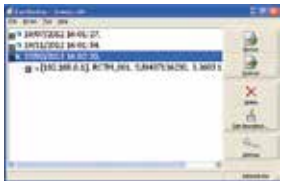
A virtual teach pendant on the PC works with a controller set on manual mode, allowing various controller settings (GUI) to be configured and monitored even from a remote location. Improves maintainability and helps a user create settings when no mini pendant or teach pendant is available.

GP Operator

Connect a robot controller to a PC and use a mouse or game pad for easy robot operation. Allows teaching to a designated variable (P type, J type or T type) to assist developer teaching in which a PC is used to control a robot.

Easy Backup

Performs backup and restores all data from multiple controllers in a batch. Automatic Easy Backup reduces task time and Easy Restore enables fast recovery when an error occurs. Contributes to improved maintainability and task efficiency.



RC Vision

Robot Vision Package

RC Vision is a robot vision application software package that utilizes DENSO Robotics and cameras to support equipment startup.

1st EVP Easy Vision Picking

EVP (Easy Vision Picking) is an image processing application that specializes in Pick & Place without using a program.

Image processing settings are configured using an application (EVP Guidance) on the PC. When executing (EVP Runtime) can be run by RC8 and the camera connected to RC8 only.
EVP also includes a calibration wizard that can perform robot calibration and calibration between camera and robot.
The picking device has built-in functionality to output the location of parts that are within the field of vision of the robot, allowing control of parts movement via a feeder or other device.

EVP Calibration Wizard

Correction
- Simply loading the chess board completes the camera calibration.
- A user simply follows the wizard to complete calibration of the robot and camera.

EVP Guidance

Settings
- An image processing flowchart can be configured by easy operation without using a program.
- Multiple models can be registered and recognized even in a mixed product environment.

EVP Runtime

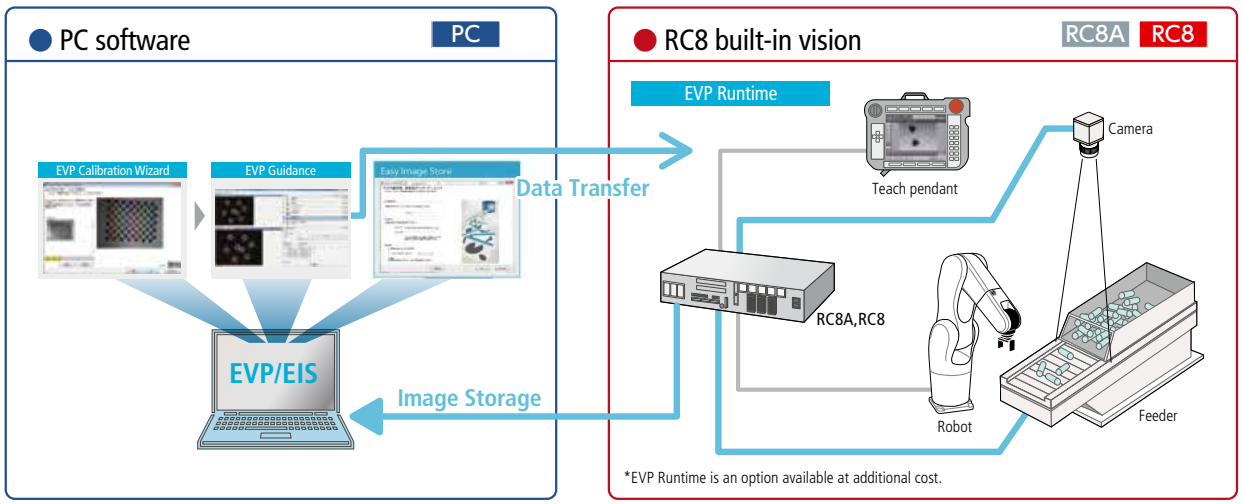
Execution
- Results can be shown on the teach pendant during execution, making a PC unnecessary.
- Image processing and communications programs are not needed to output image processing results to the robot position type (P type) variable.

2nd EIS Easy Image Store

Overview of EIS

EIS is a software to store the images of cameras connected to RC8. Images taken by the built-in image processing application (EVP) in RC8 are temporarily stored in RC8, and reset when power is turned off. With EIS, the images can be stored automatically in PC as image files.

Expanded image



System requirements : OS: Windows® 7 / 8 / 10 PC: CPU 2 GHz or faster multi-core processor, Memory 2 GB or more, HDD 1 GB or more
Camera: Basler GigE camera (ace series), iDS USB camera (uEye SE series), Canon network camera (WebView Livescope series)

Robot Simulations

EMU (Enhanced MUlti-robot simulator) is software that allows you to run simulations for multiple DENSO Robotics.

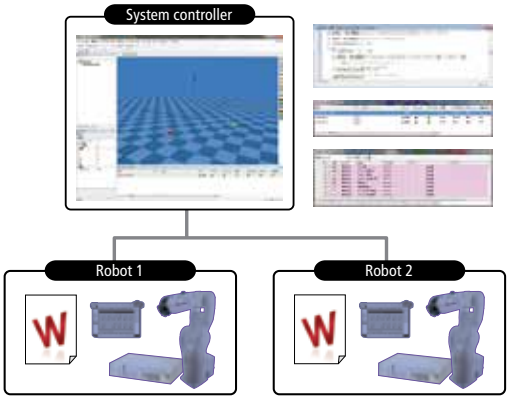
- EMU allows you to use projects created in WINCAPS®Ⅲ, coordinating with peripheral devices (models) and testing functionality in a state that is both virtual and real.
- EMU helps you achieve vertical startup for preliminary testing and production systems at the design stage for equipment centered on DENSO Robotics.

Features

System requirements : OS: Windows® 7 / 8 / 10　PC: CPU 2 GHz or faster multi-core processor, Memory 2 GB or more, HDD 1 GB or more
*Usage of EMU will also require the purchase of WINCAPS®Ⅲ.

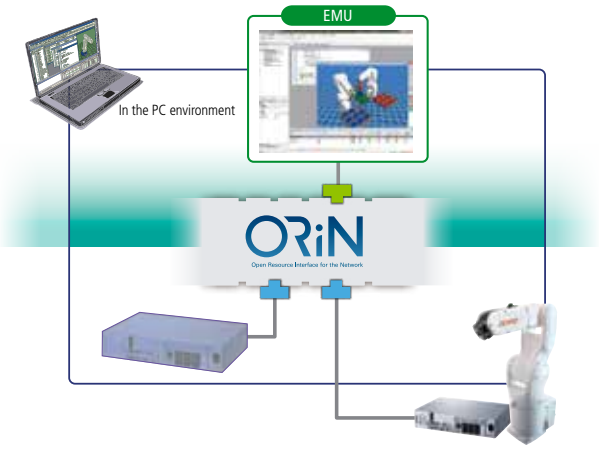
Sequence control

You can control all operating sequences for each robot by starting up each robot and using variables and I/O from the system controller program.
Coordinated operation testing using multiple DENSO Robotics is also possible.



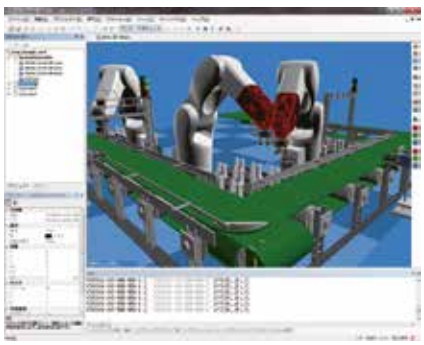
Connection with Machine

Connecting with a machine enables you to view current position information for the robot obtained from the machine in a 3D viewer and authenticate motion in a mixed virtual and real environment.



