

OMRON

OMRON TM Collaborative Robot S Series



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

OMRON TM S Series Robots

The OMRON TM Robot S Series includes a wide variety of models with reach and payload suitable for different applications, including the DC power mobile robot in both standard and compatible size.

All TM S Series units support Ethernet and Serial communication and includes the Modbus protocol for each. Our fieldbus unit also provides additional communication options, including PROFINET, EtherCAT and EtherNet/IP

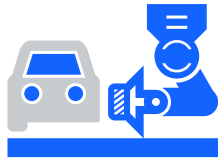
With 36 safety features, the OMRON TM S Series meets ISO 13849-1, Cat.3, PL d and ISO 10218-1 safety standards, certified by TUV Nord. The new OMRON TM S Series also comes with the UL/CSA certifications from SGS.



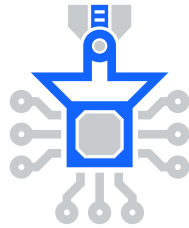
*With the PalletBoost 5 license, Omron now delivers enhanced payload performance for its heavy-payload cobot series, increasing capacity by 5 kilograms. This upgrade enables the TM25S and TM30S to handle up to 30 and 35 kg for specific movements, providing customers with greater flexibility, efficiency, and operational capability.

Target Industries

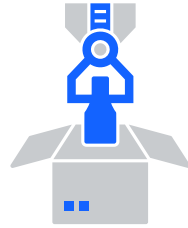
OMRON TM S Series Robots are designed for a wide variety of applications in a number of industries.



ENVIRONMENTAL
MOBILITY



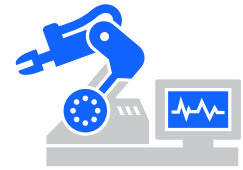
DIGITAL
DEVICES



FOOD &
COMMODITIES



MEDICAL



LOGISTICS

Target Applications



VISUAL INSPECTION

OMRON TM robots 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 robots 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 robot onto an OMRON LD or MD autonomous 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 robot tend CNC machines, injection molding machines, stamping and punch pressers, grinding, and cutting machines.



PACKAGING

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



PICK AND PLACE

Our robots 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 robots the ideal choice for nearly any application.

Ease of use

Improved hand guidance and next-generation teach pendant make programming the OMRON TM 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.



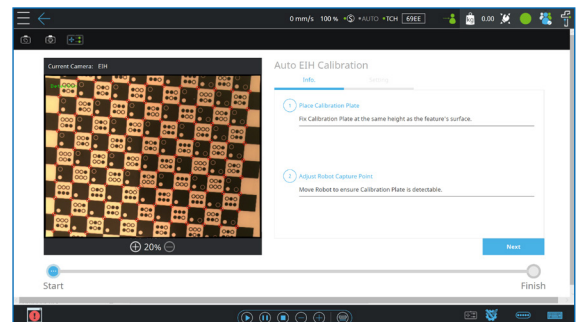
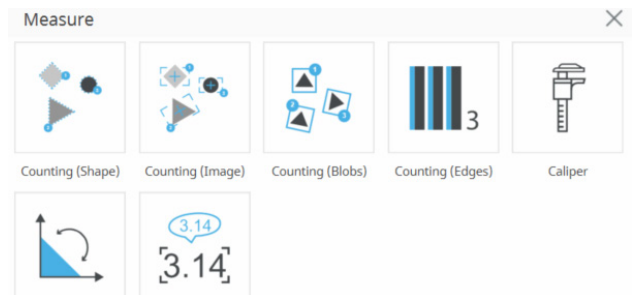
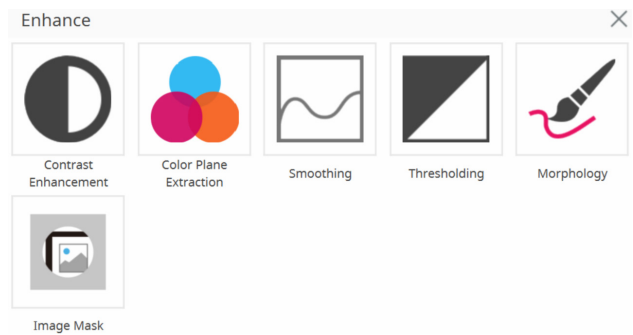
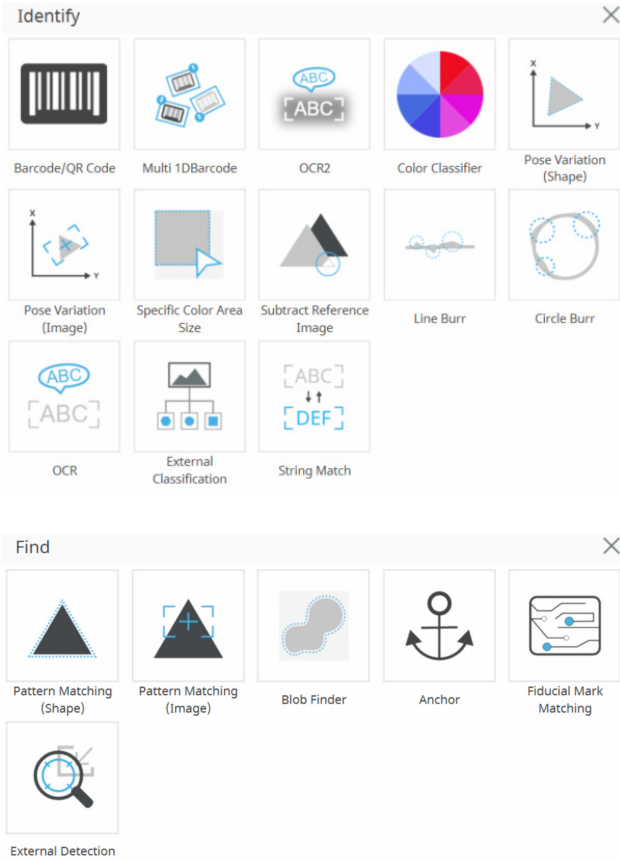
The new Robot Stick is designed to convert an **OMRON TM Screen** to a teaching pendant.

