

Brushless Motor and Driver Package

BLV Series

Standard Type, Electromagnetic Brake Type

USER MANUAL (RS-485 Communication Mode)



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

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

Table of contents

1 Introduction.....	2	4.11 Register address list	19
2 Safety precautions.....	3	■ Operation commands.....	19
3 Precautions for use.....	5	■ Maintenance commands.....	21
4 Method of control via Modbus protocol.....	6	■ Monitor commands.....	22
4.1 Guidance.....	6	■ Parameter R/W commands [Operation data].....	24
4.2 Communication specifications	9	■ Parameter R/W commands [User parameters]	26
4.3 Setting of switches.....	9	■ Parameters R/W commands [Alarm, warning].....	28
4.4 Connecting the control power supply	10	■ Parameter R/W commands [Data setter]	29
4.5 Connecting the RS-485 communication		■ Parameter R/W commands	
cable	11	[I/O function (Direct I/O)].....	29
4.6 Setting of RS-485 communication.....	12	■ Parameter R/W commands	
4.7 Communication mode.....	12	[I/O function (Remote I/O)]	30
4.8 Communication timing	13	4.12 Group send.....	32
4.9 Message.....	13	4.13 Detection of communication errors	33
4.10 Function code	16	4.14 Timing charts.....	34
■ Reading from a holding register(s) (03h).....	16	5 Alarms, warnings and communication	
■ Writing to a holding register (06h).....	17	errors	35
■ Diagnosis (08h).....	17	5.1 Alarms.....	35
■ Writing to multiple holding registers (10h)	18	5.2 Warnings	37
		5.3 Communication errors.....	38
		6 Related products (sold separately).....	39

1 Introduction

■ Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product. Use the product correctly after thoroughly reading the section "2 Safety precautions" on p.3. In addition, be sure to observe the contents described in warning, caution, and note in this manual. The product described in this document has been designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose. For the power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

■ Operating manuals for the BLV Series

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




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

■ RoHS Directive

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

2 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.
 Note	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.

Explanation of graphic symbols

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

 : Indicates "compulsory" actions that must be performed.

 WARNING	
	<ul style="list-style-type: none"> Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock or injury. Do not transport, install, 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. Do not use a motor without electromagnetic brake in a vertical application. If the driver protective function is activated, the motor will stop and the moving part of the equipment may fall, thereby causing injury or damage to equipment. Do not use the brake mechanism of the electromagnetic brake motor as a safety brake. It is intended to hold the moving part and motor positions. Using it as a safety brake may result in injury or damage to equipment. Do not forcibly bend, pull or pinch the cable. Doing so may result in fire, electric shock, or damage to equipment. Do not machine or modify the motor cable or connection cable. Doing so may result in fire, electric shock, or damage to equipment. Do not touch the motor or driver when conducting the insulation resistance measurement or dielectric strength test. Accidental contact may result in electric shock. Do not disassemble or modify the motor, gearhead and driver. Doing so may result in injury or damage to equipment. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.
	<ul style="list-style-type: none"> Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/troubleshooting of the product. Handling by unqualified and uneducated personnel may result in fire, electric shock, injury, or damage to equipment. When the protective function of the driver is activated, remove the cause before clearing the protective function. Continuing the operation without removing the cause of the problem may result in malfunction of the motor and driver, leading to injury or damage to equipment. Install the motor, gearhead and driver in an enclosure. Failure to do so may result in electric shock or injury. Always keep the power supply voltage of the driver within the specified range. Failure to do so may result in fire or electric shock. For the power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. Failure to do so may result in electric shock. Securely connect the wirings in accordance with the connection examples. Failure to do so may result in fire or electric shock. Be sure to observe the specified cable sizes. Failure to do so may result in fire or electric shock. Observe the specified screw tightening torque for the connector. Failure to do so may result in fire or damage to equipment. Use a motor, gearhead, and driver only in the specified combination. An incorrect combination may cause fire, electric shock, or damage to equipment. When the electromagnetic brake motor is used in an application of vertical drive such as elevating equipment, operate it after checking the condition of a load sufficiently so that a load in excess of the rated torque is not applied or a small value is not set in the torque limiting value. Failure to do so may result in injury or damage to equipment. Always turn off the power before performing maintenance/inspection. Failure to do so may cause injury. Regularly check the openings in the driver for accumulated dust. Failure to do so may result in fire.

 CAUTION	
	<ul style="list-style-type: none"> • Do not use the motor, gearhead and driver beyond the specifications. Doing so may result in electric shock, injury or equipment damage. • Keep your fingers and objects out of the openings in the driver. Failure to do so may result in fire, electric shock or injury. • Do not touch the motor, gearhead or driver while operating or immediately after stopping. The surface of the motor, gearhead or driver may be hot and cause a skin burn(s). • Do not leave anything around the motor and driver that would obstruct ventilation. Doing so may result in damage to equipment. • Do not move the product by holding the output shaft of the motor or the gearhead, or the motor cable. Doing so may result in injury. • Do not touch the motor output shaft (key slot or pinion) with bare hands. Doing so may result in injury. • When assembling the motor with the gearhead, exercise caution not to pinch your fingers or other parts of your body between the motor and gearhead. Injury may result. • When installing the motor or gearhead in the equipment, exercise caution not to pinch your fingers or other parts of your body between the equipment and motor or gearhead. Injury may result. • Do not shut off the negative side of the power supply during operation. Also, make sure that the wiring for the power supply does not disconnect. This may result in damage to equipment. • Do not touch the rotating part (output shaft) while operating the motor. Doing so may cause injury.
	<ul style="list-style-type: none"> • Securely install the motor, gearhead and driver to their respective mounting plates. Inappropriate installation may cause the motor, gearhead or driver to detach and fall, resulting in injury or equipment damage. • Provide a cover over the rotating part (output shaft) of the motor or gearhead. Failure to do so may result in injury. • Securely install a load on the output shaft of the motor or gearhead. Inappropriate installation may result in injury. • Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may cause injury. • Immediately when a problem occurred, stop operation and turn off the driver power. Failure to do so may result in fire, electric shock or injury. • The motor surface temperature may exceed 70°C (158°F) even under normal operating conditions. If the operator is allowed to approach the motor in operation, attach a warning label in a conspicuous position as shown in the figure. Failure to do so may result in a skin burn(s). • Dispose the product correctly in accordance with laws and regulations, or instructions of local governments. <div style="text-align: right;">  Warning label </div>

3 Precautions for use

This section covers restrictions and requirements the user should consider when using the **BLV** Series.

- **Regeneration energy**

When the motor is used in operation such as vertical drive (gravitational operation) or sudden accelerating/ decelerating of an inertia body, regeneration energy may generate. Since the driver has no function to consume regeneration energy, if the output capacity or overvoltage allowance of the DC power supply is small, the protective function for the power supply or driver may be activated to stop the motor. When performing these operations, use a DC power supply or battery that has a large output capacity or overvoltage allowance. Also, use an electromagnetic brake type motor because there is a risk of falling the moving part in vertical drive such as elevating equipment.

If the protective function for the power supply or driver is activated, contact your nearest Oriental Motor sales office.

- **Do not conduct the insulation resistance measurement or dielectric strength test with the motor and driver connected.**

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

- **Do not use a solid-state relay (SSR) to turn on 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.

- **Notes for power ON/OFF using a mechanical contact**

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

Refer to the USER MANUAL (Basic Function) for details.

- **Note on connecting a power supply whose positive terminal is grounded**

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

- **Noise elimination measures**

Refer to the USER MANUAL (Basic Function) for the noise elimination measures.

- **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.

- **Note on using in low temperature environment**

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

- **Apply grease to the hollow output shaft of a hollow shaft flat gearhead.**

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

- **The driver uses semiconductor components. So be extremely careful when handling it.**

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

- **Use a connection cable (included) when extending the wiring distance between the motor and driver.**

- **Sliding noise of electromagnetic brake**

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

4 Method of control via Modbus protocol

This chapter explains how to control the motor via RS-485 communication. The protocol used in RS-485 communication is the Modbus protocol.

The Modbus protocol is simple to use and its specification is open to the public, so this protocol is widely used in industrial applications.

Modbus communication is based on the single-master/multiple-slave method. Only the master can issue a query (command). Each slave executes the requested process and returns a response message.

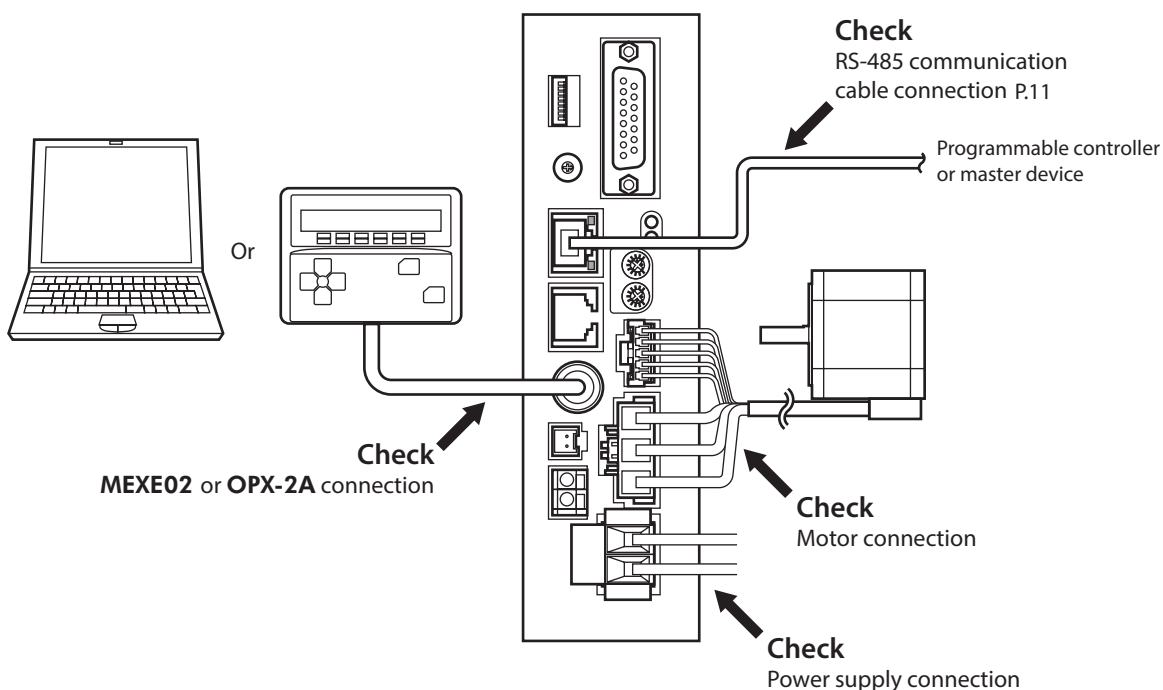
4.1 Guidance

If you are new to the **BLV** Series products, read this section to understand the operating methods along with the operation flow.

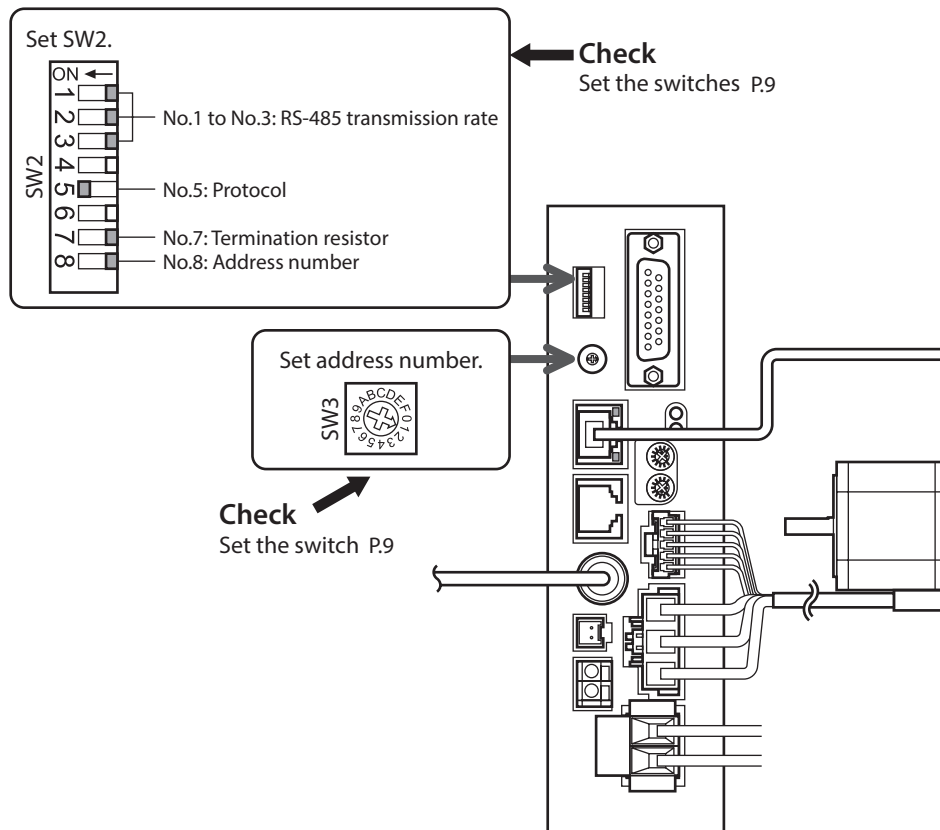
Note

Before operating the motor, check the surrounding conditions to ensure safety.

