OMRON TM Collaborative Robot

S Series

The OMRON TM S Series of collaborative robots includes advanced hardware options and expanded safety features and certifications.

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OMRON TM Collaborative Robot - S Series

The OMRON TM Collaborative Robot - S Series includes a wide variety of models with reach and payload suitable for different applications, including the DC power mobile robot compatible, EtherNet/IP, and PROFINET versions.

With 31 Safety Features, the OMRON S Series meets ISO 13849-1, Cat.3, PL D and ISO 10218 -1 Safety Standards, certified by TUV Nord. The new OMRON S Series also comes with the UL/CSA certifications from SGS.
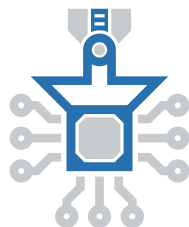
5K MAX PAYLOAD

OMRON **TM5S**
900MM REACH

7K MAX PAYLOAD

OMRON **TM7S**
700MM REACH

12K MAX PAYLOAD

OMRON **TM12S**
1300MM REACH

14K MAX PAYLOAD

OMRON **TM14S**
1100MM REACH

25K MAX PAYLOAD

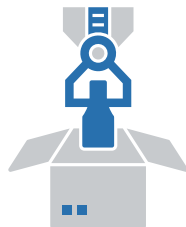OMRON **TM25S**
1902MM REACH

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Target Industries

OMRON TM Collaborative Robots are designed for a wide variety of applications in a number of industries.
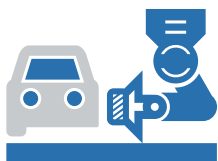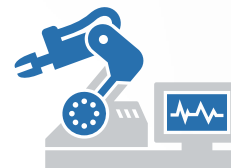
ENVIRONMENTAL MOBILITY   **DIGITAL DEVICES**   **FOOD & COMMODITIES**   **MEDICAL**   **LOGISTICS**

Target Applications

VISUAL INSPECTION

OMRON S Series comes standard with built-in high resolution camera and can conduct visual inspection on parts, part numbers and labels for greater accuracy and higher quality.

ASSEMBLY

Our cobots can improve throughput and consistency of repetitive or complex assembly tasks including part joining, insertion, tool changing, and working alongside people.

MOBILE MANIPULATION:

Mounting an OMRON TM cobot onto an OMRON LD or MD mobile robot automates not only transportation of goods but also complex picking operations.

PALLETIZING

Palletizing operation are faster than ever with increased joint speed and range. With a wide range of available payloads and reach, you can find the robot that is right for your appliication.

MACHINE TENDING

Avoid repetitive and dangerous work by letting a cobot tend CNC machines, injection molding machines, stamping and punch pressers, grinding, and cutting machines.

PACKAGING

Our cobots can pick up, inspect, and sort products directly from a moving conveyor belt.

PICK AND PLACE

Our cobots are highly flexible and have a small footprint, so they can easily be moved from one station to another for high-mix / low-volume pick-and-place applications.

MORE

The wide range of payload and reach options, combined with high precision, high resolution camera, and advanced safety features makes OMRON TM S Series cobot the ideal choice for nearly any application.

Ease of use

Improved hand guidance and next-generation teach pendant make programming the OMRON S Series easier than ever.

Advanced hand guiding experience: Applications can be programmed using the built-in hand guidance function. Simply move the head to the desired position, and with the click of a button, the position is taught.

