

Motorized Actuators

Hollow Rotary Actuators

DG Series

Accessories
Installation

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RoHS RoHS-Compliant
Hollow Rotary Actuators
DG Series

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

A hollow rotary actuator featuring a hollow table that allows large-inertia discs or arms to be installed directly. The actuator uses an **αSTEP** motor adopting closed loop control. High accuracy positioning can be performed while keeping the user-friendly features of a stepping motor intact.



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



Features

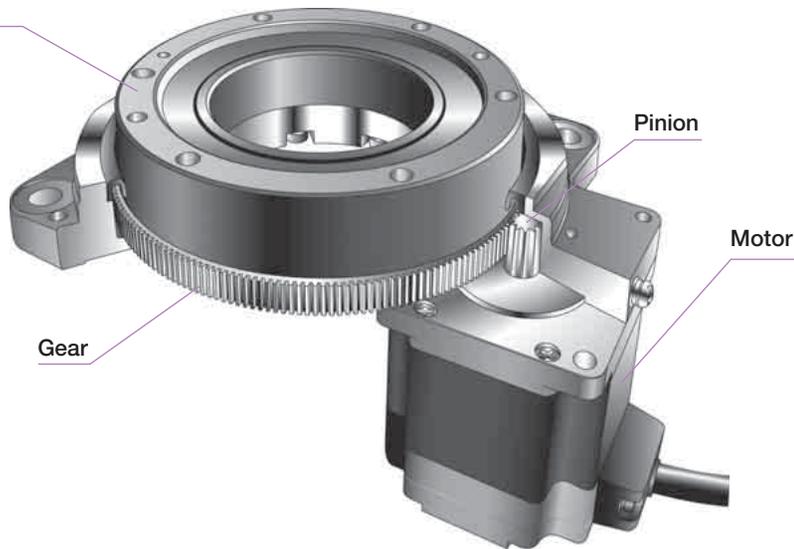
● **Accurate Positioning**

The gear-reduction mechanism employs precision gears along with a proprietary adjustment mechanism that eliminates backlash. The repetitive positioning accuracy from a single direction is ± 15 sec., while lost motion in a positioning operation from two directions is 2 arc minutes. These characteristics make the **DG** Series an ideal choice for applications in which accurate positioning is a must.

Output Table

(With integrated cross-roller bearings)

● Except for **DG60**



Product Lineup



DG60

- Permissible Torque: 0.9 N·m (7.9 lb-in)
- Frame Size: 60 mm (2.36 in.)

DG85

- Permissible Torque: 2.8 N·m (24 lb-in)
- Frame Size: 85 mm (3.35 in.)

DG130

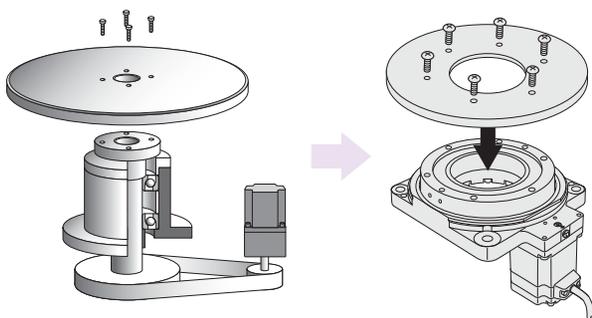
- Permissible Torque: 12 N·m (106 lb-in)
- Frame Size: 130 mm (5.12 in.)

DG200

- Permissible Torque: 50 N·m (440 lb-in)
- Frame Size: 200 mm (7.87 in.)

● **Less Hassle with Direct Coupling**

Equipment tables and arms can be installed directly on the output table. This saves you the hassle and cost of designing an installation mechanism, arranging necessary parts, adjusting the belt tension, etc., when mechanical parts such as belt and pulley are used for installation.



	Frame Size [mm (in.)]	Permissible Thrust Load [N (lb.)]
DG60	60 (2.36)	100 (22)
DG85	85 (3.35)	500 (112)
DG130	130 (5.12)	2000 (450)
DG200	200 (7.87)	4000 (900)

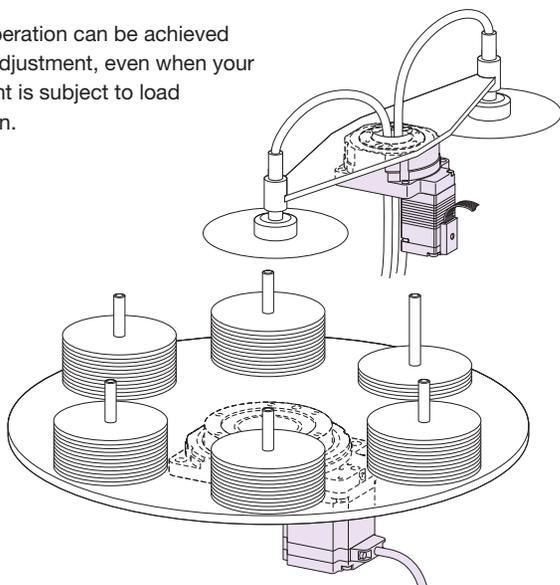
● **Supporting Sudden Load Fluctuation and Rapid Acceleration**

Adopting a closed loop *αSTEP* stepping motor designed to maintain synchronism, the **DG** Series actuator eliminates the need for tuning to prevent hunting upon sudden load fluctuation or rapid acceleration.

A built-in rotor position detection sensor constantly monitors the motor speed and position. If synchronism is about to be lost, closed loop control is implemented immediately. With the **DG** Series, you can also enjoy greater reliability because the positioning completion signal and position detection function can be used to check the actuator condition.

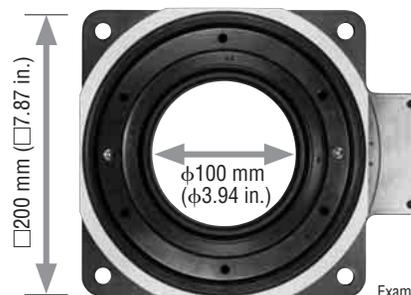


Stable operation can be achieved without adjustment, even when your equipment is subject to load fluctuation.



● **Large-Diameter, Hollow Output Table Makes Possible Simple Wiring and Piping**

The diameter of the driven gear has been increased with the use of a single-stage reduction gear mechanism, resulting in a hollow hole (through-hole) of sufficiently large diameter with respect to frame size. This helps reduce the complexity of wiring and piping, thus simplifying your equipment design.



Example: **DG200**

	Frame Size [mm (in.)]	Diameter of Hollow Section [mm (in.)]
DG60	60 (2.36)	28 (1.1)
DG85	85 (3.35)	33 (1.3)
DG130	130 (5.12)	62 (2.44)
DG200	200 (7.87)	100 (3.94)

● **Home-Sensor Set is Available as an Accessory**

The sensor set comes with all the parts required for the return to home operation, meaning you will spend less time designing, fabricating and procuring parts relating to sensor installation.



Example of sensor installation on **DG130**

● **RoHS** RoHS-Compliant

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

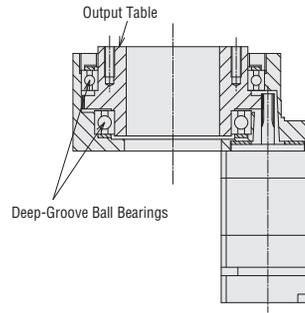
● Details of RoHS Directive → Page G-38

Type and Structure

● DG60



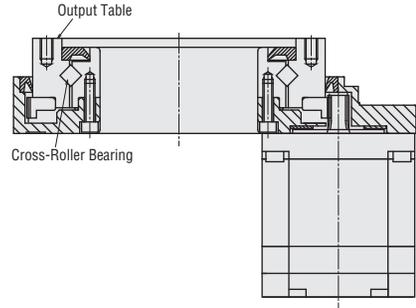
- Permissible Torque: 0.9 N·m (7.9 lb-in)
- Permissible Thrust Load: 100 N (22 lb.)
- Permissible Moment Load: 2 N·m (17.7 lb-in)



● DG85, DG130, DG200

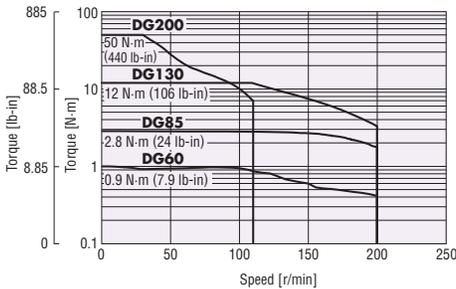


- Permissible Torque: 50 N·m (440 lb-in)
- Permissible Thrust Load: 4000 N (900 lb.)
- Permissible Moment Load: 100 N·m (880 lb-in)
(The above value is for **DG200**.)



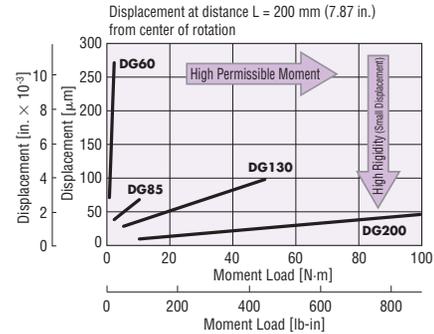
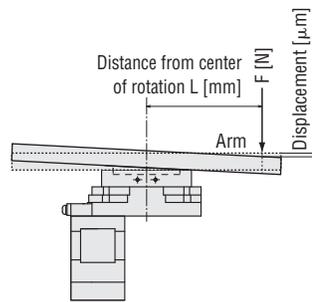
Permissible Torque

The hollow rotary actuators with larger permissible torque deliver stable, high speed positioning of larger inertial loads. Select the model that best suits your application.



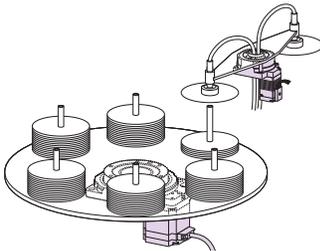
Rigidity

The output table uses deep-groove ball bearings (two pieces) for the 60 mm (2.36 in.) frame size type, and a cross-roller bearing for the 85 mm (3.35 in.), 130 mm (5.12 in.) and 200 mm (7.87 in.) frame size types. As the frame size increases, the permissible moment load also increases but the displacement caused by the moment load decreases.

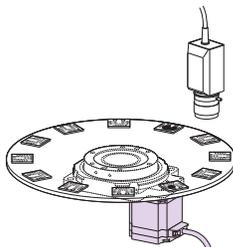


Applications

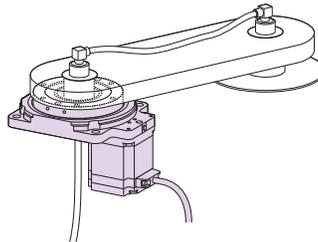
- Applications subject to changing load inertia



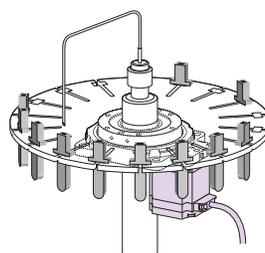
- High accuracy positioning applications



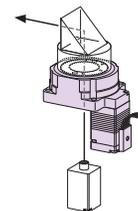
- Applications where a moment load is applied



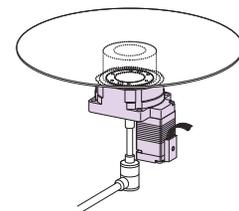
- High accuracy positioning applications using the hollow hole



- Optical applications using the hollow hole



- Air absorption applications using the hollow hole



How to Read Specifications

● Actuator

Model	Frame Size	mm (in.)	85 (3.35)	130 (5.12)
	Single-Phase 100-115 VAC	Single Shaft		DG85R-ASAA
Double Shaft			DG85R-ASBA	DG130R-ASBA
Single-Phase 200-230 VAC	Single Shaft		—	DG130R-ASAC
	Double Shaft		—	DG130R-ASBC
Three-Phase 200-230 VAC	Single Shaft		—	DG130R-ASAS
	Double Shaft		—	DG130R-ASBS
Motor Type			αSTEP	
① Type of Output Table Supporting Bearing			Cross-Roller Bearing	
② Permissible Torque		N·m (lb·in)	2.8 (24)	12 (106)
③ Maximum Holding Torque		N·m (lb·in)	1.8 (15.9)	12 (106)
④ Inertial Moment J		kg·m ² (oz·in ²)	2534 × 10 ⁻⁶ (139)	15874 × 10 ⁻⁶ (870)
⑤ Permissible Speed		r/min	200	
Gear Ratio			18 : 1	
⑥ Resolution			9000 P/R (Resolution Setting: 0.04°/step [500] [×1]) 90 000 P/R (Resolution Setting: 0.004°/step [500] [×10])	18 000 P/R (Resolution Setting: 0.02°/step [1000] [×1]) 180 000 P/R (Resolution Setting: 0.002°/step [1000] [×10])
⑦ Repetitive Positioning Accuracy		sec	±15 (±0.004°)	
⑧ Lost Motion		arc minute (degrees)	2 (0.033°)	
⑨ Angular Transmission Error		arc minute (degrees)	4 (0.067°)	3 (0.05°)
⑩ Permissible Thrust Load		N (lb.)	500 (112)	2000 (450)
⑪ Permissible Moment Load		N·m (lb·in)	10 (88)	50 (440)
⑫ Runout of Output Table Surface		mm (in.)	0.015 (0.0006)	
⑬ Runout of Output Table Inner (Outer) Diameter		mm (in.)	0.015 (0.0006)	
⑭ Parallelism of Output Table		mm (in.)	0.030 (0.0012)	
⑮ Degree of Protection			IP40 (IP20 for motor connector)	
Mass		kg (lb.)	1.2 (2.6)	2.6 (5.7)

① Type of Output Table Supporting Bearing

The type of the bearing used for the output table.

