

DENSO Robotics
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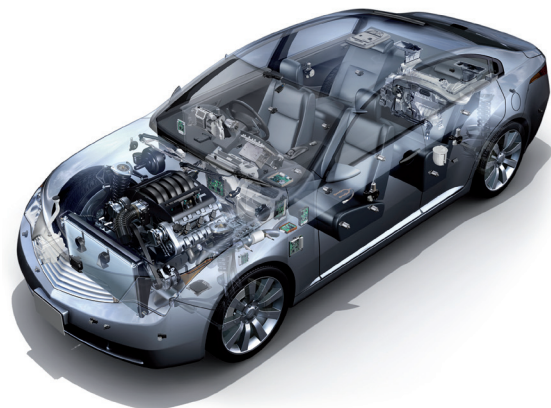
Product Overview



Innovation is in our DNA

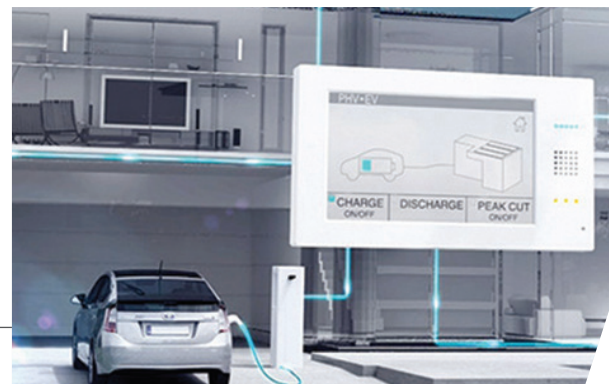
Our story began in 1949 when Nippondenso Co. Ltd. (today DENSO), a separate entity from Toyota Motor Co. Ltd., was established.

Our Business Fields



Automotive

One of TOP 3 auto parts suppliers worldwide



Customer Products



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 31.03.2023

Robotics pioneer

50 years

Over 50 Years Developing Industrial Robots

Since 1967 we are developing robots for our automotive industry.

130.000 robots

Worldwide Market Leader

With over 130.000 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.

21.500 own use

One of the World's Largest Robot Users

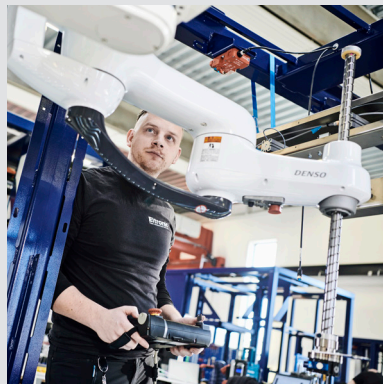
Over 21.500 DENSO robots work in our own manufacturing facilities.

