Oriental motor

HL-9013-2

LJ Linear Head

Combination with AZ Series

Function Setting Edition

Table of contents

1 Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product.
Use the product correctly after thoroughly reading the section "Safety precautions" of the operating manual. In addition, be sure to observe the contents described in warning, caution, and note in this manual.
The motorized actuator is designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

Notation on this manual

⚠ **CAUTION**	Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in injury or property damage.
Note	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.
memo	The items under this heading contain related information and contents to gain a further understanding of the text in this manual.

■ Related operating manuals

Operating manuals for this product are listed below.
Operating manuals are not included with the product. Download them from Oriental Motor Website Download Page or contact your nearest Oriental Motor sales office.

- **LJ** Linear Head Combination with **AZ** Series Function Setting Edition (this manual)
- **LJ** Linear Head OPERATING MANUAL
- **AZ** Series/Motorized actuator equipped with **AZ** Series OPERATING MANUAL Function Edition

■ Product combination list

- The box (□) in the model name indicates a number representing the stroke length.
- The box (■) in the model name indicates **A** (standard) or **M** (with electromagnetic brake) representing the motor type.
- The box (●) in the model name indicates **U** (upward), **L** (leftward), or **R** (rightward) representing the cable outlet direction.

Linear head model	Motor model
AGL5H18-□	**AZM98■C-TS10●**
	AZM98■C-TS20●
	AZM98■C-TS30●

2 Setting the parameters

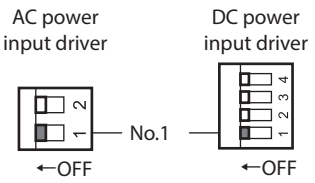
2-1 Guidance

This chapter describes the parameter setting for a motorized actuator (hereinafter referred to as rack and pinion motor) that the **LJ** linear head and the **AZ** Series motor are combined.

STEP 1	**Install the rack and pinion motor.**	Refer to the **LJ** Linear Head OPERATING MANUAL for how to assemble a linear head and a motor.
↓		
STEP 2	**Connect the driver.**	
↓		
STEP 3	**Start the support software MEXE02.**	
↓		
STEP 4	**Set the parameters of the driver. (P.4)**	The setting file having input the recommended parameters is available.
↓		
STEP 5	**Set the software limit when no sensor is used.**	
↓		
STEP 6	**Check the movement of the rack and pinion motor.**	Check the movement of the rack and pinion motor with "Teaching, remote operation" of the **MEXE02** software.
↓		
STEP 7	**Save the set data.**	

Note

- When the rack and pinion motor is used in combination with the pulse input type driver, do not change the SW1-No.1 of the function setting switch on the driver (factory setting: OFF). If this switch is set to ON, the resolution is fixed to 10,000 P/R, and an unexpected movement may result.



- If the rack is operated in a vertical direction, an alarm of Overvoltage may be detected depending on the driving condition. If an alarm of Overvoltage was generated, reconsider the operating condition or use Oriental Motor's regeneration resistor **RGB100**.
- To restore the driver to the factory setting, select "Restored to the factory setting" under the "Communication" menu to initialize.

■ About the setting file for rack and pinion motor

The setting file that the recommended parameters were input in advance to operate the rack and pinion motor is provided in the download page of the **MEXE02** software. Download the setting file to use.

memo

- The setting file is created based on the contents of this manual.
- The minimum travel amount is 0.01 mm.

2-2 Setting examples of parameters

- The box (■) in the model name indicates **A** (standard) or **M** (with electromagnetic brake) representing the motor type.
- The box (●) in the model name indicates **U** upward), **L** (leftward), or **R** (rightward) representing the cable outlet direction.

■ Product specifications

	AZM98■C-TS10●	AZM98■C-TS20●	AZM98■C-TS30●
Mechanism lead	11.310 [mm]	5.655 [mm]	3.770 [mm]

■ Motor & mechanism parameter

This section describes setting examples of parameters when the minimum travel amount is set to 0.01 mm (resolution 1,000 P/R).
Refer to the **AZ** Series OPERATING MANUAL Function Edition for how to set parameters.
items represent parameters to be changed.