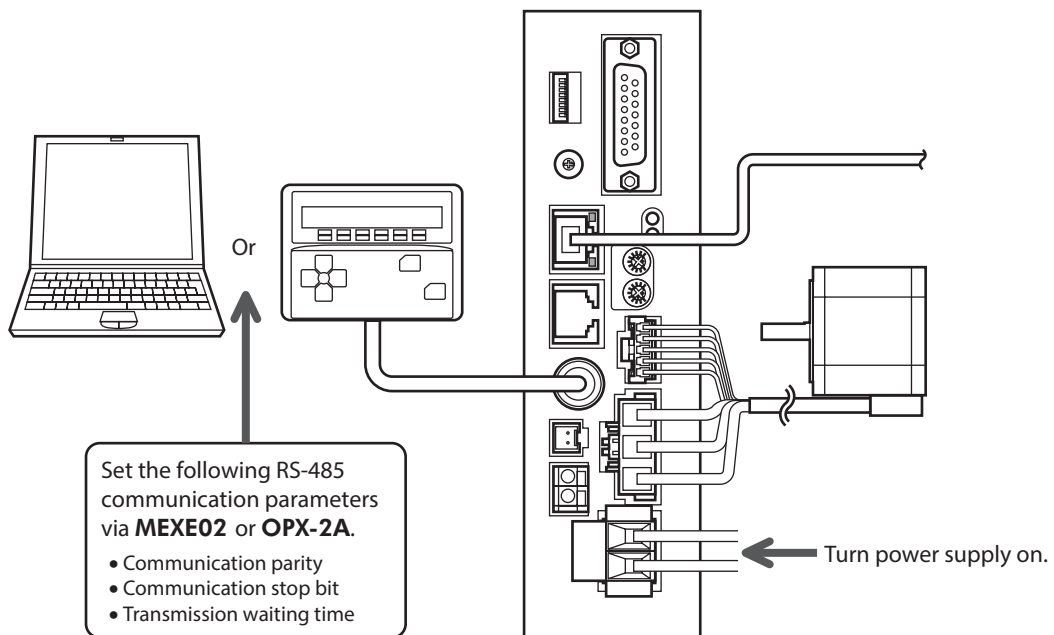
STEP 1 Check the installation and connection



STEP 2 Set the switches



STEP 3 Turn on the power and set the parameters

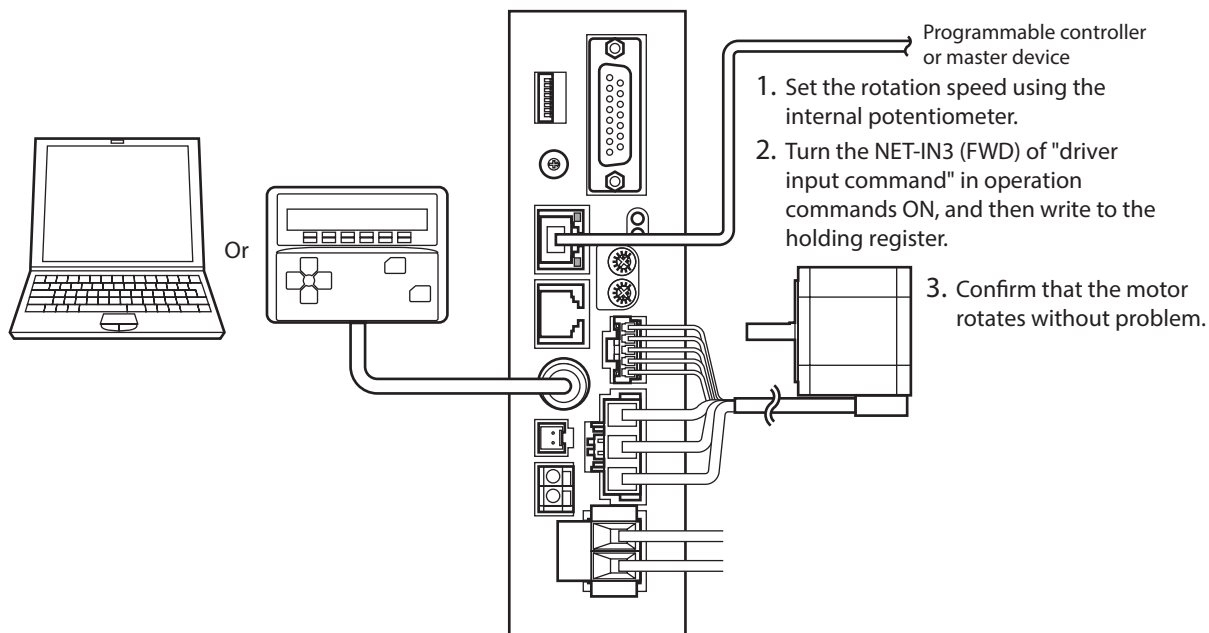


* Refer to p.28 when these parameters are set via communication.

STEP 4 Cycle the power

Parameters for "communication parity," "communication stop bit" and "transmission waiting time" will be enabled after the power is cycled.

STEP 5 Operate the motor



STEP 6 Were you able to operate the motor properly?

How did it go? Were you able to operate the motor properly? If the motor does not function, check the following points:

- Is any alarm present?
- Are the power supply, motor and RS-485 communication cable connected securely?
- Are the slave address, transmission rate and termination resistor set correctly?
- Is the C-ERR LED lit?
- Is the C-DAT LED lit?

For more detailed settings and functions, refer to the following pages.

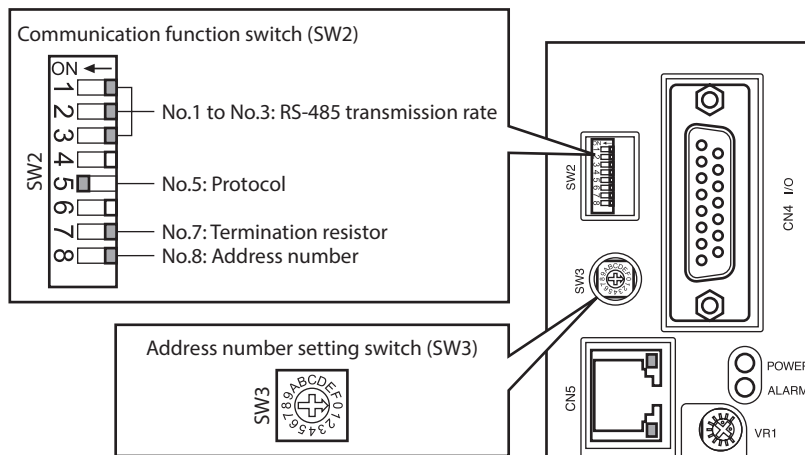
4.2 Communication specifications

Electrical characteristics	In conformance with EIA-485 Use a twisted pair cable (TIA/EIA-568B CAT5e or higher is recommended) and keep the total wiring distance including extension to 50 m (164 ft.) or less.
Transmission mode	Half duplex
Transmission rate	Selectable from 9600 bps, 19200 bps, 38400 bps, 57600 bps and 115,200 bps.
Physical layer	Asynchronous mode (data: 8 bits, stop bit: 1 bit/2 bits, parity: none/even number/odd number)
Protocol	Modbus RTU mode
Type of connection	Up to 31 drivers can be connected to one programmable controller (master device).

4.3 Setting of switches

Note

- Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new switch settings will not be enabled.
- Do not set No.4 and No.6 of the communication function switch (SW2) to ON.



■ Protocol

Set No.5 of the communication function switch (SW2) to ON. The Modbus protocol is selected.
Factory setting OFF

■ Address number (slave address)

Set the address number (slave address) using the address number setting switch (SW3) and No.8 of the communication function switch (SW2). Make sure each address number (slave address) you set for each driver is unique. Address number (slave address) 0 is reserved for broadcasting, so do not use this address.
Factory setting SW3: 0, SW2-No.8: OFF

Address number (slave address) list

SW3	SW2-No.8: OFF
0	Broadcast reserved
1	1
2	2
3	3
4	4
5	5
6	6
7	7

SW3	SW2-No.8: OFF
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

SW3	SW2-No.8: ON
0	16
1	17
2	18
3	19
4	20
5	21
6	22
7	23

SW3	SW2-No.8: ON
8	24
9	25
A	26
B	27
C	28
D	29
E	30
F	31

■ Transmission rate

Set the transmission rate using Nos. 1 to 3 of the communication function switch (SW2).
The transmission rate to be set should be the same as the transmission rate of the master device.
Factory setting All OFF (9600 bps)

SW2-No.3	SW2-No.2	SW2-No.1	Transmission rate (bps)
OFF	OFF	OFF	9600
OFF	OFF	ON	19200
OFF	ON	OFF	38400
OFF	ON	ON	57600
ON	OFF	OFF	115,200

Note Do not set other combinations except the above table.

■ Termination resistor

Use a termination resistor for the driver located farthest away (positioned at the end) from the programmable controller (master device).

Turn No.7 of the communication function switch (SW2) ON to set the termination resistor for RS-485 communication (120 Ω).

Factory setting OFF (termination resistor disabled)

SW2-No.7	Termination resistor (120 Ω)
OFF	Disabled
ON	Enabled

4.4 Connecting the control power supply

Although all functions including the communication function can be used by using the main power supply, if the driver is connected to the control power supply, it can communicate with the master device without turning on the main power supply. Using only the communication function can set the operation data and parameters, and also check the alarm history.

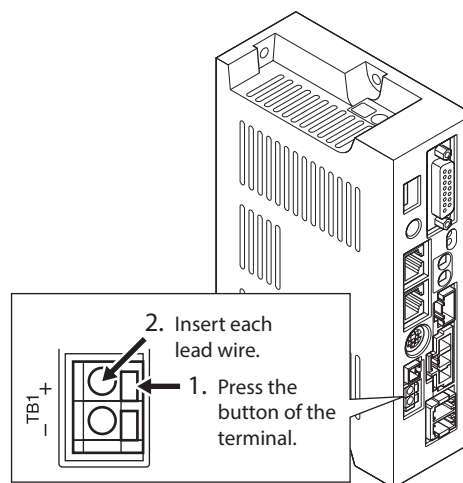
Note When the driver is connected to the control power supply while not connected to the main power supply, the undervoltage alarm is generated but the communication operation can be performed as it is.

■ Control power supply specifications

Model	Input power supply voltage	Current capacity
BLV620	24 VDC \pm 10%	300 mA or more
BLV640	48 VDC \pm 10%	

■ Applicable lead wire

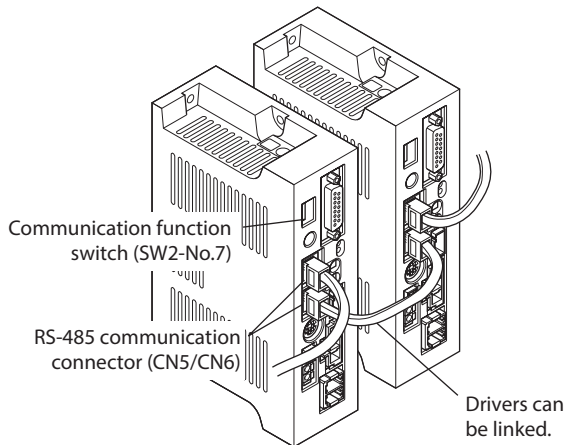
- Stripping length of wire insulation: 11 mm (0.43 in.)
- Applicable lead wire: AWG24 to AWG16 (0.2 to 1.25 mm²)



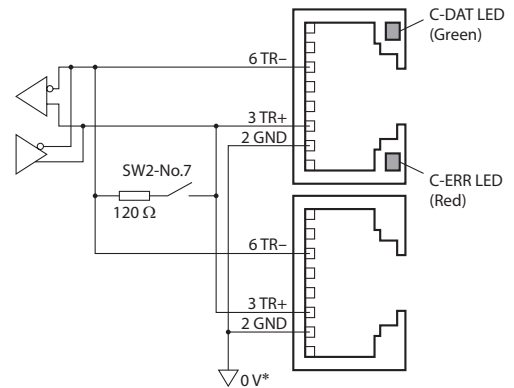
4.5 Connecting the RS-485 communication cable

Connect the RS-485 communication cable to the CN5 or CN6 on the driver.

The vacant connector can be used to connect a different driver. Use a commercial LAN cable to link drivers.



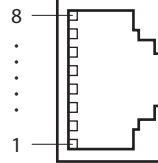
• Internal circuit



* The GND line is used in common with the main power supply input terminal (CN1) and control power supply input terminal (TB1) [not insulated].

