Oriental motor

Data setter OPX-2A
For the **BLV** Series

OPERATING MANUAL

Thank you for purchasing an Oriental Motor product.
This Operating Manual describes product handling procedures and safety precautions.
• Please read it thoroughly to ensure safe operation.
• Always keep the manual where it is readily available.

Table of contents

1 Safety precautions

The precautions described below are intended to prevent danger or injury to the user and other personnel through safe, correct use of the product. Use the product only after carefully reading and fully understanding these instructions.

Also read the "Safety precautions" sections in the USER MANUAL that came with the product you are combining with the **OPX-2A**.

⚠ **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.

⚠ WARNING

General

- 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.
- 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 or injury.
- When the driver's protective function is triggered, first remove the cause and then clear the protective function. Continuing the operation without removing the cause of the problem may cause malfunction of the motor and driver, leading to injury or damage to equipment.

Repair, disassembly and modification

- Do not disassemble or modify the data setter. This may cause electric shock or injury. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.

⚠ CAUTION

General

- Do not use the motor, gearhead and driver in conditions exceeding the specifications. Doing so may result in electric shock, injury or damage to equipment.

Operation

- Provide an emergency stop device or emergency stop circuit so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.

Disposal

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

2 Introduction

Only qualified personnel should work with the product.

Use the product correctly after thoroughly reading the section "1 Safety precautions" on page.3.

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

■ Overview of the product

The **OPX-2A** is a data setter that lets you set operation data and parameters, perform monitoring, etc.

Use the **OPX-2A** properly and safely after thoroughly reading the "**BLV** Series USER MANUAL" and understanding the basic operating procedures and other details.

■ Features of OPX-2A

The **OPX-2A** can be used to save data in addition to setting of operation data and parameters.

There are four destinations (data banks) to save data.
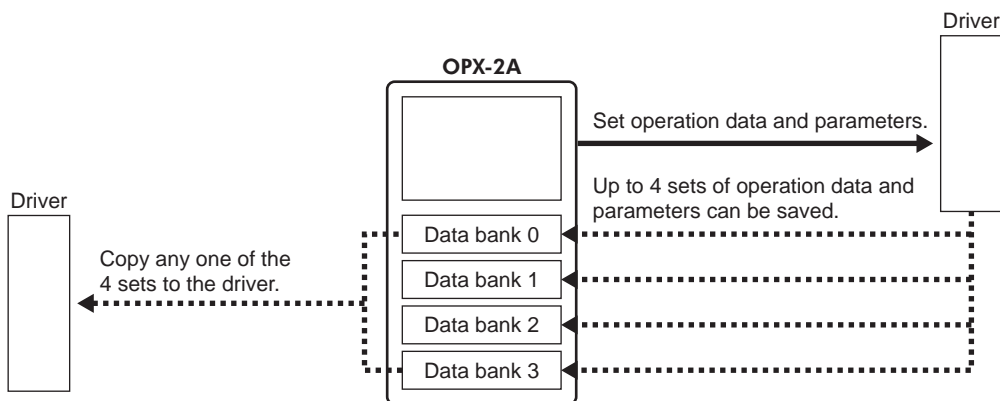
The **OPX-2A** can be used for the following purposes:

- Operation data and parameters of the driver can be set.
- The operating status of the motor can be monitored.
- Operation data and parameters set in the driver can be saved to the **OPX-2A**.
- Operation data and parameters saved in the **OPX-2A** can be copied to other drivers.

■ Specifications

Connection	Mini DIN, 8 pins
External dimensions	96 (W)×72 (H)×21.5 (D) mm [3.78 (W)×2.83 (H)×0.85 (D) in.]
Cable length	5 m (16.4 ft.)
Mass	0.25 kg (8.8 oz)

