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**DENSO Robotics**  
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densorobotics-europe.com

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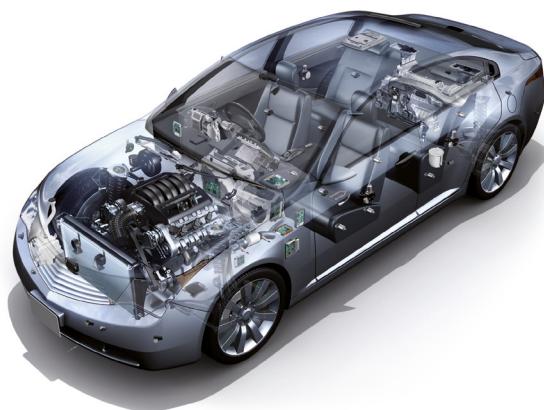
## Product Overview



# Innovation is in our DNA

Our story began in 1949 when Nippondenso Co. Ltd. (today DENSO), a separate entity from Toyota Motor Co. Ltd., was established.

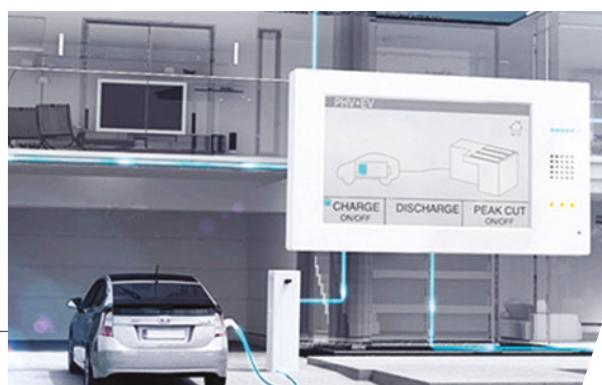
## Our Business Fields



### Customer Products

#### Automotive

One of TOP 3 auto parts suppliers worldwide



#### New business fields

Micro Grid, Electric Power Assist, Security, Healthcare, Biotechnology, Agriculture Support, Cold Chain, Community Network Solution Business



### Industrial products



# DENSO Corporation at a Glance\*



**\$48.3b**

in annual revenue (USD)



**170.000**

employees in 211 group companies



**9%**

of revenue re-invested in R&D



**1994**

QR-Code invented

\*Data as of 31.03.2024

## Robotics pioneer

**50 years**

#### Over 50 Years Developing Industrial Robots

Since 1967 we are developing robots for our automotive industry.

**143.500 robots**

#### Worldwide Market Leader

With over 143.500 DENSO robots we are the market leaders in small industrial robots.

**OEM supplier**

#### Trusted OEM Robot Supplier

Companies around the world trust in the quality of our products.

**23.000 own use**

#### One of the World's Largest Robot Users

Over 23.000 DENSO robots work in our own manufacturing facilities.

# Customer Voice



“For nearly two decades DENSO robots have proven their performance and reliability in our machines. Furthermore, a wide product range in the size of robots we are using, makes DENSO robots a natural choice for us.”

**Jakob Nors**, Innovation Manager, PJM, Denmark



“DENSO deliver fast and precise robots that are reliable and robust. Denso is also a highly reliable supplier who delivers at the agreed time in an increasingly difficult market.”

**Anders Linneberg**, Sales Director, Eltronic, Denmark



“We want to bring happiness among our customers and avoid troubles for ourselves. Denso robotics has been our technology partner almost over 12 years”.

**Ossi Parviainen**, CEO Newicon Oy, Pharmacy automation



“DENSO robots are easy to integrate into our NFC object test benches and provide robustness, reliability, and precision for both characterization and compliance testing.”

**David Mouret**, R&D Director, KEOLABS, France

“With DENSO robots, in combination with measuring camera systems, we achieve particularly precise, highly flexible and fast handling of very small components.”

**Florian Föll**, Sales, HOLZ automation GmbH



„In order to be able to maintain its high quality standard, USIMECA seeks for a safe, innovative and cost-efficient support for robotics solution.”

**Thierry Blay**, Technical Director, USIMECA, France



„The excellent quality is appreciated not only by us when installing and programming the technology, but also by our innovative customers in the field of automation. We are very satisfied with the long-term cooperation and support of our contact partner.”

**Rüdiger Storre**, Senior Key Account Manager, SIM Automation GmbH



„From start to finish, COBOTTA from DENSO Robotics proved to be an ideal candidate to create a standardized mobile manipulator. The straight forward integration does not stop at a tiny hardware footprint, but it also includes ready-made software interfaces.”

