Linear & Rotary Actuators

Hollow Rotary Actuators

DGII Series
αSTEP AR Equipped

Hollow Rotary Actuators

DGII Series αSTEP AR Series Equipped

<Additional Information>
● Technical reference ➜ Page H-1
● Regulations & Standards ➜ Page I-2

CE

● For detailed information about regulations and standards, please see the Oriental Motor website.

View Expanded Product Information, Specifications, CAD, Accessories & more online. Visit www.orientalmotor.com/catalog or use the QR code and select "**DGII** Series".

The **DGII** Series is a line of products that combines a high rigidity hollow rotary table with an **αSTEP AR** Series stepper motor and driver package. It retains the ease of use of a stepper motor, while also allowing for highly accurate positioning of large inertia loads.

- Integrated Actuator and Motor Product Makes Design Easier
- Large-Diameter Hollow Output Table
  Diameter of Hollow Section is 100 mm (3.94 in.)
- Stepper Motor Provides Excellent Performance
  - Agile Responsiveness
  - Stability at Low Speeds
  - Tuning-Free

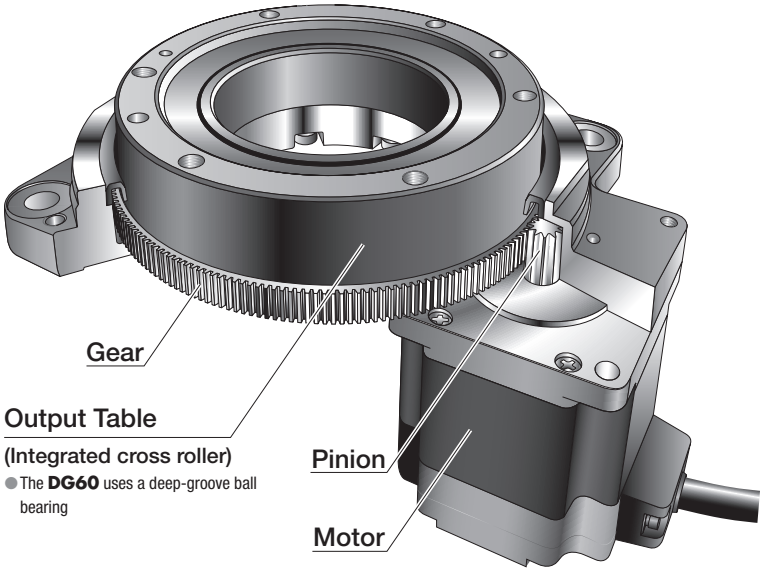
FLEX What is FLEX?

FLEX is the collective name for products that support I/O control, Modbus (RTU) control, and FA network control via network converters.
These products enable simple connection and simple control, shortening the total lead time for system construction.

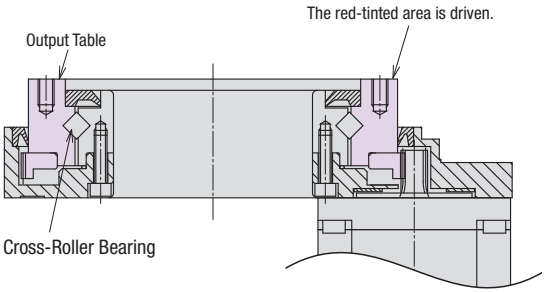
Features

Integrated Products

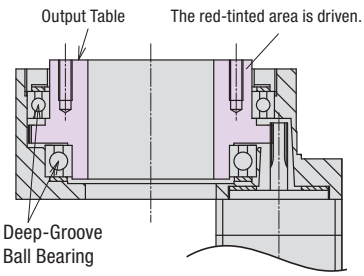
The **DGII** Series is a line of integrated product that combines a hollow rotary table with a stepper motor. The actuator has an internal speed reduction mechanism (gear ratio 18), which makes high power driving possible.



● **DG85R**, **DG130R** and **DG200R** Structure

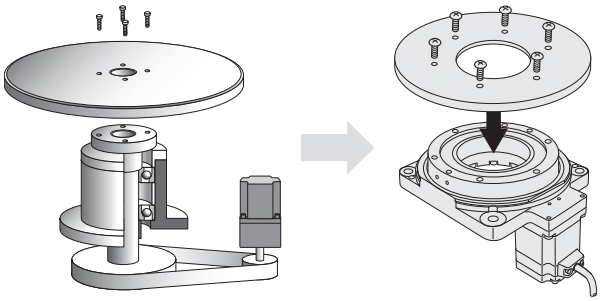


● **DG60** Structure



Simplified Design

Equipment tables and arms can be installed directly on the output table. Compared to when using mechanical components such as a belt and pulley, this save the hassle and cost of designing such a system.



Motor + Mechanical Component
(Designed and arranged separately)

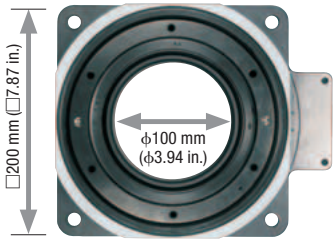
DGII Series
(Integrated product)

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

The large diameter hollow hole (through-hole) helps reduce the complexity of wiring and piping, thus simplifying equipment design.

● Filling equipment with piped-in liquid

Example: **DG200R**



	Frame Size [mm (in.)]	Diameter of Hollow Section [mm (in.)]
DG60	60 (2.36)	28 (1.1)
DG85R	85 (3.35)	33 (1.3)
DG130R	130 (5.12)	62 (2.44)
DG200R	200 (7.87)	100 (3.94)

High Load and High Rigidity

The **DGII** Series uses a cross-roller bearing* on the output table, which allows for both high load and high rigidity.

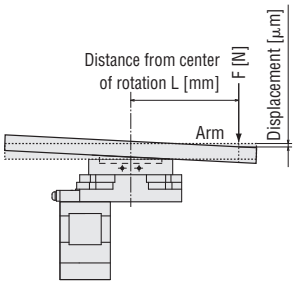
*Excludes the **DG60**

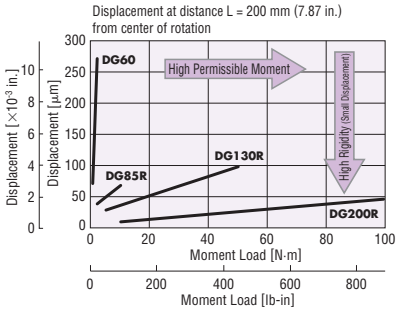
<Output Power>

Maximum Permissible Torque 50 N·m (442.5 lb-in)

<Rigidity>

Maximum Permissible Axial Load 4000 N (900 lb-in)
Maximum Permissible Moment 100 N·m (885 lb-in)
The received permissible moment increases as the frame size increases, but the displacement caused by the load moment decreases.



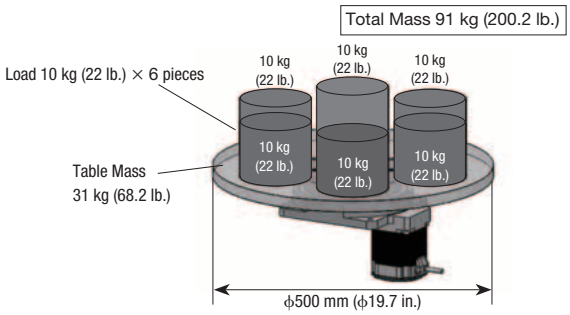


[Example Operation]

Product Name : **DG200R-ARAC2-3**
Power Supply Input : 230 VAC

Load Mass : 91 kg (200.2 lb.) (6 load pieces + table)
: Load 10 kg/piece (22 lb./piece) × 6 pieces
: Table 31 kg (68.2 lb.)
(Diameter 500 mm (19.7 in.), thickness 20 mm (0.79 in.), iron)

Overhung Distance : 160 mm (6.3 in.)
Installation Direction : Horizontal



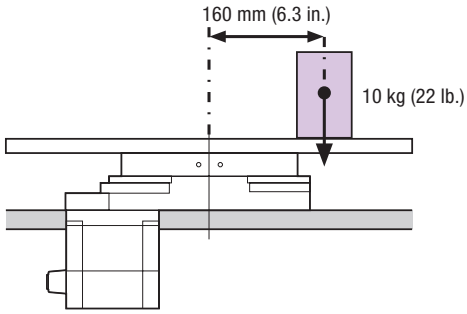
● High Load

The axial load for a total mass of 91 kg (200.2 lb.) is 893 N (201 lb.).
[10 kg (22 lb.) × 6 pieces + 31 kg (68.2 lb.)] × 9.807 m/s² ≒ 893 N (201 lb.)
The permissible axial load of the **DG200R** is 4000 N (900 lb.), so this is within the permissible value.

High Load Driving is Possible

● High Rigidity

When a 10 kg (22 lb.) load is placed 160 mm (6.3 in.) from the center of the the table, the moment is 15.7 N·m (139 lb-in).
10 kg (22 lb.) × 9.807 m/s² × 0.16 m (6.3 in.) ≒ 15.7 N·m (139 lb-in)
The permissible moment of the **DG200R** is 100 N·m (885 lb-in), so this is within the permissible value.



The DGII Series can drive even with a large load that is away from the table center.

High Positioning Accuracy with Non-Backlash

● Non-Backlash
● Repetitive Positioning Accuracy ±15 arcsec (±0.004°)

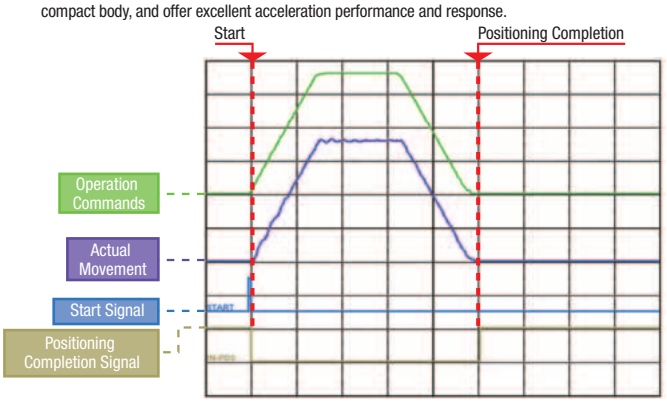
Note

The repetitive positioning accuracy is measured at a constant temperature (normal temperature) under a constant load.

Quick Positioning through Agile Responsiveness

By utilizing the high responsiveness of the stepper motor, quick short distance positioning is possible.

