Orientalmotor

NEW
PRODUCTS

RoHS RoHS-Compliant

Compact Linear Actuators

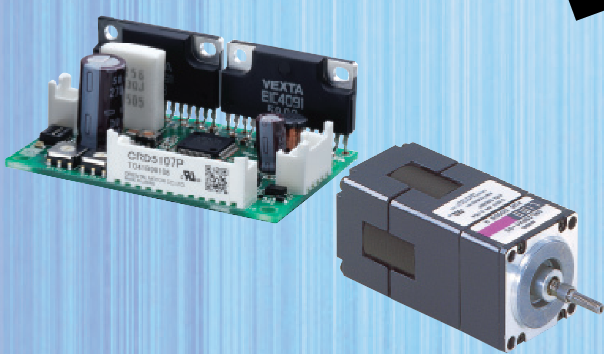
DRL Series

Lead Screw Types: Ground Ball Screw Type/Rolled Ball Screw Type
Additional Functions: With Adjusting Knob/With Electromagnetic Brake

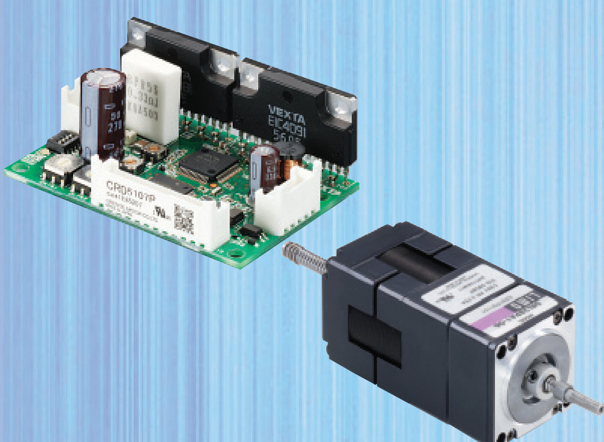
The **DRL** Series motor-integrated compact actuator features a hollow rotor incorporating large bore thrust bearings.

The **DRL** Series Allows for Size Reduction While Improving the Accuracy of Your Equipment.

The drive mechanism adopts a 5-phase stepping motor with ball screw. The **DRL** Series achieves high positioning accuracy in a space-saving design.
The extensive lineup includes a high-resolution motor and longer stroke.



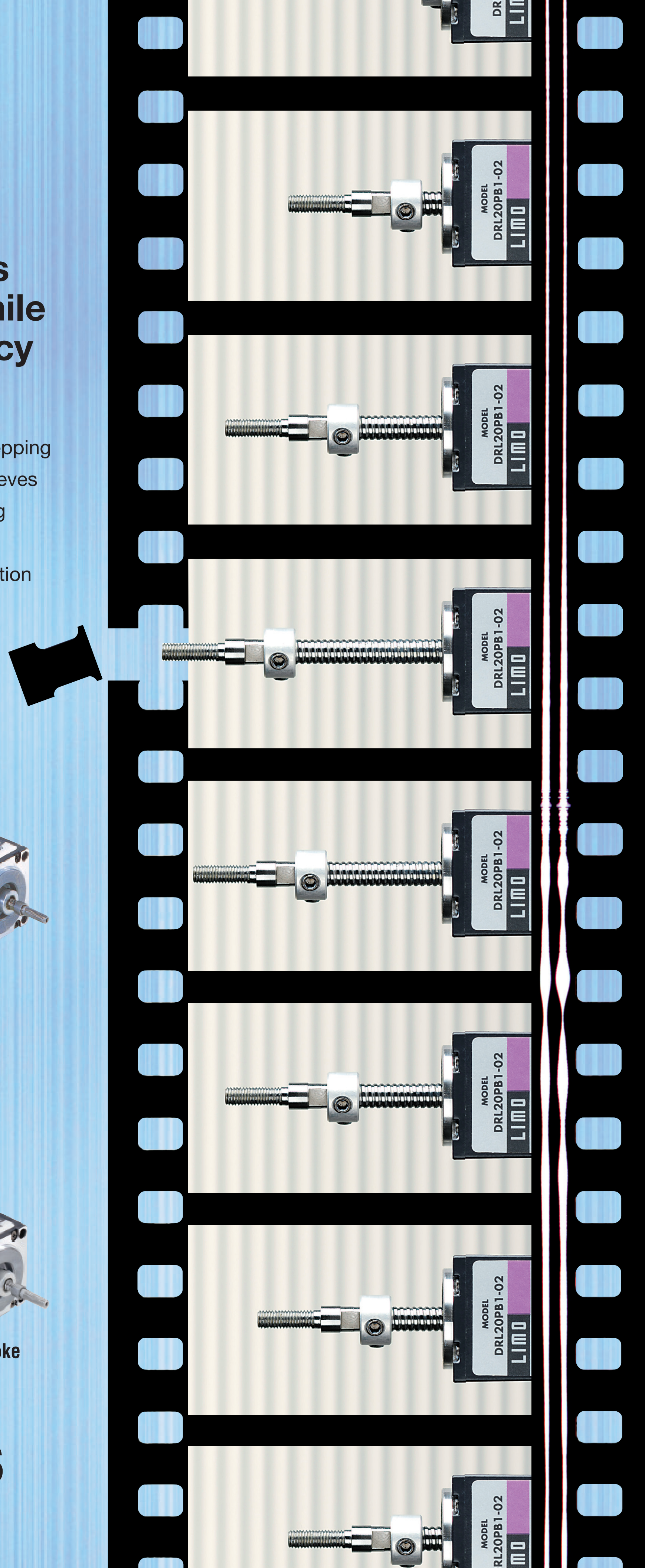
Ground Ball Screw, High-Resolution Motor



Rolled Ball Screw, Standard Motor, Longer Stroke

Compact Linear Actuators

DRL Series



Compact Design and High Positioning Accuracy

The actuator size was reduced by 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 model [repetitive positioning accuracy: ±0.005 mm (±0.0002 in.)].

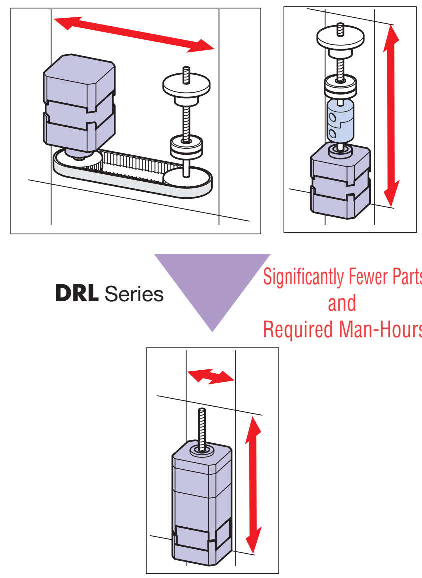
Reliable Design and Structure

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.

Large Bore Thrust Bearing
+
Hollow Rotor

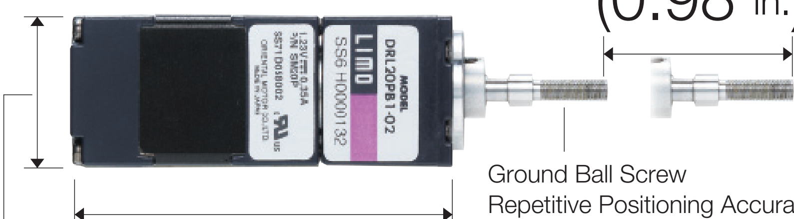
Significantly Fewer Parts and Required Man-Hours

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.



Actual Size

DRL20PB1-02



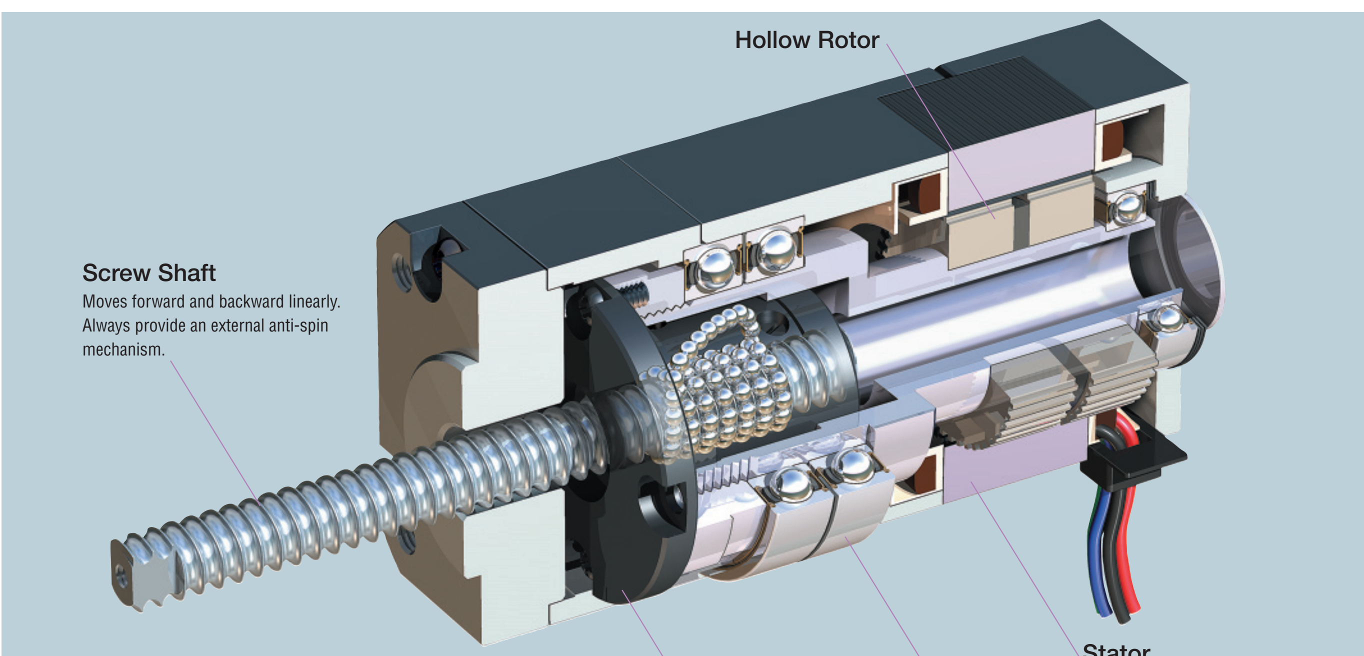
Max. Stroke
25 mm
(0.98 in.)

Ground Ball Screw
Repetitive Positioning Accuracy
±0.005 mm
(±0.0002 in.)

Frame Size
20 mm
(0.79 in.)

Length 50 mm
(1.97 in.)

●An external anti-spin mechanism must be provided with the standard type.



●The figure above shows a structure of the standard type (rolled screw shaft). A set collar (on the screw shaft), which prevents the screw shaft from retracting completely into the case, is being omitted in this figure.

Wide Range of Variations

A High-Resolution Motor and Longer Stroke are Available

Depending on the level of accuracy required, you can choose either the ground ball screw or rolled ball screw.
As for the motor, you can choose from two types—the standard motor and high-resolution motor—according to your requirements.
The longer stroke models have been designed to reflect the requests from our customers. The expanded lineup provides a broader range of models to meet a wider range of applications.

An Extensive Lineup That Addresses All Your Needs

Review our extensive lineup of compact linear actuators, and choose the one that suits your particular application.

Lead Screw Types

- Ground Ball Screw
- Rolled Ball Screw

Motor Types

- High-Resolution Motor
- Standard Motor

Actuator Types

- Standard Type
- Guide Type

● If you choose the standard type, you must provide an external anti-spin mechanism.

+

Additional Functions

- Electromagnetic Brake
- Adjusting Knob

Accessories

- Mounting Plate
- Motor Lead Wire/Connector Assembly
- Motor Connector Set
- Driver Lead Wire Set

Utility accessories are also available.
● For details, refer to page 39.

Lead Screw Types

● Ground Ball Screw

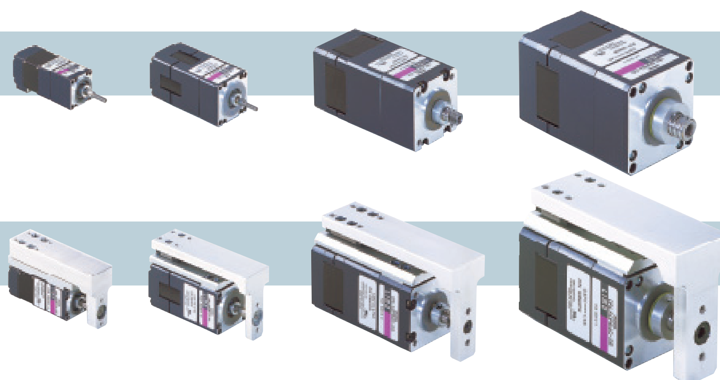
Ideal for applications where high positioning accuracy and low vibration are required, such as optical devices and semiconductor systems that use fine-feed pitches. The **DRL** ground ball screw type achieves high reliability by maximizing the performance advantages of a 5-phase stepping motor.

● Rolled Ball Screw

Ideal for general positioning applications where reliability and ease of use are given priority. It combines the superior thrust and resolution of the ground ball screw type with greater ease of use.

Standard Type

Guide Type



□20 mm (□0.79 in.)	□28 mm (□1.10 in.)	□42 mm (□1.65 in.)	□60 mm (□2.36 in.)

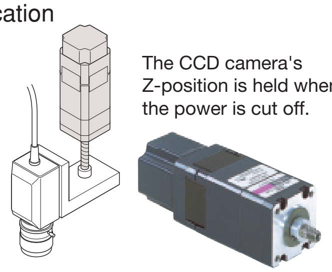
Additional Functions

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.

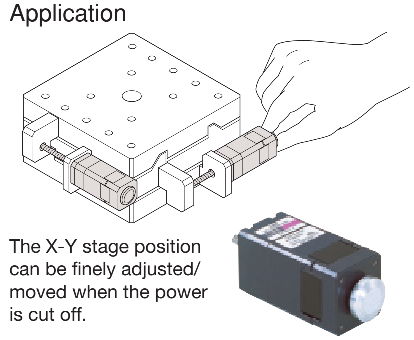
Application



● 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



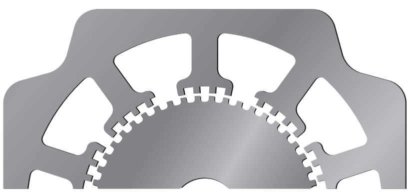
High-Resolution Motor

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.

Standard motor: 50 teeth

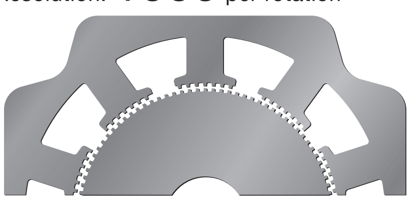
Resolution: 500 per rotation



Resolution is increased!

High-resolution motor: 100 teeth

Resolution: 1000 per rotation

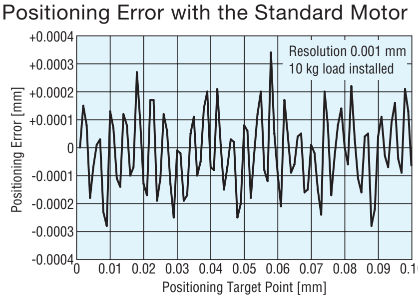


Ideal for Applications Requiring Fine-Feed and Fine Adjustment

In fine-feed operations by microsteps, 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)

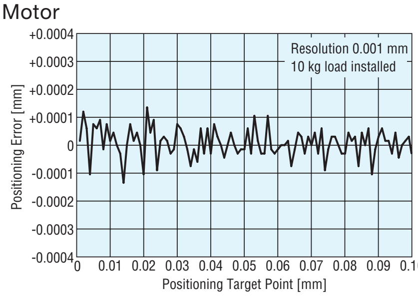
Positioning Error with the Standard Motor



Pitch error is reduced by nearly half!

✻Comparison with the standard motor

Positioning Error with the High-Resolution Motor



Longer Stroke

Longer Stroke to Support Various Operations

The ground ball screw type and rolled ball screw type with standard motor [frame size: 28 mm (1.10 in.), 42 mm (1.65 in.), 60 mm (2.36 in.)] are now available with longer strokes. The longer stroke models of the **DRL** Series extend the sphere of applications. The **DRL** Series meets the needs of our customers, including the need for longer strokes.

Longer Stroke

- ■ Lead Screw Type: Ground ball screw, Rolled ball screw
- ■ Motor type: Standard motor
- ■ Actuator type: Standard
- ■ Additional function: None

Actuator Frame Size mm (in.)	□28 (□1.10)	□42 (□1.65)	□60 (□2.36)
Stroke Length mm (in.)	30 (1.18)	40 (1.57)	50 (1.97)
	60 (2.36)	100 (3.94)	100 (3.94)

□ 28 mm (□ 1.10 in.)

□ 42 mm (□ 1.65 in.)

□ 60 mm (□ 2.36 in.)

● RoHS RoHS-Compliant

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

RoHS (Restriction of Hazardous Substances) Directive:

Directive on restriction of the use of certain hazardous substances in electrical and electronic equipment (2002/95/EC).

The RoHS Directive prohibits the use of six chemical substances in electrical and electronic products sold in the EU member states. The six controlled substances are: lead, hexavalent chromium, cadmium, mercury and two specific brominated flame-retardants (PBB and PBDE).

Compact, Lightweight Microstep Driver

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:

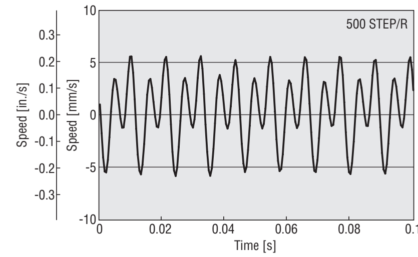
- Smooth Drive Function
- 1-pulse/2-pulse input mode switching
- 25 microstep drive resolutions
- Power LED
- Photocoupler input
- Connector with safety lock (by MOLEX)
- Conforming to major safety standards

Smooth Drive Function Embodies Quieter Operation

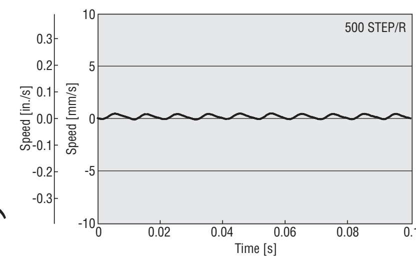
The Smooth Drive Function automatically controls the motor's microstep drive operation at the same travel and speed in the full-step mode, without the operator having to change the pulse input settings. This function is especially useful when used in the full-step or half-step mode.

