Vertical Articulated Robot

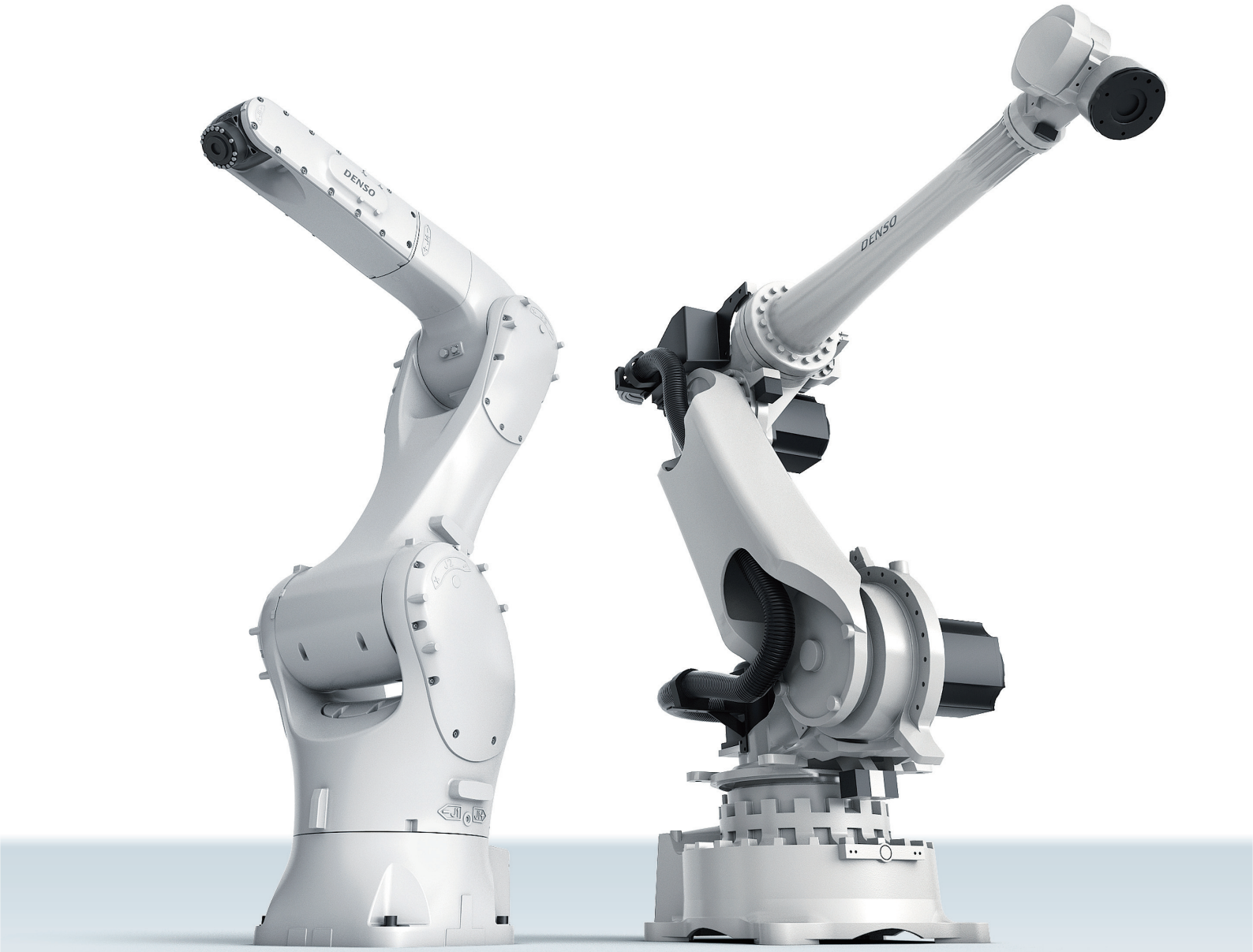
VM・VL series

Robot controller

RC9

DENSO

More powerful, Much longer



VM series

VM1500 / 1800

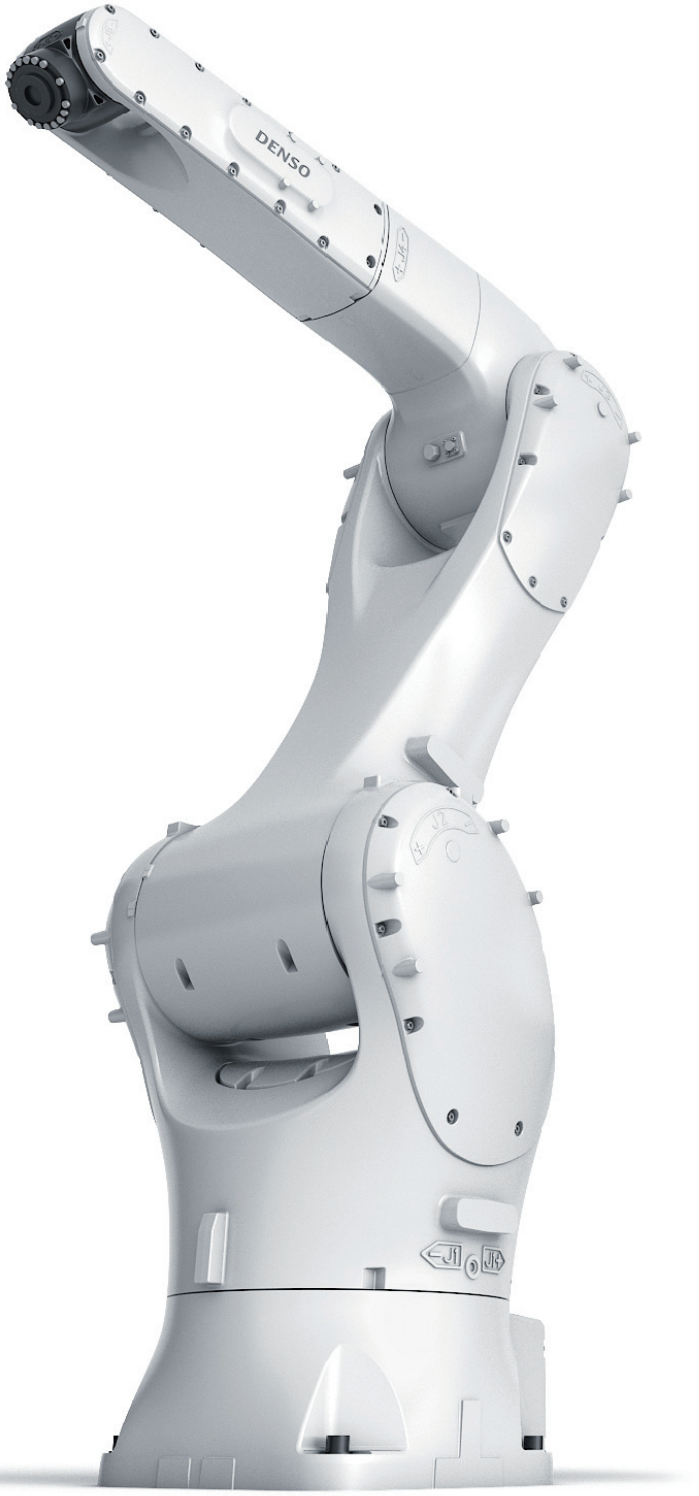
Max. arm length	Max. movable load
1506/1804mm	25kg

Features

Built for use in demanding hygienic and adverse environments

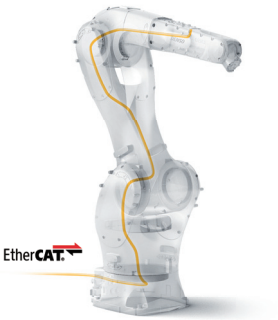
Available with standard specifications as well as specifications that deliver high levels of dustproofness/waterproofness (IP67) and cleanliness (ISO Class 5)*. The VM series can be used to automate operations in a variety of industries, including automobile part manufacturing and electric and electronic component, food product, pharmaceutical, and medical device manufacturing processes.

