



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 document has been designed and manufactured to be incorporated in general industrial equipment. Do not use 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.

■ Related operating manuals

For operating manuals not included with the product, contact your nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.

Operating manual name	Operating manual number	Included or not included with product
OPERATING MANUAL (This document)	HM-5112	Included
USER MANUAL (Basic Function)	HM-5113	Not included
USER MANUAL (RS-485 Communication Mode)	HM-5114	Not included
Data setter OPX-2A	HP-5049	Not included
Network Converter Slave Edition	HP-5065	Not included

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.

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

Description of graphic symbols

: Indicates "prohibited" actions that must not be performed.

: Indicates "compulsory" actions that must be performed.

WARNING	
	<ul style="list-style-type: none"> 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 result in fire, electric shock or injury. 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. 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. Do not touch the motor or driver when conducting the insulation resistance measurement or dielectric strength test. Accidental contact may result in electric shock. 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.

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	
	<ul style="list-style-type: none"> Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/troubleshooting of the product. Handling by unqualified and uneducated personnel may result in fire, electric shock, injury or equipment damage. 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. 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. Regularly check the openings in the driver for accumulated dust. Accumulated dust may cause fire.

CAUTION	
	<ul style="list-style-type: none"> 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. 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. 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. Do not touch the rotating part (output shaft) during operation. This may cause injury.
	<ul style="list-style-type: none"> 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. Securely install the load on the output shaft of the motor or gearhead. Inappropriate installation may result in injury. 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. 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.

● Connecting the motor and driver

For the **BLV510** product, be sure to use the included connection cable to connect the motor and driver.

For the **BLV620** and **BLV640** products, use the included connection cable to extend 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

Included with combination type-parallel shaft gearhead

- Mounting screw set 1 set
Hexagonal socket head screws, washers, spring washers, nuts 4 pieces each
- Parallel key 1 pc.
(For the **BLV620** and **BLV640** products, the parallel key is fixed to the gearhead output shaft.)

Included with combination type-hollow shaft flat gearhead

- Mounting screw set 1 set
Hexagonal socket head screws, washers, spring washers, nuts* 4 pieces each
- Parallel key 1 pc.
- Safety cover 1 pc.
- Safety cover mounting screw 2 pcs.
- * For the **BLV620** and **BLV640** products, hexagonal nuts are not included.

■ 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 the included connection cable.
- The combination types come with the motor and gearhead pre-assembled.

● Standard type

● Combination type-parallel shaft gearhead

Output power	Model	Motor model	Gearhead model	Driver model
100 W	BLV510K□S-■	BLVM510K-GFS	GFS5G□	BLVD10KM
200 W	BLV620K□S-■	BLVM620K-GFS	GFS6G□	BLVD20KM
400 W	BLV640N□S-■	BLVM640N-GFS		BLVD40NM

● Combination type-hollow shaft flat gearhead

Output power	Model	Motor model	Gearhead model	Driver model
100 W	BLV510K□F-■	BLVM510K-GFS	GFS5G□FR	BLVD10KM
200 W	BLV620K□F-■	BLVM620K-GFS	GFS6G□FR	BLVD20KM
400 W	BLV640N□F-■	BLVM640N-GFS		BLVD40NM

● Round shaft type

Output power	Model	Motor model	Driver model
200 W	BLV620KA-■	BLVM620K-A	BLVD20KM
400 W	BLV640NA-■	BLVM640N-A	BLVD40NM

● Electromagnetic brake type

● Combination type-parallel shaft gearhead

Output power	Model	Motor model	Gearhead model	Driver model
100 W	BLV510KM□S-■	BLVM510KM-GFS	GFS5G□	BLVD10KM
200 W	BLV620KM□S-■	BLVM620KM-GFS	GFS6G□	BLVD20KM
400 W	BLV640NM□S-■	BLVM640NM-GFS		BLVD40NM