■ Comparison of Speed Fluctuation

Smooth Drive Function: OFF



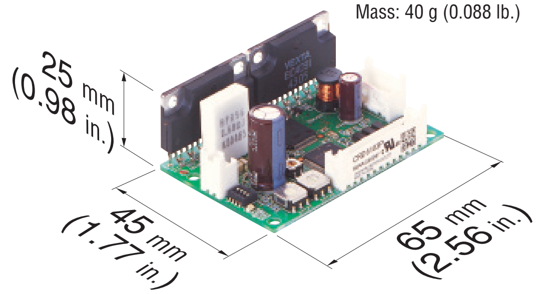
Smooth Drive Function: ON



● Compact Microstep Driver

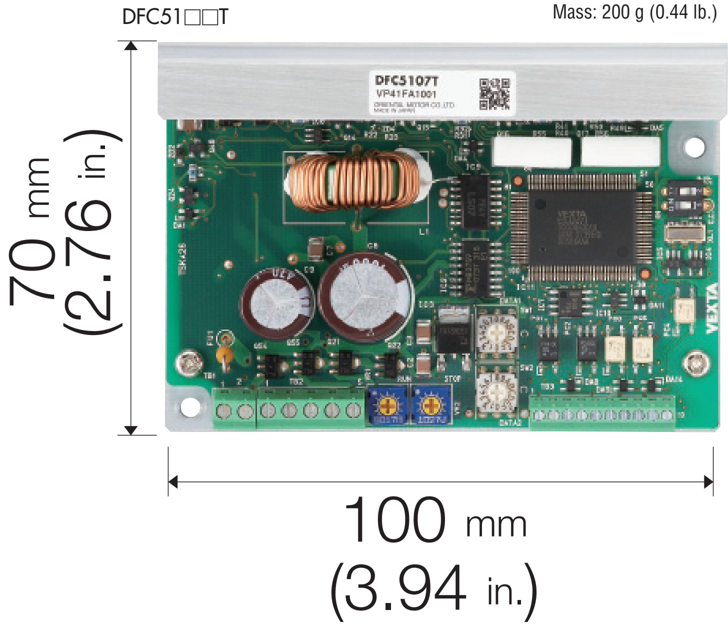
The microstep drive system allows you to set high resolutions up to one-250th of the basic resolution of the actuator. This function is effective in meeting your low-vibration/low-noise operation needs at low speeds. The high-performance driver is also compact and lightweight, achieving a reduction of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

Mass: 40 g (0.088 lb.)

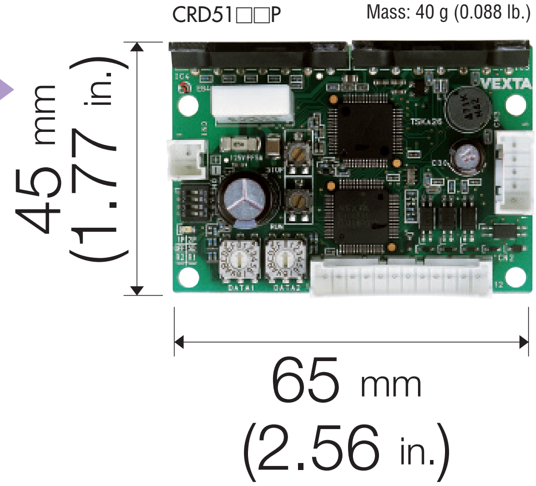


■ Comparison of Driver Size and Mass

DFC51□□T Mass: 200 g (0.44 lb.)

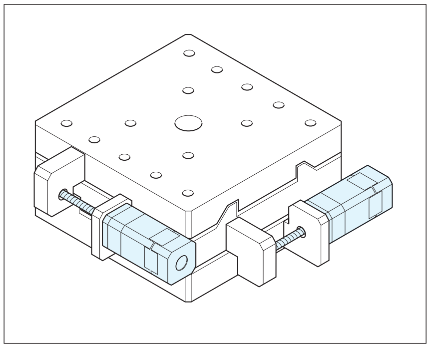


CRD51□□P Mass: 40 g (0.088 lb.)

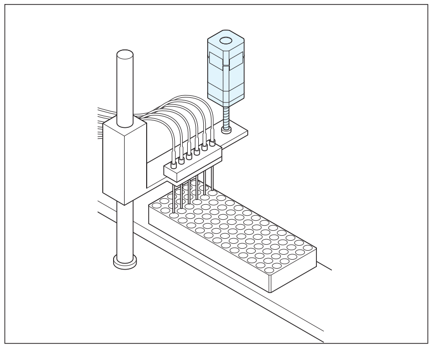


Applications

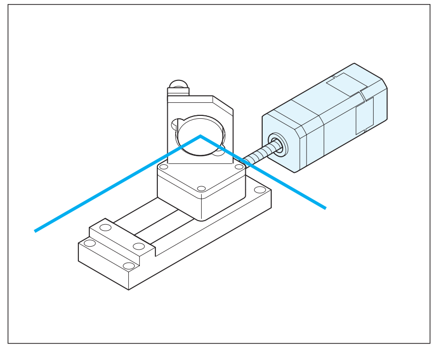
Drive mechanism for a micrometer head X-Y stage



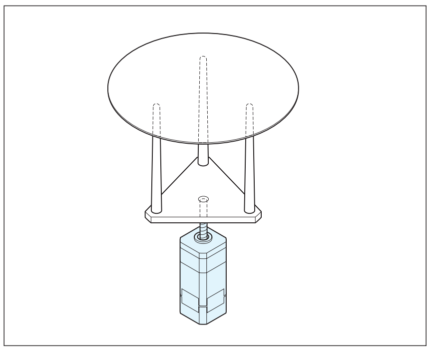
Automatic micro-plate dispensing



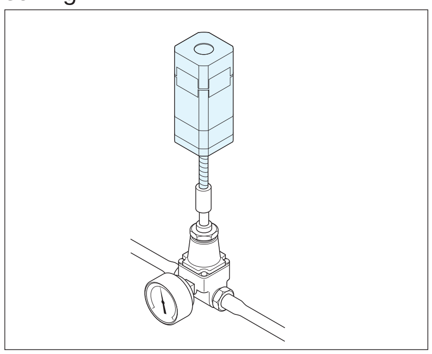
Adjusting a mirror positioning device



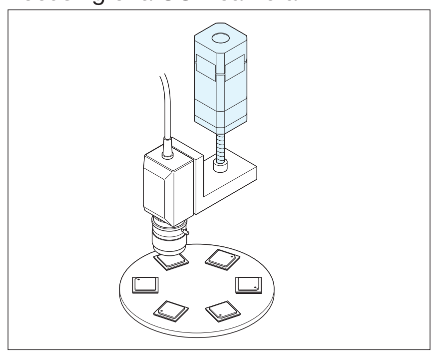
Pin lifter



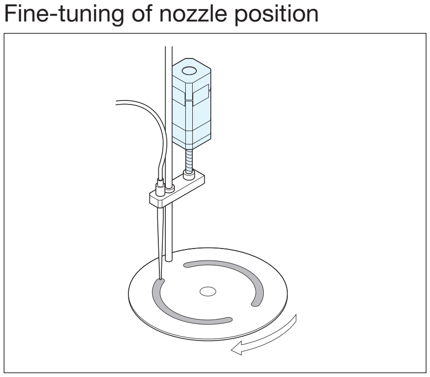
Fine-tuning of flow-rate regulator valve setting



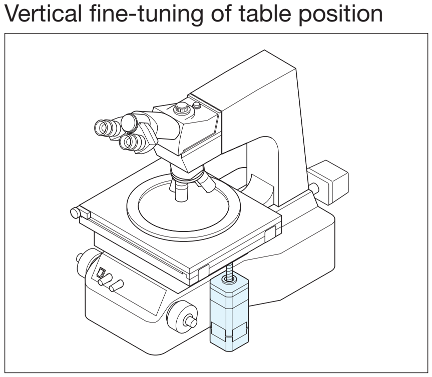
Focusing of a CCD camera



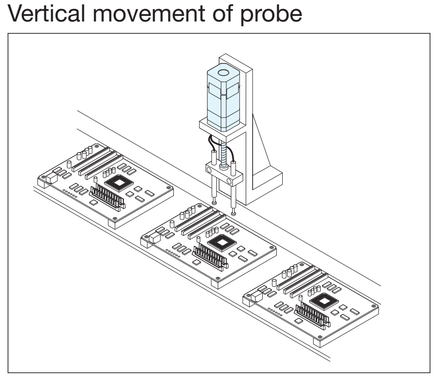
Fine-tuning of nozzle position



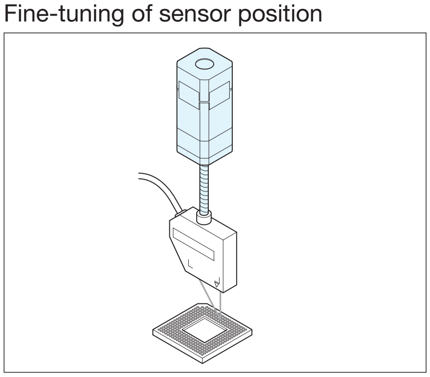
Vertical fine-tuning of table position



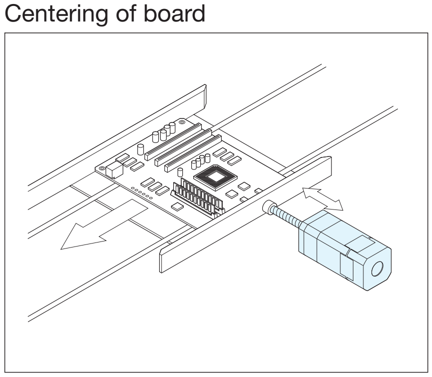
Vertical movement of probe



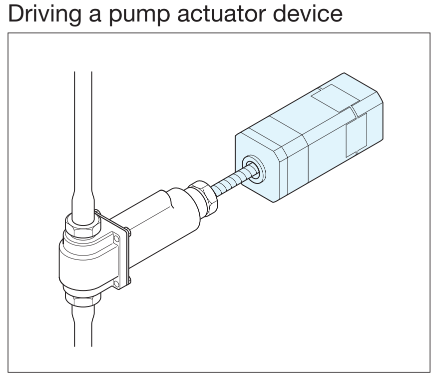
Fine-tuning of sensor position



Centering of board

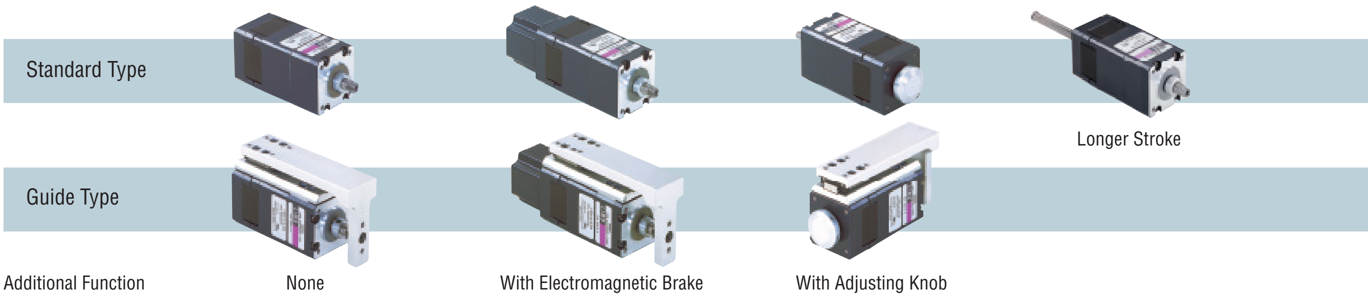


Driving a pump actuator device



Selection of the DRL Series

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

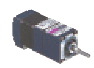
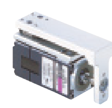
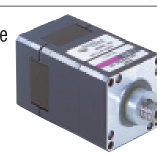
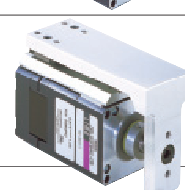


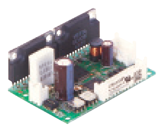
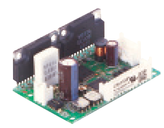
Rolled ball screw
- Standard motor, longer stroke

Ground ball screw
- High-resolution motor
- Standard motor, longer stroke

Conforming to Major Safety Standards

The actuator and driver are designed to conform to the various major safety standards, including the UL Standard. They bear the CE Mark as proof of compliance with EMC Directive.

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.)	
			30 mm (1.18 in.)	
		Guide Type 	30 mm (1.18 in.)	
□42 mm (□1.65 in.)	100 N (22 lb.)	Standard Type 	100 mm (3.94 in.)	
			40 mm (1.57 in.)	
		Guide Type 	40 mm (1.57 in.)	
□60 mm (□2.36 in.)	300 N (67 lb.)	Standard Type 	100 mm (3.94 in.)	
			50 mm (1.97 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 Function	None	With Electromagnetic Brake	With Adjusting Knob	None	With Electromagnetic Brake	With Adjusting Knob	None	With Electromagnetic Brake	With Adjusting Knob
	—	—	—	●	—	●	—	—	—
	—	—	—	●	—	●	—	—	—
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	●	—	—	●	—	—	—	—	—
	●	●	●	●	●	●	●	●	●
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	●	●	●	●	●	●	●	●	●
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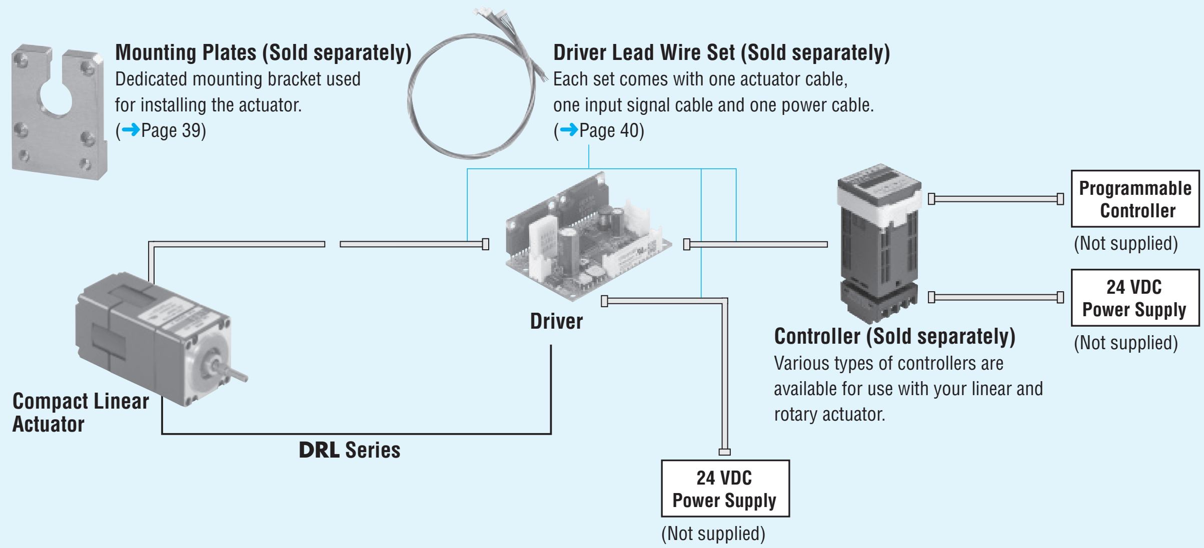
System Configuration

An example of a system configuration with the **SG8030** Series controller.



● **Example of System Configuration**

(Sold separately)

DRL Series	+	Controller	Driver Lead Wire Set* 0.6 m (2 ft.)	Mounting Plate
DRL28PB1-03G		SG8030J	LCS04SD5	PADRL-28
		◎	○	○

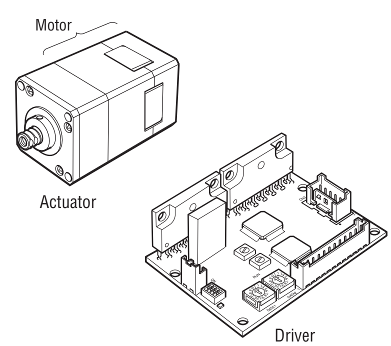
◎: Required under this system. ○: Selectable according to necessity. Oriental Motor provides.

✻ These cables consist of loose lead wires with connectors only connected to driver.

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

Safety Standards and CE Marking

Product	Model	Applicable Standards	Certification Body	Standards File No.	CE Marking
Motor	SM□P(M) SM□P(M)G SM□P(M)M SM□P(M)H SM□P(M)GM SM□P(M)GH	UL 60950 CSA C22.2 No.60950	UL	E208200	EMC Directives
Driver	CRD5103P CRD5107P CRD5114P	UL 60950 CSA C22.2 No.60950	UL		



● Enter the code for frame size in the box (□) within the model name.

● When the package is approved under various safety standards, the approved model names for various safety standards are the motor and driver names.

● Approved Conditions (UL 60950): Class Ⅲ equipment, SELV circuit, Pollution degree 2

Product Number Code

DRL 28 P B 1 G - 03 N G

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

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

Product Line

● Rolled Ball Screw, Standard Motor

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

● Ground Ball Screw, High-Resolution Motor

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

● Ground Ball Screw, Standard Motor

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

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)

c UL us CE

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)	
Maximum Speed*2	mm/s (in./s)	24 (0.94)	15 (0.59)		22 (0.87)	
Maximum Acceleration	m/s^2 ($ft./s^2$)	0.2 (0.66)	0.2 (0.66)		0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Excitation*4	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Non-Excitation	N (lb.)	0	0	0	0	0
Maximum Holding Force – Electromagnetic Brake	N (lb.)	–	–	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)	
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.)	0.18 (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	5

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

c UL us CE

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)	
Max. Vertical Transportable Mass (Fig. B)*1	kg (lb.)	1.5 (3.3)	5 (11)		15 (33)	
Maximum Speed*2	mm/s (in./s)	24 (0.94)	15 (0.59)		22 (0.87)	
Maximum Acceleration	m/s^2 ($ft./s^2$)	0.2 (0.66)	0.2 (0.66)		0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Excitation*4	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Non-Excitation	N (lb.)	0	0	0	0	0
Maximum Holding Force – Electromagnetic Brake	N (lb.)	–	–	100 (22)	–	300 (67)
Maximum Load Moment	N·m (oz-in)	M_P: 0 M_Y: 0 M_R: 0	M_P: 0.5 (71) M_Y: 0.25 (35) M_R: 0.8 (113)		M_P: 0.6 (85) M_Y: 0.35 (49) M_R: 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)	
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.		6	7	8	9	10

*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 to +10°C (+32 to +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 specified temperature under a specified load.

