

Multi-robot

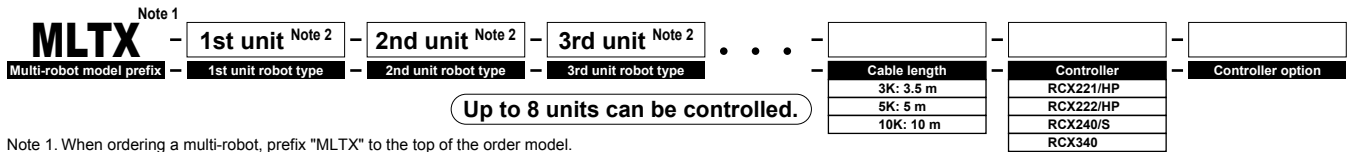
MULTI-FLIP/MULTI-PHASER

This robot has multi specifications that control multiple robots using one controller.

Advantages of control with multi-axis controller

- Sequence control is easy. System upgrades are easy at less expensive price.
- Compact and space saving when compared to the operation with multiple single-axis controllers.
- More advanced control is possible.
- RCX221, RCX240, RCX240S, and RCX340 provide mixed control of the FLIP-X series and PHASER series (linear single-axis).

Multi-robot ordering method



Note 1. When ordering a multi-robot, prefix "MLTX" to the top of the order model.
 Note 2. Select either MULTI-FLIP or MULTI-PHASER shown below.
 Note 3. For details about the controller and controller option models, please refer to relevant page of each controller.

MULTI-FLIP

Type	Model	Lead (mm)	Stroke (mm)	
T type Frame-less structure model	T4L/T4LH	12	50 to 400	
		6		
		2		
	T5L/T5LH	20	50 to 800	
		12		
		6		
	T6L	20	50 to 800	
		12		
		6		
	T9 (Standard)	T9	30	150 to 1050
			20	
			10	
5				
T9H (High thrust)	T9H	30	150 to 1050	
		20		
		10		
		5		
F type Model with high rigidity frame	F8	20	150 to 800	
		12		
		6		
	F8L	F8L	30	150 to 1050
			20	
			10	
			5	
	F8LH	F8LH	20	150 to 1050
			10	
			5	
	F10 (Standard)	F10	30	150 to 1050
			20	
			10	
			5	
	NEW F10H (High thrust)	F10H	30	150 to 1000
			20	
			10	
			5	
	F14 (Standard)	F14	30	150 to 1050
			20	
			10	
			5	
			30	
			20	
F14H (High thrust)	F14H	20	150 to 1050	
		10		
		5		
F17L	F17L	50	1100 to 2050	
		40		
		200 to 1450		
F17	F17	20	200 to 1250	
		10		
		40		
F20	F20	20	200 to 1450	
		10		
		200 to 1250		
F20N	F20N	20	1150 to 2050	
		20		
		750 to 2000		
GF type	GF14XL	20	850 to 2500	
	GF17XL	20	850 to 2500	
N type Nut rotation type model	N15 (Single-carrier)	20	500 to 2000	
	N15D (Double-carrier)		250 to 1750	
	N18 (Single-carrier)		500 to 2500	
	N18D (Double-carrier)		250 to 2250	
B type Timing belt drive model	B10	Belt drive	150 to 2550	
	B14 (Standard)	Belt drive	150 to 3050	
	B14H (High thrust)	Belt drive	150 to 3050	
R type Rotation axis model	R5	-	360 °	
	R10			
	R20			

MULTI-PHASER

Type	Model	Carrier	Stroke (mm)
MF type Flat type with core Linear motor specifications	MF7	Single	100 to 4000
	MF7D	Double	100 to 3800
	MF15	Single	300 to 4000
	MF15D	Double	100 to 3800
	MF20	Single	150 to 4050
	MF20D	Double	150 to 3850
	MF30	Single	100 to 4000
	MF30D	Double	150 to 3750
	MF75	Single	1000 to 4000
	MF75D	Double	680 to 3680
MR type Shaft type Linear motor specifications	MR12	Single	50 to 1050
	MR12D	Double	50 to 1050

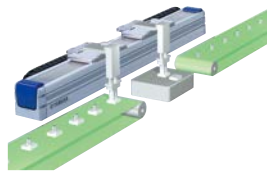
Robot settings

2-robot settings

Use of 2-robot settings and multi-task program makes it possible to perform asynchronous independent operation. As the auxiliary axis setting is used together, more free axis assignment can be made.

Double-carrier

In robot types that the motor runs separately, such as linear motor single-axis PHASER series or N type (nut rotation type) of FLIP-X series, two motors can be added to one axis.

