Brushless Motor and Driver Package

HBL *Series*

This slim line motor and compact driver produces constant torque throughout its speed range of 300～2000 r/min.

The HBL series is suitable for smaller size applications.

In the **HBL** series, a driver is provided with a motor as a package.

■Features

- Compact board level driver is suitable for smaller sized applications.
- In addition to the "Overload protection", the **HBL** series also incorporates "Out-of-Phase protection".
  In the event of a problem, the motor is brought to a stop and an alarm signal is output.
- To improve the reliability of feedback signals over longer distances, an optional extension cable is available.
  This increases the distance between the motor and driver to 5m.
- The motor features a compact design, enabling it to be installed in tight spaces.
- DC48V input makes it possible to switch to a backup power supply in the event of a power failure.
- Speed can be varied over a continuous range from 300 r/min to 2000 r/min with uniform torque throughout.
- The motor can be started, reversed and brought to an instantaneous stop using an electrical input control from the PLC.
- For easy installation, the motors and gearhead come pre-assembled in the combination type.

■Product Number Code

HBL 5 60 N - 5

- **HBL** Series
- **Motor Frame Size**
  5 : 90mm sq.
- **Output Power**
  60 : 60W
  100 : 100W
- **Voltage**
  N : DC 48V
- **Number :** Gear Ratio
  A : Round shaft

■Type

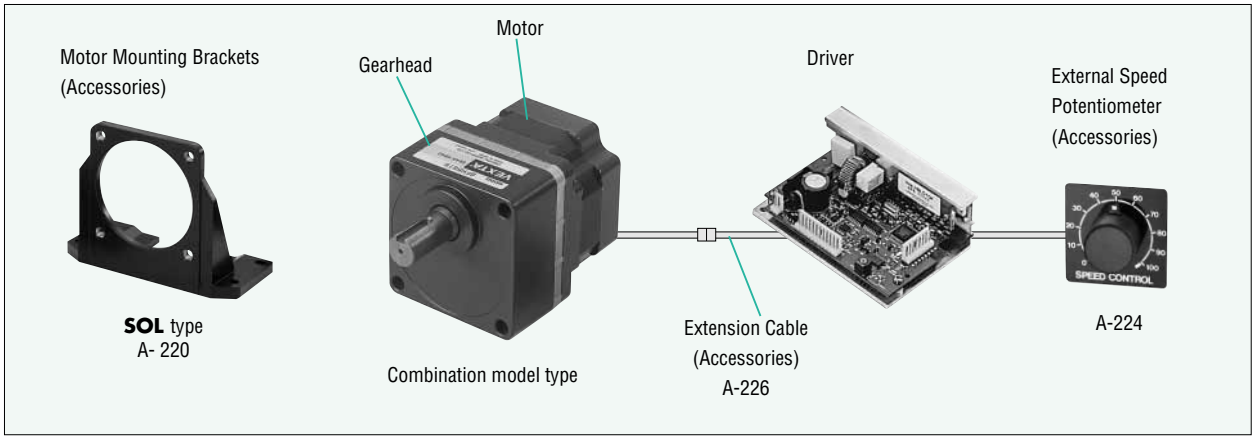
●Combination model type

Output Power	Model
60W	**HBL560N-5～20** **HBL560N-30～100** **HBL560N-200**
100W	**HBL5100N-5～20** **HBL5100N-30～100** **HBL5100N-200**

●Round shaft type

Output Power	Model
60W	**HBL560N-A**
100W	**HBL5100N-A**

■Construction



■List of Motor and Driver Combinations

Model numbers for motor / driver combinations are shown below.