Emergency Stop Button

Power Button

R — Reset Button

Speed Indicator

MODE Indicator

Robot Stick Enable Indicator

M/A Button

Play Button

Pause Button

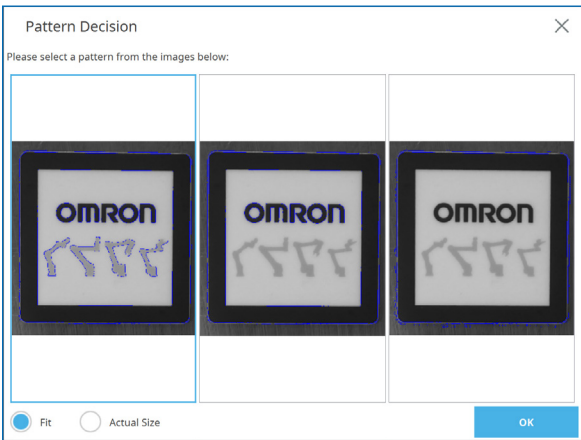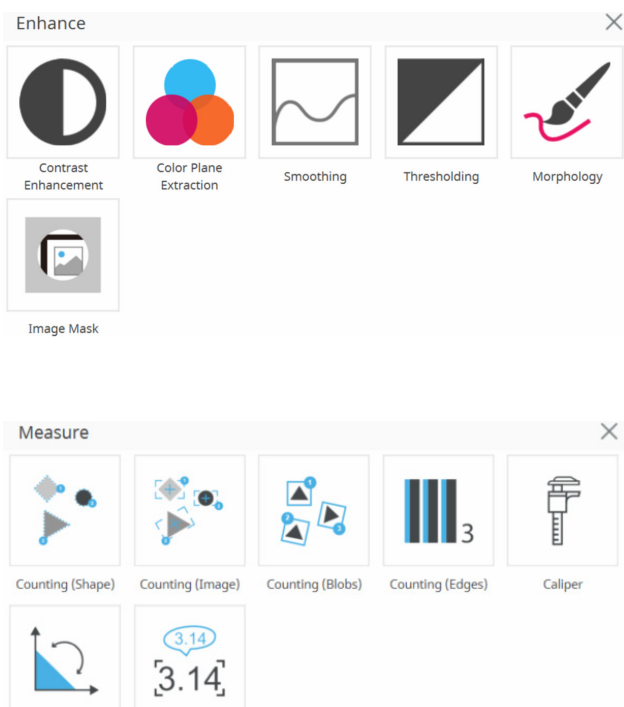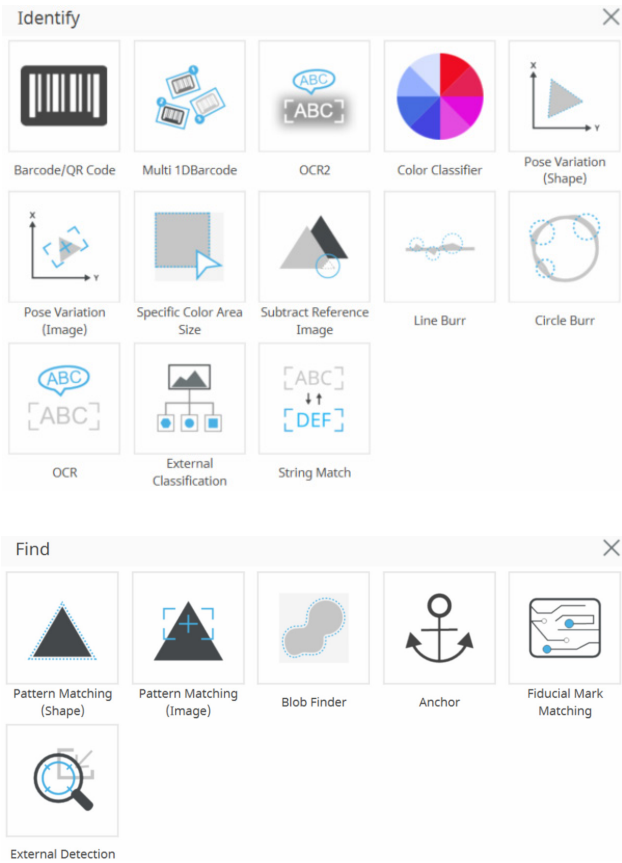- Button

Stop Button

+ Button

The new Robot Stick is designed to convert an **OMRON TM Screen** to a teaching pendant.

- Operate, control, and program the cobot using a touch screen
- No wiring or additional chip installation required
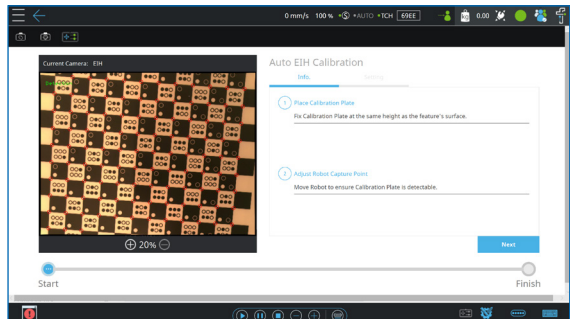- OMRON TM Pen comes standard with the OMRON TM S Series Cobots
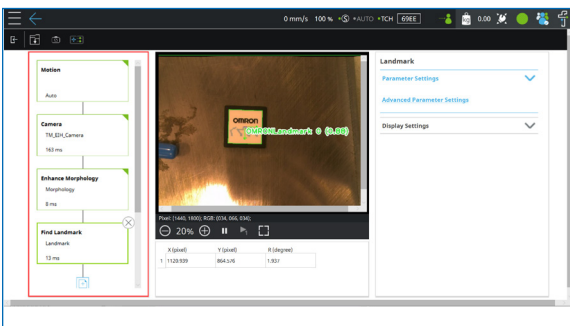
Built-In Vision System

The integrated vision system is the biggest advantage of OMRON TM cobots. It is designed for industrial grade pattern recognition, object positioning, and feature identification. Users can set up vision tasks for immediate deployment without going through complex steps if integrating external cameras or lighting equipment.