Fully covered design

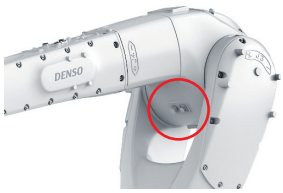


Internally routed EtherCAT wiring and free hand design

An extensive range of options for user wiring, tubing, and solenoid valves makes it possible to mount a variety of devices and hands on the robot flange. Mix and match three valve types for a total of 15 possible combinations. Internally routed EtherCAT wiring means less complex wiring and tubing on the outside of the unit.



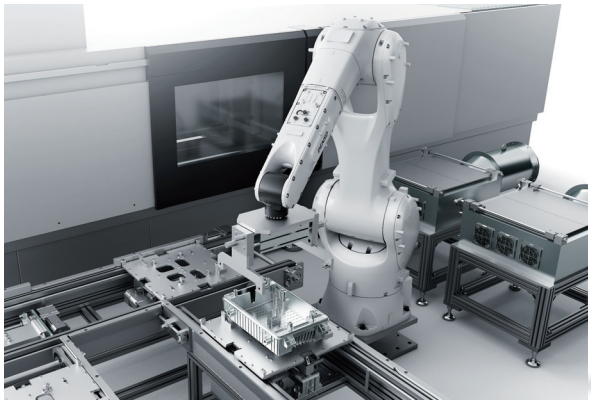
Secondary user wiring and tubing
Up to two EtherCAT runs can be routed inside the unit.



User wiring and tubing can be routed through the three axes to accommodate devices mounted on the robot arm.

