



## Compact Size with Non-Compact Output

### Advanced Non-Contact Motor DC 24V Speed Control Type

#### Constant Torque over a Wide Range of Speed

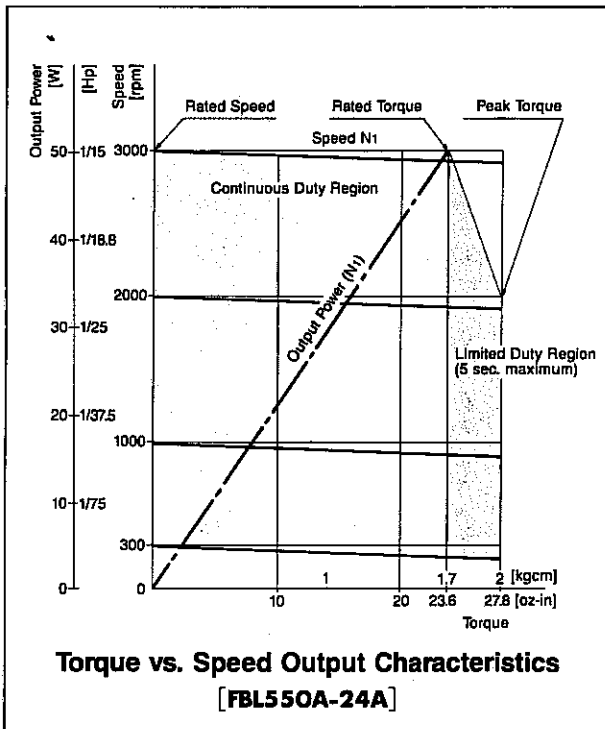
The **FBL** Series of DC speed control type motors not only offers a wide range of speed control from 300 ~ 3000 rpm but also produces a constant torque from the high speed to low speed range. With both a continuous duty region and a limited duty region, this motor is extremely effective for the starting of inertial loads and other hand to start loads.

#### Non-Contact Point Control

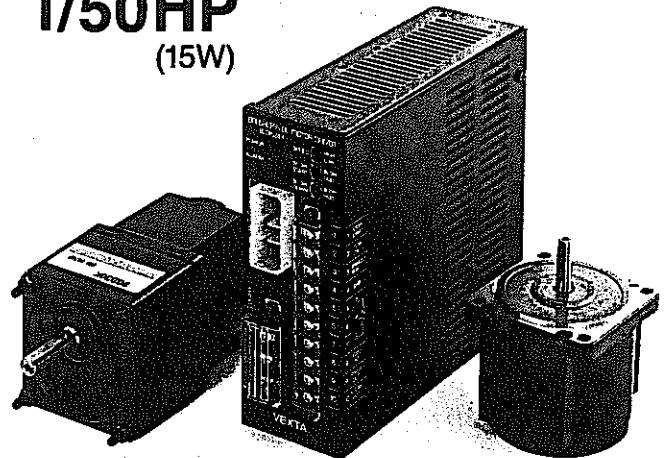
Transistor type switch control allows for perfect stop/start, brake/run and forward/reverse switching. The one-step connector also permits easy hook-up of the motor to the driver.

#### High-Power from a Slimline Design

The overall length of the motor case is a mere 2.17" (55mm). Three levels of high power output are available [1/50HP (15W), 1/25HP (30W), 1/15HP (50W)] and in addition, a pinion type shaft to which a specially developed powerful, low noise gearhead (GD type) can be directly coupled is available as standard.

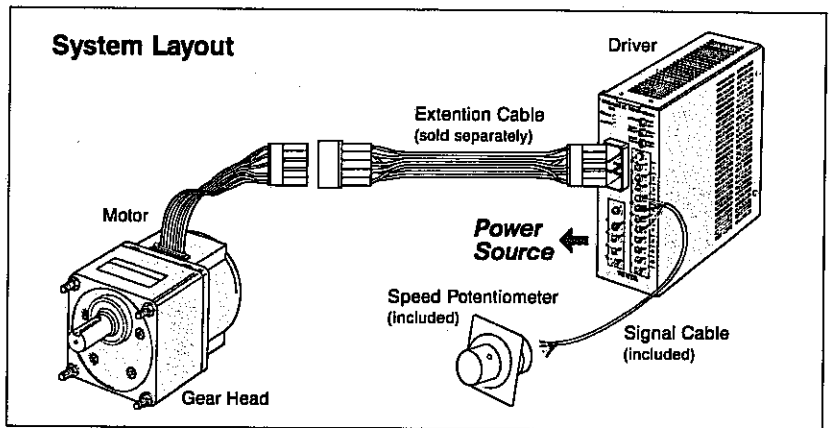


**1/50HP**  
(15W)



Round Shaft Type **FBL215A-24A**

Pinion Shaft Type **FBL215GD-24**



## Automatic Acceleration/ Deceleration

This motor is provided with an acceleration/ deceleration function which makes it possible to start and stop the motor smoothly — a convenient feature for avoiding load shock when starting, accelerating, decelerating or stopping equipment such as feed take-up reels and conveyor belts.

## Built-in Overload Protection

If overloaded (i.e. operating above the rated torque) longer than 5 seconds, the motor is shut down automatically to protect the motor and driver from burn out. At such times, the ALARM LED on the front panel lights and the alarm signal is output (open collector output).

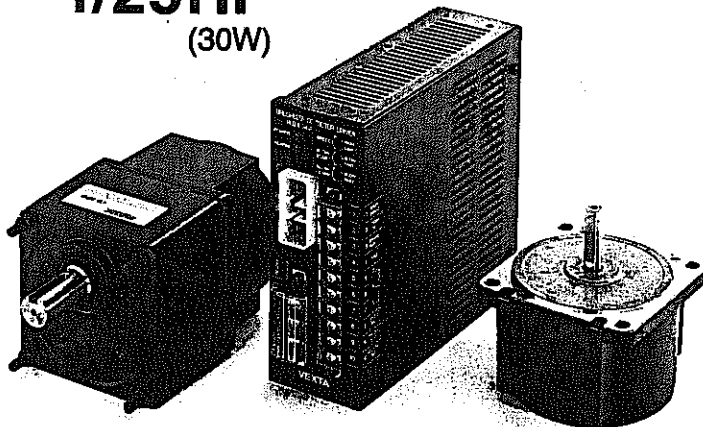
## Braking

A braking function is available to perform braking by means of non-contact type system.

