Stepping Motors

Stepping Motor and Driver Packages

DC Input

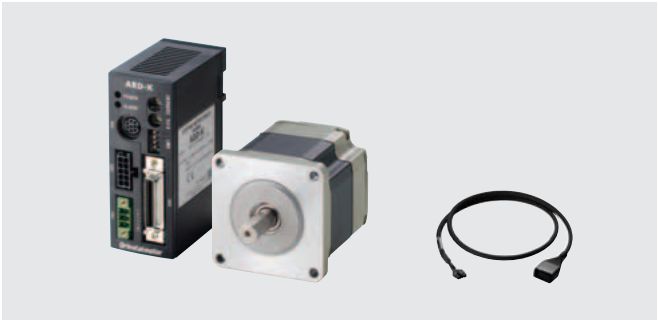
High-Efficiency AR Series

●Connection information●
Technical reference ➜ Page G-1
Safety standards ➜ Page H-2

This series substantially reduces heat generation from the motor through the use of high-efficiency technology. It allows you to take advantage of the beneficial features of the stepping motor to perform quick positioning operations over a short distance repeatedly without worrying about the duty cycle.

CE RoHS

●For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.com.

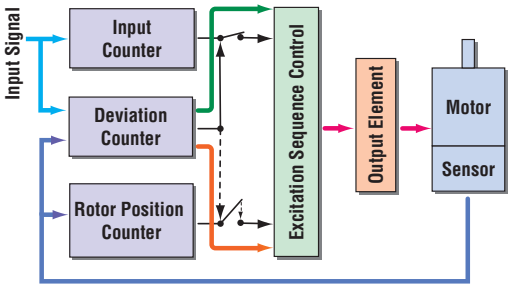


Features

●Uses Oriental Motor's Original Closed Loop Control Technology

◇Maintains Operation Even During Abrupt Load Fluctuations and Accelerations.

The **AR** Series uses our closed loop control to maintain positioning operation even during abrupt load fluctuations and accelerations. The rotor position detection sensor monitors the rotation. When an overload condition is detected, the **AR** Series will instantaneously regain control using the closed loop mode.



Normal (Positioning deviation is less than ±1.8°)

Motor runs in open loop mode like a stepping motor.

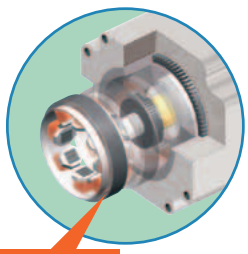
During Overload Condition (Positioning deviation is ±1.8° or more)

The closed loop mode is engaged to maintain the positioning operation.

◇Rotor Position Detection Sensor

The rotor position detection sensor uses the change in inductance caused by change in the distance between the stator teeth and the teeth on the sensor rotor to detect rotor position.

- This structure can be made small and thin, so the overall size of the motor can be reduced.
- High resolution
- This structure does not use electronic parts, so it is not affected by heat or vibration.



Sensor detects rotor position

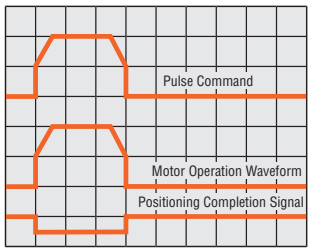
●Alarm Signal Output in Case of Abnormality

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.

●Maintaining All the Beneficial Features of a Stepping Motor

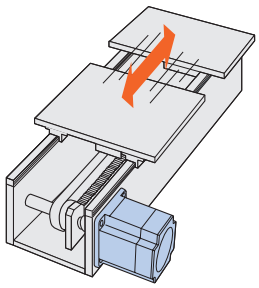
◇High Response

The motor operates synchronously with pulse commands to achieve high response. There's no delay in operation following a pulse command.



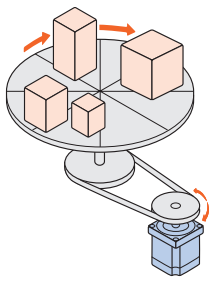
◇No Tuning

With the **AR** Series, you can perform positioning quickly after a load change, etc., without adjusting any gains.



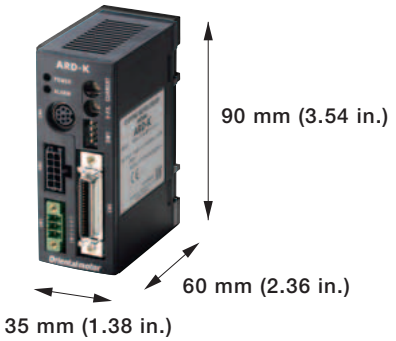
◇No Hunting

Because it uses a stepping motor, the **AR** Series does not hunt when stopped. Accordingly, the **AR** Series is ideal for applications where the equipment uses a belt-drive mechanism or otherwise has low rigidity and you don't want it to vibrate when stopping.



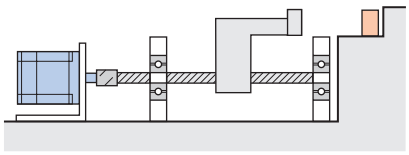
●Compact DC Input Driver with Plastic Case

The compact DC power input driver is covered by a plastic case.
The compact size is great for space-saving.
You can attach this driver to a 35 mm (1.38 in.) width DIN rail through one-step operation, no screw is needed. (DIN rail mounting is the only way to install the driver.)



◇Push Motion

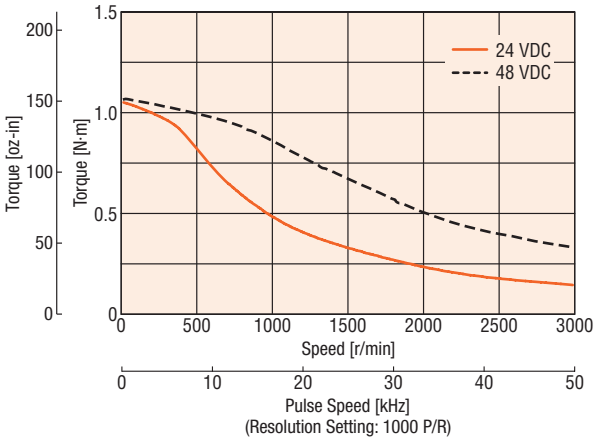
The load is pressurized continuously. When contact is made with the load, pushing operation begins, and the pressurization can be carried out at a steady torque.



◇24/48 VDC

Choose the appropriate power supply 24 VDC or 48 VDC for your application. Motor torque at speed will be increased when 48 VDC is input rather than 24 VDC. [Only 24 VDC input is available for motor frame size 28 mm (1.10 in.) motors.]

AR66AK-3



●Extended Functions

Extended Functions are Available to Access More Detailed Settings and Functions.

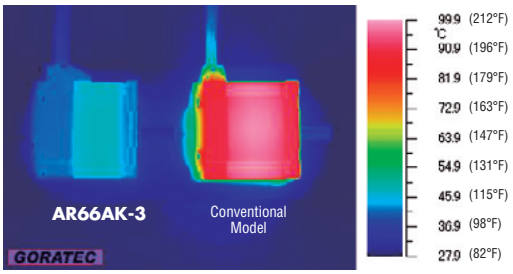
➜ Refer to page A-26 for Features, and page A-162 for Detailed

●Continuous Operation is Achieved Due to the Reduction of Motor Heat Generation by Utilizing High-Efficiency Technology

◇Lower Heat Generation

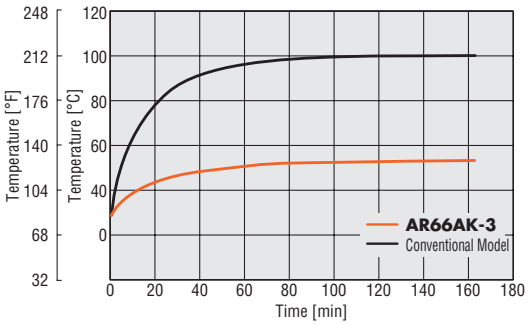
The **AR** Series utilizes high-efficiency technology to achieve a significant reduction in the amount of heat generated from the motor.

●Temperature Distribution by Thermography



Comparison under the same conditions

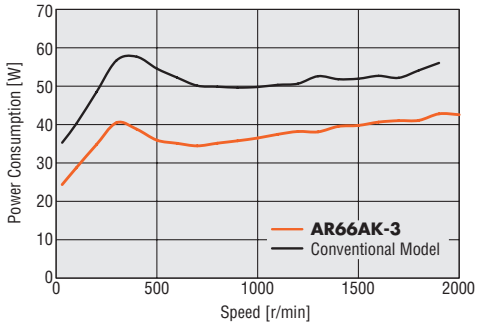
●Motor Case Temperature under Same Operating Conditions



◇Energy-Saving

Power consumption: up to **30**% less than a conventional model

●Power Consumption



CO_2 emission: up to **30**% less* than a conventional model

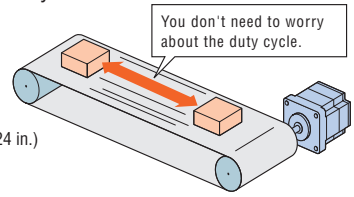
*Assuming operation at a duty of 40%

◇Continuous Operation or Operation at a high Duty Cycle

The **AR** Series can be operated at high frequency.
You can drive the motor continuously.

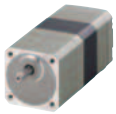
Note

●If the motor is operated continuously, a heat sink of a capacity at least equivalent to an aluminum plate with a size of 100×100 mm (3.94×3.94 in.), 6 mm (0.24 in.) thick is required.



AR Series Lineup

Characteristics Comparison for Motors and Geared Motors

Motor Type / Geared Type	Features	Permissible Torque (Maximum Torque [N·m (lb-in)])	Backlash [arc min (degrees)]	Basic Resolution [deg/step]	Output Shaft Speed [r/min]
Step Angle 0.36° Standard Type 	· Basic model of the **AR** Series	Maximum Holding Torque 2 (17)	——	0.36	4000
Low backlash — **TH** Geared Type (Parallel shaft) 	· High Speed (low gear ratio) · A wide variety of gear ratios for selecting the desired step angle (resolution) · Gear ratios: 3.6, 7.2, 10, 20, 30	12 (106)	45 (0.75)	0.012	500
Low backlash — **PS** Geared Type (Planetary) 	· High Speed (low gear ratio) · High permissible/maximum torque · A wide variety of gear ratios for selecting the desired step angle (resolution) · Centered output shaft · Gear ratios: 5, 7.2, 10, 25, 36, 50	Permissible Torque 37 (320) Maximum Torque 60 (530)	25 (0.42)	0.0072	600
Non-backlash — **PN** Geared Type (Planetary) 	· High speed (low gear ratio), high accuracy positioning · High permissible/maximum torque · A wide variety of gear ratios for selecting the desired step angle (resolution) · Centered output shaft · Gear ratios: 5, 7.2, 10, 25, 36, 50	Permissible Torque 37 (320) Maximum Torque 60 (530)	3 (0.05)	0.0072	600
Non-backlash — Harmonic Geared Type (Harmonic drive) 	· High accuracy positioning · High permissible/maximum torque · High resolution (high gear ratio) · Centered output shaft · Gear ratios: 50, 100	Permissible Torque 37 (320) Maximum Torque 55 (480)	0	0.0036	70

Note

● The values shown above must be used as reference. These values vary depending on the frame size and gear ratio.

Range of Motor Frame Size

Four motor frame sizes are available.

[□42 (□1.65): indicates a motor frame size of 42 mm (1.65 in.).]

Motor Type		□28 (□1.10) [□30 (□1.18)*1]	□42 (□1.65)	□60 (□2.36)	□85 (□3.35) [□90 (□3.54)*2]
Step Angle 0.36° Standard Type	Without Electromagnetic Brake	●	●	●	●
	With Electromagnetic Brake		●	●	●
TH, **PS**, **PN**, Harmonic Geared Type	Without Electromagnetic Brake	●	●	●	●
	With Electromagnetic Brake		●	●	●

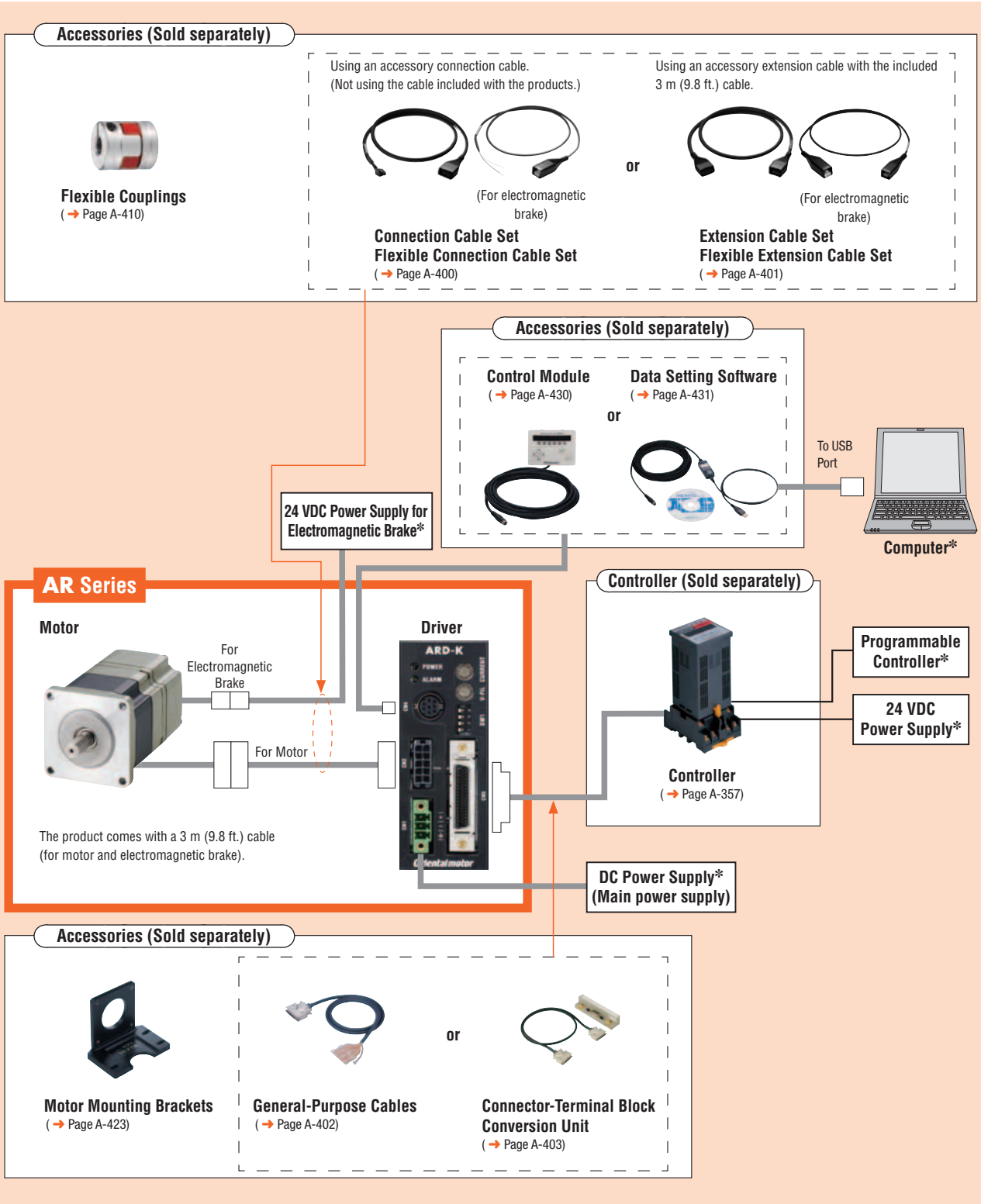
*1 Harmonic geared type
*2 Geared type

System Configuration

Standard Type with Electromagnetic Brake

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

* Not supplied



Example of System Configuration

AR Series	+	Sold Separately			
		Controller	Motor Mounting Bracket	Flexible Coupling	Connector-Terminal Block Conversion Unit [1 m (3.3 ft.)]
AR66MK-3		SG8030J-D	PAL2P5-A	MCS300610	CC36T1

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

Product Number Code

AR 6 6 □ A K - PS 10 - 3

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①	Series	**AR**: **AR** Series
②	Motor Frame Size	**2**: 28 mm (1.10 in.) [Geared type: 30 mm (1.18 in.)] **4**: 42 mm (1.65 in.) **6**: 60 mm (2.36 in.) **9**: 85 mm (3.35 in.) [Geared type: 90 mm (3.54 in.)]
③	Motor Case Length	
④	Motor Classification	
⑤	Motor Type	**A**: Standard (Single shaft) **B**: Standard (Double shaft) **M**: Electromagnetic Brake Type

⑥	Power Supply Voltage	**K**: 24/48 VDC
⑦	Gearhead Type	Blank: Standard Type **T**: **TH** Geared Type **PS**: **PS** Geared Type **N**: **PN** Geared Type **H**: Harmonic Geared Type
⑧	Gear Ratio	
⑨	Cable Length (Included)	**3**: 3 m (9.8 ft.)

Product Line

●Step Angle 0.36° Standard Type

Model (Single shaft)	Model (Double shaft)
AR24SAK-3	**AR24SBK-3**
AR26SAK-3	**AR26SBK-3**
AR46AK-3	**AR46BK-3**
AR66AK-3	**AR66BK-3**
AR69AK-3	**AR69BK-3**
AR98AK-3	**AR98BK-3**

●Step Angle 0.36° Standard Type with Electromagnetic Brake

Model
AR46MK-3
AR66MK-3
AR69MK-3
AR98MK-3

●**TH** Geared Type / ●**TH** Geared Type with Electromagnetic Brake

Model	Model
AR24SAK-T7.2-3 **AR24SAK-T10-3** **AR24SAK-T20-3** **AR24SAK-T30-3**	–
AR46AK-T3.6-3	**AR46MK-T3.6-3**
AR46AK-T7.2-3	**AR46MK-T7.2-3**
AR46AK-T10-3	**AR46MK-T10-3**
AR46AK-T20-3	**AR46MK-T20-3**
AR46AK-T30-3	**AR46MK-T30-3**
AR66AK-T3.6-3	**AR66MK-T3.6-3**
AR66AK-T7.2-3	**AR66MK-T7.2-3**
AR66AK-T10-3	**AR66MK-T10-3**
AR66AK-T20-3	**AR66MK-T20-3**
AR66AK-T30-3	**AR66MK-T30-3**
AR98AK-T3.6-3	**AR98MK-T3.6-3**
AR98AK-T7.2-3	**AR98MK-T7.2-3**
AR98AK-T10-3	**AR98MK-T10-3**
AR98AK-T20-3	**AR98MK-T20-3**
AR98AK-T30-3	**AR98MK-T30-3**

●**PS** Geared Type / ●**PS** Geared Type with Electromagnetic Brake

Model	Model
AR24SAK-PS5-3 **AR24SAK-PS7-3** **AR24SAK-PS10-3**	–
AR46AK-PS5-3	**AR46MK-PS5-3**
AR46AK-PS7-3	**AR46MK-PS7-3**
AR46AK-PS10-3	**AR46MK-PS10-3**
AR46AK-PS25-3	**AR46MK-PS25-3**
AR46AK-PS36-3	**AR46MK-PS36-3**
AR46AK-PS50-3	**AR46MK-PS50-3**
AR66AK-PS5-3	**AR66MK-PS5-3**
AR66AK-PS7-3	**AR66MK-PS7-3**
AR66AK-PS10-3	**AR66MK-PS10-3**
AR66AK-PS25-3	**AR66MK-PS25-3**
AR66AK-PS36-3	**AR66MK-PS36-3**
AR66AK-PS50-3	**AR66MK-PS50-3**
AR98AK-PS5-3	**AR98MK-PS5-3**
AR98AK-PS7-3	**AR98MK-PS7-3**
AR98AK-PS10-3	**AR98MK-PS10-3**
AR98AK-PS25-3	**AR98MK-PS25-3**
AR98AK-PS36-3	**AR98MK-PS36-3**
AR98AK-PS50-3	**AR98MK-PS50-3**

The following items are included each product.

Motor, Driver, Cable for Motor, Cable for Electromagnetic Brake*, I/O Signal Connector, Connector for Power Supply Input/Frame Ground Terminal, Surge Suppressor*, Operating Manual, USER MANUAL (CD-ROM)

●Each product comes with cables for motor and electromagnetic brake 3 m (9.8 ft.) long. If you need different length cable, or flexible cables, select an appropriate cable from among the accessories (sold separately). For details, refer to page A-400.

* Only with Electromagnetic Brake Type.

●PN Geared Type

Model
AR24SAK-N5-3
AR24SAK-N7.2-3
AR24SAK-N10-3
AR46AK-N5-3
AR46AK-N7.2-3
AR46AK-N10-3
AR66AK-N5-3
AR66AK-N7.2-3
AR66AK-N10-3
AR66AK-N25-3
AR66AK-N36-3
AR66AK-N50-3
AR98AK-N5-3
AR98AK-N7.2-3
AR98AK-N10-3
AR98AK-N25-3
AR98AK-N36-3
AR98AK-N50-3

●PN Geared Type with Electromagnetic Brake

Model
–
AR46MK-N5-3
AR46MK-N7.2-3
AR46MK-N10-3
AR66MK-N5-3
AR66MK-N7.2-3
AR66MK-N10-3
AR66MK-N25-3
AR66MK-N36-3
AR66MK-N50-3
AR98MK-N5-3
AR98MK-N7.2-3
AR98MK-N10-3
AR98MK-N25-3
AR98MK-N36-3
AR98MK-N50-3

●Harmonic Geared Type

Model
AR24SAK-H50-3
AR24SAK-H100-3
AR46AK-H50-3
AR46AK-H100-3
AR66AK-H50-3
AR66AK-H100-3
AR98AK-H50-3
AR98AK-H100-3

●Harmonic Geared Type with Electromagnetic Brake

Model
–
AR46MK-H50-3
AR46MK-H100-3
AR66MK-H50-3
AR66MK-H100-3
AR98MK-H50-3
AR98MK-H100-3

Step Angle 0.36° Motor Frame Size 28 mm (1.10 in.), 42 mm (1.65 in.), 60 mm (2.36 in.), 85 mm (3.35 in.)

Standard Type

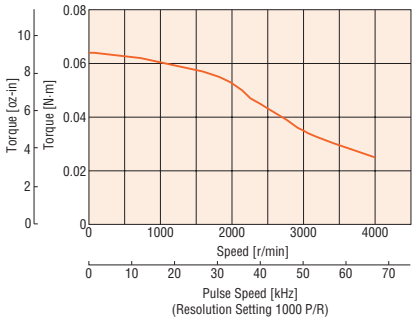
Specifications RoHS

Model			AR24SAK-3	AR26SAK-3	AR46AK-3	AR66AK-3	AR69AK-3	AR98AK-3
		Single Shaft	AR24SBK-3	AR26SBK-3	AR46BK-3	AR66BK-3	AR69BK-3	AR98BK-3
		Electromagnetic Brake	–	–	AR46MK-3	AR66MK-3	AR69MK-3	AR98MK-3
Maximum Holding Torque		N·m (oz-in)	0.055 (7.8)	0.12 (17.0)	0.3 (42)	1 (142)	2 (280)	
Holding Torque at Motor Standstill	Power ON	N·m (oz-in)	0.027 (3.8)	0.06 (8.5)	0.15 (21)	0.5 (71)	1 (142)	
	Electromagnetic Brake	N·m (oz-in)	–	–	0.15 (21)	0.5 (71)	1 (142)	
Rotor Inertia		J: kg·m^2 (oz-in^2)	11×10^{-7} (0.060)	20×10^{-7} (0.109)	58×10^{-7} (0.32) [73×10^{-7} (0.4)]*1	380×10^{-7} (2.1) [500×10^{-7} (2.7)]*1	750×10^{-7} (4.1) [870×10^{-7} (4.8)]*1	1100×10^{-7} (6) [1220×10^{-7} (6.7)]*1
Resolution		Resolution Setting:1000P/R	0.36°/Pulse					
Power Supply Input	Voltage		24 VDC±10%		24 VDC±10%/ 48 VDC±5%	24 VDC±10%/48 VDC±5%*2		
	Maximum Input Current	A	0.9		1.4	3.1	3.0	2.5
Electromagnetic Brake*3	Power Supply Input		–		24 VDC±5%*4 0.08A	24 VDC±5%*4 0.25 A		

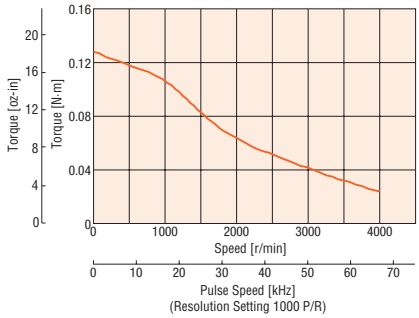
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed-Torque Characteristics

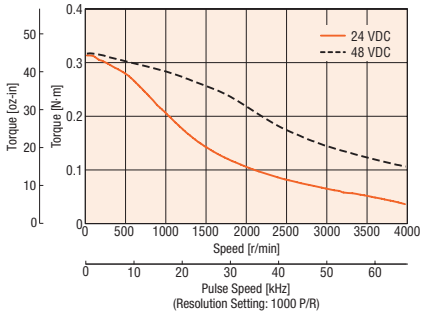
AR24



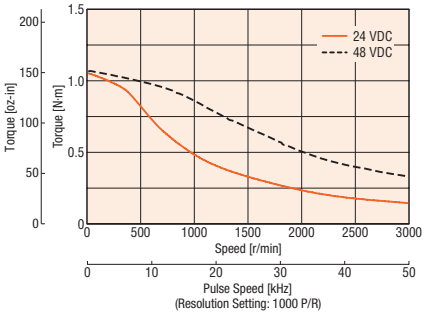
AR26



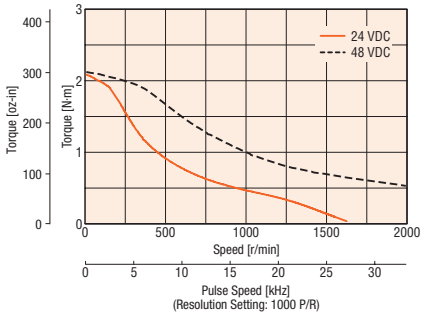
AR46



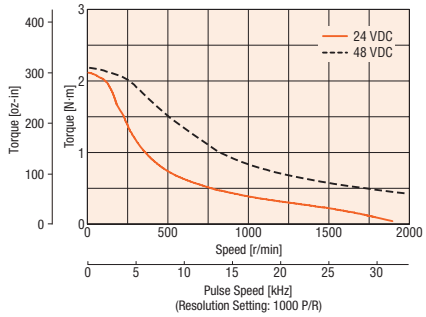
AR66



AR69



AR98



Note

● Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

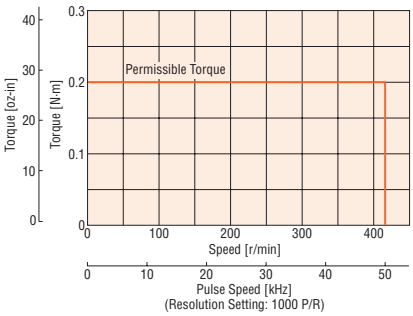
TH Geared Type Motor Frame Size 28 mm (1.10 in.)