- Operate, control, and program the robot using a touch screen
- No wiring or additional chip installation required
- OMRON TM Pen comes standard with the OMRON TM S Series Robots

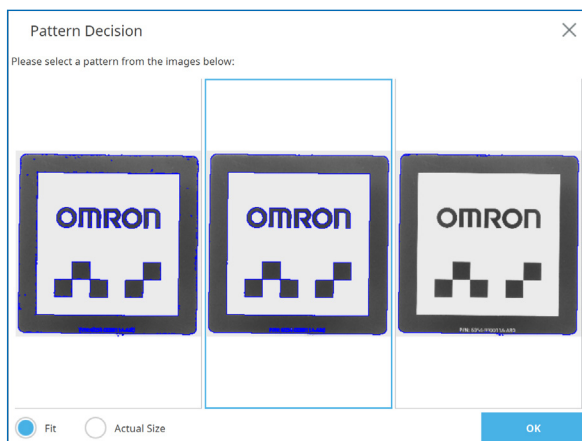


Built-In Vision System

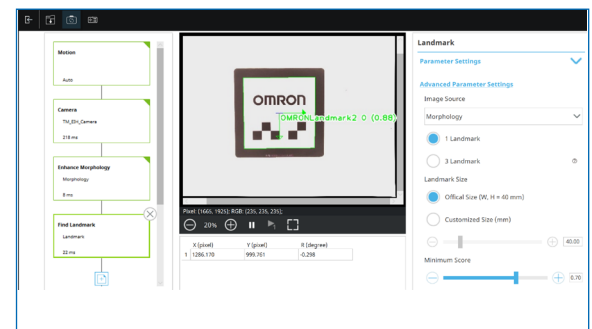
The integrated vision system is the biggest advantage of OMRON TM robots. It is designed for industrial grade pattern recognition, object positioning, and feature identification. Users can set up vision tasks for immediate deployment without the challenge of integrating external cameras or lighting equipment.



Vision Calibration



Pattern Matching Template



TMvision Workflow

TMflow Simulator

The new OMRON TMflow Simulator 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.

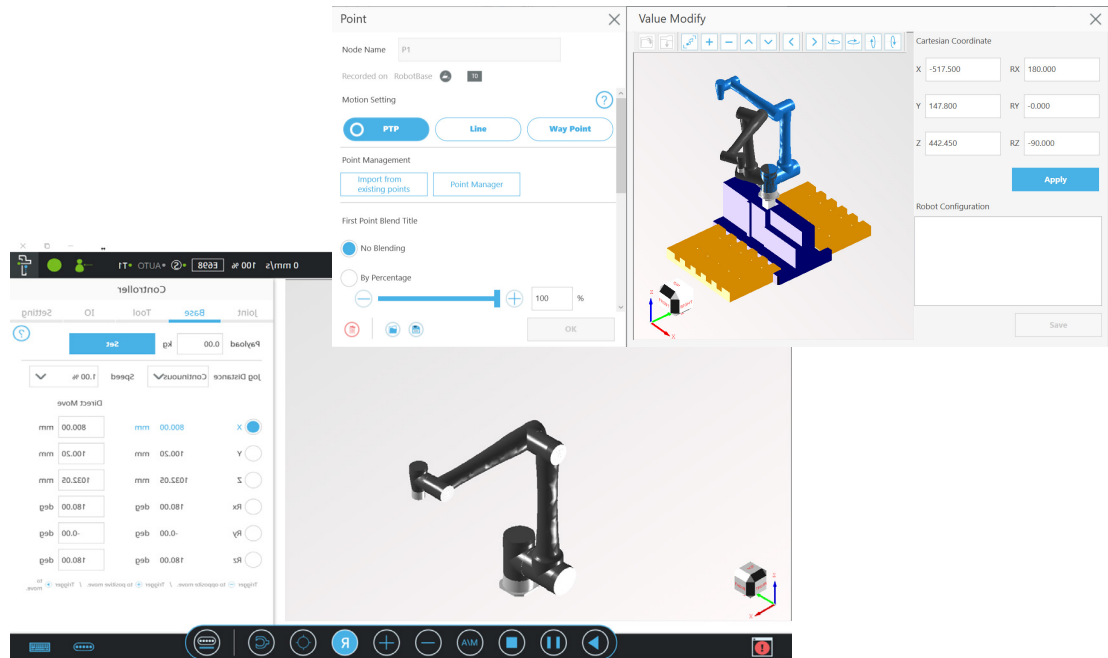
The onscreen display includes a virtual robot stick so users can control the robot just as they would control a physical robot. In addition to the standard robot control buttons, the virtual robot stick has buttons for RESET, Point, and Gripper.