• CN5/CN6 pin assignments

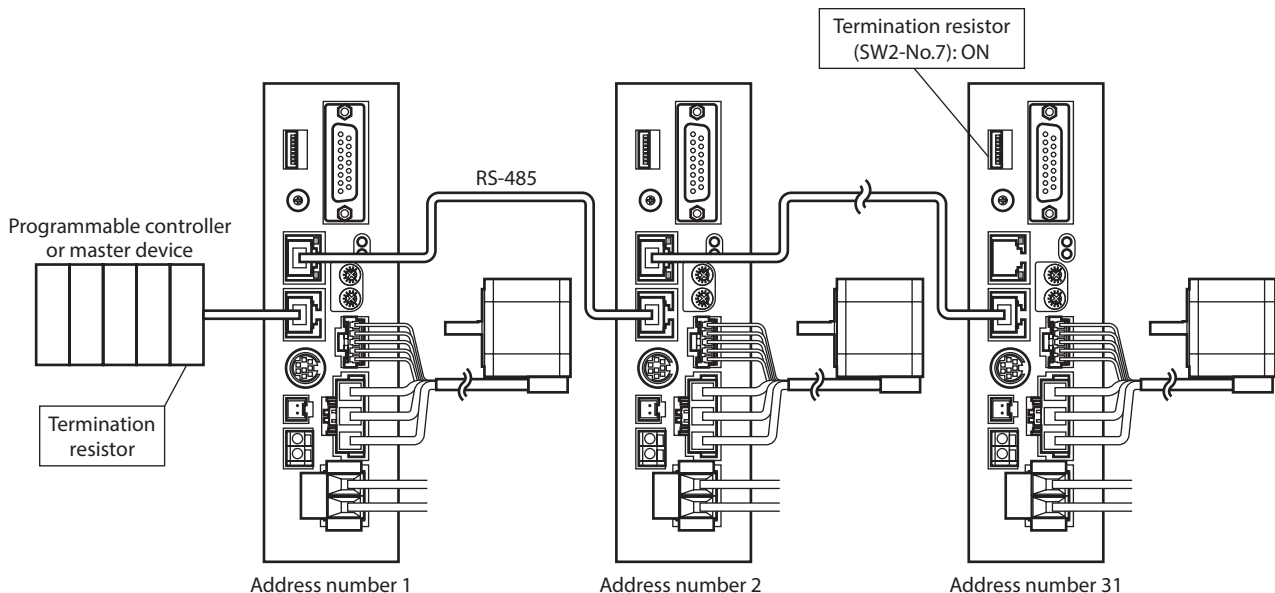
Pin No.	Signal name	Description
1	N.C.	Not used
2	GND	GND
3	TR+	RS-485 communication signal (+)
4	N.C.	Not used
5	N.C.	Not used
6	TR-	RS-485 communication signal (-)
7	N.C.	Not used
8	N.C.	Not used

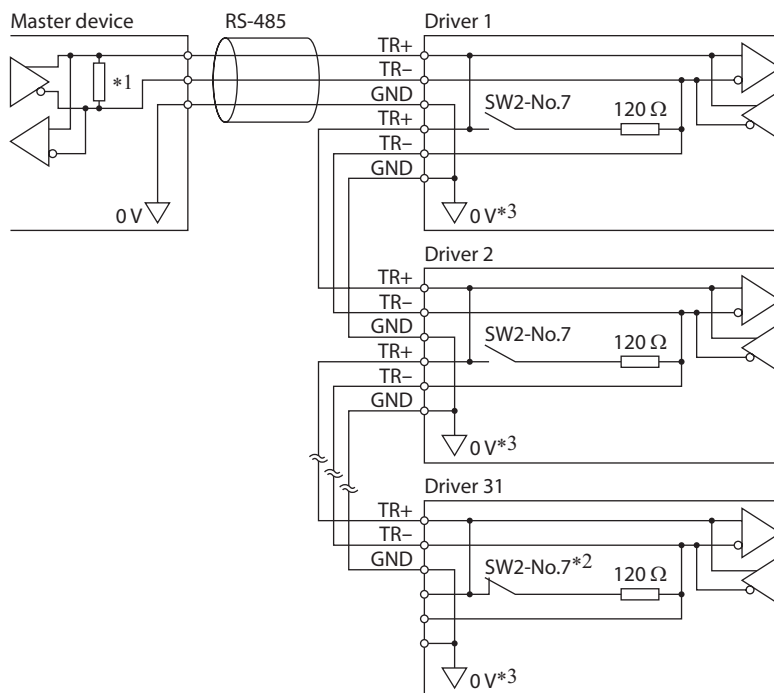


• LED

Name	Description
C-DAT LED (Green)	This LED is lit when the driver communicates with the master station properly via RS-485 communication.
C-ERR LED (Red)	This LED is lit when a RS-485 communication error occurs with the master station.

■ Connection example





- *1 Termination resistor 120 Ω
- *2 Turn the termination resistor (SW2-No.7) ON.
- *3 The GND line is used in common with the main power supply input terminal (CN1) and control power supply input terminal (TB1) [not insulated].

4.6 Setting of RS-485 communication

Set parameters required for RS-485 communication first.
Refer to p.28 when these parameters are set via communication.

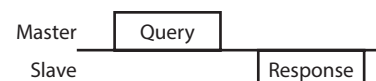
Parameter name	Setting range	Initial value	Description
Communication parity	0: None 1: Even number 2: Odd number	1	Sets the parity for RS-485 communication.
Communication stop bit	0: 1 bit 1: 2 bits	0	Sets the stop bit for RS-485 communication.
Transmission waiting time	0 to 10000 ($\times 0.1$ ms)	100	Sets the transmission waiting time for RS-485 communication.
Communication timeout	0: Not monitored 0 to 10000 ms	0	Sets the condition in which a communication timeout occurs in RS-485 communication.
Communication error alarm	1 to 10 times	3	Sets the condition in which a RS-485 communication error alarm is generated. A communication error alarm is generated when a RS-485 communication error has occurred by the number of times set here.

4.7 Communication mode

Modbus protocol communication is based on the single-master/multiple-slave method.
Under this protocol, messages are sent in one of two methods.

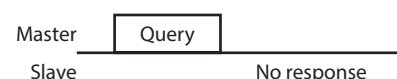
• Unicast mode

The master sends a query to only one slave.
The slave executes the process and returns a response.

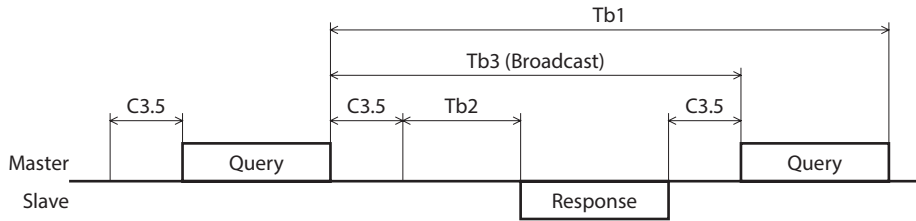


• Broadcast mode

If slave address 0 is specified on the master, the master can send a query to all slaves. Each slave executes the process, but does not return a response.



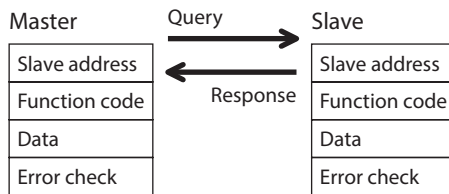
4.8 Communication timing



Character	Name	Description
Tb1	Communication timeout	The interval of the received query is monitored. If no query could be received after the time set with the "Communication timeout" parameter, a communication timeout alarm is generated (initial setting: not monitored).
Tb2	Transmission waiting time	This is the time after the slave switches its communication line to the transmission mode upon receiving a query from the master, until it starts sending a response. The transmission waiting time is set with the "Transmission waiting time" parameter (initial setting: 10 ms). The actual transmission waiting time corresponds to the silent interval (C3.5) plus transmission waiting time (Tb2).
Tb3	Broadcasting interval	This is the time until the next query is sent in broadcasting. A time equivalent to or longer than the silent interval (C3.5) plus 5 ms is required.
C3.5	Silent interval	Be sure to provide an interval of 3.5 characters or more as the transmission waiting time. If this waiting time is less than 3.5 characters long, the driver cannot respond. The silent interval should be 5.5 ms or more when the transmission rate is 9600 bps. The silent interval should be 3.5 ms or more when the transmission rate exceeds 19200 bps.

4.9 Message

The message format is shown below.



■ Query

The query message structure is shown below.

Slave address	Function code	Data	Error check
8 bits	8 bits	4×8 to 37×8 bits	16 bits

• Slave address

Specify the slave address (unicast mode).

If the slave address is set to "0," the master can send a query to all slaves (broadcast mode).

• Function code

The function codes and message lengths supported by the **BLV** Series driver are as follows.

Function code	Function	Message length (byte)		Broadcast
		Query	Response	
03h	Reading from a holding register(s)	8	7 to 37	Not possible
06h	Writing to a holding register	8	8	Possible
08h	Diagnosis	8	8	Not possible
10h	Writing to multiple holding registers	11 to 41	8	Possible

• Data

Set data associated with the selected function code. The specific data length varies depending on the function code.

• Error check

In the Modbus RTU mode, error checks are based on the CRC-16 method. The slave calculates a CRC-16 of each received message and compares the result against the error check value included in the message. If the calculated CRC-16 value matches the error check value, the slave determines that the message is normal.

CRC-16 calculation method

1. Calculate an exclusive-OR (XOR) value of the default value of FFFFh and slave address (8 bits).
2. Shift the result of step 1 to the right by 1 bit. Repeat this shift until the overflow bit becomes "1."
3. Upon obtaining "1" as the overflow bit, calculate an XOR of the result of step 2 and A001h.
4. Repeat steps 2 and 3 until a shift is performed eight times.
5. Calculate an XOR of the result of step 4 and function code (8 bits).
Repeat steps 2 to 4 for all bytes.
The final result gives the result of CRC-16 calculation.

■ Response

Slave-returned responses are classified into three types: normal response, no response, and exception response. The response message structure is the same as the query message structure.

Slave address	Function code	Data	Error check
8 bits	8 bits	3×8 to 33×8 bits	16 bits

• Normal response

Upon receiving a query from the master, the slave executes the requested process and returns a response.

• No response

The slave may not return a response to a query sent by the master. This condition is referred to as "No response." The causes of no response are explained below.

Transmission error

The slave discards the query and does not return a response if any of the following transmission errors is detected.

Cause of transmission error	Description
Framing error	Stop bit 0 was detected.
Parity error	A mismatch with the specified parity was detected.
Mismatched CRC	The calculated value of CRC-16 was found not matching the error check value.
Invalid message length	The message length exceeded 256 bytes.

Other than transmission error

A response may not be returned without any transmission error being detected.

Cause	Description
Broadcast	If the query was broadcast, the slave executes the requested process but does not return a response.
Mismatched slave address	The slave address in the query was found not matching the slave address of the driver.

• Exception response

An exception response is returned if the slave cannot execute the process requested by the query. Appended to this response is an exception code indicating why the process cannot be executed. The message structure of exception response is as follows.

Slave address	Function code	Exception code	Error check
8 bits	8 bits	8 bits	16 bits

Function code

The function code in the exception response is a sum of the function code in the query and 80h.

Example) query: 03h → Exception response: 83h

Exception code

This code indicates why the process cannot be executed.

Exception code	Communication error code	Cause	Description
01h	88h	Invalid function	The process could not be executed because the function code was invalid. · The function code is not supported. · The sub-function code for diagnosis (08h) is other than 00h.
02h		Invalid data address	The process could not be executed because the data address was invalid. · The register address is not supported (other than 0000h to 1FFFh). · The register address and the number of registers are 2000h or more in total.
03h	8Ch	Invalid data	The process could not be executed because the data was invalid. · The number of registers is 0 or more than 17. · The number of bytes is other than twice the number of registers. · The data length is outside the specified range.
04h	89h 8Ah 8Ch 8Dh	Slave error	The process could not be executed because an error occurred at the slave. • User interface communication in progress (89h) Download, initialization or teaching operation is in progress using the MEXE02 or OPX-2A . • NV memory processing in progress (8Ah) · Internal processing is in progress (S-BSY is ON). · An EEPROM error alarm is present. • Outside the parameter setting range (8Ch) The value write is outside the setting range. • Command execute disable (8Dh)

Example of exception response

Master		Query	Slave		Response
Slave address	01h		Slave address	01h	
Function code	06h		Function code	86h	
Data	Register address (upper)		Data	Exception code	04h
	Register address (lower)		Error check (lower)		02h
	Value write (upper)		Error check (upper)		61h
	Value write (lower)				
Error check (lower)	E9h				
Error check (upper)	C4h				

4.10 Function code

■ Reading from a holding register(s) (03h)

This function code is used to read a register (16 bits). Up to 16 successive registers (16×16 bits) can be read. Read the upper and lower data at the same time. If they are not read at the same time, the value may be invalid. If multiple holding registers are read, they are read in order of register addresses.

Example of read

Read the rotation speed Nos. 0 and 1 in the operation data of slave address 1.

Description	Register address	Value read	Corresponding decimal
Rotation speed No.0 (upper)	0480h	0000h	100
Rotation speed No.0 (lower)	0481h	0064h	
Rotation speed No.1 (upper)	0482h	0000h	4000
Rotation speed No.1 (lower)	0483h	0FA0h	

• Query

Field name	Data	Description
Slave address	01h	Slave address 1
Function code	03h	Reading from a holding register(s).
Data	Register address (upper)	Register address to start reading from
	Register address (lower)	
	Number of registers (upper)	Number of registers to be read from the starting register address (4 registers=0004h)
	Number of registers (lower)	
Error check (lower)	44h	Calculation result of CRC-16
Error check (upper)	D1h	

• Response

Field name	Data	Description
Slave address	01h	Same as query
Function code	03h	Same as query
Data	Number of data bytes	Twice the number of registers in the query
	Value read from register address (upper)	Value read from register address 0480h
	Value read from register address (lower)	
	Value read from register address+1 (upper)	Value read from register address 0481h
	Value read from register address+1 (lower)	
	Value read from register address+2 (upper)	Value read from register address 0482h
	Value read from register address+2 (lower)	
	Value read from register address+3 (upper)	Value read from register address 0483h
	Value read from register address+3 (lower)	
Error check (lower)	E1h	Calculation result of CRC-16
Error check (upper)	97h	

■ Writing to a holding register (06h)

This function code is used to write data to a specified register address.