Example application

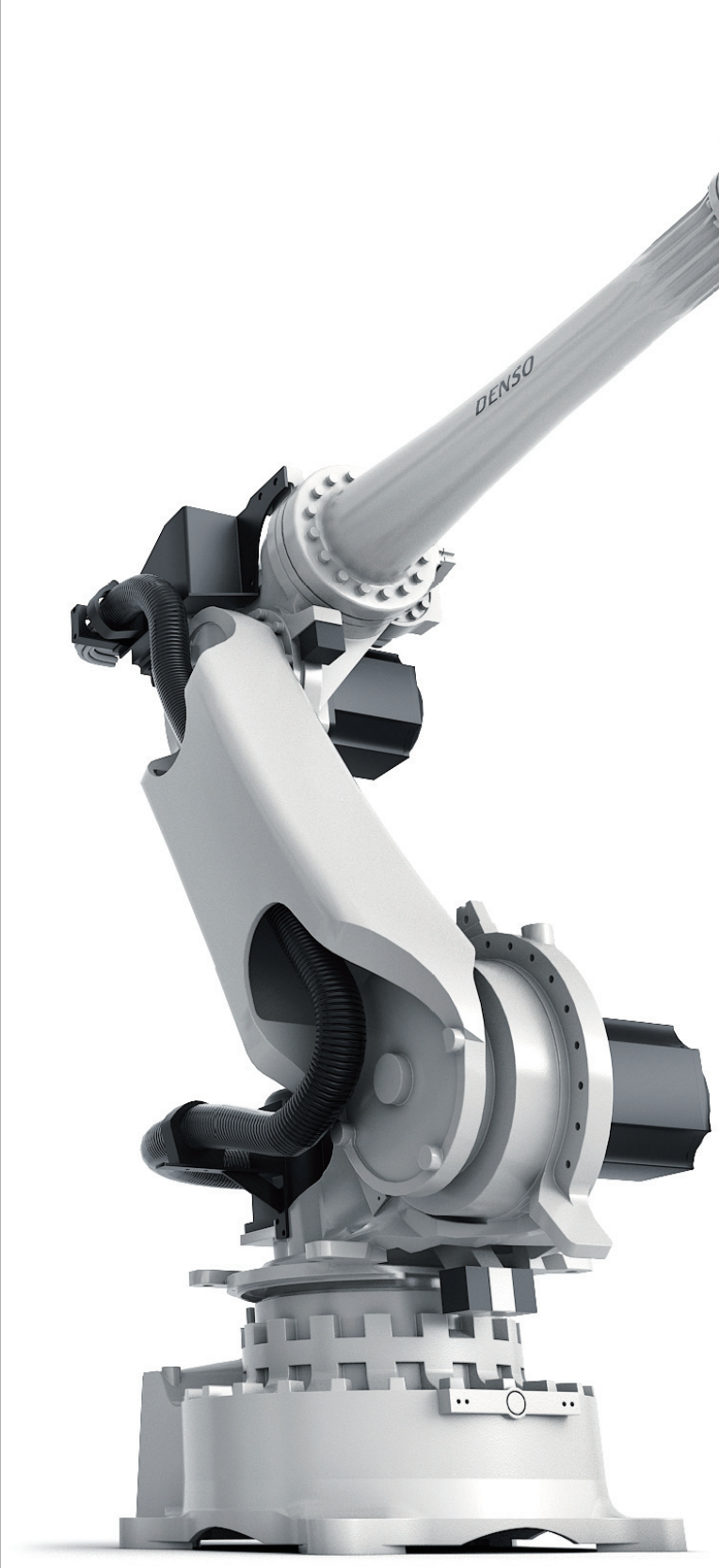
Transferring, transporting, and packaging work



VL series

VL2500

Max. arm length	Max. movable load
2503mm	40kg



Features

Designed for adverse environments

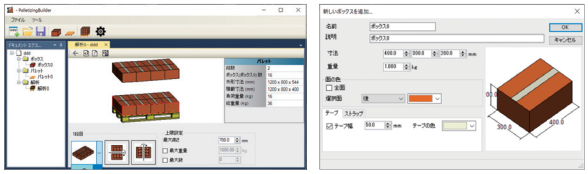
The VL series brings IP67* level protection to automation in demanding environments where the robot would be exposed to oil and mist spray.

*The wrist offers IP67 level protection, while the rest of the unit offers IP65 level protection.

Ideal for transporting and palletizing heavy objects

The VL series features the highest load capacity and the longest arm of any DENSO robot, making it ideal for automating work that involves transporting or palletizing heavy objects.
Combine the VL series with Palletizing Builder, which is part of the WINCAPS Plus offline programming software suite, to automate palletizing work without writing any code.

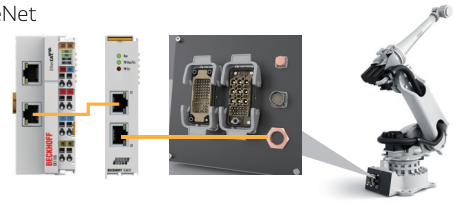
WINCAPS Plus Palletizing Builder



This software simplifies programming by automatically calculating target positions for palletizing and depalletizing processes.

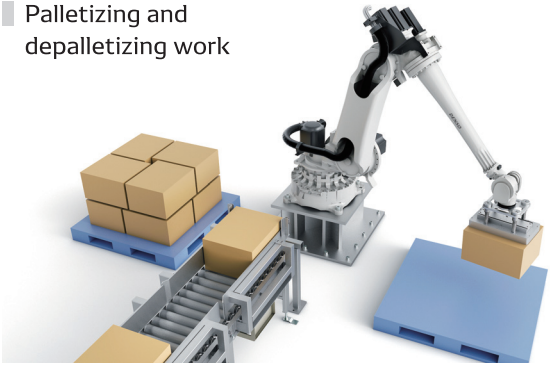
Multi-bus cables

The VL series is wired internally for connection to field networks to reduce the complexity of wiring outside the unit.
Supported communications standards: Profinet, Profibus, DeviceNet