●Combination model type

Output Power〔W〕	Model	Motor Model	Gearhead Model	Driver Model
60	**HBL560N-□**	HBLM560N-GFH	GFH5G□	HBLD60N
100	**HBL5100N-□**	HBLM5100N-GFH	GFH5G□	HBLD100N

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

●Round shaft type

Output Power〔W〕	Model	Motor Model	Driver Model
60	**HBL560N-A**	HBLM560N-A	HBLD60N
100	**HBL5100N-A**	HBLM5100N-A	HBLD100N

Specifications

Model	Combination Type	HBL560N-□	HBL5100N-□
	Round Shaft Type	HBL560N-A	HBL5100N-A
Rated Speed	r/min	2000	
Rated Output Power	W	60	100
Rated Torque	N·m	0.3	0.5
Starting Torque	N·m	0.36	0.6
Permissible Inertial Load	J×10⁻⁴kg·m²	3.75	5.6
Variable Speed Range	r/min	300～2000	
Power Source	Voltage	DC48V±10%	
	Current	3A	5A
Input Power for Signals		DC5V±5%, 100mA min.	
Speed Control Methods		1. By built-in potentiometer 2. By external potentiometer 3. By DC voltage (0~5V DC)	
Speed Regulation	Load	−3% Max. (0～rated torque, at 2000r/min)	
	Voltage	±2% Max. (Power supply voltage ±10%, at 2000r/min with no load)	
	Temperature	±2% Max. (0°C～+40°C, at 2000r/min with no load)	
Input Signal		C-MOS level negative logic L (ON) : 0～0.5V, H (OFF) : 4～5V START/STOP L : Start H : Stop BRAKE L : Run H : Brake Direction of Rotation L : CW H : CCW Speed Potentiometer Selection L : Internal H : External	
Output Signal		Open collector output External use condition: DC26.4V, 10mA max. SPEED, ALARM	
Protection Functions		When the following are activated, the alarm signal will be output and the motor will come to a stop : ●Overload Protection : This will be activated within approximately 5 seconds of the motor load exceeding rated torque. ●Out-of-Phase Protection : This will be activated when motor signals are abnormal, due to disconnection of cable, etc.	
Motor Insulation Class		Class E (120°C)	
Rating		Continuous	

Note : HBL Series motors should not be used in gravitational applications in which they are driven by the load since doing so can cause the inverter's primary voltage to exceed the maximum limit and damage the driver.

General Specifications

Item		Motor	Driver
Insulation Resistance		100MΩ or more when 500V DC is applied between the windings and the frame.	100MΩ or more when 500V DC is applied between the FG and the power supply input terminal.
Dielectric Strength		Sufficient to withstand 0.5kV at 50Hz applied between the windings and the frame for 1 minute.	Sufficient to withstand 0.5kV at 50Hz applied between the FG and the power supply input terminal for 1 minute.
Operating Environmental Conditions	Ambient Temperature	0～+50°C, nonfreezing	0～+50°C, nonfreezing
	Ambient Humidity	85% max., noncondensing	
	Atmosphere	No corrosive gases or dust	

Gearmotor — Torque Table

Unit = N·m

Model \ Gear Ratio	5	10	15	20	30	50	100	200
Speed r/min	60～400	30～200	20～133	15～100	10～67	6～40	3～20	1.5～10
HBL560N-□	1.4	2.7	4.1	5.4	7.7	13	26	30
HBL5100N-□	2.3	4.5	6.8	9	13	22	30	30

- 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.

■Permissible Overhung Load and Permissible Thrust Load

Gearhead Model	Gear Ratio	Permissible Overhung Load (N) 10mm from shaft end	Permissible Thrust Load (N)
HBL560N-□	**5**	300	150
HBL5100N-□	**10～20**	400	
	30～200	500	

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

■Permissible Inertial Load J

Unit = $\times 10^{-4}$ kg·m²

Model \ Gear Ratio	5	10	15	20	30	50	100	200
HBL560N-□ **HBL5100N-□**	25	100	225	400	900	2500	2500	2500

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

■Torque — Speed Characteristics

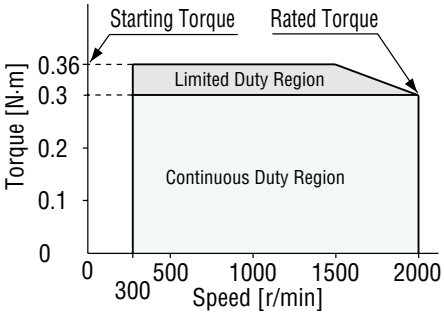
●Continuous Duty Region

Continuous operation is possible in this region.