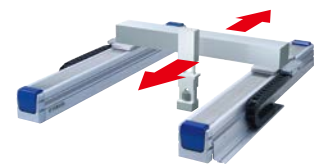


Main auxiliary axis setting





This auxiliary axis setting is used when it is inconvenient that two axes move simultaneously by the MOVE command. The axis set for the main auxiliary axis does not operate by the MOVE command and it operates only by the DRIVE command (movement command in axis units). This setting is recommended for the axis that needs to be operated asynchronously from the main robot.

Dual setting

This setting is used when performing the dual drive (2-axis synchronous control). This setting is used when the gantry type Cartesian robot with a long Y-axis stroke stabilizes the high acceleration/deceleration or when a high load or high thrust is needed.



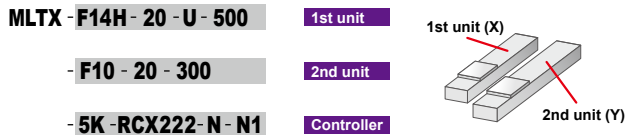
Applicable controllers

Name	1 to 2 axes controller		1 to 4 axes controller	1 to 4 axes controller
	RCX221	RCX222	RCX240/RCX240S	RCX340
Appearance	 P.524	 P.524	 P.532	 P.542
Position detection	Incremental	Absolute	Incremental/Absolute	Incremental/Absolute
Control model	FLIP-X and PHASER can be mixed.	FLIP-X	FLIP-X and PHASER can be mixed.	FLIP-X and PHASER can be mixed.
Maximum number of programs	100 programs		100 programs	100 programs
Maximum number of points	10,000 points		10,000 points	30,000 points
Number of input/output points	Standard	Dedicated input 10 points/ dedicated output 12 points General-purpose input 16 points/ general-purpose output 8 points	Dedicated input 10 points/ dedicated output 11 points General-purpose input 16 points/ general-purpose output 8 points	Dedicated input 8 points/ dedicated output 9 points General-purpose input 16 points/ general-purpose output 8 points
	Expansion	General-purpose input 24 points/ general-purpose output 16 points	General-purpose input 24 points/ general-purpose output 16 points	General-purpose input 24 points/ general-purpose output 16 points
Network option	CC-Link, DeviceNet™, Ethernet, PROFIBUS		CC-Link, DeviceNet™, EtherNet/IP™, Ethernet, PROFIBUS	CC-Link, DeviceNet™, EtherNet/IP™, Ethernet, PROFIBUS, PROFINET

Examples of multi-robot ordering methods

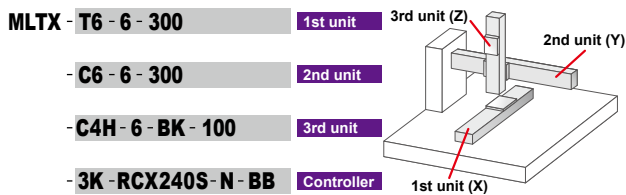
Separate single axes

<Example> F14H and F10 are installed separately.



2 axes + 1 axis

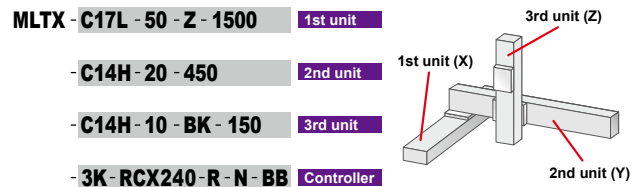
<Example> T6 is installed on the base for the 1st axis, C6 is secured to the upper portion for the 2nd axis, and CH4 is secured to the upper portion for the 3rd axis to assemble the C6 and C4H to the XZ. (Either 2 axes + 1 axis or 3 axes simultaneous control can be made by the setting.)



Note. When the customer combines each axis, it is recommended to use the cable terminal (relay cable) for the wiring among axes. For details about cable terminal, please contact YAMAHA.

3 axes combination

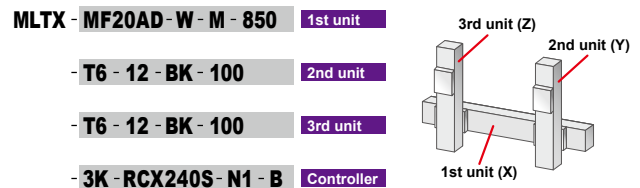
<Example> C17L, C14H, and C14H are used for the X-axis, Y-axis, and Z-axis, respectively to form a 3-axis XYZ combination.



Double-carrier

Example of 4-axis control

<Example> Two T6 are assembled to the double-carrier of the MF20A, and they are used as XZ type and controlled using one controller.

