

Brushless Motors

BLE2 Series

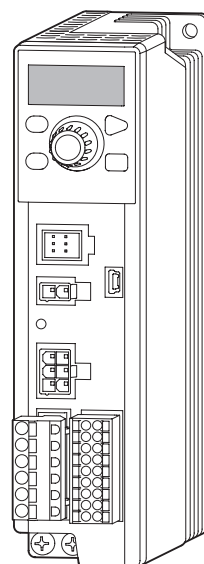
Operating Manual (Basic Function)



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.



For your use, refer to the USER MANUAL downloaded from Oriental Motor Website for detailed instructions on how to use the product.

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* Be sure to ground the Protective Earth Terminal (⏏) (ground terminal) to ensure the safe use of the product.

Refer to "3. Grounding" for details, and ground securely.

Introduction

1. 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 section "Safety precautions" on p.4. In addition, be sure to observe the contents described in warning, caution, and note in this manual.

The product described in this manual has been designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

2. 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
Motor	BLM Motor OPERATING MANUAL	Connector type	HM-5188	Included
		With Electromagnetic Brake Connector type	HM-5236	Included
		Connector type Right angle Hollow shaft Hypoid gear JH gearhead Foot mount gearhead JB gearhead Parallel shaft gearhead JV gearhead	HM-5197	Included
Driver	BLE2 Series OPERATING MANUAL (Basic Function)		HP-5104	Included
	BLE2 Series USER MANUAL		HP-5105	Not included

Refer to the USER MANUAL for details on driver functions and parameters.

Safety precautions

The precautions described below are intended to ensure the safe and correct use of the product, and to prevent the user and other personnel from exposure to the risk of injury. 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.



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

Operating environment



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.

Handling of this product



Do not transport, install, connect or inspect the product while the power is supplied. Always turn off the power before carrying out these operations.

This may result in electric shock or damage to equipment may result.

The terminals on the driver marked indicate the presence of high voltage. Do not touch these terminals while the power is supplied.

Doing so may result in fire or electric shock.

Do not use the brake mechanism of the electromagnetic brake motor as a safety brake.

Doing so may result in injury or damage to equipment.



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 damage to equipment.

Use an electromagnetic brake motor in an application of vertical drive such as elevating equipment.

Failure to do so may result in injury or damage to equipment.

If the driver protective function is activated, remove the cause before resetting the protective function.

Installation



The motor and driver are Class I equipment. When installing the motor and driver, ground their Protective Earth Terminals.

Failure to do so may result in electric shock.

Connection



Do not machine or modify the connection cable.

Do not apply any excessive force to the motor connector.

Do not forcibly bend, pull or pinch the cable.

Do not remove the connector cap until the connection cable is connected so that the O-ring of the connector connection on the motor is not damaged.

This may result in fire, electric shock or damage to equipment.



Securely connect and ground in accordance with the connection diagram.

Be sure to observe the specified cable sizes.

Operation



Do not turn the MB-FREE input ON when the electromagnetic brake motor is used in an application of vertical drive such as elevating equipment. The motor will lose its holding force.

This may result in injury or damage to equipment.

When the electromagnetic brake motor is used in an application of vertical drive such as elevating equipment, do not set the "Electromagnetic brake function at alarm" parameter to "Lock after coasting to a stop."



Always keep the power supply voltage of the driver within the specified range.

Failure to do so may result in fire or electric shock.



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.

Maintenance and inspection


	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 touch the connection terminals on the driver immediately (until the CHARGE LED turns off) after the power is turned off.	
	Always turn off the power before performing maintenance or inspection.	Accumulated dust may cause fire.
	Regularly check the openings in the driver for accumulated dust.	

Repair, disassembly and modification



	Do not disassemble or modify the motor, gearhead and driver. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.	This may result in electric shock, injury or equipment damage.
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CAUTION


Handling of this product

	Do not use the motor, gearhead, driver, and regeneration resistor in a state of exceeding the specification values.	Doing so may result in fire, electric shock, injury or equipment damage.
	Do not insert an object into the openings in the driver.	
	Do not touch the motor, gearhead, driver, and regeneration resistor while operating or for a certain time after stopping.	The surface of the motor, gearhead, driver, and regeneration resistor may be hot, thereby causing a skin burn(s).




Installation

	Do not leave anything around the motor and driver that would obstruct ventilation.	Doing so may result in damage to equipment.
	Securely install the motor, gearhead and driver to the mounting plates.	Inappropriate installation may cause the motor, gearhead or driver to detach and fall, resulting in injury or damage to equipment.

Connection

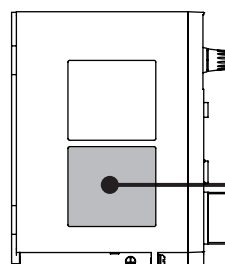
	Be sure to ground the motor and driver to prevent them from being damaged by static electricity.	Failure to do so may result in fire or damage to equipment.
	For the power supply of I/O signals, use a DC power supply with reinforced insulation on its primary and secondary sides.	Failure to do so may result in electric shock.

Operation

	Do not touch the rotating part (output shaft) while operating the motor.	This 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.	
	Immediately when trouble has occurred, stop operation and turn off the driver power.	Failure to do so may result in fire, electrical 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.  Warning label	Failure to do so may result in a skin burn(s).

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.



Driver side face

⚠ WARNING - Risk of electric shock. Hot Surface • Read manual before installing. • Do not touch the driver immediately after the power is cut off, or until the CHARGE LED (lit in red) turns off. Doing so may result in electric shock due to residual voltage. • Do not touch the heatsink. Risk of burn.	
⚠ AVERTISSEMENT - Risque de décharge électrique. Surface chaude • Lire le manuel avant l'installation. • Ne pas toucher au variateur immédiatement après la mise hors tension ou avant que la LED "présence de la tension" (Rouge) ne soit éteinte. Le non respect de ces règles pourrait entraîner un choc électrique. • Ne pas toucher le dissipateur thermique. Risque de brûlure.	
⚠ 警告 - けが・感電のおそれがあります。高温注意 • 読まずには必ず取扱説明書をお読み下さい。 • 電源を切った直後、CHARGE LED (赤色点灯) が消灯するまでドライバに触れないで下さい。残留電圧により感電の原因となります。 • ヒートシンクは高温になります。やけどに注意して下さい。	

Precautions for use

This chapter covers restrictions and requirements the user should consider when using the product.

Be sure to match the motor output power with the driver output power.

Wirings

- **Connect protective devices to the power line**
Connect a circuit breaker or earth leakage breaker to the driver power line to protect the primary circuit.
If an earth leakage breaker is installed, use one incorporating high-frequency noise elimination measures. For selection of the protective device, refer to the following "Preventing leakage current."
- **Noise elimination measures**
Provide noise elimination measures to prevent a motor malfunction caused by external noise.
For more effective elimination of noise, use a shielded I/O signal cable or attach ferrite cores if a non-shielded cable is used.
Refer to p.49 for the noise elimination measures.
- **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 a product offering resistance against high frequency current like the following:
Mitsubishi Electric Corporation: NV series
- **Connecting the motor and driver**
Limit the number of times so that attaching/detaching between the connection cable and the motor or driver will not exceed 100 times.
To connect the motor and driver, always use the dedicated connection cable (sold separately). "For BRAKE MOTOR" is indicated on the connection cable for electromagnetic brake.
Check the operating manual included with the motor for details.
- **Connection cable**
Do not apply a strong force on the locking lever of the connector for motor connection.
Applying a strong force on the locking lever may cause damage.
- **Note on connecting a power supply whose positive terminal is grounded**
The USB communication connector on the driver is 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.

Installation circumstances

- **Grease measures**
On rare occasions, grease may ooze out from the gearhead. If there is concern over possible environmental contamination resulting from the leakage of grease, check for grease stains during regular inspections. Alternatively, install an oil pan or other device to prevent damage resulting from contamination. Grease leakage may lead to problems in the user's equipment or products.
- **Caution when using in low temperature environment**
When an ambient temperature is low, since the load torque may increase by the oil seal or viscosity increment of grease used in the gearhead, the output torque may decrease or the 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.

Operations

- **Use an electromagnetic brake motor in an application of vertical drive such as elevating equipment.**
When the motor is used in an application of vertical drive such as elevating equipment, use an electromagnetic brake motor in order to hold a load in position.
When the electromagnetic brake motor is used in an application of vertical drive, although depending on a load condition, the motor shaft rotation may momentarily reverse (within 90 degrees of the motor output shaft) at the time of starting or stopping if it is operated under the setting conditions below.
 - When the set rotation speed is low
 - When the acceleration time or deceleration time is long
- **Do not use a solid-state relay (SSR) to turn on or off the power supply.**
A circuit that turns on or off the power supply via a solid-state relay (SSR) may damage the motor and driver.
- **If vertical drive (gravitational operation) such as elevating equipment is performed or if sudden start-stop operation of a large inertia is repeated frequently, use the regeneration resistor (sold separately).**
An alarm of overvoltage may be generated depending on the operating condition of the motor. When the alarm of overvoltage is detected, reconsider the operating condition or connect the regeneration resistor (sold separately).
Refer to p.19 for connection method.

Insulation resistance measurement and dielectric strength test

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.

Handling of the driver

The driver uses semiconductor elements, so be extremely careful when handling it.

Static electricity may cause damage to the driver.

Also, be sure to ground the product in order to prevent electric shock or product damage by static electricity.

Saving the data

Notes when saving the data to the non-volatile memory

The display blinks while the data is being set (writing to the non-volatile memory) by pressing the setting dial or the data is being initialized (about 5 seconds). Do not turn off the power supply while the display on the operation panel is blinking.

Doing so may abort writing the data to the non-volatile memory and cause an alarm of EEPROM error to generate. The non-volatile memory can be rewritten approximately 100,000 times.

Specification change of the driver

The specifications have been changed in some products (drivers for electromagnetic brake motor are excluded). This manual describes contents for drivers of the version 3.00 or later, which are after the specification change.

The **MEXE02** of the version 3.56 or later supports the drivers after the specification change.

Note Note that some functions described in this manual cannot be used if the version of the driver or **MEXE02** is old. The version of the driver can be checked using the unit information monitor of the **MEXE02**. (⇒ USER MANUAL)
The version of the **MEXE02** can be checked from the help menu screen.

■ Contents about the change

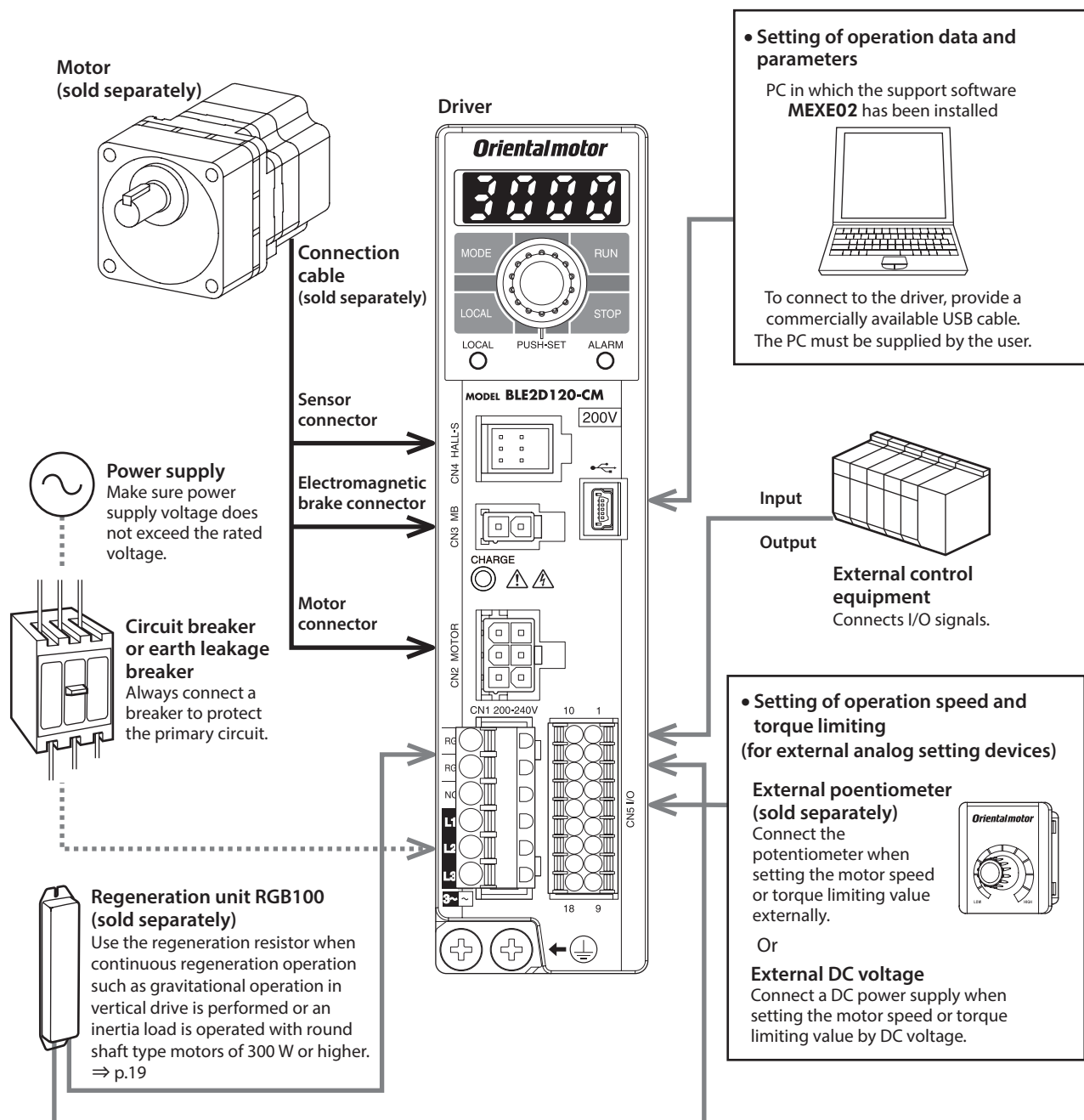
● Addition

INFO action parameters shown below are added.

Parameters	Addition	INFO action (Driver temperature information (INFO-DRVTMP)) INFO action (Speed information (INFO-SPD)) INFO action (Load information (INFO-LOAD)) INFO action (Overvoltage information (INFO-OVOLT)) INFO action (Undervoltage information (INFO-UVOLT)) INFO action (Operation prohibited information (INFO-DRV)) INFO action (Tripmeter information (INFO-TRIP)) INFO action (Odometer information (INFO-ODO)) INFO action (Main power supply time information (INFO-PTIME)) INFO action (Main power supply count information (INFO-PCOUNT)) INFO action (Start operation restricted mode information (INFO-DSLMTD)) INFO action (I/O test mode information (INFO-IOTEST)) INFO action (Configuration request information (INFO-CFG)) INFO action (Power cycling request information (INFO-RBT))
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System configuration

The system configuration of the **BLE2** Series is shown below.
The figure below shows the driver for the electromagnetic brake motor.



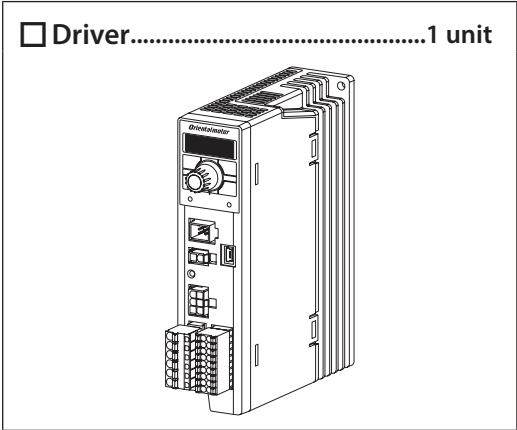
Checking the product

This chapter explains the items you should check, as well as the name and function of each part.

1. Package contents

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.

☐ Driver.....1 unit



☐ Operating manual (this document).....1 copy

2. How to identify the product model

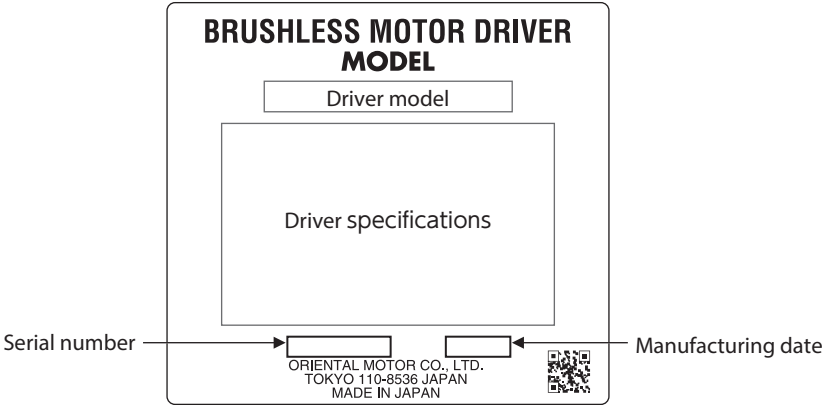
● Driver

BLE2D **200** - **C** **M**

① ② ③ ④

①	Driver type	BLE2D: BLE2 Series driver
②	Output power	30: 30 W 60: 60 W 120: 120 W 200: 200 W 300: 300 W 400: 400 W
③	Power supply voltage	A: Single-phase 100 - 120 VAC C: Single-phase, Three-phase 200 - 240 VAC S: Three-phase 200 - 240 VAC
④	Driver additional function	M: For electromagnetic brake motor

3. Information about nameplate



4. Products possible to combine

Products with which the drivers can be combined are listed below.

Verify the driver model and the motor model against the model name described on the package label.

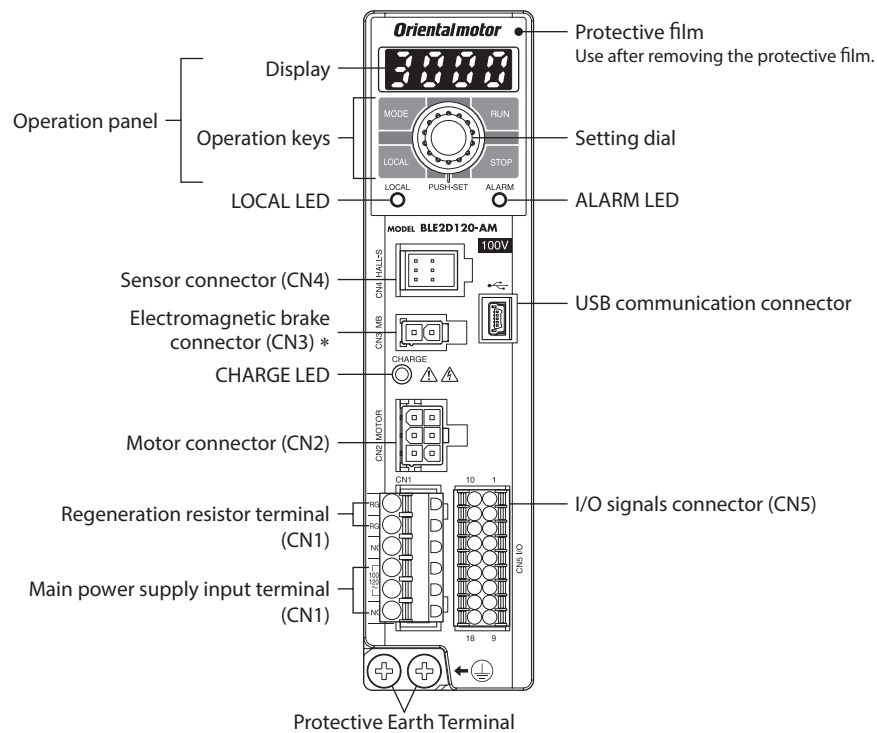
Motor model columns in the table below describes part of the motor model name. Refer to the operating manual included with the motor for details about the motor models.