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

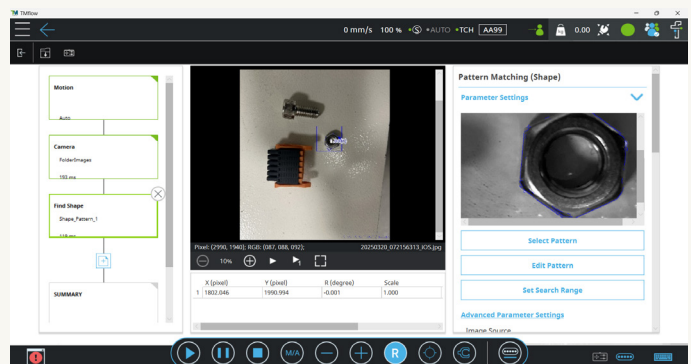
The TMflow Simulator also has options for DI and AI Signal Control Box Input Control.

This version of TMflow Simulator works with the following S Series Model robots (HW5.03):

- TM5S-X
- TM6S-X
- TM7S-X
- TM12S-X
- TM14S-X
- TM20S-X
- TM25S-X
- TM30S-X



Users can now edit and run inspection vision nodes directly within the TMflow Simulator. For image sources, users have the flexibility to use a real camera or to use images stored on a local drive. This allows for comprehensive development and testing of vision applications without requiring a physical robot.

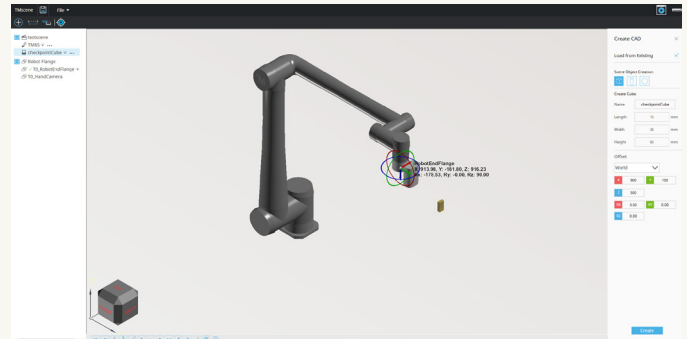


TMscene

Simulates and validates robot applications in 3D virtually. Allows for rapid hardware-less design of robot applications through import of 3D objects and scenes to model workspace. When the TMflow Simulator is launched, the TMscene server starts automatically.

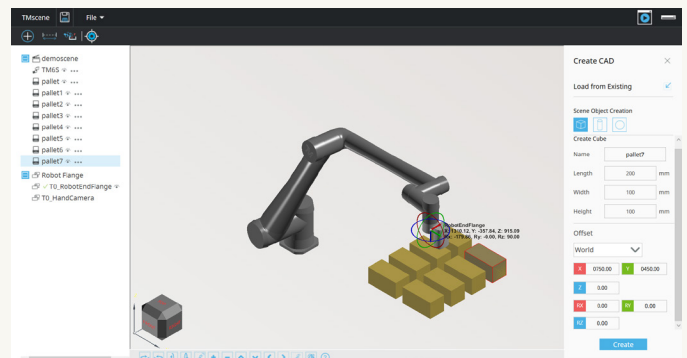
New 6D Handguideball

- Provides precise manual control and real-time virtual robot feedback, along with object name, reference base, and full coordinate details.



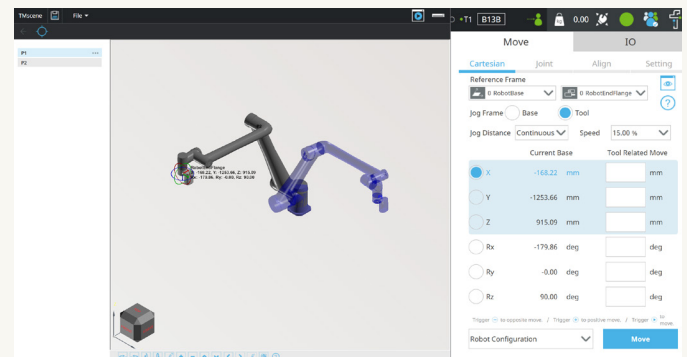
CAD Model Import and Basic 3D Object Creation

- Imports CAD models and creates basic 3D shapes for more flexible scene building.



