

Stepping Motors

Closed Loop Stepping Motor and Driver Packages



AC Input AS Series

DC Input ASC Series

Introduction

AC Input  
*AS*

DC Input  
*ASC*

5-Phase  
Microstep  
*RK*  
AC Input

2-Phase  
Full/Half  
*UMK*

5-Phase  
Microstep  
*CRK*

2-Phase  
Microstep  
*RBK*  
DC Input

2-Phase  
Microstep  
*CMK*

2-Phase  
*PK/PV*  
Without Encoder

2-Phase  
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With Encoder

*EMP400*

*SG8030J*

Accessories

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RoHS RoHS-Compliant

Closed Loop Stepping Motor and Driver Package

# $\alpha$ STEP AS Series

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

The  $\alpha$ STEP utilizes our unique closed loop control. This is a motor and driver package product offering the user-friendliness of a stepping motor combined with improved response and reliability.



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



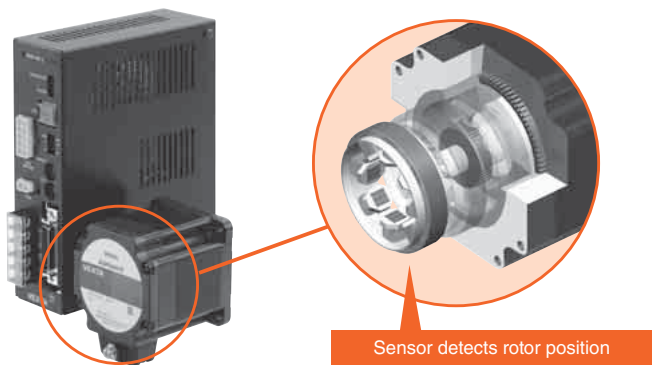
## Features

### ● Incorporating Our Unique Closed Loop Control

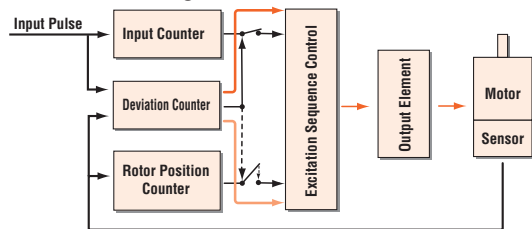
This product uses our closed loop control to maintain positioning operation even during abrupt load fluctuations and accelerations. The rotor position detection sensor monitors the rotation. When an overload condition is detected, it will instantaneously regain control using the closed loop mode.

When an overload condition continues it will output an alarm signal, thereby providing reliability equal to that of a servo motor.

$\alpha$ STEP is designed as a "package" consisting of a motor and a driver.



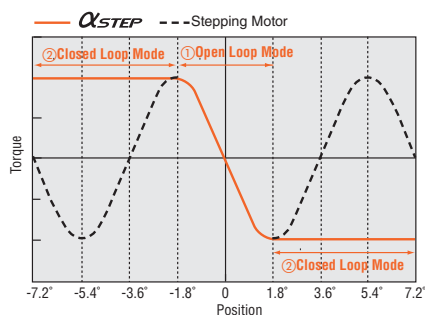
### ◇ $\alpha$ STEP Control Diagram



**Normal (Positioning deviation is less than  $\pm 1.8^\circ$ )**  
 Motor runs in open loop mode like a stepping motor.

**During Overload Condition (Positioning deviation is  $\pm 1.8^\circ$  or more)**  
 The closed loop mode is engaged to maintain the positioning operation.

### ◇ $\alpha$ STEP Angle – Torque Characteristics



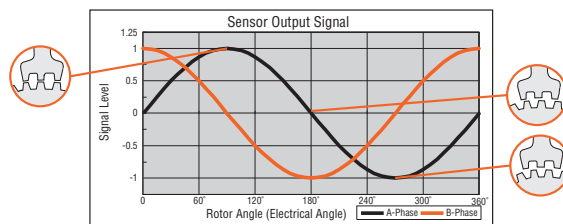
- ① If the positioning deviation is less than  $\pm 1.8^\circ$ , the motor runs in open loop mode like a stepping motor.
- ② If the positioning deviation is  $\pm 1.8^\circ$  or more, the motor runs in closed loop mode and the position is corrected by exciting the motor windings to generate maximum torque based on the rotor position.

### ◇ The Sensor to Detect Rotor's Position

The  $\alpha$ STEP 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.

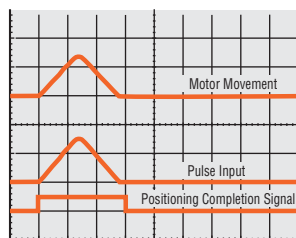
### Features

- 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.



### ● High Response

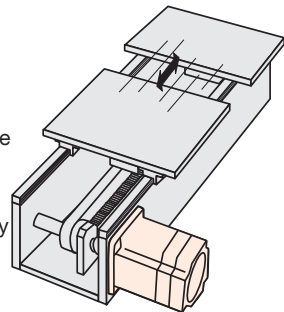
Like conventional stepping motors, **αSTEP** operates in synchronism with command pulses. This makes possible short stroke positioning in a short time.



Measurement Condition:  
Feed 1/5 rotation  
Load inertia  $250 \times 10^{-7} \text{ kg}\cdot\text{m}^2$  (J)  
(1.365 oz-in<sup>2</sup>)

### ● No Gain Tuning

Gain tuning for servo motors is critical, troublesome and time-consuming. Since the **αSTEP** operates like a stepping motor, there are no gain tuning requirements. **αSTEP** is ideal for low rigidity applications, such as belt and pulley system.

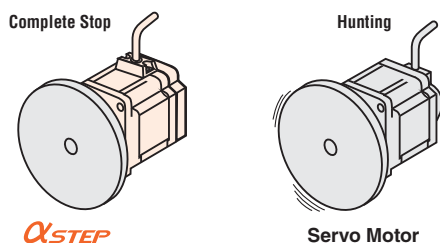


### ● The αSTEP Complies with Major Safety Standards

The **AS** Series is recognized by the UL/CSA Standards and conforms to EN Standards. [The products with the motor frame size of 42 mm (1.65 in.) are recognized with the UL Standards and conforms to EN Standards.] The CE Marking certifies compliance with the EMC and Low Voltage Directives.

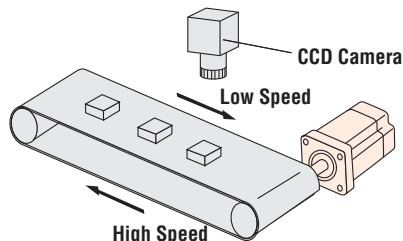
### ● No Hunting

Since **αSTEP** is a stepping motor, it has no hunting problem. Therefore, when it stops, its position is completely stable and does not fluctuate. **αSTEP** is ideal for applications in which hunting would be a problem.



### ● Low Vibration at Low Speed

The driver employs advanced technology that produces smoothness comparable to a microstep driver. Its vibration level is incredibly low, even when operating in the low speed range. When frequent changes from low to high (or vice versa) speed operations are required, the use of the Resolution Select Function solves the problem. **αSTEP** provides resolution as high as  $0.036^\circ$  per step without any damping mechanism or other mechanical device.



**αSTEP** is well-suited to applications where smooth movement or stability is required, such as where a camera is used to monitor the quality of a product.

### ● Motor/Driver Connection with a Single Cable

**αSTEP** requires only one cable for connection between the motor and the driver. Wiring is much simpler compared with conventional servo motors requiring two cables, one for motor and the other for encoder. The cable can be extended to a maximum of 20 m (65.6 ft.) [10 m (32.8 ft.) for flexible extension cable], so the motor and the driver can be installed in locations far apart.

### ● A Full Lineup including Geared Types and Industrial Connector Type

The geared types enable driving of large inertial loads and positioning at higher accuracy, while the industrial connector type provides IP65 of ingress protection against dust and water. The **αSTEP** offers a wide range of models meeting the needs of various applications.



#### Standard Type Industrial Connector

- A dedicated motor cable for industrial connector type (sold separately) is needed to connect the industrial connector type motor and driver.

### ● Improved Motor

- Protective Earth Terminal

[Excluding motors with a frame size of 42 mm (1.65 in.)]



- Twice the Motor Life (compared with a conventional model)

The life of a motor is affected by its bearing.

The **αSTEP** achieves approximately twice the life of a conventional motor by adopting a modified bearing. [Available only with the standard type and standard electromagnetic brake type with a frame size of 60 or 85 mm (2.36 or 3.35 in.)]

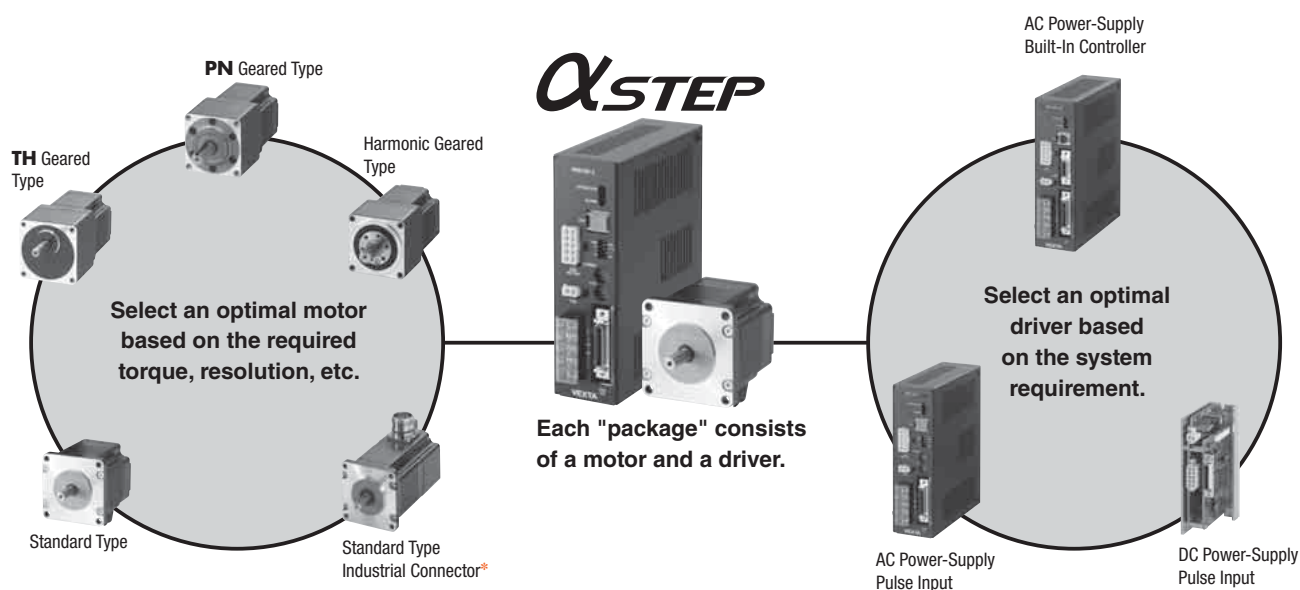
### ● (RoHS) RoHS-Compliant

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

- Details of RoHS Directive → Page G-38

# A Full Lineup of $\alpha$ STEP






You are sure to find a unit that perfectly matches the needs of your specific application.



**Motors equipped with an electromagnetic brake are also available.\***  
(An electromagnetic brake is not available on certain types.)

\* A dedicated cable (sold separately) is needed to connect the motor and driver.

## Characteristics Comparison for Motors and Geared Motors





Motor Type Geared Type	Features	Permissible Torque/ Maximum Torque [N·m (lb-in)]	Backlash [min]	Basic Resolution [deg/step]	Output Shaft Speed [r/min]
Standard 	Basic model of $\alpha$ STEP motor	Maximum Holding Torque 4 (35)	—	0.36	4000
Standard Type Industrial Connector 	The industrial connector type motor offering IP65 of ingress protection against dust and water.	Maximum Holding Torque 4 (35)	—	0.36	4000
<b>Low backlash</b> TH Geared (Parallel shaft) 	A wide variety of low gear ratios, high-speed operation Gear ratios: 3.6:1, 7.2:1, 10:1, 20:1, 30:1	12 (106)	45	0.012	500
<b>Non-backlash</b> PN Geared (Planetary) 	High speed (low gear ratios), 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: 5:1, 7.2:1, 10:1, 25:1, 36:1, 50:1	Permissible Torque 37 (320)    Maximum Torque 60 (530)	3	0.0072	600
Harmonic Geared (Harmonic drive) 	High accuracy positioning High permissible/maximum torque High gear ratios, high resolution Centered output shaft Gear ratios: 50:1, 100:1	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.

● Each series offers various motor frame sizes in accordance with the motor type and power supply voltage, as shown below.

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

	Power Supply Voltage	Standard Type	Standard Type Industrial Connector	TH Geared Type	PN Geared Type	Harmonic Geared Type
AC Power Supply <b>AS</b> Series 	Single-Phase 100-115 VAC	□42 (□1.65) □60 (□2.36) □85 (□3.35)	□60 (□2.36) □85 (□3.35)	□42 (□1.65) □60 (□2.36) □90 (□3.54)	□42 (□1.65) □60 (□2.36) □90 (□3.54)	□42 (□1.65) □60 (□2.36) □90 (□3.54)
Pulse Input Package 		Single-Phase 200-230 VAC	□60 (□2.36) □85 (□3.35)	□60 (□2.36) □85 (□3.35)	□60 (□2.36) □90 (□3.54)	□60 (□2.36) □90 (□3.54)
Built-In Controller Package 	Three-Phase 200-230 VAC	□60 (□2.36) □85 (□3.35)	□60 (□2.36) □85 (□3.35)	□60 (□2.36) □90 (□3.54)	□60 (□2.36) □90 (□3.54)	□60 (□2.36) □90 (□3.54)
DC Power Supply <b>ASC</b> Series Pulse Input Package 	24 VDC	□28 (□1.10) □42 (□1.65) □60 (□2.36)	—	□28 (□1.10) □42 (□1.65) □60 (□2.36)	□28 (□1.10) □42 (□1.65) □60 (□2.36)	□28 (□1.10) □42 (□1.65) □60 (□2.36)

● □: A pulse input package and a built-in controller package are available.

White background: A pulse input package is available.

● All the packages can be available with a motor and an electromagnetic brake. [Except for the industrial connector type and **ASC** Series with a motor frame size of 28 mm (1.10 in.).]

## Two Types of Drivers

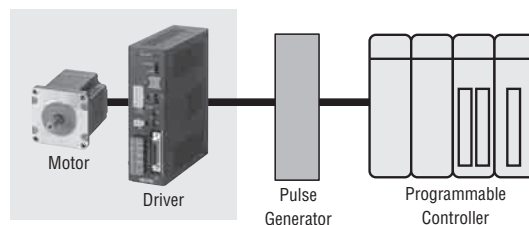
### Pulse Input

Various motor controls can be performed using a pulse generator provided by the user.

AC Power Supply

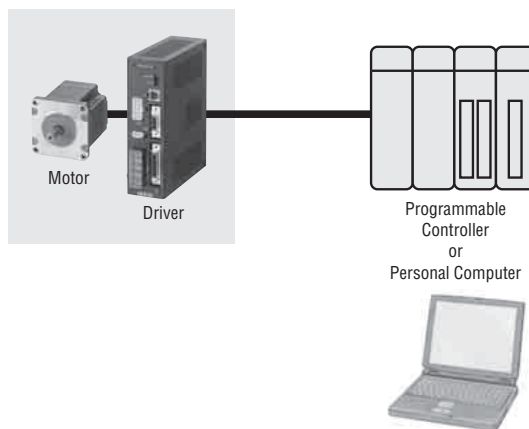


DC Power Supply



### Built-In Controller

The built-in pulse generation function allows the motor to be driven via a directly connected programmable controller or personal computer. Since no separate pulse generator is required, the drivers of this type save space, simplify wiring, and also allow the number of axes to be increased with ease.



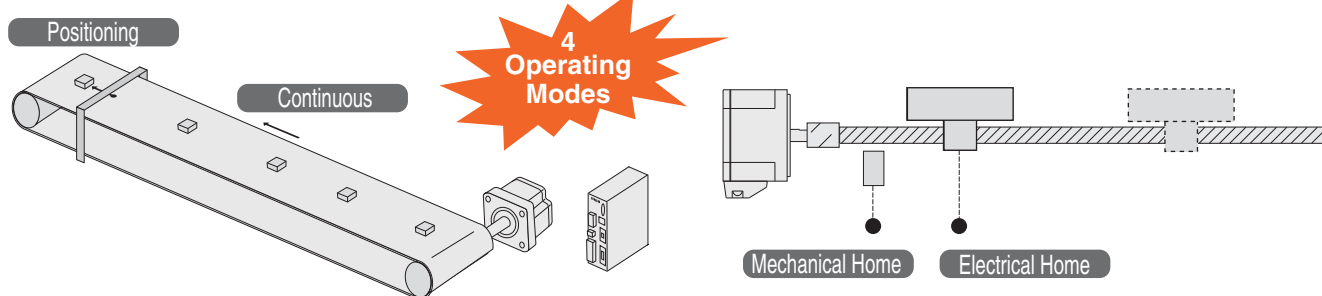
## Features of the Built-In Controller Package

The built-in controller driver has an integrated controller which ensures a simple, efficient solution for stepping motor applications.

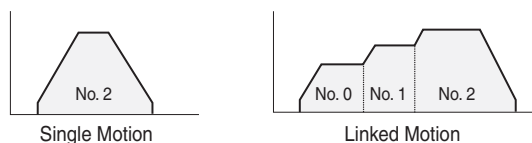
Intelligent, integrated, and ideal for technology's increasing demand on motion control, the built-in controller is computer-programmable via an RS-232C connection.



### Operating Modes



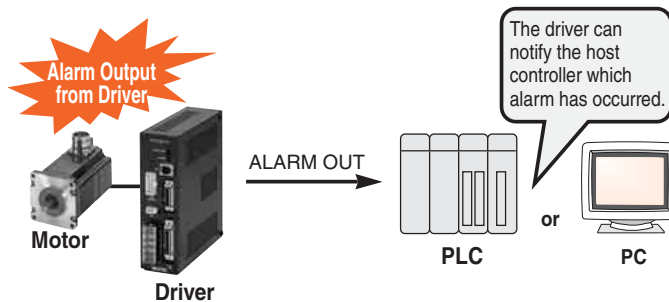
### Linked Motion Capability



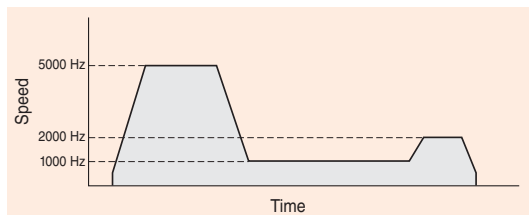
When a START signal is received motions 0, 1 and 2 are executed without stopping between each one.

### Alarm Functions

The driver can flash LEDs to indicate which alarm has occurred.

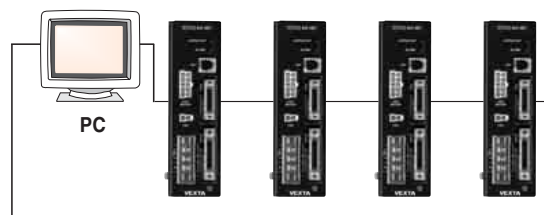


### Speed Change on the Fly



The running speed of the motor can be changed while the motor is in motion.

### Daisy Chain



Up to 36 units can be daisy chained via a customer supplied cable.

### ● Position Control

- Incremental mode (relative distance specification)/Absolute mode (absolute position specification)
- Linked operation (a maximum of four motion profiles may be linked)
- Data range (in pulses): -8 388 608 to +8 388 607
- Operating speed: 10 Hz to 500 kHz (set in 1 Hz increments)

### ● Four Operation Modes

1. Positioning
2. Mechanical return to home (+LS, -LS, HOMELS)
3. Continuous
4. Electrical return to home

### ● General Inputs/Outputs

- 8 programmable inputs
- 8 programmable outputs

### ● Daisy Chain Capability

- Up to 36 units can be daisy chained with unique device ID's.

### ● Communication

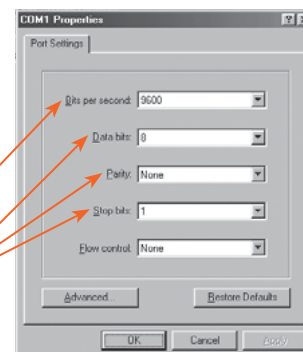
- ASCII based commands
- Conforms to RS-232C communication specifications
- Start-stop asynchronous transmission method
- Transmission speed: 9600 bps
- Data length: 8 bits, 1 stop bit, no parity
- Protocol: TTY (CR+LF)
- Modular 4-pin connector

### ● Program Memory

- Maximum number of programs: 14 (including STARTUP)
- Maximum lines per program: 64
- Commands per line: 1
- Program variables: 26 (A to Z)

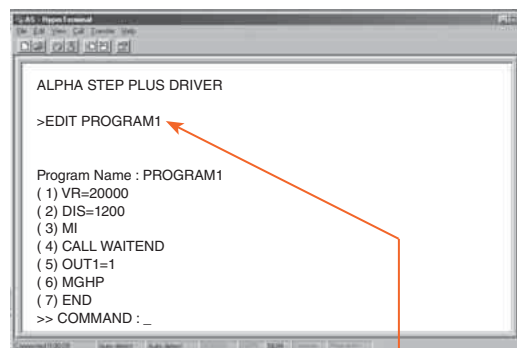
### ● Built-In Functions

- |                               |                       |                     |
|-------------------------------|-----------------------|---------------------|
| ● Selectable motor-resolution | ● Sensor logic        | ● Display values    |
| ● Run and stop current values | ● Overtravel limits   | ● Incremental moves |
| ● Velocity filter set value   | ● Software overtravel | ● I/O status        |
| ● Motor rotation direction    | ● Alarm history       |                     |
| ● External stop               | ● Syntax checking     |                     |



Using Windows HyperTerminal®, programming the built-in controller driver is a simple task.

### Example: "PROGRAM1"



### PROGRAM1 Definition

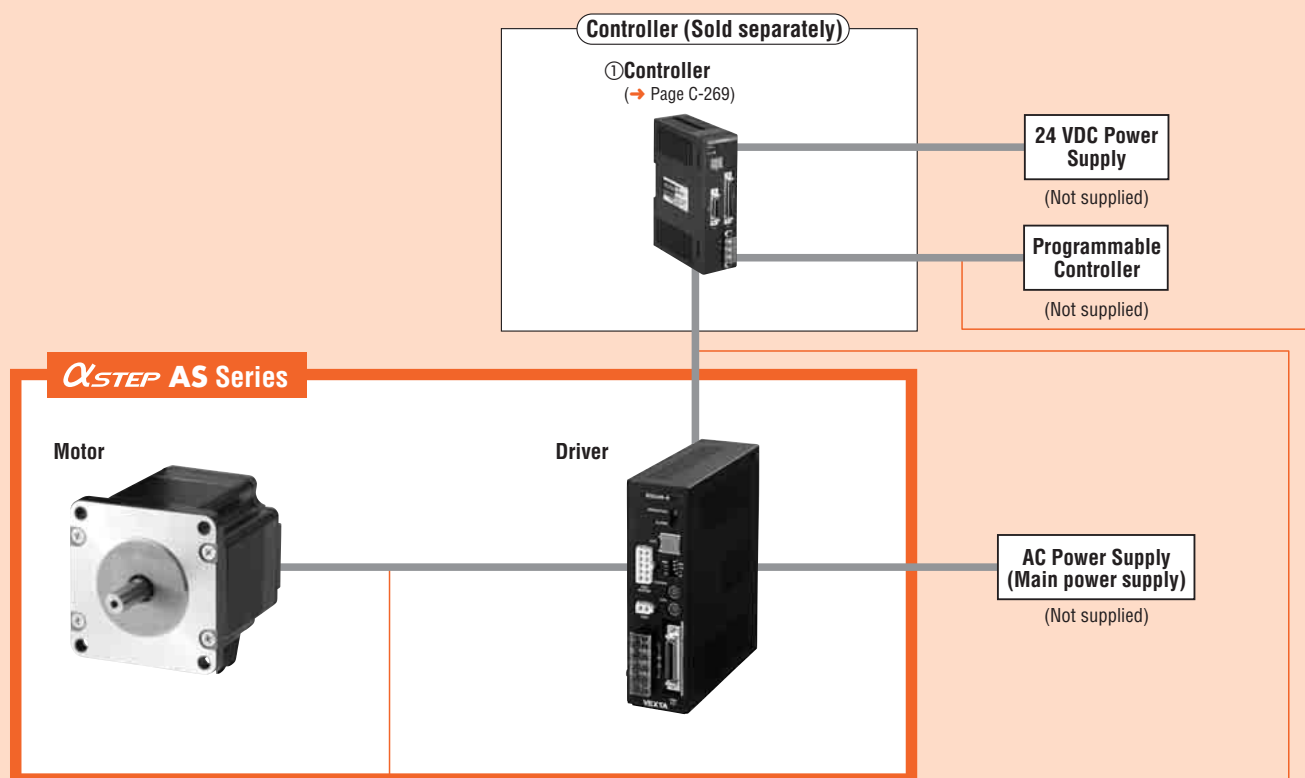
- Operating speed: 20000 Hz
- Move distance: 1200 pulses
- Call a subroutine that waits for the motor to stop before moving on to the next command
- Turn on output #1
- Seek the mechanical home position in the positive direction
- End of program



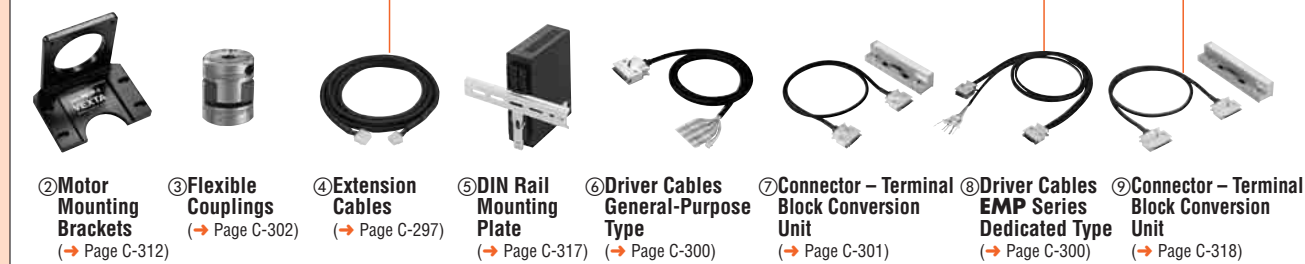
## System Configuration

### Pulse Input Package Standard Type

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



### Accessories and Peripheral Equipment (Sold separately)



No.	Product Name	Overview	Page
①	Controller	This controller outputs pulse commands that determine the rotation amount and rotating speed.	C-269
②	Motor Mounting Brackets	Dedicated mounting bracket for the motor.	C-312
③	Flexible Couplings	Coupling that connects the motor shaft to the driven shaft.	C-302
④	Extension Cables	Cable for extending the wiring distance between the motor and driver [1 to 20 m (3.3 to 65.6 ft.)].	C-297
	Flexible Extension Cables	Cable offering flexibility, used to extend the wiring distance between the motor and driver [1 to 10 m (3.3 to 32.8 ft.)].	
⑤	DIN Rail Mounting Plate	Use this plate ( <b>PADP01</b> ) when installing the driver to a DIN rail.	C-317
⑥	Driver Cables General-Purpose Type	General-purpose cable for connecting the driver and controller [1 m, 2 m (3.3 ft., 6.6 ft.)].	C-300
⑦	Connector - Terminal Block Conversion Unit	Set of terminal block and cable ( <b>CC36T1</b> ) for connecting the driver and controller [1 m (3.3 ft.)].	C-301
⑧	Driver Cables EMP Series Dedicated Type	Dedicated cable with connector for connecting the driver and <b>EMP</b> Series controller [1 m, 2 m (3.3 ft., 6.6 ft.)].	C-300
⑨	Connector - Terminal Block Conversion Unit	Set of terminal block and cable ( <b>CC50T1</b> ) for connecting the <b>EMP</b> Series controller and host controller [1 m (3.3 ft.)].	C-318

### Example of System Configuration

(Sold separately)

<b>ALPHA STEP AS Series</b>	+	<b>Controller</b>	<b>Extension Cable</b> [3 m (9.8 ft.)]	<b>Motor Mounting Bracket</b>	<b>Flexible Coupling</b>	<b>DIN Rail Mounting Plate</b>	<b>Driver Cable EMP Series Dedicated Type</b> [1 m (3.3 ft.)]	<b>Connector - Terminal Block Conversion Unit</b> [1 m (3.3 ft.)]
<b>AS66AAE</b>		<b>EMP401-1</b>	<b>CC03AIP</b>	<b>PAL2P-5A</b>	<b>MCS300808</b>	<b>PADP01</b>	<b>CC01EMP4</b>	<b>CC50T1</b>

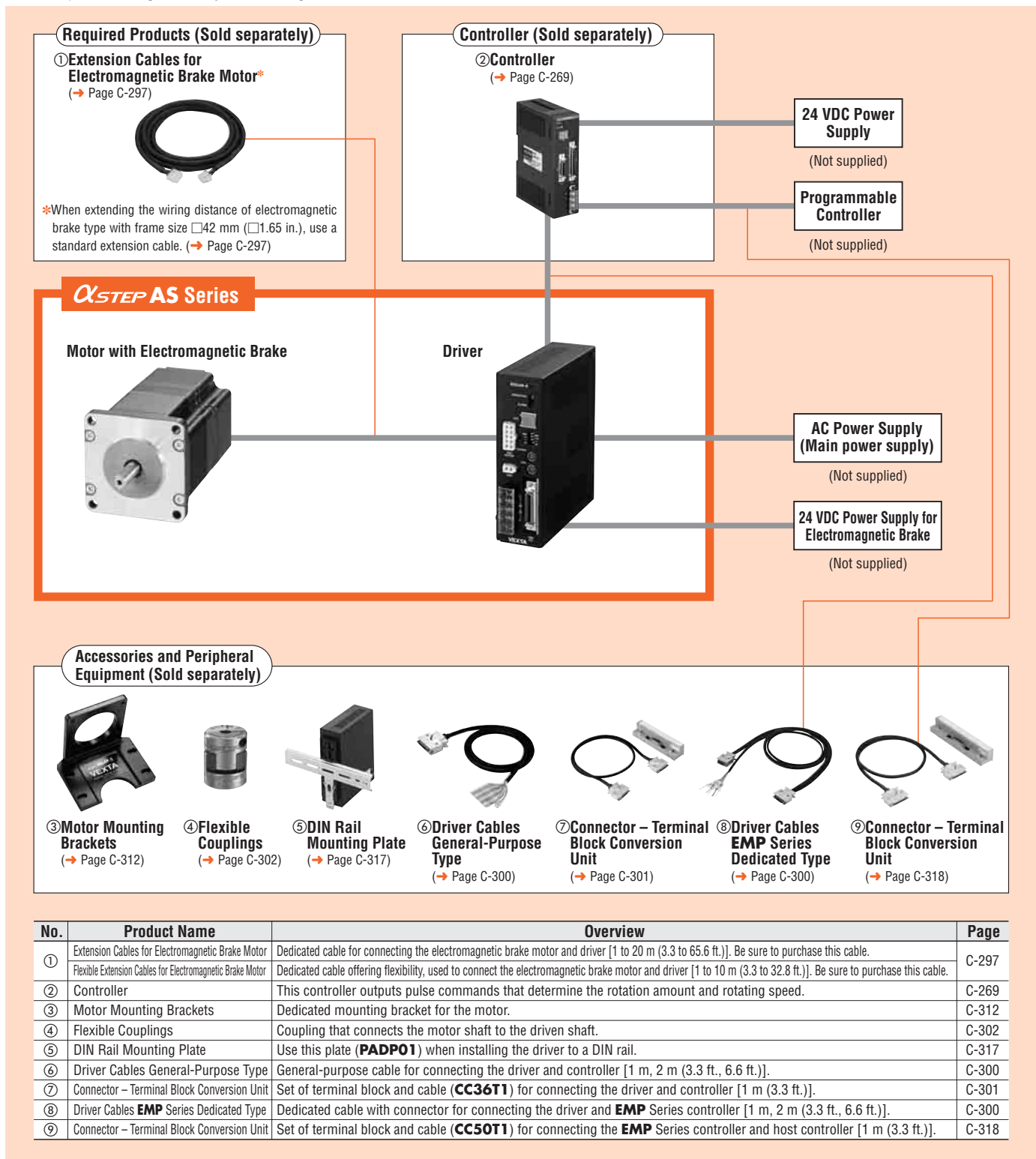
The system configuration shown above is an example. Other combinations are available.