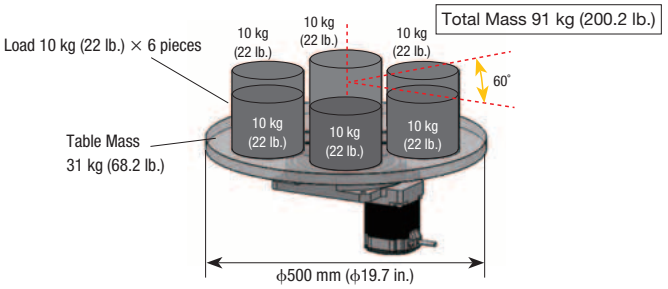
Stepper motors operate synchronously with pulse commands and generate high torque with a compact body, and offer excellent acceleration performance and response.



[Example Operation]

Product Name	:	**DG200R-ARAC2-3**
Power Supply Input	:	230 VAC
Load Mass		91 kg (200.2 lb.) (6 load pieces + table)
	:	Load 10 kg/piece (22 lb./piece) × 6 pieces
	:	Table 31 kg (68.2 lb.) (Diameter 500 mm (19.7 in.), thickness 20 mm (0.79 in.), iron)
Installation Direction	:	Horizontal
Traveling Amount		60°

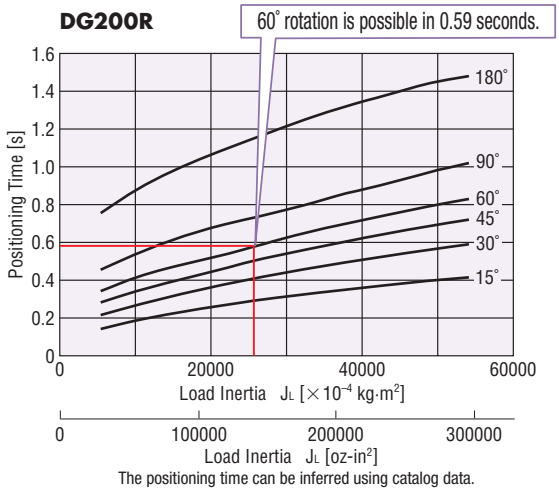
Total inertia of table and load = 2633 × 10^{-3} kg·m² (144000 oz-in²)



- Quick Positioning

With the **DG200R**, 60° rotation of a total mass of 91 kg (200.2 lb.) is possible in 0.59 seconds.

Load Inertia – Positioning Time (Reference value)



The positioning time can be inferred using catalog data.

Quick positioning is possible even with large loads.

Low Vibration Even at Low Speed

Thanks to the microstep drive system and smooth drive function* of the stepper motor, resolution can be improved without mechanical elements such as a speed reduction mechanism. As a result, speed fluctuation is minimal even at low speeds, leading to improved stability.

*About the Smooth Drive Function
The smooth drive function automatically microsteps based on the same traveling amount and traveling speed used in the full step mode, without changing the pulse input settings.

Tuning-Free

The stepper motor uses open loop control and does not require gain adjustment, so even when the load fluctuates, the movement exactly as set is obtained tuning-free.

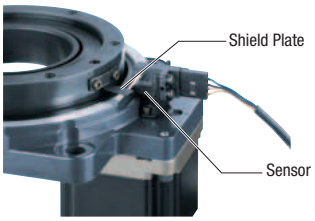
No Hunting

Thanks to the open loop control of the stepper motor, there is no "hunting", the minute shaft movements that occur during stopping. Even when a large inertia load is transported, the stop position is accurately held.

Home Sensor Set is Available as an Accessory

Because the parts necessary for return-to-home operations are available as an accessory set (sold separately), the time for designing, fabricating and procuring parts related to sensor installation is reduced.

Sensor Installation Example



Installation Pedestals are Available as an Accessory

Accessory installation pedestals (sold separately) are available to make installing the **DGII** Series easy.

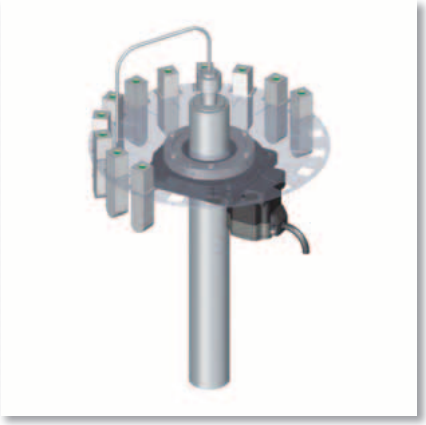
Application Example

Mounting Pedestals

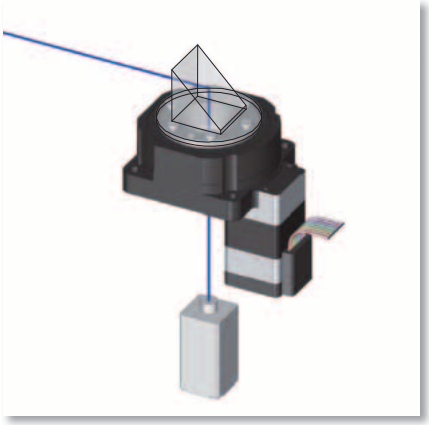
Applications

Applications Using the Hollow Hole

◇Filling Equipment with Piped-in Liquid



◇Optical Applications



Applications that Require High Rigidity

◇Applications in which a Moment Load is Applied (Ceiling installation)

Applications that Require High Performance Motors

◇High Positioning Accuracy (Image inspection equipment)

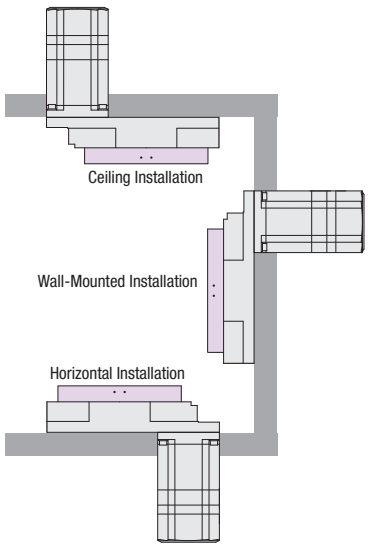
◇Applications with Load Fluctuations (Disc manufacturing equipment)

Install in Any Direction

The **DGII** Series can not only be installed horizontally, but can also be ceiling mounted or wall mounted. More options for equipment design.

Note

A small amount of grease will occasionally seep out of the hollow rotary actuator. If a grease leak would cause a contamination issue near the machine, either perform routine inspections, or install protective equipment such as an oil sump.



αSTEP AR Series Equipped

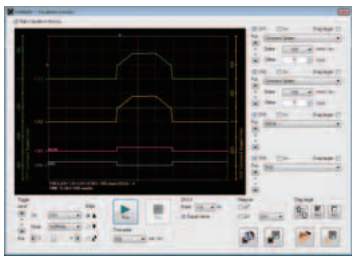
DGII Series is equipped with the αSTEP **AR** Series motor and driver package which means a common drive platform for many actuator type applications.
For increased flexibility, utilize the Built-in Controller (Stored Data) type FLEX driver with the information necessary for the actuator operations built into the drive. The burden on the host PLC (Master Controller) is reduced.

A Variety of Products with a Unified Control Method

All products in the **AR** Series group have unified controllability.

Data Setting Software and Control Module

The data setting software and the control module can both be used together with the **AR** Series.



Data Setting Software **MEXE02**

The data setting software can be downloaded from the website.

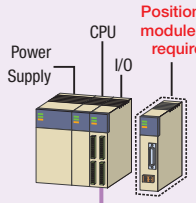
Control Module **OPX-2A** (Sold separately)

2 Driver Types Available Depending on the System Configuration

2 types of **DGII** Series drivers are available to match the requirements of the host PLC (Master Controller).

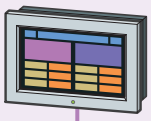
Built-in Controller Type FLEX

When controlled via I/O



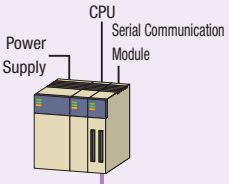
①I/O

When controlled via computer or touch screen (HMI)



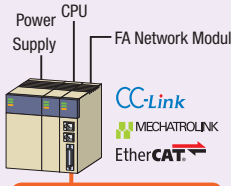
②Modbus (RTU)

When controlled via serial communication



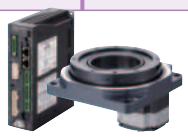
②Modbus (RTU)

When controlled via a Factory Automation (FA) network



③FA Network

②RS-485



Built-in Controller (Stored Data) Type where the operating data is set in the driver, and the operating data is selected and executed from the host system.
Host system connection and control is performed with
① I/O, ② Modbus (RTU)/RS-485 or ③ Factory Automation (FA) network.

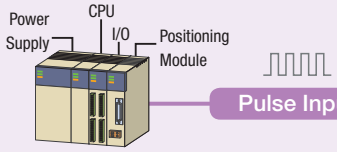
By using a network converter (sold separately), CC-link communication, MECHATROLINK or EtherCAT communication are possible. Operating data, parameter settings or operation commands can be input via the various communication types.

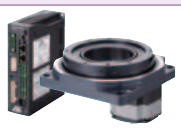
- The burden on the programmable master controller is reduced and costs are lowered when multiple axes are used.
- Unifies slaves for compatibility with various networks.
- Can also handle group sending function between slaves.

■CC-Link compatibility: Max. 12 axes.
■MECHATROLINK and EtherCAT compatibility: Max.16 axes.

CC-Link is a registered trademark of the CC-Link Association and MECHATROLINK is a registered trademark of the MECHATROLINK Association.
EtherCAT is a registered trademark licensed by Beckhoff Co., Ltd. of Germany

Pulse Input Type



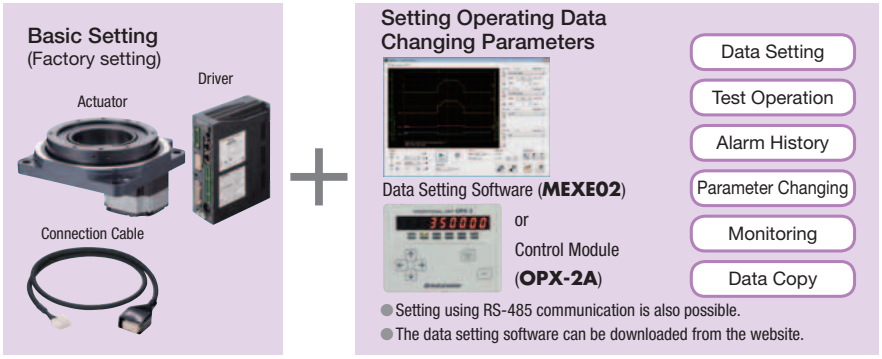


Operations are executed by inputting pulses into the driver. Motor control is carried out from the positioning module (pulse oscillator) as provided by the customer.

Driver Features

Built-in Controller Type

Because the driver has the information necessary for actuator operation, the burden on the host PLC is reduced. The system configuration when using multi-axis control can be simplified. Setting can be done by data setting software, a control module (sold separately), or RS-485 communication.



