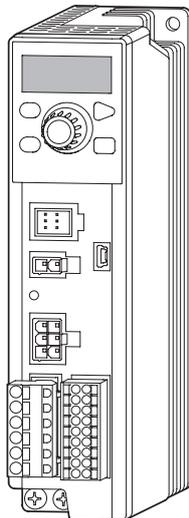


OPERATING MANUAL

Brushless Motor BLE2 Series



Thank you for purchasing an Oriental Motor product. This Operating Manual describes product handling procedures and safety precautions.

- Please read the manual thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.
- Only qualified personnel of electrical and mechanical engineering should work with the product.
- 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.

Safety precautions

Be sure to read before using the product. Use the product correctly after thoroughly reading this section.

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Use the product correctly after thoroughly
reading this section.



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

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

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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.
	The items under this heading contain related information and contents to gain a further understanding of the text in this manual.

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, in places 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.	Electric shock or damage to equipment may result.
	The terminals on the driver marked   symbol 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.	This may result in fire, electric shock or damage to equipment.
	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.	
	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 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 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.
---	--	--

CAUTION

Handling of this product

	Do not use the motor, 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, driver, and regeneration resistor while operating or for a certain time after stopping.	The surface of the motor, 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 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.

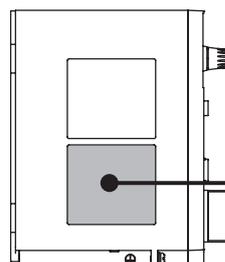
Operation

	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.	
	Take safety measures in the event of a momentary voltage drop. This may cause the motor to stop or reduce the holding force, rotational torque, or rotation speed.	Failure to do so may result in injury or damage to equipment.
	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	
• 取説を、運転の前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ブに接触しないで下さい。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.83 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 of the motor for details.

- 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.23 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.

Driver version

Check the firmware version of the driver

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**. (⇒ p.66)

The version of the **MEXE02** can be checked from the help menu screen.

Related operating manuals

Operating manuals are not included with the product. Download from Oriental Motor Website Download Page or contact your nearest Oriental Motor sales office.

	Operating manual name
Driver	BLE2 Series OPERATING MANUAL (this document)
	BLM Motor OPERATING MANUAL
Motor	BLM Motor Connector Type JH Gearhead/ JB Gearhead/ JV Gearhead OPERATING MANUAL
	BLM Motor OPERATING MANUAL

Safety precautions

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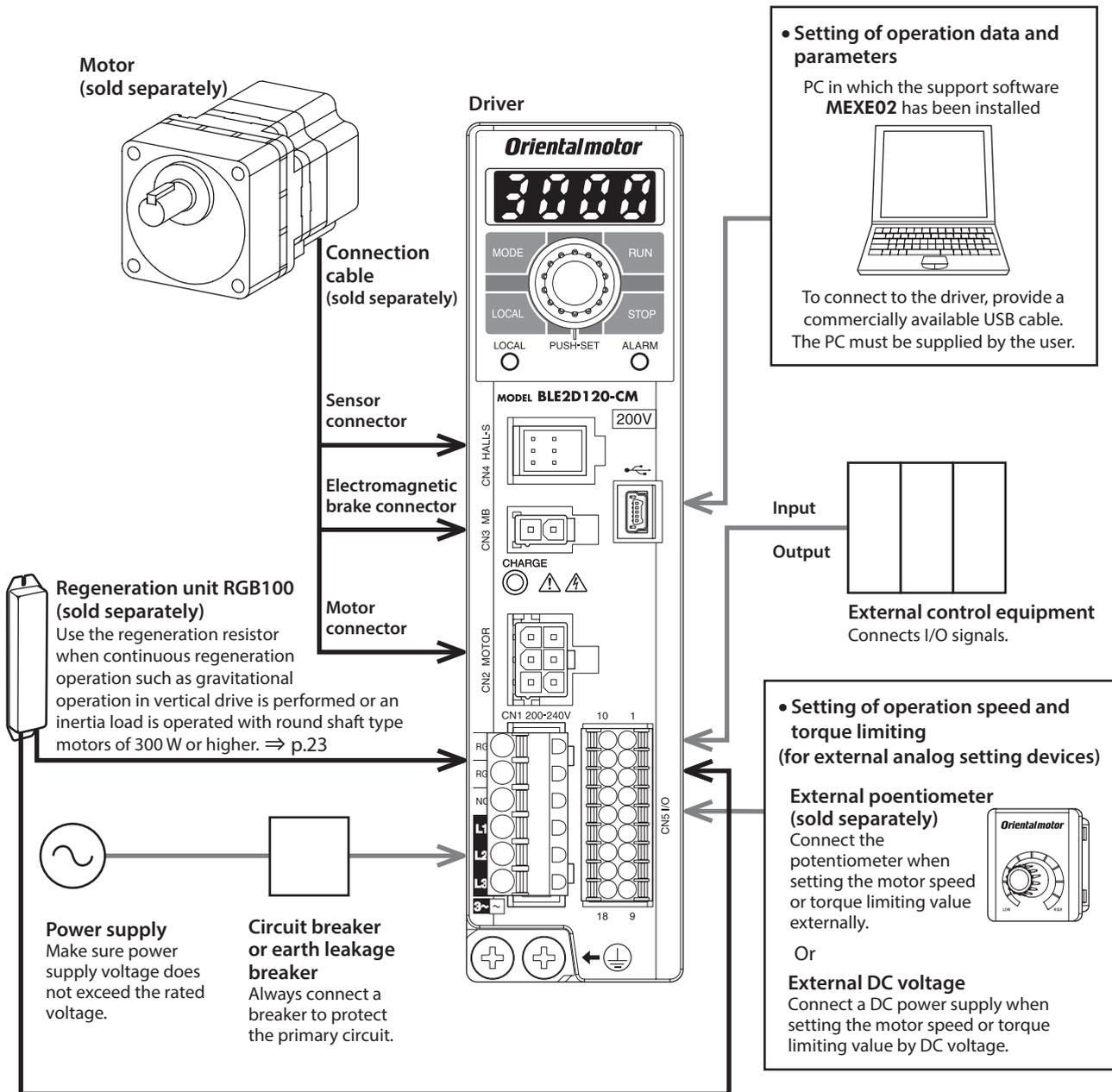
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System configuration

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



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Checking the product

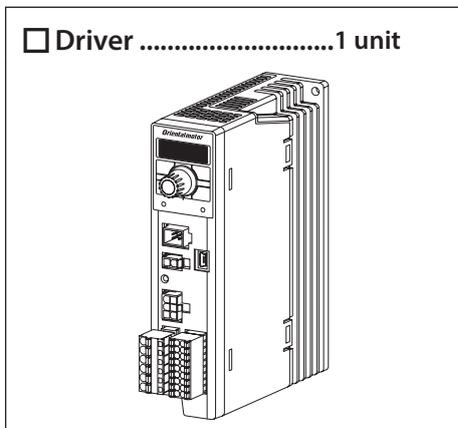
This chapter explains the items you should check, as well as the name and function of each part.

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.

Driver1 unit



Instructions and Precautions for Safe Use1 copy

2. How to identify the product model

● Driver

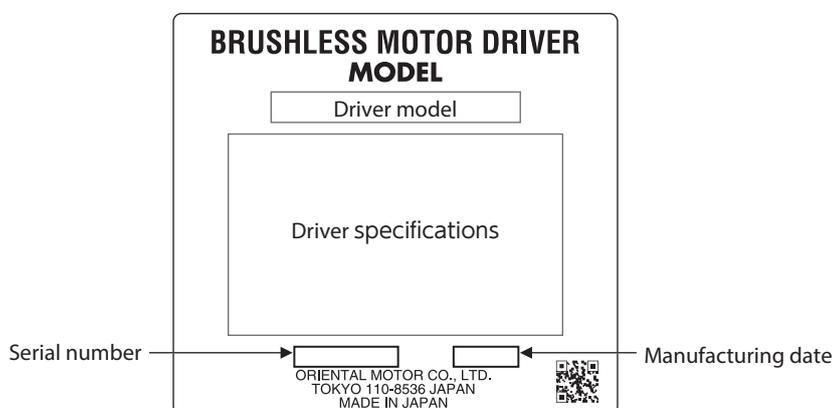
BLE2D 200 - C M

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

* **BLE2D400-C** : Single-phase 200-240 VAC only

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.

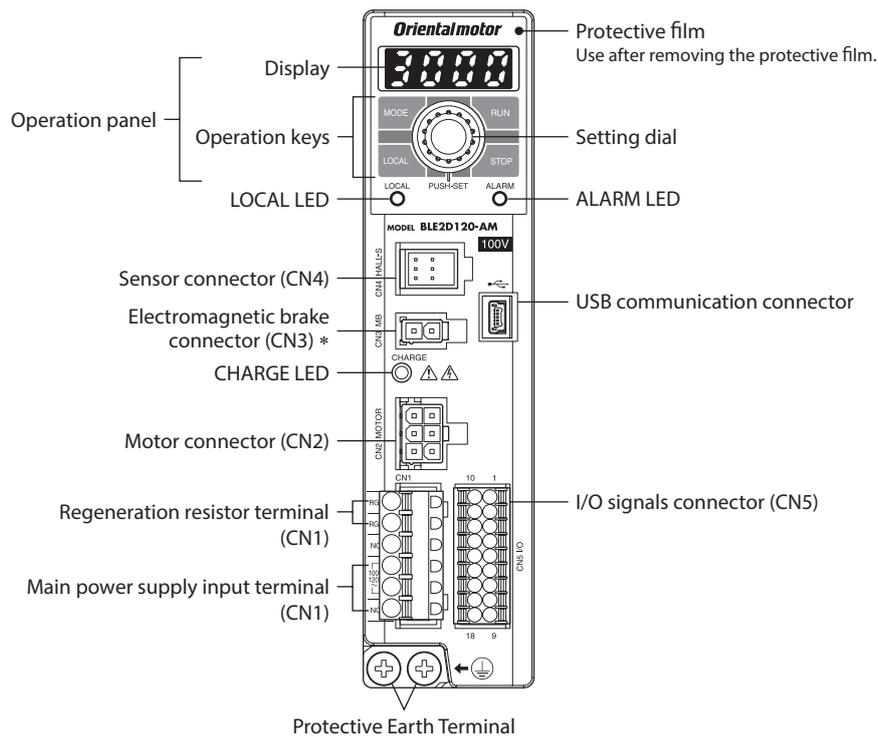
Motor model columns in the table below describes part of the motor model name. Refer to the operating manual of the motor for details about the motor models.

Output power	Power supply voltage	Driver model	Motor model
30 W	Single-phase 100-120 VAC	BLE2D30-A	BLM230HP
	Single-phase 200-240 VAC	BLE2D30-C	
	Three-phase 200-240 VAC		
60 W	Single-phase 100-120 VAC	BLE2D60-A	BLM460SHP BLM260HP
	Single-phase 200-240 VAC	BLE2D60-C	
	Three-phase 200-240 VAC		
120 W	Single-phase 100-120 VAC	BLE2D120-A	BLM5120HP
	Single-phase 200-240 VAC	BLE2D120-C	
	Three-phase 200-240 VAC		
200 W	Single-phase 100-120 VAC	BLE2D200-A	BLM6200SHP BLM5200HP BLM7200HW
	Single-phase 200-240 VAC	BLE2D200-C	
	Three-phase 200-240 VAC		
300 W	Single-phase 200-240 VAC	BLE2D300-C	BLM6300SHP BLM5300HP BLM7300HW
	Three-phase 200-240 VAC		
400 W	Single-phase 200-240 VAC	BLE2D400-C	BLM6400SHP BLM5400HP BLM7400HW
	Three-phase 200-240 VAC	BLE2D400-S	

● With Electromagnetic Brake

Output power	Power supply voltage	Driver model	Motor model
30 W	Single-phase 100-120 VAC	BLE2D30-AM	BLM230HPM
	Single-phase 200-240 VAC	BLE2D30-CM	
	Three-phase 200-240 VAC		
60 W	Single-phase 100-120 VAC	BLE2D60-AM	BLM460SHPM BLM260HPM
	Single-phase 200-240 VAC	BLE2D60-CM	
	Three-phase 200-240 VAC		
120 W	Single-phase 100-120 VAC	BLE2D120-AM	BLM5120HPM
	Single-phase 200-240 VAC	BLE2D120-CM	
	Three-phase 200-240 VAC		
200 W	Single-phase 100-120 VAC	BLE2D200-AM	BLM6200SHPM BLM5200HPM
	Single-phase 200-240 VAC	BLE2D200-CM	
	Three-phase 200-240 VAC		

5. Names and functions of parts



Item	Indication	Description	Reference page
Operation panel		Display: This display shows the monitor items, setting screen, alarms, etc.	48
	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 RUN key and STOP 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.	48
ALARM LED	ALARM	This LED blinks in red when an alarm is generated. This LED blinks in orange when information is generated.	72, 74
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.	16
	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).	23
Motor connector (CN2)	MOTOR	Connects the power connector (white) of the connection cable.	17
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.	22
I/O signals connector (CN5)	I/O	Connects input signals and output signals.	19
		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.	18
Mounting holes (two places at the rear)		These mounting holes are used to install the driver with screws (M4).	14

* 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

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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.

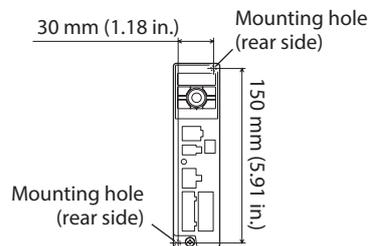
Note

- Install the driver in an enclosure whose degree of protection is IP54 minimum if the driver is used in an environment of pollution degree 3.
- 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)

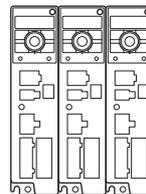


- When drivers are installed in a close contact state
Install drivers to a flat metal plate offering high heat conductivity [corresponding to an aluminum plate of 350×350×2 mm (13.78×13.78×0.08 in.) or larger].

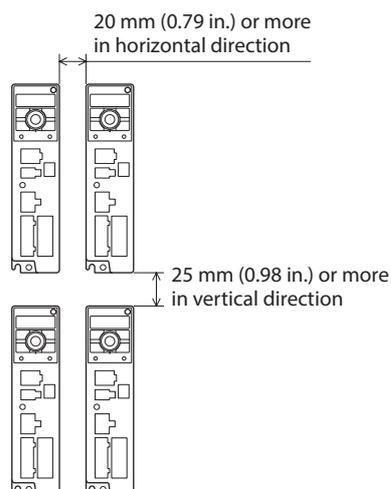
Operating ambient temperature

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 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.



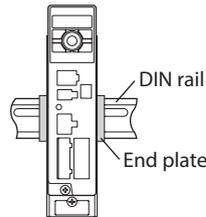
■ When a driver is installed to a DIN rail

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.

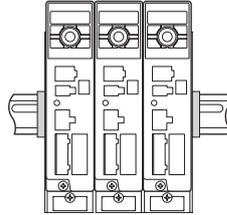
Refer to "**MADP02** handling guideline" for installation method.

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



● When drivers are installed in a close contact state

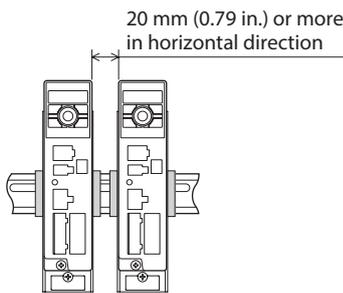
300 W type and 400 W type drivers of single-phase 200-240 VAC cannot be installed in a close contact state.



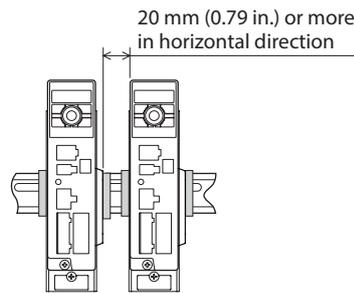
● When two or more drivers are installed

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

300 W Single-phase 200-240 VAC



400 W Single-phase 200-240 VAC



Notes when installing drivers in a close contact state

The temperature inside the driver rises as the number of units the drivers are closely installed increases, and if it exceeds 85 °C (185 °F), the main circuit overheat alarm will be generated.

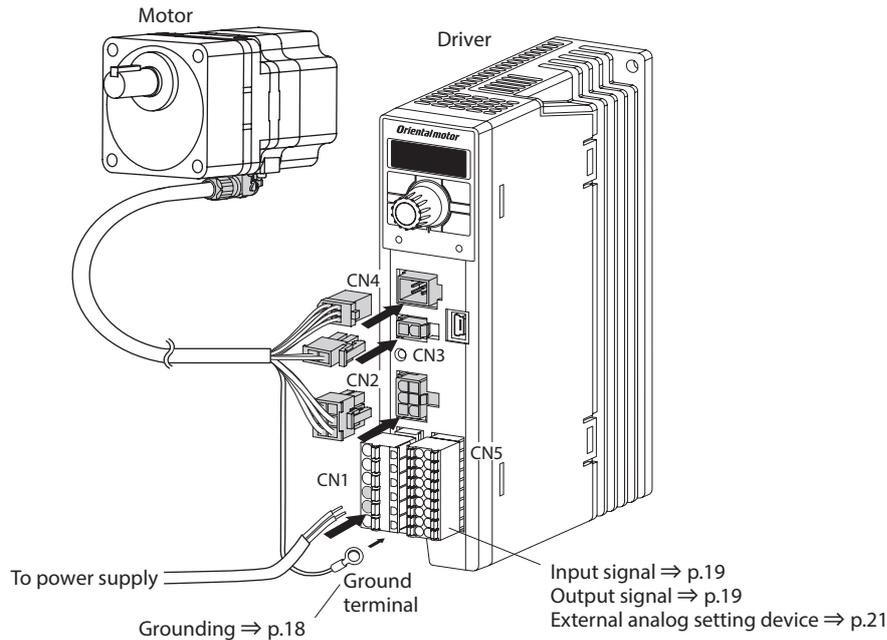
When the main circuit overheat alarm is generated, keep the temperature inside of the driver equal to or lower than 85 °C (185 °F) with either of the following methods.

- Improve the ventilation condition in the enclosure.
- Increase the size of the heat sink to which the driver is installed.

The temperature inside the driver can be checked on the status monitor of the **MEXE02**.

Connecting

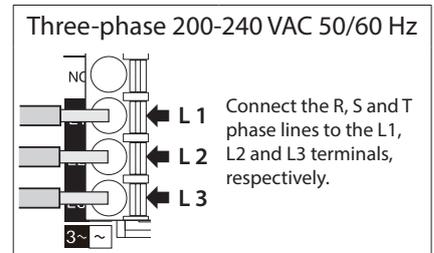
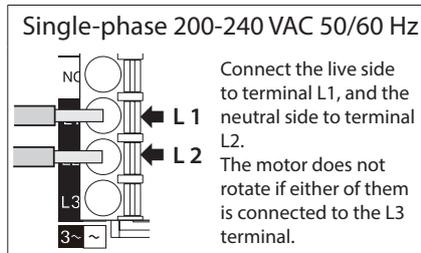
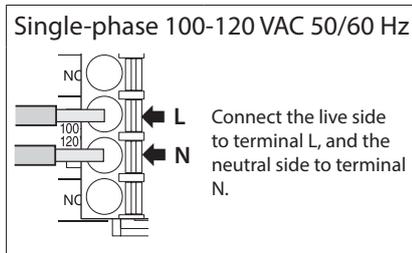
This chapter explains how to connect the motor, I/O signals and power supply to the driver, as well as grounding method using the driver for electromagnetic brake motor.
For protection against electric shock, do not turn on the power supply until the wiring is completed.



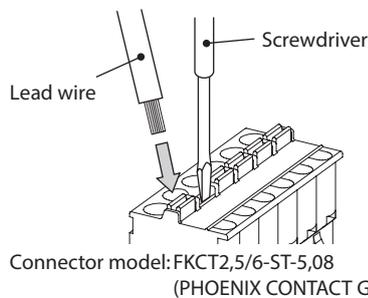
- Note**
- Be sure to connect the connectors securely. Insecure connections may cause malfunction or damage to the motor or driver.
 - When turning on the power again or inserting/pulling off the connector, turn off the power and wait for the CHARGE LED to turn off before doing so. Residual voltage may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

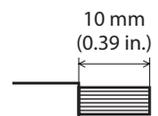


■ Connecting method



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)]

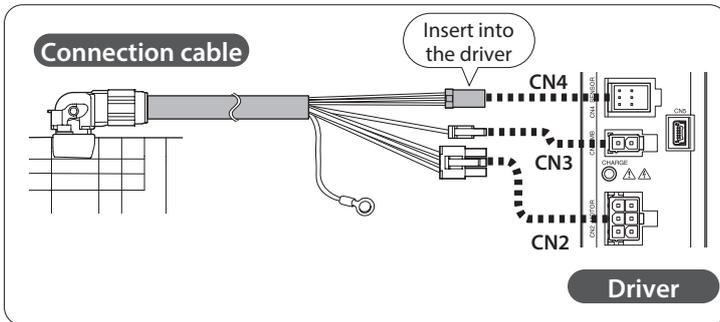
■ Circuit breaker

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

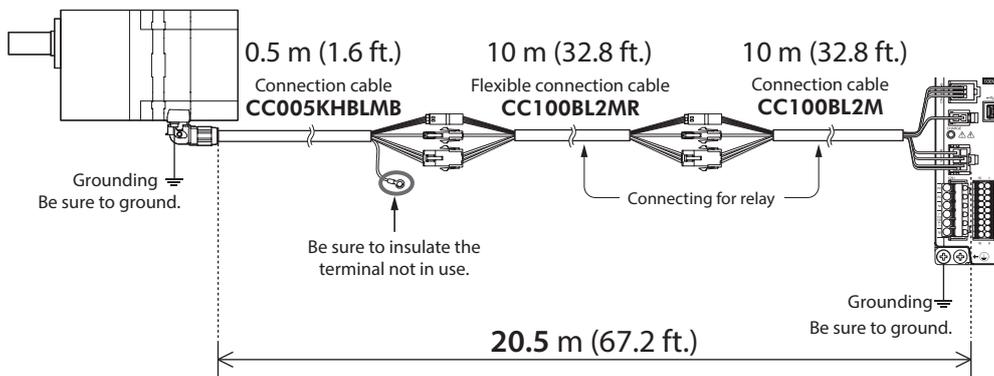
Connect the motor and driver using the connection cable (sold separately). The connection cables are provided up to 20 m (65.6 ft.). For about the connection methods of the motor and connection cable, refer to the operating manual of the motor.



■ Extension between motor and driver

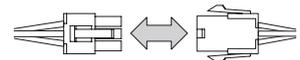
Use a connection cable for extension (sold separately) when extending the wiring distance between the motor and driver. The connection cable for extension can be used by connecting up to two pieces. The wiring distance between the motor and driver can be extended to a maximum of 20.5 m (67.2 ft.).

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.

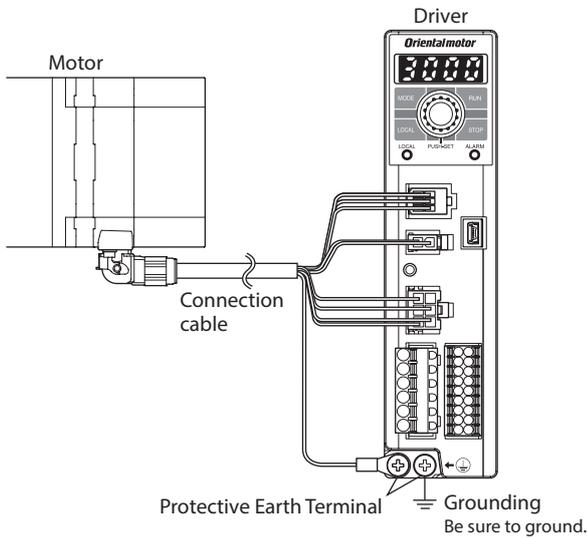


3. Grounding

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.

