

SINGLE-AXIS ROBOTS

This single-axis robot series include many models of 6 types and 29 variations for a wide range of applications.



Custom order specifications for each model are OKAY!

We gladly accept special orders for all models such as for double sliders or wide sliders. Please consult with our sales office for more information.

Product Lineup

FLIP-X Series

Six types with high reliability and durability

T
type

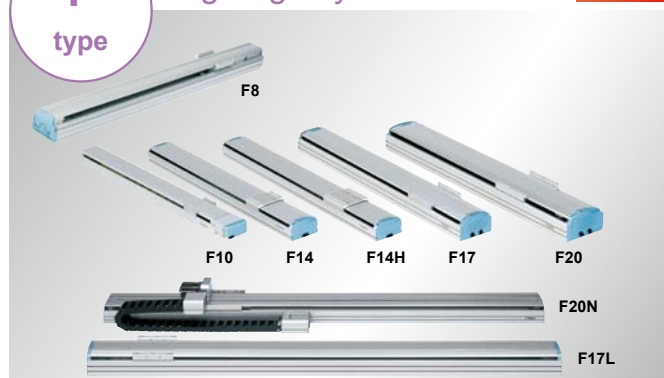
Frame-less structure model **P.88**



- Double appeal of a compact body and low price.
- Ideal in applications as an actuator directly installed on a mount.

F
type

High rigidity frame model **P.95**



- Large inertial moment capacity, easily handles offset loads.
- Ideal for Cartesian robots requiring arm strength, and for moving arms that shift the entire axis.

YMS
type

Rod type model **P.124**



- Combined with an AC servomotor and ball screw allows a rod to extend and contract from the structure.
- Usable in diverse applications including where a tool is attached to the rod tip for conveying work, or tasks where the rod pushes the work for clamping.

* Sales discontinued time: Dec. 2013

R
type

Rotation axis type model **P.126**

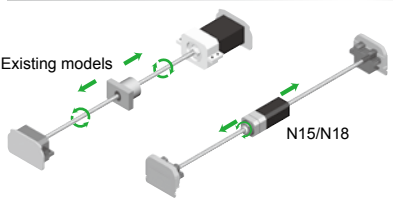
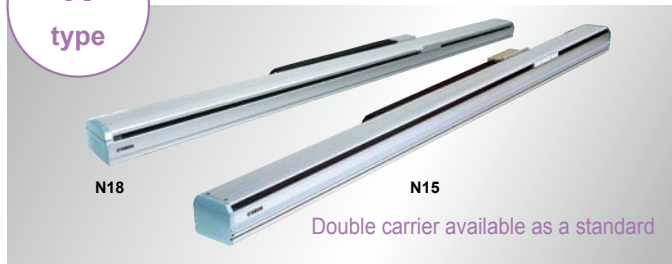


- Position repeatability accuracy of +/-30seconds (0.0083°).
- The R type can be used as the rotation axis when combined with other robots, or utilized for a wide range of applications such as index tables.
- Harmonic drive delivers high-strength and high-accuracy.

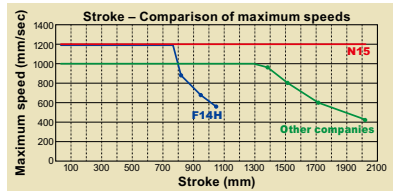


N
type

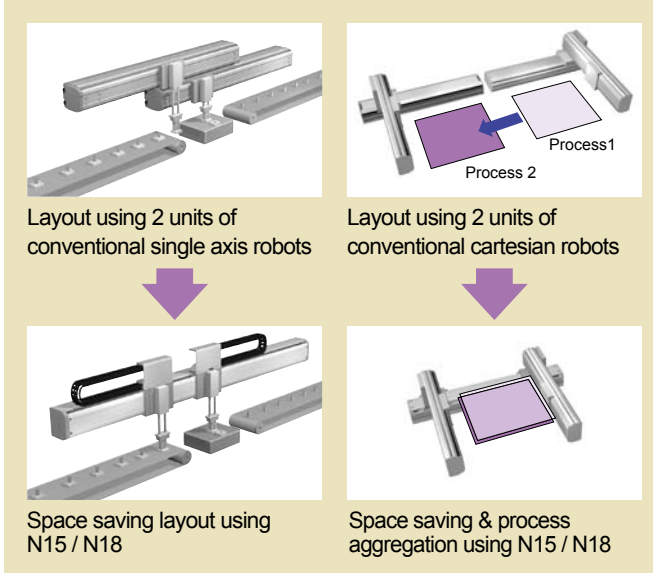
Nut rotation type model **P.110**



In this structure, movement is via a nut that rotates while clamped to a screw shaft, the ball screw nut is linked to the hollow motor.



