

Before Using a Linear Motion System

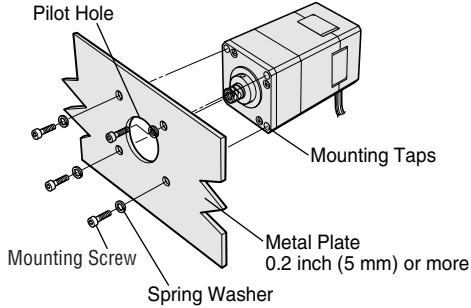
Compact Actuator DRL Series

■ Installing an Actuator

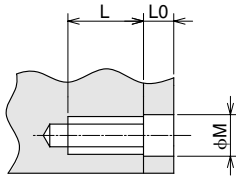
● Installation Method

1. Insert the pilot located on the actuator mounting surface into the metal plate's countersunk hole or through-hole.
2. Install the actuator to a rigid metal plate (with a thickness of 0.2 inch (5 mm) or more), using mounting bolts.

Using Mounting Taps of an Actuator



● Details of Mounting Tap



Model	Nominal Diameter of Bolt	Tightening Torque oz-in (N·m)	Dimension of Mounting Tap [inch (mm)]		
			φM	LO	L (Effective Depth)
DRL28	M2.5	85 (0.6)	0.12 (3)	0.08 (2)	0.236 (6)
DRL42	M4	250 (1.8)	—	—	0.315 (8)
DRL60	M5	710 (5.0)	0.22 (5.5)	0.16 (4)	0.394 (10)

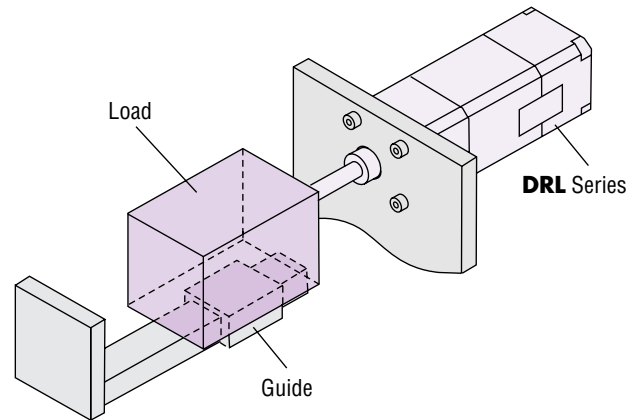
● Installation Location

Install the actuator in a place satisfying following conditions, or the product may be damaged.

- Inside an enclosure installed indoors (with ventilation holes provided)
- Ambient temperature: 32°F to 104°F (0°C to +40°C) [nonfreezing]
- Ambient humidity: 85% or less (no condensation)
- Free of explosive, or toxic gases (sulfide gas, etc.) or liquids
- Not exposed to direct sunlight
- Not exposed to significant amounts of dust or iron powder
- Not exposed to water (rain, water droplets), oil (oil droplets) or other liquids
- Not exposed to air having a high salt content
- Not subject to continuous vibration or excessive shock
- Not subject to significant electromagnetic noise caused by welding machines, power equipment, etc.
- Not exposed to radioactive materials, magnetic fields or vacuum conditions

■ Anti-spin Mechanism

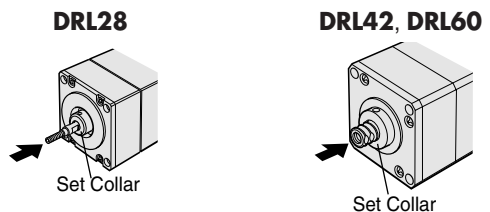
The moving part of the standard actuator does not have an anti-spin mechanism. Always provide an external anti-spin mechanism, such as a guide for positioning operation. In addition, make sure the load is supported with a linear guide, etc.



