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αSTEP
AS Series

Additional Information

Technical Reference F-1
General Information G-1

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Closed Loop Stepping Motor and Driver Package
αSTEP AS Series

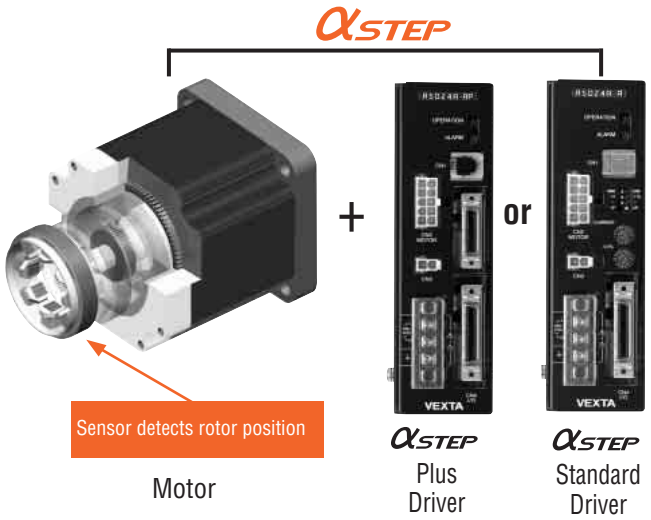
The αSTEP is a revolutionary hybrid stepping motor and driver package which eliminates missed steps; a common problem with stepping motors. The αSTEP uses a built-in feedback device that constantly monitors the motor shaft position to detect and correct for loss of synchronism. Geared models are also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



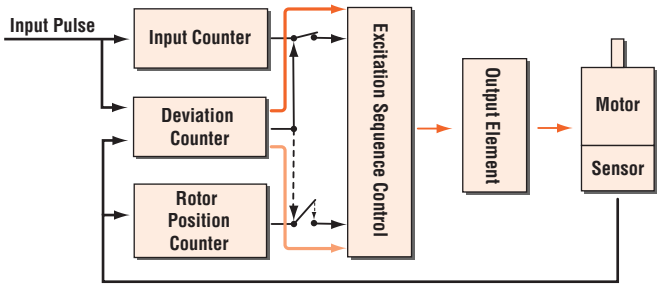
Features

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

αSTEP 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.



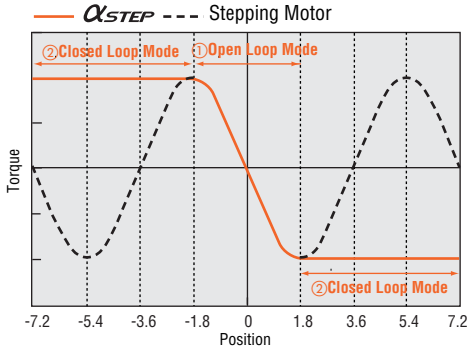
◆ αSTEP Control Diagram



Normal (Positioning Deviation is less than ±1.8°)
Mortor runs in open loop mode like a stepping motor.

If Motor Missteps (Positioning Deviation is greater than ±1.8°)
Control switches to closed loop mode to prevent loss of synchronism.

◆ αSTEP Angle-Torque Characteristics



① If the positioning deviation is ±1.8° or smaller, the motor runs in open loop mode like a stepping motor.
② If the positioning deviation is ±1.8° 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.

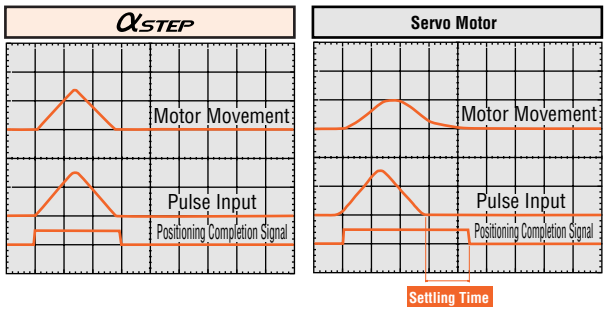
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Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

High Response

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

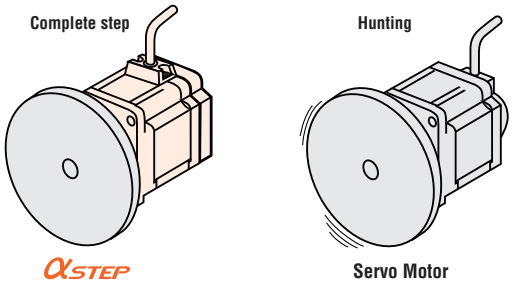
Measurement condition : Feed 1/5 rotation
Load inertia 1.365 oz-in^2 (250×10^{-7} kg·m^2)



- 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.

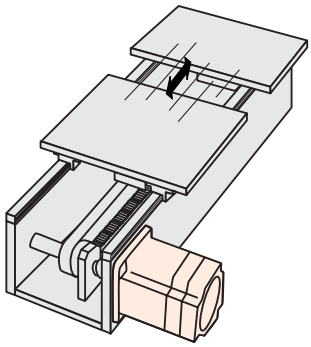
No Hunting

Since αSTEP 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. αSTEP is ideal for applications in which vibration would be a problem.



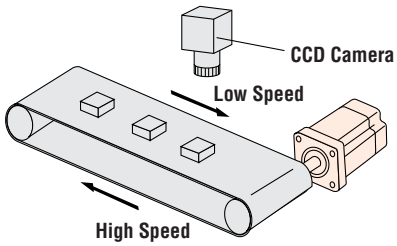
No Gain Tuning

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



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.
αSTEP 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.



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

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AS Series Line-Up

AS Series
(AC Power Input)

- αSTEP — Can be controlled from your own pulse generator
- αSTEP PLUS — **Integrated Controller and Driver** — No separate pulse generator required

ASC Series →See Page C-55
(DC Power Input)



Standard
- Basic Model of αSTEP 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

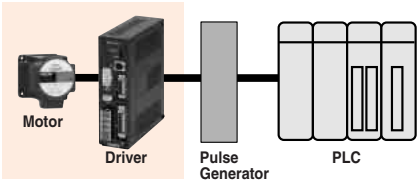
Gear Ratios 5:1, 7.2:1, 10:1, 25:1, 36:1, 50:1



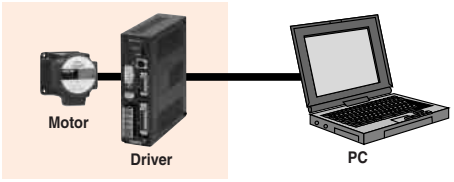
Harmonic (HG) Geared
- High positioning precision
- High permissible/maximum torque
- Zero backlash
- High gear ratio, High resolution
- Centered output shaft

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.

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αSTEP PLUS

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

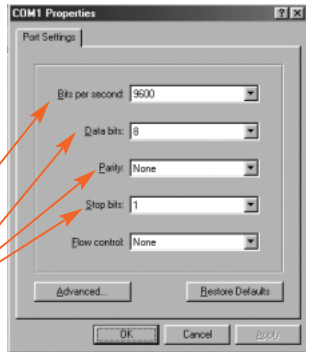
General Inputs/Outputs
- 8 Programmable Inputs
- 8 Programmable Outputs

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

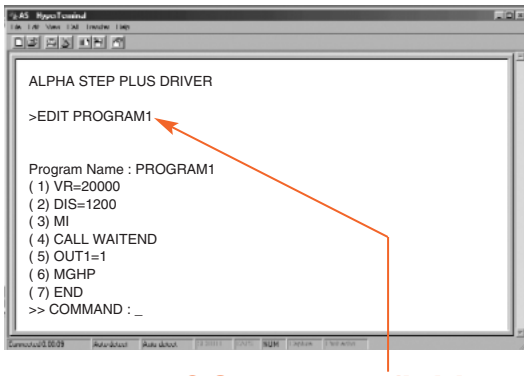
Program Memory
- Maximum number of programs: 14 (including STARTUP)
- Maximum lines per program: 64
- Commands per line: 1
- Program variables: 26 (A to Z)

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"

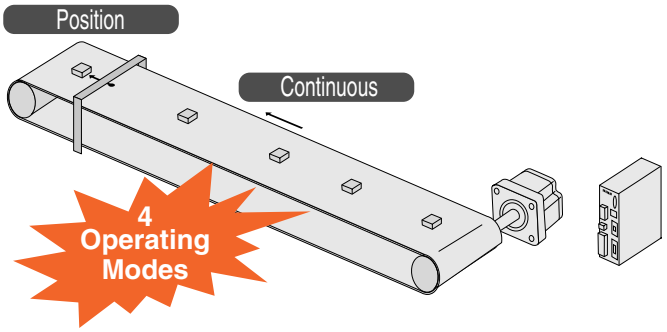


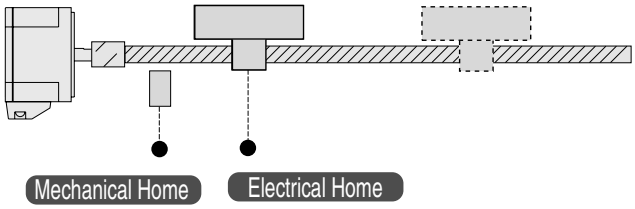
PROGRAM1 Definition
- Operating Speed: 20,000 Hz
- Move Distance: 1,200 pulses
- Call a subroutine that waits for the motor to stop before moving on to the next command
- Turn On Output #1
- Seek the Mechanical Home Position in the Positive Direction
- End of Program

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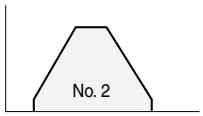
αSTEP Plus Features

Operating Modes

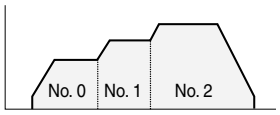




Linked Motion Capability



Single Motion

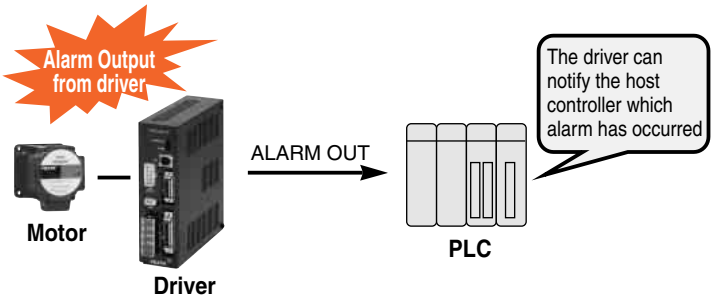


Linked Motion

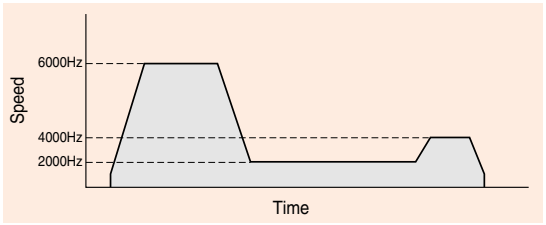
When a START signal is received motions 0, 1 and 2 are executed without stopping between each one.

Alarm Functions

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

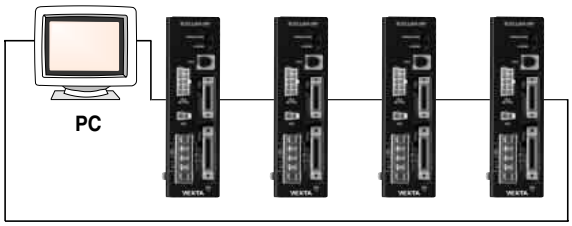


Speed Change On The Fly



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

Daisy Chain



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

Safety Standards and CE Marking

Model	Standards	Certification Body	File No.	CE Marking
Motor	UL1004 UL2111 CSA C22.2 No.100*3 CSA C22.2 No.77*3	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 on 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.

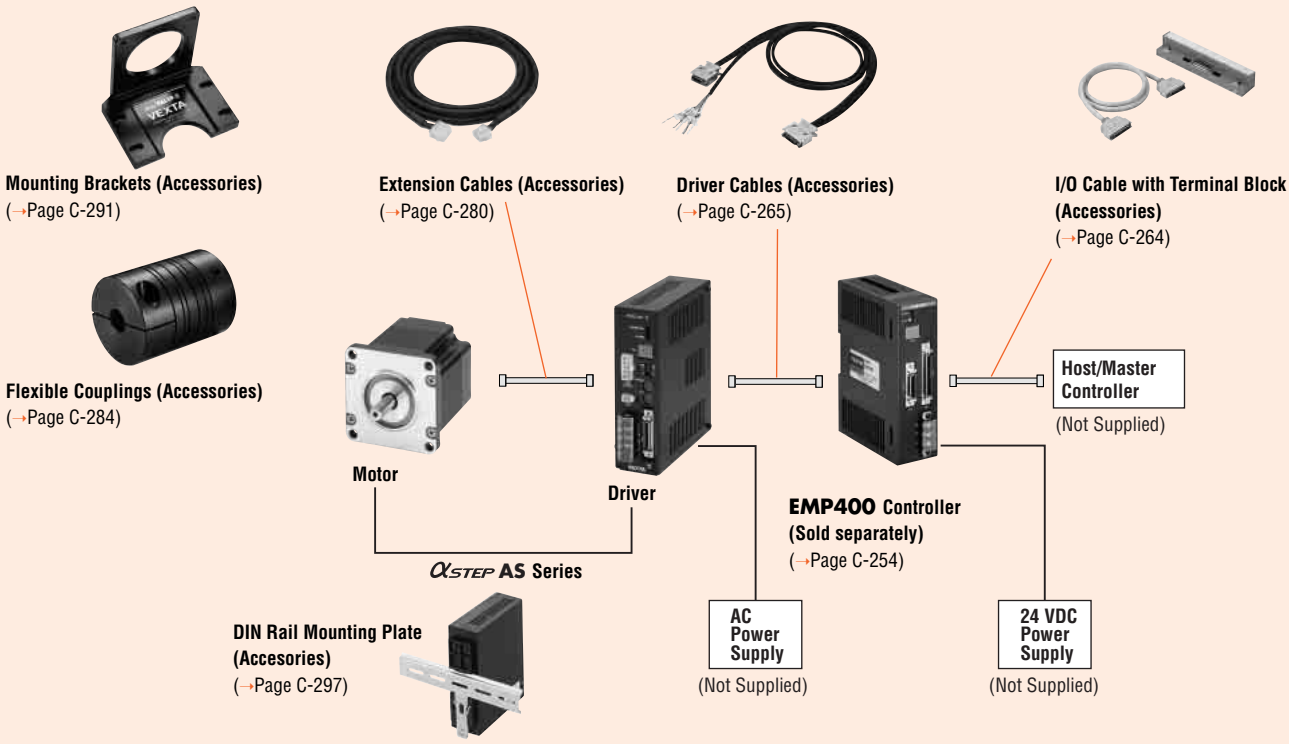
*1 Maximum Ambient Temperature for UL
AS: 122°F (+50°C), **AS PLUS**: 104°F (+40°C)
*2 EN60950 (Certified **AS** only)
*3 Except for **AS46**□□ (Motor Frame Size 1.65 inch (42 mm)).

