Linear & Rotary Actuators

Hollow Rotary Actuators

DGII Series αSTEP AR Equipped

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Hollow Rotary Actuators
DGII Series αSTEP AR Series Equipped

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

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

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

For detailed information about regulations and standards, please see the Oriental Motor website.
**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 saves the hassle and cost of designing such a system.

**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

<table>
<thead>
<tr>
<th>Frame Size [mm (in.)]</th>
<th>Diameter of Hollow Section [mm (in.)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG60</td>
<td>60 (2.36)</td>
</tr>
<tr>
<td>DG65R</td>
<td>85 (3.35)</td>
</tr>
<tr>
<td>DG130R</td>
<td>130 (5.12)</td>
</tr>
<tr>
<td>DG200R</td>
<td>200 (7.87)</td>
</tr>
</tbody>
</table>

**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)

The received permissible moment increases as the frame size increases, but the displacement caused by the load moment decreases.

**High Load Driving is Possible**

- **High Load**
  
  The axial load for a total mass of 91 kg (200.2 lb.) is 893 N (201 lb.).
  
  
  \[ 10 \text{ kg (22 lb.) \times 6 pieces} + 31 \text{ kg (68.2 lb.)} \times 9.807 \text{ m/s}^2 \div 893 \text{ N (201 lb.)} \]

  The permissible axial load of the **DG200R** is 4000 N (900 lb.), so this is within the permissible value.

**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).

\[ 10 \text{ kg (22 lb.)} \times 9.807 \text{ m/s}^2 \times 0.16 \text{ m (6.3 in.)} = 15.7 \text{ N-m (139 lb-in)} \]

The permissible moment of the **DG200R** is 100 N·m (885 lb-in), so this is within the permissible value.

**High Positioning Accuracy with Non-Backlash**

- **Non-Backlash**

- **Repetitive Positioning Accuracy** \( \pm 15 \text{ arcsec (\pm 0.004')} \)

**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 = \(2633 \times 10^{-3} \text{ kg·m}^2\) (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.

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.

Installation Pedestals are Available as an Accessory

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

- **Applications Using the Hollow Hole**
  - Filling Equipment with Piped-in Liquid
  - Optical Applications

- **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.

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

- **Applications that Require High Rigidity**
  - Applications in which a Moment Load is Applied (Ceiling installation)
Hollow Rotary Actuators
DGI\textsuperscript{II} Series

\section*{αSTEP AR Series Equipped}

DGI\textsuperscript{II} 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 driver with the information necessary for the actuator operations built into the drive. The burden on the host PLC (Master Controller) is reduced.

\subsection*{A Variety of Products with a Unified Control Method}

All products in the AR Series group have unified controllability.

\subsection*{Data Setting Software and Control Module}

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

\section*{2 Driver Types Available Depending on the System Configuration}

2 types of DGI\textsuperscript{II} Series drivers are available to match the requirements of the host PLC (Master Controller).

\subsection*{Built-in Controller Type}

- When controlled via I/O
- When controlled via computer or touch screen (HMI)
- When controlled via serial communication
- When controlled via a 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.

