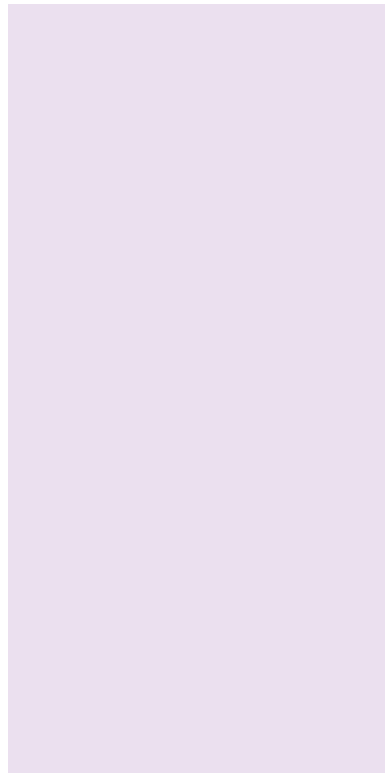


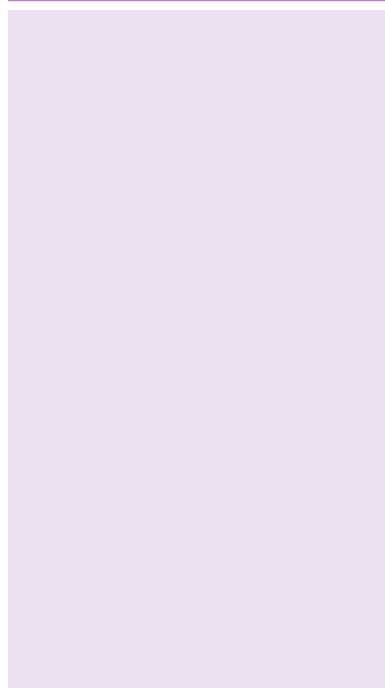
Motorized Actuators

# Compact Linear Actuators



**DRL Series**

**Accessories  
Installation**



Page

<b>DRL Series</b> .....	D-126
Accessories .....	D-159
Installation .....	D-161

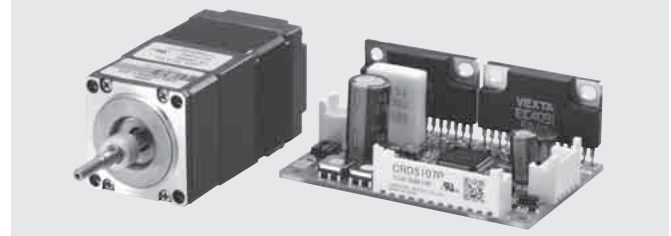
**RoHS** RoHS-Compliant  
**Compact Linear Actuators**  
**DRL Series**

● Additional Information ●  
 Technical reference → Page F-1  
 Safety standards → Page G-2

The drive mechanism adopts a 5-phase stepping motor with ball screw. The **DRL** Series achieves high positioning accuracy in a space-saving design.



● List of safety standard approved products (Model, Standards, File No., Certification Body)  
 → Page G-11

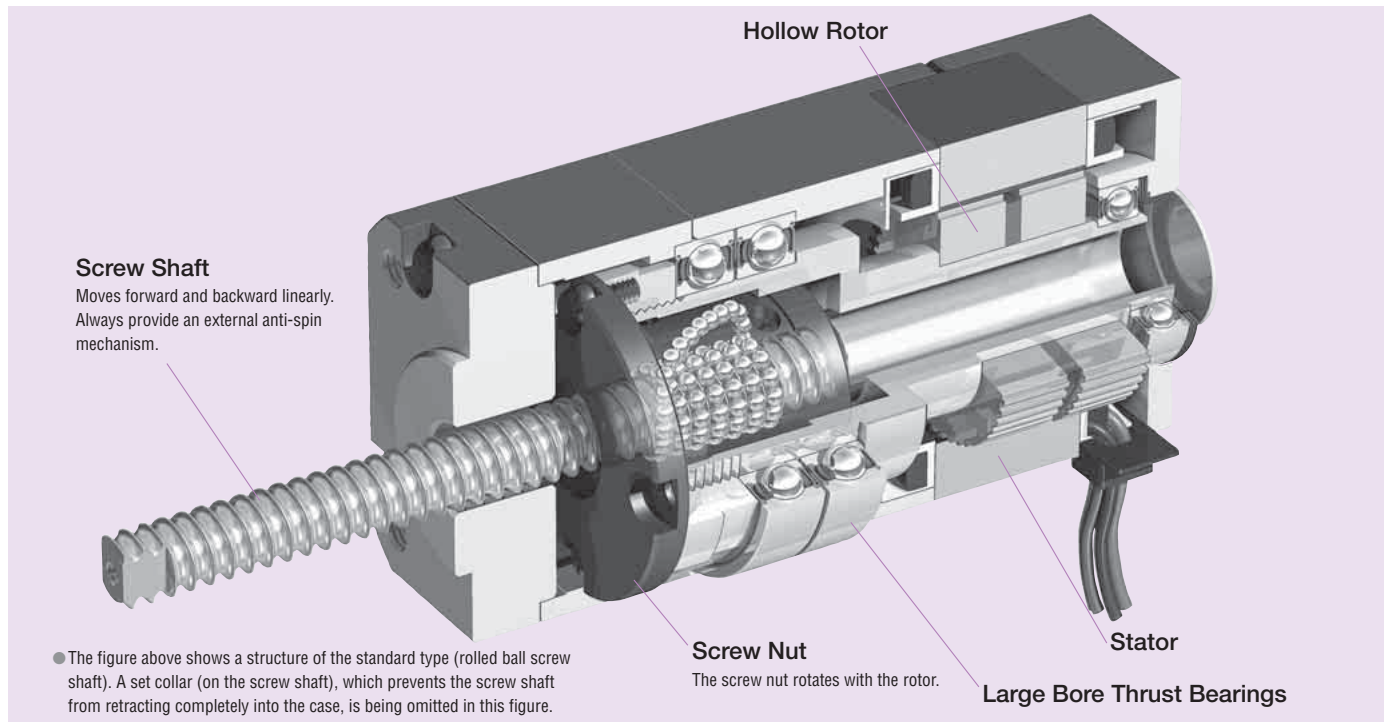


**Features**

● **Compact Design and High Positioning Accuracy**

The actuator size was reduced using Oriental Motor's original technology. The compact and lightweight body houses the linear motion mechanism as well as the rotating components of the stepping motor. The **DRL** Series helps to achieve a significant reduction in the size of your equipment and system.

To meet the user's requirements for higher positioning accuracy, all models can be ordered with a ground ball screw specification [repetitive positioning accuracy:  $\pm 0.005$  mm ( $\pm 0.0002$  in.)].



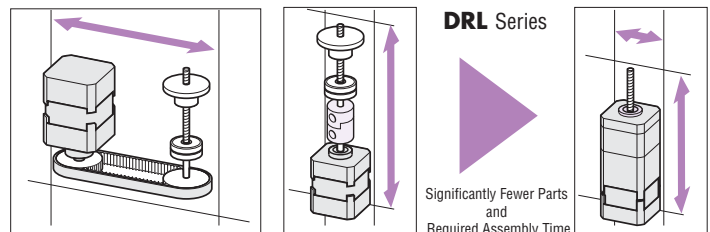
● **Significantly Fewer Parts and Required Assembly Time**

The compact body houses the entire linear-motion mechanism, with some of the conventional parts eliminated for a more streamlined structure. This substantially reduces the man-hours required for design and assembly of your equipment, so you will enjoy higher production efficiency.

● **Reliable Design and Structure**

The hollow rotor shaft incorporates large bore thrust bearings for the direct handling of thrust loads. Minimizing the number of parts involved in linear conversion results in higher reliability.

● **Comparison with "Screw Mechanism and Motor"**



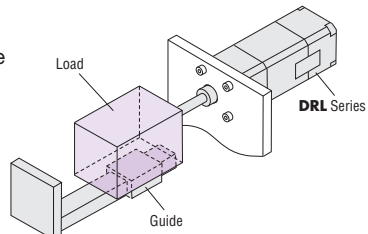
Large Bore Thrust Bearing  
 +  
 Hollow Rotor



● Actuator Types

◇ Standard Type

Install a load transfer guide externally to the actuator.



◇ Guide Type

An actuator comes with a guide provided as an anti-spin mechanism.



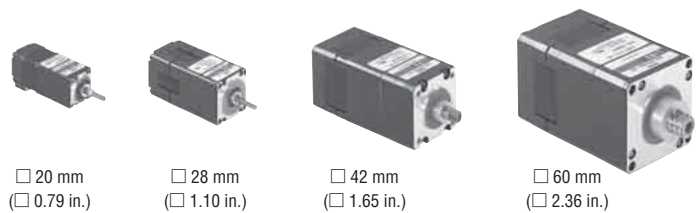
● Lead Screw Types

◇ Ground Ball Screw

Ideal for applications where high positioning accuracy and low vibration are required, such as optical devices and semiconductor systems that use fine-feed pitches. The **DRL** ground ball screw type achieves high reliability by maximizing the performance advantages of a 5-phase stepping motor.

◇ Rolled Ball Screw

Ideal for general positioning applications where reliability and ease of use are given priority.



● Improved Positioning Accuracy Achieved with the High-Resolution Motor

The high-resolution motors achieve high accuracy and reliability based on Oriental Motor's latest precision machining technology. The motor resolution is increased to double the level of a standard model to reduce the displacement angle against load torque, thereby achieving high positioning accuracy. Frame sizes of 28 mm (1.10 in.), 42 mm (1.65 in.) and 60 mm (2.36 in.) are available.

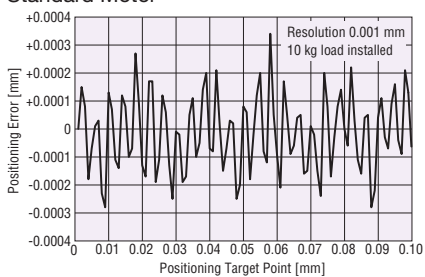
◇ Ideal for Applications Requiring Fine-Feed and Fine Adjustment

Under normal microstepping operation, the actuator will not operate until the initial motor torque exceeds the friction load. The high-resolution motor, with its high output torque, allows the torque to pick up quickly and thereby ensures smooth operation even with fine-feed.

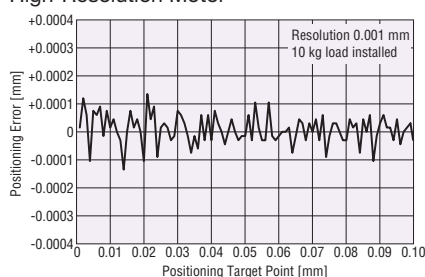


● Comparison of Positioning Error (Comparison in the **DRL42** type)

Standard Motor



High-Resolution Motor



Positioning error is reduced by nearly half!

● Comparison with the standard motor

● **Additional Functions**

The standard type and guide type are available with an electromagnetic brake or adjusting knob as additional functions.

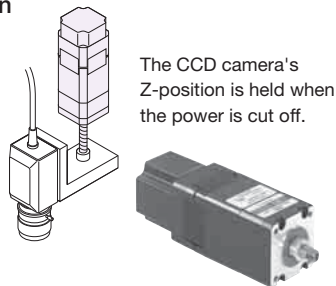
◇ **With Electromagnetic Brake**

The load position can be held when the power is cut off. Since the work will not fall in case of power failure or disconnection, you can safely use equipment in which the work moves vertically.

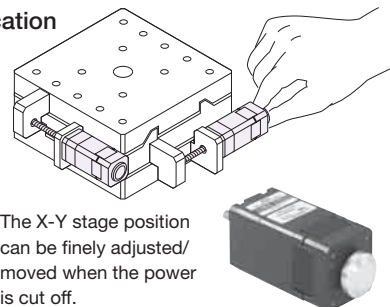
◇ **With Adjusting Knob**

The load position can be adjusted manually when the power is cut off. This function is useful during servicing of the equipment.

**Application**

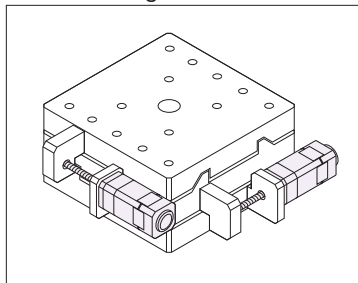


**Application**

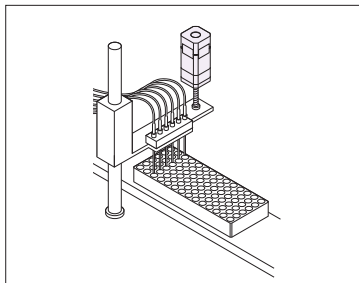


● **Applications**

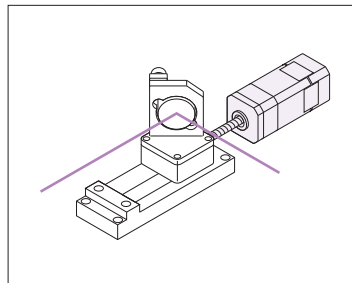
Drive mechanism for a micrometer head X-Y stage



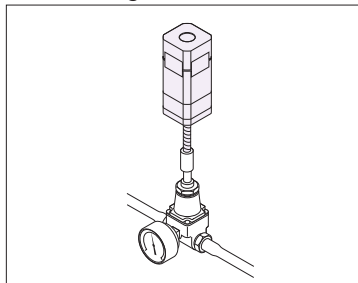
Automatic micro-plate dispensing



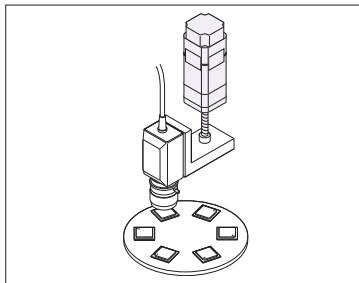
Adjusting a mirror positioning device



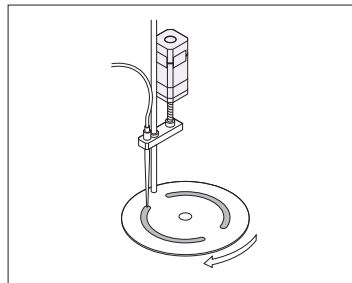
Fine-tuning of flow-rate regulator valve setting



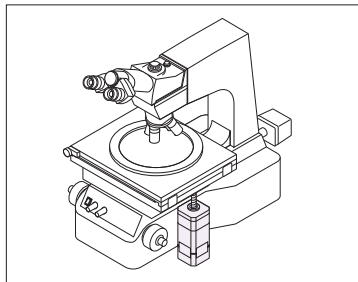
Focusing of a CCD camera



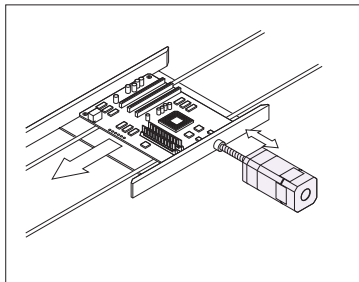
Fine-tuning of nozzle position



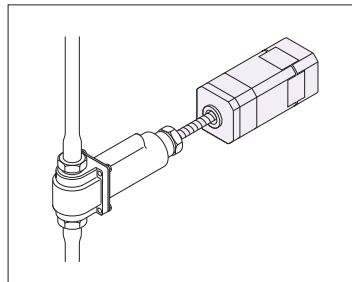
Vertical fine-tuning of table position



Centering of a board



Driving a pump actuator device



● **Compact DC Input Board Driver Meeting the Space-Saving Needs**

The compact, lightweight driver implements microstep drive. The new IC provides a wide range of functions, including the following:

- Smooth Drive Function
- 1-pulse/2-pulse input mode switching
- 25 microstep drive resolutions
- Power LED
- Photocoupler input
- Connector with lock (by MOLEX)
- Conforming to major safety standards

◇ **Compact Microstep Driver**

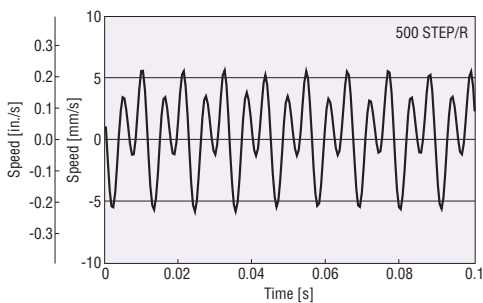
The microstep drive system allows you to set high resolutions up to one-250th of the basic resolution of the actuator. This function is effective in meeting your low-vibration/low-noise operation needs at low speeds. The high-performance driver is also compact and lightweight, achieving a reduction of approximately 47% in size compared with a conventional microstep driver.

**Smooth Drive Function Embodies Quieter Operation**

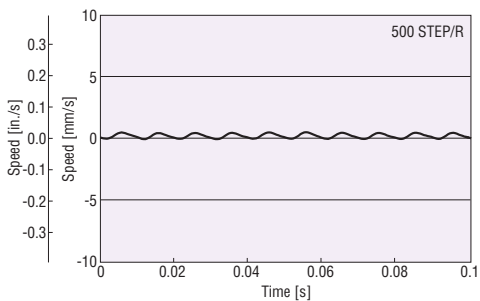
The Smooth Drive Function automatically controls the motor's microstep drive operation at the same travel and speed as in the full-step mode, without the operator having to change the pulse input settings. This function is especially useful when used in the full-step or half-step mode.

● **Comparison of Speed Fluctuation**

Smooth Drive Function: OFF



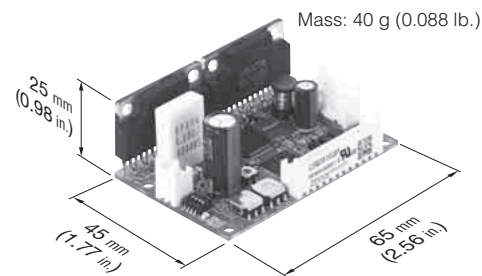
Smooth Drive Function: ON



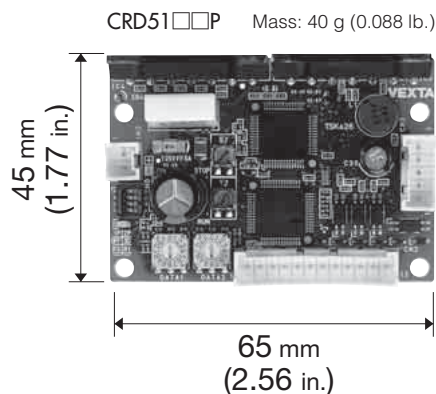
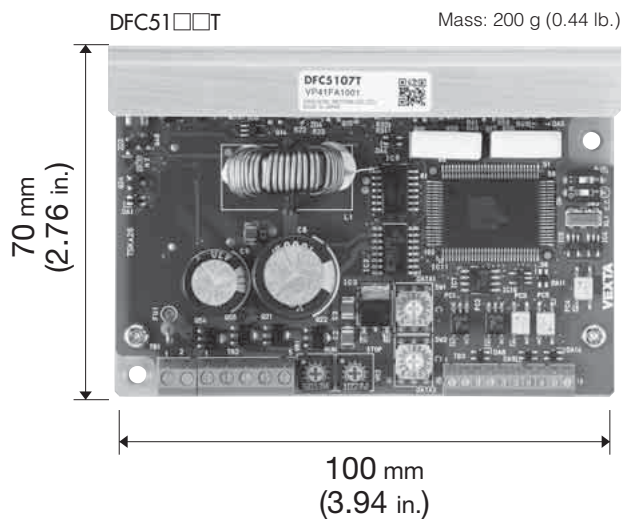
● **RoHS** RoHS-Compliant

The **DRL** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.

● Details of RoHS Directive → Page G-38

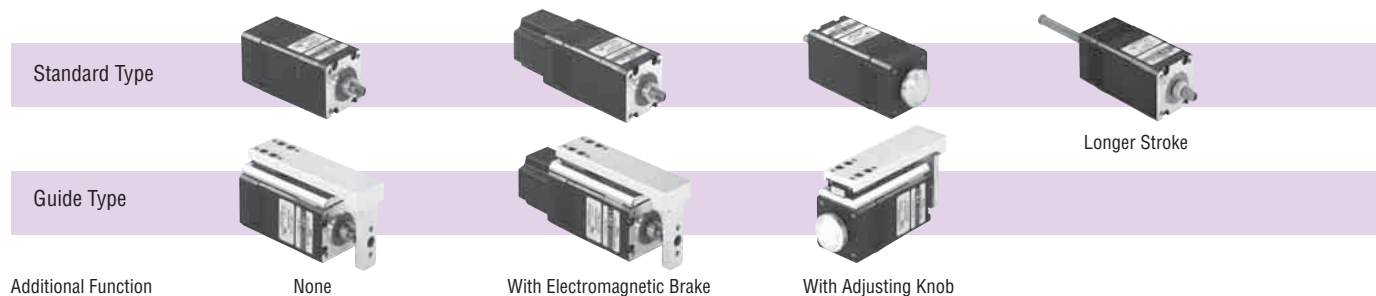










● **Comparison of Driver Size and Mass**





## Selection of the DRL Series

You can choose the product that best suits your specific needs from a wide range of functions.



Frame Size	Thrust Force	Actuator Type	Stroke Length	
□20 mm (□0.79 in.)	15 N (3.3 lb.)	Standard Type 	25 mm (0.98 in.)	
		Guide Type 	25 mm (0.98 in.)	
□28 mm (□1.10 in.)	30 N (6.7 lb.)	Standard Type 	60 mm (2.36 in.)	
		Guide Type 	30 mm (1.18 in.)	
□42 mm (□1.65 in.)	100 N (22 lb.)	Standard Type 	100 mm (3.94 in.)	
		Guide Type 	40 mm (1.57 in.)	
□60 mm (□2.36 in.)	300 N (67 lb.)	Standard Type 	100 mm (3.94 in.)	
		Guide Type 	50 mm (1.97 in.)	