Output power	Power supply voltage	Driver model	Motor model
30 W	Single-phase 100-120 VAC	BLE2D30-A	BLM230HP
	Single-phase 200-240 VAC Three-phase 200-240 VAC	BLE2D30-C	
60 W	Single-phase 100-120 VAC	BLE2D60-A	BLM460SHP BLM260HP
	Single-phase 200-240 VAC Three-phase 200-240 VAC	BLE2D60-C	
120 W	Single-phase 100-120 VAC	BLE2D120-A	BLM5120HP
	Single-phase 200-240 VAC Three-phase 200-240 VAC	BLE2D120-C	
200 W	Single-phase 200-240 VAC Three-phase 200-240 VAC	BLE2D200-C	BLM6200SHP BLM5200HP BLM7200HW
300 W	Single-phase 200-240 VAC Three-phase 200-240 VAC	BLE2D300-C	BLM6300SHP BLM5300HP
400 W	Three-phase 200-240 VAC	BLE2D400-S	BLM6400SHP BLM5400HP

● With Electromagnetic Brake

Output power	Power supply voltage	Driver model	Motor model
120 W	Single-phase 100-120 VAC	BLE2D120-AM	BLM5120HPM
	Single-phase 200-240 VAC Three-phase 200-240 VAC	BLE2D120-CM	
200 W	Single-phase 200-240 VAC Three-phase 200-240 VAC	BLE2D200-CM	BLM6200SHPM BLM5200HPM

5. Names and functions of parts



Item	Indication	Description	Reference page
Operation panel		Display: This display shows the monitor items, setting screen, alarms, etc.	32
	MODE LOCAL RUN STOP	Operation keys: These keys are used to switch the operation mode or change parameters. When the local control operation is performed, the motor can be operated and stopped using key and key.	
	PUSH-SET	Setting dial: Turn - Setting of parameter value, screen transitions Press - Determine (SET)	
LOCAL LED	LOCAL	This LED is lit in green when the local control operation is performed.	32
ALARM LED	ALARM	This LED blinks in red when an alarm is generated. This LED blinks in orange when information is generated. (Information ⇒ USER MANUAL)	44
CHARGE LED	CHARGE	This LED is lit in red while the main power is supplied. After the main power is turned off, the LED will turn off once the residual voltage in the driver drops to a safe level.	–
Main power supply input terminal (CN1)		Connects the main power supply.	14
	L, N, NC	Single-phase 100-120 VAC: Connects a single-phase 100-120 VAC power supply to L and N. NC is not used.	
	L1, L2, NC L1, L2, L3	Single-phase 200-240 VAC: Connects a single-phase 200-240 VAC power supply to L1 and L2. NC is not used.	
	L1, L2, L3	Three-phase 200-240 VAC: Connects a three-phase 200-240 VAC power supply to L1, L2, L3.	
Regeneration resistor terminal (CN1)	RG1, RG2	Connects the regeneration resistor (sold separately).	19
Motor connector (CN2)	MOTOR	Connects the power connector (white) of the connection cable.	15
Electromagnetic brake connector (CN3) *	MB	Connects the electromagnetic brake connector (white) of the connection cable.	
Sensor connector (CN4)	HALL-S	Connects the sensor connector (black) of the connection cable.	
USB communication connector		Connects a PC in which the MEXE02 has been installed.	19
I/O signals connector (CN5)	I/O	Connects input signals and output signals.	17
		Connects the external potentiometer (sold separately) or external DC power supply.	
Protective Earth Terminal		Connects the ground terminal of the connection cable and the grounding wire.	16
Mounting holes (two places at the rear)		These mounting holes are used to install the driver with screws (M4).	12

* Only drivers for electromagnetic brake motor

Installing

This chapter explains the installation location and installation method.

1. Installation location

Install the product 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 +50 °C [+32 to 122 °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 free of excessive salt
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- Altitude Up to 1000 m (3300 ft.) above sea level

2. Installation method

The driver is designed so that heat is dissipated via air convection and conduction through the enclosure.

When installing the driver, provide clearances of at least 25 mm (0.98 in.) in the horizontal and vertical directions between the driver and enclosure or other equipment within the enclosure.

Installation conditions and operating ambient temperature for the driver vary depending on the installation method.

Note

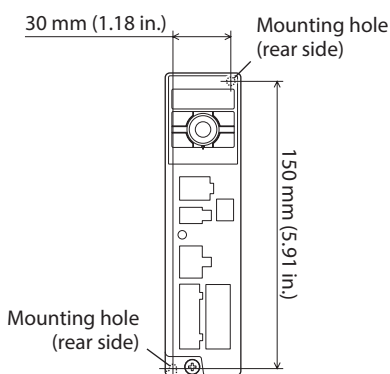
- Install the driver in an enclosure whose pollution degree is 2 or better environment, or whose degree of protection is IP54 minimum.
- Do not install any equipment that generates a large amount of heat or noise near the driver.
- Do not install the driver underneath the controller or other equipment vulnerable to heat.
- If the ambient temperature of the driver exceeds the upper limit of the operating ambient temperature, reconsider the ventilation condition or forcibly cool the area around the driver using a fan in order to keep within the operating ambient temperature.
- Be sure to install the driver vertically (in vertical position).

■ When a driver is installed with screws

Install the driver to a flat metal plate offering high heat conductivity [corresponding to an aluminum plate of 200×200×2 mm (7.87×7.87×0.08 in.)].

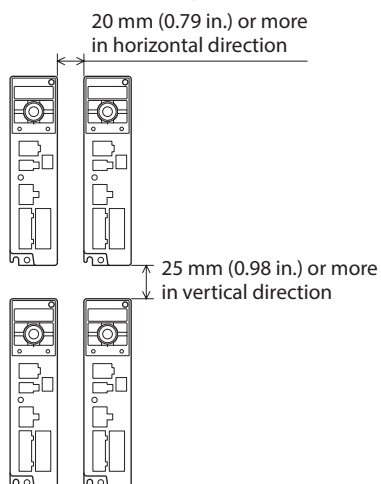
Install the driver through the mounting holes using two screws (M4: not included).

Operating ambient temperature: 0 to +50 °C (+32 to +122 °F)



● When two or more drivers are installed

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



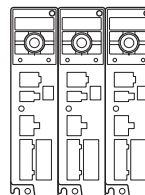
● When drivers are installed in a close contact state

Install drivers to a flat metal plate offering high heat conductivity [corresponding to an aluminum plate of 350×350×2 mm (13.78×13.78×0.08 in.) or larger].

Operating ambient temperature

30 W, 60 W, 120 W: 0 to +50 °C (+32 to +122 °F)

200 W, 300 W, 400 W: 0 to +40 °C (+32 to +104 °F)



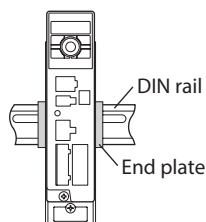
■ When a driver is installed to a DIN rail

Use the DIN rail mounting plate **MADP02** (sold separately), and install it to a 35 mm (1.38 in.) wide DIN rail.

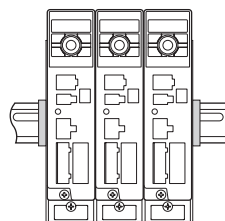
After installing to the DIN rail, secure the both sides of the driver with end plates that the customer provides.

Refer to "MADP02 handling guideline" for installation method.

Operating ambient temperature: 0 to +40 °C (+32 to +104 °F)

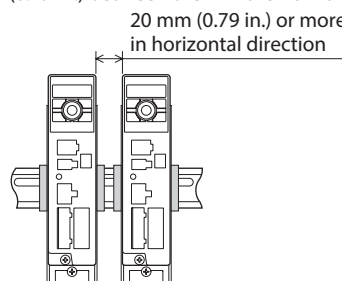


● When drivers are installed in a close contact state *



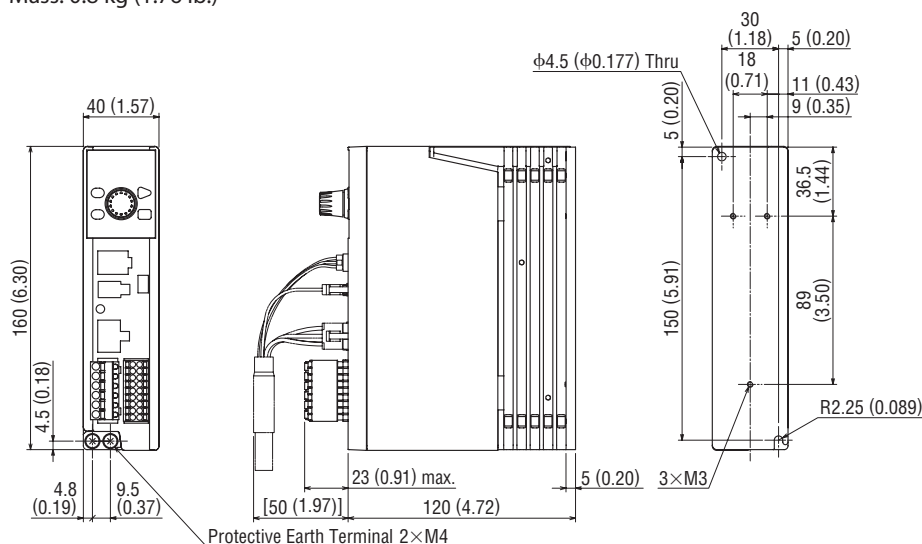
* 300 W type drivers of single-phase 200-240 VAC cannot be installed in a close contact state.

When installing two or more drivers, provide a clearance of 20 mm (0.79 in.) between them in the horizontal direction.



■ Dimensions [Unit: mm (in.)]

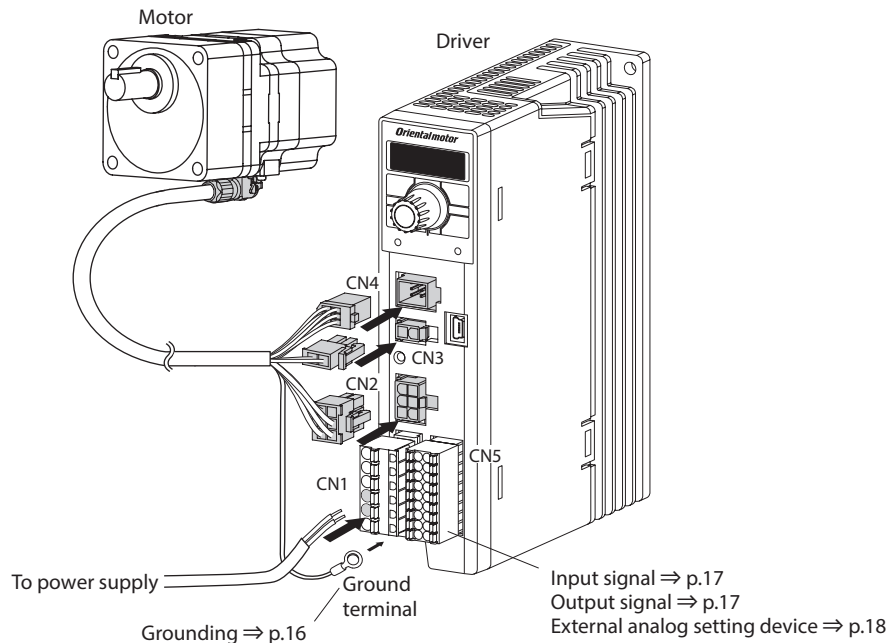
Mass: 0.8 kg (1.76 lb.)



Connecting

This chapter explains how to connect the motor, I/O signals and power supply to the driver, as well as grounding method using the driver for electromagnetic brake motor.

For protection against electric shock, do not turn on the power supply until the wiring is completed.



Note

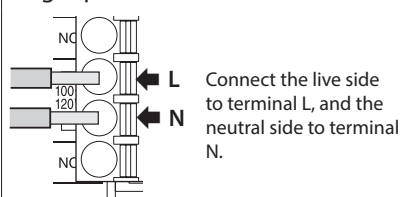
- Be sure to connect the connectors securely. Insecure connections may cause malfunction or damage to the motor or driver.
- When turning on the power again or inserting/pulling off the connector, turn off the power and wait for the CHARGE LED to turn off before doing so. Residual voltage may cause electric shock.

1. Connecting the power supply (CN1)

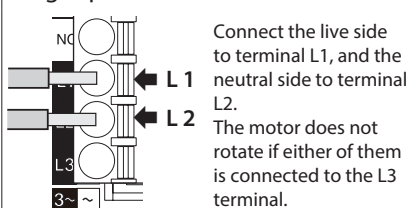
Note

Check the power-supply voltage specifications of the driver before applying the voltage. If the voltage exceeding the rated range is applied, the driver may be damaged.

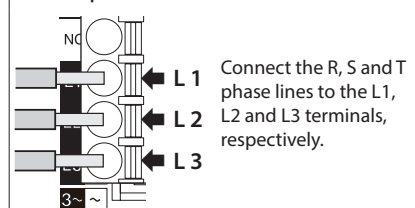
Single-phase 100 - 120 VAC 50/60 Hz



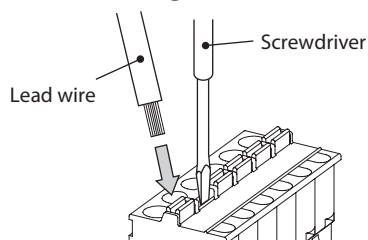
Single-phase 200 - 240 VAC 50/60 Hz



Three-phase 200 - 240 VAC 50/60 Hz



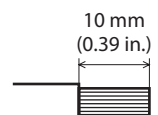
■ Connecting method



Connector model: FKCT2,5/6-ST-5,08
(PHOENIX CONTACT GmbH & Co. KG)

Applicable lead wire

- Lead wire size: Stranded wire AWG18 to 14 (0.75 to 2.0 mm²)
- Conductive material: Use only copper wires.



Applicable crimp terminal

Manufacturer: PHOENIX CONTACT GmbH & Co. KG

Model: AI 0,75-10 [Conductor cross-sectional area: 0.65 - 0.82 mm² (AWG18)]

AI 1-10 [Conductor cross-sectional area: 0.82 - 1.2 mm² (AWG18)]

AI 1,5-10 [Conductor cross-sectional area: 1.25 - 1.8 mm² (AWG16)]

AI 2,5-10 [Conductor cross-sectional area: 2.0 - 3.0 mm² (AWG14)]

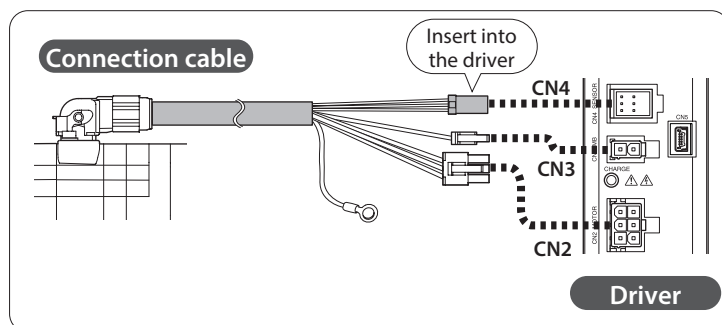
■ Circuit breaker

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

- Rated current of protective device: 10 A
- Recommended circuit breaker: Mitsubishi Electric Corporation NF30

2. Connecting the motor and driver

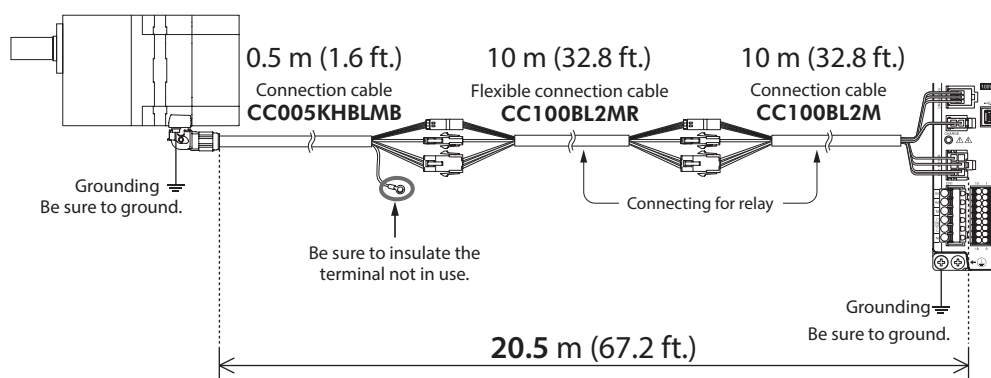
Connect the motor and driver using the connection cable (sold separately). The connection cables are provided up to 20 m (65.6 ft.). For about the connection methods of the motor and connection cable, refer to the operating manual included with the motor.



■ Extension between motor and driver

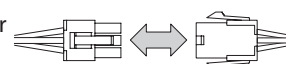
Use a connection cable for extension (sold separately) when extending the wiring distance between the motor and driver. The connection cable for extension can be used by connecting up to two pieces. The wiring distance between the motor and driver can be extended to a maximum of 20.5 m (67.2 ft.).

Example of use: Extension example when two connection cables are connected



Note

- Secure each connector part not to apply stress on the connector part. If not secured, the cables may damage due to stress.
- Securely insert the connectors straight. Insecure connections may cause malfunction or damage to the motor or driver.

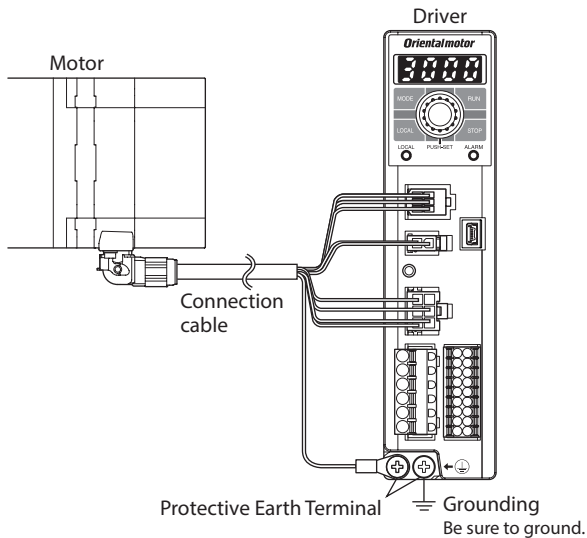


3. Grounding

Ground using the Protective Earth Terminals (⊕) of the motor and driver, as well as the ground terminal of the connection cable.