Example application

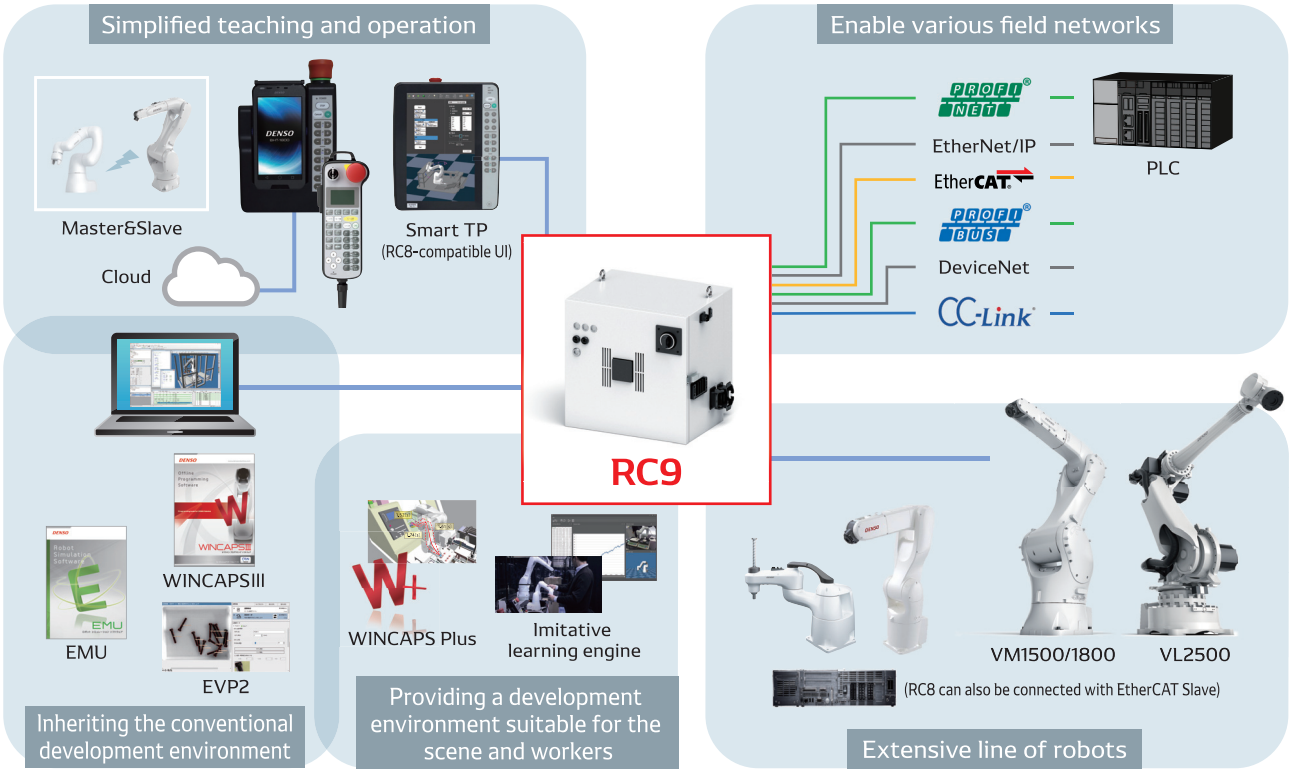
Palletizing and depalletizing work



New robot controller
RC9

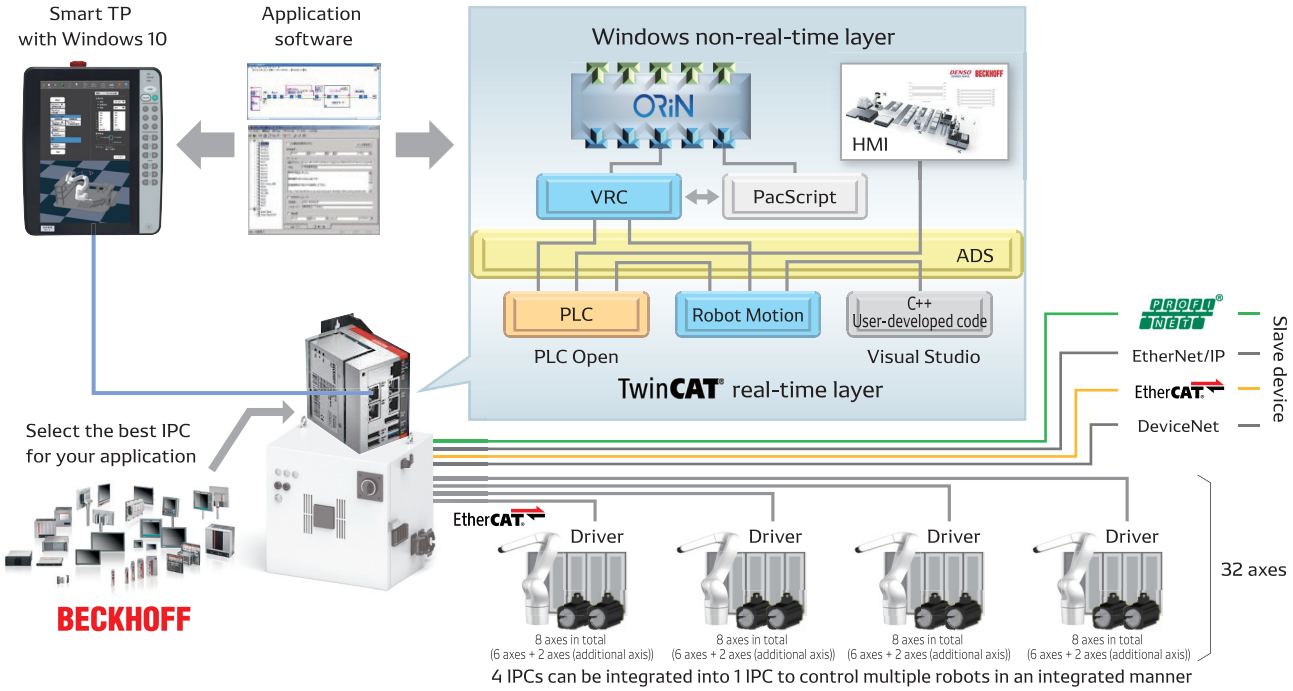
Delivering the simplicity that DENSO robots are designed to provide

