Omron TM Collaborative Robots

OMRON

Omron TM Collaborative Robots

Omron's lineup of collaborative robots includes a variety of models to guarantee the right reach and payload capacity for different applications, including mobile robot-compatible (DC) versions.

ISO 10218-1 ISO/TS 15066 ISO 13849-1

Designed to meet safety regulations ISO 10218-1 (including TS 15066) and ISO 13849-1.

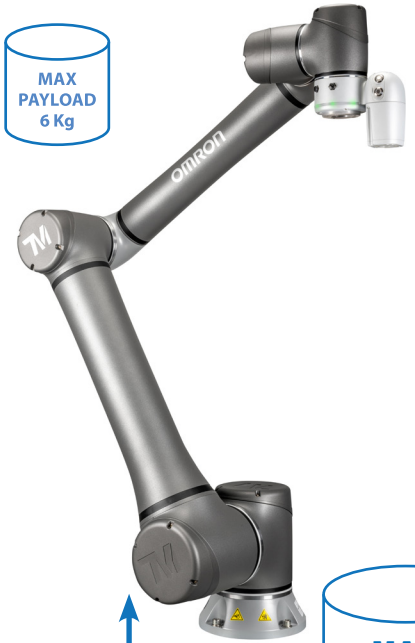
TM 5-900
Reach: 900 mm
MAX PAYLOAD 4 Kg

TM 5-700
Reach: 700 mm
MAX PAYLOAD 6 Kg

TM12
Reach: 1300 mm
MAX PAYLOAD 12 Kg

TM14
Reach: 1100 mm
MAX PAYLOAD 14 Kg

TM16
Reach: 900 mm
MAX PAYLOAD 16 Kg



TM20
Reach: 1300 mm
MAX PAYLOAD 20 Kg

Omron TM Collaborative Robots

The Omron TM Collaborative Robot is available in a variety of special models suited for specific applications and operational environments:

SEMI-S2 Rated

Designed for semiconductor manufacturing and material handling to ensure the safety of the equipment.

Integrated Fieldbus

Enabled for EtherNet/IP or PROFINET communication

Mobile (DC) Power Supply

Includes a 22-60 VDC power supply to enable the integration with mobile robots for fully autonomous machine tending and logistics handling applications

Food-Grade Grease

Features H1 rated grease sealed in the actuators allows the Omron TM Cobot installation in environments with incidental food contamination risk

Mobile (DC) Power Supply
Omron TM Cobot mounted on a Mobile Robot

Food Grade Grease
Omron TM Cobot

Key industries and applications

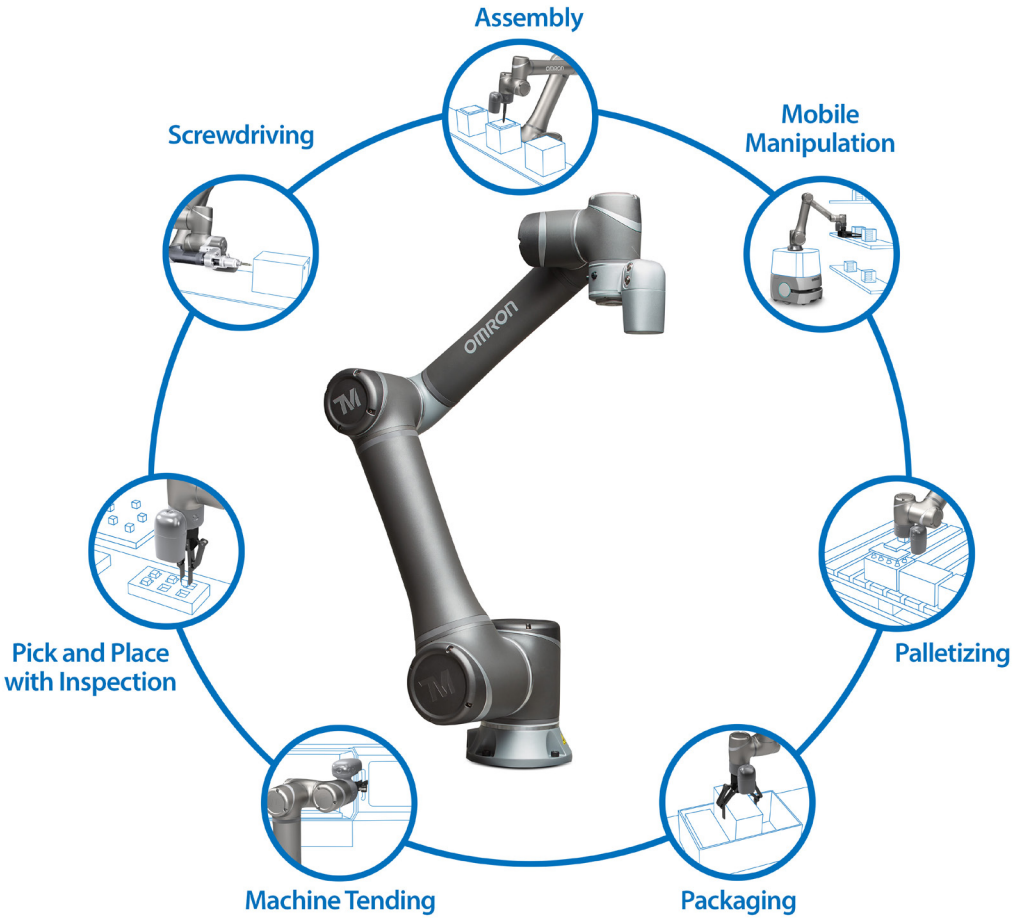
Omron TM Collaborative Robots are designed for a wide variety of applications in a number of industries.