● Maximum Transportable Mass

Figure A

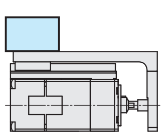
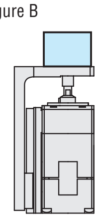
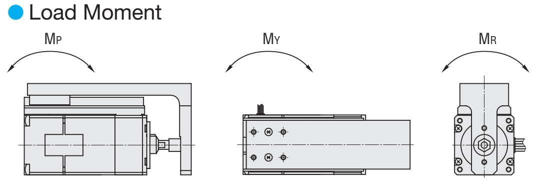


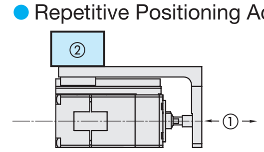
Figure B



● 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*1	kg (lb.)	1.5 (3.3)	3 (6.6)	10 (22)		30 (66)	
Maximum Speed*2	mm/s (in./s)	20 (0.79)	24 (0.94)	30 (1.18)		32 (1.26)	
Maximum Acceleration	m/s^2 ($ft./s^2$)	0.2 (0.66)	0.2 (0.66)	0.4 (1.3)		0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	15 (3.3)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Excitation*4	N (lb.)	15 (3.3)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Non-Excitation	N (lb.)	0	0	0	0	0	0
Maximum Holding Force – Electromagnetic Brake	N (lb.)	–	–	–	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.)	0.002 (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)	**03**: 30 (1.18) **06**: 60 (2.36)	**04**: 40 (1.57) **10**: 100 (3.94)	40 (1.57)	**05**: 50 (1.97) **10**: 100 (3.94)	50 (1.97)
Mass [Mass with adjusting knob]	kg (lb.)	0.08 (0.17) [0.08 (0.17)]	**03**: 0.18 (0.39) [0.19 (0.41)] **06**: 0.18 (0.39)	**04**: 0.6 (1.32) [0.6 (1.32)] **10**: 0.63 (1.38)	0.8 (1.76)	**05**: 1.3 (2.8) [1.35 (2.9)] **10**: 1.38 (3.0)	1.7 (3.7)
Actuator Dimensions No.		11	**03**: 12 **06**: 13	**04**: 16 **10**: 17	18	**05**: 19 **10**: 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)*1	kg (lb.)	1 (2.2)	1.5 (3.3)	5 (11)		15 (33)	
Maximum Speed*2	mm/s (in./s)	20 (0.79)	24 (0.94)	30 (1.18)		32 (1.26)	
Maximum Acceleration	m/s^2 ($ft./s^2$)	0.2 (0.66)	0.2 (0.66)	0.4 (1.3)		0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	15 (3.3)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Excitation*4	N (lb.)	15 (3.3)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force – At Non-Excitation	N (lb.)	0	0	0	0	0	0
Maximum Holding Force – Electromagnetic Brake	N (lb.)	–	–	–	100 (22)	–	300 (67)
Maximum Load Moment	N·m (oz-in)	M_P: 0 M_Y: 0 M_R: 0	M_P: 0 M_Y: 0 M_R: 0	M_P: 0.5 (71) M_Y: 0.25 (35) M_R: 0.8 (113)		M_P: 0.6 (85) M_Y: 0.35 (49) M_R: 2.2 (310)	
Repetitive Positioning Accuracy	mm (in.)	①±0.005 (0.0002) ②±0.01 (0.00039)	①±0.005 (0.0002) ②±0.02 (0.00079)	①±0.005 (0.0002) ②±0.01 (0.00039)			
Lost Motion	mm (in.)	0.05 (0.002)					
Resolution*5	mm (in.)	0.002 (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

*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 (+32 to +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 specified temperature under a specified load.

● Maximum Transportable Mass

Figure A

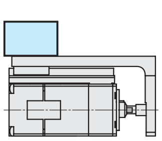
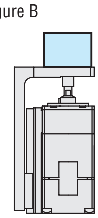
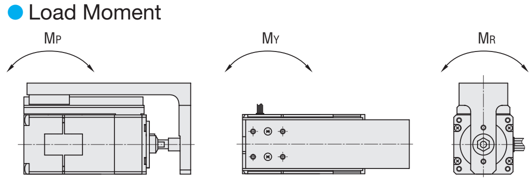


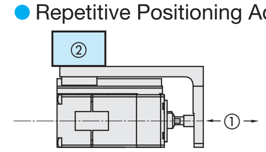
Figure B



● 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	Not equipped	Equipped	Not equipped	Equipped
Max. Vertical Transportable Mass*1	kg (lb.)	3 (6.6)	10 (22)		30 (66)	
Maximum Speed*2	mm/s (in./s)	24 (0.94)	30 (1.18)		32 (1.26)	
Maximum Acceleration	m/s² (ft./s²)	0.2 (0.66)	0.4 (1.3)		0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force — At Excitation*4	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force — At Non-Excitation	N (lb.)	0	0	0	0	0
Maximum Holding Force — 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*5	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.)	**03**: 30 (1.18) **06**: 60 (2.36)	**04**: 40 (1.57) **10**: 100 (3.94)	40 (1.57)	**05**: 50 (1.97) **10**: 100 (3.94)	50 (1.97)
Mass [Mass with adjusting knob]	kg (lb.)	**03**: 0.18 (0.39) [0.19 (0.41)] **06**: 0.18 (0.39)	**04**: 0.6 (1.32) [0.6 (1.32)] **10**: 0.63 (1.38)	0.8 (1.76)	**05**: 1.3 (2.8) [1.35 (2.9)] **10**: 1.38 (3.0)	1.7 (3.7)
Actuator Dimensions No.		**03**: 14 **06**: 15	**04**: 16 **10**: 17	18	**05**: 19 **10**: 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	Not equipped	Equipped	Not equipped	Equipped
Max. Horizontal Transportable Mass (Fig. A)	kg (lb.)	1 (2.2)	2 (4.4)		3 (6.6)	
Max. Vertical Transportable Mass (Fig. B)*1	kg (lb.)	1.5 (3.3)	5 (11)		15 (33)	
Maximum Speed*2	mm/s (in./s)	24 (0.94)	30 (1.18)		32 (1.26)	
Maximum Acceleration	m/s² (ft./s²)	0.2 (0.66)	0.4 (1.3)		0.26 (0.85)	
Maximum Thrust Force*3	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force — At Excitation*4	N (lb.)	30 (6.7)	100 (22)		300 (67)	
Maximum Holding Force — At Non-Excitation	N (lb.)	0	0	0	0	0
Maximum Holding Force — Electromagnetic Brake	N (lb.)	–	–	100 (22)	–	300 (67)
Maximum Load Moment	N·m (oz-in)	M_P: 0 M_Y: 0 M_R: 0	M_P: 0.5 (71) M_Y: 0.25 (35) M_R: 0.8 (113)		M_P: 0.6 (85) M_Y: 0.35 (49) M_R: 2.2 (310)	
Repetitive Positioning Accuracy	mm (in.)	±0.02 (0.00079)				
Lost Motion	mm (in.)	0.1 (0.0039)				
Resolution*5	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

*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 (+32 to +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 specified temperature under a specified load.

● Maximum Transportable Mass

Figure A

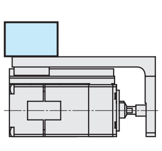
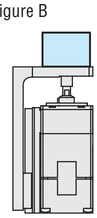
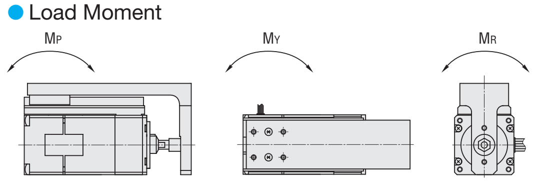


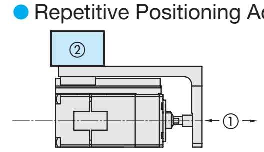
Figure B



● 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.

Specifications

Electromagnetic Brake Specifications

Type of Brake	Power Off Activated Type
Power Input Voltage/Current	**DRL42**: 24 VDC±5% 0.08 A **DRL60**: 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 when in 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 (CCW direction operation command pulse signal when in 2-pulse input mode Photocoupler ON: CW, Photocoupler OFF: CCW), 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 set by the RUN potentiometer is supplied to the actuator.		
	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 (0.088 lb.)		
Dimensions No.		28		

General Specifications

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

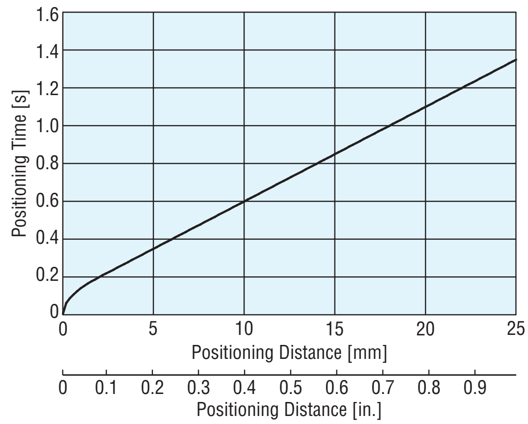
Item		Actuator	Driver
Motor Insulation Class		Class B [130˚C (266˚F)] [Recognized as class A 105˚C (221˚F) by UL/CSA Standard]	–
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the motor windings and case.	–
Dielectric Strength		Sufficient to withstand 0.5 kV* at 50 Hz or 60 Hz applied between the motor windings and case for 1 minute. ***DRL42P**, **DRL60M**: 1.0 kV, **DRL60P**: 1.5 kV	–
Operating Environment (In operation)	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.

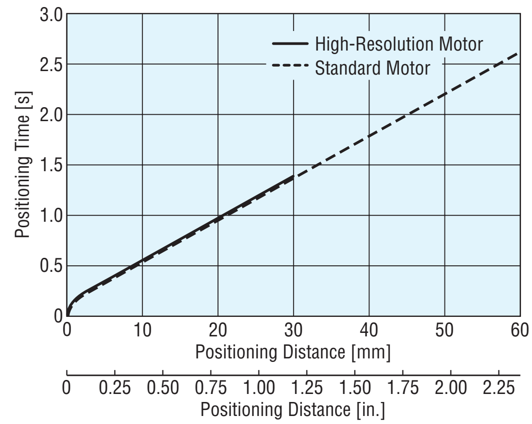
Positioning Distance – Positioning Time (Reference)

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

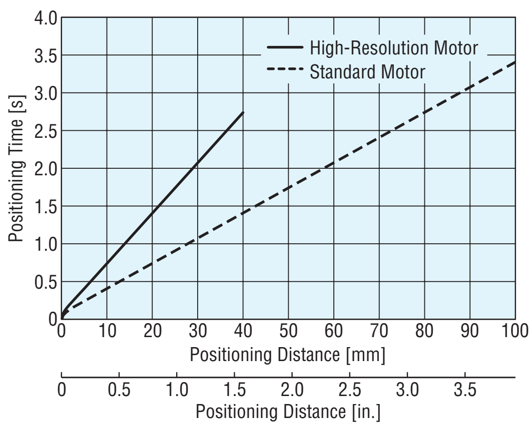
DRL20



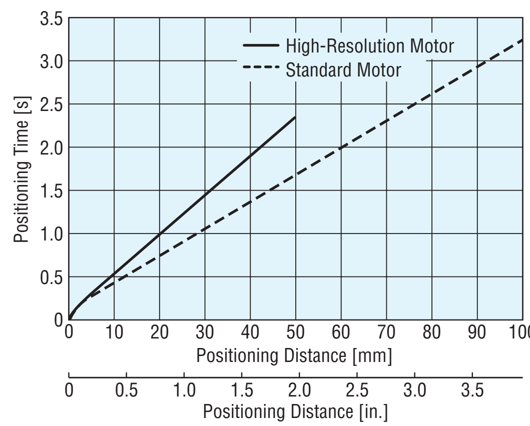
DRL28



DRL42



DRL60

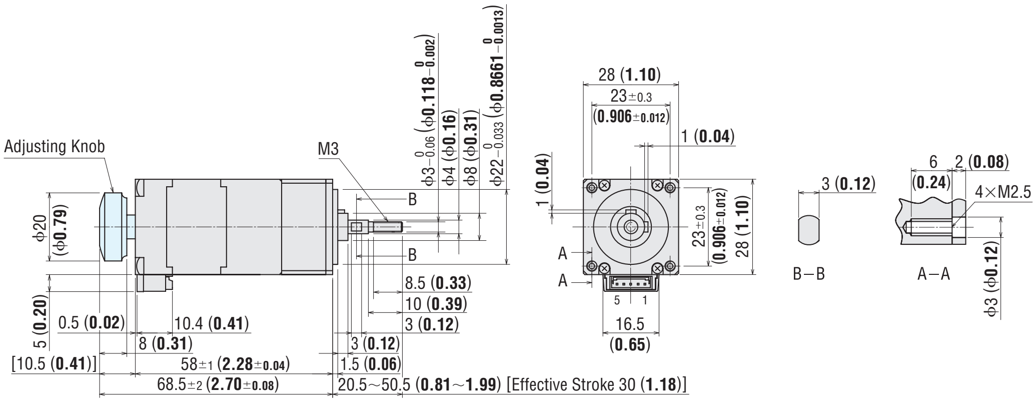


Dimensions Unit = mm (in.)

Actuator

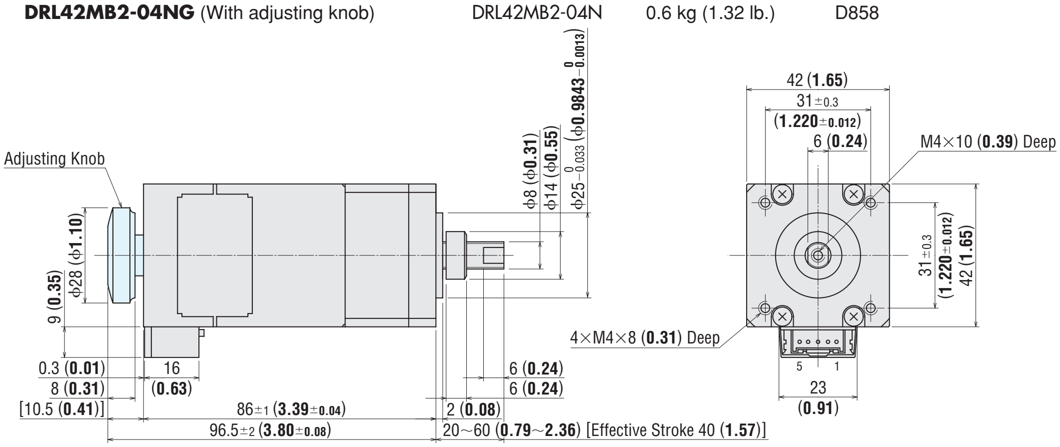
Ground Ball Screw, High-Resolution Motor

	Actuator Model	Mass	DXF
1 **DRL28MB1-03G** (Without additional function)	DRL28MB1-03	0.18 kg (0.39 lb.)	D855
DRL28MB1-03NG (With adjusting knob)	DRL28MB1-03N	0.19 kg (0.41 lb.)	D856



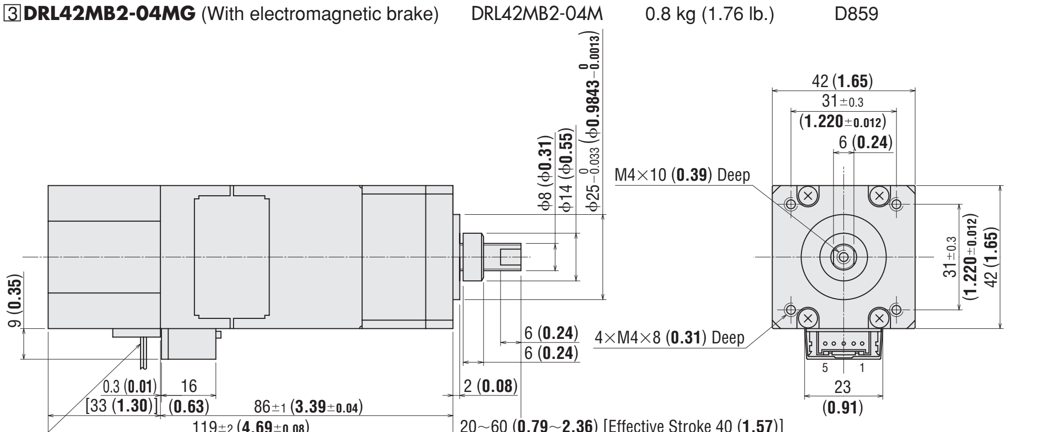
- The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

	Actuator Model	Mass	DXF
2 **DRL42MB2-04G** (Without additional function)	DRL42MB2-04	0.6 kg (1.32 lb.)	D857
DRL42MB2-04NG (With adjusting knob)	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, AWG22

	Actuator Model	Mass	DXF
3 **DRL42MB2-04MG** (With electromagnetic brake)	DRL42MB2-04M	0.8 kg (1.76 lb.)	D859

