Oriental motor

Hollow Rotary Actuators

DGII Series

Closed-loop Type

Open-loop Type

New types, <Closed-loop Type> and <Open-loop Type>, are now available in the **DGII** Series featuring the integration of a hollow rotary table and a stepping motor. These products will satisfy a variety of customers' needs.

Hollow Rotary Actuators

DGII Series

New types, <Closed-loop Type> and <Open-loop Type>, are now available in the **DGII** Series featuring the integration of a hollow rotary table and a stepping motor. These products will satisfy a variety of customers' needs with a wide range of uses.

Hollow Rotary Actuators

- **Reduction in design time by a product featuring the integration of an actuator and a motor**
- **Large diameter hollow output table Maximum hollow diameter: ϕ100 mm**
- **Excellent performance using a stepping motor**
  - •Quick responsiveness
  - •Low speed stability
  - •No tuning required

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Closed-loop Type

Both the rotary actuator and the motor unit use high-performance products.
The Closed-loop Type has excellent performance in load capacity, rigidity, and accuracy, and can be used for a wide range of purposes.

- Maximum Permissible Torque: 50 N·m
- Maximum Permissible Axial Load: 4000 N
- Repetitive Positioning Accuracy ±15 arcsec (±0.004˚)

Open-loop Type

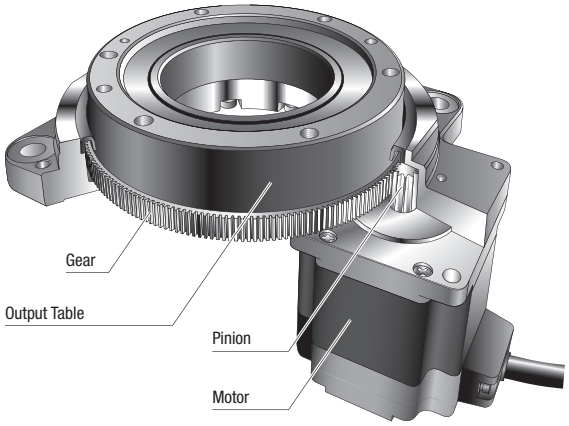
The Open-loop Type is excellent in cost effectiveness and the rotary actuator is handy to use.

- Maximum Permissible Torque: 12 N·m
- Maximum Permissible Axial Load: 300 N
- Repetitive Positioning Accuracy ±30 arcsec* (±0.008˚)
  *For **DG60**, ±15 arcsec

Features of Hollow Rotary Actuators

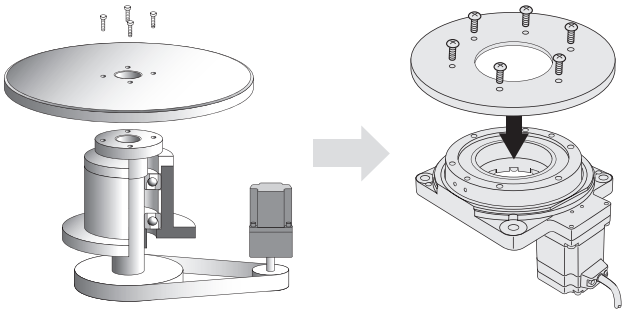
Integrated Product

The **DGII** Series features the integration of the hollow rotary table and the stepping motor. The inside of the actuator has the reducer structure (gear ratio: 18), achieving high output drive.



Reduction in Design Time

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



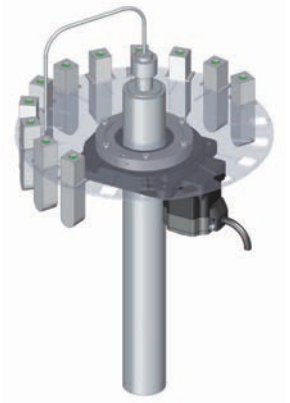
Motor + mechanism components (separately designed/arranged)

DGII Series (Integrated product)

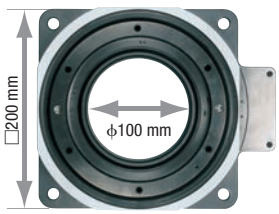
Large-Diameter, Hollow Output Table makes Simple Wiring and Piping Possible

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

● Filling instrument with pipes for liquid



Example: **DG200R**



High Load Capacity/High Rigidity

The Closed-loop Type uses the cross roller bearing for the bearing of the output table, achieving high load capacity and high rigidity.

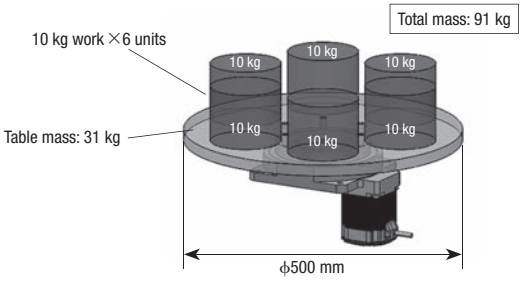
- Maximum Permissible Axial Load: 4000 N
- Maximum Permissible Moment: 100 N·m

[Operation example]

Product Name : **DG200R-ARAC2-1**
Power Supply Input : 200 VAC

Conveyor Mass : 91 kg (6 works + table)
: 10 kg work/unit × 6 units
: 31 kg table (Diameter: 500 mm, Thickness: 20 mm, iron-made)

Overhung Distance : 160 mm
Installation Direction : Horizontal



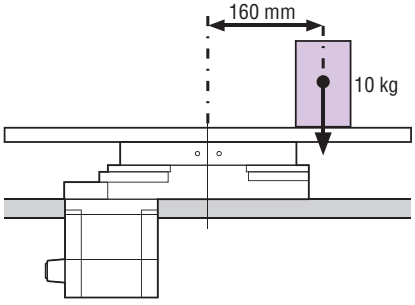
・High Load Capacity

The axial load of the total mass of 91 kg is 893 N.
(10 kg × 6 units + 31 kg) × gm/s² ≒ 893 N
The permissible axial load of **DG200R** is 4000 N, which is within the tolerance.

High load drive is possible

・High Rigidity

When a 10 kg work is located 160 mm away from the center of the table, the moment is 15.7 N·m.
10 kg × gm/s² × 0.16 m ≒ 15.7 N·m
The permissible moment of **DG200R** is 100 N·m, which is within the tolerance.

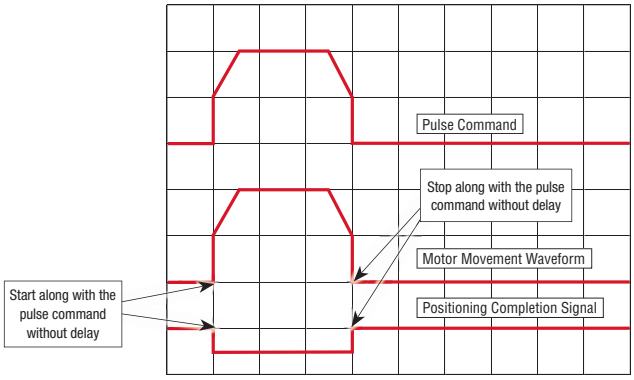


High-rigid Rotary Actuator
With high load placed away from the center of the table, driving is possible.

Quick Positioning by Quick Responsiveness

Using the high responsiveness of the stepping motor, short distance positioning is performed in a short time.

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



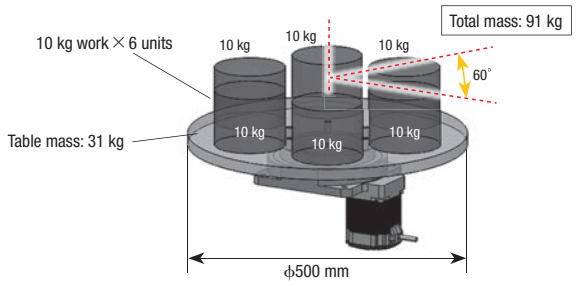
[Operation example]

Product Name : **DG200R-ARAC2-1**
Power Supply Input : 200 VAC

Conveyor Mass : 91 kg (6 works + table)
: 10 kg work/unit × 6 units
: 31 kg table (Diameter: 500 mm, Thickness: 20 mm, iron-made)

Installation Direction : Horizontal
Movement : 60°

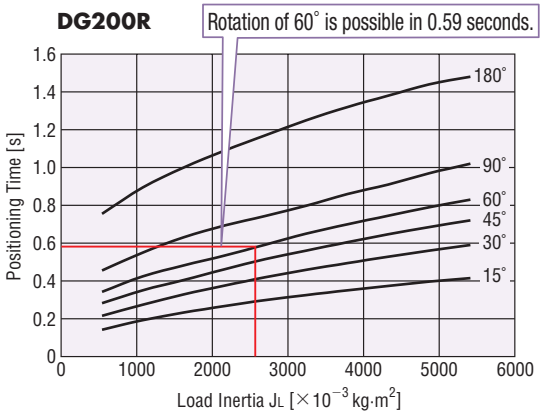
Total Inertia of Table and Load = 2633 × 10^{-3} kg·m^2



・Quick Positioning

For **DG200R**, the total mass of 91 kg can be rotated by 60° in 0.59 seconds.

Load Inertia - Positioning Time (Reference value)



Positioning time can be estimated by the data shown in the catalog.

Quick positioning is possible even with high load.

Low Vibration even at Low Speeds

Stepping motor microstep drive method and smooth drive function*. The resolution is improved without mechanical factors such as the reduction gear mechanism. This results in minimal variation in speed, and the speed is continuously kept constant.

＊Smooth drive function

The smooth drive function is a control method using, the microstep drive to automatically keep the distance traveled and the travel speed the same as with the full step, without changing the pulse input setting.

No Tuning is Required

The stepping motor does not require gain adjustment due to the open loop control. Therefore, even if the load fluctuates, the movement setting is achieved without adjusting.

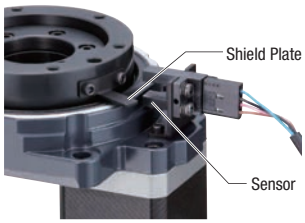
Hunting-Less

With the open loop control, the stepping motor does not cause hunting, which means that the axis minutely moves when it stops, to occur. This always enables the motor to maintain the stop position even when it carries large inertia.

"Home Sensor Set" is available as an accessory

Since all the parts required for the return-to-home operation are provided optionally (sold separately) in a set, you will spend less time designing, fabricating and procuring parts related to sensor installation.

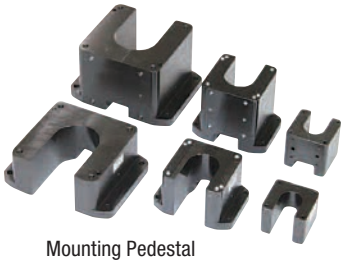
DG85 Sensor Installation Example



"Mounting pedestals" are optionally provided

Pedestals convenient for installing a **DGII** Series product to your equipment are optionally provided (sold separately).

Application Example



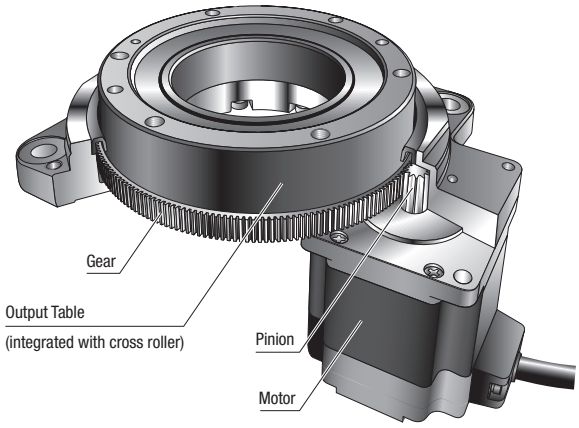
Mounting Pedestal

Closed-loop Type

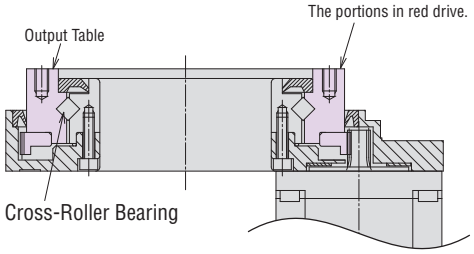
Both the rotary actuator and the motor unit use high-performance products.
The Closed-loop Type has excellent performance in load capacity, rigidity, and accuracy, and can be used for a wide range of purposes.

Features of Closed-loop Type

High power and high rigidity are achieved by the integration of a cross-roller bearing with an output table.



Structure of Closed-loop Type

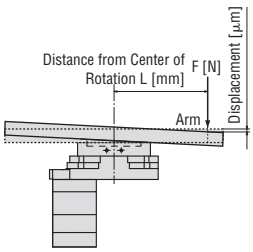


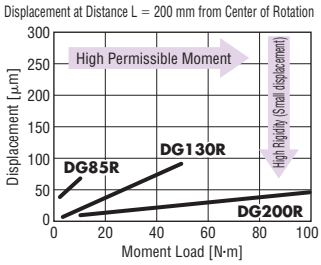
High Power and High Rigidity

The hollow output table is integrated with a high rigidity cross-roller bearing.

<Output>
Maximum Permissible Torque: 50 N·m

<Rigidity>
Maximum Permissible Axial Load: 4000 N
Maximum Permissible Moment: 100 N·m
The permissible moment increases as the frame size increases, but the displacement caused by the load moment decreases.





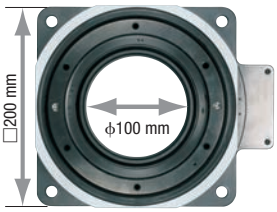
High Positioning Accuracy with Non-Backlash

- 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.

Large-Diameter Hollow Output Table

Product	Frame Size mm	Diameter of Hollow Section mm
DG85R	85	ϕ33
DG130R	130	ϕ62
DG200R	200	ϕ100



Example: **DG200R**

Equipped with Closed Loop Stepping Motor Unit αSTEP AR Series

The **DGII** Series Closed-loop Type comes equipped with the motor unit of the αSTEP **AR** Series. This type uses the same control method as the **AR** Series, so the same drive and maintenance methods can be applied during startup. The built-in positioning function type, FLEX, can be connected to a network or multiple axes.

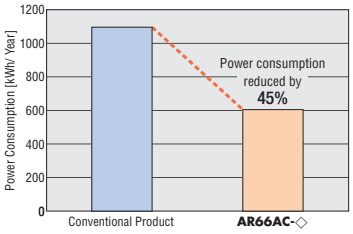
Product Variation with Unified Control Method

All the product lines equipped with the **AR** Series have unified controllability.

Energy Saving

Power Consumption: 45% less than a conventional model (also by Oriental Motor).

● Power consumption

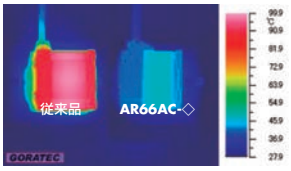


Operating conditions
Rotation Speed: 1000 r/min, Load factor: 50%
Operating Time: 24 hours of operation (70% operating, 25% standing by, 5% standstill), 365 days/year

Reduced Generation of Heat, Continuous Operation Possible

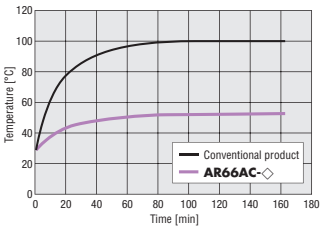
The high-efficiency technology achieves significant reduction in the amount of heat generated from the motor, enabling continuous operation.

● Temperature distribution by Thermography



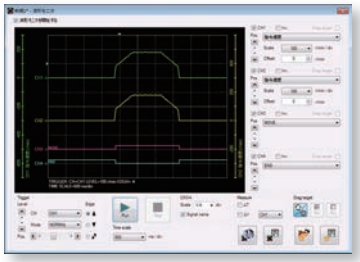
These are the images of operation under the same condition.

● Motor housing temperature at operation under the same condition



Data Setting Software and Data Setting Device are the same

The data setting software and the data setting device can be used commonly with the **AR** Series.



Data Setting Software **MEXE02**

Data Setting Software can be downloaded from the Oriental Motor website. The CD-ROM is also available (for free).

Data Setting Device **OPX-2A** (sold separately)

Alarm Signal Output in Case of Abnormality

If an overload is applied continuously, an alarm signal is output. When the positioning is complete, an END signal is output. This ensures the same level of reliability achieved by a servo motor.

No Tuning is required

AR Series motor and driver package operates synchronously with the open loop control, as far as abnormality such as overload does not occur.
The open loop control does not require gain adjustment. Therefore, if the load fluctuates, the movement setting is achieved without adjusting.

The distance between the motor and the driver can be extended up to 30 m

This series uses an included cable or accessory cable (sold separately) that can extend the wiring distance between the motor and driver up to 30 m.
For the included cable, you can select from a 1 m, 2 m, or 3 m cable.
Also, extension cables and flexible extension cables are available as accessories (sold separately).

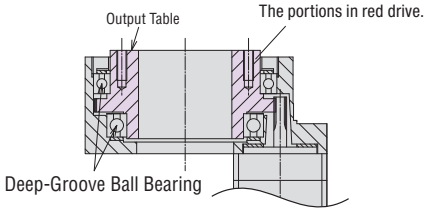
Open-loop Type

The Open-loop Type is excellent in cost effectiveness and the rotary actuator is handy to use.

Features of Open-loop Type

The Open-loop Type uses cost-effective deep groove ball bearings for the output table.

Structure of the Open-loop Type (For **DG60**)



Positioning Accuracy

- Backlash: 5 arcmin*1 (0.083˚)
- Repetitive Positioning Accuracy ±30 arcsec*2 (±0.008˚)

*1 Non-Backlash for **DG60**

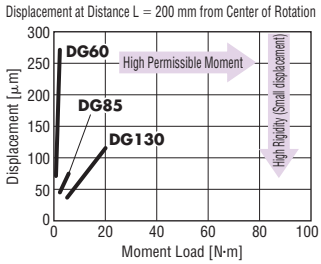
*2 ±15 arcsec for **DG60**

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

Output Power/Rigidity

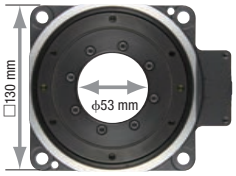
<Output>
Maximum Permissible Torque: 12 N·m

<Rigidity>
Maximum Permissible Axial Load: 300 N
Maximum Permissible Moment: 20 N·m
Deep groove ball bearings are used for the bearing of the output table.



Hollow Output Table

Product	Frame Size mm	Diameter of Hollow Section mm
DG60	60	ϕ28
DG85	85	ϕ28
DG130	130	ϕ53



Example: For **DG130**

Equipped with Five-Phase Stepping Motor and Driver Package of **RKII** Series

The Open-loop Type comes equipped with the Five-Phase Stepping Motor and Driver Package **RKII** Series. This series has the same control method as the **RKII** Series.

(For **DG60**, equipped with **AR** Series)

Five-Phase Stepping Motor and Driver Package **RKII** Series

Superior Cost Performance

The open loop control requires less number of components than the closed loop control, achieving higher cost performance.

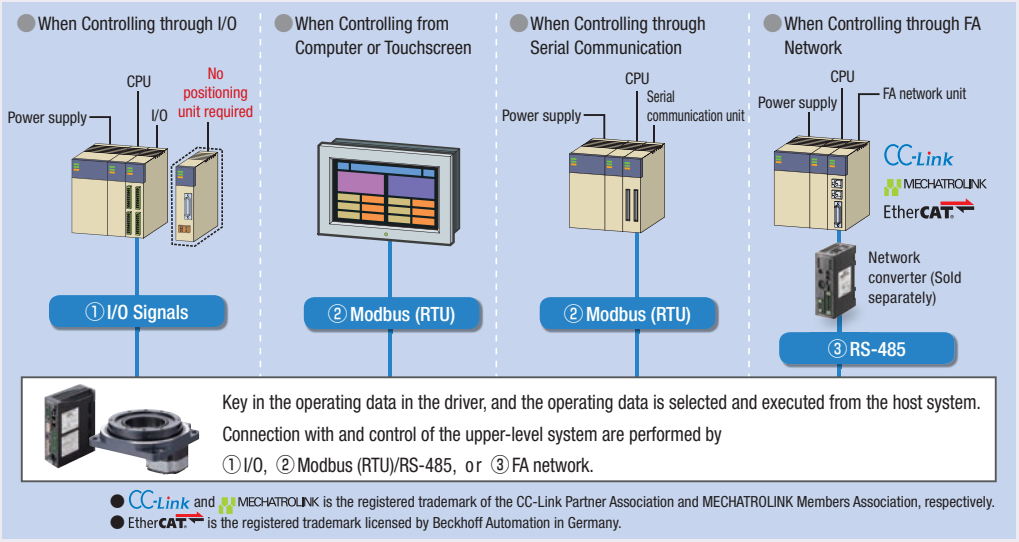
Simple Control Method and Wiring

The open loop control can make the driving simpler and also reduce the number of wiring connections.

2 Driver Types Selectable by System Configuration

You can select from 2 driver types for the **DGII** Series, depending on your host system.

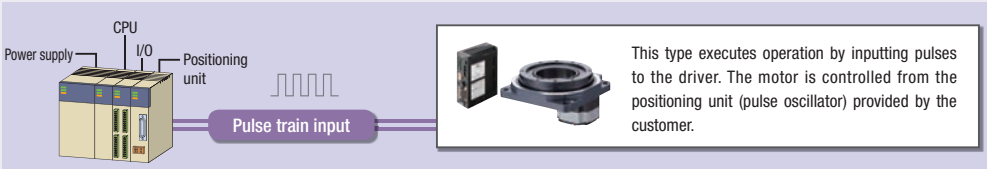
Built-in Positioning Function Type FLEX



● CC-Link and MECHATROLINK is the registered trademark of the CC-Link Partner Association and MECHATROLINK Members Association, respectively.
● EtherCAT is the registered trademark licensed by Beckhoff Automation in Germany.

By using a network converter (sold separately), the CC-Link communication, the MECHATROLINK communication, and the EtherCAT communication can be supported. Operating data, parameter setting, and operation commands can be input for each communication. FLEX can be flexibly used on your network, reducing the design time.

Pulse Train Input Type



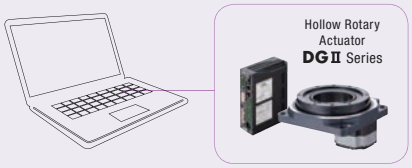
Easy Operation by Use of the Data Setting Software

(Unavailable for the pulse train input type of the following Open-loop Type: **DG85** and **DG130**)

By using the data setting software, data settings, actual operation, and checks by the various monitor functions are also easily performed on the computer.

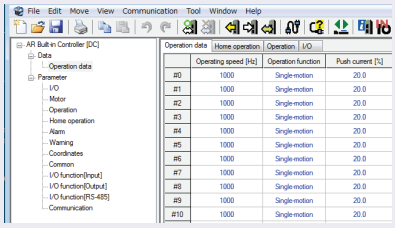
● Data Setting Software **MEXE02**

The data setting software can be downloaded from the WEB site.
The CD-ROM is also available (for free).



● Operating Data/Parameter Setting

Operating data and parameter settings can be made easily on your PC. The setting data can be saved; therefore, the same settings can be forwarded and used in the case the driver is replaced.



● Teaching/Remote Operation

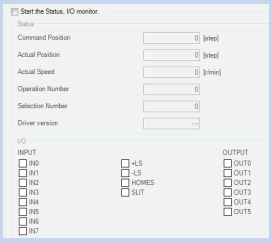
The motor can be driven by operating the data setting software. Use this function for teaching or trial operation.

● Supporting multi-monitoring, the software allows you to perform remote operation or teaching while monitoring the operational statuses.

Various monitor functions

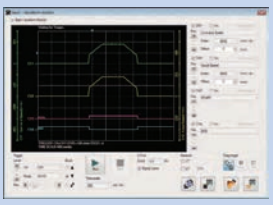
● I/O Monitoring

On your PC, you can check the statuses of the I/O wiring to the driver. Use this function for I/O check after wiring or during operation.



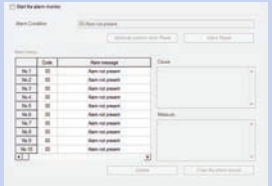
● Waveform Monitoring

Similar to using an oscilloscope, the motor drive condition (designated speed, motor load efficiency, etc.) can be checked. Use it during the startup of the device and when adjusting.



● Alarm Monitor

If an error occurs, you can check the error details and measures to be taken.



Driver Features

Built-in Positioning Function 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 has been simplified.
The setting is performed using the data setting software, data setting device (sold separately) or by RS-485 communication.

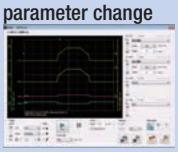
Operation Types

In the built-in positioning function 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.

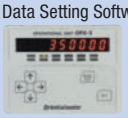
Basic setting
(Factory setting)

These are the Closed-loop Type.

Operating data setting parameter change



Data Setting Software (**MEXE02**)



or

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

- Data Setting
- Test Operation
- Alarm History
- Parameter Change
- Monitoring
- Data Copy

- Setting via the RS-485 communication is also available.
- The data setting software can be downloaded from the WEB site. The CD-ROM is also available (for free).

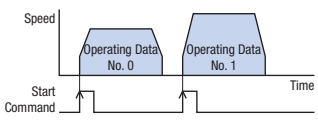
Item		Description	
Common	Control Method	I/O Control	
		RS-485 Communication	Network converter connection
			Modbus RTU protocol connection
	Position Command Input	Setting with operating data number	Command range for each point: −8388608～8388607 [step] (Setting Unit: 1 [step])
	Speed Command Input	Setting 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. You can select acceleration/deceleration rate [ms/kHz] or acceleration/deceleration time [sec]. Command Range: 0.001～1000.000 [ms/kHz] (Setting Unit: 0.001 [ms/kHz]) 0.001～1000.000 [sec] (Setting Unit: 0.001 [sec])	
	Acceleration/ Deceleration Processing	Velocity filter, movement 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 HOME sensor.
		Position Preset	A function to define the home position by P-PRESET input at an arbitrary position.
			You can set the home position 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 [sec]. (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	Change the operating data number.	
Other Operations	JOG Operation	Execute regular feed by inputting +JOG or −JOG.	
	Automatic Return Operation*1	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*1*2	The normal mode and the current control mode can be selected.	
Absolute Backup*1		You can build an absolute system by using a battery (accessory).	

- Push-motion operation cannot be used with this product.

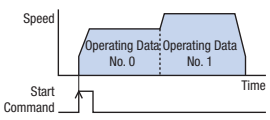
*1 Only for products equipped with **AR** Series. *2 Except when you want to further reduce heat generation or noise, using normal mode is recommended.

Positioning Operation

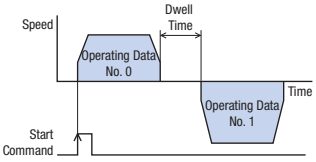
- Independent Operation



- Linked Operation



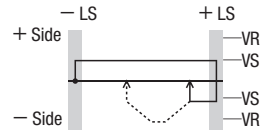
- Linked Operation 2



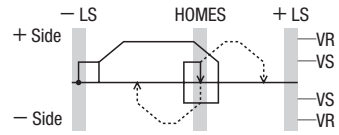
<Start Methods>
- Operating Data Selection Method
- Direct Positioning
- Sequential Positioning

Return-To-Home Operation

- 2-Sensor Mode

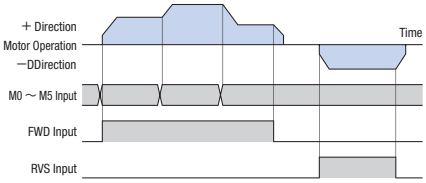


- 3-Sensor Mode



- Position Preset

Continuous Operation

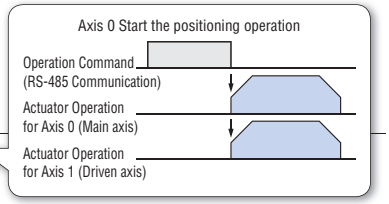
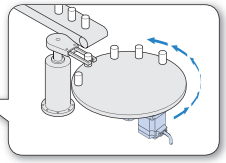
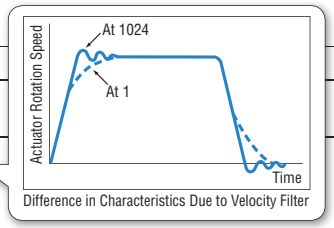


Other Operations

- JOG Operation (Test operation)
- Automatic Return Operation

● Equipped with a sequence for return-to-home operation, the product can reduce 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. How to calculate the minimum movement of the output table $1000* \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} \times \underset{\text{(gear ratio)}}{18}$ [°] *1000: Equipped with **AR** Series 500: Equipped with **RK II** Series 
Group Send Function (via RS-485 communication or network converter)	You can configure a group of multiple axes connected using RS-485 communication, and send commands by group. You can also perform simultaneous start and operation for multiple axes.
Round Function	If the command position exceeds the "round setting range"parameters, this function returns the command position and various rotation data to 0. Because the various rotation data is returned to 0, even for the continuous rotation in the same direction using the absolute backup system, position management is possible. ● When building an absolute system, the accessory (sold separately) battery is necessary. Only for product equipped with **AR** Series. 
Hardware Overtravel	This function stops the actuator when the mechanical limit is exceeded.
Software Overtravel	This function stops the actuator when exceeding the limit set by the software. Depending on the setting, only an alarm can also be output without stopping the actuator.
STOP Input (External stop)	This function forcibly stops operation when there is an abnormality or other issue. The stopping method that can be selected is instantaneous stop, deceleration stop, or all windings off (actuator holding force is off).
Alarm Code Output	You can output alarm codes that are occurring.
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.  Difference in Characteristics Due to Velocity Filter
Teaching Function*1	You can perform teaching. Move the load to the target position, and store the position data at this time as the positioning data.
I/O Monitoring*1	You can check the ON/OFF status of the I/O signals.
Waveform Monitoring*2	You can check the operating speed and I/O signals as a waveform.

● The data setting software **MEXE02** can be downloaded from the WEB site. The CD-ROM is also available (for free).
For details, please contact the nearest Oriental Motor sales office.

*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**).

Driver Features

Pulse Train Input Type

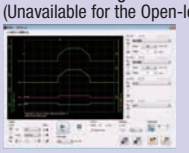
This type executes operation by inputting pulses to the driver. The data setting software and the data setting device (sold separately) can be used to perform operations according to your needs, such as changing the parameters, displaying the alarm history, and performing various types of monitoring.

Basic setting
(Factory setting)

These are the Closed-loop Type.

+

Extension setting
(Unavailable for the Open-loop Type **DG85** and **DG130**)



Test Operation
Alarm History
Parameter Change
Monitoring
Data Copy

Data Setting Software (**MEXE02**)

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

● The data setting software can be downloaded from the WEB site.
The CD-ROM is also available (for free).

Main Functions

● Common to the Closed-loop Type and the Open-loop Type ○ Unavailable for the Open-loop Type **DG85** and **DG130** □ For the Open-loop Type **DG85** and **DG130** only

Item	Overview	Basic Setting	Extended Settings
Selection of Pulse Input Mode	1-pulse input mode or 2-pulse input (positive logic/negative logic) 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.	●	○
	You can change the value of the electric gear corresponding to each function switch.	–	○
Running Current Setting	The running current setting can be changed with the current setting switch (CURRENT).	●	○
	You can change the value corresponding to each of 0～F (16 levels) for the current setting switch (CURRENT).	–	○
Setting for Stopping Current Ratio	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.	○	○
	You can change the value 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)	–	○

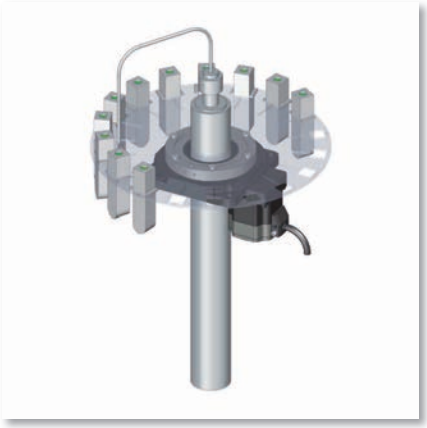
● The data setting software **MEXE02** can be downloaded from the WEB site. The CD-ROM is also available (for free).
For details, please contact the nearest Oriental Motor sales office.

*Except when you want to further reduce heat generation or noise, using normal mode is recommended.

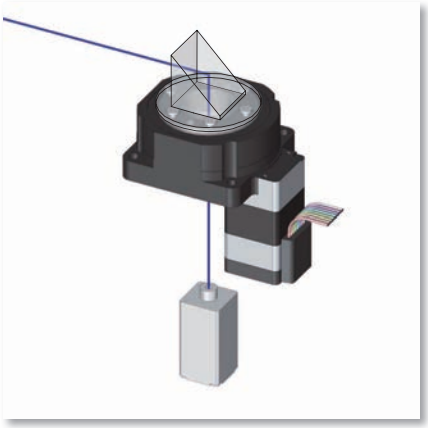
Applications

Applications Using the Hollow Hole

● Filling instrument with pipes for liquid



● Optical applications



Applications that requires High Rigidity

● Applications Where a Moment Load is Applied (Installed on a ceiling)

Applications that requires a High Performance Motor

● Positioning with high accuracy (Image inspecting device)

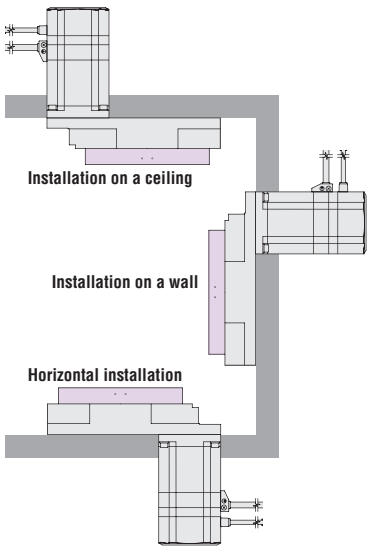
● Applications with changing inertia of load (Disk manufacturing device)

Installation in any direction

A **DG II** Series product can be installed horizontally, or on a ceiling or a wall. This provides you with a wider range of device design.

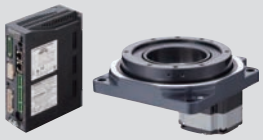
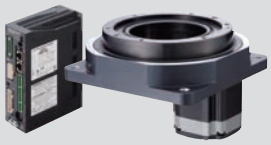
Note

On rare occasions, a little amount of grease may ooze out from the hollow rotary actuator. If contamination of the surrounding environment due to the oozing grease is problematic, check for leakage of the grease at the time of periodic inspection or install a damage prevention device, such as an oil receiver.

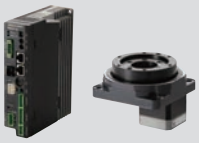
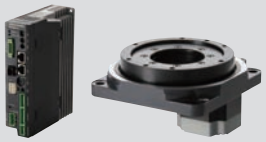


Lineup

Closed-loop Type <Cross-roller bearing>

Product Rotary Actuator Frame Size	Series Equipped With Motor	Electro-magnetic Brake	Driver Type	Power Supply Voltage [V]	Diameter of Hollow Section [mm]	Permissible Torque [N·m]	Permissible Moment [N·m] 20 40 60 80	Permissible Axial Load [N] 500 1000 ≀ 2000 3000	Lost Motion [arcmin]	Backlash [arcmin]	Angular Transmission Accuracy [arcmin]	Repetitive Positioning Accuracy [arcsec]
DG85R 85 mm 	**AR**	–	Built-in Controller	Single-Phase 100-120 Single-Phase 200-240	ϕ33	2.8	10	500	2	–	4	±15
			Pulse Train Input	Single-Phase 100-115 Single-Phase 200-230 Three-Phase 200-230								
DG130R 130 mm 	**AR**	●	Built-in Controller	Single-Phase 100-120 Single-Phase 200-240	ϕ62	12	50	2000	2	–	3	±15
			Pulse Train Input	Single-Phase 100-115 Single-Phase 200-230 Three-Phase 200-230								
DG200R 200 mm 	**AR**	●	Built-in Controller	Single-Phase 100-120 Single-Phase 200-240	ϕ100	50	100	4000	2	–	2	±15
			Pulse Train Input	Single-Phase 100-115 Single-Phase 200-230 Three-Phase 200-230								

Open-loop Type <Deep groove ball bearing>

Product Rotary Actuator Frame Size	Series Equipped With Motor	Electro-magnetic Brake	Driver Type	Power Supply Voltage [V]	Diameter of Hollow Section [mm]	Permissible Torque [N·m]	Permissible Moment [N·m] 20 40 60 80	Permissible Axial Load [N] 500 1000 ≀ 2000 3000	Lost Motion [arcmin]	Backlash [arcmin]	Angular Transmission Accuracy [arcmin]	Repetitive Positioning Accuracy [arcsec]
DG60 60 mm 	**AR**	–	Built-in Controller	DC 24	ϕ28	0.9	2	100	2	–	4	±15
			Pulse Train Input									
DG85 85 mm 	**RK II**	–	Built-in Controller	Single-Phase 100-120 Single-Phase 200-240	ϕ28	2.8	6	200	–	5	7	±30
			Pulse Train Input									
DG130 130 mm 	**RK II**	–	Built-in Controller	Single-Phase 100-120 Single-Phase 200-240	ϕ53	12	20	300	–	5	7	±30
			Pulse Train Input									

How to Read Specifications Table

Hollow Rotary Actuators Specifications

	Frame Size			60 mm	85 mm	130 mm
	Product Name	Built-in Controller		DG60-AR□KD2-◇	DG85-RKSA□D-◇	DG130-RKSA□D-◇
		Pulse Train Input		DG60-AR□K2-◇	DG85-RKSA□-◇	DG130-RKSA□-◇
	Installed Motor			AR Series	RKII Series	
①	Output Table Supporting Bearing Type			Deep-groove ball bearing		
②	Inertia		J: kg·m^2	4324×10^{-7}	24036×10^{-7}	114180×10^{-7}
	Gear Ratio			18		
③	Motor Resolution			1000 P/R	500 P/R	
④	Permissible Torque		N·m	0.9	2.8	12
⑤	Holding Torque at Motor Standstill	Power ON	N·m	0.45	2.6	9.9
⑥	Rated Speed		r/min	200	150	
⑦	Repetitive Positioning Accuracy		arcsec	±15 (±0.004°)	±30 (±0.008°)	
⑧	Backlash		arcmin	–	5 (0.083°)	
⑨	Lost Motion		arcmin	2 (0.033°)	–	
⑩	Angular Transmission Accuracy		arcmin	4 (0.067°)	7 (0.116°)	
⑪	Permissible Axial Load		N	100	200	300
⑫	Permissible Moment		N·m	2	6	20
⑬	Runout of Output Table Surface		mm	0.030	0.060	
⑭	Runout of Output Table Inner (Outer) Diameter		mm	0.030	0.060	
⑮	Parallelism of Output Table		mm	0.050	0.080	
⑯	Degree of Protection	Single Shaft		IP40 (IP20 for motor connector)		
		Double Shaft		IP20	–	
	Mass of Actuator Unit		kg	0.5	1.11	2.9
	Power Supply Input	Voltage and Frequency	Built-in Controller	24 VDC ±5%	Single-Phase 100-120 VAC, Single-Phase 200-240 VAC −15～+10% 50/60 Hz	
			Pulse Train Input	24 VDC ±10%		
		Input Current A	Built-in Controller 24 VDC	1.3	–	–
			Built-in Controller Single-Phase 100-120 VAC	–	1.9	3.8
			Built-in Controller Single-Phase 200-240 VAC	–	1.2	2.4
			Pulse Train Input 24 VDC	0.9	–	–
			Pulse Train Input Single-Phase 100-120 VAC	–	1.9	3.8
			Pulse Train Input Single-Phase 200-240 VAC	–	1.2	2.4
	Control Power Source			–	24 VDC ±5%, 0.2 A	

①Output Table Supporting Bearing Type

This is the type of the bearing used for the output table.