Identify

Barcode/QR Code	Multi 1DBarcode	OCR2	Color Classifier	Pose Variation (Shape)
Pose Variation (Image)	Specific Color Area Size	Subtract Reference Image	Line Burr	Circle Burr
OCR	External Classification	String Match		

Enhance

Contrast Enhancement	Color Plane Extraction	Smoothing	Thresholding	Morphology
Image Mask				

Measure

Counting (Shape)	Counting (Image)	Counting (Blobs)	Counting (Edges)	Caliper

Find

Pattern Matching (Shape)	Pattern Matching (Image)	Blob Finder	Anchor	Fiducial Mark Matching
External Detection				

Vision Calibration

Pattern Decision

Please select a pattern from the images below:

○ Fit ○ Actual Size [OK]

Pattern Matching Template

TMvision Workflow

5

Ease of use

The OMRON S series collaborative robots are easy to use and can be programmed using a variety of methods, including hand guidance, flow-chart programming or manual scripting.

Graphical Programming

Our innovative programming allows users to automate a task with flow-based software, creating full workflows with a click-and-drag method in TMFlow. Via Operator Platform, building an application software layout is very intuitive by drag and drop visual elements, no need for trial and error via complex coding.

Omron Next Generation Cobot – Faster Programming

The script programming method in both Project and Mode, will be available for S. The Script language may enable the advanced users to program Cobot projects more concise and organized.
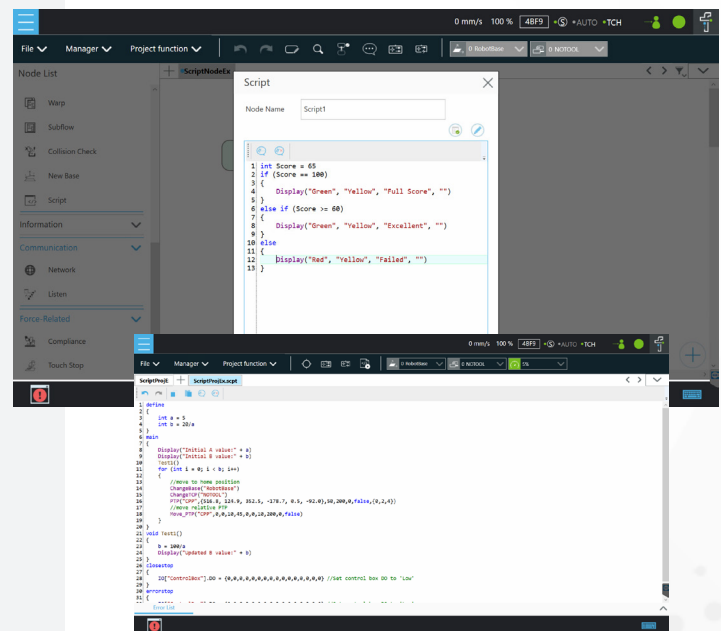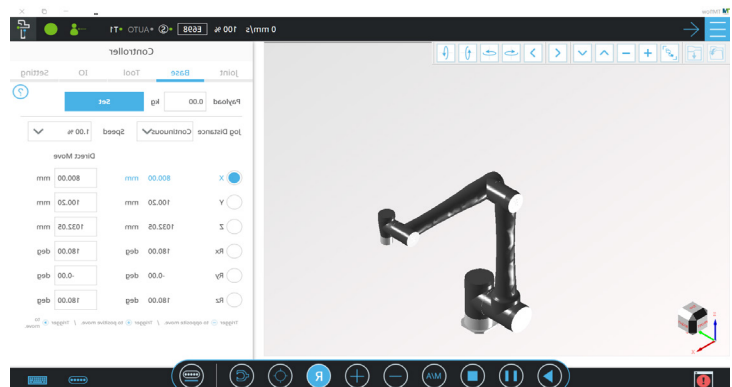
TMSimulator

The new OMRON TMSimulator lets users test and verify proper operation by developing, editing and running programs offline. By building programs offline, users can develop new processes without having to take a robot out of production.

The onscreen display includes a virtual robot stick so users can control the robot just as they would control a physical robot. In addition to the standard robot control buttons, the virtual robot stick has buttons for RESET, Point, and Gripper.
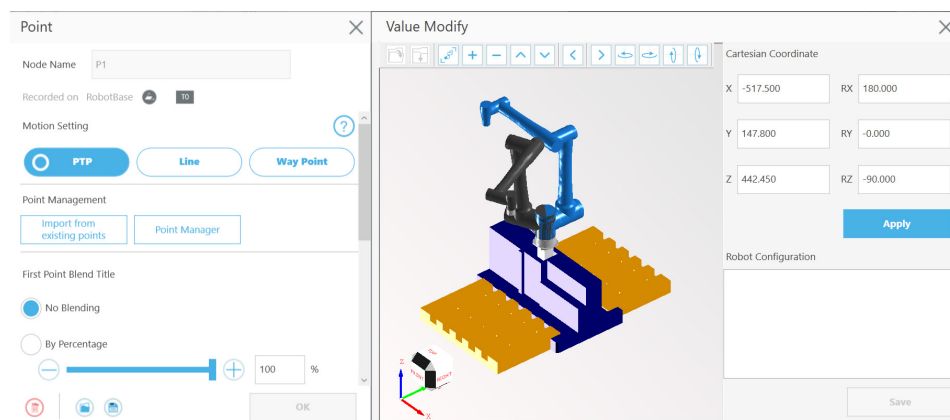
The TMSimulator can test Listen Node and Network Node communications. Modbus, Ethernet Slave, and serial configurations can also be tested.

