



αSTEP[®] AS Series

Additional Information

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Motor & Driver Packages	
AS	Closed Loop αSTEP [®] AS PLUS
ASC	DC Input
RK	5-Phase Microstep AC Input
CFKII	DC Input
CSK	5-Phase Full/Half DC Input
PMC	2-Phase Full/Half AC Input
UMK	DC Input
CSK	2-Phase Full/Half AC Input
PK/PV	2-Phase Stepping Motors without Encoder
PK	2-Phase Stepping Motors with Encoder
UI2120G	Driver with Indexer
EMP401	Controllers
SC8800	
SC8800E	
SG8030J	
SMK	Low-Speed Synchronous Motors
Accessories	
	Before Using a Stepping Motor

Closed Loop Stepping Motor and Driver Package

α STEP[®] AS Series

The α STEP is a revolutionary hybrid stepping motor and driver package which eliminates missed steps; a common problem with stepping motors. The α STEP uses a built-in feedback device that constantly monitors the motor shaft position to detect and correct for loss of synchronism. Geared models are also available.

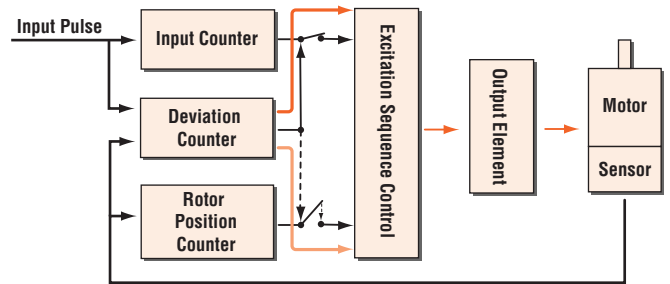
Features

- Thanks to closed loop control, there is no loss of synchronism.

α STEP does not lose synchronism even when subjected to abrupt load fluctuation or acceleration. A newly developed rotor position detection sensor constantly monitors the motor movement. If synchronism is about to be lost, closed loop control is used, so there is no need to worry about loss of steps.



α STEP Control Diagram

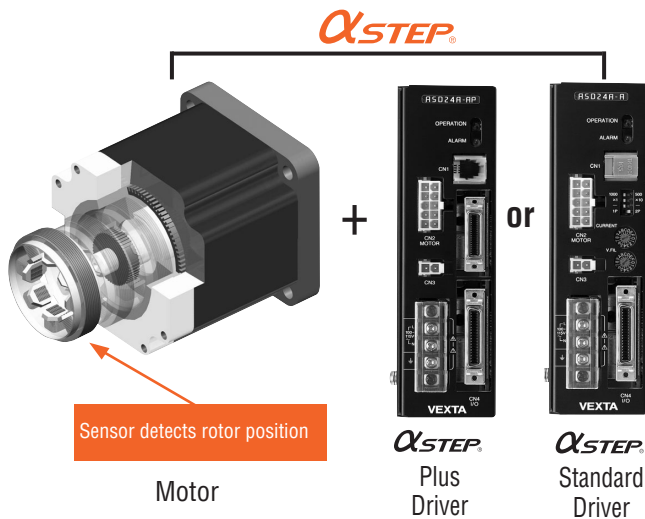


Normal (Positioning Deviation is less than $\pm 1.8^\circ$)

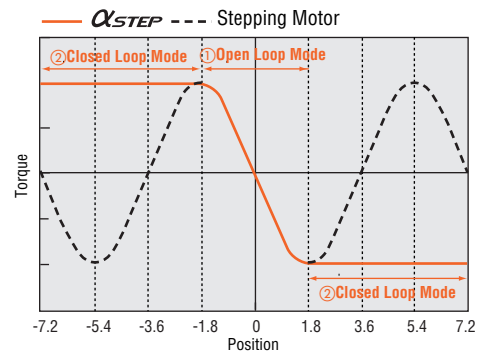
Motor runs in open loop mode like a stepping motor.

If Motor Misssteps (Positioning Deviation is greater than $\pm 1.8^\circ$)

Control switches to closed loop mode to prevent loss of synchronism.



α STEP Angle-Torque Characteristics

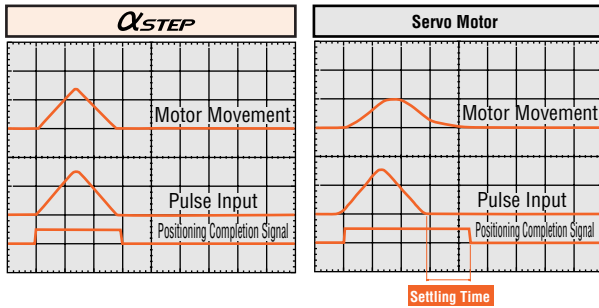


- If the positioning deviation is $\pm 1.8^\circ$ or smaller, the motor runs in open loop mode like a stepping motor.
- If the positioning deviation is $\pm 1.8^\circ$ or greater, the motor runs in closed loop mode and the position is corrected by exciting the motor windings to generate maximum torque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

● High Response

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

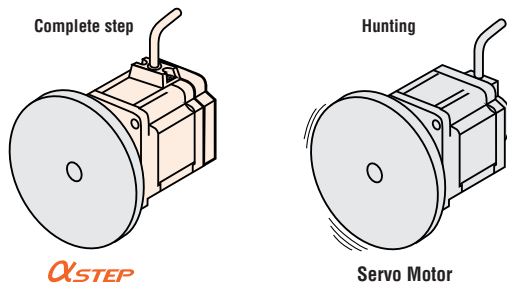
Measurement condition : Feed 1/5 rotation
Load inertia 1.365 oz-in² (250×10^{-7} kg-m²)



- In traditional servo motors, there is a delay between the input pulse signals and the motor movement due to the way positioning is continuously monitored. Therefore, a servo motor needs time to settle to a stop after input signals stop. This is called settling time.

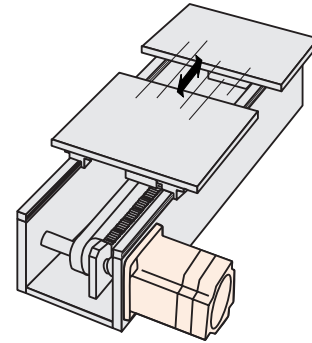
● No Hunting

Since α STEP is a stepping motor, it has no hunting problem such as might be found in a traditional servo motor. Therefore, when it stops, its position is completely stable and does not fluctuate. α STEP is ideal for applications in which vibration would be a problem.



● No Gain Tuning

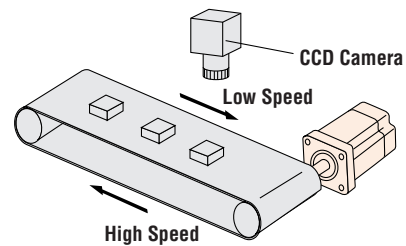
Gain tuning for a servo motor is critical, troublesome and time-consuming. Since the α STEP operates like a stepping motor, there are no gain tuning requirements. Low rigidity applications, such as a belt and pulley system, are ideal for α STEP.



● Low Vibration at Low Speed

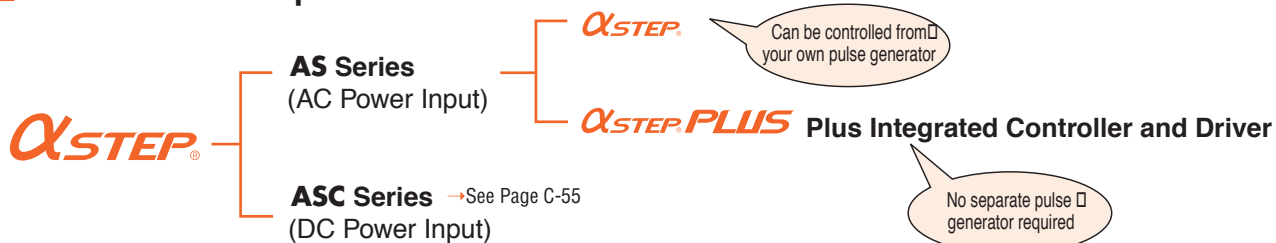
The driver employs advanced technology that produces smoothness comparable to a microstepping driver. Its vibration level is incredibly low, even when operating in the low speed range. When frequent changes from low (high) to high (low) speed operation are required, the use of the Resolution Select Function solves the problem.

α STEP provides resolution as low as 0.036° per step without any damping mechanism or other mechanical device. Even smoother operation is possible with geared models.



α STEP 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.

AS Series Line-Up



Standard

- Basic Model of **alpha STEP** Motor and Driver System



Tapered Hob (TH) Geared

- A wide variety of low gear ratios for high-speed operation
- Gear Ratios 3.6:1, 7.2:1, 10:1, 20:1, 30:1



Planetary (PN) Geared

- High speed (low gear ratios), High positioning precision
- High permissible torque
- Centered output shaft
- Gear Ratios 5:1, 7.2:1, 10:1, 25:1, 36:1, 50:1

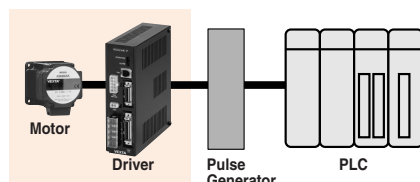


Harmonic (HG) Geared

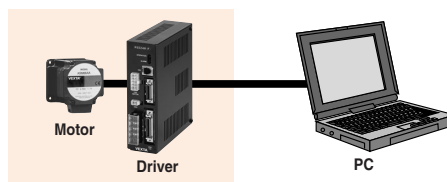
- High positioning precision
- High permissible/maximum torque
- Zero backlash
- High gear ratio, High resolution
- Centered output shaft
- Gear Ratios 50:1, 100:1

Step & Direction Input Type

or **Integrated Controller & Driver**



Motor and driver are controlled with an external pulse generator.



No external pulse generator required.

Product Line

Type	Power Supply Voltage	Maximum Holding Torque		
		□1.65 in. (□42 mm)	□2.36 in. (□60 mm)	□3.35 in. (□85 mm) [Geared: □3.54 in. (□90 mm)]
Standard Type	Single-Phase 100-115 VAC	●	●	●
	Single-Phase 200-230 VAC	—	●	●
	Three-Phase 200-230 VAC	—	●	●
		42 oz-in (0.3 N·m)	170~280 oz-in (1.2~2.0 N·m)	280~560 oz-in (2.0~4.0 N·m)
TH Geared Type	Single-Phase 100-115 VAC	●	●	●
	Single-Phase 200-230 VAC	—	●	●
	Three-Phase 200-230 VAC	—	●	●
		3.0~13.2 lb-in (0.35~1.5 N·m)	11.0~35 lb-in (1.25~4 N·m)	39~106 lb-in (4.5~12 N·m)
PN Geared Type	Single-Phase 100-115 VAC	●	●	●
	Single-Phase 200-230 VAC	—	●	●
	Three-Phase 200-230 VAC	—	●	●
		13.2 lb-in (1.5 N·m)	30~70 lb-in (3.5~8 N·m)	88~320 lb-in (10~37 N·m)
HG Geared Type	Single-Phase 100-115 VAC	●	●	●
	Single-Phase 200-230 VAC	—	●	●
	Three-Phase 200-230 VAC	—	●	●
		30~44 lb-in (3.5~5.0 N·m)	48~70 lb-in (5.5~8.0 N·m)	220~320 lb-in (25~37 N·m)

● Electromagnetic brake models are also available.

● 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 1Hz increments)

● Four Operation Modes

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

● 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

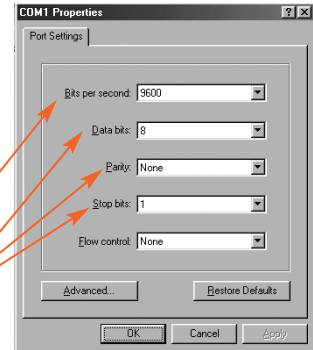
- ASCII based commands
- Conforms to RS-232C communication specifications
- Start-stop asynchronous transmission method
- Transmission speed: 9,600 bps
- Data length: 8 bits, 1 stop bit, no parity
- Protocol: TTY (CR+LF)
- Modular 4-pin connector

● Program Memory

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

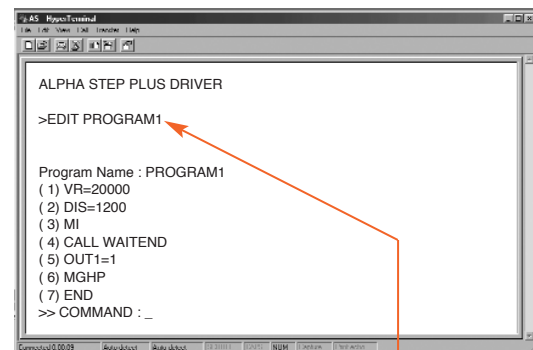
● Built-in Functions

- Selectable motor-resolution
- Run and stop current values
- Speed-filter set value
- Motor rotation direction
- Emergency stop
- Sensor logic
- Over-travel limits
- Software over-travel
- Alarm history
- Syntax checking
- Display values
- Incremental moves
- I/O status



Using Windows HyperTerminal®, programming the αSTEP Plus driver is a simple task.

Example: "PROGRAM1"

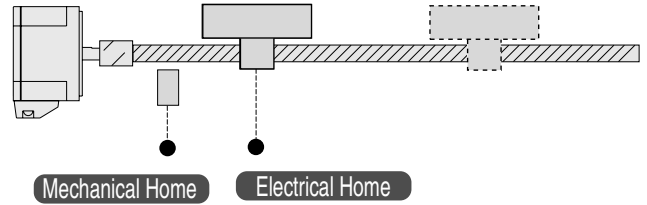
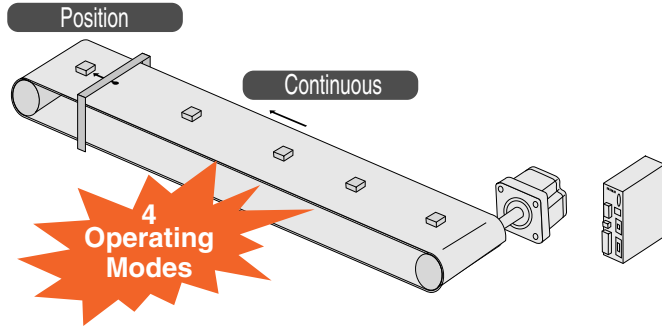


PROGRAM1 Definition

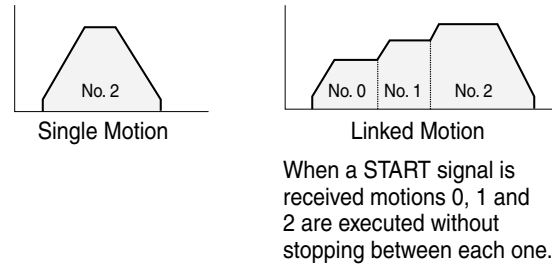
- Operating Speed: 20,000 Hz
- Move Distance: 1,200 pulses
- Call a subroutine that waits for the motor to stop before moving on to the next command
- Turn On Output #1
- Seek the Mechanical Home Position in the Positive Direction
- End of Program

■ α STEP Plus Features

● Operating Modes

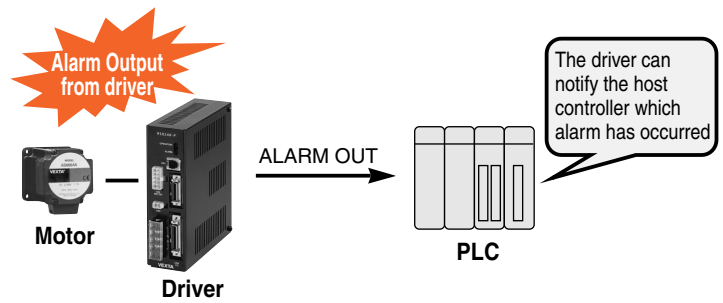


● Linked Motion Capability

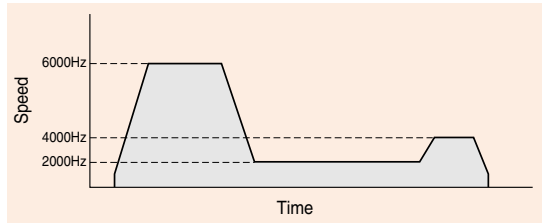


● Alarm Functions

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

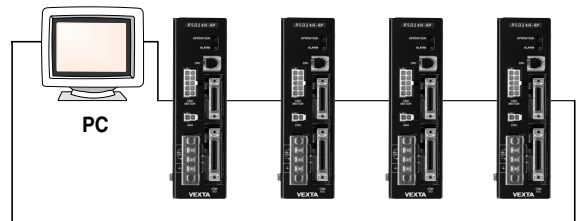


● Speed Change On The Fly



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 customer supplied cable.

■ Safety Standards and CE Marking (Except for AS46 type)

Model	Standards	Certification Body	File No.	CE Marking
Motor	UL1004 UL2111 CSA C22.2 No.100 CSA C22.2 No.77	UL	E64199	Low Voltage Directives EMC Directives
	EN60950 EN60034-1 EN60034-5	Conform to EN Standards		
Driver	UL508C *1 CSA C22.2 No.14	UL	E171462	
	EN60950 *2 EN50178	Conform to EN Standards		

• When the system is approved under various safety standards, the model names in the motor and driver nameplates are the approved model names.

List of Motor and Driver Combinations → Page C-53

• **Details of Safety Standards** → Page G-2

• The EMC value changes according to the wiring and layout. Therefore, the final EMC level must be checked with the motor/driver incorporated in the user's equipment.

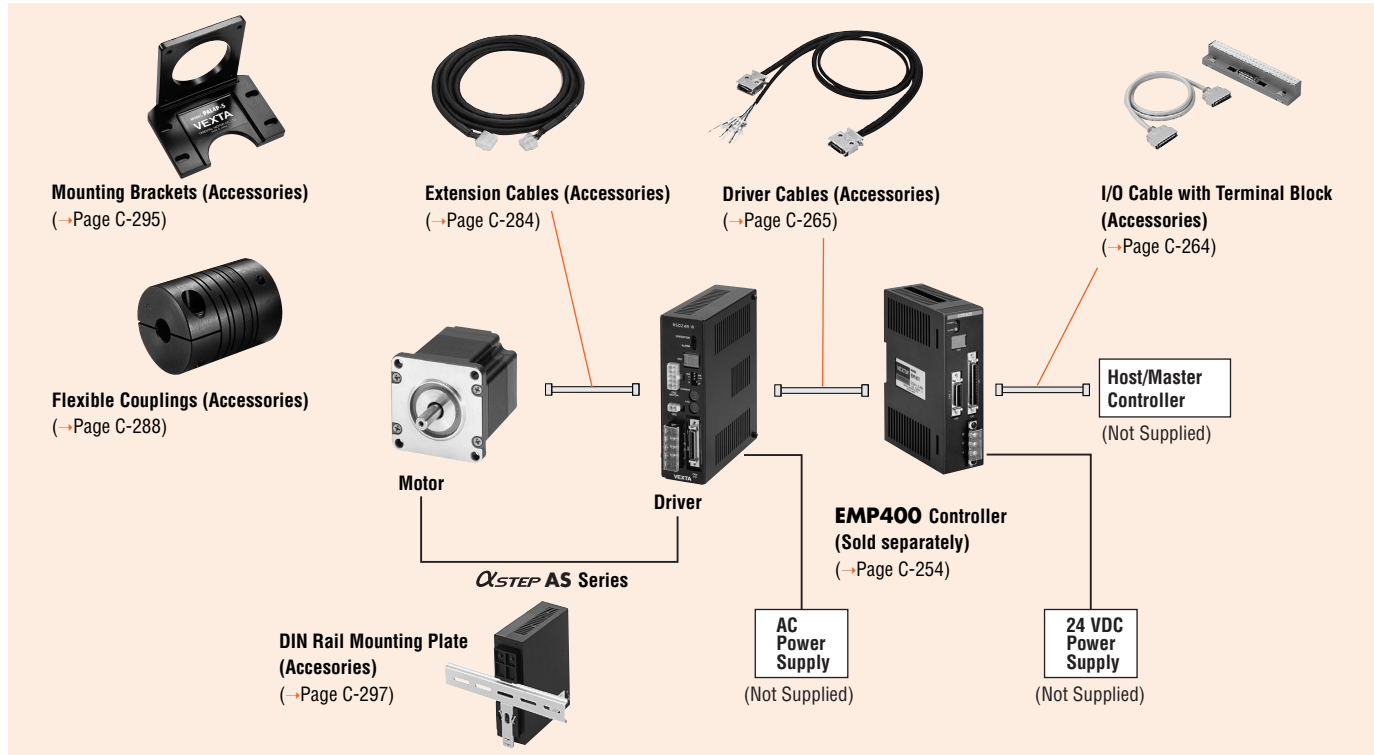
*1 Maximum Ambient Temperature for UL

AS: 122°F (+50°C), **AS PLUS:** 104°F (+40°C)

*2 EN60950 (Certified **AS** only)

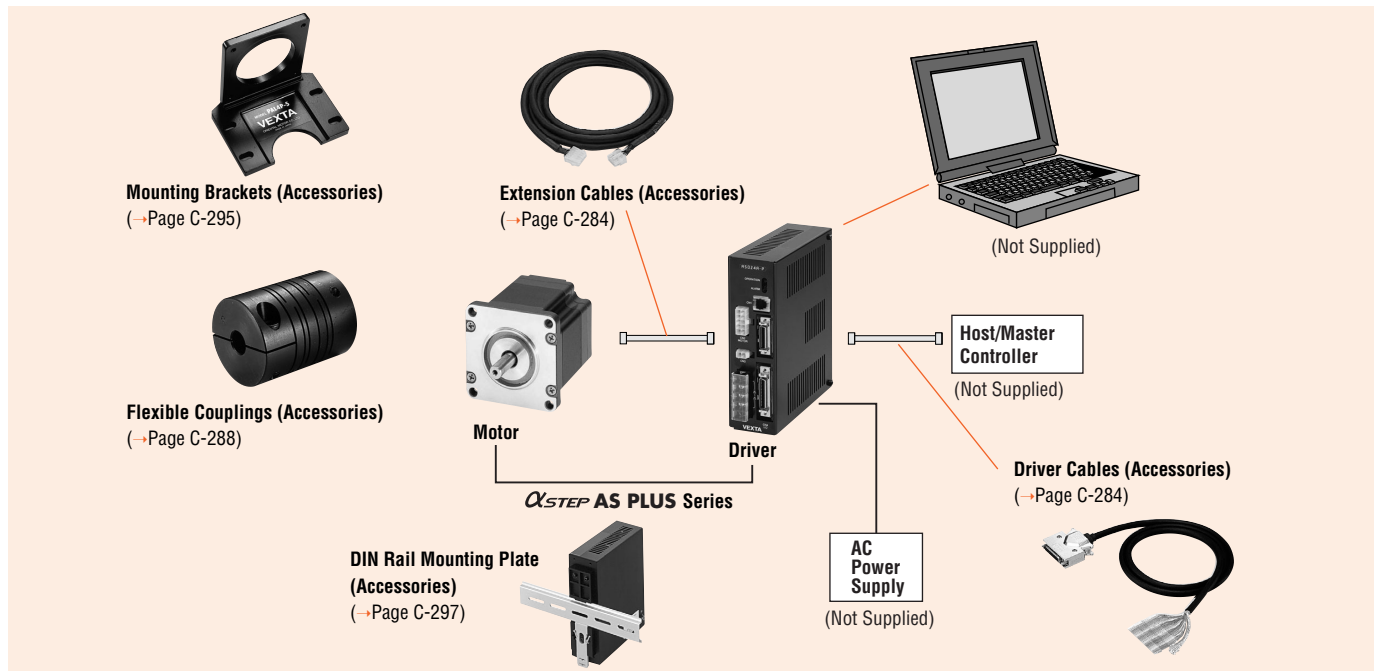
System Configuration

AS Series



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

AS PLUS



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

Extension Cables (For AS Series and AS PLUS Series)

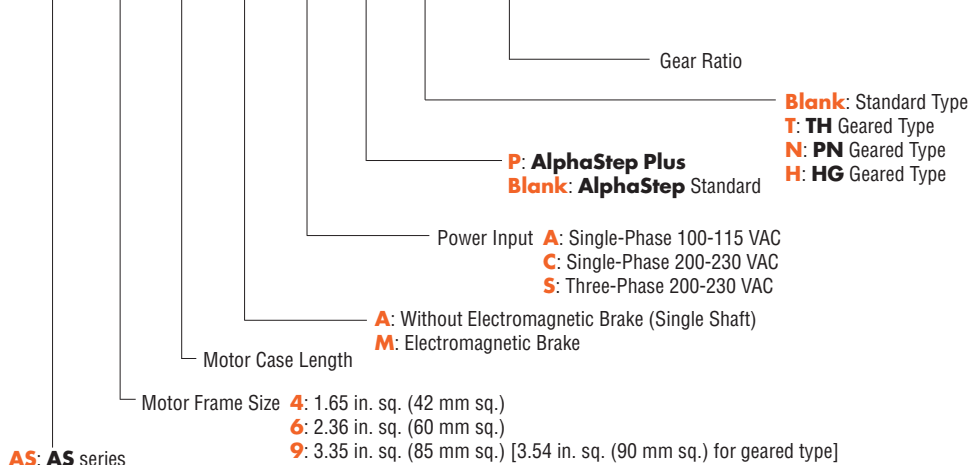
Extension cables are not included with **αSTEP** products. When using the **αSTEP** stepping motor and driver more than 1.31 feet (0.4 m) apart from each other, use an optional extension cable (sold separately).