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 - VLA Series

Max arm reach: 2.503 – 2.257 mm
Payload: 40 – 60 kg



4-AXIS - LPH Series

Max arm reach: 400 mm
Payload: 3 kg



6-AXIS - VS Series

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

4-AXIS - HS-A1 Series

Max arm reach: 350 – 550 mm
Payload: 5 kg



6-AXIS - VS-6556/6557

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



4-AXIS - HSR Series

Max arm reach: 480 – 650 mm
Payload: 8 kg



6-AXIS - VM Series

Max arm reach: 1.021 – 1.298 mm
Payload: 13 kg

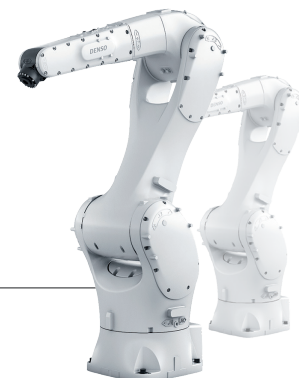
4-AXIS - HM Series

Max arm reach: 600 – 1.000 mm
Payload: 10 – 20 kg



6-AXIS - VMB Series

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



COBOTTA Series

Max arm reach: 342 – 1.303 mm
Payload: 0.5 – 12 kg

6 AXIS Robots



	VP Series		VS-6 Series		VS Series			
	VP-5243	VP-6242	VS-6556	VS-6577	VS-050	VS-060	VS-068	VS-087
Reach	430 mm	432 mm	653 mm	854 mm	505 mm	605 mm	710 mm	905 mm
Payload	3 kg	2.5 kg	7 kg		4 kg		7 kg	
Repeatability	± 0.02 mm		± 0.02 mm	± 0.03 mm	± 0.02 mm		± 0.02 mm	± 0.03 mm
Cycle Time	0.99 s ¹		0.49 s ¹	0.59 s ¹	0.35 s ¹		0.31 s ¹	0.34 s ¹
Standard protection class	Standard IP30		Standard IP40		Standard IP40			
Option	Mounting: floor & ceiling		Dust & Spash-proof (IP65/54), Cleanroom (ISO 5 & 3), UL Specifications Mounting: floor & ceiling		Dust & Spash-proof (IP65/54), Protected Type: IP67 Cleanroom (ISO 5 & 3), UL Specifications Mounting: floor, wall & ceiling			
	RC8A controller							

¹ With 1 kg Payload

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



	VM Series		VMB Series		VLA Series	
	VM-6083	VM-60B1	VMB-2515	VMB-2518	VLA-4025	VLA-6022
Reach	1.021 mm	1.298 mm	1.506 mm	1.804 mm	2.503 mm	2.257 mm
Payload	13 kg		25 kg		40 kg	60 kg
Repeatability	± 0.05 mm	± 0.07 mm	± 0.05 mm		± 0.06 mm	
Cycle Time	0.89 s ¹	0.95 s ¹	-		-	
Standard protection class	Standard IP40		Standard IP40		Standard IP65	
Option	Dust & Spash-proof (IP65/54), Cleanroom (ISO 5) Mounting: floor & ceiling		Dust & Spash-proof (IP67), Cleanroom (ISO 5) Mounting: floor, ceiling, wall ² & sloping ²		Dust & Spash-proof (wrist IP67/65) Mounting: floor, wall & sloping (max 45°)	
	RC8A controller			RC9 controller		

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

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**
- Built-in AF Camera
 - End-effector Ethernet Cable

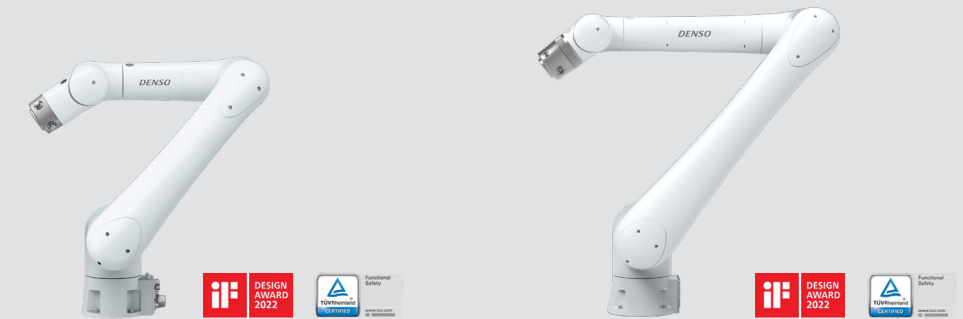
- Electric Gripper/ Vacuum Gripper**
- Built-in electrical Gripper (force controlled)
 - Electrical Vacuum Generator/ Vacuum Gripper



Reach	342.5 mm	Protection	IP 30
Payload	0.5 (0.7 kg ¹)	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

¹ When the end-effector faces downward (within ±10 °)

COBOTTA PRO-Series



	COBOTTA PRO 900	COBOTTA PRO 1300
Reach	908 mm	1.303 mm
Payload	6 kg	12 kg
Repeatability	± 0.03 mm	± 0.04 mm
Max. TCP speed	2.100 mm/s ²	2.500 mm/s ²
Protection	IP 54 Clean room ISO 5 ¹	IP 54 Clean room ISO 5 ¹
Weight	28.5 kg	38 kg
ISO Standards	EN ISO 102181:2011, EN ISO 13849 1:2015, ISO/TS 15066:2016	
Options	Bottom Connector Mounting: All directions	
	CRC9 controller	

¹ Option, ² Maximum TCP speed during high speed operation

Safety Design
Power- and force limited Cobot with inherent safe design and certified functional safety.

Easy to use
Intuitive programme creation through hand-guided teaching, integrated gripper and vision and tablet-based app applications

Portable body
With its total weight of 4 kg (incl. controller) COBOTTA is easy to transport between different stations or mounting on mobile platforms.

Open platform
Wide range of possibilities from first-time user to robot expert

High speed
A high-speed collaborative robot that balancing high productivity with safety.