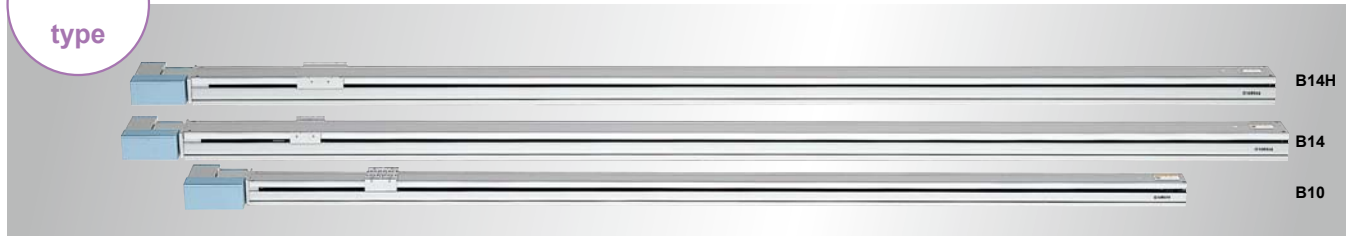
High-speed conveyance with no speed hazard restrictions.
Stroke: 2500mm
Maximum speed: 1200mm/sec



- Repeated positioning accuracy +/-0.01mm
- Maximum carrying weight 80kg
- Double carrier available as a standard

B
type

Timing belt drive model **P.118**



■ Maximum stroke length of 3050mm. Allows long distance transport between job processes.

Point 1

Uses a 4-row 2-point groove guide rail for superb durability! Note 1



The Flip-X uses 4-row circular arc groove 2-point contact guides having minimal differential ball slip. Compared to 2-line gothic arch groove 4-point contact guides, the TRANSERVO has a structure with minimal differential slip of the balls and maintains good rolling action even under heavy momentum load or when the installation surface accuracy is poor. It is also resistant to breakdown such as from abnormal wear.

2-row gothic arch groove 4-point contact guide

Large differential slip, and large friction resistance

- Very susceptible to effects from poor installation precision, friction and elastic deformation
- Might break even within the calculated service life.

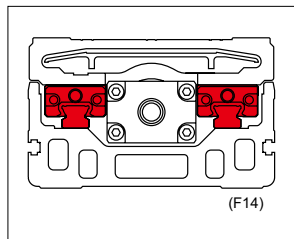
4-row circular arc groove 2-point contact guide

Small differential slip and good self-centering

- Highly resistant to alignment fluctuations and moment loads
- Resistant to breakage

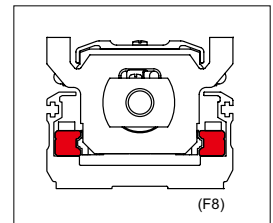
● **F/N/B type** Note 2

The F type, N type and B type layout utilizes 2 guide rails in a high-strength extruded aluminum frame. Note 2 Each rail has 2 bearing units per rail so there are a total of 4 bearing units each capable of supporting a heavy load. Large moment loads are mainly converted into an upward/downward force so that only a very slight momentum is applied to each bearing unit. The unit also employs 4-row circular arc groove 2-point contact guides whose structure is extremely resistant to breakage and that yield a satisfactory rolling action when a large momentum load is applied.



● **F8 series**

The F8 series utilizes a newly developed module guide whose cross sectional area has been drastically reduced (70% compared to F10). The rail extends fully across the frame for a compact and high-strength structure. This series of course uses the 4-row circular arc groove 2-point contact guide.



Note 1. Exclude T4 / T5 Note 2. Exclude F8 series / F10 / B10

Point 2

Environmentally rugged resolver



The position detector is a resolver. The resolver has a simple yet strong structure using not electronic components or elements and so has great features such as being extremely tough in harsh environments as well as a low breakdown rate. The resolver structure has none of the detection problems that occur in other detectors such as optical encoders whose electronic components breakdown or suffer from moisture or oil that sticks to the disk. Moreover, mechanical specifications for both absolute and incremental specifications are common to all controllers so one can switch to either absolute or incremental specifications just by setting a parameter.

