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Orientalmotor

HM-5006-11

Brushless DC Motor and Driver

FBL Ⅱ Series

OPERATING MANUAL

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/ щNpca_srgmlq ,,N,0

0, Tcpgdwgle rfc NpmbsarL_kc _lb ?aacqqmpgcq,,,,,,,,,,N,1

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2 щAmllcargml ,,,N,5

3 щMncp_rgml ,,N,/3

4 щAf_p_arcpgqrgaq ,,,N,/7

5 щRpms`jcqfmmrgle ,,,N,0.

Thank you for purchasing an Oriental Motor product.
This Operating Manual describes product handling procedures and safety precautions.
ŬPlease read it thoroughly to ensure safe operation.
ŬAlways keep the manual where it is readily available.

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1． Precautions

1．1　Precautions for Installation

●Do not use in a place where there is inflammable gas and/or corrosive gas.

●When installing the motor into your equipment, ensure that the cable is fixed and do not move.
In addition, do not apply any pressure to these cable.

●The motor housing must be mounted with a screw and spring washer to the ground point of the equipment.

●Installation must be performed by a qualified installer.

●Do not rework or modify the motor cable and extension cable (sold separately). Do not remove the sheath of the cable and then ground or touch the shielded wire. This may cause electric shock or trigger the ground fault interrupt circuit.

1．2　Precautions for Operation

●Always turn off the power to the motor before conducting checks or performing work on the motor.

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2. Verifying the Product Name and Accessories

2. 1 Motors, Drivers and Accessories

Check that the motor, driver and any accessories are all present. If an accessory is missing or damaged, contact the nearest ORIENTAL MOTOR office.

- Motor .....1 piece
  The O-rings are fitted in the pilot section of pinion shaft type motors.
- Driver.....1 piece
- Driver base mounting bracket .....2 pieces
  Driver back mounting bracket.....1 piece
  Mounting screws .....4 pieces
- External speed potentiometer.....1 piece
  Variable resistor (20kΩ, 1/4W)
- Signal Cable for externalspeed potentiometer (1m long) .....1 piece
- Set of mounting bolts
  (provided only with combination types)
  M8 bolts.....4 pieces
  Nuts.....4 pieces
  Spring washers .....4 pieces
  Washers.....4 pieces
  Key .....1 piece
- Manual (This document) .....1 piece

Note Never disassemble the motor and driver. Damage or performance impairment may result. Disassembly voids all warranties.

2. 2 Combinations and Types of Motors and Drivers

FBL Ⅱ series motors and drivers are provided in sets. When you receive a set, check that you have the proper motor and driver combination.

■Combination types

With combination type units, the motor and gearhead are pre-assembled. Mounting screws, nuts, washers,spring washers and keys are included with these models.

Unit Model	Motor Model	Driver Model
FBL220A-☐	FBLM220A-GF	FBLD20A
FBL440A-☐	FBLM440A-GF	FBLD40A

The gear ratio appears at the position in the unit model number indicated by the square.
For example, **FBL440A-50** means that the model is equipped with a gear with a 1:50 gear ratio.

■Separate types(gearheads are sold separately for pinion shaft type motors.)

Unit Model	Motor Model	Shaft Type	Driver Model	Gearhead Model
FBL220A-A	FBL220A-A	Round Shaft	FBLD20A	———
FBL220A-GF	FBL220A-GF	Pinion Shaft		GF2G☐
FBL440A-A	FBL440A-A	Round Shaft	FBLD40A	———
FBL440A-GF	FBL440A-GF	Pinion Shaft		GF4G☐

The gear ratio appears at the position in the model number indicated by the box(☐).

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3． Installation

Installation conditions

Install the motor and control unit in a location that meets the following conditions. Using the unit in a location that does not satisfy these conditions could damage it.

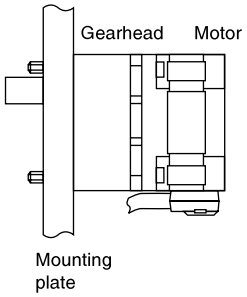
- Indoors (this product is designed and manufactured to be installed within another device)
- Ambient temperature:
  Motor : 0℃～+50℃(avoid freezing)
  Driver: 0℃～+40℃ (avoid freezing)
- Ambient humidity: 85% max. (avoid condensation)
- Not exposed to explosive, flammable, or corrosive gas
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water or oil
- A place where heat can escape easily
- Not exposed to continuous vibration or excessive impact

3．1　Motor Installation

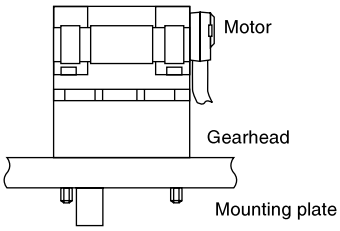
(1)　Direction of Motor Installation

Motors may be installed either horizontally or vertically.

■Horizontal mounting



■Vertical mounting



(2)　Connecting to Other Equipment (Loads)

When connecting motors to another piece of equipment (load), the motor shaft must be centered. When not properly centered, vibration will result and ball bearing life will be shortened dramatically, causing motor shaft damage.
The alignment of the coupling used, must be within its specification.

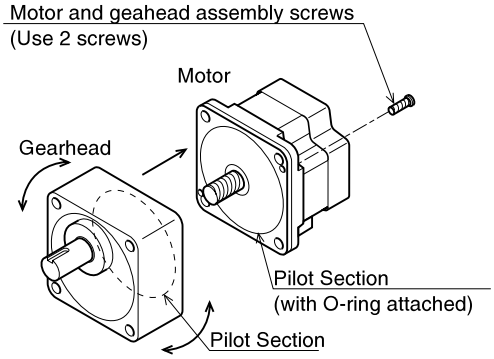
Note When attaching couplings, timing pulleys, gears or the like to a motor shaft, be sure not to subject the motor shaft to impacts. The ball bearings within the motor may become damaged.

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(3) Assembling the Motor and Gearhead (Pinion shaft motor)

Continue to the next page if you have a round shaft type or combination type motor.

Note Clean any dirt off the pilot section of the motor and gearhead.
Insufficient cleaning may cause incomplete attachment and leaking of grease within the gearhead.
Don't pinch the O-ring when assembling the motor and gearhead.



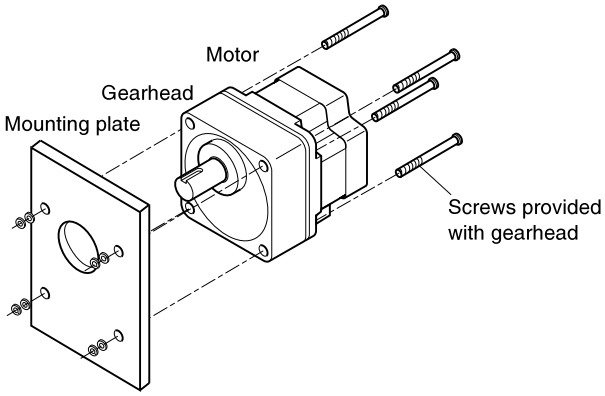
When attaching a pinion shaft type motor to a gearhead, use the pilot of the motor and gearhead as guides, and gently rotate the gearhead back and forth until it fits in place, as shown in the figure at the left. When the gearhead is in place, fasten it to the motor using the screws provided .

