



## OPERATING MANUAL

Brushless Motor and Driver Package

**BLV Series**



### Introduction

#### ■ Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product. Use the product correctly after thoroughly reading the "Safety precautions." In addition, be sure to observe the contents described in warning, caution, and note in this manual.

The product described in this manual has been designed and manufactured for use in general industrial machinery, and must not be used for any other purpose. For the power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. Oriental Motor Co., Ltd. is not responsible for any damage caused through failure to observe this warning.

#### ■ Operating manuals for the BLV Series

Operating manuals for the **BLV Series** are listed below. Read the manuals carefully before using your **BLV Series** unit.

##### • **BLV Series OPERATING MANUAL** (This document)

This manual explains the motor and driver functions as well as installation method, and others.

##### • **BLV Series USER MANUAL Basic Function**

This manual explains the motor and driver functions, installation and connection methods, operations using the support software **MEXE02** or data setter **OPX-2A**, as well as troubleshooting and others.

##### • **BLV Series USER MANUAL RS-485 Communication Mode**

This manual explains how to control the motor via RS-485 communication. The USER MANUAL (Basic Function, RS-485 Communication Mode) does not come the product. For details, contact your nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.

#### ■ CE Marking

This product has been certified under the CE Marking requirements (EMC Directive) based on the EN Standard. Because the input power supply voltage of this product is 24 VDC/48 VDC, it is not subject to the Low Voltage Directive. However, install and connect this product as follows.

##### • Installation conditions

Motor and driver are to be used as a component within other equipment.  
Overvoltage category: I Pollution degree: 2

##### • EMC Directive

Refer to USER MANUAL Basic Function for installation method.

#### ■ Republic of Korea, Radio Waves Act.

KC Mark is affixed to this product under the Radio Waves Act, the republic of Korea.

#### ■ RoHS Directive

The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).

### Safety precautions

The precautions described below are intended to prevent danger or injury to the user and other personnel through safe, correct use of the product. Use the product only after carefully reading and fully understanding these instructions.

<b>WARNING</b>	Handling the product without observing the instructions that accompany a "WARNING" symbol may result in serious injury or death.
<b>CAUTION</b>	Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in injury or property damage.
<b>Note</b>	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.

Thank you for purchasing an Oriental Motor product.

This Operating Manual describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

### **WARNING**

- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. Doing so may cause fire, electric shock or injury.
- Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/troubleshooting of the product. Handling by unqualified personnel may result in fire, electric shock, injury or damage to equipment.
- Do not transport, install the product, perform connections or inspections when the power is on. Always turn the power off before carrying out these operations. Doing so may result in electric shock or damage to equipment.
- Do not use a standard type product in vertical drive such as elevating equipment. If the driver's protection function is activated, the motor will stop and the moving part may drop, thereby causing injury or equipment damage.
- Do not use the brake mechanism of the motor with electromagnetic brake as a safety brake. It is intended to hold the movable parts and motor position. This caution is to avoid personal injury or damage to the equipment.
- When the driver's protection function is triggered, first remove the cause and then clear the protection function. Continuing the operation without removing the cause of the problem may cause malfunction of the motor and driver, leading to injury or damage to equipment.
- Install the motor, gearhead and driver in an enclosure. Failure to do so may result in electric shock or injury.
- Keep the driver's input-power voltage within the specified range to avoid fire or electric shock.
- For the power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. Failure to do so may cause electric shock.
- Securely connect the cables in accordance with the connection examples. Failure to do so may result in fire or electric shock.
- Do not forcibly bend, pull or pinch the cable. Doing so may result in fire, electric shock or damage to equipment.
- Do not machine or modify the motor cable or connection cable. Doing so may result in fire, electric shock or damage to equipment.
- Be sure to observe the specified cable sizes. Use of unspecified cable sizes may result in fire or electric shock.
- Observe the specified screw tightening torque when connecting terminals to the connector. Failure to do so may result in fire or equipment damage.
- Use a motor, gearhead, and driver only in the specified combination. Failure to do so may result in fire, electric shock or damage to equipment.
- When the electromagnetic brake motor is used in an application of vertical drive such as elevating equipment, operate it after checking the condition of a load sufficiently so that a load in excess of the rated torque is not applied or a small value is not set in the torque limiting value. Failure to do so may result in injury or damage to equipment.
- Always turn off the power before performing maintenance/inspection. Failure to do so may result in injury.
- Do not touch the motor or driver when conducting the insulation resistance measurement or dielectric strength test. Accidental contact may result in electric shock.
- Regularly check the openings in the driver for accumulated dust. Accumulated dust may cause fire.
- Do not disassemble or modify the motor, gearhead and driver. Doing so may result in injury or damage to equipment. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.

### **CAUTION**

- Do not use the motor, gearhead and driver beyond the specifications. Doing so may result in electric shock, injury or damage to equipment.
- Keep your fingers and objects out of the openings in the driver, or fire, electric shock or injury may result.
- Do not touch the motor, gearhead or driver while operating or immediately after stopping. The surface of the motor, gearhead or driver may be hot and cause a skin burn(s).