② Permissible Torque

The limit of mechanical strength of the reduction mechanism. Make sure the applied torque, including the acceleration torque and load fluctuation, does not exceed the permissible torque.

③ Maximum Holding Torque

The maximum holding torque that can be exerted by the hollow rotary actuator when the actuator is at standstill with power supplied (the driver's output current is set to maximum: F) and by actuating the current cutback function.

④ Inertial Moment

The total sum of the rotor inertial moment of the motor and the inertial moment of the reduction mechanism, converted to a moment on the output table.

⑤ Permissible Speed

The output table speed that can be tolerated by the mechanical strength of the reduction mechanism.

⑥ Resolution

The number of pulses needed to rotate the output table by one rotation.

⑦ 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.

⑧ Lost Motion

The difference in stopped angles achieved when the output table is positioned to the same position in the forward and reverse directions.

⑨ Angular Transmission Error

The difference between the theoretical rotation angle of the output table as calculated from the input pulse number, and the actual rotation angle.

⑩ Permissible Thrust Load

The permissible value of thrust load applied to the output table in the axial direction.

⑪ Permissible Moment Load

When a load is applied to a position away from the center of the output table, the output table receives a tilting force. The permissible moment load refers to the permissible value of moment load calculated by multiplying the offset distance from the center by the applied load.

⑫ Runout of Output Table Surface

The maximum value of runout of the mounting surface of the output table when the output table is rotated under no load.

⑬ Runout of Output Table Inner (Outer) Diameter

The maximum value of runout of the inner diameter or outer diameter of the table when the output table is rotated under no load.

⑭ Parallelism of Output Table

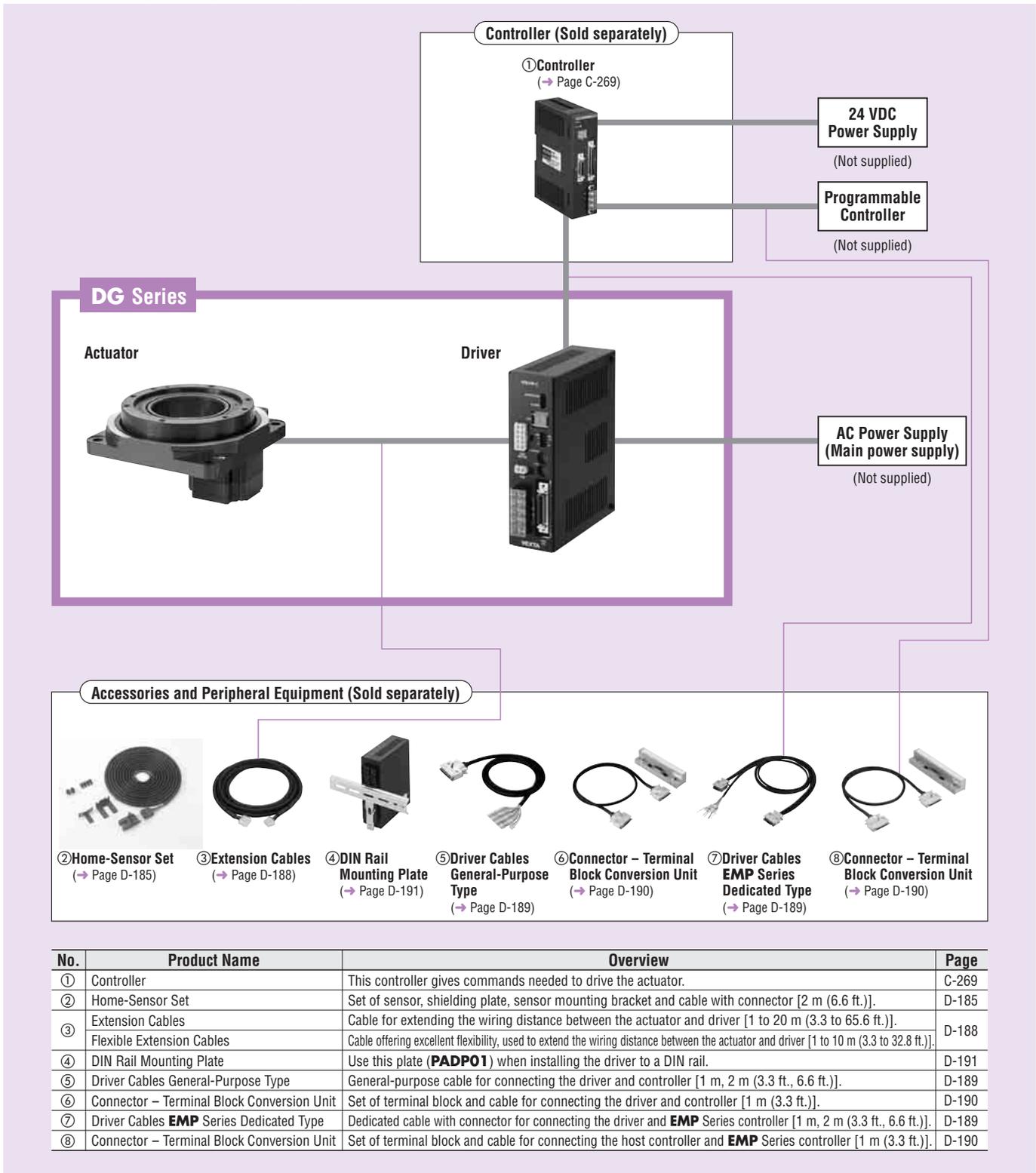
An inclination of the mounting surface of the output table compared with the actuator mounting surface on the equipment side.

⑮ Degree of Protection

IEC 60529 and EN 60034-5 (IEC 60034-5) classify the dust-resistance and waterproofing into grades.

System Configuration

An example of a single-axis system configuration with the **EMP400** Series controller.



● Example of System Configuration

(Sold separately)

DG Series	+	Controller	Extension Cable [3 m (9.8 ft.)]	Home-Sensor Set	DIN Rail Mounting Plate	Driver Cable EMP Series Dedicated Type [1 m (3.3 ft.)]	Connector - Terminal Block Conversion Unit [1 m (3.3 ft.)]
DG130R-ASAA		EMP401-1	CC03AIP	PADG-SB	PADP01	CC01EMP4	CC50T1

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

Product Number Code

DG 130 R - AS A A

- ①
- ②
- ③
- ④
- ⑤
- ⑥

①	Series	DG: DG Series
②	Frame Size	60: 60 mm (2.36 in.) 85: 85 mm (3.35 in.) 130: 130 mm (5.12 in.) 200: 200 mm (7.87 in.)
③	Type of Output Table Supporting Bearing	Blank: Deep-Groove Ball Bearing R: Cross-Roller Bearing
④	Motor Type	AS: αSTEP
⑤	Motor Shaft	A: Single Shaft B: Double Shaft
⑥	Power Supply Voltage	A: Single-Phase 100-115 VAC C: Single-Phase 200-230 VAC S: Three-Phase 200-230 VAC K: 24 VDC

Product Line

DC Input

24 VDC Model
DG60-ASAK
DG60-ASBK

AC Input

Single-Phase 100-115 VAC Model	Single-Phase 200-230 VAC Model	Three-Phase 200-230 VAC Model
DG85R-ASAA	—	—
DG85R-ASBA	—	—
DG130R-ASAA	DG130R-ASAC	DG130R-ASAS
DG130R-ASBA	DG130R-ASBC	DG130R-ASBS
DG200R-ASAA	DG200R-ASAC	DG200R-ASAS
DG200R-ASBA	DG200R-ASBC	DG200R-ASBS

The following items are included in each product.
 Actuator, Driver, Connector for Input/Output Signal, Power Connector^{*1}, Mounting Bracket for Driver (with screws)^{*2}, Operating Manual
^{*1} Only for **DG60** ^{*2} Only for **DG85, DG130** and **DG200**

Specifications

Actuator (RoHS)

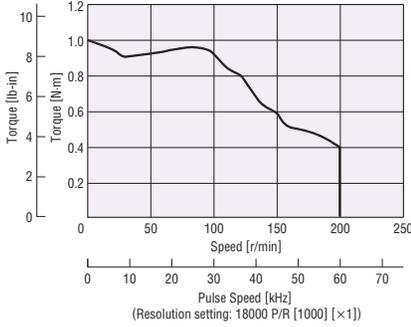
With the **DG85** type, only the driver conforms to the CSA Standards.

Model	Frame Size	mm (in.)	60 (2.36)	85 (3.35)	130 (5.12)	200 (7.87)
	24 VDC	Single Shaft	DG60-ASAK	—	—	—
	Double Shaft ^{*1}	DG60-ASBK	—	—	—	
Single-Phase 100-115 VAC	Single Shaft	—	DG85R-ASAA	DG130R-ASAA	DG200R-ASAA	
	Double Shaft ^{*1}	—	DG85R-ASBA	DG130R-ASBA	DG200R-ASBA	
Single-Phase 200-230 VAC	Single Shaft	—	—	DG130R-ASAC	DG200R-ASAC	
	Double Shaft ^{*1}	—	—	DG130R-ASBC	DG200R-ASBC	
Three-Phase 200-230 VAC	Single Shaft	—	—	DG130R-ASAS	DG200R-ASAS	
	Double Shaft ^{*1}	—	—	DG130R-ASBS	DG200R-ASBS	
Motor Type	αSTEP					
Type of Output Table Supporting Bearing	Deep-Groove Ball Bearing		Cross-Roller Bearing			
Permissible Torque	N·m (lb·in)	0.9 (7.9)	2.8 (24)	12 (106)	50 (440)	
Maximum Holding Torque	N·m (lb·in)	0.45 (3.9)	1.8 (15.9)	12 (106)	36 (310)	
Inertial Moment J	kg·m ² (oz·in ²)	4324×10 ⁻⁷ (24)	2534×10 ⁻⁶ (139)	15874×10 ⁻⁶ (870)	108160×10 ⁻⁶ (5900)	
Permissible Speed	r/min	200		110		
Gear Ratio	18 : 1					
Resolution ^{*2}	9000 P/R (Resolution Setting: 0.04°/step [500] [×1]) 18 000 P/R (Resolution Setting: 0.02°/step [1000] [×1]) 90 000 P/R (Resolution Setting: 0.004°/step [500] [×10]) 180 000 P/R (Resolution Setting: 0.002°/step [1000] [×10])					
Repetitive Positioning Accuracy	sec	±15 (±0.004°)				
Lost Motion	arc minute (degrees)	2 (0.033°)				
Angular Transmission Error	arc minute (degrees)	4 (0.067°)		3 (0.05°)		2 (0.033°)
Permissible Thrust Load	N (lb.)	100 (22)	500 (112)	2000 (450)	4000 (900)	
Permissible Moment Load	N·m (lb·in)	2 (17.7)	10 (88)	50 (440)	100 (880)	
Runout of Output Table Surface	mm (in.)	0.030 (0.0012)	0.015 (0.0006)			
Runout of Output Table Inner (Outer) Diameter	mm (in.)	0.030 (0.0012)	0.015 (0.0006)		0.030 (0.0012)	
Parallelism of Output Table	mm (in.)	0.050 (0.002)	0.030 (0.0012)		0.050 (0.002)	
Degree of Protection	IP40 (IP20 for motor connector)					
Mass	kg (lb.)	0.5 (1.1)	1.2 (2.6)	2.6 (5.7)	9.5 (20.9)	

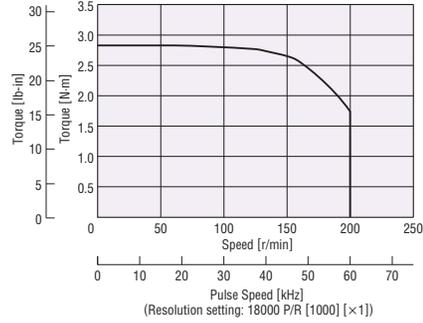
How to read specifications → Page D-169
^{*1} The back shaft of the motor in the double shaft type is intended for installing a slit disc. Do not apply load torque, overhung load or thrust load to the back shaft of the motor.
^{*2} You can set one of four resolutions using the resolution select switch or resolution select signal. The factory driver settings are [1000] [×1] and 18 000 P/R (0.02°/step).

● Speed – Torque Characteristics

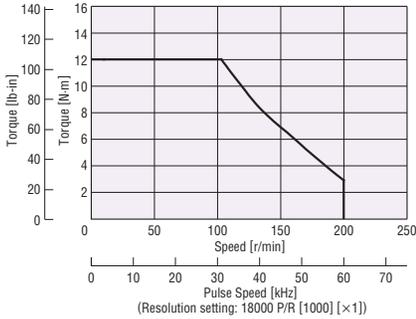
DG60-ASAK/DG60-ASBK



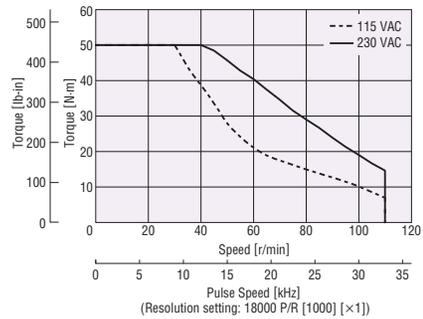
DG85R-ASAA/DG85R-ASBA



DG130R-ASA □ / DG130R-ASB □



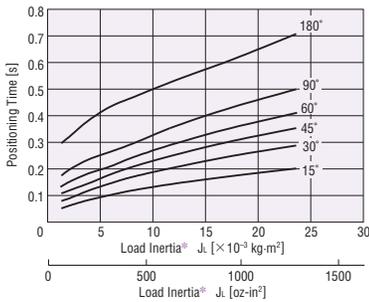
DG200R-ASA □ / DG200R-ASB □



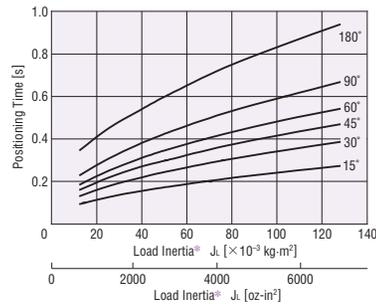
● Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.