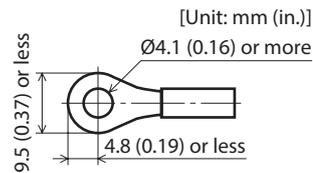


However, the grounding resistance value provided in the standards applied to the equipment may not be satisfied depending on the type or length of the connection cable. In this case, ground near the motor using the Protective Earth Terminal (⊕) on the motor. If the ground terminal of the connection cable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



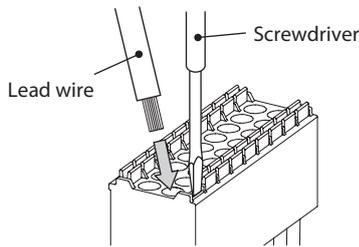
■ Precautions about static electricity

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.

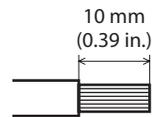
■ Connection method



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

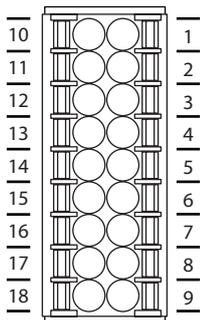
Model: AI 0,25-10 [Conductor cross-sectional area: 0.14 - 0.34 mm² (AWG24)]

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			
	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.21)
	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-		



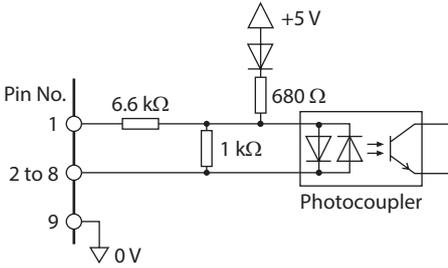
*1 Signals in brackets [] are functions assigned at the time of shipment. For the pin Nos. 2 to 8 and Nos. 15 to 18, the assigned function can be changed. Refer to p.29 for signals that can be assigned.

*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

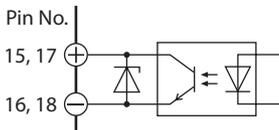
The logic level setting for input terminals IN0 to IN6 can be changed using the **MEXE02** or operation panel. Refer to p.65 for details.

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)

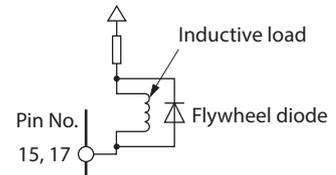


Changing the logic level setting of output signals

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 p.65 for details.

Note

- For output signals, be sure to connect a current-limiting resistor so that the current does not exceed 100 mA. When using a programmable controller, check the resistance value inside the controller and connect a current-limiting resistor as necessary.
- 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.

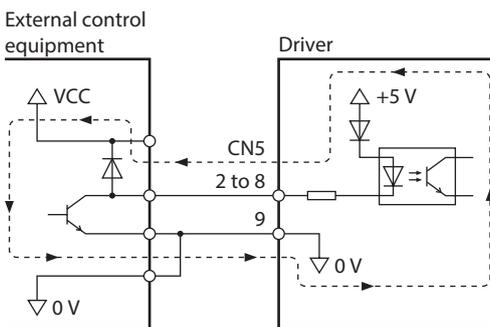


When using a controller with a built-in clamp diode

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.



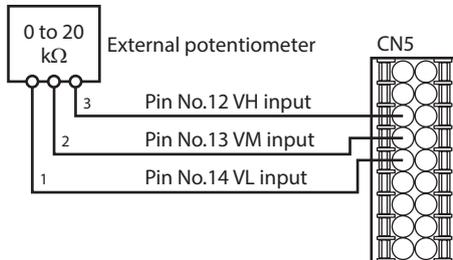
5. Connecting external analog setting devices

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.38, 41 and p.59 for the setting method.

■ Using an external potentiometer

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

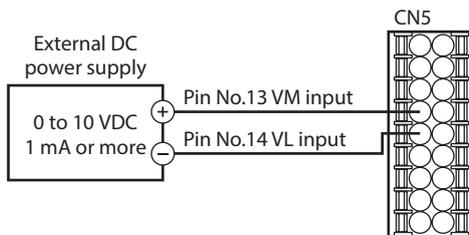


■ Using external DC voltage

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.



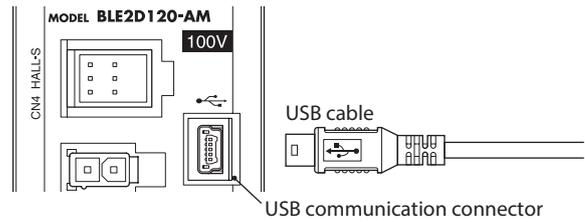
Note Be sure to use the external DC voltage at 10 V or lower. When connecting the external DC power supply, make sure the polarities are correct. Reversing the polarities may cause damage to the driver.

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



- Note**
- 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.

■ Setting of ID

If the specific USB-ID (serial number) is assigned to the driver, the individual COM port number can be set in each axis. When two or more drivers are connected to a PC at the same time, the individual COM port number can be set in each USB-ID. When multiple drivers are connected with the USB cables at the same time, set the "USB-ID enable" parameter to "Enable," and set the individual ID to each axis. To set the USB-ID, Windows automatically assigns the specific COM port number in each ID.

Related parameters

ID	Parameter name	Description	Setting range	Factory setting
498	USB-ID enable	Sets whether to enable or disable the USB-ID. When it is set to "Disable," the USB-ID is automatically set to a random number.	0: Disable 1: Enable	1
499	USB-ID	Sets the USB-ID (serial number). The COM port at power-on can be fixed.	0 to 999,999,999	0
2555	USB-PID	Sets the ID to be displayed in the COM port.	0 to 31	0

- Note**
- If the COM port number is changed, set the "Communication port setting" of the **MEXE02** again according to the COM port number after being changed.

7. Connecting the regeneration resistor

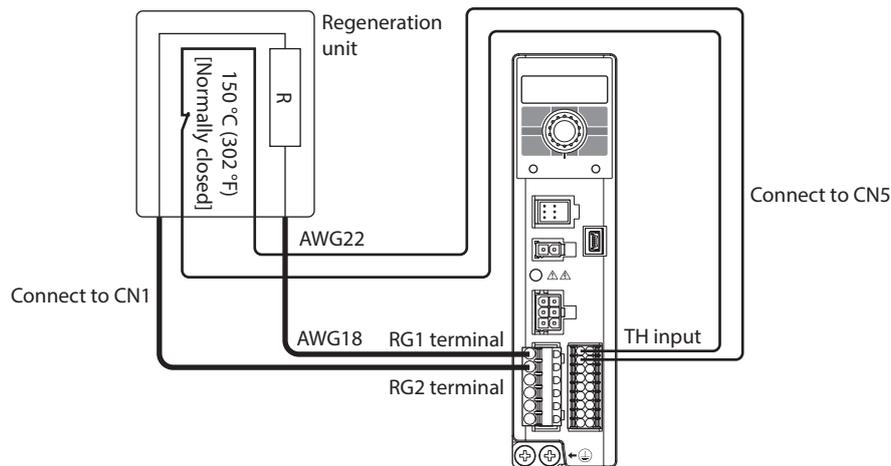
If continuous regeneration operation such as gravitational operation in vertical drive is performed or an inertia load is operated with the round shaft type motor of 300 W or higher, use the regeneration resistor **RGB100** (sold separately). Also, if the stopping time gets longer when starting and stopping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



- Note**
- 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 "A1.5.4" 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.

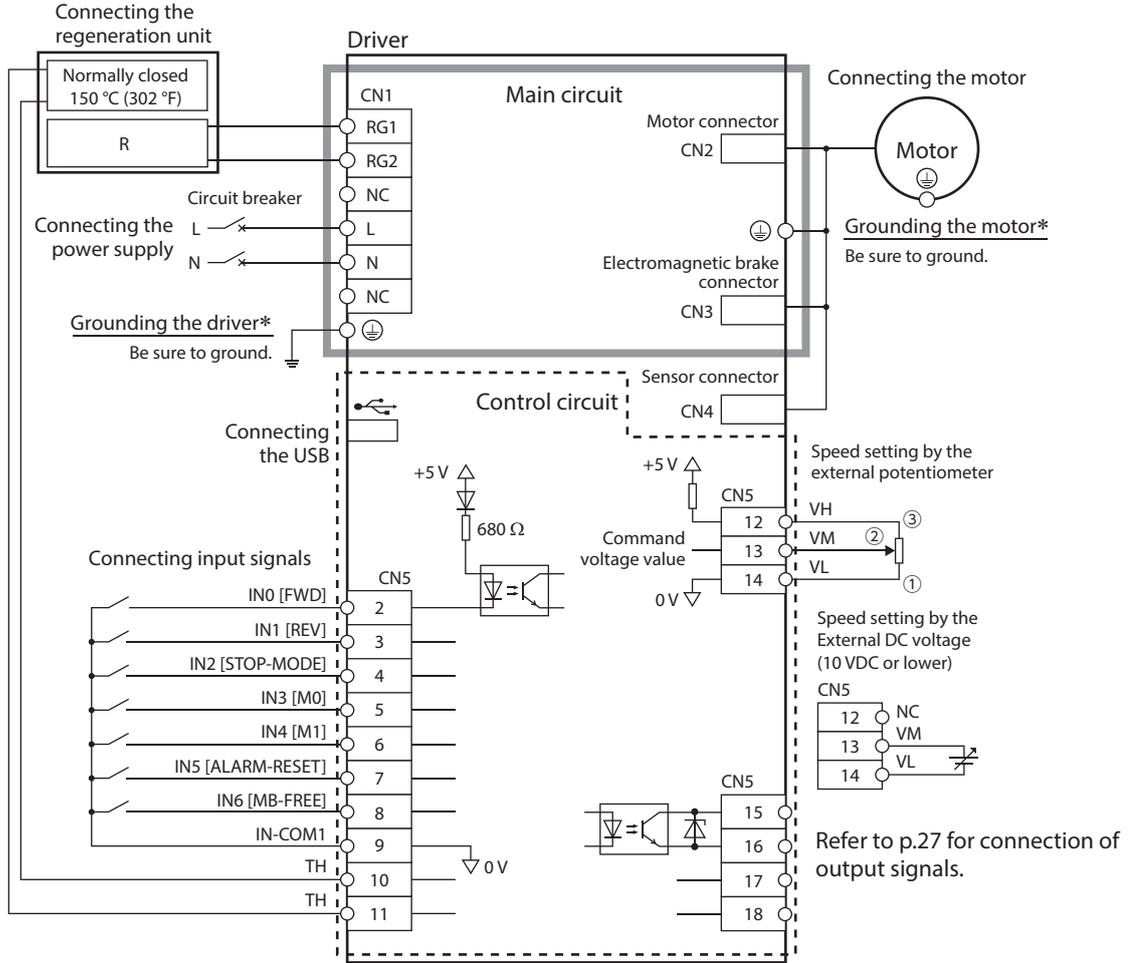
To cancel the setting to use the regeneration resistor, execute initialization of parameters without connecting anything to the pin Nos. 10 and 11 of CN5. Then, turning on the main power supply again will reset the alarm.

8. Connection diagram

■ Sink logic

● When using the internal power supply

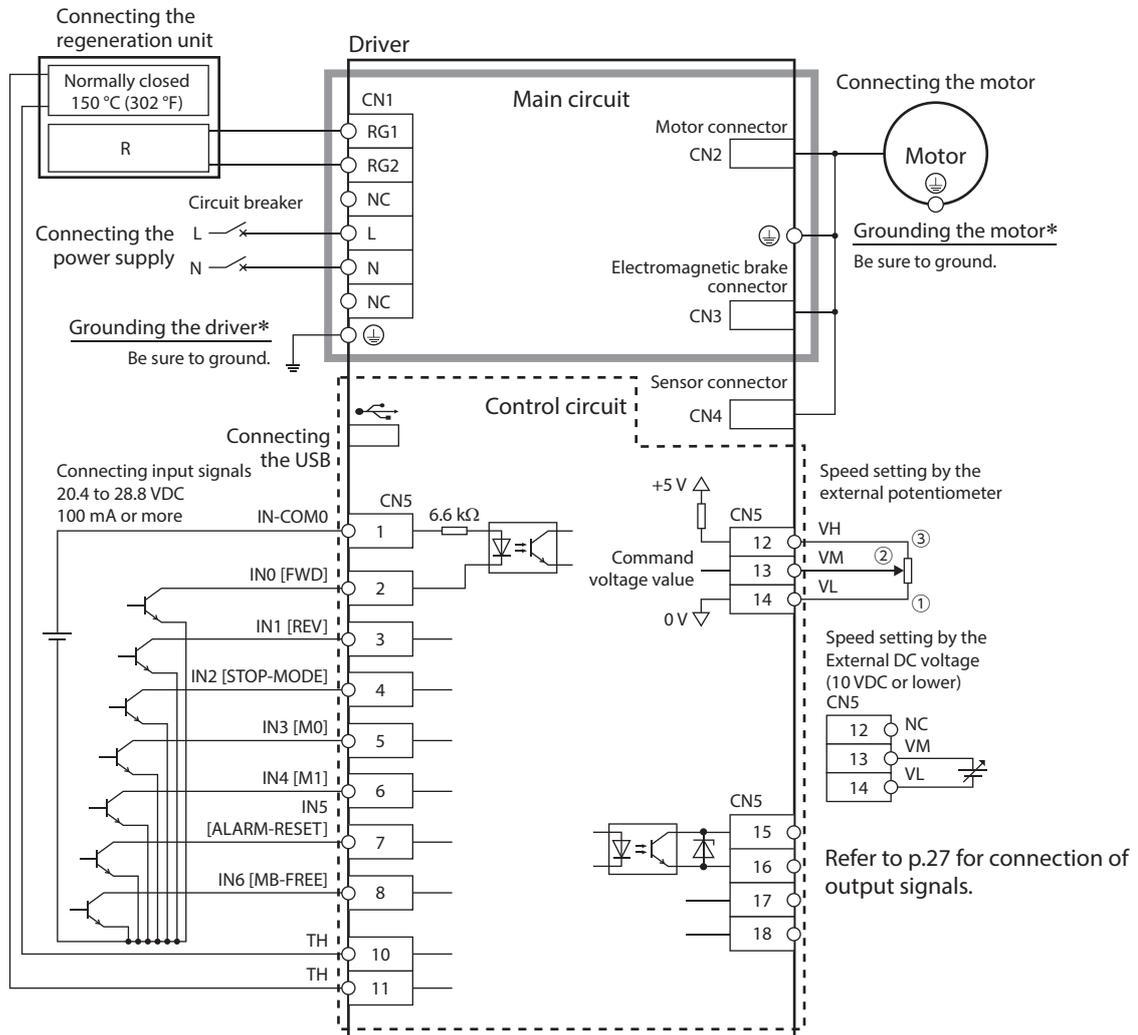
This is a connection example when the electromagnetic brake motor and the driver of single-phase 100-120 VAC are used, the rotation speed is externally set, and the internal power supply is used for input signals. I/O signals in brackets [] are set at the time of shipment. Refer to p.65 for the assignment of I/O signals.



* Be sure to ground. Refer to "3. Grounding" on p.18 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. Refer to p.65 for the assignment of I/O signals.



* Be sure to ground. Refer to "3. Grounding" on p.18 for how to ground.



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

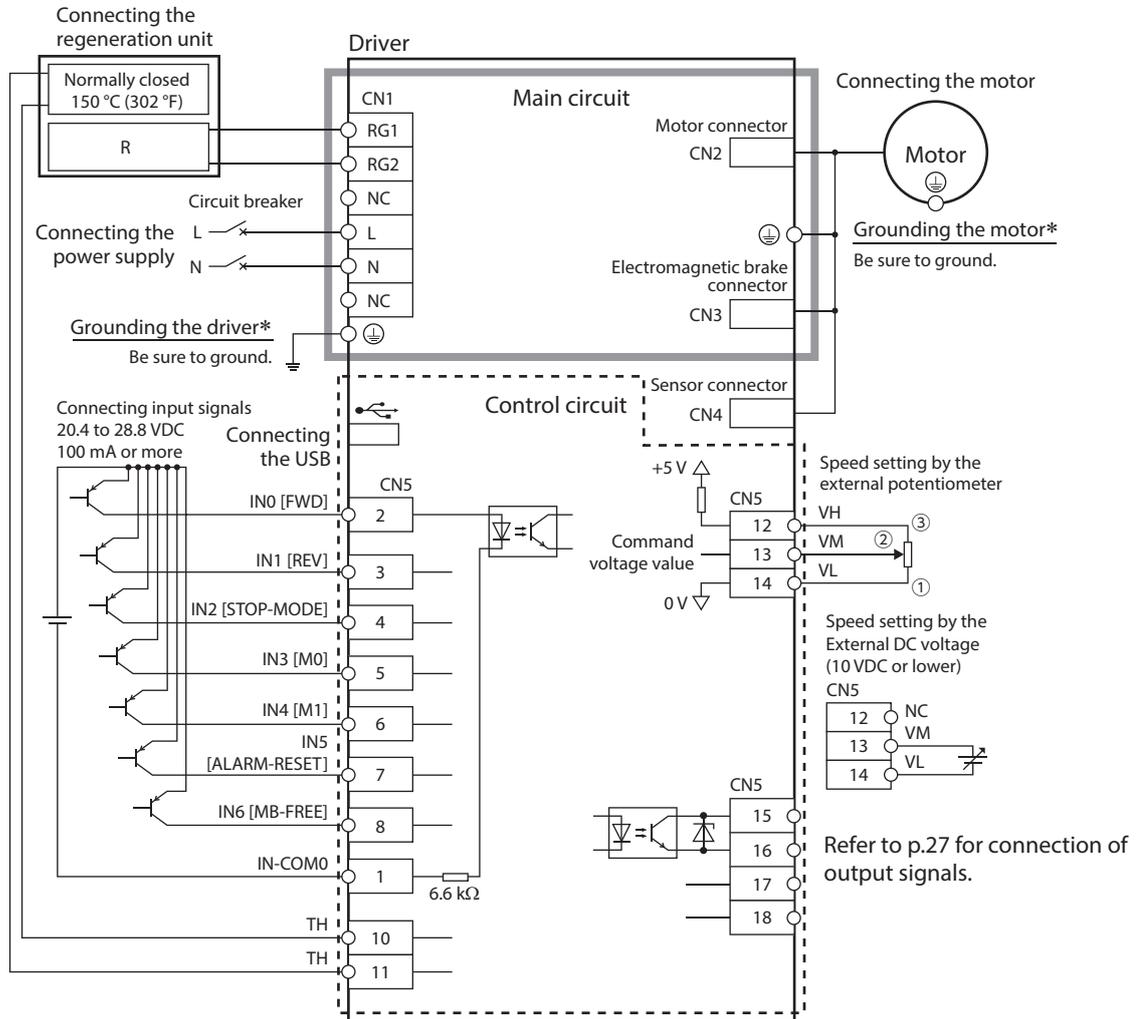
■ Source logic

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.

Refer to p.65 for the assignment of I/O signals.



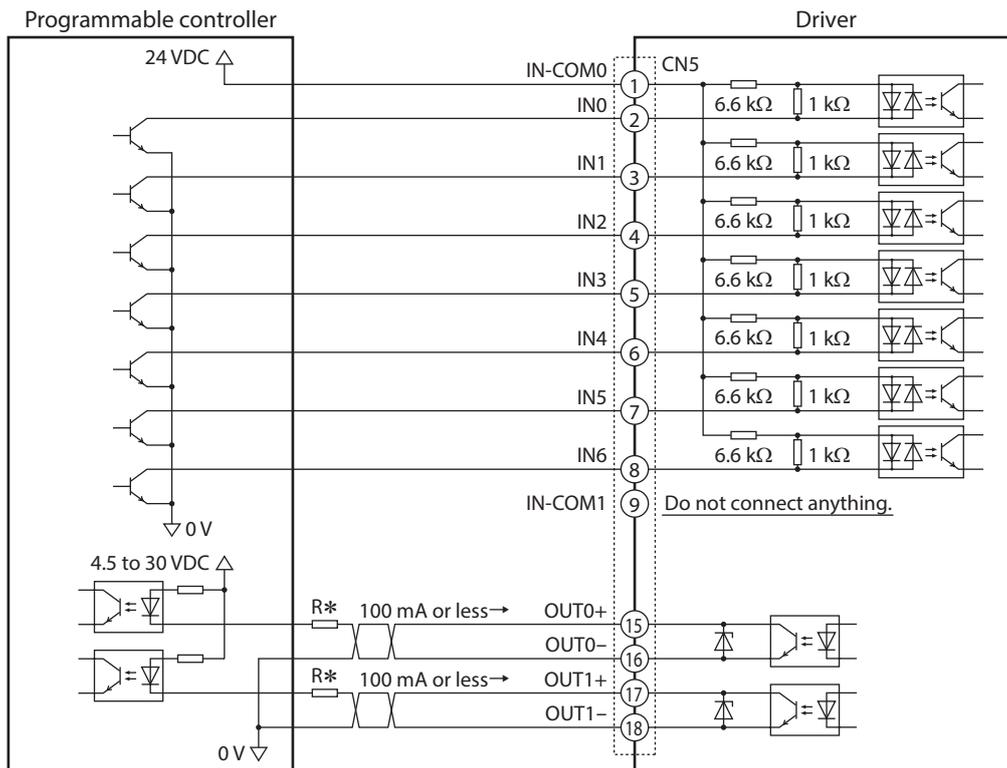
* Be sure to ground. Refer to "3. Grounding" on p.18 for how to ground.

Note

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

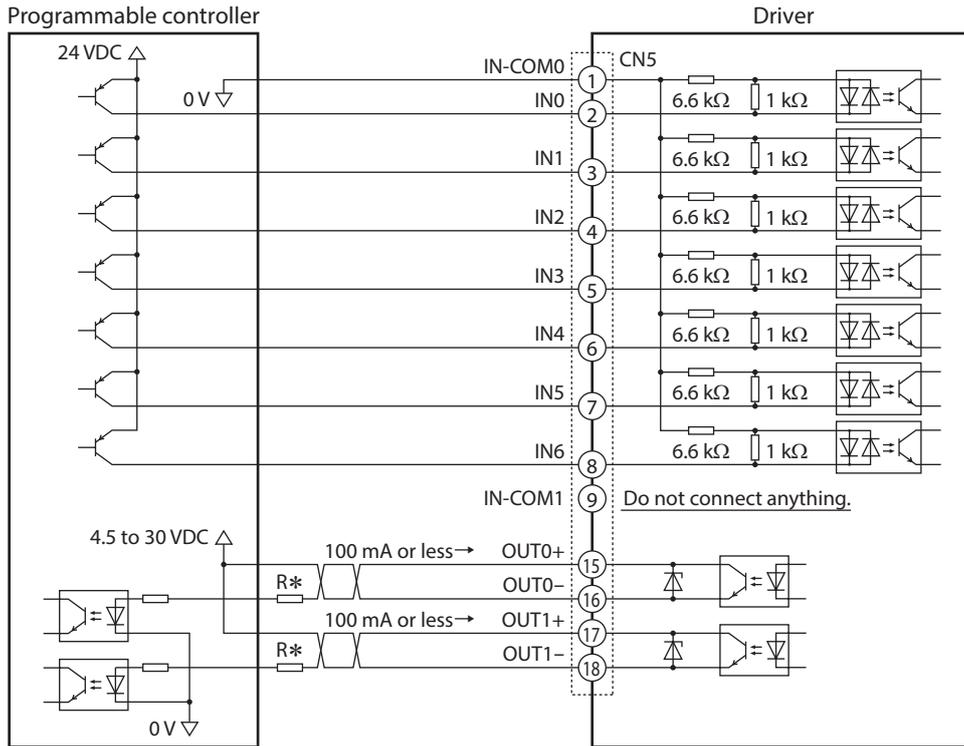


* Recommended resistance value when the current limiting resistor R is connected
 In the case of 24 VDC: 680 Ω to 2.7 kΩ (2 W) In the case of 5 VDC: 150 Ω to 560 Ω (0.5 W)

Note

- Use output signals at 4.5 VDC to 30 VDC.
- For output signals, be sure to connect a current-limiting resistor R so that the current does not exceed 100 mA. When using a programmable controller, check the resistance value inside the controller and connect a current-limiting resistor R as necessary.
- 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.