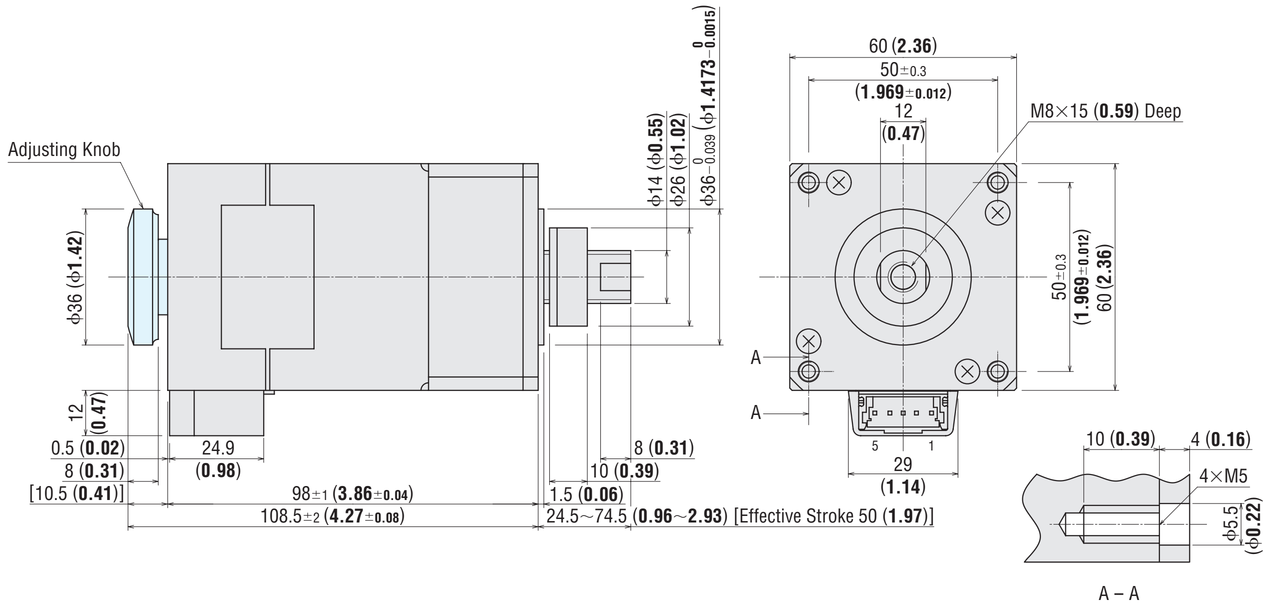


2 Brake Leads 600 mm (24 in.) Length
UL Style 1430, AWG22

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

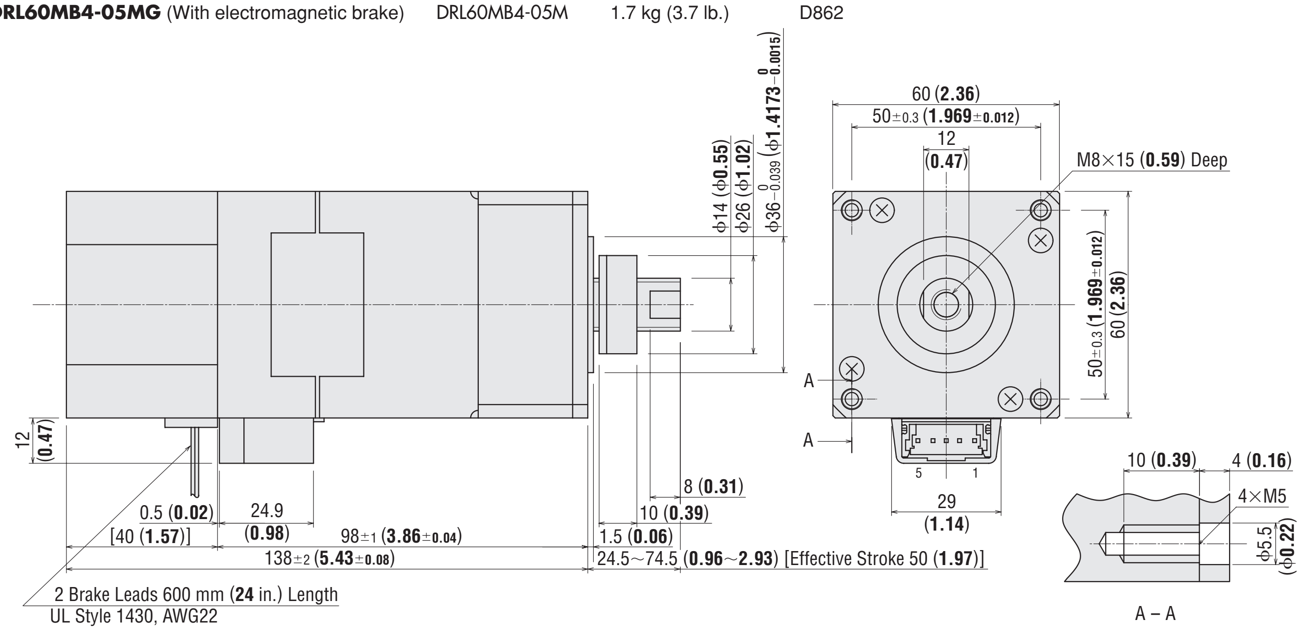
- Dimensions 1 and 2 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in areas should be ignored.

	Actuator Model	Mass	DXF
4 **DRL60MB4-05G** (Without additional function)	DRL60MB4-05	1.3 kg (2.8 lb.)	D860
DRL60MB4-05NG (With adjusting knob)	DRL60MB4-05N	1.35 kg (2.9 lb.)	D861



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

	Actuator Model	Mass	DXF
5 **DRL60MB4-05MG** (With electromagnetic brake)	DRL60MB4-05M	1.7 kg (3.7 lb.)	D862

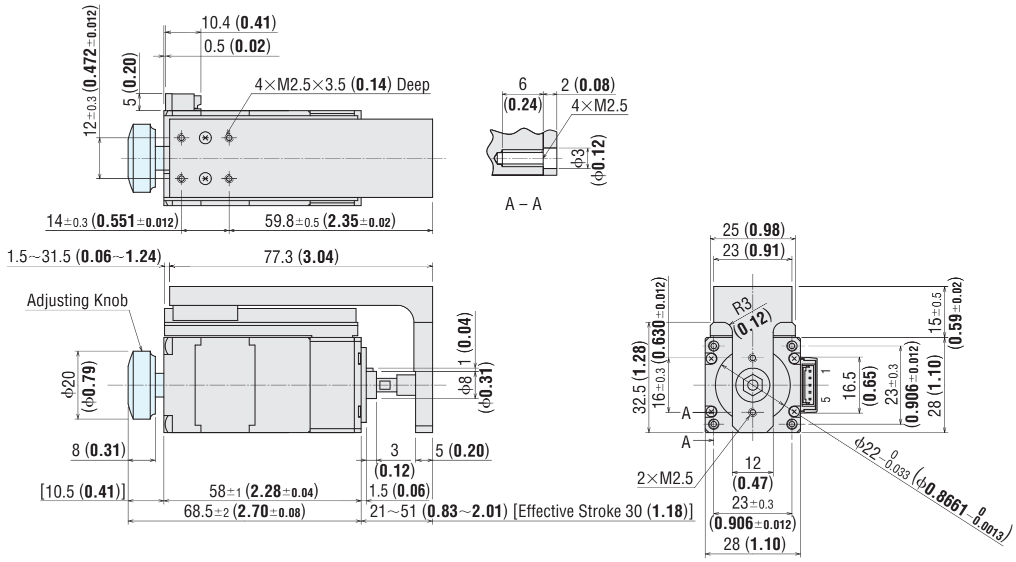


● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3266, AWG22

● 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.

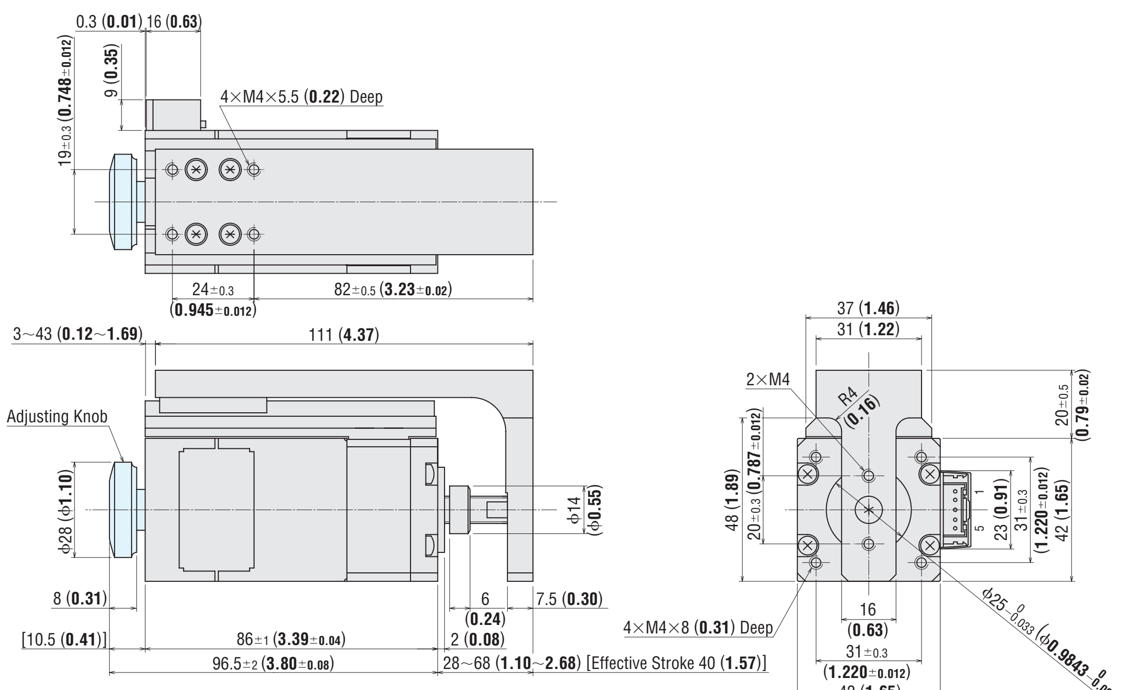
Ground Ball Screw, High-Resolution Motor, Guide Type

	Actuator Model	Mass	DXF
6 **DRL28MB1G-03G** (Without additional function)	DRL28MB1G-03	0.25 kg (0.55 lb.)	D863
DRL28MB1G-03NG (With adjusting knob)	DRL28MB1G-03N	0.26 kg (0.57 lb.)	D864



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

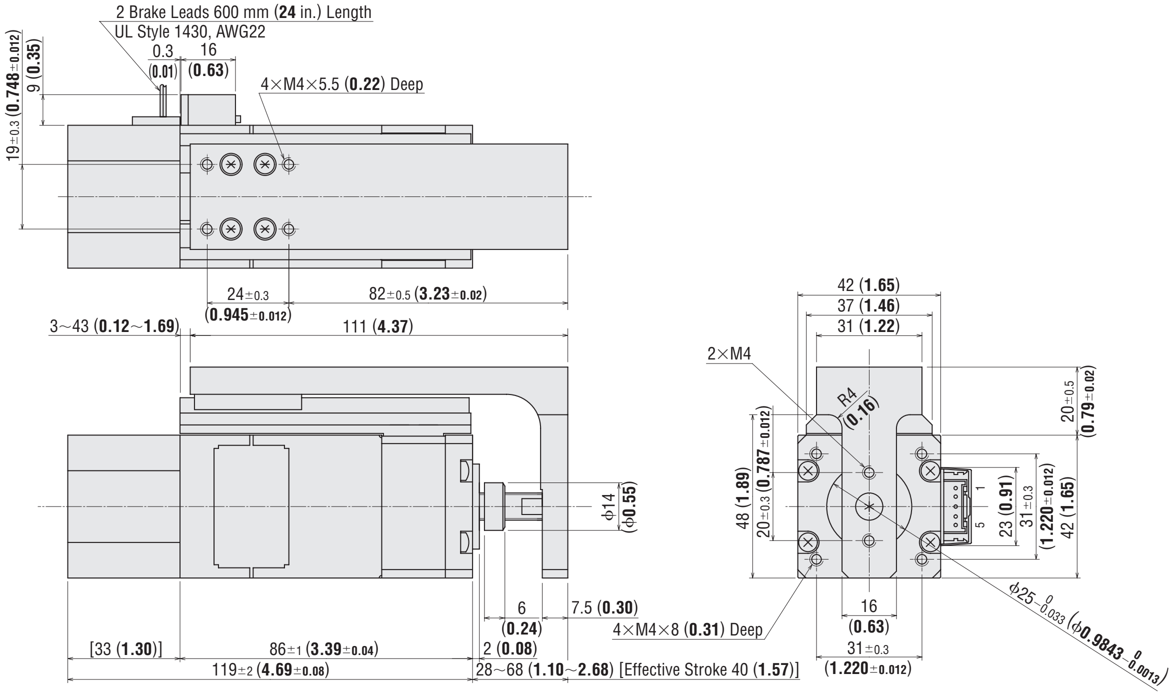
	Actuator Model	Mass	DXF
7 **DRL42MB2G-04G** (Without additional function)	DRL42MB2G-04	0.8 kg (1.76 lb.)	D865
DRL42MB2G-04NG (With adjusting knob)	DRL42MB2G-04N	0.8 kg (1.76 lb.)	D866



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

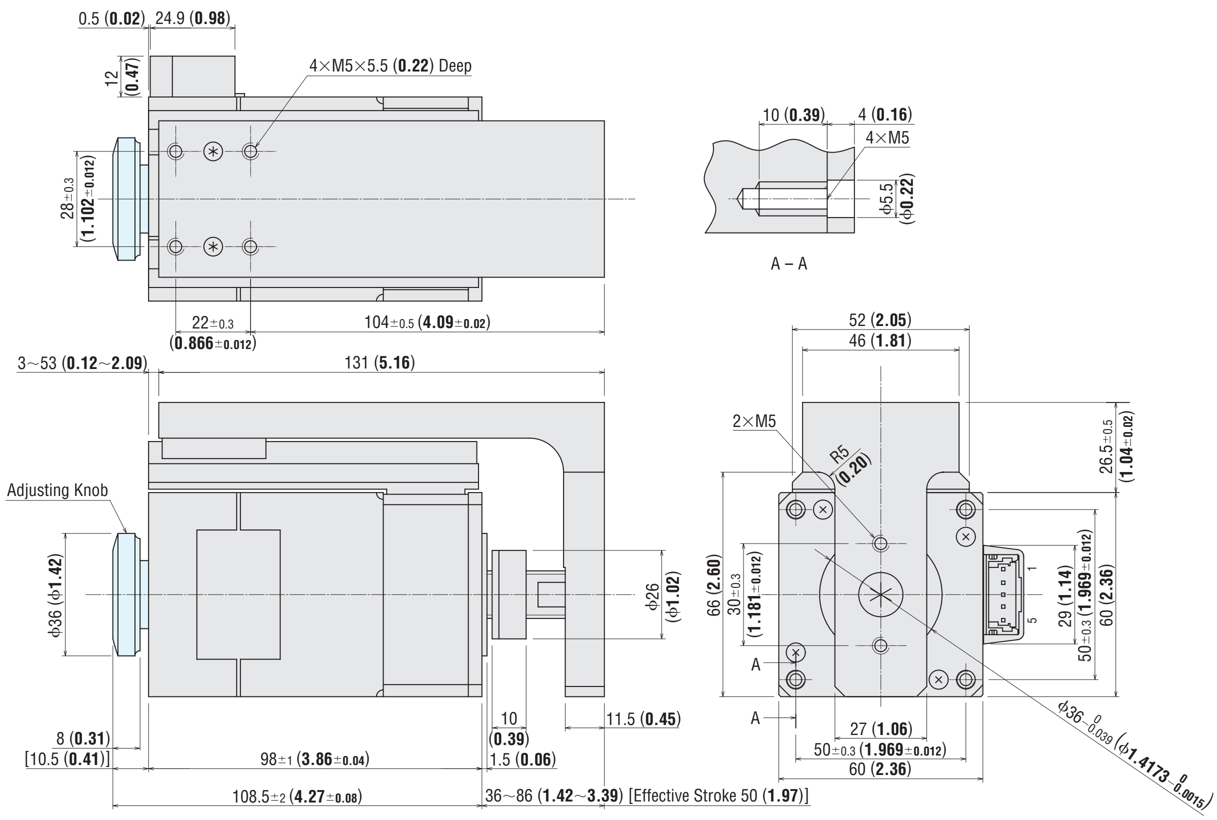
● Dimensions 6 and 7 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in areas should be ignored.

	Actuator Model	Mass	DXF
8 **DRL42MB2G-04MG** (With electromagnetic brake)	DRL42MB2G-04M	1 kg (2.2 lb.)	D867



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

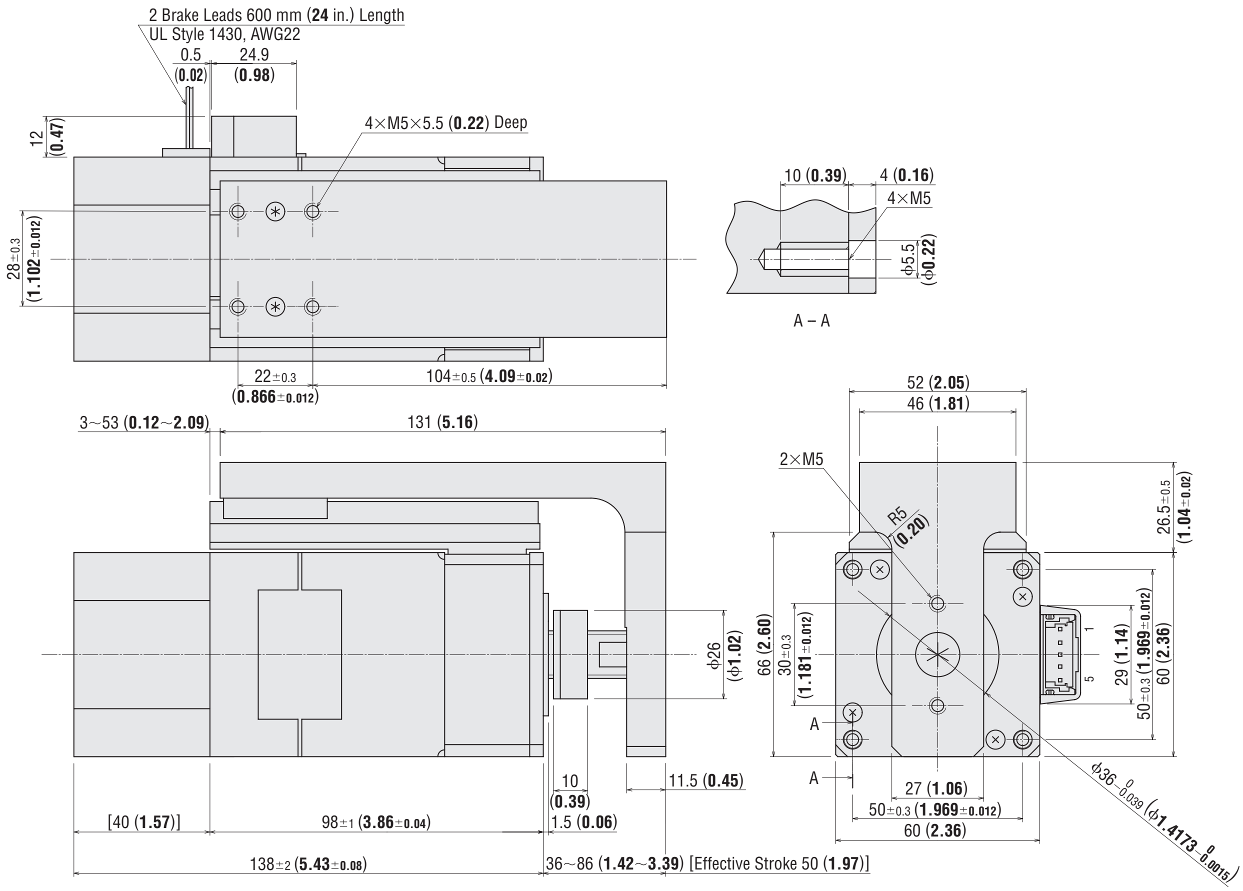
	Actuator Model	Mass	DXF
9 **DRL60MB4G-05G** (Without additional function)	DRL60MB4G-05	1.8 kg (3.9 lb.)	D868
DRL60MB4G-05NG (With adjusting knob)	DRL60MB4G-05N	1.85 kg (4.0 lb.)	D869



● 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.

