



Brushless Motor and Driver Package

BLE Series CC-Link

Installation/Connection OPERATING MANUAL



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.

Table of contents

1	Introduction	2	6	Connection.....	12
2	Safety precautions	2	6.1	Connecting the power supply	12
3	Precautions for use.....	3	6.2	Grounding.....	13
4	Preparation	4	6.3	Connecting the motor	13
4.1	Checking the product	4	6.4	Connecting the control power supply input and regeneration resistor thermal input.....	14
4.2	Combination tables.....	5	6.5	Connecting the regeneration unit	14
4.3	Names and functions of parts.....	5	6.6	Connecting the I/O signals	14
5	Installation.....	6	6.7	Connecting the communication cable ...	16
5.1	Installation location.....	6	6.8	Connecting the CC-Link communication cable	16
5.2	Installing the combination type parallel shaft gearhead.....	6	6.9	Connecting example.....	16
5.3	Installing the combination type hollow shaft flat gearhead	7	7	Inspection	17
5.4	Installing the round shaft type	8			
5.5	Installing a load on the combination type parallel gearhead or round shaft type	9			
5.6	Installing a load on the combination type hollow shaft flat gearhead	10			
5.7	Installing the driver	11			
5.8	Installing the regeneration unit	11			
5.9	Installing and wiring in compliance with EMC Directive	11			

1 Introduction

■ Before use

The **BLE** Series is designed and manufactured for use as an internal component of general industrial equipment. Do not use it for any other purpose. Oriental Motor will not be liable for whatever damage arises from failure to observe this warning.

■ Structure of the manual

Two operating manuals are provided for the **BLE** Series CC-Link, as listed below.

- Installation/Connection (this document)

This manual explains the names and functions of motor/driver components, installation method and connection method.

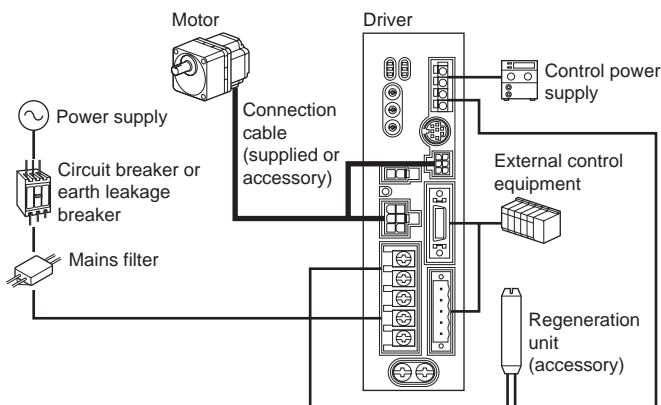
- Operation (Contact us for a copy.)

This manual explains the functions and usage of CC-Link. It also talks about the types of operations and functions of each operation. Read the “Operating Manual – Operation” carefully and understand the content fully before using your **BLE** Series.

■ System configuration

An example of system configuration using the **BLE** Series is shown below.

Three power supply specifications are supported, including single-phase 100-120 V, single-phase 200-240 V, and three-phase 200-240 V (the power frequency is 50/60 Hz with all types).



■ Standard and CE Marking

This product has been certified under the CE Marking requirements (Low Voltage Directive and EMC directive) based on the EN Standard.

- Applicable Standards

	Applicable Standards	Installation conditions
Motor*	EN 60034-1 EN 60034-5 EN 60950-1 EN 60664-1	Motor is to be used as a component within other equipment. Overvoltage category: III Pollution degree: 3 Protection against electric shock: Class I
Driver	EN 50178	Driver is to be used as a component within other equipment. Overvoltage category: II Pollution degree: 2 Protection against electric shock: Class I

* Insulation class: E

- For Low Voltage Directive

The product is to be incorporated into machinery, so it shall be installed within an enclosure.

- Install the product within an enclosure to avoid contact with hands.
- Be sure to maintain a Protective Earth in case hands should make contact with the product. Securely ground the Protective Earth Terminals of the motor and driver.

- EMC Directive

This product has received EMC measures under the conditions specified in “Example of motor and driver installation and wiring” on p.12.

Be sure to conduct EMC measures with the product assembled in your equipment by referring to 5.9 “Installing and wiring in compliance with EMC Directive” on p.11.

■ Hazardous substances

RoHS (Directive 2002/95/EC 27Jan.2003) compliant

2 Safety precautions

Only qualified personnel should work with the product. Use the product correctly after thoroughly reading the section “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. Please read and understand these precautions thoroughly before using the product.

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 the safe use of the product.

Warning

- Do not use the product in a place exposed to explosive, flammable or corrosive gases or water splashes or near combustible materials. Doing so may result in fire, electric shock or injury.
- Only qualified 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 equipment damage.
- Do not move, install, connect or inspect the product while the power is supplied. Perform these operations after turning off the power. Failure to observe these instructions may result in electric shock.
- Do not use this product in a lift device. If the driver’s protection function is activated, the motor will stop and the moving part of the equipment will drop, thereby causing injury or equipment damage.
- If the driver’s protection function has been activated, remove the cause and then reset the protection function. Continuing to operate the equipment without removing the cause of problem will lead to a motor or driver malfunction, resulting in injury or equipment damage.
- Use a specified motor (gearhead) and driver combination. Failure to do so may result in fire, electric shock or equipment damage.

- Use the motor and driver only in class I equipment. Installing them in equipment of other classes may result in electric shock.
- Install the motor and driver in an enclosure. Failure to do so may result in electric shock or injury.
- When installing the motor and driver, connect their Protective Earth Terminals. Failure to do so may result in 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 cables. Doing so may result in fire or electric shock.
- Do not machine or modify the motor cable or connection cable. Doing so may result in electric shock or fire.
- Be sure to observe the specified cable sizes. Use of unspecified cable sizes may result in fire.
- Observe the specified screw tightening torque when connecting terminals to the terminal block. Failure to do so may result in electric shock or equipment damage.
- Always keep the driver's power supply voltage below the rating. Failure to do so may result in fire or electric shock.
- When the CC-Link system has generated a communication error, etc., check the conditions of the CC-Link system and driver by referring to the operating manual of the master station and "Operating Manual – Operation". In addition, provide an interlock circuit in the sequence program using the communication status information, so that the system including the driver will operate safely upon occurrence of an error.
- Always turn off the power before performing maintenance/inspection. Failure to do so may result in electric shock.
- Do not touch the motor or driver when measuring insulation resistance or performing a dielectric strength test. Accidental contact may result in electric shock.
- Do not touch the connection terminals on the driver immediately (within 3 minutes or until the CHARGE LED turns off) after the power is turned off. Residual voltage may cause electric shock.
- Regularly check the openings in the driver for attachment of dust. Attached dust may cause fire.
- Do not disassemble or modify the motor (gearhead) and driver. Doing so may result in electric shock, injury or equipment damage. Should you require inspection or repair of internal parts, please contact the Oriental Motor branch or sales office from which you purchased the product.

⚠ Caution

- Do not use the product in conditions exceeding the motor (gearhead) or driver specifications. Doing so may result in electric shock, fire, injury or equipment damage.
- Do not insert an object into the openings in the driver. Doing so may result in fire, electric shock or injury.
- Do not touch the motor (gearhead) or driver during the operation or immediately after the operation has stopped. Touching a hot motor (gearhead) or driver surface may cause skin burn(s).
- Do not carry the product by the motor (gearhead) output shaft or any of the cables. Doing so may result in injury.
- Do not place around the motor and driver any object blocking the air flows. Doing so may result in equipment damage.
- Do not touch the motor output shaft (key groove or pinion) with bare hands. Doing so may result in injury.
- When assembling the motor (pinion shaft) with the gearhead, exercise caution not to pinch your fingers or other parts of your body between the motor and gearhead. Injury may result.

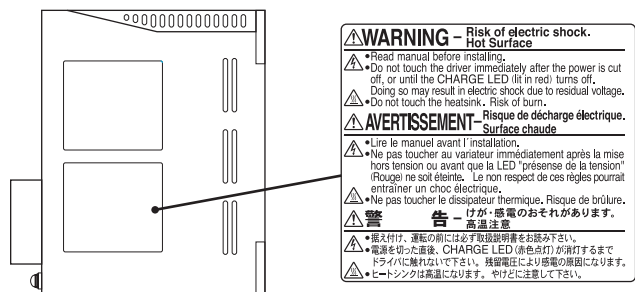
- Securely affix the motor (gearhead) and driver to their respective mounting plates. Inappropriate installation may cause the motor/driver to detach and fall, resulting in equipment damage.
- Provide a cover on the rotating part (output shaft) of the motor (gearhead). Failure to do so may result in injury.
- When installing the motor (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 motor output shaft. 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 running 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. Doing so may result in injury.
- The motor surface temperature may exceed 70 °C (158 °F), even in a normal operating condition. If the operator is allowed to approach the running motor, attach a warning label as shown below in a conspicuous position. Failure to do so may result in skin burn(s).
- To dispose of the motor (gearhead) or driver, disassemble it into parts and components as much as possible and dispose of individual parts/components as industrial waste.



Warning label

■ Warning information

A warning label with handling instructions is attached on the driver. Be sure to observe the instructions on the label when handling the driver.



3 Precautions for use

This chapter explains the restrictions and other items you should take heed of when using the BLE Series.

■ Connect protective devices to the power line

Connect a circuit breaker or earth leakage breaker to the driver's power line to protect the primary circuit. If an earth leakage breaker is to be installed, use one incorporating high-frequency noise elimination measures. Refer to p.4 and p.13 for the selection of appropriate protective devices.