Specifications RoHS

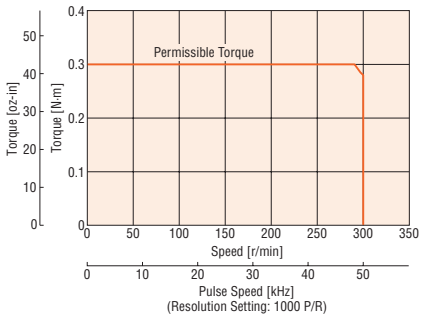
Model			AR24SAK-T7.2-3	AR24SAK-T10-3	AR24SAK-T20-3	AR24SAK-T30-3
Maximum Holding Torque		N·m (oz-in)	0.2 (28)	0.3 (42)	0.4 (56)	0.5 (71)
Rotor Inertia		J: kg·m^2 (oz-in^2)	11×10^{-7} (0.060)			
Gear Ratio			7.2	10	20	30
Resolution		Resolution Setting:1000P/R	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse
Permissible Torque		N·m (oz-in)	0.2 (28)	0.3 (42)	0.4 (56)	0.5 (71)
Holding Torque at Motor Standstill	Power ON	N·m (oz-in)	0.13 (18.4)	0.19 (26)	0.38 (53)	0.5 (71)
Permissible Speed Range		r/min	0～416	0～300	0～150	0～100
Backlash		arc min (degrees)	60 (1)			
Power Supply Input	Voltage		24 VDC±10%			
	Maximum Input Current	A	0.9			

Speed-Torque Characteristics

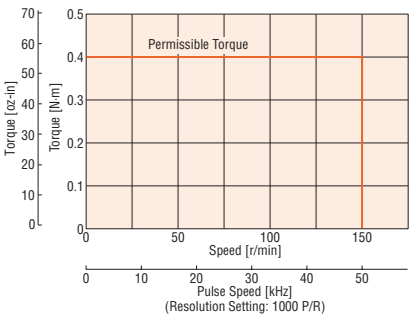
AR24 Gear Ratio **7.2**



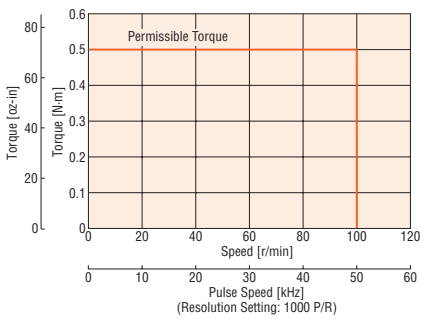
AR24 Gear Ratio **10**



AR24 Gear Ratio **20**



AR24 Gear Ratio **30**



Note

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100˚C (212˚F).

TH Geared Type Motor Frame Size 42 mm (1.65 in.)

Specifications RoHS

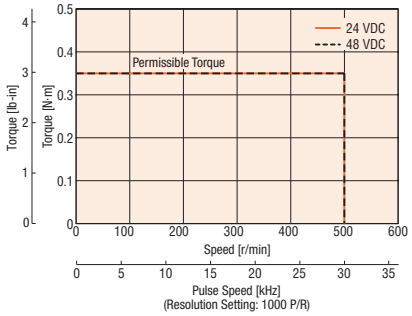
CE

Model		Single Shaft	AR46AK-T3.6-3	AR46AK-T7.2-3	AR46AK-T10-3	AR46AK-T20-3	AR46AK-T30-3
		Electromagnetic Brake	AR46MK-T3.6-3	AR46MK-T7.2-3	AR46MK-T10-3	AR46MK-T20-3	AR46MK-T30-3
Maximum Holding Torque		N·m (lb-in)	0.35 (3.0)	0.7 (6.1)	1 (8.8)	1.5 (13.2)	
Rotor Inertia		J: kg·m² (oz-in²)	58×10^{-7} (0.32) [73×10^{-7} (0.4)]*1				
Gear Ratio			3.6	7.2	10	20	30
Resolution			0.1°/Pulse	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse
Permissible Torque		N·m (lb-in)	0.35 (3.0)	0.7 (6.1)	1 (8.8)	1.5 (13.2)	
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	0.33 (2.9)	0.67 (5.9)	0.93 (8.2)	1.5 (13.2)	
	Electromagnetic Brake	N·m (lb-in)	0.33 (2.9)	0.67 (5.9)	0.93 (8.2)	1.5 (13.2)	
Permissible Speed Range		r/min	0～500	0～250	0～180	0～90	0～60
Backlash		arc min (degrees)	45 (0.75)	25 (0.42)		15 (0.25)	
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%				
	Maximum Input Current	A	1.4				
Electromagnetic Brake*2	Power Supply Input		24 VDC±5%*3 0.08 A				

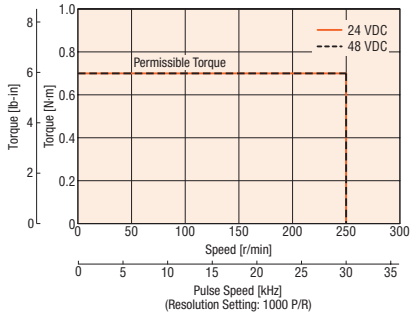
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 A separate power supply is required for the electromagnetic brakes.
*3 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

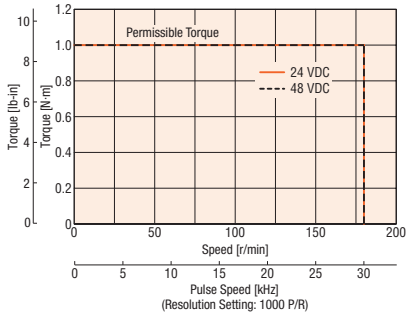
AR46 Gear Ratio 3.6



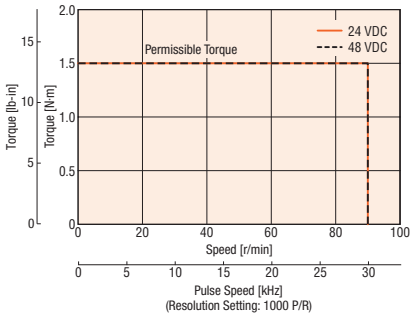
AR46 Gear Ratio 7.2



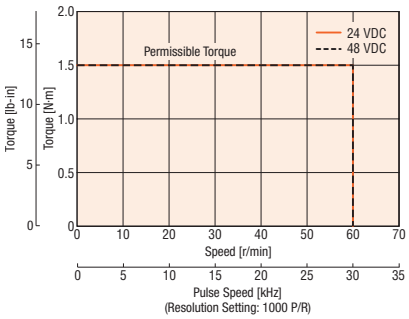
AR46 Gear Ratio 10



AR46 Gear Ratio 20



AR46 Gear Ratio 30



Note

● Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

TH Geared Type Motor Frame Size 60 mm (2.36 in.)

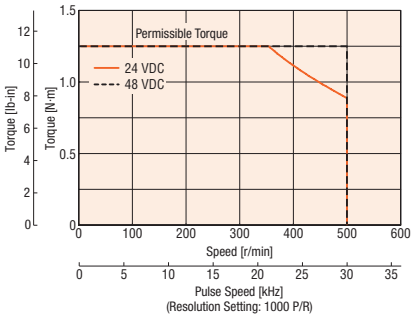
Specifications RoHS

Model		Single Shaft	AR66AK-T3.6-3	AR66AK-T7.2-3	AR66AK-T10-3	AR66AK-T20-3	AR66AK-T30-3
		Electromagnetic Brake	AR66MK-T3.6-3	AR66MK-T7.2-3	AR66MK-T10-3	AR66MK-T20-3	AR66MK-T30-3
Maximum Holding Torque		N·m (lb-in)	1.25 (11.0)	2.5 (22)	3 (26)	3.5 (30)	4 (35)
Rotor Inertia		J: kg·m² (oz-in²)	380×10⁻⁷ (2.1) [500×10⁻⁷ (2.7)]*1				
Gear Ratio			3.6	7.2	10	20	30
Resolution			0.1°/Pulse	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse
Permissible Torque		N·m (lb-in)	1.25 (11.0)	2.5 (22)	3 (26)	3.5 (30)	4 (35)
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	1.1 (9.7)	2.2 (19.4)	3 (26)	3.5 (30)	4 (35)
	Electromagnetic Brake	N·m (lb-in)	1.1 (9.7)	2.2 (19.4)	3 (26)	3.5 (30)	4 (35)
Permissible Speed Range		r/min	0～500	0～250	0～180	0～90	0～60
Backlash		arc min (degrees)	35 (0.59)	15 (0.25)		10 (0.17)	
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%*2				
	Maximum Input Current	A	3.1				
Electromagnetic Brake*3	Power Supply Input		24 VDC±5%*4 0.25 A				

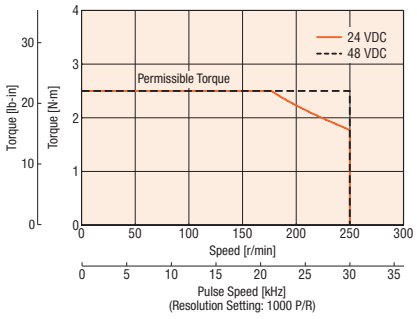
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

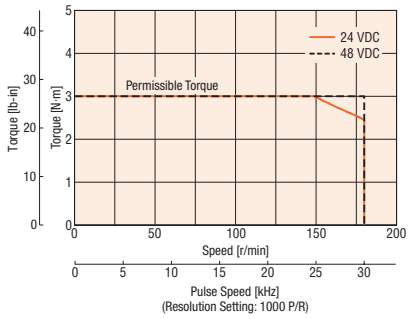
AR66 Gear Ratio 3.6



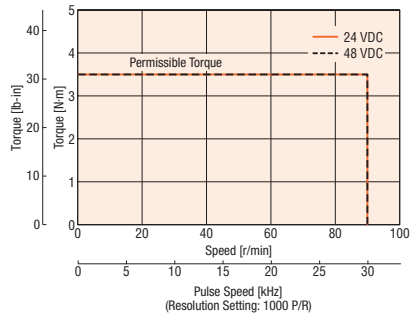
AR66 Gear Ratio 7.2



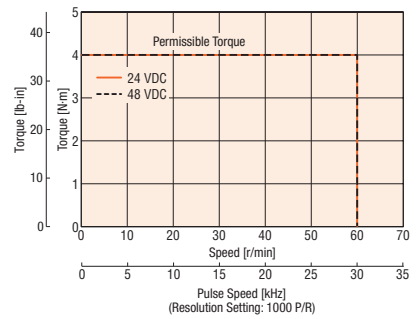
AR66 Gear Ratio 10



AR66 Gear Ratio 20



AR66 Gear Ratio 30



Note

● Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

TH Geared Type Motor Frame Size 90 mm (3.54 in.)

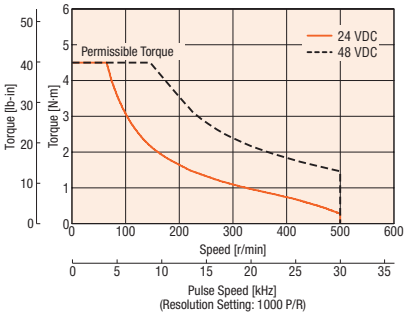
Specifications RoHS

Model		Single Shaft	AR98AK-T3.6-3	AR98AK-T7.2-3	AR98AK-T10-3	AR98AK-T20-3	AR98AK-T30-3
		Electromagnetic Brake	AR98MK-T3.6-3	AR98MK-T7.2-3	AR98MK-T10-3	AR98MK-T20-3	AR98MK-T30-3
Maximum Holding Torque		N·m (lb-in)	4.5 (39)	9 (79)		12 (106)	
Rotor Inertia		J: kg·m² (oz-in²)	1100×10⁻⁷ (6.0) [1220×10⁻⁷ (6.7)]*1				
Gear Ratio			3.6	7.2	10	20	30
Resolution			0.1°/Pulse	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse
Permissible Torque		N·m (lb-in)	4.5 (39)	9 (79)		12 (106)	
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	3.6 (31)	7.2 (63)	9 (79)	12 (106)	
	Electromagnetic Brake	N·m (lb-in)	3.6 (31)	7.2 (63)	9 (79)	12 (106)	
Permissible Speed Range		r/min	0～500	0～250	0～180	0～90	0～60
Backlash		arc min (degrees)	25 (0.42)	15 (0.25)		10 (0.17)	
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%*2				
	Maximum Input Current	A	2.5				
Electromagnetic Brake*3	Power Supply Input		24 VDC±5%*4 0.25 A				

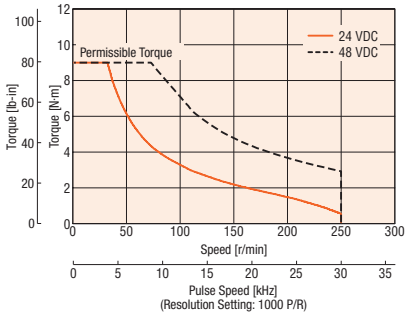
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

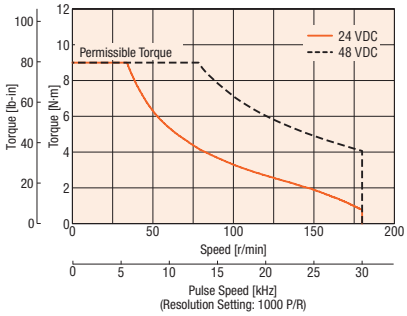
AR98 Gear Ratio 3.6



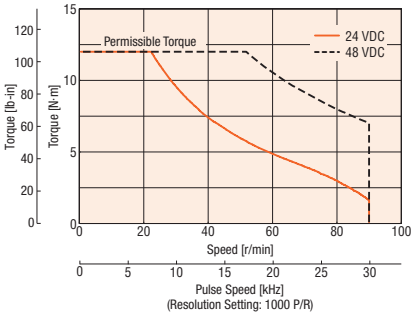
AR98 Gear Ratio 7.2



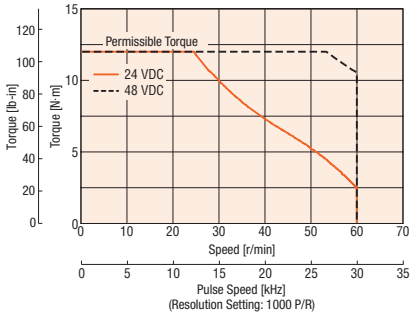
AR98 Gear Ratio 10



AR98 Gear Ratio 20



AR98 Gear Ratio 30



Note

● Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

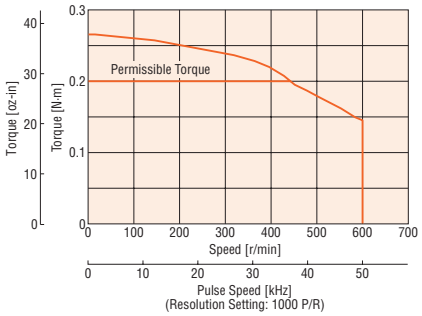
PS Geared Type Motor Frame Size 28 mm (1.10 in.)

Specifications RoHS

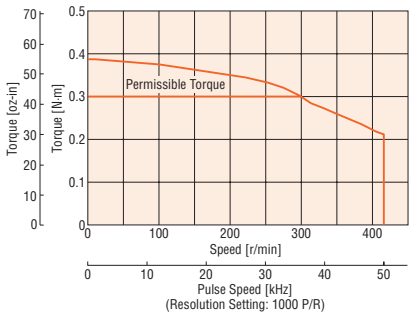
Model			AR24SAK-PS5-3	AR24SAK-PS7-3	AR24SAK-PS10-3
Maximum Holding Torque		N·m (oz-in)	0.2 (28)	0.3 (42)	0.5 (71)
Rotor Inertia		J: kg·m² (oz-in²)	11×10^{-7} (0.060)		
Gear Ratio			5	7.2	10
Resolution		Resolution Setting: 1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse
Permissible Torque		N·m (oz-in)	0.2 (28)	0.3 (42)	0.5 (71)
Maximum Torque		N·m (oz-in)	0.5 (71)		
Holding Torque at Motor Standstill	Power ON	N·m (oz-in)	0.13 (18.4)	0.19 (26)	0.27 (38)
Permissible Speed Range		r/min	0～600	0～416	0～300
Backlash		arc min (degrees)	35 (0.59)		
Power Supply Input	Voltage		24 VDC±10%		
	Maximum Input Current	A	0.9		

Speed – Torque Characteristics

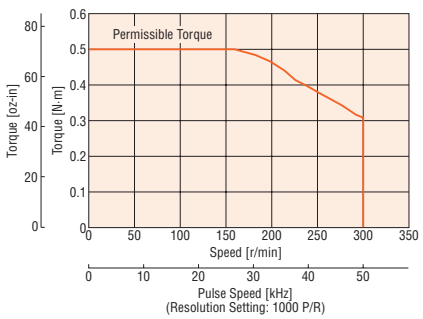
AR24 Gear Ratio **5**



AR24 Gear Ratio **7.2**



AR24 Gear Ratio **10**



Note

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

PS Geared Type Motor Frame Size 42 mm (1.65 in.)

Specifications RoHS

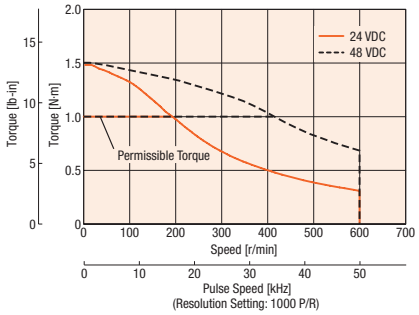
CE

Model		Single Shaft	AR46AK-PS5-3	AR46AK-PS7-3	AR46AK-PS10-3	AR46AK-PS25-3	AR46AK-PS36-3	AR46AK-PS50-3
		Electromagnetic Brake	AR46MK-PS5-3	AR46MK-PS7-3	AR46MK-PS10-3	AR46MK-PS25-3	AR46MK-PS36-3	AR46MK-PS50-3
Maximum Holding Torque		N·m (lb-in)	1 (8.8)	1.5 (13.2)		2.5 (22)	3 (26)	
Rotor Inertia		J: kg·m² (oz-in²)	58×10^{-7} (0.32) [73×10^{-7} (0.4)]*1					
Gear Ratio			5	7.2	10	25	36	50
Resolution		Resolution Setting:1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse	0.0144°/Pulse	0.01°/Pulse	0.0072°/Pulse
Permissible Torque		N·m (lb-in)	1 (8.8)	1.5 (13.2)		2.5 (22)	3 (26)	
Maximum Torque		N·m (lb-in)	1.5 (13.2)	2 (17.7)		6 (53)		
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	0.75 (6.6)	1 (8.8)	1.5 (13.2)	2.5 (22)	3 (26)	
	Electromagnetic Brake	N·m (lb-in)	0.75 (6.6)	1 (8.8)	1.5 (13.2)	2.5 (22)	3 (26)	
Permissible Speed Range		r/min	0～600	0～416	0～300	0～120	0～83	0～60
Backlash		arc min (degrees)	25 (0.42)					
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%					
	Maximum Input Current	A	1.4					
Electromagnetic Brake*2	Power Supply Input		24 VDC±5%*3 0.08 A					

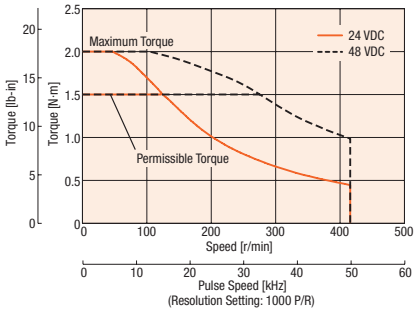
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 A separate power supply is required for the electromagnetic brakes.
*3 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

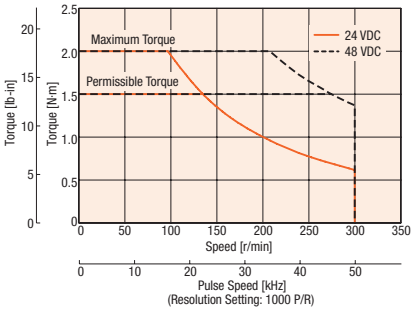
AR46 Gear Ratio 5



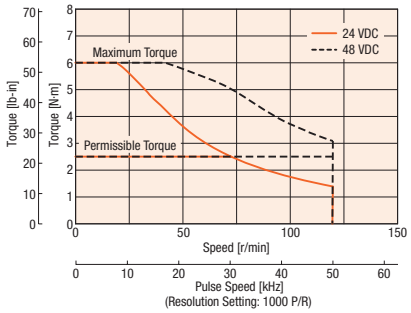
AR46 Gear Ratio 7.2



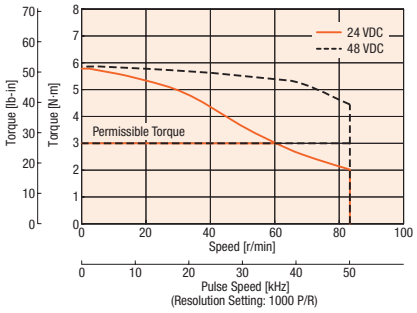
AR46 Gear Ratio 10



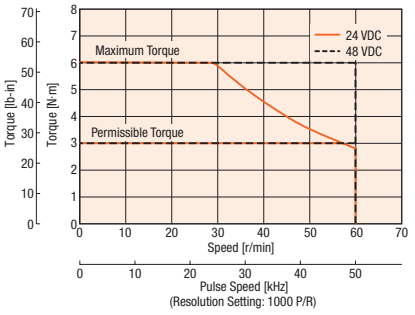
AR46 Gear Ratio 25



AR46 Gear Ratio 36



AR46 Gear Ratio 50



Note

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

PS Geared Type Motor Frame Size 60 mm (2.36 in.)