Interference checking

Being able to check for interference between devices and preliminarily test operating sequences ensures a higher degree of perfection at the initial stage of design while helping shorten development times and reduce costs.



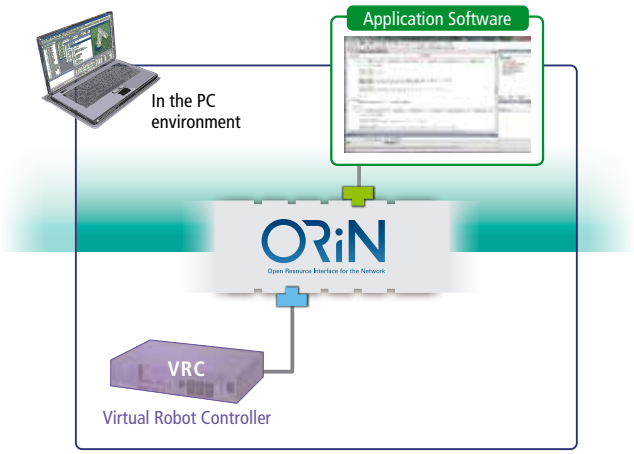
Coordination of peripheral devices

EMU enables testing of the operation of all equipment linked to robots and peripheral devices such as workpiece conveyers and loaders without using the actual equipment.

Virtual Robot Controller

As an RC8 (robot controller) virtual robot module, VRC provides an RC8 virtual environment on the PC.

- When programming in a universal language (Visual C++, Visual BASIC, Delphi, LabVIEW, etc.) on the PC, connecting to the VRC lets you control DENSO Robotics and monitor their statuses in a virtual environment.
- Being able to simulate the operation of actual robots without actually using them dramatically improves development efficiency.



Features

Provides GUI

As a tool to make VRC states visible, the VRC Teach Pendant allows for the same usage and monitoring as the teach pendant. This tool enables you to check a variety of information including current position, variables, I/O and the error log.


Current position data


Variables


I/O


Error log

Simulation Link

Linking to VRC from commercially available simulation software provides feedback of RC8 (virtual environment) information (such as current position [P type, J type, and T type], variables, and I/O), that can be expressed by GUI of various simulation software products. Path and cycle time for robot motion can be expressed just as on the actual machine to provide simulations even closer to actual execution.

System requirements :
OS: Windows® 7 / 8 / 10
PC: CPU 2 GHz or faster multi-core processor, Memory 2 GB or more, HDD 1 GB or more

Applications for smart devices

Mobile Tools is a set of application software for smart devices that support equipment startup or maintenance using DENSO robots.

Remote TP

- Remote TP displays the screens equivalent to those on the teaching pendant on the smart devices that the user is accustomed, enabling prompt response such as robot controller (RC8) settings or status check by using the smart devices on hand even if teaching pendant or PC is not available.
- This application assists maintenance such as assisting the settings when using the mini-pendant or error/log check when TP is not available.
- This function takes advantage of smart devices features to improve efficiency.

Android Terminal Application
System requirements: [OS] Android 4.1 / 4.2 / 4.3 / 4.4 / 5.0, Tablet screen size: 4.6 inches or larger
[Robot controller] RC8 Ver.1.10.3 or later

Applications can be downloaded from the website free of charge.
http://www.densorobotics.com/

AUTO-ID Products

Auto-recognition products for use in manufacturing

In applications such as…

● Process / progress management ● Shipping and receiving inspection

● Picking ● Inventory management ● Automated lines

Handy Terminal

●BHT-1700 / 1800 series

- Provided with protective class IP67 and a super-robust structure that can withstand a fall of 2.5 m.
- Incorporating AndroidTM – Google Mobile Services (GMS) to utilize a variety of applications.
- Ensuring excellent readability, thus reducing the required work time.

Fixed Scanner

●QB30 series

- A built-in scanner available semi-outdoors as well as indoors.
- Offering a wide lineup of models, including a wide-angle, field-of-view model that can be installed for space saving and a large-depth model with scanning performance at a distance.
- Ease of setting scanning conditions and data formats.

RFID-compatible Handy Scanner

●SP1 series

- The world's highest reading performance to minimize workloads.
- Linking with various smart devices, thus contributing to maximizing the return on investment.
- Smoothly introduced and stably operated by a unique application.

RFID Table Scanner

●UR20 series

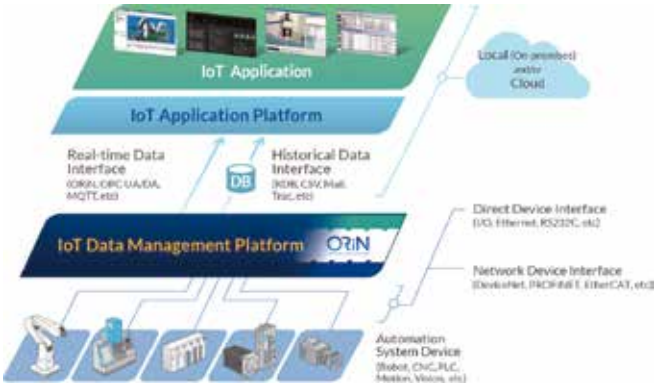
- Provided with a compact controller and thin antenna for easy installation anywhere.
- A specific low-power model that does not require a lot of time for installation and maintenance management.
- The communication distance can be adjusted according to the operation.
- Three models with a different scanning distance and interface.

IoT Products

IoT Solutions

Connectivity changes the world.

Connectivity ushers in the next generation.



Factory implementation of IoT involves gathering information from various devices and transferring this information to a host system. DENSO WAVE offers IoT products designed exclusively for use with the IoT Data Management Platform—a platform that achieves uniform accessibility with both existing and newly installed equipment based on Open Robot/ Resource Interface Network (ORiN) technology.

Hardware

IoT Data Server

Data Integration Controller

Ready for use immediately after installation

The data integration controller is a highly reliable industrial PC with IoT Data Share software preinstalled. The IoT Data Share enables data gathering without special programming.

The data integration controller incorporates as standard a range of functions dedicated to collecting, processing, storing, transmitting, and publishing data, as well as dashboard and security functions. These functions make it ideal for a broad range of applications for environments ranging from cellular systems, processing lines, factories, and the cloud.

Software

IoT Data Share

Data Integration Software

User-friendly programming-free implementation

The data integration software links to various types of factory automation machines without special programming. It offers dedicated functions for collecting, processing, storing, transmitting, and publishing data.

Operators can set a specific condition as a trigger to link the acquired data to an external function: for example, sending an email or writing to a database.

DENSO Robotics Main Functions

Dual Arm Control

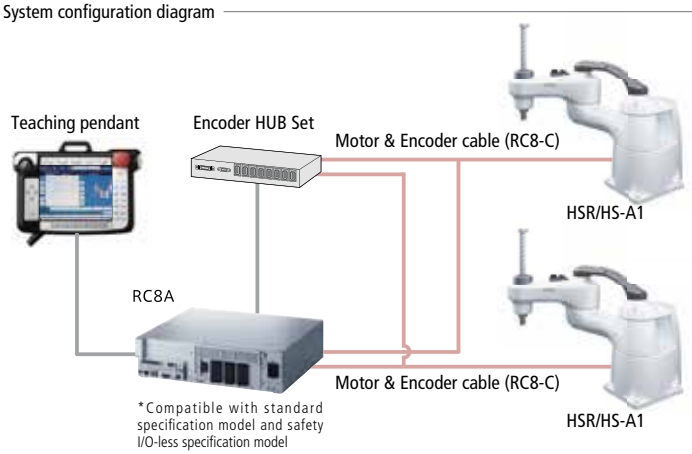
Option available at additional cost

Enables control of two robots from a single controller.This feature reduces adjustment labor hours, installation space requirements, and initial costs while achieving increased speed.