■ RoHS Directive

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

3 Preparation

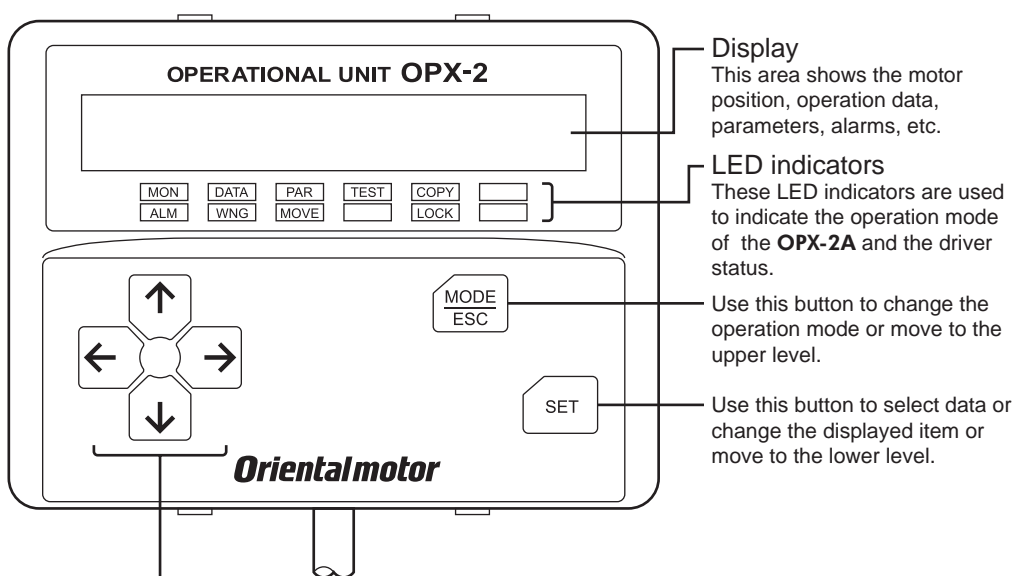This chapter explains the items you should know before using the **OPX-2A**.

3.1 Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the branch or sales office from which you purchased the product.

- Data setter **OPX-2A**.................................. 1 unit
- Information.. 1 copy

3.2 Names and functions of parts

OPERATIONAL UNIT OPX-2

| MON | DATA | PAR | TEST | COPY |
| ALM | WNG | MOVE | | LOCK |

Display
This area shows the motor position, operation data, parameters, alarms, etc.

LED indicators
These LED indicators are used to indicate the operation mode of the **OPX-2A** and the driver status.

Use this button to change the operation mode or move to the upper level.

Use this button to select data or change the displayed item or move to the lower level.

MODE/ESC

SET

Orientalmotor

Use these buttons to change the selected item or set data and parameters.

Use these buttons to increase or decrease the value or change the selected item.

Use these buttons to navigate through each data or parameter to a desired digit.

■ Notation

In this manual, keys are denoted by symbols, such as 【$\frac{MODE}{ESC}$】【SET】【↑】【↓】【←】【→】.
In figures, a simplified illustration of the display and LED indicators is used, as shown below.

3.3 How to read the display

The display consists of 7-segment LEDs. (The number "5" and alphabet "S" are the same.)

• Numbers

1	*1*	2	*2*	3	*3*	4	*4*	5	*5*	6	*6*	7	*7*	8	*8*	9	*9*	0	*0*

• Alphabets

A	*A*	B	*b*	C	*c*	D	*d*	E	*E*	F	*F*	G	*G*	H	*H*	I	*i*	J	*J*
K	*K*	L	*L*	M	*m*	N	*n*	O	*o*	P	*P*	Q	*q*	R	*r*	S	*5*	T	*t*
U	*U*	V	*u*	W	*Y*	Y	*Y*												

• Signs

+	*+*	-	*-*

3.4 How to read the LED indicators

When the operation mode is changed or an alarm or warning generates, a corresponding LED will be lit. While the motor is operating or the edit lock function is enabled, the condition is also indicated by the illumination of a corresponding LED.

Lit in the monitor mode — MON
Lit in the data mode — DATA
Lit in the parameter mode — PAR
Lit in the test mode — TEST
Lit in the copy mode — COPY
Not used