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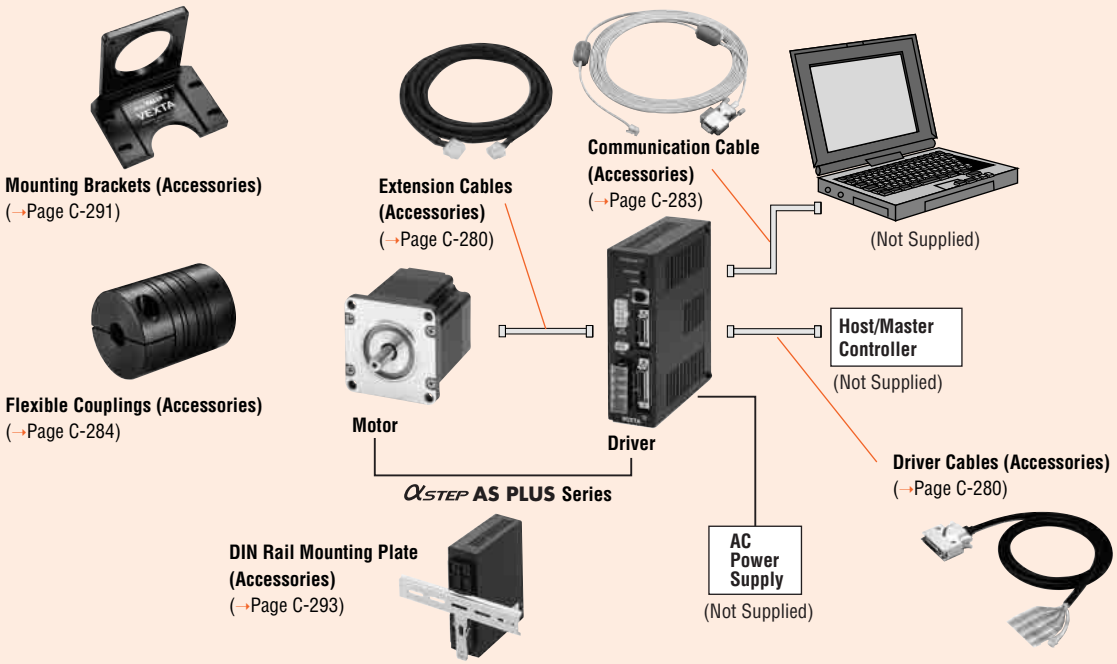
System Configuration

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.

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Product Number Code

AS 6 6 A A P-T 3.6

- **AS**: **AS** series
- **6**: Motor Frame Size — **4**: 1.65 in. sq. (42 mm sq.); **6**: 2.36 in. sq. (60 mm sq.); **9**: 3.35 in. sq. (85 mm sq.) [3.54 in. sq. (90 mm sq.) for geared type]
- **6**: Motor Case Length
- **A**: Without Electromagnetic Brake (Single Shaft); **M**: Electromagnetic Brake
- **A**: Power Input — **A**: Single-Phase 100-115 VAC; **C**: Single-Phase 200-230 VAC; **S**: Three-Phase 200-230 VAC
- **P**: **AlphaStep Plus**; **Blank**: **AlphaStep** Standard
- **Blank**: Standard Type; **T**: **TH** Geared Type; **N**: **PN** Geared Type; **H**: **HG** Geared Type
- **3.6**: Gear Ratio

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**

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◆ 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**
	—	**AS66AA-N50**	**AS98AA-N50**	—	**AS66MA-N50**	**AS98MA-N50**
Single-Phase 200-230 VAC	—	**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**
	—	**AS66AC-N36**	**AS98AC-N36**	—	**AS66MC-N36**	**AS98MC-N36**
	—	**AS66AC-N50**	**AS98AC-N50**	—	**AS66MC-N50**	**AS98MC-N50**
Three-Phase 200-230 VAC	—	**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**	**AS911AAP**	—	**AS69MAP**	—
Single-Phase 200-230 VAC	—	**AS66ACP**	**AS98ACP**	—	**AS66MCP**	**AS98MCP**
	—	**AS69ACP**	**AS911ACP**	—	**AS69MCP**	—
Three-Phase 200-230 VAC	—	**AS66ASP**	**AS98ASP**	—	**AS66MSP**	**AS98MSP**
	—	**AS69ASP**	**AS911ASP**	—	**AS69MSP**	—

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◆ 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

Features C-12 | System Configuration C-17 | Specifications/Characteristics C-21

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

Specifications

*Only the driver conforms to the CSA standard for **AS46** type motors .

Model*1			AS46AA	AS66A□	AS69A□	AS98A□	AS911A□
	AS	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			—
	Static Friction Torque	oz-in (N·m)	21 (0.15)	85 (0.6)	142 (1.0)	142 (1.0)	—
Weight*2		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				

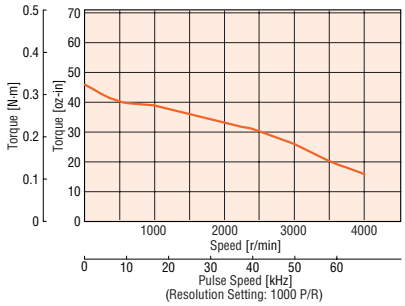
*1 The square box in the model number will contain one of the following letters to indicate the power supply voltage: **A** (Single-Phase 100-115 VAC), **C** (Single-Phase 200-230 VAC) or **S** (Three-Phase 200-230 VAC).
*2 The values inside the brackets [ ] represents the specification for electromagnetic 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. For motor frame size □1.65 in. (□42 mm), use the standard 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

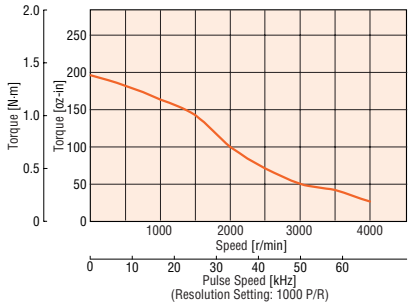
Speed — Torque Characteristics

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

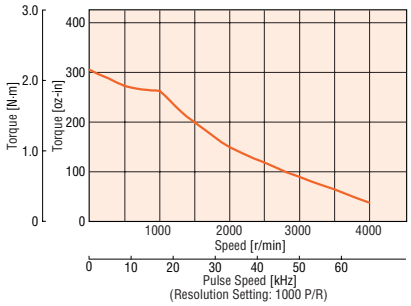
AS46□A, AS46□AP



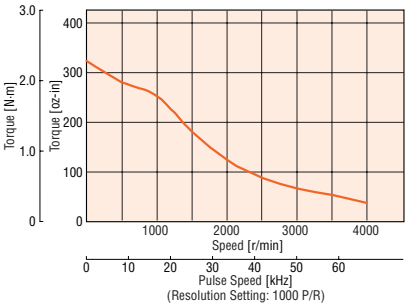
AS66□□, AS66□□P



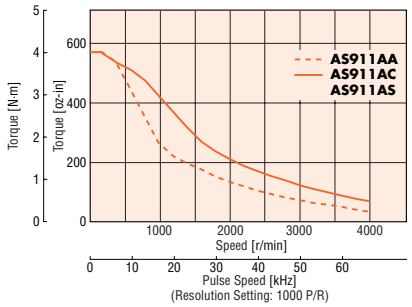
AS69□□, AS69□□P



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%.

Common Specifications C-29 | Dimensions C-32 | Connection and Operation C-39 | Motor and Driver Combinations C-53

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

Specifications

✻Only the driver conforms to the CSA standard for **AS46** type motors .

Model							
	AS	W/O Electromagnetic Brake	**AS46AA-T3.6**	**AS46AA-T7.2**	**AS46AA-T10**	**AS46AA-T20**	**AS46AA-T30**
		Electromagnetic Brake	**AS46MA-T3.6**	**AS46MA-T7.2**	**AS46MA-T10**	**AS46MA-T20**	**AS46MA-T30**
	AS PLUS	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				
	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)
Weight✻2	Motor	lb. (kg)	1.4 (0.65) [1.7 (0.75)]				
	Driver	lb. (kg)	1.8 (0.8)				
Dimension No.	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 standard 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.

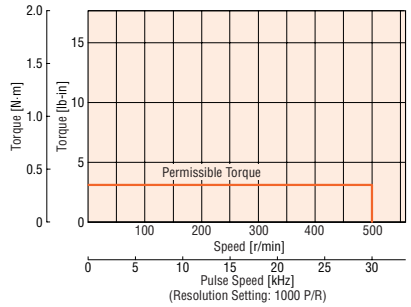
How to Read Specifications Table→Page C-9

Note:
- 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.

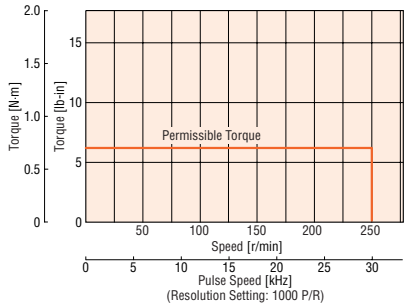
Speed — Torque Characteristics

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

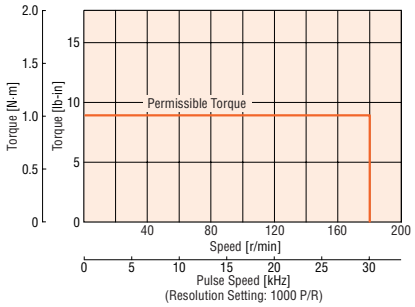
AS46□A-T3.6, AS46□AP-T3.6



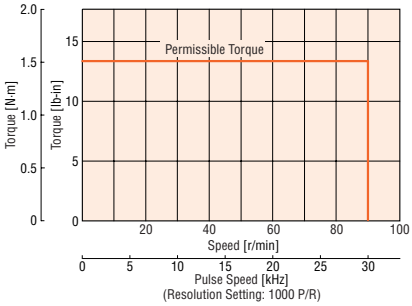
AS46□A-T7.2, AS46□AP-T7.2



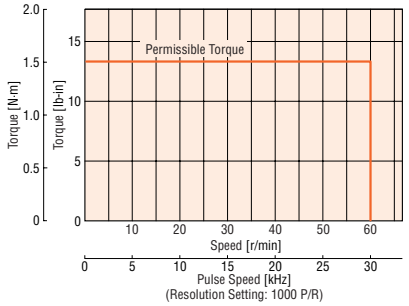
AS46□A-T10, AS46□AP-T10



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). [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%.

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

Specifications

Model*1			AS66A□-T3.6	AS66A□-T7.2	AS66A□-T10	AS66A□-T20	AS66A□-T30
	AS	W/O Electromagnetic Brake	AS66A□-T3.6	AS66A□-T7.2	AS66A□-T10	AS66A□-T20	AS66A□-T30
		Electromagnetic Brake	AS66M□-T3.6	AS66M□-T7.2	AS66M□-T10	AS66M□-T20	AS66M□-T30
	AS PLUS	W/O Electromagnetic Brake	AS66A□P-T3.6	AS66A□P-T7.2	AS66A□P-T10	AS66A□P-T20	AS66A□P-T30
		Electromagnetic Brake	AS66M□P-T3.6	AS66M□P-T7.2	AS66M□P-T10	AS66M□P-T20	AS66M□P-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-in² (kg·m²)	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		5				
	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.

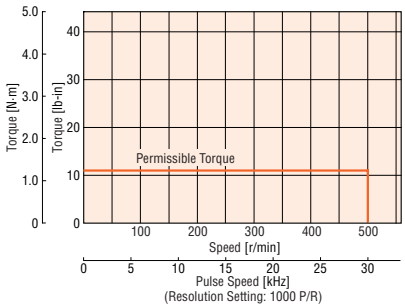
How to Read Specifications Table→Page C-9

Note:
- 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.

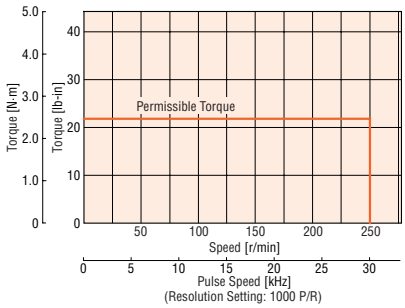
Speed — Torque Characteristics

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

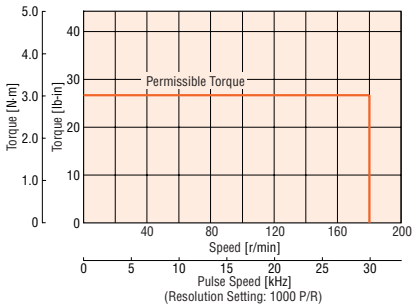
AS66□□-T3.6, AS66□□P-T3.6



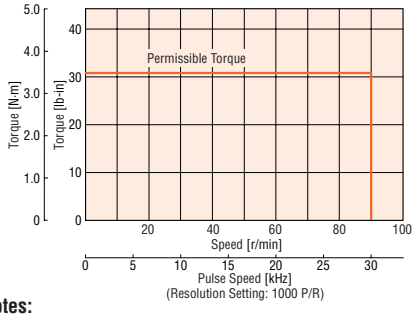
AS66□□-T7.2, AS66□□P-T7.2



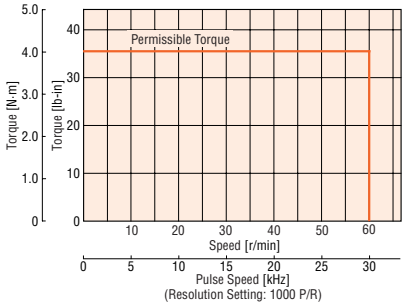
AS66□□-T10, AS66□□P-T10



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%.

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TH Geared Type

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

Specifications

Model*1			AS98A□-T3.6	AS98A□-T7.2	AS98A□-T10	AS98A□-T20	AS98A□-T30
	AS	Electromagnetic Brake	AS98M□-T3.6	AS98M□-T7.2	AS98M□-T10	AS98M□-T20	AS98M□-T30
	AS PLUS	W/O Electromagnetic Brake	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-in² (kg·m²)	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		□=**A** for Single-Phase 100-115 VAC −15%~+10% · 50/60 Hz·6.0 A □=**C** for Single-Phase 200-230 VAC −15%~+10% · 50/60 Hz·3.5 A □=**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.