Motor Frame size	Screw size
□60 (□2.36)	M2.6
□80 (□3.15)	M2.6

Dimensions in millimeters(inches).

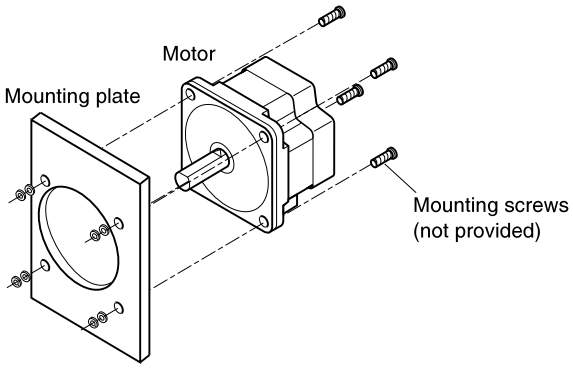
(4) Installing on Other Devices

■Combination Type And Pinion Shaft Motor



To install motor and gearhead to machinery, make installation holes in the mounting place.
Use screws provided with gearhead and secure the motor so that there are no gaps between the motor flange surface, gearhead surface and the mounting surface.
For dimensions of installation holes and the detail of mounting, see the operating manual of gearhead.

■Round shaft Motor



To install motor to machinery, make installation holes in the mounting place.
Use 4screws and secure the motor so that there are no gaps between the motor flange surface and the mounting surface.
Four screws are necessary for mounting (not provided).

Motor Frame size	Screw size	Clamping Torque
□60 (□2.36)	M4	2N·m (20kgcm)
□80 (□3.15)	M6	3N·m (30kgcm)

Dimensions in millimeters(inches).

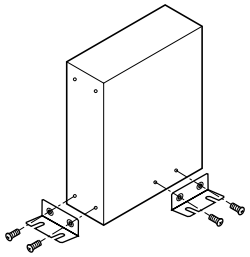
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3. 2 Driver Installation

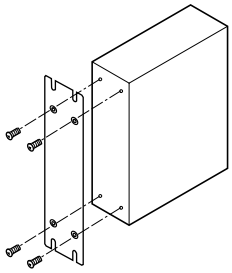
(1) Driver Installation

The driver can be mounted on machinery using the mounting brackets provided.

■Base mounting

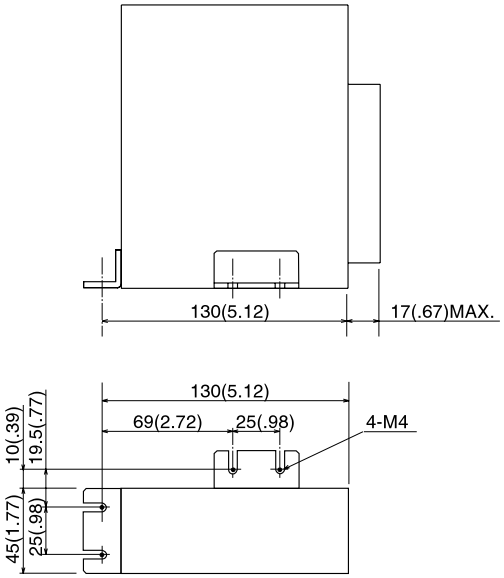


■Back mounting

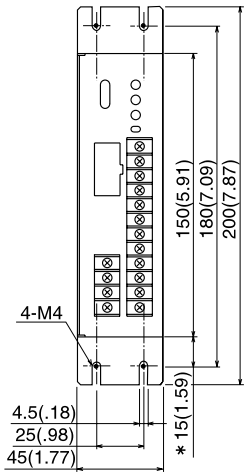


■Mounting dimensions

Base mounting



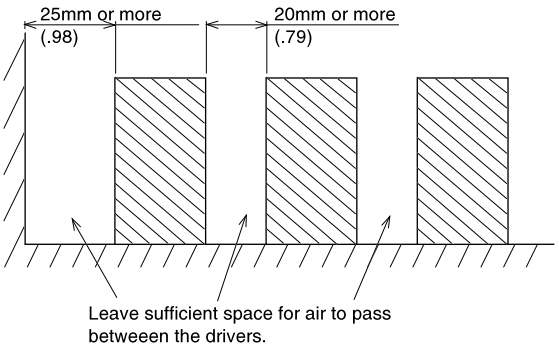
Back mounting



Note

- When mounting the driver directly on a surface without using the mounting brackets, be sure to use screws of suitable length. If the screws are too long, they could make contact with the driver's internal circuits and damage the driver. (Use mounting screws that extend no further than 3mm from the surface of the driver into the driver.)
- To improve ventilation, mount the driver in an upright position as shown in the figures above.
- When mounting the driver in a tightly close up place like the control panel and a place where there is a heating hearby , be sure to when the driver ambient temperature exceeds 40℃ , cool the driver with a fan.
- The back mount brackets are asymmetry up and down and they can be used at any direction.
- The size ∗ in the diagram vary depending on the direction of the mounting plate. In the reverse direction it is 19mm long.

