

PHASER Series

Product Lineup

LINEAR MOTOR SINGLE-AXIS ROBOTS

No limit on critical speed even when using a long stroke of 4 m.
"PHASER" series delivers superb performance
during long distance transfer.



Critical speed is not restricted and high-speed long-stroke transfer is possible.

MF type

High-power and long-stroke using flat motor with core

- Maximum stroke: 4050mm
- Maximum speed: 2500mm/s
- Repeated positioning accuracy: $\pm 5\mu\text{m}$
- Maximum payload: 7 to 160kg



MF7D



MF15



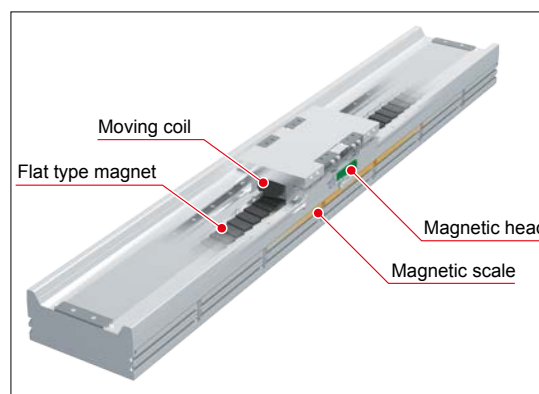
MF20



MF30D



MF75



| Type | Size (mm) ^{Note 1} | Model | Carrier | Maximum payload (kg) | Maximum speed (mm/sec.) | Stroke (mm) |
|--|-----------------------------|-------|---------|----------------------------|-------------------------|--------------|
| MF type Flat type with core Linear motor specifications | W85 × H80 | MF7 | Single | 10 (7) ^{Note 2} | 2500 | 100 to 4000 |
| | | MF7D | Double | | | 100 to 3800 |
| | W100 × H80 | MF15 | Single | 30 (15) ^{Note 2} | | 100 to 4000 |
| | | MF15D | Double | | | 100 to 3800 |
| | W150 × H80 | MF20 | Single | 40 (20) ^{Note 2} | | 150 to 4050 |
| | | MF20D | Double | | | 150 to 3850 |
| | | MF30 | Single | 60 (30) ^{Note 2} | | 100 to 4000 |
| | | MF30D | Double | | | 150 to 3750 |
| | W210 × H100 | MF75 | Single | 160 (75) ^{Note 2} | | 1000 to 4000 |
| | | MF75D | Double | | | 680 to 3680 |

Note 1. The size shows approximate maximum cross sectional size.

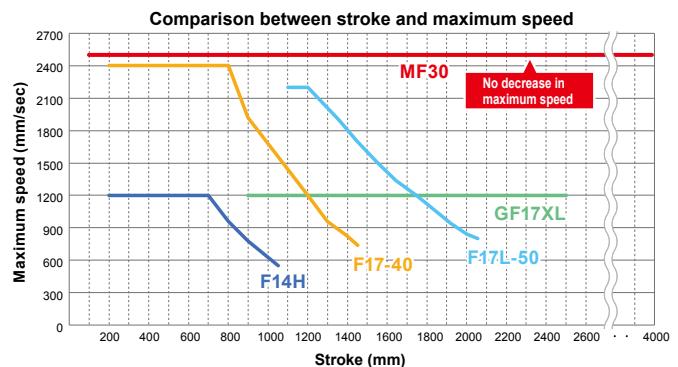
Note 2. When using at the maximum speed, the maximum payload becomes the value in ().

Linear conveyor modules
LCMR200
Single-axis robots
GX
Controller
YHX
Linear conveyor modules
LCM100
SCARA robots
YK-X
Robot Vision
RCX iV2+
Single-axis robots
Robonity
Linear motor single-axis robots
PHASER
Single-axis robots
FLIP-X
single-axis robots
TRANSEURO
Compact single-axis robots
XY-X
Cartesian robots
YP-X
Pick & place robots
CLEAN
CONTROLLER
Electric Gripper
YRG
APPLICATION SERVICE PERIOD

POINT 1

No critical speed like ball screw!