②Inertia

This is the total sum of the rotor inertial moment of the motor and the inertial moment of the speed reduction mechanism converted to a moment on the output table.

③Motor Resolution

Number of pulses needed to rotate the motor by one rotation.
For how to calculate the minimum movement [°] of the output table with the gear ratio of 18, see the pages shown below.

- Built-in Positioning Function Type
  Equipped with **AR** Series, AC power supply input ➜ Page 38
  Equipped with **AR** Series, DC power supply input ➜ Page 41
  Equipped with **RK II** Series ➜ Page 56
- Pulse Train Input Type
  Equipped with **AR** Series, AC power supply input ➜ Page 46
  Equipped with **AR** Series, DC power supply input ➜ Page 49
  Equipped with **RK II** Series ➜ Page 61

④Permissible Torque

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

⑤Holding Torque at Motor Standstill (With current applied)

This is the maximum torque with which to hold the output table in position if it stops while the power is still on.

⑥Rated Speed

This is the output table speed that the mechanical strength of the speed reduction mechanism can tolerate.

⑦Repetitive Positioning Accuracy

This is a value indicating the degree of error that generates when positioning is performed repeatedly to the same position in the same direction.

⑧Backlash

This is the play of the output table when the motor shaft is fixed. When positioning in bi-direction, the positioning accuracy is affected.

⑨Lost Motion

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

⑩Angular Transmission Accuracy

This is the difference between the theoretical rotation angle of the output table as calculated from the input pulse counter, and the actual rotation angle.

⑪Permissible Axial Load

This is the permissible value of axial load applied to the output table in the axial direction.

⑫Permissible Moment

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 load moment calculated by the eccentricity from the center by the applied load.

⑬Runout of Output Table Surface

This is the maximum value of runout of the installation surface of the output table when the output table is rotated under no load.

⑭Runout of Output Table Inner (Outer) Diameter

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

⑮Parallelism of Output Table

This is the inclination of the installation surface of the output table compared with the actuator installation surface on the equipment side.

⑯Degree of Protection

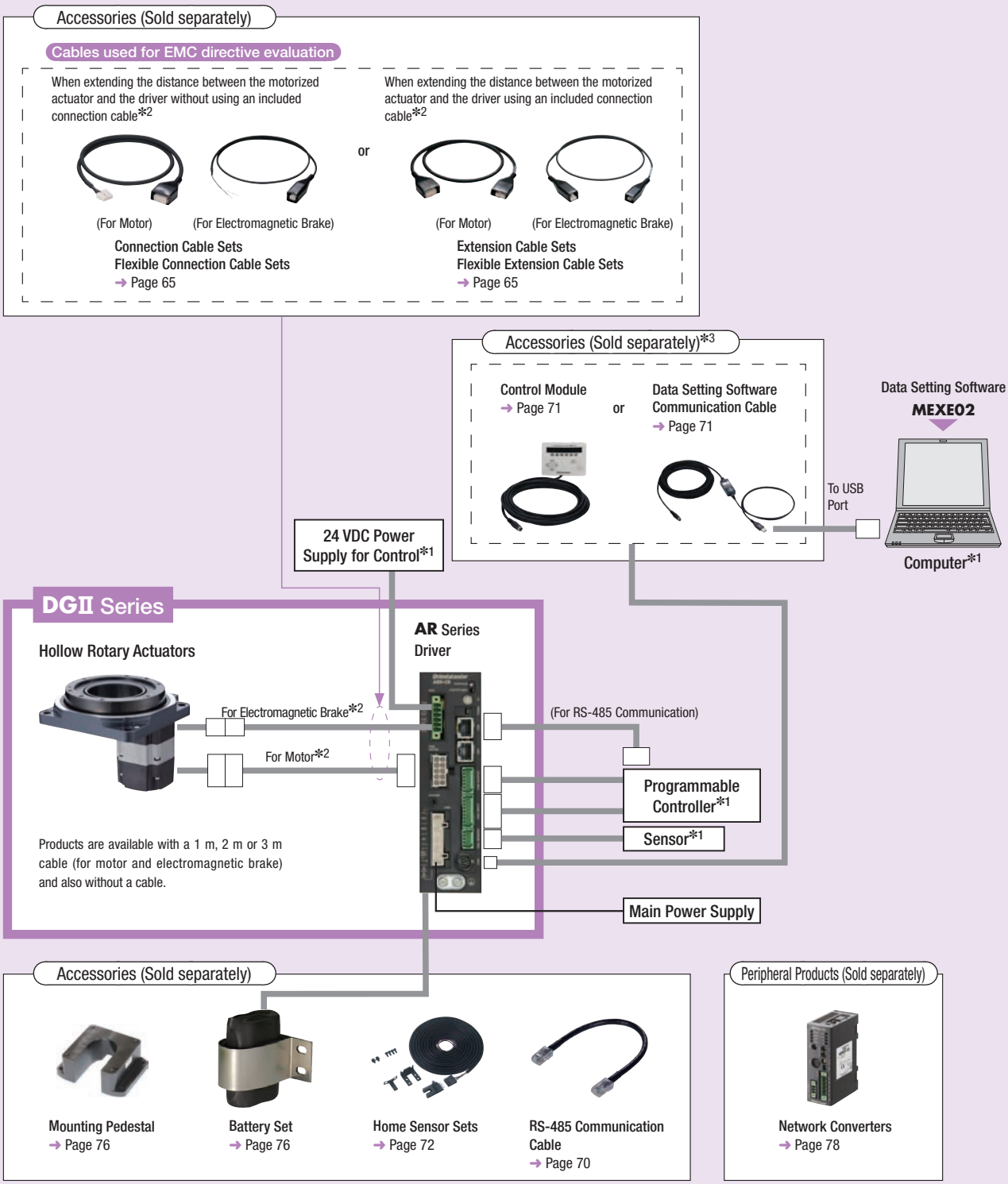
Based on IEC60529 and EN60034-5 (= IEC60034-5), dust-resistance and waterproofing regarding the degree of protection of the device is classified using a grade.

System Configuration

Series Equipped with the Built-in Positioning Function Type of the **AR** Series and with Electromagnetic Brake (AC power supply input and DC power supply input are both indicated)

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

*1 Not supplied
*2 Only with products supplied with a connection cable.
*3 Required for I/O control drive.



For details on the operation of the products, see the user's manual. The user's manual for the **DG II** Series equipped with the built-in positioning function type of the **AR** Series is same as the user's manual for the product equipped with the built-in positioning function type of the closed loop stepping motor unit **AR** Series. The User's Manual is not included with the product. Contact the nearest Oriental Motor sales office or download from the Oriental Motor website.
http://www.orientalmotor.com.sg/

System Configuration Example

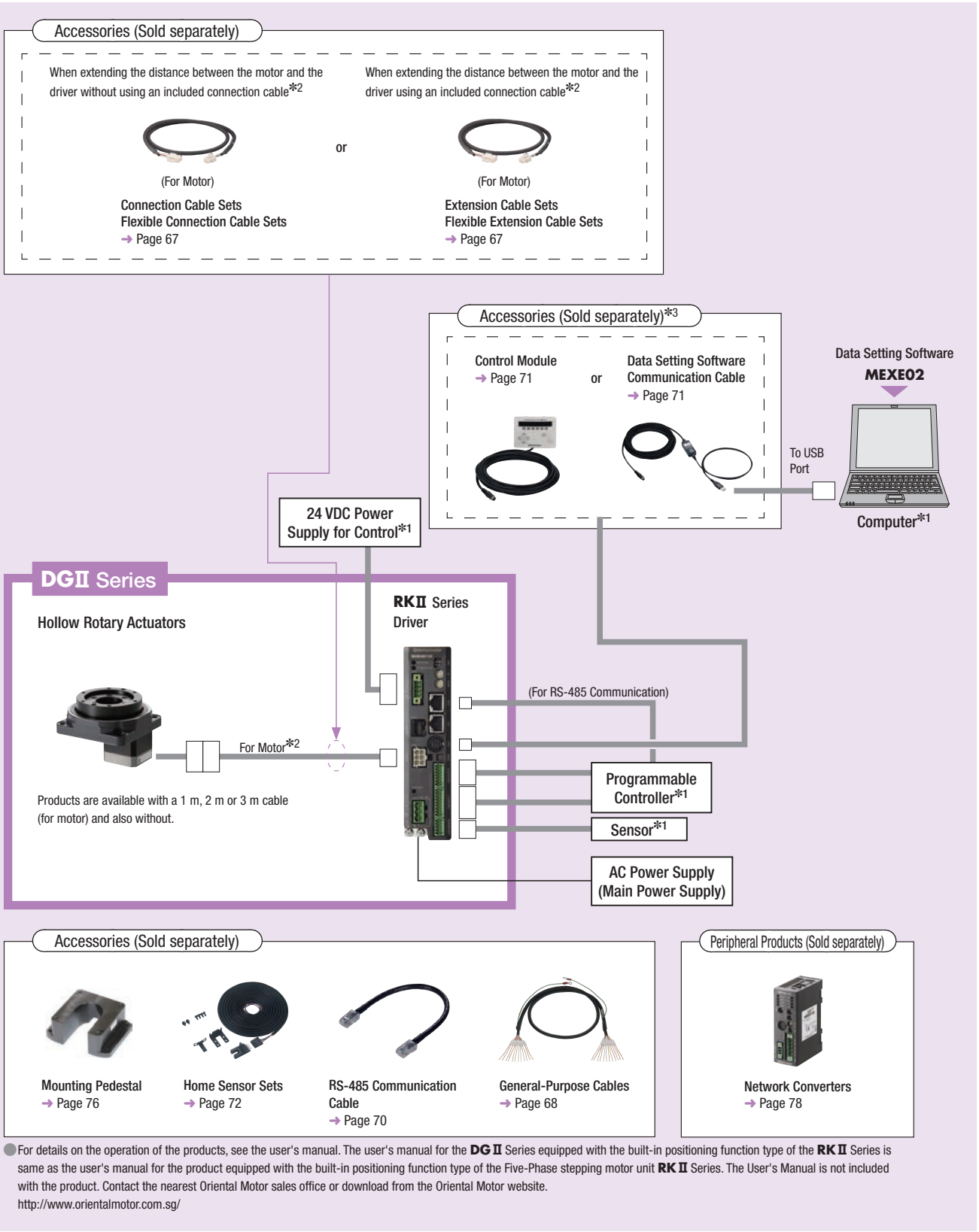
DG II Series	+	Sold Separately	
		Mounting Pedestal	Home Sensor Sets
DG130R-ARMAD2-1		MDG130B	PADG-SB

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

System Configuration Equipped with Built-in Positioning Function Type of RK II Series

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

*1 Not supplied
*2 Only with products supplied with a connection cable.
*3 Required for I/O control drive.



For details on the operation of the products, see the user's manual. The user's manual for the DG II Series equipped with the built-in positioning function type of the RK II Series is same as the user's manual for the product equipped with the built-in positioning function type of the Five-Phase stepping motor unit RK II Series. The User's Manual is not included with the product. Contact the nearest Oriental Motor sales office or download from the Oriental Motor website.
http://www.orientalmotor.com.sg/

System Configuration Example

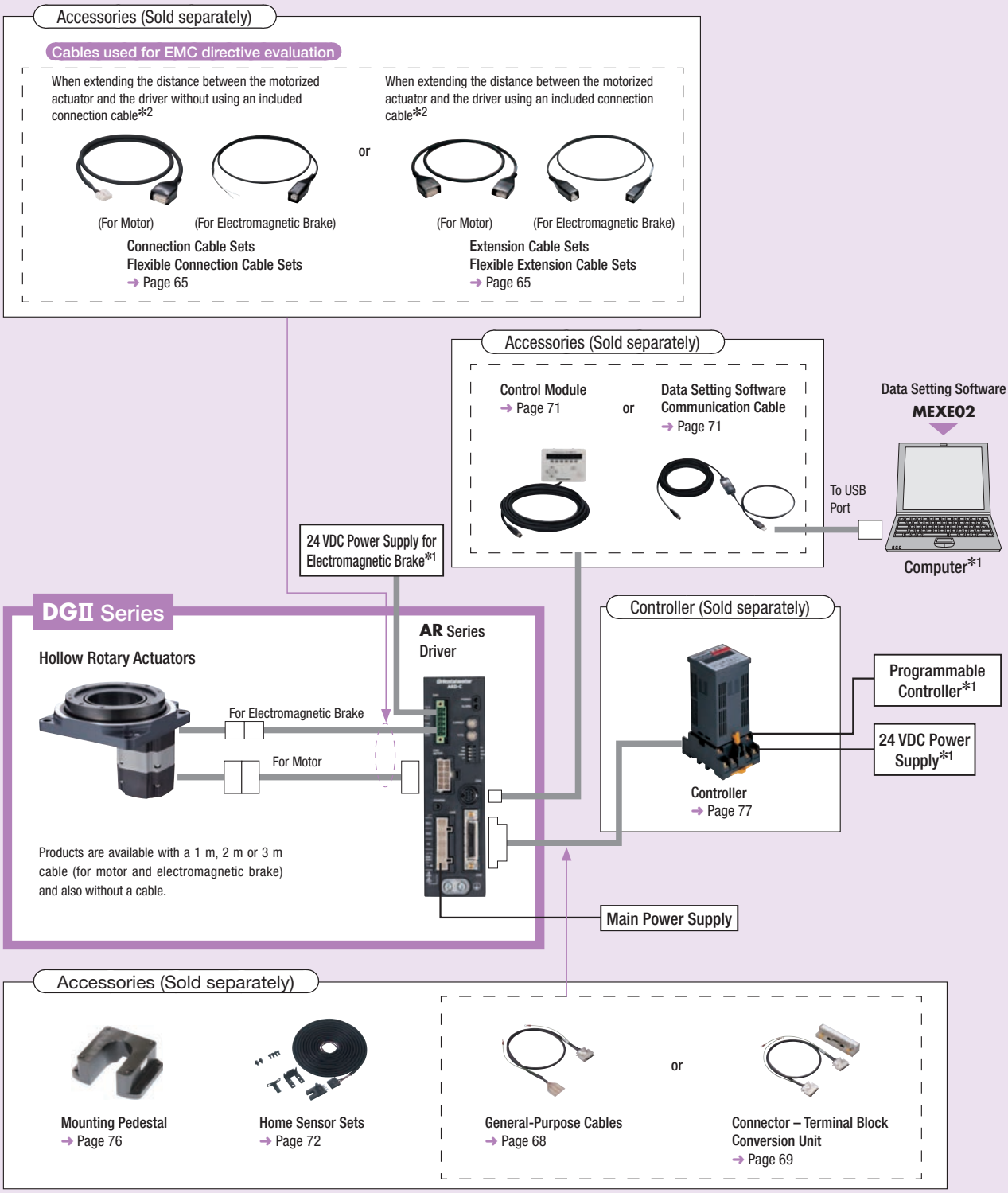
DG II Series	+	Sold Separately		
		Mounting Pedestal	Home Sensor Sets	General-Purpose Cables (1 m)
DG85-RKSAAD-1		MDG85A	PADG-SB	CC16D010B-1

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

System Configuration Equipped with Pulse Train Input Type of the **AR** Series and with Electromagnetic Brake (AC power supply input or DC power supply input is indicated)

An example of a single-axis system configuration with the **SG8030J** controller is shown below.

*1 Not supplied
*2 Only with products supplied with a connection cable.



For details on the operation of the products, see the user's manual. The user's manual of the **DGII** Series equipped with built-in positioning type **AR** Series also applies to the closed loop stepping motor unit **AR** Series of the pulse train input type. The User's Manual is not included with the product. Contact the nearest Oriental Motor sales office or download from the Oriental Motor website.
http://www.orientalmotor.com.sg/

System Configuration Example

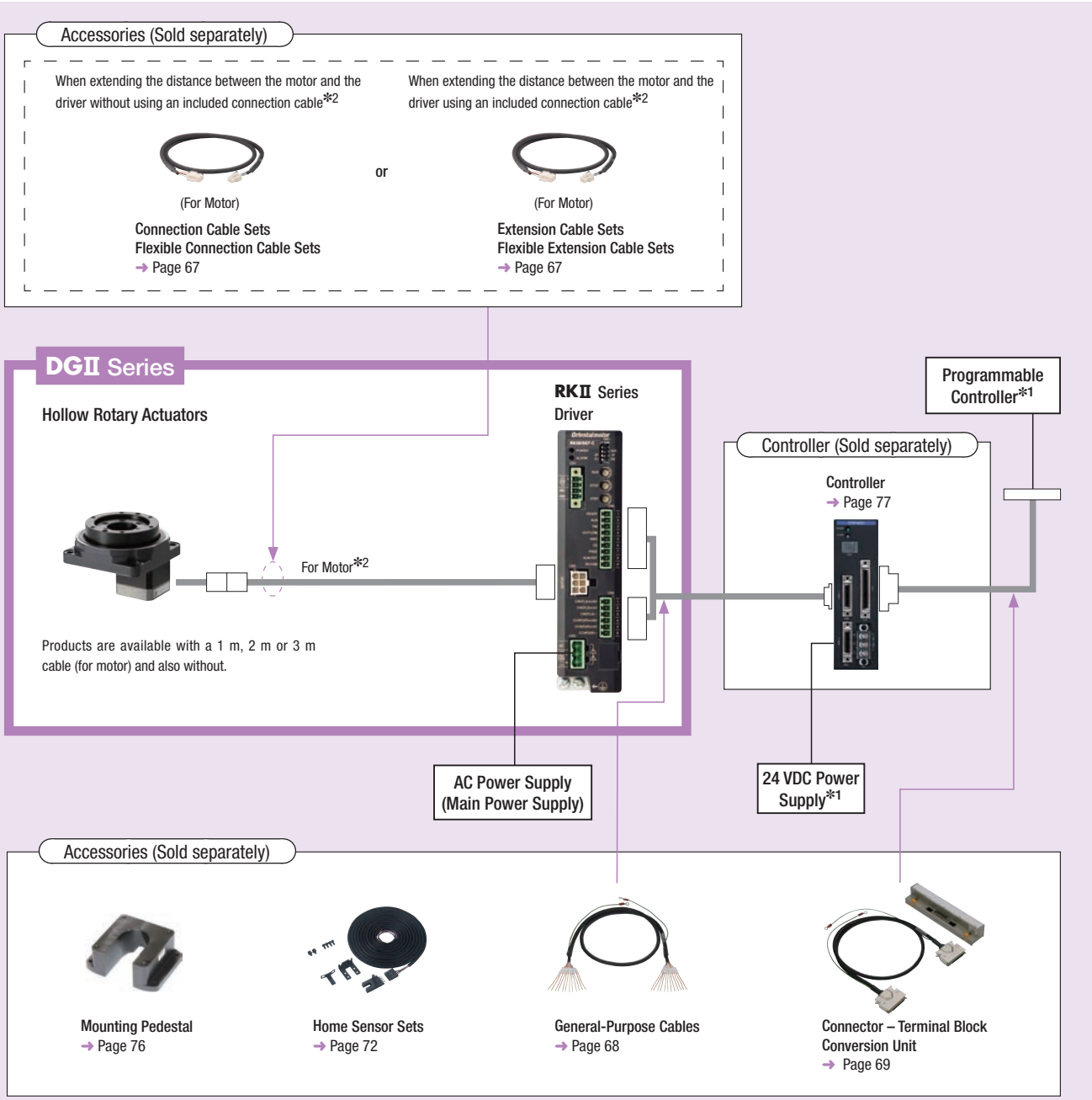
DGII Series	+	Sold Separately			
		Controller	Mounting Pedestal	Home Sensor Sets	Connector – Terminal Block Conversion Unit (1 m)
DG130R-ARMA2-1		**SG8030J-D**	**MDG130B**	**PADG-SB**	**CC36T10E**

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

System Configuration Equipped with Pulse Train Input Type of RKII Series

A single-axis system configuration with the **EMP400** controller is shown below.

*1 Not supplied
*2 Only with products supplied with a connection cable.



For details on the operation of the products, see the user's manual. The user's manual for the **DGII** Series equipped with the built-in positioning function type of the **RKII** Series is same as the user's manual for the product equipped with the pulse train input type of the Five-Phase stepping motor unit **RKII** Series. The User's Manual is not included with the product. Contact the nearest Oriental Motor sales office or download from the Oriental Motor website. http://www.orientalmotor.com.sg/

System Configuration Example

DGII Series		Sold Separately				
		Controller	Mounting Pedestal	Home Sensor Sets	General-Purpose Cables (1 m)	Connector – Terminal Block Conversion Unit (1 m)
DG85-RKSAA-1	+	EMP401-1	MDG85A	PADG-SB	CC16D010B-1	CC50T10E

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

Product Number Code

Closed-loop Type

DG 130 R - AR A C D 2 - 1

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

Open-loop Type

DG 60 - AR A K D 2 - 1

① ② ④ ⑤ ⑥ ⑦ ⑧ ⑨

DG 130 - RKS A A D - 1

① ② ④ ⑤ ⑥ ⑦ ⑨

①	Series Name	**DG**: **DG**Ⅱ Series
②	Frame Size	**60**: 60 mm **85**: 85 mm **130**: 130 mm **200**: 200 mm
③	Output Table Supporting Bearing Type	**R**: Cross-Roller Bearing None: Deep-Groove Ball Bearing
④	Installed Motor	**AR**: **AR** Series **RKS**: **RK**Ⅱ Series
⑤	Motor Shape	**A**: Single Shaft **B**: Double Shaft **M**: With Electromagnetic Brake
⑥	Power Supply Input	Equipped with **AR** Series (Built-in Positioning Function Type) **A**: Single-Phase 100-120 VAC **C**: Single-Phase 200-240 VAC **K**: 24 VDC Equipped with **AR** Series (Pulse Train Input Type) **A**: Single-Phase 100-115 VAC **C**: Single-Phase 200-230 VAC **S**: Three-Phase 200-230 VAC **K**: 24 VDC Equipped with **RK**Ⅱ Series (Built-in Positioning Function Type, Pulse Train Input Type) **A**: Single-Phase 100-120 VAC **C**: Single-Phase 200-240 VAC
⑦	Driver Type	**D**: Built-in Positioning Function Type Blank: Pulse Train Input Type
⑧	Reference Number	—
⑨	Connection Cable*	Number: Length of included cable **1**: 1 m **2**: 2 m **3**: 3 m None: Connection cable not included

*Connection cables with a length of 5 m or more are available as accessories (sold separately). For details, contact the Customer Support Center.

Types

Closed-loop Type

◇Built-in Positioning Function Type Equipped with **AR** Series

AC Power Supply Input

Single-Phase 100-120 VAC	Single-Phase 200-240 VAC
Product Name	Product Name
DG85R-ARAAD2	**DG85R-ARACD2**
DG85R-ARAAD2-◇	**DG85R-ARACD2-◇**
DG85R-ARBAD2	**DG85R-ARBCD2**
DG85R-ARBAD2-◇	**DG85R-ARBCD2-◇**
DG130R-ARAAD2	**DG130R-ARACD2**
DG130R-ARAAD2-◇	**DG130R-ARACD2-◇**
DG130R-ARBAD2	**DG130R-ARBCD2**
DG130R-ARBAD2-◇	**DG130R-ARBCD2-◇**
DG130R-ARMAD2	**DG130R-ARMCD2**
DG130R-ARMAD2-◇	**DG130R-ARMCD2-◇**
DG200R-ARAAD2	**DG200R-ARACD2**
DG200R-ARAAD2-◇	**DG200R-ARACD2-◇**
DG200R-ARBAD2	**DG200R-ARBCD2**
DG200R-ARBAD2-◇	**DG200R-ARBCD2-◇**
DG200R-ARMAD2	**DG200R-ARMCD2**
DG200R-ARMAD2-◇	**DG200R-ARMCD2-◇**

The following items are included in each product.

Actuator, Driver, Cable for the motor*1, Cable for the electromagnetic brake*1*2, Connectors for the driver, Operating Manual*3

*1 Only with products supplied with a connection cable. For the following cases, obtain a cable provided as the accessory (sold separately).
- When using a flexible extension cable
- When using a cable longer than 3 m
- When purchasing a product without a connection cable

*2 Only for electromagnetic brake type.

*3 The operating manual describes the details about product installation and wiring. For details on the operation of the products, see the user's manual.

●A number indicating the desired connection cable length of **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

◇Pulse Train Input Type　Equipped with **AR** Series

AC Power Supply Input

Single-Phase 100-115 VAC	Single-Phase 200-230 VAC	Three-Phase 200-230 VAC
Product Name	Product Name	Product Name
DG85R-ARAA2	**DG85R-ARAC2**	**DG85R-ARAS2**
DG85R-ARAA2-◇	**DG85R-ARAC2-◇**	**DG85R-ARAS2-◇**
DG85R-ARBA2	**DG85R-ARBC2**	**DG85R-ARBS2**
DG85R-ARBA2-◇	**DG85R-ARBC2-◇**	**DG85R-ARBS2-◇**
DG130R-ARAA2	**DG130R-ARAC2**	**DG130R-ARAS2**
DG130R-ARAA2-◇	**DG130R-ARAC2-◇**	**DG130R-ARAS2-◇**
DG130R-ARBA2	**DG130R-ARBC2**	**DG130R-ARBS2**
DG130R-ARBA2-◇	**DG130R-ARBC2-◇**	**DG130R-ARBS2-◇**
DG130R-ARMA2	**DG130R-ARMC2**	**DG130R-ARMS2**
DG130R-ARMA2-◇	**DG130R-ARMC2-◇**	**DG130R-ARMS2-◇**
DG200R-ARAA2	**DG200R-ARAC2**	**DG200R-ARAS2**
DG200R-ARAA2-◇	**DG200R-ARAC2-◇**	**DG200R-ARAS2-◇**
DG200R-ARBA2	**DG200R-ARBC2**	**DG200R-ARBS2**
DG200R-ARBA2-◇	**DG200R-ARBC2-◇**	**DG200R-ARBS2-◇**
DG200R-ARMA2	**DG200R-ARMC2**	**DG200R-ARMS2**
DG200R-ARMA2-◇	**DG200R-ARMC2-◇**	**DG200R-ARMS2-◇**

The following items are included in each product.

Actuator, Driver, Cable for the motor*1, Cable for the electromagnetic brake*1*2, Connectors for the driver, Operating Manual*3

*1 Only with products supplied with a connection cable. For the following cases, obtain a cable provided as the accessory (sold separately).
- When using a flexible extension cable
- When using a cable longer than 3 m
- When purchasing a product without a connection cable

*2 Only for electromagnetic brake type.

*3 The operating manual describes the details about product installation and wiring. For details on the operation of the products, see the user's manual.

Open-loop Type

◇Built-in Positioning Function Type　Equipped with **RKII** Series

AC Power Supply Input

Single-Phase 100-120 VAC	Single-Phase 200-240 VAC
Product Name	Product Name
DG85-RKSAAD	**DG85-RKSACD**
DG85-RKSAAD-◇	**DG85-RKSACD-◇**
DG130-RKSAAD	**DG130-RKSACD**
DG130-RKSAAD-◇	**DG130-RKSACD-◇**

◇Built-in Positioning Function Type　Equipped with **AR** Series

DC Power Supply Input

24 VDC
Product Name
DG60-ARAKD2
DG60-ARAKD2-◇
DG60-ARBKD2
DG60-ARBKD2-◇

◇Pulse Train Input Type　Equipped with **RKII** Series

AC Power Supply Input

Single-Phase 100-120 VAC	Single-Phase 200-240 VAC
Product Name	Product Name
DG85-RKSAA	**DG85-RKSAC**
DG85-RKSAA-◇	**DG85-RKSAC-◇**
DG130-RKSAA	**DG130-RKSAC**
DG130-RKSAA-◇	**DG130-RKSAC-◇**

◇Pulse Train Input Type　Equipped with **AR** Series

DC Power Supply Input

24 VDC
Product Name
DG60-ARAK2
DG60-ARAK2-◇
DG60-ARBK2
DG60-ARBK2-◇

The following items are included in each product.

Actuator, Driver, Cable for the motor*1, Connectors for the driver, Operating Manual*2

*1 Only with products supplied with a connection cable. For the following cases, obtain a cable provided as the accessory (sold separately).
- When using a flexible extension cable
- When using a cable longer than 3 m
- When purchasing a product without a connection cable

*2 The operating manual describes the details about product installation and wiring. For details on the operation of the products, see the user's manual.

● A number indicating the desired connection cable length of **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

Closed-loop Type

Specifications

Hollow Rotary Actuators Specifications

Frame Size				85 mm	130 mm	200 mm
Product Name	Built-in Controller			DG85R-AR□□D2-◇	DG130R-AR□□D2-◇	DG200R-AR□□D2-◇
	Pulse Train Input			DG85R-AR□□2-◇	DG130R-AR□□2-◇	DG200R-AR□□2-◇
Installed Motor				AR Series		
Output Table Supporting Bearing Type				Cross-roller bearing		
Inertia			J: kg·m^2	22092×10^{-7}	150620×10^{-7} [189500×10^{-7}]*3	916400×10^{-7} [955280×10^{-7}]*3
Gear Ratio				18		
Motor Resolution*4				1000 P/R		
Permissible Torque			N·m	2.8	12	50
Holding Torque at Motor Standstill	Power ON		N·m	1.8	12	36 [20]*3
	Electromagnetic Brake		N·m	—	12	20
Rated Speed			r/min	200		110
Repetitive Positioning Accuracy			arcsec	±15 (±0.004°)		
Lost Motion			arcmin	2 (0.033°)		
Angular Transmission Accuracy			arcmin	4 (0.067°)	3 (0.05°)	2 (0.033°)
Permissible Axial Load			N	500	2000	4000
Permissible Moment			N·m	10	50	100
Runout of Output Table Surface			mm	0.015		
Runout of Output Table Inner (Outer) Diameter			mm	0.015		0.030
Parallelism of Output Table			mm	0.030		0.050
Degree of Protection	Single Shaft, With Electromagnetic Brake			IP40 (IP20 for motor connector)		
	Double Shaft			IP20		
Mass of Actuator Unit			kg	1.17	2.65 [2.95]*3	9.5 [10.1]*3
Power Supply Input	Voltage and Frequency	Built-in Controller		Single-Phase 100-120 VAC, Single-Phase 200-240 VAC −15～+6% 50/60 Hz		
		Pulse Train Input		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	Single-Phase 100-120 VAC	2.4	3.6	5.9
			Single-Phase 200-240 VAC	1.5	2.3	3.7
		Pulse Train Input	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 Source				24 VDC ±5%, 0.5 A		
Electromagnetic Brake*5	Power Supply Input			—	24 VDC ±5%*6, 0.25 A	

- Either **A** (Single Shaft), **B** (Double Shaft) or **M** (Electromagnetic Brake Type) indicating the motor configuration is entered where the box □ is located within the product name.
  For **DG85**, 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 train input packages only) indicating power supply input is entered where the box □ is located within the product name.
- A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

*1 Except for **DG200R-ARM□2-◇**.
*2 Only for pulse train input type (Except for **DG200R-ARM□2-◇**)
*3 The brackets [ ] indicate the specifications for the electromagnetic brake type.
*4 Motor resolution at the time of shipping. For how to calculate the minimum movement [°] of the output table with the gear ratio of 18, see the pages shown below.
- Equipped with the built-in positioning function type of the **AR** Series, AC power supply input ➜ Page 38, DC power supply input ➜ Page 41
- Equipped with the pulse train input type of the **AR** Series, AC power supply input ➜ Page 46, DC power supply input ➜ Page 49

*5 For the pulse train 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 min. using an accessory cable (sold separately), the 24 VDC±4% specification applies.

Note

- The back shaft of the motor in the Double Shaft is intended for installing 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 or less.
- The repetitive positioning accuracy is measured at a constant temperature (normal temperature) under a constant load.

General Specifications (Actuator of the Closed-loop Type)

Installed Motor		Equipped with **AR** Series, AC Power Supply Input
Heat-resistant Class		130 (B) [Recognized as 105 (A) by the UL/CSA Standards]
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 the motor/sensor windings · Case – Electromagnetic brake windings
Dielectric Strength Voltage		No abnormality is found with the following application for 1 minute: · Between the case and motor sensor windings 1.5 kVAC, 50 Hz or 60 Hz · Case – Electromagnetic brake windings 1.5 kVAC, 50 Hz or 60 Hz
Operating Environment (In Operation)	Ambient Temperature	0～+50°C (Non-freezing) 0～+40°C (Non-freezing) when home sensor set (accessory) is attached
	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

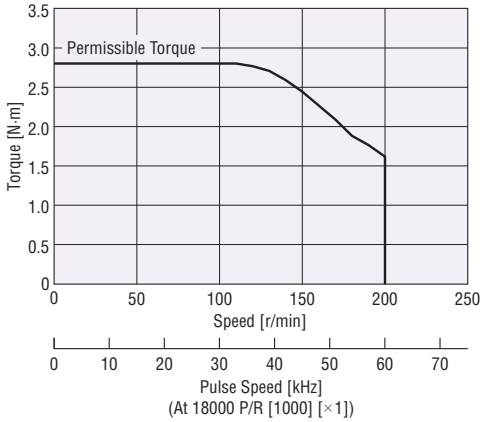
- Do not perform the insulation resistance test or dielectric voltage withstand test while the actuator and driver are connected.