(2) Mounting Two or More Drivers

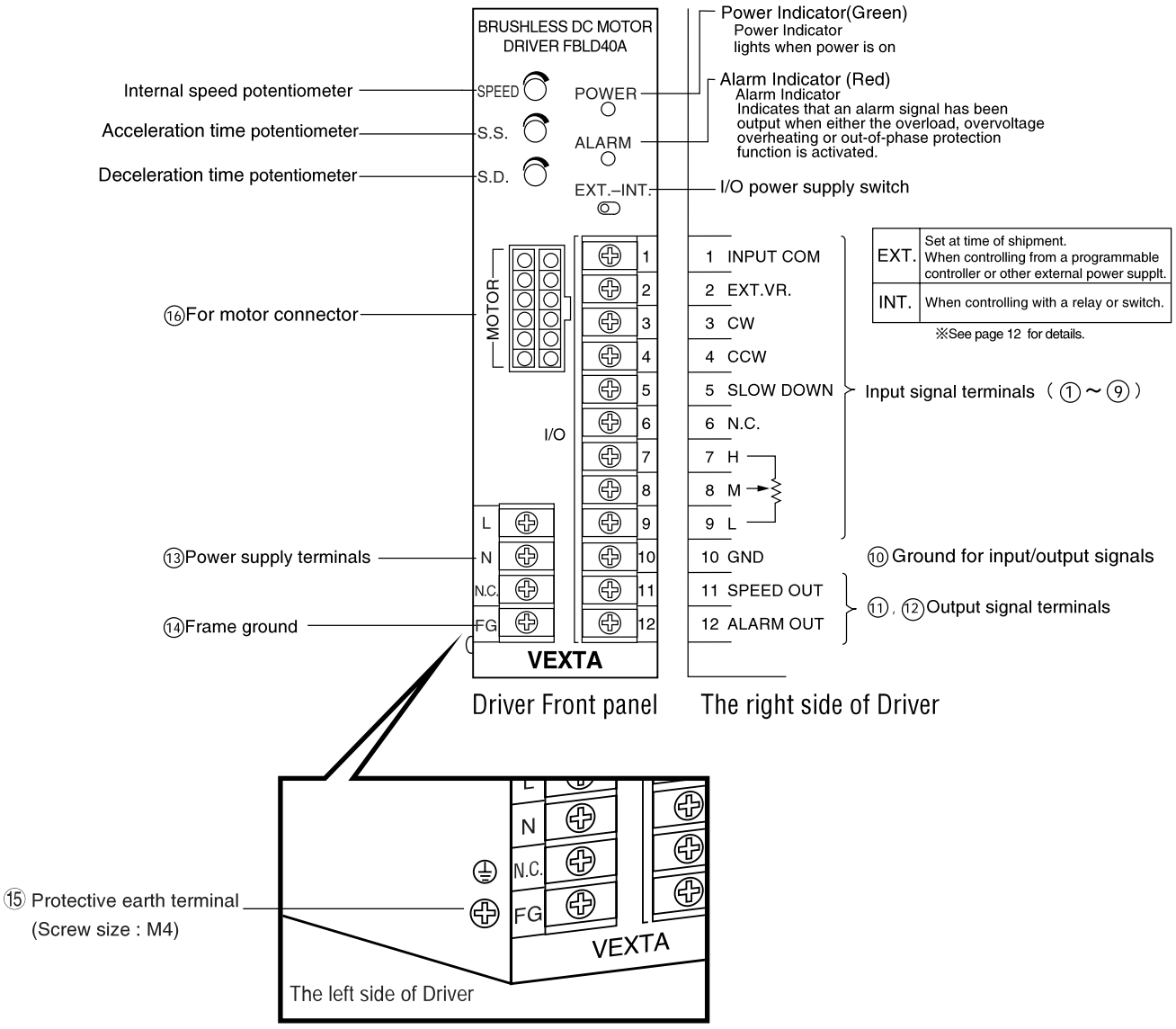


When mounting two or more drivers, separate them by a space of at least 20mm. Leave at least 25mm between of space the driver and other devices or structures.

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4. Connection

4. 1 Names and Functions of Driver



■Signal Input Terminals

① INPUT COM (external power supply for signal input)

To connect the driver to a programmable controller or other device when controlling the motor using an external power supply, flip the I/O power supply switch to "EXT." and connect the power supply to this terminal. To use the driver's built-in power supply when controlling with a relay or the like, flip the I/O power supply switch to "INT."; the terminal is not used.

② EXT.VR (speed selection)

To select the built-in speed potentiometer, turn this input off (switch to high); to select the external speed potentiometer (or DC power supply) turn this input on (switch to low).

③ CW (clockwise rotation input)

Input terminal for clockwise rotation.

④ CCW (counterclockwise rotation input)

Input terminal for counterclockwise rotation.

⑤ SLOW DOWN (deceleration input)

Input terminal for decelerating the motor to a stop. This terminal is not used for acceleration, which is set by using the built-in acceleration time potentiometer.

⑥ N.C.

Not used.

⑦ H, ⑧ M, ⑨ L (speed control input)

These are the connection terminals when controlling speed using the external speed potentiometer provided with the unit or by means of a DC power supply.

⑩ GND (ground terminal, for input/output signals)

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■Signal Output Terminals

⑪ SPEED OUT (speed signal output)
Use when monitoring the rate of rotation; 12 pulse are output for each motor rotation.

⑫ ALARM OUT (alarm signal output)
This signal is output when the protection function is activated. The ALARM LED lights and the motor comes to a stop. When an alarm signal is output, turn off power. To cancel the alarm, first resolve the cause and check for safety, and then turn power on again. Once power has been turned off, wait at least 30 seconds before turning it on again.

■Power Supply Connection

⑬ Single phase 100V/115V types :100V/115V ±15% 50Hz/60Hz (power supply connection)
Single phase 200V types : 200V ±10% 50Hz/60Hz (power supply connection)
Connecting to L Terminal , N Terminal .

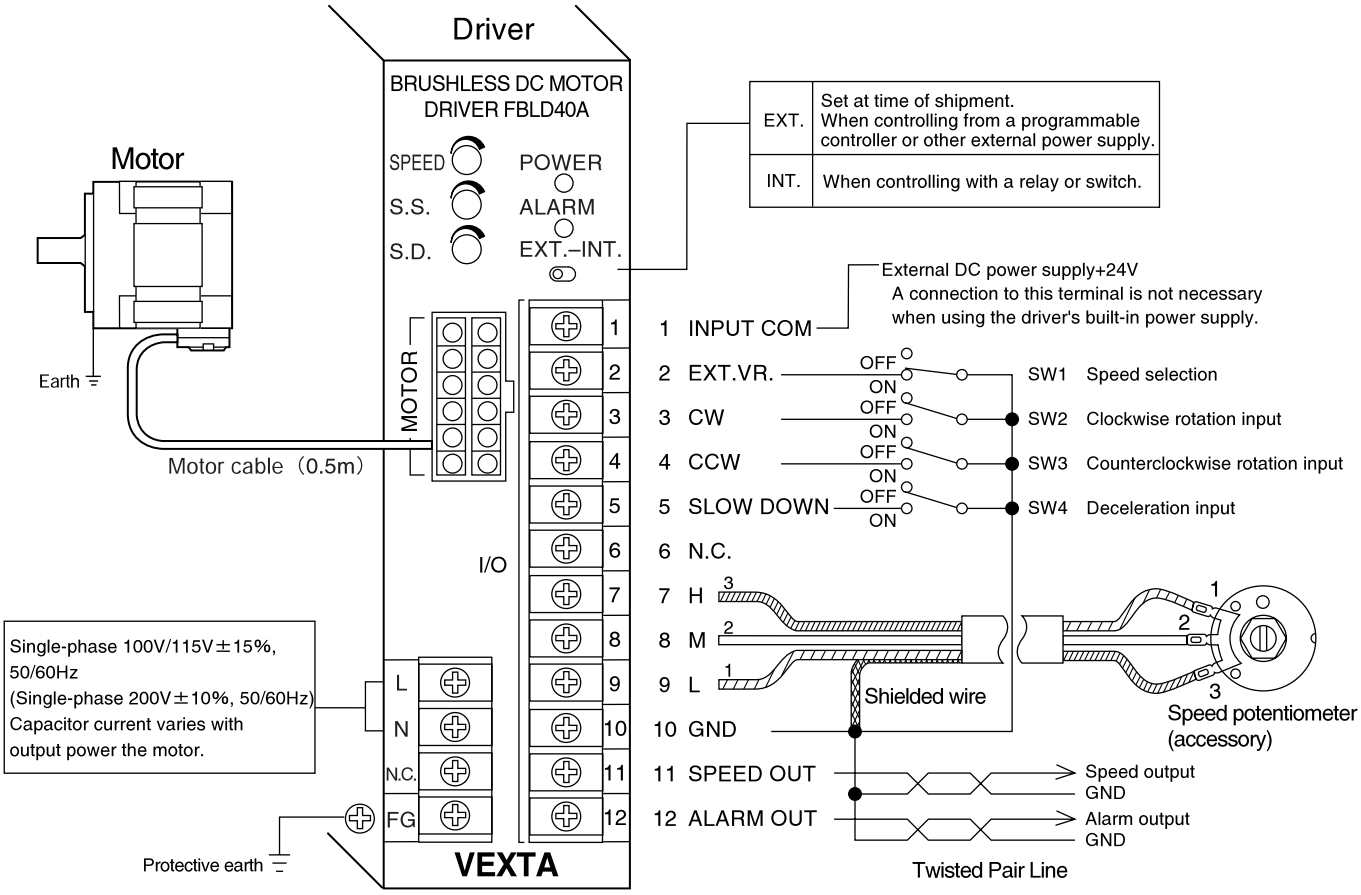
⑭ FG (frame ground)

⑮ Protective earth
Use a wire with a cross sectional area of at least 0.75mm^2 .

