DENSO

DENSO Robotics® General Product Catalog

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C-ROB-E 202206

DENSO Robotics®

General Product Catalog

DENSO


DENSO

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

HISTORY

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 54th anniversary since we began development, we have sold approximately 120 thousand robots. DENSO Robotics products will continue to work and prove their worth in the future.

1967
To enable people to work in environments befitting human beings

Aluminum die-casting operation robot

In 1967, DENSO began development of DENSO Robotics products 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 diecasting 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.

1985
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.

1991
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 Robotics products are now widely used not only in the auto-industry, but also electrical and electronic industries, food processing and pharmaceuticals

1998
Greater ease of handling

Teaching pendant with GUI

1998 saw the adoption of the world's first use of a 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 RC8A controller.

*According to our research

2014
Provision of safety and quality in the fields of food processing and medical treatment

Pharmaceutical/ medical robot VS050S2

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)

2016
Achievement of the ultimate basic performance

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 acceleration," "runs continuously," and "stops precisely." DENSO Robotics will continue to meet the challenge of going beyond the limits of performance.

2018
A robot that collaborates with people.

COLLABORATIVE ROBOTS COBOTTA

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.

2020
Now with high-payload robots

5- and 6-axis robot VMB VLA

We've added the VMB and VLA series of high-payload and long-reach models to a line that previously consisted primarily of conventional compact robots. Together with the existing product lineup, DENSO Robotics can accommodate full automation of manufacturing processes.

We strive to supply easy-to-use robots to everyone who’s involved with robots.

Recent years have brought more opportunities for customers in a diverse array of industries to use robots.
Our goal is to supply easy-to-use robots to everyone who’s involved with robots.
What does it mean for a robot to be easy to use?
Some customers wish to implement highly difficult equipment designs that integrate a development environment that incorporates multiple pieces and types of equipment, while others prefer the ease of intuitive programming and operation.
We believe that different people involved with robots define ease of use in different ways.
DENSO Robotics products continue to evolve day in and day out so that we can better meet the needs of a larger range of customers.
Our new RC9 robot controller makes possible integrated control of equipment by providing openness for integration of the user, system integrator, and manufacturer technologies along with expandability for simple integration of entire systems.
In addition, we're developing artificial intelligence technologies that deliver simplicity while enhancing our software, robot functionality, and support structures.
Going forward, DENSO Robotics will supply ease of use to everyone who’s involved with robots through an extensive range of products and support across the board, including in design, setup, operation, and maintenance.

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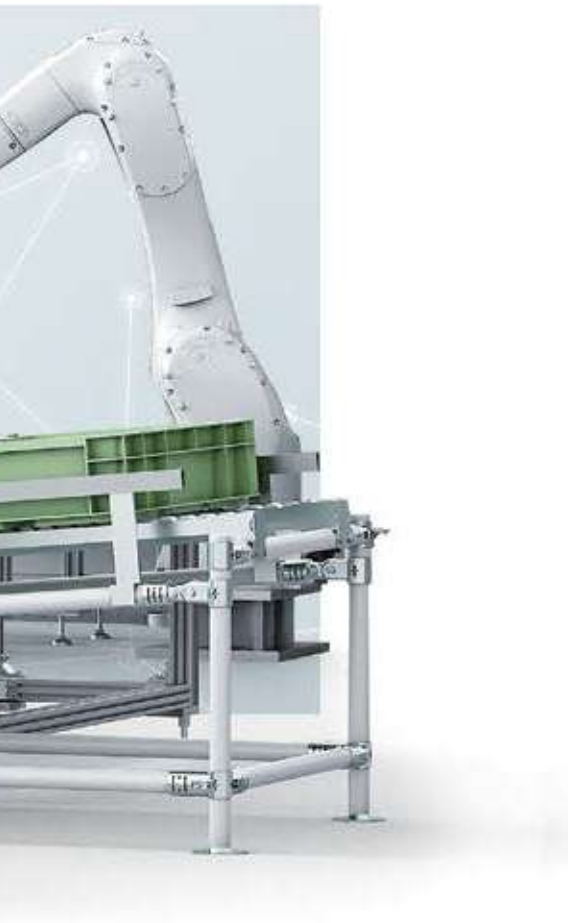


DENSO Robotics® Lineup

Supported robot controllers

RC8A ▶P.42 RC9 ▶P.36

5- AND 6-AXIS ROBOTS

VP Series RC8A

VP-5243 / 6242

Maximum arm reach	430 / 432 mm
Maximum payload	3 *1 / 2.5 *2 kg
Position repeatability *3	±0.02 mm
Options	● Standard type

VS Series RC8A

VS050 / 060

Maximum arm reach	505 / 605 mm
Maximum payload	4 kg
Position repeatability *3	±0.02 mm
Options	● Standard type ● Protected type (IP67) ● Dust & splash proof type (wrist: IP65 / unit: IP54) ● Cleanroom type (ISO Class 3/5) ● UL specifications

VS068 / 087

Maximum arm reach	710 / 905 mm
Maximum payload	7 kg
Position repeatability *3	±0.02 to ±0.03 mm
Options	● Standard type ● Protected type (IP67) ● Dust & splash proof type (wrist: IP65 / unit: IP54) ● Cleanroom type (ISO Class 3/5) ● UL specifications

VS-6556 / 6577

Maximum arm reach	653 / 854 mm
Maximum payload	7 kg *5
Position repeatability *3	±0.02 to ±0.03 mm
Options	● Standard type ● Dust & splash proof type (wrist: IP65 / unit: IP54) ● Cleanroom type (Class 10/100)

4-AXIS ROBOTS

HSR® Series RC8A

HSR®048 / 055 / 065

Arm reach	480 / 550 / 650 mm
Vertical stroke	100 / 200 / 320 / 510 mm *7
Maximum payload	8 kg
Position repeatability *3	±0.01 to ±0.012 mm
Standard cycle time *4	0.28 to 0.31 sec (for 2 kg payload)
Options	● Standard type ● Bellows type ● Dust & splash proof type (IP65) ● Cleanroom type (ISO Class 3) *8 ● UL specifications ● Ceiling type ● H1 grease type (IP65)

HS-A1 Series RC8A

HS035A1 / 045A1 / 055A1

Arm reach	350 / 450 / 550 mm
Vertical stroke	100 / 150 / 200 / 320 mm
Maximum payload	5 kg
Position repeatability *3	±0.01 mm
Standard cycle time *4	0.29 sec (for 2 kg payload)
Options	● Standard type ● Bellows type ● Dust & splash proof type (IP65) ● Cleanroom type (ISO Class 3) *8 ● UL specifications *8 ● Ceiling type

HM Series RC8A

HM-40* / 4A***

Arm reach	600 / 700 / 850 / 1,000 mm
Vertical stroke	100 / 150 / 200 / 300 / 400 mm
Maximum payload	10 / 20 kg
Position repeatability *3	±0.02 to ±0.025 mm
Standard cycle time *4	0.29 to 0.31 sec (for 2 kg payload)
Options	● Standard type ● Dust & splash proof type (IP65) ● UL specifications *9 ● Ceiling type

LPH Series RC8A

LPH-040

Arm reach	400 mm
Vertical stroke	150 mm
Maximum payload	3 kg
Position repeatability *3	±0.02 mm
Standard cycle time *4	0.45 sec
Options	● Standard type

*1: If wrist downward movement exceeds ±45°, the maximum payload is 2.5 kg. *2: If wrist downward movement exceeds ±45°, the maximum payload is 2 kg.
*3: Position repeatability (center of end-effector mounting face) is the precision at constant ambient temperature. *4: One cycle is the time taken to move an object at a height of 25 mm between two points 300 mm apart.

COLLABORATIVE ROBOTS

VM Series RC8A

VM-6083 / 60B1

1,021 / 1,298 mm	
13 kg *6	
±0.05 to ±0.07 mm	
● Standard type ● Dust & splash proof type (wrist: IP65 / unit: IP54) ● Cleanroom type (Class 100)	

VMB Series RC9

VMB-2515 / 2518

1,506 / 1,804 mm	
25 kg	
±0.05 mm	
● Standard type ● Protected type ● Cleanroom type	

VLA Series RC9

VLA-4025 / 6022

2,503 / 2,257 mm	
40 / 60 kg	
±0.06 mm	
● Protected type (wrist: IP67 / unit: IP65)	

COBOTTA®

CVR038

Total arm length (No. 1 arm + No. 2 arm)	342. 5 (165 + 177.5) mm
Rated payload (Maximum payload)	0.5 kg *10 *Without electric gripper
Position repeatability *3	±0.05 mm
Options	● Standard type ● OSS version

PHARMACEUTICAL/MEDICAL ROBOTS

VS Series RC8A

VS050S2

Maximum arm reach	520 mm
Maximum payload	4 kg
Position repeatability *3	±0.02 mm
Standard cycle time *4	0.35 sec (for 1 kg payload)
Options	● H_2O_2-resistant ● UL specifications

SCREW-TIGHTENING ROBOTS

RC8A

Maximum arm reach	600 / 700 mm
Position repeatability *3	±0.02 mm
Options	● Standard type

GANTRY ROBOTS

XR Series RC8A

XR-43***

Arm reach	200 / 250 / 300 mm
X-axis stroke	450 / 760 / 1,060 mm
Maximum payload	5 kg
Position repeatability *3	±0.015 mm
Standard cycle time *4	0.56 sec (for 3 kg payload)
Options	● Standard type

INTER-PROCESS TRANSFER ROBOTS

SC Series RC8A

SCL***

1-axis stroke	600 to 12,000 mm
2-axis stroke	100 / 200 / 300 / 400 mm
3-axis stroke	100 / 200 / 300 / 400 mm
4-axis stroke	100 / 200 / 300 / 400 mm
Maximum payload	3 kg/S *11, 5 kg/Z
Position repeatability *3	±0.02 to ±0.05 mm
Options	● Standard type

*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 type vertical stroke *8: Floor type only *9: Standard type/dust and splash proof type *10: 0.7 kg within ±10° with the wrist angled downward *11: With S stroke of 400, 2 kg/S

5- AND 6-AXIS ROBOTS
5- AND 6-AXIS ROBOTS

The VP, VS, and VM series of slim-body robots broaden freedom of design.
The VMB and VLA series provide high payloads and long arm reach.
Thanks to their extensive range of products, these lines make it possible to automate entire manufacturing processes.

Main features

Model	VP		VS									VM		VMB		VLA	
	5243	6242	050	060	068	087	6556 *7		6577 *7		050S2 (Pharmaceutical /medical)	6083 *8	60B1 *8	2515	2518	4025	6022
							Standard	With brake	Standard	With brake							
Maximum arm reach	430 mm	432 mm	505 mm	605 mm	710 mm	905 mm	653 mm		854 mm		520 mm	1,021 mm	1,298 mm	1,506 mm	1,804 mm	2,503 mm	2,257 mm
Maximum payload	3 kg *3	2.5 kg *4	4 kg		7 kg		7 kg *5				4 kg	13 kg *6		25 kg		40 kg	60 kg
Standard cycle time*1	0.99 sec (for 1 kg payload)		0.35 sec (for 1 kg payload)		0.31 sec (for 1 kg payload)	0.34 sec (for 1 kg payload)	0.49 sec (for 1 kg payload)		0.59 sec (for 1 kg payload)		0.35 sec (for 1 kg payload)	0.89 sec (for 5 kg payload)	0.95 sec (for 5 kg payload)	—	—	—	—
Position repeatability *2	±0.02 mm		±0.02 mm		±0.02 mm	±0.03 mm	±0.02 mm		±0.03 mm		±0.02 mm	±0.05 mm	±0.07 mm	±0.05 mm		±0.06 mm	
Standard type	√	√	√	√	√	√	√	√	√	√	—	√	√	√	√	—	—
Protected type (IP67)	—	—	√	√	√	√	—	—	—	—	—	—	—	√	√	√ wrist: IP67 / unit: IP65	√ wrist: IP67 / unit: IP65
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 end-effector 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 2 kg.
*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: J2 - J6 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.

VLA/VMB Series

These high-payload, long-arm-reach models are ideally suited to transport and palletizing work.

VLA-4025 / 6022

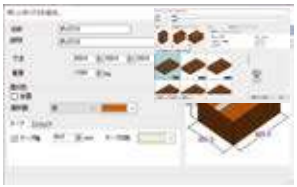
Features

Resist with adverse environments

These robots have an IP67* protection rating, helping to facilitate automation in harsh environments where oil and mist can splash.

*Wrist: IP67-compliant, main unit: IP65-compliant

Ideal for transporting and palletizing heavy loads



The robots in the VLA series have the largest payload and arm length of any DENSO robot, making them ideal for automating heavy load transfer and palletizing operations. When combined with "Palletizing Builder," which is an option with WINCAPS Plus Offline Programming software suite, the palletizing process can be automated without coding.

Built-in field network

The field network is wired inside the robot, reducing the complexity of the external wiring.
Compatible communication standards: PROFINET, PROFIBUS, DeviceNet

Options

Multibus cable

Field networks such as DeviceNet are wired inside the robot, reducing the complexity of external wiring.

Adjustable mechanical stopper kit for 1st axis (VL)

Protection cover for connector panel

Level-adjustable plate kit for fixing robot

Non adjustable leveling plate for fixing robot

Attachment for forklifts

VMB-2515 / 2518

Features

Used in contaminate-critical environments

In addition to the standard specifications, the lineup includes robots that comply with dust and splash resistance (IP67) and cleanliness standards (ISO class 5). They can be used to automate processes in a variety of industries, from automotive parts manufacturing and electrical/electronic parts to food, pharmaceutical, and medical equipment manufacturing processes.

Full-cover structure

Internal EtherCAT wiring for flexible hand design

2nd arm
User wiring option

A wide variety of devices and hands can be mounted on the robot flange with options for user wiring, piping, and solenoid valves. The 2nd arm user wiring allows up to two EtherCAT lines to be wired internally. The 3-axis wiring option prevents tangling and wear on the external wiring/piping.

3-axis wiring option

Options

External battery extension unit

A backup battery for the encoder can be installed externally to the robot. This allows easier battery replacement and improved maintenance.

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).

Level-adjustable plate kit for fixing robot

Non adjustable leveling plate for fixing robot

Attachment for forklifts

Adjustable mechanical stopper kit for 1st axis

VLA Series

Supported robot controllers
RC9 ▶P.36

VLA-4025 / 6022

With a maximum payload of 60 kg and arm reach of 2,257 mm, these models can be used in processes such as palletizing, inspection, loading, transport, and packaging.

Maximum arm reach	2,503 / 2,257 mm
Maximum payload	40 / 60 kg

Specifications

Item		Specifications	
Model		VLA-4025	VLA-6022
Axes		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)		2,085.5 (860 + 1,225.5) mm	1,835.5 (860 + 975.5) mm
Arm offset	J1 (rotation)	400 mm	
	J3 (forearm)	210 mm	
Maximum motion area (Point P)		2,503 mm	2,257 mm
Motion range *1	1-axis	±180° *2	
	2-axis	−60°, +125°	
	3-axis	−165°, 0°	
	4-axis	±2,700° *4	
	5-axis	±123°	
	6-axis	±2,700° *4	
Maximum payload		40 kg	60 kg
Maximum joint speed	1-axis	170 deg/sec	
	2-axis	150 deg/sec	
	3-axis	165 deg/sec	
	4-axis	265 deg/sec	
	5-axis	250 deg/sec	249 deg/sec
	6-axis	340 deg/sec	339 deg/sec
Position repeatability		±0.06 mm	
Allowable wrist load moment	4-axis	167 Nm	221 Nm
	5-axis	167 Nm	221 Nm
	6-axis	98 Nm	118 Nm
User air pipe(s)		1 system (inner diameter: ⌀12.5)	
User signal line(s)		14 (19-core connector)	
		15 (17-core connector) *3	
Air source	Maximum allowable pressure	2.0 MPa	
Protection grade		Main unit: IP65 / wrist: IP67	
Airborne noise (equivalent continuous A-weighted sound pressure level)		75 dB or less	
Weight		655 kg	645 kg

*1: For positive/negative direction, refer to the external dimensions and operating range diagram. *2: The operating angle is limited when the robot is installed at an angle.
*3: Can be used as ProfiBus/DeviceNet/ProfiNet using wiring. *4: 800(±400) at the factory default settings.

Legend

VLA - □□□□

Maximum payload:
40: 40 kg
60: 60 kg

Total arm length:
25: 2,503 mm
22: 2,257 mm

VMB Series

Supported robot controllers
RC9 ▶P.36

VMB-2515 / 2518

The robots are suitable for transporting large items and palletizing processes, helping automate tasks involving heavy items.

Maximum arm reach	1,506 / 1,804 mm
Maximum payload	25 kg

Specifications

Item			Specifications	
Model			VMB-2515	VMB-2518
Axes			6	
Drive motor / brake			All-axis AC servo motor / all-axis with brakes	
Total arm length (No. 1 arm + No. 2 arm)			1,395 (710 + 685) mm	1,695 (860 + 835)mm
Maximum motion area (Point P)			1,506 mm	1,804 mm
Motion range		J1	±170° *1	
		J2	+140° , −100°	
		J3	+170° , −130°	
		J4	±200°	
		J5	±145°	
		J6	±360°	
Maximum payload			25 kg	
Maximum joint speed		J1	240 deg/sec	212 deg/sec
		J2	240 deg/sec	212 deg/sec
		J3	300 deg/sec	265 deg/sec
		J4	425 deg/sec	
		J5	425 deg/sec	
		J6	887 deg/sec	
Position repeatability *2			±0.05 mm	
Allowable wrist load moment		J4	52 Nm	
		J5	52 Nm	
		J6	52 Nm	
User air pipe(s)	2nd arm unit	No option	2 systems (⌀8 x 2)	
		Solenoid valve options	9 systems (⌀6 x 8, ⌀8 x 1) *3 [The solenoid valves can be selected in a combination of systems 1, 2, 3] 1. Solenoid valve (2-position, double solenoid) 2. Solenoid valve (3-position, exhaust center solenoid) 3. Solenoid valve (3-position, closed center solenoid) Cleanroom type has 8 systems (⌀6 x 8).	
	3-axis unit	Options	1 system (⌀8)	
User signal line(s)	2nd arm unit	No option	・15 (for proximity sensor signals, etc.) *4 ・LAN cable (STP) x 1	
		Options	・Additional 10 (for proximity sensor signals, etc.) *4 ・LAN cable (STP) x 1	
	3-axis unit	Options	・Additional 10 (for proximity sensor signals, etc.) *4	
Air source		Normal pressure	0.20 to 0.39 MPa	
		Maximum allowable pressure	0.49 MPa	
Protection grade			Standard type: IP40 Protected type: IP67 Cleanroom type: ISO class 5	
Weight			Approx. 230 kg	Approx. 250 kg

*1: The movable range is narrower if the unit is installed on a wall or tilted. *2: Position repeatability is the precision at constant ambient temperature.
*3: Controllable by use of the embedded solenoid valve only for ⌀6. *4: Allowable current is limited.

Legend

VMB - □□□□□□

Maximum payload:
25: 25 kg

Total arm length:
15: 1,506 mm
18: 1,804 mm

Options:
W7: Protected type
C5: Cleanroom type (ISO class 5)

Selecting VMB robot options

When ordering a VMB robot, please select options 1 to 4 below.

1 Robot + Controller Set

Select from the eight different set part numbers [Selection required]

VMB Robot

RC9 Controller

Model	Part Name	
VMB-2515/RC9M-M	Reach 1,500 mm	IP40/RC9M NPN
VMB-2515/RC9M-P	Payload 25 kg	IP40/RC9M PNP
VMB-2515W7/RC9M-M		IP67/RC9M NPN
VMB-2515W7/RC9M-P		IP67/RC9M PNP
VMB-2515C5/RC9M-M		Clean ISO5/RC9M NPN
VMB-2515C5/RC9M-P		Clean ISO5/RC9M PNP

Model	Part Name	
VMB-2518/RC9M-M	Reach 1,800 mm	IP40/RC9M NPN
VMB-2518/RC9M-P	Payload 25 kg	IP40/RC9M PNP
VMB-2518W7/RC9M-M		IP67/RC9M NPN
VMB-2518W7/RC9M-P		IP67/RC9M PNP
VMB-2518C5/RC9M-M		Clean ISO5/RC9M NPN
VMB-2518C5/RC9M-P		Clean ISO5/RC9M PNP

2 Solenoid Valve

If a solenoid valve option is required, select one type. If it is not required, there is no need to select an option.

	①	②	③	④
1	2PD	2PD	2PD	2PD
2	2PD	2PD	2PD	3PE
3	2PD	2PD	2PD	3PC
4	2PD	2PD	3PE	3PE
5	2PD	2PD	3PE	3PC
6	2PD	2PD	3PC	3PC
7	2PD	3PE	3PE	3PE
8	2PD	3PE	3PE	3PC

	①	②	③	④
9	2PD	3PE	3PC	3PC
10	2PD	3PC	3PC	3PC
11	3PE	3PE	3PE	3PE
12	3PE	3PE	3PE	3PC
13	3PE	3PE	3PC	3PC
14	3PE	3PC	3PC	3PC
15	3PC	3PC	3PC	3PC

	Model
1	Solenoid valve OP 2PD × 4
2	Solenoid valve OP 2PD × 3 / 3PE × 1
3	Solenoid valve OP 2PD × 3 / 3PC × 1
4	Solenoid valve OP 2PD × 2 / 3PE × 2
5	Solenoid valve OP 2PD × 2 / 3PE × 1 / 3PC × 1
6	Solenoid valve OP 2PD × 2 / 3PC × 2
7	Solenoid valve OP 2PD × 1 / 3PE × 3
8	Solenoid valve OP 2PD × 1 / 3PE × 2 / 3PC × 1

	Model
9	Solenoid valve OP 2PD × 1 / 3PE × 1 / 3PC × 2
10	Solenoid valve OP 2PD × 1 / 3PC × 3
11	Solenoid valve OP 3PE × 4
12	Solenoid valve OP 3PE × 3 / 3PC
13	Solenoid valve OP 3PE × 2 / 3PC × 2
14	Solenoid valve OP 3PE × 1 / 3PC × 3
15	Solenoid valve OP 3PC × 4

3 Internal Wiring / Piping Options

Select from 48 types [Selection required]

(1) Standard wiring/piping
(2) Standard wiring/piping + 2nd arm wiring/piping option
(3) Standard wiring/piping + J3 axis wiring/piping option
(4) Standard wiring/piping + 2nd arm wiring/piping option + J3 axis wiring/piping option
*In the case of standard wiring/piping ((1) above), a part number must also be selected.

Specification to be selected

	Reach	Protected	Solenoid valve OP	2nd arm OP	3-axis OP	Product name
1	1500	IP40	–	–	–	Internal wiring/piping specifications: 1,500 mm / IP40
2			–	–	○	Internal wiring/piping specifications: 1,500 mm / IP40 / with 3-axis OP
3			–	○	–	Internal wiring/piping specifications: 1,500 mm / IP40 / with 2nd arm OP
4			–	○	○	Internal wiring/piping specifications: 1,500 mm / IP40 / with 2nd arm OP, with 3-axis OP
5			○	–	–	Internal wiring/piping specifications: 1,500 mm / IP40 / with solenoid valve
6			○	–	○	Internal wiring/piping specifications: 1,500 mm / IP40 / with 3-axis OP, with solenoid valve
7			○	○	–	Internal wiring/piping specifications: 1,500 mm / IP40 / with 2nd arm OP, with solenoid valve
8			○	○	○	Internal wiring/piping specifications: 1,500 mm / IP40 / with 2nd arm OP, with 3-axis OP, with solenoid valve
9		IP67	–	–	–	Internal wiring/piping specifications: 1,500 mm / IP67
10			–	–	○	Internal wiring/piping specifications: 1,500 mm / IP67 / with 3-axis OP
11			–	○	–	Internal wiring/piping specifications: 1,500 mm / IP67 / with 2nd arm OP
12			–	○	○	Internal wiring/piping specifications: 1,500 mm / IP67 / with 2nd arm OP, with 3-axis OP
13			○	–	–	Internal wiring/piping specifications: 1,500 mm / IP67 / with solenoid valve
14			○	–	○	Internal wiring/piping specifications: 1,500 mm / IP67 / with 3-axis OP, with solenoid valve
15			○	○	–	Internal wiring/piping specifications: 1,500 mm / IP67 / with 2nd arm OP, with solenoid valve
16			○	○	○	Internal wiring/piping specifications: 1,500 mm / IP67 / with 2nd arm OP, with 3-axis OP, with solenoid valve
17		Clean ISO5	○	–	–	Internal wiring/piping specifications: 1,500 mm / ISO5 / with solenoid valve
18			○	–	○	Internal wiring/piping specifications: 1,500 mm / ISO5 / with 3-axis OP, with solenoid valve
19			○	○	–	Internal wiring/piping specifications: 1,500 mm / ISO5 / with 2nd arm OP, with solenoid valve
20			○	○	○	Internal wiring/piping specifications: 1,500 mm / ISO5 / with 2nd arm OP, with 3-axis OP, with solenoid valve
21			–	–	–	Internal wiring/piping specifications: 1,500 mm / ISO5
22			–	–	○	Internal wiring/piping specifications: 1,500 mm / ISO5 / with 3-axis OP
23			–	○	–	Internal wiring/piping specifications: 1,500 mm / ISO5 / with 2nd arm OP
24			–	○	○	Internal wiring/piping specifications: 1,500 mm / ISO5 / with 2nd arm OP, with 3-axis OP

Specification to be selected

	Reach	Protected	Solenoid valve OP	2nd arm OP	3-axis OP	Product name
25	1800	IP40	–	–	–	Internal wiring/piping specifications: 1,800 mm / IP40
26			–	–	○	Internal wiring/piping specifications: 1,800 mm / IP40 / with 3-axis OP
27			–	○	–	Internal wiring/piping specifications: 1,800 mm / IP40 / with 2nd arm OP
28			–	○	○	Internal wiring/piping specifications: 1,800 mm / IP40 / with 2nd arm OP, with 3-axis OP
29			○	–	–	Internal wiring/piping specifications: 1,800 mm / IP40 / with solenoid valve
30			○	–	○	Internal wiring/piping specifications: 1,800 mm / IP40 / with 3-axis OP, with solenoid valve
31			○	○	–	Internal wiring/piping specifications: 1,800 mm / IP40 / with 2nd arm OP, with solenoid valve
32			○	○	○	Internal wiring/piping specifications: 1,800 mm / IP40 / with 2nd arm OP, with 3-axis OP, with solenoid valve
33		IP67	–	–	–	Internal wiring/piping specifications: 1,800 mm / IP67
34			–	–	○	Internal wiring/piping specifications: 1,800 mm / IP67 / with 3-axis OP
35			–	○	–	Internal wiring/piping specifications: 1,800 mm / IP67 / with 2nd arm OP
36			–	○	○	Internal wiring/piping specifications: 1,800 mm / IP67 / with 2nd arm OP, with 3-axis OP
37			○	–	–	Internal wiring/piping specifications: 1,800 mm / IP67 / with solenoid valve
38			○	–	○	Internal wiring/piping specifications: 1,800 mm / IP67 / with 3-axis OP, with solenoid valve
39			○	○	–	Internal wiring/piping specifications: 1,800 mm / IP67 / with 2nd arm OP, with solenoid valve
40			○	○	○	Internal wiring/piping specifications: 1,800 mm / IP67 / with 2nd arm OP, with 3-axis OP, with solenoid valve
41		Clean ISO5	○	–	–	Internal wiring/piping specifications: 1,800 mm / ISO5 / with solenoid valve
42			○	–	○	Internal wiring/piping specifications: 1,800 mm / ISO5 / with 3-axis OP, with solenoid valve
43			○	○	–	Internal wiring/piping specifications: 1,800 mm / ISO5 / with 2nd arm OP, with solenoid valve
44			○	○	○	Internal wiring/piping specifications: 1,800 mm / ISO5 / with 2nd arm OP, with 3-axis OP, with solenoid valve
45			–	–	–	Internal wiring/piping specifications: 1,800 mm / ISO5
46			–	–	○	Internal wiring/piping specifications: 1,800 mm / ISO5 / with 3-axis OP
47			–	○	–	Internal wiring/piping specifications: 1,800 mm / ISO5 / with 2nd arm OP
48			–	○	○	Internal wiring/piping specifications: 1,800 mm / ISO5 / with 2nd arm OP, with 3-axis OP

4 Power Cable

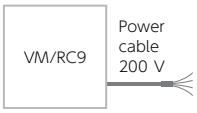
Select from two types [Selection Required]

RC9 controller

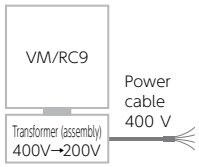
(1) Power cable 200 V
(2) Power cable 400 V

	Part Name
1	AC power cable (200 V, 10 m)
2	AC power cable (400 V, 10 m)

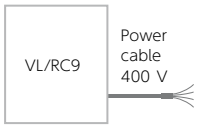
■VM (without transformer)
Select 200 V power cable.