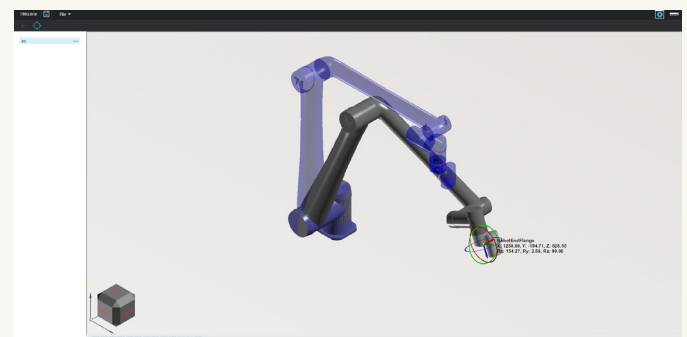
Cartesian or Joint Page Controller

- Provides fine control over virtual robot movement and posing for more precise adjustments.



Teaching and Viewing Points

- Allows users to define points in virtual space and check for possible robot motion collisions in conjunction with imported 3D CAD scenes.



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

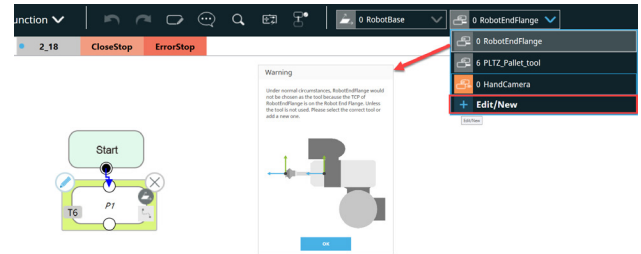
- The new Singularity Handling feature improves the robot's behavior by purposefully slowing down at the point of singularity and avoiding joint speed errors and sudden stops. This feature can be enabled for Point and Move nodes that use Line motions. Motion blending will be disabled when Singularity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

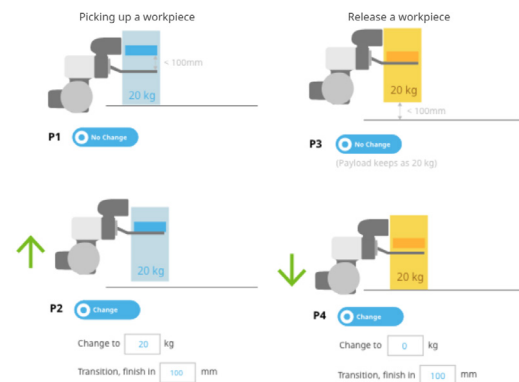
Pattern-Matching UI Improvement

- 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.



Payload

The payload transition function is designed to solve the payload transient changes while robot picking up/releasing a workpiece. It requires to set one additional motion node before fully picking up or fully release the workpiece, the following figures show the example configuration of picking up and release.



Condition

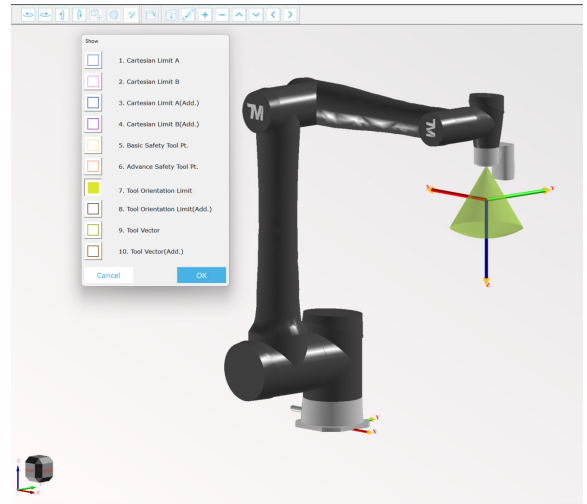
Picking up unknown payload	While picking up an unknown payload object, the payload value and payload transition will be handled from the sensor.	
Releasing unknown payload	While releasing an unknown payload object, the payload value and payload transition will be handled from the sensor.	

Note: The mass center frame w.r.t the robot end flange frame should be properly set in the Tool Setting page if the payload is changed.

Safety Features and Improvements

Safety Tool Orientation Limit

- Users can set constraints on their desired tool orientation range using the Tool Orientation Limit (SF31) function in the soft axis safety settings. This feature continuously monitors a user-specified safety tool vector within a user-configurable restriction cone. If the safety tool vector exceeds the bounds of this restriction cone, a Category 2 Stop will be initiated, ensuring operational safety.

