Standard AC Motors

Induction Motors

Reversible Motors

Electromagnetic Brake Motors

FBLII

AXU

AXH

HBL

MSS・W

ES

US

Gearheads

Linear Heads

Water Tight Motors FPW

Accessories

Brushless Motor and Driver

AC Speed Control Motors

Brushless Motor and Driver Package
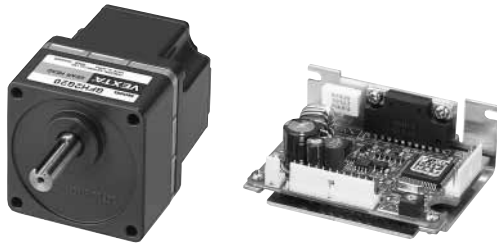
AXH *Series* CE ℞ c℞

More compact, Higher power.
DC power supply drive type package with brushless DC motor and compact board-level driver.
The AXH series is optimal for incorporation as a set in equipment where space-saving is required.
The AXH series (30W and 50W) comes with the motor and its dedicated gearhead already assembled (Combination Type).
**AXH 015K-☐ (15W) is geard type.**

The **AXH** series includes the motor, gearhead and driver.

■ Features

●Compact Board-Level Driver

The drivers for incorporation as a set in equipment have been made much more compact, smaller than the size of a business card.
Compared to Oriental Motor's **HBL** series driver, they are another approximately 60% more compact (by volume).
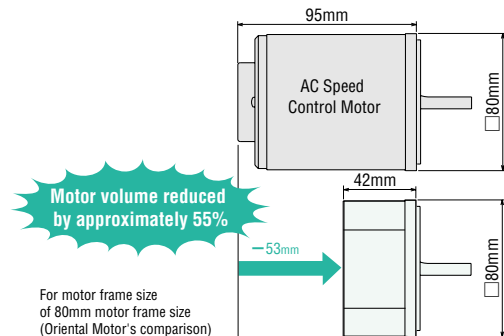

70mm 54mm
AXH Series
HBL Series
71mm
26mm
100mm
36mm

Driver volume reduced by approximately 60%
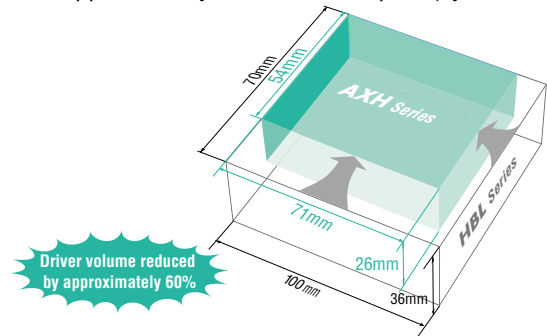
●Excellent Speed Stability

The fluctuation is only ±1% for load, voltage and temperature. These motors provide excellent speed stability with extraordinarily minimal speed fluctuation.

●Thin and High Power

The total length of the motor section for the **AXH** series has been designed to a thin 42mm.
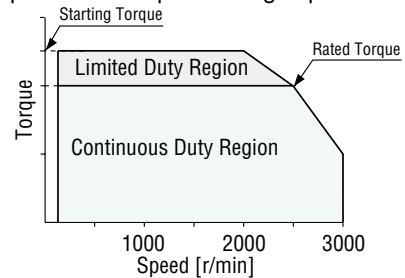High power output (50W) with the frame size of 80mm has been realized.

95mm
AC Speed Control Motor
☐80mm
42mm
☐80mm
−53mm

Motor volume reduced by approximately 55%

For motor frame size of 80mm motor frame size (Oriental Motor's comparison)

●Wide Range of Speed Control
(A speed ratio of 1:30) Flat Torque

The speed can be set within the wide range from 100r/min to 3000r/min (1:30). Moreover, the **AXH** series output a constant torque from low speed to high speed.

Starting Torque
Rated Torque
Limited Duty Region
Continuous Duty Region
Torque
1000　2000　3000
Speed [r/min]

Shown below are other features of the **AXH** series.
● The gearhead section is designed to be for high-strength.
● **AXH** series motors are equipped with various protection functions (overload/out-of-phase/overvoltage/under voltage/ overspeed protection function). When one of these protection functions detects an abnormality, it outputs an alarm signal, and brings the motor to a natural stop. Alarms can also be reset with external signals.
● Conforms to safety standards.