- To prevent the risk of damage to equipment, leave nothing around the motor and driver that would obstruct ventilation.
- Do not hold the output shaft of the motor and gearhead, as well as any of the cables. Doing so may result in injury.
- Do not touch the motor output shaft (key groove or pinion) with bare hands. Doing so may result in injury.
- When assembling the motor with the gearhead, exercise caution not to pinch your fingers or other parts of your body between the motor and gearhead. Injury may result.
- Securely install the motor, gearhead and driver to their respective mounting plates. Inappropriate installation may cause the motor, gearhead or driver to detach and fall, resulting in injury or equipment damage.
- Provide a cover over the rotating part (output shaft) of the motor or gearhead. Failure to do so may result in injury.
- When installing the motor or gearhead in the equipment, exercise caution not to pinch your fingers or other parts of your body between the equipment and motor or gearhead. Injury may result.
- Securely install the load on the output shaft of the motor or gearhead. Inappropriate installation may result in injury.
- Do not shut off the negative side of the power supply during operation. Also, note that the wiring for the power supply does not disconnect. Doing so may cause damage to equipment.
- Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
- Immediately when trouble has occurred, stop operation and turn off the driver power. Failure to do so may result in fire, electric shock or injury.
- Do not touch the rotating part (output shaft) during operation. This may cause injury.
- The motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions. If the operator is allowed to approach the motor in operation, attach a warning label in a conspicuous position as shown in the figure. Failure to do so may result in a skin burn(s).
- Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.



Warning label

## Precautions for use

### • Regeneration energy

When using the motor in operation such as vertical drive (gravitational operation) or sudden starting/stopping of an inertial load, regeneration energy may generate. Since the driver has no function to consume regeneration energy, if the output capacity or overvoltage allowance of the DC power supply is small, the protective function for the power supply or driver may activate, and the motor may stop. When performing these operations, use a DC power supply or battery that has a large output capacity or overvoltage allowance. Also, use an electromagnetic brake motor not to drop the moving part in vertical drive (gravitational operation). If the protective function for the power supply or driver is activated, contact your nearest Oriental Motor sales office.

### • Do not conduct the insulation resistance measurement or dielectric strength test with the motor and driver connected

Conducting the insulation resistance measurement or dielectric strength test with the motor and driver connected may result in damage to the product.

### • Do not use a solid-state relay (SSR) to turn on/off the power

A circuit that turns on/off the power via a solid-state relay (SSR) may damage the motor and driver.

### • Notes for power ON/OFF using a mechanical contact

When turning on or off the power supply using a mechanical contact (breaker, electromagnetic switch, relay, etc.), do so only the positive side (+) of the power supply using the mechanical contact. Turning on or off the positive side (+) and the negative side (-) of the power supply simultaneously using a mechanical contact may cause damage to the control circuit or peripheral equipment.

Refer to USER MANUAL Basic Function for details.

### • Note on connecting a power supply whose positive terminal is grounded

The driver's main power supply input terminal (CN1), I/O signal connector (CN4), communication connector (CN5/CN6/CN7) and control power supply input terminal (TB1) are not electrically insulated. When grounding the positive terminal of the power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the driver and these equipment to short, damaging both.

### • Preventing electrical noise

Refer to USER MANUAL Basic Function for measures with regard to noise.

### • Grease measures

On rare occasions, grease may ooze out from the gearhead. If there is concern over possible environmental damage resulting from the leakage of grease, check for grease stains during regular inspections. Alternatively, install an oil pan or other device to prevent leakage from causing further damage. Oil leakage may lead to problems in the customer's equipment or products.

### • Note on using in low temperature environment

When an ambient temperature is low, a load torque may increase due to the oil seal or viscosity of grease used in the gearhead, and the output torque may decrease or an overload alarm may generate. However, as time passes, the oil seal or grease is warmed up, and the motor can be operated without generating the overload alarm.

### • Apply grease to the output shaft of a hollow shaft flat gearhead

If you are using a hollow shaft flat gearhead, apply grease (molybdenum disulfide grease, etc.) on the surface of the load shaft and inner walls of the hollow output shaft to prevent seizure.

### • The driver uses semiconductor elements. Handle the driver with care

The driver uses parts that are sensitive to electrostatic charge. Before touching the driver, turn off the power to prevent electrostatic charge from generating. If an electrostatic charge is impressed on the driver, the driver may be damaged.

### • Use a connection cable (included) when extending the wiring distance between the motor and driver

### • Sliding noise of electromagnetic brake

An electromagnetic brake motor may cause a sliding noise of the brake disk during operation. There is no functional problem.

## Preparation

### ■ Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the branch or sales office from which you purchased the product.

- Motor (with a gearhead, only for combination type) ..... 1 unit
- Driver ..... 1 unit
- Connection cable ..... 1 pc.
- CN1 connector ..... 1 pc.
- OPERATING MANUAL (this document) ..... 1 copy

### Accessories for combination type

- Hexagonal socket head screw set ..... 1 set
- Parallel key ..... 1 pc.  
(Secured to the gearhead output shaft on the parallel shaft gearhead)
- Safety cover ..... 1 pc.  
(Included with the hollow shaft flat gearhead)
- Safety cover mounting screw ..... 2 pcs.  
(Included with the hollow shaft flat gearhead)

### ■ Combinations of motors and drivers

Verify the model number of the purchased unit against the number shown on the package label. Check the model number of the motor and driver against the number shown on the nameplate.

- □ in the model names indicates a number representing the gear ratio.
- ■ indicates a number representing the length of a connection cable.
- The combination types come with the motor and gearhead pre-assembled.