How to Read Specifications Table→Page C-9

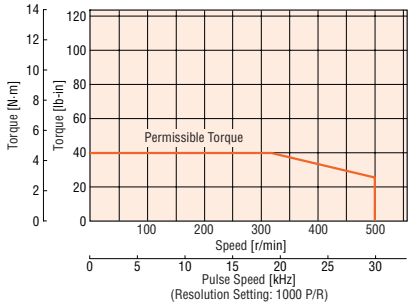
Note:

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

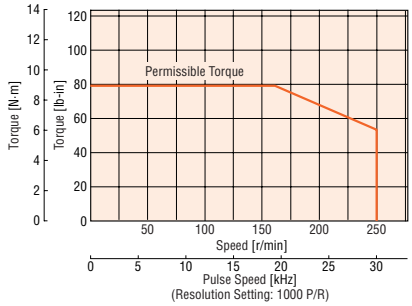
Speed — Torque Characteristics

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

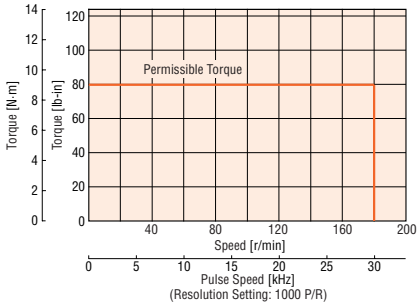
AS98□□-T3.6, AS98□□P-T3.6



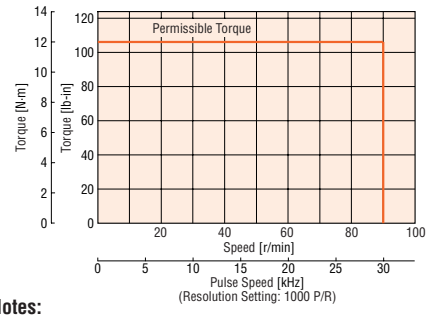
AS98□□-T7.2, AS98□□P-T7.2



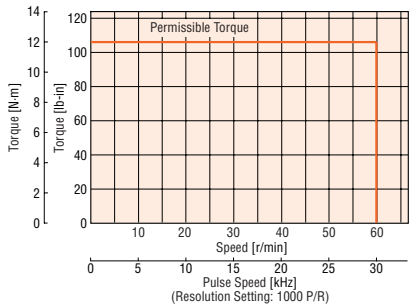
AS98□□-T10, AS98□□P-T10



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%.

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Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

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

Specifications

✻Only the driver conforms to the CSA standard for **AS46** type motors .

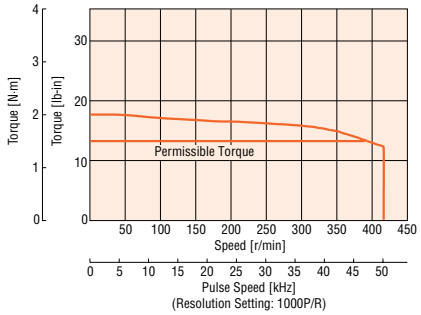
Model				
	AS	W/O Electromagnetic Brake	**AS46AA-N7.2**	**AS46AA-N10**
		Electromagnetic Brake	**AS46MA-N7.2**	**AS46MA-N10**
	AS PLUS	W/O Electromagnetic Brake	**AS46AAP-N7.2**	**AS46AAP-N10**
		Electromagnetic Brake	**AS46MAP-N7.2**	**AS46MAP-N10**
Maximum Holding Torque		lb-in (N·m)	13.2 (1.5)	
Rotor 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	
	Static Friction Torque	lb-in (N·m)	6.6 (0.75)	
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 standard 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.

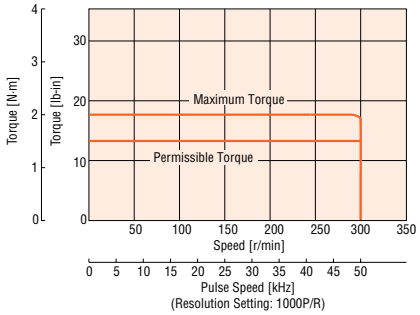
Speed — Torque Characteristics

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). [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%.

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PN Geared Type

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

Specifications

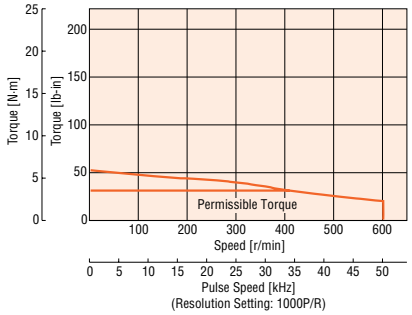
Model*1								
AS	W/O Electromagnetic Brake	AS66A□-N5	AS66A□-N7.2	AS66A□-N10	AS66A□-N25	AS66A□-N36	AS66A□-N50
	Electromagnetic Brake	AS66M□-N5	AS66M□-N7.2	AS66M□-N10	AS66M□-N25	AS66M□-N36	AS66M□-N50
AS PLUS	W/O Electromagnetic Brake	AS66A□P-N5	AS66A□P-N7.2	AS66A□P-N10	AS66A□P-N25	AS66A□P-N36	AS66A□P-N50
	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		□=**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)	15.4 (1.75)	17.7 (2.0)	22 (2.5)	35 (4.0)		
Weight*2	Motor	lb. (kg)	3.3 (1.5) [3.9 (1.75)]			3.7 (1.7) [4.3 (1.95)]		
	Driver	lb. (kg)	1.8 (0.8)					
Dimension No.	Motor		8					
	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.

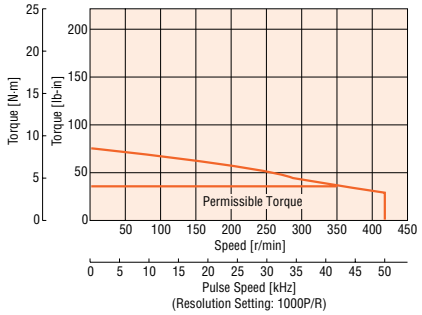
Speed — Torque Characteristics

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

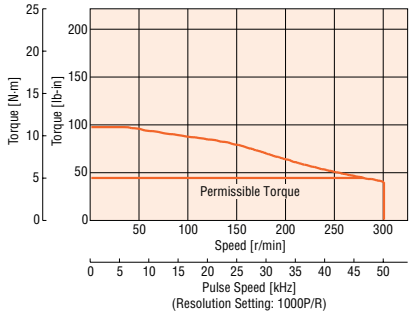
AS66□□-N5, AS66□□P-N5



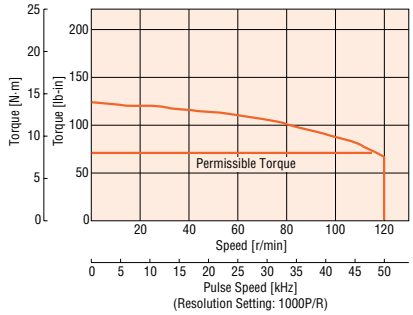
AS66□□-N7.2, AS66□□P-N7.2



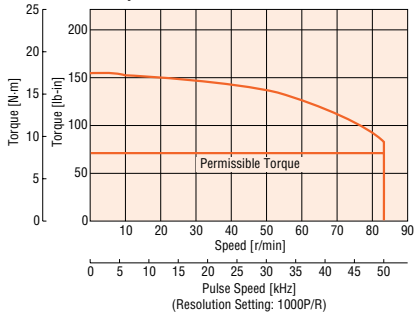
AS66□□-N10, AS66□□P-N10



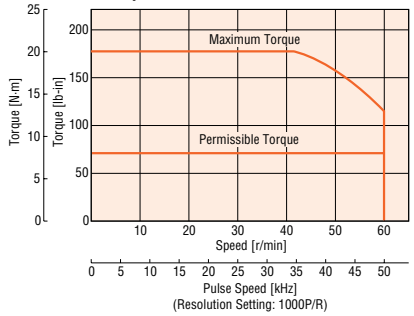
AS66□□-N25, AS66□□P-N25



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%.

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Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

PN Geared Type

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

Specifications

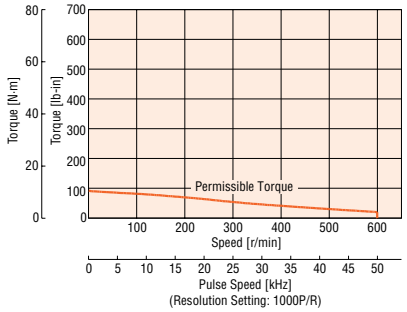
Model*1			AS98A□-N5	AS98A□-N7.2	AS98A□-N10	AS98A□-N25	AS98A□-N36	AS98A□-N50
	AS	Electromagnetic Brake	AS98M□-N5	AS98M□-N7.2	AS98M□-N10	AS98M□-N25	AS98M□-N36	AS98M□-N50
	AS PLUS	W/O Electromagnetic Brake	AS98A□P-N5	AS98A□P-N7.2	AS98A□P-N10	AS98A□P-N25	AS98A□P-N36	AS98A□P-N50
		Electromagnetic Brake	AS98M□P-N5	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		□=**A** for Single-Phase 100-115 VAC −15%~+10% · 50/60 Hz·6.0 A □=**C** for Single-Phase 200-230 VAC −15%~+10% · 50/60 Hz·3.5 A □=**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)	39 (4.5)	57 (6.45)	79 (9)	163 (18.5)		
Weight*2	Motor	lb. (kg)	8.8 (4.0) [9.7 (4.4)]			10 (4.7) [11 (5.1)]		
	Driver	lb. (kg)	1.8 (0.8)					
Dimension No.	Motor		9					
	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.

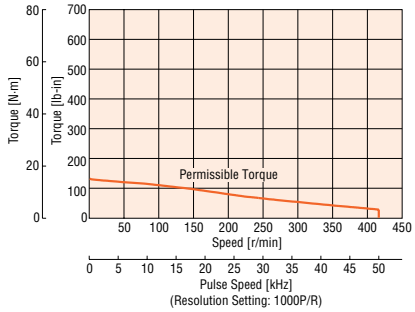
Speed — Torque Characteristics

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

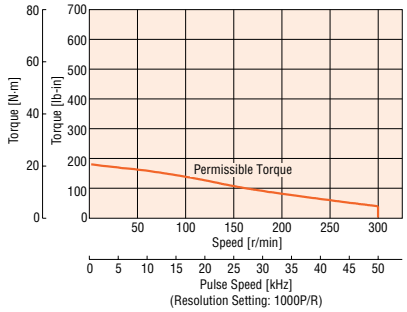
AS98□□-N5, AS98□□P-N5



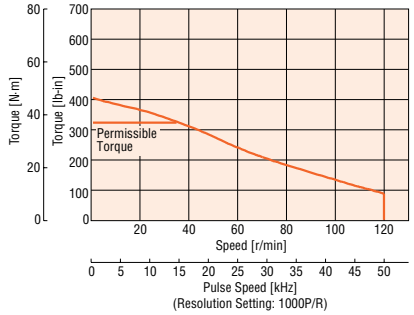
AS98□□-N7.2, AS98□□P-N7.2



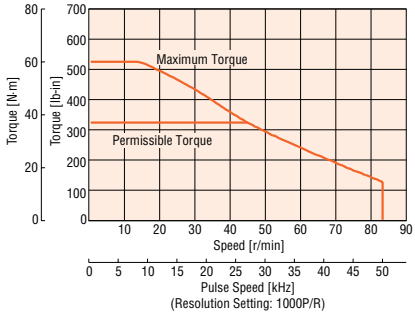
AS98□□-N10, AS98□□P-N10



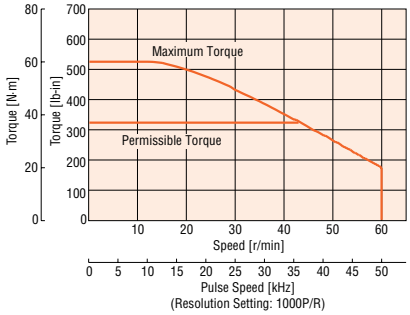
AS98□□-N25, AS98□□P-N25



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%.

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

Specifications

✻Only the driver conforms to the CSA standard for **AS46** type motors .

Model✻1								
	AS	W/O Electromagnetic Brake	**AS46AA2-H50**	**AS46AA2-H100**	**AS66A□2-H50**	**AS66A□2-H100**	**AS98A□-H50**	**AS98A□-H100**
		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-in² (kg·m²)	0.46 (85×10⁻⁷) [0.55 (100×10⁻⁷)]		2.4 (440×10⁻⁷) [3.3 (599×10⁻⁷)]		8.8 (1600×10⁻⁷) [9.6 (1759×10⁻⁷)]	
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. For motor frame size □1.65 in. (□42 mm), use the standard 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

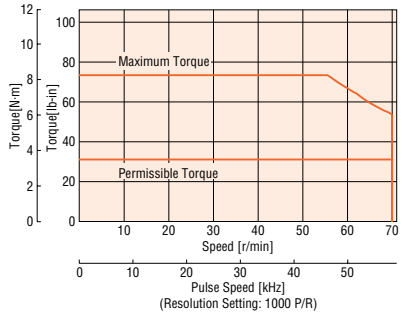
Note:

- 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.

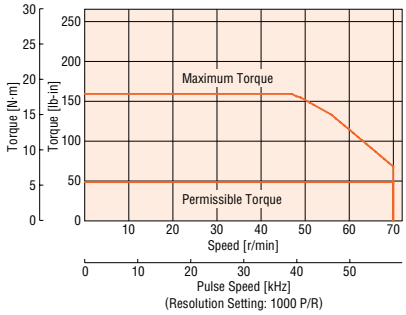
Speed — Torque Characteristics

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

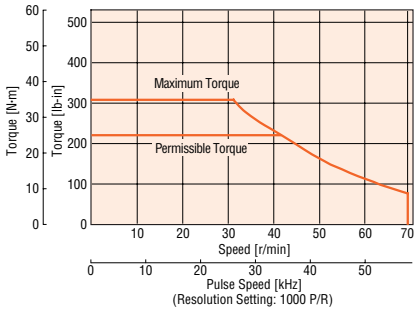
AS46□A2-H50, AS46□AP2-H50



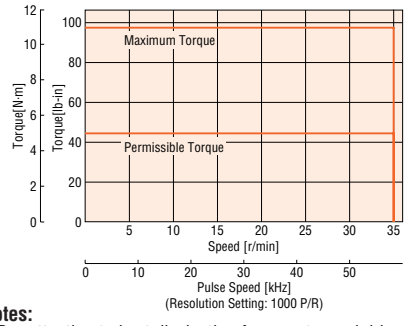
AS66□□2-H50, AS66□□P2-H50



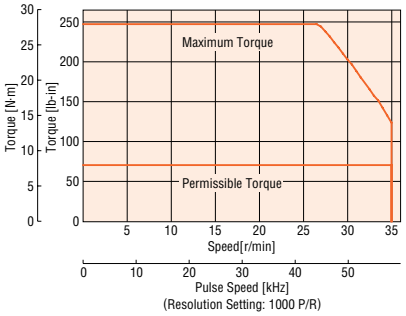
AS98□□-H50, AS98□□P-H50



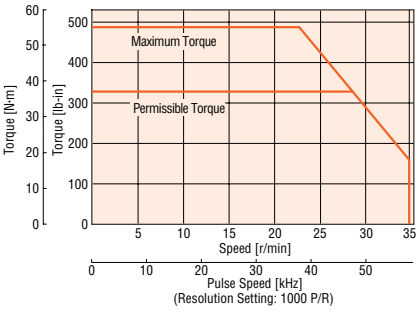
AS46□A2-H100, AS46□AP2-H100



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. 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.]
- 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%.