■ Safety Standards

Products	Applicable Standards	Certification Body	Standards File No.	CE Marking
Motor	UL1950	UL	E208200	EMC Directive
	CSA C22.2 No.950			
Driver	UL1950	UL	E208200	
	CSA C22.2 No.950			

●Use Conditions
Installation Conditions
•Overvoltage category Ⅰ
•Pollution degree 2
•Class Ⅲ equipment

●Applicable Standards

EMI
  Emission Tests   EN50081-2
  Radiated Emission Test   EN55011

EMS
  Immunity Tests   EN61000-6-2
  Radiation Field Immunity Test   IEC61000-4-3
  Electrostatic Discharge Immunity Test   IEC61000-4-2
  Fast Transient/Burst Immunity Test   IEC61000-4-4
  Conductive Noise Immunity Test   IEC61000-4-6
  Power Frequency Magnetic Field Immunity Test IEC61000-4-8

EMC
For compliance with the EMC directive, the product must be verified in the final use conditions, it located in the enclosure. Please refer to your nearest Oriental Motor office if EMC information is required.

■ System Configuration

**Motor Mounting Brackets
(Sold separately)**
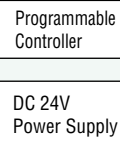(➡Page A-220)

**Combination Type
(Motor/Gearheads)**

**Extension Cables (Sold separately)
Extension Cables used between
motors and Driver.** (➡Page A-226)

Driver

**I/O Signal Cable
(Included)**

Programmable Controller

**Power Supply Cable
(Included)**

DC 24V Power Supply

AXH Series

**External Speed Potentiometer
(Sold separately)**

●**Example of System Configuration**
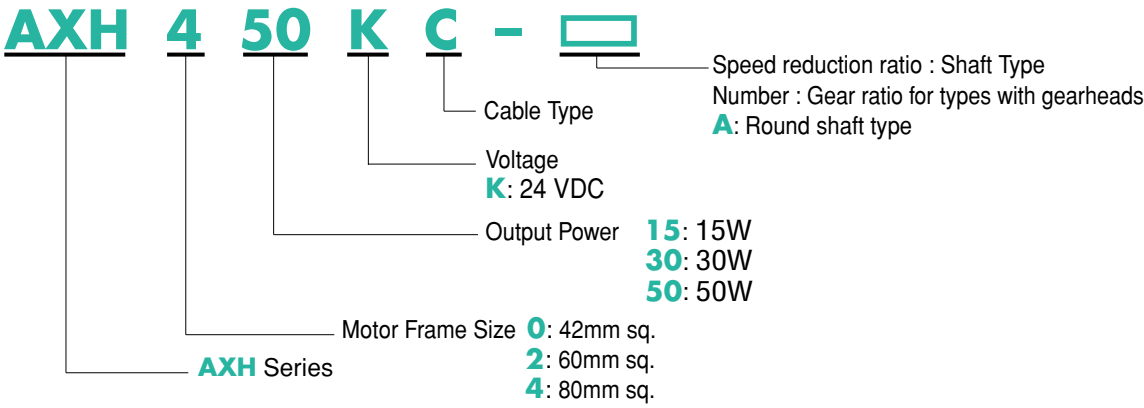(Body)

Combination Type
AXH450KC-30

(Sold separately) + ◯ Selectable according to necessity. Oriental Motor provides.

Extension Cables (1.5m)	Motor Mounting Bracket	External Speed Potentiometer
CC02AXH	**SOL4M6**	**PAVR-20KZ**
◯	◯	◯

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

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Accessories

■ Product Number Code

AXH 4 50 K C – ☐

- Speed reduction ratio : Shaft Type
  Number : Gear ratio for types with gearheads
  A: Round shaft type
- Cable Type
- Voltage
  K: 24 VDC
- Output Power **15**: 15W
  30: 30W
  50: 50W
- Motor Frame Size **0**: 42mm sq.
  2: 60mm sq.
  4: 80mm sq.
- **AXH** Series

■ Product Lines

●Combination Type

Output Power	Model	Gear Ratio
15W	**AXH015K-☐**	**5, 10, 15, 20, 30, 50, 100**
30W	**AXH230KC-☐**	**5, 10, 15, 20, 30, 50, 100, 200**
50W	**AXH450KC-☐**	**5, 10, 15, 20, 30, 50, 100, 200**

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

●Round Shaft Type

Output Power	Model
15W	**AXH015K-A**
30W	**AXH230KC-A**
50W	**AXH450KC-A**

■ Specifications

Model	Combination Type/Geared Type		**AXH015K-☐**	**AXH230KC-☐**	**AXH450KC-☐**
	Round Shaft Type		**AXH015K-A**	**AXH230KC-A**	**AXH450KC-A**
Rated Output Power		W	15	30	50
Power Source Input	Voltage	V	DC24V ±10%		
	Maximum Input Current	A	2.0	3.5	5
Rated Torque		N·m	0.05	0.12	0.20
Starting Torque		N·m	0.075	0.15	0.24
Round Shaft Type Permissible Load Inertia	$J \times 10^{-4}$kg·m^2		0.5	1.8	3.3
Maximum Speed		r/min	3000		
Rated Speed		r/min	3000	2500	
Speed Control Range		r/min	100～3000 (Speed ratio of 1 : 30)		
Speed Regulation	For Load		±1%Max.　0～Rated Torque, at reted speed		
	For Voltage		±1%Max.　Power supply voltage ±10%, at rated speed with no load		
	For Temperature		±1%Max.　0°C～+50°C, at rated speed with no load		