## Speed Monitor Output

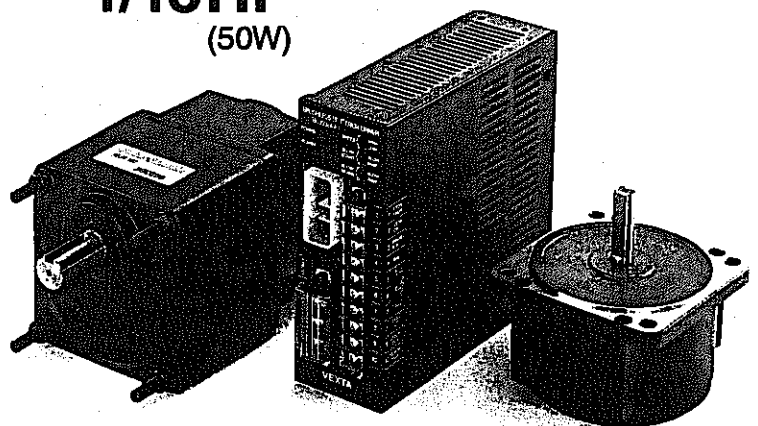
Real-time monitoring of motor speed is possible by means of the driver's speed output signal. (12P/R open collector output)

**1/25HP**  
(30W)



Round Shaft Type **FBL430A-24A**  
Pinion Shaft Type **FBL430GD-24**

**1/15HP**  
(50W)



Round Shaft Type **FBL550A-24A**  
Pinion Shaft Type **FBL550GD-24**

\* Dedicated gear heads are sold separately.



# Specifications

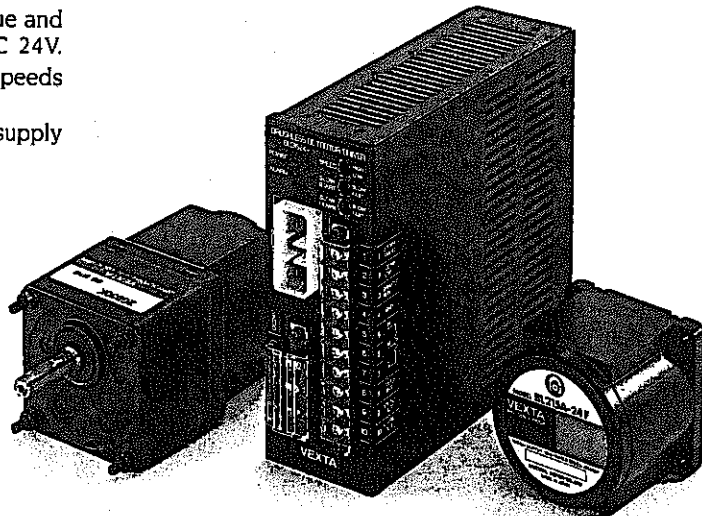
Model	Round shaft type	<b>FBL215A-24A</b>	<b>FBL430A-24A</b>	<b>FBL550A-24A</b>
	Pinion shaft type	<b>FBL215GD-24</b>	<b>FBL430GD-24</b>	<b>FBL550GD-24</b>
Rated Output Power	HP(W)	1/50 (15)	1/25 (30)	1/15 (50)
Rated Speed	(rpm)	3000		
Rated Torque	on-in(kgcm)	6.9 (0.5)	13.8 (1.0)	23.6 (1.7)
Peak Torque	on-in(kgcm)	10.4 (0.75)	20.8 (1.5)	27.8 (2.0)
Permissible Inertial Load J	on-in <sup>2</sup> (kgcm <sup>2</sup> )	2.73 (0.5)	9.57 (1.75)	17.77 (3.25)
Rated Voltage		DC 24V ± 10% 3A min.	DC 24V ± 10% 5A min.	DC 24V ± 10% 8A min.
Rated Current (Driver Input Current)		1.6A	3.0A	4.5A
Variable Speed Range	(rpm)	300 ~ 3000		
Speed Adjustment		1. By built-in potentiometer 2. By external potentiometer 3. By DC voltage control (0 ~ 6V DC)		
Acceleration/Deceleration Time		Approximately 3 ~ 15 sec. at 3000rpm with no load		
Speed Regulation	Load	- 3% (at 3000rpm with rated load)		
	Voltage	± 2% (Supply voltage DC 24V ± 10%)		
	Temperature	± 2% (32° ~ 104°F [0° ~ 40°C])		
Signal Input		5V C-MOS level negative logic Input impedance 10kΩ H:4 ~ 5V, L:0 ~ 0.5V START/STOP, CW/CCW, BRAKE/RUN		
Signal Output		Open collector output External use condition: 24V DC 10mA max. SPEED, ALARM		
Protection Function		When activated, the alarm signal will be output, the alarm LED will light, the motor current will be cut and the motor will come to a stop. <ul style="list-style-type: none"> <li>• Overload Protection Function This will be activated within approximately 5 seconds of the motor load exceeding rated torque [FBL215 type: 6.9 oz-in (0.5kgcm), FBL430 type: 13.8 oz-in (1.0kgcm), FBL550 type: 23.6 oz-in (1.7kgcm)]</li> <li>• Overheat Protection This will be activated when internal temperature of driver exceeds 176°F (80°C).</li> <li>• Overvoltage Protection This will be activated within approximately 5 seconds of the supply voltage exceeding 30V DC.</li> </ul>		
Insulation Resistance		100M ohms or more when 500V DC is applied between the case and the power supply input terminal (the coil). ( ) : the motor		
Dielectric Strength		Sufficient to withstand 1.5kV at 60Hz applied between the case and the power supply input terminal (the coil). ( ) : the motor		
Rating		continuous		
Ambient Temperature Range		32° ~ 104°F (0° ~ 40°C)		

**Note:**

The values of the rated output, rated torque, peak torque and rated current apply for a power supply voltage of DC 24V.