Driver Specifications

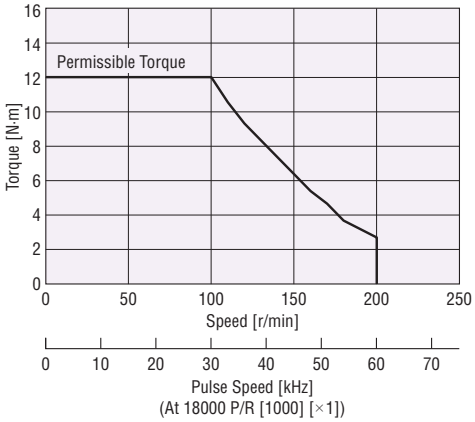
➜ Page 35

Speed – Torque Characteristics

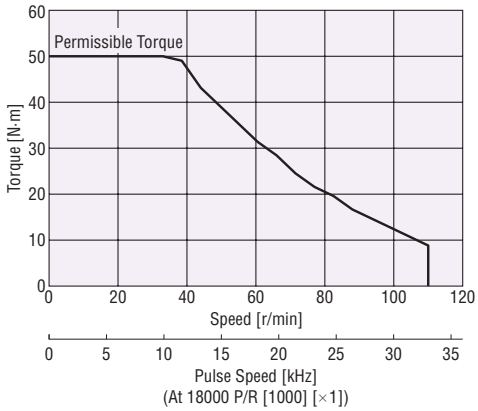
DG85R-AR



DG130R-AR

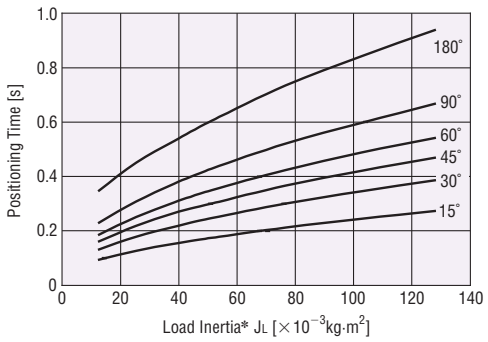


DG200R-AR

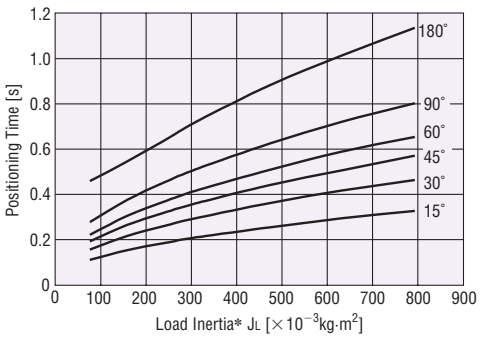


Load Inertia – Positioning Time (Reference value)

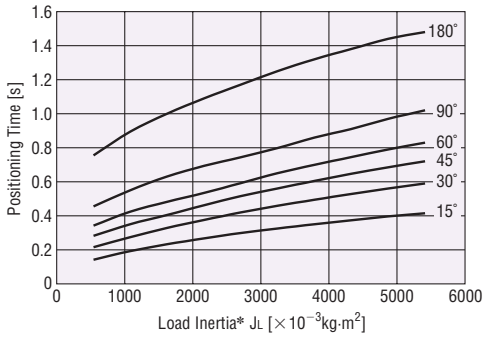
DG85R-AR



DG130R-AR

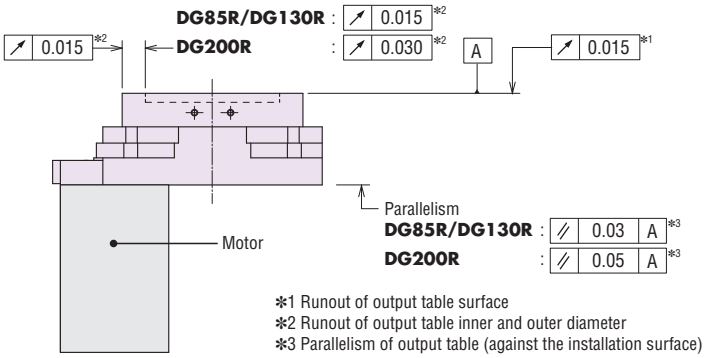


DG200R-AR



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

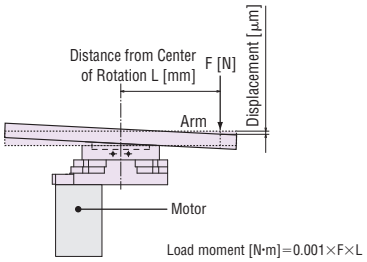
Mechanical Precision (At no load)



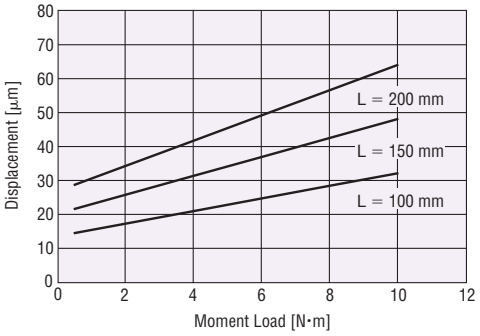
✻1 Runout of output table surface
✻2 Runout of output table inner and outer diameter
✻3 Parallelism of output table (against the installation surface)

Displacement by Load Moment (Reference value)

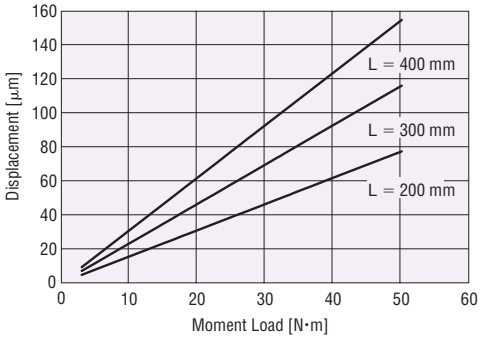
The output table will be displaced when it receives the load moment.
The graph plots the table displacement that occurs at distance L from the rotation center of the output table when a given load moment is applied in the negative direction.
The displacement becomes approximately two-fold when the load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



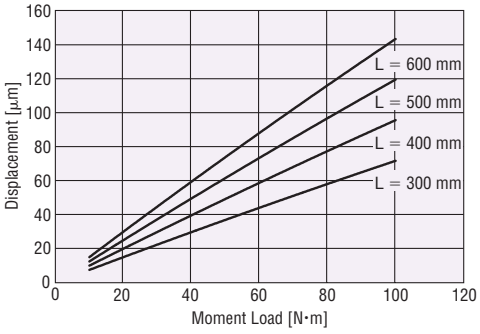
DG85R



DG130R



DG200R

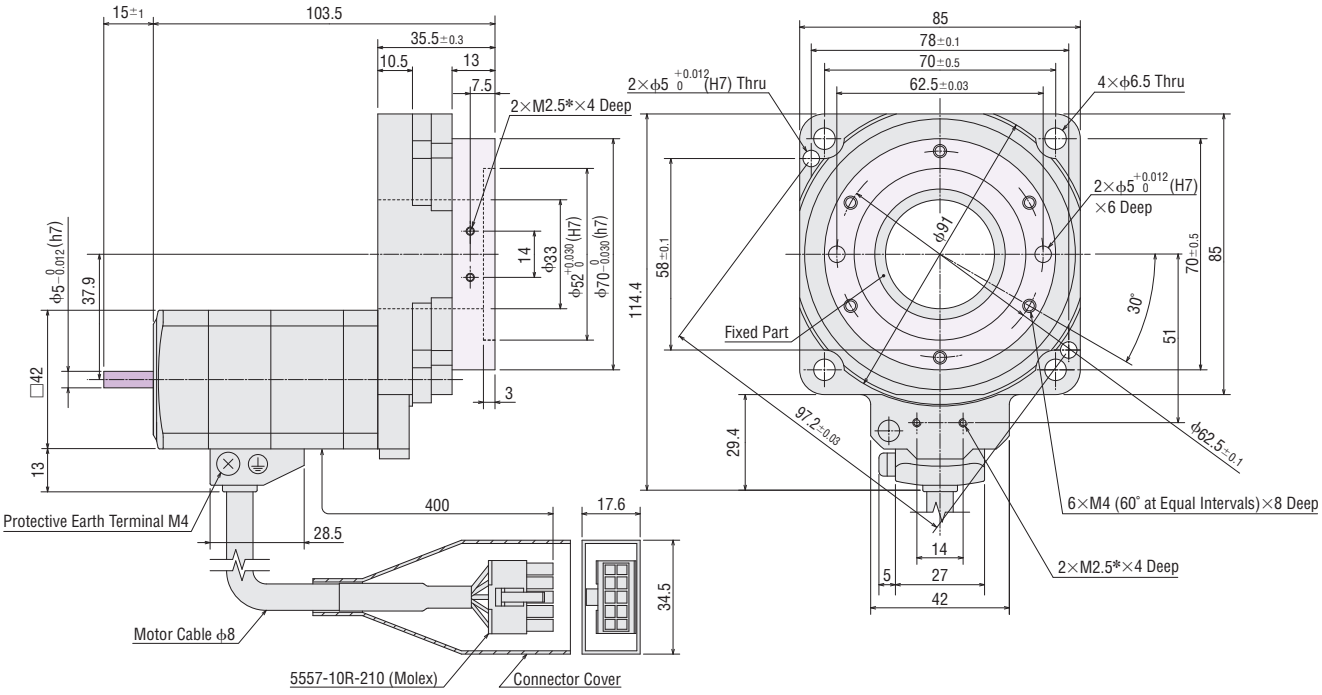


Dimensions (Unit = mm)

Actuator Dimensions

2D & 3D CAD

Product Name	Actuator Product Name	Mass	2D CAD
DG85R-ARAA□2-◇	DGM85R-ARAC	1.2 kg	D2854
DG85R-ARAC□2-◇			
DG85R-ARAS□2-◇			
DG85R-ARBA□2-◇	DGM85R-ARBC		
DG85R-ARBC□2-◇			
DG85R-ARBS2-◇			

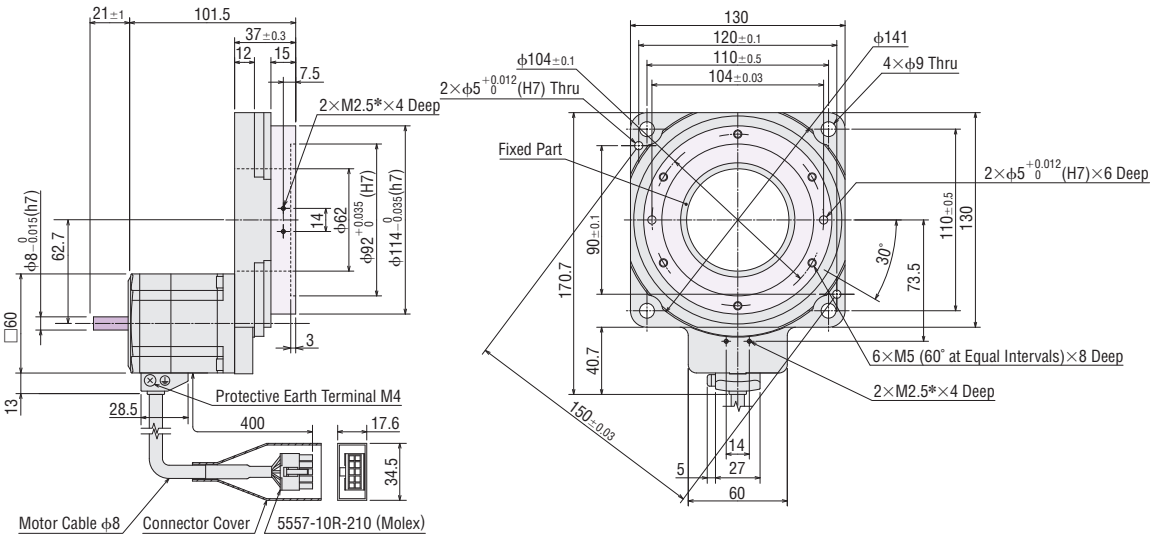


- These dimensions are for Double Shaft models.
  For Single Shaft models, ignore the shaft in the shaded areas.
- The shaded areas are rotating parts.

✻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	2D CAD
DG130R-ARAA□2-◇	DGM130R-ARAC	2.7 kg	D2855
DG130R-ARAC□2-◇			
DG130R-ARAS2-◇			
DG130R-ARBA□2-◇	DGM130R-ARBC		
DG130R-ARBC□2-◇			
DG130R-ARBS2-◇			



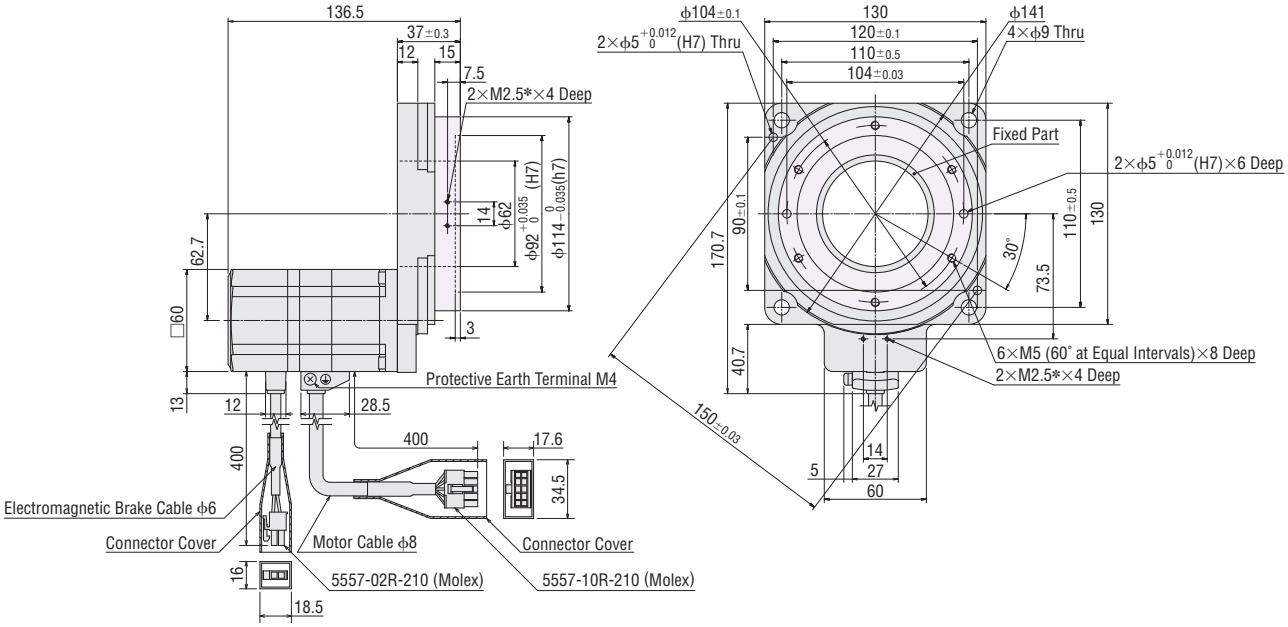
- These dimensions are for Double Shaft models.
  For Single Shaft models, ignore the shaft in the shaded areas.
- The shaded areas are rotating parts.

✻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.

- **D** indicating the driver type (built-in positioning function type) is entered where the box □ is located within the product name. A code for the pulse train input type is not entered in the box □.
  A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.
  If no connection cable is included, the product name does not have **-**◇.

2D & 3D CAD

Product Name	Actuator Product Name	Mass	2D CAD
DG130R-ARMA□2-◇	DGM130R-ARMC	3 kg	D2856
DG130R-ARMC□2-◇			
DG130R-ARMS2-◇			

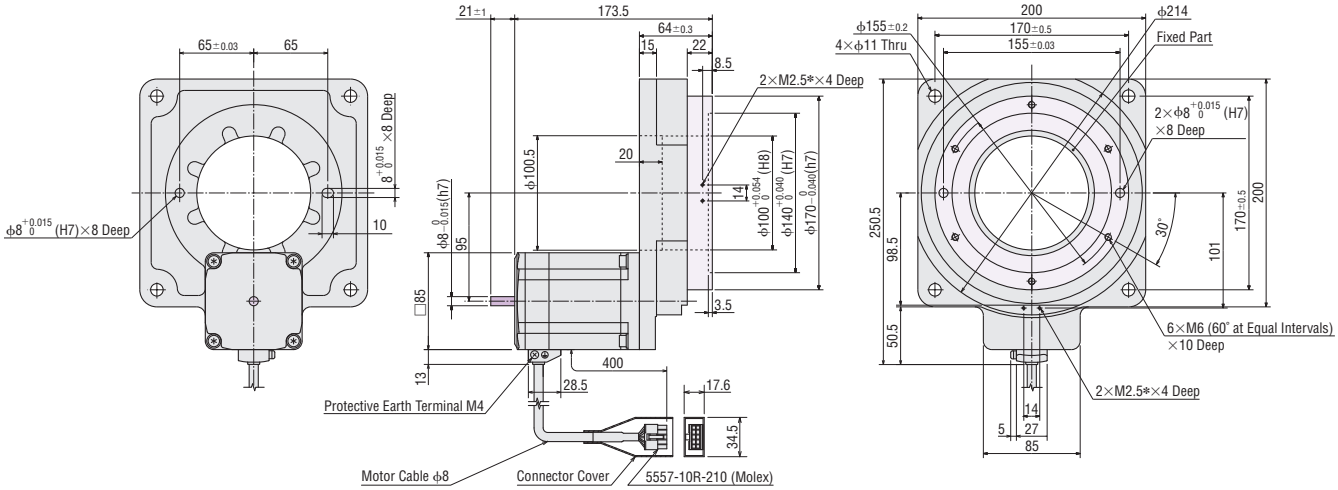


● The ▭ shaded areas are rotating parts.

✻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	2D CAD
DG200R-ARAA□2-◇	DGM200R-ARAC	9.4 kg	D2857
DG200R-ARAC□2-◇			
DG200R-ARAS2-◇			
DG200R-ARBA□2-◇	DGM200R-ARBC		
DG200R-ARBC□2-◇			
DG200R-ARBS2-◇			



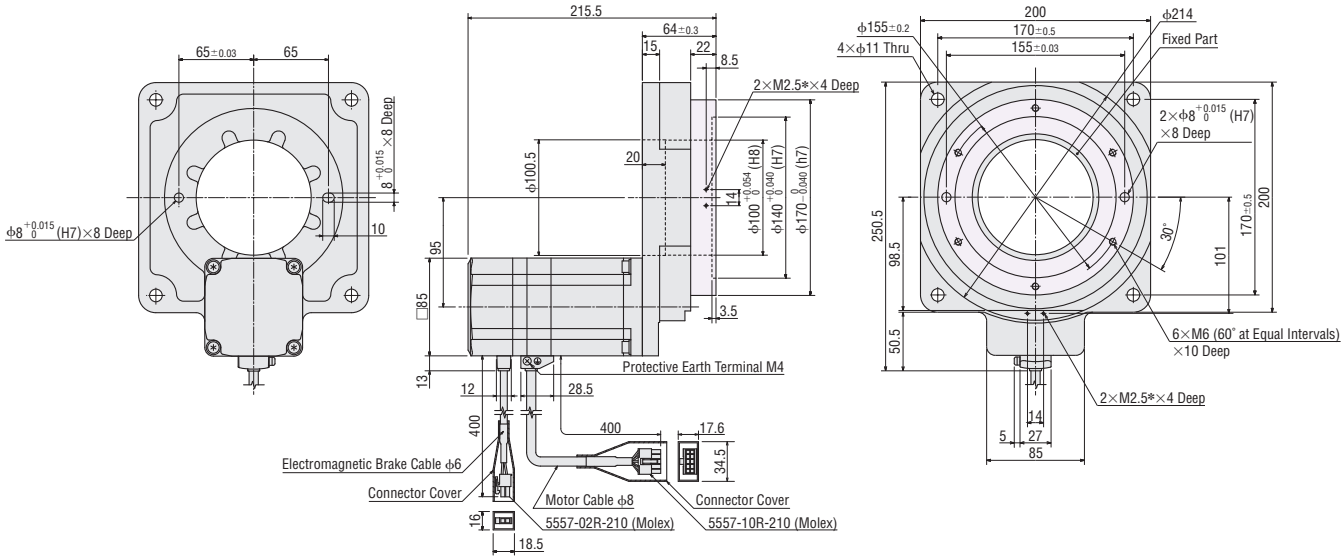
● These dimensions are for Double Shaft models.
For Single Shaft models, ignore the shaft in the ▭ shaded areas.
● The ▭ shaded areas are rotating parts.

✻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.

● **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 train input type is not entered in the box □.
A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.
If no connection cable is included, the product name does not have -◇.

2D & 3D CAD

Product Name	Actuator Product Name	Mass	2D CAD
DG200R-ARMA□2-◇	DGM200R-ARMC	10 kg	D2858
DG200R-ARMC□2-◇			
DG200R-ARMS2-◇			



● The ▭ shaded areas are rotating parts.

*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.

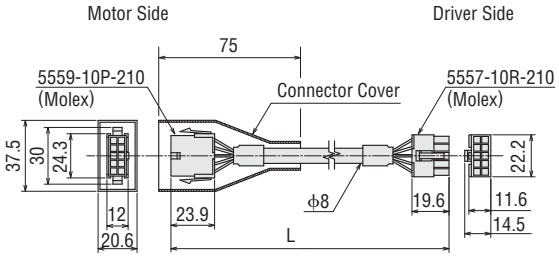
● **D** indicating the driver type (built-in controller type) is entered where the box □ is located within the product name. A code for the pulse train input type is not entered in the box □.
A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.
If no connection cable is included, the product name does not have -◇.

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

◇Only with types supplied with a connection cable

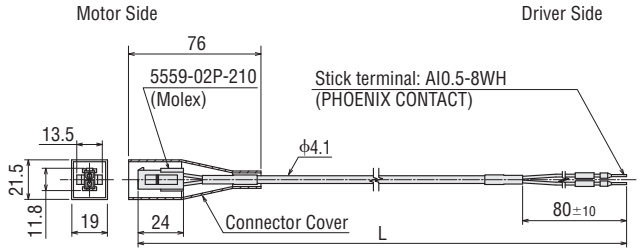
•Cables for Motor

Cable Type	Length L (m)
Cable for Motor 1 m	1
Cable for Motor 2 m	2
Cable for Motor 3 m	3



•Cables for Electromagnetic Brake (Only for electromagnetic brake type)

Cable Type	Length L (m)
Cable for Electromagnetic Brake 1 m	1
Cable for Electromagnetic Brake 2 m	2
Cable for Electromagnetic Brake 3 m	3



●Driver Dimensions

➜ Page 36

List of Actuator and Driver Combinations

Product names for actuator and driver combination products are shown below.

Built-in Positioning Function Type

Product Name	Actuator Product Name	Driver Product Name
DG85R-ARAAD2-◇	DGM85R-ARAC	ARD-AD
DG85R-ARACD2-◇		ARD-CD
DG85R-ARBAD2-◇	DGM85R-ARBC	ARD-AD
DG85R-ARBCD2-◇		ARD-CD
DG130R-ARAAD2-◇	DGM130R-ARAC	ARD-AD
DG130R-ARACD2-◇		ARD-CD
DG130R-ARBAD2-◇	DGM130R-ARBC	ARD-AD
DG130R-ARBCD2-◇		ARD-CD
DG130R-ARMAD2-◇	DGM130R-ARMC	ARD-AD
DG130R-ARMCD2-◇		ARD-CD
DG200R-ARAAD2-◇	DGM200R-ARAC	ARD-AD
DG200R-ARACD2-◇		ARD-CD
DG200R-ARBAD2-◇	DGM200R-ARBC	ARD-AD
DG200R-ARBCD2-◇		ARD-CD
DG200R-ARMAD2-◇	DGM200R-ARMC	ARD-AD
DG200R-ARMCD2-◇		ARD-CD

Pulse Train Input Type

Product Name	Actuator Product Name	Driver Product Name
DG85R-ARAA2-◇	DGM85R-ARAC	ARD-A
DG85R-ARAC2-◇		ARD-C
DG85R-ARAS2-◇		ARD-S
DG85R-ARBA2-◇	DGM85R-ARBC	ARD-A
DG85R-ARBC2-◇		ARD-C
DG85R-ARBS2-◇		ARD-S
DG130R-ARAA2-◇	DGM130R-ARAC	ARD-A
DG130R-ARAC2-◇		ARD-C
DG130R-ARAS2-◇		ARD-S
DG130R-ARBA2-◇	DGM130R-ARBC	ARD-A
DG130R-ARBC2-◇		ARD-C
DG130R-ARBS2-◇		ARD-S
DG130R-ARMA2-◇	DGM130R-ARMC	ARD-A
DG130R-ARMC2-◇		ARD-C
DG130R-ARMS2-◇		ARD-S
DG200R-ARAA2-◇	DGM200R-ARAC	ARD-A
DG200R-ARAC2-◇		ARD-C
DG200R-ARAS2-◇		ARD-S
DG200R-ARBA2-◇	DGM200R-ARBC	ARD-A
DG200R-ARBC2-◇		ARD-C
DG200R-ARBS2-◇		ARD-S
DG200R-ARMA2-◇	DGM200R-ARMC	ARD-A
DG200R-ARMC2-◇		ARD-C
DG200R-ARMS2-◇		ARD-S

● A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.
If no connection cable is included, the product name does not have -◇.

Open-loop Type

Specifications

Hollow Rotary Actuators Specifications

Frame Size			60 mm	85 mm	130 mm
Product Name	Built-in Controller		DG60-AR□KD2-◇	DG85-RKSA□D-◇	DG130-RKSA□D-◇
	Pulse Train Input		DG60-AR□K2-◇	DG85-RKSA□-◇	DG130-RKSA□-◇
Installed Motor			AR Series	RKII Series	
Output Table Supporting Bearing Type				Deep-groove ball bearing	
Inertia		J: kg·m^2	4324×10^{-7}	24036×10^{-7}	114180×10^{-7}
Gear Ratio				18	
Motor Resolution*2			1000 P/R	500 P/R	
Permissible Torque		N·m	0.9	2.8	12
Holding Torque at Motor Standstill	Power ON	N·m	0.45	2.6	9.9
Rated Speed		r/min	200	150	
Repetitive Positioning Accuracy		arcsec	±15 (±0.004°)	±30 (±0.008°)	
Backlash		arcmin	—	5 (0.083°)	
Lost Motion		arcmin	2 (0.033°)	—	
Angular Transmission Accuracy		arcmin	4 (0.067°)	7 (0.116°)	
Permissible Axial Load		N	100	200	300
Permissible Moment		N·m	2	6	20
Runout of Output Table Surface		mm	0.030	0.060	
Runout of Output Table Inner (Outer) Diameter		mm	0.030	0.060	
Parallelism of Output Table		mm	0.050	0.080	
Degree of Protection	Single Shaft		IP40 (IP20 for motor connector)		
	Double Shaft		IP20	—	
Mass of Actuator Unit		kg	0.5	1.11	2.9
Power Supply Input	Voltage and Frequency	Built-in Controller	24 VDC ±5%	Single-Phase 100-120 VAC, Single-Phase 200-240 VAC −15～+10% 50/60 Hz	
		Pulse Train Input	24 VDC ±10%		
	Input Current A	Built-in Controller / 24 VDC	1.3	—	—
		Built-in Controller / Single-Phase 100-120 VAC	—	1.9	3.8
		Built-in Controller / Single-Phase 200-240 VAC	—	1.2	2.4
		Pulse Train Input / 24 VDC	0.9	—	—
		Pulse Train Input / Single-Phase 100-120 VAC	—	1.9	3.8
		Pulse Train Input / Single-Phase 200-240 VAC	—	1.2	2.4
Control Power Source*3			—	24 VDC ±5%, 0.2 A	

● Either **A** (Single Shaft) or **B** (Double Shaft) indicating the motor configuration is entered where the box □ is located within the product name.
● Either **A** (Single-Phase 100-120 VAC) or **C** (Single-Phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name.
● A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

*1 Except for product equipped with **AR** Series

*2 Motor resolution at the time of shipping. For how to calculate the minimum movement [°] of the output table with the gear ratio of 18, see the pages shown below.

- Built-in Positioning Function Type
  - Equipped with **AR** Series, DC power supply input ➜ Page 41
  - Equipped with **RKII** Series ➜ Page 56
- Pulse Train Input Type
  - Equipped with **AR** Series, DC power supply input ➜ Page 49
  - Equipped with **RKII** Series ➜ Page 61

*3 Required for products equipped with built-in positioning function type **RKII** Series.

Note

● The back shaft of the motor in the Double Shaft is intended for installing 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 or less.
● The repetitive positioning accuracy is measured at a constant temperature (normal temperature) under a constant load.

General Specifications (Open-loop Type Actuator)

Installed Motor		Equipped with **RKII** Series, AC Power Supply Input	Equipped with **AR** Series, DC Power Supply Input
Heat-resistant Class		130 (B)	
Insulation Resistance *1		· Case – Motor Windings	· Between the case and the motor/sensor windings
Dielectric Strength Voltage *2		· Case – Motor Windings 1.5 kVAC, 50 Hz or 60 Hz	· Between the case and motor sensor windings 0.5 kVAC, 50 Hz or 60 Hz
Operating Environment (In Operation)	Ambient Temperature	0～+50°C (Non-freezing) 0～+40°C (Non-freezing) when home sensor set (accessory) is attached	
	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.	

*1 The measured value is 100 MΩ or more when a 500 VDC megger is applied between two points in the table.

*2 No failure is found even if the voltage is applied for 1 minute under the condition shown in the table.

Note

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

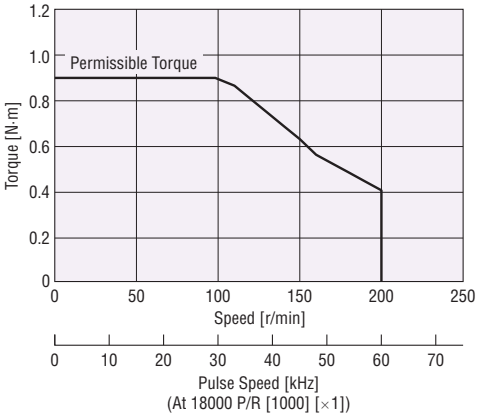
Driver Specifications

Equipped with **AR** Series ➜ Page 35
Equipped with **RKII** Series ➜ Page 53

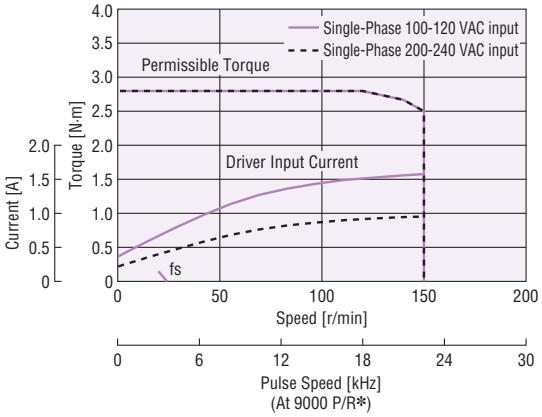
Speed – Torque Characteristics

fs: Maximum Starting Frequency

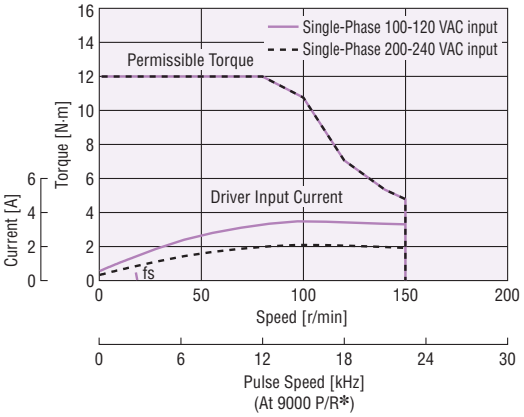
DG60-AR



DG85-RKS



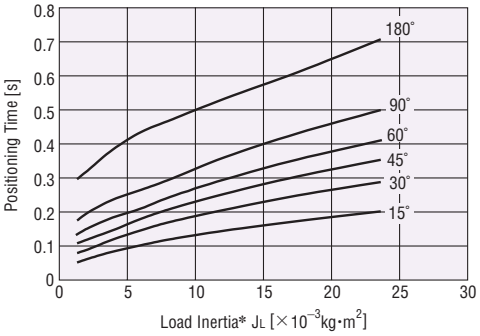
DG130-RKS



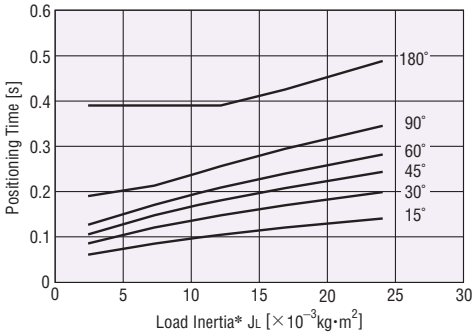
*Resolution of the output table at the time of shipping

Load Inertia – Positioning Time (Reference value)

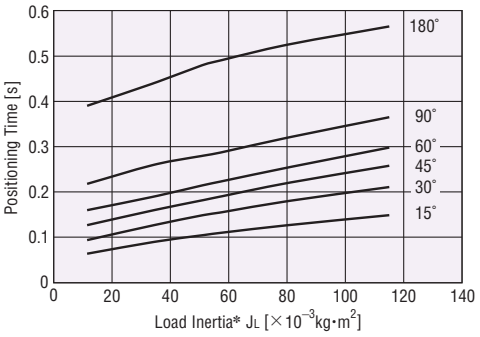
DG60-AR



DG85-RKS



DG130-RKS

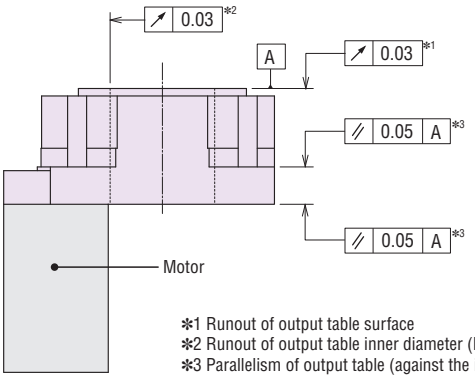


*The load inertia refers to the inertia of the customer's load.

Mechanical Precision (At no load)

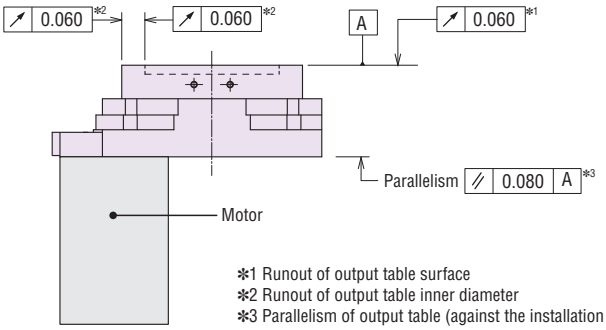
Open-loop Type

DG60



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

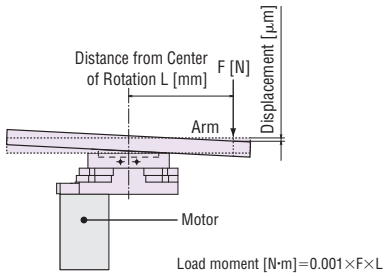
DG85/DG130



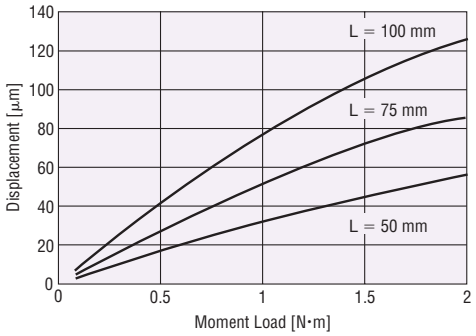
✻1 Runout of output table surface
✻2 Runout of output table inner diameter
✻3 Parallelism of output table (against the installation surface)

Displacement by Load Moment (Reference value)

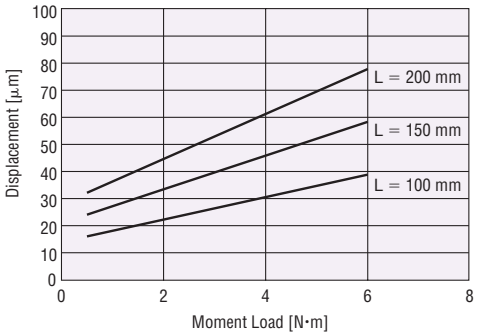
The output table will be displaced when it receives the load moment.
The graph plots the table displacement that occurs at distance L from the rotation center of the output table when a given load moment is applied in the negative direction.
The displacement becomes approximately two-fold when the load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



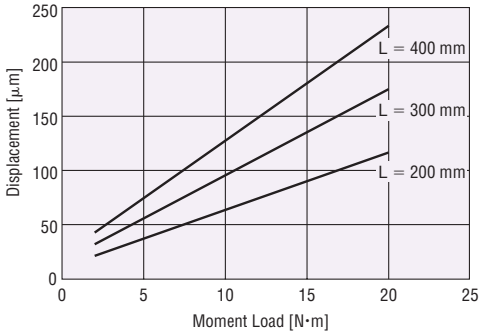
DG60



DG85



DG130

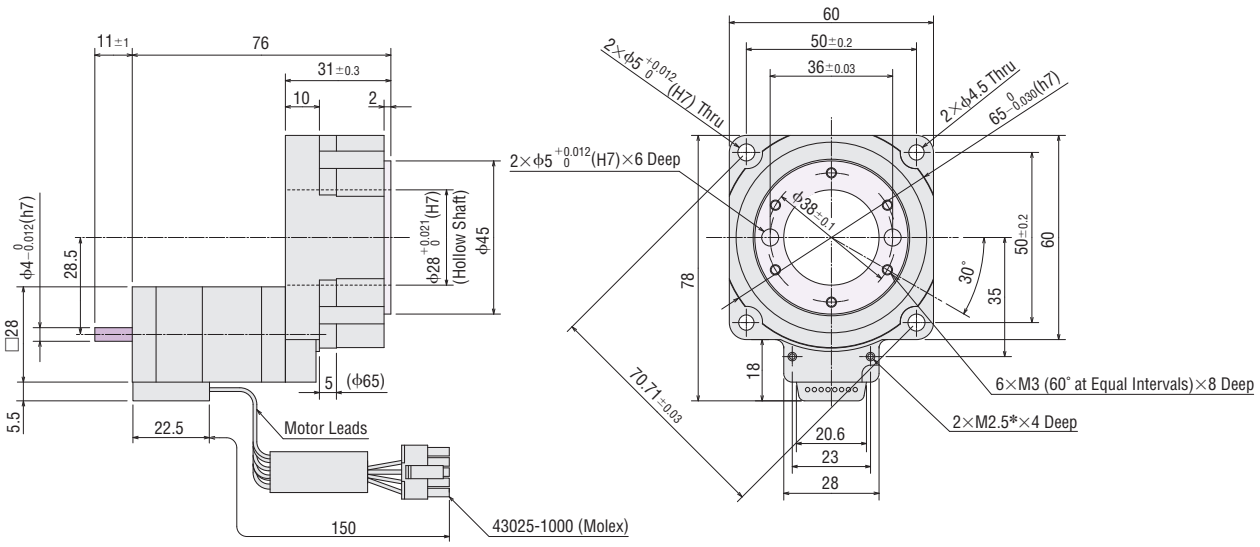


Dimensions (Unit = mm)

Actuator Dimensions

2D & 3D CAD

Product Name	Actuator Product Name	Mass	2D CAD
DG60-ARAK□2-◇	DGM60-ARAK	0.5 kg	D2853
DG60-ARBK□2-◇	DGM60-ARBK		

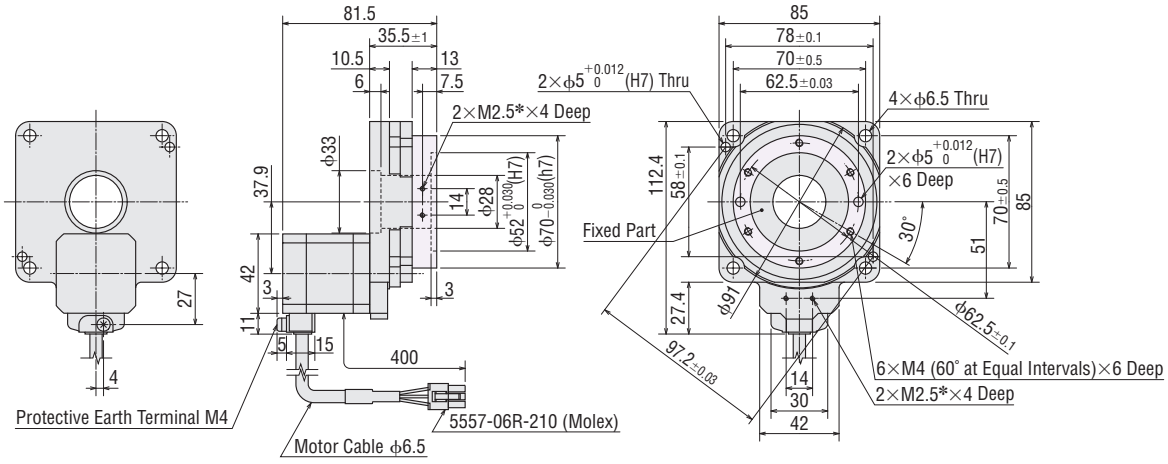


- These dimensions are for Double Shaft models.
  For Single Shaft models, ignore the shaft in the shaded areas.
- The shaded areas are rotating parts.