Lead Screw Type	Rolled Ball Screw Type Repetitive Positioning Accuracy: ±0.02 mm (±0.00079 in.)			Ground Ball Screw Type Repetitive Positioning Accuracy: ±0.005 mm (±0.0002 in.)					
Driver	CRD51□□P (Microstep driver) 			CRD51□□P (Microstep driver) 					
Motor Type	Standard Motor			Standard Motor			High-Resolution Motor		
Additional Functions	None	With Electromagnetic Brake	With Adjusting Knob	None	With Electromagnetic Brake	With Adjusting Knob	None	With Electromagnetic Brake	With Adjusting Knob
	-	-	-	●	-	●	-	-	-
	-	-	-	●	-	●	-	-	-
	●	-	-	●	-	-	-	-	-
	●	-	●	●	-	●	●	-	●
	●	-	●	●	-	●	●	-	●
	●	-	-	●	-	-	-	-	-
	●	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●	●
	●	-	-	●	-	-	-	-	-
	●	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●	●

# How to Read Specifications

## ● Actuator: Guide Type

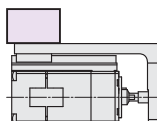
Model		DRL42PB2G-04G DRL42PB2G-04NG	DRL42PB2G-04MG	DRL60PB4G-05G DRL60PB4G-05NG	DRL60PB4G-05MG
Electromagnetic Brake		Not equipped	Equipped	Not equipped	Equipped
① Max. Horizontal Transportable Mass (Fig. A)	kg (lb.)		2 (4.4)		3 (6.6)
② Max. Vertical Transportable Mass (Fig.B)	kg (lb.)		5 (11)		15 (33)
③ Maximum Speed	mm/s (in./s)		30 (1.18)		32 (1.26)
④ Maximum Acceleration	m/s <sup>2</sup> (ft./s <sup>2</sup> )		0.4 (1.3)		0.26 (0.85)
⑤ Maximum Thrust Force	N (lb.)		100 (22)		300 (67)
Maximum Holding Force	At Excitation ⑥ N (lb.)		100 (22)		300 (67)
	At Non-Excitation ⑦ N (lb.)	0	0	0	0
	Electromagnetic Brake ⑧ N (lb.)	—	100 (22)	—	300 (67)
⑨ Maximum Load Moment	N·m (oz·in)	M <sub>P</sub> : 0.5 (71) M <sub>Y</sub> : 0.25 (35) M <sub>R</sub> : 0.8 (113)		M <sub>P</sub> : 0.6 (85) M <sub>Y</sub> : 0.35 (49) M <sub>R</sub> : 2.2 (310)	
⑩ Repetitive Positioning Accuracy	mm (in.)	① ±0.005 (0.0002) ② ±0.01 (0.00039)			
⑪ Lost Motion	mm (in.)	0.05 (0.002)			
⑫ Resolution	mm (in.)	0.004 (0.00016)		0.008 (0.00031)	
⑬ Lead	mm (in.)	2 (0.079)		4 (0.157)	
⑭ Stroke	mm (in.)	40 (1.57)		50 (1.97)	
Mass [Mass with adjusting knob]	kg (lb.)	0.8 (1.76) [0.8 (1.76)]	1 (2.2)	1.8 (3.9) [1.85 (4.0)]	2.2 (4.8)
Actuator Dimensions No.		⑳	㉑	㉒	㉓

### ① Maximum Transportable Mass (Horizontal direction)

Maximum mass that can be moved under rated conditions in the horizontal direction. Transportable mass depends on the frictional resistance of load supporting mechanism.

Therefore, the value of max. horizontal transportable mass cannot be shown for the standard type.

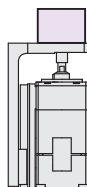
Figure A



### ② Maximum Transportable Mass (Vertical direction)

Maximum mass that can be moved under rated conditions in the vertical direction.

Figure B



### ③ Maximum Speed

Maximum speed allowed to be moved with the maximum transportable mass.

### ④ Maximum Acceleration

Maximum acceleration rate allowed to move with the maximum transportable mass.

### ⑤ Maximum Thrust Force

Maximum thrust force at constant speed with no load.

### ⑥ Maximum Holding Force at Excitation

Maximum holding force with the power on.

### ⑦ Maximum Holding Force at Non-Excitation

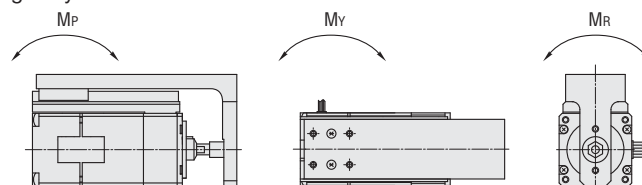
Maximum holding force with the power off.

### ⑧ Maximum Holding Force (Electromagnetic brake)

Maximum holding force of the electromagnetic brake.

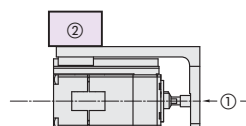
### ⑨ Maximum Load Moment

Maximum force that can be applied to the guide when the center of gravity of the actuator and load has an offset.



### ⑩ Repetitive Positioning Accuracy

A value indicating the degree of error that generates when positioning is performed repeatedly to the same position in the same direction.



① Repetitive positioning accuracy is measured at the tip of the guide.  
② Repetitive positioning accuracy is measured on the linear-guide.

If footnote ① or ② is not indicated, then the accuracy values are identical.

### ⑪ Lost Motion

Positioning error that occurs when positioning to a specific point in the opposite direction.

### ⑫ Resolution

Distance the screw shaft moves with one pulse input.

### ⑬ Lead

Distance the screw shaft moves linearly in one motor rotation.

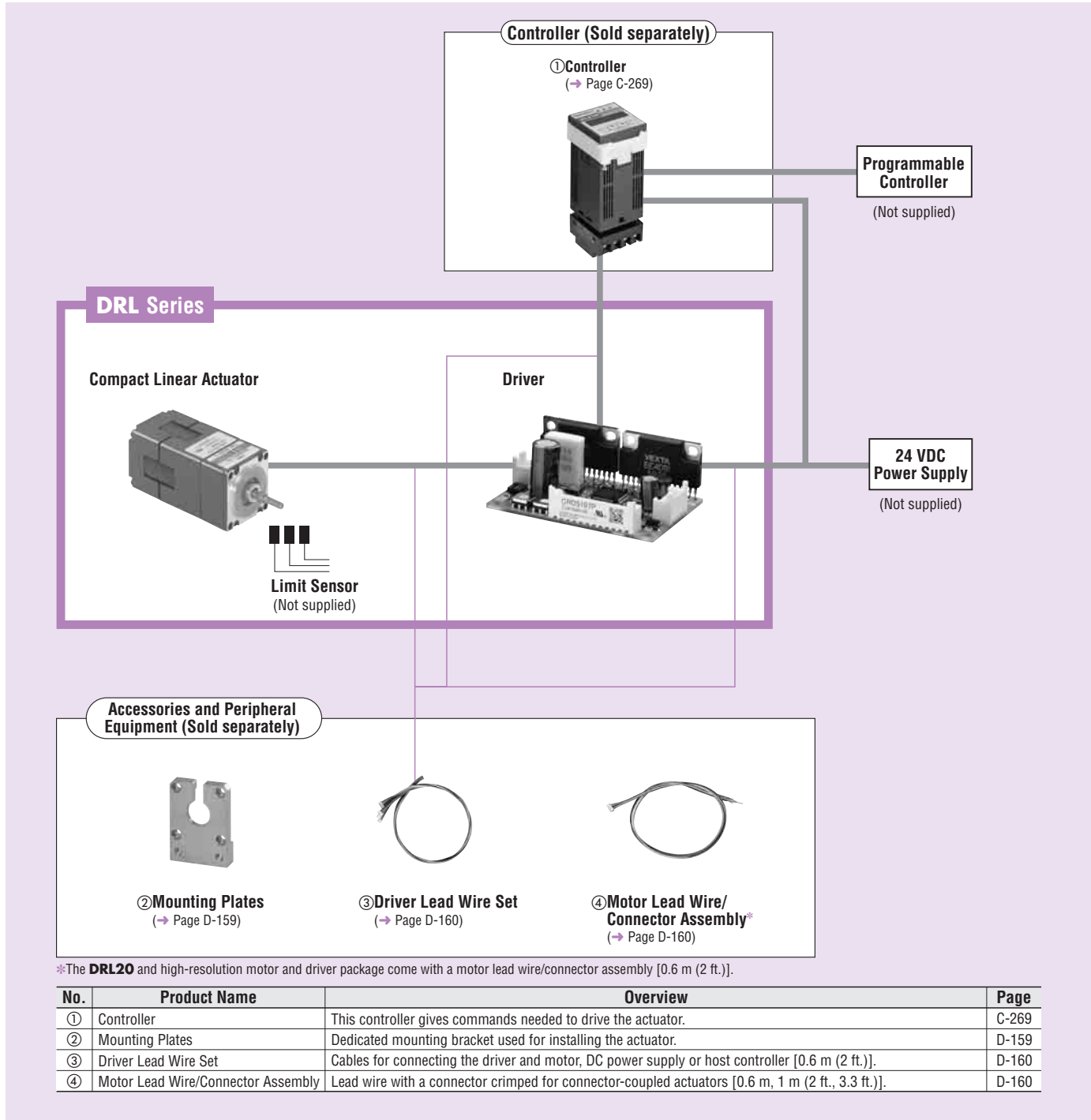
### ⑭ Stroke

Maximum distance the load can be moved.



## System Configuration

An example of system configuration with the **SG8030J** controller.



### ● Example of System Configuration

(Sold separately)

<b>DRL Series</b>	+	<b>Controller</b>	<b>Driver Lead Wire Set</b> [0.6 m (2 ft.)]	<b>Mounting Plate</b>
<b>DRL28PB1-03G</b>		<b>SG8030J-U</b>	<b>LCS04SD5</b>	<b>PADRL-28</b>

● The system configuration shown above is an example. Other combinations are available.

## Product Number Code

# DRL 28 P B 1 G - 03 N G

①      ②      ③      ④      ⑤      ⑥      ⑦      ⑧      ⑨

①	Series	<b>DRL: DRL Series</b>
②	Frame Size	<b>20:</b> □20 mm (□0.79 in.) <b>28:</b> □28 mm (□1.10 in.) <b>42:</b> □42 mm (□1.65 in.) <b>60:</b> □60 mm (□2.36 in.)
③	Motor Type	<b>M:</b> High-Resolution Motor <b>P:</b> Standard Motor
④	Lead Screw Type	<b>A:</b> Rolled Ball Screw Type <b>B:</b> Ground Ball Screw Type
⑤	Lead	<b>1:</b> 1 mm (0.039 in.) [□20 mm, 28 mm (□0.79 in., 1.10 in.)] <b>2:</b> 2 mm (0.079 in.) [□42 mm (□1.65 in.)] <b>4:</b> 4 mm (0.157 in.) [□60 mm (□2.36 in.)]
⑥	Actuator Type	None: Standard Type (Without guide) <b>G:</b> Guide Type
⑦	Stroke	<b>02:</b> 25 mm (0.98 in.) [□20 mm (□0.79 in.)] <b>03:</b> 30 mm (1.18 in.) [□28 mm (□1.10 in.)] <b>04:</b> 40 mm (1.57 in.) [□42 mm (□1.65 in.)] <b>05:</b> 50 mm (1.97 in.) [□60 mm (□2.36 in.)] <b>06:</b> 60 mm (2.36 in.) [□28 mm (□1.10 in.)] <b>10:</b> 100 mm (3.94 in.) [□42 mm, 60 mm (□1.65 in., 2.36 in.)]
⑧	Additional Functions	Blank: Without Additional Functions <b>M:</b> With Electromagnetic Brake <b>N:</b> With Adjusting Knob
⑨	Driver Type	<b>G:</b> CRD51 □□P

## Product Line

### ● Rolled Ball Screw, Standard Motor

Frame Size mm (in.)	Actuator Type	Additional Functions		
		None Model	With Electromagnetic Brake Model	With Adjusting Knob Model
□28 (□1.10)	Standard Type	<b>DRL28PA1-03G</b> <b>DRL28PA1-06G</b>	—	<b>DRL28PA1-03NG</b>
	Guide Type	<b>DRL28PA1G-03G</b>	—	<b>DRL28PA1G-03NG</b>
□42 (□1.65)	Standard Type	<b>DRL42PA2-04G</b> <b>DRL42PA2-10G</b>	<b>DRL42PA2-04MG</b>	<b>DRL42PA2-04NG</b>
	Guide Type	<b>DRL42PA2G-04G</b>	<b>DRL42PA2G-04MG</b>	<b>DRL42PA2G-04NG</b>
□60 (□2.36)	Standard Type	<b>DRL60PA4-05G</b> <b>DRL60PA4-10G</b>	<b>DRL60PA4-05MG</b>	<b>DRL60PA4-05NG</b>
	Guide Type	<b>DRL60PA4G-05G</b>	<b>DRL60PA4G-05MG</b>	<b>DRL60PA4G-05NG</b>

### ● Ground Ball Screw, High-Resolution Motor

Frame Size mm (in.)	Actuator Type	Additional Functions		
		None Model	With Electromagnetic Brake Model	With Adjusting Knob Model
□28 (□1.10)	Standard Type	<b>DRL28MB1-03G</b>	—	<b>DRL28MB1-03NG</b>
	Guide Type	<b>DRL28MB1G-03G</b>	—	<b>DRL28MB1G-03NG</b>
□42 (□1.65)	Standard Type	<b>DRL42MB2-04G</b> <b>DRL42MB2G-04G</b>	<b>DRL42MB2-04MG</b> <b>DRL42MB2G-04MG</b>	<b>DRL42MB2-04NG</b> <b>DRL42MB2G-04NG</b>
	Guide Type	<b>DRL42MB2G-04G</b>	<b>DRL42MB2G-04MG</b>	<b>DRL42MB2G-04NG</b>
□60 (□2.36)	Standard Type	<b>DRL60MB4-05G</b> <b>DRL60MB4G-05G</b>	<b>DRL60MB4-05MG</b> <b>DRL60MB4G-05MG</b>	<b>DRL60MB4-05NG</b> <b>DRL60MB4G-05NG</b>
	Guide Type	<b>DRL60MB4G-05G</b>	<b>DRL60MB4G-05MG</b>	<b>DRL60MB4G-05NG</b>

### ● Ground Ball Screw, Standard Motor

Frame Size mm (in.)	Actuator Type	Additional Functions		
		None Model	With Electromagnetic Brake Model	With Adjusting Knob Model
□20 (□0.79)	Standard Type	<b>DRL20PB1-02G</b>	—	<b>DRL20PB1-02NG</b>
	Guide Type	<b>DRL20PB1G-02G</b>	—	<b>DRL20PB1G-02NG</b>
□28 (□1.10)	Standard Type	<b>DRL28PB1-03G</b> <b>DRL28PB1-06G</b>	—	<b>DRL28PB1-03NG</b>
	Guide Type	<b>DRL28PB1G-03G</b>	—	<b>DRL28PB1G-03NG</b>
□42 (□1.65)	Standard Type	<b>DRL42PB2-04G</b> <b>DRL42PB2-10G</b>	<b>DRL42PB2-04MG</b>	<b>DRL42PB2-04NG</b>
	Guide Type	<b>DRL42PB2G-04G</b>	<b>DRL42PB2G-04MG</b>	<b>DRL42PB2G-04NG</b>
□60 (□2.36)	Standard Type	<b>DRL60PB4-05G</b> <b>DRL60PB4-10G</b>	<b>DRL60PB4-05MG</b>	<b>DRL60PB4-05NG</b>
	Guide Type	<b>DRL60PB4G-05G</b>	<b>DRL60PB4G-05MG</b>	<b>DRL60PB4G-05NG</b>

The following items are included in each product.

Actuator, Driver, Driver Connector, Motor Lead Wire/Connector Assembly\*1, Operating Manual, Surge Suppressor\*2

\*1 Only for Actuator Frame Size 20 mm (0.79 in.) and High-Resolution Motor

\*2 Only for Electromagnetic Brake Type

## Specifications

### ● Actuator

#### ◇ Ground Ball Screw, High-Resolution Motor (RoHS)



Model	DRL28MB1-03G DRL28MB1-03NG	DRL42MB2-04G DRL42MB2-04NG	DRL42MB2-04MG	DRL60MB4-05G DRL60MB4-05NG	DRL60MB4-05MG	
Electromagnetic Brake	Not equipped	Not equipped	Equipped	Not equipped	Equipped	
Max. Vertical Transportable Mass*1	kg (lb.)	3 (6.6)	10 (22)	30 (66)	30 (66)	
Maximum Speed*2	mm/s (in./s)	24 (0.94)	15 (0.59)	22 (0.87)	22 (0.87)	
Maximum Acceleration	m/s <sup>2</sup> (ft./s <sup>2</sup> )	0.2 (0.66)	0.2 (0.66)	0.26 (0.85)	0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	30 (6.7)	100 (22)	300 (67)	300 (67)	
Maximum Holding Force	At Excitation*4	30 (6.7)	100 (22)	300 (67)	300 (67)	
	At Non-Excitation	0	0	0	0	
	Electromagnetic Brake	—	—	100 (22)	—	300 (67)
Repetitive Positioning Accuracy	mm (in.)	±0.005 (0.0002)				
Lost Motion	mm (in.)	0.05 (0.002)				
Resolution*5	mm (in.)	0.001 (0.000039)	0.002 (0.000079)	0.004 (0.00016)	0.004 (0.00016)	
Lead	mm (in.)	1 (0.039)	2 (0.079)	4 (0.157)	4 (0.157)	
Stroke	mm (in.)	30 (1.18)	40 (1.57)	50 (1.97)	50 (1.97)	
Mass [Mass with adjusting knob]	kg (lb.)	0.18 (0.39) [0.19 (0.41)]	0.6 (1.32) [0.6 (1.32)]	0.8 (1.76)	1.3 (2.8) [1.35 (2.9)]	1.7 (3.7)
Actuator Dimensions No.		[1]	[2]	[3]	[4]	

#### ◇ Ground Ball Screw, High-Resolution Motor, Guide Type (RoHS)



Model	DRL28MB1G-03G DRL28MB1G-03NG	DRL42MB2G-04G DRL42MB2G-04NG	DRL42MB2G-04MG	DRL60MB4G-05G DRL60MB4G-05NG	DRL60MB4G-05MG	
Electromagnetic Brake	Not equipped	Not equipped	Equipped	Not equipped	Equipped	
Max. Horizontal Transportable Mass (Fig. A)	kg (lb.)	1 (2.2)	2 (4.4)	3 (6.6)	3 (6.6)	
Max. Vertical Transportable Mass (Fig. B)*1	kg (lb.)	1.5 (3.3)	5 (11)	15 (33)	15 (33)	
Maximum Speed*2	mm/s (in./s)	24 (0.94)	15 (0.59)	22 (0.87)	22 (0.87)	
Maximum Acceleration	m/s <sup>2</sup> (ft./s <sup>2</sup> )	0.2 (0.66)	0.2 (0.66)	0.26 (0.85)	0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	30 (6.7)	100 (22)	300 (67)	300 (67)	
Maximum Holding Force	At Excitation*4	30 (6.7)	100 (22)	300 (67)	300 (67)	
	At Non-Excitation	0	0	0	0	
	Electromagnetic Brake	—	—	100 (22)	—	300 (67)
Maximum Load Moment	N·m (oz·in)	M <sub>x</sub> : 0 M <sub>y</sub> : 0 M <sub>z</sub> : 0	M <sub>x</sub> : 0.5 (71) M <sub>y</sub> : 0.25 (35) M <sub>z</sub> : 0.8 (113)	M <sub>x</sub> : 0.6 (85) M <sub>y</sub> : 0.35 (49) M <sub>z</sub> : 2.2 (310)	M <sub>x</sub> : 0.6 (85) M <sub>y</sub> : 0.35 (49) M <sub>z</sub> : 2.2 (310)	
Repetitive Positioning Accuracy	mm (in.)	①±0.005 (0.0002) ②±0.02 (0.00079)	①±0.005 (0.0002) ②±0.01 (0.00039)			
Lost Motion	mm (in.)	0.05 (0.002)				
Resolution*5	mm (in.)	0.001 (0.000039)	0.002 (0.000079)	0.004 (0.00016)	0.004 (0.00016)	
Lead	mm (in.)	1 (0.039)	2 (0.079)	4 (0.157)	4 (0.157)	
Stroke	mm (in.)	30 (1.18)	40 (1.57)	50 (1.97)	50 (1.97)	
Mass [Mass with adjusting knob]	kg (lb.)	0.25 (0.55) [0.26 (0.57)]	0.8 (1.76) [0.8 (1.76)]	1.0 (2.2)	1.8 (3.9) [1.85 (4.0)]	2.2 (4.8)
Actuator Dimensions No.		[6]	[7]	[8]	[9]	

How to read specifications → Page D-132

- \*1 When the power is turned off, or output current is turned off (non-excitation state), the actuator loses its thrust force or holding force. As such, it can no longer keep the load in position or withstand an external force.
- \*2 Use the actuator at or below the following maximum speed in a low-temperature environment [0~+10°C (+32~+50°F)]. **DRL28**: 12 mm/s (0.47 in./s)
- \*3 The maximum thrust force is measured during constant-speed operation in horizontal operation with no load applied to the moving parts (screw shaft and joint). Thrust force varies with load mass and acceleration.
- \*4 The maximum holding force at excitation is the value when the automatic current cutback function is ON (50% of the rated current).
- \*5 25 resolutions can be set.

#### Note:

- Use the actuator in conditions where its surface temperature will not exceed 90°C (194°F). The repetitive positioning accuracy is measured at a constant temperature under a constant load.

#### ● Maximum Transportable Mass

Figure A

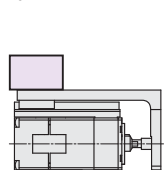
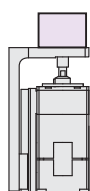
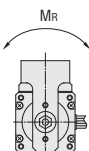
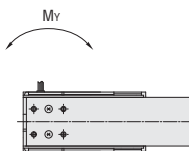
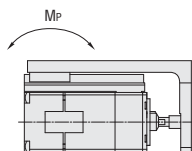


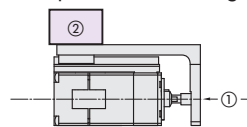
Figure B



#### ● Load Moment



#### ● Repetitive Positioning Accuracy



- ① Repetitive positioning accuracy is measured at the end of the guide.
- ② Repetitive positioning accuracy is measured on the linear-guide.

If footnote ① or ② is not indicated, then the accuracy values are identical.