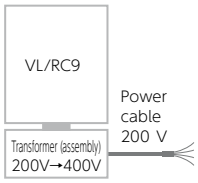
■ VM (shipped with transformer assembly)
Select 400 V power cable.



■ VL (without transformer)
Select 400 V power cable.



■ VL (shipped with transformer assembly)
Select 200 V power cable.

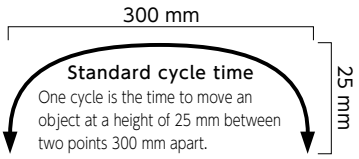


VS Series

VS050 / 060 / 068 / 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	505 / 605 / 710 / 905 mm
Maximum payload	4 / 4 / 7 / 7 kg
Standard cycle time	0.35 / 0.35 / 0.31 / 0.34 sec
Position repeatability	±0.02 / 0.02 / 0.02 / 0.03 mm



VS060 VS087

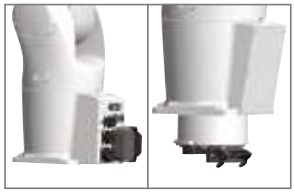
Specifications

Item		Specifications			
Model		VS050	VS060	VS068	VS087
Axes		6			
Position detection method		Absolute encoder			
Drive motor / brake		All-axis AC servo motor / all-axis brake with brakes			
Total arm length (No. 1 arm + No. 2 arm)		505 (250 + 255) mm	605 (305 + 300) mm	680 (340 + 340) mm	875 (445 + 430) mm
Maximum motion area (Point P)		505 mm	605 mm	710 mm	905 mm
Motion range	J1 (No. 1 axis)	±170° *5			
	J2 (No. 2 axis)	±120°		+135°, −100°	
	J3 (No. 3 axis)	+151°, −120°	+155°, −125°	+153°, −120°	+153°, −136°
	J4 (No. 4 axis)	±270°			
	J5 (No. 5 axis)	±120° *6		±120°	
	J6 (No. 6 axis)	±360°			
Maximum payload		4 kg		7 kg	
Maximum joint speed	J1	425 deg/sec		356.25 deg/sec	285 deg/sec
	J2	340 deg/sec	283.33 deg/sec	303 deg/sec	252.5 deg/sec
	J3	385.72 deg/sec	309.35 deg/sec	378.75 deg/sec	303 deg/sec
	J4	425 deg/sec		475 deg/sec	378.75 deg/sec
	J5	327.01 deg/sec		475 deg/sec	378.75 deg/sec
	J6	680 deg/sec		760 deg/sec	606 deg/sec
Standard cycle time *1		0.35 sec		0.31 sec	0.34 sec
Position repeatability (center of end-effector mounting face) *2		±0.02 mm			±0.03 mm
Maximum allowable moment of inertia	J4, J5	0.2 kgm²		0.45 kgm²	
	J6	0.05 kgm²		0.1 kgm²	
Maximum allowable moment	J4, J5	6.66 Nm		16.2 Nm	
	J6	3.13 Nm		6.86 Nm	
Signal lines / Air pipe solenoid valve (option)	Signal lines	10 (for proximity sensor signals, etc.) *7,8			
	Air pipe solenoid valve	5 systems (ø4 × 4, ø4 × 1)*3 2 × solenoid valves (2 position, double solenoid) Cleanroom type has 4 systems (ø4 x 4).		7 systems (ø4 × 6, ø6 × 1) *4 [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) Cleanroom type has 6 systems (ø4 x 6).	
Communication interface flange-A (option) *Standard type only		17 (power wire for cameras, etc.) *8			
		LAN×1 (1000BASE-T) *9			
Air source	Normal pressure	0.20 to 0.39 MPa			
	Maximum allowable pressure	0.49 MPa			
Airborne noise (equivalent continuous A-weighted sound pressure level)		65 dB or less			
Protection grade		Protected type: IP67 *10 (option) Dust & splash proof type: wrist IP65 / unit IP54 (option) Cleanroom type: ISO class 3 / 5 (option)			
Weight		Approx. 27 kg	Approx. 28 kg	Approx. 49 kg	Approx. 51 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: Controllable by use of the embedded solenoid valve only for ø4×4. *4: Controllable by use of the embedded solenoid valve only for ø4×6. *5: Limited motion range when wall mounted. For details, please contact our sales representative.
*6: When communication interface flange-A is selected, the motion range of J5 is +120° and -110°. *7: There are 4 of these lines (for proximity sensor signals, etc.) when selected together with communication interface flange-A.
*8: Allowable current is limited. *9: The LAN cable to connect to the connector panel is 20 m or shorter.
*10: 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.

Options

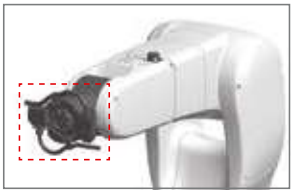
Connector panel



Rear connector panel　Bottom connector panel

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

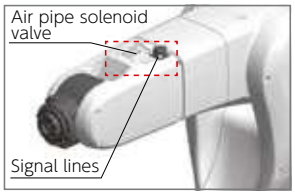
Flange



Communication interface flange-A

The flange 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　Cleanroom, 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 × solenoid valves (2 position, double solenoid)	√	√	√	√	√	—	—	—	—	—
	3 × solenoid valves (2 position, double solenoid)	—	—	—	—	—	√	√	√	√	√
	3 × solenoid valves (3 position, exhaust center solenoid)	—	—	—	—	—	√	√	√	√	√
	3 × solenoid valves (3 position, closed center solenoid)	—	—	—	—	—	√	√	√	√	√
User option	Air purge unit	—	√	—	—	—	—	√ *3	—	—	—
	Brake release unit *1	√	√	√	√	√	√	√	√	√	√
	External battery extension unit	√	√	√	√	√	√	√	√	√	√
	Main unit connecting cable angle	√	√	√	√	√	√	√	√	√	√
	Second arm cover (right-hand, with tapped holes) *2	√	—	—	—	—	√	—	—	—	—

*1: The brake release unit provides IP67 and IP54 protection for the connection area and unit, respectively.
*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, IP67.

Legend

VS □□□□□-A V6-□□□-□□N□N-□NNN

Model:
VS: 5- and 6-axis robots

Total arm length:
050 A3: 505 mm
060 A3: 605 mm
068 A4: 680 mm
087 A4: 875 mm

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:
A: 2 x solenoid valves (2 position, double solenoid)
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: 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 (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 website.

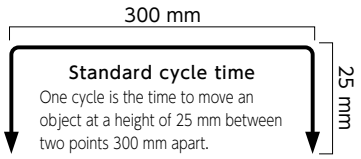
VM Series

Supported robot controllers
RC8A ▶P.42

VM-6083 / 60B1

These models boast a maximum payload of 13 kg and ensure a large work area thanks to their slim body design. They're available in dust and splash proof types as well as cleanroom types, allowing them to be used in a variety of settings.

Maximum arm reach	1,021 / 1,298 mm
Maximum payload	13 kg *4
Standard cycle time	0.89 / 0.95 sec
Position repeatability	±0.05 / 0.07 mm



VM-60B1

Specifications

Item		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)	180 mm	
	J3 (forearm)	100 mm	
Maximum motion area (Point P)		1,021 mm	1,298 mm
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		13 kg *4	
Maximum joint speed	J1	180 deg/sec	150 deg/sec
	J2	150 deg/sec	112.5 deg/sec
	J3	200 deg/sec	150 deg/sec
	J4	262.5 deg/sec	
	J5	262.5 deg/sec	
	J6	420 deg/sec	
Standard cycle time *1		0.89 sec	0.95 sec
Position repeatability (center of end-effector mounting face) *2		±0.05 mm	±0.07 mm
Maximum allowable moment of inertia	J4, J5	0.36 kgm²	
	J6	0.064 kgm²	
User air pipe(s) *3		7 systems (ø4 × 6, ø6 × 1) 3 × solenoid valves (2 position, double solenoid) Cleanroom type: 6 systems (ø4 × 6)	
User signal line(s)		10 (for proximity sensor signals, etc.)	
Air source	Normal pressure	0.10 to 0.39 MPa	
	Maximum allowable pressure	0.49 MPa	
Airborne noise (equivalent continuous A-weighted sound pressure level)		80 dB or less	
Protection grade		Dust & splash proof type: wrist IP65 / unit IP54 (option) Cleanroom type: class 100	
Weight		Approx. 82 kg	

*1: Time required for a robot to move a 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 ø4×6. *4: If the payload exceeds 11 kg, wrist downward movement is limited to ±10°.

Legend

VM - 6 0 □ □ - □

- **Model:** VM: Mid-sized 5- and 6-axis robot
- **Axes:** 6: 6-axis
- **Maximum payload:** 0: 13 kg
- **Total arm length:** 83: 830 mm; B1: 1,110 mm
- **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 website.

VS Series

Supported robot controllers

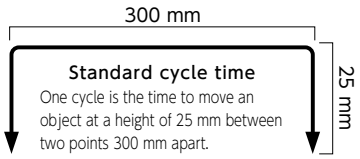
RC8A ▶P.42

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.

VS-6556-B

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



Specifications

Item		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)	75 mm	
	J3 (forearm)	90 mm	
Maximum motion area (Point P)		653 mm	854 mm
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 (Wrist downward movement is within ±45°) *4	
Maximum joint speed	J1	262.5 deg/sec	175 deg/sec
	J2	240 deg/sec	200 deg/sec
	J3	300 deg/sec	200 deg/sec
	J4	300 deg/sec	
	J5	300 deg/sec	
	J6	480 deg/sec	
Standard cycle time *1		0.49 sec	0.59 sec
Position repeatability (center of end-effector mounting face) *1, 2		±0.02 mm	±0.03 mm
Maximum allowable moment of inertia	J4, J5	0.413 kgm²	
	J6	0.063 kgm²	
User air pipe(s) *3		7 systems (ø4 × 6, ø6 × 1) 3 × solenoid valves (2 position, double solenoid) Cleanroom type: 6 systems (ø4 × 6)	
User signal line(s)		10 (for proximity sensor signals, etc.)	
Air source	Normal pressure	0.10 to 0.39 MPa	
	Maximum allowable pressure	0.49 MPa	
Airborne noise (equivalent continuous A-weighted sound pressure level)		80 dB or less	
Protection grade		Dust & splash proof type: wrist IP65 / unit IP54 (option) Cleanroom type: class 10/100 (Option)	
Weight		Approx. 35 kg	Approx. 36 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: Controllable by use of the embedded solenoid valve only for ø4×6. *4: If wrist downward movement exceeds ±45°, the maximum payload is 6 kg.

Legend

VS - 6 5 □ □ - □

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

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

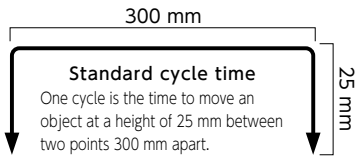
VP Series

Supported robot controllers
RC8A ▶P.42

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 / 432 mm
Maximum payload	2.5 / 3 kg
Standard cycle time	0.99 sec
Position repeatability	±0.02 mm



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

VP-6242

Specifications

Item		Specifications	
Model		VP-5243	VP-6242
Axes		5	6
Position detection method		Absolute encoder	
Drive motor / brake		All-axis AC 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)	—	75 mm
Maximum motion area (Point P)		430 mm	432 mm
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	270 deg/sec	
	J2	202.5 deg/sec	
	J3	270 deg/sec	
	J4 *5	—	324 deg/sec
	J5	324 deg/sec	
	J6	324 deg/sec	
Standard cycle time *1		0.99 sec	
Position repeatability (center of end-effector mounting face) *2		±0.02 mm	
Maximum allowable moment of inertia	J4, J5	0.04 kgm² *5	0.03 kgm²
	J6	0.01 kgm²	0.007 kgm²
User air pipe(s)		4 systems (⌀4×4)	
User signal line(s)		9 (for proximity sensor signals, etc.)	
Air source	Normal pressure	0.10 to 0.39 MPa	
	Maximum allowable pressure	0.49 MPa	
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.

Legend

VP - □ 2 □□

Model:
VP: Mini 5- and 6-axis robot

Axes:
5: 5-axis
6: 6-axis

Standard payload:
2: 2 kg (6-axis) / 2.5 kg (5-axis)

*The maximum payload is 2.5 kg (6-axis) or 3 kg (5-axis)

Total arm length:
42: 420 mm (6-axis)
43: 430 mm (5-axis)

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

Pharmaceutical/Medical Robots

Supported robot controllers
RC8A ▶P.42

VS050S2

Winner of a 2014 Good Design Grand Award

DENSO delivers a robot that meets the strict demands of the pharmaceutical and medical industry.

Maximum arm reach	520 mm
Maximum payload	4 kg
Standard cycle time	0.35 sec

Design registration No. 1507944/
No. 1508175/
No. 1508197/
No. 1508203/
No. 1518034/
No. 1518035/
No. 1518225

VS050S2

Specifications

Item		Specifications
Model		VS050S2
Axes		6
Position detection method		Absolute encoder
Drive motor / brake		All-axis AC servo motor / all-axis with brakes
Total arm length (No. 1 arm + No. 2 arm)		520 (255 + 265) mm
Maximum motion area (Point P)		520 mm
Maximum motion radius (Point P)		183.5 mm
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		4 kg
Maximum joint speed	J1	425 deg/sec
	J2	283.33 deg/sec
	J3	309.35 deg/sec
	J4	425 deg/sec
	J5	272.96 deg/sec
	J6	680 deg/sec
Standard cycle time *1		0.35 sec
Position repeatability (center of end-effector mounting face) *2		±0.02 mm
Maximum allowable moment of inertia	J4, J5	0.2 kgm²
	J6	0.05 kgm²
Maximum allowable moment	J4, J5	6.66 Nm
	J6	3.13 Nm
Signal lines / air pipe solenoid valve (option)	Signal lines	10 *5, 6
	Air pipe solenoid valve	Solenoid valve (2 position, double solenoid) × 2
Electric gripper connection flange specification-A (option)		25 (17 + 8) *6
Air source	Normal pressure	0.20 to 0.39 MPa
	Maximum allowable pressure	0.49 MPa
Noise (A weighed equivalent continuous sound pressure level)		65 dB 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. 34 kg

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

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

Specifications

Item	Specifications
Grip force	60 N
Open/close stroke	2 × 3 mm
Power supply	24V ±10%
Protection 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.

*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: Limited motion range when wall mounted. For details, please contact our sales representative. *4: When electric gripper connection flange specification-A is selected, the J5 motion range is +110, -102.
*5: This line (for proximity sensor signals, etc.) is 4-core if electric gripper connection flange specification-A is also selected. *6: Allowable current is limited.

Legend

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

- **Model:** VS: 5- and 6-axis robots
- **Total arm length:** 050S2: 505 mm, H_2O_2 -resistant, RC8A compliant
- **Mounting orientation:** A: All directions
- **Axes:** 6: 6-axis
- **Protected:** R1: Cleanroom type (ISO class 5) (wrist: IP67, unit: 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 website.

5- and 6-axis robots: List of pharmaceutical/medical robot operating ranges

VP Series

VP-5243

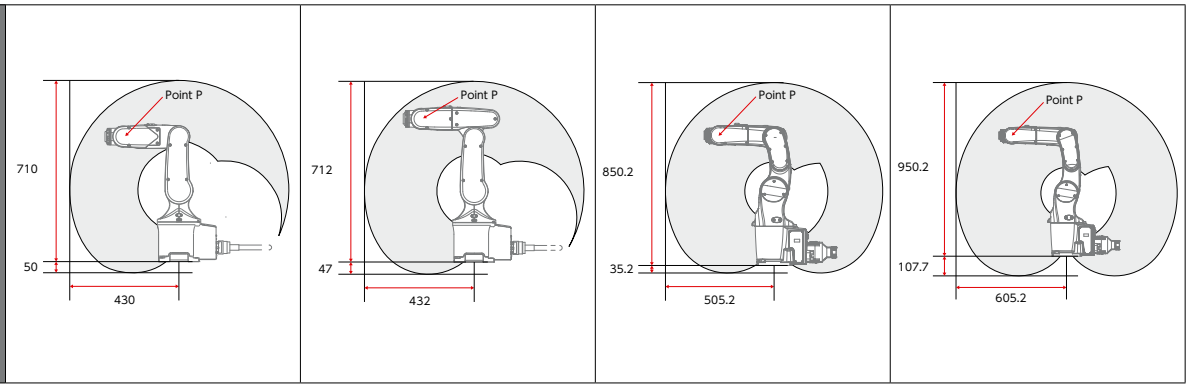
VP-6242

VS Series

VS050

VS060

Operating range



VM Series

VM-6083

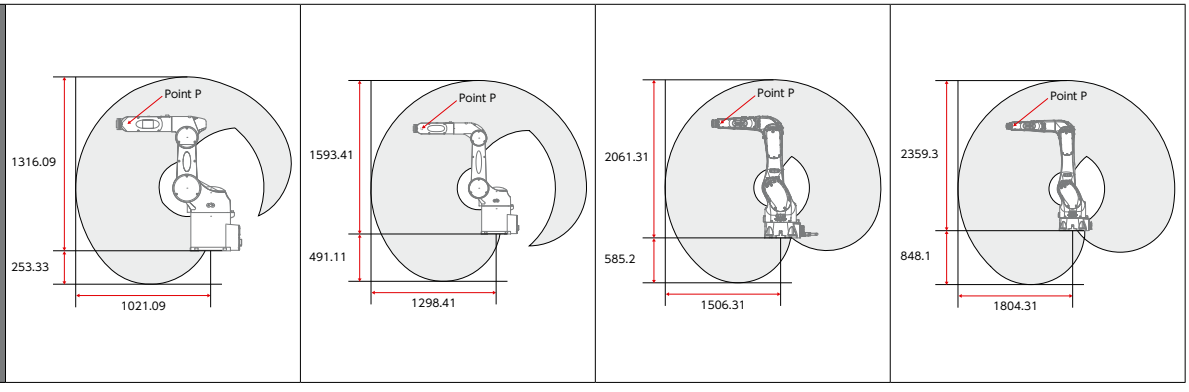
VM-60B1

VMB Series

VMB-2515

VMB-2518

Operating range



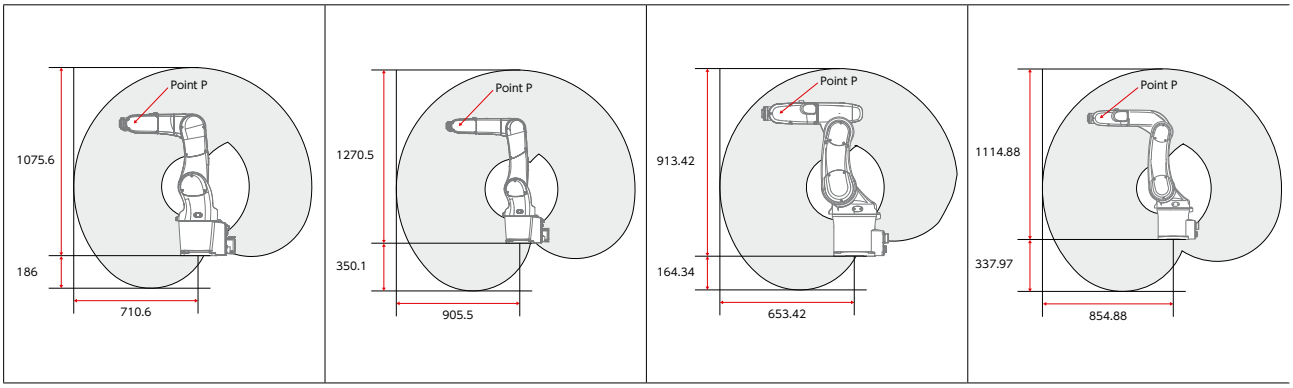
*Gray range indicates the Point P operating range.

VS068

VS087

VS-6556-B

VS-6577-B



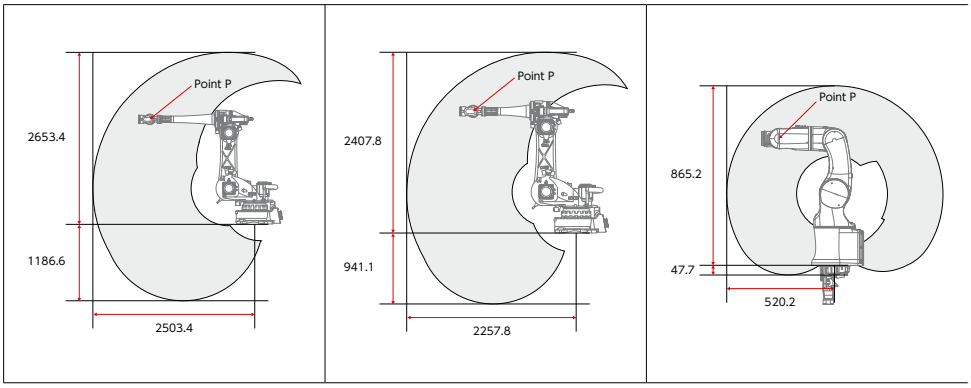
VLA Series

VLA-4025

VLA-6022

Pharmaceutical/medical robots

VS050S2



The data listed on this page is for the standard type.
For dimensions and other detailed information, see our website. Scan the QR Code to view the information.

4-AXIS ROBOTS
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		LPH	HSR®			HS-A1			HM *3							
		040	048	055	065	035	045	055	4060*	4A60*	4070*	4A70*	4085*	4A85*	40A0*	4AA0*
Arm reach		400 mm	480 mm	550 mm	650 mm	350 mm	450 mm	550 mm	600 mm		700 mm		850 mm		1,000 mm	
Vertical stroke (Z)		150 mm	100 mm *4 200 mm 320 mm 510 mm *8			100 mm 150 mm 200 mm 320 mm			*= 1: 100 mm *5 *= A: 150 mm *5 *= 2: 200 mm *= 3: 300 mm *= 4: 400 mm				*= 1: 100 mm *= A: 150 mm *= 2: 200 mm *= 3: 300 mm *= 4: 400 mm			
Maximum payload		3 kg	8 kg			5 kg			10 kg	20 kg	10 kg	20 kg	10 kg	20 kg	10 kg	20 kg
Standard cycle time *1		0.45 sec (for 2 kg payload)	0.28 sec (for 2 kg payload)		0.31 sec (for 2 kg payload)	0.29 sec (for 2 kg payload)			0.29 sec (for 2 kg payload)				0.31 sec (for 2 kg payload)			
Position repeatability *2		±0.02 mm	±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	—	√	√	√	√	√	√	—	—	—	—	—	√ *8	—	√ *8
	Ceiling	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
UL specifications	Floor	—	√	√	√	√	√	√	√ *7	√ *7	√ *7	√ *7	√ *7	√ *7	√ *7	√ *7
	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 end-effector mounting face) is the precision at constant ambient temperature.
*3: An asterisk [*] in a model name indicates 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, cleanroom type and bellows type are 170 mm, 290 mm and 450 mm. (Cleanroom type not available with 450 mm stroke.)
*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
*8: Available Z-axis strokes are 200 mm and 300 mm.

Robot list

Standard type

This is a standard type used in standard environments.

Ceiling type

Ceiling mount structure eliminates a waste of space, minimizes the entire equipment space, and expands the workable space.

Bellows type

The Z-axis shaft of the standard type is mounted with a cover.

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.

*The H1 grease type may be selected for the HSR dust and splash-proof type only.

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

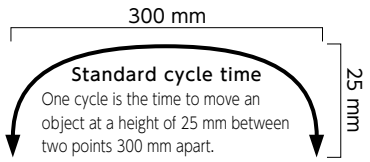
UL/cUL certified products

HSR®Series

HSR®048/055/065

Accelerates quickly, runs continuously at high speed, and stops precisely.
"True high speed" has been realized in pursuit of this ultimate basic performance.