■ Common Specifications

Item	Specifications		
Speed Control Method	Any one of the following methods. 　1. By built-in potentiometer　2. By external potentiometer　3. By DC voltage (DC0～5V)		
Input Signals	C-MOS negative logic STARD/STOP input Brake input Direction of Rotation input Speed setting method Alarm reset	L : (ON) : 0～0.5V L : START L : RUN L : CW L : Internal L : Reset	H : (OFF) : 4～5V H : STOP H : Instantaneous stop H : CCW H : External H : Normal
Output Signals	Open collector output　External use conditions DC 26.4V, 10mA max. Common to SPEED (30P/R), Alarm		
Protection Functions[*1]	When the following are activated, the alarm signal will be output and the motor will come to a natural stop. ● Overload Protection: This will be activated when a load exceeding the rated torque is applied to the motor for approximately 5 seconds or more. ● Out-of-Phase Protection: This will be activated when the sensor wire inside the motor cable is disconnected. ● Overvoltage Protection: This will be activated when the voltage applied to the driver exceeds DC24V by approximately 15% or more. ● Under Voltage Protection: This will be activated when the voltage applied to the driver goes under DC24V by approximately 25% or more. ● Over Speed Protection: This will be activated when the motor rotates at an abnormal speed far beyond 3500r/min.		
Motor Insulation Class[*2]	Class E (120°C)		
Rating	Continuous		

[*1]　With the **AXH** series, the motor speed can not be controlled in applications where the motor shaft is turned by the load, as in lowering operations. Also, if the load driven exceeds the permissible load inertia and during load lowering operation, the overvoltage protection function is activated and the motor stops naturally.

[*2]　Motor insulation is recognized as class A (105°C) by UL standard.

■ General Specifications

Item	Motor	Driver
Insulation Resistance	100MΩ or more when DC500V megger is applied between the windings and the frame after continuous operation under normal ambient temperature and humidity.	100MΩ or more when DC500V megger is applied between the power supply input terminal and the frame after continuous operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand AC0.5kV at 50Hz applied between the windings and the frame for 1 minute after continuous operation under normal ambient temperature and humidity.	Sufficient to withstand AC0.5kV at 50Hz applied between the power supply imput terminal and the frame for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise	60°C or less measured by the thermocouple method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency under normal ambient temperature and humidity, with connecting a gearhead or equivalent heat radiation plate. (excluding **AXH015K-A**) ✽	―
Ambient Temperature	0°C～+50°C (nonfreezing)	
Ambient Humidity	85% maximum (noncondensing)	
Atmosphere	No corrosive gases or dust	
Degree of Protection	15W : IP40 30W, 50W : IP54 (Except for the mounting surface of the round shaft motor)	IP00

✽Size of heat radiation plate (material: Aluminum)
AXH230KC-A: 115mm×115mm Thickness:5mm
AXH450KC-A: 135mm×135mm Thickness:5mm

■ Gearmotor–Torque Table

Unit =N·m

Model	Speed Range r/min	20 ～ 500 (600)	10 ～ 250 (300)	6.7 ～ 167 (200)	5 ～ 125 (150)	3.3 ～ 83 (100)	2 ～ 50 (60)	1 ～ 25 (30)	0.5 ～ 12.5
	Gear Ratio	**5**	**10**	**15**	**20**	**30**	**50**	**100**	**200**
AXH015K-□		0.23	0.45	0.68	0.86	1.3	2	2	―
AXH230KC-□		0.54	1.1	1.6	2.2	3.1	5.2	6	6
AXH450KC-□		0.9	1.8	2.7	3.6	5.2	8.6	16	16

● Enter the gear ratio in the box (□) within the model number.
● A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
(　　) represents the specifications of **AXH015K-**□

■ Permissible Overhung Load and Permissible Thrust Load

Model	Gear Ratio	Permissible Overhung Load		Permissible Thrust Load
		10mm from shaft end N	20mm from shaft end N	N
AXH015K-□	**5,10,15,20, 30,50,100**	50	―	30
AXH230KC-□	**5**	100	150	
	10,15,20	150	200	40
	30,50,100,200	200	300	
AXH450KC-□	**5**	200	250	
	10,15,20	300	350	100
	30,50,100,200	450	550	

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

●Round Shaft Type

Model	Permissible Overhung Load	
	10mm from shaft end N	20mm from shaft end N
AXH015K-A	50	―
AXH450KC-A	70	100
AXH450KC-A	120	140

● Avoid thrust load as much as possible.
  If thrust load is unavoidable, keep it to no more than half the motor weight.