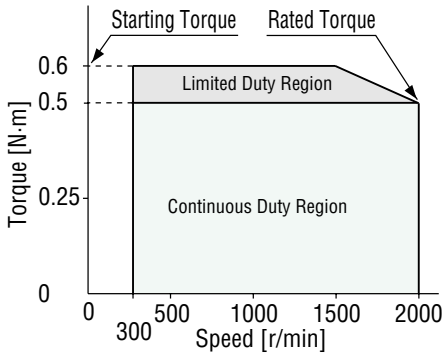
●Limited Duty Region

This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately 5 seconds, overload protection is activated and the motor comes to stop.

HBL560N-□
HBL560N-A

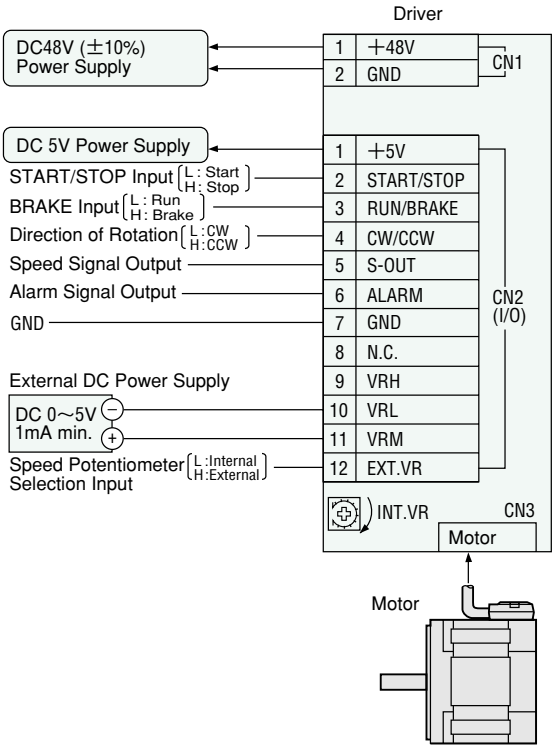


HBL5100N-□
HBL5100N-A

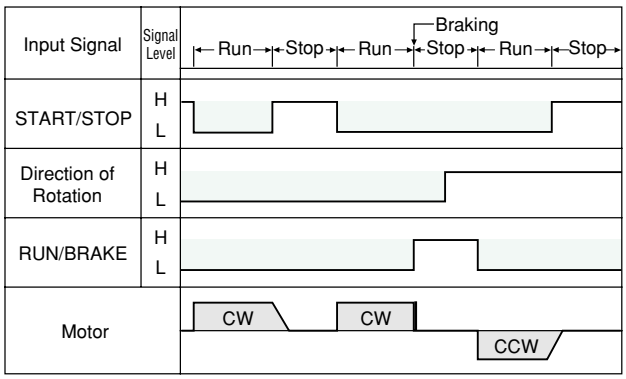


✻The combination type is the value for the motor alone.

■Wiring Diagrams



■Signal Input Timing Chart



●RUN/BRAKE

The brake input runs or stops the motor when START/STOP input has been set to “L” level, the motor rotates at the speed selected; if set to “H” level, the motor stops instantaneously.

●Direction of Rotation

The direction of rotation can be changed by the direction of rotation input. The diagram shows the direction of motor shaft rotation as viewed from the motor shaft.