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Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

Common Specifications

AS Series

Speed and Position Control Command	Pulse Train Input
Maximum Input Pulse Frequency	250 kHz (When the pulse duty is 50%)
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 (Negative logic pulse input), 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)	• Scan (Continuous operation)	• Linked Profile
	• Return (Return to electrical home position)	• Home Operation (Return to mechanical home position)	
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	• Current setting function	• Electronic gear function
	• Setting function for direction of motor rotation	• Emergency stop function	• Over-travel function
	• Software over-travel function	• Alarm trace-back 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	Transmit system: Asynchronous communication, NRZ (Non Return to Zero), Full duplex	
	Data length: 8 bits, 1 stop bit, No parity	Transmit speed: 9600 bps	
	Connector specification: Modular (4 wires, 4 pins)		
	Pin arrangement: RS232 Compatible	Protocol: TTY (CR+LF)	
User Program	Maximum number of programs: 14 programs (including STARTUP program)		Maximum lines per program: 64 lines
	Maximum commands per 1 line: 1 command (Single state)		Maximum program variables: 26 variables (A~Z)

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

General Specifications

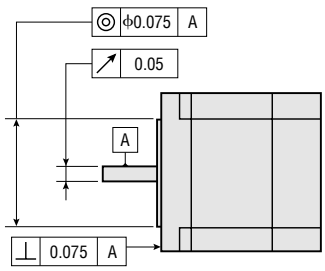
This is the value after rated operation at normal temperature and normal humidity.

		Motor	Driver
Insulation Class		Class B [266°F (130°C)] [UL/CSA: Recognized as class A 221°F(105°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.



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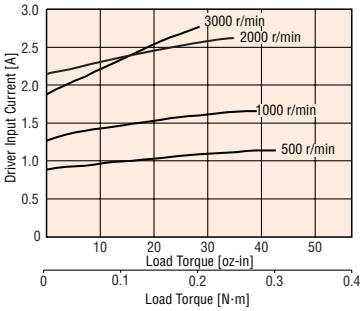
Load Torque — Driver Input Current Characteristics

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.

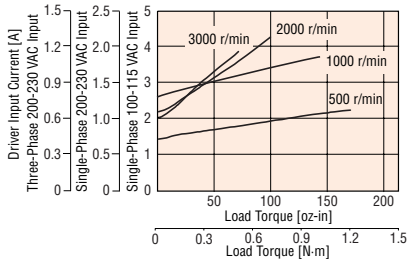
Motor shaft speed = Gear output shaft speed×Gear ratio [r/min]

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

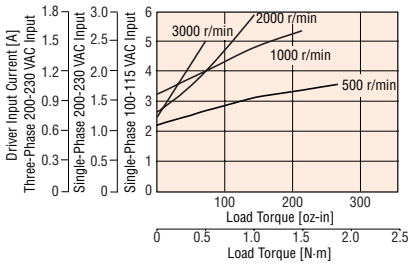
AS46□A, AS46□AP



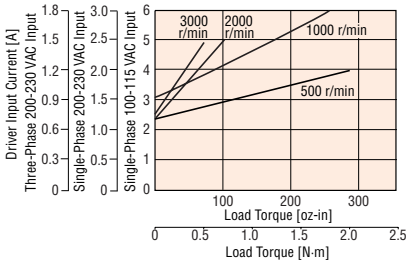
AS66□□, AS66□□P



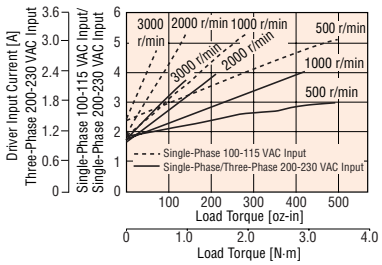
AS69□□, AS69□□P



AS98□□, AS98□□P



AS911A□, AS911A□P



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Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

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□ **AS69□**	14.1 63	16.8 75	21 95	29 130	42 190	
AS98□ **AS911A□**	58 260	65 290	76 340	87 390	108 480	
AS46□-T3.6 **AS46□-T7.2** **AS46□-T10** **AS46□-T20** **AS46□-T30**	2.2 10	3.1 14	4.5 20	6.7 30	—	3.3 15
AS66□-T3.6 **AS66□-T7.2** **AS66□-T10** **AS66□-T20** **AS66□-T30**	15.7 70	18 80	22 100	27 120	33 150	9 40
AS98□-T3.6 **AS98□-T7.2** **AS98□-T10** **AS98□-T20** **AS98□-T30**	49 220	56 250	67 300	78 350	90 400	
AS46□-N7.2	22 100	27 120	33 150	42 190	—	22 100
AS46□-N10						
AS66□-N5	45 200	49 220	56 250	63 280	72 320	
AS66□-N7.2	56 250	60 270	67 300	76 340	87 390	
AS66□-N10						
AS66□-N25 **AS66□-N36** **AS66□-N50**	74 330	81 360	90 400	101 450	117 520	
AS98□-N5	108 480	117 520	123 550	130 580	139 620	
AS98□-N7.2	108 480	121 540	135 600	153 680	177 790	
AS98□-N10						
AS98□-N25	191 850	210 940	230 1050	240 1110	260 1190	67 300
AS98□-N36	200 930	230 1030	250 1150	270 1220	290 1300	
AS98□-N50	230 1050	260 1160	290 1300	310 1380	330 1490	
AS46□2-H50	40 180	49 220	60 270	81 360	114 510	49 220
AS46□2-H100						
AS66□2-H50	72 320	83 370	99 440	123 550	162 720	101 450
AS66□2-H100						
AS98□-H50	240 1090	250 1150	270 1230	290 1310	310 1410	290 1300
AS98□-H100						

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

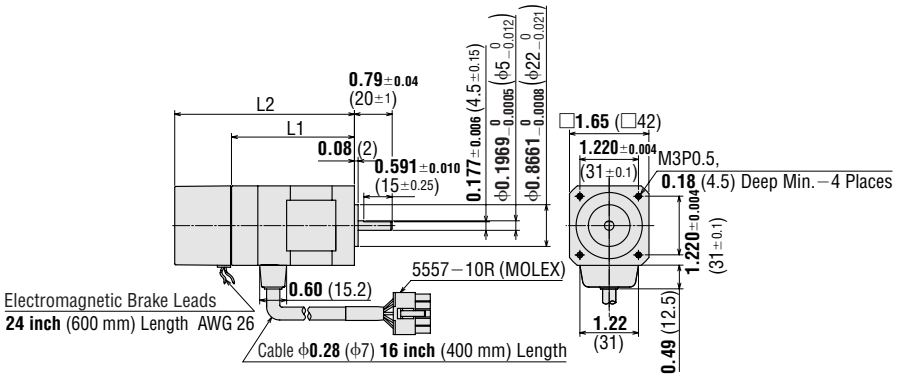
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Dimensions Scale 1/4, Unit = **inch** (mm)

Motor

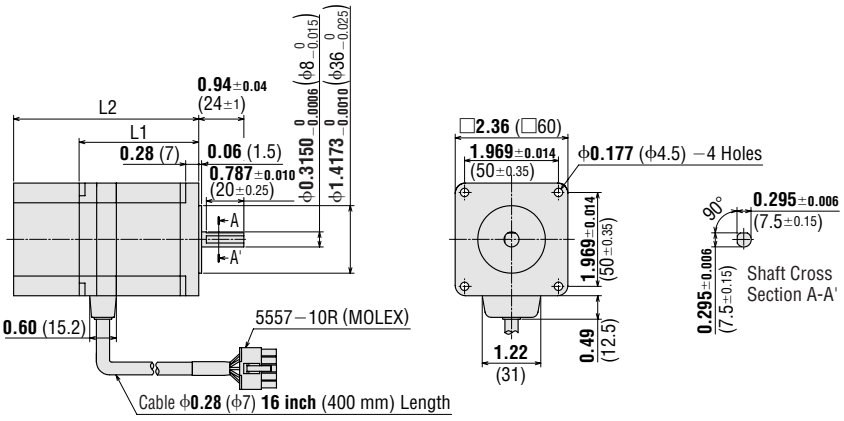
Standard Type

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)



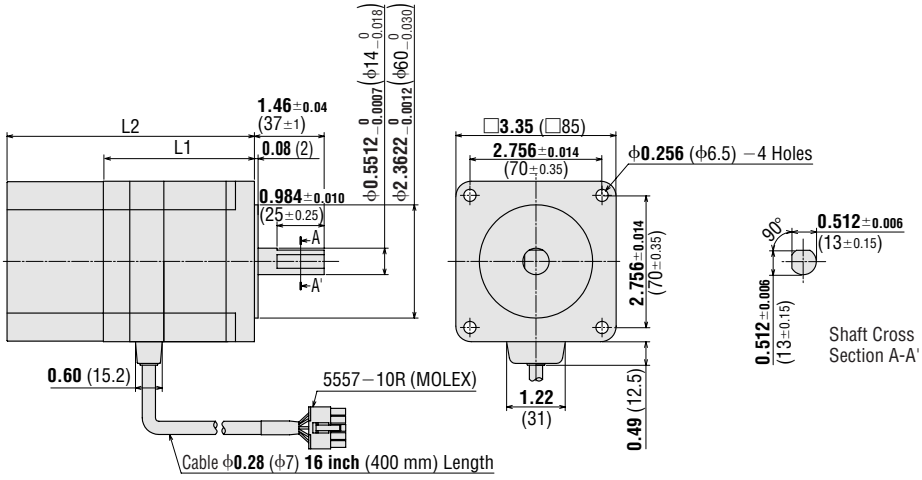
Model	Motor Model	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS66A□	ASM66A□	2.50 (63.6)	—	1.9 (0.85)	B194
AS66A□P					
AS66M□	ASM66M□	—	3.88 (98.6)	2.4 (1.1)	B195
AS66M□P					
AS69A□	ASM69A□	3.72 (94.6)	—	3.1 (1.4)	B272
AS69A□P					
AS69M□	ASM69M□	—	5.1 (129.6)	3.6 (1.65)	B273
AS69M□P					

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

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Features C-12 | System Configuration C-17 | Specifications/Characteristics C-21

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

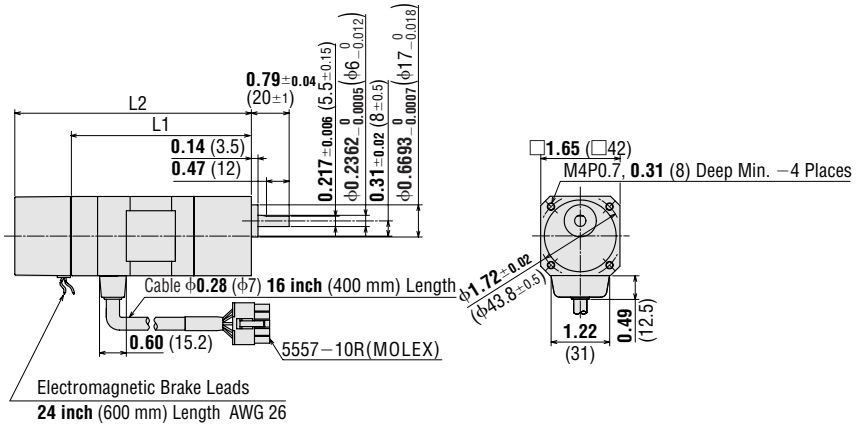


Model	Motor Model	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS98A□	ASM98A□	3.15 (80)	—	4.0 (1.8)	B196
AS98A□P					
AS98M□	ASM98M□	—	5.16 (131)	4.8 (2.2)	B235
AS98M□P					
AS911A□	ASM911A□	4.33 (110)	—	6.6 (3.0)	B264
AS911A□P					

● 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)

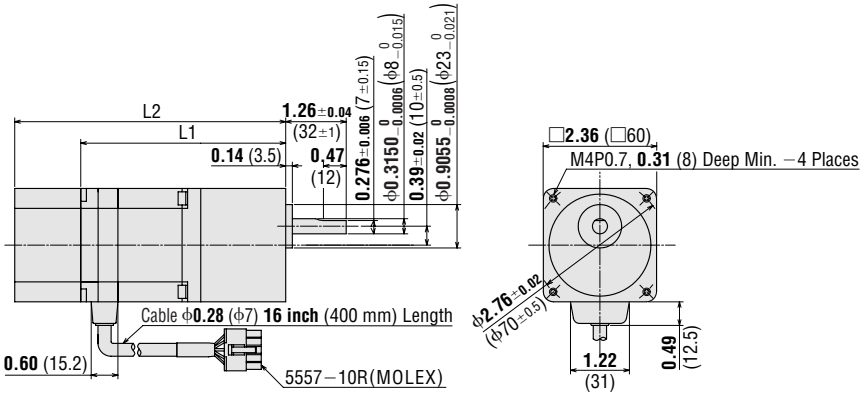


Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS46AA-T□	ASM46AA-T□	**3.6**, **7.2**, **10**, **20**, **30**	3.76 (95.4)	—	1.4 (0.65)	B199
AS46AAP-T□						
AS46MA-T□	ASM46MA-T□		—	4.94 (125.4)	1.7 (0.75)	B200
AS46MAP-T□						

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

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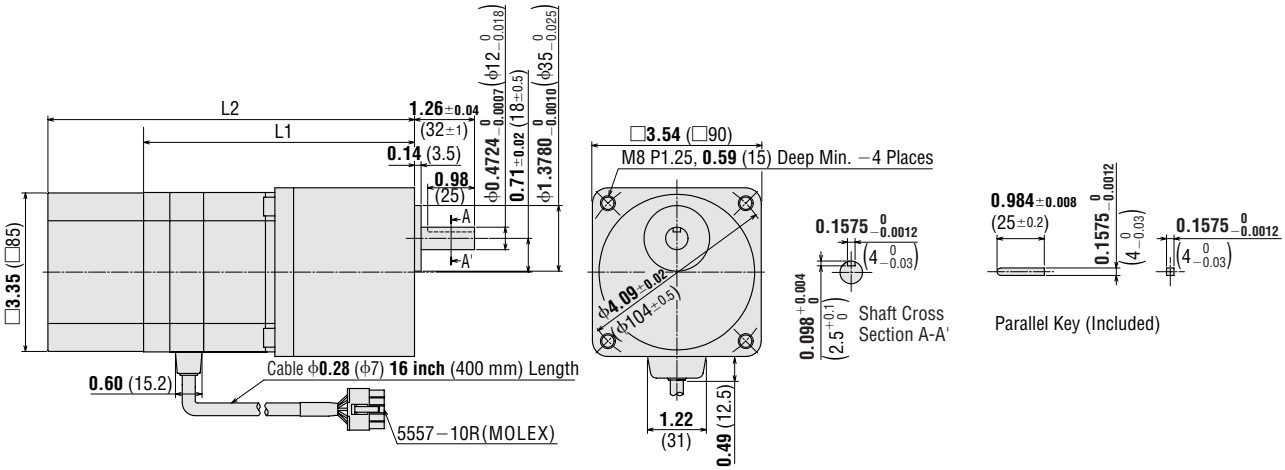
5 Motor Frame Size: □2.36 in. (□60 mm)