## System Configuration

### Pulse Input Package Standard Type with Electromagnetic Brake

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



### Example of System Configuration

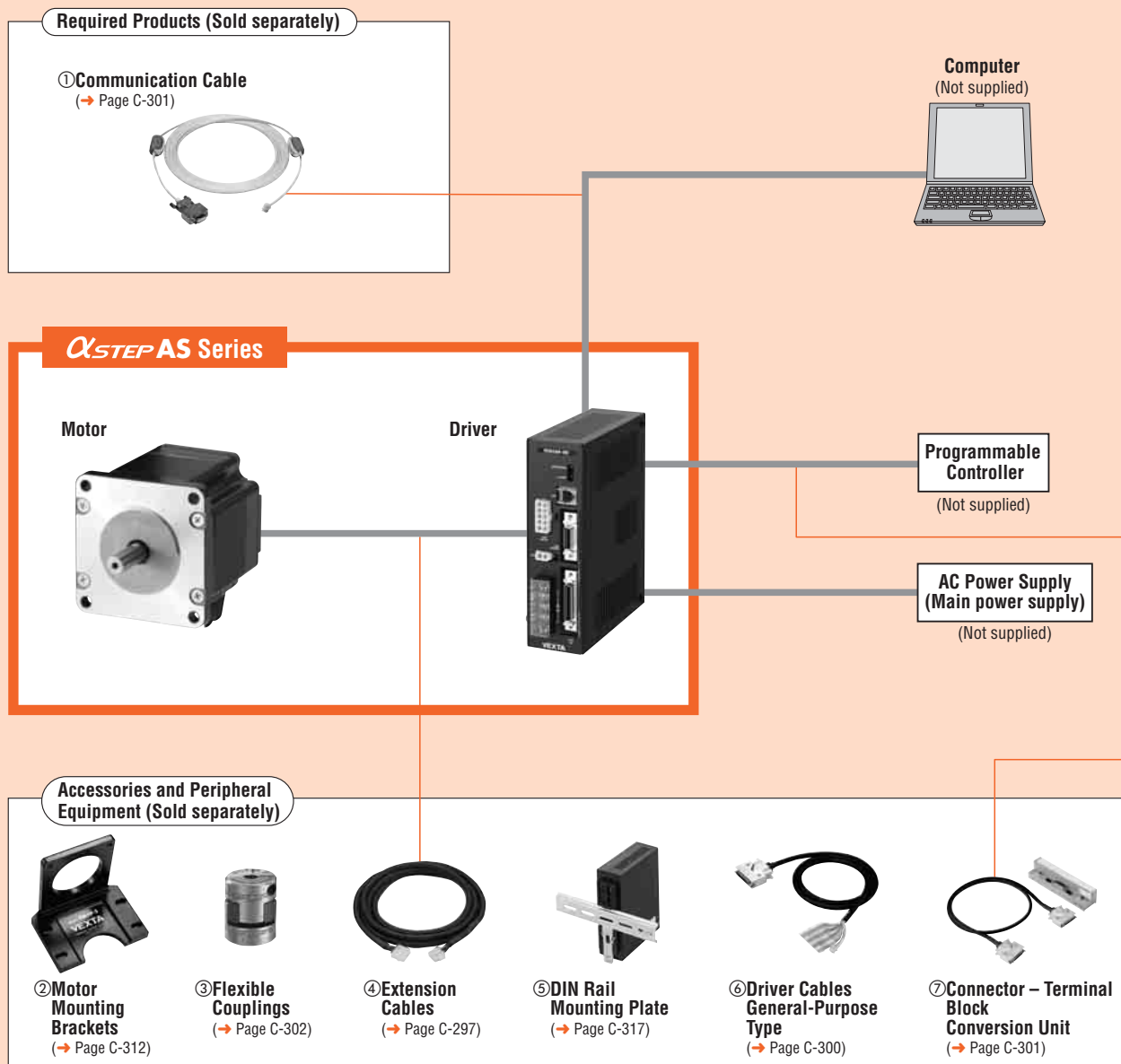
(Sold separately)



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

## System Configuration

### Built-In Controller Package Standard Type



No.	Product Name	Overview	Page
①	Communication Cable	Cable for connecting a computer and driver [5 m (16.4 ft.)].	C-301
②	Motor Mounting Brackets	Dedicated mounting bracket for the motor.	C-312
③	Flexible Couplings	Coupling that connects the motor shaft to the driven shaft.	C-302
④	Extension Cables	Cable for extending the wiring distance between the motor and driver [1 to 20 m (3.3 to 65.6 ft.)].	C-297
	Flexible Extension Cables	Cable offering flexibility, used to extend the wiring distance between the motor and driver [1 to 10 m (3.3 to 32.8 ft.)].	
⑤	DIN Rail Mounting Plate	Use this plate ( <b>PADP01</b> ) when installing the driver to a DIN rail.	C-317
⑥	Driver Cables General-Purpose Type	General-purpose cable for connecting the driver and controller [1 m, 2 m (3.3 ft., 6.6 ft.)].	C-300
⑦	Connector - Terminal Block Conversion Unit	Set of terminal block and cable ( <b>CC36T1</b> ) for connecting the driver and host controller [1 m (3.3 ft.)].	C-301

### Example of System Configuration

(Sold separately)

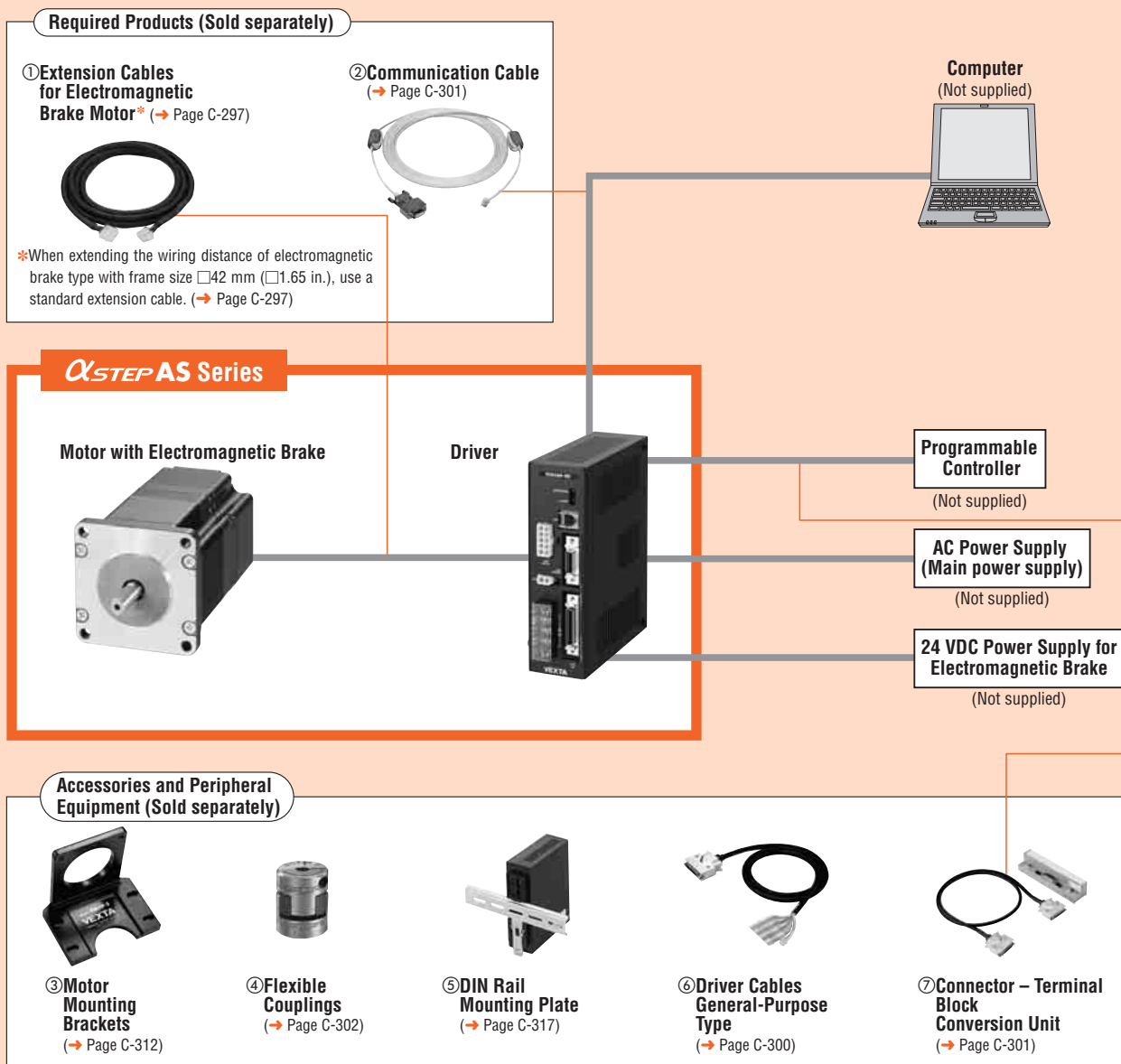
(Sold separately)

<b>Alpha Step AS Series</b>	<b>Communication Cable</b>	+	<b>Extension Cable</b>	<b>Motor Mounting Bracket</b>	<b>Flexible Coupling</b>	<b>DIN Rail Mounting Plate</b>	<b>Connector - Terminal Block Conversion Unit</b>	<b>For Sensor Input</b>	<b>For Control I/O</b>
<b>AS66AAEP</b>	<b>FC04W5</b>		<b>[3 m (9.8 ft.)]</b>	<b>PAL2P-5A</b>	<b>MCS300808</b>	<b>PADP01</b>	<b>CC20T1</b>	<b>CC36T1</b>	

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

## System Configuration

### Built-In Controller Package Standard Type with Electromagnetic Brake



No.	Product Name	Overview	Page
①	Extension Cables for Electromagnetic Brake Motor	Dedicated cable for connecting the electromagnetic brake motor and driver [1 to 20 m (3.3 to 65.6 ft.)]. Be sure to purchase this cable.	C-297
	Flexible Extension Cables for Electromagnetic Brake Motor	Dedicated cable offering flexibility, used to connect the electromagnetic brake motor and driver [1 to 10 m (3.3 to 32.8 ft.)]. Be sure to purchase this cable.	
②	Communication Cable	Cable for connecting a computer and driver [5 m (16.4 ft.)].	C-301
③	Motor Mounting Brackets	Dedicated mounting bracket for the motor.	C-312
④	Flexible Couplings	Coupling that connects the motor shaft to the driven shaft.	C-302
⑤	DIN Rail Mounting Plate	Use this plate ( <b>PADP01</b> ) when installing the driver to a DIN rail.	C-317
⑥	Driver Cables General-Purpose Type	General-purpose cable for connecting the driver and controller [1 m, 2 m (3.3 ft., 6.6 ft.)].	C-300
⑦	Connector – Terminal Block Conversion Unit	Set of terminal block and cable ( <b>CC36T1</b> ) for connecting the driver and host controller [1 m (3.3 ft.)].	C-301

### Example of System Configuration

(Sold separately)

QSTEP AS Series	Extension Cable for Electromagnetic Brake Motor [3 m (9.8 ft.)]	Communication Cable
AS66MAEP	CC03AIPM	FC04W5

(Sold separately)

Motor Mounting Bracket	Flexible Coupling	DIN Rail Mounting Plate	Connector – Terminal Block Conversion Unit [1 m (3.3 ft.)] For Sensor Input	Connector – Terminal Block Conversion Unit [1 m (3.3 ft.)] For Control I/O
PAL2P-5A	MCS300808	PADP01	CC20T1	CC36T1

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

## Product Number Code

### Standard Type

**AS 6 6 A A E P**

① ② ③ ④ ⑤ ⑥ ⑦

### Standard Type Industrial Connector

**AS 6 6 A A T P**

① ② ③ ④ ⑤ ⑥ ⑦

### Geared Type

**AS 6 6 A C E P - N 50**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

**AS 4 6 A A P 2 - H 100**

① ② ③ ④ ⑤ ⑦ ⑩ ⑧ ⑨

①	Series	<b>AS: AS</b> Series
②	Motor Frame Size	<b>4:</b> 42 mm (1.65 in.) <b>6:</b> 60 mm (2.36 in.) <b>9:</b> 85 mm (3.35 in.)
③	Motor Case Length	
④	Motor Type	<b>A:</b> Standard (Single shaft) <b>M:</b> Electromagnetic Brake Type
⑤	Power Supply Voltage	<b>A:</b> Single-Phase 100-115 VAC <b>C:</b> Single-Phase 200-230 VAC <b>S:</b> Three-Phase 200-230 VAC
⑥	Motor Classification	
⑦	Driver Type	<b>P:</b> Built-In Controller Package Blank: Pulse Input Package

①	Series	<b>AS: AS</b> Series
②	Motor Frame Size	<b>6:</b> 60 mm (2.36 in.) <b>9:</b> 85 mm (3.35 in.)
③	Motor Case Length	
④	Motor Shaft Type	<b>A:</b> Single Shaft
⑤	Power Supply Voltage	<b>A:</b> Single-Phase 100-115 VAC <b>C:</b> Single-Phase 200-230 VAC <b>S:</b> Three-Phase 200-230 VAC
⑥	Motor Classification	
⑦	Driver Type	<b>P:</b> Built-In Controller Package Blank: Pulse Input Package

①	Series	<b>AS: AS</b> Series
②	Motor Frame Size	<b>4:</b> 42 mm (1.65 in.) <b>6:</b> 60 mm (2.36 in.) <b>9:</b> 90 mm (3.54 in.)
③	Motor Case Length	
④	Motor Type	<b>A:</b> Standard (Single shaft) <b>M:</b> Electromagnetic Brake Type
⑤	Power Supply Voltage	<b>A:</b> Single-Phase 100-115 VAC <b>C:</b> Single-Phase 200-230 VAC <b>S:</b> Three-Phase 200-230 VAC
⑥	Motor Classification	
⑦	Driver Type	<b>P:</b> Built-In Controller Package Blank: Pulse Input Package
⑧	Gearhead Type	<b>T: TH</b> Geared Type <b>N: PN</b> Geared Type <b>H:</b> Harmonic Geared Type
⑨	Gear Ratio	
⑩	Reference Number	

## Product Line

The product names below are all for single shaft types, but there are also double shaft types available for all products except for those with electromagnetic brakes or industrial connector. Please contact the nearest Oriental Motor sales office for further information on the double shaft types.

### Pulse Input Package

#### Standard Type

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	AS46AA
	AS66AAE
	AS69AAE
	AS98AAE
	AS911AAE
Single-Phase 200-230 VAC	AS66ACE
	AS69ACE
	AS98ACE
	AS911ACE
	AS66ASE
Three-Phase 200-230 VAC	AS69ASE
	AS98ASE
	AS911ASE

#### Standard Type Industrial Connector

Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver.

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	AS66AAT
	AS69AAT
	AS98AAT
	AS911AAT
	AS66ACT
Single-Phase 200-230 VAC	AS69ACT
	AS98ACT
	AS911ACT
	AS66AST
	AS69AST
Three-Phase 200-230 VAC	AS98AST
	AS911AST

Motor cables for industrial connector type motor → Page C-298

#### TH Geared Type

Power Supply Voltage	Model (Single shaft)	
Single-Phase 100-115 VAC	AS46AA-T3.6	
	AS46AA-T7.2	
	AS46AA-T10	
	AS46AA-T20	
	AS46AA-T30	
	AS66AAE-T3.6	
	AS66AAE-T7.2	
	AS66AAE-T10	
	AS66AAE-T20	
	AS66AAE-T30	
	AS98AAE-T3.6	
	AS98AAE-T7.2	
	AS98AAE-T10	
	AS98AAE-T20	
	AS98AAE-T30	
	Single-Phase 200-230 VAC	AS66ACE-T3.6
		AS66ACE-T7.2
		AS66ACE-T10
		AS66ACE-T20
		AS66ACE-T30
AS98ACE-T3.6		
AS98ACE-T7.2		
AS98ACE-T10		
AS98ACE-T20		
AS98ACE-T30		
Three-Phase 200-230 VAC	AS66ASE-T3.6	
	AS66ASE-T7.2	
	AS66ASE-T10	
	AS66ASE-T20	
	AS66ASE-T30	
	AS98ASE-T3.6	
	AS98ASE-T7.2	
	AS98ASE-T10	
	AS98ASE-T20	
	AS98ASE-T30	

The following items are included in each product.

Motor, Parallel Key\*1, Surge Suppressor\*2, Driver, Connector for Input/Output Signal,

Mounting Bracket for Driver (with screws), Operating Manual

\*1 Only for the products with a key slot on the output shaft

\*2 Only for electromagnetic brake type

#### Standard Type with Electromagnetic Brake

Electromagnetic brake models except frame size □42 mm (□1.65 in.) must use an extension or flexible extension cable for an electromagnetic brake motor.

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	AS46MA
	AS66MAE
	AS69MAE
	AS98MAE
Single-Phase 200-230 VAC	AS66MCE
	AS69MCE
	AS98MCE
	AS66MSE
Three-Phase 200-230 VAC	AS69MSE
	AS98MSE

Extension cables for electromagnetic brake motor → Page C-297

#### TH Geared Type with Electromagnetic Brake

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	AS46MA-T3.6
	AS46MA-T7.2
	AS46MA-T10
	AS46MA-T20
	AS46MA-T30
	AS66MAE-T3.6
	AS66MAE-T7.2
	AS66MAE-T10
	AS66MAE-T20
	AS66MAE-T30
	AS98MAE-T3.6
	AS98MAE-T7.2
	AS98MAE-T10
Single-Phase 200-230 VAC	AS66MCE-T3.6
	AS66MCE-T7.2
	AS66MCE-T10
	AS66MCE-T20
	AS66MCE-T30
	AS98MCE-T3.6
	AS98MCE-T7.2
	AS98MCE-T10
	AS98MCE-T20
	AS98MCE-T30
Three-Phase 200-230 VAC	AS66MSE-T3.6
	AS66MSE-T7.2
	AS66MSE-T10
	AS66MSE-T20
	AS66MSE-T30
	AS98MSE-T3.6
	AS98MSE-T7.2
	AS98MSE-T10
	AS98MSE-T20
	AS98MSE-T30

Extension cables for electromagnetic brake motor → Page C-297

## ◇ PN Geared Type

Power Supply Voltage	Model (Single shaft)	
Single-Phase 100-115 VAC	AS46AA-N7.2	
	AS46AA-N10	
	AS66AAE-N5	
	AS66AAE-N7.2	
	AS66AAE-N10	
	AS66AAE-N25	
	AS66AAE-N36	
	AS66AAE-N50	
	AS98AAE-N5	
	AS98AAE-N7.2	
	AS98AAE-N10	
	AS98AAE-N25	
	AS98AAE-N36	
	AS98AAE-N50	
Single-Phase 200-230 VAC	AS66ACE-N5	
	AS66ACE-N7.2	
	AS66ACE-N10	
	AS66ACE-N25	
	AS66ACE-N36	
	AS66ACE-N50	
	AS98ACE-N5	
	AS98ACE-N7.2	
	AS98ACE-N10	
	AS98ACE-N25	
	AS98ACE-N36	
	AS98ACE-N50	
	Three-Phase 200-230 VAC	AS66ASE-N5
		AS66ASE-N7.2
AS66ASE-N10		
AS66ASE-N25		
AS66ASE-N36		
AS66ASE-N50		
AS98ASE-N5		
AS98ASE-N7.2		
AS98ASE-N10		
AS98ASE-N25		
AS98ASE-N36		
AS98ASE-N50		

## ◇ Harmonic Geared Type

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	AS46AA2-H50
	AS46AA2-H100
	AS66AAE-H50
	AS66AAE-H100
	AS98AAE-H50
	AS98AAE-H100
Single-Phase 200-230 VAC	AS66ACE-H50
	AS66ACE-H100
	AS98ACE-H50
	AS98ACE-H100
Three-Phase 200-230 VAC	AS66ASE-H50
	AS66ASE-H100
	AS98ASE-H50
	AS98ASE-H100

## ◇ PN Geared Type with Electromagnetic Brake

Power Supply Voltage	Model (Single shaft)	
Single-Phase 100-115 VAC	AS46MA-N7.2	
	AS46MA-N10	
	AS66MAE-N5	
	AS66MAE-N7.2	
	AS66MAE-N10	
	AS66MAE-N25	
	AS66MAE-N36	
	AS66MAE-N50	
	AS98MAE-N5	
	AS98MAE-N7.2	
	AS98MAE-N10	
	AS98MAE-N25	
	AS98MAE-N36	
	AS98MAE-N50	
Single-Phase 200-230 VAC	AS66MCE-N5	
	AS66MCE-N7.2	
	AS66MCE-N10	
	AS66MCE-N25	
	AS66MCE-N36	
	AS66MCE-N50	
	AS98MCE-N5	
	AS98MCE-N7.2	
	AS98MCE-N10	
	AS98MCE-N25	
	AS98MCE-N36	
	AS98MCE-N50	
	Three-Phase 200-230 VAC	AS66MSE-N5
		AS66MSE-N7.2
AS66MSE-N10		
AS66MSE-N25		
AS66MSE-N36		
AS66MSE-N50		
AS98MSE-N5		
AS98MSE-N7.2		
AS98MSE-N10		
AS98MSE-N25		
AS98MSE-N36		
AS98MSE-N50		

Extension cables for electromagnetic brake motor → Page C-297

## ◇ Harmonic Geared Type with Electromagnetic Brake

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	AS46MA2-H50
	AS46MA2-H100
	AS66MAE-H50
	AS66MAE-H100
	AS98MAE-H50
	AS98MAE-H100
Single-Phase 200-230 VAC	AS66MCE-H50
	AS66MCE-H100
	AS98MCE-H50
	AS98MCE-H100
Three-Phase 200-230 VAC	AS66MSE-H50
	AS66MSE-H100
	AS98MSE-H50
	AS98MSE-H100

Extension cables for electromagnetic brake motor → Page C-297

## ● Built-In Controller Package

### ◇ Standard Type

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	<b>AS46AAP</b>
	<b>AS66AAEP</b>
	<b>AS69AAEP</b>
	<b>AS98AAEP</b>
	<b>AS911AAEP</b>
Single-Phase 200-230 VAC	<b>AS66ACEP</b>
	<b>AS69ACEP</b>
	<b>AS98ACEP</b>
	<b>AS911ACEP</b>
	<b>AS66ASEP</b>
Three-Phase 200-230 VAC	<b>AS69ASEP</b>
	<b>AS98ASEP</b>
	<b>AS911ASEP</b>

### ◇ Standard Type Industrial Connector

Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver.