Note:

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

Product Number Code

AS 6 6 A A P-T 3.6



AS Product Lines

AS Series

Standard Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.35 in. (□85 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.35 in. (□85 mm) Model
Single-Phase 100-115 VAC	AS46AA	AS66AA	AS98AA	AS46MA	AS66MA	AS98MA
	—	AS69AA	AS911AA	—	AS69MA	—
Single-Phase 200-230 VAC	—	AS66AC	AS98AC	—	AS66MC	AS98MC
	—	AS69AC	AS911AC	—	AS69MC	—
Three-Phase 200-230 VAC	—	AS66AS	AS98AS	—	AS66MS	AS98MS
	—	AS69AS	AS911AS	—	AS69MS	—

TH Geared Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model
Single-Phase 100-115 VAC	AS46AA-T3.6	AS66AA-T3.6	AS98AA-T3.6	AS46MA-T3.6	AS66MA-T3.6	AS98MA-T3.6
	AS46AA-T7.2	AS66AA-T7.2	AS98AA-T7.2	AS46MA-T7.2	AS66MA-T7.2	AS98MA-T7.2
	AS46AA-T10	AS66AA-T10	AS98AA-T10	AS46MA-T10	AS66MA-T10	AS98MA-T10
	AS46AA-T20	AS66AA-T20	AS98AA-T20	AS46MA-T20	AS66MA-T20	AS98MA-T20
	AS46AA-T30	AS66AA-T30	AS98AA-T30	AS46MA-T30	AS66MA-T30	AS98MA-T30
Single-Phase 200-230 VAC	—	AS66AC-T3.6	AS98AC-T3.6	—	AS66MC-T3.6	AS98MC-T3.6
	—	AS66AC-T7.2	AS98AC-T7.2	—	AS66MC-T7.2	AS98MC-T7.2
	—	AS66AC-T10	AS98AC-T10	—	AS66MC-T10	AS98MC-T10
	—	AS66AC-T20	AS98AC-T20	—	AS66MC-T20	AS98MC-T20
	—	AS66AC-T30	AS98AC-T30	—	AS66MC-T30	AS98MC-T30
Three-Phase 200-230 VAC	—	AS66AS-T3.6	AS98AS-T3.6	—	AS66MS-T3.6	AS98MS-T3.6
	—	AS66AS-T7.2	AS98AS-T7.2	—	AS66MS-T7.2	AS98MS-T7.2
	—	AS66AS-T10	AS98AS-T10	—	AS66MS-T10	AS98MS-T10
	—	AS66AS-T20	AS98AS-T20	—	AS66MS-T20	AS98MS-T20
	—	AS66AS-T30	AS98AS-T30	—	AS66MS-T30	AS98MS-T30

◆ PN Geared Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model
Single-Phase 100-115 VAC	—	AS66AA-N5	AS98AA-N5	—	AS66MA-N5	AS98MA-N5
	AS46AA-N7.2	AS66AA-N7.2	AS98AA-N7.2	AS46MA-N7.2	AS66MA-N7.2	AS98MA-N7.2
	AS46AA-N10	AS66AA-N10	AS98AA-N10	AS46MA-N10	AS66MA-N10	AS98MA-N10
	—	AS66AA-N25	AS98AA-N25	—	AS66MA-N25	AS98MA-N25
	—	AS66AA-N36	AS98AA-N36	—	AS66MA-N36	AS98MA-N36
Single-Phase 200-230 VAC	—	AS66AA-N50	AS98AA-N50	—	AS66MA-N50	AS98MA-N50
	—	AS66AC-N5	AS98AC-N5	—	AS66MC-N5	AS98MC-N5
	—	AS66AC-N7.2	AS98AC-N7.2	—	AS66MC-N7.2	AS98MC-N7.2
	—	AS66AC-N10	AS98AC-N10	—	AS66MC-N10	AS98MC-N10
	—	AS66AC-N25	AS98AC-N25	—	AS66MC-N25	AS98MC-N25
Three-Phase 200-230 VAC	—	AS66AC-N36	AS98AC-N36	—	AS66MC-N36	AS98MC-N36
	—	AS66AC-N50	AS98AC-N50	—	AS66MC-N50	AS98MC-N50
	—	AS66AS-N5	AS98AS-N5	—	AS66MS-N5	AS98MS-N5
	—	AS66AS-N7.2	AS98AS-N7.2	—	AS66MS-N7.2	AS98MS-N7.2
	—	AS66AS-N10	AS98AS-N10	—	AS66MS-N10	AS98MS-N10
—	AS66AS-N25	AS98AS-N25	—	AS66MS-N25	AS98MS-N25	
—	AS66AS-N36	AS98AS-N36	—	AS66MS-N36	AS98MS-N36	
—	AS66AS-N50	AS98AS-N50	—	AS66MS-N50	AS98MS-N50	

◆ HG Geared Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model
Single-Phase 100-115 VAC	AS46AA2-H50	AS66AA2-H50	AS98AA-H50	AS46MA2-H50	AS66MA2-H50	AS98MA-H50
	AS46AA2-H100	AS66AA2-H100	AS98AA-H100	AS46MA2-H100	AS66MA2-H100	AS98MA-H100
Single-Phase 200-230 VAC	—	AS66AC2-H50	AS98AC-H50	—	AS66MC2-H50	AS98MC-H50
	—	AS66AC2-H100	AS98AC-H100	—	AS66MC2-H100	AS98MC-H100
Three-Phase 200-230 VAC	—	AS66AS2-H50	AS98AS-H50	—	AS66MS2-H50	AS98MS-H50
	—	AS66AS2-H100	AS98AS-H100	—	AS66MS2-H100	AS98MS-H100

● AS Series α STEP PLUS

◆ Standard Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.35 in. (□85 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.35 in. (□85 mm) Model
Single-Phase 100-115 VAC	AS46AAP	AS66AAP	AS98AAP	AS46MAP	AS66MAP	AS98MAP
	—	AS69AAP	AS91AAP	—	AS69MAP	—
Single-Phase 200-230 VAC	—	AS66ACP	AS98ACP	—	AS66MCP	AS98MCP
	—	AS69ACP	AS91ACP	—	AS69MCP	—
Three-Phase 200-230 VAC	—	AS66ASP	AS98ASP	—	AS66MSP	AS98MSP
	—	AS69ASP	AS91ASP	—	AS69MSP	—

Introduction

AS

AS PLUS

ASC

RK

CFK II

CSK

PMC

UMK

CSK

PK/PV

PK

U12120G

EMP401

EMP402

SC8800

SC8800E

SG8030J

SMK

Accessories

Before Using a Stepping Motor

Low-Speed Synchronous Motors

Controllers

Driver with Indexer

2-Phase Stepping Motors without Encoder

2-Phase Full/Half AC Input DC Input

5-Phase Microstep

5-Phase Full/Half DC Input

Motor & Driver Packages

◆ TH Geared Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model
Single-Phase 100-115 VAC	AS46AAP-T3.6	AS66AAP-T3.6	AS98AAP-T3.6	AS46MAP-T3.6	AS66MAP-T3.6	AS98MAP-T3.6
	AS46AAP-T7.2	AS66AAP-T7.2	AS98AAP-T7.2	AS46MAP-T7.2	AS66MAP-T7.2	AS98MAP-T7.2
	AS46AAP-T10	AS66AAP-T10	AS98AAP-T10	AS46MAP-T10	AS66MAP-T10	AS98MAP-T10
	AS46AAP-T20	AS66AAP-T20	AS98AAP-T20	AS46MAP-T20	AS66MAP-T20	AS98MAP-T20
	AS46AAP-T30	AS66AAP-T30	AS98AAP-T30	AS46MAP-T30	AS66MAP-T30	AS98MAP-T30
Single-Phase 200-230 VAC	—	AS66ACP-T3.6	AS98ACP-T3.6	—	AS66MCP-T3.6	AS98MCP-T3.6
	—	AS66ACP-T7.2	AS98ACP-T7.2	—	AS66MCP-T7.2	AS98MCP-T7.2
	—	AS66ACP-T10	AS98ACP-T10	—	AS66MCP-T10	AS98MCP-T10
	—	AS66ACP-T20	AS98ACP-T20	—	AS66MCP-T20	AS98MCP-T20
	—	AS66ACP-T30	AS98ACP-T30	—	AS66MCP-T30	AS98MCP-T30
Three-Phase 200-230 VAC	—	AS66ASP-T3.6	AS98ASP-T3.6	—	AS66MSP-T3.6	AS98MSP-T3.6
	—	AS66ASP-T7.2	AS98ASP-T7.2	—	AS66MSP-T7.2	AS98MSP-T7.2
	—	AS66ASP-T10	AS98ASP-T10	—	AS66MSP-T10	AS98MSP-T10
	—	AS66ASP-T20	AS98ASP-T20	—	AS66MSP-T20	AS98MSP-T20
	—	AS66ASP-T30	AS98ASP-T30	—	AS66MSP-T30	AS98MSP-T30

◆ PN Geared Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model
Single-Phase 100-115 VAC	—	AS66AAP-N5	AS98AAP-N5	—	AS66MAP-N5	AS98MAP-N5
	AS46AAP-N7.2	AS66AAP-N7.2	AS98AAP-N7.2	AS46MAP-N7.2	AS66MAP-N7.2	AS98MAP-N7.2
	AS46AAP-N10	AS66AAP-N10	AS98AAP-N10	AS46MAP-N10	AS66MAP-N10	AS98MAP-N10
	—	AS66AAP-N25	AS98AAP-N25	—	AS66MAP-N25	AS98MAP-N25
	—	AS66AAP-N36	AS98AAP-N36	—	AS66MAP-N36	AS98MAP-N36
	—	AS66AAP-N50	AS98AAP-N50	—	AS66MAP-N50	AS98MAP-N50
Single-Phase 200-230 VAC	—	AS66ACP-N5	AS98ACP-N5	—	AS66MCP-N5	AS98MCP-N5
	—	AS66ACP-N7.2	AS98ACP-N7.2	—	AS66MCP-N7.2	AS98MCP-N7.2
	—	AS66ACP-N10	AS98ACP-N10	—	AS66MCP-N10	AS98MCP-N10
	—	AS66ACP-N25	AS98ACP-N25	—	AS66MCP-N25	AS98MCP-N25
	—	AS66ACP-N36	AS98ACP-N36	—	AS66MCP-N36	AS98MCP-N36
	—	AS66ACP-N50	AS98ACP-N50	—	AS66MCP-N50	AS98MCP-N50
Three-Phase 200-230 VAC	—	AS66ASP-N5	AS98ASP-N5	—	AS66MSP-N5	AS98MSP-N5
	—	AS66ASP-N7.2	AS98ASP-N7.2	—	AS66MSP-N7.2	AS98MSP-N7.2
	—	AS66ASP-N10	AS98ASP-N10	—	AS66MSP-N10	AS98MSP-N10
	—	AS66ASP-N25	AS98ASP-N25	—	AS66MSP-N25	AS98MSP-N25
	—	AS66ASP-N36	AS98ASP-N36	—	AS66MSP-N36	AS98MSP-N36
	—	AS66ASP-N50	AS98ASP-N50	—	AS66MSP-N50	AS98MSP-N50

◆ HG Geared Type

Power Source	Without Electromagnetic Brake			Electromagnetic Brake		
	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model	Motor Frame Size: □1.65 in. (□42 mm) Model	Motor Frame Size: □2.36 in. (□60 mm) Model	Motor Frame Size: □3.54 in. (□90 mm) Model
Single-Phase 100-115 VAC	AS46AAP2-H50	AS66AAP2-H50	AS98AAP-H50	AS46MAP2-H50	AS66MAP2-H50	AS98MAP-H50
	AS46AAP2-H100	AS66AAP2-H100	AS98AAP-H100	AS46MAP2-H100	AS66MAP2-H100	AS98MAP-H100
Single-Phase 200-230 VAC	—	AS66ACP2-H50	AS98ACP-H50	—	AS66MCP2-H50	AS98MCP-H50
	—	AS66ACP2-H100	AS98ACP-H100	—	AS66MCP2-H100	AS98MCP-H100
Three-Phase 200-230 VAC	—	AS66ASP2-H50	AS98ASP-H50	—	AS66MSP2-H50	AS98MSP-H50
	—	AS66ASP2-H100	AS98ASP-H100	—	AS66MSP2-H100	AS98MSP-H100

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

Specifications

UL US CE (Except for AS46 type)

Model*1	AS	W/O Electromagnetic Brake	AS46AA	AS66A□	AS69A□	AS98A□	AS911A□
		Electromagnetic Brake	AS46MA	AS66M□	AS69M□	AS98M□	—
	AS PLUS	W/O Electromagnetic Brake	AS46AAP	AS66A□P	AS69A□P	AS98A□P	AS911A□P
		Electromagnetic Brake	AS46MAP	AS66M□P	AS69M□P	AS98M□P	—
Maximum Holding Torque	oz-in (N·m)		42 (0.3)	170 (1.2)	280 (2.0)	280 (2.0)	560 (4.0)
Rotor Inertia*2 J	oz-in ² (kg·m ²)		0.37 (68×10 ⁻⁷) [0.45 (83×10 ⁻⁷)]	2.2 (405×10 ⁻⁷) [3.1 (564×10 ⁻⁷)]	4.4 (802×10 ⁻⁷) [5.3 (961×10 ⁻⁷)]	7.7 (1400×10 ⁻⁷) [8.5 (1560×10 ⁻⁷)]	14.8 (2710×10 ⁻⁷)
Resolution*4			0.36°/Pulse (Resolution Setting: 1000 P/R)				
Power Source	Voltage-Frequency		□=A for Single-Phase 100-115 VAC -15%~+10% · 50/60 Hz □=C for Single-Phase 200-230 VAC -15%~+10% · 50/60 Hz □=S for Three-Phase 200-230 VAC -15%~+10% · 50/60 Hz				
Maximum Input Current	Single-Phase 100-115 VAC		3.3 A	5.0 A	6.4 A	6.0 A	6.5 A
	Single-Phase 200-230 VAC		—	3.0 A	3.9 A	3.5 A	4.5 A
	Three-Phase 200-230 VAC		—	1.5 A	2.2 A	1.9 A	2.4 A
Electromagnetic Brake*3	Type		Active when power is off				—
	Power Supply Input		24 VDC ±5%				—
	Power Consumption		2 W	6 W		—	
	Excitation Current		0.08 A	0.25 A		—	
Weight*2	Static Friction Torque oz-in (N·m)		21 (0.15)	85 (0.6)	142 (1.0)	142 (1.0)	—
	Motor lb. (kg)		1.1 (0.5) [1.3 (0.6)]	1.9 (0.85) [2.4 (1.1)]	3.1 (1.4) [3.6 (1.65)]	4.0 (1.8) [4.8 (2.2)]	6.6 (3.0)
	Driver lb. (kg)		1.8 (0.8)				
Dimension No.	Motor		1	2		3	
	Driver		AS=13 AS PLUS=14				

*1 The square box in the model number will contain one of the following letters to indicate the power supply voltage: **A** (Single-Phase 100-115 VAC), **C** (Single-Phase 200-230 VAC) or **S** (Three-Phase 200-230 VAC).

*2 The values inside the brackets [] represents the specification for electromagnetic brake type.

*3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking.

Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.

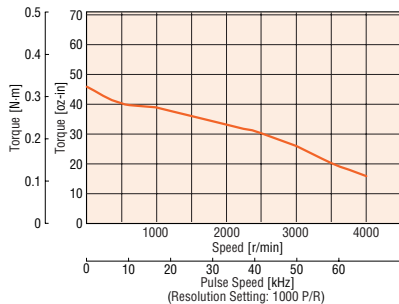
*4 **AS** series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.

AS PLUS: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

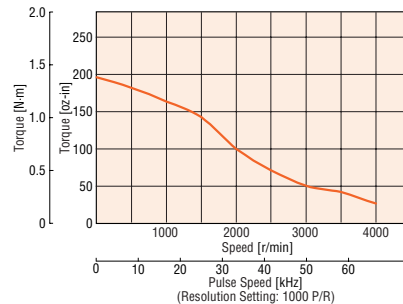
How to Read Specifications Table → Page C-9

Speed — Torque Characteristics How to Read Speed-Torque Characteristics → Page C-10

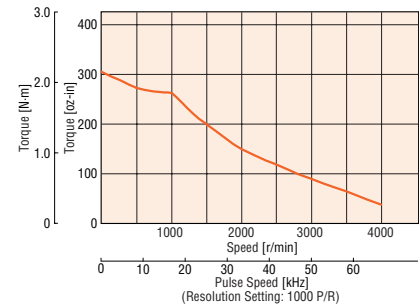
AS46□A, AS46□AP



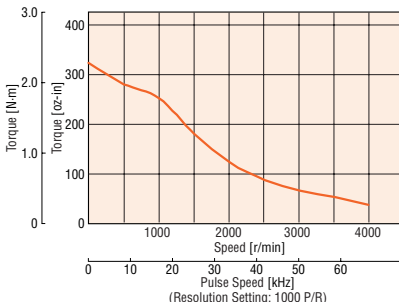
AS66□□, AS66□□P



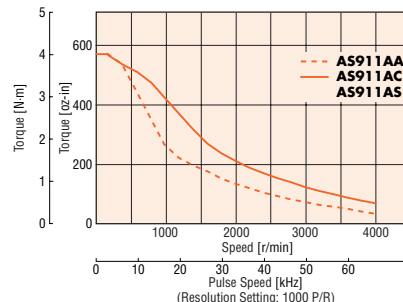
AS69□□, AS69□□P



AS98□□, AS98□□P



AS911A□, AS911A□P



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 212°F (100°C). [Under 176°F (75°C) is required to comply with UL or CSA standards.]
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

TH Geared Type

Motor Frame Size: 1.65 in. (42 mm)

Specifications

Model	AS		AS46AA-T3.6	AS46AA-T7.2	AS46AA-T10	AS46AA-T20	AS46AA-T30
	AS PLUS		AS46MA-T3.6	AS46MA-T7.2	AS46MA-T10	AS46MA-T20	AS46MA-T30
		W/O Electromagnetic Brake	AS46AAP-T3.6	AS46AAP-T7.2	AS46AAP-T10	AS46AAP-T20	AS46AAP-T30
		Electromagnetic Brake	AS46MAP-T3.6	AS46MAP-T7.2	AS46MAP-T10	AS46MAP-T20	AS46MAP-T30
Maximum Holding Torque	lb-in (N·m)		3 (0.35)	6.1 (0.7)	8.8 (1)	13.2 (1.5)	13.2 (1.5)
Rotor Inertia*2 J	oz-in ² (kg·m ²)		0.37 (68×10 ⁻⁷) [0.45 (83×10 ⁻⁷)]				
Backlash	arc min (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*4	1000 P/R		0.1°/pulse	0.05°/pulse	0.036°/pulse	0.018°/pulse	0.012°/pulse
Permissible Torque	lb-in (N·m)		3 (0.35)	6.1 (0.7)	8.8 (1)	13.2 (1.5)	13.2 (1.5)
Power Source	Voltage-Frequency-Maximum Input Current		Single-Phase 100-115 VAC -15%~+10% · 50/60 Hz-3.3 A				
Electromagnetic Brake*3	Type		Active when power is off				
	Power Supply Input		24 VDC±5%				
	Power Consumption		2 W				
	Excitation Current		0.08 A				
Weight*2	Static Friction Torque lb-in (N·m)		1.5 (0.17)	3 (0.35)	4.4 (0.5)	6.6 (0.75)	6.6 (0.75)
	Motor lb. (kg)		1.4 (0.65) [1.7 (0.75)]				
Dimension No.	Driver lb. (kg)		1.8 (0.8)				
	Motor		4				
	Driver		AS=13 AS PLUS=14				

*2 The values inside the brackets [] represents the specification for electromagnetic brake type.

