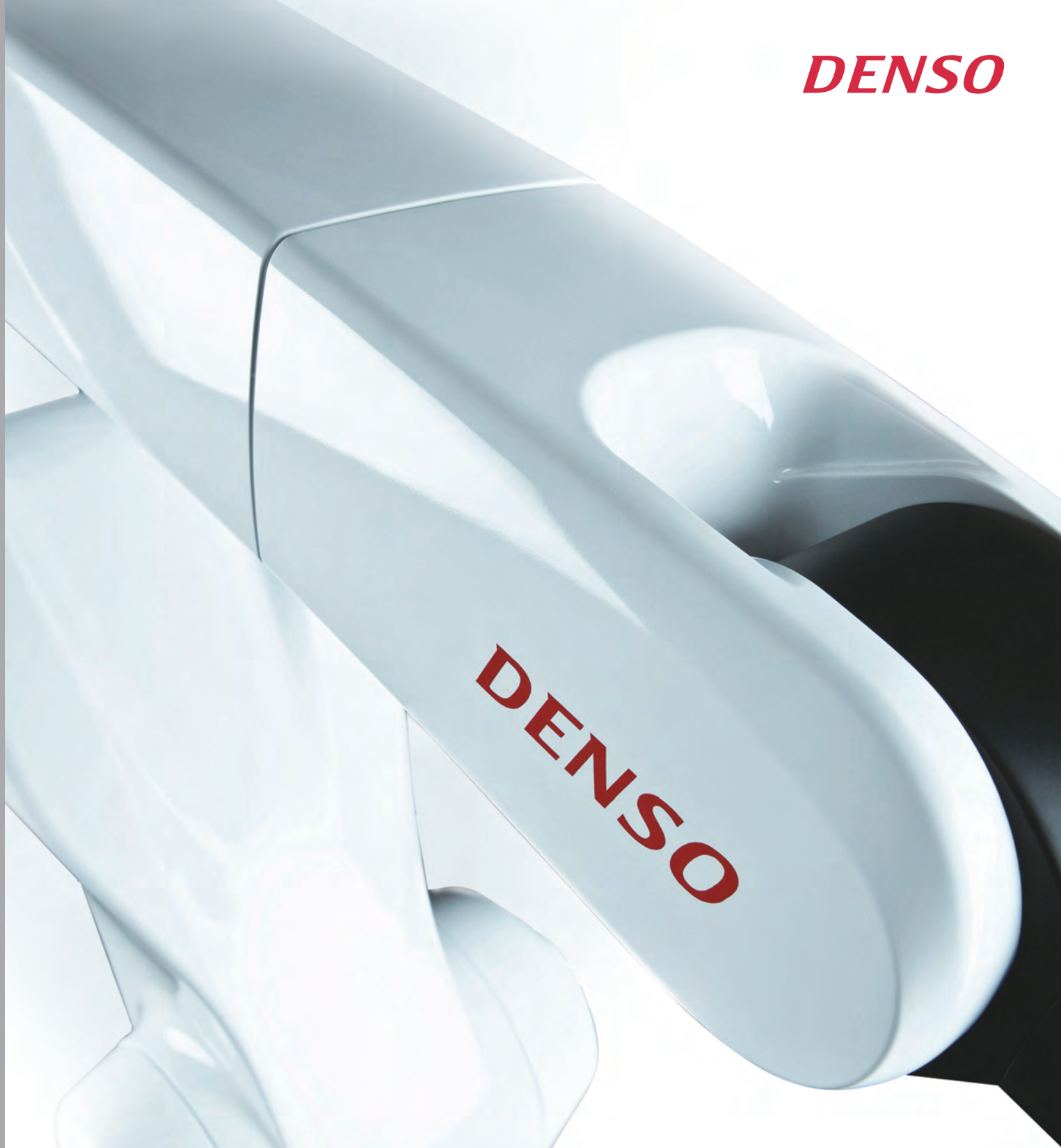
DENSO



DENSO Robotics

www.densorobotics.com

DENSO

Technology & Humanity

Experts of factory creation to achieve a healthy working environment and high productivity.

Developing various in-house factory automation (FA) systems, the DENSO Group provides a flexible manufacturing system to meet the needs of a diversified marketplace. Our FA division provides products for a wide variety of customer applications based on the proven experiences of core technology and devices in our cutting-edge factory automation. DENSO Robotics are one such product line.
In continuing effort to overcome the challenges of factory automation, including high quality standards, maintaining productivity, and shortened production lead times, the DENSO Group's manufacturing technical skill culminates in the DENSO Robotics. DENSO contributes to global manufacturing and promotes automation for a large number of clients worldwide with solutions of highly reliable quality and high performance in variations to support a variety of needs.

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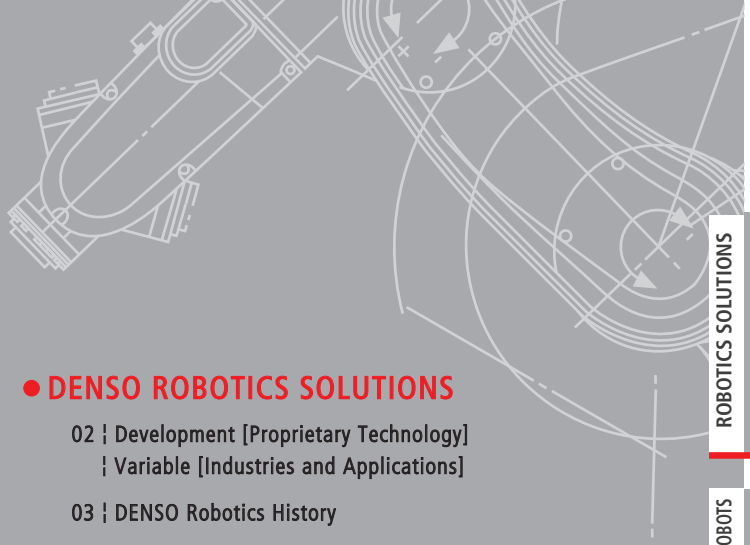

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Development

[Development strength]

Cultivated in automobile parts development, DENSO's proprietary development skills use advanced technologies to achieve high performance and high quality

For the high productivity and low cost demanded by all production equipment, DENSO Robotics is continuously evolving.
The DENSO Group develops unique products by combining advanced technical skills and variability gained from its automotive parts development that include improved speed and accuracy for high productivity, compactness for high variability and smaller footprint, and energy saving to minimize electricity costs.
Our strict quality control ensures high performing, reliable DENSO Robotics.
Such dedication to meeting the needs of its many clients earns DENSO their trust.

Variable

[Adaptability]

Proven technology for every application, in a number of industries with a list of case studies.

[Industries]

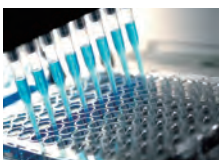
- Automotive and automobile parts
- Electronics
- Semiconductors
- Metal processing
- Machine tools
- Chemicals
- Plastics
- Medical devices
- Pharmaceuticals and cosmetics
- Food
- General manufacturing
- Agriculture

And many others

[Applications]

- Pick & place
- Inspection
- Mounting / removal of workpieces on machine tools
- Coating
- Screw tightening
- Assembly
- Wrapping and packaging
- Deburring
- Laser welding and soldering
- Labeling

And many others





History of the DENSO Robotics

[History]

Globally pre-eminent high product quality cultivated by technical skill and know-how gained from our long history of experience.

Robot Controller

RC8

RC7M

RC5

RC3

DENSO Robotics

2015 Medical and pharmaceutical robot VS-050S2 series released

2014 Medical and pharmaceutical robot VS-050S2 series wins Good Design Grand award

GOOD DESIGN

Medical and pharmaceutical robot VS-050S2 series

2012 Robot controller RC8

2011 DENSO 5- and 6-axis robots VS series (3rd generation)

VS-050 / 060 / 068 / 087

2009 First medical and pharmaceutical robot VP-G2 released in Japan

XR series

2008 Built-in robot XR series

2006 ORiN2 SDK released

2005 Robot controller RC7M

VP series

2004 DENSO 5- and 6-axis robot VP series

2003 DENSO 5- and 6-axis robots VM series

HS series

2002 DENSO 4-axis robots HS / HM series (2nd generation)
DENSO 5- and 6-axis robots VS-E series (2nd generation)

VS series

2001 Established DENSO WAVE INCORPORATED

2000 Sale of movable robot DM series

1998 Robot controller RC5

1992 First VS (1st generation) released

1991 Sale of DENSO Robotics off-site begins
First HM (1st generation) released

Mid-sized 6-axis robot

Mid-sized 4-axis robot

1985 In-house implementation of assembly robots started

1983 Mid-sized 6-axis robot (DEV code 560) developed

1982 Mid-sized 4-axis robot (DEV code 240 / DEV code 340) developed

1970 Manufacture of the first aluminum die-casting operation robot for actual use (implemented at our head factory)

The first aluminum die-casting operation robot

1967 Robot development started

47 years

When industrial robots first appeared in the early 1960s, DENSO began to develop and apply the emerging technologies to its own production processes. Since then, through a variety of robot development experience, over 80,000 DENSO Robotics are used across the globe. And now today, as the established market leader in the small assembly robot segment, DENSO continues to set the standard for reliability, flexibility and functionality.

DENSO Robotics

DENSO 5- AND 6-AXIS ROBOTS




VP Series

	VP-5243 / 6242	VP-6242G2 / 6242G2-S1
Maximum arm reach	430 / 432 mm	432 mm
Maximum payload	3 (*1) / 2.5 (*2) kg	2 kg
Position repeatability (*3)	±0.02 mm	±0.02 mm
Cycle time (*4)	0.99 sec (for 1 kg payload)	0.99 sec (for 1 kg payload)
Maximum composite speed	3,900 mm/sec	3,900 mm/sec
Options	● Standard type	● Standard type ● H_2O_2-resistant ● UL specifications
Detailed description	P.08	P.10

VS Series

	VS-050 / 060	VS-068 / 087
Maximum arm reach	505 / 605 mm	710 / 905 mm
Maximum payload	4 kg	7 kg
Position repeatability (*3)	±0.02 mm	±0.02 mm
Cycle time (*4)	0.35 sec〈RC8〉(for 1 kg payload) 0.37 sec〈RC7〉(for 1 kg payload)	0.31 / 0.34 sec〈RC8〉(for 1 kg payload) 0.33 / 0.36 sec〈RC7〉(for 1 kg payload)
Maximum composite speed	9,080 / 9,390 mm/sec〈RC8〉 9,000 / 9,000 mm/sec〈RC7〉	11,290 / 11,380 mm/sec〈RC8〉 11,000 / 11,000 mm/sec〈RC7〉
Options	● Standard type ● Protected type (IP67) ● Dust & splash proof type (wrist : IP65 / unit : IP54) ● Cleanroom type (ISO class 3/5) ● UL specifications (*5)	● Standard type ● Protected type (IP67) ● Dust & splash proof type (wrist : IP65 / unit : IP54) ● Cleanroom type (ISO class 3/5) ● UL specifications (*5)
Detailed description	P.14	P.16

DENSO 4-AXIS ROBOTS



Ceiling type

HS Series

HM Series

	HS-4535 / 4545 / 4555	HM-40xxx / 4Axxx
Arm reach	350 / 450 / 550 mm	600, 700, 850 and 1,000 mm
Vertical stroke	200 and 320 mm	200, 300 and 400 mm
Maximum payload	5 kg	10 / 20 kg
Position repeatability (*3)	±0.015 - ±0.02 mm	±0.02 - ±0.025 mm
Cycle time (*4)	0.35 sec (for 2 kg payload)	0.29 - 0.31 sec (for 2 kg payload)
Maximum composite speed	7,200 / 6,300 / 7,100 mm/sec	8,780 - 11,450 mm/sec
Options	● Standard type ● Dust & splash proof type (IP65) ● Cleanroom type (*9) ● UL specifications (*9) (*10) ● Ceiling type	● Standard type ● Dust & splash proof type (IP65) ● UL specifications (*11) ● Ceiling type
Detailed description	P.28	P.30

Dust & splash proof type

Cleanroom type

Robot controller supported RC7 RC8

Medical and Pharmaceutical Robots 6-AXIS ROBOTS

GOOD DESIGN AWARD 2014 GRAND AWARD

VS-6556 / 6577

	653 / 854 mm
	7 kg (*6)
	±0.02 - ±0.03 mm
	0.49 / 0.59 sec (for 1 kg payload)
	8,200 / 7,600 mm/sec
	● Standard type ● Dust & splash proof type (wrist : IP65 / unit : IP54) ● Cleanroom type (class 10/100) ● UL specifications (*7)

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VM Series

VM-6083 / 60B1

	1,021 / 1,298 mm
	13 kg (*8)
	±0.05 - ±0.07 mm
	0.89 / 0.95 sec (for 5 kg payload)
	8,300 mm/sec
	● Standard type ● Dust & splash proof type (wrist : IP65 / unit : IP54) ● Cleanroom type (class 100)

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VS Series

VS-050S2

Maximum arm reach	520 mm
Maximum payload	4 kg
Position repeatability (*3)	±0.02 mm
Cycle time (*4)	0.35 sec (for 1 kg payload)
Maximum composite speed	8,573 mm/sec
Options	● H_2O_2-resistant ● UL specifications (compliancy scheduled for FY2015)
Detailed description	P.18

BUILT-IN ROBOTS

XR Series

XR-43xxx

Arm reach	200, 250 and 300 mm
X-Axis stroke	450, 760 and 1,060 mm
Maximum payload	5 kg
Position repeatability (*3)	±0.015 mm
Cycle time (*4)	0.56 sec (for 3 kg payload)
Maximum composite speed	3,240 - 3,650 mm/sec
Options	● Standard type
Detailed description	P.32

*1: If wrist and neck downward movement exceed ± 45°, the maximum payload is 2.5 kg.
*2: If wrist and neck downward movement exceed ± 45°, the maximum payload is 2 kg.
*3: Position repeatability (center of tool mounting face) is the precision at constant ambient temperature.
*4: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm.
*5: RC8-compliant only.
*6: If wrist and neck downward movement exceed ± 45°, the maximum payload is 6 kg.
*7: RC7-compliant only.
*8: If the payload exceeds 11 kg, flange downward movement is limited to ±10°.
*9: Cleanroom type / UL specifications are for floor type only.
*10: Standard type is RC8- and RC7-compliant.
*11: Standard type is RC8- and RC7-compliant; Dust & splash proof type is RC8-compliant only.

DENSO 5- AND 6-AXIS ROBOTS

The DENSO lineup of 5- and 6-axis articulated robots offer an array of arm sizes in the VP, VS and VM series.

Built with joints similar to a human arm, these robots offer greater flexibility. Increased freedom of movement makes them suited to handle a much wider range of applications.

DENSO 5- and 6-axis articulated robots are ideal for the following industrial applications:

Applications

- Pick & place
- Inspection
- Mounting / removal of workpieces on machine tools
- Coating
- Screw tightening
- Medical product manufacturing
- Assembly
- Packaging
- Deburring
- Laser welding and soldering
- Labeling
- Various other applications

Main Features

- Cycle times: from 0.31 s to 0.99 s
- Position repeatability: from ±0.02 mm to ±0.07 mm
- Maximum composite speed: from 3,900 mm/s up to 11,380 mm/s
- Maximum arm reach: between 430 mm and 1,298 mm
- Maximum payload: 13 kg

Options

*For supported options, refer to the table on right.

- Standard type
- Protected type (IP67)
- Dust & splash proof type (wrist: IP65, unit: IP54)
- Cleanroom type class 10 / 100 (ISO class 3 / 5)
- UL specifications

VP

	VP-5243	VP-6242
Maximum payload (kg)	3 (*1)	2.5 (*2)
Maximum arm reach (mm)	430	432
Standard type	✔	✔
UL specifications	—	—

*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 2kg.

VP-G2 / G2-S1

UL specifications

VP-6242G2	VP-6242G2-S1
2	
432	
✔	✔
✔	✔

VS-050 / 060 / 068 / 087

Protected type (IP67)

Dust & splash proof type

UL specifications

	VS-050	VS-060	VS-068	VS-087
Maximum payload (kg)	4		7	
Maximum arm reach (mm)	505	605	710	905
Standard type	✔	✔	✔	✔
Protected type (IP67)	✔	✔	✔	✔
Dust & splash proof type (wrist: IP65 / unit: IP54)	✔	✔	✔	✔
Cleanroom type (cleanliness: Iso class 3 / 5)	✔	✔	✔	✔
UL specifications	✔	✔	✔	✔

VS-6556 / 6577

Dust & splash proof type

Cleanroom type

UL specifications

	VS-6556		VS-6577	
	Standard (J2 to J4 with brakes)	With brakes (J2 to J6 with brakes)	Standard (J2 to J4 with brakes)	With brakes (J2 to J6 with brakes)
Maximum payload (kg)	7 (*3)		7 (*3)	
Maximum arm reach (mm)	653		854	
Standard type	✔	✔	✔	✔
Dust & splash proof type (wrist: IP65 / unit: IP54)	✔	✔	✔	✔
Cleanroom type (cleanliness: class 10 / 100)	✔	✔	✔	✔
UL specifications	—	✔ (*4)	—	✔ (*4)

*3: If wrist downward movement exceeds ±45°, the maximum payload is 6 kg. *4: UL specifications are for all axes (single axis - 6-axis) with brakes.

VM

Dust & splash proof type

Cleanroom type

	VM-6083	VM-60B1
Maximum payload (kg)	13 (*5)	
Maximum arm reach (mm)	1,021	1,298
Standard type	✔	✔
Dust & splash proof type (wrist: IP65 / unit: IP54)	✔	✔
Cleanroom type (cleanliness: class 100)	✔	✔

*5: If the payload exceeds 11 kg, wrist downward movement is limited to ±10°.

VS-050S2

	VS-050S2
Maximum payload (kg)	4
Maximum arm reach (mm)	520
H_2O_2-resistant	✔
UL specifications (compliancy scheduled for FY2015)	✔

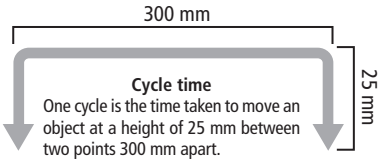
VP SERIES 430-432 mm

Supported Robot Controllers | RC8 RC7

The DENSO 5- and 6-axis robots VP series are perfect for installations where motion space is limited.

- Position repeatability : ±0.02 mm
- Cycle time : 0.99 s
- Maximum composite speed : 3,900 mm/s
- Maximum payload : 3 kg (VP-5243)
- Arm reach : 430 mm and 432 mm
- Mounting options : floor and ceiling
- Exceptional usability in restricted spaces : robot mounting surface is only 160 mm × 160 mm.
- Exceptionally lightweight specification : robot unit weighs only 13 kg (VP-5243).
- Energy saving : total capacity of all-axis servo motors used is 80 W or less. Total motor capacity is less than 300 W.
- ANSI and CE compliance

Controller : 〈RC8〉 Supported on the standard type
〈RC7M〉 Supported on the global type



Specifications

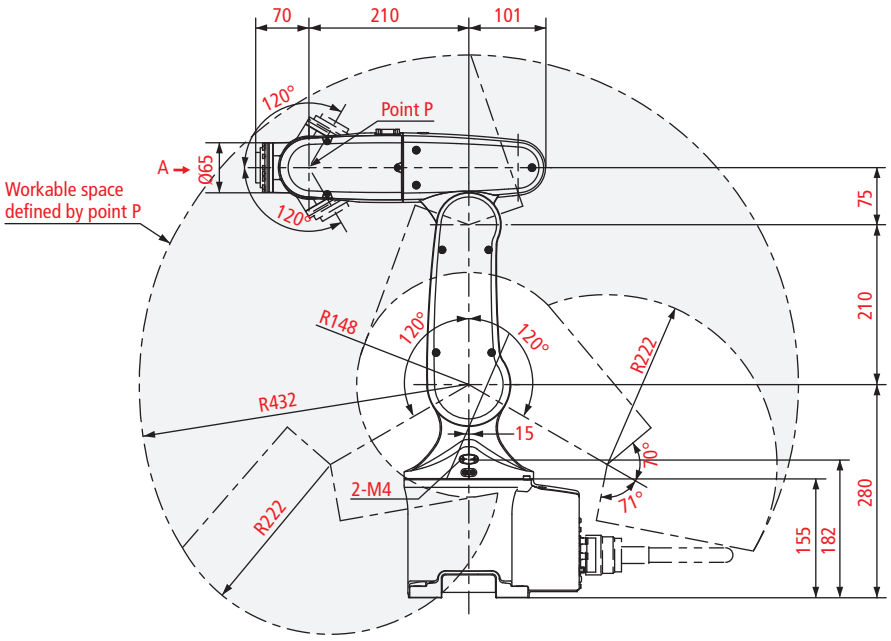
Term		Unit	Specifications	
Model			VP-5243	VP-6242
Axes			5	6
Position detection method			Absolute encoder	
Drive motor / brake			All-axis servo motor / all-axis with brakes	
Total arm length (No. 1 arm + No. 2 arm)		mm	430 (210+220)	420 (210+210)
Arm offset	J3 (forearm)	mm	—	75
Maximum motion area (Point P)		mm	430	432
Motion range	J1	°	±160	
	J2		±120	
	J3		+136, −128	+160, +19
	J4		—	±160
	J5		±120	
	J6		±360	
Maximum payload		kg	3 (Wrist downward movement is within ±45°) (*3)	2.5 (Wrist downward movement is within ±45°) (*4)
Maximum composite speed (center of tool mounting face)		mm/sec	3,900	
Cycle time (*1)		sec	0.99	
Position repeatability (center of tool mounting face) (*2)		mm	±0.02	
Maximum allowable moment of inertia	J4, J5	kgm²	0.04(*5)	0.03
	J6		0.01	0.007
User air pipe			4 systems (φ4×4)	
User signal line			9 (for proximity sensor signals, etc.)	
Air source	Normal pressure	MPa	0.10-0.39	
	Maximum allowable pressure		0.49	
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	80 or less	
Weight		kg	Approx. 13	Approx. 15

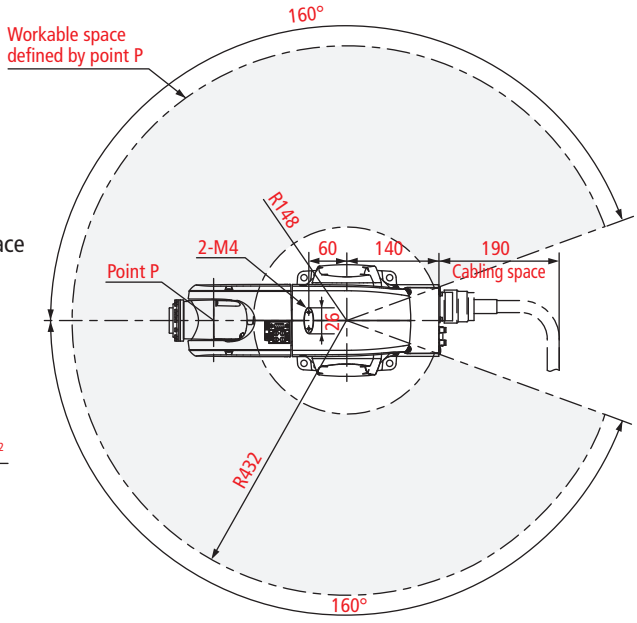
VP-5243

VP-6242

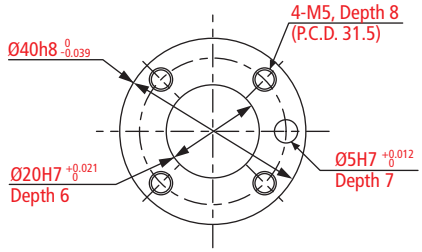
*1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm. *2: Position repeatability is the precision at constant ambient temperature.
*3: If wrist downward movement exceeds ±45°, the maximum payload is 2.5 kg. *4: If wrist downward movement exceeds ±45°,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

External dimensions and workable space [VP-6242]

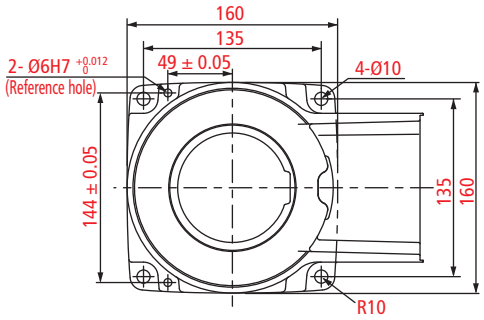




Detailed drawing of end-effector mounting face (View A)



Detailed drawing of base mounting face (Top view)



Unit : mm

Legend

VP - □ 2 □□

- Mini 5- and 6-axis type
- 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, 43: 430 mm

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

VP-G2 SERIES 432 mm

Supported Robot Controllers | RC7

Compactness and energy-efficient design of the VP series robot equipped with surfaces that can be wiped with hydrogen peroxide solution and a bottom connector panel specification in functions optimized for the pharmaceutical and medical fields.