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	<b>AS66AATP</b>
	<b>AS69AATP</b>
	<b>AS98AATP</b>
	<b>AS911AATP</b>
Single-Phase 200-230 VAC	<b>AS66ACTP</b>
	<b>AS69ACTP</b>
	<b>AS98ACTP</b>
	<b>AS911ACTP</b>
Three-Phase 200-230 VAC	<b>AS66ASTP</b>
	<b>AS69ASTP</b>
	<b>AS98ASTP</b>
	<b>AS911ASTP</b>

Motor cables for industrial connector type motor → Page C-298

### ◇ TH Geared Type

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	<b>AS46AAP-T3.6</b>
	<b>AS46AAP-T7.2</b>
	<b>AS46AAP-T10</b>
	<b>AS46AAP-T20</b>
	<b>AS46AAP-T30</b>
	<b>AS66AAEP-T3.6</b>
	<b>AS66AAEP-T7.2</b>
	<b>AS66AAEP-T10</b>
	<b>AS66AAEP-T20</b>
	<b>AS66AAEP-T30</b>
	<b>AS98AAEP-T3.6</b>
	<b>AS98AAEP-T7.2</b>
	<b>AS98AAEP-T10</b>
	<b>AS98AAEP-T20</b>
	<b>AS98AAEP-T30</b>
	Single-Phase 200-230 VAC
<b>AS66ACEP-T7.2</b>	
<b>AS66ACEP-T10</b>	
<b>AS66ACEP-T20</b>	
<b>AS66ACEP-T30</b>	
<b>AS98ACEP-T3.6</b>	
<b>AS98ACEP-T7.2</b>	
<b>AS98ACEP-T10</b>	
<b>AS98ACEP-T20</b>	
<b>AS98ACEP-T30</b>	
Three-Phase 200-230 VAC	<b>AS66ASEP-T3.6</b>
	<b>AS66ASEP-T7.2</b>
	<b>AS66ASEP-T10</b>
	<b>AS66ASEP-T20</b>
	<b>AS66ASEP-T30</b>
	<b>AS98ASEP-T3.6</b>
	<b>AS98ASEP-T7.2</b>
	<b>AS98ASEP-T10</b>
	<b>AS98ASEP-T20</b>
	<b>AS98ASEP-T30</b>

### ◇ Standard Type with Electromagnetic Brake

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	<b>AS46MAP</b>
	<b>AS66MAEP</b>
	<b>AS69MAEP</b>
	<b>AS98MAEP</b>
Single-Phase 200-230 VAC	<b>AS66MCEP</b>
	<b>AS69MCEP</b>
	<b>AS98MCEP</b>
Three-Phase 200-230 VAC	<b>AS66MSEP</b>
	<b>AS69MSEP</b>
	<b>AS98MSEP</b>

Extension cables for electromagnetic brake motor → Page C-297

### ◇ TH Geared Type with Electromagnetic Brake

Power Supply Voltage	Model (Single shaft)
Single-Phase 100-115 VAC	<b>AS46MAP-T3.6</b>
	<b>AS46MAP-T7.2</b>
	<b>AS46MAP-T10</b>
	<b>AS46MAP-T20</b>
	<b>AS46MAP-T30</b>
	<b>AS66MAEP-T3.6</b>
	<b>AS66MAEP-T7.2</b>
	<b>AS66MAEP-T10</b>
	<b>AS66MAEP-T20</b>
	<b>AS66MAEP-T30</b>
	<b>AS98MAEP-T3.6</b>
	<b>AS98MAEP-T7.2</b>
	<b>AS98MAEP-T10</b>
	<b>AS98MAEP-T20</b>
	<b>AS98MAEP-T30</b>
	Single-Phase 200-230 VAC
<b>AS66MCEP-T7.2</b>	
<b>AS66MCEP-T10</b>	
<b>AS66MCEP-T20</b>	
<b>AS66MCEP-T30</b>	
<b>AS98MCEP-T3.6</b>	
<b>AS98MCEP-T7.2</b>	
<b>AS98MCEP-T10</b>	
<b>AS98MCEP-T20</b>	
<b>AS98MCEP-T30</b>	
Three-Phase 200-230 VAC	<b>AS66MSEP-T3.6</b>
	<b>AS66MSEP-T7.2</b>
	<b>AS66MSEP-T10</b>
	<b>AS66MSEP-T20</b>
	<b>AS66MSEP-T30</b>
	<b>AS98MSEP-T3.6</b>
	<b>AS98MSEP-T7.2</b>
	<b>AS98MSEP-T10</b>
	<b>AS98MSEP-T20</b>
	<b>AS98MSEP-T30</b>

Extension cables for electromagnetic brake motor → Page C-297



## ◇ PN Geared Type

Power Supply Voltage	Model (Single shaft)		
Single-Phase 100-115 VAC	AS46AAP-N7.2 AS46AAP-N10		
	AS66AAEP-N5 AS66AAEP-N7.2 AS66AAEP-N10 AS66AAEP-N25 AS66AAEP-N36 AS66AAEP-N50		
	AS98AAEP-N5 AS98AAEP-N7.2 AS98AAEP-N10 AS98AAEP-N25 AS98AAEP-N36 AS98AAEP-N50		
	Single-Phase 200-230 VAC	AS66ACEP-N5 AS66ACEP-N7.2 AS66ACEP-N10 AS66ACEP-N25 AS66ACEP-N36 AS66ACEP-N50	
		AS98ACEP-N5 AS98ACEP-N7.2 AS98ACEP-N10 AS98ACEP-N25 AS98ACEP-N36 AS98ACEP-N50	
		Three-Phase 200-230 VAC	AS66ASEP-N5 AS66ASEP-N7.2 AS66ASEP-N10 AS66ASEP-N25 AS66ASEP-N36 AS66ASEP-N50
			AS98ASEP-N5 AS98ASEP-N7.2 AS98ASEP-N10 AS98ASEP-N25 AS98ASEP-N36 AS98ASEP-N50

## ◇ Harmonic Geared Type

Power Supply Voltage	Model (Single shaft)	
Single-Phase 100-115 VAC	AS46AAP2-H50 AS46AAP2-H100	
	AS66AAEP-H50 AS66AAEP-H100	
	AS98AAEP-H50 AS98AAEP-H100	
	Single-Phase 200-230 VAC	AS66ACEP-H50 AS66ACEP-H100
		AS98ACEP-H50 AS98ACEP-H100
Three-Phase 200-230 VAC		AS66ASEP-H50 AS66ASEP-H100
		AS98ASEP-H50 AS98ASEP-H100

- Electromagnetic brake models except frame size □42 mm (□1.65 in.) must use an extension cable or flexible extension cable for an electromagnetic brake motor. The frame size □42 mm (□1.65 in.) models can use a standard extension cable even for electromagnetic brake motor models.

## ● Extension Cables for Electromagnetic Brake Motor

Model	Length m (ft.)
CC01AIPM	1 (3.3)
CC02AIPM	2 (6.6)
CC03AIPM	3 (9.8)
CC05AIPM	5 (16.4)
CC07AIPM	7 (23)
CC10AIPM	10 (32.8)
CC15AIPM	15 (49.2)
CC20AIPM	20 (65.6)

## ◇ PN Geared Type with Electromagnetic Brake

Power Supply Voltage	Model (Single shaft)		
Single-Phase 100-115 VAC	AS46MAP-N7.2 AS46MAP-N10		
	AS66MAEP-N5 AS66MAEP-N7.2 AS66MAEP-N10 AS66MAEP-N25 AS66MAEP-N36 AS66MAEP-N50		
	AS98MAEP-N5 AS98MAEP-N7.2 AS98MAEP-N10 AS98MAEP-N25 AS98MAEP-N36 AS98MAEP-N50		
	Single-Phase 200-230 VAC	AS66MCEP-N5 AS66MCEP-N7.2 AS66MCEP-N10 AS66MCEP-N25 AS66MCEP-N36 AS66MCEP-N50	
		AS98MCEP-N5 AS98MCEP-N7.2 AS98MCEP-N10 AS98MCEP-N25 AS98MCEP-N36 AS98MCEP-N50	
		Three-Phase 200-230 VAC	AS66MSEP-N5 AS66MSEP-N7.2 AS66MSEP-N10 AS66MSEP-N25 AS66MSEP-N36 AS66MSEP-N50
			AS98MSEP-N5 AS98MSEP-N7.2 AS98MSEP-N10 AS98MSEP-N25 AS98MSEP-N36 AS98MSEP-N50

Extension cables for electromagnetic brake motor → Page C-297

## ◇ Harmonic Geared Type with Electromagnetic Brake

Power Supply Voltage	Model (Single shaft)	
Single-Phase 100-115 VAC	AS46MAP2-H50 AS46MAP2-H100	
	AS66MAEP-H50 AS66MAEP-H100	
	AS98MAEP-H50 AS98MAEP-H100	
	Single-Phase 200-230 VAC	AS66MCEP-H50 AS66MCEP-H100
		AS98MCEP-H50 AS98MCEP-H100
Three-Phase 200-230 VAC		AS66MSEP-H50 AS66MSEP-H100
		AS98MSEP-H50 AS98MSEP-H100



Extension cables for electromagnetic brake motor → Page C-297

## ● Flexible Extension Cables for Electromagnetic Brake Motor

Model	Length m (ft.)
CC01SARM2	1 (3.3)
CC02SARM2	2 (6.6)
CC03SARM2	3 (9.8)
CC05SARM2	5 (16.4)
CC07SARM2	7 (23)
CC10SARM2	10 (32.8)

# Standard Type Motor Frame Size 42 mm (1.65 in.), 60 mm (2.36 in.), 85 mm (3.35 in.)

## Specifications RoHS

  ● With the **AS46** type, only the driver conforms to the CSA Standards.

Model	Pulse Input Package	Standard	<b>AS46AA</b>	<b>AS66A</b> <input type="checkbox"/> E	<b>AS69A</b> <input type="checkbox"/> E	<b>AS98A</b> <input type="checkbox"/> E	<b>AS911A</b> <input type="checkbox"/> E	
	Built-In Controller Package	Electromagnetic Brake	<b>AS46MA</b>	<b>AS66M</b> <input type="checkbox"/> E	<b>AS69M</b> <input type="checkbox"/> E	<b>AS98M</b> <input type="checkbox"/> E	—	
Maximum Holding Torque	Standard		0.3 (42)		1.2 (170)		2 (280)	
	Electromagnetic Brake		0.3 (42)		1.2 (170)		2 (280)	
Rotational Inertia J	Standard		68×10 <sup>-7</sup> (0.37) [83×10 <sup>-7</sup> (0.45)]*1		405×10 <sup>-7</sup> (2.2) [564×10 <sup>-7</sup> (3.1)]*1		802×10 <sup>-7</sup> (4.4) [961×10 <sup>-7</sup> (5.3)]*1	
Resolution*2	Resolution Setting: 1000 P/R		0.36°/Pulse		0.36°/Pulse		0.36°/Pulse	
Power Source	Voltage/Frequency		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz		Single-Phase 200-230 VAC -15%~+10% 50/60 Hz	
	Maximum Input Current A		Single-Phase 100-115 VAC 3.3		Single-Phase 200-230 VAC 3		Single-Phase 200-230 VAC 3.9	
			Three-Phase 100-115 VAC —		Three-Phase 200-230 VAC 1.5		Three-Phase 200-230 VAC 2.2	
Electromagnetic Brake*3	Type		Active when the power is off		Active when the power is off		Active when the power is off	
	Power Supply Input		24 VDC±5%		24 VDC±5%		24 VDC±5%	
	Power Consumption W		2		6		—	
	Excitation Current A		0.08		0.25		—	
Mass	Static Friction Torque N·m (oz·in)		0.15 (21)		0.6 (85)		1 (142)	
	Motor kg (lb.)		0.5 (1.1) [0.6 (1.3)]*1		0.85 (1.9) [1.1 (2.4)]*1		1.4 (3.1) [1.65 (3.6)]*1	
Dimension No.	Driver kg (lb.)		—		0.8 (1.8)		—	
	Motor		1		2		3	
Dimension No.	Pulse Input		15		15		15	
	Built-In Controller		16		16		16	

How to read specifications table → Page C-11 Extension cables for electromagnetic brake motor → Page C-297

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

\*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*2 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.

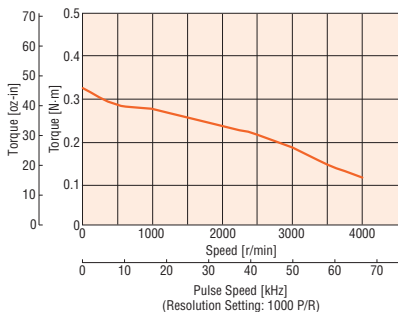
Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

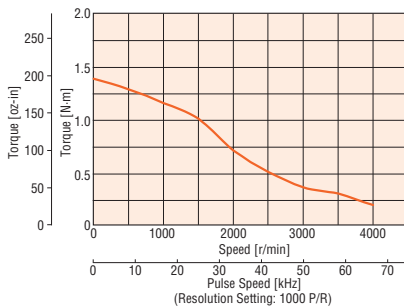
\*3 The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC±5%, 0.3 A minimum (**AS46**: 0.1 A minimum) power supply is required for the electromagnetic brakes.

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-12

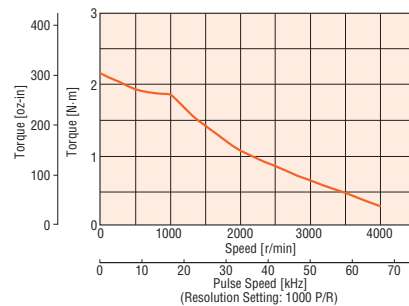
**AS46**A/**AS46**AP



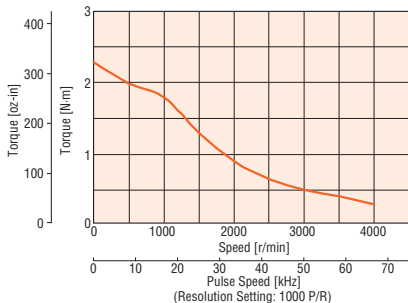
**AS66**E/**AS66**EP



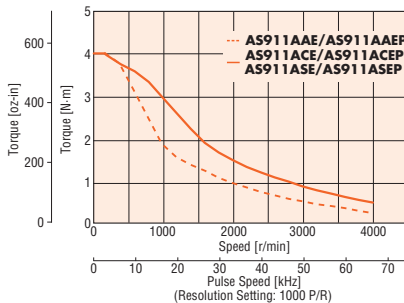
**AS69**E/**AS69**EP



**AS98**E/**AS98**EP



**AS911A**E/**AS911A**EP



● Enter **A** (standard) or **M** (electromagnetic brake) in the box (□) within the model name.

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

### Notes:

● Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]

● The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

# Standard Type Industrial Connector Motor Frame Size 60 mm (2.36 in.), 85 mm (3.35 in.)

## Specifications RoHS



Model	Pulse Input Package	Standard	AS66A□T	AS69A□T	AS98A□T	AS911A□T
	Built-In Controller Package	Standard	AS66A□TP	AS69A□TP	AS98A□TP	AS911A□TP
Maximum Holding Torque	N·m (oz·in)		1.2 (170)	2 (280)		4 (560)
Rotor Inertia J	kg·m <sup>2</sup> (oz·in <sup>2</sup> )		405×10 <sup>-7</sup> (2.2)	802×10 <sup>-7</sup> (4.4)	1400×10 <sup>-7</sup> (7.7)	2710×10 <sup>-7</sup> (14.8)
Resolution*1	Resolution Setting: 1000 P/R		0.36°/Pulse			
Power Source	Voltage/Frequency		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz			
			Single-Phase 200-230 VAC -15%~+10% 50/60 Hz			
			Three-Phase 200-230 VAC -15%~+10% 50/60 Hz			
Maximum Input Current A	Single-Phase 100-115 VAC		5	6.4	6	6.5
	Single-Phase 200-230 VAC		3	3.9	3.5	4.5
	Three-Phase 200-230 VAC		1.5	2.2	1.9	2.4
Degree of Protection			Motor: IP65*2		Driver: IP10	
Mass	Motor	kg (lb.)	1 (2.2)	1.5 (3.3)	2.2 (4.8)	3.3 (7.3)
	Driver	kg (lb.)	0.8 (1.8)			
Dimension No.	Motor		4		5	
	Driver	Pulse Input	15			
		Built-In Controller	16			

How to read specifications table → Page C-11

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

\*1 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.

Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

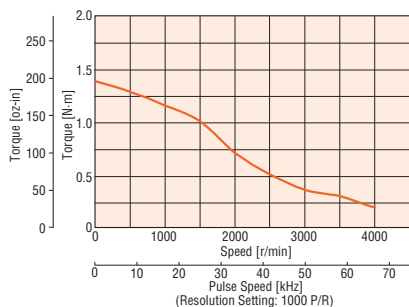
\*2 Excluding the gap between the shaft and the flange.

● Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver. → Page C-298

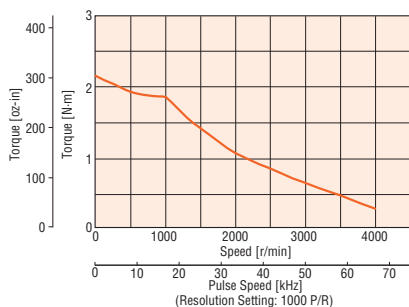
## Speed – Torque Characteristics

How to read speed – torque characteristics → Page C-12

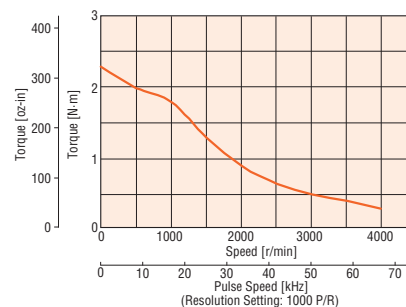
### AS66A□T/AS66A□TP



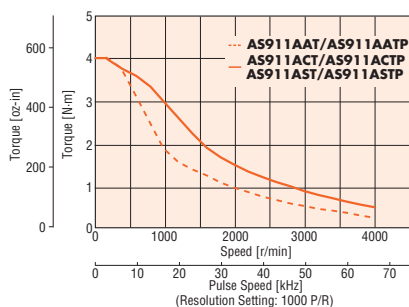
### AS69A□T/AS69A□TP



### AS98A□T/AS98A□TP



### AS911A□T/AS911A□TP



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

#### Notes:

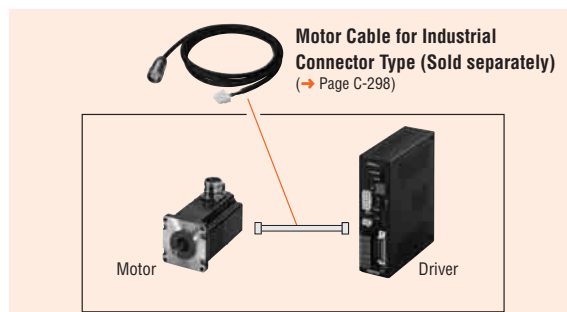
● Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]

● The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

## Requirement for Motor Cable for Industrial Connector Type (Sold separately)

Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver.

The industrial connector type cannot be driven unless the dedicated motor cable is used.



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

## Specifications (RoHS)

UL<sup>®</sup> CE ● With the **AS46** type, only the driver conforms to the CSA Standards.

Model	Pulse Input Package		AS46AA-T3.6	AS46AA-T7.2	AS46AA-T10	AS46AA-T20	AS46AA-T30	
	Standard	Electromagnetic Brake	AS46MA-T3.6	AS46MA-T7.2	AS46MA-T10	AS46MA-T20	AS46MA-T30	
Model	Built-In Controller Package		AS46AAP-T3.6	AS46AAP-T7.2	AS46AAP-T10	AS46AAP-T20	AS46AAP-T30	
	Standard	Electromagnetic Brake	AS46MAP-T3.6	AS46MAP-T7.2	AS46MAP-T10	AS46MAP-T20	AS46MAP-T30	
Maximum Holding Torque	N·m (lb·in)		0.35 (3)	0.7 (6.1)	1 (8.8)	1.5 (13.2)		
Rotor Inertia J	kg·m <sup>2</sup> (oz·in <sup>2</sup> )		68×10 <sup>-7</sup> (0.37) [83×10 <sup>-7</sup> (0.45)] <sup>*1</sup>					
Backlash	arc minute (degrees)		45 (0.75°)	25 (0.417°)	25 (0.417°)	15 (0.25°)	15 (0.25°)	
Permissible Speed Range	r/min		0~500	0~250	0~180	0~90	0~60	
Gear Ratio			3.6:1	7.2:1	10:1	20:1	30:1	
Resolution <sup>*2</sup>	Resolution Setting: 1000 P/R		0.1°/Pulse	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse	
Permissible Torque	N·m (lb·in)		0.35 (3)	0.7 (6.1)	1 (8.8)	1.5 (13.2)		
Power Source	Voltage/Frequency		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz					
Electromagnetic Brake <sup>*3</sup>	Maximum Input Current A		3.3					
	Type		Active when the power is off					
	Power Supply Input		24 VDC±5%					
	Power Consumption W		2					
Electromagnetic Brake <sup>*3</sup>	Excitation Current A		0.08					
	Static Friction Torque		N·m (lb·in)	0.17 (1.5)	0.35 (3)	0.5 (4.4)	0.75 (6.6)	
	Mass		Motor kg (lb.)	0.65 (1.4) [0.75 (1.7)] <sup>*1</sup>				
Dimension No.	Driver		Motor kg (lb.)	0.8 (1.8)				
	Pulse Input		6					
Dimension No.	Built-In Controller		15					
			16					

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\*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*2 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.  
Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

\*3 The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC±5%, 0.1 A minimum power supply is required for the electromagnetic brakes.

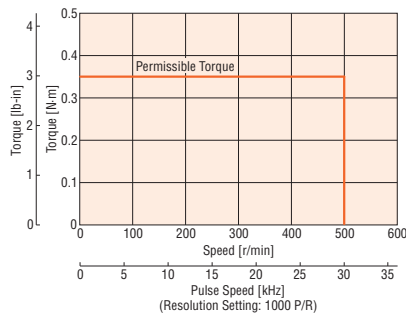
### Note:

● Direction of rotation of the motor and that of the gear output shaft are the same for the gear ratios 3.6:1, 7.2:1 and 10:1. It is opposite for 20:1 and 30:1 gear ratios.

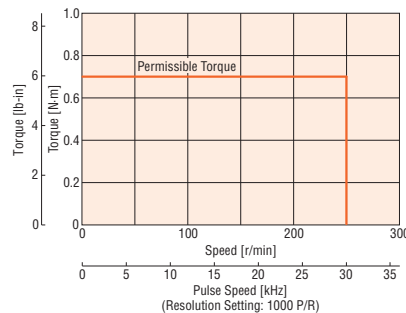
## Speed – Torque Characteristics

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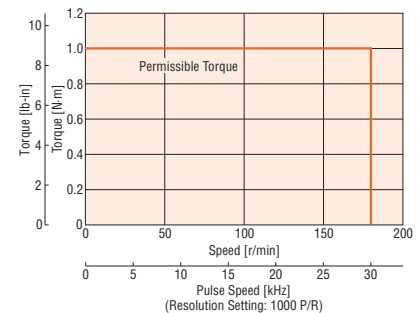
AS46□A-T3.6/AS46□AP-T3.6



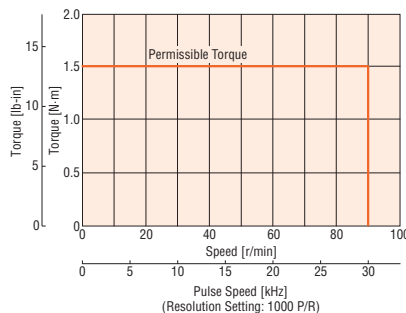
AS46□A-T7.2/AS46□AP-T7.2



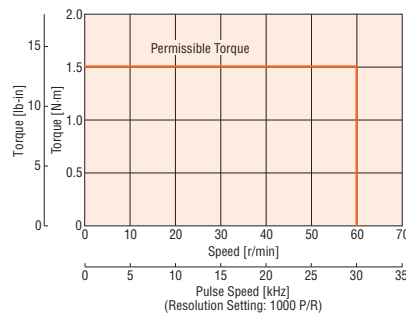
AS46□A-T10/AS46□AP-T10



AS46□A-T20/AS46□AP-T20



AS46□A-T30/AS46□AP-T30



● Enter **A** (standard) or **M** (electromagnetic brake) in the box (□) within the model name.

### Notes:

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

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

## Specifications RoHS



Model	Pulse Input Package	Standard	AS66A□E-T3.6	AS66A□E-T7.2	AS66A□E-T10	AS66A□E-T20	AS66A□E-T30
	Electromagnetic Brake Package	Electromagnetic Brake	AS66M□E-T3.6	AS66M□E-T7.2	AS66M□E-T10	AS66M□E-T20	AS66M□E-T30
Model	Built-In Controller Package	Standard	AS66A□EP-T3.6	AS66A□EP-T7.2	AS66A□EP-T10	AS66A□EP-T20	AS66A□EP-T30
	Electromagnetic Brake Package	Electromagnetic Brake	AS66M□EP-T3.6	AS66M□EP-T7.2	AS66M□EP-T10	AS66M□EP-T20	AS66M□EP-T30
Maximum Holding Torque	N·m (lb·in)		1.25 (11)	2.5 (22)	3 (26)	3.5 (30)	4 (35)
Rotor Inertia J	kg·m <sup>2</sup> (oz·in <sup>2</sup> )		405×10 <sup>-7</sup> (2.2) [564×10 <sup>-7</sup> (3.1)]*1				
Backlash	arc minute (degrees)		35 (0.584°)	15 (0.25°)	10 (0.167°)		
Permissible Speed Range	r/min		0~500	0~250	0~180	0~90	0~60
Gear Ratio			3.6:1	7.2:1	10:1	20:1	30:1
Resolution*2	Resolution Setting: 1000 P/R		0.1°/Pulse	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse
Permissible Torque	N·m (lb·in)		1.25 (11)	2.5 (22)	3 (26)	3.5 (30)	4 (35)
Power Source	Voltage/Frequency		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz				
			Single-Phase 200-230 VAC -15%~+10% 50/60 Hz				
			Three-Phase 200-230 VAC -15%~+10% 50/60 Hz				
	Maximum Input Current	A	5				
Electromagnetic Brake*3	Type		Active when the power is off				
	Power Supply Input		24 VDC±5%				
	Power Consumption W		6				
	Excitation Current A		0.25				
Mass	Static Friction Torque	N·m (lb·in)	0.62 (5.4)	1.25 (11)	1.5 (13.2)	1.75 (15.4)	2 (17.7)
	Motor	kg (lb.)	1.25 (2.8) [1.5 (3.3)]*1				
Dimension No.	Driver	Motor	7				
		Built-In Controller	15				
			16				

How to read specifications table → Page C-11 Extension cables for electromagnetic brake motor → Page C-297

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

\*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*2 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.

Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

\*3 The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC±5%, 0.3 A minimum power supply is required for the electromagnetic brakes.

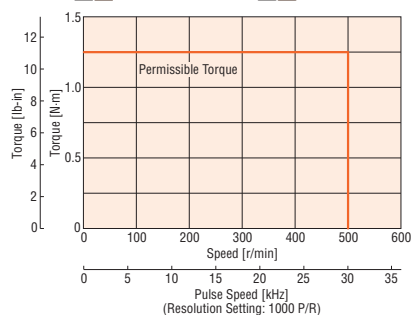
### Note:

● Direction of rotation of the motor and that of the gear output shaft are the same for the gear ratios 3.6:1, 7.2:1 and 10:1. It is opposite for 20:1 and 30:1 gear ratios.

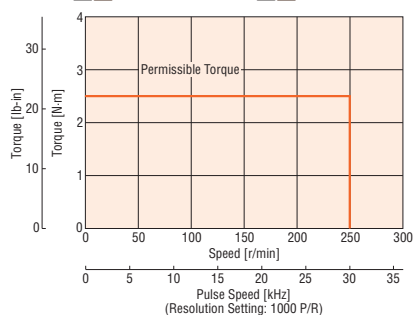
## Speed – Torque Characteristics

How to read speed – torque characteristics → Page C-12

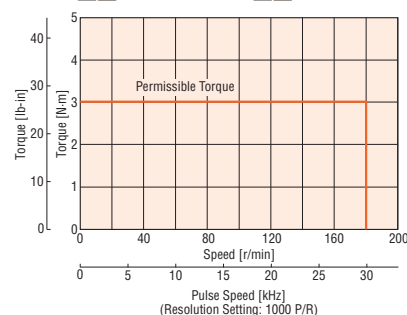
### AS66□□E-T3.6/AS66□□EP-T3.6



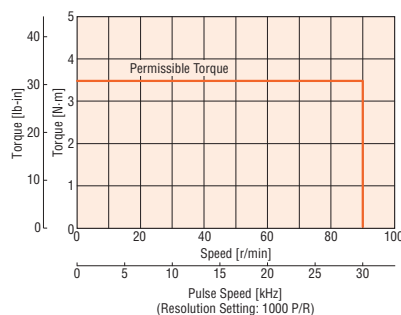
### AS66□□E-T7.2/AS66□□EP-T7.2



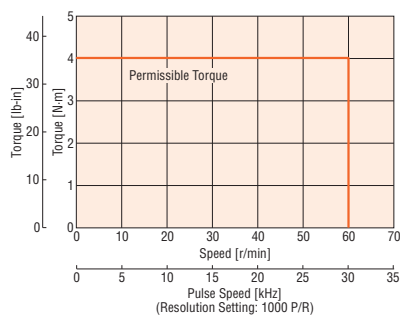
### AS66□□E-T10/AS66□□EP-T10



### AS66□□E-T20/AS66□□EP-T20



### AS66□□E-T30/AS66□□EP-T30



● Enter **A** (standard) or **M** (electromagnetic brake) in the box (□) within the model name.