Safety
Equipped with various safety functions that ensures highest safety standards.

Easy to use
Simple, intuitive programming using visual programming „Blockly“. Realize complex & high precision teaching & program applications easily.

Integrated control
RC9 with integrated equipment control and open development environment.

4 AXIS Robots



	HS-A1 Series			HSR Series		
	HS-035A1	HS-045A1	HS-055A1	HSR-048	HSR-055	HSR-065
Reach	350 mm	450 mm	550 mm	480 mm	550 mm	650 mm
Vertical Stroke	100,150,200 and 320 mm			100, 200, 320 and 510 mm (with bellows 170 and 290 mm)		
Payload	5 kg			8 kg		
Repeatability	± 0.015 mm	± 0.02 mm	± 0.02 mm	± 0.01 mm	± 0.012 mm	± 0.012 mm
Cycle time	0.29 s ²			0.28 s ²		0.31 s ²
Standard Protection class	Standard IP20			Standard IP20		
Options	Bellows on 3rd axis, Dust & splash-proof (IP65), Cleanroom (ISO3) ³ , UL Specification ⁴ Ceiling Mounted (only with 045A1&HS055A1)			Bellows on 3rd axis, Dust & splash-proof (IP65), Cleanroom (ISO3&5), UL Specification ⁴ Ceiling Mounted (all models)		

¹With 1 kg Payload ²With 2 kg Payload ³Cleanroom type is only suitable for floor mounting
⁴UL Specifications are only for floor mounting (HS-A1 Series) ⁵UL Specifications are for floor and ceiling mounting (HM series) ⁶Not 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.



	HM Series				LPH Series
	HM-4060*	HM-4070*	HM-4085*	HM40A0*	LPH-040
Reach	600 mm	700 mm	850 mm	1.000 mm	400 mm
Vertical Stroke	100,150, 200, 300 and 400 mm				150 mm
Payload	10/20 KG				3 kg
Repeatability	± 0.02 mm		± 0.025 mm		± 0.02 mm
Cycle time	0.29 s ²		0.31 s ²		0.45 s ¹
Standard Protection class	Standard IP20				Standard IP20
Options	Bellows on 3rd axis, Dust & Splash-proof (IP65), Cleanroom (ISO 5), UL Specification ⁵ Ceiling Mounted (only HM-4070*G & HM-4085*G 10 kg and 20 kg)				-