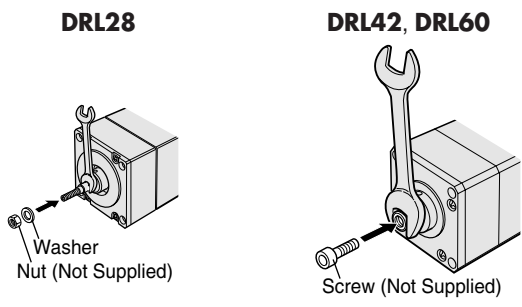
Installing a Load

Standard Type

1. Retract the screw shaft until it stops at the set collar.



2. Holding the flat section of the screw shaft with a wrench, affix the load with a screw (or nut, in the case of the **DRL28**).



Mode	Nominal Diameter of Screw/Nut
DRL28	M3 Nut
DRL42	M4 Screw
DRL60	M8 Screw

Installation Accuracy

When connecting a load, ensure the installation accuracy specified below. Poor installation accuracy may result in a malfunction or shortened service life.

Perpendicularity Unit = inch (mm)

DRL28

⊥	φ0.0012 (0.03)	A
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DRL42, DRL60:

⊥	φ0.002 (0.05)	A
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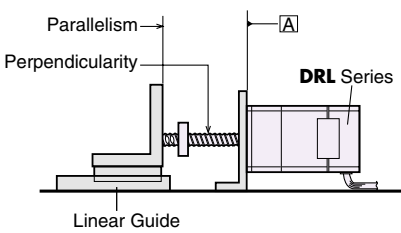
Parallelism Unit = inch (mm)

DRL28

//	0.0012 (0.03)	A
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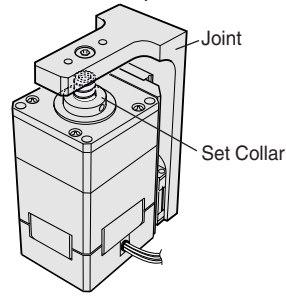
DRL42, DRL60

//	0.002 (0.05)	A
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Guide Type

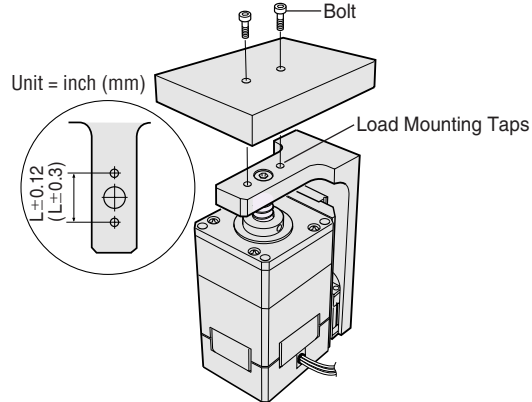
1. Retract the screw shaft until it stops at the set collar.



2. Affix the load with a screw.

When using load-mounting taps on the screw-shaft side

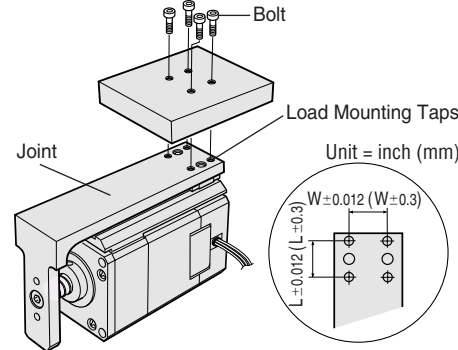
Install the load using load-mounting taps on the L-shaped bracket and the appropriate bolts (not supplied).



Model	Nominal Diameter of Bolt	Tightening Torque oz-in (N·m)	Effective Depth inch (mm)	L inch (mm)
DRL28	M2.5	85 (0.6)	0.197 (5)	0.63 (16)
DRL42	M4	142 (1.0)	0.295 (7.5)	0.787 (20)
DRL60	M5	280 (2.0)	0.453 (11.5)	1.181 (30)

When using load-mounting taps on the linear-guide side

Install the load using load-mounting taps on the L-shaped bracket and appropriate bolts (not supplied).



