

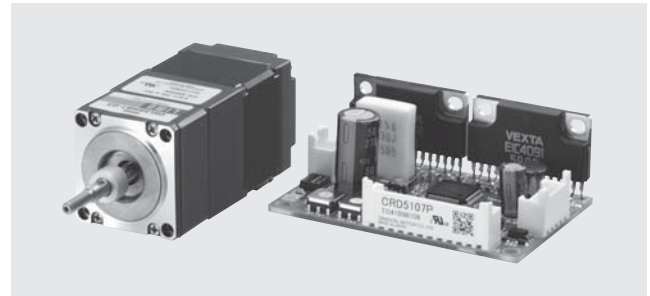
**RoHS** RoHS-Compliant  
Compact Linear Actuators  
**DRL Series**

● 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-10

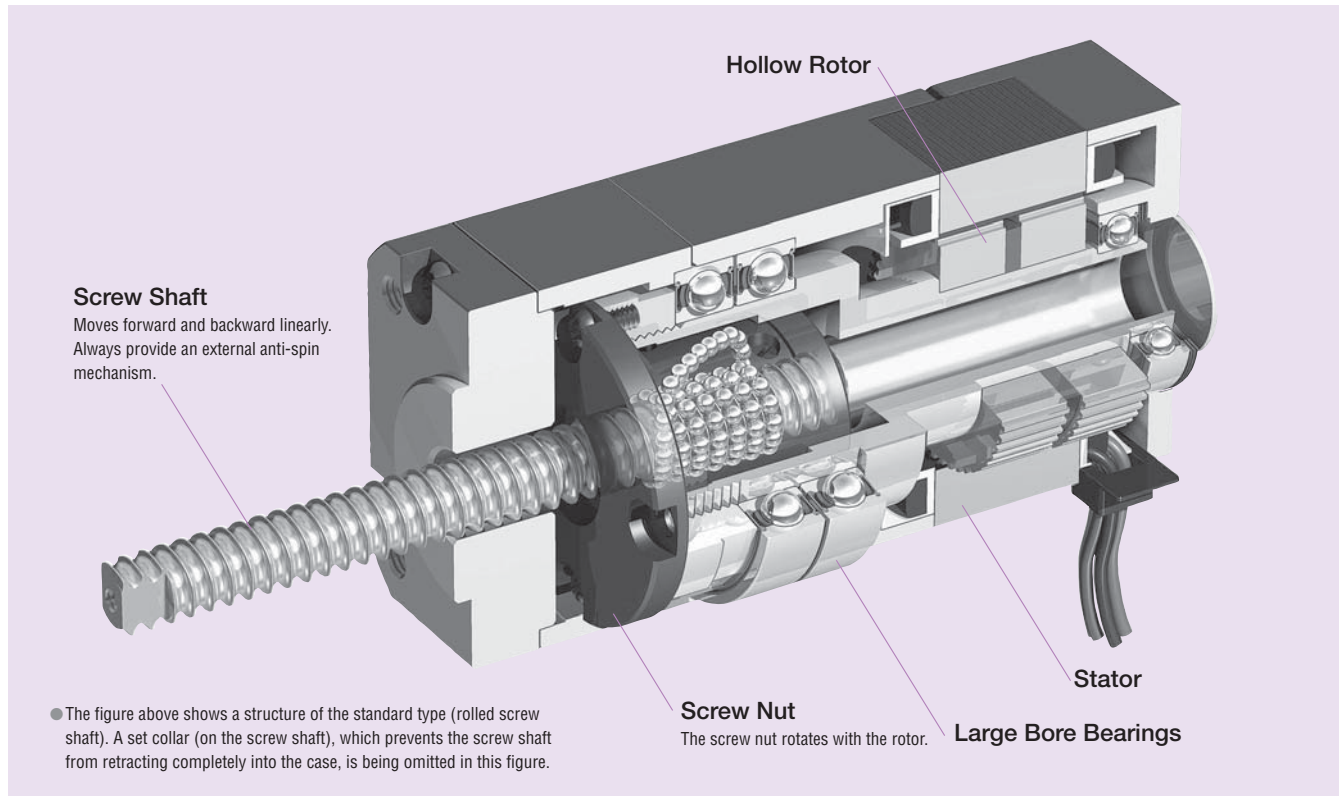


**Features**

● **Compact Design and High Positioning Accuracy**

The actuator size was reduced using Oriental Motor's original technology. The compact and lightweight body houses the rotating components as well as the linear motion mechanism 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 (positioning repeatability:  $\pm 0.005$  mm).



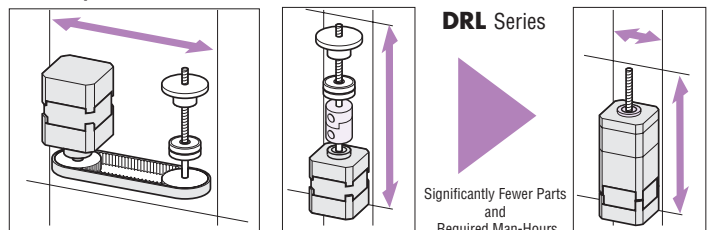
● **Significantly Fewer Parts and Required Man-Hours**

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 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"**



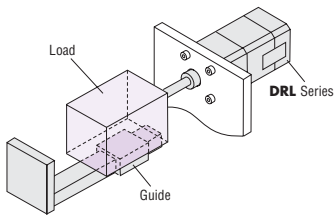
Large Bore Bearing + Hollow Rotor



● Standard Type, Guide Type

◇ 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.



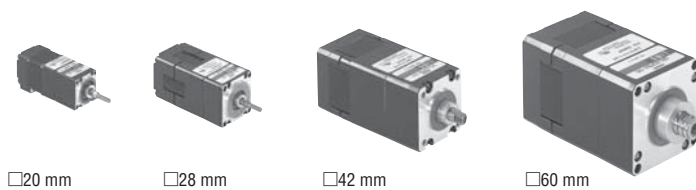
● Ground Ball Screw, Rolled Ball Screw

◇ Ground Ball Screw Type

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 Type

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



● Additional Functions

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

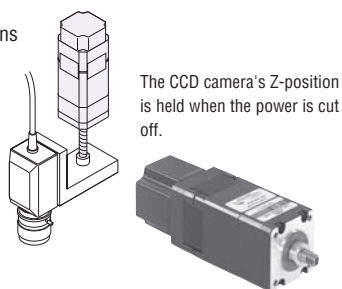
◇ With Electromagnetic Brake

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.

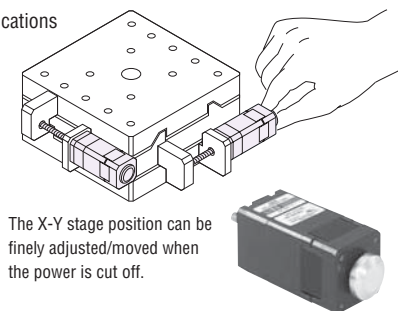
◇ With Adjusting Knob

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

Applications

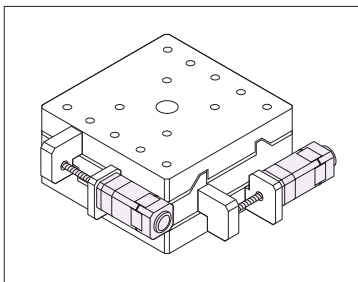


Applications

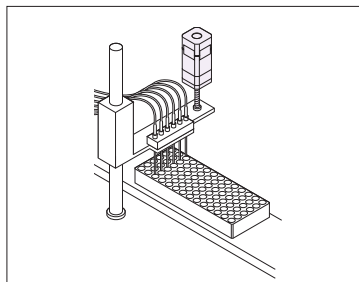


● Applications

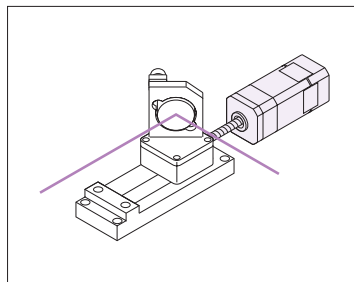
Drive mechanism for a micrometer head X-Y stage



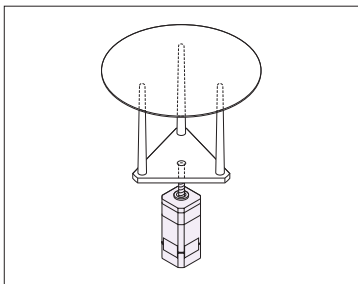
Automatic micro-plate dispensing



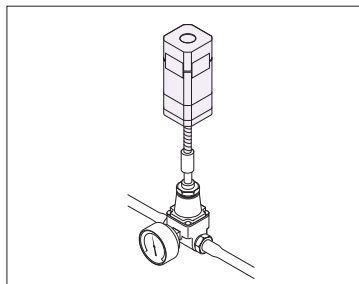
Adjusting a mirror positioning device



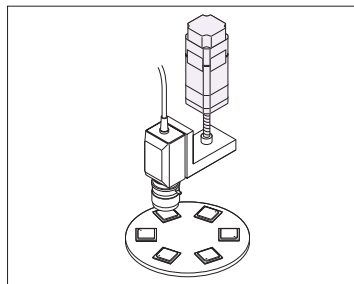
Pin lifter



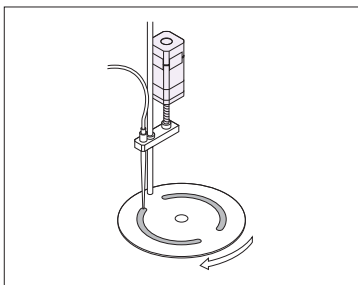
Fine-tuning of flow-rate regulator valve setting



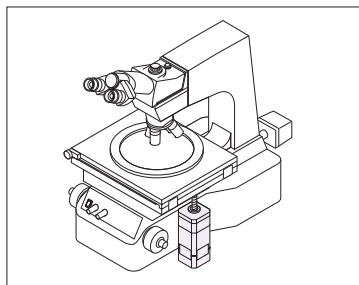
Focusing of a CCD camera



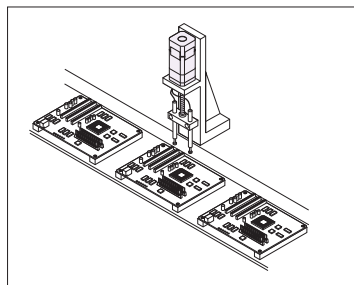
Fine tuning of nozzle position



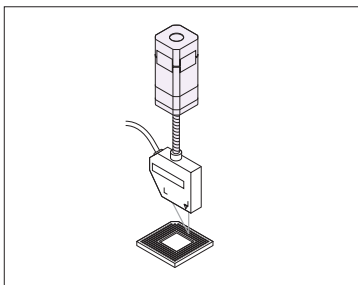
Vertical fine-tuning of table position



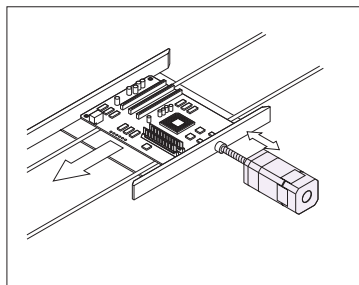
Vertical movement of probe



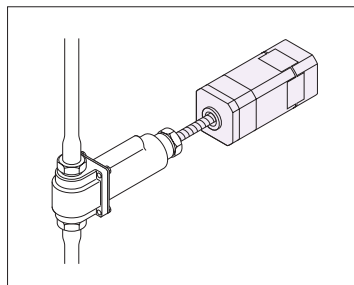
Fine-tuning of sensor position



Centering of 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 safety lock (by MOLEX)
- Conforming to major safety standards

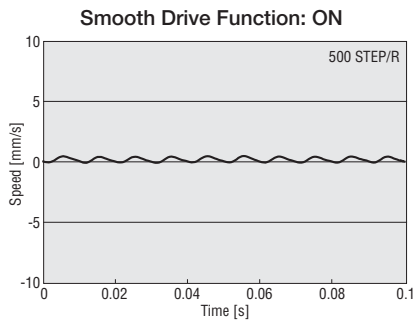
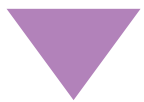
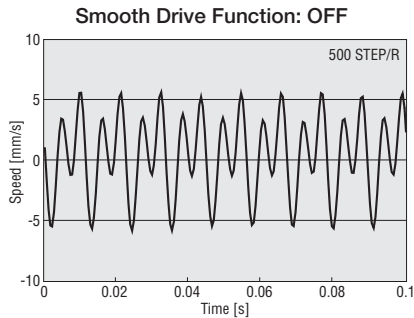
◇ Compact Microstep Driver

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 full-step 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 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.