**Christian Deppe**, Product Manager Robotics and Virtual Training, Festo Didactic



# Our full range of small industrial robots

## 5 & 6-AXIS - VP Series

Max arm reach: 430 – 432 mm  
Payload: 2.5 – 3 kg



## 6-AXIS - VS-6556/6557

Max arm reach: 653 – 854 mm  
Payload: 7 kg



## 6-AXIS - VS Series

Max arm reach: 505 – 905 mm  
Payload: 4 – 7 kg



## 6-AXIS - VMB Series

Max arm reach: 1.506 – 1.804 mm  
Payload: 25 kg



# 6 AXIS Robots



	VP Series		VS-6 Series		VS Series					VM Series		VMB Series		VLA Series	
	VP-5243	VP-6242	VS-6556	VS-6577	VS-050	VS-060	VS-068	VS-087		VM-6083	VM-60B1	VMB-2515	VMB-2518	VLA-4025	VLA-6022
Reach	430 mm	432 mm	653 mm	854 mm	505 mm	605 mm	710 mm	905 mm	Reach	1.021 mm	1.298 mm	1.506 mm	1.804 mm	2.503 mm	2.257 mm
Payload	3 kg	2.5 kg	7 kg		4 kg		7 kg		Payload	13 kg		25 kg		40 kg	60 kg
Repeatability	± 0.02 mm		± 0.02 mm	± 0.03 mm	± 0.02 mm		± 0.02 mm	± 0.03 mm	Repeatability	± 0.05 mm	± 0.07 mm	± 0.05 mm		± 0.06 mm	
Cycle Time	0.99 s <sup>1</sup>		0.49 s <sup>1</sup>	0.59 s <sup>1</sup>	0.35 s <sup>1</sup>		0.31 s <sup>1</sup>	0.34 s <sup>1</sup>	Cycle Time	0.89 s <sup>1</sup>	0.95 s <sup>1</sup>	-		-	
Standard protection class	Standard IP30		Standard IP40		Standard IP40				Standard protection class	Standard IP40		Standard IP40		Standard IP65	
Option	Mounting: floor & ceiling		Dust & Splash-proof (IP65/54), Cleanroom (ISO 5 & 3), UL Specifications		Dust & Splash-proof (IP65/54), Protected Type: IP67 Cleanroom (ISO 5 & 3), UL Specifications Mounting: floor, wall & ceiling				Option	Dust & Splash-proof (IP65/54), Cleanroom (ISO 5)		Dust & Splash-proof (IP67), Cleanroom (ISO 5)		Dust & Splash-proof (wrist IP67/65) Mounting: floor, wall & sloping <sup>2</sup>	
	RC8A controller									RC8A controller		RC9 controller			

<sup>1</sup> With 1 kg Payload

<sup>1</sup> With 1 kg Payload, <sup>2</sup> Operation angle is limited on wall-mount and sloping-mount

## Communication Interface – Patented Technology

- Connect servo grippers and GigE devices easily to the robot's flange.
- Avoid long cables and their entanglement with surrounding equipment.
- Available for VS-Series and VS-050-S2



## VS-050-S2

Hygienic design according to GMP, certified by Fraunhofer institute, perfectly suited for pharmaceutical and medical industries.

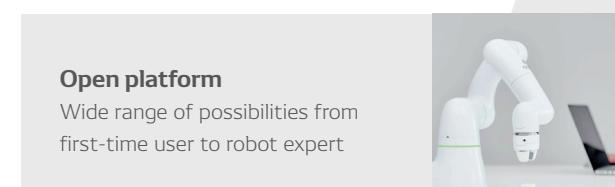
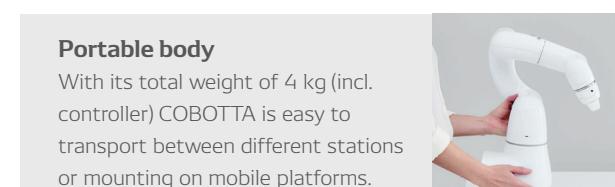
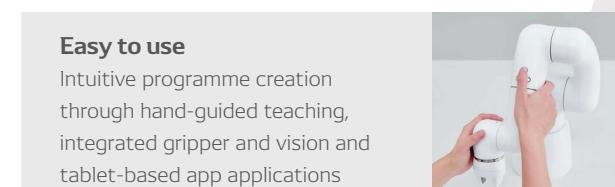
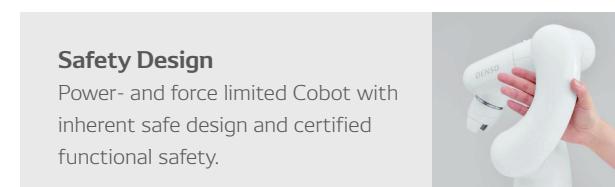
- Payload 4 kg
- Arm reach 520 mm
- Round edges and no external screws, avoiding bacteria accumulation and maintain high sanitation levels
- Resistant to UV light, H2O2 (35% concentration) and other chemicals



## COBOTTA-Series

Camera Built-In Set		Integrated cabling	
<ul style="list-style-type: none"> <li>Built-in AF Camera</li> <li>End-effector Ethernet Cable</li> </ul>			
Electric Gripper/ Vacuum Gripper			
<ul style="list-style-type: none"> <li>Built-in electrical Gripper (force controlled)</li> <li>Electrical Vacuum Generator/ Vacuum Gripper</li> </ul>			
			