● Combination type-hollow shaft flat gearhead

Output power	Model	Motor model	Gearhead model	Driver model
100 W	BLV510KM□F-■	BLVM510KM-GFS	GFS5G□FR	BLVD10KM
200 W	BLV620KM□F-■	BLVM620KM-GFS	GFS6G□FR	BLVD20KM
400 W	BLV640NM□F-■	BLVM640NM-GFS		BLVD40NM

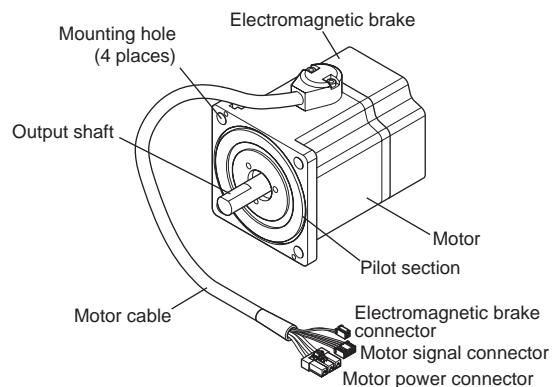
● Round shaft type

Output power	Model	Motor model	Driver model
200 W	BLV620KMA-■	BLVM620KM-A	BLVD20KM
400 W	BLV640NMA-■	BLVM640NM-A	BLVD40NM

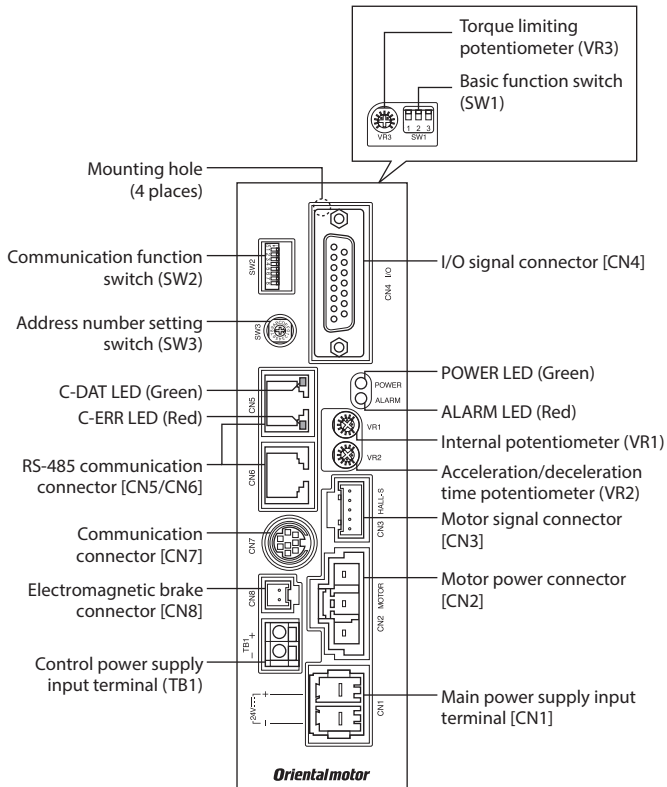
■ Names and functions of parts

● Motor

The figure shows the electromagnetic brake type of 200 W.



● Driver



Name	Description
POWER LED (Green)	This LED is 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)	The acceleration time and deceleration time for starting and stopping can be set.
Torque limiting potentiometer (VR3)	Set the torque limiting value of the motor.
Main power supply input terminal [CN1]	Connect the main power supply. BLV510, BLV620: +24 V, BLV640: +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.
I/O signal connector [CN4]	Use this connector when using an external control device (programmable controller) or inputting a operation command.
Basic function switch (SW1)	Select the setting of the speed response, external DC voltage and sink logic/source logic.
Communication connector [CN7]	Connect the MEXE02 or OPX-2A .
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)	Set the address number (slave address) of RS-485 communication.
Mounting hole (4 places)	4 places on the back surface and side surface

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

Installation

■ Location for installation

The motor and driver are designed and manufactured to be incorporated 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 0 to +40 °C [+32 to 104 °F] (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- 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