\*1 The peak torque may be used for up to 5 seconds at speeds of 2000 rpm or less.

\*2 Overload protection is activated when the power supply voltage is raised by the Back EMF voltage.





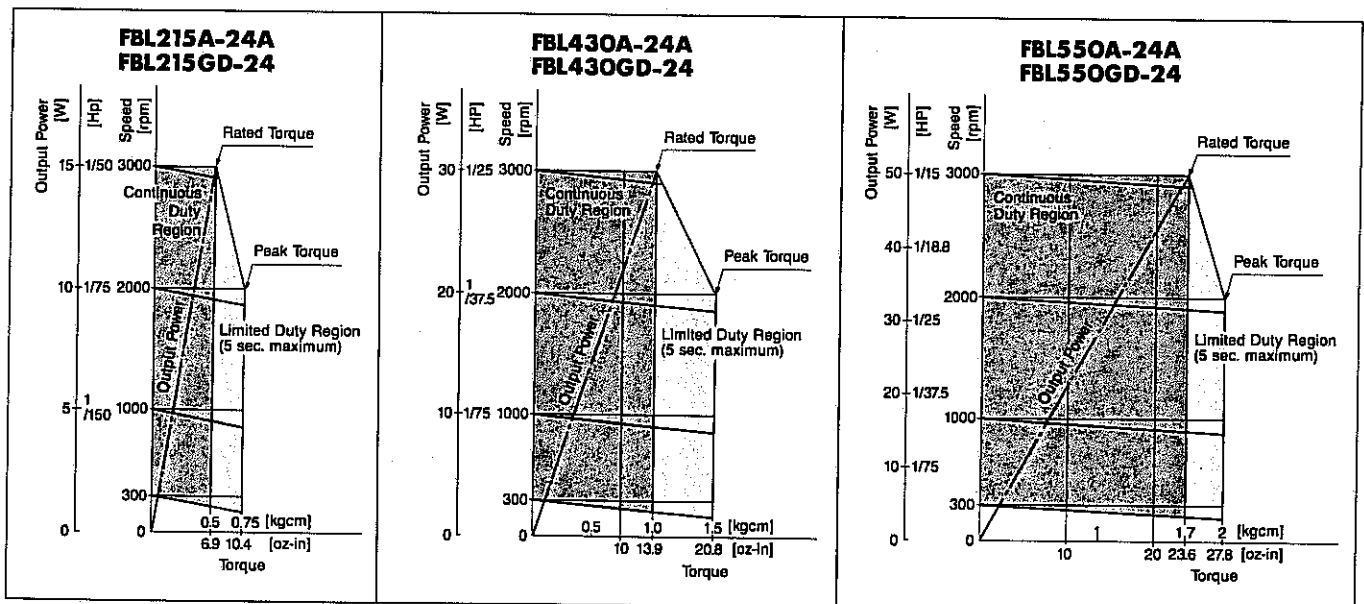
# Gear Head Torque Table

Gear Ratio		5	10	15	20	30	50	100	200		
Variable Speed Range		rpm	60~600	30~300	20~200	15~150	10~100	6~60	3~30	1.5~15	
<b>FBL215GD-24</b> <b>2GD□K</b>	Model		<b>2GD5K</b>	<b>2GD10K</b>	<b>2GD15K</b>	<b>2GD20K</b>	<b>2GD30K</b>	<b>2GD50K</b>	<b>2GD100K</b>	<b>2GD200K</b>	
	Maximum Torque	lb.-in. (kg cm)	1.7 (2.0)	3.5 (4.1)	4.7 (5.5)	7.0 (8.1)	9.5 (11)	15.6 (18)	28.6 (33)	34.7 (40)	
	Maximum Thrust Load	lbs. (kg)	11 (5)	11 (5)	11 (5)	11 (5)	11 (5)	11 (5)	11 (5)	11 (5)	
	Maximum Overhung Load	0.4 in (10mm) from shaft end	lbs. (kg)	22 (10)	22 (10)	22 (10)	22 (10)	22 (10)	33 (15)	33 (15)	33 (15)
		0.8 in (20mm) from shaft end	lbs. (kg)	33 (15)	33 (15)	33 (15)	33 (15)	33 (15)	55 (25)	55 (25)	55 (25)
<b>FBL430GD-24</b> <b>4GD□K</b>	Model		<b>4GD5K</b>	<b>4GD10K</b>	<b>4GD15K</b>	<b>4GD20K</b>	<b>4GD30K</b>	<b>4GD50K</b>	<b>4GD100K</b>	<b>4GD200K</b>	
	Maximum Torque	lb.-in. (kg cm)	3.5 (4.1)	7.0 (8.1)	9.5 (11)	13.0 (15)	19.1 (22)	31.3 (36)	57.3 (66)	86.9 (100)	
	Maximum Thrust Load	lbs. (kg)	22 (10)	22 (10)	22 (10)	22 (10)	22 (10)	22 (10)	22 (10)	22 (10)	
	Maximum Overhung Load	0.4 in (10mm) from shaft end	lbs. (kg)	55 (25)	55 (25)	55 (25)	66 (30)	66 (30)	66 (30)	66 (30)	66 (30)
		0.8 in (20mm) from shaft end	lbs. (kg)	77 (35)	77 (35)	77 (35)	99 (45)	99 (45)	99 (45)	99 (45)	99 (45)
<b>FBL550GD-24</b> <b>5GD□K</b>	Model		<b>5GD5K</b>	<b>5GD10K</b>	<b>5GD15K</b>	<b>5GD20K</b>	<b>5GD30K</b>	<b>5GD50K</b>	<b>5GD100K</b>	<b>5GD200K</b>	
	Maximum Torque	lb.-in. (kg cm)	5.9 (6.9)	12.1 (14)	18.2 (21)	21.6 (25)	32.1 (37)	53.8 (62)	97.2 (112)	173.5 (200)	
	Maximum Thrust Load	lbs. (kg)	33 (15)	33 (15)	33 (15)	33 (15)	33 (15)	33 (15)	33 (15)	33 (15)	
	Maximum Overhung Load	0.4 in (10mm) from shaft end	lbs. (kg)	66 (30)	66 (30)	66 (30)	88 (40)	88 (40)	88 (40)	88 (40)	88 (40)
		0.8 in (20mm) from shaft end	lbs. (kg)	110 (50)	110 (50)	110 (50)	132 (60)	132 (60)	132 (60)	132 (60)	132 (60)