Reach	342.5 mm	Protection	IP 30
Payload	0.5 (0.7 kg <sup>1</sup> )	Weight	4 kg
Repeatability	± 0.05 mm	ISO Standards	EN ISO 102181:2011, EN ISO 13849 1:2015, ISO/TS 15066:2016
Max. TCP speed	450 mm/s		Integrated controller

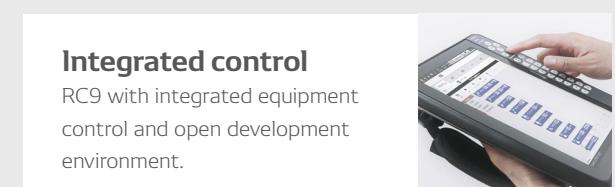
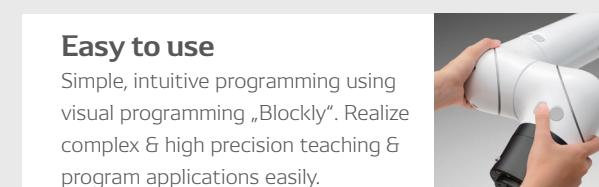
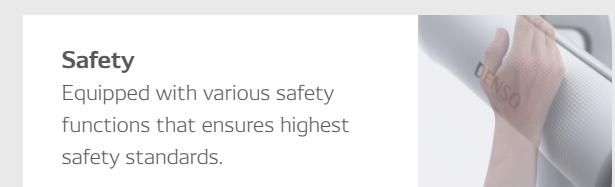
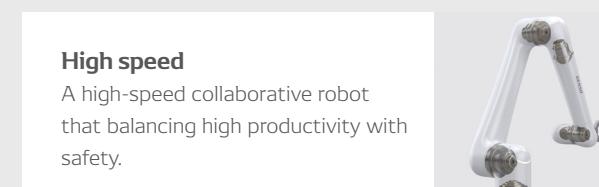
<sup>1</sup> When the end-effector faces downward (within ±10 °)



## COBOTTA PRO-Series

	
	
	
<b>COBOTTA PRO 900</b>	<b>COBOTTA PRO 1300</b>
Reach	908 mm
Payload	6 kg
Repeatability	± 0.03 mm
Max. TCP speed	2.100 mm/s <sup>2</sup>
Protection	IP 54 Clean room ISO 5 <sup>1</sup>
Weight	28.5 kg
ISO Standards	EN ISO 102181:2011, EN ISO 13849 1:2015, ISO/TS 15066:2016
Options	Bottom Connector Mounting: All directions
	CRC9 controller

<sup>1</sup> Option, <sup>2</sup> Maximum TCP speed during high speed operation



## 4 AXIS Robots



HS-A1 Series			HSR Series			HM Series				
	HS-035A1	HS-045A1	HS-055A1	HSR-048	HSR-055	HSR-065	HM-4060*	HM-4070*	HM-4085*	HM40AO*
Reach	350 mm	450 mm	550 mm	480 mm	550 mm	650 mm	Reach	600 mm	700 mm	850 mm
Vertical Stroke	100,150,200 and 320 mm			100, 200, 320 and 510 mm (with bellows 170 and 290 mm)			Vertical Stroke	100,150, 200, 300 and 400 mm		
Payload	5 kg			8 kg			Payload	10/20 KG		
Repeatability	± 0.015 mm	± 0.02 mm	± 0.02 mm	± 0.01 mm	± 0.012 mm	± 0.012 mm	Repeatability	± 0.02 mm	± 0.025 mm	
Cycle time	0.29 s <sup>2</sup>			0.28 s <sup>2</sup>		0.31 s <sup>2</sup>	Cycle time	0.29 s <sup>2</sup>	0.31 s <sup>2</sup>	
Standard Protection class	Standard IP20			Standard IP20			Standard Protection class	Standard IP20		
Options	Bellows on 3rd axis, Dust & splash-proof (IP65) Cleanroom (ISO3) <sup>3</sup> , UL Specification <sup>4</sup> Ceiling Mounted (only with 045A1&HS055A1)			Bellows on 3rd axis, Dust & splash-proof (IP65), Cleanroom (ISO3&5), UL Specification <sup>4</sup> Ceiling Mounted (all models)			Options	Bellows on 3rd axis, Dust & Splash-proof (IP65), Cleanroom (ISO 5), UL Specification <sup>5</sup> Ceiling Mounted (only HM-4070*G & HM-4085*G 10 kg and 20 kg)		

<sup>1</sup>With 1 kg Payload <sup>2</sup>With 2 kg Payload <sup>3</sup>Cleanroom type is only suitable for floor mounting

<sup>4</sup>UL Specifications are only for floor mounting (HS-A1 Series) <sup>5</sup>UL Specifications are for floor and ceiling mounting (HM series) <sup>6</sup>Not for Dust & Splash Proof

## HSR Highlights

### High-speed motion

High acceleration & motion profiles.  
Improved cycle per minute allows the robot to move at high speed continuously.



### Continuous motion

Improved heat dissipation performance at the base unit allows the robot to achieve continuous motion.



## XR Series

### Payload:

5 kg

### Motion range:

Up to 1660 mm

### R-axis stroke:

1660 mm

### Application examples:

palletizing, assembly, pick & place, feeding & carrier, etc.



