



# OMRON™ Collaborative Robot

## S Series

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

## OMRON TM Collaborative Robot - S Series

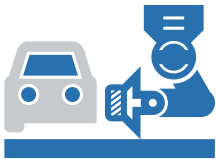
The OMRON TM Collaborative Robot - S Series includes a wide variety of models with reach and payload suitable for different applications, including the DC power mobile robot compatible, EtherNet/IP, and PROFINET versions.

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.

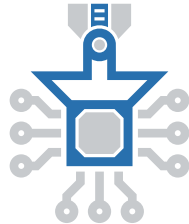


## Target Industries

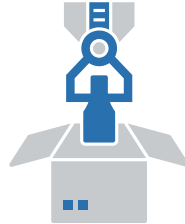
OMRON TM Collaborative Robots are designed for a wide variety of applications in a number of industries.



ENVIRONMENTAL  
MOBILITY



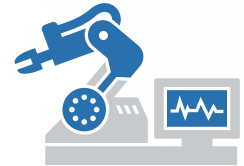
DIGITAL  
DEVICES



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 application.



### 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.



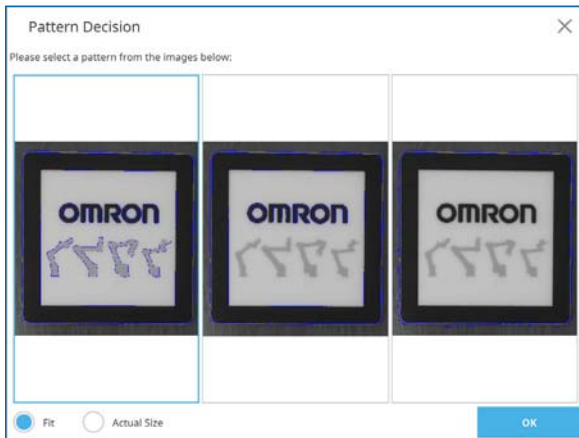
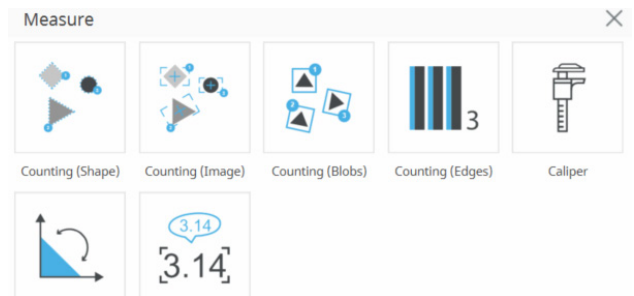
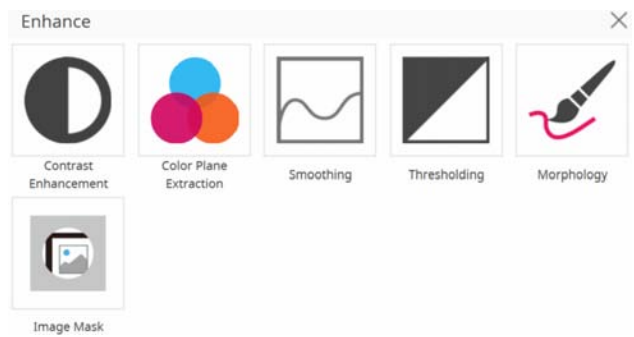
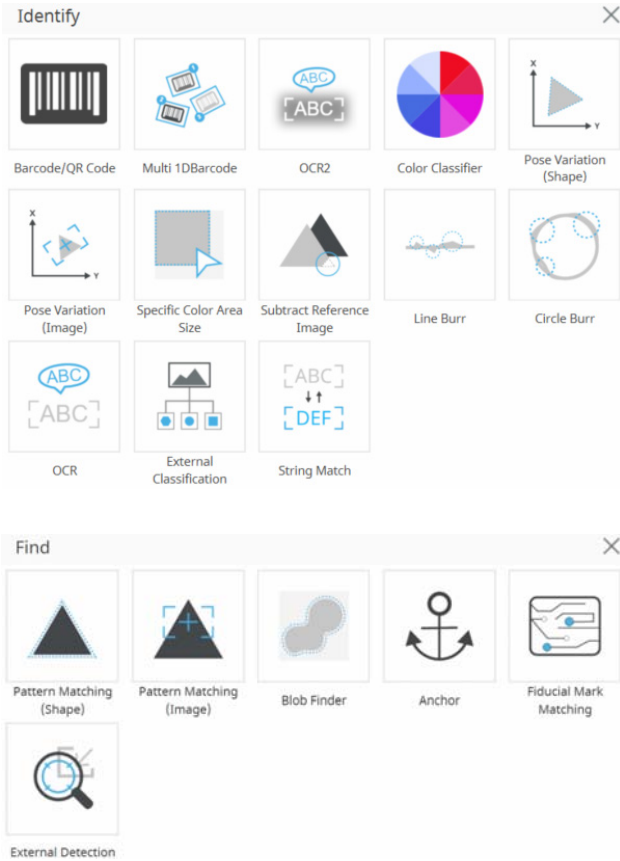
The new Robot Stick is designed to convert an **OMRON TM Screen** to a teaching pendant.