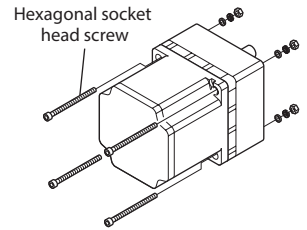
- Do not forcibly assemble the motor and gearhead. Also, do not let metal objects or other foreign matters enter the gearhead. The pinion of the motor output shaft or gear may be damaged, resulting in noise or shorter service life.
- Do not allow dust to attach to the pilot sections of the motor and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

● Combination type-parallel shaft gearhead

Secure the motor and gearhead through four mounting holes using the included mounting screw set. Do not leave a gap 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 mounting screw set is used.

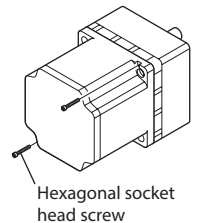


Removing/assembling the gearhead

See the following steps to replace the gearhead or to change the cable outlet position.

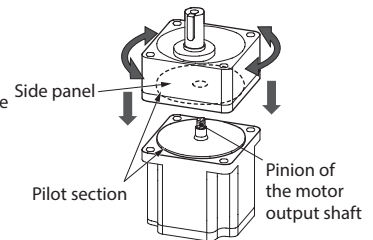
Removing the gearhead from the motor

Remove the hexagonal socket head screws (2 places) assembling the motor and gearhead, and detach the gearhead from the motor.



Assembling the gearhead to the motor

1. Keep the pilot sections of the motor and gearhead in parallel, and assemble the gearhead with the motor while slowly rotating it clockwise/counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the side panel or gears of the gearhead strongly.



Assemble the gearhead to the motor in a condition where the motor output shaft is in an upward direction.

2. Check no gaps remain between the motor and gearhead, and tighten them with hexagonal socket head screws (2 pieces).

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

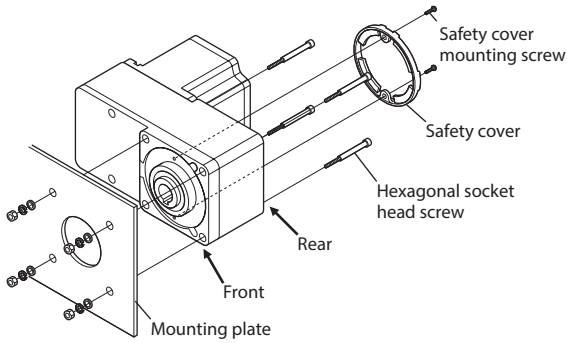
● Combination type-hollow shaft flat gearhead

A combination type-hollow shaft flat gearhead can be installed by using either its front or rear side as the mounting surface. (Illustration shows when installing the gearhead by using its front side as the mounting surface.)

Secure the gearhead through four mounting holes using the included mounting screw set. Do not leave a gap between the gearhead and mounting plate.

Hexagonal nuts are not included with the **BLV620** and **BLV640** products, so provide them separately or drill tapped holes in the mounting plate.

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)

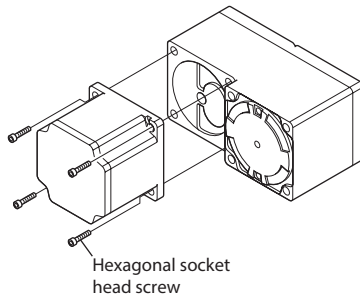
* When the included mounting screw set is used.

Removing/assembling the gearhead

See the following steps to replace the gearhead or to change the cable outlet position. Note that the motor cable cannot be positioned in the direction where it faces to the gearhead output shaft side.

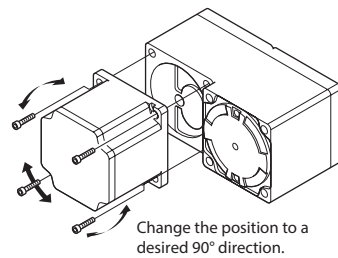
Removing the gearhead from the motor

Remove the hexagonal socket head screws (4 places) assembling the motor and gearhead, and detach the gearhead from the motor.