*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	2D CAD
DG85-RKSAA□-◇	DGM85-5PKEAC	1.2 kg	D4485
DG85-RKSAC□-◇			

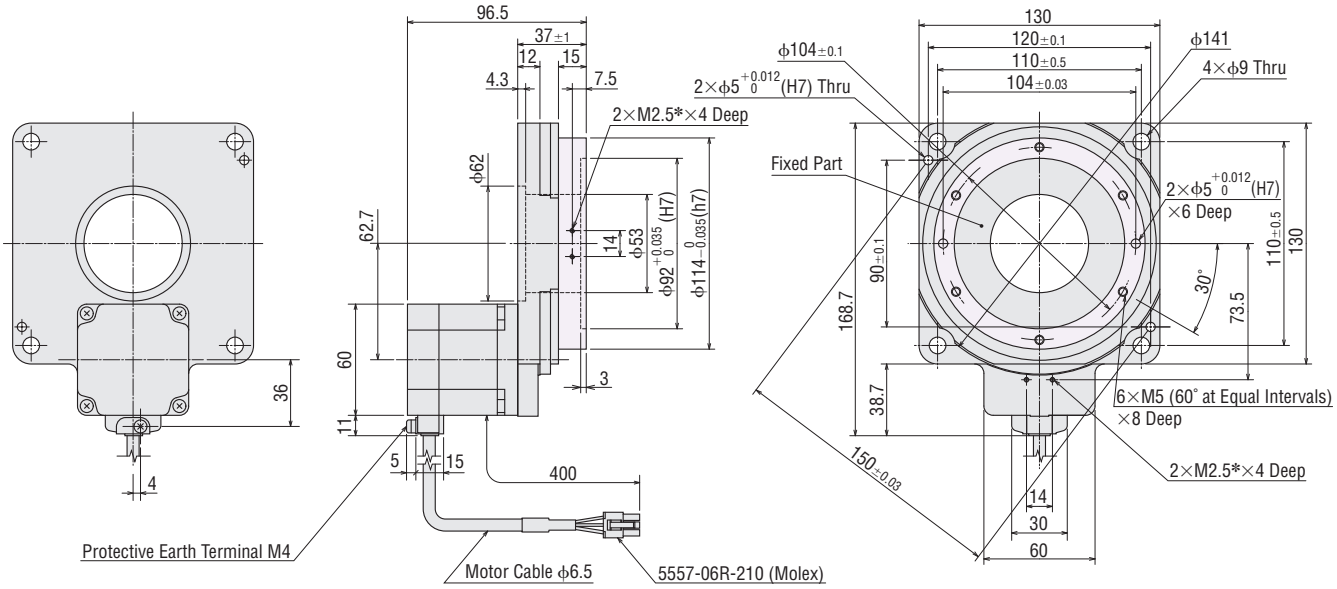


*Use M2.5 screw holes when installing the home sensor set (sold separately).
Do not use these holes for any purpose other than to install the home sensor.
- The shaded areas are rotating parts.

- **D** indicating the driver type (built-in positioning function type) is entered where the box □ is located within the product name. A code for the pulse train input type is not entered in the box □.
  A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.
  If no connection cable is included, the product name does not have -◇.

2D & 3D CAD

Product Name	Actuator Product Name	Mass	2D CAD
DG130-RKSAA□-◇	DGM130-5PKEAC	2.9 kg	D4486
DG130-RKSAC□-◇			



*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.

● The ▭ shaded areas are rotating parts.

● **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 train input type is not entered in the box □.
A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.
If no connection cable is included, the product name does not have -◇.

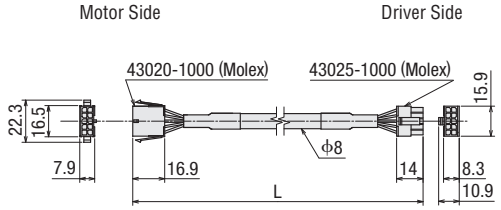
●Cable for Motor (Accessory) Dimensions

◇Only with types supplied with a connection cable

•Common to all the DC power source models equipped with **AR** Series

Cables for Motor

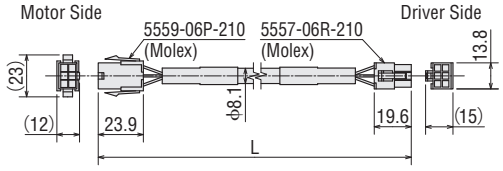
Cable Type	Length L (m)
Cable for Motor 1 m	1
Cable for Motor 2 m	2
Cable for Motor 3 m	3



•Common to all the models equipped with the **RKII** Series

Cables for Motor

Cable Type	Length L (m)
Cable for Motor 1 m	1
Cable for Motor 2 m	2
Cable for Motor 3 m	3



●Driver Dimensions

Equipped with **AR** Series ➜ Page 36
Equipped with **RKII** Series ➜ Page 54

List of Actuator and Driver Combinations

Product names for actuator and driver combination products are shown below.

Built-in Positioning Function Type

Product Name	Actuator Product Name	Driver Product Name
DG60-ARAKD2	DGM60-ARAK	ARD-KD
DG60-ARBKD2	DGM60-ARBK	
DG60-ARAKD2-◇	DGM60-ARAK	
DG60-ARBKD2-◇	DGM60-ARBK	
DG85-RKSAAD	DGM85-5PKEAC	RKSD503-AD
DG85-RKSAAD-◇	DGM85-5PKEAC	
DG85-RKSACD	DGM85-5PKEAC	RKSD503-CD
DG85-RKSACD-◇	DGM85-5PKEAC	
DG130-RKSAAD	DGM130-5PKEAC	RKSD507-AD
DG130-RKSAAD-◇	DGM130-5PKEAC	
DG130-RKSACD	DGM130-5PKEAC	RKSD507-CD
DG130-RKSACD-◇	DGM130-5PKEAC	

Pulse Train Input Type

Product Name	Actuator Product Name	Driver Product Name
DG60-ARAK2	DGM60-ARAK	ARD-K
DG60-ARBK2	DGM60-ARBK	
DG60-ARAK2-◇	DGM60-ARAK	
DG60-ARBK2-◇	DGM60-ARBK	
DG85-RKSAA	DGM85-5PKEAC	RKSD503-A
DG85-RKSAA-◇	DGM85-5PKEAC	
DG85-RKSAC	DGM85-5PKEAC	RKSD503-C
DG85-RKSAC-◇	DGM85-5PKEAC	
DG130-RKSAA	DGM130-5PKEAC	RKSD507-A
DG130-RKSAA-◇	DGM130-5PKEAC	
DG130-RKSAC	DGM130-5PKEAC	RKSD507-C
DG130-RKSAC-◇	DGM130-5PKEAC	

● A number indicating the desired connection cable length of **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

Driver

Equipped with AR Series

Built-in Positioning Function Type		Pulse Train Input Type Driver	
AC Power Supply Input	DC Power Supply Input	AC Power Supply Input	DC Power Supply Input
ARD-□D 	ARD-KD 	ARD-□ 	ARD-K 

● Either **A** (Single-Phase 100-115 (120) VAC), **C** (Single-Phase 200-230 (240) VAC) or **S** (Three-Phase 200-230 VAC: pulse input only) indicating power supply input is entered where the box □ is located within the driver product name.

Driver Specifications

		Built-in Positioning Function Type	Pulse Train Input Type
Maximum Input Pulse Frequency		–	Line driver output by programmable controller: 500 kHz (When the pulse duty is 50%) Open-collector output by programmable controller: 250 kHz (When the pulse duty is 50%)*
Number of Positioning Data Sets		64 points	–
Positioning Operation	Independent	○	–
	Linked	○	–
	Linked 2	○	–
	Sequential	○	–
	Direct	○	–
Continuous Operation		○	–
JOG Operation		○	–
Return-To-Home Operation		○	–
Test Operation		○	○
Absolute Backup System		○	–
Control Module **OPX-2A**		○	○
Data Setting Software **MEXE02**		○	○

* The values when the separately-sold general-purpose cable is used. **General-purpose cable** ➜ Page 68

Driver General Specifications

		AC Power Supply Input		DC Power Supply Input	
		Built-in Positioning Function Type	Pulse Train Input Type	Built-in Positioning Function Type	Pulse Train Input Type
Insulation Resistance*1		· PE Terminal – Power Supply Terminal · Signal I/O Terminal – Power Supply Terminal		· FG Terminal – Power Input Terminal	–
Dielectric Strength Voltage*2		· PE Terminal – Power Supply Terminal 1.8 kV, 50 Hz or 60 Hz · Signal I/O Terminal – Power Supply Terminal 1.9 kV, 50 Hz or 60 Hz	· PE Terminal – Power Supply Terminal 1.5 kV, 50 Hz or 60 Hz · Signal I/O Terminal – Power Supply Terminal 1.8 kV, 50 Hz or 60 Hz	· FG Terminal – Power Input Terminal 500 VAC, 50 Hz or 60 Hz	–
Operating Environment (In Operation)	Ambient Temperature	0～+55°C*3 (Non-freezing)	0～+50°C*3 (Non-freezing)	0～+50°C (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.			
Degree of Protection		IP10	IP20	IP10	IP20

*1 The measured value is 100 MΩ or more when a 500 VDC megger is applied between two points in the table.

*2 No failure is found even if the voltage is applied for 1 minute under the condition shown in the table.

*3 When a heat sink is installed that is equivalent to an aluminum plate size of at least 200×200 mm and 2 mm thickness.

Note

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

Built-in Positioning Function Type RS-485 Communication Specifications

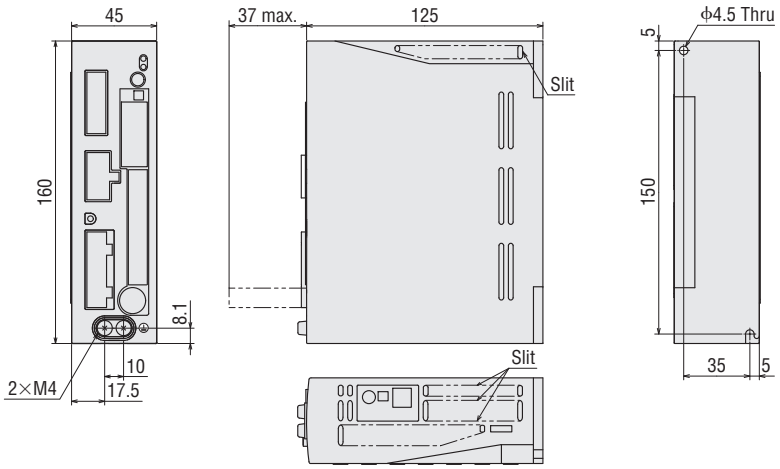
Protocol	Modbus protocol (Modbus RTU mode)
Electrical Characteristics	Straight cable compliant with EIA-485 Use twist-pair cables (TIA/EIA-568B CAT5e or better recommended). The maximum total extension length is 50 m.
Communication Mode	Half duplex and Start-stop synchronization (data: 8 bits, stop bit: 1 bit or 2 bits, parity: none, even, or odd)
Baud Rate	9600 bps/19200 bps/38400 bps/57600 bps/115200 bps
Connection Type	Up to 31 units can be connected to a single programmable controller (master unit).

Dimensions (Unit = mm)

Built-in Positioning Function Type

◇AC Power Supply Input (ARD-AD, ARD-CD)

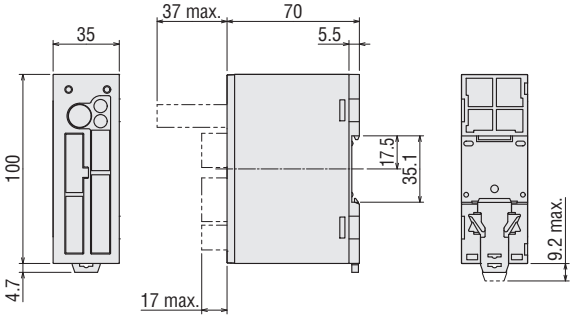
Mass: 0.75 kg 2D CAD B797 3D CAD



●Included
Power Input Terminal Connector (CN1)
Connector: MC1,5/6-STF-3,5 (PHOENIX CONTACT)
Sensor Signal Connector (CN5)
Connector: FK-MC0,5/5-ST-2,5 (PHOENIX CONTACT)
Input Signal Connector (CN8)
Connector: FK-MC0,5/9-ST-2,5 (PHOENIX CONTACT)
Output Signal Connector (CN9)
Connector: FK-MC0,5/7-ST-2,5 (PHOENIX CONTACT)
Connector for Regeneration Unit Input/Main Power Input Terminals (CN3)
Connector: 54928-0570 (Molex)

◇DC Power Supply Input (ARD-KD)

Mass: 0.17 kg 2D CAD B711 3D CAD

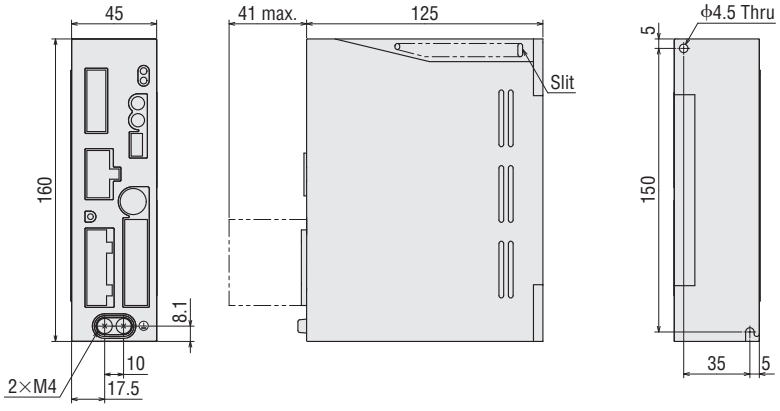


●Included
Power Input Terminal Connector (CN1)
Connector: MC1,5/5-STF-3,5 (PHOENIX CONTACT)
Sensor Signal Connector (CN5)
Connector: FK-MC0,5/5-ST-2,5 (PHOENIX CONTACT)
Input Signal Connector (CN8)
Connector: FK-MC0,5/9-ST-2,5 (PHOENIX CONTACT)
Output Signal Connector (CN9)
Connector: FK-MC0,5/7-ST-2,5 (PHOENIX CONTACT)

Pulse Train Input Type

◇AC Power Supply Input (ARD-A, ARD-C, ARD-S)

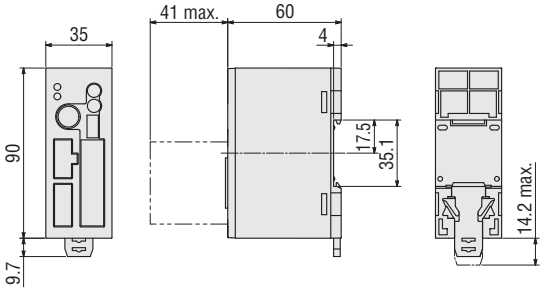
Mass: 0.75 kg 2D CAD B454 3D CAD



●Included
Control I/O Connector (CN5)
Case: 10336-52A0-008 (Sumitomo 3M)
Connector: 10136-3000PE (Sumitomo 3M)
Connector for Regeneration Unit Input/Main Power Input Terminals (CN3)
Connector: 54928-0570 (Molex)
Connector for 24 VDC Power Supply Input/Regeneration Unit Thermal Input/ Electromagnetic Brake Output Terminals (CN1)
Connector: MC1,5/6-STF-3,5 (PHOENIX CONTACT)

◇DC Power Supply Input (ARD-K)

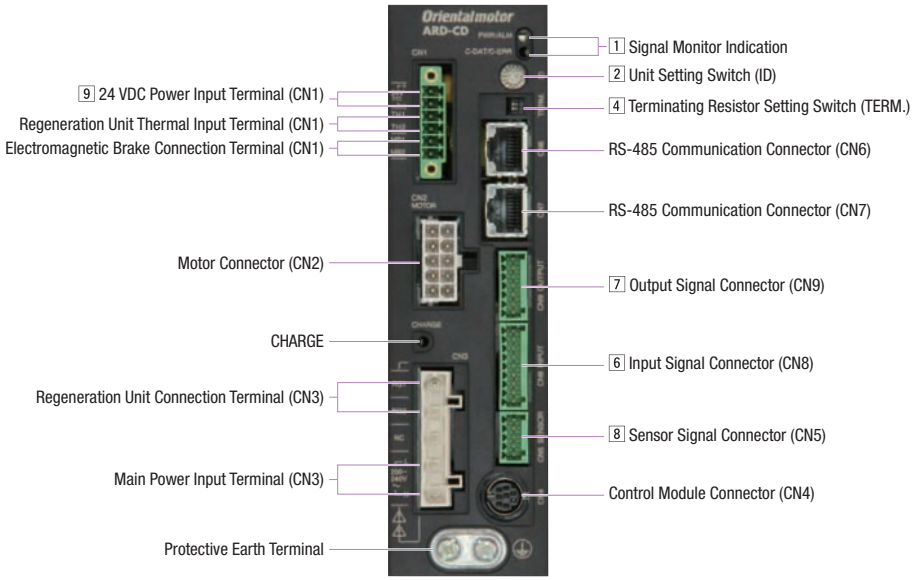
Mass: 0.17 kg 2D CAD B546 3D CAD



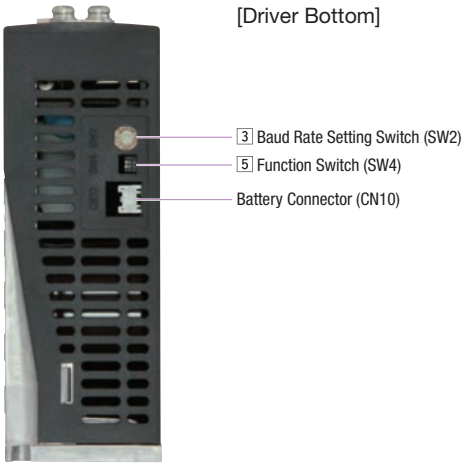
●Included
Control I/O Connector (CN5)
Case: 10336-52A0-008 (Sumitomo 3M)
Connector: 10136-3000PE (Sumitomo 3M)
Connector for Main Power Input/Frame Ground Terminals (CN1)
Connector: MC1,5/3-STF-3,5 (PHOENIX CONTACT)

Connection and Operation (Series equipped with built-in positioning function type of the **AR** Series)

Driver Part Names and Functions (Series equipped with built-in positioning function type of the **AR** Series, AC power supply input)



[Driver Bottom]



1 Signal Monitor Indication

◇LED Indication

Indication	LED Indicators	Function	Lighting Condition
PWR/ ALM	Green	Power Supply Indication	When 24 VDC power supply is input
	Red	Alarm Indication	When a protective function is activated (blinking)

Indication	LED Indicators	Function	Lighting Condition
C-DAT/ C-ERR	Green	Communication Indication	When communication data is being sent or received
	Red	Communication Error Indication	When communication data is in error

2 Unit Setting Switch (ID)

Indication	Switch Name	Function
ID	Address Number Setting Switch	Set this when you use RS-485 communication. Set the unit number (Factory setting: 0).

3 Baud Rate Setting Switch (SW2)

Indication	Switch Name	Function
SW2	Baud Rate Setting Switch	Set this when you use RS-485 communication. Set the baud rate (Factory setting: 7). 0: 9600 bps 1: 19200 bps 2: 38400 bps 3: 57600 bps 4: 115200 bps 7: 625000 bps (Connection with a network converter) Note 5, 6, 8～F are not used.

4 Terminating Resistor Setting Switch (TERM.)

Indication	No.	Function
TERM.	1	Set the terminating resistor (120 Ω) for RS-485 communication (Factory setting: OFF).
	2	OFF: Terminating resistor not used ON: Terminating resistor used

✻ Configure both No. 1 and No. 2 to the same setting.

5 Function Switch (SW4)

Indication	No.	Function
SW4	1	Use in combination with the unit setting switch (ID) to set the unit number (Factory setting: OFF).
	2	Set the RS-485 communication protocol (Factory setting: OFF). OFF: Connection with a network converter ON: Modbus RTU Mode

6 Input Signal Connector (CN8)

Indication	Pin No.	Signal Name	Description	
CN8	1	IN0	HOME	Execute the return-to-home operation.
	2	IN1	START	Execute the positioning operation.
	3	IN2	M0	Use 3 bits to select the operating data number.
	4	IN3	M1	
	5	IN4	M2	
	6	IN5	FREE	Stop motor excitation and release the electromagnetic brake.
	7	IN6	STOP	Stop the actuator.
	8	IN7	ALM-RST	Reset current alarm.
	9	IN-COM1	Common for input signals	

✻You can set functions to assign by specifying parameters. Initial values are shown above. For details, refer to the **AR** Series User's Manual.

The following input signals can be assigned to input terminals IN0～7.

Input Signals								
0: Not used	5: SSTART	10: MS2	17: C-ON	27: HMI	36: R4	41: R9	46: R14	51: M3
1: FWD	6: +JOG	11: MS3	18: STOP	32: R0	37: R5	42: R10	47: R15	52: M4
2: RVS	7: −JOG	12: MS4	24: ALM-RST	33: R1	38: R6	43: R11	48: M0	53: M5
3: HOME	8: MS0	13: MS5	25: P-PRESET	34: R2	39: R7	44: R12	49: M1	
4: START	9: MS1	16: FREE	26: P-CLR	35: R3	40: R8	45: R13	50: M2	

Note

Taking the continuous operation as example, the output table movement for the FWD and RVS input signals are shown below.

- For the FWD input signal: The motor output shaft rotates in the CW direction, and the output table moves to the opposite side.
- For the RVS input signal: The motor output shaft rotates in the CCW direction, and the output table moves to the opposite side.

7 Output Signal Connector (CN9)

Indication	Pin No.	Signal Name	Description	
CN9	1	OUT0	HOME-P	Output when the actuator is in the home position.
	2	OUT1	END	Output when the positioning operation is completed.
	3	OUT2	AREA1	Output when the actuator is within the range of area 1.
	4	OUT3	READY	Output when the driver is ready for operation.
	5	OUT4	WNG	Outputs the warning status for the driver.
	6	OUT5	ALM	Outputs the alarm status for the driver (B contact point).
	7	OUT-COM	Common for output signals	

✻You can set functions to assign by specifying parameters. Initial values are shown above. For details, refer to the **AR** Series User's Manual.

The following output signals can be assigned to output terminals OUT0～5.

Output Signals							
0: Not used	7: −JOG_R	16: FREE_R	36: R4	43: R11	50: M2_R	63: SLIT_R	71: TLC
1: FWD_R	8: MS0_R	17: C-ON_R	37: R5	44: R12	51: M3_R	65: ALM	72: TIM
2: RVS_R	9: MS1_R	18: STOP_R	38: R6	45: R13	52: M4_R	66: WNG	73: AREA1
3: HOME_R	10: MS2_R	32: R0	39: R7	46: R14	53: M5_R	67: READY	74: AREA2
4: START_R	11: MS3_R	33: R1	40: R8	47: R15	60: +LS_R	68: MOVE	75: AREA3
5: SSTART_R	12: MS4_R	34: R2	41: R9	48: M0_R	61: −LS_R	69: END	80: S-BSY
6: +JOG_R	13: MS5_R	35: R3	42: R10	49: M1_R	62: HOMES_R	70: HOME-P	82: MPS

8 Sensor Signal Connector (CN5)

Indication	Pin No.	Signal Name	Description
CN5	1	+LS	+Side limit sensor input
	2	−LS	−Side limit sensor input
	3	HOMES	Mechanical home sensor input
	4	SLIT	Slit sensor input
	5	IN-COM2	Common for sensors

9 24 VDC Power Input Terminal/Regeneration Unit Input Terminal/Electromagnetic Brake Connection Terminal (CN1)

Indication	I/O	Terminal Name	Description
24V+	Input	24 VDC Power Input Terminal+	The power supply for the driver control circuit. Always connect when using.
24V−		24 VDC Power Input Terminal−	
TH1		Regeneration Unit Thermal Input Terminal	Connect the accessory (sold separately) regeneration unit (**RGB100**). When not connecting a regeneration unit, short these 2 terminals to each other.
TH2		Regeneration Unit Thermal Input Terminal	
MB1	Output	Electromagnetic Brake Connection Terminal−	For an electromagnetic brake actuator, connect the electromagnetic brake line here.
MB2		Electromagnetic Brake Connection Terminal+	

●Setting example of the resolution (minimum movement) of the output table

You can set minimum movement of the built-in positioning function type output table using the parameters (Electronic gear A, Electronic gear B) of the driver.

The following shows the calculating formula of the minimum movement of the output table.

$$\text{Minimum movement of the output table [°]} = \frac{360[°]}{(18 \times 1000 \times (\text{Electronic gear B} \div \text{Electronic gear A}))}$$

18: Gear Ratio

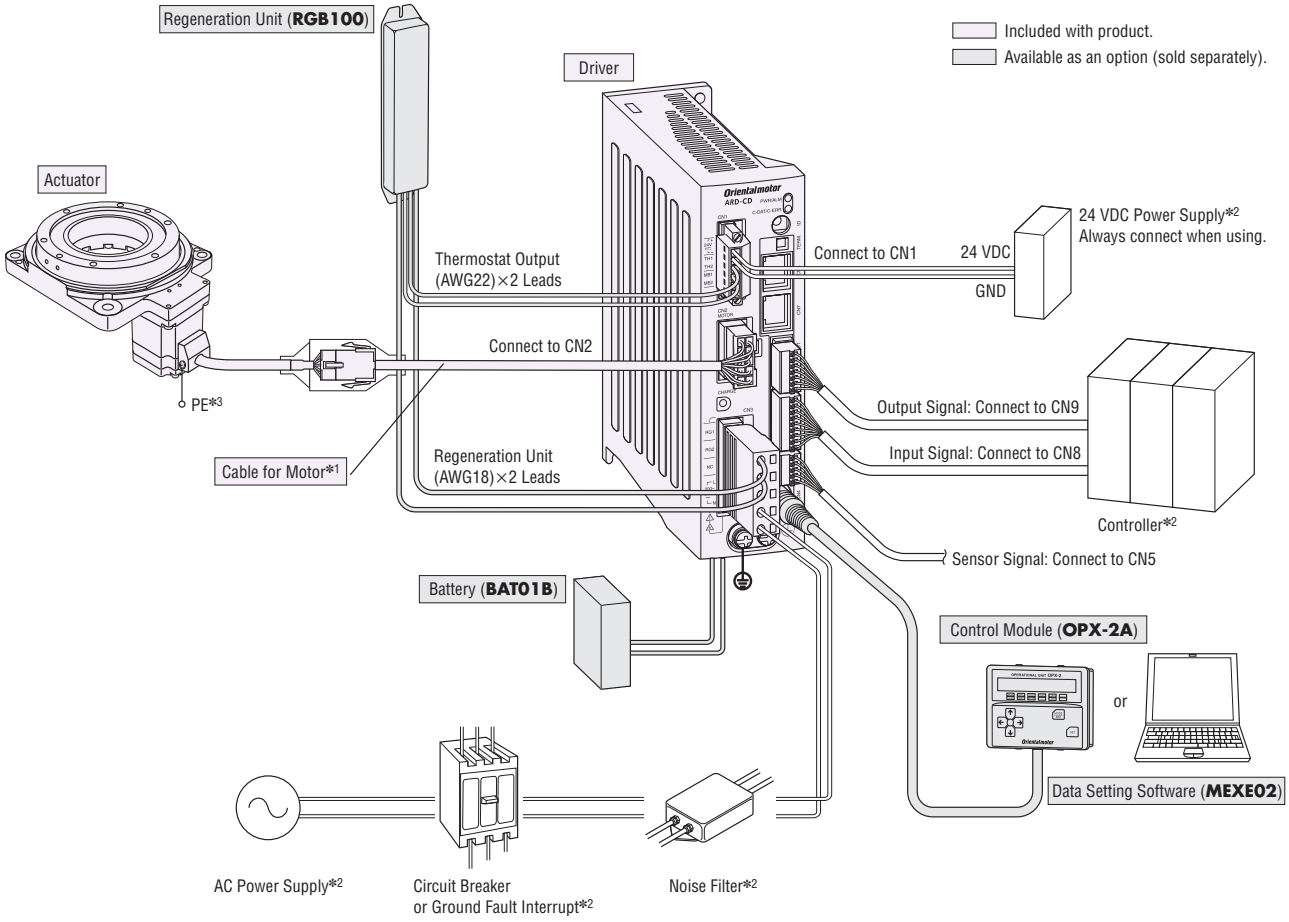
1000: Basic resolution per rotation of an **AR** Series motor.

When setting the minimum movement of the output table to 0.1 [°], set the Electronic gear A and Electronic gear B to 5 and 1, respectively. The calculation example is shown below.

$$\text{Minimum movement of the output table [°]} = \frac{360[°]}{(18 \times 1000 \times (1 \div 5))}$$

●Connection Diagram (AC power supply input for series equipped with the built-in positioning function type of the **AR** Series)

◇Connections with Peripheral Equipment



*1 Products are available with a cable for motor and driver (1 m, 2m or 3 m), and also without the cable.
If you need cables longer than 3 m or flexible cables, select appropriate cables from the accessories (sold separately).
Keep the wiring distance between the actuator and driver to 30 m max.

*2 Not supplied

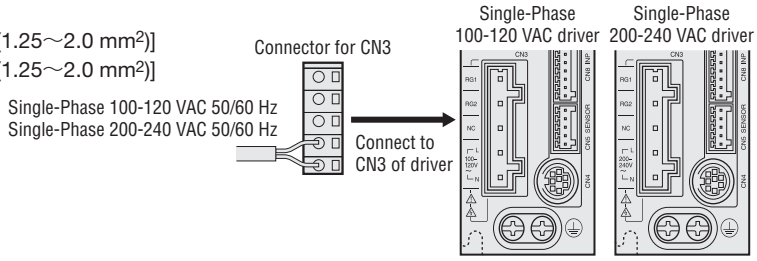
*3 Ground to the PE terminal of the motor or at the plate used to install the actuator.

◇Connecting the Main Power Supply

Furnish the following cable for the power supply lines.

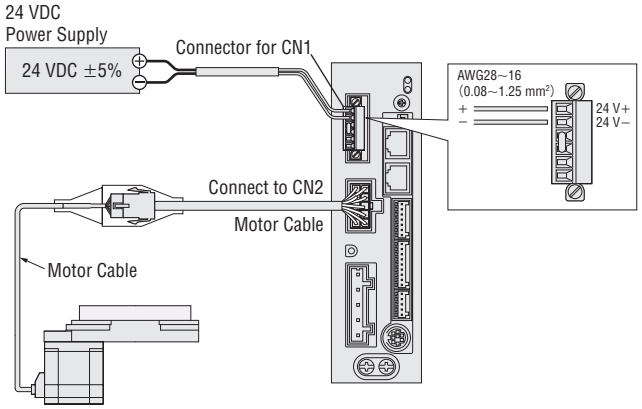
Single-Phase 100-120 VAC: Three-Core Cable [AWG16～14 (1.25～2.0 mm²)]

Single-Phase 200-240 VAC: Three-Core Cable [AWG16～14 (1.25～2.0 mm²)]

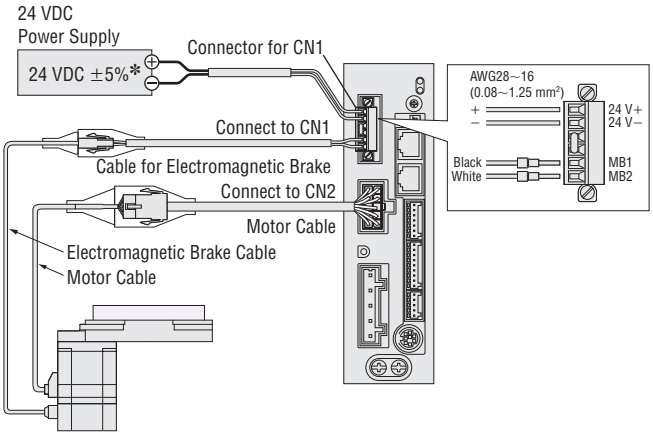


◇Connecting the Control Power Source

Prepare a 24 VDC power supply.



◇Connecting the Electromagnetic Brake

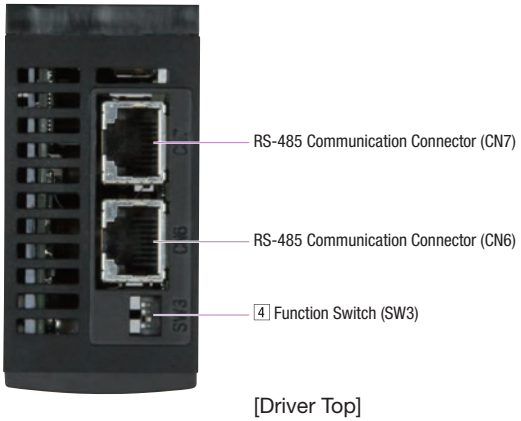


*If the wiring distance is extended to 20 m min. using an accessory cable (sold separately), the 24 VDC±4% specification applies.

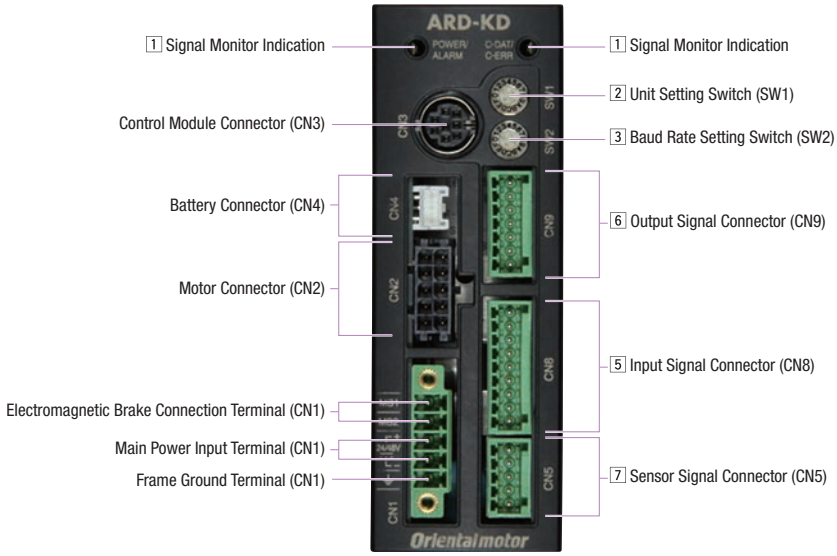
◇Connecting to the Host Controller

➜ Page 43

Driver Part Names and Functions (Series equipped with the built-in positioning function type of the **AR** Series, DC power supply input)



[Driver Top]



1 Signal Monitor Indication

◇LED Indication

Indication	LED Indicators	Function	Lighting Condition
POWER/ ALARM	Green	Power Supply Indication	When power is applied
	Red	Alarm Indication	When a protective function is activated (blinking)

Indication	LED Indicators	Function	Lighting Condition
C-DAT/ C-ERR	Green	Communication Indication	When communication data is being sent or received
	Red	Communication Error Indication	When communication data is in error

2 Unit Setting Switch (SW1)

Indication	Function
SW1	Set this when you use RS-485 communication. Set the unit number (Factory setting: 0).

3 Baud Rate Setting Switch (SW2)

Indication	Switch Name	Function
SW2	Baud Rate Setting Switch	Set this when you use RS-485 communication. Set the baud rate (Factory setting: 7). 0: 9600 bps 1: 19200 bps 2: 38400 bps 3: 57600 bps 4: 115200 bps 7: 625000 bps (Connection with a network converter) Note 5, 6, 8~F are not used.

4 Function Switch (SW3)

Indication	No.	Function
SW3	1	Set the unit number (Factory setting: OFF) in combination with Unit Setting Switch SW1.
	2	Set the RS-485 communication protocol (Factory setting: OFF). OFF: Connection with a network converter ON: Modbus RTU Mode
	3	Not used.
	4	Set the terminating resistor (120 Ω) for RS-485 communication (Factory setting: OFF). OFF: Terminating resistor not used ON: Terminating resistor used

5 Input Signal Connector (CN8)

Indication	Pin No.	Signal Name	Description	
CN8	1	IN0	HOME	Execute the return-to-home operation.
	2	IN1	START	Execute the positioning operation.
	3	IN2	M0	Use 3 bits to select the operating data number.
	4	IN3	M1	
	5	IN4	M2	
	6	IN5	FREE	Stop motor excitation and release the electromagnetic brake.
	7	IN6	STOP	Stop the actuator.
	8	IN7	ALM-RST	Reset current alarm.
	9	IN-COM1	Common for input signals	

✻You can set functions to assign by specifying parameters. Initial values are shown above. For details, refer to the **AR** Series User's Manual.

The following input signals can be assigned to input terminals IN0～7.

Input Signals								
0: Not used	5: SSTART	10: MS2	17: C-ON	27: HMI	36: R4	41: R9	46: R14	51: M3
1: FWD	6: +JOG	11: MS3	18: STOP	32: R0	37: R5	42: R10	47: R15	52: M4
2: RVS	7: −JOG	12: MS4	24: ALM-RST	33: R1	38: R6	43: R11	48: M0	53: M5
3: HOME	8: MS0	13: MS5	25: P-PRESET	34: R2	39: R7	44: R12	49: M1	
4: START	9: MS1	16: FREE	26: P-CLR	35: R3	40: R8	45: R13	50: M2	

Note

Taking the continuous operation as example, the output table movement for the FWD and RVS input signals are shown below.

- For the FWD input signal: The motor output shaft rotates in the CW direction, and the output table moves to the opposite side.
- For the RVS input signal: The motor output shaft rotates in the CCW direction, and the output table moves to the opposite side.

6 Output Signal Connector (CN9)

Indication	Pin No.	Signal Name	Description	
CN9	1	OUT0	HOME-P	Output when the actuator is in the home position.
	2	OUT1	END	Output when the positioning operation is completed.
	3	OUT2	AREA1	Output when the actuator is within the range of area 1.
	4	OUT3	READY	Output when the driver is ready for operation.
	5	OUT4	WNG	Outputs the warning status for the driver.
	6	OUT5	ALM	Outputs the alarm status for the driver (B contact point).
	7	OUT-COM	Common for output signals	

✻You can set functions to assign by specifying parameters. Initial values are shown above. For details, refer to the **AR** Series User's Manual.

The following output signals can be assigned to output terminals OUT0～5.

Output Signals							
0: Not used	7: −JOG_R	16: FREE_R	36: R4	43: R11	50: M2_R	63: SLIT_R	71: TLC
1: FWD_R	8: MS0_R	17: C-ON_R	37: R5	44: R12	51: M3_R	65: ALM	72: TIM
2: RVS_R	9: MS1_R	18: STOP_R	38: R6	45: R13	52: M4_R	66: WNG	73: AREA1
3: HOME_R	10: MS2_R	32: R0	39: R7	46: R14	53: M5_R	67: READY	74: AREA2
4: START_R	11: MS3_R	33: R1	40: R8	47: R15	60: +LS_R	68: MOVE	75: AREA3
5: SSTART_R	12: MS4_R	34: R2	41: R9	48: M0_R	61: −LS_R	69: END	80: S-BSY
6: +JOG_R	13: MS5_R	35: R3	42: R10	49: M1_R	62: HOMES_R	70: HOME-P	

7 Sensor Signal Input (CN5)

Indication	Pin No.	Signal Name	Description
CN5	1	+LS	+Side limit sensor input
	2	−LS	−Side limit sensor input
	3	HOMES	Mechanical home sensor input
	4	SLIT	Slit sensor input
	5	IN-COM2	Common for sensors

●Setting example of the resolution (minimum movement) of the output table

You can set minimum movement of the built-in positioning function type output table using the parameters (Electronic gear A, Electronic gear B) of the driver.