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

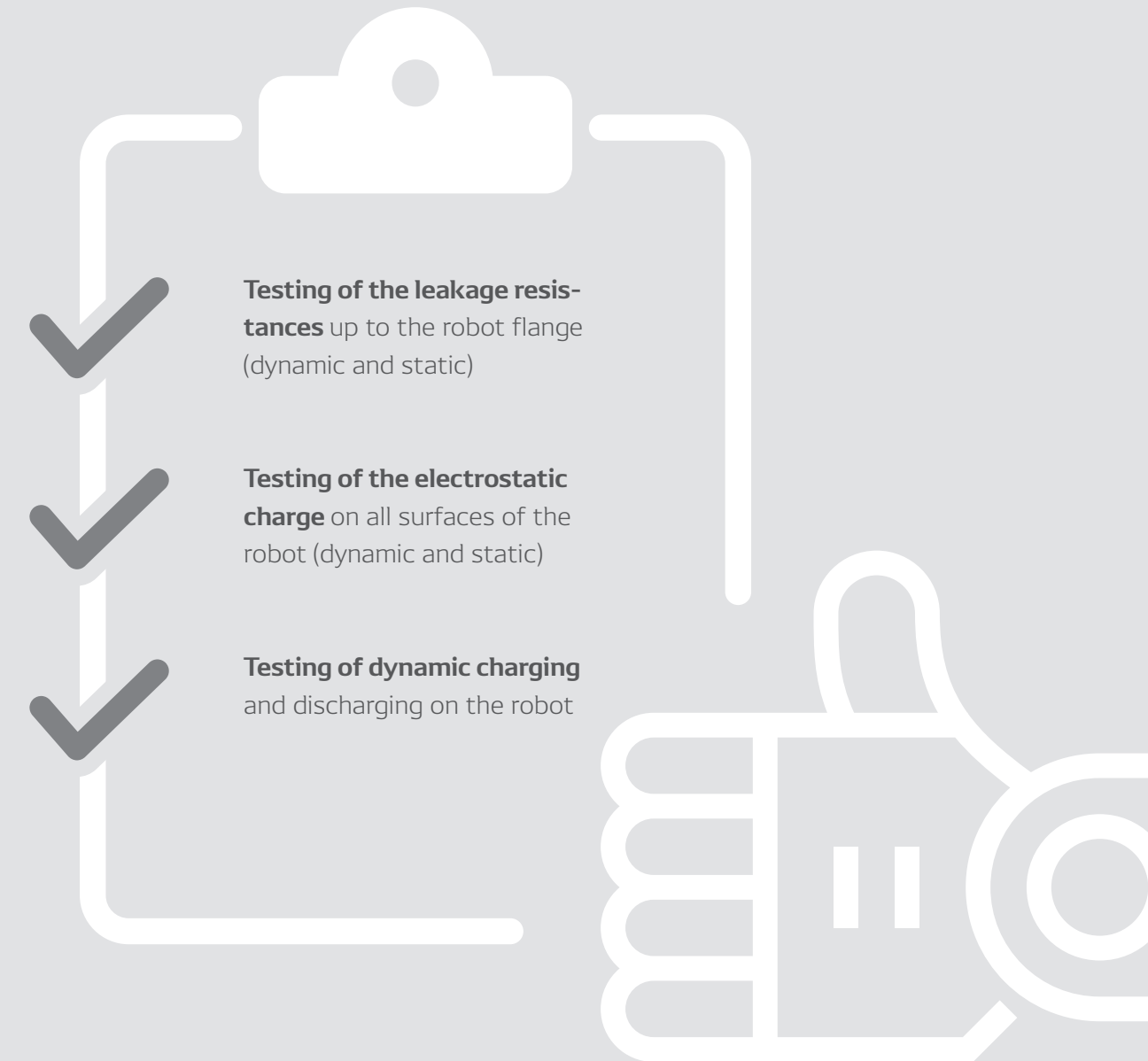
When handling electronic components, for example during PCB assembly, visual inspection, product testing and packaging, uncontrolled electrostatic discharges (ESD) endanger product integrity.

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

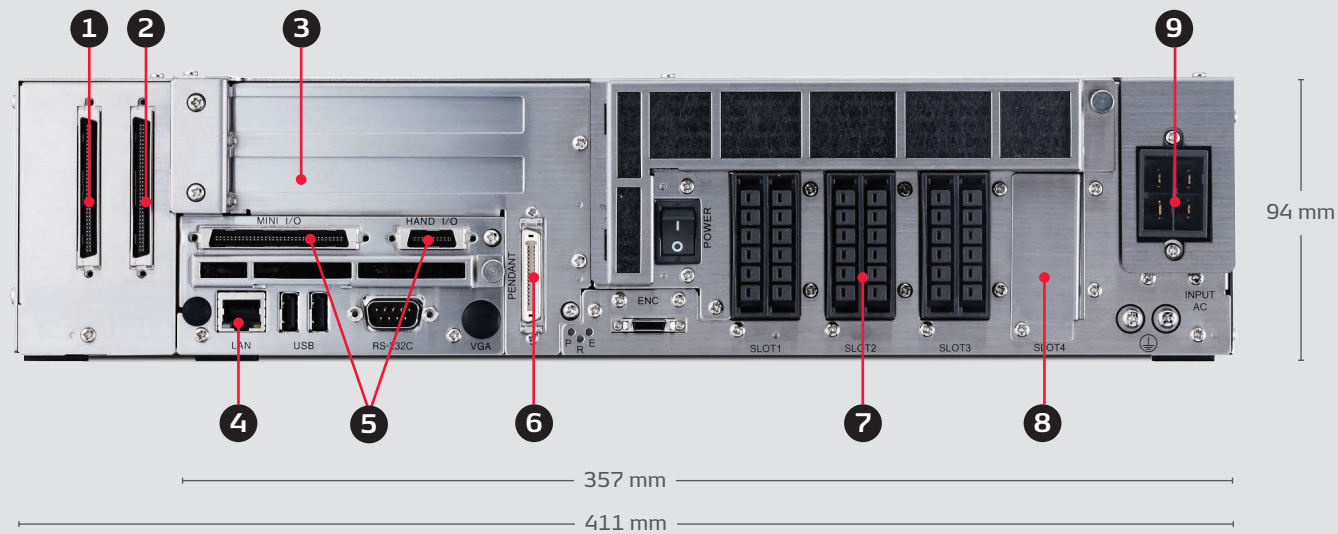
industry, the HS-A1 series as well as the VS series have been subjected to a type approval test by the ESD Academy to ensure that all necessary limits according to IEC 61340-5-1:2016 / ANSI/ESD S20.20:2021 are met and that the product integrity is not compromised.