Speed Control

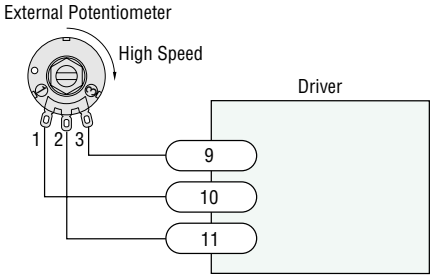
① Speed Control by Built-in Potentiometer

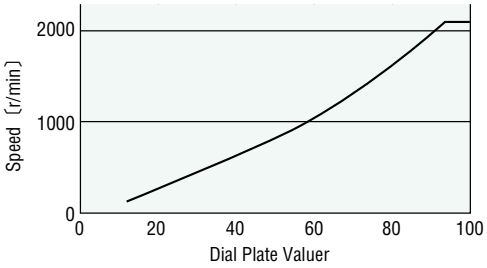
The EXT. VR input has been set to OFF ("L"Level), and turn the potentiometer clockwise to increase the speed.

② Speed Control by External Potentiometer

To control the speed of the motor when it is separated from the driver, connect the external potentiometer provided with the motor as follows.

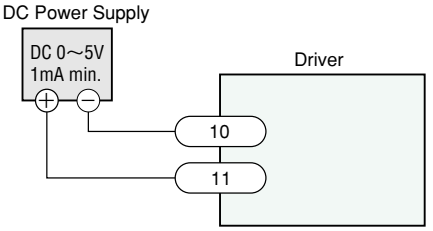
External Potentiometer **PAVR-20KY**(Sold separately)

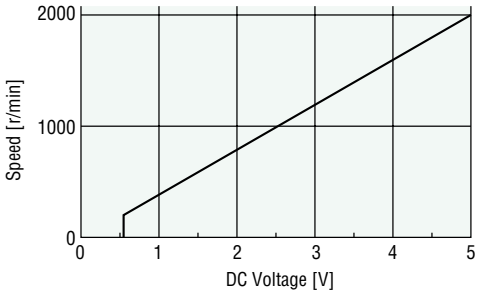




③ Speed Control by DC Voltage

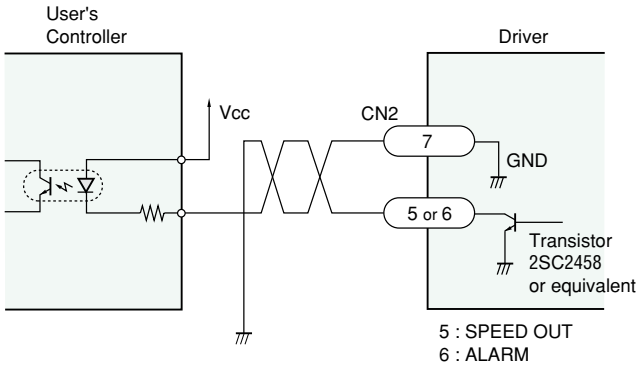
To control the speed of the motor by DC voltage, connect the DC power supply as follows.





DC Voltage — Speed Characteristics

Connection of Output Signals



Speed Signal Output:

It is output at a rate of 12 pulses per motor rotation. Motor speed can be determined using the following formula:

$$\text{Motor speed} = \frac{\text{Speed output frequency [Hz]}}{12} \times 60\,[\text{r/min}]$$

Alarm Signal Output:

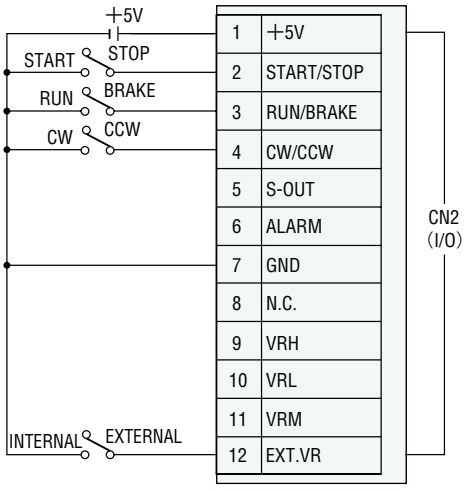
This signal is output when protection for overload or out-of-phase has been activated.

Note:

- Signal output is done through an open collector transistor which requires an external power source.
- The external power source should be less than DC26.4V. The transistor in the driver requires less than 10mA.