■Connector for Motor

⑯ Port for connecting the motor cable.

4. 2 Examples of Connections



・Input/output signal input can also be controlled by non-contact means (TTL, transistors), as well as by the switches shown in the above diagram. For details, see the section "4.6 Signal Input Circuits" on page12.

・To operate the motor, connect the motor and driver, and the driver's signal and power supply input.

Note
・The user must furnish the power supply cable.
・Be sure that the motor connector is fully inserted before turning on power. A loose connection can cause faulty operation.
・Do not rework or modify the motor cable and extension cable (sold separately). Do not remove the sheath of the cable and then ground or touch the shielded wire. This may cause electric shock or trigger the ground fault interrupt circuit.
・Be sure to put in the terminal cover after connecting.

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4. 3 Motor and Driver Connections

The motor is connected to the driver using the connectors provided. The cable can be extended to a maximum of 10.5 meters using an extension cable (sold separately).

Model	Cable Length
CC01FBL	3.3ft. (1m)
CC02FBL	6.6ft. (2m)
CC03FBL	9.8ft. (3m)
CC05FBL	16.4ft. (5m)
CC07FBL	23.0ft. (7m)
CC10FBL	32.8ft. (10m)

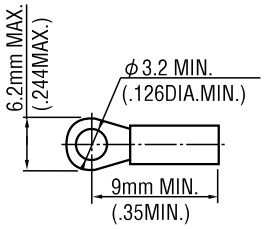
Note Do not lengthen the motor cable by more than 10.5 meters by connecting two or more extension cables, as this can lead to faulty operation.

4. 4 Connecting Drivers and Power Supplies

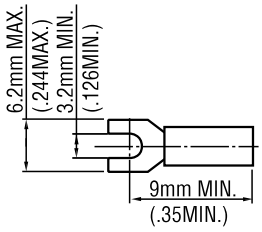
Use a power supply cable whose wire has a cross sectional area of at least 0.75 mm². The power supply voltage is single-phase 100/115V; the power supply input current varies depending on the motor output (see tables below).

■Recommended Terminal Rings

■Round shape terminal with insulation



■U-shape terminal with insulation



■Power Supply Input Current

Combination Type	Round Shaft Type	Pinion Shaft Type	Maximum Input Current
FBL220A-☐	**FBL220A-A**	**FBL220A-GF**	1.3A
FBL440A-☐	**FBL440A-A**	**FBL440A-GF**	2.0A

Note
- Ground the driver using the FG terminal or Protective earth terminal (ground resistance of 100Ω max.).
- Once power has been turned off, do not turn power on again or remove or insert the motor connector until the POWER LED is completely extinguished (at least 30 seconds).

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4．5　Methods of Speed Setting and Their Connection

(1)　The following three methods of setting speed can be used with **FBL**Ⅱ units.

■Internal Speed Potentiometer

Motor speed can be adjusted by turning the potentiometer screw on the driver's front panel. This method is suitable for infrequent speed changes.

■External Speed Potentiometer

Speed settings can be controlled remotely using the external speed potentiometer provided with the unit. This method is suitable when adjusting speed from a control panel.

■External DC Voltage

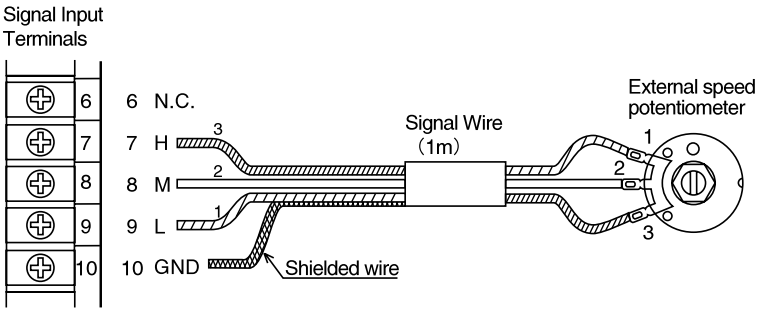
The motor speed can be changed with DC voltages of 0-5 V.
Have ready a DC power supply of 1 mA or more.

(2)　Connection Methods

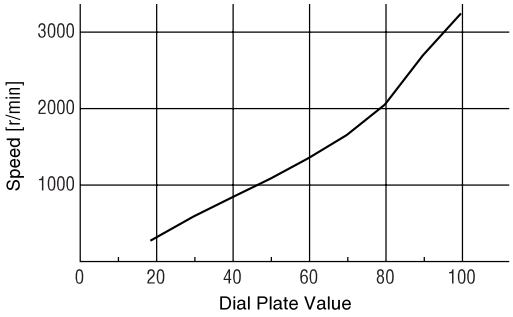
■Internal Speed Potentiometer

The built-in speed potentiometer can be selected by turning off (i.e. switching to high) input to the EXT.VR terminal ②.
The speed is set to 0 r/min when the product is shipped. Rotate clockwise to start the motor rotating.

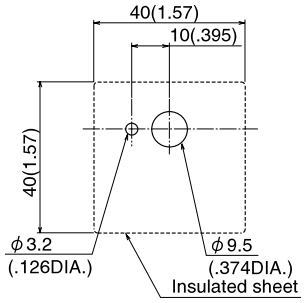
■External Speed Potentiometer



The external potentiometer can be selected by turning on(switced to low) input to the EXT.VR terminal ②.
The external speed potentiometer is connected as shown in the following diagram below using the signal line provided.
When connecting , turn the external speed potentiometer's knob counterclockwise and set the speed 0r/min.
In this case high-speed operation can be set when turning the external potentiometer's knob clockwise.



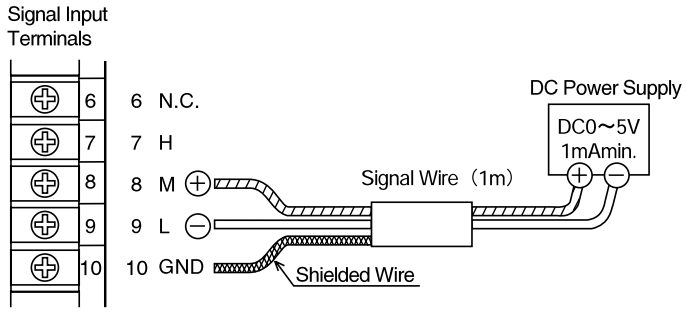
Mounting hole reference dimensions
Speed Characteristics (Representative Values)



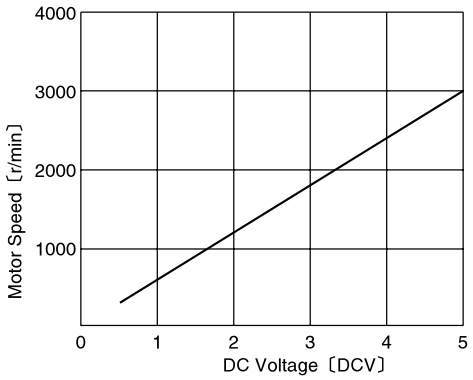
External Speed Potentiometer Scale/Motor

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■External DC Voltage



The external DC voltage can be selected by turning on (switchd to low) input to the EXT.VR terminal ②.
To connect an external DC voltage, connect the plus wire to the M terminal ⑧, the minus wire to the L terminal ⑨, and the shielded wire to GND ⑩.
High speed operation can be set when DC voltage of the external DC source is elevated.



