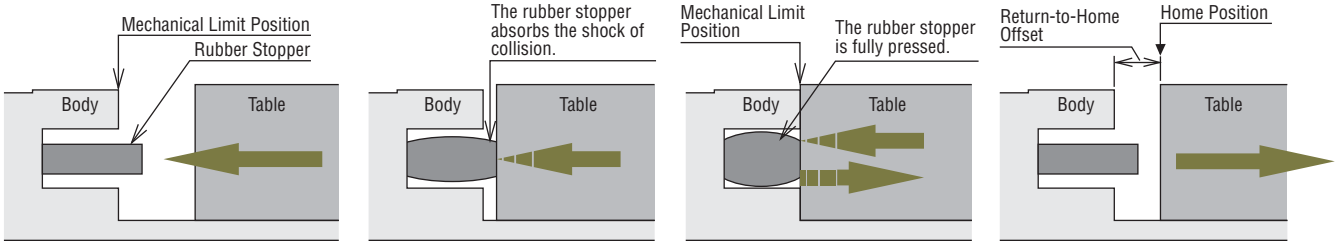
Linear & Rotary Actuators

Push-Motion Return-to-Home Operation

The push-motion return-to-home operation is performed by pressing the moving parts on the actuator body. By developing a structure that utilizes a special rubber stopper and pushes on the end surface of the metal components, high-speed return-to-home is possible.

Operating Push-Motion Return to Home

◇Electric Linear Slides (Electric cylinders)



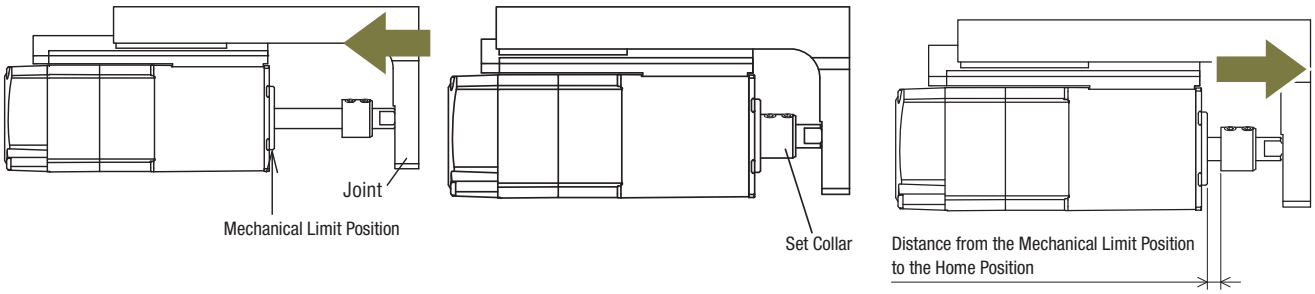
① At the push-motion return-to-home operation, the table moves to the mechanical limit position at high speed.

② After touching the rubber stopper, the table moves at low speed.

③ The table touches the mechanical limit position. When the metal planes touch, the direction is reversed.

④ **AR** Equipped Products:
The body stops at the set position of the return-to-home offset.
AZ Equipped Products:
The body stops at the factory set position.

◇Compact Linear Actuators



① At the push-motion return-to-home operation, the joint moves to the mechanical limit position at high speed.
✻The direction of the push-motion return-to-home operation must be toward the motor.

② The set collar contacts the mechanical limit position.

③ The set collar contacts the mechanical limit position.