Control by Small Capacity Relays or Switches

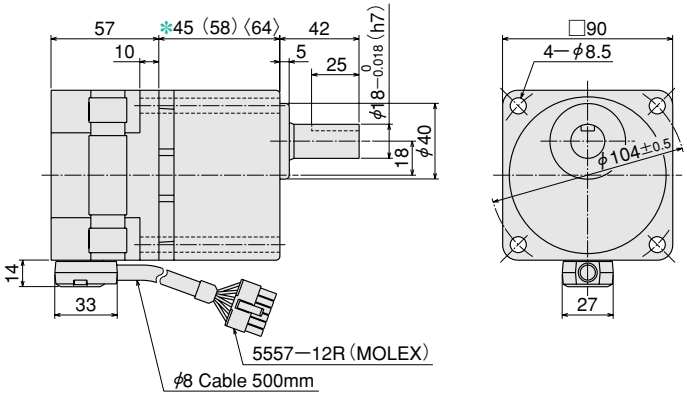
Switch Capacity : DC24V 10mA



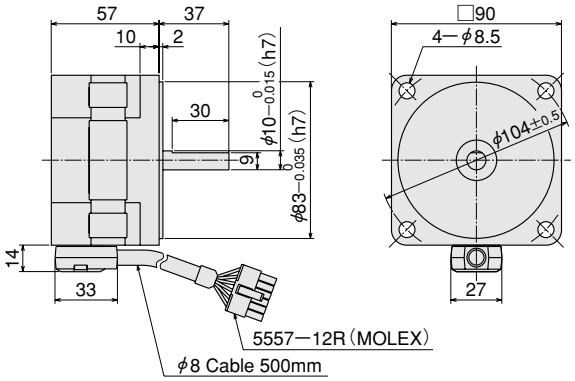
■Dimensions (Scale 1/4, Unit = mm)

HBL560N-□ (Combination Model)
Motor：HBLM560N-GFH /Gearhead：GFH5G□
Driver：HBLD60N
Mass：3.0kg

✻ for GFH5G5～GFH5G20
( ) for GFH5G30～GFH5G100
〈 〉 for GFH5G200

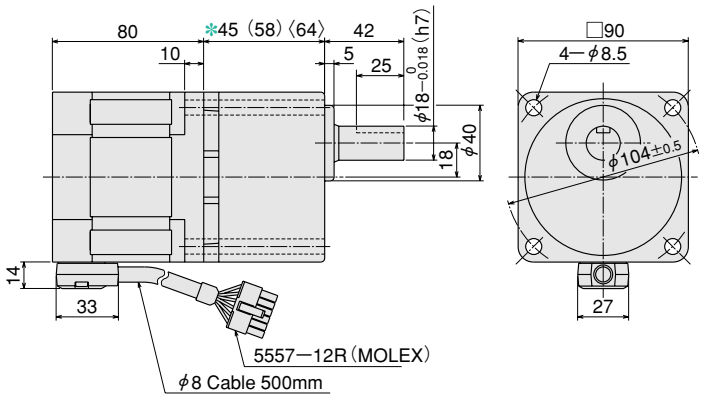


HBL560N-A (Round Shaft Type)
Motor：HBLM560N-A
Driver：HBLD60N
Mass：1.5kg

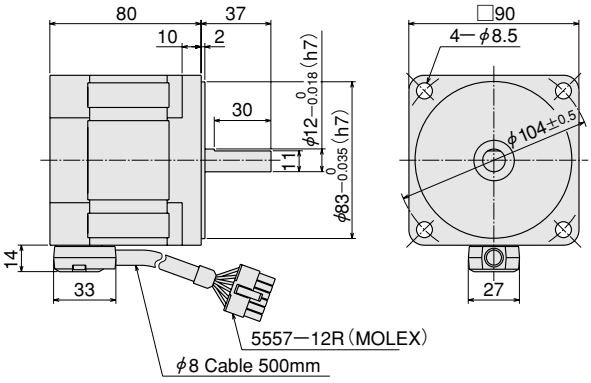


HBL5100N-□ (Combination Model)
Motor：HBLM5100N-GFH /Gearhead：GFH5G□
Driver：HBLD100N
Mass：4.0kg