■ Permissible Load Inertia J for Combination Type

Unit = J(×10⁻⁴kg•m²)

Model \ Gear Ratio	**5**	**10**	**15**	**20**	**30**	**50**	**100**	**200**
AXH015K-□	0.4	1.7	3.9	7.0	15.7	43.7	43.7	―
AXH230KC-□	1.55	6.2	14.0	24.8	55.8	155	155	155
AXH450KC-□	5.5	22	49.5	88	198	550	550	550

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

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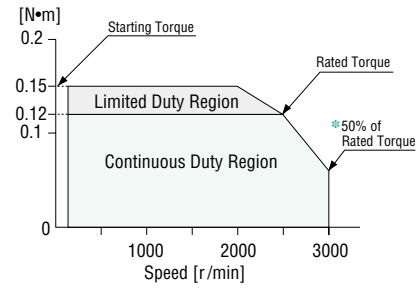
AC Speed Control Motors

■ Speed-Torque Characteristics

- For the combination type and geared type, the values are for the motor alone.
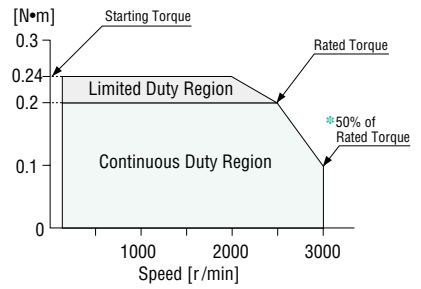- Enter the gear ratio in the box (□) within the model number.

AXH015K-□/AXH015K-A
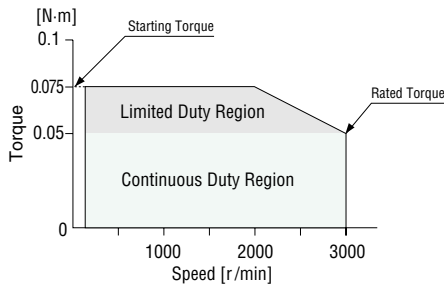
AXH230KC-□/AXH230KC-A

AXH450KC-□/AXH450KC-A

❊Values for DC24V with no extension cable ❊Values for DC24V with no extension cable

■ Dimensions (Scale 1/4 Unit = mm)

Mounting screws are included with the combination type.
Dimensions for screw included ➡ Page A-13
Enter the gear ratio in the box (□) within the model number.

●Motor/Gearhead

AXH015K-□ (Geared Type)
Motor: AXHM015K-□
Mass: 0.5kg

4-M4 P0.7 8 Deep
Leads UL Style 3265, AWG 24
Tube φ6
Housing : 171822−8(AMP)
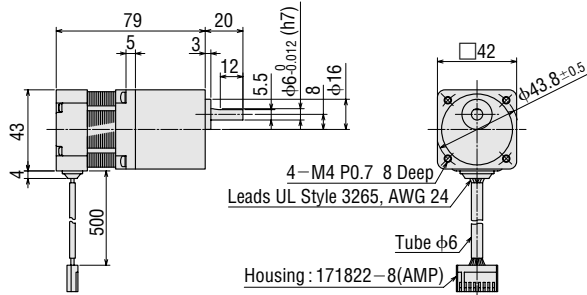
AXH015K-A (Round Shaft Type)
Motor: AXHM015K-A
Mass: 0.25kg
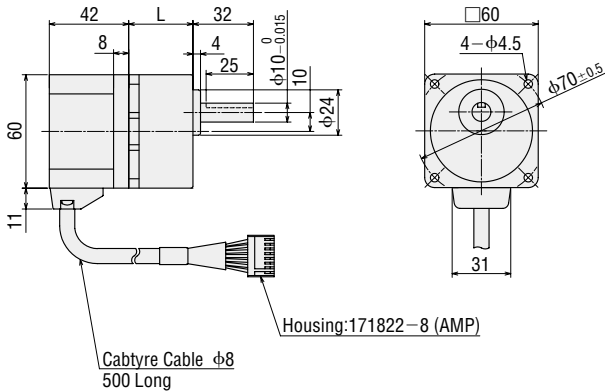

4-φ3.5
Leads UL Style 3265, AWG 24
Tube φ6
Housing : 171822−8(AMP)
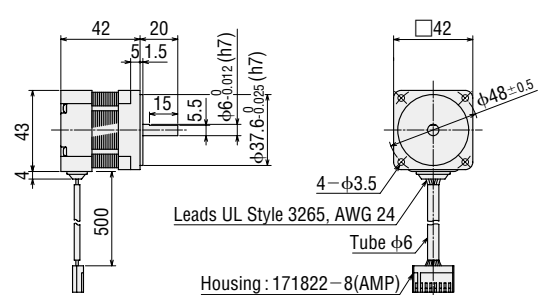
●Motor/Gearhead