- Hydrogen peroxide-washable (wipeable) surface : anodized aluminum coverings and a protective outer coating, as well as specially sealed joints, protect robot against corrosion (can wipe with 6% H_2O_2 concentration) (VP-6242G2-S1)
- Class 100 (cleanliness) : designed for cleanrooms and other contamination-control environments (VP-6242G2-S1)
- Bottom cable connection : eliminates cables from cleanroom environment
- Energy saving : total capacity of all-axis servo motors used is 80 W or less.
  Total motor capacity is less than 300 W.
- ANSI and CE compliance
  Controller : 〈RC7M〉 Supported on the global type
- cUL authorized product (UL standards / Canada CSA standards) also available
- Hygienic design based on Good Manufacturing Practice (GMP) and European Hygienic Engineering & Design Group (EHEDG)

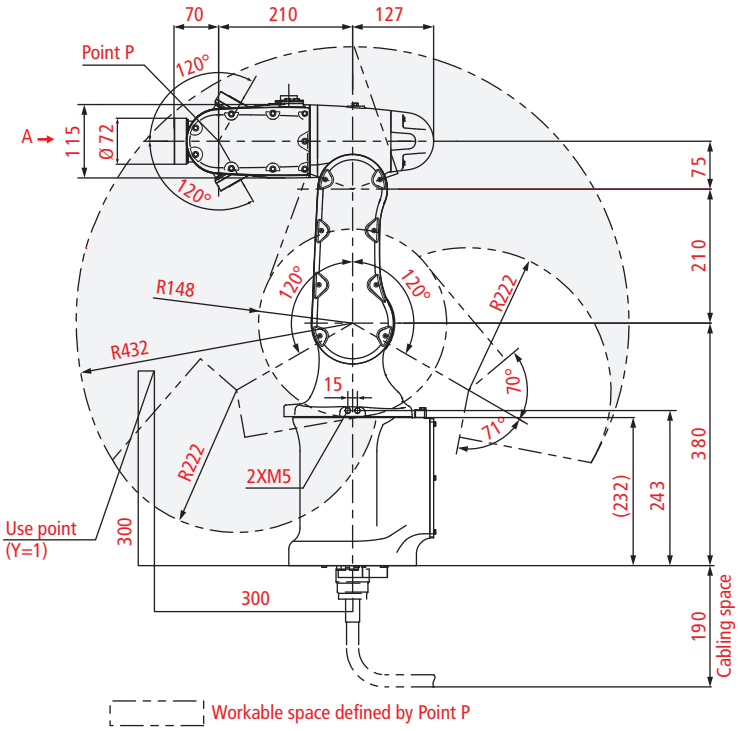
Specifications

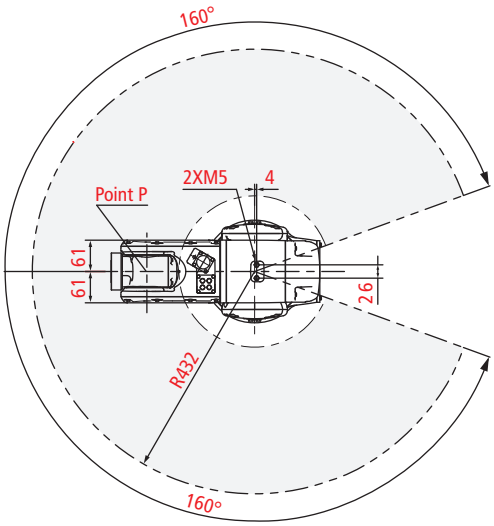
Term		Unit	Specifications	
Set model (*1)			VP-6242G2	VP-6242G2-S1 (*4)
Model			VP-6242G2M	VP-6242G2M-S1
Axes			6	
Position detection method			Absolute encoder	
Drive motor / brake			All-axis servo motor / all-axis brake	
Total arm length (No. 1 arm + No. 2 arm)		mm	420 (210+210)	
Arm offset	J3 (forearm)	mm	75	
Maximum motion area (Point P)		mm	432	
Motion range	J1	°	±160	
	J2		±120	
	J3		+160, +19	
	J4		±160	
	J5		±120	
	J6		±360	
Maximum payload		kg	2	
Maximum composite speed (center of tool mounting face)		mm / sec	3,900	
Cycle time (*2)		sec	0.99	
Position repeatability (center of tool mounting face) (*3)		mm	±0.02	
Maximum allowable moment of inertia	J4, J5	kgm^2	0.03	
	J6		0.007	
User air pipe			4 systems (ϕ4 × 4)	
User signal line			16 (for proximity sensor signals, etc.)	
Air source	Normal pressure	MPa	0.10-0.39	
	Maximum allowable pressure		0.49	
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	80 or less	
Hydrogen peroxide-resistant specification			—	Can wipe with 6% H_2O_2 concentration
Cleanliness (FED-STD-209D)			—	Class 100 (0, 3μ)
Weight		kg	Approx. 24	Approx. 25

*1: The set model includes a complete set of the robot unit, robot controllers, etc.
*2: Time required for a robot to move a 1 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: VP-6242G2-S1 is a special specification. For details, please contact our sales representative.

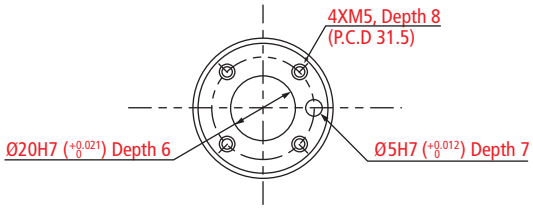
* Optional VP-G2 external battery extension unit (1.5 m) available.

External dimensions and workable space [VP-6242G2 / 6242G2-S1]

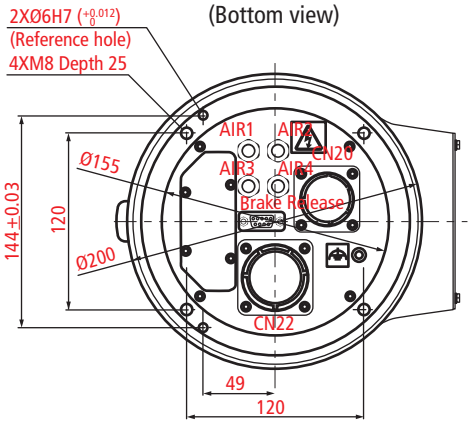




Detailed drawing of end-effector mounting face
(View A)



Detailed drawing of base mounting face
(Bottom view)



Unit : mm

Legend

VP - 6 2 42 G2 - □ - □

Mini 5- and 6-axis type	Axes:	Maximum payload:	Total arm length:	Series name:	Options:	Compliant standard:
	6: 6-axis	2: 2 kg	42: 420 mm	G2: G2 series	None: Standard type S1: H_2O_2-resistant	None UL: UL standard

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

VS SERIES FEATURES

Supported Robot Controllers RC8 RC7

Series Lineup

VS-050
Maximum arm reach : 505 mm
Maximum payload : 4 kg

VS-060
Maximum arm reach : 605 mm
Maximum payload : 4 kg

VS-068
Maximum arm reach : 710 mm
Maximum payload : 7 kg

VS-087
Maximum arm reach : 905 mm
Maximum payload : 7 kg

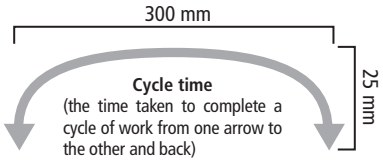
Speed = Improved Productivity

Pick & place / Maximum composite speed

	VS-050	VS-068
Pick & place time [sec] for 1 kg (measurement)	0.35 〈RC8〉 0.37 〈RC7〉	0.31 〈RC8〉 0.33 〈RC7〉
Maximum composite speed [mm/sec]	9,080 〈RC8〉 9,000 〈RC7〉	11,290 〈RC8〉 11,000 〈RC7〉

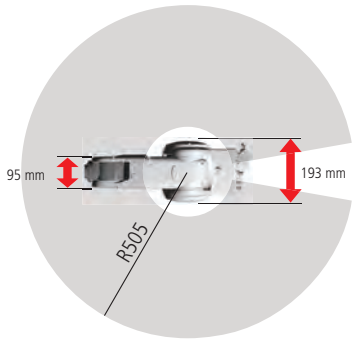
Pick & place time

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



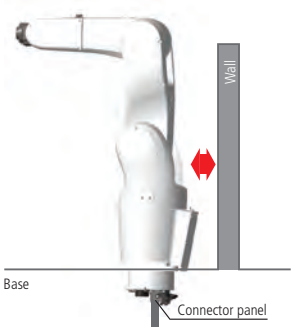
Fits into Compact Equipment

Arm width / Wrist width / Workable space

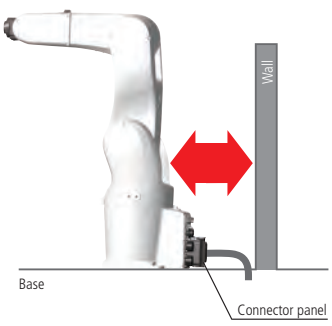


VS-050

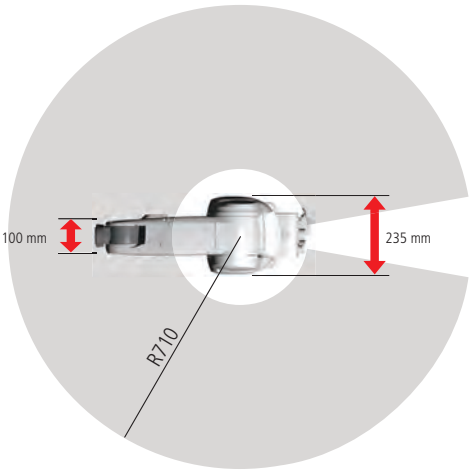
Efficient Use of Dead Space



Bottom connector panel
(option)



Standard



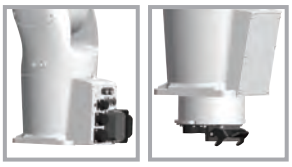
VS-068

Improved Usability and Maintainability

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

VS Series Options

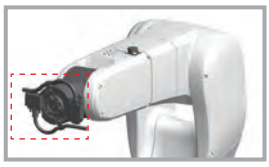
Connector panel



Rear connector panel | Bottom connector panel

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

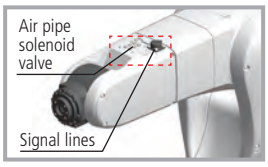
Flange



Communication interface flange-A

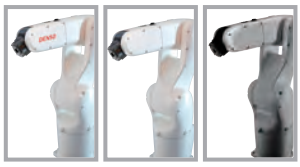
Plate mechanical interface has connectors for electrical signal lines and EtherNet, allowing wiring to be embedded in the robot unit.

Signal lines / Air pipe solenoid valve



Signal lines and air pipe solenoid valves are embedded in the top of the second arm. Three varieties are available for VS-068 / 087 and one for VS-050 / 060.

Paint / Surface finish



Standard type | Clean, IP54 | IP67

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

User Options

External battery extension unit

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

Brake release unit

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

Air purge unit

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

Second arm cover R (with tapped holes)

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

Category	Part Name / Specification / Type	VS-050/060 Standard	VS-050/060 Protected (IP67)	VS-050/060 Dust & splash proof (Wrist: IP65 Unit: IP54)	VS-050/060 Cleanroom (ISO class 5)	VS-050/060 Cleanroom (ISO class 3)	VS-068/087 Standard	VS-068/087 Protected (IP67)	VS-068/087 Dust & splash proof (Wrist: IP65 Unit: IP54)	VS-068/087 Cleanroom (ISO class 5)	VS-068/087 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)						✔	✔	✔	✔	✔
Options	Air purge unit							✔			
	Brake release unit (*1)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	External battery extension unit	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Motor & encoder cable angle	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Second arm cover R (with tapped holes)(*2)	✔					✔				

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

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

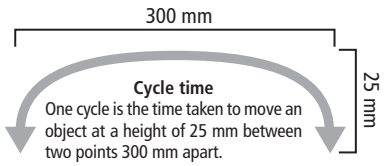
VS SERIES 505-605 mm

Supported Robot Controllers RC8 RC7

The New VS series VS-050 / 060 is equipped with exceptional power and speed in a compact body.

- Position repeatability : ±0.02 mm
- Cycle time : 0.35 s 〈RC8〉 0.37 s 〈RC7〉
- Maximum composite speed : up to 9,390 mm/s
- Maximum payload : 4 kg
- Arm reach : 505 mm and 605 mm
- Mounting options : floor, wall, ceiling
- Slim design : arm width : 189 mm / wrist width : 95 mm
- ANSI and CE compliance

Controller : 〈RC8〉 Supported on the standard type
〈RC7M〉 Supported on the global type



Specifications

Term		Unit	Specifications	
Model			VS-050	VS-060
Axes			6	
Position detection method			Absolute encoder	
Drive motor / brake			All-axis servo motor / all-axis brake	
Total arm length (No. 1 arm + No. 2 arm)		mm	505 (250+255)	605 (305+300)
Maximum motion area (Point P)		mm	505	605
Motion range	J1	°	±170 (*4)	
	J2		±120	
	J3		+151, −120	+155, −125
	J4		±270	
	J5		±120 (*5)	
	J6		±360	
Maximum payload		kg	4	
Maximum composite speed (center of tool mounting face)		mm / sec	9,080 〈RC8〉 9,000 〈RC7〉	9,390 〈RC8〉 9,000 〈RC7〉
Cycle time (*1)		sec	0.35 〈RC8〉 0.37 〈RC7〉	
Position repeatability (center of tool mounting face) (*2)		mm	±0.02	
Maximum allowable moment of inertia	J4, J5	kgm^2	0.2	
	J6		0.05	
Maximum allowable moment	J4, J5	Nm	6.66	
	J6		3.13	
Signal line / Air pipe solenoid valve (option)	Signal lines		10 (for proximity sensor signals, etc.) (*6, *7)	
	Air pipe solenoid valve (*3)		5 systems (ϕ4 × 4, ϕ4 × 1) 2 × solenoid valves (2 position, double solenoid)	
Communication interface flange-A (option)			17 (power wire for cameras, etc.) (*7)	
			LAN × 1 (1000BASE-T) (*8)	
Air source	Normal pressure	MPa	0.20-0.39	
	Maximum allowable pressure		0.49	
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	65 or less	
Protect grade			Protected type : IP67 (*9) (option) Dust & splash proof type : wrist IP65 / unit IP54 Cleanroom type : ISO class 3 / 5	
Weight		kg	Approx. 27	Approx. 28

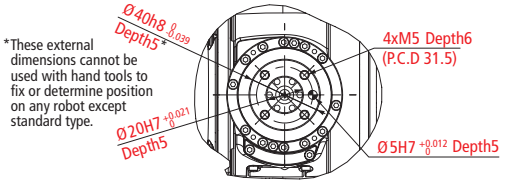
VS-050

VS-060

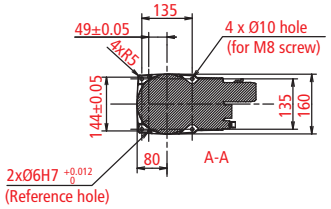
*1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm.
*2: Position repeatability is the precision at constant ambient temperature. *3: Controllable by use of the embedded solenoid valve only for ϕ4×4.
*4: Limited motion range when wall mounted. For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

External dimensions and workable space

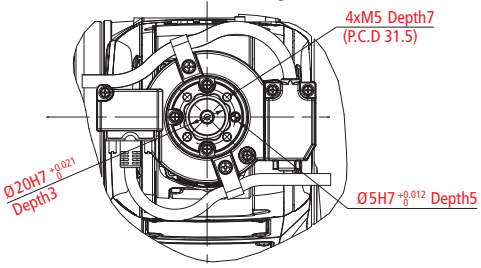
Detailed drawing of end-effector mounting face (Standard Flange) (View A)



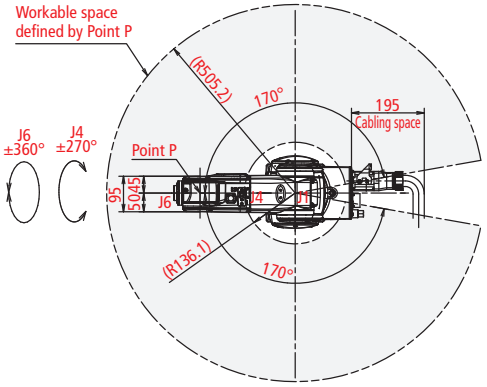
Detailed drawing of base mounting face (Top view)



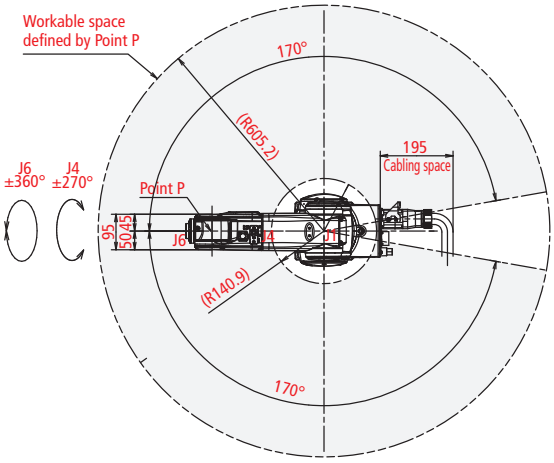
Detailed drawing of end-effector mounting face (Communication Interface Flange-A) (View A)

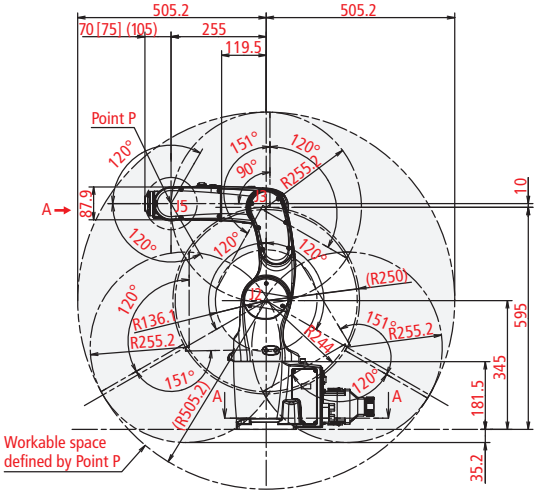


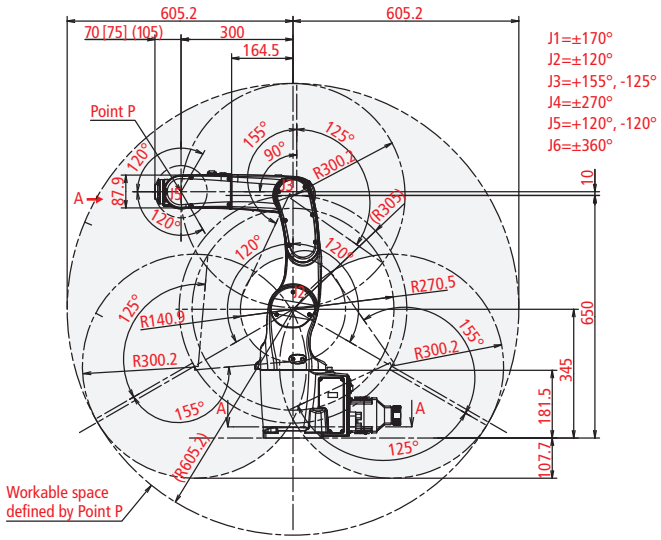
[VS-050]



[VS-060]







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

Legend

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

- Robot name: VS: DENSO 5- and 6-axis robots
- Mounting orientation: A: All directions
- Total arm length: 050 A1: 505 mm RC7M supported; 060 A1: 605 mm RC7M supported; 050 A3: 505 mm RC8 supported; 060 A3: 605 mm RC8 supported
- Axes: V6: 6-axis
- 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)
- 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); N: Specification without signal lines/air pipe solenoid valve
- Paint/Surface finish: N: DENSO standard colors (*2); A: Unpainted (*3)

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

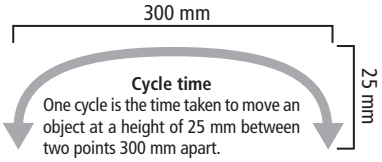
The data listed on this page is for the standard type. For other options, see our webpage.

VS SERIES 710-905 mm

Supported Robot Controllers RC8 RC7

Boasts top-performing speed in its class to greatly improve productivity.