ALM — Lit while an alarm is present
WNG — Lit while a warning is present
MOVE — Lit while the motor is operating
LOCK — Lit while the edit lock function is enabled
Not used
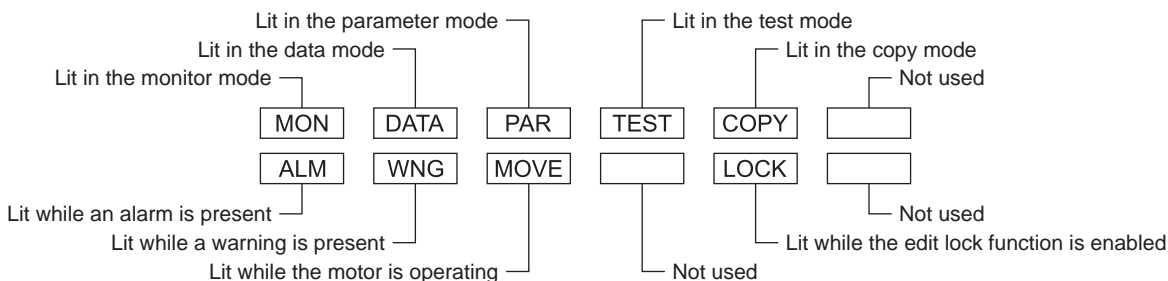
3.5 Types of operation modes

The **OPX-2A** has multiple operation modes. The operation mode will change every time the 【 MODE / ESC 】 key is pressed.

The display starts in the monitor mode when the power is turned on.

When the operation mode is changed, the LED indicator corresponding to the previous mode will turn off and the one corresponding to the new mode will be lit. Identify the present operation mode based on the LED indicator currently lit.

Monitor mode (MON)
Copy mode (COPY)
Data mode (DATA)
Test mode (TEST)
Parameter mode (PAR)

MODE/ESC The mode changes every time the key is pressed.
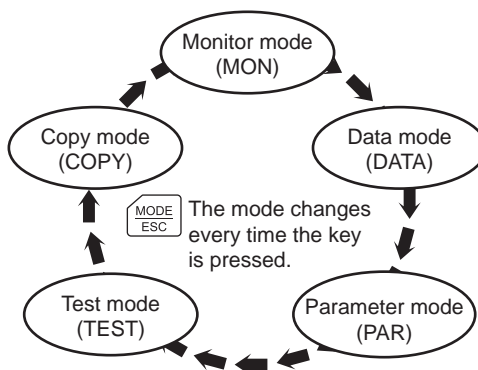
3.6 Basic operations of the OPX-2A

Use the six keys 【$\frac{MODE}{ESC}$】【SET】【↑】【↓】【←】【→】 to set data and operate the motor.

■ Operation flow

The **OPX-2A** is operated according to the flow shown below.

Level 1: Top screen in each mode   Level 2: Item selection screen   Level 3
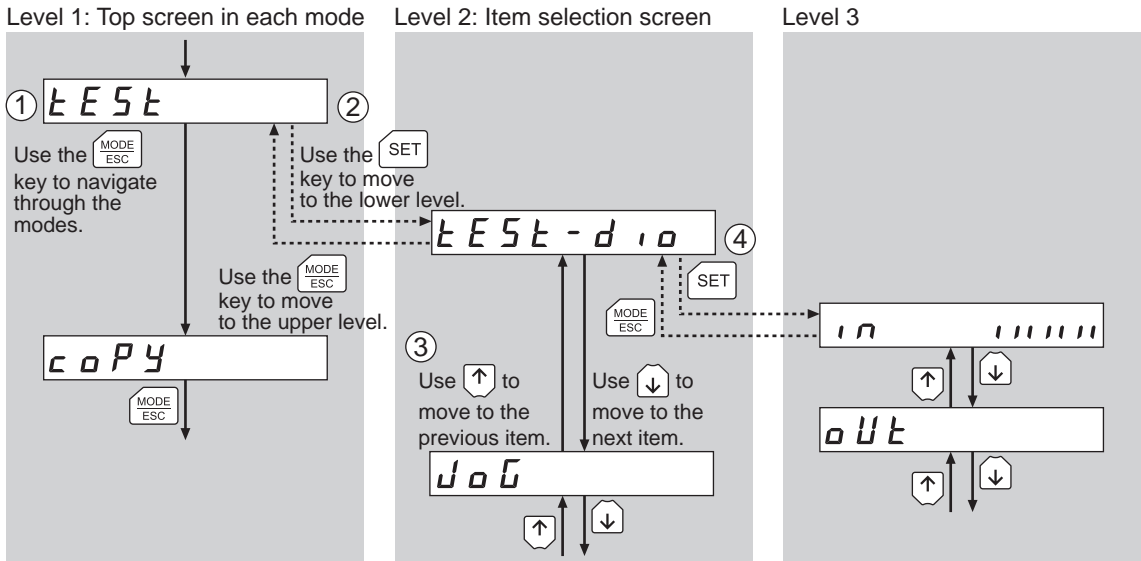
1. Use the 【$\frac{MODE}{ESC}$】 key to select a desired operation mode appropriate for your intended operation.