Model	Nominal Diameter of Bolt	Tightening Torque oz-in (N·m)	Effective Depth inch (mm)	L inch (mm)	W inch (mm)
DRL28	M2.5	85 (0.6)	0.138 (3.5)	0.472 (12)	0.551 (14)
DRL42	M4	142 (1.0)	0.217 (5.5)	0.945 (24)	0.748 (19)
DRL60	M5	280 (2.0)	0.217 (5.5)	0.866 (22)	1.102 (28)

- When installing a load to the guide type, do not disconnect the ball screw from the L-shaped bracket. This may cause an offset when assembling, resulting in malfunction.
- Do not apply an overhung load to the L-shaped bracket of the guide type. Also, do not apply an inertial load to the L-shaped bracket of the **DRL28** guide actuator. Doing so may result in a malfunction or shortened service life.
- When transporting, remove the load installed to the actuator, or damage may be caused to the equipment.

■ Precautions in Handling

- Do not loosen the actuator's mounting screws or attempt to disassemble the unit.
- The accuracy and other data are measured at a specific temperature and load.
- When transporting the equipment in which the actuator is installed, be sure to remove the load from the screw axis.

■ Precautions for Operation

- The surface temperature of the actuator should be kept at 194°F (90°C) or less during operation.
- Although the actuator has a built-in stopper for the ball screw, it may lock up or become damaged due to impact if it hits the stroke end. Do not allow the actuator to hit the stroke end or the equipment.

■ Installing a Driver

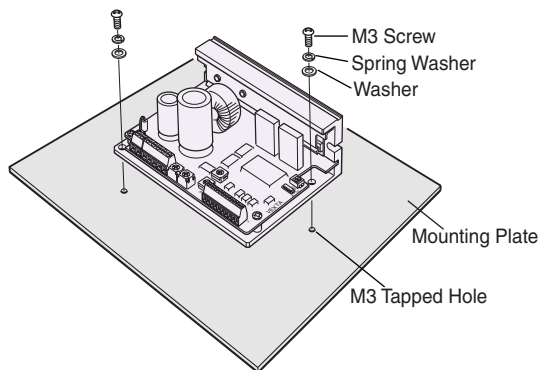
● Installation Direction

When installing the driver in an enclosure, always install it in the direction illustrated below. There must be a clearance of at least 1 inch (25 mm) and 2 inch (50 mm) in the horizontal and vertical directions, respectively, between the driver and enclosure or other equipment.

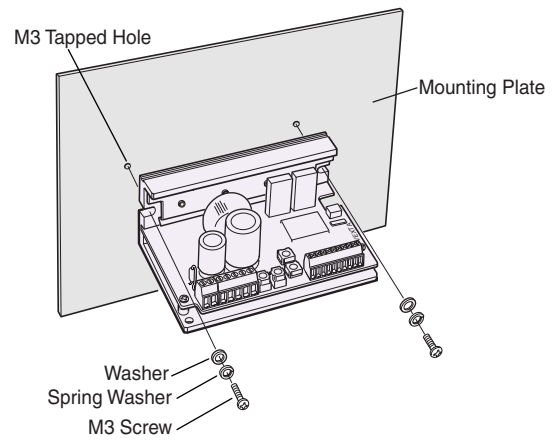
When installing two or more drivers in parallel, provide a minimum clearance of 0.8 inch (20 mm) between adjacent drivers.

Attach the driver to the mounting plate using M3 screws.

● Installation in the Horizontal Direction



● Installation in the Vertical Direction



Notes:

- Do not install equipment generating significant heat or electrical noise in the vicinity of the driver.
- Adjust the ventilation condition if the ambient temperature of the driver exceeds 104°F (40°C).

● Installation Location

The driver is designed and manufactured for use as a built-in component in industrial equipment.

Install it in a well-ventilated place satisfying the following conditions, where the product can be easily accessed for the purpose of inspection.