Item	Setting example					
	AZM98■C-TS10●		AZM98■C-TS20●		AZM98■C-TS30●	
Mechanism settings	Manual setting					
Electronic gear A	36,893		55,057		55,057	
Electronic gear B	41,725		31,134		20,756	
Mechanism lead	11,310		5,655		3,770	
Mechanism lead decimal digit setting	×0.001 [mm]					
Initial coordinate generation & wrap coordinate setting	Manual setting					
Initial coordinate generation & wrap setting range	1800 [rev]					
Wrap setting	Disable					
The number of the RND-ZERO output in wrap range	180		90		60	
JOG/HOME/ZHOME operation setting	Manual setting					
Unit of travel amount	step	mm *Not possible to set	step	mm *Not possible to set	step	mm *Not possible to set
(JOG) Operating speed	1,000 [Hz]	10 [mm/s]	1,000 [Hz]	10 [mm/s]	1,000 [Hz]	10 [mm/s]
(JOG) Acceleration/deceleration	50 [kHz/s]]	0.5 [m/s^2]	15 [kHz/s]	0.15 [m/s^2]	5 [kHz/s]	0.05 [m/s^2]
(JOG) Operating speed (high)	2,000 [Hz]	20 [mm/s]	2,000 [Hz]	20 [mm/s]	2,000 [Hz]	20 [mm/s]
(ZHOME) Operating speed	2,000 [Hz]	20 [mm/s]	2,000 [Hz]	20 [mm/s]	2,000 [Hz]	20 [mm/s]
(ZHOME) Acceleration/ deceleration rate	50 [kHz/s]	0.5 [m/s^2]	15 [kHz/s]	0.15 [m/s^2]	5 [kHz/s]	0.05 [m/s^2]
(HOME) Home-seeking mode	Push-motion					
(HOME) Operating speed	600 [Hz]	6 [mm/s]	600 [Hz]	6 [mm/s]	600 [Hz]	6 [mm/s]
(HOME) Acceleration/ deceleration	50 [kHz/s]	0.5 [m/s^2]	15 [kHz/s]	0.15 [m/s^2]	5 [kHz/s]	0.05 [m/s^2]
(HOME) Operating current for push-home-seeking	51 %		49 %		55 %	

memo

- Set the unit of the travel amount with "step".
- When changing the acceleration/deceleration unit, also change the values set in the (JOG) Acceleration/deceleration, (ZHOME) Acceleration/deceleration, and (HOME) Acceleration/deceleration parameters. Only changing the unit will not change the setting values.
- Check the specifications of the maximum speed to set the operating speed.
- If an alarm is detected, reconsider the operating condition or use Oriental Motor's regeneration resistor **RGB100**.
- Use equal to or less than the values shown in the table below for the acceleration/deceleration rate when setting the electronic gears (0.01 mm/step).

	AZM98■C-TS10●	**AZM98■C-TS20●**	**AZM98■C-TS30●**
Maximum acceleration	1 m/s^2	0.3 m/s^2	0.1 m/s^2
Acceleration/ deceleration rate	100 kHz/s	30 kHz/s	10 kHz/s

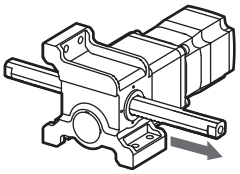
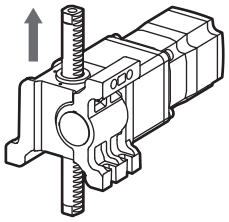
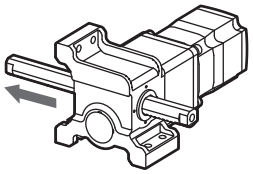
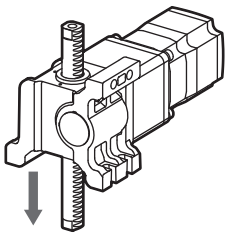
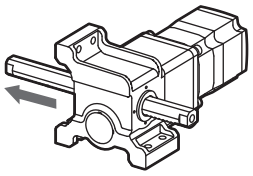
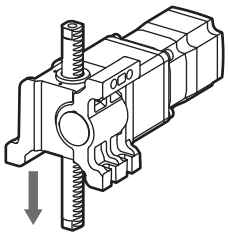
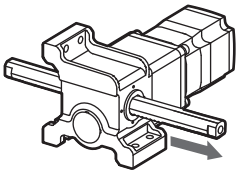
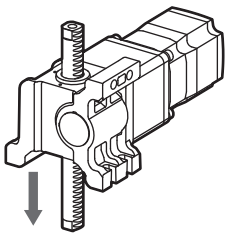
2-3 Moving direction of rack

The following two methods are available to change the moving direction of the rack. Use them selectively in accordance with the intended use.