■ Do not perform gravitational operation

With the BLE Series, any operation in which the motor output shaft is turned (gravitational operation) will disable the motor speed control. In addition, a gravitational operation will cause the driver's primary inverter voltage to exceed the allowable value, thereby triggering a protection function and causing the motor to stop spontaneously. When the motor stops, the load may drop.

■ 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.

■ Conduct the insulation resistance measurement or withstand voltage test separately on the motor and the driver

Conducting the insulation resistance measurement or withstand voltage test with the motor and driver connected may result in injury or damage to the product.

■ Grease measures

On rare occasions, a small amount of 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.

■ Apply grease on the output shaft of 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.

■ Preventing leakage current

Stray capacitance exists between the driver’s current-carrying line and other current-carrying lines, the earth and the motor, respectively. A high-frequency current may leak out through such capacitance, having a detrimental effect on the surrounding equipment. The actual leakage current depends on the driver’s switching frequency, the length of wiring between the driver and motor, and so on.

When connecting an earth leakage breaker, use one of the following products offering resistance against high frequency:

- Mitsubishi Electric Corporation: NV series
- Fuji Electric FA Components & Systems Co., Ltd.: EG and SG series

■ Noise elimination measures

Provide the following noise elimination measures to prevent a motor or driver malfunction caused by external noise.

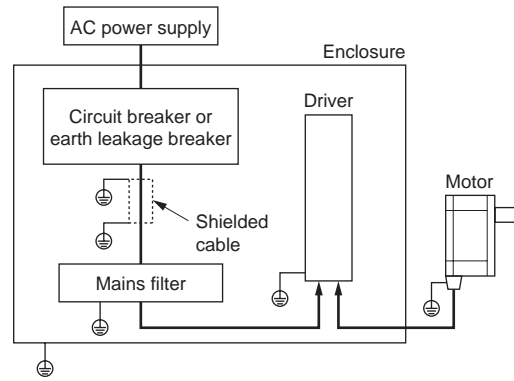
• Wiring the motor

Use connection cable (supplied or accessory) when extending the wiring distance between the motor and driver.

- Wiring the I/O signal cable
- Minimize the wiring length of the I/O signal cable.
- Provide a minimum clearance of 100 mm (4 in.) between the I/O signal cable and any inductive load such as an electromagnetic relay or any power line (power cable, motor cable, etc.). Do not place the I/O signal cable and a power line in the same duct or pipe or bundle them together.
- For more effective elimination of noise, use a shielded I/O signal cable or attach ferrite cores if a non-shielded cable is used.

• Connecting a mains filter for power line

- Connect a mains filter to the AC power input part of the driver to prevent external noise from reaching the driver via the power line.
- Provide a ground connection from the mains filter ground terminal using a cable of AWG18 to 14 (0.75 to 2.0 mm²).
- Be sure to ground both ends of the shielded cable used for the mains filter.



■ Note on connecting a power supply whose positive terminal is grounded

The communication connector (CN3) and I/O signal connector (CN5) are not 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 PC to short, damaging both.

■ Use connection cable (supplied or accessory) when extending the wiring distance between the motor and driver

4 Preparation

This chapter explains what you must do before using the **BLE** Series, as well as the name and function of each part of the unit.

4.1 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.

Verify the model number of the purchased product against the number shown on the package label.

Check the model number of the motor and driver against the number shown on the nameplate.

Model names for motor and driver combinations are listed in section 4.2 “Combination tables.”

- Motor 1 unit
(with a gearhead, only for combination type)
- Driver 1 unit
- User I/O connector 1 pc.
- CC-Link connector 1 pc.
- Connection cable 1 pc.
(Only models with a supplied connection cable)
- Installation/Connection OPERATING MANUAL
(this document) 1 copy

Accessories for combination type parallel shaft gearhead

- Hexagonal socket head screw set 1 set
(Screw, flat washer, spring washer and nut, 4 pcs. each)
- Parallel key 1 pc.

Accessories for combination type hollow shaft flat gearhead

- Hexagonal socket head screw set 1 set
(Screw, flat washer, spring washer and nut, 4 pcs. each)
- Safety cover 1 pc.
- Safety cover mounting screw (M3) 2 pcs.
- Parallel key 1 pc.

4.2 Combination tables

- in the model names indicates a number representing the gear ratio.
- in the model names indicates a number representing the length of a connection cable. (This number is not described in the model name when the connection cable is not included in the product.)

• Combination type parallel shaft gearhead

The motor comes preassembled with a parallel shaft gearhead.

Model	Motor model	Gearhead model	Driver model
BLE23AC□S-■	BLEM23-GFS	GFS2G□	BLED3A-CC
BLE23CC□S-■			BLED3C-CC
BLE46AC□S-■	BLEM46-GFS	GFS4G□	BLED6A-CC
BLE46CC□S-■			BLED6C-CC
BLE512AC□S-■	BLEM512-GFS	GFS5G□	BLED12A-CC
BLE512CC□S-■			BLED12C-CC

• Combination type hollow shaft flat gearhead

The motor comes preassembled with a hollow shaft flat gearhead.

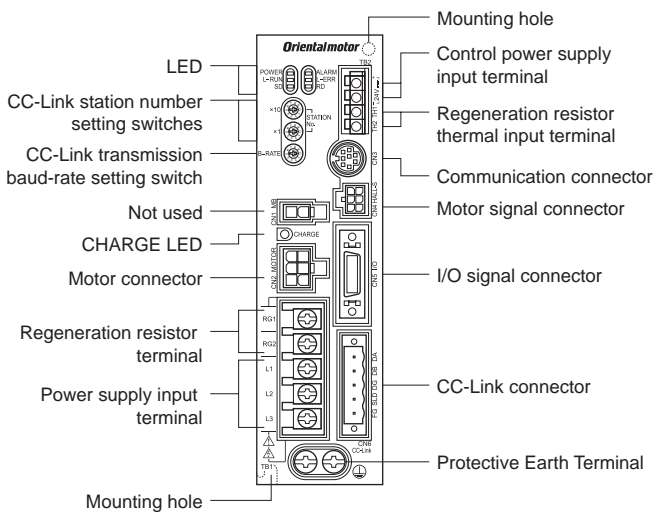
Model	Motor model	Gearhead model	Driver model
BLE23AC□F-■	BLEM23-GFS	GFS2G□FR	BLED3A-CC
BLE23CC□F-■			BLED3C-CC
BLE46AC□F-■	BLEM46-GFS	GFS4G□FR	BLED6A-CC
BLE46CC□F-■			BLED6C-CC
BLE512AC□F-■	BLEM512-GFS	GFS5G□FR	BLED12A-CC
BLE512CC□F-■			BLED12C-CC

• Round shaft type

Model	Motor model	Driver model
BLE23ACA-■	BLEM23-A	BLED3A-CC
BLE23CCA-■		BLED3C-CC
BLE46ACA-■	BLEM46-A	BLED6A-CC
BLE46CCA-■		BLED6C-CC
BLE512ACA-■	BLEM512-A	BLED12A-CC
BLE512CCA-■		BLED12C-CC

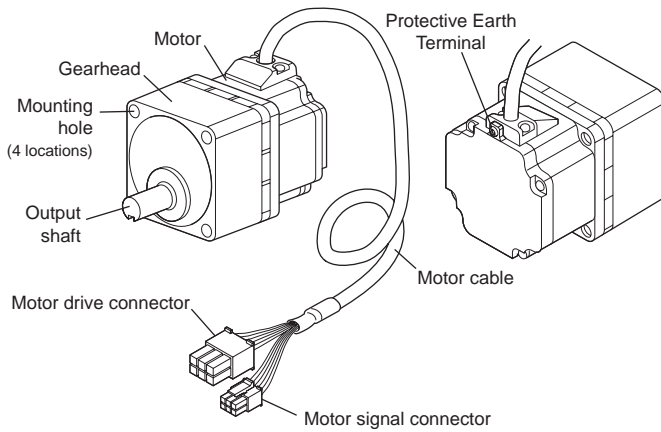
4.3 Names and functions of parts

■ Driver



Name	Description
LED	LED shows the condition of the driver and CC-Link communication. POWER (green): Lit while the control power supply is input. ALARM (red): Blinks when a protective function is triggered. L-RUN (green): Lit while communication is carried out properly. L-ERR (red): Lit or blinks when communication is abnormal. SD (green): Lit when data is sent. RD (green): Lit when data is received.
CC-Link station number setting switches [STATION No.]	Set the driver's station number in the range between 01 and 64. When connecting two or more CC-Link devices, do not set duplicate station numbers. [x10]: Set the 10's place [x1]: Set the 1's place Factory setting: 01
CC-Link transmission baud-rate setting switch [B-RATE]	Set the transmission speed of CC-Link communication. Factory setting: 0 (156 kbps)
Not used [CN1]	Not use.
CHARGE LED (red)	Lit while the main power is input. After the main power has been turned off, the LED will turn off once the residual voltage in the driver drops to a safe level.
Motor connector [CN2]	Connect the motor drive connector on the motor cable or connection cable.
Regeneration resistor terminal (TB1) [RG1, RG2]	Connect the accessory regeneration unit RGB100 (sold separately).
Power supply input terminal (TB1) [L, N] [L1, L2, L3]	Connect a single-phase main power supply. • Single-phase 100-120 V L, N: Connect a single-phase 100-120 VAC NC: Not used. • Single-phase 200-240 V L1, L2: Connect a single-phase 200-240 VAC L3: Not used. • Three-phase 200-240 V L1, L2, L3: Connect a three-phase 200-240 VAC
Control power supply input terminal (TB2) [24 V+, 24 V-]	Connect a control power supply of the driver. (24 VDC -15 to +20%)
Regeneration resistor thermal input terminal (TB2) [TH1, TH2]	Connect the thermal input of an accessory regeneration unit RGB100 (sold separately).
Communication connector [CN3]	Connect a PC in which the data editing software MEXE02 has been installed, or the data setter OPX-2A . MEXE02 is supported from the software version of 1.20 or later.
Motor signal connector [CN4]	Connect the motor signal connector on the motor cable or connection cable.
I/O signal connector [CN5]	Connect the I/O signals of the programmable controller.
CC-Link connector [CN6]	Connect the CC-Link communication cable.
Protective Earth Terminal	Ground this terminal using a grounding wire of AWG18 to 14 (0.75 to 2.0 mm ²).
Mounting holes (2 locations at the back)	These mounting holes are used to install the driver with screws.