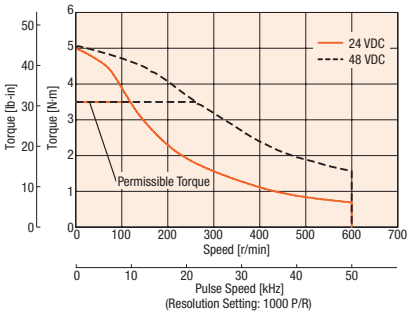
Specifications RoHS

Model		Single Shaft	AR66AK-PS5-3	AR66AK-PS7-3	AR66AK-PS10-3	AR66AK-PS25-3	AR66AK-PS36-3	AR66AK-PS50-3
		Electromagnetic Brake	AR66MK-PS5-3	AR66MK-PS7-3	AR66MK-PS10-3	AR66MK-PS25-3	AR66MK-PS36-3	AR66MK-PS50-3
Maximum Holding Torque		N·m (lb-in)	3.5 (30)	4 (35)	5 (44)	8 (70)		
Rotor Inertia		J: kg·m² (oz-in²)	380×10⁻⁷ (2.1) [500×10⁻⁷ (2.7)]*1					
Gear Ratio			5	7.2	10	25	36	50
Resolution		Resolution Setting: 1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse	0.0144°/Pulse	0.01°/Pulse	0.0072°/Pulse
Permissible Torque		N·m (lb-in)	3.5 (30)	4 (35)	5 (44)	8 (70)		
Maximum Torque		N·m (lb-in)	7 (61)	9 (79)	11 (97)	16 (141)	20 (177)	
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	2.5 (22)	3.6 (31)	5 (44)	7.6 (67)	8 (70)	
	Electromagnetic Brake	N·m (lb-in)	2.5 (22)	3.6 (31)	5 (44)	7.6 (67)	8 (70)	
Permissible Speed Range		r/min	0～600	0～416	0～300	0～120	0～83	0～60
Backlash		arc min (degrees)	15 (0.25)					
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%*2					
	Maximum Input Current	A	3.1					
Electromagnetic Brake*3	Power Supply Input		24 VDC±5%*4 0.25 A					

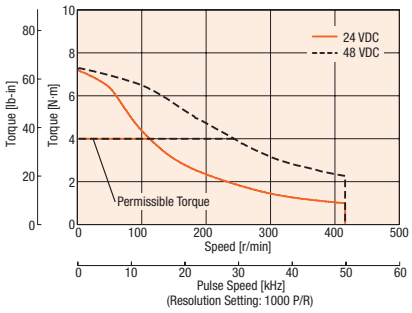
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

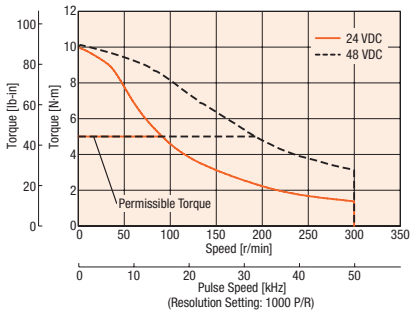
AR66 Gear Ratio **5**



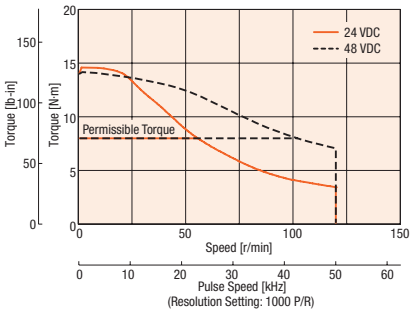
AR66 Gear Ratio **7.2**



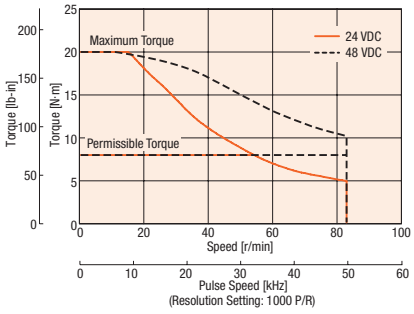
AR66 Gear Ratio **10**



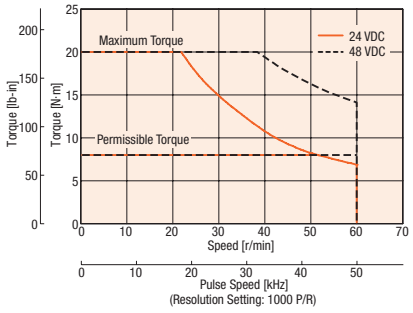
AR66 Gear Ratio **25**



AR66 Gear Ratio **36**



AR66 Gear Ratio **50**



Note

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

PS Geared Type Motor Frame Size 90 mm (3.54 in.)

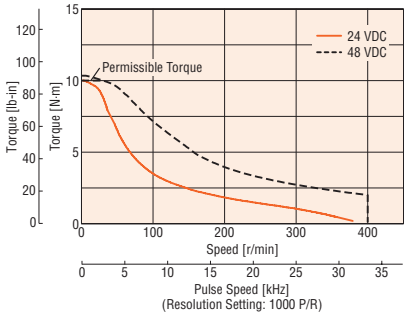
Specifications RoHS

Model		Single Shaft	AR98AK-PS5-3	AR98AK-PS7-3	AR98AK-PS10-3	AR98AK-PS25-3	AR98AK-PS36-3	AR98AK-PS50-3
		Electromagnetic Brake	AR98MK-PS5-3	AR98MK-PS7-3	AR98MK-PS10-3	AR98MK-PS25-3	AR98MK-PS36-3	AR98MK-PS50-3
Maximum Holding Torque		N·m (lb-in)	10 (88)	14 (123)	20 (177)	37 (320)		
Rotor Inertia		J: kg·m² (oz-in²)	1100×10⁻⁷ (6.0) [1220×10⁻⁷ (6.7)]*1					
Gear Ratio			5	7.2	10	25	36	50
Resolution		Resolution Setting:1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse	0.0144°/Pulse	0.01°/Pulse	0.0072°/Pulse
Permissible Torque		N·m (lb-in)	10 (88)	14 (123)	20 (177)	37 (320)		
Maximum Torque		N·m (lb-in)	28 (240)	35 (300)		56 (490)	60 (530)	
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	5 (44)	7.2 (63)	10 (88)	25 (220)	36 (310)	37 (320)
	Electromagnetic Brake	N·m (lb-in)	5 (44)	7.2 (63)	10 (88)	25 (220)	36 (310)	37 (320)
Permissible Speed Range		r/min	0～400	0～277	0～200	0～80	0～55	0～40
Backlash		arc min (degrees)	15 (0.25)					
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%*2					
	Maximum Input Current	A	2.5					
Electromagnetic Brake*3	Power Supply Input		24 VDC±5%*4 0.25A					

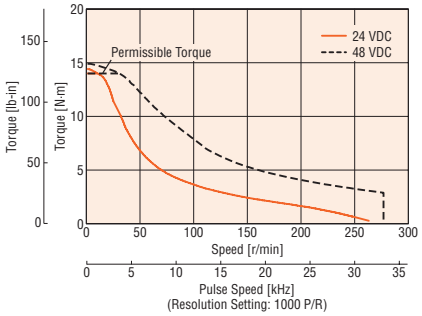
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

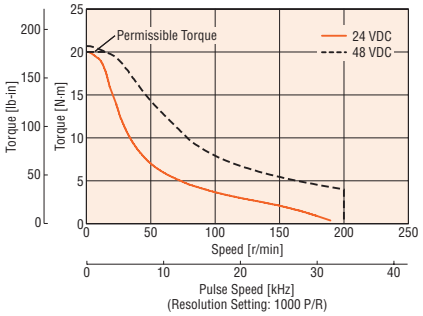
AR98 Gear Ratio 5



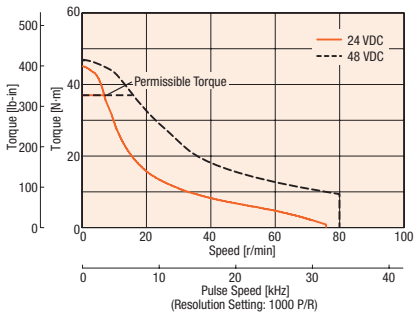
AR98 Gear Ratio 7.2



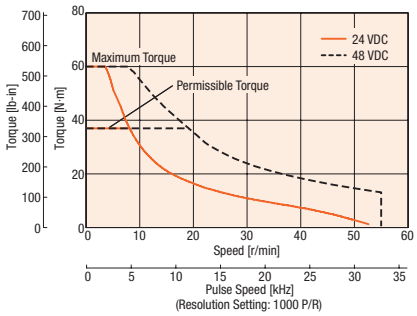
AR98 Gear Ratio 10



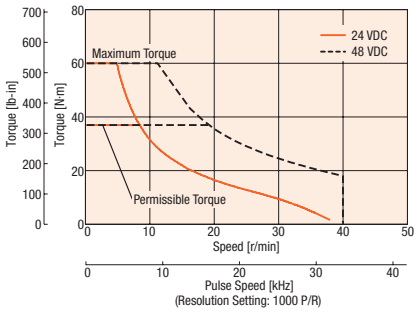
AR98 Gear Ratio 25



AR98 Gear Ratio 36



AR98 Gear Ratio 50



Note

● Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

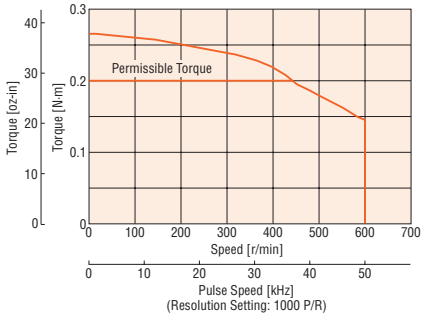
PN Geared Type Motor Frame Size 28 mm (1.10 in.)

Specifications RoHS

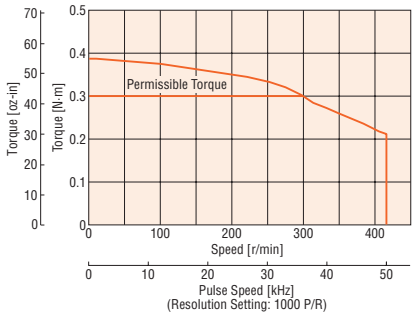
Model			AR24SAK-N5-3	AR24SAK-N7.2-3	AR24SAK-N10-3
Maximum Holding Torque		N·m (oz-in)	0.2 (28)	0.3 (42)	0.5 (71)
Rotor Inertia		J: kg·m² (oz-in²)	11×10^{-7} (0.060)		
Gear Ratio			5	7.2	10
Resolution		Resolution Setting: 1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse
Permissible Torque		N·m (oz-in)	0.2 (28)	0.3 (42)	0.5 (71)
Maximum Torque		N·m (oz-in)	0.5 (71)		
Holding Torque at Motor Standstill	Power ON	N·m (oz-in)	0.13 (18.4)	0.19 (26)	0.27 (38)
Permissible Speed Range		r/min	0～600	0～416	0～300
Backlash		arc min (degrees)	3 (0.05)		
Power Supply Input	Voltage		24 VDC±10%		
	Maximum Input Current	A	0.9		

Speed – Torque Characteristics

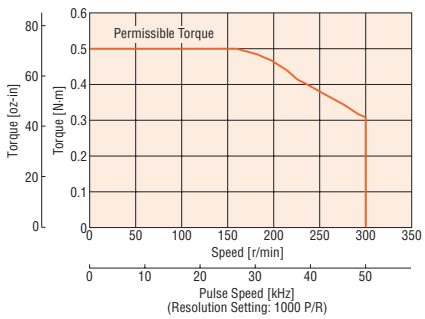
AR24 Gear Ratio **5**



AR24 Gear Ratio **7.2**



AR24 Gear Ratio **10**



Note

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

PN Geared Type Motor Frame Size 42 mm (1.65 in.)

Specifications RoHS

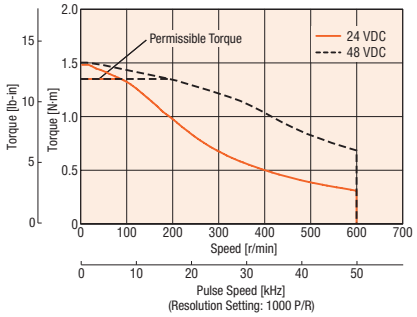
CE

Model		Single Shaft	AR46AK-N5-3	AR46AK-N7.2-3	AR46AK-N10-3
		Electromagnetic Brake	AR46MK-N5-3	AR46MK-N7.2-3	AR46MK-N10-3
Maximum Holding Torque		N·m (lb-in)	1.35 (11.9)	1.5 (13.2)	
Rotor Inertia		J: kg·m² (oz-in²)	58×10⁻⁷ (0.32) [73×10⁻⁷ (0.4)]*1		
Gear Ratio			5	7.2	10
Resolution		Resolution Setting:1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse
Permissible Torque		N·m (lb-in)	1.35 (11.9)	1.5 (13.2)	
Maximum Torque		N·m (lb-in)	1.5 (13.2)	2 (17.7)	
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	0.75 (6.6)	1 (8.8)	1.5 (13.2)
	Electromagnetic Brake	N·m (lb-in)	0.75 (6.6)	1 (8.8)	1.5 (13.2)
Permissible Speed Range		r/min	0～600	0～416	0～300
Backlash		arc min (degrees)	2 (0.034)		
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%		
	Maximum Input Current	A	1.4		
Electromagnetic Brake*2	Power Supply Input		24 VDC±5%*3 0.08 A		

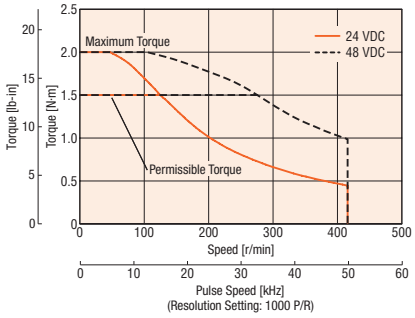
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 A separate power supply is required for the electromagnetic brakes.
*3 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

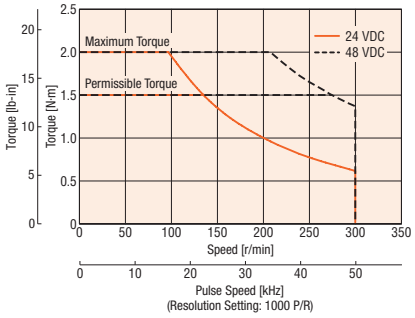
AR46 Gear Ratio **5**



AR46 Gear Ratio **7.2**



AR46 Gear Ratio **10**



Note

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

PN Geared Type Motor Frame Size 60 mm (2.36 in.)

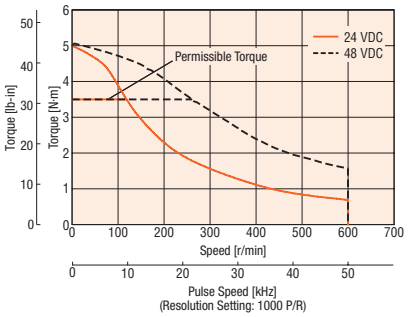
Specifications RoHS

Model			AR66AK-N5-3	AR66AK-N7.2-3	AR66AK-N10-3	AR66AK-N25-3	AR66AK-N36-3	AR66AK-N50-3
		Electromagnetic Brake	AR66MK-N5-3	AR66MK-N7.2-3	AR66MK-N10-3	AR66MK-N25-3	AR66MK-N36-3	AR66MK-N50-3
Maximum Holding Torque		N·m (lb-in)	3.5 (30)	4 (35)	5 (44)	8 (70)		
Rotor Inertia		J: kg·m² (oz-in²)	380×10⁻⁷ (2.1) [500×10⁻⁷ (2.7)]*1					
Gear Ratio			5	7.2	10	25	36	50
Resolution		Resolution Setting: 1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse	0.0144°/Pulse	0.01°/Pulse	0.0072°/Pulse
Permissible Torque		N·m (lb-in)	3.5 (30)	4 (35)	5 (44)	8 (70)		
Maximum Torque		N·m (lb-in)	7 (61)	9 (79)	11 (97)	16 (141)	20 (177)	
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	2.5 (22)	3.6 (31)	5 (44)	7.6 (67)	8 (70)	
	Electromagnetic Brake	N·m (lb-in)	2.5 (22)	3.6 (31)	5 (44)	7.6 (67)	8 (70)	
Permissible Speed Range		r/min	0～600	0～416	0～300	0～120	0～83	0～60
Backlash		arc min (degrees)	2 (0.034)			3 (0.05)		
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%*2					
	Maximum Input Current	A	3.1					
Electromagnetic Brake*3	Power Supply Input		24 VDC±5%*4 0.25 A					

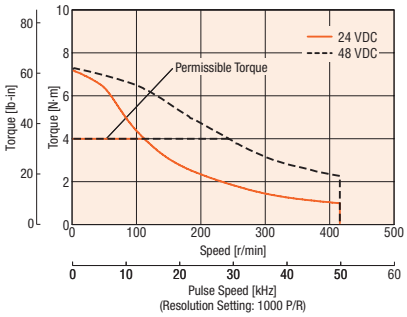
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

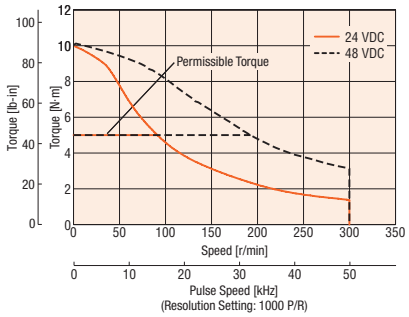
AR66 Gear Ratio **5**



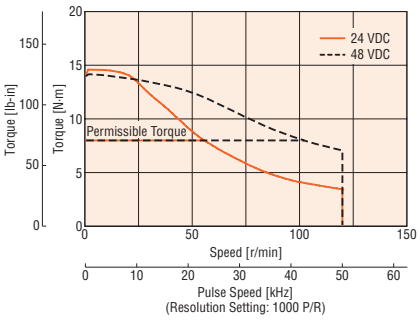
AR66 Gear Ratio **7.2**



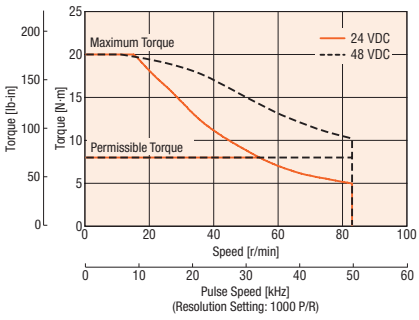
AR66 Gear Ratio **10**



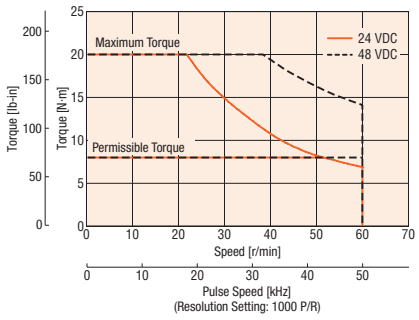
AR66 Gear Ratio **25**



AR66 Gear Ratio **36**



AR66 Gear Ratio **50**



Note

● Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

PN Geared Type Motor Frame Size 90 mm (3.54 in.)

Specifications RoHS

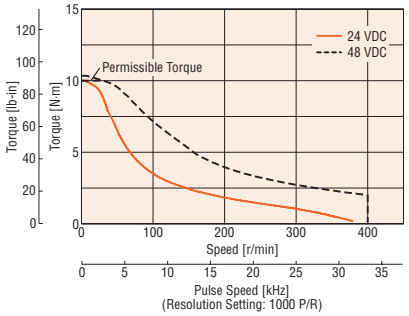
CE

Model	Single Shaft	AR98AK-N5-3	AR98AK-N7.2-3	AR98AK-N10-3	AR98AK-N25-3	AR98AK-N36-3	AR98AK-N50-3
	Electromagnetic Brake	AR98MK-N5-3	AR98MK-N7.2-3	AR98MK-N10-3	AR98MK-N25-3	AR98MK-N36-3	AR98MK-N50-3
Maximum Holding Torque	N·m (lb-in)	10 (88)	14 (123)	20 (177)	37 (320)		
Rotor Inertia	J: kg·m² (oz-in²)	1100×10⁻⁷ (6.0) [1220×10⁻⁷ (6.7)]*1					
Gear Ratio		5	7.2	10	25	36	50
Resolution	Resolution Setting:1000P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse	0.0144°/Pulse	0.01°/Pulse	0.0072°/Pulse
Permissible Torque	N·m (lb-in)	10 (88)	14 (123)	20 (177)	37 (320)		
Maximum Torque	N·m (lb-in)	28 (240)	35 (300)		56 (490)	60 (530)	
Holding Torque at Motor Standstill	Power ON N·m (lb-in)	5 (44)	7.2 (63)	10 (88)	25 (220)	36 (310)	37 (320)
	Electromagnetic Brake N·m (lb-in)	5 (44)	7.2 (63)	10 (88)	25 (220)	36 (310)	37 (320)
Permissible Speed Range	r/min	0～400	0～277	0～200	0～80	0～55	0～40
Backlash	arc min (degrees)	2 (0.034)			3 (0.05)		
Power Source	Voltage	24 VDC±10%/48 VDC±5%*2					
	Maximum Input Current A	2.5					
Electromagnetic Brake*3	Power Supply Input	24 VDC±5%*4 0.25 A					

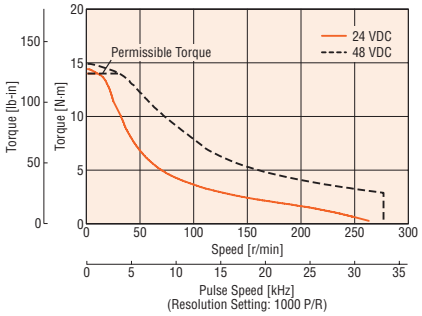
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Speed – Torque Characteristics

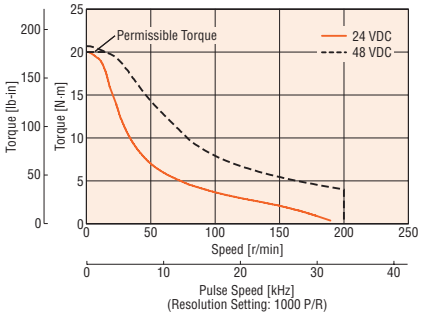
AR98 Gear Ratio 5



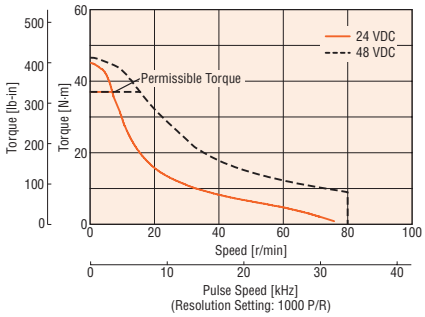
AR98 Gear Ratio 7.2



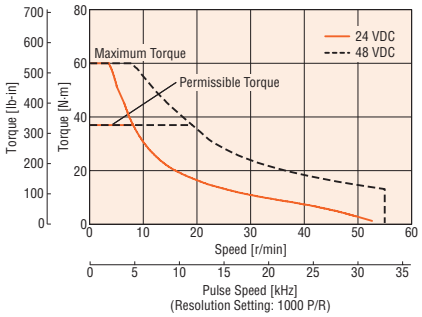
AR98 Gear Ratio 10



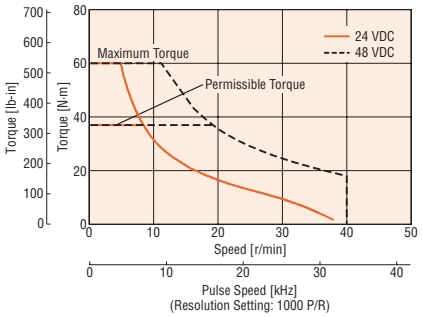
AR98 Gear Ratio 25



AR98 Gear Ratio 36



AR98 Gear Ratio 50



Note

● Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).

Harmonic Geared Type Motor Frame Size 30 mm (1.18 in.), 42 mm (1.65 in.)

Specifications RoHS

CE

Model	Single Shaft	AR24SAK-H50-3	AR24SAK-H100-3	AR46AK-H50-3	AR46AK-H100-3
	Electromagnetic Brake	–	–	AR46MK-H50-3	AR46MK-H100-3
Maximum Holding Torque	N·m (oz-in)	1.8 (250)	2.4 (340)	3.5 (30)	5 (44)
Rotor Inertia	J: kg·m² (oz-in²)	14×10^{-7} (0.077)		75×10^{-7} (0.41) [90×10^{-7} (0.49)]*1	
Gear Ratio		50	100	50	100
Resolution	Resolution Setting: 1000P/R	0.0072°/Pulse	0.0036°/Pulse	0.0072°/Pulse	0.0036°/Pulse
Permissible Torque	N·m (oz-in)	1.8 (250)	2.4 (340)	3.5 (30)	5 (44)
Maximum Torque	N·m (oz-in)	3.3 (460)	4.8 (680)	8.3 (73)	11 (97)
Holding Torque at Motor Standstill — Power ON	N·m (oz-in)	1.3 (184)	2.4 (340)	3.5 (30)	5 (44)
Holding Torque at Motor Standstill — Electromagnetic Brake	N·m (oz-in)	–	–	3.5 (30)	5 (44)
Lost Motion (Load Torque)	arc min	1.5 max (±0.09 N·m)	1.5 max (±0.12 N·m)	1.5 max (±0.16 N·m)	1.5 max (±0.2 N·m)
Permissible Speed Range	r/min	0~70	0~35	0~70	0~35
Power Supply Input — Voltage		24 VDC±10%		24 VDC±10%/48 VDC±5%	
Power Supply Input — Maximum Input Current	A	0.9		1.4	
Electromagnetic Brake*2 — Power Supply Input		–	–	24 VDC±5%*3 0.08A	

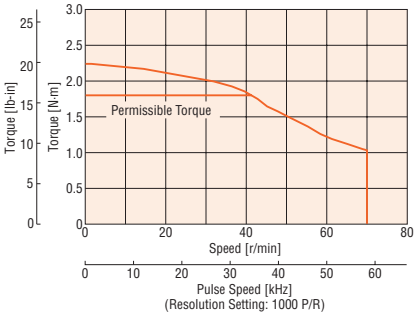
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 A separate power supply is required for the electromagnetic brakes.
*3 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Note

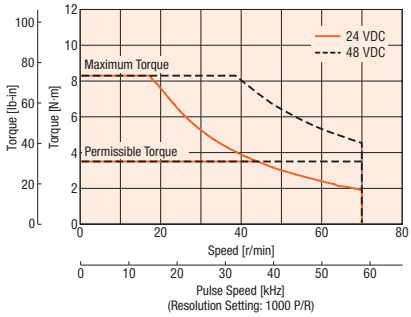
- The inertia represents a sum of the inertia of the harmonic gear converted to a motor shaft value, and the rotor inertia.

Speed – Torque Characteristics

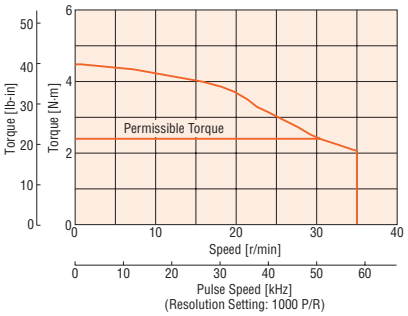
AR24 Gear Ratio 50



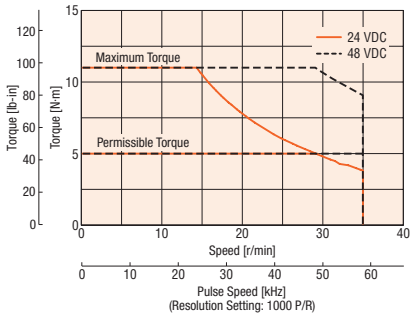
AR46 Gear Ratio 50



AR24 Gear Ratio 100



AR46 Gear Ratio 100



Notes

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).
- In order to prevent fatigue of the gear grease in the harmonic gear, keep the temperature of the gear case under 70°C (158°F).