- Inside an enclosure installed indoors (with ventilation holes provided)
- Ambient temperature: 32°F to 104°F (0°C to +40°C) [nonfreezing]
- Ambient humidity: 85% or less (no condensation)
- Free of explosive, or toxic gases (sulfide gas, etc.) or liquids
- Not exposed to direct sunlight
- Not exposed to significant amounts of dust or iron powder
- Not exposed to water (rain, water droplets), oil (oil droplets) or other liquids
- Not exposed to air having a high salt content
- Not subject to continuous vibration or excessive shock
- Not subject to significant electromagnetic noise caused by welding machines, power equipment, etc.
- Not exposed to radioactive materials, magnetic fields or vacuum conditions

Linear Heads

■ Installing a Linear Head

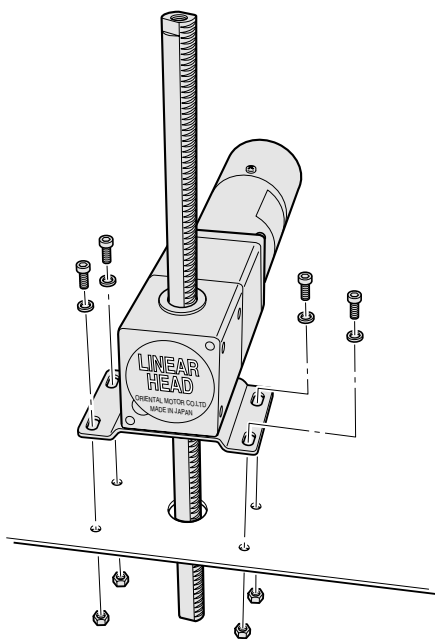
● Installation Direction of Linear Head

There are no restrictions on the installation direction of linear heads.

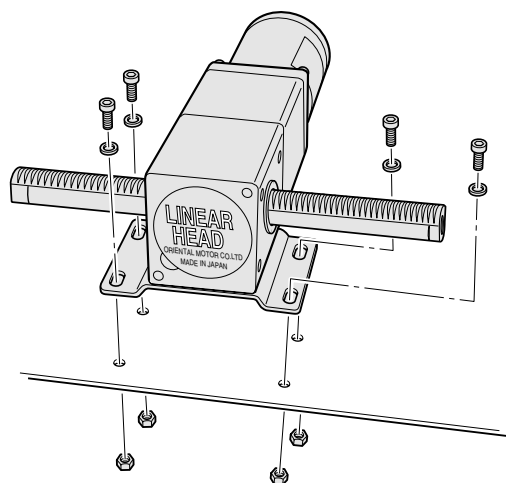
● Installation Method for a Linear Head

- Secure the linear head firmly on a grounded metal plate.
- Make a mounting hole or tapped hole on the mounting plate.
- For **F** type (vertical movement), make an additional hole so that the rack can pass.
- Using the 4 mounting holes on the linear head mounting surface, secure the linear head with 4 screws so that there are no gaps between the linear head and the metal plate. (Mounting screws are not provided.)

F Type



B Type



● Installation Conditions

Linear heads are designed and manufactured to be installed within another device. Make sure the installation location meets the following conditions.

A well-ventilated space with easy access for inspection.

- Inside an enclosure installed indoors (with ventilation holes provided.)

- Ambient temperature*

Linear head: 14°F~122°F [-10~+50°C (nonfreezing)]

Circuit: 32°F~104°F [0°C~+40°C (nonfreezing)]

- Ambient humidity 85% max. (noncondensing)
- Not exposed to an explosive atmosphere, toxic gases (sulfurized gas, etc.) or liquid
- Not exposed to direct sunlight
- Not exposed to significant amounts of dust or iron powder.
- Not exposed to water (rain, water droplets), oil (oil droplets) or other liquid
- Not exposed to air having high salt content
- Not exposed to continuous vibration or excessive impact
- Not subjected to significant electromagnetic noise caused by welding machines, power equipment etc.
- Not exposed to radioactive materials, magnetic field or vacuum conditions

* The ambient temperature may vary with the motor/linear head combination. Refer to the motor specifications for details.

■ Precautions for Handling

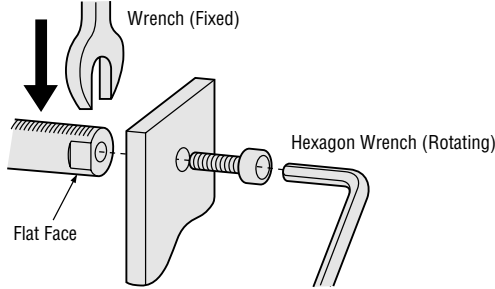
● Rack Lubrication

A lubricating agent is necessary to prevent friction when the rack passes through the rack grommet. The surface of the rack and any gears that mesh with the pinion should always be kept lubricated. Since the rack case is filled with a lubrication agent, there is no need to lubricate the rack case. However, ensure that the surface of the rack or gear teeth do not become dry, as operating in this condition will shorten the product's life. When a rack is used vertically, or under high ambient temperature, the separated grease may drip.