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



Design registration No. 1558886 / No. 1558887

HSR®055

Specifications

Item		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 = 480 mm	275 + 275 = 550 mm	375 + 275 = 650 mm
Motion range and stroke	J1 (No. 1 axis)	±130°		
	J2 (No. 2 axis)	±143.5°	±150°	±150°
	Z (No. 3 axis) *	* = 10: 100 mm		
		* = 20: 200 mm		
		* = 32: 320 mm		
		* = 51: 510 mm		
	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		8 kg		
Standard cycle time *2		0.28 sec	0.28 sec	0.31 sec
Maximum joint speed	J1	450 deg/sec	450 deg/sec	450 deg/sec
	J2	785 deg/sec	785 deg/sec	785 deg/sec
	Z	10: 1,700 mm/sec, 20: 2,300 mm/sec, 32: 2,475 mm/sec		
	T	2,500 deg/sec		
Position repeatability (center of end-effector mounting face) *3	J1 + J2	±0.01 mm	±0.012 mm	±0.012 mm
	Z	±0.01 mm		
	T	±0.004°		
Maximum pressure input (downward)		98 N (1 second or less)		
Maximum allowable moment of inertia		0.12 kgm²		
Position detection method		Absolute encoder		
Drive motor / brake		All-axis AC servo motor / Z- and T-axis with brakes		
User air pipe(s)		4 systems (⌀4×2, ⌀6×2)		
User signal line(s)		19 (for proximity sensor signals, etc.) Ethernet (8) *Option		
Air source	Normal pressure	0.05 to 0.35 MPa		
	Maximum allowable pressure	0.59 MPa		
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.

Legend

HSR □□□ A1 - □□□ - □□□ - N □□N □ - NNNN

- Model: HSR: 4-axis robots
- Total arm length: 048: 480 mm; 055: 550 mm; 065: 650 mm
- Mounting orientation: N: Floor; S: Ceiling
- Z-axis stroke *1: 10: 100 mm; 20: 200 mm; 32: 320 mm; 51: 510 mm
- 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
- Signal line/Ethernet: N: Standard specification; A: Embedded Ethernet Specifications
- Grease *3: N: Standard; H: H1 grease type
- External battery specifications *2: N: Without; A: With

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

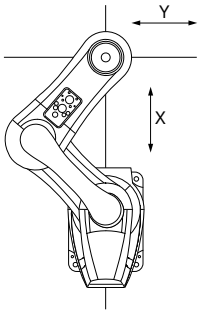
The data listed on this page is for the standard type. For other options, see our website.

Features

High-speed motion

High acceleration & motion profiles

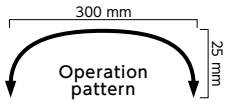
Improved CPM (cycle per minute) enables high-speed and prolonged motion.



cycle/min

	X-direction	Y-direction
HSR065	118	149

For 1 kg payload



*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 over extended periods of time, which is required in actual processes.

Light weight

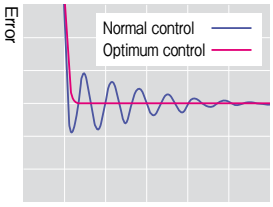
Newly designed, highly rigid, lightweight arm

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

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

Improved flexibility in mounting direction

The mounting direction can be shifted by operating the shaft in the opposite direction.

Floor and ceiling mount models available.

*If you need to change the mounting type, please contact our sales representative.

Optimum layout

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

Weight reduction at the tip of the arm and optimized arm structure made possible by integrating a high-capacity motor into the base unit allow the robot to improve its high-speed performance.

Options

Wiring sub-arm protection kit

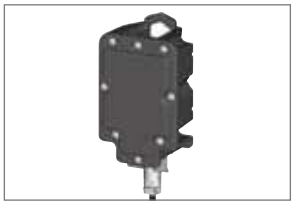
Protects external wiring to prevent cables from becoming unorganized and avoid the risk of broken wires.

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 specifications



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

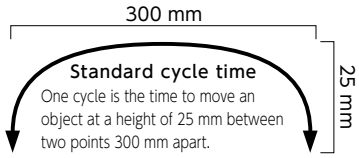
HM Series

Supported robot controllers
RC8A ▶P.42

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

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

Maximum arm reach	600 to 1,000 mm
Maximum payload	10 / 20 kg
Standard cycle time	0.29 / 0.31 sec
Position repeatability	±0.02 / 0.025 mm



HM-40A0

Specifications

Item		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		1,000 (500 + 500) mm	
Motion range and stroke	J1 (No. 1 axis)	±165°							
	J2 (No. 2 axis)	±143°		±147°					
	Z (No. 3 axis)	* = 1: 100 mm, * = A: 150 mm, * = 2: 200 mm, * = 3: 300 mm, * = 4: 400 mm							
	T (No. 4 axis)	±360°							
Maximum payload		10 kg	20 kg	10 kg	20 kg	10 kg	20 kg	10 kg	20 kg
Maximum joint speed	J1	449.74 deg/sec				412.26 deg/sec		374.78 deg/sec	
	J2	667.5 deg/sec				611.87 deg/sec		556.25 deg/sec	
	Z	2,764.88 mm/sec				2,764.88 mm/sec			
	T	2,229.93 deg/sec	1,544.51 deg/sec	2,229.93 deg/sec	1,544.51 deg/sec	2,229.93 deg/sec	1,544.51 deg/sec	2,229.93 deg/sec	1,544.51 deg/sec
Standard cycle time *2		0.29 sec				0.31 sec			
Position repeatability (center of end-effector mounting face) *3	J1 + J2	±0.02 mm				±0.025 mm			
	Z	±0.01 mm							
	T	±0.005°							
Maximum pressure input (downward, for up to 1 sec)		98 N							
Maximum allowable moment of inertia		0.25 kgm²	0.45 kgm²	0.25 kgm²	0.45 kgm²	0.25 kgm²	0.45 kgm²	0.25 kgm²	0.45 kgm²
User air pipe(s)		4 systems (⌀6)							
User signal line(s)		24 (for proximity sensor signals, etc.)							
Air source	Normal pressure	0.05 to 0.35 MPa							
	Maximum allowable pressure	0.59 MPa							
Airborne noise (equivalent continuous A-weighted sound pressure level)		80 dB or less							
Protection grade		Dust & splash proof type: IP65 (option) Cleanroom type: ISO class 5 (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.

Legend

HM □ - 4 □ □□ □ - □

- **Model:** HM: Mid-sized 4-axis robot
- **Robot type:** None: Floor; S: Ceiling
- **Axes:** 4: 4-axis
- **Maximum payload:** 0: 10 kg; A: 20 kg
- **Total arm length:** 60: 600 mm; 70: 700 mm; 85: 850 mm; A0: 1,000 mm
- **Vertical stroke:** 1: 100 mm; 2: 200 mm; 4: 400 mm; A: 150 mm; 3: 300 mm
- **Options:** None: Standard type; W: Dust & splash proof type (IP65); UL: UL specification; C5: Cleanroom type (ISO class 5)

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

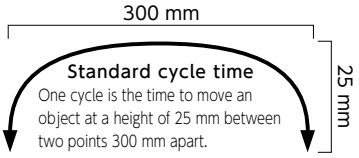
HS-A1 Series

Supported robot controllers
RC8A ▶P.42

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	5 kg
Standard cycle time	0.29 sec
Position repeatability	±0. 015 / 0.02 mm



HS045A1

Specifications

Item		Specifications		
Model *1		HS035A1-N*	HS045A1-N/S*	HS055A1-N/S*
Axes		4		
Position detection method		Absolute encoder		
Drive motor / brake		All-axis AC servo motor / Z- and T-axis with brakes		
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: 100 mm, * = 15: 150 mm, * = 20: 200 mm, * = 32: 320 mm,		
	T (No. 4 axis)	±360°		
Maximum payload		5 kg		
Maximum composite speed (center of end-effector mounting face)	Arm end	7,200 mm/sec	6,300 mm/sec	7,100 mm/sec
	T	2,400/sec		
Maximum joint speed	J1	720 deg/sec	450 deg/sec	
	J2	720 deg/sec		
	Z	2,000 mm/sec		
	T	2,400 deg/sec		
Standard cycle time *2		0.29 sec		
Position repeatability (center of end-effector mounting face) *3	J1 + J2	±0.015 mm	±0.02 mm	
	Z	±0.01 mm		
	T	±0.005°		
Maximum pressure input (downward, for up to 1 sec)		98 N		
Maximum allowable moment of inertia		0.1 kgm²		
User air pipe(s)		4 systems (⌀4 × 2, ⌀6 × 2)		
User signal line(s)		19 (for proximity sensor signals, etc.)		
Air source	Normal pressure	0.05 to 0.35 MPa		
	Maximum allowable pressure	0.59 MPa		
Airborne noise (equivalent continuous A-weighted sound pressure level)		80 dB or less		
Protection 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.

Legend

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

- Model: HS: 4-axis robots
- Total arm length: 035: 350 mm, 045: 450 mm, 055: 550 mm
- Mechanical type: A1: Arm length 350 mm, 450 mm, 550 mm
- Mounting orientation: N: Standard, S: Ceiling
- Z-axis stroke: 10: 100 mm, 15: 150 mm, 20: 200 mm, 32: 320 mm
- 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: Standard colors

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

LPH Series

Supported robot controllers
RC8A ▶P.42

LPH-040

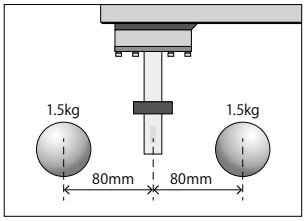
Introducing a line of multifunctional, low-cost SCARA robots with lightweight, compact designs!

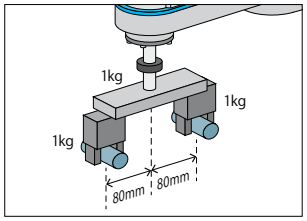
Maximum arm reach	400 mm
Maximum payload	3 kg
Position repeatability	±0.02 mm
Mounting orientation	Floor

Features

Gripper design with high degree of freedom

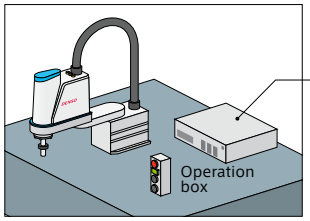
The maximum moment of inertia of the T-axis is large in order to provide a gripper design with a high degree of freedom. Also supports use in other configurations including in an overhanging position.

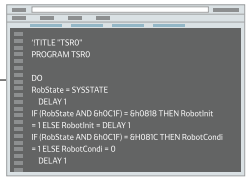




Reduction in work time without the use of PLC

The robot and surrounding equipment can be controlled together according to the purpose through use of the high-performance controller RC8A function. This feature realizes a total cost down for equipment.





Privilege task function

Enables control from PLC with no programming knowledge required

A function block (FB) that supports 130 types of robot commands allows a PLC to control the robot directly. This feature allows adjustments to be performed with only PLC knowledge without needing to create programs on the robot side, to realize a reduction in work time for initial adjustments at the start of use.

Specifications

Item		Specifications
Model		LPH-040A1-N15-NNN-NNNNN-3NAN (*1)
Position detection method		Absolute encoder
Drive motor / brake		All-axis AC servo motor / Z-axis with brakes
Total arm length (No. 1 arm + No. 2 arm)		400 (200 + 200) mm
Motion range and stroke	J1 (No. 1 axis)	±130°
	J2 (No. 2 axis)	±146.6°
	Z (No. 3 axis)	150 mm
	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		3 kg
Standard cycle time *2		0.45 sec
Maximum composite speed (center of end-effector mounting face)	Arm end	4,710 mm/sec
	Z	1,250 mm/sec
	T	1,875 deg/sec
Position repeatability (center of end-effector mounting face) *3	J1 + J2	±0.02 mm
	Z	0.02 mm
	T	±0.01°
Maximum pressure input (downward, for up to 1 sec)		45 N (1 sec or less)
Maximum allowable moment of inertia		0.075 kgm^2
User air pipe(s)		3 systems (⌀4×2, ⌀6×1)
User signal line(s)		15 (for proximity sensor signals, etc.)
Air source	Normal pressure	0.05 to 0.35 MPa
	Maximum allowable pressure	0.6 MPa
Weight		Approx. 16 kg

*1: This product cannot be sold in some countries. Ships with main unit connecting cable (3 m).
*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.

4-axis Robot Operating Range

HSR® Series

HSR®055

HM Series

HM-40702

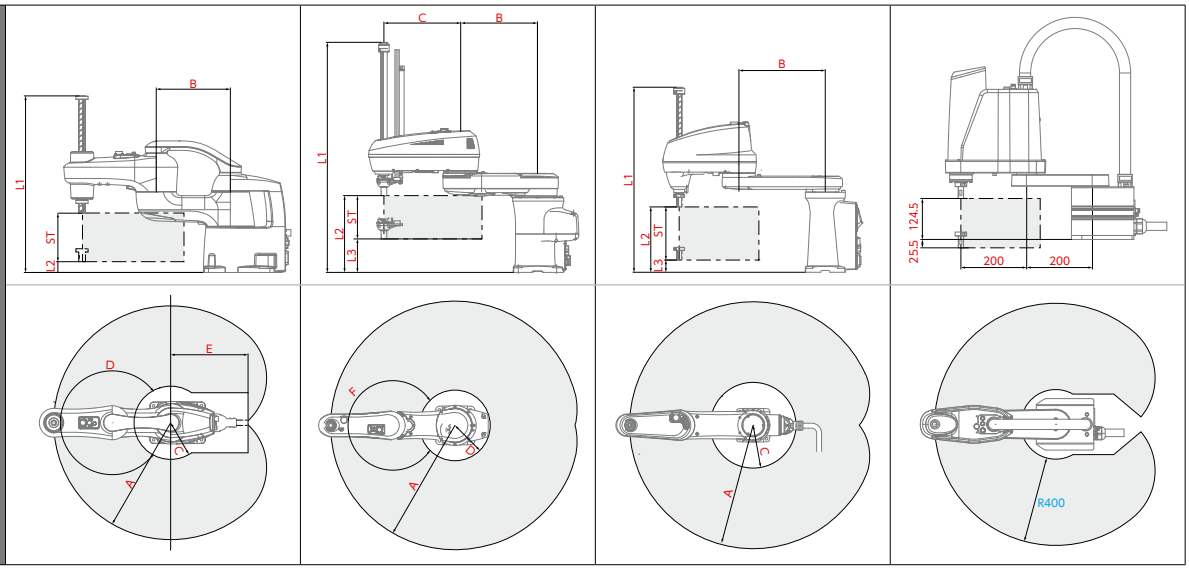
HS-A1 Series

HS045A1

LPH

LPH-040

Operating range



*Gray range indicates the operating range.

For dimensions and other detailed information, see our website. Scan the QR Code to view the information.

HSR Series

Model	A	B	C	D	E
HSR®048A1-N*	480	205	164.4	287°	406.53
HSR®055A1-N*	550	275	142.4	300°	364.32
HSR®065A1-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 *1
* = 51: 510	965.2	-290 *1

Z-axis stroke correspondence table

Z-axis stroke: ST (mm)	Standard type	Dust & splash proof type	Cleanroom type	Bellows type
100	√	—	—	—
170	—	√	√	√
200	√	—	—	—
290	—	√	√	√
320	√	—	—	—
450	—	√	—	√
510	√	—	—	—

*1: If the Z-axis stroke is 320 mm or 510 mm, exercise caution concerning interference with peripheral equipment as when fully lowered, the Z-axis will reach a position lower than the base mounting face.

HM Series

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°

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

S	L1		L2	L3
(Z-axis stroke)	10 kg	20 kg	—	—
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

HS-A1 Series

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 *1

*1: If the Z-axis stroke is 320 mm, exercise caution concerning interference with peripheral equipment as when fully lowered, the Z-axis will reach a position lower than the base mounting face.

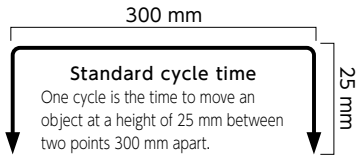
The data listed on this page is for the standard type.

XR Series

Supported robot controllers
RC8A ▶P.42

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	5 kg
Standard cycle time	0.56 sec



*For dimensions, see our website.

Patent No. 4793376 / No. 5272647

Specifications

Item		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 with brakes						
Total arm length (No. 1 arm + No. 2 arm)		200 mm		250 mm	300 mm	200 mm	250 mm	300 mm
Motion range and stroke	X (No. 1 axis)	450 mm	760 mm			1,060 mm		
	R (No. 2 axis)	±168°						
	Z (No. 3 axis)	* = 1: 135 mm, * = 2: 200 mm						
	T (No. 4 axis)	±360°						
Maximum payload		5 kg						
Maximum joint speed	X	1,650 mm/sec	1,600 mm/sec			1,240 mm/sec		
	R	572.94 deg/sec		458.35 deg/sec	382 deg/sec	572.94 deg/sec	458.35 deg/sec	382 deg/sec
	Z	2,250 mm/sec						
	T	720 deg/sec						
Standard cycle time *2		0.56 sec						
Position repeatability (center of end-effector mounting face) *3	X + R	±0.015 mm						
	Z	±0.01 mm						
	T	±0.005°						
Maximum allowable moment of inertia		0.05 kgm²						
User air pipe(s)		1 air supply system (⌀8) (4 systems (⌀4 × 8) with optional manifold valve)						
User signal line(s)		10 (for proximity sensor signals, etc.)						
Air source	Normal pressure	0.05 to 0.35 MPa						
	Maximum allowable pressure	0.59 MPa						
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.

Legend

XR-43 □ □ □

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

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

SC Series

Supported robot controllers
RC8A ▶P.42

A compact design based on a proprietary structure makes it possible to construct equipment that's ideally suited to transporting workpieces between processes.

Compact structure that can accommodate a variety of equipment layouts

An expanding and contracting structure lets you minimize the width of the equipment's front surface.

Long-distance, high-speed transport

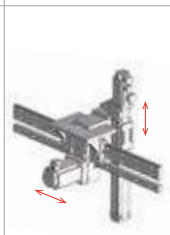
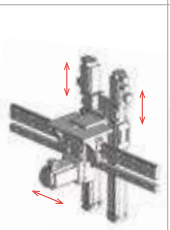
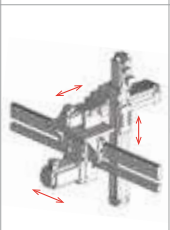
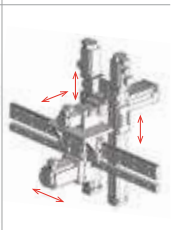
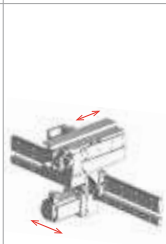
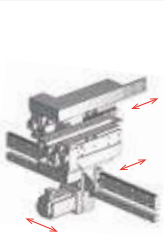
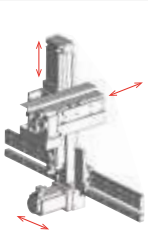
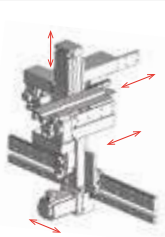
Transport workpieces at high speeds of 2 m/sec over distances of up to 12 m.

Interoperation of multiple units to accommodate fluctuations in production volume

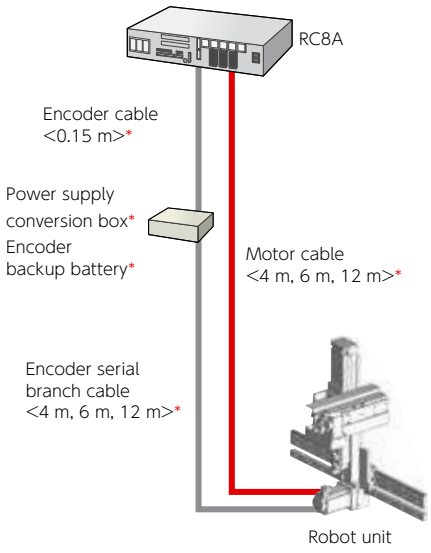
Multiple robot units can be mounted on a single rail, allowing the number of units to be increased or decreased in response to production volume.

*For dimensions, see our website.

Extensive range of options to accommodate a variety of tasks

Robot type	LZNN	LZZN	LYZN	LYZZ
Ball screw type Maximum payload 5kg				
Robot type	**LSNN**	**LSSN**	**LZSN**	**LZSS**
Retractable type Maximum payload 3kg				

System configuration diagram *: Option



Specifications

Item		Specifications							
Model		LZNN	LZZN	LYZN	LYZZ	LSNN	LSSN	LZSN	LZSS
Axis operating range stroke	J1	600 to 12,000 mm				600 to 12,000 mm			
	J2	100 mm, 200 mm		100 mm		300 mm, 400 mm		100 mm, 200 mm	
	J3	—	100 mm, 200 mm	100 mm, 200 mm		—	300 mm, 400 mm	300 mm, 400 mm	
	J4	—		100 mm, 200 mm		—		300 mm, 400 mm	
Maximum payload		5 kg / Z				3 kg / S (with S stroke of 400, 2 kg / S)			
Maximum joint speed	J1	2,000 mm/sec				2,000 mm/sec			
	J2	500 mm/sec				1,000 mm/sec		500 mm/sec	
	J3	—	500 mm/sec			—	1,000 mm/sec		
	J4	—		500 mm/sec		—		1,000 mm/sec	
Position repeatability		L: ±0.05 mm / Y, Z: ±0.02 mm				L, S: ±0.05 mm / Y, Z: ±0.02 mm			
Brake		J2	J2, J3	J3	J3, J4	—		J2	
Weight		Approx. 7 kg	Approx. 9 kg	Approx. 10 kg	Approx. 12 kg	Approx. 9 kg	Approx. 12 kg	Approx. 13 kg	Approx. 16 kg

Legend

SC □□□□ A1-N NN-00 10-30 NN-E NN N

- **Model:** SC: Inter-process transfer robot
- **Robot type:** LZNN LSNN / LZZN LSSN / LYZN LZSN / LYZZ LZSS
- **Discretionary**
- **Mechanical type**
- **Environment and standards**
- **1-axis stroke:** 10: Fixed (600 to 12,000 mm)
- **2-axis stroke:** 10 : 100mm / 20 : 200mm / 30 : 300mm / 40 : 400mm
- **3-axis stroke:** NN: — / 10 : 100mm / 20 : 200mm / 30 : 300mm / 40 : 400mm
- **4-axis stroke:** NN: — / 10 : 100mm / 20 : 200mm / 30 : 300mm / 40 : 400mm
- **Wiring specifications**

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

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

The human-friendly, compact, and portable design
allows you to take COBOTTA anywhere, and automate tasks right away.

1 safety design

Safe shape and movement

2 portable body

Transportable immediately to sites with staff shortages

3 easy to use

Simple teaching with no memorization

4 open platform

Infinite possibilities

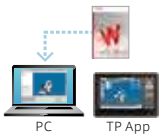
teaching & operating software

Choose according to your application.

Easy start method

Cobotta World

COBOTTA World is an application that runs on an Android tablet. Using this application, you can program the robot to perform a simple task such as picking and placing by simply moving items or operating the COBOTTA robot according to the guidance instruction.



WINCAPS III & TP App *1

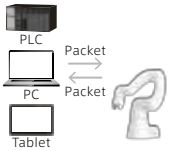
WINCAPS III is a programming application that runs on a Windows PC. It allows for easy editing and management of data of multiple units of COBOTTA. TP App is used to operate the COBOTTA robot or perform position teaching.

PC application to control the robot

For Windows OS

Use of ORiN2 SDK

By installing the middleware, ORiN2 SDK, in the PC, COBOTTA can be controlled with a development tool that supports OLE (COM, Active X), such as Visual Basic, C++, or LabVIEW.

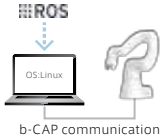


For OS other than Windows OS

Use of b-CAP communication *2

When Linux, iOS, or Android is used, COBOTTA can be controlled by transmitting and receiving b-CAP packets.

ROS



Use of an external PC installed with ROS

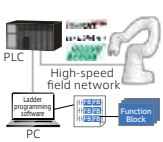
By installing a ROS package from GitHub to an external PC, COBOTTA can be controlled using b-CAP communication (transmission of b-CAP packets).

Use of COBOTTA OSS version

The COBOTTA OSS version enables the COBOTTA unit as a PC. Simply install Linux and ROS in the COBOTTA unit for its control.

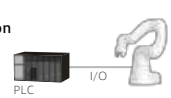
QR code to download the COBOTTA driver for Linux

PLC for the control



Use of Command Slave function

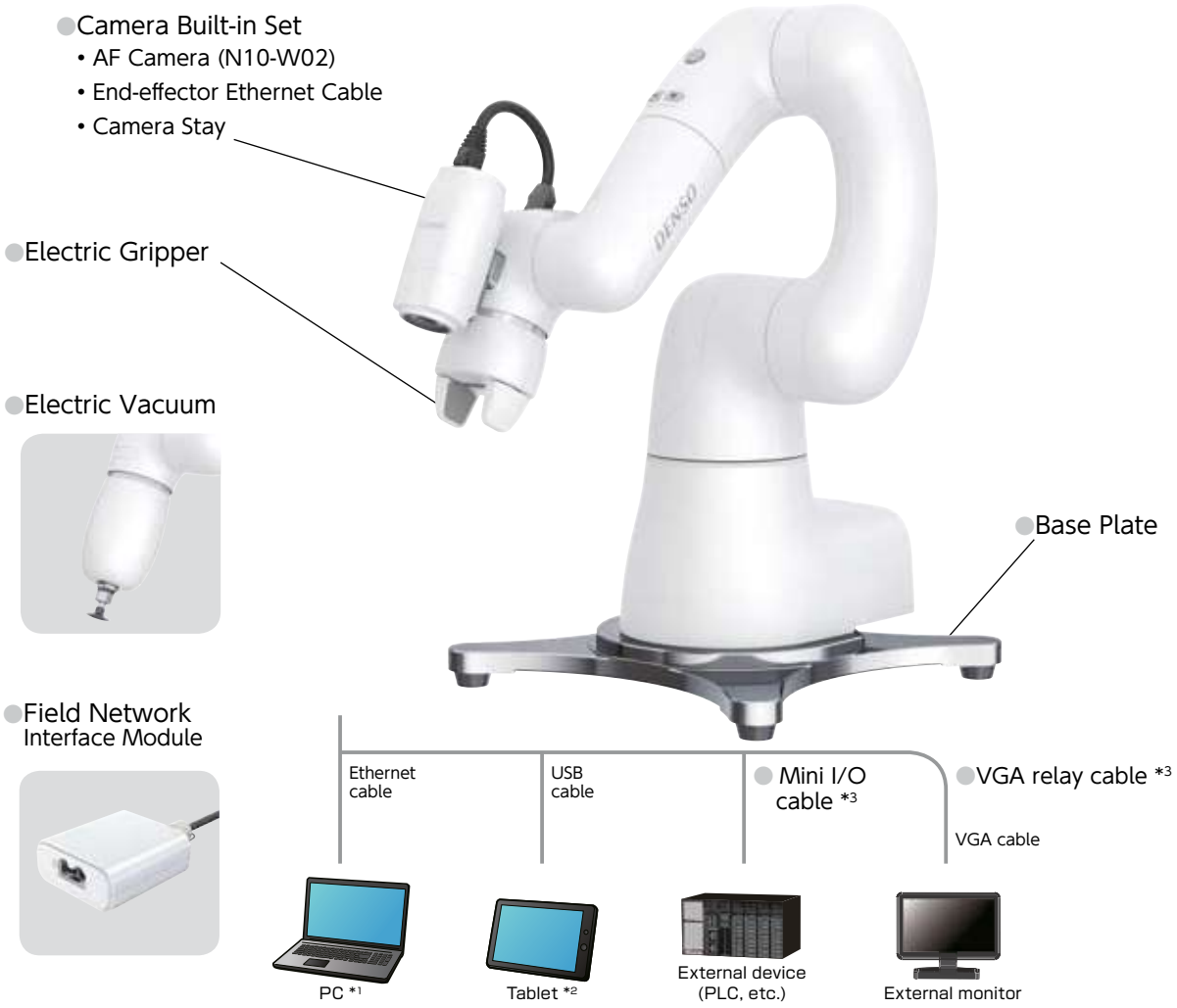
Connect the PLC to COBOTTA using a high-speed field network. COBOTTA can be controlled by the PLC language (ladder program).