Note: A color background indicates that the output shaft of the gearmotor rotates in the same direction as the output shaft of the motor.



# Speed-Torque Characteristics (Supply Voltage is 24V.DC)

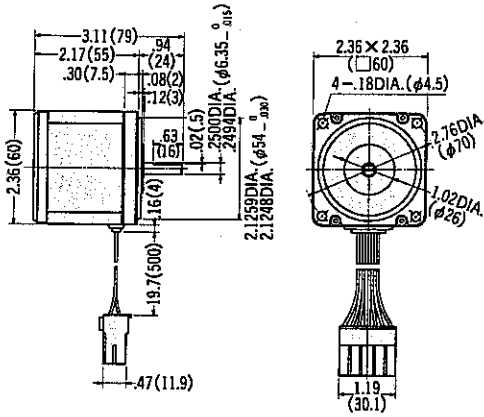


# D

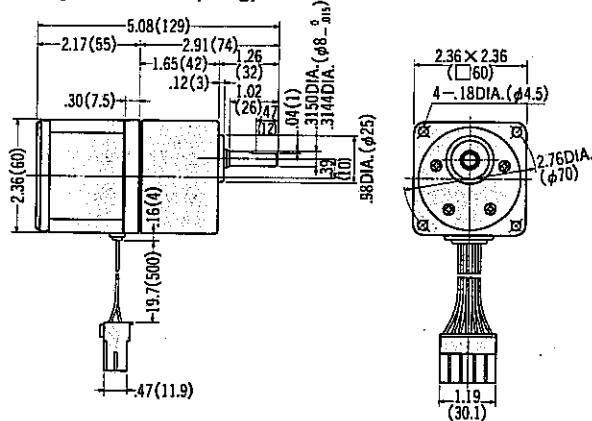
## Dimensions unit=inch(mm)

### Motor scale 1:4

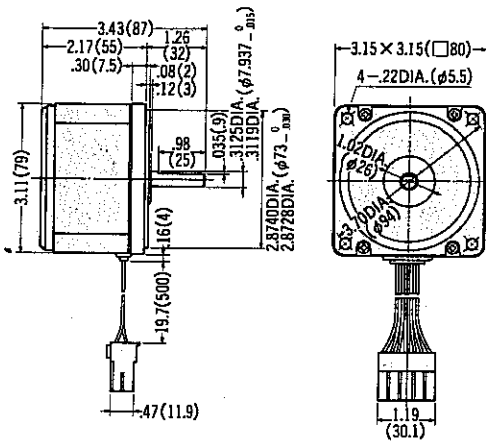
- **Round Shaft Type** BL215A-24AF  
Weight 1.32 lbs. (0.6kg)



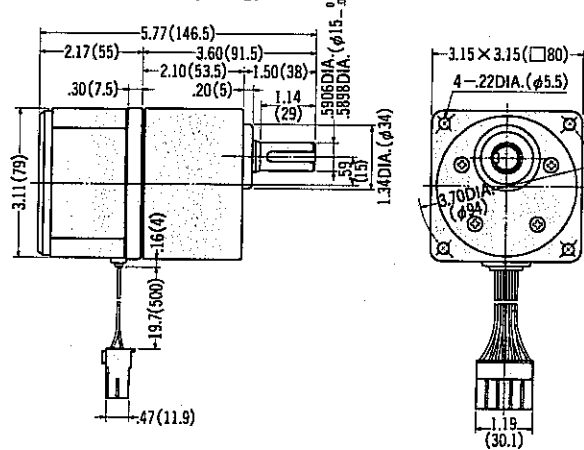
- **Gear Motor Type** BL215GD-24F/2GD□K  
Weight 2.42 lbs. (1.1kg)



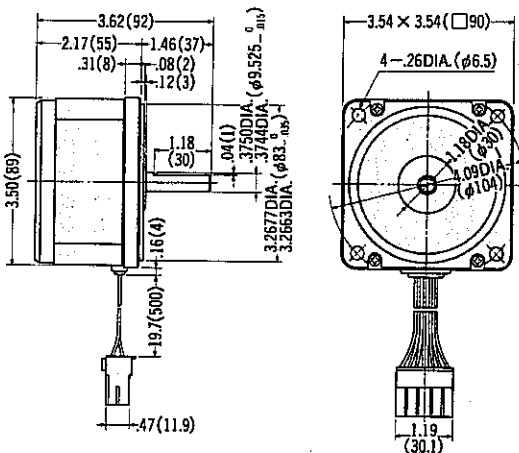
- **Round Shaft Type** BL430A-24AF  
Weight 2.20 lbs. (1.0kg)