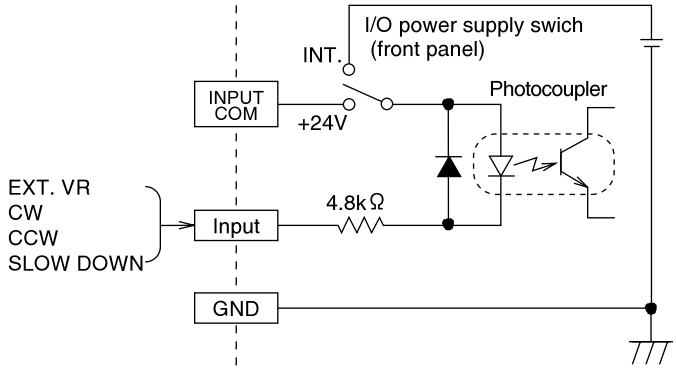
DC Voltage/Motor Speed Characteristics
(Representative Values)

Note ・When setting speed using the external speed potentiometer or by means of a DC voltage, use the signal line provided with the unit, to prevent faulty operation due to external noise or interference.
The shielded wire of the signal line should be connected to the GND terminal.
・Do not allow the voltage to exceed 5V, and be sure there are no errors in polarity when making the connections.

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4. 6 Signal Input Circuit

(1) Input Circuit

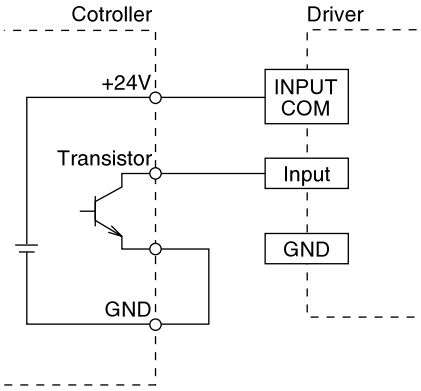


The input circuits function by means of photocoupler input, as shown in the diagram at left. The input photocoupler can be driven by either the internal power supply or by an external DC power supply (24V DC ±10% 0.1A min.).

(2) Input Circuit Connection

This connection is used for EXT.VR, CW, CCW, and SLOW DOWN input.

■When using an external DC power supply

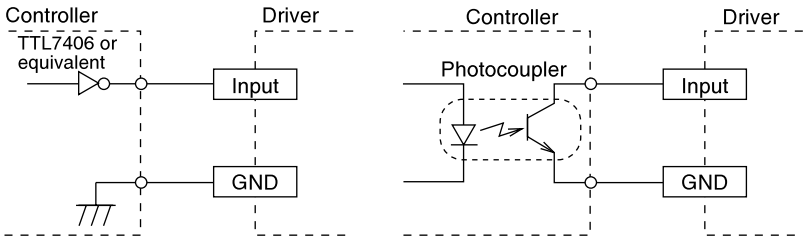


Flip the I/O power supply switch to "EXT." (set at time of shipment).

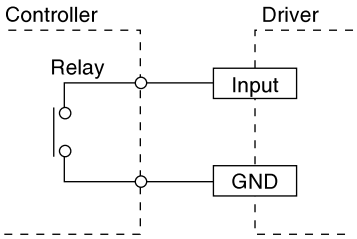
■When using the driver's built-in power supply

Switch the I/O power supply switch to "INT." Signals will not be input if it is set to "EXT.".

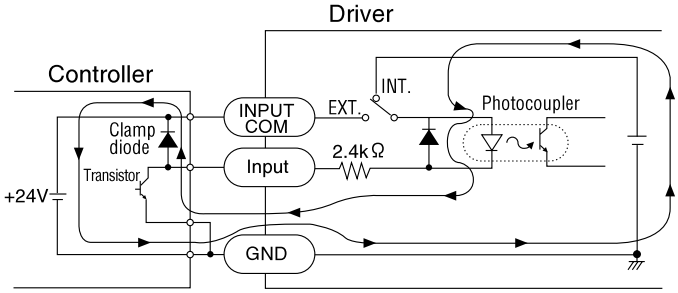
《Non-contact control》



《Contact control》



■Cautions to observe when using a controller with an internal clamp diode

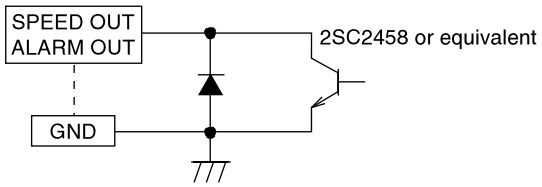


When using a controller with an internal clamp diode, the I/O power supply switch to " EXT." .
If the I/O power supply swith is the " INT." position, current will flow as indicated by the arrows in the diagram, thereby causing the motor to run unexpectedly.

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4. 7 Signal Output Circuit

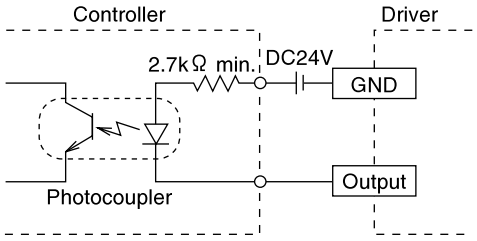
(1) Output Circuit



As shown in the diagram at right, an open collector transistor is used for the output circuits, which requires an external power supply. This connection is necessary only if the speed monitor and alarm function are used. This power supply should be DC26.4V or less. Also connect a limiting resistor suitable for the power supply voltage to keep the current from exceeding 10mA.

(2) Example of Output Signal Connections

■This connection is used for ALARM and SPEED output.

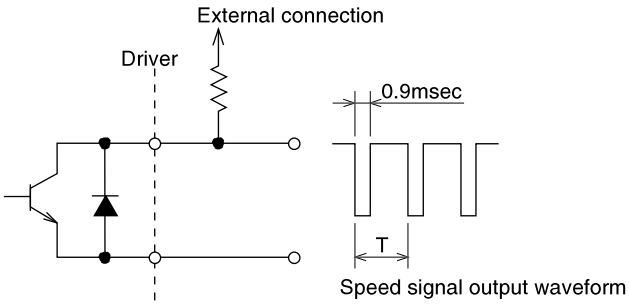


■Speed Signals

It is output at a rate of 12 pulse per motor rotation.
Motor rotation rate can be determined with the following formula;

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

$$\frac{1}{T} = \text{Speed output frequency}$$



The pulse length of the signal that turns speed output on (low) is 0.9msec, regardless of motor speed.