● 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.
- For output signals, be sure to connect a current-limiting resistor R so that the current does not exceed 100 mA. When using a programmable controller, check the resistance value inside the controller and connect a current-limiting resistor R as necessary.
- 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

This section explains about input signals and output signals.

9-1 I/O signals list

■ Input signals

Signal name	Function	Description	Reference page
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. The motor stops when the signal is turned OFF. The motor rotates in the direction set in the "Rotation direction" parameter.	2-Wire mode 30
IN1	REV		
IN2	STOP-MODE		
IN3	M0	These are signals to select the operation data number. 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.	32
IN4	M1		
IN5	ALARM-RESET	This is a signal to reset the present alarm when a driver protective function is activated.	32
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.	33
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. If the RUN/BRAKE input is turned OFF, the motor stops instantaneously.	3-Wire mode 31
	RUN/BRAKE		
	CW/CCW	This is a signal to change the motor rotation direction.	32
	M2	These are signals to select the operation data number. Up to 16 data can be switched using the M0, M1, M2, and M3 inputs.	
	M3		
	H-FREE	This is a signal to select whether to enable or disable the load holding function. You can switch whether to hold the motor shaft by the load holding function when the motor stops.	33
	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

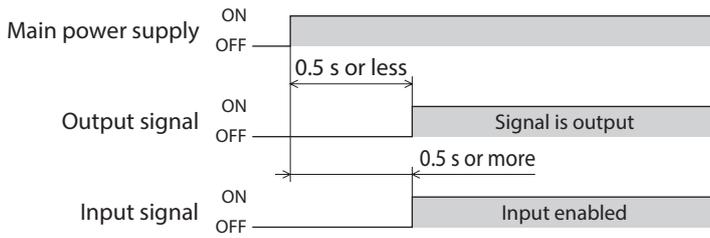
Signal name	Function	Description	Reference page
OUT0	SPEED-OUT	This is a signal to be output in synchronization with the motor rotation. 30 pulses are output while the motor output shaft makes one revolution.	34
OUT1	ALARM-OUT	This is a signal to be output when a driver protective function is activated. (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.	35
	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.

Refer to "I/O function selection parameter" on p.65 when changing the signal assigned in the I/O signal terminals.

9-2 Timing chart when power is input

This timing chart describes the timing of input signals and output signals when the power supply is turned on.



9-3 Description of input signals

Operation input signals vary depending on the input mode. The input mode can be changed by the setting of the "Operation input mode selection" parameter (ID: 1819). Refer to p.64 for details.

Operation input signals 2-Wire mode: FWD input, REV input, STOP-MODE input
3-Wire mode: START/STOP input, RUN/BRAKE input, CW/CCW input

■ 2-Wire mode

● FWD input, REV input

When the FWD input is turned ON, the motor rotates in the forward direction. The motor decelerates to a stop when the signal is turned OFF.

When the REV input is turned ON, the motor rotates in the reverse direction. The motor decelerates to a stop when the signal is turned OFF.

The chart below shows an example when the "Motor rotation direction" parameter (ID: 450) is set to "Positive direction=CW."

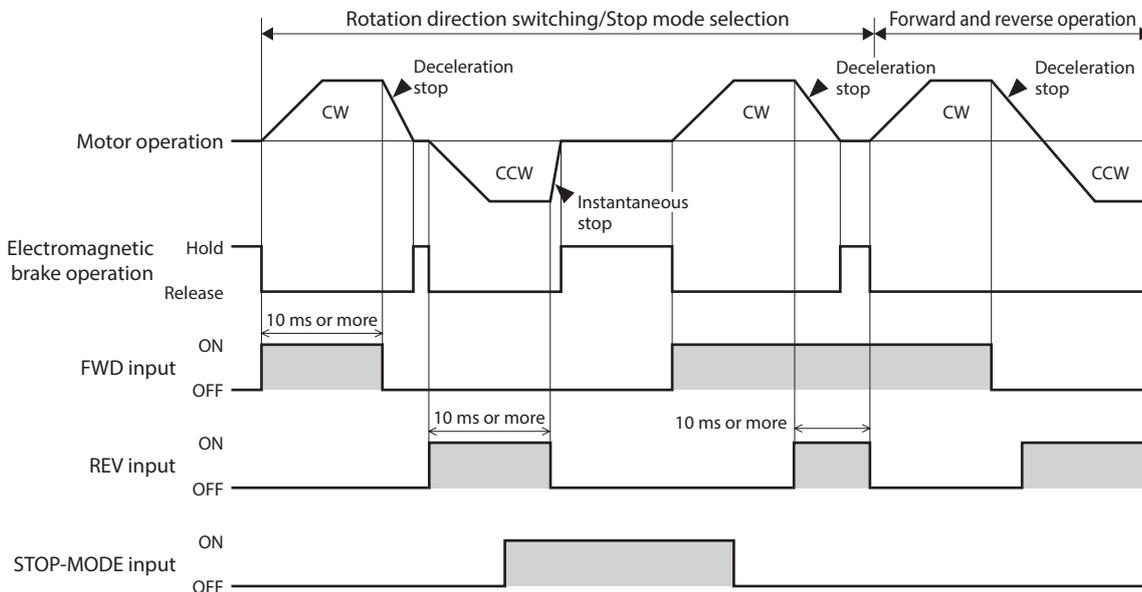
If the "Operation input mode selection" parameter (ID: 1819) is set to "2-Wire mode 1," the motor decelerates to a stop when both the FWD input and the REV input are turned ON.

● STOP-MODE input

This is a signal to select how the motor would stop when the FWD input or the REV input is turned OFF.

When the STOP-MODE input is OFF, the motor decelerates to a stop according to the deceleration time of the operation data number.

When the STOP-MODE input is ON, the motor stops at the shortest time (instantaneous stop).



■ 3-Wire mode

● START/STOP input, RUN/BRAKE input

The motor rotates when both the START/STOP input and the RUN/BRAKE input are turned ON.

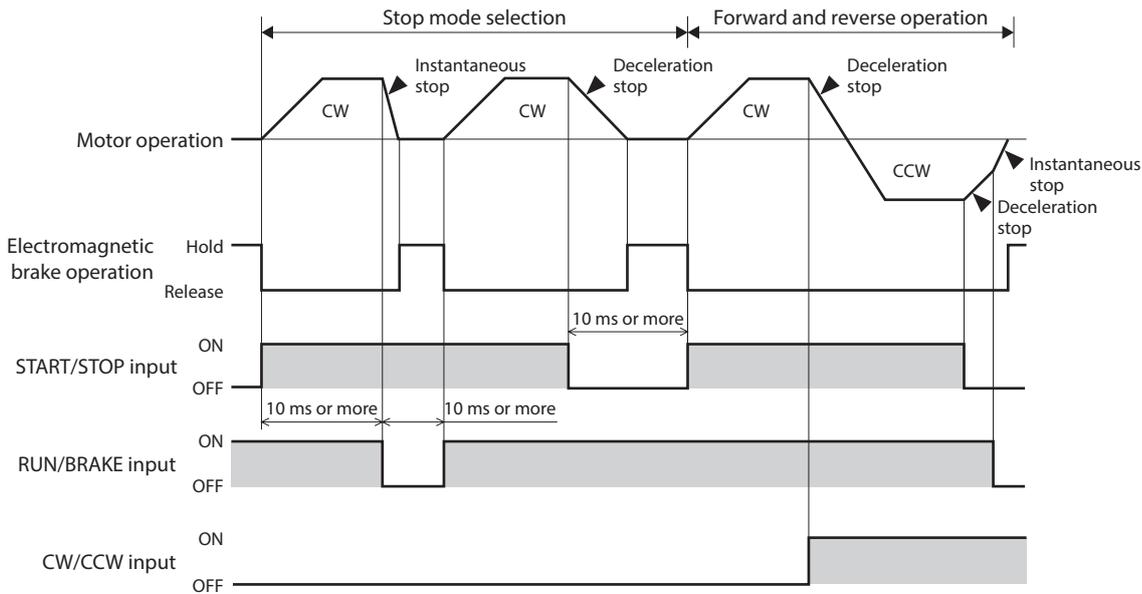
When the START/STOP input is turned OFF while the motor is rotating, the motor decelerates to a stop according to the deceleration time of the operation data number.

If the RUN/BRAKE input is turned OFF while the motor is rotating, the motor stops at the shortest time (instantaneous stop).

● CW/CCW input

This is a signal to change the motor rotation direction. The motor rotates in the CCW direction when this signal is turned ON, and in the CW direction when it is turned OFF.

The chart below shows an example when the "Motor rotation direction" parameter (ID: 450) is set to "Positive direction=CW" and the "Operation input mode selection" parameter (ID: 1819) is set to "3-Wire mode 1."



■ M0 to M3 inputs

A desired operation data number can be selected by a combination of ON-OFF status of the M0 to M3 inputs.

The M0 and M1 inputs are assigned at the time of shipment. If the M2 and M3 inputs are assigned, the operation of 16 speeds can be performed.

Operation data No.	M3	M2	M1	M0
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	ON	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

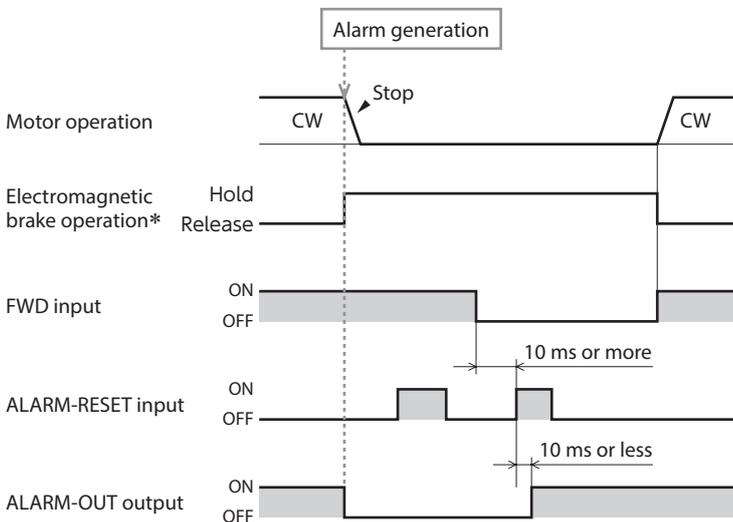
Refer to p.44 for how to set two or more speeds and operate the motor.

■ 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. (The alarm will be reset at the ON edge of the input.)

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.)



- Continuing the operation without removing the cause of the alarm may cause damage to equipment.
- The overcurrent and EEPROM errors cannot be reset using the ALARM-RESET input.

■ Other inputs

● MB-FREE input (Available for only drivers for electromagnetic brake motor)

This input signal can be used to operate whether the electromagnetic brake holds or releases while the motor stops. When this input is turned ON at motor standstill, the electromagnetic brake is released to bring the motor shaft in a free-run state.

Even if the "Load holding function selection" parameter is set to enable, when the MB-FREE input is turned ON, the motor shaft will be in a free-run state.

You cannot operate to release the electromagnetic brake while an alarm is being generated.

● H-FREE input

This input signal can be used when the load holding function is enabled.

If the H-FREE input is turned ON when the stopped motor shaft is electrically held by the load holding function, the motor shaft can be in a free-run state.

In the case of the drivers for electromagnetic brake motor, if the H-FREE input is turned ON while the motor shaft is held by the load holding function, the motor excitation is turned OFF, and the electromagnetic brake holds the motor shaft.

● TL input

The TL input is normally closed.

When the TL input is turned ON, the torque limiting function is enabled.

The motor output torque is limited based on the set torque.

When the TL input is turned OFF, the torque limiting function is disabled, and the maximum value of the motor output torque will be the peak torque.

● INFO-CLR input

The INFO-CLR input is a signal to clear an information status. (Information will be cleared at the ON edge of the input.)

This signal can be used when the "INFO auto clear" parameter is set to disable, and the information status will be cleared when the signal is turned ON.

● HMI input

The HMI input is normally closed.

When the HMI input is turned ON, the function limitation by the operation panel or **MEXE02** is released. When the HMI input is turned OFF, the function limitation is imposed.

[Functions to be limited]

- I/O test
- Local control operation
- Teaching/remote operation
- Editing parameters and data, downloading, initializing
- Configuration

● EXT-ERROR input

The EXT-ERROR input is normally closed.

When this signal is turned OFF, an alarm is generated, and the motor stops instantaneously.

Then "**AL.EE**" is shown on the display.



When the HMI input, TL input, and EXT-ERROR input are not assigned to input terminals, they are always set to ON. And if a single input is assigned to multiple input terminals, the function will be performed when all of the terminals are turned ON.

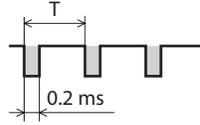
9-4 Description of output signals

■ SPEED-OUT output

30 pulses are output while the motor output shaft makes one revolution in synchronization with the motor operation. The pulse width of output pulse signals is 0.2 ms. The motor rotation speed can be calculated using the SPEED-OUT output.

$$\text{Frequency of the SPEED-OUT (Hz)} = \frac{1}{T}$$

$$\text{Rotation speed (r/min)} = \frac{\text{Frequency of the SPEED-OUT}}{30} \times 60$$



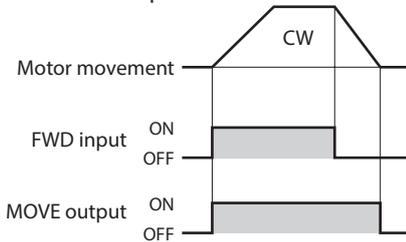
■ ALARM-OUT output

When the protective function of the driver is activated, the ALARM-OUT output is turned OFF and the ALARM LED blinks (normally closed).

At the same time, the alarm code is shown on the display of the operation panel, and the motor coasts to a stop. (The motor stops instantaneously if stopped by the EXT-ERROR input.)

■ MOVE output

The MOVE output is turned ON when the motor is rotating by turning the operation input signal ON.



■ INFO output

If information is generated, the INFO output is turned ON.

You can set whether to turn the INFO output ON or OFF in each INFO action parameter.

Related parameters

ID	Parameter name	Description	Setting range	Factory setting
1954	INFO action (Driver temperature information (INFO-DRVTMP))	Sets the INFO output and LED status when corresponding information is generated. Only the specified information can be output. ※ The bit output status of each Information is not changed. The bit output can be checked using the internal I/O monitor of the MEXE02 .	0: INFO action is not applied • INFO output: OFF • LED: Unlit 1: INFO action is applied • INFO output: ON • LED: Blink	1
1956	INFO action (Overvoltage information (INFO-OVOLT))			
1957	INFO action (Undervoltage information (INFO-UVOLT))			
1959	INFO action (Load information (INFO-LOAD))			
1960	INFO action (Speed information (INFO-SPD))			
1964	INFO action (Operation prohibited information (INFO-DRV))			
1972	INFO action (Tripmeter information (INFO-TRIP))			
1973	INFO action (Odometer information (INFO-ODO))			
1978	INFO action (Main power supply time information (INFO-PTIME))			
1979	INFO action (Main power supply count information (INFO-PCOUNT))			
1980	INFO action (Start operation restricted mode information (INFO-DSLMTD))			
1981	INFO action (I/O test mode information (INFO-IOTEST))			
1982	INFO action (Configuration request information (INFO-CFG))			
1983	INFO action (Power cycling request information (INFO-RBT))			

■ TLC output

When the motor torque reaches the torque limiting value, the TLC output is turned ON.

Note If the torque limiting value is set to less than 20%, the TLC output may not be stable.

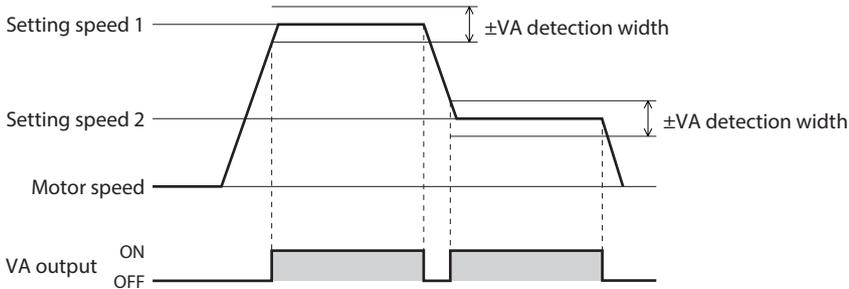
■ VA output

This signal is turned ON when the detection speed reaches "plus or minus range of VA detection width against the setting speed." The width to turn the VA output ON can be set using the "VA detection width" parameter (ID: 1817).

Related parameters

ID	Parameter name	Description	Setting range	Factory setting
1817	VA detection width	Sets the detection width for the VA output.	1 to 400 r/min	200

Example When the motor speed changes from the setting speed 1 to the setting speed 2



■ DIR output

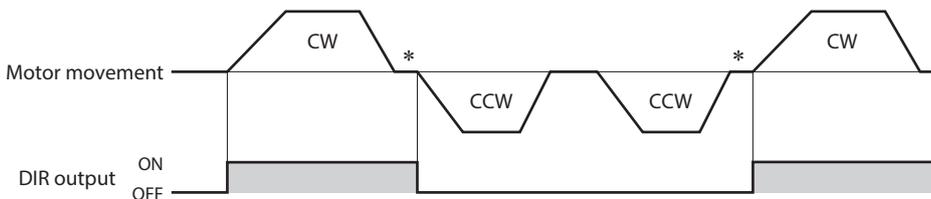
This is a signal to output information of the motor rotation direction.

This output is turned ON when the motor rotates in the direction to which the positive side was set in the "Motor rotation direction" parameter.

Related parameters

ID	Parameter name	Description	Setting range	Factory setting
450	Motor rotation direction	Sets the motor rotation direction. (Sets the rotation direction when turning the FWD input ON if the "2-wire mode" is selected with the "Operation input mode selection" parameter. Sets the rotation direction when turning the CW/CCW input OFF if the "3-wire mode" is selected.)	0: Positive direction=CCW 1: Positive direction=CW	1

Example When the "Motor rotation direction" parameter (ID: 450) is set to 1



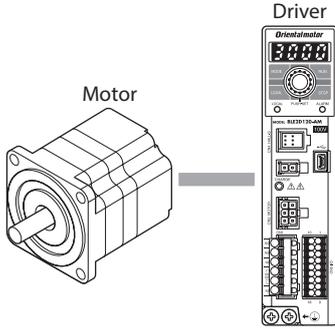
* A state just before stopping is output while the motor stops.

Operating

There are two methods to operate the motor.

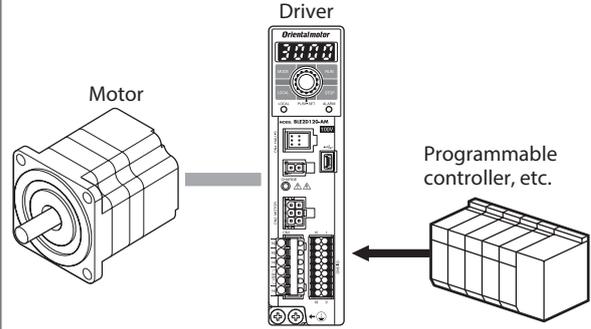
Operating using the operation panel

The motor can be operated using the operation panel of the driver.



Operating using external signals

The motor can be operated using external signals or the MEXE02.



Safety precautions

Preparation

How to use

Help

Appendix

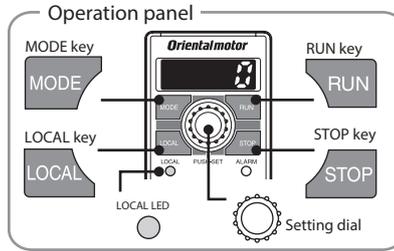
1. Operating using the operation panel

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.48 for details about the operation panel.

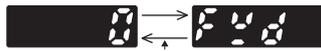
2 Operation selection

Press the LOCAL key.



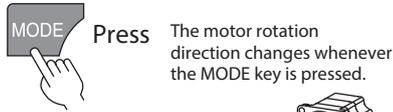
The LOCAL LED is lit in green.

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

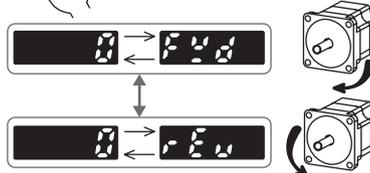


Interval of approximately 1 second

3 Rotation direction selection



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



* The figures show the round shaft type.
In the case of the gearhead output shaft, the rotation direction varies depending on the gear ratio of the gearhead.

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

4 Start of motor

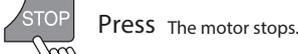


Press The motor rotates.



50 r/min (factory setting)

To stop the motor



Press The motor stops.



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



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

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.

* If **E r** is displayed, set the "Speed, torque limiting command selection" parameter to "0: Digital setting."

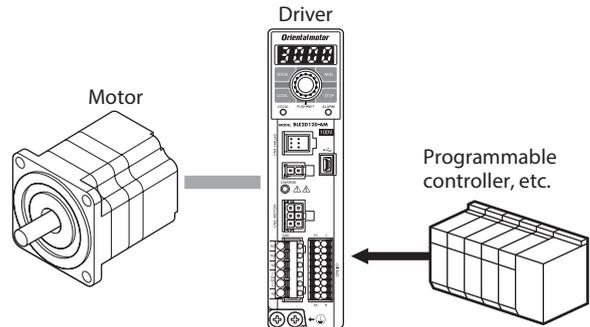
If the rotation speed or the torque limiting is set to the analog setting, an external control device is required to connect to rotate the motor.

2. Operating using external signals

2-1 Overview

The motor can be operated by setting up to 16 operation data and selecting the operation data number externally.

Operation data No.	Item	Setting range	Factory setting	Reference page
0 to 15	Rotation speed	50 to 4000 r/min	50	37
	Torque limiting	0 to 300%	300	41
	Acceleration time	0.0 to 15.0 s	0.5	43
	Deceleration time			



2-2 Setting method of the rotation speed

The rotation speed can be set by the following four methods.

Digital setting		Analog setting	
Operation panel p.52	MEXE02 p.65	External potentiometer p.38	External DC voltage External DC power supply 0 to 10 VDC 1 mA or more p.38

2-3 Procedures to set the rotation speed

2-3-1 When setting with the operation panel

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

- Turn on the AC power supply

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

Press **Data No.0**

Data number selection screen
- Press **Rotation speed**

Operation data selection screen in the data number
- Press **Setting screen of rotation speed**

50 r/min (factory setting)

Change to 1000 r/min

Turn

1000 r/min
- Set (store) the data

Press

[To return to the rotation speed display]

Press five times **MODE**

Press
- Refer to p.39 for the operating method.

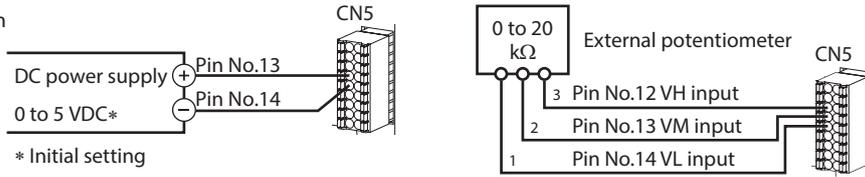
If the display is not shown as the above steps, check "Setting of operation data" of the operation panel on p.52.

2-3-2 When setting with the external potentiometer or external DC voltage

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 "2"



Press three times



Parameter mode

4



Press twice



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



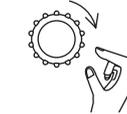
Press



7



Press once



Turn clockwise to select Configuration



8



Press twice



[To return to the rotation speed display]



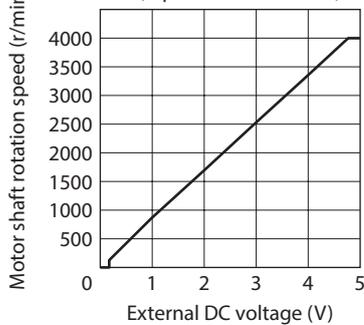
Press three times



9

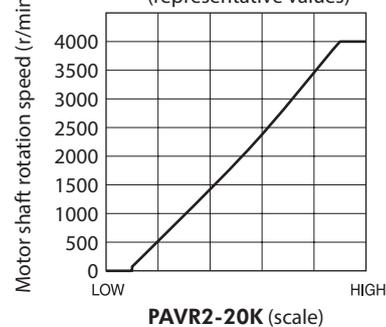
Determine the setting value by changing the DC voltage value

- External DC voltage - Rotation speed characteristics (representative values)



The rotation speed can be set with the voltage between 0 VDC and 10 VDC.
⇒ p.40

- External potentiometer - Rotation speed characteristics (representative values)



10

Refer to p.39 for the operating method.