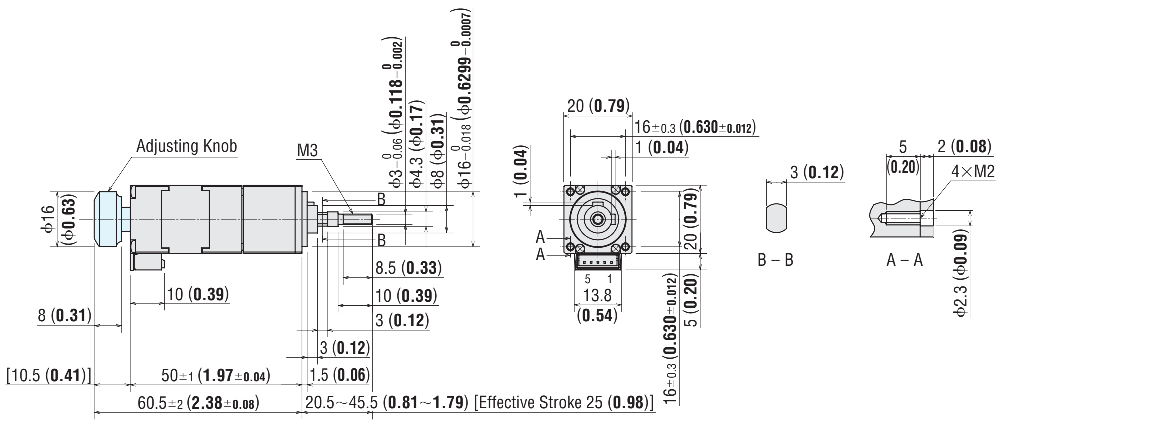
	Actuator Model	Mass	DXF
10 **DRL60MB4G-05MG** (With electromagnetic brake)	DRL60MB4G-05M	2.2 kg (4.8 lb.)	D870



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

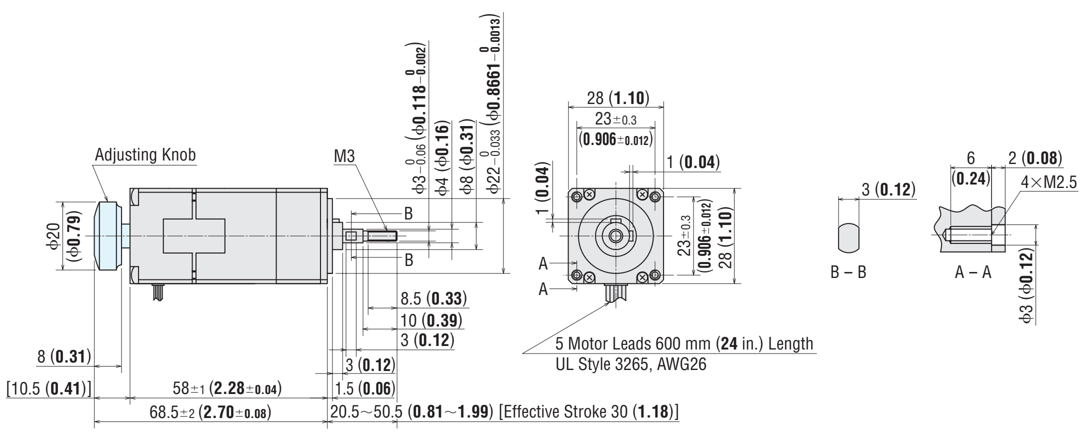
Ground Ball Screw/Rolled Ball Screw, Standard Motor

	Actuator Model	Mass	DXF
11 **DRL20PB1-02G** (Without additional function)	DRL20PB1-02	0.08 kg (0.17 lb.)	D520
DRL20PB1-02NG (With adjusting knob)	DRL20PB1-02N	0.08 kg (0.17 lb.)	D521

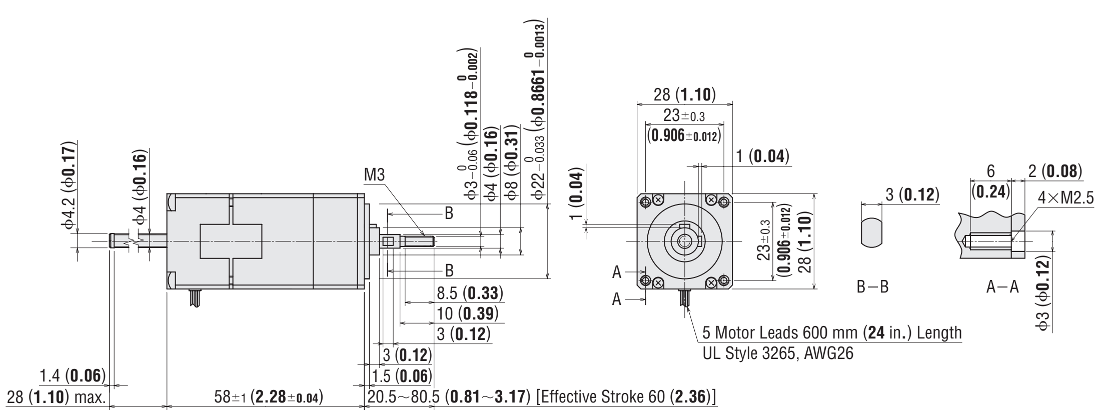


● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

	Actuator Model	Mass	DXF
12 **DRL28PB1-03G** (Without additional function)	DRL28PB1-03	0.18 kg (0.39 lb.)	D455
DRL28PB1-03NG (With adjusting knob)	DRL28PB1-03N	0.19 kg (0.41 lb.)	D504

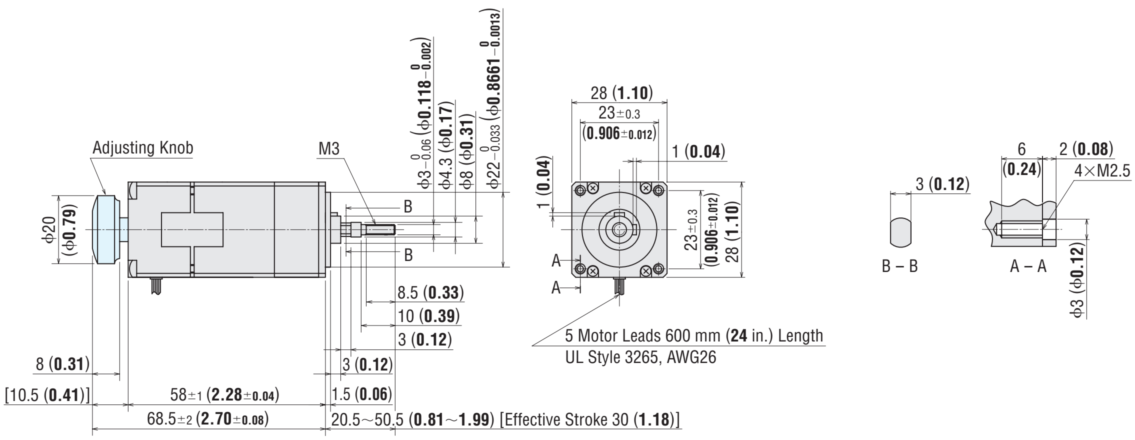


	Actuator Model	Mass	DXF
13 **DRL28PB1-06G** (Without additional function)	DRL28PB1-06	0.18 kg (0.39 lb.)	D871

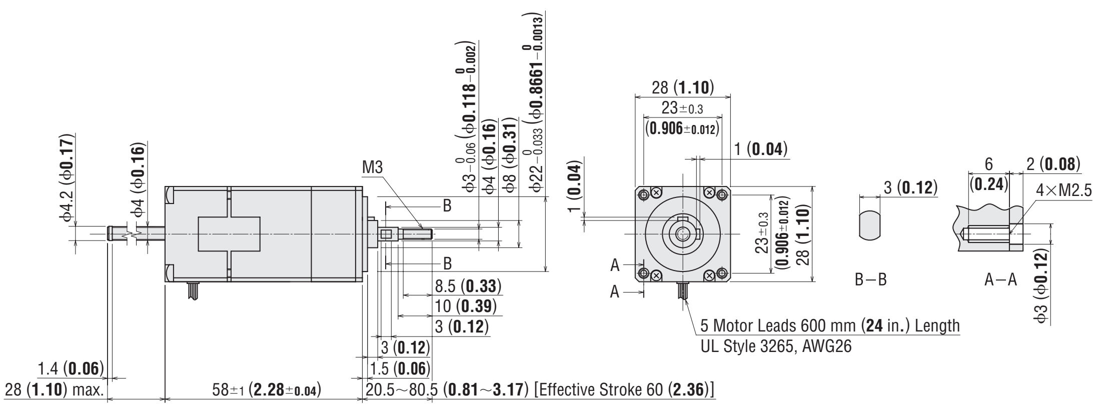


● Dimensions 11 and 12 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in areas should be ignored.

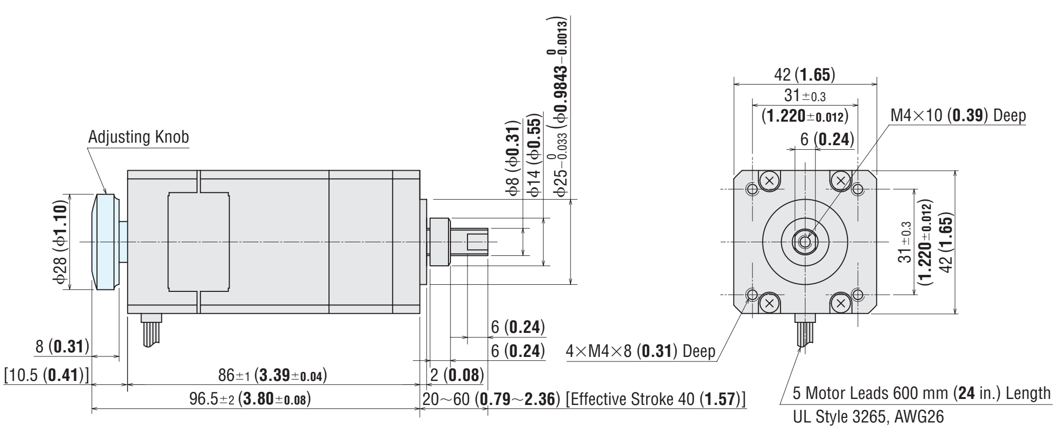
	Actuator Model	Mass	DXF
14 **DRL28PA1-03G** (Without additional function)	DRL28PA1-03	0.18 kg (0.39 lb.)	D468
DRL28PA1-03NG (With adjusting knob)	DRL28PA1-03N	0.19 kg (0.41 lb.)	D503



	Actuator Model	Mass	DXF
15 **DRL28PA1-06G** (Without additional function)	DRL28PA1-06	0.18 kg (0.39 lb.)	D872

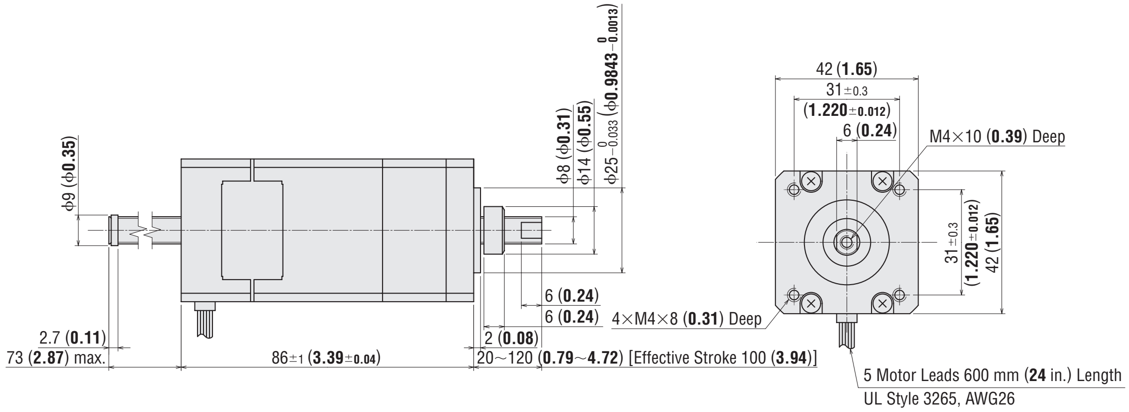


	Actuator Model	Mass	DXF
16 **DRL42PB2-04G** (Without additional function)	DRL42PB2-04	0.6 kg (1.32 lb.)	D361
DRL42PA2-04G (Without additional function)	DRL42PA2-04	0.6 kg (1.32 lb.)	D361
DRL42PB2-04NG (With adjusting knob)	DRL42PB2-04N	0.6 kg (1.32 lb.)	D507
DRL42PA2-04NG (With adjusting knob)	DRL42PA2-04N	0.6 kg (1.32 lb.)	D507

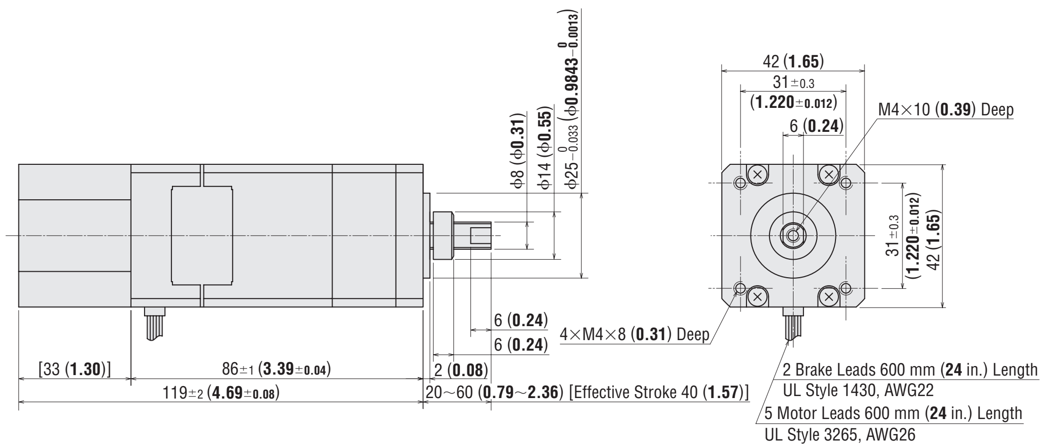


● Dimensions 14 and 16 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in areas should be ignored.

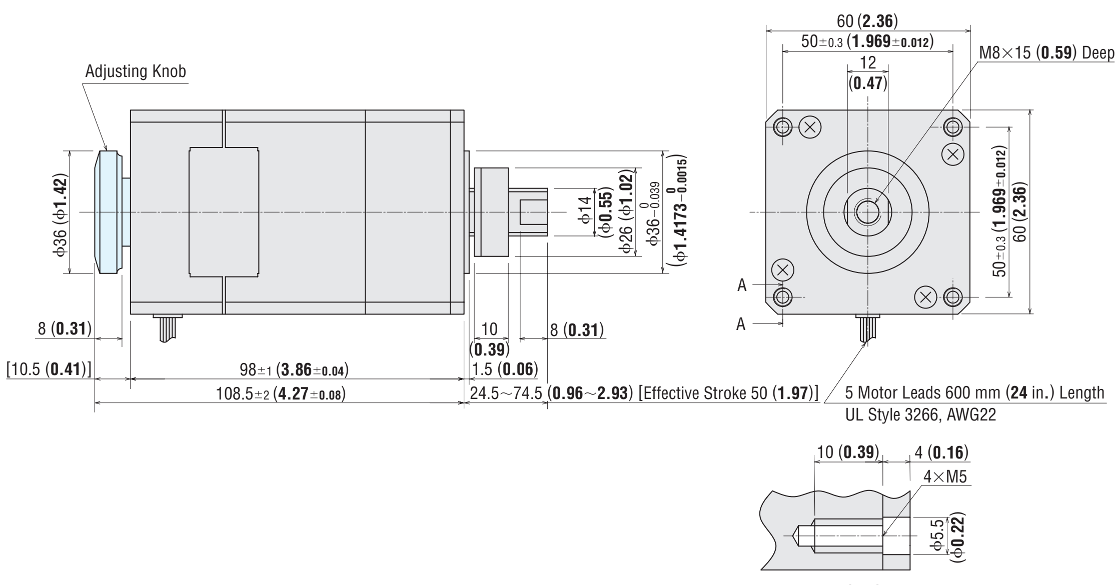
	Actuator Model	Mass	DXF
17 **DRL42PB2-10G** (Without additional function)	DRL42PB2-10	0.63 kg (1.38 lb.)	D873
DRL42PA2-10G (Without additional function)	DRL42PA2-10	0.63 kg (1.38 lb.)	D873



	Actuator Model	Mass	DXF
18 **DRL42PB2-04MG** (With electromagnetic brake)	DRL42PB2-04M	0.8 kg (1.76 lb.)	D510
DRL42PA2-04MG (With electromagnetic brake)	DRL42PA2-04M	0.8 kg (1.76 lb.)	D510

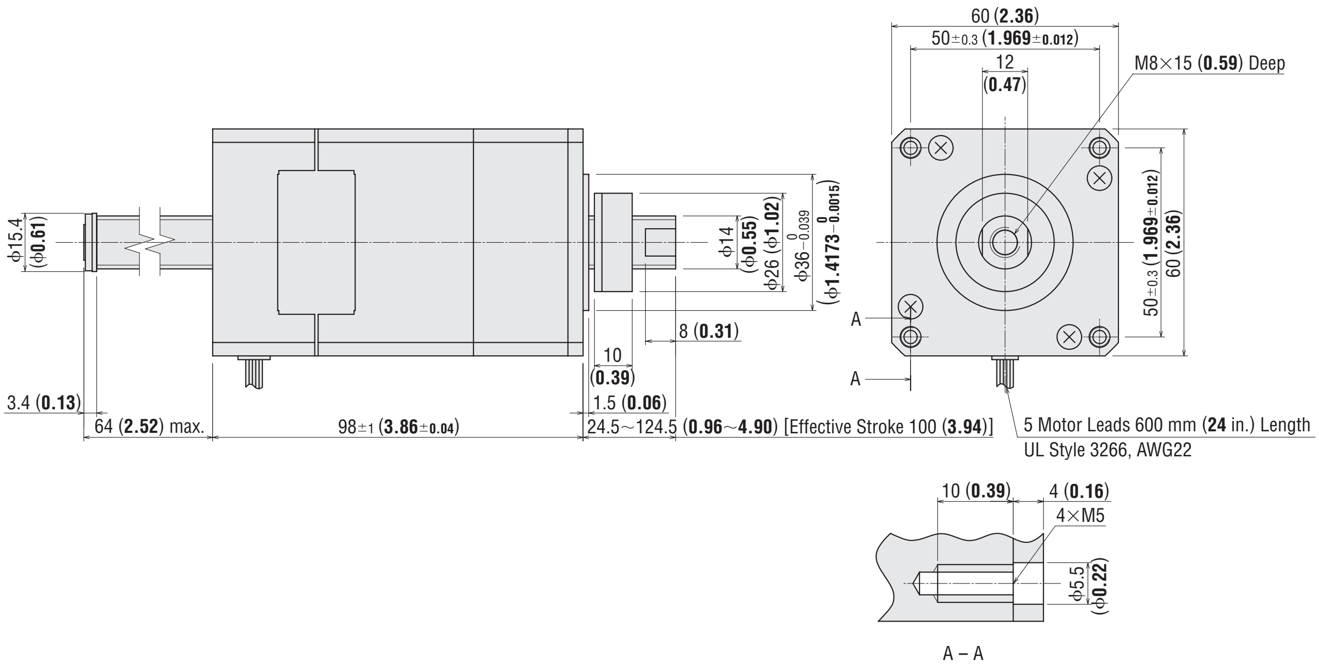


	Actuator Model	Mass	DXF
19 **DRL60PB4-05G** (Without additional function)	DRL60PB4-05	1.3 kg (2.8 lb.)	D362
DRL60PA4-05G (Without additional function)	DRL60PA4-05	1.3 kg (2.8 lb.)	D362
DRL60PB4-05NG (With adjusting knob)	DRL60PB4-05N	1.35 kg (2.9 lb.)	D511
DRL60PA4-05NG (With adjusting knob)	DRL60PA4-05N	1.35 kg (2.9 lb.)	D511