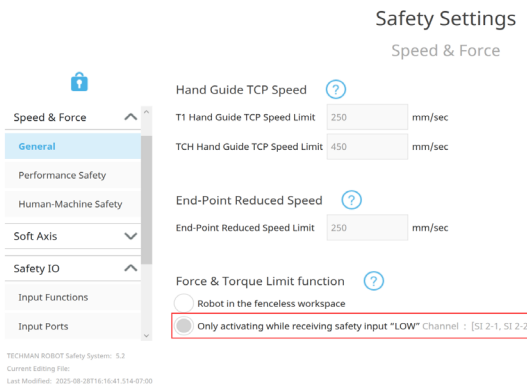


User-Connected Freebot Input

- SF32-User Connected Freebot Input, which allows for users to hand guide the robot from an external device such as a customer end effector with its own Freebot button attached.

Mute Force & Torque Limits via Safety Input

- Provides a means for users to mute the force and torque limit function through a safety input. Users can determine the areas or conditions in which the robot should monitor force and torque limits, ensuring alignment with the integration scenario and proper risk assessment.



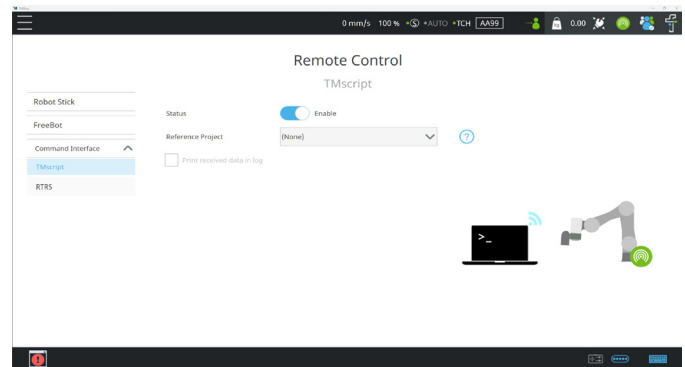
Safety Output

- Communicates STO and SOS safety states to external devices for better visibility.

Remote Controls Improvements

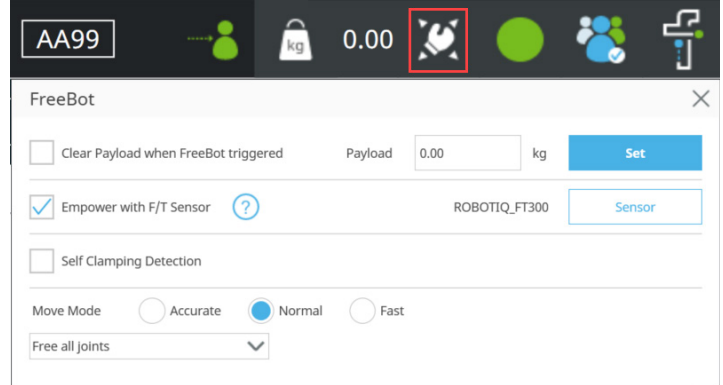
Remote Control via TMscript

- Users can now enable complete remote control from an external device through TMscript. This feature functions similarly to the Listen node, but it is managed through the remote control settings of TMflow. Furthermore, both TMscript and RTRS have been incorporated into the Remote Control/Command Interact page, providing comprehensive tools for remote operations.



Real-Time Remote Server

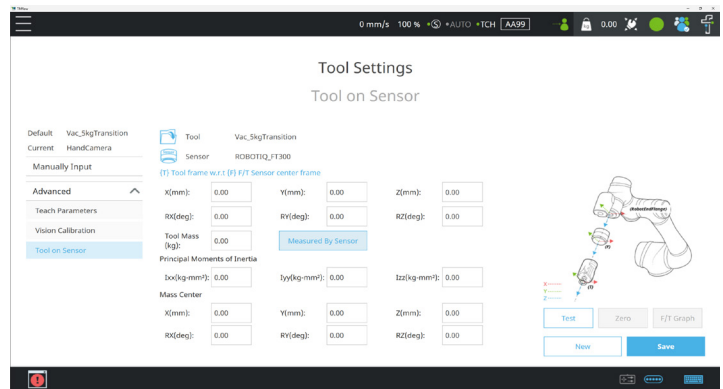
- Users can now remotely exchange robot data and control robot motion in real-time. The Real-Time Remote Server (RTRS) has been integrated into the real-time operating system, enabling it to effectively process both data exchange and motion commands. Users can configure the RTRS in TMflow to allow up to three connections to external devices from data exchange and up to one external device for complete motion control.



Force Torque (F/T) Sensor Improvements

Force Sensor Hand-Guide Function

- Users can now empower hand-guiding by using feedback from a force sensor installed on the robot's end flange. When this setting is activated and a force sensor is selected, the robot will automatically apply force compensation during hand-guide mode, providing a more intuitive and responsive FreeBot experience.