The following shows the calculating formula of the minimum movement of the output table.

$$\text{Minimum movement of the output table [°]} = \frac{360[°]}{(18 \times 1000 \times (\text{Electronic gear B} \div \text{Electronic gear A}))}$$

18: Gear Ratio

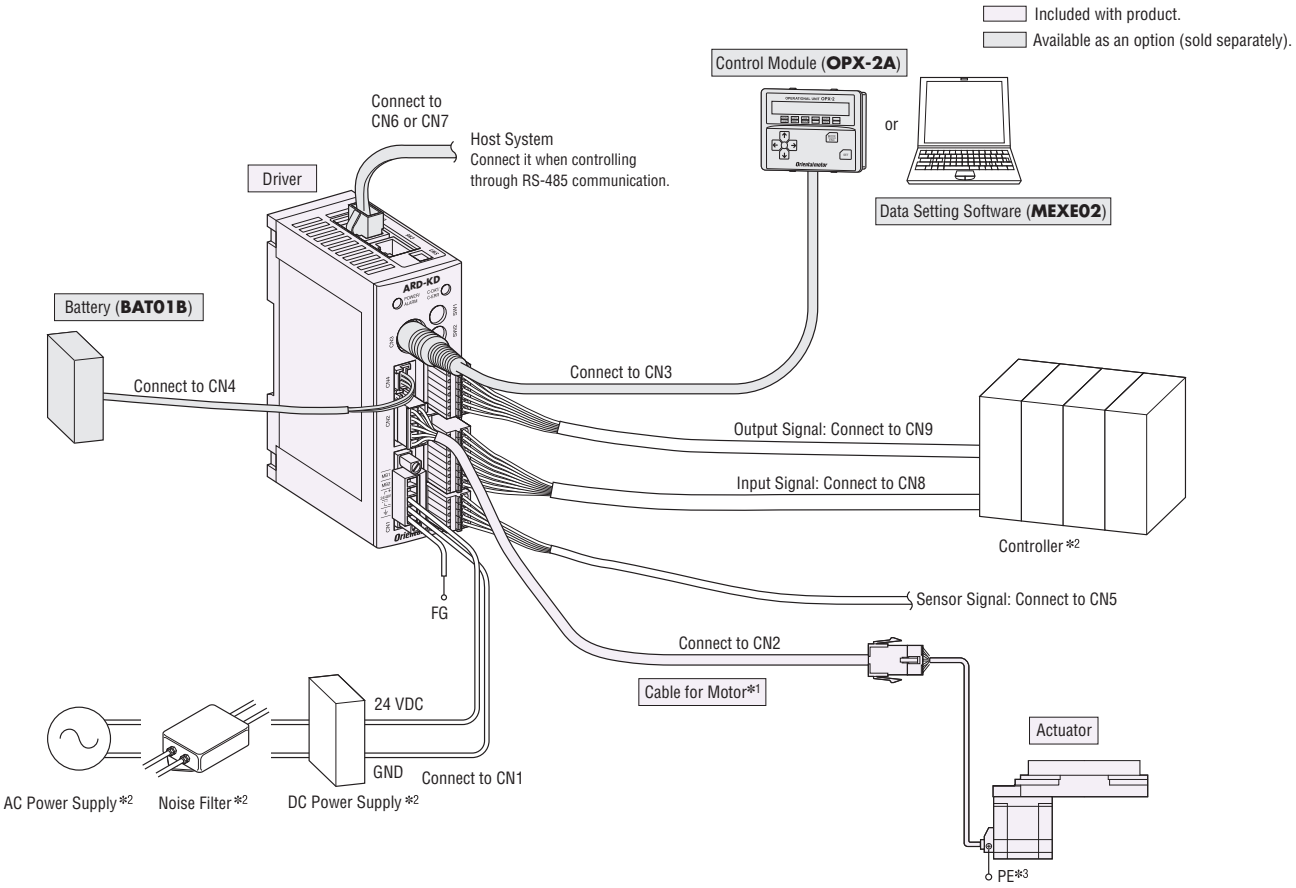
1000: Basic resolution per rotation of an **AR** Series motor.

When setting the minimum movement of the output table to 0.1 [°], set the Electronic gear A and Electronic gear B to 5 and 1, respectively. The calculation example is shown below.

$$\text{Minimum movement of the output table [°]} = \frac{360[°]}{(18 \times 1000 \times (1 \div 5))}$$

●Connection Diagram (DC power supply input for series equipped with the built-in positioning function type of the **AR** Series)

◇Connections with Peripheral Equipment



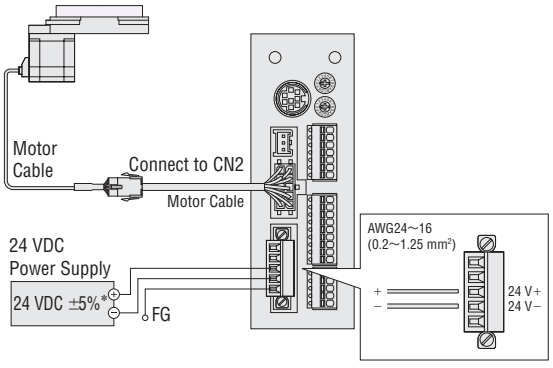
*1 Products are available with a cable for motor and driver (1 m, 2m or 3 m), and also without the cable.
If you need cables longer than 3 m or flexible cables, select appropriate cables from the accessories (sold separately).
Keep the wiring distance between the actuator and driver to 30 m max.

*2 Not supplied

*3 Ground to the PE terminal of the motor or at the plate used to install the actuator.

◇Connecting the Main Power Supply

Furnish the following cable for the power supply lines.
AWG24～16 (0.2～1.25 mm^2)



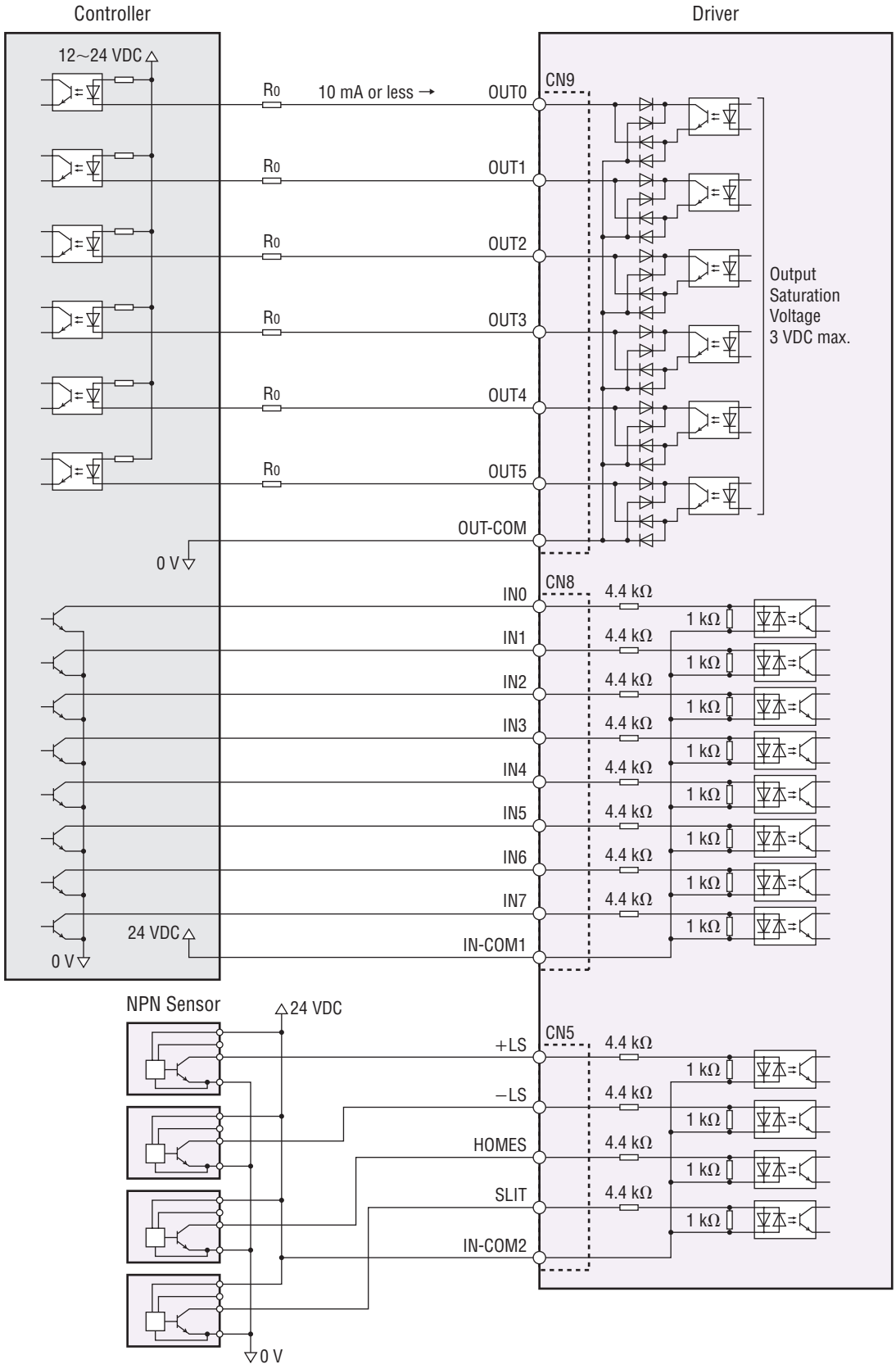
*If the wiring distance is extended to 20 m min. using an accessory cable (sold separately), the 24 VDC±4% specification applies.

◇Connecting to the Host Controller

➜ Page 43

◇Connecting to the Host Controller (Equipped with built-in positioning type **AR** Series, AC power supply input/DC power supply input)

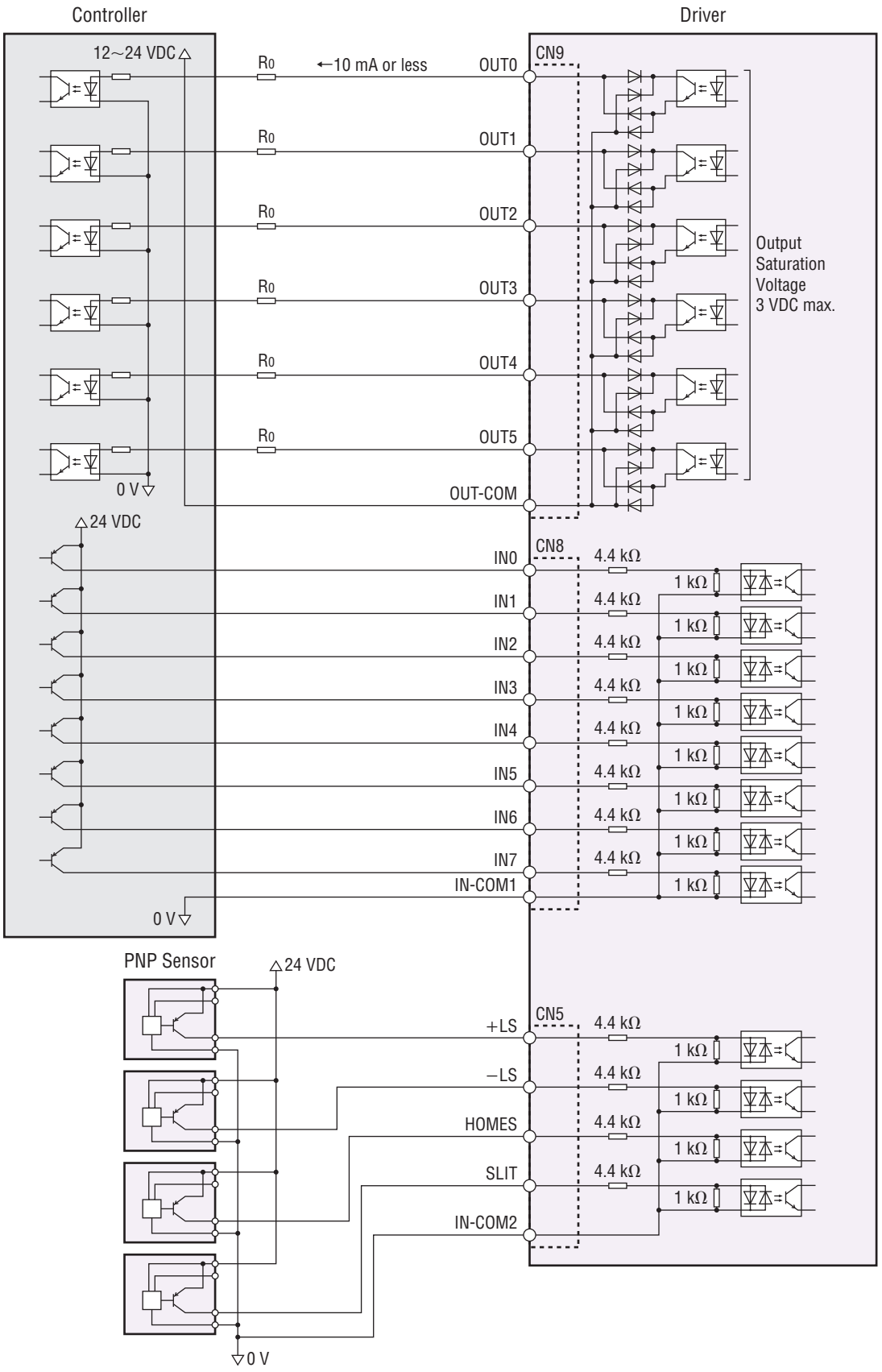
•Connection Diagram for Connection with Current Sink Output Circuit



Note

- Use 24 VDC for the input signals.
- Use the product with output signals of 12～24 VDC and 10 mA or less. When the current value exceeds 10 mA, connect the external resistor R_0 to reduce the current to 10 mA max.
- The maximum saturation voltage for the output signals is 3 V.
- Provide a distance of 200 mm or longer between the signal lines and power lines (power supply lines, motor lines). Do not run the signal lines in the same piping as power lines or bundle them with power lines.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

• **Connection Diagram for Connection with Current Source Output Circuit**

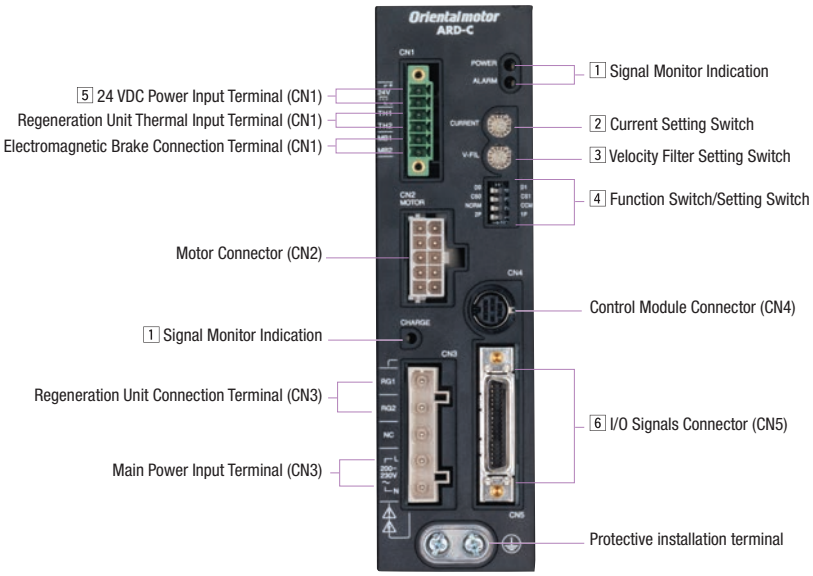


Note

- Use 24 VDC for the input signals.
- Use the product with output signals of 12～24 VDC and 10 mA or less. When the current value exceeds 10 mA, connect the external resistor R_0 to reduce the current to 10 mA max.
- The maximum saturation voltage for the output signals is 3 V.
- Provide a distance of 200 mm or longer between the signal lines and power lines (power supply lines, motor lines).
  Do not run the signal lines in the same piping as power lines or bundle them with power lines.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

Connection and Operation (Pulse train input type)

Driver Part Names and Functions (Series equipped with the pulse train input type of the **AR** Series, AC power supply input)



1 Signal Monitor Indication

◇LED Indication

Indication	Color	Function	Lighting Condition
POWER	Green	Power Supply Indication	When the main power supply or 24 VDC power supply is input
ALARM	Red	Alarm Indication	When a protective function is activated (blinking)
CHARGE	Red	Power Supply Indication	When the main power supply is input

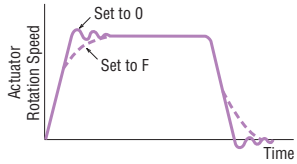
◇Alarm Details

Blink Count	Function	Operating Condition
2	Overheat Protection	When the temperature inside the driver exceeds 85˚C
	Overload	When the accumulated value for the time that the load torque exceeds the maximum torque exceeds the overload detection time (Initial Value: 5 sec.)
	Overspeed	When the motor output shaft speed exceeds 4500 r/min
	Command Pulse Error	When an error has occurred for the command pulse value
	Regeneration Unit Overheat	When the signal thermal protector for the regeneration unit has been activated
3	Overvoltage Protection	When the primary voltage of the driver's inverter exceeds the upper limit value
	Main Power Supply Error	When the main power supply has been cut off while operation commands are being input to the driver
	Undervoltage	When the primary voltage of the driver's inverter has fallen below the lower limit
4	Overflow during All Windings On	When the positioning deviation has exceeded the overflow rotation amount (Initial value: 3 rotations)
	Overflow during All Windings Off	When all winding on was performed even though the positioning deviation during all windings off was above the permissible value (Initial Value: 100 rotations min.)
5	Overcurrent Protection	An excessive current has flowed through the inverter power component inside the driver
	Power Supply Circuit Error	When an actuator power line is disconnected
7	Operating Data Error	When a return-to-electrical home operation was performed when an operating data error warning occurred
	Electronic Gear Setting Error	When the resolution set by the electronic gear is outside the range of the specifications
8	Sensor Error during Operation	When an abnormality has occurred in a sensor while the actuator is rotating
	Sensor Error during Initialization	When the main power supply was turned on before the motor cable was connected to the driver
	Initial Rotor Revolution Error	When the main power supply was turned on while the actuator was operating
	Motor Combination Error	A motor that cannot be combined with the other components was connected
9	EEPROM Error	When a control parameter has failed

2 Current Setting Switch

Indication	Switch Name	Function
CURRENT	Current Setting Switch	Sets the current value during operation. Used to limit the torque or temperature rise. The current value is set with a ratio (%) relative to the rated output current value. Factory setting: F

3 Velocity Filter Setting Switch

Indication	Switch Name	Function
V-FIL	Velocity Filter Setting Switch	Adjust the responsiveness of the actuator. Adjust to suppress the vibration of the actuator or make starting and stopping smoother. The minimum value of the velocity filter is "0" and the maximum value is "F". Factory setting: 1 Difference in Characteristics Due to Velocity Filter 

4 Function Switch/Setting Switch

Indication	Switch Name	Function
D0/D1 CS0/CS1	Resolution Select Switch	With this item set to [4: D0/D1] or [3: CS0/CS1], you can change the resolution of the motor without using mechanical gear mechanism. The resolution [P/R] of the motor and the minimum movement [°] per rotation of the output table are as follows: [4: D0] [3: CS0] → 1000[P/R], 0.02[°] (Factory setting) [4: D0] [3: CS1] → 10000[P/R], 0.002[°] [4: D1] [3: CS0] → 500[P/R], 0.04[°] [4: D1] [3: CS1] → 5000[P/R], 0.004[°] With the electronic gear (B, A1) of the driver set together, you can change the minimum movement of the output table as follow: (Setting range: 0.002~0.2[°]) $\text{Minimum movement [°]} = \frac{360\ [°]}{18 \times \text{Resolution power} \times (\text{Electronic gear B/Electronic gear A1})}$ ●For a detailed explanation of the electronic gear, refer to the **AR** Series User's Manual.
NORM/ CCM	Control Mode Select Switch	Switches the control mode from normal mode to current control mode. When set to current control mode, the synchronization of the motor is lost, but the noise and vibration is reduced. "NORM": Normal mode (Factory setting) "CCM": Current control mode
2P/1P	Pulse Input Mode Select Switch	Switches the pulse input mode between 1-pulse input mode and 2-pulse input mode. "2P": 2-pulse input mode (Factory setting) "1P": 1-pulse input mode

5 24 VDC Power Input Terminal/Regeneration Unit Thermal Input Terminal/Electromagnetic Brake Connection Terminal (CN1)

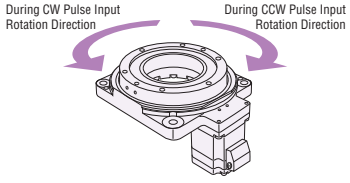
Indication	I/O	Terminal Name	Description
24V+	Input	24 VDC Power Input Terminal+	To separate the main power supply and control power supply, connect the power supplies here. The control power supply is not mandatory. When using an electromagnetic brake actuator, connect it as the power supply for the electromagnetic brake.
24V−		24 VDC Power Input Terminal−	
TH1		Regeneration Unit Thermal Input Terminal	Connect the accessory (sold separately) regeneration unit (**RGB100**). When not connecting a regeneration unit, short these 2 terminals to each other.
TH2		Regeneration Unit Thermal Input Terminal	
MB1	Output	Electromagnetic Brake Connection Terminal−	For an electromagnetic brake actuator, connect the electromagnetic brake line here.
MB2		Electromagnetic Brake Connection Terminal+	

6 I/O Signals Connector (CN5 36 pins)

Indication	I/O	Pin No.	Code	Signal Name
CN5	–	1	–	–
	Output	2	GND	Ground Connection
		3	ASG+	A-Phase Pulse Output Signal (Line driver)
		4	ASG−	
		5	BSG+	B-Phase Pulse Output Signal (Line driver)
		6	BSG−	
		7	TIM1+	Timing Output (Line driver)
		8	TIM1−	
		9	ALM+	Alarm Output
		10	ALM−	
		11	WNG+	Warning Output
		12	WNG−	
		13	END+	Positioning Completion Output
		14	END−	
		15	READY+/AL0+*1	Operation Ready Output/Alarm Code Output 0*1
		16	READY−/AL0−*1	
		17	TLC+/AL1+*1	Torque Limiting Output/Alarm Code Output 1*1
		18	TLC−/AL1−*1	
		19	TIM2+/AL2+*1	Timing Output (Open collector)/Alarm Code Output 2*1
		20	TIM2−/AL2−*1	
		21	GND	Ground Connection
	Input	22	IN-COM	Common for Input Signals
		23	C-ON*2	All Windings On Input*2
		24	CLR/ALM-RST	Deviation Counter Clear Input/Alarm Reset Input
		25	CCM	Current Control Mode On Input
		26	CS	Resolution Select Input
		27	–	–
		28	RETURN	Return-To-Electrical Home Operation
		29	P-RESET	Position Reset Input
		30	FREE	Excitation Off and Electromagnetic Brake Release
		31	CW+/PLS+	CW Pulse Input/Pulse Input (+5 V/line driver)
		32	CW−/PLS−	
		33	CW+24/PLS+24V	CW Pulse Input/Pulse Input (+24 V)
		34	CCW+24/DIR+24V	CCW Pulse Input/Rotation Direction Input (+24 V)
		35	CCW+/DIR+	CCW Pulse Input/Rotation Direction Input (+5 V/line driver)
		36	CCW−/DIR−	

*1 Enabled when the settings are changed with the separately-sold control module (**OPX-2A**) or data setting software (**MEXE02**).

*2 The initial value for the all windings on input is normally open contact. When operating the motor, be sure to turn the all windings on input ON. When the all windings on input is not used, set the input logic to normally close contact in the separately-sold control module (**OPX-2A**) or data setting software (**MEXE02**).



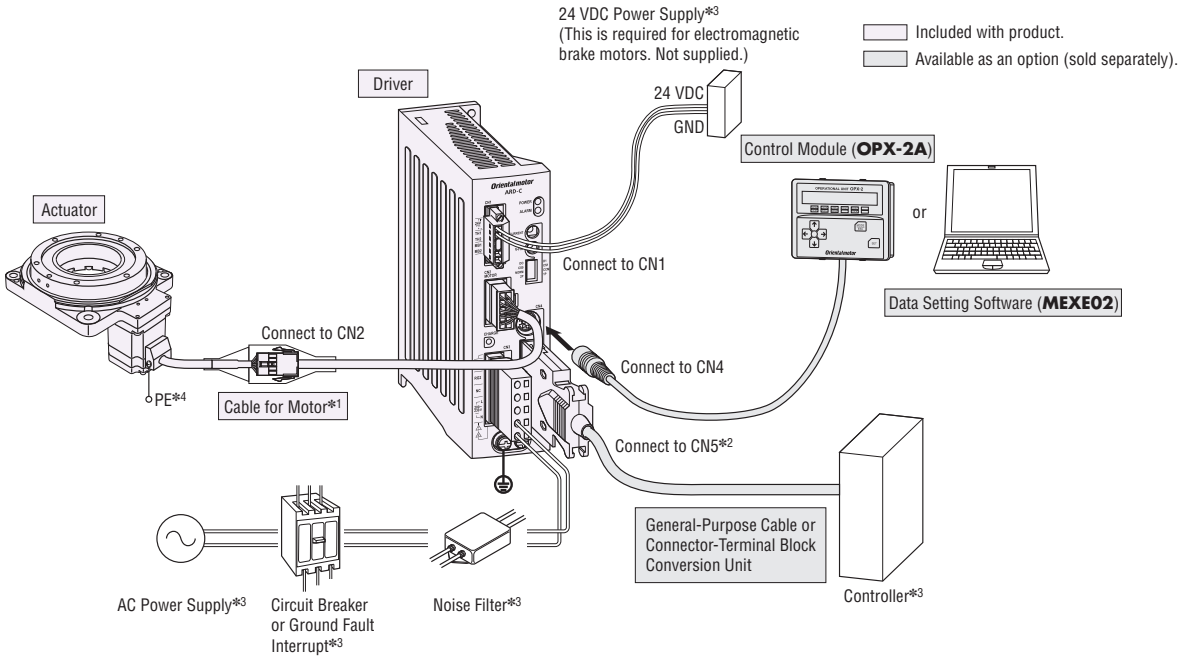
Note

The output table moves as follows when receiving CW pulse and CCW pulse of driver input signal:

- When CW pulse is input: The output table rotates CCW.
- When CCW pulse is input: The output table rotates CW.

●Connection Diagram (Series equipped with the pulse train input type of the **AR** Series, AC power supply input)

◇Connections with Peripheral Equipment



*1 Products are available with a cable for motor and driver (1 m, 2m or 3 m), and also without the cable.
If you need cables longer than 3 m or flexible cables, select appropriate cables from the accessories (sold separately).
Keep the wiring distance between the actuator and driver to 30 m max.

*2 The control I/O connector (CN5) is included with the product, but you can also purchase an accessory general-purpose cable or connector terminal block conversion unit (sold separately). Choose one or the other.

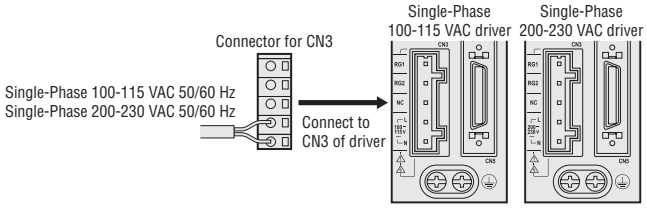
*3 Not supplied

*4 Ground to the PE terminal of the motor or at the plate used to install the motorized actuator.

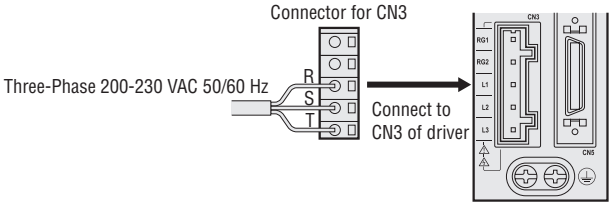
◇Connecting the Main Power Supply

Furnish the following cable for the power supply lines.
Single-Phase 100-115 VAC: Three-Core Cable [AWG16~14 (1.25~2.0 mm²)]
Single-Phase 200-230 VAC: Three-Core Cable [AWG16~14 (1.25~2.0 mm²)]
Three-Phase 200-230 VAC: Four-Core Cable [AWG16~14 (1.25~2.0 mm²)]

- For Single-Phase 100-115 VAC/Single-Phase 200-230 VAC

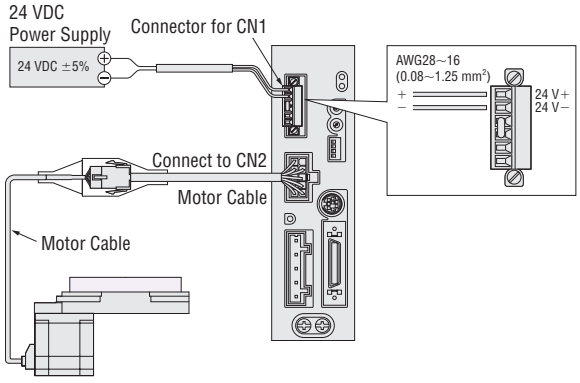


- For Three-Phase 200-230 VAC



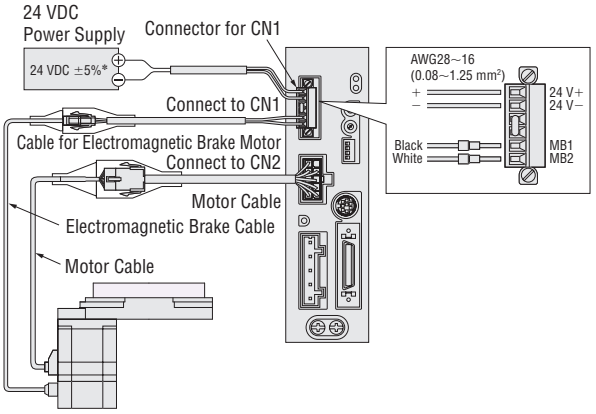
◇Control Power Source

To separate the main power supply and control power supply, prepare a 24 VDC power supply. The control power supply is not mandatory.



◇Connecting the Electromagnetic Brake

Prepare a 24 VDC power supply.
The main power supply and control power supply are separated in this case too.

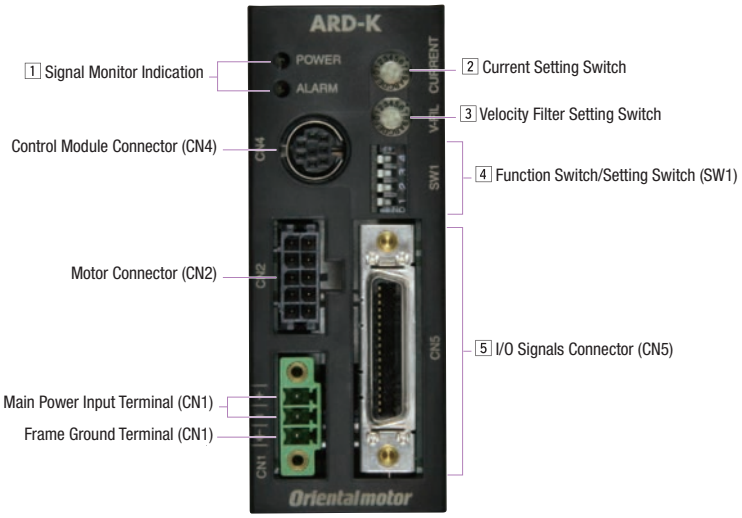


*If the wiring distance is extended to 20 m min. using an accessory cable (sold separately), the 24 VDC±4% specification applies.

◇Connecting to the Host Controller

➜ Page 51

Driver Part Names and Functions (Series equipped with the pulse train input type of the **AR** Series, DC power supply input)



1 Signal Monitor Indication

◇LED Indication

Indication	Color	Function	Lighting Condition
POWER	Green	Power Supply Indication	When the main power supply is input
ALARM	Red	Alarm Indication	When a protective function is activated (blinking)

◇Alarm Details

Blink Count	Function	Operating Condition
2	Overheat Protection	When the temperature inside the driver exceeds 85°C
	Overload	When the accumulated value for the time that the load torque exceeds the maximum torque exceeds the overload detection time (Initial Value: 5 sec.)
	Overspeed	When the motor output shaft speed exceeds 4500 r/min
	Command Pulse Error	When an error has occurred for the command pulse value
3	Overvoltage Protection	When the primary voltage of the driver's inverter exceeds the upper limit value
	Undervoltage	When the primary voltage of the driver's inverter has fallen below the lower limit
4	Overflow during All Windings On	When the positioning deviation has exceeded the overflow rotation amount (Initial value: 3 rotations)
	Overflow during All Windings Off	When all winding on was performed even though the positioning deviation during all windings off was above the permissible value (Initial Value: 100 rotations min.)
7	Operating Data Error	When a return-to-electrical home operation was performed when an operating data error warning occurred
	Electronic Gear Setting Error	When the resolution set by the electronic gear is outside the range of the specifications
8	Sensor Error during Operation	When an abnormality has occurred in a sensor while the actuator is rotating
	Sensor Error during Initialization	When the main power supply was turned on before the motor cable was connected to the driver
	Initial Rotor Revolution Error	When the main power supply was turned on while the actuator was operating
	Motor Combination Error	A motor that cannot be combined with the other components was connected
9	EEPROM Error	When a control parameter has failed

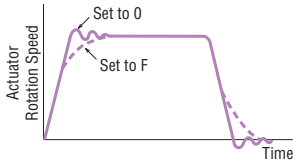
2 Current Setting Switch

Indication	Switch Name	Function
CURRENT	Current Setting Switch	Sets the current value during operation. Used to limit the torque or temperature rise. The current value is set with a ratio (%) relative to the rated output current value. Factory setting: F

3 Velocity Filter Setting Switch

Indication	Switch Name	Function
V-FIL	Velocity Filter Setting Switch	Adjust the responsiveness of the actuator. Adjust to suppress the vibration of the actuator or make starting and stopping smoother. The minimum value of the velocity filter is "0" and the maximum value is "F". Factory setting: 1

Difference in Characteristics Due to Velocity Filter



4 Function Switch/Setting Switch (SW1)

Indication	Switch Name	Function
4 3	Resolution Select Switch "D0/D1" "CS0/CS1"	With this item set to [4: OFF/ON] or [3: OFF/ON], you can change the resolution of the motor without using mechanical gear mechanism. The resolution [P/R] of the motor and the minimum movement [°] per rotation of the output table are as follows: [4: OFF], [3: OFF] → 1000[P/R], 0.02[°] (Factory setting) [4: OFF], [3: ON] → 10000[P/R], 0.002[°] [4: ON], [3: OFF] → 500[P/R], 0.04[°] [4: ON], [3: ON] → 5000[P/R], 0.004[°] With the electronic gear (B, A1) of the driver set together, you can change the minimum movement of the output table as follow: (Setting range: 0.002～0.2[°]) $\text{Minimum movement [°]} = \frac{360\ [°]}{18 \times 1000 \times (\text{Electronic gear B} / \text{Electronic gear A1})}$ ● For a detailed explanation of the electronic gear, refer to the **AR** Series User's Manual.
2	Control Mode Select Switch "NORM/CCM"	Switches the control mode from normal mode to current control mode. When set to current control mode, the synchronization of the motor is lost, but the noise and vibration is reduced. "OFF": Normal mode (Factory setting) "ON": Current control mode
1	Pulse Input Mode Select Switch "2P/1P"	Switches the pulse input mode between 1-pulse input mode and 2-pulse input mode. "OFF": 2-pulse input mode (Factory setting) "ON": 1-pulse input mode

5 I/O Signals Connector (CN5 36 pins)

Indication	I/O	Pin No.	Code	Signal Name
CN5	–	1	–	–
	Output	2	GND	Ground Connection
		3	ASG+	A-Phase Pulse Output Signal (Line driver)
		4	ASG−	
		5	BSG+	B-Phase Pulse Output Signal (Line driver)
		6	BSG−	
		7	TIM1+	Timing Output (Line driver)
		8	TIM1−	
		9	ALM+	Alarm Output
		10	ALM−	
		11	WNG+	Warning Output
		12	WNG−	
		13	END+	Positioning Completion Output
		14	END−	
		15	READY+/AL0+*1	Operation Ready Output/Alarm Code Output 0*1
		16	READY−/AL0−*1	
		17	TLC+/AL1+*1	Torque Limiting Output/Alarm Code Output 1*1
		18	TLC−/AL1−*1	
		19	TIM2+/AL2+*1	Timing Output (Open collector)/Alarm Code Output 2*1
		20	TIM2−/AL2−*1	
		21	GND	Ground Connection
	Input	22	IN−COM	Common for Input Signals
		23	C−ON*2	All Windings On Input*2
		24	CLR/ALM−RST	Deviation Counter Clear Input/Alarm Reset Input
		25	CCM	Current Control Mode On Input
		26	CS	Resolution Select Input
		27	–	–
		28	RETURN	Return-To-Electrical Home Operation
		29	P−RESET	Position Reset Input
		30	FREE	Excitation Off
		31	CW+/PLS+	CW Pulse Input/Pulse Input (+5 V/line driver)
		32	CW−/PLS−	
		33	CW+24/PLS+24V	CW Pulse Input/Pulse Input (+24 V)
		34	CCW+24/DIR+24V	CCW Pulse Input/Rotation Direction Input (+24 V)
		35	CCW+/DIR+	CCW Pulse Input/Rotation Direction Input (+5 V/line driver)
		36	CCW−/DIR−	

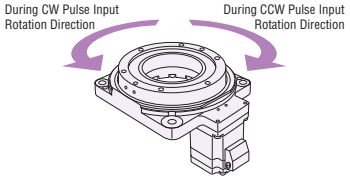
*1 Enabled when the settings are changed with the separately-sold control module (**OPX-2A**) or data setting software (**MEXE02**).

*2 The initial value for the all windings on input is normally open contact. When operating the motor, be sure to turn the all windings on input ON. When the all windings on input is not used, set the input logic to normally close contact in the separately-sold control module (**OPX-2A**) or data setting software (**MEXE02**).