This controller lets you build a system by choosing the optimal robot, peripheral equipment, and software for your application. The new teaching devices and application software "WINCAPS Plus" are also available to achieve further simplification while inheriting the RC8 development environment. It offers simplicity and peace of mind to all personnel involved with equipment setup and operation.

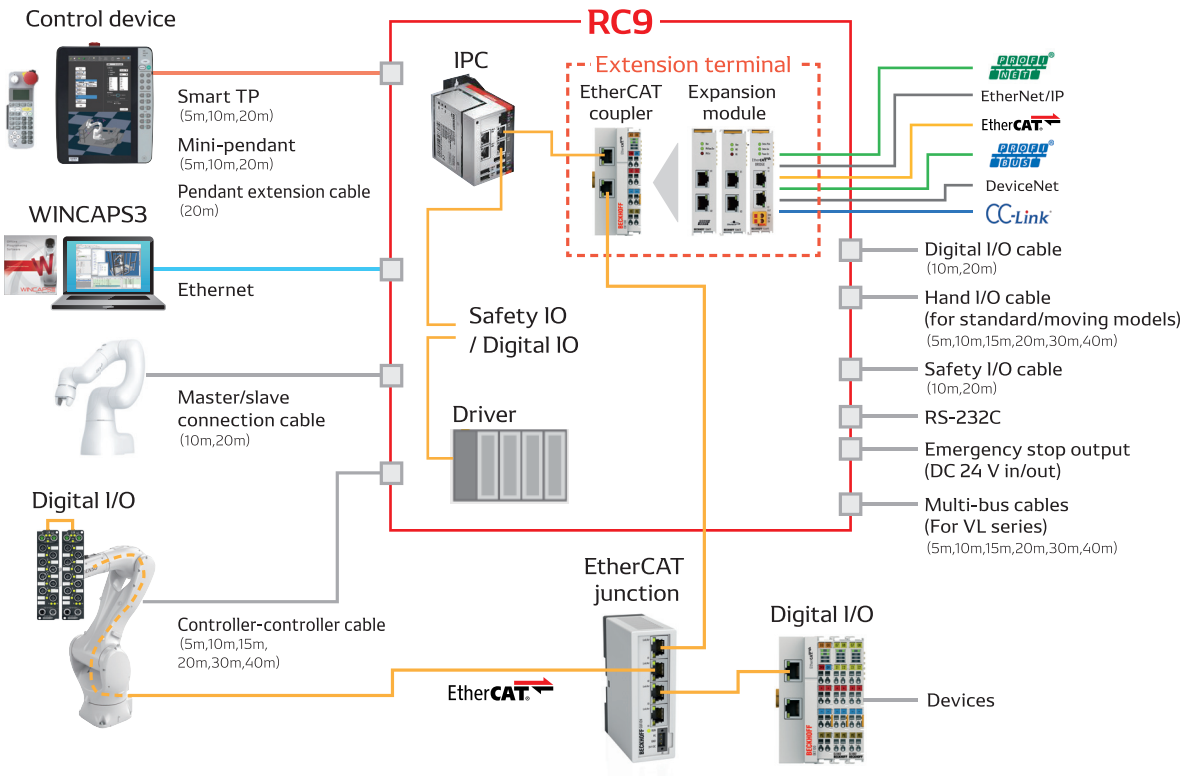


Controller that realizes integrated equipment control

RC9 can be provided with firmware. Since it has the selectivity that can be optimized according to the application, the openness that allows the fusion of user, Sier, and maker technologies, and the expandability that allows the entire system to be simply integrated, simple equipment integrated control is realized.



System configuration



List of expansion options

Cables	Power cable for EtherCAT box	M8-Open : 2, 10, 40m
		M8-M8 : 0.5, 2, 5, 10, 20, 40m
		7/8"-open, movable : 2, 10, 40 m
		7/8"-7/ 8", movable : 0.5, 2, 5, 10, 20, 40 m
	EtherCAT cable for EtherCAT box	M8-RJ45, movable : 0.5, 2, 5, 10, 20, 40 m
		M8-M8: 0.5, 2, 5, 10, 20, 40m
	IO-Link sensor cables	M12-Open, Class A : 0.5, 2, 10, 40m
		M12-M12, Class A : 2, 5, 10, 20, 40m
		M12-Open, Class B : 2, 10, 40m
		M12-M12, Class B, movable : 0.5, 2, 5, 10, 20, 40 m
	DIO sensor cables	M8-Open : 2, 10, 40m
	EtherCAT cables	RJ45-RJ45 : 0.5, 2, 5, 10, 20, 40m
		RJ45-RJ45, movable : 0.5, 2, 5, 10, 20, 40 m
Expansion functionality (USB dongle/license)		TwinCAT3 PLC
		TwinCAT3 OPC UA
		TwinCAT3 PLC + HMI Web
		TwinCAT3 PLC + OPC UAb
		TwinCAT3 PLC + HMI Web + OPC UAb