If the display is not shown as the above steps, check "Setting of parameters" of the operation panel on p.53.

2-4 Operation/standstill using external signals

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 p.64 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

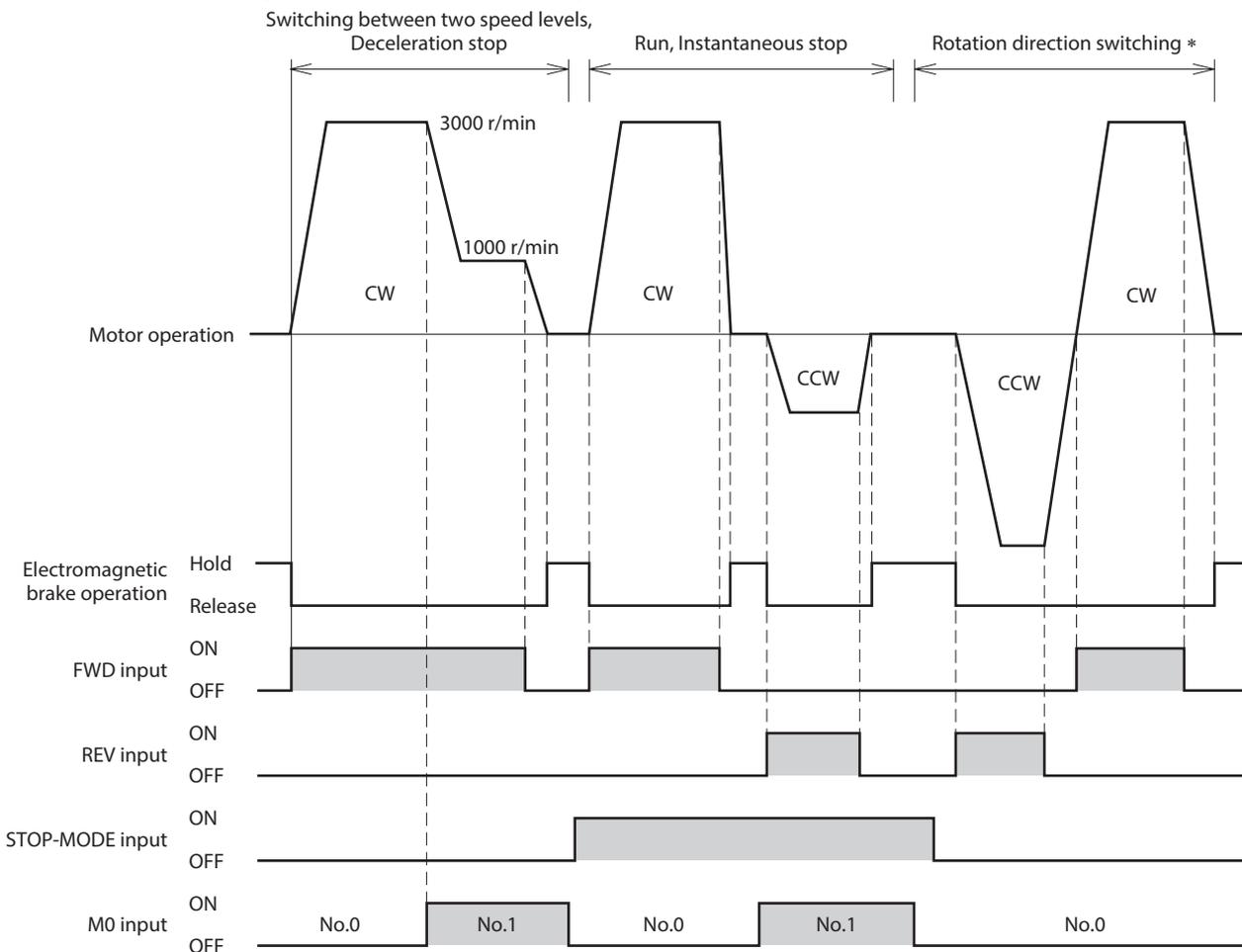
Note When the electromagnetic brake motor is used in an application of vertical drive such as elevating equipment, although depending on a load condition, the motor shaft rotation may momentarily reverse (within 90 degrees of the motor output shaft) at the time of starting or stopping if it is operated 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 p.44 for the setting and operation 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 of 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.

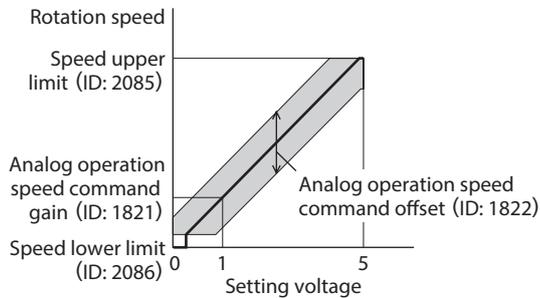
2-5 Gain adjustment and offset adjustment for rotation speed

If the gain or offset is adjusted when the rotation speed is set using the external potentiometer or external DC voltage, the slope of the speed command can be changed and the speed can finely be adjusted.

Note The rotation speed corresponding to the voltage value varies depending on the product.

Gain adjustment and offset adjustment for rotation speed

Adjust using the following parameters.



$$\text{Analog operation speed command} = \frac{\text{Analog operation speed command}}{\text{gain}} \times \text{Setting voltage} + \text{Analog operation speed command offset}$$

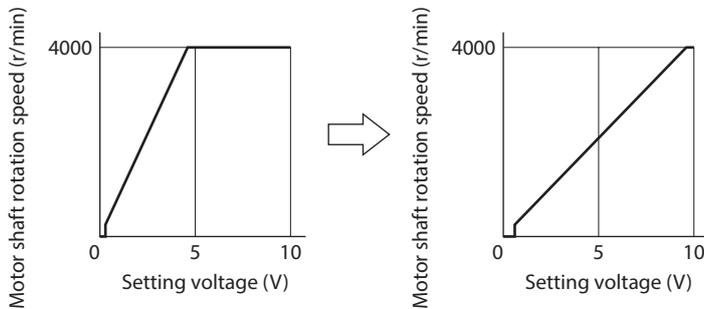
Related parameters

ID	Parameter name	Description	Setting range	Factory setting
1821	Analog operation speed command gain	Sets the speed command per 1 VDC of the input voltage by the external analog setting device.	0 to 4000 r/min	850
1822	Analog operation speed command offset	Sets the offset of the speed command input by the external analog setting device.	-2000 to +2000 r/min	0
2085	Speed upper limit	Sets the upper limit value of the speed command.	50 to 4000 r/min	4000
2086	Speed lower limit	Sets the lower limit value of the speed command.	50 to 4000 r/min	50

Setting example 1:

When operating the motor linearly up to the maximum rotation speed of 4000 r/min with external DC voltage between 0 and 10 VDC

Set the "Analog operation speed command gain" parameter (ID: 1821) to 425.



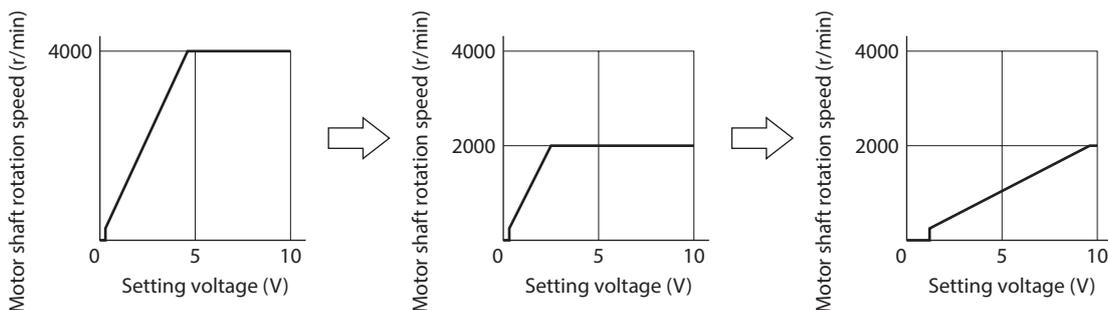
$$\text{Analog operation speed command gain}^* = \frac{\text{Speed upper limit}}{\text{Maximum value of setting voltage}}$$

* If the motor does not reach the speed upper limit when the setting voltage is the maximum value, increase the value in the analog operation speed command gain.

Setting example 2:

When operating the motor linearly up to the maximum rotation speed of 2000 r/min with external DC voltage between 0 and 10 VDC

Set the "Speed upper limit" parameter (ID: 2085) to 2000 first, and set the "Analog operation speed command gain" parameter (ID: 1821) to 213.



Refer to p.60 when setting the "Speed lower limit" parameter using the analog setting device.

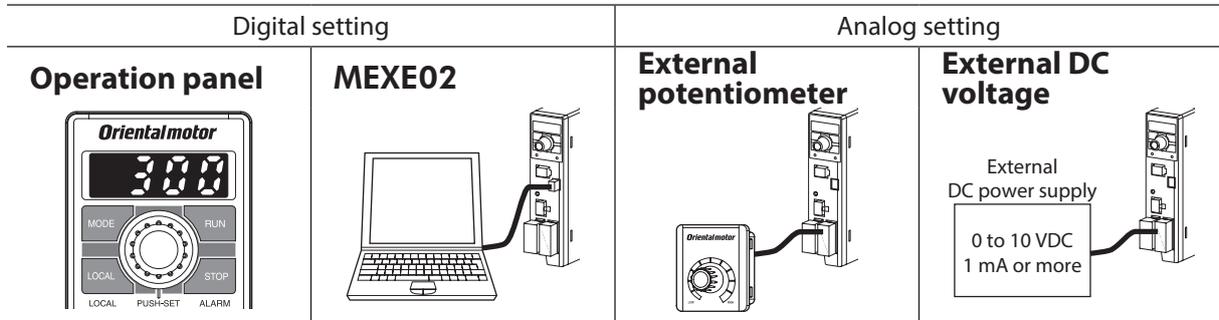
3. Setting of torque limiting

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%]

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

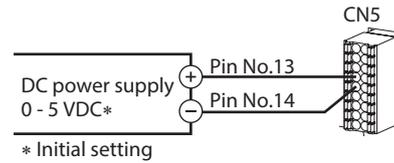
■ Setting method



■ Setting procedures

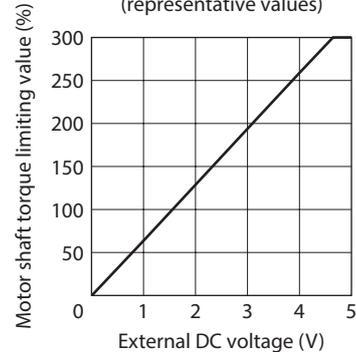
Example: When using external DC voltage

1. Set the "Speed, torque limiting command selection" parameter (ID: 1820) to "3: Torque limiting is analog setting."
2. Connect a DC power supply.



3. Set the torque limiting value by reference to the figure on the right.

• External DC voltage - Torque limiting characteristics (representative values)



■ Related I/O signals

If the TL input is assigned to the input terminal, the setting of whether to enable or disable the torque limiting value can be switched externally.

Also, using the TLC output can externally detect whether the torque limiting is presently performed.

● TL input

When the TL input is assigned to the input terminal, the setting of whether to enable or disable the torque limiting can be switched by the ON-OFF status of the TL input.

When the TL input is being ON: The torque limiting function is enabled, and the maximum output torque of the motor is limited based on the set torque limiting value.

When the TL input is being OFF: The torque limiting function is disabled, and the maximum output torque of the motor is the peak torque.

Note When the TL input is not assigned to the input terminal, this input will be always set to ON. If the TL input is assigned to multiple input terminals, the function will be performed when all of the terminals are turned ON.

● TLC output

When the motor torque reaches the torque limiting value, the TLC output is turned ON.

Note If the torque limiting value is set to less than 20%, the TLC output may not be stable.

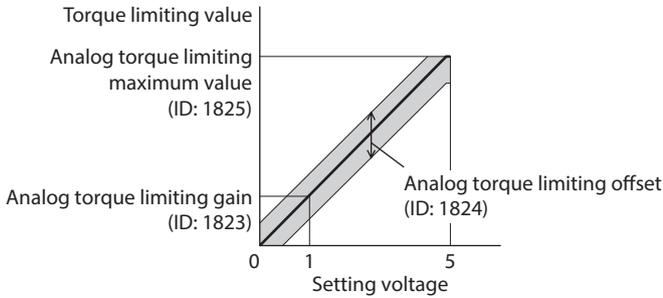
3-1 Gain adjustment and offset adjustment for torque limiting value

If the gain or offset is adjusted when the torque limiting value is set using the external potentiometer or external DC voltage, the slope or lower limit of the command can be set.

Note The torque limiting value corresponding to the voltage value varies depending on the product.

Gain adjustment and offset adjustment for torque limiting value

Adjust using the following parameters.

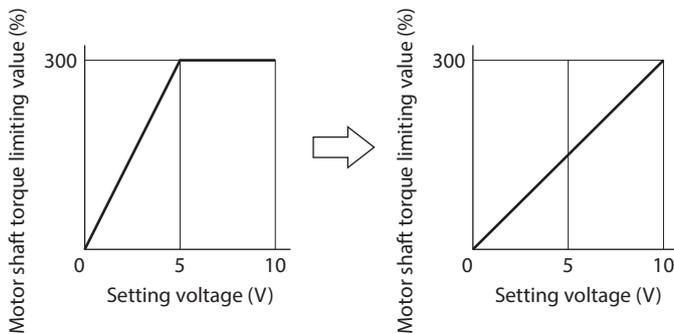


Related parameters

ID	Parameter name	Description	Setting range	Factory setting
1823	Analog torque limiting gain	Sets the torque limiting value per 1 VDC of the input voltage by the external analog setting device.	0 to 300%/V	65
1824	Analog torque limiting offset	Sets the offset of the torque limiting input by the external analog setting device.	-150 to +150%	0
1825	Analog torque limiting maximum value	Sets the maximum value of the torque limiting by the external analog setting device.	0 to 300%	300

Setting example:

When adjusting the torque limiting value up to 300% using external DC voltage between 0 and 10 VDC
Set the "Analog torque limiting gain" parameter (ID: 1823) to 32.



$$\text{Analog torque limiting gain}^* = \frac{\text{Analog torque limiting}}{\text{Maximum value of setting voltage}}$$

* If the motor does not reach the torque upper limit when the setting voltage is the maximum value, increase the value in the analog torque limiting gain.

4. 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).

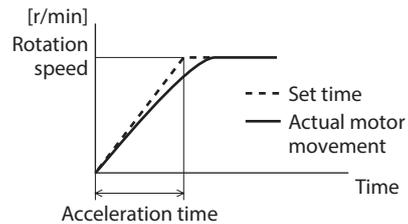
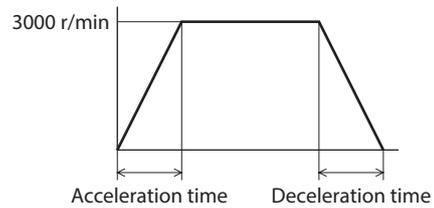
The actual acceleration time and deceleration time vary depending on the conditions of use, load inertia, load torque, etc. If smooth acceleration or deceleration cannot be performed, reconsider the acceleration time or deceleration time.

■ 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

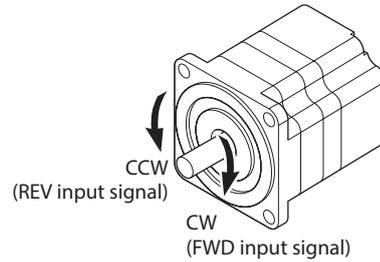
Digital setting	
<p>Operation panel</p> <p>p.52</p>	<p>MEXE02</p> <p>p.65</p>

- 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. Refer to p.63 for details.

5. 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 rotation direction can be changed with the parameter.



Related parameters

ID	Parameter name	Description	Setting range	Factory setting
450	Motor rotation direction	Sets the motor rotation direction. (Sets the rotation direction when turning the FWD input ON if the "2-wire mode" is selected with the "Operation input mode selection" parameter. Sets the rotation direction when turning the CW/CCW input OFF if the "3-wire mode" is selected.)	0: Positive direction=CCW 1: Positive direction=CW	1

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 of 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.



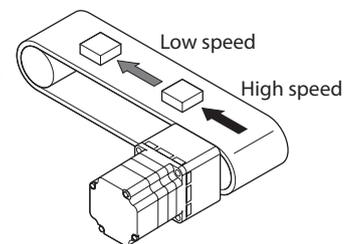
In the case of FWD: (Factory setting)

In the case of REV:

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

6. Operating at two or more speeds (multi-speed operation)

The multi-speed operation can be performed by setting the rotation speed and switching the ON-OFF status of the M0 to M3 inputs.
When the M0 to M3 inputs are assigned to CN5, the variable speed operation can be performed using up to 16 operation data.



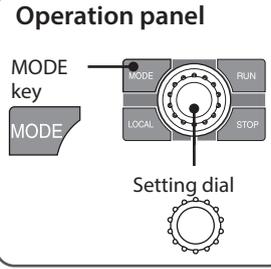
■ Data setting method (Example: Rotation speed)

- 1 Turn on the AC power supply  Rotation speed : 0 r/min
- 2  Press twice Data mode 
- 3  Press Data number selection screen  Data No.0: 00
The desired operation data number can be selected from the operation data No.0 to No.15 (16 data) by turning .
- 4  Press Data No.0 selection screen 
The desired item can be selected by turning .
 - Rotation speed 
 - Torque limiting value 
 - Acceleration time 
 - Deceleration time 
 - Initialization 
- 5  Press Setting screen  Rotation speed: 50 r/min (factory setting)
The display blinks
- 6  Turn Setting  Continue to turn clockwise until "1000"
The display blinks
- 7  Press Data setting  → 
Blinks a few times fast
- 8  Press once Data number selection screen 

[To return to the rotation speed display]

 Press four times →  →  Press

Operation panel



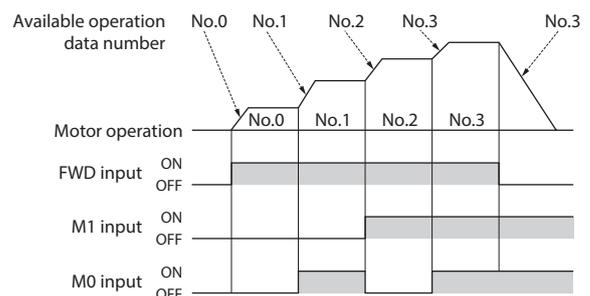
■ How to operate (Example: Four speeds, 2-wire mode)

Select any of the operation data Nos. 0 to 3 by switching the ON-OFF status of the M0 and M1 inputs, and operate the motor. The motor is operated using the rotation speed, torque limiting value, acceleration time, and deceleration time in the selected operation data number.

- <Operation procedure>
1. Select the operation data number using the M0 and M1 inputs.
 2. When either the FWD input or the REV input is turned ON, the motor rotates.
 3. Switch the operation data using the M0 and M1 inputs.
 4. When the FWD input or the REV input which has been turned ON is turned OFF, the motor stops.

Operation data No.	M1	M0
0	OFF	OFF
1	OFF	ON
2	ON	OFF
3	ON	ON

The setting method of the rotation speed can be selected by the setting of the "Speed, torque limiting command selection" parameter (ID: 1820). Refer to p.59 for details.



7. Adjusting the rotation speed of two or more motors by a single setting device (multi-motor control)

Multiple motors can be operated at the same speed using a single variable resistor or external DC voltage.

- Change the "Speed, torque limiting command selection" parameter (ID: 1820) to "1" or "2" of the analog setting when operating in this method.

When setting to "1": Selecting the data No.1 makes the rotation speed the analog setting.

When setting to "2": Selecting any of the data numbers makes the rotation speed the analog setting.

- A connection example shown below applies to products for the single-phase power supply. In the case of products for the three-phase power supply, connect the power supply line to a three-phase power supply. Connections of motors and I/O signals are omitted in the figure.

■ When using a variable resistor

Connect the drivers as shown below.

When using a variable resistor, operate products of 20 units or less.

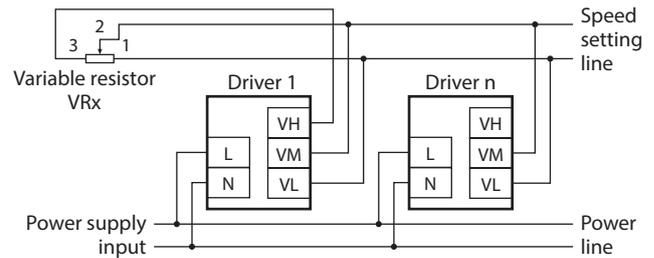
Calculation method of resistance (VRx) when the number of drivers is n

$$\text{Resistance (VRx)} = 20/n \text{ (k}\Omega\text{)}, n/20 \text{ (W)}$$

Example: If two drivers are used

$$\text{Resistance (VRx)} = 20/2 \text{ (k}\Omega\text{)}, 2/20 \text{ (W)}$$

Therefore, the resistance is calculated as 10 kΩ, 1/10 W.



■ When using external DC voltage

Connect the drivers as shown below.

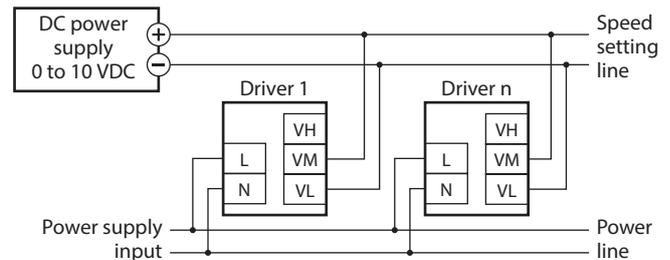
Calculation method of current capacity (I) of external DC power supply when the number of drivers is n

$$\text{Current capacity (I)} = 1 \times n \text{ (mA)}$$

Example: If two drivers are used

$$\text{Current capacity (I)} = 1 \times 2 \text{ (mA)}$$

Therefore, the current capacity is calculated as 2 mA or more.



■ How to adjust the speed difference

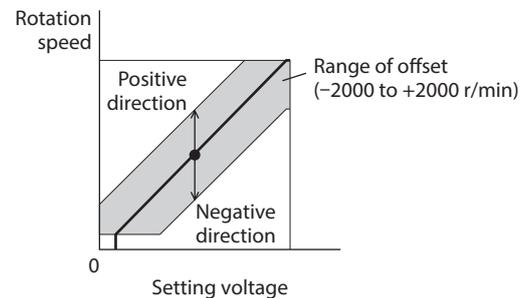
To adjust the speed difference among the first motor and the second and subsequent motors, change the parameter or connect a resistor to adjust.

- Adjustment by the parameter

The speed difference can be adjusted by changing the "Analog operation speed command gain" parameter (ID: 1821) and "Analog operation speed command offset" parameter (ID: 1822) for the second and subsequent drivers. This section explains how to adjust with the "Analog operation speed command offset" parameter.

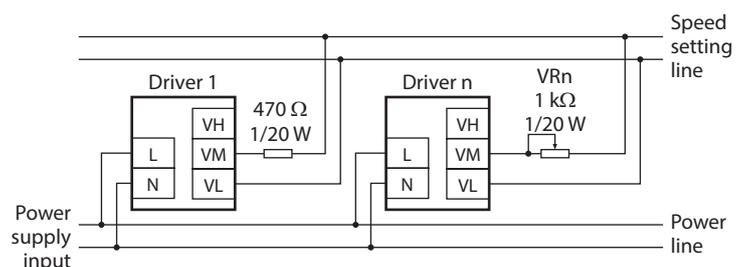
Refer to p.60 for how to set the parameter.

- When the speed of the second motor is slower than that of the first motor: Set the offset value to rotate faster (positive side) with the "Analog operation speed command offset" parameter.
- When the speed of the second motor is faster than that of the first motor: Set the offset value to rotate slower (negative side) with the "Analog operation speed command offset" parameter.