- Position repeatability: from ±0.02 mm to ±0.03 mm
- Cycle times: 0.31 s and 0.34 s 〈RC8〉
  0.33 s and 0.36 s 〈RC7〉
- Maximum composite speed: up to 11,380 mm/s
- Maximum payload: 7 kg
- Arm reach: 710 mm and 905 mm
- Mounting options: floor, wall, ceiling
- Slim design: arm width: 235 mm / wrist width: 100 mm
- ANSI and CE compliance
  Controller : 〈RC8〉 Supported on the standard type
  〈RC7M〉 Supported on the global type



Specifications

Term		Unit	Specifications	
Model			VS-068	VS-087
Axes			6	
Position detection method			Absolute encoder	
Drive motor / brake			All-axis servo motor / all-axis brake	
Total arm length (No. 1 arm + No. 2 arm)		mm	680 (340+340)	875 (445+430)
Maximum motion area (Point P)		mm	710	905
Motion range	J1	°	±170 (*4)	
	J2		+135, −100	
	J3		+153, −120	+153, −136
	J4		±270	
	J5		±120	
	J6		±360	
Maximum payload		kg	7	
Maximum composite speed (center of tool mounting face)		mm / sec	11,290 〈RC8〉 11,000 〈RC7〉	11,380 〈RC8〉 11,000 〈RC7〉
Cycle time (*1)		sec	0.31 〈RC8〉 0.33 〈RC7〉	0.34 〈RC8〉 0.36 〈RC7〉
Position repeatability (center of tool mounting face) (*2)		mm	±0.02	±0.03
Maximum allowable moment of inertia	J4, J5	kgm^2	0.45	
	J6		0.1	
Maximum allowable moment	J4, J5	Nm	16.2	
	J6		6.86	
Signal line / Air pipe solenoid valve (option)	Signal lines		10 (for proximity sensor signals, etc.) (*5, 6)	
	Air pipe solenoid valve (*3)		7 systems (ϕ4 × 6, ϕ6 × 1) [solenoid valves can be selected from 1 to 3] 1. 3 × solenoid valves (2 position, double solenoid) 2. 3 × solenoid valves (3 position, exhaust center solenoid) 3. 3 × solenoid valves (3 position, closed center solenoid)	
Communication interface flange-A (option)			17 (power wire for cameras, etc.) (*6)	
			LAN × 1 (1000BASE-T) (*7)	
Air source	Normal pressure	MPa	0.20-0.39	
	Maximum allowable pressure		0.49	
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	65 or less	
Protect grade			Protected type : IP67 (*8) (option) Dust & splash proof type : wrist IP65 / unit IP54 Cleanroom type : ISO class 3 / 5	
Weight		kg	Approx. 49	Approx. 51

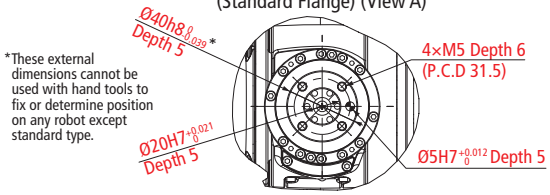
VS-068

VS-087

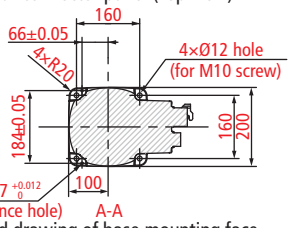
*1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm. *2: Position repeatability is the precision at constant ambient temperature.
*3: Controllable by use of the embedded solenoid valve only for ϕ4×6. *4: Limited motion range when wall mounted. For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

External dimensions and workable space

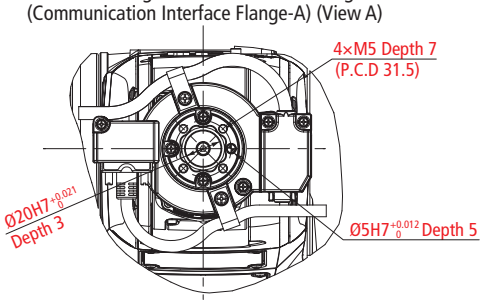
Detailed drawing of end-effector mounting face (Standard Flange) (View A)



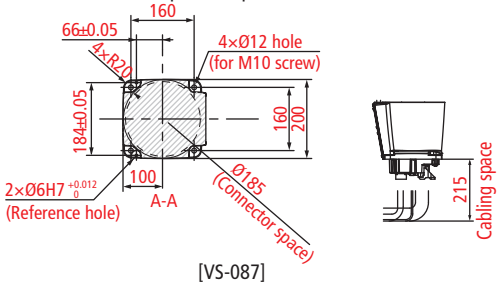
Detailed drawing of base mounting face – Rear connector panel (Top view)



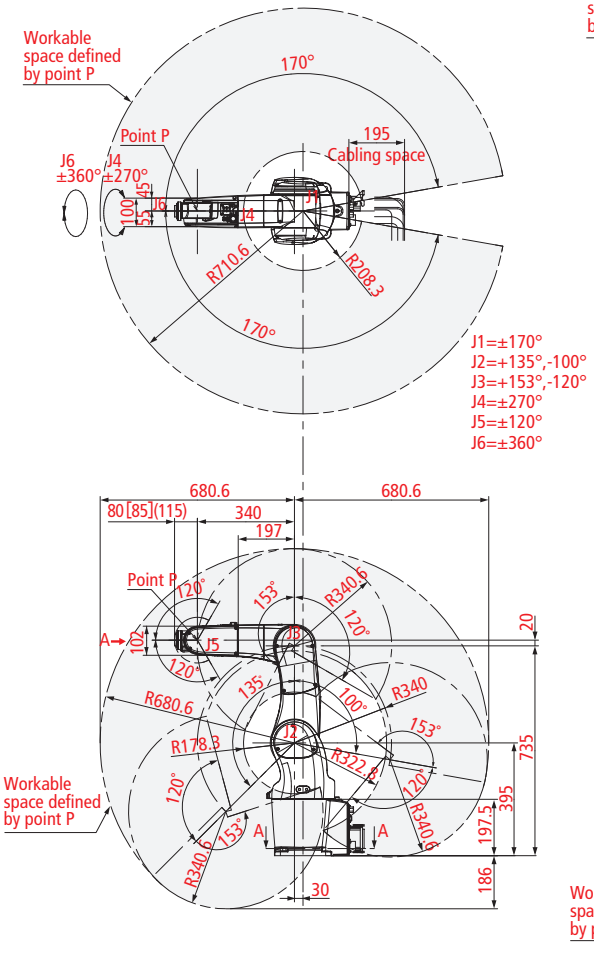
Detailed drawing of end-effector mounting face (Communication Interface Flange-A) (View A)



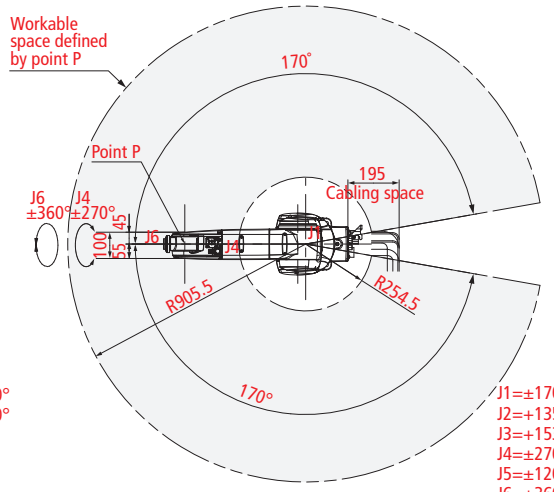
Detailed drawing of base mounting face – Bottom connector panel (Top view)

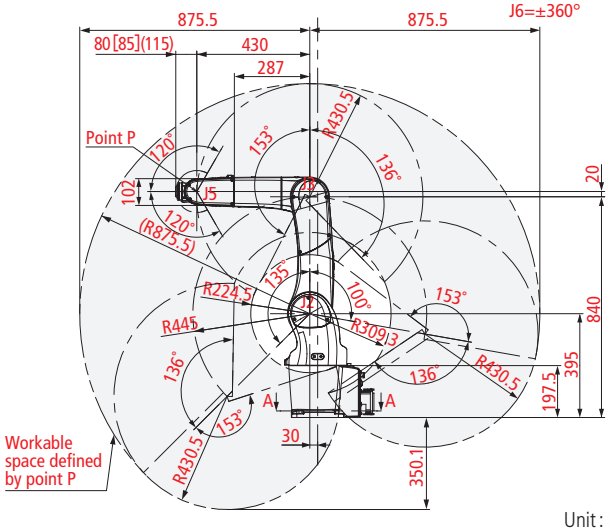


[VS-068]



[VS-087]





Unit : mm

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

Legend

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

- Robot name : VS: DENSO 5- and 6-axis robots
- Mounting orientation : A: All directions
- Axes : V6: 6-axis
- Total arm length : 068 A2: 680 mm RC7M supported; 087 A2: 875 mm RC7M supported; 068 A4: 680 mm RC8 supported; 087 A4: 875 mm RC8 supported
- 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)
- Compliant standard: N: Standard specification; U: UL specification
- Flange : N: Standard flange; A: Communication interface flange-A (*1)
- Connector panel : N: Rear connector panel; A: Bottom connector panel
- Signal lines / Air pipe solenoid valve : B: 3 x solenoid valves (2 position, double solenoid); C: 3 x solenoid valves (3 position, exhaust center solenoid); D: 3 x solenoid valves (3 position, closed center solenoid); N: Specification without signal lines / air pipe solenoid valve
- Paint / Surface finish : N: DENSO standard colors (*2); A: Unpainted (*3)

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

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

Medical and Pharmaceutical Robots

Supported Robot Controller | RC8

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

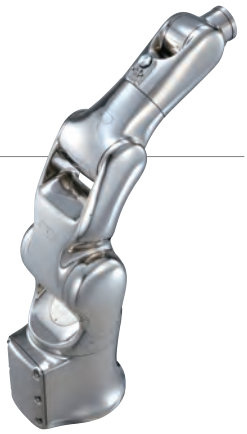
DENSO delivers a robot that meets the strict demands of the pharmaceutical and medical industry. Automation in clean environments prevents the hazards of foreign matter from manual tasks, human error, and operator exposure.

GOOD DESIGN AWARD 2014
GRAND AWARD

Features

Sterilizable

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.



Electric gripper connection flange-A (option)

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

Resists Contamination

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

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

Maintainability

Optional external mount battery for improved maintainability and battery replacement.

Authentication

- Design compliant with GMP (product management and quality control standard).
- cUL certified products* (UL standard / Canada CSA standard) also available.

*Compliancy scheduled for FY2015

Isolation (suitability for sealed environments)

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

Applications

Manufacture of medical products

- Preparation
- Filling
- Inspection
- Packaging and packing
- Transport

etc.

Manufacture of medical instruments

- Inspection
- Filling
- Transport

etc.

Medicine control

- Adjustment of chemicals
- Inspection
- Transport

etc.

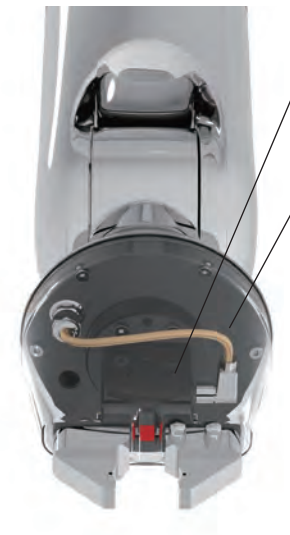
Research and development of new drugs/ regenerative medicine

- Reagent dispensation
- Agitation
- Cell cultures

etc.

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 3 (GMP Grade A)
- Made with FDA-certified material

Specification

Term	Specification
Grip force	60 N
Switch stroke	2 × 3 mm
Power supply	24 V ±10%
Protect grade	IP65
Cleanliness	ISO Class 3 (GMP Grade A)
I/O type	NPN / PNP selection
Unit weight	Hand unit 145 g / cover 285 g

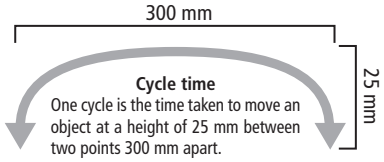
VS-S2 SERIES

Supported Robot Controllers RC8

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

- 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.
- Smooth surface prevents adherence of dust and dirt. The robot arm is constructed without screws to maintain high sanitation levels. (Cleanliness : ISO Class 5 / Wrist : IP67, Unit : IP65)
- Position repeatability : ± 0.02 mm
- Cycle time : 0.35 s
- Maximum composite speed : 8,573 mm/s
- Maximum payload : 4 kg
- Arm reach : 520 mm
- Mounting options : floor, wall, ceiling

GOOD DESIGN AWARD 2014 GRAND AWARD



Specification *Specification may be changed without prior notice.

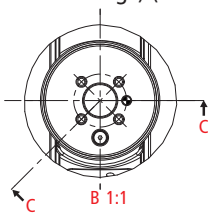
Term		Unit	Specification
Model			VS-050S2
Axes			6
Position detection method			Absolute encoder
Drive motor / brake			All-axis servo motor / all-axis brake
Total arm length (No. 1 arm + No. 2 arm)		mm	520 (255 + 265)
Maximum motion area (Point P)		mm	520
Minimum motion radius (Point P)		mm	183.5
Motion range	J1	°	±180 (*3)
	J2		+120, –115
	J3		+141, –115
	J4		±270
	J5		±115 (*4)
	J6		±360
Maximum payload		kg	4
Maximum composite speed (center of tool mounting face)		mm/sec	8,573
Cycle time (*1)		sec	0.35
Position repeatability (center of tool mounting face) (*2)		mm	±0.02
Maximum allowable moment of inertia	J4,J5	kgm^2	0.2
	J6		0.05
Maximum allowable moment	J4,J5	Nm	6.66
	J6		3.13
Signal wire/air pipe solenoid valve (Option)	Signal wire		10 cores (*5), (*6)
	Air pipe solenoid valve		Solenoid valve (2 position, double solenoid) × 2
Electric gripper connection flange specification-A (Option)			25 cores (17 + 8) (*6)
Air source	Normal pressure	MPa	0.20-0.39
	Maximum allowable pressure		0.49
Noise (A weighed equivalent continuous sound pressure level)		dB	65 or less
Environmental resistance	Hydrogen peroxide environment		35% hydrogen peroxide steam (dry / wet)
	Protection level		Wrist IP67 / Unit IP65
	Cleanliness		ISO Class 5
Weight		kg	Approx. 34

VS-050S2

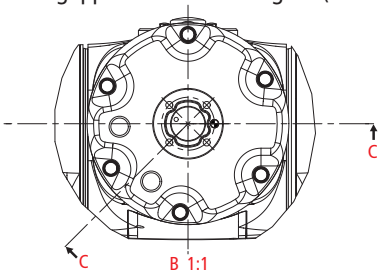
*1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm.
*2: Position repeatability is the precision at constant ambient temperature. *3: Motion range is limited when mounted to a wall. Inquire for details.
*4: When electric gripper connection flange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

External Dimensions and Motion Range [VS-050S2]

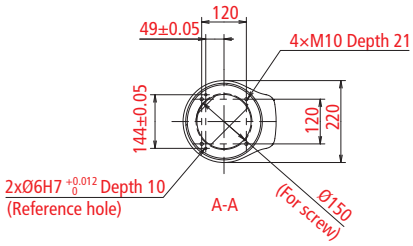
Detailed drawing of end-effector mounting face (Standard Flange) (View A)



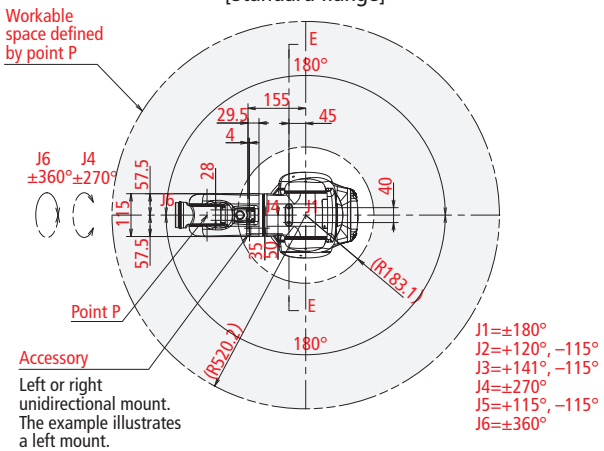
Detailed drawing of end-effector mounting face - Electric gripper connection flange-A (View A)



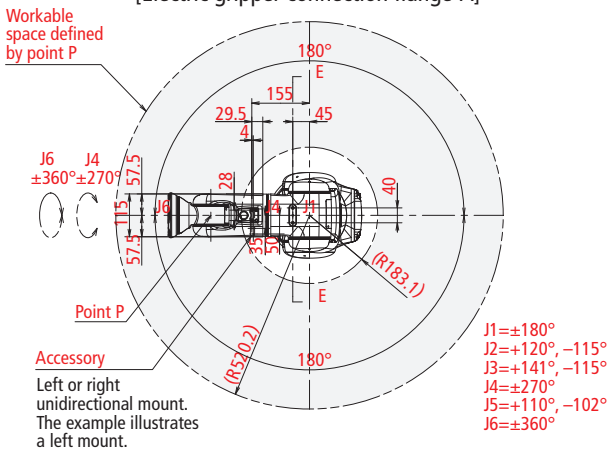
Detailed drawing of base mounting face (Top view)

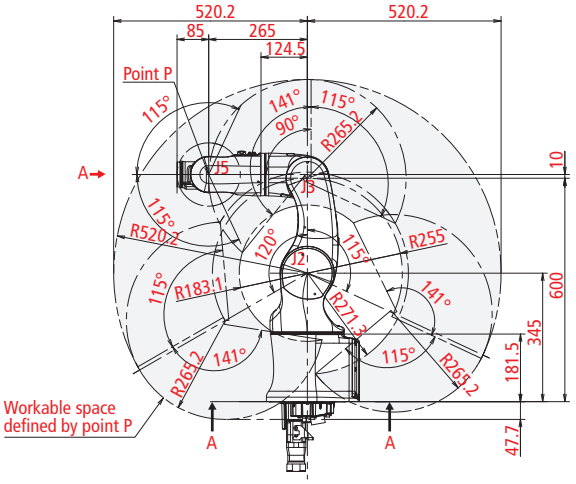


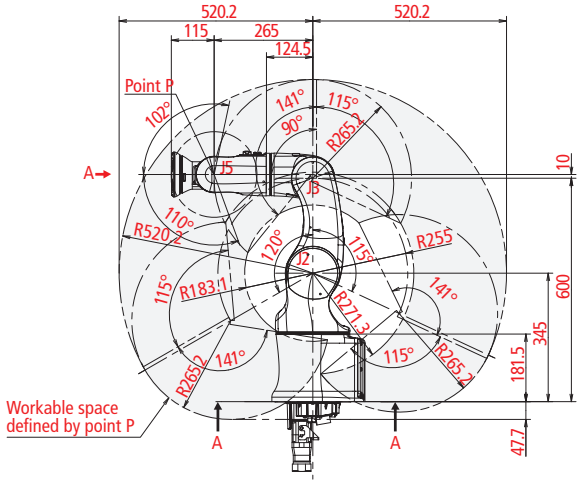
[Standard flange]



[Electric gripper connection flange-A]







Unit : mm

Legend

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

- Robot name: VS: DENSO 5- AND 6-AXIS ROBOTS
- Total arm length: 050S2: 505 mm
- H_2O_2-resistant RC8 compliant
- Mount direction: A: All directions
- Axes: 6: 6-axes
- Environmental resistance: R1: Cleanroom type (ISO Class 5) (Wrist: IP67, Unit: IP65)
- Compliant standards: N: Standard specification U: UL specification*
- Connector panel: A: Connector panel bottom specification
- Flange: N: Standard flange A: Electric gripper connection flange-A
- Signal wire/Air pipe solenoid valve: A: Solenoid valve (2 position, double solenoid) × 2 N: No signal wire/air pipe solenoid valve specification
- Surface processing: A: Unpainted

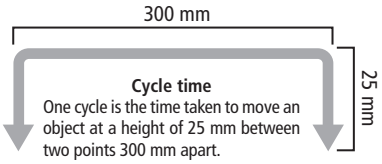
*Compliancy with UL specifications scheduled for FY2015.

VS SERIES 653-854 mm

Supported Robot Controllers RC8 RC7

The VS series VS-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 range of environments.

- Position repeatability: from ±0.02 mm to ±0.03 mm
- Cycle times: 0.49 s and 0.59 s
- Maximum composite speed: from 7,600 mm/s up to 8,200 mm/s
- Maximum payload: 7 kg
- Arm reach: 653 mm and 854 mm
- Mounting options: floor and ceiling
- ANSI and CE compliance
  Controller: 〈RC8〉 Supported on the standard type
  〈RC7M〉 Supported on the global type
- cUL authorized product (UL standards / Canada CSA standards) also available *RC7M supported only



Specifications

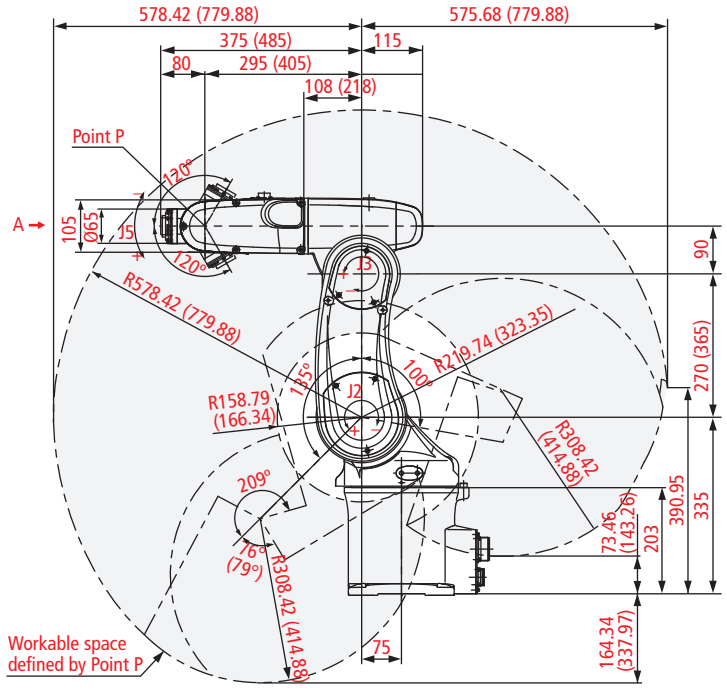
Term		Unit	Specifications	
Model			VS-6556	VS-6577
Axes			6	
Position detection method			Absolute encode	
Drive motor / brake (*1)			All-axis servo motor / J2 to J4 with brake (Brake expansion type : J2 to J6 with brake)	
Total arm length (No. 1 arm + No. 2 arm)		mm	565 (270+295)	770 (365+405)
Arm offset	J1 (rotation)	mm	75	
	J3 (forearm)	mm	90	
Maximum motion area (Point P)		mm	653	854
Motion range	J1	°	±170	
	J2		+135, −100	
	J3		+166, −119	+169, −119
	J4		±190	
	J5		±120	
	J6		±360	
Maximum payload		kg	7 (Wrist downward movement is within ±45°) (*5)	
Maximum composite speed (center of tool mounting face)		mm / sec	8,200	7,600
Cycle time (*2)		sec	0.49	0.59
Position repeatability (center of tool mounting face) (*3)		mm	±0.02	±0.03
Maximum allowable moment of inertia	J4, J5	kgm^2	0.413	
	J6		0.063	
User air pipe (*4)			7 systems 3 × solenoid valves (2 position, double solenoid)	
User signal line			10 (for proximity sensor signals, etc.)	
Air source	Normal pressure	MPa	0.10-0.39	
	Maximum allowable pressure		0.49	
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	80 or less	
Protect grade			Dust & splash proof type: Wrist IP65 / unit IP54 (option) Cleanroom type: class 10 / 100	
Weight		kg	Approx. 35	Approx. 36

*1: UL specifications are for all-axis with brake, including single axis. For specification and external dimensions, please contact our sales representative.
*2: Time required for a robot to move a 1 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: Controllable by use of the embedded solenoid valve only for ϕ4×6.
*5: If wrist downward movement exceeds ±45°, the maximum payload is 6 kg.