I/O terminals	EtherCAT junction	3 ports, 4 ports, 8 ports
	EtherCAT bridge terminal	
	Profinet RT controller terminal	
	Profinet RT device terminal	
	Ethernet/IP master terminal	
	Ethernet/IP slave terminal	
	Profibus master terminal	
	Profibus slave terminal	
	DeviceNet master terminal	
	DeviceNet slave terminal	
	CC-Link slave terminal	
	RC232C 2-channel terminal	
	RS422/RS485 2-channel terminal	
	Digital input terminal (PNP, 8-point, 10 µs, IP20)	
	Digital input terminal (PNP, 16-point, 3 µs, IP20)	
	Digital output terminal (PNP, 8-point, 0.5 A, IP20)	
	Digital output terminal (PNP, 16-point, 0.5 A, IP20)	
	Digital input terminal (NPN, 8-point, 10 µs, IP20)	
	Digital input terminal (NPN, 16-point, 3 µs, IP20)	
	Digital output terminal (NPN, 8-point, 0.5 A, IP20)	
	Digital output terminal (NPN, 16-point, 0.5 A, IP20)	
	Digital output terminal (NPN, 16-point, 0.5 A, IP20)	
	Digital I/O terminal (PNP, 16-point, 3 ms, IP67)	
	Digital I/O terminal (NPN, 16-point, 3 ms, IP67)	
	IO-Link master, Class A, IP67	4 ports, 8 ports
	IO-Link master, Class B, IP67	4 ports, 8 ports
	EtherCAT coupler terminal (standalone)	
	EtherCAT expansion terminal	
	Ethernet expansion module (assembly)	
	EtherCAT coupler terminal + bus end-cap set (assembly)	
	Bus end-cap (standalone)	
	Digital I/O protective plug (M8, set of 50)	
	IO-Link protective plug (M12, set of 50)	

Smart TP

The Smart TP is a multifunctional teaching pendant that can be used in a variety of situations to teach based on robot settings or as an equipment display.

Features

Large touch panel

The Smart TP runs Windows 10 and features a large, 10.1-inch screen for improved ease of use.

Improved GUI to increase work efficiency

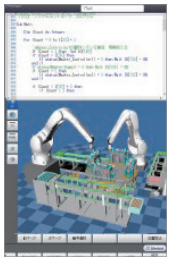
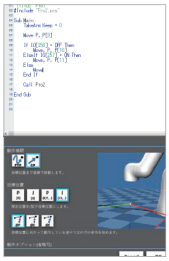
The Smart TP offers an easy-to-see menu architecture and excellent ease of use. Its GUI and functionality have been improved so that you can check simulations related to robot deployment on the pendant, shortening work times.

The Smart TP provides IP65 level drip-proof protection

Functionality

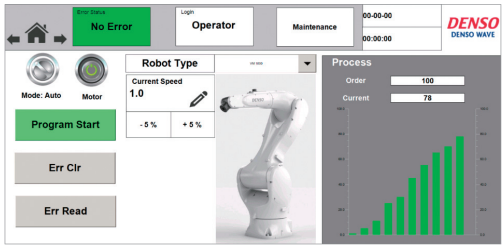
RC8-compatible UI

The Smart TP is compatible with the existing RC8 controller so that you can continue using the same development environment and operability that you've enjoyed to date.

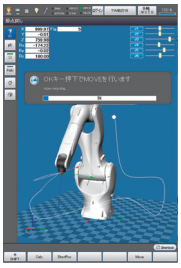
TwinCAT3 PLC/HMI

It can display screens created with TwinCAT3 PLC/HMI.



WINCAPS Plus UI

Offline programming software suite, The Smart TP supports the WINCAPS Plus GUI.




Applications

As a teaching pendant

The Smart TP incorporates teaching functionality that can be used to adjust individual robot axes.

As an equipment control panel display

It can serve as a display for not only the robot, but the entire equipment setup.

As a programming-use computer

It can run not only WINCAPS Plus, but also customer-developed and general-purpose applications. It can be connected to a keyboard and used to author programs.

Specifications

Size	10,1" (16:10)
Resolution	WXGA (800 × 1,280 pixels)
Touch screen	Transmissive capacitive touch panel
Backlight	LED
Dimensions (length × width × height)	215×284×69mm
Weight	Approx. 1,120 g