◇ Ground Ball Screw, Standard Motor (RoHS)



Model		DRL20PB1-02G DRL20PB1-02NG	DRL28PB1-03G DRL28PB1-06G DRL28PB1-03NG	DRL42PB2-04G DRL42PB2-10G DRL42PB2-04NG	DRL42PB2-04MG	DRL60PB4-05G DRL60PB4-10G DRL60PB4-05NG	DRL60PB4-05MG
Electromagnetic Brake		Not equipped	Not equipped	Not equipped	Equipped	Not equipped	Equipped
Max. Vertical Transportable Mass <sup>*1</sup>	kg (lb.)	1.5 (3.3)	3 (6.6)	10 (22)		30 (66)	
Maximum Speed <sup>*2</sup>	mm/s (in./s)	20 (0.79)	24 (0.94)	30 (1.18)		32 (1.26)	
Maximum Acceleration	m/s <sup>2</sup> (ft./s <sup>2</sup> )	0.2 (0.66)	0.2 (0.66)	0.4 (1.3)		0.26 (0.85)	
Maximum Thrust Force <sup>*3</sup>	N (lb.)	15 (3.3)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force	At Excitation <sup>*4</sup>	N (lb.)	30 (6.7)	100 (22)		300 (67)	
	At Non-Excitation	N (lb.)	0	0	0	0	0
	Electromagnetic Brake	N (lb.)	—	—	—	100 (22)	—
Repetitive Positioning Accuracy	mm (in.)	±0.005 (0.0002)					
Lost Motion	mm (in.)	0.05 (0.002)					
Resolution <sup>*5</sup>	mm (in.)	0.002 (0.000079)	0.002 (0.000079)	0.004 (0.00016)		0.008 (0.00031)	
Lead	mm (in.)	1 (0.039)		2 (0.079)		4 (0.157)	
Stroke	mm (in.)	25 (0.98)	<b>03:</b> 30 (1.18) <b>06:</b> 60 (2.36)	<b>04:</b> 40 (1.57) <b>10:</b> 100 (3.94)	40 (1.57)	<b>05:</b> 50 (1.97) <b>10:</b> 100 (3.94)	50 (1.97)
Mass [Mass with adjusting knob]	kg (lb.)	0.08 (0.17) [0.08 (0.17)]	<b>03:</b> 0.18 (0.39) [0.19 (0.41)] <b>06:</b> 0.18 (0.39)	<b>04:</b> 0.6 (1.32) [0.6 (1.32)] <b>10:</b> 0.63 (1.38)	0.8 (1.76)	<b>05:</b> 1.3 (2.8) [1.35 (2.9)] <b>10:</b> 1.38 (3.0)	1.7 (3.7)
Actuator Dimensions No.		11	<b>03:</b> 12 <b>06:</b> 13	<b>04:</b> 16 <b>10:</b> 17	18	<b>05:</b> 19 <b>10:</b> 20	21

◇ Ground Ball Screw, Standard Motor, Guide Type (RoHS)



Model		DRL20PB1G-02G DRL20PB1G-02NG	DRL28PB1G-03G DRL28PB1G-03NG	DRL42PB2G-04G DRL42PB2G-04NG	DRL42PB2G-04MG	DRL60PB4G-05G DRL60PB4G-05NG	DRL60PB4G-05MG
Electromagnetic Brake		Not equipped	Not equipped	Not equipped	Equipped	Not equipped	Equipped
Max. Horizontal Transportable Mass (Fig. A)	kg (lb.)	0.5 (1.1)	1 (2.2)	2 (4.4)		3 (6.6)	
Max. Vertical Transportable Mass (Fig. B) <sup>*1</sup>	kg (lb.)	1 (2.2)	1.5 (3.3)	5 (11)		15 (33)	
Maximum Speed <sup>*2</sup>	mm/s (in./s)	20 (0.79)	24 (0.94)	30 (1.18)		32 (1.26)	
Maximum Acceleration	m/s <sup>2</sup> (ft./s <sup>2</sup> )	0.2 (0.66)	0.2 (0.66)	0.4 (1.3)		0.26 (0.85)	
Maximum Thrust Force <sup>*3</sup>	N (lb.)	15 (3.3)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force	At Excitation <sup>*4</sup>	N (lb.)	30 (6.7)	100 (22)		300 (67)	
	At Non-Excitation	N (lb.)	0	0	0	0	0
	Electromagnetic Brake	N (lb.)	—	—	—	100 (22)	—
Maximum Load Moment	N·m (oz·in)	M <sub>c</sub> : 0 M <sub>v</sub> : 0 M <sub>a</sub> : 0	M <sub>c</sub> : 0 M <sub>v</sub> : 0 M <sub>a</sub> : 0	M <sub>c</sub> : 0.5 (71) M <sub>v</sub> : 0.25 (35) M <sub>a</sub> : 0.8 (113)	M <sub>c</sub> : 0.6 (85) M <sub>v</sub> : 0.35 (49) M <sub>a</sub> : 2.2 (310)		
Repetitive Positioning Accuracy	mm (in.)	①±0.005 (0.0002) ②±0.01 (0.00039)		①±0.005 (0.0002) ②±0.01 (0.00039)			
Lost Motion	mm (in.)	0.05 (0.002)					
Resolution <sup>*5</sup>	mm (in.)	0.002 (0.000079)	0.002 (0.000079)	0.004 (0.00016)		0.008 (0.00031)	
Lead	mm (in.)	1 (0.039)		2 (0.079)		4 (0.157)	
Stroke	mm (in.)	25 (0.98)	30 (1.18)	40 (1.57)		50 (1.97)	
Mass [Mass with adjusting knob]	kg (lb.)	0.14 (0.3) [0.15 (0.33)]	0.25 (0.55) [0.26 (0.57)]	0.8 (1.76) [0.8 (1.76)]	1.0 (2.2)	1.8 (3.9) [1.85 (4.0)]	2.2 (4.8)
Actuator Dimensions No.		22	23	24	25	26	27

How to read specifications → Page D-132

- \*1 When the power is turned off, or output current is turned off (non-excitation state), the actuator loses its thrust force or holding force. As such, it can no longer keep the load in position or withstand an external force.
- \*2 Use each actuator at or below the following maximum speed in a low-temperature environment [0~+10°C (+32~+50°F)].  
**DRL20:** 13 mm/s (0.51 in./s), **DRL28:** 15 mm/s (0.59 in./s), **DRL42:** 20 mm/s (0.79 in./s), **DRL60:** 24 mm/s (0.94 in./s)
- \*3 The maximum thrust force is measured during constant-speed operation in horizontal operation with no load applied to the moving parts (screw shaft and joint). Thrust force varies with load mass and acceleration.
- \*4 The maximum holding force at excitation is the value when the automatic current cutback function is ON (50% of the rated current).
- \*5 25 resolutions can be set.

Note:

- Use the actuator in conditions where its surface temperature will not exceed 90°C (194°F). The repetitive positioning accuracy is measured at a constant temperature under a constant load.

● Maximum Transportable Mass

Figure A

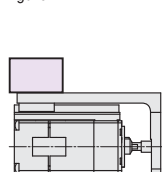
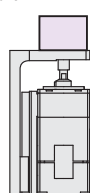
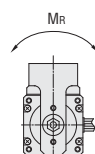
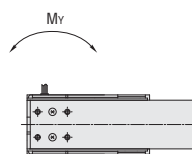
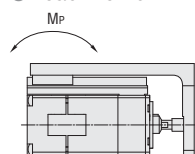


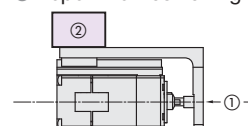
Figure B



● Load Moment



● Repetitive Positioning Accuracy



- ① Repetitive positioning accuracy is measured at the end of the guide.
- ② Repetitive positioning accuracy is measured on the linear-guide.

If footnote ① or ② is not indicated, then the accuracy values are identical.



◇ Rolled Ball Screw, Standard Motor (RoHS)

Model	DRL28PA1-03G DRL28PA1-06G DRL28PA1-03NG	DRL42PA2-04G DRL42PA2-10G DRL42PA2-04NG	DRL42PA2-04MG	DRL60PA4-05G DRL60PA4-10G DRL60PA4-05NG	DRL60PA4-05MG	
Electromagnetic Brake	Not equipped		Equipped	Not equipped		
Max. Vertical Transportable Mass <sup>*1</sup>	kg (lb.)	3 (6.6)	10 (22)	30 (66)		
Maximum Speed <sup>*2</sup>	mm/s (in./s)	24 (0.94)	30 (1.18)	32 (1.26)		
Maximum Acceleration	m/s <sup>2</sup> (ft./s <sup>2</sup> )	0.2 (0.66)	0.4 (1.3)	0.26 (0.85)		
Maximum Thrust Force <sup>*3</sup>	N (lb.)	30 (6.7)	100 (22)	300 (67)		
Maximum Holding Force	At Excitation <sup>*4</sup>	N (lb.)	30 (6.7)	100 (22)	300 (67)	
	At Non-Excitation	N (lb.)	0	0	0	
	Electromagnetic Brake	N (lb.)	—	100 (22)	—	300 (67)
Repetitive Positioning Accuracy	mm (in.)	±0.02 (0.00079)				
Lost Motion	mm (in.)	0.1 (0.0039)				
Resolution <sup>*5</sup>	mm (in.)	0.002 (0.000079)	0.004 (0.00016)	0.008 (0.00031)		
Lead	mm (in.)	1 (0.039)	2 (0.079)	4 (0.157)		
Stroke	mm (in.)	<b>03:</b> 30 (1.18) <b>06:</b> 60 (2.36)	<b>04:</b> 40 (1.57) <b>10:</b> 100 (3.94)	40 (1.57)	<b>05:</b> 50 (1.97) <b>10:</b> 100 (3.94)	50 (1.97)
	kg (lb.)	<b>03:</b> 0.18 (0.39) [0.19 (0.41)] <b>06:</b> 0.18 (0.39)	<b>04:</b> 0.6 (1.32) [0.6 (1.32)] <b>10:</b> 0.63 (1.38)	0.8 (1.76)	<b>05:</b> 1.3 (2.8) [1.35 (2.9)] <b>10:</b> 1.38 (3.0)	1.7 (3.7)
Actuator Dimensions No.		<b>03:</b> 14 <b>06:</b> 15	<b>04:</b> 16 <b>10:</b> 17	18	<b>05:</b> 19 <b>10:</b> 20	21

◇ Rolled Ball Screw, Standard Motor, Guide Type (RoHS)



Model	DRL28PA1G-03G DRL28PA1G-03NG	DRL42PA2G-04G DRL42PA2G-04NG	DRL42PA2G-04MG	DRL60PA4G-05G DRL60PA4G-05NG	DRL60PA4G-05MG	
Electromagnetic Brake	Not equipped		Equipped	Not equipped		
Max. Horizontal Transportable Mass (Fig. A)	kg (lb.)	1 (2.2)	2 (4.4)	3 (6.6)		
Max. Vertical Transportable Mass (Fig. B) <sup>*1</sup>	kg (lb.)	1.5 (3.3)	5 (11)	15 (33)		
Maximum Speed <sup>*2</sup>	mm/s (in./s)	24 (0.94)	30 (1.18)	32 (1.26)		
Maximum Acceleration	m/s <sup>2</sup> (ft./s <sup>2</sup> )	0.2 (0.66)	0.4 (1.3)	0.26 (0.85)		
Maximum Thrust Force <sup>*3</sup>	N (lb.)	30 (6.7)	100 (22)	300 (67)		
Maximum Holding Force	At Excitation <sup>*4</sup>	N (lb.)	30 (6.7)	100 (22)	300 (67)	
	At Non-Excitation	N (lb.)	0	0	0	
	Electromagnetic Brake	N (lb.)	—	100 (22)	—	300 (67)
Maximum Load Moment	N·m (oz·in)	M <sub>p</sub> : 0 M <sub>v</sub> : 0 M <sub>R</sub> : 0	M <sub>p</sub> : 0.5 (71) M <sub>v</sub> : 0.25 (35) M <sub>R</sub> : 0.8 (113)	M <sub>p</sub> : 0.6 (85) M <sub>v</sub> : 0.35 (49) M <sub>R</sub> : 2.2 (310)		
Repetitive Positioning Accuracy	mm (in.)	±0.02 (0.00079)				
Lost Motion	mm (in.)	0.1 (0.0039)				
Resolution <sup>*5</sup>	mm (in.)	0.002 (0.000079)	0.004 (0.00016)	0.008 (0.00031)		
Lead	mm (in.)	1 (0.039)	2 (0.079)	4 (0.157)		
Stroke	mm (in.)	30 (1.18)	40 (1.57)	50 (1.97)		
Mass [Mass with adjusting knob]	kg (lb.)	0.25 (0.55) [0.26 (0.57)]	0.8 (1.76) [0.8 (1.76)]	1.0 (2.2)	1.8 (3.9) [1.85 (4.0)]	2.2 (4.8)
Actuator Dimensions No.		23	24	25	26	27

How to read specifications → Page D-132

- \*1 When the power is turned off, or output current is turned off (non-excitation state), the actuator loses its thrust force or holding force. As such, it can no longer keep the load in position or withstand an external force.
- \*2 Use each actuator at or below the following maximum speed in a low-temperature environment [0~+10°C (+32~+50°F)].  
**DRL28:** 15 mm/s (0.59 in./s), **DRL42:** 20 mm/s (0.79 in./s), **DRL60:** 24 mm/s (0.94 in./s)
- \*3 The maximum thrust force is measured during constant-speed operation in horizontal operation with no load applied to the moving parts (screw shaft and joint). Thrust force varies with load mass and acceleration.
- \*4 The maximum holding force at excitation is the value when the automatic current cutback function is ON (50% of the rated current).
- \*5 25 resolutions can be set.

Note:

● Use the actuator in conditions where its surface temperature will not exceed 90°C (194°F). The repetitive positioning accuracy is measured at a constant temperature under a constant load.

● Maximum Transportable Mass

Figure A

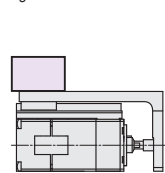
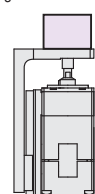
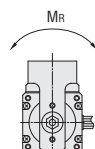
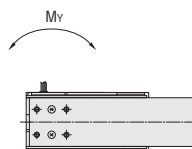
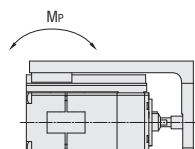


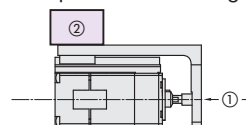
Figure B



● Load Moment



● Repetitive Positioning Accuracy



- ① Repetitive positioning accuracy is measured at the end of the guide.
- ② Repetitive positioning accuracy is measured on the linear-guide.

If footnote ① or ② is not indicated, then the accuracy values are identical.

### ● Electromagnetic Brake

Type of Brake	Power off activated type
Power Input Voltage/Current	<b>DRL42</b> : 24 VDC±5% 0.08 A <b>DRL60</b> : 24 VDC±5% 0.25 A
Brake Activate/Release Time	Activate time: 20 msec Release time: 30 msec
Time Rating	Continuous

### ● Driver

Driver Model		CRD5103P	CRD5107P	CRD5114P
Power Source	Voltage	24 VDC±10%		
	Current	0.7 A	1.4 A	2.5 A
Input Signals	Input Mode	Photocoupler input, Input resistance 220 Ω, Input current 10~20 mA Photocoupler ON: +4.5~5.25 V, Photocoupler OFF: 0~1 V (Voltage between terminals)		
	Pulse Signal (CW Pulse Signal)	Operation command pulse signal (CW direction operation command signal when in 2-pulse input mode), Negative logic pulse input Pulse width: 1 μs minimum, Pulse rise/fall: 2 μs maximum, Pulse duty 50% maximum Screw shaft moves one step when the pulse input is switched from photocoupler ON to OFF. Maximum input pulse frequency: 500 kHz (when the pulse duty is 50%)		
	Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal, Photocoupler ON: CW, Photocoupler OFF: CCW ( CCW direction operation command pulse signal when in 2-pulse input mode, Negative logic pulse input, Pulse width: 1 μs minimum, Pulse rise/fall: 2 μs maximum, Pulse duty 50% maximum ) Screw shaft moves one step backward when the pulse input is switched from photocoupler ON to OFF. Maximum input pulse frequency: 500 kHz (when the pulse duty is 50%)		
	Resolution Select Signal	Resolution specified in DATA1 when "photocoupler OFF" Resolution specified in DATA2 when "photocoupler ON"		
	All Windings Off Signal	When in the "photocoupler ON" state, the output current to the actuator is cut off. When in the "photocoupler OFF" state, the output current is supplied to the actuator.		
	Automatic Current Cutback Release Signal	When in the "photocoupler ON" state, the automatic current cutback function at actuator standstill is released. When in the "photocoupler OFF" state, the automatic current cutback function is activated after actuator stops (approximately 100 msec).		
Output Signal	Output Mode	Photocoupler, Open-collector output External use condition: 24 VDC maximum, 10 mA maximum		
	Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0." (photocoupler ON) When microsteps/step set at 1: Signal is output every 10 pulses When microsteps/step set at 10: Signal is output every 100 pulses		
Functions		Automatic current cutback, Resolution select, Pulse input mode switch, Smooth drive function, All windings off, Excitation timing		
Cooling Method		Natural Ventilation		
Mass		0.04 kg (0.088 lb.)		
Dimensions No.		28		

## ■ General Specifications

This is the value after rated operation under normal ambient temperature and humidity.

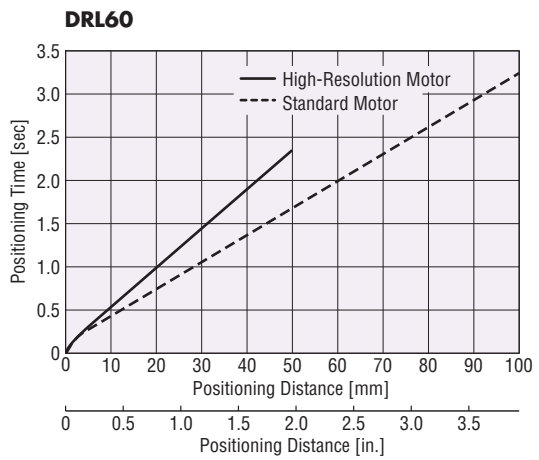
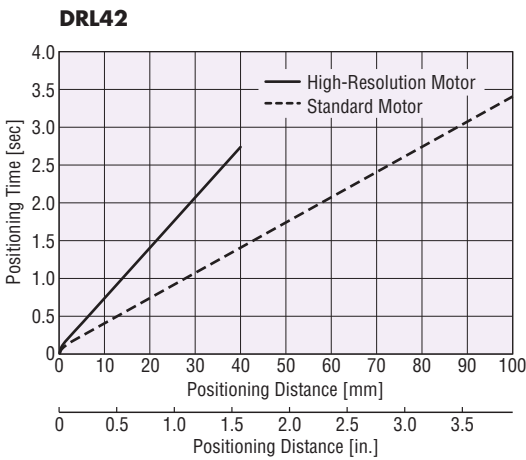
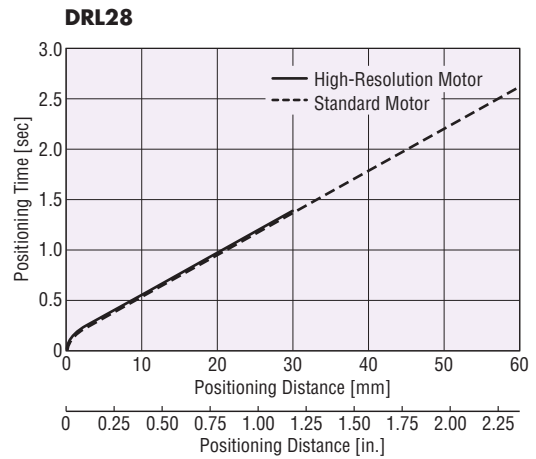
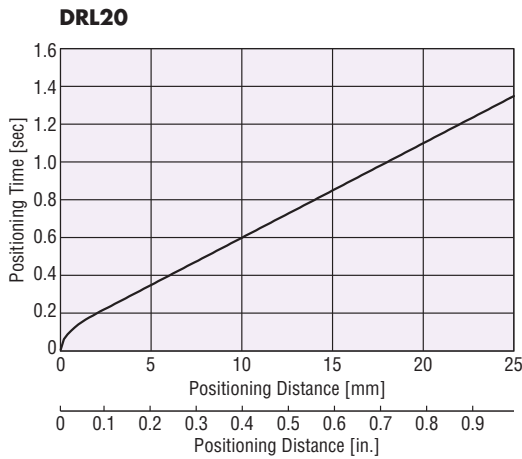
Item	Actuator	Driver
Motor Insulation Class	Class B [130°C (266°F)] [Recognized as Class A 105°C (221°F) by UL/CSA Standards.]	—
Insulation Resistance	100 MΩ or more when 500 VDC megger is applied between the motor windings and case.	—
Dielectric Strength	Sufficient to withstand 0.5 kV <sup>ac</sup> at 50 Hz or 60 Hz applied between the motor windings and case for 1 minute. * <b>DRL42P, DRL60M</b> : 1.0 kVAC, <b>DRL60P</b> : 1.5 kVAC	—
Operating Environment	Ambient Temperature	0~+40°C (+32~+104°F) (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Atmosphere	No corrosive gases, dust, water or oil

**Note:**

- Do not measure insulation resistance or perform the dielectric strength test while the actuator and driver are connected.

● Positioning Distance – Positioning Time (Reference)

The graphs below represent the characteristics when operated at maximum speed and maximum acceleration.



● Use each actuator at the following starting speed.

- DRL20, DRL28:** 0.2 mm/s or less
- DRL42:** 0.4 mm/s or less
- DRL60:** 0.8 mm/s or less

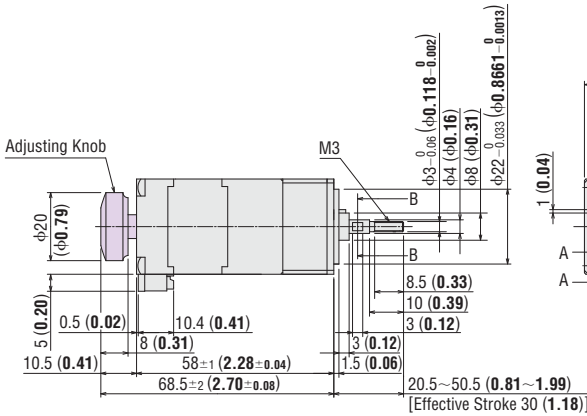
## Dimensions Unit = mm (in.)