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

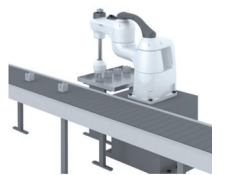
Robots can be controlled with PLC languages (ladder programs). Function blocks that support 107 robot commands are offered.

EtherNet/IP EtherCAT



Conveyor tracking

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



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.



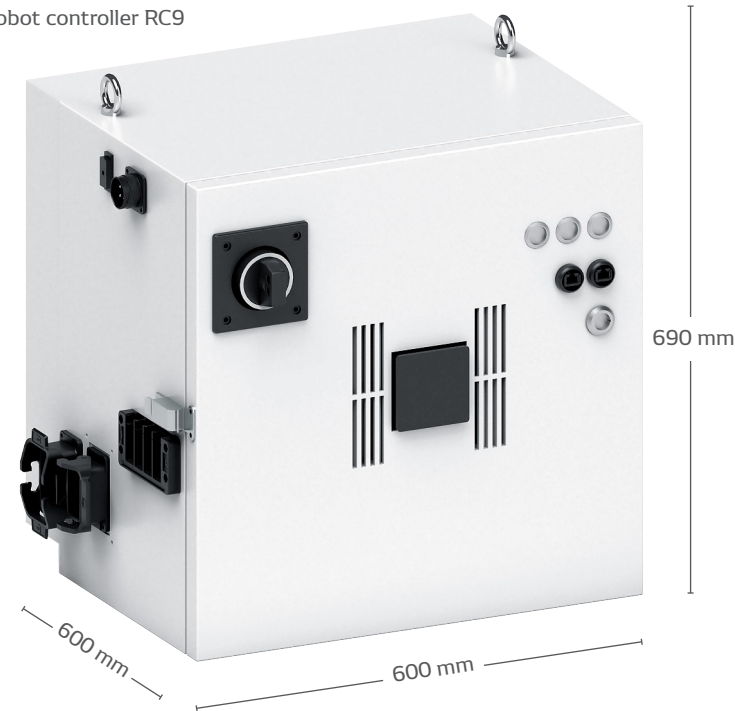
Dual Arm Control

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



RC9 Controller

Robot controller RC9



Compact robot controller CRC9



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 Ple, 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

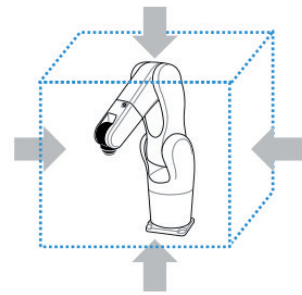
Safety function that allows humans and robots to work in a shared area

- 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.