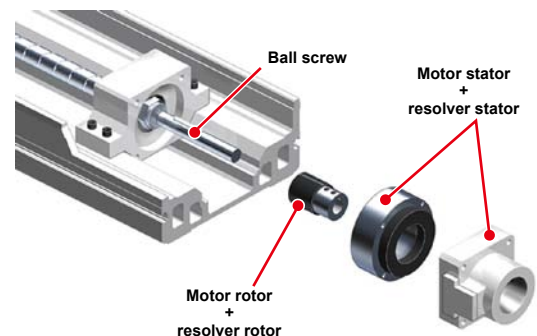
The resolver is a magnetic position detector. Its structure is simple with no electronic component and no optical elements. One great feature compared to ordinary optical encoders is that there are very few points where a failure might occur. Vast quantities of resolvers are used in fields like aviation and the automobile industry where reliability is essential and also because they are **highly tough in harsh environments with a low failure rate.**

Also even if the absolute battery is completely worn down, the FLIP-X can operate on incremental specifications so in the unlikely event of trouble one can feel secure knowing that there will be no need to stop the production line. The backup circuit has been completely renovated and now has a backup period extending to 1 year.

Point 3






Direct coupling structure Streamlined maintenance tasks

The FLIP-X utilizes a structure where the motor is built directly into the end of the ball screw axis. This structure helps achieve a smaller overall length, better servo rigidity, and lower cost. Even though it uses a built-in structure, components such as the motor and ball screw can be replaced individually so maintenance tasks are smooth and simple.



The ideal controller to match your application!

Besides operation by robot programs and pulse train control, this new controller lineup includes positioners that operate by specifying a point No. These also support multi-spec operation where 1 controller unit operates multiple robots. Select the optimal controller to match your application.

Programs			I/O point trace (positioner)	Pulse train input
				
SR1-X	RCX222	RCX240/ RCX240S	TS-X	RDX
P.421	P.431	P.438	P.396	P.412

Type	Size (mm) <small>Note 1</small>	Model	Lead (mm)	Maximum payload (kg)		Maximum speed (mm/sec)	Stroke (mm)	Detailed info page
				Horizontal	Vertical			
T type Frame-less structure model	W45 × H53	NEW T4L/T4LH	12	4.5	1.2	720	50 to 400	T4L: P.88
			6	6	2.4	360		T4LH:P.89
			2	6	7.2	120		
	W55 × H52	NEW T5L/T5LH	20	3	-	1200	50 to 800	T5L: P.90
			12	5	1.2	800		T5LH:P.91
			6	9	2.4	400		
	W65 × H56	NEW T6L	20	10	-	1333		P.92
			12	12	4	800		
			6	30	8	400		
	W94 × H98	T9 (Standard)	30	15	-	1800	150 to 1050	P.93
			20	30	4	1200		
			10	55	10	600		
		T9H (High thrust)	5	80	20	300	150 to 1050	P.94
			30	25	-	1800		
			20	40	8	1200		
F type High rigidity frame model	W80 × H65	F8	10	80	20	300	150 to 800	P.95
			20	12	-	1200		
			6	40	8	360		
	W80 × H65	F8L	30	7	-	1800	150 to 1050	P.96
			20	20	4	1200		
			10	40	8	600		
			5	50	16	300		
	W80 × H65	F8LH	20	30	-	1200	150 to 1050	P.98
			10	60	-	600		
			5	80	-	300		
	W110 × H71	F10	30	15	-	1800	150 to 1050	P.99
			20	20	4	1200		
			10	40	10	600		
		F14 (Standard)	5	60	20	300	150 to 1050	P.100
			30	15	-	1800		
20			30	4	1200			
10	55		10	600				
W136 × H83	F14H (High thrust)	5	80	20	300	150 to 1050	P.101	
		30	25	-	1800			
	20	40	8	1200				
	10	80	20	600				
W168 × H100	F17	5	100	30	300	1100 to 2050	P.104	
		30	15	-	1800			
		20	30	4	1200			
W202 × H115	F20	10	60	-	2400	200 to 1450	P.102	
		40	50	10	2200			
		20	80	15	1200			
W202 × H120	F20N	10	120	25	1200	200 to 1250	P.106	
		40	60	-	2400			
		20	120	25	1200			
N type Nut rotation type model	W145 × H120	N15 (Single carriage) N15D (Double carriage)	20	50	-	1200	1150 to 2050	P.108
			500 to 2000	P.110				
	W180 × H115	N18 (Single carriage) N18D (Double carriage)	80	-	-	250 to 1750	P.112	
B type Timing belt drive model	W100 × H81	B10	Belt drive	10	-	1875	500 to 2500	P.114
			Belt drive	20	-	1875	250 to 2250	P.116
			Belt drive	30	-	1875	150 to 2550	P.118
YMS type <small>Note 2</small> Rod type model	W45 × H45	YMS45	12	4.5	1	600	150 to 3050	B14: P.120
			6	6	2	300	B14H: P.122	
			12	5	1.5	600		
R type Rotation axis type model	-	R5	-	0.12kgm ²	-	360°/sec	360°	P.124
			-	0.36kgm ²	-		P.125	
			-	1.83kgm ²	-		P.126	