The TMSimulator also has options for DI and AI Signal Control Box Input Control.

This version of TMSimulator works with the following S Series Model robots (HW5.0):

- TM5S-X
- TM7S-X
- TM12S-X
- TM14S-X
- TM25S-X

TMflow

OMRON's highly versatile programming software for collaborative robots is more capable and easier to use than ever before.

Programming Improvements

Project Stop and Error Stop Handling Procedures

• Users can create special subflow logic to define the steps the robot takes after a project or error stop.

Tool Setting Improvements

• Tool Settings option added to the project page for easier access so users no longer need to navigate away from the project page to change Tool Settings.

Operational Improvements Behavior

Improvements when Passing Through Singularity

• The new Singularity Handling feature imroves the robot's behavior by purposefully slowing down at the point of singularity and avoiding joint speed errors and sudden stops. This feature can be enabled for Point and Move nodes that use Line motions. Motion blending will be disabled when Singularity Handling is enabled.

Redefine Payload Settings in Motion Nodes

• New Payload Settings UI in motion nodes make it easier for users to configure the robot picking up or releasing a workpiece. For applications with unknowno or widly varying payloads, the robot can now use an external for and torque sensor to automatically calculate and compensate for the payload mass.
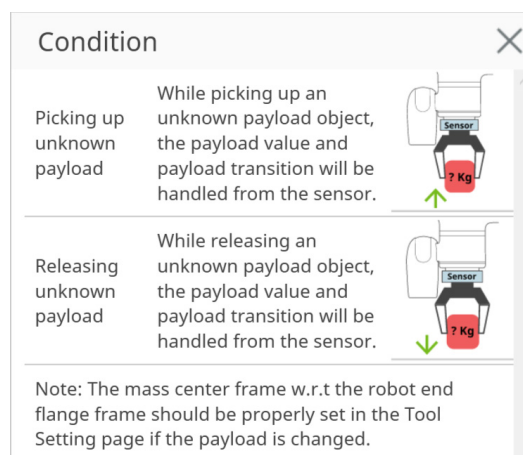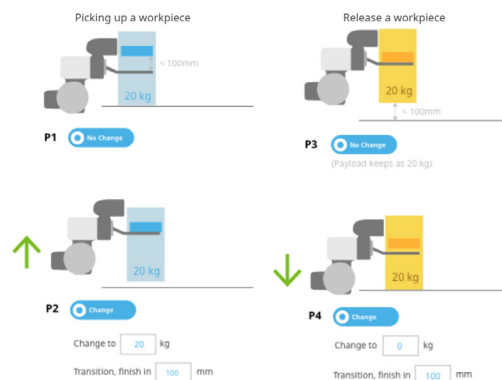
Pattern-Matching UI Improvement

• Users can choose from three pattern-matching algorithms in TMvision Find tasks for more reliable results. The object detection score is more intuitive, represented as a single numerical value.
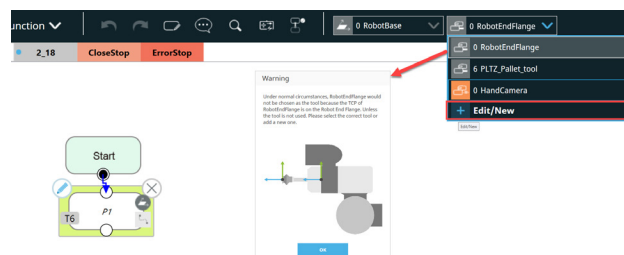
Tool Setting Improvements

Payload Settings

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Safety

Newly added safety functions provides for a wide variety of safety devices/switch configurations without the need for an additional safety controller.