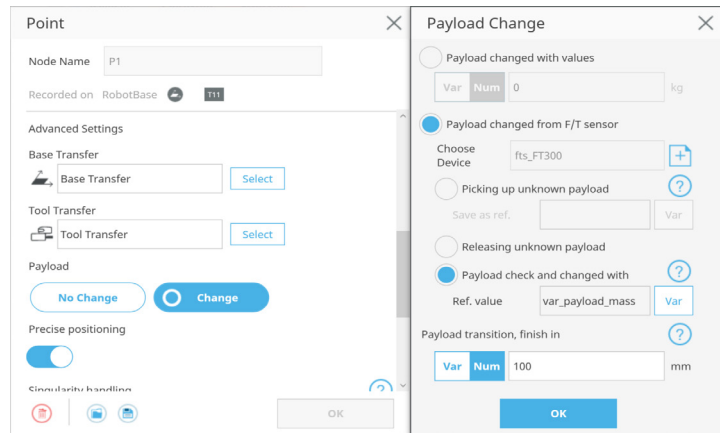


Tool Measured by F/T Sensor

- Robots that are equipped with a F/T sensor can now automatically calculate the tool's mass properties based on feedback from the sensor. This will allow customers to have a rough estimate for tools with an unknown weight and mass center frame.

Payload Diagnosis by Force Sensor

- In the Payload settings of motion nodes, users can now verify whether the payload matches the users expected value. Specifically, the system now includes a function to verify whether the payload measured by the F/T sensor matches the user-defined expected payload after the payload transition distance. This function is designed to assist users in confirming the successful pickup or release of a workpiece.



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

- 36 Safety features in total
- 17 Newly added safety features

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

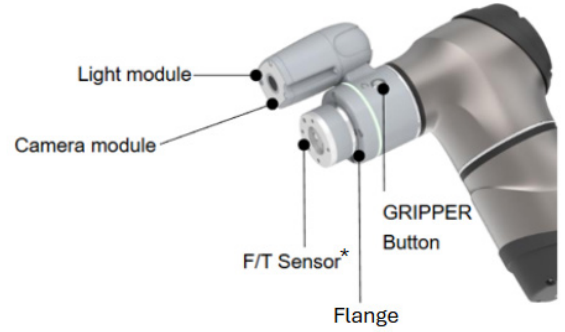
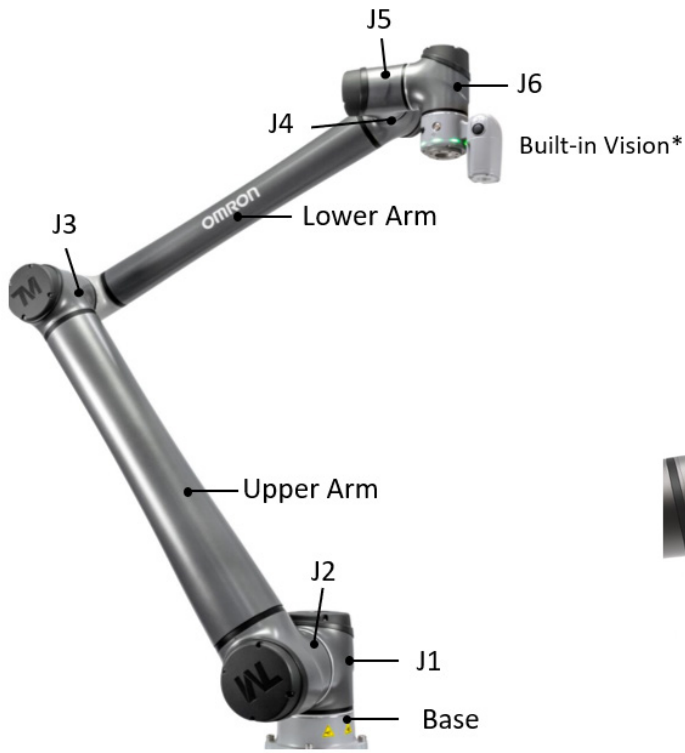
Certifications:

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

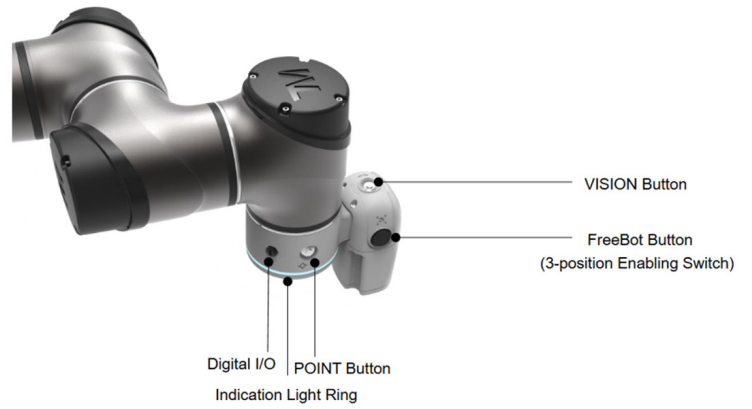
Protections:

- IP65 rating for Robot Arm, IP54 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 Robots