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

### Notes:

● Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]

● The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

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

## Specifications RoHS



Model	Pulse Input	Standard	AS98A□E-T3.6	AS98A□E-T7.2	AS98A□E-T10	AS98A□E-T20	AS98A□E-T30	
	Package	Electromagnetic Brake	AS98M□E-T3.6	AS98M□E-T7.2	AS98M□E-T10	AS98M□E-T20	AS98M□E-T30	
Model	Built-In Controller	Standard	AS98A□EP-T3.6	AS98A□EP-T7.2	AS98A□EP-T10	AS98A□EP-T20	AS98A□EP-T30	
	Package	Electromagnetic Brake	AS98M□EP-T3.6	AS98M□EP-T7.2	AS98M□EP-T10	AS98M□EP-T20	AS98M□EP-T30	
Maximum Holding Torque	N·m (lb-in)		4.5 (39)	9 (79)		12 (106)		
Rotor Inertia J	kg·m <sup>2</sup> (oz-in <sup>2</sup> )		1400×10 <sup>-7</sup> (7.7) [1560×10 <sup>-7</sup> (8.5)] <sup>*1</sup>					
Backlash	arc minute (degrees)		25 (0.417°)	15 (0.25°)	10 (0.167°)			
Permissible Speed Range	r/min		0~500	0~250	0~180	0~90	0~60	
Gear Ratio			3.6:1	7.2:1	10:1	20:1	30:1	
Resolution <sup>*2</sup>	Resolution Setting: 1000 P/R		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)		
Power Source	Voltage/Frequency		Single-Phase 100-115 VAC -15%~+10%				50/60 Hz	
			Single-Phase 200-230 VAC -15%~+10%				50/60 Hz	
			Three-Phase 200-230 VAC -15%~+10%				50/60 Hz	
Maximum Input Current	A	Single-Phase 100-115 VAC	6					
		Single-Phase 200-230 VAC	3.5					
		Three-Phase 200-230 VAC	1.9					
Electromagnetic Brake <sup>*3</sup>	Type		Active when the power is off					
	Power Supply Input		24 VDC±5%					
	Power Consumption W		6					
	Excitation Current A		0.25					
Static Friction Torque	N·m (lb-in)		2.25 (19.9)	4.5 (39)		6 (53)		
		Motor	kg (lb.)	3 (6.6) [3.4 (7.5)] <sup>*1</sup>				
Mass	Driver	kg (lb.)	0.8 (1.8)					
		Motor		8				
Dimension No.	Pulse Input		15					
	Built-In Controller		16					

How to read specifications table → Page C-11 Extension cables for electromagnetic brake motor → Page C-297

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

\*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*2 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.  
Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

\*3 The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC±5%, 0.3 A minimum power supply is required for the electromagnetic brakes.

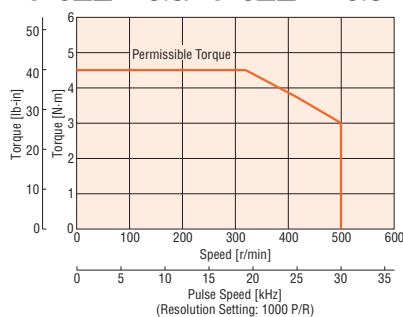
### Note:

● Direction of rotation of the motor and that of the gear output shaft are the same for the gear ratios 3.6:1, 7.2:1 and 10:1. It is opposite for 20:1 and 30:1 gear ratios.

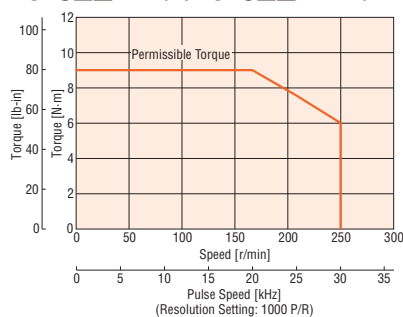
## Speed – Torque Characteristics

How to read speed – torque characteristics → Page C-12

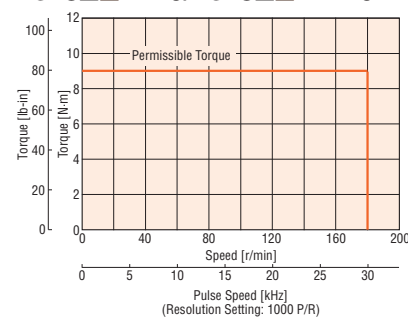
AS98□E-T3.6/AS98□EP-T3.6



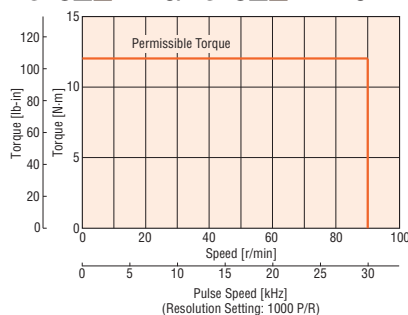
AS98□E-T7.2/AS98□EP-T7.2



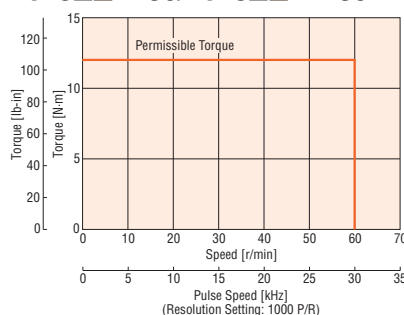
AS98□E-T10/AS98□EP-T10



AS98□E-T20/AS98□EP-T20



AS98□E-T30/AS98□EP-T30



● Enter **A** (standard) or **M** (electromagnetic brake) in the box (□) within the model name.

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

### Notes:

● Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]

● The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

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

## Specifications RoHS



● With the **AS46** type, only the driver conforms to the CSA Standards.

Model	Pulse Input Package	Standard	<b>AS46AA-N7.2</b>	<b>AS46AA-N10</b>
		Electromagnetic Brake		<b>AS46MA-N7.2</b>
	Built-In Controller Package	Standard	<b>AS46AAP-N7.2</b>	<b>AS46AAP-N10</b>
	Electromagnetic Brake		<b>AS46MAP-N7.2</b>	<b>AS46MAP-N10</b>
Maximum Holding Torque	N·m (lb·in)		1.5 (13.2)	
Rotor Inertia J	kg·m <sup>2</sup> (oz·in <sup>2</sup> )		68×10 <sup>-7</sup> (0.37) [83×10 <sup>-7</sup> (0.45)]*1	
Backlash	arc minute (degrees)		2 (0.034)	
Angular Transmission Error	arc minute (degrees)		6 (0.1)	
Permissible Speed Range	r/min		0~416	0~300
Gear Ratio			7.2:1	10:1
Resolution*2	Resolution Setting: 1000 P/R		0.05/Pulse	0.036/Pulse
Permissible Torque	N·m (lb·in)		1.5 (13.2)	
Maximum Torque*3	N·m (lb·in)		2 (17.7)	
Power Source	Voltage/Frequency		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz	
	Maximum Input Current A	Single-Phase 100-115 VAC	3.3	
Electromagnetic Brake*4	Type		Active when the power is off	
	Power Supply Input		24 VDC±5%	
	Power Consumption W		2	
	Excitation Current A		0.08	
Mass	Static Friction Torque	N·m (lb·in)	0.75 (6.6)	
	Motor	kg (lb.)	0.71 (1.6) [0.81 (1.8)]*1	
Dimension No.	Driver	kg (lb.)	0.8 (1.8)	
	Motor		[9]	
	Driver	Pulse Input	[15]	
		Built-In Controller	[16]	

How to read specifications table → Page C-11

\*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*2 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.

Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

\*3 The value of maximum torque is for gear. For output torque for geared motor, refer to the speed – torque characteristics.

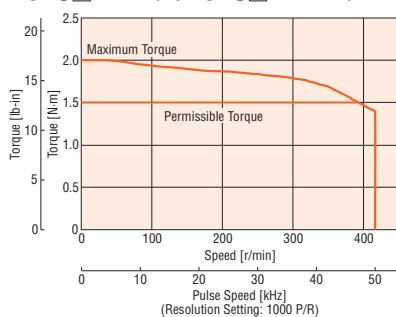
\*4 The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC±5%, 0.1 A minimum power supply is required for the electromagnetic brakes.

### Note:

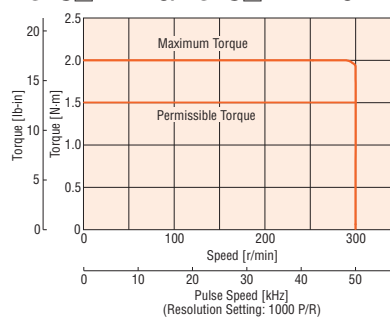
● Direction of rotation of the motor shaft and that of the gear output shaft are the same.

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-12

### AS46□A-N7.2/AS46□AP-N7.2



### AS46□A-N10/AS46□AP-N10



● Enter **A** (standard) or **M** (electromagnetic brake) in the box (□) within the model name.

### Notes:

● Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]

● The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.



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

## Specifications RoHS



Model	Pulse Input Package	Standard	AS66A□E-N5	AS66A□E-N7.2	AS66A□E-N10	AS66A□E-N25	AS66A□E-N36	AS66A□E-N50
	Electromagnetic Brake Package	AS66M□E-N5	AS66M□E-N7.2	AS66M□E-N10	AS66M□E-N25	AS66M□E-N36	AS66M□E-N50	
Built-In Controller Package	Standard	AS66A□EP-N5	AS66A□EP-N7.2	AS66A□EP-N10	AS66A□EP-N25	AS66A□EP-N36	AS66A□EP-N50	
	Electromagnetic Brake	AS66M□EP-N5	AS66M□EP-N7.2	AS66M□EP-N10	AS66M□EP-N25	AS66M□EP-N36	AS66M□EP-N50	
Maximum Holding Torque	N·m (lb-in)	3.5 (30)	4 (35)	5 (44)	8 (70)			
Rotor Inertia J	kg·m <sup>2</sup> (oz-in <sup>2</sup> )	405 × 10 <sup>-7</sup> (2.2)			564 × 10 <sup>-7</sup> (3.1) <sup>*1</sup>			
Backlash	arc minute (degrees)	2 (0.034)			3 (0.05 <sup>°</sup> )			
Angular Transmission Error	arc minute (degrees)	5 (0.084 <sup>°</sup> )						
Permissible Speed Range	r/min	0~600	0~416	0~300	0~120	0~83	0~60	
Gear Ratio		5:1	7.2:1	10:1	25:1	36:1	50:1	
Resolution <sup>*2</sup>	Resolution Setting: 1000 P/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 <sup>*3</sup>	N·m (lb-in)	7 (61)	9 (79)	11 (97)	16 (141)	20 (177)		
Power Source	Voltage/Frequency	Single-Phase 100-115 VAC -15%~+10% 50/60 Hz						
		Single-Phase 200-230 VAC -15%~+10% 50/60 Hz						
		Three-Phase 200-230 VAC -15%~+10% 50/60 Hz						
Maximum Input Current A	Single-Phase 100-115 VAC	5						
	Single-Phase 200-230 VAC	3						
	Three-Phase 200-230 VAC	1.5						
Electromagnetic Brake <sup>*4</sup>	Type	Active when the power is off						
	Power Supply Input	24 VDC ±5%						
	Excitation Current A	0.25						
Static Friction Torque	N·m (lb-in)	1.75 (15.4)	2 (17.7)	2.5 (22)	4 (35)			
	Motor kg (lb.)	1.5 (3.3) [1.75 (3.9)] <sup>*1</sup>			1.7 (3.7) [1.95 (4.3)] <sup>*1</sup>			
Mass	Driver kg (lb.)	0.8 (1.8)						
	Motor	10						
Dimension No.	Pulse Input	19						
	Built-In Controller	16						

How to read specifications table → Page C-11 Extension cables for electromagnetic brake motor → Page C-297

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

\*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*2 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.

Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

\*3 The value of maximum torque is for gear. For output torque for geared motor, refer to the speed – torque characteristics.

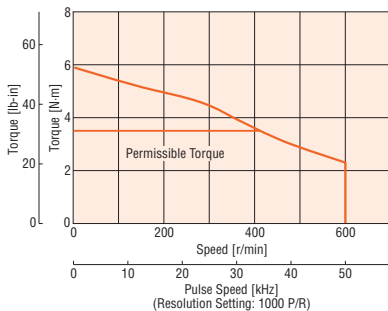
\*4 The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC ±5%, 0.3 A minimum power supply is required for the electromagnetic brakes.

**Note:** Direction of rotation of the motor shaft and that of the gear output shaft are the same.

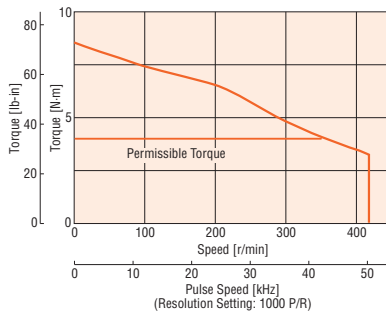
## Speed – Torque Characteristics

How to read speed – torque characteristics → Page C-12

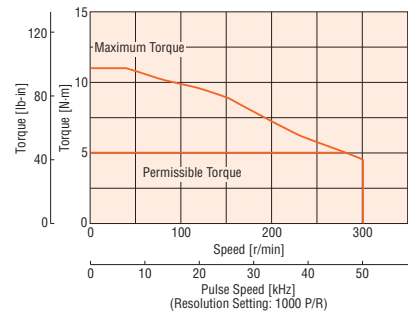
AS66□□E-N5/AS66□□EP-N5



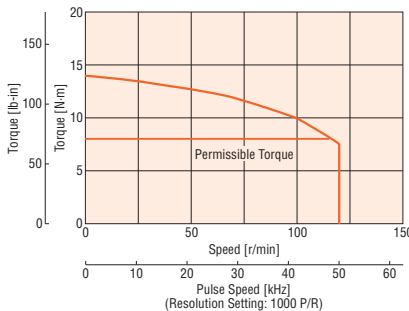
AS66□□E-N7.2/AS66□□EP-N7.2



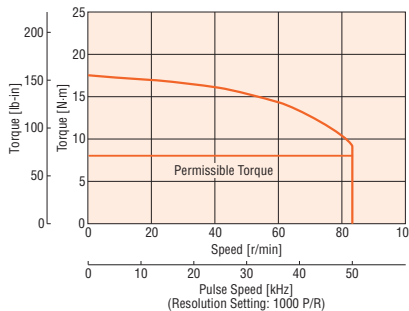
AS66□□E-N10/AS66□□EP-N10



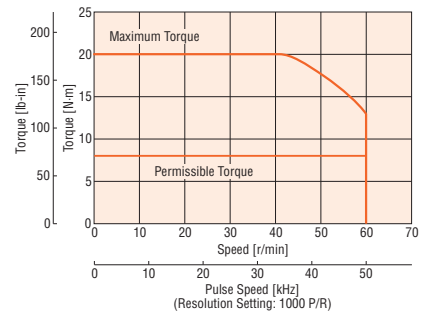
AS66□□E-N25/AS66□□EP-N25



AS66□□E-N36/AS66□□EP-N36



AS66□□E-N50/AS66□□EP-N50



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

**Notes:**

● Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]

● The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

Introduction

AC Input *QSTEP AS*

DC Input *QSTEP AS C*

AC Input 5-Phase Microstep *RK*

AC Input 2-Phase Full/Half *UMK*

AC Input 5-Phase Microstep *CMK*

DC Input 2-Phase Microstep *RBK*

2-Phase Microstep *CMK*

2-Phase PK/PV Without Encoder

2-Phase PK With Encoder

EMP400 Controllers

SG8030U

Accessories

Installation

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

## Specifications RoHS



Model	Pulse Input Package	Standard	AS98A□E-N5	AS98A□E-N7.2	AS98A□E-N10	AS98A□E-N25	AS98A□E-N36	AS98A□E-N50
	Electromagnetic Brake Package	Standard	AS98M□E-N5	AS98M□E-N7.2	AS98M□E-N10	AS98M□E-N25	AS98M□E-N36	AS98M□E-N50
	Built-In Controller Package	Standard	AS98A□EP-N5	AS98A□EP-N7.2	AS98A□EP-N10	AS98A□EP-N25	AS98A□EP-N36	AS98A□EP-N50
	Electromagnetic Brake Package	Standard	AS98M□EP-N5	AS98M□EP-N7.2	AS98M□EP-N10	AS98M□EP-N25	AS98M□EP-N36	AS98M□EP-N50
Maximum Holding Torque	N·m (lb·in)		10 (88)	14 (123)	20 (177)		37 (320)	
Rotor Inertia J	kg·m <sup>2</sup> (oz·in <sup>2</sup> )				1400×10 <sup>-7</sup> (7.7)		1560×10 <sup>-7</sup> (8.5)* <sup>1</sup>	
Backlash	arc minute (degrees)			2 (0.034)			3 (0.05)	
Angular Transmission Error	arc minute (degrees)				4 (0.067)			
Permissible Speed Range	r/min		0~600	0~416	0~300	0~120	0~83	0~60
Gear Ratio			5:1	7.2:1	10:1	25:1	36:1	50:1
Resolution* <sup>2</sup>	Resolution Setting: 1000 P/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* <sup>3</sup>	N·m (lb·in)		28 (240)		35 (300)		56 (490)	60 (530)
Power Source	Voltage/Frequency				Single-Phase 100-115 VAC	-15%~+10%	50/60 Hz	
					Single-Phase 200-230 VAC	-15%~+10%	50/60 Hz	
					Three-Phase 200-230 VAC	-15%~+10%	50/60 Hz	
Electromagnetic Brake* <sup>4</sup>	Maximum Input Current	A				6		
						3.5		
						1.9		
Type	Power Supply Input					Active when the power is off		
	Power Consumption W					24 VDC±5%		
	Excitation Current A					6		
Mass	Static Friction Torque	N·m (lb·in)	4.5 (39)	6.45 (57)	9 (79)		18.5 (163)	
	Motor	kg (lb.)		4 (8.8) [4.4 (9.7)]* <sup>1</sup>			4.7 (10) [5.1 (11)]* <sup>1</sup>	
	Driver	kg (lb.)				0.8 (1.8)		
Dimension No.	Motor							11
	Driver							15
	Built-In Controller							16

How to read specifications table → Page C-11 Extension cables for electromagnetic brake motor → Page C-297

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

\*<sup>1</sup> The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*<sup>2</sup> Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.  
Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

\*<sup>3</sup> The value of maximum torque is for gear. For output torque for geared motor, refer to the speed – torque characteristics.

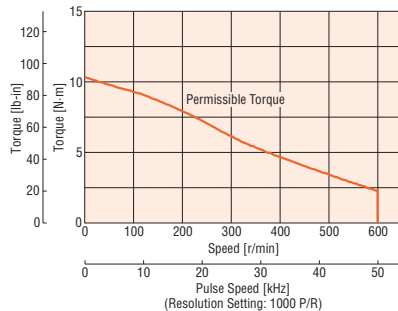
\*<sup>4</sup> The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC±5%, 0.3 A minimum power supply is required for the electromagnetic brakes.

**Note:** Direction of rotation of the motor shaft and that of the gear output shaft are the same.

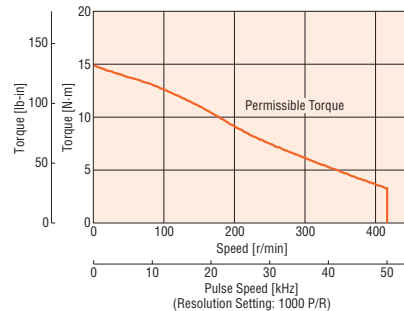
## Speed – Torque Characteristics

How to read speed – torque characteristics → Page C-12

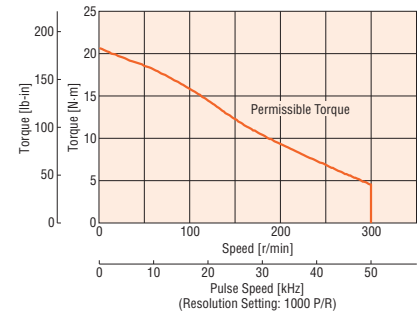
### AS98□□E-N5/AS98□□EP-N5



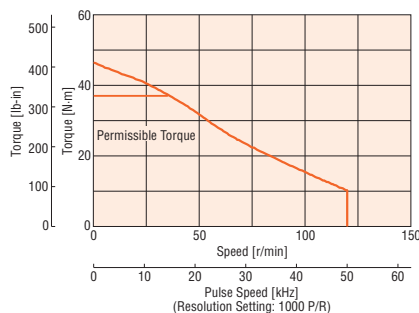
### AS98□□E-N7.2/AS98□□EP-N7.2



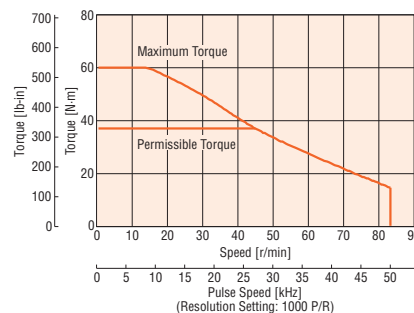
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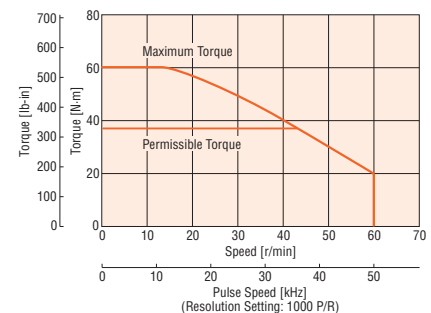
### AS98□□E-N25/AS98□□EP-N25



### AS98□□E-N36/AS98□□EP-N36



### AS98□□E-N50/AS98□□EP-N50



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

### Notes:

● Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]

● The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

# Harmonic Geared Type Motor Frame Size 42 mm (1.65 in.), 60 mm (2.36 in.), 90 mm (3.54 in.)

## Specifications RoHS

**UL** **CE** ● With the **AS46** type, only the driver conforms to the CSA Standards.

Model	Pulse Input Package	Standard	<b>AS46AA2-H50</b>	<b>AS46AA2-H100</b>	<b>AS66A□E-H50</b>	<b>AS66A□E-H100</b>	<b>AS98A□E-H50</b>	<b>AS98A□E-H100</b>
	Built-In Controller Package	Standard	<b>AS46AAP2-H50</b>	<b>AS46AAP2-H100</b>	<b>AS66A□EP-H50</b>	<b>AS66A□EP-H100</b>	<b>AS98A□EP-H50</b>	<b>AS98A□EP-H100</b>
Maximum Holding Torque	N·m (lb·in)		3.5 (30)	5 (44)	5.5 (48)	8 (70)	25 (220)	37 (320)
Rotor Inertia J	kg·m <sup>2</sup> (oz·in <sup>2</sup> )		85×10 <sup>-7</sup> (0.46) [100×10 <sup>-7</sup> (0.55)]*1		440×10 <sup>-7</sup> (2.4) [599×10 <sup>-7</sup> (3.3)]*1		1600×10 <sup>-7</sup> (8.8) [1759×10 <sup>-7</sup> (9.6)]*1	
Permissible Speed Range	r/min		0~70	0~35	0~70	0~35	0~70	0~35
Gear Ratio			50:1	100:1	50:1	100:1	50:1	100:1
Resolution*2	Resolution Setting: 1000 P/R		0.0072°/Pulse	0.0036°/Pulse	0.0072°/Pulse	0.0036°/Pulse	0.0072°/Pulse	0.0036°/Pulse
Permissible Torque	N·m (lb·in)		3.5 (30)	5 (44)	5.5 (48)	8 (70)	25 (220)	37 (320)
Maximum Torque	N·m (lb·in)		8.3 (73)	11 (97)	18 (159)	28 (240)	35 (300)	55 (480)
Lost Motion (Load Torque)	arc minute		1.5 max. (±0.16 N·m)	1.5 max. (±0.2 N·m)	0.7 max. (±0.28 N·m)	0.7 max. (±0.39 N·m)	1.5 max. (±1.2 N·m)	
Power Source	Voltage/Frequency		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz		Single-Phase 100-115 VAC -15%~+10% 50/60 Hz		Single-Phase 200-230 VAC -15%~+10% 50/60 Hz	
	Maximum Input Current	A	3.3		5		6	
			-		3		3.5	
Electromagnetic Brake*3	Type		Active when the power is off					
	Power Supply Input		24 VDC±5%					
	Power Consumption W		2		6		0.25	
	Excitation Current A		0.08		-		-	
Mass	Static Friction Torque	N·m (lb·in)	1.75 (15.4)	2.5 (22)	2.75 (24)	4 (35)	12.5 (110)	18.5 (163)
	Motor	kg (lb.)	0.7 (1.5) [0.8 (1.8)]*1		1.4 (3.1) [1.65 (3.6)]*1		3.9 (8.6) [4.3 (9.5)]*1	
Dimension No.	Driver		I2		I3		I4	
	Pulse Input				I5			
	Built-In Controller				I6			

How to read specifications table → Page C-11 Extension cables for electromagnetic brake motor → Page C-297

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

\*1 The values inside the brackets [ ] represent the specification for the electromagnetic brake type.

\*2 Pulse Input Package: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, or 10000 P/R with the resolution select switch or resolution select signals.  
Resolution select switch → Page C-50

Built-In Controller Package: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

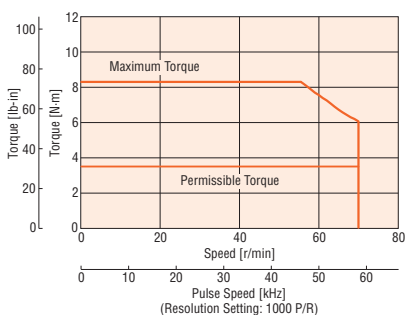
\*3 The electromagnetic brakes are for holding the position when the power is off. They cannot be used to stop the motor. Also, a separate 24 VDC±5%, 0.3 A minimum (**AS46**: 0.1 A minimum) power supply is required for the electromagnetic brakes.

**Note:** The inertia represents a sum of the inertia of the harmonic gear converted to a motor shaft value, and the rotor inertia. Direction of rotation of the motor shaft and that of the gear output shaft are the opposite.

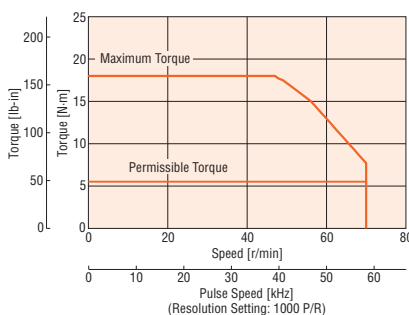
## Speed – Torque Characteristics

How to read speed – torque characteristics → Page C-12

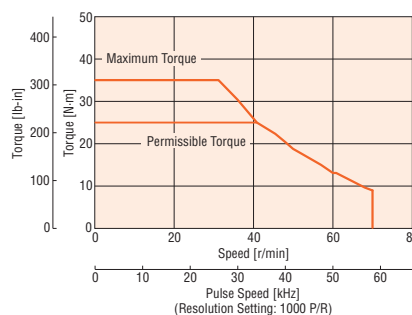
**AS46□A2-H50/AS46□AP2-H50**



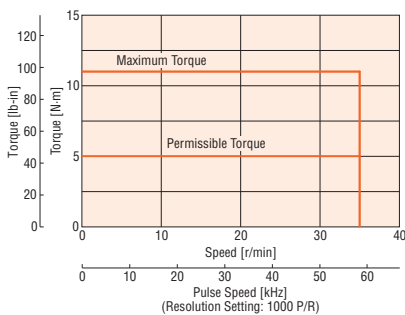
**AS66□E-H50/AS66□EP-H50**



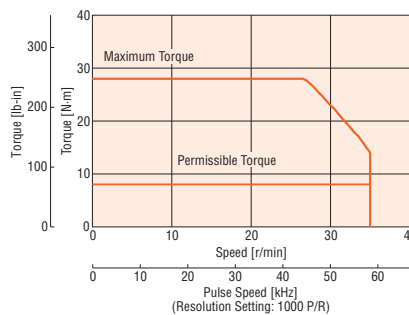
**AS98□E-H50/AS98□EP-H50**



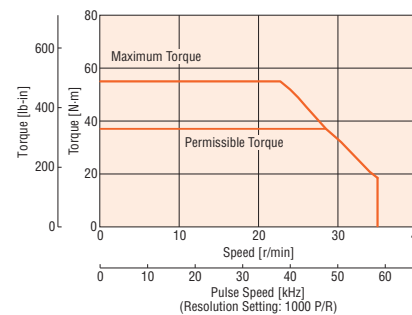
**AS46□A2-H100/AS46□AP2-H100**



**AS66□E-H100/AS66□EP-H100**



**AS98□E-H100/AS98□EP-H100**



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

### Notes:

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]
- 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).
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

## Driver Specifications

	Pulse Input Package	Built-In Controller Package
Speed and Positioning Control Command	Pulse input	Stored program
Maximum Input Pulse Frequency	250 kHz (When the pulse duty is 50%)	—
Protective Functions	When the protective functions are activated, an alarm signal is output and the motor will coast to a stop.	
	Overheat, Overload, Overvoltage, Speed error, Overcurrent, Overspeed, EEPROM data error, Sensor error, System error	Stack overflow, Memory read error, Program reference error, Compilation error, Operation result overflow, Parameter out-of-range error, Divide by zero, General I/O definition error, PC command execution error, Overheat protection, Overload protection, Overspeed error, Overvoltage protection, Excessive position deviation, Overcurrent protection, External stop, Incorrect limit-sensor logic, Reverse limit-sensor connection, Return to mechanical home error, Overtravel, Software overtravel, Invalid operation data, Resolver sensor error, Initial rotor revolution error, NVRAM error, System error
Input Signals	Photocoupler input, Input resistance: 220 Ω, Input current: 7~20 mA Pulse (CW pulse) signal [Negative logic pulse input], Rotation direction (CCW pulse) signal [Negative logic pulse input], All windings off, Alarm clear, Resolution select	Photocoupler input, Control input: 24 VDC, Input resistance: 4.7 kΩ (X0~X7, START, E-STOP, HOME LS, +LS, -LS, SENSOR)
Output Signals	Photocoupler, Open-collector output External use condition: 30 VDC maximum, 15 mA maximum (Positioning completion signal, Alarm signal) Transistor, Open-collector output External use condition: 30 VDC maximum, 15 mA maximum [Timing signal, Quadrature (ASG/BSG) signal] Line driver output: Equivalent of 26C31 [Timing signal, Quadrature (ASG/BSG) signal]	Photocoupler, Open-collector output External use condition: 30 VDC maximum, 4~8 mA (Y0~Y7, ALM) Line driver output: Equivalent of 26C31 (ASG/BSG signal)
User Programs	—	Maximum number of programs: 14 programs (Including STARTUP program) Maximum lines per program: 64 lines Maximum commands per 1 line: 1 command (Single state) Maximum program variables: 26 variables (A~Z)
Positioning Control	—	Incremental (relative distance specification) mode/Absolute (absolute position specification) mode One-shot operation/Linked operation (A maximum of 4 profiles can be linked) Maximum operating ranges Steps: -8 388 608~+8 388 607 (1 each) Operating speed: 10~500 000 Hz (500 kHz) Acceleration/Deceleration rate*: 10~50 000 msec
Operating Modes	—	Positioning operation (Indexing) Continuous operation (Scan) Linked profile Return to electrical home position (Return) Return to mechanical home position (Home operation)
Return to Mechanical Home Operation	—	Return to home operation is performed from the entire range using mechanical position detection signals (+LS, -LS, HOME LS)
Other Functions	—	Velocity filter value setting function Current setting function Electric gear function Setting function for direction of motor rotation External stop function Overtravel function Software overtravel function Alarm trace-back function Daisy chain connections
Terminal Emulation	—	Connection standard: RS-232C conformity Transfer system: Asynchronous communication, NRZ (Non return to zero), Full duplex Data length: 8 bits, 1 stop bit, No parity Transmit speed: 9600 bps Connector specification: Modular (4 wires, 4 pins) Pin arrangement: RS-232C compatible Protocol: TTY (CR+LF)

\*The rates of acceleration and deceleration can be set separately.