### Longer motion range

Compared to 4 and 6-axis robots thanks to X-R structure.

### Compact

Ideal for shortened production lines with restricted spaces and low-height areas.

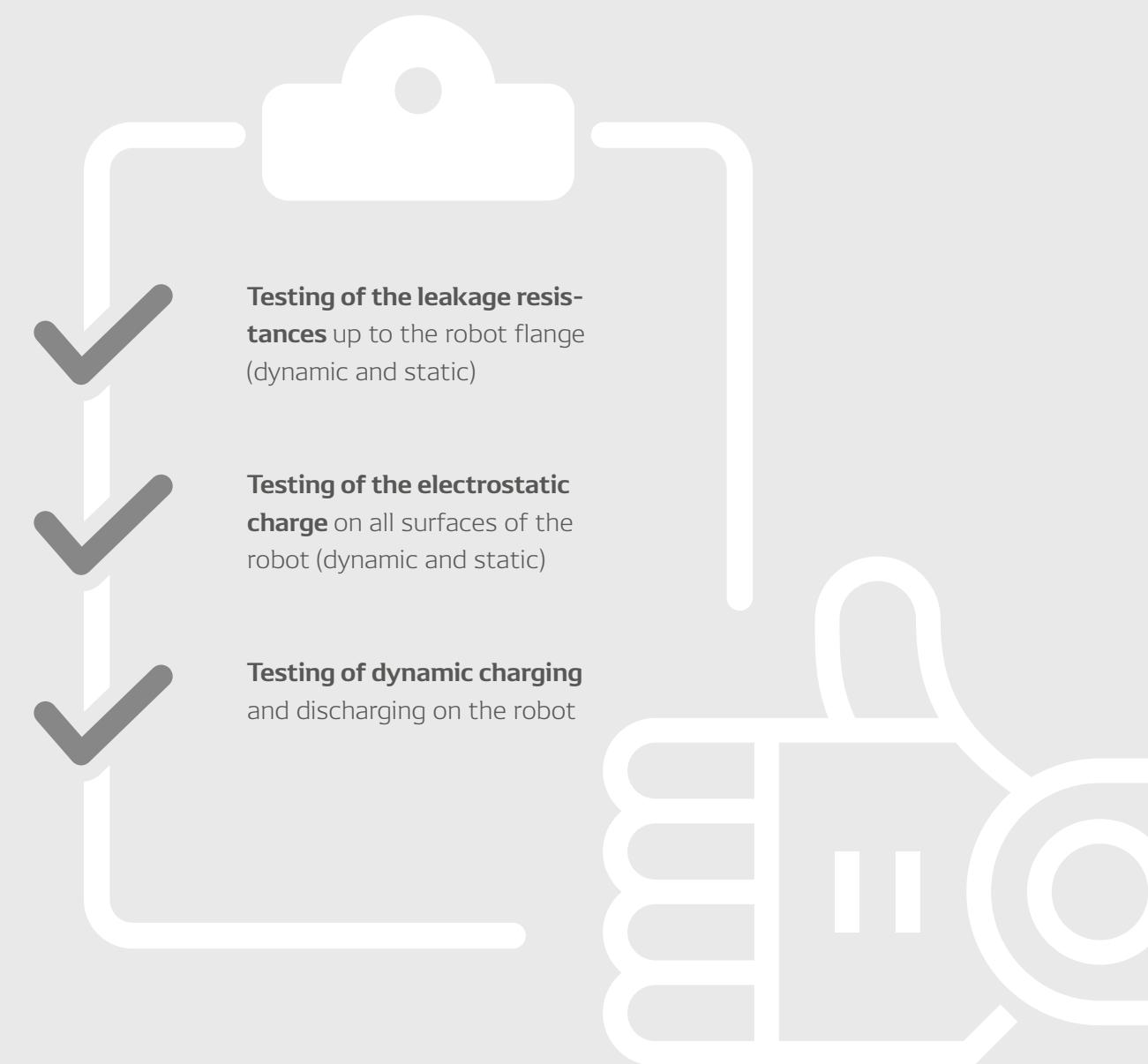
# ESD Series

**When handling electronic components, for example during PCB assembly, visual inspection, product testing and packaging, uncontrolled electrostatic discharges (ESD) endanger product integrity.**