Safety Features
- 31 Safety features in total
- 12 Newly added safety features

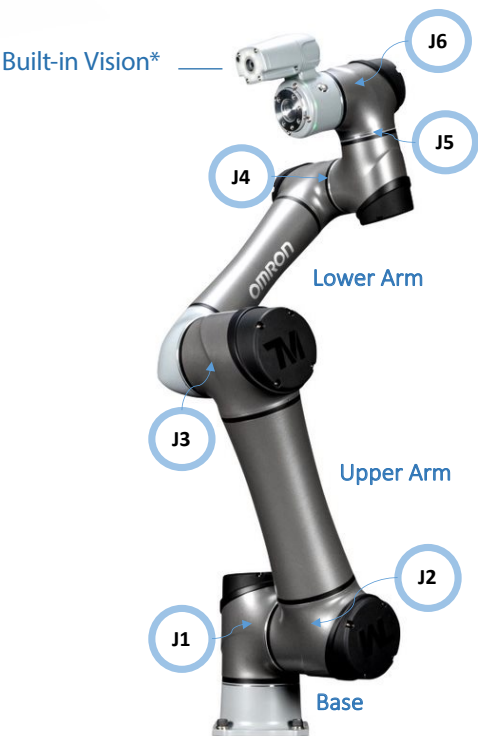|	
Robot Stick E-Stop	Cartesian Limit A
User Connected E-Stop Input	Cartesian Limit B
Encoder Standstill Output	**NEW** Robot Stick Enabling Switch
User Connected External Safeguard Input	**NEW** Reset Output
Additional Joint Torque Monitoring	**NEW** Robot Stick Reset
Joint Position Limit	**NEW** Enabling Switch on end-module
Joint Speed Limit	**NEW** User Connected External Bumping Sensor Input
Speed Limit	**NEW** End-Point Reduced Speed Limit
Additional Force Limit	**NEW** User Connected MODE Switch Input
User Connected External Safeguard Input for Human-machine Safety Settings	**NEW** User Connected Reset Input
Robot E-Stop Output	**NEW** User Connected Soft Axis Setting Switch Input
User Connected External Safeguard Output	**NEW** Enabling Switch Output
Robot Human-Machine Safety Setting Output	**NEW** MODE Switch Output
Robot Recovery Mode Output	**NEW** Safe Home Output
Robot Moving Output	
User Connected Enabling Switch Input	
User Connected E-Stop Input without Robot E-Stop Output	

Certifications:
- ISO 13849-1, Cat.3, PL d
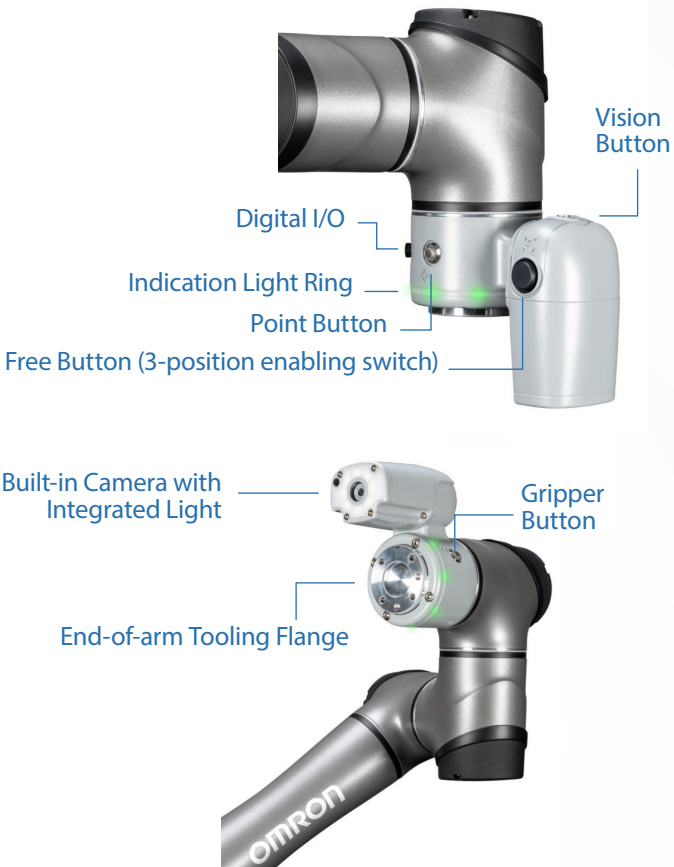- ISO 10218-1:2011
- UL & CSA Safety Certification

Protections:
- IP54 rating for Robot Arm, AC control box, Robot Stick and TM screen.
- ISO Class 3 for the Cleanroom
- Enhance oil resistant covers for joints

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Anatomy of OMRON TM S Series Cobot

Built-in Vision*

J6

J5

J4

Lower Arm

J3

Upper Arm

J2

J1

Base

*Not available for non-camera version

Vision Button

Digital I/O

Indication Light Ring

Point Button

Free Button (3-position enabling switch)