Directly controlling from PLC

Like other DENSO robotics products, COBOTTA can be controlled directly by PLC inputs and outputs.

*1: TP App comes in two types. Remote TP for Android tablet and Virtual TP for Windows PC.
*2:b-CAP is a protocol which is created by following the concept of CAP, whose specifications are stipulated by ORiN, to improve communication speed.
[Notes] This product is an industrial robot capable of operating in collaboration with human beings. Before using the product, be sure to conduct risk assessment in accordance with the applicable law, regulations, notices, guidance, JIS B 9700:2013, etc., and reduce risk as much as possible. In addition, the user should check compliance with laws, ordinances and standards pertaining to the operating environment.



*1: OS: Windows *2: OS: Android, 8" or larger screen recommended. *3: Option(s) required.

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.

Other options

Base Plate Set *3
This baseplate allows COBOTTA to operate in a freestanding orientation so that the robot doesn't need to be mounted.

Field Network Interface Module
Use EtherCAT, Ethernet/IP, and PROFINET.

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.

Third-party products
Explore how to broaden COBOTTA's utility.

*1: Specify at time of order. *2: To use the camera, supply PoE to the hub. The set includes an end-effector Ethernet cable and camera stay.

COBOTTA®

CVR038

Anywhere, anytime, hassle-free.
A robot that collaborates with everyone.
The human-friendly, compact, and portable design allows you to take COBOTTA anywhere, and automate tasks right away.

Maximum arm reach	342.5 mm
Rated payload	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, be sure to conduct risk assessment in accordance with the applicable law, regulations, notices, guidance, JIS B 9700:2013, etc., and reduce risk as much as possible. 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

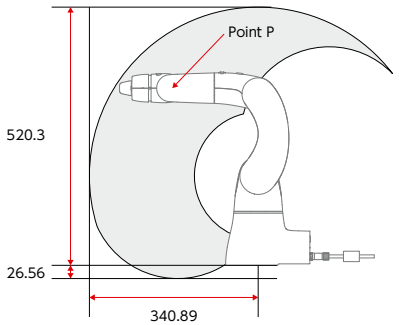
COBOTTA ®

Specifications

Item	Specifications
Axes	6 axes (arm unit) + 1 axis (electric gripper unit) *1
Brake	1, 2, 3, 4 and 5 axes with brakes
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° with the wrist angled downward) *2
Maximum allowable moment of inertia	J4: 0.0065 kgm² J5: 0.0040 kgm² J6: 0.00025 kgm²
Position repeatability	±0.05 mm *3
Standard cycle time	4.32 sec in the factory configuration, 1.6 sec when set to maximum speed (Reciprocating movement time for 200 mm in the horizontal direction and 25 mm in the vertical direction)
Protection grade	IP30
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 100 - 240 V AC ±10%/ 47 - 63 Hz
External signal	Dedicated input: 12 points/Dedicated output: 10 points General-purpose input: 8 points/General-purpose output: 10 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 (no condensation allowed)
Unit weight	Approx. 4 kg
Safety specifications	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

*1. Options *2. Without electric gripper *3. At fixed ambient temperature

External dimensions and workable space Unit: mm



For dimensions and other detailed information, see our website.

System configuration

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

*1: Select based on type of power outlet in country where robot will be used.
*2: When not using the optional mini I/O cable.
*3: Install on tablet or PC.
*4: Android app can also be downloaded from Google Play.

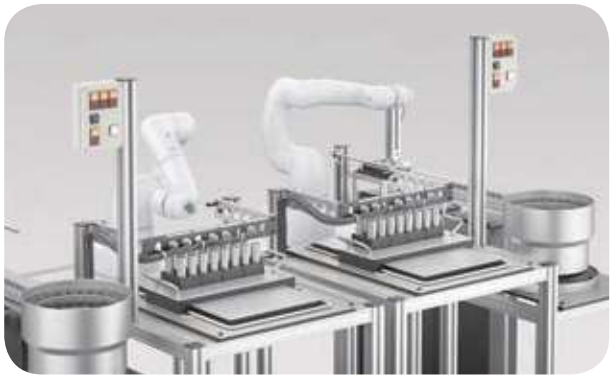
Legend

CVR 038 A1 - NV6 - NNC - NNN□□ - NNN□

- Model: CVR: Collaborative vertically-articulated robot
- Axis specifications: V6: 6-axis
- 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

Case studies

Understanding issues and ideas.



Industry | Placing and arranging parts in rows

(Courtesy of Toyota Motor Corporation)

COBOTTA recognizes the front and back side of parts fed from a parts feeder and positions them in the correct orientation. COBOTTA releases the worker from a process with a workload not enough for one worker.

Industry | Sorting parts, operating tablet, and inspecting substrate

(Courtesy of Canon Inc.)

COBOTTA utilizes a camera and image processing software to automate simple and repetitive work that requires visual confirmation. COBOTTA can perform a multi-movement processing job in a limited space.

Industry | Packing teabags in a box using AI vision

(Courtesy of Innotech Corporation and OSARO Inc.)

COBOTTA can automate a process of picking transparent, lustrous or irregularly shaped items and image recognition by utilizing AI vision. COBOTTA can perform packing work in a limited space.

Laboratory | Chemical analysis

COBOTTA can automate a variety of work involved in chemical analysis, such as solution filtration, constant volume measurement, agitation and beaker washing. COBOTTA releases researchers from simple work in a laboratory.

Academic | Serving as a programming learning tool

COBOTTA OSS version enables development activities in an ROS or LabVIEW environment, thus allowing for its use in education and training.

Office | RPA&COBOTTA® office automation support

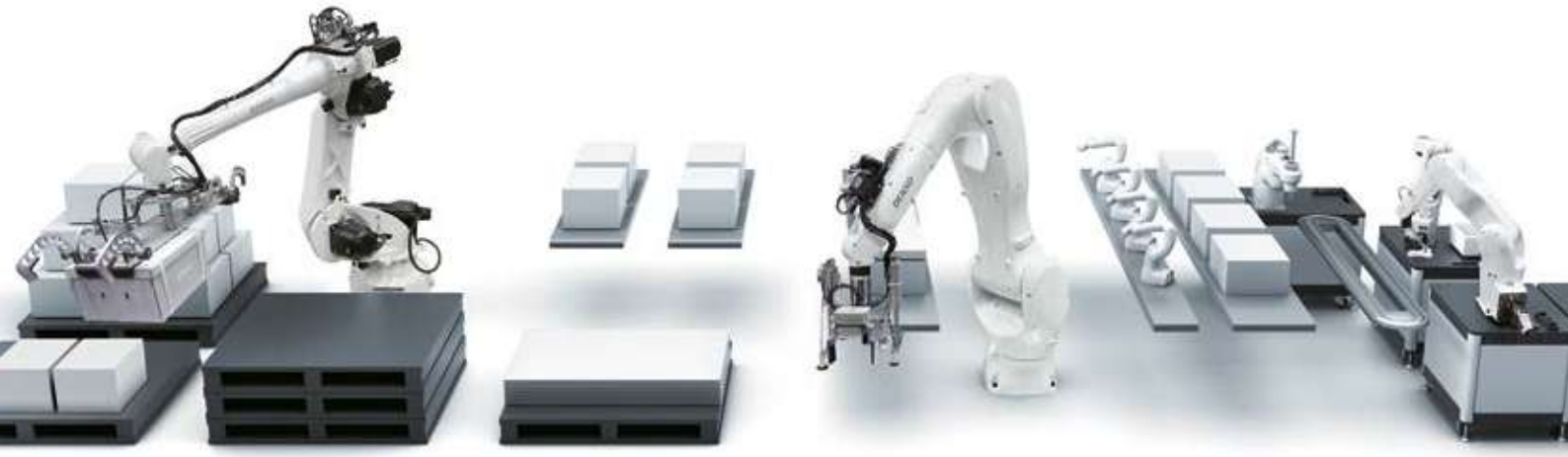
(Developed jointly with Mitsubishi HC Capital Inc. and Hitachi Systems, Ltd.)

RPA&COBOTTA® automates a series of tasks, such as placement of seal stamps and conversion of paper documents to digital data. It can combine with RPA tools to improve office efficiency and reduce workloads.

Robot controllers

Robot controllers

The RC9 robot controller provides equipment integration control and an integration development environment that inherits the DENSO Robotics development environment.
You can use it to build systems with original robot control and safety performance.
It delivers the ease of use that customers require.



Robot controllers

RC9

6-axis

Robot Type

VMB / VLA

Size	VMB: W600 × D581 × H690 VLA: W600 × D581 × H840	Weight	VMB: Approx. 93 kg VLA: Approx. 104 kg

RC8A

6-axis

4-axis

Bild in Type

Transfer Robot

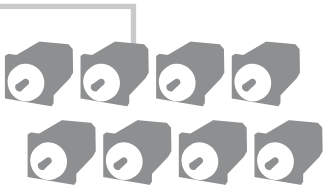
Robot Type

RC8A: VP / VS / VM / HSR / HS-A1 / HM / XR / SC

Size	W357 × D320 × H94 mm	Weight	10 kg

Motion controller

MC8A



motor

Motor Type

30 / 50 / 100 / 200 / 400 / 750 / 1,000 W

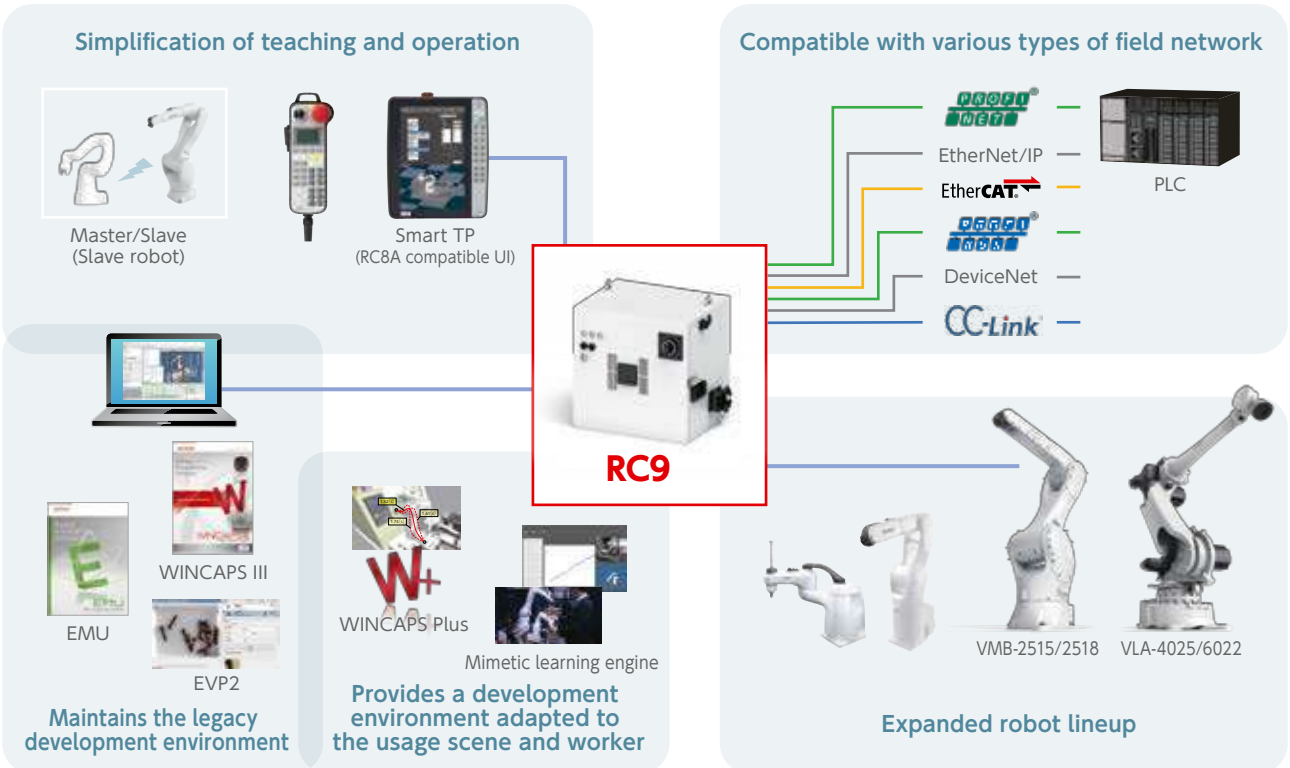
Size	MC8A: W357 × D320 × H94 mm MC8: W357 × D300 × H94 mm	Weight	10 kg

RC9

DENSO is developing robot controllers with the aim of creating a robot language that anyone can use, while considering standardization and openness in the development environment.
We have been developing JIS-compliant industrial programming languages since the 1990s, and released the Windows OS-compatible middleware "ORiN," which offers excellent connectivity with peripheral devices.
In recent years, the introduction of robots into various industries has led to an expansion of applications and links with general-purpose software.
The RC9 robot controller adapts to the increasing sophistication and complexity of robot control equipment while maintaining the legacy development environment.

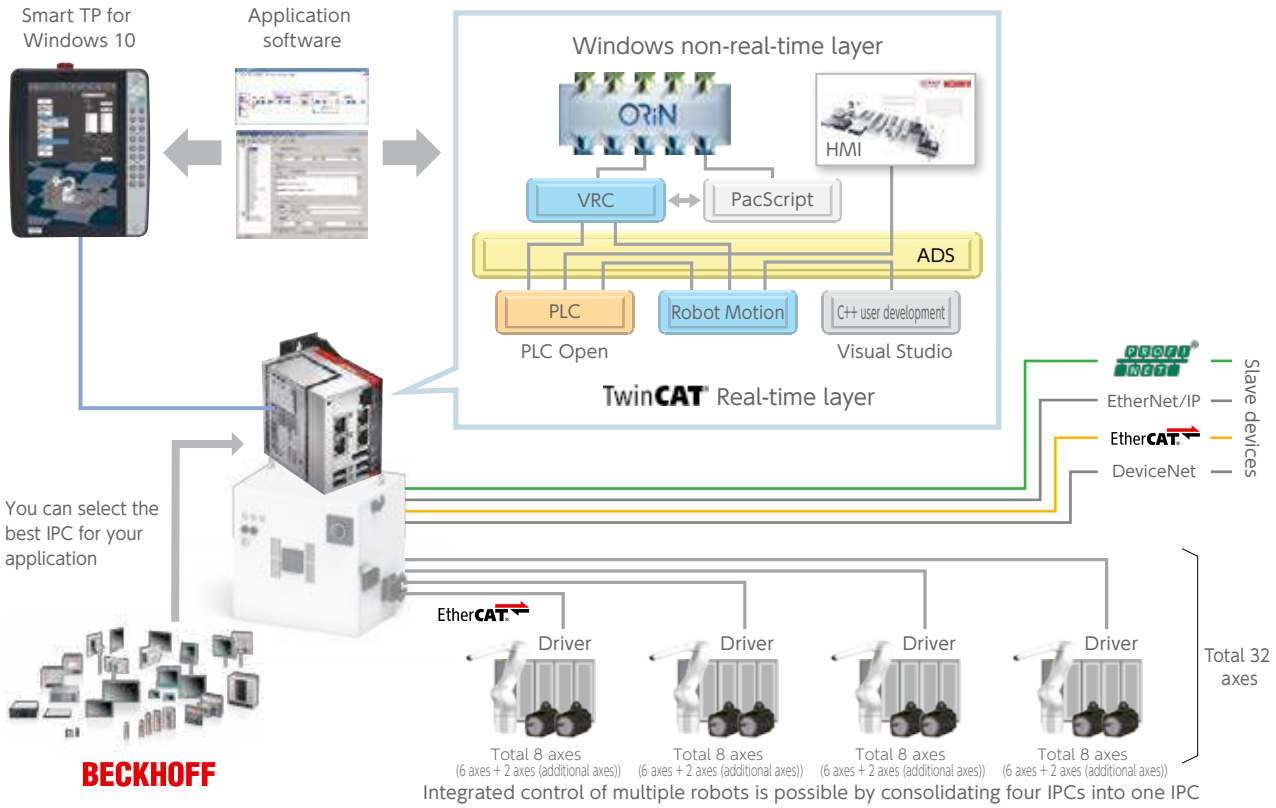
Achieving DENSO robots' goal of simplification

The RC9 controller allows you to select the most suitable robot, peripheral equipment, and software for your application. While maintaining the RC8 development environment, new teaching devices and the application software "WINCAPS Plus" are provided for further simplification. These features deliver simplicity and peace of mind for everyone involved in robot start-up and operation.



Controller for integrated equipment control

The RC9 can be supplied in as firmware. By combining selectivity for optimization according to the application; openness for integration of the user, system integrator, and manufacturer technologies; and expandability for simple integration of the entire system, the RC9 controller achieves simple integrated facility control.



Integrated control of multiple robots is possible by consolidating four IPCs into one IPC

RC9

The RC9 is a new concept in robot controllers that can be supplied as firmware. This approach allows us to supply robot systems that are optimized for individual customers.

Specifications

Item		Specifications	
Applicable robots		VMB-2515 / 2518	VLA-4025 / 6022
Power supply	Power supply capacity	4.5 kVA	10.0 kVA
	Input voltage range	Three-phase 200 V AC -10% to 230 V AC +10%	Three-phase 400 V AC -10% to 480 V AC +10%
	Power supply frequency	47 to 63 Hz	
Power cable length		10 m	
Controllable axes		6	
Control method		PTP, CP 3-dimensional linear, 3-dimensional arc	
Drive method		All axes all digital AC servo	
Language used		DENSO Robotics Language (PacScript)	
Memory capacity		User area Global variable: Every 32,766 points, Number of program files: Up to 256 files	
Teaching system		1) Remote teaching 2) Numerical entry (MDI)	
External signal	Digital I/O	System fixed Dedicated input: 8 points/Dedicated output: 8 or 9 points (unit ships with No. 28 assigned to user output) User open General-purpose input: 8 points/General-purpose output: 7 or 8 points (unit ships with No. 28 assigned to user output)	
	Hand I/O	General-purpose input: 12 points/General-purpose output: 12 points	General-purpose input: 6 points/General-purpose output: 6 points (included in the main unit connecting cable)
	Safety I/O	System fixed input: 8 points/System fixed output: 8 points	
External communication	Ethernet	Panel: 1 line (GbE: Gigabit Ethernet)	
	USB	Panel: 1 line, internal: 3 lines	
Option extension		3 units	
Self-diagnostic function		Overrun, servo error, memory error, input error, short circuit detection (user wiring section), etc.	
Timer function		In units of 1 msec	
Error indication		External error output	
		Display the error code on the mini pendant (optional)	
		Display the error message and return method on the teaching pendant (optional)	
Environmental conditions (during operation)		Temperature: 0 to 40° C, Humidity: 20 to 90%RH (no condensation)	
I/O power supply	Use an external power supply	Supply 24 V DC ±10% from external source	
	Use an internal power supply	Supply 24 V DC ±10% from inside controller	
SCCR		5 kA	
Stop category		1	
Safety-related control systems / performance		Emergency stop, protective stop, enable: PLd, Cat.3 STO: PLd, Cat. 3	
Protection grade		IP54	
Weight (transformer weight not included)		Approx. 93 kg	Approx. 104 kg
External dimensions [mm]		600(W) × 581(L) × 690(H)	600(W) × 581(L) × 840(H)

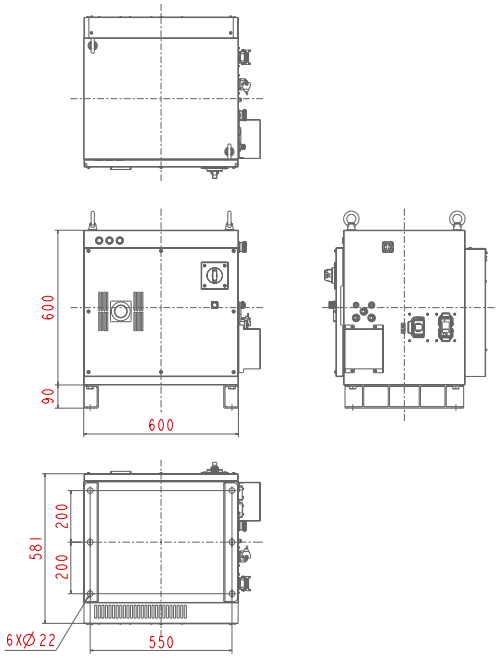
Extended options list

Cables	Power cables for EtherCAT Box	M8-Open, for movable: 2, 10, 40 m
		M8-M8, for movable: 0.5, 2, 5, 10, 20, 40 m
		7/8"-Open, for bending resistance: 2, 10, 40 m
		7/8"-7/8", for bending resistance: 0.5, 2, 5, 10, 20, 40 m
	EtherCAT cables for EtherCAT Box	M8-RJ45, for bending resistance: 0.5, 2, 5, 10, 20, 40 m
		M8-M8, for movable: 0.5, 2, 5, 10, 20, 40 m
	Sensor cables for I/O Link	M12-Open, Class A, for movable: 2, 10, 40 m
		M12-M12, Class A, for movable: 0.5, 2, 5, 10, 20, 40 m
		M12-Open, Class B, for bending resistance: 2, 10, 40 m
		M12-M12, Class A, for bending resistance: 0.5, 2, 5, 10, 20, 40 m
	Sensor cables for DIO	M8-Open, for movable: 2, 10, 40 m
	EtherCAT cables	RJ45-RJ45, for fixed: 0.5, 2, 5, 10, 20, 40 m
		RJ45-RJ45, for bending resistance: 0.5, 2, 5, 10, 20, 40 m
Expanded functionality (USB dongle license)		TwinCAT3 PLC
		TwinCAT3 OPC UA
		TwinCAT3 PLC + HMI Web
		TwinCAT3 PLC + OPC UA
		TwinCAT3 PLC + HMI Web + OPC UA
Power supply		Power transformer (VMB) (assembly)
		Power transformer (VLA) (assembly)
I/O terminals	EtherCAT junction	3 port, 4 port
	EtherCAT bridge terminal	
	PROFINET RT controller terminal	
	PROFINET RT device terminal	
	EtherNet/IP master terminal	
	EtherNet/IP slave terminal	

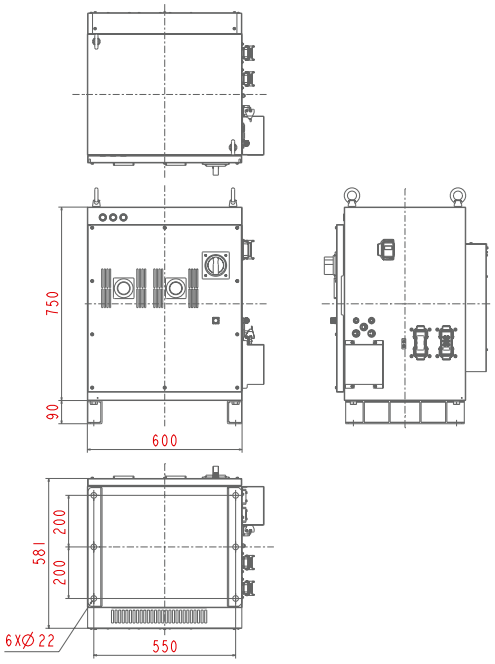
I/O terminals	PROFIBUS master terminal
	PROFIBUS slave terminal
	DeviceNet master terminal
	DeviceNet slave terminal
	CC-Link slave terminal
	RS232C 2ch terminal
	RS422/RS485 2ch terminal
	Digital input terminal PNP, 8 points, 10 μs, IP20
	Digital input terminal PNP, 16 points, 3 ms, IP20
	Digital output terminal PNP, 8 points, 0.5 A, IP20
	Digital output terminal PNP, 16 points, 0.5 A, IP20
	Digital input terminal NPN, 8 points, 10 μs, IP20
	Digital input terminal NPN, 16 points, 3 ms, IP20
	Digital output terminal NPN, 8 points, 0.5 A, IP20
	Digital output terminal NPN, 16 points, 0.5 A, IP20
	EtherCAT Box DIO, PNP, 16 points, 3 ms, IP67
	EtherCAT Box DIO, NPN, 16 points, 3 ms, IP67
	EtherCAT Box IO Link master, Class A, IP67
	EtherCAT Box IO Link master, Class B, IP67
	EtherCAT coupler (standalone)
	EtherCAT expansion terminal
	Ethernet expansion module (assembly)
	EtherCAT coupler + bus end cap set (assembly)
	Bus end cap (standalone)
	Protective plug M8 for DIO (50 pcs set)
	Protective Plug M12 for IO Link (50 pcs set)

Dimensional outline drawing

VMB-2515 / 2518



VLA-4025 / 6022

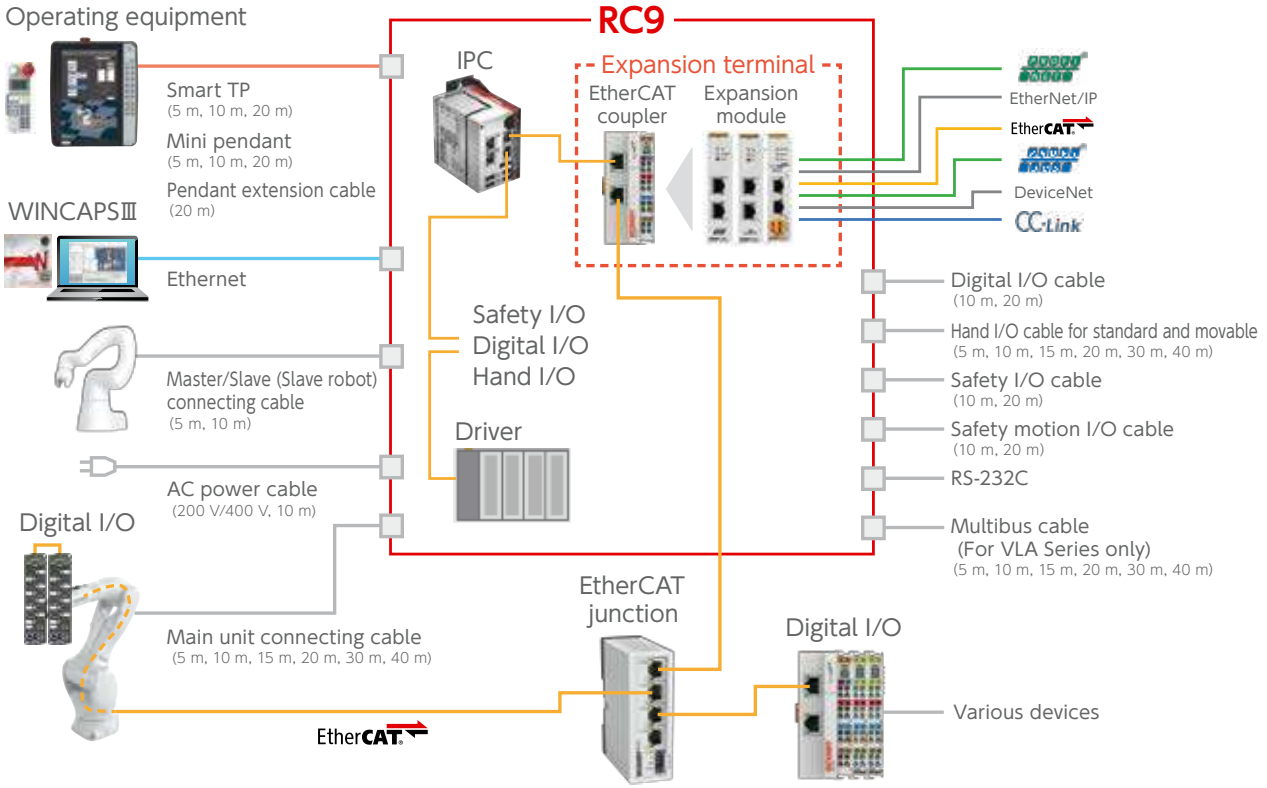


Legend

RC9 □ - □

- Controller name
- Controller series name:
  M: RC9 VMB Series
  L: RC9 VLA Series
- I/O type:
  M: Negative common (NPN)
  P: Positive common (PNP)

System configuration diagram



Safety Motion Function

*Planned for release in 2022

Realizes harmony between humans and robots while achieving both safety and high productivity.