- Adjustment by a resistor

Connect a resistor of 470 Ω, 1/20 W to the terminal VM on the driver 1 and connect a variable resistor VRn of 1 kΩ, 1/20 W to the driver 2 and subsequent drivers.



Convenient functions

Display

Displaying the rotation speed of the gearhead output shaft	p.58
Displaying the transfer speed of the conveyor drive	p.58
Displaying the speed increased by an external mechanism	p.58
Displaying the motor output torque	p.50
Displaying the operation data number presently selected	p.50
Changing the display at power ON	p.65

Speed setting

Changing the setting method of the rotation speed	p.59
Setting the rotation speed with the teaching operation	p.51
Operating at two or more speeds	p.44
Limiting the setting range of the rotation speed	p.60
Checking the setting value of the external speed setting device	p.50

Application

Holding a load by the load holding function at motor standstill	p.63
Softening an impact at starting and stopping	p.63
Changing the motor rotation direction with the FWD input	p.44
Operating the motor by ON-OFF control of the power supply	p.61

Input and output

Changing the functions of input signals	p.65
Changing the functions of output signals	p.65
Checking the ON-OFF status of input signals	p.50
Checking the ON-OFF status of output signals	p.50
Testing the status of I/O signals	p.54
Changing the operation input mode from the 2-wire mode to the 3-wire mode	p.64

Alarm Information

Resetting the alarm that is present	p.72
Changing the overload alarm detection time	p.61
Checking the history of generated alarms	p.50
Checking the contents of generated information	p.50
Changing the generation condition or output setting of information	p.61

Lock

Locking so that the setting is not changed with the operation panel	p.55
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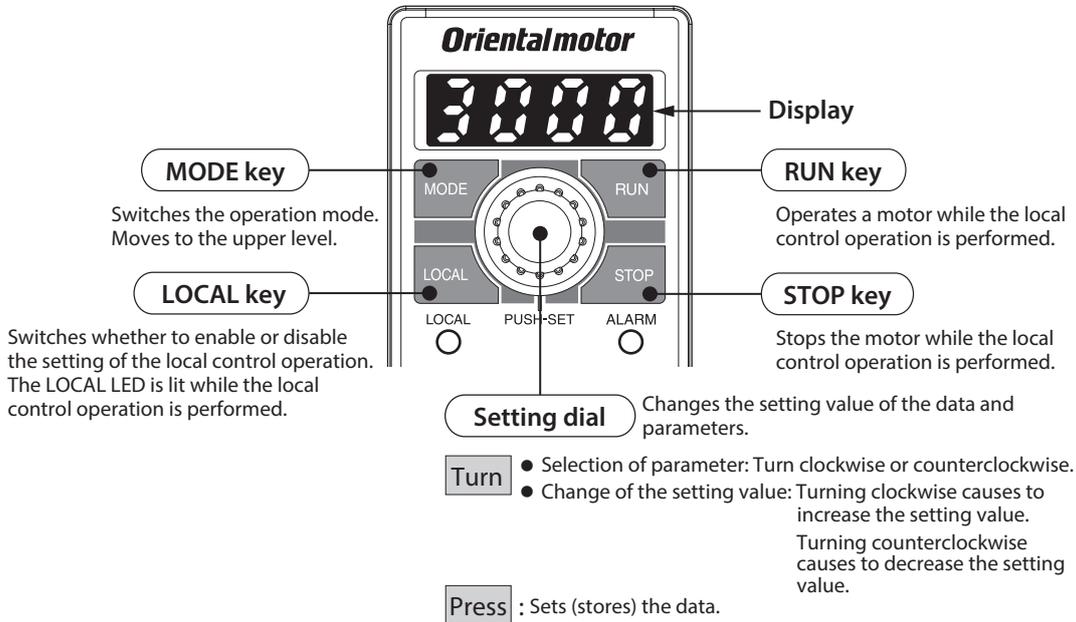
Operation panel

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

1. Operation panel

This chapter 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.36.

The operation panel cannot remove from the driver.

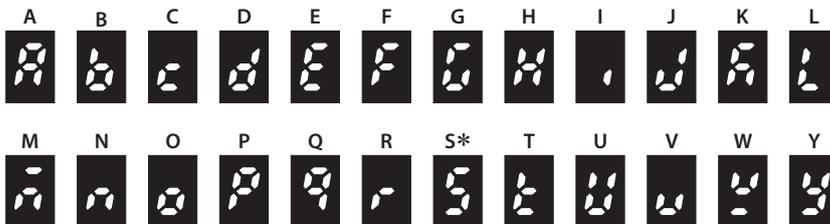
1-2 How to read the display

The display shows as follows.

• Arabic number



• Alphabet



• Sign

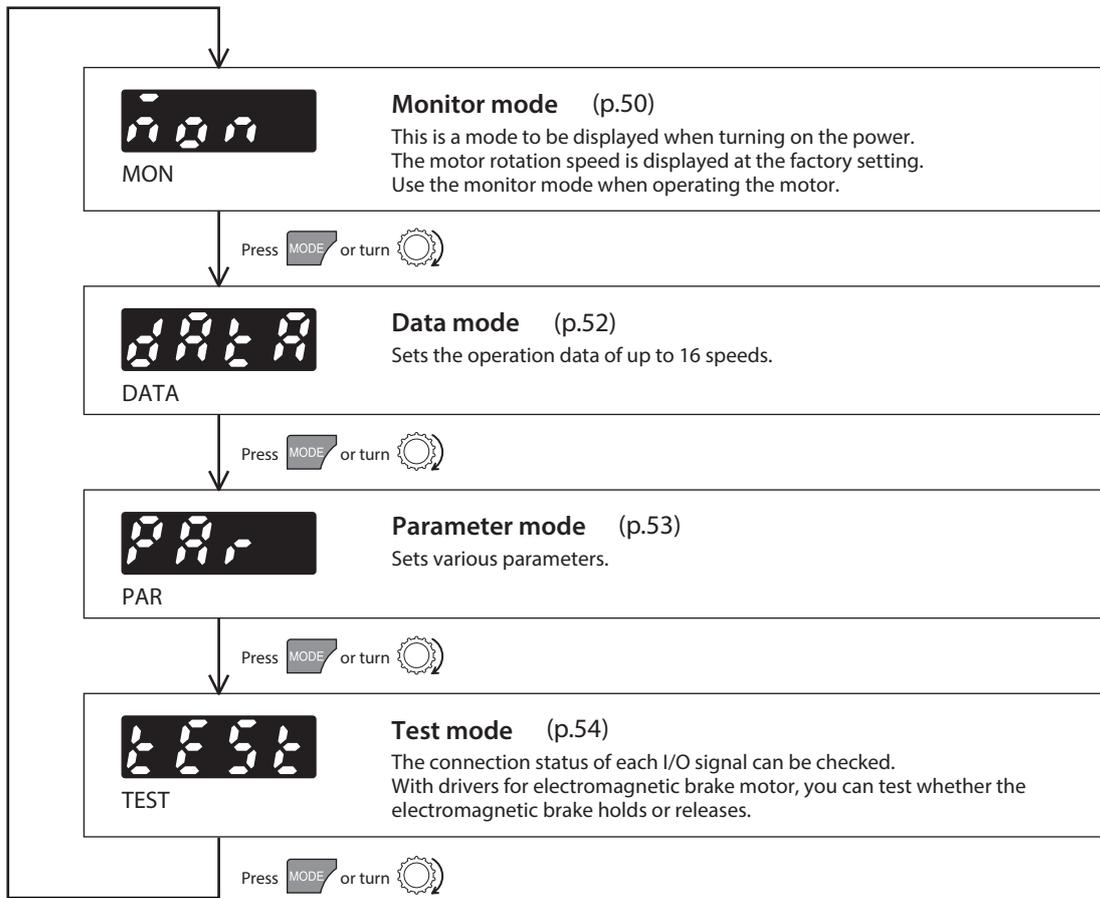


* Arabic number "5" and alphabet "S" are the same sign.

1-3 Function mode types

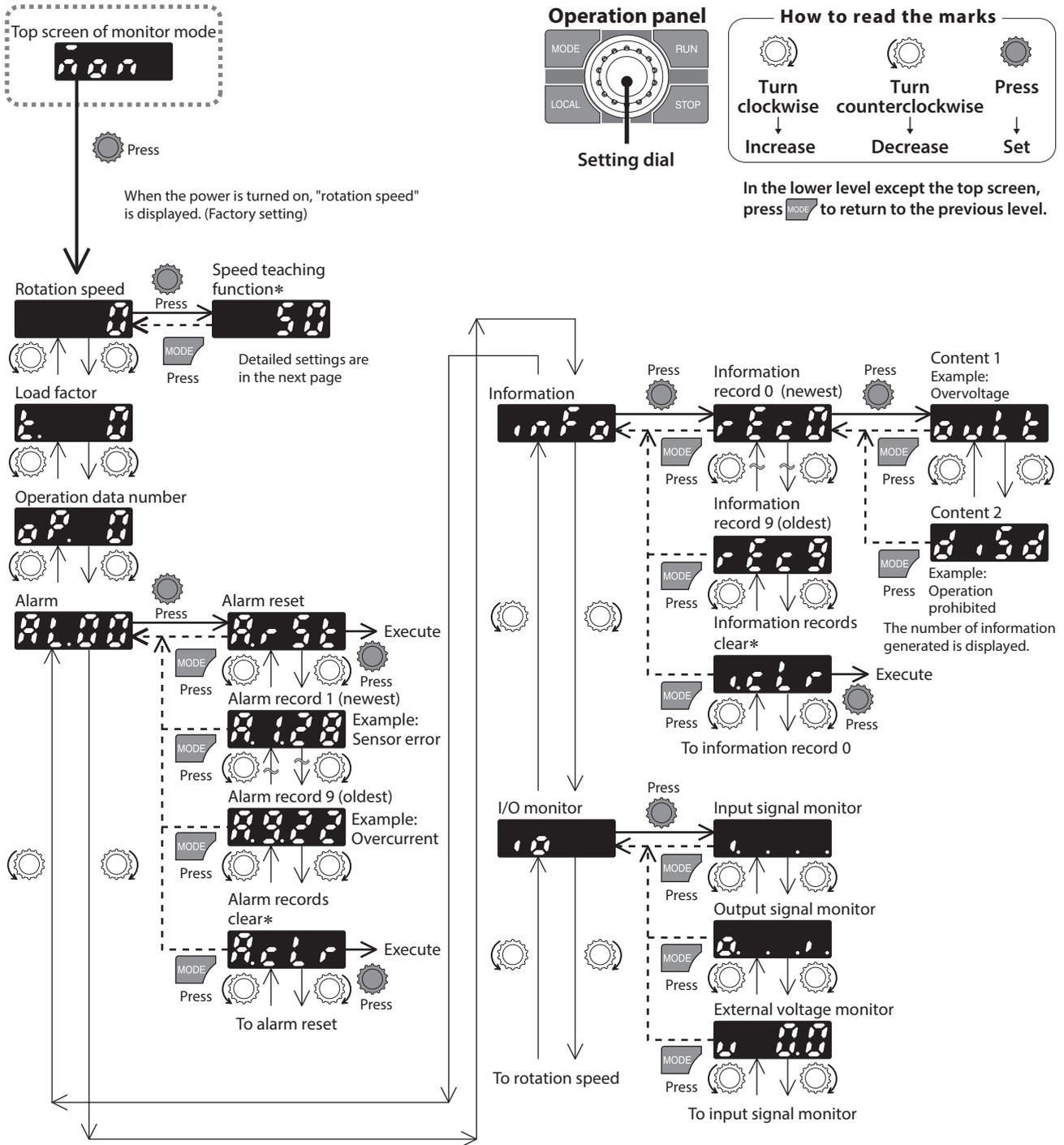
There are four operation modes in this product.

On the top screen of each mode, pressing the **MODE** 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).

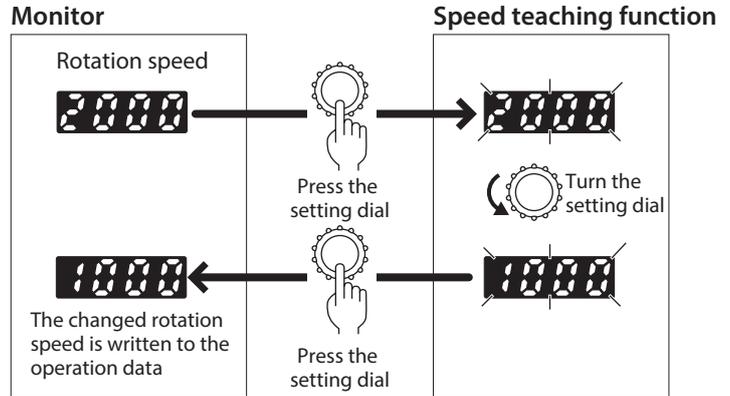
It is also possible to increase the rotation speed and display the increased speed. Set with the "Speed increasing ratio" parameter (ID: 2039).

Note 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.72 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 p.74 for details about information.

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

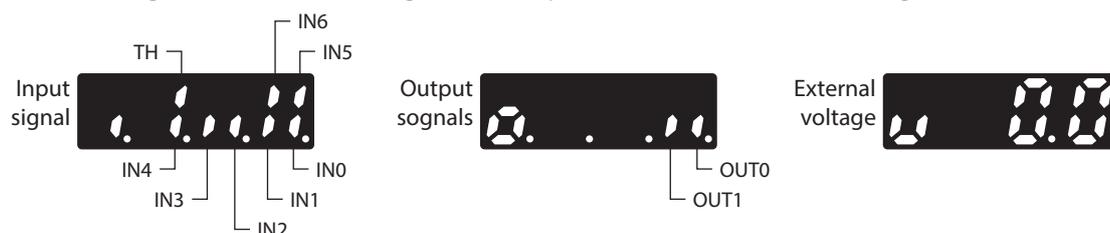
The screen to eliminate the information is shown after information history clear, and eliminating the information is executed when the setting dial is pressed.

■ I/O monitor

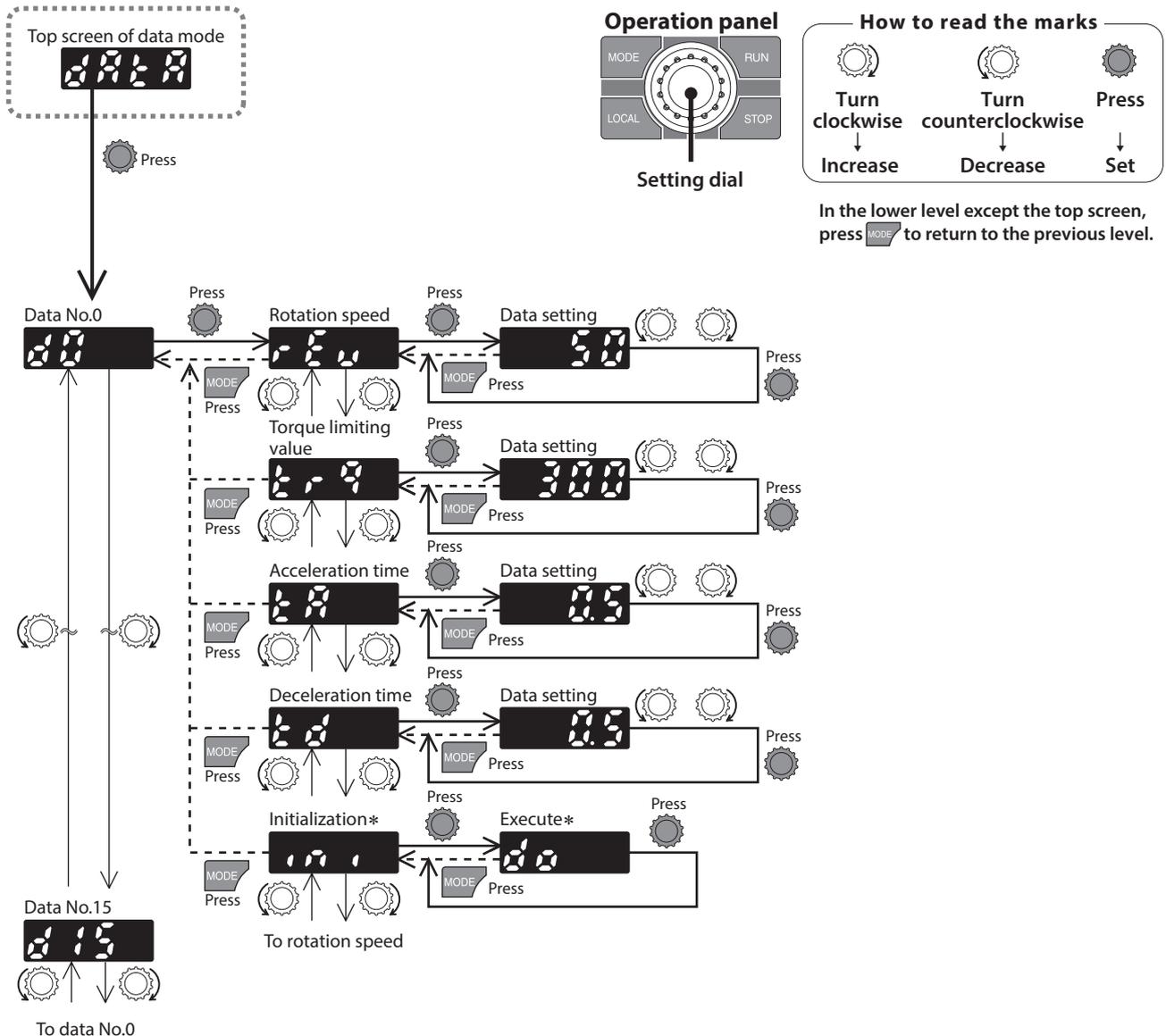
The ON-OFF status of each I/O signal for the driver can be checked.

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

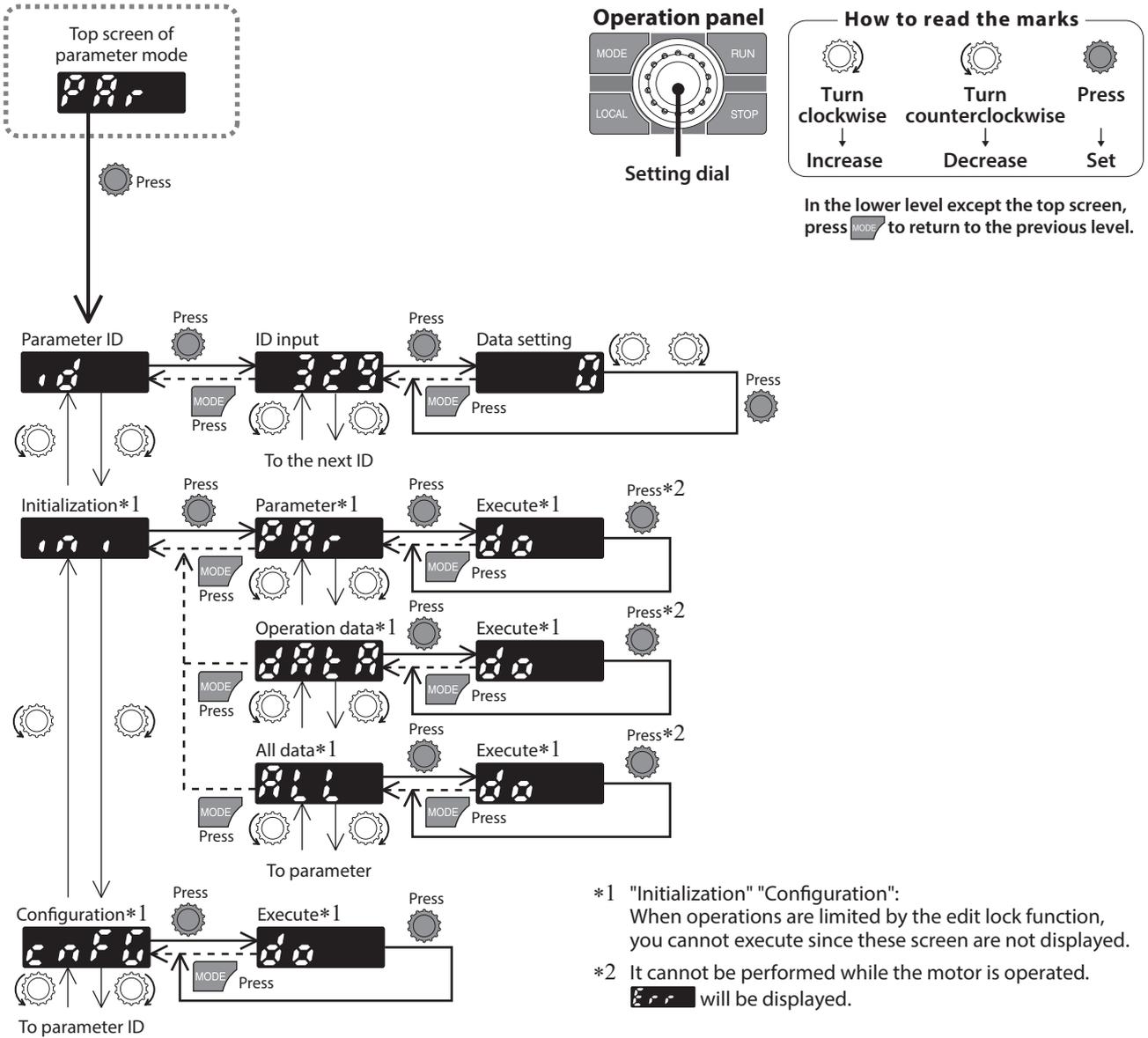


* "Initialization": When operations are limited by the edit lock function, you cannot execute since the screen is not displayed.

● 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." ⇒ p.62	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." ⇒ p.62			
Initialization	Restores the data for each data number to the factory setting.	-	-	-

2-3 Setting of parameters



Parameter ID

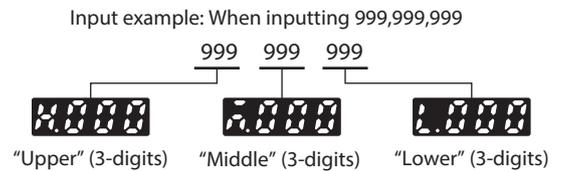
There is a unique ID in each parameter. Input the ID and set. Refer to p.56 for parameter ID.

[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."