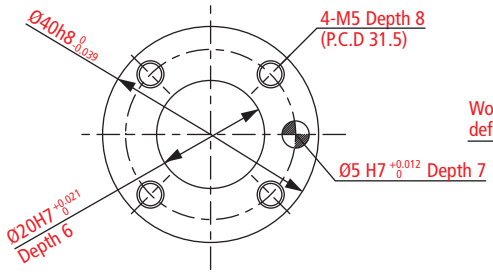
VS-6556

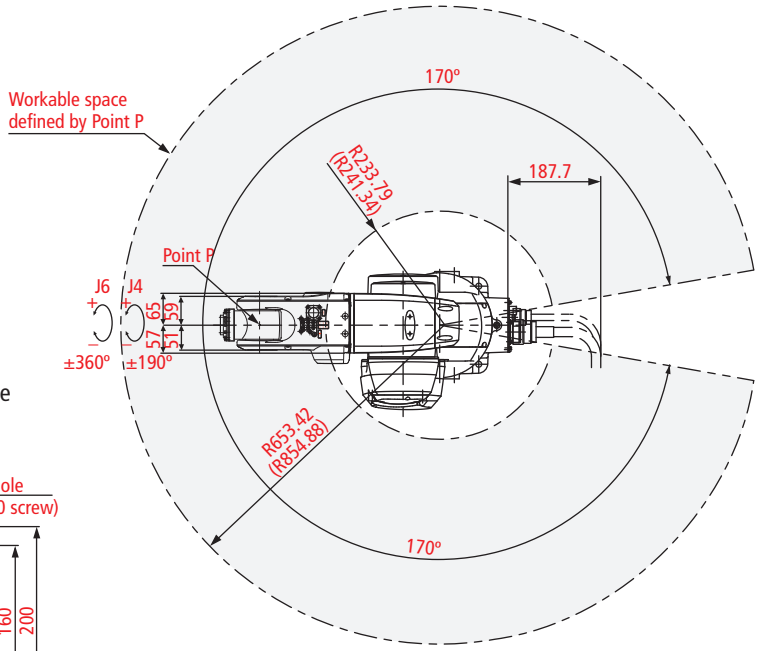
VS-6577

External dimensions and workable space [VS-6556-B]

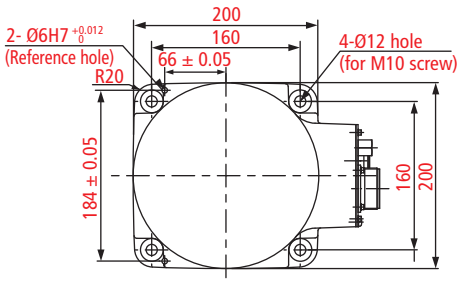


Detailed drawing of end-effector mounting face (View A)





Detailed drawing of base mounting face (Top view)



The values in parentheses ( ) are of VS-6577

Unit : mm

Legend

VS - 6 5 □□ - □

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

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

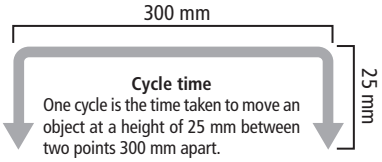
VM SERIES 1021-1298 mm

Supported Robot Controllers | RC8 RC7

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

- Position repeatability: from ±0.05 mm to ±0.07 mm
- Cycle times: 0.89 s and 0.95 s
- Maximum composite speed: 8,300 mm/s
- Maximum payload: 13 kg*4
- Arm reach: 1,021 mm and 1,298 mm
- Mounting options: floor and ceiling
- ANSI and CE compliance

Controller : 〈RC8〉 Supported on the standard type
〈RC7M〉 Supported on the global type



Specifications

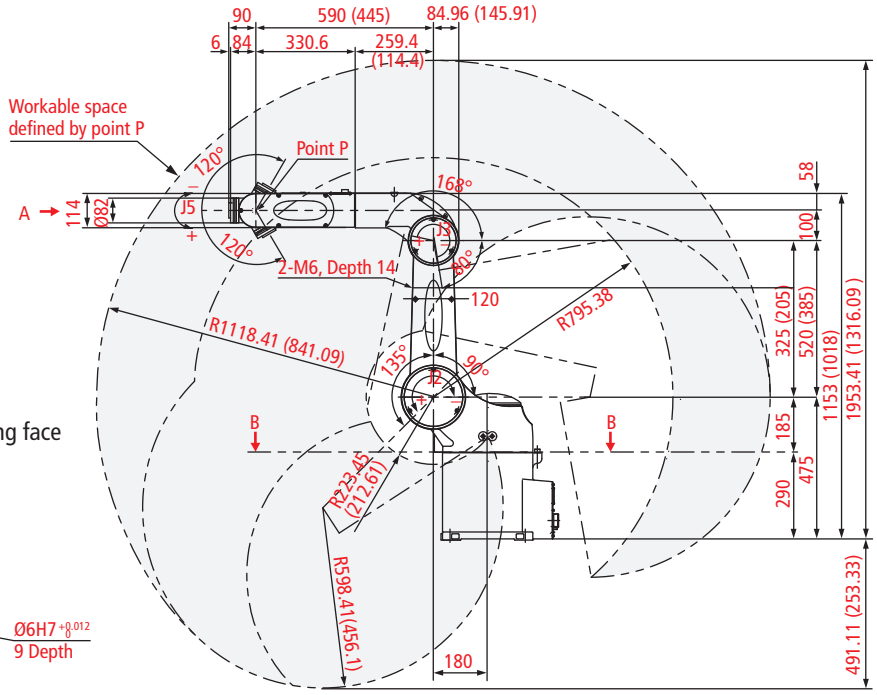
Term		Unit	Specifications	
Model			VM-6083	VM-60B1
Axes			6	
Position detection method			Absolute encoder	
Drive motor/brake			All-axis servo motor/J2 to J6 with brake	
Total arm length (No. 1 arm + No. 2 arm)		mm	830 (385+445)	1,110 (520+590)
Arm offset	J1 (rotation)	mm	180	
	J3 (forearm)		100	
Maximum motion area (Point P)		mm	1,021	1,298
Motion range	J1	°	±170	
	J2		+135, –90	
	J3		+165, –80	+168, –80
	J4		±185	
	J5		±120	
	J6		±360	
Maximum payload		kg	13 (*4)	
Maximum composite speed (center of tool mounting face)		mm/sec	8,300	
Cycle time (*1)		sec	0.89	0.95
Position repeatability (center of tool mounting face) (*2)		mm	±0.05	±0.07
Maximum allowable moment of inertia	J4, J5	kgm^2	0.36	
	J6		0.064	
User air pipe (*3)			7 systems (ϕ4 × 6, ϕ6 × 1) 3 × solenoid valves (2 position, double solenoid)	
User signal line			10 (for proximity sensor signals, etc.)	
Air source	Normal pressure	MPa	0.10-0.39	
	Maximum allowable pressure		0.49	
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	80 or less	
Protect grade			Dust & splash proof type : wrist : IP65/unit IP54 (option) Cleanroom type : class 100	
Weight		kg	Approx. 82	

VM-6083

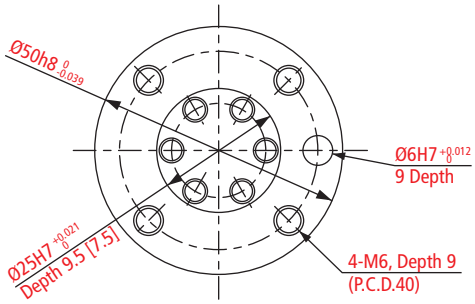
VM-60B1

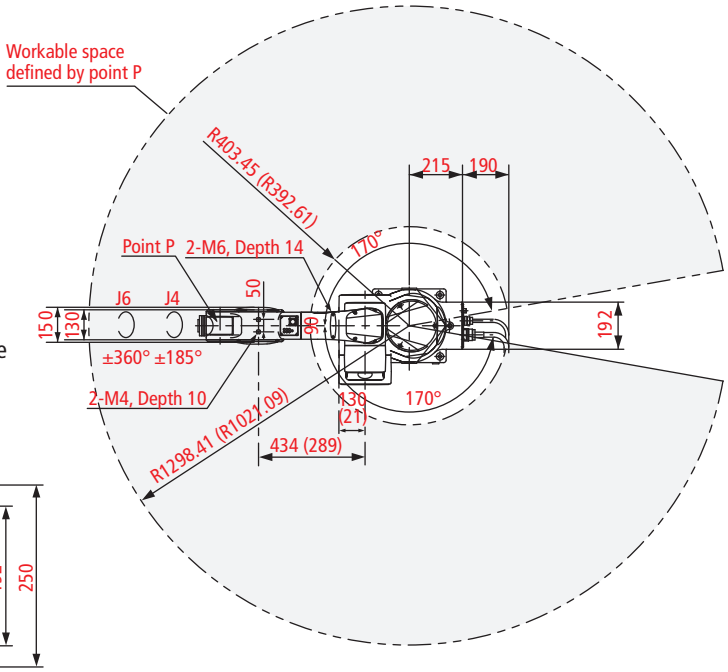
*1: Time required for a robot to move a 5 kg payload between two points 300 mm apart at a height of 25 mm.
*2: Position repeatability is the precision at constant ambient temperature. *3: Controllable by use of the embedded solenoid valve only for ϕ4×6.
*4: If the payload exceeds 11 kg, wrist downward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

External dimensions and workable space [VM-60B1]

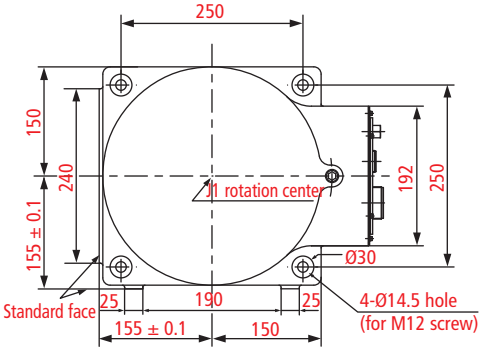


Detailed drawing of end-effector mounting face
(View A)





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



The values in parentheses ( ) are VM-6083
The values in brackets [ ] are of the cleanroom type (class 100)

Unit : mm

Legend

VM - 6 0 □□ - □

- Mid-sized 4-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 webpage.

DENSO 4-AXIS ROBOTS

The DENSO 4-axis robot lineup consists of the HS series and HM series with different load capacity and arm lengths.

Also called SCARA robots, these robots are suited for tasks that require speed and precise motion in the horizontal direction.

Applications

- Pick & place
- Inspection
- Coating
- Screw tightening
- Various other applications
- Assembly
- Packaging
- Laser welding and soldering
- Labeling

Main Features

- Cycle times: from 0.29 s to 0.35 s
- Position repeatability: from ±0.015 mm to ±0.025 mm
- Maximum composite speed: from 6,300 mm/s up to 11,500 mm/s
- Maximum arm reach: between 350 mm and 1,000 mm
- Maximum payload: 20 kg

Options

*For supported options, refer to the table on right.

- Standard type
- Dust & splash proof type (IP65)
- Cleanroom type (class 10)
- UL specifications
- Ceiling type

HS



Dust & splash proof type

Cleanroom type

UL specifications

Ceiling type

		HS-4535*		HS-4545*		HS-4555*	
		*: 2	*: 3	*: 2	*: 3	*: 2	*: 3
Maximum payload (kg)		5					
Total arm length (mm)		350		450		550	
Vertical stroke (Z) (mm)		200	320	200	320	200	320
Standard type	Floor	✔	✔	✔	✔	✔	✔
	Ceiling			✔	✔	✔	✔
Dust & splash proof type (IP65)	Floor	✔	✔	✔	✔	✔	✔
	Ceiling			✔	✔	✔	✔
Cleanroom type (cleanliness: class 10 [0.1µm])	Floor	✔	✔	✔	✔	✔	✔
UL specifications	Floor	✔	✔	✔	✔	✔	✔

HM



Dust & splash proof type

UL specifications

Ceiling type

		HM-4060* [maximum payload: 10 kg]/HM-4A60* [maximum payload: 20 kg]			HM-4070* [maximum payload: 10 kg]/HM-4A70* [maximum payload: 20 kg]		
		*: 2	*: 3	*: 4	*: 2	*: 3	*: 4
Maximum payload (kg)		10 / 20			10 / 20		
Total arm length (mm)		600			700		
Vertical stroke (Z) (mm)		200	300	400	200	300	400
Standard type	Floor	✔	✔	✔	✔	✔	✔
	Ceiling				✔	✔	✔
Dust & splash proof type (IP65)	Floor	✔	✔	✔	✔	✔	✔
	Ceiling				✔	✔	✔
UL specifications (standard / dust & splash proof type)	Floor	✔	✔	✔	✔	✔	✔
	Ceiling				✔	✔	✔

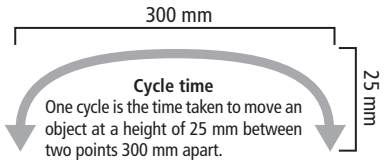
		HM-4085* [maximum payload: 10 kg]/HM-4A85* [maximum payload: 20 kg]			HM-40A0* [maximum payload: 10 kg]/HM-4AA0* [maximum payload: 20 kg]		
		*: 2	*: 3	*: 4	*: 2	*: 3	*: 4
Maximum payload (kg)		10 / 20			10 / 20		
Total arm length (mm)		850			1000		
Vertical stroke (Z) (mm)		200	300	400	200	300	400
Standard type	Floor	✔	✔	✔	✔	✔	✔
	Ceiling	✔	✔	✔			
Dust & splash proof type (IP65)	Floor	✔	✔	✔	✔	✔	✔
	Ceiling	✔	✔	✔			
UL specifications (standard / dust & splash proof type)	Floor	✔	✔	✔	✔	✔	✔
	Ceiling	✔	✔	✔			

HS SERIES 350-550 mm

Supported Robot Controllers | RC8 RC7

The DENSO 4-axis robots HS series are capable of high speed motion within a small mounting surface.

- Position repeatability : from ±0.015 mm to ±0.02 mm
- Cycle time : 0.35 s
- Maximum composite speed : from 6,300 mm/s up to 7,200 mm/s
- Maximum payload : 5 kg
- Arm reach : from 350 mm to 550 mm
- Mounting options : floor type and ceiling type
- ANSI and CE compliance
  Controller : 〈RC8〉 Supported on the standard type
  〈RC7M〉 Supported on the global type
- cUL authorized product (UL standards / Canada CSA standards) also available



Specifications

Term		Unit	Specifications		
Model (*1)			HS-4535*	HS-4545*	HS-4555*
Axes			4		
Position detection method			Absolute encoder		
Drive motor / brake			All-axis servo motor / Z-axis, T-axis with brake		
Total arm length (No. 1 arm + No. 2 arm)		mm	350 (125+225)	450 (225+225)	550 (325+225)
Motion range and stroke	J1 (No. 1 axis)	°	±155		
	J2 (No. 2 axis)		±145		
	Z (No. 3 axis)	mm	*=2 : 200, *=3 : 320		
	T (No. 4 axis)	°	±360		
Maximum payload		kg	5		
Maximum composite speed (center of tool mounting face)	Arm end	mm/sec	7,200	6,300	7,100
	Z		2,000		
	T	°/sec	2,400		
Cycle time (*2)		sec	0.35		
Position repeatability (center of tool mounting face) (*3)	J1+J2	mm	±0.015	±0.02	
	Z		±0.01		
	T	°	±0.005		
Maximum pressure input (downward, for up to 1 s)		N	98		
Maximum allowable moment of inertia		kgm²	0.1		
User air pipe			4 systems (φ4 × 2, φ6 × 2)		
User signal line			19 (for proximity sensor signals, etc.)		
Air source	Normal pressure	MPa	0.05-0.35		
	Maximum allowable pressure		0.59		
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	80 or less		
Protect grade			Dust & splash proof type : IP65 (option) Cleanroom type : class 10		
Weight		kg	Approx. 25		

HS-4535*

HS-4545*

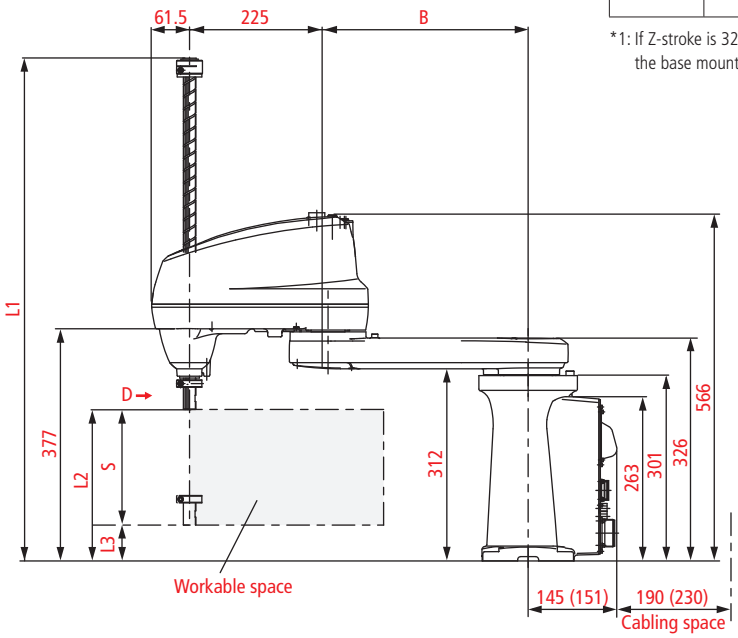
HS-4555*

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

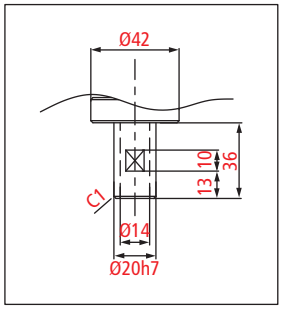
External dimensions and workable space

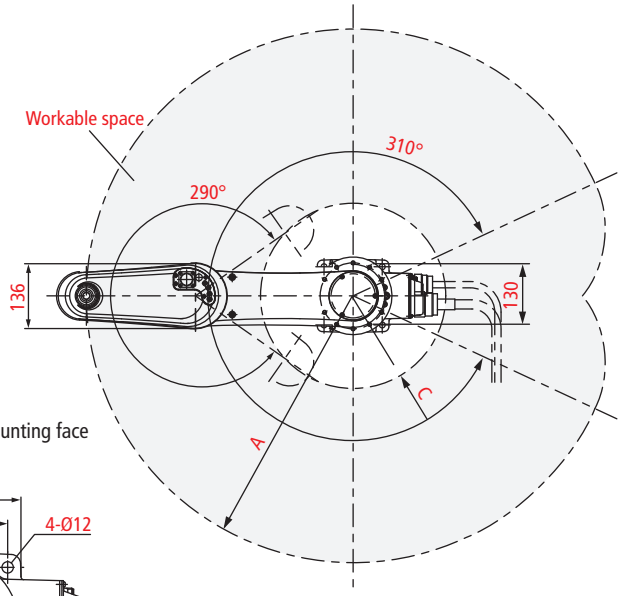
S (mm)	Type	L1	L2	L3
*=2:200	Standard	697	246	46
	Dust & splash proof	790	206	6
	Cleanroom	798		
*=3:320	Standard	817	246	-74 (*1)
	Dust & splash proof	910	206	-114 (*1)
	Cleanroom	918		

*1: If Z-stroke is 320 mm, the lowest point of the Z-axis will achieve a position lower than the base mounting surface.

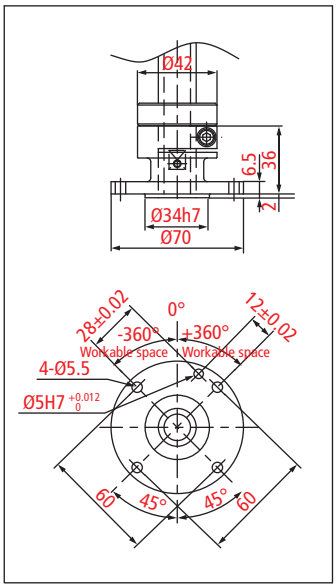


Detailed drawing of end-effector mounting face (View D)

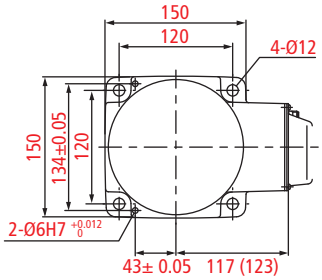




Flange (option)



Detailed drawing of base mounting face (Top view)



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

Model	A	B	C
HS-4535*	350	125	143
HS-4545*	450	225	136
HS-4555*	550	325	191

Legend

HS □ - 4 5 □□ □ - □

- Small 4-axis type
- Robot type: None: Floor; S: Ceiling
- Axes: 4: 4-axis
- Maximum payload: 5: 5 kg
- Total arm length: 35: 350 mm; 45: 450 mm; 55: 550 mm
- Vertical stroke: 2: 200 mm; 3: 320 mm
- Options: None: Standard type; W: Dust & splash proof type (IP65); P: Cleanroom type (class 10); UL: UL specifications

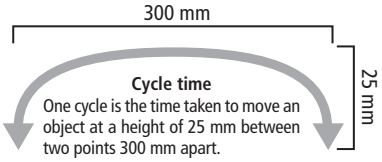
The data listed on this page is for the standard type. For other options, see our webpage.

HM SERIES 600-1000 mm

Supported Robot Controllers | RC8 RC7

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

- Position repeatability: from ±0.02 mm to ±0.025 mm
- Cycle times: 0.29 s and 0.31 s
- Maximum composite speed: from 8,780 mm/s up to 11,450 mm/s
- Maximum payload: 20 kg
- Arm reach: between ±1,000 mm and ±600 mm
- Mounting options: floor type and ceiling type
- ANSI and CE compliance
  Controller: 〈RC8〉 Supported on the standard type
  〈RC7M〉 Supported on the global type
- cUL authorized product (UL standards / Canada CSA standards) also available



HM-4A60*

HM-4A70*

HM-4A85*

HM-4AA0*

Specifications

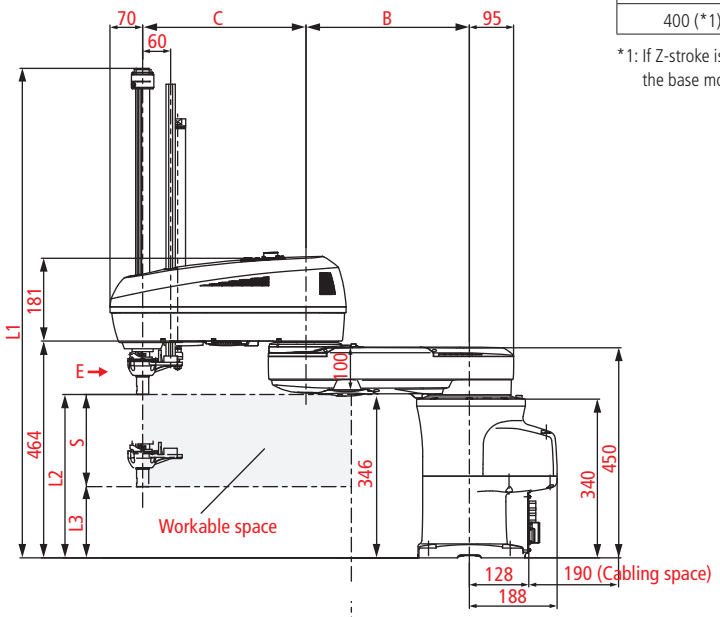
Term		Unit	Specifications							
Model (*1)			HM-4060*	HM-4A60*	HM-4070*	HM-4A70*	HM-4085*	HM-4A85*	HM-40A0*	HM-4AA0*
Axes			4							
Position detection method			Absolute encoder							
Drive motor / brake			All-axis servo motor / Z-Axis gravity balance air cylinder / Z-Axis motor brake							
Total arm length (No. 1 arm + No. 2 arm)		mm	600 (250+350)		700 (350+350)		850 (350+500)		1,000 (500+500)	
Motion range and stroke	J1 (No. 1 axis)	°	±165							
	J2 (No. 2 axis)	°	±143		±147					
	Z (No. 3 axis)	mm	*=2 : 200, *=3 : 300, *=4 : 400							
	T (No. 4 axis)	°	±360							
Maximum payload		kg	10	20	10	20	10	20	10	20
Maximum composite speed (center of tool mounting face)	Arm end	mm/sec	8,780		9,570		11,450		11,390	
	Z	mm/sec	2,760							
	T	°/sec	2,220	1,540	2,220	1,540	2,220	1,540	2,220	1,540
Cycle time (*2)		sec	0.29				0.31			
Position repeatability (center of tool mounting face) (*3)	J1+J2	mm	±0.02				±0.025			
	Z	mm	±0.01							
	T	°	±0.005							
Maximum pressure input (downward, for up to 1 s)		N	98							
Maximum allowable moment of inertia		kgm²	0.25	0.45	0.25	0.45	0.25	0.45	0.25	0.45
User air pipe			4 systems (φ6)							
User signal line			24 (for proximity sensor signals, etc.)							
Air source	Normal pressure	MPa	0.05-0.35							
	Maximum allowable pressure	MPa	0.59							
Airborne noise (equivalent continuous A-weighted sound pressure level)		dB	80 or less							
Protect grade			Dust & splash proof type : IP65 (option)							
Weight		kg	Approx. 53-56							

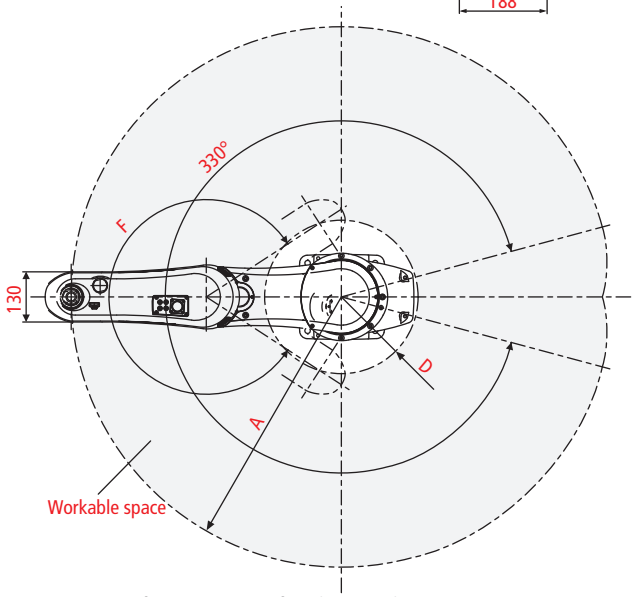
*1: An asterisk [*] in a model name indicates Z-axis stroke. *2: Time required for a robot to move a 2 kg payload between two points 300 mm apart at a height of 25 mm.
*3: Position repeatability is the precision at constant ambient temperature.