### • Standard type

#### • Combination type parallel shaft gearhead

Unit model	Motor model	Gearhead model	Driver model
BLV620K□S-■	BLVM620K-GFS	GFS6G□	BLVD20KM
BLV640N□S-■	BLVM640N-GFS		BLVD40NM

#### • Combination type hollow shaft flat gearhead

Unit model	Motor model	Gearhead model	Driver model
BLV620K□F-■	BLVM620K-GFS	GFS6G□FR	BLVD20KM
BLV640N□F-■	BLVM640N-GFS		BLVD40NM

#### • Round shaft type

Unit model	Motor model	Driver model
BLV620KA-■	BLVM620K-A	BLVD20KM
BLV640NA-■	BLVM640N-A	BLVD40NM

## ● Electromagnetic brake type

### ● Combination type parallel shaft gearhead

Unit model	Motor model	Gearhead model	Driver model
<b>BLV620KM□S-■</b>	BLVM620KM-GFS	GFS6G□	BLVD20KM
<b>BLV640NM□S-■</b>	BLVM640NM-GFS		BLVD40NM

### ● Combination type hollow shaft flat gearhead

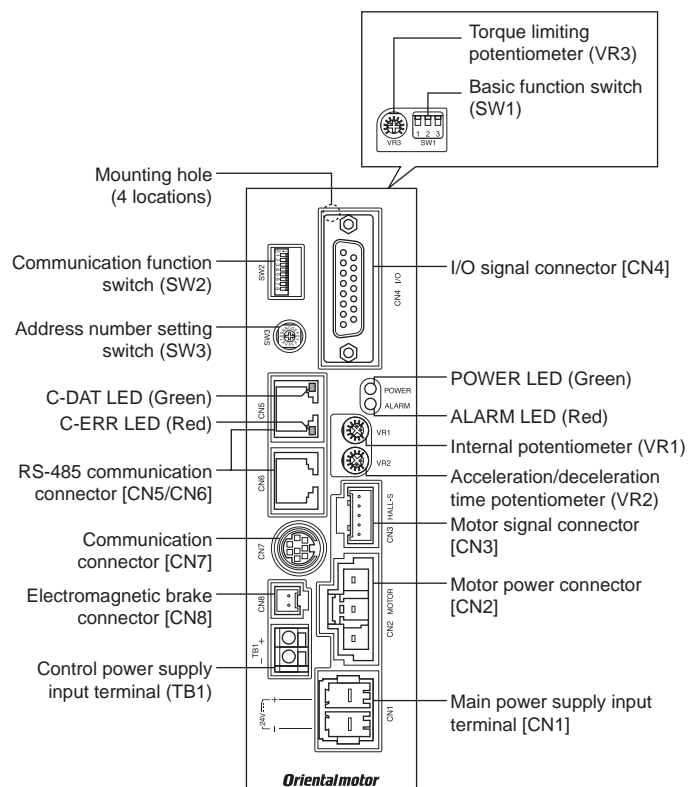
Unit model	Motor model	Gearhead model	Driver model
<b>BLV620KM□F-■</b>	BLVM620KM-GFS	GFS6G□FR	BLVD20KM
<b>BLV640NM□F-■</b>	BLVM640NM-GFS		BLVD40NM

### ● Round shaft type

Unit model	Motor model	Driver model
<b>BLV620KMA-■</b>	BLVM620KM-A	BLVD20KM
<b>BLV640NMA-■</b>	BLVM640NM-A	BLVD40NM

## ■ Names and functions of parts

### ● Driver



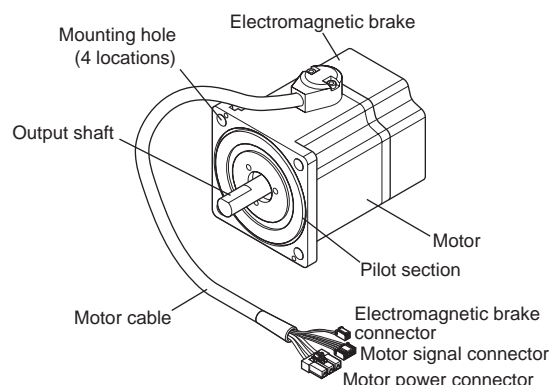
Name	Description
POWER LED (Green)	This LED lit while the main power or control power is input.
ALARM LED (Red)	This LED will blink when an alarm generates (a protective function is triggered). You can check the generated alarm by counting the number of times the LED blinks.
Internal potentiometer (VR1)	Set the motor rotation speed.
Acceleration/deceleration time potentiometer (VR2)	Set the acceleration time and deceleration time for the motor.
Torque limiting potentiometer (VR3)	Set the torque limiting value of the motor.
Main power supply input terminal [CN1]	Connect the main power supply. <b>BLV620:</b> +24 V, <b>BLV640:</b> +48 V
Motor power connector [CN2]	Connect the motor power connector.
Motor signal connector [CN3]	Connect the motor signal connector.
Electromagnetic brake connector [CN8]	Connect the electromagnetic brake connector.

Name	Description
I/O signal connector [CN4]	Use this connector when using an external control device (programmable controller) or inputting a operation command.
Basic function switches (SW1)	Select the setting of the speed response, external DC voltage and sink logic/source logic.
Communication connector [CN7]	Connect the <b>MEXE02</b> or <b>OPX-2A</b> .
Control power supply input terminal* (TB1)	Connect the driver control power supply.
RS-485 communication connector* [CN5/CN6]	Connect the RS-485 communication cable.
C-DAT LED (Green)*	This LED will illuminate when the driver is communicating with the master station properly via RS-485 communication.
C-ERR LED (Red)*	This LED will illuminate when a RS-485 communication error occurs with the master station.
Communication function switch* (SW2)	Set the transmission rate, communication protocol and termination resistor of RS-485 communication.
Address number setting switch* (SW3)	This switch set the address number (slave address) of RS-485 communication.
Mounting hole (4 locations)	4 locations on the back surface and side surface

\* Uses when controlling the system via RS-485 communication.

### ● Motor

Illustration shows electromagnetic brake type.