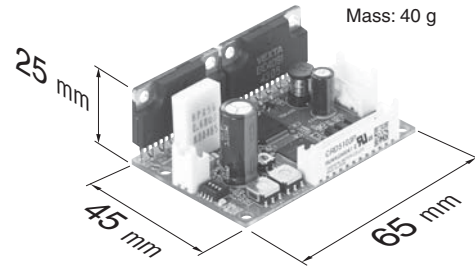
● Comparison of Speed Fluctuation



● **RoHS** RoHS-Compliant

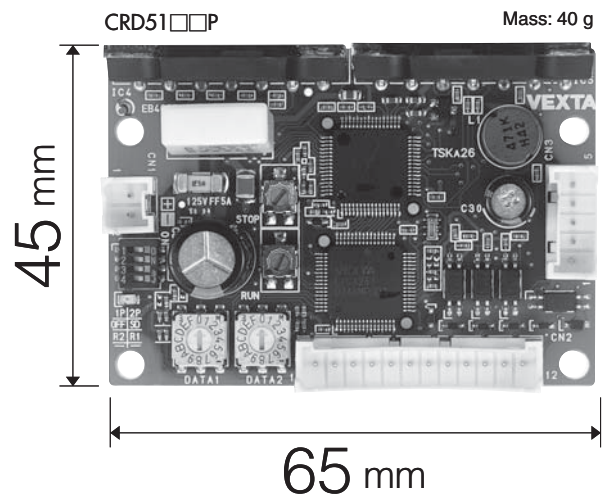
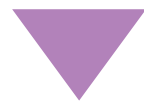
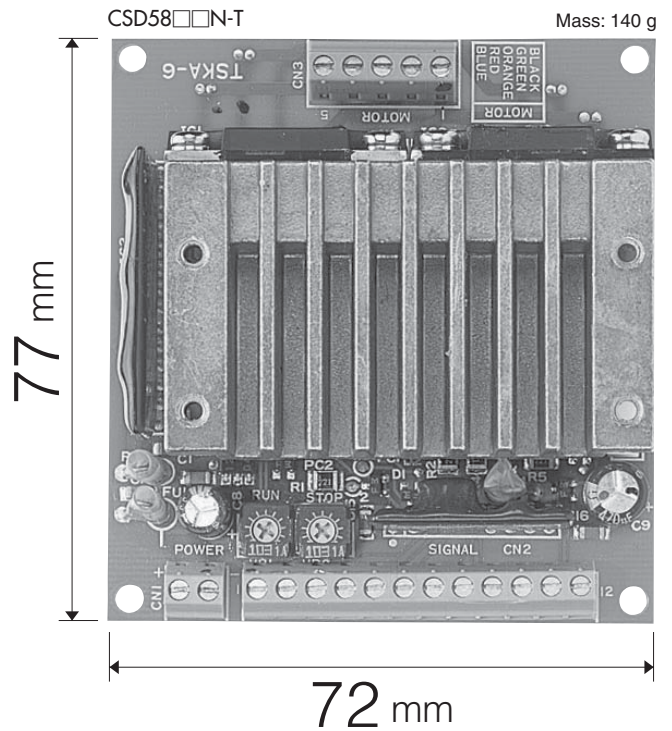
The **DRL** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.

● Details of RoHS Directive → Page G-23



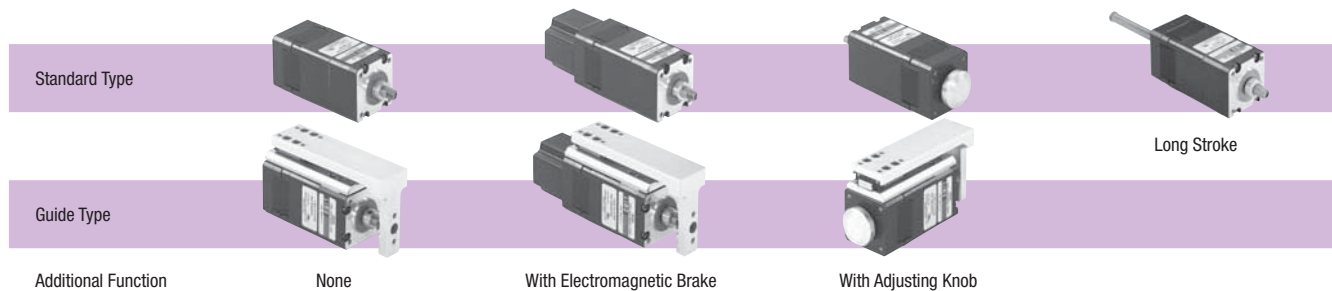
● Comparison of Driver Size and Mass

Actual Size











# Selection of DRL Series

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



Screw Type (Drive Method)	
Rolled Ball Screw Type Repetitive Positioning Accuracy: ±0.02 mm	Ground Ball Screw Type Repetitive Positioning Accuracy: ±0.005 mm

Frame Size	Thrust Force	Actuator Type	Stroke Length	Additional Function					
				None	With Electro-magnetic Brake	With Adjusting Knob	None	With Electro-magnetic Brake	With Adjusting Knob
□20 mm	15 N	Standard Type 	25 mm	-	-	-	●	-	●
		Guide Type 	25 mm	-	-	-	●	-	●
□28 mm	30 N	Standard Type 	60 mm	●	-	-	●	-	-
			30 mm	●	-	●	●	-	●
		Guide Type 	30 mm	●	-	●	●	-	●
□42 mm	100 N	Standard Type 	100 mm	●	-	-	●	-	-
			40 mm	●	●	●	●	●	●
		Guide Type 	40 mm	●	●	●	●	●	●
□60 mm	300 N	Standard Type 	100 mm	●	-	-	●	-	-
			50 mm	●	●	●	●	●	●
		Guide Type 	50 mm	●	●	●	●	●	●

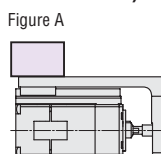
# How to Read Specifications

## ● 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		2		3
② Max. Vertical Transportable Mass (Fig.B) kg		5		15
③ Maximum Speed mm/s		30		32
④ Maximum Acceleration m/s <sup>2</sup>		0.4		0.26
⑤ Maximum Thrust Force N		100		300
Maximum Holding Force	At Excitation ⑥ N		100	300
	At Non-Excitation ⑦ N	0	0	0
	Electromagnetic Brake ⑧ N	—	100	—
⑨ Maximum Load Moment N·m	M <sub>P</sub> : 0.5 M <sub>V</sub> : 0.25 M <sub>R</sub> : 0.8		M <sub>P</sub> : 0.6 M <sub>V</sub> : 0.35 M <sub>R</sub> : 2.2	
⑩ Repetitive Positioning Accuracy mm	①±0.005 ②±0.01			
⑪ Lost Motion mm	0.05			
⑫ Resolution mm	0.004		0.008	
⑬ Lead mm	2		4	
⑭ Stroke mm	40		50	
Mass (Mass with adjusting knob) kg	0.8 (0.8)	1	1.8 (1.85)	2.2
Actuator Dimensions No.	⑭	⑮	⑯	⑰

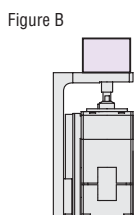
### ① Maximum Transportable Mass (Horizontal direction)

Maximum mass that can be moved under rated conditions in the horizontal direction. For the standard type the thrust force is reduced by the amount of frictional resistance of the sliding surface and the mass of a guide, therefore the value cannot be shown.



### ② Maximum Transportable Mass (Vertical direction)

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



### 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

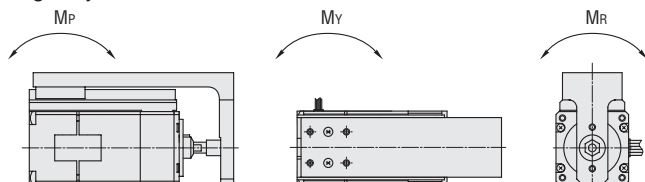
Maximum holding force with the power off.

### ⑧ Maximum Holding Force (Electromagnetic brake)

Maximum holding force of the electromagnetic brake.

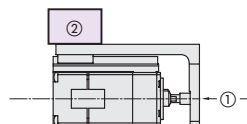
### ⑨ Maximum Load Moment

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

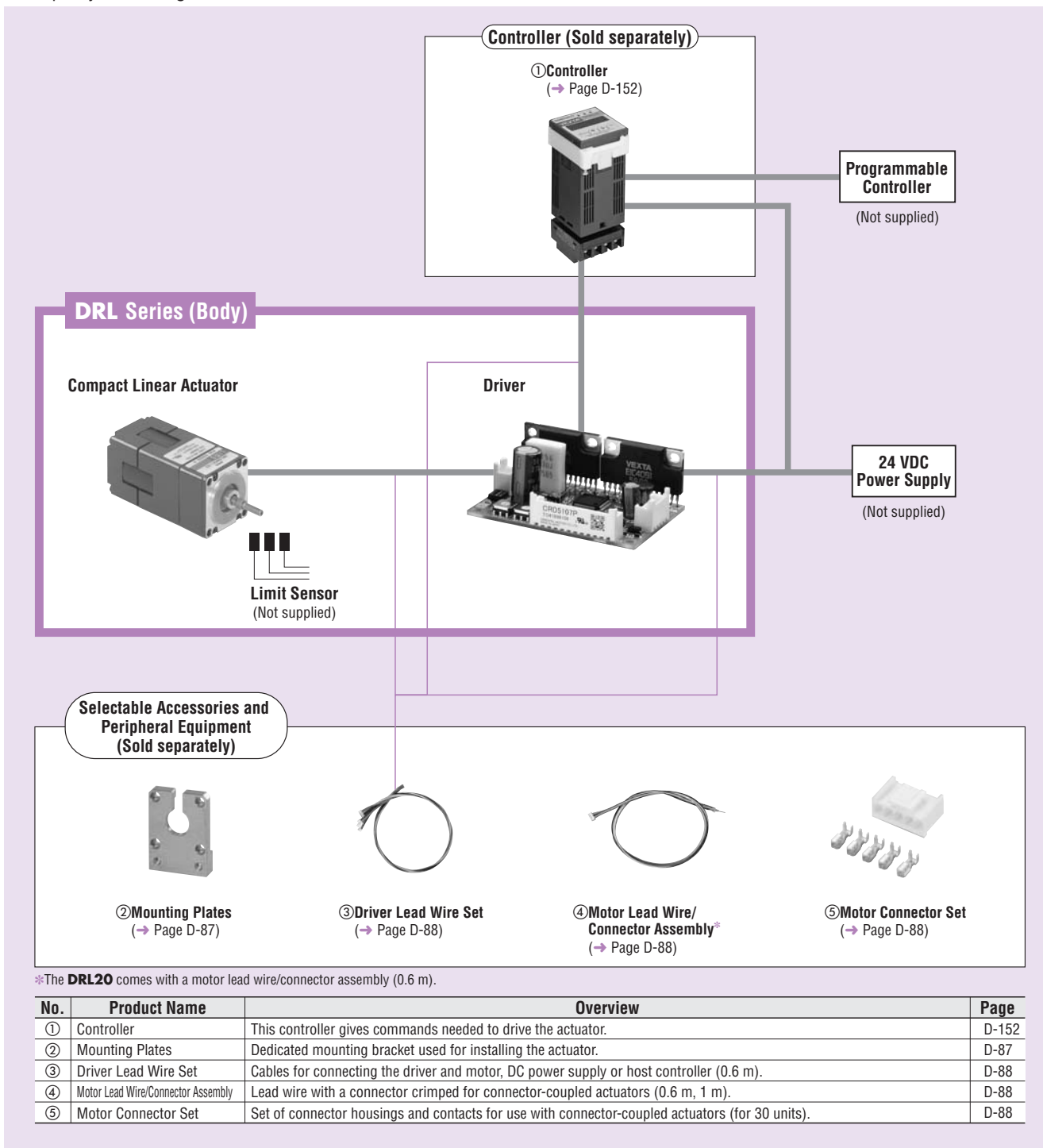
Distance the screw shaft moves linearly in one motor rotation.

### ⑭ Stroke

Maximum distance the load can be moved.

## System Configuration

A sample system configuration with **SG8030JY** controller.



### Example of System Configuration

(Body)

(Sold separately)

<b>DRL Series</b>	+	<b>Controller</b>	<b>Driver Lead Wire Set (0.6 m)</b>	<b>Mounting Plate</b>
<b>DRL28PB1-03G</b>		<b>SG8030JY-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 <b>28:</b> □28 mm <b>42:</b> □42 mm <b>60:</b> □60 mm
③	Motor Type	<b>P:</b> Stepping Motor
④	Drive Method	<b>A:</b> Rolled Ball Screw Type <b>B:</b> Ground Ball Screw Type
⑤	Lead	<b>1:</b> 1 mm (□20 mm, 28 mm) <b>2:</b> 2 mm (□42 mm) <b>4:</b> 4 mm (□60 mm)
⑥	Type	None: Standard Type (Without Guide) <b>G:</b> Guide Type
⑦	Stroke	<b>02:</b> 25 mm (□20 mm) <b>03:</b> 30 mm (□28 mm) <b>04:</b> 40 mm (□42 mm) <b>05:</b> 50 mm (□60 mm) <b>06:</b> 60 mm (□28 mm) <b>10:</b> 100 mm (□42 mm, 60 mm)
⑧	Additional Function	None: With No Additional Function <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

Frame Size (mm)	Type	Additional Function		
		None Model	With Electromagnetic Brake Model	With Adjusting Knob Model
□28	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	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	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

Frame Size (mm)	Type	Additional Function		
		None Model	With Electromagnetic Brake Model	With Adjusting Knob Model
□20	Standard Type	<b>DRL20PB1-02G</b>	—	<b>DRL20PB1-02NG</b>
	Guide Type	<b>DRL20PB1G-02G</b>	—	<b>DRL20PB1G-02NG</b>
□28	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	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	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<sup>\*1</sup>, Operating Manual, Surge Suppressor<sup>\*2</sup>

\*1 Only for Actuator Frame Size 20 mm

\*2 Only for Electromagnetic Brake Type



## Specifications

### Actuator Unit

#### Ground Ball Screw (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 1.5	3	10		30	
Maximum Speed* <sup>2</sup>	mm/s 20	24	30		32	
Maximum Acceleration	m/s <sup>2</sup> 0.2	0.2	0.4		0.26	
Maximum Thrust Force* <sup>3</sup>	N 15	30	100		300	
Maximum Holding Force	At Excitation* <sup>4</sup>	N 15	30	100	300	
	At Non-Excitation	N 0	0	0	0	0
	Electromagnetic Brake	N -	-	-	100	-
Repetitive Positioning Accuracy	mm ±0.005					
Lost Motion	mm 0.05					
Resolution* <sup>5</sup>	mm 0.002	0.002	0.004		0.008	
Lead	mm 1		2		4	
Stroke	mm 25	03: 30 06: 60	04: 40 10: 100	40	05: 50 10: 100	50
Mass (Mass with adjusting knob)	kg 0.08 (0.08)	03: 0.18 (0.19) 06: 0.18	04: 0.6 (0.6) 10: 0.63	0.8	05: 1.3 (1.35) 10: 1.38	1.7
Actuator Dimensions No.	[1]	03: [2] 06: [3]	04: [6] 10: [7]	[8]	05: [9] 10: [10]	[11]