### ● Actuator

#### ◇ Ground Ball Screw, High-Resolution Motor

- ① **DRL28MB1-03G** (Without additional function)  
**DRL28MB1-03NG** (With adjusting knob)

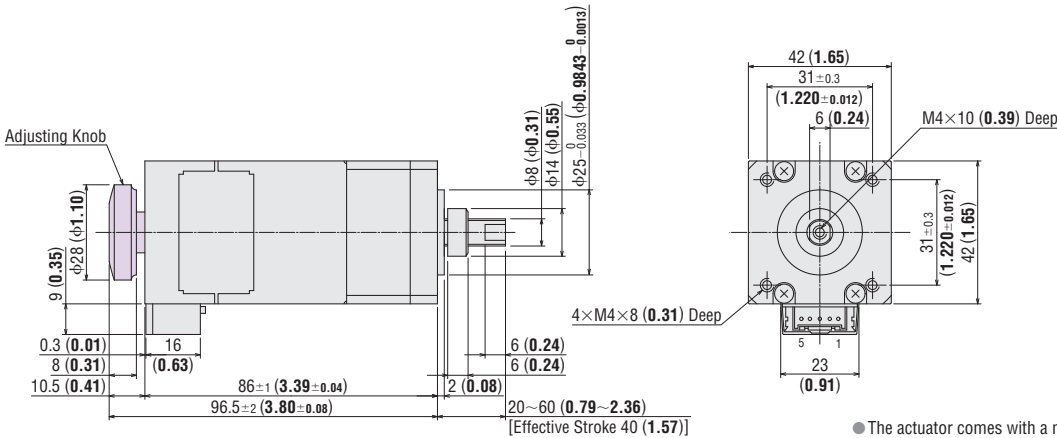
Actuator Model	Mass	DXF
DRL28MB1-03	0.18 kg (0.39 lb.)	D855
DRL28MB1-03N	0.19 kg (0.41 lb.)	D856



● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

- ② **DRL42MB2-04G** (Without additional function)  
**DRL42MB2-04NG** (With adjusting knob)

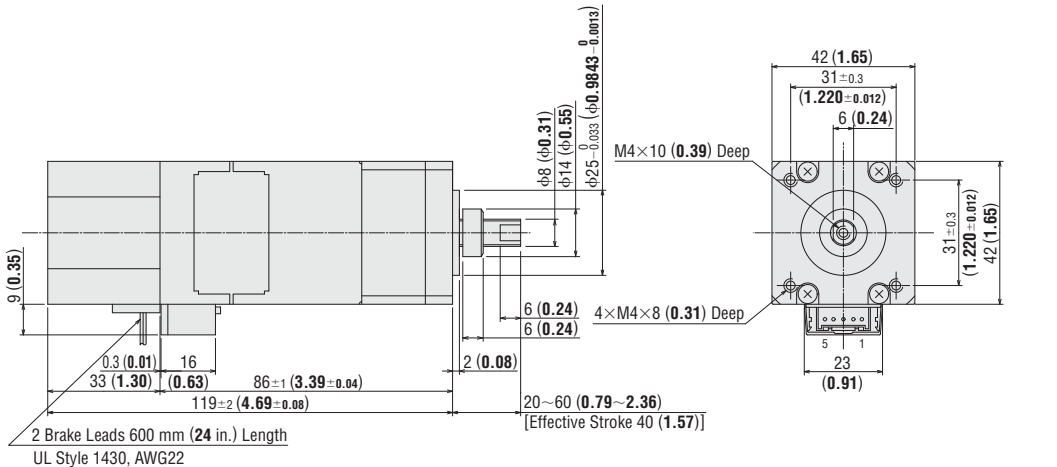
Actuator Model	Mass	DXF
DRL42MB2-04	0.6 kg (1.32 lb.)	D857
DRL42MB2-04N	0.6 kg (1.32 lb.)	D858



● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

- ③ **DRL42MB2-04MG** (With electromagnetic brake)

Actuator Model	Mass	DXF
DRL42MB2-04M	0.8 kg (1.76 lb.)	D859



● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

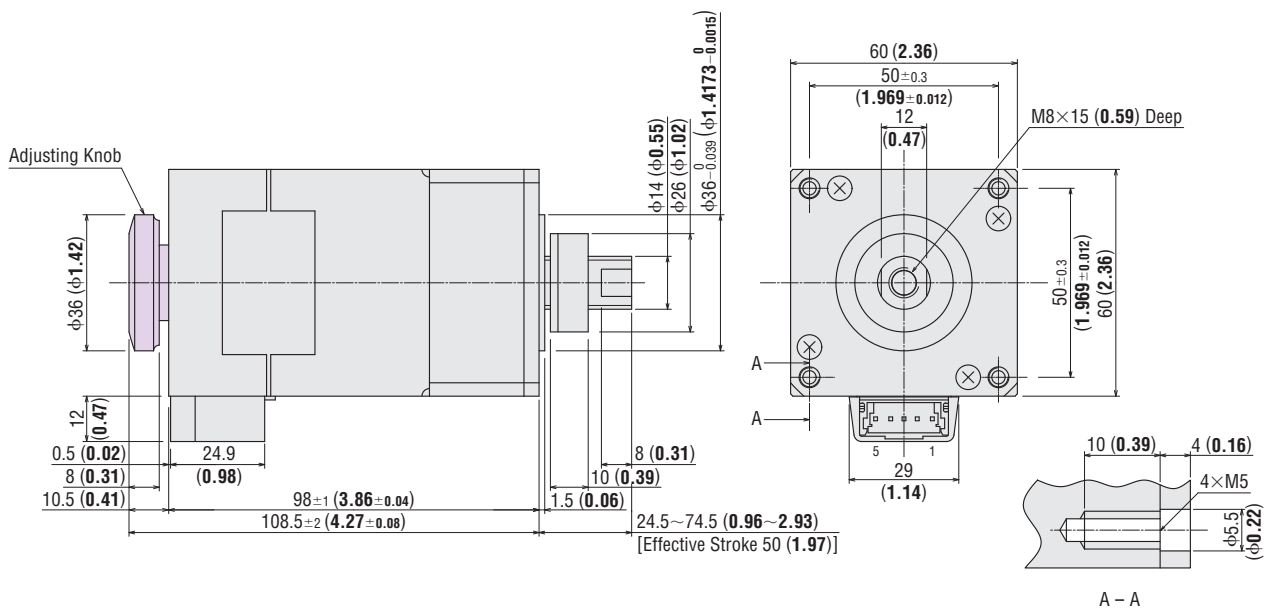
● Dimensions ① and ② apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.



4 **DRL60MB4-05G** (Without additional function)  
**DRL60MB4-05NG** (With adjusting knob)

Actuator Model  
 DRL60MB4-05  
 DRL60MB4-05N  
 Mass  
 1.3 kg (2.8 lb.)  
 1.35 kg (2.9 lb.)

**DXF**  
 D860  
 D861

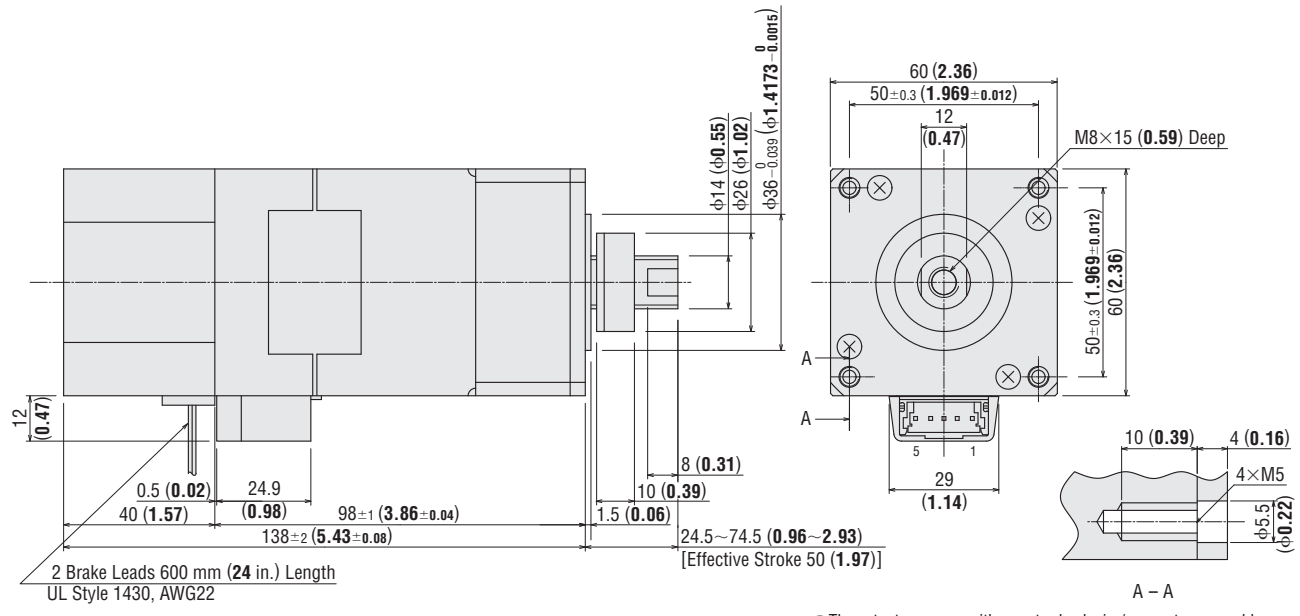


● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3266, AWG22

5 **DRL60MB4-05MG** (With electromagnetic brake)

Actuator Model  
 DRL60MB4-05M  
 Mass  
 1.7 kg (3.7 lb.)

**DXF**  
 D862



● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3266, AWG22

● Dimension 4 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.

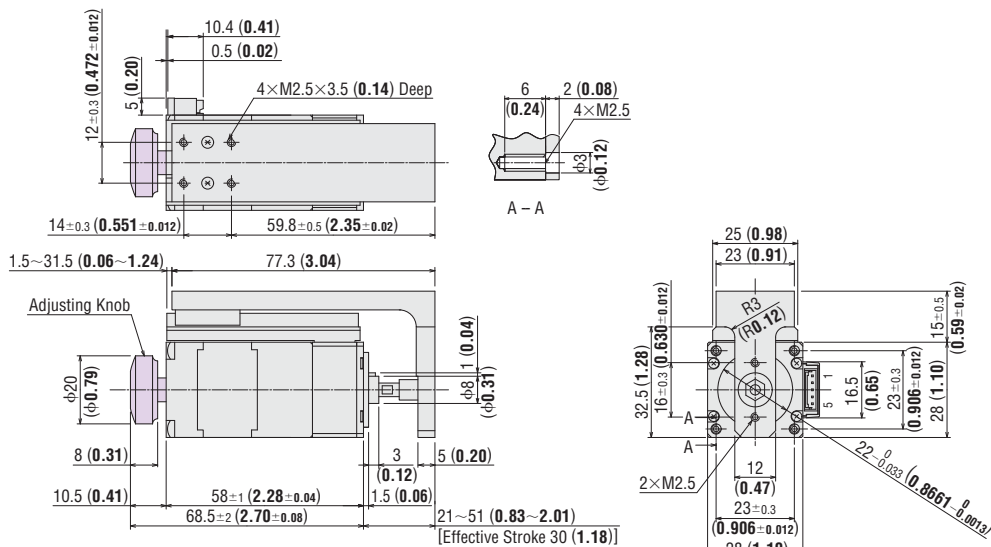
◇ Ground Ball Screw, High-Resolution Motor, Guide Type

⑥ **DRL28MB1G-03G** (Without additional function)  
**DRL28MB1G-03NG** (With adjusting knob)

Actuator Model  
 DRL28MB1G-03  
 DRL28MB1G-03N

Mass  
 0.25 kg (0.55 lb.)  
 0.26 kg (0.57 lb.)

**DXF**  
 D863  
 D864



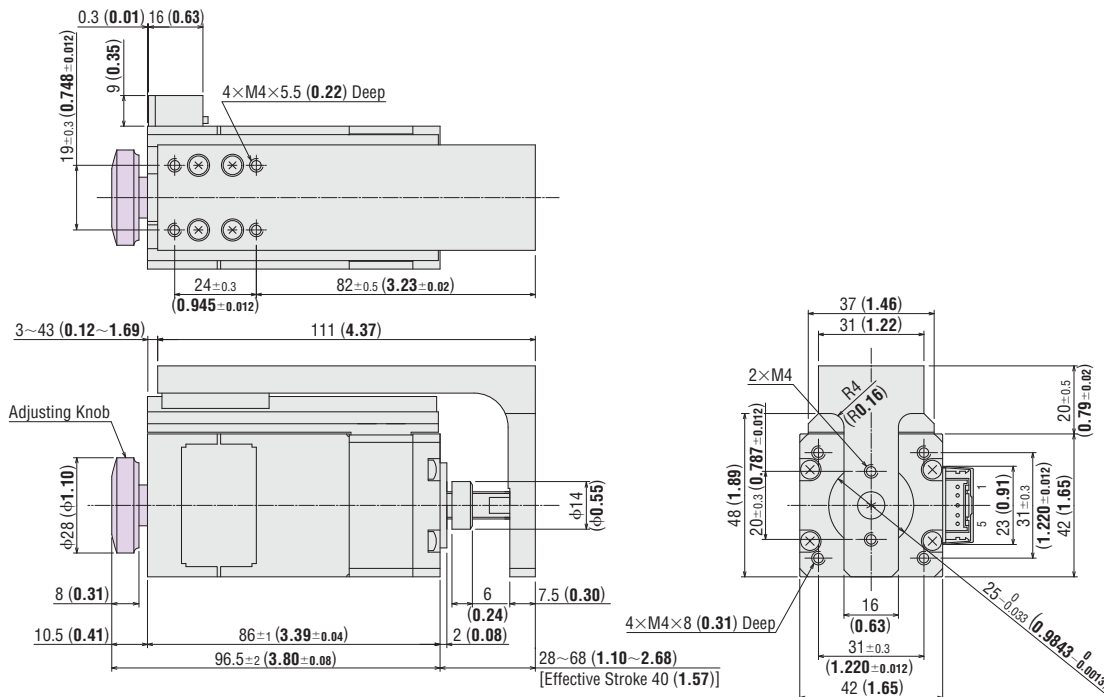
● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

⑦ **DRL42MB2G-04G** (Without additional function)  
**DRL42MB2G-04NG** (With adjusting knob)

Actuator Model  
 DRL42MB2G-04  
 DRL42MB2G-04N

Mass  
 0.8 kg (1.76 lb.)  
 0.8 kg (1.76 lb.)

**DXF**  
 D865  
 D866

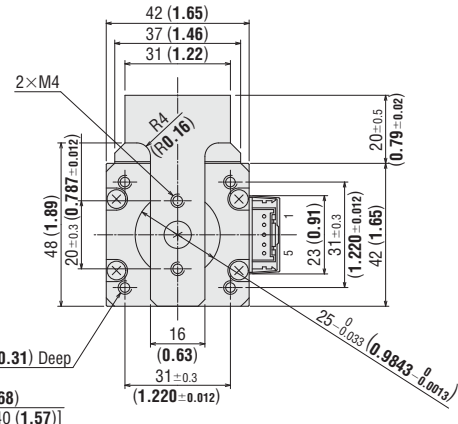
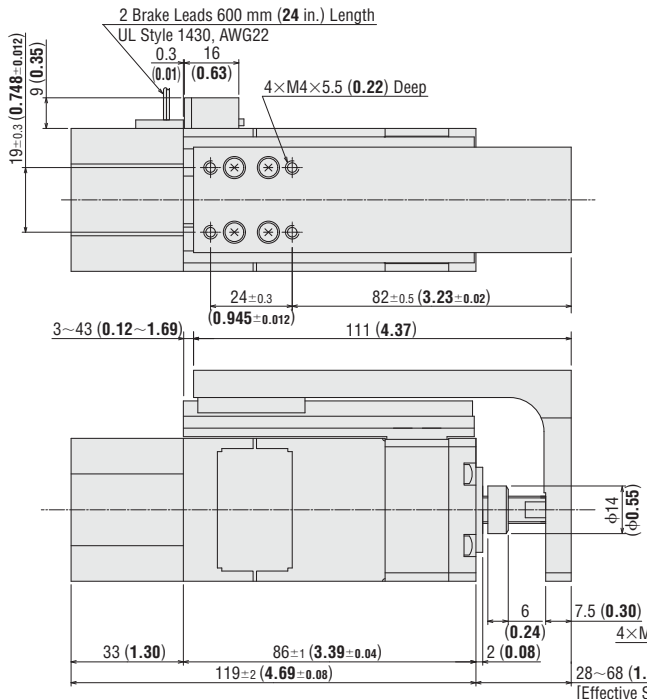


● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

● Dimensions ⑥ and ⑦ apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.

Actuator Model DRL42MB2G-04MG (With electromagnetic brake) DRL42MB2G-04M  
 Mass 1 kg (2.2 lb.)

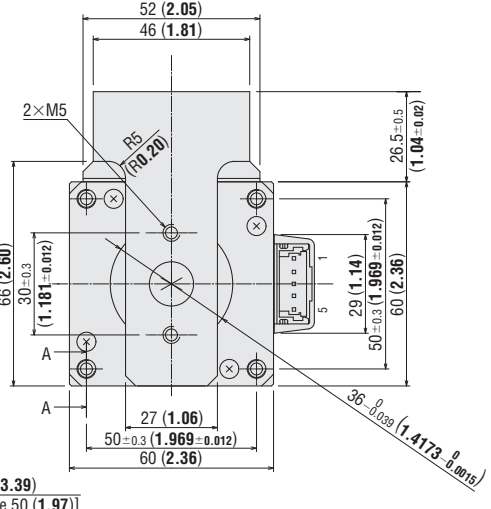
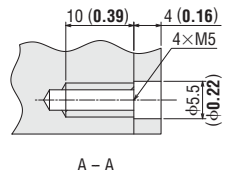
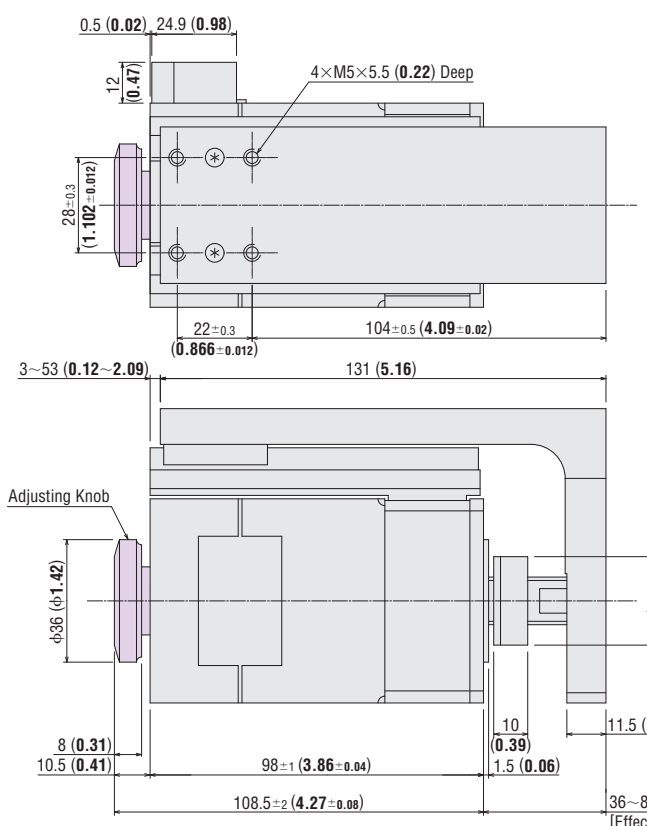
DXF D867



● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG22

Actuator Model DRL60MB4G-05G (Without additional function) DRL60MB4G-05  
 Mass 1.8 kg (3.9 lb.)  
 DRL60MB4G-05NG (With adjusting knob) DRL60MB4G-05N  
 Mass 1.85 kg (4.0 lb.)

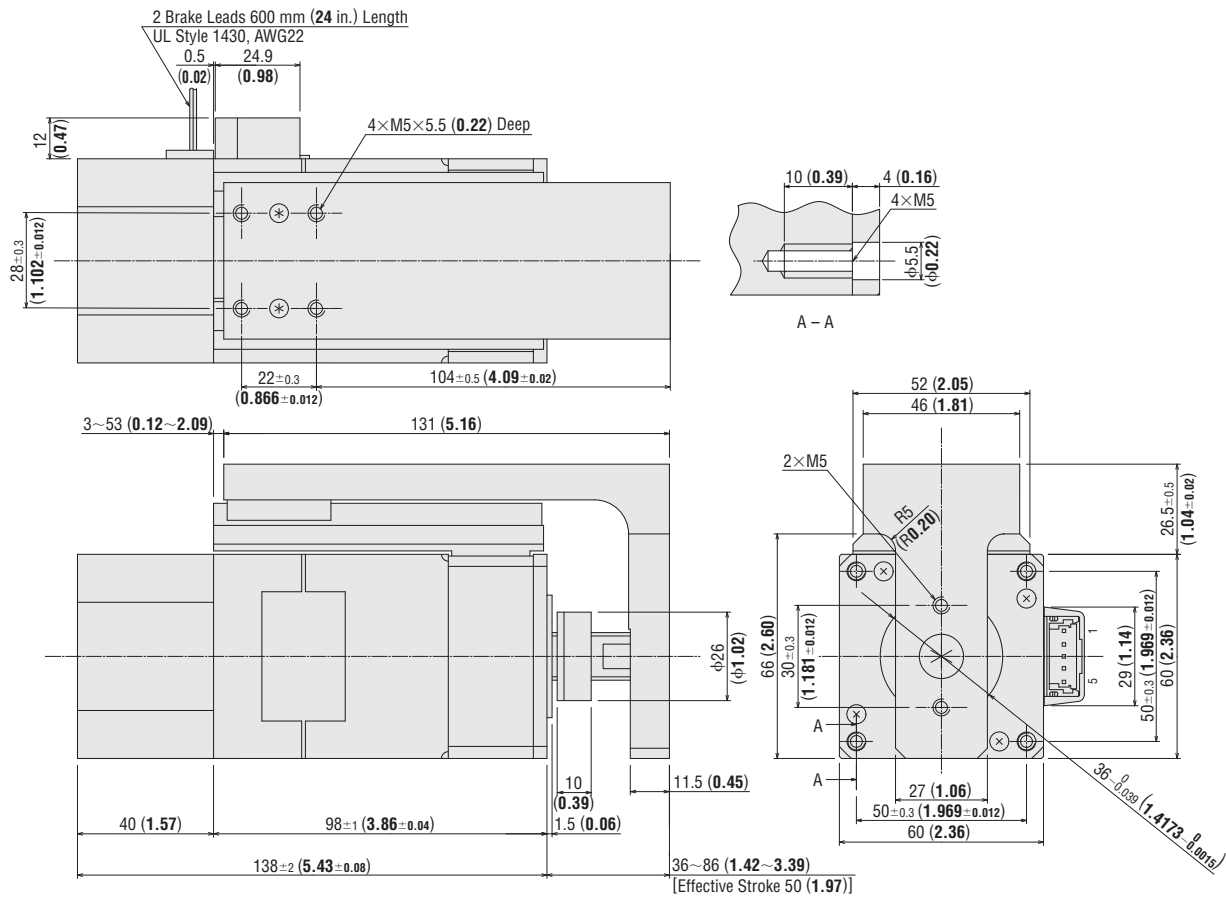
DXF D868 D869



● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3266, AWG22

● Dimension ⑨ applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in □ areas should be ignored.