Note Be sure to ground the product. Failure to do so may result in electric shock or damage to the product. Static electricity may cause damage to the product if the Protective Earth Terminals are not grounded.

Two Protective Earth Terminals (⊕) are provided on the driver. Be sure to ground one of the Protective Earth Terminals. Do not share the Protective Earth Terminal with a welder or any other power equipment. Connect the ground terminal of the connection cable to the other terminal.

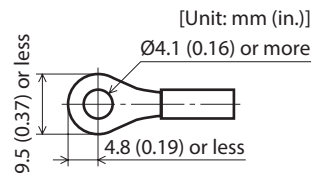


However, the grounding resistance value provided in the standards applied to the equipment may not be satisfied depending on the type or length of the connection cable. In this case, ground near the motor using the Protective Earth Terminal (⊕) on the motor. If the ground terminal of the connection cable is not used, be sure to insulate.

Reference
Protective earth wire of the connection cable
Conductor size: AWG18 (0.75 mm²)
Maximum conductor resistance: 25.0 Ω/km

Ground terminal

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Terminal screw size: M4
- Tightening torque: 1.2 N·m (10.6 lb-in)
- Applicable lead wire: AWG18 to 14 (0.75 to 2.0 mm²)



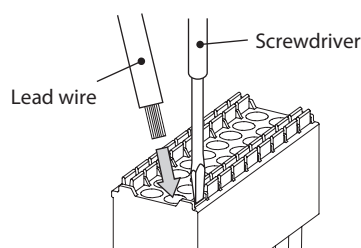
■ Precautions about static electricity

Static electricity may cause the driver to malfunction or suffer damage. Be sure to ground the motor and driver to prevent them from being damaged by static electricity.

4. Connecting the I/O signals (CN5)

Connect the input signals and output signals to CN5.

■ Connection method

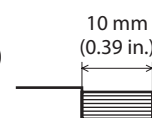


Connector model: DFMC1,5/9-ST-3,5

(PHOENIX CONTACT GmbH & Co. KG)

Applicable lead wire

- Lead wire size: Stranded wire AWG24 to 18 (0.2 to 0.75 mm²)
- Conductive material: Use only copper wires.



Applicable crimp terminal

Manufacturer: PHOENIX CONTACT GmbH & Co. KG

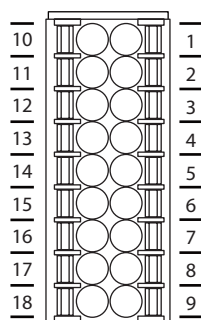
Model: AI 0,25-10 [Conductor cross-sectional area: 0.14 - 0.34 mm² (AWG24)]

AI 0,34-10 [Conductor cross-sectional area: 0.14 - 0.34 mm² (AWG22)]

AI 0,5-10 [Conductor cross-sectional area: 0.40 - 0.65 mm² (AWG20)]

AI 0,75-10 [Conductor cross-sectional area: 0.65 - 0.82 mm² (AWG18)]

Pin assignment



Pin No.	Signal name	Function *1	Description
1	IN-COM0	Input signals common (for external power supply)	Connect when using an external power supply.
2	IN0	[FWD]	The motor rotates in the forward direction while this signal is being ON.
3	IN1	[REV]	The motor rotates in the reverse direction while this signal is being ON.
4	IN2	[STOP-MODE]	Select how to stop the motor. When it is OFF, the motor decelerates to a stop.
5	IN3	[M0]	Select a desired operation data number by switching the ON-OFF status of the M0 and M1 inputs.
6	IN4	[M1]	
7	IN5	[ALARM-RESET]	Reset the alarm presently generated.
8	IN6	[MB-FREE] *2	Select how the electromagnetic brake would operate (hold/release) when the motor stops. If this signal is turned ON, the electromagnetic brake can be released.
9	IN-COM1	0 V (for internal power supply)	Connect when using the internal power supply.
10	TH	TH	When a regeneration resistor is used, connect the thermostat output of the regeneration resistor (normally closed). If the regeneration resistor overheats to turn the thermostat output OFF, the "regeneration resistor overheat" alarm is generated.
11	TH		
12	VH	External analog setting input	Connect when the rotation speed or torque limiting value is set externally using an external potentiometer or external DC voltage. (Refer to p.18)
13	VM		
14	VL		
15	OUT0+	[SPEED-OUT]	30 pulses are output while the motor output shaft makes one revolution.
16	OUT0-		
17	OUT1+	[ALARM-OUT]	This signal will be output if an alarm is generated. (Normally closed)
18	OUT1-		

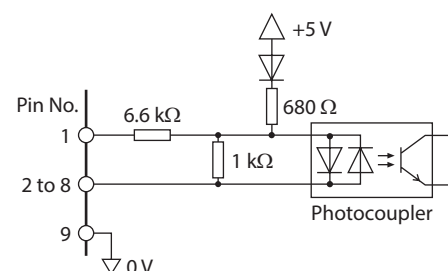
*1 Signals in brackets [] are functions assigned at the time of shipment. For the pin Nos. 2 to 8 and Nos. 15 to 18, the assigned function can be changed. Refer to p.24 for signals that can be assigned.

*2 Available for only drivers for electromagnetic brake motor

■ Input signals circuit

All input signals of the driver are photocoupler inputs.

When an external power supply is used: 20.4 to 28.8 VDC, 100 mA or more



● Changing the logic level setting of input signals

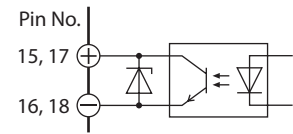
The logic level setting for input terminals IN0 to IN6 can be changed using the **MEXE02** or operation panel. Refer to the USER MANUAL for details.

■ Output signals circuit

All output signals of the driver are photocoupler/open-collector outputs.

ON voltage: 1.6 VDC maximum

External power supply: 4.5 to 30 VDC, 100 mA or less (5 mA or more for the SPEED-OUT output)



● Changing the logic level setting of output signals

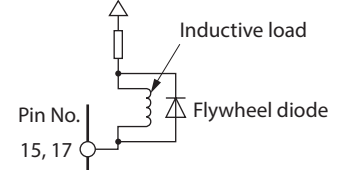
The logic level setting for output terminals OUT0 and OUT1 can be changed using the **MEXE02** or operation panel.

However, if the SPEED-OUT output is assigned, it cannot be changed.

Refer to the USER MANUAL for details.

Note

- Be sure to suppress a current flowing to the output circuit to 100 mA or less. Connect a current limiting resistor externally if the current exceeds this specified value. 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, provide a fly-back voltage control measure based on diode, etc., for the inductive load. Or use a relay with built-in flywheel diode.

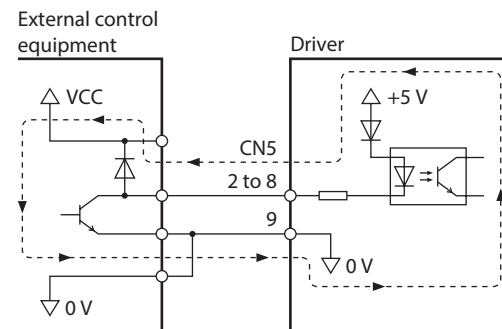


■ When using a controller with a built-in clamp diode

If a controller with a built-in clamp diode is used, a leakage path may form and cause the motor to rotate even when the controller power is turned off, as long as the driver power is on.

Since the current capacity of the controller is different from that of the driver, the motor may rotate when the controller and driver powers are turned on or off simultaneously.

When powering down, turn off the driver power first, followed by the controller power, and when powering up, turn on the controller power first, followed by the driver power.



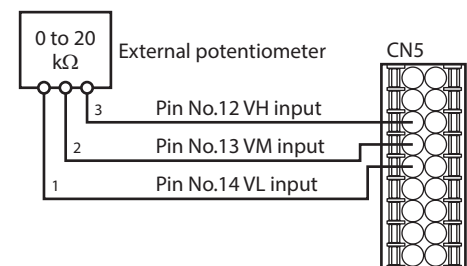
5. Connecting external analog setting devices

Using an external potentiometer (sold separately) or external DC voltage, the analog setting for the rotation speed or torque limiting value can be performed.

Refer to p.28 and p.29 as well as the USER MANUAL for the setting method.

■ Using an external potentiometer

Connect to the pin Nos. 12 to 14 of CN5.

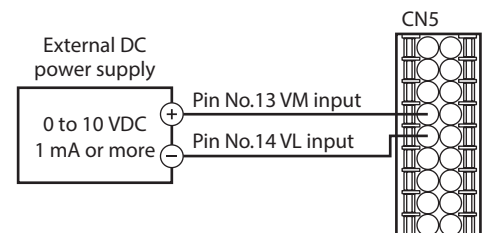


■ Using external DC voltage

For the external voltage, use a DC power supply (0 to 10 VDC) with reinforced insulation on its primary and secondary sides, and connect to the pin Nos. 13 and 14 of CN5.

The input impedance between the VM input and VL input is approximately 41.8 kΩ.

The VL input is connected to IN-COM1 inside the driver.



Note

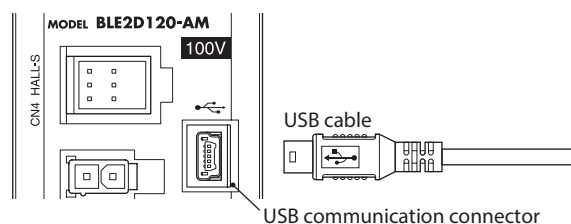
Be sure to use the external DC voltage at 10 V or lower. When connecting the external DC power supply, make sure the polarities are correct. Reversing the polarities may cause damage to the driver.

6. Connecting the USB cable

Connect the USB cable to the USB communication connector when using the **MEXE02**.

Specifications of USB cable

Specifications	USB2.0 (full speed)
Cable	Length: 3 m (9.8 ft.) or less Shape: A to mini-B



- Connect the driver and PC directly using the USB cable without using a hub or extension cable.
- In large electrically noisy environments, use the USB cable with a ferrite core or install a ferrite core to the USB cable.

7. Connecting the regeneration resistor

If continuous regeneration operation such as gravitational operation in vertical drive is performed or an inertia load is operated with the round shaft type motor of 300 W or higher, use the regeneration resistor **RGB100** (sold separately).

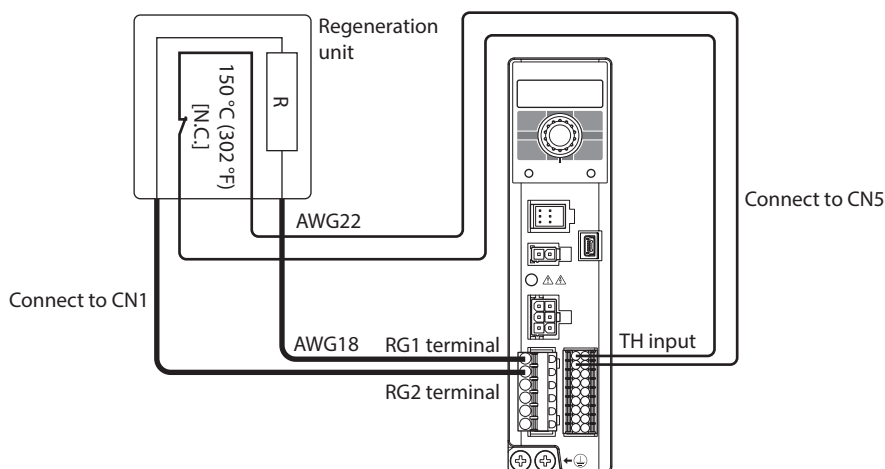
Also, if the stopping time gets longer when starting and stopping operations of a large inertia load are repeated frequently, use the regeneration resistor.

Install the regeneration resistor 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.

7-1 Connection method

Connect the regeneration resistor before turning on the main power.

- A regenerative current flows through the two thick lead wires (AWG18: 0.75 mm²) of the regeneration resistor. Connect them to the RG1 and RG2 terminals of CN1.
- The two thin lead wires (AWG22: 0.3 mm²) of the regeneration resistor are the thermostat outputs. Connect to the TH input (pin Nos. 10 and 11) of CN5.



- Be sure to connect the thermostat output to the TH input when using the regeneration resistor.
- If the regeneration resistor overheats to exceed the permissible temperature, the thermostat output is turned OFF to generate the "regeneration resistor overheat" alarm. If the "regeneration resistor overheat" alarm is generated, reconsider the driving condition, ambient temperature and others.

7-2 Regeneration resistor specifications

Model	Continuous regenerative power	Instantaneous regenerative power	Resistance value	Thermostat operating temperature
RGB100	70 W	720 W	150 Ω	Operation: Opens at 150±7 °C (302±13 °F) Reset: Closes at 145±12 °C (293±22 °F) [normally closed]

About regeneration resistor overheat alarm

The regeneration resistor overheat alarm "AL.54" may be generated even if the regeneration resistor is not connected. Once the main power supply is turned on in a state where the pin Nos. 10 and 11 (TH input) of CN5 are short-circuited, the driver recognizes that the regeneration resistor is connected and changes to the setting that the regeneration resistor is used. After that, if the power supply is turned on again in a state where nothing is connected to the pin Nos. 10 and 11 of CN5, the regeneration resistor overheat alarm will be generated.

To cancel the setting to use the regeneration resistor, execute initialization of parameters without connecting anything to the pin Nos. 10 and 11 of CN5. Then, turning on the main power supply again will reset the alarm.

8. Connection diagram

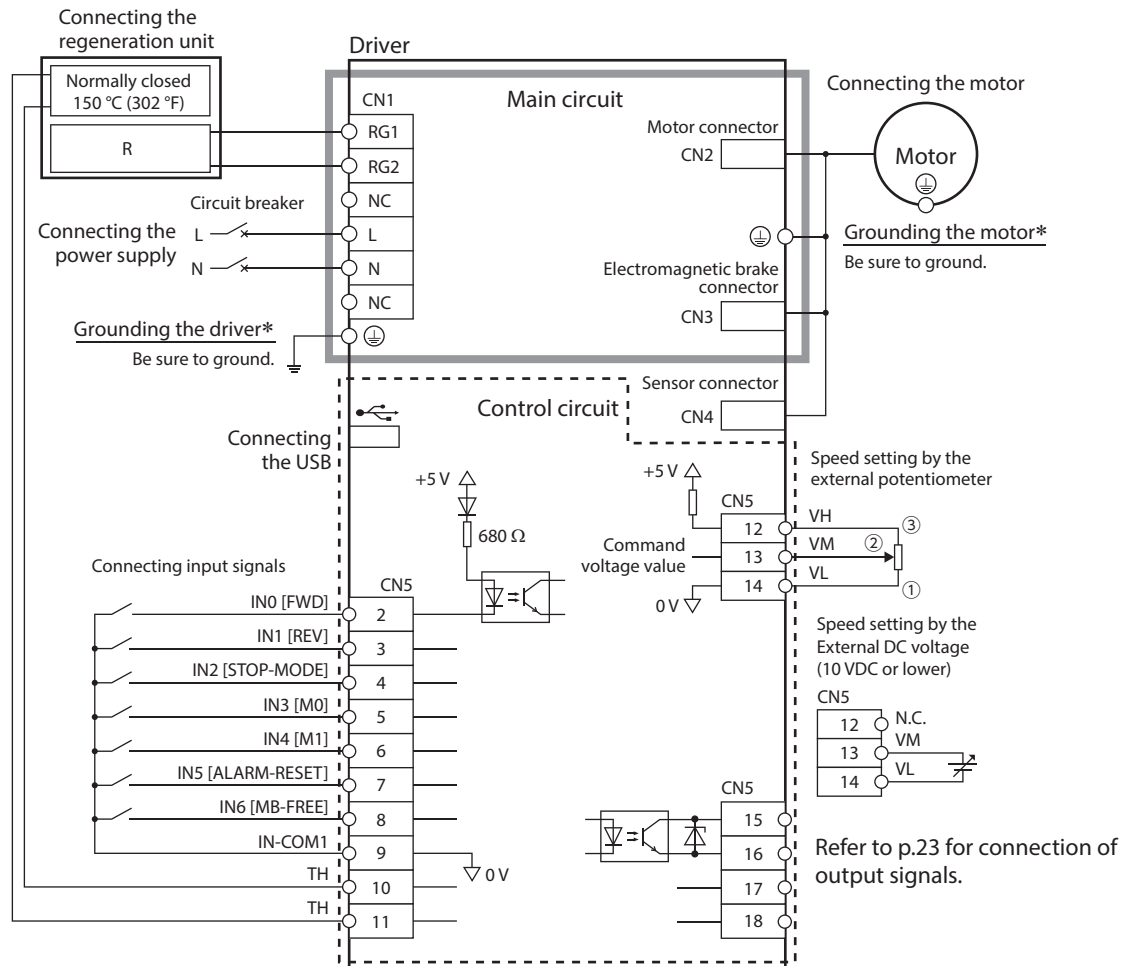
■ Sink logic

● When using the internal power supply

This is a connection example when the electromagnetic brake motor and the driver of single-phase 100-120 VAC are used, the rotation speed is externally set, and the internal power supply is used for input signals.

I/O signals in brackets [] are set at the time of shipment.