## General Specifications

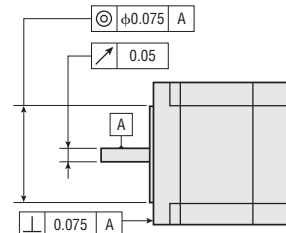
This is the value after rated operation at normal ambient temperature and humidity.

Item		Motor	Driver
Insulation Class		Class B [130°C (266°F)] [Recognized as Class A 105°C (221°F) by UL/CSA Standards]	-
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the following places: · Case – Motor and sensor windings · Case – Electromagnetic brake windings	100 MΩ or more when 500 VDC megger is applied between the following places: · Case – Power input terminal · Signal I/O terminal – Power input terminal
Dielectric Strength		Sufficient to withstand the following for 1 minute: · Case – Motor and sensor windings 1.5 kVAC (1.0 kVAC for <b>AS46</b> ) 50 Hz or 60 Hz · Case – Electromagnetic brake windings 1.0 kVAC 50 Hz or 60 Hz	Sufficient to withstand the following for 1 minute: · Case – Power input terminal 1.5 kVAC 50 Hz or 60 Hz · Signal I/O terminal – Power input terminal 2.3 kVAC (3.0 kVAC for 200-230 VAC) 50 Hz or 60 Hz; Pulse input package 1.8 kVAC 50 Hz or 60 Hz; Built-in controller package
Operating Environment	Ambient Temperature	0~+50°C (+32~+122°F) (non-freezing): Standard type, <b>TH, PN</b> geared type 0~+40°C (+32~+104°F) (non-freezing): Harmonic geared type	0~+50°C (+32~+122°F) (non-freezing): Pulse input package 0~+40°C (+32~+104°F) (non-freezing): Built-in controller package
	Ambient Humidity	85% or less (non-condensing)	
	Atmosphere	No corrosive gases, dust, water or oil (Industrial connector type: No corrosive gases)	
Stop Position Accuracy		± 5 arc minutes (± 0.084°)	-
Shaft Runout		0.05 mm (0.002 in.) T.I.R.*	-
Concentricity		0.075 mm (0.003 in.) T.I.R.*	-
Perpendicularity		0.075 mm (0.003 in.) T.I.R.*	-

\* 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.



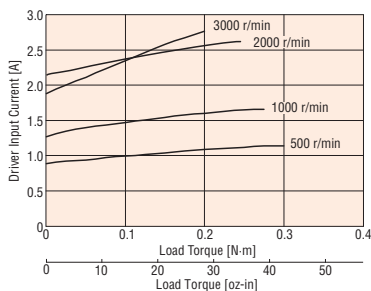
## Load Torque – Driver Input Current Characteristics

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.

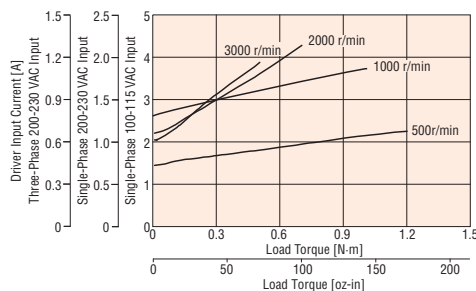
$$\text{Motor shaft speed [r/min]} = \text{Gear output shaft speed} \times \text{Gear ratio}$$

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

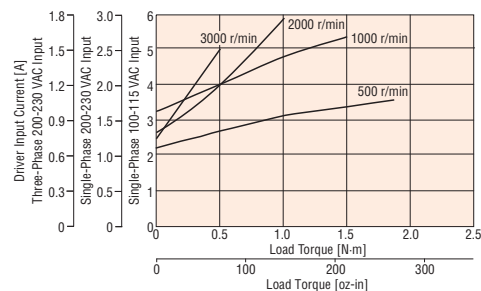
### AS46



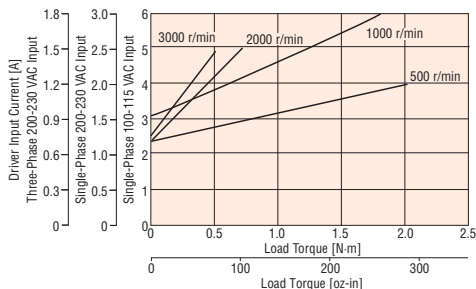
### AS66



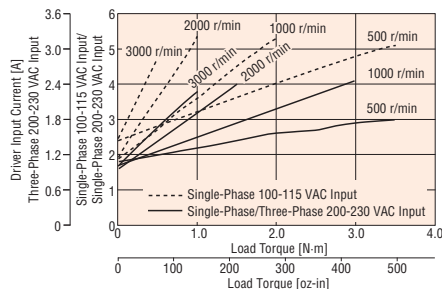
### AS69



### AS98



### AS911



## Permissible Overhung Load and Permissible Thrust Load

Unit = N (lb.)

Type	Model	Gear Ratio	Permissible Overhung Load					Permissible Thrust Load
			Distance from Shaft End					
			0 mm (0 in.)	5 mm (0.2 in.)	10 mm (0.39 in.)	15 mm (0.59 in.)	20 mm (0.79 in.)	
Standard Type Standard Type Industrial Connector	AS46□A AS46□AP	-	20 (4.5)	25 (5.6)	34 (7.6)	52 (11.7)	-	The permissible thrust load shall be no greater than the motor mass.
	AS66□E AS66A□T AS66□EP AS66A□TP AS69□E AS69A□T AS69□EP AS69A□TP		63 (14.1)	75 (16.8)	95 (21)	130 (29)	190 (42)	
	AS98□E AS98A□T AS98□EP AS98A□TP AS911A□E AS911A□T AS911A□EP AS911A□TP		260 (58)	290 (65)	340 (76)	390 (87)	480 (108)	
TH Geared Type	AS46□A-T□ AS46□AP-T□	3.6, 7.2, 10, 20, 30	10 (2.2)	14 (3.1)	20 (4.5)	30 (6.7)	-	15 (3.3)
	AS66□E-T□ AS66□EP-T□		70 (15.7)	80 (18)	100 (22)	120 (27)	150 (33)	40 (9)
	AS98□E-T□ AS98□EP-T□		220 (49)	250 (56)	300 (67)	350 (78)	400 (40)	100 (22)
PN Geared Type	AS46□A-N□ AS46□AP-N□	7.2, 10	100 (22)	120 (27)	150 (33)	190 (42)	-	100 (22)
	AS66□E-N5 AS66□EP-N5	5	200 (45)	220 (49)	250 (56)	280 (63)	320 (72)	
	AS66□E-N□ AS66□EP-N□	7.2, 10 25, 36, 50	250 (56) 330 (74)	270 (60) 360 (81)	300 (67) 400 (90)	340 (76) 450 (101)	390 (87) 520 (117)	
	AS98□E-N5 AS98□EP-N5	5	480 (108)	520 (117)	550 (123)	580 (130)	620 (139)	300 (67)
	AS98□E-N□ AS98□EP-N□	7.2, 10	480 (108)	540 (121)	600 (135)	680 (153)	790 (177)	
	AS98□E-N25 AS98□EP-N25	25	850 (191)	940 (210)	1050 (230)	1110 (240)	1190 (260)	
	AS98□E-N36 AS98□EP-N36	36	930 (200)	1030 (230)	1150 (250)	1220 (270)	1300 (290)	
AS98□E-N50 AS98□EP-N50	50	1050 (230)	1160 (260)	1300 (290)	1380 (310)	1490 (330)		
Harmonic Geared Type	AS46□A2-H□ AS46□AP2-H□	50, 100	180 (40)	220 (49)	270 (60)	360 (81)	510 (114)	220 (49)
	AS66□E-H□ AS66□EP-H□		320 (72)	370 (83)	440 (99)	550 (123)	720 (162)	450 (101)
	AS98□E-H□ AS98□EP-H□		1090 (240)	1150 (250)	1230 (270)	1310 (290)	1410 (310)	1300 (290)

● Enter **A** (standard) or **M** (electromagnetic brake) in the box (□) within the model name.

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

Enter the gear ratio in the box (□) within the model name.

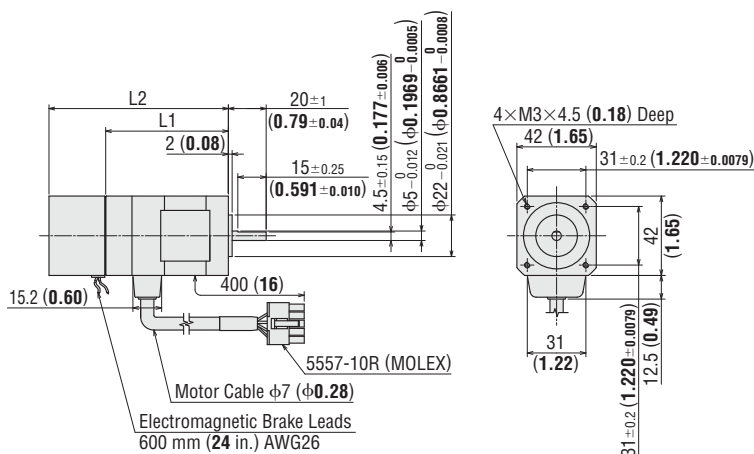
## Dimensions Unit = mm (in.)

### ● Motor

#### ◇ Standard Type

#### 1 □ 42 mm (□ 1.65 in.)

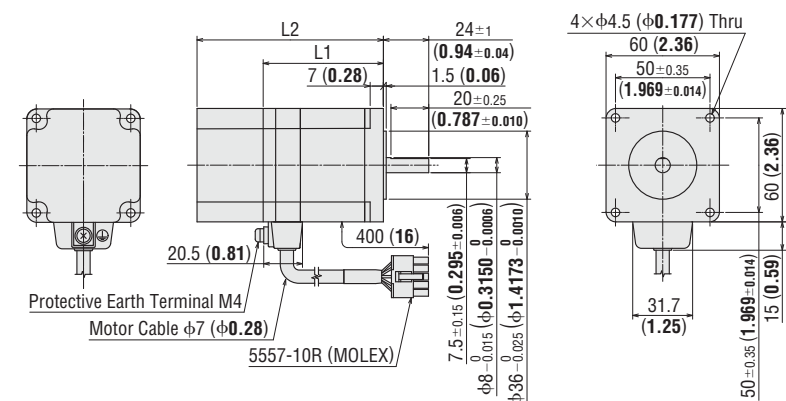
Model	Motor Model	L1	L2	Mass kg (lb.)	DXF
<b>AS46AA</b> <b>AS46AAP</b>	ASM46AA	64.9 (2.56)	-	0.5 (1.1)	B192
<b>AS46MA</b> <b>AS46MAP</b>	ASM46MA	-	94.9 (3.74)	0.6 (1.32)	B193



#### 2 □ 60 mm (□ 2.36 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	DXF
<b>AS66A□E</b> <b>AS66A□EP</b>	ASM66A□E	63.6 (2.50)	-	0.85 (1.9)	B406
<b>AS66M□E</b> <b>AS66M□EP</b>	ASM66M□E	-	98.6 (3.88)	1.1 (2.4)	B407
<b>AS69A□E</b> <b>AS69A□EP</b>	ASM69A□E	94.6 (3.72)	-	1.4 (3.1)	B408
<b>AS69M□E</b> <b>AS69M□EP</b>	ASM69M□E	-	129.6 (5.1)	1.65 (3.6)	B409

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

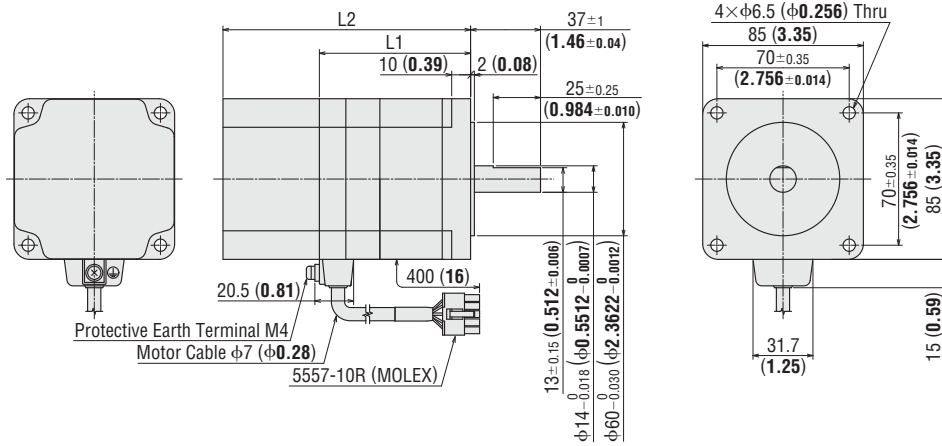




3 □ 85 mm (□ 3.35 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	DXF
<b>AS98A</b> □E <b>AS98A</b> □EP	ASM98A□E	80 (3.15)	-	1.8 (4.0)	B410
<b>AS98M</b> □E <b>AS98M</b> □EP	ASM98M□E	-	131 (5.16)	2.2 (4.8)	B411
<b>AS911A</b> □E <b>AS911A</b> □EP	ASM911A□E	110 (4.33)	-	3 (6.6)	B412

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

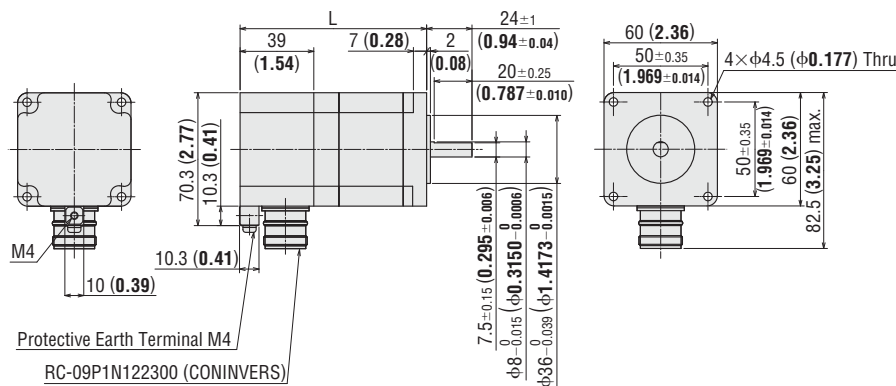


## ◇ Standard Type Industrial Connector

### 4 □ 60 mm (□ 2.36 in.)

Model	Motor Model	L	Mass kg (lb.)	DXF
<b>AS66A</b> □ <b>T</b> <b>AS66A</b> □ <b>TP</b>	ASM66A□ <b>T</b>	98.7 (3.89)	1 (2.2)	B364
<b>AS69A</b> □ <b>T</b> <b>AS69A</b> □ <b>TP</b>	ASM69A□ <b>T</b>	129.7 (5.11)	1.5 (3.3)	B365

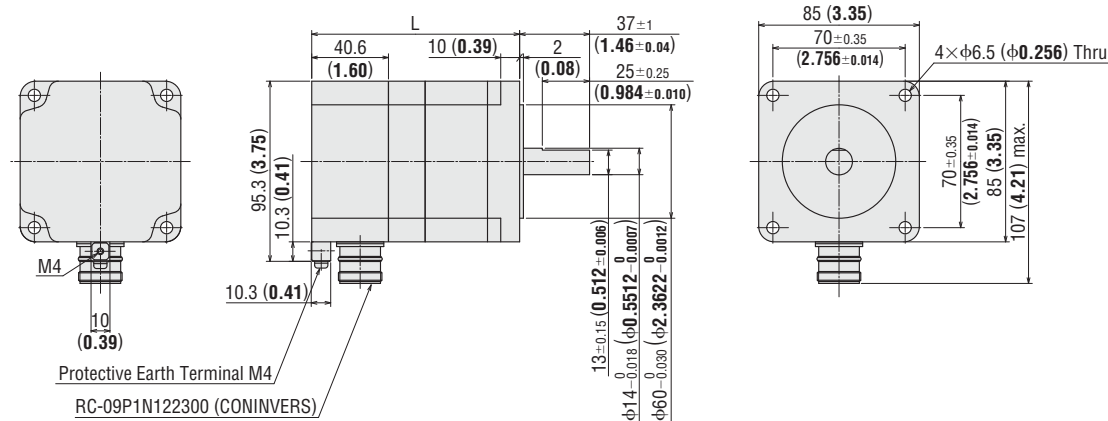
- Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.
- Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver.



### 5 □ 85 mm (□ 3.35 in.)

Model	Motor Model	L	Mass kg (lb.)	DXF
<b>AS98A</b> □ <b>T</b> <b>AS98A</b> □ <b>TP</b>	ASM98A□ <b>T</b>	110 (4.33)	2.2 (4.8)	B317
<b>AS911A</b> □ <b>T</b> <b>AS911A</b> □ <b>TP</b>	ASM911A□ <b>T</b>	140 (5.51)	3.3 (7.3)	B318

- Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.
- Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver.



## ● Requirement for Motor Cable for Industrial Connector Type (Sold separately)

Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver. The industrial connector type motor cannot be driven unless the dedicated motor cable is used.

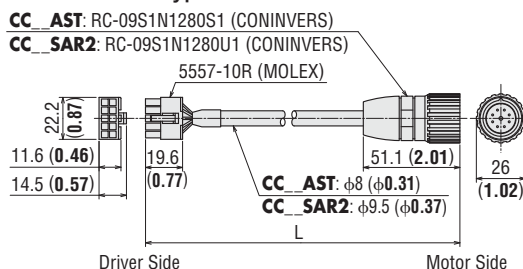
### ◇ Motor Cables for Industrial Connector Type

Model	Length: L m (ft.)
<b>CC01AST</b>	1 (3.3)
<b>CC02AST</b>	2 (6.6)
<b>CC03AST</b>	3 (9.8)
<b>CC05AST</b>	5 (16.4)
<b>CC07AST</b>	7 (23)
<b>CC10AST</b>	10 (32.8)
<b>CC15AST</b>	15 (49.2)
<b>CC20AST</b>	20 (65.6)

### ◇ Flexible Motor Cables for Industrial Connector Type

Model	Length: L m (ft.)
<b>CC01SAR2</b>	1 (3.3)
<b>CC02SAR2</b>	2 (6.6)
<b>CC03SAR2</b>	3 (9.8)
<b>CC05SAR2</b>	5 (16.4)
<b>CC07SAR2</b>	7 (23)
<b>CC10SAR2</b>	10 (32.8)

### Motor Cables/Flexible Motor Cables for Industrial Connector Type

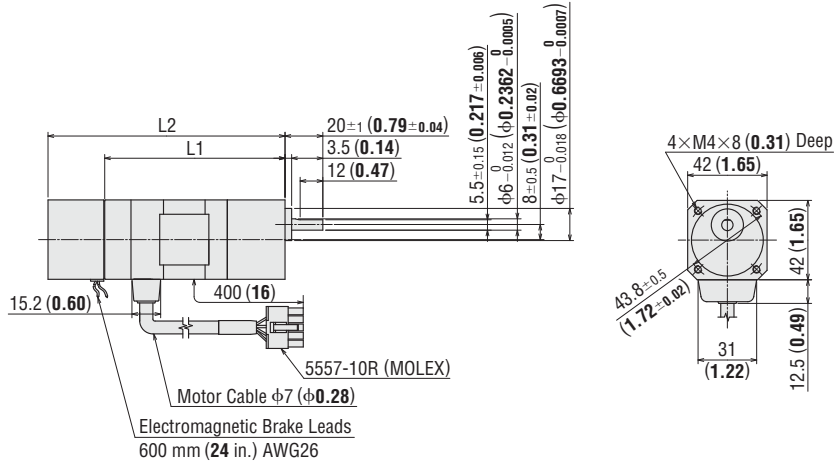


## ◇ TH Geared Type

⑥ □42 mm (□1.65 in.)

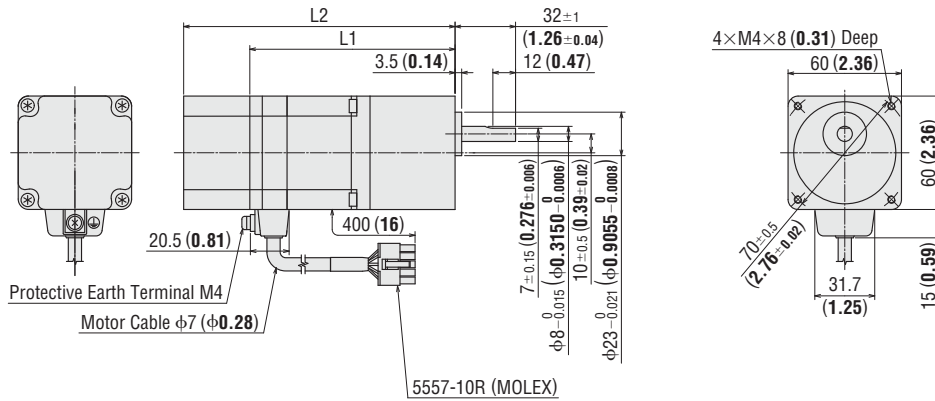
Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS46AA-T</b> □ <b>AS46AP-T</b> □	ASM46AA-T □	<b>3.6, 7.2, 10, 20, 30</b>	95.4 (3.76)	—	0.65 (1.43)	B199
<b>AS46MA-T</b> □ <b>AS46MAP-T</b> □	ASM46MA-T □		—	125.4 (4.94)	0.75 (1.7)	B200

● Enter the gear ratio in the box (□) within the model name.



⑦ □60 mm (□2.36 in.)

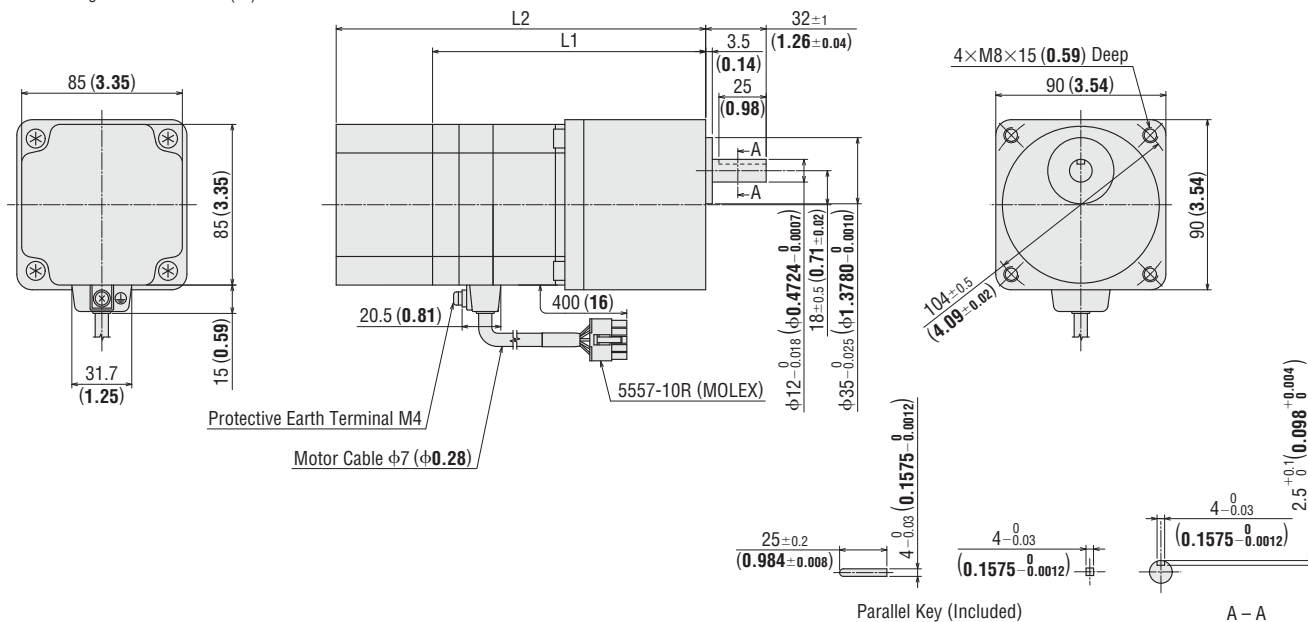
Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS66A</b> □ <b>E-T</b> □ <b>AS66A</b> □ <b>EP-T</b> □	ASM66A □ <b>E-T</b> □	<b>3.6, 7.2, 10, 20, 30</b>	108.6 (4.28)	—	1.25 (2.8)	B413
<b>AS66M</b> □ <b>E-T</b> □ <b>AS66M</b> □ <b>EP-T</b> □	ASM66M □ <b>E-T</b> □		—	143.6 (5.65)	1.5 (3.3)	B414

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

8 □ 90 mm (□ 3.54 in.)

Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS98A</b> □E-T□ <b>AS98A</b> □EP-T□	ASM98A□E-T□	<b>3.6, 7.2, 10, 20, 30</b>	144.5 (5.69)	-	3 (6.6)	B415
<b>AS98M</b> □E-T□ <b>AS98M</b> □EP-T□	ASM98M□E-T□		-	195.5 (7.70)	3.4 (7.5)	B416

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

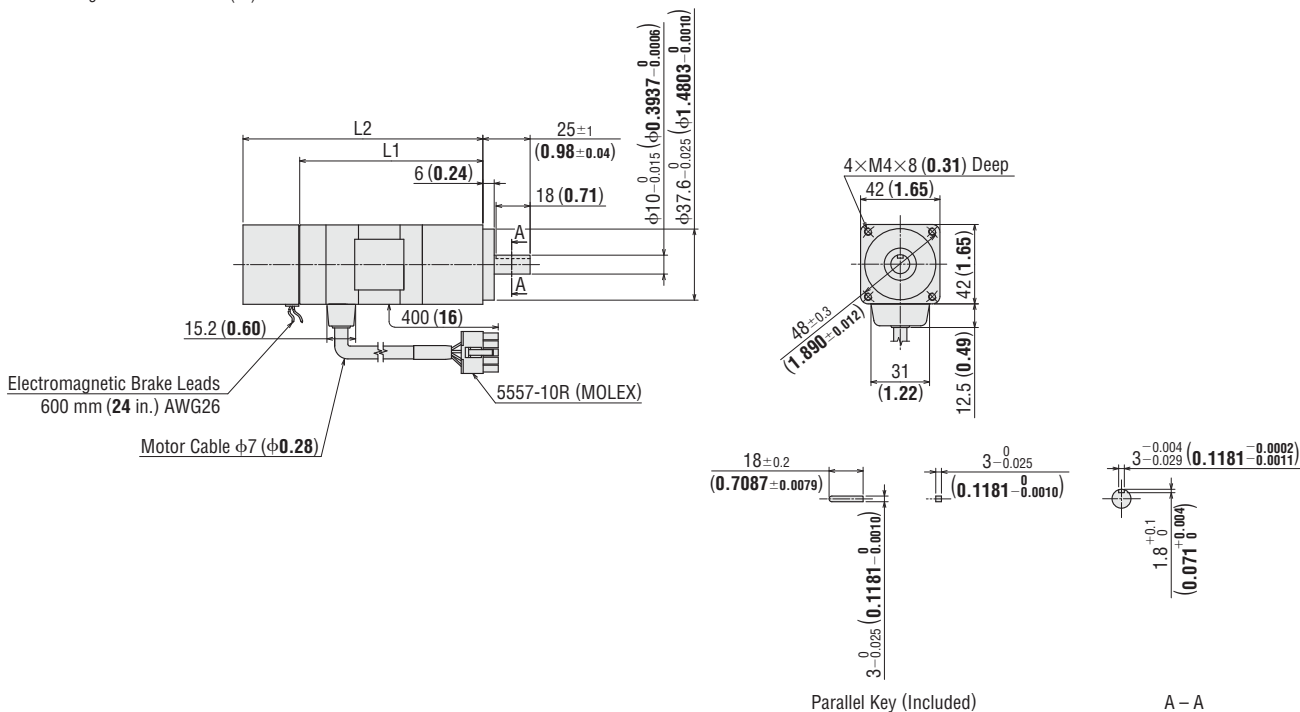


◇ PN Geared Type

9 □ 42 mm (□ 1.65 in.)

Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS46AA-N</b> □ <b>AS46AAP-N</b> □	ASM46AA-N□	<b>7.2, 10</b>	96.9 (3.18)	-	0.71 (1.6)	B306
<b>AS46MA-N</b> □ <b>AS46MAP-N</b> □	ASM46MA-N□		-	126.9 (5.0)	0.81 (1.8)	B307

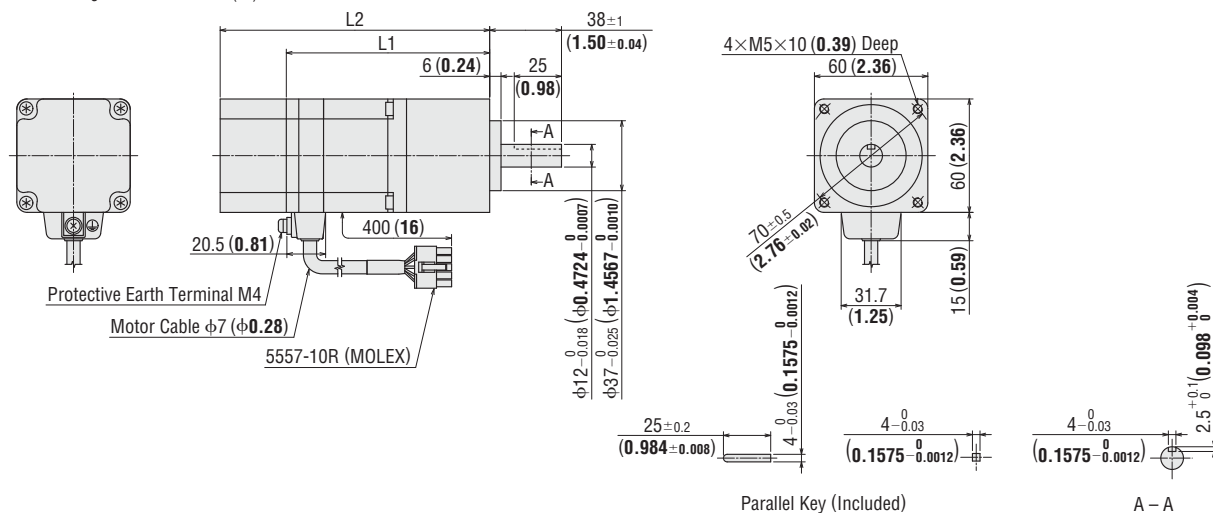
● Enter the gear ratio in the box (□) within the model name.



**10** □60 mm (□2.36 in.)

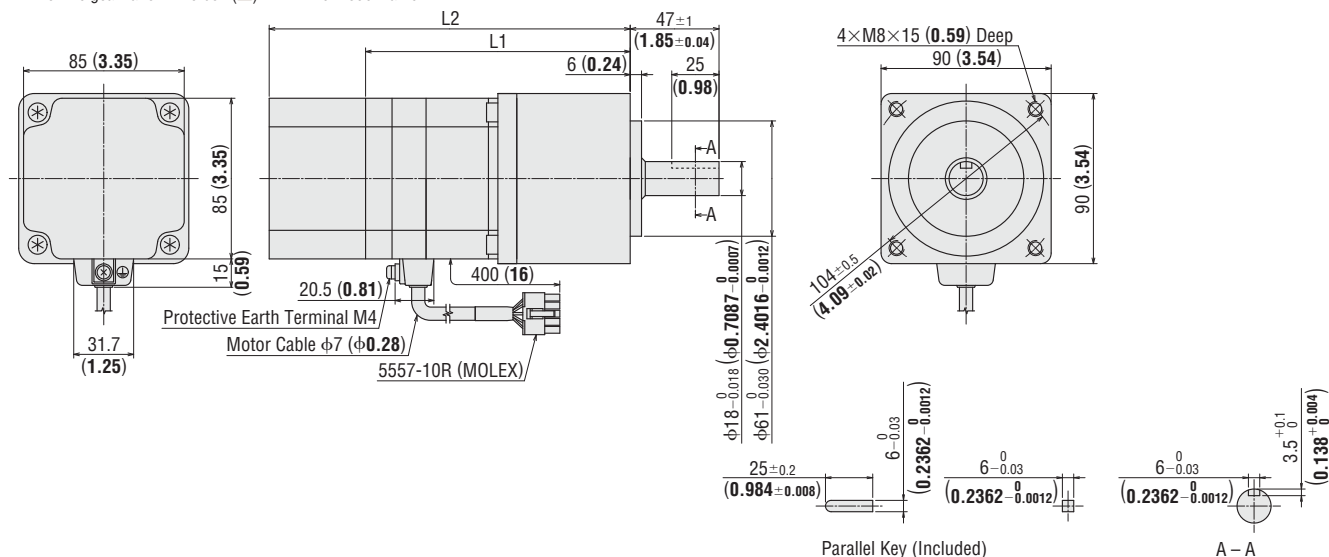
Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS66A</b> □E-N□ <b>AS66A</b> □EP-N□	ASM66A□E-N□	<b>5, 7.2, 10</b>	107.6 (4.24)	–	1.5 (3.3)	B425
		<b>25, 36, 50</b>	123.6 (4.87)	–	1.7 (3.7)	B426
<b>AS66M</b> □E-N□ <b>AS66M</b> □EP-N□	ASM66M□E-N□	<b>5, 7.2, 10</b>	–	142.6 (5.61)	1.75 (3.9)	B427
		<b>25, 36, 50</b>	–	158.6 (6.24)	1.95 (4.3)	B428

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


**11** □90 mm (□3.54 in.)

Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS98A</b> □E-N□ <b>AS98A</b> □EP-N□	ASM98A□E-N□	<b>5, 7.2, 10</b>	140 (5.51)	–	4 (8.8)	B429
		<b>25, 36, 50</b>	163 (6.42)	–	4.7 (10)	B430
<b>AS98M</b> □E-N□ <b>AS98M</b> □EP-N□	ASM98M□E-N□	<b>5, 7.2, 10</b>	–	191 (7.52)	4.4 (9.7)	B431
		<b>25, 36, 50</b>	–	214 (8.43)	5.1 (11)	B432

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

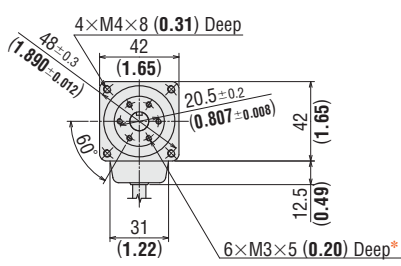
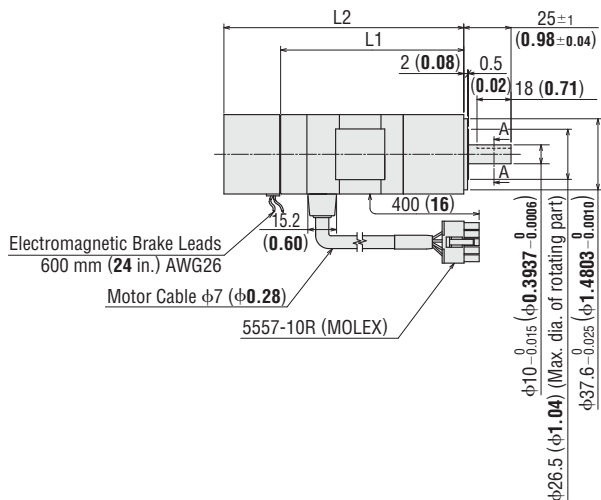


◇ Harmonic Geared Type

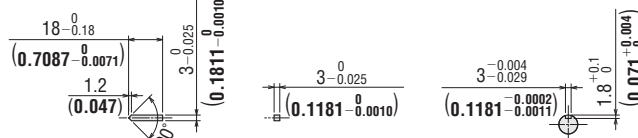
12 □ 42 mm (□ 1.65 in.)

Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS46AA2-H</b> □ <b>AS46AAP2-H</b> □	ASM46AA2-H □	<b>50, 100</b>	96.9 (3.81)	—	0.7 (1.5)	B308
<b>AS46MA2-H</b> □ <b>AS46MAP2-H</b> □	ASM46MA2-H □		—	126.9 (5.0)	0.8 (1.8)	B309

● Enter the gear ratio in the box (□) within the model name.



\*The position of the key slot on the output shaft [φ10 (φ0.3937)] relative to the screw holes on a maximum diameter of φ26.5 (φ1.04) on the rotating part is arbitrary.



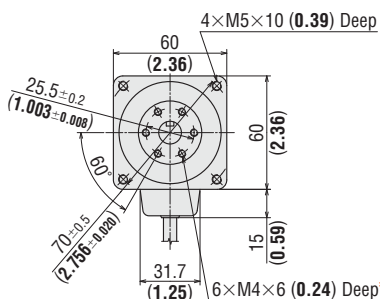
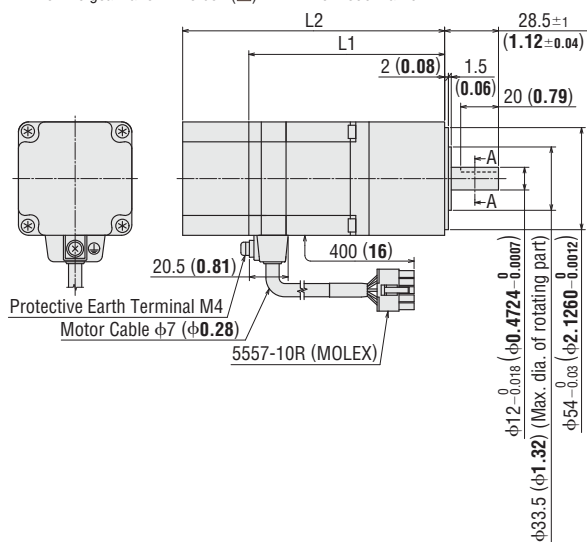
Parallel Key (Included)

A - A

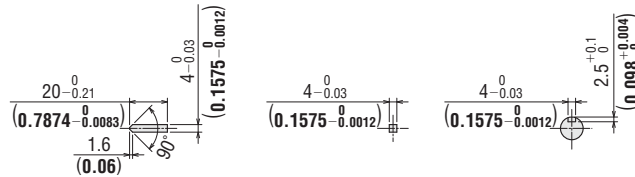
13 □ 60 mm (□ 2.36 in.)

Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS66A</b> □ <b>E-H</b> □ <b>AS66A</b> □ <b>EP-H</b> □	ASM66A □ <b>E-H</b> □	<b>50, 100</b>	103.6 (4.08)	—	1.4 (3.1)	B433
<b>AS66M</b> □ <b>E-H</b> □ <b>AS66M</b> □ <b>EP-H</b> □	ASM66M □ <b>E-H</b> □		—	138.6 (5.46)	1.65 (3.6)	B434

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



\*The position of the key slot on the output shaft [φ12 (φ0.4724)] relative to the screw holes on a maximum diameter of φ33.5 (φ1.32) on the rotating part is arbitrary.



Parallel Key (Included)

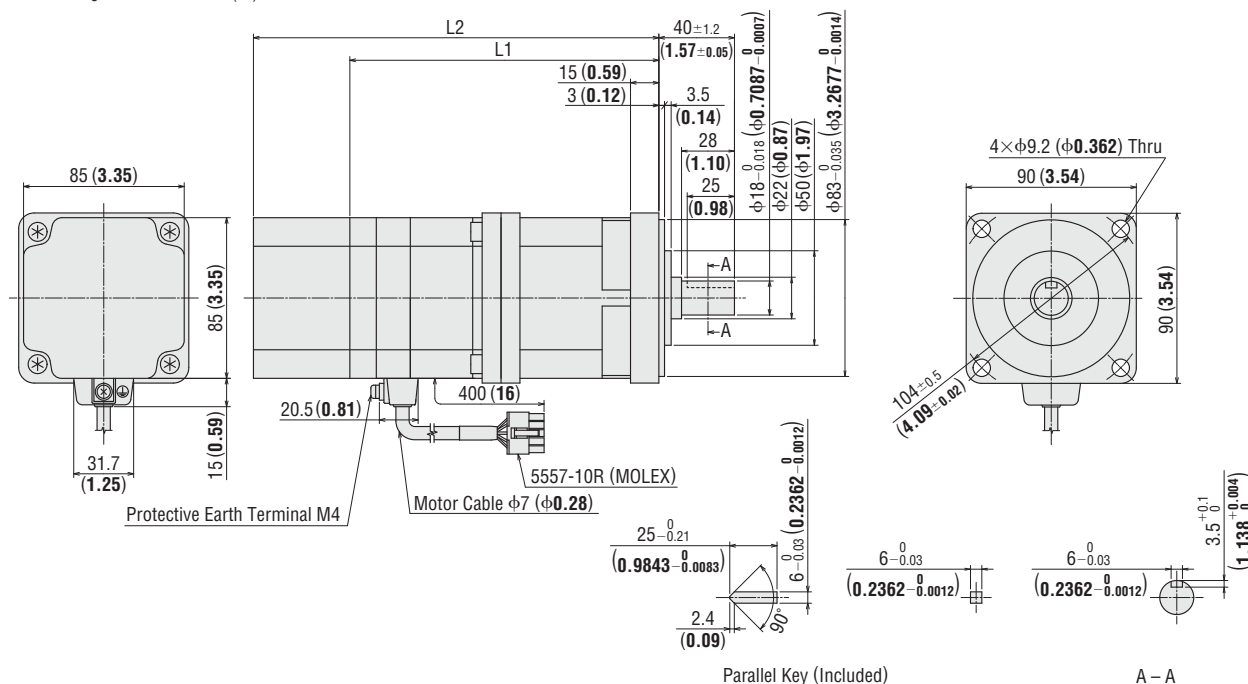
A - A

□90 mm (□3.54 in.)

Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	DXF
<b>AS98A</b> □E-H□ <b>AS98A</b> □EP-H□	ASM98A□E-H□	<b>50, 100</b>	163.5 (6.44)	-	3.9 (8.6)	B435
<b>AS98M</b> □E-H□ <b>AS98M</b> □EP-H□	ASM98M□E-H□		-	214.5 (8.44)	4.3 (9.5)	B436

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

Enter the gear ratio in the box (□) within the model name.

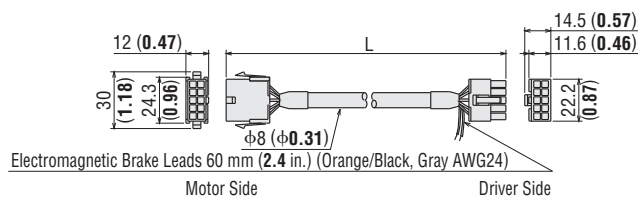


● Electromagnetic brake models except frame size □42 mm (□1.65 in.) must use an extension cable or flexible extension cable for the electromagnetic brake motor.

Extension cables for electromagnetic brake motor → Page C-297

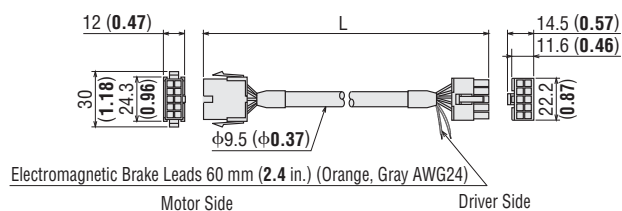
#### ● Extension Cables for Electromagnetic Brake Motor

Model	Length: L m (ft.)
<b>CC01AIPM</b>	1 (3.3)
<b>CC02AIPM</b>	2 (6.6)
<b>CC03AIPM</b>	3 (9.8)
<b>CC05AIPM</b>	5 (16.4)
<b>CC07AIPM</b>	7 (23)
<b>CC10AIPM</b>	10 (32.8)
<b>CC15AIPM</b>	15 (49.2)
<b>CC20AIPM</b>	20 (65.6)



#### ● Flexible Extension Cables for Electromagnetic Brake Motor

Model	Length: L m (ft.)
<b>CC01SARM2</b>	1 (3.3)
<b>CC02SARM2</b>	2 (6.6)
<b>CC03SARM2</b>	3 (9.8)
<b>CC05SARM2</b>	5 (16.4)
<b>CC07SARM2</b>	7 (23)
<b>CC10SARM2</b>	10 (32.8)



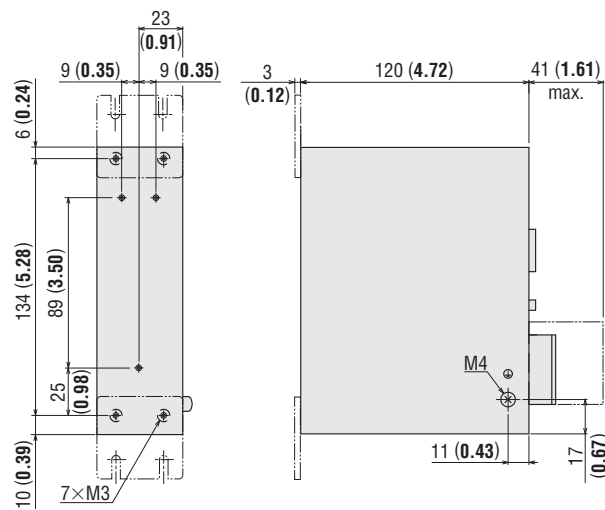


● Driver

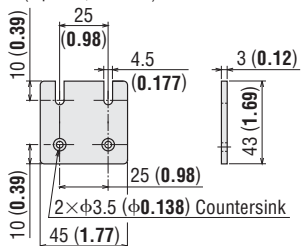
**15 Pulse Input Package**

ASD13□-A, ASD24□-A, ASD30□-A  
 ASD12□-C, ASD16□-C, ASD20A-C  
 ASD12□-S, ASD16□-S, ASD20A-S  
 Mass: 0.8 kg (1.8 lb.)

**DXF** B197



● Mounting Bracket  
 (2 pieces, included)

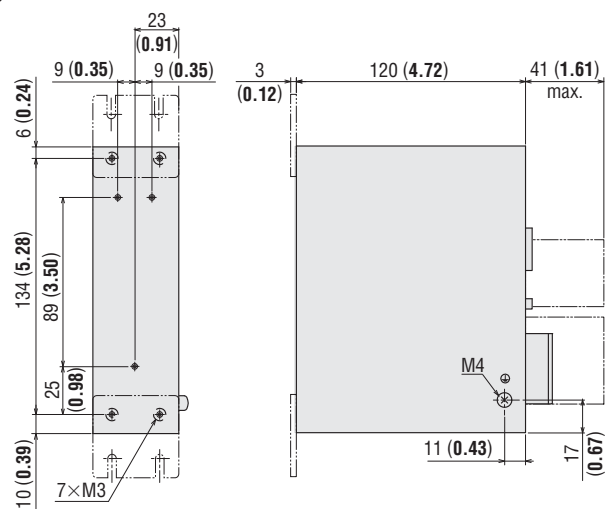


● Control I/O Connector (Included)  
 Cover Assembly: 54331-1361 (MOLEX)  
 Connector: 54306-3619 (MOLEX)

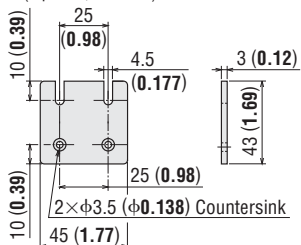
**16 Built-In Controller Package**

ASD13□-AP, ASD24□-AP, ASD30□-AP  
 ASD12□-CP, ASD16□-CP, ASD20A-CP  
 ASD12□-SP, ASD16□-SP, ASD20A-SP  
 Mass: 0.8 kg (1.8 lb.)

**DXF** B298



● Mounting Bracket  
 (2 pieces, included)



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

● Sensor Input Connector (Included)  
 Cover Assembly: 54331-1201 (MOLEX)  
 Connector: 54306-2019 (MOLEX)

Introduction

AC Input *QSTEP* AS

DC Input *QSTEP* ASC

AC Input 5-Phase Microstep RK

Full/Half UMK 2-Phase

5-Phase Microstep CRK

DC Input 2-Phase Microstep RBK

2-Phase Microstep CMK

2-Phase PK/PV Without Encoder

2-Phase PK With Encoder

EMP400 Controllers

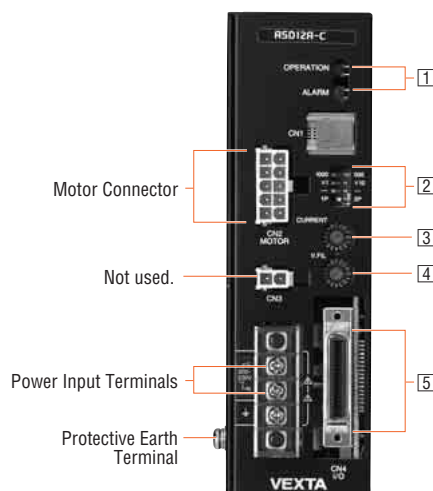
SG8030U

Accessories

Installation

## Connection and Operation (Pulse Input Package)

### Names and Functions of Driver Parts



#### 1 Signal Monitor Display

##### ◇ LED Indicators

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

##### ◇ Alarm

Blink Count	Function	When Activated
1	Overheat	The temperature of the driver's internal heat sink has reached approximately 85°C (185°F).
2	Overload	The motor has been operated continuously over 5 seconds under a load exceeding the maximum torque.
3	Overvoltage	The primary voltage of the driver's inverter has exceeded the allowable level.
4	Speed Error	The motor cannot accurately follow at the indicated pulse speed.
5	Overcurrent	An excessive current has flowed through the inverter power element inside the driver.
6	Overspeed	The motor shaft velocity exceeds 5000 r/min. (Except geared type)
7	EEPROM Data Error	A motor control parameter has been damaged.
8	Sensor Error	The power has been turned on without the motor cable connected to the driver.
Lights (No blinking)	System Error	The driver has fatal error.

#### 2 Function Switches

Indication	Switch Name	Function
1000/500 ×1/×10	Resolution Select Switch	This function is for selecting the motor resolution. For each geared type, the resolution of gear output shaft is 1/gear ratio. [1000] [×1] → 1000 P/R (0.36°/step) [1000] [×10] → 10000 P/R (0.036°/step) [500] [×1] → 500 P/R (0.72°/step) [500] [×10] → 5000 P/R (0.072°/step)
1P/2P	Pulse Input Mode Switch	The settings of this switch are compatible with the following two types of pulse input modes: "1P" for the 1-pulse input mode, "2P" for the 2-pulse input mode.

##### Notes:

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

#### 3 Current Adjustment Switch

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

#### 4 Velocity Filter Adjustment Switch

Indication	Switch Name	Function
V.FIL	Velocity Filter Adjustment Switch	This switch is used to make adjustments when a smooth start-stop or smooth motion at low speed is required (a maximum of 16 settings). <div style="text-align: center;"> </div>

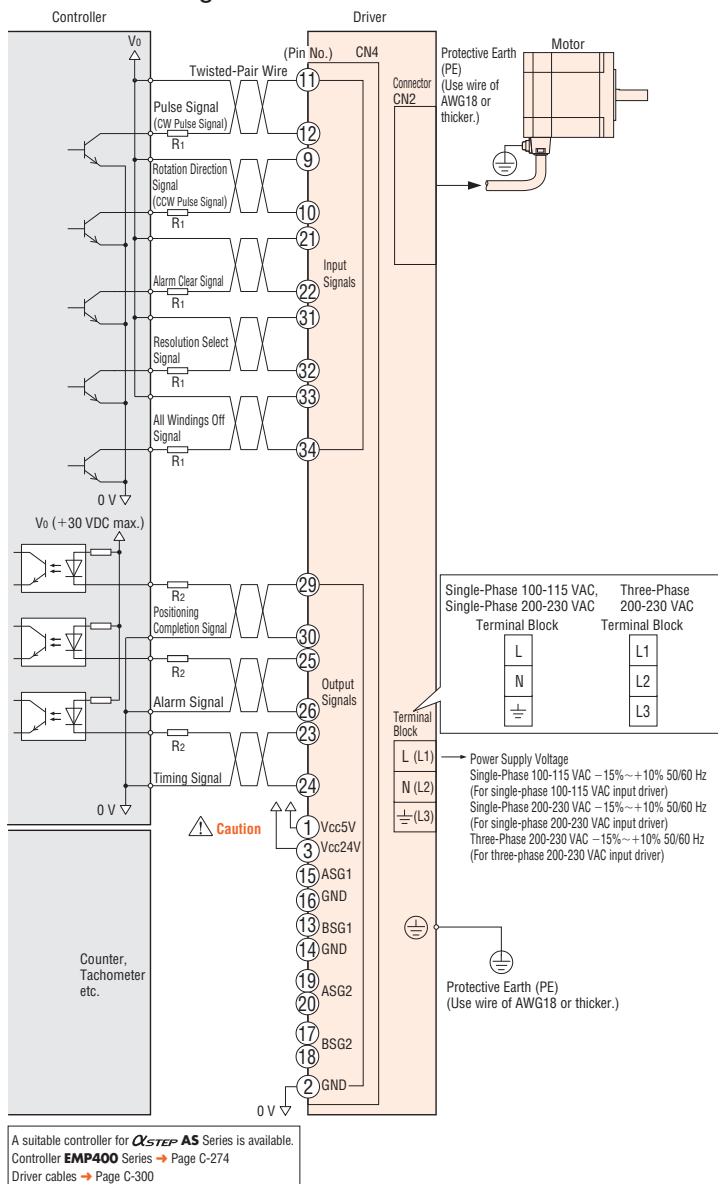
#### 5 Input/Output Signals (36 pins)

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

Description of input/output signals → Page C-52

\*Signal name in parentheses represents the setting in 2-pulse input mode.

## ● Connection Diagram



A suitable controller for **AS** Series is available.  
 Controller **EMPA400** Series → Page C-274  
 Driver cables → Page C-300

## ◇ Input Signal Connection

Signals can be connected directly when 5 VDC is supplied. If the signals are used at a voltage exceeding 5 VDC, be sure to provide an external resistor to prevent the current exceeding 20 mA from flowing. Internal components will be damaged if a voltage exceeding 5 VDC is supplied directly without using an external resistor.  
 Example: If the voltage is 24 VDC, connect a resistor (R<sub>1</sub>) of 1.5 to 2.2 kΩ and 0.5 W or more.

## ◇ Output Signal Connection

Use output signals at 30 VDC or less and 15 mA or less.  
 If these specifications are exceeded, the internal components may be damaged. Check the specification of the connected equipment.  
 When the current is above 15 mA, connect an external resistor R<sub>2</sub>.

## ◇ Notes on Wiring

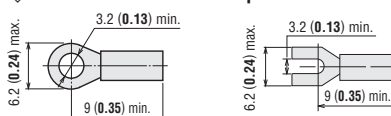
- Use multi-core, twisted-pair shielded wires of AWG28 or thicker for the control I/O signal lines (CN4), and keep wiring as short as possible [within 2 m (6.6 ft.)].
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases. Technical reference → Page F-54
- When it is necessary to extend the wiring distance between the motor and driver more than 0.4 m (1.31 ft.), the accessory extension cable or flexible extension cable must be used. Electromagnetic brake motor models [except motor frame size 42 mm (1.65 in.)] must use an electromagnetic brake extension cable or flexible extension cable (sold separately). The frame size 42 mm (1.65 in.) models can use a standard extension cable even for electromagnetic brake motor models. Extension cables for electromagnetic brake motor → Page C-297
- Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver.
- Use the following cable for the power line:  
 Single-phase 100-115 VAC, Single-phase 200-230 VAC: 3-core cable of AWG18 or thicker.  
 Three-phase 200-230 VAC: 4-core cable of AWG18 or thicker.
- Provide a minimum distance of 300 mm (1 ft.) between the control I/O signal lines and power lines (AC lines, motor lines and other large-current circuits). Do not run the control I/O signal lines in the same duct as power lines or bundle them with power lines.
- To ground the driver, lead the ground conductor from the protective earth terminal (M4) and connect the ground conductor to provide a common ground point.