Built-in Camera with Integrated Light

Gripper Button

End-of-arm Tooling Flange

Maximum Payload

25 kg	TM25S
20 kg	
15 kg	TM14S
10 kg	TM12S
	TM7S
5 kg	TM5S
0 kg	

700 mm   900 mm   1100 mm   1300 mm   1500 mm   1900 mm

Reach
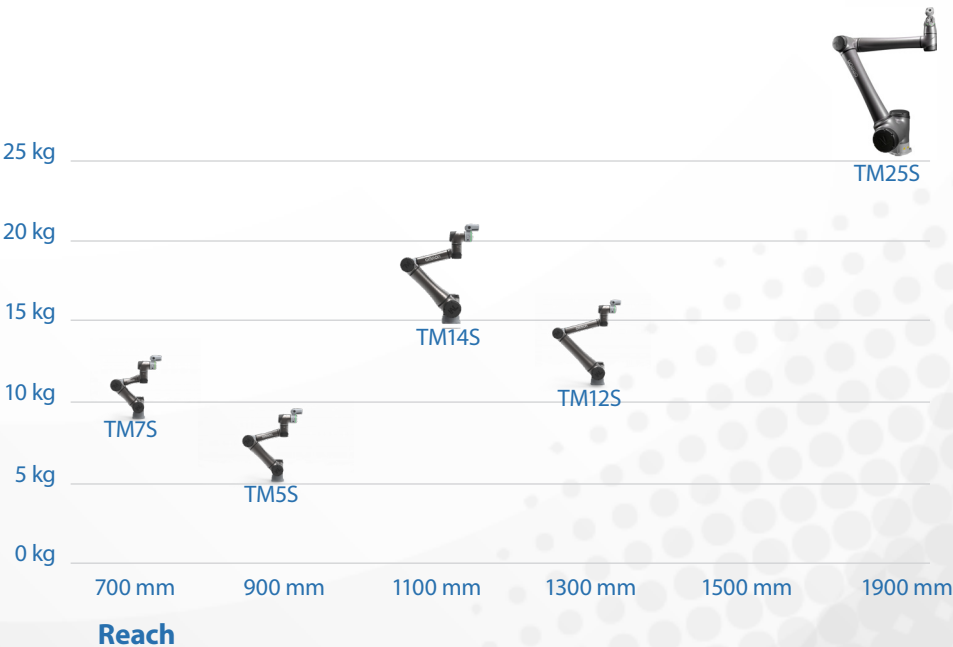
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OMRON S Series Cobots' Main Advantage

⚖	**Payload**	A wide range of payload options from 5 kg up to 25 kg.
🦾	**Joint Range**	360° freedom for J1, J2, J4, J5 and J6
⏱	**Motor Speed**	The joint speed J6 increased from 225 °/s to 450 °/s; Faster or equivalent J1~J5.
✚	**Repeatability**	Maximum 70% improvement of repeatability to 0.03 mm*
🚧	**Ingress Protection Level**	IP54: Robot Arm, AC control box, Robot Stick, TM Teach Pendent
💧	**Anti Cutting Oil Corrosion**	Enhanced joint covers
🦺	**Safety**	31 Safety features; PLD Cat.3, TÜV Nord certified CE SGS certified UL/CSA

360°

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Cobots vs. Industrial Robots

OMRON TM Collaborative Robots change the way in which traditional factories work. Physical cages are no longer needed. Designed for high-mix, low-volume production at a speed comparable to human workers, OMRON cobots can work in harmony with humans.

Industrial Robot
- Requires cage
- Multiple sensors required for safety

Collaborative Robot
- Smaller footprint
- No physical barriers
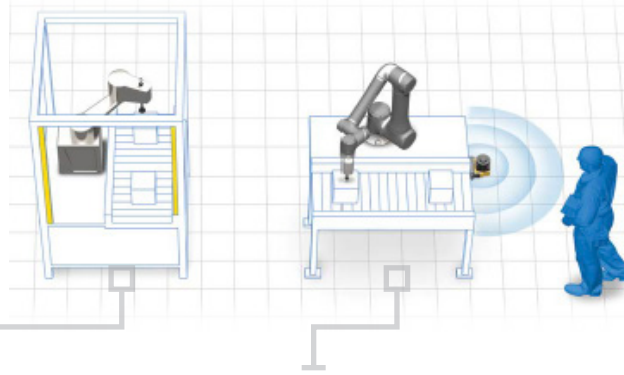
	Traditional Industrial Robots	**OMRON Cobots**
Safety	Needs a physical barrier, such as a fence or cage, to ensure safety.	Designed to be inherently safe but may need safety sensors (e.g. OMRON safety laser scanner) based on risk assessment. Typically does not need physical barrier if working in collaborative mode. Simple safety software with easy-to-use graphical user interface.
Workspace	Separated from human workspace.	Can be shared with people.
Footprint	Large	Small
Flexibility	No. Fixed to one location and works on dedicated task.	Yes. Can be moved between locations during the day to work on different tasks. Built-in camera and Landmark positioning enable quick relocation.
Programming	Difficult. Requires skill and training.	Easy. Can be done with minimal training.
Setup	Requires advanced skills and is time-consuming.	Quick and easy.
Application	Fit for mass production at high speeds.	Fit for high-mix, low-volume production at a speed comparable to human workers. Can be used at high speeds with safety measures.
Cycle Time (Pick & Place)	Down to seconds	Over 5 seconds
Speed of Process (Path)	Fast	Slow
Repeatability	+/- 0.02 mm	TM5S, TM7S, TM12S, and TM14S: +/- 0.03 mm TM25S: +/- 0.05 mm
Environment	IP requirements above IP54	IP54 for robot arm, AC control bo, Robot Stick, and TM Screen
Process Complexity	Can be complex	Should be simple