■Alarm Output

This signal is output when one of the driver's protection functions is activated.
While the signal is output, terminals between ALARM OUT and GND is a electrified.
See page 15 for the descriptions of these protection functions.

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4. 8 Noise Control

When excessive external noise works its way into the driver, malfunctions can result. To prevent problems caused by noise, take the following countermeasures.

■Power Supply Lines

- Separate the power line of the noise source from the driver's power line.
- The driver must be earthed with the earth wire of the protective earth terminal or the frame ground (FG) terminal.

■Signal Lines (I/O)

- Keep the signal line as short as possible (2 meters or less).
- When setting speed by means of the external speed potentiometer or a DC voltage, use the signal line provided with the unit.
- Separate power lines at least 30 cm from any cable running a large current.

■Feedback signals between the motor and driver

Place motor cable at least 30 cm away from any cable running a large current.

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5. Operation

5. 1 Operating Conditions

Motor operating requirements have been established in order to prevent increases in motor temperature.
The temperature of the motor increase when the frictional load or inertial load is high, and when the motor is operated with frequent start/stops or changes of direction. It is important,therefore,to operate the motor in accordance with the requirements given below. (See Catalogue for the rated torque,starting torque and the permissible inertia load.)

Note The temperature of the motor's casing and the driver's rear panel should not exceed 90℃ and 80℃, respectively. If the driver's internal heat sink exceeds 90℃, the overheat protection function will be activated, causing the motor to stop.

(1) Conditions for Continuous Operation

The load torque converted into the motor shaft should not exceed the rated torque.

(2) Inertial Load Conditions

The Inertial load (GD^2) converted into the motor shaft should be no greater than the permissible load inertia.

(3) Operating Patterns

When doing start/stops (instant stops) or direction reversals in short cycles, pay careful attention to motor and driver temperature rises.

5. 2 Protection Functions

The **FBL Ⅱ** series has several protection functions.
When a protection function is activated, an alarm signal is output, the LED on the driver's front panel lights and the motor comes to a natural stop. When an alarm signal is output, turn off power, correct the problem which caused the alarm, and then restore power. Turn off power, correct the problem that caused the alarm, and turn power back on (be sure that at least 30 seconds have passed since turning power off). No alarm signal is output when the low-speed protection function activates, since the function adjusts the speed back to the minimum or set speed.

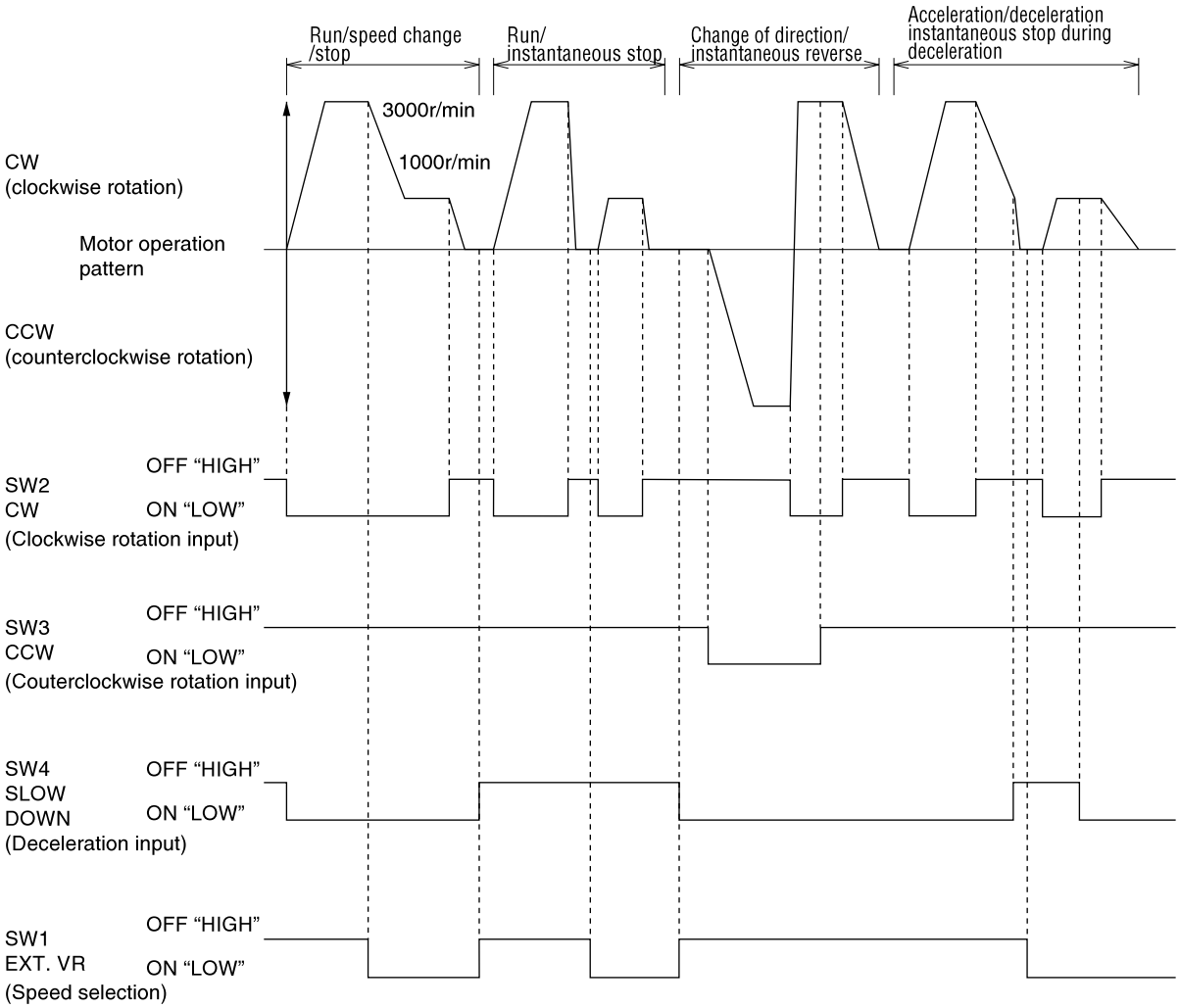
Type of protection function		Action	Response
Alarm Signal Output	Overload protection	Activated when a load exceeding the rated torque is applied to the motor for 5 seconds or more or when the motor is operated in short cycles of stopping/starting or CW/CCW rotation.	Check the load torque, referring to the load torque-driver input current characteristics on page 19. Reduce the load torque if it seems to exceed the rated torque, or lengthen the operating cycle.
	Overheating protection	Activated when the driver's ambient temperature exceeds 40℃, or when its internal radiator exceeds 90℃ a result of using short operating cycles of starting/stopping or CW/CCW rotation.	If the driver's ambient temperature exceeds 40℃, employ some cooling method to lower it; otherwise, reduce the load torque or lengthen the operation cycle.
	Overvoltage protection	Protects the driver against damage when the motor is driving an inertial load exceeding the permissible inertial load, or when the motor shaft is turned by the load (during lowering operation).	Check to see that the inertial load does not exceed the permissible value (see Catalogue) or that the motor shaft is not being turned by the load.
	Open-Phase protection	Prevents motor malfunction when the sensor cable within the motor cable is disconnected during motor operation. (An alarm signal will not be output while the motor is at a standstill.)	Check to see that the motor cable has not been disconnected.
No Alarm Signal Output	Low-speed	Activated when motor speed falls considerably below the speed control range (less than 250r/min) due to a reduction in the speed setting, an overload, etc.	Increase the speed setting to 300r/min or higher. This function is not activated by an overload if speed is above 300r/min.