Harmonic Geared Type Motor Frame Size 60 mm (2.36 in.), 90 mm (3.54 in.)

Specifications RoHS

Model		Single Shaft	AR66AK-H50-3	AR66AK-H100-3	AR98AK-H50-3	AR98AK-H100-3
		Electromagnetic Brake	AR66MK-H50-3	AR66MK-H100-3	AR98MK-H50-3	AR98MK-H100-3
Maximum Holding Torque		N·m (lb-in)	5.5 (48)	8 (70)	25 (220)	37 (320)
Rotor Inertia		J: kg·m² (oz-in²)	415×10⁻⁷ (2.3) [535×10⁻⁷ (2.9)]*1		1300×10⁻⁷ (7.1) [1420×10⁻⁷ (7.8)]*1	
Gear Ratio			50	100	50	100
Resolution		Resolution Setting:1000P/R	0.0072°/Pulse	0.0036°/Pulse	0.0072°/Pulse	0.0036°/Pulse
Permissible Torque		N·m (lb-in)	5.5 (48)	8 (70)	25 (220)	37 (320)
Maximum Torque		N·m (lb-in)	18 (159)	28 (240)	35 (300)	55 (480)
Holding Torque at Motor Standstill	Power ON	N·m (lb-in)	5.5 (48)	8 (70)	25 (220)	37 (320)
	Electromagnetic Brake	N·m (lb-in)	5.5 (48)	8 (70)	25 (220)	37 (320)
Lost Motion (Load Torque)		arc min	0.7 max (±0.28 N·m)	0.7 max (±0.39 N·m)	1.5 max (±1.2 N·m)	
Permissible Speed Range		r/min	0～60	0～30	0～40	0～20
Power Supply Input	Voltage		24 VDC±10%/48 VDC±5%*2			
	Maximum Input Current	A	3.1		2.5	
Electromagnetic Brake*3	Power Supply Input		24 VDC±5%*4 0.25 A			

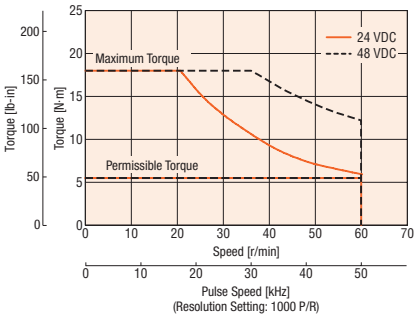
*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.
*2 When running the motor at 48 VDC, the load inertia should be under 10 times of the rotor inertia and allow for a safety factor of 2 or more times the required torque.
*3 A separate power supply is required for the electromagnetic brakes.
*4 If the distance between the motor and driver is extended to 20 m (65.6 ft.) or longer, use a power supply of 24 VDC±4%.

Note

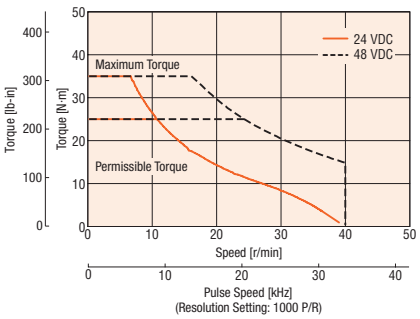
- The inertia represents a sum of the inertia of the harmonic gear converted to a motor shaft value, and the rotor inertia.

Speed – Torque Characteristics

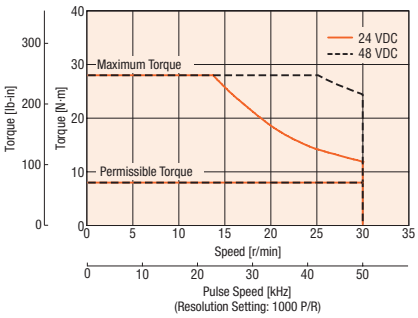
AR66 Gear Ratio 50



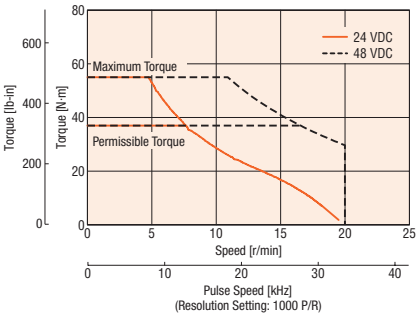
AR98 Gear Ratio 50



AR66 Gear Ratio 100



AR98 Gear Ratio 100



Notes

- Pay attention to heat dissipation from the motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).
- In order to prevent fatigue of the gear grease in the harmonic gear, keep the temperature of the gear case under 70°C (158°F).

Driver Specifications

Speed and Positioning Control Command	Pulse input
Maximum Input Pulse Frequency	When the host controller is a line driver output: 500 kHz (When the pulse duty is 50%) When the host controller is an open-collector output: 250 kHz (When the pulse duty is 50%)*
Protective Functions	When the following protective functions are activated, an alarm signal is output and the motor will coast to a stop. Overheat, Overload, Overspeed, Command pulse error, Overvoltage, Undervoltage, Overflow rotation during current on, Overflow rotation during current off, Abnormal operation data, Electronic gear setting error, Sensor error during operation, Initial sensor error, Initial rotor rotation error, Motor combination error, EEPROM error
Input Signals	Photocoupler input, Input resistance: 3 kΩ, Input signal voltage: 4.75 to 26.4 V (C-ON, FREE, CS, RETURN, P-RESET, CLR/ALM-RST, CCM, M0, M1, M2) Photocoupler input, Input resistance: 200 Ω, Input signal voltage: 3 to 5.25 V (CW/PLS, CCW/DIR) Photocoupler input, Input resistance: 2.7 kΩ, Input signal voltage: 21.6 to 26.4 V (CW24V/PLS24V, CCW24V/DIR24V)
Output Signals	Photocoupler, Open-collector output External use condition: 30 VDC maximum, 10 mA maximum (READY, TLC, END, TIM2, WNG, ALM) Line driver output External use condition: Connect a terminal resistor of 100 Ω or more between the driver and the input of the line receiver. (TIM1, ASG, BSG)
Other Functions	· Motor resolution setting function (4 levels) · Current setting function (16 levels) · Velocity filter function (16 levels) · Pulse input setting function (2-pulse input, 1-pulse input) · Current control mode function
Extended Functions [When the control module (**OPX-2A**) or data setting software (**MEXE02**) (both sold separately) is used]	· Push-motion operation function (8 current levels; desired levels can be set within a range of 0 to 100%) · Motor resolution setting function (electronic gear) · Alarm code output function (3 bits) · Current setting function (16 levels; desired levels can be set within a range of 0 to 100%) · Velocity filter function (16 levels; desired levels can be set within a range of 0 to 200 ms) · Current ON (C-ON) input logic setting function · Positioning completion (END) signal width setting function · Positioning completion (END) signal offset setting function · Standstill current setting function · Return operation setting function (starting speed, acceleration/deceleration rate, operating speed) · JOG operation setting function (starting speed, acceleration/deceleration rate, operating speed) · **OPX-2A** display setting function (gear output shaft speed, speed code display, setting change prohibition) · Pulse input setting function (2-pulse, 1-pulse, logic, phase difference, multiplication) · Smooth drive cancellation · Motor excitation position setting function at power ON · Excitation position reset operation function at current ON · Motor rotation direction setting function · Warning output setting function (overflow rotation during current on, overflow rotation during current off, overheat, overvoltage, undervoltage, overload, overspeed, abnormal operation data, electronic gear setting error)

*Value applies when an accessory general-purpose cable (**CC36D1-1**) is used. General-purpose cable ➜ Page A-402

General Specifications

Item		Motor	Driver
Thermal Class		130 (B)	–
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the following places: · Case – Motor and sensor windings · Case – Electromagnetic brake windings	–
Dielectric Strength		Sufficient to withstand the following for 1 minute: · Case – Motor and sensor windings 1.0 kVAC 50 Hz or 60 Hz · Case – Electromagnetic brake windings 1.0 kVAC 50 Hz or 60 Hz	–
Operating Environment	Ambient Temperature	−10～+50°C (+14～+122°F) (non-freezing)*1: Step Angle 0.36° Standard type, **TH**, **PS**, **PN** geared type 0～+40°C (+32～+104°F) (non-freezing)*1: Harmonic geared type	0～+50°C (+32～+122°F) (non-freezing)
	Ambient Humidity	85% or less (non-condensing)	
	Atmosphere	No corrosive gases, dust, water or oil	
Degree of Protection		IP54 (Double shaft type, **AR24** and **AR26**: IP20)*2	IP20
Stop Position Accuracy		**AR24**, **AR26**, **AR46**: ±4 arc minutes (±0.067°) **AR66**, **AR69**, **AR98**: ±3 arc minutes (±0.05°)	
Shaft Runout		0.05 mm (0.002 in) T.I.R.*3	–
Concentricity		0.075 mm (0.003 in) T.I.R.*3	–
Perpendicularity		0.075 mm (0.003 in) T.I.R.*3	–

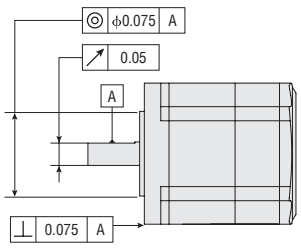
*1 When a heat sink of a capacity at least equivalent to an aluminum plate with a size of 100×100 mm (3.94×3.94 in), 6 mm (0.24 in.) thick is installed.
*2 Excluding the mounting surface and connector
*3 T.I.R. (Total Indicator Reading): The total dial gauge reading when the measurement section is rotated one revolution centered on the reference axis center.

Note

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

Permissible Overhung Load and Permissible Thrust Load

➜ Page A-14



Load Torque – Driver Input Current Characteristics

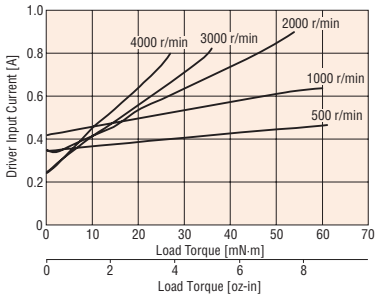
This is the relationship between the load torque and driver input current at each speed when the motor is operated. From these characteristics, the current capacity required when used for multiple axes can be estimated. For geared motors, convert to torque and speed at the motor shaft.

Motor shaft speed [r/min] = Gear output shaft speed×Gear ratio

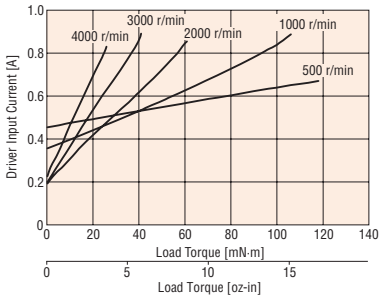
$$\text{Motor shaft torque [N·m (oz-in)]} = \frac{\text{Gear output shaft torque}}{\text{Gear ratio}}$$

●24 VDC

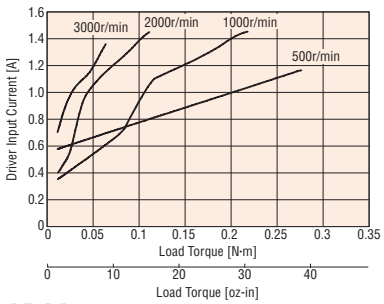
AR24



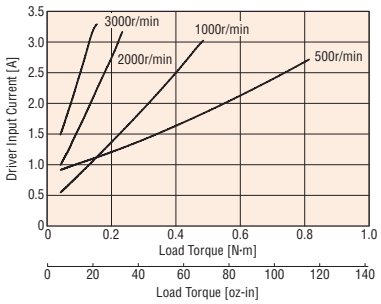
AR26



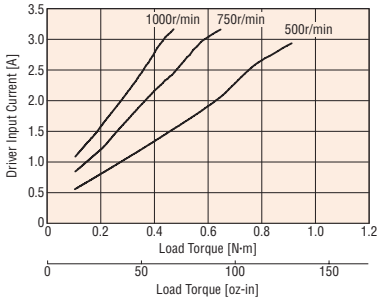
AR46



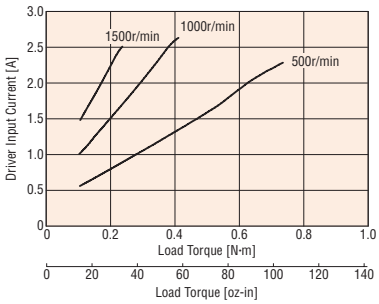
AR66



AR69

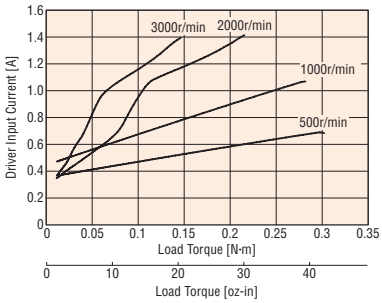


AR98

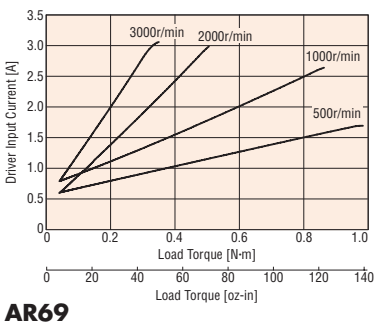


●48 VDC

AR46



AR66



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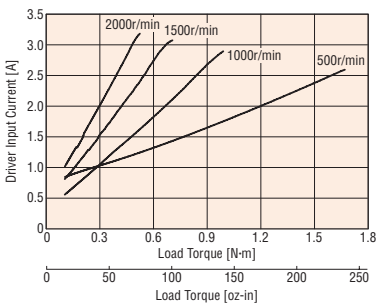

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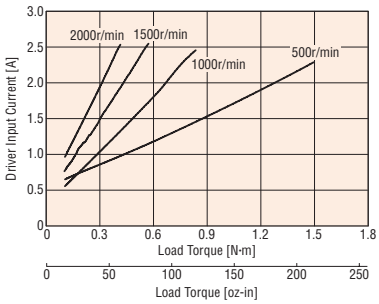


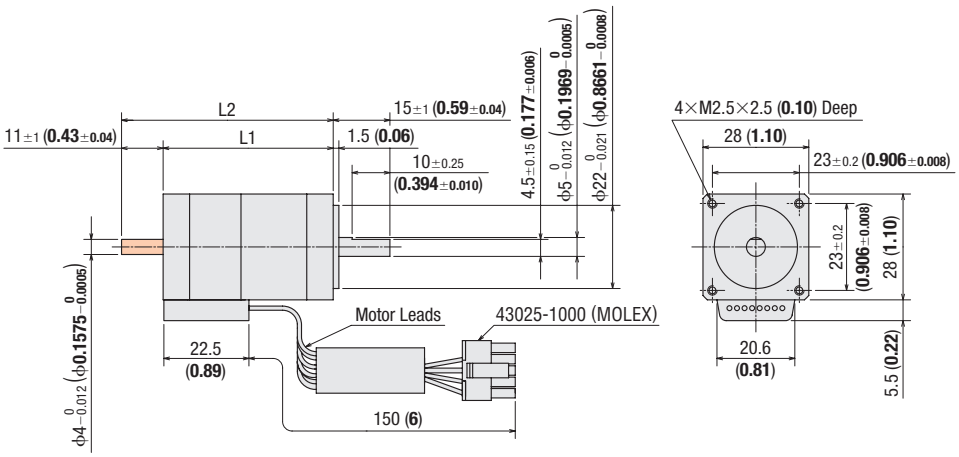
Dimensions Unit = mm (in.)

Motor

◇Step Angle 0.36° Standard Type

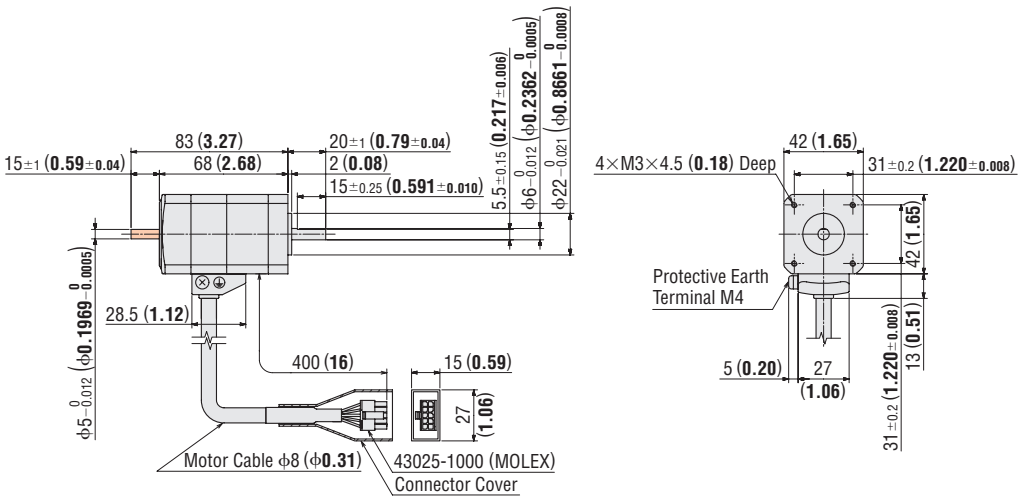
Motor Frame Size 28 mm (1.10 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	DXF
AR24SAK-3	ARM24SAK	45 (1.77)	–	0.15 (5.3)	B705
AR24SBK-3	ARM24SBK		56 (2.20)		
AR26SAK-3	ARM26SAK	65 (2.56)	–	0.22 (7.8)	B706
AR26SBK-3	ARM26SBK		76 (2.99)		



Motor Frame Size 42 mm (1.65 in.)

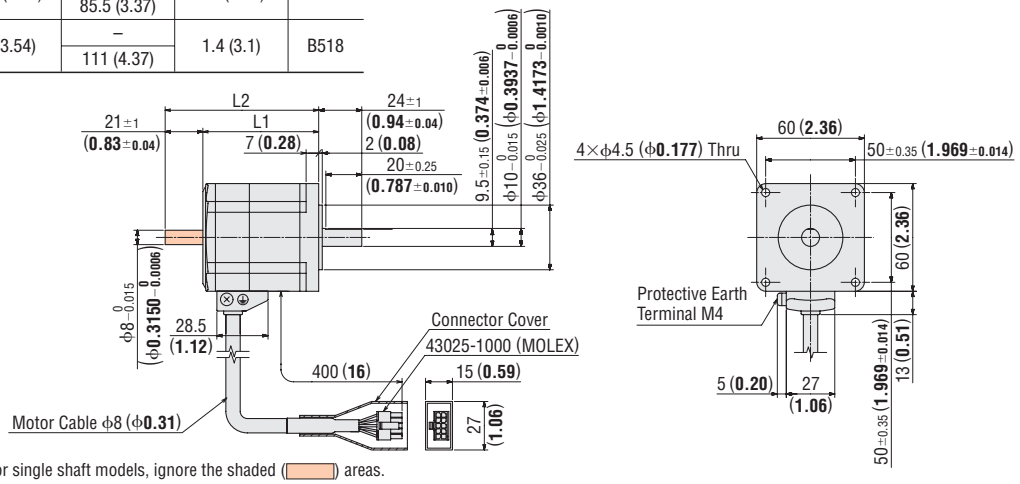
Model	Motor Model	Mass kg (lb.)	DXF
AR46AK-3	ARM46AK	0.47 (1.03)	B516
AR46BK-3	ARM46BK		



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

Motor Frame Size 60 mm (2.36 in.)

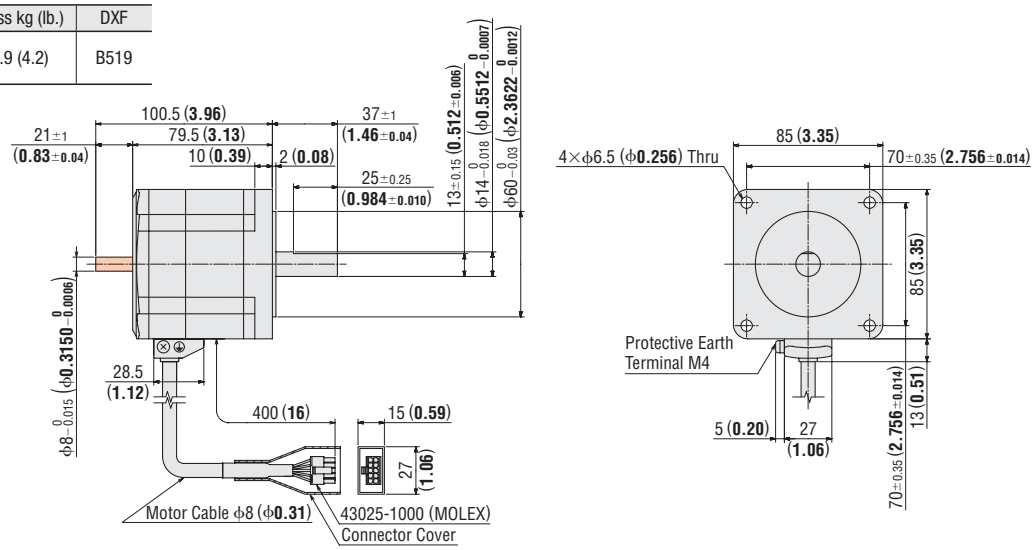
Model	Motor Model	L1	L2	Mass kg (lb.)	DXF
AR66AK-3	ARM66AK	64.5 (2.54)	–	0.9 (1.98)	B517
AR66BK-3	ARM66BK		85.5 (3.37)		
AR69AK-3	ARM69AK	90 (3.54)	–	1.4 (3.1)	B518
AR69BK-3	ARM69BK		111 (4.37)		



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

Motor Frame Size 85 mm (3.35 in.)

Model	Motor Model	Mass kg (lb.)	DXF
AR98AK-3	ARM98AK	1.9 (4.2)	B519
AR98BK-3	ARM98BK		

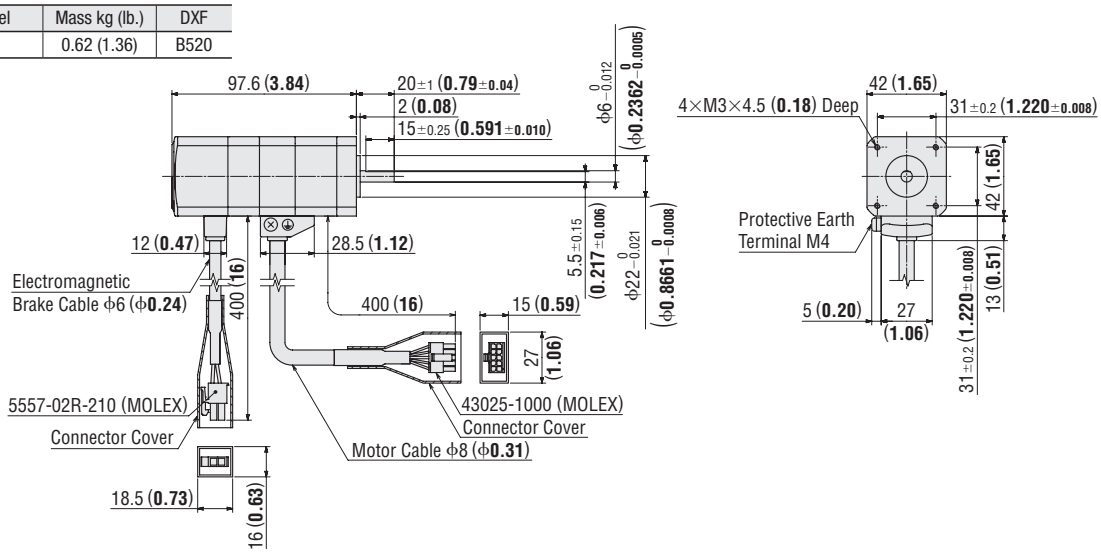


● These dimensions are for double shaft models. For single shaft models, ignore the shaded ( ) areas.

◇Step Angle 0.36° Standard Type with Electromagnetic Brake

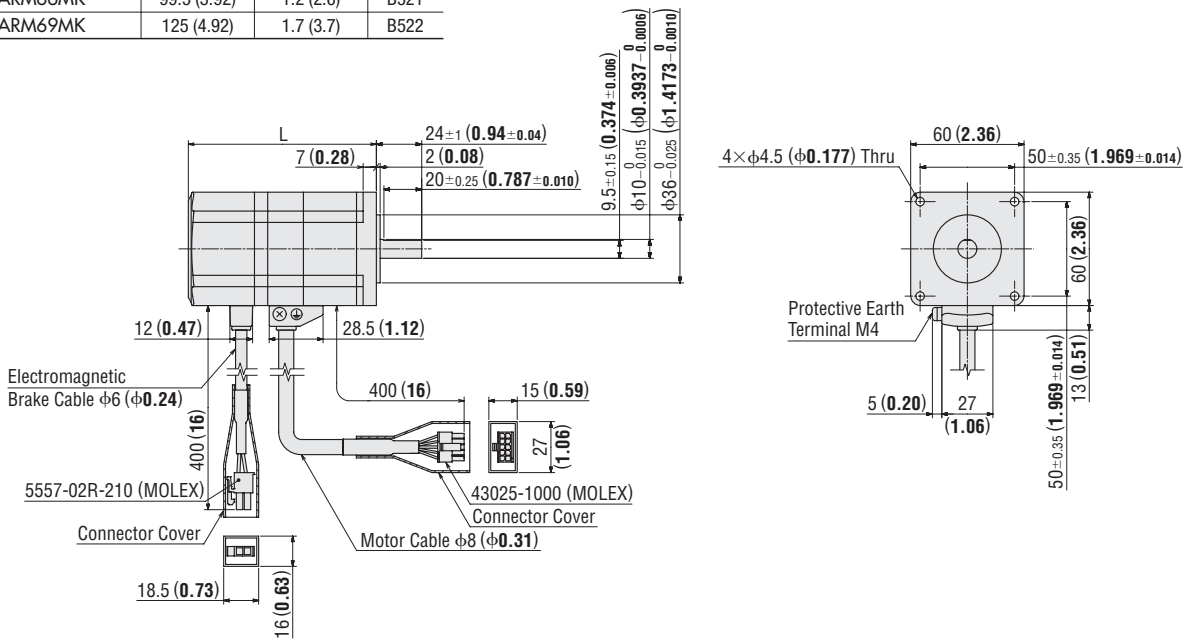
Motor Frame Size 42 mm (1.65 in.)