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□		—	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□		—	7.70 (195.5)	7.5 (3.4)	B236
AS98M□P-T□						

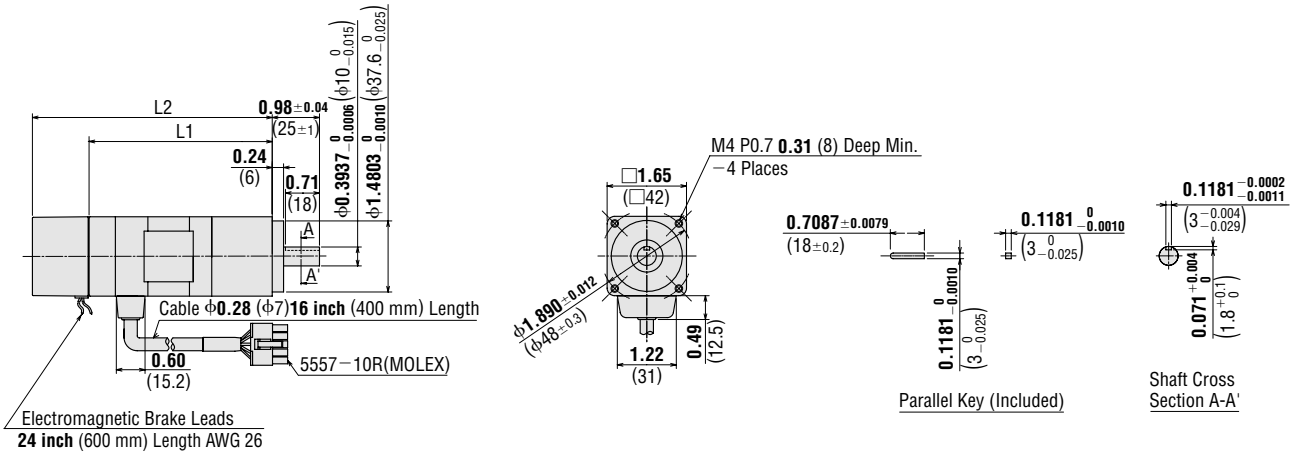
- Enter the gear ratio in the box (□) within the model number.
- Enter the power supply voltage **A**, **C** or **S** in the box (□) within the model number.

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Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

◆ PN Geared Type

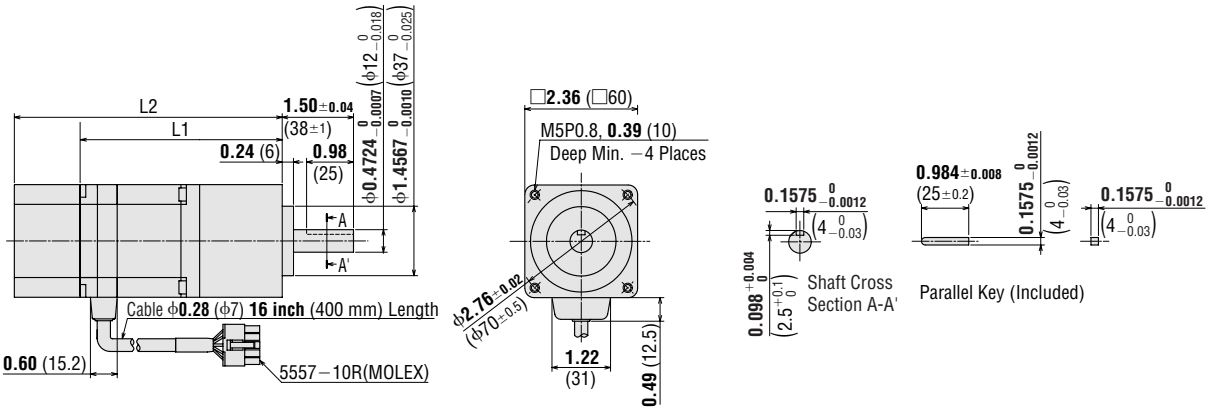
7 Motor Frame Size: □1.65 in. (□42 mm)



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
AS46AAP-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)

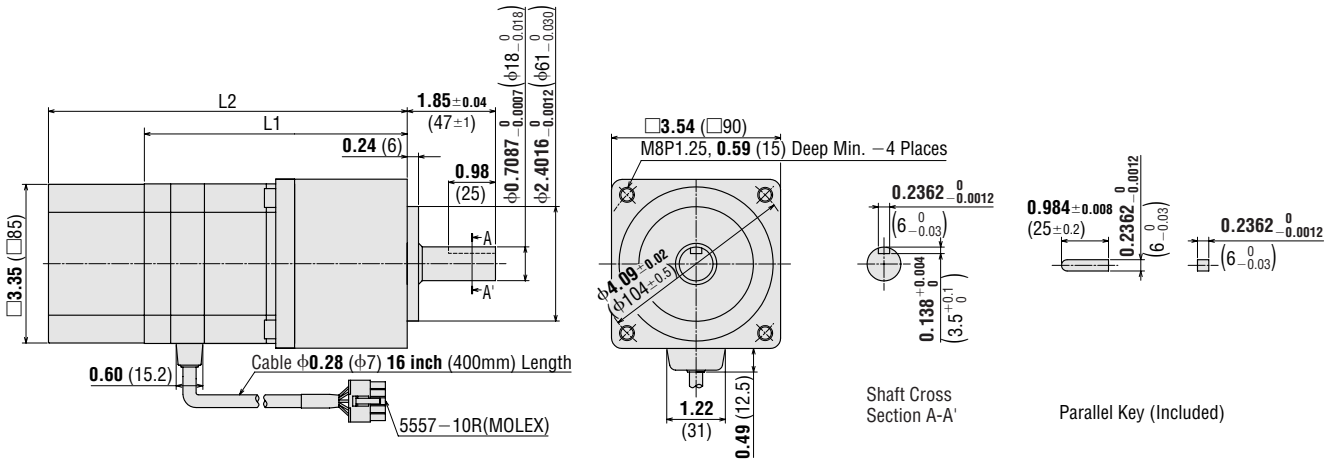


Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS66A□-N□	ASM66A□-N□	**5, 7.2, 10**	4.24 (107.6)	—	3.3 (1.5)	B226
AS66A□P-N□						
AS66A□-N□	ASM66A□-N□	**25, 36, 50**	4.87 (123.6)		3.7 (1.7)	B228
AS66A□P-N□						
AS66M□-N□	ASM66M□-N□	**5, 7.2, 10**	—	5.61 (142.6)	3.9 (1.75)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

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

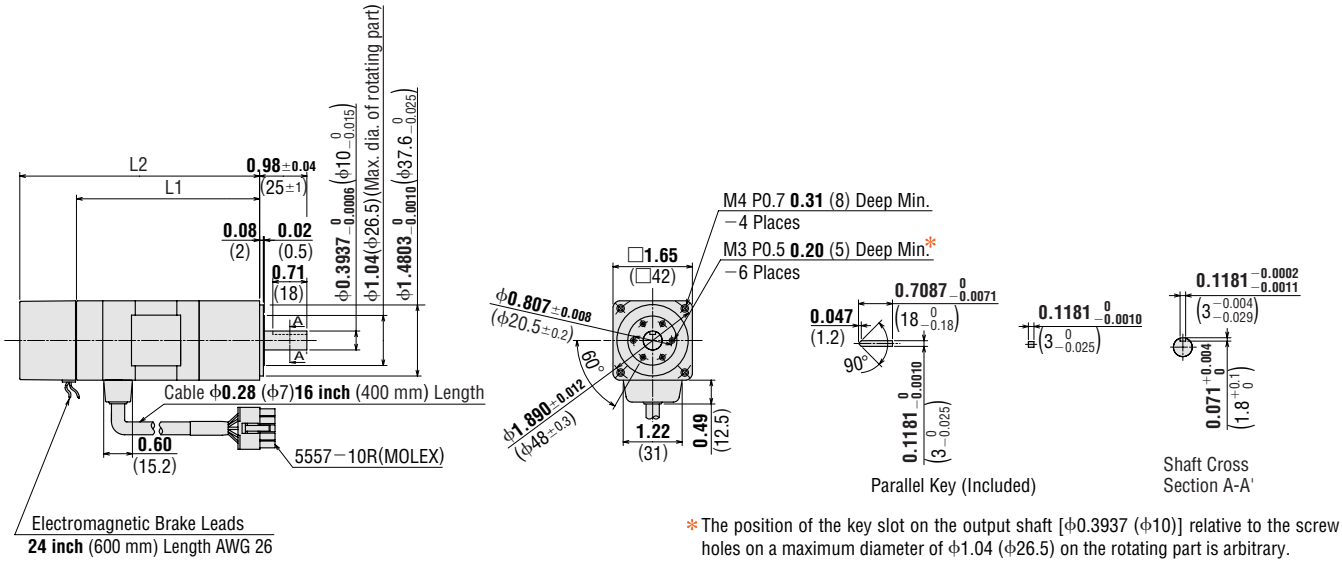


Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS98A□-N□ **AS98A□P-N□**	ASM98A□-N□	**5**, **7.2**, **10**	5.51 (140)	—	8.8 (4.0)	B230
AS98A□-N□ **AS98A□P-N□**	ASM98A□-N□	**25**, **36**, **50**	6.42 (163)		10 (4.7)	B231
AS98M□-N□ **AS98M□P-N□**	ASM98M□-N□	**5**, **7.2**, **10**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

- 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.

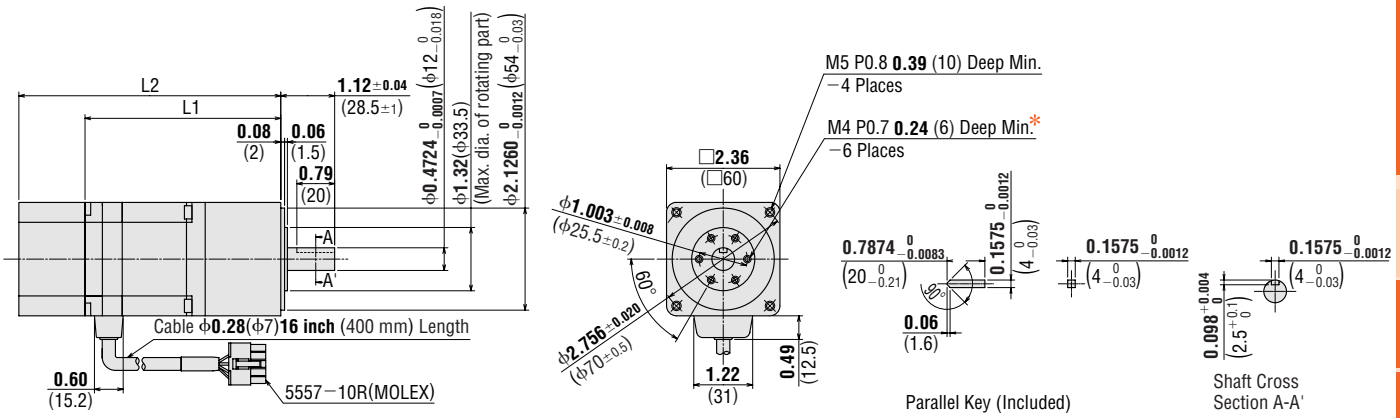
Model	Motor Model	Gear Ratio	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
AS46AA2-H□	ASM46AA2-H□	**50**, **100**	3.81 (96.9)	—	1.5 (0.7)	B308
AS46AAP2-H□						
AS46MA2-H□	ASM46MA2-H□		—	5.0 (126.9)	1.8 (0.8)	B309
AS46MAP2-H□						

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

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Features C-12 | System Configuration C-17 | Specifications/Characteristics C-21

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

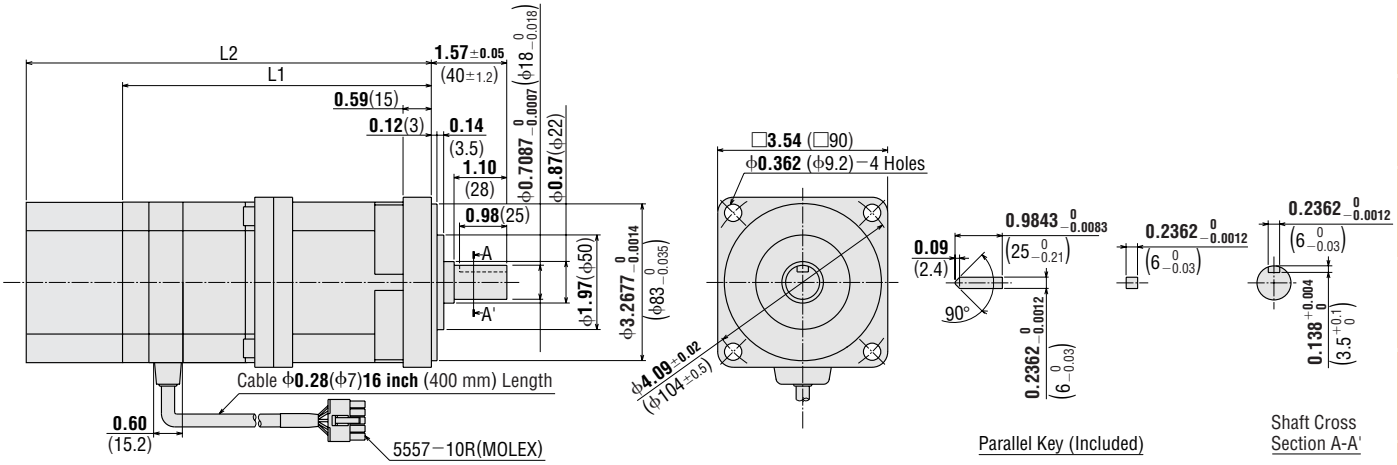


* The position of the key slot on the output shaft [ϕ0.4724 (ϕ12)] relative to the screw holes on a maximum diameter of ϕ1.32 (ϕ33.5) on the rotating part is arbitrary.

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□		—	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□		—	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.