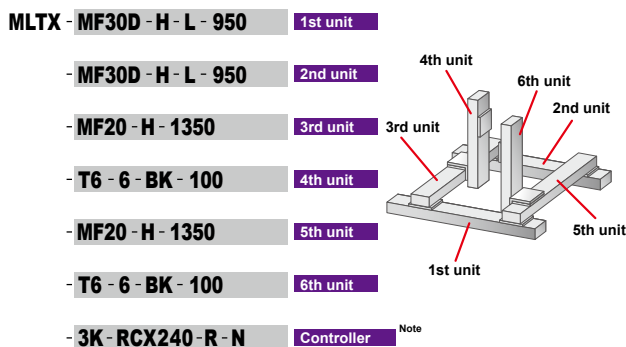


Note. For the double-carrier, since one robot occupies two axes of the controller, the number of robots may differ from the number of controllable axes.

Double-carrier/dual drive (2-axis simultaneous control)

Example of 8-axis control

<Example> Two double-carriers of the MF30 are arranged in parallel and two MF20 installed on the top are moved by the dual-drive. T6 is attached to each tip of the MF20 and the robots are controlled using two controllers.



Note. For this specification, when writing one controller model, two controller will be arranged automatically.

CAUTION

Conditions needing regenerative unit on multi-robot

- The total motor capacity exceeds 450 W.
- The total motor capacity of the vertical axis exceeds 240 W.
- The B14H performs the operation at a maximum speed of more than 1250 mm/s.
- When the vertical axis is 240 W or less, the conditions shown below are satisfied.
 - There is a 200 W-vertical axis.
 - A 100 W-vertical axis has a stroke of 700 mm or more.
 - There are two 100 W-vertical axes with a 5 mm-lead.

FLIP-X terminology

High lead

This term indicates models supporting ball screw leads that exceed the standard lead (12 mm or 20 mm). (The standard lead of the F17L and C17L is 50.)

Origin on non-motor side

This term indicates models that are applicable to the origin non-motor specifications as standard. The origin on the non-motor side in the standard state is not supported with a lead not stated in the catalog. If special specifications are needed, please consult YAMAHA.

Maximum speed

This term indicates the maximum transfer speed. YAMAHA's single-axis robots can transfer a workpiece at this speed regardless of the transfer weight as long as it is within the maximum payload. However, as the workpiece is heavier, the acceleration/deceleration curve becomes gentle. If the movement distance is short, the speed does not reach the maximum speed stated in the catalog.

CAUTION

When the stroke of the ball screw drive type is long, noise or vibration is produced due to resonance of the ball screw if moved at the maximum speed. If this happens, lower the speed to that stated in the note column. (It is also possible to lower the transfer speed of the entire program using the SPEED setting or make the adjustment for each movement command.)

Maximum payload

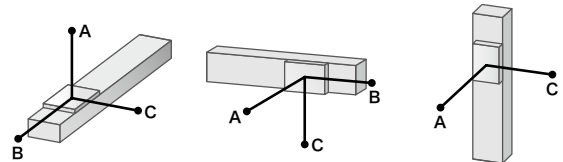
This term indicates the maximum weight that can be loaded on the slider and transferred. Select an appropriate model so that the total weight of the customer's tools (air cylinder or chuck) and workpiece is less than this data. When the center of gravity of the tool or workpiece is offset from the center of the slider, the allowable overhang needs to be taken into consideration. Additionally, when entering the total weight of the tool and workpiece for the payload parameter of the controller, optimal acceleration/deceleration and servo parameter are automatically set.

Rated thrust

This term indicates the force to be applied in the slider advancing direction in the slider stationary (hold) state. When using vertically, the weight of the loaded workpiece is subtracted from this value (when the force is applied downward from the top). The slider can move only at a low speed (approximately 10 % of the maximum speed), but this value becomes lower than the specification value. Additionally, the type B of the timing belt drive cannot be used for applications, in which thrust is applied.

Allowable overhang

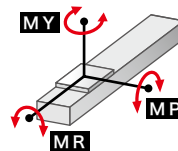
This term indicates an allowable overhang of an object to be transferred. In the specification data, this indicates the distance from the center of the top face of the slider to the center of gravity of an object to be transferred by the weight. This value is determined according to the service life of the linear guide. Under normal operation conditions^{Note}, the 90 %-service life of the linear guide is 10,000 km or more if gravity centers of the workpiece and tool are kept within the allowable overhang. When using with an overhang amount exceeding the specification data, it is necessary to install a separate support guide or restrict operating conditions (speed, acceleration) so that a load is not applied to the linear guide of the single-axis robot. For detail, please consult YAMAHA.



Note. Speed, acceleration 100 % (It is preconditioned that the weight parameters are set correctly.)
There shall be no impact load or excessive vibration during operation.
Additionally, the alignment is correct.

Static tolerance moment

This term indicates the load moment applied to the slider in the robot stationary state.



Critical speed

When the stroke of the ball screw drive type is long, noise or vibration is produced due to resonance of the ball screw if moved at the maximum speed. If this happens, lower the speed to that stated in the note column. (It is also possible to lower the transfer speed of the entire program using the SPEED setting or make the adjustment for each movement command.)