*3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking.

Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.

*4 AS series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.

AS PLUS: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

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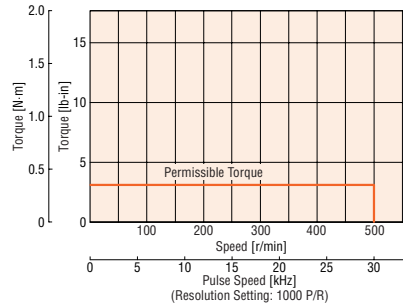
Note:

- Direction of rotation of the motor and that of the gear output shaft are the same for unit type with reduction ratio 3.6:1, 7.2:1 and 10:1. It is opposite for 20:1 and 30:1 ratio type.

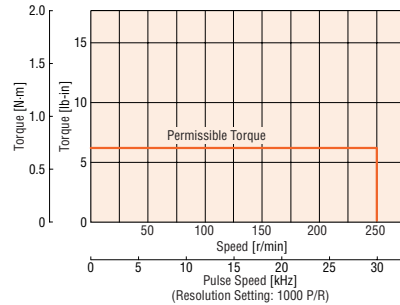
Speed – Torque Characteristics

How to Read Speed-Torque Characteristics → Page C-10

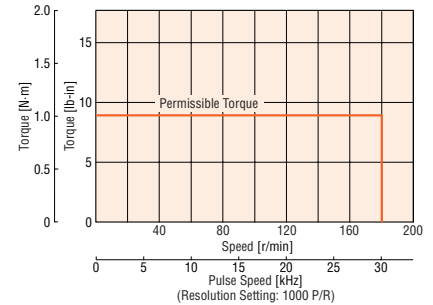
AS46□A-T3.6, AS46□AP-T3.6



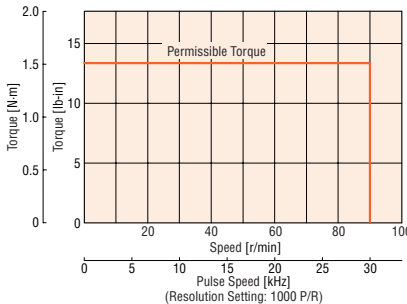
AS46□A-T7.2, AS46□AP-T7.2



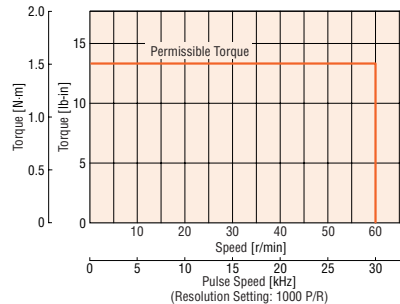
AS46□A-T10, AS46□AP-T10



AS46□A-T20, AS46□AP-T20



AS46□A-T30, AS46□AP-T30



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 212°F (100°C).
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

TH Geared Type

Motor Frame Size: □ 2.36 in. (□ 60 mm)



Specifications

Model*1	AS		AS66A□-T3.6	AS66A□-T7.2	AS66A□-T10	AS66A□-T20	AS66A□-T30
	AS PLUS		AS66M□-T3.6	AS66M□-T7.2	AS66M□-T10	AS66M□-T20	AS66M□-T30
Maximum Holding Torque	lb-in (N·m)		11 (1.25)	22 (2.5)	26 (3)	30 (3.5)	35 (4)
Rotor Inertia*2 J	oz-in ² (kg·m ²)		2.2 (405×10 ⁻⁷) [3.1 (564×10 ⁻⁷)]				
Backlash	arc min (degrees)		35 (0.584°)	15 (0.25°)	15 (0.25°)	10 (0.167°)	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*4	1000 P/R		0.1°/pulse	0.05°/pulse	0.036°/pulse	0.018°/pulse	0.012°/pulse
Permissible Torque	lb-in (N·m)		11 (1.25)	22 (2.5)	26 (3)	30 (3.5)	35 (4)
Power Source	Voltage-Frequency-Maximum Input Current		□=A For Single-Phase 100-115 VAC -15%~+10% · 50/60 Hz·5.0 A □=C For Single-Phase 200-230 VAC -15%~+10% · 50/60 Hz·3.0 A □=S For Three-Phase 200-230 VAC -15%~+10% · 50/60 Hz·1.5 A				
Electromagnetic Brake*3	Type		Active when power is off				
	Power Supply Input		24 VDC±5%				
	Power Consumption		6 W				
	Excitation Current		0.25 A				
	Static Friction Torque lb-in (N·m)		5.4 (0.62)	11 (1.25)	13.2 (1.5)	15.4 (1.75)	17.7 (2.0)
Weight*2	Motor lb. (kg)		2.8 (1.25) [3.3 (1.5)]				
	Driver lb. (kg)		1.8 (0.8)				
Dimension No.	Motor		□				
	Driver		AS=□13 AS PLUS=□14				

*1 The square box in the model number will contain one of the following letters to indicate the power supply voltage: **A** (Single-Phase 100-115 VAC), **C** (Single-Phase 200-230 VAC) or **S** (Three-Phase 200-230 VAC).

*2 The values inside the brackets [] represents the specification for electromagnetic brake type.

*3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking.

Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.

*4 **AS** series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.

AS PLUS: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

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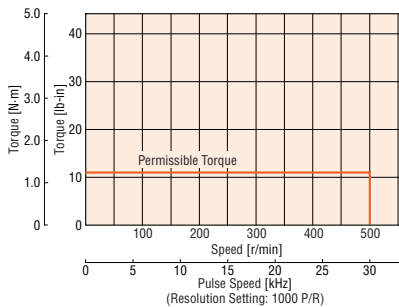
Note:

- Direction of rotation of the motor and that of the gear output shaft are the same for unit type with reduction ratio 3.6:1, 7.2:1 and 10:1. It is opposite for 20:1 and 30:1 ratio type.

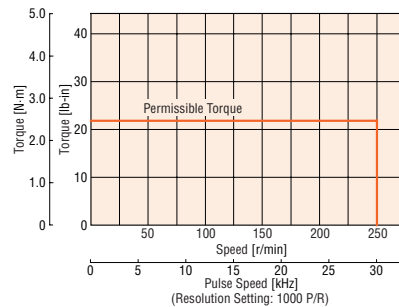
Speed — Torque Characteristics

How to Read Speed-Torque Characteristics → Page C-10

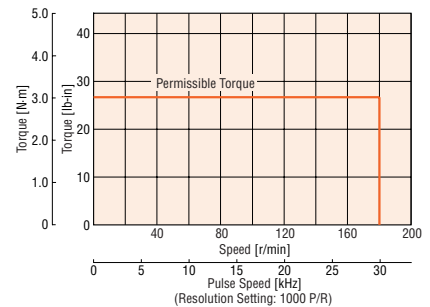
AS66□□-T3.6, AS66□□P-T3.6



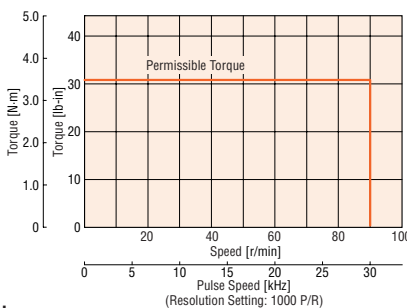
AS66□□-T7.2, AS66□□P-T7.2



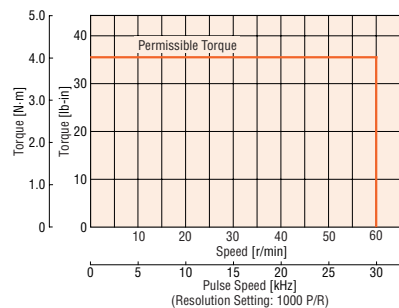
AS66□□-T10, AS66□□P-T10



AS66□□-T20, AS66□□P-T20



AS66□□-T30, AS66□□P-T30



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 212°F (100°C). [Under 176°F (75°C) is required to comply with UL or CSA standards.]
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

TH Geared Type

Motor Frame Size: □ 3.54 in. (□ 90 mm)



Specifications

Model*1	AS		AS98A□-T3.6	AS98A□-T7.2	AS98A□-T10	AS98A□-T20	AS98A□-T30
	Electromagnetic Brake		AS98M□-T3.6	AS98M□-T7.2	AS98M□-T10	AS98M□-T20	AS98M□-T30
Model*1	AS PLUS		AS98A□P-T3.6	AS98A□P-T7.2	AS98A□P-T10	AS98A□P-T20	AS98A□P-T30
	Electromagnetic Brake		AS98M□P-T3.6	AS98M□P-T7.2	AS98M□P-T10	AS98M□P-T20	AS98M□P-T30
Maximum Holding Torque	lb-in (N·m)		39 (4.5)	79 (9)	79 (9)	106 (12)	106 (12)
Rotor Inertia*2 J	oz-in ² (kg·m ²)		7.7 (1400×10 ⁻⁷) [8.5 (1560×10 ⁻⁷)]				
Backlash	arc min (degrees)		25 (0.417°)	15 (0.25°)	15 (0.25°)	10 (0.167°)	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*4	1000 P/R		0.1°/pulse	0.05°/pulse	0.036°/pulse	0.018°/pulse	0.012°/pulse
Permissible Torque	lb-in (N·m)		39 (4.5)	79 (9)	79 (9)	106 (12)	106 (12)
Power Source	Voltage-Frequency-Maximum Input Current		<input type="checkbox"/> =A for Single-Phase 100-115 VAC -15%~+10% · 50/60 Hz-6.0 A <input type="checkbox"/> =C for Single-Phase 200-230 VAC -15%~+10% · 50/60 Hz-3.5 A <input type="checkbox"/> =S for Three-Phase 200-230 VAC -15%~+10% · 50/60 Hz-1.9 A				
Electromagnetic Brake*3	Type		Active when power is off				
	Power Supply Input		24 VDC±5%				
	Power Consumption		6 W				
	Excitation Current		0.25 A				
Static Friction Torque	lb-in (N·m)		19.9 (2.25)	39 (4.5)	39 (4.5)	53 (6)	53 (6)
Weight*2	Motor	lb. (kg)	6.6 (3.0) [7.5 (3.4)]				
	Driver	lb. (kg)	1.8 (0.8)				
Dimension No.	Motor		□6				
	Driver		AS=□13 AS PLUS=□14				

*1 The square box in the model number will contain one of the following letters to indicate the power supply voltage: **A** (Single-Phase 100-115 VAC), **C** (Single-Phase 200-230 VAC) or **S** (Three-Phase 200-230 VAC).

*2 The values inside the brackets [] represents the specification for electromagnetic brake type.

*3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking.

Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.

*4 **AS** series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.

AS PLUS: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

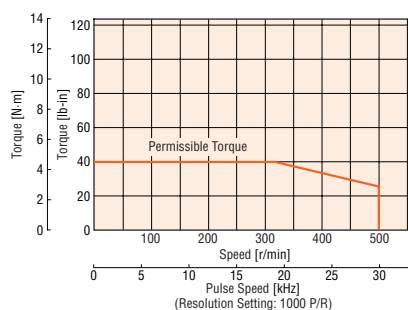
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Note:

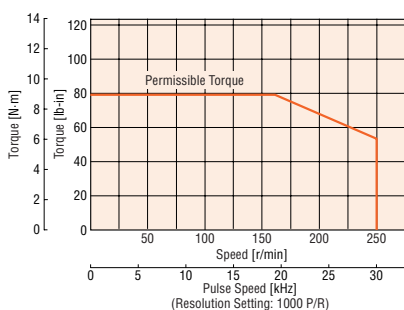
- Direction of rotation of the motor and that of the gear output shaft are the same for unit type with reduction ratio 3.6:1, 7.2:1 and 10:1. It is opposite for 20:1 and 30:1 ratio type.

Speed — Torque Characteristics **How to Read Speed-Torque Characteristics**→Page C-10

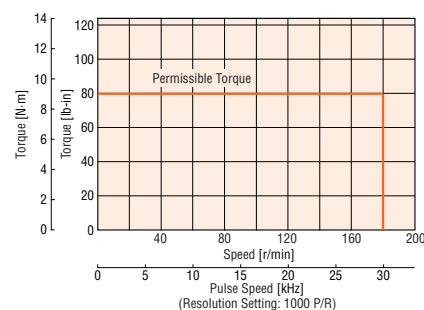
AS98□□-T3.6, AS98□□P-T3.6



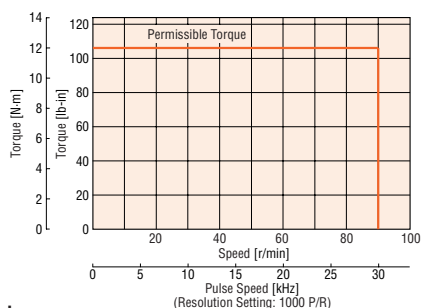
AS98□□-T7.2, AS98□□P-T7.2



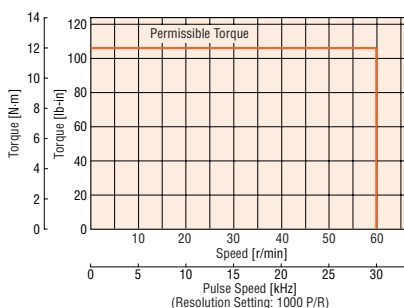
AS98□□-T10, AS98□□P-T10



AS98□□-T20, AS98□□P-T20



AS98□□-T30, AS98□□P-T30



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 212°F (100°C). [Under 176°F (75°C) is required to comply with UL or CSA standards.]
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

PN Geared Type

Motor Frame Size: 1.65 in. (42 mm)

Specifications

Model	AS	AS PLUS	AS46AA-N7.2	AS46AA-N10
	W/O Electromagnetic Brake	W/O Electromagnetic Brake	AS46MA-N7.2	AS46MA-N10
	Electromagnetic Brake	Electromagnetic Brake	AS46AAP-N7.2	AS46AAP-N10
			AS46MAP-N7.2	AS46MAP-N10
Maximum Holding Torque	lb-in (N·m)		13.2 (1.5)	
Rotor Inertia*2 J	oz-in ² (kg·m ²)		0.37 (68×10 ⁻⁷) [0.45 (83×10 ⁻⁷)]	
Backlash	arc min (degrees)		2 (0.034°)	
Angle Error	arc min (degrees)		6 (0.1°)	
Permissible Speed Range	r/min		0~416	0~300
Gear Ratio			7.2 : 1	10 : 1
Resolution*4	1000 P/R		0.05°/pulse	0.036°/pulse
Permissible Torque	lb-in (N·m)		13.2 (1.5)	
Maximum Torque*5	lb-in (N·m)		17.7 (2)	
Power Source	Voltage-Frequency-Maximum Input Current		Single-Phase 100-115 VAC -15%~+10% · 50/60 Hz·3.3 A	
Electromagnetic Brake*3	Type		Active when power is off	
	Power Supply Input		24 VDC±5%	
	Power Consumption		2 W	
	Excitation Current		0.08 A	
Weight*2	Motor	lb. (kg)	1.6 (0.71) [1.8 (0.81)]	
	Driver	lb. (kg)	1.8 (0.8)	
Dimension No.	Motor		7	
	Driver		AS=13 AS PLUS=14	

*2 The values inside the brackets [] represents the specification for electromagnetic brake type.

*3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking.

Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.

*4 **AS** series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.

AS PLUS: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

*5 The value of Maximum Torque is for gear. For output torque for geared motor, refer to the Speed - Torque characteristics.

How to Read Specifications Table→Page C-9

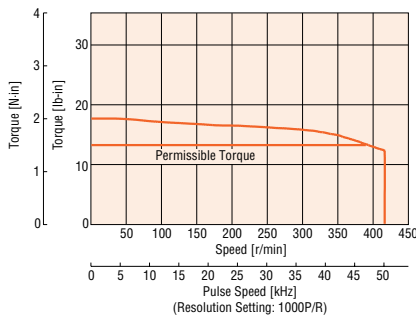
Note:

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

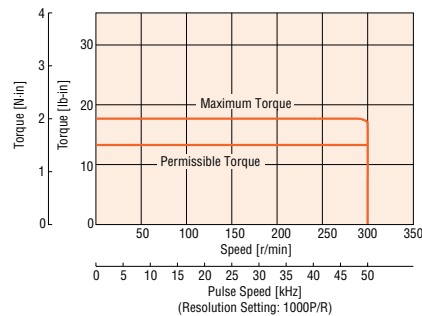
Speed — Torque Characteristics

How to Read Speed-Torque Characteristics→Page C-10

AS46□A-N7.2, AS46□AP-N7.2



AS46□A-N10, AS46□AP-N10



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 212°F (100°C).
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

Introduction

AS

AS PLUS

ASC

RK

CFK II

CSK

PMC

UMK

CSK

PK/PV

PK

PK/PV

PK

PK

U12120G

EMP401

SC8800

SC8800E

SG8030J

SMK

SMK

SMK

Accessories

Before Using a Stepping Motor

Motor & Driver Packages

2-Phase Stepping Motors without Encoder

Driver with Indexer

Controllers

Low-Speed Synchronous Motors

Before Using a Stepping Motor

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



Specifications

Model*1	AS		AS66A□-N5	AS66A□-N7.2	AS66A□-N10	AS66A□-N25	AS66A□-N36	AS66A□-N50
	W/O Electromagnetic Brake		AS66M□-N5	AS66M□-N7.2	AS66M□-N10	AS66M□-N25	AS66M□-N36	AS66M□-N50
AS PLUS	W/O Electromagnetic Brake		AS66A□P-N5	AS66A□P-N7.2	AS66A□P-N10	AS66A□P-N25	AS66A□P-N36	AS66A□P-N50
	Electromagnetic Brake		AS66M□P-N5	AS66M□P-N7.2	AS66M□P-N10	AS66M□P-N25	AS66M□P-N36	AS66M□P-N50
Maximum Holding Torque	lb-in (N·m)		30 (3.5)	35 (4.0)	44 (5.0)	70 (8.0)		
Rotor Inertia*2 J	oz-in ² (kg·m ²)		2.2 (405×10 ⁻⁷) [3.1 (564×10 ⁻⁷)]					
Backlash	arc min (degrees)		2 (0.034°)			3 (0.05°)		
Angle Error	arc min (degrees)		5 (0.084°)					
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*4	1000 P/R		0.072°/pulse	0.05°/pulse	0.036°/pulse	0.0144°/pulse	0.01°/pulse	0.0072°/pulse
Permissible Torque	lb-in (N·m)		30 (3.5)	35 (4.0)	44 (5.0)	70 (8.0)		
Maximum Torque*5	lb-in (N·m)		61 (7)	79 (9)	97 (11)	141 (16)	177 (20)	177 (20)
Power Source	Voltage-Frequency-Maximum Input Current		<input type="checkbox"/> =A for Single-Phase 100-115 VAC -15%~+10% · 50/60 Hz·5.0 A <input type="checkbox"/> =C for Single-Phase 200-230 VAC -15%~+10% · 50/60 Hz·3.0 A <input type="checkbox"/> =S for Three-Phase 200-230 VAC -15%~+10% · 50/60 Hz·1.5 A					
Electromagnetic Brake*3	Type		Active when power is off					
	Power Supply Input		24 VDC±5%					
	Power Consumption		6 W					
	Excitation Current		0.25 A					
Weight*2	Static Friction Torque lb-in (N·m)		15.4 (1.75)	17.7 (2.0)	22 (2.5)	35 (4.0)		
	Motor	lb. (kg)	3.3 (1.5) [3.9 (1.75)]			3.7 (1.7) [4.3 (1.95)]		
Dimension No.	Driver	lb. (kg)	1.8 (0.8)					
	Motor		8					
			AS=13 AS PLUS=14					

*1 The square box in the model number will contain one of the following letters to indicate the power supply voltage: **A** (Single-Phase 100-115 VAC), **C** (Single-Phase 200-230 VAC) or **S** (Three-Phase 200-230 VAC).

*2 The values inside the brackets [] represents the specification for electromagnetic brake type.

*3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking.

Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.

*4 **AS** series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.

AS PLUS: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

*5 The value of Maximum Torque is for gear. For output torque for geared motor, refer to the Speed - Torque characteristics.