#### Ground Ball Screw, Guide Type (RoHS)



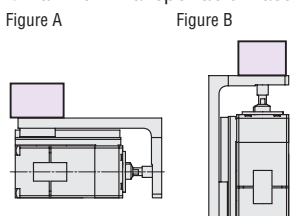
Model	DRL20PB1G-02G DRL20PB1G-02NG	DRL28PB1G-03G DRL28PB1G-03NG	DRL42PB2G-04G DRL42PB2G-04NG	DRL42PB2G-04MG	DRL60PB4G-05G DRL60PB4G-05NG	DRL60PB4G-05MG
Electromagnetic Brake	Not equipped	Not equipped	Not equipped	Equipped	Not equipped	Equipped
Max. Horizontal Transportable Mass (Fig. A)	kg 0.5	1	2		3	
Max. Vertical Transportable Mass (Fig. B)* <sup>1</sup>	kg 1	1.5	5		15	
Maximum Speed* <sup>2</sup>	mm/s 20	24	30		32	
Maximum Acceleration	m/s <sup>2</sup> 0.2	0.2	0.4		0.26	
Maximum Thrust Force* <sup>3</sup>	N 15	30	100		300	
Maximum Holding Force	At Excitation* <sup>4</sup>	N 15	30	100	300	
	At Non-Excitation	N 0	0	0	0	0
	Electromagnetic Brake	N -	-	-	100	-
Maximum Load Moment	N·m M <sub>p</sub> : 0 M <sub>y</sub> : 0 M <sub>r</sub> : 0	M <sub>p</sub> : 0 M <sub>y</sub> : 0 M <sub>r</sub> : 0	M <sub>p</sub> : 0.5 M <sub>y</sub> : 0.25 M <sub>r</sub> : 0.8		M <sub>p</sub> : 0.6 M <sub>y</sub> : 0.35 M <sub>r</sub> : 2.2	
Repetitive Positioning Accuracy	mm ①±0.005 ②±0.01		①±0.005 ②±0.02		①±0.005 ②±0.01	
Lost Motion	mm 0.05					
Resolution* <sup>5</sup>	mm 0.002	0.002	0.004		0.008	
Lead	mm 1		2		4	
Stroke	mm 25	30	40		50	
Mass (Mass with adjusting knob)	kg 0.14 (0.15)	0.25 (0.26)	0.8 (0.8)	1	1.8 (1.85)	2.2
Actuator Dimensions No.	[12]	[13]	[14]	[15]	[16]	[17]

- \*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 to +10°C).  
**DRL20:** 13 mm/s, **DRL28:** 15 mm/s, **DRL42:** 20 mm/s, **DRL60:** 24 mm/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.

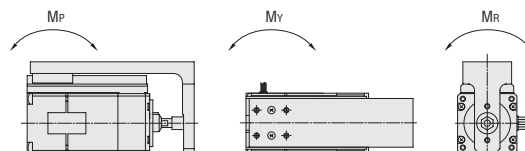
**Note:**

- Use the actuator in conditions where its surface temperature will not exceed 90°C. The repetitive positioning accuracy is measured at a specified temperature under a specified load.
- **How to read specifications** → Page D-67

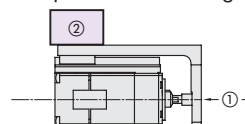
#### Maximum Transportable Mass



#### 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 (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*1	kg	3	10	30	30	
Maximum Speed*2	mm/s	24	30	32	32	
Maximum Acceleration	m/s <sup>2</sup>	0.2	0.4	0.26	0.26	
Maximum Thrust Force*3	N	30	100	300	300	
Maximum Holding Force	At Excitation*4	N	30	100	300	
	At Non-Excitation	N	0	0	0	
	Electromagnetic Brake	N	—	100	—	
Repetitive Positioning Accuracy	mm	±0.02				
Lost Motion	mm	0.1				
Resolution*5	mm	0.002	0.004	0.008	0.008	
Lead	mm	1	2	4	4	
Stroke	mm	03: 30 06: 60	04: 40 10: 100	40	05: 50 10: 100	50
Mass (Mass with adjusting knob)	kg	03: 0.18 (0.19) 06: 0.18	04: 0.6 (0.6) 10: 0.63	0.8	05: 1.3 (1.35) 10: 1.38	1.7
Actuator Dimensions No.		03: [4] 06: [5]	04: [6] 10: [7]	[8]	05: [9] 10: [10]	[11]

◇ Rolled Ball Screw, 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	1	2	3	3	
Max. Vertical Transportable Mass (Fig. B)*1	kg	1.5	5	15	15	
Maximum Speed*2	mm/s	24	30	32	32	
Maximum Acceleration	m/s <sup>2</sup>	0.2	0.4	0.26	0.26	
Maximum Thrust Force*3	N	30	100	300	300	
Maximum Holding Force	At Excitation*4	N	30	100	300	
	At Non-Excitation	N	0	0	0	
	Electromagnetic Brake	N	—	100	—	
Maximum Load Moment	N·m	M <sub>p</sub> : 0 M <sub>v</sub> : 0 M <sub>r</sub> : 0	M <sub>p</sub> : 0.5 M <sub>v</sub> : 0.25 M <sub>r</sub> : 0.8	M <sub>p</sub> : 0.6 M <sub>v</sub> : 0.35 M <sub>r</sub> : 2.2	M <sub>p</sub> : 0.6 M <sub>v</sub> : 0.35 M <sub>r</sub> : 2.2	
Repetitive Positioning Accuracy	mm	±0.02				
Lost Motion	mm	0.1				
Resolution*5	mm	0.002	0.004	0.008	0.008	
Lead	mm	1	2	4	4	
Stroke	mm	30	40	50	50	
Mass (Mass with adjusting knob)	kg	0.25 (0.26)	0.8 (0.8)	1	1.8 (1.85)	2.2
Actuator Dimensions No.		[13]	[14]	[15]	[16]	[17]

- \*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 to +10°C).  
**DRL28:** 15 mm/s, **DRL42:** 20 mm/s, **DRL60:** 24 mm/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. The repetitive positioning accuracy is measured at a specified temperature under a specified load.
- **How to read specifications** → Page D-67

● Maximum Transportable Mass

Figure A

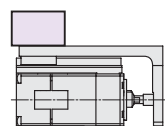
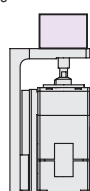
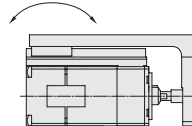


Figure B

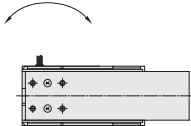


● Load Moment

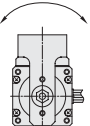
M<sub>p</sub>



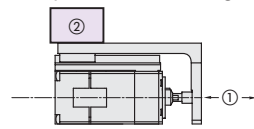
M<sub>v</sub>



M<sub>r</sub>



● 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.

## Specifications

### Electromagnetic Brake Specifications

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 ms Release Time: 30 ms
Time Rating	Continuous

### Driver Specifications

Driver Model		CRD5103P	CRD5107P	CRD5114P
Power Source	Voltage	24 VDC±10%		
	Current	0.7 A	1.4 A	2.5 A
Input Signal	Input Mode	Photocoupler input, Input resistance 220 Ω, Input current 10 to 20 mA Photocoupler ON: +4.5 to 5.25 V, Photocoupler OFF: 0 to 1 V (Voltage between terminals)		
	Pulse Signal (CW Pulse Signal)	Operation command pulse signal (CW direction operation command signal at 2-pulse input mode), Negative logic pulse input Pulse width: 1 μs minimum, Pulse rise/fall time: 2 μs maximum, Pulse duty 50% maximum Screw shaft moves one step forward 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 signal at 2-pulse input mode), Negative logic pulse input Pulse width: 1 μs minimum, Pulse rise/fall time: 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 to the actuator is turned on.		
	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 ms).		
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 resolution set at 1: Signal is output every 10 pulses When resolution set at 10: Signal is output every 100 pulses		
Function	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			
Dimensions No.	18			

## General Specifications

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

Item	Actuator Unit	Driver Unit
Motor Insulation Class	Class B (130°C) [Recognized as class A (105°C) by UL/CSA Standard]	—
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* at 50 Hz or 60 Hz applied between the motor windings and case for 1 minute. * <b>DRL42P:</b> 1.0 kV, <b>DRL60P:</b> 1.5kV	—
Operating Environment (In operation)	Ambient Temperature	0~+40°C (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Atmosphere	No corrosive gases, dust, water or oil

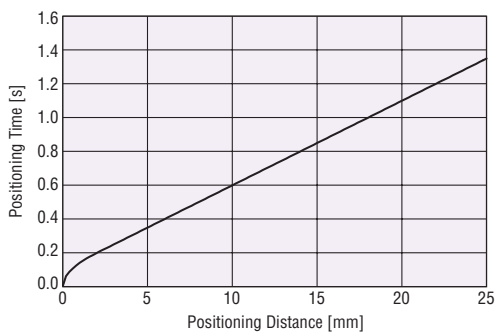
#### Note:

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

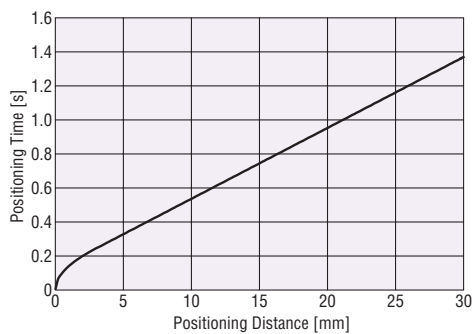
● Positioning Distance – Positioning Time (Reference)

The positioning time (reference) can be checked from the positioning distance. The graphs below represent the characteristics when operated at maximum speed and maximum acceleration.

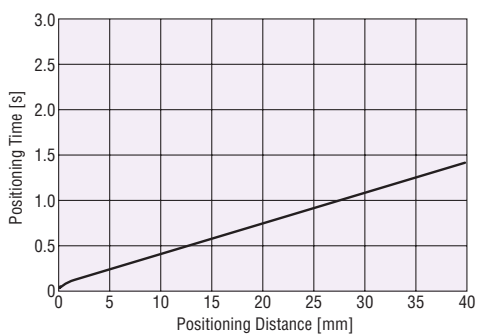
**DRL20**



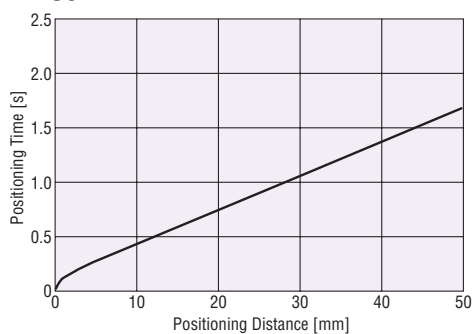
**DRL28**



**DRL42**



**DRL60**



● The starting speed should conform to the following range:

**DRL20, DRL28** : 0.2 mm/s or less

**DRL42** : 0.4 mm/s or less

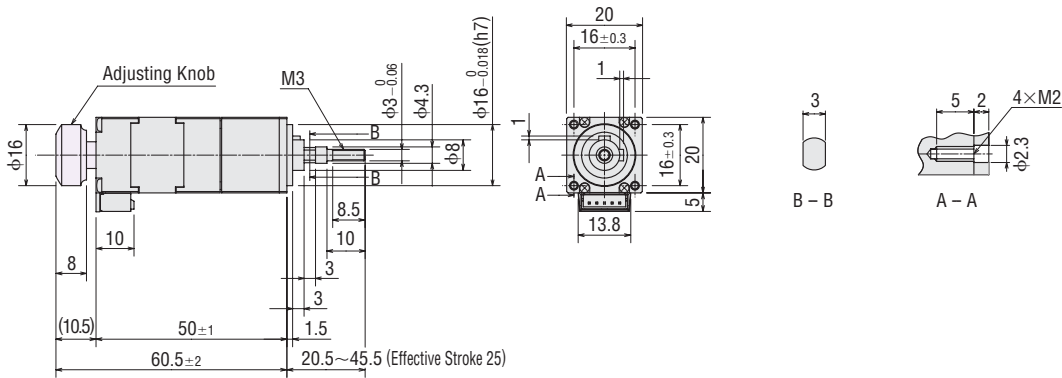
**DRL60** : 0.8 mm/s or less

## Dimensions (Unit = mm)

### ● Actuator Unit

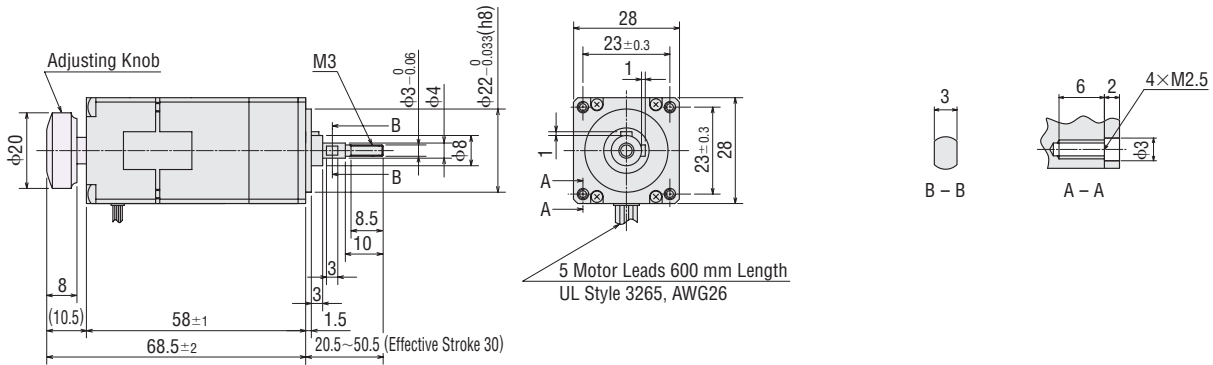
#### ◇ Ground Ball Screw/Rolled Ball Screw Type