**DRL60MB4G-05MG** (With electromagnetic brake)    Actuator Model **DRL60MB4G-05M**    Mass 2.2 kg (4.8 lb.)    **DXF** D870

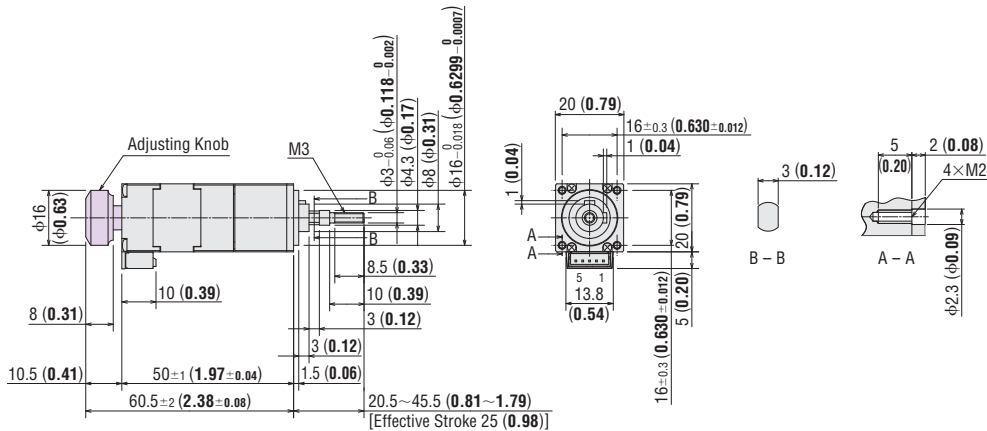


● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3266, AWG22

◇ Ground Ball Screw/Rolled Ball Screw, Standard Motor

⑪ **DRL20PB1-02G** (Without additional function)  
**DRL20PB1-02NG** (With adjusting knob)

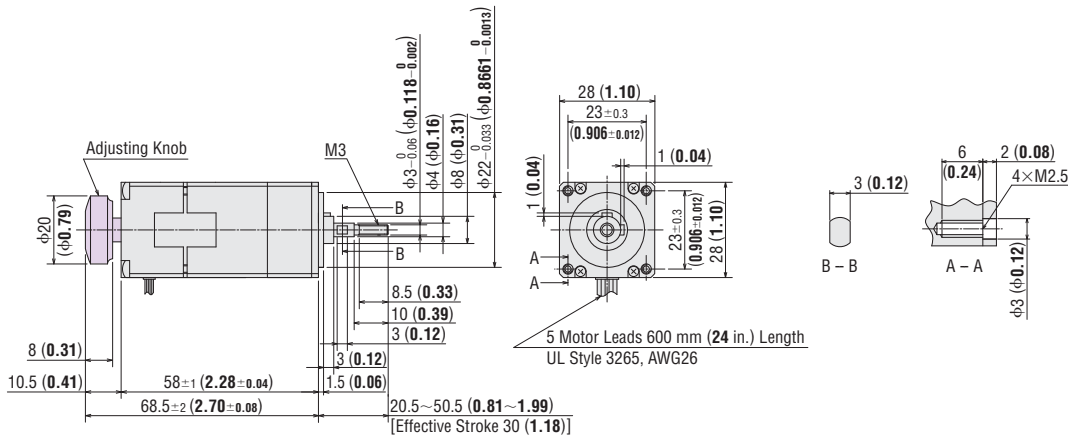
Actuator Model	Mass	DXF
DRL20PB1-02	0.08 kg (0.17 lb.)	D520
DRL20PB1-02N	0.08 kg (0.17 lb.)	D521



● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

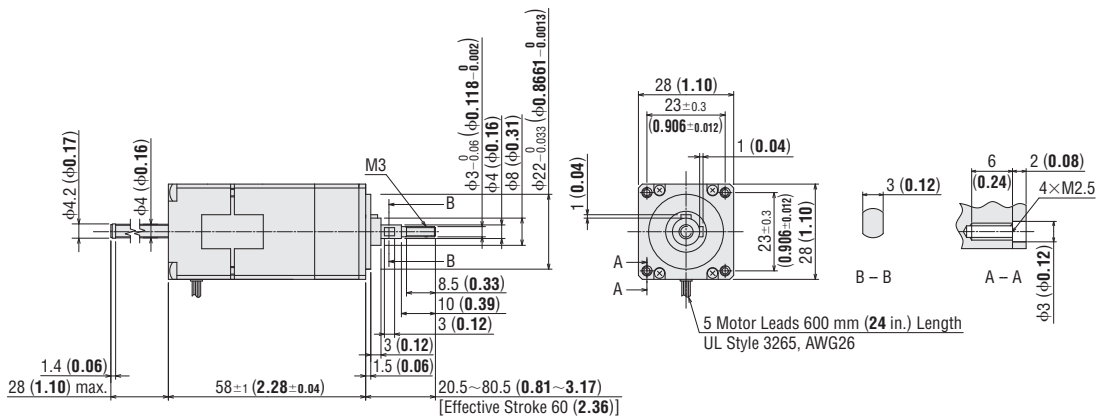
⑫ **DRL28PB1-03G** (Without additional function)  
**DRL28PB1-03NG** (With adjusting knob)

Actuator Model	Mass	DXF
DRL28PB1-03	0.18 kg (0.39 lb.)	D455
DRL28PB1-03N	0.19 kg (0.41 lb.)	D504



⑬ **DRL28PB1-06G** (Without additional function)

Actuator Model	Mass	DXF
DRL28PB1-06	0.18 kg (0.39 lb.)	D871



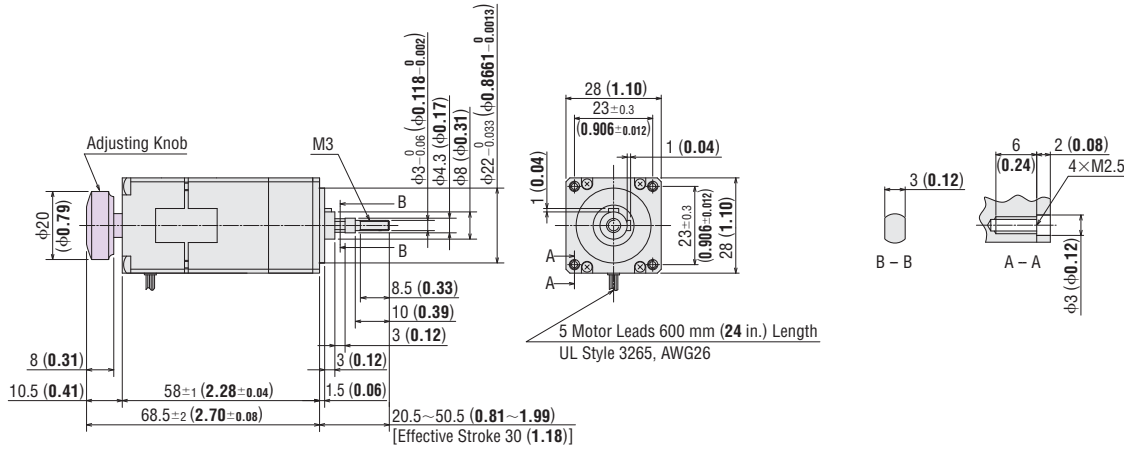
● Dimensions ⑪ and ⑫ apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in [ ] areas should be ignored.

**14** **DRL28PA1-03G** (Without additional function)  
**DRL28PA1-03NG** (With adjusting knob)

Actuator Model  
 DRL28PA1-03  
 DRL28PA1-03N

Mass  
 0.18 kg (0.39 lb.)  
 0.19 kg (0.41 lb.)

**DXF**  
 D468  
 D503

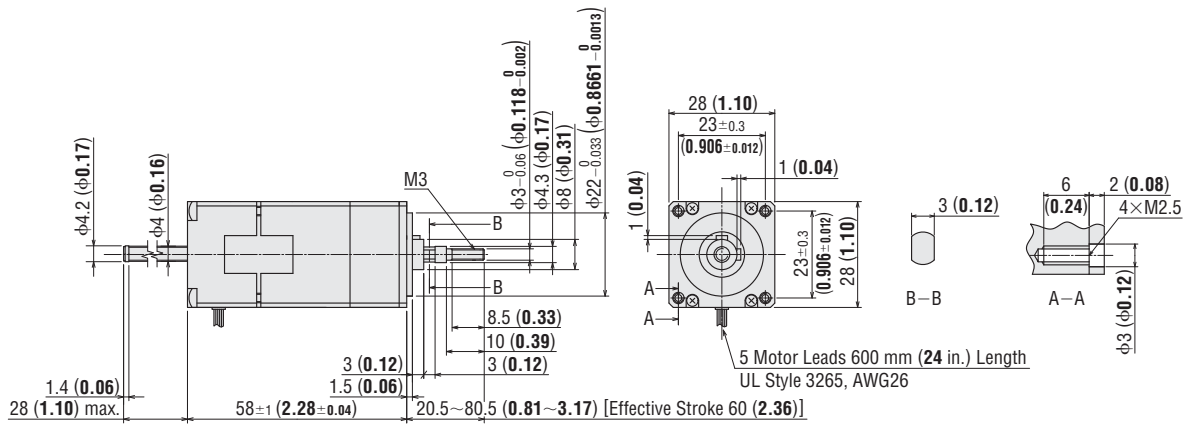


**15** **DRL28PA1-06G** (Without additional function)

Actuator Model  
 DRL28PA1-06

Mass  
 0.18 kg (0.39 lb.)

**DXF**  
 D872

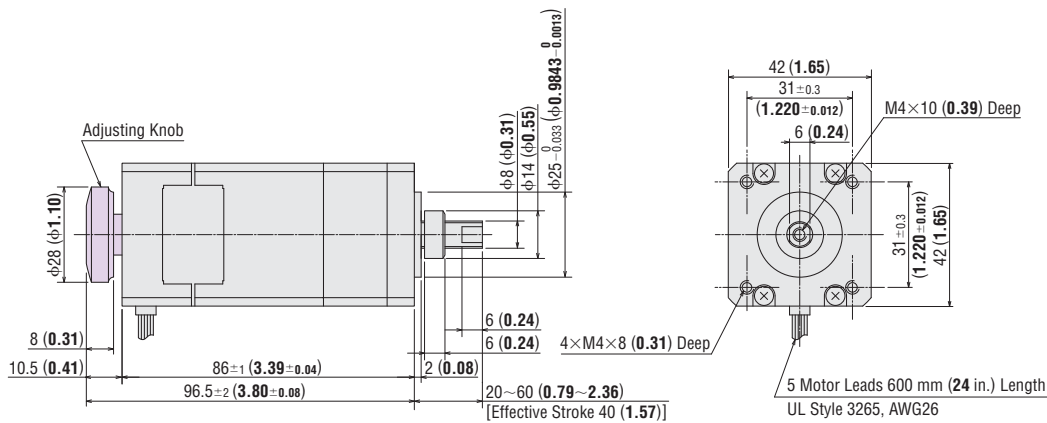


**16** **DRL42PB2-04G** (Without additional function)  
**DRL42PA2-04G** (Without additional function)  
**DRL42PB2-04NG** (With adjusting knob)  
**DRL42PA2-04NG** (With adjusting knob)

Actuator Model  
 DRL42PB2-04  
 DRL42PA2-04  
 DRL42PB2-04N  
 DRL42PA2-04N

Mass  
 0.6 kg (1.32 lb.)  
 0.6 kg (1.32 lb.)  
 0.6 kg (1.32 lb.)  
 0.6 kg (1.32 lb.)

**DXF**  
 D361  
 D361  
 D507  
 D507



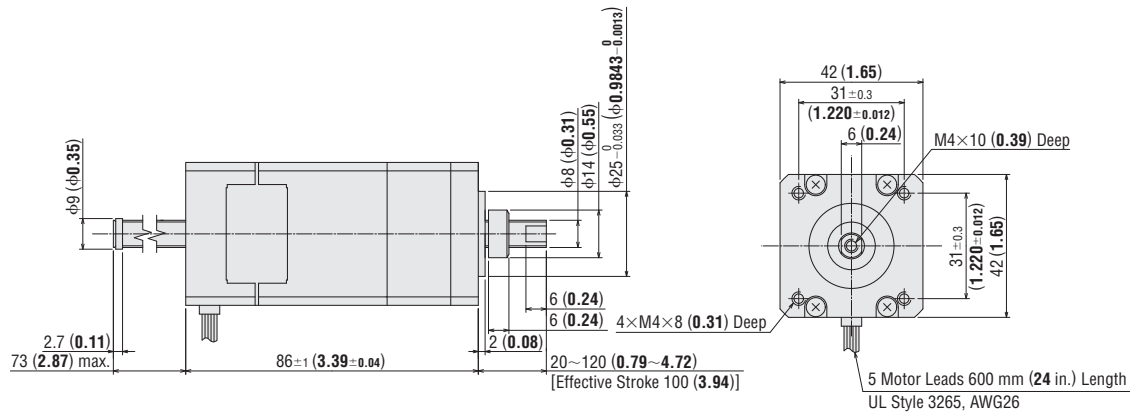
● Dimensions 14 and 16 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.

**17** **DRL42PB2-10G** (Without additional function)  
**DRL42PA2-10G** (Without additional function)

Actuator Model  
 DRL42PB2-10  
 DRL42PA2-10

Mass  
 0.63 kg (1.38 lb.)  
 0.63 kg (1.38 lb.)

**DXF**  
 D873  
 D873

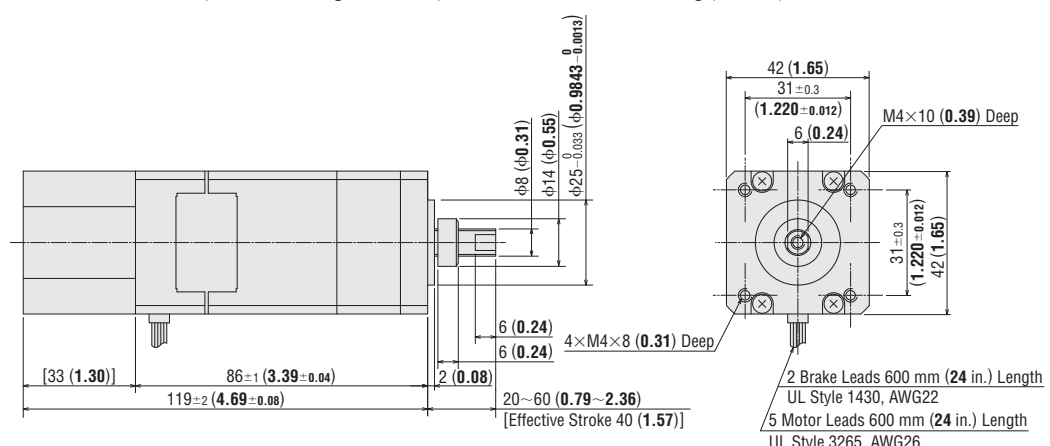


**18** **DRL42PB2-04MG** (With electromagnetic brake)  
**DRL42PA2-04MG** (With electromagnetic brake)

Actuator Model  
 DRL42PB2-04M  
 DRL42PA2-04M

Mass  
 0.8 kg (1.76 lb.)  
 0.8 kg (1.76 lb.)

**DXF**  
 D510  
 D510

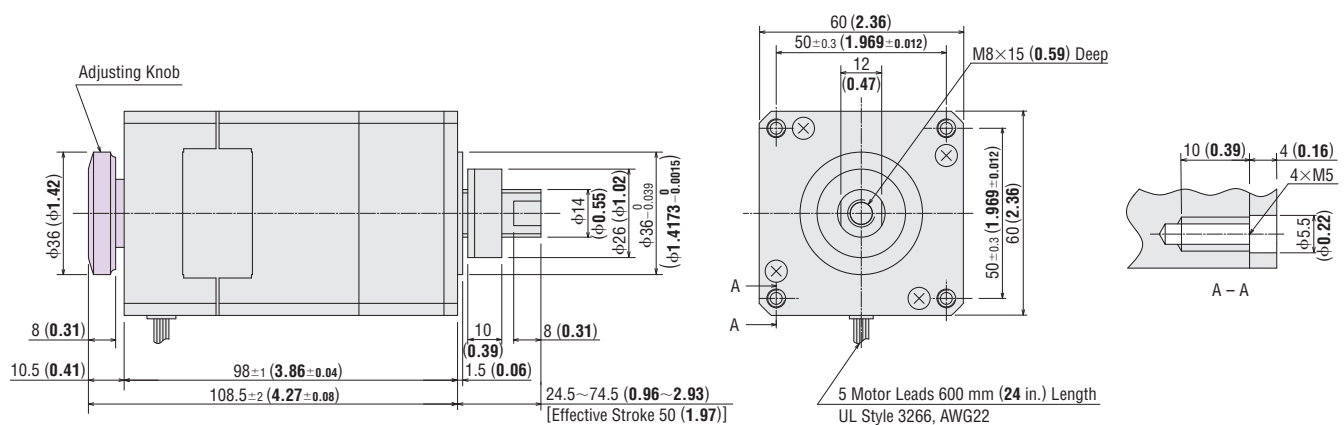


**19** **DRL60PB4-05G** (Without additional function)  
**DRL60PA4-05G** (Without additional function)  
**DRL60PB4-05NG** (With adjusting knob)  
**DRL60PA4-05NG** (With adjusting knob)

Actuator Model  
 DRL60PB4-05  
 DRL60PA4-05  
 DRL60PB4-05N  
 DRL60PA4-05N

Mass  
 1.3 kg (2.8 lb.)  
 1.3 kg (2.8 lb.)  
 1.35 kg (2.9 lb.)  
 1.35 kg (2.9 lb.)

**DXF**  
 D362  
 D362  
 D511  
 D511

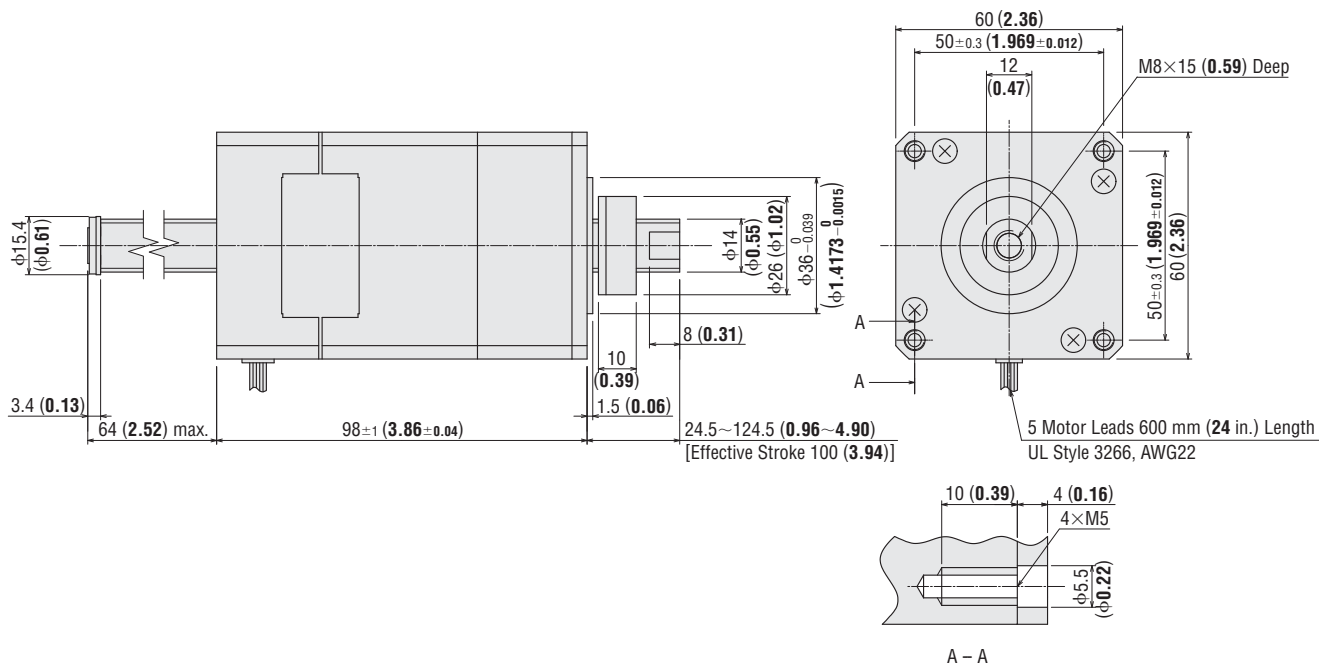


● Dimension 19 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  area should be ignored.

**20 DRL60PB4-10G** (Without additional function)  
**DRL60PA4-10G** (Without additional function)

Actuator Model	Mass
DRL60PB4-10	1.38 kg (3.0 lb.)
DRL60PA4-10	1.38 kg (3.0 lb.)

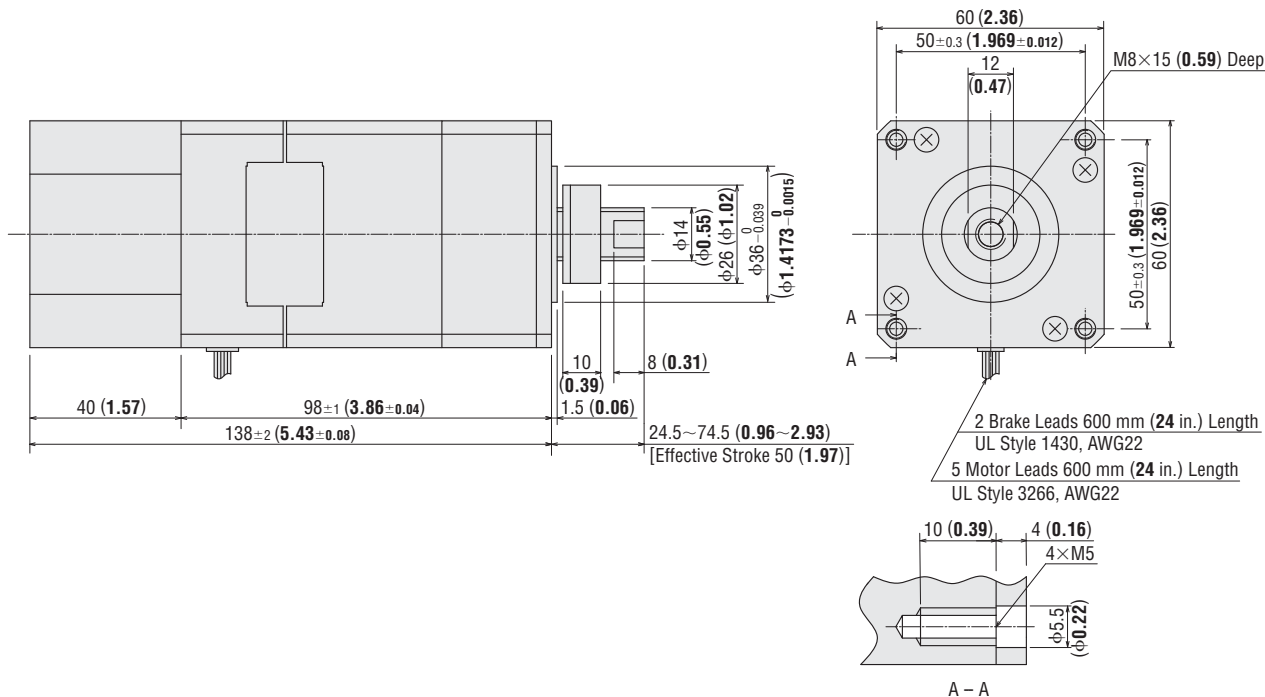
**DXF**  
D874  
D874



**21 DRL60PB4-05MG** (With electromagnetic brake)  
**DRL60PA4-05MG** (With electromagnetic brake)

Actuator Model	Mass
DRL60PB4-05M	1.7 kg (3.7 lb.)
DRL60PA4-05M	1.7 kg (3.7 lb.)