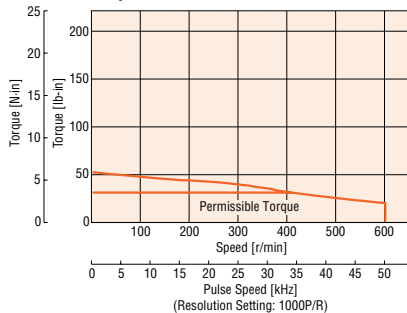
How to Read Specifications Table→Page C-9

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

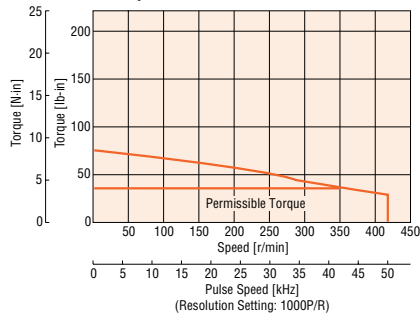
Speed — Torque Characteristics

How to Read Speed-Torque Characteristics→Page C-10

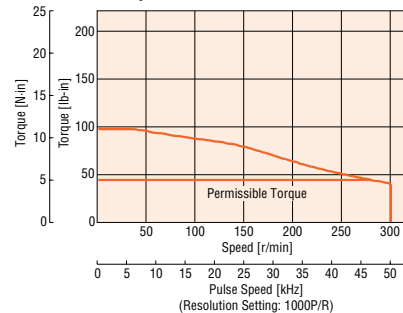
AS66□-N5, AS66□P-N5



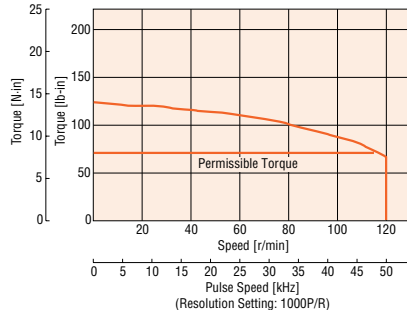
AS66□-N7.2, AS66□P-N7.2



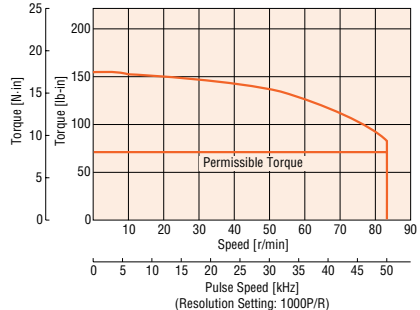
AS66□-N10, AS66□P-N10



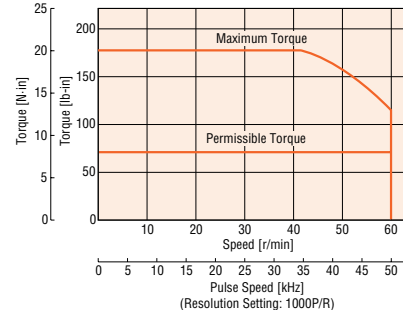
AS66□-N25, AS66□P-N25



AS66□-N36, AS66□P-N36



AS66□-N50, AS66□P-N50



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 212°F (100°C). [Under 176°F (75°C) is required to comply with UL or CSA standards.]
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

PN Geared Type

Motor Frame Size: 3.54 in. (90 mm)



Specifications

Model*1	AS		AS98A□-N5	AS98A□-N7.2	AS98A□-N10	AS98A□-N25	AS98A□-N36	AS98A□-N50
	W/O Electromagnetic Brake		AS98M□-N5	AS98M□-N7.2	AS98M□-N10	AS98M□-N25	AS98M□-N36	AS98M□-N50
AS PLUS	W/O Electromagnetic Brake		AS98A□-P-N5	AS98A□-P-N7.2	AS98A□-P-N10	AS98A□-P-N25	AS98A□-P-N36	AS98A□-P-N50
	Electromagnetic Brake		AS98M□-P-N5	AS98M□-P-N7.2	AS98M□-P-N10	AS98M□-P-N25	AS98M□-P-N36	AS98M□-P-N50
Maximum Holding Torque	lb-in (N·m)		88 (10)	123 (14)	177 (20)	320 (37)		
Rotor Inertia*2 J	oz-in ² (kg·m ²)		7.7 (1400×10 ⁻⁷) [8.5 (1560×10 ⁻⁷)]					
Backlash	arc min (degrees)		2 (0.034°)			3 (0.05°)		
Angle Error	arc min (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*4	1000 P/R		0.072°/pulse	0.05°/pulse	0.036°/pulse	0.0144°/pulse	0.01°/pulse	0.0072°/pulse
Permissible Torque	lb-in (N·m)		88 (10)	123 (14)	177 (20)	320 (37)		
Maximum Torque*5	lb-in (N·m)		240 (28)	300 (35)	300 (35)	490 (56)	530 (60)	530 (60)
Power Source	Voltage-Frequency-Maximum Input Current		<input type="checkbox"/> = A for Single-Phase 100-115 VAC -15%~+10% · 50/60 Hz·6.0 A <input type="checkbox"/> = C for Single-Phase 200-230 VAC -15%~+10% · 50/60 Hz·3.5 A <input type="checkbox"/> = S for Three-Phase 200-230 VAC -15%~+10% · 50/60 Hz·1.9 A					
Electromagnetic Brake*3	Type		Active when power is off					
	Power Supply Input		24 VDC±5%					
	Power Consumption		6 W					
	Excitation Current		0.25 A					
Weight*2	Static Friction Torque	lb-in (N·m)	39 (4.5)	57 (6.45)	79 (9)	163 (18.5)		
	Motor	lb. (kg)	8.8 (4.0) [9.7 (4.4)]			10 (4.7) [11 (5.1)]		
Dimension No.	Driver		AS=13 AS PLUS=14					

*1 The square box in the model number will contain one of the following letters to indicate the power supply voltage: **A** (Single-Phase 100-115 VAC), **C** (Single-Phase 200-230 VAC) or **S** (Three-Phase 200-230 VAC).

*2 The values inside the brackets [] represents the specification for electromagnetic brake type.

*3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking.

Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.

*4 **AS** series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.

AS PLUS: The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

*5 The value of Maximum Torque is for gear. For output torque for geared motor, refer to the Speed - Torque characteristics.

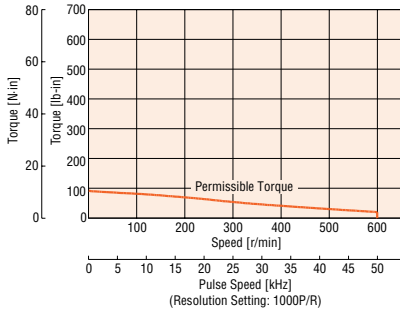
How to Read Specifications Table → Page C-9

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

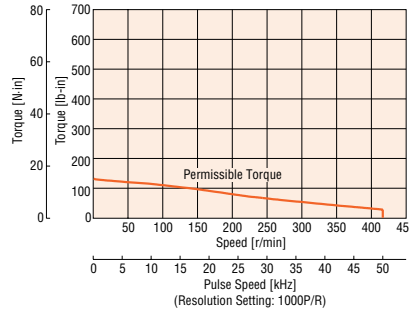
Speed — Torque Characteristics

How to Read Speed-Torque Characteristics → Page C-10

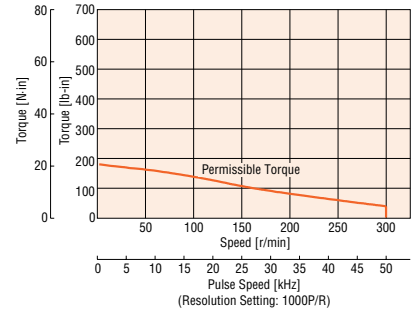
AS98□-N5, AS98□-P-N5



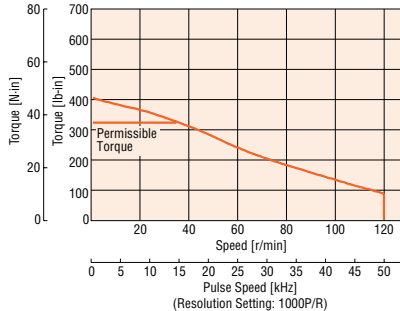
AS98□-N7.2, AS98□-P-N7.2



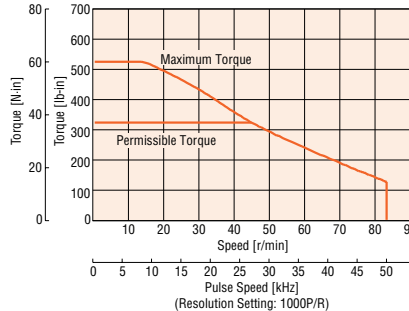
AS98□-N10, AS98□-P-N10



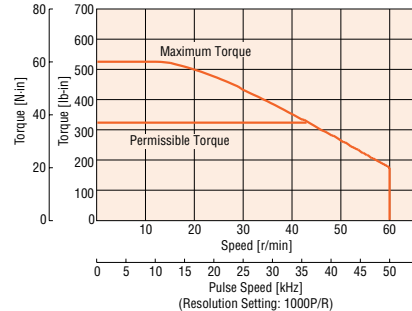
AS98□-N25, AS98□-P-N25



AS98□-N36, AS98□-P-N36



AS98□-N50, AS98□-P-N50



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 212°F (100°C). [Under 176°F (75°C) is required to comply with UL or CSA standards.]
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

HG Geared Type Motor Frame Size: □ 1.65 in. (□ 42 mm), □ 2.36 in. (□ 60 mm), □ 3.54 in. (□ 90 mm)

Specifications

RU **us** **€** (Except for **AS46** type)

Model*1	AS		AS46AA2-H50	AS46AA2-H100	AS66A□2-H50	AS66A□2-H100	AS98A□-H50	AS98A□-H100
	W/O Electromagnetic Brake		AS46MA2-H50	AS46MA2-H100	AS66M□2-H50	AS66M□2-H100	AS98M□-H50	AS98M□-H100
AS PLUS	W/O Electromagnetic Brake		AS46AAP2-H50	AS46AAP2-H100	AS66A□P2-H50	AS66A□P2-H100	AS98A□P-H50	AS98A□P-H100
	Electromagnetic Brake		AS46MAP2-H50	AS46MAP2-H100	AS66M□P2-H50	AS66M□P2-H100	AS98M□P-H50	AS98M□P-H100
Maximum Holding Torque	lb-in (N·m)		30 (3.5)	44 (5.0)	48 (5.5)	70 (8.0)	220 (25)	320 (37)
Rotor Inertia*2 J	oz-in ² (kg·m ²)		0.46 (85×10 ⁻⁷)	[0.55 (100×10 ⁻⁷)]	2.3 (422×10 ⁻⁷)	[3.18 (581×10 ⁻⁷)]	7.8 (1417×10 ⁻⁷)	[8.6 (1577×10 ⁻⁷)]
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*4	1000 P/R		0.0072°/pulse	0.0036°/pulse	0.0072°/pulse	0.0036°/pulse	0.0072°/pulse	0.0036°/pulse
Permissible Torque	lb-in (N·m)		30 (3.5)	44 (5.0)	48 (5.5)	70 (8.0)	220 (25)	320 (37)
Maximum Torque	lb-in (N·m)		73 (8.3)	97 (11)	159 (18)	240 (28)	300 (35)	480 (55)
Lost Motion (Load Torque)	arc min		Max. 1.5 (±0.16 N·m)	Max. 1.5 (±0.2 N·m)	Max. 0.7 (±0.28 N·m)	Max. 0.7 (±0.39 N·m)	Max. 1.5 (±1.2 N·m)	Max. 1.5 (±1.2 N·m)
Power Source	Voltage-Frequency-Maximum Input Current		Single-Phase 100-115 VAC -15%~+10%-50/60 Hz 3.3 A		Single-Phase 100-115 VAC -15%~+10%-50/60 Hz 5 A Single-Phase 200-230 VAC -15%~+10%-50/60 Hz 3 A Three-Phase 200-230 VAC -15%~+10%-50/60 Hz 1.5 A		Single-Phase 100-115 VAC -15%~+10%-50/60 Hz 6 A Single-Phase 200-230 VAC -15%~+10%-50/60 Hz 3.5 A Three-Phase 200-230 VAC -15%~+10%-50/60 Hz 1.9 A	
Electromagnetic Brake*3	Type		Active when power is off					
	Power Supply Input		24 VDC±5%					
	Power Consumption		2 W		6 W		6 W	
	Excitation Current		0.08 A		0.25 A		0.25 A	
	Static Friction Torque	lb-in (N·m)	15.4 (1.75)	22 (2.5)	24 (2.75)	35 (4)	110 (12.5)	163 (18.5)
Weight*2	Motor	lb. (kg)	1.5 (0.7) [1.8 (0.8)]		3.1 (1.4) [3.6 (1.65)]		8.6 (3.9) [9.5 (4.3)]	
	Driver	lb. (kg)	1.8 (0.8)					
Dimension No.	Motor		□10		□11		□12	
	Driver		AS=□13 AS PLUS=□14					

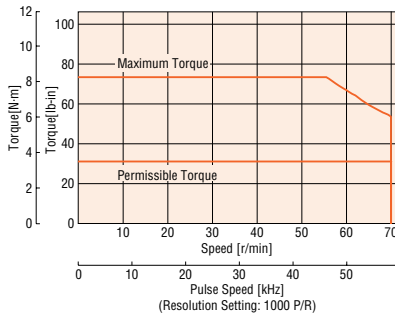
- *1 The square box in the model number will contain one of the following letters to indicate the power supply voltage: **A** (Single-Phase 100-115 VAC), **C** (Single-Phase 200-230 VAC) or **S** (Three-Phase 200-230 VAC).
 - *2 The values inside the brackets [] represents the specification for electromagnetic brake type.
 - *3 The electromagnetic brakes are for holding the position when the power is off. They can not be used for complicated braking. Also, a separate 24 VDC ±5%, 0.3 A min. power supply is required for the electromagnetic brake, along with the accessory electromagnetic brake type extension cable.
 - *4 **AS** series: The resolution can be set to any one of 500 P/R, 1000 P/R, 5000 P/R, 10000 P/R with the resolution select switch or resolution select switching signals. See page C-39 for details.
- AS PLUS:** The resolution can be set from 500 P/R to 10000 P/R by setting parameters.

How to Read Specifications Table → Page C-9
Note:

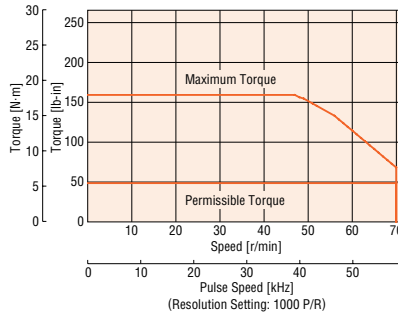
- The inertia represents a sum of the inertia at the harmonic gear converted to a motor shaft value, and the rotor inertia. Direction of rotation of the motor and that of the gear output shaft are the opposite.

Speed – Torque Characteristics How to Read Speed-Torque Characteristics → Page C-10

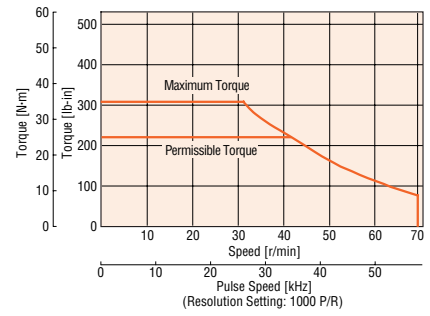
AS46□A2-H50, AS46□AP2-H50



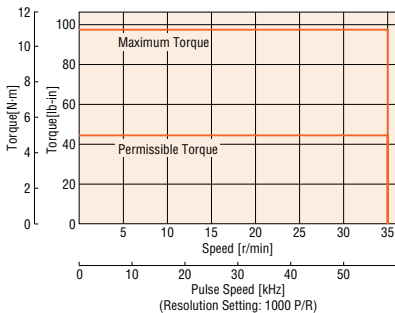
AS66□□2-H50, AS66□□P2-H50



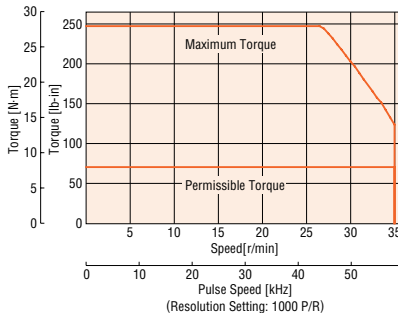
AS98□□-H50, AS98□□P-H50



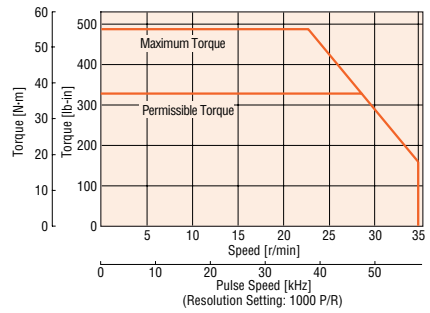
AS46□A2-H100, AS46□AP2-H100



AS66□□2-H100, AS66□□P2-H100



AS98□□-H100, AS98□□P-H100



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. In order to prevent fatigue of the gear grease in the harmonic gear, keep the temperature of the gear case under 158°F (70°C).
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

Common Specifications

AS Series

Speed and Position Control Command	Pulse Train Input
Maximum Input Pulse Frequency	250 kHz
Protective Functions	Overheat, Overload, Overvoltage, Speed Error, Overcurrent, OverSpeed, EEPROM Data Error, Sensor Error, System Error
Input Signals	Photocoupler Input (optically isolated), Equivalent Input Impedance : 220 Ω, Input Current 7~20 mA (Pulse Signal, Rotation Direction Signal, All Windings Off Signal, Alarm Clear Signal, Resolution Select Signal)
Output Signals	Photocoupler, Open-Collector Output, External use condition: 30 VDC maximum, 15 mA Maximum (Positioning Completion Signal, Alarm Signal, Excitation Timing Signal, ASG•BSG Signal) Line Driver Output: Equivalent of 26C31 (Timing Signal, ASG•BSG Signal)

AS PLUS

Positioning Control	Incremental (relative distance) mode/Absolute (absolute positioning) mode. One-shot operation/Linked operation (A maximum of 4 profiles can be linked) Maximum Operating Ranges • Steps: -8388608~8388607 (1 each) • Operating speed: 10 Hz~500,000 Hz (500 kHz) • Acceleration/deceleration rate*: 10~50,000 msec		
Operating Modes	• Indexing (Positioning operation) • Return (Return to electrical home position)	• Scan (Continuous operation) • Home Operation (Return to mechanical home position)	• Linked Profile
Mechanical Home Hunting Function	Home hunting operation is performed from the entire range using mechanical position detection signals (+LS, -LS, HOMELS).		
Other Functions	• Setting function for speed-filter value • Setting function for direction of motor rotation • Software over-travel function	• Current setting function • Emergency stop function • Alarm trace-back function	• Electronic gear function • Over-travel function • Daisy-chain connections
Input Signals	AC Photocoupler input Control inputs: 24 VDC, input resistance 4.7 kΩ (X0~X7, START, E-STOP, HOMELS, +LS, -LS, SENSOR)		
Output Signals	Photocoupler/Open Collector Output	External operating conditions; 30 VDC or below, 4~8 mA (Y0~Y7, ALM)	
Terminal Emulation	Communication Standard: RS-232C conformity Data length: 8 bits, 1 stop bit, No parity Connector specification: Modular (4 wires, 4 pins) Pin arrangement: RS232 Compatible	Transmit system: Asynchronous communication, NRZ (Non Return to Zero), Full duplex Transmit speed: 9600 bps Protocol: TTY (CR+LF)	
User Program	Maximum number of programs: 14 programs (including STARTUP program) Maximum commands per 1 line: 1 command (Single state)	Maximum lines per program: 64 lines Maximum program variables: 26 variables (A~Z)	

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

General Specifications

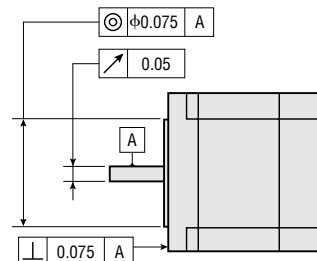
This is the value after rated operation at normal temperature and normal humidity.

		Motor	Driver
Insulation Class		Class B [266°F (130°C)]	—
Insulation Resistance		100 MΩ minimum when measured by a 500 VDC megger between the following places: • Frame-Windings • Frame-Electromagnetic brake windings	100 MΩ minimum when measured by a 500 VDC megger between the following places: • Frame-Power supply input terminal • I/O-Power supply input terminal
Dielectric Strength		Sufficient to withstand the following for one minute: • Frame-Windings 1.5 kV (1.0 kV for AS46) 50 Hz • Frame-Electromagnetic brake windings 1.0 kV 50 Hz	Sufficient to withstand the following for one minute: • Frame-Power supply input terminal 1.5 kV 50 Hz • I/O-Power supply input terminal 2.3 kV (3.0 kV for 200-230 VAC) 50 Hz: AS 1.8 kV 50 Hz: AS PLUS
Operating Environment (In Operation)	Ambient Temperature	0°C~+50°C (32°F~122°F), nonfreezing	AS PLUS : 0°C~+40°C (32°F~104°F) AS : 0°C~+50°C (32°F~122°F), nonfreezing
	Ambient Humidity	85% or less (noncondensing)	
	Atmosphere	No corrosive gases, dust, water or oil.	
Static Angle Error		±5 minutes	—
Shaft Runout		0.002 inch (0.05 mm) T.I.R.*	—
Concentricity		0.003 inch (0.075 mm) T.I.R.*	—
Perpendicularity		0.003 inch (0.075 mm) T.I.R.*	—

* T.I.R.(Total Indicator Reading) : Refers to the total dial gauge reading when the measurement section is rotated 1 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.



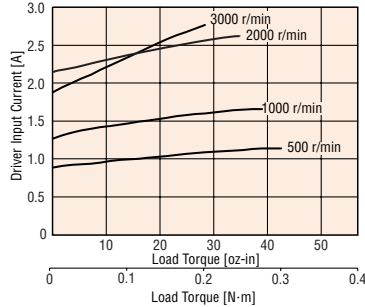
Load Torque — Driver Input Current Characteristics

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 the Geared Type, calculate the power capacity in terms of the speed and the torque at the motor shaft.