	Actuator Model	Mass
① <b>DRL20PB1-02G</b> (Without additional function)	DRL20PB1-02	0.08 kg
<b>DRL20PB1-02NG</b> (With adjusting knob)	DRL20PB1-02N	0.08 kg

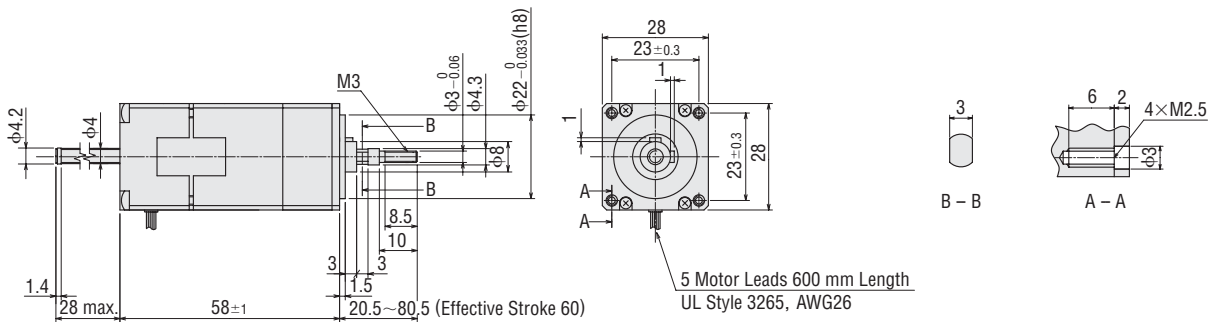


● The actuator comes with a motor lead wire/connector assembly (0.6 m). UL Style 3265, AWG24

	Actuator Model	Mass
② <b>DRL28PB1-03G</b> (Without additional function)	DRL28PB1-03	0.18 kg
<b>DRL28PB1-03NG</b> (With adjusting knob)	DRL28PB1-03N	0.19 kg



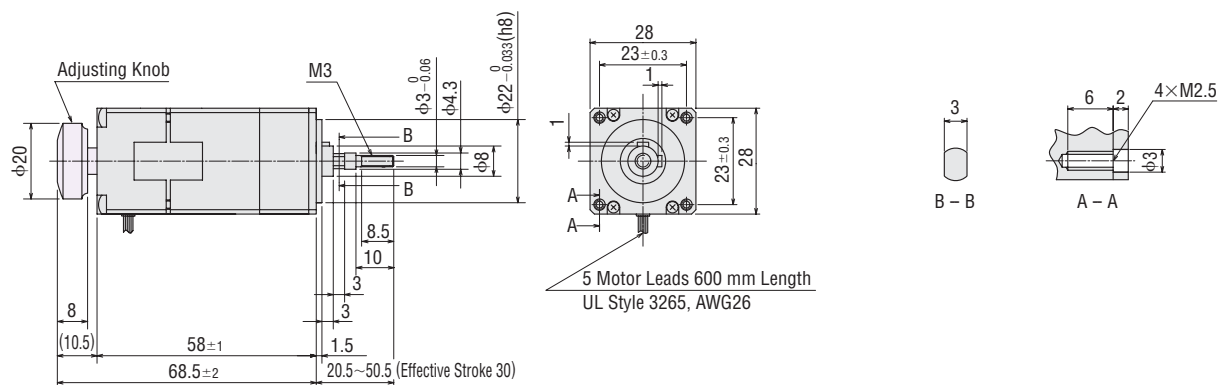
	Actuator Model	Mass
③ <b>DRL28PB1-06G</b> (Without additional function)	DRL28PB1-06	0.18 kg



● 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.

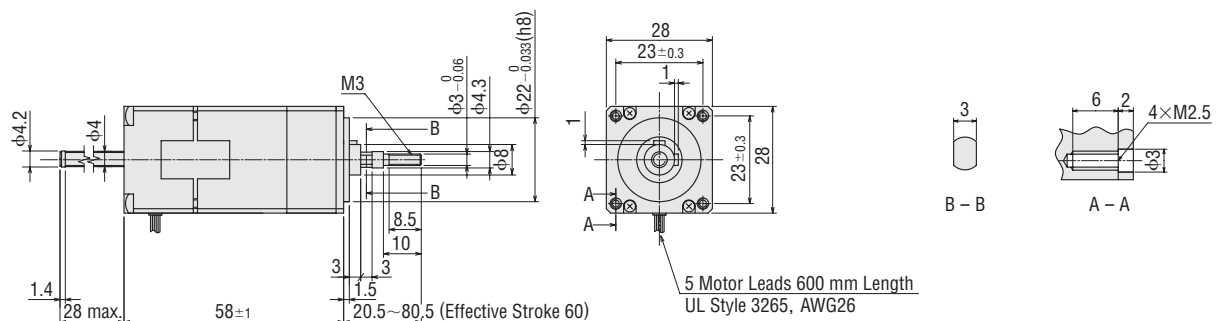
④ **DRL28PA1-03G** (Without additional function)  
**DRL28PA1-03NG** (With adjusting knob)

Actuator Model	Mass
DRL28PA1-03	0.18 kg
DRL28PA1-03N	0.19 kg



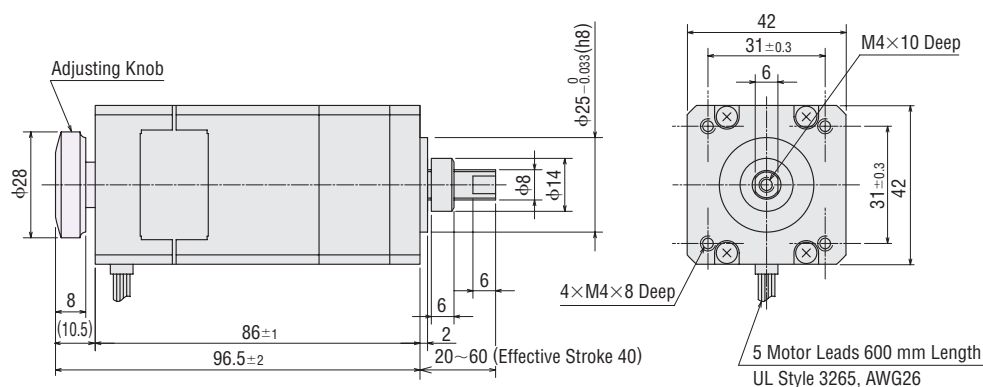
⑤ **DRL28PA1-06G** (Without additional function)

Actuator Model	Mass
DRL28PA1-06	0.18 kg



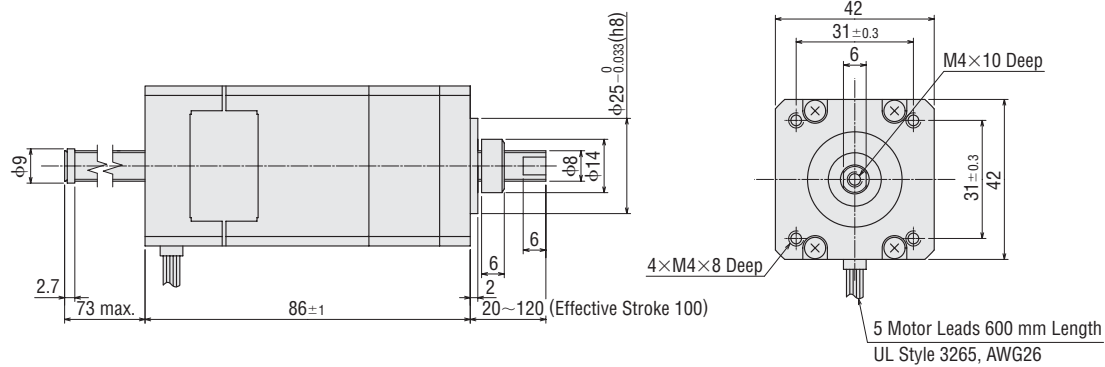
⑥ **DRL42PB2-04G** (Without additional function)  
**DRL42PA2-04G** (Without additional function)  
**DRL42PB2-04NG** (With adjusting knob)  
**DRL42PA2-04NG** (With adjusting knob)

Actuator Model	Mass
DRL42PB2-04	0.6 kg
DRL42PA2-04	0.6 kg
DRL42PB2-04N	0.6 kg
DRL42PA2-04N	0.6 kg

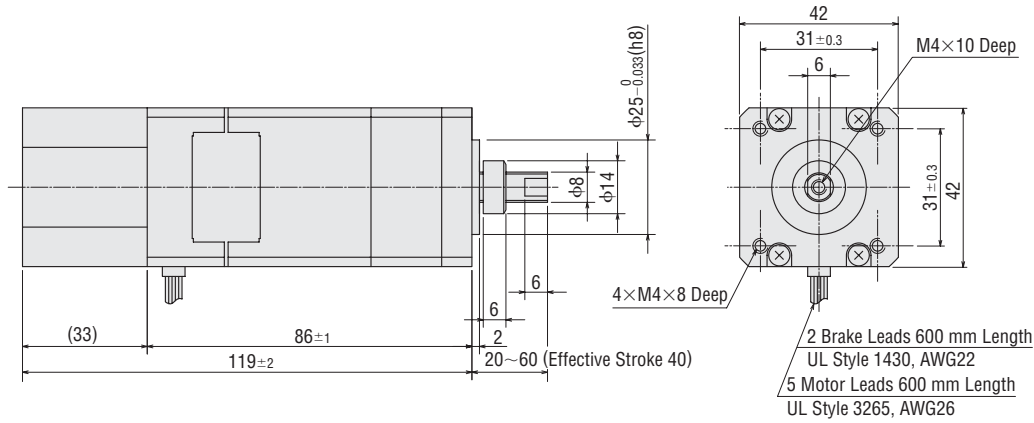


● Dimensions ④ and ⑥ apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.

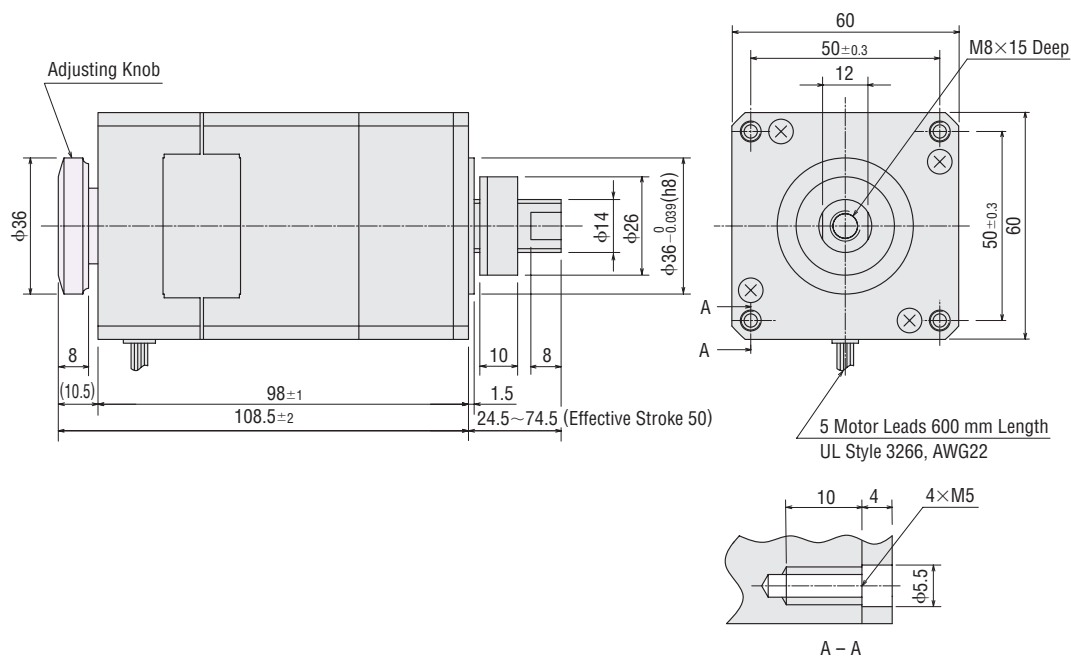
7	<b>DRL42PB2-10G</b> (Without additional function)	Actuator Model	DRL42PB2-10	Mass	0.63 kg
	<b>DRL42PA2-10G</b> (Without additional function)		DRL42PA2-10		0.63 kg



8	<b>DRL42PB2-04MG</b> (With electromagnetic brake)	Actuator Model	DRL42PB2-04M	Mass	0.8 kg
	<b>DRL42PA2-04MG</b> (With electromagnetic brake)		DRL42PA2-04M		0.8 kg