Supported Robots

HSR, HS-A1

System configuration diagram



Extended-Joint Tracking

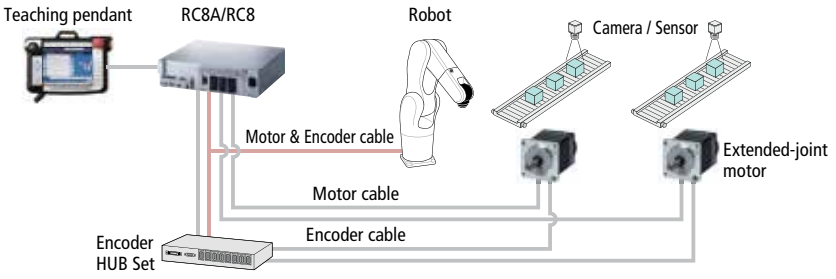
Option available at additional cost

The conveyor and robot operations are controlled concurrently, allowing accurate tracking even in the event of sudden acceleration or deceleration.This is especially useful and convenient in processes involving arranging and transporting workpieces before or after feeding to packaging equipment—processes commonly encountered in the manufacture of food, pharmaceuticals, and cosmetics products.

Supported Robots

All robot models compatible with RC8A or RC8

System configuration diagram



EtherCAT Slave motion

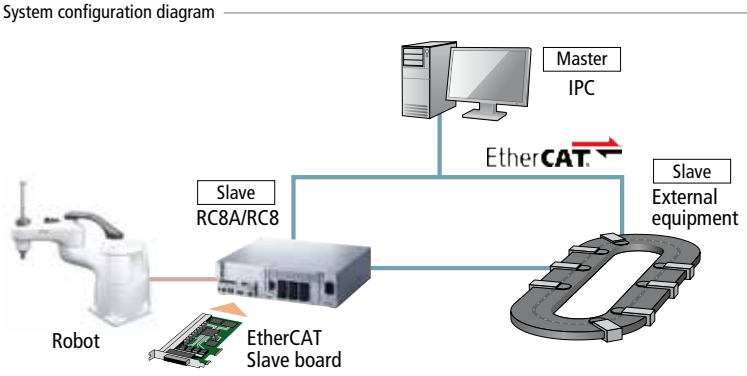
Option available at additional cost

Via EtherCAT, this integrated development environment using the TwinCAT3 PC-base integration software enables centralized control of a robot and other devices based on a generated track from an IPC equipped with EtherCAT Master.

Supported Robots

All robot models compatible with RC8A or RC8

System configuration diagram

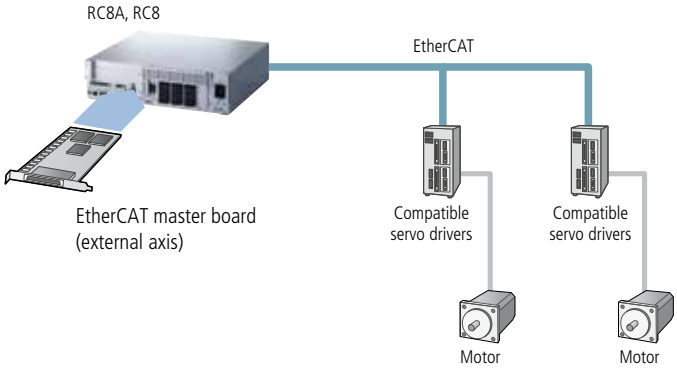


External axis control

Option available at additional cost

Servo motors of any capacity can be controlled by expanding the EtherCAT master board (external axis).

System configuration diagram



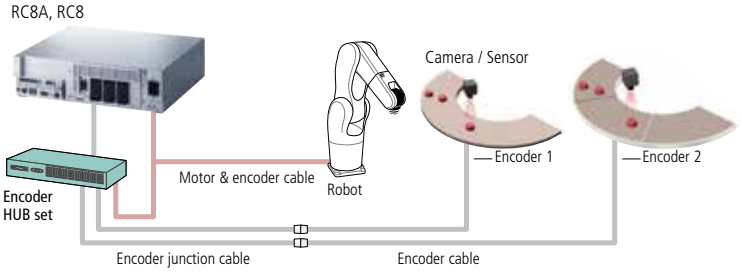
SANMOTION R ADVANCED MODEL EtherCAT / Manufactured by Sanyo Denki Co., Ltd.
ASDA-A2-E / Manufactured by DELTA ELECTRONICS, INC.
D1-N / D2T AC servo motors & Linear motors / Manufactured by HIWIN CORPORATION
MINAS A5B•A6B / Manufactured by Panasonic Corporation

Circular tracking

Option available at additional cost

The conveyor tracking is compatible with circular conveyors. Robot tracking of workpieces moving in a circular orbit can be set using the Wizard-type GUI similar to the conventional linear conveyor tracking.

System configuration diagram



Supported Robots

All robot models compatible with RC8A or RC8

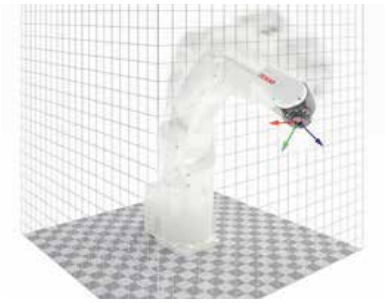
High-precision calibration (Hi-Cal)

Option available at additional cost

Improved absolute precision and reduced variation in robot machine enables significant reduction of the worktime in teaching.

Benefits

The worktime in re-teaching when robots are exchanged is reduced.
Improved vision and correction accuracy of 2D/3D vision picking that is subject to rotation and posture change



Supported Robots

VS-050/060/068/087 standard type

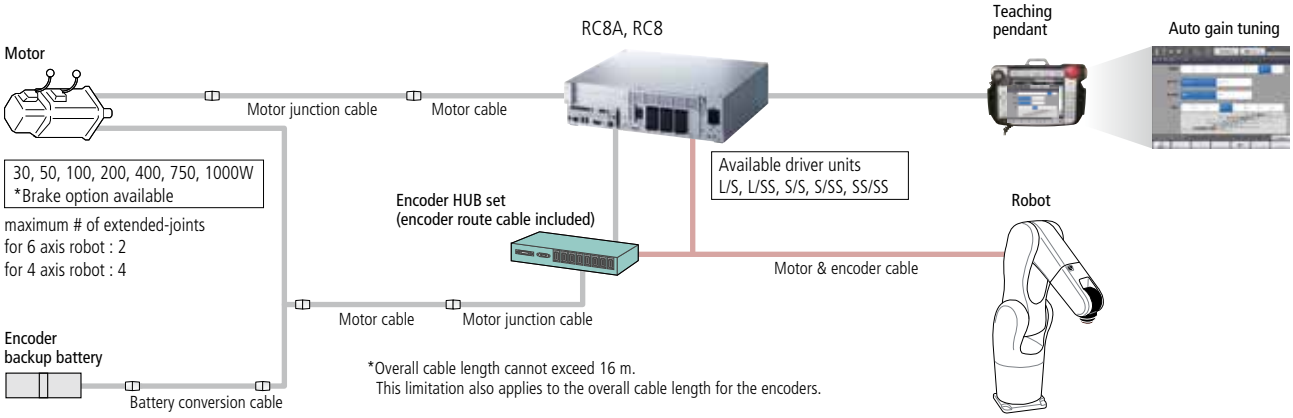
Hi-CAL High-Accuracy Calibration

Extended-joint support specification

Option available at additional cost

Extended-joint support can be controlled with the same interface as the robot. Easy adjustment with auto gain tuning.