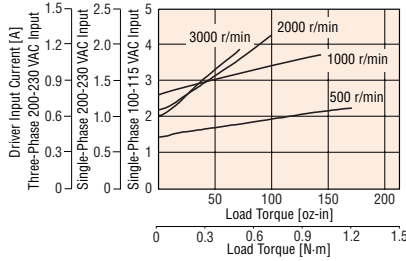
Motor shaft speed = Gear output shaft speed × Gear ratio [r/min]

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

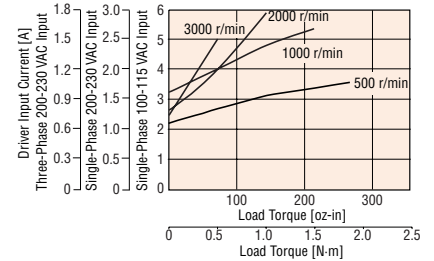
AS46□A, AS46□AP



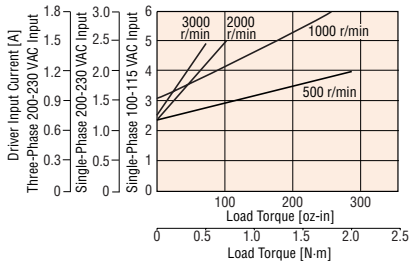
AS66□□, AS66□□P



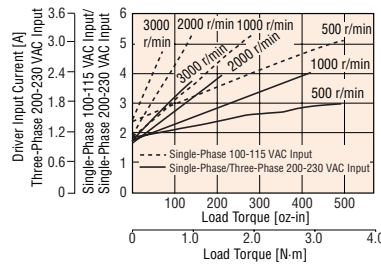
AS69□□, AS69□□P



AS98□□, AS98□□P



AS911A□□, AS911A□□P



Permissible Overhung Load and Permissible Thrust Load

Unit = Upper values: lb./Lower values: N

Model	Overhung Load Distance from Shaft End [inch (mm)]					Thrust Load
	0	0.2 (5)	0.39 (10)	0.59 (15)	0.79 (20)	
AS46 □	4.5 20	5.6 25	7.6 34	11.7 52	—	Keep thrust loads below the weight of the motor used.
AS66 □	14.1	16.8	21	29	42	
AS69 □	63	75	95	130	190	
AS98 □	58	65	76	87	108	
AS911A □	260	290	340	390	480	
AS46 □- T3.6	2.2 10	3.1 14	4.5 20	6.7 30	—	3.3 15
AS46 □- T7.2						
AS46 □- T10						
AS46 □- T20						
AS46 □- T30						
AS66 □- T3.6	15.7 70	18 80	22 100	27 120	33 150	9 40
AS66 □- T7.2						
AS66 □- T10						
AS66 □- T20						
AS66 □- T30						
AS98 □- T3.6	49 220	56 250	67 300	78 350	90 400	
AS98 □- T7.2						
AS98 □- T10						
AS98 □- T20						
AS98 □- T30						
AS46 □- N7.2	22 100	27 120	33 150	42 190	—	22 100
AS46 □- N10						
AS66 □- N5						
AS66 □- N7.2						
AS66 □- N10						
AS66 □- N25	74 330	81 360	90 400	101 450	117 520	
AS66 □- N36						
AS66 □- N50						
AS98 □- N5						
AS98 □- N7.2						
AS98 □- N10	108 480	117 520	123 550	130 580	139 620	
AS98 □- N25						
AS98 □- N36						
AS98 □- N50						
AS46 □- 2-H50						
AS46 □- 2-H100	180	220	270	360	510	240
AS66 □- 2-H50						
AS66 □- 2-H100						
AS98 □- H50						
AS98 □- H100						

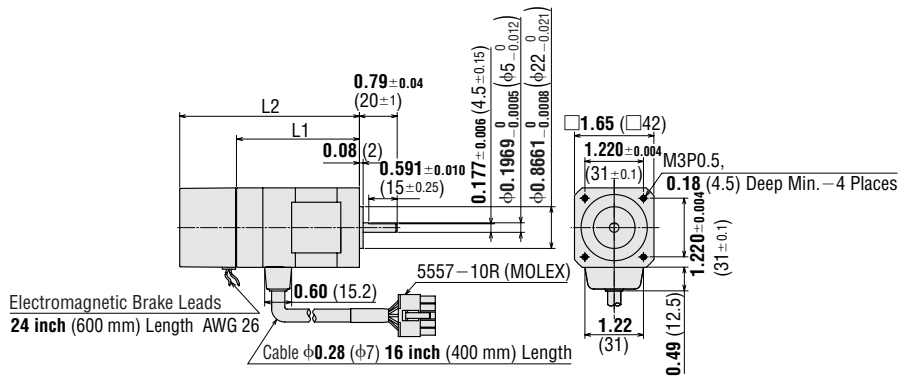
* These values are common to the **AS** Series, the **AS PLUS** Series and all electromagnetic brake models.

■ Dimensions Scale 1/4, Unit = inch (mm)

● Motor

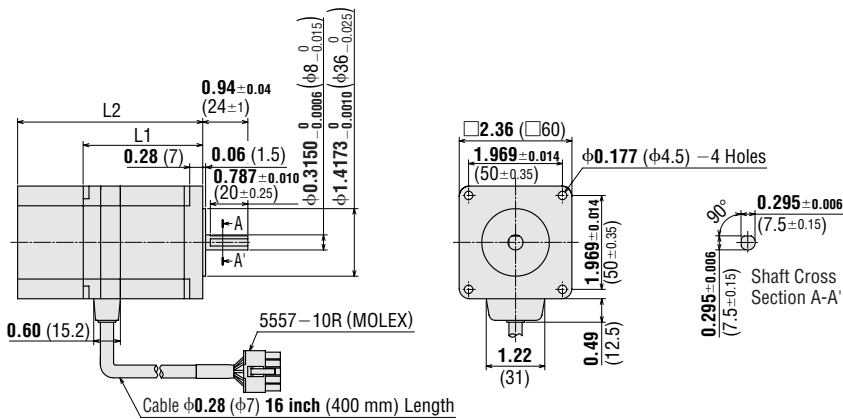
◆ Standard Type

1 Motor Frame Size: □1.65 in. (□42 mm)



Model	Motor Model	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS46AA	ASM46AA	2.56 (64.9)	—	1.1 (0.5)	B192
AS46AAP					
AS46MA	ASM46MA	—	3.74 (94.9)	1.3 (0.6)	B193
AS46MAP					

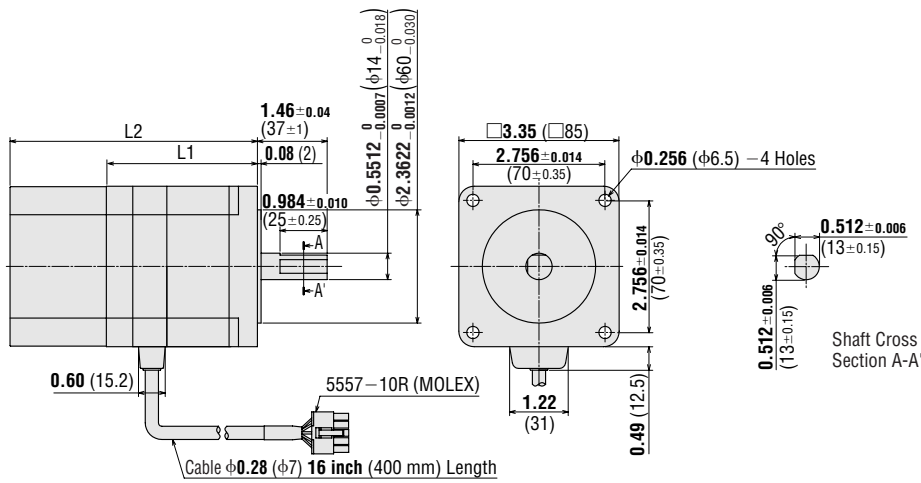
2 Motor Frame Size: □2.36 in. (□60 mm)



Model	Motor Model	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS66A □	ASM66A □	2.50 (63.6)	—	1.9 (0.85)	B194
AS66A □P					
AS66M □	ASM66M □	—	3.88 (98.6)	2.4 (1.1)	B195
AS66M □P					
AS69A □	ASM69A □	3.72 (94.6)	—	3.1 (1.4)	B272
AS69A □P					
AS69M □	ASM69M □	—	5.1 (129.6)	3.6 (1.65)	B273
AS69M □P					

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

3 Motor Frame Size: □3.35 in. (□85 mm)

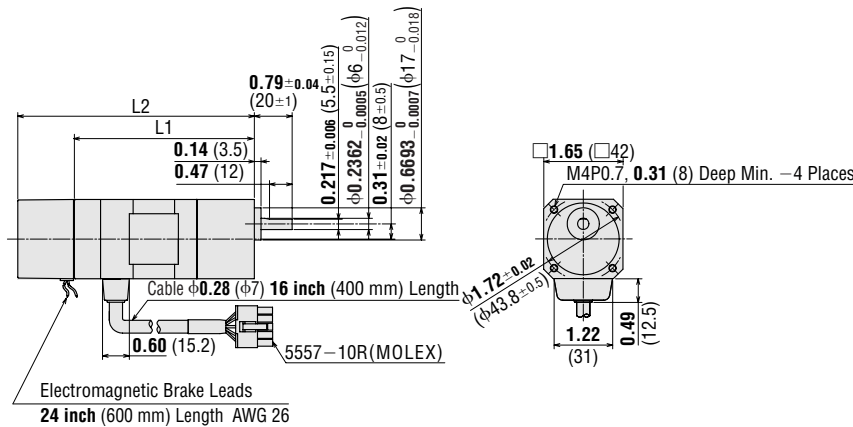


Model	Motor Model	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS98A □	ASM98A□	3.15 (80)	—	4.0 (1.8)	B196
AS98A □ P					
AS98M □	ASM98M□	—	5.16 (131)	4.8 (2.2)	B235
AS98M □ P					
AS911A □	ASM911A□	4.33 (110)	—	6.6 (3.0)	B264
AS911A □ P					

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

◆ TH Geared Type

4 Motor Frame Size: □1.65 in. (□42 mm)



Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS46AA-T □	ASM46AA-T□	3.6, 7.2, 10, 20, 30	3.76 (95.4)	—	1.4 (0.65)	B199
AS46AAP-T □						
AS46MA-T □	ASM46MA-T□	—	—	4.94 (125.4)	1.7 (0.75)	B200
AS46MAP-T □						

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

Introduction

AS

AS PLUS

ASC

RK

CFK II

CSK

PMC

UMK

CSK

PK/PV

PK

UI2120G

EMP401

EMP402

SC8800E

SG6030J

SMK

Accessories

Before Using a Stepping Motor

Controllers

Low-Speed Synchronous Motors

Driver with Indexer

2-Phase Stepping Motors without Encoder

2-Phase Stepping Motors with Encoder

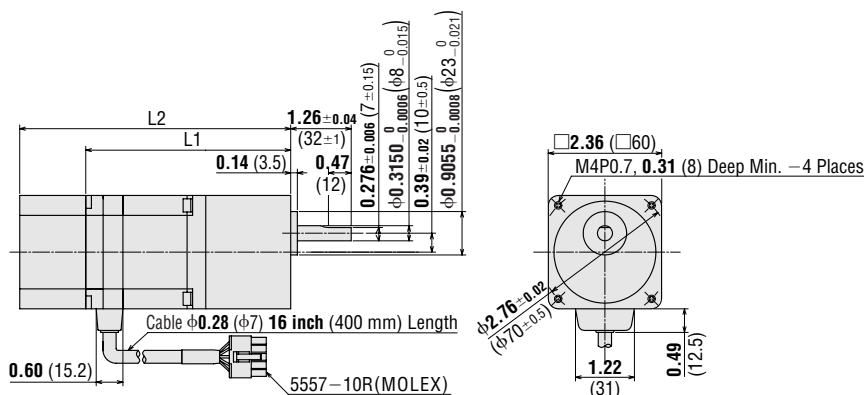
5-Phase Microstep AC Input

5-Phase Full/Half DC Input

5-Phase Full/Half AC Input

Motor & Driver Packages

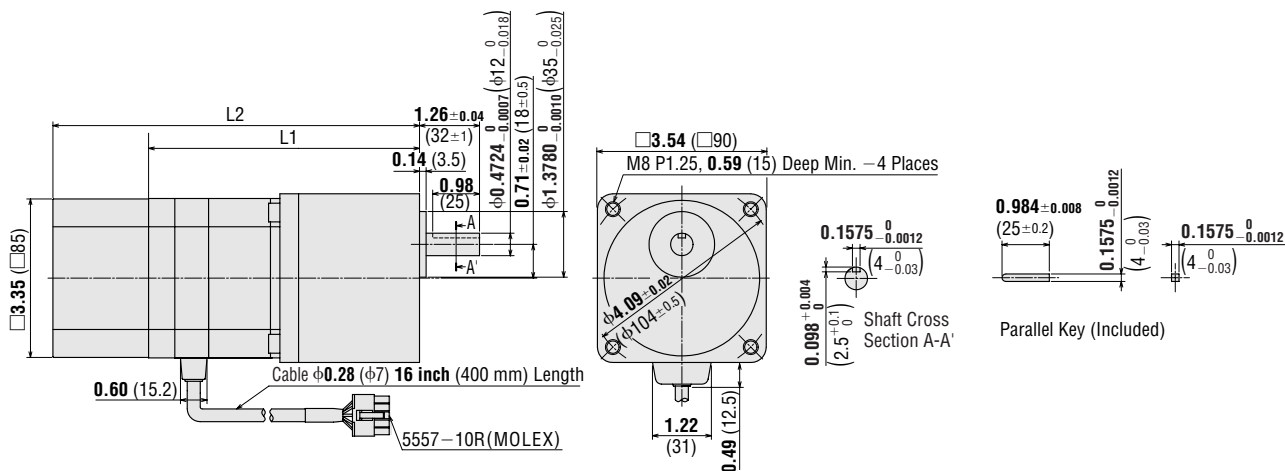
5 Motor Frame Size: □2.36 in. (□60 mm)



Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS66A □-T□	ASM66A□-T□	3.6, 7.2, 10, 20, 30	4.28 (108.6)	—	2.8 (1.25)	B201
AS66A □-P-T□						
AS66M □-T□	ASM66M□-T□	3.6, 7.2, 10, 20, 30	—	5.65 (143.6)	3.3 (1.5)	B202
AS66M □-P-T□						

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

6 Motor Frame Size: □3.54 in. (□90 mm)

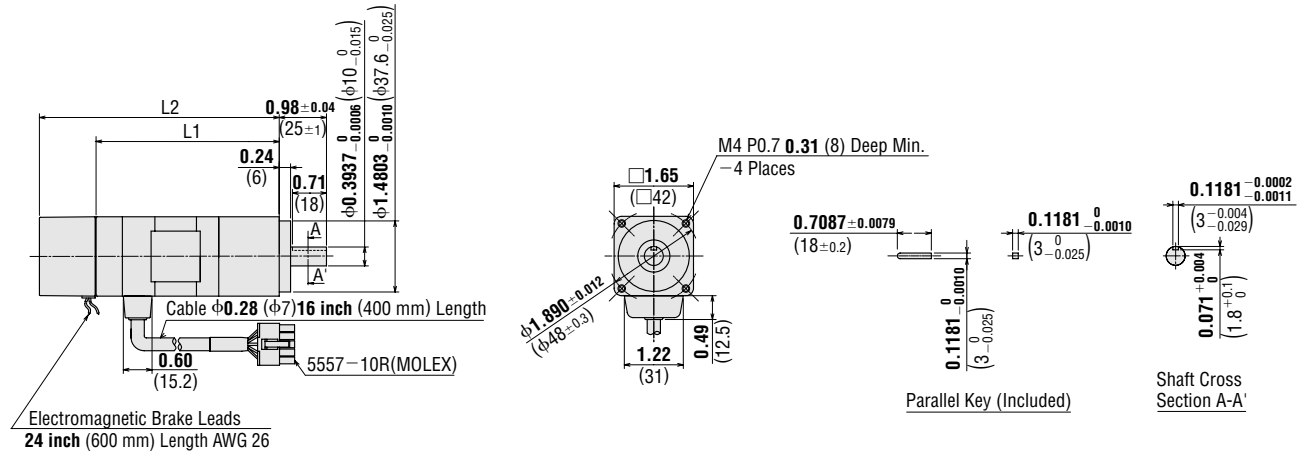


Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS98A □-T□	ASM98A□-T□	3.6, 7.2, 10, 20, 30	5.69 (144.5)	—	6.6 (3.0)	B203
AS98A □-P-T□						
AS98M □-T□	ASM98M□-T□	3.6, 7.2, 10, 20, 30	—	7.70 (195.5)	7.5 (3.4)	B236
AS98M □-P-T□						

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

◆ PN Geared Type

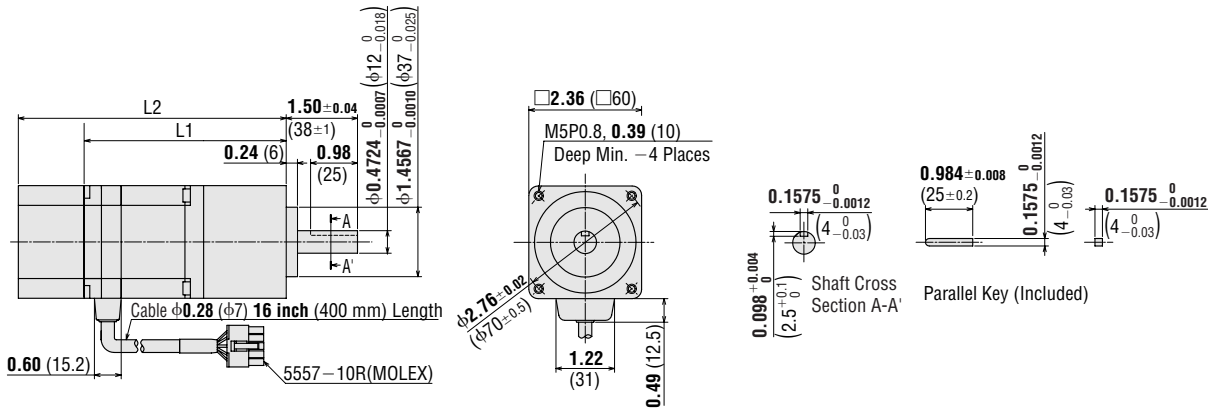
7 Motor Frame Size: □1.65 in. (□42 mm)



Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS46AA-N□	ASM46AA-N□	7.2, 10	3.81 (96.9)	—	1.6 (0.71)	B306
AS46AP-N□						
AS46MA-N□	ASM46MA-N□	—	—	5.0 (126.9)	1.8 (0.81)	B307
AS46MAP-N□						

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

8 Motor Frame Size: □2.36 in. (□60 mm)



Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS66A□-N□	ASM66A□-N□	5, 7.2, 10	4.24 (107.6)	—	3.3 (1.5)	B226
AS66A□-P-N□						
AS66A□-N□	ASM66A□-N□	25, 36, 50	4.87 (123.6)	—	3.7 (1.7)	B228
AS66A□-P-N□						
AS66M□-N□	ASM66M□-N□	5, 7.2, 10	—	5.61 (142.6)	3.9 (1.75)	B227
AS66M□-P-N□						
AS66M□-N□	ASM66M□-N□	25, 36, 50	—	6.24 (158.6)	4.3 (1.95)	B229
AS66M□-P-N□						

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

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

Introduction

AS

AS PLUS

ASC

RK

CFK II

CSK

PMC

UMK

CSK

PK/PV

PK

PK/PV

PK

PK

U12120G

EMP401

EMP402

SC8800

SC8800E

SG6030J

SMK

Accessories

Before Using

a Stepping

Motor

Motor & Driver Packages

2-Phase Stepping Motors

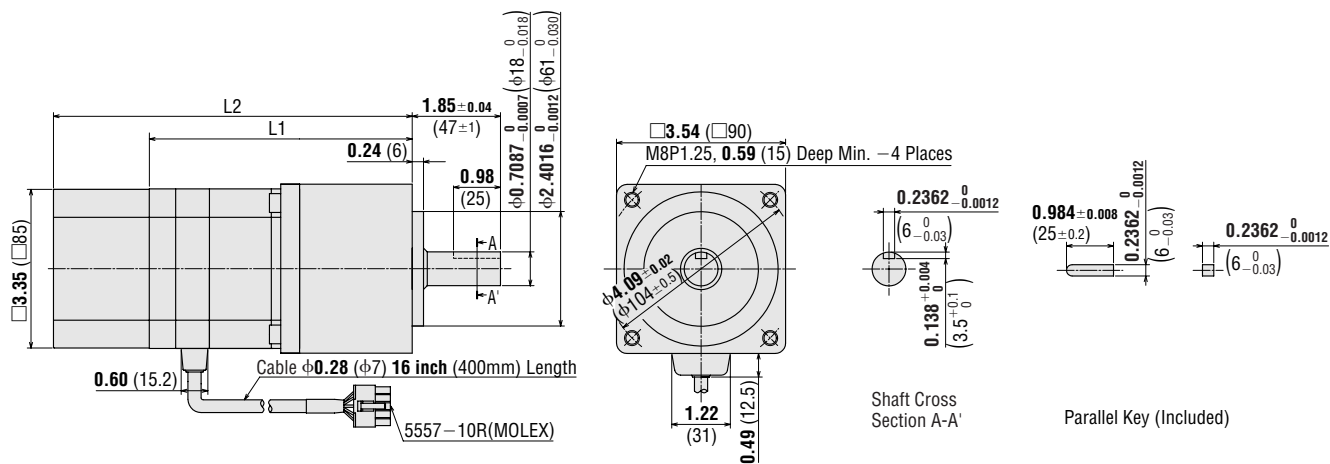
Driver

Controllers

Low-Speed Synchronous Motors

Before Using a Stepping Motor

9 Motor Frame Size: □3.54 in. (□90 mm)

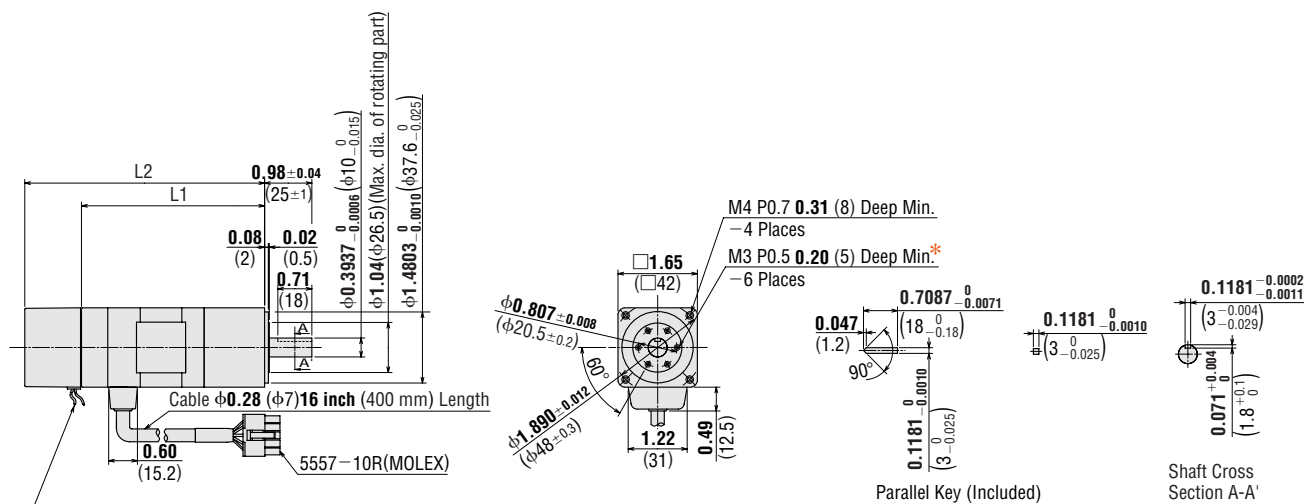


Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS98A□-N□	ASM98A□-N□	5, 7.2, 10	5.51 (140)	—	8.8 (4.0)	B230
AS98A□-P-N□						
AS98A□-N□	ASM98A□-N□	25, 36, 50	6.42 (163)	—	10 (4.7)	B231
AS98A□-P-N□						
AS98M□-N□	ASM98M□-N□	5, 7.2, 10	—	7.52 (191)	9.7 (4.4)	B239
AS98M□-P-N□						
AS98M□-N□	ASM98M□-N□	25, 36, 50	—	8.43 (214)	11 (5.1)	B240
AS98M□-P-N□						

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

◆ HG Geared Type

10 Motor Frame Size: □1.65 in. (□42 mm)

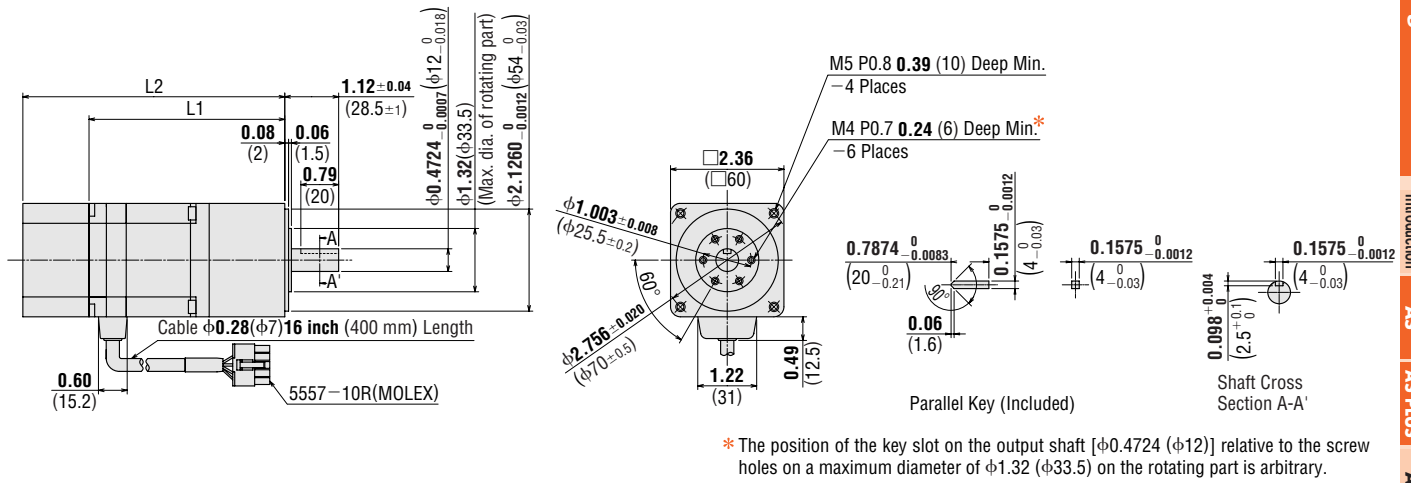


* The position of the key slot on the output shaft [φ0.3937 (φ10)] relative to the screw holes on a maximum diameter of φ1.04 (φ26.5) on the rotating part is arbitrary.