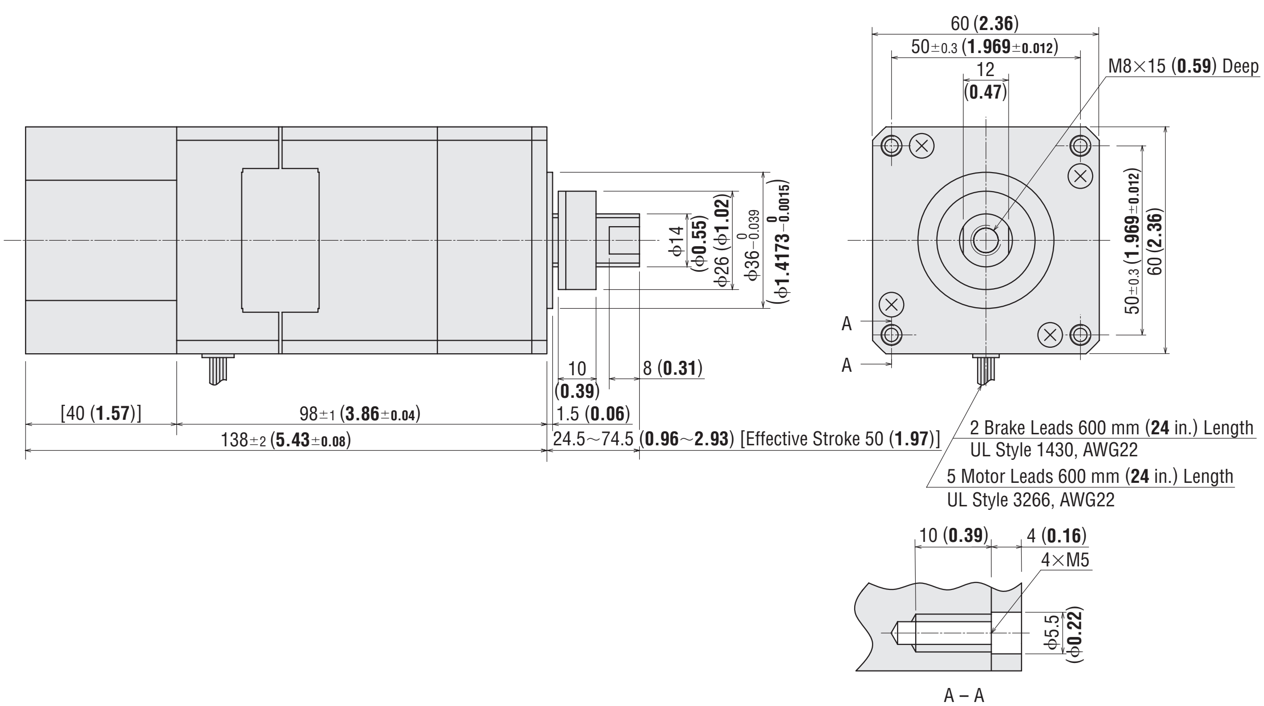


● Dimension 19 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in area should be ignored.

	Actuator Model	Mass	DXF
20 **DRL60PB4-10G** (Without additional function)	DRL60PB4-10	1.38 kg (3.0 lb.)	D874
DRL60PA4-10G (Without additional function)	DRL60PA4-10	1.38 kg (3.0 lb.)	D874

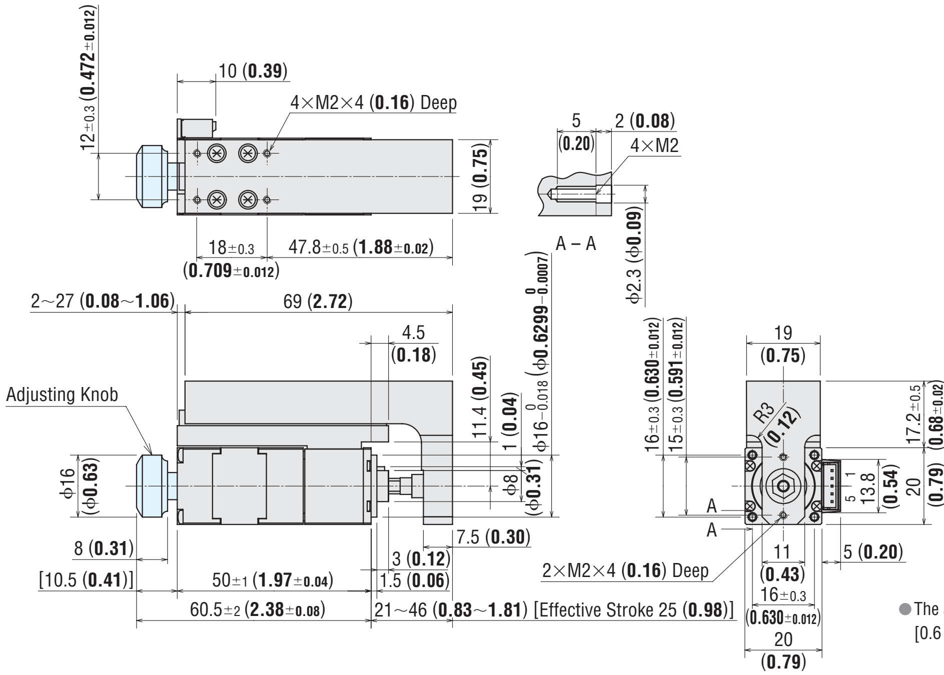


	Actuator Model	Mass	DXF
21 **DRL60PB4-05MG** (With electromagnetic brake)	DRL60PB4-05M	1.7 kg (3.7 lb.)	D512
DRL60PA4-05MG (With electromagnetic brake)	DRL60PA4-05M	1.7 kg (3.7 lb.)	D512



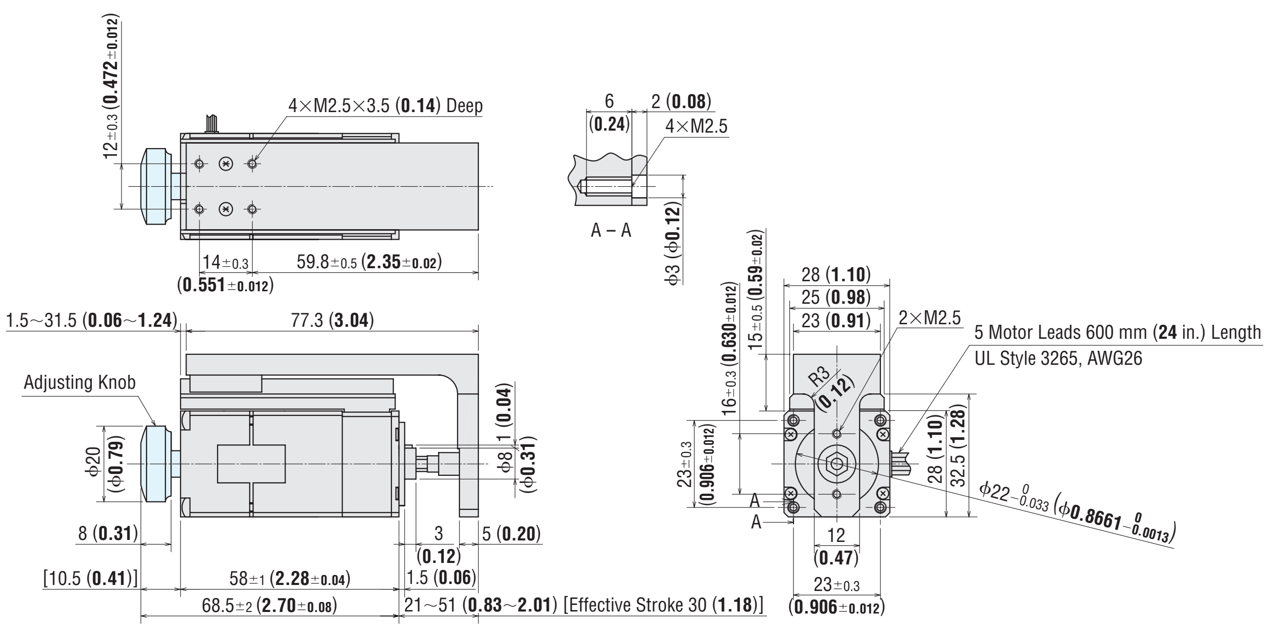
Ground Ball Screw/Rolled Ball Screw, Standard Motor, Guide Type

	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



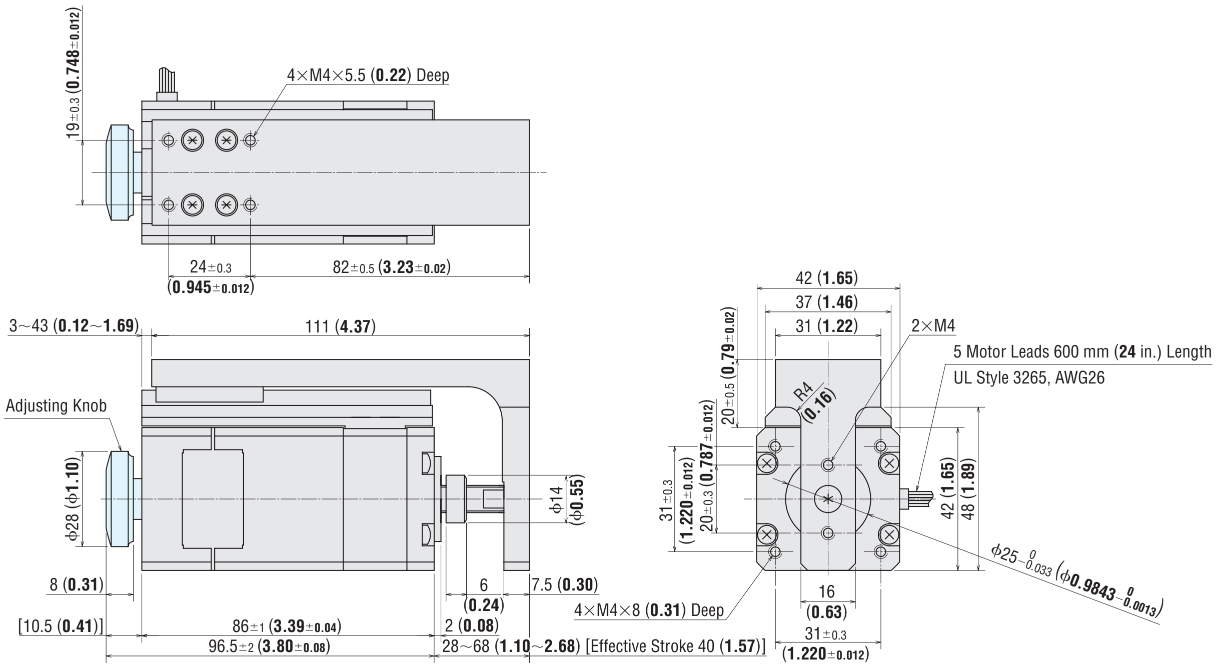
● The actuator comes with a motor lead wire/connector assembly [0.6 m (2 ft.)]. UL Style 3265, AWG24

	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

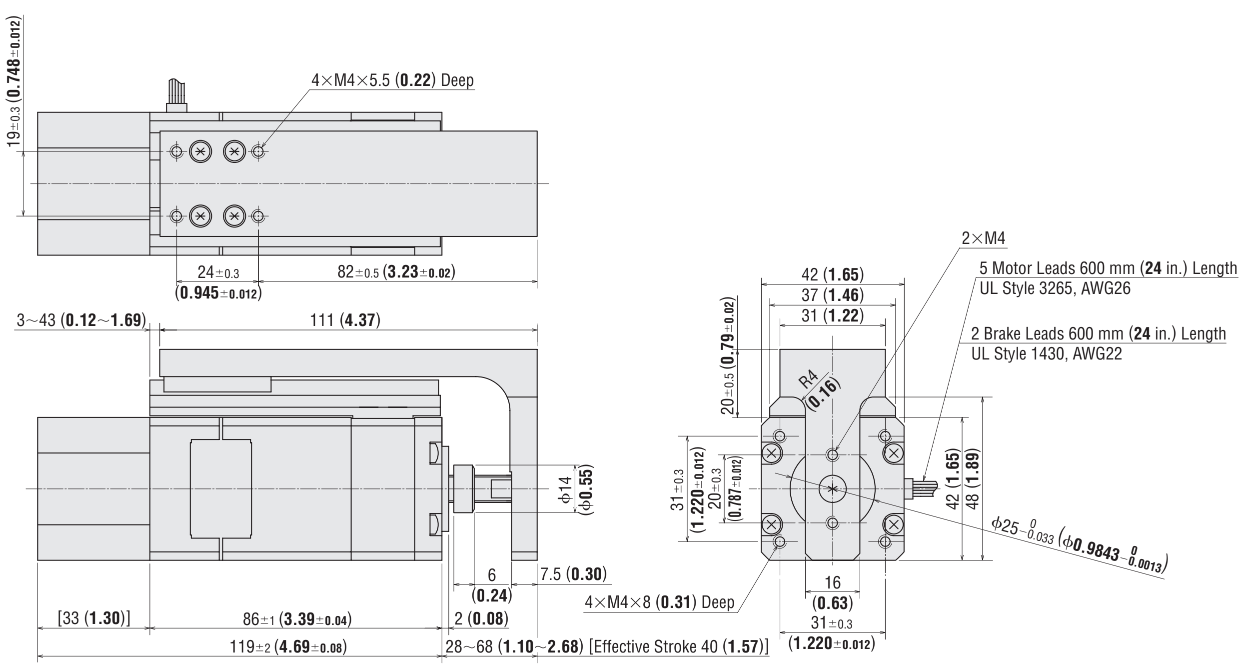


● Dimensions 22 and 23 apply to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in areas should be ignored.

	Actuator Model	Mass	DXF
24 **DRL42PB2G-04G** (Without additional function)	DRL42PB2G-04	0.8 kg (1.76 lb.)	D364
DRL42PA2G-04G (Without additional function)	DRL42PA2G-04	0.8 kg (1.76 lb.)	D364
DRL42PB2G-04NG (With adjusting knob)	DRL42PB2G-04N	0.8 kg (1.76 lb.)	D514
DRL42PA2G-04NG (With adjusting knob)	DRL42PA2G-04N	0.8 kg (1.76 lb.)	D514

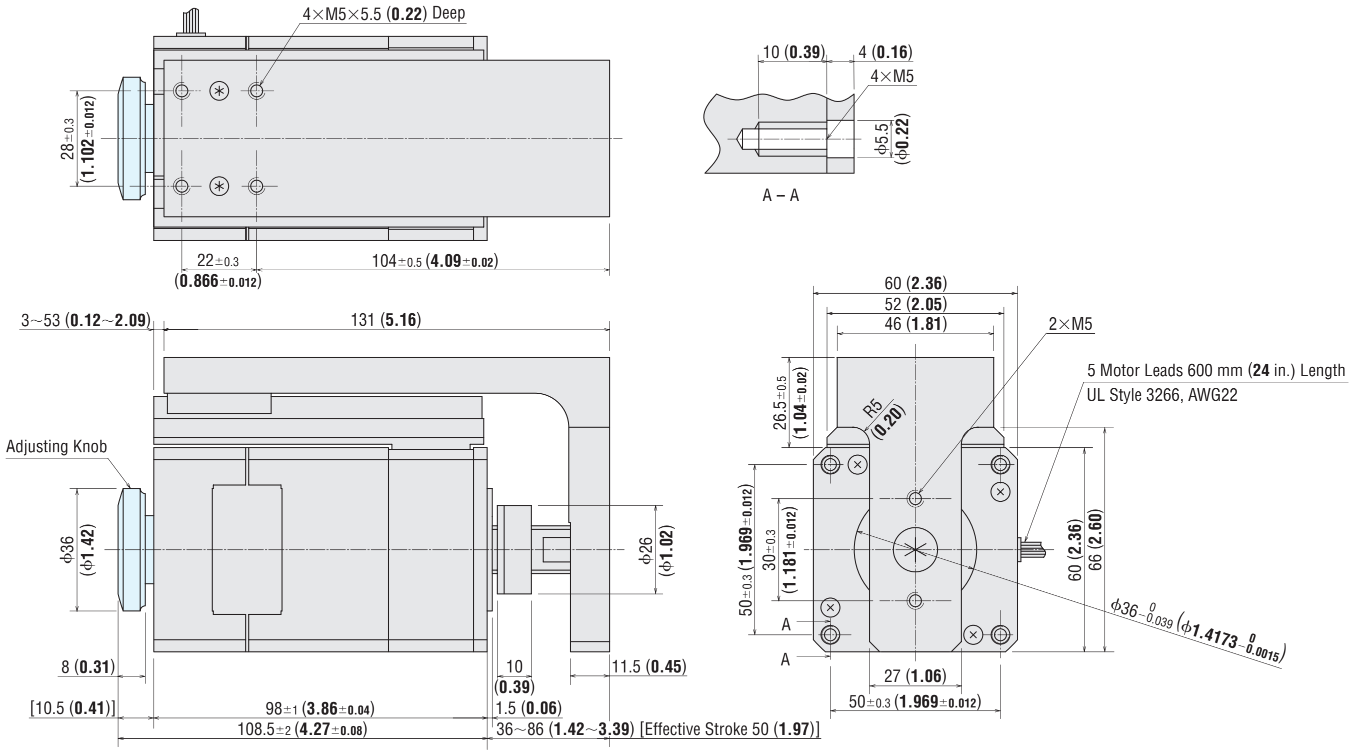


	Actuator Model	Mass	DXF
25 **DRL42PB2G-04MG** (With electromagnetic brake)	DRL42PB2G-04M	1 kg (2.2 lb.)	D515
DRL42PA2G-04MG (With electromagnetic brake)	DRL42PA2G-04M	1 kg (2.2 lb.)	D515