However, since the result combining the upper and lower may be outside the data range, write the upper and lower at the same time using the "Writing to multiple holding registers (10h)."

Example of write

Write 50 (32h) as overload warning level (lower) to slave address 2.

Description	Register address	Value write	Corresponding decimal
Overload warning level (lower)	10ABh	32h	50

• Query

Field name		Data	Description
Slave address		02h	Slave address 2
Function code		06h	Writing to a holding register.
Data	Register address (upper)	10h	Register address to be written
	Register address (lower)	ABh	
	Value write (upper)	00h	Value written to the register address
	Value write (lower)	32h	
Error check (lower)		7Dh	Calculation result of CRC-16
Error check (upper)		0Ch	

• Response

Field name		Data	Description
Slave address		02h	Same as query
Function code		06h	Same as query
Data	Register address (upper)	10h	Same as query
	Register address (lower)	ABh	
	Value write (upper)	00h	Same as query
	Value write (lower)	32h	
Error check (lower)		7Dh	Calculation result of CRC-16
Error check (upper)		0Ch	

■ Diagnosis (08h)

This function code is used to diagnose the communication between the master and slave. Arbitrary data is sent and the returned data is used to determine whether the communication is normal. 00h (reply to query) is the only sub-function supported by this function code.

Example of diagnosis

Send arbitrary data (1234h) to the slave address 3.

• Query

Field name		Data	Description
Slave address		03h	Slave address 3
Function code		08h	Diagnosis
Data	Sub-function code (upper)	00h	Return the query data
	Sub-function code (lower)	00h	
	Data value (upper)	12h	Arbitrary data (1234h)
	Data value (lower)	34h	
Error check (lower)		ECh	Calculation result of CRC-16
Error check (upper)		9Eh	

• Response

Field name		Data	Description
Slave address		03h	Same as query
Function code		08h	Same as query
Data	Sub-function code (upper)	00h	Same as query
	Sub-function code (lower)	00h	
	Data value (upper)	12h	Same as query
	Data value (lower)	34h	
Error check (lower)		ECh	Same as query
Error check (upper)		9Eh	

■ Writing to multiple holding registers (10h)

This function code is used to write data to multiple successive registers. Up to 16 registers can be written. Write the data to the upper and lower at the same time. If not, an invalid value may be written.

Registers are written in order of register addresses. Note that even when an exception response is returned because some data is invalid as being outside the specified range, etc., other data may have been written properly.

Example of write

Set the following data to the acceleration Nos. 0 to 2 in the operation data of slave address 4.

Description	Register address	Value write	Corresponding decimal
Acceleration time No.0 (upper)	0600h	0000h	2
Acceleration time No.0 (lower)	0601h	0002h	
Acceleration time No.1 (upper)	0602h	0000h	50
Acceleration time No.1 (lower)	0603h	0032h	
Acceleration time No.2 (upper)	0604h	0000h	150
Acceleration time No.2 (lower)	0605h	0096h	

• Query

Field name		Data	Description
Slave address		04h	Slave address 4
Function code		10h	Writing to multiple holding registers
Data	Register address (upper)	06h	Register address to start writing from
	Register address (lower)	00h	
	Number of registers (upper)	00h	Number of registers to be written from the starting register address (6 registers=0006h)
	Number of registers (lower)	06h	
	Number of data bytes	0Ch	Twice the number of registers in the query (6 registers × 2 = 12 registers: 0Ch)
	Value write to register address (upper)	00h	Value written to register address 0600h
	Value write to register address (lower)	00h	
	Value write to register address+1 (upper)	00h	Value written to register address 0601h
	Value write to register address+1 (lower)	02h	
	Value write to register address+2 (upper)	00h	Value written to register address 0602h
	Value write to register address+2 (lower)	00h	
	Value write to register address+3 (upper)	00h	Value written to register address 0603h
	Value write to register address+3 (lower)	32h	
	Value write to register address+4 (upper)	00h	Value written to register address 0604h
	Value write to register address+4 (lower)	00h	
	Value write to register address+5 (upper)	00h	Value written to register address 0605h
	Value write to register address+5 (lower)	96h	
Error check (lower)		85h	Calculation result of CRC-16
Error check (upper)		70h	

• Response

Field name		Data	Description
Slave address		04h	Same as query
Function code		10h	Same as query
Data	Register address (upper)	06h	Same as query
	Register address (lower)	00h	
	Number of registers (upper)	00h	Same as query
	Number of registers (lower)	06h	
Error check (lower)		40h	Calculation result of CRC-16
Error check (upper)		D6h	

4.11 Register address list

All data used by the driver is 32-bit wide. The register for the Modbus protocol is 16-bit wide, and one data is described by two registers.

Since the address assignment is big endian, the even number addresses become the upper and the odd number addresses become the lower.

■ Operation commands

These are commands related to motor operation. Operation commands are not saved in the non-volatile memory.

Register address		READ/WRITE	Name	Description
Dec	Hex			
48	0030h	R/W	Group (upper)	Sets the address number for the group send.
49	0031h		Group (lower)	
124	007Ch	R/W	Driver input command (upper)	Sets the input command to the driver.
125	007Dh		Driver input command (lower)	
126	007Eh	R	Driver output command (upper)	Reads the output status of the driver.
127	007Fh		Driver output command (lower)	

● Group (0030h, 0031h)

Multiple slaves are made into a group and a query is sent to all slaves in the group at once.

Refer to p.32 for details on group.

● Driver input command (007Ch, 007Dh)

These are the driver input signals that can be accessed via RS-485 communication. Assignments of the remote I/O (NET-IN0 to NET-IN15) are as follows.

(): Initial value (2-wire input mode)

Address (Hex)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
007Ch	Upper	—	—	—	—	—	—	—	—
	Lower	—	—	—	—	—	—	—	—
007Dh	Upper	NET-IN15 (Not used)	NET-IN14 (Not used)	NET-IN13 (Not used)	NET-IN12 (Not used)	NET-IN11 (Not used)	NET-IN10 (Not used)	NET-IN9 (Not used)	NET-IN8 (Not used)
	Lower	NET-IN7 (MB-FREE)	NET-IN6 (Not used)	NET-IN5 (STOP-MODE)*	NET-IN4 (REV)*	NET-IN3 (FWD)*	NET-IN2 (M2)	NET-IN1 (M1)	NET-IN0 (M0)

* When the "3-wire input mode" is set with the "Operation input mode selection" parameter, the following signals are applied.

FWD → START/STOP, REV → RUN/BRAKE, STOP-MODE → FWD/REV

Input signals shown below can be assigned to the NET-IN0 to NET-IN15 of the remote I/O by setting parameters. Refer to "Parameter R/W commands [I/O function (Remote I/O)]" on p.30 for details on parameters.

Signal name	Function	Setting range
Not used	Set when the input terminal is not used.	—
FWD	[2-wire input mode] The motor rotates in the forward direction when the bit of the FWD input is set to "1." The motor stops when it is set to "0."	0: Stop 1: Rotate in forward direction
REV	The motor rotates in the reverse direction when the bit of the REV input is set to "1." The motor stops when it is set to "0."	0: Stop 1: Rotate in reverse direction
STOP-MODE	Select how the motor should stop with the bit of the STOP-MODE input.	0: Instantaneous stop 1: Deceleration stop
START/STOP	[3-wire input mode] The motor rotates when both the bits of the START/STOP input and RUN/BRAKE input are set to "1."	0: Deceleration stop 1: Operation
RUN/BRAKE	The motor decelerates and stops when the bit of the START/STOP input is set to "0," while the motor stops instantaneously when the bit of the RUN/BRAKE input is set to "0."	0: Instantaneous stop 1: Operation
FWD/REV	Select the motor rotation direction with the bit of the FWD/REV input.	0: Forward direction 1: Reverse direction
MB-FREE	Select how the electromagnetic brake would operate when the motor stops.	0: Hold when it stops 1: Release when it stops
HMI	Release the function limitation of the support software MEXE02 or data setter OPX-2A .	0: Function limitation 1: Function limitation release
M0 to M2	Select the operation data number using these three bits.	0 to 7: Operation data number

Note

- Do not assign the same input signal to multiple input terminals. When the same input signal is assigned to multiple input terminals, the function will be executed if any of the terminals becomes active.
- When the same input signal is assigned to both remote I/O and direct I/O (X0 to X5), the function will be executed if any of the terminals becomes active.
- If the HMI input is not assigned to the input terminal, the HMI input will always become "1" (function limitation release). If the HMI input is assigned to both remote I/O and direct I/O (X0 to X5), the function limitation will be released when both of them become "1."

• Driver output command (007Eh, 007Fh)

These are the driver output signals that can be received via RS-485 communication. Assignments of the remote I/O (NET-OUT0 to NET-OUT15) are as follows.

(): Initial value (2-wire input mode)

Address (Hex)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
007Eh	Upper	—	—	—	—	—	—	—	—
	Lower	—	—	—	—	—	—	—	—
007Fh	Upper	NET-OUT15 (TLC)	NET-OUT14 (VA)	NET-OUT13 (MOVE)	NET-OUT12 (ALARM-OUT2)	NET-OUT11 (Not used)	NET-OUT10 (Not used)	NET-OUT9 (Not used)	NET-OUT8 (S-BSY)
	Lower	NET-OUT7 (ALARM-OUT1)	NET-OUT6 (WNG)	NET-OUT5 (STOP-MODE_R)*	NET-OUT4 (REV_R)*	NET-OUT3 (FWD_R)*	NET-OUT2 (M2_R)	NET-OUT1 (M1_R)	NET-OUT0 (M0_R)

* When the "3-wire input mode" is set with the "Operation input mode selection" parameter, the following signals are applied.
FWD_R → START/STOP_R, REV_R → RUN/BRAKE_R, STOP-MODE_R → FWD/REV_R

Output signals shown below can be assigned to the output terminals NET-OUT0 to NET-OUT15 of the remote I/O by setting parameters.

Refer to "Parameter R/W commands [I/O function (Remote I/O)]" on p.30 for details on parameters.

Signal name	Function		Setting range
Not used	Set when the output terminal is not used.		—
FWD_R	2-wire input mode	Output in response to the FWD input.	0: FWD=OFF 1: FWD=ON
REV_R		Output in response to the REV input.	0: REV=OFF 1: REV=ON
STOP-MODE_R		Output in response to the STOP-MODE input.	0: STOP-MODE=OFF 1: STOP-MODE=ON
START/STOP_R	3-wire input mode	Output in response to the START/STOP input.	0: START/STOP=OFF 1: START/STOP=ON
RUN/BRAKE_R		Output in response to the RUN/BRAKE input.	0: RUN/BRAKE=OFF 1: RUN/BRAKE=ON
FWD/REV_R		Output in response to the FWD/REV input.	0: FWD/REV=OFF 1: FWD/REV=ON
MB-FREE_R	Output in response to the MB-FREE input.		0: MB-FREE=OFF 1: MB-FREE=ON
M0_R	Output in response to the M0 input.		0: M0=OFF 1: M0=ON
M1_R	Output in response to the M1 input.		0: M1=OFF 1: M1=ON
M2_R	Output in response to the M2 input.		0: M2=OFF 1: M2=ON
ALARM-OUT1	Output the alarm of the BLV Series driver.		0: Normal operation 1: Alarm present
WNG	Output the warning of the BLV Series driver.		0: Normal operation 1: Warning present
MOVE	Output when the motor operates.		0: Motor standstill 1: Motor in operation
TLC	Output when a load exceeds the torque limiting value.		0: Within the torque limiting value 1: Outside the torque limiting value
VA	Output when the speed difference between the set rotation speed and actual motor rotation speed becomes equal to or less than the value set in the "Rotation speed attainment band" parameter.		0: Within the speed attainment band 1: Outside the speed attainment band
S-BSY	Output when the BLV Series driver is in an internal processing state.		0: No internal processing 1: During internal processing
ALARM-OUT2	Output when the load torque of the motor exceeded the overload warning level.		0: Normal operation 1: In overload operation
MPS	Output the power-on status of the main power supply.		0: Main power supply OFF 1: Main power supply ON
DIR	Output a state of the rotation direction of the motor shaft.		0: Reverse direction 1: Forward direction

■ Maintenance commands

These commands are used to reset alarms and warnings. They are also used to execute the batch processing for the non-volatile memory. All commands can be read and written (READ/WRITE). They are executed when written from 0 to 1.