Notes on Using the Push-Motion Return-to-Home Operation

- Perform the push-motion return-to-home operation below the dynamic permissible moment.
- When performing the push-motion return-to-home operation, configure and check the home positional offset and the current value of the push-motion return-to-home operation.
- With the **EAC** Series, when performing the return-to-home operation to the side opposite the motor, be sure to provide a mechanism that keeps the rod within the range of effective stroke.
  If the effective stroke is exceeded when the rod is pushed to the side opposite the motor, it may cause damage to the motor.
- When operating the load vertically with the **EAS4** or **EAC4** and a 12 mm lead, be sure that the max. load mass is less than 4 kg during the push-motion return-to-home operation to the upper side.
  Exceeding 4 kg causes an error in the home position.
- When operating the load vertically with the **EAS2** or **EAC2** and a 6 mm lead, perform the push-motion return-to-home operation to the downward side.
  Performing the push-motion return-to-home operation to the upward side causes an error in the home position.
- The products equipped with **AR** Series with pulse input type does not have the push-motion return-to-home operation function.

●Setting the Push-Motion Return-to-Home Offset (Distance from the mechanical limit position to the home position [mm])

◇αSTEP AZ Series

When the push-motion return-to-home offset is set to the Initial value (0), the push-motion return-to-home operation returns to the factory default position after reaching the mechanical limit position. Refer to the table below for the factory-set return distance.

Series	Actuator Size	Return-to-Home Offset (Distance from the mechanical limit position to the home position [mm])
EAS	2	4
	4	3
	6	6
EZS	3	3
	4	3
	6	6
EAC	2	4
	4	4
	6	4
DRS2	42	1

◇αSTEP AR Series

Set the return-to-home offset (distance from the mechanical limit position to the home position [mm]) to a value higher than the number contained in the table below.

Series	Actuator Size	Return-to-Home Offset (Distance from the mechanical limit position to the home position [mm])
EAS	2	4
	4	3
	6	6
EZS	3	3
	4	3
	6	6
EAC	2	4
	4	4
	6	4

Note

- When the push-motion return-to-home offset (distance from the mechanical limit position to the home position [mm]) is set to the Initial value (0), the electric linear slides (electric cylinders) equipped with **AR** Series motors lack sufficient offset and continue touching the rubber stopper that absorbs shock, which affects the accuracy of return-to-home.

●Setting the Current Value of the Push-Motion Return-to-Home Operation (Pushing force) (Recommended value)

◇αSTEP AZ Series

The current value of push-motion return-to-home is set to Absolute Sensor as the factory recommended value.

◇αSTEP AR Series

Set the current value of push-motion return-to-home (pushing force) according to the table below.

AC Power Supply Input

Series	Actuator Size	Lead [mm]	Push-Motion Return-to-Home Running Current (%)
EAS	4	6	100
		12	100
	6	6	55
		12	85
EAC	4	6	100
		12	100
	6	6	55
		12	85
EZS	3	6	100
		12	100
	4	6	100
		12	100
	6	6	55
		12	85

Note

- Be sure to set the current value of push-motion return-to-home to the recommended value.

DC Power Supply Input

Series	Actuator Size	Lead [mm]	Push-Motion Return-to-Home Running Current (%)
EAS	2	3	100
		6	100
	4	6	100
		12	100
	6	6	80
		12	100
EAC	2	3	100
		6	100
	4	6	100
		12	100
	6	6	80
		12	100
EZS	3	6	100
		12	100
	4	6	100
		12	100
	6	6	80
		12	100

●Push-Motion Return-to-Home Speed

The upper limits of the push-motion return-to-home speed are as follows.

◇α_{STEP} **AZ** Series

Series	Actuator Size	Lead [mm]	Push-Motion Return-to-Home Speed Limit [mm/s]
EAS	2	3	25
		6	50
	4, 6	6	50
		12	100
EAC	2	3	25
		6	50
	4, 6	6	50
		12	100
EZS	3, 4, 6	6	50
		12	100
DRS2	42	2	6
		8	

◇α_{STEP} **AR** Series

Series	Actuator Size	Lead [mm]	Push-Motion Return-to-Home Speed Limit [mm/s]
EAS	2	3, 6	10
	4	6, 12	25
	6		
EAC	2	3, 6	10
	4	6, 12	25
	6		
EZS	3	6, 12	25
	4		
	6		

Note

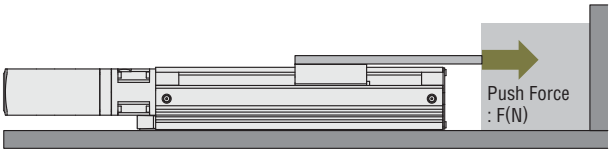
● Check the values of the dynamic permissible moment.