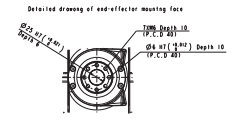
VM series options and specifications

Specifications

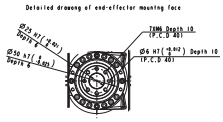
Robot name			VM1500	VM1800
Number of axes			6	
Drive motor/brake			AC servomotor (all axes) (With brake for all axes)	
Total arm length (arm 1 + arm 2) [mm]			1395 (710+685)	1695 (860+835)
Maximum motion area (point P) [mm]			1506	1804
Range of operation [˚]		J1	340 (±170)*1	
		J2	240 (140～-100)	
		J3	300 (170～-130)	
		J4	400 (±200)	
		J5	290 (±145)	
		J6	720 (±360)	
Maximum payload [kg]			25	
Speed of operation [˚/s]		J1	240	212
		J2	240	212
		J3	300	265
		J4	425	
		J5	425	
		J6	887	
Positioning repeatability [mm]*2			±0.05	
Wrist allowable load moment [N·m]		J4	52	
		J5	52	
		J6	32	
User air tube	Second arm part	No options	2 circuits (ϕ8 × 2)	
		Solenoid valve options	9 circuits (ϕ6×8, ϕ8×1)*3 [Choose from three solenoid valve types as listed below.] 1. Solenoid valve (2-position, double solenoid) 2. Solenoid valve (3-position, exhaust center) 3. Solenoid valve (3-position, closed center)	
	3-axis part	Options	1 circuits (ϕ8)	
User wiring	Second arm part	No options	·15-core (signal wires for proximity sensors, etc.)*4 ·LAN cable(STP)×1	
		Options	·Additional 10 core (signal wires for proximity sensors, etc.)*4 ·LAN cable(STP)×1	
	3-axis part	Options	·Additional 10 core (signal wires for proximity sensors, etc.)*4 ·LAN cable(STP)×1	
Air source [MPa]		Working pressure	0.20～0.39	
		Maximum allowable pressure	0.49	
Protection class			Standard type : IP40 Protected type : IP67 Clean type : ISO5	
Unit weight [kg]			220	225

*1 Range of movement will be reduced if unit is hung on a wall or installed at an angle. *2 Positioning repeatability figure indicates precision at constant ambient temperature.
*3: Only ϕ6 can be controlled by built-in solenoid valve. *4: Allowable current is subject to limitations. *5: Future release planned

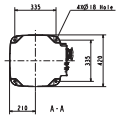
Dimensional drawing

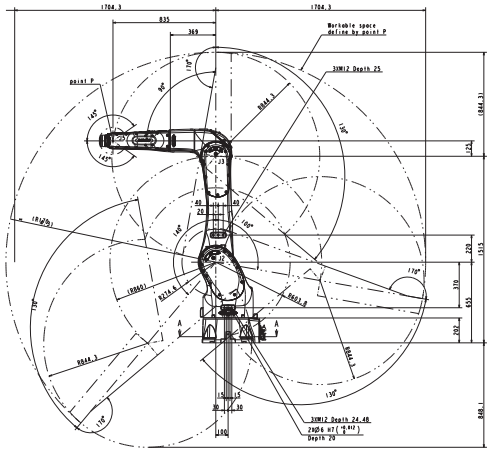


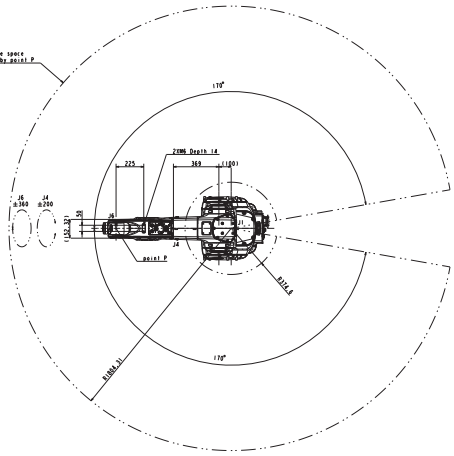
Protected type (IP67)



Standard type (IP40)







Options

External battery unit

This encoder backup battery can be installed outside the robot. It simplifies battery replacement and improves maintainability.

Brake release unit

This switch is used to release each axis's brake. (It's designed to be wired directly to each axis's brake release signal.)

Robot fixing plate kit
With leveling

Forklift attachment

Robot fixing plate
Without leveling

Power supply transformer (VM)
This option is required for overseas use
3-phase 400 VAC → 3-phase 200 VAC

Variable mechanical stopper for axis 1 / Variable mechanical stopper bolts for axis 2/3

*Product appearance and specifications are subject to change without notice.