   Example: If you want to use a function in the test mode, press the 【$\frac{MODE}{ESC}$】 key to select the test mode (indicated by a lit "TEST" LED).

   The top screen of the test mode is displayed.

2. Press the 【SET】 key to move to the lower level.

3. Use the 【↑】【↓】 keys to select a desired item.

4. To move to the lower level, press the 【SET】 key. To return to the previous level, press the 【$\frac{MODE}{ESC}$】 key.

As explained above, use the 【SET】 key to navigate through the levels and use the 【↑】【↓】 keys to select a desired item. This is the basic operation flow.

| Note | If the 【SET】 key is pressed while the driver performs the internal processing, the screen cannot change to any lower level from the top screen, and "mEm-bUSY" is displayed. Be sure to wait until all internal processing is completed, before pressing the 【SET】 key. |

■ How to input values

As an example, how to change the rotation speed from "80" r/min to "1000" r/min is explained.

Basic operations

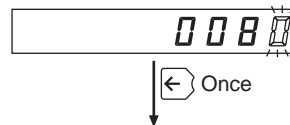- Use the【↑】【↓】keys to increase/decrease the value or change the sign. Use the【←】【→】keys to move to the digit you want to edit.
- If positive and negative values are differentiated, each value is preceded by a sign.
- The digit currently blinking can be edited.

1. First, change the 10's place from "8" to "0."
   Press the【←】key once to move to the 10's digit you want to edit.

   `0 0 8 0`
   ← Once

2. Press the【↑】key twice to change the value to "0."

   `0 0 8 0`
   ↑ Twice
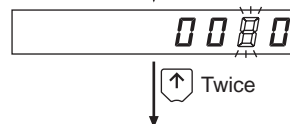
3. Next, change the 1000's place from "0" to "1."
   Press the【←】key twice to move to the 1000's digit you want to edit.

   `0 0 8 0`
   ← Twice
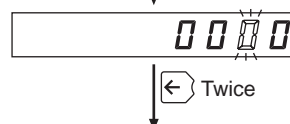
4. Press the【↑】key once to change the value to "1."

   `0 0 0 0`
   ↑ Once
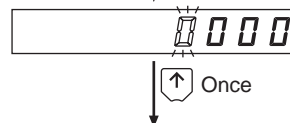
5. After all digits have been changed, press the【SET】key to determine the value.
   All digits comprising the value blink for approximately 2 seconds.
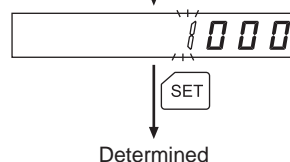
   `1 0 0 0`
   SET

   Determined

Note If the value you have input is outside the setting range, "Error" will be displayed for 1 second. If this error display appears, input a different value that falls within the setting range.

3.7 Edit lock function

Enable the edit lock function if you want to prevent operation data and parameters from being edited or cleared.
Operation data and parameters cannot be changed or deleted while the edit lock function is enabled.

- Setting the edit lock function

Press the【$\frac{MODE}{ESC}$】key for at least 5 seconds on the top screen in each mode.
The display will show "LocK" and the edit lock function will be enabled.
The "LOCK" LED in the LED indicator area will also be lit.
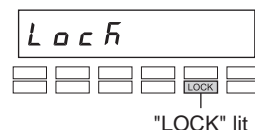
`L o c K`
LOCK
"LOCK" lit

- Canceling the edit lock function

Again, press the【$\frac{MODE}{ESC}$】key for at least 5 seconds on the top screen in each mode.
The display will show "UnLocK" and the edit lock function will be cancelled.
The "LOCK" LED in the LED indicator area will turn off.

