

Demag Robot DR 7.. CNC

Linear robots at a glance
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General technical specification

With its DR7..CNC Demag Robot series of linear robots, Demag Plastics Group provides customers with an attractive, technically advanced, high-performance solution for a whole array of different automation tasks surrounding the direct production environment of injection moulding machines, such as parts removal, insertion, handling and downstream production sequences.

Innovative technology in combination with powerful performance and reliability allows cost-efficient solutions for a wide variety of automation tasks. The ongoing evolution of Demag's robot range reflects the company's extensive experience gained from a large number of installations used for high-volume production. Featuring powerful performance, flexible programming, versatility and attractive pricing, the Demag robot DR7.. CNC series is designed to exploit multiple potentials.

The main robot beam axes

Z-stroke (traverse axis)

The traverse axis consists of a high-strength steel support accurately finished on machining centres. Precise parallelism of the guide rails and drive elements (toothed belts on DR 711/713 CNC, rack-and-pinion drives from size DR 721 CNC up) guarantee minimum wear to robots used for high-performance, continuous production.

Y-stroke (vertical stroke)

The vertical axis is available in different variants: as a specially designed aluminium profile (undivided or divided and telescoping) or made of steel. The robot-specific geometry of the axis depends on the requirements as regards payload capacity, speed, stability, and operating weight.

The DR 713/723 CNC as well as all robot models from the DR 733 CNC up are equipped with a patented telescoping stroke. Optimised for torsional stiffness, the rigid inner telescoping tube is motor-driven via a rack-and-pinion drive; the end-of-arm gripper tube is driven by a circulating toothed belt at twice the speed of the former. Doubling the travelling speed of the gripper promotes minimum part removal time.

The telescopic vertical axis combines a low silhouette with the ability to cover long vertical strokes for applications such as palletising.

X-stroke (strip stroke)

The mounting profile consists of a high-strength aluminium extrusion with a high torsional stiffness. The vertical axis beam is flanged directly to the front end of the profile tube. Minimised weight warrants accurate picking and placing, a high rigidity of the structure, and minimum vibration even at high travel speeds.

Mechanical assembly

Guide rails on all main axes (X, Y, Z) with zero-backlash, high-performance bearings, maximum payload capacity and maximum distance between bearings deliver maximum support for vibration-free robot operation. The main axes are designed to provide high acceleration and deceleration rates. On robot models equipped with rack and pinion drives the pinion is encased by a lubrication cage for a long service life of the system.



DR 731 CNC with teach box R7

Drive technology

All Demag DR7.. CNC robots are equipped with position-controlled, brushless a.c. synchronous servo-motors on all 3 main axes (X,Y,Z). The use of 3 servo-controllers throughout permits parallel operation of the main axes and provides excellent performance characteristics.

CNC drives of high power density in conjunction with light-weight and yet rugged and torsionally rigid axis designs guarantee high acceleration capability - important especially where short distances are to be traversed. This results in shorter mould open times and enhanced productivity of the total system.

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Auxiliary axes

C-axis (swivelling placement gripper, standard)

The C-axis has a compact design and a pneumatic rack-and-pinion drive. It delivers a high torque, supports two limit positions (0°/90°) and, additionally, pneumatic locking at 90°.

A-axis (pivot gripper hand, optional)

The A-axis is available as a pneumatically driven two-position (0°/180°) or three-position (0°/90°/180°) unit.

B-axis (pivot vertical arm, optional)

For all robots from DR 721 CNC up. The pivoting movement of the vertical arm facilitates complex stacking tasks and frequently changing operations of removing parts from the moving or the stationary mould half. The B-axis is a motor-driven 0°-270° module with 15° gradation.

All auxiliary axes are available separately or in combination with a servo-drive and a high angular resolution to suit the selected robot model.

Control cabinet

Demag Robot DR 7.. CNC Series

The complete control system of the Demag DR 7.. CNC Robot series is arranged for convenient access and space savings on the rear side of the Z-main beam of the unit. Activation of complex peripheral equipment can optionally be provided via separate peripheral input/output modules (up to 64I/64O). These (from 16I/16O) are accommodated in a separate control cabinet and controlled in quasi-real time via the CAN bus system.

Control and signal transmission

The Demag robots of the DR 7.. CNC series are equipped with an efficient teach-in control and a reliable high-performance bus system (CAN-bus). Due to the reduced cable and connector requirements for connection with continuously moving robot components, this system offers the benefit of a significantly improved uptime. Typically, all signal and sensor wiring from the gripper hand is bundled directly to a single control unit located right on the carriage of the strip stroke. This control unit is connected in turn to both the control components inside the robot control cabinet by means of a single CAN bus cable.

Operation and programming

A teach box (Teach Box R6.2) is provided for the user to conveniently program the robot control system. Equipped with an LCD colour monitor and graphical, menu-driven user interface, the teach box allows straightforward and hands-on programming and operation.

Both beginners as well as experienced operators programming the robots are supported by

- a graphical teach-in programming sequence,
- a choice of pre-programmed standard sequences,
- selection of menu-driven plain-text programming, and
- storage of system and application programs on separate smart media cards.

Optionally, a teach box with a touch screen (Teach Box R7-Touch) is available which enhances operating and programming convenience and permits menu-prompted graphical programming.



DR 711 CNC with teach box R6.2

CAN bus interface to Demag injection moulding machines

Robots of the Demag Robot DR 7.. CNC series can communicate with Demag injection moulding machines via the optionally available CAN bus interface. Unlike common signal interfaces according to Euromap E12/E67, this concept provides for the robot to be linked to the injection moulding machine via a CAN bus.

Decisive benefits for the user are:

Direct communication between machine control and robot control via the data bus reduces signal transit times and, as a result, accelerates the parts removal process. The robot setting data are stored together with the corresponding machine setting program. Moreover, all functions of the production unit with relevance for every-day production processes are controlled by the Ergocontrol system of the injection moulding machine; these include the activation and deactivation of the robot or other automation equipment, travel to the robots reference position, plain-text error messages, and manual controlled movement of individual robot axes.