Motor



* Illustration shows combination type parallel shaft gearhead.

5 Installation

5.1 Installation location

The motor and driver are designed and manufactured for use as internal components of equipment.

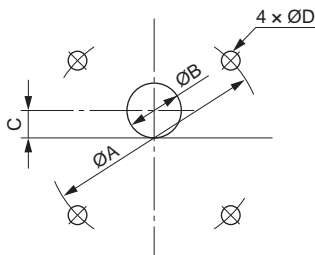
Install the motor and driver in a well-ventilated place where they can be inspected easily and the following conditions are satisfied:

- Inside an enclosure installed indoors (provide a ventilation hole)
- Ambient temperature: 0 to +50 °C (+32 to +122 °F) (non-freezing)
- 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

Install the motor to a flat mounting plate offering excellent vibration resistance and high heat conductivity.

5.2 Installing the combination type parallel shaft gearhead

1. Open mounting holes in the mounting plate.



Unit: mm (in.)

Model	ØA	ØB	C	ØD
BLE23	70 (2.76)	24 (0.94)	10 (0.39)	4.5 (0.177)
BLE46	94 (3.70)	34 (1.34)	13 (0.51)	6.5 (0.256)
BLE512	104 (4.09)	40 (1.57)	18 (0.71)	8.5 (0.335)

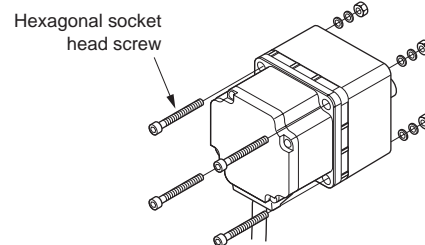
* ØB indicates the external dimensions of the product.
Open holes with a minimum diameter of ØB + 1 mm (0.04 in.).

Maximum applicable plate thickness

Model	Maximum applicable plate thickness
BLE23	5 mm (0.20 in.)
BLE46	8 mm (0.31 in.)
BLE512	12 mm (0.47 in.)

* The figures in the table apply when the supplied hexagonal socket head screw is used.

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



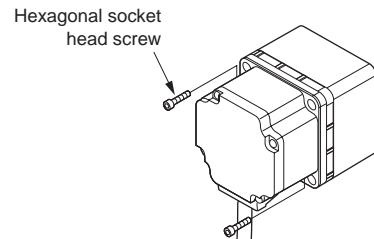
Model	Nominal thread size	Tightening torque
BLE23	M4	1.8 N·m (15.9 lb-in)
BLE46	M6	6.4 N·m (56 lb-in)
BLE512	M8	15.5 N·m (137 lb-in)

Note Fit the boss on the gearhead mounting surface into a pilot-receiving hole.

Installing/removing the gearhead

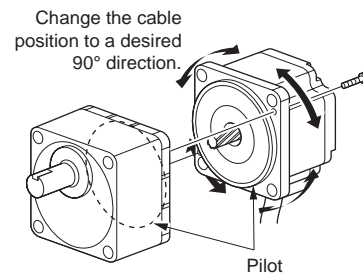
The gearhead can be removed and the motor cable position changed to the desired 90° direction.

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



2. Using the pilot sections of the motor and gearhead as guides, install the gearhead to the motor and tighten the hexagonal socket head screws.

At this time, the motor cable position can be changed to the desired 90° direction. 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. Also confirm that no gaps remain between the motor flange surface and the end face of the gearhead's pilot section.

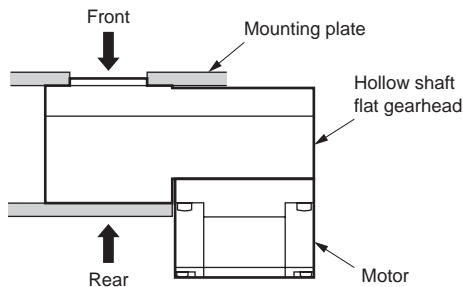


Model	Nominal thread size	Tightening torque
BLE23, BLE46	M2.6	0.4 N·m (3.5 lb-in)
BLE512	M3	0.6 N·m (5.3 lb-in)

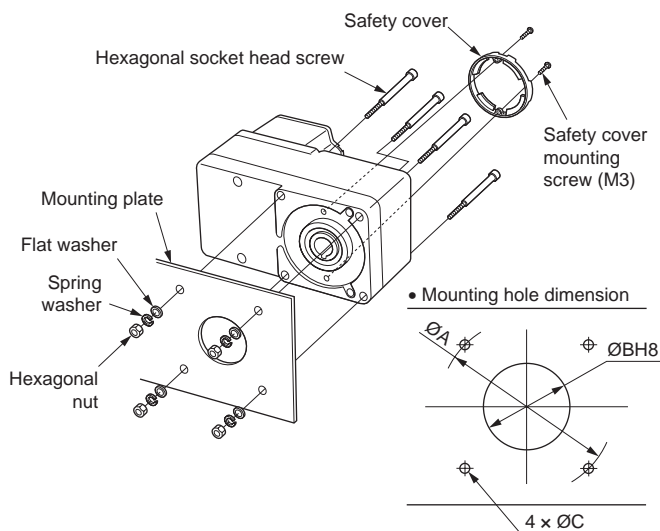
- Note**
- Do not forcibly assemble the motor and gearhead. Also, do not let metal objects or other foreign matter enter the gearhead. The pinion or gear of the motor output shaft may be damaged, resulting in noise or shorter service life.
 - Do not allow dust to attach to the pilot sections of the motor 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.
 - The hexagonal socket head screws assembling the motor and gearhead are affixing the motor and gearhead only temporarily. When installing the gearhead, be sure to use the supplied four hexagonal socket head screws.

5.3 Installing the combination type hollow shaft flat gearhead

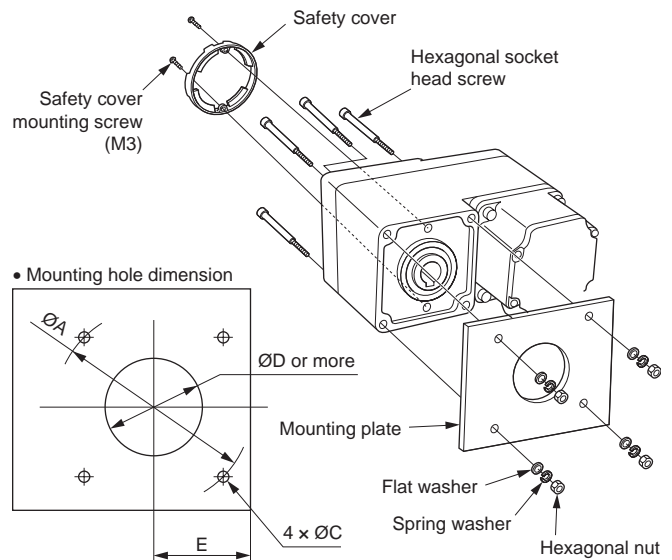
A combination type hollow shaft flat gearhead can be installed by using either its front or rear side as the mounting surface. Install the supplied hexagonal socket head screw in the four mounting holes you opened and tighten the nuts until no gaps remain between the motor and mounting plate. Also, attach the supplied safety cover to the hollow output shaft on the end opposite from the the one where the load shaft is installed.



- Using the front side as the mounting surface
When the gearhead is installed by using its front side as the mounting surface, use the boss of the output shaft to align the center.



- Using the rear side as the mounting surface



- Mounting hole dimension [unit: mm (in.)]

Model	ØA	ØBH8	ØC	ØD	E
BLE23	70 (2.76)	34 ^{+0.039} ₀ (1.34 ^{+0.0015} ₀)	5.5 (0.217)	25 (0.98)	29 (1.14)
BLE46	94 (3.70)	38 ^{+0.039} ₀ (1.50 ^{+0.0015} ₀)	6.5 (0.256)	30 (1.18)	39 (1.54)
BLE512	104 (4.09)	50 ^{+0.039} ₀ (1.97 ^{+0.0015} ₀)	8.5 (0.335)	35 (1.38)	44 (1.73)

- Note** When installing the gearhead by using its rear side as the mounting surface, prevent contact between the mounting plate and motor by keeping dimension E below the specified value.