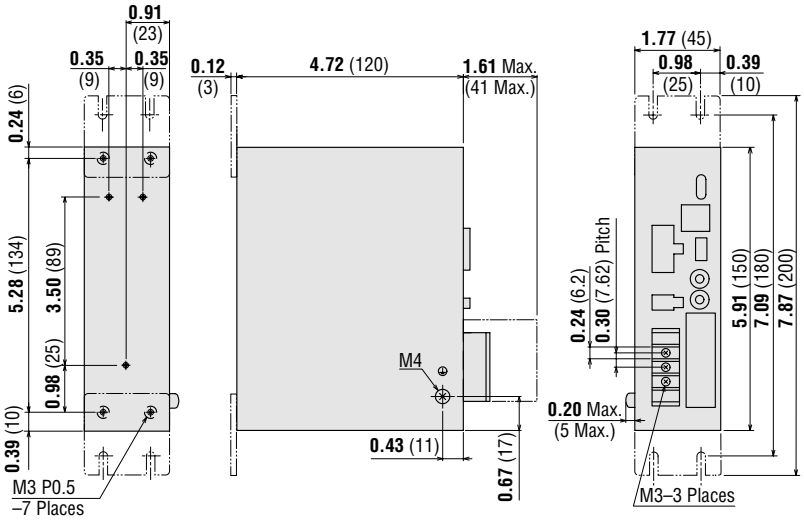
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Driver

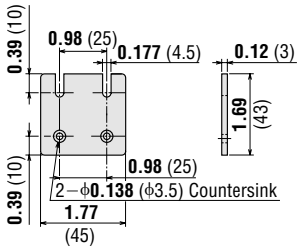
13 AS Series

Weight: 1.8 lb. (0.8 kg)

DXF B197



●Mounting Bracket (2 pieces, included)



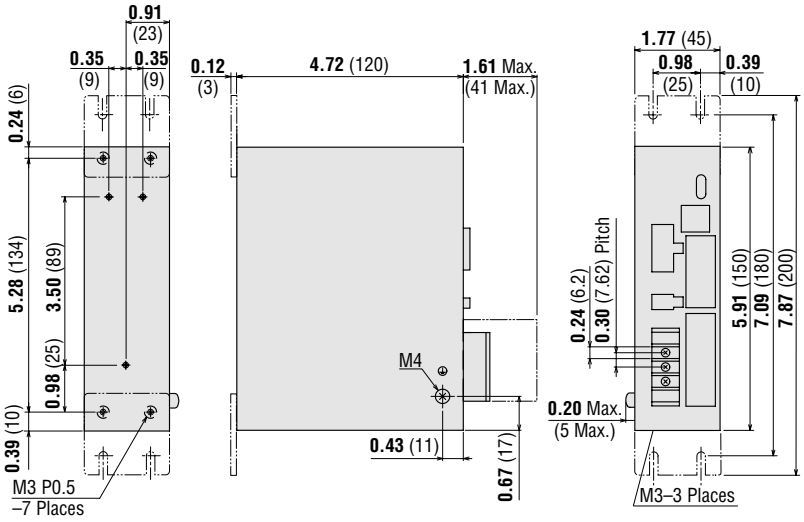
●I/O Connector (included)

Connector: 54306-3619 (MOLEX)
Cover Assembly: 54331-0361 (MOLEX)

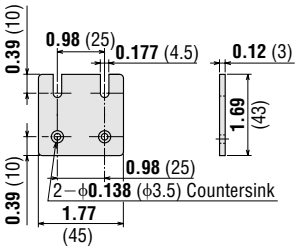
14 AS PLUS

Weight: 1.8 lb. (0.8 kg)

DXF B298



●Mounting Bracket (2 pieces, included)



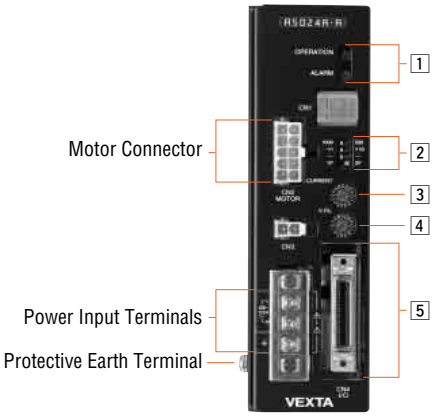
●I/O Connector (included)

Connector (36 pin): 54306-3619 (MOLEX) for CN4
Cover Assembly (36 pin): 54331-0361 (MOLEX) for CN4
Connector (20 pin): 54306-2019 (MOLEX) for CN5
Cover Assembly (20 pin): 54331-0201 (MOLEX) for CN5

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Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

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).

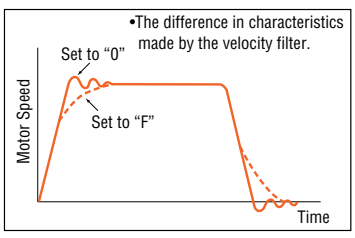
Note:
- Always turn the power off before switching resolution or pulse input, and turn it ON again after you have made the change.
  If the "Resolution Select" switch is set to "×10", it cannot control the resolution select by input terminal. It is always "×10".

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.



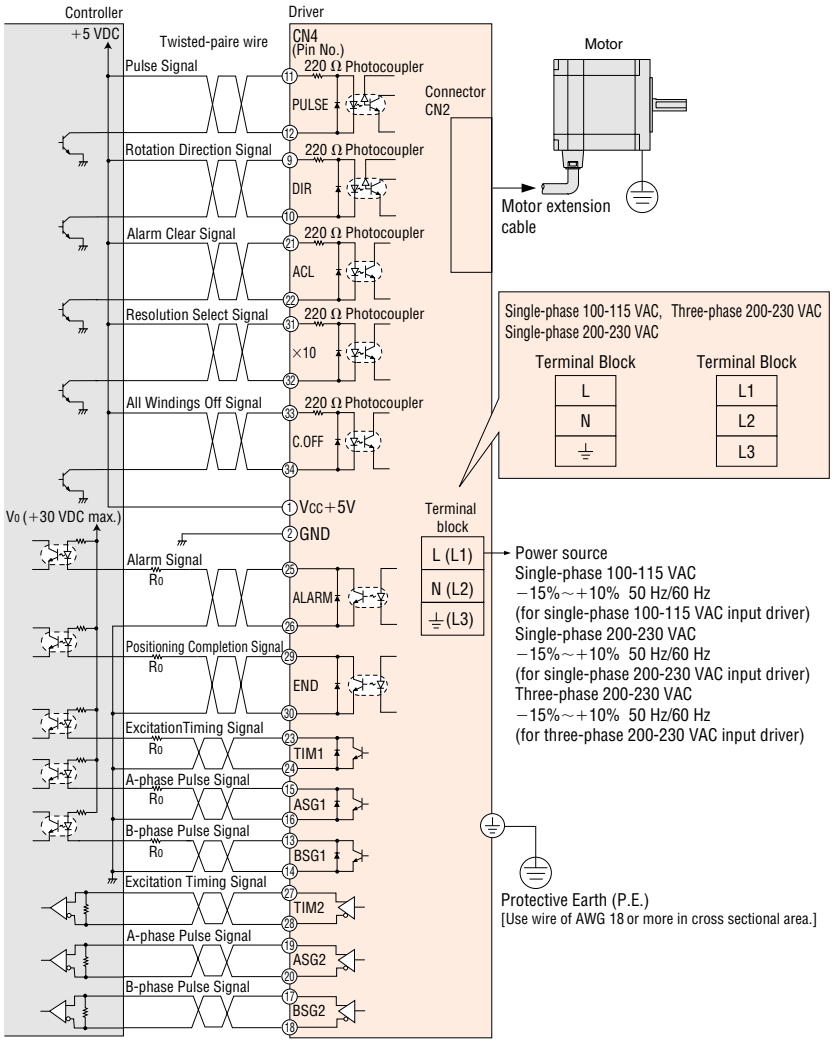
5 Input/Output Signals

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 (DIR)	CCW Pulse(Rotation Direction)*2
	10		$\overline{\text{CCW}}$ $\overline{\text{(DIR)}}$	
	11		CW (PLS)	CW Pulse(Pulse)*2
	12		$\overline{\text{CW}}$ $\overline{\text{(PLS)}}$	
	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		$\overline{\text{BSG2}}$	
	19		ASG2	A-Phase Pulse Output (Line Driver)
	20		$\overline{\text{ASG2}}$	
	21	Input Signal	ACL	Alarm Clear
	22		$\overline{\text{ACL}}$	
	23	Output Signal	TIM1	Timing (Open Collector)
	24		GND	
	25		ALARM	Alarm
	26		$\overline{\text{ALARM}}$	
	27		TIM2	Timing (Line Driver)
	28		$\overline{\text{TIM2}}$	
	29		END	Positioning Completion
	30		$\overline{\text{END}}$	
	31	Input Signal	×10	Resolution Select
	32		$\overline{\times 10}$	
	33		C.OFF	All Windings Off
	34		$\overline{\text{C.OFF}}$	

*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.

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Connection Diagrams
AS Series



Notes:

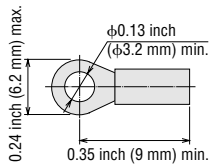
- Vo and the current must be 30 VDC, 15 mA or less respectively. If the current exceeds 15 mA, connect external resistance Ro.
- Use a multi-core, twisted-pair shielded wire AWG 28 for the control input/output signal line (CN4), and keep wiring as short as possible [within 6.6 feet (2 m)].
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases.
- When it is necessary to separate the motor and driver by more than 1.31 ft. (0.4 m), an optional extension cable or flexible cable must be used. Electromagnetic brake motor models (except motor frame size 1.65 inch (42 mm) must use an electromagnetic brake extension cable (sold separately). The frame size 1.65 inch (42 mm) models can use a standard extension cable even for electromagnetic brake motor models.
- 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.

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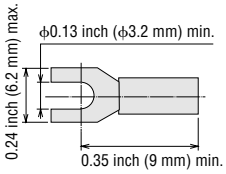
Features C-13 | System Configuration C-17 | Specifications/Characteristics C-21

◆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 ±5% 0.3 A min. (**AS46**: 0.1 A min.) and therefore must be independent of the driver's power supply.

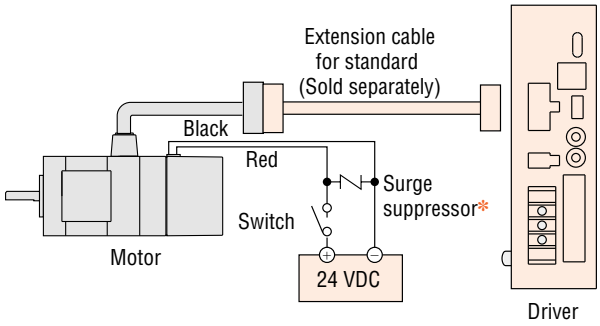
Notes:

- 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.
- To prevent noise, use a dedicated power supply for the electromagnetic brake.
- 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

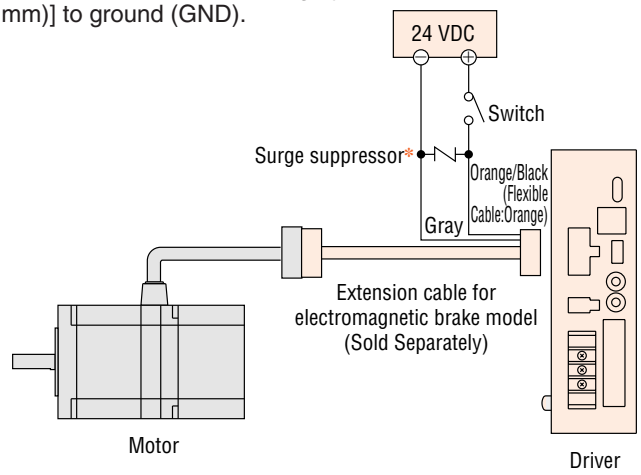
AS46

The electromagnetic brake wire is linked to the connector on the motor [23.6 inch (600 mm)]. When connecting with 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.



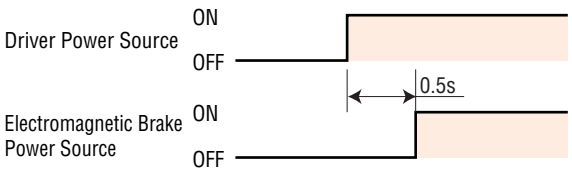
AS66, AS69, AS98

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 flexible cable. Connect the orange/black wire from the standard cable (orange wire for the flexible cable) [2.36 in. (60 mm)] to + 24 V, and the gray lead wire [2.36 inch (60 mm)] to 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.

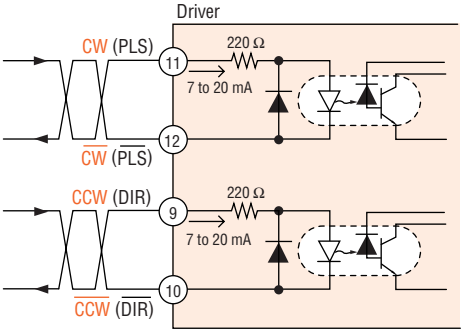


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●Description of Input/Output Signals

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

♦Input Circuit and Sample Connection



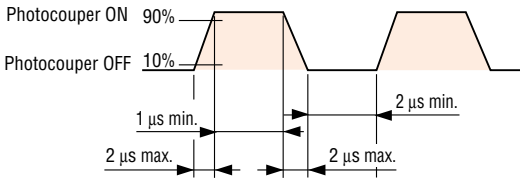
The letters indicate signals under the 2-pulse input mode, while the letters in parentheses indicate signals under the 1-pulse input mode.
The factory setting is 2-pulse input mode.

Note:

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

♦Pulse Waveform Characteristics

(Photocoupler state corresponding to the input pulse)



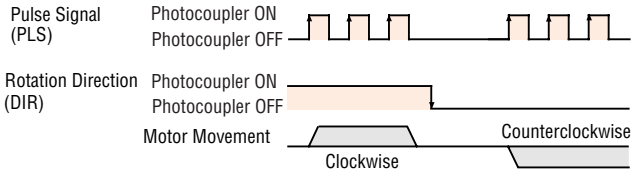
For pulse signals, use input pulse waveforms like those shown in the figure above.

♦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 photocoupler on), CCW by inputting at high level (with input photocoupler off).
"Rotation Direction" signals
Photocoupler "ON": Clockwise,
Photocoupler "OFF": Counterclockwise

1 Pulse Input Mode



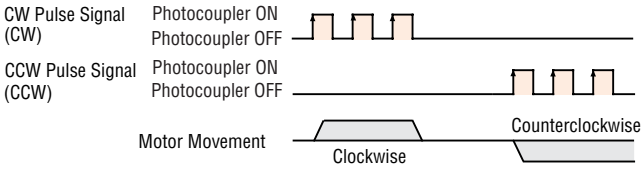
2-pulse input mode

The 2-pulse input mode 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:

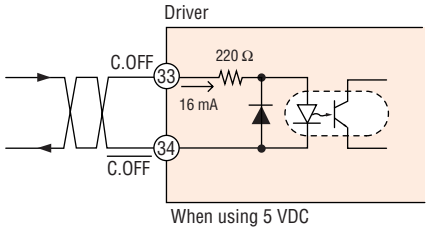
- The factory setting is 2-pulse input.