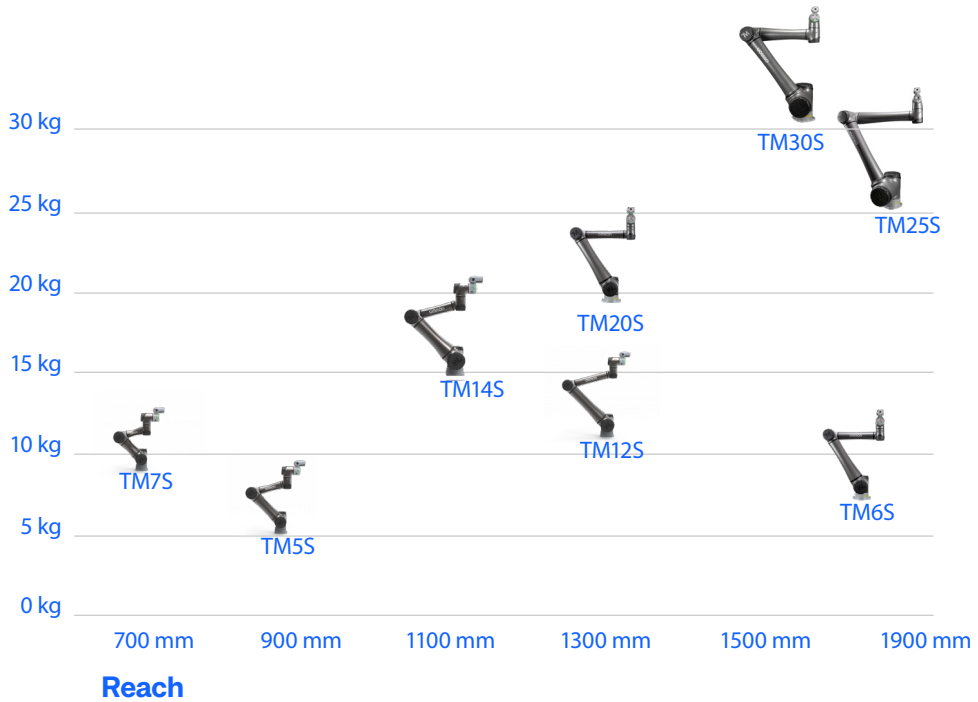


*F/T Sensor is only available for HW5.03 TM25S and TM30S Units



*Not available for non-camera version

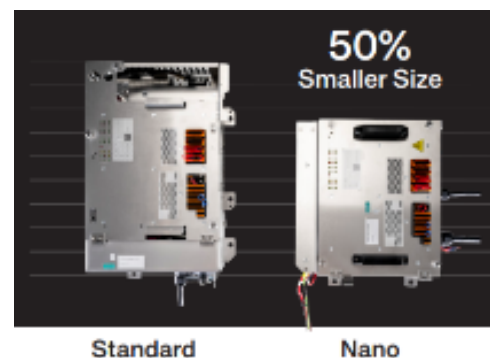
Maximum Payload



OMRON S Series

	Payload	A wide range of payload options from 5 kg up to 30 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*
	Flexibility	Two DC control box sizes for easy integration into a variety of applications
	Ingress Protection Level	IP65: Robot Arm IP54: AC Control Box, Robot Stick, TM Teach Pendant
	Anti Cutting Oil Corrosion	Anti Cutting Oil for the Corrosion: Enhanced joint covers for TM5S/TM6S/TM7S/TM12S/TM14S/TM20S. Metal Joint covers for TM25S and TM30S
	Safety	36 Safety features; PLD Cat.3, TÜV Nord certified CE SGS certified UL/CSA

*Based on the comparison between the HW5.0 TM12S unit and the HW3.2 TM12 unit.



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

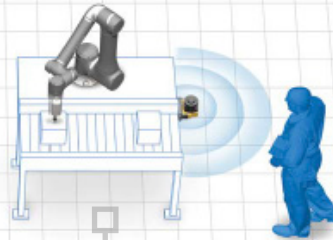
- Requires cage
- Multiple sensors required for safety



Traditional Industrial Robots

Collaborative Robot

- Smaller footprint
- No physical barriers



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, TM20S, TM25S, TM30S: ± 0.05 mm, TM6S ±0.1
Environment	IP requirements above IP54	IP65 for Robot Arm. IP 54 for AC control box, Robot Stick, and TM Screen
Process Complexity	Can be complex	Should be simple