● Load Inertia – Positioning Time (Reference value)

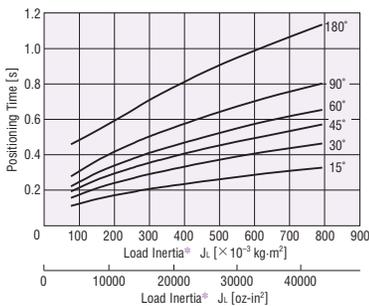
DG60-ASAK/DG60-ASBK



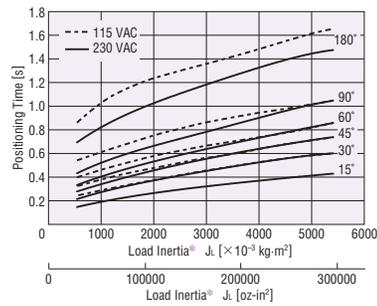
DG85R-ASAA/DG85R-ASBA



DG130R-ASA □ / DG130R-ASB □



DG200R-ASA □ / DG200R-ASB □

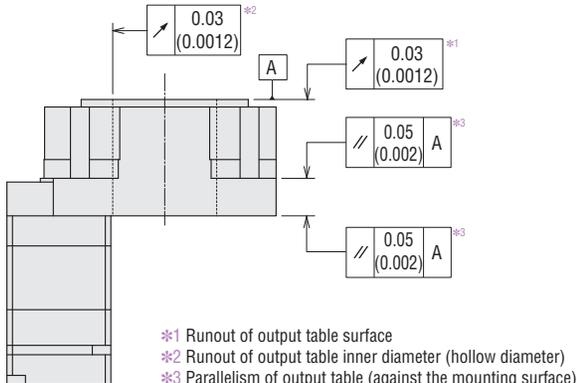


* The load inertia refers to the inertia of the customer's work.

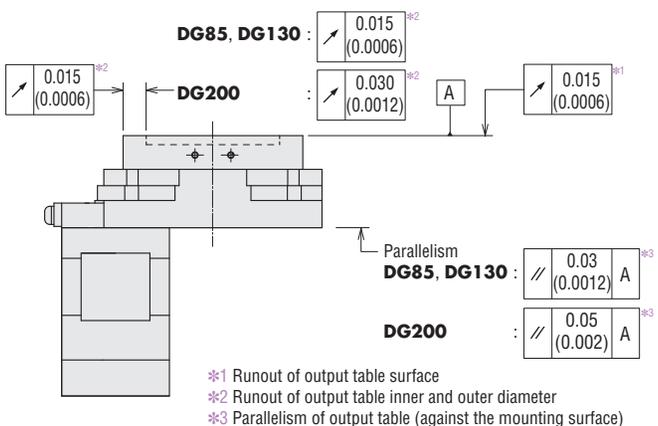
● Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.

● Table Precision (at no load) Unit = mm (in.)

DG60

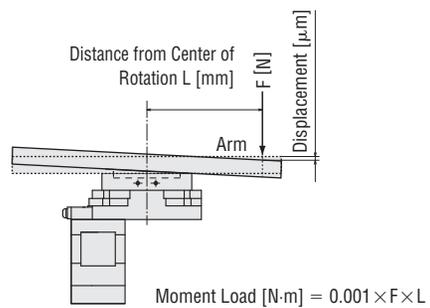


DG85, DG130, DG200

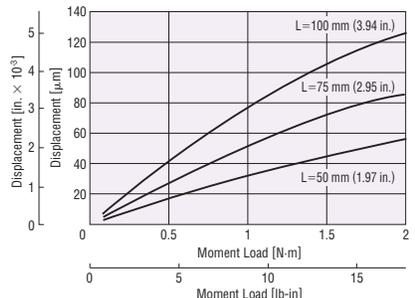


● Displacement by Moment Load (Reference value)

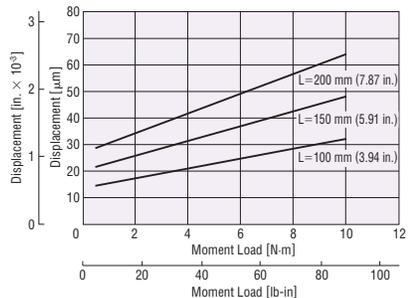
The output table will be displaced when it receives the moment load. The graph plots the table displacement that occurs at distance L from the rotation center of the output table when a given load is applied in the negative direction. The displacement becomes approximately twofold when the moment load is applied in both the positive and negative directions.



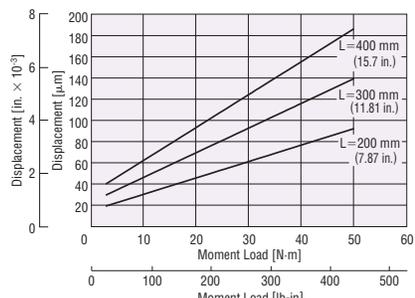
DG60-ASAK/DG60-ASBK



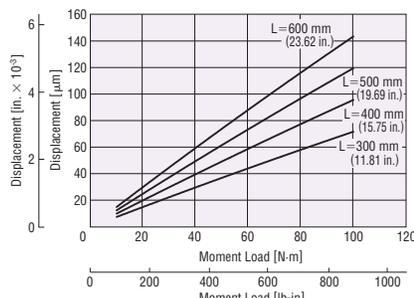
DG85R-ASAA/DG85R-ASBA



DG130R-ASA □ / DG130R-ASB □



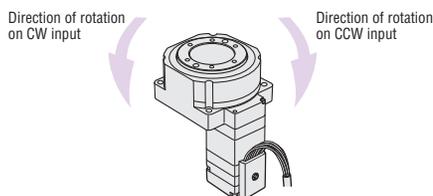
DG200R-ASA □ / DG200R-ASB □



● Enter the power supply voltage (A, C or S) in the box (□) within the model name.

● Driver

Driver Model	ASD10A-K	ASD13B-A	ASD24A-A	ASD30E-A	ASD12A-C	ASD20A-C	ASD12A-S	ASD20A-S	
Power Source	Voltage	24 VDC ± 10%	Single-Phase 100-115 VAC ^{+10%} / _{-15%}			Single-Phase 200-230 VAC ^{+10%} / _{-15%}		Three-Phase 200-230 VAC ^{+10%} / _{-15%}	
	Frequency	—	50/60 Hz			50/60 Hz		50/60 Hz	
	Current	1.0 A	3.3 A	5 A	6.5 A	3 A	4.5 A	1.5 A	2.4 A
Maximum Input Pulse Frequency		250 kHz (when the pulse duty is 50%)							
Input Signals	Input Mode	Photocoupler input, Input resistance: 220 Ω, Input current: 7~20 mA							
	Pulse Signal (CW Pulse Signal)	Operation command pulse signal (CW direction operation command pulse signal when in 2-pulse input mode) Pulse width: 1 μs minimum, Pulse rise/fall: 2 μs maximum (negative logic pulse input)							
	Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal Photocoupler ON: CCW, Photocoupler OFF: CW (CCW direction operation command pulse signal when in 2-pulse input mode) Pulse width: 1 μs minimum, Pulse rise/fall: 2 μs maximum (negative logic pulse input)							
	Alarm Clear Signal	This signal is used when a protective function has been activated, for canceling the alarm without turning off the power to the driver.							
	All Windings Off Signal	When in the "photocoupler ON" state, the current to the motor is cut off and the output table can be rotated manually. When in the "photocoupler OFF" state, the current is supplied to the motor.							
	Resolution Select Signal	When in the "photocoupler ON" state, the resolution is 10 times of the initial resolution setting. When in the "photocoupler OFF" state, the initial resolution setting is selected. This function is effective when the resolution select switch is set to 9000 P/R or 18 000 P/R.							
Output Signals	Output Mode	Photocoupler, Open-collector output External use condition: 30 VDC maximum, 15 mA maximum [Positioning completion, Alarm, Timing (only for ASD10A-K)] Transistor, Open-collector output External use condition: 30 VDC maximum, 15 mA maximum [Quadrature A/B phase, Timing (except ASD10A-K)] Line driver output, equivalent to 26C31 [Timing, Quadrature A/B phase] (except ASD10A-K)							
	Timing Signal	The signal is output every time the output table rotates 0.4°. (Photocoupler: ON) A precise "Timing" signal cannot be obtained when the speed of the pulse input frequency is over 500 Hz.							
	Alarm Signal	The signal is output when one of the driver's protective functions has been activated. (Photocoupler: OFF) When the "Alarm" signal is output, the alarm indicator (red LED) blinks, and the actuator stops (non-excitation state).							
	Positioning Completion Signal	The signal is output when positioning is completed. (Photocoupler: ON) This signal is output when the table position is less than ±0.1" from the commanded position during operation with a pulse input frequency of 500 Hz or less.							
	Quadrature (ASG/BSG) Signal	This signal is output at the resolution set when the driver's power was turned on. The phase difference between A and B is 90° electrical. There is a 1 msec (max.) time lag between real actuator motion and the output signals. This signal is only for position verification when the actuator stopped.							
Protective Functions		Overheat, Overload, Overvoltage, Speed error, Overcurrent, Overspeed, EEPROM data error, Sensor error, System error (ASD10A-K does not have overheat and overcurrent protections.)							
Degree of Protection		IP00			IP10				
Indicator (LED)		Operation indicator: Green LED, Alarm indicator: Red LED							
Cooling Method		Natural Ventilation							
Mass		kg (lb.)	0.25 (0.55)			0.8 (1.76)			



Note:

- The rotation directions of the driver input signals (CW and CCW) are opposite the actual rotation directions of the output table.
When the CW signal is input, the output table will rotate in the counterclockwise direction. When the CCW signal is input, the output table will rotate in the clockwise direction.

General Specifications

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

Item	Motor	Driver
Insulation Class	Class B [130°C (266°F)] [Recognized as Class A 105°C (221°F) by UL/CSA Standards]	—
Insulation Resistance	100 MΩ or more when 500 VDC megger is applied between the following places: • Case – Motor and sensor windings	100 MΩ or more when 500 VDC megger is applied between the following places: [ASD10A-K] • Heat sink – Power input terminal [ASD13B-A, ASD24A-A, ASD30E-A, ASD12A-C, ASD20A-C, ASD12A-S, ASD20A-S] • Case – Power input terminal • Signal I/O terminal – Power input terminal
Dielectric Strength	Sufficient to withstand the following for 1 minute: [DGM60-ASAK, DGM60-ASBK] • Case – Motor and sensor windings 0.5 kVAC 50 Hz or 60 Hz [DGM85R-ASAA, DGM85R-ASBA] • Case – Motor and sensor windings 1 kVAC 50 Hz or 60 Hz [DGM130R-ASAA, DGM130R-ASBA, DGM130R-ASAC, DGM130R-ASBC, DGM200R-ASAA, DGM200R-ASBA, DGM200R-ASAC, DGM200R-ASBC] • Case – Motor and sensor windings 1.5 kVAC 50 Hz or 60 Hz	Sufficient to withstand the following for 1 minute: [ASD10A-K] • Heat sink – Power input terminal 0.5 kVAC 50 Hz or 60 Hz [ASD13B-A, ASD24A-A, ASD30E-A, ASD12A-C, ASD20A-C, ASD12A-S, ASD20A-S] • Case – Power input terminal 1.5 kVAC 50 Hz or 60 Hz • Signal I/O terminal – Power input terminal 2.3 kVAC (3.0 kVAC for 200-230 VAC input) 50 Hz or 60 Hz
Ambient Temperature	0~+50°C (+32~+122°F) (non-freezing) 0~+40°C (+32~+104°F) (non-freezing) when accessory home-sensor set is attached	[ASD13B-A, ASD24A-A, ASD30E-A, ASD12A-C, ASD20A-C, ASD12A-S, ASD20A-S] 0~+50°C (+32~+122°F) (non-freezing) [ASD10A-K] 0~+40°C (+32~+104°F) (non-freezing)
Ambient Humidity	85% or less (non-condensing)	

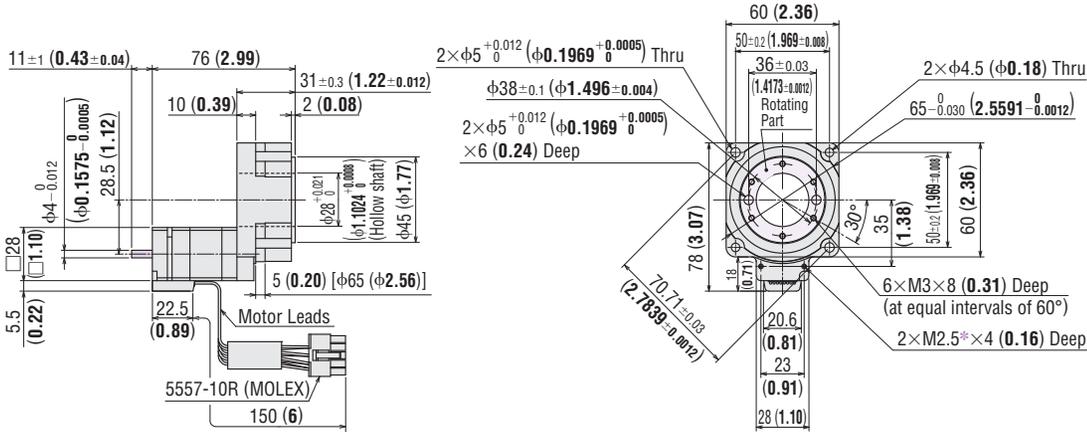
Note:

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

Dimensions Unit = mm (in.)