- 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

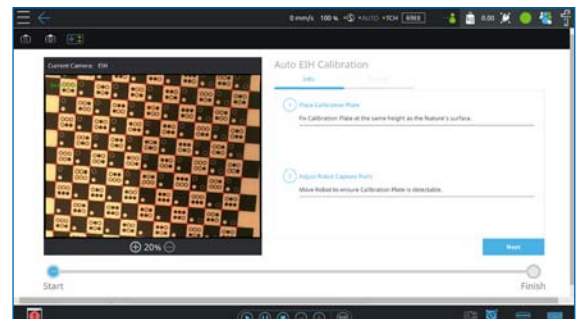


## Built-In Vision System

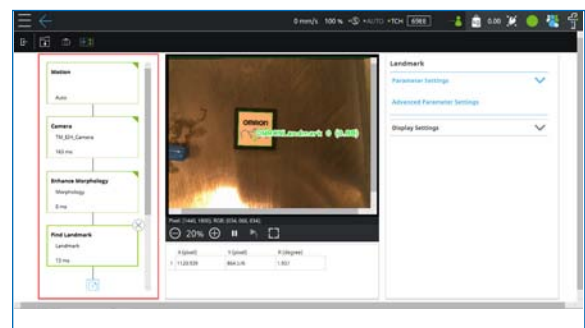
The integrated vision system is the biggest advantage of OMRON™ cobots. It is designed for industrial grade pattern recognition, object positioning, and feature identification. Users can set up vision tasks for immediate deployment without going through complex steps if integrating external cameras or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