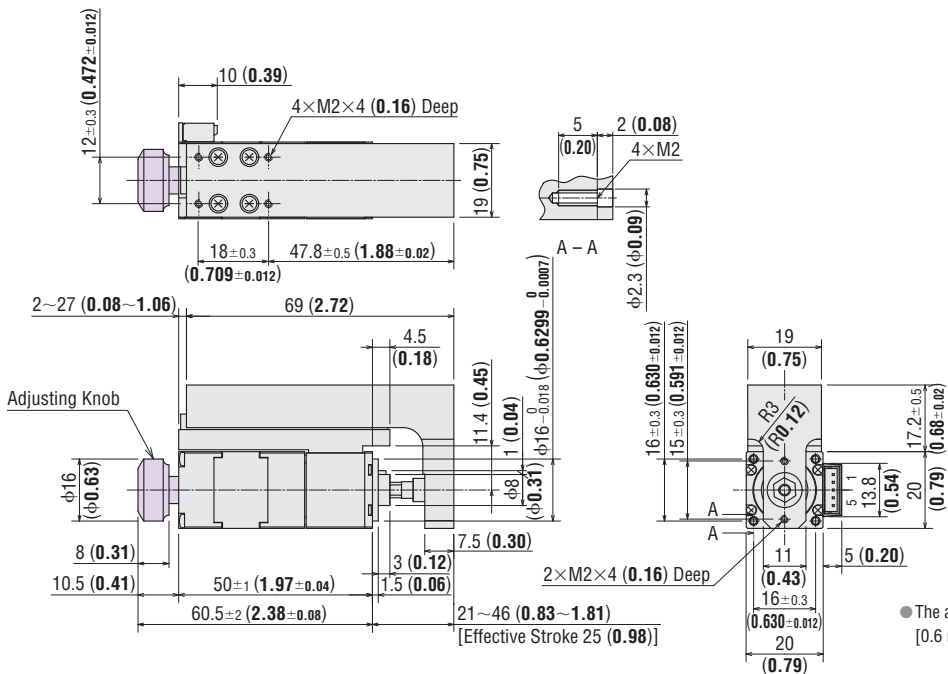
**DXF**  
D512  
D512



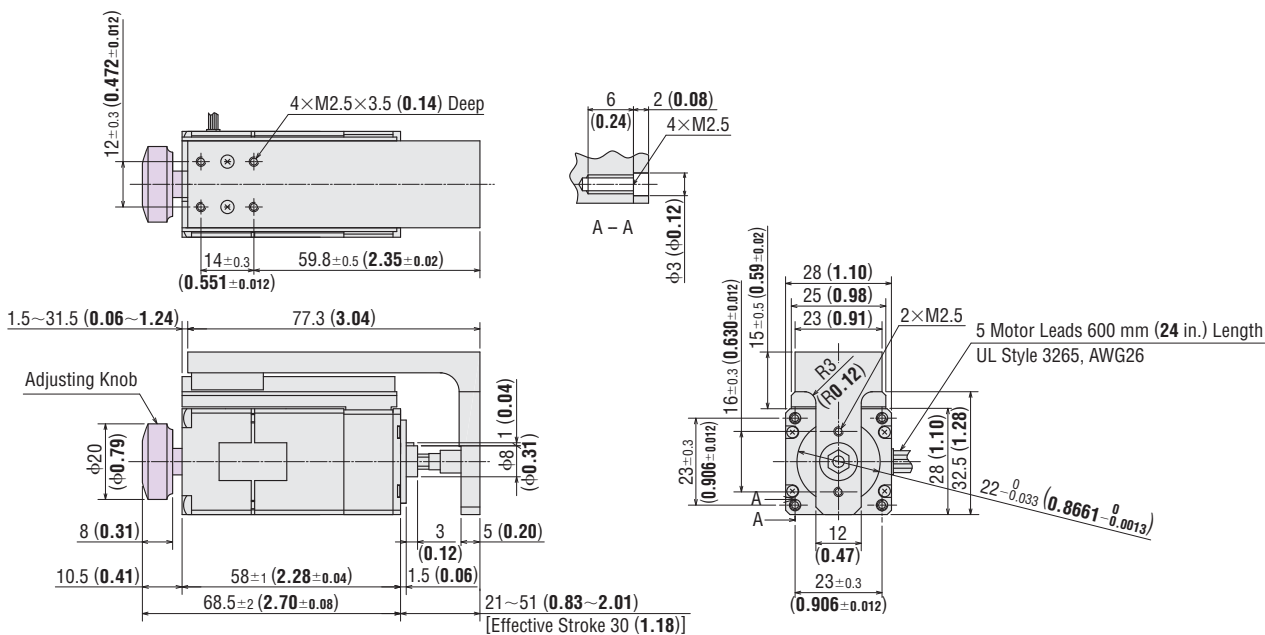


◇ Ground Ball Screw/Rolled Ball Screw, Standard Motor, Guide Type

	Actuator Model	Mass	DXF
22 DRL20PB1G-02G (Without additional function)	DRL20PB1G-02	0.14 kg (0.3 lb.)	D522
DRL20PB1G-02NG (With adjusting knob)	DRL20PB1G-02N	0.15 kg (0.33 lb.)	D523



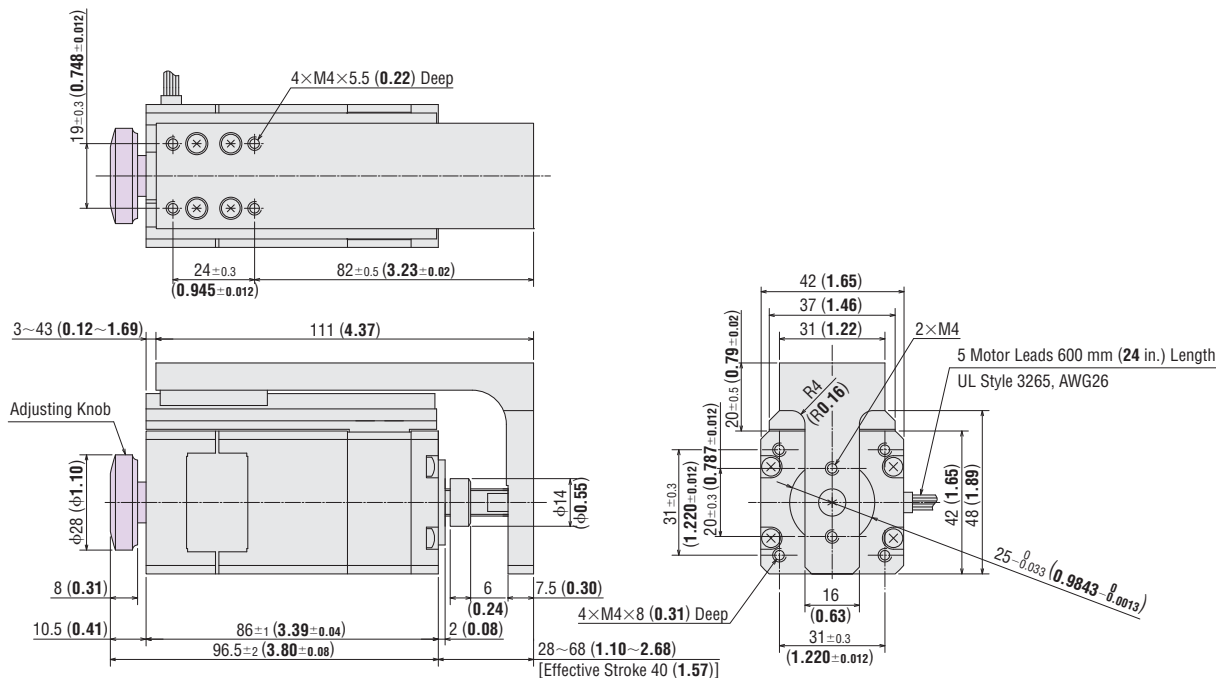
	Actuator Model	Mass	DXF
23 DRL28PB1G-03G (Without additional function)	DRL28PB1G-03	0.25 kg (0.55 lb.)	D456
DRL28PA1G-03G (Without additional function)	DRL28PA1G-03	0.25 kg (0.55 lb.)	D456
DRL28PB1G-03NG (With adjusting knob)	DRL28PB1G-03N	0.26 kg (0.57 lb.)	D513
DRL28PA1G-03NG (With adjusting knob)	DRL28PA1G-03N	0.26 kg (0.57 lb.)	D513



● Dimensions 22 and 23 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in [ ] areas should be ignored.

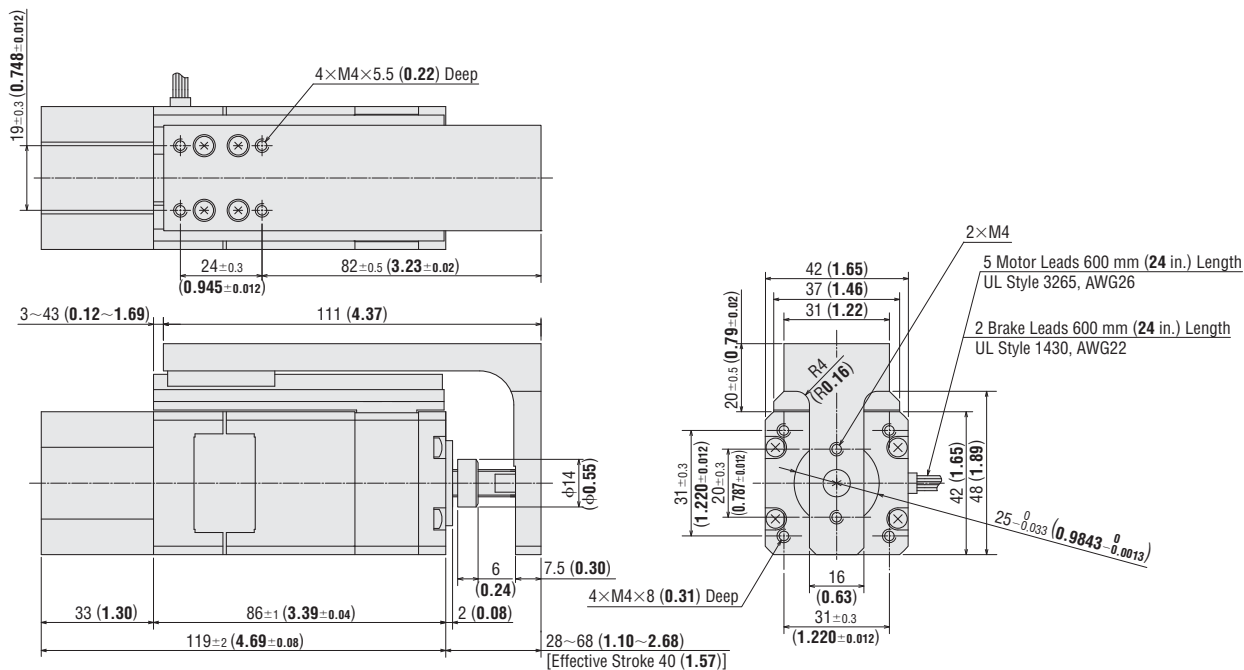
- 24 **DRL42PB2G-04G** (Without additional function)
- DRL42PA2G-04G** (Without additional function)
- DRL42PB2G-04NG** (With adjusting knob)
- DRL42PA2G-04NG** (With adjusting knob)

Actuator Model	Mass	<b>DXF</b>
DRL42PB2G-04	0.8 kg (1.76 lb.)	D364
DRL42PA2G-04	0.8 kg (1.76 lb.)	D364
DRL42PB2G-04N	0.8 kg (1.76 lb.)	D514
DRL42PA2G-04N	0.8 kg (1.76 lb.)	D514



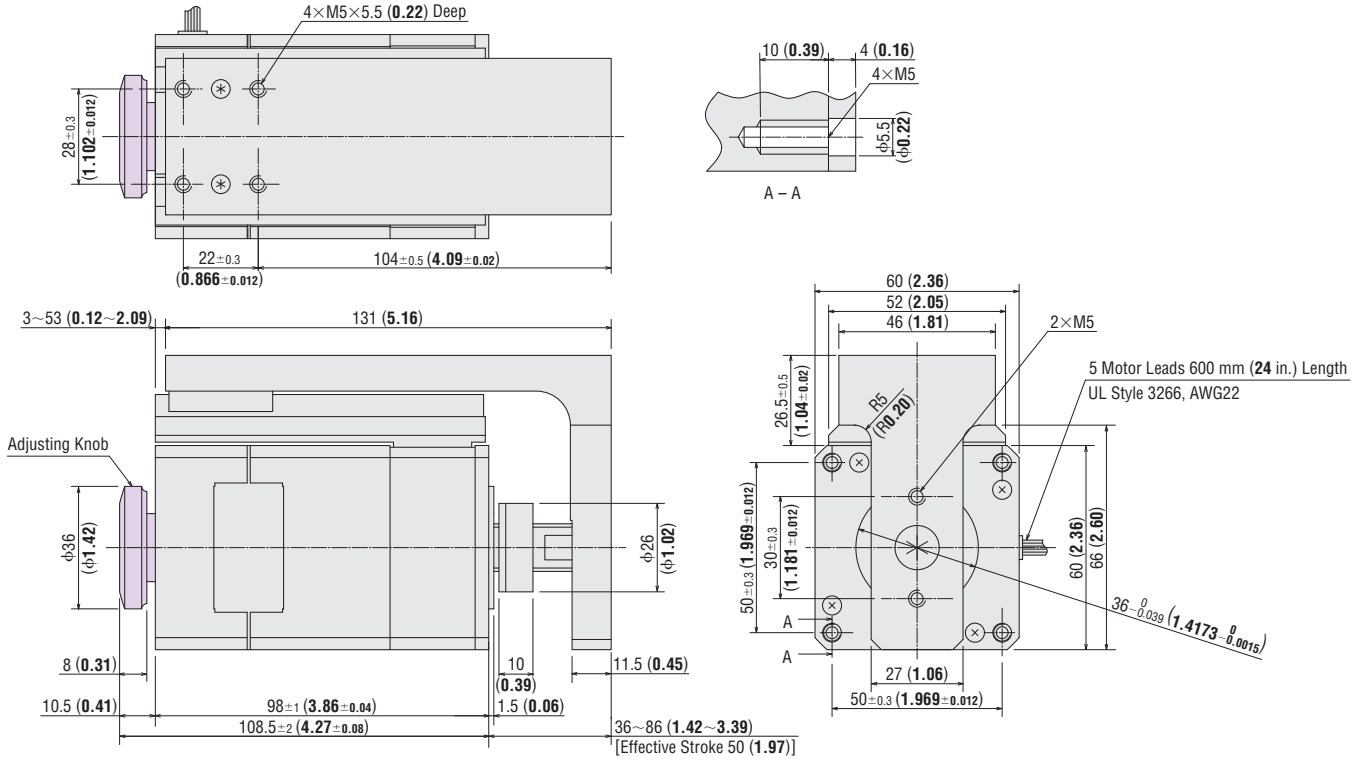
- 25 **DRL42PB2G-04MG** (With electromagnetic brake)
- DRL42PA2G-04MG** (With electromagnetic brake)

Actuator Model	Mass	<b>DXF</b>
DRL42PB2G-04M	1 kg (2.2 lb.)	D515
DRL42PA2G-04M	1 kg (2.2 lb.)	D515

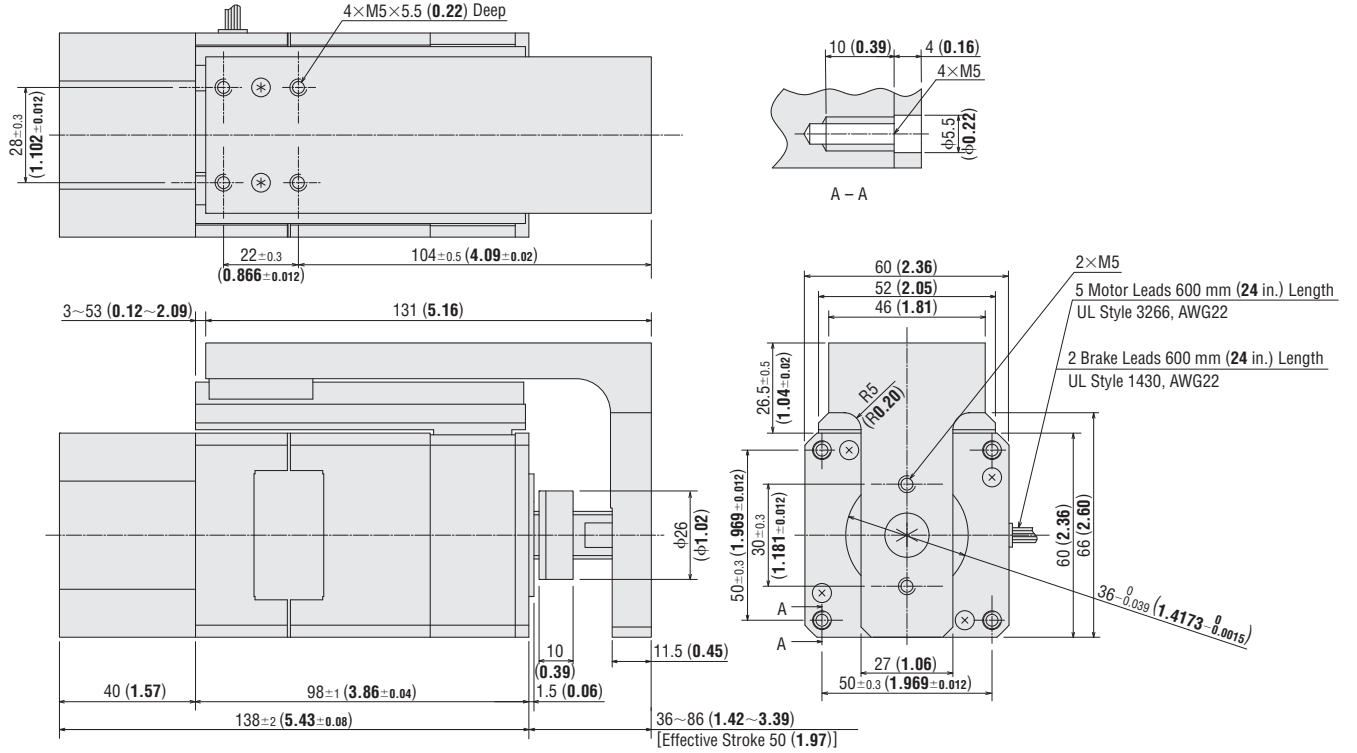


● Dimension 24 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.

26	<b>DRL60PB4G-05G</b> (Without additional function)	Actuator Model	DRL60PB4G-05	Mass	1.8 kg (3.9 lb.)	<b>DXF</b>	D365
	<b>DRL60PA4G-05G</b> (Without additional function)		DRL60PA4G-05		1.8 kg (3.9 lb.)		D365
	<b>DRL60PB4G-05NG</b> (With adjusting knob)		DRL60PB4G-05N		1.85 kg (4.0 lb.)		D516
	<b>DRL60PA4G-05NG</b> (With adjusting knob)		DRL60PA4G-05N		1.85 kg (4.0 lb.)		D516



27	<b>DRL60PB4G-05MG</b> (With electromagnetic brake)	Actuator Model	DRL60PB4G-05M	Mass	2.2 kg (4.8 lb.)	<b>DXF</b>	D517
	<b>DRL60PA4G-05MG</b> (With electromagnetic brake)		DRL60PA4G-05M		2.2 kg (4.8 lb.)		D517



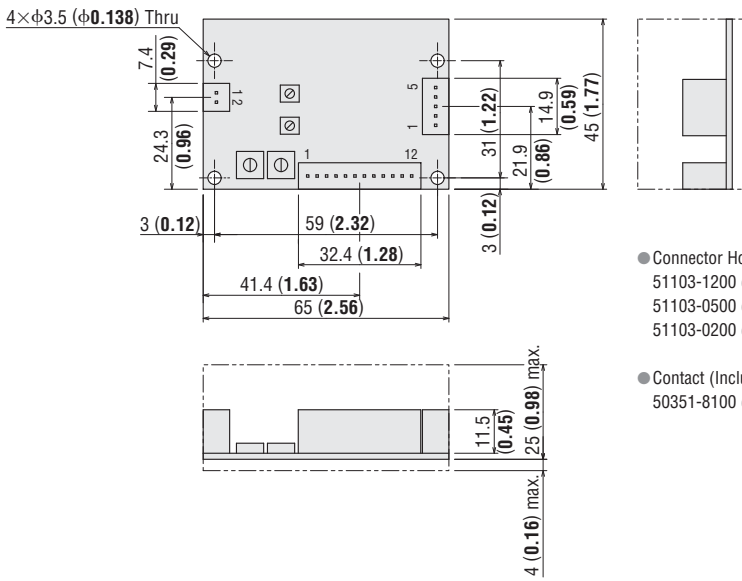
● Dimension 26 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in [ ] areas should be ignored.

● Driver

☒ CRD5103P, CRD5107P, CRD5114P

Mass: 0.04 kg (0.088 lb.)