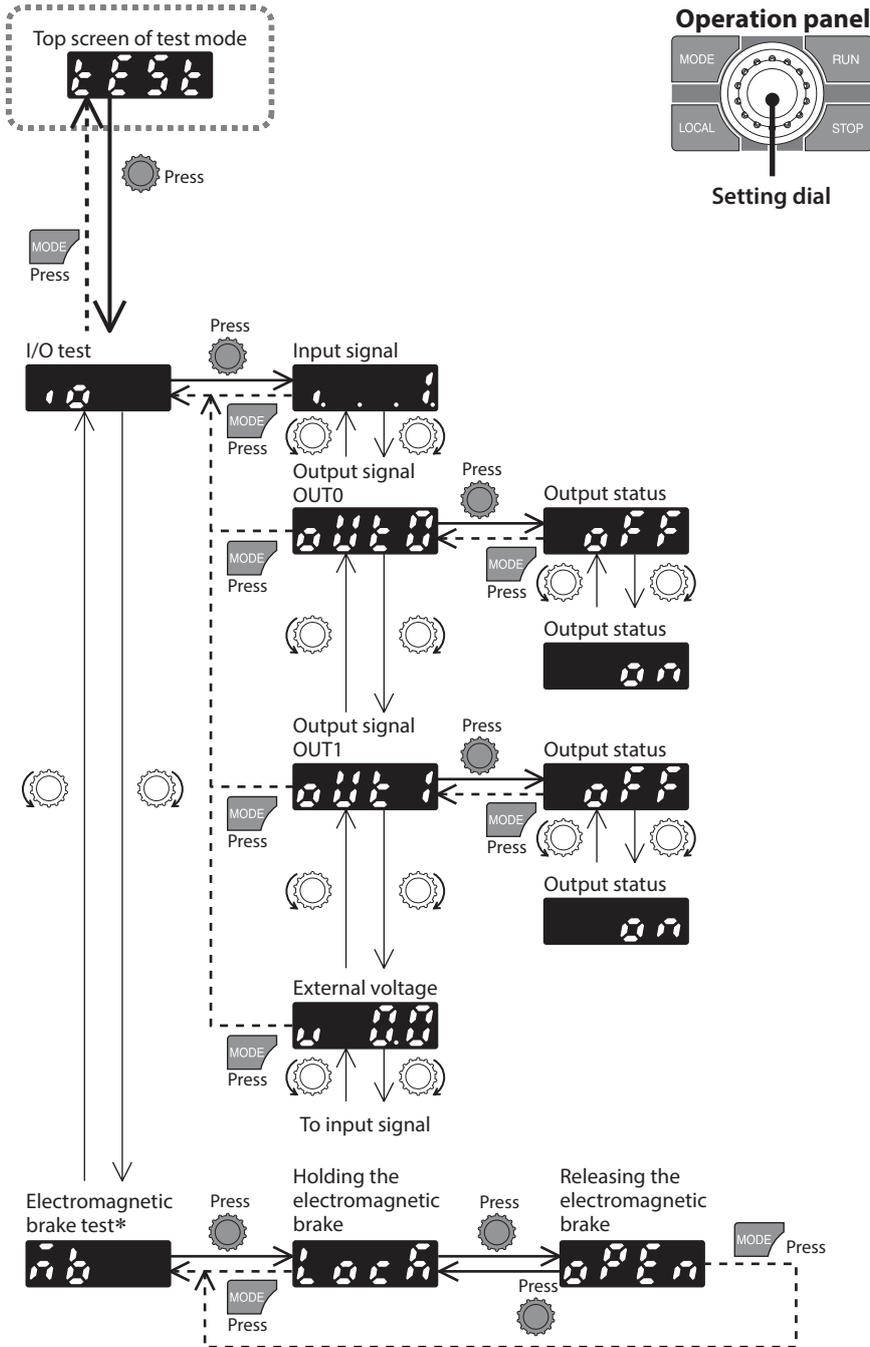
Initialization

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



How to read the marks

Turn clockwise → Increase
 Turn counterclockwise → Decrease
 Press → Set

In the lower level except the top screen, press **MODE** to return to the previous level.

Safety precautions

Preparation

How to use

Help

Appendix

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.

* Only drivers for electromagnetic brake motor

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.

When an electromagnetic brake motor is used, the electromagnetic brake actuates to hold the motor shaft.

Note If the setting dial is pressed to move to the I/O test screen while the load holding 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.

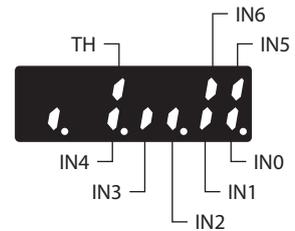
Input signal

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.

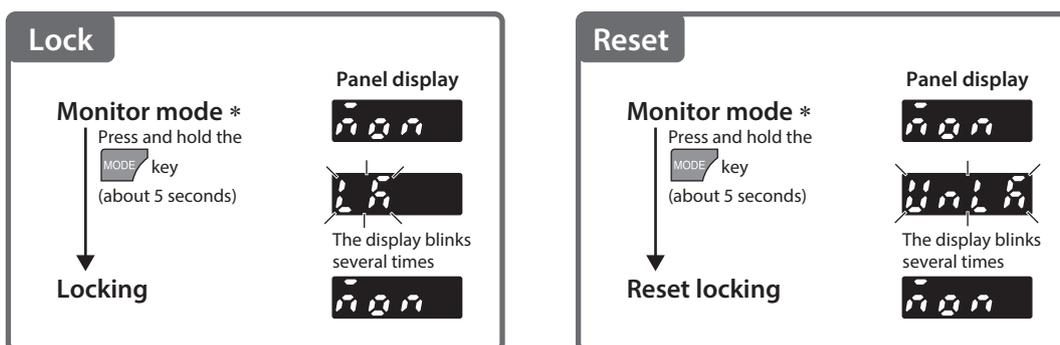
Electromagnetic brake test

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.

Note 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, "E" is displayed for about one second.

Parameters

1. Parameter list

	ID	Parameter name	Setting range	Factory setting	Update *1	Reference page
Base settings	–	Driver user name	Up to 16 characters	–	A	58
	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	60
	2086	Speed lower limit	50 to 4000 [r/min]	50	A	
	1821	Analog operation speed command gain	0 to 4000 [r/min/V]	850		
	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	61
	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	Reference page
Alarm and information settings	1964	INFO action (Operation prohibited information (INFO-DRV)) *3	0: INFO action is not applied 1: INFO action is applied	1	A	61
	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	Load holding function selection	0: Disable 1: Enable	0	C	62
	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 mode 1 1: 3-Wire mode 1 2: 2-Wire mode 2 3: 2-Wire mode 3 4: 3-Wire mode 2 5: 3-Wire mode 3	0	C	64
	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	65
	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	147		
	2145	OUT1 output function selection	140: TLC, 141: VA 147: SPEED-OUT, 148: DIR	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	65
	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		
	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.

2. Timing for parameter to update

Parameters can be set using the operation panel or **MEXE02**.

When parameters are written to the driver, they are saved in the non-volatile memory. The parameters saved in the non-volatile memory are stored even after the power supply is turned off. When a parameter is changed, the timing to update the new value varies depending on the parameter. See the following four types.

- Update immediatelyRecalculation and setup are immediately executed when the parameter is written.
- Update after operation stop.....Recalculation and setup are executed when the operation is stopped.
- Update after executing configuration.....Recalculation and setup are executed after configuration is executed.
The configuration is executed using the parameter mode of the operation panel or **MEXE02**.
- Update after turning on the power again.....Recalculation and setup are executed after the power is turned on again.

■ Notation rules

In this chapter, each update timing is represented in an alphabet.

A: Update immediately

B: Update after operation stop

C: Update after executing configuration or turning the power again

D: Update after turning on the power again

3. Explanation of parameters

3-1 Base settings parameters

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

ID	Parameter name	Description	Setting range	Factory setting	Update
–	Driver user name	A desired name can be given to the driver used. (Setting by using the MEXE02 only)	Up to 16 characters	–	A
1820	Speed, torque limiting command selection	Selects the setting method of the rotation speed and torque limiting value.	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	If the speed reduction ratio is set, the converted rotation speed is displayed.	100 to 9999	100	A
2038	Speed reduction ratio digit setting	The speed reduction ratio can be set by multiplying the value in "Speed reduction ratio" parameter by the value in "Speed reduction ratio digit setting" parameter.	0: ×1 1: ×0.1 2: ×0.01	2	
2039	Speed increasing ratio	Sets the speed increasing ratio. If the speed increasing ratio is set to the value other than 1, the rotation speed calculated by the formula [motor rotation speed x setting value] is displayed. At this time, the setting of the speed reduction ratio is disabled.	1.00 to 2.00	1.00	
450	Motor rotation direction	Sets the motor rotation direction. (Sets the rotation direction when turning the FWD input ON if the "2-wire mode" is selected with the "Operation input mode selection" parameter. Sets the rotation direction when turning the CW/CCW input OFF if the "3-wire mode" is selected.) Refer to p.44 for the rotation direction.	0: Positive direction=CCW 1: Positive direction=CW	1	C

■ Setting method of the rotation speed and torque limiting value

The setting method can be selected using the "Speed, torque limiting command selection" parameter. Refer to the table below for four types of parameter setting methods.

● "Speed, torque limiting command selection" parameter (ID: 1820)

Operation data No.	Setting value: 0		Setting value: 1		Setting value: 2		Setting value: 3	
	Rotation speed	Torque limiting						
0			Digital setting					
1	Digital setting	Digital setting	Analog setting	Digital setting	Analog setting	Digital setting	Digital setting	Analog setting
2 to 15			Digital setting					

Digital setting: Operation panel, **MEXE02**

Analog setting: External potentiometer (sold separately), external DC voltage

[Setting value] ● Digital setting for the rotation speed and torque limiting value in all operation data: "0"

● Analog setting for one of the rotation speed (operation data No.1), and digital setting for other operation data: "1"

● Analog setting for the rotation speed, and digital setting for the torque limiting value in each operation data: "2"

● Digital setting for the rotation speed in each operation data, and analog setting for the torque limiting value: "3"

■ Calculation method of speed reduction ratio: "Speed reduction ratio" parameter (ID: 2033), "Speed reduction ratio digit setting" parameter (ID: 2038)

Set using the "Speed reduction ratio" parameter (ID: 2033) and "Speed reduction ratio digit setting" parameter (ID: 2038).

In the case of motors with the **JH** gearhead, the **JB** gearhead, and the **JV** gearhead, input the actual gear ratio into the gear ratio of the gearhead. Check the operating manual of the motor for the actual gear ratio.

To display the rotation speed for the gearhead gear ratio

Example) When the speed reduction ratio 15 is set

Set 150 to the "Speed reduction ratio" parameter and 1 to the "Speed reduction ratio digit setting" parameter.

15 that was calculated by the formula "150 x 0.1" was set.

At this time, one-fifteenth speed of the motor rotation speed is displayed.

For example, when the motor rotation speed is 1300, "86.6" is shown on the display.



Rotation speed



To display as the conveyor transfer speed

To display the conveyor transfer speed, calculate the conveyor speed reduction ratio by using the formula below and set to the "Speed reduction ratio" parameter.

$$\text{Conveyor speed reduction ratio} = \frac{1}{\text{Feed rate per motor revolution}} = \frac{\text{Gearhead gear ratio}}{\text{Pulley diameter [m]} \times \pi}$$

When the calculated conveyor speed reduction ratio is used, the conveyor transfer speed is converted as follows.

$$\text{Conveyor transfer speed [m/min]} = \frac{\text{Motor output shaft rotation speed [r/min]}}{\text{Conveyor speed reduction ratio}}$$

Example) When the pulley diameter is 0.1 m and the gear ratio of the gearhead is 20

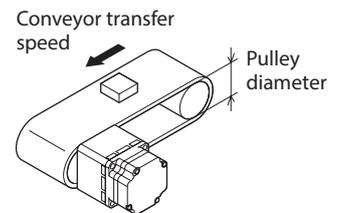
$$\text{Conveyor speed reduction ratio} = \frac{\text{Gearhead gear ratio}}{\text{Pulley diameter [m]} \times \pi} = \frac{20}{0.1 \text{ [m]} \times \pi} \cong 63.7$$

From the conversion formula, the conveyor speed reduction ratio is calculated as 63.7 in this example.

If the conveyor speed reduction ratio is 63.7 and the rotation speed of the motor is 1300 r/min, the conveyor transfer speed is converted as follows:

$$\text{Conveyor transfer speed [m/min]} = \frac{1300}{63.7} \cong 20.4$$

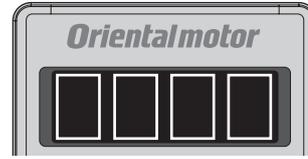
Accordingly, "20.4" is shown on the display.



■ Display when setting the speed reduction ratio

The position of the decimal point displayed on the rotation speed monitor varies as shown in the table below depending on the set speed reduction ratio or conveyor speed reduction ratio.

Setting of speed reduction ratio, calculated conveyor speed reduction ratio	Displayed decimal point position
1.00 to 9.99	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
10.00 to 99.99	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
100.0 to 999.9	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
1000 or more	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



3-2 Speed/torque limiting adjustment parameters

A: Update immediately, B: Update after operation stop

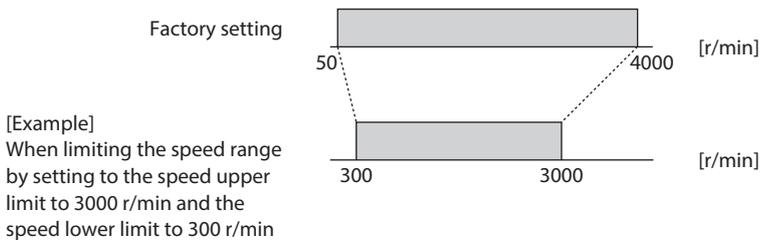
ID	Parameter name	Description	Setting range	Factory setting	Update
2085	Speed upper limit	Sets the upper limit value of the speed command.	50 to 4000 [r/min]	4000	B
2086	Speed lower limit	Sets the lower limit value of the speed command.	50 to 4000 [r/min]	50	
1821	Analog operation speed command gain	Sets the speed command per 1 VDC of the input voltage by the external analog setting device.	0 to 4000 [r/min/V]	850	A
1822	Analog operation speed command offset	Sets the offset of the speed command input by the external analog setting device.	-2000 to +2000 [r/min]	0	
1823	Analog torque limiting gain	Sets the torque limiting value per 1 VDC of the input voltage by the external analog setting device.	0 to 300 [%/V]	65	
1824	Analog torque limiting offset	Sets the offset of the torque limiting input by the external analog setting device.	-150 to +150 [%]	0	
1825	Analog torque limiting maximum value	Sets the maximum value of the torque limiting by the external analog setting device.	0 to 300 [%]	300	

■ Limiting the setting range of the rotation speed

- "Speed upper limit" parameter (ID: 2085), "Speed lower limit" parameter (ID: 2086)

The setting range of the rotation speed is set to 50 to 4000 r/min at the time of shipment. This setting range can be changed to limit.

Setting range of the rotation speed



- Speed upper limit

Set the upper limit value of the rotation speed in the "Speed upper limit" parameter.

If the rotation speed exceeding the speed upper limit value is already set, the rotation speed is limited to the speed set in the "Speed upper limit" parameter.

- Speed lower limit

Set the lower limit value of the rotation speed in the "Speed lower limit" parameter.

If the rotation speed below the speed lower limit value is already set, the rotation speed is limited to the speed set in the "Speed lower limit" parameter.

If the analog setting is used for the speed setting method

Even if the "Speed lower limit" parameter is set to 50 [r/min] or more, under the condition of the analog operation speed command of less than 50 [r/min], the speed setting is acknowledged as 0 [r/min] to stop the motor.

To rotate the motor at the setting value in the "Speed lower limit" parameter without stopping, set 50 [r/min] or more in the "Analog operation speed command offset" parameter.

3-3 Alarm/information setting parameters

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

ID	Parameter name	Description	Setting range	Factory setting	Update
384	Overload alarm detection time	Sets the detection time of the overload alarm. 200 W or lower: At a time of about 180% load 300 W or higher: At a time of about 150% load	0.1 to 40.0 [s]	30.0	A
414	Prevention of operation at power-on alarm	If the "Prevention of operation at power-on alarm" parameter is set to disable, the motor can be operated by ON-OFF control of the power supply. Refer to p.62 for details.	0: Disable 1: Enable	1	C
413	Electromagnetic brake function at alarm	Sets the action of the electromagnetic brake when an alarm is generated.	0: Lock after coasting to a stop 1: Lock immediately	1	
447	INFO auto clear	Sets whether a state of generating information is automatically cleared when the cause generated the information was removed.	0: Disable 1: Enable	1	A
416	Driver temperature information	Sets the generation condition of the driver temperature information.	40 to 85 [°C]	85	
418	Speed information	Sets the generation condition of the speed information.	50 to 5000 [r/min]	5000	
422	Load information	Sets the generation condition of the load information.	10 to 300 [%]	300	
425	Overvoltage information	Sets the generation condition of the overvoltage information.	280 to 440 [V]	435	
426	Undervoltage information	Sets the generation condition of the undervoltage information.	120 to 280 [V]	120	
431	Tripmeter information	Sets the generation condition of the tripmeter information.	0: Disable 1 to 999,999,999 (1=0.1 kRev)	0	
432	Odometer information	Sets the generation condition of the odometer information.	0: Disable 1 to 999,999,999 (1=0.1 kRev)	0	
438	Main power supply time information	Sets the generation condition of the main power supply time information.	0: Disable 1 to 999,999,999 [min]	0	
439	Main power supply count information	Sets the generation condition of the main power supply count information.	0: Disable 1 to 999,999,999 [times]	0	
1954	INFO action (Driver temperature information (INFO-DRVTMP))	Set the INFO output and LED status when corresponding information is generated. Only the specified information can be output. ※ The bit output status of each Information is not changed. The bit output can be checked using the internal I/O monitor of the MEXE02 .	0: INFO action is not applied • INFO output: OFF • LED: Unlit 1: INFO action is applied • INFO output: ON • LED: Blink	1	
1956	INFO action (Overvoltage information (INFO-OVOLT))				
1957	INFO action (Undervoltage information (INFO-UVOLT))				
1959	INFO action (Load information (INFO-LOAD))				
1960	INFO action (Speed information (INFO-SPD))				
1964	INFO action (Operation prohibited information (INFO-DRV))				
1972	INFO action (Tripmeter information (INFO-TRIP))				
1973	INFO action (Odometer information (INFO-ODO))				
1978	INFO action (Main power supply time information (INFO-PTIME))				
1979	INFO action (Main power supply count information (INFO-PCOUNT))				
1980	INFO action (Start operation restricted mode information (INFO-DSLMTD))				
1981	INFO action (I/O test mode information (INFO-IOTEST))				
1982	INFO action (Configuration request information (INFO-CFG))				
1983	INFO action (Power cycling request information (INFO-RBT))				

- Note**
- When the product is used in an application of vertical drive such as elevating equipment, set the "Electromagnetic brake function at alarm" parameter to "1: Lock immediately." Setting to "0 : Lock after coasting to a stop" causes a load to fall.
 - When an alarm of the sensor error is generated, the electromagnetic brake is activated to hold the motor shaft (a load) regardless of the setting of the "Electromagnetic brake function at alarm" parameter.

■ Changing the overload alarm detection time

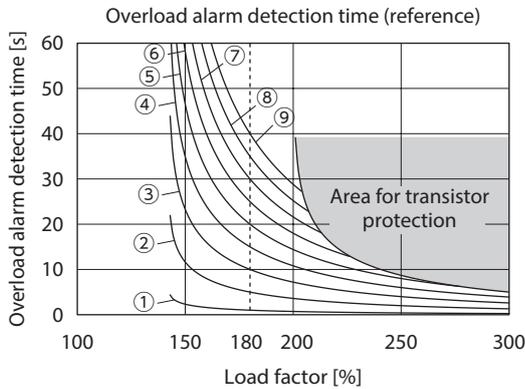
You can change the time till the overload alarm is detected after the motor output torque exceeded the overload detection level. The time when the overload alarm is generated varies according to the load factor of the motor.

Overload alarm detection time

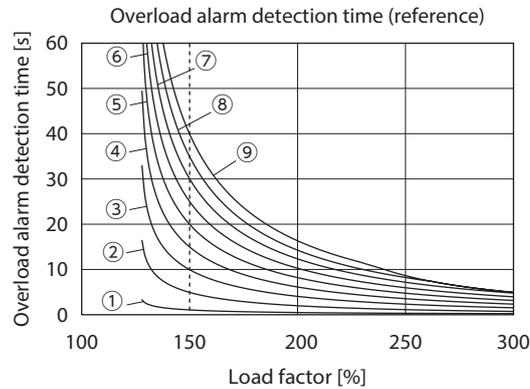
The time set in the "Overload alarm detection time" parameter (ID: 384) is an operating time at the following load factor.

- 200 W or lower: About 180%
- 300 W or higher: About 150%

● 200 W or lower



● 300 W or higher



Setting value

- ① : 1 second
- ② : 5 seconds
- ③ : 10 seconds
- ④ : 15 seconds
- ⑤ : 20 seconds
- ⑥ : 25 seconds
- ⑦ : 30 seconds
- ⑧ : 35 seconds
- ⑨ : 40 seconds

■ Operating the motor by ON-OFF control of the power supply

The "Prevention of operation at power-on alarm" parameter is set to enable at the time of shipment in order to prevent the motor from rotating suddenly when the power is turned on.

Setting the "Prevention of operation at power-on alarm" parameter to disable can operate or stop the motor by ON-OFF control of the power supply of the driver.

Note Execute an operation after confirming thoroughly that no risk occurs by rotation of the motor.

● Setting procedures

1. Set the "Prevention of operation at power-on alarm" parameter from "1 (Enable)" to "0 (Disable)".

2. Set a rotation speed in the operation data.

If the operation data number is not selected, the motor rotates at the rotation speed set in the operation data No.0. To use an external analog setting device, change the "Speed, torque limiting command selection" parameter.

3. Turn the operation input signal (FWD input or REV input*) ON.

Input a signal indicating the motor rotation direction desired.

* In the case of 2-Wire mode

4. Turn off the driver power. Turn on the power again, and the motor will rotate immediately.

To stop the motor, turn off the driver power or turn the operation input signal OFF.

3-4 Operation parameters

B: Update after operation stop, C: Update after executing configuration or turning on the power again

ID	Parameter name	Description	Setting range	Factory setting	Update
2069	Load holding function selection	Sets whether a certain degree of holding force is generated when the motor stops.	0: Disable 1: Enable	0	C
329	Acceleration/deceleration unit selection	Sets the setting unit for the acceleration time and deceleration time when setting the rotation speed to the digital setting.	0: [s / 3000 r/min] 1: [s]	0	B
330	Impact softening filter	This is a function to soften an impact at starting and stopping against the set acceleration time and deceleration time.	0: No filter 1: Filter 1 2: Filter 2	0	

■ Holding a load at motor standstill

Although the electromagnetic brake motor can hold a load by the electromagnetic brake when the motor stops, even if a motor without an electromagnetic brake is used, a certain degree of holding force can be generated at motor standstill by the load holding function.

● "Load holding function selection" parameter (ID: 2069)

If the "Load holding function selection" parameter is set to "1: Enable," a certain degree of holding force is generated when the motor stops (load holding torque).

The factory setting is "0: Disable."

If the angle of the motor output shaft is changed about 15°, a holding force is generated.

If the motor holds a large load, heat generated by the driver increases. Therefore, use in a state where a load does not exceed 50% of the rated torque.

- For the load holding torque, the holding force is lost when the power supply to the driver is turned off. This function cannot be used for keeping the load position in the event of a power outage.
- If the torque limiting value set in the selected operation data number is lower than 50%, the load holding torque will be generated up to the torque limiting value.
- If the load holding function is set to enable with the driver for electromagnetic brake motor, the electromagnetic brake is released, and the load holding torque generates to hold a load when the motor stops. When the main power supply is turned off, the electromagnetic brake holds a load.

If the load holding function is set to enable, the time until the motor stops will be longer than the disabled setting according to the setting or load conditions.

In addition, the motor output shaft may vibrate when the motor stops.

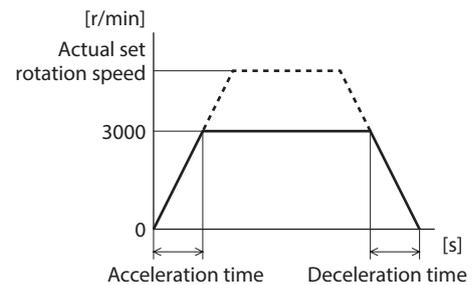
■ Setting the acceleration/deceleration time

● "Acceleration/deceleration unit selection" parameter (ID: 329)

When the setting is "0"

The acceleration time is set as the time needed for the motor to reach the rated rotation speed (3000 r/min) from the standstill state.

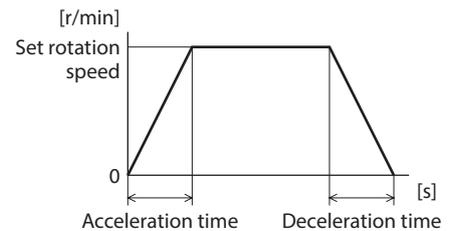
The deceleration time is set as the time needed for the motor to stop from the rated rotation speed (3000 r/min).



When the setting is "1"

When the digital setting is used to set the rotation speed, you can set by the time in the right figure with reference to the set rotation speed.

However, if the "Operation input mode selection" parameter is set to "3" or "5," the setting "1" of the "Acceleration/deceleration unit selection" parameter is not applied, and the motor operates according to the data in the setting "0." Refer to p.64 for the "Operation input mode selection" parameter.