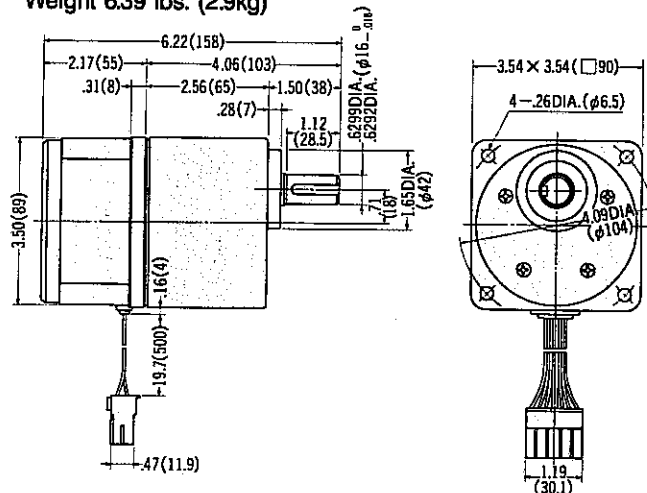
- **Gear Motor Type** BL430GD-24F/4GD□K  
Weight 5.07 lbs. (2.3kg)



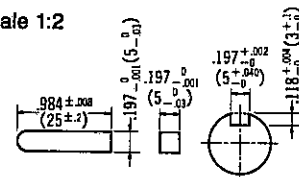
- **Round Shaft Type** BL550A-24AF  
Weight 2.87 lbs. (1.3kg)



- **Gear Motor Type** BL550GD-24F/5GD□K  
Weight 6.39 lbs. (2.9kg)



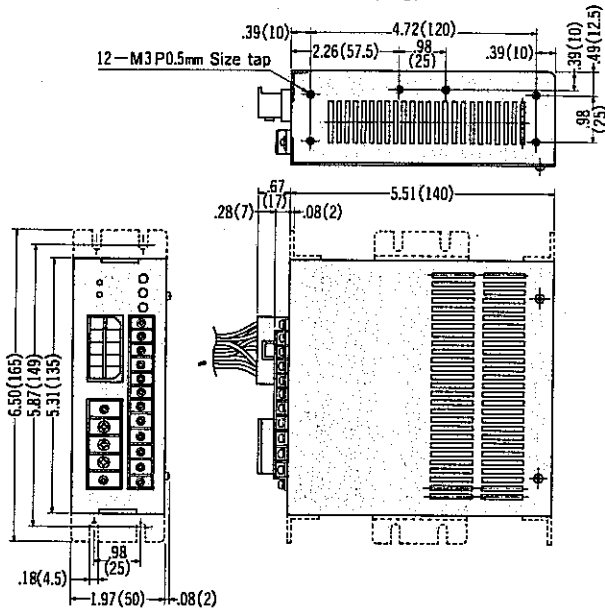
- **Key and Key Slot** scale 1:2  
(attached to 4GD□K and 5GD□K gear head)



## Driver scale 1:4

- BLD1524-F
- BLD3024-F
- BLD5024-F

Weight approximately 2.20 lbs. (1kg)



## Precautions for Operation

### Temperature Rise

During short operation cycles, be careful of rises in motor or driver temperature that may occur when starting, stopping (braking) or using bidirectional operation.

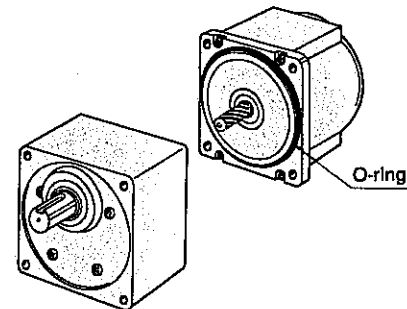
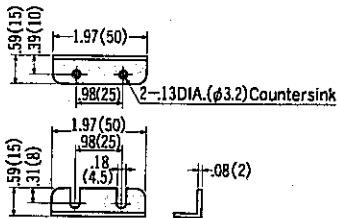
The motor should not be used if the temperature of its outer casing exceeds 158°F (70°C) or if the driver's radiating plate exceeds 176°F (80°C). — If the temperature of driver's internal radiating plate should exceed 176°F (80°C), the thermal protective circuit is activated and the motor comes to a stop. —

### Connecting the Gear Head to the Motor

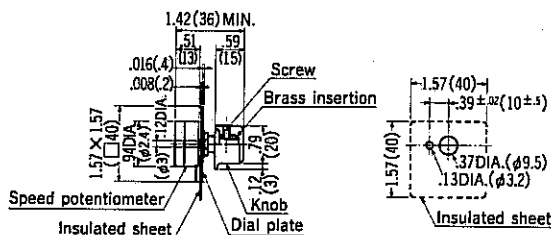
1. Always use the O-ring provided with the motor at the motor joint (pinion shaft type only).
2. Ensure that the mating surfaces of the motor and gear head are clear of dust, dirt or other contaminants prior to assembling the gear motor.
3. Be sure that the motor and the gear head are not connected in a manner such that the O-ring will be damaged.

## Accessories scale 1:4

- Driver Mounting Tab (included)  
(1 set of 2 included)