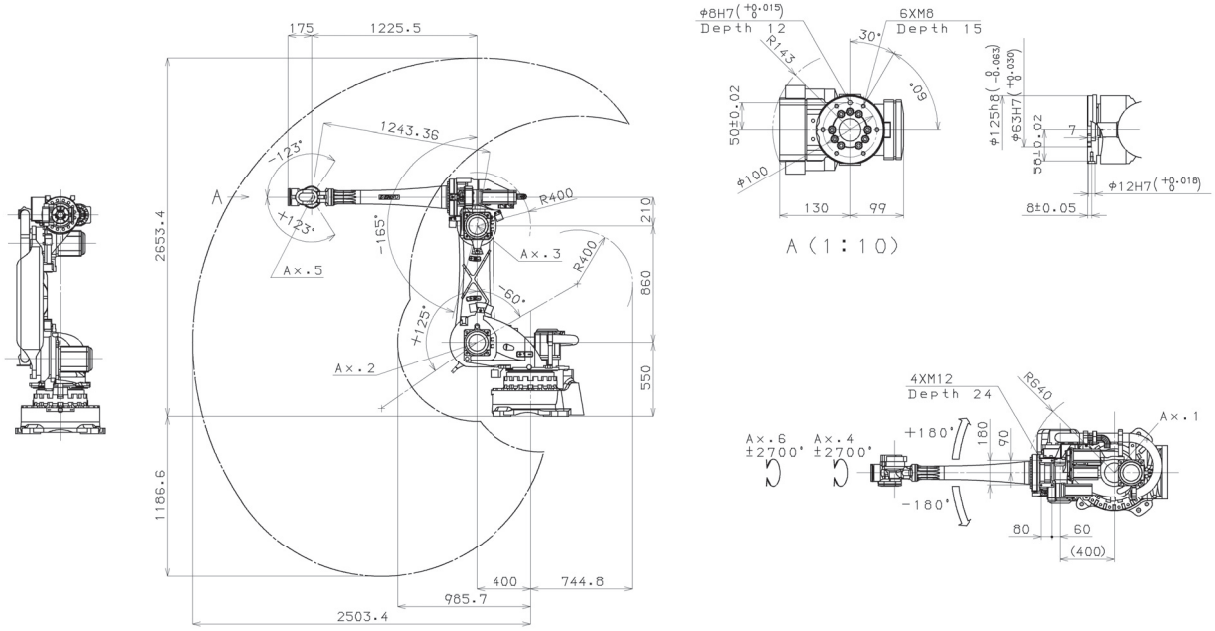
VL series options and specifications

Specifications

Robot name		VLA-4025W5
Number of axes		6
Drive motor/brake		AC servomotor (all axes) (with brake for all axes)
Total arm length (arm 1 + arm 2) [mm]		2085.5 (860+1225.5)
Maximum area of operation (P-point) [mm]		2503
Angle of operation*1 [˚]	J1	360 (±180)*2
	J2	185 (-60～125)
	J3	160 (-160～0)
	J4	5400 (±2700)
	J5	246 (±123)
	J6	5400 (±2700)
Maximum load [kg]		40
peed of operation [˚/s]	J1	170
	J2	150
	J3	165
	J4	265
	J5	250
	J6	340
Positioning repeatability [mm]		±0.06
Wrist allowable load moment [N·m]	J4	167
	J5	167
	J6	98
User air tube		1 circuits (inner diameter: ϕ12.5)
User signal wires		14-core (19-core connector)
		15-core (17-core connector)*3
Air source [MPa]	Maximum allowable pressure	2.0
Protection class		Wrist : IP67; rest of unit : IP65
Unit weight [kg]		655

*1 For positive/negative directions, see dimensional drawing and range of operation drawing. *2 When installed at an angle, the angle of operation will be subject to limitations.
*3: Can be used as Profibus, DeviceNet, or Profinet by connecting the multi-bus cable

Dimensional drawing



Options

Multi-bus cables

The VL series is wired internally for connection to field networks such as DeviceNet to reduce the complexity of wiring outside the unit.

Robot fixing plate
With leveling

Robot fixing plate kit
Without leveling

Connector panel protective cover

Axis 1/2/3 Variable mechanical stopper (VL)

Forklift attachment

Power supply transformer (VL)
3-phase 200 VAC → 3-phase 400 VAC

*Product appearance and specifications are subject to change without notice.

RC9 specifications

Specifications

Compatible robots		VMB-2515 series	VLA-4025 series
			
Power supply	Power supply capacity	4.5kVA	10.0kVA
	Input voltage range	3-phase 200 V AC -10% to 230 V AC +10%	3-phase 400 V AC -10% to 480 V AC +10%
	Power supply frequency	47～63Hz	
Power cable length		10m	
Number of control axes		6	
Control method		PTP, CP 3-dimensional straight line, 3-dimensional arc	
Drive method		All-digital AC servos for all axes	
Language		DENSO robot language (PacScript)	
Memory capacity		User domain　Global variables: 32,766 (for each point); number of program files: up to 256	
Teaching method		1) Remote teaching　2) Numerical entry (MDI)	
External signals	Digital I/O	System (fixed): 8 dedicated inputs and 8 or 9 dedicated outputs (ships with No. 28 set to user output) User: 8 general-purpose inputs and 7 or 8 general-purpose outputs (ships with No. 28 set to user output)	
	Hand I/O	General-purpose inputs: 12; general-purpose outputs: 12	General-purpose inputs: 6; general-purpose outputs: 6 (including controller-controller cable)
	Safety I/O	System (fixed): 8 inputs and 8 outputs	
External communications	Ethernet	Panel: 1 line (GbE: Gigabit Ethernet)	
	USB	Panel: 1 line; internal: 3 lines	
Optional expansions		3 units	
Self-test function		Overrun, servo error, memory error, input error, short-circuit detection (user wiring), etc.	
Timer function		Unit: 1 ms	
Error display		External error output	
		Display of error codes on mini-pendant (option)	
		Display of error messages and recovery methods on teaching pendant (option)	
Environmental conditions (during operation)		Temperature: 0˚ C to 40˚ C; humidity: 20% to 90% RH (non-condensing)	
I/O power supply	Uses external power supply	Supply 24 V DC ±10% from external source.	
	Uses internal power supply	24 V DC ±10% is supplied by the controller.	
SCCR		5kA	
Stop category		1	
Safety-related control systems and performance		Emergency stop, protective stop, enable: PLd, Cat. 3	
Protection class		IP54	
Weight		65kg	85kg

※ The appearance and specifications are subject to change for improvement without prior notice.

DENSO
DENSO WAVE

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