- Applicable hexagonal socket head screw and tightening torque

Model	Nominal thread size	Tightening torque
BLE23	M5	3.8 N·m (33 lb-in)
BLE46	M6	6.4 N·m (56 lb-in)
BLE512	M8	15.5 N·m (137 lb-in)

- Maximum applicable plate thickness

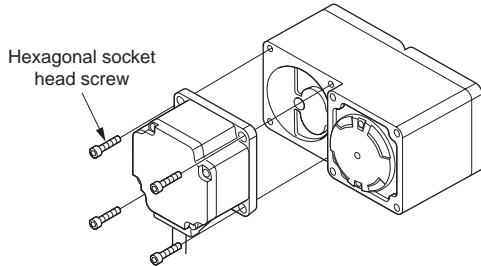
Model	Maximum applicable plate thickness
BLE23	5 mm (0.20 in.)
BLE46	8 mm (0.31 in.)
BLE512	12 mm (0.47 in.)

- * The figures in the table apply when the supplied hexagonal socket head screw is used.

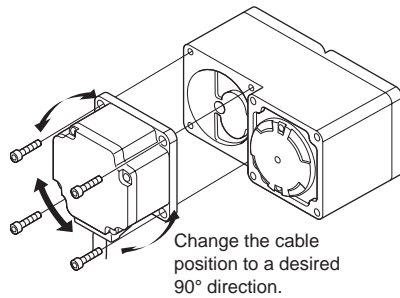
■ Installing/removing the hollow shaft flat gearhead

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.

1. Remove the hexagonal socket head screws (4 pcs.) attaching the hollow shaft flat gearhead and motor and detach the motor from the hollow shaft flat gearhead.



2. Using the pilot sections of the motor and hollow shaft flat gearhead as guides, install the motor to the hollow shaft flat gearhead and tighten the hexagonal socket head screws. At this time, the motor cable position can be changed to one of three 90° directions. Install the motor carefully to prevent the pinion of the motor output shaft from contacting the casing or gear of the hollow shaft flat gearhead. Also confirm that no gaps remain between the motor flange surface and the end face of the hollow shaft flat gearhead's pilot section.



Model	Nominal thread size	Tightening torque
BLE23	M4	1.8 N·m (15.9 lb-in)
BLE46	M6	6.4 N·m (56 lb-in)
BLE512	M8	15.5 N·m (137 lb-in)

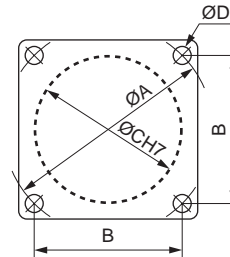
- Note**
- Do not forcibly assemble the motor and hollow shaft flat gearhead. Also, do not let metal objects or other foreign matter enter the hollow shaft flat gearhead. The pinion of the motor output shaft or the hollow shaft flat gearhead itself may be damaged, resulting in noise or shorter service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

5.4 Installing the round shaft type

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 radiation plate [mm (in.)]	Thickness [mm (in.)]	Material
BLE23	115×115 (4.53×4.53)	5 (0.20)	Aluminum
BLE46	135×135 (5.31×5.31)		
BLE512	165×165 (6.50×6.50)		

1. Open mounting holes in the mounting plate.

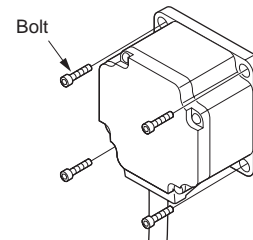


Unit: mm (in.)

Model	ØA	B	ØCH7	ØD
BLE23	70 (2.76)	49.5 (1.949)	$54^{+0.030}_0$ ($2.1260^{+0.0012}_0$)	4.5 (0.177)
BLE46	94 (3.70)	66.47 (2.616)	$73^{+0.030}_0$ ($2.8740^{+0.0012}_0$)	6.5 (0.256)
BLE512	104 (4.09)	73.54 (2.895)	$83^{+0.035}_0$ ($3.2677^{+0.0014}_0$)	8.5 (0.335)

* ØC indicates the pilot diameter on the flange.

2. Install four screws (not supplied) in the four mounting holes you just opened and tighten the nuts until no gaps remain between the motor and mounting plate.



Model	Nominal thread size	Tightening torque
BLE23	M4	1.8 N·m (15.9 lb-in)
BLE46	M6	6.4 N·m (56 lb-in)
BLE512	M8	15.5 N·m (137 lb-in)

- Note** Insert the pilot located on the motor's installation surface into the mounting plate's.

5.5 Installing a load on the combination type parallel gearhead or round shaft type

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

- Note**
- When coupling the motor (gearhead) with a load, pay attention to centering, belt tension, parallelism of pulleys, etc. Also, securely affix 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 motor (gearhead) output shaft. The bearing may be damaged or motor (gearhead) may break.

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 supplied parallel key.

Model	Parallel key dimension
BLE23	4 mm (0.1575 in.)
BLE46	5 mm (0.1969 in.)
BLE512	6 mm (0.2362 in.)

Round shaft type

A flat section is provided on the motor output shaft of each round shaft motor. 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 (gearhead) output shaft with the centerline of the load shaft.

Using a belt

Adjust the motor (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 (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.

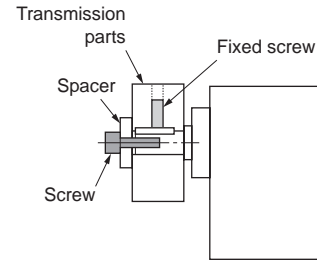
When using the output axis tip screw hole of a gearhead

Use a screw hole provided at the tip of the output shaft as an auxiliary means for preventing the transfer mechanism from disengaging. (GFS2G□ type have no output shaft tip screw hole.)

Gearhead model*	Output shaft tip screw hole
GFS4G□	M5, effective depth 10 mm (0.39 in.)
GFS5G□	M6, effective depth 12 mm (0.47 in.)

* The square box in the gearhead model will contain a value representing the gear ratio.

<The example of output axis tip screw hole use>



Permissible overhung load and permissible thrust load

Make sure the overhung load and thrust load received by the gearhead output shaft will not exceed the allowable values shown in the table below.

Note If the overhung load or thrust load exceeds the specified allowable value, repeated load applications may cause the bearing or output shaft of the gearhead to undergo a fatigue failure.

Combination type parallel shaft gearhead

Model	Gear ratio	Distance from tip of gearhead output shaft and permissible overhung load [N (lb.)]*		Permissible thrust load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
BLE23	5	100 (22) [90 (20)]	150 (33) [110 (24)]	40 (9)
	10 to 20	150 (33) [130 (29)]	200 (45) [170 (38)]	
	30 to 200	200 (45) [180 (40)]	300 (67) [230 (51)]	
BLE46	5	200 (45) [180 (40)]	250 (56) [220 (49)]	100 (22)
	10 to 20	300 (67) [270 (60)]	350 (78) [330 (74)]	
	30 to 200	450 (101) [420 (94)]	550 (123) [500 (112)]	
BLE512	5	300 (67) [230 (51)]	400 (90) [300 (67)]	150 (33)
	10 to 20	400 (90) [370 (83)]	500 (112) [430 (96)]	
	30 to 200	500 (112) [450 (101)]	650 (146) [550 (123)]	

* 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 overhung load [N (lb.)]		Permissible thrust load [N (lb.)]
	10 mm (0.39 in.)	20 mm (0.79 in.)	
BLE23	80 (18)	100 (22)	Not to exceed one-half the motor's dead weight *
BLE46	110 (24)	130 (29)	
BLE512	150 (33)	170 (38)	

* Minimize the thrust load. If a thrust load must be applied, do not let it exceed one-half the motor's dead weight.

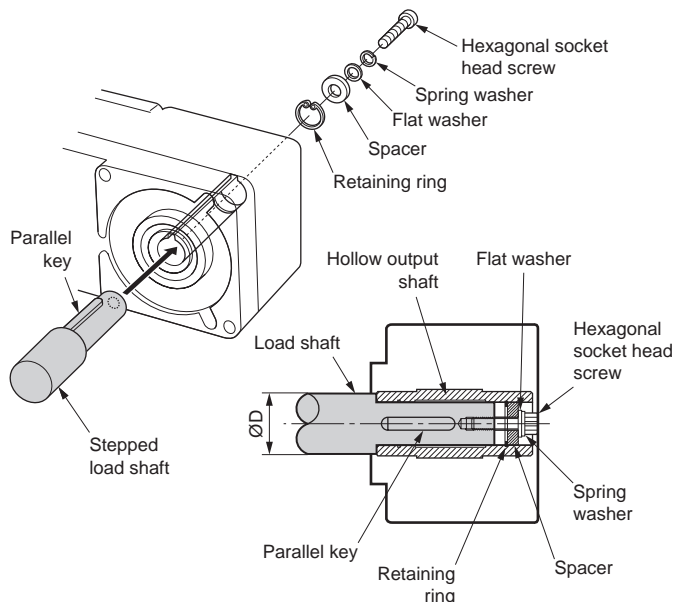
5.6 Installing a load on the combination type hollow shaft flat gearhead

If the motor is subject to a strong impact upon instantaneous stop or receives a large overhung 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.

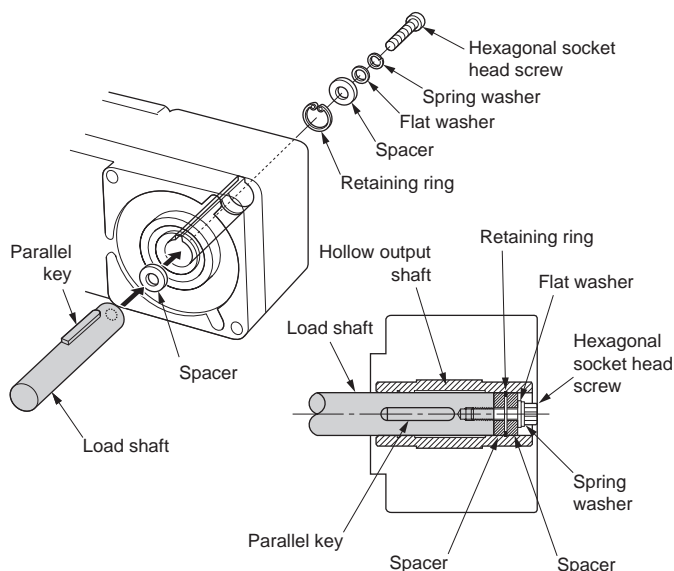
• Stepped load shaft

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.