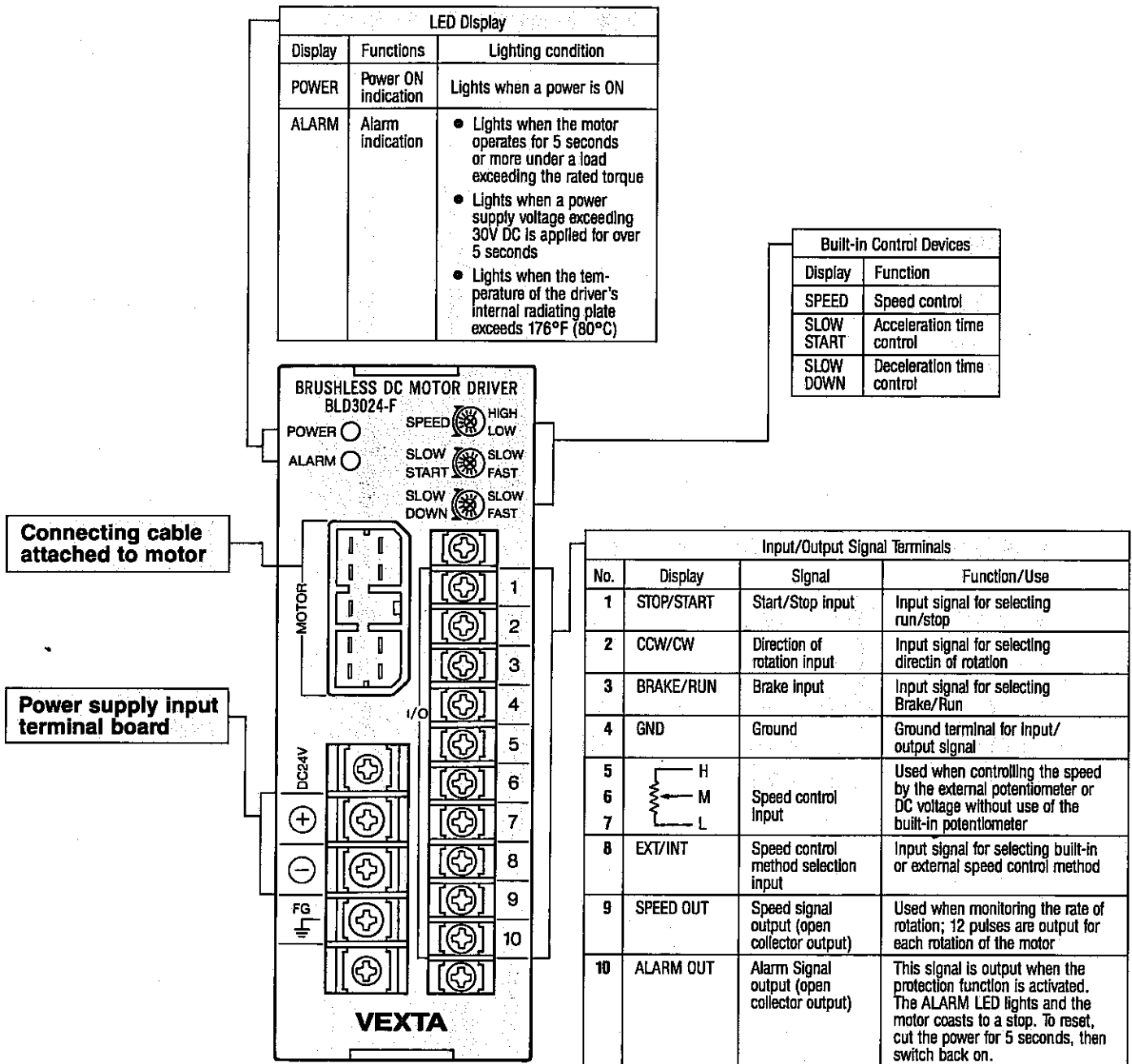
- External Speed Potentiometer (included)



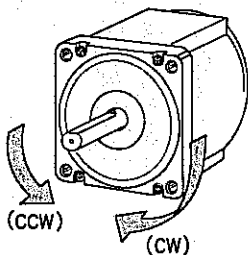
## Unit Components

Unit Model	Motor Model	Driver Model
<b>FBL215A-24A</b>	BL215A-24AF	BLD1524-F
<b>FBL215GD-24</b>	BL215GD-24F	
<b>FBL430A-24A</b>	BL430A-24AF	BLD3024-F
<b>FBL430GD-24</b>	BL430GD-24F	
<b>FBL550A-24A</b>	BL550A-24AF	BLD5024-F
<b>FBL550GD-24</b>	BL550GD-24F	