2 Pulse Input Mode

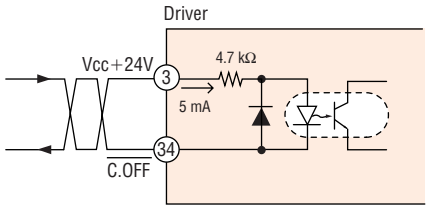


All Windings Off (C.OFF) Input Signal

♦Input Circuit and Sample Connection



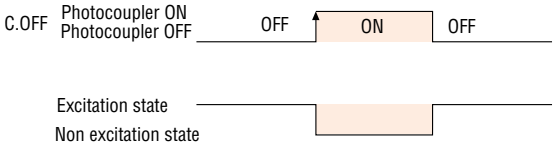
When using 5 VDC



When using 24 VDC

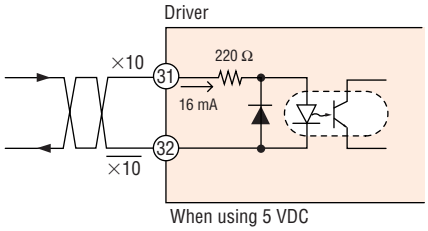
This controller power source offers a choice of either 5 VDC or 24 VDC.

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

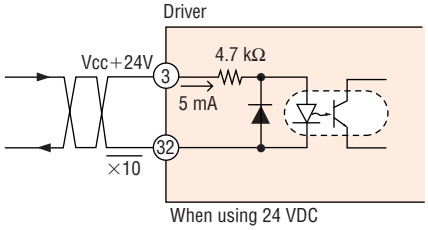


Resolution Select (×10) Input Signal

♦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 ×10. It is only valid when the resolution select switch is set to ×1.

Note:

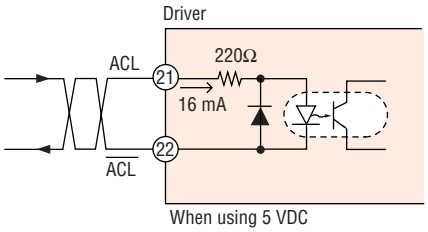
- When the resolution select switch is set to ×10, the "Resolution Select" Input is ignored. In this case, the "Resolution Select" Input is always equal to ON.

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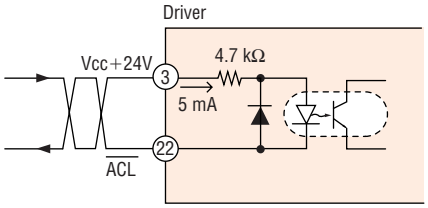
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Alarm Clear (ACL) Input Signal

♦Input Circuit and Sample Connection



When using 5 VDC



When using 24 VDC

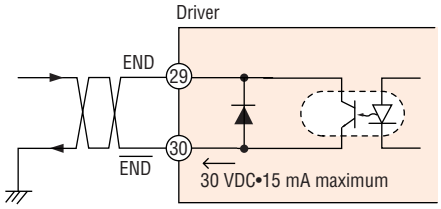
This controller power source offers a choice of either 5 VDC or 24 VDC. This signal is used when a protection circuit has been activated, for canceling the alarm without turning off power to the driver.

Note:

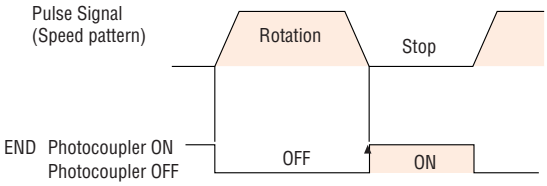
- The following alarm cannot be released. To cancel the alarm, first resolve the cause and check for safety, and then turn power on again.
  ●Over Current ●EEPROM Data Error ●System Error

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 ±1.8˚ from the command position, approximately 2 ms after the pulse input stops.

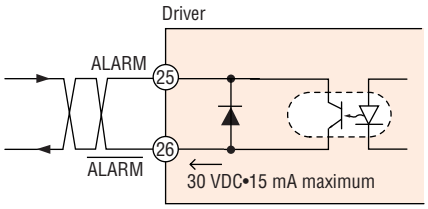


Note:

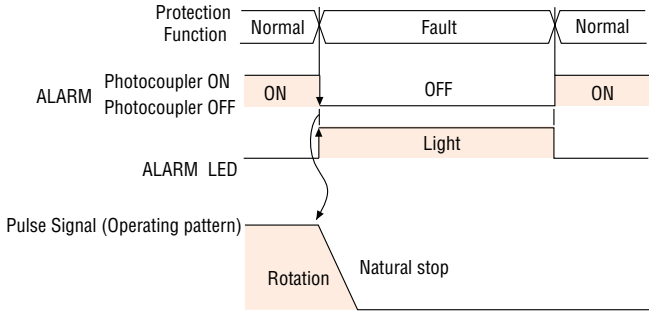
- The END signal flashes during operation with a pulse input frequency of 500 Hz or less.

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 10 seconds before turning it on again.



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

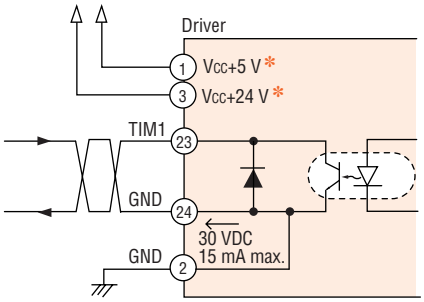
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Excitation Timing (TIM.) Output Signal

♦Output Circuit and Sample Connection

Open Collector Output (Current Source Type)

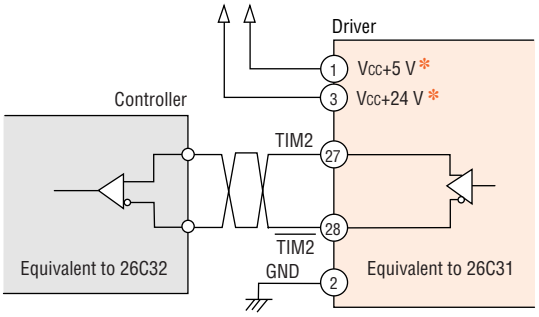
*Power supply for timing output should be connected to either 5 VDC or 24 VDC.
Do not input 5 VDC and 24 VDC at the same time.



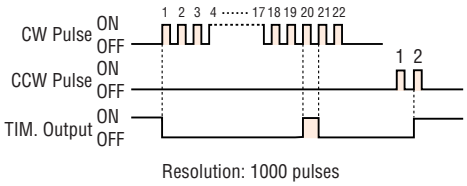
Circuits for use with 30 V, 15 mA maximum.

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.



Resolution: 1000 pulses

Notes:

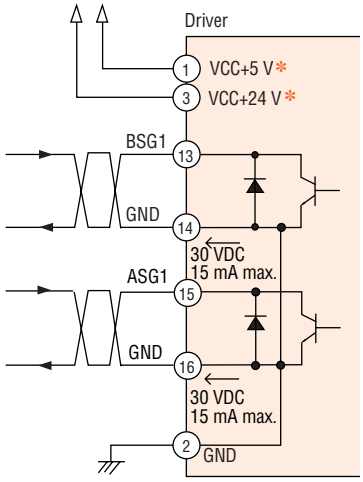
- A precise timing signal cannot be obtained when the speed of the pulse input frequency is over 500 Hz.
- When the Timing Signal Output is used, 5 VDC or 24 VDC power supply is necessary.

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

♦Output Circuit and Sample Connection

Open Collector Output (Current Source Type)

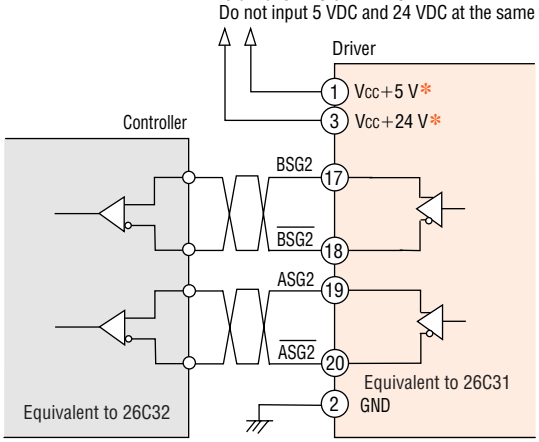
*Power supply for quadrature output should be connected to either 5 VDC or 24 VDC.
Do not input 5 VDC and 24 VDC at the same time.



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.

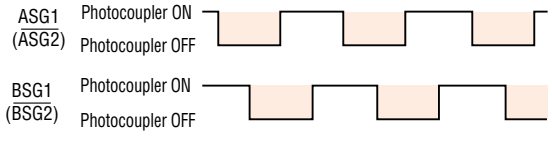


These signals are used when monitoring the motor position. The pulse resolution is the same as the motor resolution at the time of power-on.
[Example: Resolution select switch (1000 P/R)→Output pulse number for each motor revolution (1000).] The phase difference between A and B is 90° electrical.

Notes:

- The pulse output accuracy is, regardless of resolution, within ±0.36° (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

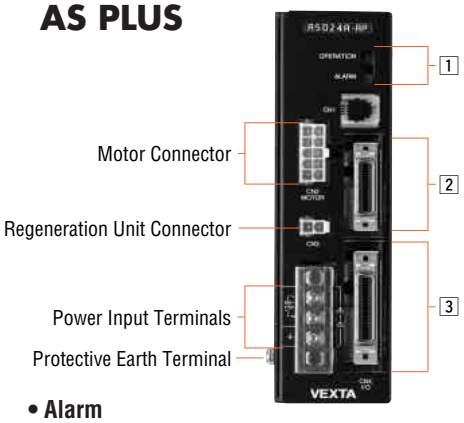


(Clockwise rotation of motor)

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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 it's holding torque.	✻ Possible
	Overload protection	A load exceeding the maximum torque was applied to the motor for the duration set by the OLTIME command.	30h (Decimal: 48)		
	Overspeed error	The speed of the motor's output shaft has exceeded 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 it's holding torque.	✻ Possible
4	Excessive position deviation	The position of the motor's output shaft has deviated from the position specified by the operation command, by at least the number of revolutions set by the OVERFLOW command.	10h (Decimal: 16)	The motor loses it's holding torque.	✻ Possible
5	Overcurrent protection	An excessive current has flowed into the power element of the driver's inverter section.	20h (Decimal: 32)	The motor loses it's holding torque.	✻ Impossible
6	Emergency stop	An E-STOP signal has been input.	68h (Decimal: 104)	The program stops. The motor loses it's 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 it's holding torque.	✻ Impossible
	Initial rotor revolution error	The driver's power was turned on while the motor's output shaft was turning by external force.	43h (Decimal: 67)		
9	NVRAM error	Motor control parameters has been damaged.	41h (Decimal: 65)	The motor loses it's holding torque.	✻ Impossible
Stays ON.	System error	Driver failure has occurred.	F0h (Decimal: 240)	The motor loses it's holding torque.	✻ Impossible

✻ Possible – The Alarm can be cleared with the ALMCLR command or an ACL input.
Impossible – The AC power must be cycled to clear these alarms.

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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		$\overline{Y0}$	
	5		Y1	
	6		$\overline{Y1}$	
	7		Y2	
	8		$\overline{Y2}$	
	9		Y3	
	10		$\overline{Y3}$	
	11		ASG	Phase A pulse output (Line-driver output)
	12		$\overline{ASG}$	
	13		BSG	Phase B pulse output (Line-driver output)
	14		$\overline{BSG}$	
	15	Input	START	START
	16		E-STOP	Emergency stop
	17		COM1	Power source for input signal
	18			
	19	Output	Y4	General output*1 (Y4 to Y7)
	20		$\overline{Y4}$	
	21		Y5	
	22		$\overline{Y5}$	
	23		Y6	
	24		$\overline{Y6}$	
	25		Y7	
	26		$\overline{Y7}$	
	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

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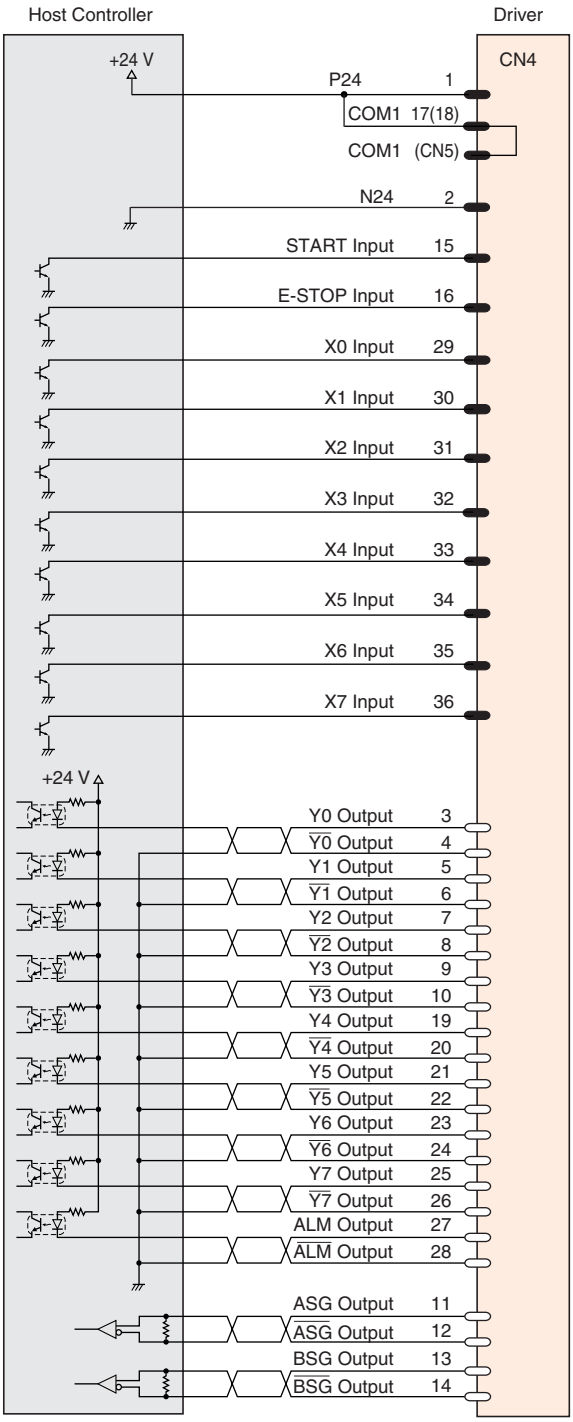
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● Connection Diagrams