`U n L o c K`
LOCK

3.8 Rewriting the driver's non-volatile memory

Operation data and parameters are saved to the driver's non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times. The non-volatile memory will be rewritten after one of the following operations is performed:

- Edit any operation data or parameter
- Download data from the **OPX-2A** to the driver
- Initialize driver operation data and parameters

4 Installation and connection of the OPX-2A

4.1 Location for installation

The **OPX-2A** is designed and manufactured to be incorporated in equipment.

Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature 0 to +40 °C (+32 to +104 °F) (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- 1000 m (3300 ft.) or less above sea level

4.2 Installation method

Using a metal plate of 1 to 3 mm (0.04 to 0.12 in.) in thickness, insert the **OPX-2A** into the mounting hole from the front side and securely attach it.

• Dimension of mounting hole [mm (in.)]

$92 {}^{+0.8}_{0}$ ($3.62 {}^{+0.031}_{0}$)

$68 {}^{+0.7}_{0}$ ($2.68 {}^{+0.028}_{0}$)
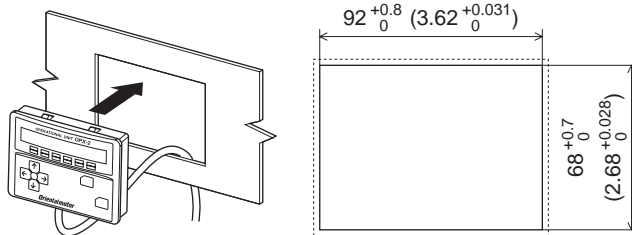
Removing method

Press all of the four hooks provided on top and bottom of the **OPX-2A**.

In this condition, press the **OPX-2A** forward to release.

Hook
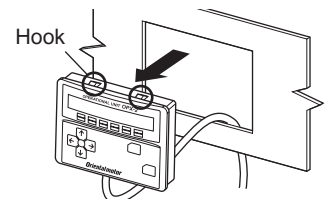
4.3 Connecting to the driver

Plug the connector attached to the end of the **OPX-2A** cable into the communication connector (CN7) on the driver, and then turn on the power to the driver.

Communication
connector
(CN7)
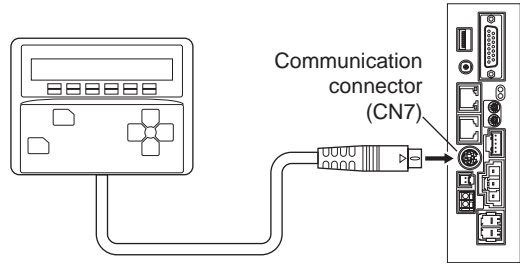
Note	• When operation data and parameters are set on the **OPX-2A**, they will be stored in the driver. Once stored in the driver, the data will not be cleared even after the **OPX-2A** is disconnected from the driver.
	• Turning on the power to the driver will also turn on the power to the **OPX-2A**. Turning off the driver power will turn off the **OPX-2A** power.
	• Turn off the driver power before connecting or disconnecting the **OPX-2A** cable.

4.4 Error display on OPX-2A screen

The following error message is displayed on the **OPX-2A** screen.

Error display	Description	Remedial action
ｈ ｉ ｎ Ｅ ｏ Ｕ ｈ ｌ. ｌ.	A communication error occurred between the **OPX-2A** and driver.	• Check if the **OPX-2A** is connected securely. • Check if the **OPX-2A** cable is disconnected or damaged. • The **OPX-2A** or the communication part of the driver may have damaged. Contact your nearest Oriental Motor sales office.

5 Screen transitions

Top screen

Monitor mode [MODE ESC]

`ñ o n`

Operation speed

`r E u        0`

Conveyor transfer speed

`u        0`

Load factor

`t r 9        0`

Operation data number

`o P E - n`

Present alarm

`A L`

Alarm record 1 (latest)

`A L - 1`

Alarm record 10 (oldest)

`A L - 10`

Clear alarm records

`A L r E c - c L r` ---> Processing is in progress (blinking display)

Alarm reset

`A L - r 5 t` ---> Processing is in progress (blinking display)

Present warning

`ʸ n G`

Warning record 1 (latest)

`ʸ n G - 1`

Warning record 10 (oldest)

`ʸ n G - 10`

Clear warning records

`ʸ n G - c L r` ---> Processing is in progress (blinking display)

I/O monitor

`d i o`

Operation speed

Input monitor

`i n        ıı ıı ıı`

Output monitor

`o U t        ıı`

Voltage monitor of external speed setting

`u i n        5.0`

⟷ : [↑] [↓] Use these buttons to move.