Key Industries

Automotive

Food & Commodities

Digital & Semiconductor



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 mobile robot automates not only materials transport, but also complicated picking operations.

Palletizing:

Our space-saving cobots can streamline end-of-line case stacking onto a pallet. With built-in vision, cases can be sorted by barcode or other visual indication.

Packaging:

Our cobots can inspect and sort products, before putting them into cases. Customers can quickly adapt production lines to new products or seasonal models.

Machine Tending:

A cobot can be used to tend CNC machines, injection molding machines, stamping and punch pressers, grinding, and cutting machines, relieving workers from repetitive and dangerous work.

Pick and Place with Inspection:

Our cobots feature a built-in vision system that allows for easy pick-and-place together with sophisticated inspection, without the need for installing additional cameras or lighting equipment.

Screwdriving:

Our cobots add precision and consistency to your screwdriving and parts fastening applications. A complete ready-to-use solution is provided with a screwdriving kit and pneumatic control box.

Easy to use

With graphical programming, hand guidance, and intelligent vision, Omron TM cobots are designed to be easy and intuitive. Customers can set up simple applications in just a few minutes.

Hand Guidance

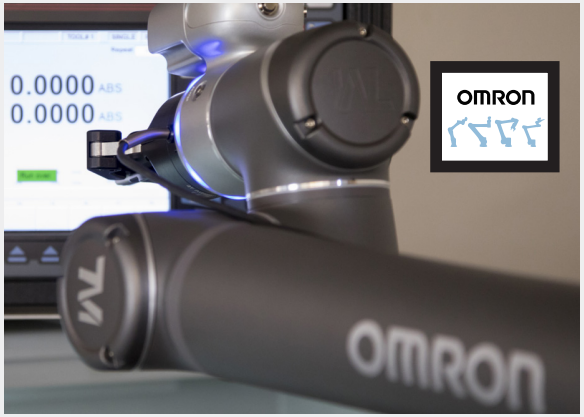
Hand guidance mode allows users to easily set points and assign tasks to the robot. With buttons built into the cobot arm, users can guide the robot into position and automatically record the position in the software.

ISO/TS 15066 Oriented Safety Settings

Our unique patented “body region safety settings” have preset safety parameter values, based on TS 15066 and robot kinematics. There is no need to understand complicated safety calculations to set up a safe application.

Intelligent Vision

Our built-in vision system allows for quick setup of pick-and-place tasks, with the help of easy hand guiding and landmark positioning.

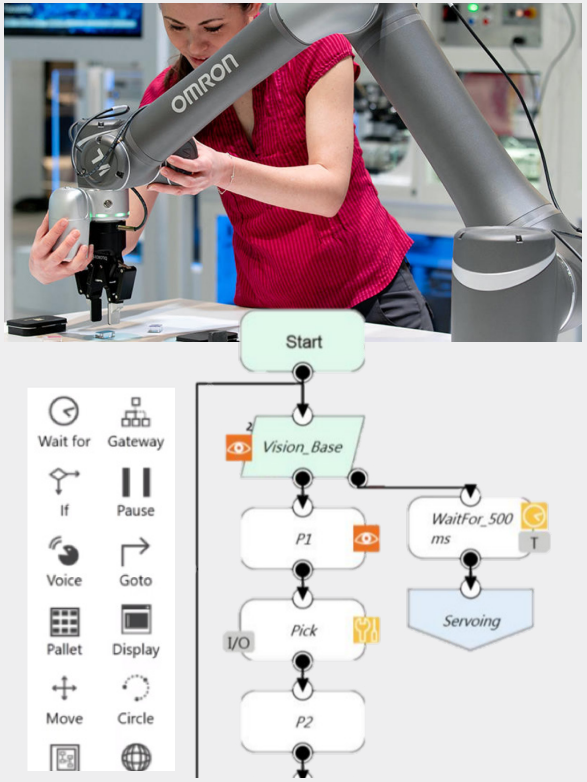


Landmark

A landmark is a physical object that can be recognized by the robot’s built-in camera, and acts as a beacon to help the robot navigate. The robot uses a Landmark as a reference point so it can better locate objects within the workspace. During high-mix, low-volume production with quick changeovers, customers can redeploy the robot without spending time to recalibrate the vision system.