Assembling the gearhead to the motor

1. Keep the pilot sections of the motor and gearhead in parallel, and assemble the gearhead with the motor while slowly rotating it clockwise/counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the side panel or gears of the gearhead strongly.



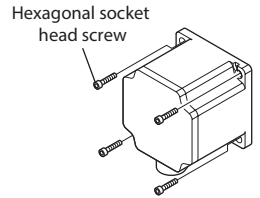
2. Check no gaps remain between the motor and gearhead, and tighten them with hexagonal socket head screws (4 pieces).

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

■ Installing the round shaft type

Secure the motor with hexagonal socket head screws through the four mounting holes provided. Do not leave a gap between the motor and mounting plate.

Since hexagonal socket head screws are not included with the product. They must be provided by the customer.



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

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).

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, the gearhead output shaft, or bearings. Installing the load forcibly with a hammer or the like may break the bearings. 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 gearhead

A key slot is provided on the output shaft of the gearhead. Form a key slot on the load side, and secure 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 firmly secure the load and prevent it from spinning.

● How to install a load

Using a coupling

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

Using a belt drive

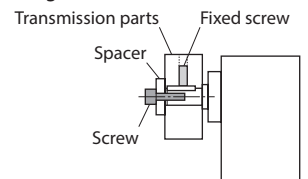
Adjust the output shaft of the motor or gearhead to lie parallel with the load shaft, and form right angles between the output shaft/load shaft and the line connecting the centers of both pulleys.

Using a gear drive

Adjust the output shaft of the motor or gearhead 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 shaft end tapped hole of a gearhead

Use a screw hole [M6; Effective depth 12 mm (0.47 in)] provided at the end 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 a large impact occurs at instantaneous stop or a large radial load is applied, 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.

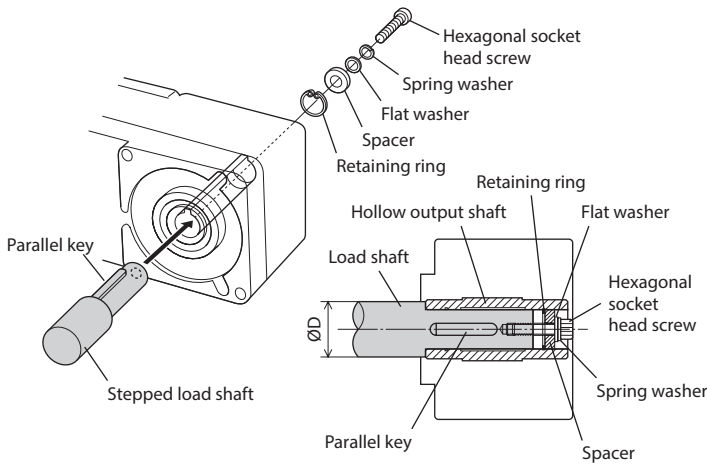
● Recommended load shaft installation dimensions [Unit: mm (in.)]

Model	BLV510	BLV620, BLV640
Inner diameter of hollow shaft (H8)	$\varnothing 20^{+0.033}_0$ ($\varnothing 0.7874^{+0.0013}_0$)	$\varnothing 25^{+0.033}_0$ ($\varnothing 0.9843^{+0.0013}_0$)
Recommended diameter of load shaft (h7)	$\varnothing 20^{-0.021}_0$ ($\varnothing 0.7874^{-0.0008}_0$)	$\varnothing 25^{-0.021}_0$ ($\varnothing 0.9843^{-0.0008}_0$)
Nominal diameter of retaining ring	$\varnothing 20$ ($\varnothing 0.79$)	$\varnothing 25$ ($\varnothing 0.98$)
Applicable screw	M6	M8
Spacer thickness	5 (0.20)	6 (0.24) [3 (0.12)]*
Outer diameter of stepped shaft ($\varnothing D$)	30 (1.18)	40 (1.57)