DXF B363



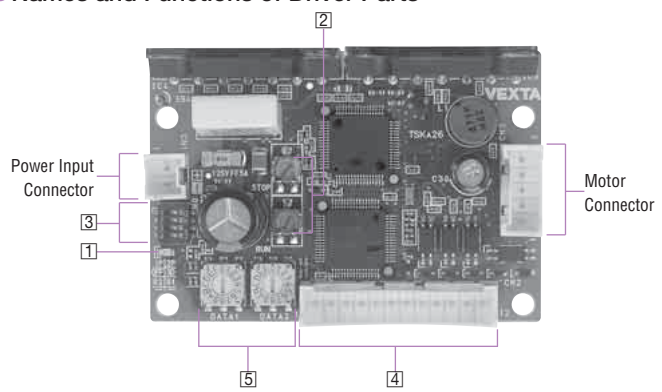
Note:

● When assembling the connector, use the hand-operated crimp tool for contact 57295-5000 (MOLEX) or the crimped driver lead wire set (sold separately). The crimp tool is not provided with the product. It must be purchased separately.

Driver lead wire set → Page D-160

## Connection and Operation

### Names and Functions of Driver Parts



#### 1 Power Input Display

Color	Function	When Activated
Green	Power Supply Indication	Lights when power is on

#### 2 Current Adjustment Potentiometers

Indication	Potentiometer Name	Function
RUN	Motor Operating Current Adjustment Potentiometer	For adjusting the operating current of the motor
STOP	Motor Standstill Current Adjustment Potentiometer	For adjusting the standstill current of the motor

#### 3 Function Switches

Indication	Switch Name	Function
1P/2P	Pulse Input Mode Switch	Switches between 1-pulse input mode and 2-pulse input mode
OFF/SD	Smooth Drive Function Switch	Enables or disables the smooth drive function
R2/R1	Resolution Select Switch	Switches the base resolution between R1 and R2

#### 4 Input/Output Signals

Indication	Input/Output	Pin No.	Signal Name	Function
CN2	Input	1	Pulse Signal	Operation command pulse signal
		2	(CW Pulse Signal)	(The motor will rotate in the CW direction when in 2-pulse input mode.)
		3	Rotation Direction Signal	Rotation direction signal
		4	(CCW Pulse Signal)	Photocoupler OFF: CCW, photocoupler ON: CW (The motor will rotate in the CCW direction when in 2-pulse input mode.)
		5	All Windings Off Signal	Turns off the output current to the motor so that the motor shaft can be rotated by external force
		6		
		7	Resolution Select Signal	Switches to the resolution set in DATA1 and DATA2
		8		
		9	Automatic Current Cutback Release Signal	Disables the automatic current cutback function
		10		
	Output	11	Excitation Timing Signal	This signal is output when the excitation sequence is in step "0."
		12		

#### 5 Resolution Setting Switches

Indication	Switch Name	Function
DATA1	Resolution Setting Switch	Each switch can be set to the desired resolution from the 16 resolution levels.
DATA2		

Tables of each product settings Page → D-154

**DRL20, DRL28** ●With the high-resolution motor, the resolution is one-half the values specified below.

R1			R2			
Resolution Setting Switch		Microsteps/ Step 1	Resolution 1 mm (in.)	Resolution Setting Switch		Resolution 2 mm (in.)
DATA1	DATA2			DATA1	DATA2	
0		1	0.002 (0.000079)	0	×2.5	0.005 (0.00020)
1		2	0.001 (0.000039)	1	×1.25	0.0025 (0.000098)
2		2.5	0.0008 (0.000031)	2	1.6	0.00125 (0.000049)
3		4	0.0005 (0.00002)	3	2	0.001 (0.000039)
4		5	0.0004 (0.000016)	4	3.2	0.000625 (0.000025)
5		8	0.00025 (0.0000098)	5	4	0.0005 (0.000020)
6		10	0.0002 (0.0000079)	6	6.4	0.0003125 (0.000012)
7		20	0.0001 (0.0000039)	7	10	0.0002 (0.0000079)
8		25	0.00008 (0.0000031)	8	12.8	0.00015625 (0.0000062)
9		40	0.00005 (0.000002)	9	20	0.0001 (0.0000039)
A		50	0.00004 (0.0000016)	A	25.6	0.000078125 (0.0000031)
B		80	0.000025 (0.00000098)	B	40	0.00005 (0.0000020)
C		100	0.00002 (0.00000079)	C	50	0.00004 (0.0000016)
D		125	0.000016 (0.00000063)	D	51.2	0.0000390625 (0.0000015)
E		200	0.00001 (0.00000039)	E	100	0.00002 (0.00000079)
F		250	0.000008 (0.00000031)	F	102.4	0.00001953125 (0.00000077)

**DRL42** ●With the high-resolution motor, the resolution is one-half the values specified below.

R1			R2			
Resolution Setting Switch		Microsteps/ Step 1	Resolution 1 mm (in.)	Resolution Setting Switch		Resolution 2 mm (in.)
DATA1	DATA2			DATA1	DATA2	
0		1	0.004 (0.00016)	0	×2.5	0.01 (0.00039)
1		2	0.002 (0.000079)	1	×1.25	0.005 (0.00020)
2		2.5	0.0016 (0.000063)	2	1.6	0.0025 (0.000098)
3		4	0.001 (0.000039)	3	2	0.002 (0.000079)
4		5	0.0008 (0.000031)	4	3.2	0.00125 (0.000049)
5		8	0.0005 (0.00002)	5	4	0.001 (0.000039)
6		10	0.0004 (0.000016)	6	6.4	0.000625 (0.000025)
7		20	0.0002 (0.0000079)	7	10	0.0004 (0.000016)
8		25	0.00016 (0.0000063)	8	12.8	0.0003125 (0.000012)
9		40	0.0001 (0.0000039)	9	20	0.0002 (0.0000079)
A		50	0.00008 (0.0000031)	A	25.6	0.00015625 (0.0000062)
B		80	0.00005 (0.000002)	B	40	0.0001 (0.0000039)
C		100	0.00004 (0.0000016)	C	50	0.00008 (0.0000031)
D		125	0.000032 (0.0000013)	D	51.2	0.000078125 (0.0000031)
E		200	0.00002 (0.00000079)	E	100	0.00004 (0.0000016)
F		250	0.000016 (0.00000063)	F	102.4	0.0000390625 (0.0000015)

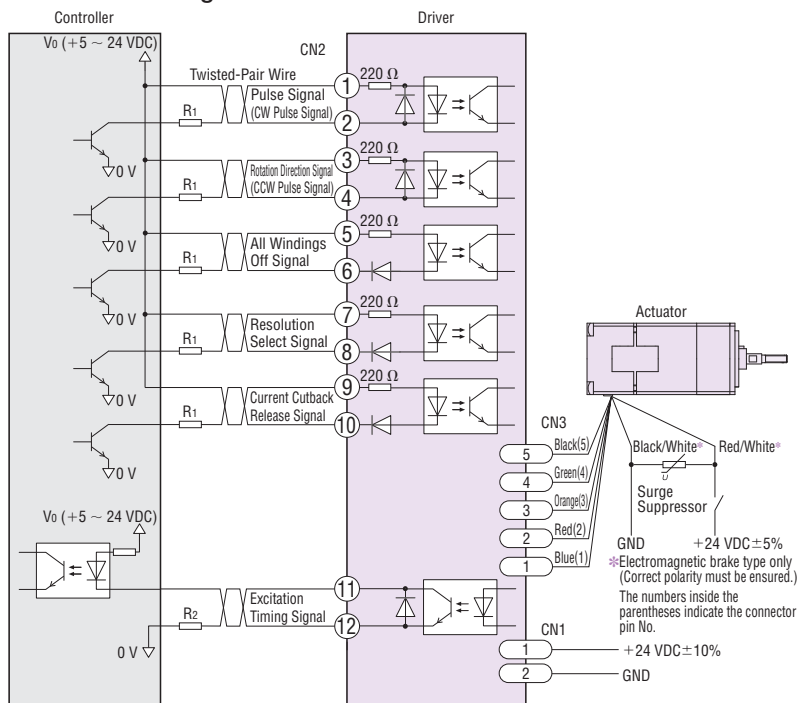
**DRL60** ●With the high-resolution motor, the resolution is one-half the values specified below.

R1			R2			
Resolution Setting Switch		Microsteps/ Step 1	Resolution 1 mm (in.)	Resolution Setting Switch		Resolution 2 mm (in.)
DATA1	DATA2			DATA1	DATA2	
0		1	0.008 (0.00031)	0	×2.5	0.02 (0.00079)
1		2	0.004 (0.00016)	1	×1.25	0.01 (0.00039)
2		2.5	0.0032 (0.00013)	2	1.6	0.005 (0.00020)
3		4	0.002 (0.000079)	3	2	0.004 (0.00016)
4		5	0.0016 (0.000063)	4	3.2	0.0025 (0.000098)
5		8	0.001 (0.000039)	5	4	0.002 (0.000079)
6		10	0.0008 (0.000031)	6	6.4	0.00125 (0.000049)
7		20	0.0004 (0.000016)	7	10	0.0008 (0.000031)
8		25	0.00032 (0.000013)	8	12.8	0.000625 (0.000025)
9		40	0.0002 (0.0000079)	9	20	0.0004 (0.000016)
A		50	0.00016 (0.0000063)	A	25.6	0.0003125 (0.000012)
B		80	0.0001 (0.0000039)	B	40	0.0002 (0.0000079)
C		100	0.00008 (0.0000031)	C	50	0.00016 (0.0000063)
D		125	0.000064 (0.0000025)	D	51.2	0.00015625 (0.0000062)
E		200	0.00004 (0.0000016)	E	100	0.00008 (0.0000031)
F		250	0.000032 (0.0000013)	F	102.4	0.000078125 (0.0000031)

**Notes:**

- The resolutions are theoretical values.
- The resolution is calculated by dividing the base resolution by the number of microstep.
- The numbers of microsteps that can be specified by the "Resolution Select" signal are limited to those selected in resolution 1 or resolution 2.
- Do not change the "Resolution Select" signal input or resolution select switch while the actuator is operating. It may cause malfunction.

● Connection Diagram



◇ Input/Output Signal Connection

- Keep the input signal  $V_0$  between 5 VDC and 24 VDC. When  $V_0$  is equal to 5 VDC, the external resistor  $R_1$  is not necessary. When  $V_0$  is above 5 VDC, connect  $R_1$  to keep the current between 10 mA and 20 mA. Example: When  $V_0$  is 24 VDC  $R_1$ : 1.5 to 2.2 k $\Omega$ , 0.5 W or more
- Keep the output signal voltage  $V_0$  between 5 VDC and 24 VDC, current 10 mA or less. When  $V_0$  is above 10 mA, connect  $R_2$  to keep the current 10 mA or less.

◇ Power Supply

Use a power supply that can supply sufficient input current. When power supply capacity is insufficient, a decrease in actuator output can cause the following malfunctions:

- Actuator does not move properly at high-speed (insufficient thrust).
- Slow actuator startup and stopping

◇ Connecting the Electromagnetic Brake to Power Supply

- Connect the red/white lead from the actuator to the +24 VDC terminal on the DC power supply and the black/white lead to the GND terminal. (The electromagnetic brake leads have polarity. The electromagnetic brake will not operate if the leads are connected in reverse polarity.)
- For the electromagnetic brake, use a power supply of 24 VDC  $\pm 5\%$ , 0.1 A or more for **DRL42**, or 24 VDC  $\pm 5\%$ , 0.3 A or more for **DRL60**.
- To connect the electromagnetic brake to the DC power supply, use a shielded cable of AWG24 or thicker and keep the wiring distance to a minimum. Be sure to use the supplied surge suppressor to protect switch contact and suppress noise.

◇ Notes on Wiring

- Use twisted-pair wires of AWG24 to 22 and 2 m (6.6 ft.) or less in length for the signal lines.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases. Technical reference  $\rightarrow$  F-67
- Use wires of AWG22 for the power supply lines. When assembling the connector, use the hand-operated crimp tool or the crimped driver lead wire set (sold separately). The crimp tool is not provided with the package. It must be purchased separately.
- Signal lines should be kept at least 2 cm (0.79 in.) away from power lines (power supply lines and motor lines). Do not wire the signal lines with the power lines in the same duct or bundle them together.
- Extension of the motor leads should be within 10 m (32.8 ft.).
- If noise generated by the wiring and layout of motor cables and/or power cables causes a problem, try shielding the cables or insert ferrite cores.
- Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning the power on.

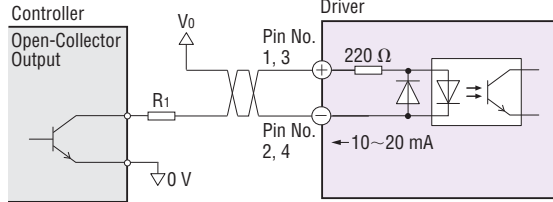
● Description of Input/Output Signals

Indication of Input/Output Signal "ON"/"OFF"  
 Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver.

Photocoupler OFF ON

Pulse (CW) and Rotation Direction (CCW) Input Signal

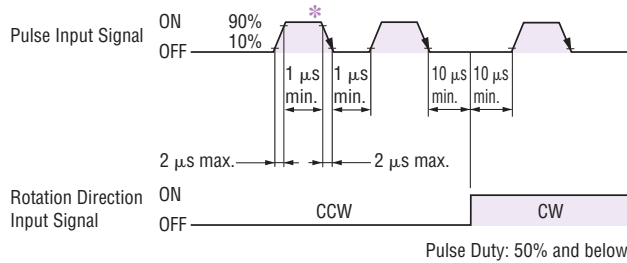
◇ Input Circuit and Sample Connection



Notes:

- Keep the input signal voltage  $V_0$  between 5 VDC and 24 VDC.
- When  $V_0$  is equal to 5 VDC, the external resistor  $R_1$  is not necessary. When  $V_0$  is above 5 VDC, connect  $R_1$  to keep the current between 10 mA and 20 mA.

◇ Pulse Waveform Characteristics

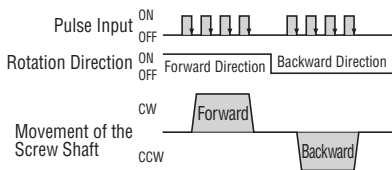


- \* The shaded area indicates when the photocoupler diode is ON. The actuator moves when the photocoupler state changes from ON to OFF.
- The minimum interval time when changing rotation direction 10 μs is shown as a response time of circuit. This value varies greatly depending on the actuator type and load inertia.

◇ Pulse Input Mode

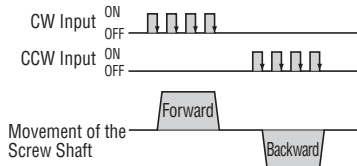
● 1-Pulse Input Mode

The 1-pulse input mode uses "Pulse" and "Rotation Direction" signals. When the "Pulse" input is switched from ON to OFF while the "Rotation Direction" input is ON, the screw shaft moves one step forward. When the "Pulse" input is switched from ON to OFF while the "Rotation Direction" input is OFF, the screw shaft moves one step backward.



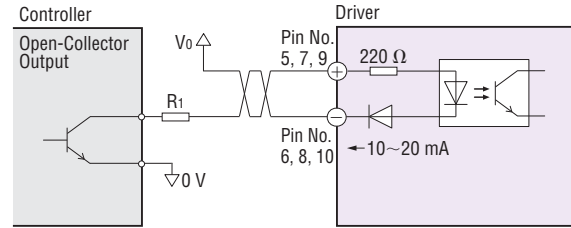
● 2-Pulse Input Mode

The 2-pulse input mode uses "CW" and "CCW" pulse signals. When the "CW" input is switched from ON to OFF, the screw shaft moves one step forward. When the "CCW" input is switched from ON to OFF, the screw shaft moves one step backward.



All Windings Off (A.W.OFF)/Resolution Select (C/S)/ Automatic Current Cutback Release (C.D.INH) Input Signal

◇ Input Circuit and Sample Connection



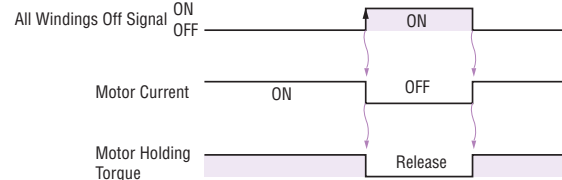
Note:

- Keep the input signal voltage  $V_0$  between 5 VDC and 24 VDC. When  $V_0$  is equal to 5 VDC, the external resistor  $R_1$  is not necessary. When  $V_0$  is above 5 VDC, connect  $R_1$  to keep the current between 10 mA and 20 mA.

◇ All Windings Off (A.W.OFF) Input Signal

Pin No. ⑤, ⑥

- This signal is used when moving the screw shaft for manual positioning.
- When the "All Windings Off" input is turned "ON," the motor current turns off and the actuator loses its holding torque.
- When the "All Windings Off" input is turned "OFF," the motor current turns on and the actuator regains its holding torque.



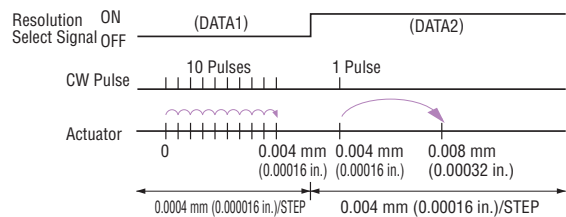
Note:

- When operating the actuator, this switch must be "OFF."

◇ Resolution Select (C/S) Input Signal

Pin No. ⑦, ⑧

- This signal is used to switch between two resolutions set by resolution setting switch (DATA1, DATA2). When the "Resolution Select" input is in the "photocoupler OFF" state, the resolution set by resolution setting switch DATA1 is selected. When the "Resolution Select" input is in the "photocoupler ON" state, the resolution set by resolution setting switch DATA2 is selected.
- Example: Changing the resolution from 0.0004 mm (0.00016 in.) (10 microsteps/step) to 0.004 mm (0.0016 in.) (1 microsteps/step) (**DRL42P**)



◇ Automatic Current Cutback Release (C.D.INH) Input Signal

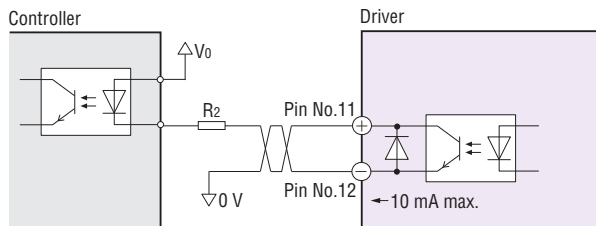
Pin No. ⑨, ⑩

- Turning the "Automatic Current Cutback Release" input "ON" will disable the automatic current cutback function when the actuator is at standstill. Turning the "Automatic Current Cutback Release" input "OFF" will enable the automatic current cutback function. When the automatic current cutback function is enabled, the output current to the motor will be automatically reduced within approximately 0.1 second after the pulse input is stopped, thus suppressing heat generation from the motor and driver.



## Excitation Timing (TIM.) Output Signal

### ◇ Output Circuit and Sample Connection

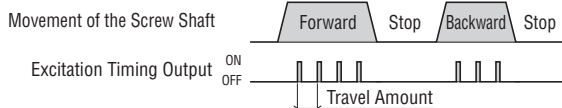


**Note:**

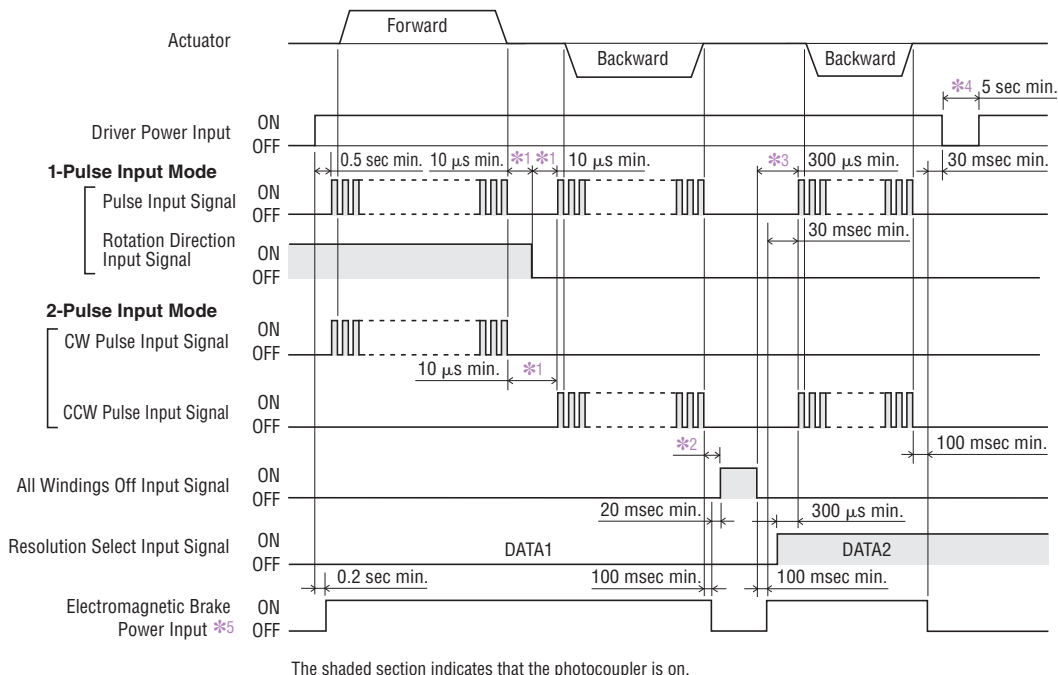
● Keep the output signal voltage  $V_0$  between 5 VDC and 24 VDC, current 10 mA or less.  
When  $V_0$  is above 10 mA, connect the external resistor  $R_2$  as shown in the figure to keep the current 10 mA or less.

● This signal is used for precise home detection, etc.  
The "Excitation Timing" output comes on every particular amount (see the chart below) of the screw shaft movement.

Model	Travel Amount of the Screw Shaft
<b>DRL20, DRL28P</b>	0.02 mm (0.00079 in.)
<b>DRL42P</b>	0.04 mm (0.0016 in.)
<b>DRL60P</b>	0.08 mm (0.0031 in.)
<b>DRL28M</b>	0.01 mm (0.00039 in.)
<b>DRL42M</b>	0.02 mm (0.00079 in.)
<b>DRL60M</b>	0.04 mm (0.0016 in.)