Model	Motor Model	Mass kg (lb.)	DXF
AR46MK-3	ARM46MK	0.62 (1.36)	B520



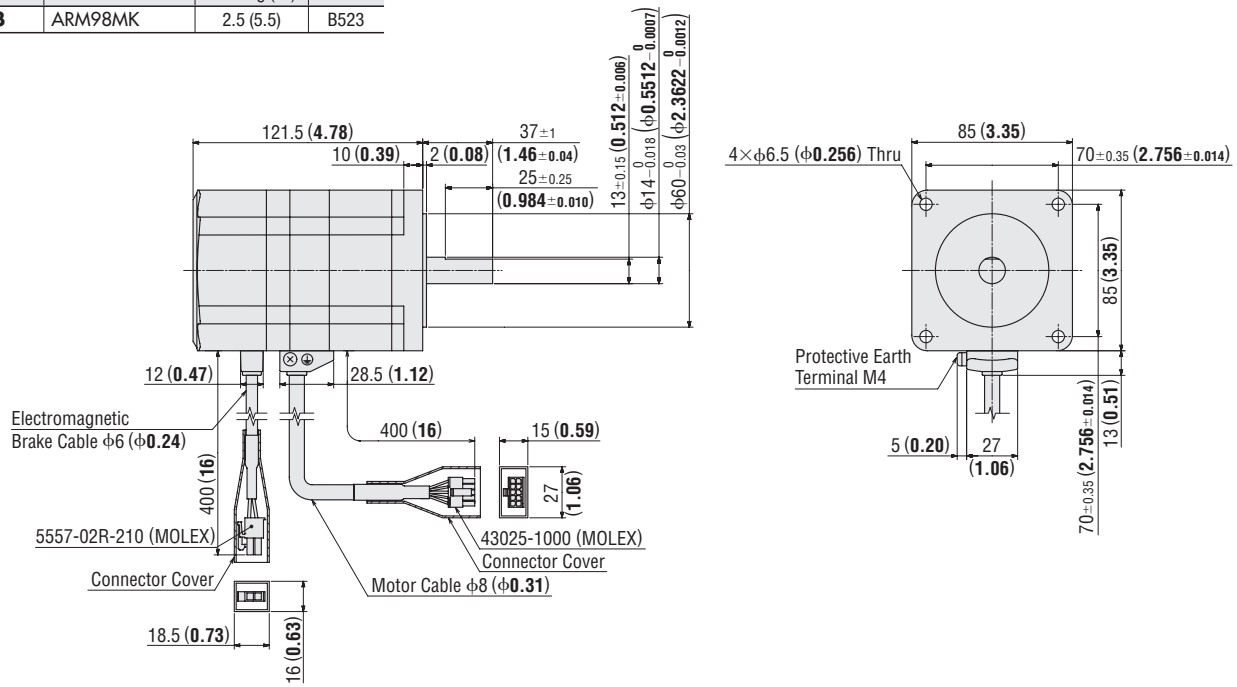
Motor Frame Size 60 mm (2.36 in.)

Model	Motor Model	L	Mass kg (lb.)	DXF
AR66MK-3	ARM66MK	99.5 (3.92)	1.2 (2.6)	B521
AR69MK-3	ARM69MK	125 (4.92)	1.7 (3.7)	B522



Motor Frame Size 85 mm (3.35 in.)

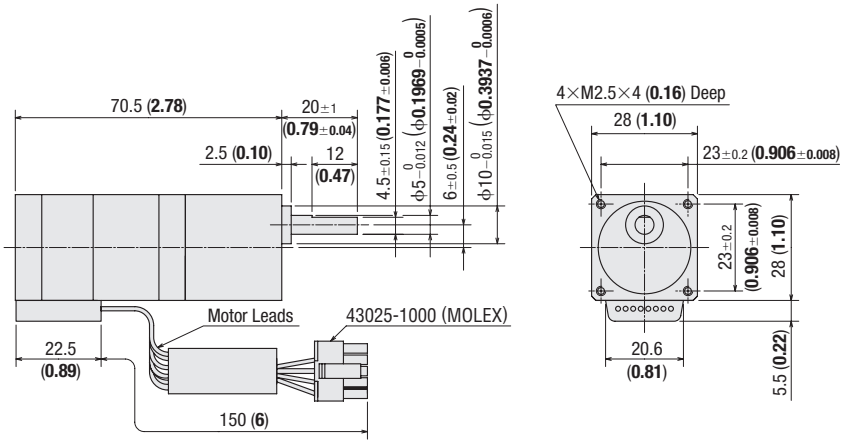
Model	Motor Model	Mass kg (lb.)	DXF
AR98MK-3	ARM98MK	2.5 (5.5)	B523



◇TH Geared Type

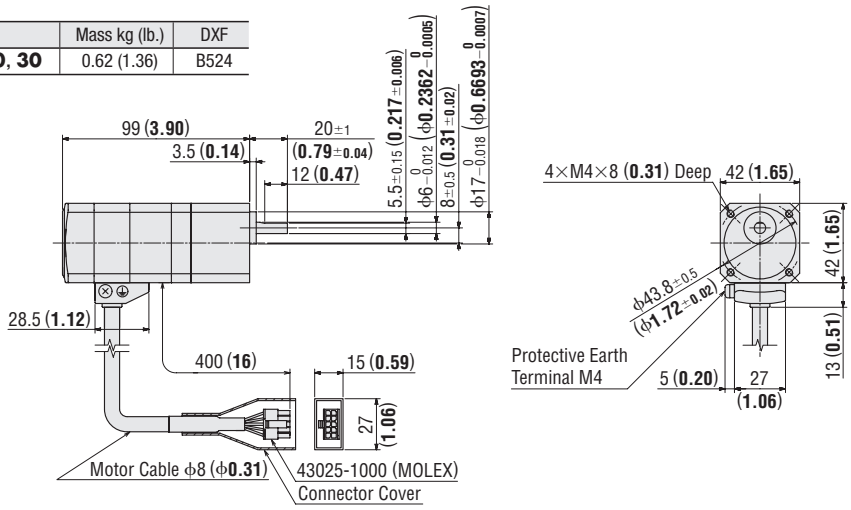
Motor Frame Size 28 mm (1.10 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR24SAK-T□-3	ARM24SAK-T□	**7.2**, **10**, **20**, **30**	0.21 (7.4)	B707



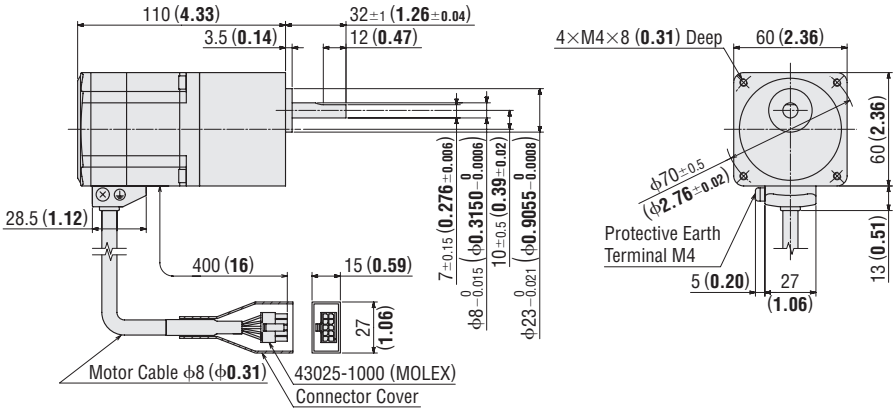
Motor Frame Size 42 mm (1.65 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR46AK-T□-3	ARM46AK-T□	**3.6**, **7.2**, **10**, **20**, **30**	0.62 (1.36)	B524



Motor Frame Size 60 mm (2.36 in.)

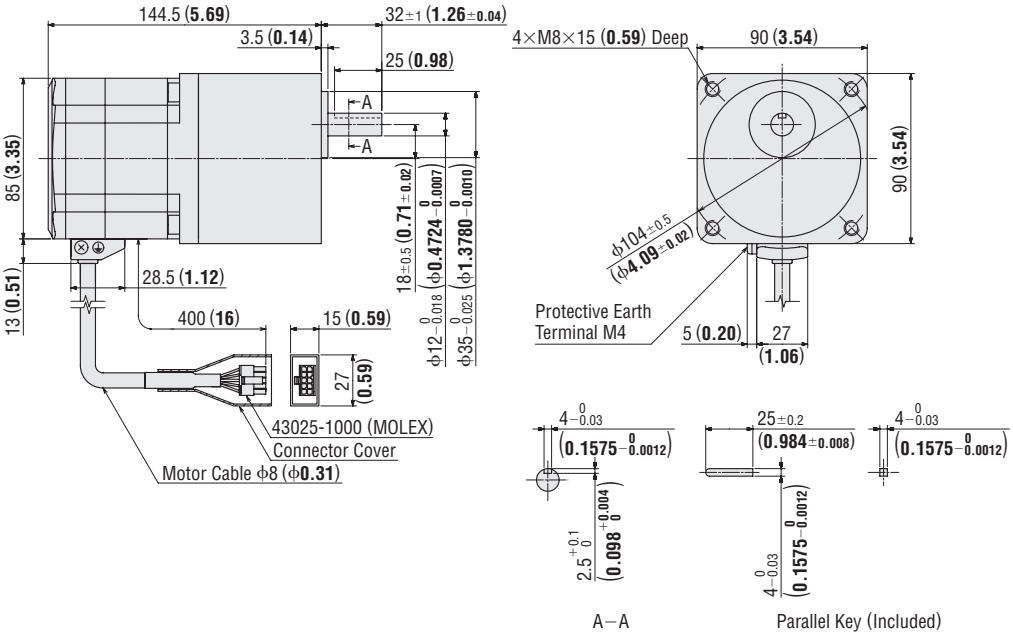
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR66AK-T□-3	ARM66AK-T□	**3.6**, **7.2**, **10**, **20**, **30**	1.3 (2.9)	B525



● A number indicating the gear ratio is entered where the box (□) is located within the model name.

Motor Frame Size 90 mm (3.54 in.)

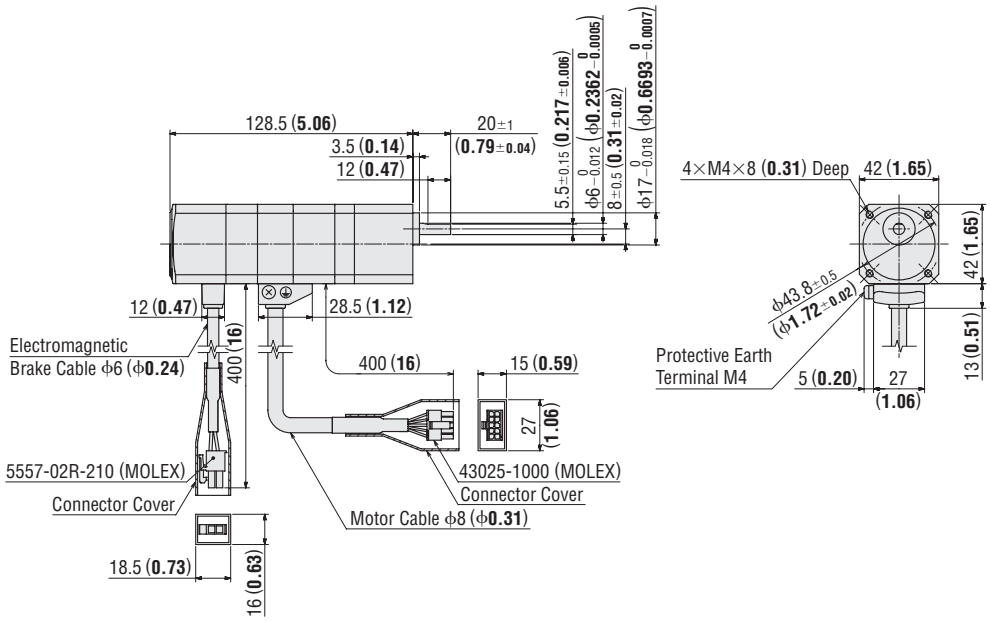
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR98AK-T□-3	ARM98AK-T□	**3.6, 7.2, 10, 20, 30**	3.1 (6.8)	B526



◇TH Geared Type with Electromagnetic Brake

Motor Frame Size 42 mm (1.65 in.)

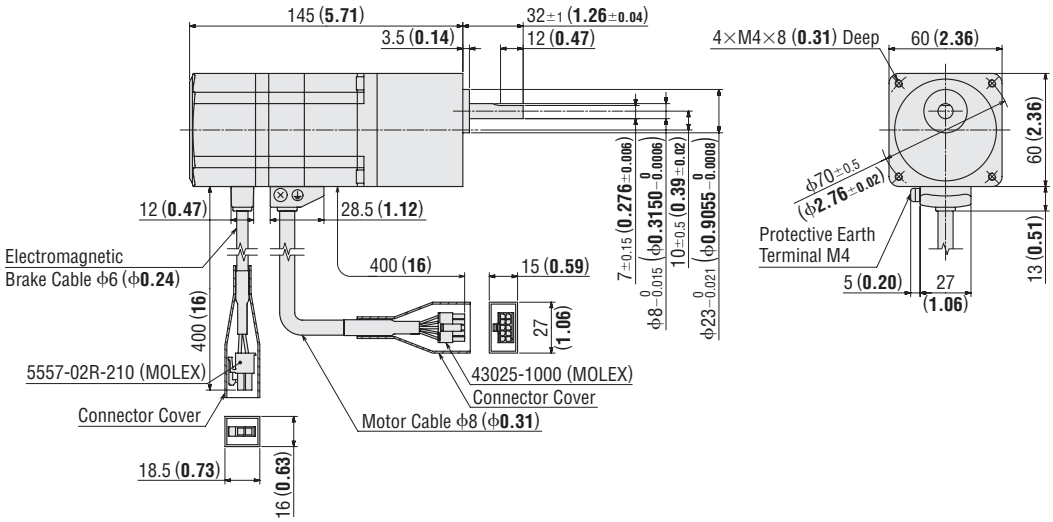
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR46MK-T□-3	ARM46MK-T□	**3.6, 7.2, 10, 20, 30**	0.77 (1.69)	B527



● A number indicating the gear ratio is entered where the box (□) is located within the model name.

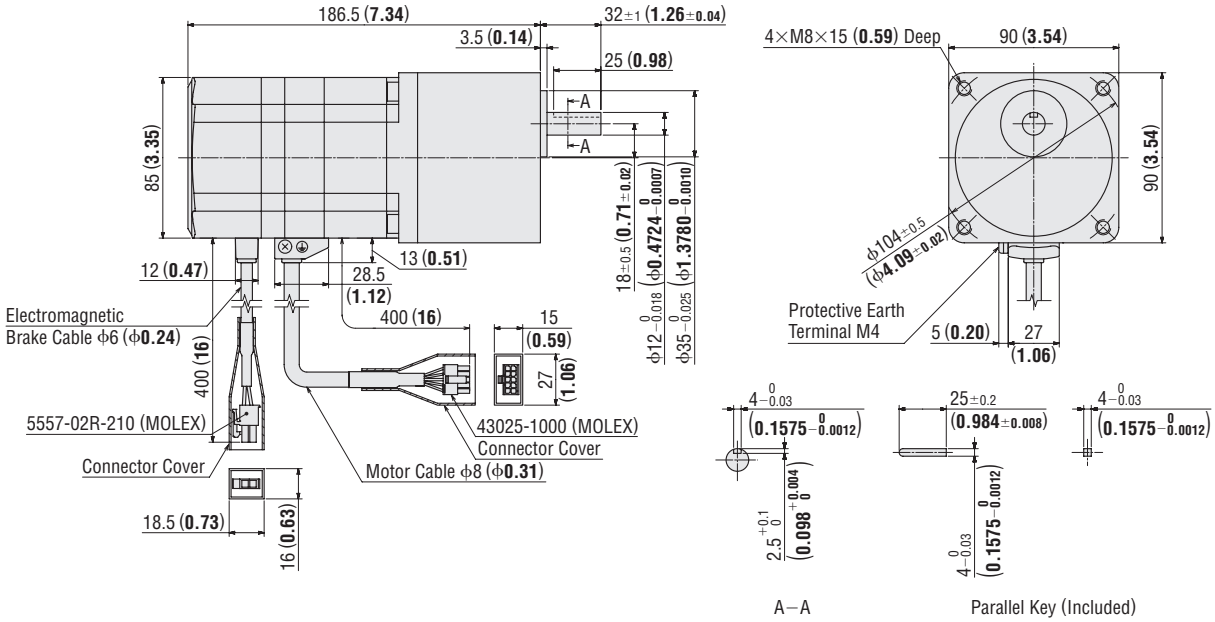
Motor Frame Size 60 mm (2.36 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR66MK-T■-3	ARM66MK-T■	**3.6, 7.2, 10, 20, 30**	1.6 (3.5)	B528



Motor Frame Size 90 mm (3.54 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR98MK-T■-3	ARM98MK-T■	**3.6, 7.2, 10, 20, 30**	3.7 (8.1)	B529

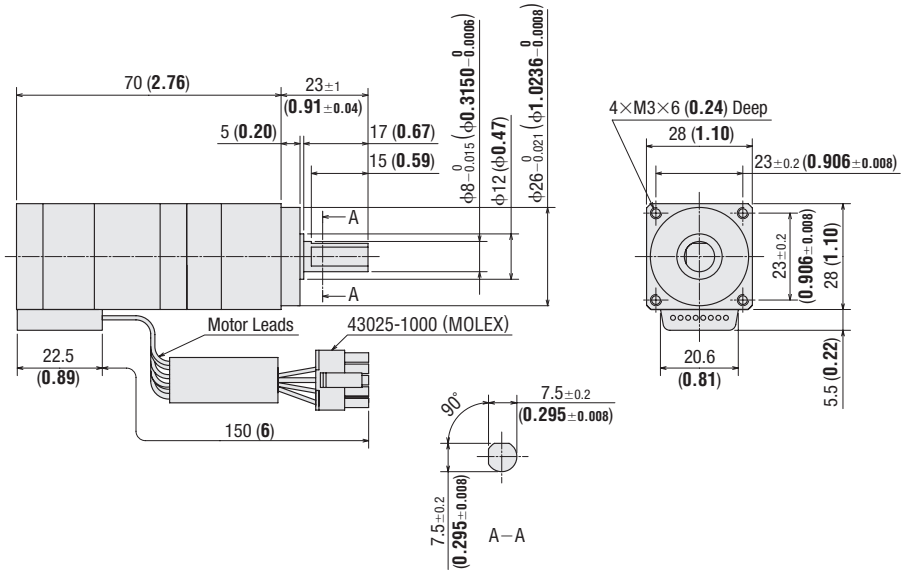


● A number indicating the gear ratio is entered where the box (■) is located within the model name.

◇PS Geared Type

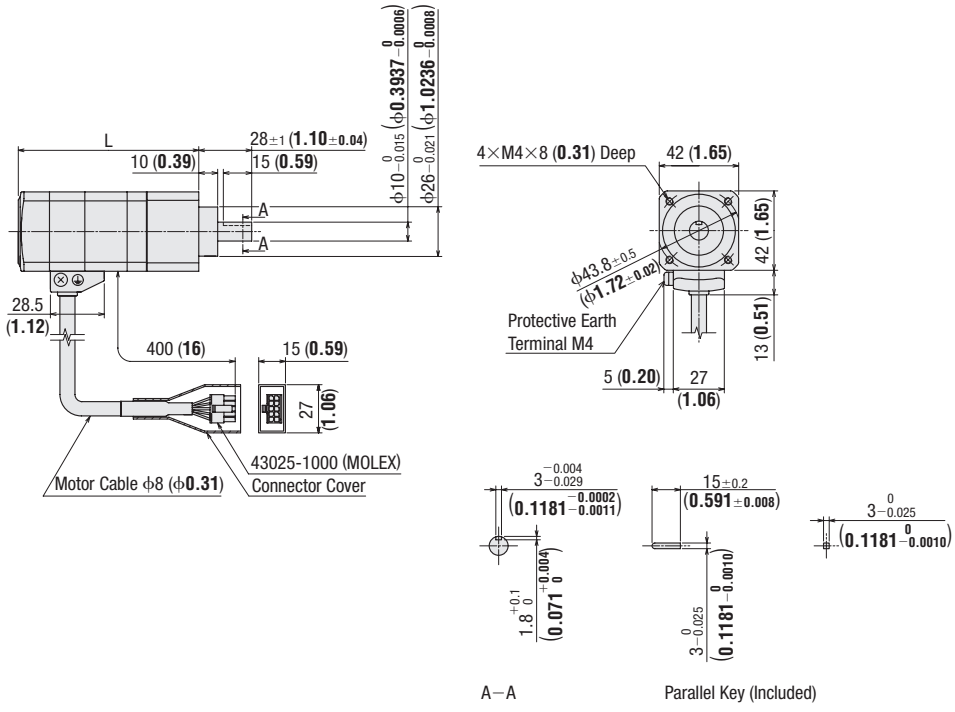
Motor Frame Size 28 mm (1.10 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR24SAK-PS■-3	ARM24SAK-PS■	**5, 7.2, 10**	0.25 (8.8)	B708



Motor Frame Size 42 mm (1.65 in.)

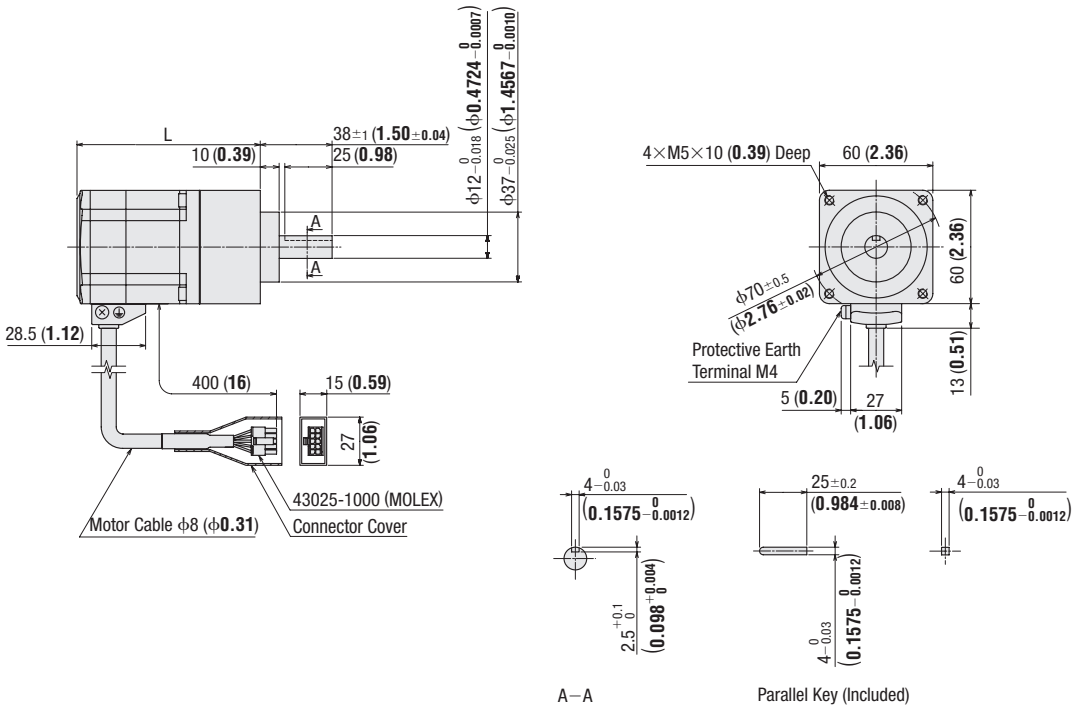
Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR46AK-PS■-3	ARM46AK-PS■	**5, 7.2, 10**	96 (3.78)	0.67 (1.47)	B654
		25, 36, 50	119.5 (4.70)	0.82 (1.80)	B655



● A number indicating the gear ratio is entered where the box (■) is located within the model name.