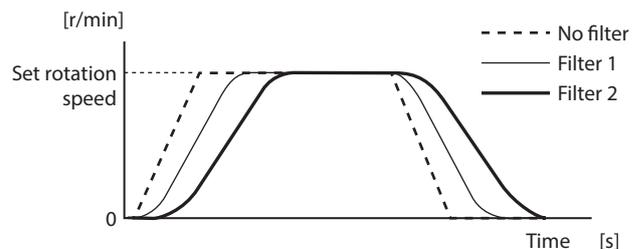


■ Softening an impact at starting and stopping

● "Impact softening filter" parameter (ID: 330)

This is a function to accelerate slowly and decelerate slowly so that the position of a transported load does not move when the motor starts and stops.

It can soften an impact when the motor starts, stops, and changes the speed against the set acceleration time and deceleration time.



3-5 I/O action parameters

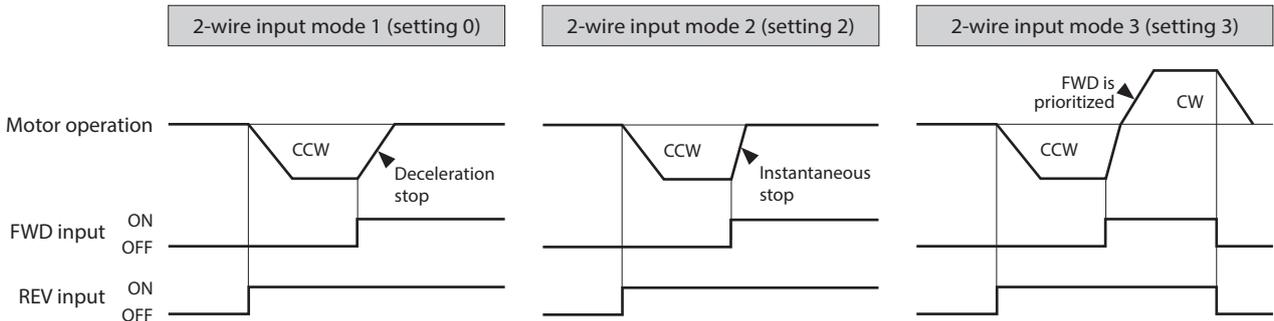
A: Update immediately, C: Update after executing configuration or turning on the power again

ID	Parameter name	Description	Setting range	Factory setting	Update
1819	Operation input mode selection	Selects whether the operation input signal is used in the 2-wire mode or the 3-wire mode. Refer to p.30 for the 2-wire mode or 3-wire mode. Also, using this parameter, the motor movement when the same operation input signals are input can be changed as shown in the charts below.	0: 2-Wire mode 1 1: 3-Wire mode 1 2: 2-Wire mode 2 3: 2-Wire mode 3 4: 3-Wire mode 2 5: 3-Wire mode 3	0	C
1817	VA detection width	Sets the detection width for the VA output.	1 to 400 [r/min]	200	A

■ "Operation input mode selection" parameter (ID: 1819)

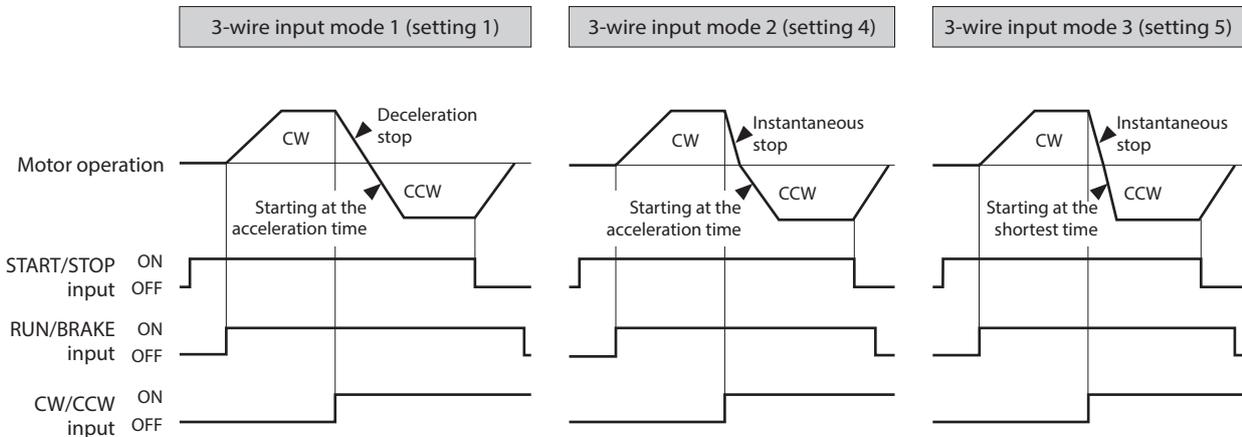
● 2-Wire mode

The motor movement when the FWD input and the REV input are turned ON simultaneously varies depending on the settings.



● 3-Wire mode

The motor movement when the ON-OFF status of the CW/CCW input is switched varies depending on the settings.

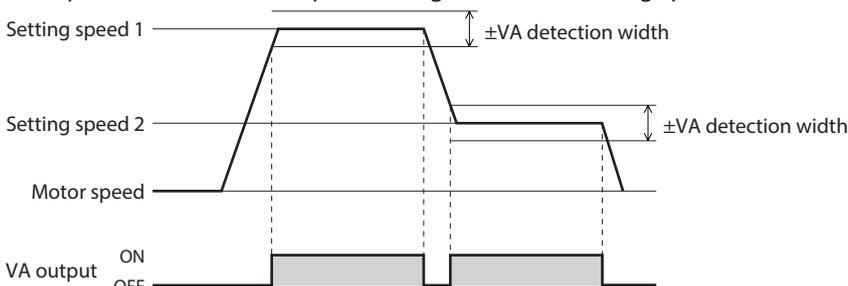


■ "VA detection width" parameter (ID: 1817)

The VA output signal is output when the motor reaches the plus or minus range of the "VA detection width" with respect to the set rotation speed.

The VA detection width can be set in a range of 1 to 400 r/min with respect to the set rotation speed. (Factory setting: 200 r/min)

Example: When the motor speed changes from the setting speed 1 to the setting speed 2



3-6 I/O function selection parameters

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

ID	Parameter name	Description	Setting range	Factory setting	Update
2112	IN0 input function selection	Assigns the input signals to the input terminals IN0 to IN6.	Refer to the "Input function selection" parameters in the table below.	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	IN0 logic level setting	Sets the logic level setting of input signals.	0: Non invert 1: Invert	0	
2129	IN1 logic level setting				
2130	IN2 logic level setting				
2131	IN3 logic level setting				
2132	IN4 logic level setting				
2133	IN5 logic level setting				
2134	IN6 logic level setting				
2144	OUT0 output function selection	Assigns the output signals to the output terminals OUT0 and OUT1.	Refer to the "Output function selection" parameters in the table below.	147	
2145	OUT1 output function selection			130	
2160	OUT0 logic level setting	Sets the logic level setting of output signals.	0: Non invert 1: Invert	0	
2161	OUT1 logic level setting				

■ Setting range of the function selection parameter

● "Input function selection" parameters *1

0: Not used	64: M0
8: ALARM-RESET	65: M1
14: INFO-CLR	66: M2
16: HMI	67: M3
22: TL	72: STOP-MODE (CW/CCW)
25: EXT-ERROR	73: MB-FREE*2
58: FWD (START/STOP)	74: H-FREE
59: REV (RUN/BRAKE)	

*1 If the 3-wire mode is selected with the "Operation input mode selection" parameter, signals in parentheses () will be applied.

*2 Drivers for electromagnetic brake motor only

● "Output function selection" parameters

0: Not used	140: TLC
130: ALARM-OUT	141: VA
134: MOVE	147: SPEED-OUT
135: INFO	148: DIR

3-7 I/F function parameters

A: Update immediately, D: Update after turning on the power again

ID	Parameter name	Description	Setting range	Factory setting	Update
488	Operation panel editing	Editing on the operation panel can be disabled. Switching to the local control operation cannot be performed if it is disabled.	0: Disable 1: Enable	1	A
489	Operation panel initial view	Sets the initial screen to display on the operation panel when the driver power is turned on.	0: Rotation speed [r/min] 1: Load factor [%] 2: Operation data number	0	
498	USB-ID enable	Sets whether to enable or disable the USB-ID. When it is set to "Disable," the USB-ID is automatically set to a random number.	0: Disable 1: Enable	1	D
499	USB-ID	Sets the USB-ID (serial number). The COM port at power-on can be fixed.	0 to 999,999,999	0	
2555	USB-PID	Sets the ID to be displayed in the COM port.	0 to 31	0	

The **MEXE02** is software to set the data required to operate the motor using a PC. Refer to the operating manual of the **MEXE02** for how to use such as data editing method and others. This chapter explains details about the **BLE2** Series.

1. Starting MEXE02

Select the product.
Series: BLE2
Prodcut: BLE2

2. Monitor

■ Unit information monitor

The device information of the **BLE2** Series can be monitored.

● How to view the unit information monitor window

Item	Description
Driver user name	Monitors the name set in the "Driver user name" parameter.
Product name	Monitors the model name of the driver.
Ver.	Monitors the software version used.
Main power count	Monitors the number of times that the main power supply of the driver is turned on.
Main power supply time	Monitors the integrated value of the main power supply time of the driver.
Electromagenetic brake Y/N	Yes: This is a driver that the electromagnetic brake can be connected. No: This is a driver that the electromagnetic brake cannot be connected.
Regeneration resistor connection	Disable: The setting is in a state where the regeneration resistor is not used. Enable: The setting is in a state where the regeneration resistor is used. Refer to p.23 for how to use the regeneration resistor.
Driver setting value	Monitors the parameter values set in the driver.

■ Status monitor

The operating status of the **BLE2** Series can be monitored.

● How to view the status monitor window

Main monitored items	Description
Command speed (motor shaft)	Monitors the present command speed.
Actual speed (motor shaft)	Monitors the present feedback speed.
Command speed (gearhead shaft)	Monitors the present command speed as a value converted by the set speed reduction ratio.
Actual speed (gearhead shaft)	Monitors the present feedback speed as a value converted by the set speed reduction ratio.
Gear ratio	Monitors the gear ratio presently set.
Speed increasing ratio	Monitors the speed increasing ratio presently set.
Selection number	Monitors the operation data number presently selected.
Load factor	Monitors the present motor output torque as a load factor. The load factor is a value based on the rated torque being 100%.
Main circuit DC voltage	Monitors the present voltage value inside the driver.
External analog setting device (input voltage)	Monitors the voltage value of the external analog setting device presently input.
Elapsed time from BOOT	Monitors the time that has elapsed since the power supply was turned on.
Driver temperature	Monitors the present driver temperature.
Odometer	Monitors the cumulative rotation amount inside the driver since the driver was started operating.
Tripmeter	Monitors the total rotation amount inside the driver. The value of the tripmeter can be cleared by executing "Clear tripmeter."
Alarm	Monitors the present alarm status. Details of the alarm generated and the driver status when the alarm was generated can be checked using the alarm monitor.
Information	Monitors the present information status. Details of the information can be checked using the information monitor.
Sequence history	Monitors the operation data numbers executed previously (the latest 16 data). "-" is displayed when the motor is stopped, and the value same as the selection number is displayed during operation. The sequence history can be cleared by executing "Clear sequence history."

■ D-I/O monitor

The ON-OFF status of the I/O signals of the **BLE2** Series and the setting value of the external analog setting device can be monitored. D-I/O represents direct I/O.

■ I/O test

I/O signals of D-I/O can be tested. Forcible output of output signals in addition to monitors of input signals and external DC voltage can be executed.

This function is convenient when the wire connection with the programmable controller is checked. Also, with drivers for electromagnetic brake motor, the electromagnetic brake of the motor can be controlled to hold or release forcibly.



- Output signals can forcibly be turned ON or OFF with I/O test. Therefore, other devices connected to the applicable product may operate. Before operation, check the condition of the surrounding area to ensure safety.
- If I/O test is started while the load holding function is enabled, the holding force of the motor is lost. When I/O test is ended, the holding force is generated.
- The electromagnetic brake cannot be held or released forcibly while the alarm is generated.

■ Internal I/O monitor

All I/O signals of the **BLE2** Series can be monitored. Signals that are not assigned to direct I/O can also be checked.

■ Alarm monitor

The alarm information of the **BLE2** Series can be monitored.

● Items that can be checked in the alarm history

Item	Description
Code	This is an alarm code.
Alarm message	This is the description of the alarm.
Sub code	This is our code for checking.
Driver temperature	This is the driver temperature when an alarm is generated.
Main circuit DC voltage	This is the internal voltage of the driver when an alarm is generated.
Physical I/O input	Monitors the status of IN0 to IN6 when an alarm is generated.
Internal I/O output	Monitors the status of the internal I/O when an alarm is generated.
Operation data number	Monitors the data number operated when an alarm is generated.
Command speed	Monitors the rotation speed command operated when an alarm is generated.
Detection speed	Monitors the detection speed when an alarm is generated.
Load factor	Monitors the motor load factor when an alarm is generated.
Elapsed time from BOOT	This is the elapsed time from the input of the main power supply to the generation of the alarm.
Elapsed time from starting operation	This is the elapsed time from the start of the operation to the generation of the alarm.
Main power supply time	This is the elapsed time from the input of the main power supply of the driver to the generation of the alarm.

When the sensor error at power-on and the EEPROM error shortly after power-on are generated, "0" is shown in all fields. (Excluding the code, alarm message, and main power supply time)

■ Information monitor

Information contents of the **BLE2** Series can be monitored.

■ Waveform monitor

The motor rotation speed or the status of I/O signals can be checked in a waveform format.

Refer to the operating manual of the **MEXE02** for the procedures to operate the applicable products using the **MEXE02**.

● CH1 to CH4 (analog CH)

The rotation speed or the detected torque (actual torque), etc. can be checked. Using the waveform monitor can check successive changes.

Monitored items	Unit	Range selection
Command speed (motor shaft)	r/min	100, 200, 500, 1000, 2000, 5000
Actual speed (motor shaft)	r/min	100, 200, 500, 1000, 2000, 5000
Main circuit DC voltage	V	50, 100, 200, 500
Actual torque	%	50, 100, 200
Selection number	–	1, 2, 5, 10, 20
External analog setting device	V	1.0, 2.0, 5.0, 10.0, 20.0

● CH5 to CH12 (digital CH)

The ON/OFF status of signals can be checked. There is no setting for range and offset in the digital CH.

Monitored items	Monitored items	Monitored items	Monitored items	Monitored items
ALARM-OUT	DIR	INFO-CFG	INFO-PTIME	MB-FREE
ALARM-RESET	DOUT0	INFO-DRVTMP	INFO-RBT	MOVE
DIN0	DOUT1	INFO-DRV	INFO-SPD	REV (RUN/BRAKE)
DIN1	EXT-ERROR	INFO-DSLMTD	INFO-TRIP	SPEED-OUT
DIN2	FWD (START/STOP)	INFO-IOTEST	INFO-UVOLT	STOP-MODE (CW/CCW)
DIN3	H-FREE	INFO-LOAD	M0	TL
DIN4	HMI	INFO-ODO	M1	TLC
DIN5	INFO-CLR	INFO-OVOLT	M2	VA
DIN6	INFO	INFO-PCOUNT	M3	

● Time scale

The following time scales can be set.

5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000 [Unit: ms]

3. Teaching, remote operation

A motor can be operated using the **MEXE02**. The motor operation can be checked before connecting to a programmable controller.

Also, the teaching function of the operation data can be performed.

The ALARM LED on the driver blinks in orange when teaching/remote operation is started.

Note

- While teaching/remote operation is performed, the motor is operated based on the data set in the teaching data.
- If the motor is used in a state where the output torque is limited, check the setting of the teaching data before performing teaching/remote operation.
- If the operation input signal was ON (active state) when teaching/remote operation is completed, the operation prohibited information is generated. The operation prohibited information can be cleared by turning the operation input signal OFF.

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.

- Note**
- 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.

- Note**
- 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.

Safety precautions

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.
	<ul style="list-style-type: none"> ● 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.
	<ul style="list-style-type: none"> ● 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.
	<ul style="list-style-type: none"> ● 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.
	<ul style="list-style-type: none"> ● An alarm is present. <ul style="list-style-type: none"> ▷ A protective function is triggered and an alarm is being generated. Refer to p.72, and reset the alarm after removing the cause of the alarm.

Preparation

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.
	<ul style="list-style-type: none"> ● 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.

How to use

 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.
	<ul style="list-style-type: none"> ● 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.
	<ul style="list-style-type: none"> ● 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 p.74, and check the cause of information and how to reset.
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Help

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.
	<ul style="list-style-type: none"> ● 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 of the motor for the rotation direction of the gearhead output shaft.
	<ul style="list-style-type: none"> ● 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.

Appendix

<p>The motor movement is not stable.</p> <p>Motor vibration is too large.</p>	<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.
	<ul style="list-style-type: none"> ● 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. <p>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.]</p>

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. Configuration cannot be executed while an alarm is generated. (With the drivers for electromagnetic brake motor, the electromagnetic brake holds the motor shaft.)

Safety precautions

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.

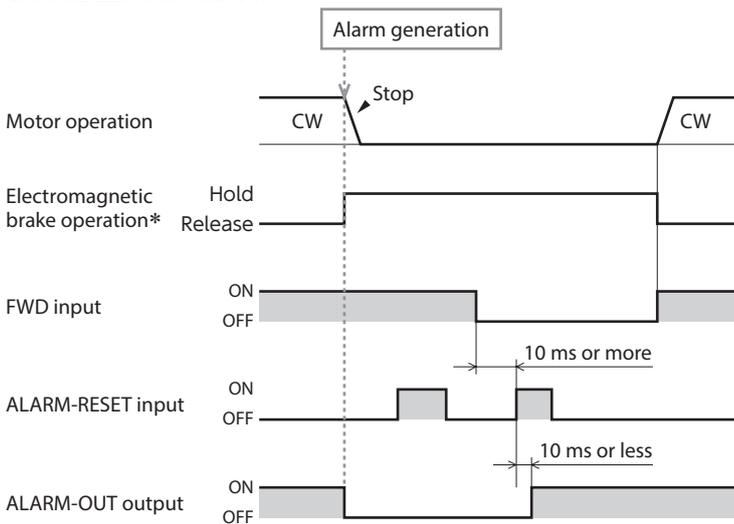


- Some alarms cannot be reset other than turning on the power again. Check with "3. Alarm lists."
- Continuing the operation without removing the cause of the alarm may cause damage to equipment.

Preparation

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.



How to use

* 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.)

Help

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.

Appendix

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 p.62 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 condition. 	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. Refer to p.62 for details.

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.

Information

The driver is equipped with a function to generate information output before an alarm is generated. This function can be utilized for periodic maintenance of equipment by setting a suitable value in the parameter of each information.

Contents of information can be checked using the **MEXE02** or the monitor mode of the operation panel.

- INFO output

If information is generated, the INFO output is turned ON.

- LED indicator

The ALARM LED blinks in orange when information is generated.

- Information bit output

If information is generated, a bit output (INFO-** output) of the corresponding information is turned ON. The bit output can be checked using the internal I/O monitor and waveform monitor of the **MEXE02**.

- Motor operation

The motor continues to operate during information unlike in the case of an alarm.

- Parameter

A generation condition for some information can be adjusted by parameter setting.

Each information has a corresponding "INFO action" parameter. If the parameter is set to "INFO action is not applied," only the bit output of information is turned ON.

Also, setting the "INFO auto clear" parameter can select whether the INFO output or the bit output of the corresponding information is automatically turned OFF when the cause of information is removed.

Safety precautions

Preparation

How to use

Help

Appendix

1. Information history

Up to 16 generated information are saved in the RAM in order of the latest to oldest.

Information history is cleared if the power supply is turned off. The history can be checked and cleared by the following methods.

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

2. Information lists

Information	Information bit output signal	Cause	Condition to reset and clear
 Driver temperature	INFO-DRVTMP	<ul style="list-style-type: none"> ● The internal temperature of the driver increased to the setting value or higher of the "Driver temperature information" parameter. 	<ul style="list-style-type: none"> ● The internal temperature of the driver fell below the setting value of the "Driver temperature information" parameter.
 Overvoltage	INFO-OVOLT	The main circuit DC voltage inside the driver increased to the setting value or higher of the "Overvoltage information" parameter due to the following causes. <ul style="list-style-type: none"> ● A large inertia load was stopped abruptly. ● A power supply voltage exceeding the specification was applied. 	The main circuit DC voltage inside the driver fell below the setting value of the "Overvoltage information" parameter due to the following remedial actions. <ul style="list-style-type: none"> ● Set the deceleration time longer. ● Apply the power supply voltage within the specification.
 Undervoltage	INFO-UVOLT	The main circuit DC voltage inside the driver fell to the setting value or lower of the "Undervoltage information" parameter due to the following causes. <ul style="list-style-type: none"> ● A power supply voltage lower than the specification was applied. 	The main circuit DC voltage inside the driver exceeded the setting value of the "Undervoltage information" parameter due to the following remedial actions. <ul style="list-style-type: none"> ● Apply the power supply voltage within the specification.
 Load	INFO-LOAD	<ul style="list-style-type: none"> ● The output torque of the motor increased to the setting value or higher of the "Load information" parameter. 	<ul style="list-style-type: none"> ● The output torque of the motor fell below the setting value of the "Overload information" parameter.
 Speed	INFO-SPD	<ul style="list-style-type: none"> ● The detection speed of the motor increased to the setting value or higher of the "Speed information" parameter. 	<ul style="list-style-type: none"> ● The detection speed of the motor fell below the setting value of the "Speed information" parameter.

Information	Information bit output signal	Cause	Condition to reset and clear
 Operation prohibited *1	INFO-DRV	<ul style="list-style-type: none"> ● The operation input signal is being ON when the test mode has switched to other mode. ● The operation input signal is being ON when I/O test of the MEXE02 or teaching/remote operation has completed. ● Configuration was executed in a state where the motor would immediately rotate when the assignment or the logic level setting of input terminals was changed. ● The operation input signal is being ON when the local control operation has switched to the remote control operation. 	<ul style="list-style-type: none"> ● The operation input signal was turned OFF.
 Tripmeter	INFO-TRIP	<ul style="list-style-type: none"> ● The rotation amount inside the driver increased to the setting value or more of the "Tripmeter information" parameter. 	<p>The following operation was performed, and the rotation amount inside the driver fell below the setting value of the "Tripmeter information" parameter.</p> <ul style="list-style-type: none"> ● The "Tripmeter information" parameter was set again. ● Tripmeter was cleared using the MEXE02.
 Odometer	INFO-ODO	<ul style="list-style-type: none"> ● The integrated rotation amount inside the driver increased to the setting value or more of the "Odometer information" parameter. 	<p>The following operation was performed, and the rotation amount inside the driver fell below the setting value of the "Odometer information" parameter.</p> <ul style="list-style-type: none"> ● The "Odometer information" parameter was set again.
 Main power supply time	INFO-PTIME	<ul style="list-style-type: none"> ● A time period having supplied the power to the main power supply of the driver increased to the setting value or more of the "Main power supply time information" parameter. 	<ul style="list-style-type: none"> ● The "Main power supply time information" parameter was set again, and the time period having supplied the power to the main power supply of the driver fell below the setting value of the "Main power supply time information" parameter.
 Main power supply count	INFO-PCOUNT	<ul style="list-style-type: none"> ● The number of times for turning on the main power supply of the driver increased to the setting value or more of the "Main power supply count information" parameter. 	<ul style="list-style-type: none"> ● The "Main power supply count information" parameter was set again, and the number of times for turning on the main power supply of the driver fell below the setting value of the "Main power supply count information" parameter.
 Start operation restricted mode	INFO-DSLMTD	<ul style="list-style-type: none"> ● The local control operation is performed. *2 ● Configuration was executed. ● "Teaching/remote operation" was executed using the MEXE02. ● Writing was performed using the MEXE02. ● Initialization was executed. 	<ul style="list-style-type: none"> ● The local control operation was complete. ● Remote control operation was performed. ● Configuration was complete. ● "Teaching/remote operation" was released. ● Initialization was complete.
 I/O test mode	INFO-IOTEST	<ul style="list-style-type: none"> ● "I/O test" was executed using the MEXE02. ● Configuration was executed. ● The screen was moved to the "test mode" using the operation panel. 	<ul style="list-style-type: none"> ● I/O test was released. ● Configuration was complete. ● The screen on the operation panel changed to other than the "test mode."
 Configuration request	INFO-CFG	<ul style="list-style-type: none"> ● The parameter change required configuration was executed. 	<ul style="list-style-type: none"> ● Configuration was executed.
 Power cycling request	INFO-RBT	<ul style="list-style-type: none"> ● The parameter change required to cycle the driver power was executed. 	<ul style="list-style-type: none"> ● The driver power was turned off, and turned on again.