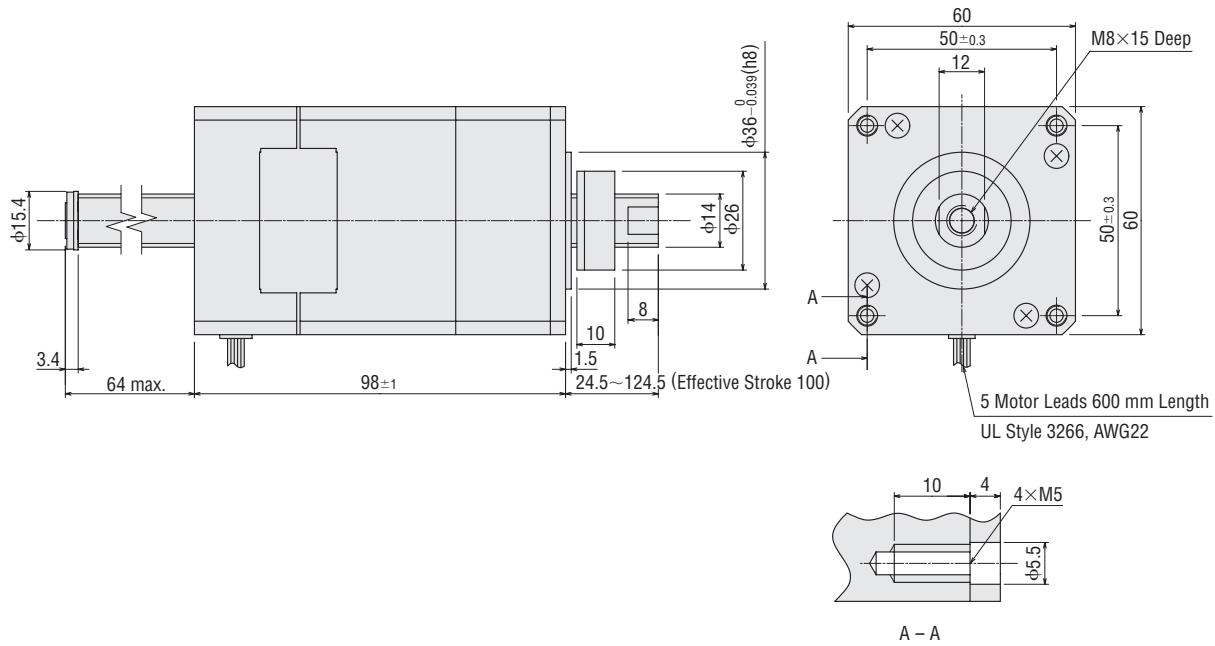
9	<b>DRL60PB4-05G</b> (Without additional function)	Actuator Model	DRL60PB4-05	Mass	1.3 kg
	<b>DRL60PA4-05G</b> (Without additional function)		DRL60PA4-05		1.3 kg
	<b>DRL60PB4-05NG</b> (With adjusting knob)		DRL60PB4-05N		1.35 kg
	<b>DRL60PA4-05NG</b> (With adjusting knob)		DRL60PA4-05N		1.35 kg



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

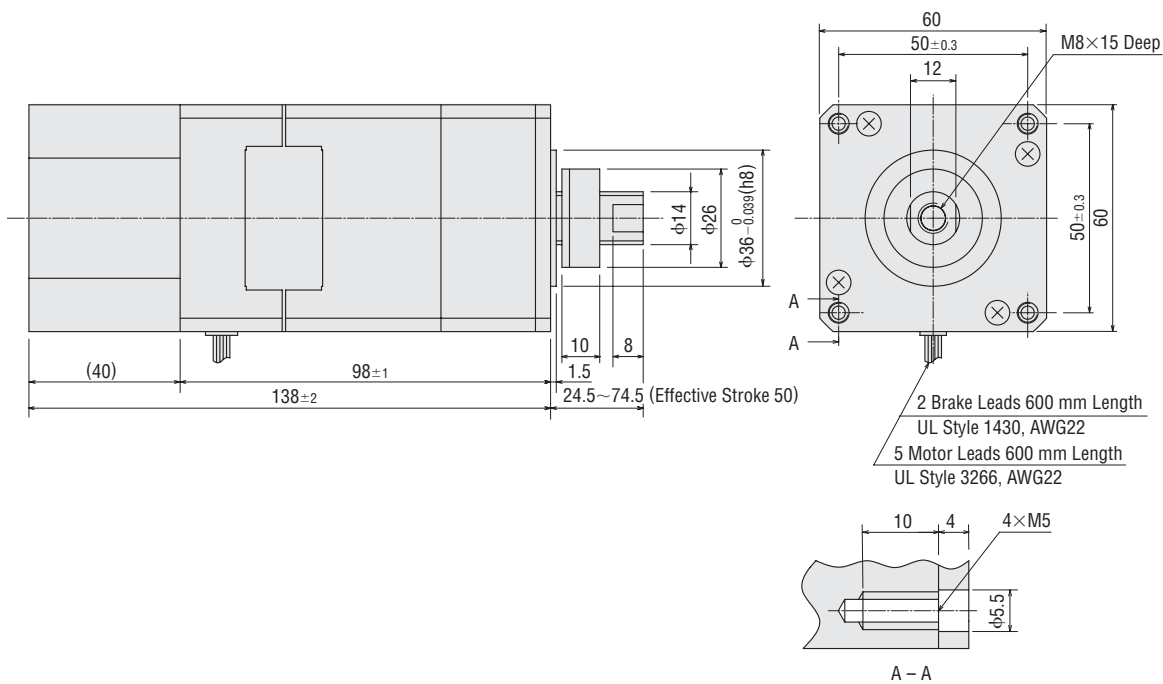
10 **DRL60PB4-10G** (Without additional function)  
**DRL60PA4-10G** (Without additional function)

Actuator Model	Mass
DRL60PB4-10	1.38 kg
DRL60PA4-10	1.38 kg



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

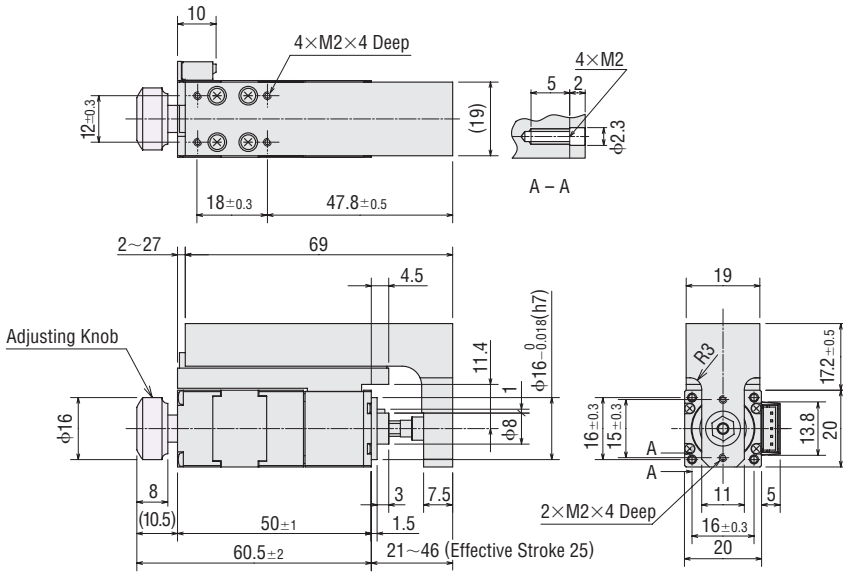
Actuator Model	Mass
DRL60PB4-05M	1.7 kg
DRL60PA4-05M	1.7 kg





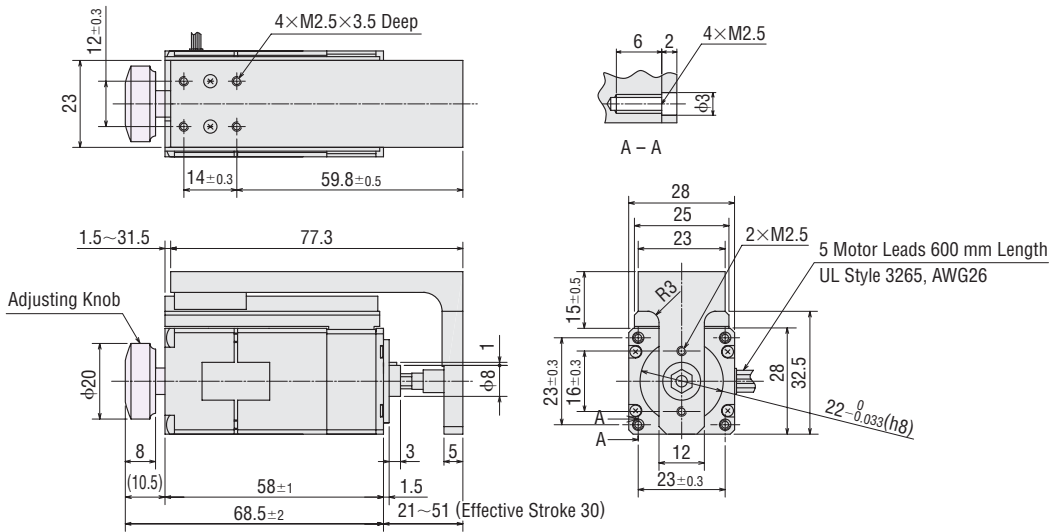
◇ Ground Ball Screw/Rolled Ball Screw Guide Type

	Actuator Model	Mass
12 <b>DRL20PB1G-02G</b> (Without additional function)	DRL20PB1G-02	0.14 kg
<b>DRL20PB1G-02NG</b> (With adjusting knob)	DRL20PB1G-02N	0.15 kg



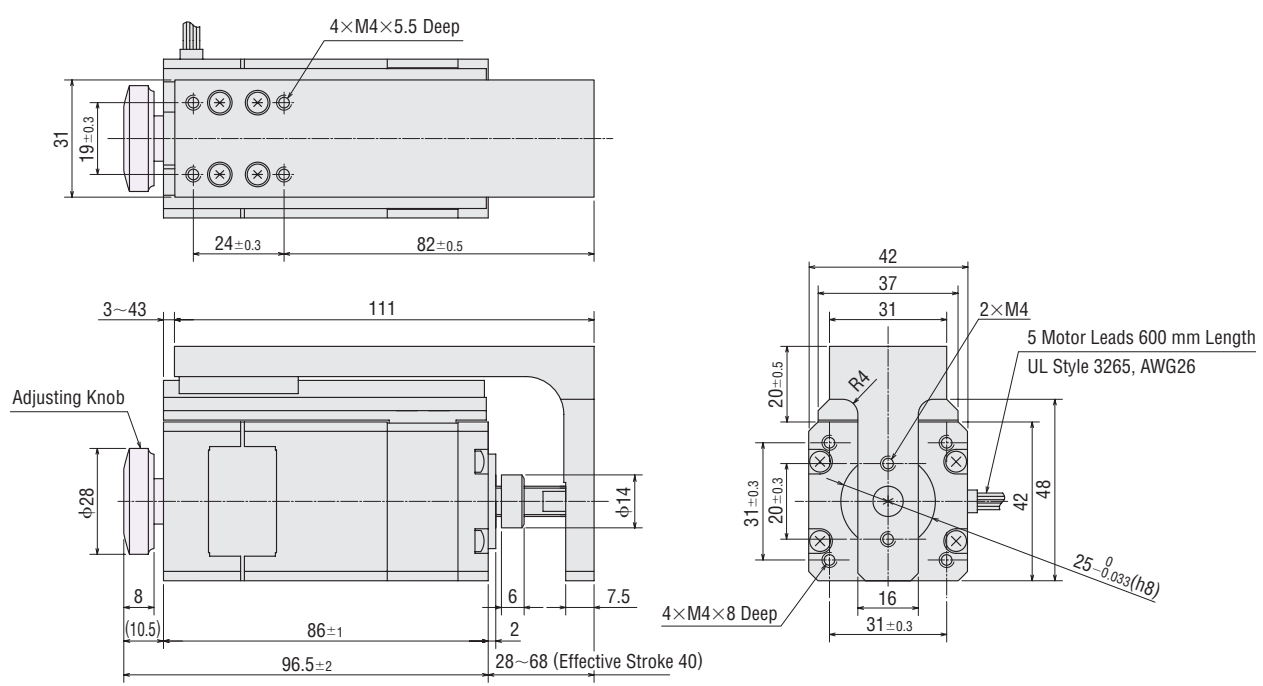
● The actuator comes with a motor lead wire/connector assembly (0.6 m). UL Style 3265, AWG24

	Actuator Model	Mass
13 <b>DRL28PB1G-03G</b> (Without additional function)	DRL28PB1G-03	0.25 kg
<b>DRL28PA1G-03G</b> (Without additional function)	DRL28PA1G-03	0.25 kg
<b>DRL28PB1G-03NG</b> (With adjusting knob)	DRL28PB1G-03N	0.26 kg
<b>DRL28PA1G-03NG</b> (With adjusting knob)	DRL28PA1G-03N	0.26 kg

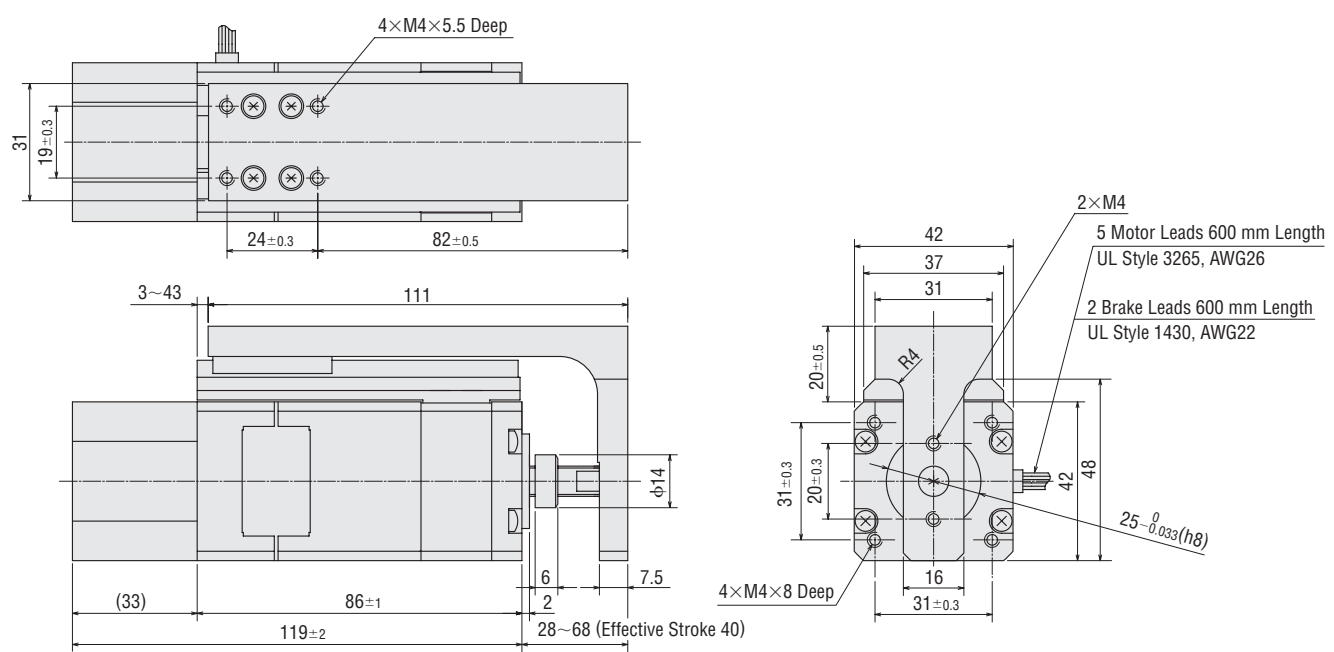


● Dimensions 12 and 13 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.