- To change the travel amount.
- To change the "Motor rotation direction" parameter.

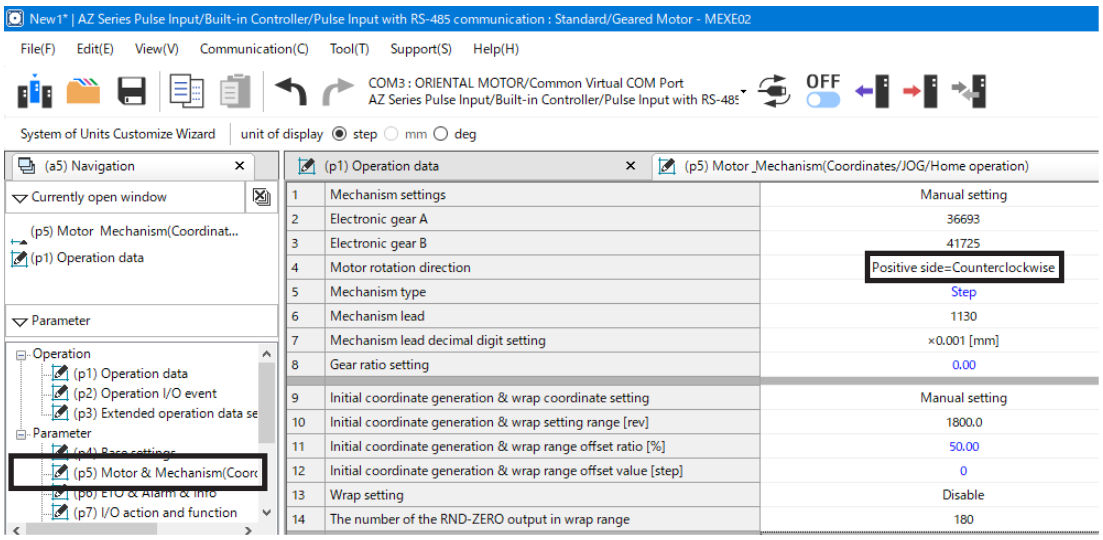
■ When changing the travel amount

When assembling the **LJ** linear head and the **AZ** Series motor (factory shipment), the moving direction of the rack is set as shown below. Changing the travel amount or the pulse input method can change the moving direction of the rack.

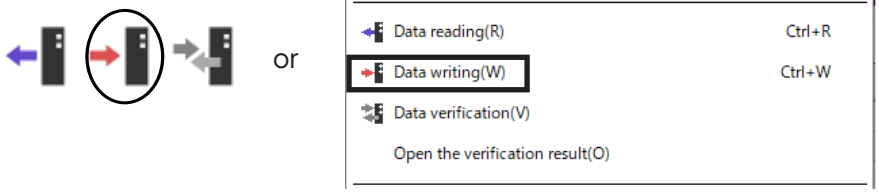
<table>
<tr><th rowspan="2">When setting the operation data</th><th rowspan="2">When inputting the pulse signal</th><th colspan="2">Moving direction of rack</th></tr>
<tr><th>Horizontal installation</th><th>Vertical installation</th></tr>
<tr><td rowspan="4">Set the positive (+) value in travel amount</td><td rowspan="4">• 2-pulse input mode
Input the pulse signal to the CW input
• 1-pulse input mode
Input the pulse signal to the PLS input when the DIR input is ON</td><td colspan="2">AZM98-TS10</td></tr>
<tr><td> 
Positive direction</td><td>Positive direction
  </td></tr>
<tr><td colspan="2">AZM98-TS20, AZM98-TS30</td></tr>
<tr><td> 
Positive direction</td><td> 
Positive direction</td></tr>
<tr><td rowspan="4">Set the negative (-) value in travel amount</td><td rowspan="4">• 2-pulse input mode
Input the pulse signal to the CCW input
• 1-pulse input mode
Input the pulse signal to the PLS input when the DIR input is OFF</td><td colspan="2">AZM98-TS10</td></tr>
<tr><td>Negative direction
  </td><td> 
Negative direction</td></tr>
<tr><td colspan="2">AZM98-TS20, AZM98-TS30</td></tr>
<tr><td> 
Negative direction</td><td> 
Negative direction</td></tr>
</table>