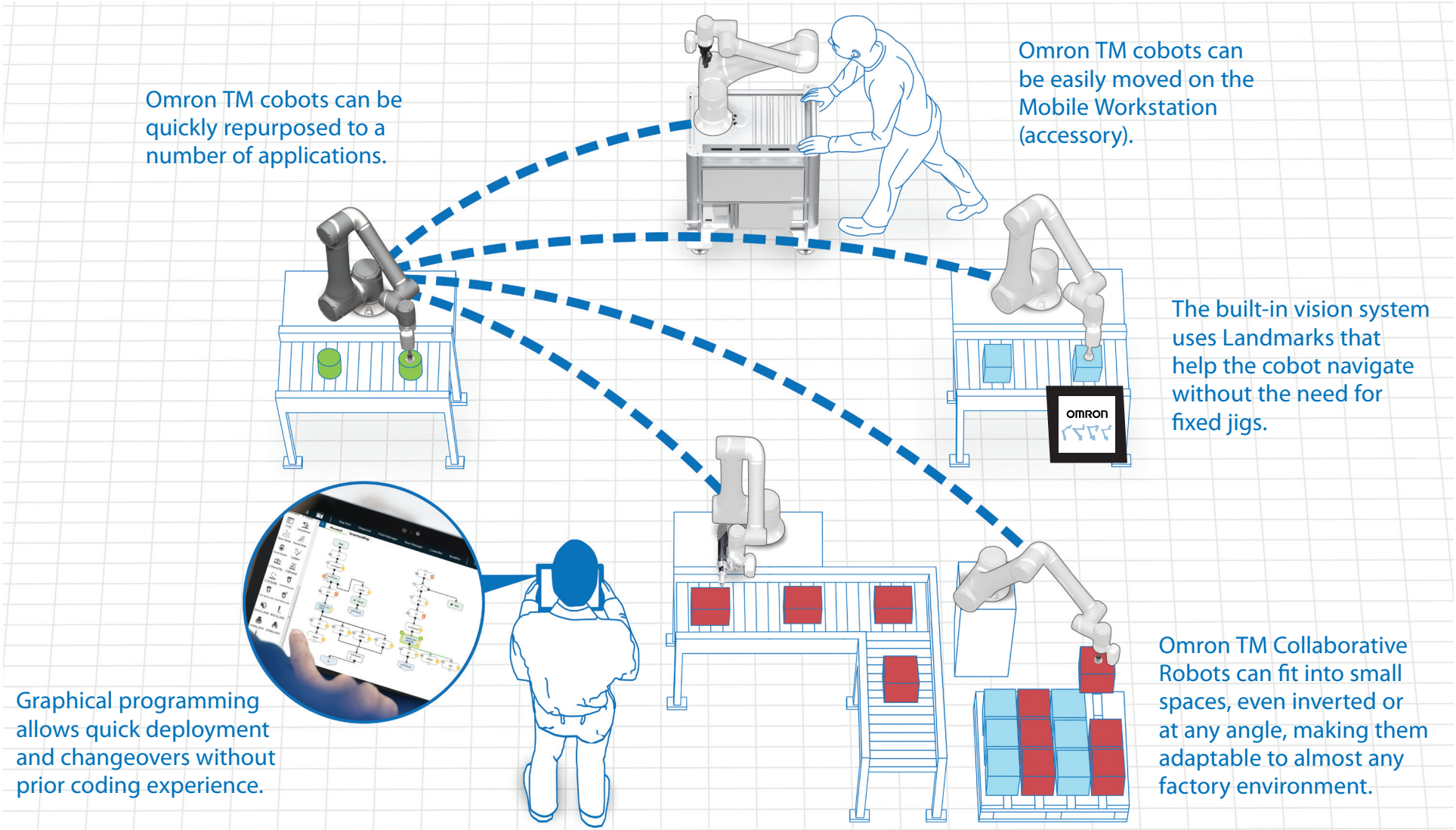
Graphical Programming

Intuitive programming allows users to automate a task with flow-based software, creating full workflows with a click-and-drag method.



Designed for flexible manufacturing

Omron TM Collaborative Robots are designed to be easily redeployed to different tasks and applications, making production as flexible as needed.



Built-In Vision

Users can set up vision tasks for immediate deployment without going through complex steps of integrating external cameras or lighting equipment. For even greater utility, users can choose to add up to two optional external cameras to best suit their unique application needs.