1 Motion area detection

Limits the motion area of the robot and detects when it is within the restricted area.

■ Benefits

· Miniaturization of equipment
· Enables mutual access to common work areas by workers and robots

2 Speed detection

Limits the speed of the robot and detects when it is below the limit speed.

■ Benefits

· Operations can be continued at a safe speed even when a worker is nearby.

Patent No. 6379853

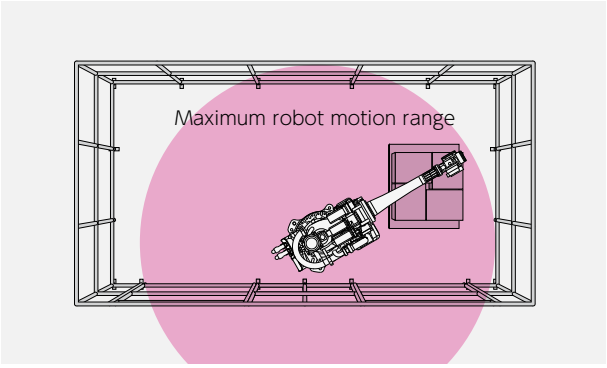
3 Stop detection

Detects the robot stop status without shutting off the power.

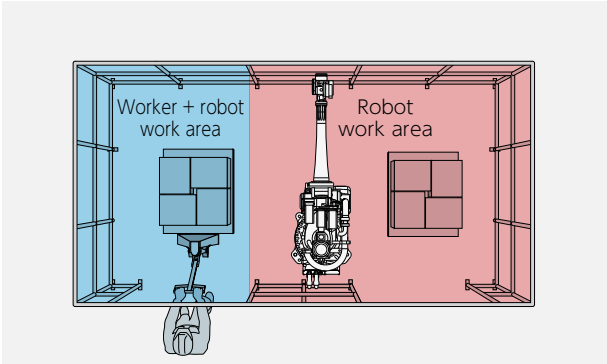
■ Benefits

· Smoother return to operations after the worker has left the common work area, leading to improved productivity

Features



Since the motion area of the robot is monitored, safety fences with the minimum necessary size can be installed, enabling compact equipment design.



When the safety sensor detects a nearby worker, the robot stops with the motor power on to ensure their safety. When the worker leaves the sensor detection area, the robot immediately starts moving again.

Safety features

Name	Description
STO (Safe Torque Off)	Turns OFF the motor power immediately
RLP (Robot Limited Position) Robot position limit PLd cat.3	Detects if the robot has moved beyond the set virtual safety fence, and stops with STO if the fence is exceeded
SLP (Safely Limited Position) Each axis position limit PLd cat.3	Detects whether any of the axes has moved beyond the soft limit If the limit is exceeded, the robot stops with STO

Name	Description
RLS (Robot Limited Speed) Robot speed limit PLd cat.3	Detects if the speed at the monitoring point on the robot is less than the specified value, and stops with SS1 if the specified value is exceeded
SS2 (Safe Stop 2)	Decelerates the robot to a stop and maintains motor power in the ON state
SOS (Safe Operating Stop)	Monitors the robot to see if it has moved from the stopped position

RC8A

Robot Controller Development Code No. 8

Robot controller

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

Compact size

A small, lightweight high-performance 8-axis controller that offers a high degree of freedom in installation to save space

Robot controller	Specifications	Size (mm)	Weight (kg)
RC8A	Standard / Safety I/O-less	356.5 × 319.6 × 96.8	Approx. 10

Exceptional usability

Improved GUI increases work efficiency

Easier-to-view menu configuration and more user-friendly operability are realized.
Improved GUI and functionality help reduce time spent on robot deployment.

Compliance with global standards

Open Network

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

Standards / Certification

- ISO 10218-1:2011 / CE (Standard specification, Safety motion specification, UL specification)
- UL (UL specification)
- PLe / SIL3 (Standard specification, UL specification)
- PLd / SIL2 (Safety motion specification)
- KCs (Standard specification, Safety motion specification)

* Please feel free to contact DENSO Robotics for details of the acquisition of certification.

Field Network

Supporting a wide range of network standards used in the FA field.

Safety motion function

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

Supported controller RC8A

Safety features

Name	Description
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 motor 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

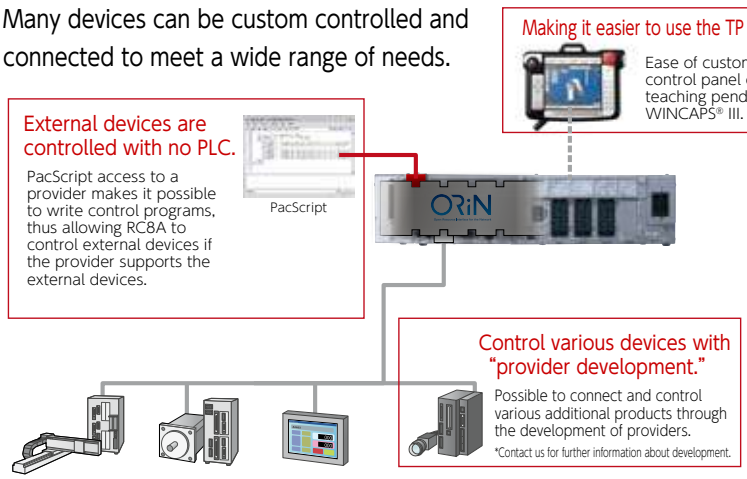
Name	Description
RSM (Robot Speed Monitoring)	Function to monitor the robot's specified sections do not exceed the specified speed.
RPM (Robot Position Monitoring)	Function to monitor the robot's specified sections do not exceed the specified motion area
SBC (Safe Brake Control)	Function to turn off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

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.

Wide expandability

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



Supported Controllers

Robot controller	Specifications	Robot
RC8A	Standard	VP, VS, VM, HSR®, HS-A1, HM, XR, SC
	Safety I/O-less	VP, VS, VM, HM, XR, SC, HSR®, HS-A1
	Safety motion	VP, VS, VM, HSR®, HS-A1, HM, XR, SC

RC8A

Specifications

Item			Specifications								
Applicable robots			VP -5243/6242 *1	VS 050/060/ 050 (pharmaceu- tical / medical)	VS 068/087	VS -6556/6577	VM -6083/60B1	HSR® 048/055/065	HS 035A1/045A1 /055A1	HM -4*****	XR -43***
Power supply	Power supply capacity		1.00 kVA (*1)	1.15 kVA	2.78 kVA	1.80 kVA	3.30 kVA	1.80 kVA	1.80 kVA	2.45 kVA	1.85 kVA
	Input voltage range		Three-phase 200 V AC −15% to 240 V AC +10% (100 V specification also available for the VP series.)								
			Single-phase, 230 V AC -10% to 240 V AC +10% *1				—	Single-phase, 230 V AC -10% to 240 V AC +10%			
	Power supply frequency		50Hz / 60Hz								
Power cable length			5 m								
Controllable axes			5 / 6	6				4			
Control method			PTP, CP 3-dimensional linear, 3-dimensional arc (PTP control only for extended-joint support)								
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 signals (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								
		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 board for expansion (option)		Expansion slot: PCI Input: 40 points / Output: 48 points								
	CC-Link remote device board (option)		Expansion slot: PCI Express Input: max. 8,192 points / Output: max. 8,192 points, Remote register Input: max. 2,048 words / Output: 2,048 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: 1,024 points / Output: 1,024 points								
	EtherNet / IP adapter board (option)		Expansion slot: PCI Express Input: max. 4,032 points / Output: max. 4,032 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. 8,192 points / Output: max. 8,192 points								
	EtherCAT slave board (option)		Expansion slot: PCI Express Input: max. 2,048 points / Output: max. 2,048 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 conditions (during operation)			Temperature: 0 to 40° C / Humidity: 20 to 90%RH (no condensation allowed)								
Safety performance			See "Options" below.								
Protection grade			IP20								
Weight			Safety I/O-less specification, Standard specification: Approx. 10 kg, Safety motion specification: Approx. 11 kg *3								

*1: Power for the 100 V AC specification is "Single-phase 100 V AC -5% to 110 V AC +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. Extended-joint support 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 performance	Standard	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 / 050 (pharmaceutical / medical)
VSA4: VS068 / 087
VSA0: VS-6556 / 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)

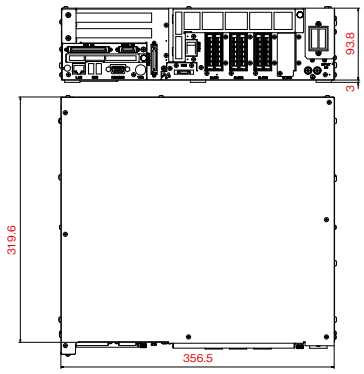
CPU:
N: Standard
E: Standard
(In and after June 2020)
*Due to CPU change.

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

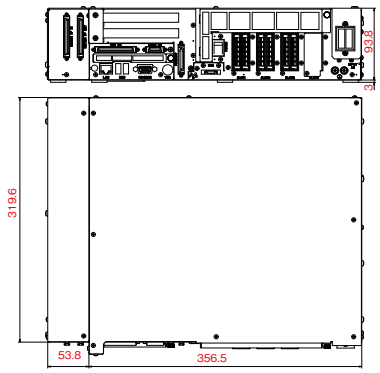
Compliant standard:
NN: Safety-I/O-less specification (safety-I/O-less)
*The RC8A safety I/O-less specification is selectable for the HSR/HS-A1 series.
NI: Standard specification (safety I/O)
NM: Safety motion specification (safety I/O, safety motion)
UI: UL specification *5 (safety I/O)
UM: UL specification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

External dimensions Unit: mm

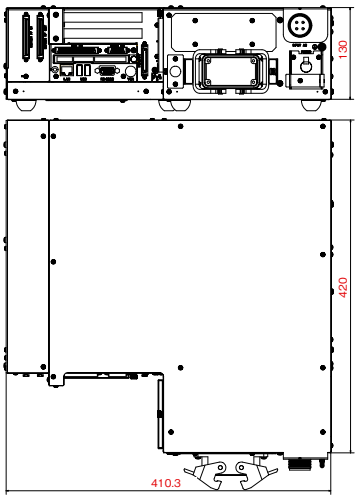
Standard specification / Safety I/O-less specification



Safety motion specification

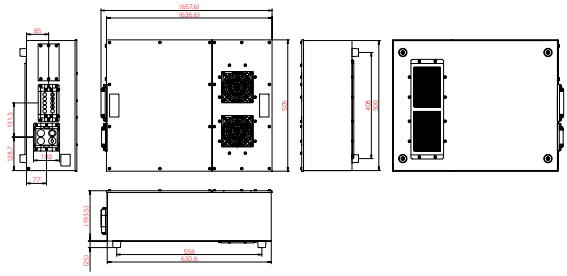


Standard UL specification / Safety motion UL specification

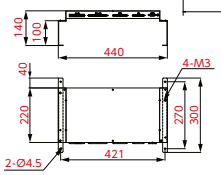


Options

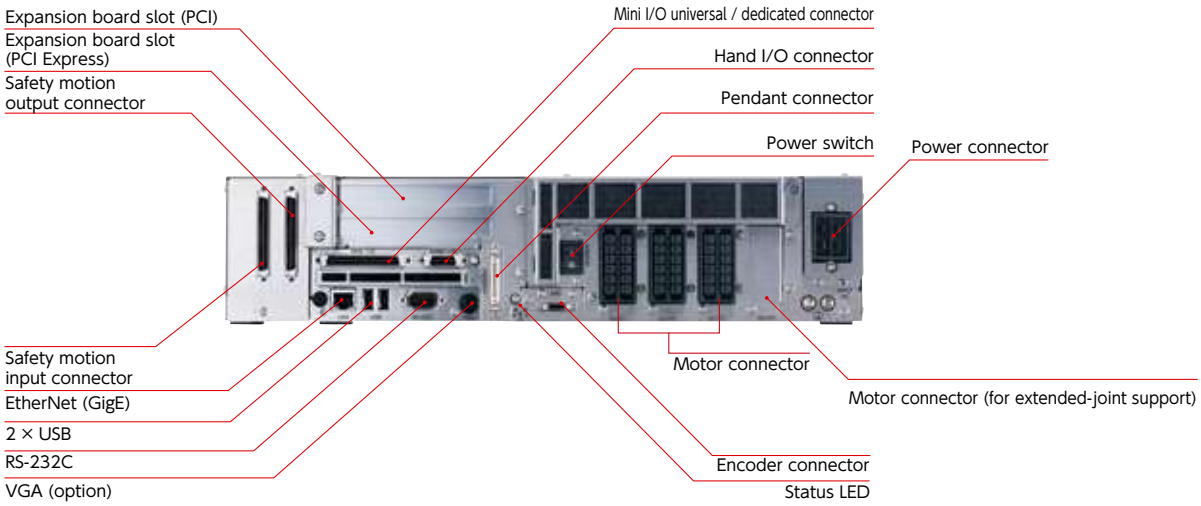
RC8 controller protective box light



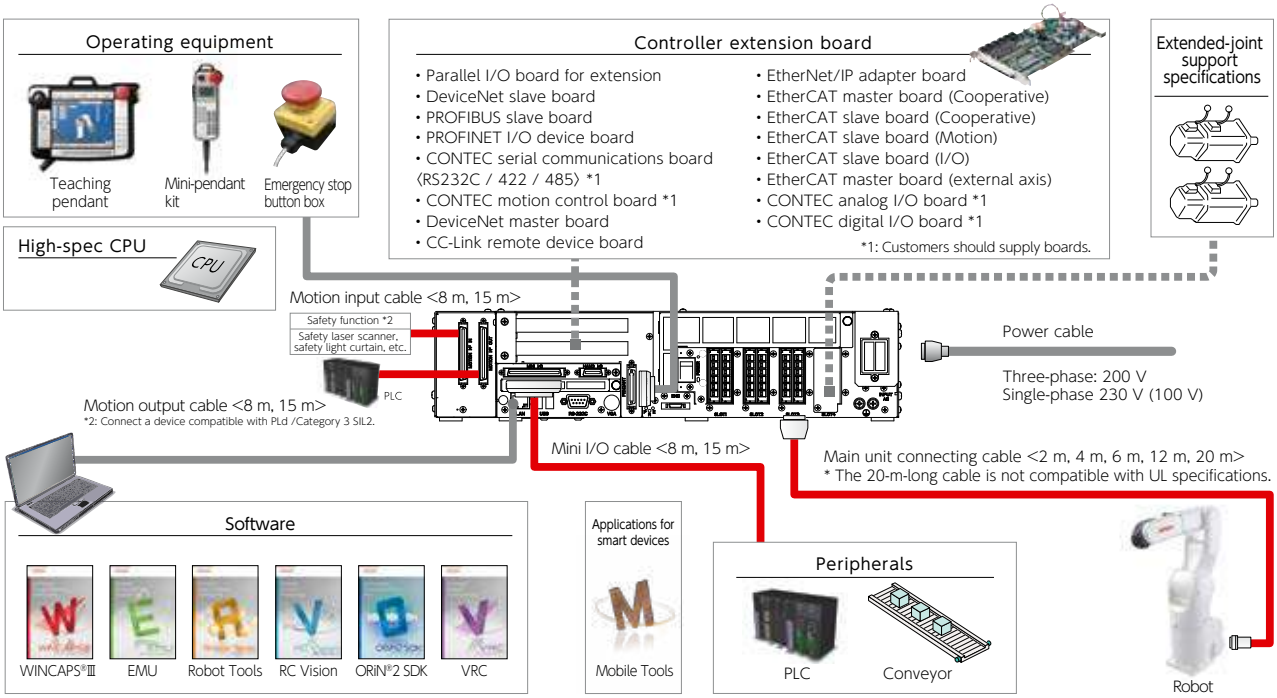
I/O conversion box (RC5 → RC8/8A Safety I/O-less specification)



User interface



System configuration diagram



MC8A

Motion controller suited to developing custom robots based on the RC8A robot controller.

Specifications

Item			Specifications
Power supply	Power supply capacity		3 kVA
	Input voltage range		Three-phase 200 V AC −15% to 240 V AC +10%
	Power supply frequency		50Hz / 60Hz
Power cable length			5 m
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 signals (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 board for expansion (option)		Expansion slot: PCI Input: 40 points / Output: 48 points
	CC-Link remote device board (option)		Expansion slot: PCI Express Input: max. 8,192 points / Output: max. 8,192 points Remote register Input: max. 2,048 words / Output: 2,048 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: 1,024 points / Output: 1,024 points
	EtherNet / IP adapter board (option)		Expansion slot: PCI Express Input: max. 4,032 points / Output: max. 4,032 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. 8,192 points / Output: max. 8,192 points
	EtherCAT slave board (option)		Expansion slot: PCI Express Input: max. 2,048 points / Output: max. 2,048 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 conditions (during operation)			Temperature: 0 to 40°C / Humidity: 90%RH or less (no condensation allowed)
Safety performance			See "Options" below.
Protection grade			IP20
Weight			MC8A: Standard specification: Approx. 10 kg, Safety motion specification: Approx. 11 kg *3

*1: CP 3-dimensional linear, 3-dimensional 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 performance	Standard	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	

Motor list

Motor capacity	With/Without brake	With/Without oil seal	Flange aperture dimensions
30 W	With / Without	With / Without	□40 mm
50 W	With / Without	With / Without	□40 mm
100 W	With / Without	With / Without	□60 mm / □40 mm
200 W	With / Without	With / Without	□60 mm
400 W	With / Without	With / Without	□80 mm / □60 mm
750 W	With / Without	With / Without	□100 mm / □80 mm
1,000 W	With / Without	With / Without	□100 mm

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	30 W / 50 W / 100 W
S	200 W / 400 W
L	750 W / 1,000 W

<Selection example> *4
· 750 W motor × 1, 400 W 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.

Legend

RC8A - MC81 - NN □□ - □□ - NNN

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

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.

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 RC8A interface specially adapted to robot control

Shorten startup time

- Use of the same off-line software and teaching pendant as for all current DENSO Robotics products let customers continue to use controls they're familiar with, reducing the number of work-hours necessary in order to use the robot.
- Reduces worktime in the design of emergency stops, etc. by making use of the MC8A's safety circuits
- Provides ease of use by allowing gain tuning and other adjustments to be performed using MC8 functionality.

Maximum 8-axis control + wide expandability

Utilizes an RC8A provider to directly control various FA devices

Improving efficiency by integrating control

- Using ORiN allows usage of the RC8A 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 programming and maintenance man-hours.
- Uses the same GUI as the RC8A providing greater efficiency.

World-class safety

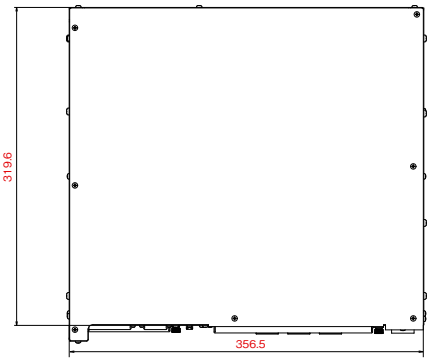
Complies with the same global safety standards as the RC8A.

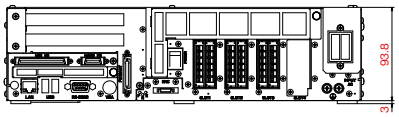
Standards / certification

- CE (standard specification, safety motion specification, UL specification)
- PLe/SIL3 (standard specification)
- UL (UL specification)
- KC (MC standard specification)

External dimensions Unit: mm

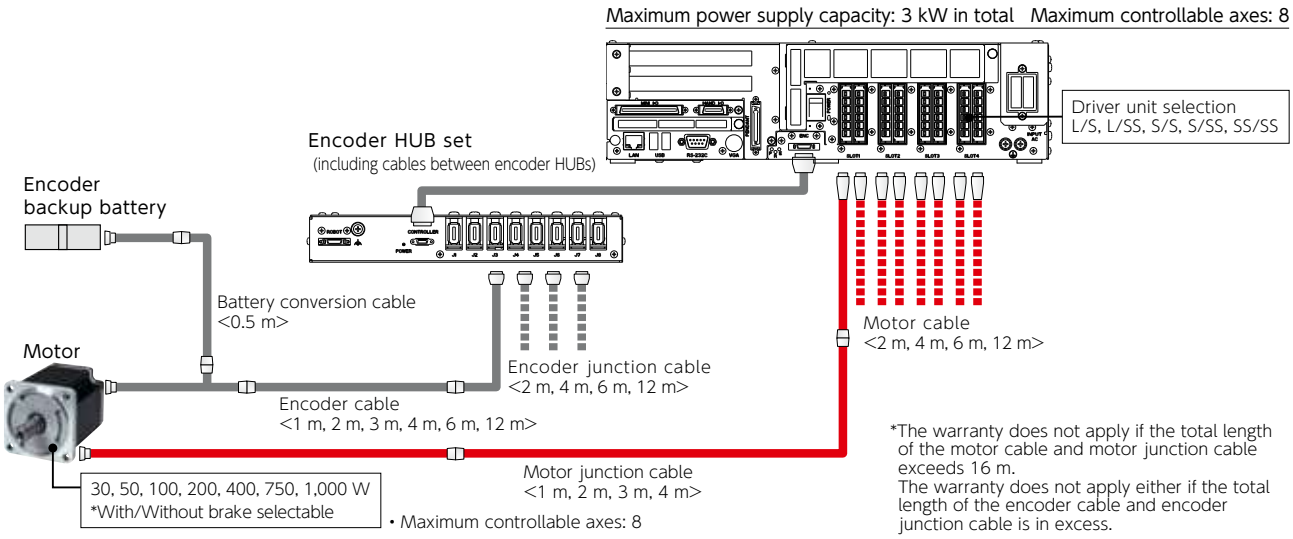
MC8A





*For safety motion, standard UL and safety motion UL specifications, see external dimensions on P.43.

System configuration diagram



*The warranty does not apply if the total length of the motor cable and motor junction cable exceeds 16 m.
The warranty does not apply either if the total length of the encoder cable and encoder junction cable is in excess.

HIGH PERFORMANCE TEACHING PENDANT

Smart TP

Supported robot controllers

RC9 ▶P.36

Smart TP is a high performance teaching pendant that can be used in a variety of situations, such as configuring robot settings, teaching, and serving as an HMI.

Applications

As a teaching pendant
Smart TP is equipped with a teaching function that allows each axis of the robot to be adjusted.

As a PC for programming
In addition to WINCAPS Plus, customer-developed applications and general-purpose applications can also be installed. A keyboard can be connected to create programs.

As an HMI
It can be used as an indicator not only for robots but for the entire facility.

Features

Embedded with the large touch panel
Smart TP runs on Windows 10 and features a large 10.1" screen for improved operability.

Splashproof with IP65 protection rating

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.

Functions

RC8A compatible UI
Compatible with the existing RC8A controller, maintaining the legacy development environment and ensuring operability.

Customizable control panel screen
Screens created by TwinCAT3 PLC HMI can be displayed.

WINCAPS Plus UI
Compatible with the GUI of "WINCAPS Plus," an Offline Programming Software group.

Software PLC UI
Programming screens created with TwinCAT3 PLC can be displayed.

Specifications

Item	Specifications
Size	10.1" (16:10)
Resolution	WXGA 800×1,280 pixels
Touch screen	Transmissive capacitance type
Backlight	LED
Dimensions (L x W x H)	215 × 284 × 69 mm
Weight	Approx. 1,120 g

PERIPHERALS

Teaching pendant / Mini pendant

Supported robot controllers

RC8A ▶P.44

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.

The screen can be customized using control panel functions.
The teaching pendant screen can be customized as a control panel of robot and peripheral devices.

Protection grade
Splash proof equivalent to IP65

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

Specifications

Item	Multifunction teach pendant	Mini-pendant *1
Power supply	24 V DC (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° C, Humidity: 90% RH or less (no condensation allowed)	
Protection 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®III Light, 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.