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

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

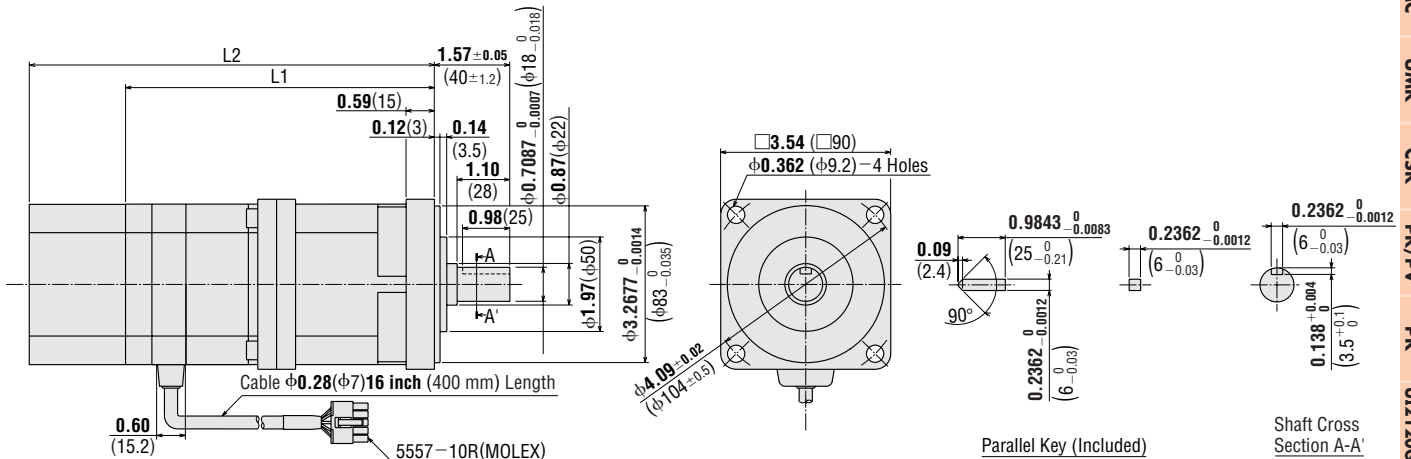
11 Motor Frame Size: □2.36 in. (□60 mm)



Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS66A□2-H□	ASM66A□2-H□	50, 100	4.08 (103.6)	—	3.1 (1.4)	B310
AS66A□P2-H□						
AS66M□2-H□	ASM66M□2-H□	50, 100	—	5.46 (138.6)	3.6 (1.65)	B311
AS66M□P2-H□						

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

12 Motor Frame Size: □3.54 in. (□90 mm)



Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS98A□-H□	ASM98A□-H□	50, 100	6.44 (163.5)	—	8.6 (3.9)	B218
AS98A□P-H□						
AS98M□-H□	ASM98M□-H□	50, 100	—	8.44 (214.5)	9.5 (4.3)	B241
AS98M□P-H□						

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

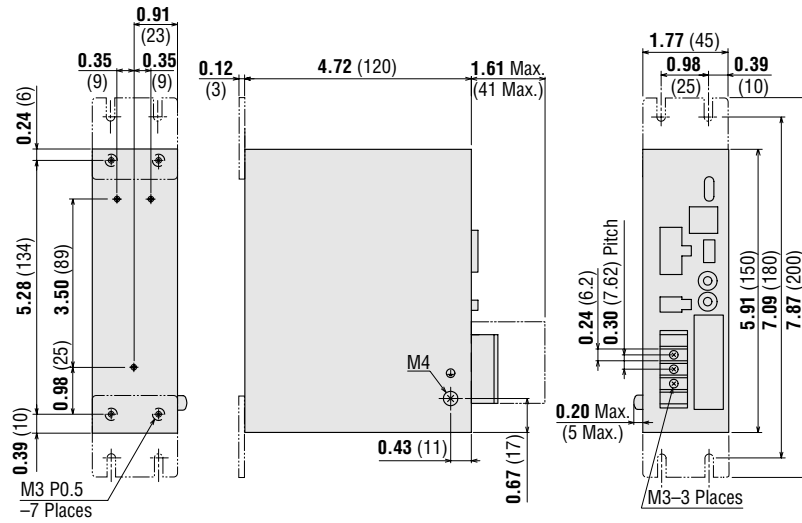
Introduction	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor
	AS	AS PLUS	ASC	RK	CFK II	CSK	PMC	UMK	CSK	PK/PV	PK	UI2120G	EMP401	EMP402	SC8800E	SG8030J	SMK	Accessories	Before Using a Stepping Motor

● Driver

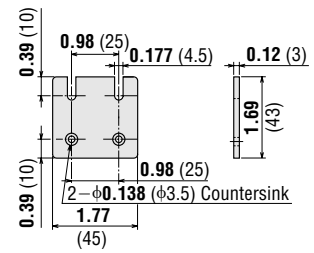
13 AS Series

Weight: 1.8 lb. (0.8 kg)

DXF B197



● Mounting Bracket (2 pieces, included)



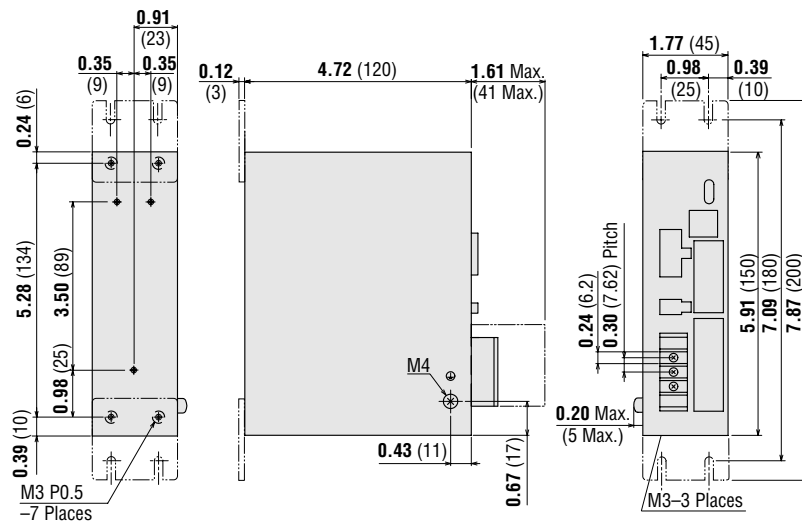
● I/O Connector (included)

Connector: 54306-3611 (MOLEX)
Cover Assembly: 54331-1361 (MOLEX)

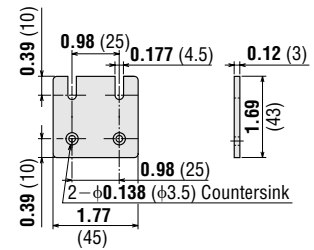
14 AS PLUS

Weight: 1.8 lb. (0.8 kg)

DXF B298



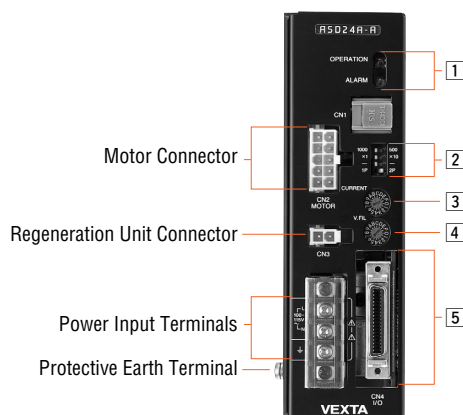
● Mounting Bracket (2 pieces, included)



● I/O Connector (included)

Connector (36 pin): 54306-3611 (MOLEX) for CN4
Cover Assembly (36 pin): 54331-1361 (MOLEX) for CN4
Connector (24 pin): 54306-2011 (MOLEX) for CN5
Cover Assembly (24 pin): 54331-1201 (MOLEX) for CN5

Connection and Operation AS Series



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 protection functions are activated.

• Alarm

Blink Count	Protection Function	When Activated
1	Overheat	The temperature of the driver's internal heat sink rises to approximately 185°F (85°C).
2	Overload	The motor is operated continuously over 5 seconds under a load exceeding the maximum torque.
3	Overvoltage	The primary voltage of the driver's inverter exceeds the permissible value.
4	Speed error	The motor cannot accurately follow at the indicated pulse velocity.
5	Overcurrent	An excessive current has flowed to the driver's inverter.
6	Overspeed	The motor shaft velocity exceeds 5000 r/min. (Except for Gear Type)
7	EEPROM Data Error	The EEPROM has a fault.
8	Sensor Error	The power source turns it on when the motor cable is not connected to the driver.
No Blink	System Error	The driver has a fatal error.

2 Function Switches

Indication	Switch Name	Function
1000/500 X1/ X10	Resolution Select Switch	This function is for selecting the motor resolution. For each geared type, the resolution of the gears output shaft is 1/gear ratio. "1000" "×1" → 1000 pulses (0.36°/step) "1000" "×10" → 10000 pulses (0.036°/step) "500" "×1" → 500 pulses (0.72°/step) "500" "×10" → 5000 pulses (0.072°/step)
1P/2P	Pulse Input Mode Switch	The settings of this switch are compatible with the following two pulse input modes: "1P" for the 1-pulse input mode (step and direction), "2P" for the 2-pulse input mode (CW, CCW).

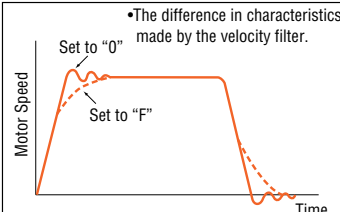
Note:

- 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 select by input terminal. 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.

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. 

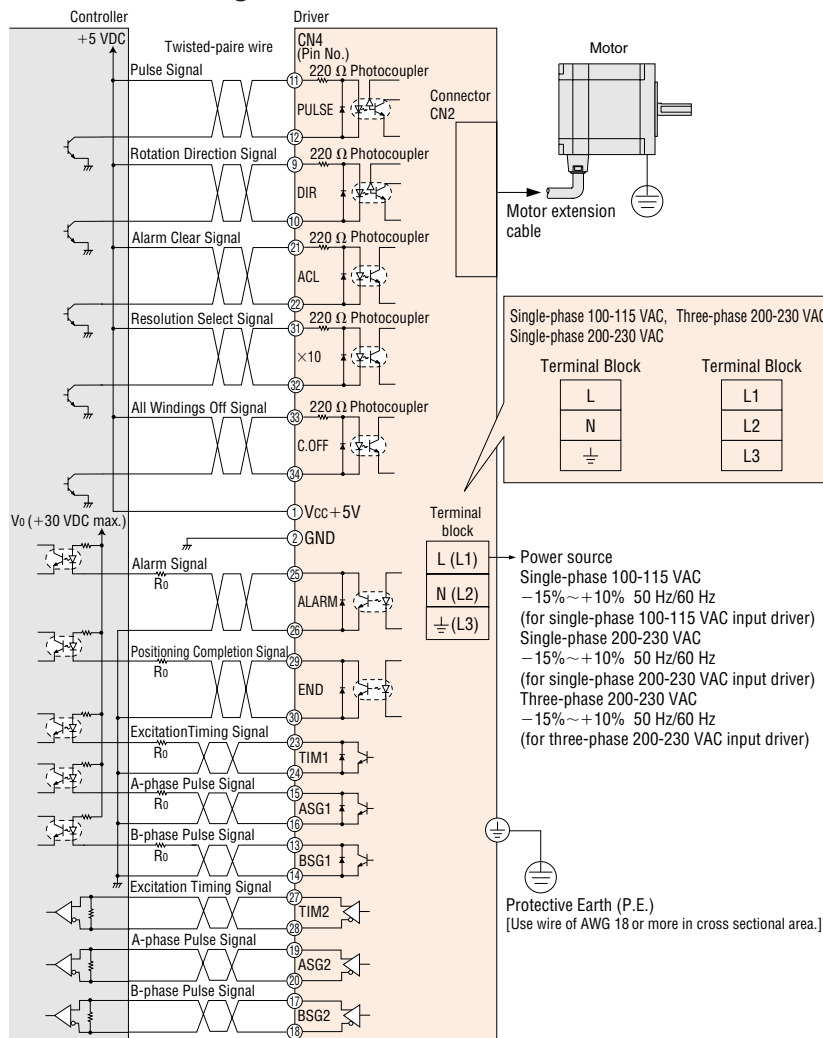
5 Input/Output Signals

Connector	Pin Number	Input/Output	Signal	Name of Signal	
CN4	1	External Power Input	Vcc + 5V*1	Power supply for control signal	
	2		GND		
	3		Vcc + 24V*1		
	9	Input Signal	CCW (DRE)	CCW Pulse (Rotation Direction)*2	
	10		CCW (DRE)		
	11		CW (PLS)		
	12		CW (PLS)		
	13	Output Signal	BSG1	B-Phase Pulse Output (Open Collector)	
	14		GND		
	15		ASG1	A-Phase Pulse Output (Open Collector)	
	16		GND		
	17		BSG2	B-Phase Pulse Output (Line Driver)	
	18		BSG2		
	19		ASG2	A-Phase Pulse Output (Line Driver)	
	20		ASG2		
	21	Input Signal	ACL	Alarm Clear	
	22		ACL		
	23	Output Signal	TIM1	Timing (Open Collector)	
	24		GND		
	25		ALARM	Alarm	
	26		ALARM		
	27		TIM2	Timing (Line Driver)	
	28		TIM2		
	29		END	Positioning Completion	
	30		END		
	31		Input Signal	×10	Resolution Select
	32			×10	
	33	C.OFF		All Windings Off	
	34	C.OFF			

*1 Do not input 5 VDC and 24 VDC at the same time.

*2 Value in parentheses represents the setting 1-pulse input mode. The setting at shipment is the 2-pulse input mode.

● Connection Diagrams

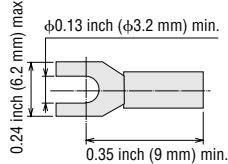
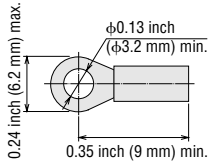


Notes:

- V_o and the current must be 30 VDC, 15 mA or less respectively. If the current exceeds 15 mA, connect external resistance R_o .
- Use a multi-core, twisted-pair shielded wire AWG 28 for the control input/output signal line (CN4), and keep wiring as short as possible [within 6.6 feet (2 m)].
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases.
- For the wiring between the motor and driver, use the extension cable or movable cable.
- Use a three-core cable for the power supply line with a conductor cross-sectional area of at least AWG 18. (single-phase 100-115 VAC, single-phase 200-230 VAC)
- Use a four-core cable for the power supply line with a conductor cross-sectional area of at least AWG 18. (three-phase 200-230 VAC)
- Keep the control input/output signal line at least 1 foot (300 mm) away from power lines (e.g. lines carrying large current, such as AC lines and motor lines). Also, do not run these lines through the same ducts or pipes as power lines.
- The customer must furnish the cables for power supply lines and control input/output signal lines.
- The driver must be properly grounded. The driver's Protective Earth terminal should be grounded to a common ground point, using a cable of AWG 18.
- When the "Timing Signal" or "Pulse Signal" is used, 5 VDC or 24 VDC power supply is necessary. Use either a 5 VDC or a 24 VDC power supply. Do not connect power to pins ① and ③ at the same time. See [5] Input/Output table on page C-39.

◆ Recommended Crimp Terminals

- Round shape terminals with insulator
- U shape terminals with insulator



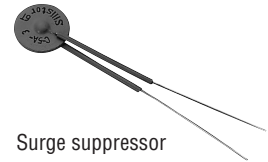
* Crimp terminals are not provided with the package. They must be furnished separately.

◆ Connecting the Electromagnetic Brake to Power Supply

Connect the electromagnetic brake to the power supply using a cable with a conductor cross-sectional area of at least AWG 24. The power supply input to the electromagnetic brake is 24 VDC $\pm 5\%$ 0.3 A min. (**AS46**: 0.1 A min.) and therefore must be independent of the driver's power supply.

Notes:

- Applying a voltage that exceeds the specifications will cause the electromagnetic brake to generate a great deal 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 accessory surge suppressor.
- Correct polarity (+ and -) must be ensured when connecting the electromagnetic brake lead wire of **AS** series to the DC power supply. If polarity is incorrect, the electromagnetic brake will not operate properly.
- When using as a CE certified part, use a DC power supply with reinforced insulation for the primary side as the power supply for the electromagnetic brake.
(* The surge suppressor is included with electromagnetic brake motors.)

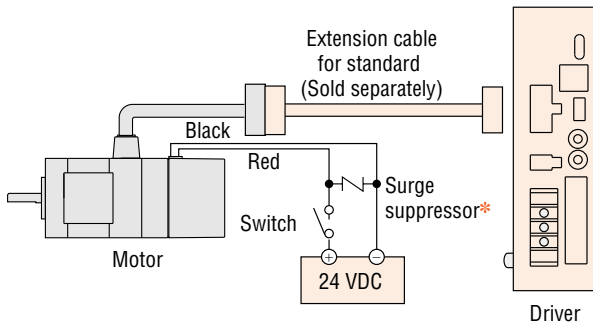


Surge suppressor

Connection Method

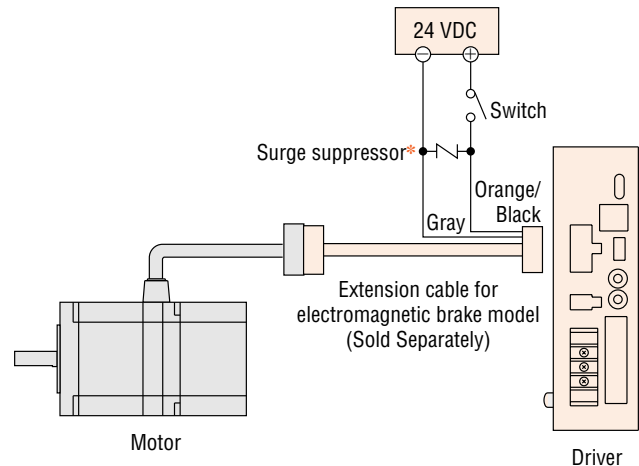
AS46

The electromagnetic brake wire is linked to the connector on the motor [23.6 inch (600 mm)]. 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 movable cable (both sold separately) for standard.



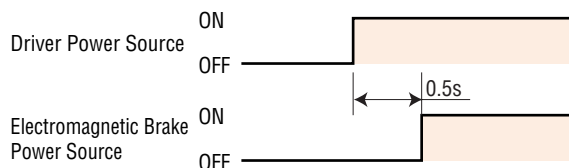
AS66, AS69, AS98

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



Timing Chart for Electromagnetic Brake Operation

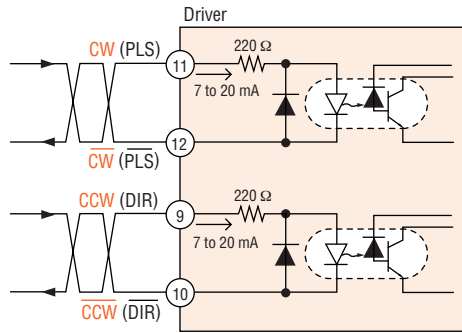
To release the electromagnetic brake, wait at least 0.5 seconds after turning on the driver power source. The load may fall down due to a loss of holding torque.



● Description of Input/Output Signals

Pulse Input (CW) and Rotation Direction (CCW) Input Signal

◆ Input Circuit and Sample Connection



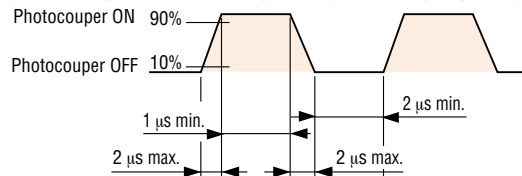
The letters indicate signals under the 2-pulse input mode, while the letters in parentheses indicate signals under the 1-pulse input mode. The factory setting is 2-pulse input mode.

Note:

- When V_o is equal to 5 VDC, external resistance is not necessary.
- When V_o is above 5 VDC, connect external resistance to keep the input current between 7 mA and 20 mA.