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

Model	Inner diameter of hollow shaft (H8)	Recommended tolerance of load shaft (h7)	Outer diameter of stepped shaft (ØD)
BLE23	$\varnothing 12^{+0.027}_0$ ($\varnothing 0.4724^{+0.0011}_0$)	$\varnothing 12^{0}_{-0.018}$ ($\varnothing 0.4724^{0}_{-0.0007}$)	20 (0.79)
BLE46	$\varnothing 15^{+0.027}_0$ ($\varnothing 0.5906^{+0.0011}_0$)	$\varnothing 15^{0}_{-0.018}$ ($\varnothing 0.5906^{0}_{-0.0007}$)	25 (0.98)
BLE512	$\varnothing 20^{+0.033}_0$ ($\varnothing 0.7874^{+0.0013}_0$)	$\varnothing 20^{0}_{-0.021}$ ($\varnothing 0.7874^{0}_{-0.0008}$)	30 (1.18)

Model	Nominal diameter of retaining ring	Applicable screw	Spacer thickness
BLE23	$\varnothing 12$ ($\varnothing 0.47$)	M4	3 (0.12)
BLE46	$\varnothing 15$ ($\varnothing 0.59$)	M5	4 (0.16)
BLE512	$\varnothing 20$ ($\varnothing 0.79$)	M6	5 (0.20)

■ Permissible overhung load and permissible thrust load

Make sure the overhung load and thrust load received by the gearhead output shaft will not exceed the allowable values shown in the table below.

Note If the overhung load or thrust load exceeds the specified allowable value, repeated load applications may cause the bearing or output shaft of the gearhead to undergo fatigue failure.

• Combination type hollow shaft flat gearhead

Model	Gear ratio	Distance from hollow shaft flat gearhead mounting surface and overhung load [N (lb.)]*		Permissible thrust load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
BLE23	5, 10	450 (101) [410 (92)]	370 (83) [330 (74)]	200 (45)
	15 to 200	500 (112) [460 (103)]	400 (90) [370 (83)]	
BLE46	5, 10	800 (180) [730 (164)]	660 (148) [600 (135)]	400 (90)
	15 to 200	1200 (270) [1100 (240)]	1000 (220) [910 (200)]	
BLE512	5, 10	900 (200) [820 (184)]	770 (173) [700 (157)]	500 (112)
	15, 20	1300 (290) [1200 (270)]	1110 (240) [1020 (220)]	
	30 to 200	1500 (330) [1400 (310)]	1280 (280) [1200 (270)]	

* 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.

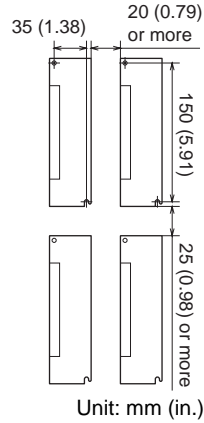
5.7 Installing the driver

■ Installation direction

The driver is designed so that heat is dissipated via air convection and conduction through the enclosure. Be sure to install (position) the driver vertically.

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. Install the driver to a flat metal plate offering excellent vibration resistance.

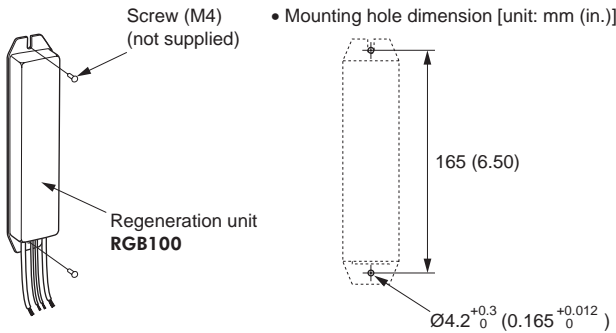
When installing the driver, use two screws (M4, not supplied) to affix the driver through the mounting holes.



- Note**
- Install the driver in an enclosure whose pollution degree is 2 or above or protection class is IP54 or better.
 - Be sure to install (position) the driver vertically. Do not block the radiation openings.
 - 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 50 °C (122 °F), revise the ventilation condition or force-cool the area around the driver using a fan.

5.8 Installing the regeneration unit

Install the accessory regeneration unit **RGB100** (sold separately) in a location where heat dissipation capacity equivalent to a level achieved with a heat sink [made of aluminum, 350×350×3 mm (13.78×13.78×0.12 in.)] is ensured. Affix the **RGB100** on a smooth metal plate offering high heat conductivity, using two screws (M4, not supplied).



5.9 Installing and wiring in compliance with EMC Directive

The **BLE** Series is designed and manufactured for use as an internal component of equipment. The EMC Directives require that your mechanical equipment in which the **BLE** Series is installed satisfy the applicable requirements.

The installation/wiring methods of the motor and driver explained here represent the basic methods that are effective in helping your mechanical equipment conform to the EMC Directives.

The final level of conformance of your mechanical equipment to the EMC Directives will vary depending on the control system equipment used with the motor/driver, configuration of electrical parts, wiring, layout, hazard level, and the like. Therefore, you must conduct the EMC tests on your mechanical equipment to confirm compliance.

■ Applicable Standards

EMI	Emission Tests	EN 61000-6-4
	Harmonics Current Test	EN 61000-3-2
	Voltage Fluctuations Test	EN 61000-3-3
EMS	Immunity Tests	EN 61000-6-2

Without effective measures to suppress the electromagnetic interference (EMI) caused by the **BLE** Series in the surrounding control system equipment or the electromagnetic spectrum (EMS) generated by the **BLE** Series, the function of your mechanical equipment may be seriously affected.

The **BLE** Series will conform to the EMC Directives if installed/wired using the methods specified below.

■ Connecting a mains filter

Install a mains filter in the power line in order to prevent the noise generated within the driver from propagating outside via the AC input line. For mains filters, use the products as shown in the chart, or an equivalent.

Manufacturer	Single-phase 100-120 V	Single-phase 200-240 V	Three-phase 200-240 V
TDK-Lambda Corporation	MC1210	MC1210	MC1310

Overvoltage category II applies to mains filters.

Install the mains filter as close to the driver as possible, and use cable clamps and other means to secure the input and output cables firmly to the surface of the enclosure. Connect the ground terminal of the mains filter to the grounding point, using as thick and short a wire as possible.

Do not place the AC input cable (AWG18 to 14: 0.75 to 2.0 mm²) parallel with the mains-filter output cable (AWG18 to 14: 0.75 to 2.0 mm²). Parallel placement will reduce mains filter effectiveness if the enclosure's internal noise is directly coupled to the power supply cable by means of stray capacitance.

■ Connecting the AC power line reactor

When inputting single-phase 200-240 V, insert a reactor (5 A, 5 mH) in the AC power line to ensure compliance with EN 61000-3-2.

■ Connecting the control power supply

Use a control power supply conforming to the EMC Directive. Use a shielded cable for wiring and wire/ground the control power supply over the shortest possible distance. Refer to "Wiring the power supply cable and signal cable" below for how to ground the shielded cable.

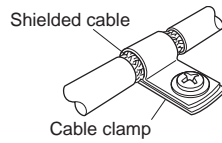
■ Grounding procedure

The cable used to ground the motor, driver, mains filter and power supply cable (shielded cable) must be as thick and short to the grounding point as possible so that no potential difference is generated. Choose a large, thick and uniformly conductive surface for the grounding point. Refer to the 6.2 "Grounding" on p.13 for the way to ground.

■ Wiring the power supply cable

Use a shielded cable of AWG 18 to 14 (0.75 to 2.0 mm²) in diameter for the driver power supply cable and keep it as short as possible. Strip a part of the shielded cable and ground the stripped part using a metal cable clamp that contacts the stripped cable around its entire circumference, or use a drain wire to make ground connection.

When grounding the shielded cable, connect both ends (mains filter side and power supply side) to earth to prevent potential difference from generating in the shielded cable.



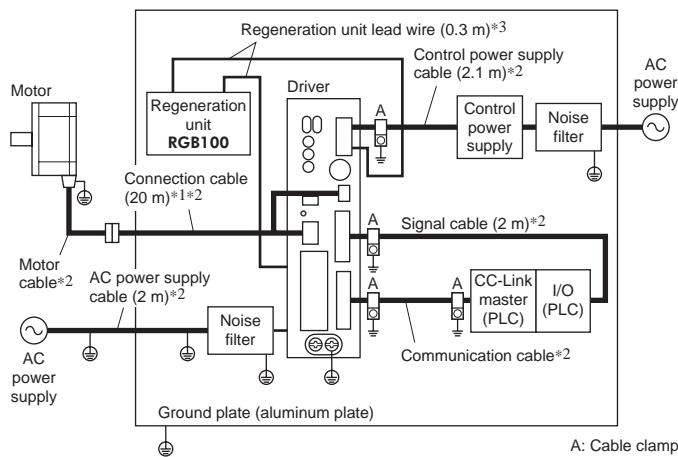
■ Notes about installation and wiring

- Connect the motor/driver and other peripheral control equipment directly to the grounding point so as to prevent a potential difference from developing between grounds.
- When relays or electromagnetic switches are used together with the system, use mains filters and CR circuits to suppress surges generated by them.
- Keep cables as short as possible without coiling and bundling extra lengths.
- Wire the power lines such as the motor cable and power cable away from the signal cables by providing a minimum clearance of 100 mm (3.94 in.) between them. If they must cross, do so at a right angle. Place the AC input cable and output cable of a mains filter separately from each other.
- Use connection cable (supplied or accessory) when extending the wiring distance between the motor and driver. The EMC measures are conducted using the Oriental Motor connection cable.