**Pattern Matching Template**



**Vision Calibration**



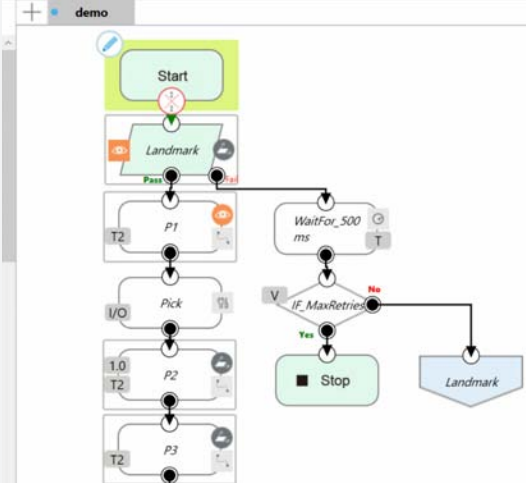
**TMvision Workflow**

## 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.

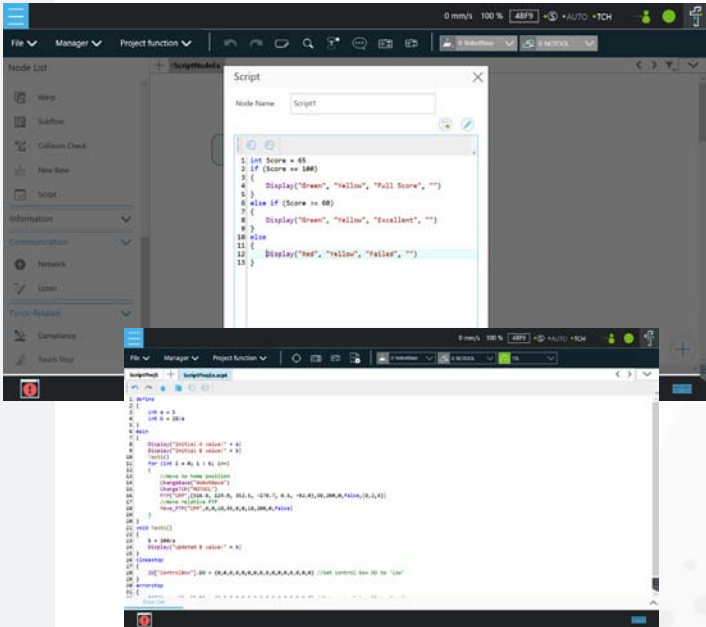
### Graphical Programming

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.



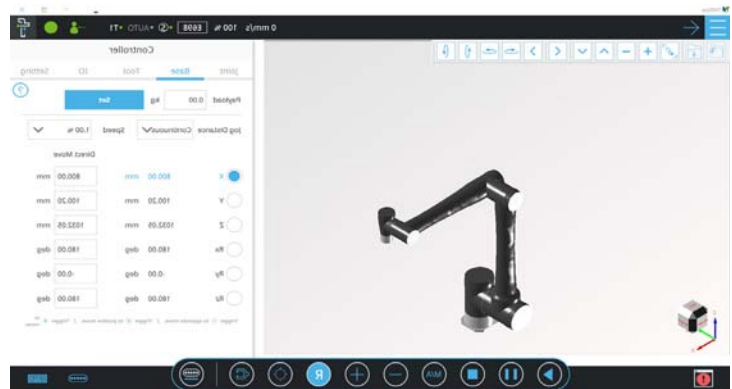
## TMSimulator

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.

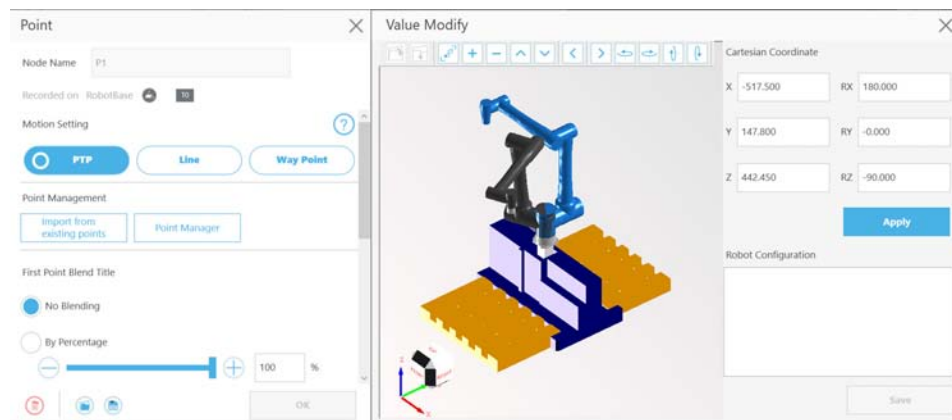
The TMSimulator can test Listen Node and Network Node communications. Modbus, Ethernet Slave, and serial configurations can also be tested.

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

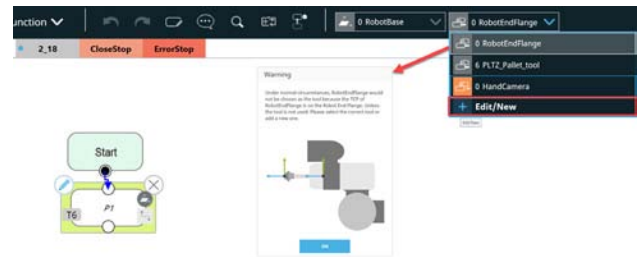
- The new Singularity Handling feature improves the robot's behavior by purposefully slowing down at the point of singularity and avoiding joint speed errors and sudden stops. This feature can be enabled for Point and Move nodes that use Line motions. Motion blending will be disabled when Singularity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