Note

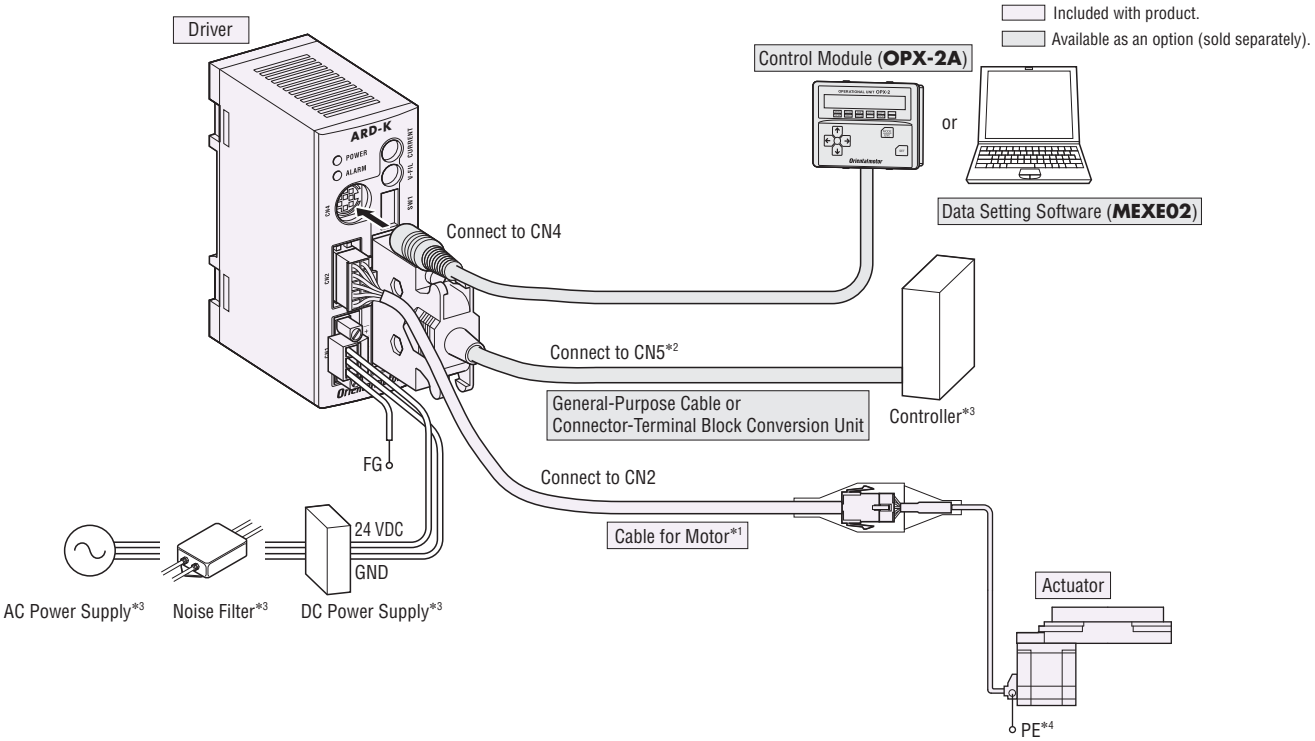
The output table moves as follows when receiving CW pulse and CCW pulse of driver input signal:

- When CW pulse is input: The output table rotates CCW.
- When CCW pulse is input: The output table rotates CW.



●Connection Diagram (Series equipped with the pulse train input type of the **AR** Series, DC power supply input)

◇Connections with Peripheral Equipment



*1 Products are available with a cable for motor and driver (1 m, 2m or 3 m), and also without the cable.
If you need cables longer than 3 m or flexible cables, select appropriate cables from the accessories (sold separately).
Keep the wiring distance between the actuator and driver to 30 m max.

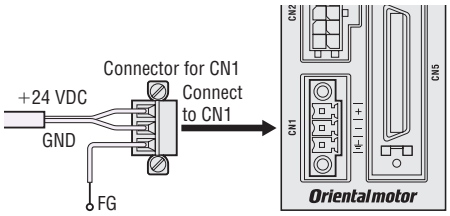
*2 The control I/O connector (CN5) is included with the product, but you can also purchase an accessory general-purpose cable or connector terminal block conversion unit (sold separately). Choose one or the other.

*3 Not supplied

*4 Ground to the PE terminal of the motor or at the plate used to install the motorized actuator.

◇Connecting the Main Power Supply

Furnish the following cable for the power supply lines.
AWG24～16 (0.2～1.25 mm^2)



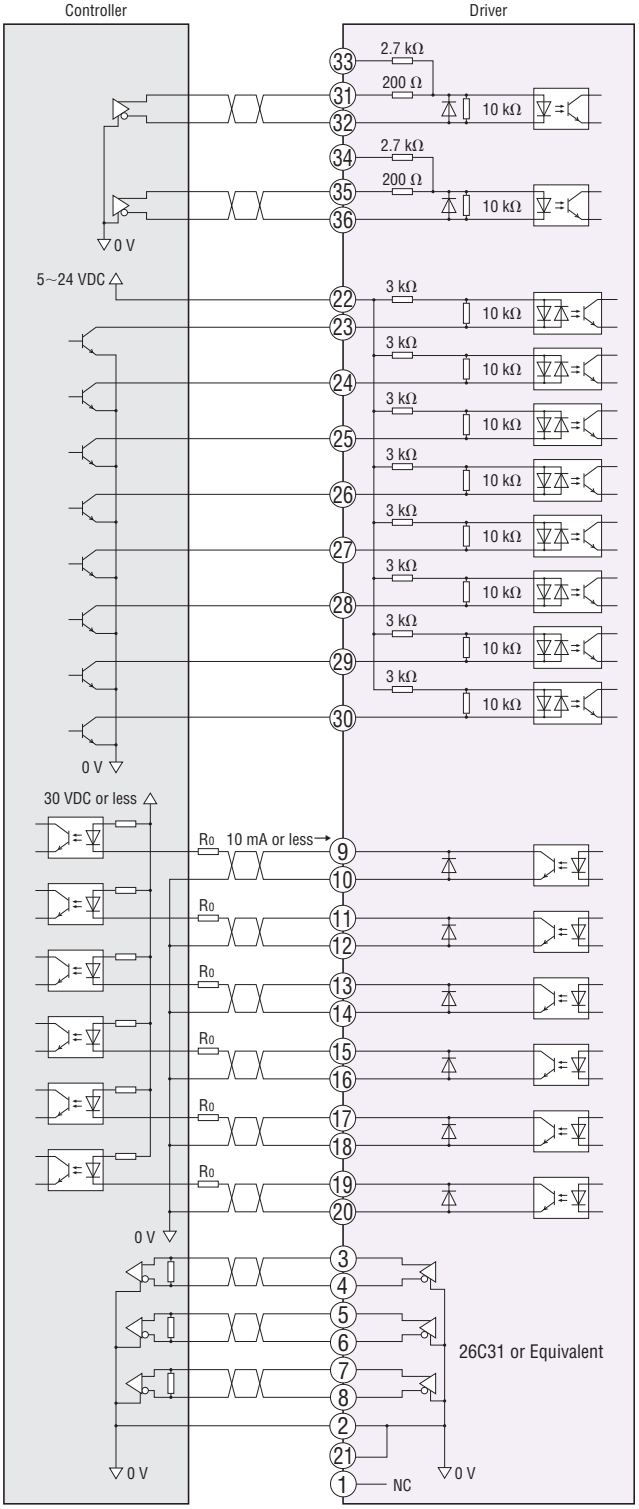
◇Connecting to the Host Controller

➜ Page 51

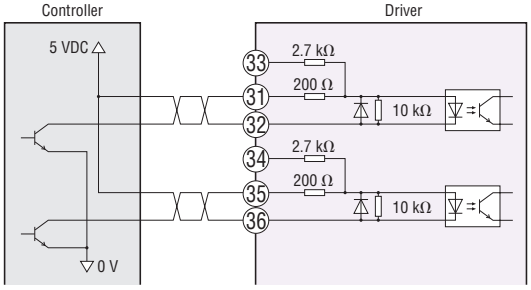
◇Connection to Programmable Controller (Series equipped with the pulse train input type of the **AR** Series, AC/DC power supply input)

•Connection Diagram for Connection with Current Sink Output Circuit

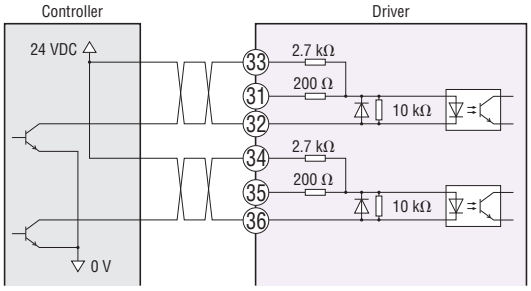
When the Pulse Input is the Line Driver



When the Pulse Input is Open Collector 5 V



When the Pulse Input is Open Collector 24 V

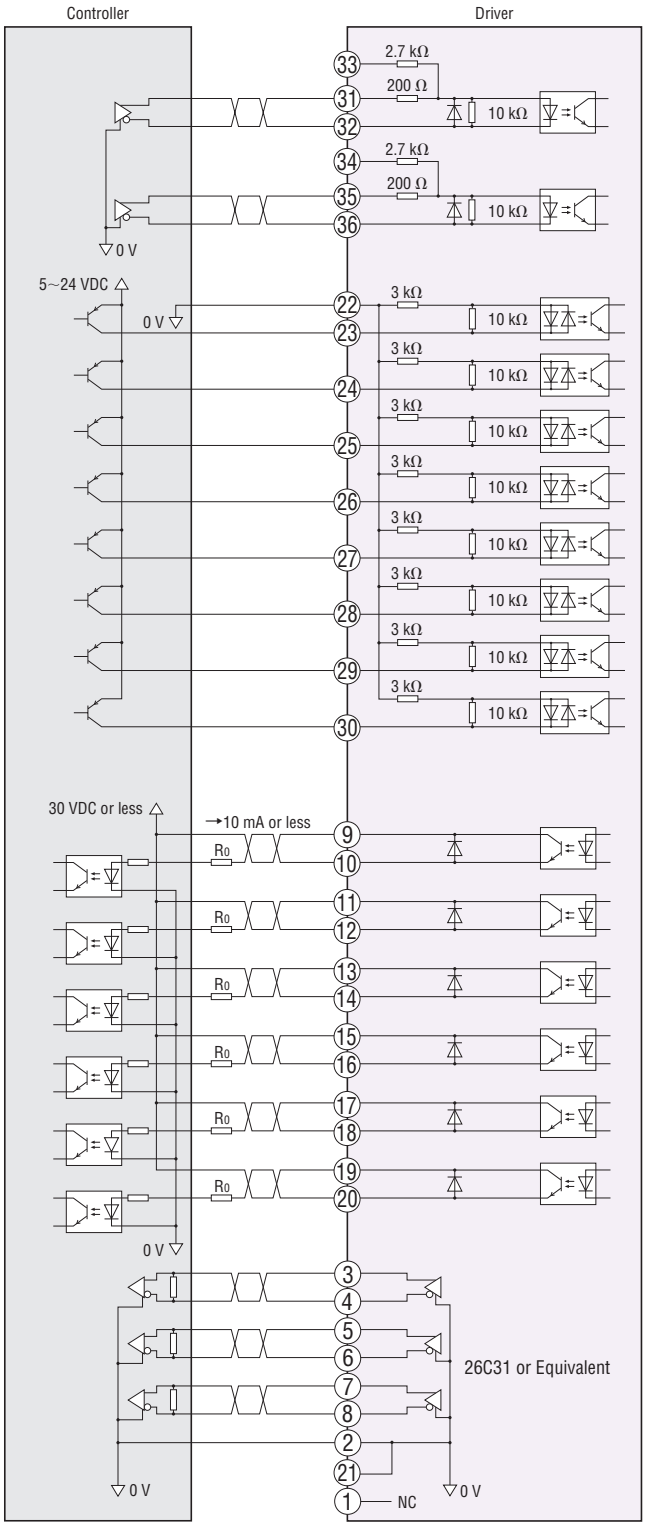


Note

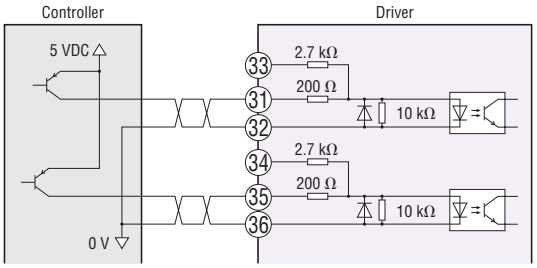
- Use the product with output signals of 30 VDC or less. When the current value exceeds 10 mA, connect the external resistor Ro.
- Connect a terminating resistor of 100 Ω or more between the line receiver inputs.
- For the control I/O signal lines (CN5), use a multi-core shielded twisted-pair wire [AWG28~24 (0.08~0.2 mm2)] and keep the wiring length as short as possible (no more than 2 m).
- Note that as the length of the pulse line increases, the maximum transmission frequency decreases.
- Provide a distance of 200 mm or more between the control I/O signal lines and power lines (power supply lines, motor lines and other large-current circuits).

•Connection Diagram for Connection with Current Source Output Circuit

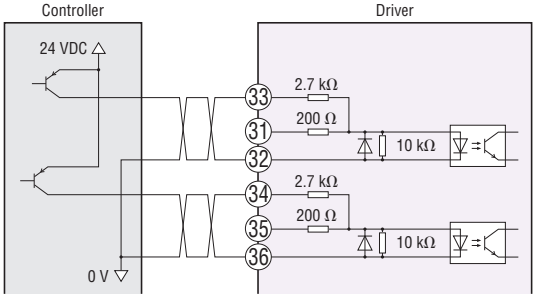
When the Pulse Input is the Line Driver



When the Pulse Input is Open Collector 5 V



When the Pulse Input is Open Collector 24 V



Note

- Use the product with output signals of 30 VDC or less. When the current value exceeds 10 mA, connect the external resistor R_O.
- Connect a terminating resistor of 100 Ω or more between the line receiver inputs.
- For the control I/O signal lines (CN5), use a multi-core shielded twisted-pair wire [AWG28~24 (0.08~0.2 mm2)] and keep the wiring length as short as possible (no more than 2 m).
- Note that as the length of the pulse line increases, the maximum transmission frequency decreases.
- Provide a distance of 200 mm or more between the control I/O signal lines and power lines (power supply lines, motor lines and other large-current circuits).

Equipped with RKII Series

Positioning Function Type Driver	Pulse Train Input Type Driver
RKSD503-□D RKSD507-□D 	RKSD503-□ RKSD507-□ 

● Either **A** (Single-Phase 100-120 VAC) or **C** (Single-Phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the driver product name.

Driver General Specifications

		Built-in Positioning Function Type	Pulse Train Input Type
Insulation Resistance		The measured value is 100 MΩ or more when a 500 VDC megger is applied between the following locations: · Protective Earth Terminal – Power Supply Terminal · Power Input Terminal – Power Supply Terminal	
Dielectric Strength Voltage		No abnormality is found with the following application for 1 minute:	
		· Protective Earth Terminal – Power Supply Terminal 1.5 kV 50 Hz or 60 Hz · Power Input Terminal – Power Supply Terminal 1.8 kV 50 Hz or 60 Hz	· Protective Earth Terminal – Power Supply Terminal 1.8 kV 50 Hz or 60 Hz · Power Input Terminal – Power Supply Terminal 1.9 kV 50 Hz or 60 Hz
Operating Environment (In Operation)	Ambient Temperature	0～+55°C* (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.	

*When a heat sink is installed that is equivalent to an aluminum plate size of at least 200×200 mm and 2 mm thickness.

Note

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

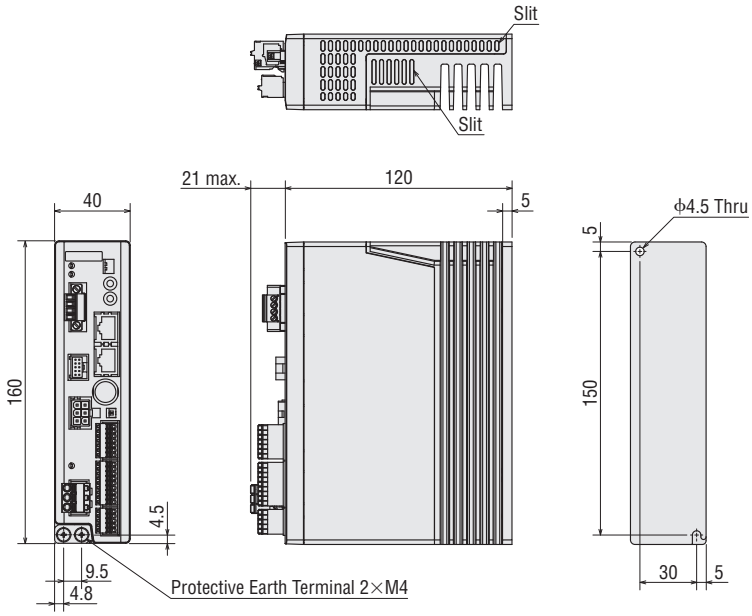
Built-in Positioning Function Type RS-485 Communication Specifications

Protocol	Modbus protocol (Modbus RTU mode)
Electrical Characteristics	Straight cable compliant with EIA-485 Use twisted-pair cables (TIA/EIA-568B CAT5e or better recommended). The maximum total extension length is 50 m.
Communication Mode	Half duplex and Start-stop synchronization (data: 8 bits, stop bit: 1 bit or 2 bits, parity: none, even, or odd)
Baud Rate	9600 bps/19200 bps/38400 bps/57600 bps/115200 bps
Connection Type	Up to 31 units can be connected to a single programmable controller (master unit).

Dimensions (Unit = mm)

Built-in Positioning Function Type

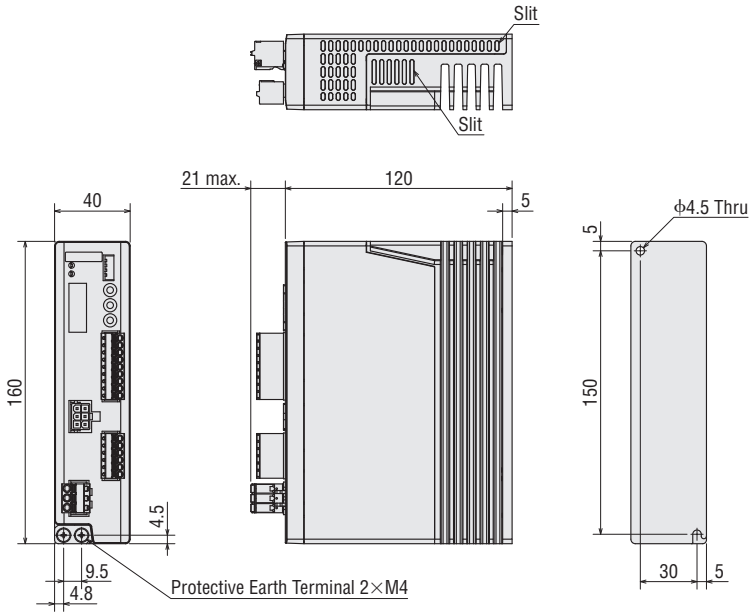
Mass: 0.8 kg 2D CAD B1048 3D CAD



Included
- Power Input Terminal Connector (CN1)
  - Connector: MC1,5/4-STF-3,5 (PHOENIX CONTACT)
- Sensor Signal Connector (CN5)
  - Connector: FK-MC0,5/5-ST-2,5 (PHOENIX CONTACT)
- Input Signal Connector (CN8)
  - Connector: FK-MC0,5/9-ST-2,5 (PHOENIX CONTACT)
- Output Signal Connector (CN9)
  - Connector: FK-MC0,5/7-ST-2,5 (PHOENIX CONTACT)
- Connector for Main Power Input Terminals (CN3)
  - Connector: FKCT2,5/3-ST-5,08 (PHOENIX CONTACT)

Pulse Train Input Type

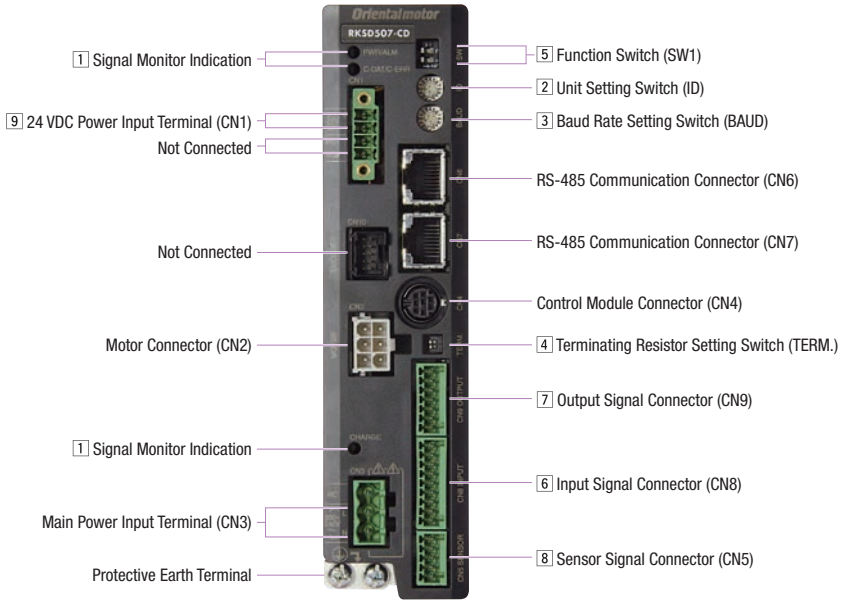
Mass: 0.8 kg 2D CAD B1015 3D CAD



Included
- I/O Signals Connector (CN5)
  - Connector: FK-MCP1,5/9-ST-3,81 (PHOENIX CONTACT)
- Connector for Pulse Input (CN4)
  - Connector: FK-MCP1,5/6-ST-3,81 (PHOENIX CONTACT)
- Connector for Main Power Input Terminals (CN3)
  - Connector: FKCT2,5/3-ST-5,08 (PHOENIX CONTACT)

Connection and Operation (Product equipped with built-in positioning function type RKII Series)

Driver Part Names and Functions (Product equipped with built-in positioning function type RKII Series)



1 Signal Monitor Indication

◇LED Indication

Indication	Color	Function	Lighting Condition
PWR	Green	Power Supply Indication	When 24 VDC power supply is input
ALM	Red	Alarm Indication	When a protective function is activated (blinking)
C-DAT	Green	Communication Indication	When communication data is being sent or received
C-ERR	Red	Communication Error Indication	When communication data is in error
CHARGE	Red	Power Supply Indication	When the main power supply is input

2 Unit Setting Switch (ID)

Indication	Switch Name	Function
ID	Unit Setting Switch	Set this when you use RS-485 communication. Set the unit number (Factory setting: 0).

3 Baud Rate Setting Switch (BAUD)

Indication	Switch Name	Function
BAUD	Baud Rate Setting Switch	Set this when you use RS-485 communication. Set communication speed (Factory setting: 7).

◇RS-485 Baud Rate Setting

No.	Baud Rate (bps)
0	9600
1	19200
2	38400
3	57600
4	115200
5～6	Not used
7	625000 (Connection with a network converter)
8～F	Not used

4 Terminating Resistor Setting Switch (TERM.)

Indication	No.	Function
TERM.	1	Set the terminating resistor (120 Ω) for RS-485 communication (Factory setting: OFF). OFF: Terminating resistor not used ON: Terminating resistor used
	2	

✻ Configure both No. 1 and No. 2 to the same setting.

5 Function Switch (SW1)

Indication	No.	Function
SW1	1	Use in combination with the axis setting switch (ID) to set the axis number (Factory setting: OFF).
	2	Set the RS-485 communication protocol (Factory setting: OFF)

◇RS-485 Communication Protocol Setting

No. \ Connection	Connection with a Network Converter	Modbus RTU Mode
2	OFF	ON

6 Input Signal Connector (CN8)

Indication	Pin No.	Signal Name	Description	
CN8	1	IN0	HOME	Execute the return-to-home operation.
	2	IN1	START	Execute the positioning operation.
	3	IN2	M0	Use 3 bits to select the operating data number.
	4	IN3	M1	
	5	IN4	M2	
	6	IN5	FREE	Stops motor excitation.
	7	IN6	STOP	Stop the motor.
	8	IN7	ALM-RST	Reset current alarm.
	9	IN-COM	Common for input signals	

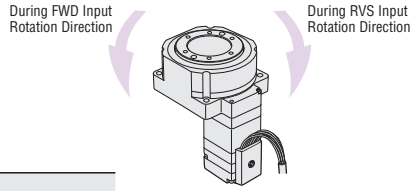
✻You can set functions to assign by specifying parameters. Initial values are shown above. For details, refer to the **RKII** Series User's Manual.

The following input signals can be assigned to input terminals IN0～7.

Input Signals								
0: Not used	5: SSTART	10: MS2	17: AWO	32: R0	37: R5	42: R10	47: R15	52: M4
1: FWD	6: +JOG	11: MS3	18: STOP	33: R1	38: R6	43: R11	48: M0	53: M5
2: RVS	7: −JOG	12: MS4	24: ALM-RST	34: R2	39: R7	44: R12	49: M1	
3: HOME	8: MS0	13: MS5	25: P-PRESET	35: R3	40: R8	45: R13	50: M2	
4: START	9: MS1	16: FREE	27: HMI	36: R4	41: R9	46: R14	51: M3	

Note

The rotation directions of the driver input signals (FWD and RVS) are opposite the actual rotation directions of the output table. When the FWD pulse signal is input, the output table rotates in the counterclockwise direction. When the RVS signal is input, the output table will rotate in the clockwise direction.



7 Output Signal Connector (CN9)

Indication	Pin No.	Signal Name	Description	
CN9	1	OUT0	HOME-P	Output when the motor is in the home position.
	2	OUT1	MOVE	Output when the motor is in operation.
	3	OUT2	AREA1	Output when the motor is within the range of area 1.
	4	OUT3	READY	Output when the driver is ready for operation.
	5	OUT4	WNG	Outputs the warning status for the driver.
	6	OUT5	ALM	Outputs the alarm status for the driver (normal close).
	7	OUT-COM	Common for output signals	

✻You can set functions to assign by specifying parameters. Initial values are shown above. For details, refer to the **RKII** Series User's Manual.

The following output signals can be assigned to output terminals OUT0～5.

Output Signals								
0: Not used	7: −JOG_R	16: FREE_R	36: R4	43: R11	50: M2_R	63: SLIT_R	73: AREA1	85: ZSG
1: FWD_R	8: MS0_R	17: AWO_R	37: R5	44: R12	51: M3_R	65: ALM	74: AREA2	86: MBC
2: RVS_R	9: MS1_R	18: STOP_R	38: R6	45: R13	52: M4_R	66: WNG	75: AREA3	
3: HOME_R	10: MS2_R	32: R0	39: R7	46: R14	53: M5_R	67: READY	80: S-BSY	
4: START_R	11: MS3_R	33: R1	40: R8	47: R15	60: +LS_R	68: MOVE	82: MPS	
5: SSTART_R	12: MS4_R	34: R2	41: R9	48: M0_R	61: −LS_R	70: HOME-P	83: STEPOUT	
6: +JOG_R	13: MS5_R	35: R3	42: R10	49: M1_R	62: HOMES_R	72: TIM	84: OH	

8 Sensor Signal Connector (CN5)

Indication	Pin No.	Signal Name	Description
CN5	1	+LS	+Side Limit Sensor Input
	2	−LS	−Side Limit Sensor Input
	3	HOMES	Mechanical Home Sensor Input
	4	SLIT	Slit Sensor Input
	5	IN-COM2	Common for Sensors

9 24 VDC Power Input Terminal (CN1)

Indication	I/O	Terminal Name	Description
24V+	Input	24 VDC Power Input Terminal+	The power supply for the driver control circuit. Always connect when using.
24V−		24 VDC Power Input Terminal−	
MB1	—	—	Not Connected.
MB2			

●Setting example of the resolution (minimum movement) of the output table

You can set minimum movement of the built-in positioning function type output table using the parameters (Electronic gear A, Electronic gear B) of the driver.

The following shows the calculating formula of the minimum movement of the output table.

$$\text{Minimum movement of the output table [°]} = \frac{360[°]}{(18 \times 500 \times (\text{Electronic gear B} \div \text{Electronic gear A}))}$$

18: Gear Ratio

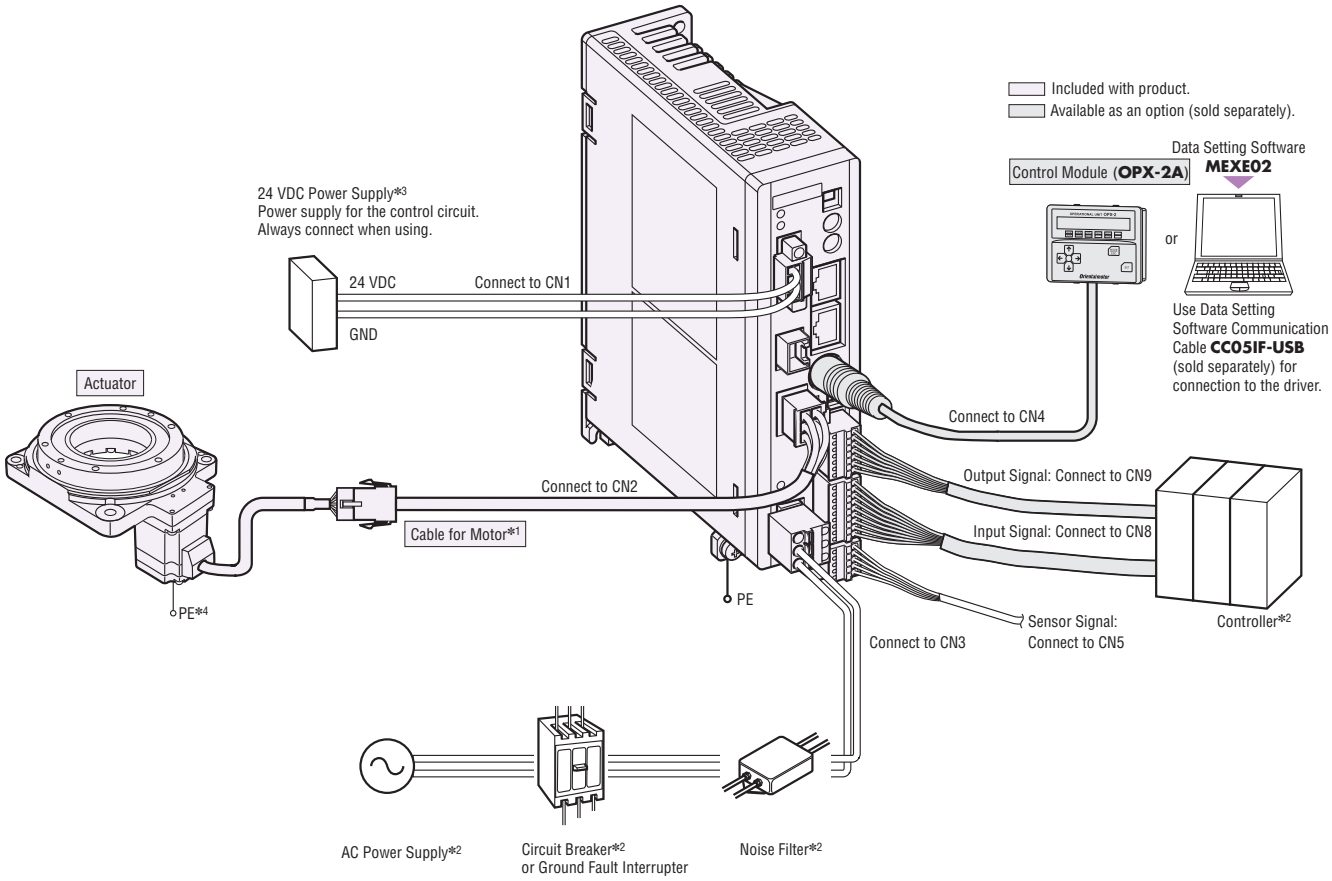
500: Basic resolution per rotation of a Five-Phase stepping motor

When set the minimum movement of the output table to 0.1 [°], set the Electronic gear A and Electronic gear B to 5 and 2, respectively. The calculation example is shown below.

$$\text{Minimum movement of the output table [°]} = \frac{360[°]}{(18 \times 500 \times (2 \div 5))}$$

Connection Diagram

◇Connections with Peripheral Equipment



*1 Products are available with a cable for motor and driver (1 m, 2 m or 3 m), and also without the cable.
If you need cables longer than 3 m or flexible cables, select appropriate cables from the accessories (sold separately).
Keep the wiring distance between the motor and driver to 20 m or less.

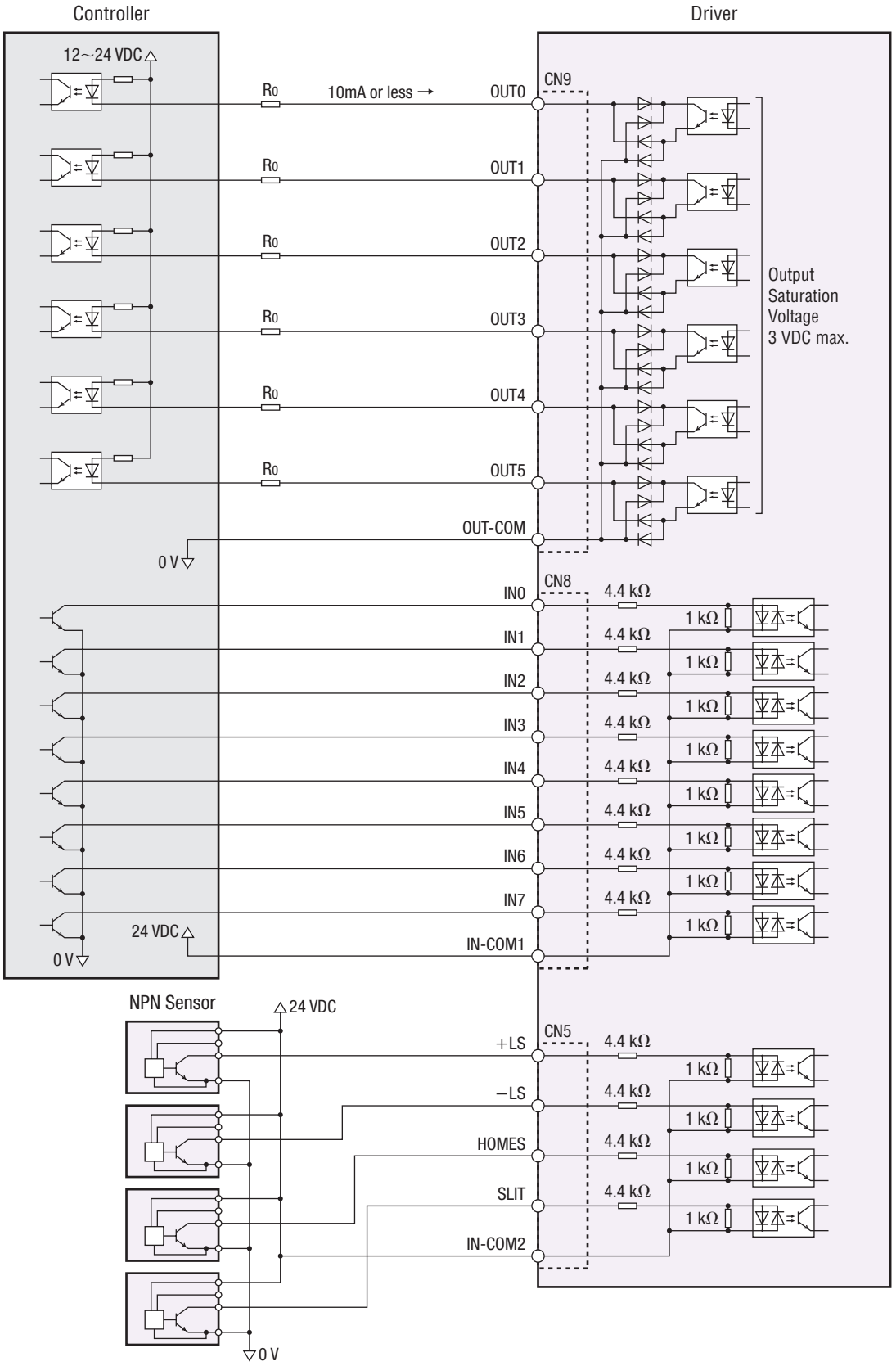
*2 Not supplied

*3 Not supplied. If the wiring distance between the motor and driver is extended to 15 m or longer using an accessory cable (sold separately), the 24 VDC±4% specification applies.

*4 Ground to the PE terminal of the motor or at the plate used to install the motorized actuator.

