



Omron TM5 Cobot & Vision Station

Omron TM5 collaborative robot on mobile chassis with light beacon and worktop

Description of the technological support

The Omron TM5 Cobot & Vision Station is an industrial training system for implementing a 6-axis collaborative robot with machine vision.

This system integrates an **Omron TM5** 6-axis collaborative robot (4Kg load - 900mm radius - 5MPix colour camera at the end of the arm) with its controller and control box. The system is fully secured (collaborative robot) and can be used to implement practical activities based on collaborative industrial robotics.

The Omron TM5 Cobot & Vision Station can be used for training in collaborative robotics.

Two experimental environments are proposed :

- ✓ Parts for **clip and glue simulation** projects
- ✓ Parts for **2D and pick-and-place** projects

But the open character of the station allows it to be adapted to many other scenarios.

The **numerous options** (safety laser scanners, 3D camera, grippers, project parts) allow the development of a **complete educational approach to robotics and vision**.

All references are listed on the last page.

This **robotic** system, designed in the spirit of **Industry 4.0**, meets the main requirements for intelligence and the evolution of production methods:

- ✓ **Scalability & Flexibility** with the possibility to assign the station to different uses within the workshop
- ✓ **IoT & Communications** with Omron TM5 industrial robot and 2D (Basic) or 3D (Optional) cameras

This training system is mainly intended for **industrial maintenance, robotics & automation activities**.

The main reference is :

- ✓ **ON00: Omron Cobot & Vision Station: Omron TM5 4kg R900 collaborative robot with on-board camera on a height-adjustable mobile chassis with light beacon and removable work surface**

This product is accompanied by a technical and educational file in digital format.

Highlights of the Omron TM5 Cobot & Vision Station

- ✓ Real industrial system with modern technologies (collaborative robotics, 2D/3D vision, ...)
- ✓ **Production flexibility**: station can be assigned to different tasks
- ✓ **Simplicity of programming of collaborative robots**
- ✓ Omron TM robots are widely used in industry.

CAP CIP - Bac PRO PLP / MELEC / MSPC
BTS CRSA / Electrical engineering / MS
IUT - Universities - Engineering schools

Main themes

Industrial Maintenance
Multi-technology Systems Design
Industrial Automation and Robotics

Themes
"Industry 4.0"
addressed

Scalability & Flexibility

Customisation

Simplified programming

Digital twin

Mobile Robotics

Collaborative Robotics

Efficient Actuators

CAPM & CMMS

Digital instructions & MES

Quality control "online".

Vision & Smart Sensors

IOT & Communications

Big Data, AI & Predictive Maintenance

Augmented reality

Virtual reality

Additive manufacturing for tooling...



ON00: Omron TM5 Cobot & Vision Station with height-adjustable frame and removable tray





6-axis collaborative robot sub-assembly (ON00)

It consists mainly of:

- ✓ A 6-axis industrial collaborative robot with a 900mm radius of action and a maximum load of 4kg (Omron TM5)
- ✓ A 5MPix colour camera integrated at the end of the robot arm
- ✓ A robot controller
- ✓ A robot control box
- ✓ A set of software for controlling and programming the robot
- ✓ Various accessories (USB restoration key, etc.)

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Chassis and work table sub-assembly (In ON00)

It consists mainly of :

- ✓ A frame made of aluminium profiles with height adjustment of the robot's position and its work surface
- ✓ A removable, scalable worktop for the robot
- ✓ A lighted beacon
- ✓ An electrical cabinet with **protection, power supply** and space available to accommodate other electrotechnical components depending on the project (PLC, Dimmer, etc.)

The following can be added to this frame

- ✓ The set of two laser scanners for safe management of travel speeds (Ref: UR11)
- ✓ The FRL when using pneumatic grippers (Ref: UR16)

Option UR14: 3D camera at the end of the robot arm for 3D uncoiling

This option allows jars, boxes or loose objects to be captured in 3D in a carton. In addition to the ability to work in 3D, the advantage of this structured light solution is that it is not affected by light conditions and works even under changing and difficult conditions.



Options UR16 "Vacuum and air grippers (UR16 only) and FRL

This sub-assembly allows the gripping of parts (jars, cans, prisms...) on the work table and allows the deposit of these parts in mini-stores... It is supplied with a suction cup, the pneumatic distributor, the vacuum generator with vacuum switch, the air treatment unit (FRL) and, in a pneumatic clamp with parallel jaws (8 mm stroke and 30N clamping capacity).



Options ON18 Suction cup gripper and Schmalz on-board autonomous vacuum generator for Omron TM Cobot Station

This sub-assembly allows the gripping of parts (jars, cans, prisms...) on the work tray and allows the deposit of these parts in vertical mini-stores or on the conveyor belt for evacuation... It consists of several suction cups and an autonomous OnRobot vacuum generator.



Option ON17: OnRobot RG2 Collaborative Electric Gripper for Omron TM Cobot Station

The RG2 gripper is an end-of-arm collaborative tool designed for seamless integration with the leading brands of collaborative robotic arms. Some technical features and benefits:

- ✓ No external cables
- ✓ Adjustable gripping force from 3 to 40N
- ✓ Adjustable gripping distance from 0 to 110mm
- ✓ Absolute reading of the width in mm, without initialisation
- ✓ Grip status indications
- ✓ Automatic depth compensation
- ✓ Automatic calculation of payload and tool centre point (PCO)
- ✓ Multi-position mounting bracket
- ✓ Customisable fingertips



Option UR11: Two laser scanners for safe management of travel speeds

This option allows for the implementation of a laser scanner safety system that will slow down the robot as an operator approaches it.

It is a solution that is widely used in collaborative robotics, as it combines operator safety with speed of movement. A tutorial on the safety of collaborative robotic cells is provided.



Educational activities

The Omron TM5 Cobot & Vision Station allows educational activities of :

- ✓ Discovering and getting to grips with the system
- ✓ Study of a robotic workstation, ergonomics, robot and actuator sizing...
- ✓ Commissioning and validation of operation
- ✓ Adjustment and parameterisation of the various components
- ✓ Programming the Omron robot and the vision, safety and gripping devices
- ✓ Diagnosis
- ✓ Enhanced maintenance with new features
- ✓ Safety of collaborative robotic cells (Risk analysis, Scanners configuration...)
- ✓ Design and manufacture of 3D printing robot tools

Practical work available

- TP1: Bases and tools for 6-axis robot trajectories
- TP2: Creation of a cycle on a 6-axis robot
- TP3: Vision-based detection in a robotic application
- TP4: Study of a robotized station
- TP5: Safety and risks on Universal Robots

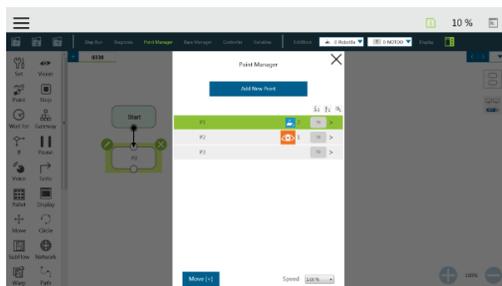


Installation features

- ✓ ON00: Dimensions (WxDxH): 1300x710x1800 mm
- ✓ Weight: 120kg
- ✓ Power supply: 230 V single phase (P + N + T)

Software tools

The Omron TM5 Cobot & Vision Station is supplied with the **Omron TMFlow software suite** needed to implement the robot and the application programs. TMFlow offers graphical or scripted programming modes in robot connection or offline



References "Equipment"

- ✓ **ON00**: Cobot & Vision Station "Omron TM5" Lite: Omron TM5 4kg R900 collaborative robot with on-board camera on a height-adjustable mobile chassis with light beacon and removable work surface
- ✓ **UR11**: Laser Scanners option for safe management of travel speeds, for Cobot & Vision Station
- ✓ **UR14**: 3D camera option at the end of the robot arm for 3D uncoiling, for Cobot Station.
- ✓ **UR16**: "Vacuum and air grippers and FRL".
- ✓ **ON17**: OnRobot RG2 Collaborative Electric Gripper Option for Omron TM Cobot & Vision Station
- ✓ **ON18**: OnRobot suction cup gripper and autonomous on-board vacuum generator option for Omron TM Cobot & Vision Station
- ✓ **RK11**: Parts for robotic clip and glue simulation projects
- ✓ **RK12**: Parts for 2D and pick-and-place projects

Diota" Augmented Reality Scenario available



From the CAD/PLM tool (Solidworks Composer) to the industrial maintenance RA scenario job card
DF10: Industrial augmented reality solution DIOTA Tablet