Push-Motion Operation

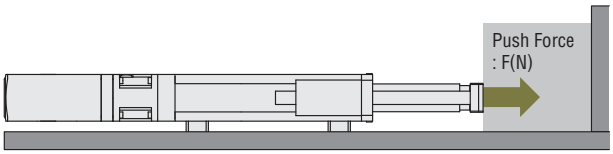
The push-motion operation applies pressures continuously when the moving parts contact the load. The operation can be performed with both built-in controller type and pulse input type. The upper limits of the pushing force are as follows.

Series	Actuator Size	Lead [mm]	Maximum Pushing Force [N]
EAS **EAC**	2	3	80
		6	40
	4	6	200
		12	100
	6	6	500
		12	400
EZS	3 4	6	200
		12	100
	6	6	500
		12	400
DRS2	42	2	400
		8	100

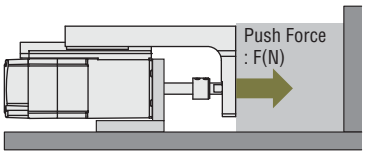
Electric Linear Slides



Electric Cylinders



Compact Linear Actuators

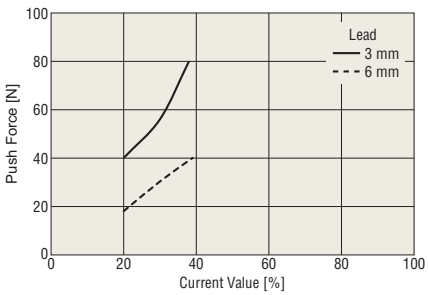


●Actual Pushing Value

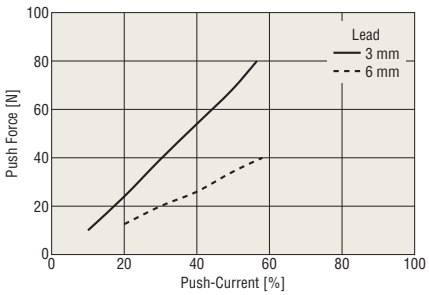
The pushing force and current values of the linear & rotary actuators are shown below as a reference.
The relationship between the pushing force and pushing current value varies depending on the following conditions. Check it on the actual assembled equipment.

- Installation conditions (Horizontal installation or vertical installation)
- The types and configurations of the linear & rotary actuators (without shaft guide/with shaft guide, stroke)
- Load conditions of user's jig, etc.

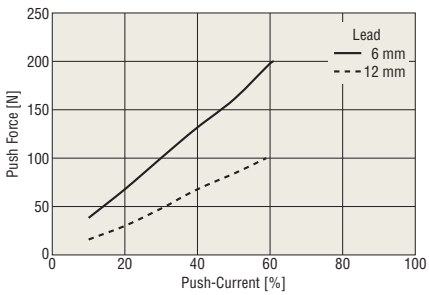
◇**EAS2, EAC2***
AZ Series
DC Power Supply Input



◇**EAS2, EAC2***
AR Series
DC Power Supply Input

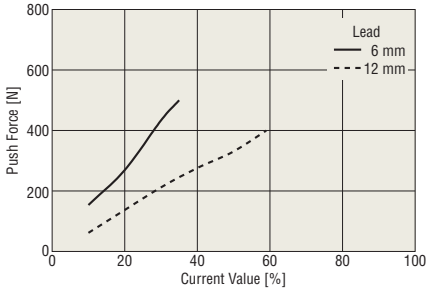


◇**EAS4, EAC4, EZS3, EZS4***
AZ/AR Series
AC Power Supply Input/DC Power Supply Input