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

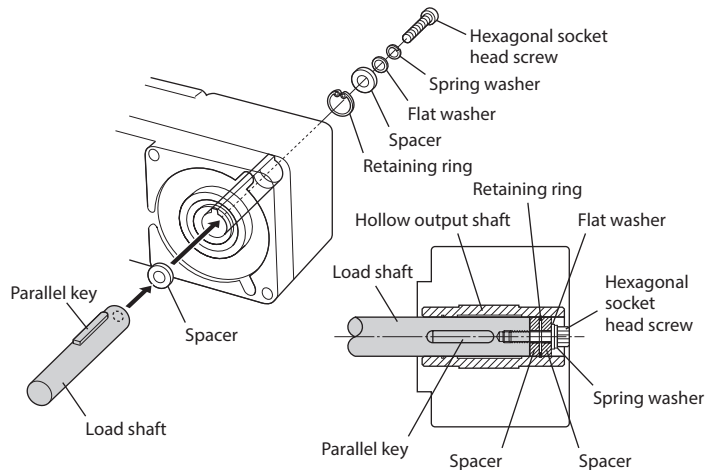
● Stepped load shaft

Secure the retaining ring to the load shaft by tightening the hexagonal socket head screw over a spacer, flat washer and spring washer.



● Non-stepped load shaft

Install a spacer on the load shaft side and secure the retaining ring to the load shaft by tightening the hexagonal socket head screw over a spacer, flat washer and spring washer.



■ Permissible radial load and permissible axial load

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

● Combination type-parallel gearhead

Model	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.)	
BLV510	5	300 (67)	400 (90)	150 (33)
	10 to 20	400 (90)	500 (112)	
	30 to 200	500 (112)	650 (146)	
BLV620 BLV640	5 to 20	550 (123) <500 (112)>	800 (180) <700 (157)>	200 (45)
	30, 50	1000 (220) <900 (200)>	1250 (280) <1100 (240)>	
	100, 200	1400 (310) <1200 (270)>	1700 (380) <1400 (310)>	

* 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

Model	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.)	
BLV510	5, 10	900 (200)	770 (173)	500 (112)
	15, 20	1300 (290)	1110 (240)	
	30 to 200	1500 (330)	1280 (280)	
BLV640	5	1230 (270)	1070 (240)	800 (180)
	10	<1130 (250)>	<990 (220)>	
BLV620 BLV640	15, 20	1680 (370) <1550 (340)>	1470 (330) <1360 (300)>	
	30 to 100	2040 (450) <1900 (420)>	1780 (400) <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

Model	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.)	
BLV620 BLV640	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 to a flat metal plate offering excellent vibration resistance. When two or more drivers are to be installed side by side, provide at least 20 mm (0.79 in.) and 25 mm (0.98 in.) clearances in the horizontal and vertical directions, respectively.

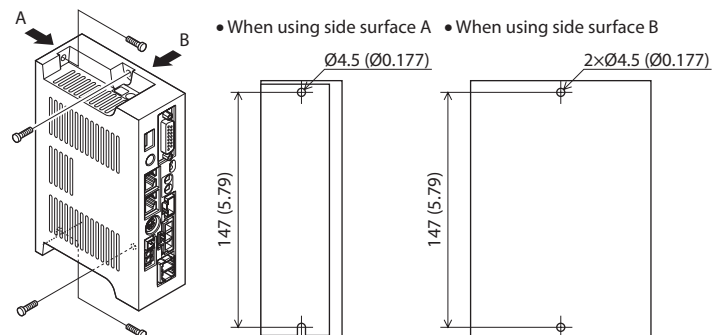
Note

- 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.