Plug & Play

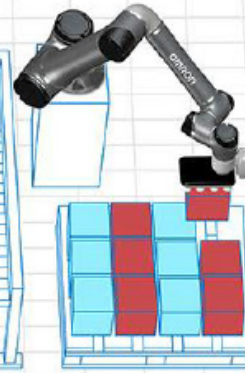
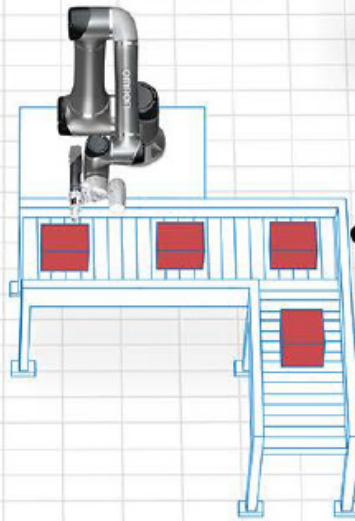
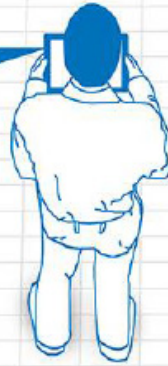
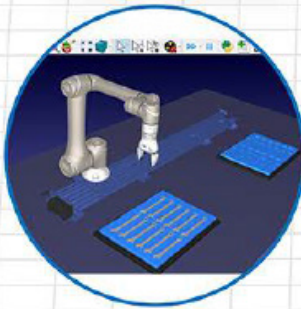
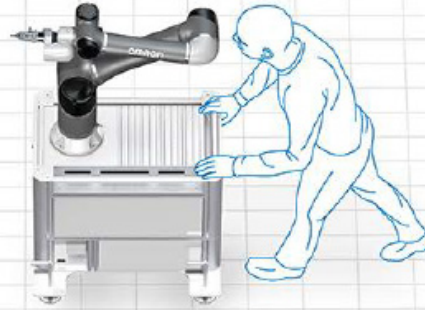
OMRON has partnered with a select number of companies to offer a wide variety of peripherals that quickly and easily integrate with our cobots, allowing for a faster deployment and return on investment. They are collectively referred to as Plug & Play devices and software, designed to serve a broad range 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	TM6S	TM7S	TM12S	TM14S	TM20S	TM25S	TM30S	
Weight with camera		23.9 kg	35.5 kg	22.9 kg	23.5 kg	22.6 kg	33.3 kg	81.6 kg	80.6 kg	
Weight without camera		23.6 kg	35.2 kg	22.6 kg	33 kg	32.7 kg	33.0 kg	81.3 kg	80.3 kg	
Control Box Weight, AC unit / DC		13.5 / 8.9 kg						17.5 / 11.7 kg		
Maximum payload		5 kg	6 kg	7 kg	12 kg	14 kg	20 kg	25 kg	30 kg	
Reach		900 mm	1800 mm	700 mm	1300 mm	1100 mm	1300 mm	1902 mm	1702 mm	
Joint ranges		± 360°								
J1, J2, J4, J5, J6										
J3		± 158°	± 166°	± 152°	± 162°	± 159°	± 162°	± 166°	± 170°	
J1						130°/s		100°/s		
J2		210 °/s	130 °/s	210 °/s	130°/s		95 °/s			
J3						210 °/s		130°/s		
J4		225°/s					160/s		195°/s	
J5							190/s		210°/s	
J6		450°/s*5					225°/s*5			
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	± 0.1 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								
IP classification		IP65 for Robot Arm, IP54 for Control Box*3, Robot Stick and TM Screen								
Cleanroom Class		ISO Cleanroom 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, 50/60 Hz (AC) 48-60 VDC (DC)		
I/O interface		2 COM, 1 HDMI, 3 LAN, 2 USB2.0, 4 USB3.0								
Communication		RS-232/RS-422/RS-485, Ethernet, Modbus TCP/RTU (master & slave), PROFINET (optional), EtherNet/IP (optional)								
Programming environment		TMflow (flowchart based), TMScript (script-based), TMCraft (developer-based)								
Certification		TÜV-certified ISO 13849-1, ISO 10218-1, ISO/TS 15066, UL1740, CAN/CSA Z424-14 (R2019), SEMI S2 (optional)								
Positioning Accuracy		2D Positioning: 0.1 mm **4 (camera models only)								
Robot vision		Eye in hand (built in)		1.2MP / 5MP, color camera (camera models only)						
		Eye in hand (optional)		Support Maximum 2 GigE 2D cameras						
Force x-y-z (TM25S/30S)		Range		± 300 N						
		Precision		2% full scale						
		Accuracy		5.5% full scale						
Torque x-y-z (TM25S/30S)		Range		± 30 Nm						
		Position		0.3% full scale						
		Accuracy		5% full scale						

*1. The weight indicated applies to robots with no option. The weight for the fieldbus option will be 0.02 kg heavier than that of the standard unit. The weight of the DC SEMI S2 option for the TM5S/6S/7S/12S/14S units is 9.9 kg.

*2. Average speed is determined for each robot by performing a large linear motion at full project speed and default acceleration with no payload.

*3. The AC Control Box has an IP54 rating. The DC Control Box is not IP rated.

*4. The data in this table are measured by TM laboratory and the working distance is 100 mm. It should be noted that in practical applications, the relevant values may be different due to factors such as the on-site ambient light source, object characteristics, and vision programming methods that will affect the change in accuracy. methods that will affect the change in accuracy.

*5 The TM20S AC unit has a J6 joint speed of 450°/s while the TM20S DC unit has a J6 joint speed of 225°/s



OMRON

Cat. No. I892-E-07 (5/26)

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