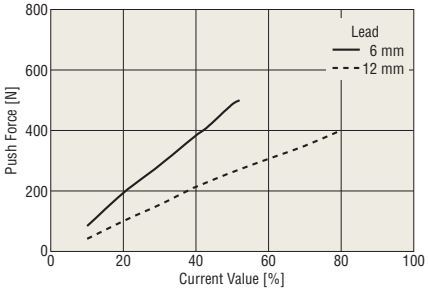


*Graphing conditions: The average pushing measurements were calculated using the **EAC** Series in a horizontal installation.

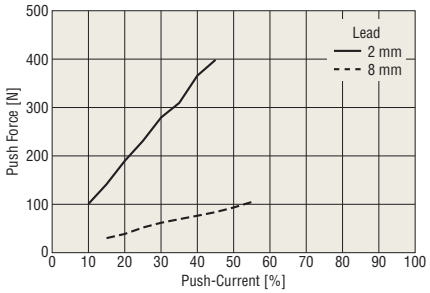
◇**EAS6, EAC6, EZS6**✻1
AZ/AR Series
AC Power Supply Input



◇**EAS6, EAC6, EZS6**✻1
AZ/AR Series
DC Power Supply Input



◇**DRS42**✻2
AZ Series
DC Power Supply Input



✻1 Graphing conditions: The average pushing measurements were calculated using the **EAC** Series in a horizontal installation.
✻2 Graphing conditions: The average pushing measurements were calculated using the **DRS2** Series in a horizontal installation.

●Push-Motion Operation Speed (Upper limits)

The upper limits of the push-motion operation speed are as follows.

◇α_{STEP} **AZ** Series

Series	Push-Motion Speed [mm/s]
EAS	25
EAC	
EZS	
EZSH	
DRS2	6

◇α_{STEP} **AR** Series

Series	Actuator Size	Push-Motion Speed [mm/s]
EAS	2	10
	4, 6	25
EAC	2	10
	4, 6	25
EZS	3, 4, 6	25

●Perform the push-motion operation below the push-motion speed. If the push-motion operation exceeds the speed limits, it may result in damage.

●Recommended Starting Speed for **DRS2** Series

When the **DRS2** reaches the extremity of its stroke or collides with a device during operation, remove the load and return a ball screw at the recommended starting speed.

Series Frame Size	Lead [mm]	Recommended Starting Speed [mm/s]
DRSM42	2	0.4
	8	1.6

Linear Guide Types of Electric Linear Slides

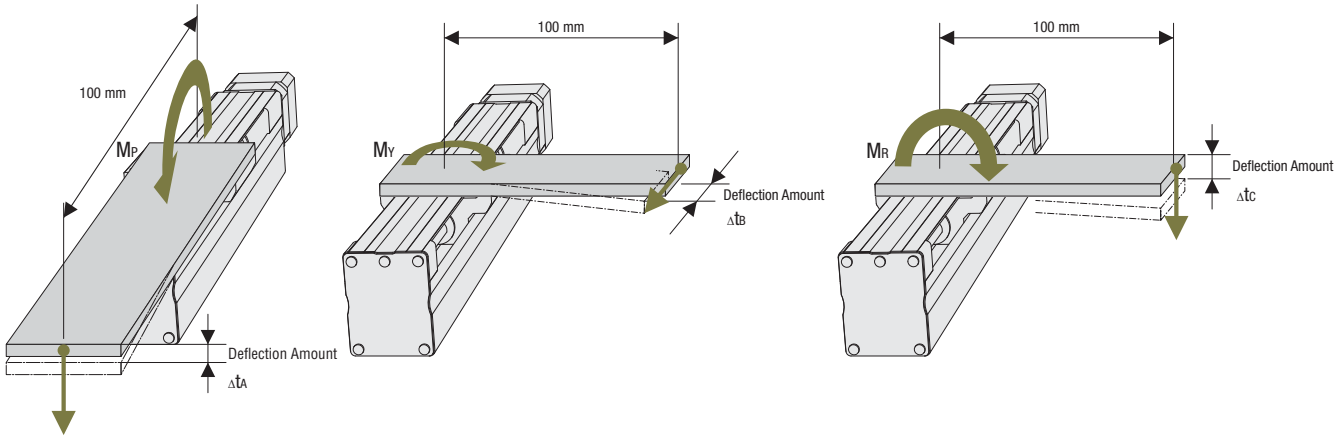
The linear guides used on electric linear slides are made by THK. The type for each series is shown in the table below.