■ Precautions about static electricity

Static electricity may cause the driver to malfunction or become damaged. Do not come close to or touch the driver while the power is on except when operating the switch of the front of driver.

■ Example of motor and driver installation and wiring



*1 Performance has been evaluated based on connection cable lengths of up to 20 m (65.6 ft.). You can connect up to three connection cables.

*2 Shielded cable

*3 Unshielded cable

6 Connection

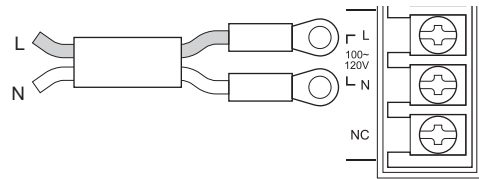
6.1 Connecting the power supply

Connect the power cable to the Power supply input terminal (TB1) on the driver. The connection method varies depending on the input power supply voltage.

- Note**
- Confirm the power supply voltage and the driver's rated voltage. To protect the primary circuit, connect a protective device to the driver's power line.
 - Do not wire the driver's power cable with other power line or the motor cable in the same duct.
 - Connect a mains filter to the AC power input part of the driver to prevent external noise from reaching the driver via the power line.

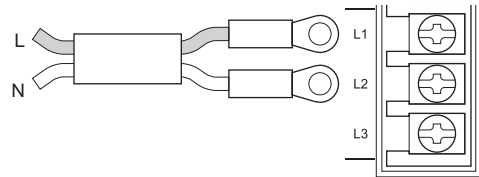
■ Single-phase 100-120 V

Connect the live side to terminal L, and the neutral side to terminal N.



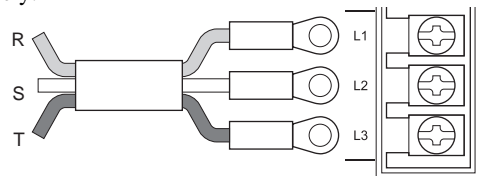
■ Single-phase 200-240 V

Connect the live side to terminal L1, and the neutral side to terminal L2.



■ Three-phase 200-240 V

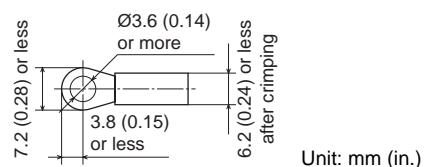
Connect the R, S and T phase lines to the L1, L2 and L3 terminals, respectively.



■ Power connection terminal and cable

The product does not come with a power cable. It must be prepared by the user.

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Thread size of terminal: M3.5
- Tightening torque: 1.0 N·m (142 oz·in)
- Applicable lead wire: AWG18 to 14 (0.75 to 2.0 mm²)
- Temperature rating of lead wire: 60 °C, 60 or 75 °C, or 75 °C (140 °F, 140 or 167 °F, or 167 °F)
- Conductive material: Use only copper wire.



■ Circuit breaker

Be sure to connect a circuit breaker to the power line of the driver to protect the primary circuit.

Rated current of protective device

Model	Rated current
BLE23A, BLE23C, BLE46C, BLE512C *1	5 A
BLE46A, BLE512A, BLE512C *2	10 A

*1 Three phase 200-240 V input

*2 Single-phase 200-240 V input

Circuit breaker

Mitsubishi Electric Corporation NF30

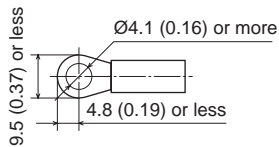
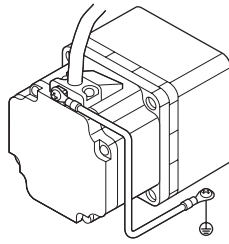
6.2 Grounding

■ Grounding the motor

Connect the Protective Earth Terminal on the motor to the ground near the motor. Minimize the wiring length of the ground cable.

Tightening torque: 0.8 to 1.0 N·m (113.6 to 142 oz-in)

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Thread size of terminal: M4
- Tightening torque: 0.8 to 1.0 N·m (113.6 to 142 oz-in)
- Applicable lead wire: AWG18 to 14 (0.75 to 2.0 mm²)



Unit: mm (in.)

■ Grounding the driver

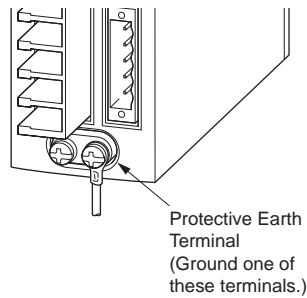
Be sure to ground the Protective Earth Terminal (screw size: M4) of the driver.

Tightening torque: 1.2 N·m (170 oz-in)

You can ground either of the two Protective Earth Terminals. The terminal that is not grounded is used as a service terminal.

Use the service terminal according to your specific need, such as connecting it to the motor in order to ground the motor.

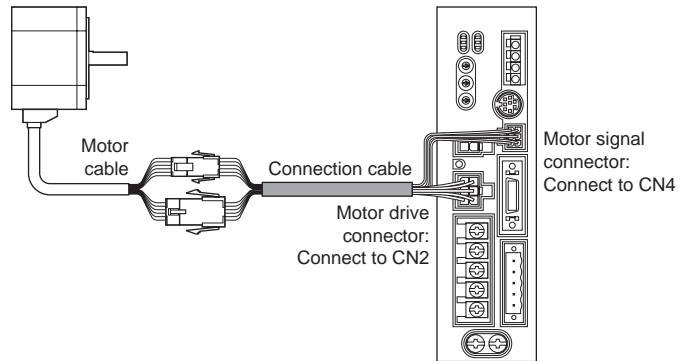
Use a grounding wire of AWG18 to 14 (0.75 to 2.0 mm²), and do not share the Protective Earth Terminal with a welder or any other power equipment. When grounding the Protective Earth Terminal, use a round terminal and affix the grounding point near the driver.



Protective Earth Terminal
(Ground one of these terminals.)

6.3 Connecting the motor

Insert the motor cable into the motor connector (CN2) and motor signal connector (CN4) of the driver. To expand connection between the motor and driver, use the connection cable (supplied or accessory). Connection can be extended to a maximum of 20.4 m (66.9 ft.).



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

■ Connection cable

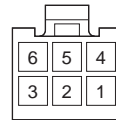
This cable is used to extend the wiring distance between the driver and motor.

Flexible connection cable is available. You can connect up to three connection cables.

Length [m (ft.)]	Connection cable	Flexible connection cable
1 (3.3)	CC01BLE	CC01BLER
2 (6.6)	CC02BLE	CC02BLER
3 (9.8)	CC03BLE	CC03BLER
5 (16.4)	CC05BLE	CC05BLER
7 (23)	CC07BLE	CC07BLER
10 (32.8)	CC10BLE	CC10BLER
15 (49.2)	CC15BLE	CC15BLER
20 (65.6)	CC20BLE	CC20BLER

■ Connector of the motor cable

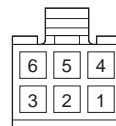
Motor drive connector



Housing: 5557-06R-210 (Molex)
Terminal: 5556T (Molex)

Pin No.	Color	Lead wire
1	Blue	AWG18
2	-	-
3	-	Drain AWG24 or equivalent
4	Purple	AWG18
5	Gray	AWG18
6	-	-

Motor signal connector



Housing: 43025-0600 (Molex)
Terminal: 43030-0004 (Molex)

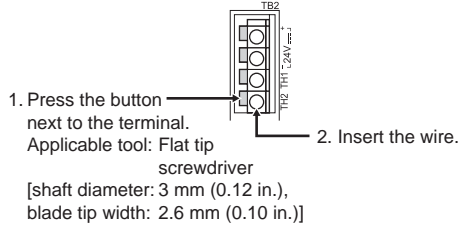
Pin No.	Color	Lead wire
1	-	-
2	Green	AWG26
3	Yellow	AWG26
4	Brown	AWG26
5	Red	AWG26
6	Orange	AWG26

6.4 Connecting the control power supply input and regeneration resistor thermal input

Connect the control power supply input and regeneration resistor thermal input to TB2. Connect the lead wire to the connector while checking the pin numbers in below.

Display	Description	Display	Description
24V+	Control power supply input	TH1	Regeneration resistor thermal input
24V-		TH2	

■ Connecting method



Applicable lead wire

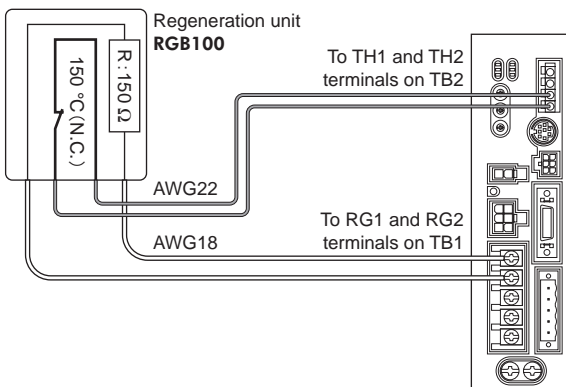
- Strip length: 11 mm (0.43 in.)
- Applicable lead wire: AWG24 to 16 (0.2 to 1.25 mm²)

■ Control power supply specifications

Connect a power supply of 24 VDC -15 to +20%, 1.0 A or more.