System configuration diagram



Main applications

Robot drive axis / servo hand, device to determine position

Supported Robots

Compatible RC8A and RC8 robots: All models

Conveyer tracking

Option available at additional cost

Robot tracks the workpiece to Pick & Place without stopping the conveyer. Use a wizard-type GUI to easily adjust complex conveyer tracking. In addition, free curve interpolation control is also possible during conveyor tracking.

Sensor Tracking

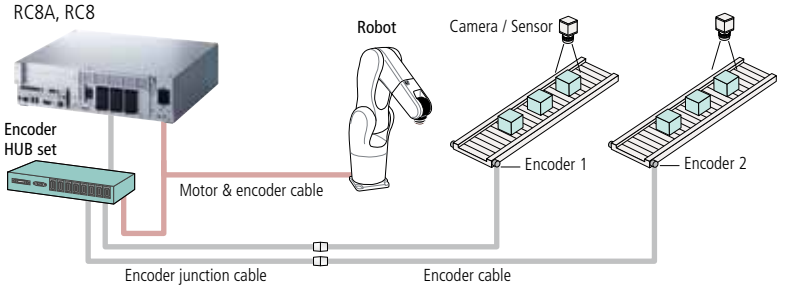
Configure in 5 steps

Easy-to-use settings wizard

Vision Tracking

Configure in 6 steps

System configuration diagram



Simple connection to commercially available image processing equipment

OMRON	FZ/FH/FZM1 / FQ2 series
Keyence	CV/CV-X / XG series
Sharp	IV series
Cognex	Insight series
Panasonic Industrial Devices SUNX	PV series
Matrox	Matrox Design Assistant
Baumer	VeriSens series

Main applications

Picking and packaging trays of food products / medical and pharmaceutical product workpieces

Supported Robots

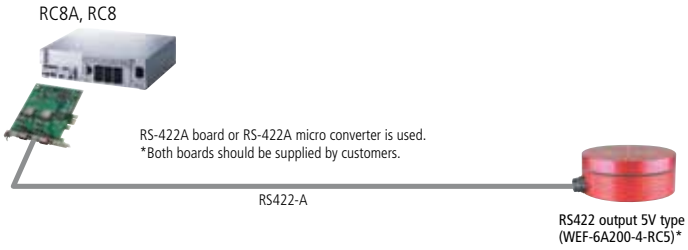
Compatible RC8A and RC8 robots: All models

Compliance Control Function with Force Sensor

Option available at additional cost

Feedback control from a force sensor and DENSO exclusive strength control algorithm enable detailed copying, fitting and press action. Dedicated GUI allows monitoring of feedback values from the force sensor and enables force control settings to be adjusted to aid reduction of man-hours to startup.

System configuration diagram

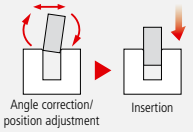


Models that support Wacoh-Tech inner force sensor

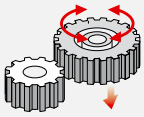
WEF-6A200-4-RCD	RS422 type	Load rating : 200 N
WEF-6A200-4-RCD-B	RS422 type	Load rating : 200 N
WEF-6A200-20-RCD-B	RS422 type	Load rating : 200 N
WEF-6A500-10-RCD-B	RS422 type	Load rating : 500 N
WEF-6A1000-30-RCD-B	RS422 type	Load rating : 1000 N

Main applications

Copying action at insertion ofparts



Fitting needed in assembly



Press action such as applying constant pressure

Supported Robots

All models of RC8A-, RC8-compatible DENSO 6-axis articulated robots. All models of RC8A, RC8-compatible 4-axis robots.

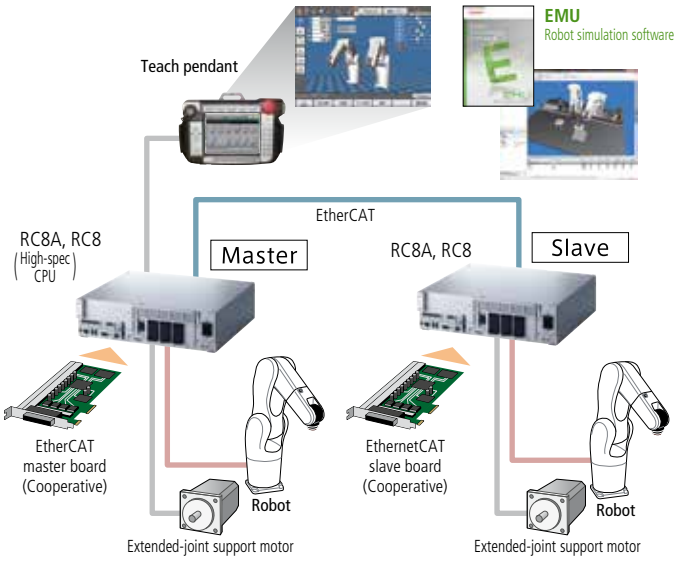
*Internal wiring can be used with VS-050, 060, 068, 087 communication cable flange specification A.

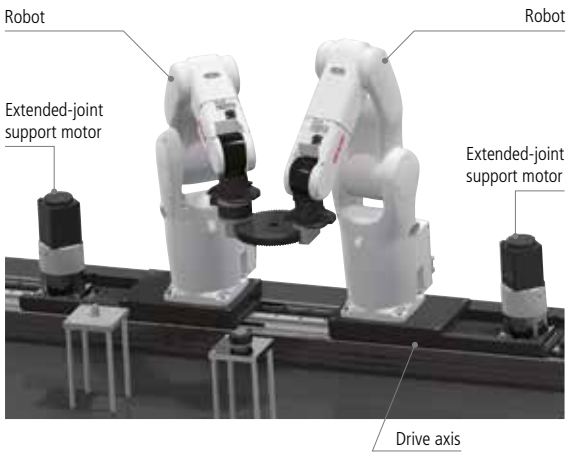
Cooperative Control

Option available at additional cost

Multiple small robots can be used, replacing one large robot. Two robots can handle higher payloads and manipulate larger tools, while still retaining the ability to work independently.

System configuration diagram





Main applications

Assembly of heavier and larger parts.

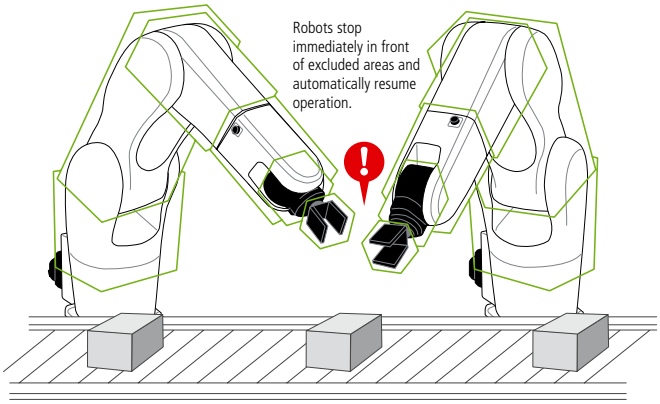
Supported Robots

All models of RC8A-, RC8-compatible DENSO 6-axis robots.
All models of DENSO 4-axis robots.