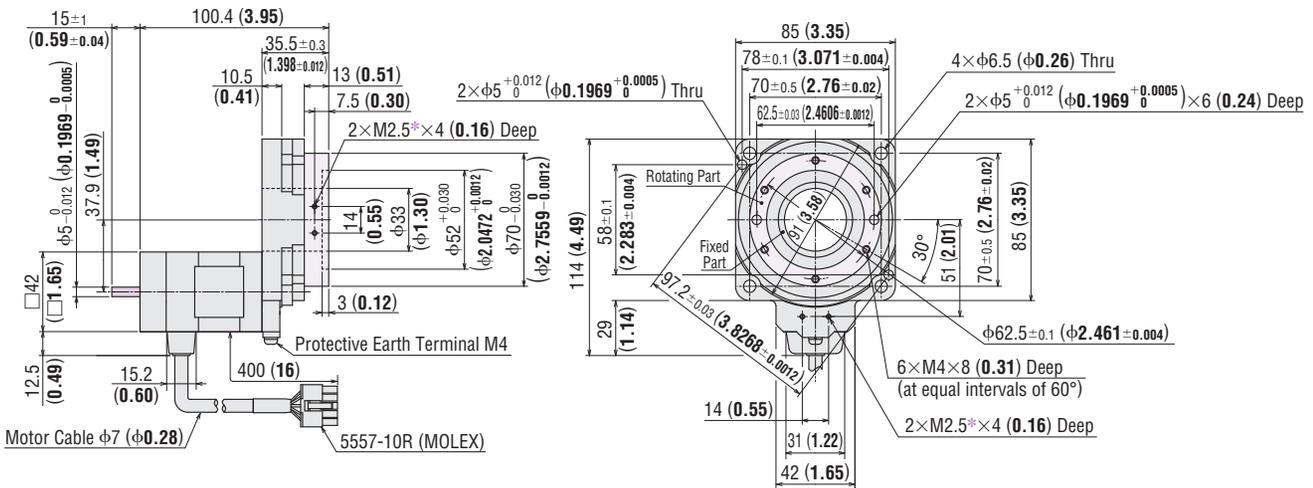
● Actuator

Model	Actuator Model	Mass kg (lb.)	DXF
DG60-ASAK	DGM60-ASAK	0.5	D469
DG60-ASBK	DGM60-ASBK	(1.1)	



* Use M2.5 screw holes when installing the home-sensor set (sold separately).
Do not use these holes for any purpose other than to install the home-sensor.

Model	Actuator Model	Mass kg (lb.)	DXF
DG85R-ASAA	DGM85R-ASAA	1.2	D518
DG85R-ASBA	DGM85R-ASBA	(2.6)	

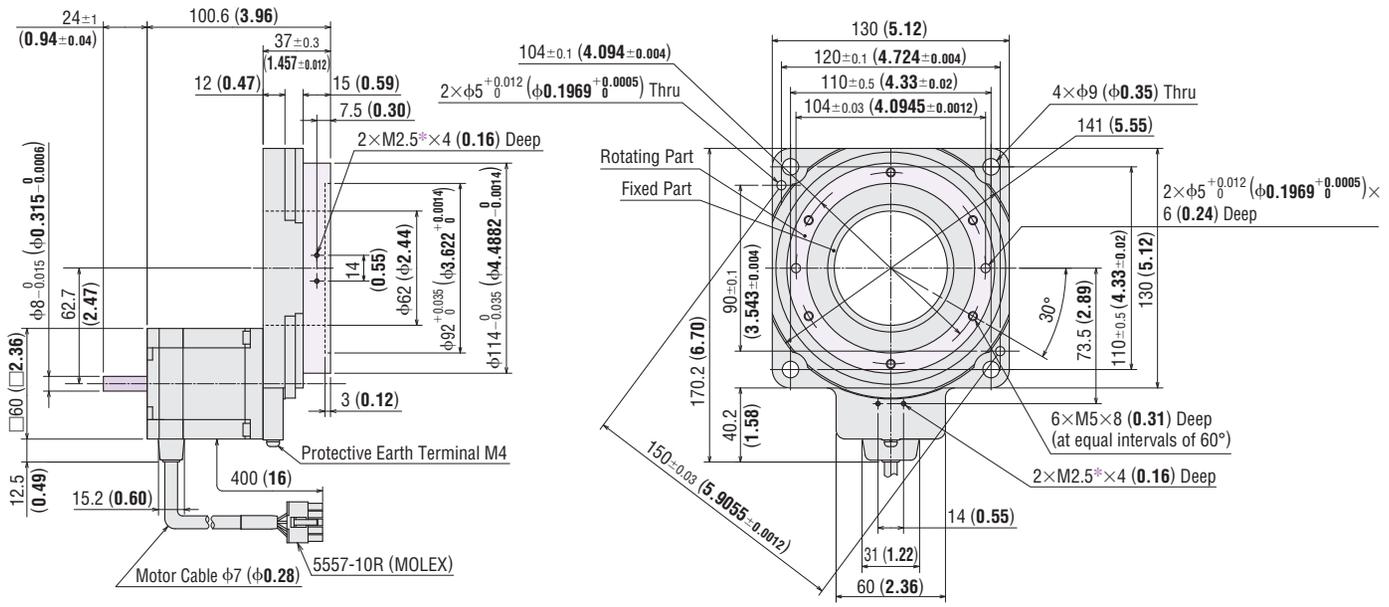


* Use M2.5 screw holes when installing the home-sensor set (sold separately).
Do not use these holes for any purpose other than to install the home-sensor.

● These dimensions are for the double shaft models. For the single shaft models, ignore the purple () areas.

Model	Actuator Model	Mass kg (lb.)	DXF
DG130R-ASA □	DGM130R-ASA □	2.6	D519
DG130R-ASB □	DGM130R-ASB □	(5.7)	

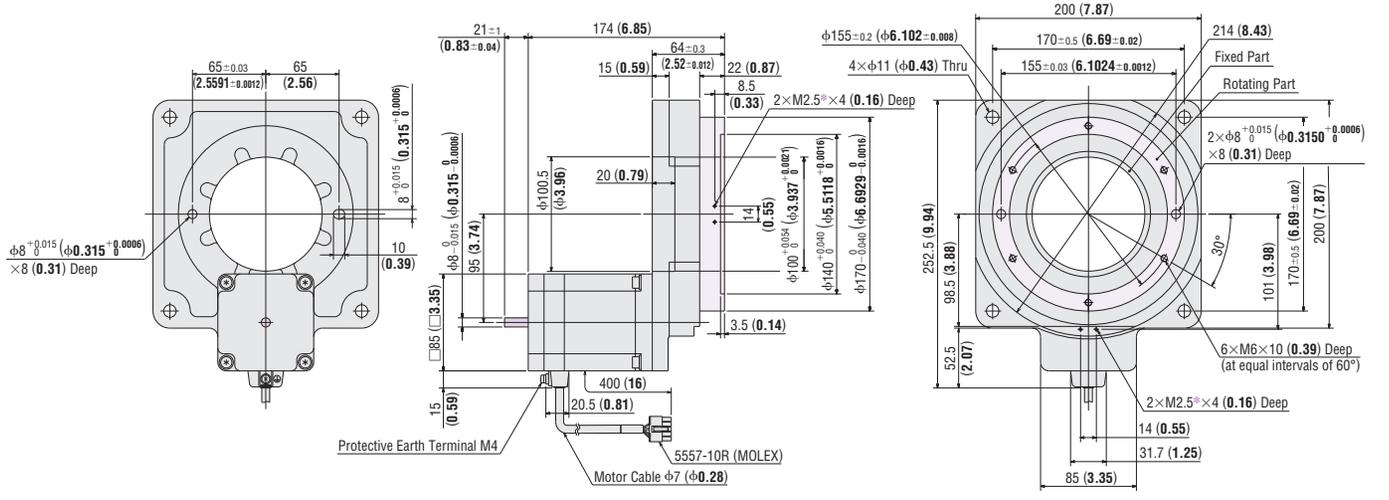
● Enter the power supply voltage (**A, C or S**) in the box (□) within the model name.



* Use M2.5 screw holes when installing the home-sensor set (sold separately). Do not use these holes for any purpose other than to install the home sensor.

Model	Actuator Model	Mass kg (lb.)	DXF
DG200R-ASA □	DGM200R-ASA □	9.5	D1057
DG200R-ASB □	DGM200R-ASB □	(20.9)	

● Enter the power supply voltage (**A, C or S**) in the box (□) within the model name.



* Use M2.5 screw holes when installing the home-sensor set (sold separately). Do not use these holes for any purpose other than to install the home sensor.

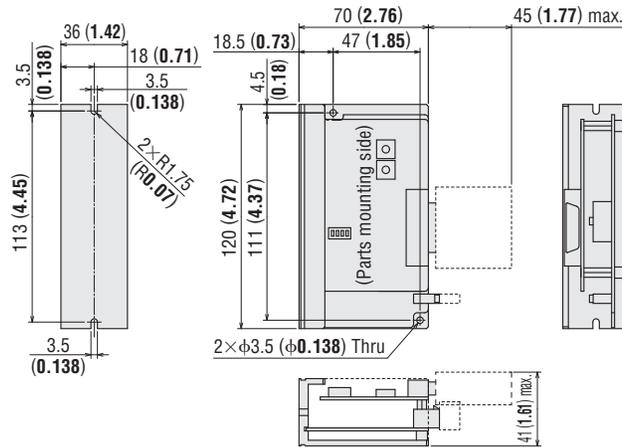
● These dimensions are for the double shaft models. For the single shaft models, ignore the purple (□) areas.

● **Driver**

ASD10A-K

Mass: 0.25 kg (0.55 lb.)

DXF B198



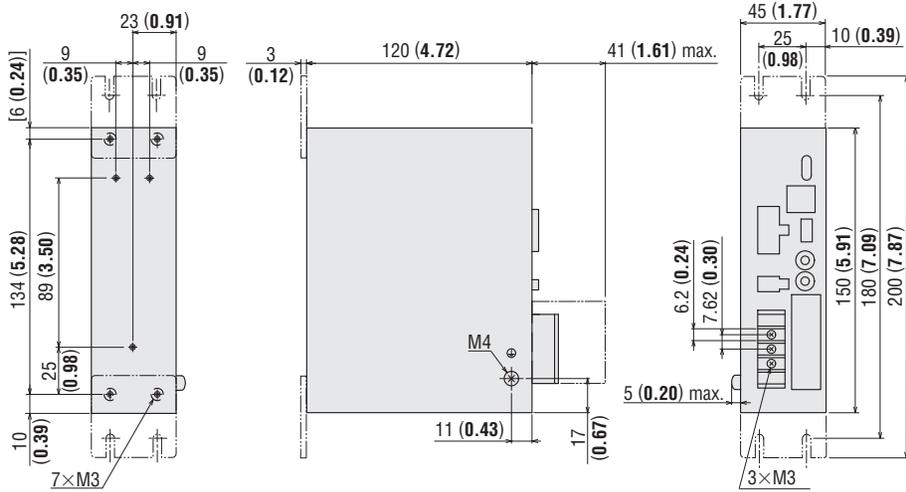
- Control I/O Connector (Included)
Cover assembly: 54331-1361 (MOLEX)
Connector: 54306-3619 (MOLEX)

- Power Supply Connector (Included)
Connector: 5557-02R (MOLEX)
Connector crimp terminal: 5556TL (MOLEX)

ASD13B-A, ASD24A-A, ASD30E-A, ASD12A-C, ASD20A-C, ASD12A-S, ASD20A-S

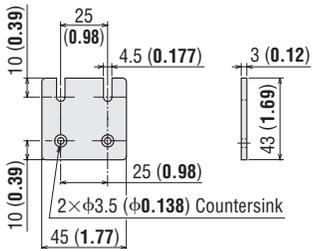
Mass: 0.8 kg (1.76 lb.)

DXF B197



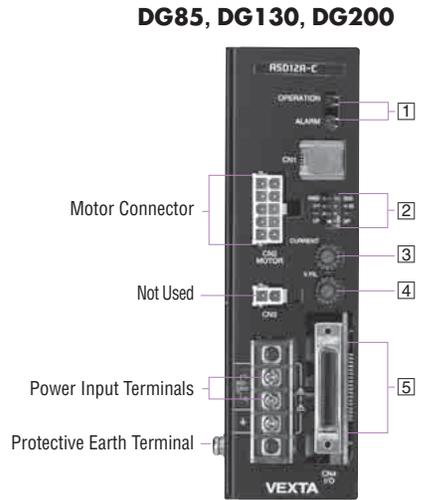
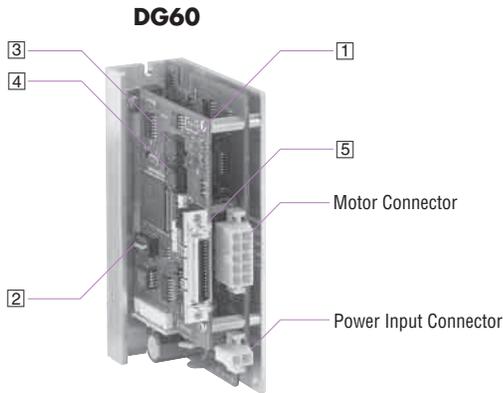
- Control I/O Connector (Included)
Cover assembly: 54331-1361 (MOLEX)
Connector: 54306-3619 (MOLEX)

- Mounting Bracket
(2 pieces, included)



Connection and Operation

Names and Functions of Driver Parts



1 Signal Monitor Display

◇ LED Indicators

Indication	Color	Function	When Activated
OPERATION	Green	Power Supply Indication	Lights when power is on.
ALARM	Red	Alarm Indication	Blinks when protective functions are activated.