Assignment of I/O signals ⇒ USER MANUAL



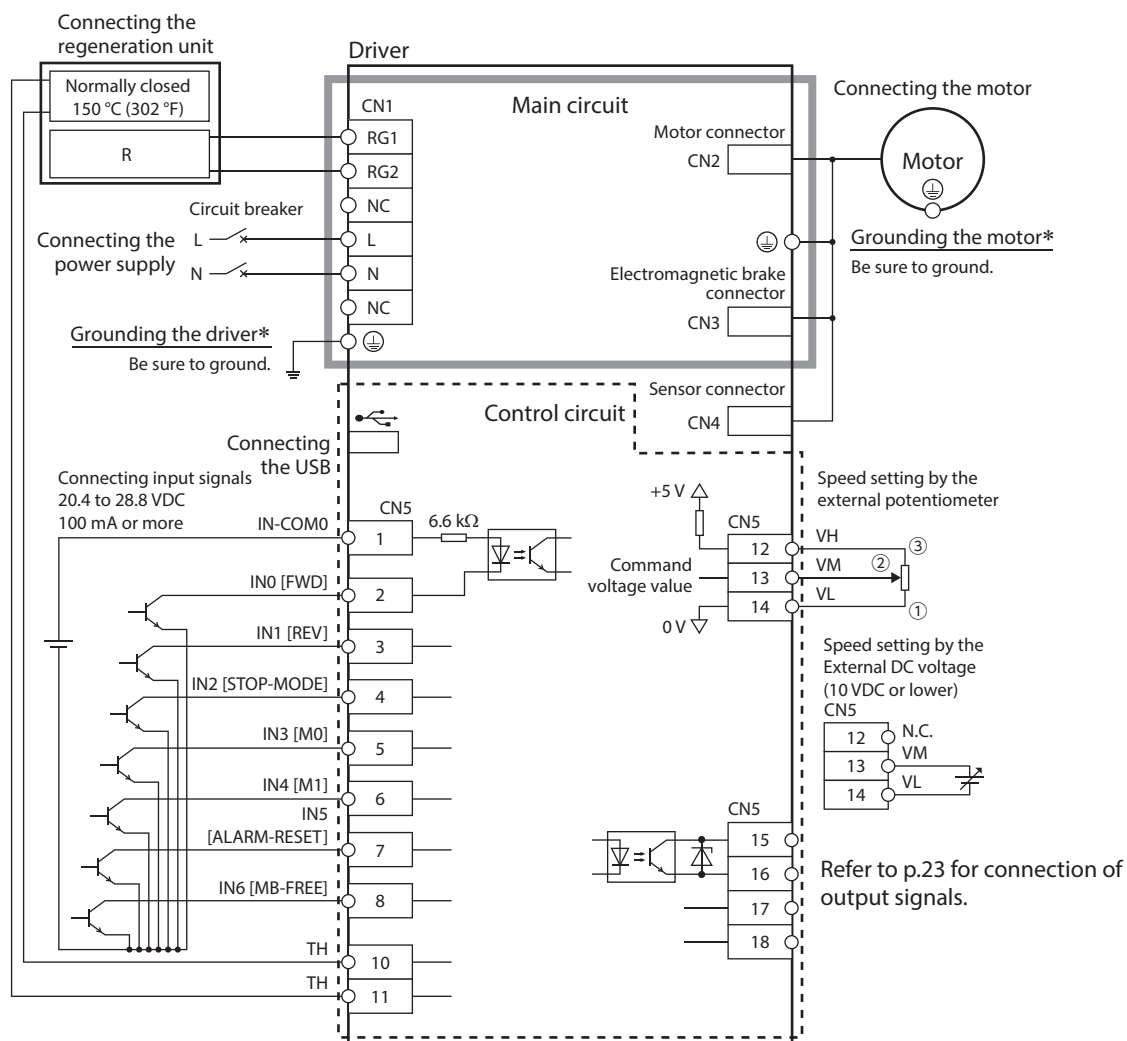
* Be sure to ground. Refer to "3. Grounding" on p.16 for how to ground.

● When using an external power supply

This is a connection example when the electromagnetic brake motor and the driver of single-phase 100-120 VAC are used, and the motor is operated by setting the rotation speed externally.

I/O signals in brackets [] are set at the time of shipment.

Assignment of I/O signals ⇒ USER MANUAL



* Be sure to ground. Refer to "3. Grounding" on p.16 for how to ground.



Use a power supply of 20.4 VDC to 28.8 VDC, 100 mA or more, for connecting input signals.

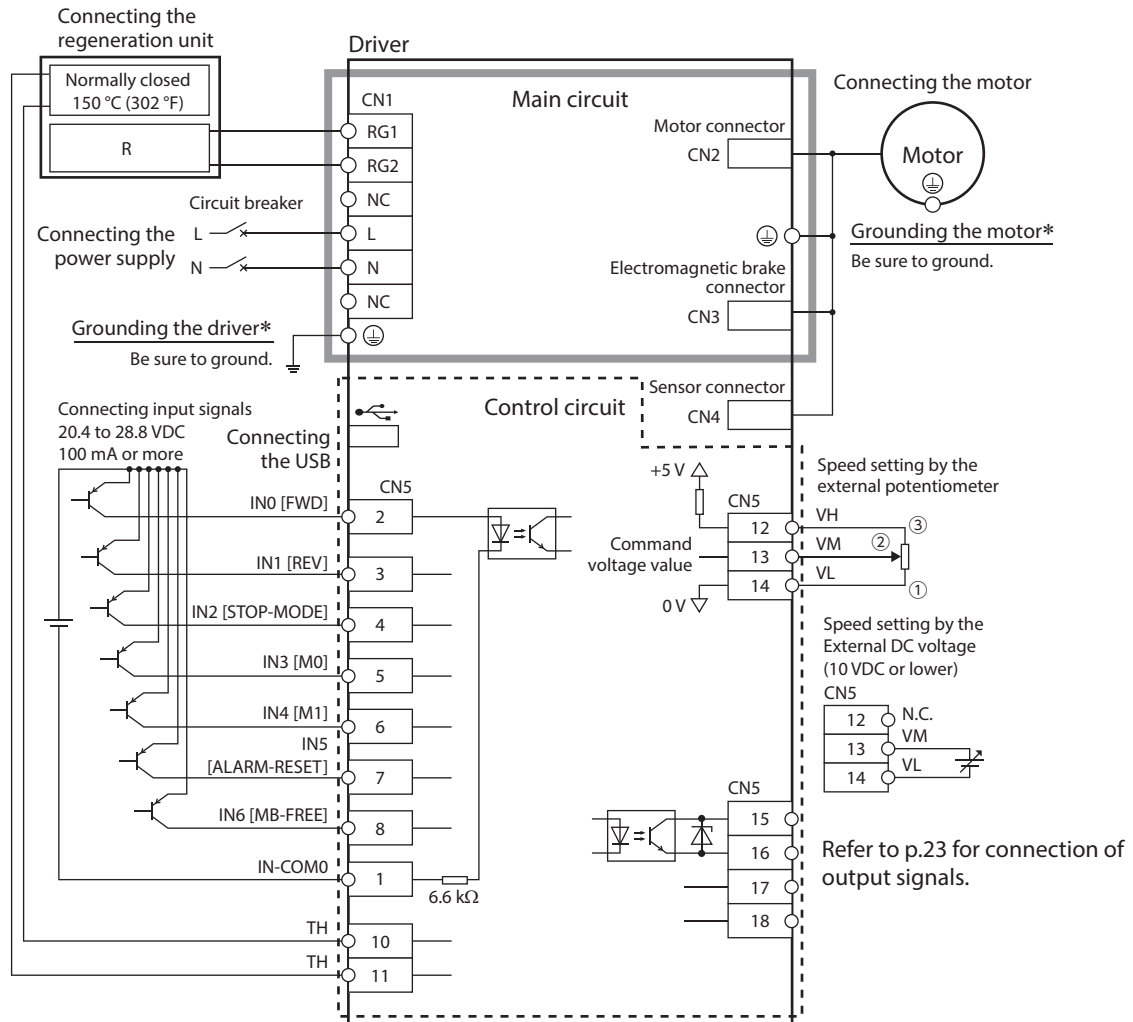
■ Source logic

When using an external power supply

This is a connection example when the electromagnetic brake motor and the driver of single-phase 100-120 VAC are used, and the motor is operated by setting the rotation speed externally.

I/O signals in brackets [] are set at the time of shipment.

Assignment of I/O signals ⇒ USER MANUAL



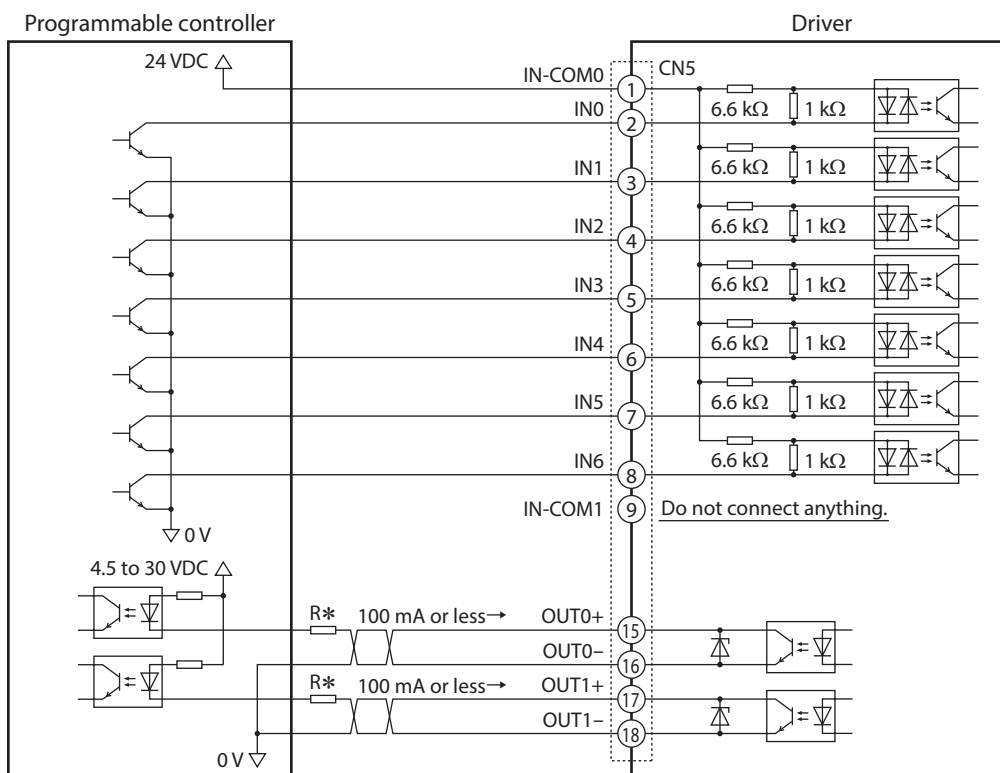
* Be sure to ground. Refer to "3. Grounding" on p.16 for how to ground.



Use a power supply of 20.4 VDC to 28.8 VDC, 100 mA or more, for connecting input signals.

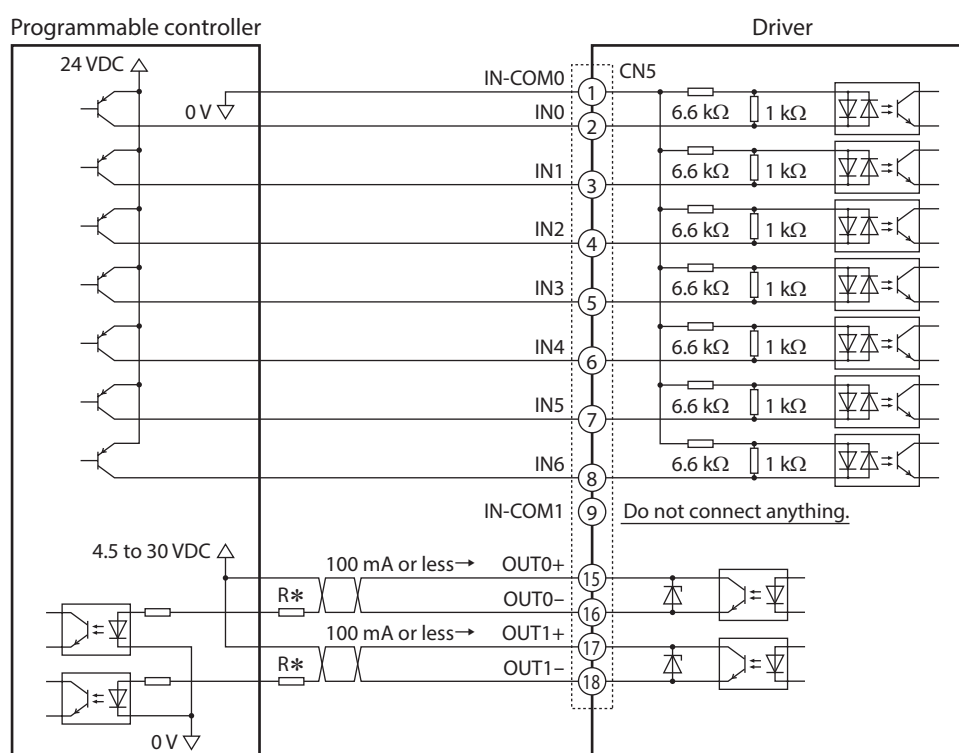
■ Connection example for I/O signals and programmable controller

● Sink logic



* Recommended resistance value when the current limiting resistor R is connected
 In the case of 24 VDC: 680 Ω to 2.7 kΩ (2 W) In the case of 5 VDC: 150 Ω to 560 Ω (0.5 W)

● Source logic



* Recommended resistance value when the current limiting resistor R is connected
 In the case of 24 VDC: 680 Ω to 2.7 kΩ (2 W) In the case of 5 VDC: 150 Ω to 560 Ω (0.5 W)

Note

- Use output signals at 4.5 VDC to 30 VDC.
- Be sure to use the current of the OUT0 and OUT1 at 100 mA or less. If the current exceeds this value, connect the current limiting resistor R.
- Pass the current of 5 mA or more for the SPEED-OUT output.
- Do not connect anything to the pin No. 9 when using an external power supply.

9. I/O signals list

This section explains about input signals and output signals.

Refer to the USER MANUAL when changing the signal assigned to the I/O signal terminals.

■ Input signals

Signal name	Function	Description	
IN0	FWD	This is a signal to operate the motor. When either the FWD input or the REV input is turned ON, the motor rotates.	2-Wire mode
IN1	REV	The motor stops when the signal is turned OFF. The motor rotates in the direction set in the "Rotation direction" parameter.	
IN2	STOP-MODE	This is a signal to select how to stop the motor. Deceleration stop or instantaneous stop can be selected.	
IN3	M0	These are signals to select the operation data number.	3-Wire mode
IN4	M1	They are used to switch the operation data number when multi-speed operation is performed. Up to 4 data can be switched using the M0 and M1 inputs.	
IN5	ALARM-RESET	This is a signal to reset the present alarm when a driver protective function is activated.	
IN6	MB-FREE *	This is a signal to select how the electromagnetic brake would operate (hold or release) when the motor stops. If this signal is turned ON, the electromagnetic brake can be released.	
Signals possible to change the assignment	START/STOP	These signals are used to operate the motor. The motor rotates when both the START/STOP input and the RUN/BRAKE input are turned ON. If the START/STOP input is turned OFF, the motor decelerates to a stop.	
	RUN/BRAKE	If the RUN/BRAKE input is turned OFF, the motor stops instantaneously.	
	CW/CCW	This is a signal to change the motor rotation direction.	
	M2	These are signals to select the operation data number.	
	M3	Up to 16 data can be switched using the M0, M1, M2, and M3 inputs.	
	H-FREE	This is a signal to select whether to enable or disable the slight position-keeping function. You can switch whether to hold the motor shaft by the slight position-keeping function when the motor stops.	
	TL	This is a signal to switch whether to enable or disable the torque limiting function. (Normally closed) You can switch whether to limit the output torque of the motor.	
	INFO-CLR	This is a signal to clear the information presently generated.	
	HMI	This is a signal to restrict the operation using the operation panel or MEXE02 . (Normally closed)	
	EXT-ERROR	This is a signal to stop the motor forcibly. (Normally closed) If this signal is turned OFF, the external stop alarm is generated.	

* Available for only drivers for electromagnetic brake motor

■ Output signals

Signal name	Function	Description
OUT0	SPEED-OUT	This is a signal to be output in synchronization with the motor rotation. 30 pulses are output while the motor output shaft makes one revolution.
OUT1	ALARM-OUT	This is a signal to be output when a driver protective function is activated. (Normally closed)
Signals possible to change the assignment	MOVE	This is a signal to be output when the motor is rotating by turning the operation input signal ON.
	INFO	This is a signal to be output when information is generated.
	TLC	This is a signal to be output when the motor output torque reached the torque limiting value.
	VA	This is a signal to be output when the motor detection speed reached the plus or minus range of "VA detection width" against the setting speed.
	DIR	This is a signal to output information of the motor rotation direction.

: These are functions to be assigned at the time of shipment.

Operating using the operation panel

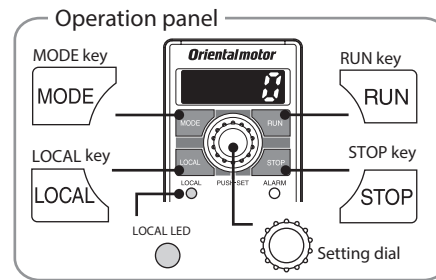
This chapter explains how to rotate the motor using only the operation panel without connecting an external control device.

1 AC power ON

When the power supply is turned on, the display shows as follows.



Display: Rotation speed
0 r/min (standstill)



Refer to p.32 for details about the operation panel.

2 Operation selection

Press the LOCAL key.



Press



The LOCAL LED
is lit in green.

The operation using the operation panel is set, and the rotation speed and rotation direction are alternately continued to show on the display.



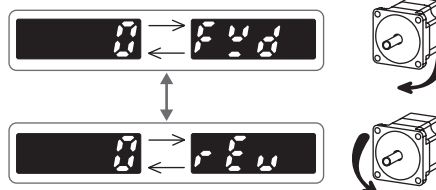
Interval of approximately 1 second

3 Rotation direction selection



Press

The motor rotation
direction changes
whenever the MODE key
is pressed.



* The figures show the round shaft type.

Check the operating manual included with the motor for the rotation direction of the gearhead output shaft.

4 Start of motor



Press

The motor rotates.



50 r/min (factory setting)

To stop the motor

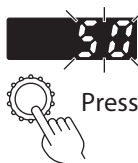


Press

The motor stops.



5 Changing speed of motor [example: 50 to 1000 r/min]



Press

The display blinks.
You can adjust the speed while blinking.

Adjustment



Set



Press

Decelerate Accelerate
Turn


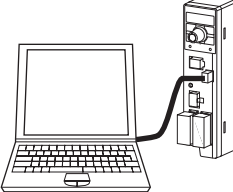
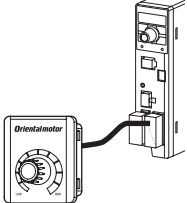
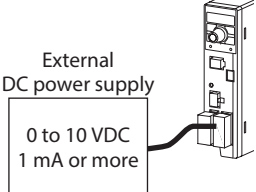
The display changes to lighting from blinking, and the speed will be set.
When you start the motor next time, it will rotate at the set speed.

3. Setting of rotation speed

The rotation speed can be set with the digital setting at the time of shipment. To set the data with the analog setting, the "Speed, torque limiting command selection" parameter is required to change. Each setting procedure is shown below.

[Setting range: 50 to 4000 r/min] (Factory setting: 50 r/min)


■ Setting method

Digital setting		Analog setting	
Operation panel	MEXE02	External potentiometer	External DC voltage
			
p.27	⇒ USER MANUAL	p.28	


■ Procedure to set the rotation speed with the operation panel

Example: Set the rotation speed of the operation data No.0 to 1000 r/min.


- 1 Turn on the AC power supply




Rotation speed: 0 r/min
- 2 Press twice MODE




Press



Press




Data No.0
Data number selection screen
- 3 Press




Press


Rotation speed



Operation data selection screen in the data number
- 4 Press




Press





Setting screen of rotation speed
50 r/min (factory setting)

Change to 1000 r/min




Turn



- 5 Set (store) the data



Press




→



[To return to the rotation speed display]
MODE Press Press → 000 → Up arrow button Press
- 6 Turn the operation input signal ON

Driver
CN5


FWD	2
REV	3
IN-COM1	9




The motor rotates.

If the input signal having been turned ON is turned OFF, the motor will stop.

FWD : ON



REV : ON



* The figures show the rotation direction of the round shaft type motor with the factory setting.

Details about operation and stop ⇒ Refer to p.30 for details.