Series	Actuator Size	Linear Guide Type
EAS	**2**	SRS12M
	4	SHS15V
	6	SSR25XW
EZS	**3**	SRS12WM
	4	SRS15WM
	6	SRS15WM × 2 Blocks

Deflection and Rigidity of the Table

When a load moment is applied to the table of an electric linear slide, the table is being supported by the linear guide. The action of load moment causes balls in the linear guide to deflect, and as a result, displacement of the load is observed. Shown below are the actual displacements that were measured when a load moment was applied to an electric linear slide.

<Measurement Conditions>
A 100 mm overhung plate was fixed on a linear slide table and a load moment equivalent to the dynamic permissible moments (M_P, M_Y, M_R) was applied in each direction. The deflection of the tip (Δt_A, Δt_B, Δt_C) was measured under these conditions.



Pitching Direction　　Yawing Direction　　Rolling Direction

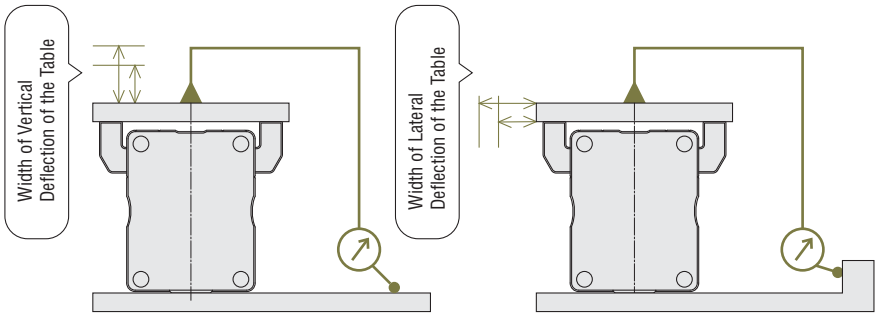
Table Deflection under Dynamic Permissible Moment

Series	Product	Pitching Direction		Yawing Direction		Rolling Direction	
		M_P [N·m]	Δt_A [mm]	M_Y [N·m]	Δt_B [mm]	M_R [N·m]	Δt_C [mm]
EAS	**EAS2**	2.4	0.15	1.5	0.13	4.6	0.36
	EAS4	16.3	0.11	4.8	0.03	15	0.38
	EAS6	31.8	0.11	10.3	0.03	40.6	0.41
EZS	**EZS3**	4.2	0.11	4.2	0.14	10.5	0.14
	EZS4	8	0.09	8	0.12	27.8	0.17
	EZS6	45.7	0.1	37.5	0.19	55.6	0.04

- Deflection of the 100 mm plate is ignored.
- Deflection characteristics do not change among different table types.

Traveling Parallelism of Electric Linear Slides

Traveling parallelism shows a range of fluctuation in the distance between the table and a reference plane that is equivalent to the table traveling with the linear slide installed to the reference plane.
The **EAS** Series and the **EZS** Series achieve high traveling parallelism because the linear guide can be used directly as the installation surface. (0.03 mm max.)