\subsection*{CC-Link compatibility: Max. 12 axes.}

\subsection*{MECHATROLINK and EtherCAT compatibility: Max. 16 axes.}

\subsection*{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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Control Method** | I/O Control  
RS-485 Communication  
Modbus RTU Protocol Connection |
| **Position Command Input** | Setting with operating data number  
Command range for each point: \(-8388608 \sim 8388607\) \([\text{step}]\) (Setting unit: \(1\) \([\text{step}]\)) |
| **Speed Command Input** | Setting with operating data number  
Command range: \(0 \sim 1000000\) \([\text{Hz}]\) (Setting unit: \(1\) \([\text{Hz}]\)) |
| **Acceleration/Deceleration Command Input** | Set with the operating data number or parameter.  
The acceleration/deceleration rate \([\text{ms/Hz}]\) or acceleration/deceleration time \([\text{s}]\) can be selected.  
Command range: \(0.001 \sim 1000.000\) \([\text{ms/Hz}]\) (Setting unit: \(0.001\) \([\text{ms/Hz}]\))  
\(0.001 \sim 1000.000\) \([\text{s}]\) (Setting unit: \(0.001\) \([\text{s}]\)) |
| **Acceleration/Deceleration Processing** | Velocity Filter, Traveling Average Filter |
| **Return-To-Home Operation** | 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 \sim 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 \(0 \sim 50.000\) \([\text{s}]\) (Setting unit: \(0.001\) \([\text{s}]\)). |
| **Start Methods** | Operating Data Selection Method  
Starts the positioning operation when START is input after selecting M0 \sim M5.  
Direct Method (Direct positioning)  
Starts the positioning operation with the operating data number set in the parameters when M50 \sim M55 is input.  
Sequential Method (Sequential positioning)  
Starts the positioning operation in sequence from the operating data No. 0 each time SSTART is input. |
| **Continuous Operation** | Number of Speed Points  
64 points (No.0 \sim 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. |
| **Absolute Backup** | The normal mode and the current control mode can be selected.  
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

- **Independent Operation**

- **Linked Operation**

- **Linked Operation 2**

<Start Methods>
- Operating Data Selection Method
- Direct Positioning
- Sequential Positioning
**Main Functions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Resolution Setting Function&lt;sup&gt;1&lt;/sup&gt;</td>
<td>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. $1000 \times \text{Electronic gear B} \times 18$ (Gear ratio)</td>
</tr>
<tr>
<td>Group Send Function (Via RS-485 communication or network converter)</td>
<td>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.</td>
</tr>
<tr>
<td>Round Function</td>
<td>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.</td>
</tr>
<tr>
<td>Hardware Overtravel</td>
<td>This function stops the actuator when the mechanical limit sensor is exceeded.</td>
</tr>
<tr>
<td>Software Overtravel</td>
<td>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.</td>
</tr>
<tr>
<td>STOP input (External stop)</td>
<td>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.</td>
</tr>
<tr>
<td>Alarm Code Output</td>
<td>Alarm codes that are occurring can be output.</td>
</tr>
<tr>
<td>Alarm History</td>
<td>Even if the power is turned off, up to 10 alarms that have occurred can be stored. This can be used for troubleshooting.</td>
</tr>
<tr>
<td>Velocity Filter</td>
<td>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.</td>
</tr>
<tr>
<td>Teaching Function&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Teaching can be performed. Move the load to the target position, and store the position data for that time as the positioning data.</td>
</tr>
<tr>
<td>I/O Monitoring&lt;sup&gt;1&lt;/sup&gt;</td>
<td>The ON/OFF status of the I/O signals can be checked.</td>
</tr>
<tr>
<td>Waveform Monitoring&lt;sup&gt;2&lt;/sup&gt;</td>
<td>The operating speed and I/O signals can be checked as a waveform.</td>
</tr>
</tbody>
</table>

<sup>1</sup>The data setting software **MEXE02** can be downloaded from the website.