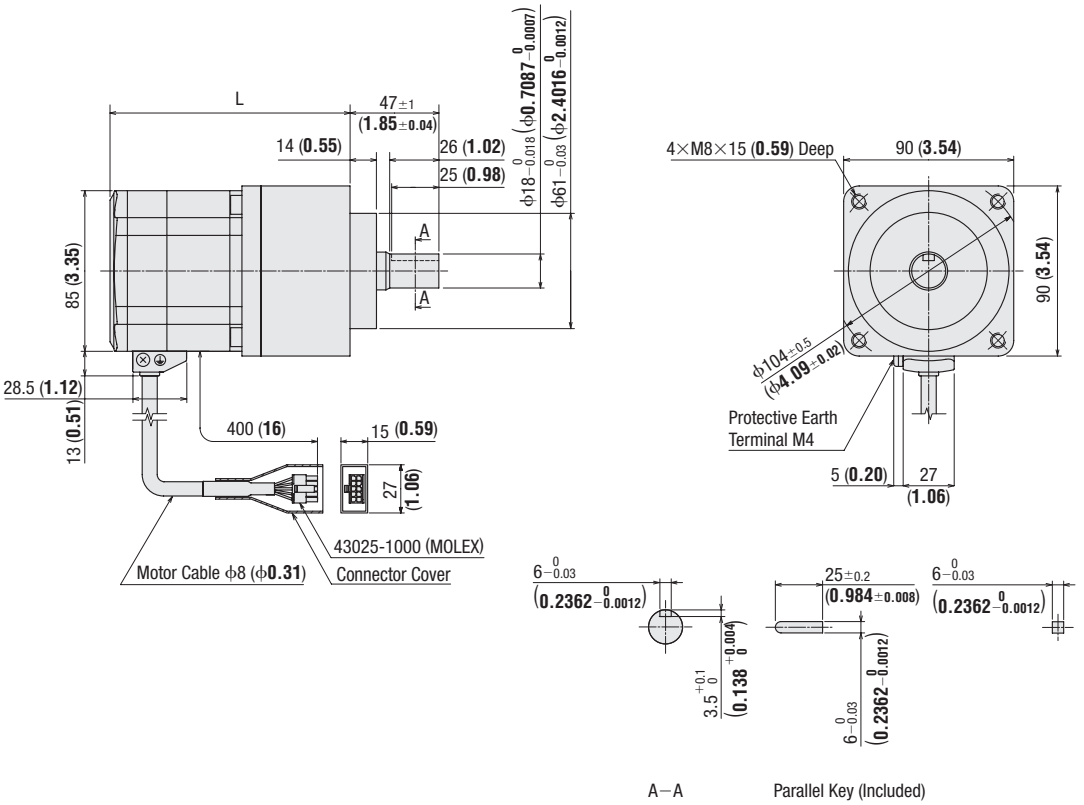
Motor Frame Size 60 mm (2.36 in.)

Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR66AK-PS■-3	ARM66AK-PS■	**5, 7.2, 10**	97 (3.82)	1.3 (2.9)	B658
		25, 36, 50	117 (4.61)	1.6 (3.5)	B659



Motor Frame Size 90 mm (3.54 in.)

Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR98AK-PS■-3	ARM98AK-PS■	**5, 7.2, 10**	127 (5.00)	3.3 (7.3)	B662
		25, 36, 50	154.5 (6.08)	4.1 (9.0)	B663

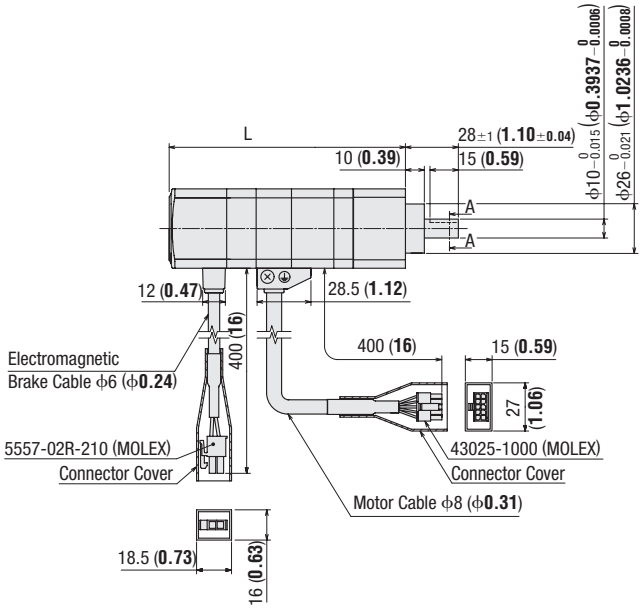


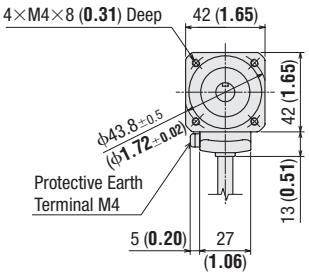
● A number indicating the gear ratio is entered where the box (■) is located within the model name.

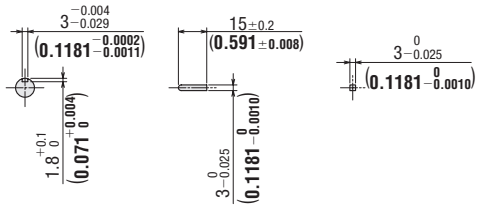
◇**PS** Geared Type with Electromagnetic Breake

Motor Frame Size 42 mm (1.65 in.)

Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR46MK-PS■-3	ARM46MK-PS■	**5, 7.2, 10**	125.5 (4.94)	0.82 (1.80)	B656
		25, 36, 50	149 (5.87)	0.97 (2.1)	B657





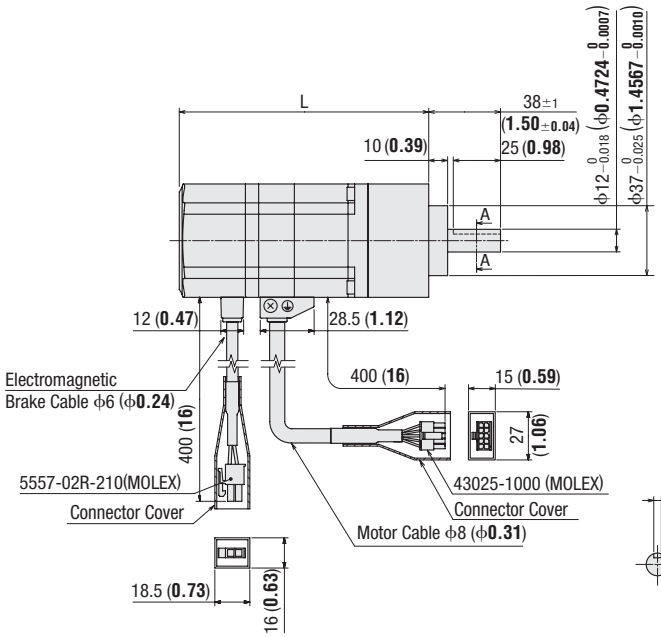


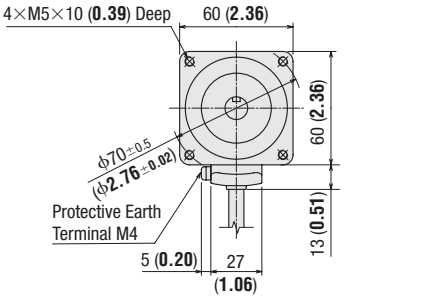
A–A

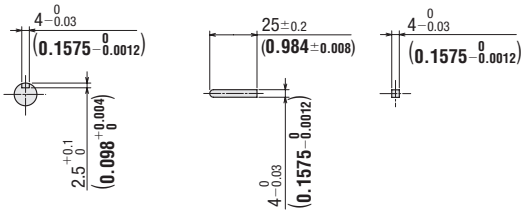
Parallel Key (Included)

Motor Frame Size 60 mm (2.36 in.)

Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR66MK-PS■-3	ARM66MK-PS■	**5, 7.2, 10**	132 (5.20)	1.6 (3.5)	B660
		25, 36, 50	152 (5.98)	1.9 (4.2)	B661







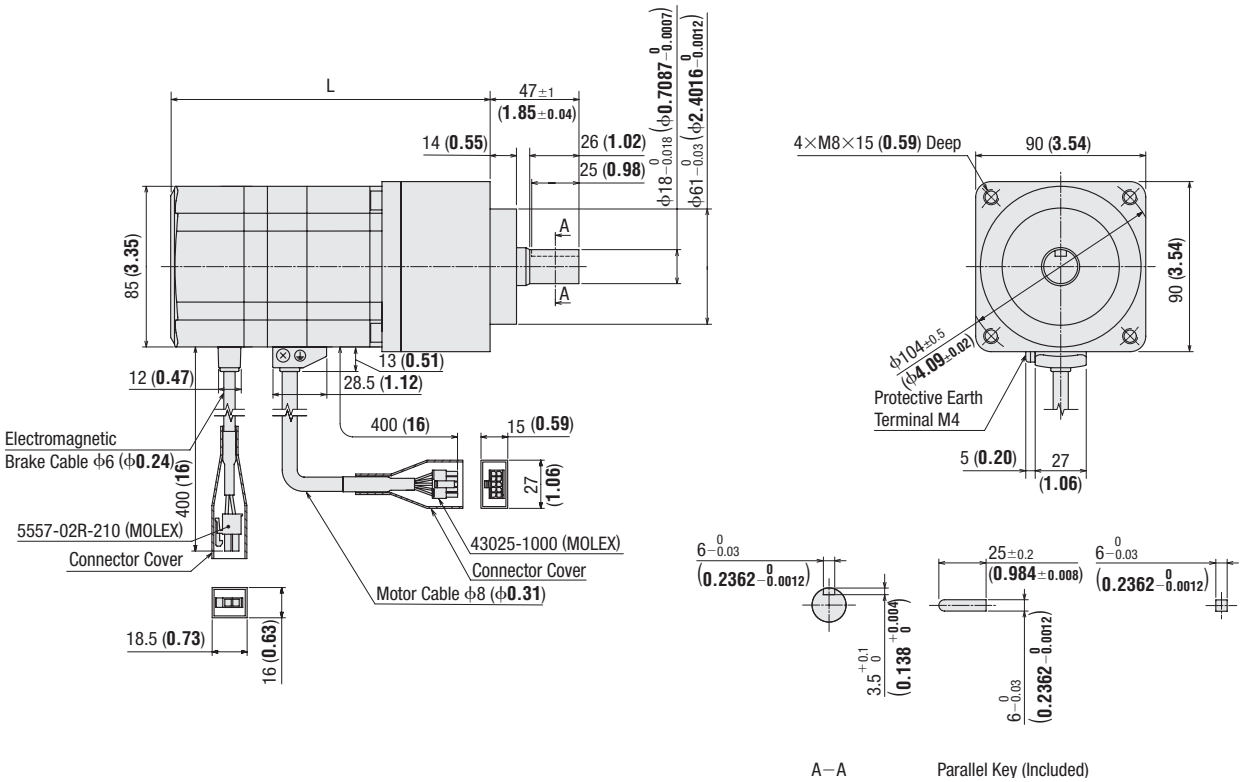
A–A

Parallel Key (Included)

● A number indicating the gear ratio is entered where the box (■) is located within the model name.

Motor Frame Size 90 mm (3.54 in.)

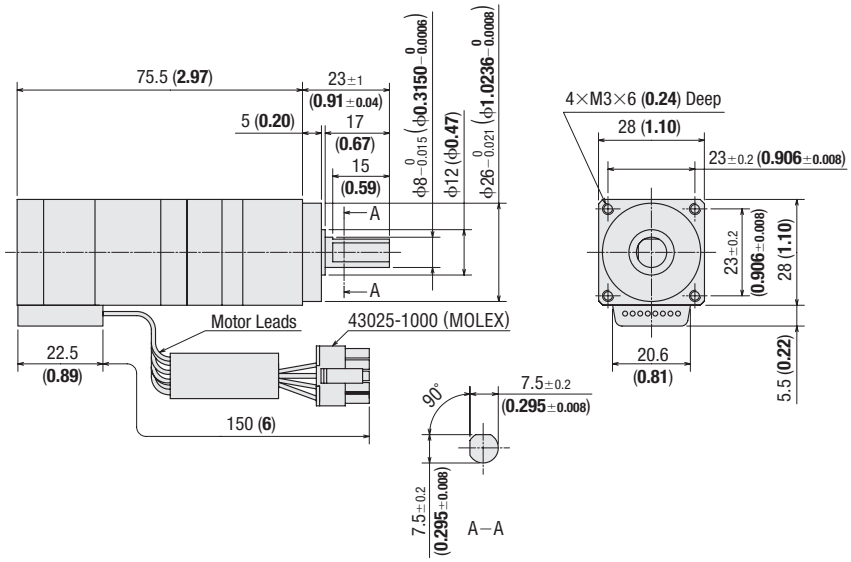
Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR98MK-PS□-3	ARM98MK-PS□	**5, 7.2, 10**	169 (6.65)	3.9 (8.6)	B664
		25, 36, 50	196.5 (7.74)	4.7 (10.3)	B665



◇PN Geared Type

Motor Frame Size 28 mm (1.10 in.)

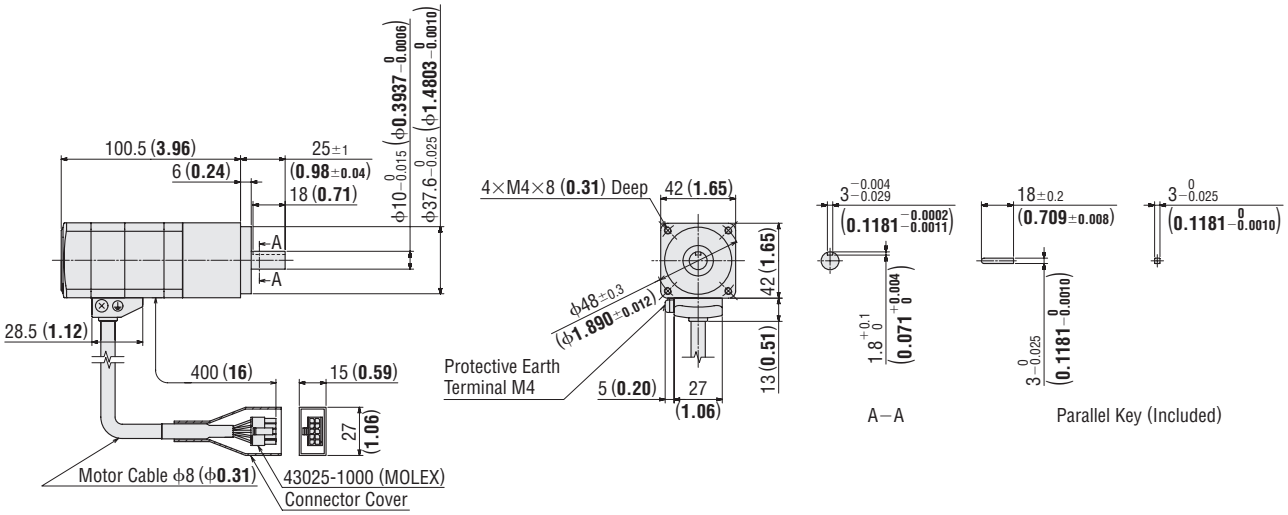
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR24SAK-N□-3	ARM24SAK-N□	**5, 7.2, 10**	0.28 (9.9)	B709



● A number indicating the gear ratio is entered where the box (□) is located within the model name.

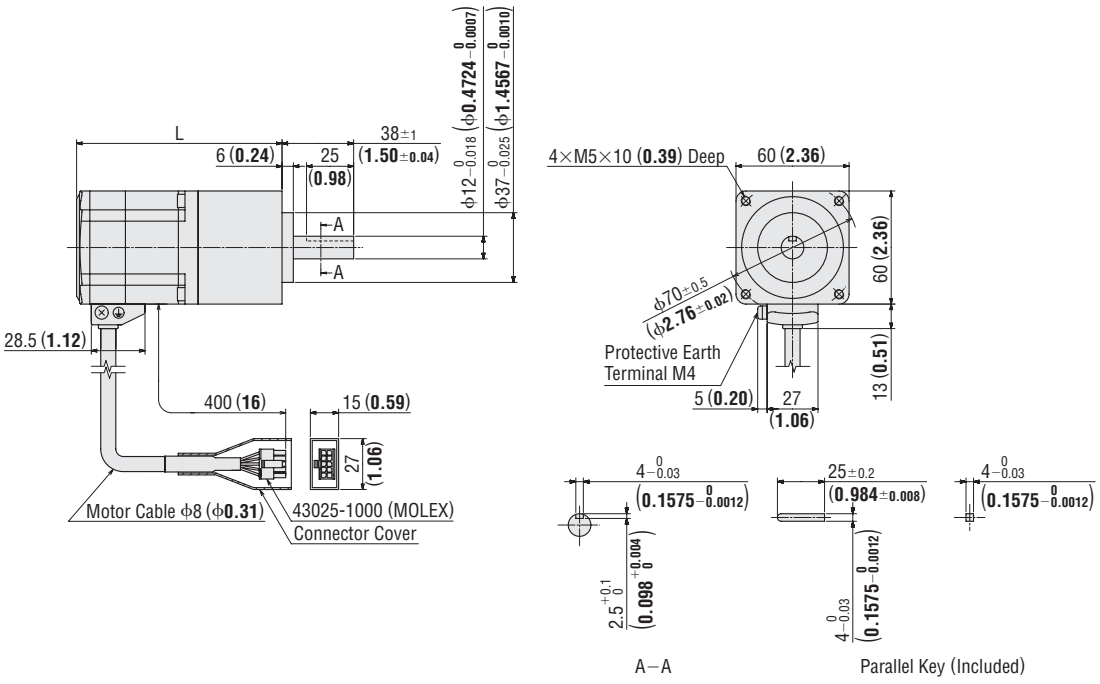
Motor Frame Size 42 mm (1.65 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR46AK-N□-3	ARM46AK-N□	**5, 7.2, 10**	0.73 (1.61)	B530



Motor Frame Size 60 mm (2.36 in.)

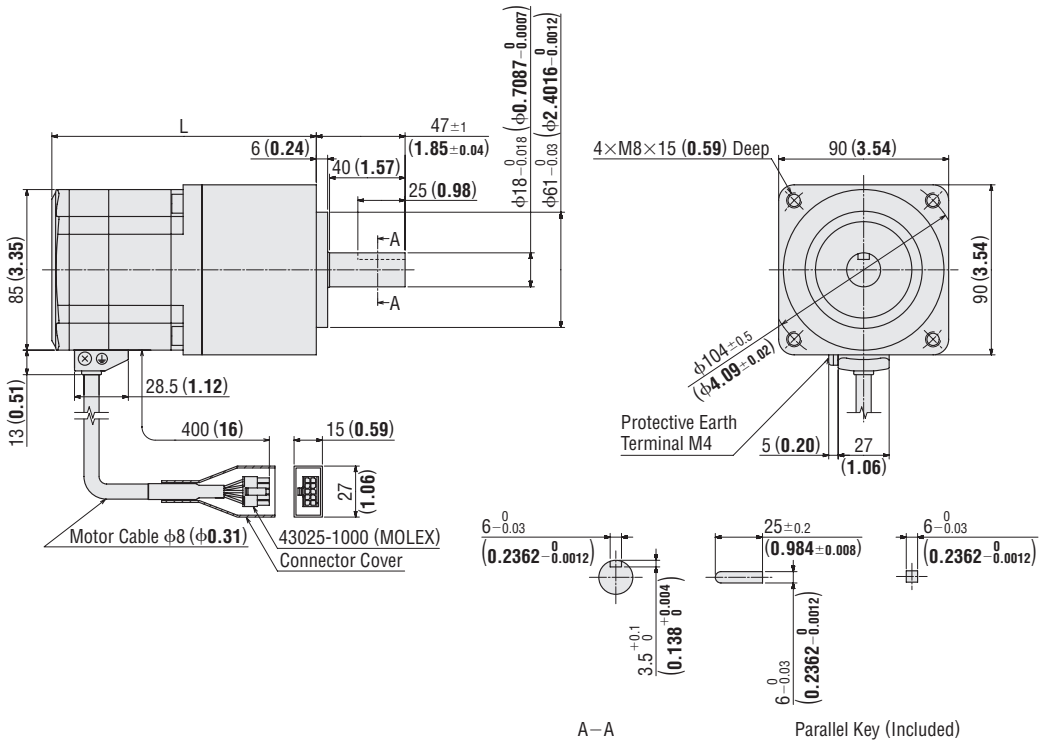
Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR66AK-N□-3	ARM66AK-N□	**5, 7.2, 10**	109 (4.29)	1.5 (3.3)	B531
		25, 36, 50	125 (4.92)	1.73 (3.8)	B532



● A number indicating the gear ratio is entered where the box (□) is located within the model name.

Motor Frame Size 90 mm (3.54 in.)

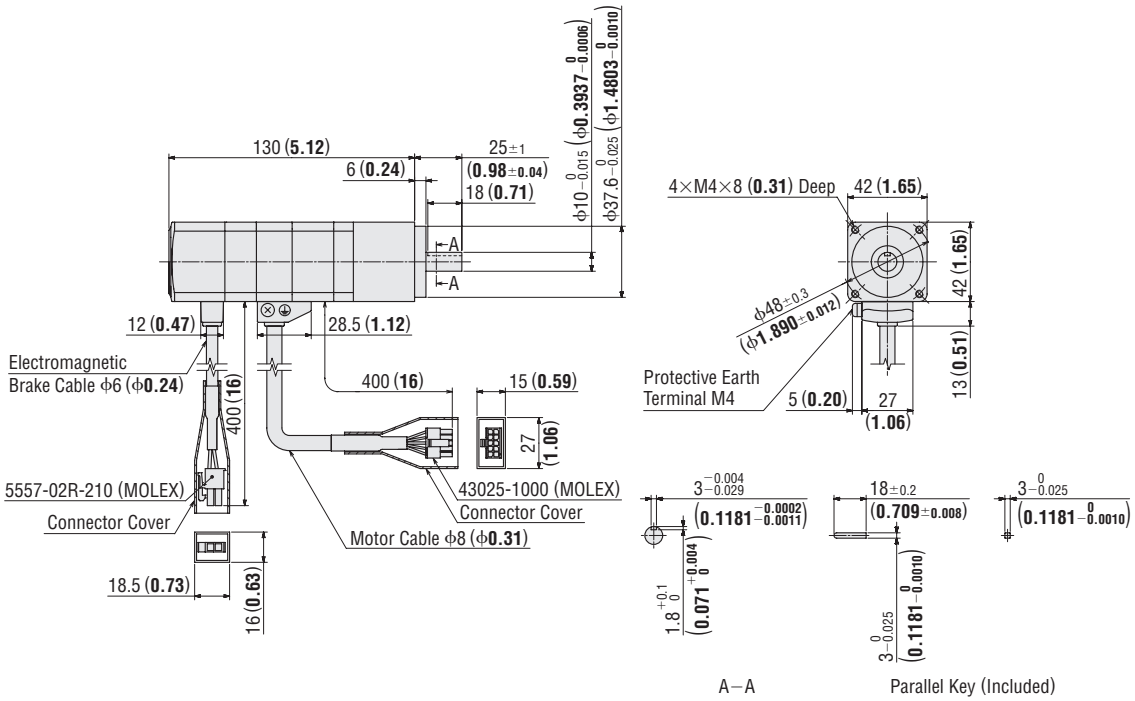
Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR98AK-N□-3	ARM98AK-N□	**5**, **7.2**, **10**	140 (5.51)	3.8 (8.4)	B533
		25, **36**, **50**	163 (6.42)	4.5 (9.9)	B534



◇PN Geared Type with Electromagnetic Brake

Motor Frame Size 42 mm (1.65 in.)

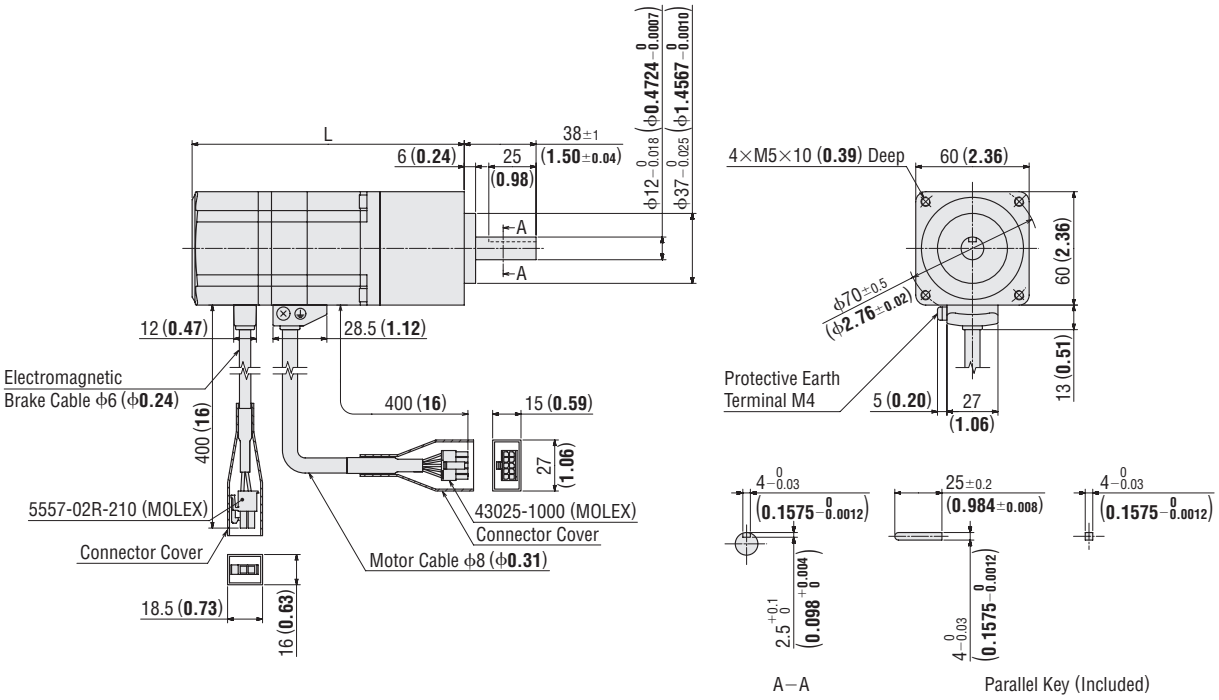
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR46MK-N□-3	ARM46MK-N□	**5**, **7.2**, **10**	0.88 (1.94)	B535



● A number indicating the gear ratio is entered where the box (□) is located within the model name.