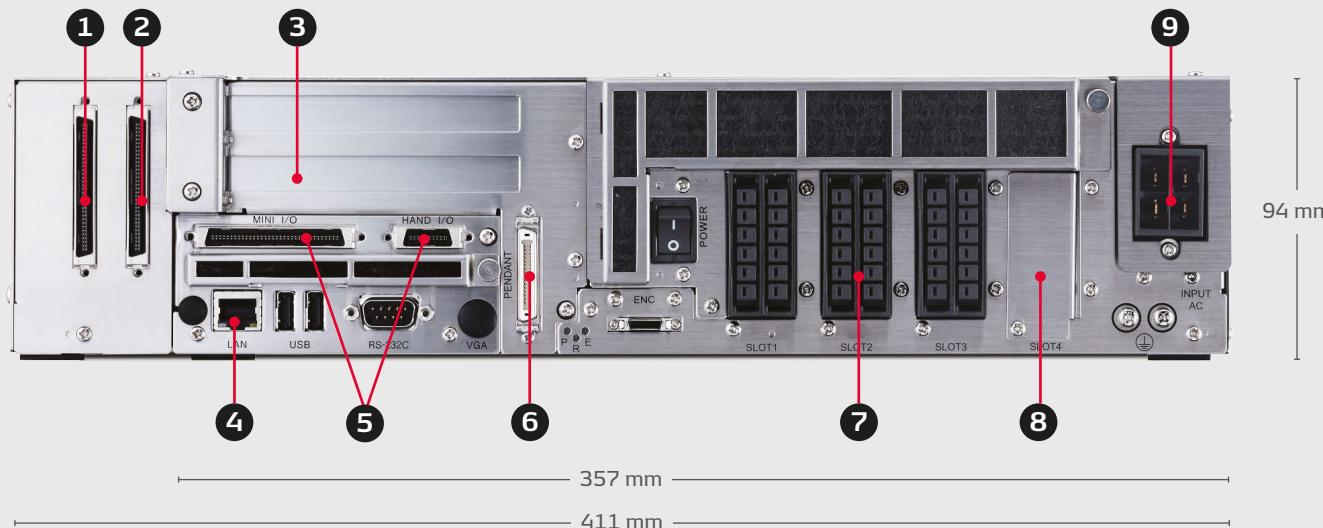
By expanding the possible protection classes to include ESD, DENSO offers the ideal solution for the electronics industry. The ESD series includes the HS-A1 series, as well as the VS series. Ranges from 350 mm up to 905 mm with payloads of up to 7 kg are fully covered. In order to achieve the ESD conformity, required in many parts of the electronics

industry, the HS-A1 series as well as the VS series have been subjected to a type approval test by the ESD Academy to ensure that all necessary limits according to IEC 61340-5-1:2016 / ANSI/ESD S20.20:2021 are met and that the product integrity is not compromised.

**The ESD conformity was determined and certified by an independent testing institute (ESD Academy) with the following tests.**



# RC8A Controller



**1 Safety Motion Input Cable (8m, 15m)**  
Safety Devices, Safety Laser Scanner, Safety Light Curtain, Safety Mat, Safety PLC

**2 Safety Motion Output Cable (8m, 15m)**  
Safety Devices, Safety PLC

**3 Control Expansion Boards**

- Parallel I/O
- DeviceNet Slave
- DeviceNet Master
- PROFIBUS Slave
- PROFINET I/O Device
- CC-Link RD
- EtherNet/IP
- EtherCAT Slave
- CONTEC Serial Comm.
- CONTEC Analog I/O
- CONTEC Digital I/O
- External Axis

**4 Software**

- WINCAPS III
- EMU
- Robot Tools
- VRC
- ORiN 2 SDK
- RC Vision

**5 Mini I/O Cable (8 m, 15 m)**  
Peripheral Devices: PLC, Conveyor  
**Hand I/O Cable (8 m, 15 m)**  
8 Inputs / 8 Outputs

**6 Operating Devices**  
Teach Pendant, Mini Pendant, Emergency Stop Box

**7 Robot Connector Cable (2,4,6,12,20 m)**

**8** Additional Axis, Eyefeeder with Camera

**9** Power-Supply Cable

## RC8A Features

### Compact & light

357mm x 320mm x 94mm  
smallest lightweight high-performance 8-axis controller in his class

### High control capacity

- Control up to 8 axis
- Control additional peripheral

### Safe control

- Safety I/O
- Safety Motion up to Ple, Cat 4

### Expandability

- Supporting all network standards
- Control versatile external devices

### Programming Flexibility

3D visual programming, PacScript, Python, Java, C++, C#, VB, LabVIEW, ... or PLC code

### Standard Connections

- 16 Inputs / 15 Outputs
- GigE Ethernet

## RC8A Functions

### Command Slave

Robots can be controlled with PLC languages (ladder programs). Function blocks that support 107 robot commands are offered.



**EtherNet/IP** **EtherCAT** **PROFINET**

### Conveyer tracking

Since a robot can track workpieces, workpieces can be conveyed and aligned without stopping the conveyer.



### b-CAP (communications protocol)

By directly sending packets of motion commands to the robot from a PC, PLC or other device, the robot can be controlled.



### Dual Arm Control

Allows a single controller to control two SCARA robots. Saves space and simplifies operations.