External dimensions and workable space

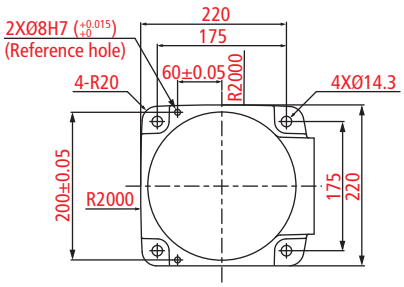
S (Z-axis stroke)	L1		L2	L3
	10 kg	20 kg	—	—
200	855	849	350	150
300	955	949	350	50
400 (*1)	1055	1049	350	-50

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

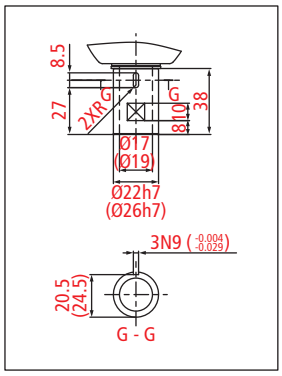




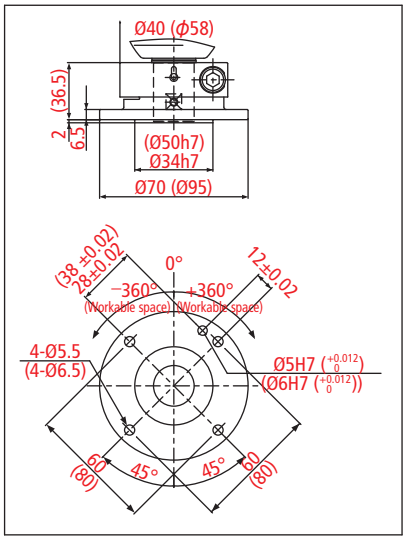
Detailed drawing of base mounting face (Top view)



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



Flange (option) (*2)



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

Unit : mm

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°

Legend

HM □ - 4 □ □□ □ - □

- 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: 1000 mm
- Vertical stroke : 2: 200 mm; 3: 300 mm; 4: 400 mm
- Options : None: Standard type; W: Dust & splash proof type (IP65); UL: UL specifications

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

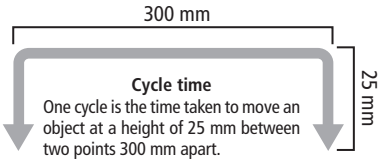
XR SERIES

Supported Robot Controllers | RC8 RC7

The built-in robot XR series has a unique Structure that enables high speed motion in a smaller facility.

- Position repeatability : ± 0.015 mm
- Cycle time : 0.56 s
- Maximum composite speed : 3,240 mm/s up to 3,650 mm/s
- Maximum payload : 5 kg
- Unique structure allows a very compact facility (narrow, low ceiling, and short depth).
- Combined motion of the linear axis (X) and pivot (R) results in fast motion.
- Ceiling mount structure allows effective use of space.
- ANSI and CE compliance

Controller : 〈RC8〉 Supported on the standard type
〈RC7M〉 Supported on the global type

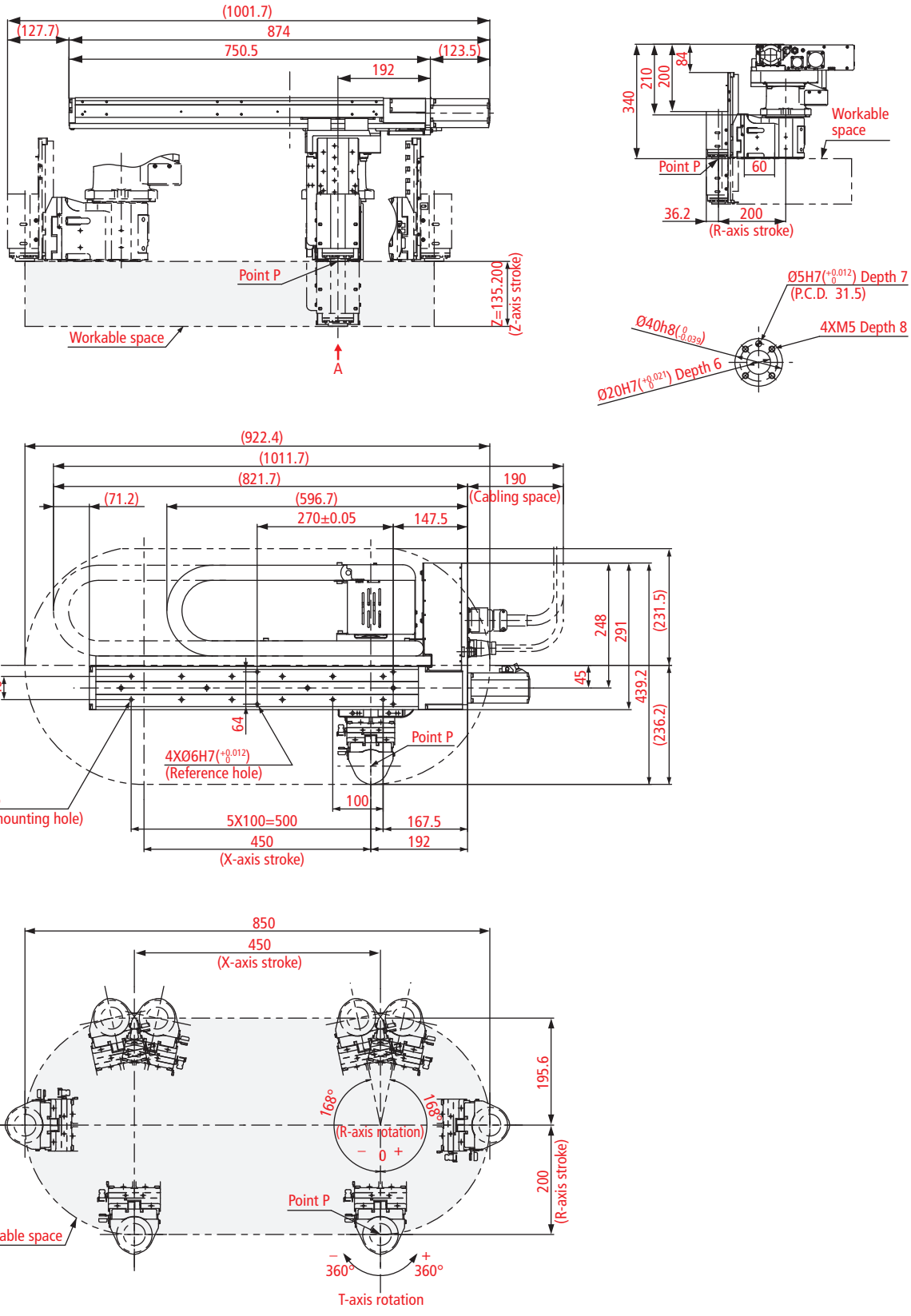


Specifications

Term		Unit	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 servo motor / Z-axis with brake						
Total arm length (No. 1 arm + No. 2 arm)		mm	200		250	300	200	250	300
Motion range and stroke	X (No. 1 axis)	mm	450	760			1,060		
	R (No. 2 axis)	°	±168						
	Z (No. 3 axis)	mm	*=1 : 135, *=2 : 200						
	T (No. 4 axis)	°	±360						
Maximum payload		kg	5						
Maximum composite speed (center of tool mounting face)	Arm end	mm/sec	3,650	3,600			3,240		
	Z		1,500						
	T	°/sec	720						
Position repeatability (center of tool mounting face) (*2)	X+R	mm	±0.015						
	Z		±0.01						
	T	°	±0.005						
Maximum allowable moment of inertia		kgm²	0.05						
User air pipe			1 air supply system (φ8) (4 systems (φ4 × 8) with optional manifold bulb)						
User signal line			10 (for proximity sensor signals, etc.)						
Air source	Normal pressure	MPa	0.05-0.35						
	Maximum allowable pressure		0.59						
Weight (*3)		kg	Approx. 33	Approx. 45	Approx. 46	Approx. 47	Approx. 51	Approx. 52	Approx. 53

*1: An asterisk [*] in a model name indicates Z-axis stroke.
*2: Position repeatability is the precision at constant ambient temperature.
*3: The heaviest model (Z = 200 mm) is listed.

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



Unit: mm

Legend

XR - 4 3 □ □ □

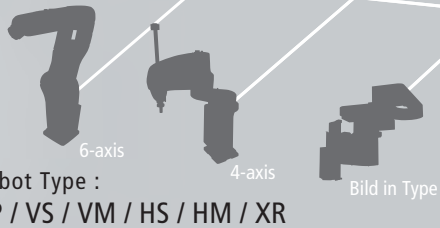
Built-in type	Axes:	Maximum payload:	X-axis stroke:	Total arm length:	Z-axis stroke:
	4: 4-axis	3: 5 kg	4: 450 mm 7: 760 mm A: 1,060 mm	1: 200 mm 2: 250 mm 3: 300 mm	1: 135 mm 2: 200 mm

DENSO Robot Controller

Lineup

RC8
Robot Controller

P.36



Robot Type :
VP / VS / VM / HS / HM / XR
Size : W441×D300×H94mm
Weight : 12kg

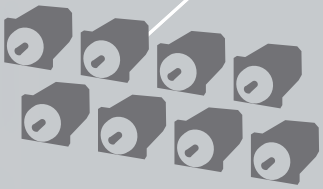
RC7M
Robot Controller

P.40

Robot Type :
VP / VS / VM / HS / HM / XR
Size : W484×D425×H153mm
Weight : 22kg

MC8
Motion Controller

P.37



Motor Type :
30 / 50 / 100 / 200 / 400 / 750 / 1000W
Size : W441×D300×H94mm
Weight : 12kg

DENSO ROBOT CONTROLLER concept

Compact

Compact size

Advanced functionality in
a small package.
Reduction of required space.

Functionality

Further enhancing ease of use

Improved functionality coupled with
an intuitive interface.
User-friendliness is a top priority.

The Global Standard

Compliance with global standards

Conforms to Safety Requirements
for Industrial Robots.
Can be deployed anywhere in the world.

Flexibility

Improved expandability

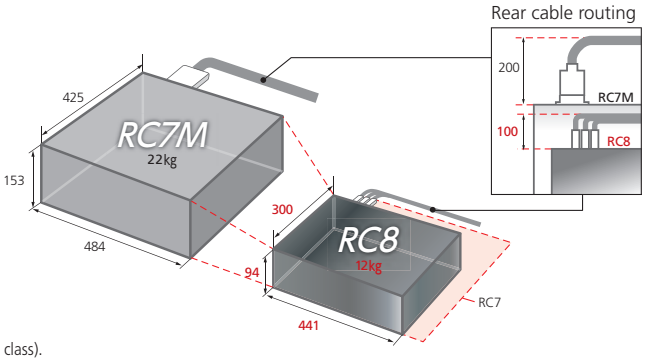
Connect to and control a wide range
of outside devices.
Customize the controller to your needs.

■ Robot controller

RC8

Robot Controller
Development Code No.8

State-of-the-art DENSO robot controller



Compact Size

The world's smallest*
high performance 8-axis controller

- Lightweight 〈RC7M: 22 kg, RC8: 12 kg〉
- Space-saving Cable

* As of December, 2014, in-house research. For robot controllers supporting 6-axis robots (3 kW class).

Exceptional Usability

Improved GUI
for increased efficiency

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

Compliance with global standards

Open network

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

Standards / Authentication

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

Field network

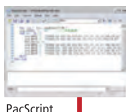
Supporting 80% of the global share of network standards

- Fieldbus
- Industrial EtherNet

Wide Expandability

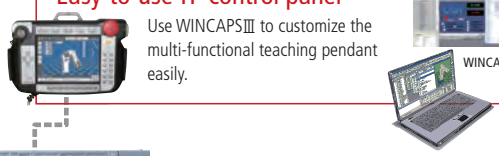
Control external devices without using PLC

You can access your provider from PacScript to create a control program to allow control from RC8 if a provider that supports external devices is available.

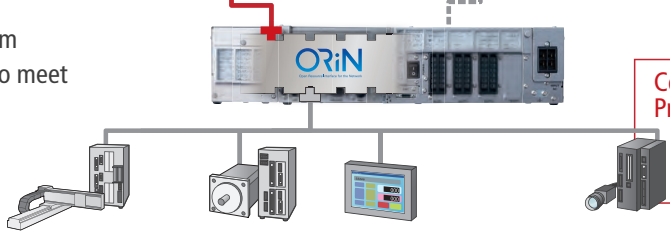


Easy-to-use TP control panel

Use WINCAPSⅢ to customize the multi-functional teaching pendant easily.



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



Control many devices with Provider Development

The custom provider allows additional connection and control over different products.
*Contact us for further information about development.

■ Motion controller

MC8

Motion Controller
Development Code No.8

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

Supports the development of custom robots

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

Orthogonal robot | Cylindrical coordinate robot | Tabletop robot

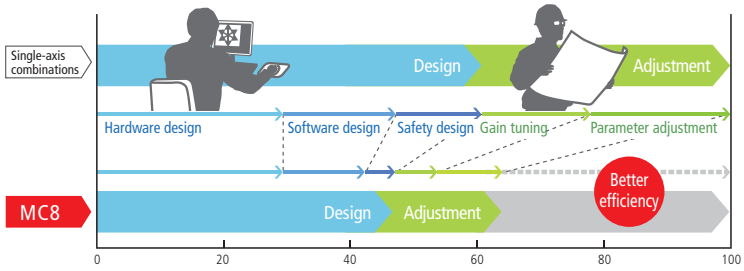
Exceptional Usability

Uses a RC8 interface specially adapted to robot control

WINCAPSⅢ | ORiN2 SDK | TP

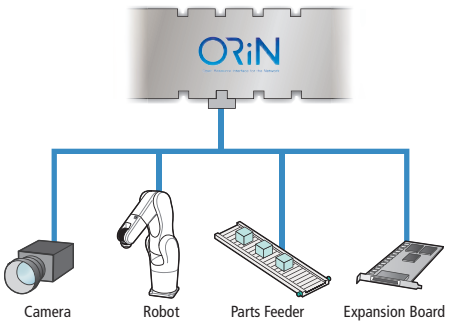
Shorten startup time

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



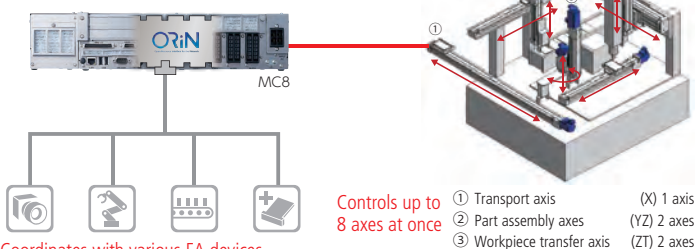
Maximum 8-Axis Control + Wide Expandability

Utilizes an RC8 provider to directly control various FA devices



Improving efficiency by integrating control

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



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

Controls up to 8 axes at once

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

World-class safety

Joins the RC8 in supporting international safety standards

Standards / Authentication

- CE (standard specification)
- PLe / SIL3 (standard specification)

RC8

Specifications

Term			Unit	Specifications							
Applicable robots				VP-5243 / 6242	VS-050 / 060 / 050 (Medical and pharmaceutical robot)	VS-068 / 087	VS-6556 / 6577	VM-6083 / 60B1	HS-45***	HM-4*****	XR-43***
Power	Power supply		kVA	1.00 (*1)	1.15	2.78	1.80	3.30	1.80	2.45	1.85
	Input voltage range			Three-phase, 200 VAC –15% to 240 VAC +10% (100 V specification also available for the VP series)							
				Single-phase, 230 VAC –10% to 240 VAC +10% (*1)					Single-phase, 230 VAC –10% to 240 VAC +10%		
	Power supply frequency		Hz	50 / 60							
Power cable			m	5							
Controllable axes				5 / 6	6				4		
Control method				PTP, CP 3-dimensional linear, 3-dimensional arc (PTP control only for additional axes)							
Drive method				All axes all digital AC servo							
Language used				DENSO Robotics language (PacScript)							
Memory capacity				User area Variable area : 1.75 MB (32,766 points equivalent), file area : 400 MB (5,000 steps × 256 files)							
Teaching system				1) Remote teaching 2) Numerical entry (MDI) 3) Direct teaching (HS series and HM series only)							
External signal (I/O, etc.)	Universal / dedicated I/O	Mini I/O		Input : User open 8 points + system fix 14 points (the safety I/O less version has system fix 13 points) (*2) Output : User open 8 points + system fix 16 points (the safety I/O less version has system fix 12 points)							
		Hand I/O		Input : User open 8 points / Output : User open 8 points							
	Parallel I/O boards (option)			Bus : PCI Input : User open 40 points / Output : User open 48 points							
	DeviceNet slave board (option)			Bus : PCI Express Input : 256 points / Output : 256 points							
	CC-Link remote device board (option)			Bus : PCI Express Input : 128 points / Output : 128 points Remote registers Input : 256 points / Output : 256 points							
	PROFIBUS slave board (option)			Bus : PCI Express Input : 256 points / Output : 256 points							
	EtherNet / IP adapter board (option)			Bus : PCI Express Input : 4,032 points / Output : 4,032 points							
	PROFINET I/O device board (option)			Bus : PCI Express Input : 8192 points / Output : 8192 points							
	EtherCAT slave board (option)			Bus : PCI Express Input : 2048 points / Output : 2048 points							
External communication				RS-232C : 1 line, EtherNet : 1 line (GbE : Gigabit EtherNet), USB : 2 lines, VGA : 1 line (option)							
Expansion slot				•PCI 1 slot •PCI Express 1 slot							
Self diagnosis function				Overrun, servo error, memory error, input error, short circuit detection (user wiring part), etc.							
Environmental condition (in motion)				Temperature : 0 to 40 degree C, Humidity : 90% RH or less (no condensation allowed)							
Safety category				Standard specification Category 4, PL = e (ISO 13849-1 : 2006) (*2)							
Protect grade				IP20							
Weight			kg	Standard approx. 12 (*3)							

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

Options (*4)

	Controller Type	Safety Category	Standard(s)	I/O Type
Standard specification	Standard	PLe	CE	NPN (negative common) / PNP (positive common)
	Safety-I/O-less			
	UL specifications (*5)	PLe	CE+UL	
Extended-joint support specification	Standard	PLe	CE	
	Safety-I/O-less			
	UL specifications	PLe	CE+UL	

*4: Specifications must be specified when placing an order. Changes to specifications cannot be made after shipment.
*5: UL specifications are also required for the robot unit. A multi-functional teach pendant or mini pendant is also required.
Note: VS-050 / 060 / 068 / 087 require a releasing brakes unit.

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

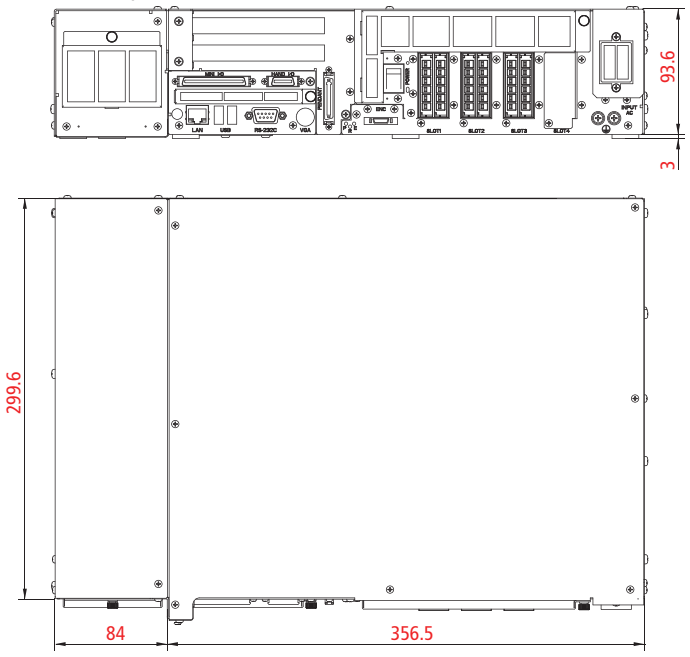
Legend

RC8 - □□□□ - NN □ □ - □□ - NNN

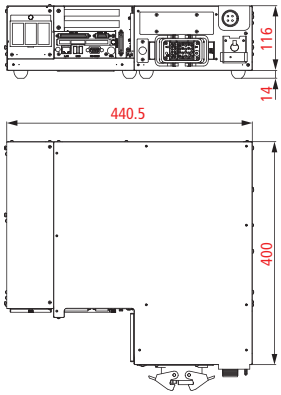
- RC8 — Controller name
- □□□□ — Robot type format:
  - VPA0: VP-5243 / 6242
  - VSA3: VS-050 / 060 / 050 (Medical and pharmaceutical robot)
  - VSA4: VS-068 / 087
  - VSA0: VS-6566 / 6577
  - VMA0: VM series
  - HSA0: HS series
  - HMA0: HM series
  - XRA0: XR series
- NN □ □ — CPU :
  - N: Standard
  - 7: High-spec CPU
- □ — I/O type:
  - M: Negative common (NPN)
  - P: Positive common (PNP)
- □□ — Compliant standard:
  - NI: Standard specification (safety I/O, safety category 4 / PLe)
  - NN: Safety-I/O-less specification (safety-I/O-less, no safety category)

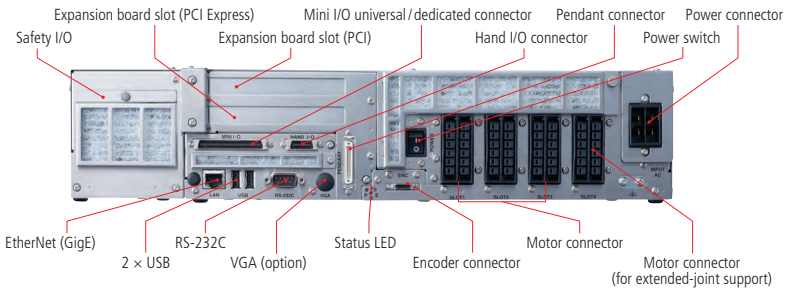
External dimensions

● Standard specification



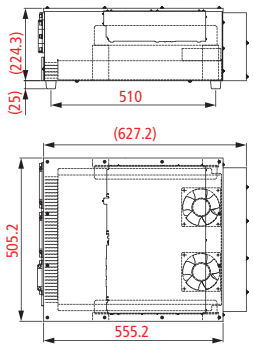
● UL specifications



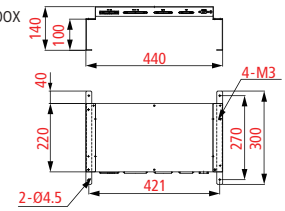


Option

● RC8 controller protection box

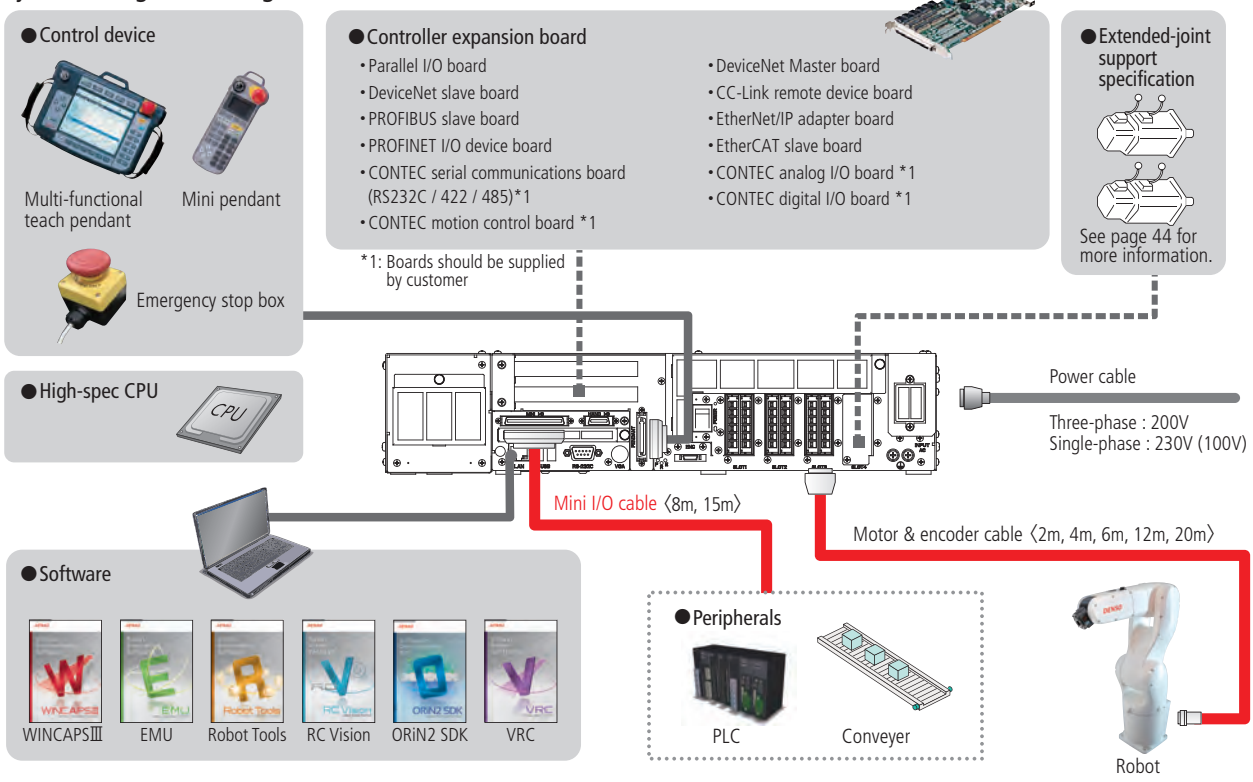


● I/O conversion box (RC5→RC8)



Unit : mm

System configuration diagram



RC7M

Safety category 4　　Safety category 3

Extensive variety of connection interfaces:

- EtherNet × 1
- RS232C × 1
- USB × 2
- Mini I/O
- Hand I/O

Other interface options include:

- RS232C expansion
- PROFIBUS
- CC-Link
- S-LINK V
- DeviceNet
- Parallel I/O expansion
- EtherNet/IP

Extended-joint support specification (option):

Controls of the peripheral and tool are consolidated to a robot (*1)

Controller protection box (option):

Protects controller from unclean air

*1: PTP control is the only control available for the extended-joint support motor.