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Plug & Play

OMRON has partnered with a select number of companies to offer a wide variety of peripherals that quickly and easily integrate with our cobots, allowing for a faster deployment and return on investment. They are collectively referred to as Plug & Play devices and software, designed to serve a broad range of customer applications and meet the highest testing standards of OMRON.

Grippers

Applications

Connectivity

More
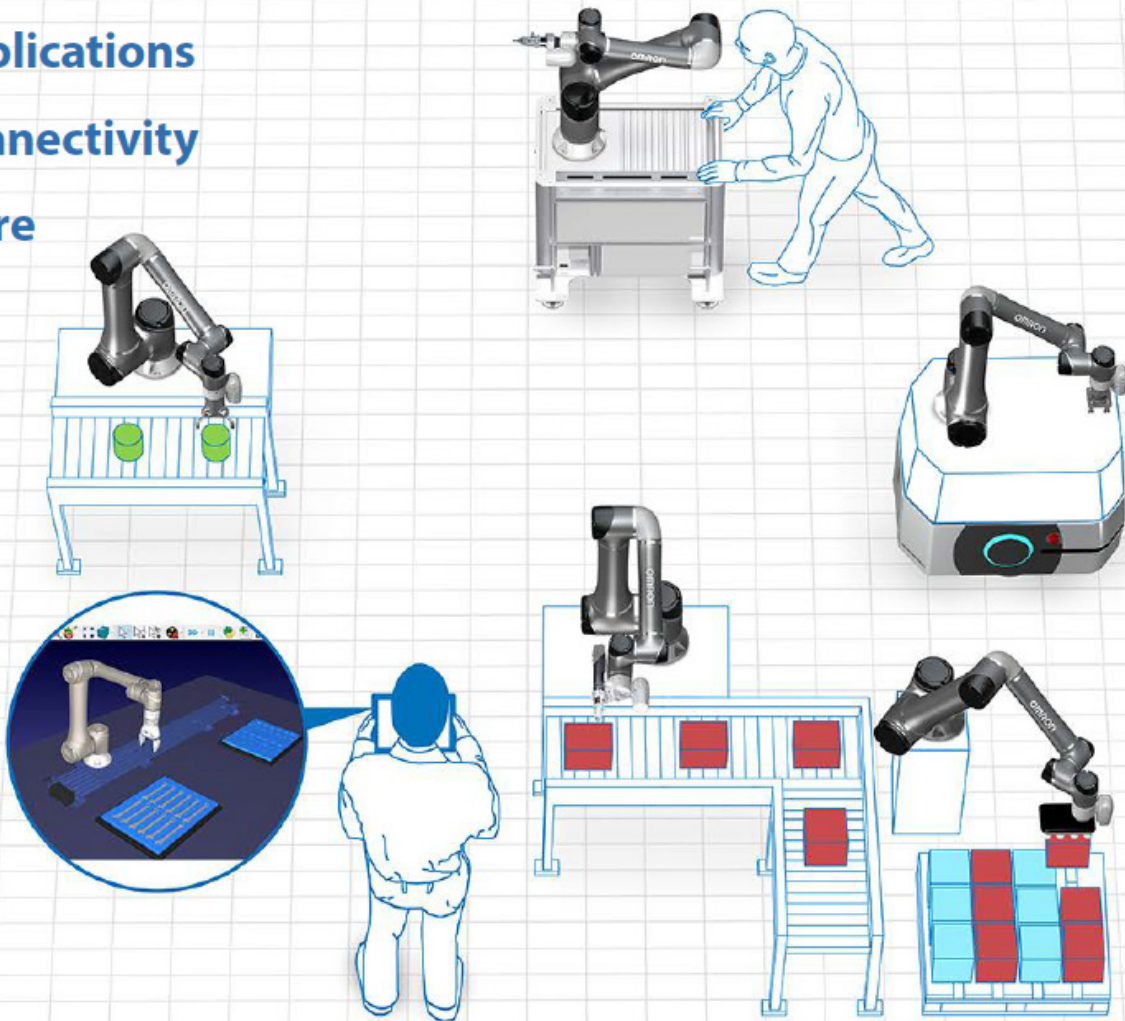
Plug & Play Kits

All products come as a ready-to-use kit for easy installation

S Series Specifications

		TM5S	TM7S	TM12S	TM14S	TM25S
Weight with camera		23.9 kg	22.9 kg	23.5 kg	22.6 kg	81.6 kg
Weight without camera		23.6 kg	22.6 kg	33 kg	32.7 kg	813 kg
Maximum payload		5 kg	7 kg	12 kg	14 kg	25 kg
Reach		900 mm	700 mm	1300 mm	1100 mm	1902 mm
Joint ranges	J1, J2, J4, J5, J6	+/- 360°				
	J3	+/- 158°	+/- 152°	+/- 162°	+/- 159°	+/- 166°
Joint speed	J1, J2	180°/s		120°/s		100°/s
	J3	180°/s		180°/s		130°/s
	J4	225°/s		225°/s		195°/s
	J5	225°/s		225°/s		210°/s
	J6	450°/s		450°/s		225°/s
Average speed*		1.4 m/s	1.1 m/s	1.3 m/s	1.1 m/s	2.1 m/s
Repeatability		+/- 0.03 mm	+/- 0.03 mm	+/- 0.03 mm	+/- 0.03 mm	+/- 0.05 mm
Degrees of freedom		6 rotating joints				
I/O ports	Control Box	Digital In: 16 / Digital Out: 16 Analog In: 2 / Analog Out: 2				
	Tool Con.	Digital In: 3 / Digital Out: 3				
I/O power supply		24 V 2.0 A for control box and 24 V 1.5 A for tool				24 V 2.0 A for control box and 24 V 1.5 A for tool
IP classification		IP54 for Robot Arm, AC Control Box, Robot Stick and TM Screen				
Cleanroom Class		ISO Class 3				
Operating Temperature and Humidity		0 to 50°C, 85% max. (with no condensation)				
Motor Power supply		100-240 VAC, 50-60 Hz for AC units; 24 to 60 VDC for DC units				200-240 VAC (AC) 48-60 VDC (DC)
I/O interface		2×COM, 1×HDMI, 3×LAN, 2×USB2.0, 4×USB3.0				