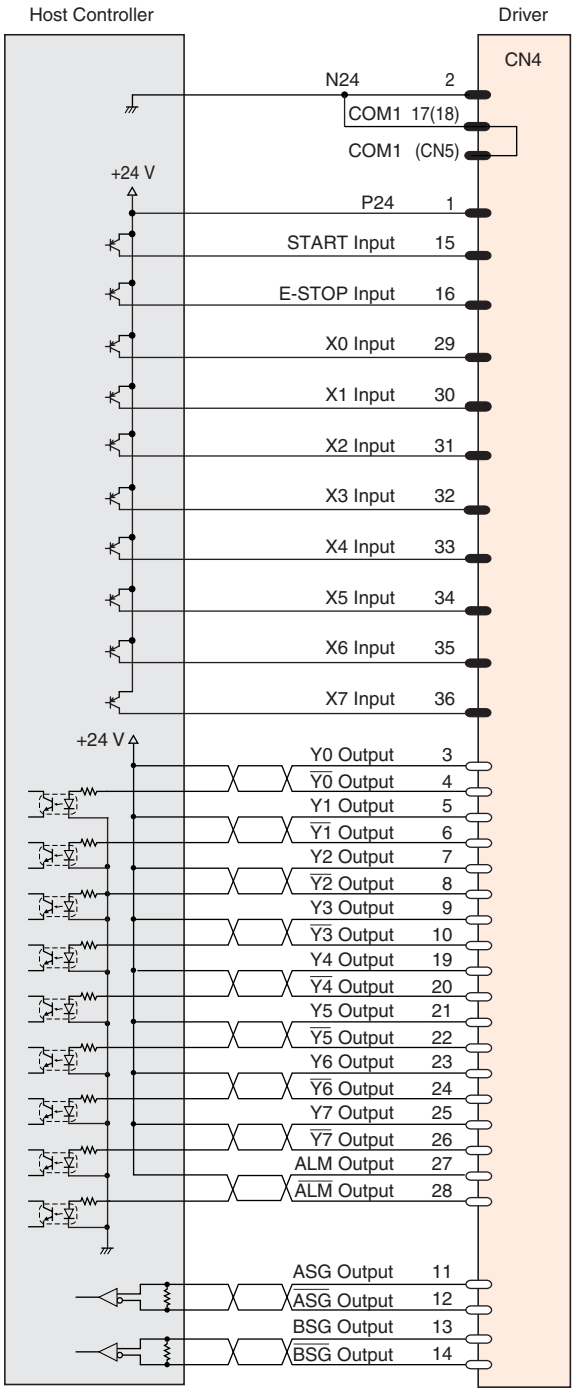
AS PLUS

◆ Power Lines and I/O Signals (CN4)

• Current source input and current sink output



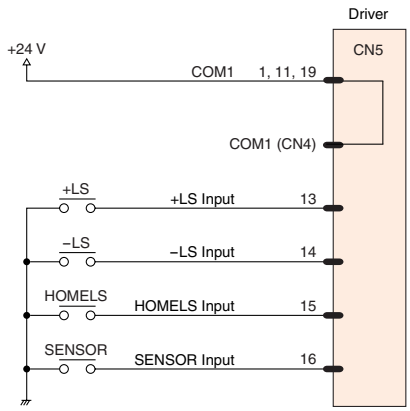
• Current sink input current source output



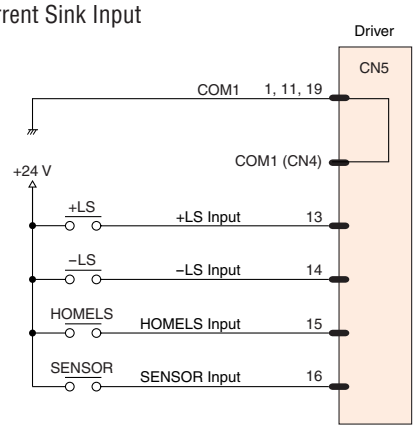
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♦ Power Lines and Limit Sensors (CN5)

• Current Source Input



• Current Sink Input



♦ Wiring the signal cable

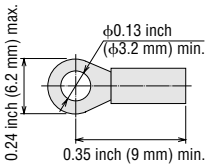
- Use input signals at 24 VDC±10%.
- Use output signals at 30 VDC or below and at 4 to 8 mA.
- Use a shielded cable with a wire of a size ranging between AWG 24 and AWG 22 for the driver signal cable (I/O signals, limit sensors signals), and keep it as short as possible.
- Keep the control input/output 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

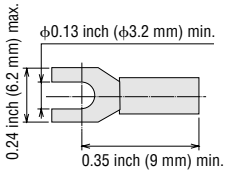
- When it is necessary to separate the motor and driver by more than 1.31 ft. (0.4 m), an optional extension cable or flexible cable must be used. Electromagnetic brake motor models (except motor frame size 1.65 inch (42 mm)) must use an electromagnetic brake extension cable (sold separately). The frame size 1.65 inch (42 mm) models can use a standard extension cable even for electromagnetic brake motor models.
- 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



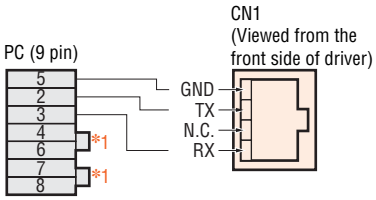
U shape terminals with insulator



✻ 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 (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).

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Features C-12 | System Configuration C-17 | Specifications/Characteristics C-21

◆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 ±5% 0.3 A min. (**AS46**: 0.1 A min.) and therefore must be independent of the driver's power supply.

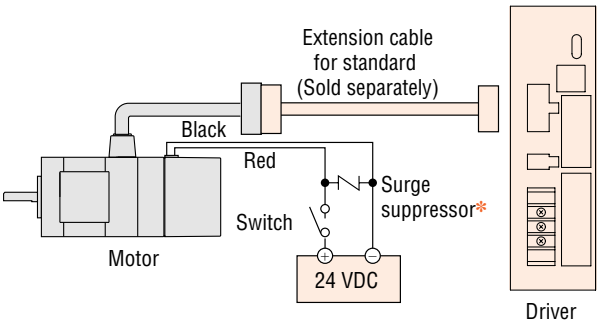
Notes:

- 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.
- To prevent noise, use a dedicated power supply for the electromagnetic brake.
- 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

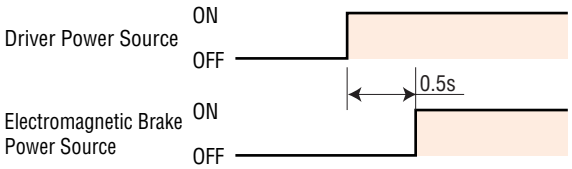
AS46

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.



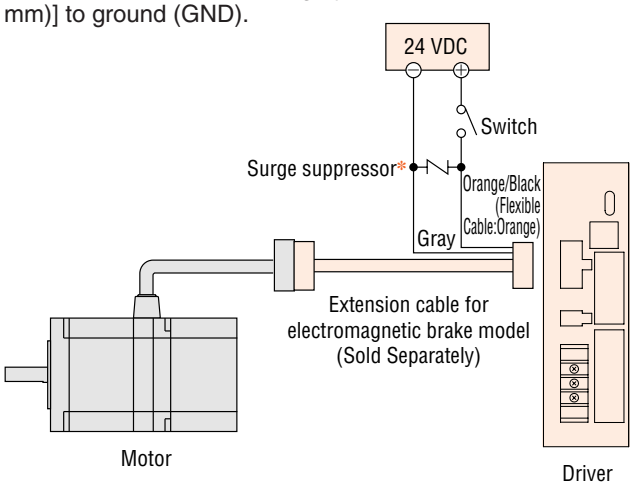
Timing Chart for Electromagnetic Brake Operation

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.



AS66, AS69, AS98

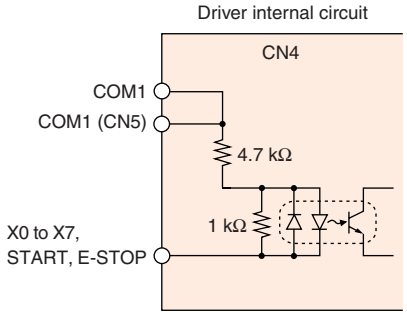
The electromagnetic brake wire is linked to the connector on the driver connection side of extension cable for electromagnetic brake models (sold separately). Be sure to use the accessory (sold separately) extension cable or movable cable. Connect the orange/black wire from the standard cable (orange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



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●Description of Input Signals (CN4)

♦Input Circuit and Sample Connection



Note:
• Use input signals at 24 VDC±10%.

• P24 input, N24 input

These inputs are for the external power supply required for the RS-232C communication, ASG and BSG line driver outputs. Make sure to use a power supply of at least 24 VDC±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±10%, 0.2A.

• START input

This signal starts the program named "STARTUP".

OFF→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→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 thorough X7 inputs can be used as input ports for general signals. The status of each port can be read using an IN command or INx command.

The general signals assignable to the X0 through X7 inputs are listed below. Use a corresponding command to assign signal.

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

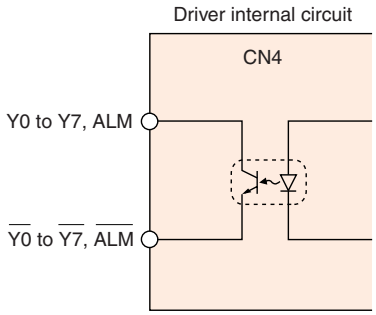
• ACL input

This signal is used to reset the alarm that has been generated by the driver's protective function.

Input an ACL signal once after removing the cause that has triggered the protective function.

●Description of Output Signals (CN4)

♦Output Circuit and Sample Connection



Note:
• Use output signals at 30 VDC or below and at 4 to 8 mA.

• Y0 to Y7 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.

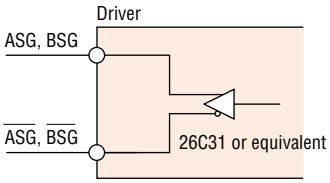
END output.....OUTEND command
RUN output .....OUTRUN command
MOVE output.....OUTMOVE command
HOME-P output.....OUTHOMEP command
TIM output .....OUTTIM command
MBC output.....OUTMBC command

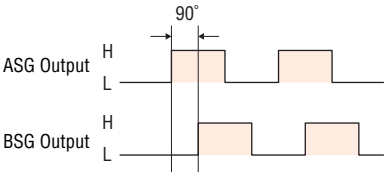
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ASG, BSG Output

● Line driver output (26C31 or equivalent)





• ASG, BSG Line Driver 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.

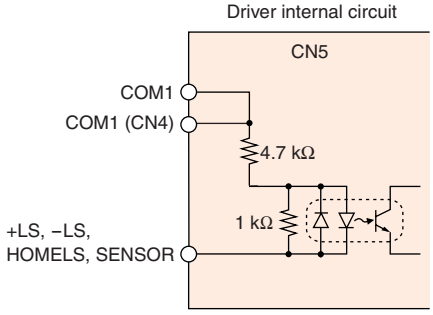
• ALM Output

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±10%.

• COM1 input

This is a power-source input terminal for limit-sensor signals. The power-source voltage must be 24 VDC±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.

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• **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.

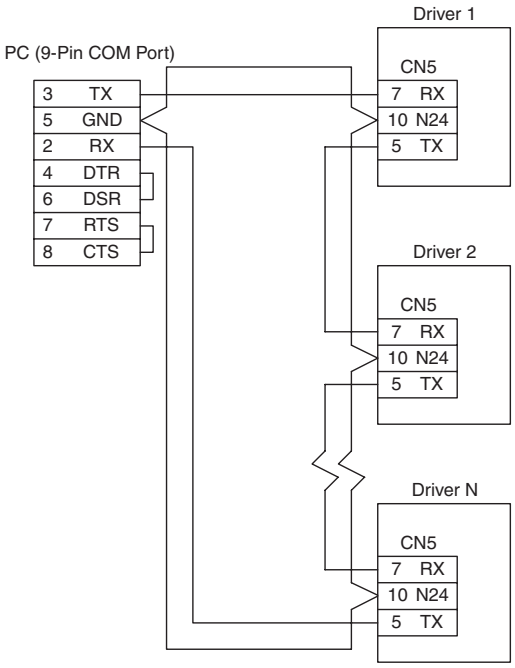
Continuous Operation

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±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).

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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	ASD24C-A	**AS66□AP-N36**	ASM66□A-N36	ASD24C-AP
	AS66□A-N50	ASM66□A-N50		**AS66□AP-N50**	ASM66□A-N50	
	AS98□A-N5	ASM98□A-N5	ASD30A-A	**AS98□AP-N5**	ASM98□A-N5	ASD30A-AP
	AS98□A-N7.2	ASM98□A-N7.2		**AS98□AP-N7.2**	ASM98□A-N7.2	
	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		**AS98□AP-N36**	ASM98□A-N36	
	AS98□A-N50	ASM98□A-N50	ASD30B-A	**AS98□AP-N50**	ASM98□A-N50	ASD30B-AP
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.

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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		**AS66□CP-T10**	ASM66□C-T10	
	AS66□C-T20	ASM66□C-T20	ASD12C-C	**AS66□CP-T20**	ASM66□C-T20	ASD12C-CP
	AS66□C-T30	ASM66□C-T30		**AS66□CP-T30**	ASM66□C-T30	
	AS98□C-T3.6	ASM98□C-T3.6	ASD16A-C	**AS98□CP-T3.6**	ASM98□C-T3.6	ASD16A-CP
	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		**AS66□CP-N10**	ASM66□C-N10	
	AS66□C-N25	ASM66□C-N25	ASD12B-C	**AS66□CP-N25**	ASM66□C-N25	ASD12B-CP
	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		**AS98□CP-N36**	ASM98□C-N36	
	AS98□C-N50	ASM98□C-N50	ASD16B-C	**AS98□CP-N50**	ASM98□C-N50	ASD16B-CP
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		**AS66□SP-T10**	ASM66□C-T10	
	AS66□S-T20	ASM66□C-T20	ASD12C-S	**AS66□SP-T20**	ASM66□C-T20	ASD12C-SP
	AS66□S-T30	ASM66□C-T30		**AS66□SP-T30**	ASM66□C-T30	
	AS98□S-T3.6	ASM98□C-T3.6	ASD16A-S	**AS98□SP-T3.6**	ASM98□C-T3.6	ASD16A-SP
	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		**AS66□SP-N10**	ASM66□C-N10	
	AS66□S-N25	ASM66□C-N25	ASD12B-S	**AS66□SP-N25**	ASM66□C-N25	ASD12B-SP
	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		**AS98□SP-N36**	ASM98□C-N36	
	AS98□S-N50	ASM98□C-N50	ASD16B-S	**AS98□SP-N50**	ASM98□C-N50	ASD16B-SP
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.

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