Supported robots	VS068 / VS087
Supported controllers	RC8A

*Standard flange specification only

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.

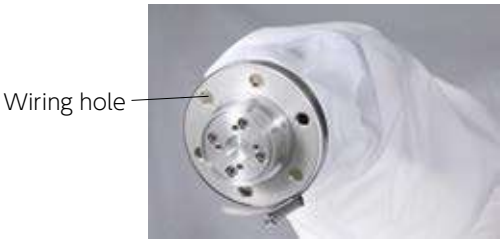
Compatible with chemicals used in food manufacturing processing

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° C to 100° 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 specification	Robot fitted with jacket	Standard specification	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) (Including mounting flange weight)	955 (445+430+80)	1025 (445+430+150) (Including mounting flange weight)
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 (Excluding mounting flange weight)	7	6 (Excluding mounting flange weight)
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 (Excluding mounting flange weight)	0.45	0.44 (Excluding mounting flange weight)
Maximum allowable moment	J4, J5	Nm	16.2	14.4 (Excluding mounting flange weight)	16.2	14.4 (Excluding mounting flange weight)
	J6		6.86	6.69 (Excluding mounting flange weight)	6.86	6.69 (Excluding mounting flange weight)
Signal line and air pipe solenoid valves *5		–	7 systems (ø4 × 6, ø6 × 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)	Signal lines: CN21 10 (No single wires allowed. 1 cable with coating outer diameter of 6.5 to 8 mm) Air pipes: 6 max. *4	7 systems (ø4 × 6, ø6 × 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)	Signal lines: CN21 10 (No single wires allowed. 1 cable with coating outer diameter of 6.5 to 8 mm) Air pipes: 6 max. *4
Installation orientation		–	Floor-standing, wall-mounted, ceiling	Floor only	Floor-standing, wall-mounted, ceiling	Floor only
Weight		kg	49	50 (Including mounting flange weight)	51	52 (Including mounting flange weight)

*1: Movable range includes composite movements by all axes. The standard specification movable range applies to single-axis movements.
*2: Depends on the movable range of customer robot. Customer to configure software limits.
*3: Addition of a jacket may cause the robot to heat up more readily than previously. *4: A maximum of six signal lines and air pipes may be routed outside the robot jacket. *5: Standard type, protected type

RC8 Controller Protective Box Light

Protect your robot controller from harsh environments where equipment is exposed to oil, dust, and other contaminants.
The product offers the same waterproof performance as the previous design, but at a lower price.

Compatible controllers	RC8A (standard specifications, safety motion specifications, and safety I/O-less specifications), RC8

*VM series, VS068/087 with extended-joint support
If using the MC8 (with total motor capacity of 2,000 W or greater), use the previous RC8 Controller Protective Box.

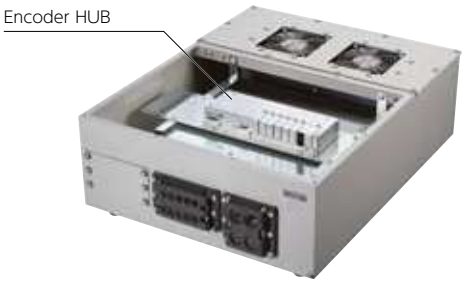
Features

IP54 protection to withstand harsh environments

The RC8 Controller Protective Box Light delivers the same IP54 protection as the original RC8 Controller Protective Box, but at a more affordable price point.

Space for options

The box can accommodate an encoder HUB.

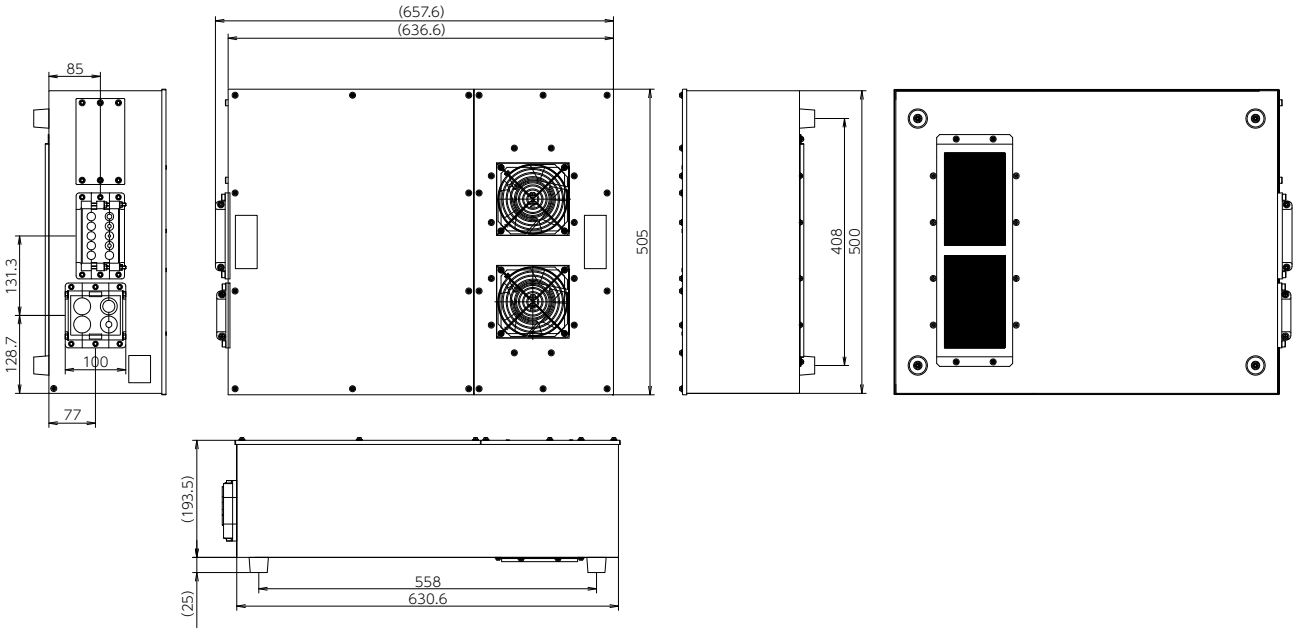


Specifications

Item		Specifications
Supported controllers		RC8 type controllers (with space for encoder HUB)
Operating environment (temperature and humidity)	During operation	0°C to 40°C, 90% RH or less (no condensation allowed)
	During storage or transport	-10°C to 60°C, 75% RH or less (no condensation allowed)
Protective structure		IP54 or equivalent
Installation orientation		Freestanding
Weight		Approx. 17.5 kg (not including robot controller)
Power supply *1	Three-phase	185-253 V AC (200 V AC-7% to 230 V AC +10%)
	Single-phase	207-253 V AC (230 V AC ±10%)
Heat exchanger	Cooling capacity	25 W/K (calculated for temperature difference of 1°C)
	Power supply	From controller power supply (using single-phase 200 V AC from branch at terminal block)

*1: Differs from the power supply specifications of the standalone RC8.

Dimensional outline drawing



Software

Software

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

ORiN Version 2

WINCAPS®III

Offline Programming Software

Software used to program DENSO Robotics (PAC language, PacScript) and create simulations on the program

WINCAPS Plus

Offline Programming Software

Software used alongside WINCAPS III to provide optimal applications for use cases such as design, deployment, and maintenance

EMU

Robot Simulation Software

Software that allows you to run simulations for multiple DENSO Robotics

RC Vision

Robot Vision Package

A robot vision application software package that utilizes DENSO Robotics and cameras to support equipment startup

Robot Tools

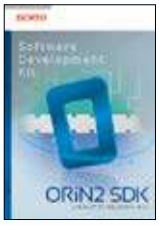
Utility Application Software

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

VRC

Virtual Robot Controller

An emulator that creates an image of RC8A (robot controller) itself and provides a virtual RC8A environment on the PC



ORiN® 2 SDK

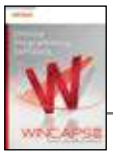
Software Development Kit

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

Mobile Tools

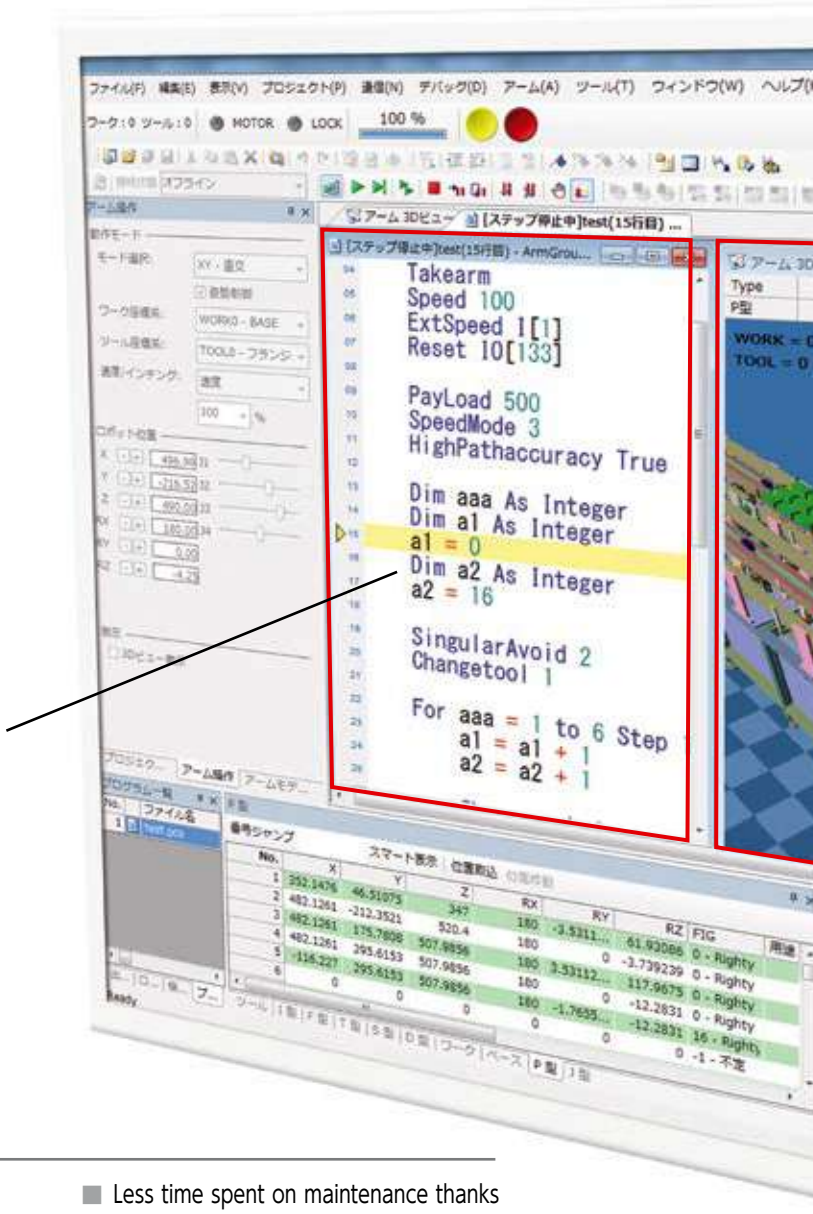
Smart Device Application Software

A set of application software for smart devices that support equipment startup or maintenance using DENSO Robotics products



Offline Programming Software

WINCAPS III software provides across-the-board support for DENSO Robotics, from the deployment study stage to maintenance.
The software supports operation of DENSO Robotics products by providing an extensive range of functionality at low cost, including for creating robot programs, backing up controller data, and reviewing robot posture using 3D drawings.



Accessible interface and ease of use

WINCAPS III delivers intuitive ease of use and refined operability so users can easily check teaching points and interference with peripherals.

Program creation

Immediately simulate program content in the program editing window on a PC. You can also display errors like spelling mistakes using the program error-checking function.

Online functions

Connect to robot controllers and use monitor and debugging functions. You can easily send and receive program data and receive and save log data.

Benefits

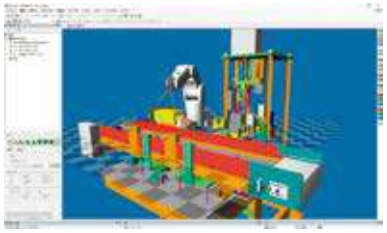
- Less time spent designing and fabricating robotic equipment
  - Significantly shorten the amount of time spent getting equipment up and running.
- Less time spent on maintenance thanks to extensive logging functionality
  - Speed up analysis work.

Features

Equipment conceptualization/design

3D CAD data import
Check equipment interference and teaching points.

Support for VRML and Direct X 3D CAD
Easily check equipment interference and teaching points without relying on the actual hardware.

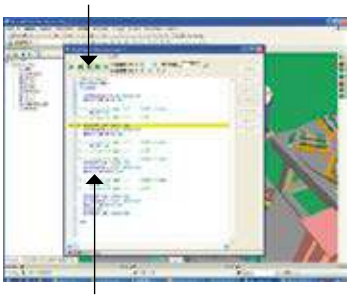


Import 3D data, monitor robot operation, and easily check equipment interference and teaching points using manual controls.

Operation preparation and equipment adjustment

Robot simulator
Simulate robot programs on a PC.

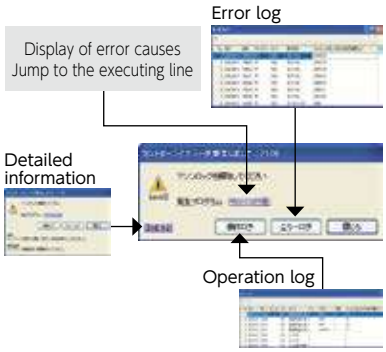
Display speed and cycle time.

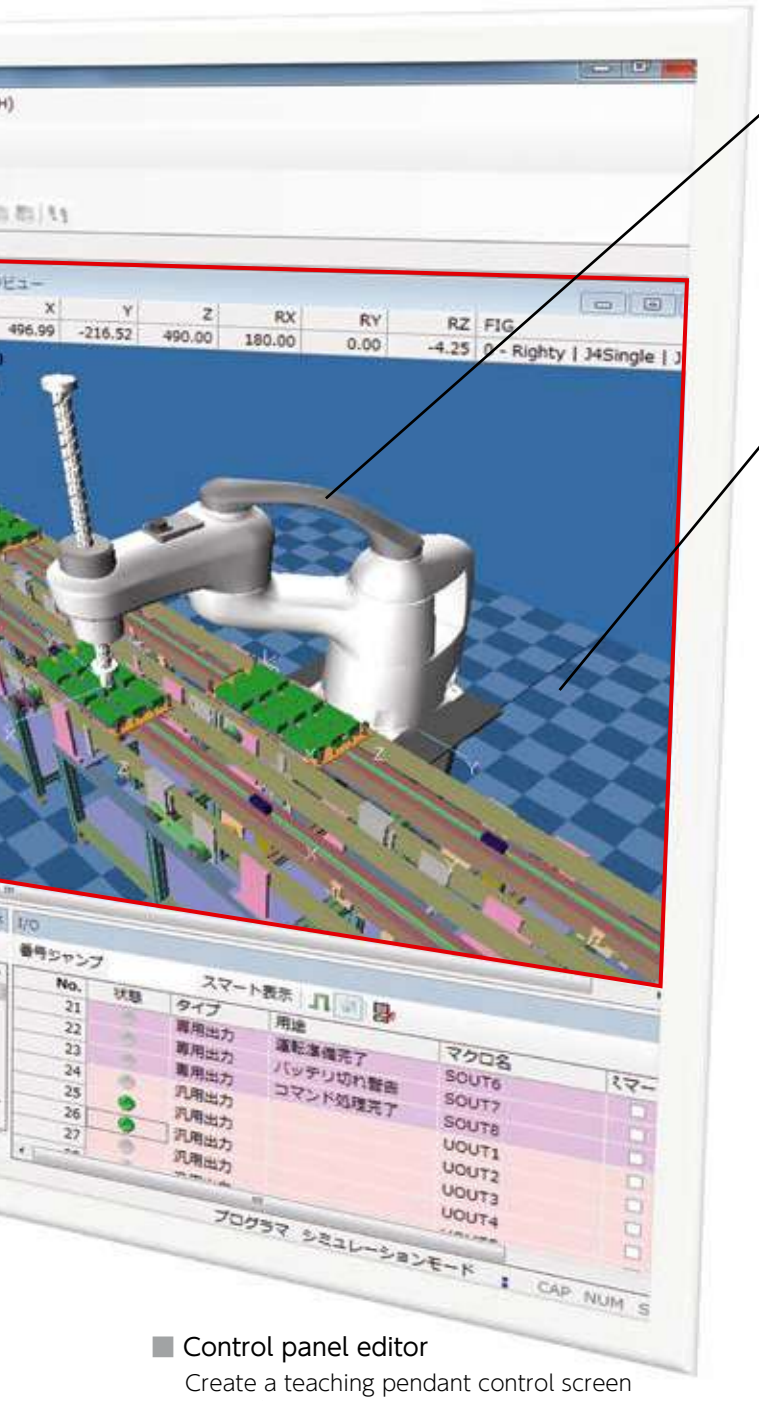


Display the program line being executed.
Unsupported command lines are shown with cross-hatching so they're easy to identify.

Operation/maintenance

Extensive robot analysis tools
Sophisticated monitoring functionality and extensive log management
Generation of backup data





Arm 3D view

Displays the robot and peripheral devices in 3D and simulates robot motion on a PC. Since you can easily zoom in and out and switch perspectives using the mouse, you can perform simulations while viewing the equipment and robot from the desired angle, through 360°.

Simulation functions

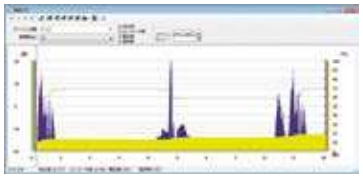
Execute user-created programs on the PC to check cycle time, robot movement, pose and interference. Since you can perform simulations without operating the actual robot, you can develop programs safely and efficiently.

●Convenient functions

- Interference checking
- Cycle time measurement
- Robot path display

Log function

View error logs, operation logs, trace logs, and other data.



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 is changed can be corrected at once.

Control panel editor

Create a teaching pendant control screen on a PC.

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, RAM: 2 GB or more, HDD: 1 GB or more

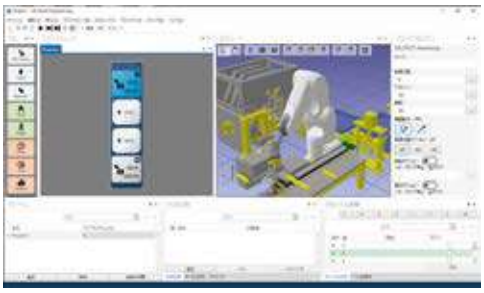
Languages supported: 5
Japanese, English, German, Korean, Chinese

*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.

WINCAPS Plus

Offline Programming Software

**Used alongside WINCAPS III, this suite of software helps you save man-hours by optimizing operation in use cases such as design, deployment, and maintenance.
Purchase only the software you need.**



3D Visual Programming

This programming software lets you easily teach and control hardware by placing items in an arm view so that it can be used by even programming novices.
It can also be used to create the framework for more complex programs.

Features

Visual teaching and control

Enjoy intuitive operation and teaching by clicking and dragging robots in the Arm Viewer. Since commands such as flow control instructions are shown on the robot's path, you can ascertain at a glance what operations are being performed on the path.

Convert created programs to PacScript

Programs created using 3D Visual Programming can be converted to PacScript, the DENSO Robotics development language. By converting the operational framework created in 3D Visual Programming to PacScript and then adding details, you can create programs that implement complex operations.

Simple programming by choosing from an extensive selection of block programs

Create programs using a flowchart simply by choosing and placing items in line with your application from an extensive selection of block programs. By making it easy to understand the overall program and identify locations that need to be changed, this approach can reduce programming man-hours.

Easy visualization and sharing of equipment operation

3D Visual Programming lets you visually express robot operation. You can easily visualize and share equipment operation, for example when explaining equipment structure to colleagues involved with your project, including production and maintenance personnel who are working with actual robots.

Optimized Motion Planner

When you specify the starting and ending points for a robot operation, the program will automatically generate the path with the shortest cycle time while avoiding obstacles. By allowing robot paths, the design of which until now has relied on user experience, to be generated scientifically, this capability lets both veterans and novices alike realize the same level of performance when operating robots.

Features

Fewer adjustment man-hours

By acquiring CAD data for peripherals in advance, determining starting and ending points, and automatically generating a path while avoiding peripherals, you can significantly reduce the number of man-hours spent on confirmation work using actual equipment and detailed teaching work.

Reduced takt times

The software helps shorten takt times by calculating the shortest path and generating waste-free robot movements while avoiding collisions with peripherals.

Execution procedure

Both veterans and novices alike can easily generate an optimal path using the following procedure:

(1) Import CAD data with the Robot Viewer*.

(2) Set the robot's starting and ending points.

(3) Set via points.

(4) Automatically calculate the path.

*Robot Viewer is a 3D viewer used by the various software components of WINCAPS Plus. It can also be used as a layout verification tool with robots and peripherals.

Return-to-origin guidance

Based on the assumption that the path taken by the robot during automatic operation is safe and free of obstructions, the software uses automatically collected information about the robot's path to generate a path by which it can safety return to the origin. Operations can also be partially played back in reverse.

Features

Elimination of the need to create complex programs

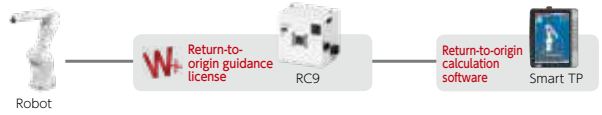
The software completely eliminates the need to spend an enormous number of man-hours on programming while painstakingly avoiding collisions with peripherals in order to return the robot safely to the origin.

Simple return-to-origin operation

Since the robot can easily be returned to its origin using a Smart TP, functionality is accessible to on-site operators who may not be familiar with robot operation.

System configuration diagram

■ Using the RC9



■ Using the RC8A

Robot Viewer

Robot Viewer is a 3D viewer used by the various software components of WINCAPS Plus. It makes it easy to import 3D CAD data and display CAD models in WINCAPS III. It can also be used as a layout verification tool with converted-output robots and peripherals. *Robot Viewer can be used with WINCAPS III.

Features

Easy import and output of 3D CAD data

Robot Viewer can import 3D CAD data in formats such as STEP, IGES, VRML, and X*. It can also convert CAD models and output them in the VRML and STL formats.
*We plan to add Parasolid support in the future.

Use as a layout verification tool

Robot Viewer can also be used as a layout verification tool with robots and peripherals. Model structure and placement are managed easily using a tree. The ability to simplify and compress or expand placed model shapes makes layout verification easy.

Palletizing Builder

Palletizing Builder simplifies everything from simulating to executing palletizing and depalletizing processes. Once you enter the shape and dimensions of the pallet and cargo, the software performs a series of automatic calculations and displays target positions that take the robot's movable range into account.

Features

Simplifying time-consuming teaching for palletizing and depalletizing

Palletizing Builder dramatically reduces the amount of teaching required for palletizing and depalletizing processes, which until now have required time-consuming programming. Combine with the high-payload, long-arm-reach VMB series and VLA series for an even broader range of uses.

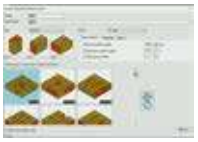
Easy simulation of loading method, weight, and other parameters

The software makes it easy to set pallet and box sizes. The ability to simulate the optimal box loading method, stack height, and weight for pallets helps save man-hours.

Simple operation

Set the box size.

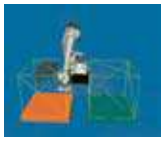
Set the pallet size.



Set the loading method for the pallet.

The software automatically calculates the stack height based on the height settings.

The loading method for each level can be easily customized.



Simulations take into account the robot's movable range.

System Requirements

The following environment is recommended:

	Palletizing Builder	Optimized Motion Planner	Robot Viewer	3D Visual Programming
OS	Windows 10/64 (Version 1803) or later			
Screen size	WXGA (1280×800) or better	Full HD (1920×1080) or better		WXGA (1024×768) or better
CPU	2-core 2 GHz or better	4-core 2 GHz or better		
RAM	8 GB or more	16 GB or more		
GPU	—	Discrete GPU recommended (reliance on onboard graphics is not recommended)		
Other	Microsoft .NET Framework 4.7.2 or later			Microsoft .NET Framework 4.7 or later

*These applications assume that WINCAPS III has been installed on the same computer.

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 EVP2 Easy Vision Picking 2

■ EVP2 is an image processing application that adds significantly enhanced functionality to EVP's simple operation.
EVP2 is a programing-free image processing application specially developed for use with a "pick & place" robot.
This software offers enhanced functionality and several times greater processing power than the previous EVP application, while maintaining the same ease of operation.

■ EVP2 consists of EVP2 Guidance and EVP2 Runtime.
Image processing operations can be set using the application (EVP2 Guidance) that runs on a PC.
When EVP2 Runtime is running, only the robot controller and connected camera are required for operation.

EVP2

EVP2 Guidance (PC software)
*Option available at additional cost

Features: Simple setup of image processing flow without programming

Versatile search function
- Shape search
- Contrast search
- Blob search
- Color search
- Auxiliary search

Convenient functions
- Model masking
- Search area editing
- Detection method selection

EVP2 Runtime (built-in robot vision software)
*Option available at additional cost

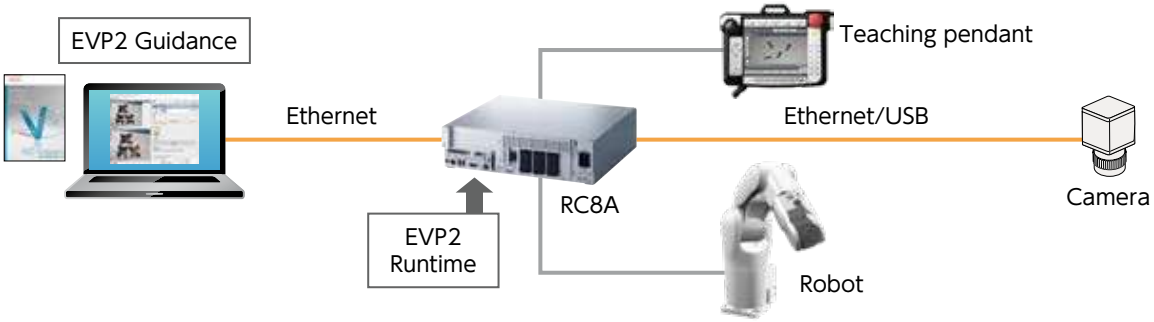
Features: Cut costs with a robot controller that includes a built-in robot vision application for image processing.