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

<sup>3</sup>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

<table>
<thead>
<tr>
<th>Item</th>
<th>Overview</th>
<th>Basic Setting</th>
<th>Extended Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of Pulse Input Mode</td>
<td>1-pulse input mode or 2-pulse input mode can be selected.</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Resolution Setting</td>
<td>The resolution can be selected with a function switch.</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Running Current Setting</td>
<td>The running current setting can be changed with the current setting switch (CURRENT).</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Standstill Current Ratio Setting</td>
<td>The ratio of the standstill current relative to the running current can be set.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>Motor Rotational Coordinates Setting</td>
<td>The rotational coordinates for the motor can be set.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>All Windings On Signal (C-ON input)</td>
<td>The input signal for the excitation of the motor.</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Return to Excitation Position Operation During All Windings On Enable/Disable</td>
<td>Set whether or not to return to the excitation position (deviation 0 position) during all windings on.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>Alarm Code Signal Enable/Disable</td>
<td>Set to output the code when an alarm occurs.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>END Output Signal Range Setting</td>
<td>The END output signal range can be changed.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>END Output Signal Offset</td>
<td>The END output signal value can be offset.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>A/B Phase Output</td>
<td>This can be used to confirm the position of the motor.</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Timing Output Signal</td>
<td>This is output each time the motor rotates 7.2˚ (0.4˚ for the output table).</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Velocity Filter Setting</td>
<td>Applies a filter to the operation command to control the motor action.</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Vibration Suppression Function for Normal Mode</td>
<td>This can be set to suppress resonant vibration during rotation.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>Gain Adjustment for Current Control Mode</td>
<td>Adjusts the position and speed loop gain.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>Selection of Motor Excitation Position at Power On</td>
<td>The motor excitation position for when the power is on can be selected.</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>Control Module Setting</td>
<td>Select whether to use symbols or an absolute value display for the speed display of the control module.</td>
<td>–</td>
<td>●</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>Product Name</th>
<th>Motor Type</th>
<th>Type of Output Table Supporting Bearing</th>
<th>Gear Ratio</th>
<th>Motor Resolution</th>
<th>Permissible Torque</th>
<th>Holding Torque at Motor Standstill</th>
<th>Rated Speed</th>
<th>Repetitive Positioning Accuracy</th>
<th>Lost Motion</th>
<th>Angular Transmission Accuracy</th>
<th>Permissible Axial Load</th>
<th>Permissible Moment Load</th>
<th>Runout of Output Table Surface</th>
<th>Runout of Output Table Inner (Outer) Diameter</th>
<th>Parallelism of Output Table</th>
<th>Degree of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Built-in Controller</td>
<td>AR Series</td>
<td>Deep-Groove Ball Bearing</td>
<td>18</td>
<td>1000 P/R</td>
<td>0.9 (7.9)</td>
<td>0.45 (3.9)</td>
<td>200</td>
<td>±5 (±0.004°)</td>
<td>±15 (±0.004°)</td>
<td>4 (0.067°)</td>
<td>100 (22)</td>
<td>2 (17.7)</td>
<td>0.030 (0.00012)</td>
<td>0.030 (0.0012)</td>
<td>0.050 (0.0012)</td>
<td>IP40 (IP20 for motor connector)</td>
</tr>
<tr>
<td></td>
<td>Pulse Input</td>
<td></td>
<td>Cross-Roller Bearing</td>
<td></td>
<td></td>
<td>2.8 (24)</td>
<td>1.8 (15.9)</td>
<td>12 (106)</td>
<td>2.8 (24)</td>
<td>36 [20]</td>
<td>3 (0.05°)</td>
<td>500 (112)</td>
<td>10 (88)</td>
<td>0.015 (0.0006)</td>
<td>0.015 (0.0006)</td>
<td>0.050 (0.0012)</td>
<td>IP20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12 (106)</td>
<td>2 (17.7)</td>
<td>10 (88)</td>
<td>12 (106)</td>
<td>100 (880)</td>
<td>2 (0.033°)</td>
<td>2000 (450)</td>
<td>50 (440)</td>
<td>0.030 (0.00012)</td>
<td>0.030 (0.0012)</td>
<td>0.050 (0.0012)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50 (440)</td>
<td>10 (88)</td>
<td>100 (880)</td>
<td>50 (440)</td>
<td>4000 (900)</td>
<td>3 (0.05°)</td>
<td>5000 (1120)</td>
<td>10 (88)</td>
<td>0.030 (0.00012)</td>
<td>0.030 (0.0012)</td>
<td>0.050 (0.0012)</td>
<td></td>
</tr>
</tbody>
</table>

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

2. **Inertia**
   - 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.

3. **Motor 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.

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

5. **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.

6. **Angular 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.

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

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

9. **Angular Transmission Accuracy**
   - The accuracy of the reduction mechanism, converted to a moment on the output table.

10. **Holding Torque at Motor Standstill**
    - **Power ON**: This is the maximum torque with which to hold the output table when the power is on.
    - **Electromagnetic Brake**: Static friction torque when the electromagnetic brake is activated at standstill is shown.

11. **Parallelism of Output Table**
    - The maximum value of runout of the inner or outer diameter of the table when the output table is rotated under no load.

12. **Runout of Output Table Surface**
    - A value indicating the degree of error that generates when positioning is performed repeatedly to the same position in the forward and reverse directions.

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

14. **Angular 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.