# RC9 Controller

Robot controller RC9



## Simplified teaching and operation

- Master & Slave function
- Intuitive Smart TP

## Software

- WINCAPS III
- WINCAPS Plus
- EMU
- EVP2
- Imitative learning engine

## Enable various field networks

- Fieldbus
   
  
- Industrial EtherNet



## RC9/CRC9 controller available for

- VMB 1500/1800 (RC9)
- VLA 2500 (RC9)
- COBOTTA PRO (CRC9)
- (RC8 can also be connected with EtherCAT Slave)

## RC9 Features

### Built in PLC

- Fully integrated Beckhoff TwinCAT Real Time control
- Compatible with all Beckhoff components

### Real-time Control Architecture

- Real-time intelligent control robots & equipment
- 250 ms motion control real-time capability

### Safe control

- Safety I/O
- Safety Motion up to Plc, Cat 4

### Smart Teach Pendant

Multifunctional smart Teach pendant  
TwinCAT3 PLC UI and Wincaps Plus UI

### Programming Flexibility

Advanced software functionality / known RC8 programming environment

### Standard Connections

- 20 Inputs / 20 Outputs
- GigE Ethernet

### Expandability

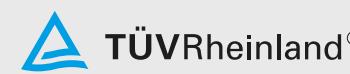
- Control up to 4 robot arms or 32 axis



# Safety Motion Function

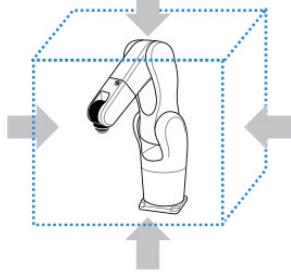
## Safety function that allows humans and robots to work in a shared area

- EN ISO 13849-1 (safety function). Certified by TÜV Rheinland.
- Performance level PL = d/SIL2 (standard controller; PL = e/SIL3).



## Overview

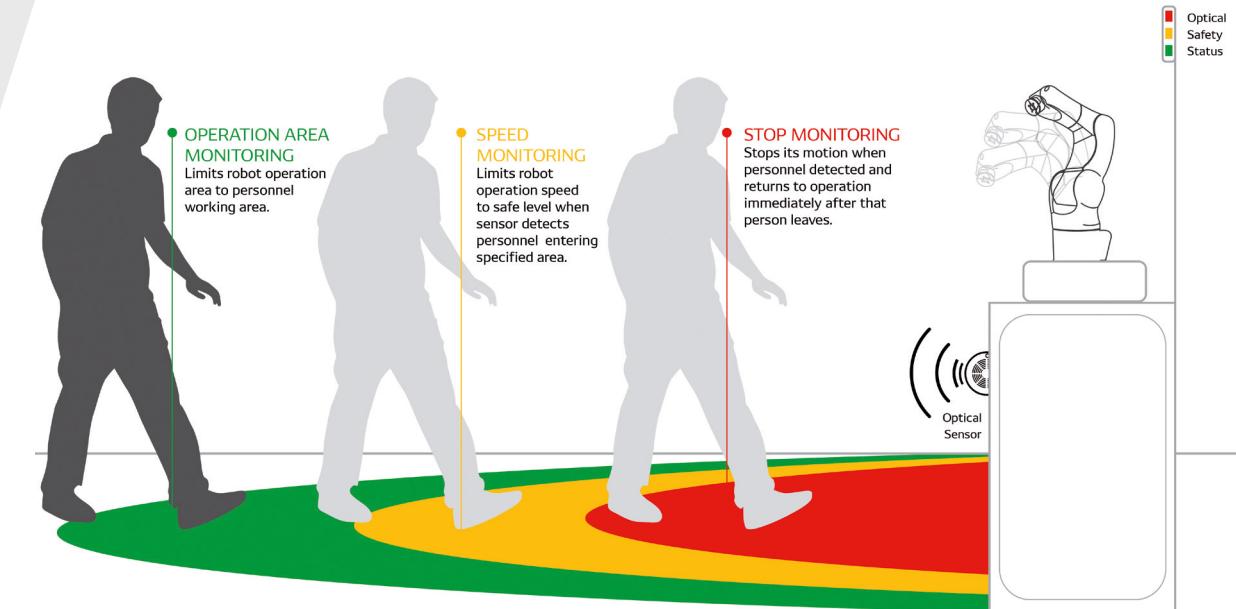
The safety function monitors and controls the robot operation status to realize safe and highly-productive robot equipment.

	<b>1. Monitor the motion area</b> Robot motion area is limited to monitor the motions is within the limited area. <ul style="list-style-type: none"><li>Small-sized equipment mutual access to the work area common to human and robots.</li></ul>
	<b>2. Monitor the speed</b> Robot speed is controlled to monitor the robot speed is slower than the speed limit. <ul style="list-style-type: none"><li>Continuous motion as maintaining the safe speed is enabled even when human approaches the robot.</li></ul>
	<b>3. Monitor the robot stop</b> The stop status of the robot is monitored without shutting down the motive power. <ul style="list-style-type: none"><li>Smooth recovery of robot motion when human leaves the common work area is assured to improve the productivity.</li></ul>

## Use scenarios

When entry of a human into the set motion area is detected by devices such as laser scanners, the robot speed is limited to

the specified safe speed or less to enable continuous production. The robot stops moving when the human enters the stop area.