#### Redefine Payload Settings in Motion Nodes

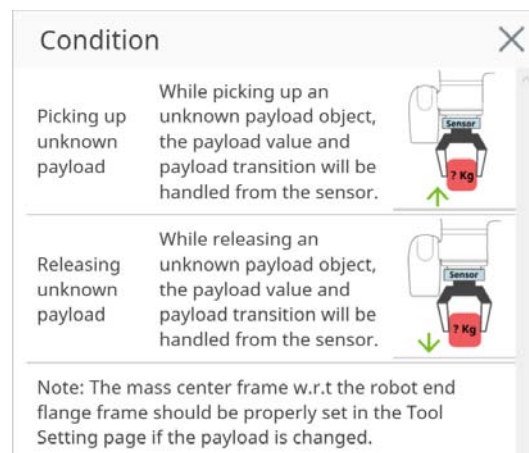
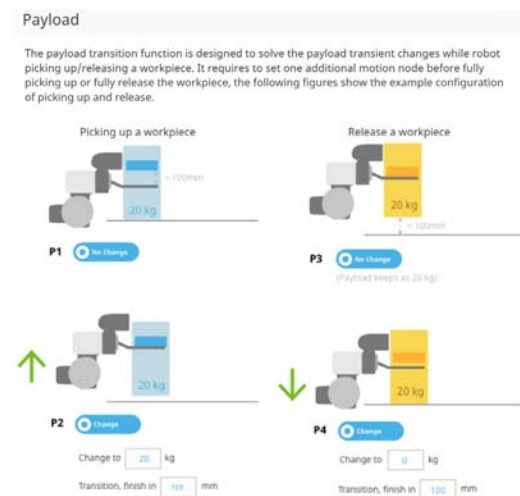
- New Payload Settings UI in motion nodes make it easier for users to configure the robot picking up or releasing a workpiece. For applications with unknown or widely varying payloads, the robot can now use an external force and torque sensor to automatically calculate and compensate for the payload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



## 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

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Robot Stick E-Stop

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User Connected E-Stop Input

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Encoder Standstill Output

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User Connected External Safeguard Input

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Additional Joint Torque Monitoring

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Joint Position Limit

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Joint Speed Limit

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Speed Limit

---

Additional Force Limit

---

User Connected External Safeguard Input for Human-machine Safety Settings

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Robot E-Stop Output

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User Connected External Safeguard Output

---

Robot Human-Machine Safety Setting Output

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Robot Recovery Mode Output

---

Robot Moving Output

---

User Connected Enabling Switch Input

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User Connected E-Stop Input without Robot E-Stop Output

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Cartesian Limit A

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Cartesian Limit B

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**NEW** Robot Stick Enabling Switch

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**NEW** Reset Output

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**NEW** Robot Stick Reset

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**NEW** Enabling Switch on end-module

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**NEW** User Connected External Bumping Sensor Input

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**NEW** End-Point Reduced Speed Limit

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**NEW** User Connected MODE Switch Input

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**NEW** User Connected Reset Input

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**NEW** User Connected Soft Axis Setting Switch Input

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**NEW** Enabling Switch Output

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**NEW** MODE Switch Output

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**NEW** Safe Home Output

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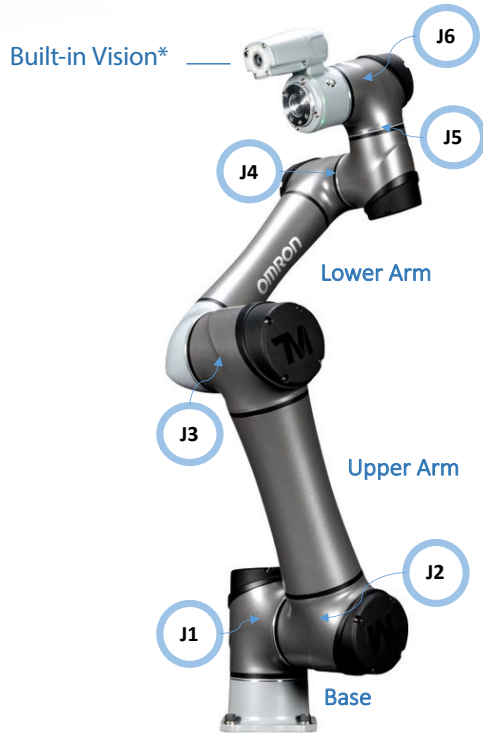
### Certifications:

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

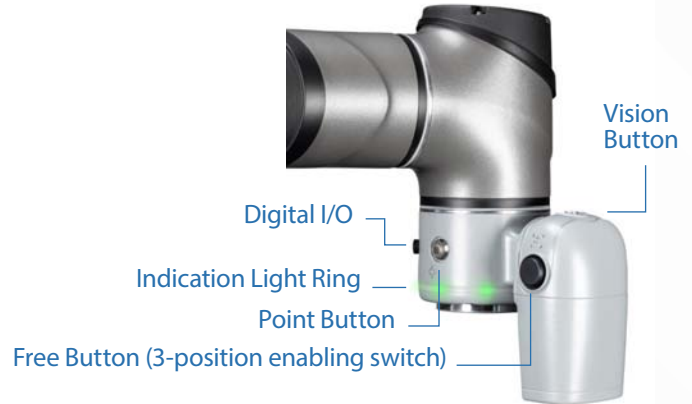
### Protections:

- 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

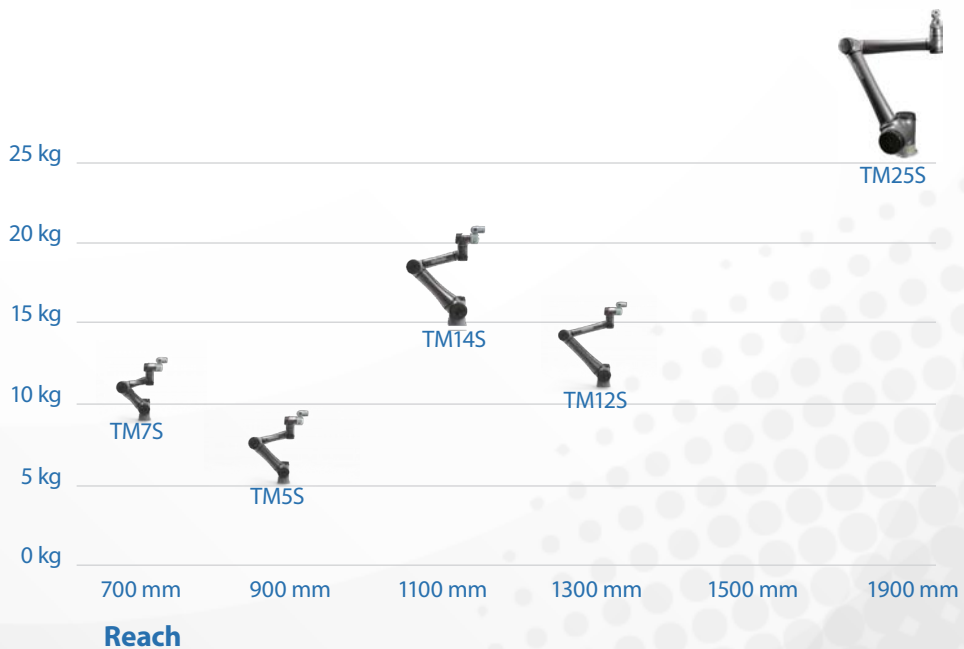
## Anatomy of OMRON TM S Series Cobot










\*Not available for non-camera version



### Maximum Payload



## OMRON S Series Cobots' Main Advantage

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

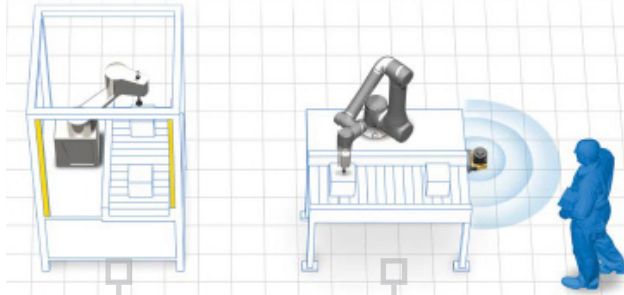


## Cobots vs. Industrial Robots

OMRON™ 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

Needs a physical barrier, such as a fence or cage, to ensure safety.