Simple configuration
- No PC required
- No visual controller required
- No communication program required for sending image processing results to the robot
- A wide range of compatible cameras

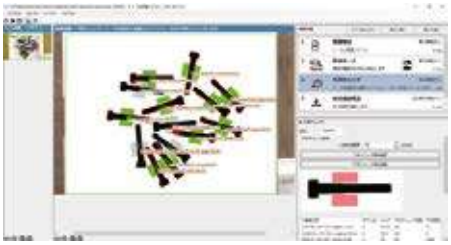
Robot controller with built-in vision application

Features: Significantly improved image processing library and faster image recognition speed (as compared to EVP)
- Contrast search
- Shape search
- Blob search

System configuration diagram



Enhanced basic functionality: Improved robot vision functions



Interference check function

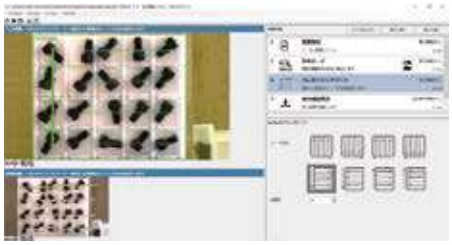
This function prevents the end effector from colliding against adjacent workpieces when grasping the detected workpiece.

Part presence detection function

This function determines whether the detected workpiece is located within the specified area. The area can be specified based on the check direction, the number of longitudinal divisions and the number of lateral divisions.

Part distribution detection function

The position of the feeder can be controlled by dividing the area and accurately identifying the location of each part.



Palletizing sort function

This function sorts the detected workpieces according to the specified rule. The workpiece sort sequence can be decided based on the sorting direction and the number of divisions.

Operating environment

[O S] Windows® 7 / 8 / 10
[P C] CPU: 2 GHz or faster multi-core processor, RAM: 4 GB or more, HDD: 4 GB or more
[Robot controller] RC8 Ver. 2.11.1 or later, COBOTTA Ver. 2.11.1 or later
RC8 □-□□□□ —□□E□ — □□ — □□□
(For more information about robot controller models, see "Controller Models" [ID:1314] in DENSO ROBOT USER MANUALS.)

[Recommended cameras] Basler GigE camera (ace series)
iDS USB camera (uEye SE series)
Canon network camera (WebView Livescope series)
Canon network camera (N10-W02)

*Windows is a trademark or registered trademark of Microsoft Corporation in the U.S. and / or other countries.

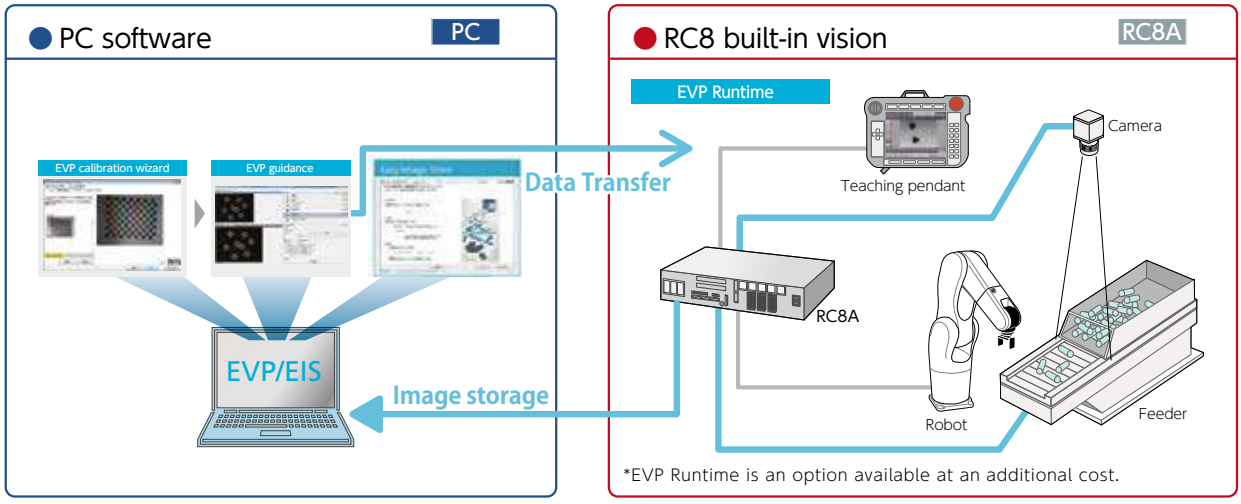
*For more information about EVP, please contact our sales representative.

2nd EIS Easy Image Store

Overview of EIS

EIS is a software to store the images of cameras connected to RC8A. Images taken by the built-in image processing application (EVP) in RC8A are temporarily stored in RC8A and reset when power is turned off. With EIS, the images can be stored automatically in PC as image files.

Expanded image



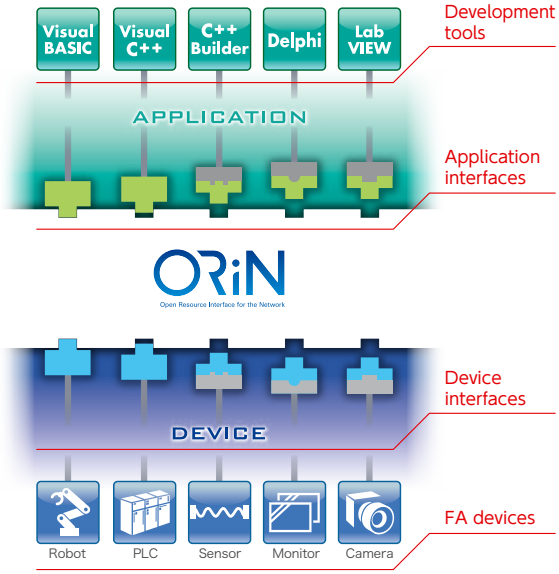
System requirements: [OS] Windows® 7 / 8 / 10 [PC] CPU: 2 GHz or faster multi-core processor, RAM: 2 GB or more, HDD: 1 GB or more
[Camera] Basler GigE camera (ace series), iDS USB camera (uEye SE series), Canon network camera (WebView Livescope series)

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 ORiN®2 specification.

- 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, etc.

Create an original provider

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

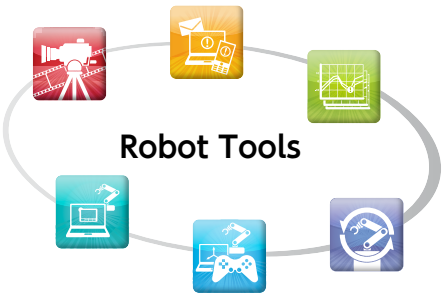
Package Type	ORiN®2 Software Development Kit (Ver. 2.1.21)											
	Provider Development			Runtime + Utilities Set			Runtime			DENSO Products		
Purpose	Provider Development + Execution Environment			Execution Environment + Expanded Components			Execution Environment			Execution Environment (limited 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, RAM: 512 MB or more, HDD: 500 MB or more

Robot Tools

Robot Setup / Maintenance Support Tools



Robot Tools comprises a suite of utility software that supports optimum maintenance and operation of DENSO Robotics.

● It can be used to streamline daily maintenance work and reduce post-installation running costs of robots.

Product features

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

Image Logger

This software helps identify the cause of sudden equipment issues and assembly problems. It captures video before and after issues occur along with associated equipment data (I/O, variables, etc.). By reviewing the video and data, you can pinpoint the cause of the issue and improve the equipment accordingly.

Mobile Monitor

This software monitors controller status and provides email notification of anomalies and other equipment issues, for example to remote workers' mobile phones, so that quick action can be taken.
It helps improve maintenance and streamline operations.

Control Log Analyzer

This software acquires control logs from a specified controller and automatically generates a graph display. It can analyze a robot's control status (for example, to detect problematic waveforms), and it stores the control log as a database so that it can be compared with past data. It helps improve maintainability and helps users visualize (quantify) errors.

Virtual TP

When the controller is in manual mode, this software serves as a virtual teaching pendant running on a PC so that the controller can be configured (GUI) and monitored remotely. It also improves maintainability and aids in configuration when operating without a mini pendant or teaching pendant.

GP Operator

This software lets you connect a robot controller to a PC and provides simple robot control using a mouse or game pad. It also helps developers perform teaching work by allowing them to teach specified variables (P, J, and T types) and control robots using a PC.

Easy Backup

This software creates and restores full backups for multiple controllers. The ability to automatically create full backups reduces work times, while the ability to restore full backups helps speed recovery in the event of a problem.
It helps improve maintenance and streamline operations.

EMU

Robot Simulations

EMU (Enhanced MUlti-robot simulator) is a 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.

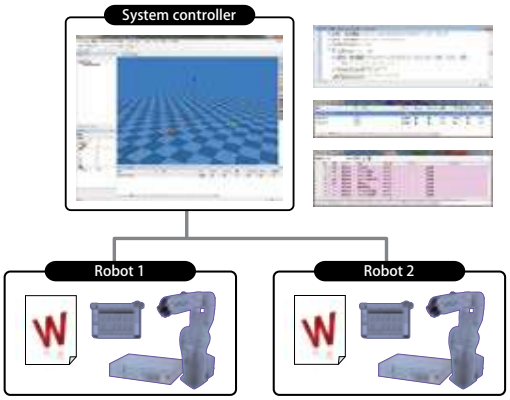
Patent No. 4834816

Features

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

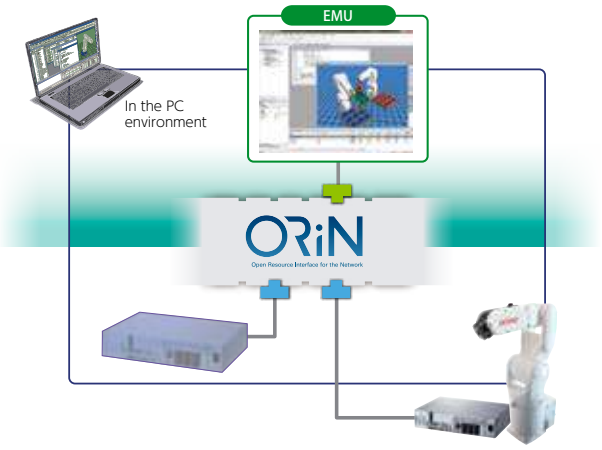
Sequence control

You can control all operating sequences for the entire system 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 conveyors and loaders without using the actual equipment.

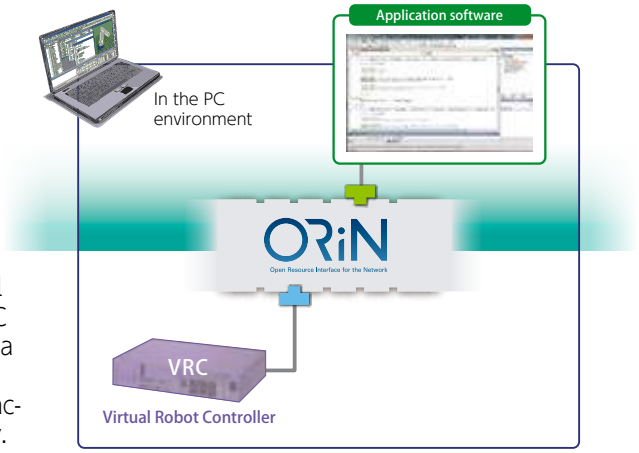
Software

VRC / VRC9

Virtual Robot Controller

As an RC9/RC8A (robot controller) virtual robot module, VRC provides a robot controller virtual environment on a 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 RC9/RC8A (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, RAM: 2 GB or more, HDD: 1 GB or more
*Usage of VRC will also require the purchase of the ORiN®2 SDK.

Software

Mobile Tools

Applications for smart devices

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

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 (RC8A) 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 5.0 to 10.0, 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/

DENSO Robotics Main Functions

Master/slave function Option available at additional cost

This remote control function operates a remotely located manipulator (slave) using instructions from a control device (master).

Supported robots: All models of RC9/RC8A-compatible (slave) DENSO 5- and 6-axis robots

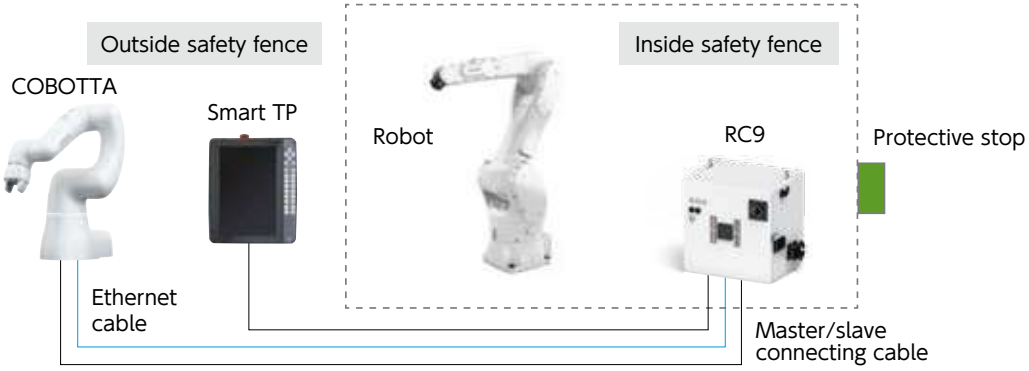
Safe, intuitive control and teaching system

Using a COBOTTA collaborative robot as a master device, you can intuitively control a large robot by operating the COBOTTA's arm. You can also use the robot's virtual fence function to specify the slave robot's movable range to ensure safety.

- Realize intuitive robot teaching and control, even if you're not familiar with programming.
- The ability to control the robot from outside a clean environment such as a pharmaceutical manufacturing process lets you keep out foreign materials and prevent worker contamination. *1

Use of this capability requires a master/slave expansion function license.

System configuration diagram



Master robot

COBOTTA

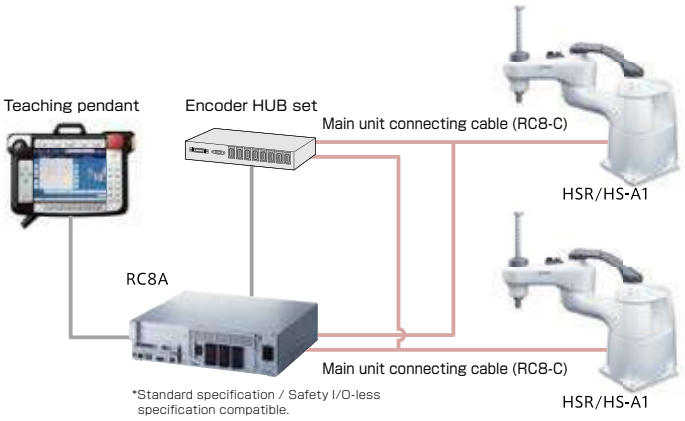
Item	Specifications
Arm length (No. 1 arm + No. 2 arm)	342.5 (165 + 177.5) mm
Rated payload (Maximum payload)	0.5 kg (0.7 kg within ±10° with the wrist angled downward)
Position repeatability	±0.05 mm
Protection grade	COBOTTA unit: IP30 AC adapter, AC cable: IP20

*1: For safety reasons, use is limited to a maximum cable length of 20 m and the area within which the slave robot is visible.

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.

System configuration diagram



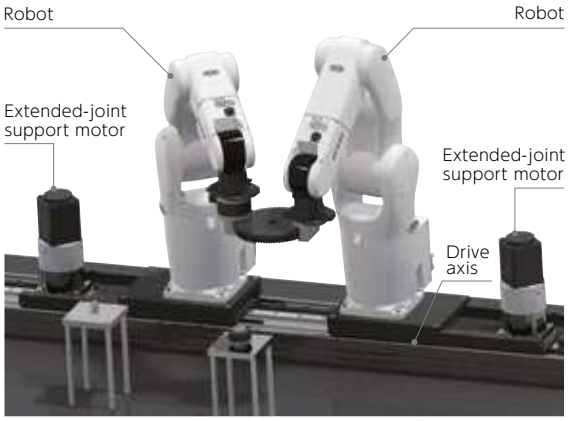
*Standard specification / Safety I/O-less specification compatible.

Supported Robots

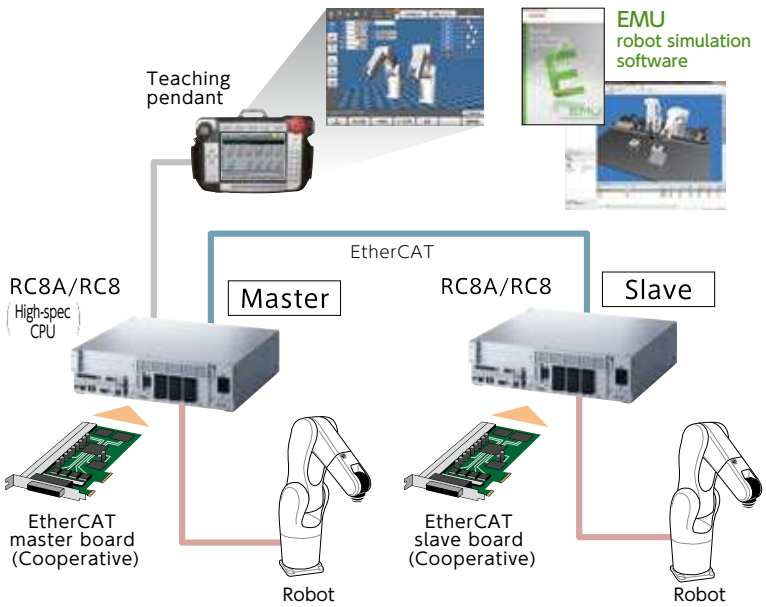
HSR, HS-A1

Cooperative control Option available at additional cost

The cooperative control function implements synchronized operation of multiple robots, allowing the transport or assembly of large or heavy objects that would be difficult to accomplish with a single robot. The ability to create and execute programs for multiple robots using a single controller simplifies programming and configuration.



System configuration diagram



Main applications

Transport and assembly of large or heavy objects.

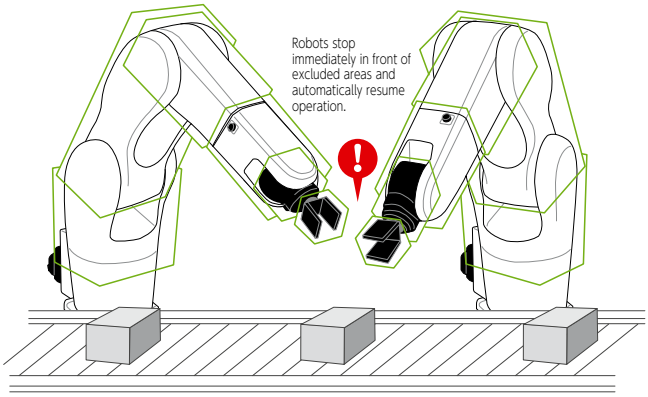
Supported robots

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

Exclusive control Option available at additional cost

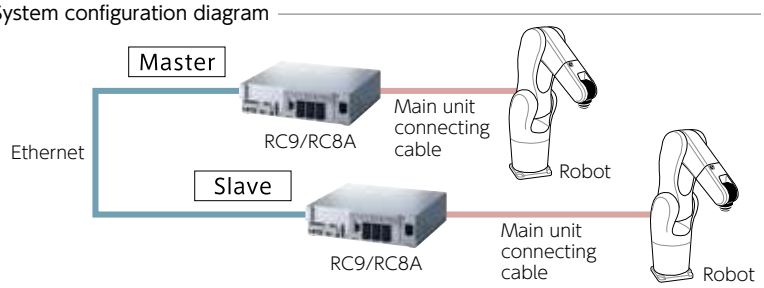
Entry of multiple robots into excluded areas can be controlled.

This function restricts entry into the work area to one robot when a work area is being shared by multiple robots. Entry into exclusive areas is prohibited by decelerating or stopping other robots that attempt to enter.



*A maximum number of exclusion controllable robots is 4.

System configuration diagram



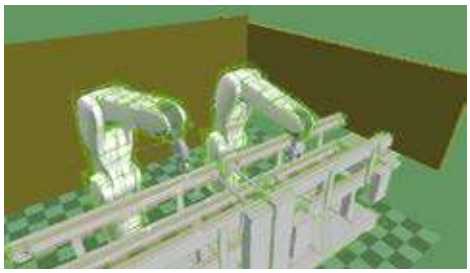
Supported Robots

All robot models compatible with RC9 or RC8A

Virtual fence Option available at additional cost

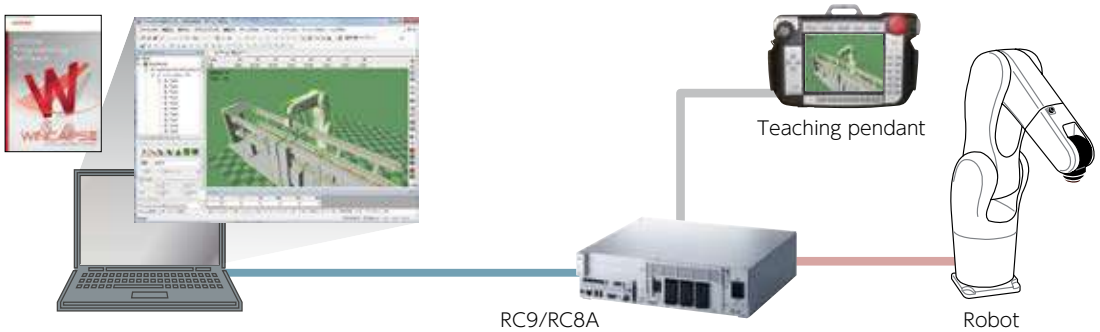
Eliminates interference between robots and peripherals.

This function models robots, tools, and other equipment and prevents collisions between monitored models.



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

System configuration diagram



Supported Robots

All robot models compatible with RC9 or RC8A

Conveyor tracking Option available at additional cost

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

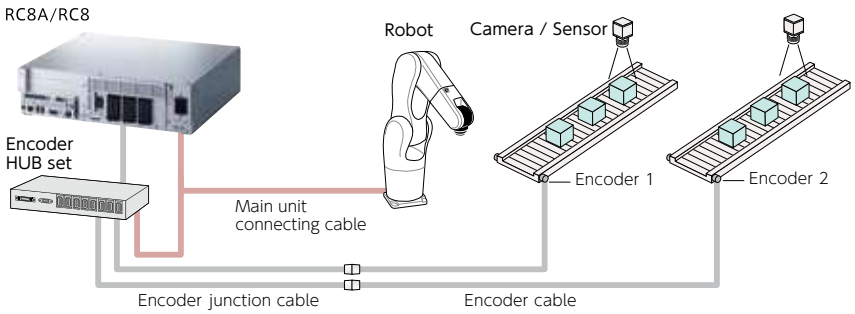
Sensor tracking

This function registers the position of workpieces crossing in front of a photoelectric sensor in advance, calculates where each workpiece will move, and controls the robot so as to track it.

Vision tracking

This function registers the position and orientation of workpieces detected by a vision sensor using image recognition, calculates where each workpiece will move, and controls the robot so as to track it.

System configuration diagram



Easy, wizard-style setup

Main applications

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

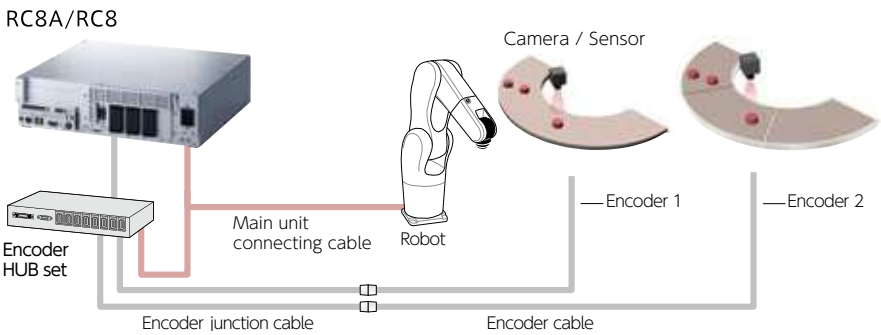
Supported Robots

All robot models compatible with RC8A

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 a wizard-type GUI similar to the conventional linear conveyor tracking.

System configuration diagram



Supported Robots

All robot models compatible with RC8A

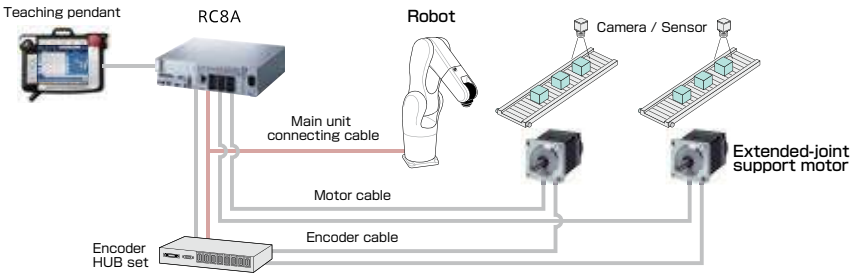
Extended-joint tracking Option available at additional cost

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

System configuration diagram



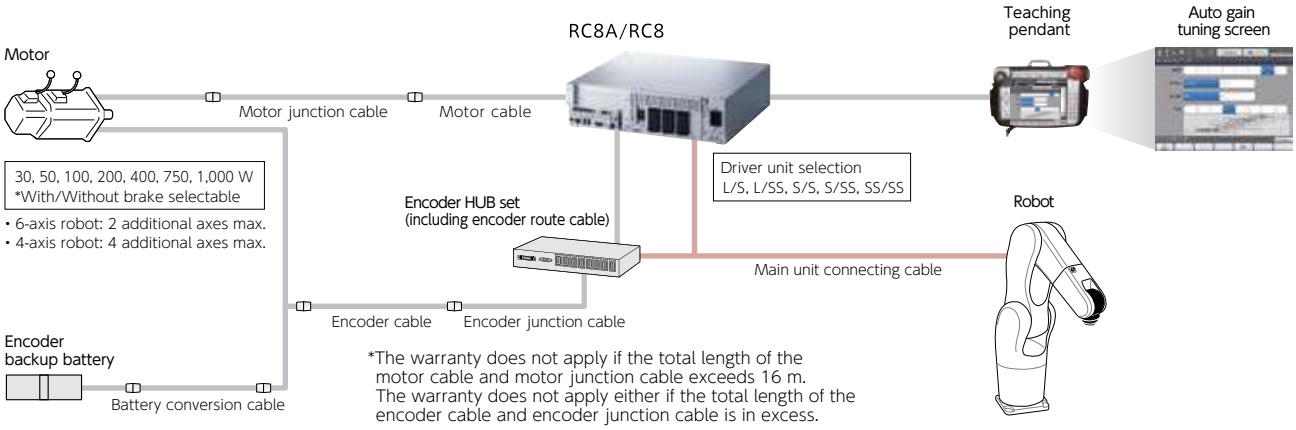
Extended-joint support control Option available at additional cost

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

System configuration diagram

This function makes it possible to control a robot's peripheral devices, for example a drive axis, servo hand, or tray changer, as an extended-joint support using the same interface as the robot.