## Safety Function

<b>STO (Safe Torque Off)</b>	Function of immediate shutdown of the motor power
<b>SS1 (Safe Stop 1)</b>	Function to shut down the motor power after slowing down and stopping the robot
<b>SS2 (Safe Stop 2)</b>	Function to leave the power on after slowing down and stopping the robot
<b>SOS (Safe Operating Stop)</b>	Function to monitor the robot does not move from the stop position
<b>SLP (Safely-Limited Position)</b>	Function to monitor the axes do not exceed the soft limit
<b>RSM (Robot Speed Monitoring)</b>	Function to monitor the robot's specified sections do not exceed the specified speed.
<b>RMP (Robot Position Monitoring)</b>	Function to monitor the robot's specified sections do not exceed the specified motion area.
<b>SBC (Safe Brake Control)</b>	Function to turn off the external brake power and lock the brake.

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

# Standard Software

## WINCAPS III - Offline Programming Software

### Arm 3D View

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

### Online Functions

Connect online to robot controller to use various monitoring and debugging functions

### Simulation functionality

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

### Log Function

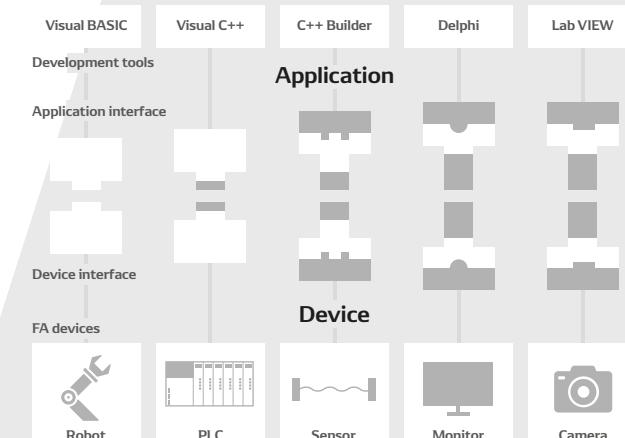
User can view and export various logs to analyze.



## WINCAPS Plus

The Software package offers five independent software packages and is a perfect add-on for WINCAPS III to reduce man-hours for nearly each Industrial Scenario during Design, Installation, Operation and Maintenance.

- 3D visual programming
- Optimized motion planner
- Home position guidance
- Robot viewer
- Palletizing builder



**ORiN**

## ORiN

ORiN 2 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.

The superior expendability of ORiN2 supports not only industrial robots, but a variety of devices (including PLC, CNC machine tools, bar code readers and many more) to enable application development that is independent of manufacturer or model.

## Robot Tools

**Fully featured suite of utility tools created for optimize maintenance and operation of DENSO robots.**

### Virtual TP

A virtual teach pendant on the PC works with a controller set on manual mode, allowing configuration and monitoring from a remote location.

### Mobile monitor

Monitors controller operating status and enables quick response to an error by sending notification email.

### Control log analyzer

Obtains the control log from a designated controller and automatically displays it in a graph.

### Image logger

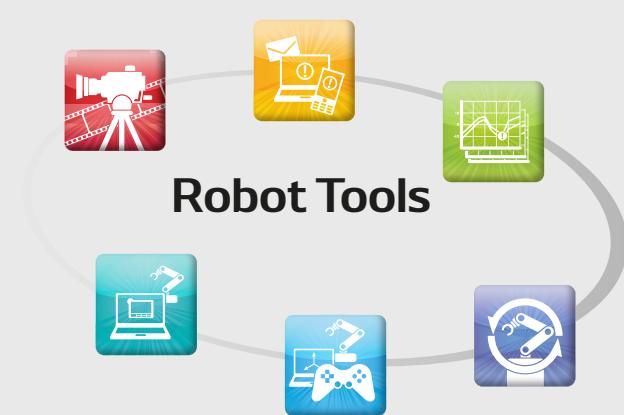
Help to determine cause of sudden errors and incorrect equipment assembly.

### GP Operator

Connect a robot controller to a PC and use a mouse or game pad for easy robot operation.

### Easy Backup

Performs backup and restores all data from single or multiple controllers in a batch.



## DENSO Difference + USP's

**Our highest priority at DENSO is offering you the best quality and cost-effective products, which allows you to maximise your production while delivering maximum ROI.**

### Over 10 Years Working Life and Reliability

DENSO robots are well-known for operating over decade delivering the same precision and performance as from their first day.

### Ease of Integration

Solutions to program DENSO robots and factory automation devices such as external axis, feed systems and sensors using only one interface.

### Ease of Programming

Templates and wizards to program pick & place and palletising.  
Program DENSO robots with LabVIEWTM, Matlab, Python, C++, C#, Java, ROS and Visual Basic or via PLC.

### Low Maintenance

DENSO robot gears are lubricated with life-time grease. This results in a low cost of ownership.

### Standard 24-Months Guarantee

DENSO offers a 24 months guarantee to all of our customers.

### Unique Technologies

Optional Ethernet and electrical internal wiring up to the robot's flange to protect cables.

### Compact Design

Small and slim robot arm.  
Smallest robot controller.

### Wide Variety of Options

Extensive array of robot arms and optional features, e.g. from standard to water protected and clean room.