■ When changing the “Motor rotation direction“ parameter

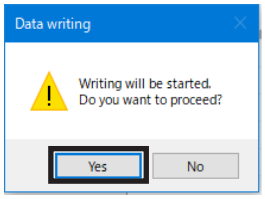
1. Select the “Motor & Mechanism (Coordinates/JOG/Home operation)“ on the **MEXE02** software.
2. Change the “Motor rotation direction“ parameter to “Positive side=Clockwise“ or “Positive side=Counterclockwise.“



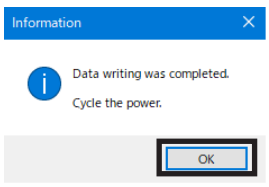
3. Write the parameter to the driver in the following steps.
   1) Click the “Data writing“ icon or “Data writing“ under “Communication.“



   2) Click “Yes.“
   Writing the parameter is started.



   3) Click “OK.“
   Writing the parameter is completed.



   4) Turn on the power supply of the driver again.

4. Check that the changed parameter is updated on the unit information monitor window.

		Active	Driver parameter	ABZO (fixed)
5-1	Mechanism settings	Driver parameter	Manual setting	
5-2	Electronic gear A	0	36693	0
5-3	Electronic gear B	0	41725	0
5-4	Motor rotation direction	Positive side=Counterclockwise	Positive side=Counterclockwise	Positive side=Counterclockwise
5-5	Mechanism type	Step	Step	No setting
5-6	Mechanism lead (pitch) [mm]	0 [mm]		
5-7	Mechanism lead	0	1130	0
5-8	Mechanism lead decimal digit setting	x1 [mm]	×0.001 [mm]	x1 [mm]
5-9	Mechanism stroke	0 [mm]		0 [mm]
5-10	Magnetic brake	None		None
5-11	Gear ratio setting	0.00	Gear ratio setting is invalid	0.00
5-12	Initial coordinate generation & wrap coordinate setting	Driver parameter	Manual setting	No setting
5-13	Initial coordinate generation & wrap setting range	0.0 [rev]	1800.0 [rev]	0.0 [rev]