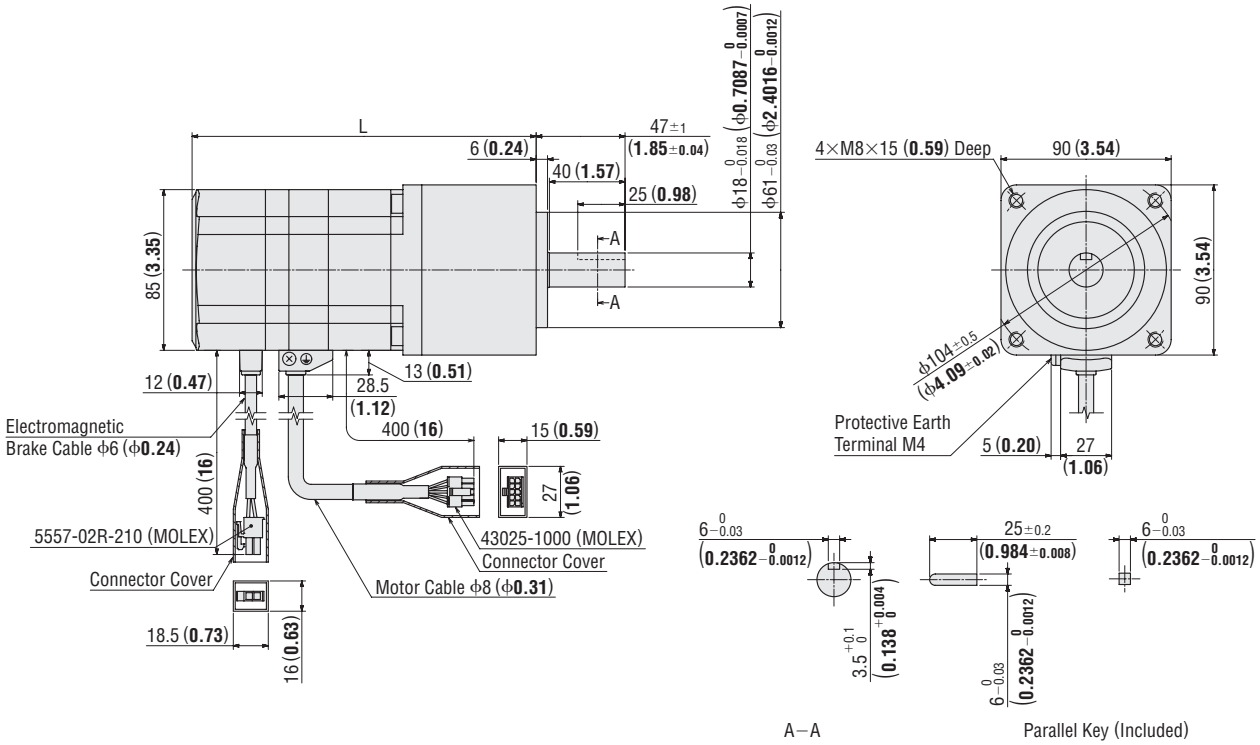
Motor Frame Size 60 mm (2.36 in.)

Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR66MK-N□-3	ARM66MK-N□	**5, 7.2, 10**	144 (5.67)	1.8 (4.0)	B536
		25, 36, 50	160 (6.30)	2.0 (4.4)	B537



Motor Frame Size 90 mm (3.54 in.)

Model	Motor Model	Gear Ratio	L	Mass kg (lb.)	DXF
AR98MK-N□-3	ARM98MK-N□	**5, 7.2, 10**	182 (7.17)	4.4 (9.7)	B538
		25, 36, 50	205 (8.07)	5.1 (11.2)	B539

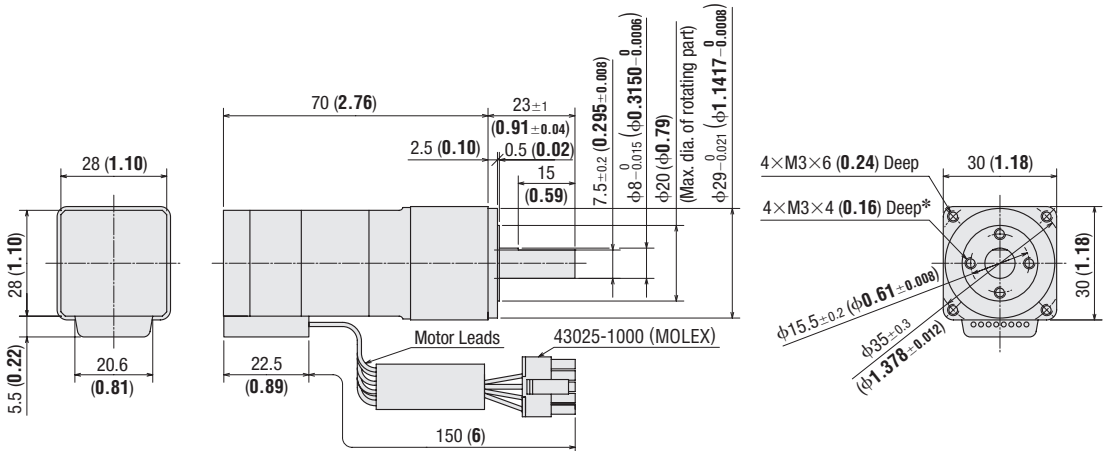


● A number indicating the gear ratio is entered where the box (□) is located within the model name.

◇Harmonic Geared Type

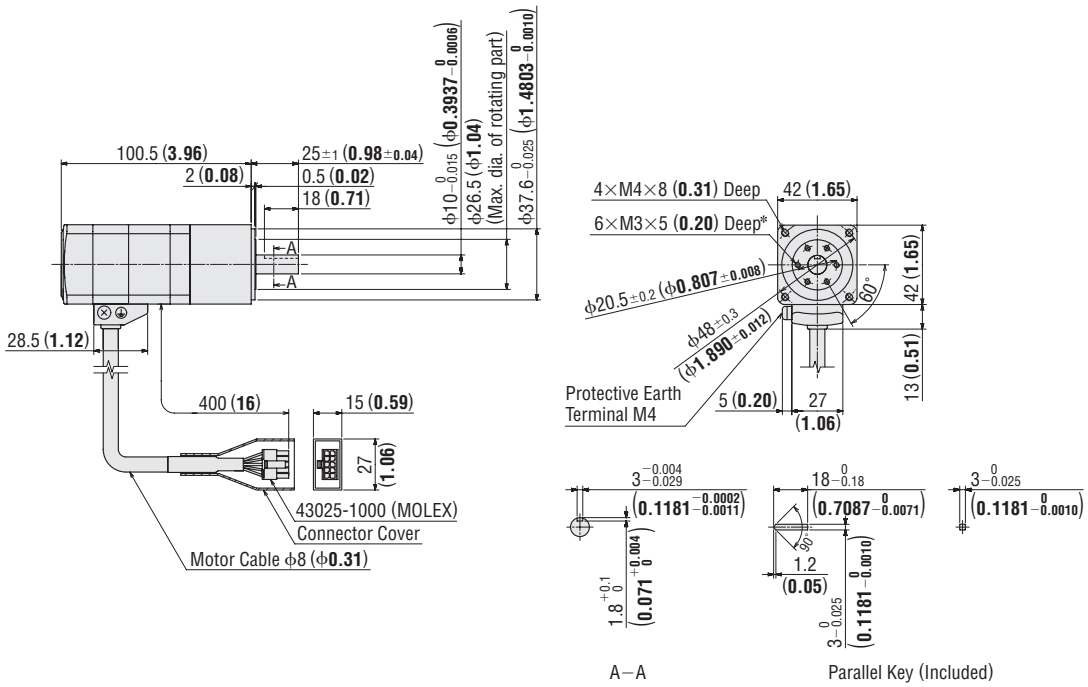
Motor Frame Size 30 mm (1.18 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR24SAK-H□-3	ARM24SAK-H□	**50, 100**	0.24 (8.5)	B710



Motor Frame Size 42 mm (1.65 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR46AK-H□-3	ARM46AK-H□	**50, 100**	0.68 (1.5)	B540

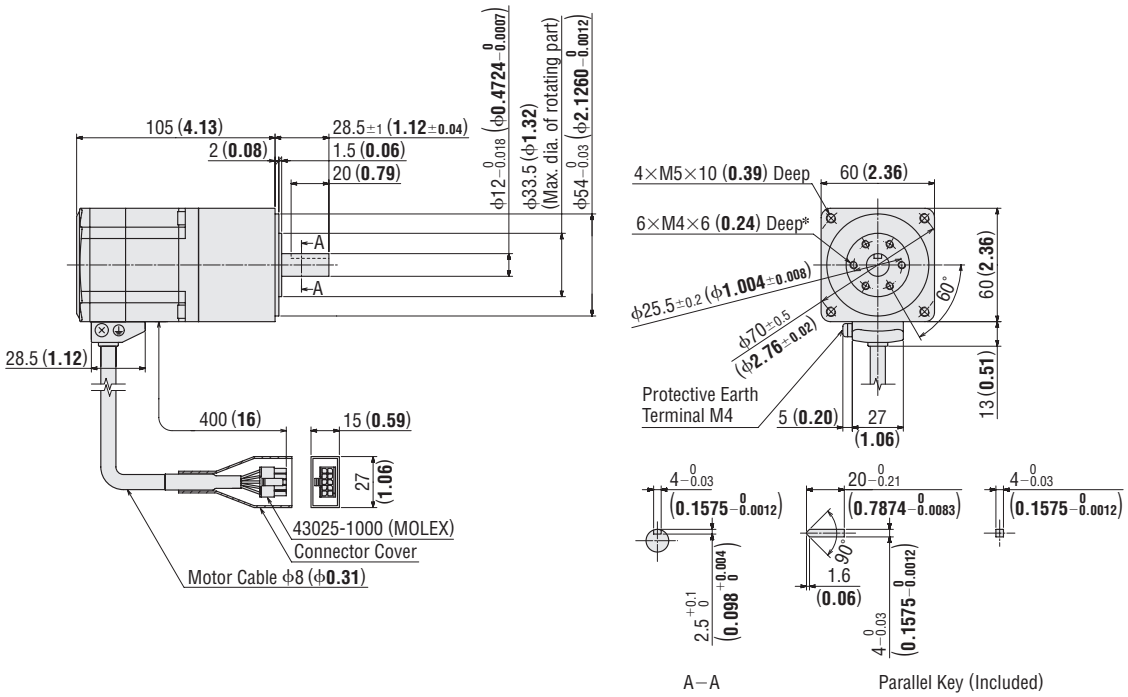


✻The position of the output shaft relative to the screw holes on the rotating part is arbitrary.

● A number indicating the gear ratio is entered where the box (□) is located within the model name.

Motor Frame Size 60 mm (2.36 in.)

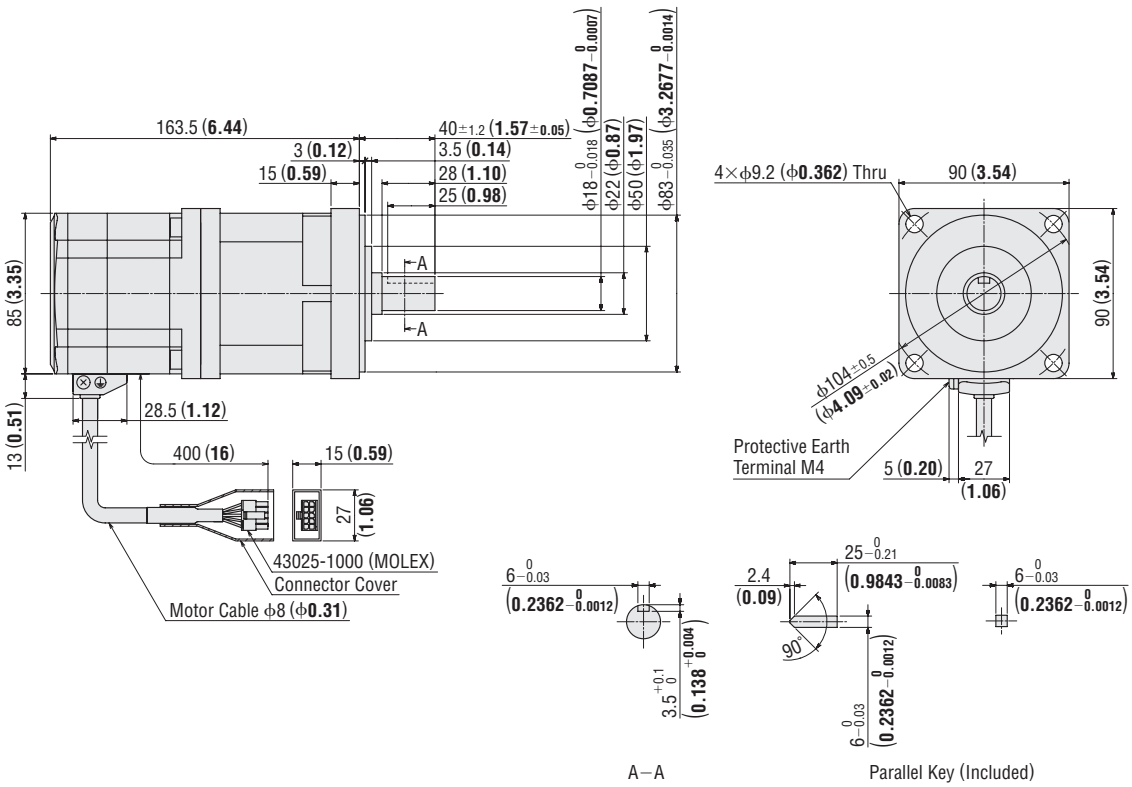
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR66AK-H□-3	ARM66AK-H□	**50, 100**	1.41 (3.1)	B541



✻The position of the output shaft relative to the screw holes on the rotating part is arbitrary.

Motor Frame Size 90 mm (3.54 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR98AK-H□-3	ARM98AK-H□	**50, 100**	4.0 (8.8)	B542

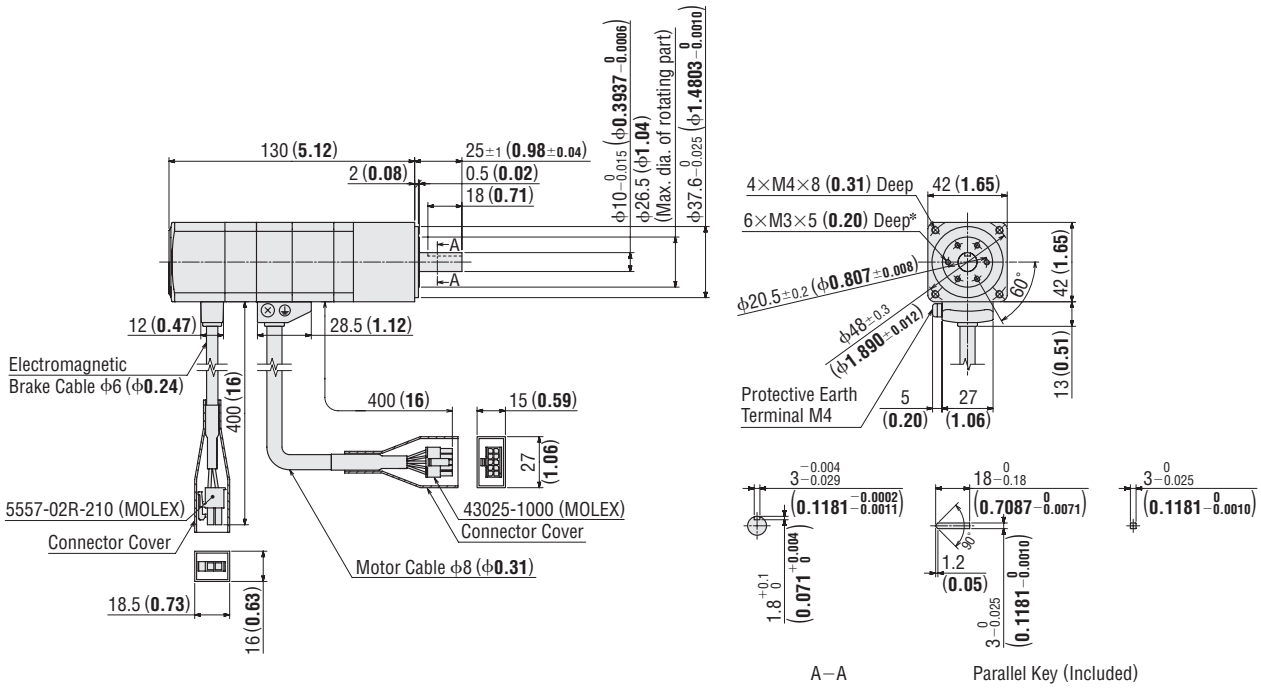


● A number indicating the gear ratio is entered where the box (□) is located within the model name.

◇Harmonic Geared Type with Electromagnetic Brake

Motor Frame Size 42 mm (1.65 in.)

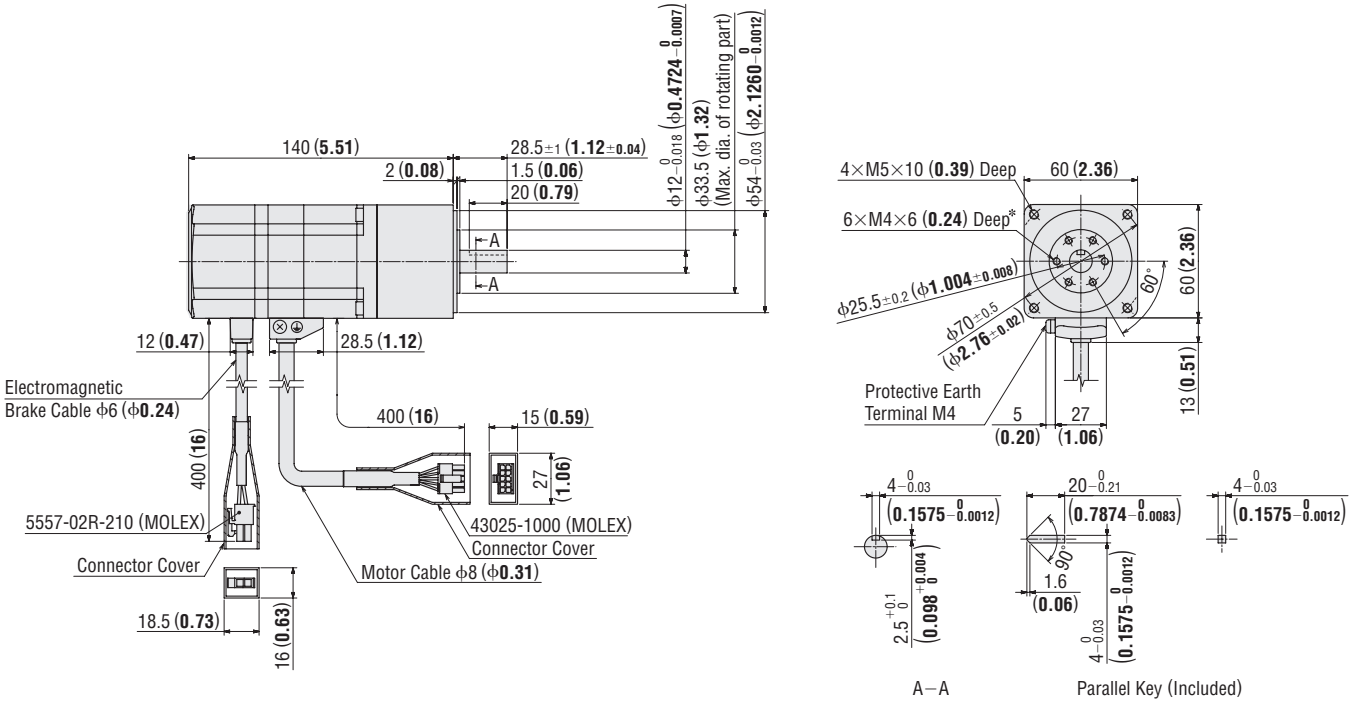
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR46MK-H□-3	ARM46MK-H□	**50, 100**	0.83 (1.83)	B543



✻The position of the output shaft relative to the screw holes on the rotating part is arbitrary.

Motor Frame Size 60 mm (2.36 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR66MK-H□-3	ARM66MK-H□	**50, 100**	1.71 (3.8)	B544

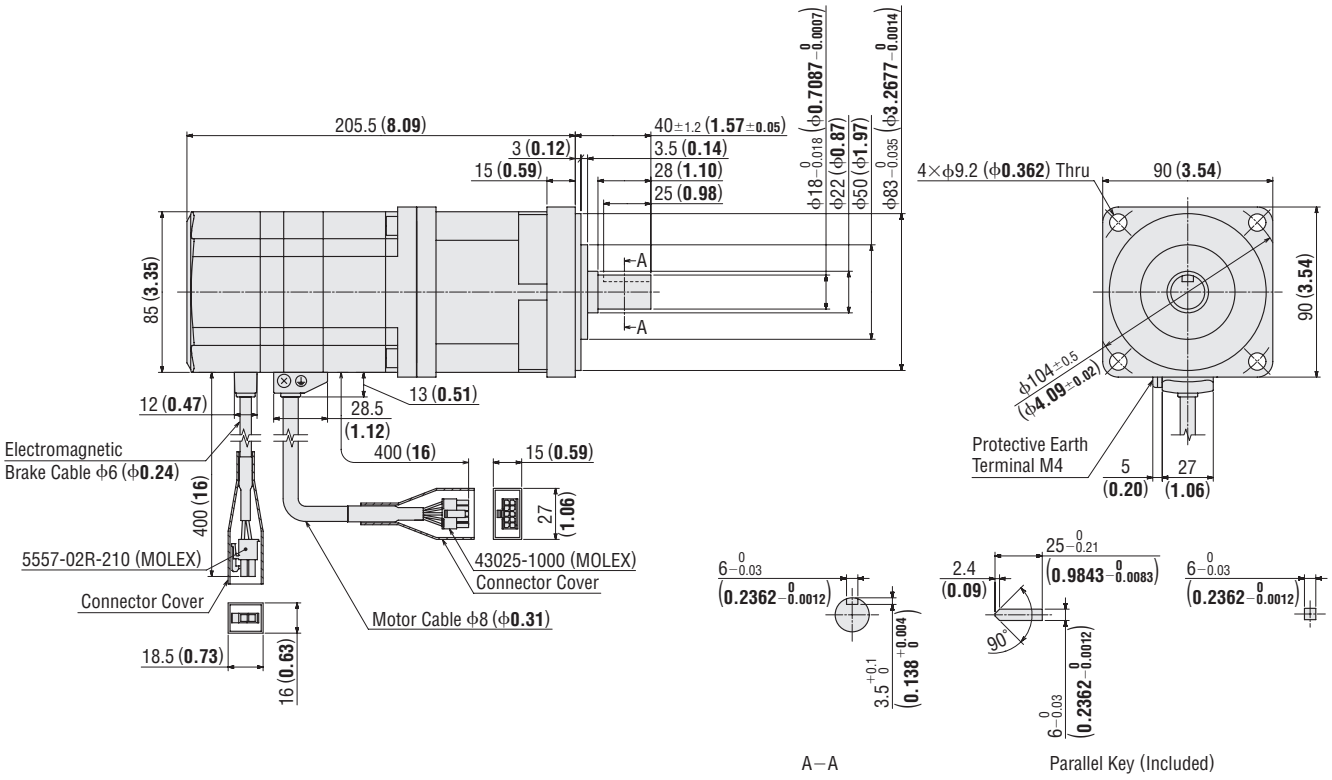


✻The position of the output shaft relative to the screw holes on the rotating part is arbitrary.

● A number indicating the gear ratio is entered where the box (□) is located within the model name.

Motor Frame Size 90 mm (3.54 in.)

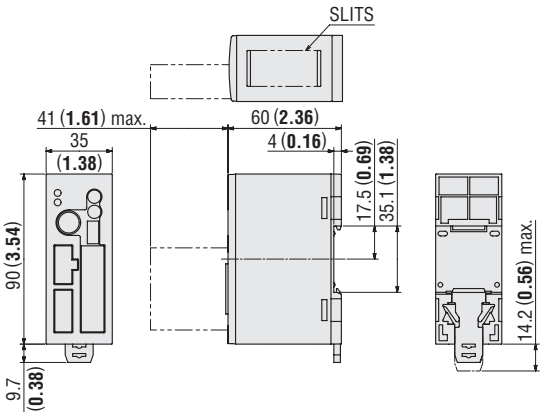
Model	Motor Model	Gear Ratio	Mass kg (lb.)	DXF
AR98MK-H□-3	ARM98MK-H□	**50, 100**	4.6 (10.1)	B545



● A number indicating the gear ratio is entered where the box (□) is located within the model name.