Specifications

Term			Unit	Specifications								
Applicable robots				VP-5243/6242	VP-6242G2/6242G2-S1	VS-050/060	VS-068/087	VS-6556/6577	VM-6083/60B1	HS-45***	HM-4*****	XR-43***
Power	Power supply		kVA	1.00 (*2)	1.00 (*2)	1.15	2.78	1.85	3.30	1.80	2.45	1.80
	Input voltage range			Three-phase, 200 VAC −15% to 230 VAC +10% (100 VAC specification also available for the VP/VP-G2 Series) (*2)								
				Single-phase, 230 VAC −10% to 230 VAC +10%						Single-phase, 230 VAC −10% to 230 VAC +10%		
	Power supply frequency		Hz	50 / 60								
Power cable			m	5								
Controllable axes				5/6	6					4		
Control method				PTP, CP 3-dimensional linear, 3-dimensional arc								
Drive method				All axes all digital AC servo								
Language used				DENSO Robotics language (conforming to SLIM)								
Memory capacity				3.25 MB (equivalent to 10,000 steps, 32,766 points) (Can be increased to 5.5 MB (option)) (*3)								
Teaching system				1) Remote teaching 2) Numerical entry (MDI)						1) Remote teaching 2) Numerical entry (MDI) 3) Direct teaching		1) Remote teaching 2) Numerical entry (MDI)
External signal (I/O, etc.)	Standard I/O	Mini I/O		Input : User open 8 points + system fix 11 points / Output : User open 8 points + system fix 14 points (*4)								
		Hand I/O		Input : User open 8 points / Output : User open 8 points								
	Safety I/O (*1)			Input : System fix 6 points / Output : System fix 5 points								
	Parallel I/O board (option)	Mount 2 boards		Input : User open 80 points / Output : User open 96 points (expandable)								
		Mount 1 board		Input : User open 40 points / Output : User open 48 points (expandable)								
	DeviceNet board (option)	Master/Slave		Input : 1,024 points (master) + 256 points (slave) / Output : 1,024 points (master) + 256 points (slave)								
		Master		Input : 1,024 points / Output : 1,024 points								
		Slave		Input : 256 points / Output : 256 points								
	CC-Link remote device board (option)	Remote device		Input : 384 points / Output : 384 points (including remote registers RWw and RWr)								
External communication				RS-232C : 1 line, EtherNet : 1 line, USB : 2 lines (Supporting flash memory)								
Expansion slot				3 (For optional boards)								
Self diagnosis function				Overrun, servo error, memory error, input error, etc.								
Timer function				0.02 s to 10 s (1/60 s step)								
Environmental condition (in motion)				Temperature : 0 to 40 degree C, Humidity : 90% RH or less (no condensation allowed) Altitude : 1,000 m or less								
Protect grade				IP20 (IP54 when controller protection box is used)								
Weight			kg	Approx. 18 (*5)						Approx. 17 (*5)		

*1: Used with safety specification and UL specifications. (Requires a safety I/O cable)
*2: Power for the 100 V specification is "Single-phase 100 VAC −10% to 110 VAC +10% 50/60 Hz, 1 kVA."　*3: Requires additional functionality at controller shipping.
*4: The global type of the controller cannot use system-fixed emergency stop I/Os.　*5: Does not include the supplied cables.

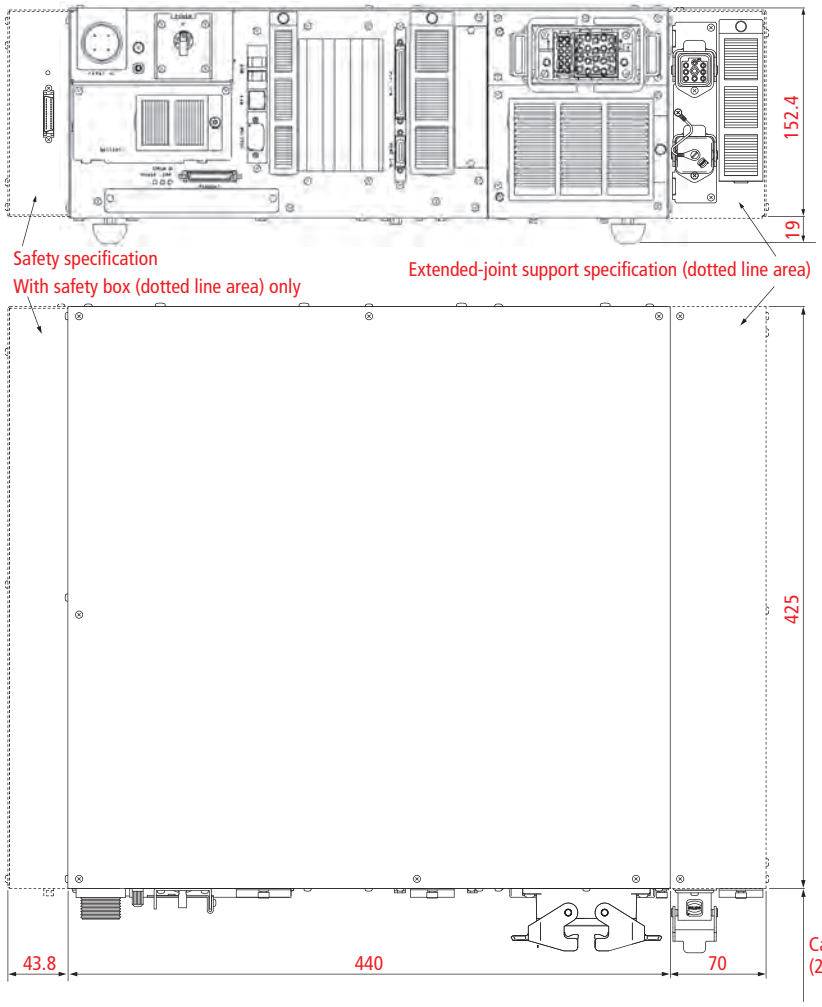
Options (*6)

	Controller Type		Safety Category	Standard(s)	I/O Type
Standard	Standard				NPN (negative common) (*8)/ PNP (positive common)
	Safety specification	With safety board	3	CE	
		With safety box	4		
	UL specification (*7)	With safety board	3	CE+UL	
		With safety box	4		
Extended-joint support specification	Standard				
	Safety specification	With safety board	3	CE	
		With safety box	4		

*6: Specifications must be specified when placing an order. Changes to specifications cannot be made after shipment.
*7: UL specifications are also required for the robot unit. A multi-functional teach pendant or mini pendant is also required.
*8: Standard used in Japan.

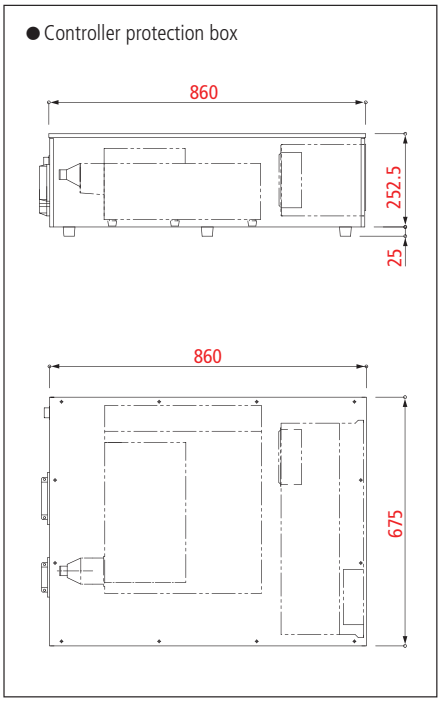
Compliant robot safety standards :
ISO 10218-1: 2011,
ANSI/RIA R15.06-1999
UL standards UL1740, CSA Z434, etc.

External dimensions



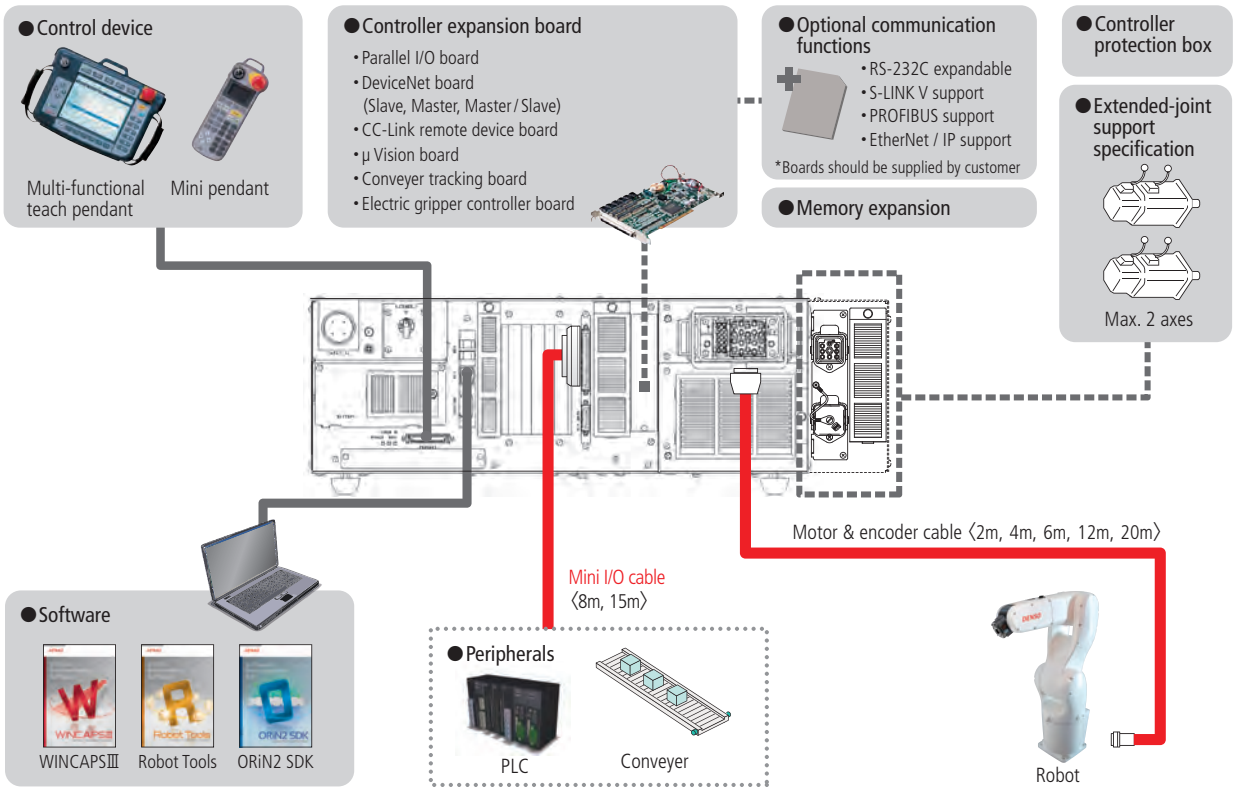
Option

● Controller protection box

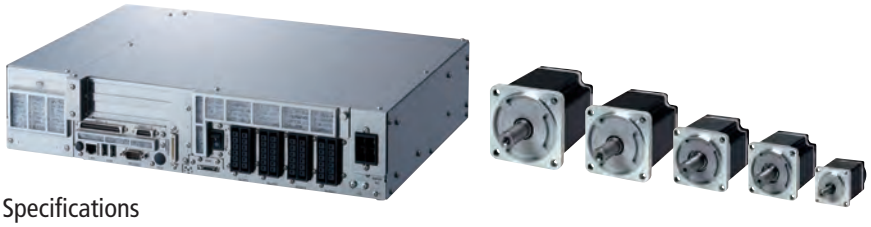


Unit : mm

System configuration diagram



MC8



Specifications

Term			Unit	Specifications
Power	Power supply		kVA	3
	Input voltage range			Three-phase 200 VAC −15% to 240 VAC +10%
	Power supply frequency		Hz	50 / 60
Power cable			m	5
Controllable axes				8 max.
Control method				PTP, CP 3-dimensional linear, 3-dimensional arc (*1)
Drive method				All axes all digital AC servo
Language used				DENSO Robotics language (PacScript)
Memory capacity				User area Variable area : 1.75 MB (32,766 points equivalent), file area : 400 MB (5,000 steps × 256 files)
Teaching system				1) Remote teaching 2) Numerical entry (MDI)
External signal (I/O, etc.)	Universal / dedicated I/O	Mini I/O		Input : User open 8 points + system fix 14 points (the safety I/O less version has system fix 13 points) (*2) Output : User open 8 points + system fix 16 points (the safety I/O less version has system fix 12 points)
		Hand I/O		Input : User open 8 points / Output : User open 8 points
	Parallel I/O boards (option)			Bus : PCI Input : User open 40 points / Output : User open 48 points
	DeviceNet slave board (option)			Bus : PCI Express Input : 256 points / Output : 256 points
	CC-Link remote device board (option)			Bus : PCI Express Input : 128 points / Output : 128 points Remote registers Input : 256 points / Output : 256 points
	PROFIBUS slave board (option)			Bus : PCI Express Input : 256 points / Output : 256 points
	EtherNet / IP adapter board (option)			Bus : PCI Express Input : 4,032 points / Output : 4,032 points
	PROFINET I/O device board (option)			Bus : PCI Express Input : 8192 / Output : 8192
	EtherCAT slave board (option)			Bus : PCI Express Input : 2048 / Output : 2048
External communication				RS-232C : 1 line, EtherNet : 1 line (GbE : Gigabit EtherNet), USB : 2 lines, VGA : 1 line (option)
Expansion slot				・PCI 1 slot ・PCI Express 1 slot
Self diagnosis function				Overrun, servo error, memory error, input error, short circuit detection (user wiring part), etc.
Environmental condition (in motion)				Temperature : 0 to 40 degree C, Humidity : 90% RH or less (no condensation allowed)
Safety category				Standard specification Category 4, PL = e (ISO 13849-1 : 2006) (*2)
Protect grade				IP20
Weight			kg	Standard approx. 12 (*3)

Driver units

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

Supported driver units

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

〈Selection example〉 (*4)

750W motor × 1, 400W motor × 1 = Select L/S

400W motor × 1 = Select S/SS

100W motor × 2 = Select SS/SS

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

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

*3: Does not include the supplied cables.

*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

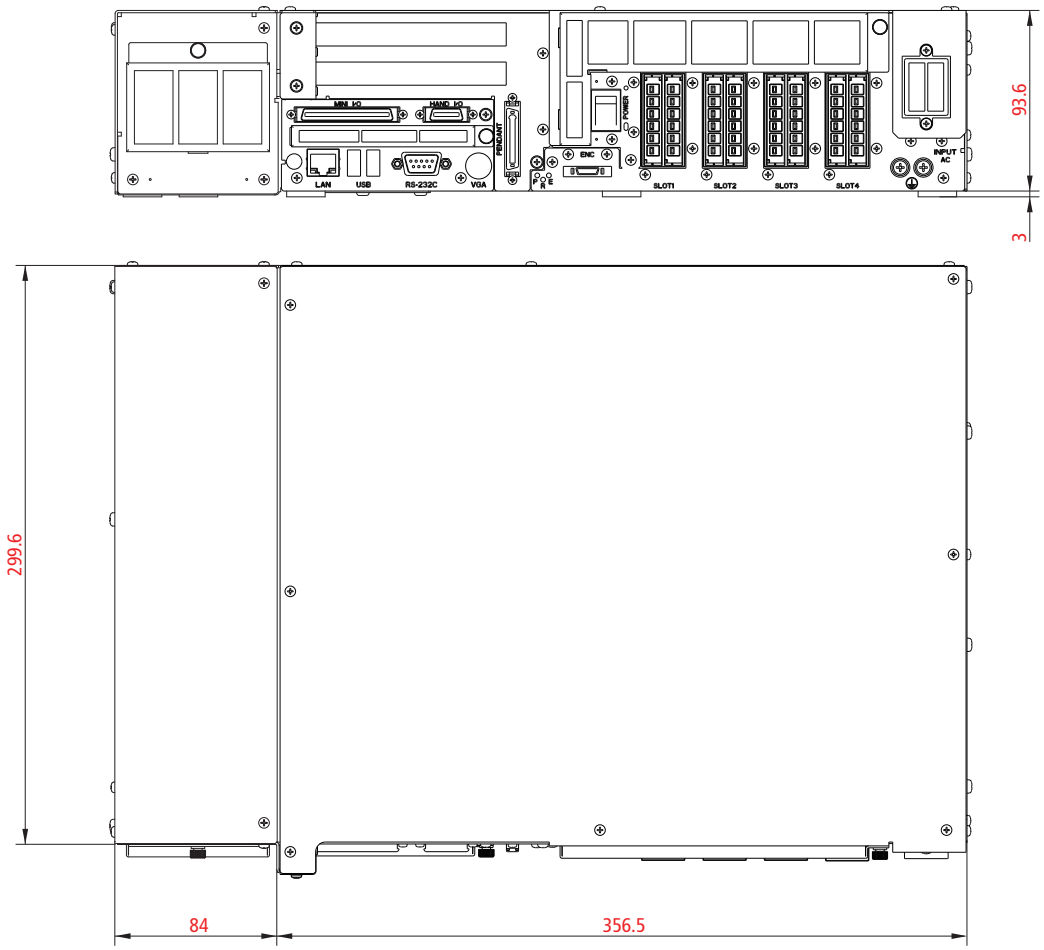
RC8 - MC81 - NN□□ - □□ - NNN

CPU:
N: Standard
7: High-spec CPU

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

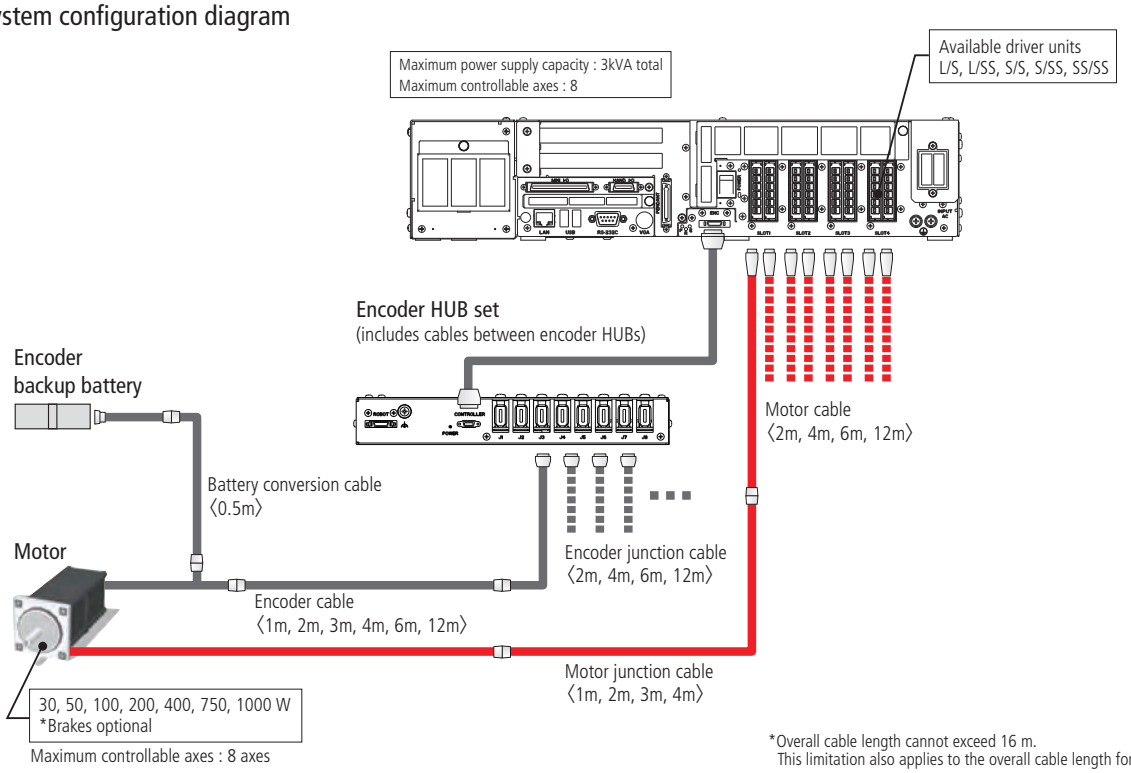
Compliant standard:
NI: Standard specification (safety I/O, safety category Cat. 4 / PLe)
NN: Safety-I/O-less specification (safety-I/O-less, no safety category)

External dimensions



Unit : mm

System configuration diagram



*Overall cable length cannot exceed 16 m.
This limitation also applies to the overall cable length for the encoders.

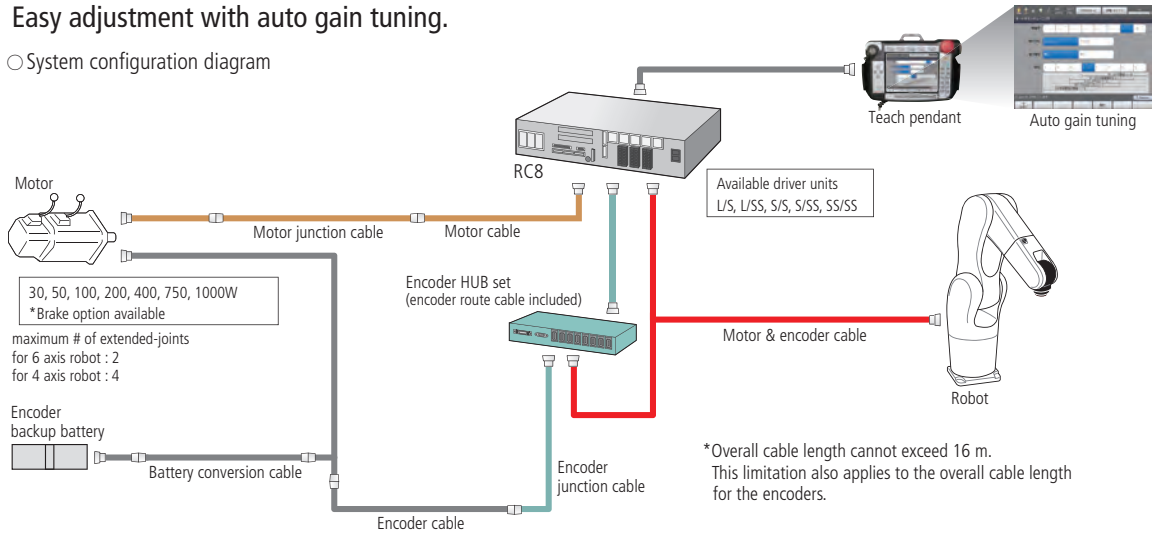
Extended-joint system

Option available at additional cost

RC8

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

○System configuration diagram



Main applications

●Robot drive axis / servo hand, device to determine position

[Supported Robots]

All RC8 robot models

Conveyer tracking

Option available at additional cost

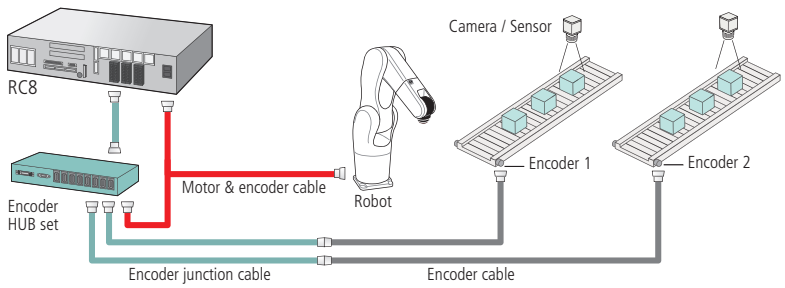
RC8

Robot tracks the workpiece to Pick & Place without stopping the conveyer. Use a wizard-type GUI to easily adjust complex conveyer tracking.