	Actuator Model	Mass
14 <b>DRL42PB2G-04G</b> (Without additional function)	DRL42PB2G-04	0.8 kg
<b>DRL42PA2G-04G</b> (Without additional function)	DRL42PA2G-04	0.8 kg
<b>DRL42PB2G-04NG</b> (With adjusting knob)	DRL42PB2G-04N	0.8 kg
<b>DRL42PA2G-04NG</b> (With adjusting knob)	DRL42PA2G-04N	0.8 kg

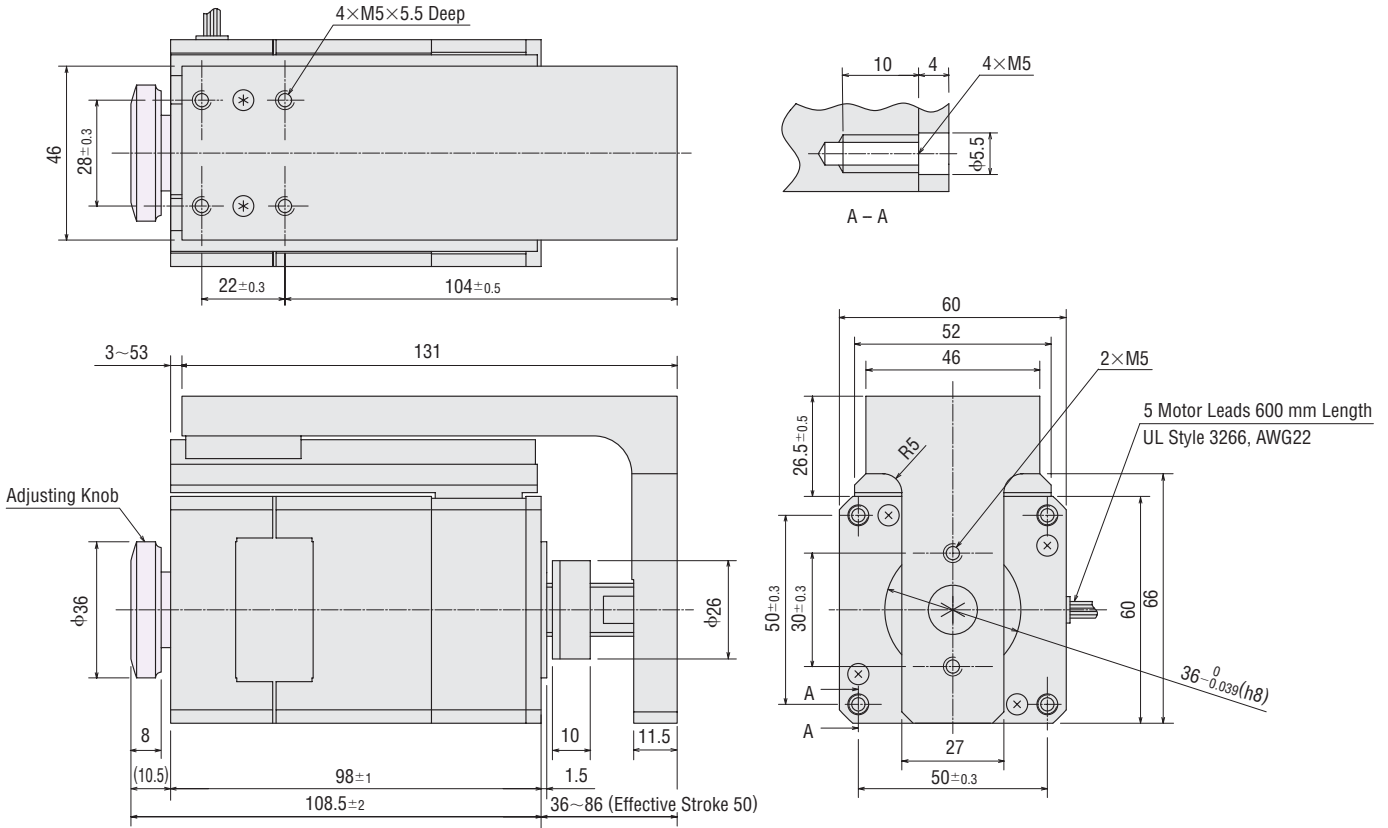


	Actuator Model	Mass
15 <b>DRL42PB2G-04MG</b> (With electromagnetic brake)	DRL42PB2G-04M	1 kg
<b>DRL42PA2G-04MG</b> (With electromagnetic brake)	DRL42PA2G-04M	1 kg

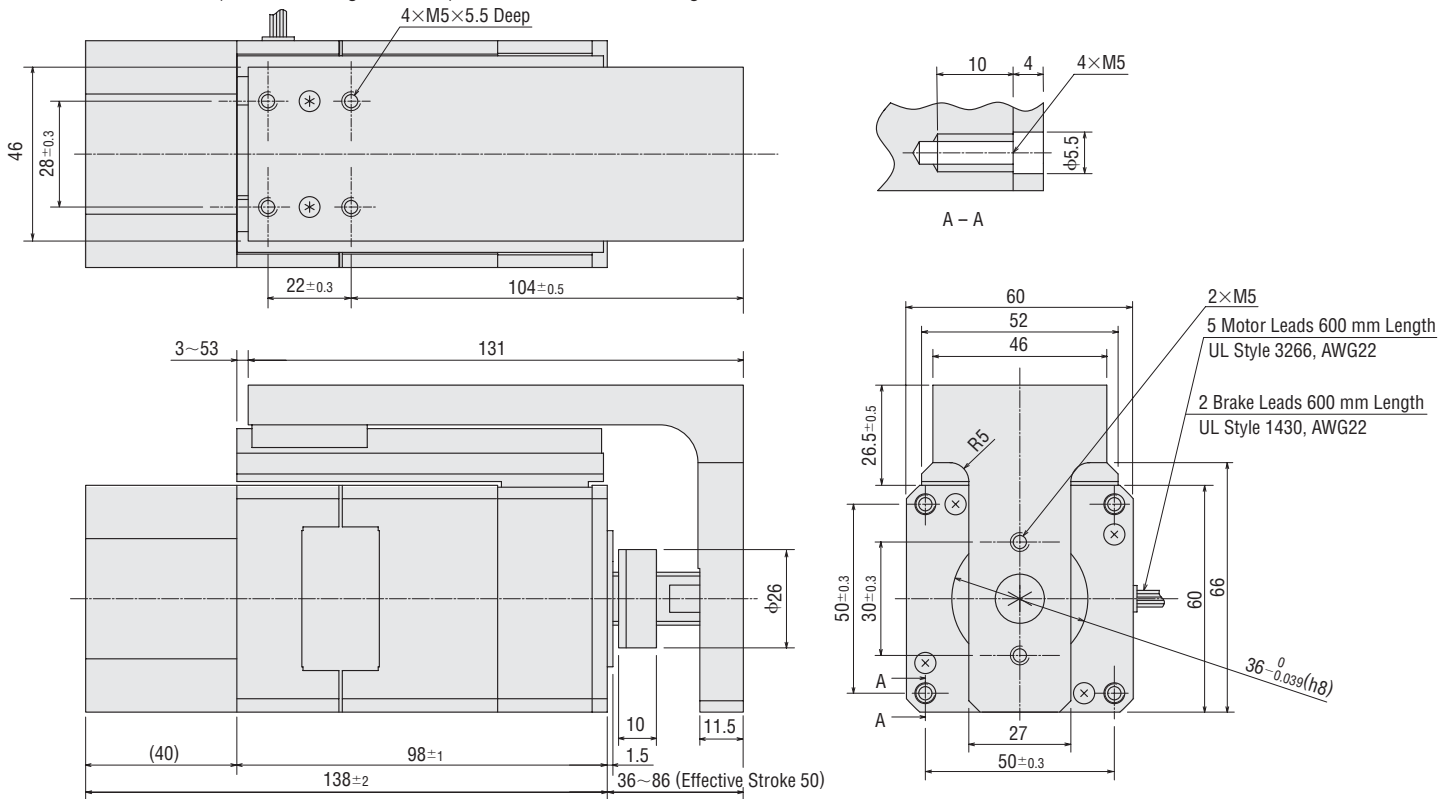


● Dimension 14 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in shaded areas should be ignored.

	Actuator Model	Mass
16	<b>DRL60PB4G-05G</b> (Without additional function)	DRL60PB4G-05 1.8 kg
	<b>DRL60PA4G-05G</b> (Without additional function)	DRL60PA4G-05 1.8 kg
	<b>DRL60PB4G-05NG</b> (With adjusting knob)	DRL60PB4G-05N 1.85 kg
	<b>DRL60PA4G-05NG</b> (With adjusting knob)	DRL60PA4G-05N 1.85 kg



	Actuator Model	Mass
17	<b>DRL60PB4G-05MG</b> (With electromagnetic brake)	DRL60PB4G-05M 2.2 kg
	<b>DRL60PA4G-05MG</b> (With electromagnetic brake)	DRL60PA4G-05M 2.2 kg

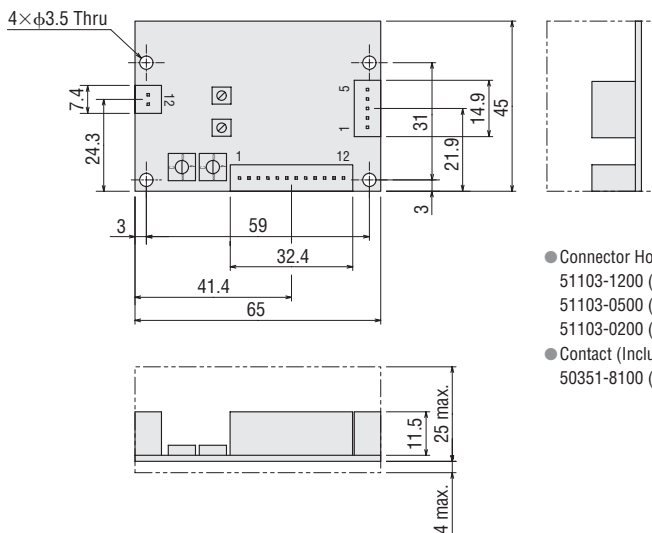


● Dimension 16 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in  areas should be ignored.

● Driver Unit

☞ Driver Model: CRD5103P, CRD5107P, CRD5114P

Mass: 0.04 kg



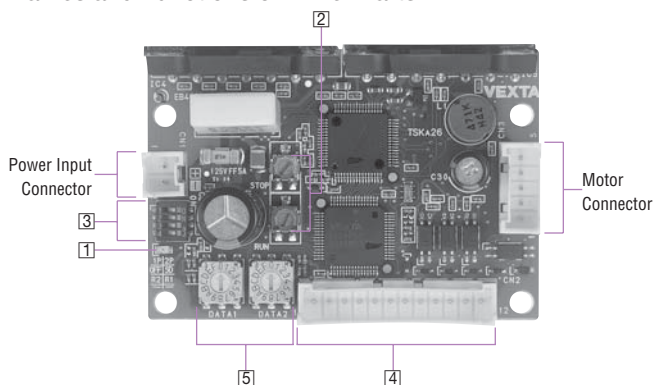
Note:

● 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 products. It must be purchased separately.