### OMRON Cobots

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.

<b>Safety</b>	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.
<b>Workspace</b>	Separated from human workspace.	Can be shared with people.
<b>Footprint</b>	Large	Small
<b>Flexibility</b>	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.
<b>Programming</b>	Difficult. Requires skill and training.	Easy. Can be done with minimal training.
<b>Setup</b>	Requires advanced skills and is time-consuming.	Quick and easy.
<b>Application</b>	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.
<b>Cycle Time (Pick &amp; Place)</b>	Down to seconds	Over 5 seconds
<b>Speed of Process (Path)</b>	Fast	Slow
<b>Repeatability</b>	+/- 0.02 mm	TM5S, TM7S, TM12S, and TM14S: +/- 0.03 mm TM25S: +/- 0.05 mm
<b>Environment</b>	IP requirements above IP54	IP54 for robot arm, AC control bo, Robot Stick, and TM Screen
<b>Process Complexity</b>	Can be complex	Should be simple

## Plug & Play

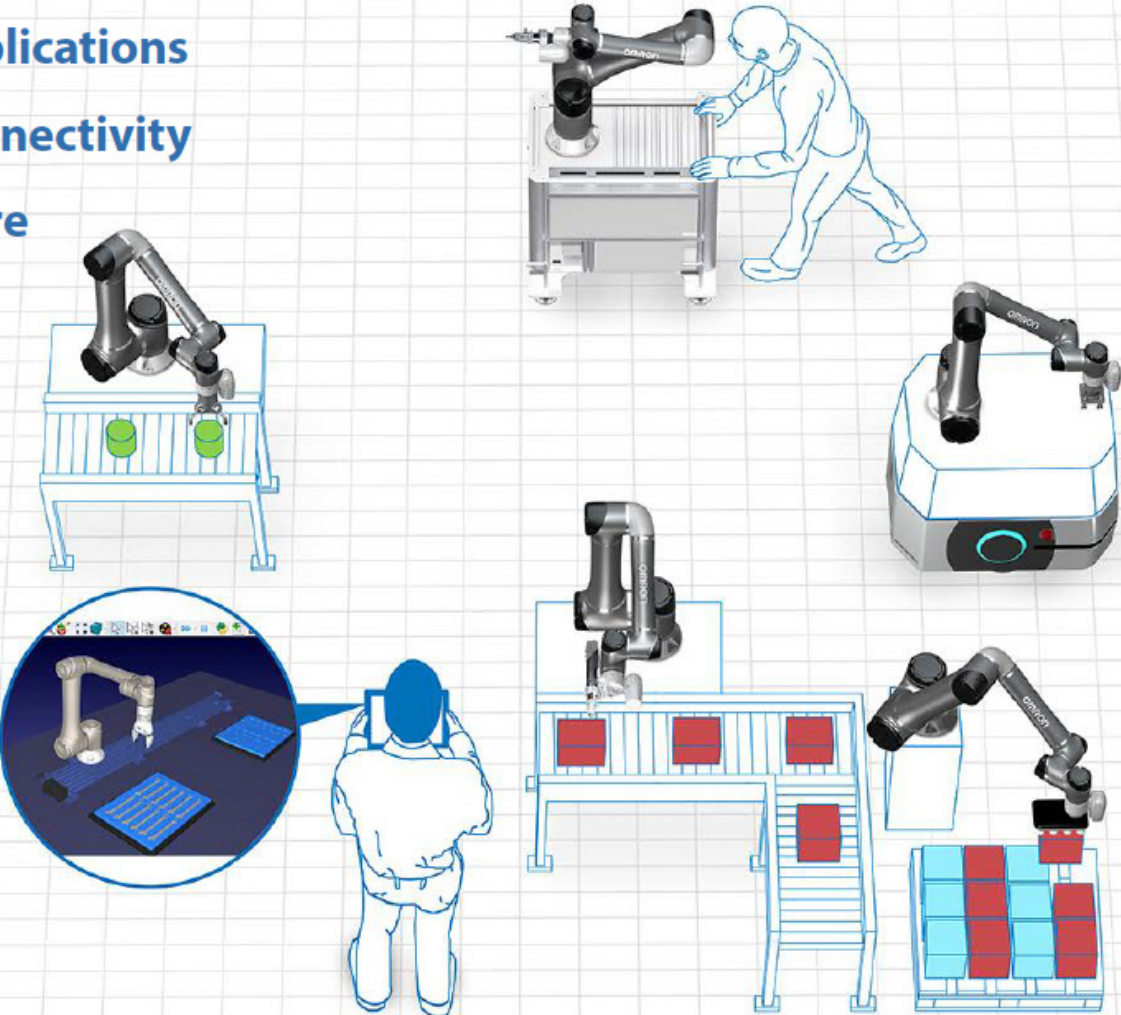
OMRON has partnered with a select number of companies to offer a wide variety of peripherals that quickly and easily integrate with our cobots, allowing for a faster deployment and return on investment. They are collectively referred to as Plug & Play devices and software, designed to serve a broad range 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
<b>Weight with camera</b>		23.9 kg	22.9 kg	23.5 kg	22.6 kg	81.6 kg
<b>Weight without camera</b>		23.6 kg	22.6 kg	33 kg	32.7 kg	813 kg
<b>Maximum payload</b>		5 kg	7 kg	12 kg	14 kg	25 kg
<b>Reach</b>		900 mm	700 mm	1300 mm	1100 mm	1902 mm
<b>Joint ranges</b>	<b>J1, J2, J4, J5, J6</b>	+/- 360°				