### ⚠ Caution

- If the "Timing" signal output or "Quadrature" signal output is used, a 5 VDC or 24 VDC power supply is required. Connect the power supply for "Timing" signal output or "Quadrature" signal output to either 5 VDC or 24 VDC. Do not input 5 VDC and 24 VDC at the same time.

Description of input/output signals → Page C-52

## ◇ Recommended Crimp Terminals unit = mm (in.)



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

## ■ Connecting the Electromagnetic Brake to a Power Supply

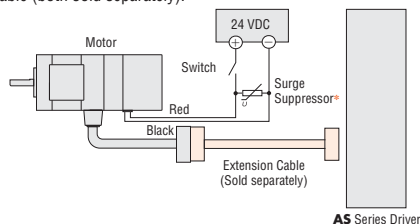
Connect the electromagnetic brake to the power supply using a cable of at least AWG24. The power supply input to the electromagnetic brake is 24 VDC ±5% 0.3 A minimum (**AS46**: 0.1 A minimum) and therefore must be independent of the driver's power supply for signal control.

### Notes:

- Applying a voltage that exceeds the specifications will cause the electromagnetic brake to generate a great amount of heat, resulting in motor temperature rises and possible damage to the motor. Conversely, if voltage is too low, the electromagnetic brake may not release.
- To protect the switch contacts and prevent noise, always connect the surge suppressor.\* (\*The surge suppressor is included with electromagnetic brake motors.)
- To prevent noise, use a dedicated power supply for electromagnetic brake.
- Correct polarity (+ and -) must be ensured when connecting the electromagnetic brake leads of **AS** Series to the DC power supply. If polarity is incorrect, the electromagnetic brake will not operate.
- When using as a CE certified part, use a dedicated DC power supply for electromagnetic brake.

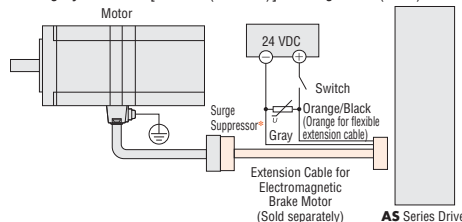
### (1) AS46

The electromagnetic brake leads are linked to the connector on the motor [600 mm (23.6 in.)]. When connecting with the DC power supply, connect the red spiral lead wire to +24 V, and the black lead wire to the ground (GND). Use the extension cable or the flexible extension cable (both sold separately).



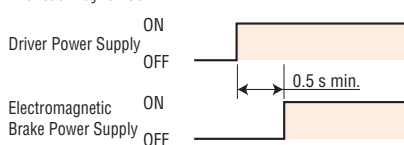
### (2) AS66, AS69, AS98

The electromagnetic brake leads are linked to the connector on the driver connection side of extension cable for electromagnetic brake motor (sold separately). Be sure to use the accessory (sold separately) extension cable or flexible extension cable. Connect the orange/black spiral lead wire (orange for flexible extension cable) [60 mm (2.36 in.)] to +24 V, and the gray lead wire [60 mm (2.36 in.)] to the ground (GND).

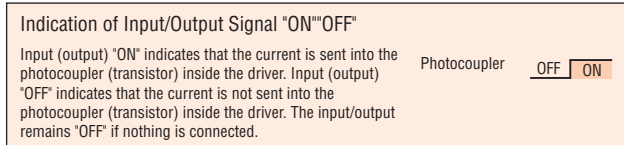


### Timing Chart for Electromagnetic Brake Operation

To release the electromagnetic brake, wait at least 0.5 second after turning on the driver power supply. The load may fall down.

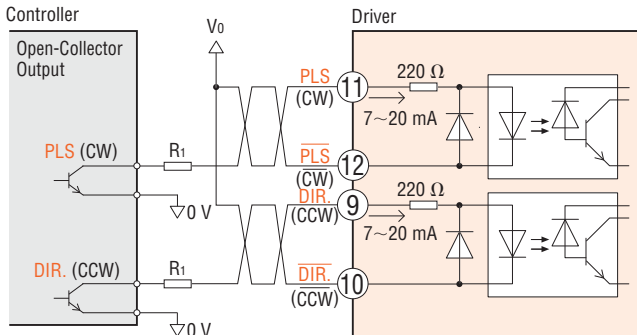


## ● Description of Input/Output Signals



## PLS (CW) and DIR. (CCW) Input Signal

### ◇ Input Circuit and Sample Connection

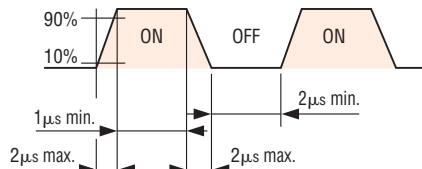


- The colored characters indicate signals under the 1-pulse input mode, while the black characters indicate signals under the 2-pulse input mode.

#### Note:

- The external resistor is not needed when  $V_0$  is 5 VDC. When the voltage exceeds 5 VDC, connect the external resistor  $R_1$  to keep input current at 20 mA or less. When 5 VDC or more is applied without the external resistor, the internal components may get damaged.

### ◇ Pulse Waveform Characteristics



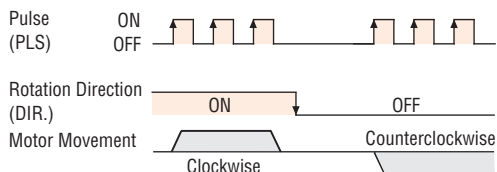
- For pulse signals, use input pulse waveforms like those shown in the figure above.

### ◇ Pulse Input Modes

#### ● 1-Pulse Input Mode

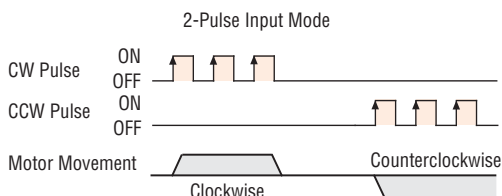
The 1-pulse input mode uses "Pulse" (PLS) and "Rotation Direction" (DIR.) signals. CW is selected by inputting DIR. signal at low level (with the input photocoupler ON), CCW by inputting at high level (with input photocoupler OFF).

Rotation Direction Signals Photocoupler "ON": Clockwise  
Photocoupler "OFF": Counterclockwise  
1-Pulse Input Mode



#### ● 2-Pulse Input Mode

The 2-pulse input mode uses "CW" and "CCW" pulses. When "CW" pulses are input, the motor's output shaft rotates clockwise when the motor is viewed facing the shaft; when "CCW" pulses are input, the shaft rotates counterclockwise.



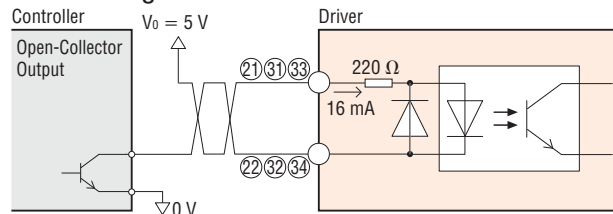
## All Windings Off (C.OFF) Input Signal

### Resolution Select ( $\times 10$ ) Input Signal

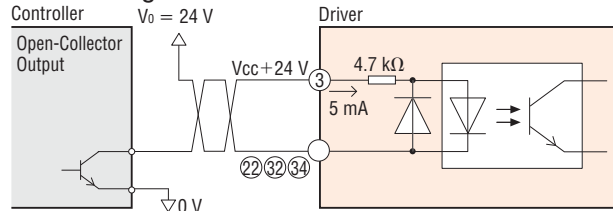
### Alarm Clear (ACL) Input Signal

### ◇ Input Circuit and Sample Connection

#### ● When Using 5 VDC



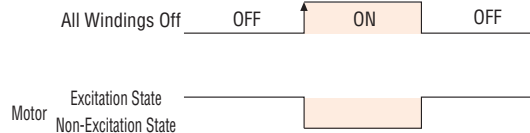
#### ● When Using 24 VDC



### ◇ All Windings Off (C.OFF) Input Signal

Pin No. ③③, ③④

This controller power supply offers a choice of either 5 VDC or 24 VDC. Inputting the "All Windings Off" (C.OFF) signal puts the motor in a non-excitation (free) state. It is used when turning the motor shaft externally or when positioning manually. This signal clears the deviation counter.



### ◇ Resolution Select ( $\times 10$ ) Input Signal

Pin No. ③①, ③②

This controller power supply offers a choice of either 5 VDC or 24 VDC.

Inputting this signal when 1000 P/R or 500 P/R is selected as resolution via the function switch will increase the resolution ten times to 10000 P/R or 5000 P/R.

#### Note:

- While the resolution select switch is set to 10000 P/R or 5000 P/R, input of this signal will not change the resolution.

### ◇ Alarm Clear (ACL) Input Signal

Pin No. ②①, ②②

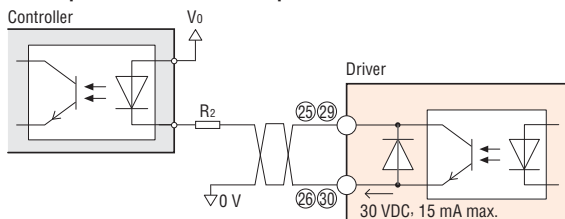
This controller power supply offers a choice of either 5 VDC or 24 VDC. This signal is used for canceling the alarm without turning off power to the driver when a protective function has been activated.

#### Note:

- The following alarm cannot be cleared. To cancel the alarm, first resolve the cause and check for safety, and then turn power on again.
  - Overcurrent · EEPROM data error · System error

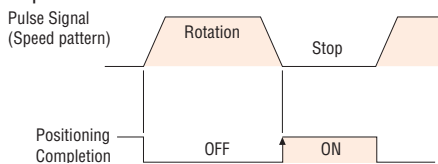
### Positioning Completion (END) Output Signal Alarm (ALARM) Output Signal

#### ◇ Output Circuit and Sample Connection



#### ◇ Positioning Completion (END) Output Signal Pin No. 29, 30

Circuits for use with 30 VDC, 15 mA maximum.  
This signal is output at the photocoupler ON state when positioning is completed. This signal is output when the rotor position is less than  $\pm 1.8^\circ$  from the command position, approximately 2 msec after the pulse input stops.

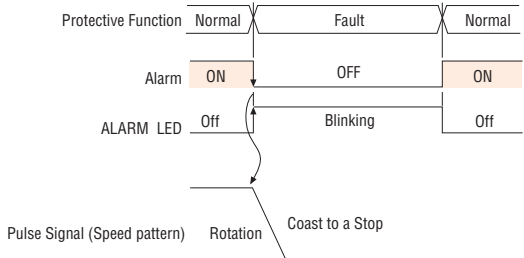


**Note:**

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

#### ◇ Alarm (ALARM) Output Signal Pin No. 25, 26

Circuits for use with 30 VDC, 15 mA maximum. The photocoupler turns OFF when one of the driver's protective functions has been activated. When an abnormality such as an overload or overcurrent is detected, the "Alarm" signal will be output, the driver's LED indicator (ALARM) blinks, and the motor stops (non-excitation state). To cancel the alarm, first resolve the cause and check for safety, and then input an "Alarm Clear" (ACL) signal or reset power. Once power has been turned off, wait at least 10 seconds before turning it on again.



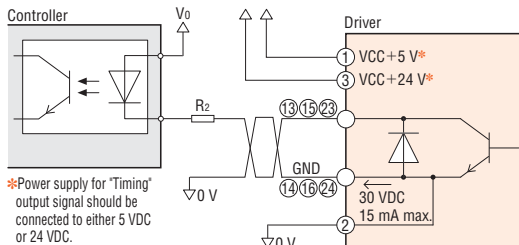
**Notes:**

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

### Timing (TIM.1, TIM.2) Output Signal Quadrature (ASG1/BSG1, ASG2/BSG2) Output Signal

#### ◇ Output Circuit and Sample Connection

##### Open-Collector Output

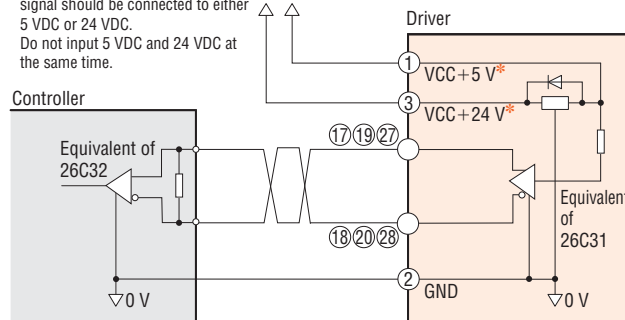


\*Power supply for "Timing" output signal should be connected to either 5 VDC or 24 VDC. Do not input 5 VDC and 24 VDC at the same time.

Circuits for use with 30 VDC, 15 mA maximum.

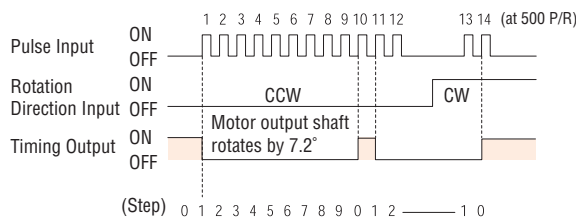
### Line Driver Output

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



#### ◇ Timing (TIM.1, TIM.2) Output Signal Pin No. 23, 24, 27, 28

When the "Timing" signal is output, the transistor turns ON (For the line driver output which is TIM.2, the output signal is ON). This signal is used to detect the home position with greater precision. The number of pulses of this signal is 50 pulses per one motor shaft rotation.



**Notes:**

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

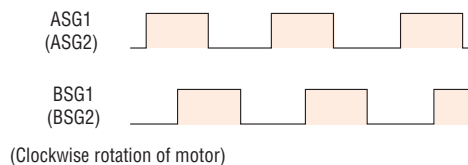
#### ◇ Quadrature (ASG1/BSG1, ASG2/BSG2) Output Signal Pin No. 13~20

A counter or similar device can be connected to monitor the position of the motor. The pulse resolution is the same as the motor resolution at the time of power-on.  
[Example: Resolution select switch (1000 P/R) → Output pulse number for each motor rotation (1000).]  
The phase difference between A and B is  $90^\circ$  in electrical angle.

**Notes:**

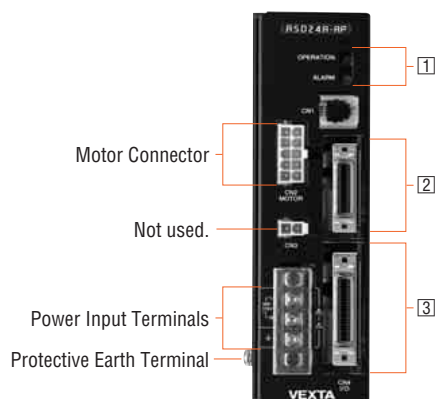
- The pulse output accuracy is, regardless of resolution, within  $\pm 0.36^\circ$  (repetition accuracy: within  $\pm 0.09^\circ$ ).
- When the "Quadrature" signal output is used, 5 VDC or 24 VDC power supply is necessary. This signal is only for position verification when the motor has stopped. There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

#### ◇ Pulse Waveform Characteristics



## Connection and Operation (Built-In Controller Package)

### Names and Functions of Driver Parts



#### 1 Signal Monitor Display

##### ◇ LED Indicators

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

##### ◇ Alarm

Blink Count	Protective Function	When Activated	Alarm Code Output	Operation	Reset
1	Stack Overflow	Too many nested LOOP, ENDL, CALL, etc.	90h (Decimal: 144)	The program stops. The motor performs stop operation set by MSTOPACT.	* Possible
	Memory Read Error	The data stored in the memory is damaged.	91h (Decimal: 145)		
	Program Reference Error	The called program does not exist.	94h (Decimal: 148)		
	Compilation Error	The executed program is not executable.	95h (Decimal: 149)		
	Operation Result Overflow	The operation result exceeds the range of −8 388 608 to +8 388 607.	98h (Decimal: 152)		
	Parameter Out-of-Range Error	The parameter exceeds its setting range.	99h (Decimal: 153)		
	Divide by Zero	Divide by zero was executed.	9Ah (Decimal: 154)		
	General I/O Definition Error	The signal assignment method for general I/O ports was not correct.	9Ch (Decimal: 156)		
	PC Command Execution Error	A PC command was executed while the motor was operating or not energized.	9Dh (Decimal: 157)		
2	Overheat Protection	The temperature of the heat sink in the driver has reached approx. 85°C (185°F).	21h (Decimal: 33)	The motor loses it's holding torque.	* Possible
	Overload Protection	A load exceeding the maximum torque was applied to the motor for the duration set by the OLTIME command.	30h (Decimal: 48)		
	Overspeed Error	The speed of the motor's output shaft has exceeded 5000 r/min.	31h (Decimal: 49)		
3	Overvoltage Protection	The driver's primary inverter voltage has exceeded the limit of tolerance.	22h (Decimal: 34)	The motor loses it's holding torque.	* Possible
4	Excessive Position Deviation	The position of the motor's output shaft has deviated from the position specified by the operation command, by at least the number of revolutions set by the OVERFLOW command.	10h (Decimal: 16)	The motor loses it's holding torque.	* Possible
5	Overcurrent Protection	An excessive current has flowed into the power element of the driver's inverter section.	20h (Decimal: 32)	The motor loses it's holding torque.	* Impossible
6	External Stop	An E-STOP signal has been input.	68h (Decimal: 104)	The program stops. The motor loses it's holding torque (ESTOPACT = 0).	* Possible
	Incorrect Limit-Sensor Logic	Both the +LS and −LS are ON simultaneously.	60h (Decimal: 96)	The motor stops immediately.	* Possible
	Reverse Limit-Sensor Connection	The +LS and −LS are connected in reverse.	61h (Decimal: 97)		
	Mechanical Home Seeking Error	Return to mechanical home could not be executed correctly.	62h (Decimal: 98)		
	Overtravel	The motor has exceeded its hardware limit.	66h (Decimal: 102)	The program stops. The motor stops immediately (ESTOPACT = 1).	
	Software Overtravel	The motor has exceeded its software limit.	67h (Decimal: 103)	Decelerates to a stop.	
	External Stop	An E-STOP signal has been input.	68h (Decimal: 104)	The motor stops immediately.	
Invalid Operation Data	An inoperable operation pattern has been started.	70h (Decimal: 112)	Motion is stopped.		
8	Resolver Sensor Error	The motor cable has not been connected or a motor's error has occurred in a sensor.	42h (Decimal: 66)	The motor loses it's holding torque.	* Impossible
	Initial Rotor Revolution Error	The driver's power was turned on while the motor's output shaft was turning by external force.	43h (Decimal: 67)		
9	NVRAM Error	Motor control parameters has been damaged.	41h (Decimal: 65)	The motor loses it's holding torque.	* Impossible
Lights (No blinking)	System Error	Driver failure has occurred.	F0h (Decimal: 240)	The motor loses it's holding torque.	* Impossible

\* Possible - The alarm can be cleared with the ALMCLR command or an ACL input.

Impossible - The AC power must be cycled to clear these alarms.



## ② Limit Sensor Input and Communication Signals (CN5) (20 pins)

Indication	Input/Output	Pin No.	Signal	Signal Name
CN5	Input	1	COM1	Power Supply for Input Signals
		2	COM2	Power Supply for Input Signals
	–	3	–	No Connection
	–	4	–	No Connection
	Output	5	TX	RS-232C Transmit
		6	–	No Connection
	Input	7	RX	RS-232C Receive
		8	–	No Connection
	–	9	–	No Connection
	Input	10	N24	External Power Supply Terminal (GND)
	Input	11	COM1	Power Supply for Input Signals
		12	COM2	Power Supply for Input Signals
		13	+LS	+LS Limit Sensor
		14	–LS	–LS Limit Sensor
		15	HOMELS	HOME Sensor
		16	SENSOR	Sensor
		17	–	No Connection
		18	–	No Connection
		19	COM1	Power Supply for Input Signals
		20	COM2	Power Supply for Input Signals

## ③ Input/Output Signals (CN4) (36 pins)

Indication	Input/Output	Pin No.	Signal	Signal Name	
CN4	Input	1	P24	Power Supply for RS-232C, ASG and BSG (24 VDC)	
		2	N24	Power Supply for RS-232C, ASG and BSG (GND)	
	Output	3	Y0	General Output*1 (Y0 to Y3)	
		4	Y0		
		5	Y1		
		6	Y1		
		7	Y2		
		8	Y2		
		9	Y3		
		10	Y3		
		11	ASG	A-phase Pulse Output (Line driver output)	
		12	ASG	(Line driver output)	
		13	BSG	B-phase Pulse Output (Line driver output)	
		14	BSG	(Line driver output)	
		Input	15	START	START
			16	E-STOP	External Stop
	17		COM1	Power Supply for Input Signal	
	18				
	Output	19	Y4	General Output*1 (Y4 to Y7)	
		20	Y4		
		21	Y5		
		22	Y5		
		23	Y6		
		24	Y6		
		25	Y7		
		26	Y7		
		27	ALM	Alarm	
		28	ALM		
	Input	29	X0	General Input*2 (X0 to X7)	
		30	X1		
		31	X2		
		32	X3		
		33	X4		
		34	X5		
		35	X6		
		36	X7		

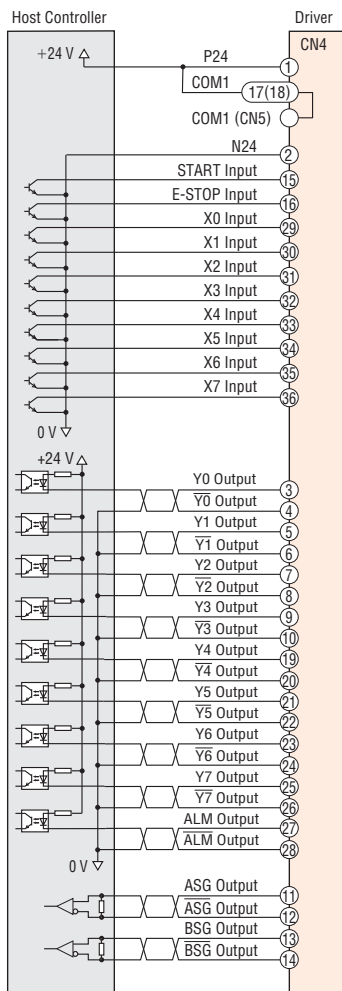
\*1 The following signals can be assigned arbitrarily via program settings. Additionally, the output logic of each signal can be switched. END output, RUN output, MOVE output, HOME-P output, TIM output, MBC output

\*2 The following signals can be assigned arbitrarily via program settings. Additionally, the input logic of each signal can be switched. ACL input, PAUSE input, MSTOP input, RESTART input

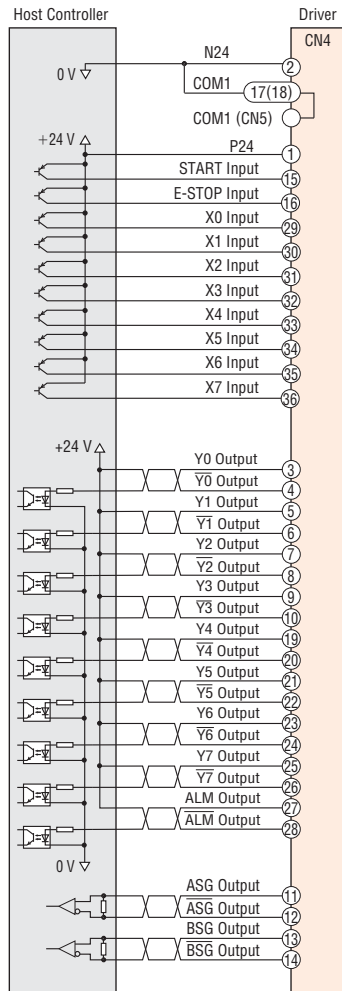


## ● Connection Diagrams

### ● Current Source Input and Current Sink Output

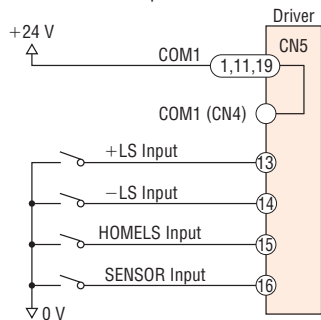


### ● Current Sink Input and Current Source Output

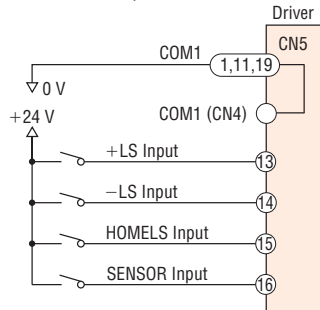


## ◇ Limit Sensor (CN5)

### ● Current Source Input



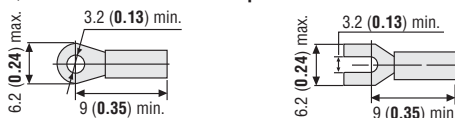
### ● Current Sink Input



## ◇ Notes on Wiring

- Use input signals at 24 VDC  $\pm 10\%$ .
- Use output signals at 30 VDC or below and at 4 to 8 mA.
- Use a shielded cable with a wire of a size ranging between AWG24 and AWG22 for the driver signal cable (I/O signals, limit sensors signals), and keep it as short as possible.
- When it is necessary to extend wiring distance between the motor and driver more than 0.4 m (1.31 ft.), the accessory extension cable or flexible extension cable must be used. Electromagnetic brake motor models [except motor frame size 42 mm (1.65 in.)] must use an electromagnetic brake extension cable or flexible extension cable (sold separately.) The frame size 42 mm (1.65 in.) models can use a standard extension cable even for electromagnetic brake motor models. Extension cables for electromagnetic brake motor → Page C-297
- Always use the motor cable for industrial connector type motor (sold separately) for connection between the industrial connector type motor and the driver.
- Use the following cable for the power line
  - Single-phase 100-115 VAC, Single-phase 200-230 VAC: 3-core cable of AWG18 or thicker
  - Three-phase 200-230 VAC: 4-core cable of AWG18 or thicker
- Provide a minimum distance of 300 mm (1 ft.) between the control I/O signal line 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.
- To ground the driver, lead the ground conductor from the protective earth terminal (M4) and connect the ground conductor to provide a common ground point.

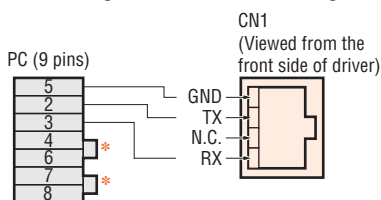
## ◇ Recommended Crimp Terminals unit = mm (in.)



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

## ◇ Connecting the Driver with a Personal Computer (CN1)

### ● Pin Assignments and Connecting



- \*Short pins 4 and 6 together, as well as pins 7 and 8 together

### ● Communication Specifications

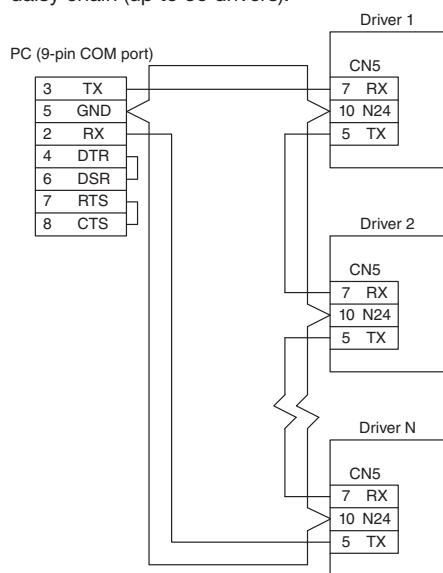
Item	Description
Electrical Characteristics	In conformance with RS-232C
Transmission Method	Start-stop asynchronous method, NRZ (non-return to Zero), full-duplex
Data Length	8 bits, 1 stop bit, no parity
Transmission Speed	9600 bps
Protocol	TTY (CR+LF)
Connector Specification	Modular (4 lines, 4 pins)

### Notes:

- Confirm that 24 VDC is supplied to the driver's external power supply input terminals (P24 and N24).
- Use the RS-232C signal lines over the shortest possible distance. It is recommended that the signal lines be shielded to protect them from noise interference.
- The maximum distance between drivers when using a daisy chain connection should be 15 m (49.2 ft.).