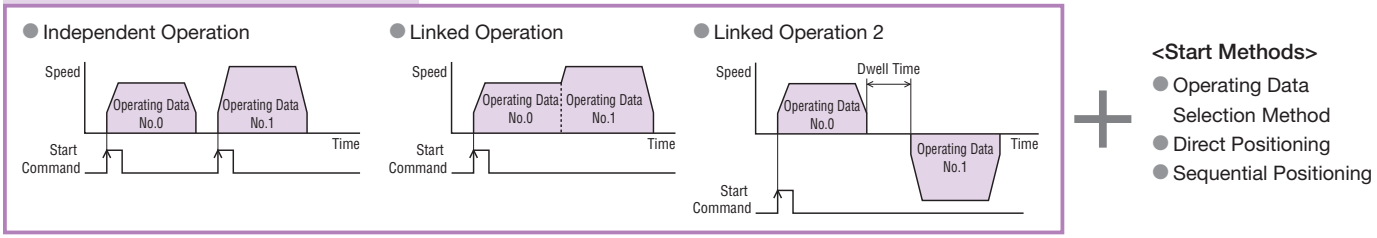
Operation Types

In the built-in controller type, the operating speed and traveling amount of the actuator are set with operating data, and operation is performed according to the selected operating data.

Item		Description	
Common	Control Method	I/O Control	
		RS-485 Communication	Network Converter Connection
			Modbus RTU Protocol Connection
	Position Command Input	Setting with operating data number	Command range for each point: −8388608～8388607 [step] (Setting unit: 1 [step])
	Speed Command Input	Setting with operating data number	Command range: 0～1000000 [Hz] (Setting unit: 1 [Hz])
	Acceleration/Deceleration Command Input	Set with the operating data number or parameter. The acceleration/deceleration rate [ms/kHz] or acceleration/deceleration time [s] can be selected. Command range: 0.001～1000.000 [ms/kHz] (Setting unit: 0.001 [ms/kHz]) 0.001～1000.000 [s] (Setting unit: 0.001 [s])	
	Acceleration/Deceleration Processing	Velocity Filter, Traveling Average Filter	
Return-To-Home Operation	Return-to-Home Modes	2-Sensor Mode	A return-to-home operation that uses a limit sensor (+LS, −LS).
		3-Sensor Mode	A return-to-home operation that uses a limit sensor and a HOME sensor.
		Position Preset	A function where P-PRESET is input at the desired position to confirm the home position.
			The home position can be set to the desired value.
Positioning Operation	Number of Positioning Points	64 points (No.0～63)	
	Operating Modes	Incremental Mode (Relative positioning)	
		Absolute Mode (Absolute positioning)	
	Operation Functions	Independent Operation	A PTP (Point to Point) positioning operation.
		Linked Operation	A multistep speed-change positioning operation that is linked with operating data.
		Linked Operation 2	A positioning operation with a timer that is linked with operating data. The timer (dwell time) can be set from 0～50.000 [s]. (Setting unit: 0.001 [s])
	Start Methods	Operating Data Selection Method	Starts the positioning operation when START is input after selecting M0～M5.
		Direct Method (Direct positioning)	Starts the positioning operation with the operating data number set in the parameters when MS0～MS5 is input.
		Sequential Method (Sequential positioning)	Starts the positioning operation in sequence from operating data No. 0 each time SSTART is input.
Continuous Operation	Number of Speed Points	64 points (No.0～63)	
	Speed Change Method	Changes the operating data number.	
Other Operations	JOG Operation	Regular feed is performed by inputting +JOG or −JOG.	
	Automatic Return Operation	When the motor position is moved by an external force while the motor is in a non-excitation state, it automatically returns to the position where it originally stopped.	
	Control Mode*	The normal mode and the current control mode can be selected.	
Absolute Backup		An absolute system can be built by using a battery (accessory).	

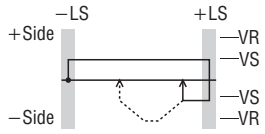
● Push-motion operation cannot be used with this product.
*Except when further reduction of heat generation or noise is needed, using normal mode is recommended.

Positioning Operation

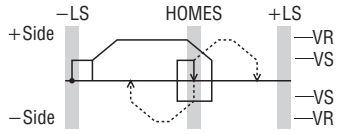


Return-To-Home Operation

● 2-Sensor Mode

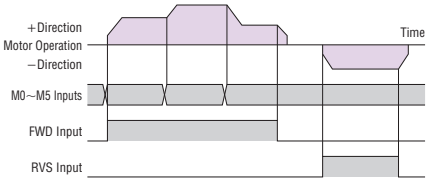


● 3-Sensor Mode



● Position Preset

Continuous Operation



Other Operations

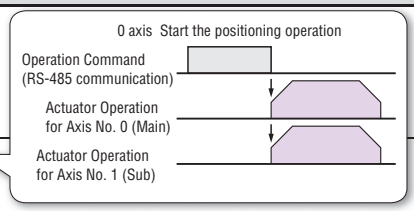
● JOG Operation (Test operation)

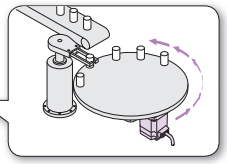
● Automatic Return Operation

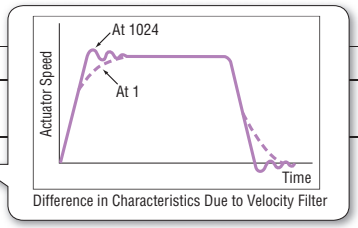
● Equipped with a sequence for return-to-home operation that reduces the burden of the host master and the hassle of creating a ladder.

Main Functions

Function	Description
Motor Resolution Setting Function*1	The motor resolution can be changed by the driver without the mechanically operated speed reduction mechanism. Determining the minimum traveling amount of the output table $1000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} \times \frac{18}{\text{(Gear ratio)}}$ [°]
Group Send Function (Via RS-485 communication or network converter)	Configure a group of multiple axes connected using RS-485 communication, and send commands by group. Simultaneous start and operation can also be performed for multiple axes.
Round Function	A function that returns the command position and multiple rotation data to 0 when the command position exceeds the round setting range parameter setting value. Since the multiple rotation data is returned to 0, position control is possible even with continuous rotation operation in the same direction using an absolute backup system. ● When building an absolute system, the accessory (sold separately) battery is necessary.
Hardware Overtravel	This function stops the actuator when the mechanical limit sensor is exceeded.
Software Overtravel	This function stops the actuator when exceeding the limit set by the software. Depending on the setting, an alarm can also be output without stopping.
STOP Input (External stop)	This function forcibly stops operation when there is an abnormality or other issue. Select instantaneous stop, deceleration stop, or all windings off (actuator holding force is off) as the stopping method.
Alarm Code Output	Alarm codes that are occurring can be output.
Alarm History	Even if the power is turned off, up to 10 alarms that have occurred can be stored. This can be used for troubleshooting.
Velocity Filter	This is used to make the movement at start/stop smoother or to reduce vibration during low-speed operation. This function controls the speed changes of the actuator to prevent them from becoming too large even for sudden operation command changes.
Teaching Function*1	Teaching can be performed. Move the load to the target position, and store the position data for that time as the positioning data.
I/O Monitoring*1	The ON/OFF status of the I/O signals can be checked.
Waveform Monitoring*2	The operating speed and I/O signals can be checked as a waveform.







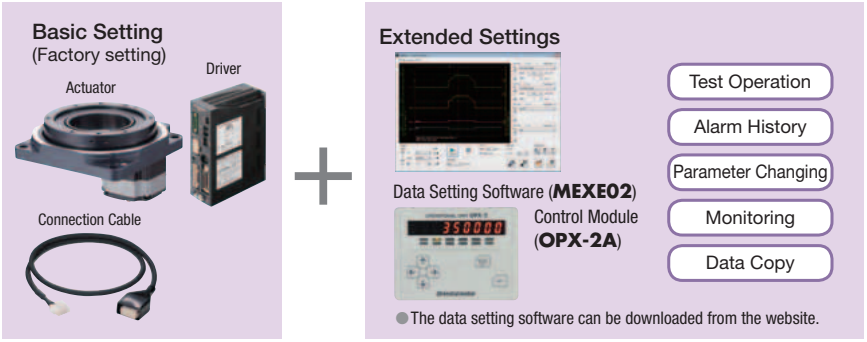
● The data setting software **MEXE02** can be downloaded from the website.

*1 Can be performed with the separately-sold control module (**OPX-2A**) or data setting software (**MEXE02**).

*2 Can be performed with the data setting software (**MEXE02**).

Pulse Input Type

Use the control module (sold separately) and data setting software to perform operations, such as changing the parameters, displaying the alarm history, and performing various types of monitoring.



Main Functions

Item	Overview	Basic Setting	Extended Settings
Selection of Pulse Input Mode	1-pulse input mode or 2-pulse input mode can be selected.	●	●
	In addition to the normal settings, the phase difference input can also be set. • 1-pulse input mode (positive logic/negative logic) • 2-pulse input mode (positive logic/negative logic) • Phase difference input (1-multiplication/2-multiplication/4-multiplication)	–	●
Resolution Setting	The resolution can be selected with a function switch.	●	●
	The function switch can be used to the change each of the corresponding electronic gear values.	–	●
Running Current Setting	The running current setting can be changed with the current setting switch (CURRENT).	●	●
	The value corresponding to each stage of the current setting switch (CURRENT), 0~F (16 stages), can be changed.	–	●
Standstill Current Ratio Setting	The ratio of the standstill current relative to the running current can be set.	–	●
Motor Rotational Coordinates Setting	The rotational coordinates for the motor can be set.	–	●
All Windings On Signal (C-ON input)	The input signal for the excitation of the motor.	●	●
	The logic of the C-ON input during power supply input can be set.	–	●
Return to Excitation Position Operation During All Windings On Enable/Disable	Set whether or not to return to the excitation position (deviation 0 position) during all windings on.	–	●
Alarm Code Signal Enable/Disable	Set to output the code when an alarm occurs.	–	●
END Output Signal Range Setting	The END output signal range can be changed.	–	●
END Output Signal Offset	The END output signal value can be offset.	–	●
A/B Phase Output	This can be used to confirm the position of the motor.	●	●
Timing Output Signal	This is output each time the motor rotates 7.2° (0.4° for the output table).	●	●
Velocity Filter Setting	Applies a filter to the operation command to control the motor action.	●	●
	The values corresponding to each of 0~F (16 levels) for the setting switch.	–	●
Vibration Suppression Function for Normal Mode	This can be set to suppress resonant vibration during rotation.	–	●
	This can be set to suppress vibration during acceleration, and deceleration, and when stopped.	–	●
Gain Adjustment for Current Control Mode*	Adjusts the position and speed loop gain.	–	●
	Adjusts the speed integration time constant.	–	●
	Sets the damping control vibration frequency.	–	●
	Sets whether to enable or disable damping control.	–	●
Selection of Motor Excitation Position at Power On	The motor excitation position for when the power is on can be selected.	–	●
Control Module Setting	Select whether to use symbols or an absolute value display for the speed display of the control module.	–	●
	The geared motor gear ratio for the speed monitor can be set. (The gear ratio for the **DGII** Series is 1:18)	–	●

●The data setting software **MEXE02** can be downloaded from the website.
*Except when further reduction of heat generation or noise is needed, using normal mode is recommended.