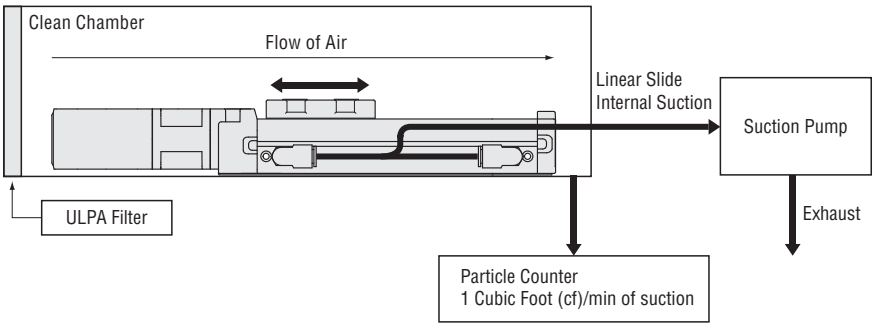


Particulate-Generation Amount of Cleanroom Use

The **EZS** Series has achieved ISO Standard Class 3 (equivalent to FED Standard Class 1) with improved airtightness through the use of low particulate-generative grease and a stainless steel sheet.

Measurement method

The method for measuring the level of cleanliness is shown below. (Conforms to Japanese Industrial Standards (JIS) B 9926)

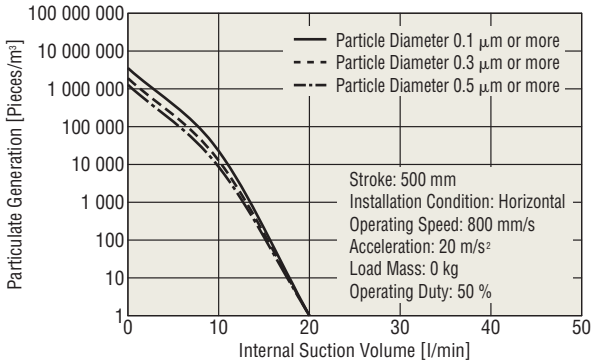


[ISO Standards]

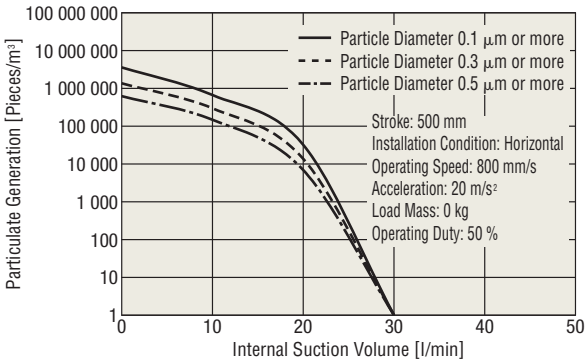
Class/Particle Size (μm)	Class 3
0.1	1000 max.
0.3	102 max.
0.5	35 max.

Correlation Diagram of Particulate-Generation and Suction Volume (Actual values measured from the sample data)

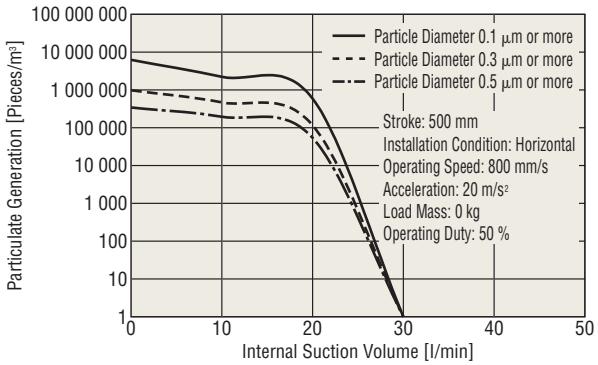
EZS3CL-D050, EZS3CR-D050



EZS4CL-D050, EZS4CR-D050



EZS6CL-D050, EZS6CR-D050



- The product names on the characteristics diagram are listed such that the product names are distinguishable. The characteristics of the **AR** Series are the same as those of the **AZ** Series.