AXH230KC-□ (Combination Type)
Motor: AXHM230KC-GFH
Gearhead: GFH2G□
Mass: 1.0kg (Gearhead included)

Housing:171822−8 (AMP)
Cabtyre Cable φ8
500 Long

AXH230KC-A (Round Shaft Type)
Motor: AXHM230KC-A
Mass: 0.5kg

Housing:171822−8 (AMP)
Cabtyre Cable φ8
500 Long
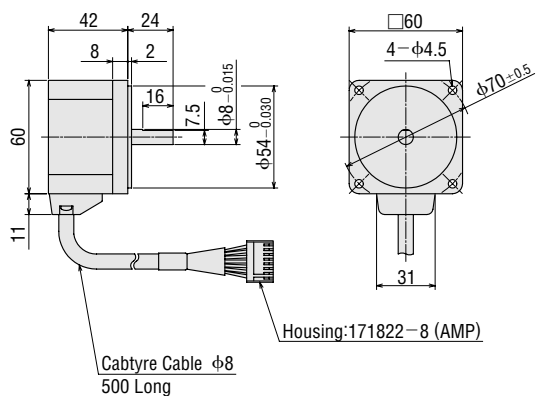
L=34 GFH2G5～20
L=38 GFH2G30～100
L=43 GFH2G200

●Key and Key Slot (Included with combination type)

● Motor/Gearhead

AXH450KC-□ (Combination Type)
Motor: AXHM450KC-GFH
Gearhead: GFH4G□
Mass: 1.8kg (Gearhead included)

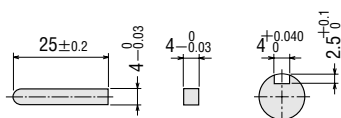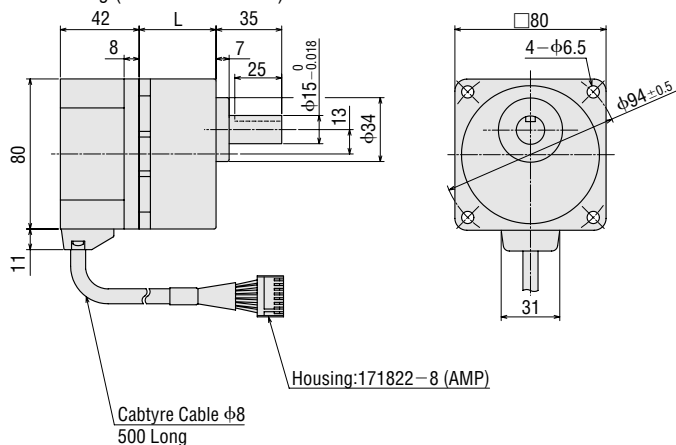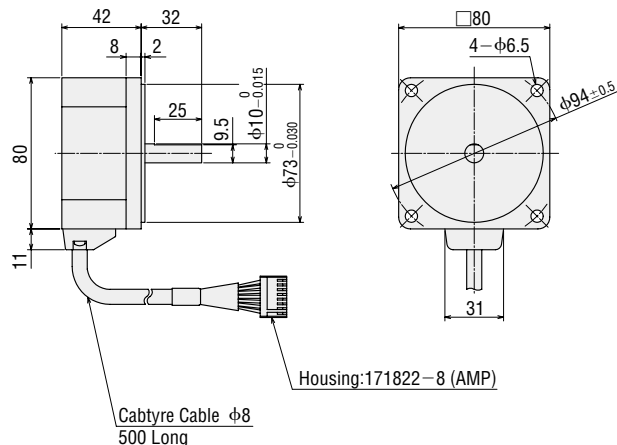**AXH450KC-A** (Round Shaft Type)
Motor: AXHM450KC-A
Mass: 0.8kg

Housing:171822−8 (AMP)
Cabtyre Cable φ8
500 Long

L=41 GFH4G5~20
L=46 GFH4G30~100
L=51 GFH4G200

● Key and Key Slot (Included with combination type)
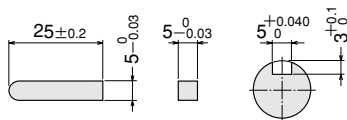
● Driver