*1 The motor does not rotate while the operation prohibited information is generated.

*2 The ALARM LED does not blink when the local control operation is performed.

● Setting value of related parameters

Parameter name	Setting range	Factory setting
Overvoltage information	280 to 440 [VDC]	435
Undervoltage information	120 to 280 [VDC]	120
Load information	10 to 300 [%]	300

Details of parameters ⇒ p.61

- The setting values for the overvoltage information and the undervoltage information represent the value of the main circuit DC voltage inside the driver.

The main circuit DC voltage is approximately equal to the power input voltage multiplied by the square root of 2.

In the case of single-phase 100-120 VAC types, however, the value is approximately equal to double the power input voltage multiplied by the square root of 2.

[Example] When the input voltage is 100 VAC, the main circuit DC voltage inside the driver is approximately 283 VDC.

When the input voltage is 240 VAC, the main circuit DC voltage inside the driver is approximately 340 VDC.

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.

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

● 30 W and 60 W

Motor		BLM230HP		BLM460SHP BLM260HP	
Model		BLE2D30-A BLE2D30-AM	BLE2D30-C BLE2D30-CM	BLE2D60-A BLE2D60-AM	BLE2D60-C BLE2D60-CM
Driver					
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*2	Single-phase: 1.1 A (1.2 A)	Single-phase: 0.67 A (0.71 A) Three-phase: 0.39 A (0.40 A)	Single-phase: 1.7 A (1.7 A)	Single-phase: 1.0 A (1.1 A) Three-phase: 0.61 A (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 (13.6 oz-in)		0.191 N·m (27 oz-in)	
Peak torque		0.2 N·m (28 oz-in) [80 to 2000 r/min]		0.4 N·m (56 oz-in) [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 of the motor.

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

● 120 W and 200 W

Motor		BLM5120HP		BLM6200SHP BLM5200HP BLM7200HW	
Model		BLE2D120-A BLE2D120-AM	BLE2D120-C BLE2D120-CM	BLE2D200-A BLE2D200-AM	BLE2D200-C BLE2D200-CM
Driver					
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 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 *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: 4.3 A (4.4 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: 11.5 A	Single-phase: 6.5 A Three-phase: 4.3 A
Rated torque		0.382 N·m (54 oz-in)		0.637 N·m (90 oz-in)	
Peak torque		0.8 N·m (113 oz-in) [80 to 2000 r/min]		1.15 N·m (163 oz-in) [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 of the motor.

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

● 300 W and 400 W

Model		BLM6300SHP BLM5300HP BLM7300HW	BLM6400SHP BLM5400HP BLM7400HW	
Motor				
Driver		BLE2D300-C	BLE2D400-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	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: 3.2 A Three-phase: 1.8 A	Single-phase: 4.6 A	Three-phase: 2.3 A
	Maximum input current	Single-phase: 8.5 A Three-phase: 6.0 A	Single-phase: 9.9 A	Three-phase: 6.1 A
Rated torque		0.955 N·m	1.27 N·m	
Peak torque		1.72 N·m (240 oz-in) [80 to 2000 r/min]	2.28 N·m (320 oz-in) [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 of 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 (3300 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 location, refer to p.13.)
	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.14 for details.

Safety precautions

Preparation

How to use

Help

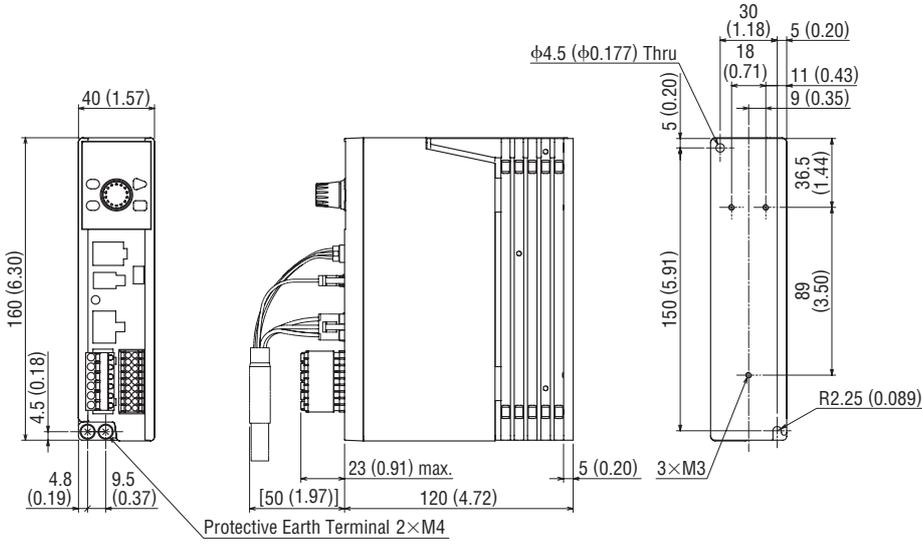
Appendix

3. Dimensions

● 30 W, 60 W, 120 W, 200 W (BLE2D200-C, BLE2D200-CM) 300 W, 400 W (BLE2D400-S)

Mass: 0.8 kg (1.76 lb.)

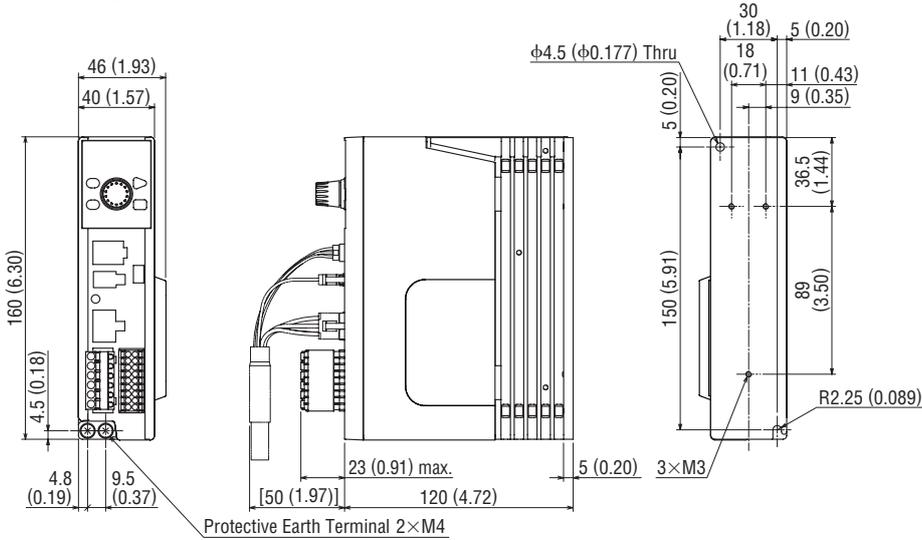
[Unit: mm (in.)]



● 200 W (BLE2D200-A, BLE2D200-AM), 400 W (BLE2D400-C)

Mass: 0.8 kg (1.76 lb.)

[Unit: mm (in.)]

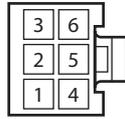


4. Pin assignment

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

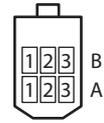
Pin No.	Lead wire color	Lead wire size
1	Blue	AWG18
2	–	–
3	–	Drain AWG24 or equivalent
4	Purple	AWG18
5	Gray	
6	–	–



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

• Sensor connector (black) CN4

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



Housing: J11DF-06V-KY
(J.S.T. Mfg. Co.,Ltd.)
Terminal: SF1F-002GC-P0.6
(J.S.T. Mfg. Co.,Ltd.)

• Electromagnetic brake connector (white) CN3*

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



Housing: 5557-02R-210 (molex)
Terminal: 5556T (molex)

* Only drivers for electromagnetic brake motor

Regulations and standards

1. UL Standards, CSA Standards

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

2. CE Marking/UKCA Marking

This product is affixed with the marks under the following directives/regulations.

2-1 EU Low Voltage Directive/UK Electrical Equipment (Safety) Regulation

■ Installation conditions

Overvoltage category	II
Pollution degree	2
Degree of protection	IP20
Protection against electric shock	Class I equipment

- This product cannot be used in IT power distribution systems.
- 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.
- Use a circuit breaker conforming to EN or IEC Standards.
- The driver is not provided with the motor overtemperature protection specified in EN Standards.
- The driver is provided with the electronic motor overload protection specified in EN Standards. Refer to p.62 for detection of the overload alarm.



The driver is provided with the electronic motor overload protection, but is not provided with the thermal memory retention function and the speed sensitive function.

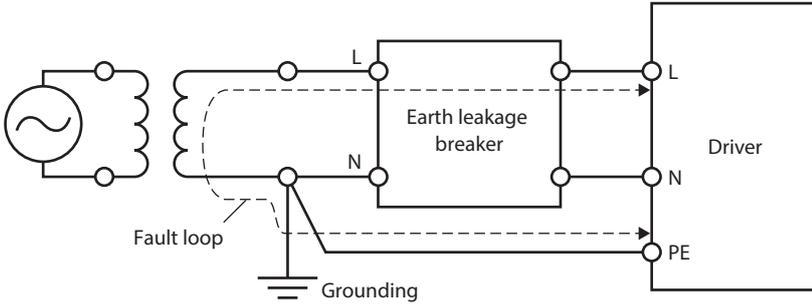
- The driver is not provided with the ground fault protection. Wire the product in accordance with "Wiring example having considered ground fault protection." Also observe the followings.
 - Earth leakage breaker: Rated sensitivity current 30 mA
 - Fault loop impedance: Equal to or less than the value in table
 - When connecting to a power supply of Overvoltage category III, use an insulation transformer to ground its secondary side (N for single-phase, Neutral point for three-phase).

Driver power supply specifications	Fault loop impedance
Single-phase 100-120 V	500 Ω
Single-phase 200-240 V Three-phase 200-240 V	1000 Ω

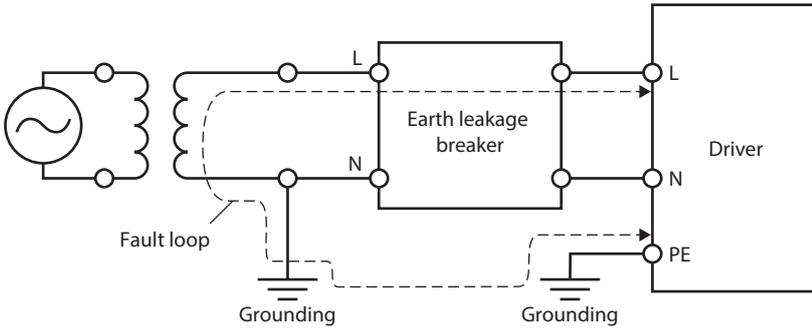
● Wiring example having considered ground fault protection

Single-phase 100-120 V

- TN power distribution systems

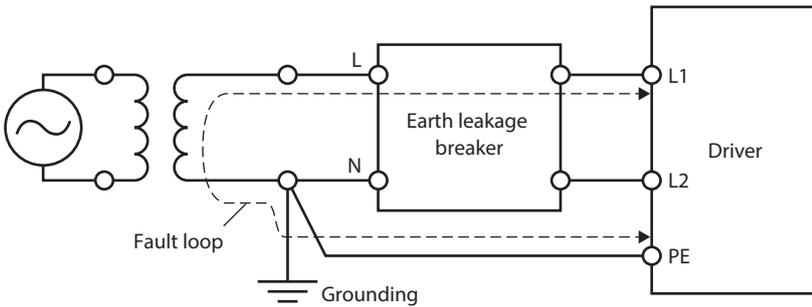


- TT power distribution systems

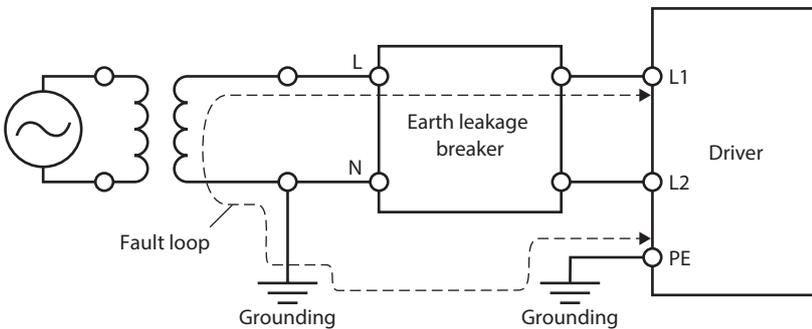


Single-phase 200-240 V

- TN power distribution systems

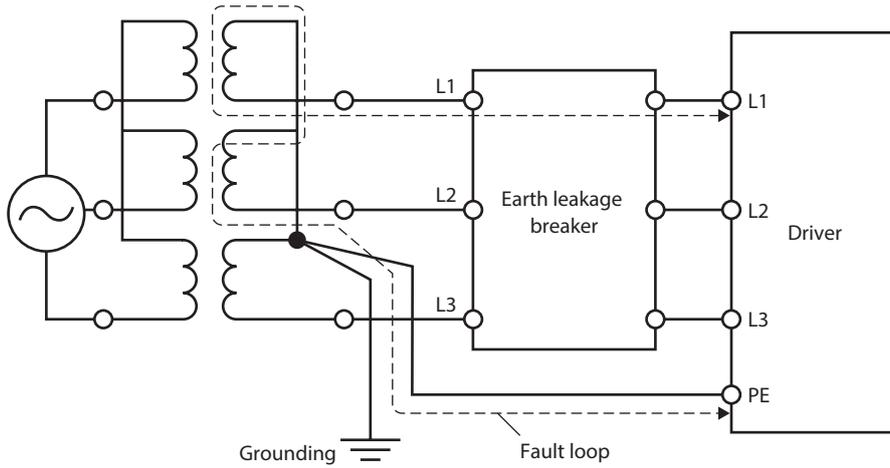


- TT power distribution systems

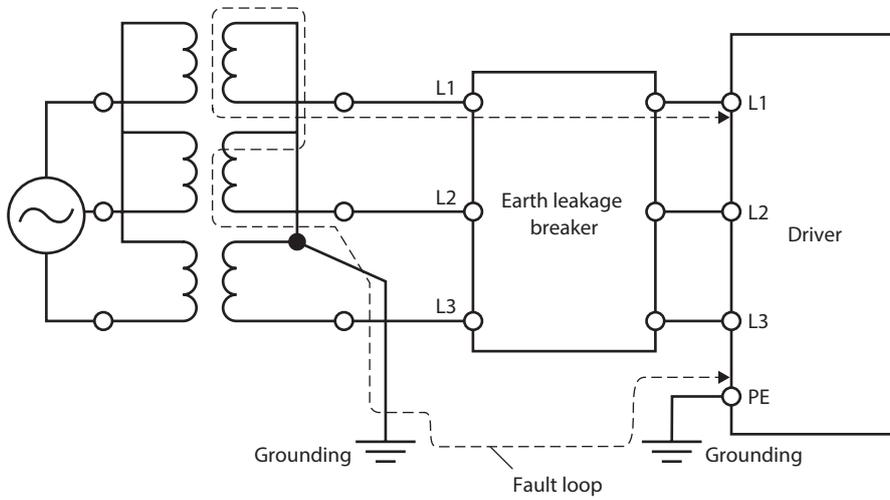


Three-phase 200-240 V

- TN power distribution systems



- TT power distribution systems



2-2 EU EMC Directive/UK EMC Regulation

Refer to "4. Conformity to the EMC" on p.83 for details about conformity.

2-3 EU RoHS Directive/UK RoHS Regulation

This product does not contain the substances exceeding the restriction values.

3. Conformity to the EMC

Effective measures must be taken against the EMI that the motor and driver may give to adjacent controlsystem equipment, as well as the EMS of the motor and driver itself, in order to prevent a serious functional impediment in the machinery. The use of the following installation and wiring methods will enable the motor and driver to be compliant with the EMC. Oriental Motor conducts EMC testing on its motors and driver in accordance with "Example of installation and wiring" on p.84. The user is responsible for ensuring the machine's compliance with the EMC, based on the installation and wiring explained below.



CAUTION

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

■ 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. 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.

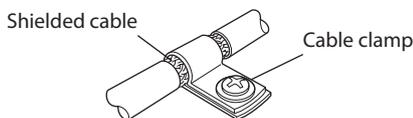
■ How to ground

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.18 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.

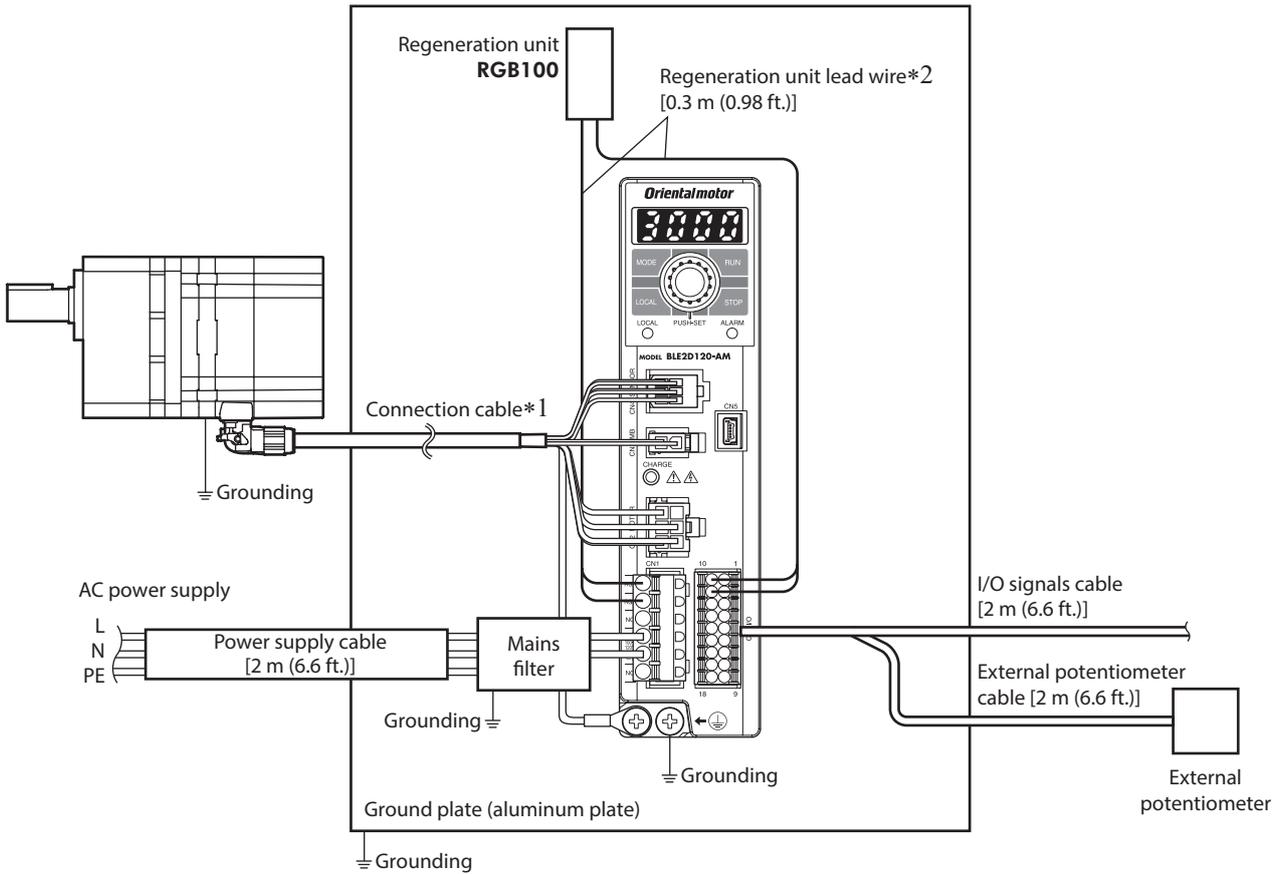
Connect both ends (mains filter side and power supply side) of the shielded cable to the grounding points so that no potential difference is generated between grounds.



■ 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.

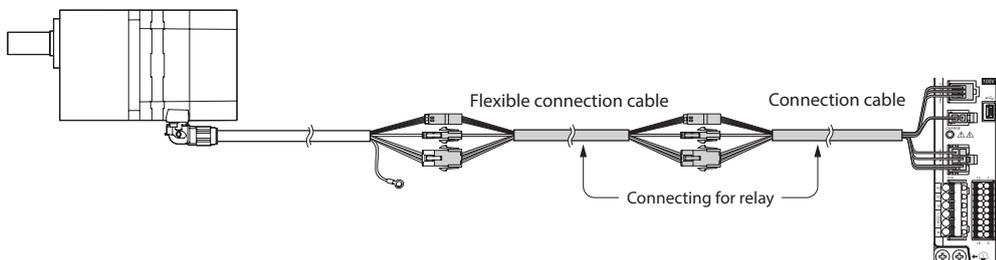
Cable and peripheral equipment

■ Connection cable

This cable is used to extend the wiring distance between the driver and motor. The wiring distance between the motor and driver can be extended to a maximum of 20.5 m (67.2 ft.).

Flexible connection cables are also available.

The connection cables and flexible connection cables are shielded cables which have taken measures against the electrical noise. The connection cable for extension can be used by connecting up to two pieces.



● For extension

● Connection cable

Length	Model
1 m (3.3 ft.)	CC01BL2
2 m (6.6 ft.)	CC02BL2
3 m (9.8 ft.)	CC03BL2
5 m (16.4 ft.)	CC05BL2
7 m (23.0 ft.)	CC07BL2
10 m (32.8 ft.)	CC10BL2

● Flexible connection cables

Length	Model
1 m (3.3 ft.)	CC01BL2R
2 m (6.6 ft.)	CC02BL2R
3 m (9.8 ft.)	CC03BL2R
5 m (16.4 ft.)	CC05BL2R
7 m (23.0 ft.)	CC07BL2R
10 m (32.8 ft.)	CC10BL2R

● For extension, for electromagnetic brake motor

● Connection cable

Length	Model
1 m (3.3 ft.)	CC010BL2M
2 m (6.6 ft.)	CC020BL2M
3 m (9.8 ft.)	CC030BL2M
5 m (16.4 ft.)	CC050BL2M
7 m (23.0 ft.)	CC070BL2M
10 m (32.8 ft.)	CC100BL2M

● Flexible connection cables

Length	Model
1 m (3.3 ft.)	CC010BL2MR
2 m (6.6 ft.)	CC020BL2MR
3 m (9.8 ft.)	CC030BL2MR
5 m (16.4 ft.)	CC050BL2MR
7 m (23.0 ft.)	CC070BL2MR
10 m (32.8 ft.)	CC100BL2MR

■ Regeneration resistor

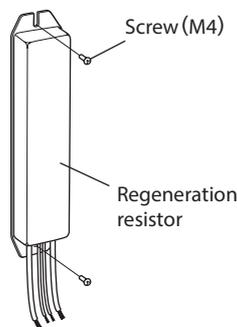
Use the regeneration resistor when continuous regeneration operation such as gravitational operation in vertical drive is performed or an inertia load is operated with round shaft type motors of 300 W or higher.

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

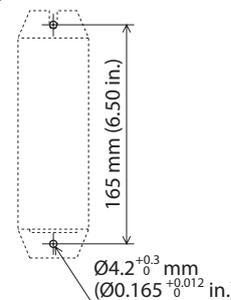
Model: **RGB100**

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.) or equivalent] is ensured.

Secure the regeneration resistor on a smooth metal plate offering high heat conductivity, using two screws (M4, not supplied).



● Battery installation dimensions



Information about couplings and mounting brackets can be checked on the Oriental Motor Website. Visit our website for details.

About the mounting bracket (**SOL**) of the motor

When the mounting bracket and motor are secured, use so that the direction of the connector for motor connection is installed upward or sideways against the installation surface. Installing the motor connector to the downward direction is not recommended since the motor connector is come into contact with the mounting bracket or installation surface.

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