Driver lead wire set → Page D-88

## 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 Potentiometer

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 Switch

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 Signal

Indication	I/O	Pin No.	Signal Name	Function
CN2	Input Signal	1	Pulse Signal (CW Pulse Signal)	Operation command pulse signal (The motor will rotate in the CW direction when in 2-pulse input mode.)
		2		
		3	Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal Photocoupler ON: CW, photocoupler OFF: CCW (The motor will rotate in the CCW direction when in 2-pulse input mode.)
		4		
		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	Current Cutback Release Signal	Disables the automatic current cutback function
		9		
		10	Output Signal	Excitation Timing Signal
11				
12				

#### 5 Resolution Setting Switch

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

### DRL20, DRL28

R1			R2		
Resolution Setting Switch	Microstep/Step 1	Resolution 1 (mm)	Resolution Setting Switch	Microstep/Step 2	Resolution 2 (mm)
DATA1 DATA2			DATA1 DATA2		
0	1	0.002	0	×2.5	0.005
1	2	0.001	1	×1.25	0.0025
2	2.5	0.0008	2	1.6	0.00125
3	4	0.0005	3	2	0.001
4	5	0.0004	4	3.2	0.000625
5	8	0.00025	5	4	0.0005
6	10	0.0002	6	6.4	0.0003125
7	20	0.0001	7	10	0.0002
8	25	0.00008	8	12.8	0.00015625
9	40	0.00005	9	20	0.0001
A	50	0.00004	A	25.6	0.000078125
B	80	0.000025	B	40	0.00005
C	100	0.00002	C	50	0.00004
D	125	0.000016	D	51.2	0.0000390625
E	200	0.00001	E	100	0.00002
F	250	0.000008	F	102.4	0.00001953125

### DRL42

R1			R2		
Resolution Setting Switch	Microstep/Step 1	Resolution 1 (mm)	Resolution Setting Switch	Microstep/Step 2	Resolution 2 (mm)
DATA1 DATA2			DATA1 DATA2		
0	1	0.004	0	×2.5	0.01
1	2	0.002	1	×1.25	0.005
2	2.5	0.0016	2	1.6	0.0025
3	4	0.001	3	2	0.002
4	5	0.0008	4	3.2	0.00125
5	8	0.0005	5	4	0.001
6	10	0.0004	6	6.4	0.000625
7	20	0.0002	7	10	0.0004
8	25	0.00016	8	12.8	0.0003125
9	40	0.0001	9	20	0.0002
A	50	0.00008	A	25.6	0.00015625
B	80	0.00005	B	40	0.0001
C	100	0.00004	C	50	0.00008
D	125	0.000032	D	51.2	0.000078125
E	200	0.00002	E	100	0.00004
F	250	0.000016	F	102.4	0.0000390625

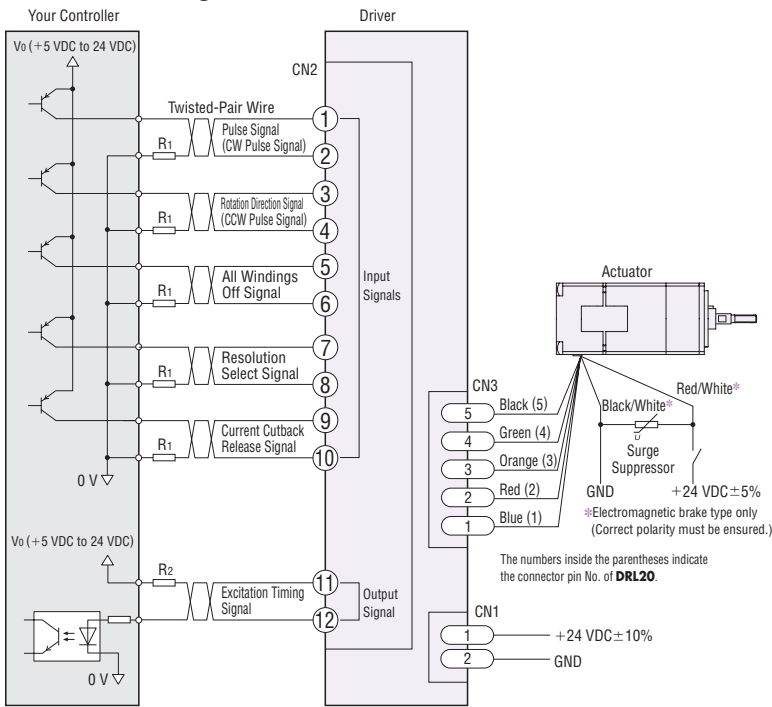
### DRL60

R1			R2		
Resolution Setting Switch	Microstep/Step 1	Resolution 1 (mm)	Resolution Setting Switch	Microstep/Step 2	Resolution 2 (mm)
DATA1 DATA2			DATA1 DATA2		
0	1	0.008	0	×2.5	0.02
1	2	0.004	1	×1.25	0.01
2	2.5	0.0032	2	1.6	0.005
3	4	0.002	3	2	0.004
4	5	0.0016	4	3.2	0.0025
5	8	0.001	5	4	0.002
6	10	0.0008	6	6.4	0.00125
7	20	0.0004	7	10	0.0008
8	25	0.00032	8	12.8	0.000625
9	40	0.0002	9	20	0.0004
A	50	0.00016	A	25.6	0.0003125
B	80	0.0001	B	40	0.0002
C	100	0.00008	C	50	0.00016
D	125	0.000064	D	51.2	0.00015625
E	200	0.00004	E	100	0.00008
F	250	0.000032	F	102.4	0.000078125

#### 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 C/S (resolution select) signal are limited to those selected in resolution 1 or resolution 2.
- Do not change the C/S input or resolution select switch while the actuator is operating. It may cause malfunction.

● Connection Diagrams



◇ Connecting Input Signal

- 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 a Power Supply for Electromagnetic Brake

- 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 above for **DRL42**, or 24 VDC  $\pm$  5%, 0.3 A or above for **DRL60**.
- To connect the electromagnetic brake to the DC power supply, use a shielded cable of AWG24 (0.2 mm<sup>2</sup>) 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 (0.2 to 0.3 mm<sup>2</sup>) and 2 m or less in length for the signal lines.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases.
- Use cables of AWG22 (0.3 mm<sup>2</sup>) 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 away from power lines (power supply lines and actuator 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.
- 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

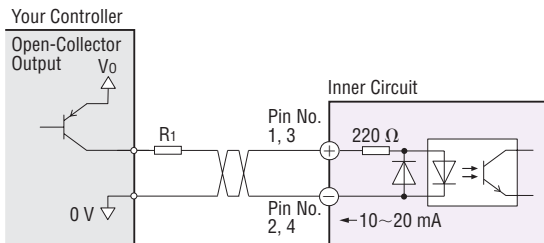
Indication of Input/Output Signal "ON""OFF"

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

PLS (CW), DIR. (CCW) Input Signal

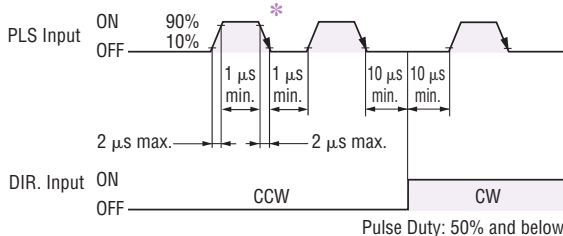
◇ Input Circuit and Sample Connection



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



- \* 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.

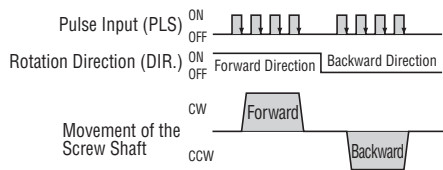
◇ Pulse Input Mode

● 1-Pulse Input Mode

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

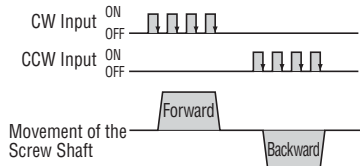
Note:

- Factory setting is 1-pulse input.



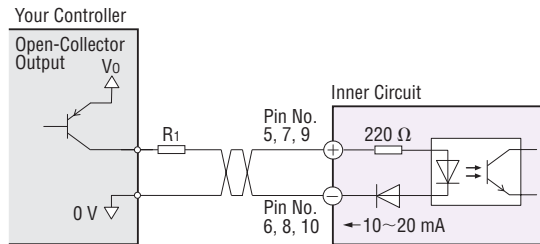
● 2-Pulse Input Mode

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)/ Current Cutback Release (C.D.INH) Input Signal

◇ Input Circuit and Sample Connection



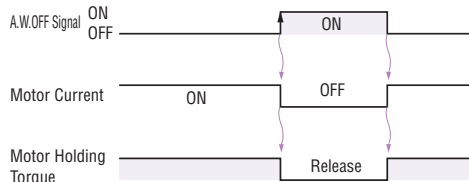
Note:

- 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

Pin No. ⑤, ⑥

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



Note:

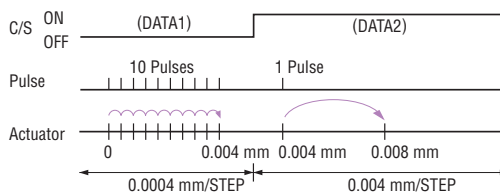
- When operating the actuator, this switch must be "OFF."

◇ 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 C/S input is in the "photocoupler OFF" state, the resolution set by resolution setting switch DATA1 is selected. When the C/S 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 (10 divisions) to 0.004 mm (1 division) (DRL42P)



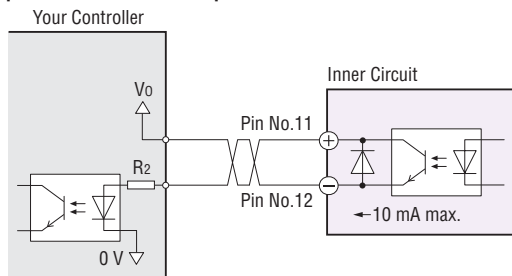
◇ Current Cutback Release (C.D.INH) Input Signal

Pin No. ⑨, ⑩

- Turning the C.D.INH input "ON" will disable the automatic current cutback function when the actuator is at standstill. Turning the C.D.INH 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

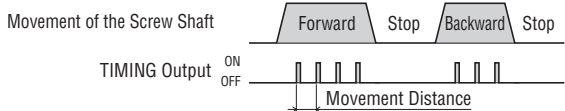


**Note:**

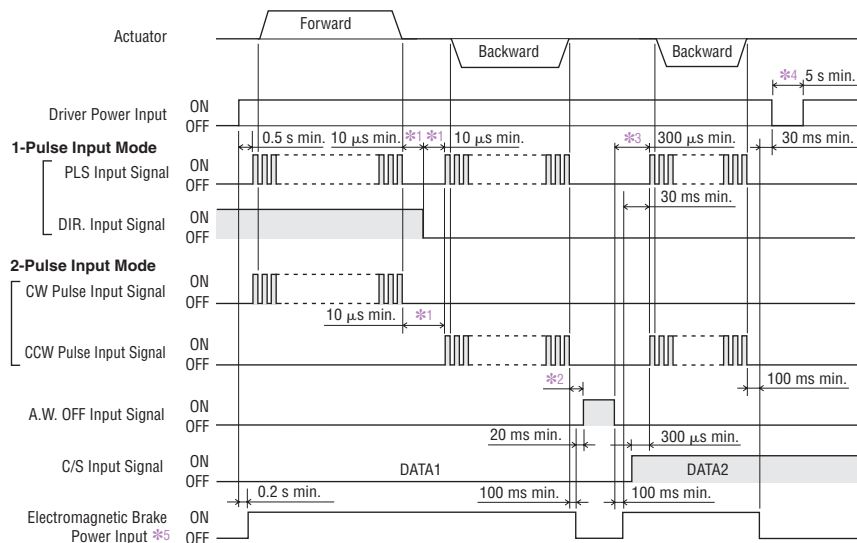
● Keep the output signal voltage  $V_0$  between 5 VDC and 24 VDC, current 10 mA or less. When  $V_0$  is above 10 mA, connect the external resistor  $R_2$  as shown in the figure to keep the current 10 mA or less.

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

Model	Movement Distance of the Screw Shaft
<b>DRL20, DRL28P</b>	0.02 mm
<b>DRL42P</b>	0.04 mm
<b>DRL60P</b>	0.08 mm



#### ● Timing Chart



The shaded section indicates that the photocoupler is on.

- \*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 5 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)	Type	Additional Functions	Model	Actuator Model	Driver Model
□20	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	Standard Type	None	<b>DRL28PB1-03G</b>	DRL28PB1-03	CRD5107P
		With Adjusting Knob	<b>DRL28PB1-03NG</b>	DRL28PB1-03N	
	Guide Type	None	<b>DRL28PB1G-03G</b>	DRL28PB1G-03	
		With Adjusting Knob	<b>DRL28PB1G-03NG</b>	DRL28PB1G-03N	
□42	Standard Type	None	<b>DRL42PB2-04G</b>	DRL42PB2-04	CRD5107P
		With Electromagnetic Brake	<b>DRL42PB2-04MG</b>	DRL42PB2-04M	
		With Adjusting Knob	<b>DRL42PB2-04NG</b>	DRL42PB2-04N	
	Guide Type	None	<b>DRL42PB2G-04G</b>	DRL42PB2G-04	
		With Electromagnetic Brake	<b>DRL42PB2G-04MG</b>	DRL42PB2G-04M	
		With Adjusting Knob	<b>DRL42PB2G-04NG</b>	DRL42PB2G-04N	
□60	Standard Type	None	<b>DRL60PB4-05G</b>	DRL60PB4-05	CRD5114P
		With Electromagnetic Brake	<b>DRL60PB4-05MG</b>	DRL60PB4-05M	
		With Adjusting Knob	<b>DRL60PB4-05NG</b>	DRL60PB4-05N	
	Guide Type	None	<b>DRL60PB4G-05G</b>	DRL60PB4G-05	
		With Electromagnetic Brake	<b>DRL60PB4G-05MG</b>	DRL60PB4G-05M	
		With Adjusting Knob	<b>DRL60PB4G-05NG</b>	DRL60PB4G-05N	

### ● Rolled Ball Screw

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

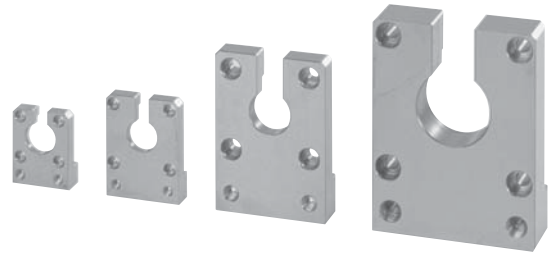
● The customer must provide screws for installing the plate to the equipment.