Driver

Mass: 0.17 kg (0.37 lb.)
DXF B546

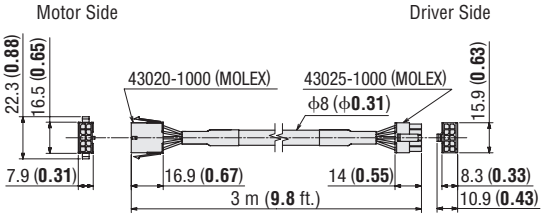


- Control I/O Connector (CN5)
  Cover Assembly: 10336-52A0-008 (SUMITOMO 3M)
  Connector: 10136-3000PE (SUMITOMO 3M)
- Connector for Power Supply Input/Frame Ground Terminal (CN1)
  Connector: MC1.5/3-STF-3.5 (PHOENIX CONTACT)

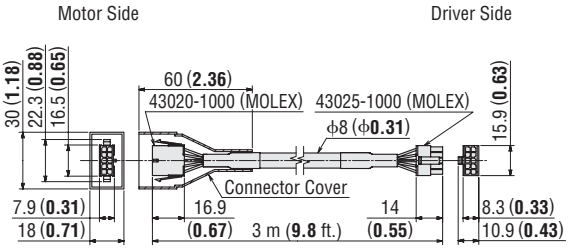
Connection Cables (Included)

• Cable for Motor

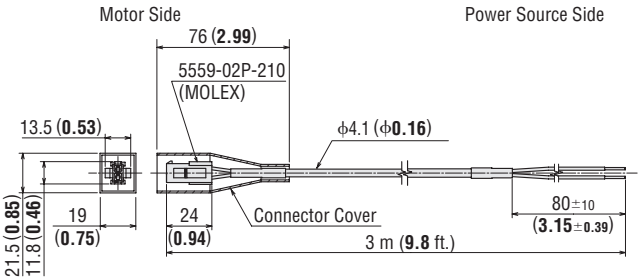
For **AR24** and **AR26**



For **AR46**, **AR66**, **AR69** and **AR98**

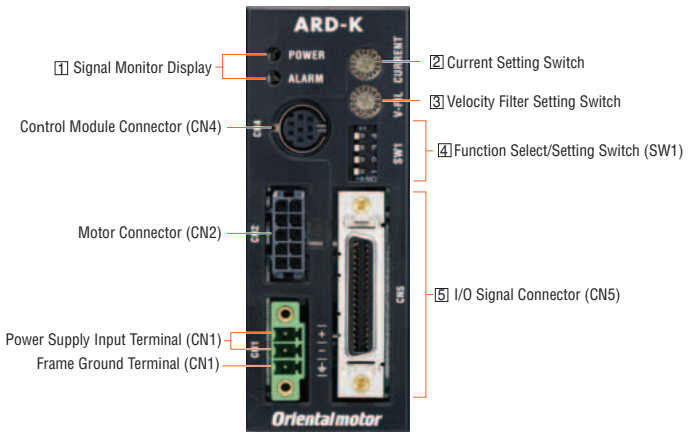


• Cable for Electromagnetic Brake (Only for electromagnetic brake type)



Connection and Operation

Names and Functions of Driver Parts



1 Signal Monitor Displays

◇LED Displays

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

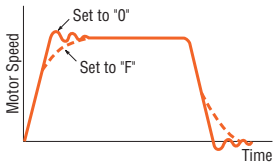
◇Alarms

Blink Count	Function	When Activated
2	Overheat	The temperature inside the driver rises above 85°C (185°F).
	Overload	When the amount of time during which the load torque exceeded the maximum torque exceeds the overload detection time. (Default value: 5 seconds)
	Overspeed	The motor output shaft speed exceeds 4500 r/min.
	Command pulse error	The command pulse value becomes abnormal.
3	Overvoltage	The primary voltage of the driver's inverter exceeds the upper limit.
	Undervoltage	The primary voltage of the driver's inverter drops below the lower limit.
4	Overflow rotation during current on	The position deviation exceeds the overflow revolutions. (Default value: 3 revolutions)
	Overflow rotation during current off	The current is turned on even though the position deviation when the current is turned off was equal to or greater than the permissible value. (Default value: 100 revolutions or more)
7	Abnormal operation data	Return to electrical home operation is performed while an operation data error warning is present.
	Electronic gear setting error	The resolution set by the electronic gear is outside the specified range.
8	Sensor error during operation	A sensor error occurs while the motor is rotating.
	Initial sensor error	The power source is turned on when the motor cable is not connected to the driver.
	Initial rotor rotation error	The main power is turned on while the motor is rotating.
	Motor combination error	A motor not supported by the driver is connected.
9	EEPROM error	A motor control parameter is damaged.

2 Current Setting Switch

Indication	Switch Name	Function
CURRENT	Current setting switch	This switch adjusts the operating current. It is used to limit the torque and temperature rise. A desired current can be set as a percentage (%) of the rated output current. The factory setting is "F".

3 Velocity Filter Setting Switch

Indication	Switch Name	Function
V-FIL	Velocity filter setting switch	This switch adjusts the motor response. Adjust the switch if you want to suppress motor vibration or cause the motor to start/stop smoothly. "0" and "F" correspond to the minimum and maximum velocity filter settings, respectively. The factory setting is "1." The difference in characteristics mode by the velocity filter 

4 Function Select/Setting Switches

Indication	Switch Name	Function
4 3	Resolution select switches "DO/D1" "CS0/CS1"	These switches are used to set the resolution per rotation of the motor output shaft. "4:OFF" "3:OFF"→1000 pulse (0.36°/step) [Factory setting] "4:OFF" "3:ON"→10000 pulse (0.036°/step) "4:ON" "3:OFF"→500 pulse (0.72°/step) "4:ON" "3:ON"→5000 pulse (0.072°/step)
2	Control mode select switches "NORM/CCM"	This switch toggles the driver between the normal mode and current control mode. In the current control mode, noise and vibration can be reduced although the motor synchronicity may reduce. "OFF": Normal mode [Factory setting] "ON": Current control mode
1	Pulse input mode switch "2P/1P"	The settings of this switch are compatible with the following two types of pulse input modes: "OFF": 2-pulse input mode "ON": 1-pulse input mode [Factory setting]

5 I/O Signal Connector (CN5, 36 pins)

Indication	Input/Output	Pin No.	Signal		Signal Name	
			Positioning Operation	Push-Motion Operation	Positioning Operation	Push-Motion Operation*1
CN5	–	1	–		–	
	Output	2	GND		Ground connection	
		3	ASG+		A-phase pulse output (line driver)	
		4	ASG–			
		5	BSG+		B-phase pulse output (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 complete output	
		14	END–			
		15	READY+/AL0+		Operation ready complete output/Alarm code output 0*1	
		16	READY–/AL0–			
		17	TLC+/AL1+		Torque limit output /Alarm code output 1*1	
		18	TLC–/AL1–			
		19	TIM2+/AL2+		Timing output (open-collector)/Alarm code output 2*1	
		20	TIM2–/AL2–			
		21	GND		Ground connection	
	Input	22	IN–COM		Input signal common	
		23	C–ON		Current on input*2	
		24	CLR/ALM–RST		Deviation counter clear input/Alarm reset input	
		25	CCM		Current control mode ON input	
		26	CS	T–MODE	Resolution select input	Push-motion operation ON*1
		27	–	M0	–	Push-current setting select input*1
		28	RETURN	M1	Return to electrical home operation	
		29	P–RESET	M2	Position reset input	
		30	FREE		Excitation OFF	
		31	PLS+/CW+		Pulse input/CW pulse input (+5 V/line driver)	
		32	PLS–/CW–			
		33	PLS+24/CW+24V		Pulse input/CW pulse input (+24V)	
		34	DIR+24/CCW+24V		Direction input/CCW pulse input (+24V)	
		35	DIR+/CCW+		Direction input/CCW pulse input (+5 V/line driver)	
		36	DIR–/CCW–			

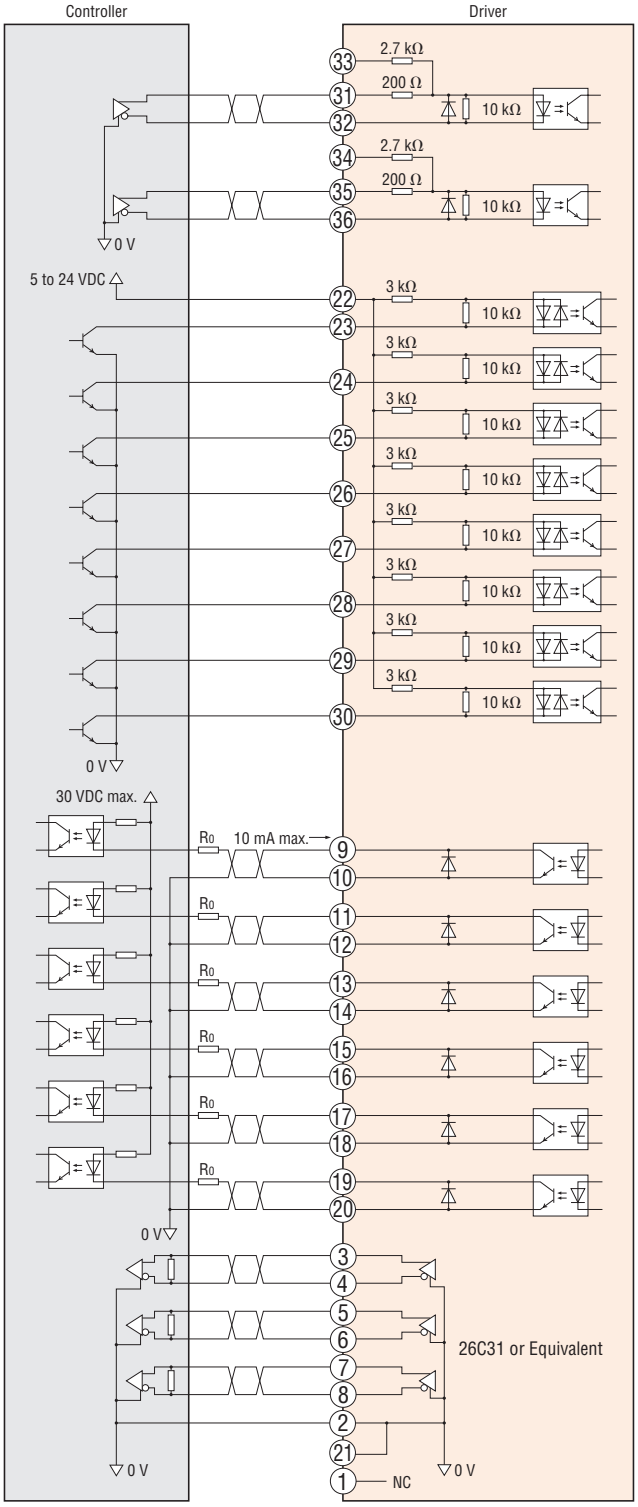
*1 The signal will become effective if the applicable setting has been changed using the accessory control module **OPX-2A** or the data setting software **MEXE02** (both sold separately).
*2 The factory setting of the C-ON input is normally open. Be sure to turn the C-ON input ON when operating the motor.
Set the C-ON input to normally close with a control module (**OPX-2A**, sold separately) or a data setting software (**MEXE02**, sold separately) when the C-ON input is not used.

●Connection Diagram

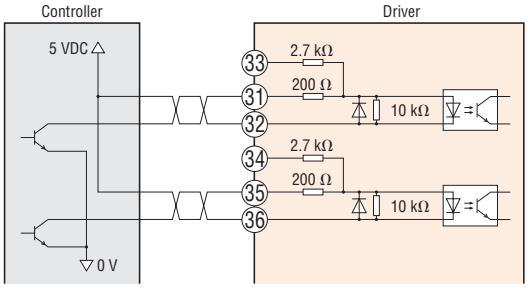
◇Connecting to a Host Controller

• Connecting to a Current Sink Output Circuit

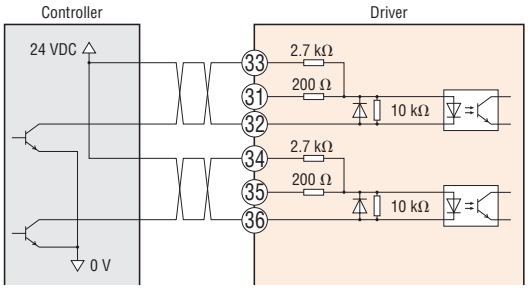
When pulse input is of line driver type



When pulse input is of 5 VDC type



When pulse input is of 24 VDC type



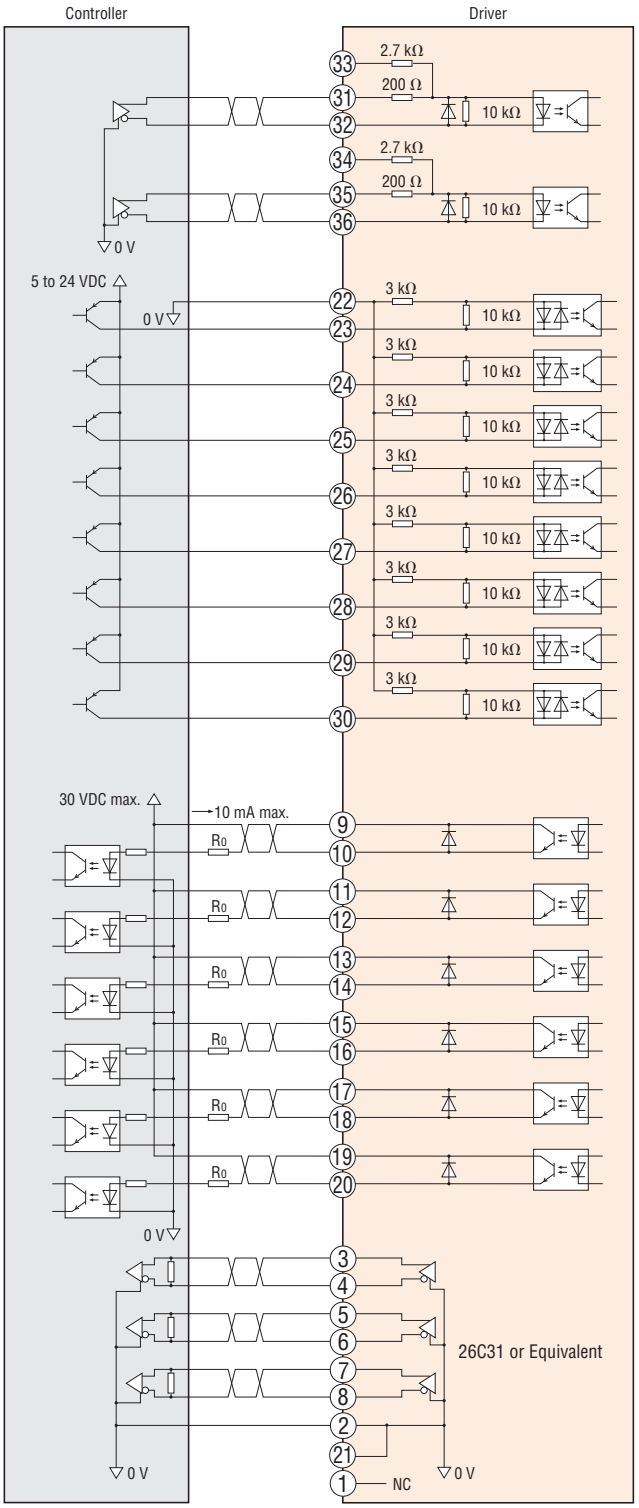
Notes

- Use output signals at 30 VDC or less. If the current exceeds 10 mA, connect an external resistor R_o.
- Connect a terminal resistor of 100 Ω or more between the input of the line receiver terminals.
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line (CN5), and keep wiring as short as possible [within 2 m (6.6 ft.)].
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases.
- Provide a minimum distance of 200 mm (7.9 in.) between the control I/O signal lines and power lines (AC lines, motor lines and other large-current circuits). Do not run the control I/O signal lines in the same duct as power lines or bundle them with power lines.

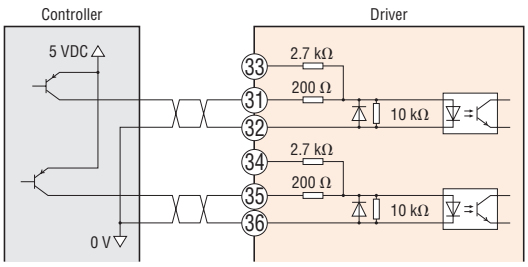
◇Connecting to a Host Controller

• Connecting to a Current Source Output Circuit

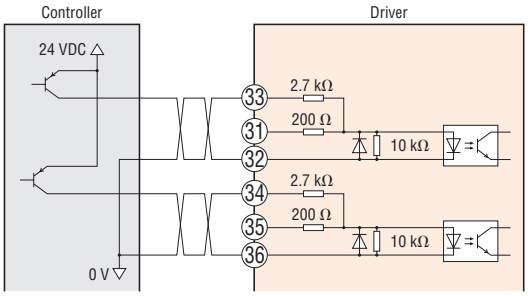
When pulse input is of line driver type



When pulse input is of 5 VDC type



When pulse input is of 24 VDC type



Notes

- Use output signals at 30 VDC or less. If the current exceeds 10 mA, connect an external resistor R_0.
- Connect a terminal resistor of 100 Ω or more between the input of the line receiver terminals.
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line (CN5), and keep wiring as short as possible [within 2 m (6.6 ft.)].
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases.
- Provide a minimum distance of 200 mm (7.9 in.) between the control I/O signal lines and power lines (AC lines, motor lines and other large-current circuits). Do not run the control I/O signal lines in the same duct as power lines or bundle them with power lines.

List of Motor and Driver Combinations

Model names for motor and driver combinations are shown below.

Type	Model	Motor Model	Driver Model
Standard Type	**AR24S□K-3***1	ARM24S□K	ARD-K
	AR26S□K-3*1	ARM26S□K	
	AR46□K-3*2	ARM46□K	
	AR66□K-3*2	ARM66□K	
	AR69□K-3*2	ARM69□K	
	AR98□K-3*2	ARM98□K	
TH Geared Type	**AR24SAK-T7.2-3**	ARM24SAK-T7.2	
	AR24SAK-T10-3	ARM24SAK-T10	
	AR24SAK-T20-3	ARM24SAK-T20	
	AR24SAK-T30-3	ARM24SAK-T30	
	AR46□K-T3.6-3	ARM46□K-T3.6	
	AR46□K-T7.2-3	ARM46□K-T7.2	
	AR46□K-T10-3	ARM46□K-T10	
	AR46□K-T20-3	ARM46□K-T20	
	AR46□K-T30-3	ARM46□K-T30	
	AR66□K-T3.6-3	ARM66□K-T3.6	
	AR66□K-T7.2-3	ARM66□K-T7.2	
	AR66□K-T10-3	ARM66□K-T10	
	AR66□K-T20-3	ARM66□K-T20	
	AR66□K-T30-3	ARM66□K-T30	
	AR98□K-T3.6-3	ARM98□K-T3.6	
	AR98□K-T7.2-3	ARM98□K-T7.2	
	AR98□K-T10-3	ARM98□K-T10	
	AR98□K-T20-3	ARM98□K-T20	
	AR98□K-T30-3	ARM98□K-T30	
PS Geared Type	**AR24SAK-PS5-3**	ARM24SAK-PS5	
	AR24SAK-PS7-3	ARM24SAK-PS7	
	AR24SAK-PS10-3	ARM24SAK-PS10	
	AR46□K-PS5-3	ARM46□K-PS5	
	AR46□K-PS7-3	ARM46□K-PS7	
	AR46□K-PS10-3	ARM46□K-PS10	
	AR46□K-PS25-3	ARM46□K-PS25	
	AR46□K-PS36-3	ARM46□K-PS36	
	AR46□K-PS50-3	ARM46□K-PS50	
	AR66□K-PS5-3	ARM66□K-PS5	
	AR66□K-PS7-3	ARM66□K-PS7	
	AR66□K-PS10-3	ARM66□K-PS10	
	AR66□K-PS25-3	ARM66□K-PS25	
	AR66□K-PS36-3	ARM66□K-PS36	
	AR66□K-PS50-3	ARM66□K-PS50	
	AR98□K-PS5-3	ARM98□K-PS5	
	AR98□K-PS7-3	ARM98□K-PS7	
	AR98□K-PS10-3	ARM98□K-PS10	
	AR98□K-PS25-3	ARM98□K-PS25	
	AR98□K-PS36-3	ARM98□K-PS36	
	AR98□K-PS50-3	ARM98□K-PS50	

Type	Model	Motor Model	Driver Model
PN Geared Type	**AR24SAK-N5-3**	ARM24SAK-N5	ARD-K
	AR24SAK-N7.2-3	ARM24SAK-N7.2	
	AR24SAK-N10-3	ARM24SAK-N10	
	AR46□K-N5-3	ARM46□K-N5	
	AR46□K-N7.2-3	ARM46□K-N7.2	
	AR46□K-N10-3	ARM46□K-N10	
	AR66□K-N5-3	ARM66□K-N5	
	AR66□K-N7.2-3	ARM66□K-N7.2	
	AR66□K-N10-3	ARM66□K-N10	
	AR66□K-N25-3	ARM66□K-N25	
	AR66□K-N36-3	ARM66□K-N36	
	AR66□K-N50-3	ARM66□K-N50	
	AR98□K-N5-3	ARM98□K-N5	
	AR98□K-N7.2-3	ARM98□K-N7.2	
	AR98□K-N10-3	ARM98□K-N10	
	AR98□K-N25-3	ARM98□K-N25	
	AR98□K-N36-3	ARM98□K-N36	
	AR98□K-N50-3	ARM98□K-N50	
Harmonic Geared Type	**AR24SAK-H50-3**	ARM24SAK-H50	
	AR24SAK-H100-3	ARM24SAK-H100	
	AR46□K-H50-3	ARM46□K-H50	
	AR46□K-H100-3	ARM46□K-H100	
	AR66□K-H50-3	ARM66□K-H50	
	AR66□K-H100-3	ARM66□K-H100	
	AR98□K-H50-3	ARM98□K-H50	
	AR98□K-H100-3	ARM98□K-H100	

● Enter **A** (single shaft) or **M** (electromagnetic brake) in the box (□) within the model name.
∗1 Enter **A** (single shaft) or **B** (double shaft) in the box (□) within the model names of **AR24S□K-3** and **AR26□K-3**.
∗2 Enter **A** (single shaft), **B** (double shaft) or **M** (electromagnetic brake) in the box (□) within the model names of **AR46□K-3**, **AR66□K-3**, **AR69□K-3** and **AR98□K-3**.

Extended Functions

With the accessory control module **OPX-2A** or data setting software **MEXE02** (both sold separately), extended functions of the **AR** Series are available. You can change the internal parameters of the driver, perform test operations and monitor the operation.

Control Module (**OPX-2A**)
➜ Page A-430

Data Setting Software (**MEXE02**)
➜ Page A-431

Parameter Setting

You can set the advanced settings of the signals and change the generation conditions of the alarm.

Application Parameter	Operating current	Current value assigned to the operating current setting switch
	Speed filter	Filter time constant assigned to the speed filter setting switch
	I/O	Input signal mode Positioning operation/push-motion operation switching
		Alarm code signal enabled/disabled
		C-ON input logic
		Output condition for END signal (output width)
		Current value applicable to push-motion operation
	Normal mode	Standstill current in the normal mode
		Speed difference gain in the normal mode
	Current control mode	Position loop gain in the current control mode
		Speed loop gain in the current control mode
		Speed loop integral time constant in the current control mode
		Damping control enabled/disabled in the current control mode
		Damping control vibration frequency in the current control mode
	Alarm/Warning	Operation data error warning enabled/disabled
		Generation condition of overflow rotation alarm during current on
		Generation condition of overflow rotation alarm during current off
		Generation condition of overload alarm
		Generation condition of overflow rotation warning
		Generation condition of overvoltage warning
		Generation condition of undervoltage warning
		Generation condition of overheat warning
		Generation condition of overload warning
		Generation condition of overspeed warning
	Return to electrical home operation	Operating speed for return to electrical home operation
		Acceleration/deceleration rate for return to electrical home operation
		Starting speed for return to electrical home operation
	Manual operation	Operating speed for test operation
		Acceleration/deceleration rate for test operation
		Starting speed for test operation
	Control module	Speed monitor display. Show the speed on the control module with a sign or as an absolute value
		Gear ratio for geared motor used for speed monitor
System Parameter (Becomes effective after the power is cycled)	Electronic gear	Resolution assigned to each resolution switch
	Operation setting	Pulse input mode
		Smooth drive enabled/disabled
		Initial motor excitation position at power ON. Detected position/electrical angle 0° switching
		Automatic return operation at current ON enabled/disabled
		Motor rotation direction

Monitoring

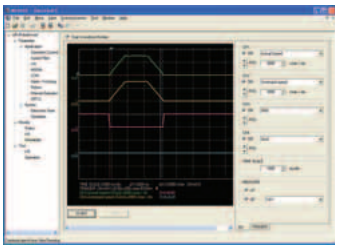
You can monitor various signals, alarms and motor speeds/positions, and also perform test operations.

Monitoring	Monitor positions
	Monitor speeds
	Monitor I/Os
Waveform monitoring*	Monitor positions*
	Monitor speeds*
	Measure waveforms*
	Save waveforms*
Test	Perform test operation (JOG operation)
	Monitor conditions during test operation
	Perform return to electrical home operation
	Forcibly turn output signals ON/OFF
Alarm	Check information on alarms that generated
	Check alarm history (10 most recent alarms)
	Clear alarm history
	Cancel
Warning	Check information on warnings that generated
	Check warning history (10 most recent warnings)
	Clear warning history

∗This function is available only when the data setting software (**MEXE02**) is used.

◇Waveform Monitoring

You can monitor various signals and motor speeds/positions using waveforms.



Other

Electrical home reset
Parameter initialization