How to Read Specifications

●Hollow Rotary Actuators

	Frame Size		mm (in.)	60 (2.36)	85 (3.35)	130 (5.12)	200 (7.87)
	Product Name	Built-in Controller		**DG60-AR□KD2-3**	**DG85R-AR□□D2-3**	**DG130R-AR□□D2-3**	**DG200R-AR□□D2-3**
		Pulse Input		**DG60-AR□K2-3**	**DG85R-AR□□2-3**	**DG130R-AR□□2-3**	**DG200R-AR□□2-3**
	Motor Type			**AR** Series			
①	Type of Output Table Supporting Bearing			Deep-Groove Ball Bearing	Cross-Roller Bearing		
②	Inertia		J: kg·m^2 (oz-in^2)	4324×10^{-7} (23.7)	22092×10^{-7} (120.8)	150620×10^{-7} [189500×10^{-7}] (823.9) [(1036.6)]	916400×10^{-7} [955280×10^{-7}] (5012.7) [(5225.4)]
	Gear Ratio			18			
③	Motor Resolution			1000 P/R			
④	Permissible Torque		N·m (lb-in)	0.9 (7.9)	2.8 (24)	12 (106)	50 (440)
⑤	Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	0.45 (3.9)	1.8 (15.9)	12 (106)	36 [20] (310) [(177)]
		Electromagnetic Brake	N·m (lb-in)	–	–	12 (106)	20 (177)
⑥	Rated Speed		r/min	200			110
⑦	Repetitive Positioning Accuracy		arcsec (degrees)	±15 (±0.004°)			
⑧	Lost Motion		arcmin (degrees)	2 (0.033°)			
⑨	Angular Transmission Accuracy		arcmin (degrees)	4 (0.067°)	4 (0.067°)	3 (0.05°)	2 (0.033°)
⑩	Permissible Axial Load		N (lb.)	100 (22)	500 (112)	2000 (450)	4000 (900)
⑪	Permissible Moment Load		N·m (lb-in)	2 (17.7)	10 (88)	50 (440)	100 (880)
⑫	Runout of Output Table Surface		mm (in.)	0.030 (0.0012)	0.015 (0.0006)		
⑬	Runout of Output Table Inner (Outer) Diameter		mm (in.)	0.030 (0.0012)	0.015 (0.0006)		0.030 (0.0012)
⑭	Parallelism of Output Table		mm (in.)	0.050 (0.002)	0.030 (0.0012)		0.050 (0.002)
⑮	Degree of Protection	Single Shaft, Electromagnetic Brake Type		IP40 (IP20 for motor connector)			
		Double Shaft		IP20			
	Power Supply Input	Voltage and Frequency	Built-in Controller	24 VDC±5%	Single-Phase 100-120 VAC, Single-Phase 200-240 VAC −15～+6%, 50/60 Hz		
			Pulse Input	24 VDC±10%	Single-Phase 100-115 VAC, Single-Phase 200-230 VAC, Three-Phase 200-230 VAC −15～+10%, 50/60 Hz		
		Input Current A	Built-in Controller 24 VDC	1.3	–	–	–
			Built-in Controller Single-Phase 100-120 VAC	–	2.4	3.6	5.9
			Built-in Controller Single-Phase 200-240 VAC	–	1.5	2.3	3.7
			Pulse Input 24 VDC	0.9	–	–	–
			Pulse Input Single-Phase 100-115 VAC	–	2.9	4.4	6.5
			Pulse Input Single-Phase 200-230 VAC	–	1.9	2.7	4.1
			Pulse Input Three-Phase 200-230 VAC	–	1.0	1.4	2.2
	Control Power Supply			–	24 VDC±5%, 0.5 A		
	Electromagnetic Brake Power Supply Input			–	–	24 VDC±5%, 0.25 A	

①Type of Output Table Supporting Bearing
The type of bearing used for the output table.

②Inertia
The total sum of the rotor inertia of the motor and the inertia of the reduction mechanism, converted to a moment on the output table.

③Motor Resolution
The number of pulses needed to rotate the output table by one rotation. Check the operating manual for the method of calculating the minimum traveling amount [°] of the output table at a gear ratio of 18.

④Permissible 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.

⑤Holding Torque at Motor Standstill
- Power ON: This is the maximum torque with which to hold the output table in position if it stops when the power is on.
- Electromagnetic Brake: Static friction torque when the electromagnetic brake is activated at standstill is shown. (Electromagnetic brake is non-excitation actuated type)

⑥Rated Speed
The output table speed that the mechanical strength of the speed reduction mechanism can tolerate.

⑦Repetitive Positioning Accuracy
A value indicating the degree of error that generates when positioning is performed repeatedly to the same position in the same direction.

⑧Lost Motion
The difference in stopped angles achieved when the output table is positioned to the same position in the forward and reverse directions.

⑨Angular Transmission Accuracy
The difference between the theoretical rotation angle of the output table as calculated from the input pulse number and the actual rotation angle.

⑩Permissible Axial Load
The permissible value of axial load applied to the output table in the axial direction.

⑪Permissible 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.

⑫Runout 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.

⑬Runout 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.

⑭Parallelism of Output Table
An inclination of the mounting surface of the output table compared with the actuator mounting surface on the equipment side.

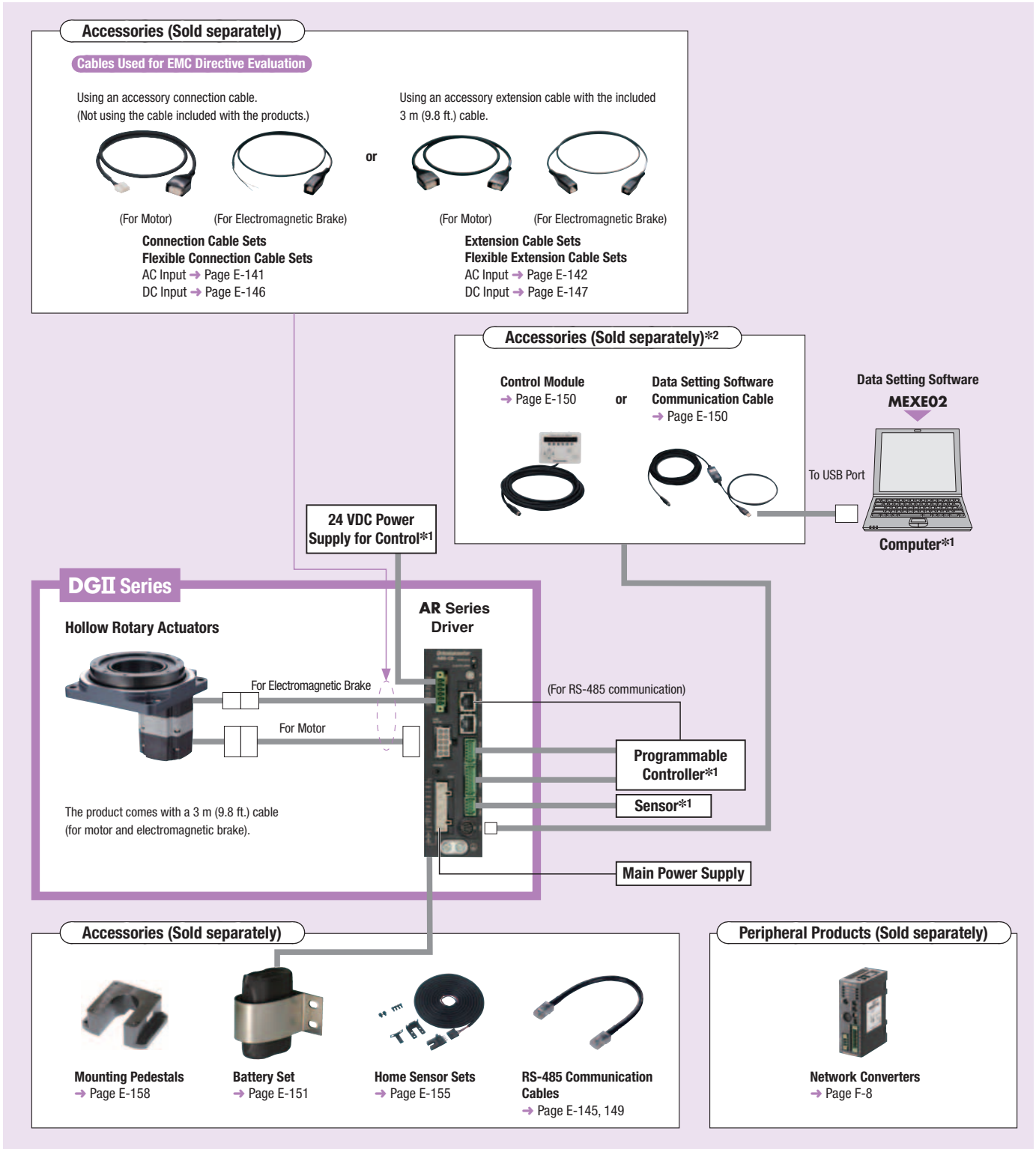
⑮Degree of Protection
IEC 60529 and EN 60034-5 (IEC 60034-5) classify the dust resistance and waterproofing into grades.

System Configuration

When Equipped with **AR** Series, Built-in Controller Type with Electromagnetic Brake

An example of a configuration using I/O control or RS-485 communication is shown below.

*1 Not supplied
*2 Required for I/O control drive.