3 Operation

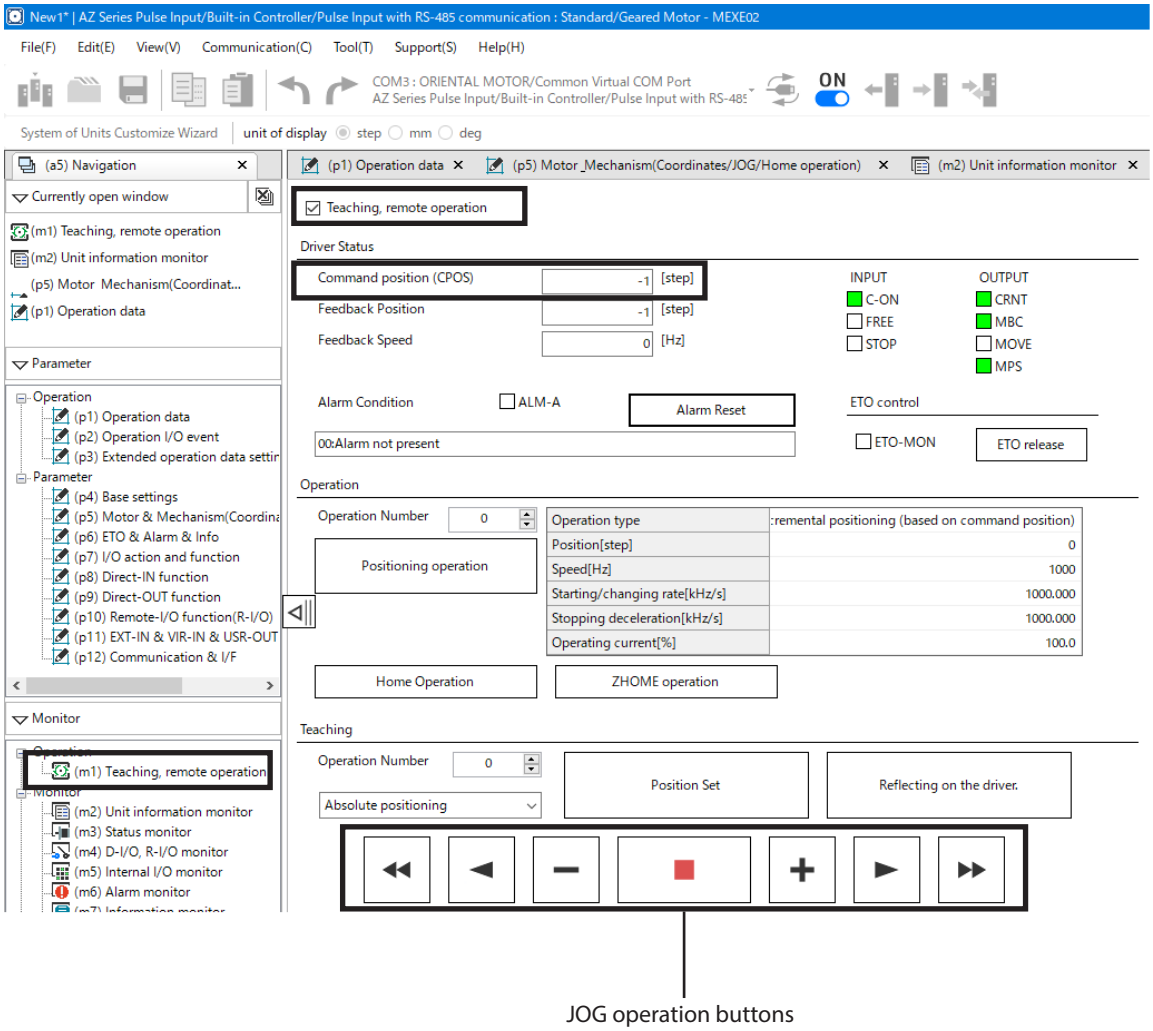
3-1 Absolute positioning operation

The motor of the **AZ** Series manages the absolute position by the ABZO sensor.
The ABZO sensor stores the present position as the absolute position until the number of rotations of the motor output shaft exceeds 1,800 revolutions (±900 revolutions) with reference to the home. Within this range, it keeps the present position even if the driver power is turned off.
Before starting absolute positioning operation, be sure to set the home.

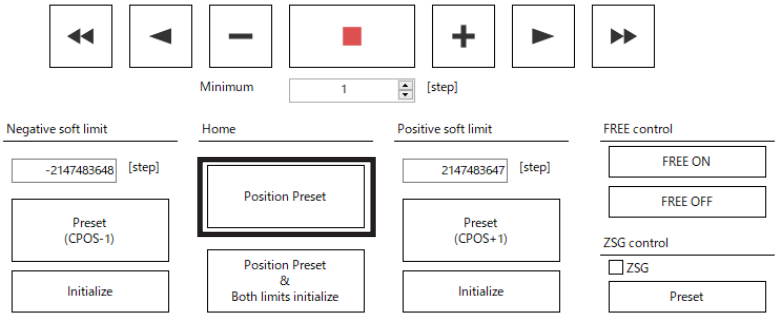
■ Setting the home

memo When replacing the linear head or motor, set the home again after replacement.

1. Select "Teaching, remote operation" using the **MEXE02** software.
2. Click "Teaching, remote operation."
3. Using the JOG operation switches, move the rack to the home. Adjust the position while checking the "Command position (CPOS)" in the "Driver Status" field.