■ Procedures to set the rotation speed with an analog setting device

When the rotation speed is set using the external potentiometer or external DC voltage, the setting of the "Speed, torque limiting command selection" parameter is required to change.

- 1

Check the connection
- 2

Turn on the AC power supply

Rotation speed: 0 r/min
- 3

Change the setting of the "Speed, torque limiting command selection" parameter (ID: 1820) to "1"

Press three times

Parameter mode
- 4

Press twice

ID input screen

Turn clockwise to select 1820
- 5

Press

[Parameter setting range]
0: Digital setting
1: Analog setting for the rotation speed of the operation data No.1
2: Analog setting
- 6

Turn clockwise to select 2

Press
- 7

Press once

Turn clockwise to select Configuration
- 8

Press twice

Execute

[To return to the rotation speed display]

Press three times

Press
- 9

Set the rotation speed

PAVR2-20K

External potentiometer - Rotation speed characteristics (representative values)

External DC voltage - Rotation speed characteristics (representative values)

Changing the parameter can set the rotation speed using DC voltage of 0 VDC to 10 VDC.
- 10

When the operation input signal is turned ON, the motor rotates. Refer to p.27 for the operating method.

Details of parameters ⇒ USER MANUAL


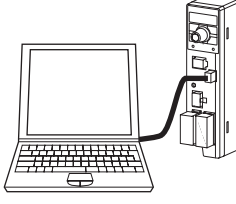
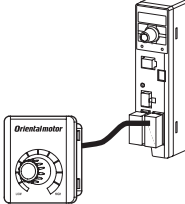
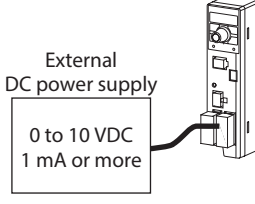
4. Setting of torque limiting

The maximum output torque of the motor can be limited. Set when suppressing the motor output torque for safe uses or limiting according to a load.

[Setting range: 0 to 300%] (Factory setting: 300%)

If the time to lock the motor shaft exceeds five seconds, use the torque limiting value at 50% or less.

■ Setting method

Digital setting		Analog setting	
Operation panel	MEXE02	External potentiometer	External DC voltage
			
p.36		⇒ USER MANUAL	

5. Setting of acceleration/deceleration time

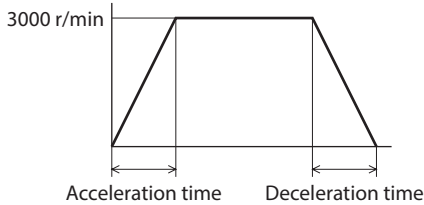
The acceleration time and deceleration time can be set to prevent a load from receiving a shock upon starting or stopping.

[Setting range: 0.0 to 15.0 seconds] (Factory setting: 0.5 seconds)

Acceleration time refers to the time needed for the motor to reach the rated rotation speed (3000 r/min) from the standstill status.

Deceleration time refers to the time needed for the motor to stop from the rated rotation speed (3000 r/min).

The actual acceleration time and deceleration time vary depending on the conditions of use, load inertia, load torque, etc. If smooth acceleration or deceleration cannot be performed, reconsider the acceleration time or deceleration time.

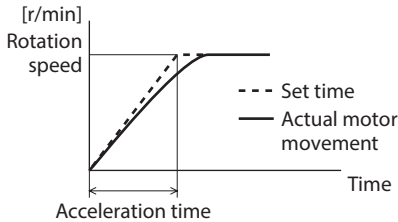


■ About motor movement


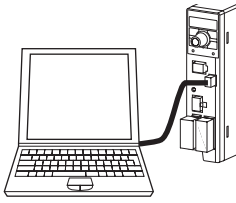
If the acceleration time and deceleration time are set to 0 second, the motor moves at a longer time than the setting.

If they are set more than 0.1 seconds, the motor can move at the set time. (With no load)

If the frictional load or inertia load becomes larger, the moving time against the setting tends to be longer.



■ Setting method

Digital setting	
Operation panel	MEXE02
	
p.36	USER MANUAL

- If the rotation speed is set with the digital setting, the acceleration time and deceleration time can be set by the time needed to reach the set speed. Details ⇒ USER MANUAL

6. Operation/stop

To switch between operation and stop of the motor in the 2-wire mode, the FWD input and the REV input are used. This section explains as an example when the "2-Wire mode 1" is selected with the "Operation input mode selection" parameter. Refer to the USER MANUAL for the operation input mode.

FWD input	REV input	Motor movement	Turn the input signal having turned ON to OFF *
ON	OFF	Rotates in the forward direction	Deceleration stop
OFF	ON	Rotates in the reverse direction	Deceleration stop
Turn both signals ON during rotation		Deceleration stop	—

* How to stop the motor can be changed by the setting of the STOP-MODE input.

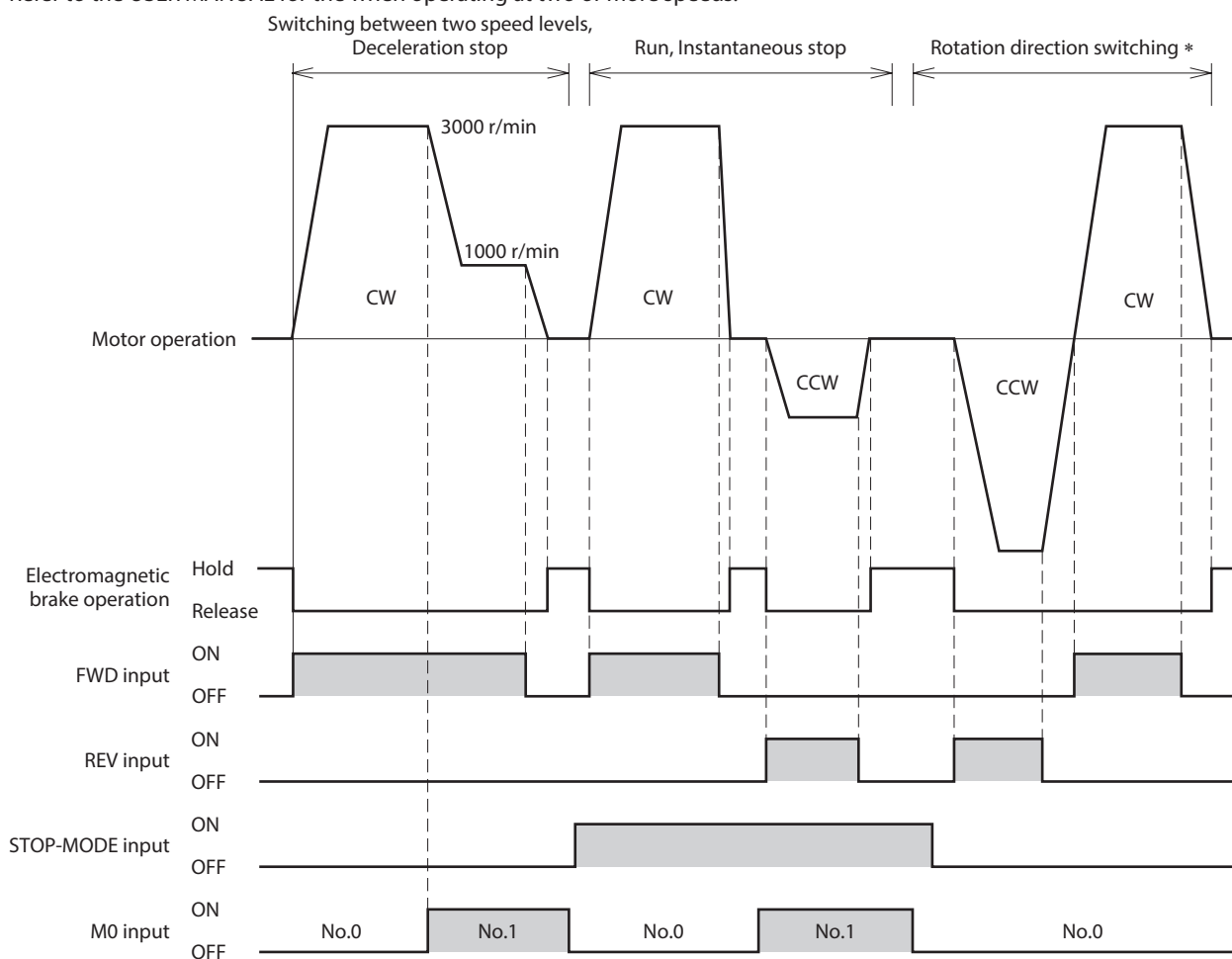
STOP-MODE input	OFF	ON
Stopping movement	Deceleration stop	Instantaneous stop

Note When the electromagnetic brake motor is used in an application of vertical drive such as elevating equipment, although depending on a load condition, the motor shaft rotation may momentarily reverse (within 90 degrees of the motor output shaft) at the time of starting or stopping if it is operated under the setting conditions below.

- When the set rotation speed is low
- When the acceleration time or deceleration time is long

■ Operation example

The chart below is an example when the operation data No.0 and No.1 are set to 3000 r/min and 1000 r/min respectively, and the speed of the electromagnetic brake motor is switched between these two levels. Refer to the USER MANUAL for the when operating at two or more speeds.



* When the motor is combined with the JH gearhead, JB gearhead, or JV gearhead, the rotation direction cannot be switched instantaneously depending on the motor output. Check the operating manual included with the motor.

• The motor rotation direction can be switched by setting of the "Motor rotation direction" parameter. This example shows when "Positive direction=CW" is set.

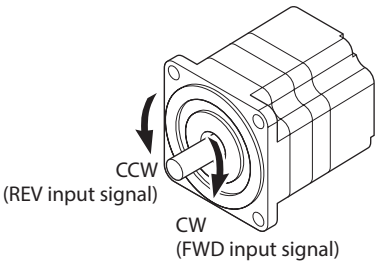
Note

- Make sure each signal remains ON for at least 10 ms.
- When switching the motor rotation direction, provide an interval of at least 10 ms to turn the signal ON.

7. Setting of rotation direction

■ Rotation direction of the motor output shaft

The rotation direction of the motor output shaft represents the direction when viewed from the motor output shaft side.
The motor rotation direction when the FWD input is turned ON can be changed using the **MEXE02** or operation panel.
The figure shows when the "Motor rotation direction" parameter is set to "Positive direction=CW."



Rotation direction of the gearhead output shaft

The rotation direction of the gearhead output shaft varies depending on the type or the gear ratio of the gearhead. Check the operating manual included with the motor for the rotation direction of the gearhead output shaft.

■ Rotation direction when the local control operation is performed

During the local control operation, the rotation direction is continuously displayed blinking when the motor is at standstill. At this time, the motor rotation direction can be changed by pressing **MODE** key.



In the case of FWD: 
(Factory setting)

In the case of REV: 

Local control operation: Using 3 keys of **LOCAL**, **RUN** and **STOP**, the motor can be operated.

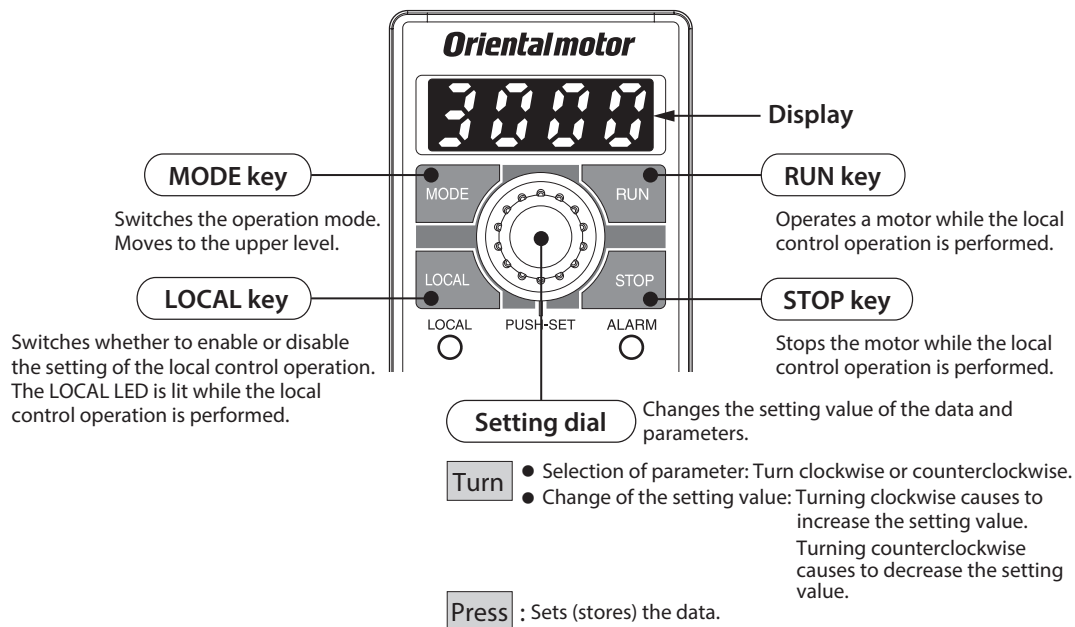
Operation panel

This chapter explains how to set data and how to operate a motor using the operation panel on the driver.

1. Operation panel

This section explains the name and function of each part of the operation panel as well as function modes.

1-1 Names and functions of parts



Local control operation: This is a method to operate using the operation panel.

Remote control operation: This is the method to operate using the external signals or **MEXE02**.

- The local control operation can be enabled when the monitor mode is selected. If the LOCAL key is pressed when the other operation mode is selected, "Err" is displayed.
- The operation input signal is disabled during the local control operation. (Other input signals are enabled.)
- The operating method is described on p.27.

The operation panel cannot remove from the driver.

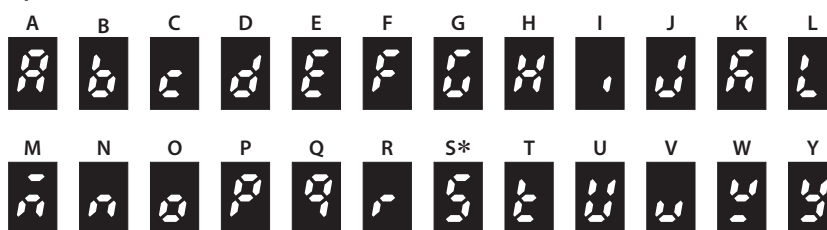
1-2 How to read the display

The display shows as follows.

• Arabic number



• Alphabet




• Sign



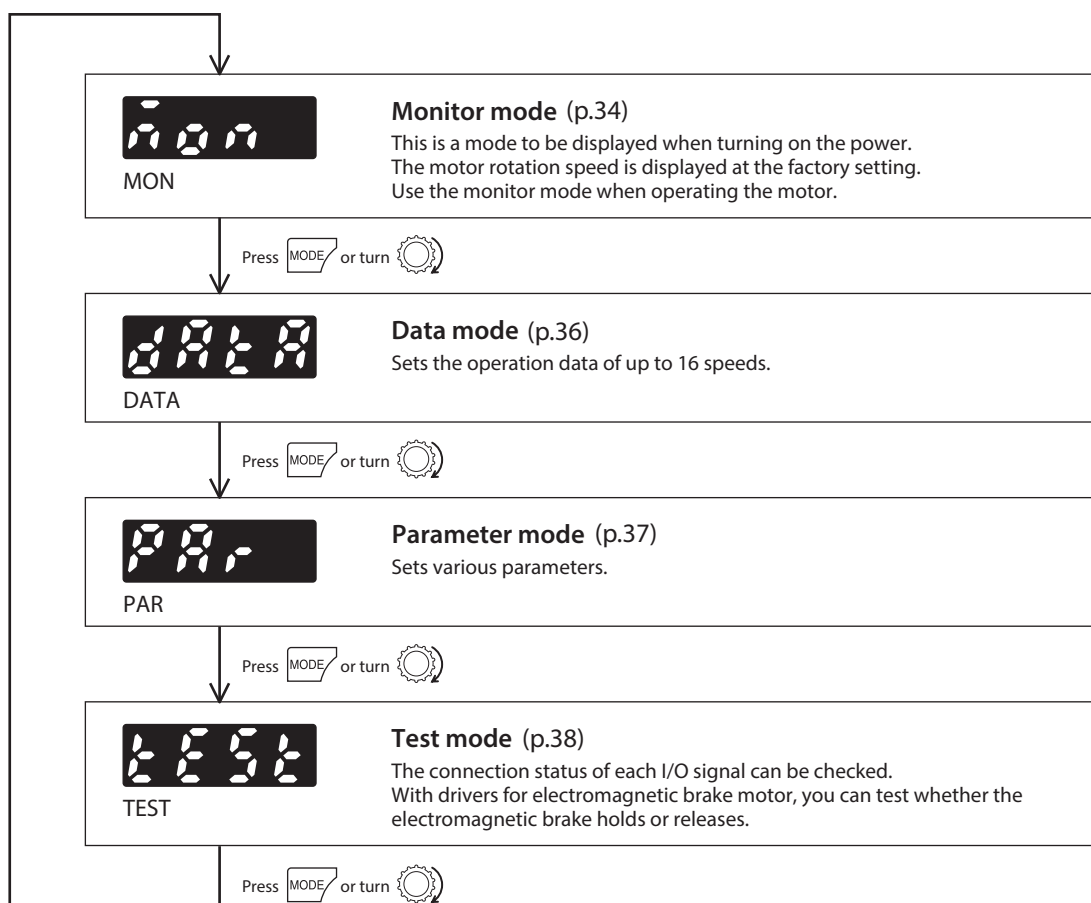
* Arabic number "5" and alphabet "S" are the same sign.

1-3 Function mode types

There are four operation modes in this product.