### ■ Driver Panel Layout (common to all drivers)

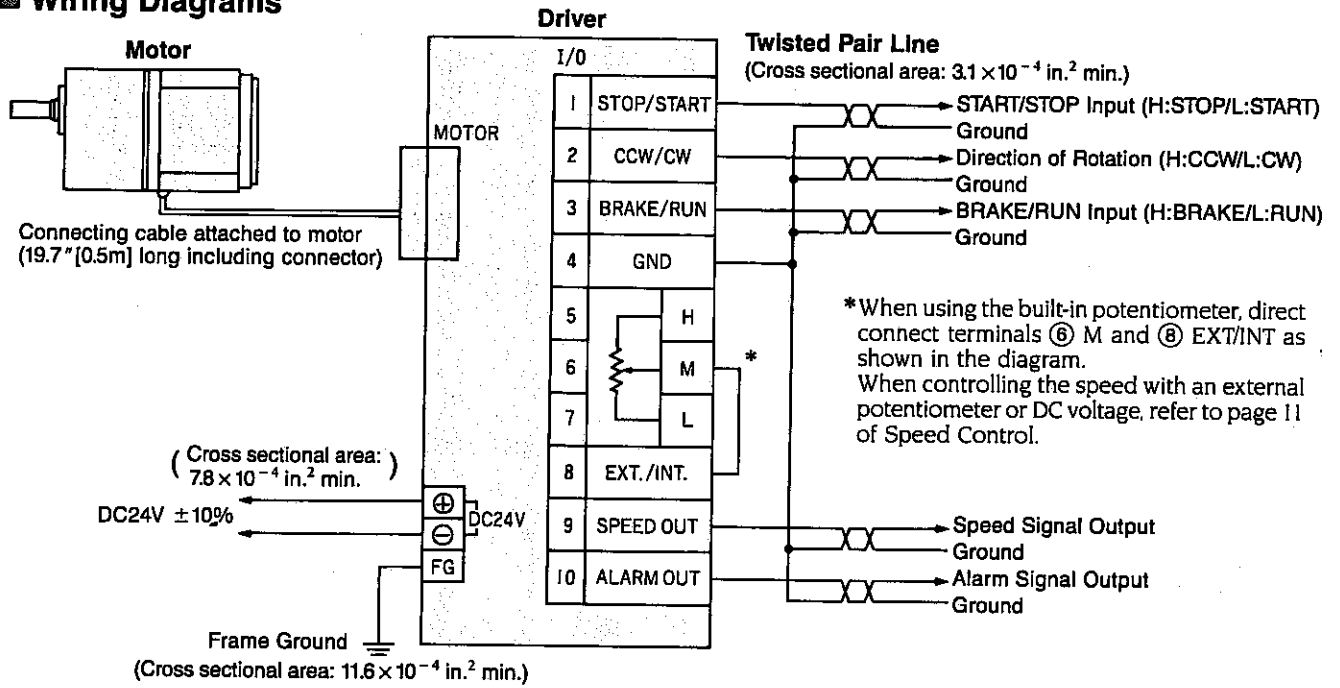


### ■ Direction of Motor shaft rotation





## Wiring Diagrams

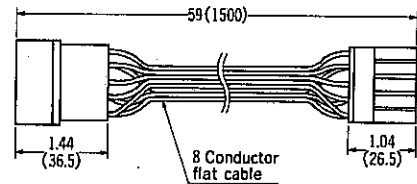


### Precaution for Wiring

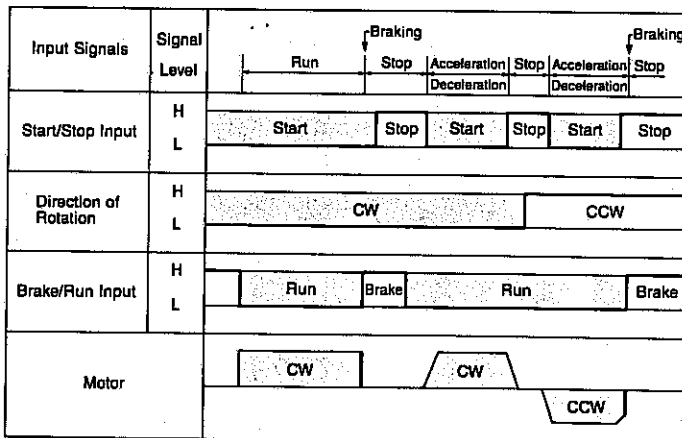
- Motor wires should be no more than 79" (2m) in length. The motor comes equipped with a 19.7" (0.5m) long connector-equipped cable which can be extended to up to 79" (2m) by using an optional extension cable. For models **FBL550A-24A** and **FBL550GD-24**, however, extending the cable may result in a torque reduction of about 5%. (Tests using a noise simulator have confirmed that the motor will operate without error even if a noise of 500V, 1 $\mu$ s is applied to the motor lead wires. However, protection against external noise is recommended.)
- Signal wires and motor wires should be kept away from equipment, power cables and other sources of magnetic noise.

### Extension Cable: FC015FBL-DC

scale 1:3 unit=inch(mm)



## Signal Input Timing Chart



### Brake/Run

The brake input runs or stops the motor when start/stop input has been set to "L" level. If brake input is set to "L" level, the motor runs at the speed selected; if set to "H" level, the motor stops (regenerative braking).

### Automatic Acceleration/Deceleration and Braking during Deceleration

If the start/stop input is set to "L" level with brake input set to "L" level, the motor will accelerate to the speed selected; if the start/stop input is set to "H" level, the motor will decelerate and come to a stop.

The acceleration/deceleration time is set by using the built-in potentiometers. (However, if the speed is controlled by DC voltage, acceleration/deceleration cannot be controlled via the start/stop input.)

To brake during deceleration, first set the start/stop input to "H"; then the brake input to "H". (When running the motor, always set the brake input to "L".)

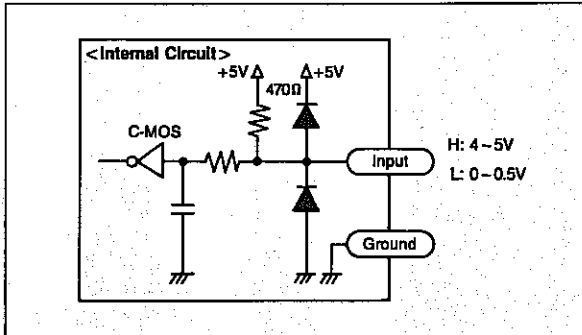
### Direction of Rotation

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

## ■ Input/Output Signal Circuit

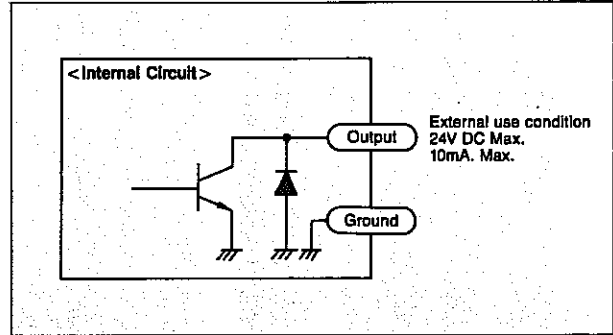
### • Input Signal Circuit

Common to: STOP/START, CCW/CW, BRAKE/RUN input



### • Output Signal Circuit

Common to: SPEED OUT, ALARM OUT output



## ■ Connection of Input Signal

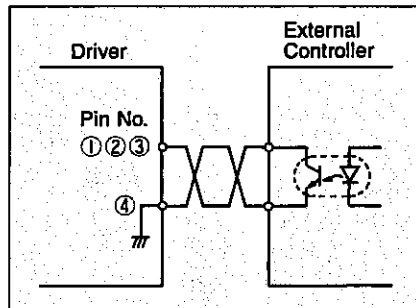
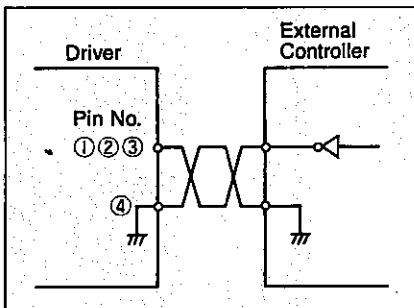
### • Direct Control by Logic Level Signals

TTL

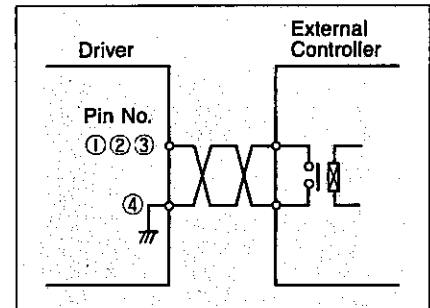
Transistor (Photo-Coupler)

### • Contact Point Control

Relay



Use with a saturation voltage (voltage when power is turned on) of 0.5V or less.