4. Click "Position Preset". The home is set.

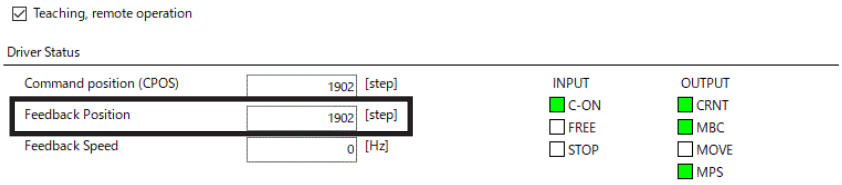


■ Checking the movable distance

Check the movable distance by the **MEXE02** software or actual measurement.

● Check by MEXE02 software

Using the JOG operation switches, move the rack from the home.
Check the "Feedback position" in the "Driver Status" field.



● Check by actual measurement

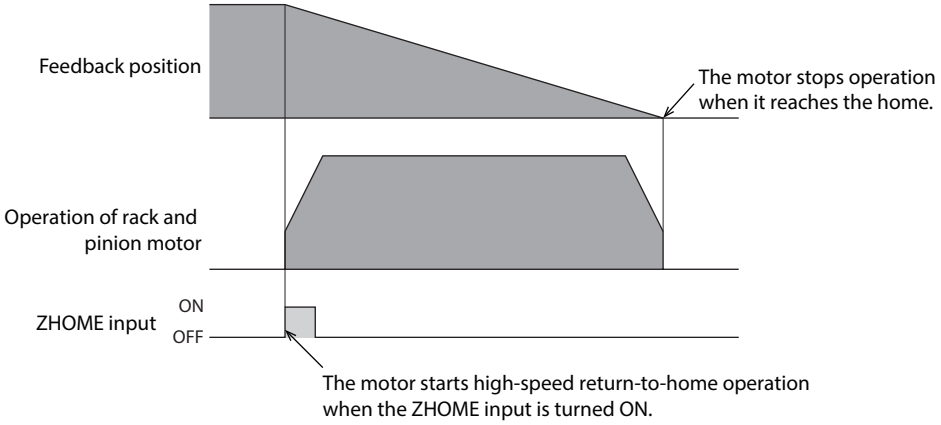
Using the JOG operation switches, move the rack to a desired position.
Measure the distance from the end face of the rack to the rack bushing.

3-2 Return-to-home

Return-to-home is operation that the reference position (home) to be the starting point is established when positioning operation is performed.
Return-to-home operation is performed to return to the home from the present position when the power supply is turned on or positioning operation is completed.
Two types of return-to-home methods are available. One is high-speed return-to-home operation, and the other is return-to-home operation.

■ High-speed return-to-home operation

High-speed return-to-home operation is operation to return to the mechanical home on the absolute coordinates set in advance. Since the home is recognized by the ABZO sensor, return-to-home operation can be executed at the same speed as that of the normal positioning operation without using an external sensor.
When the ZHOME input is turned ON, high-speed return-to-home operation is started. The rack and pinion motor stops when the operation stop signal is turned ON while the motor is operating.



■ Return-to-home operation

Return-to-home operation is operation to detect the home using an external sensor.
There are four types of return-to-home operations shown below.

Operation mode	Features
2-sensor mode	• Two sensors are required externally. • The operating speed is at a low rate (starting speed of return-to-home).
3-sensor mode	• Three sensors are required externally. • The operating speed is at a high rate (starting speed of return-to-home).
One-way rotation mode	• One sensor is required externally. • The operating speed is at a high rate (starting speed of return-to-home). • Not reversed.
Push-motion mode	• An external sensor is not required. • The operating speed is at a high rate (operating speed of return-to-home).

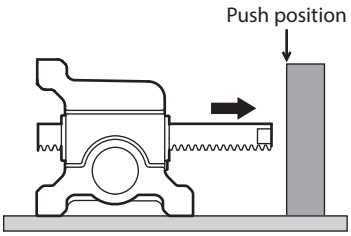
- **Push-motion mode**

⚠ CAUTION

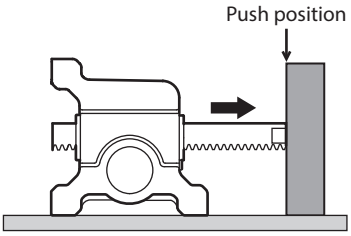
When return-to-home operation is performed in the push-motion mode, provide an external mechanism that the rack presses against within the range of the stroke. Pressing against exceeding the range of the stroke may result in injury or damage to equipment.