Sensor Tracking — Configure in 5 steps

Vision Tracking — Configure in 6 steps

○System configuration diagram



●Simple connection to commercially available image processing equipment

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

Main applications

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

[Supported Robots]

All RC8 robot models

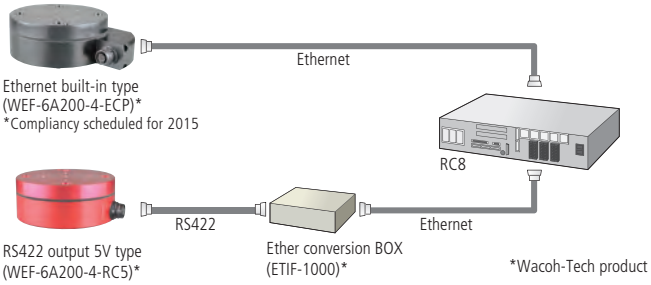
Compliance Control Function with Force Sensor

Option available at additional cost

RC8

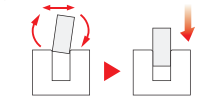
- Feedback control from a force sensor and DENSO exclusive strength control algorithm enable detailed copying, fitting and press action.
- Dedicated GUI allows monitoring of feedback values from the force sensor and enables force control settings to be adjusted to aid reduction of man-hours to startup.

○ System configuration diagram

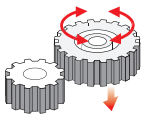


Main applications

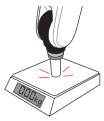
- ●Copying action at insertion of parts



- ●Fitting needed in assembly



- ●Press action such as applying constant pressure



[Models that support Wacoh-Tech inner force sensor]

·WEF-6A200-4-ECP	Ethernet built-in type	Load rating : 200 N
·WEF-6A200-4-RC5	RS422 type	Load rating : 200 N
·WEF-6A500-10-RC5	RS422 type	Load rating : 500 N
·WEF-6A1000-30-RC5	RS422 type	Load rating : 1000 N

[Supported Robots]

All models of RC8-supported DENSO 6-AXIS ROBOTS

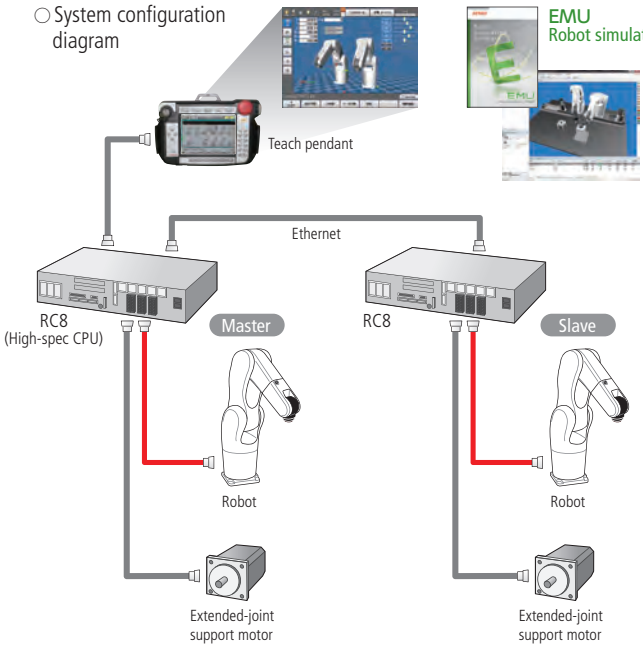
Cooperative Control

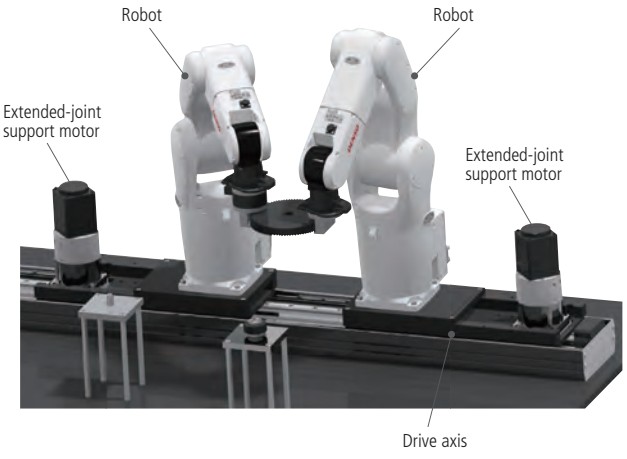
Option available at additional cost

RC8

- Multiple small robots can be used in place of large robots to convey and assemble heavy payloads and long payloads.

○ System configuration diagram





Main applications

- ●Conveyance and assembly tasks of heavy payloads and long payloads

[Supported Robots]

All RC8 robot models

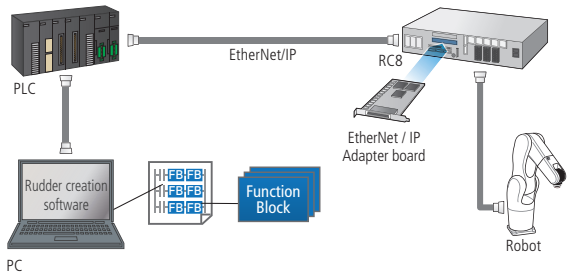
Command Slave

Option included

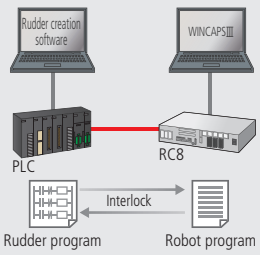
RC8

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

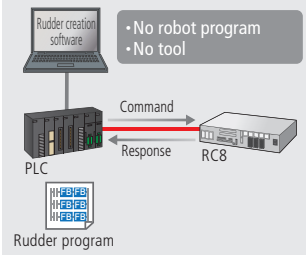
○System configuration diagram



Before (currently)



After If command slave function is used



Main applications

- Robot control from PLC

[Supported PLC]

Omron NJ series

[Supported Robots]

All RC8 robot models

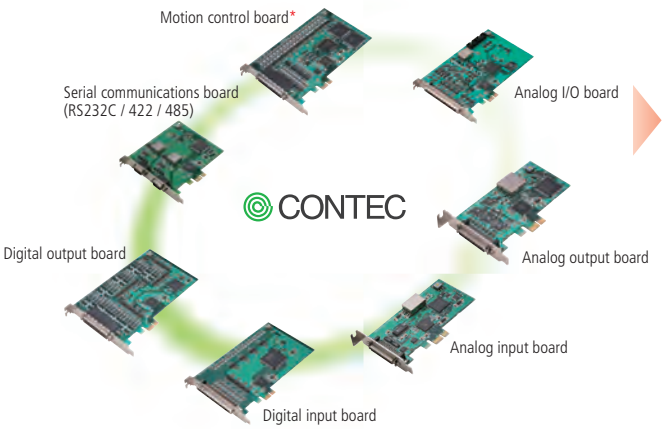
Supports CONTEC Expansion Boards

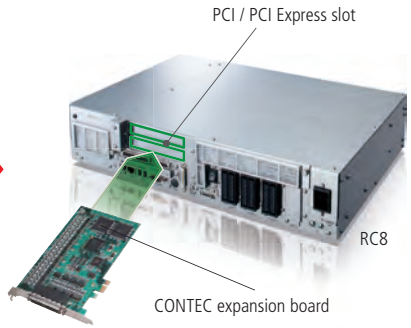
Option included*

RC8

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

- Approximately 200 CONTEC expansion boards are supported.





[Supported Boards]

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

[Supported Robots]

All RC8 robot models

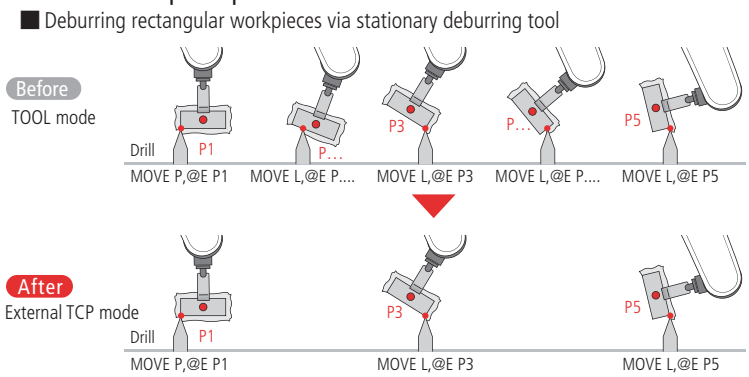
External TCP

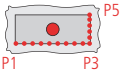
Option available at additional cost

RC7 RC8

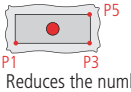
- Rotation around a defined center point of the workpiece allows for an easier method of teaching points and reduction of required positions

■ Deburring rectangular workpieces via stationary deburring tool



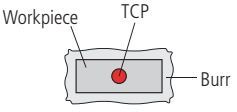


A large number of taught positions are required



Reduces the number of taught positions to 3

→Result : better efficiency



Main applications

- Deburring and sealant coating

[Supported Robots]

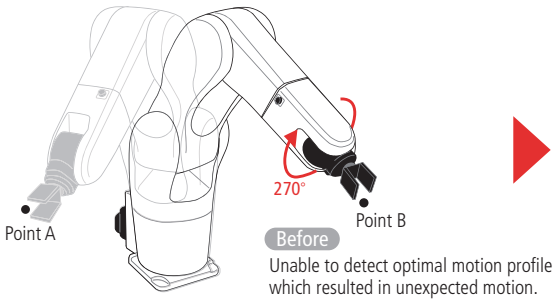
All RC8 robot models

Autofig

RC8

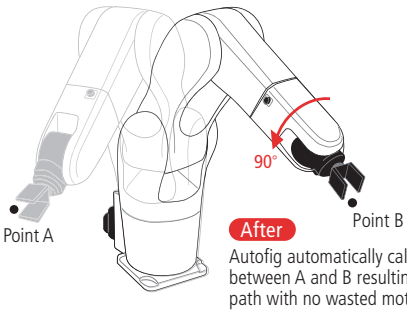
Automatically calculates the optimal "figure" for motion to a designated position resulting in reduction of setup time.

■ Movement from Point A to Point B



Before

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



After

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

Main applications

- When used with a program that employs a palletize library

[Supported Robots]

All RC8 robot models

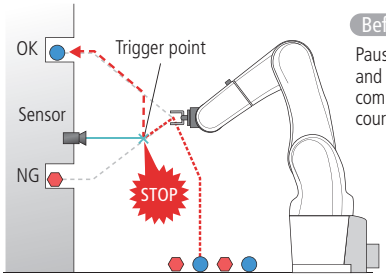
Motion Skip

RC8

Will change the target point and perform actions via external command without stopping during automatic operation.

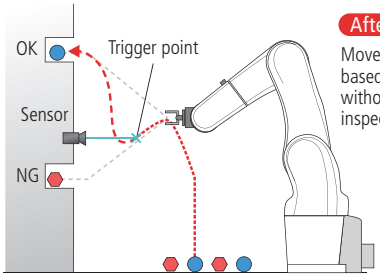
Reduced cycle for applications with dynamic workpiece positioning

■ Sorting and transporting workpieces



Before

Pauses on inspection points and restarts via external command on a corrected course.



After

Moves to the designated point based on inspection results without stopping on the inspection point.

Main applications

- Sorting and transporting various kinds of workpieces

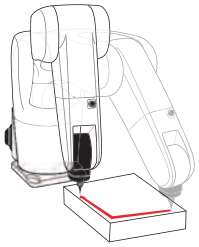
[Supported Robots]

All RC8 robot models

High-accuracy Path Control

RC7 RC8

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



Main applications

- Sealant and silicone adhesive coatings

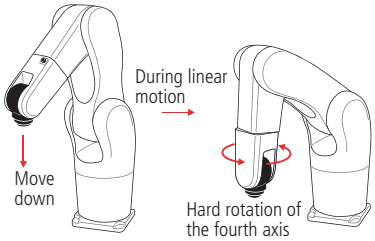
[Supported Robots]

VP series, VP–G2 series
VS series : VS–050 / 060 / 068 / 087, VS–6556 / 6577
VM series
HS series, HM series, XR series

Singular Point Avoiding Function

RC7 RC8

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



Main applications

- Used with a program that employs a palletize library

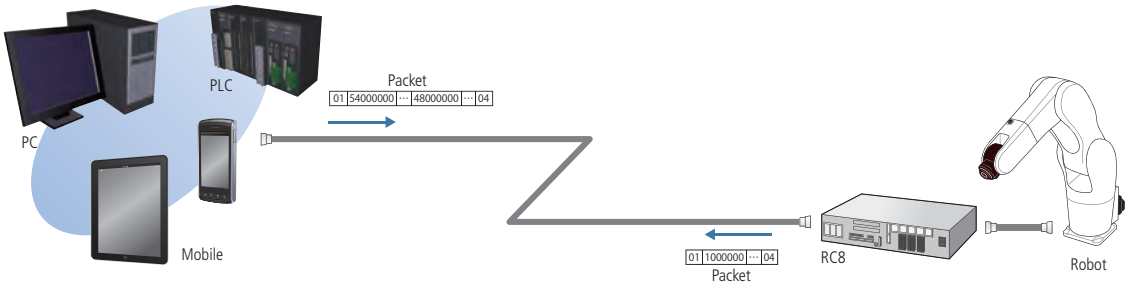
[Supported Robots]

VP series, VP–G2 series
VS series : VS–050 / 060 / 068 / 087, VS–6556 / 6577
VM series

b-CAP (communications protocol)

RC7 RC8

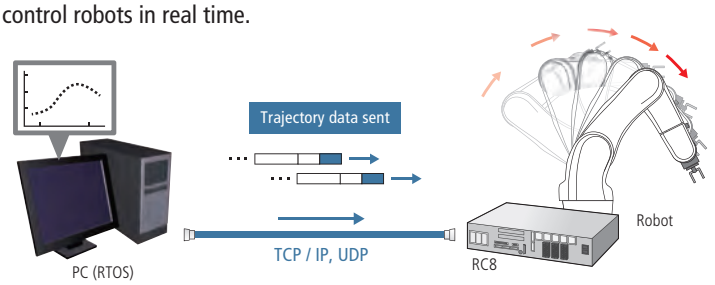
Send motion command packets from PC and PLC and other devices to directly control a robot.



b-CAP Slave

Option included RC8

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



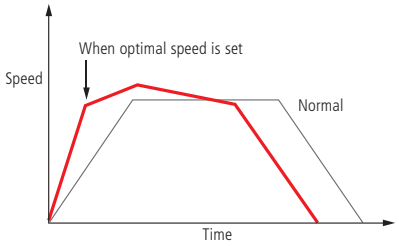
[Supported Robots]

VP series / VP-G2 series
VS series VS-050 / 060 / 068 / 087 / VS-6556 / 6577
VM series
HS series / HM series / XR series

Optimal Speed Setting

RC7 RC8

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



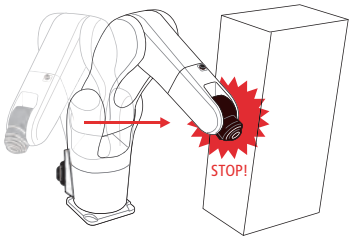
[Supported Robots]

VP series / VP-G2 series
VS series VS-050 / 060 / 068 / 087 / VS-6556 / 6577
VM series
HS series / HM series / XR series

Collision detection

RC7 RC8

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

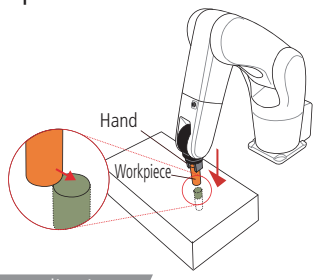
[Supported Robots]

VP series, VP–G2 series
VS series : VS–050 / 060 / 068 / 087, VS–6556 / 6577
VM series
HS series, HM series, XR series

Compliance control function

RC7 RC8

Adjust the press strength to protect the workpiece and hand from excessive loads.



Force limitation is applied to the vertical motion of the robot.
↓
Enables the robot to have spring function

Main applications ● Product assembly

[Supported Robots]

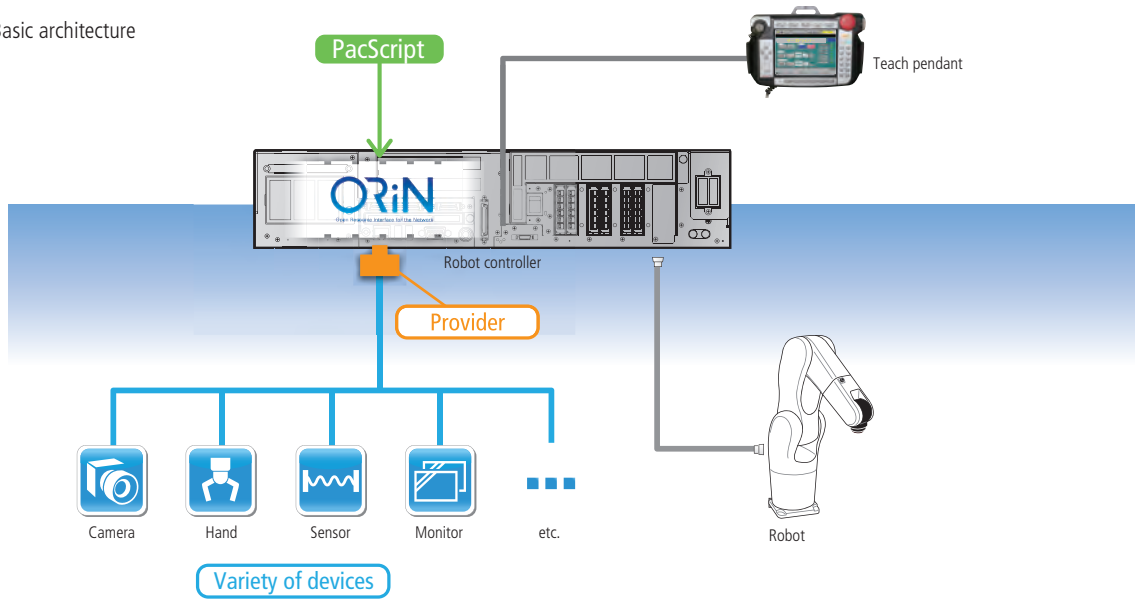
VP series, VP–G2 series
VS series : VS–050 / 060 / 068 / 087, VS–6556 / 6577
VM series
HS series, HM series, XR series

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

Provider

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

○Basic architecture



■Supported Product List

Category	Manufacturer	Product / Series
Image processing equipment	OMRON Corporation	FZ / FH / FZM1 / FQ2 series (*1)
	Keyence Corporation	XG / CV / CV-X series (*1)
	Panasonic Industrial Devices SUNX Co., Ltd.	PV series (*1)
	Cognex Corporation	InSight series (*1)
	Sharp Manufacturing Systems Corporation	IV series (*1)
	Canon Inc.	VB-H43B / VB-M42B (*1)
Actuators	KOGANEI Corporation	EWHA (*1)
	KEBA Japan Co., Ltd.	Active contact flange (*1)
Robots	Yamaha Motor Co., Ltd.	SR1 / DRCX / RCX series (*2)
Sensors	Wacoh-Tech Inc.	DynPick series (*1) (*3)
	DENSO WAVE INCORPORATED	GT / QD / QB series

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

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 Lineup

ORiN Version 2

WINCAPSⅢ
Offline Programming Software

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

EMU
Robot Simulation Software

Software that enables simulation of multiple DENSO Robotics

Robot Tools
Utility Application Software

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

RC Vision
Robot Vision Package

Software that utilizes DENSO Robotics and cameras to support equipment startup

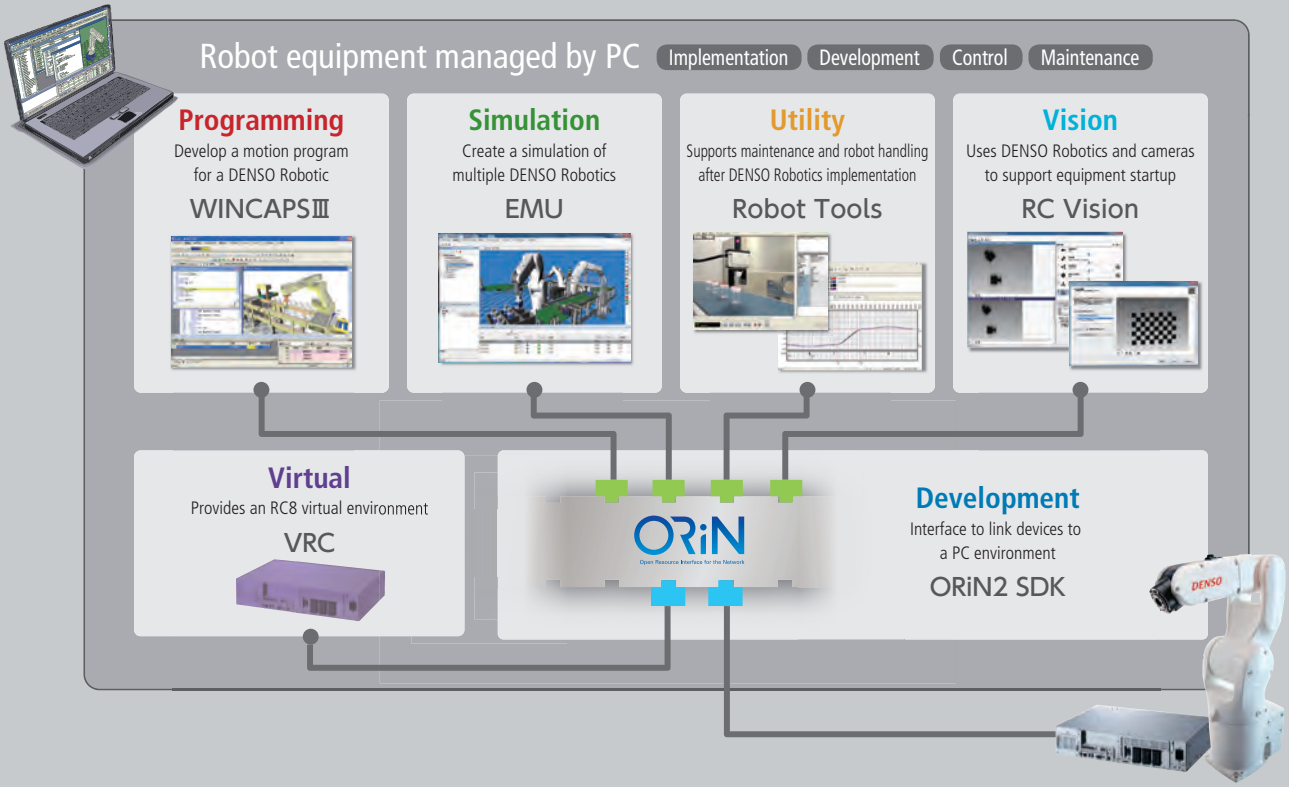
ORiN2 SDK
Software Development Kit

Middleware used to develop an application program or provider based on ORiN2 specification

VRC
Virtual Robot Controller

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

Software Positioning



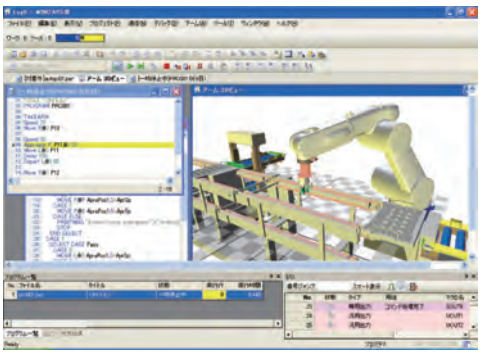
WINCAPS Ⅲ

RC8 RC7

DENSO

Offline Programming

WINCAPS Ⅲ is software used to program DENSO Robotics (RC8 : PacScript, RC7 : PAC) and create simulations on the PC.