◇ Alarm

Blink Count	Function	When Activated
1	Overheat*	The temperature of the heat sink inside the driver has reached approximately 85°C (185°F).
2	Overload	The motor has been operated continuously over 5 seconds under a load exceeding the maximum torque.
3	Overvoltage	The primary inverter voltage of the driver has exceeded the allowable level.
4	Speed Error	The actuator cannot accurately follow at the indicated pulse speed.
5	Overcurrent*	An excessive current has flowed through the inverter power element inside the driver.
6	Overspeed	The output table speed has exceeded 270 r/min.
7	EEPROM Data Error	A motor control parameter has been damaged.
8	Sensor Error	The power has been turned on without the motor cable connected to the driver.
Lights (No blinking)	System Error	The driver has fatal error.

* **DG60** does not have "Overheat protection" and "Overcurrent protection" functions.

2 Function Switches

Indication	Switch Name	Function
1000/500 ×1/×10	Resolution Select Switch	This function is for selecting the actuator resolution. The resolution of output table is 18 times of indications. [500] [×1] → 9000 P/R (0.04°/step) [1000] [×1] → 18 000 P/R (0.02°/step) [500] [×10] → 90 000 P/R (0.004°/step) [1000] [×10] → 180 000 P/R (0.002°/step)
1P/2P	Pulse Input Mode Switch	The settings of this switch are compatible with the following two pulse input modes: "1P" for the 1-pulse input mode, "2P" for the 2-pulse input mode.

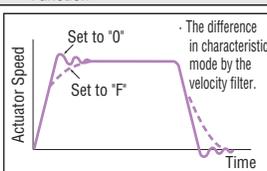
Notes:

- Always turn the power OFF before switching resolution or pulse input, and turn it ON again after you have made the change.
- If the resolution select switch is set to [×10], it cannot control the resolution selected by input terminal. It is always [×10].

3 Current Adjustment Switch

Indication	Switch Name	Function
CURRENT	Current Adjustment Switch	The motor running current can be lowered to suppress temperature rise in the motor and driver, or lower operating current in order to allow a margin for motor torque (a maximum of 16 settings).

4 Velocity Filter Adjustment Switch

Indication	Switch Name	Function
V.FIL	Velocity Filter Adjustment Switch	This switch is used to make adjustments when a smooth start-stop or smooth motion at low speed is required (a maximum of 16 settings). 

5 Input/Output Signals (36 pins)

◇ DG60

Indication	Input/Output	Pin No.	Signal	Signal Name
External power input		2	GND	Power supply for signal control
		3	Vcc+24 V	
Input		9	DIR. (CCW)	Rotation direction (CCW pulse)
		10	DIR. (CCW)	
		11	PLS (CW)	Pulse (CW pulse)
		12	PLS (CW)	
Output		13	BSG1	Quadrature BSG output (Open-collector)
		14	GND	
		15	ASG1	Quadrature ASG output (Open-collector)
		16	GND	
Input		21	ACL	Alarm clear
		22	ACL	
Output		23	TIM.1	Timing (Open-collector)
		24	TIM.1	
		25	ALARM	Alarm
		26	ALARM	
		29	END	Positioning completion
		30	END	
Input		31	×10	Resolution select
		32	×10	
		33	C.OFF	All windings off
		34	C.OFF	

● For more details, refer to the description of input/output signals.

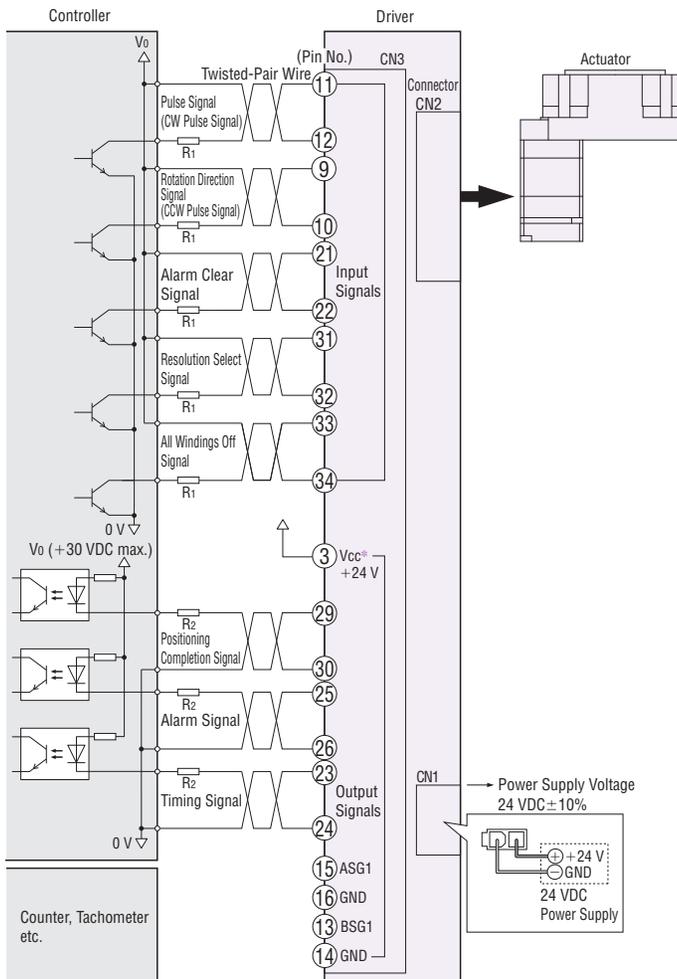
◇ DG85, DG130, DG200

Indication	Input/Output	Pin No.	Signal	Signal Name
External power input		1	Vcc+5 V	Power supply for signal control
		2	GND	
		3	Vcc+24 V	
Input		9	DIR. (CCW)	Rotation direction (CCW pulse)
		10	DIR. (CCW)	
		11	PLS (CW)	Pulse (CW pulse)
		12	PLS (CW)	
Output		13	BSG1	Quadrature BSG output (Open-collector)
		14	GND	
		15	ASG1	Quadrature ASG output (Open-collector)
		16	GND	
		17	BSG2	Quadrature BSG output (Line driver)
		18	BSG2	
		19	ASG2	Quadrature ASG output (Line driver)
		20	ASG2	
Input		21	ACL	Alarm clear
		22	ACL	
Output		23	TIM.1	Timing (Open-collector)
		24	GND	
		25	ALARM	Alarm
		26	ALARM	
		27	TIM.2	Timing (Line driver)
		28	TIM.2	
Input		29	END	Positioning completion
		30	END	
Output		31	×10	Resolution select
		32	×10	
		33	C.OFF	All windings off
		34	C.OFF	

● For more details, refer to the description of input/output signals.

● Connection Diagram

◇ DG60



◇ Input Signal Connection

Signals can be connected directly when 5 VDC is supplied. If the signals are used at a voltage exceeding 5 VDC, be sure to provide an external resistor to prevent the current exceeding 20 mA from flowing. Internal components will be damaged if a voltage exceeding 5 VDC is supplied directly without using an external resistor. Example: If the voltage is 24 VDC, connect a resistor (R_1) of 1.5 to 2.2 k Ω and 0.5 W or more.

◇ Output Signal Connection

Use output signals at 30 VDC or less and 15 mA or less. If these specifications are exceeded, the internal components may be damaged. Check the specification of the connected equipment. If the current exceeds 15 mA, connect an external resistor R_2 .

* Check the connection on page D-182 when using a 24 VDC power supply for control signals.

◇ Power Supply

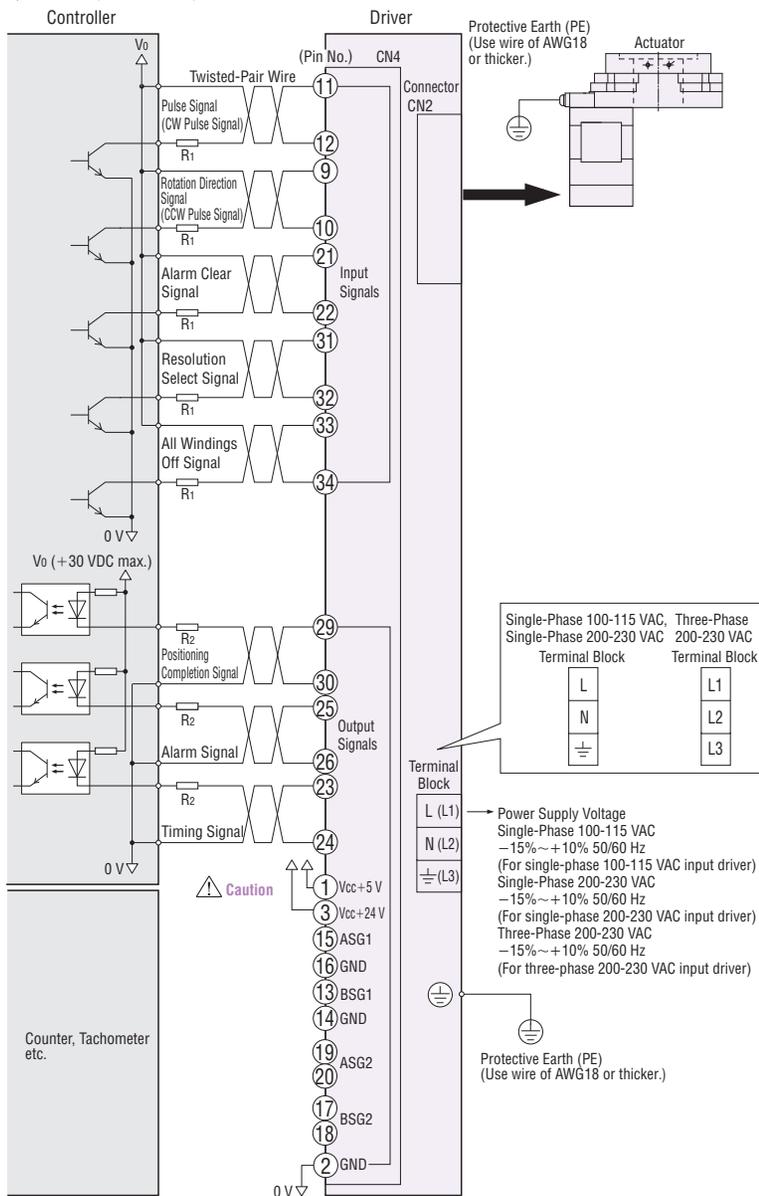
Use an input power voltage of 24 VDC. Use a power supply that can supply sufficient input current. When power supply capacity is insufficient, a decrease in motor output can cause the following malfunction:

● Actuator does not operate properly (insufficient torque).

◇ Notes on Wiring

- Use multi-core, twisted-pair shielded wires of AWG28 or thicker for the control I/O signal lines (CN3), and keep wiring as short as possible [within 2 m (6.6 ft.)].
- Note that as the length of the pulse signal line increase, the maximum transmission frequency decreases. Technical reference → Page F-67
- When it is necessary to extend the wiring distance between the actuator and driver, the accessory extension cable or flexible extension cable must be used. Accessories → Page D-188
- The range of wire for the power connector (CN1) is AWG24 to 18. Use wires of AWG20 or thicker for the power supply lines.
- Provide a minimum distance of 300 mm (1 ft.) between the control I/O signal lines and power lines (AC lines, motor lines and other large-current circuits). Do not run the control I/O signal lines in the same ducts as power lines or bundle them with power lines.
- The customer must furnish the cables for power supply lines and control I/O signal lines.
- Use included connector for connection of power supply connector.
- To install the pins, be sure to use the specified crimping tool made by MOLEX 57026-5000 (for UL 1007) or 57027-5000 (for UL 1015).

◇ DG85, DG130, DG200



◇ Input Signal Connection

Signals can be connected directly when 5 VDC is supplied. If the signals are used at a voltage exceeding 5 VDC, be sure to provide an external resistor to prevent the current exceeding 20 mA from flowing. Internal components will be damaged if a voltage exceeding 5 VDC is supplied directly without using an external resistor. Example: If the voltage is 24 VDC, connect a resistor (R_1) of 1.5 to 2.2 k Ω and 0.5 W or more.

◇ Output Signal Connection

Use output signals at 30 VDC or less and 15 mA or less. If these specifications are exceeded, the internal components may be damaged. Check the specification of the connected equipment. If the current exceeds 15 mA, connect an external resistor R_2 .

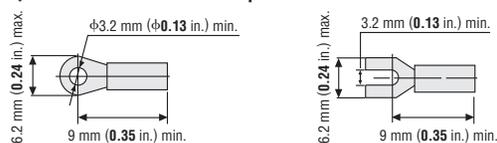
◇ Notes on Wiring

- Use multi-core, twisted-pair shielded wires of AWG28 or thicker for the control I/O signal lines (CN3), and keep wiring as short as possible [within 2 m (6.6 ft.).]
- Note that as the length of the pulse signal line increase, the maximum transmission frequency decreases. Technical reference → Page F-67
- When it is necessary to extend the wiring distance between the actuator and driver, the accessory extension cable or flexible extension cable must be used. Accessories → Page D-188
- Use the following cable for the power line:
Single-phase 100-115 VAC, Single-phase 200-230 VAC: 3-core cable of AWG18 or thicker
Three-phase 200-230 VAC: 4-core cable of AWG18 or thicker
- Provide a minimum distance of 300 mm (1 ft.) between the control I/O signal lines and power lines (AC lines, motor lines and other large-current circuits.) Do not run the control I/O signal lines in the same ducts as power lines or bundle them with power lines.
- To ground the driver, lead the ground conductor from the protective earth terminal (M4) and connect the ground conductor to provide a common ground point.