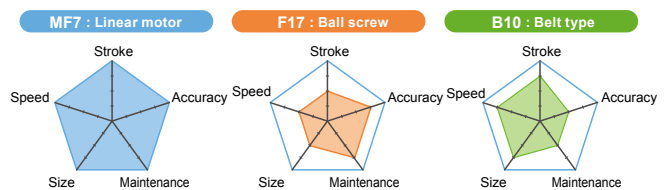
The main attraction of the linear motor single-axis robot is that it has no critical speed like ball screw. The maximum speed does not decrease even during long distance transfer. In addition, the maximum stroke is 4 m. The cycle time is reduced significantly in the long-distance transfer process. Also, unlike the ball-screw single-axis robot, there are few sliding parts and rotating parts, ensuring excellent quietness. Furthermore, the coil and magnet are non-contact and are not worn out, ensuring long-term use.



POINT 2

In-house manufacturing of major parts achieves low costs.

Magnetic scales are developed and manufactured at YAMAHA. In-house manufacturing of other major parts achieves large cost reduction. Nowadays, the linear motor is not a special mechanism. The customer can select the linear motor or ball screw in the similar way according to the customer's needs. In particular, when performing a high-speed and long-distance transfer of a light workpiece, selecting linear motor robots may reduce the cost.



Comparison of single-axis robot models

| Model name | Main body price ^{Note 1} | Maximum speed (mm/sec.) | Maximum payload (kg) | Repeated positioning accuracy (μm) | Maximum stroke (mm) | Maximum cross-sectional dimension ^{Note 2} (mm) |
|-------------|-----------------------------------|-------------------------|-------------------------|------------------------------------|---------------------|--|
| MF7-1500 | | 2500 | 10(7) ^{Note 3} | ±5 | 4000 | W85×H80 |
| F17-40-1450 | | 720 ^{Note 4} | 40 | ±10 | 1450 | W168×H100 |
| B10-1450 | | 1850 | 10 | ±40 | 2550 | W100×H81 |

Note 1: The prices are compared with the strokes shown above.

Note 2: Cable carriers are not included.

Note 3: The payload is 7 kg when the maximum speed is 2500 mm/s. (10 kg-payload: 2100 mm/s)

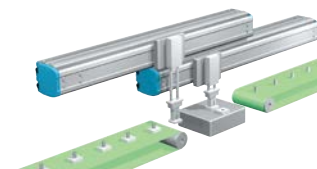
Note 4: This value is obtained by considering the critical speed with a stroke of 1450 mm.

POINT 3

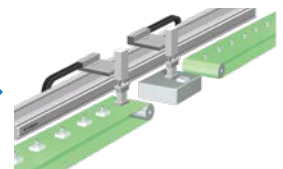
Double-carrier available as standard

Double-carrier specifications that operate two carriers on one robot are available as standard. High effects, such as space saving, cost reduction, and tact improvement are obtained when compared to two single-axis robots. Furthermore, no axis alignment is needed and tools are commonly used to shorten the setup time. (When using the RCX series controller, an anti-collision function can be used.)

Layout using two ball screw single-axis robots



Space saving using double-carrier



POINT 4

Suitable for heavy object transfer.

Maximum payload 160 kg

The maximum payload is 160 kg. The robot can transfer a heavy object, such as large LCD panel at a high speed with high accuracy. (In the payload range of some MF types, the maximum speed may be restricted.)



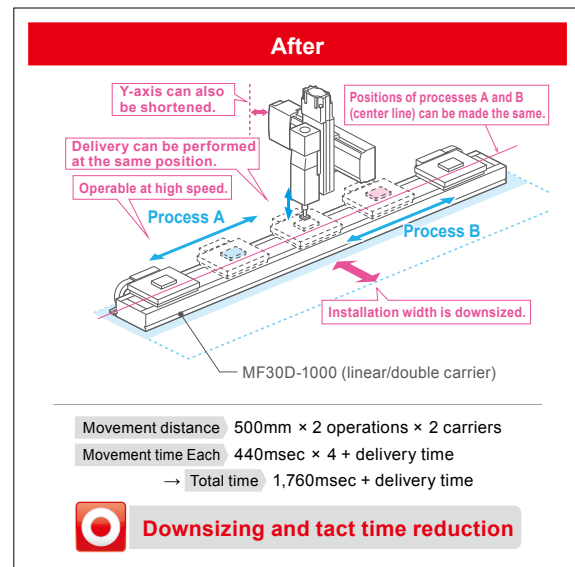
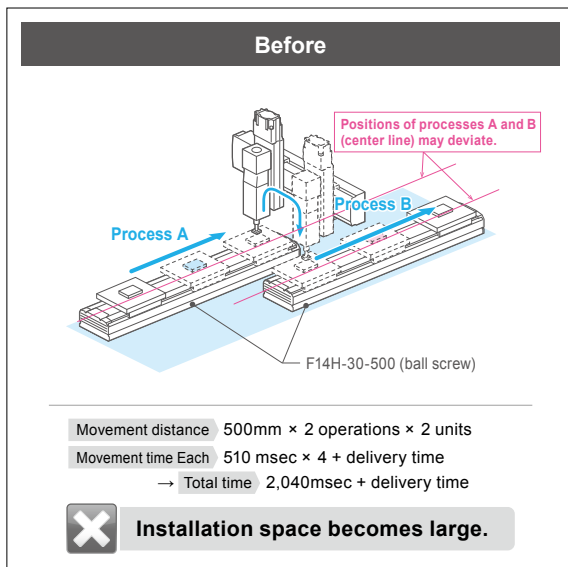
In the case of dual drive (2-axis synchronous control), the maximum payload is 320 kg.