## ● Description of Daisy Chain Connections

Use the RS-232C communication pins (TX, RX and N24) of the sensor connector (CN5) when connecting two or more drivers via a daisy chain (up to 36 drivers).



## ◇ TX, RX

These communication terminals are used when implementing daisy chain connections.

### Notes:

- Confirm that 24 VDC is supplied to the driver's external power supply input terminals (P24 and N24).
- Use the RS-232C signal lines over the shortest possible distance. It is recommended that the signal lines be shielded to protect them from noise interference.
- The maximum distance between drivers when using a daisy chain connection should be 15 m (49.2 ft.).
- Do not use the RS-232C communication port (CN1).

## ■ Connecting the Electromagnetic Brake to a Power Supply

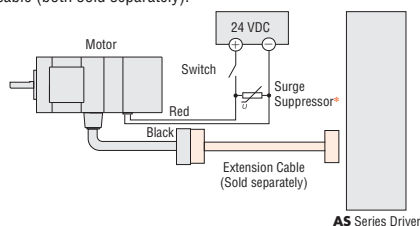
Connect the electromagnetic brake to the power supply using a cable of at least AWG24. The power supply input to the electromagnetic brake is 24 VDC  $\pm$ 5% 0.3 A minimum (**AS46**: 0.1 A minimum) and therefore must be independent of the driver's power supply for signal control.

### Notes:

- Applying a voltage that exceeds the specifications will cause the electromagnetic brake to generate a great amount of heat, resulting in motor temperature rises and possible damage to the motor. Conversely, if voltage is too low, the electromagnetic brake may not release.
- To protect the switch contacts and prevent noise, always connect the surge suppressor.\*  
(\*The surge suppressor is included with electromagnetic brake motors.)
- To prevent noise, use a dedicated power supply for electromagnetic brake.
- Correct polarity (+ and -) must be ensured when connecting the electromagnetic brake leads of **AS** Series to the DC power supply. If polarity is incorrect, the electromagnetic brake will not operate.
- When using as a CE certified part, use a dedicated DC power supply for electromagnetic brake.

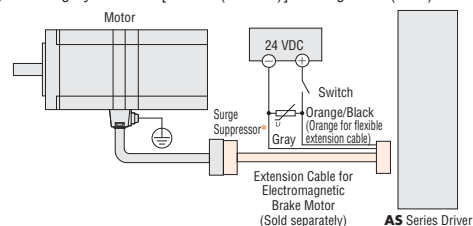
### (1) AS46

The electromagnetic brake leads are linked to the connector on the motor [600 mm (23.6 in.)]. When connecting with the DC power supply, connect the red spiral lead wire to +24 V, and the black lead wire to the ground (GND). Use the extension cable or the flexible extension cable (both sold separately).



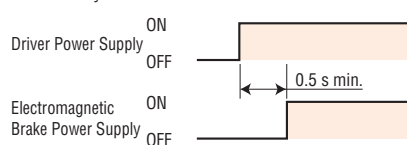
### (2) AS66, AS69, AS98

The electromagnetic brake leads are linked to the connector on the driver connection side of extension cable for electromagnetic brake motor (sold separately). Be sure to use the accessory (sold separately) extension cable or flexible extension cable. Connect the orange/black spiral lead wire (orange for flexible extension cable)[60 mm (2.36 in.)] to +24 V, and the gray lead wire [60 mm (2.36 in.)] to the ground (GND).



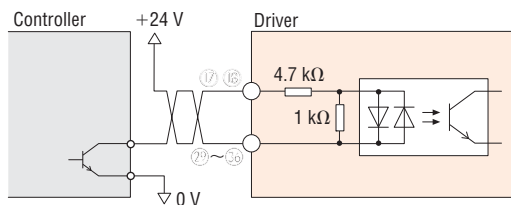
### Timing Chart for Electromagnetic Brake Operation

To release the electromagnetic brake, wait at least 0.5 second after turning on the driver power supply. The load may fall down.



## ● Description of Input Signals (CN4)

### ◇ Input Circuit and Sample Connection



#### Note:

- Use input signals at 24 VDC $\pm$ 10%.

### ◇ P24 Input, N24 Input

These inputs are for the external power supply required for the RS-232C communication, ASG and BSG outputs. Make sure to use a power supply of at least 24 VDC $\pm$ 10%, 0.05 A. If the same power supply is going to be used for the RS-232C, ASG, BSG and other external I/O, make sure to use a power supply of at least 24 VDC $\pm$ 10%, 0.2 A.

### ◇ START Input

This signal starts the program named "STARTUP."  
OFF $\rightarrow$ ON edge to start "STARTUP" program.

### ◇ E-STOP Input

This signal is used to forcibly stop the operation. Set the stopping method using the ESTOPACT command. Additionally, the input logic can be changed using the ESTOPLV command. (The factory setting of this command is normally open.) OFF $\rightarrow$ ON edge to stop operation.

### ◇ COM1 Input

This is an external power supply terminal for input signals. This signal is internally connected to terminals COM1 of CN5.

### ◇ X0 to X7 Inputs

The X0 through X7 inputs can be used as input ports for general signals. The status of each port can be read using an IN command or INx command. The general signals assignable to the X0 through X7 inputs are listed below. Use a corresponding command to assign signal.

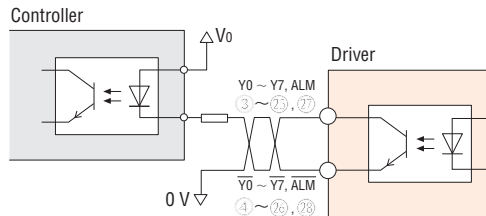
ACL input .....INACL command  
PAUSE input .....INPAUSE command  
MSTOP input .....INMSTOP command  
RESTART input ...INRESTART command

### ◇ ACL Input

This signal is used to reset the alarm that has been generated by the driver's protective function. Input an ACL signal once after removing the cause that has triggered the protective function.

## ● Description of Output Signals (CN4)

### ◇ Output Circuit and Sample Connection



#### Note:

- Use output signals at 30 VDC or below and at 4 to 8 mA.

### ◇ Y0 to Y7 Outputs

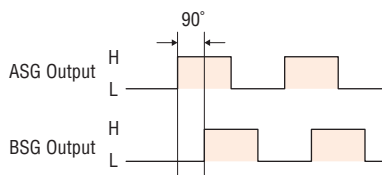
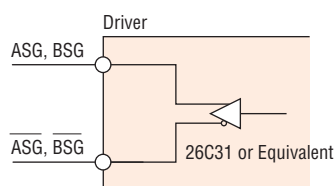
The Y0 through Y7 outputs can be used as output ports for general signals. The status of each port can be read using an OUT command or OUTx command.

The general signals assignable to the Y0 through Y7 outputs are listed below. Use the corresponding command to assign each signal.

END output ..... OUTEND command  
RUN output ..... OUTRUN command  
MOVE output ..... OUTMOVE command  
HOME-P output ..... OUTHOMEP command  
TIM output ..... OUTTIM command  
MBC output ..... OUTMBC command

### ◇ ASG Output, BSG Output

- Line driver output (26C31 or equivalent)



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

[Example: Resolution select switch (1000 P/R)  $\rightarrow$  Output pulse number for each motor revolution (1000).] The phase difference between A and B is 90° in electrical angle.

#### Notes:

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

### ◇ ALM Output

This signal is output when an alarm is generated by the driver's protective function.

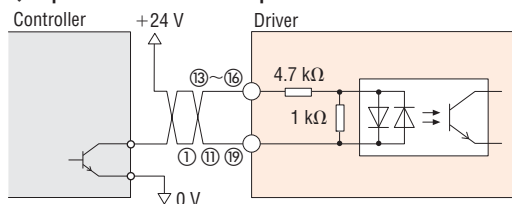
The reason for triggering of the protective function can be identified through the blink count of the alarm LED, or ALM command.

To reset the ALM output, remove the cause of the alarm and then perform one of the following procedures after ensuring safety:

- Assign INACL then turn the ACL input to ON.
- Enter an ALMCLR command.
- Turn off the AC power, wait at least 10 seconds, then turn it back on.

## ● Description of Limit Sensors (CN5)

### ◇ Input Circuit and Sample Connection



#### Note:

- Use input signals at 24 VDC $\pm$ 10%.

### ◇ COM1 Input

This is a power supply input terminal for limit-sensor signals. The power supply voltage must be 24 VDC $\pm$ 10%.

This signal is internally connected to terminals COM1 of CN4.

### ◇ COM2 Input

This is a power supply input terminal for limit-sensor signals.

Use it when sharing the input signal power supply among two or more drivers.

### ◇ +LS Input, -LS Input

These signals are input from +LS and -LS.

The input logic can be changed using the OTLV command. (The factory setting of this command is normally open.) Input logic for the +LS input and -LS input cannot be set separately.

#### Continuous Operation and Positioning Operation

When a +LS or -LS is detected, the driver's protective function (overtravel) is activated. As a result, the ALM output is turned OFF and the motor stops.

Set the stopping method using the OTACT command.

To pull out of +LS or -LS, cancel the protective function by inputting an ACL signal once or by using the ALMCLR command. Then perform return to mechanical home or operate the motor in the direction opposite that of the limit sensor during continuous operation.

#### Return to Mechanical Home

When a +LS or -LS is detected, the motor operates in the direction opposite that of the detected limit.

### ◇ HOMELS Input

This signal is input from HOMELS.

Connect the HOMELS when return to mechanical home is performed in 3-sensor mode.

When return to mechanical home is performed in 3-sensor mode, the HOMELS becomes the mechanical home. The input logic can be changed using the HOMELV command. (The factory setting of this command is normally open.)

### ◇ SENSOR Input

This signal is input from SENSOR.

The input logic can be changed using the SENSORLV command. (The factory setting of this command is normally open.)

#### Return to Mechanical Home

This input is used when detecting the mechanical home at a specific point on the motor's output shaft or load shaft using a slotted disc, etc. The accuracy of return to mechanical home increases if this input is used in conjunction with the TIM. signal.

#### Continuous Operation

The motor can be stopped forcibly upon the detection of SENSOR. Set the stopping method using the SENSORACT command.

#### Note:

- If the SENSOR input is used in return to mechanical home, it cannot be used during continuous operation.

## List of Motor and Driver Combinations

Model names for motor and driver combinations are shown below.

Power Supply Voltage	Type	Pulse Input Package			Built-In Controller Package			
		Model	Motor Model	Driver Model	Model	Motor Model	Driver Model	
Single-Phase 100-115 VAC Input	Standard Type	<b>AS46</b> □ <b>A</b>	ASM46□A	ASD13A-A	<b>AS46</b> □ <b>AP</b>	ASM46□A	ASD13A-AP	
		<b>AS66</b> □ <b>AE</b>	ASM66□AE	ASD24A-A	<b>AS66</b> □ <b>AEP</b>	ASM66□AE	ASD24A-AP	
		<b>AS69</b> □ <b>AE</b>	ASM69□AE	ASD30D-A	<b>AS69</b> □ <b>AEP</b>	ASM69□AE	ASD30D-AP	
		<b>AS98</b> □ <b>AE</b>	ASM98□AE	ASD30A-A	<b>AS98</b> □ <b>AEP</b>	ASM98□AE	ASD30A-AP	
		<b>AS911AAE</b>	ASM911AAE	ASD30E-A	<b>AS911AAEP</b>	ASM911AAE	ASD30E-AP	
	Standard Type Industrial Connector	<b>AS66AAT</b>	ASM66AAT	ASD24A-A	<b>AS66AATP</b>	ASM66AAT	ASD24A-AP	
		<b>AS69AAT</b>	ASM69AAT	ASD30D-A	<b>AS69AATP</b>	ASM69AAT	ASD30D-AP	
		<b>AS98AAT</b>	ASM98AAT	ASD30A-A	<b>AS98AATP</b>	ASM98AAT	ASD30A-AP	
		<b>AS911AAT</b>	ASM911AAT	ASD30E-A	<b>AS911AATP</b>	ASM911AAT	ASD30E-AP	
		<b>TH</b> Geared Type	<b>AS46</b> □ <b>A-T3.6</b>	ASM46□A-T3.6	ASD13B-A	<b>AS46</b> □ <b>AP-T3.6</b>	ASM46□A-T3.6	ASD13B-AP
	<b>AS46</b> □ <b>A-T7.2</b>		ASM46□A-T7.2	<b>AS46</b> □ <b>AP-T7.2</b>		ASM46□A-T7.2		
	<b>AS46</b> □ <b>A-T10</b>		ASM46□A-T10	<b>AS46</b> □ <b>AP-T10</b>		ASM46□A-T10		
	<b>AS46</b> □ <b>A-T20</b>		ASM46□A-T20	ASD13C-A	<b>AS46</b> □ <b>AP-T20</b>	ASM46□A-T20	ASD13C-AP	
	<b>AS46</b> □ <b>A-T30</b>		ASM46□A-T30		<b>AS46</b> □ <b>AP-T30</b>	ASM46□A-T30		
	<b>AS66</b> □ <b>AE-T3.6</b>		ASM66□AE-T3.6	ASD24B-A	<b>AS66</b> □ <b>AEP-T3.6</b>	ASM66□AE-T3.6	ASD24B-AP	
	<b>AS66</b> □ <b>AE-T7.2</b>		ASM66□AE-T7.2		<b>AS66</b> □ <b>AEP-T7.2</b>	ASM66□AE-T7.2		
	<b>AS66</b> □ <b>AE-T10</b>		ASM66□AE-T10		<b>AS66</b> □ <b>AEP-T10</b>	ASM66□AE-T10		
	<b>AS66</b> □ <b>AE-T20</b>		ASM66□AE-T20	ASD24C-A	<b>AS66</b> □ <b>AEP-T20</b>	ASM66□AE-T20	ASD24C-AP	
	<b>AS66</b> □ <b>AE-T30</b>		ASM66□AE-T30		<b>AS66</b> □ <b>AEP-T30</b>	ASM66□AE-T30		
	<b>AS98</b> □ <b>AE-T3.6</b>		ASM98□AE-T3.6	ASD30A-A	<b>AS98</b> □ <b>AEP-T3.6</b>	ASM98□AE-T3.6	ASD30A-AP	
	<b>AS98</b> □ <b>AE-T7.2</b>		ASM98□AE-T7.2		<b>AS98</b> □ <b>AEP-T7.2</b>	ASM98□AE-T7.2		
	<b>AS98</b> □ <b>AE-T10</b>		ASM98□AE-T10		<b>AS98</b> □ <b>AEP-T10</b>	ASM98□AE-T10		
	<b>AS98</b> □ <b>AE-T20</b>		ASM98□AE-T20	ASD30C-A	<b>AS98</b> □ <b>AEP-T20</b>	ASM98□AE-T20	ASD30C-AP	
	<b>AS98</b> □ <b>AE-T30</b>		ASM98□AE-T30		<b>AS98</b> □ <b>AEP-T30</b>	ASM98□AE-T30		
	<b>PN</b> Geared Type	<b>AS46</b> □ <b>A-N7.2</b>	ASM46□A-N7.2	ASD13A-A	<b>AS46</b> □ <b>AP-N7.2</b>	ASM46□A-N7.2	ASD13A-AP	
		<b>AS46</b> □ <b>A-N10</b>	ASM46□A-N10		<b>AS46</b> □ <b>AP-N10</b>	ASM46□A-N10		
		<b>AS66</b> □ <b>AE-N5</b>	ASM66□AE-N5	ASD24A-A	<b>AS66</b> □ <b>AEP-N5</b>	ASM66□AE-N5	ASD24A-AP	
		<b>AS66</b> □ <b>AE-N7.2</b>	ASM66□AE-N7.2		<b>AS66</b> □ <b>AEP-N7.2</b>	ASM66□AE-N7.2		
		<b>AS66</b> □ <b>AE-N10</b>	ASM66□AE-N10		<b>AS66</b> □ <b>AEP-N10</b>	ASM66□AE-N10		
		<b>AS66</b> □ <b>AE-N25</b>	ASM66□AE-N25	ASD24B-A	<b>AS66</b> □ <b>AEP-N25</b>	ASM66□AE-N25	ASD24B-AP	
		<b>AS66</b> □ <b>AE-N36</b>	ASM66□AE-N36		<b>AS66</b> □ <b>AEP-N36</b>	ASM66□AE-N36		
		<b>AS66</b> □ <b>AE-N50</b>	ASM66□AE-N50	ASD24C-A	<b>AS66</b> □ <b>AEP-N50</b>	ASM66□AE-N50	ASD24C-AP	
		<b>AS98</b> □ <b>AE-N5</b>	ASM98□AE-N5		<b>AS98</b> □ <b>AEP-N5</b>	ASM98□AE-N5		
		<b>AS98</b> □ <b>AE-N7.2</b>	ASM98□AE-N7.2		<b>AS98</b> □ <b>AEP-N7.2</b>	ASM98□AE-N7.2		
		<b>AS98</b> □ <b>AE-N10</b>	ASM98□AE-N10	ASD30A-A	<b>AS98</b> □ <b>AEP-N10</b>	ASM98□AE-N10	ASD30A-AP	
		<b>AS98</b> □ <b>AE-N25</b>	ASM98□AE-N25		<b>AS98</b> □ <b>AEP-N25</b>	ASM98□AE-N25		
		<b>AS98</b> □ <b>AE-N36</b>	ASM98□AE-N36	ASD30B-A	<b>AS98</b> □ <b>AEP-N36</b>	ASM98□AE-N36	ASD30B-AP	
		<b>AS98</b> □ <b>AE-N50</b>	ASM98□AE-N50		<b>AS98</b> □ <b>AEP-N50</b>	ASM98□AE-N50		
		Harmonic Geared Type	<b>AS46</b> □ <b>A2-H50</b>	ASM46□A2-H50	ASD13A-A	<b>AS46</b> □ <b>AP2-H50</b>	ASM46□A2-H50	ASD13A-AP
	<b>AS46</b> □ <b>A2-H100</b>		ASM46□A2-H100	<b>AS46</b> □ <b>AP2-H100</b>		ASM46□A2-H100		
	<b>AS66</b> □ <b>AE-H50</b>		ASM66□AE-H50	ASD24B-A	<b>AS66</b> □ <b>AEP-H50</b>	ASM66□AE-H50	ASD24B-AP	
	<b>AS66</b> □ <b>AE-H100</b>		ASM66□AE-H100	ASD24C-A	<b>AS66</b> □ <b>AEP-H100</b>	ASM66□AE-H100	ASD24C-AP	
	<b>AS98</b> □ <b>AE-H50</b>		ASM98□AE-H50	ASD30B-A	<b>AS98</b> □ <b>AEP-H50</b>	ASM98□AE-H50	ASD30B-AP	
	<b>AS98</b> □ <b>AE-H100</b>	ASM98□AE-H100	<b>AS98</b> □ <b>AEP-H100</b>		ASM98□AE-H100			
	Single-Phase 200-230 VAC Input	Standard Type	<b>AS66</b> □ <b>CE</b>	ASM66□CE	ASD12A-C	<b>AS66</b> □ <b>CEP</b>	ASM66□CE	ASD12A-CP
			<b>AS69</b> □ <b>CE</b>	ASM69□CE	ASD16D-C	<b>AS69</b> □ <b>CEP</b>	ASM69□CE	ASD16D-CP
			<b>AS98</b> □ <b>CE</b>	ASM98□CE	ASD16A-C	<b>AS98</b> □ <b>CEP</b>	ASM98□CE	ASD16A-CP
			<b>AS911ACE</b>	ASM911ACE	ASD20A-C	<b>AS911ACEP</b>	ASM911ACE	ASD20A-CP
			<b>AS66ACT</b>	ASM66ACT	ASD12A-C	<b>AS66ACTP</b>	ASM66ACT	ASD12A-CP
		Standard Type Industrial Connector	<b>AS69ACT</b>	ASM69ACT	ASD16D-C	<b>AS69ACTP</b>	ASM69ACT	ASD16D-CP
			<b>AS98ACT</b>	ASM98ACT	ASD16A-C	<b>AS98ACTP</b>	ASM98ACT	ASD16A-CP
			<b>AS911ACT</b>	ASM911ACT	ASD20A-C	<b>AS911ACTP</b>	ASM911ACT	ASD20A-CP
			<b>AS66</b> □ <b>CE-T3.6</b>	ASM66□CE-T3.6	ASD12B-C	<b>AS66</b> □ <b>CEP-T3.6</b>	ASM66□CE-T3.6	ASD12B-CP
			<b>AS66</b> □ <b>CE-T7.2</b>	ASM66□CE-T7.2		<b>AS66</b> □ <b>CEP-T7.2</b>	ASM66□CE-T7.2	
		<b>AS66</b> □ <b>CE-T10</b>	ASM66□CE-T10	<b>AS66</b> □ <b>CEP-T10</b>		ASM66□CE-T10		
		<b>AS66</b> □ <b>CE-T20</b>	ASM66□CE-T20	ASD12C-C	<b>AS66</b> □ <b>CEP-T20</b>	ASM66□CE-T20	ASD12C-CP	
		<b>AS66</b> □ <b>CE-T30</b>	ASM66□CE-T30		<b>AS66</b> □ <b>CEP-T30</b>	ASM66□CE-T30		

● Enter **A** (standard) or **M** (electromagnetic brake) in the box (□) within the model name.

Power Supply Voltage	Type	Pulse Input Package			Built-In Controller Package			
		Model	Motor Model	Driver Model	Model	Motor Model	Driver Model	
Single-Phase 200-230 VAC Input	TH Geared Type	AS98□CE-T3.6	ASM98□CE-T3.6	ASD16A-C	AS98□CEP-T3.6	ASM98□CE-T3.6	ASD16A-CP	
		AS98□CE-T7.2	ASM98□CE-T7.2		AS98□CEP-T7.2	ASM98□CE-T7.2		
		AS98□CE-T10	ASM98□CE-T10		AS98□CEP-T10	ASM98□CE-T10		
		AS98□CE-T20	ASM98□CE-T20	ASD16C-C	AS98□CEP-T20	ASM98□CE-T20	ASD16C-CP	
		AS98□CE-T30	ASM98□CE-T30		AS98□CEP-T30	ASM98□CE-T30		
		AS66□CE-N5	ASM66□CE-N5		AS66□CEP-N5	ASM66□CE-N5		
	PN Geared Type	AS66□CE-N7.2	ASM66□CE-N7.2	ASD12A-C	AS66□CEP-N7.2	ASM66□CE-N7.2	ASD12A-CP	
		AS66□CE-N10	ASM66□CE-N10		AS66□CEP-N10	ASM66□CE-N10		
		AS66□CE-N25	ASM66□CE-N25		AS66□CEP-N25	ASM66□CE-N25		
		AS66□CE-N36	ASM66□CE-N36	ASD12C-C	AS66□CEP-N36	ASM66□CE-N36	ASD12C-CP	
		AS66□CE-N50	ASM66□CE-N50		AS66□CEP-N50	ASM66□CE-N50		
		AS98□CE-N5	ASM98□CE-N5		AS98□CEP-N5	ASM98□CE-N5		
		Harmonic Geared Type	AS98□CE-N7.2	ASM98□CE-N7.2	ASD16A-C	AS98□CEP-N7.2	ASM98□CE-N7.2	ASD16A-CP
			AS98□CE-N10	ASM98□CE-N10		AS98□CEP-N10	ASM98□CE-N10	
			AS98□CE-N25	ASM98□CE-N25		AS98□CEP-N25	ASM98□CE-N25	
			AS98□CE-N36	ASM98□CE-N36		AS98□CEP-N36	ASM98□CE-N36	
			AS98□CE-N50	ASM98□CE-N50		AS98□CEP-N50	ASM98□CE-N50	
			AS66□CE-H50	ASM66□CE-H50	ASD12B-C	AS66□CEP-H50	ASM66□CE-H50	ASD12B-CP
	AS66□CE-H100		ASM66□CE-H100	ASD12C-C	AS66□CEP-H100	ASM66□CE-H100	ASD12C-CP	
	AS98□CE-H50		ASM98□CE-H50	ASD16B-C	AS98□CEP-H50	ASM98□CE-H50	ASD16B-CP	
	AS98□CE-H100		ASM98□CE-H100		AS98□CEP-H100	ASM98□CE-H100		
	Three-Phase 200-230 VAC Input		Standard Type	AS66□SE	ASM66□CE	ASD12A-S	AS66□SEP	ASM66□CE
		AS69□SE		ASM69□CE	ASD16D-S	AS69□SEP	ASM69□CE	ASD16D-SP
		AS98□SE		ASM98□CE	ASD16A-S	AS98□SEP	ASM98□CE	ASD16A-SP
		AS911ASE		ASM911ACE	ASD20A-S	AS911ASEP	ASM911ACE	ASD20A-SP
		AS66AST		ASM66ACT	ASD12A-S	AS66ASTP	ASM66ACT	ASD12A-SP
		Standard Type Industrial Connector	AS69AST	ASM69ACT	ASD16D-S	AS69ASTP	ASM69ACT	ASD16D-SP
AS98AST			ASM98ACT	ASD16A-S	AS98ASTP	ASM98ACT	ASD16A-SP	
AS911AST			ASM911ACT	ASD20A-S	AS911ASTP	ASM911ACT	ASD20A-SP	
TH Geared Type			AS66□SE-T3.6	ASM66□CE-T3.6	ASD12B-S	AS66□SEP-T3.6	ASM66□CE-T3.6	ASD12B-SP
			AS66□SE-T7.2	ASM66□CE-T7.2		AS66□SEP-T7.2	ASM66□CE-T7.2	
		AS66□SE-T10	ASM66□CE-T10	AS66□SEP-T10		ASM66□CE-T10		
		AS66□SE-T20	ASM66□CE-T20	ASD12C-S	AS66□SEP-T20	ASM66□CE-T20	ASD12C-SP	
		AS66□SE-T30	ASM66□CE-T30		AS66□SEP-T30	ASM66□CE-T30		
		AS98□SE-T3.6	ASM98□CE-T3.6		AS98□SEP-T3.6	ASM98□CE-T3.6		
		AS98□SE-T7.2	ASM98□CE-T7.2	ASD16A-S	AS98□SEP-T7.2	ASM98□CE-T7.2	ASD16A-SP	
		AS98□SE-T10	ASM98□CE-T10		AS98□SEP-T10	ASM98□CE-T10		
		AS98□SE-T20	ASM98□CE-T20		AS98□SEP-T20	ASM98□CE-T20		
AS98□SE-T30		ASM98□CE-T30	ASD16C-S	AS98□SEP-T30	ASM98□CE-T30	ASD16C-SP		
PN Geared Type		AS66□SE-N5	ASM66□CE-N5	ASD12A-S	AS66□SEP-N5	ASM66□CE-N5	ASD12A-SP	
		AS66□SE-N7.2	ASM66□CE-N7.2		AS66□SEP-N7.2	ASM66□CE-N7.2		
		AS66□SE-N10	ASM66□CE-N10		AS66□SEP-N10	ASM66□CE-N10		
		AS66□SE-N25	ASM66□CE-N25	ASD12B-S	AS66□SEP-N25	ASM66□CE-N25	ASD12B-SP	
		AS66□SE-N36	ASM66□CE-N36	ASD12C-S	AS66□SEP-N36	ASM66□CE-N36	ASD12C-SP	
		AS66□SE-N50	ASM66□CE-N50		AS66□SEP-N50	ASM66□CE-N50		
		AS98□SE-N5	ASM98□CE-N5		AS98□SEP-N5	ASM98□CE-N5		
		Harmonic Geared Type	AS98□SE-N7.2	ASM98□CE-N7.2	ASD16A-S	AS98□SEP-N7.2	ASM98□CE-N7.2	ASD16A-SP
			AS98□SE-N10	ASM98□CE-N10		AS98□SEP-N10	ASM98□CE-N10	
	AS98□SE-N25		ASM98□CE-N25	AS98□SEP-N25		ASM98□CE-N25		
	AS98□SE-N36		ASM98□CE-N36	AS98□SEP-N36		ASM98□CE-N36		
	AS98□SE-N50		ASM98□CE-N50	AS98□SEP-N50		ASM98□CE-N50		
AS66□SE-H50	ASM66□CE-H50		ASD16B-S	AS66□SEP-H50	ASM66□CE-H50	ASD16B-SP		
AS66□SE-H100	ASM66□CE-H100		ASD12C-S	AS66□SEP-H100	ASM66□CE-H100	ASD12C-SP		
AS98□SE-H50	ASM98□CE-H50		ASD16B-S	AS98□SEP-H50	ASM98□CE-H50	ASD16B-SP		
AS98□SE-H100	ASM98□CE-H100			AS98□SEP-H100	ASM98□CE-H100			

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Introduction

AC Input

DC Input

AC Input

DC Input

DC Input

DC Input

DC Input

Without Encoder

With Encoder

Controllers

Controllers

Accessories

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