Material: Iron

Surface treatment: Electroless nickel plating

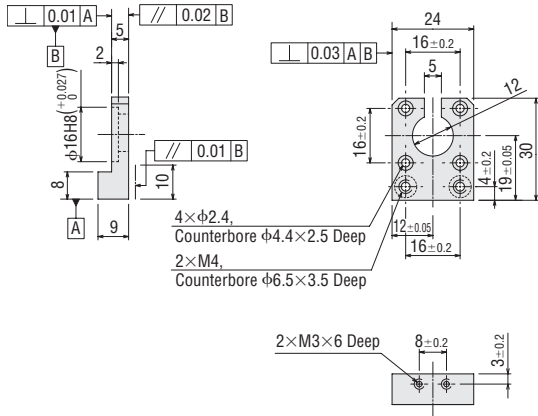
### Product Line

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

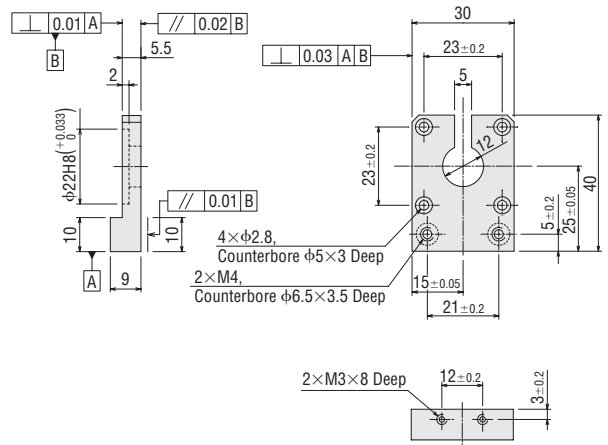


### Dimensions (Unit = mm)

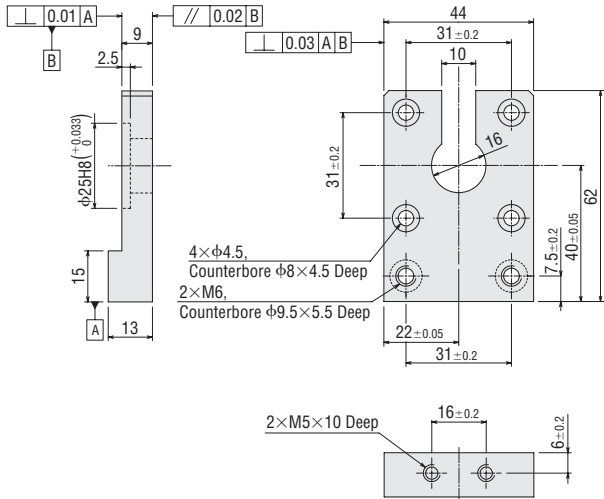
#### PADRL-20



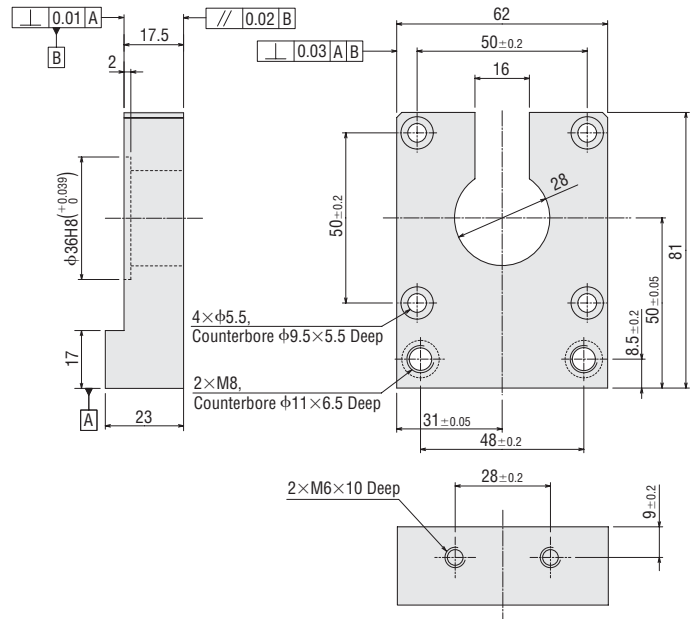
#### PADRL-28



#### PADRL-42



#### PADRL-60



### 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)
<b>LCS04SD5</b>	0.6

### Motor Connector Set (RoHS)

A set of connector housings and contacts for use with connector-coupled motors. Each package contains enough housings and contacts for 30 motors.

#### Product Line

Model	Applicable Product
<b>CS5N30A</b>	<b>DRL20</b>

### Motor Lead Wire/Connector Assembly (RoHS)

These lead wires with connectors are available for connection with **DRL20**, eliminating the need for assembling a connector. (A motor lead wire/connector assembly of 0.6 m is included with the **DRL20**.)



#### Product Line

Model	Applicable Product	Length (m)
<b>LC5N06A</b>	<b>DRL20</b>	0.6
<b>LC5N10A</b>		1



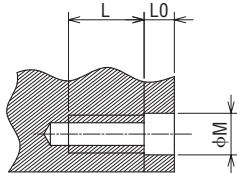
# Compact Linear Actuators Installation

## Installing an Actuator

### Installation Method

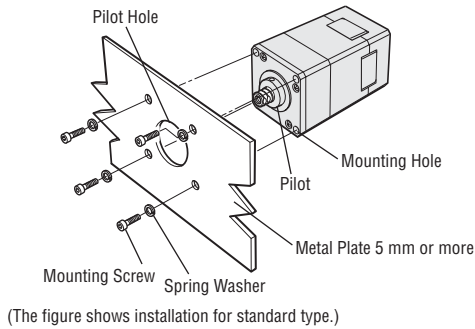
1. Insert the pilot located on the actuator mounting surface into the metal plate's countersunk hole or through-hole.
2. Install the actuator to a metal plate or a device with mounting screws, using mounting holes of the actuator (①), or using a mounting plate (②) (accessories).

● Details of Mounting Hole (Unit = mm)



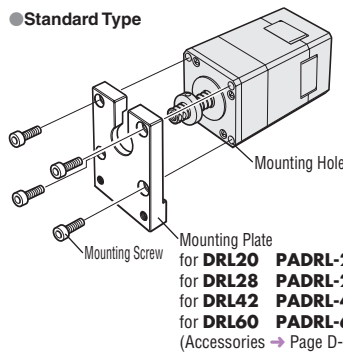
Model	Nominal Diameter	Tightening Torque N·m	Dimension of Mounting Hole (mm)		
			φM	LO	L (Effective Depth)
<b>DRL20</b>	M2	0.4	2.3	2	5
<b>DRL28</b>	M2.5	0.6	3	2	6
<b>DRL42</b>	M4	1.8	—	—	8
<b>DRL60</b>	M5	5.0	5.5	4	10

### ① Using mounting holes of an actuator

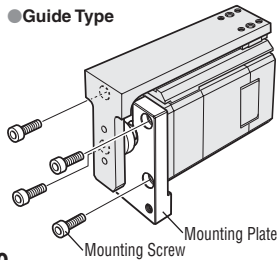


### ② Using a mounting plate (accessory)

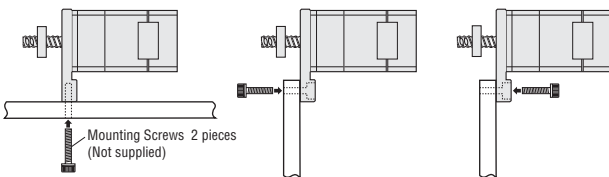
#### ● Standard Type



#### ● Guide Type



There are three ways of mounting an actuator to device.



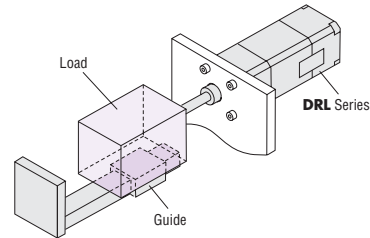
### Installation Conditions

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

- Inside an enclosure installed indoors (with ventilation holes provided)
- Ambient temperature: 0 to +40°C (non-freezing)
- Ambient humidity: 85% or less (non-condensing)
- Not exposed to an explosive atmosphere, toxic gases (sulfurized gas, etc.) or liquid
- Not exposed to direct sunlight
- Not exposed to significant amounts of dust or iron powder
- Not exposed to water (rain, water droplets), oil (oil droplets) or other liquid
- Not exposed to air having high salt content
- Not exposed to continuous vibration or excessive impact
- Not subjected to significant electromagnetic noise caused by welding machines, power equipment, etc.
- Not exposed to radioactive materials, magnetic field or vacuum conditions

## Anti-Spin Mechanism

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



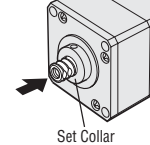
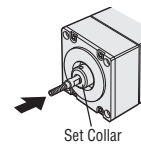
## Installing a Load

### Standard Type

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

**DRL20, DRL28**

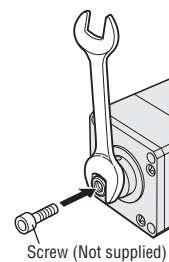
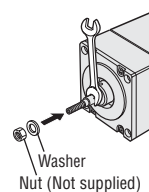
**DRL42, DRL60**



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

**DRL20, DRL28**

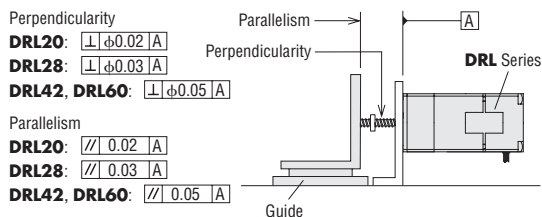
**DRL42, DRL60**



Model	Nominal Diameter of Screw/Nut	Tightening Torque N·m
<b>DRL20</b>	M3 Nut	0.6
<b>DRL28</b>	M3 Nut	0.6
<b>DRL42</b>	M4 Screw	1.8
<b>DRL60</b>	M8 Screw	5.0

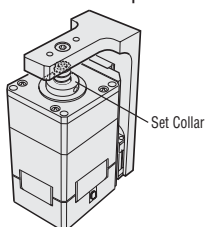
### ● Installation Accuracy

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



### Guide Type

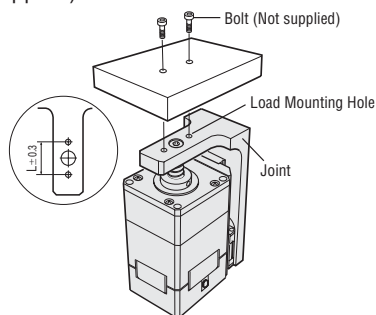
1. Retract the screw shaft until it stops at the set collar.



2. Affix the load with a screw.

### ● When Using Load-Mounting Holes on the Screw-Shaft Side

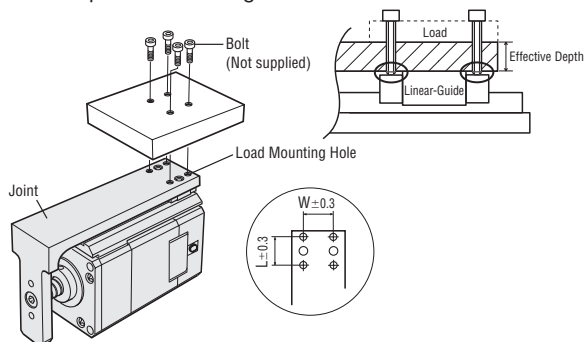
Install the load using load-mounting holes on the joint and the bolts (not supplied).



Model	Nominal Diameter of Bolt	Tightening Torque N·m	Effective Depth mm	L mm
<b>DRL20</b>	M2	0.4	4	15
<b>DRL28</b>	M2.5	0.6	5	16
<b>DRL42</b>	M4	1.0	7.5	20
<b>DRL60</b>	M5	2.0	11.5	30

### ● 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 screws whose length does not exceed the effective depth in the linear-guide.



Model	Nominal Diameter of Bolt	Tightening Torque N·m	Effective Depth mm	L mm	W mm
<b>DRL20</b>	M2	0.4	4	18	12
<b>DRL28</b>	M2.5	0.6	3.5	14	12
<b>DRL42</b>	M4	1.0	5.5	24	19
<b>DRL60</b>	M5	2.0	5.5	22	28

### 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 overhanging 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.

## ■ Installing a Driver

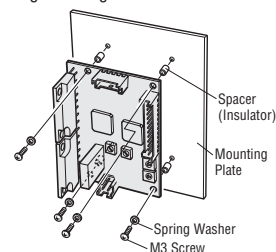
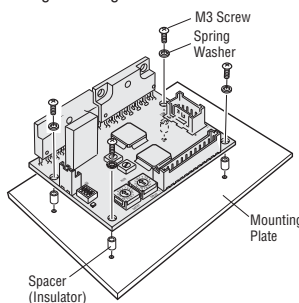
Considering heat radiation, mount the driver as follows:

### 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 and 50 mm in the horizontal and vertical directions respectively, between the driver and enclosure or other equipment. When installing two or more drivers in parallel, provide a minimum clearance of 20 mm and 50 mm in the horizontal and vertical direction respectively, between adjacent drivers.

### ● Installation Conditions

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

- Indoors (This product is designed and manufactured for use in equipment as an internal component.)
- Ambient temperature: 0 to +40°C (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 liquid
- 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.