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

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

17. **Degree of Protection**
    - IEC 60529 and EN 60034-5 (IEC 60034-5) classify the dust 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.

---

**Example of System Configuration**

**DGII Series**

**Hollow Rotary Actuators**

The product comes with a 3 m (9.8 ft.) cable (for motor and electromagnetic brake).

**Accessories (Sold separately)**

- Mounting Pedestals → Page E-158
- Battery Set → Page E-151
- Home Sensor Sets → Page E-155
- RS-485 Communication Cables → Page E-145, 149

**AR Series Driver**

- Programmable Controller
- Sensor
- Main Power Supply

**Connections**

- For Motor
- For Electromagnetic Brake

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**DG Series**

**Mounting Pedestals**

- DG130R-ARMAD2-3 $2,654.00

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**Accessories (Sold separately)**

- Network Converters → Page F-8

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**Peripheral Products (Sold separately)**

- 24 VDC Power Supply for Control
- Data Setting Software MEXE02

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**Cables Used for EMC Directive Evaluation**

- Using an accessory connection cable (Not using the cable included with the products).
- Using an accessory extension cable with the included 3 m (9.8 ft.) cable.

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**Accessories (Sold separately)**

- Control Module → Page E-150
- Data Setting Software Communication Cable → Page E-150

---

**24 VDC Power Supply for Control**

- To USB Port

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**DGII Series**

- For Electromagnetic Brake
- For Motor

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**Notes**

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

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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.

Example of System Configuration

<table>
<thead>
<tr>
<th>DGII Series</th>
<th>Controller</th>
<th>Mounting Pedestals</th>
<th>Home Sensor Sets</th>
<th>General-Purpose Cables</th>
<th>Connector-Terminal Block Conversion Units</th>
<th>Sold Separately</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG130R-ARMA2-3</td>
<td>SCX11</td>
<td>MDG150B</td>
<td>PADG-5B</td>
<td>CC36Y10E</td>
<td>$349.00</td>
<td>$400.00</td>
</tr>
</tbody>
</table>

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

**DG 130 R - AR A C D 2 - 1**

<table>
<thead>
<tr>
<th>①</th>
<th>Series Name</th>
<th>DG- DGII Series</th>
</tr>
</thead>
</table>
| 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**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG85R-ARA-D2-3</td>
<td>$2,183.00</td>
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<td>$2,410.00</td>
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<tr>
<td>DG130R-ARB-D2-3</td>
<td>$2,413.00</td>
</tr>
<tr>
<td>DG130R-ARM-D2-3</td>
<td>$2,654.00</td>
</tr>
<tr>
<td>DG200R-ARA-D2-3</td>
<td>$2,841.00</td>
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<tr>
<td>DG200R-ARB-D2-3</td>
<td>$2,845.00</td>
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<tr>
<td>DG200R-ARM-D2-3</td>
<td>$3,085.00</td>
</tr>
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</table>

#### Pulse Input Type

**◇ AC Input**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>List Price</th>
</tr>
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<tr>
<td>DG85R-ARA-D2-3</td>
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<tr>
<td>DG85R-ARB-D2-3</td>
<td>$2,186.00</td>
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<tr>
<td>DG130R-ARM-D2-3</td>
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<tr>
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<td>$2,845.00</td>
</tr>
<tr>
<td>DG200R-ARM-D2-3</td>
<td>$3,085.00</td>
</tr>
</tbody>
</table>

The following items are included with each product:

- Actuator, Driver, Cable for Motor\(^1\), Cable for Electromagnetic Brake\(^1\)\(^2\)\(^3\), 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

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>mm (in.)</th>
<th>60 (2.36)</th>
<th>85 (3.35)</th>
<th>130 (5.12)</th>
<th>200 (7.87)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Built-in Controller</th>
<th>Pulse Input</th>
<th>AR Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG60-AR, KD2-3</td>
<td>DG60-AR, K2-3</td>
<td>DG60-AR, L2-3</td>
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</tr>
<tr>
<td>DG85R-AR, KD2-3</td>
<td>DG85R-AR, K2-3</td>
<td>DG85R-AR, L2-3</td>
<td></td>
</tr>
<tr>
<td>DG130R-AR, KD2-3</td>
<td>DG130R-AR, K2-3</td>
<td>DG130R-AR, L2-3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>AR Series</th>
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<tbody>
<tr>
<td>Series AC Input</td>
<td>AR Series DC Input</td>
</tr>
<tr>
<td>DG60</td>
<td>DG85R</td>
</tr>
</tbody>
</table>