## Installation

### ■ Location for installation

The motor and driver are designed and manufactured for installation in equipment. Install them in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature
  - Motor: 0 to +40 °C [+32 to 104 °F] (non-freezing)
  - Driver: 0 to +40 °C [+32 to 104 °F] (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area free of excessive salt
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- Altitude Up to 1000 m (3300 ft.) above sea level

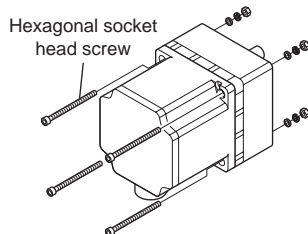
## ■ Installing the combination type

### Note

- Do not forcibly assemble the motor and gearhead. Also, do not let metal objects or other foreign matter enter the gearhead. The pinion or gear of the motor output shaft may be damaged, resulting in noise or shorter service life.
- Do not allow dust to attach to the pilot sections of the motor and gearhead. Also, assemble the motor and gearhead carefully by not pinching the O-ring at the motor's pilot section. If the O-ring is crushed or severed, grease may leak from the gearhead.

### ● Combination type parallel shaft gearhead

Install the hexagonal socket head screw in the four mounting holes you drilled and tighten the nuts until no gaps remain between the motor and mounting plate.



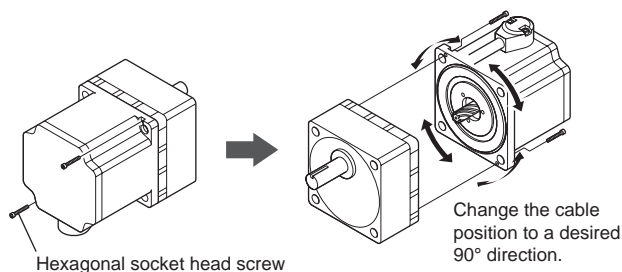
Screw size	Tightening torque [N·m (lb-in)]	Maximum applicable plate thickness [mm (in.)]*
M8	15.5 (137)	12 (0.47)

\* When the included hexagonal socket head screw set is used.

### Removing/Installing the gearhead

To replace the gearhead or change the cable outlet direction, remove the screws assembling the gearhead. The gearhead can be removed and the motor cable position changed to a desired 90° direction.

- Remove the hexagonal socket head screws (2 pcs.) assembling the motor and gearhead and detach the motor from the gearhead.
- Using the pilot sections of the motor and gearhead as guides, install the gearhead to the motor and tighten the hexagonal socket head screws. When installing the gearhead, slowly rotate it clockwise/counterclockwise to prevent the pinion of the motor output shaft from contacting the side panel or gear of the gearhead.



### Assembly screws

Screw size	Tightening torque [N·m (lb-in)]
M3	0.6 (5.3)

### ● Combination type hollow shaft flat gearhead

A combination type hollow shaft flat gearhead can be installed by using either its front or rear side as the mounting surface. Install the included hexagonal socket head screw set in the four mounting holes you drilled and tighten the nuts until no gaps remain between the motor and mounting plate. Since hexagonal nuts are not included with the product, provide them separately or drill tapped holes in the mounting plate. Also, attach the included safety cover to the hollow output shaft on the end opposite from the one where the load shaft is installed.

[Tightening torque: 0.45 N·m (3.9 lb-in)]

Screw size	Tightening torque [N·m (lb-in)]	Maximum applicable plate thickness [mm (in.)]*
M8	15.5 (137)	12 (0.47)

\* When the included hexagonal socket head screw set is used.

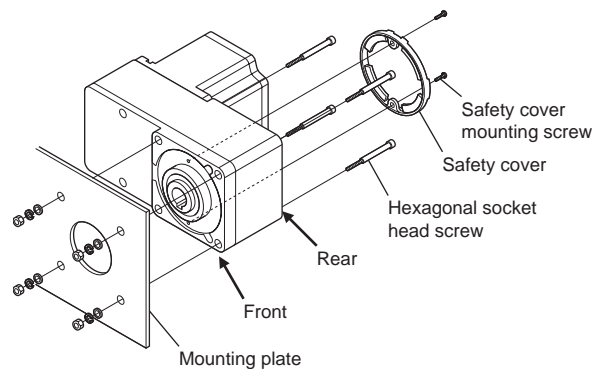


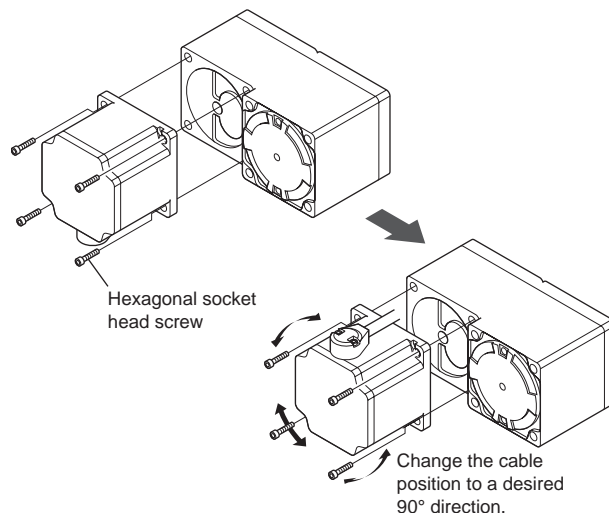
Illustration shows when installing the gearhead by using its front side as the mounting surface.

### Removing/Installing the gearhead

To replace the gearhead or change the cable outlet direction, remove the screws assembling the gearhead. The gearhead can be removed and the motor cable position changed to one of three 90° directions.

Note that the motor cable cannot be positioned in the direction where the cable faces the gearhead output shaft.

- Remove the hexagonal socket head screws (4 pcs.) attaching the gearhead and motor and detach the motor from the gearhead.
- Using the pilot sections of the motor and gearhead as guides, install the motor to the gearhead and tighten the hexagonal socket head screws. Install the motor carefully to prevent the pinion of the motor output shaft from contacting the casing or gear of the gearhead.