◆ Pulse Waveform Characteristics

(Photocopier state corresponding to the input pulse)



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

◆ Pulse Input Mode

1-Pulse Input Mode

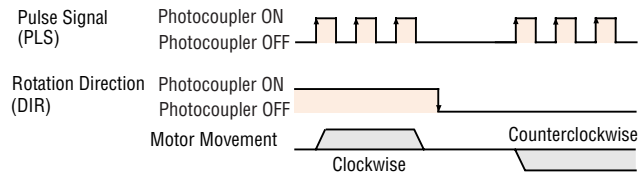
The 1-pulse input mode uses "Pulse" (PLS) and "Rotation Direction" (DIR) signals. CW is selected by inputting DIR signals at low level (with the input photocopier on), CCW by inputting at high level (with input photocopier off).

"Rotation Direction" signals

Photocopier "ON": Clockwise,

Photocopier "OFF": Counterclockwise

1 Pulse Input Mode



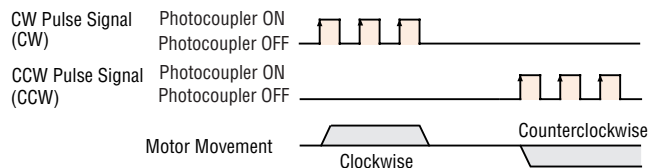
2-pulse input mode

The 2-pulse input mode is used for "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.

Note:

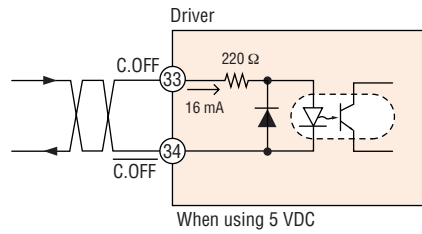
- The factory setting is 2-pulse input.

2 Pulse Input Mode

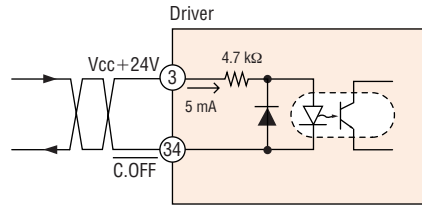


All Windings Off (C.OFF) Input Signal

◆ Input Circuit and Sample Connection



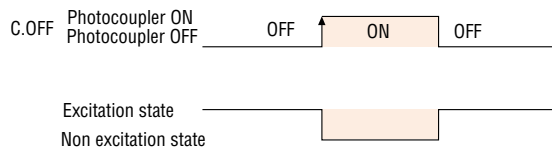
When using 5 VDC



When using 24 VDC

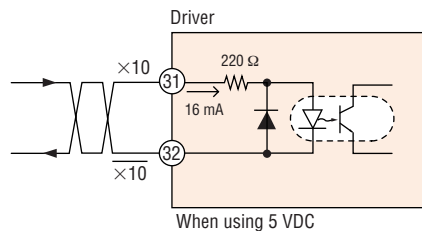
This controller power source offers a choice of either 5 VDC or 24 VDC.

Inputting the "All Windings Off" (C.OFF) signal puts the motor in a non-excitation (free) state. It is functioning when the photocopier is ON. It is used when turning the motor shaft externally or when positioning manually. This signal clears the deviation counter.

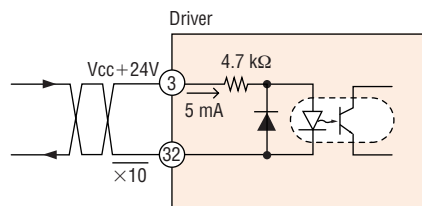


Resolution Select ($\times 10$) Input Signal

◆ Input Circuit and Sample Connection



When using 5 VDC



When using 24 VDC

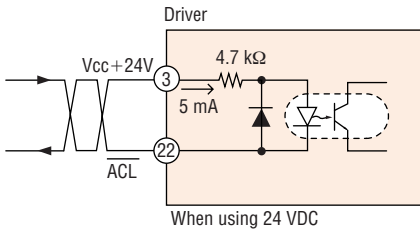
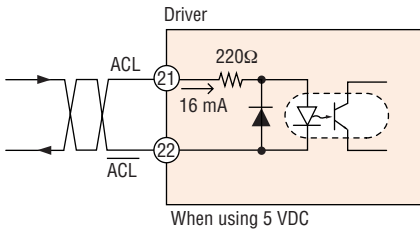
This controller power source offers a choice of either 5 VDC or 24 VDC. During input of this signal, the magnification of the resolution is $\times 10$. It is only valid when the resolution select switch is set to $\times 1$.

Note:

- When the resolution select switch is set to $\times 10$, the "Resolution Select" Input is ignored. In this case, the "Resolution Select" Input is always equal to ON.

Alarm Clear (ACL) Input Signal

◆ Input Circuit and Sample Connection



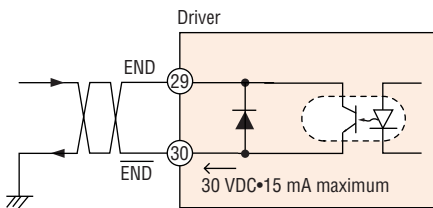
This controller power source offers a choice of either 5 VDC or 24 VDC. This signal is used when a protection circuit has been activated, for canceling the alarm without turning off power to the driver.

Note:

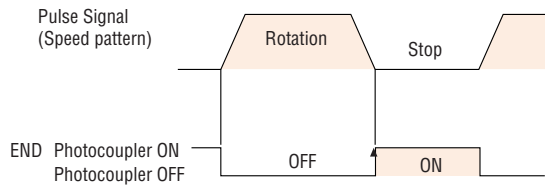
- The following alarm cannot be released. To cancel the alarm, first resolve the cause and check for safety, and then turn power on again.
 - Over Current
 - EEPROM Data Error
 - System Error

Position Completion (END) Output Signal

◆ Output Circuit and Sample Connection



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 ms after the pulse input stops.

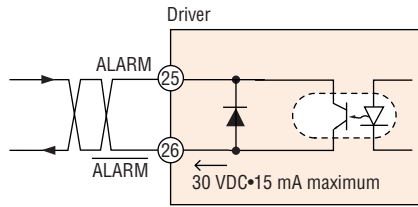


Note:

- The END signal flashes during operation with a pulse input frequency of 500 Hz or less.

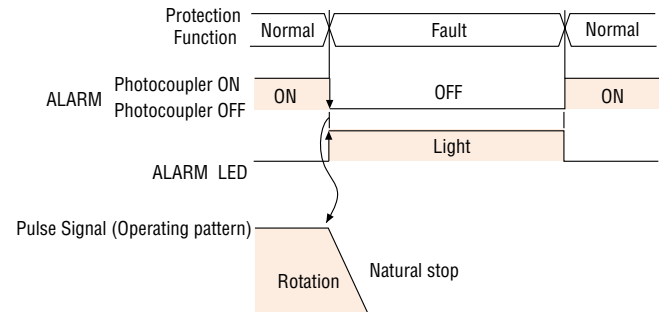
Alarm (ALARM) Output Signal

◆ Output Circuit and Sample Connection



Circuits for use with 30 VDC, 15 mA maximum.

This signal indicates that one of the driver's protection circuits has been activated. When an abnormality such as an overload or over current is detected, the alarm signal is output, the ALARM indicator lights, 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 cycle power. Once power has been turned off, wait at least 3 seconds before turning it on again.



Note:

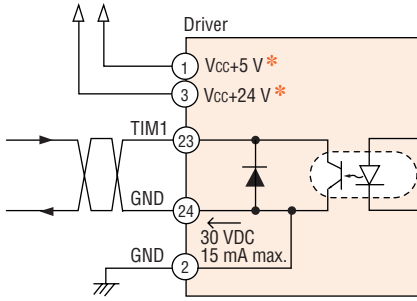
The alarm output uses positive logic (Normally Closed), all other outputs use negative logic (Normally Open).

Excitation Timing (TIM.) Output Signal

◆ Output Circuit and Sample Connection

Open Collector Output (Current Source Type)

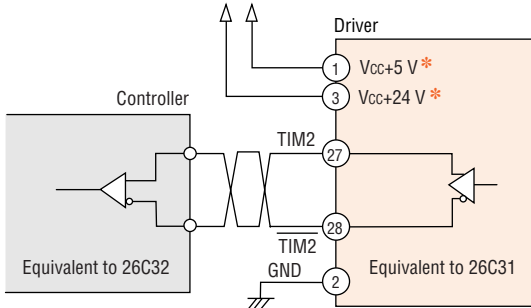
*Power supply for timing output should be connected to either 5 VDC or 24 VDC.
Do not input 5 VDC and 24 VDC at the same time.



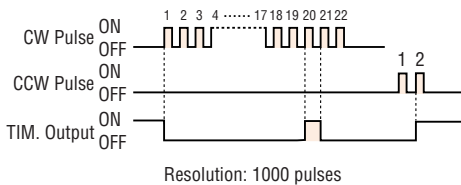
Circuits for use with 30 V, 15 mA maximum.

Line Driver Output

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



When the "Excitation Timing" signal is output, the photocoupler turns ON (For the line driver output which is TIM2, the output signal is High). This signal can be used to detect the home position with greater precision. This signal is output 50 times per motor shaft revolution.



Notes:

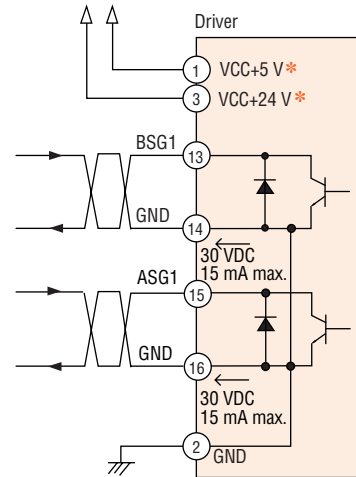
- A precise timing signal cannot be obtained when the speed of the pulse input frequency is over 500 Hz.
- When the Timing Signal Output is used, 5 VDC or 24 VDC power supply is necessary.

Quadrature (ASG1/BSG1, ASG2/BSG2) Output Signal

◆ Output Circuit and Sample Connection

Open Collector Output (Current Source Type)

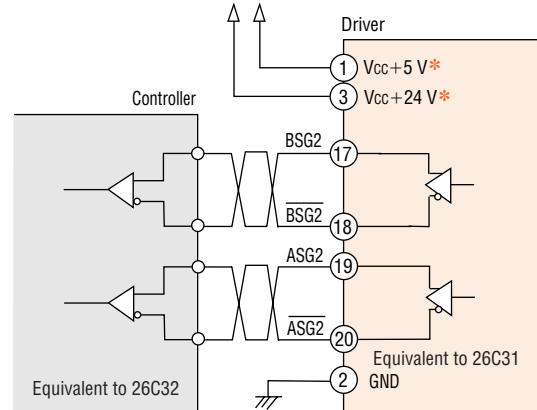
*Power supply for quadrature output should be connected to either 5 VDC or 24 VDC.
Do not input 5 VDC and 24 VDC at the same time.



Circuits for use with 30 V, 15 mA maximum.

Line Driver Output

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



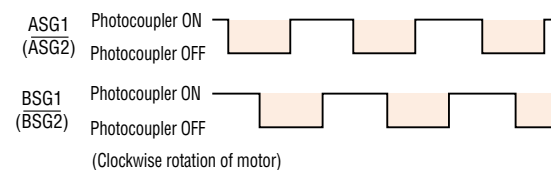
These signals are used when monitoring the motor position. The pulse resolution is the same as the motor resolution at the time of power-on.

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

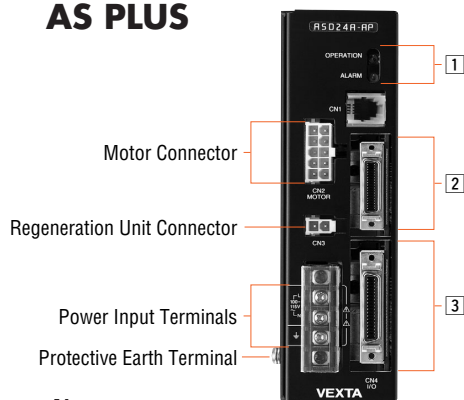
Notes:

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

◆ Pulse Waveform Characteristics



Connection and Operation AS PLUS



1 Signal Monitor Display

• LED Indications

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. 185°F (85°C).	21h□ (Decimal: 33)	The motor loses its□ 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 5,000 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 its□ 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 its□ 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 its□ holding torque.	* Impossible
6	Emergency stop	An E-STOP signal has been input.	68h□ (Decimal: 104)	The program stops.□ The motor loses its□ holding torque□ (ESTOPACT = 0).	* Possible
7	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	Mechanical home seeking 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.	
	Emergency 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 its□ 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 its□ holding torque.	*□ Impossible
Stays ON.	System error	Driver failure has occurred.	F0h□ (Decimal: 240)	The motor loses its□ 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 Communication Signals (CN5)

Connector	Pin No.	Input/Output	Signal	Signal Name
CN5	1	Input	COM1	Power source for input signals
	2		COM2	Power source for input signals
	3	-	-	No Connection
	4	-	-	No Connection
	5	Output	TX	RS-232C Transmit
	6	-	-	No Connection
	7	Input	RX	RS-232C Receive
	8	-	-	No Connection
	9	-	-	No Connection
	10	Input	N24	External power supply terminal (GND)
	11	Input	COM1	Power source for input signals
	12		COM2	Power source 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 source for input signals
	20		COM2	Power source for input signals

3 I/O Signals (CN4)

Connector	Pin No.	Input/Output	Signal	Signal Name	
CN4	1	Input	P24	Power source for RS-232C, ASG and BSG (24 VDC)	
	2		N24	Power source for RS-232C, ASG and BSG (GND)	
	3	Output	Y0	General output*1 (Y0 to Y3)	
	4		Y0		
	5		Y1		
	6		Y1		
	7		Y2		
	8		Y2		
	9		Y3		
	10		Y3		
	11		ASG		Phase A pulse output□
	12		ASG		(Line-driver output)
	13	BSG	Phase B pulse output□		
	14	BSG	(Line-driver output)		
	15	Input	START	START	
	16		E-STOP	Emergency stop	
	17		COM1	Power source for input signal	
	18	Output	Y4	General output*1 (Y4 to Y7)	
	19		Y4		
	20		Y5		
	21		Y5		
	22		Y6		
	23		Y6		
	24		Y7		
	25		Y7		
	26		Y7		
	27		ALM		Alarm
	28	ALM			
	29	Input	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□□

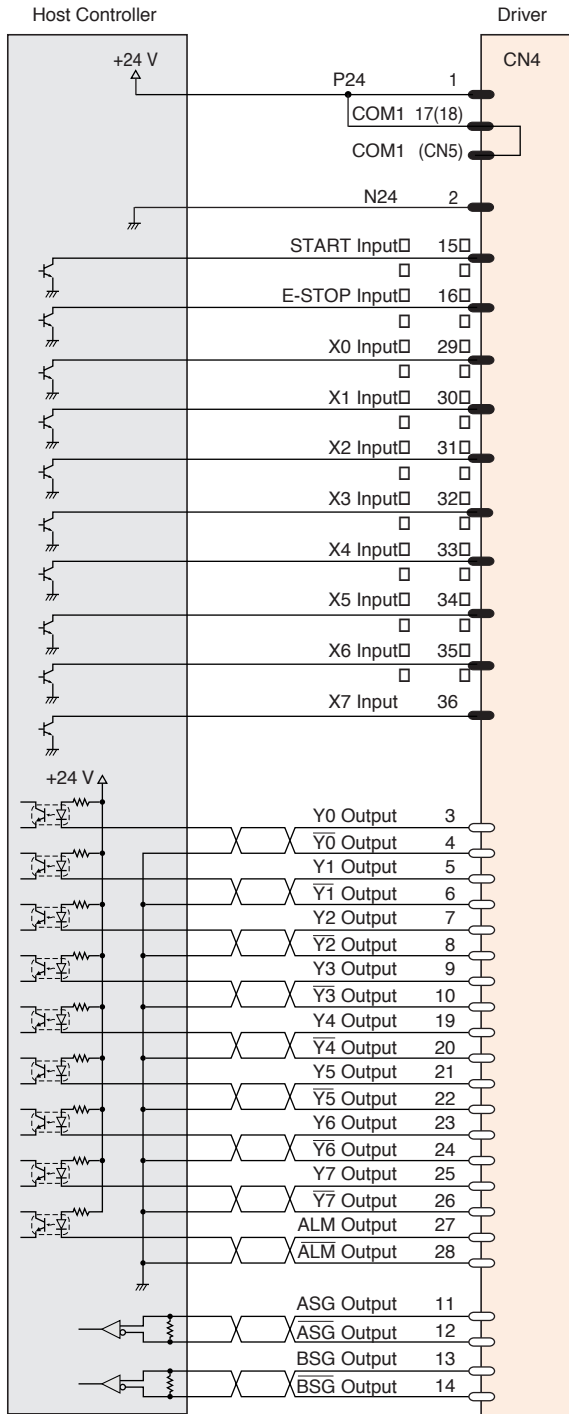
*2: The following signals can be assigned arbitrarily via program settings. Additionally, the input logic of each signal can be switched. □ACL input, PAUSE input, MSTOP input, RESTART input

● Connection Diagrams

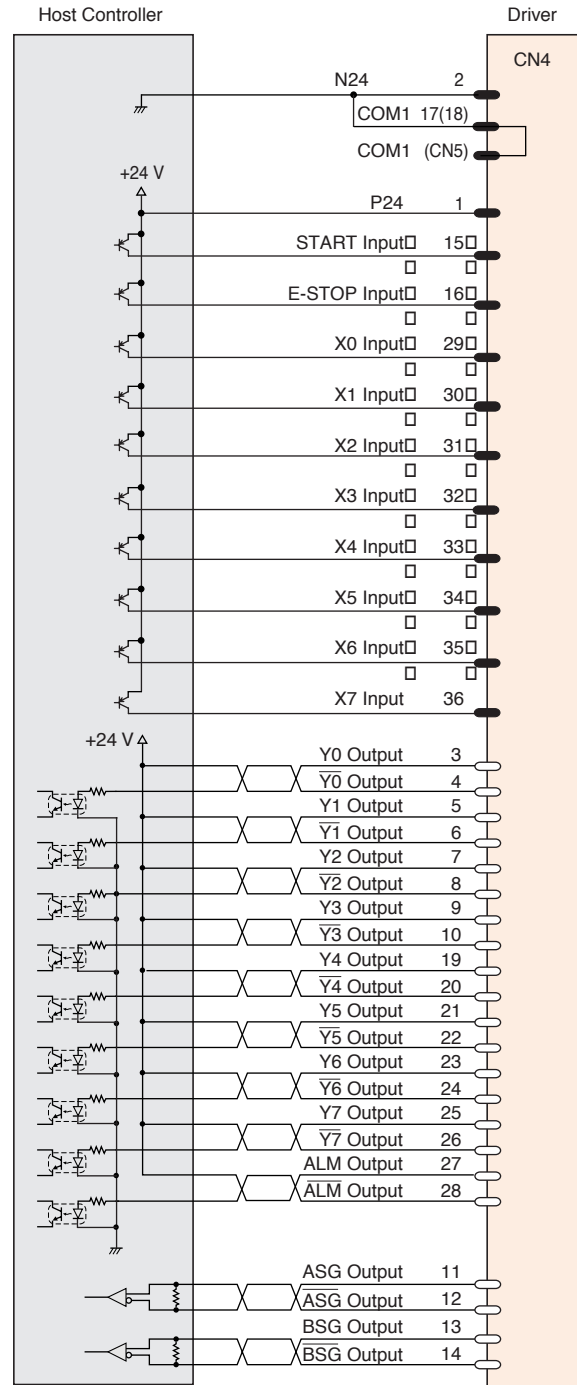
AS PLUS

◆ Power Lines and I/O Signals (CN4)

• Current source input and current sink output



• Current sink input current source output



Introduction

AS

AS PLUS

ASC

RK

CFK II

CSK

PMC

UMK

CSK

PK/PV

PK

UI2120G

EMP401

EMP402

SC8800

SC8800E

SG8030J

SMK

Accessories

Before Using a Stepping Motor

Motor & Driver Packages

5-Phase Microstep

5-Phase Full/Half

2-Phase Full/Half

without Encoder

with Indexer

with Encoder

Controllers

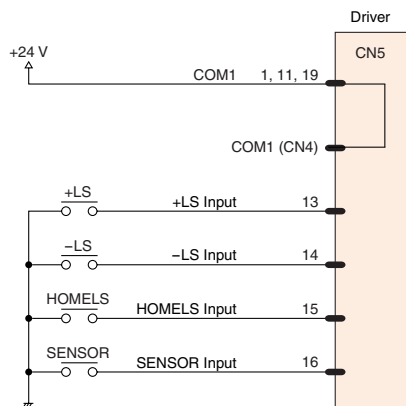
Low-Speed Synchronous Motors

Accessories

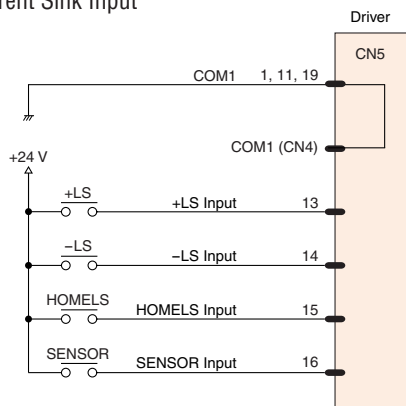
Before Using a Stepping Motor

◆ Power Lines and Limit Sensors (CN5)

• Current Source Input



• Current Sink Input



◆ Wiring the signal cable

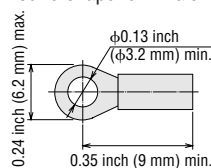
- Use input signals at $24\text{ VDC} \pm 10\%$.
- Use output signals at 30 VDC or below and at 4 to 8 mA.
- Use a shielded cable with a wire of a size ranging between AWG 24 and AWG 22 for the driver signal cable (I/O signals, limit sensors signals), and keep it as short as possible.
- Keep the control input/output signal line at least 1 foot (300 mm) away from power lines (e.g. lines carrying large current, such as AC lines and motor lines). Also, do not run these lines through the same ducts or pipes as power lines.