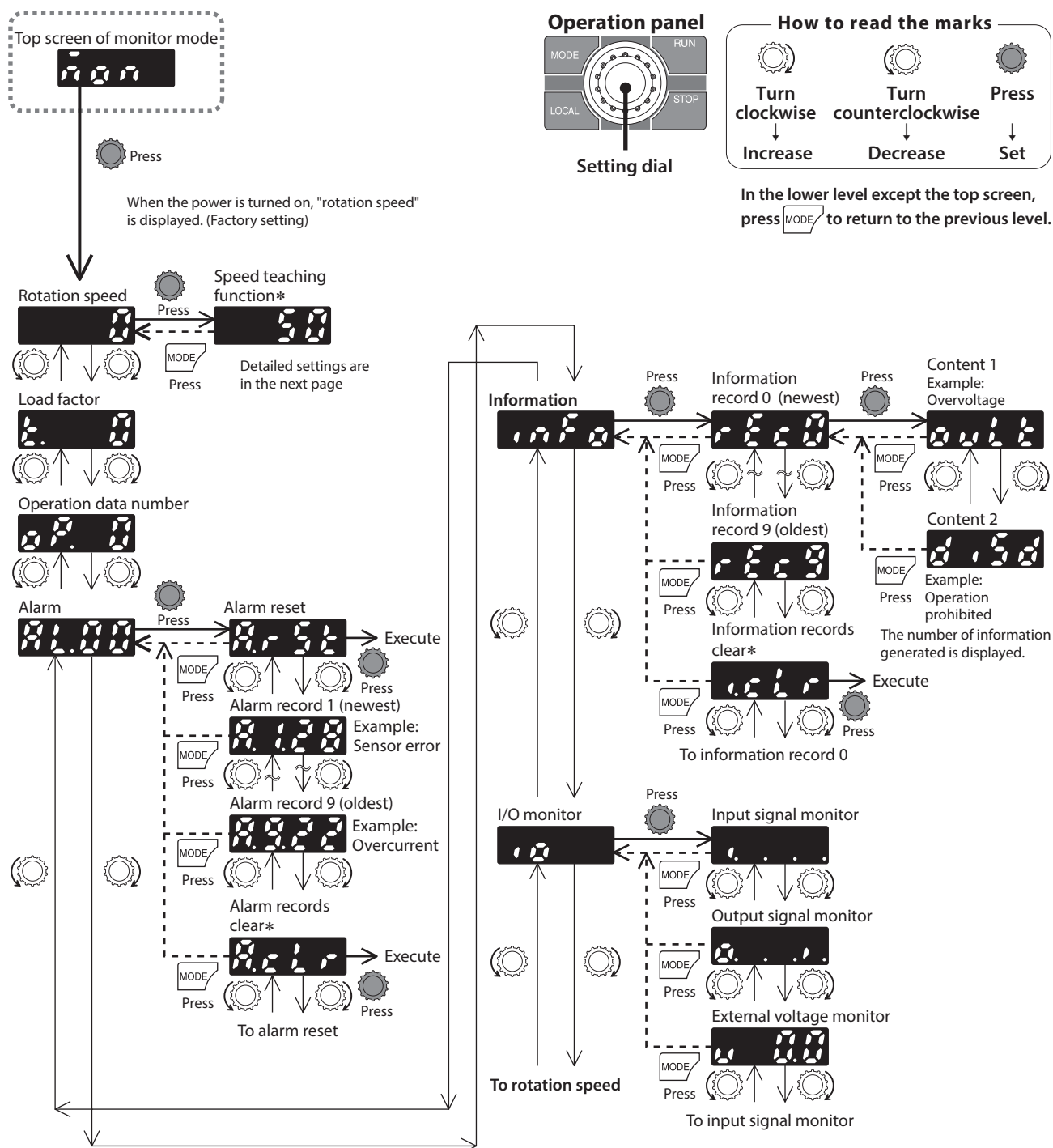
On the top screen of each mode, pressing the  key or turning the setting dial will switch the operation mode.

The top screens for each mode are shown below.



2. Operation transitions

2-1 Items that can be monitored



* "Speed teaching function" "Alarm records clear" "Information records clear":

When operations are limited by the edit lock function, you cannot execute since these screen are not displayed.

■ Rotation speed

The motor rotation speed can be checked.

The rotation speed can be displayed as the rotation speed of the gearhead output shaft. To do this, set with the "Speed reduction ratio" parameter (ID: 2033) and "Speed reduction ratio digit setting" parameter (ID: 2038).

It is also possible to increase the rotation speed and display the increased speed. Set with the "Speed increasing ratio" parameter (ID: 2039).

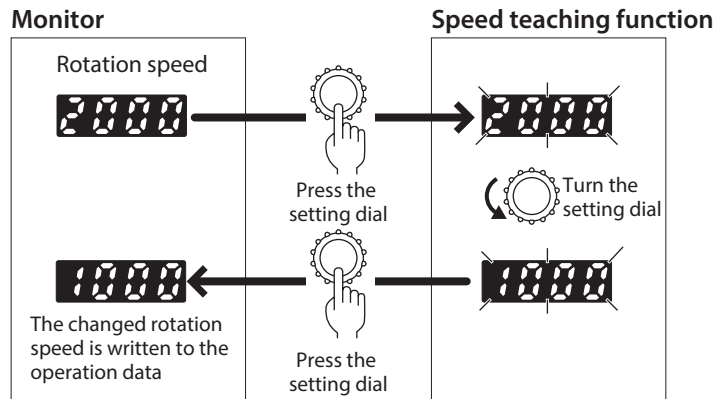


When the "Speed increasing ratio" parameter is set to 1.00, the speed reduction ratio is enabled. When the "Speed increasing ratio" parameter is set to other than 1.00, the speed increasing ratio is enabled.

● Speed teaching function

In the monitor mode, the rotation speed of the data number presently being operated can be changed while the motor is rotating.

The speed teaching function cannot be used when the rotation speed is set using the external potentiometer or external DC voltage.



■ Load factor

The output torque of the motor can be checked.

When the load factor is 0 to 300%, the present load factor of the output torque is displayed in units of 1% based on the motor rated torque being 100%.

The display is the load factor on the motor output shaft. It is not for the gearhead output shaft.

In the case of the gearhead output shaft, the permissible torque varies depending on the gear ratio of the gearhead used. Use the product so that the load does not exceed the permissible torque of the gearhead output shaft.

■ Operation data number

The operation data number presently selected can be checked.

■ Alarm

If an alarm is generated, 2-digit alarm code will be displayed. The present alarm can be reset, and also alarm history can be checked and cleared. Refer to p.44 for the causes or actions of alarms.

■ Information

A content of information presently generated can be checked. Also, information history can be checked and cleared. Refer to the USER MANUAL for details about the information.

- When the "INFO auto clear" parameter (ID: 447) is set to disable

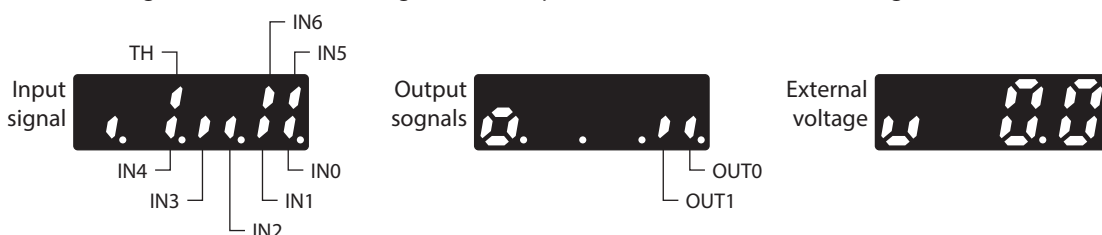
The screen to eliminate the information is shown after information history clear, and eliminating the information is executed when the setting dial is pressed.

■ I/O monitor

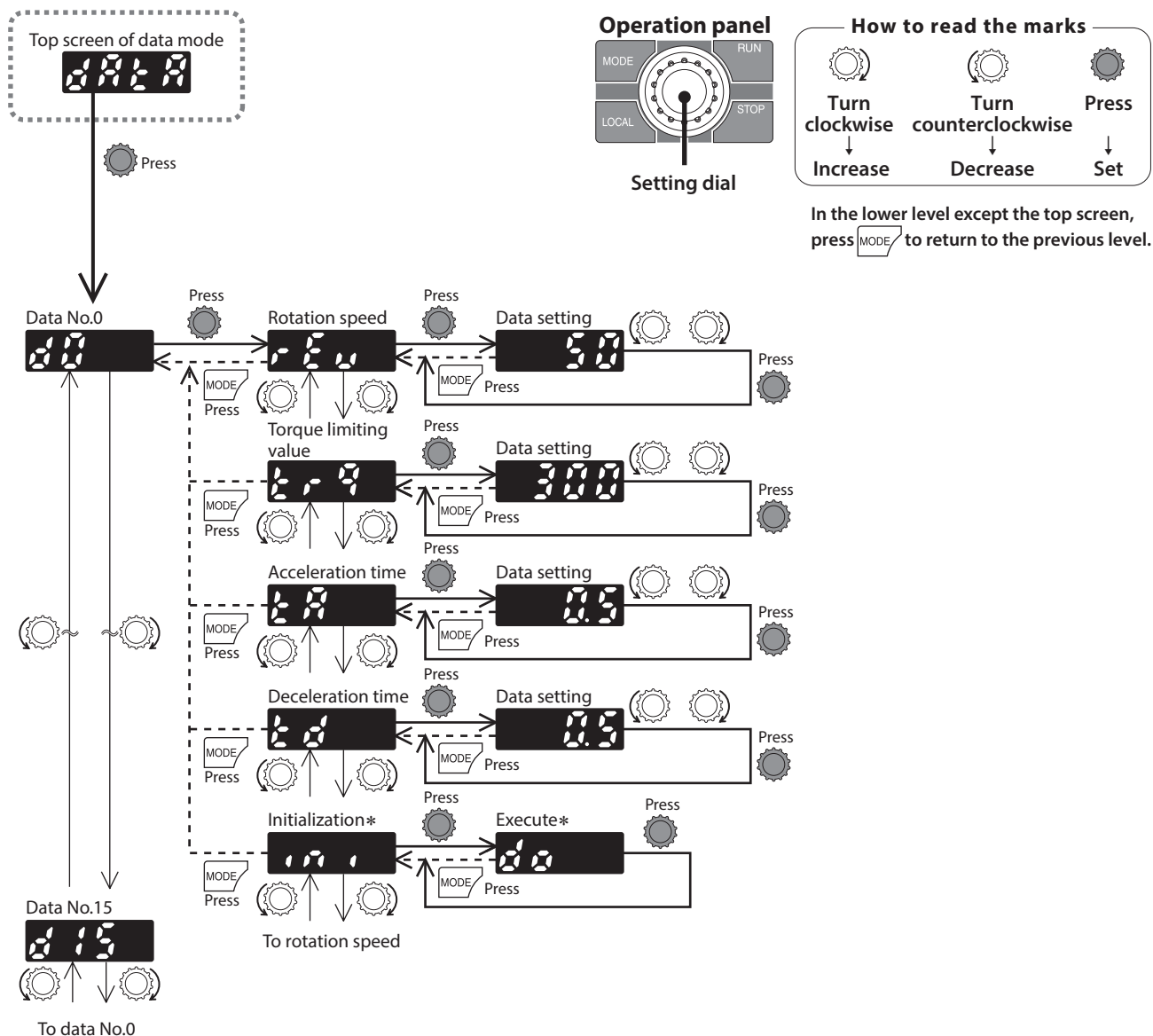
The ON-OFF status of each I/O signal for the driver can be checked.

Each digit on the 7-segment LED display corresponds to a signal. The corresponding digit is lit when the signal is ON, and the digit is unlit when the signal is OFF.

Also, the voltage value that was set using the external potentiometer or external DC voltage can be checked.



2-2 Setting of operation data

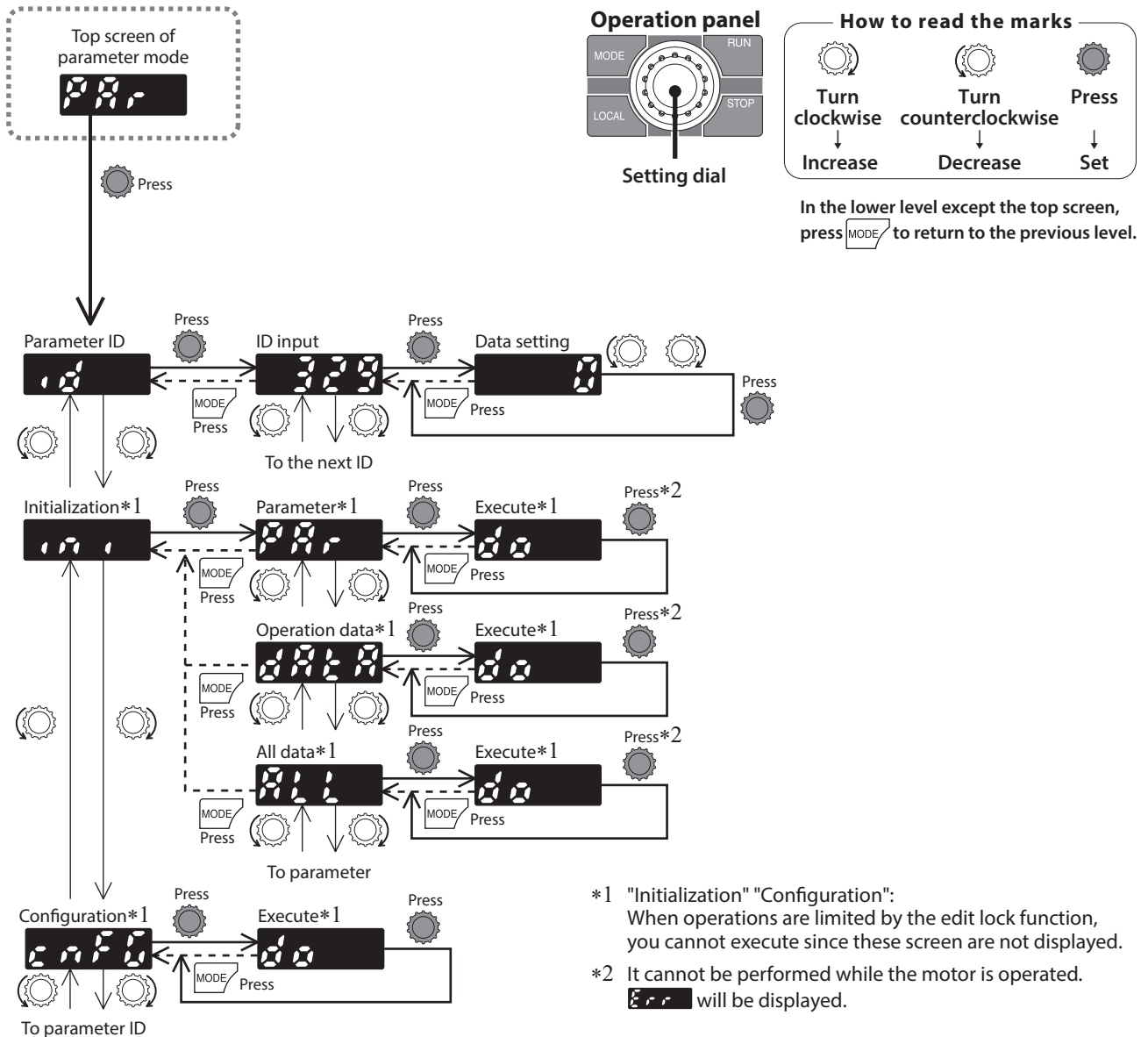


* "Initialization": When operations are limited by the edit lock function, you cannot execute since the screen is not displayed.

● Setting items

Item	Description	Setting range	Setting unit	Factory setting
Rotation speed	Sets the motor rotation speed. Even if the speed reduction ratio or speed increasing ratio is set, set the rotation speed based on the motor shaft.	50 to 4000 r/min	1	50
Torque limiting value	Sets if the output torque is limited while the motor rotates. Set the maximum torque based on the motor rated torque being 100%.	0 to 300%	1	300
Acceleration time	Sets the acceleration time as the time needed for the motor to reach the rated rotation speed (3000 r/min) from the standstill state. If the acceleration time needed to reach the setting speed is set, change the value of the "Acceleration/deceleration unit selection" parameter to "1." ⇒ USER MANUAL	0.0 to 15.0 s	0.1	0.5
Deceleration time	Sets the deceleration time as the time needed for the motor to stop from the rated rotation speed (3000 r/min). If the deceleration time needed to stop from the speed being rotated is set, change the value of the "Acceleration/deceleration unit selection" parameter to "1." ⇒ USER MANUAL			
Initialization	Restores the data for each data number to the factory setting.	—	—	—

2-3 Setting of parameters



■ Parameter ID

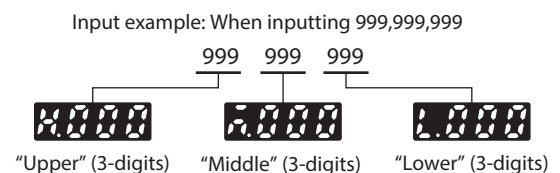
There is a unique ID in each parameter. Input the ID and set.
Refer to p.40 for parameter ID. Refer to the USER MANUAL for details of parameters.

[Setting method of the parameter selecting a sign]

Selecting a sign after setting ID and pressing the setting dial will appear the data setting screen.

[Setting method of the parameter possible to set up to 9 digits]

The operation panel is 4-digit LED display. Input the setting value of up to nine digits by dividing into an "upper," "middle," and "lower."



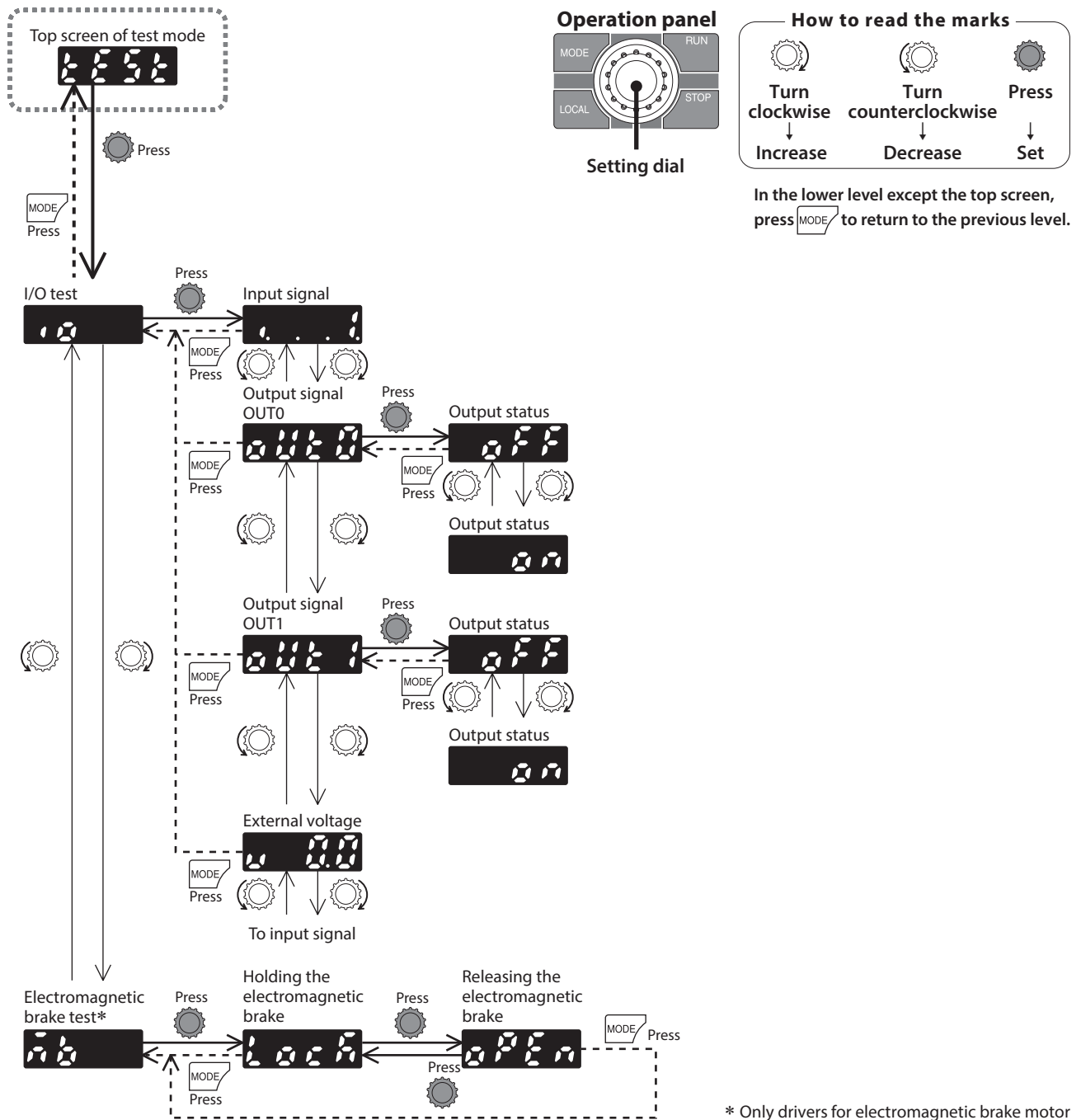
■ Initialization

Initialization is used to restore the data stored in the driver to the factory setting. Any of the operating data only, parameter only or all data can be selected, and the selected data can be restored to the factory setting.