Exclusive control

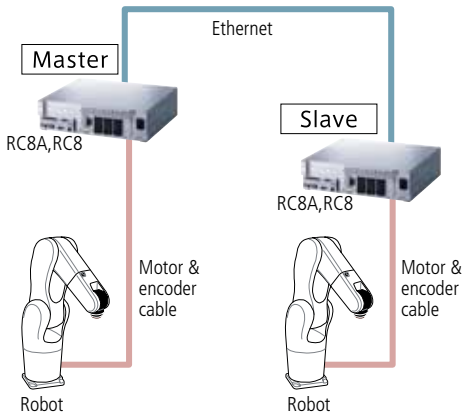
Option available at additional cost

Entry of multiple robots into excluded areas can be controlled.



*Maximum number of exclusion controllable robots is 4.

System configuration diagram



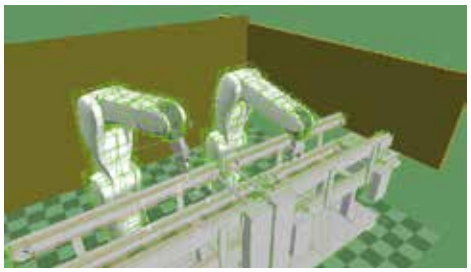
Supported Robots

Compatible RC8A and RC8 robots: All models

Virtual fence

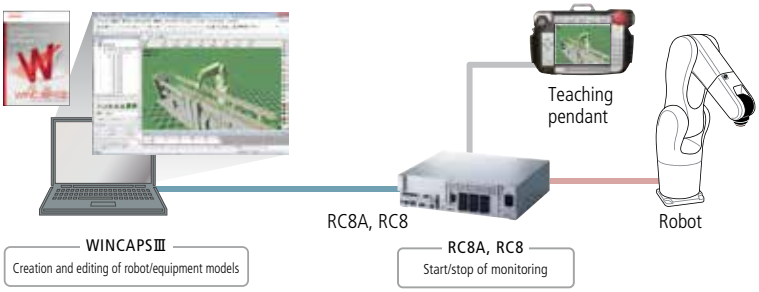
Option available at additional cost

Eliminates interference between robots and peripherals



*Applicable to multiple robots (2 max.) only when they are cooperated.

System configuration diagram



Main applications

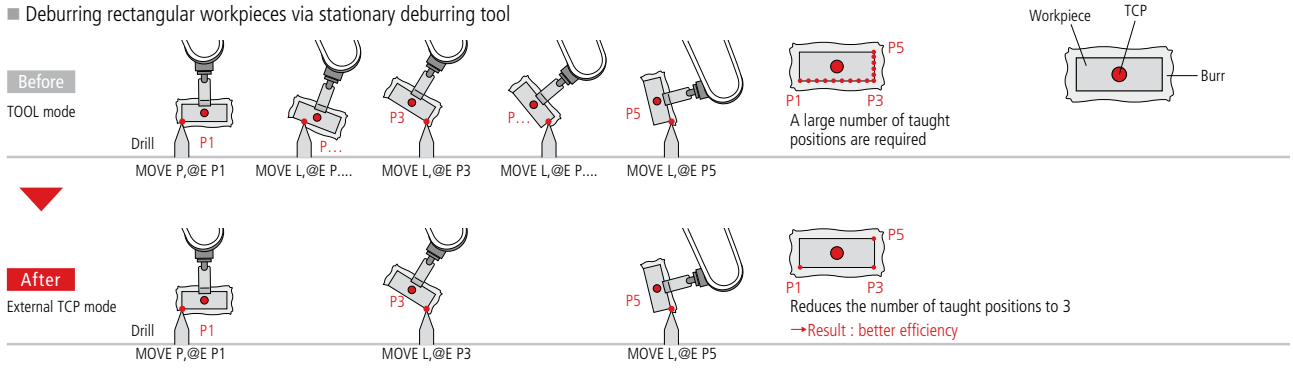
Compatible RC8A and RC8 robots: All models

External TCP

Option available at additional cost

Rotation around a defined center point of the workpiece allows for an easier method of teaching points and reduction of required positions

■ Deburring rectangular workpieces via stationary deburring tool



Main applications

Deburring and sealant coating

Supported Robots

All robot models compatible with RC8A or RC8

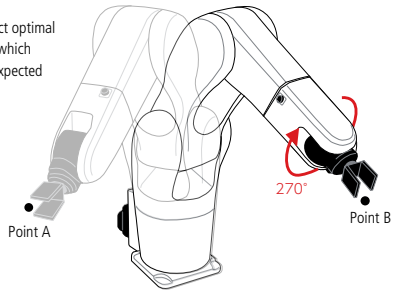
Autofig

Automatically calculates the optimal "figure" for motion to a designated position resulting in reduction of setup time.

■ Movement from Point A to Point B

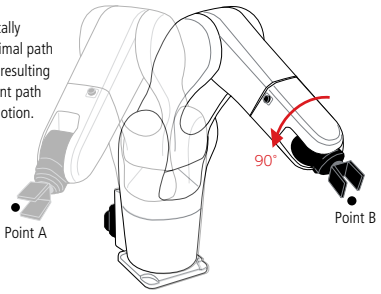
Before

Unable to detect optimal motion profile which resulted in unexpected motion.



After

Autofig automatically calculates the optimal path between A and B resulting in the most efficient path with no wasted motion.



Main applications

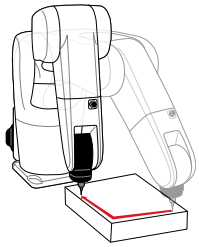
When used with a program that employs a palletize library

Supported Robots

Compatible RC8A and RC8 robots: All models

High-accuracy Path Control

Reduces path changes caused by variation in speed and uses arc motion and free curve interpolation control to improve path accuracy.



Main applications

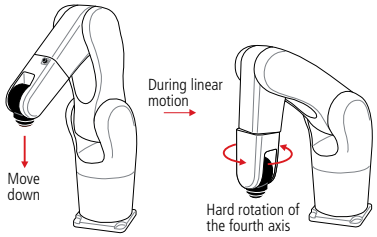
Sealant and silicone adhesive coatings

Supported Robots

VP series
VS series : VS050 / 060 / 068 / 087, VS–6556 / 6577
VM series, HSR® series, HS-A1 series
HM series, XR series

Singular Point Avoiding Function

Use for smooth movement when linear interpretation is required to pass a point at which a robot's position changes, such as in the vicinity of a singular point.



Main applications

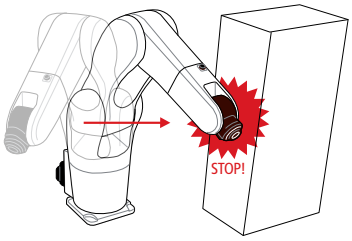
Used with a program that employs a palletize library

Supported Robots

VP series
VS series : VS050 / 060 / 068 / 087, VS–6556 / 6577
VM series

Collision detection

Detects a potential collision between the robot and any peripheral or workpiece and executes a robot emergency stop.



Main applications

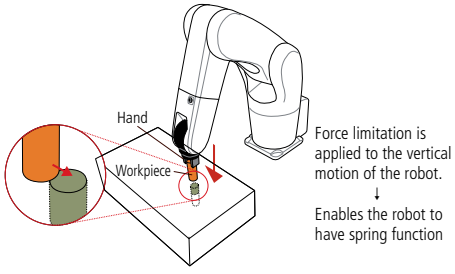
Prevents damage to the workpiece and hand caused by erroneous operation during teaching

Supported Robots

VP series
VS series : VS050 / 060 / 068 / 087, VS–6556 / 6577
VM series, HSR® series, HS-A1 series
HM series, XR series

Compliance control function

Control the force to protect the workpiece and hand from excessive loads.