## Cost of ownership



### DENSO RC3 V3-C series robot

#### Installed at 601 plant 11/06/2003

- Performed oxygen sensor heater setting at DENSO Manufacturing plant in Athens, TN
- Total hours run in production: **45.400**
- Total cycles on robot: **35.000.000**
- Removed from production on 6/1/2016
- Original purchase price **\$20.000 USD**
- Maintenance performed over 20 years service life: Batteries, belts, filters, grease exchange, amplifier replacement, motor and drive replacement cost **\$6978,45**
- Total cost of ownership per production hour: **\$0,59**

# OUTSTANDING Worldwide Service and Support

**No matter where you need us, our team of highly qualified specialists are ready to help you; fast and personal contact, no hotlines.**

**We offer a vast range of services such as:**

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## Training

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- Programming
  - Operator
  - Maintenance
  - Repair
  - And more
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## Technical support

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- Simulations
  - Tests
  - Troubleshooting
  - Programming
  - And more
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## Repair centre located in Germany

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- Quick and professional repair (on and off-site)
  - Robot refurbishment
  - Robot optimization
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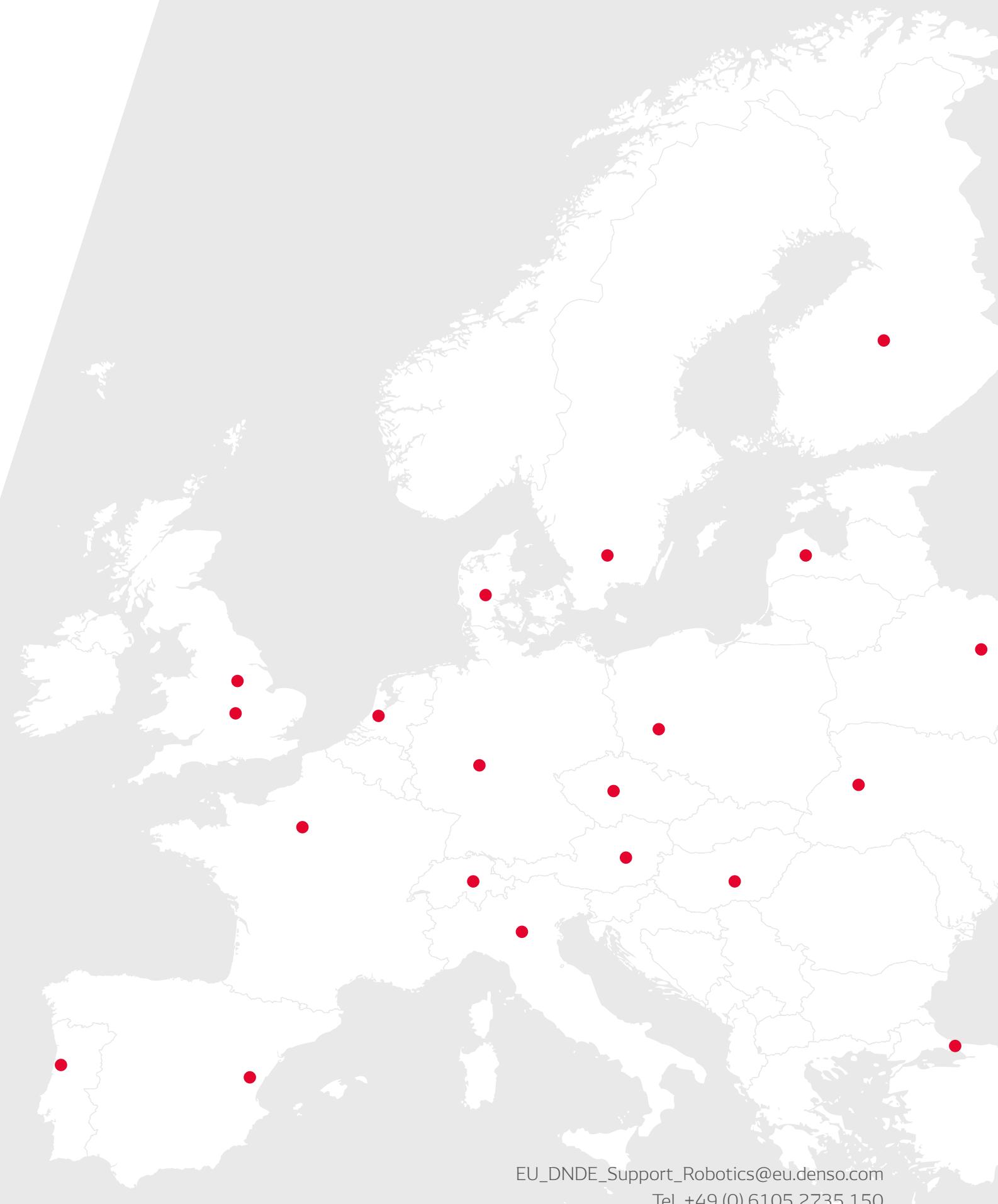
## AMC

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- Trouble-free production thanks to plannable maintenance
  - Priority spare parts supply
  - Attractive pricing and further discounts
- 



**Local spare parts centres  
that provide fast delivery**



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