1. Monitor the motion area

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

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



2. Monitor the speed

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

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



3. Monitor the robot stop

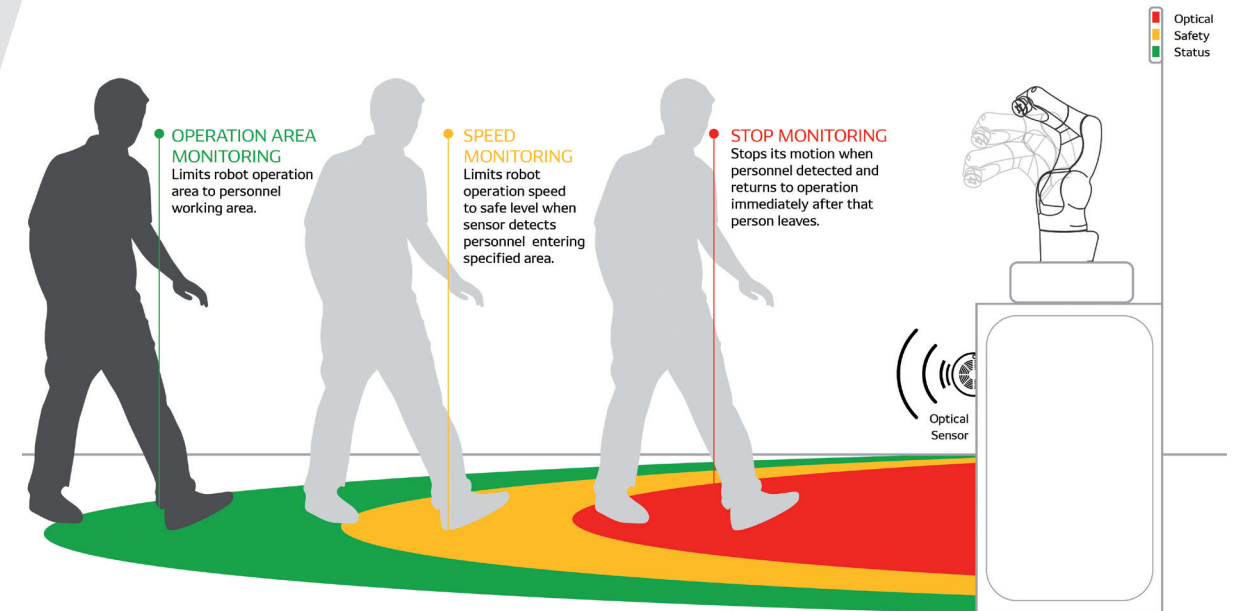
The stop status of the robot is monitored without shutting down the motive power.

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

Use scenarios

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

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

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

Standard Software

WINCAPS III - Offline Programming Software

Arm 3D View

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

Online Functions

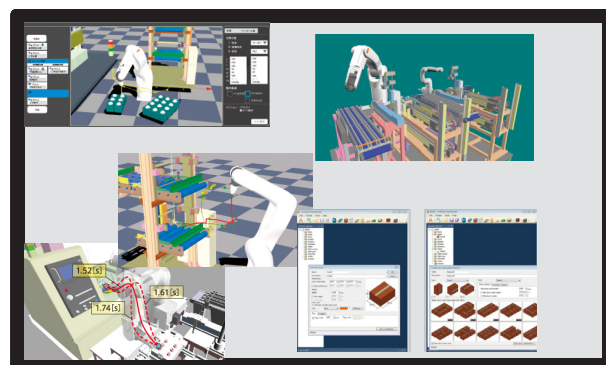
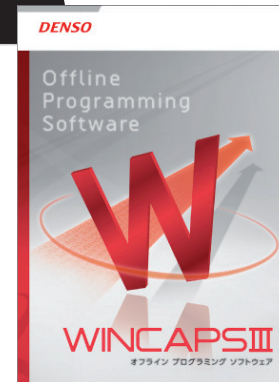
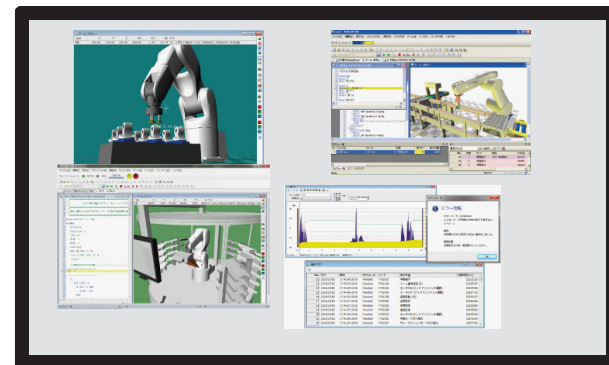
Connect online to robot controller to use various monitoring and debugging functions

Simulation functionality

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

Log Function

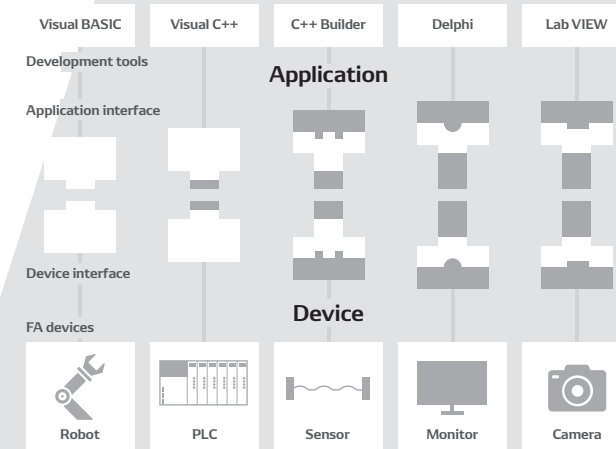
User can view and export various logs to analyze.