Main applications

Product assembly

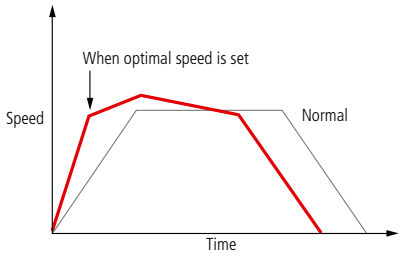
Supported Robots

VP series
VS series : VS050 / 060 / 068 / 087, VS–6556 / 6577
VM series

*When precision is the required force control, please use compliance control function with force sensor (an option available at additional cost).

Optimal Speed Setting

Motion speed and acceleration is optimized to correspond to the payload on the robot tip to reduce cycle time.



Supported Robots

VP series
VS series VS-050 / 060 / 068 / 087 / VS-6556 / 6577
VM series, HSR® series, HS-A1 series
HM series, XR series

Command input support functions

Easily programmable by selecting parameters from the command input screen.

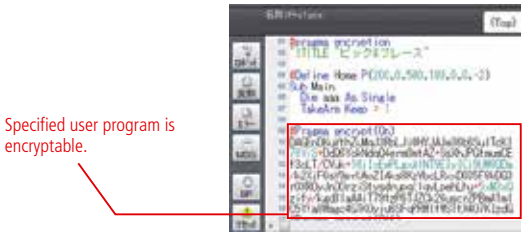
Eight frequently used commands are available.

Supported Robots

Compatible RC8A and RC8 robots: All models

Encryption function

Converts the user programs to indecipherable character strings to prevent people other than the authorized person from viewing them.



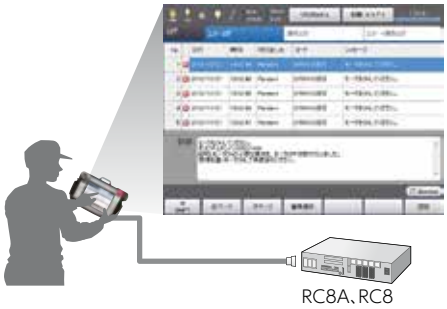
Encryption key must be stored carefully. Decryption is impossible if the key is lost.

Supported Robots

Compatible RC8A and RC8 robots: All models

Log function

Various logs of robot movements and operations can be recorded, viewed and saved. Data can be used for identification or improvement of errors or failure cause and reduction of cycle time.



Supported Robots

VP series
VS series VS050 / 060 / 068 / 087 / VS-6556 / 6577
VM series, HSR® series, HS-A1 series
HM series, XR series

Control Panel Function

The teaching pendant screen can be customized as a control panel for robots and peripherals.

WINCAPSⅢ, the offline programming software, can be used to create screens from PC.

Supported Robots

VP series
VS series VS050 / 060 / 068 / 087 / VS-6556 / 6577
VM series, HSR® series, HS-A1 series
HM series, XR series

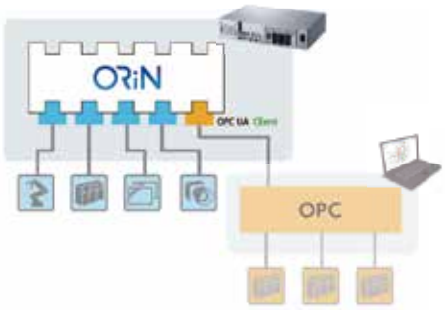
OPC Linkage

OPC UA server functions and client functions can be used for tasks such as linkage to upper hierarchy OPC systems or connection to OPC-compatible devices.

Server Functions

*A separate license is required when using the OPC-UA server functions.

Client Functions



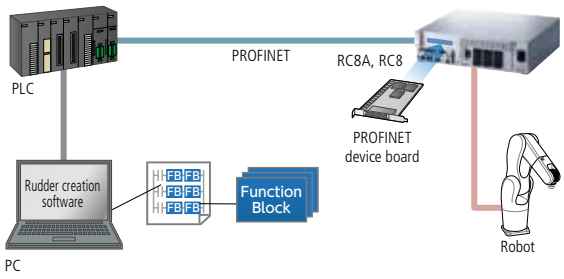
Supported Robots

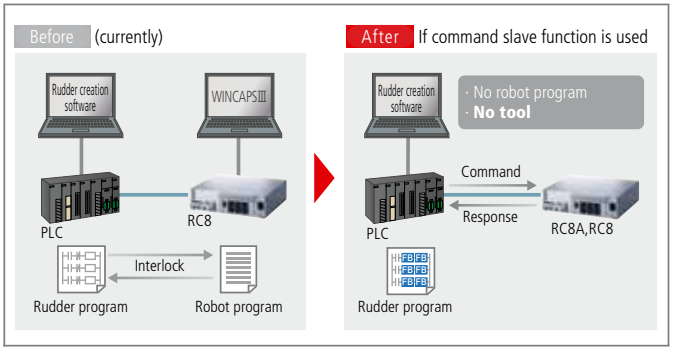
Compatible RC8A and RC8 robots: All models

Command Slave Option included

Robots can be controlled from PLC languages (ladder programs). Function block (FB) supports 107 types of robot commands.

System configuration diagram





Main applications

Robot control from PLC

Supported PLC

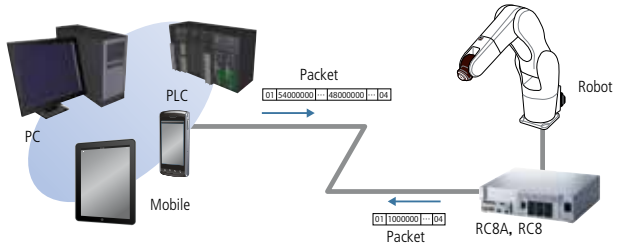
SIEMENS / SIMATIC S7-1500
Rockwell Automation / Model Compatible with STUDIO 5000 Logix Designer Version 30
CODESYS V3

Supported Robots

Compatible RC8A and RC8 robots: All models

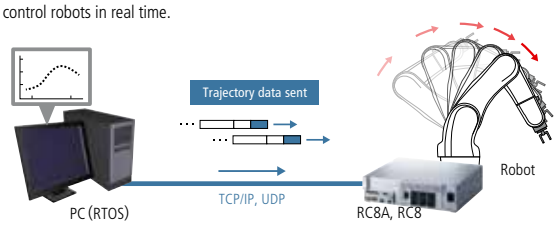
b-CAP (communications protocol)

Send motion command packets from PC and PLC and other devices to directly control a robot.



b-CAP Slave Option included RC8A,RC8

Send PC-generated trajectory data to the controller to control robots in real time.



*Use of the EtherCAT slave board (Motion) enables EtherCAT communication.