AXHD15K
AXHD30K
AXHD50K
Mass: 0.1kg

CN3: Connection to Motor
2- φ 3.5
CN2: 1-171825-2 (AMP)
CN1: 171825-2 (AMP)
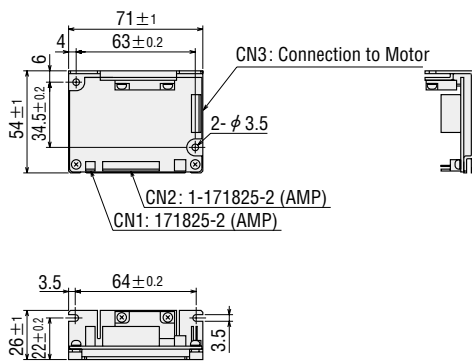
● Driver Input Signal Cable (Included, Common to All Models)

300

1-171822-2(AMP)

Leads UL STYLE 1007 AWG26

● Driver Power Supply Cable (Included, Common to All Models)

300

171822-2(AMP)

Leads   UL STYLE 1007 AWG22

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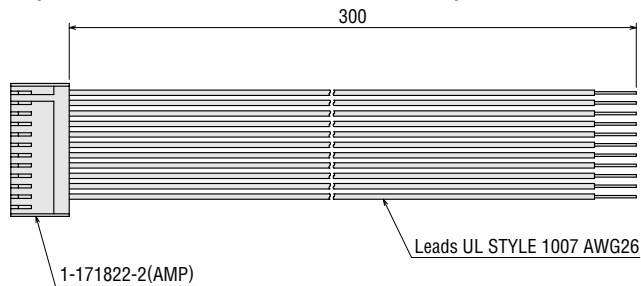
AC Speed Control Motors
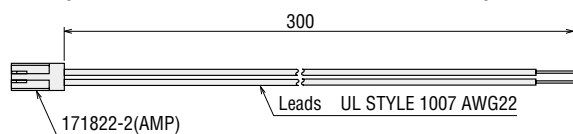
■ Connection and Operation

● Wiring Diagram

Driver

Power supply connection
Connected to 24 VDC (±10%)
power supply

2	GND
1	+24V

CN1

12	N.C.
11	START/STOP
10	RUN/BRAKE
9	CW/CCW
8	INT. VR/EXT. input
7	ALARM-RESET input
6	VRH
5	VRM
4	VRL
3	GND
2	SPEED output
1	ALARM output

CN2 (I/O)

Start/Stop input [L(ON) :Start / H(OFF):Stop] — Black
Brake input [L(ON) :Run / H(OFF):Instantaneous stop] — White
Rotation direction switching input [L(ON) : CW / H(OFF): CCW] — Gray
Speed potentiometer switching input [L(ON) :Internal / H(OFF):External] — Brown
Alarm reset input [L(ON) :Reset / H(OFF):Normal] — Purple

Speed setting DC power supply
0～5 VDC (+) — Green
1mA min (−) — Yellow
GND — Orange
Speed output — Red
Alarm output — Brown

INT.VR. CN3
Motor

Motor

● When the motor cable is extended, use an optional extension cable (sold separately, 1.5m).

● Timing Chart (During Operation)

2-Speed Switching/Stop   Run/Brake   Rotation Direction Switching

High Speed
CW (Clockwise)   Low Speed
Motor Operation Pattern
CCW (Counterclockwise)

START/STOP Input "H"(OFF) / "L" (ON)   START   START

CW/CCW Input "H"(OFF) / "L" (ON)   CW   CCW   CW

RUN/BRAKE Input "H"(OFF) / "L" (ON)   RUN   RUN   RUN

INT.VR./EXT.Input "H"(OFF) / "L" (ON)   EXT.   INT.VR.   EXT.   INT.VR.   EXT.

SPEED Output "H"(OFF) / "L" (ON)
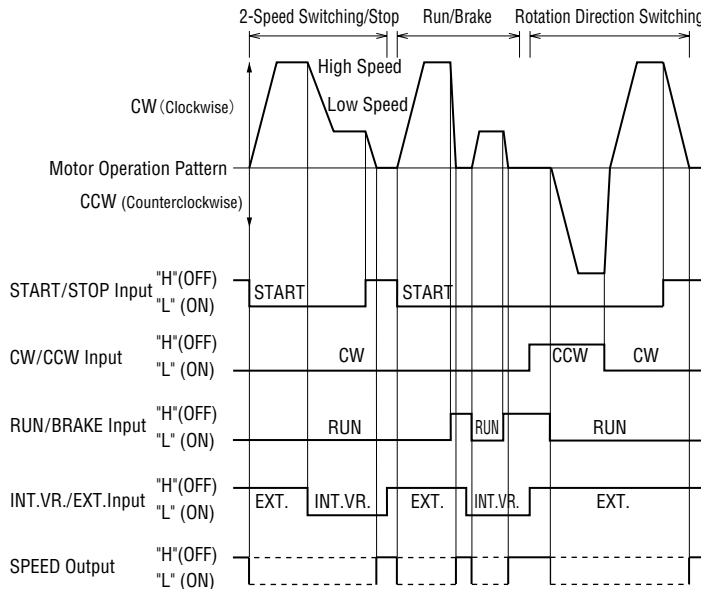
● Run/stop, instantaneous stopping and rotation direction switching operations can all be controlled with the START/STOP, RUN/BRAKE and CW/CCW signals.