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 LabVIEW™, 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:

Training

- Programming
- Operator
- Maintenance
- Repair
- And more

Repair centre located in Germany

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

Technical support

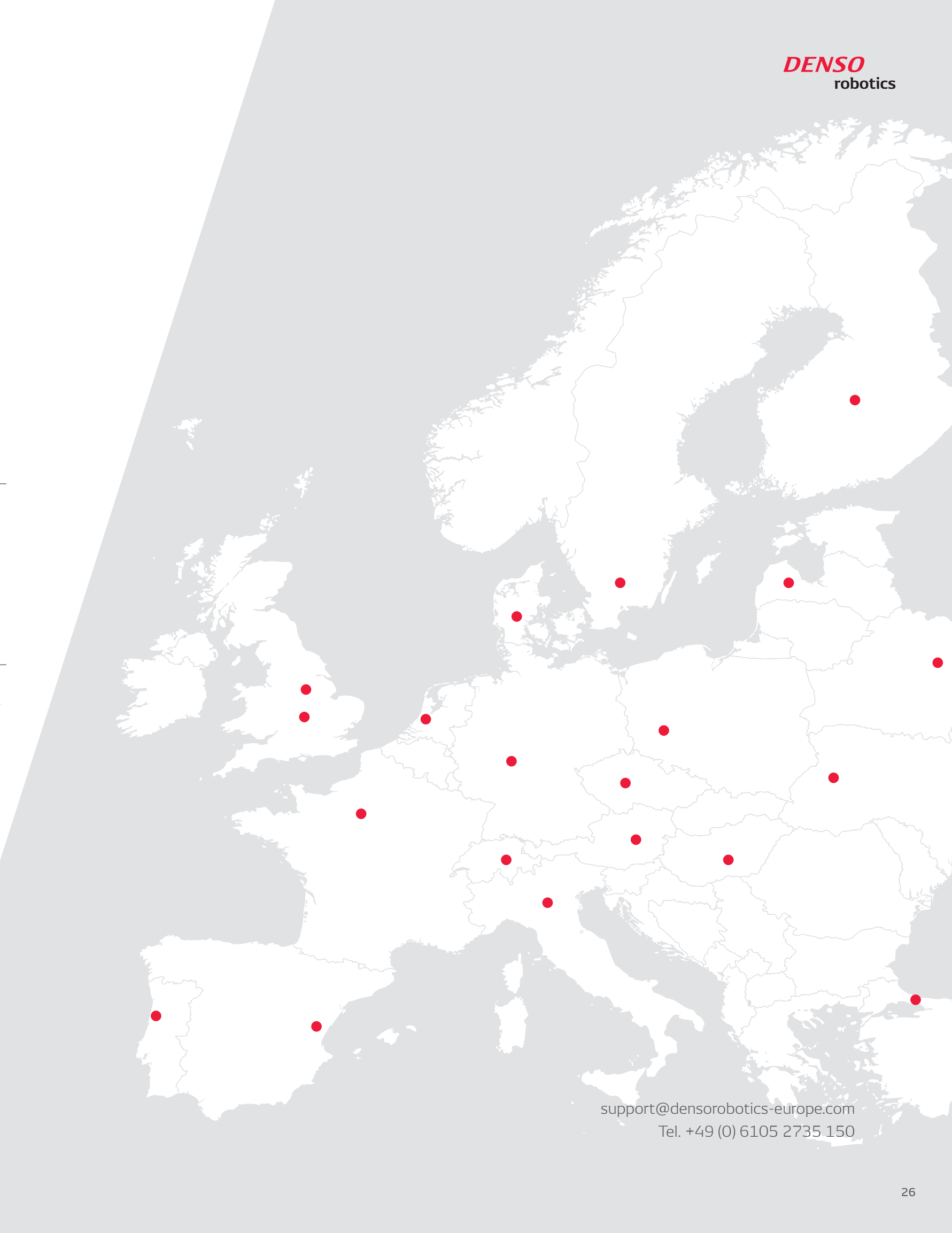
- Simulations
- Tests
- Troubleshooting
- Programming
- And more

AMC

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



Local spare parts centres
that provide fast delivery



support@denso-robotics-europe.com
Tel. +49 (0) 6105 2735 150