

DENSO Robotics®

# General Product Catalog

**DENSO**



# HISTORY

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

DENSO is pursuing productivity by creating environments where people can work in a manner befitting human beings. Our concept of production with a focus on human beings is the starting point for our development of robots. We apply our experience of using production technologies at our production sites to product development, which drives our continuing efforts to create high-performance robots that are easy to use. We are approaching the 56th anniversary; we have sold approximately 120,000 robots since we began development.



Aluminum die-casting operation robot

### 1967 To enable people to work in environments befitting human beings

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

### 1985 Continuing refinement at in-house factories

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



Mid-sized 4-axis robot

### 1991 Introduction of robot technology to the world

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



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

## 1998 Greater ease of handling

1998 saw the adoption of the world's first use of a graphical user interface (GUI) in teaching pendant control panels in the robot industry \*. The resulting intuitive easy-to-understand UI has improved user operability and reduced the time consumed by robot introduction, adjustment and maintenance. The GUI has further evolved into the current RC8A controller. \*According to our research



Teaching pendant with GUI



Pharmaceutical/medical robot VS050S2

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

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

## 2016 Achievement of the ultimate basic performance

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



4-axis robot HSR Series



COLLABORATIVE ROBOTS COBOTTA

## 2018 A robot that collaborates with people.

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

## 2020 Now with high-payload robots

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



5- and 6-axis robot VMB VLA



Collaborative robot COBOTTA PRO

## 2023 High-speed collaborative robot

COBOTTA PRO is designed not only to collaborate with an operator but also to consistently improve productivity. It delivers both productivity and safety for not only simple tasks but also multi-process tasks such as assembly and inspections.

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

Recent years have brought more opportunities for customers in a diverse array of industries to use robots.

Our goal is to supply easy-to-use robots to everyone who's involved with robots.

What does it mean for a robot to be easy to use?

Some customers wish to implement highly difficult equipment designs that integrate a development environment that incorporates multiple pieces and types of equipment, while others prefer the ease of intuitive programming and operation.

We believe that different people involved with robots define ease of use in different ways.

DENSO Robotics products continue to evolve day in and day out so that we can better meet the needs of a larger range of customers.

Our new RC9 robot controller makes possible integrated control of equipment by providing openness for integration of the user, system integrator, and manufacturer technologies along with expandability for simple integration of entire systems.

In addition, we're developing artificial intelligence technologies that deliver simplicity while enhancing our software, robot functionality, and support structures.

Going forward, DENSO Robotics will supply ease of use to everyone who's involved with robots through an extensive range of products and support across the board, including in design, setup, operation, and maintenance.

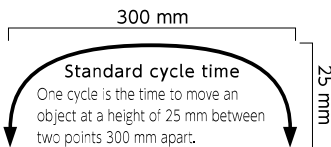


# VS Series

## VS050 / 060 / 068 / 087

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

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



VS060

VS087

### Specifications

Item	Specifications				
Model	VS050	VS060	VS068	VS087	
Axes	6				
Position detection method	Absolute encoder				
Drive motor / brake	All-axis AC servo motor / all-axis brake with brakes				
Total arm length (No. 1 arm + No. 2 arm)	505 (250 + 255) mm	605 (305 + 300) mm	680 (340 + 340) mm	875 (445 + 430) mm	
Maximum motion area (Point P)	505 mm	605 mm	710 mm	905 mm	
Motion range	1st axis	±170° *5			
	2nd axis	±120°			
	3rd axis	+151°, -120°	+155°, -125°	+153°, -120°	+153°, -136°
	4th axis	±270°			
	5th axis	±120° *6		±120°	
	6th axis	±360°			
Maximum payload	4 kg		7 kg		
Maximum joint speed	1st axis	425 deg/sec		356.25 deg/sec	285 deg/sec
	2nd axis	340 deg/sec	283.33 deg/sec	303 deg/sec	252.5 deg/sec
	3rd axis	385.72 deg/sec	309.35 deg/sec	378.75 deg/sec	303 deg/sec
	4th axis	425 deg/sec		475 deg/sec	378.75 deg/sec
	5th axis	327.01 deg/sec		475 deg/sec	378.75 deg/sec
	6th axis	680 deg/sec		760 deg/sec	606 deg/sec
Standard cycle time *1	0.35 sec		0.31 sec	0.34 sec	
Position repeatability (at the center of a tool mounting face) *2	±0.02 mm		±0.03 mm		
Maximum allowable moment of inertia	4th axis, 5th axis	0.2 kgm <sup>2</sup>		0.45 kgm <sup>2</sup>	
	6th axis	0.05 kgm <sup>2</sup>		0.1 kgm <sup>2</sup>	
Maximum allowable moment	4th axis, 5th axis	6.66 Nm		16.2 Nm	
	6th axis	3.13 Nm		6.86 Nm	
Signal lines	10 (for proximity sensor signals, etc.) *7,8				
Signal lines / Air pipe solenoid valve (option)	Air pipe solenoid valve	5 systems (ø4 × 4, ø4 × 1) *3 2 × solenoid valves (2 position, double solenoid) Cleanroom type has 4 systems (ø4 × 4).		7 systems (ø4 × 6, ø6 × 1) *4 [solenoid valves can be selected from 1 to 3] 1. 3 × solenoid valves (2 position, double solenoid) 2. 3 × solenoid valves (3 position, exhaust center solenoid) 3. 3 × solenoid valves (3 position, closed center solenoid) Cleanroom type has 6 systems (ø4 × 6).	
	Communication interface flange-A (option) *Standard type only	17 (power wire for cameras, etc.) *8 LAN×1 (1000BASE-T) *9			
Air source	Normal pressure	0.20 to 0.39 MPa			
	Maximum allowable pressure	0.49 MPa			
Airborne noise (equivalent continuous A-weighted sound pressure level)	65 dB or less				
Protection grade	Protected type: IP67 *10 (option) Dust & splash proof type: wrist IP65 / unit IP54 (option) Cleanroom type: ISO class 3 / 5 (option)				
Weight	Approx. 27 kg	Approx. 28 kg	Approx. 49 kg	Approx. 51 kg	