	<b>J3</b>	+/- 158°	+/- 152°	+/- 162°	+/- 159°	+/- 166°
<b>Joint speed</b>	<b>J1, J2</b>	180°/s		120°/s		100°/s
	<b>J3</b>	180°/s		180°/s		130°/s
	<b>J4</b>	225°/s		225°/s		195°/s
	<b>J5</b>	225°/s		225°/s		210°/s
	<b>J6</b>	450°/s		450°/s		225°/s
<b>Average speed*</b>		1.4 m/s	1.1 m/s	1.3 m/s	1.1 m/s	2.1 m/s
<b>Repeatability</b>		+/- 0.03 mm	+/- 0.03 mm	+/- 0.03 mm	+/- 0.03 mm	+/- 0.05 mm
<b>Degrees of freedom</b>		6 rotating joints				
<b>I/O ports</b>	<b>Control Box</b>	Digital In: 16 / Digital Out: 16 Analog In: 2 / Analog Out: 2				
	<b>Tool Con.</b>	Digital In: 3 / Digital Out: 3				
<b>I/O power supply</b>		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
<b>IP classification</b>		IP54 for Robot Arm, AC Control Box, Robot Stick and TM Screen				
<b>Cleanroom Class</b>		ISO Class 3				
<b>Operating Temperature and Humidity</b>		0 to 50°C, 85% max. (with no condensation)				
<b>Motor Power supply</b>		100-240 VAC, 50-60 Hz for AC units; 24 to 60 VDC for DC units				200-240 VAC (AC) 48-60 VDC (DC)
<b>I/O interface</b>		2×COM, 1×HDMI, 3×LAN, 2×USB2.0, 4×USB3.0				
<b>Communication</b>		RS232, Ethernet, Modbus TCP/RTU (master & slave) PROFINET (optional), EtherNet/IP (optional)				
<b>Programming environment</b>		TMflow, flowchart based and script based				
<b>Certification</b>		SEMI S2 (coming soon)		SEMI S2 (optional)		
<b>Robot vision</b>	<b>Eye in hand (built in)</b>	1.2M/5M pixels, color camera (camera models only)				Auto-focused color camera with 5M resolution, Working distance: 100 mm ~ ∞
	<b>Eye in hand (optional)</b>	Support Maximum 2 GigE 2D cameras				

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



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