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5. 3 Example of Operational Timing Chart

The following chart shows an example in which speed is switched between two levels, with the external speed potentiometer set to 1000 r/min, and the internal speed potentiometer set to 3000 r/min.

[Timing chart]



The switch numbers shown in the timing chart (e.g. SW2) correspond to SW1-4 in the connection diagram on page 7.

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5. 4 Operating the Motor

(1) Mode Table for Signal Input

Mode \ Signal Input		CW Input	CCW Input	Deceleration Input
Acceleration /Deceleration	CW operation	ON : Acceleration OFF : Deceleration	OFF	ON
	CCW operation	OFF	ON : Acceleration OFF : Deceleration	
Acceleration /Instantaneous stop	CW operaton	ON : Acceleration OFF : Instantaneous stop	OFF	OFF
	CCW operation	OFF	ON : Acceleration OFF : Instantaneous stop	

(2) CW and CCW Operation

When CW or CCW input is turned on (switched to low), the motor accelerates to the selected speed for the length of time set on the acceleration time potentiometer. If CW and CCW are input simultaneously, CW has priority. Thus, if CCW input is left on, direction can be changed instantaneously by turning the CW input on and off. However, under certain power supply voltages or load conditions, change of direction may be delayed.

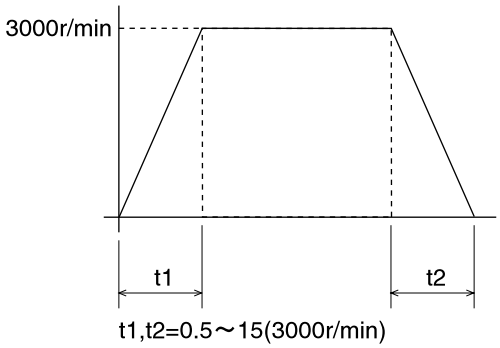
Note When the motor is operated with the gearhead attached, the gearhead's output shaft may, depending on the gear ratio, turn in the opposite direction of the motor shaft.
See the operating manual of gearhead for information concerning the direction of rotation of the gearhead output shaft.

(3) Instantaneous Stop and Deceleration to a Stop

■Instantaneous Stop

To stop the motor instantly, turn SLOW DOWN input off (switch to high).

■Deceleration (and stop)



When SLOW DOWN input is turned on (switched to low), the motor decelerates for the length of time set on the deceleration time potentiometer and comes to a stop.
The acceleration/deceleration time is set using the time potentiometers on the front panel of the driver. The time of acceleration/deceleration is lengthened by turning the potentiometer clockwise. In addition, the motor can be stopped instantly if SLOW DOWN input is turned off (switched to high) during deceleration.

(4) Changing Speeds

Speed can be changed by selecting the external speed potentiometer or the built-in speed potentiometer by means of signal input to EXT.VR (speed selection input) as given in the table below. Speed can be changed while the motor is running.
The rate of acceleration/deceleration depends on the time set for acceleration/deceleration.

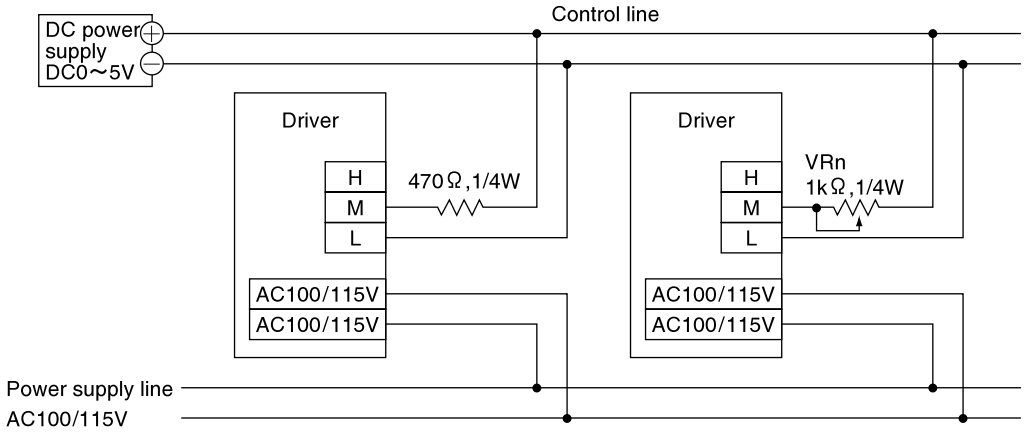
EXT. VR (speed selection input)	Speed Potentiometer Selected	Speed Setting Range
OFF (HIGH)	Internal speed potentiometer	300～3000r/min
ON (LOW)	External speed potentiometer	300～3000r/min

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5. 5 Multi-Motor Control

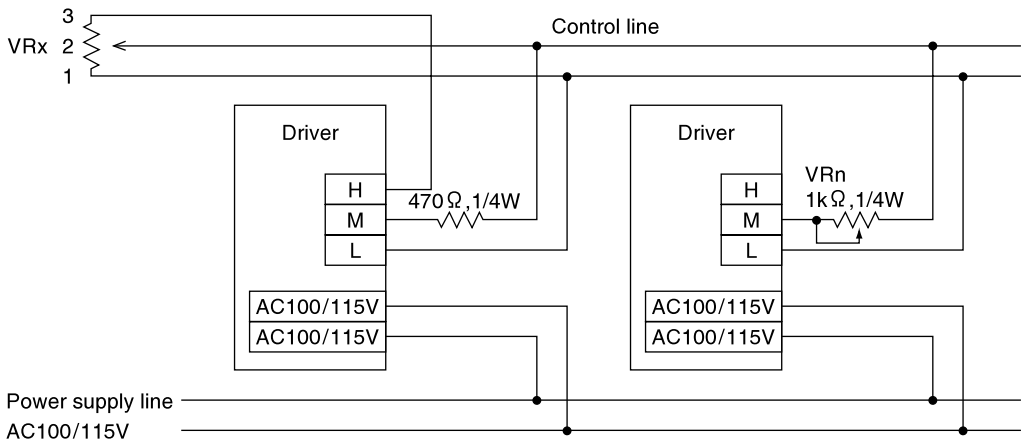
Two or more motors and drivers can be operated at the same speed by using a DC power supply or the external speed potentiometer.

(1) Using a DC Power Supply



Note
- Use a DC power supply whose current capacity is equal to or greater than the value obtained by the following expression:
  I = 1 × N [mA]
  where N is the number of drivers.
  Thus, when two drivers are used, current capacity should be at least 2mA.
- The lines for other input/output signals should be connected to each driver individually.
- Motor speed differences can be adjusted by connecting a resistance of 470Ω, 1/4W to the M terminal of the first driver, and a 1kΩ, 1/4W variable resistor (VRn) to the M terminals of the other drivers.