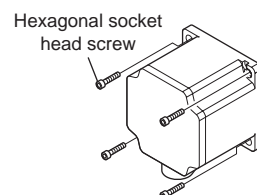


### Assembly screws

Screw size	Tightening torque [N·m (lb-in)]
M8	15.5 (137)

## ■ Installing the round shaft type

Install the hexagonal socket head screw in the four mounting holes you drilled and tighten the nuts until no gaps remain between the motor and mounting plate. Since hexagonal socket head screws are not included with the product, they must be provided by the customer.



Screw size
M8

Install the motor to a mounting plate of the following size or larger, so that the motor case temperature will not exceed 90 °C (194 °F).

Unit model	Size of mounting plate [mm (in.)]	Thickness [mm (in.)]	Material
BLV620	200×200 (7.87×7.87)	5 (0.2)	Aluminum
BLV640	250×250 (9.84×9.84)	6 (0.24)	



## ■ Installing a load of the combination type parallel gearhead or round shaft type

When installing a load on the motor or the gearhead, align the center of the motor output shaft or the gearhead output shaft with the center of the load shaft.

- Note**
- When coupling the motor or the gearhead with a load, pay attention to centering, belt tension, parallelism of pulleys, etc. Also, firmly secure the tightening screws of the coupling or pulleys.
  - When installing a load, do not damage the motor output shaft (gearhead output shaft) or bearing. Forcing in the load by driving it with a hammer, etc., may break the bearing. Do not apply any excessive force to the output shaft.
  - Do not modify or machine the output shaft of the motor or gearhead. Doing so may damage the bearings, leading to damage to the motor or gearhead.

### ● Output shaft shape

#### Combination type parallel shaft gearhead

A key groove is provided on the output shaft of each combination type parallel shaft gearhead. Form a key groove on the load side and affix the load using the included parallel key. [Parallel key dimension: 6 mm (0.236 in.)]

#### Round shaft type

A flat section is provided on the motor output shaft of each round shaft type. Apply a double-point screw, etc., at the flat section to securely affix the load and prevent it from spinning.

### ● How to install a load

#### Using a coupling

Align the centerline of the motor or gearhead output shaft with the centerline of the load shaft.

#### Using a belt

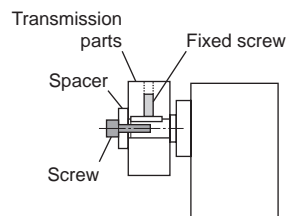
Adjust the motor or gearhead output shaft to lie parallel with the load shaft, and form right angles between the output shaft/load shaft and the line connecting the centers of both pulleys.

#### Using a gear

Adjust the motor or gearhead output shaft to lie parallel with the gear shaft, and allow the output shaft to mesh correctly with the centers of the gear teeth.

#### When using the output axis tip screw hole of a gearhead

Use a screw hole [M6; Effective depth 12 mm (0.47 in)] provided at the tip of the output shaft as an auxiliary means for preventing the transfer mechanism from disengaging.



## ■ Installing a load of the combination type hollow shaft flat gearhead

If the motor is subject to a strong impact upon instantaneous stop or receives a large radial load, use a stepped load shaft.

- Note** Apply grease (molybdenum disulfide grease, etc.) on the surface of the load shaft and inner walls of the hollow output shaft to prevent seizure.

### ● Recommended load shaft installation dimensions

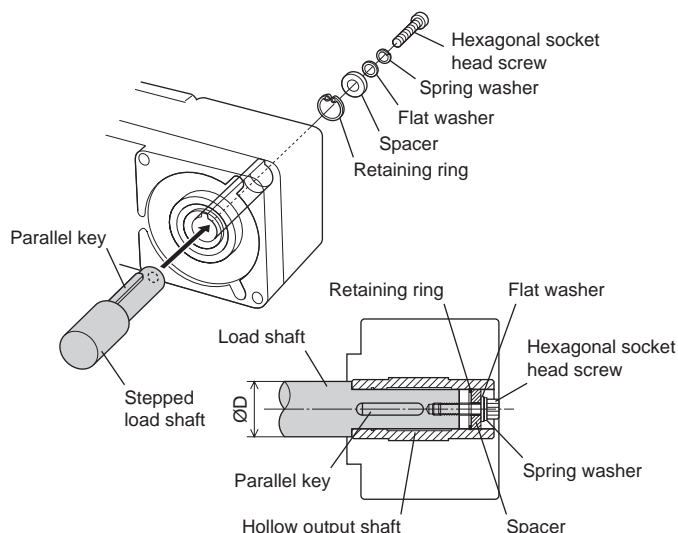
[Unit: mm (in.)]

Inner diameter of hollow shaft (H8)	Recommended diameter of load shaft (h7)	Nominal diameter of retaining ring
$\varnothing 25^{+0.033}_{-0} (0.9843^{+0.0013}_{-0})$	$\varnothing 25^{0}_{-0.021} (0.9843^{0}_{-0.0008})$	$\varnothing 25 (0.98)$
Applicable screw	Spacer thickness	Outer diameter of stepped shaft ( $\varnothing D$ )
M8	6 (0.24) [3 (0.12)]*	40 (1.57)

\* The value in [ ] is the thickness when installing the gearhead by using its rear side as the mounting surface.