#### General Specifications (Actuator)

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>AR Series AC Input</th>
<th>AR Series DC Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series AC Input</td>
<td>Page A-44</td>
<td>DC Input</td>
</tr>
</tbody>
</table>

#### Driver Specifications

**AR Series AC Input**

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>mm (in.)</th>
<th>60 (2.36)</th>
<th>85 (3.35)</th>
<th>130 (5.12)</th>
<th>200 (7.87)</th>
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</table>

<table>
<thead>
<tr>
<th>Series DC Input</th>
<th>Page A-165</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions E-133</td>
<td>Actuator and Driver Combinations E-137</td>
</tr>
</tbody>
</table>
### Speed – Torque Characteristics

**DG60**

![Graph](image1)

**DG85R**

![Graph](image2)

**DG130R**

![Graph](image3)

**DG200R**

![Graph](image4)

### Load Inertia – Positioning Time (Reference value)

**DG60**

![Graph](image5)

**DG85R**

![Graph](image6)

**DG130R**

![Graph](image7)

**DG200R**

![Graph](image8)

*The load inertia refers to the inertia of the customer’s load.*
Hollow Rotary Actuators  
DGII Series

---

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Runout of output table surface</th>
<th>Runout of output table inner diameter (hollow diameter)</th>
<th>Parallelism of output table (against the mounting surface)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG60</td>
<td>0.03 (0.0012)</td>
<td>0.05 (0.002)</td>
<td></td>
</tr>
<tr>
<td>DG85R, DG130R, DG200R</td>
<td>0.015 (0.0006)</td>
<td>0.05 (0.002)</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- #1 Runout of output table surface
- #2 Runout of output table inner diameter (hollow 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.

**Graphs:**
- DG60
- DG85R
- DG130R
- DG200R

**Equation:**
\[ \text{Moment Load [N·m]} = 0.001 \times F \times L \]

---

**Dimensions:**
- Distance from Center of Rotation L [mm]
- Arm
- Displacement [μm]

---

**Tables:**
- Moment Load [N·m]
- Displacement [μm]

---

**Units:**
- [mm] (in.)
### Dimensions

Unit = mm (in.)

#### Actuator

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Actuator Product Name</th>
<th>Mass kg (lb.)</th>
<th>2D CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG60-ARAK-2-3</td>
<td>DGM60-ARAK</td>
<td>0.5 (1.1)</td>
<td>D2853</td>
</tr>
<tr>
<td>DG60-ARBK-2-3</td>
<td>DGM60-ARBK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![](image1)

- 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.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Actuator Product Name</th>
<th>Mass kg (lb.)</th>
<th>2D CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG85R-ARAC-2-3</td>
<td>DGM85R-ARAC</td>
<td>1.2 (2.6)</td>
<td>D2854</td>
</tr>
<tr>
<td>DG85R-ARAC2-3</td>
<td>DGM85R-ARAC2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DG85R-ARB2-3</td>
<td>DGM85R-ARB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DG85R-ARBC-2-3</td>
<td>DGM85R-ARBC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DG85R-ARBC2-3</td>
<td>DGM85R-ARBC2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![](image2)

- 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.
### Hollow Rotary Actuators

#### DGII Series

**Table 1: Product Name, Actuator Product Name, Mass (kg), 2D CAD**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Actuator Product Name</th>
<th>Mass (kg)</th>
<th>2D CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG13OR-ARMA</td>
<td>DGM13OR-ARMC</td>
<td>3</td>
<td>D2856</td>
</tr>
<tr>
<td>DG13OR-ARMA</td>
<td>DGM13OR-ARMC</td>
<td>3</td>
<td>D2856</td>
</tr>
<tr>
<td>DG13OR-ARMA</td>
<td>DGM13OR-ARMC</td>
<td>3</td>
<td>D2856</td>
</tr>
<tr>
<td>DG13OR-ARMA</td>
<td>DGM13OR-ARMC</td>
<td>3</td>
<td>D2856</td>
</tr>
<tr>
<td>DG13OR-ARMA</td>
<td>DGM13OR-ARMC</td>
<td>3</td>
<td>D2856</td>
</tr>
<tr>
<td>DG13OR-ARMA</td>
<td>DGM13OR-ARMC</td>
<td>3</td>
<td>D2856</td>
</tr>
</tbody>
</table>