Note 1. Size is the approximate cross sectional size.
Note 2. Sales discontinued time: Dec. 2013

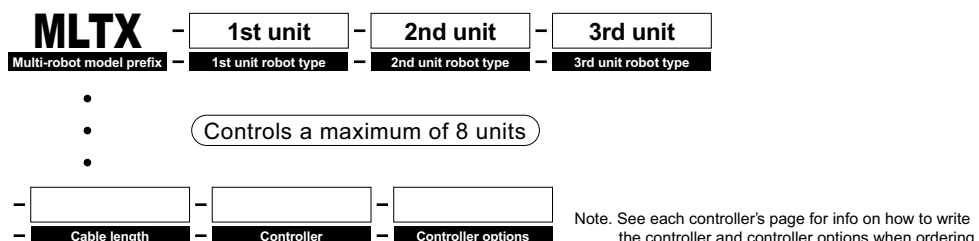
MULTI ROBOT

MULTI-FLIP/MULTI-PHASER

Operation where 1 controller runs multiple single-axis robots.

- The advantage of multi-axis controller operation.
- Sequence control is simple! System upgrades are inexpensive.
- More compact and saves more space than when operating multiple single-axis controllers.
- Allows more sophisticated control.
- Multi-axis controllers RCX221/RCX240 provide mixed control of the (linear single-axis) PHASER series and FLIP-X series.

Multi-robot ordering method



Robot settings

● 2-unit robot setting

Using a multi-task program along with this 2-unit setting allows asynchronous independent operation.

Using this along with an auxiliary axis setting allows even more freedom in assigning axes to tasks.

● Main auxiliary axis setting

Use this auxiliary axis setting when simultaneous movement with the MOVE command is impossible. An axis set for the main auxiliary axis moves only by the DRIVE command (axis separate movement command) and cannot operate from the MOVE command. Using this setting is recommended for operating on an axis that is not synchronized with the main robot.




● Dual setting

Make this setting when operating dual -drive (2-axis simultaneous control).

Use this dual-drive setting on gantry type Cartesian robots having a long Y axis stroke when stabilizing at high acceleration/deceleration or when high-thrust is needed with high loads.

● Double carrier

This setting allows adding 2 motors to 1 axis on robot types where the motor unit runs separately such as the linear motor single-axis PHASER series or the N-type (nut rotation type) FLIP-X series.

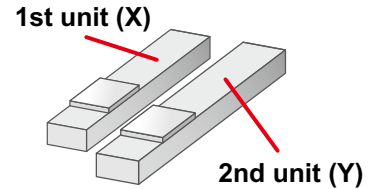
Name	2 axes controller		4 axes controller
	RCX221	RCX222	RCX240/RCX240S
Dimensions		 P.431	 P.438
Position detection	Incremental	Absolute	Incremental / Absolute
Control model	Can use combination of FLIP-X and PHASER		Can use combination of FLIP-X and PHASER
Maximum number of programs	100 programs		100 programs
Points	10000 points		10000 points
I/O points	General input 16 points / General output 8 points		General input 24 points / General output 16 points
Network option	CC-Link, DeviceNet, Profibus, Ethernet		

Multi-robot ordering method

Separate single axes

[Example] F14H and F10 can each be used separately.