◇Connecting to the Host Controller

•Connection Diagram for Connection with Current Sink Output Circuit

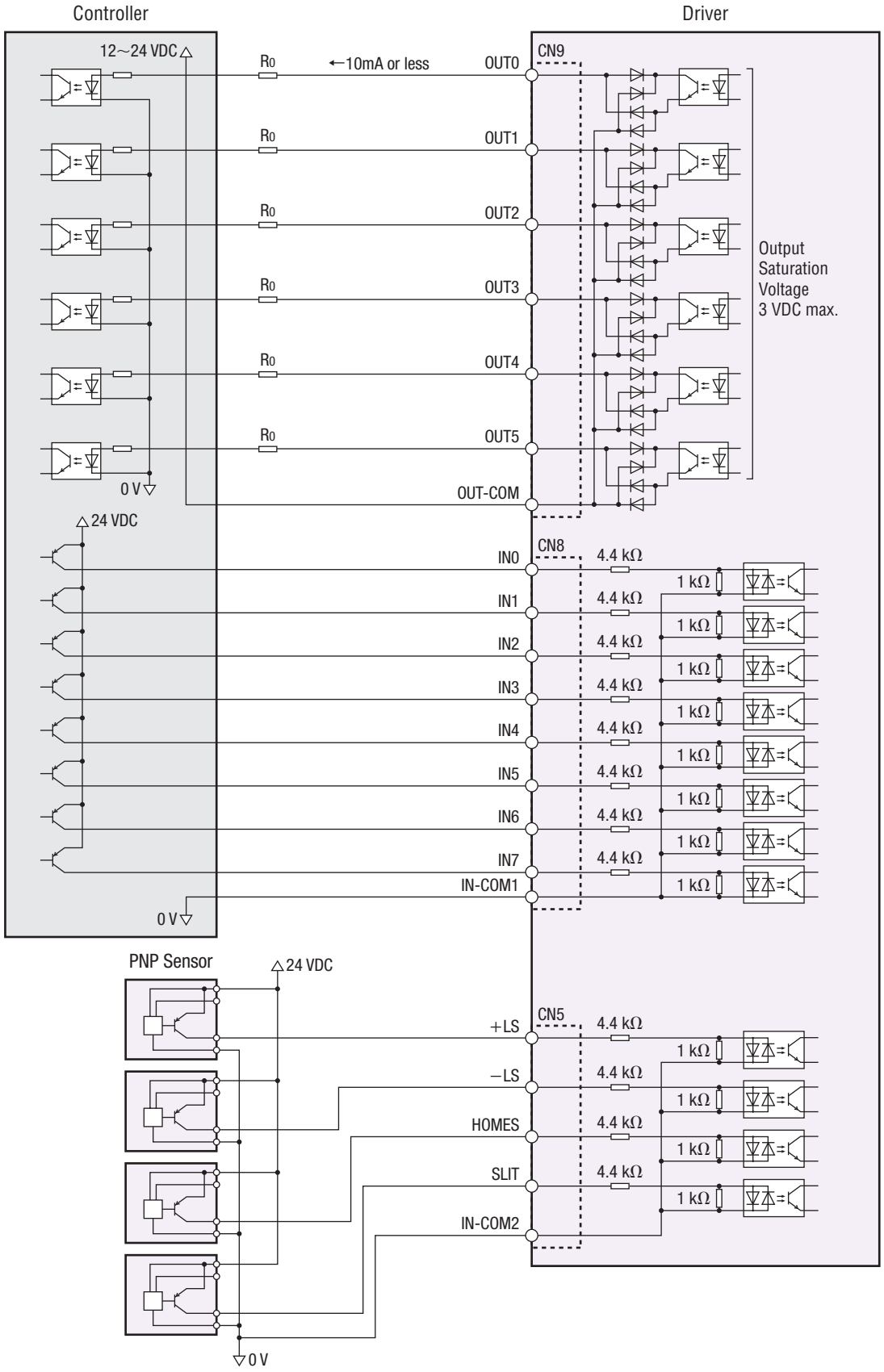


Note

- Use the product with input signals of 24 VDC.
- Use the product with output signals of 12～24 VDC and 10 mA or less. When the current value exceeds 10 mA, connect the external resistor R_0 to reduce the current to 10 mA max.
- The maximum saturation voltage for the output signals is 3 V.
- Provide a distance of 100 mm or longer between the signal lines and power lines (power supply lines, motor lines).
  Do not run the signal lines in the same piping as power lines or bundle them with power lines.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

◇Connecting to the Host Controller

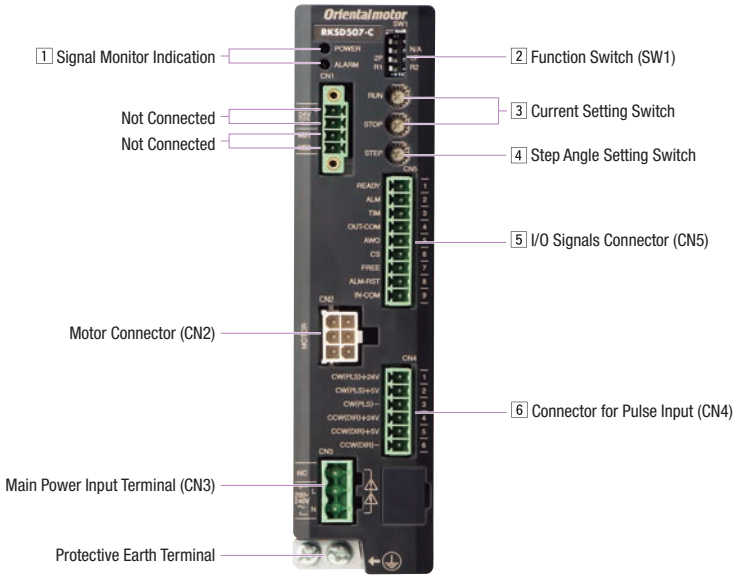
•Connection Diagram for Connection with Current Source Output Circuit



Note

- Use the product with input signals of 24 VDC.
- Use the product with output signals of 12～24 VDC and 10 mA or less. When the current value exceeds 10 mA, connect the external resistor R_0 to reduce the current to 10 mA max.
- The maximum saturation voltage for the output signals is 3 V.
- Provide a distance of 100 mm or longer between the signal lines and power lines (power supply lines, motor lines).
  Do not run the signal lines in the same piping as power lines or bundle them with power lines.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

Driver Part Names and Functions (Series equipped with the pulse train input type of the RKII Series)



1 Signal Monitor Indication

◇LED Indication

Indication	Color	Function	Lighting Condition
POWER	Green	Power Supply Indication	When the main power supply is input
ALARM	Red	Alarm Indication	When a protective function is activated (blinking)

◇Alarm Details

Blink Count	Function	Operating Condition	Cancellation by ALM-RST Input	Motor Excitation
2	Main Circuit Overheating	When the temperature inside the driver exceeds 85˚C	Enable	No Holding
3	Overvoltage	When the internal voltage of the driver's inverter exceeds the permissible value	Disable	
4	Command Pulse Error	When an error has occurred for the command pulse value	Enable	
5	Overcurrent	When the motor, cable or driver output circuit is short-circuited	Disable	
6	Undervoltage	When the power supply has been cut off instantaneously When the voltage is short	Enable	
9	Electrolytic Capacitor Error	When the main circuit electrolytic capacitor is damaged	Disable	
	EEPROM Error	When the saved data for the driver is damaged		
Lighting	CPU Error	When the CPU malfunctions		

2 Function Switch (SW1)

Indication	No.	Function
R1/R2	1	Sets the step angle in combination with step angle setting switch.
2P/1P	2	Switches the pulse input mode between 1-pulse input mode and 2-pulse input mode. "2P": 2-pulse input mode "1P": 1-pulse input mode

3 Current Setting Switch

Indication	Switch Name	Function
RUN	Running Current Setting Switch	Sets the motor's operating current. The current value is set with a ratio (%) relative to the rated output current value.
STOP	Standstill Current Setting Switch	Sets the motor's standstill current. The current value is set with a ratio (%) relative to the rated output current value.

4 Step Angle Setting Switch

Indication	Function
STEP	You can use the function setting switch (SW1) in combination with other switches to set the minimum movement of the output table. The following shows the calculating formula of the minimum movement of the output table.

$$\text{Minimum movement of the output table [°]} = \frac{\text{Motor step angle [°]}}{18}$$

18: Gear Ratio

The following table shows the settable minimum movement of the output table.

Step Angle Setting Switch (STEP) Scale	Function Switch (SW1): For R1			Function Switch (SW1): For R2		
	Minimum Movement of Output Table [°]	Resolution of Motor [P/R]	Step Angle of Motor [°]	Minimum Movement of Output Table [°]	Resolution of Motor [P/R]	Step Angle of Motor [°]
0	0.04	500	0.72	0.1	200	1.8
1	0.02	1000	0.36	0.05	400	0.9
2	0.016	1250	0.288	$\frac{0.6}{18}$ (0.0333···)	600	0.6
3	0.01	2000	0.18	0.025	800	0.45
4	0.008	2500	0.144	$\frac{0.3}{18}$ (0.0166···)	1200	0.3
5	0.005	4000	0.09	0.0125	1600	0.225
6	0.004	5000	0.072	0.00625	3200	0.1125
7	0.002	10000	0.036	$\frac{0.06}{18}$ (0.00333···)	6000	0.06
8	0.0016	12500	0.0288	0.003125	6400	0.05625
9	0.001	20000	0.018	$\frac{0.05}{18}$ (0.00277···)	7200	0.05
A	0.0008	25000	0.0144	0.0025	8000	0.045
B	0.0005	40000	0.009	$\frac{0.03}{18}$ (0.00166···)	12000	0.03
C	0.0004	50000	0.0072	0.0015625	12800	0.028125
D	0.00032	62500	0.00576	0.00125	16000	0.0225
E	0.0002	100000	0.0036	0.00078125	25600	0.0140625
F	0.00016	125000	0.00288	0.0001	200000	0.0018

5 I/O Signals Connector (CN5)

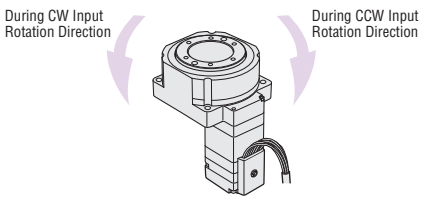
Indication	I/O	Pin No.	Description
READY	Output	1	Output when the driver is ready for operation.
ALM		2	Outputs the alarm status for the driver (normal close).
TIM		3	Output when the motor's excitation state is in the Step "0".
OUT-COM		4	Output common.
AWO	Input	5	Stops motor excitation.
CS		6	Switches the step angle.
FREE		7	Stops motor excitation.
ALM-RST		8	Reset current alarm.
IN-COM		9	Input common.

6 Connector for Pulse Input (CN4)

Indication	Pin No.	Description
CW (PLS)+24 V	1	CW Pulse Input (Pulse Input) [+24 V]
CW (PLS)+5 V	2	CW Pulse Input (Pulse Input) [+5 V or line driver]
CW (PLS)−	3	
CCW (DIR)+24 V	4	CCW Pulse Input (Rotation Direction Input) [+24 V]
CCW (DIR)+5 V	5	CCW Pulse Input (Rotation Direction Input) [+5 V or line driver]
CCW (DIR)−	6	

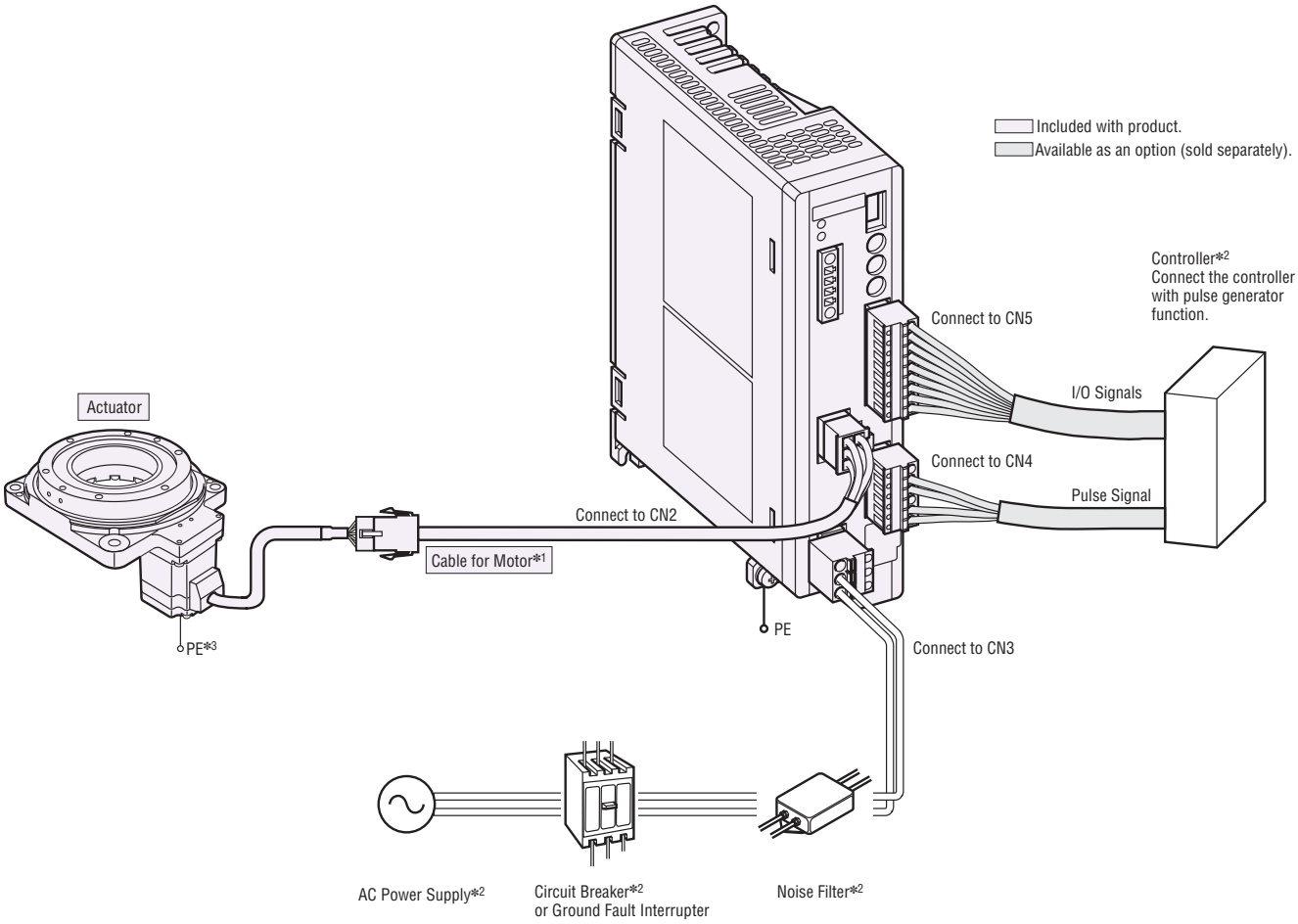
Note

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



Connection Diagram

◇Connections with Peripheral Equipment



*1 Products are available with a cable for motor and driver (1 m, 2 m or 3 m), and also without the cable.
If you need cables longer than 3 m or flexible cables, select appropriate cables from the accessories (sold separately).
Keep the wiring distance between the motor and driver to 20 m or less.

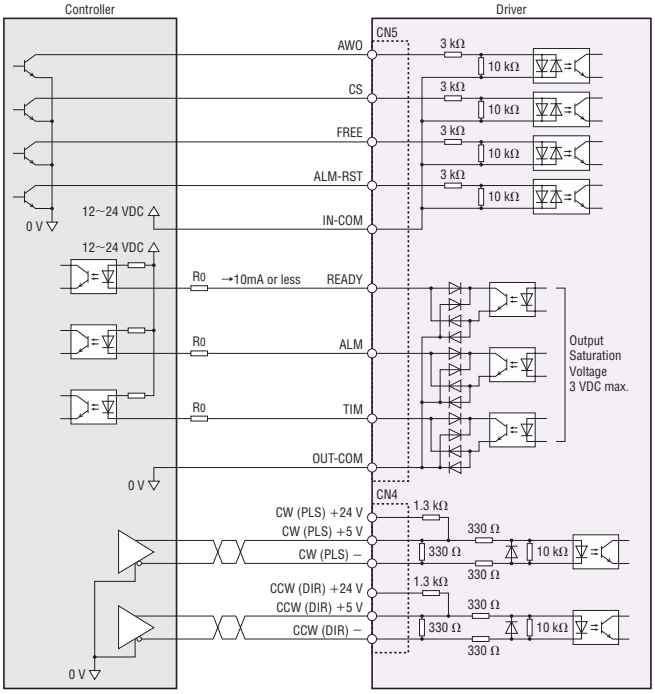
*2 Not supplied

*3 Ground to the PE terminal of the motor or at the plate used to install the motorized actuator.

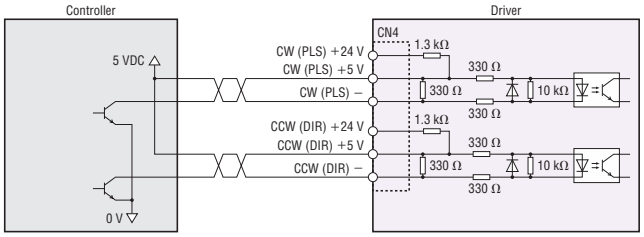
◇Connecting to the Host Controller

•Connection Diagram for Connection with Current Sink Output Circuit

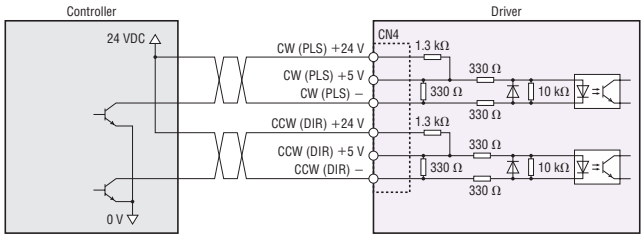
When the Pulse Input is the Line Driver



When the Pulse Input is Open Collector 5 V



When the Pulse Input is Open Collector 24 V

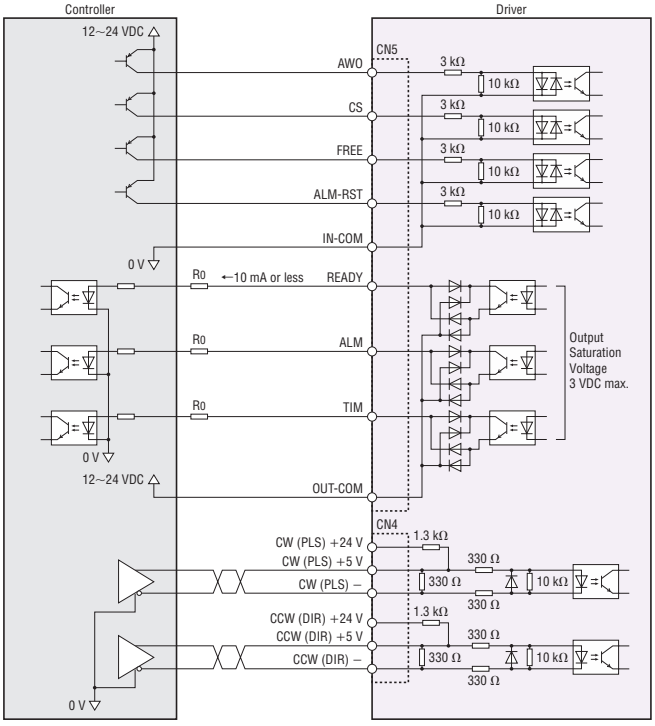


Note

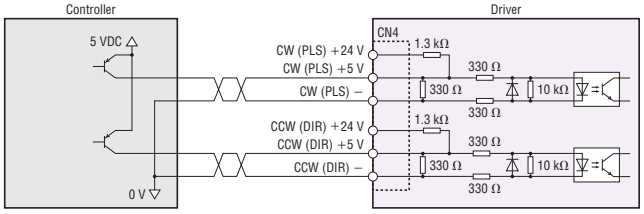
- Use the product with input signals of 12~24 VDC.
- Use the product with output signals of 12~24 VDC and 10 mA or less. When the current value exceeds 10 mA, connect the external resistor R_0 to reduce the current to 10 mA max.
- The maximum saturation voltage for the output signals is 3 V.
- Provide a distance of 100 mm or longer between the signal lines and power lines (power supply lines, motor lines).
  Do not run the signal lines in the same piping as power lines or bundle them with power lines.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

•Connection Diagram for Connection with Current Source Output Circuit

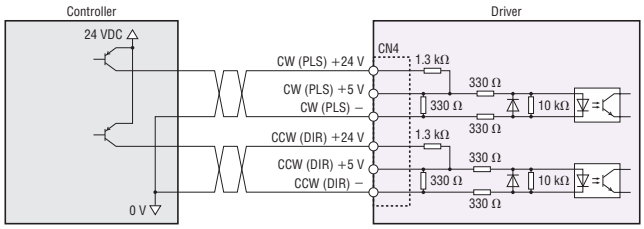
When the Pulse Input is the Line Driver



When the Pulse Input is Open Collector 5 V



When the Pulse Input is Open Collector 24 V



Note

- Use the product with input signals of 12~24 VDC.
- Use the product with output signals of 12~24 VDC and 10 mA or less. When the current value exceeds 10 mA, connect the external resistor R_0 to reduce the current to 10 mA max.
- The maximum saturation voltage for the output signals is 3 V.
- Provide a distance of 100 mm or longer between the signal lines and power lines (power supply lines, motor lines).
  Do not run the signal lines in the same piping as power lines or bundle them with power lines.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

Accessories (Sold separately)

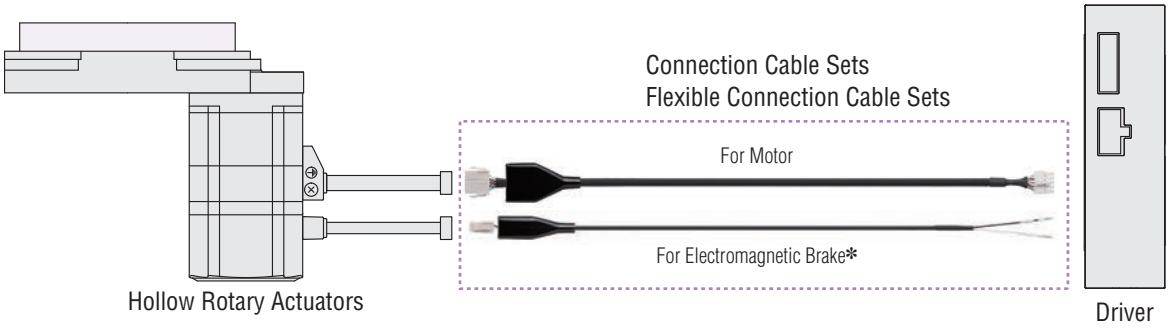
Connection Cable Sets, Flexible Connection Cable Sets Extension Cable Sets, Flexible Extension Cable Sets

The **DGII** Series are available with a cable for motor and driver (1 m, 2m or 3 m), and also without the cable.
If the distance between the motor and driver is extended to 3 m or longer, a connection cable set or extension cable set must be used.
Use a flexible connection cable set or flexible extension cable set if the cable will be bent repeatedly.

System Configuration

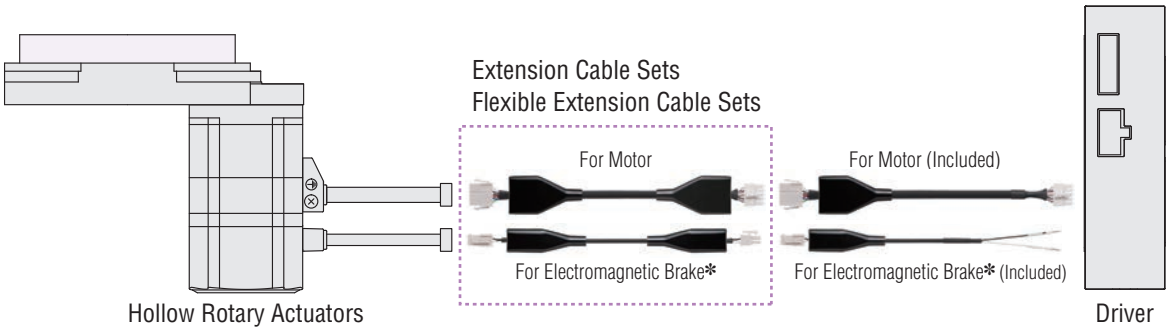
When Connecting the Motor and Driver without Using an Included Cable

Use a connection cable set.
Use a flexible connection cable set if the cable will be bent.



When Extending the Distance between the Motor and the Driver Using an Included Cable

Use an extension cable set and connect it to the included cable.
Use a flexible extension cable set if the cable will be bent.



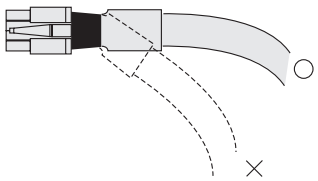
*Cables for electromagnetic brake to be used with the electromagnetic brake type.

Note

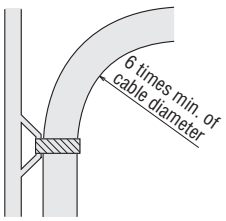
- When using an extension cable set or a flexible extension cable set to connect with a cable included with the **DGII** Series, keep the overall cable length as follows:
  Equipped with **AR** Series : Keep the overall cable length 30 m max.
  Equipped with **RKII** Series : Keep the overall cable length 20 m max.

Notes on Use of Flexible Cable

①Do not allow the cable to bend at the cable connector.

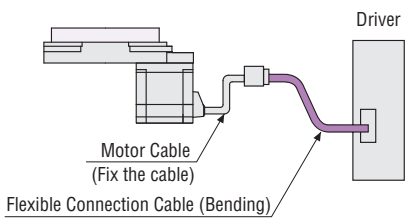


For the bending radius, use at 6 times min. of the cable diameter.

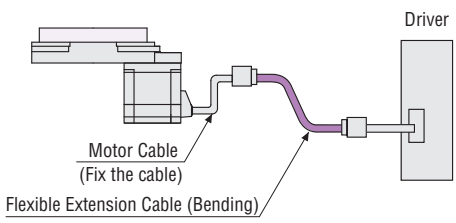


③The cable from the actuator and the included cable are not for bending. If the motor cable is to be bent, bend it at the flexible cable.

- **Flexible Connection Cable**



- **Flexible Extension Cable**



Connection Cable Sets, Flexible Connection Cable Sets (Equipped with AR Series)

Types

Connection Cable Sets

◇AC Power Supply Input
For Single Shaft and Double Shaft

Cable for Motor

Product Name	Length L (m)
CC010VAF	1
CC020VAF	2
CC030VAF	3
CC050VAF	5
CC070VAF	7
CC100VAF	10
CC150VAF	15
CC200VAF	20
CC300VAF	30

◇AC Power Supply Input
For Electromagnetic Brake Type

Cable for Motor

Cable for Electromagnetic Brake

Product Name	Length L (m)
CC010VAFB	1
CC020VAFB	2
CC030VAFB	3
CC050VAFB	5
CC070VAFB	7
CC100VAFB	10
CC150VAFB	15
CC200VAFB	20
CC300VAFB	30

◇DC Power Supply Input
For Single Shaft and Double Shaft

Cable for Motor

Product Name	Length L (m)
CC010VA2F2	1
CC020VA2F2	2
CC030VA2F2	3
CC050VA2F2	5
CC070VA2F2	7
CC100VA2F2	10
CC150VA2F2	15
CC200VA2F2	20
CC300VA2F2	30

Flexible Connection Cable Set

◇AC Power Supply Input
For Single Shaft and Double Shaft

Cable for Motor

Product Name	Length L (m)
CC010VAR	1
CC020VAR	2
CC030VAR	3
CC050VAR	5
CC070VAR	7
CC100VAR	10
CC150VAR	15
CC200VAR	20
CC300VAR	30

◇AC Power Supply Input
For Electromagnetic Brake Type

Cable for Motor

Cable for Electromagnetic Brake

Product Name	Length L (m)
CC010VARB	1
CC020VARB	2
CC030VARB	3
CC050VARB	5
CC070VARB	7
CC100VARB	10
CC150VARB	15
CC200VARB	20
CC300VARB	30

◇DC Power Supply Input
For Single Shaft and Double Shaft

Cable for Motor

Product Name	Length L (m)
CC010VA2R2	1
CC020VA2R2	2
CC030VA2R2	3
CC050VA2R2	5
CC070VA2R2	7
CC100VA2R2	10
CC150VA2R2	15
CC200VA2R2	20
CC300VA2R2	30

Extension Cable Sets, Flexible Extension Cable Sets (Equipped with AR Series)

Types

Extension Cable Set

◇AC Power Supply Input
For Single Shaft and Double Shaft

Cable for Motor

Product Name	Length L (m)
CC010VAFT	1
CC020VAFT	2
CC030VAFT	3
CC050VAFT	5
CC070VAFT	7
CC100VAFT	10
CC150VAFT	15
CC200VAFT	20

◇AC Power Supply Input
For Electromagnetic Brake Type

Cable for Motor

Cable for Electromagnetic Brake

Product Name	Length L (m)
CC010VAFBT	1
CC020VAFBT	2
CC030VAFBT	3
CC050VAFBT	5
CC070VAFBT	7
CC100VAFBT	10
CC150VAFBT	15
CC200VAFBT	20

◇DC Power Supply Input
For Single Shaft and Double Shaft

Cable for Motor

Product Name	Length L (m)
CC010VA2F2	1
CC020VA2F2	2
CC030VA2F2	3
CC050VA2F2	5
CC070VA2F2	7
CC100VA2F2	10
CC150VA2F2	15
CC200VA2F2	20

Flexible Extension Cable Set

◇AC Power Supply Input
For Single Shaft and Double Shaft

Cable for Motor

Product Name	Length L (m)
CC010VART	1
CC020VART	2
CC030VART	3
CC050VART	5
CC070VART	7
CC100VART	10
CC150VART	15
CC200VART	20

◇AC Power Supply Input
For Electromagnetic Brake Type

Cable for Motor

Cable for Electromagnetic Brake

Product Name	Length L (m)
CC010VARBT	1
CC020VARBT	2
CC030VARBT	3
CC050VARBT	5
CC070VARBT	7
CC100VARBT	10
CC150VARBT	15
CC200VARBT	20

◇DC Power Supply Input
For Single Shaft and Double Shaft

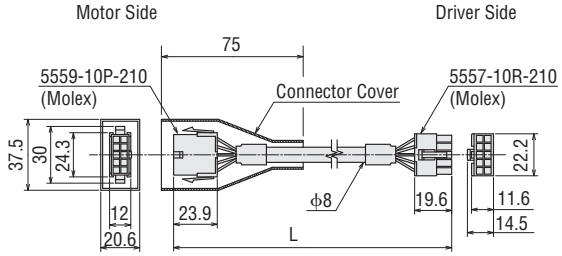
Cable for Motor

Product Name	Length L (m)
CC010VA2R2	1
CC020VA2R2	2
CC030VA2R2	3
CC050VA2R2	5
CC070VA2R2	7
CC100VA2R2	10
CC150VA2R2	15
CC200VA2R2	20

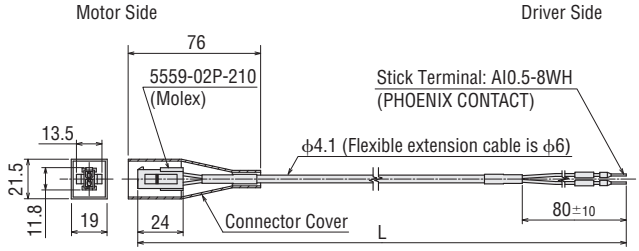
Dimensions (Unit = mm)

Connection Cable

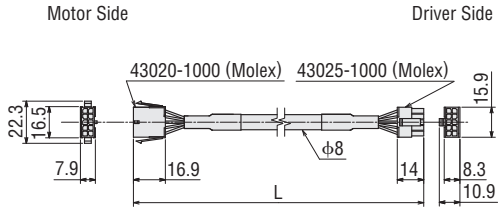
◇Cables for AC Power Supply Input Motor



◇Cables for AC Power Supply Input Electromagnetic Brake

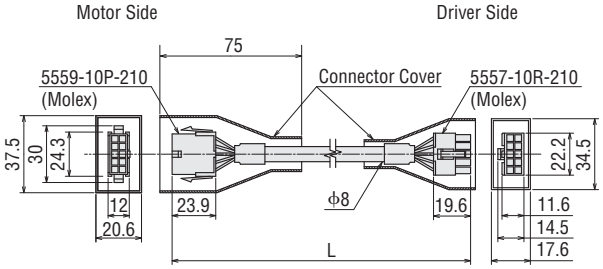


◇Cables for DC Power Supply Input Motor

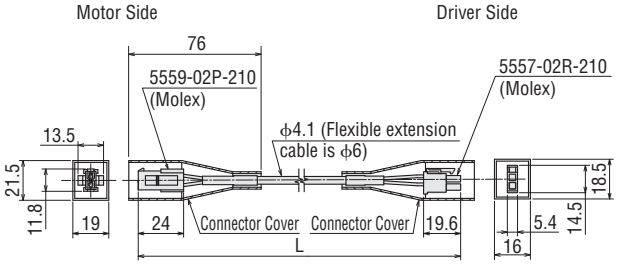


Extension Cable

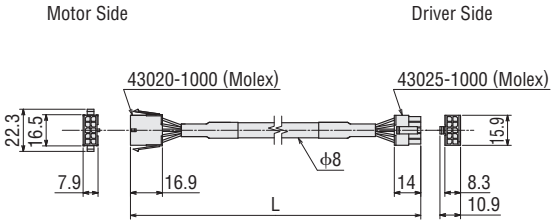
◇Cables for AC Power Supply Input Motor



◇Cables for AC Power Supply Input Electromagnetic Brake



◇Cables for DC Power Supply Input Motor



Connection Cable Sets, Flexible Connection Cable Sets (Equipped with RKII Series)

Types

Connection Cable Sets

◇For Single Shaft

Cable for Motor

Product Name	Length L (m)
CC010VPF	1
CC020VPF	2
CC030VPF	3
CC050VPF	5
CC070VPF	7
CC100VPF	10
CC150VPF	15
CC200VPF	20

Flexible Connection Cable Sets

◇For Single Shaft

Cable for Motor

Product Name	Length L (m)
CC010VPR	1
CC020VPR	2
CC030VPR	3
CC050VPR	5
CC070VPR	7
CC100VPR	10
CC150VPR	15
CC200VPR	20

Extension Cable Sets, Flexible Extension Cable Sets (Equipped with RKII Series)

Types

Extension Cable Sets

◇For Single Shaft

Cable for Motor

Product Name	Length L (m)
CC010VPF	1
CC020VPF	2
CC030VPF	3
CC050VPF	5
CC070VPF	7
CC100VPF	10
CC150VPF	15

Flexible Extension Cable Sets

◇For Single Shaft

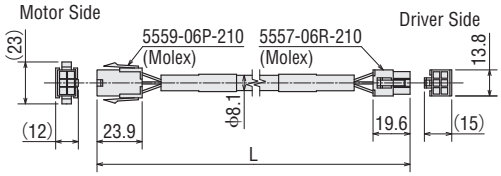
Cable for Motor

Product Name	Length L (m)
CC010VPR	1
CC020VPR	2
CC030VPR	3
CC050VPR	5
CC070VPR	7
CC100VPR	10
CC150VPR	15

Dimensions (Unit = mm)

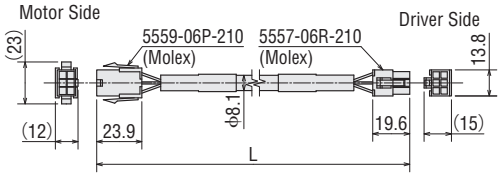
Connection Cable

◇Cable for Motor



Extension Cable

◇Cable for Motor



Driver Cable

Equipped with AR Series General-Purpose Cables

This shielded cable has a half-pitch connector at one end of the cable for easy connecting to the driver.

Note

- Note that as the length of the pulse line between the driver and controller increases, the maximum transmission frequency decreases.
- Install a connector that matches the controller you are using to the other end of the cable.

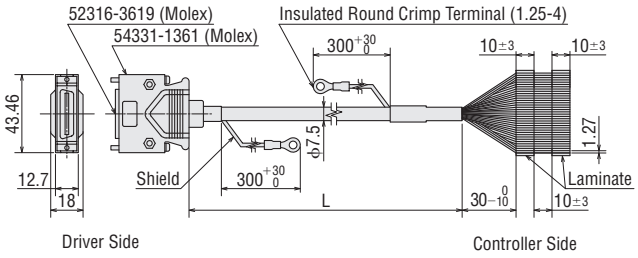
Types

Type	Product Name	Applicable	Length L (m)
Straight	**CC36D1E**	Pulse train input type CN5 (36 pins)	1
	CC36D2E		2
Right Angle	**CC36D1AE**		1
	CC36D2AE		2

Dimensions (Unit = mm)

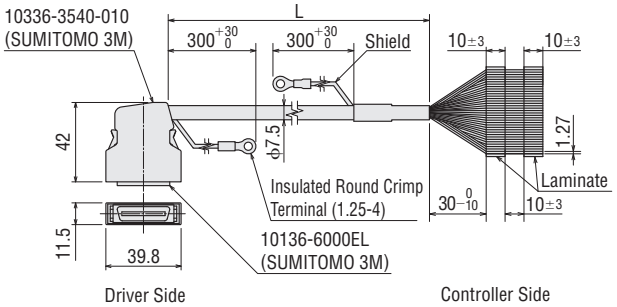
CC36D1E, **CC36D2E**

Conductor: AWG28 (0.08 mm^2)



CC36D1AE, **CC36D2AE**

Conductor: AWG28 (0.08 mm^2)



Equipped with RKII Series General-Purpose Cables

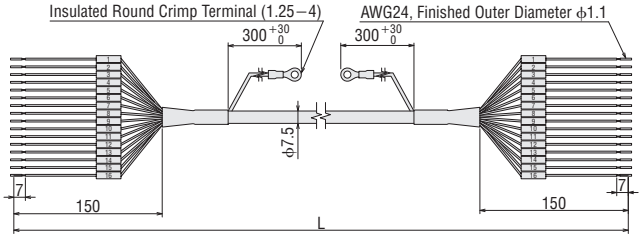
General-purpose multi-core cables provide convenient connection between a driver and programmable controller.

Types

Product Name	Length L (m)
CC16D005B-1	0.5
CC16D010B-1	1.0
CC16D015B-1	1.5
CC16D020B-1	2.0

Dimensions (Unit = mm)

CC16D005B-1, **CC16D010B-1**,
CC16D015B-1, **CC16D020B-1**,



Equipped with **AR** Series Connector – Terminal Block Conversion Unit

CC36T10E

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

- Includes a signal name plate for easy, one-glance identification of driver signal names
- DIN-rail Installable
- Cable length: 1 m

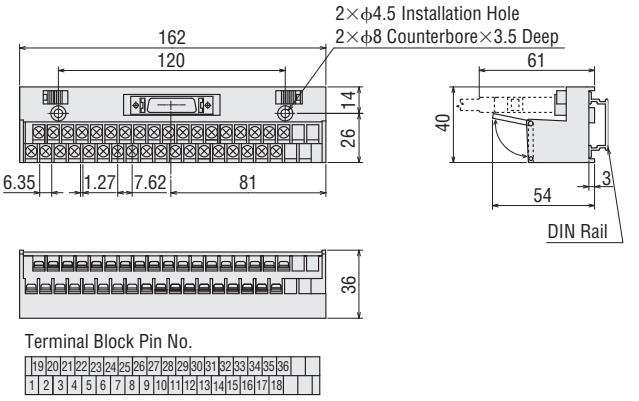
Type

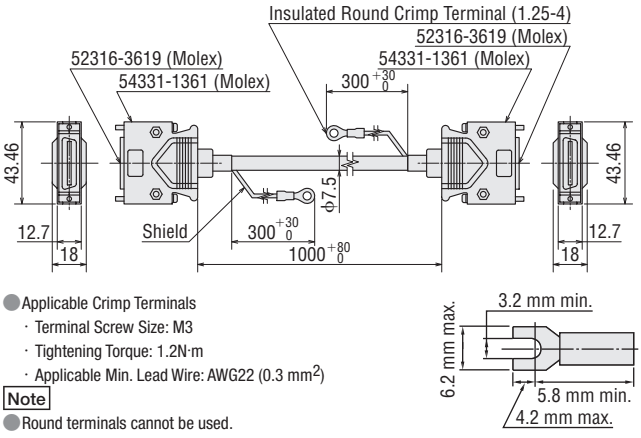
Product Name	Applicable	Length (m)
CC36T10E	Pulse train input type CN5 (36 pins)	1

Dimensions (Unit = mm)

CC36T10E

2D CAD B991





- Applicable Crimp Terminals
  - Terminal Screw Size: M3
  - Tightening Torque: 1.2N·m
  - Applicable Min. Lead Wire: AWG22 (0.3 mm^2)

Note

- Round terminals cannot be used.

Equipped with **RKII** Series Connector – Terminal Block Conversion Unit

CC50T10E

The **EMP** Series half-pitch connector can be connected with the terminal block.