Movement

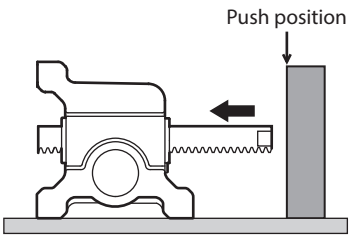
1. When push-motion return-to-home operation is performed, the rack moves to a mechanism.



2. The rack presses against the mechanism.



3. The rack returns to the home having set and stops.



Push force

Set the push force of push-motion return-to-home operation as a percentage of the rated current.
Set the upper limit value to be equal to or less than a value shown in the table. Do not set a value larger than that in the table.

Model		Operating current (%)
Linear head	Motor	
AGL5H18-□	**AZM98■C-TS10●**	51
	AZM98■C-TS20●	49
	AZM98■C-TS30●	55

Operating speed of push-motion return-to-home

The upper limit value of the push-motion return-to-home speed is 6 mm/s.

3-3 Push-motion operation

Push-motion operation is operation that continuously pressurizes on a load when having pressed against it.

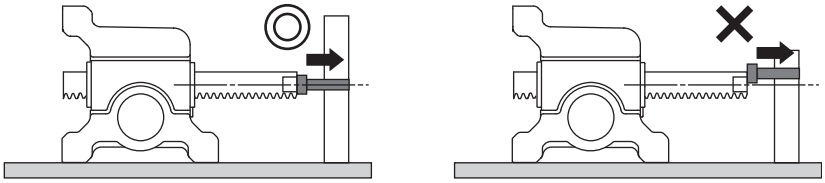
■ Setting of push force

The push force can be set in the "Operating current" of the operation data. The maximum push forces are as shown in the table.

Model		Maximum push force [N]	Operating current (%)
Linear head	Motor		
AGL5H18-□	**AZM98■C-TS10●**	637	51
	AZM98■C-TS20●	1,274	49
	AZM98■C-TS30●	1,961	55

Note

- Set the operating current in order not to exceed the maximum push force. Performing push-motion operation with the current exceeding the maximum push force may cause damage to equipment or deterioration of specifications.
- Perform push-motion operation on an extension of the rack. Performing push-motion operation in a position deviated from the extension of the rack may cause damage to the rack and pinion motor.

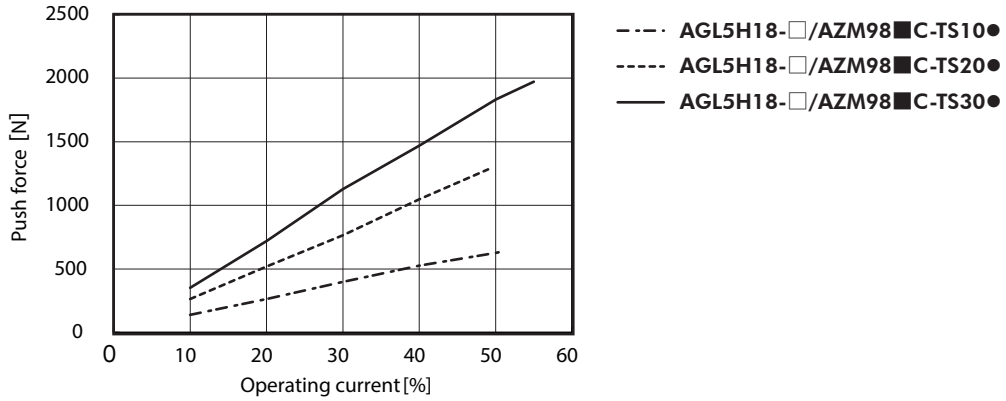


● **Reference: Measurement result of the operating current and push force**

This section shows the reference value of the push force when the **LJ** linear head (**AGL5H18-□**) is combined with the **AZ** Series **TS** geared type motor.

Note

- The relationship between the operating current and push force varies depending on your load conditions such as jig. Refer to the graph to check the actual push force using the equipment, and adjust the operating current.
- If the rack and pinion motor is used in a vertical direction, the actual transportable mass is a value obtained by subtracting the mass of the rack from the specification value.



■ Push speed

The upper limit value of push speed is 6 mm/s.

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