Example of System Configuration

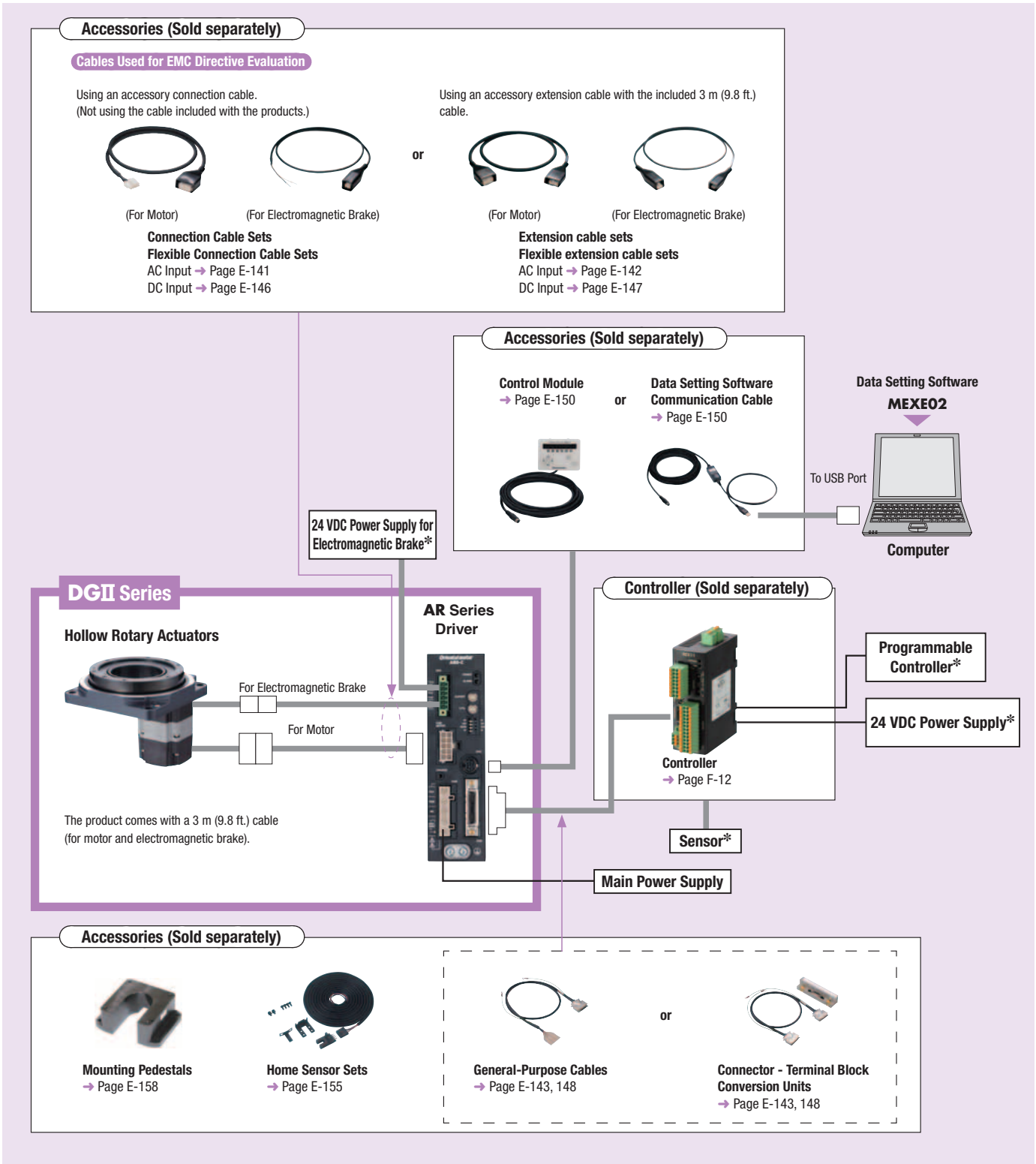
DGII Series		Sold Separately	
		Mounting Pedestals	Home Sensor Sets
DG130R-ARMAD2-3	+	MDG130B	PADG-5B
$2,654.00		$400.00	$107.00

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

●When Equipped with **AR** Series, Pulse Input Type with Electromagnetic Brake

An example of a single-axis system configuration with the **SCX11** controller is shown below.

*Not supplied



●Example of System Configuration

DGII Series		Sold Separately			
		Controller	Mounting Pedestals	Home Sensor Sets	Connector-Terminal Block Conversion Units 1 m (3.3 ft.)
DG130R-ARMA2-3	+	SCX11	MDG130B	PADG-SB	CC36T10E
$2,654.00		$349.00	$400.00	$107.00	$284.00

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

Product Number

DG 130 R - AR A C D 2 - 1

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①	Series Name	**DG**: **DGII** 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	**R**: Cross-Roller Bearing Blank: Deep-Groove Ball Bearing
④	Motor Type	**AR**: **AR** Series
⑤	Motor Shaft	**A**: Single Shaft **B**: Double Shaft **M**: With Electromagnetic Brake
⑥	Power Supply Input	**AR** Series (Built-in controller type) **A**: Single-Phase 100-120 VAC **C**: Single-Phase 200-240 VAC **K**: 24 VDC **AR** Series (Pulse input type) **A**: Single-Phase 100-115 VAC **C**: Single-Phase 200-230 VAC **S**: Three-Phase 200-230 VAC **K**: 24 VDC
⑦	Driver Type	**D**: Built-in Controller Type Blank: Pulse Input Type
⑧	Reference Number	–
⑨	Connection Cable*	Number: Length of Included Connection Cable **3**: 3 m (9.8 ft.)

*Connection cables 5 m (16.4 ft.) and longer are available as accessories (sold separately).

Product Line

Built-in Controller Type

AC Input

Product Name	List Price
DG85R-ARA□D2-3	$2,183.00
DG85R-ARB□D2-3	$2,186.00
DG130R-ARA□D2-3	$2,410.00
DG130R-ARB□D2-3	$2,413.00
DG130R-ARM□D2-3	$2,654.00
DG200R-ARA□D2-3	$2,841.00
DG200R-ARB□D2-3	$2,845.00
DG200R-ARM□D2-3	$3,085.00

DC Input

Product Name	List Price
DG60-ARAKD2-3	$1,315.00
DG60-ARBKD2-3	$1,318.00

Pulse Input Type

AC Input

Product Name	List Price
DG85R-ARA□2-3	$2,183.00
DG85R-ARB□2-3	$2,186.00
DG130R-ARA□2-3	$2,410.00
DG130R-ARB□2-3	$2,413.00
DG130R-ARM□2-3	$2,654.00
DG200R-ARA□2-3	$2,841.00
DG200R-ARB□2-3	$2,845.00
DG200R-ARM□2-3	$3,085.00

DC Input

Product Name	List Price
DG60-ARAK2-3	$1,265.00
DG60-ARBK2-3	$1,268.00

The following items are included with each product.

Actuator, Driver, Cable for Motor*1, Cable for Electromagnetic Brake*1*2, Connector Set for Driver, Operating Manual*3

*1 Accessory cables (sold separately) must be purchased in the following situations:
- When using a flexible extension cable
- When using a cable longer than 3 m (9.8 ft.)

*2 Only for electromagnetic brake type.

*3 Details regarding product installation and wiring are in the operating manual. See the user manual for details regarding product operation.

● Either **A** (single-phase 100-115 (120) VAC), **C** (single-phase 200-230 (240) VAC) or **S** (three-phase 200-230 VAC: pulse input packages only) indicating power supply input is entered where the □ is located within the product name.

Specifications

Hollow Rotary Actuators

AC input: c UL us *1 CE *1 *2 DC input: CE *1

Frame Size			mm (in.)	60 (2.36)	85 (3.35)	130 (5.12)	200 (7.87)
Product Name	Built-in Controller			**DG60-AR□KD2-3**	**DG85R-AR□□D2-3**	**DG130R-AR□□D2-3**	**DG200R-AR□□D2-3**
	Pulse Input			**DG60-AR□K2-3**	**DG85R-AR□□2-3**	**DG130R-AR□□2-3**	**DG200R-AR□□2-3**
Motor Type				**AR** Series			
Type of Output Table Supporting Bearing				Deep-Groove Ball Bearing	Cross-Roller Bearing		
Inertia			J: kg·m^2 (oz-in^2)	4324×10^{-7} (23.7)	22092×10^{-7} (120.8)	150620×10^{-7} [189500×10^{-7}]*3 (823.9) [(1036.6)]*3	916400×10^{-7} [955280×10^{-7}]*3 (5012.7) [(5225.4)]*3
Gear Ratio				18			
Motor Resolution*4				1000 P/R			
Permissible Torque			N·m (lb-in)	0.9 (7.9)	2.8 (24)	12 (106)	50 (440)
Holding Torque at Motor Standstill	Power ON		N·m (lb-in)	0.45 (3.9)	1.8 (15.9)	12 (106)	36 [20]*3 (310) [(177)]*3
	Electromagnetic Brake		N·m (lb-in)	–	–	12 (106)	20 (177)
Rated Speed			r/min	200			110
Repetitive Positioning Accuracy			arcsec (degrees)	±15 (±0.004°)			
Lost Motion			arcmin (degrees)	2 (0.033°)			
Angular Transmission Accuracy			arcmin (degrees)	4 (0.067°)	4 (0.067°)	3 (0.05°)	2 (0.033°)
Permissible Axial 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	Single Shaft, Electromagnetic Brake Type			IP40 (IP20 for motor connector)			
	Double Shaft			IP20			
Power Supply Input	Voltage and Frequency	Built-in Controller		24 VDC±5%	Single-Phase 100-120 VAC, Single-Phase 200-240 VAC −15~+6%, 50/60 Hz		
		Pulse Input		24 VDC±10%	Single-Phase 100-115 VAC, Single-Phase 200-230 VAC, Three-Phase 200-230 VAC −15~+10%, 50/60 Hz		
	Input Current A	Built-in Controller	24 VDC	1.3	–	–	–
			Single-Phase 100-120 VAC	–	2.4	3.6	5.9
			Single-Phase 200-240 VAC	–	1.5	2.3	3.7
		Pulse Input	24 VDC	0.9	–	–	–
			Single-Phase 100-115 VAC	–	2.9	4.4	6.5
			Single-Phase 200-230 VAC	–	1.9	2.7	4.1
			Three-Phase 200-230 VAC	–	1.0	1.4	2.2
Control Power Supply				–	24 VDC±5%, 0.5 A		
Electromagnetic Brake Power Supply Input*5				–	–	24 VDC±5%*6, 0.25 A	

- Either **A** (single shaft), **B** (double shaft) or **M** (with electromagnetic brake) indicating the configuration of the motor is entered where the box □ is located within the product name.
  For **DG60** and **DG85R**, either **A** (single shaft) or **B** (double shaft) is entered.
- Either **A** (single-phase 100-115 (120) VAC), **C** (single-phase 200-230 (240) VAC) or **S** (three-phase 200-230 VAC: pulse input packages only) indicating power supply input is entered where the box □ is located within the product name.

*1 For motor product names, not actuator product names. (**DG200R-ARM□2-3**: CE Marking only)
*2 Pulse input type only (excluding **DG200R-ARM□2-3**)
*3 The brackets [ ] indicate the specifications for the electromagnetic brake type.
*4 The motor resolution when shipped. Check the operating manual for the method of calculating the minimum traveling amount [°] of the output table at a gear ratio of 18.
*5 For the pulse input type, a separate power supply for the electromagnetic brakes is required for the electromagnetic brake type.
*6 If the wiring distance between the motor and driver is extended to 20 m (65.6 ft.) or longer using an accessory cable (sold separately), the 24 VDC±4% specification applies.