\*1: Time required for a robot to move a 1 kg payload between two points 300 mm apart at a height of 25 mm. \*2: Position repeatability is the precision at constant ambient temperature.

\*3: Controllable by use of the embedded solenoid valve only for ø4×4. \*4: Controllable by use of the embedded solenoid valve only for ø4×6. \*5: Limited motion range when wall mounted. For details, please contact our sales representative.

\*6: When communication interface flange-A is selected, the motion range of J5 is +120° and -110°. \*7: There are 4 of these lines (for proximity sensor signals, etc.) when selected together with communication interface flange-A.

\*8: Allowable current is limited. \*9: The LAN cable to connect to the connector panel is 20 m or shorter.

\*10: The robot interior is air-pressurized to maintain protective class IP67. Use the air-purge unit to remove air. Do not use the robot underwater.



## Options

### Connector panel



Rear connector panel Bottom connector panel

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

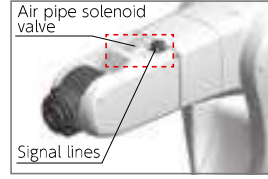
### Flange



Communication interface flange-A

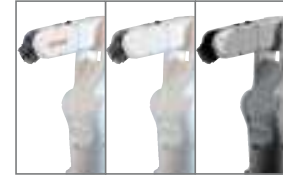
The flange has connectors for electrical signal lines and EtherNet, allowing wiring to be embedded in the robot unit.

### Signal lines / Air pipe solenoid valve



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

### Paint / Surface finish



Standard type Cleanroom IP54 IP67

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

## User options

### External battery extension unit



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

### Brake release unit



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

### Air purge unit



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

### Second arm cover (right-hand, with tapped holes)



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

Category	Part Name Specification / Type	VS050 / 060					VS068 / 087				
		Standard	Protected (IP67)	Dust & splash proof (Wrist: IP65) (Unit: IP54)	Cleanroom (ISO Class 5)	Cleanroom (ISO Class 3)	Standard	Protected (IP67)	Dust & splash proof (Wrist: IP65) (Unit: IP54)	Cleanroom (ISO Class 5)	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)	—	—	—	—	—	✓	✓	✓	✓	✓
User option	3 × solenoid valves (3 position, closed center solenoid)	—	—	—	—	—	✓	✓	✓	✓	✓
	Air purge unit	—	✓	—	—	—	—	✓ <sup>*3</sup>	—	—	—
	Brake release unit <sup>*1</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	External battery extension unit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Main unit connecting cable angle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Second arm cover (right-hand, with tapped holes) <sup>*2</sup>	✓	—	—	—	—	✓	—	—	—	—

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

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

\*3: An air purge unit is necessary to keep the protection level, IP67.

## Legend

<b>Model:</b> VS: 5- and 6-axis robots	<b>Mounting orientation:</b> A: All directions	<b>Axes:</b> V6: 6-axis	<b>Compliant standard:</b> N: Standard specification U: U specification	<b>Flange:</b> N: Standard flange A: Communication interface flange-A <sup>*1</sup>	<b>Paint / Surface finish:</b> N: Standard colors <sup>*2</sup> A: Unpainted <sup>*3</sup>
<b>Total arm length:</b> 050 A3: 505 mm 060 A3: 605 mm 068 A4: 680 mm 087 A4: 875 mm	<b>Protected:</b> 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)	<b>Connector panel:</b> N: Rear connector panel A: Bottom connector panel	<b>Signal lines / Air pipe solenoid valve:</b> A: 2 × solenoid valves (2 position, double solenoid) B: 3 × solenoid valves (2 position, double solenoid) C: 3 × solenoid valves (3 position, exhaust center solenoid) D: 3 × solenoid valves (3 position, closed center solenoid) N: Specification without signal lines / air pipe solenoid valve		

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

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