Functions

Create a program

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

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

Simulation functions

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

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

Panel screen editor

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

Simple calibration

The following 3 types of calibration can be used :

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

Arm 3D view

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

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

Log function

Users can view the following logs :

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

Online functions

Connect to the robot controller to use the following functions :

[Monitor function] Monitor robot status

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

[Debug functions] Execute programs in the robot controller from the PC

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

and others

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	✔	✔	✔

*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.

System requirements :
OS: Windows® XP SP1 or later / Vista / 7 / 8
PC: CPU 2 GHz or faster multi-core processor, Memory 2 GB or more, HDD 1 GB or more
Languages supported : 5
Japanese, English, German, Korean, Chinese

ORiN2 SDK

RC8 RC7

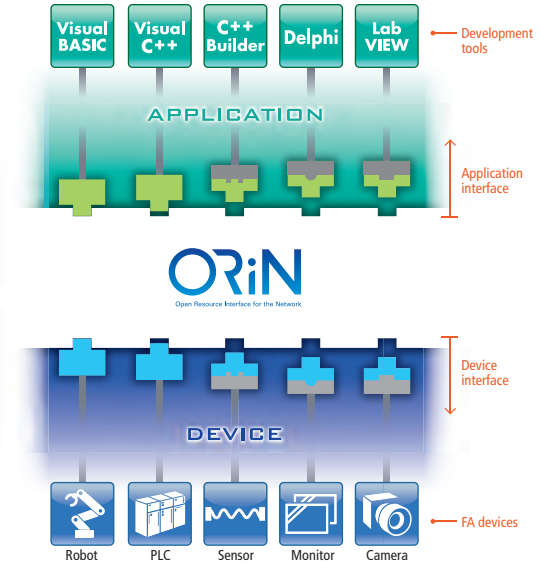
Integration Middleware for PC

ORiN2 SDK is a software tool kit used to develop an application program or provider based on ORiN2 specification.

It provides a standard communication interface for robots as well as various FA peripherals and databases.

ORiN2 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 ORiN2 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

ORiN2 enables easy system development that supports distributed object technologies such as DCOM and SOAP, and provides two standard interfaces : the application interface and device interface.

Recycles applications

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

Development tool options

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

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

Create an original provider

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

Package Type	ORiN2 Software Development Kit (ver2.1.20)											
	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	✔	✔		✔	✔		✔	✔		✔	✔	
CAO-OPC	✔	✔		✔	✔							
CAO-SQL	✔	✔		✔	✔		✔	✔		✔	✔	
CAO-UPnP		✔			✔							
CAO-Script		✔			✔							

System requirements: OS: Windows® XP SP1 or later / Vista / 7 / 8 PC: CPU Pentium® Ⅲ 1 GHz or faster, Memory 512 MB or more, HDD 500 MB or more

Robot Tools

Robot Stand / Maintenance Support Tools

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

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

Product Features

Image Logger

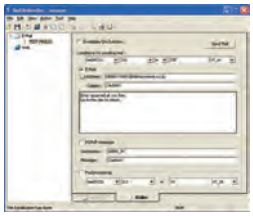
Supported controllers RC8 RC7

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

Mobile Monitor

Supported controllers RC8 RC7

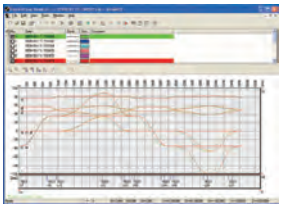
Monitors controller operating status and enables quick response to an error by sending an error notification email to a portable device when an operator is offsite.
Contributes to improved maintainability and task efficiency.



Control Log Analyzer

Supported controllers RC8 RC7

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



Virtual TP

Supported controller RC8 RC7

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

GP Operator

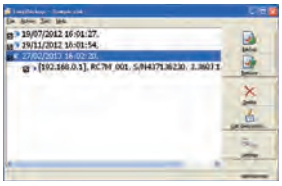
Supported controllers RC8 RC7

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

Easy Backup

Supported controller RC8 RC7

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



System requirements: OS: Windows® XP SP1 or later / Vista / 7 / 8 PC: CPU Pentium® Ⅲ 1 GHz or faster, Memory 512 MB or more, HDD 500 MB or more

RC Vision

Robot Vision Package

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

RC Vision
Vision tools for DENSO Robotics
EVP 1st

EVP Easy Vision Picking

RC Vision Application 1st

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

Image processing settings are configured using an application (EVP Guidance) on the PC. When executing (EVP Runtime) can be run by RC8 and the camera connected to RC8 only.

EVP also includes a calibration wizard that can perform robot calibration and calibration between camera and robot.

The picking device has built-in functionality to output the location of parts that are within the field of vision of the robot, allowing control of parts movement via a feeder or other device.

EVP Calibration Wizard

Correction

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

EVP Guidance

Settings

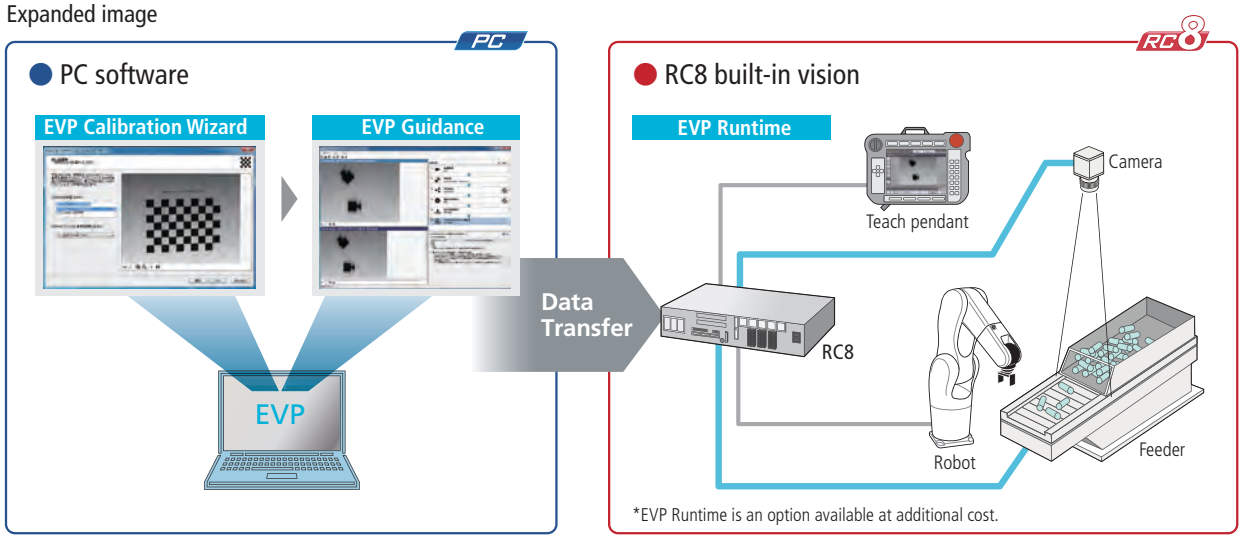
- An image processing flowchart can be configured by easy operation without using a program.
- Multiple models can be registered and recognized even in a mixed product environment.

EVP Runtime

Execution

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

Expanded image



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

EMU

Robot Simulations

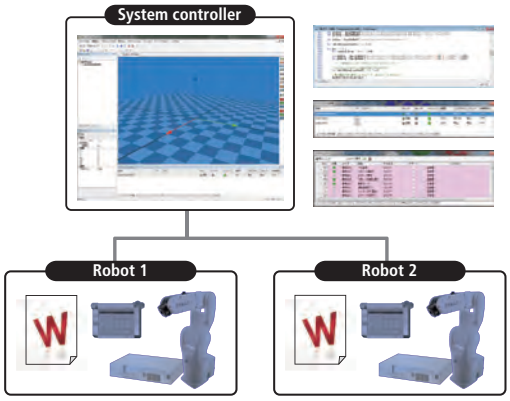
EMU (Enhanced MUlti-robot simulator) is software that allows you to run simulations for multiple DENSO Robotics.

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

Features

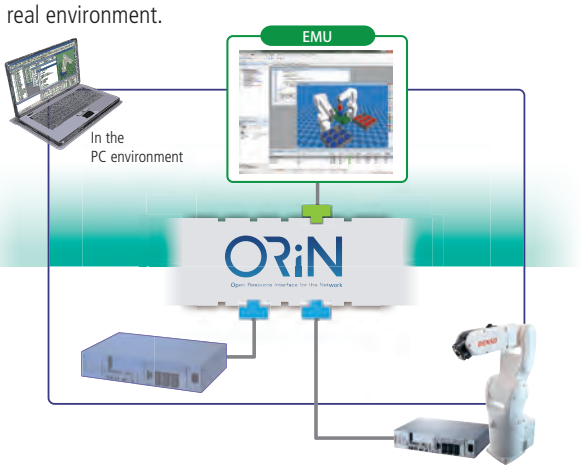
Sequence control

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



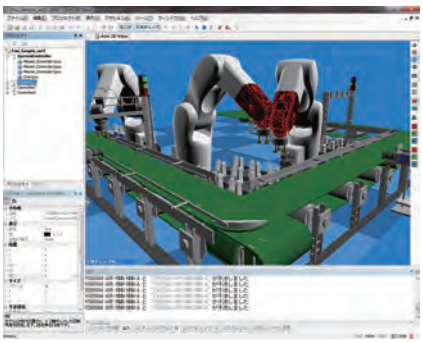
Connection with Machine

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



Interference checking

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



Coordination of peripheral devices

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

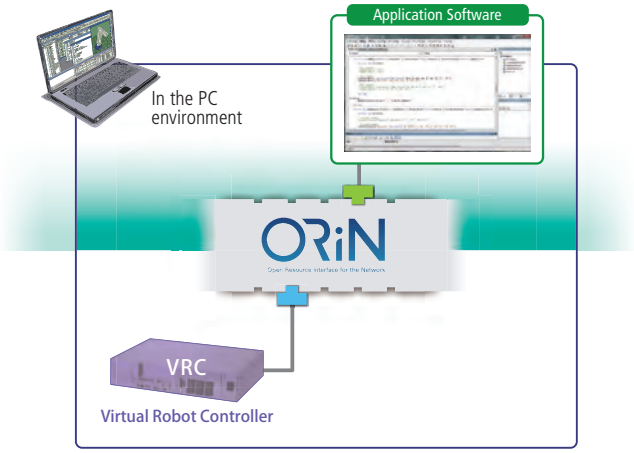
System requirements : OS: Windows® XP SP1 or later / Vista / 7 / 8　PC: CPU 2 GHz or faster multi-core processor, Memory 2 GB or more, HDD 1 GB or more

*Usage of EMU will also require the purchase of WINCAPS Ⅲ .

Virtual Robot Controller

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

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



Features

Provides GUI

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


Current position data

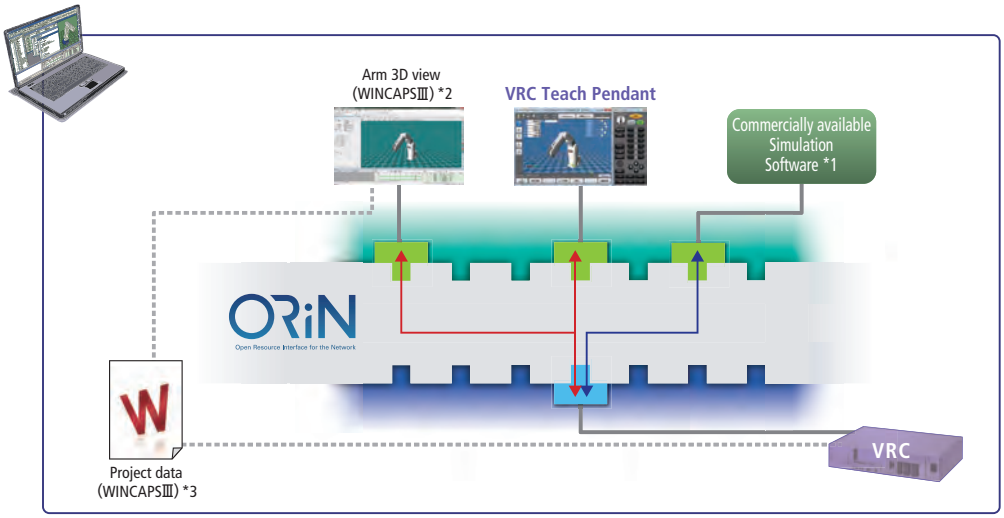

Variables


I/O


Error log

Simulation Link

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



*1: For commercially available simulation software that supports VRC, please inquire separately.
*2: WINCAPS III arm 3D view can also be used as a GUI that visually represents VRC.
*3: Specifying project data when VRC is started enables you to define robot type.

System requirements : OS: Windows® XP SP1 or later / Vista / 7 / 8 PC: CPU 2 GHz or faster multi-core processor, Memory 2 GB or more, HDD 1 GB or more
*Usage of VRC will also require the purchase of ORiN2 SDK.

DENSO

Auto Hand Changer

Features

- Mountable as-is to the DENSO Robotics plate mechanical interface.
- Standard equipment includes hand anti-drop mechanism triggered by reduced air pressure and a check valve for the air lock at hand detachment.
- Up to 6 pipes and 10 wires can be connected.

Supporting Robots	Part Name	Model	Weight	Moment of Inertia	Thickness	Hand Mounting Hole
VP series VS series	AHC unit	AHC5-U	0.44 kg (includes plate)	2.77×10^{-4} kg·m^2	55.5 mm (includes plate)	4-M5 P.C.D44
	Adapter	AHC5-A				
	Mounting plate	AHC5-P				
	Stand	AHC5-S				
VM series	AHC unit	AHC5-U	0.39 kg	2.6×10^{-4} kg·m^2	45.5 mm	4-M5 P.C.D44
	Adapter	AHC5-A				
	Stand	AHC5-S				
HS series HM series (*1) XYC series	AHC unit	AHC10-U	0.6 kg	5.1×10^{-4} kg·m^2	49 mm	4-M5 P.C.D50
	Adapter	AHC10-A				
	Stand	AHC10-S				

*1: Only the 10 kg payload HM series specification is supported.

Stand

Adapter
(hand side)

AHC unit
(robot side)

Specifications

Term			Unit	Specifications	
Model				AHC5 (5- / 6-axis specification)	AHC10 (4-axis specification)
Position repeatability			mm	±0.01	±0.015
Consolidated axial force resistance (0.5 MPa)			N	802	1420
Moment-resistant (0.5 MPa)			N·m	24	49
Torque-resistant (0.5 MPa)			N·m	24	49
Ambient operating temperature			°C	0-60	
Interface	Air	Number of circuits	Qty.	6	
		Maximum use pressure	MPa	0.7	
		Effective sectional area	mm^2	1	
	Electric	Number of contacts	Qty.	10	
		Contact capacity	A	3	

Bar Code and 2D Code 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

Handy terminal : BHT-1300 series

- Select from two OSs : Windows OS / BHT-OS
- Ultralight/compact model for exceptional usability.
- 360°readability reduces workhours. (2D code model only)

Handy terminal : BHT-1200 series

- High-spec model with friendly operation.
- Embedded LCD with 3.5-inch large screen touch panel.
- New release of wireless WAN (3G)-model to support a number of use scenarios.

Handy Scanner

Handy scanner : AT20 series

- High-speed reading of QR codes and bar codes.
- Top durability in its class.
- New high resolution models added to the lineup.

Direct Marking Support Model

Fixed scanner : QD25

- Reads 2D codes marked on paper, metal, resin, glass and other surfaces.
- Full adjustment functionality enables reading of deteriorated or altered print.

What is direct marking?

Used increasingly in a number of sectors, direct marking enables printing in small spaces, which eliminates the need for paper and lowers operation costs. Reads 2D codes created by laser marker or dot pins used to print directly on a product or part.

Support

Web Site

■ DENSO Robotics grand top

http://www.densorobotics.com/

■ Domestic visitor site

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

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

■ Member site

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

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

FA Technical Support

■ FA School

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

■ FA Seminar

Case studies and factory tours are used to highlight our customers' progress in automation and power conservation, and pass on knowledge DENSO has gained from years of experience.

FA School and FA Seminar Office

TEL: +81-569-49-1587

E-mail: fa-school.seminar@denso-wave.co.jp

*Please visit our website for information and application instructions for FA school and FA seminar.
[http://www.denso-wave.com/en/robot/]

■ Application Tests

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

*For a robot application test, inquire at an office nearest you.

■ FA Technical Support Center

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

FA Technical Support Center Desk

TEL: +81-569-49-1591

(Weekdays 9:00 – 12:00 and 13:00 – 17:00 Japan Standard Time)

E-mail: fa-support@denso-wave.co.jp

*For details, please visit our website.
[http://www.denso-wave.com/en/robot/]

Customer Service

■ Customers in Japan

	Service	Description
1	Business Trip Repair Service	Repair service when an error occurs A service technician travels to a site to perform repairs.
2	Send in for Repair Service	Repair service provided at our Repair Center We repair any product or parts sent in to us.
3	Broken Part Analysis Service	Investigation and reporting of causes of malfunctions Helps in clarifying and eliminating causes.
4	ANSHIN Inspection Service	Regular maintenance inspections A service technician performs regular maintenance inspections on-site. *Optional plans for things like bulk discounts and warranties are also available.
5	ANSHIN Refresh Service	Inspection and overhaul service Conducts motion inspections and surveys repairs, overhauling, and shipping. *Supported products: robot unit, controllers, teach pendants
6	Substitute Product Rental Service	A service for renting out substitute robot unit, controllers, etc. This service is provided during periods when we conduct our "ANSHIN Refresh Service".
7	Robot School (Maintenance)	Training in maintenance (1) Regular school: participants acquire maintenance knowledge pertaining to areas such as regular maintenance inspections, functional parts replacement, and troubleshooting. (2-days course) (2) Business trip school: maintenance education carried out on-site using actual customer machines. (3) Individual school: maintenance education tailored to individual customer needs.

Optional Services

8	ANSHIN Call 24 Service (annual contract)	24-hour maintenance and technical support service by telephone, available overnight and on holidays (1) Skilled technicians provide overnight and holiday troubleshooting support. (2) Same-night delivery of parts needed to get robots restored. *Provided as a set with the "ANSHIN Inspection Service".

■ Overseas Factory Customers — Support for robots relocated outside Japan —

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

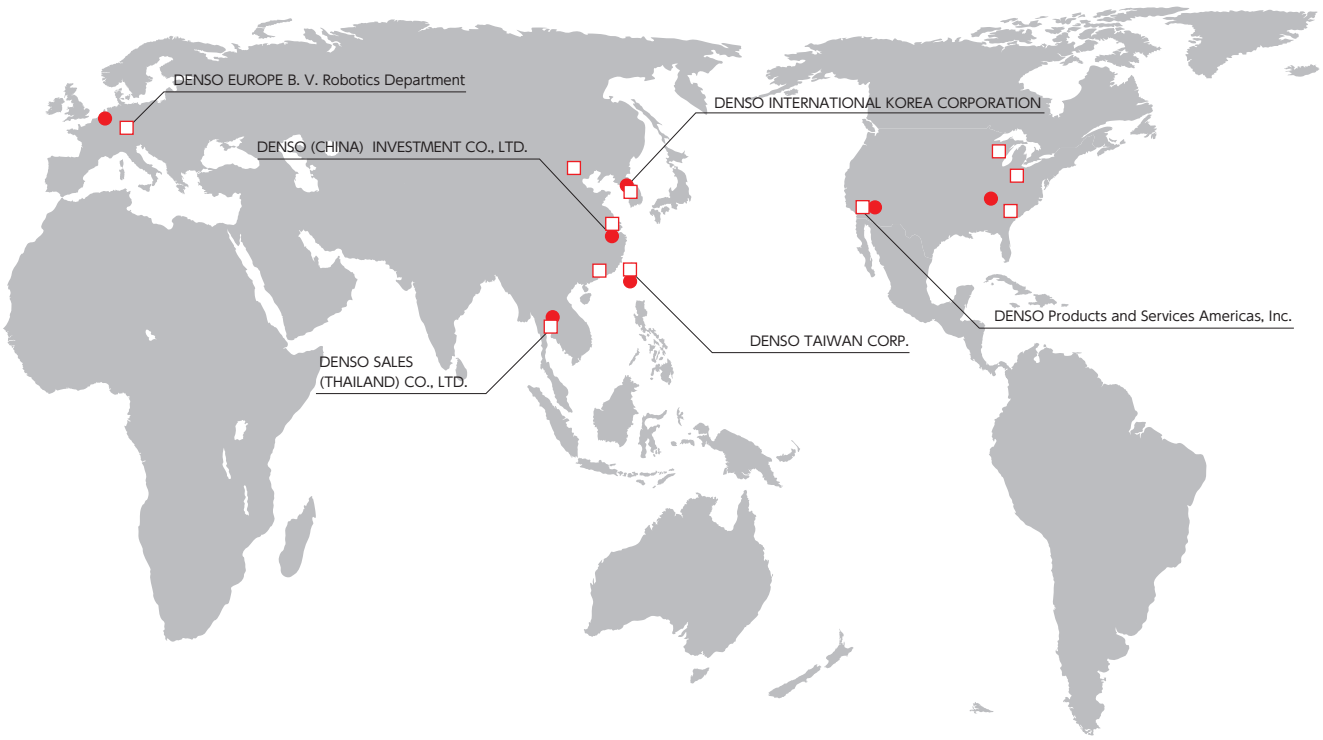
	Service	Description
1	General Overseas Service (*1)	Support offered by the local vendor or service center (*2) (1) Technical consult at a local office (2) Send in for repair (3) Spare and service parts available for local purchase (4) Maintenance education
2	Global Warranty Service (*3)	Support offered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

Regions Supported by DENSO Service Centers	
North America	U.S.A. (*4), Mexico
Europe	Germany, Italy, Benelux, France, Great Britain, etc.
Asia	Singapore, Malaysia, South Korea, China, Thailand, Vietnam, Taiwan, India

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

*4: Also handles neighboring countries that can send parts to the U.S.A. for repair.

Global Network



Overseas Centers

□ : Sales offices ● : Service centers

DENSO Products and Services Americas, Inc.	3900 Via Oro Avenue, Long Beach, California, 90810, U.S.A.	TEL:+1-888-476-2689	FAX:+1-310-952-7502
DENSO EUROPE B. V. Robotics Department	Waldeckerstrasse 9 D-64546 Moerfelden-Walldorf, Germany	TEL:+49-6105-27-35-150	FAX:+49-6105-27-35-180
DENSO INTERNATIONAL KOREA CORPORATION	131, Seonggogae-ro, Uiwang-si, Gyeonggi-do, Korea 437-120	TEL:+82-31-340-1783	FAX:+82-31-8033-7210
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DENSO SALES (THAILAND) CO., LTD.	888 Moo 1 Bangna - Trad Rd., KM. 27. 5, T. Bangbo, A. Bangbo, Samutprakam 10560, Thailand	TEL:+66-2-315-9500	FAX:+66-2-315-9556