Register address		Name	Description	Setting range
Dec	Hex			
384	0180h	Reset alarm (upper)	Resets the alarm that is present. Some alarms cannot be reset with the "reset alarm."	0, 1
385	0181h	Reset alarm (lower)		
388	0184h	Clear alarm history (upper)	Clears the alarm history.	
389	0185h	Clear alarm history (lower)		
390	0186h	Clear warning history (upper)	Clears the warning history.	
391	0187h	Clear warning history (lower)		
392	0188h	Clear communication error history (upper)	Clears the communication error history.	
393	0189h	Clear communication error history (lower)		
396	018Ch	Configuration (upper)	Executes the parameter recalculation and the setup.	
397	018Dh	Configuration (lower)		
398	018Eh	Batch data initialization (upper)*1	Restores the parameters saved in the non-volatile memory to their initial values. (Excluding parameters related to communication setting)	
399	018Fh	Batch data initialization (lower)*1		
400	0190h	Batch NV memory read (upper)	Reads the parameters saved in the non-volatile memory to the RAM. All operation data and parameters previously saved in the RAM are overwritten.	
401	0191h	Batch NV memory read (lower)		
402	0192h	Batch NV memory write (upper)	Writes the parameters saved in the RAM to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.	
403	0193h	Batch NV memory write (lower)		
404	0194h	All data batch initialization (upper)*2	Restores all parameters saved in the non-volatile memory to their initial values. (Including parameters related to communication)	
405	0195h	All data batch initialization (lower)*2		

*1 Even if "Batch data initialization" is executed, communication parity, communication stop bit, and transmission waiting time are not initialized.

*2 If "All data batch initialization" is executed, communication parity, communication stop bit, and transmission waiting time are also initialized.

Turning on the power again after "All data batch initialization" was executed may change the communication setting, thereby causing communication to disable.

Note Before executing "Batch data initialization" or "All data batch initialization" of the maintenance command, be sure to turn the X0 and X1 terminals of the direct I/O and the NET-IN3 and NET-IN4 of the remote I/O to OFF. The motor may suddenly rotate after initialization unless these signals are turned OFF.

● Configuration (018Ch, 018Dh)

Configuration will be executed when all of the following conditions are satisfied:

- An alarm is not present
- The motor is not operated
- The **OPX-2A** is being used in other modes than the test mode or copy mode.
- The **MEXE02** is not being used in I/O test, teaching/remote operation, and download.

The table below shows the driver status before and after configuration is executed.

Item	Configuration is ready to execute	Configuration is executing	Update after executing configuration
POWER LED	Lit	Lit	Based on the driver condition.
ALARM LED	Unlit	Unlit	
Electromagnetic brake	Hold/Release	Hold/Release	
Output signals	Allowed	Indeterminable	Allowed
Input signals	Allowed	Not allowed	Allowed

Note The correct monitor value may not return even when the monitor is executed via the **MEXE02**, **OPX-2A** or RS-485 communication while configuration is executed.

■ Monitor commands

These commands are used to monitor the operating speed or the alarm and warning histories. All commands can be read (READ).

Register address		Name	Description	Output range
Dec	Hex			
128	0080h	Present alarm (upper)	Monitors the alarm code presently generated.	00h to FFh
129	0081h	Present alarm (lower)		
130	0082h	Alarm history 1 (upper)	Monitors the alarm history 1 to alarm history 10.	
131	0083h	Alarm history 1 (lower)		
132	0084h	Alarm history 2 (upper)		
133	0085h	Alarm history 2 (lower)		
134	0086h	Alarm history 3 (upper)		
135	0087h	Alarm history 3 (lower)		
136	0088h	Alarm history 4 (upper)		
137	0089h	Alarm history 4 (lower)		
138	008Ah	Alarm history 5 (upper)		
139	008Bh	Alarm history 5 (lower)		
140	008Ch	Alarm history 6 (upper)		
141	008Dh	Alarm history 6 (lower)		
142	008Eh	Alarm history 7 (upper)		
143	008Fh	Alarm history 7 (lower)		
144	0090h	Alarm history 8 (upper)		
145	0091h	Alarm history 8 (lower)		
146	0092h	Alarm history 9 (upper)		
147	0093h	Alarm history 9 (lower)		
148	0094h	Alarm history 10 (upper)		
149	0095h	Alarm history 10 (lower)		
150	0096h	Present warning (upper)	Monitors the warning code presently generated.	00h to FFh
151	0097h	Present warning (lower)		
152	0098h	Warning history 1 (upper)	Monitors the warning history 1 to warning history 10.	
153	0099h	Warning history 1 (lower)		
154	009Ah	Warning history 2 (upper)		
155	009Bh	Warning history 2 (lower)		
156	009Ch	Warning history 3 (upper)		
157	009Dh	Warning history 3 (lower)		
158	009Eh	Warning history 4 (upper)		
159	009Fh	Warning history 4 (lower)		
160	00A0h	Warning history 5 (upper)		
161	00A1h	Warning history 5 (lower)		
162	00A2h	Warning history 6 (upper)		
163	00A3h	Warning history 6 (lower)		
164	00A4h	Warning history 7 (upper)		
165	00A5h	Warning history 7 (lower)		
166	00A6h	Warning history 8 (upper)		
167	00A7h	Warning history 8 (lower)		
168	00A8h	Warning history 9 (upper)		
169	00A9h	Warning history 9 (lower)		
170	00AAh	Warning history 10 (upper)		
171	00ABh	Warning history 10 (lower)		
172	00ACh	Communication error code (upper)	Monitors the communication error code presently generated.	00h to FFh
173	00ADh	Communication error code (lower)		
174	00AEh	Communication error code history 1 (upper)	Monitors the communication error code history 1 to communication error code history 10.	
175	00AFh	Communication error code history 1 (lower)		
176	00B0h	Communication error code history 2 (upper)		
177	00B1h	Communication error code history 2 (lower)		

Register address		Name	Description	Output range
Dec	Hex			
178	00B2h	Communication error code history 3 (upper)	Monitors the communication error code history 1 to communication error code history 10.	00h to FFh
179	00B3h	Communication error code history 3 (lower)		
180	00B4h	Communication error code history 4 (upper)		
181	00B5h	Communication error code history 4 (lower)		
182	00B6h	Communication error code history 5 (upper)		
183	00B7h	Communication error code history 5 (lower)		
184	00B8h	Communication error code history 6 (upper)		
185	00B9h	Communication error code history 6 (lower)		
186	00BAh	Communication error code history 7 (upper)		
187	00BBh	Communication error code history 7 (lower)		
188	00BCh	Communication error code history 8 (upper)		
189	00BDh	Communication error code history 8 (lower)		
190	00BEh	Communication error code history 9 (upper)		
191	00BFh	Communication error code history 9 (lower)		
192	00C0h	Communication error code history 10 (upper)		
193	00C1h	Communication error code history 10 (lower)		
196	00C4h	Present operation data No. (upper)	Monitors the operation data number presently selected.	0 to 7
197	00C5h	Present operation data No. (lower)		
200	00C8h	Command speed (upper)	Monitors the command speed presently selected.	-4010 to +4010 r/min +: Forward -: Reverse 0: Stop
201	00C9h	Command speed (lower)		
206	00CEh	Feedback speed (upper)	Monitors the feedback speed.	-5200 to +5200 r/min +: Forward -: Reverse 0: Stop
207	00CFh	Feedback speed (lower)		
212	00D4h	Direct I/O and electromagnetic brake status (upper)	Monitors the each direct I/O signal (X0 to X5, Y0, Y1) and electromagnetic brake status.	Refer to the next table.
213	00D5h	Direct I/O and electromagnetic brake status (lower)		
256	0100h	Operating speed (upper)	Monitors the feedback speed calculated by the "Speed reduction ratio" parameter or "Speed increasing ratio" parameter.	+: Forward -: Reverse 0: Stop
257	0101h	Operating speed (lower)		
258	0102h	Operating speed decimal position (upper)	Monitors the decimal position in the operating speed. *1	0: No decimal point 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places
259	0103h	Operating speed decimal position (lower)		
260	0104h	Conveyor transfer speed (upper)	Monitors the feedback speed calculated by the "Conveyor speed reduction ratio" parameter or "Conveyor speed increasing ratio" parameter.	+: Forward -: Reverse 0: Stop
261	0105h	Conveyor transfer speed (lower)		
262	0106h	Conveyor transfer speed decimal position (upper)	Monitors the decimal position in the conveyor transfer speed. *2	0: No decimal point 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places
263	0107h	Conveyor transfer speed decimal position (lower)		
264	0108h	Load factor (upper)	Monitors the torque that is output by the motor based on the rated torque being 100%.	0 to 200%
265	0109h	Load factor (lower)		
268	010Ch	External analog speed setting (upper)	Monitors the operating speed setting value by the analog setting. *3	0 to 4010 r/min
269	010Dh	External analog speed setting (lower)		
272	0110h	External analog torque limit setting (upper)	Monitors the torque limiting value by the analog setting. *3	0 to 200%
273	0111h	External analog torque limit setting (lower)		
278	0116h	External analog voltage setting (upper)	Monitors the voltage setting value by the analog setting. *4	0 to 50 (1=0.1 V)
279	0117h	External analog voltage setting (lower)		

*1 The decimal position is automatically changed based on the setting of the "Speed reduction ratio" parameter or "Speed reduction ratio decimal digit setting" parameter.

*2 The decimal position is automatically changed based on the setting of the "Conveyor speed reduction ratio" parameter or "Conveyor speed reduction ratio decimal digit setting" parameter.

*3 When it is not selected in the "Analog input signal selection" parameter, "FFFFh" is displayed.

*4 When No.2 of the basic function switch (SW1) is set to ON, the indicated value of the input voltage will be half.

Direct I/O and electromagnetic brake status (00D4h, 00D5h)

Address (Hex)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
00D4h	Upper	—	—	—	—	—	—	—	MB
	Lower	—	—	—	—	—	—	Y1	Y0
00D5h	Upper	—	—	—	—	—	—	—	—
	Lower	—	—	X5	X4	X3	X2	X1	X0

■ Parameter R/W commands [Operation data]

These commands are used to read or write parameters. All commands can be read and written (READ/WRITE). For details on parameter, refer to the USER MANUAL (Basic Function).

Register address		Name	Setting range	Setting unit	Initial value	Update *
Dec	Hex					
1152	0480h	Rotation speed No.0 (upper)	0 r/min, and 80 to 4000 r/min	1	0	A
1153	0481h	Rotation speed No.0 (lower)				
1154	0482h	Rotation speed No.1 (upper)				
1155	0483h	Rotation speed No.1 (lower)				
1156	0484h	Rotation speed No.2 (upper)				
1157	0485h	Rotation speed No.2 (lower)				
1158	0486h	Rotation speed No.3 (upper)				
1159	0487h	Rotation speed No.3 (lower)				
1160	0488h	Rotation speed No.4 (upper)				
1161	0489h	Rotation speed No.4 (lower)				
1162	048Ah	Rotation speed No.5 (upper)				
1163	048Bh	Rotation speed No.5 (lower)				
1164	048Ch	Rotation speed No.6 (upper)				
1165	048Dh	Rotation speed No.6 (lower)				
1166	048Eh	Rotation speed No.7 (upper)				
1167	048Fh	Rotation speed No.7 (lower)				
1536	0600h	Acceleration time No.0 (upper)	2 to 150 (1=0.1 s)	1	5	
1537	0601h	Acceleration time No.0 (lower)				
1538	0602h	Acceleration time No.1 (upper)				
1539	0603h	Acceleration time No.1 (lower)				
1540	0604h	Acceleration time No.2 (upper)				
1541	0605h	Acceleration time No.2 (lower)				
1542	0606h	Acceleration time No.3 (upper)				
1543	0607h	Acceleration time No.3 (lower)				
1544	0608h	Acceleration time No.4 (upper)				
1545	0609h	Acceleration time No.4 (lower)				
1546	060Ah	Acceleration time No.5 (upper)				
1547	060Bh	Acceleration time No.5 (lower)				
1548	060Ch	Acceleration time No.6 (upper)				
1549	060Dh	Acceleration time No.6 (lower)				
1550	060Eh	Acceleration time No.7 (upper)				
1551	060Fh	Acceleration time No.7 (lower)				

* It indicates the timing for the data to update.

A: Update immediately

Register address		Name	Setting range	Setting unit	Initial value	Update *
Dec	Hex					
1664	0680h	Deceleration time No.0 (upper)	2 to 150 (1=0.1 s)	1	5	A
1665	0681h	Deceleration time No.0 (lower)				
1666	0682h	Deceleration time No.1 (upper)				
1667	0683h	Deceleration time No.1 (lower)				
1668	0684h	Deceleration time No.2 (upper)				
1669	0685h	Deceleration time No.2 (lower)				
1670	0686h	Deceleration time No.3 (upper)				
1671	0687h	Deceleration time No.3 (lower)				
1672	0688h	Deceleration time No.4 (upper)				
1673	0689h	Deceleration time No.4 (lower)				
1674	068Ah	Deceleration time No.5 (upper)				
1675	068Bh	Deceleration time No.5 (lower)				
1676	068Ch	Deceleration time No.6 (upper)				
1677	068Dh	Deceleration time No.6 (lower)				
1678	068Eh	Deceleration time No.7 (upper)				
1679	068Fh	Deceleration time No.7 (lower)				
1792	0700h	Torque limiting No.0 (upper)	0 to 200%	1	200	
1793	0701h	Torque limiting No.0 (lower)				
1794	0702h	Torque limiting No.1 (upper)				
1795	0703h	Torque limiting No.1 (lower)				
1796	0704h	Torque limiting No.2 (upper)				
1797	0705h	Torque limiting No.2 (lower)				
1798	0706h	Torque limiting No.3 (upper)				
1799	0707h	Torque limiting No.3 (lower)				
1800	0708h	Torque limiting No.4 (upper)				
1801	0709h	Torque limiting No.4 (lower)				
1802	070Ah	Torque limiting No.5 (upper)				
1803	070Bh	Torque limiting No.5 (lower)				
1804	070Ch	Torque limiting No.6 (upper)				
1805	070Dh	Torque limiting No.6 (lower)				
1806	070Eh	Torque limiting No.7 (upper)				
1807	070Fh	Torque limiting No.7 (lower)				

* It indicates the timing for the data to update.