■ Configuration

Executing Configuration can apply the parameters which timing to update is "C: Configuration" to the driver setting.

2-4 Test mode



When pressing the setting dial while operating a motor

The screen cannot move from the top screen of the test mode to the I/O test screen or electromagnetic brake test screen during operation.

An error occurs even when the setting dial is pressed, and **E r r** is displayed.

Be sure to stop the motor operation before pressing the setting dial.

■ I/O test

With the I/O test, the ON-OFF status of each input signal can be checked, and the ON-OFF status of each output signal can be switched.

The ALARM LED on the driver blinks in orange when the screen is moved to the I/O test.

During the I/O test screen, the I/O terminals of CN5 are disabled, and the motor does not rotate even if the operation input signal is turned ON.



If the setting dial is pressed to move to the I/O test screen while the slight position-keeping function is enabled, the holding force is lost.

When the screen is returned to the top screen of the test mode, the holding force is generated.

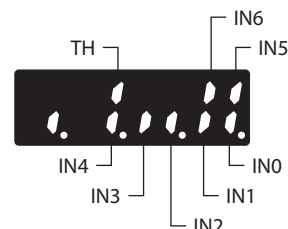
● Input signal

Each digit on the 7-segment LED display corresponds to a signal.

The corresponding digit is lit when the signal is ON, and the digit is unlit when the signal is OFF.

The connection with a programmable controller can be checked.

In this time, the motor does not rotate even if the input signal is turned ON.



● Output signal

The ON-OFF status of the output signal can be switched using the setting dial.

● External voltage

The voltage value input by the external analog setting device can also be checked.

■ Electromagnetic brake test

The electromagnetic brake can be released to bring the motor shaft in a free-run state at motor standstill even if input signals are not connected. It cannot be executed while an alarm is generated.

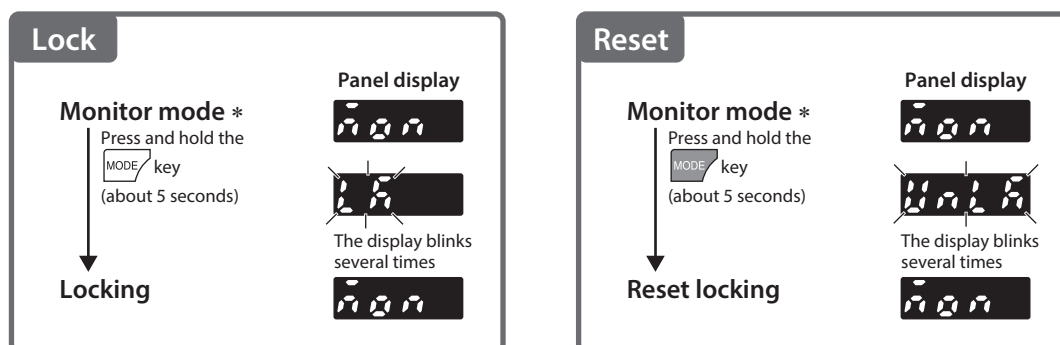


When a load is installed vertically, do not perform the electromagnetic brake test.

The motor loses its holding torque, and the load may fall.

3. Edit lock function

This is a function to prohibit the local control operation in addition to editing and erasing of data and parameters by the operation panel.



* The edit lock function can be set when the top screen of each mode is displayed.

Display while the edit lock function is enabled

If the setting value of the operation data or parameter is tried to change while the edit lock function is enabled, "L H" is displayed for about one second.

Parameter list

Refer to the USER MANUAL for details.

	ID	Parameter name	Setting range	Factory setting	Update *1
Base settings	—	Driver user name	Up to 16 characters	—	A
	1820	Speed, torque limiting command selection	0: Digital setting 1: Analog setting for the speed No.1, and digital setting for others 2: Analog setting for speed, and digital setting for torque limiting 3: Digital setting for speed, and analog setting for torque limiting	0	C
	2033	Speed reduction ratio	100 to 9999	100	A
	2038	Speed reduction ratio digit setting	0: ×1, 1: ×0.1, 2: ×0.01	2	
	2039	Speed increasing ratio	1.00 to 2.00	1.00	
	450	Motor rotation direction	0: Positive direction=CCW 1: Positive direction=CW	1	C
Speed, torque limiting adjustment	2085	Speed upper limit	50 to 4000 [r/min]	4000	B
	2086	Speed lower limit	50 to 4000 [r/min]	50	
	1821	Analog operation speed command gain	0 to 4000 [r/min/V]	850	A
	1822	Analog operation speed command offset	-2000 to +2000 [r/min]	0	
	1823	Analog torque limiting gain	0 to 300 [%/V]	65	
	1824	Analog torque limiting offset	-150 to +150 [%]	0	
	1825	Analog torque limiting maximum value	0 to 300 [%]	300	
Alarm/information setting	384	Overload alarm detection time	0.1 to 40.0 [s]	30.0	A
	414	Prevention of operation at power-on alarm	0: Disable, 1: Enable	1	C
	413	Electromagnetic brake function at alarm *2	0: Lock after coasting to a stop 1: Lock immediately	1	
	447	INFO auto clear	0: Disable 1: Enable	1	A
	416	Driver temperature information	40 to 85 [°C]	85	
	418	Speed information	50 to 5000 [r/min]	5000	
	422	Load information	10 to 300 [%]	300	
	425	Overvoltage information	280 to 440 [V]	435	
	426	Undervoltage information	120 to 280 [V]	120	
	431	Tripmeter information	0: Disable 1 to 999,999,999 (1=0.1 kRev)	0	
	432	Odometer information	0: Disable 1 to 999,999,999 (1=0.1 kRev)	0	
	438	Main power supply time information	0: Disable 1 to 999,999,999 [min]	0	
	439	Main power supply count information	0: Disable 1 to 999,999,999 [times]	0	
	1954	INFO action (Driver temperature information (INFO-DRVTMP)) *3	0: INFO action is not applied 1: INFO action is applied	1	
	1956	INFO action (Overvoltage information (INFO-OVOLT)) *3			
	1957	INFO action (Undervoltage information (INFO-UVOLT)) *3			
	1959	INFO action (Load information (INFO-LOAD)) *3			
	1960	INFO action (Speed information (INFO-SPD)) *3			

*1 Timing to update

A: Update immediately (Recalculation and setup are immediately executed when the parameter is written.)

B: Update after operation stop (Recalculation and setup are executed when the operation is stopped.)

C: Update after executing configuration or turning on the power again

(Recalculation and setup are executed after the configuration is executed or the power is turned on again.)

D: Update after turning on the power again (Recalculation and setup are executed after the power is turned on again.)

*2 Only drivers for electromagnetic brake motor are available.

*3 It is enabled for drivers with software version 3.00 or later.

	ID	Parameter name	Setting range	Factory setting	Update *1	
Alarm/information setting	1964	INFO action (Operation prohibited information (INFO-DRV)) *3	0: INFO action is not applied 1: INFO action is applied	1	A	
	1972	INFO action (Tripmeter information (INFO-TRIP)) *3				
	1973	INFO action (Odometer information (INFO-ODO)) *3				
	1978	INFO action (Main power supply time information (INFO-PTIME)) *3				
	1979	INFO action (Main power supply count information (INFO-PCOUNT)) *3				
	1980	INFO action (Start operation restricted mode information (INFO-DSLMTD)) *3				
	1981	INFO action (I/O test mode information (INFO-IOTEST)) *3				
	1982	INFO action (Configuration request information (INFO-CFG)) *3				
	1983	INFO action (Power cycling request information (INFO-RBT)) *3				
Operation	2069	Slight position-keeping function selection	0: Disable 1: Enable	0	C	
	329	Acceleration/deceleration unit selection	0: [s / 3000 r/min] 1: [s]	0	B	
	330	Impact softening filter	0: No filter 1: Filter 1 2: Filter 2	0		
I/O action	1819	Operation input mode selection	0: 2-Wire input mode 1 1: 3-Wire input mode 1 2: 2-Wire input mode 2 3: 2-Wire input mode 3 4: 3-Wire input mode 2 5: 3-Wire input mode 3	0	C	
	1817	VA detection width	1 to 400 [r/min]	200	A	
I/O function selection	2112	IN0 input function selection	0: Not used, 8: ALARM-RESET 14: INFO-CLR, 16: HMI 22: TL, 25: EXT-ERROR 58: FWD (START/STOP) 59: REV (RUN/BRAKE) 64: M0, 65: M1 66: M2, 67: M3 72: STOP-MODE (CW/CCW) 73: MB-FREE *2, 74: H-FREE	58	C	
	2113	IN1 input function selection		59		
	2114	IN2 input function selection		72		
	2115	IN3 input function selection		64		
	2116	IN4 input function selection		65		
	2117	IN5 input function selection		8		
	2118	IN6 input function selection		73		
	2128 to 2134	IN0 logic level setting to IN6 logic level setting	0: Not invert 1: Invert	0		
	2144	OUT0 output function selection	0: Not used, 130: ALARM-OUT 134: MOVE, 135: INFO 140: TLC, 141: VA 147: SPEED-OUT, 148: DIR	147		
	2145	OUT1 output function selection		130		
	2160	OUT0 logic level setting	0: Not invert 1: Invert	0		
	2161	OUT1 logic level setting				
I/F function	488	Operation panel editing	0: Disable, 1: Enable	1	A	
	489	Operation panel initial view	0: Rotation speed [r/min] 1: Load factor [%] 2: Operation data number	0		
	498	USB-ID enable	0: Disable, 1: Enable	1	D	
	499	USB-ID	0 to 999,999,999	0		
	2555	USB-PID	0 to 31	0		

*1 Timing to update

A: Update immediately (Recalculation and setup are immediately executed when the parameter is written.)

B: Update after operation stop (Recalculation and setup are executed when the operation is stopped.)

C: Update after executing configuration or turning on the power again

(Recalculation and setup are executed after the configuration is executed or the power is turned on again.)

D: Update after turning on the power again (Recalculation and setup are executed after the power is turned on again.)

*2 Only drivers for electromagnetic brake motor are available.

*3 It is enabled for drivers with software version 3.00 or later.

Maintenance and inspection

1. Inspection

It is recommended that periodic inspections for the items listed below are conducted after each operation of the motor. If an abnormal condition is noted, discontinue any use and contact your nearest Oriental Motor sales office.



- Do not conduct the insulation resistance measurement or dielectric strength test with the motor and driver connected. Doing so may cause damage to the product.
- The driver uses semiconductor elements, so be extremely careful when handling them. Static electricity may damage the driver.

■ Inspection item

- Check if any of the mounting screws of the motor and gearhead is loose.
- Check if the bearing part (ball bearings) of the motor generates unusual noises.
- Check if the bearing part (ball bearings) or gear meshing part of the gearhead generates unusual noises.
- Check if the output shaft of the motor and gearhead and a load shaft are out of alignment.
- Check if a damage or stress is applied on the cable or the connection part between the cable and driver is loose.
- Check if the openings in the driver are clogged.
- Check if any of the driver mounting screws or the connection part of the main power supply input is loose.
- Check if there is any abnormality or unusual smell inside the driver.

2. Warranty

Check on the Oriental Motor Website for the product warranty.

3. Disposal


Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.

Troubleshooting

During motor operation, the motor or driver may fail to function properly due to an improper speed setting or wiring. When the motor cannot be operated properly, refer to the contents provided in this chapter and take appropriate action. If the problem persists, contact your nearest Oriental Motor sales office.



- Check the alarm contents when an alarm is generated.
- I/O signals can be monitored with the monitor mode. Use it to check the wiring condition of the I/O signals.

The motor does not operate.	<ul style="list-style-type: none"> ● The power supply is not connected correctly or it is improper connection. <ul style="list-style-type: none"> ▷ Check the connection of the power supply. ● An operation using external signals is being tried while the local control operation is performed. <ul style="list-style-type: none"> ▷ Press LOCAL key to set the remote control operation. ● When the local control operation is not set, RUN key is pressed. <ul style="list-style-type: none"> ▷ Press LOCAL key to set the local control operation before pressing RUN key. ● Both the FWD input and the REV input are being OFF. Both the FWD input and the REV input are being ON. <ul style="list-style-type: none"> ▷ Turn either the FWD input or the REV input ON. ● An alarm is present. <ul style="list-style-type: none"> ▷ A protective function is triggered and an alarm is being generated. Refer to p.44 and reset the alarm after removing the cause of the alarm.
The rotation speed is not displayed.	<ul style="list-style-type: none"> ● The "Operation panel initial view" parameter is not set to the rotation speed. <ul style="list-style-type: none"> ▷ Set the "Operation panel initial view" parameter to the rotation speed. ● The "Speed reduction ratio" and "Speed increasing ratio" parameters are being set. <ul style="list-style-type: none"> ▷ Check the "Speed reduction ratio" and "Speed increasing ratio" parameters.
 is displayed and the setting is unable	<ul style="list-style-type: none"> ● The analog setting is applied to the rotation speed, and the speed teaching function is being executed. <ul style="list-style-type: none"> ▷ When the speed teaching function is performed, set to the digital setting. ● The ALARM-RESET is being executed using the operation panel in a state where both the FWD input and the REV input are not turned OFF while an alarm is generated. <ul style="list-style-type: none"> ▷ Turn both the FWD input and the REV input OFF before executing the ALARM-RESET input. ● Rewriting the data on the operation panel or setting to the local control operation is tried while the communication is performed via the MEXE02. <ul style="list-style-type: none"> ▷ During communication, do not change the data on the operation panel. Also, do not set to the local control operation.
ALARM LED (orange) blinks	<ul style="list-style-type: none"> ● Information is present. <ul style="list-style-type: none"> ▷ Information is present because of any of causes. Refer to the USER MANUAL, and check the cause of information and how to reset.
The motor rotates in the opposite direction against the specified direction.	<ul style="list-style-type: none"> ● The FWD input and the REV input are connected wrongly or otherwise not connected correctly. <ul style="list-style-type: none"> ▷ Check the connection of the FWD input and the REV input. ● The gearhead with a reduction ratio which rotation direction is opposite to the motor output shaft is used. <ul style="list-style-type: none"> ▷ Check the operating manual included with the motor for the rotation direction of the gearhead output shaft. ● The "Motor rotation direction" parameter is set to 0 (positive direction=CCW). <ul style="list-style-type: none"> ▷ Change the setting for the "Motor rotation direction" parameter to 1 (positive direction=CW).
The setting cannot be performed using the setting dial.	<ul style="list-style-type: none"> ● The edit lock function is enabled or the "Operation panel editing" parameter is set to disable. <ul style="list-style-type: none"> ▷ Release the edit lock function or enable the setting of the "Operation panel editing" parameter.
The rotation speed cannot be increased.	<ul style="list-style-type: none"> ● The speed upper limit is set. <ul style="list-style-type: none"> ▷ Increase the speed upper limit.
The rotation speed cannot be decreased.	<ul style="list-style-type: none"> ● The speed lower limit is set. <ul style="list-style-type: none"> ▷ Decrease the speed lower limit.
The motor movement is not stable. Motor vibration is too large.	<ul style="list-style-type: none"> ● The motor and gearhead output shaft and a load shaft are out of alignment. <ul style="list-style-type: none"> ▷ Check the installation status of the motor (gearhead) output shaft and load shaft. ● The product is affected by electrical noise. <ul style="list-style-type: none"> ▷ Check the operation using the motor, driver, and a minimum of external devices required to operate. If an effect of noise has been confirmed, implement the following countermeasures: [Keep away from the noise sources.] [Reconsider the wiring.] [Change the signal cable to a shielded cable.] [Install ferrite cores.]

Alarm

This driver has the alarm function to protect from temperature rise, poor connection, error in operation, and others. If an alarm is generated, the ALARM-OUT output is turned OFF, and the motor stops. At the same time, the alarm code is displayed on the operation panel, and the ALARM LED blinks in red. (With the drivers for electromagnetic brake motor, the electromagnetic brake holds the motor shaft.) Refer to the USER MANUAL for the information function that are output before an alarm is generated.

1. Alarm reset

Before resetting an alarm by one of the following methods, be sure to remove the cause of the alarm and ensure safety.

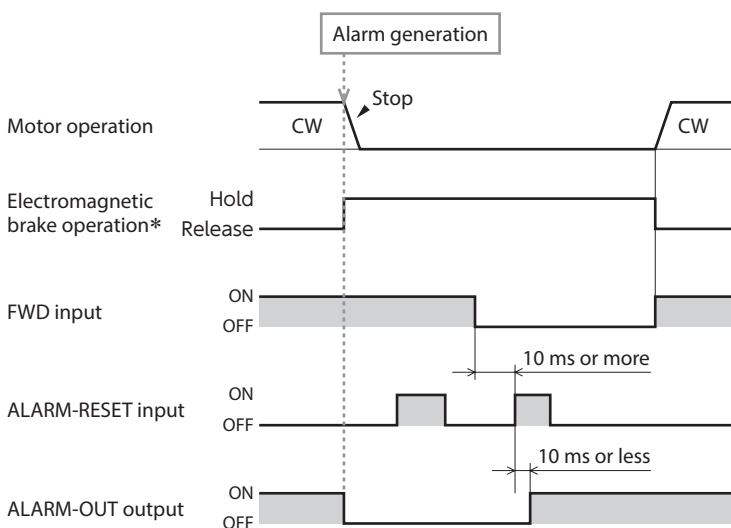
- Turn the ALARM-RESET input ON. (The alarm will be reset at the ON edge of the input.)
- Execute an alarm reset using the operation panel.
- Execute the alarm reset using the **MEXE02**.
- Turn on the power again.



- Some alarms cannot be reset other than turning on the power again. Check with "3. Alarm lists."
- Continuing the operation without removing the cause of the alarm may cause damage to equipment.