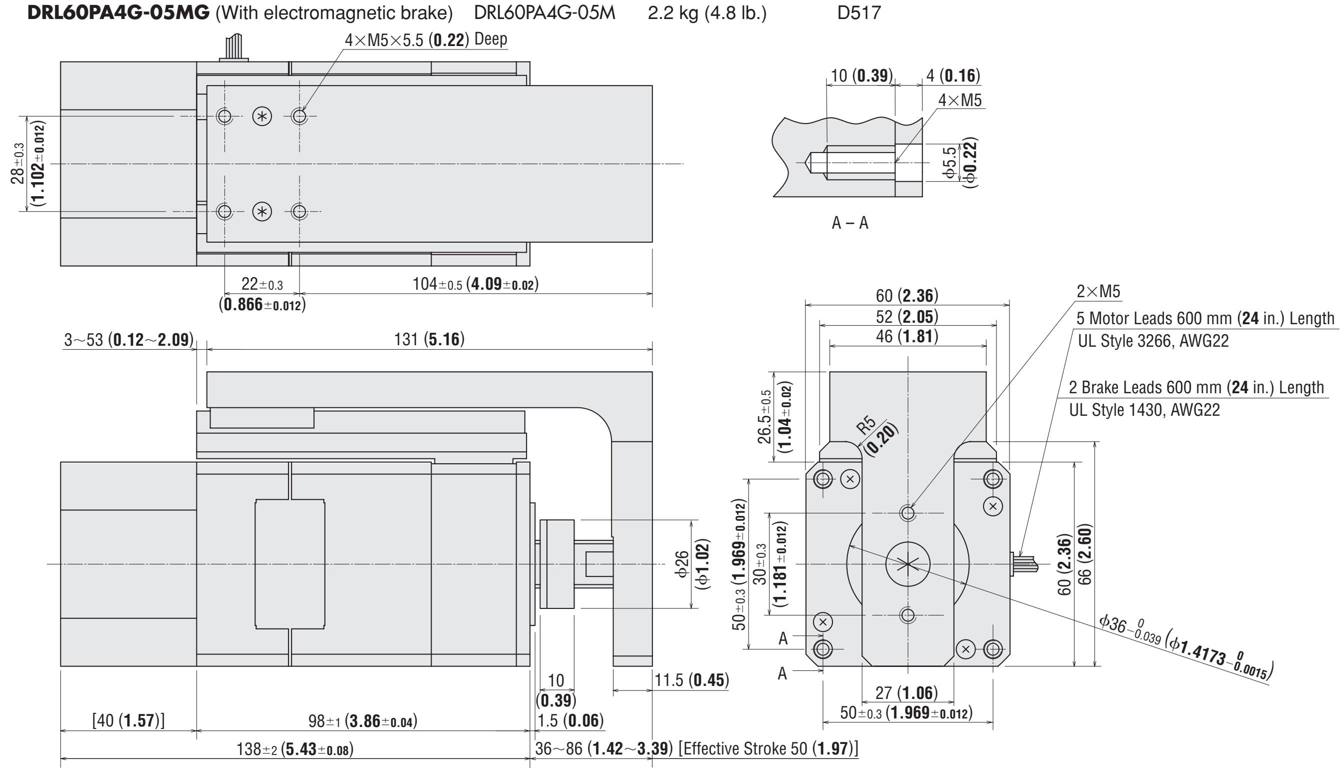


● Dimension 24 applies to a configuration with adjusting knob. For models without adjusting knob, the shaft and adjusting knob shown in ▭ areas should be ignored.

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



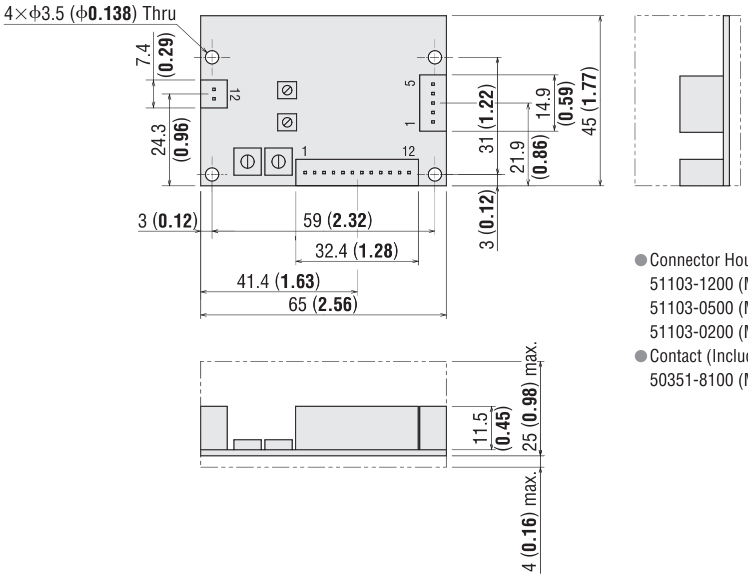
	Actuator Model	Mass	DXF
27 **DRL60PB4G-05MG** (With electromagnetic brake)	DRL60PB4G-05M	2.2 kg (4.8 lb.)	D517
DRL60PA4G-05MG (With electromagnetic brake)	DRL60PA4G-05M	2.2 kg (4.8 lb.)	D517



● 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 Unit

28 Driver Model: CRD5103P, CRD5107P, CRD5114P
Mass: 0.04 kg (0.088 lb.)
DXF: B363

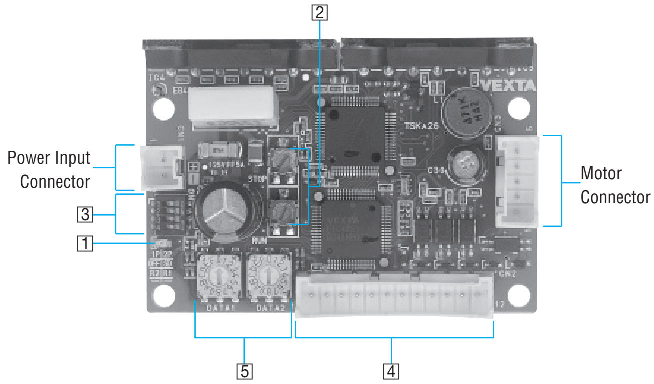


- Connector Housing (Included)
  51103-1200 (MOLEX)
  51103-0500 (MOLEX)
  51103-0200 (MOLEX)
- Contact (Included)
  50351-8100 (MOLEX)

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 40

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 OFF: CCW, photocoupler ON: CW (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		
		9	Current Cutback Release Signal	Disables the automatic current cutback function
		10		
	Output Signal	11	Excitation Timing Signal	This signal is output when the excitation sequence is in step "0."
		12		

5 Resolution Setting Switch

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

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

R1			R2		
Resolution Setting Switch DATA1 DATA2	Microstep/ Step 1	Resolution 1 mm (in.)	Resolution Setting Switch DATA1 DATA2	Microstep/ Step 2	Resolution 2 mm (in.)
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.

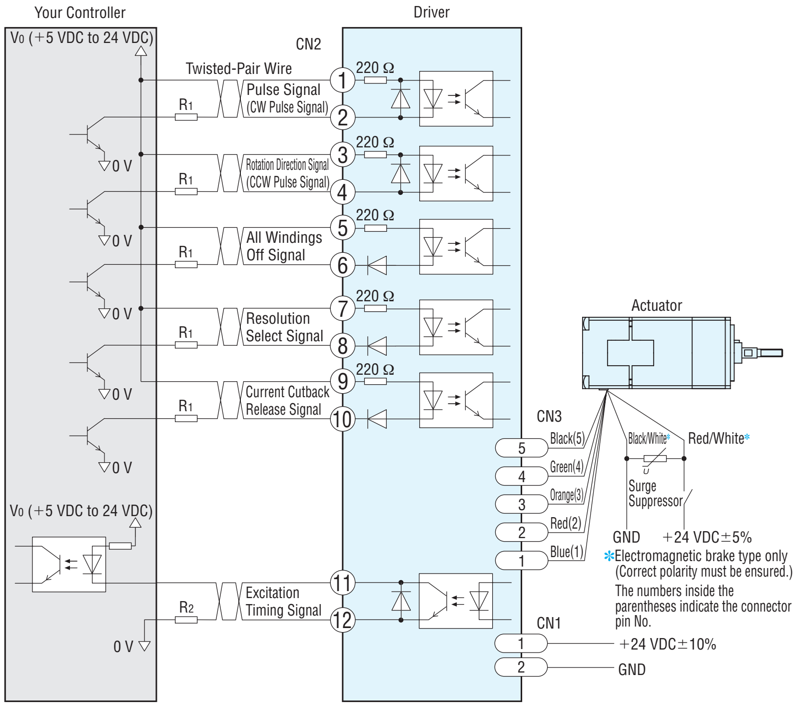
R1			R2		
Resolution Setting Switch DATA1 DATA2	Microstep/ Step 1	Resolution 1 mm (in.)	Resolution Setting Switch DATA1 DATA2	Microstep/ Step 2	Resolution 2 mm (in.)
0	1	0.004 (0.00016)	0	×2.5	0.01 (0.00039)
1	2	0.002 (0.000079)	1	×1.25	0.005 (0.00020)
2	2.5	0.0016 (0.000063)	2	1.6	0.0025 (0.000098)
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 DATA1 DATA2	Microstep/ Step 1	Resolution 1 mm (in.)	Resolution Setting Switch DATA1 DATA2	Microstep/ Step 2	Resolution 2 mm (in.)
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 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 kΩ, 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±5%, 0.1 A or above for **DRL42**, or 24 VDC±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 mm²) 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.

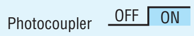
◇Notes on Wiring

- Use twisted-pair wires of AWG24 to AWG22 (0.2 to 0.3 mm²) 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.
- Use cables of AWG22 (0.3 mm²) 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 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 (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

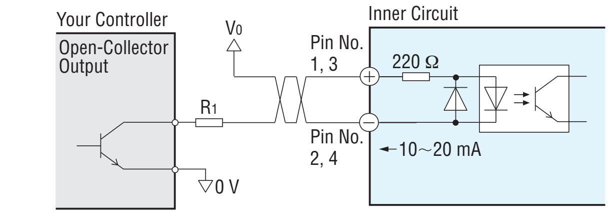
Indication of Input/Output Signal "ON""OFF"

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.



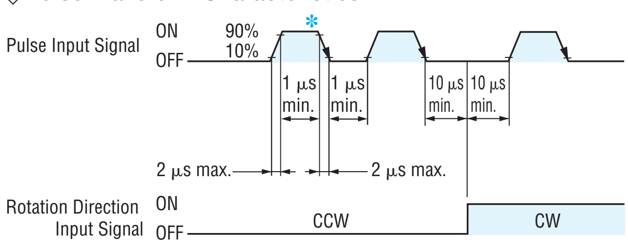
PLS (CW), DIR. (CCW) Input Signal

◇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 Characteristics



Pulse Duty: 50% and below

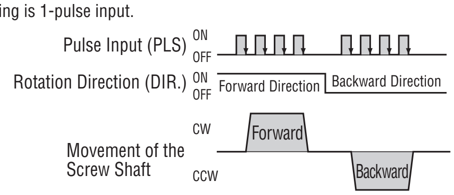
*The shaded area indicates when the photocoupler diode is ON. The actuator moves when the photocoupler state changes from ON to OFF.
- The minimum interval time when changing rotation direction 10 μs is shown as a response time of circuit. This value varies greatly depending on the actuator type and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

◇Pulse Input Mode

• 1-Pulse Input Mode

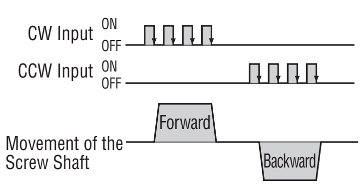
The 1-pulse input mode uses "Pulse" (PLS) and "Rotation Direction" (DIR.) signals. When the PLS input is switched from ON to OFF while the DIR. input is ON, the screw shaft moves one step forward. When the PLS input is switched from ON to OFF while the DIR. input is OFF, the screw shaft moves one step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

Note:
- Factory setting is 1-pulse input.



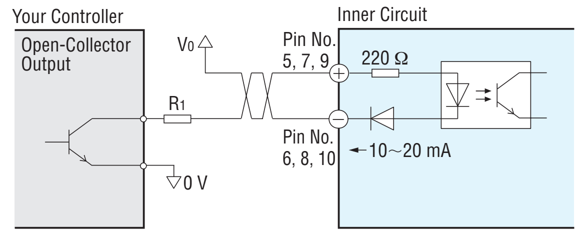
• 2-Pulse Input Mode

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

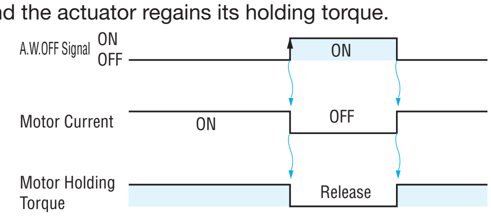


Note:
- Keep the input signal voltage V_0 between 5 VDC and 24 VDC. When V_0 is equal to 5 VDC, the external resistor R_1 is not necessary. When V_0 is above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA.

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

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.



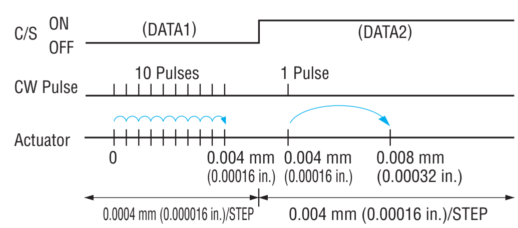
Note:
- When operating the actuator, this switch must be "OFF."

◇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 (0.000016 in.) (10 microstep/step) to 0.004 mm (0.00016 in.) (1 microstep/step) (**DRL42P**)



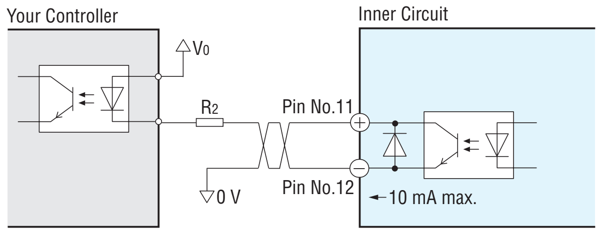
◇Current Cutback Release (C.D.INH) Input Signal

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

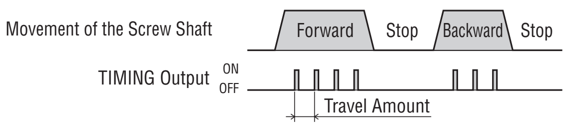
◇Output Circuit and Sample Connection



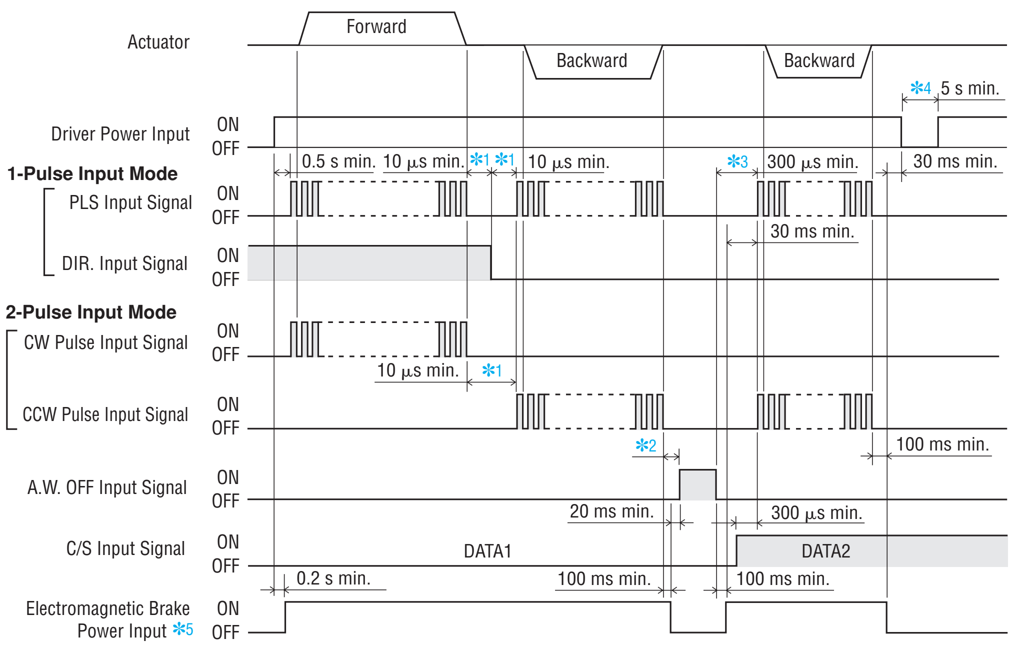
Note:
- Keep the output signal voltage Vo between 5 VDC and 24 VDC, current 10 mA or less. When Vo is above 10 mA, connect the external resistor R2 as shown in the figure to keep the current 10 mA or less.

- 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	Travel Amount of the Screw Shaft
DRL20, **DRL28P**	0.02 mm (0.00079 in.)
DRL42P	0.04 mm (0.0016 in.)
DRL60P	0.08 mm (0.0031 in.)
DRL28M	0.01 mm (0.00039 in.)
DRL42M	0.02 mm (0.00079 in.)
DRL60M	0.04 mm (0.0016 in.)