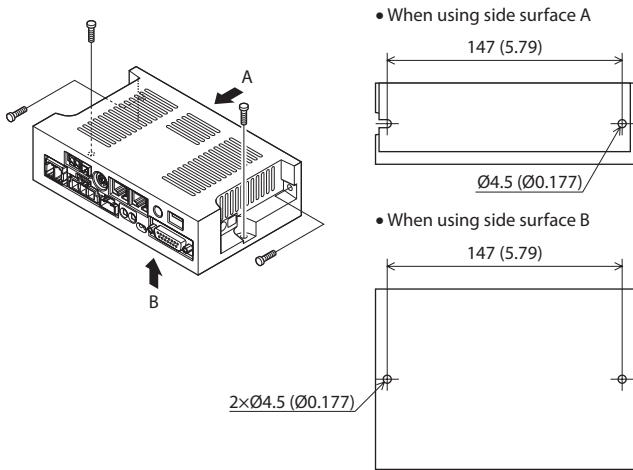
● Installing with screws

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

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

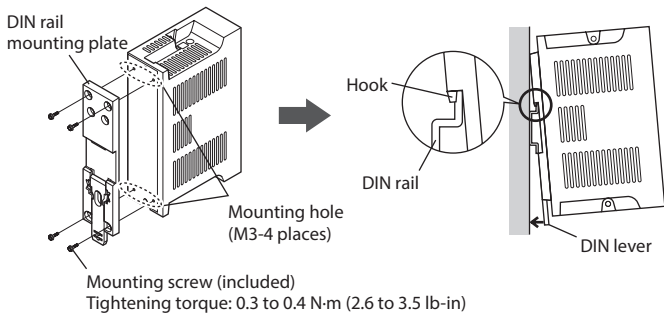


When mounting in horizontal direction [Unit: mm (in.)]



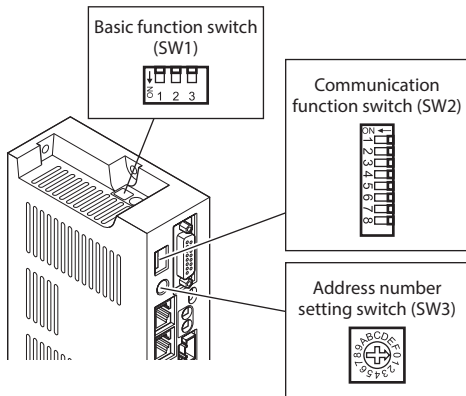
● **Mounting to DIN rail**

Use the DIN rail mounting plate **PADP03** (sold separately), and install 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 places) 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.

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		OFF
2	Transmission rate	
3		
4	Not used	
5	Communication protocol selection	
6	Not used	
7	Termination resistor	
8	Extending the address number	

■ **Address number setting (SW3)**

Set when controlling the system via RS-485 communication. Set the address number using this switch in combination with No. 8 of the SW2. Factory setting: 0

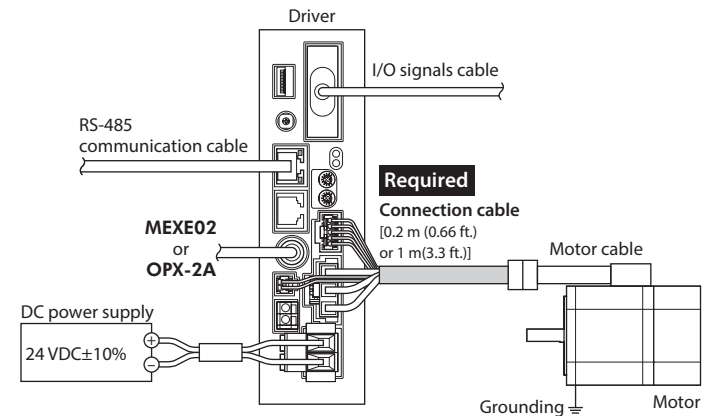
Connection

This section explains how to connect the driver and motor, I/O signals, and power supply.