When an alarm is reset by the ALARM-RESET input

To reset an alarm, turn both the FWD input and the REV input OFF, and remove the cause of the alarm before turning the ALARM-RESET input ON. If either the FWD input or the REV input is being ON, the ALARM-RESET input is disabled. (In the case of the 3-wire mode, when both the START/STOP input and the RUN/BRAKE input are being ON, the ALARM-RESET input is disabled.) When the alarm cannot be reset by the ALARM-RESET input, once turn off the driver power, and turn on the power again after the CHARGE LED is turned off.



* The electromagnetic brake will activate to hold the load at the moment an alarm generates. (The action of the electromagnetic brake can be changed with the "Electromagnetic brake function at alarm" parameter. However, do not change the parameter setting when using the motor in an application of vertical drive such as elevating equipment.)

2. Alarm history

Up to 10 generated alarms are saved in the non-volatile memory in order of the latest to oldest. The alarm history is not cleared even if the power is shut off. The history can be checked and cleared by the following methods.

- Operation panel: The alarm history can be checked and cleared with the monitor mode.
- **MEXE02**: The alarm history can be checked and cleared with the alarm monitor.

3. Alarm lists

Alarm	Cause	Remedial action	Reset by the ALARM-RESET
 Overcurrent	<ul style="list-style-type: none"> ● Excessive current was flown through the driver due to ground fault, etc. ● A different combination in output powers for the motor and the driver was used. 	<ul style="list-style-type: none"> ● Check whether the wiring between the driver and motor is damaged. ● Match the output powers for the motor and the driver. 	Not possible

Alarm	Cause	Remedial action	Reset by the ALARM-RESET
 Main circuit overheat	<ul style="list-style-type: none"> The temperature inside the driver exceeded the detection temperature of the alarm. 	<ul style="list-style-type: none"> Reconsider the ambient temperature. Reconsider the ventilation condition in the enclosure. 	Possible
 Overvoltage	<ul style="list-style-type: none"> The power supply voltage exceeded approximately 120% of the rated voltage. A large inertia load was stopped abruptly. 	<ul style="list-style-type: none"> Check the power supply voltage. If this alarm is generated during operation, decrease the load or increase the acceleration/deceleration time. 	Possible
 Undervoltage	<ul style="list-style-type: none"> The power supply voltage dropped below approximately 60% of the rated voltage. 	<ul style="list-style-type: none"> Check the power supply voltage. Check the wiring of the power supply cable. 	Possible
 Sensor error	<ul style="list-style-type: none"> The sensor line of the connection cable was disconnected. Or the connection cable was come off. 	<ul style="list-style-type: none"> Check the wiring between the driver and motor. 	Possible
 Main circuit output error *1	<ul style="list-style-type: none"> The power lines of the connection cable were all disconnected. Or the connection cable was come off. A different combination in output powers for the motor and the driver was used. 	<ul style="list-style-type: none"> Check the wiring between the driver and motor. Match the output powers for the motor and the driver. 	Possible
 Overload	<ul style="list-style-type: none"> A load exceeding the rated torque was applied to the motor for the time set in the "Overload alarm detection time" parameter. The time when the overload alarm is generated varies according to the load torque. Refer to the USER MANUAL for details. 	<ul style="list-style-type: none"> Decrease the load. Reconsider the operating conditions such as the acceleration/deceleration time. If this alarm is generated in low temperature environment, perform a trial operation in a light load state. 	Possible
 Overspeed	<ul style="list-style-type: none"> The motor detection speed was exceeded 5200 [r/min]. A different combination in output powers for the motor and the driver was used. 	<ul style="list-style-type: none"> Decrease the load. Reconsider the operating conditions such as the acceleration/deceleration time. Match the output powers for the motor and the driver. 	Possible
 EEPROM error	<ul style="list-style-type: none"> The stored data of the driver was damaged. 	<ul style="list-style-type: none"> Initialize the parameters. 	Not possible
 Sensor error at power-on	<ul style="list-style-type: none"> The sensor line of the connection cable was disconnected before the power is supplied. Or the connection cable was come off. 	<ul style="list-style-type: none"> Check the wiring between the driver and motor. 	Possible
 Prevention of operation at power-on *2	<ul style="list-style-type: none"> The power supply was turned on again when the operation input signal was being ON. 	<ul style="list-style-type: none"> Before supplying power to the driver, turn the operation input signal OFF. 	Possible
 Regeneration resistor overheat	<ul style="list-style-type: none"> The regeneration resistor is not connected properly. The regeneration resistor was overheated extraordinarily. 	<ul style="list-style-type: none"> Check the connection for the thermostat output and the TH input of the regeneration resistor. The power consumption of the regeneration resistor exceeds the allowable level. Reconsider the load condition and operating conditions. 	Possible
 External stop	<ul style="list-style-type: none"> The EXT-ERROR input was turned OFF. 	<ul style="list-style-type: none"> Check the EXT-ERROR input. 	Possible

*1 This alarm is not generated when the torque limit value is set to approximately 60% or less.

*2 This alarm can be disabled with the "Prevention of operation at power-on alarm" parameter.

About regeneration resistor overheat alarm

The regeneration resistor overheat alarm "AL.51" may be generated even if the regeneration resistor is not connected. Once the main power supply is turned on in a state where the pin Nos. 10 and 11 (TH input) of CN5 are short-circuited, the driver recognizes that the regeneration resistor is connected and changes to the setting that the regeneration resistor is used. After that, if the power supply is turned on again in a state where nothing is connected to the pin Nos. 10 and 11 of CN5, the regeneration resistor overheat alarm will be generated.

To cancel the setting to use the regeneration resistor, execute initialization of parameters without connecting anything to the pin Nos. 10 and 11 of CN5. Then, turning on the main power supply again will reset the alarm.

Specifications

1. Specifications

Values in the rated torque, peak torque, rated rotation speed, and speed control range represent those in a state where the gearhead is not combined.

Refer to the operating manual included with the motor for the motor model name.

● 30 W and 60 W

Model		BLM230HP		BLM460SHP BLM260HP	
Driver		BLE2D30-A	BLE2D30-C	BLE2D60-A	BLE2D60-C
Rated output power (Continuous)		30 W		60 W	
Power supply input	Rated voltage	Single-phase 100-120 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC	Single-phase 100-120 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC
	Permissible voltage range	-15% to +10%			
	Rated frequency	50/60 Hz			
	Permissible frequency range	±5%			
	Rated input current	Single-phase: 1.1 A	Single-phase: 0.67 A Three-phase: 0.39 A	Single-phase: 1.7 A	Single-phase: 1.0 A Three-phase: 0.61 A
	Maximum input current	Single-phase: 3.3 A	Single-phase: 2.2 A Three-phase: 1.2 A	Single-phase: 5.4 A	Single-phase: 3.5 A Three-phase: 2.0 A
Rated torque		0.096 N·m		0.191 N·m	
Peak torque		0.2 N·m (80 to 2000 r/min)		0.4 N·m (80 to 2000 r/min)	
Rated rotation speed		3000 r/min			
Speed control range		80 to 4000 r/min *			

* There are products which maximum rotation speed is 3600 r/min depending on the type of gearhead.
Check the operating manual included with the motor.

● 120 W and 200 W

Model		BLM5120HP		BLM6200SHP BLM5200HP BLM7200HW
Driver		BLE2D120-A BLE2D120-AM	BLE2D120-C BLE2D120-CM	BLE2D200-C BLE2D200-CM
Rated output power (Continuous)		120 W		200 W
Power supply input	Rated voltage	Single-phase 100-120 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC
	Permissible voltage range	-15% to +10%		
	Rated frequency	50/60 Hz		
	Permissible frequency range	±5%		
	Rated input current *2	Single-phase: 2.7 A (2.8 A)	Single-phase: 1.7 A (1.7 A) Three-phase: 1.02 A (1.02 A)	Single-phase: 2.4 A (2.5 A) Three-phase: 1.4 A (1.5 A)
	Maximum input current	Single-phase: 7.4 A	Single-phase: 4.8 A Three-phase: 3.3 A	Single-phase: 6.5 A Three-phase: 4.3 A
Rated torque		0.382 N·m		0.637 N·m
Peak torque		0.8 N·m (80 to 2000 r/min)		1.15 N·m (80 to 2000 r/min)
Rated rotation speed		3000 r/min		
Speed control range		80 to 4000 r/min *1		

*1 There are products which maximum rotation speed is 3600 r/min depending on the type of gearhead.
Check the operating manual included with the motor.

*2 Values in parentheses () indicate those of drivers for electromagnetic brake motor.

● 300 W and 400 W

Model	Motor	BLM6300SHP BLM5300HP	BLM6400SHP BLM5400HP
	Driver	BLE2D300-C	BLE2D400-S
Rated output power (Continuous)		300 W	400 W
Power supply input	Rated voltage	Single-phase 200-240 VAC Three-phase 200-240 VAC	Three-phase 200-240 VAC
	Permissible voltage range	-15% to +10%	
	Rated frequency	50/60 Hz	
	Permissible frequency range	±5%	
	Rated input current	Single-phase: 3.2 A Three-phase: 1.8 A	Three-phase: 2.3 A
	Maximum input current	Single-phase: 8.5 A Three-phase: 6.0 A	Three-phase: 6.1 A
Rated torque		0.955 N·m	1.27 N·m
Peak torque		1.72 N·m (80 to 2000 r/min)	2.28 N·m (80 to 2000 r/min)
Rated rotation speed		3000 r/min	
Speed control range		80 to 4000 r/min *	

* There are products which maximum rotation speed is 3600 r/min depending on the type of gearhead.
Check the operating manual included with the motor.

2. General specifications

Operating environment	Ambient temperature	Driver: 0 to +50 °C [+32 to +122 °F] (non-freezing) *
	Ambient humidity	85% or less (non-condensing)
	Altitude	Up to 1000 m (10000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. Not exposed to oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environment. (For details about installation locations, refer to p.12.)
	Vibration	Not subject to continuous vibrations or excessive impact. In conformance with JIS C 60068-2-6 "Sine-wave vibration test method" Frequency range: 10 to 55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times
Storage environment Shipping environment	Ambient temperature	Driver: -25 to +70 °C [-13 to +158 °F] (non-freezing)
	Ambient humidity	85% or less (non-condensing)
	Altitude	Up to 3000 m (10000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environment
Degree of protection		Driver: IP20

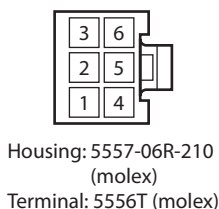
* The conditions of use vary when two or more drivers are installed closely in the horizontal direction. Refer to p.13 for details.

3. Pin assignment

The pin assignments of the connectors for driver connection of the connection cable are shown here. The following figures represent as the view from the direction of the lead wires side of the connection cable.

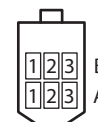
● Power connector (white) CN2

Pin No.	Lead wire color	Lead wire size
1	Blue	AWG18
2	—	—
3	—	Drain AWG24 or equivalent
4	Purple	AWG18
5	Gray	
6	—	—



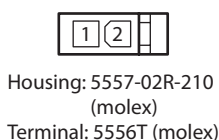
● Sensor connector (black) CN4

Pin No.	Lead wire color	Lead wire size
A3	—	—
A2	Green	AWG26
A1	Yellow	
B3	Brown	
B2	Red	
B1	Orange	



● Electromagnetic brake connector (white) CN3 *

Pin No.	Lead wire color	Lead wire size
1	Black	AWG22
2	White	



* Only drivers for electromagnetic brake motor

Regulations and standards

1. UL Standards, CSA Standards

This products is recognized by UL under the UL and CSA Standards.

Applicable Standards	Certification body	Standards File No.
UL 61800-5-1 CSA C22.2 No.274	UL	E171462

2. EU Directives

This products is affixed the CE Marking under the Low Voltage Directive and EMC Directive.

■ CE Marking

● Low Voltage Directive

Applicable standards	EN 61800-5-1
Installation conditions (EN Standards)	For incorporating in equipment Overvoltage category: II Pollution degree: 2 Degree of protection: IP20 Protection against electric shock: Class I equipment

- This product is designed and manufactured to be incorporated in equipment.
- This product cannot be used in IT power distribution systems.
- Install the product inside an enclosure in order to avoid contact with hands.
- Be sure to ground (protective earth) if the product can be made contact with hands. Ground the Protective Earth Terminals for the motor (or connection cable) and driver securely.
- Isolate power cables such as the connection cable, power supply cable and other drive cables from the signal cable (CN5) and USB cable by means of double insulation.

● EMC Directive

This product has received EMC compliance under the conditions specified in "Example of installation and wiring" on p.50. The final level of conformance of your mechanical equipment to the EMC Directive will vary depending on such factors as the control system equipment used with the motor and driver, configuration of electrical parts, wiring, layout and hazard level. It therefore must be verified through conducting EMC measures on your mechanical equipment.

Applicable standards

EMI	EN 55011 Group 1 Class A EN 61000-6-4, EN 61800-3
EMS	EN 61000-6-2, EN 61800-3

Caution: This equipment is not intended for use in residential environments nor for use on a low-voltage public network supplied in residential premises, and it may not provide adequate protection to radio reception interference in such environments.

3. Republic of Korea, Radio Waves Act

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

4. RoHS Directive

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

5. Installing and wiring in compliance with EMC Directive

This product has been designed and manufactured to be incorporated in equipment. The EMC Directive requires that your mechanical equipment in which the product is installed satisfies the applicable requirements.

The installation and 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 Directive.

The final level of conformance of your mechanical equipment to the EMC Directive will vary depending on such factors as the control system equipment used with the motor/driver, configuration of electrical parts, wiring, layout and hazard level. It therefore must be verified through conducting EMC measures on your mechanical equipment.

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

The use of the following installation and wiring methods will enable this product to be compliant with the EMC directive.

■ Connecting a mains filter

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

Manufacturer	Single-phase 100-120 VAC Single-phase 200-240 VAC	Three-phase 200-240 VAC
Soshin Electric Co., Ltd.	HF2010A-UPF, NF2010A-UP	HF3010C-SZA, NFU3010C-Z1
Schaffner EMC	FN2070-10-06	FN3025HP-10-71

- Overvoltage category II applies to mains filters.
- Install the mains filter as close to the driver as possible.
- 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 an external power supply

Use an external power supply conforming to the EMC Directive. Use a shielded cable to wire the external power supply over the shortest possible distance. Refer to "Wiring the power supply cable" for how to ground the shielded cable.

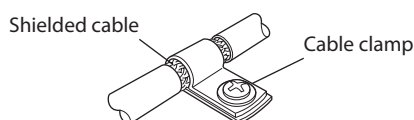
■ How to ground

The cable used to ground the motor, driver, mains filter and power supply cable (shielded cable) must be as thick and short as possible so that no potential difference is generated among the grounding points. Choose a large, thick and uniformly conductive surface for the grounding point. Refer to the p.16 for the recommended grounding method.

■ Wiring of the power supply cable

Use a shielded cable of AWG18 to 14 (0.75 to 2.0 mm²) in diameter for the 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 the ground connection.

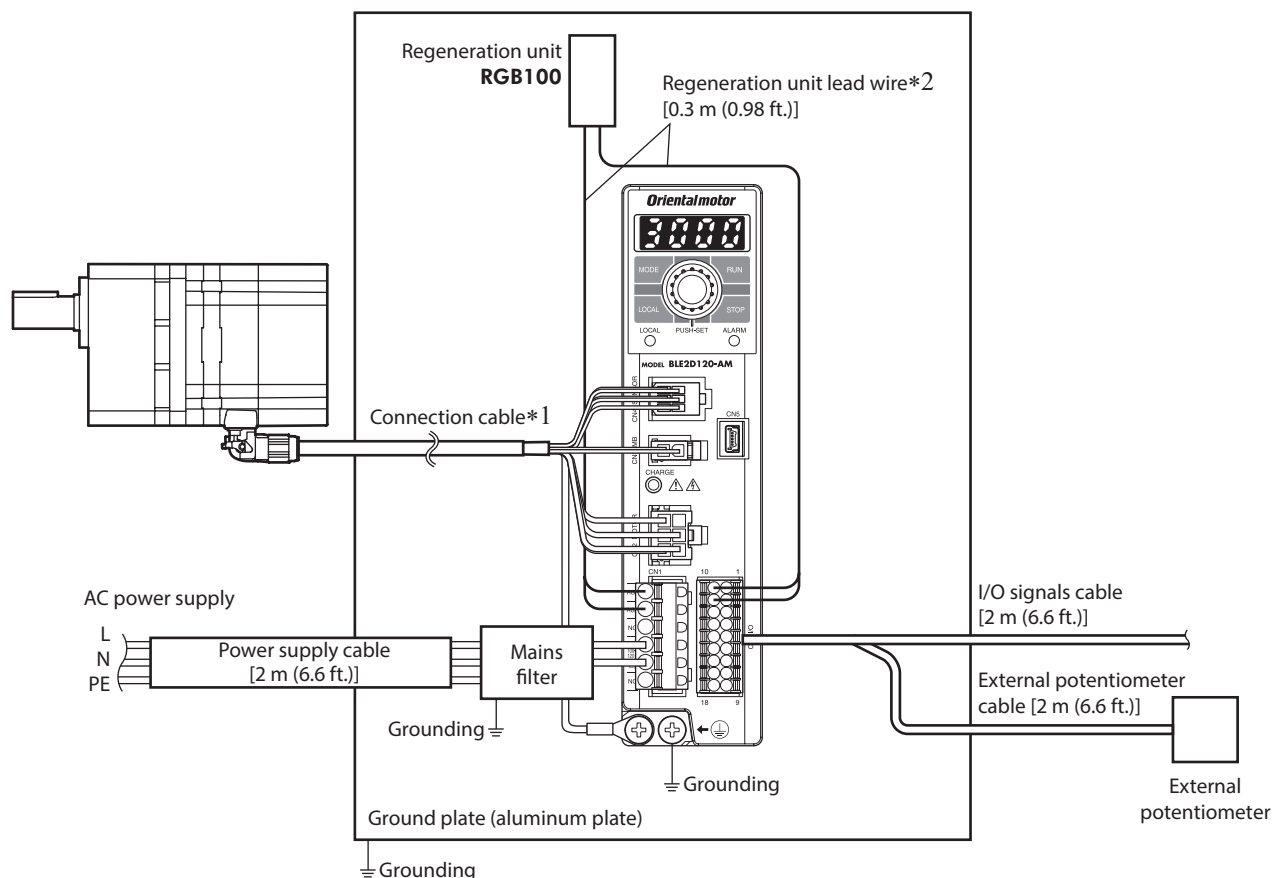
Connect both ends (mains filter side and power supply side) of the shielded cable to the grounding points so that no potential difference is generated between grounds.



■ 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 product, use mains filters or 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 connection cable and power supply 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 a dedicated connection cable (sold separately) for the connection between the motor and driver.
The EMC measures are conducted using the Oriental Motor connection cable.

■ Example of installation and wiring



*1 The connection cables for up to 20.5 m (67.2 ft.) have been evaluated.

*2 Non-shielded cable

■ Precautions about static electricity

Static electricity may cause damage to the driver.

Be sure to ground the product in order to prevent electric shock or product damage by static electricity.

Except when operating the operation panel on the driver, do not approach or touch the driver while the power is on.

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