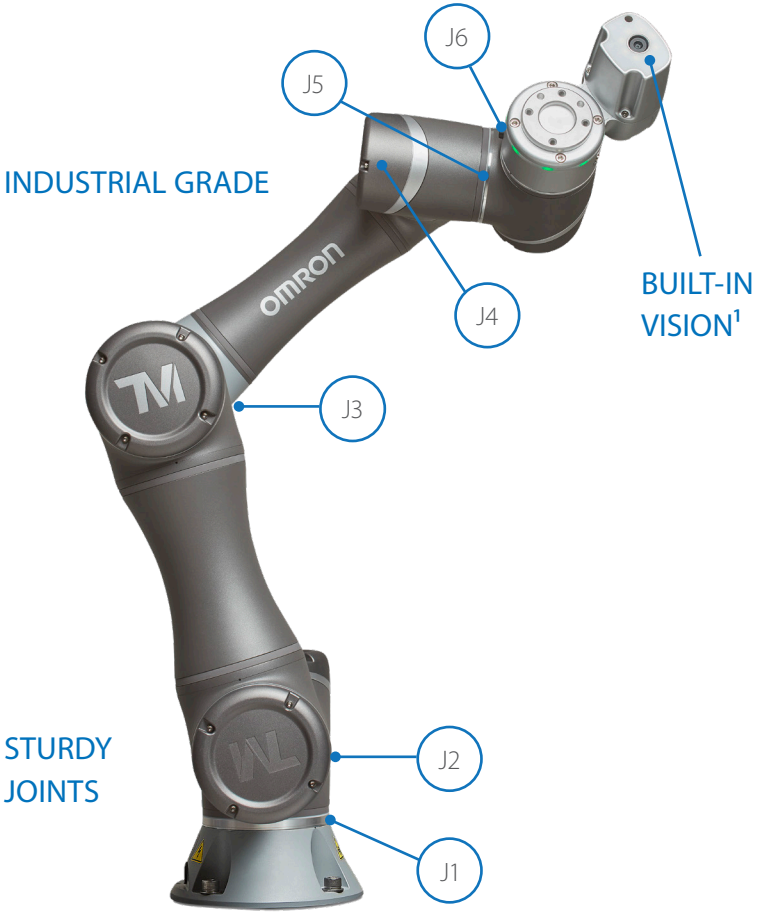
Standard Vision Package

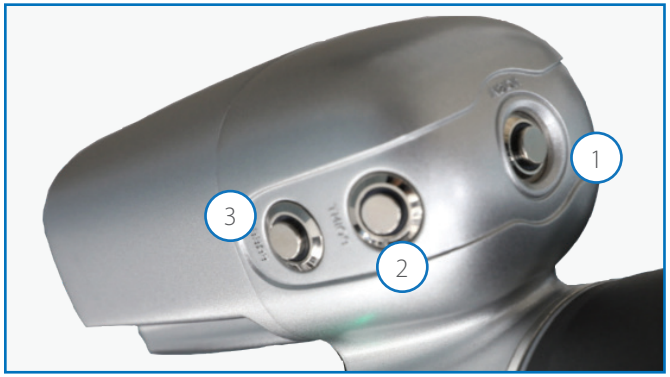
- Contrast Enhancement
- Pattern Matching (Shape)
- Barcode QR Code
- Color Plane Extraction
- Pattern Matching (Image)
- Color Classifier
- Smoothing
- Blob Finder
- String match
- Thresholding
- Anchor
- Morphology
- Fiducial Mark Matching
- Flip

Optional Vision Package

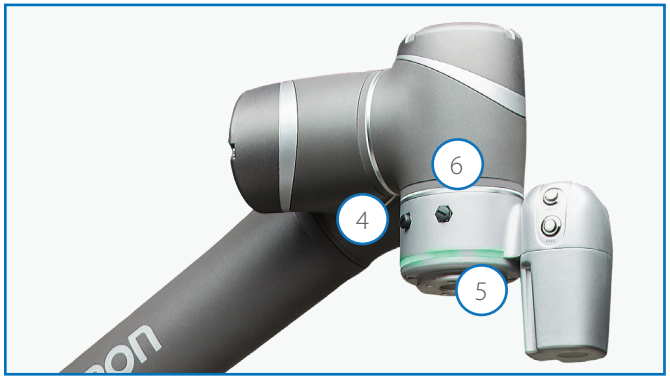
- Pose Variation (Shape)
- Counting (Blobs)
- Line Burr
- Gauge (Distance & Angle)
- Pose Variation (Image)
- Counting (Shape)
- Circle Burr
- OCR (Number)
- Specific Color Area Size
- Counting (Image)
- OCR (Letter)
- Subtract Reference Image
- Counting (Edges)

Anatomy of an Omron TM Cobot

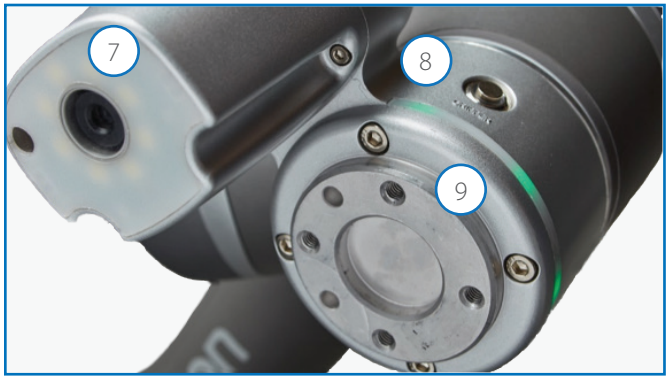




1. VISION button teaches vision tasks and task sequences
2. POINT button records position in cobot program
3. FREE button allows hands-on teaching



4. Analog I/O port
5. Indicator light ring shows robot status
6. Digital I/O port



7. Built-in camera with integrated light
8. Gripper button
9. End-of-arm tooling flange

1. No-camera version is available on request.

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.