**Diagram Notes:**

- **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阴影** shaded areas are rotating parts.

**Diagram:**

- 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.

---

**ORIENTAL MOTOR GENERAL CATALOG**

2015/2016
### Product Name | Actuator Product Name | Mass kg (lb.) | 2D CAD
---|---|---|---
DG200R-ARA, 2-3 | DGM200R-ARAC | 9.4 (20.7) | D2857
DG200R-ARAC, 2-3 | DGM200R-ARAC | 9.4 (20.7) | D2857
DG200R-ARAS2-3 | DGM200R-ARBC | 9.4 (20.7) | D2857
DG200R-ARBA, 2-3 | DGM200R-ARBC | 9.4 (20.7) | D2857
DG200R-ARBC, 2-3 | DGM200R-ARBC | 9.4 (20.7) | D2857
DG200R-ARBS2-3 | DGM200R-ARBC | 9.4 (20.7) | D2857

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.

---

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

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 **b** is located within the product name. A code for the pulse input type is not entered in the box **b**.
*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

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Length L m (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable for Motor</td>
<td>3 (0.8)</td>
</tr>
</tbody>
</table>

● Cables for Electromagnetic Brake (Electromagnetic brake type only)

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Length L m (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable for Electromagnetic Brake</td>
<td>3 (0.8)</td>
</tr>
</tbody>
</table>

◇ DC Input, Common to All Types

● Cables for Motor

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Length L m (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable for Motor</td>
<td>3 (0.8)</td>
</tr>
</tbody>
</table>

● 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

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Actuator Product Name</th>
<th>Driver Product Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG60-ARAKD2-3</td>
<td>DGM60-ARAK</td>
<td>ARD-KD</td>
</tr>
<tr>
<td>DG60-ARBKD2-3</td>
<td>DGM60-ARBK</td>
<td>ARD-AD</td>
</tr>
<tr>
<td>DG85R-ARAAD2-3</td>
<td>DGM85R-ARAC</td>
<td>ARD-AD</td>
</tr>
<tr>
<td>DG85R-ARBAD2-3</td>
<td>DGM85R-ARBK</td>
<td>ARD-CD</td>
</tr>
<tr>
<td>DG130R-ARAAD2-3</td>
<td>DGM130R-ARAC</td>
<td>ARD-AD</td>
</tr>
<tr>
<td>DG130R-ARBAD2-3</td>
<td>DGM130R-ARBK</td>
<td>ARD-CD</td>
</tr>
<tr>
<td>DG130R-ARMAD2-3</td>
<td>DGM130R-ARMC</td>
<td>ARD-AD</td>
</tr>
<tr>
<td>DG130R-ARMCD2-3</td>
<td>DGM130R-ARMC</td>
<td>ARD-CD</td>
</tr>
<tr>
<td>DG200R-ARAAD2-3</td>
<td>DGM200R-ARAC</td>
<td>ARD-AD</td>
</tr>
<tr>
<td>DG200R-ARBAD2-3</td>
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<td>DG200R-ARMAD2-3</td>
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<td>ARD-AD</td>
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</table>

#### Pulse Input Type

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Actuator Product Name</th>
<th>Driver Product Name</th>
</tr>
</thead>
<tbody>
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<td>DG60-ARAK2-3</td>
<td>DGM60-ARAK</td>
<td>ARD-K</td>
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<td>DGM60-ARBK</td>
<td>ARD-A</td>
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<td>ARD-C</td>
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<td>ARD-S</td>
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<td>ARD-AD</td>
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<td>DGM200R-ARBC</td>
<td>ARD-CD</td>
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