● **BLV510**

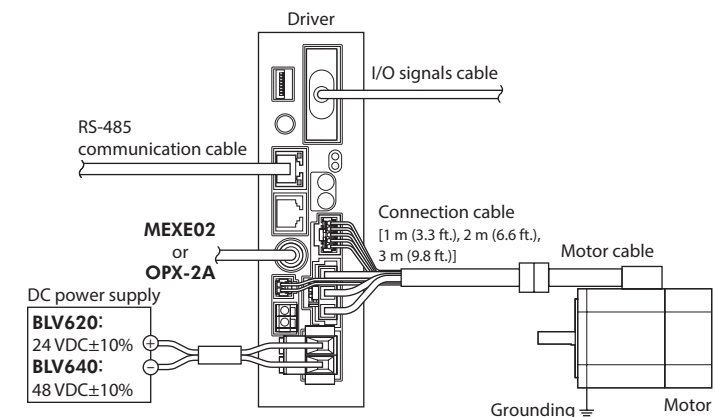
Be sure to use the connection cable (included) for the exclusive use of the **BLV510** product to connect the motor and driver. The motor cable cannot be connected to the driver directly. It is required to convert the connector of the motor cable using the connection cable (included) for the exclusive use of the **BLV510** product.

Maximum extension distance between the motor and driver : 1.5 m (4.9 ft.) [including 0.5 m (1.6 ft.) of the motor cable]



● **BLV620, BLV640**

Maximum extension distance between the motor and driver : 3.5 m (11.5 ft.) [including 0.5 m (1.6 ft.) of the motor cable]

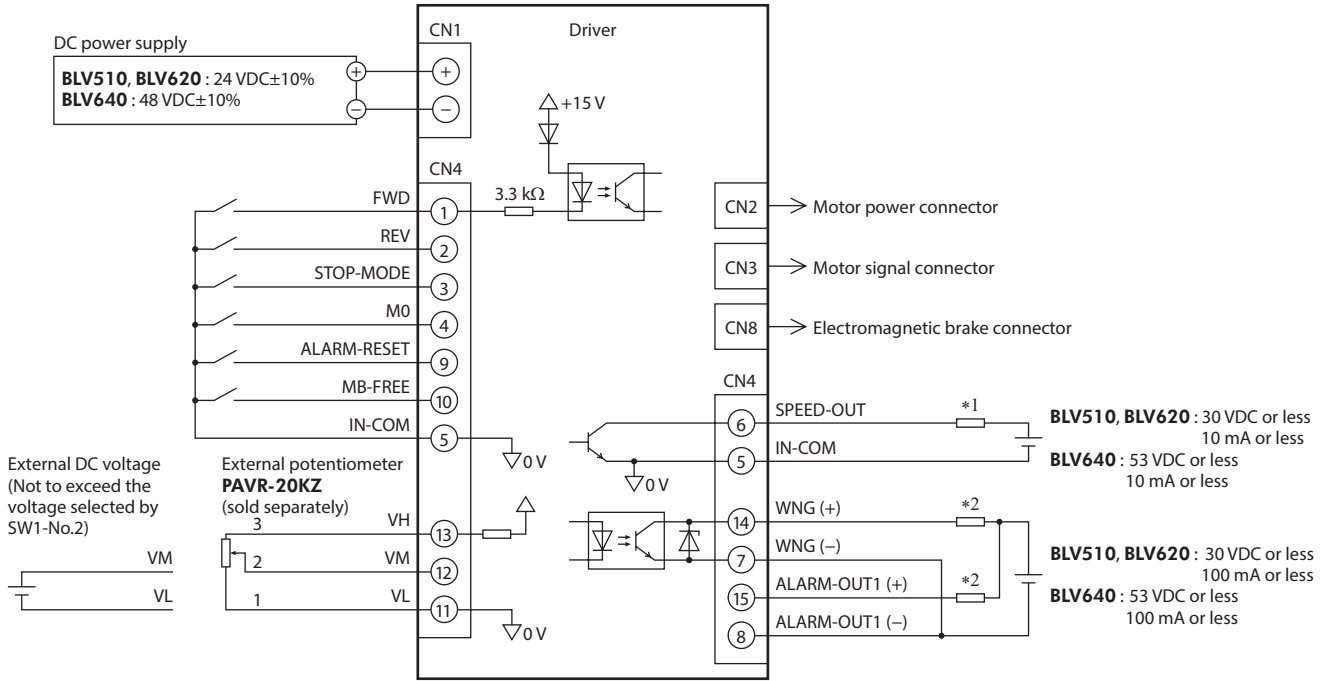


The motor cable can be connected to the driver directly.