◆ Other wiring

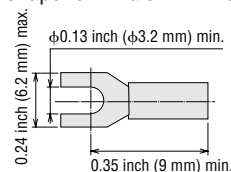
- For the wiring between the motor and driver, use the extension cable or movable extension cable.
- Use a three-core cable for the power supply line with a conductor cross-sectional area of at least AWG 18.
- The customer must furnish the cables for power supply lines and control input/output signal lines.
- The driver must be properly grounded. The driver's Protective Earth terminal should be grounded to a common ground point, using a cable of AWG 18.

◆ Recommended Crimp Terminals

Round shape terminals with insulator



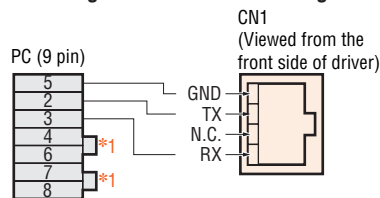
U shape terminals with insulator



* Crimp terminals are not provided with the package. They must be furnished separately.

◆ Connecting the Driver with a Personal Computer (CN1)

• Pin Assignments and Connecting



*1 Short pins 4 and 6 together, as well as pins 7 and 8 together.

• Communication Specifications

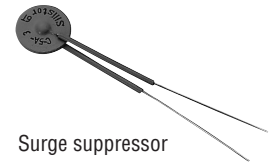
Item	Description
Electrical characteristics	In conformance with RS-232C.
Transmission method	Start-stop asynchronous method, NRZ \square (non-return to Zero), full-duplex
Data length	8 bits, 1 stop bit, no parity
Transmission speed	9,600 bps
Protocol	TTY (CR+LF)
Connector specification	Modular (4 lines, 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 49.2 feet (15 m).

◆ Connecting the Electromagnetic Brake to Power Supply

Connect the electromagnetic brake to the power supply using a cable with a conductor cross-sectional area of at least AWG 24. The power supply input to the electromagnetic brake is 24 VDC $\pm 5\%$ 0.3 A min. (**AS46**: 0.1 A min.) and therefore must be independent of the driver's power supply.



Surge suppressor

Notes:

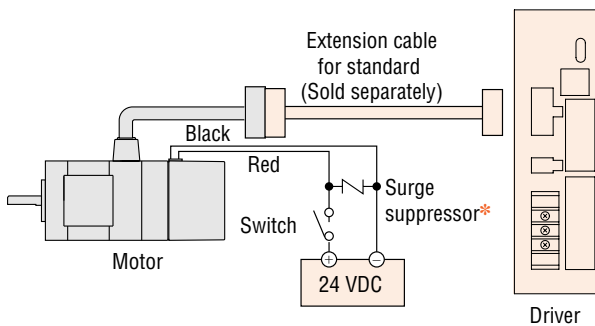
- Applying a voltage that exceeds the specifications will cause the electromagnetic brake to generate a great deal of heat, resulting in motor temperature rises and possible damage to the motor. Conversely, if voltage is too low, the electromagnetic brake may not release.
- To protect the switch contacts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

(* The surge suppressor is included with electromagnetic brake motors.)

Connection Method

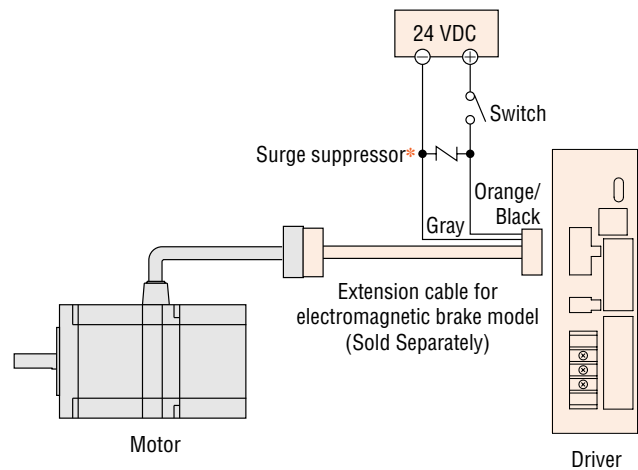
AS46

The electromagnetic brake wire is linked to the connector on the motor [23.6 inch (600 mm)]. When connecting with 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 movable cable (both sold separately) for standard type.



AS66, AS69, AS98

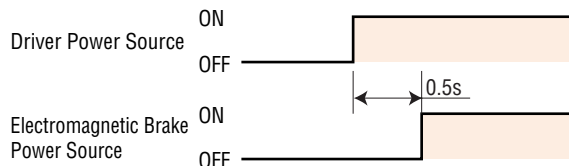
The electromagnetic brake wire is linked to the connector on the driver connection side of extension cable for electromagnetic brake model (sold separately). Be sure to use the accessory (sold separately) extension cable or movable cable. Connect the orange/black spiral lead wire [2.36 inch (60 mm)]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



Timing Chart for Electromagnetic Brake Operation

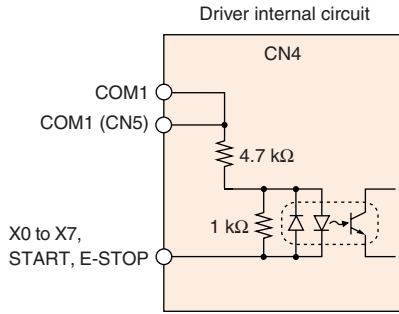
To release the electromagnetic brake, wait at least 0.5 seconds after turning on the driver power source.

The load may fall down due to a loss of holding torque.



● 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%, 0.05A.

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%, 0.2A.

• 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-source 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.

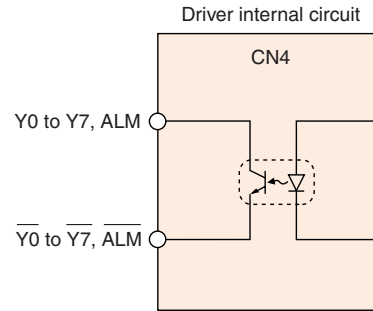
ACL inputINACL command
PAUSE input.....INPAUSE command
MSTOP input.....INMSTOP command
RESTART input.....INRESTART command

• 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 output

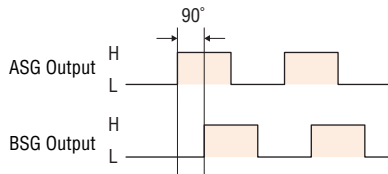
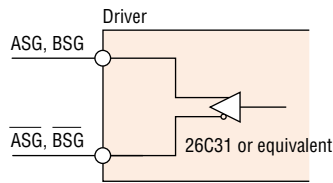
The Y0 through Y7 outputs can be used as output ports for general signals. The status of each port can be read using an OUT command or OUTx command.

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 outputOUTRUN command
MOVE output.....OUTMOVE command
HOME-P output.....OUTHOMEP command
TIM outputOUTTIM command
MBC output.....OUTMBC command

ASG, BSG Output

- Line driver output (26C31 or equivalent)



● ASG Output, BSG Output

To monitor the motor position, connect these signals to a counter, etc.

The pulse resolution is the same as the motor resolution at the time of power-on.

The ASG output and BSG output have a phase difference of 90 degrees electrical.

Pulse output is subject to a maximum delay of 1 ms relative to the motor's motion. Use the ASG output and BSG output to check the stopping position.

● ALM Output

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

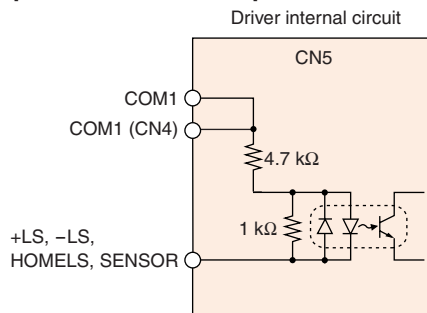
The reason for triggering of the protective function can be identified through the blink count of the alarm LED, or ALM command.

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-source input terminal for limit-sensor signals. The power-source voltage must be 24 VDC \pm 10%.

This signal is internally connected to terminals COM1 of CN4.

● COM2 input

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

Use it when sharing the input signal power source 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 (over travel) 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 mechanical home seeking routine or operate the motor in the direction opposite that of the limit sensor during continuous operation.

Mechanical Home Seeking Routine

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 mechanical home seeking is performed in 3-sensor mode.

When mechanical home seeking 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.)

Mechanical Home Seeking Routine

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 mechanical home hunting increases if this input is used in conjunction with the TIM signal.

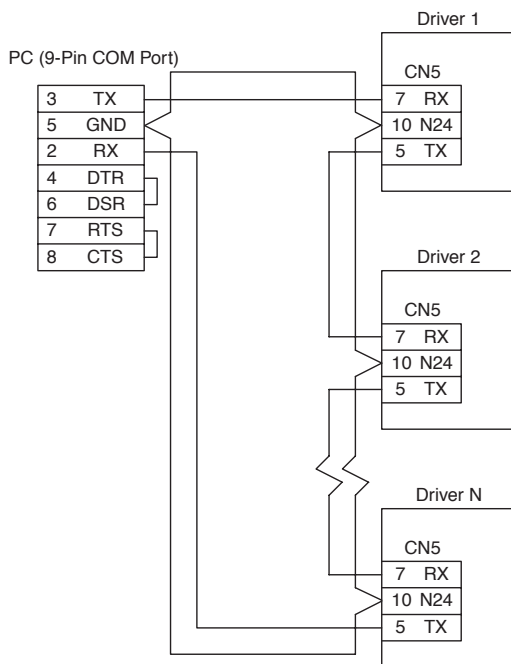
Continuous Operation

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 mechanical home hunting, it cannot be used during continuous operation.



- **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 each driver is supplied 24 VDC \pm 10% (P24 and N24) of CN4 from outside for communication.
- Wire 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 49.2 feet (15 m).
- Do not use the RS-232C communication port (CN1).

List of Motor and Driver Combinations

Single-Phase 100-115 VAC

Type	AS			AS PLUS		
	Package Model	Motor Model	Driver Model	Package Model	Motor Model	Driver Model
Standard	AS46□A	ASM46□A	ASD13A-A	AS46□AP	ASM46□A	ASD13A-AP
	AS66□A	ASM66□A	ASD24A-A	AS66□AP	ASM66□A	ASD24A-AP
	AS69□A	ASM69□A	ASD30D-A	AS69□AP	ASM69□A	ASD30D-AP
	AS98□A	ASM98□A	ASD30A-A	AS98□AP	ASM98□A	ASD30A-AP
	AS911AA	ASM911AA	ASD30E-A	AS911AAP	ASM911AA	ASD30E-AP
TH Geared	AS46□A-T3.6	ASM46□A-T3.6	ASD13B-A	AS46□AP-T3.6	ASM46□A-T3.6	ASD13B-AP
	AS46□A-T7.2	ASM46□A-T7.2		AS46□AP-T7.2	ASM46□A-T7.2	
	AS46□A-T10	ASM46□A-T10		AS46□AP-T10	ASM46□A-T10	
	AS46□A-T20	ASM46□A-T20	ASD13C-A	AS46□AP-T20	ASM46□A-T20	ASD13C-AP
	AS46□A-T30	ASM46□A-T30		AS46□AP-T30	ASM46□A-T30	
	AS66□A-T3.6	ASM66□A-T3.6	ASD24B-A	AS66□AP-T3.6	ASM66□A-T3.6	ASD24B-AP
	AS66□A-T7.2	ASM66□A-T7.2		AS66□AP-T7.2	ASM66□A-T7.2	
	AS66□A-T10	ASM66□A-T10		AS66□AP-T10	ASM66□A-T10	
	AS66□A-T20	ASM66□A-T20	ASD24C-A	AS66□AP-T20	ASM66□A-T20	ASD24C-AP
	AS66□A-T30	ASM66□A-T30		AS66□AP-T30	ASM66□A-T30	
	AS98□A-T3.6	ASM98□A-T3.6	ASD30A-A	AS98□AP-T3.6	ASM98□A-T3.6	ASD30A-AP
	AS98□A-T7.2	ASM98□A-T7.2		AS98□AP-T7.2	ASM98□A-T7.2	
	AS98□A-T10	ASM98□A-T10		AS98□AP-T10	ASM98□A-T10	
	AS98□A-T20	ASM98□A-T20	ASD30C-A	AS98□AP-T20	ASM98□A-T20	ASD30C-AP
AS98□A-T30	ASM98□A-T30	AS98□AP-T30		ASM98□A-T30		
PN Geared	AS46□A-N7.2	ASM46□A-N7.2	ASD13A-A	AS46□AP-N7.2	ASM46□A-N7.2	ASD13A-AP
	AS46□A-N10	ASM46□A-N10		AS46□AP-N10	ASM46□A-N10	
	AS66□A-N5	ASM66□A-N5	ASD24A-A	AS66□AP-N5	ASM66□A-N5	ASD24A-AP
	AS66□A-N7.2	ASM66□A-N7.2		AS66□AP-N7.2	ASM66□A-N7.2	
	AS66□A-N10	ASM66□A-N10		AS66□AP-N10	ASM66□A-N10	
	AS66□A-N25	ASM66□A-N25	ASD24B-A	AS66□AP-N25	ASM66□A-N25	ASD24B-AP
	AS66□A-N36	ASM66□A-N36		AS66□AP-N36	ASM66□A-N36	
	AS66□A-N50	ASM66□A-N50	ASD24C-A	AS66□AP-N50	ASM66□A-N50	ASD24C-AP
	AS98□A-N5	ASM98□A-N5		AS98□AP-N5	ASM98□A-N5	
	AS98□A-N7.2	ASM98□A-N7.2	ASD30A-A	AS98□AP-N7.2	ASM98□A-N7.2	ASD30A-AP
	AS98□A-N10	ASM98□A-N10		AS98□AP-N10	ASM98□A-N10	
	AS98□A-N25	ASM98□A-N25		AS98□AP-N25	ASM98□A-N25	
	AS98□A-N36	ASM98□A-N36	ASD30B-A	AS98□AP-N36	ASM98□A-N36	ASD30B-AP
	AS98□A-N50	ASM98□A-N50		AS98□AP-N50	ASM98□A-N50	
HG Geared	AS46□A2-H50	ASM46□A2-H50	ASD13A-A	AS46□AP2-H50	ASM46□A2-H50	ASD13A-AP
	AS46□A2-H100	ASM46□A2-H100		AS46□AP2-H100	ASM46□A2-H100	
	AS66□A2-H50	ASM66□A2-H50	ASD24B-A	AS66□AP2-H50	ASM66□A2-H50	ASD24B-AP
	AS66□A2-H100	ASM66□A2-H100	ASD24C-A	AS66□AP2-H100	ASM66□A2-H100	ASD24C-AP
	AS98□A-H50	ASM98□A-H50	ASD30B-A	AS98□AP-H50	ASM98□A-H50	ASD30B-AP
	AS98□A-H100	ASM98□A-H100		AS98□AP-H100	ASM98□A-H100	

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

Single-Phase 200-230 VAC

Type	AS			AS PLUS		
	Package Model	Motor Model	Driver Model	Package Model	Motor Model	Driver Model
Standard	AS66□C	ASM66□C	ASD12A-C	AS66□CP	ASM66□C	ASD12A-CP
	AS69□C	ASM69□C	ASD16D-C	AS69□CP	ASM69□C	ASD16D-CP
	AS98□C	ASM98□C	ASD16A-C	AS98□CP	ASM98□C	ASD16A-CP
	AS911AC	ASM911AC	ASD20A-C	AS911ACP	ASM911AC	ASD20A-CP

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

● Single-Phase 200-230 VAC

Type	AS			AS PLUS		
	Package Model	Motor Model	Driver Model	Package Model	Motor Model	Driver Model
TH Geared	AS66□C-T3.6	ASM66□C-T3.6	ASD12B-C	AS66□CP-T3.6	ASM66□C-T3.6	ASD12B-CP
	AS66□C-T7.2	ASM66□C-T7.2		AS66□CP-T7.2	ASM66□C-T7.2	
	AS66□C-T10	ASM66□C-T10	ASD12C-C	AS66□CP-T10	ASM66□C-T10	ASD12C-CP
	AS66□C-T20	ASM66□C-T20		AS66□CP-T20	ASM66□C-T20	
	AS66□C-T30	ASM66□C-T30	ASD16A-C	AS66□CP-T30	ASM66□C-T30	ASD16A-CP
	AS98□C-T3.6	ASM98□C-T3.6		AS98□CP-T3.6	ASM98□C-T3.6	
	AS98□C-T7.2	ASM98□C-T7.2		AS98□CP-T7.2	ASM98□C-T7.2	
	AS98□C-T10	ASM98□C-T10		AS98□CP-T10	ASM98□C-T10	
AS98□C-T20	ASM98□C-T20	ASD16C-C	AS98□CP-T20	ASM98□C-T20	ASD16C-CP	
AS98□C-T30	ASM98□C-T30		AS98□CP-T30	ASM98□C-T30		
PN Geared	AS66□C-N5	ASM66□C-N5	ASD12A-C	AS66□CP-N5	ASM66□C-N5	ASD12A-CP
	AS66□C-N7.2	ASM66□C-N7.2		AS66□CP-N7.2	ASM66□C-N7.2	
	AS66□C-N10	ASM66□C-N10	ASD12B-C	AS66□CP-N10	ASM66□C-N10	ASD12B-CP
	AS66□C-N25	ASM66□C-N25		AS66□CP-N25	ASM66□C-N25	
	AS66□C-N36	ASM66□C-N36	ASD12C-C	AS66□CP-N36	ASM66□C-N36	ASD12C-CP
	AS66□C-N50	ASM66□C-N50		AS66□CP-N50	ASM66□C-N50	
	AS98□C-N5	ASM98□C-N5	ASD16A-C	AS98□CP-N5	ASM98□C-N5	ASD16A-CP
	AS98□C-N7.2	ASM98□C-N7.2		AS98□CP-N7.2	ASM98□C-N7.2	
	AS98□C-N10	ASM98□C-N10		AS98□CP-N10	ASM98□C-N10	
	AS98□C-N25	ASM98□C-N25		AS98□CP-N25	ASM98□C-N25	
AS98□C-N36	ASM98□C-N36	ASD16B-C	AS98□CP-N36	ASM98□C-N36	ASD16B-CP	
AS98□C-N50	ASM98□C-N50		AS98□CP-N50	ASM98□C-N50		
HG Geared	AS66□C2-H50	ASM66□C2-H50	ASD12B-C	AS66□CP2-H50	ASM66□C2-H50	ASD12B-CP
	AS66□C2-H100	ASM66□C2-H100	ASD12C-C	AS66□CP2-H100	ASM66□C2-H100	ASD12C-CP
	AS98□C-H50	ASM98□C-H50	ASD16B-C	AS98□CP-H50	ASM98□C-H50	ASD16B-CP
	AS98□C-H100	ASM98□C-H100		AS98□CP-H100	ASM98□C-H100	

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

● Three-Phase 200-230 VAC

Type	AS			AS PLUS		
	Package Model	Motor Model	Driver Model	Package Model	Motor Model	Driver Model
Standard	AS66□S	ASM66□C	ASD12A-S	AS66□SP	ASM66□C	ASD12A-SP
	AS69□S	ASM69□C	ASD16D-S	AS69□SP	ASM69□C	ASD16D-SP
	AS98□S	ASM98□C	ASD16A-S	AS98□SP	ASM98□C	ASD16A-SP
	AS911AS	ASM911AC	ASD20A-S	AS911ASP	ASM911AC	ASD20A-SP
TH Geared	AS66□S-T3.6	ASM66□C-T3.6	ASD12B-S	AS66□SP-T3.6	ASM66□C-T3.6	ASD12B-SP
	AS66□S-T7.2	ASM66□C-T7.2		AS66□SP-T7.2	ASM66□C-T7.2	
	AS66□S-T10	ASM66□C-T10	ASD12C-S	AS66□SP-T10	ASM66□C-T10	ASD12C-SP
	AS66□S-T20	ASM66□C-T20		AS66□SP-T20	ASM66□C-T20	
	AS66□S-T30	ASM66□C-T30	ASD16A-S	AS66□SP-T30	ASM66□C-T30	ASD16A-SP
	AS98□S-T3.6	ASM98□C-T3.6		AS98□SP-T3.6	ASM98□C-T3.6	
	AS98□S-T7.2	ASM98□C-T7.2		AS98□SP-T7.2	ASM98□C-T7.2	
	AS98□S-T10	ASM98□C-T10		AS98□SP-T10	ASM98□C-T10	
AS98□S-T20	ASM98□C-T20	ASD16C-S	AS98□SP-T20	ASM98□C-T20	ASD16C-SP	
AS98□S-T30	ASM98□C-T30		AS98□SP-T30	ASM98□C-T30		
PN Geared	AS66□S-N5	ASM66□C-N5	ASD12A-S	AS66□SP-N5	ASM66□C-N5	ASD12A-SP
	AS66□S-N7.2	ASM66□C-N7.2		AS66□SP-N7.2	ASM66□C-N7.2	
	AS66□S-N10	ASM66□C-N10	ASD12B-S	AS66□SP-N10	ASM66□C-N10	ASD12B-SP
	AS66□S-N25	ASM66□C-N25		AS66□SP-N25	ASM66□C-N25	
	AS66□S-N36	ASM66□C-N36	ASD12C-S	AS66□SP-N36	ASM66□C-N36	ASD12C-SP
	AS66□S-N50	ASM66□C-N50		AS66□SP-N50	ASM66□C-N50	
	AS98□S-N5	ASM98□C-N5	ASD16A-S	AS98□SP-N5	ASM98□C-N5	ASD16A-SP
	AS98□S-N7.2	ASM98□C-N7.2		AS98□SP-N7.2	ASM98□C-N7.2	
	AS98□S-N10	ASM98□C-N10		AS98□SP-N10	ASM98□C-N10	
	AS98□S-N25	ASM98□C-N25		AS98□SP-N25	ASM98□C-N25	
AS98□S-N36	ASM98□C-N36	ASD16B-S	AS98□SP-N36	ASM98□C-N36	ASD16B-SP	
AS98□S-N50	ASM98□C-N50		AS98□SP-N50	ASM98□C-N50		
HG Geared	AS66□S2-H50	ASM66□C2-H50	ASD12B-S	AS66□SP2-H50	ASM66□C2-H50	ASD12B-SP
	AS66□S2-H100	ASM66□C2-H100	ASD12C-S	AS66□SP2-H100	ASM66□C2-H100	ASD12C-SP
	AS98□S-H50	ASM98□C-H50	ASD16B-S	AS98□SP-H50	ASM98□C-H50	ASD16B-SP
	AS98□S-H100	ASM98□C-H100		AS98□SP-H100	ASM98□C-H100	

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