✻ for GFH5G5～GFH5G20
( ) for GFH5G30～GFH5G100
〈 〉 for GFH5G200

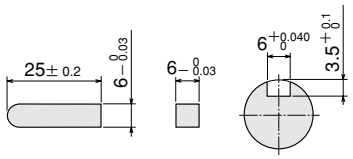


HBL5100N-A (Round Shaft Type)
Motor：HBLM5100N-A
Driver：HBLD100N
Mass：2.5kg



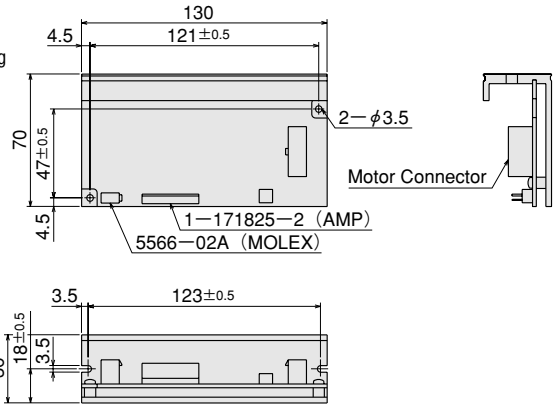
●Key and Key Slot (Scale 1/2)

(The key is provided with the **HBL560**and **HBL5100** combination model.)

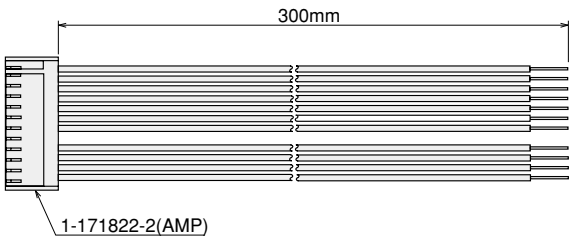


●Driver

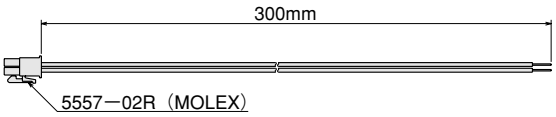
HBLD60N
HBLD100N
Mass：0.24kg



●Input Signal Cable (included)



●Power Supply Cable (included)

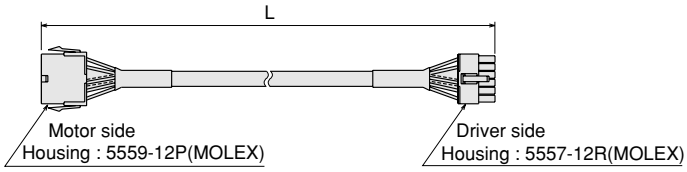


Accessories (Sold separately)

Extension Cable

Using the extension cable allows the motor and driver to be separated by up to 5.5m.

Model	Length L [m]
CC01FBL	1
CC02FBL	2
CC03FBL	3
CC05FBL	5

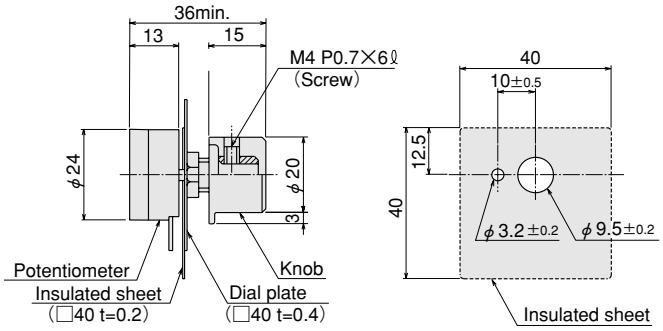


External Speed Potentiometer

Model: **PAVR-20KY**

Dimensions

Mass 35g



Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads.
Refer to page A-220 for further detail.

Motor Model	Mounting Bracket
HBL560 type	**SOL5M8**
HBL5100 type	