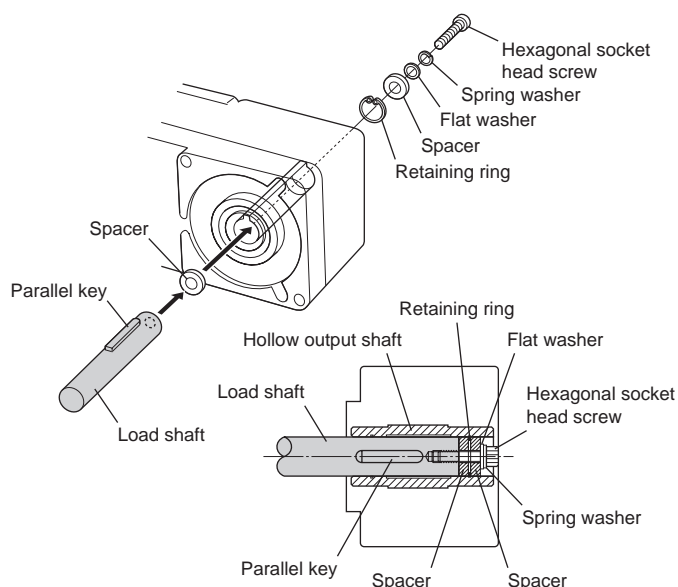
### ● Stepped load shaft

Install each hexagonal socket head screw over a retaining ring, spacer, flat washer and spring washer and securely affix the ring.



### ● Non-stepped load shaft

Install each hexagonal socket head screw over a retaining ring, spacer, flat washer and spring washer and securely affix the ring. Also insert a spacer on the load shaft side.



### ■ Permissible radial load and permissible axial load

- Note** Failure due to fatigue may occur when the motor or gearhead bearings and output shaft are subject to repeated loading by a radial or axial load that is in excess of the permissible limit.

### ● Combination type parallel shaft gearhead

Gear ratio	Distance from tip of gearhead output shaft and permissible radial load* [N (lb.)]		Permissible axial load [N (lb.)]
	10 mm (0.39 in.)	20 mm (0.79 in.)	
5 to 20	550 (123) <500 (112)>	800 (180) <700 (157)>	200 (45)
30, 50	1000 (220) <900 (200)>	1250 (280) <1100 (240)>	300 (67)
100, 200	1400 (310) <1200 (270)>	1700 (380) <1400 (310)>	400 (90)

\* The values assume a rated speed of 3000 r/min or below.  
The values in < > are based on a rated speed of 4000 r/min.

### ● Combination type hollow shaft flat gearhead

Gear ratio	Distance from gearhead mounting surface and permissible radial load* [N (lb.)]		Permissible axial load [N (lb.)]
	10 mm (0.39 in.)	20 mm (0.79 in.)	
5 (BLV640 only)	1230 (270)	1070 (240)	800 (180)
10	<1130 (250)>	<990 (220)>	
15, 20	1680 (370)	1470 (330)	
	<1550 (340)>	<1360 (300)>	
30 to 100	2040 (450)	1780 (400)	
	<1900 (420)>	<1660 (370)>	

\* The values assume a rated speed of 3000 r/min or below.  
The values in <> are based on a rated speed of 4000 r/min.

### ● Round shaft type

Distance from tip of motor output shaft and permissible radial load [N (lb.)]		Permissible axial load [N (lb.)]
10 mm (0.39 in.)	20 mm (0.79 in.)	
197 (44)	221 (49)	25 (5.6)

### ■ Installing the driver

The driver is designed so that heat is dissipated via air convection and conduction through the enclosure. Install the driver on a flat metal plate having excellent vibration resistance and heat conductivity.

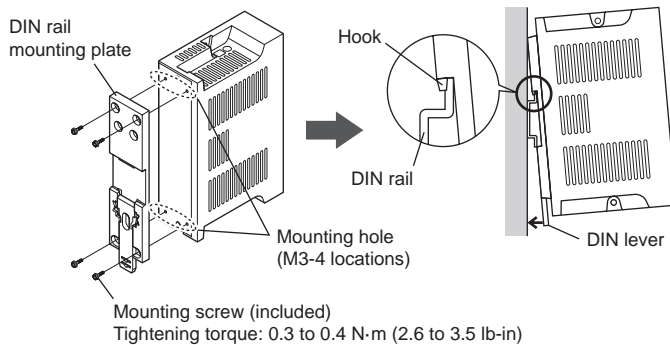
When two or more drivers are to be installed side by side, provide 20 mm (0.79 in.) and 25 mm (0.98 in.) clearances in the horizontal and vertical directions, respectively.

#### Note

- Install the driver in an enclosure whose pollution degree is 2 or better environment, or whose degree of protection is IP54 minimum.
- Do not cover the radiation vent of the driver.
- Do not install any equipment that generates a large amount of heat or noise near the driver.
- If the ambient temperature of the driver exceeds 40 °C (104 °F), revise the ventilation condition or force-cool the area around the driver using a fan.

### ● Mounting to DIN rail

When mounting the driver to a DIN rail, use the DIN rail mounting plate **PADP03** (sold separately) and attach it to a 35 mm (1.38 in.) wide DIN rail. After installation, fix the both sides of the driver with the end plate (not included).



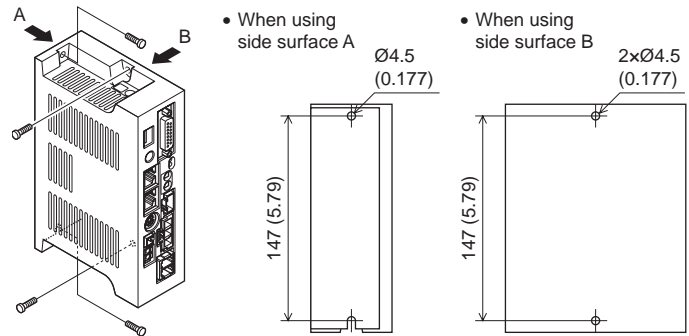
#### Note

- Do not use the mounting holes (M3, four locations) for the DIN rail mounting plate for any purpose other than securing the DIN rail mounting plate.
- Be sure to use the included screws when securing the DIN rail mounting plate. The use of screws that would penetrate 3 mm (0.12 in.) or more through the surface of the driver may cause damage to the driver.