⚠ Caution

- If the "Timing" signal output or "Quadrature" signal output is used, a 5VDC or 24 VDC power supply is required. Connect the power supply for "Timing" signal output or "Quadrature" signal output either 5 VDC or 24 VDC. Do not input 5 VDC and 24 VDC at the same time. Description of input/output signals → Page D-182

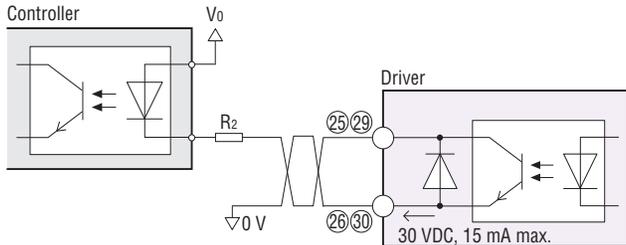
◇ Recommended Crimp Terminals



- Crimp terminals are not provided with the products. They must be purchased separately.

Positioning Completion (END) Output Signal Alarm (ALARM) Output Signal

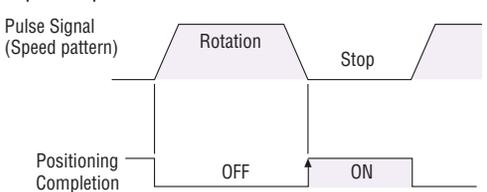
◇ Output Circuit and Sample Connection



◇ Positioning Completion (END) Output Signal

Pin No. 29, 30

Circuits for use with 30 VDC, 15 mA maximum. This signal is output at the photocoupler ON state when positioning is completed. This signal is output when the table position is less than $\pm 0.1^\circ$ from the command position, approximately 2 msec after the pulse input stops.



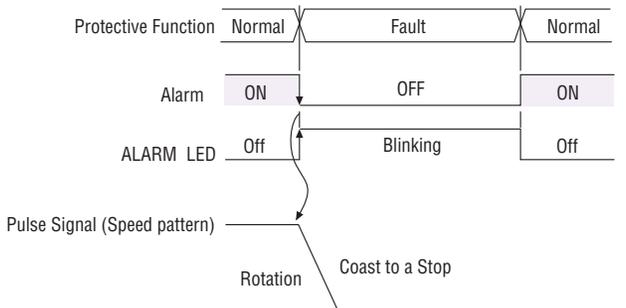
Note:
 ● The "Positioning Completion" signal blinks during operation with a pulse input frequency of 500 Hz or less.

◇ Alarm (ALARM) Output Signal

Pin No. 25, 26

Circuits for use with 30 VDC, 15 mA maximum. The photocoupler turns OFF when one of the driver's protective functions has been activated. When an abnormality such as an overload or overcurrent* is detected, the "Alarm" signal will be output, the driver's LED indicator (ALARM) blinks, and the actuator stops (non-excitation state). *Except for **DG60**

To cancel the alarm, first resolve the cause and check for safety, and then input an "Alarm Clear" (ACL) signal or reset power. Once power has been turned off, wait at least 10 seconds (5 seconds for **DG60**) before turning it on again.

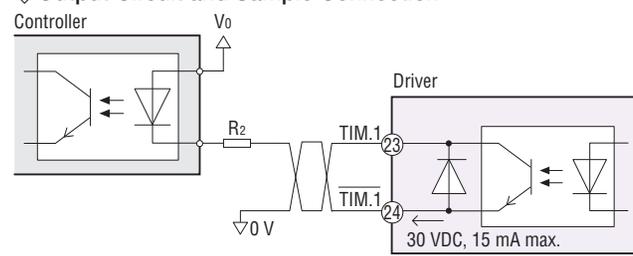


Notes:
 ● The "Alarm" output uses positive logic (normally closed), all other outputs use negative logic (normally open).
 ● The ALARM indicator lights (not blinks) when system error protective function has been activated.

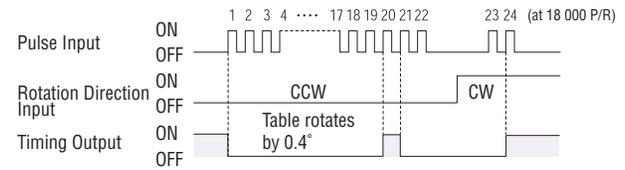
DG60

Timing (TIM.1) Output Signal

◇ Output Circuit and Sample Connection



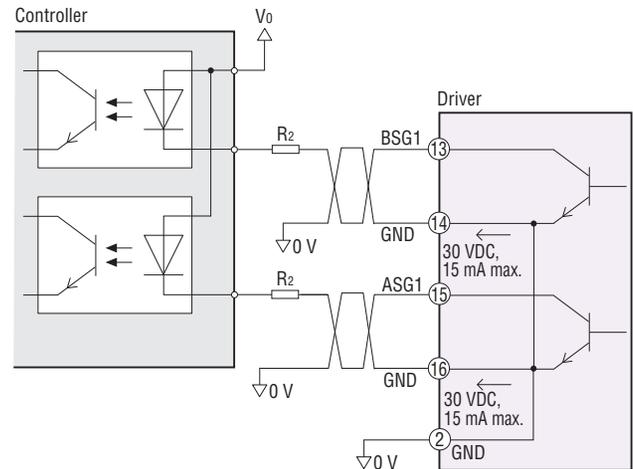
Circuits for use with 30 VDC, 15 mA maximum. When the "Timing" signal is output, the transistor turns ON. This signal is used to detect the home position with greater precision. The number of pulses of this signal is 900 pulses per one table rotation.



Note:
 ● A precise "Timing" signal output cannot be obtained when the speed of the pulse input frequency is over 500 Hz.

Quadrature (ASG1/BSG1) Output Signal

◇ Output Circuit and Sample Connection

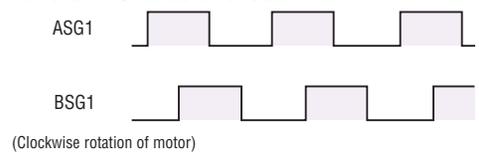


Circuits for use with 30 VDC, 15 mA maximum. A counter or similar device can be connected to monitor the position of the output table. The pulse resolution is the same as the motor resolution at the time of power-on.

[Example: Resolution select switch (18 000 P/R) → Output pulse number for each table rotation (18 000)]
 The phase difference between A and B is 90° in electrical angle.

Notes:
 ● The pulse output accuracy of the motor is, regardless of resolution, within $\pm 0.36^\circ$ (repetition accuracy: within $\pm 0.09^\circ$).
 ● This signal is only for position verification when the motor has stopped. There is 1 msec (max.) time lag between real motor motion and the output signals.

◇ Pulse Waveform Characteristics



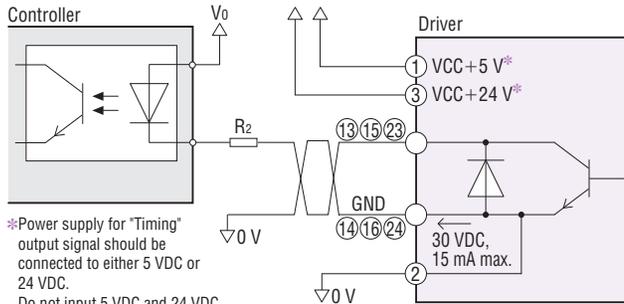
DG85, DG130, DG200

Timing (TIM.1, TIM.2) Output Signal

Quadrature (ASG1/BSG1, ASG2/BSG2) Output Signal

◇ Output Circuit and Sample Connection

Open-Collector Output

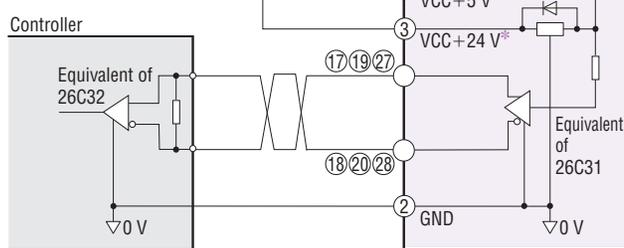


*Power supply for "Timing" output signal should be connected to either 5 VDC or 24 VDC. Do not input 5 VDC and 24 VDC at the same time.

Circuits for use with 30 VDC, 15 mA maximum.

Line Driver Output

*Power supply for "Timing" output signal should be connected to either 5 VDC or 24 VDC. Do not input 5 VDC and 24 VDC at the same time.

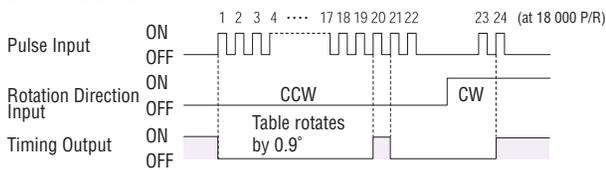


◇ Timing (TIM.1, TIM.2) Output Signal

Pin No. 23, 24, 27, 28

When the "Timing" signal is output, the transistor turns ON (For the line driver output which is TIM.2, the output signal is ON).

This signal is used to detect the home position with greater precision. The number of pulses of this signal is 900 pulses per one table rotation.



Notes:

- A precise "Timing" signal output cannot be obtained when the speed of the pulse input frequency is over 500 Hz.
- When the "Timing" signal output is used, 5 VDC or 24 VDC power supply is necessary.

◇ Quadrature (ASG1/BSG1, ASG2/BSG2) Output Signal

Pin No. 13~20

A counter or similar device can be connected to monitor the position of the output table. The pulse resolution is the same as the motor resolution at the time of power-on.

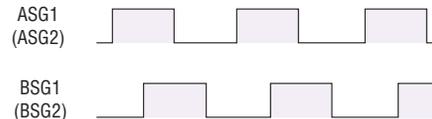
[Example: Resolution select switch (18 000 P/R) → Output pulse number for each table rotation (18 000)]

The phase difference between A and B is 90° in electrical angle.

Notes:

- The pulse output accuracy of the motor is, regardless of resolution, within $\pm 0.36^\circ$ (repetition accuracy: within $\pm 0.09^\circ$).
- When the pulse output is used, 5 VDC or 24 VDC power supply is necessary. This signal is only for position verification when the motor has stopped. There is 1 msec (max.) time lag between real motor motion and the output signals.

◇ Pulse Waveform Characteristics



(Clockwise rotation of motor)

List of Actuator and Driver Combinations

Model names for actuator and driver combinations are shown below.

Model	Actuator Model	Driver Model
DG60-ASAK	DGM60-ASAK	ASD10A-K
DG60-ASBK	DGM60-ASBK	ASD10A-K
DG85R-ASAA	DGM85R-ASAA	ASD13B-A
DG85R-ASBA	DGM85R-ASBA	ASD13B-A
DG130R-ASAA	DGM130R-ASAA	ASD24A-A
DG130R-ASBA	DGM130R-ASBA	ASD24A-A
DG130R-ASAC	DGM130R-ASAC	ASD12A-C
DG130R-ASBC	DGM130R-ASBC	ASD12A-C
DG130R-ASAS	DGM130R-ASAC	ASD12A-S
DG130R-ASBS	DGM130R-ASBC	ASD12A-S
DG200R-ASAA	DGM200R-ASAA	ASD30E-A
DG200R-ASBA	DGM200R-ASBA	ASD30E-A
DG200R-ASAC	DGM200R-ASAC	ASD20A-C
DG200R-ASBC	DGM200R-ASBC	ASD20A-C
DG200R-ASAS	DGM200R-ASAC	ASD20A-S
DG200R-ASBS	DGM200R-ASBC	ASD20A-S

Hollow Rotary Actuators Accessories (Sold separately)

Home-Sensor Set (RoHS)

A home-sensor set, which consists of a photomicro sensor, connector with cable, sensor mounting bracket, shielding plate and mounting screws, is provided to facilitate easy return to home operation.

All parts needed for return to home operation are included in the set, so you will spend less time designing, fabricating or procuring parts in connection with sensor installation. Installation is very easy, so you can start using the sensor right away.

Product Line

Model	Sensor Output	Applicable Product
PADG-SA	NPN	DG60-ASAK/DG60-ASBK
PADG-SAY	PNP	
PADG-SB	NPN	DG85R-ASAA/DG85R-ASBA DG130R-ASA □/ DG130R-ASB □
PADG-SBY	PNP	DG200R-ASA □/ DG200R-ASB □

● Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.



Model: PADG-SB

Sensor Specifications

◇ NPN Type

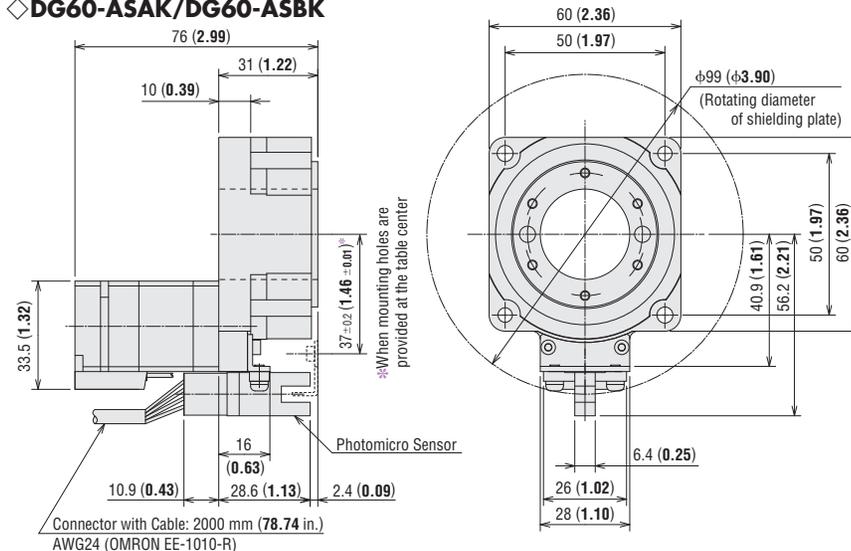
Model	PADG-SA (OMRON Model: EE-SX672A) PADG-SB (OMRON Model: EE-SX673A)
Power Supply	5~24 VDC±10%, ripple (P-P) 10% or less
Current Consumption	35 mA or less
Control Output	NPN open-collector output, 5~24 VDC 100 mA or less Residual voltage 0.8 V or less (at load current of 100 mA)
Indicator LED	Detection display (red)
Sensor Logic	Normally open/normally closed (selectable, depending on connection)

◇ PNP Type

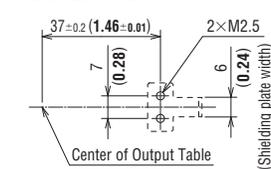
Model	PADG-SAY (OMRON Model: EE-SX672R) PADG-SBY (OMRON Model: EE-SX673R)
Power Supply	5~24 VDC±10%, ripple (P-P) 10% or less
Current Consumption	30 mA or less
Control Output	PNP open-collector output, 5~24 VDC 50 mA or less Residual voltage 1.3 V or less (at load current of 50 mA)
Indicator LED	Detection display (red)
Sensor Logic	Normally open/normally closed (selectable, depending on connection)

Dimensions of Sensor Installation Unit = mm (in.)