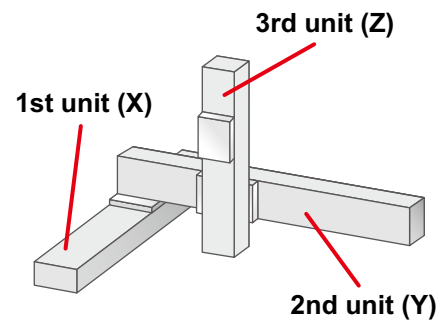
MLTX - F14H - 20 - U - 500	1st unit
- F10 - 20 - 300	2nd unit
- 5L - RCX222 - N - N1	Controller



3 axis combination

[Example] Install C17L as the X axis, the C14H as the Y axis, and the C14H as the Z axis to form a 3-axis XYZ combination.

MLTX - C17L - 50 - Z - 1500	1st unit
- C14H - 20 - 450	2nd unit
- C14H - 10 - BK - 150	3rd unit
- 3L - RCX240 - R - N - BB	Controller



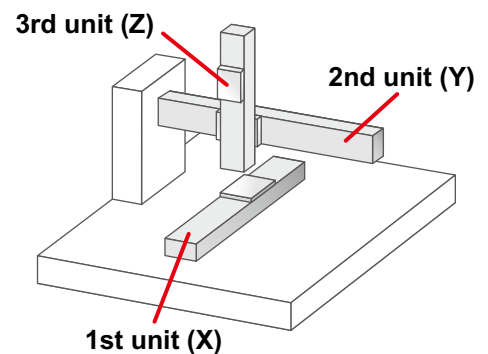
2-axes + 1-axis

[Example] The first axis is T6 mounted on the base.

The second axis is C6, the third axis C4H is clamped on the upper section, with C6 and C4H assembled in an XZ combination.

(These can be mounted in either 2-axis+1-axis or a 3-axis synchronous control by making the required setting.)

MLTX - T6 - 6 - 300	1st unit
- C6 - 6 - 300	2nd unit
- C4H - 6 - BK - 100	3rd unit
- 3L - RCX240S - N - BB	Controller



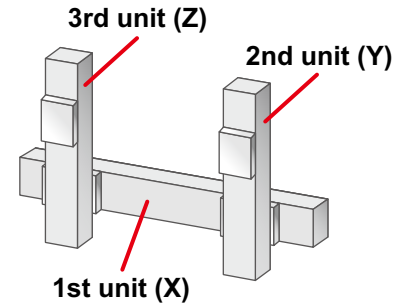
Note. Using cable terminals (intermediate cables) on the wiring between each axis is recommended when customers make their own axis combination. Please inquire at our company's sales section for more information on cable terminals.

Double carriage

4-axis control: examples ^{Note}

[Example] Two T6 are combined with MF20A double carrier in an XZ arrangement. Robots are controlled by 1 controller.

- MLTX - MF20AD - W - M - 850** 1st unit
- T6 - 12 - BK - 100** 2nd unit
- T6 - 12 - BK - 100** 3rd unit
- 3L - RCX240S - N1 - B** Controller



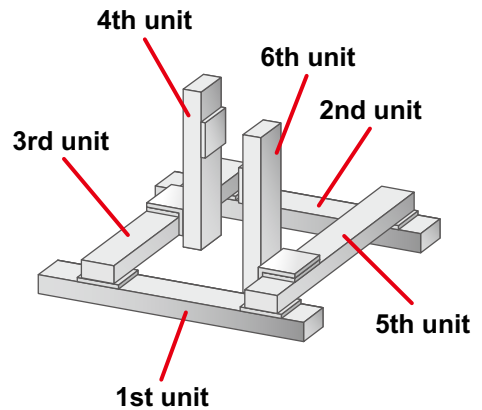
Note. If using a double carrier, then 1 robot unit takes up 2 axes on the controller so the number of robots and number of control axes will differ.

Double carriage / Dual drive (2-axis synchronous control)

8-axis control: examples ^{Note}

[Example] Two MF30 double carrier are arrayed in parallel and run by dual-drive with two MF20 mounted above. Two T6 are each mounted on the tip of the MF20. Robots are controlled by 2 controllers.