● If both the START/STOP signal and the RUN/BRAKE signal are set to L level (ON), the motor rotates. At this time, if the CW/CCW signal is set to L level (ON), then the motor rotates clockwise as seen from the motor shaft side; if the CW/CCW signal is set to H level (OFF), the motor rotates in the counterclockwise direction.

● If the RUN/BRAKE signal is set to H level (OFF) while the START/STOP signal is L level (ON), the motor stops instantaneously. If the START/STOP signal is set to H level (OFF) while the RUN/BRAKE signal is set to L level (ON), the motor stops naturally.

● The duration of each input signal must be 10 msec or longer.

● Do not operate (turn ON/OFF) two or more input signals simultaneously.
There must be a minimum interval of 10 msec after an input signal is operated before another input signal can be operated.

●Input Signal Circuit
◇Input Circuit
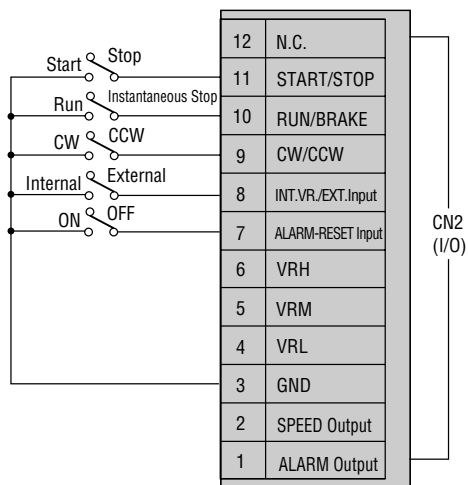
Driver Internal Circuit
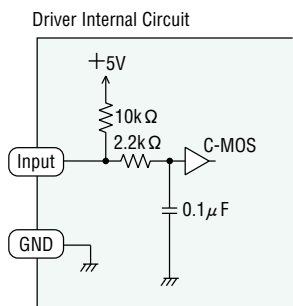
● Common to ALARM-RESET, INT.VR./EXT., CW/CCW, RUN/BRAKE, and START/STOP.

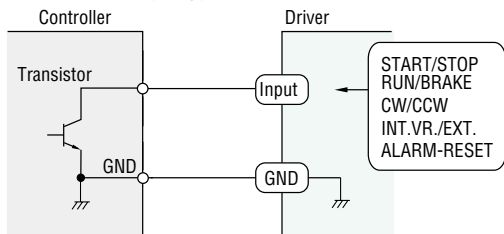### ◇**Example of Input Circuit Connection**
・**Control by Small Capacity Relay, Switch, or the like**
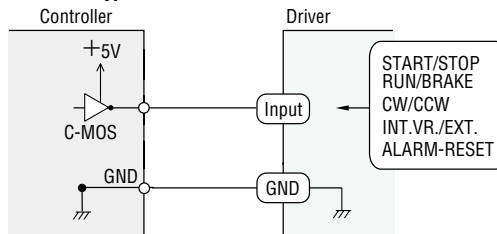
Switch Capacity : DC24V 10mA

12	N.C.
11	START/STOP
10	RUN/BRAKE
9	CW/CCW
8	INT.VR./EXT.Input
7	ALARM-RESET Input
6	VRH
5	VRM
4	VRL
3	GND
2	SPEED Output
1	ALARM Output

CN2 (I/O)

Start　Stop
Run　Instantaneous Stop
CW　CCW
Internal　External
ON　OFF

・**Control by Controller**

■ **Transistor output type**

Controller　　Driver

Transistor

Input

GND

START/STOP
RUN/BRAKE
CW/CCW
INT.VR./EXT.
ALARM-RESET

GND

■ **C-MOS type**

Controller　　Driver

＋5V

C-MOS

Input

GND

START/STOP
RUN/BRAKE
CW/CCW
INT.VR./EXT.
ALARM-RESET

GND

Induction Motors

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FBLⅡ

AXU

AXH

HBL

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Brushless Motor and Driver

AC Speed Control Motors

● Output Signal Circuit

◇ Output Circuit

(Internal Circuit)