6.5 Connecting the regeneration unit

Use the accessory regeneration unit **RGB100** (sold separately) if sudden starting/stopping of a large inertia load, will be repeated frequently.



- The two thin lead wires (AWG22: 0.3 mm²) of the regeneration unit are thermostat outputs. Connect them to the TH1 and TH2 terminals of the TB2.
- Regenerative current flows through the two thick lead wires (AWG18: 0.75 mm²) of the regeneration unit. Connect them to the RG1 and RG2 terminals of the TB1.

Note If the current consumption of the regeneration unit exceeds the allowable level, the thermostat will be triggered and a regeneration unit overheat alarm will generate. If a regeneration unit overheat alarm generates, turn off the power and check the content of the error.

■ Regeneration unit specifications

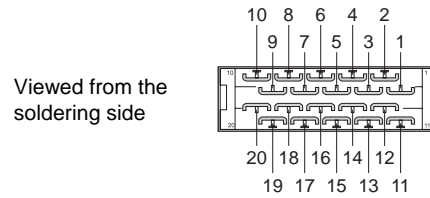
Model	RGB100
Continuous regenerative power	100 W
Resistance	150 Ω
Operating temperature of thermostat	Operation: Opens at 150±7 °C (302±45 F°) Reset: Closes at 145±12 °C (293±54 F°) (normally closed)
Electrical rating of thermostat	120 VAC 4 A, 30 VDC 4 A (minimum current: 5 mA)

* Install the regeneration unit in a location where heat dissipation capacity equivalent to a level achieved with a heat sink [made of aluminum, 350×350×3 mm (13.78×13.78×0.12 in.)] is ensured.

6.6 Connecting the I/O signals

Check the pin No. and signal name shown in the table, apply solder to an I/O signals cable (AWG28 to 26: 0.08 to 0.14 mm²) to the user I/O connector pin. Use a shielded cable.

If you have purchased your driver as a standalone unit, the driver does not come with a user I/O connector. Purchase the user I/O connector separately (accessory: model **AS-SD1**).



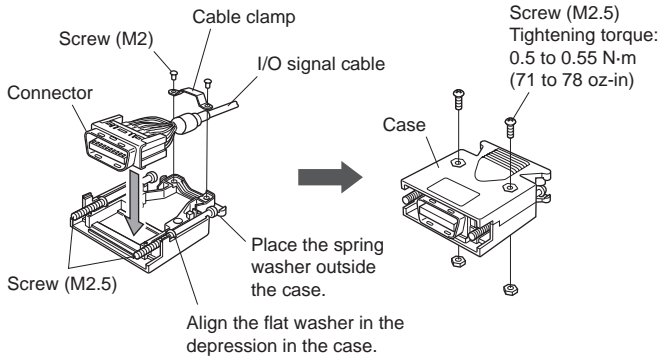
Connector function table

Pin No.	Signal name	Name	Initial value	Description
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	Y0	Output signal 0*1	MOVE	Motor running output
6	$\bar{Y}0$			
7	Y1	Output signal 0*1	ALARM -OUT1	Alarm output
8	$\bar{Y}1$			
9	-	-	-	-
10	-	-	-	-
11	IN-COM0	Input common*2	-	-
12	-	-	-	-
13	X0	Input signal 0*1	FWD	Forward input
14	X1	Input signal 1*1	REV	Reverse input
15	X2	Input signal 2*1	STOP-MODE	Stop mode selection input
16	X3	Input signal 3*1	ALARM -RESET	Alarm reset input
17	-	-	-	-
18	-	-	-	-
19	IN-COM1	Input common*2	-	-
20	-	-	-	-

*1 The assignments of these I/O signals can be changed via CC-Link communication or using the data setter **OPX-2A** or data editing software **MEXE02**. **MEXE02** is supported from the software version of 1.20 and higher.

*2 The input common is shared internally.

■ Assembling the connector

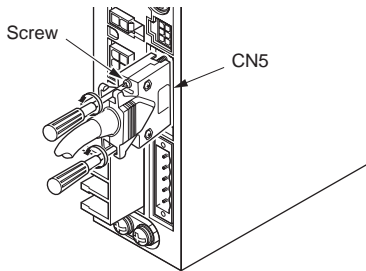


■ Connecting the Use I/O connector

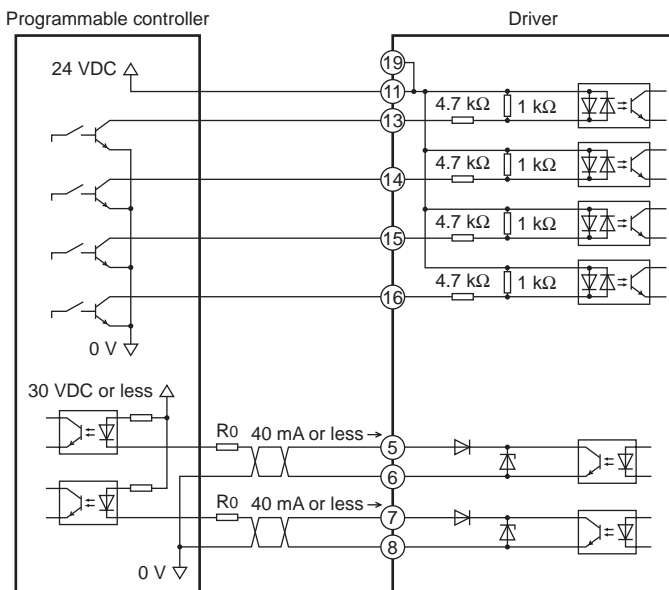
Insert the user I/O connector into the I/O signals connector (CN5) on the driver, and tighten the screw.

Tightening torque: 0.3 to 0.35 N·m (42 to 49 oz-in)

Be certain the I/O signals cable is as short as possible.

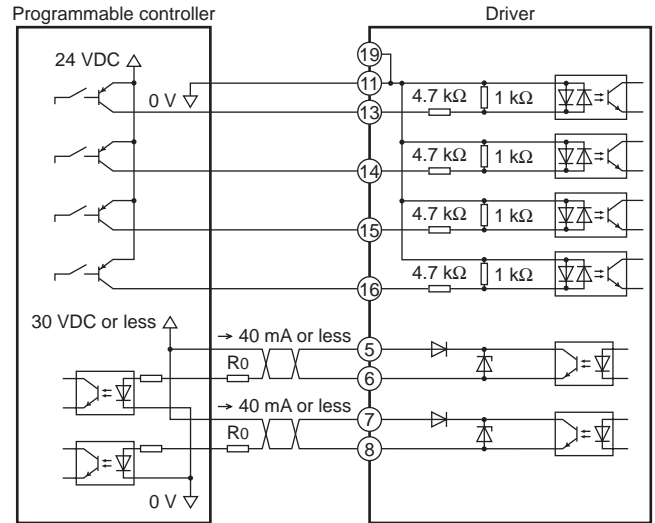


■ Connecting to a current sink output circuit



Note Use output signals at 30 VDC or less. Always connect a current-limiting resistor R_0 to keep the current to 40 mA or less.

■ Connecting to a current source output circuit

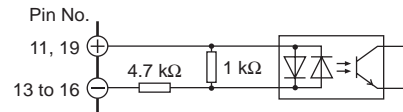


Note Use output signals at 30 VDC or less. Always connect a current-limiting resistor R_0 to keep the current to 40 mA or less.

■ Input circuit

All input signals of the driver are photocoupler inputs. The signal state represents the “ON: Carrying current” or “OFF: Not carrying current” state of the internal photocoupler rather than the voltage level of the signal.

External power supply: 20.4 to 28.8 VDC 100 mA or more

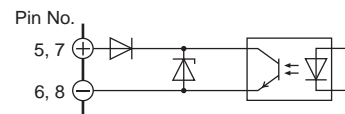


■ Output circuit

The driver outputs signals are photocoupler/open-collector output. The signal state represents the “ON: Carrying current” or “OFF: Not carrying current” state of the internal photocoupler rather than the voltage level of the signal.

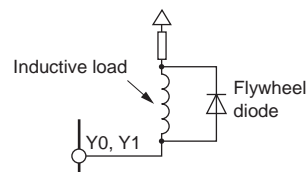
The ON voltage of the output circuit is max. 1.6 V. When driving each element using the output signal circuit, give consideration to this ON voltage.

4.5 to 30 VDC 40 mA or less



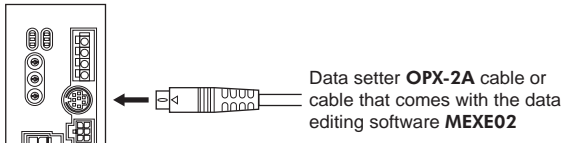
Note

- Always connect a current-limiting resistor. If the power supply voltage is connected to the output circuit directly without connecting a current-limiting resistor in between, the driver will be damaged.
- When connecting a relay (inductive load), etc., to detect alarm outputs, use a relay with built-in flywheel diode, or provide a fly-back voltage control measure based on diode, etc., for the inductive load.



6.7 Connecting the communication cable

Connect to the communication connector (CN3) on the driver the data setter **OPX-2A** cable or cable that comes with the data editing software **MEXE02**. **MEXE02** is supported from the software version of 1.20 or later.