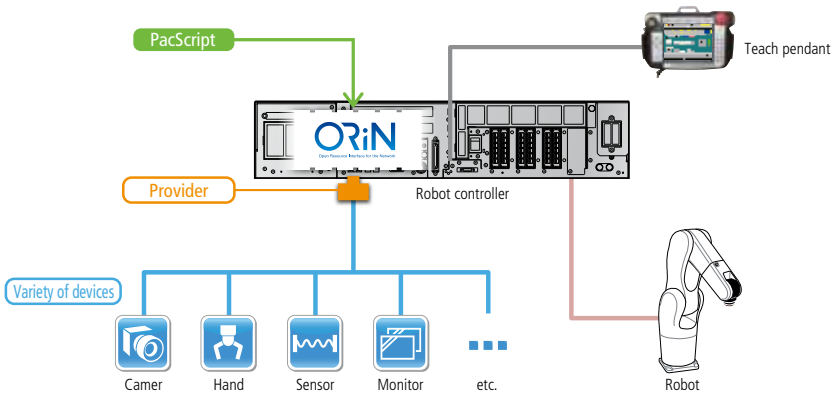
Supported Robots

VP series
VS series VS050 / 060 / 068 / 087 / VS-6556 / 6577
VM series, HSR® series, HS-A1 series
HM series, XR series

Provider

Provider refers to the device interface used to directly control a variety of Factory Automation products (image processing equipment, sensors or hands) from PacScript (DENSO Robotics language).

System configuration diagram



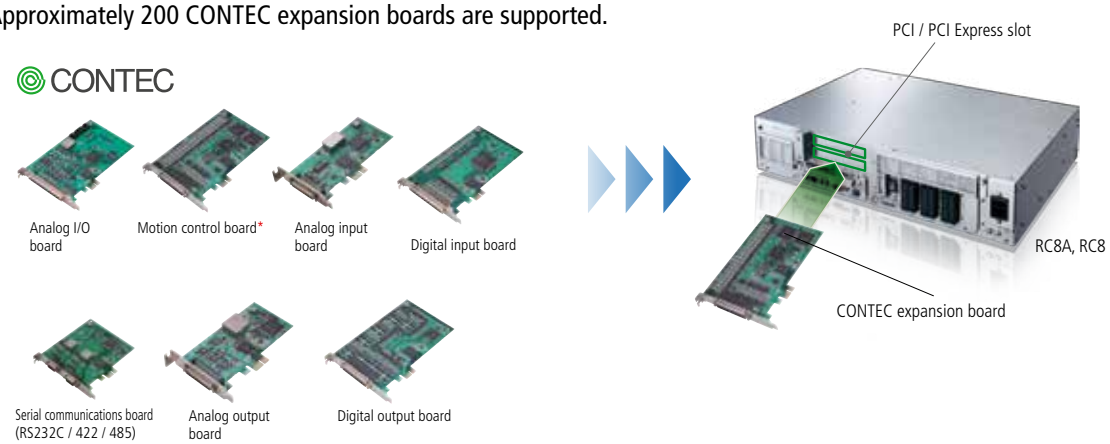
Supported Product List

Category	Manufacturer	Product / Series
Robots	Yamaha Motor Co., Ltd.	SR1 / DRCX / RCX series [1]
	IAI Corporation	P-CON / E-CON series
Image processing equipment	OMRON Corporation	FZ3 / FZ4 / FZM1 / FZ5 / FH / FQ-M / FQ2 [2]
	Keyence Corporation	XG / XGX/ CV / CVX series [2]
	Panasonic Industrial Devices SUNX Co., Ltd.	PV series [2]
	Cognex Corporation	In-Sight series [2]
	Sharp Manufacturing Systems Corporation	IV series [2]
	Canon Inc.	VB-H43B / VB-M42B [2]
	Matrox	Matrox Design Assistant
	IMAC Co., Ltd.	IPPA series
Partsfeeders	flexfactory	anyfeed series
Actuators	KOGANEI Corporation EWHA	EWHA series [2]
Sensors	Wacoh-Tech Inc.	DynPick series [2, 3]
Modbus RTU/ASCII/TCP	—	—
IO-Link	Balluff	EtherNet/IP IO-Link master BNI004A, BNI009T, BNI006A, BNI007N, and BNI00AA

1: This is an option available at additional cost. 2: This is a free license. Please confirm your company's license at "Check Free License" in the Member's Site area of the homepage.
3: Compliance control function with force sensor requires system extensions available separately (at additional cost).

Supports CONTEC Expansion Boards Option included*

Approximately 200 CONTEC expansion boards are supported.



Supported Boards *Additional costs apply to the motion control board expansion option only.

- Analog I/O board
- Analog input board
- Analog output board
- Motion control board*
- Digital input board
- Digital output board
- Serial communications board (RS232C / 422 / 485)

Supported Robots

Compatible RC8A and RC8 robots: All models

Support

Web Site

Domestic visitor site

https://www.denso-wave.com/ja/robot/

These sites are available for robot product information (features, specification, external dimensions), support (such as FA school and FA seminar) and other inquiries.

Member site

Register on the member site for download services (such as robot CAD data, software, user's manuals and robot programs*) as well as access to our information search service (FAQ).

*Customers who have not yet purchased a product may use the "Robot CAD Data and Software [Trial Version]".

e-learning

https://www.denso-wave.com/en/robot/support/learning/

The DENSO digital learning system provides the first step to have command of DENSO robots.
Trainees learn basics and procedure of robot operation and programming.
It is helpful for the beginner of the robot operation; by understanding the basic robot operation and the procedure, you can handle and solve the unexpected troubles.

Technical Support

Robot School

Periodic

The wide array of instruction available at our Training Center ranges from "Basic Operation of DENSO Robotics" to instruction in "Advanced Use" for every robot model. Regularly scheduled instruction in inspection and repair skills are also held at the Maintenance School.

On-demand

Trainees learn by actual operation of the teaching devices prepared for each lecture course. Course detail is determined after coordination of the schedule and lecture courses among the customer and our sales staff. The lecture courses can be held at our head office in Aichi prefecture or the venues specified by the customer.*

*In this case, material transporting cost, travel cost of instructors, etc. shall be paid after agreeing on the cost.

FA School Office	TEL : +81-566-55-9499 E-mail : fa-school.seminar@denso-wave.co.jp

Robot verification testing

A system of Application Tests is available at the FA Application Center, which is equipped with all types of robots to use in cycle time tests, examination of equipment layouts and other pre-evaluation testing.

*If you require testing, please apply to your nearest sales office or from the DENSO Robotics homepage.

Technical Support Center

The Center responds to inquiries regarding the robot's detailed functions and performance as well as control, programming and other technical aspects of use.

FA Technical Support Center Desk	TEL : +81-50-5213-4650(Weekdays 9:00 – 12:00 and 13:00 – 17:00 Japan Standard Time) Notes: Please follow the instructions through our automated phone service and press the corresponding number key to reach technical inquiries. E-mail : fa-support@denso-wave.co.jp

Service

Customer Service

Customers in Japan

	Service	Description
1	Business Trip Repair Service	Repair service when an error occurs A service technician travels to a site to perform repairs.
2	Send in for Repair Service	Repair service provided at our Repair Center We repair any product or parts sent in to us.
3	Broken Part Analysis Service	Investigation and reporting of causes of malfunctions Helps in clarifying and eliminating causes.
4	ANSHIN Inspection Service	Regular maintenance inspections A service technician performs regular maintenance inspections on-site. *Optional plans for things like bulk discounts and warranties are also available.
5	ANSHIN Refresh Service	Inspection and overhaul service Conducts motion inspections and surveys repairs, overhauling, and shipping. *Supported products: robot unit, controllers, teach pendants
6	Substitute Product Rental Service	A service for renting out substitute robot unit, controllers, etc. This service is provided during periods when we conduct our "ANSHIN Refresh Service". *Loans may not be possible depending on the model.
7	Robot School (Maintenance)	Training in maintenance (1) Regular school: participants acquire maintenance knowledge pertaining to areas such as regular maintenance inspections, functional parts replacement, and troubleshooting. (2-days course) (2) Business trip school: maintenance education carried out on-site using actual customer machines. (3) Individual school: maintenance education tailored to individual customer needs.
8	[Optional Service] ANSHIN Call 24 hour service (annual contract)	24-hour maintenance and technical support service by telephone, available overnight and on holidays (1) Skilled technicians provide overnight and holiday troubleshooting support. (2) Same-night delivery of parts needed to get robots restored. *Provided as a set with the "ANSHIN Inspection Service".
9	[Optional Service] ANSHIN Warranty Extension Service	This service is an extension of warranty period. Maximum warranty period extension is 36 months. * However, the maximum warranty period extension shall be within the 12,000 hours after starting running (operating).