- MLTX - MF30D - H - L - 950** 1st unit
- MF30D - H - L - 950** 2nd unit
- MF20 - H - 1350** 3rd unit
- T6 - 6 - BK - 100** 4th unit
- MF20 - H - 1350** 5th unit
- T6 - 6 - BK - 100** 6th unit
- 3L - RCX240 - R - N** Controller ^{Note}



Note. When using these specifications, 2 units will automatically be procured for the customer when 1 controller unit was entered on the order form.

CAUTION Conditions where regenerative unit is needed on multi robots

- Where motor capacity exceeds a total of 450W.
- Where motor capacity for perpendicular axis exceeds a total of 240W.
- Where maximum speed exceeds 1250mm/sec. with B14H.
- Where the following conditions apply when perpendicular axis capacity is 240W or less.
 - Perpendicular axis is 200W.
 - Perpendicular axis is 100W and stroke is 700mm or more.
 - Where there are 2 perpendicular axes at 100W, and includes leads of 5mm.

FLIP-X terminology

High leads

This term indicates models supporting ball screw leads that exceed standard lead lengths (12mm or 20mm). (Standard lead length on the F17 and C17L is 50.)

Origin at non-motor side

This term indicates models supporting motors with inverse origin specifications as standard. Leads not showing this indication cannot support an inverse motor origin in the standard state. If custom specifications are required then please consult with our company.

Maximum speed

The maximum speed here means the maximum carrying speed. YAMAHA's single axis robots can carry the work at this speed regardless of its weight as long as it is within the maximum load capacity. If the carrying distance is short, however, the maximum speed may not be reached because the heavier the work being carried is, the more lenient the acceleration /deceleration curve becomes.

<Caution>

Vibration or abnormal sounds might occur when operated at maximum speed due to ball screw resonance caused by using ball screw types having a long stroke. If this happens, lower the speed to that listed in correct box in the notes. (The speed can be adjusted by lowering the conveyance speed for the entire program with the SPEED setting or by adjusting the movement command each time.)

Maximum payload

The maximum payload means the maximum weight that can be loaded on the slider and carried. When selecting the model, the total weight of tools (air cylinder, chuck, etc.) and the work should be less than this value. If the gravity center of the work is offset from the center of the slider, it is necessary to consider the permissible overhang as well. Also, it is so designed that optimum acceleration/deceleration speed and servo parameters are automatically set only by entering the total weight of tools and work for the payload parameter on the controller.

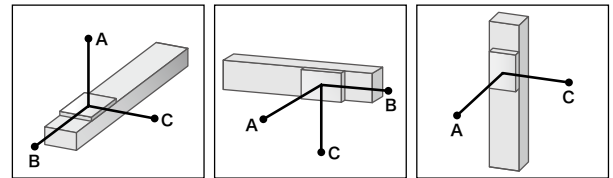
Rated thrus

The rated thrust means the force applied in the advancing direction of the slider while it is held stationary (hold). During the vertical use (a force is applied downward from the top), reduce the weight of the load. The slider can move only at a slow speed (about 10% of the maximum speed), but this value may become lower than the specification. The type B which is driven by the timing belt cannot be used for the purpose where thrust is applied.

Allowable overhang

The allowable overhang means how much the work may overhang. It is indicated as a specification by the distance from the center of the top face of the slider to the gravity center of the work to be carried by the weight. This value is determined on the basis of the service life of the linear guide. Under normal operation conditions ^(Note), the 90% service life of the linear guide is 10,000km (5,000km for T4, T5, C4 and C5) or more if gravity centers of the work and tools are kept within the permissible overhang.

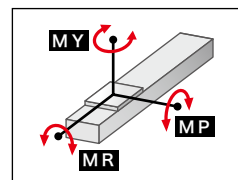
If using with an overhang amount exceeding the specification data then installing a separate support guide to prevent applying a load on the linear guides of the single axis robot or limiting the operating condition (speed, acceleration) is necessary. Please consult our company if more information is needed.



Note. Speed, acceleration 100% (The weight parameter must be set correctly). There should be no impact load or excessive vibration during operation. Alignment should be correct.

Static tolerance moment

This term expresses the load moment applied to the slider in a state where the robot is stopped.



Critical speed

Vibration or abnormal sounds might occur when operated at maximum speed due to ball screw resonance caused by using ball screw types having a long stroke. If that happens, lower the speed to that listed within the maximum speed table at the very bottom of each page. (Adjust the speed by lowering the conveyance speed for the entire program with the SPEED setting or by adjusting the movement command each time.)