Note

- The back shaft on a double shaft motor is intended for installation of a slit disk. Do not apply load torque, radial load or axial load to the back shaft of the motor.
- Depending on the driving conditions, a considerable amount of heat may be generated by the motor. Be sure to keep the motor case temperature at 100°C (212°F) or less.
- The repetitive positioning accuracy is measured at a constant temperature (normal temperature) under a constant load.

General Specifications (Actuator)

Motor Type		**AR** Series AC Input	**AR** Series DC Input
Thermal Class		130 (B) [The DC input is certified as compliant with UL Standards 105 (A).]	
Insulation Resistance		The measured value is 100 MΩ or more when a 500 VDC megger is applied between the following locations: ・Between the case and motor sensor windings ・Between the case and electromagnetic brake windings	
Dielectric Strength		Sufficient to withstand the following for 1 minute: ・Between the case and motor sensor windings: 1.5 kVAC, 50 Hz or 60 Hz ・Between the case and electromagnetic brake windings: 1.5 kVAC, 50 Hz or 60 Hz	Sufficient to withstand the following for 1 minute: ・Between the case and motor sensor windings: 0.5 kVAC, 50 Hz or 60 Hz
Operating Environment (In operation)	Ambient Temperature	0~+50°C (+32~+122°F) (Non-freezing) When home sensor set (accessory) is installed: 0~+40°C (+32~+104°F) (Non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Atmosphere	Use in an area without corrosive gases and dust. The product should not be exposed to water, oil or other liquids.	

Note

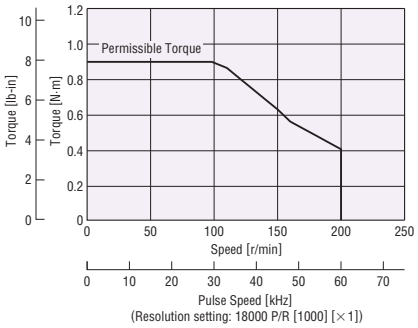
- Do not perform the insulation resistance test or dielectric voltage withstand test while the actuator and driver are connected.

Driver Specifications

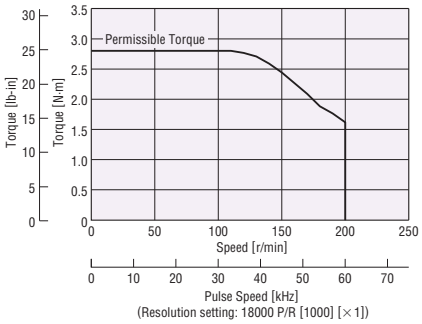
AR Series AC Input → Page A-44
DC Input → Page A-165

Speed – Torque Characteristics

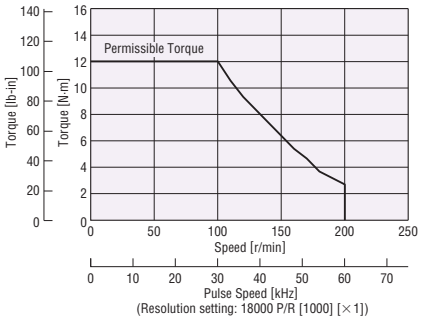
DG60



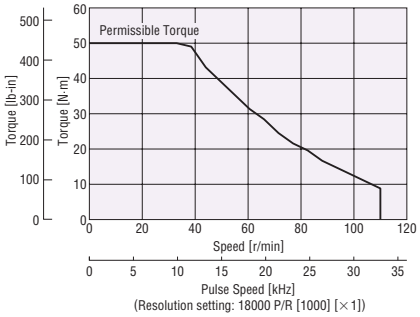
DG85R



DG130R

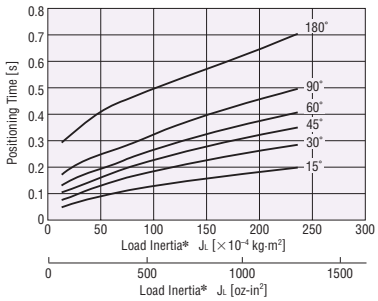


DG200R

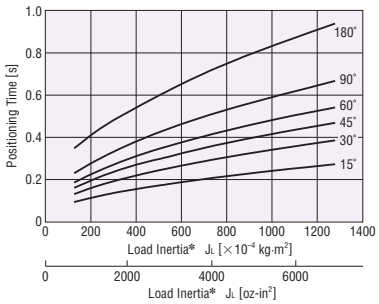


Load Inertia – Positioning Time (Reference value)

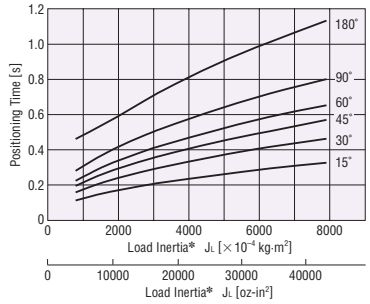
DG60



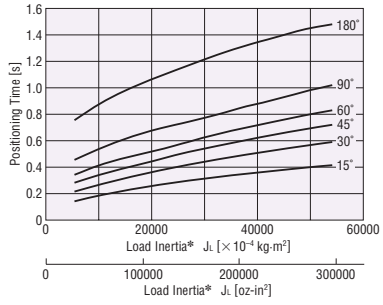
DG85R



DG130R



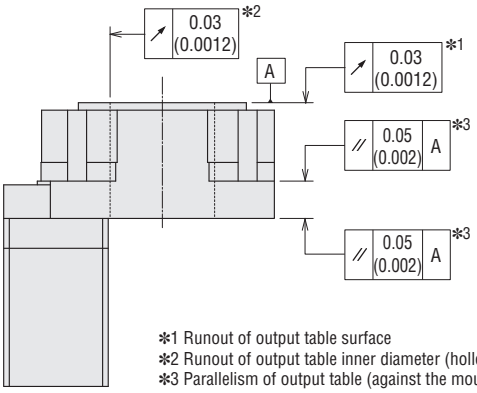
DG200R



∗The load inertia refers to the inertia of the customer's load.

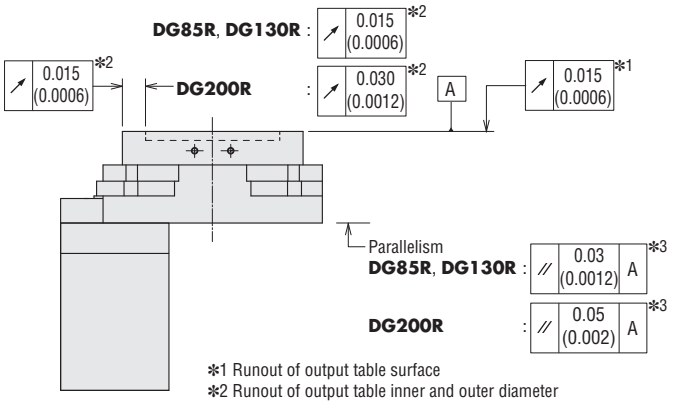
Table Precision (at no load) Unit = mm (in.)

DG60



*1 Runout of output table surface
*2 Runout of output table inner diameter (hollow diameter)
*3 Parallelism of output table (against the mounting surface)

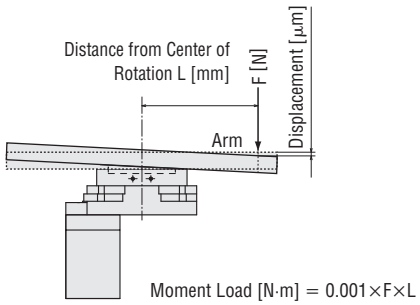
DG85R, DG130R, DG200R



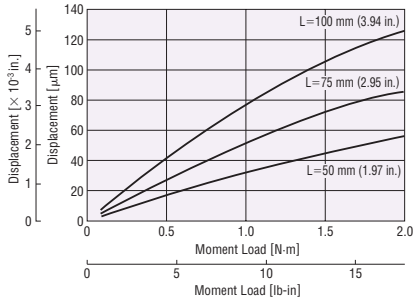
*1 Runout of output table surface
*2 Runout of output table inner and outer diameter
*3 Parallelism of output table (against the mounting surface)

Displacement by Moment Load (Reference value)

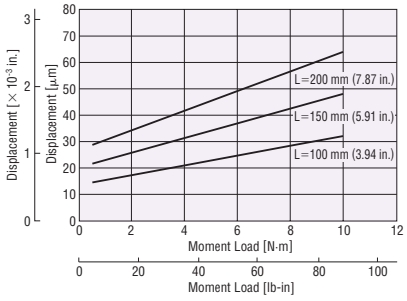
The output table will be displaced when it receives the moment load. The graph plots the table displacement that occurs at distance L from the rotation center of the output table when a given load is applied in the negative direction.
The displacement becomes approximately double when the moment load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



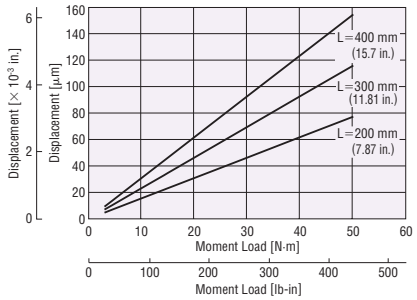
DG60



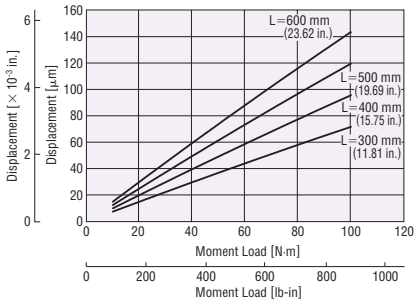
DG85R



DG130R



DG200R

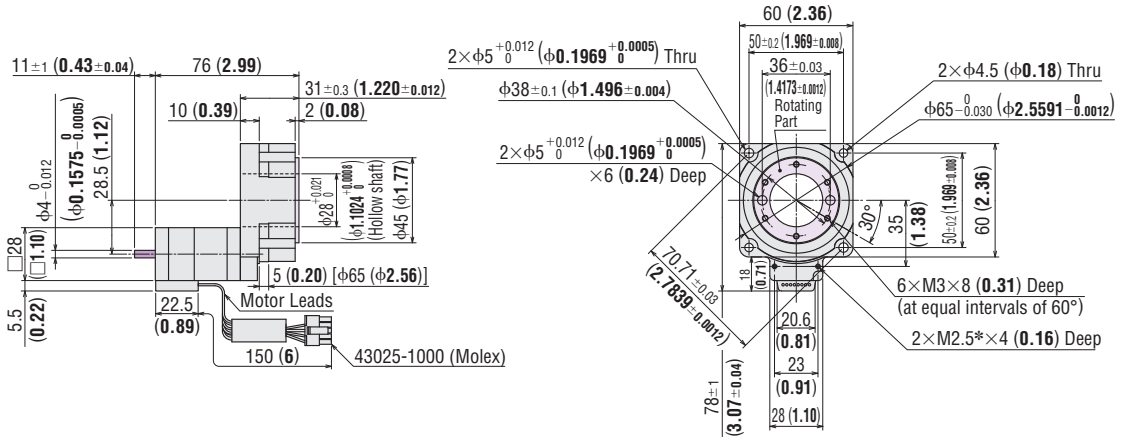


Dimensions Unit = mm (in.)