### ● Timing Chart



- \*1 The minimum switching time to change rotation direction (1-pulse input mode), and switching time to change CW, CCW pulse (2-pulse input mode) 10  $\mu$ s is shown as a response time of circuit. The actuator may need more time.
- \*2 Depends on load inertia, load torque and starting frequency.
- \*3 Never input a pulse signal immediately after switching the "All Windings Off" signal to the "photocoupler OFF" state. The actuator may not start.
- \*4 Wait at least five seconds before turning on the power again.
- \*5 Only for electromagnetic brake type

## List of Actuator and Driver Combinations

### ● Ground Ball Screw

Frame Size mm (in.)	Actuator Type	Additional Function	Model	Actuator Model	Driver Model
□20 (□0.79)	Standard Type	None	<b>DRL20PB1-02G</b>	DRL20PB1-02	CRD5103P
		With Adjusting Knob	<b>DRL20PB1-02NG</b>	DRL20PB1-02N	
	Guide Type	None	<b>DRL20PB1G-02G</b>	DRL20PB1G-02	
		With Adjusting Knob	<b>DRL20PB1G-02NG</b>	DRL20PB1G-02N	
□28 (□1.10)	Standard Type	None	<b>DRL28□B1-03G</b>	DRL28□B1-03	CRD5107P
		With Adjusting Knob	<b>DRL28PB1-06G</b>	DRL28PB1-06	
		With Adjusting Knob	<b>DRL28□B1-03NG</b>	DRL28□B1-03N	
	Guide Type	None	<b>DRL28□B1G-03G</b>	DRL28□B1G-03	
		With Adjusting Knob	<b>DRL28□B1G-03NG</b>	DRL28□B1G-03N	
		With Adjusting Knob	<b>DRL28□B1G-03NG</b>	DRL28□B1G-03N	
□42 (□1.65)	Standard Type	None	<b>DRL42□B2-04G</b>	DRL42□B2-04	CRD5107P
		With Electromagnetic Brake	<b>DRL42PB2-10G</b>	DRL42PB2-10	
		With Adjusting Knob	<b>DRL42□B2-04MG</b>	DRL42□B2-04M	
	Guide Type	None	<b>DRL42□B2-04NG</b>	DRL42□B2-04N	
		With Electromagnetic Brake	<b>DRL42□B2G-04G</b>	DRL42□B2G-04	
		With Adjusting Knob	<b>DRL42□B2G-04MG</b>	DRL42□B2G-04M	
□60 (□2.36)	Standard Type	None	<b>DRL60□B4-05G</b>	DRL60□B4-05	CRD5114P
		With Electromagnetic Brake	<b>DRL60PB4-10G</b>	DRL60PB4-10	
		With Adjusting Knob	<b>DRL60□B4-05MG</b>	DRL60□B4-05M	
	Guide Type	None	<b>DRL60□B4-05NG</b>	DRL60□B4-05N	
		With Electromagnetic Brake	<b>DRL60□B4G-05G</b>	DRL60□B4G-05	
		With Adjusting Knob	<b>DRL60□B4G-05MG</b>	DRL60□B4G-05M	
		With Adjusting Knob	<b>DRL60□B4G-05NG</b>	DRL60□B4G-05N	

● Enter **M** (high-resolution motor) or **P** (standard motor) in the box (□) within the model name.

### ● Rolled Ball Screw

Frame Size mm (in.)	Actuator Type	Additional Function	Model	Actuator Model	Driver Model
□28 (□1.10)	Standard Type	None	<b>DRL28PA1-03G</b>	DRL28PA1-03	CRD5107P
		With Adjusting Knob	<b>DRL28PA1-06G</b>	DRL28PA1-06	
	Guide Type	None	<b>DRL28PA1G-03G</b>	DRL28PA1G-03	
		With Adjusting Knob	<b>DRL28PA1G-03NG</b>	DRL28PA1G-03N	
□42 (□1.65)	Standard Type	None	<b>DRL42PA2-04G</b>	DRL42PA2-04	CRD5107P
		With Electromagnetic Brake	<b>DRL42PA2-10G</b>	DRL42PA2-10	
		With Adjusting Knob	<b>DRL42PA2-04MG</b>	DRL42PA2-04M	
	Guide Type	None	<b>DRL42PA2-04NG</b>	DRL42PA2-04N	
		With Electromagnetic Brake	<b>DRL42PA2G-04G</b>	DRL42PA2G-04	
		With Adjusting Knob	<b>DRL42PA2G-04MG</b>	DRL42PA2G-04M	
□60 (□2.36)	Standard Type	None	<b>DRL60PA4-05G</b>	DRL60PA4-05	CRD5114P
		With Electromagnetic Brake	<b>DRL60PA4-10G</b>	DRL60PA4-10	
		With Adjusting Knob	<b>DRL60PA4-05MG</b>	DRL60PA4-05M	
	Guide Type	None	<b>DRL60PA4-05NG</b>	DRL60PA4-05N	
		With Electromagnetic Brake	<b>DRL60PA4G-05G</b>	DRL60PA4G-05	
		With Adjusting Knob	<b>DRL60PA4G-05MG</b>	DRL60PA4G-05M	
		With Adjusting Knob	<b>DRL60PA4G-05NG</b>	DRL60PA4G-05N	

# Compact Linear Actuators Accessories (Sold separately)

## Mounting Plates **RoHS**

A dedicated mounting bracket used for installation of the **DRL** Series actuator.

Each mounting plate comes with mounting screws for fastening the actuator to the plate.

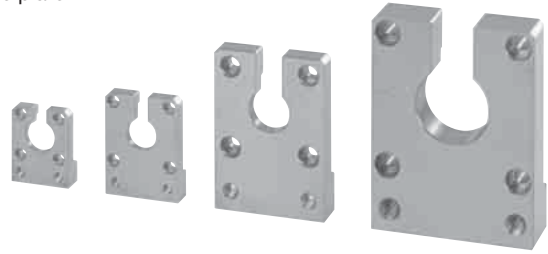
● The customer must provide screws for installing the plate to the equipment.

Material: Iron

Surface treatment: Electroless nickel plating

### Product Line

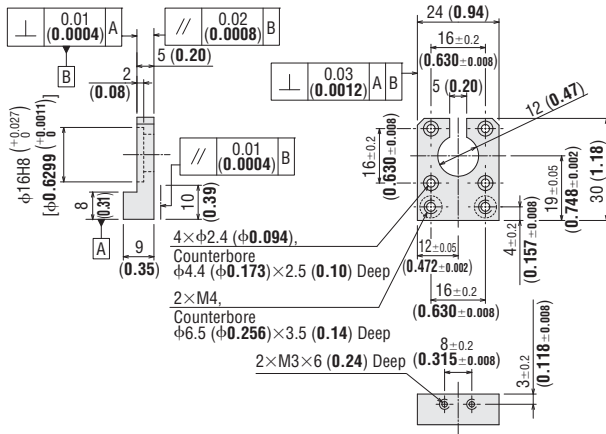
Model	Applicable Product	Mass g (lb.)
<b>PADRL-20</b>	<b>DRL20</b>	25 (0.055)
<b>PADRL-28</b>	<b>DRL28</b>	45 (0.099)
<b>PADRL-42</b>	<b>DRL42</b>	165 (0.36)
<b>PADRL-60</b>	<b>DRL60</b>	570 (1.25)



### Dimensions Unit = mm (in.)

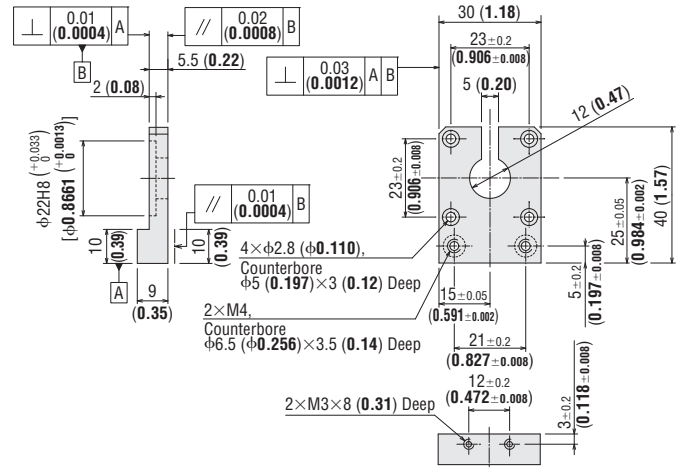
#### PADRL-20

**DXF** D528



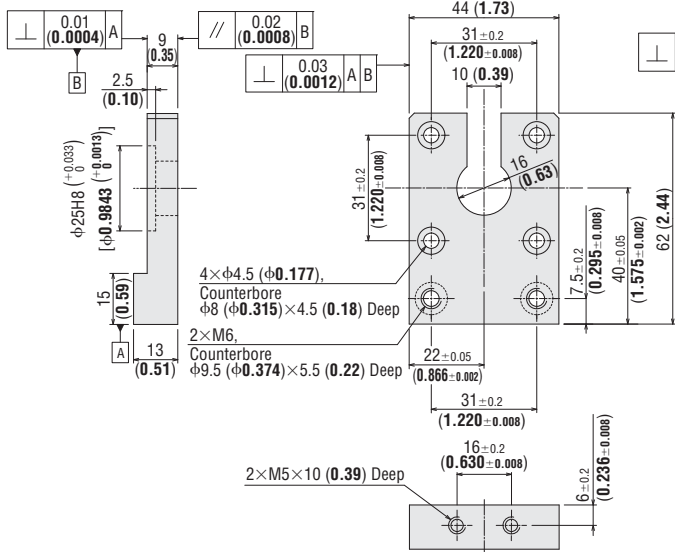
#### PADRL-28

**DXF** D465



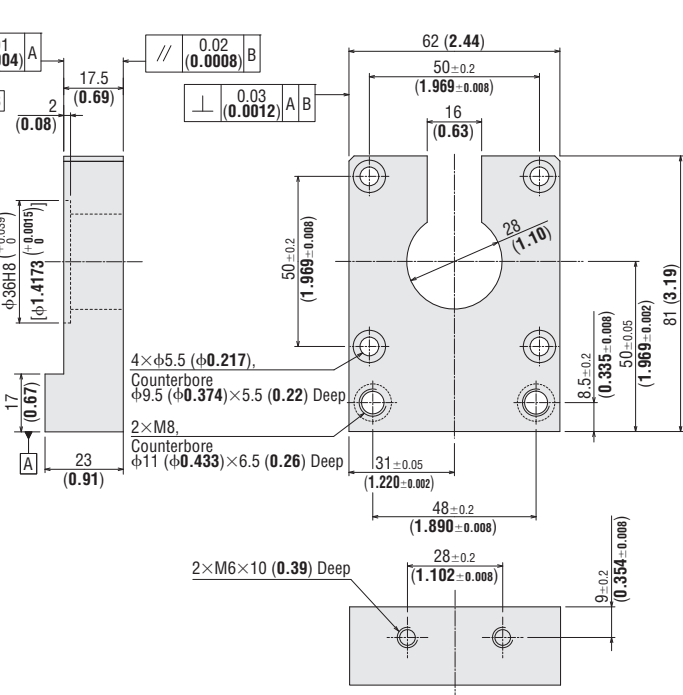
#### PADRL-42

**DXF** D466



#### PADRL-60

**DXF** D467



### Driver Lead Wire Set RoHS

These lead wires are used to connect the driver with the actuator, controller and DC power supply. The driver lead wire set includes three lead wire/connector assemblies (for actuator, power supply, input/output signal). One end of the lead wire is crimped, therefore crimping is not necessary.



#### Product Line

Model	Length m (ft.)
<b>LCS04SD5</b>	0.6 (2)

### Motor Lead Wire/Connector Assembly RoHS

These lead wires with connectors are available for connection with the products below, eliminating the need for assembling a connector. [A motor lead wire/connector assembly of 0.6 m (2 ft.) is included with the **DRL20** and high-resolution motor and driver package.]



#### Product Line

Model	Applicable Product	Length m (ft.)
<b>LC5N06A</b>	<b>DRL20</b>	0.6 (2)
<b>LC5N10A</b>	<b>DRL28M</b>	1 (3.3)
<b>LC5N06B</b>	<b>DRL42M</b>	0.6 (2)
<b>LC5N10B</b>		1 (3.3)
<b>LC5N06C</b>	<b>DRL60M</b>	0.6 (2)
<b>LC5N10C</b>		1 (3.3)

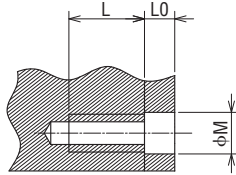
# Compact Linear Actuators Installation

## Actuator Installation

### Installation Method

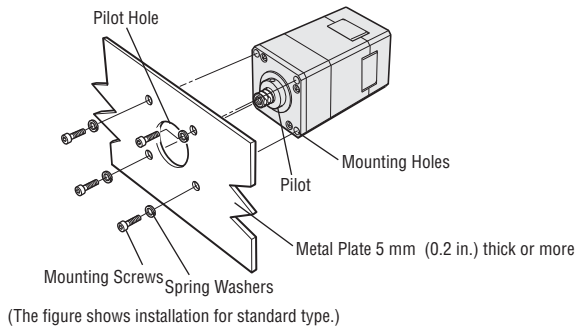
1. Insert the pilot located on the actuator mounting surface into the metal plate's counterbore hole or through-hole.
2. Install the actuator to a metal plate or a device with mounting screws, using mounting holes of the actuator (①), or using a mounting plate (②) (accessories).

#### Details of Mounting Hole



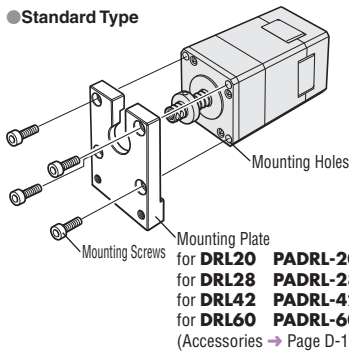
Model	Nominal Diameter	Tightening Torque N·m (oz·in)	Dimension of Mounting Hole mm (in.)		
			φM	L0	L (Effective depth)
<b>DRL20</b>	M2	0.4 (56)	2.3 (0.09)	2 (0.08)	5 (0.2)
<b>DRL28</b>	M2.5	0.6 (85)	3 (0.12)	2 (0.08)	6 (0.24)
<b>DRL42</b>	M4	1.8 (250)	—	—	8 (0.31)
<b>DRL60</b>	M5	5.0 (710)	5.5 (0.22)	4 (0.16)	10 (0.39)

### ① Using mounting holes of an actuator

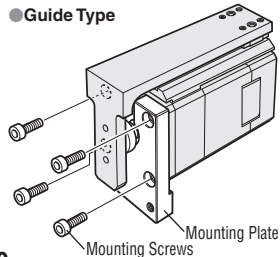


### ② Using a mounting plate (accessories)

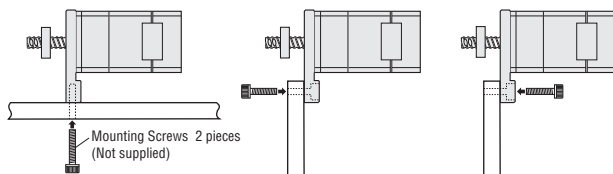
#### Standard Type



#### Guide Type



There are three ways of mounting an actuator to device.



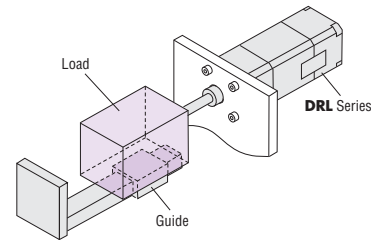
### Installation Conditions

Install the actuator in a location that meets the following conditions, or the product may be damaged.

- Inside an enclosure installed indoors (with ventilation holes provided)
- Ambient temperature: 0~+40°C (+32~+104°F) (non-freezing)
- Ambient humidity: 85% or less (non-condensing)
- Not exposed to an explosive atmosphere, toxic gases (sulfurized 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 liquid
- Not exposed to continuous vibration or excessive impact

### Anti-Spin Mechanism

The moving part of the standard type 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.



Introduction

EZlimo EZSII Motorized Linear Slides

Accessories Installation

EZlimo EFC

EZlimo EZHC Motorized Cylinders

EZlimo EZHP

Accessories Installation

DRL Compact Linear Actuators

Accessories Installation

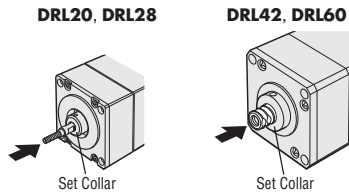
DG Hollow Rotary Actuators

Accessories Installation

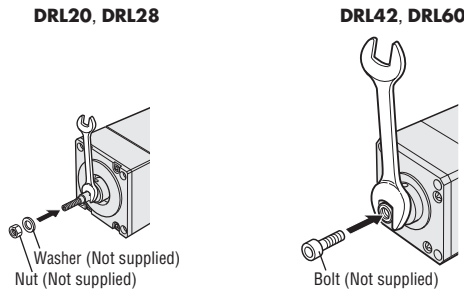
## Installing a Load

### Standard Type

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



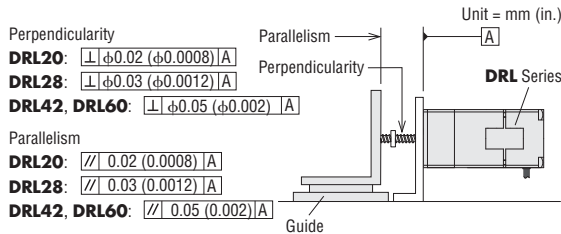
2. Holding the flat section of the screw shaft with a wrench, affix the load with a bolt (or nut, in the case of the **DRL20** and **DRL28**).



Model	Nominal Diameter of Bolt/Nut	Tightening Torque N·m (oz·in)
<b>DRL20</b>	M3 Nut	0.6 (85)
<b>DRL28</b>	M3 Nut	0.6 (85)
<b>DRL42</b>	M4 Bolt	1.8 (250)
<b>DRL60</b>	M8 Bolt	5.0 (710)

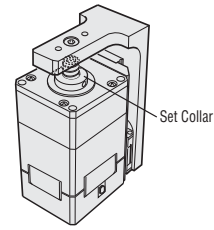
### Installation Accuracy

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



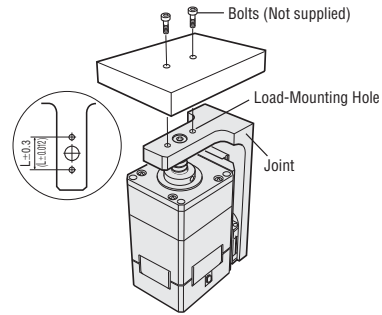
### Guide Type

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



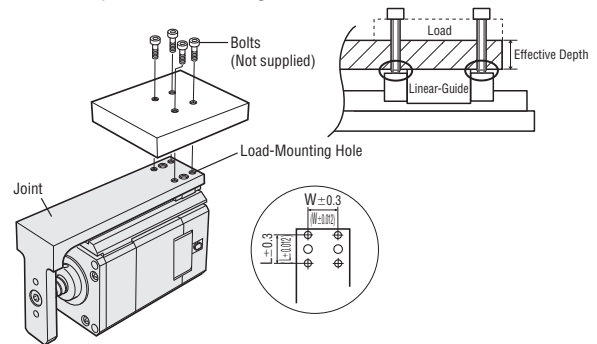
2. Affix the load with a bolt.

● **When Using Load-Mounting Holes on the Screw-Shaft Side**  
 Install the load using load-mounting holes on the joint and the bolts (not supplied).



Model	Nominal Diameter of Bolt	Tightening Torque N·m (oz·in)	Effective Depth mm (in.)	L mm (in.)
<b>DRL20</b>	M2	0.4 (56)	4 (0.16)	15 (0.59)
<b>DRL28</b>	M2.5	0.6 (85)	5 (0.2)	16 (0.63)
<b>DRL42</b>	M4	1.0 (142)	7.5 (0.3)	20 (0.79)
<b>DRL60</b>	M5	2.0 (280)	11.5 (0.45)	30 (1.18)

● **When Using Load-Mounting Holes on the Linear-Guide Side**  
 Install the load using load-mounting holes on the joint and bolts (not supplied). Use bolts whose length does not exceed the effective depth in the linear-guide.



Model	Nominal Diameter of Bolt	Tightening Torque N·m (oz·in)	Effective Depth mm (in.)	L mm (in.)	W mm (in.)
<b>DRL20</b>	M2	0.4 (56)	4 (0.16)	18 (0.71)	12 (0.47)
<b>DRL28</b>	M2.5	0.6 (85)	3.5 (0.14)	14 (0.55)	12 (0.47)
<b>DRL42</b>	M4	1.0 (142)	5.5 (0.22)	24 (0.94)	19 (0.75)
<b>DRL60</b>	M5	2.0 (280)	5.5 (0.22)	22 (0.87)	28 (1.10)

### Notes:

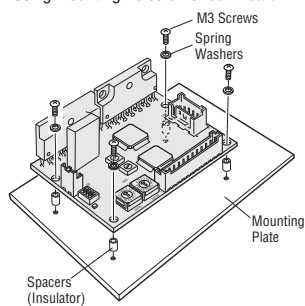
- When installing a load to the guide type, do not disconnect the ball screw from the joint. This may cause an offset when assembling, resulting in malfunction.
- Do not apply an overhung load to the joint of the guide type. Also, do not apply a load moment to the joint of the **DRL20** and **DRL28** guide type. 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.

## Driver Installation

Considering heat radiation, mount the driver as follows:

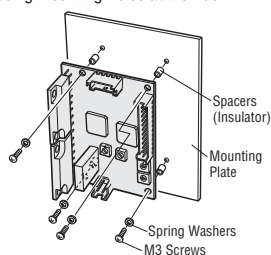
### Installation in the Horizontal Direction

• Using Mounting Holes on Circuit Board



### Installation in the Vertical Direction

• Using Mounting Holes at the Back



### Installation Clearances

There must be a clearance of at least 25 mm (0.98 in.) and 50 mm (1.97 in.) 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 20 mm (0.79 in.) and 50 mm (1.97 in.) in the horizontal and vertical direction respectively, between adjacent drivers.

### Installation Conditions

Install the driver in a location that meets the following conditions, or the product may be damaged.

- Indoors (This product is designed and manufactured to be installed within another device.)
- Ambient temperature: 0~+40°C (+32~+104°F) (non-freezing)
- Ambient humidity: 85% or less (non-condensing)
- Not exposed to explosive, flammable or corrosive gases
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water, oil or other liquids
- A place where the driver can easily discharge heat
- Not exposed to continuous vibration or excessive impact

#### Notes:

- When installing the driver in an enclosed space such as a control box, or somewhere close to a heat-radiating object, vent holes should be used to prevent the driver from overheating.
- Do not install the driver in a location where a source of vibration will cause the driver to vibrate.
- In situations where drivers are located close to a large noise source such as high frequency welding machines or large electromagnetic switches, take steps to prevent noise interference, either by inserting noise filters or connecting the driver to a separate circuit.
- Take care that pieces of conductive material (filings, pins, pieces of wire, etc.) do not enter the drivers.