Overseas Factory Customers [Support for robots relocated outside Japan]

DENSO provides a reliable support system that can be used overseas.
A Global Warranty Service is also available in addition to the general service for greater security.

	Service	Description
1	General Overseas Service [1]	Support offered by the local vendor or service center [2] (1) Technical consult at a local office (2) Send in for repair (3) Spare and service parts available for local purchase (4) Maintenance education
2	Global Warranty Service [3]	Support offered by the local vendor or service center Provided in addition to the above services: (5) Extended warranty period: 12 months → 24 months Discounted service fees unavailable to non-contracted robots are offered for contracted robots.

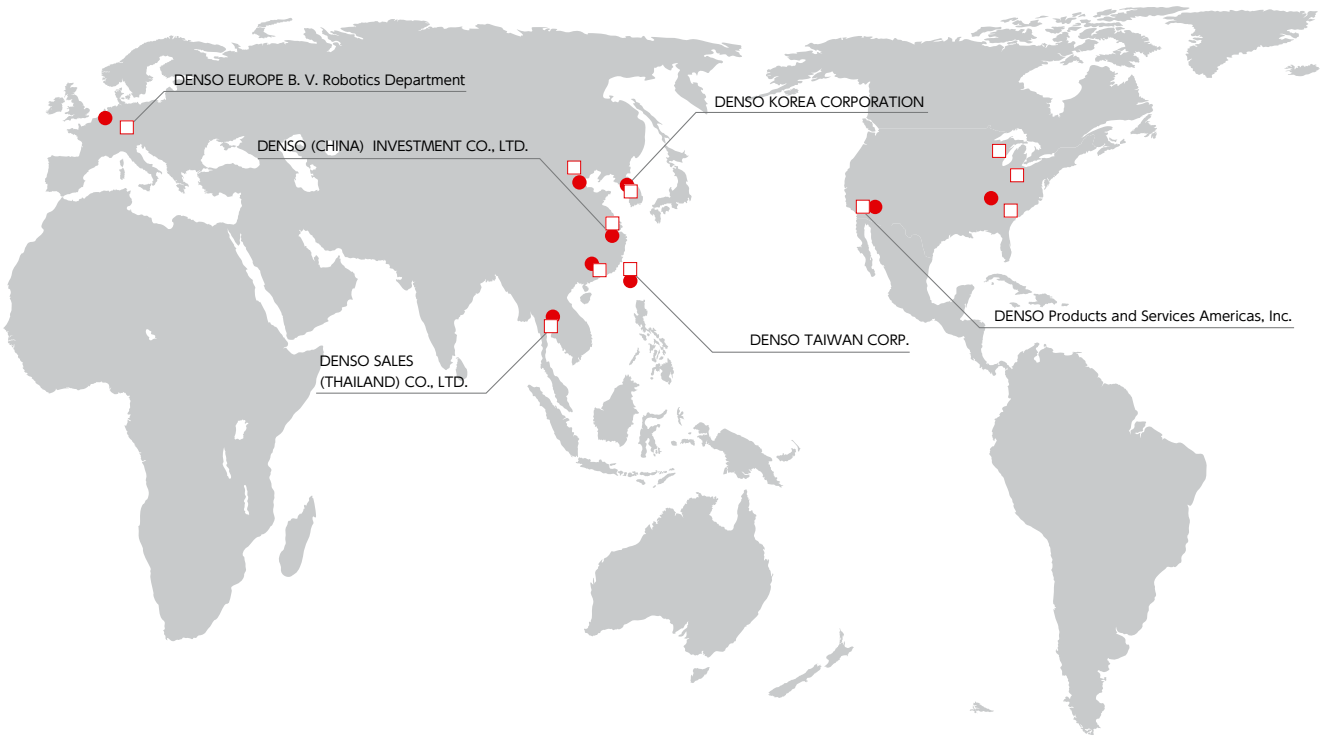
Regions Supported by DENSO Service Centers	
North America	USA, Canada, Mexico, Brazil
Europe	Germany, Italy, France, Great Britain, Netherlands and other European countries
Asia	China, South Korea, Taiwan, Thailand, Singapore, Malaysia, Vietnam, India, Indonesia

1: This is a paid service that includes support for product malfunction.
2: Service in regions without a DENSO service center will be handled at factory headquarters in Japan.
3: A contract fee is required to use this service.
As a rule, only robots supported at the local site are applicable for this service.

Service Contact

Please contact the domestic service centers listed on P.77 for inquiries on the robot repairs, maintenance service and maintenance training.

Global Network



□ : Sales offices ● : Service centers

Overseas centers

DENSO Products and Services Americas, Inc.	3900 Via Oro Avenue, Long Beach, California, 90810, U.S.A.	TEL : +1-888-476-2689	FAX : +1-310-952-7502
DENSO EUROPE B. V. DENSO Robotics Europe	Waldeckerstrasse 9 D-64546 Moerfelden-Walldorf, Germany	TEL : +49-6105-27-35-150	FAX : +49-6105-27-35-180
DENSO KOREA CORPORATION	131, Seonggogae-ro, Uiwang-si, Gyeonggi-do, Korea 437-120	TEL : +82-31-340-1783	FAX : +82-31-8033-7210
DENSO (CHINA) INVESTMENT CO., LTD.	No.35 Yuandian Road, Minhang District, Shanghai, CHINA 201108	TEL : +86-21-2350-0093	FAX : +86-21-2350-0179
DENSO TAIWAN CORP.	No.525, Sec2, Mei Su Rd., Jui Ping Li, Yang Mei Town, Taoyuan Hsien, Taiwan	TEL : +886-3-482-8001	FAX : +886-3-482-8003
DENSO SALES (THAILAND) CO., LTD.	888 Moo 1 Bangna - Trad Rd., KM. 27. 5, T. Bangbo, A. Bangbo, Samutprakarn 10560, Thailand	TEL : +66-2-315-9500	FAX : +66-2-315-9556

YouTube

[You Tube] https://m.youtube.com/channel/UC9I8Zbhx2j_bZ4iHQYneR2w

[Facebook] https://m.facebook.com/DENSOWAVEofficial/?locale2=ja_JP

To ensure safe usage of products

- Please read the instruction manual thoroughly and use products following proper procedures.
- For ease of clarity and understanding, safety equipment and devices stipulated by law such as safety fences are not shown in photographs and illustrations in this catalog.

DENSO WAVE INCORPORATED

1-1 Showa-Cho, Kariya, Aichi, Japan 448-8661

Sales Planning Dept. TEL: +81-50-5213-4650
FAX:+81-566-55-4778

Notes: Please follow the instructions through our automated phone service and press the corresponding number key to reach general inquires.

- For information of the export of products, please see "Export Control" on our website at https://www.denso-wave.com/ja/robot/support/export/.
- If robots are to be used overseas, purchase of safety-specification products and subscription to our Global Warranty Service is recommended.
-
- The data in this catalog is current as of December, 2019 and is subject to change without notice.

For purchases and consultation: