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1977  Yasnac RB  
MOTOMAN-L10

1980  Yasnac RG

1983  MOTOMAN-L10W

1983  Yasnac RX

1985  MOTOMAN-L106

1988  Yasnac ERC  
MOTOMAN K10S

1994  Yasnc MRC  
MOTOMAN-SK16

1998  Motoman XRC

MOTOMAN-UP20

2004  Motoman NX100  
MOTOMAN-EA1400N

MOTOMAN-ES165N

2006  MOTOMAN-IA20  
MOTOMAN-DA20

MOTOMAN robot history
1. The programming unit was used to move each robot axis and save its position. When running the program the robot would assume each position in the very same order that they were recorded.

Yasnac RB and MOTOMAN-L10

**MOTOMAN-L10**
- Introduced in 1977
- Five axes
- Maximum workload 10 kg (including gripper)
- Weight 470 kg

**Control system RB**
- Programming capacity 250 positions, could be extended to 600 and 350 instructions
- 16 input signals and 15 output signals
- 99 robot jobs in magnetic memory
- 63 welding parameters
- Dimension 1600x650x700 mm
- Weight 350 kg

**The very first Motoman robot**
Motoman L10 was the first robot which Yaskawa introduced on the market. Its control system was equipped with a separate programming pendant used to record the robot’s position one by one. The control system had a magnetic memory which did not require a backup.

New positions, points, could be added or moved, but it was impossible to erase any of them in the recorded program. Four finished programs could be accessed from separate keys on the programming unit.

Using a few points to calculate a straight line or a circle (so called interpolation) was not possible. Consequently it was necessary to record quite a lot of points in order to complete a welding line.

2. RB control cabinet.

4. With circular interpolation only three points (two for linear) are needed for the control system to complete a welding line.

5. The RG controller cabinet.

Yasnac RG and MOTOMAN-L10W

<table>
<thead>
<tr>
<th>MOTOMAN-L10W</th>
<th>MOTOMAN-L10WA</th>
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<tr>
<td>Introduced in 1982</td>
<td>Introduced in 1983</td>
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<tr>
<td>Five axes</td>
<td>Six axes</td>
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<td>Maximum workload 10 kg</td>
<td>Maximum workload 5 kg</td>
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<tr>
<td>Weight 280 kg</td>
<td>Weight 280 kg</td>
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Control system RG

Introduced in 1980
Controls up to six axes
Programming capacity 1000 pos (600 instructions).
99 robot jobs in magnetic memory (external memory on tapes)
22 input signals and 21 output signals
127 welding parameters
Linear and circular interpolation possible
Dimensions 1600x650x700 mm
Weight 350 kg

Many improvements to robot and controller

The work area in the new Motoman L10W was increased by 80% and the robot wrist is more narrow. The robot was made of a light aluminum alloy which helped reduce the size of its motors.

The model L10WA, with its extra wrist axis called A, was the world’s first six axes robot. The control system RG could handle either this robot model, or the ordinary L10W and an external axis. However, the L10W-models were almost exclusively used with the next generation controller RX.

The later versions of RG control system enabled circular and linear interpolation, three dimensional shifting of a robot job and pendular motion. It was even possible to control it from an external computer, but that was not put to much practical use.
Yasnac RX and MOTOMAN L-series

**MOTOMAN-L106**
Introduced in 1985
Six axes
Maximum workload 10 kg
Weight 350 kg

**Control system RX**
Introduced in 1983
Controls up to eight axes (the robot's six plus two external axes)
Programming capacity 2,200 pos and 1,200 instructions (could be extended to 5,000 pos)
249 robot jobs in memory
48 input signals, 24 output signals plus 2 analogue outlets
127 welding parameters
Dimensions 700x1100x580 mm
Weight 200 kg

**Other models in the series**
L15, L30, L60 and L120

**Introducing a whole robot series**
This meant several robot models that could be operated with the same type of control system. The L-series included robots able to handle workload up to 120 kg. There was direct drive on the three wrist axes RBT.

The later versions of the RX controller were equipped with “modern” functions like COM-ARC (seam tracking), multi layer, 3D-shift, parallel shift etc. In order to synchronise robot welding with a rotating manipulator the TRT function was developed.

Operator safety features included automatic low speed during programming and a teach-lock mechanism which prohibits operation through other equipment than the programming unit.
Yasnac ERC and MOTOMAN K-series

MOTOMAN-K10S
Introduced in 1988
Six axes
Maximum workload 10 kg
Weight 300 kg

Control system ERC
Controls up to 12 axes
Programming capacity 2,200 pos and 1,200 instructions, could be extended to 10,000 pos and 5,000 instructions.
55 input signals and 35 output signals (could be extended to 96/44)
Dimensions 700x1140x580 mm

Other robots in the series
K3S, K6SB, K30WSB, K60S and K100S

Advanced functions
The K-series of robots had a direct drive on all six axes. This meant that the power was transferred to the axes directly and not through long chain transmissions or link-arms.

The ERC control system was able to control more axes than any other controller at the time. It had a lot of improved features like electronic seam tracking (ComarcII) and Multi Layer functions which meant that external sensors and seam tracking devices were no longer necessary. Other smart features were user coordinates, a step by step position control (forwards and backward,) fine adjustment of speed etc.

The programming pendant weighted only 0.9 kg and was equipped with a small display (12 characters) and a three positions deadmans handle.
Yasnac MRC and MOTOMAN SK-series

**MOTOMAN-SK16**

- Introduced in 1994
- Six axes
- Maximum workload 16 kg
- Weight 280 kg

**Control system MRC**

- Controls up to 21 axes
- Synchronised control of two robots (patented)
- Programming capacity 2,200 pos (could be extended to 60,000 pos)
- 48 input and 48 output signals (could be extended to 144/144)
- Dimensions 900x1600x650 mm
- Weight 190 kg

**Other robots in the series**

SK 6 C, SK 16-6, SK 45-30, SK 120, SK 300 and SK-16

**Improved performance**

With the introduction of the robots in the SK-series the maximum workload was increased by 300%. The system could control more axes as the previous one, and it could also synchronise the motions of two robots.

The MRC introduced some new functions well suited for machine handling and necessary when synchronising two robots: e.g. Multi-tasking, servo float and S-move.

MRC also made it possible to edit robot jobs from an ordinary PC, so called offline programming. Although it had been possible to read robot jobs as text files before, it was only now possible to return changes made in the PC or even send completely new programs to the controller.
Motoman XRC and MOTOMAN UP-series

**MOTOMAN-UP20**

Introduced in 1998
Six axes
Maximum workload 20 kg
Weight 280 kg

**Control system XRC**

Controls up to 27 axes
Synchronised control of three (four) robots
Programming capacity 5,000 pos and 3,000 instructions, can be extended to 60,000 pos and 20,000 instructions
40 input and 40 output signals (can be extended to 256/256)
Dimensions 800x900x650 mm
Weight 190 kg

**Other robots in the series**

UP6C, UP20-6, UP20M, UP50, UP130, UP165, UP165-100, UP200 and UP350

**Increased usability**

The XRC control system has a Windows oriented interface with directories and folders. Several types of PC-software for job editing, file transfer or offline programming and simulation are available.

Some interesting new features introduced with XRC are Form Cutting (used in laser-, plasma or water cutting), shock sensor functions and the ability to have acceleration/retardation in any point.
NX100 and application dedicated robots

**MOTOMAN-EA1400N**
- Introduced in 2004
- Six axes
- Maximum workload 3 kg
- Weight 130 kg

**MOTOMAN-ES165N**
- Introduced in 2004
- Six axes
- Maximum workload 165 kg
- Weight 1100 kg

**Control system NX100**
- Controls up to 36 axes
- Synchronised control of four robots
- Programming capacity 60,000 pos and 10,000 instructions
- 40 input and 40 output signals (can be extended to 1024/1024)
- Dimensions 800x1000x650 mm
- Weight 170 kg

**Other robot series**
- EA-series (arc welding)
- EPL-series (palletizing)
- ES-series (spot welding, general application)
- HP (general application)
- PX-series (painting)

Application dedicated robots

Each robot series is specially designed for its specific application, such as arc welding, palletizing or painting. In many of these models the supply cables are fitted into the upper robot arm, rather than hanging on the outside, which significantly increases the robot’s freedom of movement. In 2006 the brand new robot models: human sized single armed MOTOMAN-IA20 and dual armed MOTOMAN-DA20 are taking this concept one step further with all of the supply cables hidden in the robot arm.
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