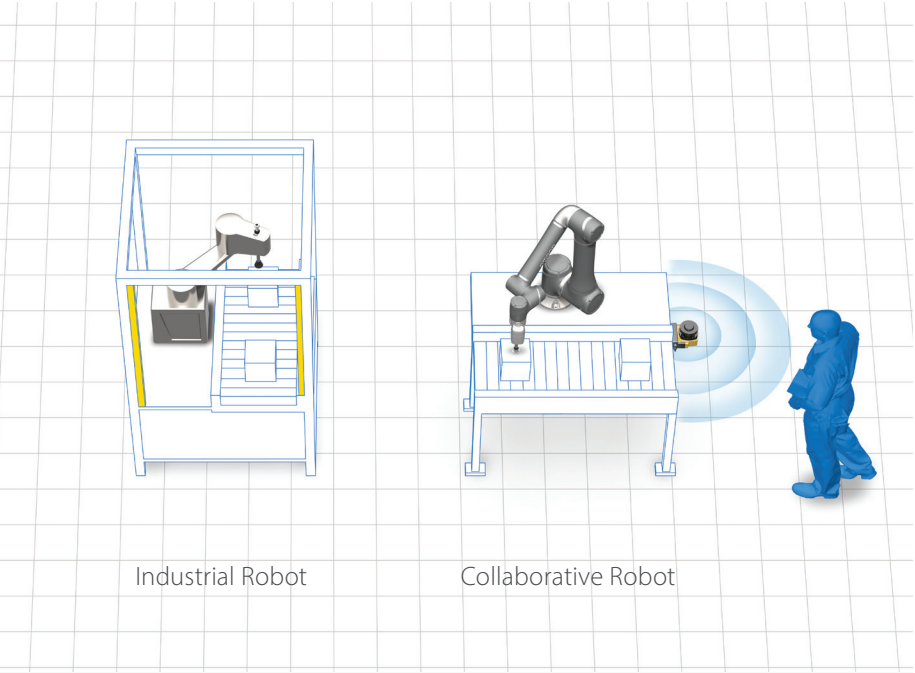
Plug & Play Categories

Plug & Play Kits

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

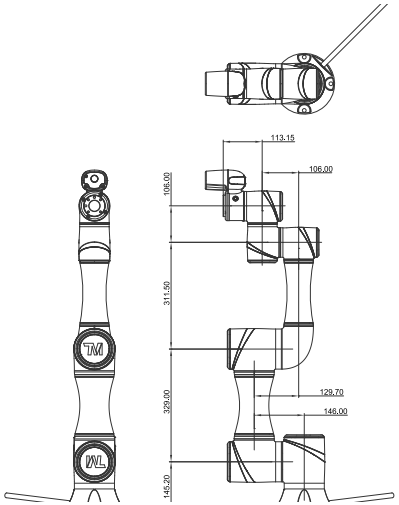
Choosing Cobots vs. Industrial Robot

Collaborative Robots have changed the way the traditional factory used to work. Designed to "collaborate" with people, cobots offer users a safe and easy to use feature set that can eliminate physical cages as well as the need for highly trained robot programmers.

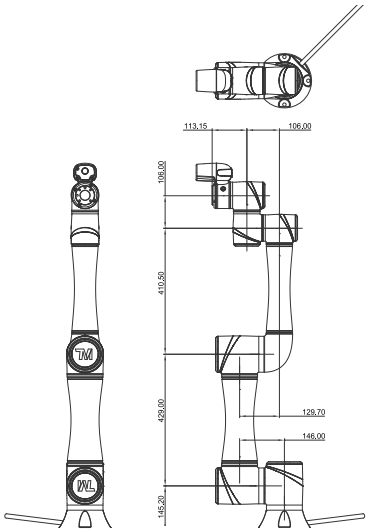


Traditional Industrial Robots		Omron Cobots
Safety	Needs a physical barrier, such as a fence or cage, to ensure safety.	Designed to be inherently safe but may need safety sensors to ensure that the application is safe (e.g. Omron safety laser scanner) based on risk assessment. Typically does not need physical barrier if working in collaborative mode. Software safety setting is easy with 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)	Below 8.2 m/s	Below 1.4 m/s
Repeatability	+/- 0.02 mm	+/- 0.05 mm
Environment	IP requirements above IP54	IP54 (robot arm), IP32 (control box)
Process Complexity	Can be complex	Should be simple