- Includes a signal name plate for easy, one-glance identification of signal names
- DIN-rail Installable

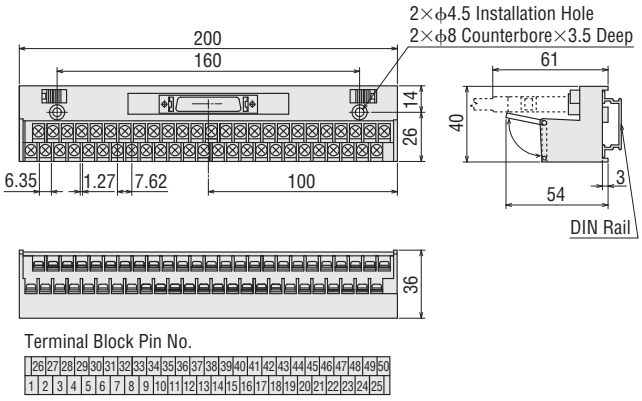
Type

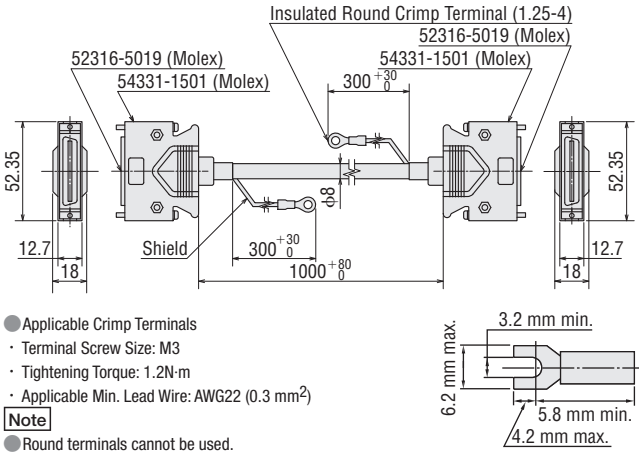
Product Name	Applicable	Length (m)
CC50T10E	**EMP** Series	1

Dimensions (Unit = mm)

CC50T10E

2D CAD B992





- Applicable Crimp Terminals
  - Terminal Screw Size: M3
  - Tightening Torque: 1.2N·m
  - Applicable Min. Lead Wire: AWG22 (0.3 mm^2)

Note

- Round terminals cannot be used.

Equipped with AR/RKII Series
RS-485 Communication Cables

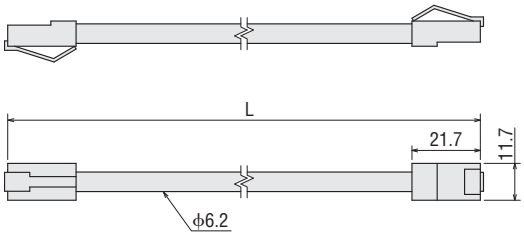
This cable is used to link a driver to another driver in multi-axis operations.
It also connects the network converter to the driver.

Types

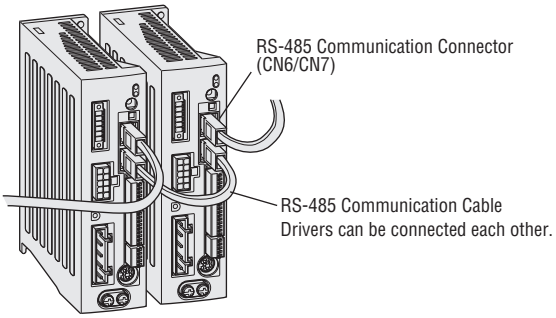
Product Name	Length L (m)	Applicable
CC001-RS4	0.1	Equipped with **AR** Series, DC power supply input
CC002-RS4	0.25	Equipped with **AR** Series, DC power supply input Equipped with **AR** Series, AC power supply input Equipped with **RKII** Series

Dimensions (Unit = mm)

CC001-RS4, **CC002-RS4**



● Connection example (When connecting the driver for the **AR** Series AC power supply with the driver)



Equipped with AR/RKII Series
FLEX Communication Cable

This cable is convenient for connecting to other equipment when controlling FLEX-compatible products by Modbus through RS-485.
The following types are provided: the general-purpose type suitable for connecting a variety of devices including a PLC panel by using one end of a cable as a discrete wire with a crimp terminal; and the exclusive type equipped with a connector that can be connected to a programmable indicator (touch panel) manufactured by Digital Electronics Corporation or Hakko Electronics Co., Ltd.

General-Purpose Type

Exclusive Type

Types

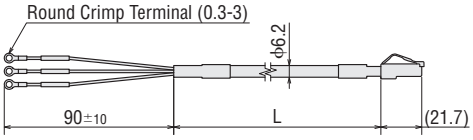
Product Line	Product Name	Length L (m)
General-Purpose Type	**CC02FLT**	2
	CC05FLT	5
Exclusive Type Digital Electronics Corporation GP3000 Series For COM1	**CC02FLT2**	2
	CC05FLT2	5
Exclusive Type Digital Electronics Corporation GP3000 Series For COM2*1	**CC02FLT3**	2
	CC05FLT3	5
Exclusive Type Hakko Electronics Co., Ltd. MONITOUCH For V8 Series*2	**CC02FLT4**	2
	CC05FLT4	5

*1 To use the product for COM2, the online adapter CA4-ADPONL-01, an accessory provided by Digital Electronics Corporation, is separately required.
*2 Except for V808iCH/V808CH.

Dimensions (Unit = mm)

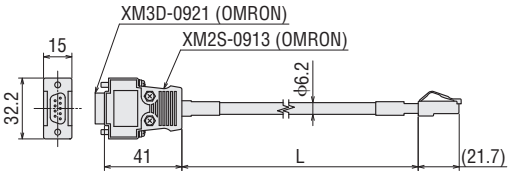
General-Purpose Type

CC02FLT, **CC05FLT**

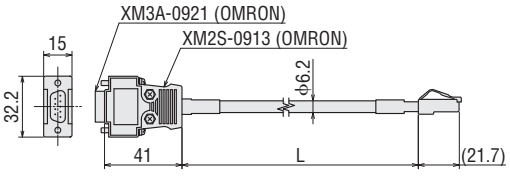


Exclusive Type

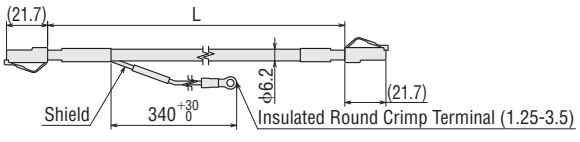
CC02FLT2, **CC05FLT2**



CC02FLT3, **CC05FLT3**

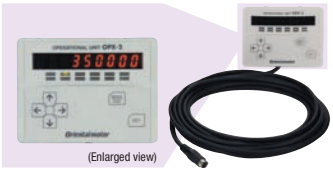


CC02FLT4, **CC05FLT4**



Equipped with AR/RKII Series Control Module

This enables you to perform operations such as setting the driver's internal parameters and setting or changing the data. It can also be used for operations such as speed and I/O monitoring, and teaching.



Type

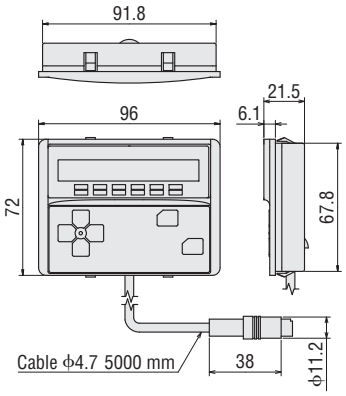
Product Name
OPX-2A

Dimensions (Unit = mm)

Control Module

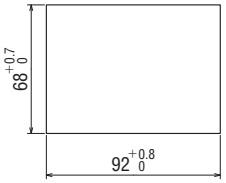
Mass: 0.25 kg

2D CAD B453



Panel Cut-Out

(Installation plate thickness 1~3 mm)



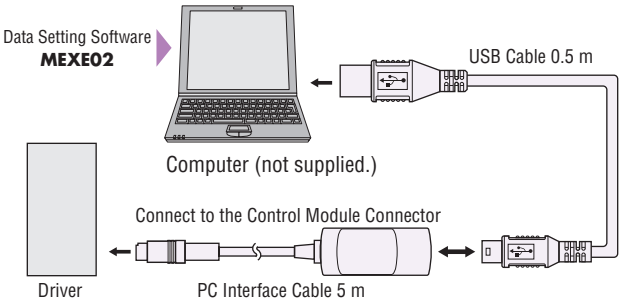
Equipped with AR/RKII Series Data Setting Software Communication Cable

This communication cable is required for connecting with the computer on which the data setting software is installed.

Type

Product Name
CC05IF-USB

Computer and Driver Connection



Note

- To connect to a computer, you must install a dedicated driver.

Data Setting Software MEXE02

Data Setting Software can be downloaded from the Oriental Motor website.

CD-ROMs are also available.

Visit our website, or contact the nearest Oriental Motor sales office.

http://www.orientalmotor.com.sg/

◇Operating System (OS)

For the following operating systems, the 32 bit (x86) editions and 64 bit (x64) editions are supported.

- Microsoft Windows XP Service Pack 3*
- Microsoft Windows Vista Service Pack 2
- Microsoft Windows 7 Service Pack 1
- Microsoft Windows 8
- Microsoft Windows 8.1

*For the 64-bit (x64) version, Service Pack 2 is used.

◇PC

Recommended CPU*1	Intel Core processor 2 GHz or faster (OS must be supported)
Display	Video adapter and monitor with a minimum resolution of XGA (1024 × 768)
Recommended Memory*1	32 bit (x86) edition: 1 GB or more 64 bit (x64) edition: 2 GB or more
Hard Disk*2	Free disk space of at least 30 MB
USB Port	USB1.1 1 port
Disk Device	CD-ROM drive (for installation)

*1 The system requirements for the OS must be met.

*2 **MEXE02** requires Microsoft .NET Framework 4 Client Profile. If it is not installed, it will be installed automatically. The following additional free space may be required.
32 bit (x86) edition: 600 MB
64 bit (x64) edition: 1.5 GB or more

- Windows and Windows Vista are registered trademarks of Microsoft Corporation in the United States and other countries.

Note

- Depending on your system environment, the required memory and hard disk may vary.

Equipped with AR/RKII Series
Home Sensor Sets

A home sensor set, which consists of a photomicro sensor, robot cable type connector, sensor installation bracket, shield plate and installation screws, is provided to facilitate easy return-to-home operation.
Since the sensor set comes with all the parts required for the return-to-home operation, you will spend less time designing, fabricating and procuring parts related to sensor installation. Installation is very easy, so you can start using the sensor right away.

Types

Product Name	Sensor Output	Applicable
PADG-SA	NPN	**DG60-AR**
PADG-SAY	PNP	
PADG-SB	NPN	**DG85R-AR**, **DG85-RKS** **DG130R-AR**, **DG130-RKS** **DG200R-AR**
PADG-SBY	PNP	

PADG-SB

Specifications

NPN Type

Sensor Product Name	**DG60-AR**: EE-SX672A (Made by OMRON) **DG85R-AR**, **DG85-RKS**, **DG130R-AR**, **DG130-RKS**, **DG200R-AR**: EE-SX673A (Made by OMRON)
Power Supply Voltage	5～24 VDC ±10%　Ripple (P-P)　10% max.
Current Consumption	35 mA or less
Control Output	NPN Open-Collector Output　5～24 VDC　100 mA max. Residual voltage 0.8 V max.　(At load current 100 mA)
Indicator LED	Detection Display (Red)
Sensor Logic	Normally Open/Normally Closed (Selectable, depending on connection)

PNP Type

Sensor Product Name	**DG60-AR**: EE-SX672R (Made by OMRON) **DG85R-AR**, **DG85-RKS**, **DG130R-AR**, **DG130-RKS**, **DG200R-AR**: EE-SX673R (Made by OMRON)
Power Supply Voltage	5～24 VDC ±10%　Ripple (P-P)　10% max.
Current Consumption	30 mA or less
Control Output	PNP Open-Collector Output　5～24 VDC　50 mA max. Residual Voltage 1.3 V max.　(At load current 50 mA)
Indicator LED	Detection Display (Red)
Sensor Logic	Normally Open/Normally Closed (Selectable, depending on connection)

Installing the Home Sensor Set

Be aware of the following points when installing the accessory home sensor set.

- Set the operating conditions so that the operating ambient temperature stays at 40˚C or less and the surface temperature of the actuator motor stays at 90˚C or less.
- When performing return-to-home operation using the back shaft of the motor, a separate sensor, installation bracket and other necessary parts should be provided.

When Extending the Sensor Line

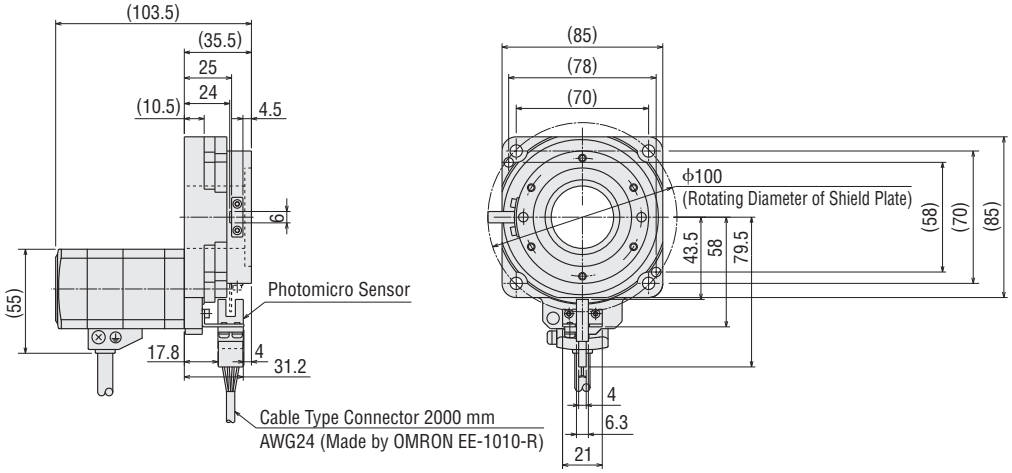
Use a shielded cable when extending the sensor line by a minimum of 2 m. The shielded cable must be grounded.

Home Sensor Set Installation Dimensions (Unit = mm)

Closed-loop Type

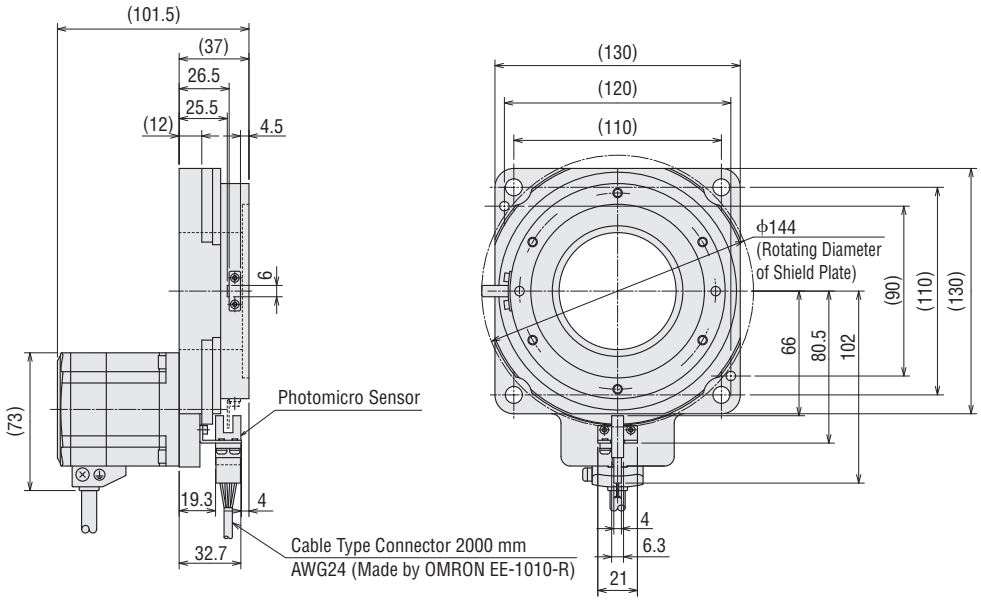
◇DG85R-AR

The following shows the dimensions when the home sensor set is installed in the Single Shaft.
For double shaft, also check the shape of the motor.
Actuator Product Name: DGM85R-ARAC
2D CAD D2864



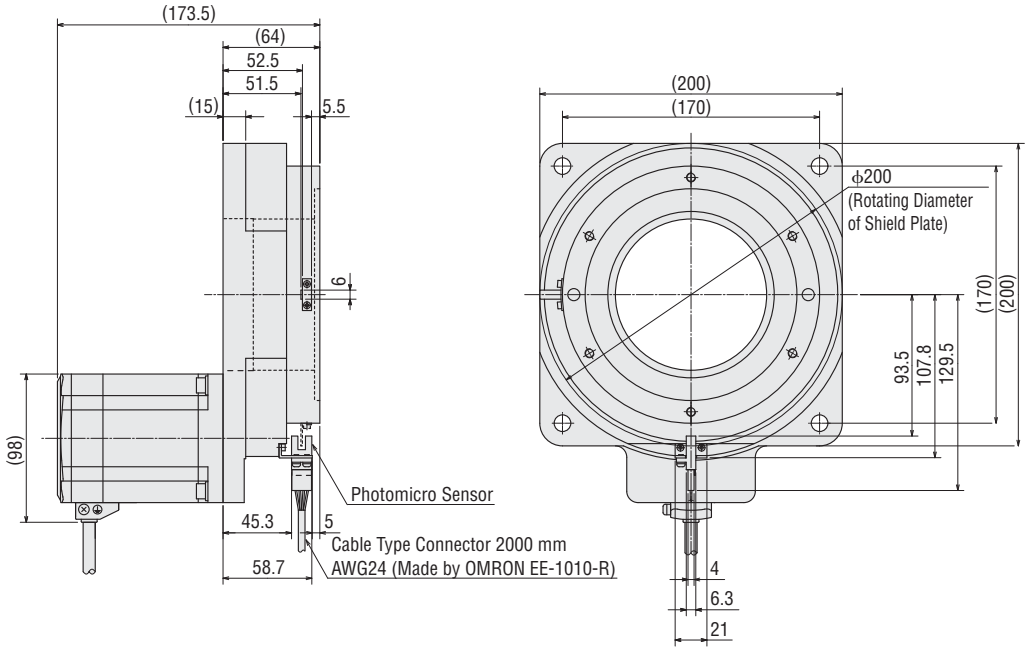
◇DG130R-AR

The following shows the dimensions when the home sensor set is installed in the Single Shaft.
For the Double Shaft or a product with the electromagnetic brake, also check the shape of the motor.
Actuator Product Name: DGM130R-ARAC
2D CAD D2865



◇DG200R-AR

The following shows the dimensions when the home sensor set is installed in the Single Shaft.
For the Double Shaft or a product with the electromagnetic brake, also check the shape of the motor.
Actuator Product Name: DGM200R-ARAC
2D CAD D2866



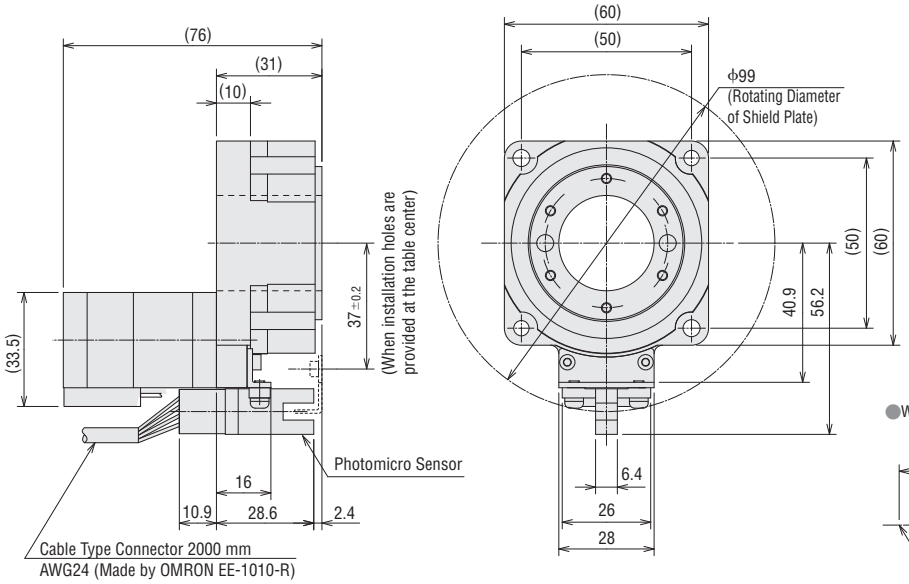
●Open-loop Type

◇DG60-AR

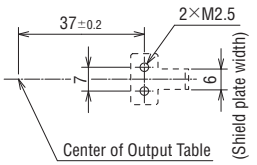
The following shows the dimensions when the home sensor set is installed in the Single Shaft.
For Double Shaft, also check the shape of the motor.

Actuator Product Name: DGM60-ARAK

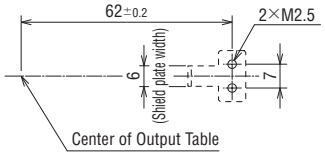
2D CAD D2863



●When installation holes are provided at the table center



●When installation holes are provided at a distance from the table center

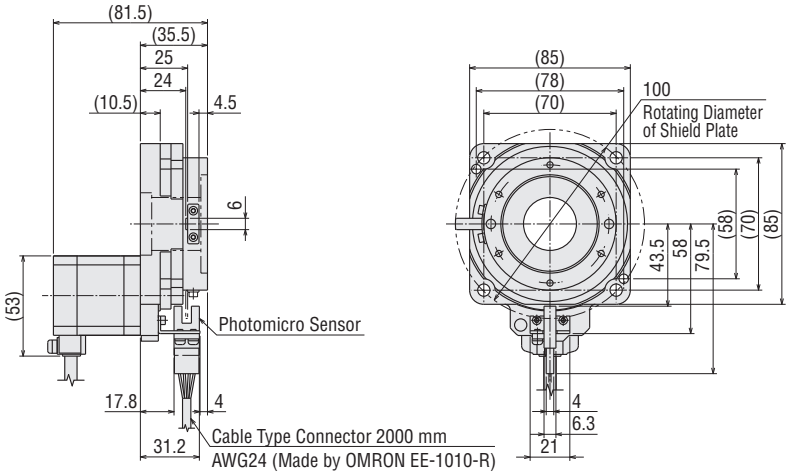


[Installation plate cut-out dimensions for shield plate]

◇DG85-RKS

Actuator Product Name: DGM85-5PKEAC

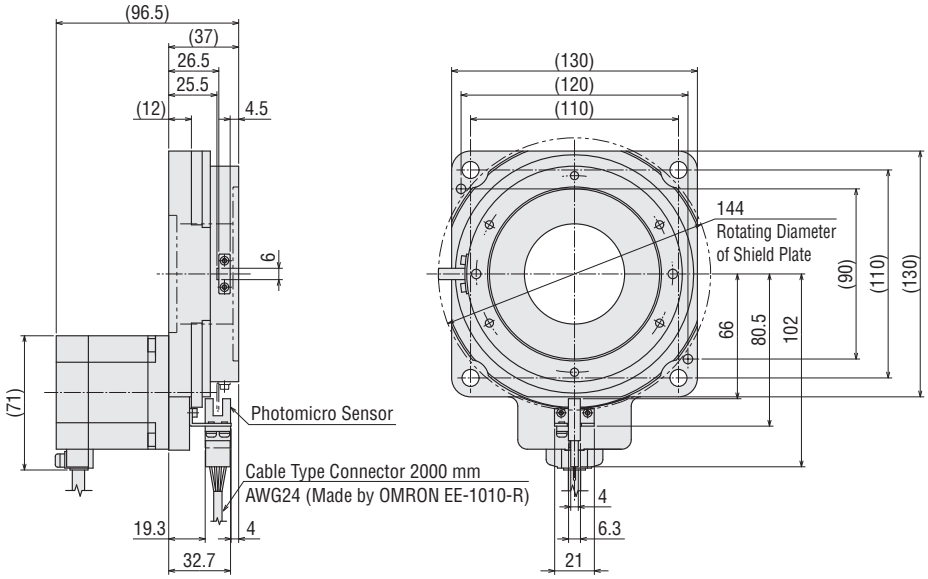
2D CAD D4487



◇DG130-RKS

Actuator Product Name: DGM130-5PKEAC

2D CAD D4488

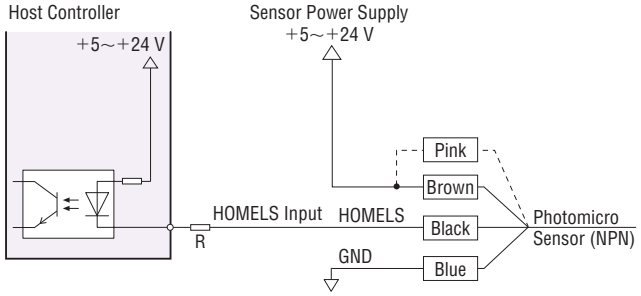


Wiring the Sensor

NPN Type

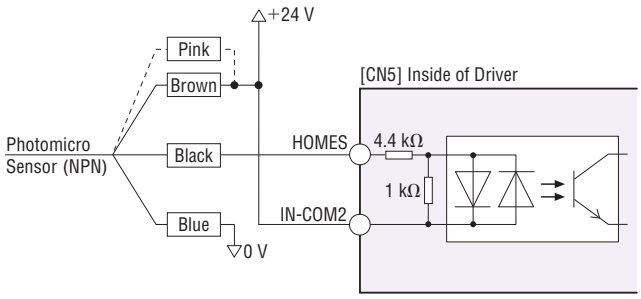
Keep the power-supply voltage between 5 VDC and 24 VDC. In addition, Keep the current value at 100 mA or less.
When the current exceeds 100 mA, connect the external resistor R.
The GND of sensor power and power of external controller should be connected together.

〈Pulse Train Input Type〉



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

〈Built-in Positioning Function Type〉

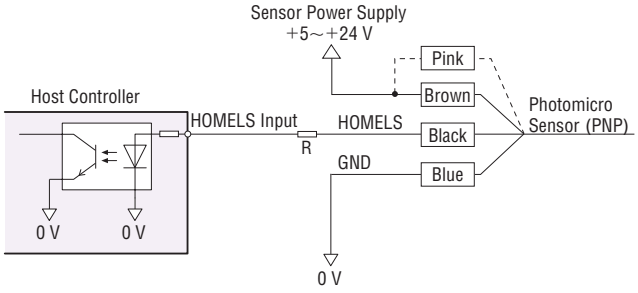


--- Connect the pink lead wire to the brown lead wire when the sensor logic is N.C. (normally closed).
The pink lead wire is not connected when the sensor logic is N.O. (normally open).

PNP Type

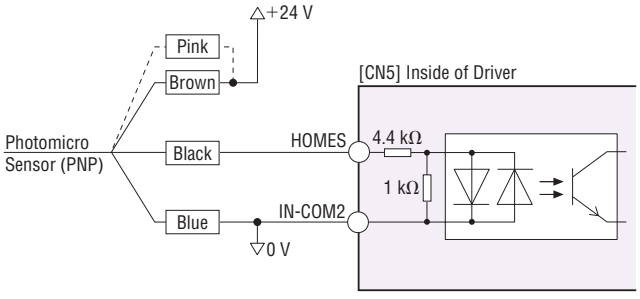
Keep the power-supply voltage between 5 VDC and 24 VDC. Keep the current value at 50 mA or less.
When the current exceeds 50 mA, connect the external resistor R.

〈Pulse Train Input Type〉



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

〈Built-in Positioning Function Type〉



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

Equipped with AR/RKII Series
Installation Pedestal for DG Series

This is a useful installation pedestal that enables the DGII Series to be used as a direct drive motor. Applications that require height and installation from the side can also be performed, expanding the range of available operations.

Types

Product Name	DGII Series Applicable Products	
	Type	Product Name
MDG60A	Single Shaft	**DG60-ARA**
MDG60B	Single Shaft/Double Shaft	**DG60-ARA** **DG60-ARB**
MDG85A	Single Shaft	**DG85R-ARA** **DG85-RKSA**
MDG85B	Single Shaft/Double Shaft	**DG85R-ARA** **DG85R-ARB** **DG85-RKSA**
MDG130A	Single Shaft	**DG130R-ARA** **DG130-RKSA**
MDG130B	Single Shaft/Double Shaft with electromagnetic brake	**DG130R-ARA** **DG130R-ARB** **DG130R-ARM** **DG130-RKSA**

● The product names of the applicable products are described with text by which the product name can be identified.

The following items are included in each product.
Hexagon socket head screws for actuator assembly, positioning pins, bands (for cable clamping), band bases, set screws for band bases

Equipped with AR Series
Battery Set

Connect it when used as the absolute backup system.

Type

Product Name	Application
BAT01B	Equipped with **AR** Series Built-in positioning function type

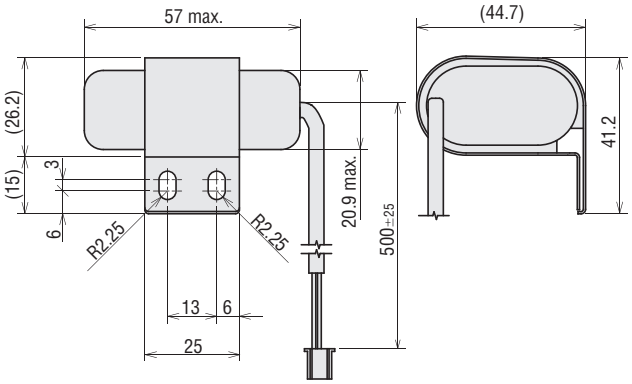
Specifications

Item	Description
Battery Type	Sealed Nickel-Hydrogen Battery
Nominal Voltage	2.4 V
Rated Capacity	1900 mAh
Expected Life	Approx. 4 years*1
Charge Time	32 hours*1
Data Retention Period	Approx. 360 hours (Approx. 15 days)*1*2
Operating Ambient Temperature	0～+40˚C (Non-freezing)
Operating Ambient Humidity	45～85% (Non-Condensing)

*1 At an ambient temperature of 20˚C.
*2 After the power supply is cut OFF with the battery fully charged.

Dimensions (Unit = mm)

Mass: 0.1 kg
2D CAD B560



Equipped with AR Series
Regeneration Unit

During vertical drive (gravitational operation) or sudden start/stop in high inertia, an external force causes the motor to rotate and function as a power generator. When the regenerative power exceeds the driver's regenerative power absorption capacity, it may cause damage to the motor. In such a case, the regeneration unit is connected to the driver to convert regenerative energy into thermal energy for dissipation.

Type

Product Name	Applicable Product
RGB100	Equipped with **AR** Series, AC power supply input

Specifications

Item	Description
Continuous Regenerative Power	50 W
Resistance Value	150 Ω
Thermostat Operating Temperature	Open: 150±7˚C Close: 145±12˚C (Normally closed)
Thermostat Electrical Rating	120 VAC, 4 A 30 VDC, 4 A (Min. current 5 mA)

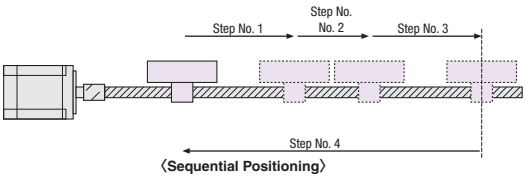
● Install the regeneration unit in the location that has the same heat radiation capability as the heat sink (Material: aluminum, 350 × 350 mm, 3 mm thick).

Controller (Sold separately)

Stored-Data Type Controllers
SG8030J

All operations including data setting can easily be performed using the 4 touch pads on the panel.
In addition, the number of signal lines is reduced to a minimum for easy operation and connection.

- Jerk Limiting Control Function Suppresses Motor Drive Vibration
- Step Sequential Positioning Operation and External Signal Operation Possible
- Maximum Oscillation Frequency 200 kHz
- 1-Pulse Output Signal/2-Pulse Output Signal Mode Select Possible



〈Sequential Positioning〉


For DIN Rail Installation


Recessed Installation Model

Types

Product Line	Product Name
For DIN Rail Installation	**SG8030J-D**
Recessed Installation Model	**SG8030J-U**

Stored-Program Type Controllers
EMP400 Series

In addition to enhanced oscillation functions that only a motor manufacturer can provide, this series includes I/O control functions and sequence functions that make programming sequential operations possible.

- Allowing the Input of 32 Sequence Programs
- Various Operating Patterns Can be Achieved
- Teaching Function
  Using the accessory **OP300** control module, adjustment of traveling amounts through teaching and monitoring of the current position is possible.
- Dedicated Software is Unnecessary


For Single Shaft


For Dual Shaft


Control Module (Sold separately)

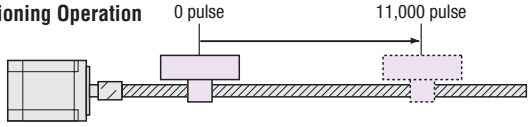
Types

Product Name	Number of Axis	Connector
EMP401-1	Single Shaft	–
EMP401-2		Included
EMP402-1	Dual Shaft	–
EMP402-2		Included

- Control Module **OP300**

Sample Program

Positioning Operation



[1] VS1␣500 : Startup speed at 500 Hz
[2] V1␣1000 : Operating speed at 1,000 Hz
[3] T1␣30.0 : Acceleration rate at 30.0 ms/kHz
[4] D1␣+11000 : 11,000 pulses in the CW direction of movement
[5] INC1 : Execution of relative positioning operation

Network Converters

The network converter converts host communication protocol to Oriental Motor's original RS-485 communication protocol. You can use a network converter to control Oriental Motor's RS-485-compatible products within the host communication environment.

NETC01-CC　NETC01-M2　NETC01-M3　NETC01-ECT

Types

Network Type	Product Name
CC-Link Compatible	**NETC01-CC**
MECHATROLINK-Ⅱ Compatible	**NETC01-M2**
MECHATROLINK-Ⅲ Compatible	**NETC01-M3**
EtherCAT Compatible	**NETC01-ECT**

Specifications

Power Supply Input　24 VDC±10%　Current Consumption 0.2 A

CC-Link Specifications **NETC01-CC**

Item	Description
Communication Protocol	CC-Link Ver.1.10
Baud Rate	156 kbps/625 kbps/2.5 Mbps/5 Mbps/10 Mbps
Station Type	Remote Device Station
Number of Occupied Stations	4 Stations Occupied
Maximum Number of Connectable Units	Number that Meets the Following Conditions {(1×a)+(2×b)+(3×c)+(4×d)}≦64 a: Number of 1 Station Occupation Unit b: Number of 2 Stations Occupation Unit c: Number of 3 Stations Occupation Unit d: Number of 4 Stations Occupation Unit {(16×A)+(54×B)+(88×C)}≦2304 A: Number of Remote 1/0 Station (64 stations max.) B: Number of Remote Device Station (42 stations max.) C: Number of Local Station (26 stations max.)

Dedicated CC-Link Connection Cable Length

Baud Rate	156 kbps	625 kbps	2.5 Mbps	5 Mbps	10 Mbps
Maximum Cable Total Extension Length	1200 m	900 m	400 m	160 m	100 m
Cable Length between Stations	0.2 m min.				

EtherCAT Specifications **NETC01-ECT**

Item	Description
Baud Rate	100 Mbps
Communication Period	Depending on the setting of the master
Node Address	0～255 (00 h～FF h, Initial value: 01 h)
Maximum number of bytes to be used	300 bytes
Communication Protocol	Proprietary protocol for EtherCAT (CoE), Profile type: CIA301 compatible
Communication Cable	Category 5 Straight cable (Twisted cable with shield)

MECHATROLINK Specifications

◇**NETC01-M2**　MECHATROLINK-Ⅱ Specifications

Item	Description
Baud Rate	10 Mbps
Transmission Frequency	0.5 ms/1.0 ms/1.5 ms/2.0 ms/2.5 ms/3.0 ms/3.5 ms/4.0 ms/8.0 ms
Station Address	60 h～7F h (Initial value: 61 h)
Transmission Bytes	17/32 bytes (Initial value: 32 bytes)
Installation Command	Intelligent I/O Command

◇**NETC01-M3**　MECHATROLINK-Ⅲ仕様

Item	Description
Baud Rate	100 Mbps
Transmission Frequency	0.5 ms/1.0 ms/1.5 ms/2.0 ms/2.5 ms/3.0 ms/3.5 ms/4.0 ms/8.0 ms
Station Address	03 h～EF h (Initial value: 61 h)
Transmission Bytes	16/32/48/64 bytes (Initial value: 32 bytes)
Profile	Standard I/O Profile Command

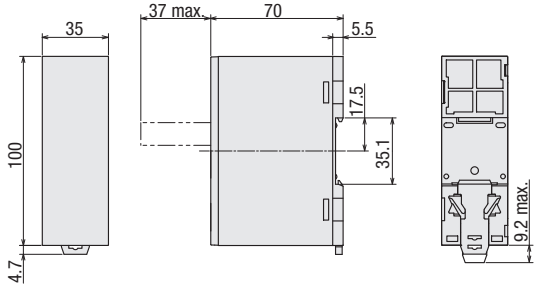
RS-485 Communication Specifications

Item	Description
Electrical Characteristics	Straight cable compliant with EIA-485 Use twist-pair cables (TIA/EIA-568B CAT5e or better recommended). The maximum total extension length is 50 m.
Communication Mode	Half duplex and Start-stop synchronization (8 bits, 1 stop bit, no parity)
Baud Rate	625 000 bps
Protocol	10-Byte Fixed Length Frame, Binary Transfer

Dimensions (Unit = mm)

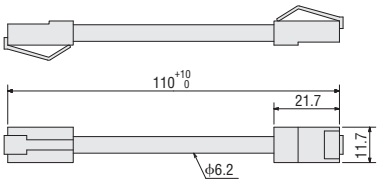
2D CAD

Product Name	Mass	2D CAD
NETC01-CC	0.15 kg	B548
NETC01-M2		B632
NETC01-M3		B632
NETC01-ECT		B1049



Included

- RS-485 communication cable



- Power connector
  Connector: MC1,5/3-STF-3,5 (PHOENIX CONTACT)
- CC-Link communication connector (Included in **NETC01-CC** only)
  Connector: MVSTBW2,5/5-STF-5,08AU (PHOENIX CONTACT)

⚠ Safety Precautions

- To ensure correct operation, carefully read the Operating Manual before using it.
- The products listed in this catalogue are for industrial use and for built-in component. Do not use for any other applications.

- The factories which manufacture the products listed in this catalogue have obtained Quality Management Systems ISO9001 and Environment Management Systems ISO14001.
- The content listed in this catalogue such as performance and specifications of the products are subject to change without notice for improvements.
- The price of all products listed in this catalogue does not include the consumption tax etc.
- For details of the products, please contact the nearest dealer, sales office or the following "Order Support Center" or "Customer Support Center".
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