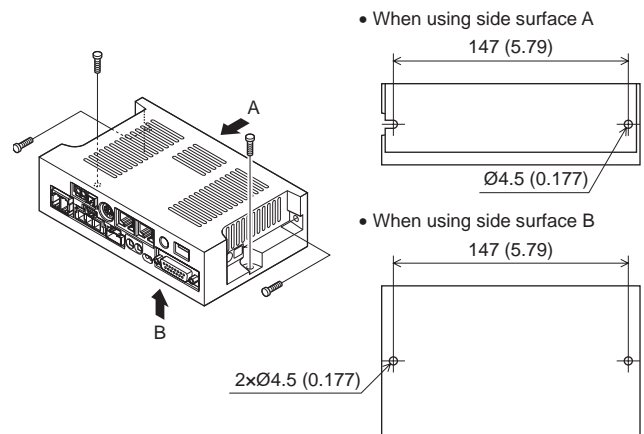
### ● Installing with screws

Affix the driver through the mounting holes using two screws (M4: not included).

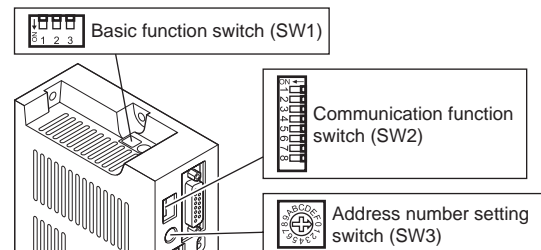
When mounting in vertical direction [Unit: mm (in.)]



When mounting in horizontal direction [Unit: mm (in.)]



### Setting



### ■ Basic function (SW1)

SW1	Description	Setting range
1	Speed response	ON: High response mode OFF: Regenerative power suppression mode (Factory setting)
2	External DC voltage	ON: 0 to 10 V OFF: 0 to 5 V (Factory setting)
3	Sink logic/Source logic	ON: Source logic OFF: Sink logic (Factory setting)

### ■ Communication function (SW2)

Set when controlling the system via RS-485 communication.

SW2	Description	Factory setting
1	Transmission rate	OFF
2		
3		
4	Not used	
5	Communication protocol	
6	Not used	
7	Termination resistor	
8	Extending the address number	

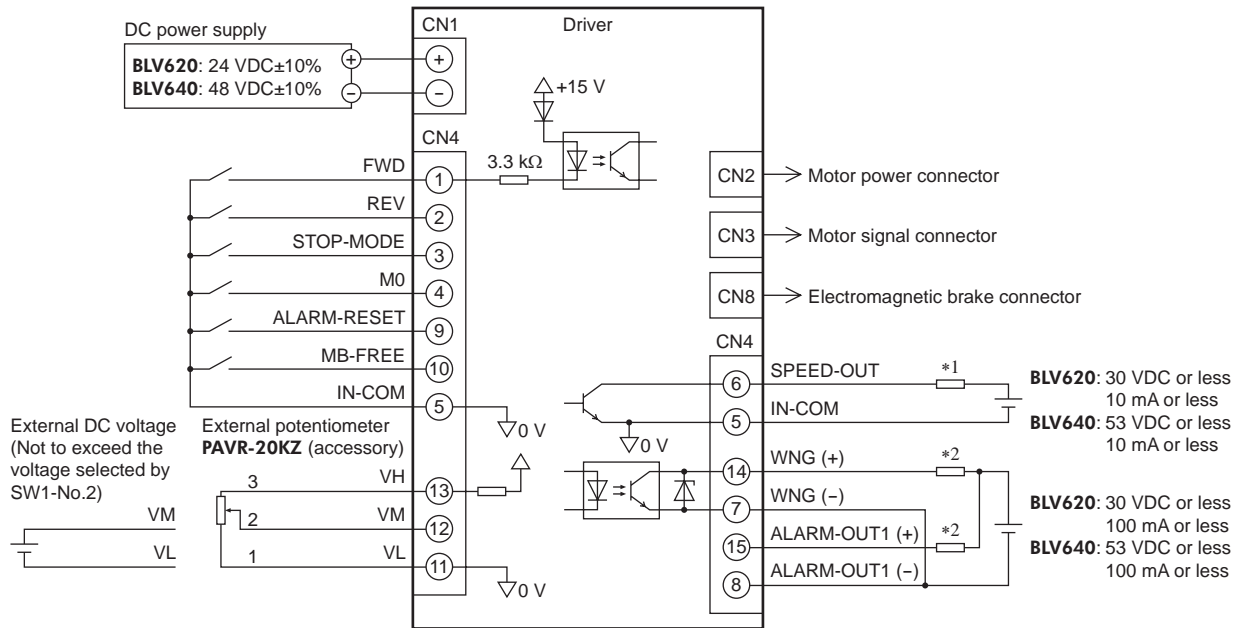
### ■ Address number setting (SW3)

Set the address number using the SW3 and No. 8 of the communication function switch (SW2).

Factory setting : 0

## Connection

### ■ Connection example (Sink logic)



\*1 Be sure to suppress the current value to 10 mA or less. Connect a current-limiting resistor if the current exceeds this specified value.

\*2 Be sure to suppress the current value to 100 mA or less. Connect a current-limiting resistor if the current exceeds this specified value.

### ■ Connecting the power supply

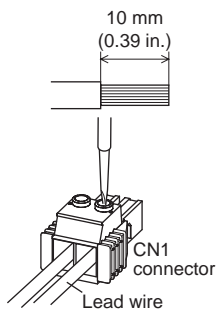
#### ● Connecting method

- Strip the insulation cover of the lead wire by 10 mm (0.39 in.).