A: Update immediately

■ Parameter R/W commands [User parameters]

Register address		Name	Description	Setting range	Setting unit	Initial value	Update *
Dec	Hex						
646	0286h	JOG operating speed (upper)	Sets the rotation speed of JOG operation.	0 r/min, and 80 to 1000 r/min	1	300	A
647	0287h	JOG operating speed (lower)					
900	0384h	Motor rotation direction selection (upper)	Sets the motor rotation direction to be applied when the FWD input is turned ON.	0: Positive direction=CCW 1: Positive direction=CW	—	1	C
901	0385h	Motor rotation direction selection (lower)					
4160	1040h	Operation input mode selection (upper)	Switches operation signals of external input between the 2-wire input mode and 3-wire input mode.	0: 2-Wire mode 1: 3-Wire mode	—	0	
4161	1041h	Operation input mode selection (lower)					
4162	1042h	JOG operation torque (upper)	Sets the torque limiting value of JOG operation.	0 to 200%	1	200	A
4163	1043h	JOG operation torque (lower)					
4170	104Ah	Speed reduction ratio (upper)	When the gear ratio of the gearhead is entered, the rotation speed of the gearhead output shaft can be displayed. The speed reduction ratio is calculated by multiplying a value in the "Speed reduction ratio" parameter by that in the "Speed reduction ratio decimal digit setting" parameter.	100 to 9999	1	100	
4171	104Bh	Speed reduction ratio (lower)					
4172	104Ch	Speed reduction ratio decimal digit setting (upper)		0: x 1 1: x 0.1 2: x 0.01	—	2	
4173	104Dh	Speed reduction ratio decimal digit setting (lower)					
4174	104Eh	Speed increasing ratio (upper)	Sets the speed increasing ratio relative to the rotation speed of the motor output shaft. The display varies depending on the setting value. When the speed increasing ratio is set to 1, the speed reduction ratio will be enabled. When the speed increasing ratio is set to other than 1, the speed increasing ratio will be enabled.	1 to 5	—	1	
4175	104Fh	Speed increasing ratio (lower)					
4176	1050h	Conveyor speed reduction ratio (upper)	When the conveyor speed reduction ratio is set, the transfer speed of the conveyor can be displayed. The conveyor speed reduction ratio is calculated by multiplying a value in the "Conveyor speed reduction ratio" parameter by that in the "Conveyor speed reduction ratio decimal digit setting" parameter.	100 to 9999	1	100	
4177	1051h	Conveyor speed reduction ratio (lower)					
4178	1052h	Conveyor speed reduction ratio decimal digit setting (upper)		0: x 1 1: x 0.1 2: x 0.01	—	2	
4179	1053h	Conveyor speed reduction ratio decimal digit setting (lower)					
4180	1054h	Conveyor speed increasing ratio (upper)	Sets the conveyor speed increasing ratio relative to the rotation speed of the motor output shaft.	1 to 5	—	1	
4181	1055h	Conveyor speed increasing ratio (lower)					
4322	10E2h	Analog input signal selection (upper)	Setting method of operation data can be changed. Refer to the next table for details.	0: Mode 0 1: Mode 1 2: Mode 2 3: Mode 3 4: Mode 4 5: Mode 5	—	0	C
4323	10E3h	Analog input signal selection (lower)					
4430	114Eh	Rotation speed attainment band (upper)	Sets the band within which the motor rotation speed is deemed to have reached the set value.	0 to 400 r/min	1	200	A
4431	114Fh	Rotation speed attainment band (lower)					

* It indicates the timing for the data to update.

A: Update immediately, C: Update after executing configuration

• **Operation data setting using analog input signal selection**

The setting method of operation data can be changed using the "Analog input signal selection" parameter. Combinations of the mode number and analog setting/digital setting are shown in the table below. Others except the following combinations are not available to be set.

Mode No.	Operation data No.	VR1	VR2	VR3	External potentiometer	Digital setting
Mode 0 (initial setting)	0	Rotation speed	Acceleration/ Deceleration time	Torque limiting value	—	—
	1	—	Acceleration/ Deceleration time	Torque limiting value	Rotation speed	—
	2 to 7	—	—	—	—	Rotation speed Acceleration time Deceleration time Torque limiting value
Mode 1	0 to 7	—	—	—	—	Rotation speed Acceleration time Deceleration time Torque limiting value
Mode 2	0 to 7	—	—	—	Torque limiting value	Rotation speed Acceleration time Deceleration time
Mode 3	0	Acceleration time	Deceleration time	Rotation speed	—	Torque limiting value
	1	Acceleration time	Deceleration time	—	Rotation speed	Torque limiting value
	2 to 7	—	—	—	—	Rotation speed Acceleration time Deceleration time Torque limiting value
Mode 4	0	Rotation speed	Torque limiting value	Acceleration/ Deceleration time	—	—
	1	—	Torque limiting value	Acceleration/ Deceleration time	Rotation speed	—
	2 to 7	—	—	—	—	Rotation speed Acceleration time Deceleration time Torque limiting value
Mode 5	0	Torque limiting value	Acceleration/ Deceleration time	Rotation speed	—	—
	1	Torque limiting value	Acceleration/ Deceleration time	—	Rotation speed	—
	2 to 7	—	—	—	—	Rotation speed Acceleration time Deceleration time Torque limiting value



The torque limiting potentiometer (VR3) is set to the maximum value at the time of shipment. When selecting the mode Nos. 3 to 5, check the setting value before operating a motor because the rotation speed and acceleration/deceleration time are set to the maximum value initially.

■ Parameters R/W commands [Alarm, warning]

Register address		Name	Description	Setting range	Setting unit	Initial value	Update #2
Dec	Hex						
840	0348h	Undervoltage warning level (upper)	Sets the warning level for the undervoltage of the main power supply.	0 to 480 (1=0.1 V)	1	24 VDC type: 216 48 VDC type: 432	A
841	0349h	Undervoltage warning level (lower)					
4224	1080h	Electromagnetic brake action at alarm (upper)	Sets the timing to activate the electromagnetic brake when an alarm is generated. If "0" is set, the electromagnetic brake activates to hold the position after the motor coasts to a stop.	0: Hold after coasting to a stop 1: Hold immediately	—	1	C
4225	1081h	Electromagnetic brake action at alarm (lower)					
4226	1082h	Prevention of operation at power-on alarm function (upper)	Switches whether to enable or disable the prevention of operation at power-on alarm.	0: Disable 1: Enable	—	0	
4227	1083h	Prevention of operation at power-on alarm function (lower)					
4228	1084h	Undervoltage alarm latch (upper)	Switches whether to enable or disable the retaining state of the undervoltage alarm function. If "0" is set, the undervoltage alarm will automatically be cleared when the main power supply voltage returns to the undervoltage detection level or more.	0: Disable 1: Enable	—	0	
4229	1085h	Undervoltage alarm latch (lower)					
4258	10A2h	Overload warning function (upper)	Switches whether to enable or disable the overload warning function.	0: Disable 1: Enable	—	1	A
4259	10A3h	Overload warning function (lower)					
4264	10A8h	Undervoltage warning function (upper)	Switches whether to enable or disable the undervoltage warning function.	0: Disable 1: Enable	—	1	
4265	10A9h	Undervoltage warning function (lower)					
4266	10AAh	Overload warning level (upper)	Sets the warning level for the load torque of the motor.	50 to 100%	1	100	
4267	10ABh	Overload warning level (lower)					
4608	1200h	Communication timeout (upper)	Sets the condition in which a communication timeout occurs in RS-485 communication.	0: Not monitored 0 to 10000 ms	1	0	D
4609	1201h	Communication timeout (lower)					
4610	1202h	Communication error alarm (upper)	Sets the condition in which a RS-485 communication error alarm is generated. The communication error alarm is generated when the RS-485 communication error has occurred by the number of times set here.	1 to 10 times	1	3	
4611	1203h	Communication error alarm (lower)					
5126	1406h	Communication parity (upper) *1	Sets the parity for RS-485 communication.	0: None 1: Even parity 2: Odd parity	—	1	
5127	1407h	Communication parity (lower) *1					
5128	1408h	Communication stop bit (upper) *1	Sets the stop bit for RS-485 communication.	0: 1 bit 1: 2 bits	—	0	
5129	1409h	Communication stop bit (lower) *1					
5130	140Ah	Transmission waiting time (upper) *1	Sets the transmission waiting time for RS-485 communication.	0 to 10000 (×0.1 ms)	1	100	
5131	140Bh	Transmission waiting time (lower) *1					

*1 Turning on the power again after changing the parameter setting may change the communication setting, thereby causing communication to disable.

*2 It indicates the timing for the data to update.

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

■ Parameter R/W commands [Data setter]

Register address		Name	Description	Setting range	Initial value	Update *
Dec	Hex					
960	03C0h	Data setter speed display (upper)	Sets the display method of operating speed in the monitor mode. If "0" is set, "-" will be displayed when the motor rotates in the reverse direction.	0: Signed 1: Absolute value	0	A
961	03C1h	Data setter speed display (lower)				
962	03C2h	Data setter edit (upper)	Switches whether to enable or disable the following editing functions. <ul style="list-style-type: none"> • Clear of the alarm and warning histories in the monitor mode • Change of the setting value in the data mode and parameter mode • All operation in the copy mode 	0: Disable 1: Enable	1	D
963	03C3h	Data setter edit (lower)				
4320	10E0h	Data setter initial display (upper)	Selects the initial screen when the power is supplied to the BLV Series driver.	0: Rotation speed 1: Conveyor transfer speed 2: Load factor 3: Operation data number 4: Top screen of monitor mode	0	
4321	10E1h	Data setter initial display (lower)				

* It indicates the timing for the data to update.

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

■ Parameter R/W commands [I/O function (Direct I/O)]

Register address		Name	Setting range	Initial value	Update *1
Dec	Hex				
4352	1100h	X0 input function selection (upper)	0: Not used 1: FWD (START/STOP) *2 2: REV (RUN/BRAKE) *2 19: STOP-MODE (FWD/REV) *2 20: MB-FREE 21: EXT-ERROR 24: ALARM-RESET 27: HMI 48: M0 49: M1 50: M2	1	B
4353	1101h	X0 input function selection (lower)			
4354	1102h	X1 input function selection (upper)		2	
4355	1103h	X1 input function selection (lower)			
4356	1104h	X2 input function selection (upper)		19	
4357	1105h	X2 input function selection (lower)			
4358	1106h	X3 input function selection (upper)		48	
4359	1107h	X3 input function selection (lower)			
4360	1108h	X4 input function selection (upper)		24	
4361	1109h	X4 input function selection (lower)			
4362	110Ah	X5 input function selection (upper)		20	
4363	110Bh	X5 input function selection (lower)			
4416	1140h	Y0 output function selection (upper)	0: Not used 65: ALARM-OUT1 66: WNG 68: MOVE 71: TLC 77: VA 81: ALARM-OUT2 84: DIR	65	A
4417	1141h	Y0 output function selection (lower)			
4418	1142h	Y1 output function selection (upper)		66	
4419	1143h	Y1 output function selection (lower)			

*1 It indicates the timing for the data to update.

A: Update immediately, B: Update after operation stop

*2 The parentheses () will be applied when the "3-wire input mode" is selected with the "Operation input mode selection" parameter.

■ Parameter R/W commands [I/O function (Remote I/O)]

Register address		Name	Setting range	Initial value	Update *1
Dec	Hex				
4448	1160h	NET-IN0 input function selection (upper)	0: Not used 1: FWD (START/STOP) *2 2: REV (RUN/BRAKE) *2 19: STOP-MODE (FWD/REV) *2 20: MB-FREE 27: HMI 48: M0 49: M1 50: M2	48	C
4449	1161h	NET-IN0 input function selection (lower)			
4450	1162h	NET-IN1 input function selection (upper)		49	
4451	1163h	NET-IN1 input function selection (lower)			
4452	1164h	NET-IN2 input function selection (upper)		50	
4453	1165h	NET-IN2 input function selection (lower)			
4454	1166h	NET-IN3 input function selection (upper)		1	
4455	1167h	NET-IN3 input function selection (lower)			
4456	1168h	NET-IN4 input function selection (upper)		2	
4457	1169h	NET-IN4 input function selection (lower)			
4458	116Ah	NET-IN5 input function selection (upper)		19	
4459	116Bh	NET-IN5 input function selection (lower)			
4460	116Ch	NET-IN6 input function selection (upper)		0	
4461	116Dh	NET-IN6 input function selection (lower)			
4462	116Eh	NET-IN7 input function selection (upper)		20	
4463	116Fh	NET-IN7 input function selection (lower)			
4464	1170h	NET-IN8 input function selection (upper)		0	
4465	1171h	NET-IN8 input function selection (lower)			
4466	1172h	NET-IN9 input function selection (upper)		0	
4467	1173h	NET-IN9 input function selection (lower)			
4468	1174h	NET-IN10 input function selection (upper)		0	
4469	1175h	NET-IN10 input function selection (lower)			
4470	1176h	NET-IN11 input function selection (upper)		0	
4471	1177h	NET-IN11 input function selection (lower)			
4472	1178h	NET-IN12 input function selection (upper)		0	
4473	1179h	NET-IN12 input function selection (lower)			
4474	117Ah	NET-IN13 input function selection (upper)		0	
4475	117Bh	NET-IN13 input function selection (lower)			
4476	117Ch	NET-IN14 input function selection (upper)		0	
4477	117Dh	NET-IN14 input function selection (lower)			
4478	117Eh	NET-IN15 input function selection (upper)		0	
4479	117Fh	NET-IN15 input function selection (lower)			

*1 It indicates the timing for the data to update.