Technical Data
TM5



TM5-700



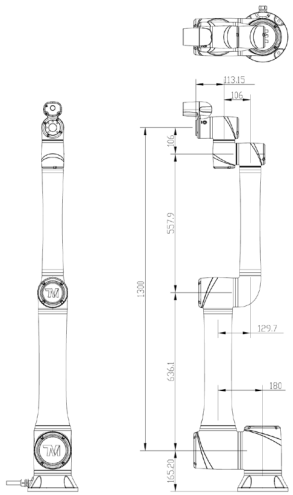
TM5-900

1. No-camera version available on request.

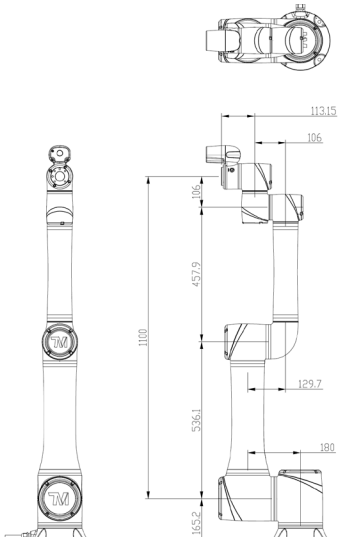
TM5 Specifications

Model		TM5-700	TM5-900	TM5X-700	TM5X-900
Weight		22.1kg	22.6kg	21.8kg	22.3kg
Maximum Payload		6kg	4kg	6kg	4kg
Reach		700mm	900mm	700mm	900mm
Typical Speed		1.1m/s	1.4m/s	1.1m/s	1.4m/s
Joint ranges	**J1,J6**	+/- 270°	+/- 270°	+/- 360°	+/- 360°
	J2,J4,J5	+/- 180°	+/- 180°	+/- 360°	+/- 360°
	J3	+/- 155°			
Speed	**J1~J3**	180°/s			
	J4~J6	225°/s			
Repeatability		+/- 0.05 mm			
Degrees of freedom		6 rotating joints			
I/O ports		**Digital in**	**Digital out**	**Analog in**	**Analog out**
	Control Box	16	16	2	1
	Tool	4	4	1	0
I/O power supply		24V 2.0A for control box and 24V 1.5A for tool			
IP classification		IP54 (Robot Arm); IP32 (Control Box)			
Power consumption		Typical 220 watts			
Temperature		The robot can work in a temperature range of 0-50°C			
Power supply		100-240 VAC, 50-60 Hz or 22-60 VDC			
I/O Interface		3×COM, 1×HDMI, 3×LAN, 4×USB2.0, 2×USB3.0			
Communication		RS232, Ethernet, Modbus TCP/RTU (master & slave), Optional EtherNet/IP or PROFINET			
Programming Environment		TMflow, flowchart based			
Certification		CE, SEMI S2 (optional)			
Robot Vision					
Eye in Hand (Built in)		1.2M/5M pixels, color camera		N/A	
Eye to Hand (Optional)		Support Maximum 2 GigE cameras			

Technical Data TM12/14



TM12



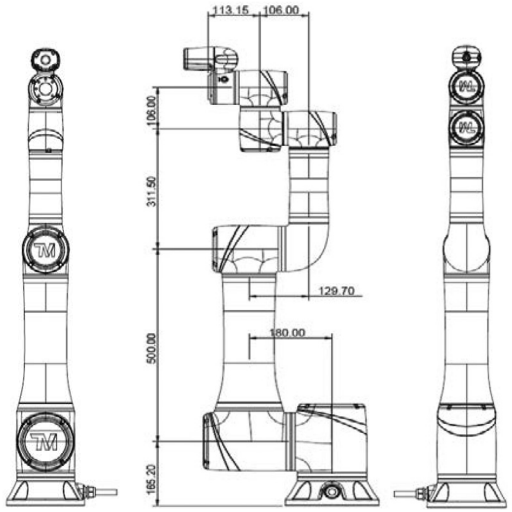
TM14

1. No-camera version available on request.

TM12/14 Specifications

Model		TM14	TM12	TM14X	TM12X
Weight		32.6Kg	33.3Kg	32.3Kg	33Kg
Maximum Payload		14kg	12kg	14kg	12kg
Reach		1100mm	1300mm	1100mm	1300mm
Typical Speed		1.1m/s	1.3m/s	1.1m/s	1.3m/s
Joint ranges	J1,J6	+/- 270°	+/- 270°	+/- 360°	+/- 360°
	J2,J4,J5	+/- 180°	+/- 180°	+/- 360°	+/- 360°
	J3	+/- 163°	+/- 166°	+/- 163°	+/- 166°
Speed	J1~J2	120°/s			
	J3	180°/s			
	J4~J5	150°/s	180°/s	150°/s	180°/s
	J6	180°/s			
Repeatability		+/- 0.1 mm			
Degrees of freedom		6 rotating joints			
I/O ports		**Digital in**	**Digital out**	**Analog in**	**Analog out**
	Control Box	16	16	2	1
	Tool	4	4	1	0
I/O power supply		24V 2.0A for control box and 24V 1.5A for tool			
IP classification		IP54 (Robot Arm); IP32 (Control Box)			
Power consumption		Typical 220 watts			
Temperature		The robot can work in a temperature range of 0-50°C			
Power supply		100-240 VAC, 50-60 Hz or 22-60 VDC			
I/O Interface		3×COM, 1×HDMI, 3×LAN, 4×USB2.0, 2×USB3.0			
Communication		RS232, Ethernet, Modbus TCP/RTU (master & slave), Optional EtherNet/IP or PROFINET			
Programming Environment		TMflow, flowchart based			
Certification		CE, SEMI S2 (optional)			
Robot Vision					
Eye in Hand (Built in)		1.2M/5M pixels, color camera		N/A	
Eye to Hand (Optional)		Support Maximum 2 GigE cameras			