2SC2458 equivalent

Output

GND

External Use Condition DC26.4V Max. 10mA Max.
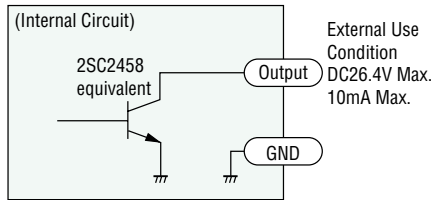
◇ Example of Output Circuit Connection
Output Signal Connections

Controller   Driver

Vcc

SPEED ALARM

R

GND

2SC2458 equivalent
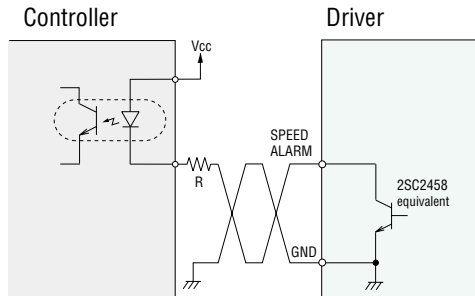
SPEED Output

The system outputs pulse signals (with a width of 0.3ms) at a rate of 30 pulses per rotation of the motor output shaft synchronized with the motor drive.

You can measure the SPEED output frequency and calculate the motor speed.

$$\text{Motor speed (r/min)} = \frac{\text{SPEED output frequency 〔Hz〕}}{30} \times 60$$

$$\text{SPEED output frequency (Hz)} = \frac{1}{T}$$

0.3 ms

T
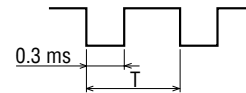
ALARM Output

The ALARM output is normally L level (ON) and goes H level (OFF) when there is an alarm.

ALARM-RESET

When the motor is stopped, setting this signal L level (ON), then returning it to H level (OFF) resets the alarm.

Please return either the START/STOP input or the RUN/BRAKE input to H level (OFF) before inputting the ALARM-RESET.

The ALARM-RESET is not accepted if both these signals are L level (ON).

Note:
● Output signal is open collector output, so an external power supply (Vcc) is required.
● Use a power supply of no more than DC26.4V and connect a limit resistance (R) such that the output current does not exceed 10mA.

When using neither the speed output function nor the alarm output function, this connection is not required.

## ● Speed Setting Method

◇ Internal Potentiometer

When INT.VR/EXT. input is set to L level (ON), the speed can be set with the internal speed potentiometer.

There is no need for this connection when the internal potentiometer is not used.
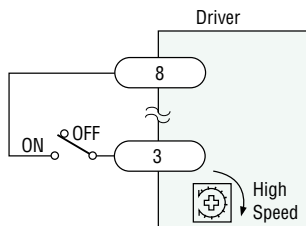
◇ External Potentiometer

When separating the motor speed setting from the driver, connect the optional external potentiometer as follows.
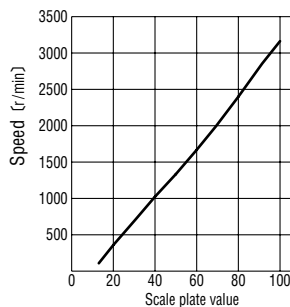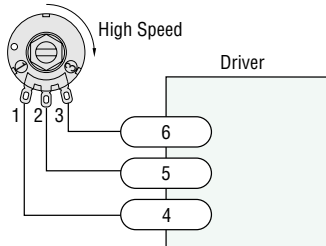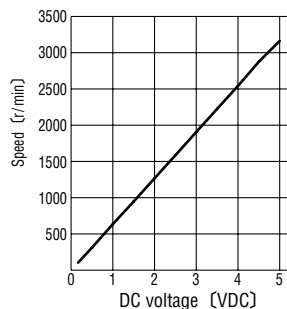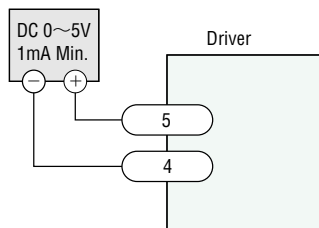

External Potentiometer Scale－Speed Characteristics (Representative Values)

◇ External DC Voltage

When setting the motor speed with an external DC voltage, do so in the following manner.

External DC Voltage－Speed Characteristics (Representative Values)

■ List of Motor and Driver Combinations

Output Power	Model	Motor Model	Gearhead Model	Driver Model
15W	**AXH015K-□**	AXHM015K-□	－	AXHD15K
30W	**AXH230KC-□**	AXHM230KC-GFH	GFH2G□	AXHD30K
50W	**AXH450KC-□**	AXHM450KC-GFH	GFH4G□	AXHD50K

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

● Round Shaft Type

Output Power	Model	Motor Model	Driver Model
15W	**AXH015K-A**	AXHM015K-A	AXHD15K
30W	**AXH230KC-A**	AXHM230KC-A	AXHD30K
50W	**AXH450KC-A**	AXHM450KC-A	AXHD50K