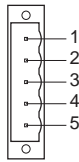


6.8 Connecting the CC-Link communication cable

Connect the CC-Link connection cable using the supplied CC-Link connector (5-pin). If you have purchased your driver as a standalone unit, the driver does not come with a CC-Link connector. Purchase the CC-Link connector separately (accessory: model **AS-CC1**). Check the pin No. and signal name shown in the table, connect the CC-Link dedicated cable to the CC-Link connector.

CC-Link connector

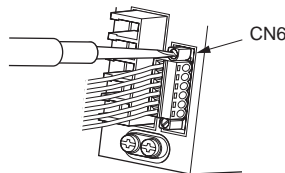
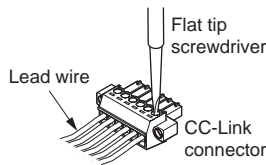
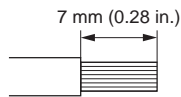
Pin No.	Signal name	Name
1	DA	Communication cable
2	DB	
3	DG	
4	SLD	Communication shielded cable
5	FG	Frame ground



Note Use the dedicated CC-Link cable for the CC-Link system. If a cable other than the dedicated CC-Link cable is used, the performance of the CC-Link system cannot be guaranteed. For the specification of the dedicated CC-Link cable or if you have any question, visit the homepage of the CC-Link Partner Association (<http://www.cc-link.org/>).

■ Connecting method

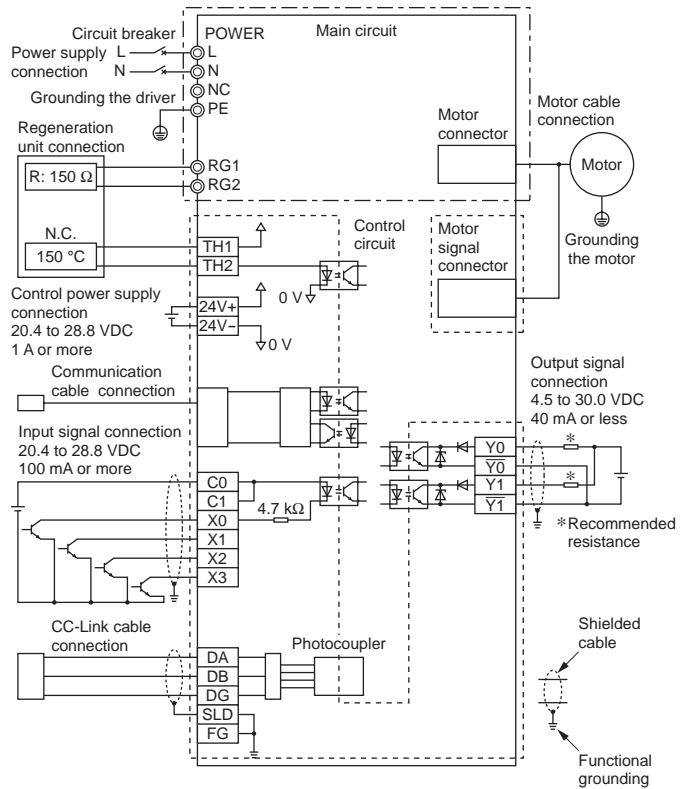
- Strip the insulation cover of the CC-Link dedicated cable by 7 mm (0.28 in.)
- Insert CC-Link dedicated cable into the CC-Link connector and tighten the screw using a flat tip screwdriver (connector screw size: M2).
Tightening torque: 0.22 to 0.25 N·m (31 to 35 oz-in)
- Insert the CC-Link connector into CN6 on the driver and tighten the screws using a flat tip screwdriver (connector screw size: M2.5).
Tightening torque: 0.4 N·m (56 oz-in)



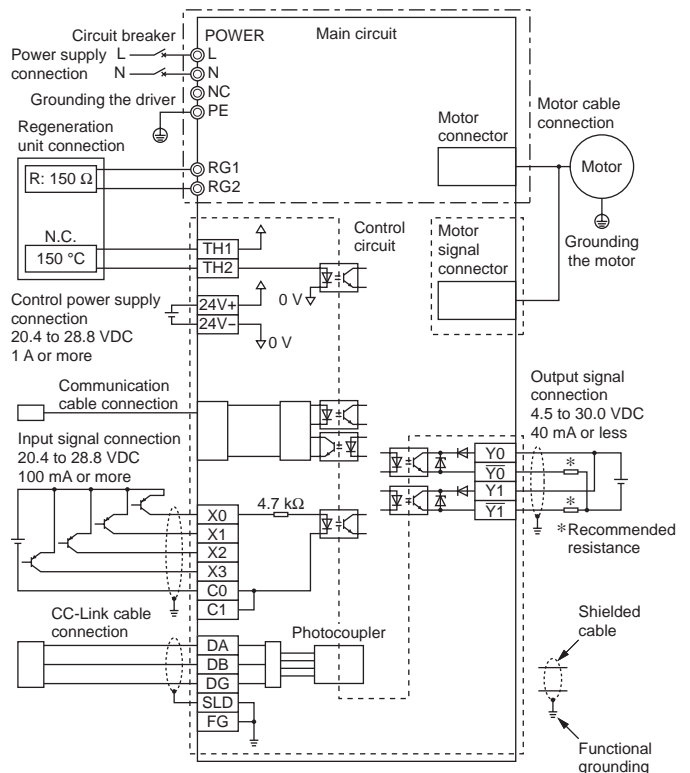
6.9 Connecting example

The connection example described below assumes that the motor is operated using a single-phase 100-120 V power supply.

■ Sink logic



■ Source logic



7 Inspection

It is recommended that the items listed below be inspected regularly after motor operation. If any abnormality is found, stop using the motor and call our Technical Support Line.

- Note**
- Never measure insulation resistance or conduct a dielectric strength test with the motor and driver connected. Doing so may damage the motor/driver.
 - The driver uses semiconductor elements, so handle it with due care. Electrostatic can damage the driver.

■ Inspection items

Confirm that:

- The motor/gearhead mounting screws are not loose.
- The bearing (ball bearing) and other parts of the motor are not generating noise.
- The bearing (ball bearing) and gear meshing parts of the gearhead are not generating noise.
- The motor/gearhead output shaft is not misaligned with the load shaft.
- The cables are free from damage or stress and are securely connected to the driver.
- The openings in the driver are not blocked.
- The driver mounting screws and power connection terminal screws are not loose.
- The power elements and smoothing capacitors in the driver are not generating an abnormal smell or having abnormalities.

- Unauthorized reproduction or copying of all or part of this manual is prohibited.
If a new copy is required to replace an original manual that has been damaged or lost, please contact your nearest Oriental Motor branch or sales office.
- Oriental Motor shall not be liable whatsoever for any problems relating to industrial property rights arising from use of any information, circuit, equipment or device provided or referenced in this manual.
- Characteristics, specifications and dimensions are subject to change without notice.
- While we make every effort to offer accurate information in the manual, we welcome your input. Should you find unclear descriptions, errors or omissions, please contact the nearest office.
- **Orientalmotor** is a registered trademark or trademark of Oriental Motor Co., Ltd., in Japan and other countries.
CC-Link is a registered trademark of the CC-Link Partner Association.
Other product names and company names mentioned in this manual may be registered trademarks or trademarks of their respective companies and are hereby acknowledged. The third-party products mentioned in this manual are recommended products, and references to their names shall not be construed as any form of performance guarantee. Oriental Motor is not liable whatsoever for the performance of these third-party products.

© Copyright ORIENTAL MOTOR CO., LTD. 2011

- Please contact your nearest Oriental Motor office for further information.

ORIENTAL MOTOR U.S.A. CORP.
Technical Support Tel:(800)468-3982
8:30 A.M. to 5:00 P.M., P.S.T. (M-F)
7:30 A.M. to 5:00 P.M., C.S.T. (M-F)
E-mail: techsupport@orientalmotor.com
www.orientalmotor.com

ORIENTAL MOTOR (EUROPA) GmbH
Headquarters and Düsseldorf Office
Tel:0211-52067-00 Fax:0211-52067-099
Munich Office
Tel:089-3181225-00 Fax:089-3181225-25
Hamburg Office
Tel:040-76910443 Fax:040-76910445

ORIENTAL MOTOR (UK) LTD.
Tel:01256-347090 Fax:01256-347099

ORIENTAL MOTOR (FRANCE) SARL
Tel:01 47 86 97 50 Fax:01 47 82 45 16

ORIENTAL MOTOR ITALIA s.r.l.
Tel:02-93906346 Fax:02-93906348

SHANGHAI ORIENTAL MOTOR CO.,LTD.
Tel:400-820-6516 Fax:021-6278-0269

TAIWAN ORIENTAL MOTOR CO.,LTD.
Tel:(02)8228-0707 Fax:(02)8228-0708

SINGAPORE ORIENTAL MOTOR PTE LTD
Tel:+65-6745-7344 Fax:+65-6745-9405

ORIENTAL MOTOR (MALAYSIA) SDN. BHD.
Tel:(03)22875778 Fax:(03)22875528

ORIENTAL MOTOR (THAILAND) CO.,LTD.
Tel:+66-2-251-1871 Fax:+66-2-251-1872

INA ORIENTAL MOTOR CO.,LTD.
KOREA
Tel:080-777-2042 Fax:02-2026-5495

ORIENTAL MOTOR CO.,LTD.
Headquarters Tokyo, Japan
Tel:03-6744-0361 Fax:03-5826-2576