Actuator

2D & 3D CAD

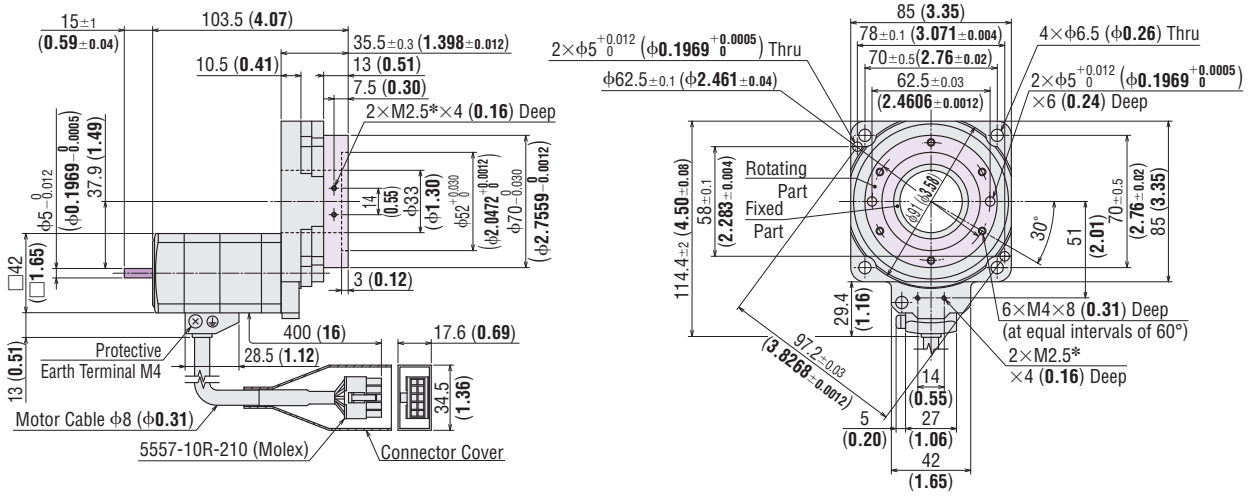
Product Name	Actuator Product Name	Mass kg (lb.)	2D CAD
DG60-ARAK□2-3	DGM60-ARAK	0.5 (1.1)	D2853
DG60-ARBK□2-3	DGM60-ARBK		



*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.

2D & 3D CAD

Product Name	Actuator Product Name	Mass kg (lb.)	2D CAD
DG85R-ARAA□2-3	DGM85R-ARAC	1.2 (2.6)	D2854
DG85R-ARAC□2-3			
DG85R-ARAS2-3			
DG85R-ARBA□2-3	DGM85R-ARBC		
DG85R-ARBC□2-3			
DG85R-ARBS2-3			

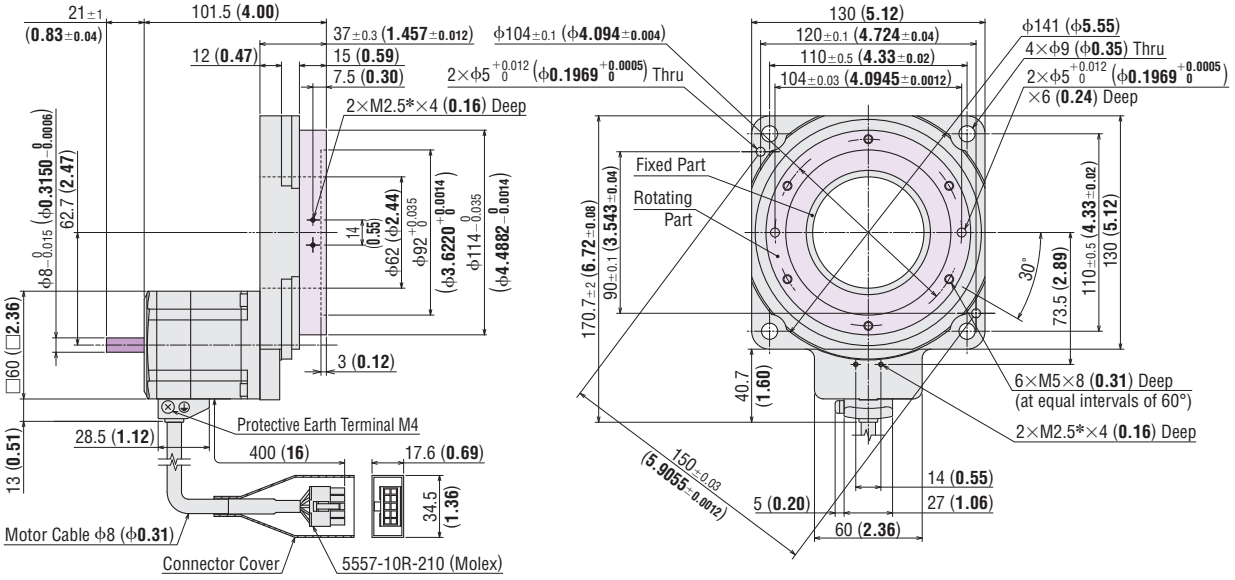


*Use M2.5 screw holes when installing the home-sensor set (sold separately). Do not use these holes for any purpose other than to install the home-sensor.

- A letter **D** indicating the driver type (built-in controller type) is entered where the box □ is located within the product name. A code for the pulse input type is not entered in the box □.
- These dimensions are for the double shaft types. For the single shaft types, ignore the purple ( ) areas.
- The shaded areas are rotating parts.

2D & 3D CAD

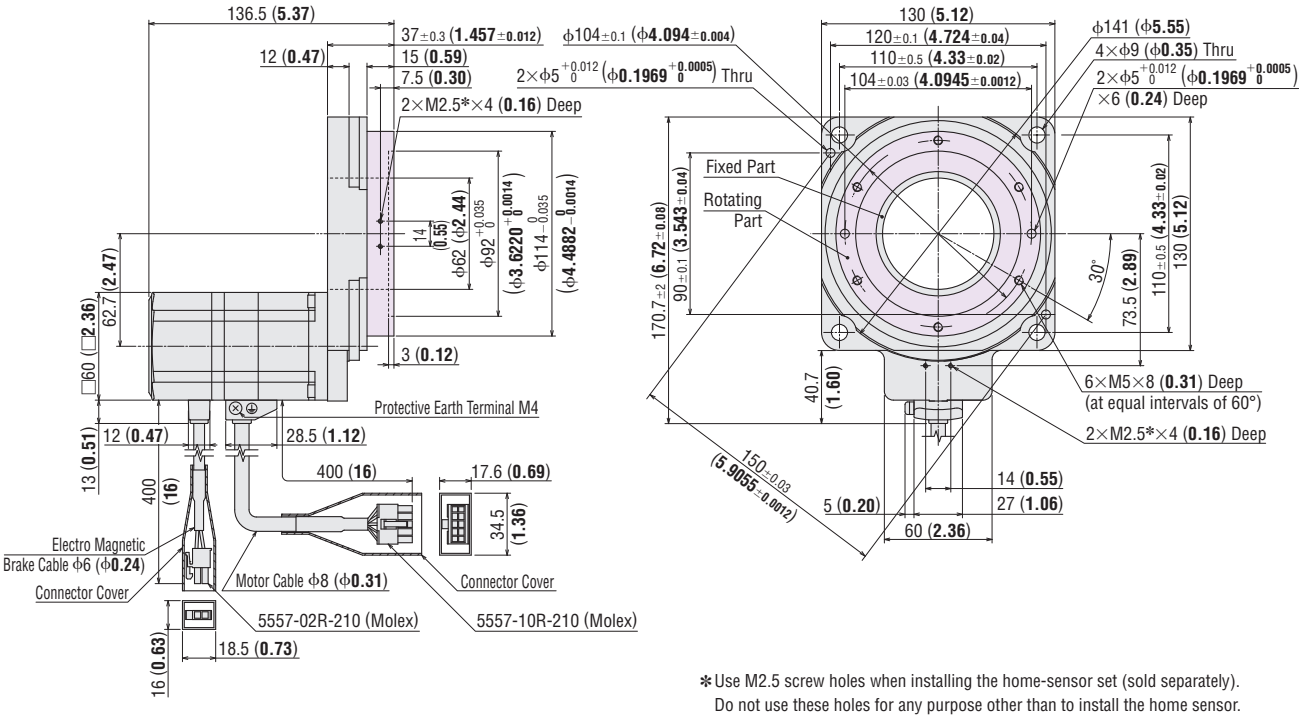
Product Name	Actuator Product Name	Mass kg (lb.)	2D CAD
DG130R-ARAA□2-3	DGM130R-ARAC	2.7 (5.9)	D2855
DG130R-ARAC□2-3			
DG130R-ARAS2-3			
DG130R-ARBA□2-3	DGM130R-ARBC		
DG130R-ARBC□2-3			
DG130R-ARBS2-3			



*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.