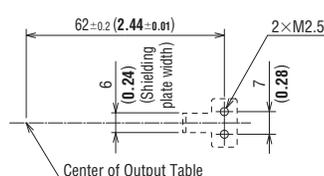
◇ DG60-ASAK/DG60-ASBK



● When mounting holes are provided at the table center

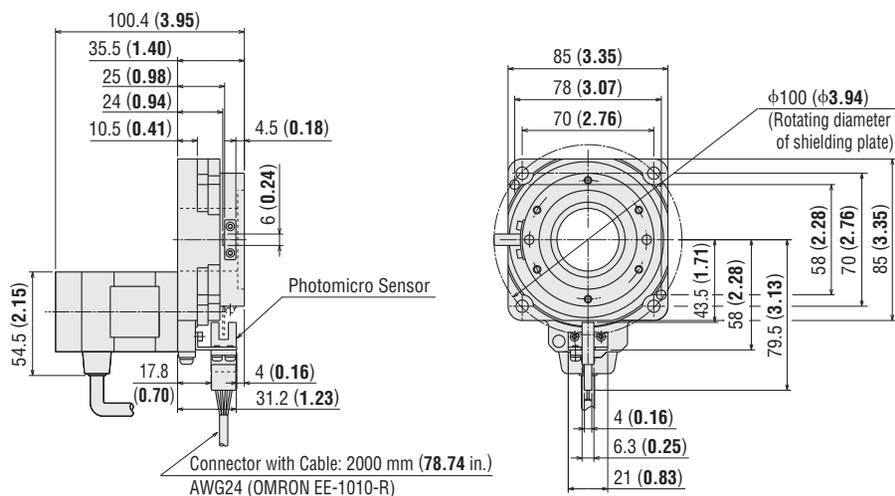


● When mounting holes are provided a distance from the table center

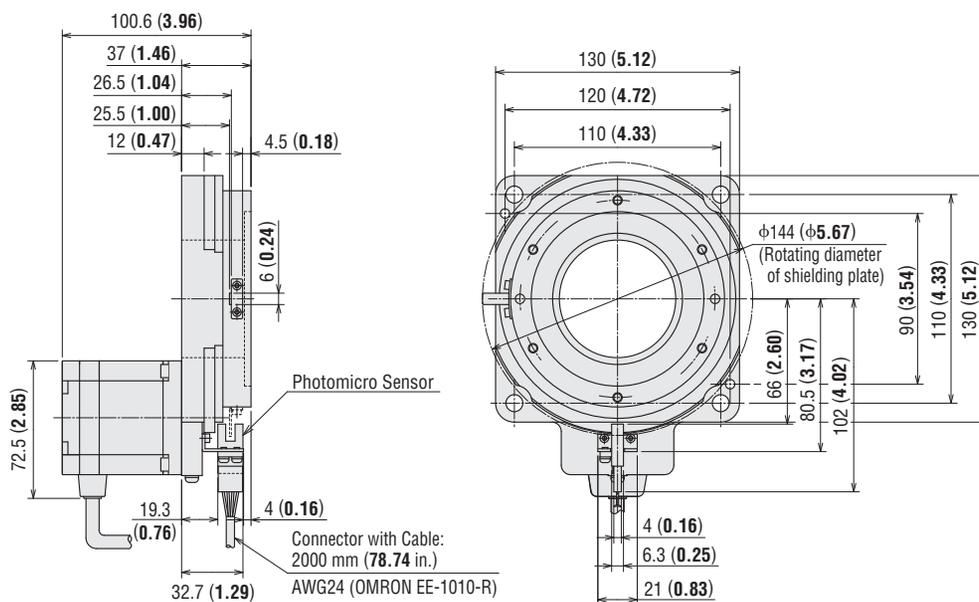


Machining Dimension Drawing for Installation of Shielding Plate

◇ DG85R-ASAA/DG85R-ASBA

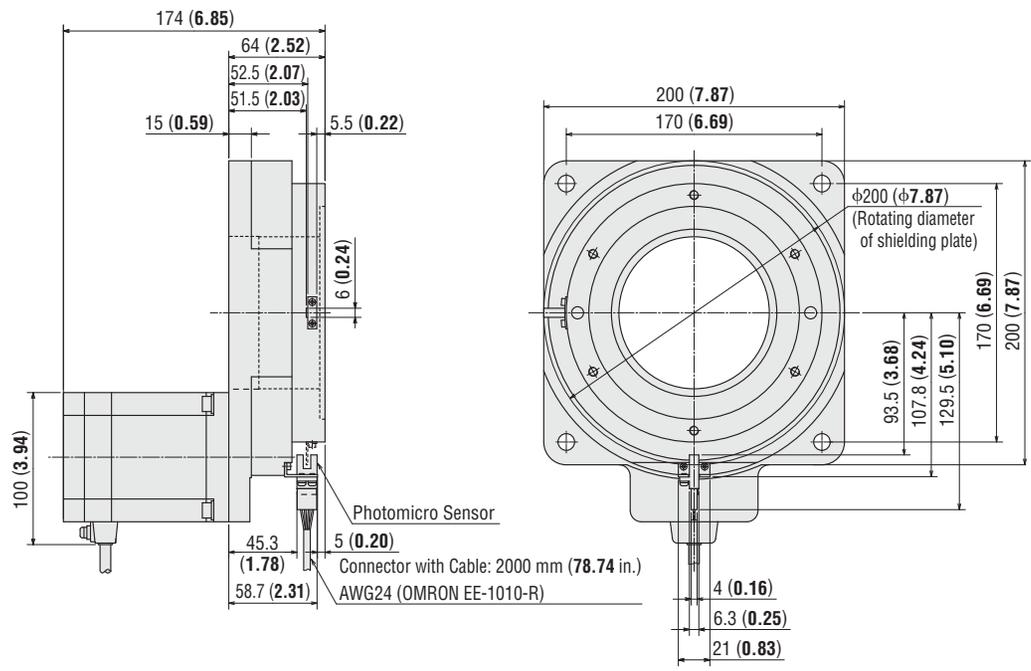


◇ DG130R-ASA□/ DG130R-ASB□



● Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.

◇ DG200R-ASA□/DG200R-ASB□



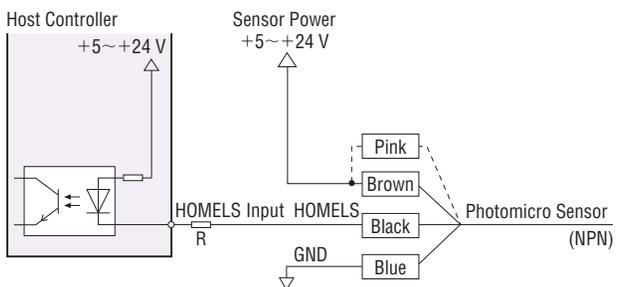
● Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.

● Wiring the Sensor

◇ NPN Type

Power supply voltage and current must be 5 to 24 VDC, 100 mA or below.

If the current exceeds 100 mA, connect an external resistor R. GND for sensor power supply and customer's controller power supply should be common.

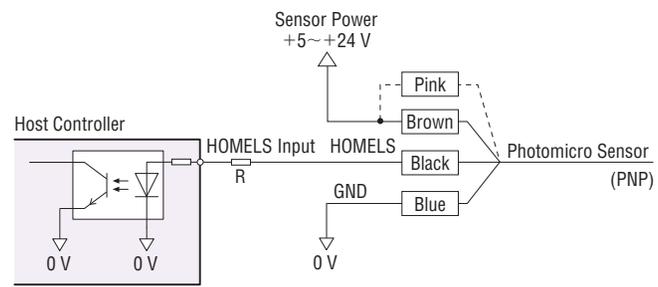


--- Connect the pink lead to the brown lead when the sensor logic is N.C. (normally closed). The pink lead is not connected when the sensor logic is N.O. (normally open).

◇ PNP Type

Power supply voltage and current must be 5 to 24 VDC, 50 mA or below.

If the current exceeds 50 mA, connect an external resistor R.



--- Connect the pink lead to the brown lead when the sensor logic is N.C. (normally closed). The pink lead is not connected when the sensor logic is N.O. (normally open).

Introduction

EZlimo EZSII

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EZlimo EFC

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EZlimo EZHC

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Compact Linear Actuators

DRL

Accessories Installation

DG

Hollow Rotary Actuators

Accessories Installation

Motor Cables RoHS

Extension Cables

These extension cables are used to extend the wiring distance between the actuator and driver.

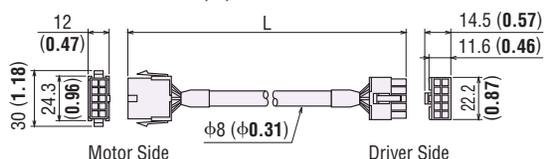


Product Line

Model	Length: L m (ft.)
CC01AIP	1 (3.3)
CC02AIP	2 (6.6)
CC03AIP	3 (9.8)
CC05AIP	5 (16.4)
CC07AIP	7 (23)
CC10AIP	10 (32.8)
CC15AIP*	15 (49.2)
CC20AIP*	20 (65.6)

* Only for **DG85**, **DG130** and **DG200**

Dimensions Unit = mm (in.)



Flexible Extension Cables

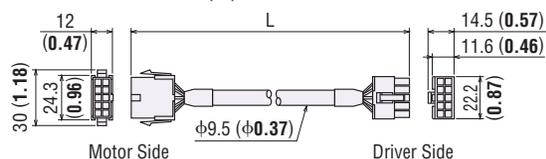
We recommend these flexible cables when the actuator is installed on a moving section and the cable is bent and flexed.



Product Line

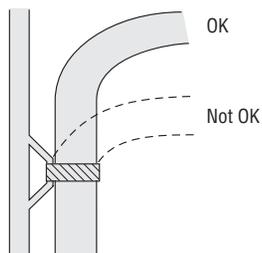
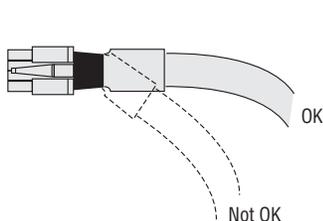
Model	Length: L m (ft.)
CC01SAR	1 (3.3)
CC02SAR	2 (6.6)
CC03SAR	3 (9.8)
CC05SAR	5 (16.4)
CC07SAR	7 (23)
CC10SAR	10 (32.8)

Dimensions Unit = mm (in.)

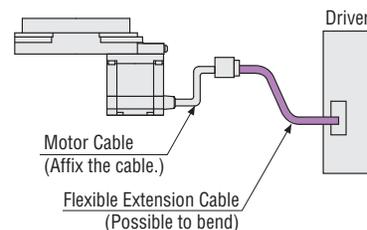


Notes on Use of a Flexible Extension Cable

- ① Do not allow the cable to bend at the cable connector.
- ② Keep the bending radius to 60 mm (2.36 in.) or more.



- ③ The motor cable is not a flexible cable. If the motor cable is to be bent, bend it at the flexible extension cable.



Driver Cables RoHS

● EMP Series Dedicated Type

One end of the cable is a half-pitch connector that snaps into the driver for the **DG** Series. The other end of the cable is equipped with the connector for the **EMP** Series controller.



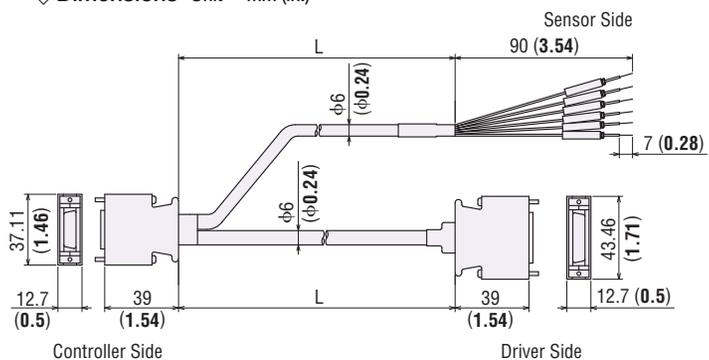
◇ Product Line

Model	Length: L m (ft.)
CC01EMP4	1 (3.3)
CC02EMP4	2 (6.6)

Note:

● The alarm clear function is not available on the **EMP400** Series.

◇ Dimensions Unit = mm (in.)



● General-Purpose Type

This is a shielded cable equipped with, at one end of the cable, the half-pitch connector that snaps into the driver for the **DG** Series.

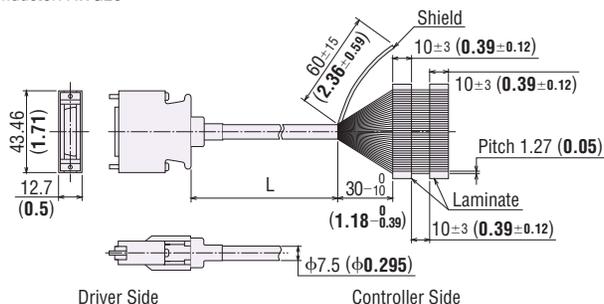


◇ Product Line

Model	Length: L m (ft.)	Connector
CC36D1-1	1 (3.3)	Control input pin: 36 pins
CC36D2-1	2 (6.6)	

◇ Dimensions Unit = mm (in.)