System configuration diagram



Main applications

Robot drive axis / servo hand, device to determine position

Supported Robots

All robot models compatible with RC8A

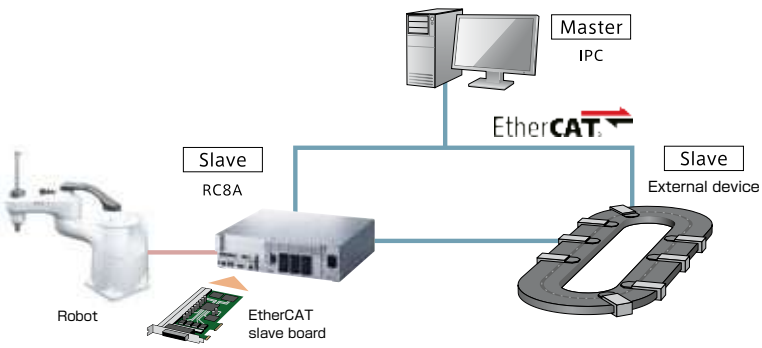
EtherCAT Slave motion Option available at additional cost

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

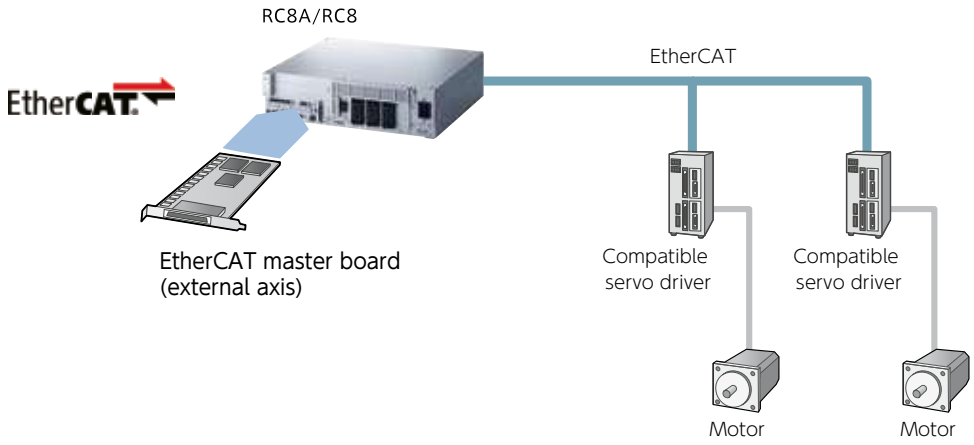
System configuration diagram



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



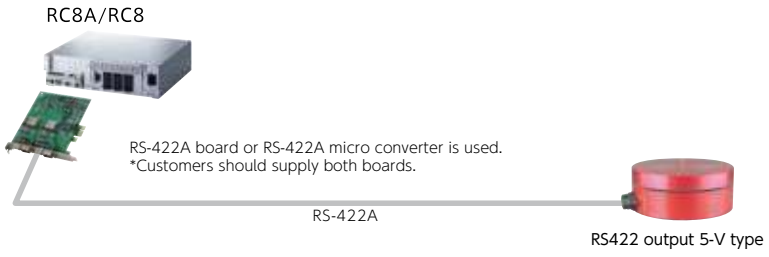
Supported servomotors

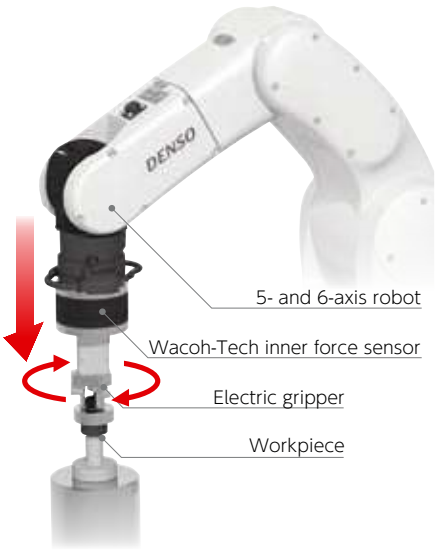
Sanyo Denki Co., Ltd.: SANMOTION R ADVANCED MODEL EtherCAT (H-type only)
HIWIN CORPORATION: D1-N / D2T AC servo motors & Linear motors
Delta Electronics, Inc.: ASDA-A2-E
Panasonic Corporation: MINAS A5B/A6B

Compliance control Function with force sensor Option available at additional cost

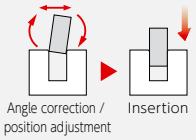
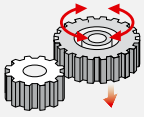
Feedback control from a force sensor and DENSO exclusive strength control algorithm enable detailed copying, fitting and press action. Dedicated GUI allows monitoring of feedback values from the force sensor and enables force control settings to be adjusted to aid reduction of man-hours to startup.

System configuration diagram





Main applications

Copying action at insertion of parts	Fitting needed in assembly	Press action such as applying constant pressure
		
Angle correction / position adjustment / Insertion		

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

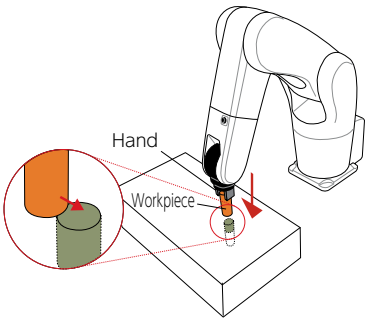
Supported Robots

All models of RC8A-compatible DENSO 6-axis robots.
All models of DENSO 4-axis robots.
*Internal wiring can be used with VS050, 060, 068, and 087 models with communication interface flange-A.

Compliance control function

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

This function can be used to control force returning to the motor on each axis to absorb misalignment. It's effective when used in work that involves contact with the target object, for example when mating or fitting together parts.



Force limitation is applied to the vertical motion of the robot.

↓

Enables the robot to have a spring function.

Main applications

Product assembly

Supported Robots

VP series
VS series: 050 / 060 / 068 / 087 / 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).

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.

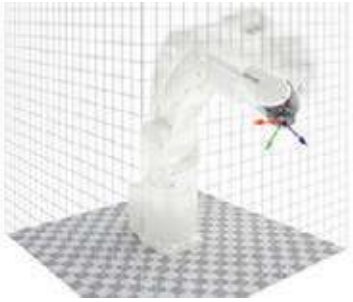
Benefits

Absolute accuracy, one of the three types of robot accuracy, has been improved to yield the following benefits:

The worktime in re-teaching when robots are exchanged is reduced.
Replacing one robot for which high-precision calibration has been performed with another reduces disparities between teaching points and shortens adjustment times after replacement.

Increased vision correction accuracy
Improved vision and correction accuracy of 2D/3D vision picking that is subject to rotation and posture change make it possible to grip workpieces more precisely.

Increased accuracy for tool offsets
This improvement shows its worth in tasks like the alignment or assembly of minuscule workpieces that require accuracy.



Hi-CAL High-Accuracy Calibration

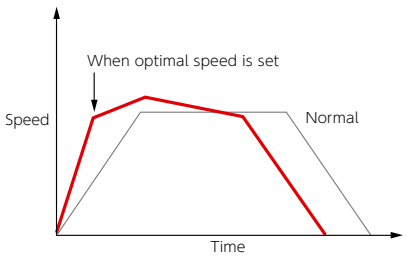
Supported Robots

VS-050 / 060 / 068 / 087 standard type

Optimal speed setting

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

The weight and location of the center of gravity of tools and workpieces attached to the end of a robot arm cause the optimal speed and acceleration to vary. Optimized speed control allows the user to set the weight, location of the center of gravity, and mode for tools and workpieces based on the robot's end load and posture.



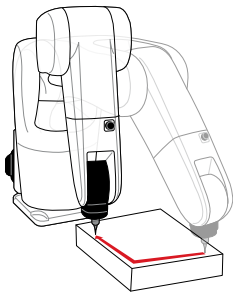
Supported Robots

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

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.

Increases the accuracy of the robot's operational path.
Increases the accuracy of the operational path, particularly during high-speed arc motion and free curve interpolation control.



Main applications

Sealant and silicone adhesive coatings

Supported Robots

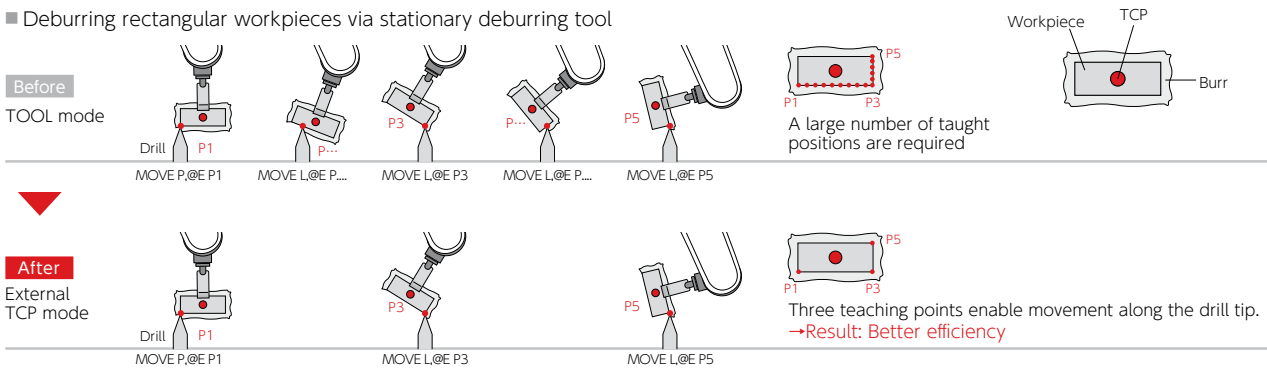
VP series
VS series: 050 / 060 / 068 / 087 / 6556 / 6577
VM series, HSR® series, HS-A1 series, HM series, XR series

External TCP Option available at additional cost

Rotation around a defined center point of the workpiece allows for an easier method of teaching based on target objects.

The external TCP function reduces the number of teaching points when performing CP operation (linear or arc) while the robot is holding a workpiece, for example when you wish to remove burrs from the workpiece using a drill that's mounted on the device or when you wish to apply a sealant coating to a workpiece using a mounted sealant gun.

■ Deburring rectangular workpieces via stationary deburring tool



Main applications

Deburring and sealant coating

Supported Robots

All robot models compatible with RC9 or RC8A

Control panel function

The teaching pendant screen can be customized as a control panel of robot and peripheral devices.

WINCAPS III, the offline programming software, can create screens from PC.

Supported Robots

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

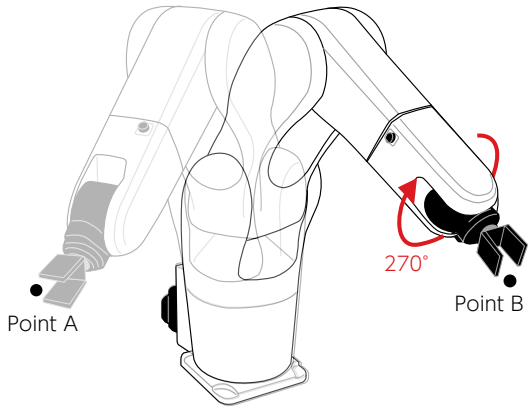
Autofig

Automatically calculates the optimal “figure” for motion to a designated position, reducing takt and teaching time by eliminating unnecessary movement.

■Movement from point A to point B

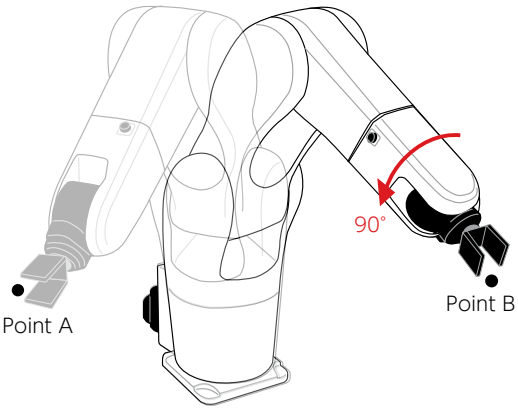
Before

Only the movement between A and B is recognized, which will result in useless motion.



After

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



Main applications

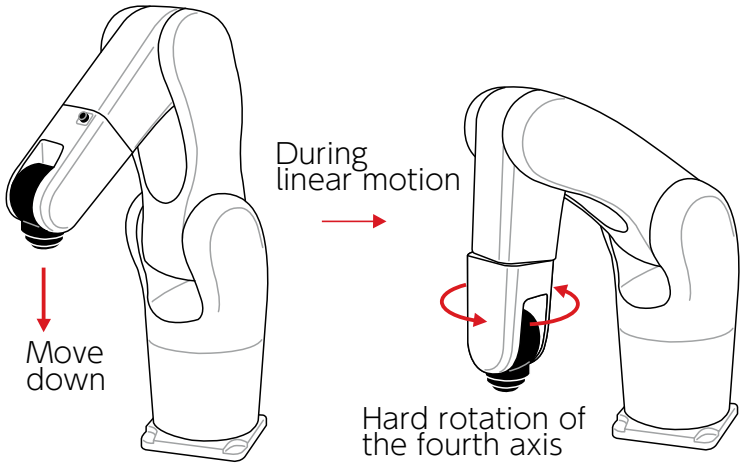
When used with a program that employs a palletize library

Supported Robots

All robot models compatible with RC8A

Singular point avoiding function

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



Main applications

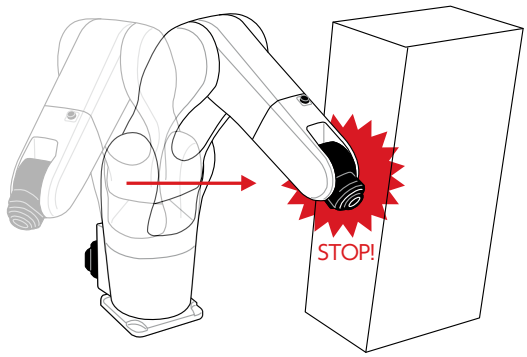
When used with a program that employs a palletize library

Supported Robots

VP Series
VS series: 050 / 060 / 068 / 087 / 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: 050 / 060 / 068 / 087 / 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

All robot models compatible with RC8A

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.

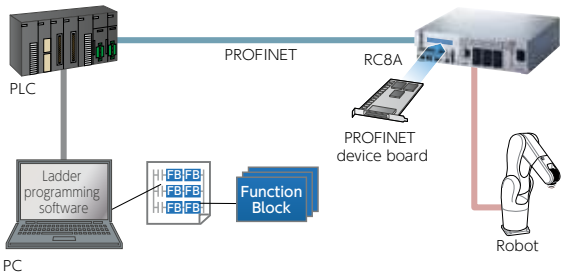
Supported Robots

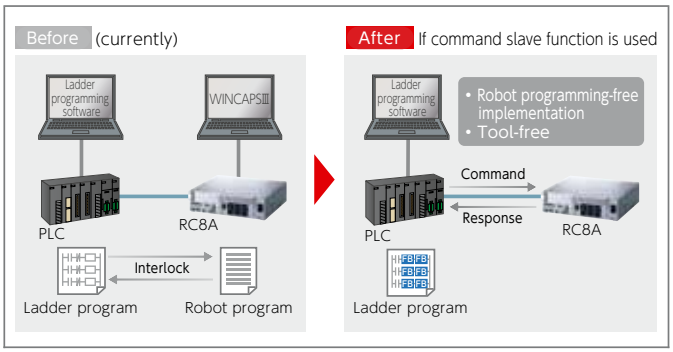
VP series
VS series: 050 / 060 / 068 / 087 / 6556 / 6577
VM series, HSR® series, HS-A1 series, HM series, XR series

Command slave Option included

Robots can be controlled from PLC languages (ladder programs).
Function block (FB) supports 130 types of robot commands.

System configuration diagram





Main applications

Robot control from PLC

Supported PLCs

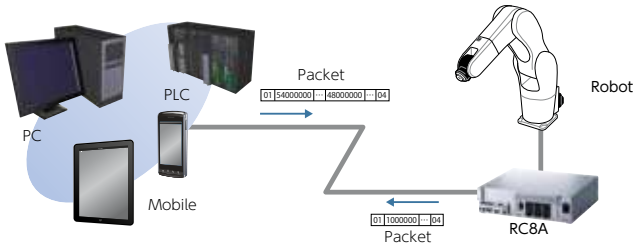
SIEMENS: SIMATIC S7-1500
Rockwell Automation: Model Compatible with STUDIO 5000 Logix Designer Version 30
CODESYS V3

Supported Robots

All robot models compatible with RC8A

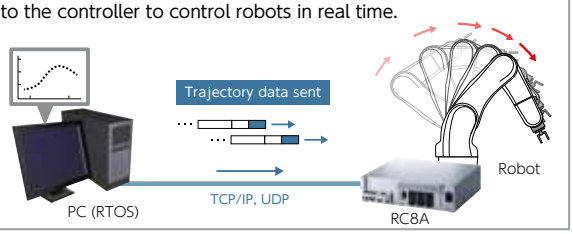
b-CAP (communications protocol)

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



b-CAP slave Option included RC8A

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



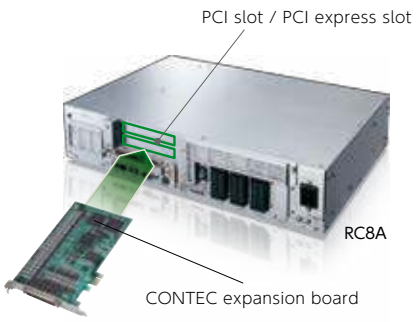
*Use of the EtherCAT slave board (Motion) enables EtherCAT communication.

Supported Robots

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

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)

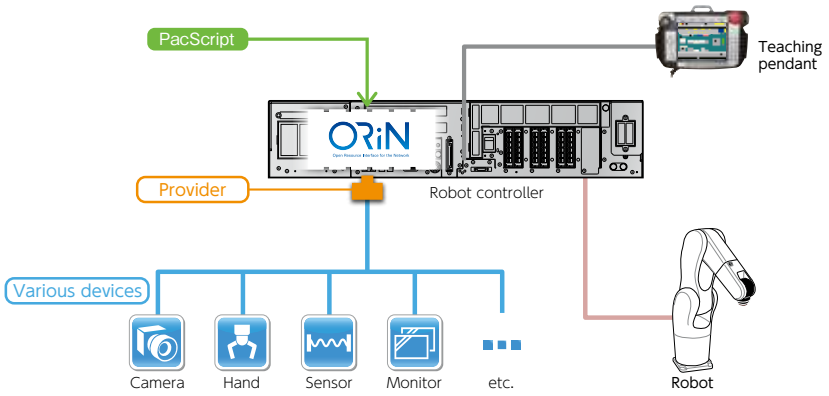
Supported Robots

All robot models compatible with RC8A

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).

Basic configuration



Supported product list

Category	Manufacturer	Product / Series
Robot	Yamaha Motor Co., Ltd.	SR1 / DRCX / RCX
	IAI Corporation	P-CON / E-CON / SEL
Image processing equipment	OMRON Corporation	FZ3 / FZ4 / FZM1 / FZ5 / FH / FQ-M / FQ2
	Keyence Corporation	XG / XGX/ CV / CVX
	Panasonic Industrial Devices SUNX Co., Ltd.	PV series
	Cognex Corporation	In-Sight series
	Sharp Manufacturing Systems Corporation	IV series
	Canon Inc.	VB-H43B / VB-M42B
	Matrox	Matrox Design Assistant
	Leimac Ltd.	IPPA series
	BAUMER	VeriSens Smart Camera
	SICK	PLOC2D series
Non-contact IC card reader/ writers	DENSO Corporation	PR-450, PR-550, QK12-IC
QR Code scanners	DENSO Corporation	Active USB-COM port driver compatible models
RFID reader/writers	DENSO Corporation	SE1-HU-P
Parts feeders	flexfactory	anyfeed series
	Asyril	Asycube series
Servo hands	KOGANEI Corporation	EWHA series
Network modules	Balluff	BNI EIP-507-005-Z040 EtherNet/IP IO-Link masters BNI004A, BNI009T, BNI006A, BNI007N, BNI00AA
Sensors	Wacoh-Tech Inc.	DynPick series
	ATI	F/T models
Displacement sensors	KEYENCE	LJ-V7000, LK-G3000, LK-G3000P, LK-G3000V, and LK-G3000PV
Laser markers	KEYENCE	MD-X1000, 1500, MD-F3200, 5200, MD-U1000, and ML-Z9600
Modbus RTU/ASCII/TCP	—	—
Printers	EPSON	Models that support ESC/POS commands
Lightweight modules	MettlerToledo	WMF204C-W/IE
Torque sensors	Daiichiseiko Co., Ltd.	ESTORQ / ES-Gripper
LED lighting	CCS Inc.	PD3 series
	Optex FA Co., Ltd.	OPPD 30E

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-M80: BHT-M60 series

Android™ 10 for exceptional communications capabilities and operational expandability

- The product line includes the BHT-M80, which features a large, 5.0" display, and the BHT-M60, which combines a 3.2" display designed for maximum ease of use and a keypad.
- Built with best-in-class drop resistance to withstand daily use.

QR code solutions

● Face authentication SQRC

Provides rigorous authentication performance, making it ideal for applications such as the detection of credentialed users.

- Data describing facial characteristics is converted into a secure QR Code (SQRC) to enable authentication without requiring new servers or other equipment.
- One-on-one offline authentication that avoids storing personal information on a server reduces security risks.

UHF-band RF tag high-power handy scanner

● SP1

The world's highest reading performance

- Streamline operations with scan speeds of up to 700 tags per second and a scan range of about 8 m.
- DENSO's proprietary RFID verification app features smooth deployment and stable operation.

UHF-band RF tag fixed scanner

● UR40 / UR50

UR40 UR50

Reliable scanning, even on high-speed conveyor lines

- The UR40 delivers long-distance scanning at distances of up to 8 m. *1
- The UR50 delivers scanning at super-close distances of 5 mm to 50 cm (when using an expansion antenna).
- High-speed scanning at up to 600 tags per second helps reduce lead times. *2

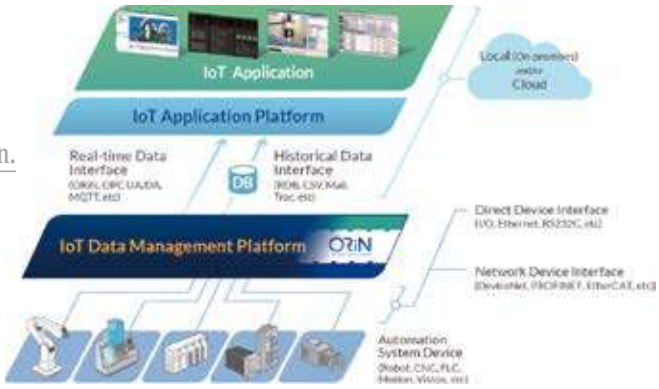
*1: With linear polarization.
*2: Subject to country- and function-specific limitations. Reference values; performance varies with actual environmental conditions.

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]

Installation-free design for immediate use

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

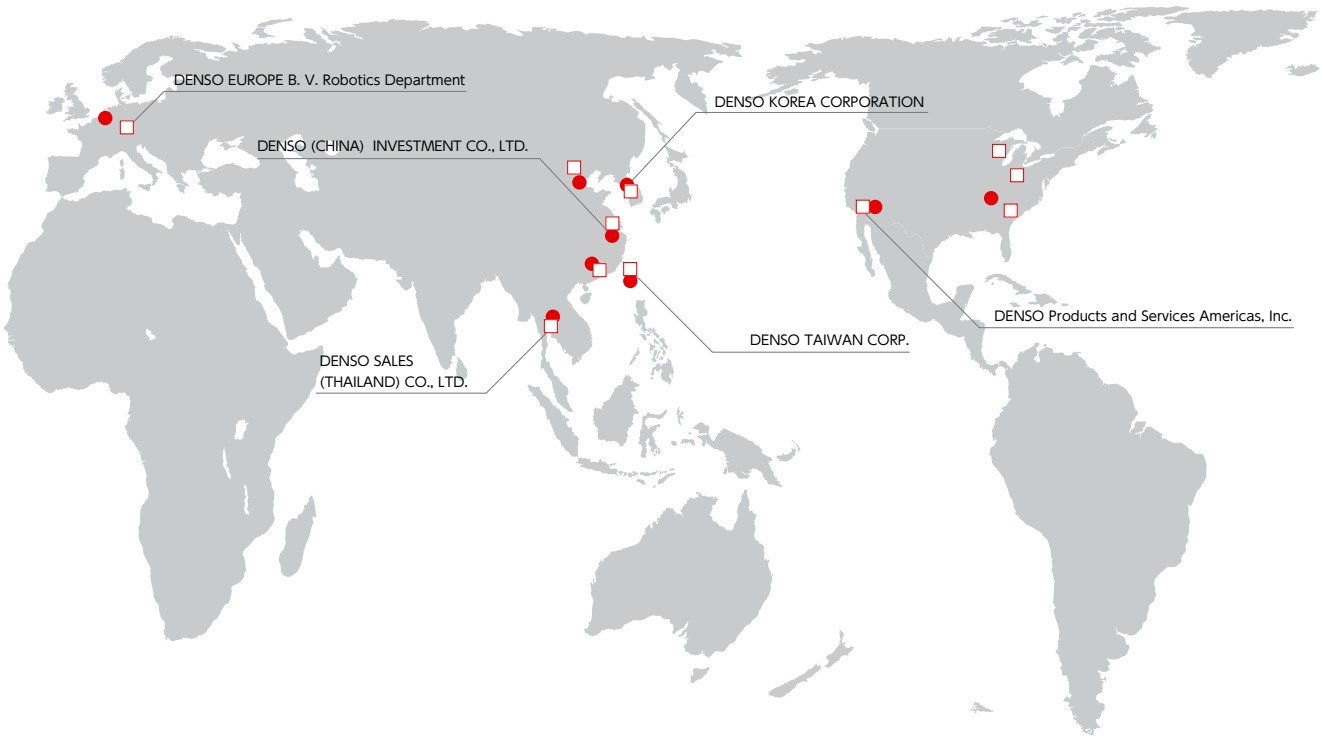
IoT Data Share

[Data Integration Software]

Easy setup with thanks to 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.

Global Network



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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.

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