■ Connection example (Sink logic)

This section describes the connection example of sink logic.

Refer to the USER MANUAL (Basic Function) for the connection example of source logic and switching between sink logic and source logic.



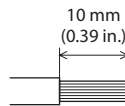
*1 Be sure to suppress the current value to 10 mA or less. Connect a current-limiting resistor if the current exceeds this specified value.

*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.

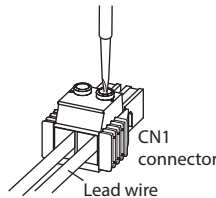
■ Connecting the power supply

● Connecting method

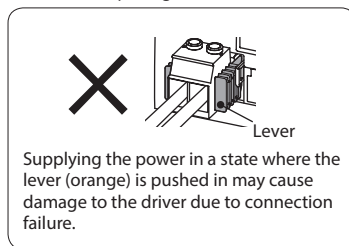
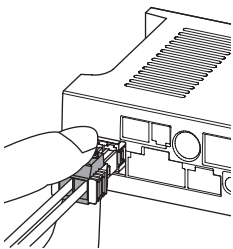
- Strip the insulation cover of the lead wire by 10 mm (0.39 in.).
Applicable lead wire: AWG16 to 10 (1.25 to 6 mm²)



- 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.

● Applicable crimp terminal

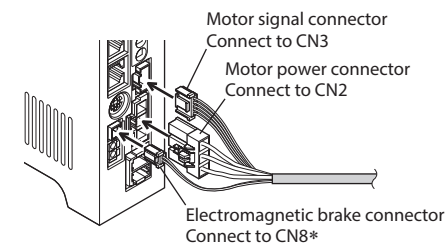
If crimp terminals are used, select the following terminals.

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

■ Recommended power supply capacity

Model	Input power supply voltage	Power supply capacity
BLV510	24 VDC±10%	400 W or more
BLV620	24 VDC±10%	800 W or more
BLV640	48 VDC±10%	1 kW or more

■ Connecting the motor



* Electromagnetic brake type only

Connect the motor power connector to the CN2, and the motor signal connector to the CN3 on the driver.

When using an electromagnetic brake type product, connect the electromagnetic brake connector to the CN8.

For the BLV510 product, the connection cable (included) is required to connect the motor and driver.

Note Make sure the connector is inserted securely. Insecure connection may cause malfunction or damage to the motor or driver.

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 lines or motor cable. Doing so may cause malfunction due to noise.
- When turning on the power again or inserting/pulling out 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.

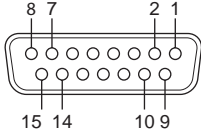
■ Connecting the I/O signals

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



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

● 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 rotates in the clockwise direction.
2		X1	REV	The motor rotates in the counter clockwise 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	Reset the alarm.
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 by the external potentiometer or 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.

* For the electromagnetic brake type

Operation overview

■ Basic operation

With the **BLV** Series, the following operations can be performed. Refer to the USER MANUAL (Basic Function) for details.

● Speed setting

Internal potentiometer, external potentiometer, external DC voltage

● Operation and stop

Operates or stops the motor.

● Setting the acceleration time and deceleration time

The acceleration time and deceleration time for starting and stopping can be set.

● Two-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.

Using the support software **MEXE02** or the data setter **OPX-2A** (sold separately) can extend functions such as the digital setting of the rotation speed and torque limiting value, the setting of parameters, and various monitors.

■ 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
NETC01-CC	CC-Link
NETC01-M2/M3	MECHATROLINK
NETC01-ECT	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.

Regulations and standards

■ CE Marking

This product is affixed the CE Marking (EMC Directive) based on the EN Standard. The input power supply voltage of this product is 24 VDC/48 VDC. Therefore this product is not subject to the Low Voltage Directive, but install and connect it as follows.

● Installation conditions

For incorporating in 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).

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