Technical Data
TM16



TM16

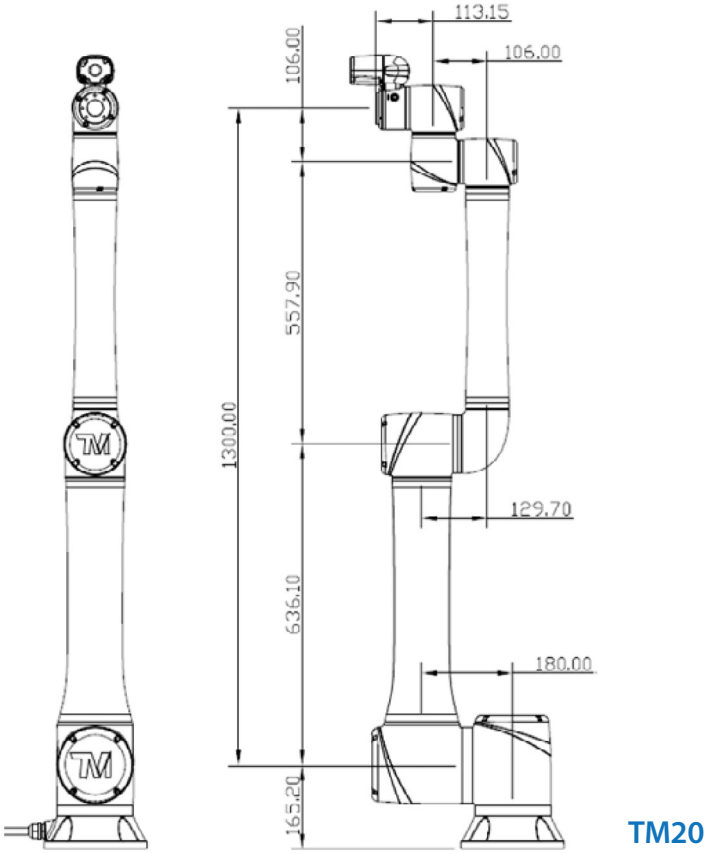
TM16 Specifications

Product Name		TM16		TM16X	
Power Source		AC	DC	AC	DC
Weight (kg)		32		32	
Controller Weight (kg)		14.1		14.1	
Max Payload (kg)		16			
Reach (mm)		900			
Mounting		Wall, Table, Ceiling			
Typical Speed (m/s)		1.1			
Joint Ranges	Joint 1	+/- 270°		+/- 360°	
	Joint 2,4,5	+/- 180°		+/- 360°	
	Joint 3	+/- 155°			
	Joint 6	+/- 270°		+/- 360°	
Joint Speeds	Joint 1,2	120°/s			
	Joint 3-6	180°/s			
Repeatability (mm)		+/- 0.1 mm			
Ingress Protection		IP 54 (robot arm), IP 32 (control box), IP 40 (robot stick)			
Cleanroom Class		ISO Class 3			
Operating Temperature & Humidity		0 to 50°C, 85% max (with no condensation)			
Storage Temperature & Humidity		-20 to 60°C, 75% max (with no condensation)			
Operating & Storage Environment		No corrosive gases or exposure to water-soluble cutting oil			
Motor Power Supply		110 to 240 VAC 50/60 HZ	22 to 60 VDC	110 to 240 VAC 50/60 HZ	22 to 60 VDC
Robot Arm Cable Length		3 m	1.5 m	3 m	1.5 m
I/O ports		**Digital in**	**Digital out**	**Analog in**	**Analog out**
	Control Box	16	16	2	1
	Tool Conn.	4	4	1	0
Communication		RS232, Ethernet, Modbus TCP/RTU (master & slave), PROFINET (optional), EtherNet/IP (optional)			
I/O Power Supply		24 VDC 2.0 A(control box), 24 VDC 1.5A(tool)			
Programming Environment		TMFlow, flowchart based			
Integrated Camera Available		5M Pixels, color	5M Pixels, color	None	None
SEMI S2 Certification[2] Available		No	Yes	No	No

[1] If water-soluble cutting oil is present, use a protective sleeve to prevent damage to the robot housing.

[2] SEMI (Semiconductor Equipment and Materials International) is the central global network of manufacturers of micro and nano electronics that issues safety guidelines. SEMI S2 is the most well-known standard in semiconductor manufacturing equipment for Environmental, Health, and Safety (EHS).