Applicable lead wire: AWG16 to 10  
(1.25 to 6 mm<sup>2</sup>)

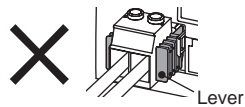
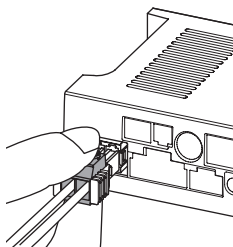
- Insert each lead wire into the CN1 connector and tighten the screw.

Tightening torque: 0.7 to 0.8 N·m  
(6.1 to 7.0 lb·in)



- Insert the CN1 connector into CN1.

Hold the green part of the CN1 connector, and insert it into the CN1 on the driver. Push the lever (orange) into the CN1 on the driver before pulling out the CN1 connector.



Supplying the power in a state where the lever (orange) is pushed in may cause damage to the driver due to connection failure.

#### Note

- When connecting, check the indication of the driver case and pay attention to the polarity of the power supply. Reverse-polarity connection may cause damage to the driver.
- Do not wire the power supply cable of the driver in the same cable duct with other power line or motor cable. Doing so may cause malfunction due to noise.
- When cycling the power or plugging/unplugging the connector, turn off the power and wait for the POWER LED to turn off.
- When turning on or off the power supply using a mechanical contact (breaker, electromagnetic switch, relay, etc.), do so only the positive side (+) of the power supply using the mechanical contact. Turning on or off the positive side (+) and the negative side (-) of the power supply simultaneously using a mechanical contact may cause damage to the control circuit or peripheral equipment.

#### ● Applicable crimp terminal

If crimp terminals are used, select the following terminals.

Manufacturer	Model	Applicable lead wire
PHOENIX CONTACT GmbH & Co. KG	AI 1,5-10	AWG16 (1.25 mm <sup>2</sup> )
	AI 2,5-10	AWG14 (2 mm <sup>2</sup> )
	AI 4-10	AWG12 (3.5 mm <sup>2</sup> )

#### ● Recommended power supply capacity

Unit model	Input power supply voltage	Current capacity
BLV620	24 VDC±10%	800 W or more
BLV640	48 VDC±10%	1 kW or more

### ■ Connecting the motor and driver

Connect the motor cable to the motor power connector (CN2) and motor signal connector (CN3) of the driver. When using an electromagnetic brake motor, also connect to the electromagnetic brake connector (CN8). To expand connection between the motor and driver, use the included connection cable. Connection can be extended to a maximum of 3.5 m (11.5 ft.).

#### Note

Have the connector plugged in securely. Insecure connection may cause malfunction or damage to the motor or driver.

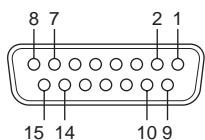
### ■ Connecting the I/O signals

Connecting the I/O signals to the I/O connector (CN4). Keep the wiring distance as short as possible [less than 2 m (6.6 ft.)] to suppress the effect of noise.

#### Note

- The connector for connecting the I/O signals are not included. Please prepare as follows;
  - D-Sub connector (15-pin)
  - Hood (the screw: No.4-40UNC)
- Wire the signal cable at a distance of 100 mm (3.94 in.) or more from the inductive load (electromagnetic relay etc.), power supply or power cable (motor cable etc.).

## I/O connector function table



This figure is the CN4 connector viewed from the driver front side.

Pin No.	Signal type	Terminal name	Signal name	Description
1	Input	X0	FWD	The motor turns in the clockwise direction.
2		X1	REV	The motor turns in the counterclockwise direction.
3		X2	STOP-MODE	Select instantaneous stop or deceleration stop.
4		X3	M0	Select the internal potentiometer or external potentiometer (external DC voltage).
5	GND	C0	IN-COM	—
6	Output	Y2	SPEED-OUT	30 pulses are output with each revolution of the motor output shaft.
7		Y1-	WNG (-)	—
8		Y0-	ALARM-OUT1 (-)	—
9	Input	X4	ALARM-RESET	Alarms are reset.
10		X5	MB-FREE*	Select how the electromagnetic brake would operate when the motor stops.
11	Analog input	VL	VL	External speed setting input; Set the speed of the external potentiometer (external DC voltage).
12		VM	VM	
13		VH	VH	
14	Output	Y1+	WNG (+)	This signal is output when a warning generates.
15		Y0+	ALARM-OUT1 (+)	This signal is output when an alarm generates (normally closed).

\* Electromagnetic brake type only.

## Overview of the operation

### Basic operation

With the **BLV** Series, you can perform following operations. Refer to USER MANUAL Basic Function for details.

#### Speed setting

Internal potentiometer, external potentiometer, external DC voltage

#### Running/stopping the motor

Run/stop the motor by inputting operation control signals.

#### Setting the acceleration time and deceleration time

You can set the acceleration time and deceleration time for starting and stopping.

#### 2-speed operation

Operation can be performed at two speeds through use of both the internal potentiometer and external potentiometer (external DC voltage).

#### Multi-motor control

A single external potentiometer (external DC voltage) can be used to set the same speed for multiple motors.

If the support software **MEXE02** or the data setter **OPX-2A** (sold separately) is used, the function can be extended so that the digital setting of the rotation speed and torque limiting value, the setting of parameters, and various monitors can be performed.

## Operation via communication

### RS-485 communication

Operation data and parameters can be set and operation commands can be input from the host controller via RS-485 communication. The protocol for the RS-485 communication is the Modbus protocol. Refer to the USER MANUAL RS-485 Communication Mode for details.

### Network converter

This product can be used via various network when connecting to a network converter (sold separately). Refer to the operating manual of the network converter for details.

Network converter model	Supported network
<b>NETC01-CC</b>	CC-Link
<b>NETC01-M2/M3</b>	MECHATROLINK
<b>NETC01-ECT</b>	EtherCAT

Refer to the USER MANUAL for details on the product. For the USER MANUAL, contact your nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.

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