Conductor: AWG28



Connector – Terminal Block Conversion Unit RoHS

A conversion unit that connects a driver to a host controller using a terminal block.

- With a signal name plate for easy, one-glance identification of driver signal names.
- DIN-rail mountable
- Cable length: 1 m (3.3 ft.)

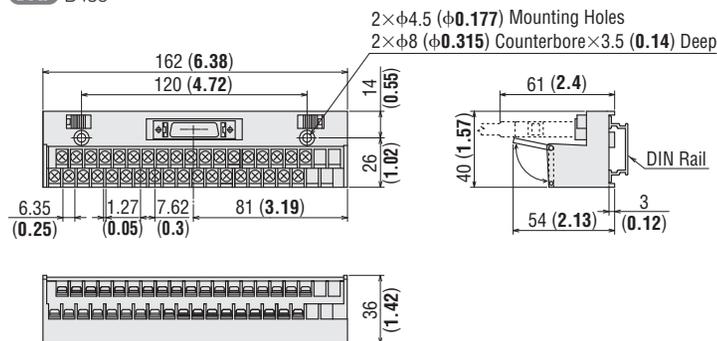
Product Line

Model	Length m (ft.)	Connector/Applicable Product
CC36T1	1 (3.3)	Control input pin: 36 pins
CC50T1		For EMP Series

Dimensions Unit = mm (in.)

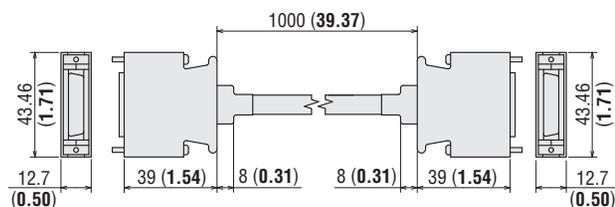
CC36T1

DXF B438



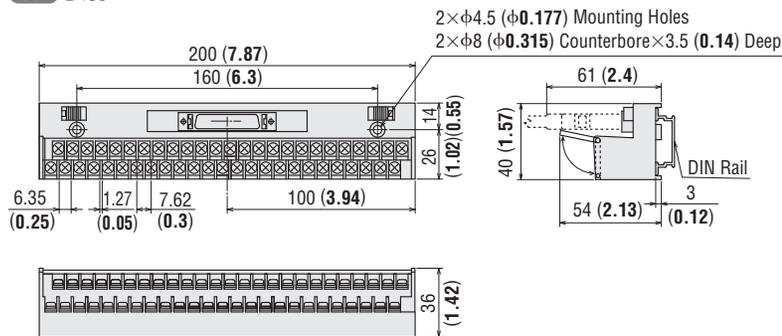
Terminal Block Pin Configuration

19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18



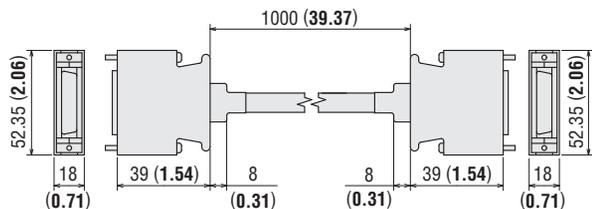
CC50T1

DXF B439



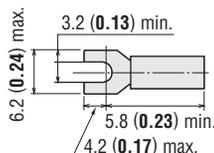
Terminal Block Pin Configuration

26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25



Recommended Crimp Terminals

- Terminal screw size: M3
- Tightening torque: 1.2 N·m (170 oz-in)
- Applicable minimum lead wire: AWG22



DIN Rail Mounting Plate RoHS

This mounting plate is convenient for installing the drivers of **DG85**, **DG130** and **DG200** on DIN rails with ease. The plate enables a simple, one-touch attachment/detachment to/from the DIN rail.

Product Line

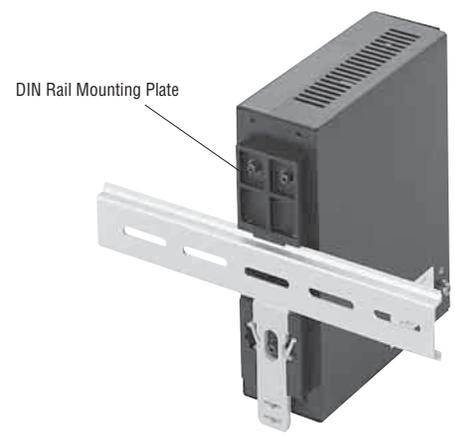
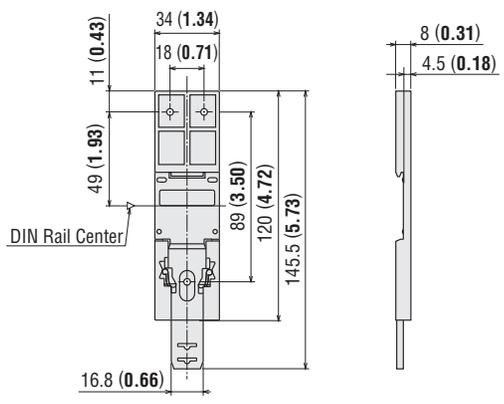
Model	Applicable Product
PADP01	DG85 DG130 DG200

Dimensions Unit = mm (in.)

Mass: 20 g (0.71 oz.)

● Screws (3 pieces, included)

M3P0.5 Length 8 mm (0.31 in.)



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DRL

Compact Linear Actuators
Accessories
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DG

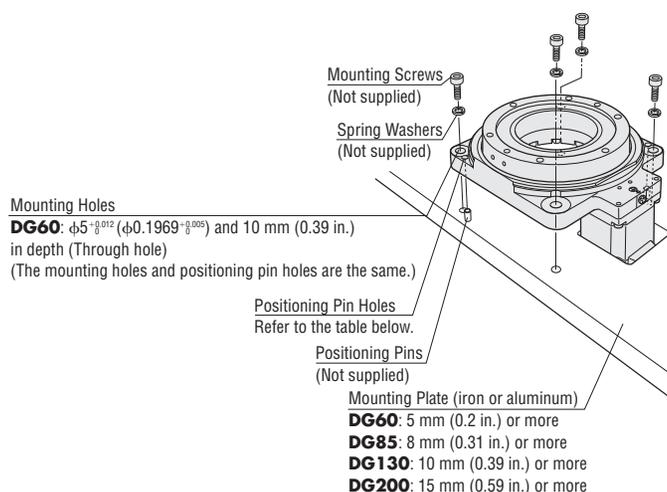
Hollow Rotary Actuators
Accessories
Installation

Hollow Rotary Actuators Installation

Actuator Installation

Install the actuator onto the mounting plate from the direction shown in the figure. Two positioning pin holes are provided in the mounting surface of the actuator. [With the actuator with a frame size of 60 mm (2.36 in.), the mounting holes and positioning pin holes are the same.] Use these holes to determine the position of the actuator on your equipment. Be sure to firmly attach the positioning pins in the mounting plate.

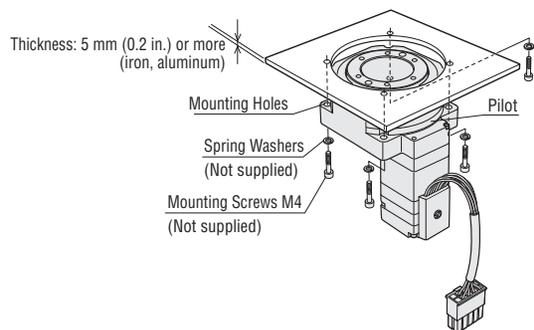
Provide relief holes in the mounting plate to prevent contact with the motor.



Positioning Pin Hole

Model	Pin Hole Diameter mm (in.)	Pin Hole Depth mm (in.)	Number of Pin Hole
DG85	$\phi 5^{+0.012}$ ($\phi 0.1969^{+0.0005}$)	10.5 (0.41) (Through hole)	2
DG130		12 (0.47) (Through hole)	
DG200	$\phi 8^{+0.015}$ ($\phi 0.3150^{+0.0006}$)	8 (0.31) (Blind hole)	2 [One of those is 8 mm × 10 mm (0.31 in. × 0.39 in.) hole]

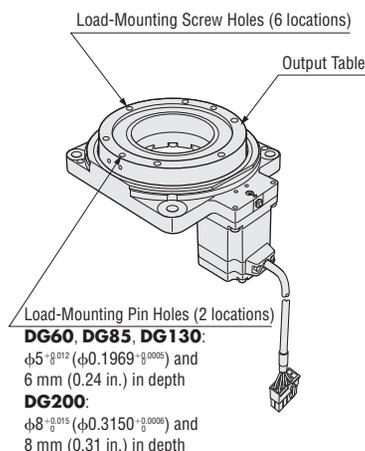
The actuator with a frame size of 60 mm (2.36 in.) can be installed from the direction shown in the figure using a pilot [$\phi 65_{-0.030}$ ($\phi 2.5591_{-0.0012}$)]. However, installation from this direction is not possible when the accessory home-sensor set is used.



Attaching the Load to the Output Table

Attach the load using the load-mounting screw holes (six locations) provided in the output table.

Two load-mounting pin holes are provided in the output table. Use these holes and positioning pins to determine the position of the load. Be sure to firmly attach the positioning pins in the load.



Installation Conditions

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

- Indoors (This product is designed and manufactured to be installed within another device.)
- Ambient temperature: 0~+50°C (+32~+122°F) (non-freezing)
0~+40°C (+32~+104°F) (non-freezing) when home-sensor set is attached
- Ambient humidity: 85% or less (non-condensing)
- Not exposed to explosive, flammable or corrosive gases
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water, oil or other liquids
- A place where heat can escape easily
- Not exposed to continuous vibration or excessive impact

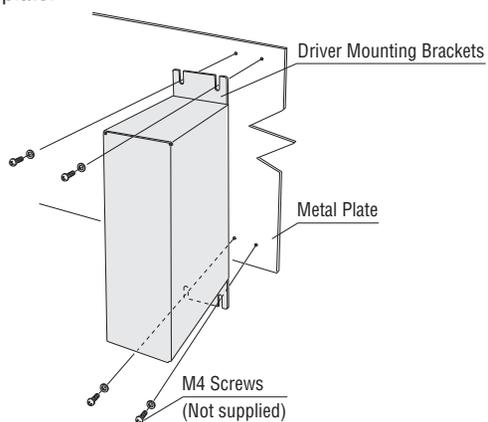
Driver Installation

Installation Direction and Method

AC Input Type

◇ Installing Using Driver Mounting Bracket

1. Install the driver mounting brackets over the mounting holes at the back of the driver, using screws included.
2. Using the mounting holes in the driver mounting brackets and four screws, install the driver by making sure no gaps remain along the metal plate.

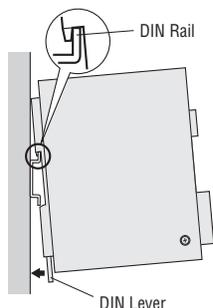


Notes:

- Firmly install on a metal plate that has good heat conductivity, such as iron or aluminum of 2 mm (0.08 in.) or more in thickness.
- To directly install the driver without using the screws included, pay particular attention to the length of the screws used for the mounting holes.

◇ Installing to a DIN Rail

Pull the DIN lever down, engage the upper hooks of the DIN rail mounting plate over the DIN rail, and push the DIN lever until it locks in place.

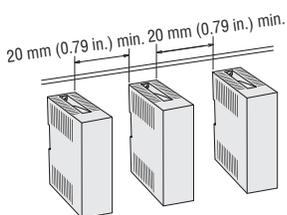


Notes:

- Use a DIN rail with a rail width of 35 mm (1.38 in.). Also, use an end plate for affixing the driver.
- The DIN rail and end plate are not supplied with the driver. Those items must be provided by the customer.

◇ Installation Clearances

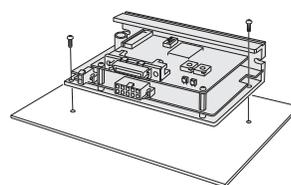
When two or more drivers are installed, the ambient temperature will increase due to rise in the temperature of each driver. Provide a minimum clearance of 20 mm (0.79 in.) between the two adjacent drivers and a minimum clearance of 25 mm (0.98 in.) between each driver and other equipment or structure in all directions. If the ambient temperature exceeds 50°C (122°F), provide forced cooling via a fan.



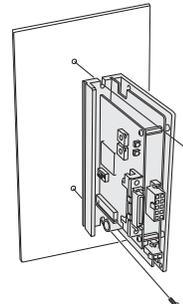
DC Input Type

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 minimum clearance of 25 mm (0.98 in.) and 50 mm (1.97 in.) in the horizontal and vertical directions respectively, between the driver and enclosure or other equipment. When installing two or more drivers in parallel, provide a minimum clearance of 20 mm (0.79 in.) and 50 mm (1.97 in.) in the horizontal and vertical directions respectively, between adjacent drivers.

● Installation Conditions

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

- Indoors (This product is designed and manufactured to be installed within another device.)
- Ambient temperature: 0~+40°C (+32~+104°F) (non-freezing)

DG60

: 0~+50°C (+32~+122°F) (non-freezing)

DG85

DG130

DG200

- Ambient humidity: 85% or less (non-condensing)
- Not exposed to explosive, flammable or corrosive gases
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water, oil or other liquids
- A place where heat can escape easily
- 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 (fillings, pins, pieces of wire, etc.) do not enter the drivers.