2D & 3D CAD

Product Name	Actuator Product Name	Mass kg (lb.)	2D CAD
DG130R-ARMA□2-3	DGM130R-ARMC	3 (6.6)	D2856
DG130R-ARMC□2-3			
DG130R-ARMS2-3			

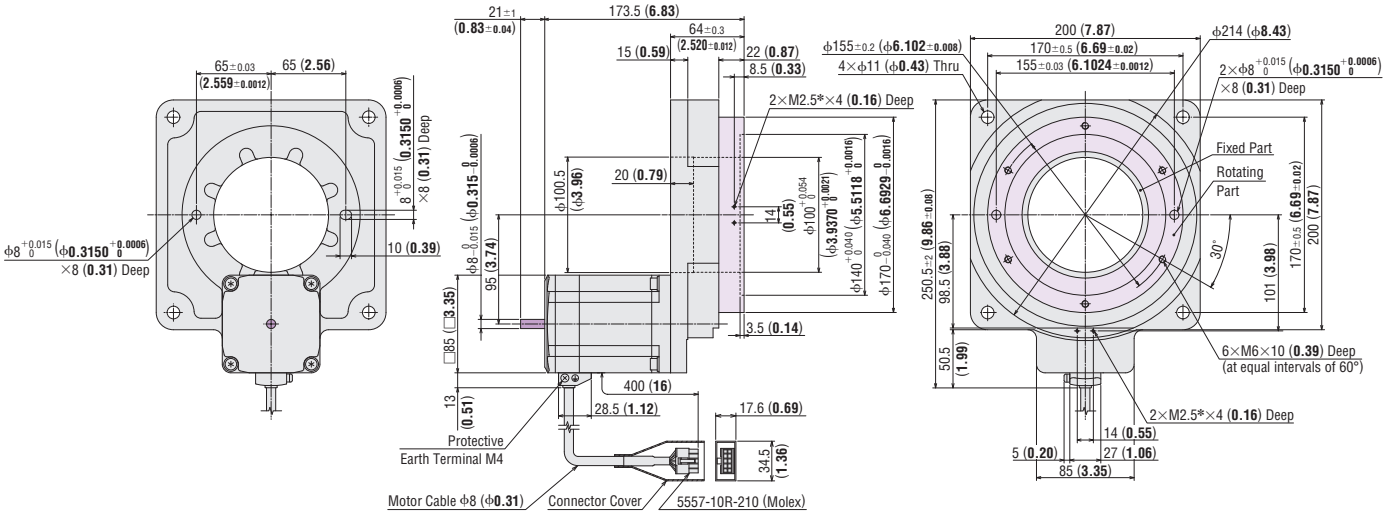


*Use M2.5 screw holes when installing the home-sensor set (sold separately). Do not use these holes for any purpose other than to install the home sensor.

- A letter **D** indicating the driver type (built-in controller type) is entered where the box □ is located within the product name. A code for the pulse input type is not entered in the box □.
- These dimensions are for the double shaft types. For the single shaft types, ignore the purple ( ) areas.
- The shaded areas are rotating parts.

2D & 3D CAD

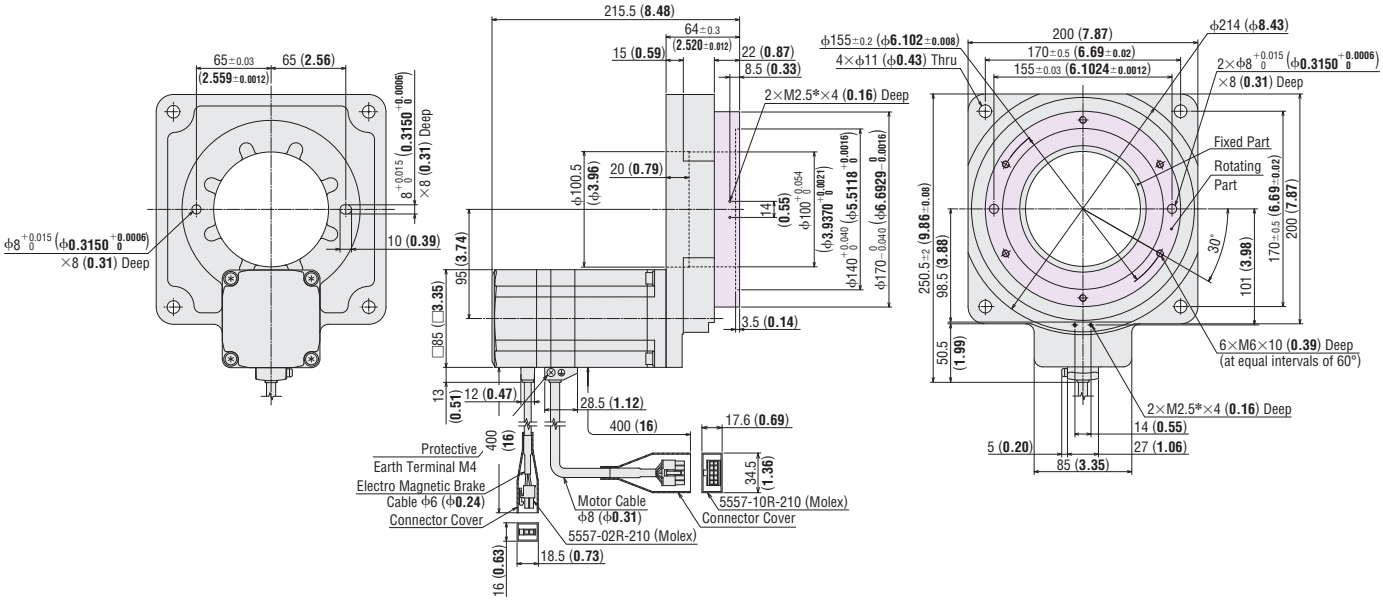
Product Name	Actuator Product Name	Mass kg (lb.)	2D CAD
DG200R-ARAA□2-3	DGM200R-ARAC	9.4 (20.7)	D2857
DG200R-ARAC□2-3			
DG200R-ARAS2-3			
DG200R-ARBA□2-3	DGM200R-ARBC		
DG200R-ARBC□2-3			
DG200R-ARBS2-3			



*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.

2D & 3D CAD

Product Name	Actuator Product Name	Mass kg (lb.)	2D CAD
DG200R-ARMA□2-3	DGM200R-ARMC	10 (22)	D2858
DG200R-ARMC□2-3			
DG200R-ARMS2-3			



*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.

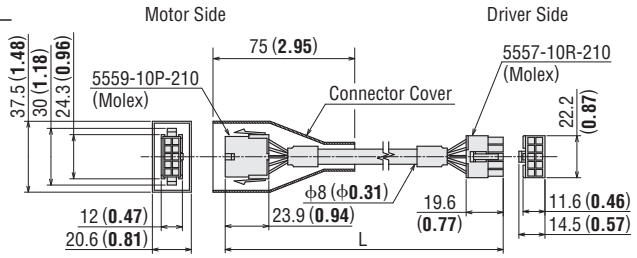
- A letter **D** indicating the driver type (built-in controller type) is entered where the box □ is located within the product name. A code for the pulse input type is not entered in the box □.
- These dimensions are for the double shaft types. For the single shaft types, ignore the purple ( ) areas.
- The shaded areas are rotating parts.

●Cables for Motor (Included), Cables for Electromagnetic Brake (Included)

◇AC Input, Common to All Types

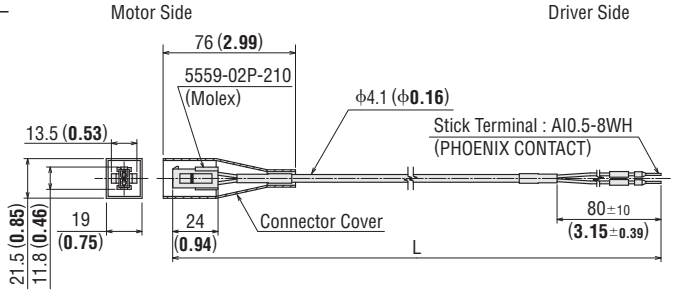
•Cables for Motor

Cable Type	Length L m (ft.)
Cable for Motor	3 (9.8)



•Cables for Electromagnetic Brake (Electromagnetic brake type only)

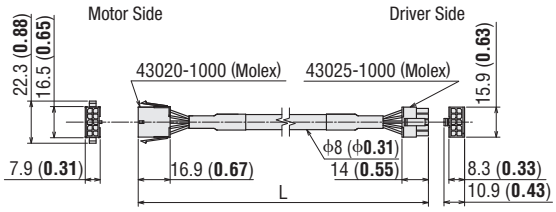
Cable Type	Length L m (ft.)
Cable for Electromagnetic Brake	3 (9.8)



◇DC Input, Common to All Types

•Cables for Motor

Cable Type	Length L m (ft.)
Cable for Motor	3 (9.8)



●Driver Dimensions

AR Series AC Input ➜ A-61
DC Input ➜ A-185

■Connection and Operation

AR Series AC Input Built-in Controller Type ➜ A-62
Pulse Input Type ➜ A-67
AR Series DC Input Built-in Controller Type ➜ A-186
Pulse Input Type ➜ A-190

List of Actuator and Driver Combinations

Product names for actuator and driver combinations are shown below.

Built-in Controller Type

Product Name	Actuator Product Name	Driver Product Name
DG60-ARAKD2-3	DGM60-ARAK	ARD-KD
DG60-ARBKD2-3	DGM60-ARBK	
DG85R-ARAAD2-3	DGM85R-ARAC	ARD-AD
DG85R-ARACD2-3		ARD-CD
DG85R-ARBAD2-3	DGM85R-ARBC	ARD-AD
DG85R-ARBCD2-3		ARD-CD
DG130R-ARAAD2-3	DGM130R-ARAC	ARD-AD
DG130R-ARACD2-3		ARD-CD
DG130R-ARBAD2-3	DGM130R-ARBC	ARD-AD
DG130R-ARBCD2-3		ARD-CD
DG130R-ARMAD2-3	DGM130R-ARMC	ARD-AD
DG130R-ARMCD2-3		ARD-CD
DG200R-ARAAD2-3	DGM200R-ARAC	ARD-AD
DG200R-ARACD2-3		ARD-CD
DG200R-ARBAD2-3	DGM200R-ARBC	ARD-AD
DG200R-ARBCD2-3		ARD-CD
DG200R-ARMAD2-3	DGM200R-ARMC	ARD-AD
DG200R-ARMCD2-3		ARD-CD

Pulse Input Type

Product Name	Actuator Product Name	Driver Product Name
DG60-ARAK2-3	DGM60-ARAK	ARD-K
DG60-ARBK2-3	DGM60-ARBK	
DG85R-ARAA2-3	DGM85R-ARAC	ARD-A
DG85R-ARAC2-3		ARD-C
DG85R-ARAS2-3		ARD-S
DG85R-ARBA2-3	DGM85R-ARBC	ARD-A
DG85R-ARBC2-3		ARD-C
DG85R-ARBS2-3		ARD-S
DG130R-ARAA2-3	DGM130R-ARAC	ARD-A
DG130R-ARAC2-3		ARD-C
DG130R-ARAS2-3		ARD-S
DG130R-ARBA2-3	DGM130R-ARBC	ARD-A
DG130R-ARBC2-3		ARD-C
DG130R-ARBS2-3		ARD-S
DG130R-ARMA2-3	DGM130R-ARMC	ARD-A
DG130R-ARMC2-3		ARD-C
DG130R-ARMS2-3		ARD-S
DG200R-ARAA2-3	DGM200R-ARAC	ARD-A
DG200R-ARAC2-3		ARD-C
DG200R-ARAS2-3		ARD-S
DG200R-ARBA2-3	DGM200R-ARBC	ARD-A
DG200R-ARBC2-3		ARD-C
DG200R-ARBS2-3		ARD-S
DG200R-ARMA2-3	DGM200R-ARMC	ARD-A
DG200R-ARMC2-3		ARD-C
DG200R-ARMS2-3		ARD-S