POINT 5

Both long stroke transfer and downsizing are achieved.

When transferring a workpiece over a long distance while maintaining the tact, a structure in which multiple single-axis robots are used to deliver the workpiece can be considered. (Illustration "Before") However, in this case, not only is the installation width required for the number of single-axis robots, but there is also the risk of mistakes that occur during workpiece delivery. In the case of PHASER, the tact can be maintained even with long strokes, and since no workpiece is delivered to another robot, it is possible to reduce the installation width while suppressing transfer errors. (Illustration "After")

Example of actual introduction



POINT 6

Linear scale developed by YAMAHA

YAMAHA originally developed a new linear scale based on its excellent magnetic signal detection technology.



Magnetic scale provides high environment resistance.

YAMAHA's magnetic scale is resistant to dirt and can be used in an environment where grease or cutting fluid sometimes splashes.

Semi-absolute specifications

The current position is obtained by reading the signal recorded in the linear scale. So, it is not necessary to perform a large return-to-origin movement before starting the operation after turning on the power (the slider moves up to 76 mm when reading the signals).

Cost reduction

In-house linear scale development and manufacturing achieves large cost reduction.

High resolution 1 μm

Magnetic signals recorded in the magnetic scale are detected and interpolated to achieve a highly accurate resolution of 1 μm.

Repeated positioning accuracy: ±5 μm

A fully-closed control that always feeds back the table position provides high accuracy steadily. Additionally, there are no mechanical backlashes, such as ball screws or timing belts.

POINT 7

Silence and long service life

Unlike ball screw type robots, there are few sliding and rotating parts. So, the operation is very quiet. Moreover, as the coil is not in contact with the magnet, they are not worn out and can be used for an extended period of time.

POINT 8

Dust-proof structure

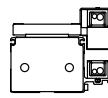
All YAMAHA's linear motor robots use a stainless steel shutter. This prevents entry of foreign objects. Additionally, these shutters are made of tough stainless steel with an extremely high fatigue strength to support high-speed and long-stroke operation.

POINT 9

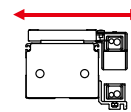
Flat type without cable carrier protrusion

For the MF7, as the main body is made compact, a flat type that the cable carrier becomes flat on the top surface of the table is prepared as standard. Please select this type according to the tool or workpiece shape, or installation method.

Standard type



Flat type



As the cable carrier does not protrude from the table upper surface in the flat type, a large tool can be installed easily.

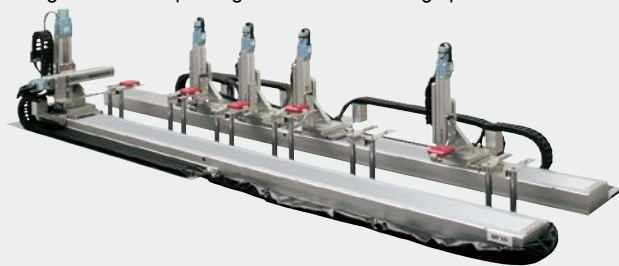


Applicable to multi-carrier operation

The PHASER series also supports “multi-carrier” operation that allows using three or more carriers on one robot. This “multi-carrier” operation drastically extends applications due to its high effect in improving tact time and saving space.



Supported by special order. So, contact YAMAHA.



Applicable to dual-drive

As a dual-drive that simultaneously drives two axes, high-speed transfer and heavy object transfer are possible in a wide area. YAMAHA can propose an optimal control method according to the robot linkage rigidity.