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 µs 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 (in.)	Actuator Type	Additional Function	Model	Actuator Model	Driver Model
□20 (□0.79)	Standard Type	None	**DRL20PB1-02G**	DRL20PB1-02	CRD5103P
		With Adjusting Knob	**DRL20PB1-02NG**	DRL20PB1-02N	
	Guide Type	None	**DRL20PB1G-02G**	DRL20PB1G-02	
		With Adjusting Knob	**DRL20PB1G-02NG**	DRL20PB1G-02N	
□28 (□1.10)	Standard Type	None	**DRL28□B1-03G**	DRL28□B1-03	CRD5107P
			DRL28PB1-06G	DRL28PB1-06	
		With Adjusting Knob	**DRL28□B1-03NG**	DRL28□B1-03N	
	Guide Type	None	**DRL28□B1G-03G**	DRL28□B1G-03	
		With Adjusting Knob	**DRL28□B1G-03NG**	DRL28□B1G-03N	
□42 (□1.65)	Standard Type	None	**DRL42□B2-04G**	DRL42□B2-04	
			DRL42PB2-10G	DRL42PB2-10	
		With Electromagnetic Brake	**DRL42□B2-04MG**	DRL42□B2-04M	
		With Adjusting Knob	**DRL42□B2-04NG**	DRL42□B2-04N	
	Guide Type	None	**DRL42□B2G-04G**	DRL42□B2G-04	
		With Electromagnetic Brake	**DRL42□B2G-04MG**	DRL42□B2G-04M	
		With Adjusting Knob	**DRL42□B2G-04NG**	DRL42□B2G-04N	
□60 (□2.36)	Standard Type	None	**DRL60□B4-05G**	DRL60□B4-05	CRD5114P
			DRL60PB4-10G	DRL60PB4-10	
		With Electromagnetic Brake	**DRL60□B4-05MG**	DRL60□B4-05M	
		With Adjusting Knob	**DRL60□B4-05NG**	DRL60□B4-05N	
	Guide Type	None	**DRL60□B4G-05G**	DRL60□B4G-05	
		With Electromagnetic Brake	**DRL60□B4G-05MG**	DRL60□B4G-05M	
		With Adjusting Knob	**DRL60□B4G-05NG**	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	**DRL28PA1-03G**	DRL28PA1-03	CRD5107P
			DRL28PA1-06G	DRL28PA1-06	
		With Adjusting Knob	**DRL28PA1-03NG**	DRL28PA1-03N	
	Guide Type	None	**DRL28PA1G-03G**	DRL28PA1G-03	
		With Adjusting Knob	**DRL28PA1G-03NG**	DRL28PA1G-03N	
□42 (□1.65)	Standard Type	None	**DRL42PA2-04G**	DRL42PA2-04	
			DRL42PA2-10G	DRL42PA2-10	
		With Electromagnetic Brake	**DRL42PA2-04MG**	DRL42PA2-04M	
		With Adjusting Knob	**DRL42PA2-04NG**	DRL42PA2-04N	
	Guide Type	None	**DRL42PA2G-04G**	DRL42PA2G-04	
		With Electromagnetic Brake	**DRL42PA2G-04MG**	DRL42PA2G-04M	
		With Adjusting Knob	**DRL42PA2G-04NG**	DRL42PA2G-04N	
□60 (□2.36)	Standard Type	None	**DRL60PA4-05G**	DRL60PA4-05	CRD5114P
			DRL60PA4-10G	DRL60PA4-10	
		With Electromagnetic Brake	**DRL60PA4-05MG**	DRL60PA4-05M	
		With Adjusting Knob	**DRL60PA4-05NG**	DRL60PA4-05N	
	Guide Type	None	**DRL60PA4G-05G**	DRL60PA4G-05	
		With Electromagnetic Brake	**DRL60PA4G-05MG**	DRL60PA4G-05M	
		With Adjusting Knob	**DRL60PA4G-05NG**	DRL60PA4G-05N	

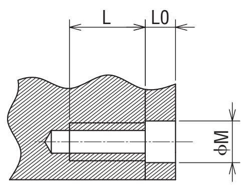
Installation

Installing an Actuator

Installation Method

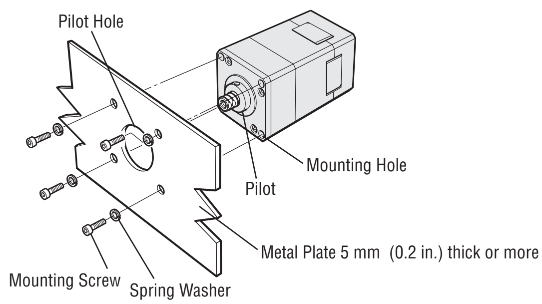
1. Insert the pilot located on the actuator mounting surface into the metal plate's countersunk hole or through-hole.
2. Install the actuator to a metal plate or a device with mounting screws, using mounting holes of the actuator (①), or using a mounting plate (②) (accessories).

Details of Mounting Hole



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

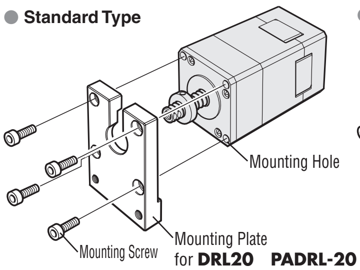
① Using mounting holes of an actuator



(The figure shows installation for standard type.)

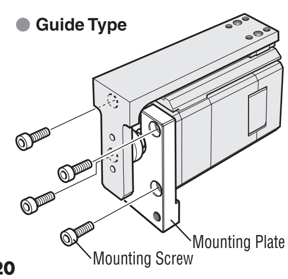
② Using a mounting plate (accessories)

Standard Type

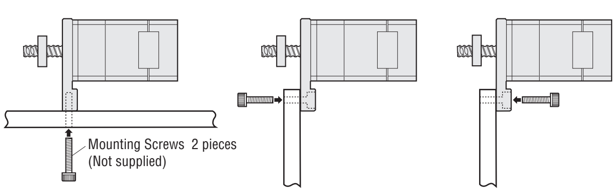


for **DRL20** **PADRL-20**
for **DRL28** **PADRL-28**
for **DRL42** **PADRL-42**
for **DRL60** **PADRL-60**
(Accessories ➜ Page 39)

Guide Type



There are three ways of mounting an actuator to device.



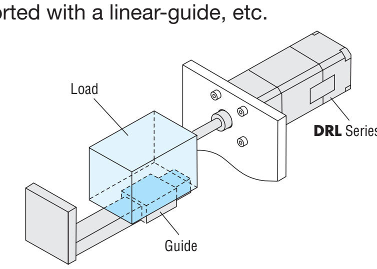
Installation Conditions

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 (+32 to +104˚F) (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 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.

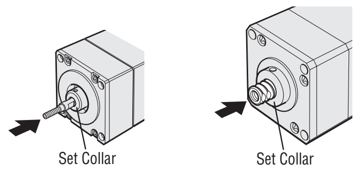


■Installing a Load

Standard Type

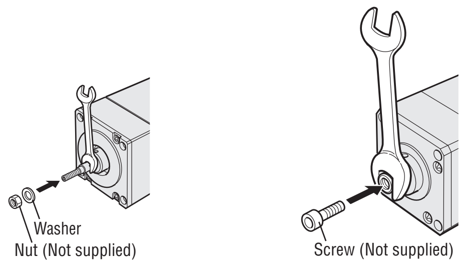
1. Retract the screw shaft until it stops at the set collar.

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 (oz-in)
DRL20	M3 Nut	0.6 (85)
DRL28	M3 Nut	0.6 (85)
DRL42	M4 Screw	1.8 (250)
DRL60	M8 Screw	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.

Perpendicularity Unit = mm (in.)

DRL20: ⊥ ϕ0.02 (ϕ0.0008) A

DRL28: ⊥ ϕ0.03 (ϕ0.0012) A

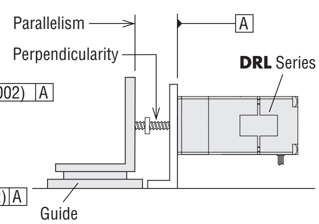
DRL42, **DRL60**: ⊥ ϕ0.05 (ϕ0.002) A

Parallelism

DRL20: // 0.02 (0.0008) A

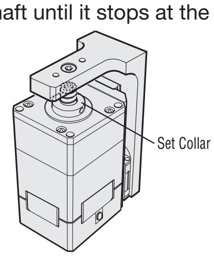
DRL28: // 0.03 (0.0012) A

DRL42, **DRL60**: // 0.05 (0.002) A



Guide Type

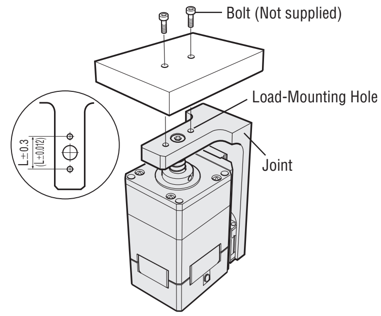
1. Retract the screw shaft until it stops at the set collar.



2. Affix the load with a screw.

• When Using Load-Mounting Holes on the Screw-Shaft Side

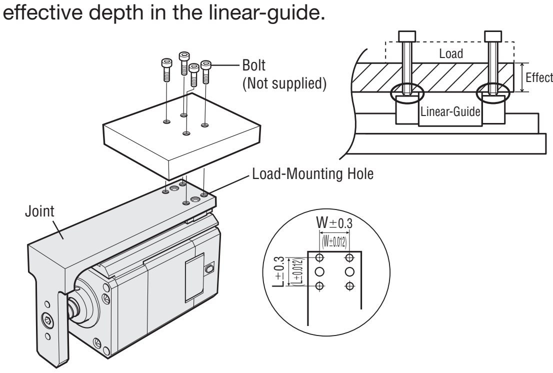
Install the load using load-mounting holes on the joint and the bolts (not supplied).



Model	Nominal Diameter of Bolt	Tightening Torque N·m (oz-in)	Effective Depth mm (in.)	L mm (in.)
DRL20	M2	0.4 (56)	4 (0.16)	15 (0.59)
DRL28	M2.5	0.6 (85)	5 (0.2)	16 (0.63)
DRL42	M4	1.0 (142)	7.5 (0.3)	20 (0.79)
DRL60	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 screws 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.)
DRL20	M2	0.4 (56)	4 (0.16)	18 (0.71)	12 (0.47)
DRL28	M2.5	0.6 (85)	3.5 (0.14)	14 (0.55)	12 (0.47)
DRL42	M4	1.0 (142)	5.5 (0.22)	24 (0.94)	19 (0.75)
DRL60	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.

Repetitive Positioning Accuracy

Take proper precautions in order to ensure observance of the repetitive positioning accuracy requirements provided in the specifications.

① Sufficient Rigidity for Peripheral Equipment

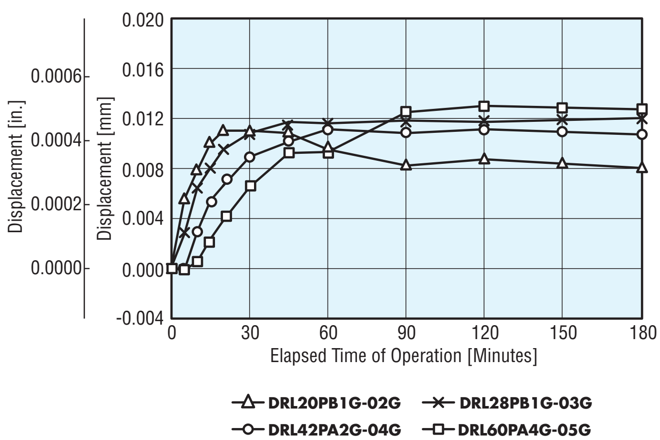
- The linear-guide and other mechanical components to be used with the actuator should have rigidity sufficient to withstand the load mass and external forces. Insufficient rigidity may cause deflection, which will prevent the actuator from meeting the requirements defined in the specifications.
- The mounting brackets used for installation of the actuator and the work piece attachment brackets should also have rigidity sufficient to withstand the load mass and external forces. Insufficient rigidity may cause deflection, which will prevent the actuator from meeting the requirements defined in the specifications.

② Sensor

- Use a high accuracy home sensor (photo micro sensor etc.). Home positioning accuracy is not included as part of the repetitive positioning accuracy.

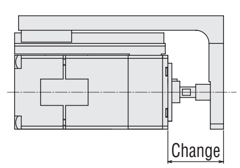
③ Temperature Rise in Actuator

- The actuator may generate a significant amount of heat, depending on the drive conditions. The heat thus generated will cause the internal ball screw to elongate, resulting in displacement as shown in the following figure (reference value). To minimize the temperature dependent effects on the repetitive positioning accuracy, control the input current to the actuator and provide a design that allows for adequate heat ventilation in peripheral equipment.



Conditions

Current cutback: OFF
Running duty: 80%
Measurement method: Using a laser displacement meter



Precautions in Handling

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

Precautions for Operation

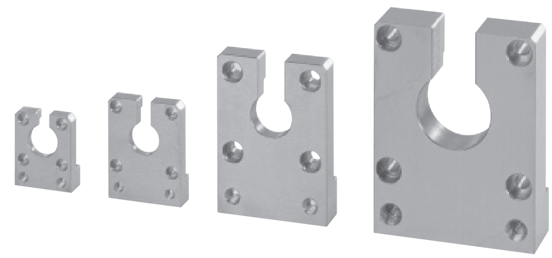
- The surface temperature of the actuator should be kept at 90°C (194°F) or less during operation.
- Although the actuator has a built-in stopper for the ball screw, it may lock up or become damaged due to impact if it hits the stroke end. Do not allow the actuator to hit the stroke end or the equipment.

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



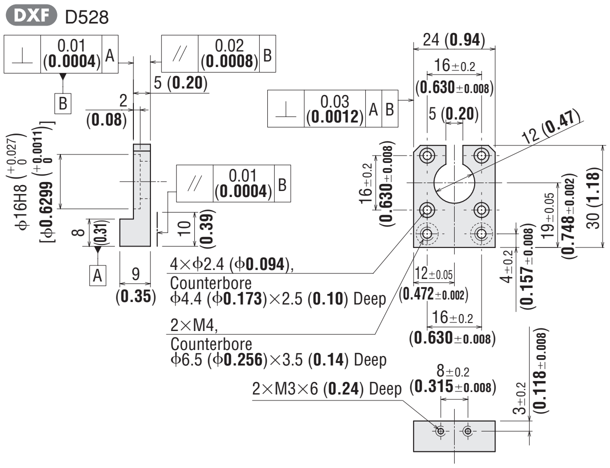
Product Line

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

Dimensions Unit = mm (in.)

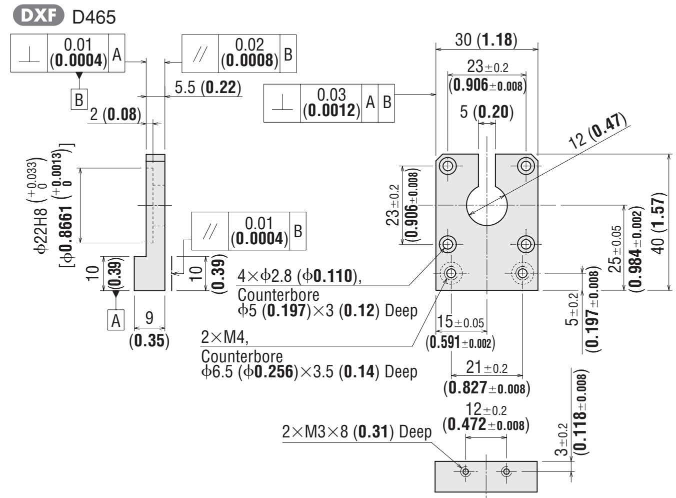
PADRL-20

DXF D528



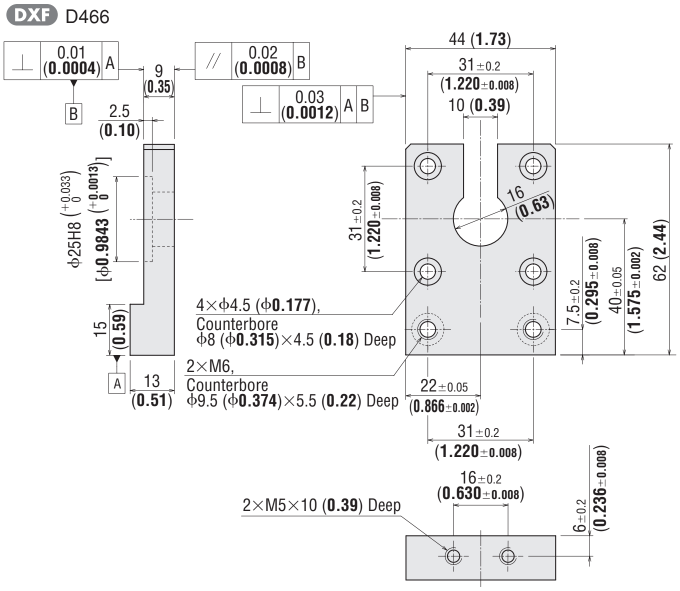
PADRL-28

DXF D465



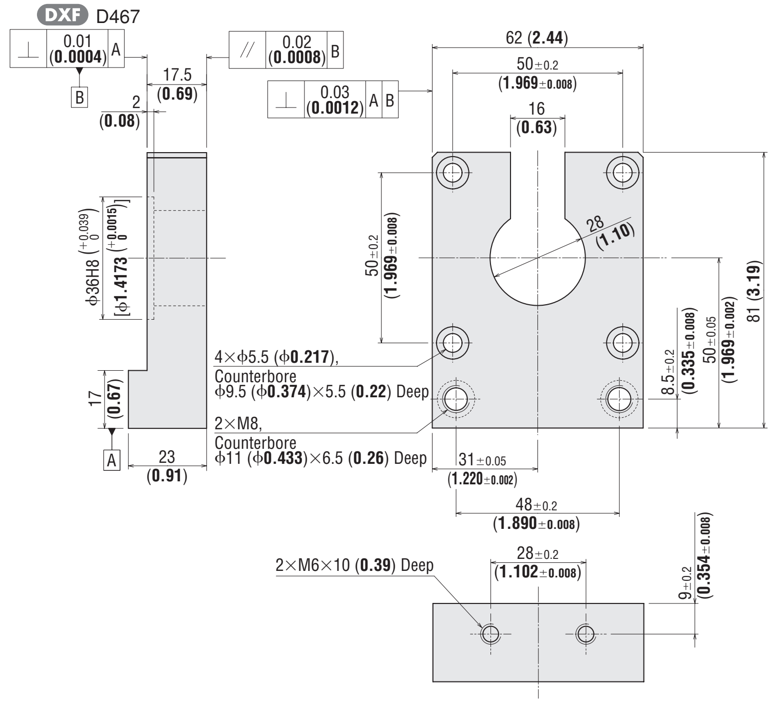
PADRL-42

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.)
LCS04SD5	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 package.]

●Product Line

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

This product is manufactured at a plant certified with the international standards **ISO 9001** (for quality assurance) and **ISO 14001** (for systems of environmental management).

Specifications are subject to change without notice.
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ORIENTAL MOTOR U.S.A. CORP.

Western Sales and Customer Service Center
Tel: (310) 715-3301 Fax: (310) 225-2594

Los Angeles
Tel: (310) 715-3301

San Jose
Tel: (408) 392-9735

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Tel: (847) 285-5100 Fax: (847) 843-4121

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Tel: (973) 359-1100

Technical Support
Tel: (800) 468-3982 / 8:30 A.M. to 5:00 P.M., P.S.T. (M–F)
7:30 A.M. to 5:00 P.M., C.S.T. (M–F)
E-mail: techsupport@orientalmotor.com

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