Communication		RS232, Ethernet, Modbus TCP/RTU (master & slave) PROFINET (optional), EtherNet/IP (optional)				
Programming environment		TMflow, flowchart based and script based				
Certification		SEMI S2 (coming soon)		SEMI S2 (optional)		
Robot vision	Eye in hand (built in)	1.2M/5M pixels, color camera (camera models only)				Auto-focused color camera with 5M resolution, Working distance: 100 mm ~ ∞
	Eye in hand (optional)	Support Maximum 2 GigE 2D cameras				

* Average speed was tested and calculated with robot in Performance Mode.

Notes

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OMRON Corporation   **Industrial Automation Company**

Kyoto, JAPAN   **Contact: www.ia.omron.com**

OMRON ROBOTICS AND SAFETY TECHNOLOGIES, INC.
4225 Hacienda Drive, Pleasanton, CA 94588 U.S.A.
Tel: (1) 925-245-3400/Fax: (1) 925-960-0590

OMRON EUROPE B.V.
Wegalaan 67-69, 2132 JD Hoofddorp
The Netherlands
Tel: (31)2356-81-300/Fax: (31)2356-81-388

OMRON ELECTRONICS LLC
2895 Greenspoint Parkway, Suite 200 Hoffman Estates,
IL 60169 U.S.A.
Tel: (1) 847-843-7900/Fax: (1) 847-843-7787

OMRON (CHINA) CO., LTD.
Room 2211, Bank of China Tower, 200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Tel: (86) 21-5037-2222/Fax: (86) 21-5037-2200

OMRON ASIA PACIFIC PTE. LTD.
No. 438A Alexandra Road # 05-05/08 (Lobby 2),
Alexandra Technopark,
Singapore 119967
Tel: (65) 6835-3011/Fax: (65) 6835-2711

OMRON ELECTRONICS KOREA CO,. LTD
18Floor, Kyobo Tower B Wing, 465, Gangnam-daero,
Seocho-Gu, Seoul, Republic of Korea
Tel: (82) 70-4506-4106/Fax: (82) 2-3483-7788

OMRON AUTOMATION PRIVATE LIMITED
THE QUBE 5th Floor, Unit No. 501 - 504, M V Road, Marol,
Andheri (EAST), Mumbai -MH-400059, India
Tel: (91) 22-7128-8400/Fax: (91) 22-7128-8401

OMRON TAIWAN ELECTRONICS INC.
6F,Home Young Budg.,No.363,Fu-Shing N.Road,
Taipei, Taiwan R.O.C
Tel: (886) 2-2715-3331/Fax: (886) 2-2712-6712

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