C: Update after executing configuration

*2 The parentheses () will be applied when the "3-wire input mode" is selected with the "Operation input mode selection" parameter.

Register address		Name	Setting range	Initial value	Update *1
Dec	Hex				
4480	1180h	NET-OUT0 output function selection (upper)	0: Not used 1: FWD_R (START/STOP_R) *2 2: REV_R (RUN/BRAKE_R) *2 19: STOP-MODE_R (FWD/REV_R) *2 20: MB-FREE_R 27: HMI_R 48: M0_R 49: M1_R 50: M2_R 65: ALARM-OUT1 66: WNG 68: MOVE 71: TLC 77: VA 80: S-BSY 81: ALARM-OUT2 82: MPS 84: DIR	48	C
4481	1181h	NET-OUT0 output function selection (lower)			
4482	1182h	NET-OUT1 output function selection (upper)		49	
4483	1183h	NET-OUT1 output function selection (lower)			
4484	1184h	NET-OUT2 output function selection (upper)		50	
4485	1185h	NET-OUT2 output function selection (lower)			
4486	1186h	NET-OUT3 output function selection (upper)		1	
4487	1187h	NET-OUT3 output function selection (lower)			
4488	1188h	NET-OUT4 output function selection (upper)		2	
4489	1189h	NET-OUT4 output function selection (lower)			
4490	118Ah	NET-OUT5 output function selection (upper)		19	
4491	118Bh	NET-OUT5 output function selection (lower)			
4492	118Ch	NET-OUT6 output function selection (upper)		66	
4493	118Dh	NET-OUT6 output function selection (lower)			
4494	118Eh	NET-OUT7 output function selection (upper)		65	
4495	118Fh	NET-OUT7 output function selection (lower)			
4496	1190h	NET-OUT8 output function selection (upper)		80	
4497	1191h	NET-OUT8 output function selection (lower)			
4498	1192h	NET-OUT9 output function selection (upper)		0	
4499	1193h	NET-OUT9 output function selection (lower)			
4500	1194h	NET-OUT10 output function selection (upper)		0	
4501	1195h	NET-OUT10 output function selection (lower)			
4502	1196h	NET-OUT11 output function selection (upper)		0	
4503	1197h	NET-OUT11 output function selection (lower)			
4504	1198h	NET-OUT12 output function selection (upper)		81	
4505	1199h	NET-OUT12 output function selection (lower)			
4506	119Ah	NET-OUT13 output function selection (upper)		68	
4507	119Bh	NET-OUT13 output function selection (lower)			
4508	119Ch	NET-OUT14 output function selection (upper)		77	
4509	119Dh	NET-OUT14 output function selection (lower)			
4510	119Eh	NET-OUT15 output function selection (upper)		71	
4511	119Fh	NET-OUT15 output function selection (lower)			

*1 It indicates the timing for the data to update.

C: Update after executing configuration

*2 The parentheses () will be applied when the "3-wire input mode" is selected with the "Operation input mode selection" parameter.

4.12 Group send

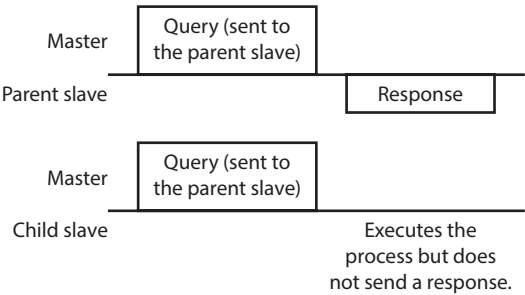
Multiple slaves are made into a group and a query is sent to all slaves in the group at once.

- **Group composition**

A group consists of one parent slave and child slaves and only the parent slave returns a response.

- **Group address**

To perform a group send, set a group address to the child slaves to be included in the group.
The child slaves to which the group address has been set can receive a query sent to the parent slave.



- **Parent slave**

No special setting is required on the parent slave to perform a group send. The address of the parent slave becomes the group address. When a query is sent to the parent slave from the master, the parent slave executes the requested process and then returns a response (same as with the unicast mode).

- **Child slave**

Use a "Group" command to set a group address to each child slave.
Change the group in the unicast mode.

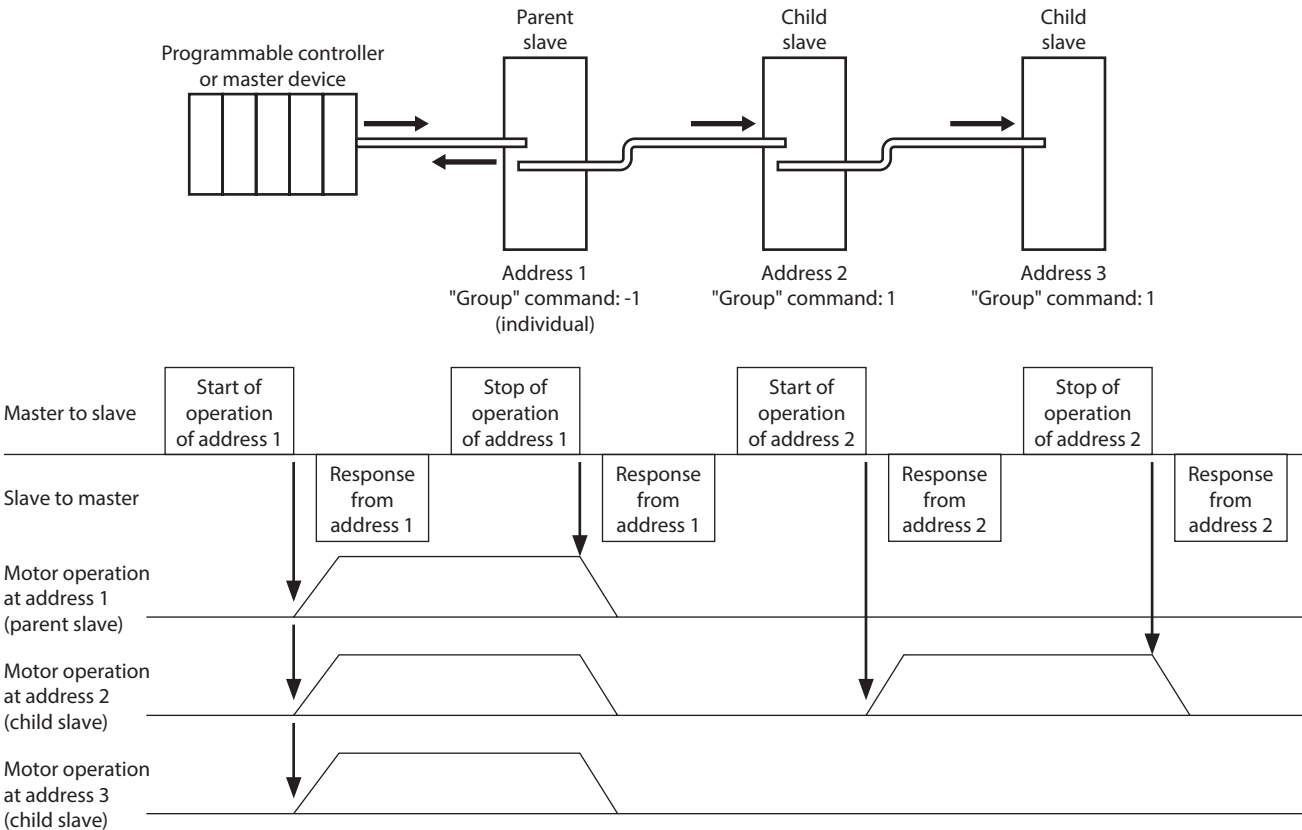
Address	Setting range	Initial value
0030h	-1: No group specification (Group send is not performed) 1 to 31: Sets a group address.	-1



The group setting is not saved in the non-volatile memory even when the "Batch NV memory write" is executed. Therefore, the group setting will be initialized when the driver power is turned off. Reset the group setting whenever the power is turned on.

- **Function code to execute in a group send**

Function code	Function
10h	Writing to multiple holding registers



4.13 Detection of communication errors

This function detects abnormalities that may occur during RS-485 communication. The abnormalities that can be detected include communication errors, alarms and warnings.

■ Communication errors

A communication error history will be saved in the RAM. The communication error can be checked using the "Communication error history" command via RS-485 communication.

Note The communication error history is cleared when the driver power is turned off.

Type of communication error	Code	Cause
RS-485 communication error	84h	A transmission error was detected. Refer to "No response" on p.14.
Command not yet defined	88h	An exception response (exception code 01h, 02h) was detected. Refer to p.15.
User I/F communication in progress	89h	An exception response (exception code 04h) was detected. Refer to p.15.
Non-volatile memory processing in progress	8Ah	An exception response (exception code 04h) was detected. Refer to p.15.
Outside setting range	8Ch	An exception response (exception code 03h, 04h) was detected. Refer to p.15.
Command execute disable	8Dh	An exception response (exception code 04h) was detected. Refer to p.15.

■ Alarms and warnings

If an alarm is generated, the ALARM-OUT output is turned OFF to stop the motor. At the same time, the ALARM LED will start blinking.

If a warning is generated, the WNG output is turned ON. The motor will continue to operate. Once the cause of the warning is removed, the WNG output will be turned OFF automatically.

Note The warning history is cleared when the driver power is turned off.

- **Communication switch setting error (alarm code 83h)**

If No.4 of the communication function switch (SW2) is set to ON, an alarm is generated.

- **RS-485 communication error (alarm/warning code 84h)**

The table below shows the relationship between alarms and warnings when a RS-485 communication error occurs.

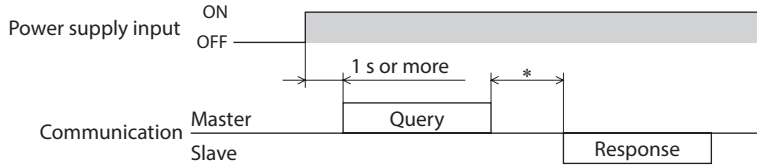
Description of error	Description
Warning	A warning will be generated when a RS-485 communication error is detected once. If normal reception occurs while the warning is present, the warning will be cleared automatically.
Alarm	An alarm will be generated when a RS-485 communication error has been detected consecutively by the number of times set in the "Communication error alarm" parameter.

- **RS-485 communication timeout (alarm code 85h)**

If communication is not established with the master after an elapse of the time set with the "Communication time out" parameter, an alarm will be generated.

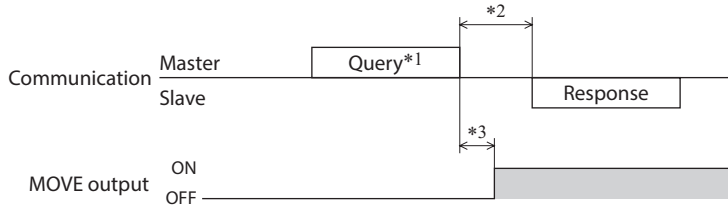
4.14 Timing charts

■ Communication start



* Tb2 (transmission waiting time) + C3.5 (silent interval) + command processing time

■ Operation start

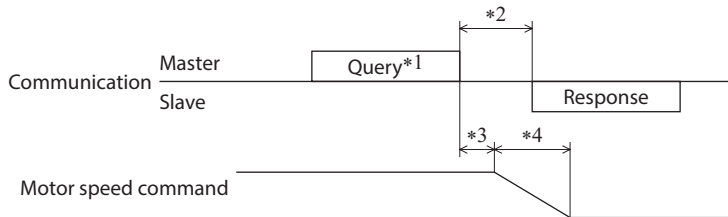


*1 A message including a query to start operation via RS-485 communication.

*2 Tb2 (transmission waiting time) + C3.5 (silent interval) + command processing time

*3 C3.5 (silent interval) + command processing time

■ Operation stop, speed change



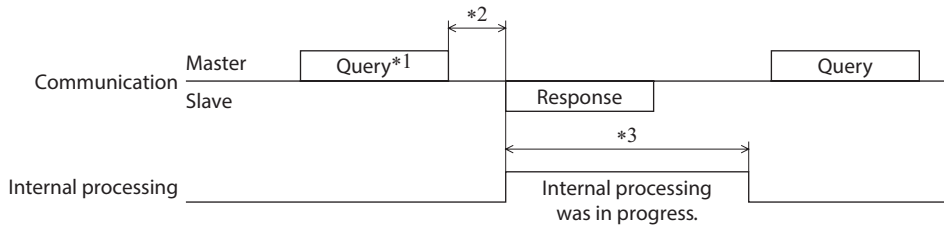
*1 A message including a query to stop operation and another to change the speed via RS-485 communication.

*2 Tb2 (transmission waiting time) + C3.5 (silent interval) + command processing time

*3 C3.5 (silent interval) + command processing time

*4 The specific time varies depending on the driver input command or the parameter setting.

■ Configuration



*1 A message including a query for configuration via RS-485 communication.