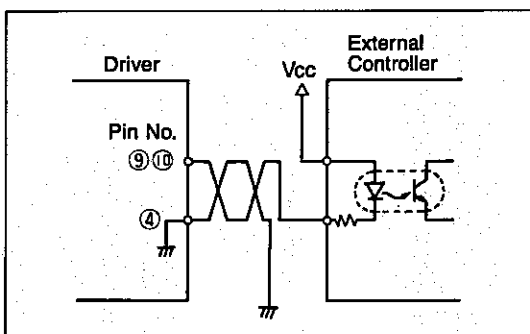


Uses a small contact point-type relay capable of switching DC 5V, 10mA.

### Caution

Noise in the signal line can lead to errors in operation. Use shielded wire or twisted pair line for the signal line.

## ■ Connection of Output Signal



At 24V or less, a current of 10mA or less can be switched on and off at Vcc. This connection is necessary only if the speed monitor and alarm functions are used.

**Speed Signal Output:** It is output at a rate of 12 pulse signals per motor rotation. Motor rotation rate can be determined with the following formula:

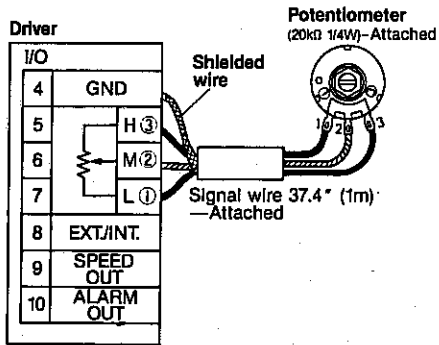
$$\text{Motor rotation rate} = \frac{\text{Speed output cycle rate [Hz]}}{12} \times 60 \text{ [rpm]}$$

**Alarm Signal Output:** Alarm indicator lights and alarm signal is sent to terminal ⑩ for external use. Driver is reset by removing power from the driver for 5 seconds.

## ■ Speed Control

### ● Use of the External Potentiometer

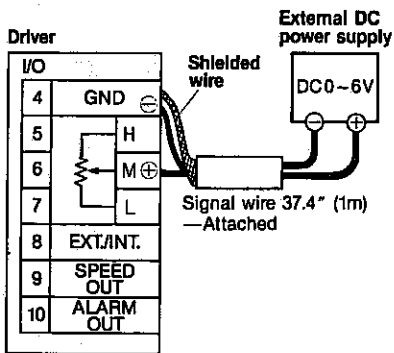
To control the speed of the motor when it is separated from the driver, connect the external potentiometer provided with the motor as follows;



- Make no Connection to ⑧ EXT/INT.  
Always use the 20k $\Omega$  potentiometer provided with the motor as the external potentiometer.

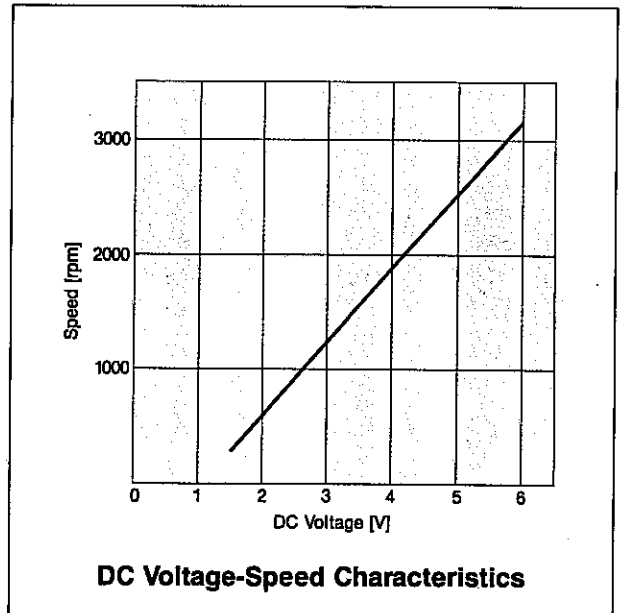
### ● Speed Control by DC Voltage

To control the speed of the motor by DC voltage, follow the instructions below;



- Make no connection to ⑧EXT/INT.
- Do not allow the voltage to exceed 6V, and be sure there are no errors in  $\oplus$   $\ominus$  polarity when making the connections.
- The start/stop input is deactivated when controlling speed via the external potentiometer. Therefore, the brake/run input is used at such times to run and brake the motor. (Normal stopping is accomplished by setting the voltage to 0V.)

Control of the acceleration/deceleration time by means of the driver's built-in acceleration/deceleration time control device is also not possible at this time. Instead, acceleration/deceleration should be controlled by varying the DC voltage directly.



### Caution:

When controlling the speed using the external potentiometer or DC voltage, always use the signal line provided with the motor (diameter: 0.13" (3.3mm) length: 39" (1m)). The shielded wire of the signal line should be connected to the GND terminal. Also ensure that the shielded wire does not come into contact with other terminals on the external potentiometer or DC voltage source.

The specifications of the products listed here are subject to change without notice.



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