(2) Using the External Speed Potentiometer



Note
- Connect the control line to the H, M and L terminals of each driver.
- The resistance of the speed set potentiometer is given by the following expression:
  VRx = 20/N [kΩ], N/4 (W)
  where N is the number of drivers.
  Thus, if two drivers are used, the resistance is 10kΩ, 1/2W.
- Connect the other input/output lines to each driver individually.
- Motor speed differences can be adjusted by connecting a resistance of 470Ω, 1/4W to the M terminal of the first driver, and a 1kΩ, 1/4W variable resistor (VRn) to the M terminals of the other drivers.
- No more than 20 motors should be operated simultaneously when using the external speed potentiometer.

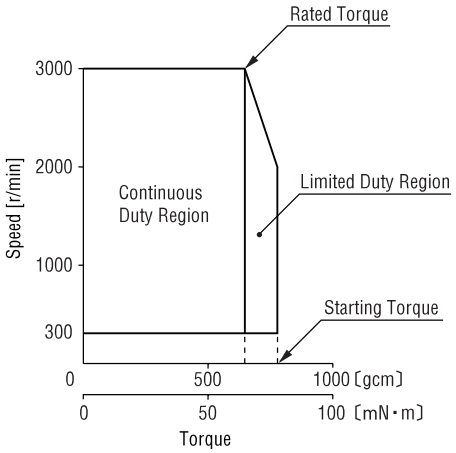
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6. Characteristics

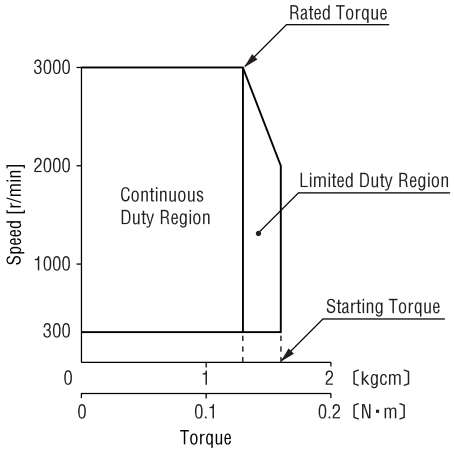
6. 1 Speed-Torque Characteristics

- Continuous Duty Region
  Continuous operation is possible in this region.
- Limited Duty Region
  This region is used primarily when accelerating. When a load that exceed the rated torque is applied continuously for approximately 5 seconds, an overload protection is activated and the motor comes to a stop.

FBL220A—□



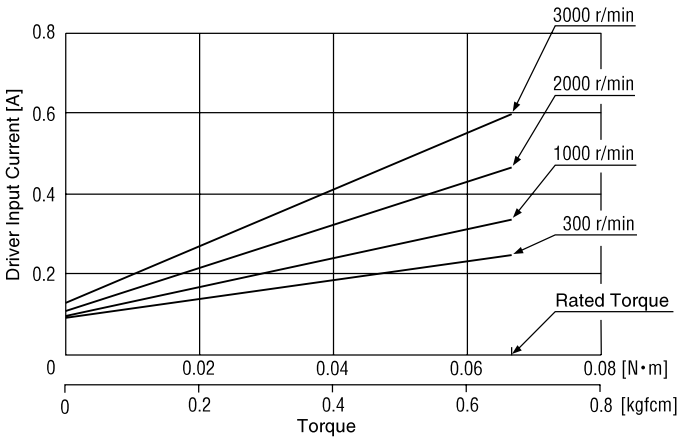
FBL440A—□



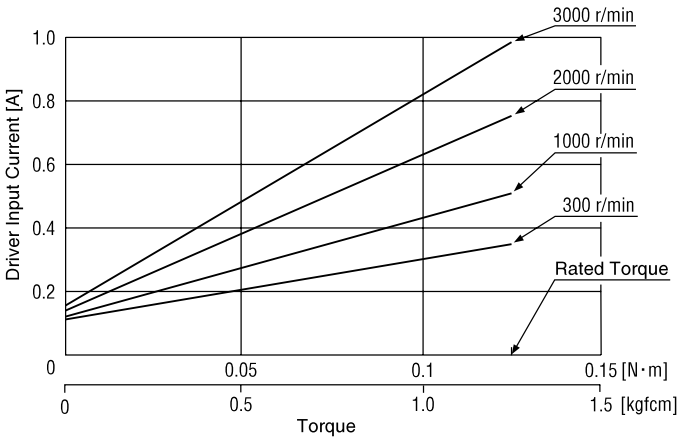
6. 2 Load Torque-Driver Input Current Characteristics

Driver input current of the **FBL**Ⅱ Series motor varies with the load torque. Load torque is roughly proportional to driver input current. This characteristic may be used to estimate load torque from the driver input current. It holds only when the motor is rotating at a steady speed. Starting and be-directional motions require greater current input, so the relationship does not apply to these operations.

FBL220A—□



FBL440A—□



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Problem	What to Check	Response
Motor does not run	Is the power supply connected correctly?	Connect the power supply and check to see that the POWER LED (green) is lit.
	Are the connector connections secure?	Insert connectors firmly all the way in.
	Are the CW and CCW inputs on (low)?	Turn on (switch to low) the input for the desired direction of rotation.
	Is the speed potentiometer turned all the way in the counterclockwise direction?	Turn the speed potentiometer to the clockwise. (This applies to both internal and external speed potentiometer.)
	Is the alarm signal being output?	Turn off power, correct the problem that caused the alarm, and turn power back on (be sure that at least 30 seconds have passed since turning power off). The operating status prior to alarm output will be restored.
	Have you selected the desired speed setting method?	Check the speed setting method.
Speed does not change	Have you selected the desired speed setting method?	Check the speed setting method.
Motor rotates in an opposite direction	Are you using a gearhead?	Some gearhead speed ratios will cause rotation in the opposite direction to the motor shaft.
Starting is delayed	Is the setting of the acceleration duration potentiometer other than "0"?	Set the acceleration time potentiometer to "0".
Reversing is delayed	Is the load inertia excessive?	Reversing can be delayed if the load inertial is high.
Stopping is delayed	Is the setting of the deceleration duration potentiometer other than "0"?	Either turn off (switch to high) the SLOW DOWN input or set the deceleration time potentiometer to "0".
	Is the load inertia excessive?	Check the load inertia.
Alarm is output	Is there an overload?	Check that the load is no greater than the rated load and no greater than the permissible load inertia.
	Does the driver's ambient temperature exceed 40к ?	Use an appropriate cooling method to reduce ambient temperature to 40к or less.
	Are direction reversals or start/stops being repeated in short cycles?	Try lengthening the operating cycle or reducing the load.
	Is the motor cable connection broken?	If there is anything wrong with the motor cable (sensor signal), the motor will stop. Check for any damage to the motor cable.

Note Amlbsarrfc glqsj_rgml pcqggr_lack c_qspck clrmpugfqr_lb tmjr_ec rcqrqcn_p_rcjwml rfc k mrmp_lb rfc bpgtcp, Amlbsargle rfc glqsj_rgml pcqggr_lack c_qspck clrmpugfqr_lb tmjr_ec rcqrugf rfc k mrmp_lb bpgtcpamllcarcbk _wb_k _ec wmspnpmbsar,

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