Technical Data TM20



TM20

TM20 Specifications

Product Name		TM20		TM20X	
Power Source		AC	DC	AC	DC
Weight (kg)		33		33	
Controller Weight (kg)		14.1		14.1	
Max Payload (kg)		20			
Reach (mm)		1300			
Mounting		Wall, Table, Ceiling			
Typical Speed (m/s)		1.3			
Joint Ranges	Joint 1	+/- 270°		+/- 360°	
	Joint 2,4,5	+/- 180°		+/- 360°	
	Joint 3	+/- 166°			
	Joint 6	+/- 270°		+/- 360°	
Joint Speeds	Joint 1,2	90°/s			
	Joint 3	120°/s			
	Joint 4	150°/s			
	Joint 5	180°/s			
	Joint 6	225°/s			
Repeatability (mm)		+/- 0.1 mm			
Ingress Protection		IP 54 (robot arm), IP 32 (control box), IP 40 (robot stick)			
Cleanroom Class		ISO Class 3			
Operating Temperature & Humidity		0 to 50°C, 85% max (with no condensation)			
Storage Temperature & Humidity		-20 to 60°C, 75% max (with no condensation)			
Operating & Storage Environment		No exposure to corrosive gases or liquids			
Motor Power Supply		110 to 240 VAC 50/60 HZ	24 to 60 VDC	110 to 240 VAC 50/60 HZ	24 to 60 VDC
Robot Arm Cable Length		3 m or 12 m	1.5 m	3 m or 12 m	1.5 m
I/O ports		**Digital in**	**Digital out**	**Analog in**	**Analog out**
	Control Box	16	16	2	1
	Tool Conn.	4	4	1	0
I/O Interface		COM: 3, HEMI: 1, LAN: 3, USB2.0: 4, USB3.0: 2			
Communication		RS232, Ethernet, Modbus TCP/RTU (master & slave), PROFINET (optional), EtherNet/IP (optional)			
I/O Power Supply		24 VDC 2.0 A(control box), 24 VDC 1.5A(tool)			
Programming Environment		TMFlow, flowchart based			
Integrated Camera Available		5M Pixels, color	5M Pixels, color	None	None
SEMI S2 Certification[2] Available		No	Yes	No	No

[1]SEMI (Semiconductor Equipment and Materials International) is the central global network of manufacturers of micro and nano electronics that issues safety guidelines. SEMI S2 is the most well-known standard in semiconductor manufacturing equipment for Environmental, Health, and Safety (EHS).

Global Network

For decades, Omron's safety services have been the partner of choice of global brands and machine manufactures in automotive, food and beverage, consumer electronics and cosmetics industries. Our expertise in industrial, mobile, and collaborative robotics combined with 85+ years of experience in industrial automation gives us unparalleled expertise in safety.

Risk Assessment Service

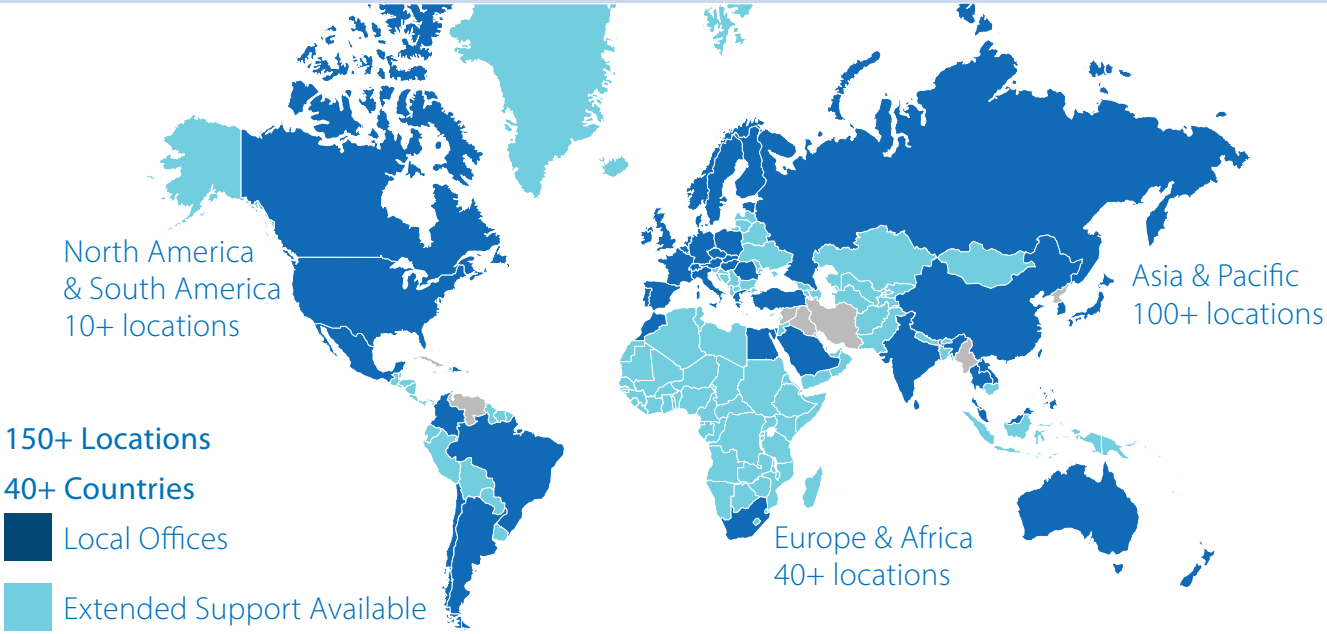
Omron's Risk Assessment Service helps customers mitigate potential safety hazards before deploying a robotics solution. Our functional safety engineers bring unrivaled expertise to work with customers onsite, to identify relevant standards and requirements for human-machine interaction.

We offer:

- Support with process analysis, identification of application use cases, tasks, and potential collision points.
- Risk, compliance, and conformity assessment according to latest industry standards.
- Risk reduction strategies with a focus on shared human-robot workspace and end-effector design.

Training

We provide strategic training programs On-demand (Virtual) or in person to customers get the most out of your new robot systems. Our courses include programming of collaborative robot applications and it is applied to all level of users, from beginners to advanced.



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