■ Precautions for Installation

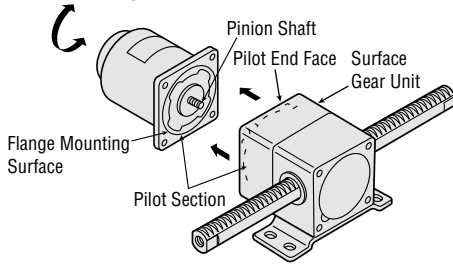
● Installation of Load to End of Rack

When connecting the load using the tapped hole on the end of the rack, hold the flat face of the rack rather than the toothed surface with a wrench while tightening the screw so that a rotational force is not applied to the rack. When the load is installed with a rotational force applied to the rack, malfunction may result.



● Connecting Linear Heads to Motors

As shown in the figure below, a linear head is connected to a motor using the pilot on each unit as guides. Gently slide the linear head from side to side without forcing the pinion shaft against the gear of linear head. Attempting to put a motor and linear head together by force can result in damage to the tooth surface, causing abnormal noise.



■ Precautions for Operation

● Ensure Bi-Directional Movement

The linear head rack moves by a controlling motor. Blocking the operation at the end of the rack in order to stop the motor will apply excessive torque to the rack-and-pinion section, and also result in an inertial shock, causing damage to the gear.

● Do Not Exceed the Maximum Transportable Mass

Maximum transportable mass is determined by taking into consideration the motor torque and the mechanical strength of the shafts and gears, then adding a safety margin. Generally, the lower the motor's basic speed, the greater the maximum transportable mass becomes. If a load greater than this value is applied, or rack movement is locked for a long time, it is likely to result in damage to the rack-and-pinion section.

Also, when the rack moves horizontally, installation of a guide may allow the rack to move a load beyond the maximum transportable mass. This is likely to result in damage to the gear due to the shock by braking. Do not exceed the maximum transportable mass of either the motor or linear head, regardless of the direction of movement of the rack.

● Maintain the Overhung Load within the Permissible Value.

The amount of overhung load that can be applied to the rack is determined by the total load on the rack bearing. Operate the rack at loads within the permissible value given in the following table. The table shows the maximum rack stroke length that can be used. When the actual usable range is shorter than the rack stroke, a load up to the permissible value for that length of stroke can be applied.

Unit = lb. (N)

Rack Stroke inch (mm)	0L Type	2L Type	4L Type	5L-U Type
3.94 (100)	2.7 (12)	12.3 (55)	27 (120)	29 (130)
7.87 (200)	1.8 (8)	9 (40)	20 (90)	22 (100)
11.81 (300)	—	6.7 (30)	15.7 (70)	18 (80)
15.75 (400)	—	5.6 (25)	13.5 (60)	13.5 (60)
19.69 (500)	—	4.5 (20)	11.2 (50)	11.2 (50)
23.62 (600)	—	—	9 (40)	11.2 (50)
27.56 (700)	—	—	9 (40)	9 (40)

Note:

- When the overhung is applied, rack play increases. If the rack play is a problem, an external guide should be used.

● Use an Electromagnetic Brake Motor for Vertical Operation

Operation using vertical motion, such as in elevators, often requires that the load be held in position at mid-stroke. For such applications, a motor equipped with an electromagnetic brake, which offers high holding power, is recommended. The combination of a linear head and reversible motor has a certain amount of holding power, but the holding power is unstable and unsuitable for vertical operation. The electromagnetic brake motor is more powerful and reliable. The electromagnetic brake motors can be combined with linear heads, are power off brakes that are engaged in the event of a power failure.

Introduction

Precision Rack & Pinion
Linear Actuators
DRL LH

Accessories

Before Using
a Linear
Motion System