*2 Tb2 (transmission waiting time) + C3.5 (silent interval) + command processing time

*3 C3.5 (silent interval) + 1 s or less

*4 Execute a query after the driver internal processing is completed.

5 Alarms, warnings and communication errors

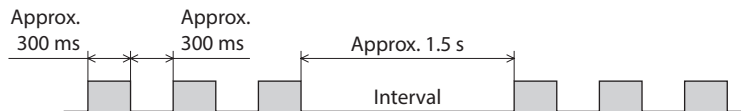
The driver provides alarms that are designed to protect the driver from overheating, poor connection, misoperation, etc. (protective functions), as well as warnings that are output before the corresponding alarms are generated (warning functions).

A communication error will occur when the process requested by the master could not be executed.

5.1 Alarms

If an alarm is generated, the ALARM-OUT output is turned OFF to stop the motor. At the same time, the ALARM LED will start blinking. The present alarm can be checked by counting the number of times the ALARM LED blinks, or using the **MEXE02**, **OPX-2A** or RS-485 communication.

Example: Sensor error alarm (number of blinks: 3)



■ Alarm list

Alarm code	Number of times ALARM LED blinks	Alarm type	Cause	Remedial action	Reset using the ALARM-RESET input
30h	2	Overload	A load exceeding the rated torque was applied to the motor for five seconds or more.	<ul style="list-style-type: none"> Decrease a load. Reconsider the operating conditions such as acceleration/deceleration time. 	
28h	3	Sensor error	The motor sensor signal line was disconnected or the motor signal connector came off during operation.	Check the connection between the driver and motor.	
42h		Initial sensor error	The motor sensor signal line was disconnected or the motor signal connector came off before the main power supply was turned on.		
22h	4	Overvoltage	<ul style="list-style-type: none"> The main power supply voltage exceeded the overvoltage detection level. [Detection level] BLV620: Approximately 40 VDC BLV640: Approximately 72 VDC Sudden starting/stopping of a large inertia load was performed. 	<ul style="list-style-type: none"> Check the voltage of the main power supply. If the alarm is generated during operation, decrease a load or increase the acceleration time and deceleration time. If the alarm is generated in acceleration, set the speed response to the regenerative power suppression mode. If the alarm is generated when the motor stops, set the STOP-MODE to instantaneous stop. 	Possible
25h	5	Undervoltage	The main power supply voltage dropped below the undervoltage detection level. [Detection level] BLV620 : Approximately 10 VDC BLV640 : Approximately 20 VDC	<ul style="list-style-type: none"> Check the voltage of the main power supply. Check the wiring of the power supply cable. 	
31h	6	Overspeed	The rotation speed of the motor output shaft exceeded approximately 4800 r/min.	<ul style="list-style-type: none"> Decrease the load. Reconsider the operating condition such as acceleration time and deceleration time. 	
20h	7	Overcurrent	Excessive current was flown through the driver due to ground fault, etc.	Check that no damage is given to the wiring between the driver and motor, and turn on the power again.	Not possible

Alarm code	Number of times ALARM LED blinks	Alarm type	Cause	Remedial action	Reset using the ALARM-RESET input
41h	8	EEPROM error	<ul style="list-style-type: none"> Stored data was damaged. Data became no longer writable or readable. 	Initialize the parameters using the MEXE02, OPX-2A , or RS-485 communication, and then turn on the power supply again.	Not possible
21h	9	Main circuit overheat	The temperature inside the driver exceeded the main circuit overheat level.	Reconsider the ventilation condition in the enclosure.	Possible
6Eh	10	External stop *1	The EXT-ERROR input was turned OFF.	Check the EXT-ERROR input.	Possible
46h	11	Prevention of operation at power-on *2	The main power supply was turned on when the FWD input or REV input was being ON. ※ When the "3-wire input mode" was set with the "Operation input mode selection" parameter, the main power supply was turned on in a state where the START/STOP input and RUN/BRAKE input were being ON.	Turn the FWD input and REV input OFF, and turn on the main power supply again. ※ When the "3-wire input mode" was set with the "Operation input mode selection" parameter, turn either the START/STOP input or RUN/BRAKE input OFF before turning on the main power supply again.	
81h	12	Network bus error	The bus of host network of the network converter was in a disconnection state while the motor was operated.	Check the connector and cable of the host network.	
83h		Communication switch setting error	No.4 of the communication function switch (SW2) was turned ON.	Turn No.4 of the communication function switch (SW2) OFF, and turn on the power again.	
84h		RS-485 communication error	The number of consecutive RS-485 communication errors reached the set value in the "Communication error alarm" parameter.	<ul style="list-style-type: none"> Check the connection between the driver and programmable controller. Check the setting of RS-485 communication. 	
85h		RS-485 communication timeout	The time set in the "Communication timeout" parameter has elapsed, and yet the communication could not be established with the programmable controller.	Check the connection between the driver and programmable controller.	
8Eh		Network converter error	An alarm was generated in the network converter.	Check the alarm code of the network converter.	
2Dh	14	Main circuit output error *3	<ul style="list-style-type: none"> The motor power line was disconnected or the motor power connector came off. When the operation input signal was switched instantaneously, the motor could not follow and continued a state of not rotating. 	<ul style="list-style-type: none"> Check the connection between the driver and motor. Check the motor has rotated before switching the operation command. 	Possible

*1 This alarm is generated when the EXT-ERROR is assigned to the X0 to X5 inputs.

*2 This alarm is generated when the "Prevention of operation at power-on alarm function" parameter is set to "Enable."

*3 This alarm is not generated when the torque limiting value is set to less than 200%.

■ Alarm reset

Before resetting an alarm by performing one of the reset operations specified below, be sure to remove the cause of the alarm and turn the FWD and REV input signals OFF to ensure safety. Refer to the USER MANUAL (Basic Function) for the timing chart.

- Turn the ALARM-RESET input ON (keep it ON for 10 ms or more) and then OFF.
- Execute the reset alarm by the maintenance command.
- Execute an alarm reset using the **MEXE02** or **OPX-2A**.
- Cycle the main power. Also, cycle the control power supply when connecting it.



- Some alarms cannot be reset with the ALARM-RESET input, **MEXE02, OPX-2A** or maintenance command. Check with the alarm list. To reset these alarms, cycle the driver power.
- In the case of resetting an alarm via RS-485 communication, if the reset alarm is executed in a state where the FWD input or REV input is being ON, it is dangerous because the motor will start rotating after the alarm is reset. Be sure to turn both the FWD input and REV input OFF before resetting the alarm.

■ Alarm history

Up to 10 generated alarms are saved in the non-volatile memory in order of the latest to oldest. The alarm history saved in the non-volatile memory can be read and cleared when any of the following items is performed.

- Read the alarm history with the monitor command.
- Clear the alarm history with the maintenance command.
- Read and clear the alarm history using the **MEXE02** or **OPX-2A**.

5.2 Warnings

If a warning is generated, the WNG output is turned ON. The motor will continue to operate. Once the cause of the warning is removed, the WNG output will turn OFF automatically.

■ Warning list

Code	Warning type	Cause	Remedial action
21h	Main circuit overheat	The temperature inside the driver exceeded the overheat warning level.	Reconsider the ventilation condition in the enclosure.
25h	Undervoltage *	The main power supply voltage dropped by approximately 10% or more from the rated voltage.	<ul style="list-style-type: none"> • Check the input voltage of the main power supply. • Check the wiring of the power supply cable.
30h	Overload *	The load torque of the motor exceeded the overload warning level.	<ul style="list-style-type: none"> • Decrease the load. • Reconsider the operating condition such as acceleration time and deceleration time.
6Ch	Operation prohibited	<ul style="list-style-type: none"> • When moved from the test mode to other mode using the MEXE02 or OPX-2A, the FWD input or REV input was being ON. ※ When the "3-wire input mode" was set with the "Operation input mode selection" parameter, the START/STOP input and RUN/BRAKE input was being ON. • When the assignment of the input terminal was changed using the MEXE02, OPX-2A, or RS-485 communication, the assigned terminal was being ON. 	Turn the input signal OFF.
84h	RS-485 communication error	A RS-485 communication error was detected.	<ul style="list-style-type: none"> • Check the connection between the driver and programmable controller. • Check the setting of RS-485 communication.

* The detection level can be changed using the **MEXE02** or **OPX-2A**.

■ Warning history

Up to 10 generated warnings are saved in the RAM in order of the latest to oldest. The warning history saved in the RAM can be read and cleared when any of the following items is performed.

- Read the warning history with the monitor command.
- Clear the warning history with the maintenance command.
- Read and clear the warning history using the **MEXE02** or **OPX-2A**.

Note The warning history is cleared when the driver power is turned off.

5.3 Communication errors

Up to 10 communication errors are saved in the RAM in order of the latest to the oldest. They can be checked via RS-485 communication.

■ Communication error list

Code	Type of communication error	Cause	Remedial action
84h	RS-485 communication error	One of the following errors was detected. · Framing error · BCC error	<ul style="list-style-type: none"> • Check the connection between the driver and programmable controller. • Check the setting of RS-485 communication.
88h	Command not yet defined	The command requested by the master could not be executed because of being undefined.	<ul style="list-style-type: none"> • Check the setting value for the command. • Check the flame configuration.
89h	User I/F communication in progress	The command requested by the master could not be executed since the MEXE02 or OPX-2A was communicating with the driver.	Wait until the processing for the MEXE02 or OPX-2A will be completed.
8Ah	Non-volatile memory processing in progress	The command could not be executed because the driver was under the non-volatile memory processing. · Internal processing was in progress. (S-BSY is ON.) · An EEPROM error alarm was present.	<ul style="list-style-type: none"> • Wait until the internal processing will be completed. • When the EEPROM error was generated, initialize all parameters using any of the MEXE02, OPX-2A or RS-485 communication.
8Ch	Outside setting range	The setting data requested by the master could not be executed due to out of range.	Check the setting data.
8Dh	Command execute disable	When the command is unable to execute, it was tried to execute.	Check the driver status.

■ Communication error history

Up to 10 communication errors are saved in the RAM in order of the latest to oldest. The communication error history saved in the RAM can be read and cleared when any of the following items is performed.

- Read the communication error history with the monitor command.
- Clear the communication error history with the maintenance command.
- Read and clear the communication error history using the **MEXE02**.

Note The communication error history is cleared when the driver power is turned off.

6 Related products (sold separately)

■ Network converter

NETC01-CC (CC-Link compatible)

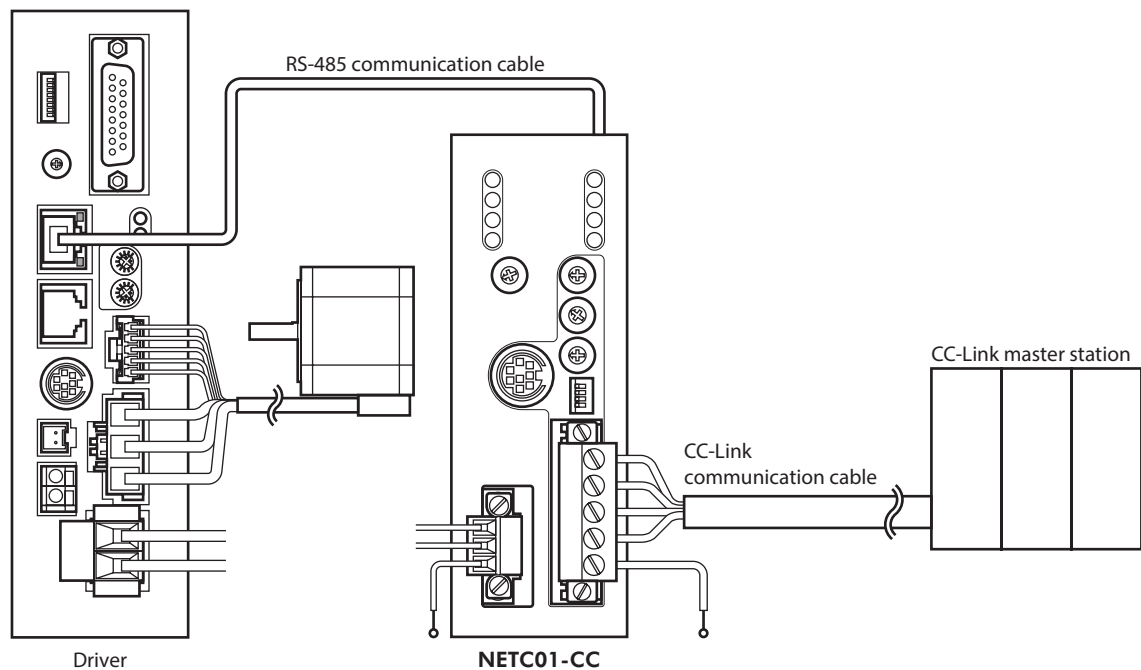
NETC01-M2 (MECHATROLINK-Ⅱ compatible)

NETC01-M3 (MECHATROLINK-Ⅲ compatible)

NETC01-ECT (EtherCAT compatible)

If the **BLV** Series is connected via the network converter when the **BLV** Series is used in a CC-Link system, MECHATROLINK system, or EtherCAT system, data can be sent to the driver by converting from each communication protocol to the RS-485 communication protocol. Alarms and other data output from the driver can also be sent to the master station by converting from the RS-485 communication protocol to each communication protocol.

Example: Connecting to the network converter NETC01-CC



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