⟵······ : [SET] Use this button to move or execute.

In the lower level except the top screen, press the [MODE ESC] key to return to the previous level.

| Note | • The following limitations are present while the edit lock function is enabled.
· Data mode, parameter mode: These are displayed in the screen but cannot be operated.
· Clearing of the alarm and warning records, copy mode: These are not displayed in the screen.
• When the HMI input is in an OFF state, all functions of the test mode cannot executed.
Downloading and initializing are also disabled. |

When internal processing is in progress, data writing cannot be executed via RS-485 communication.
"mEm-bUSy" is displayed even when the SET key is pressed.

Data mode

Parameter mode

`P A r`

MODE ESC

Test mode

`t E S t`

MODE ESC

Parameter selection
(Example: speed increasing ratio)

`i d    2 0 8 7`

Parameter setting

`1`

Writing of data
is in progress
(blinking display)

Enter the parameter ID and press
`SET` key, then move to the setting
screen for each parameter.

I/O test

`t E S t - d i o`

Input test

`i n      i i i i i`

Output test

`o U t`

Output test

`o U t      - -`

Voltage test of
external speed setting

`u  i n      5.0`

JOG operation

`J o G`

Operation is in progress

`-  1 0 0 0`

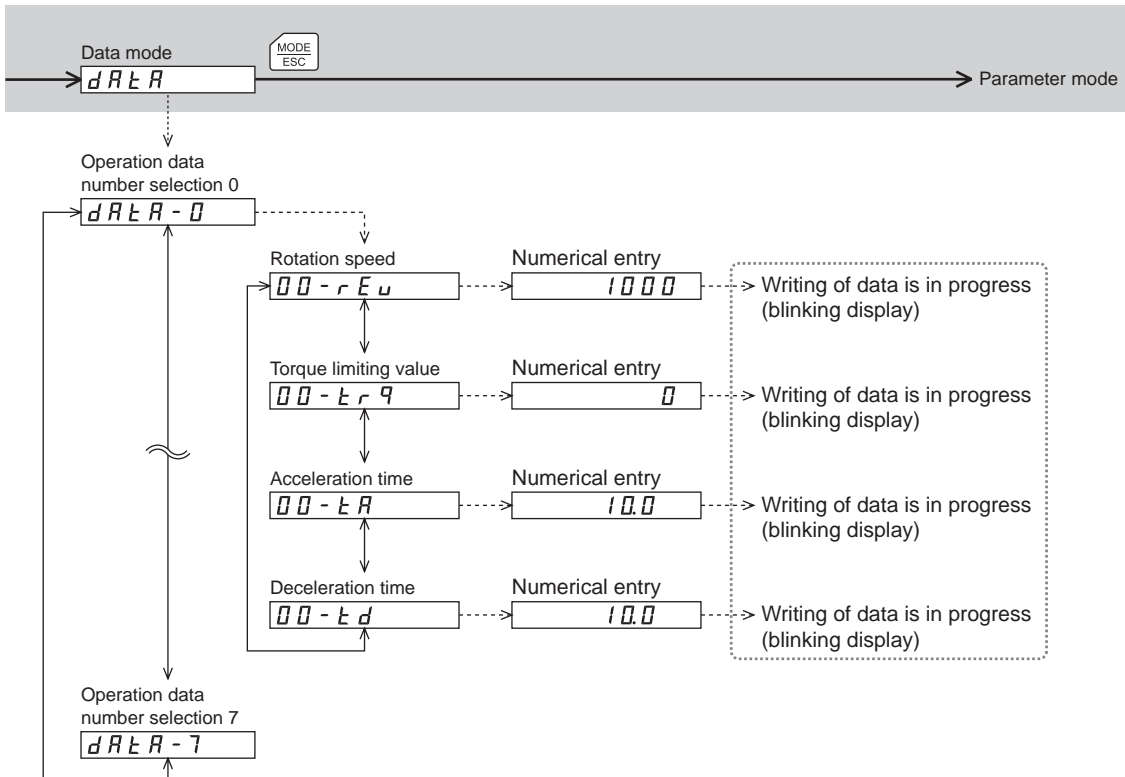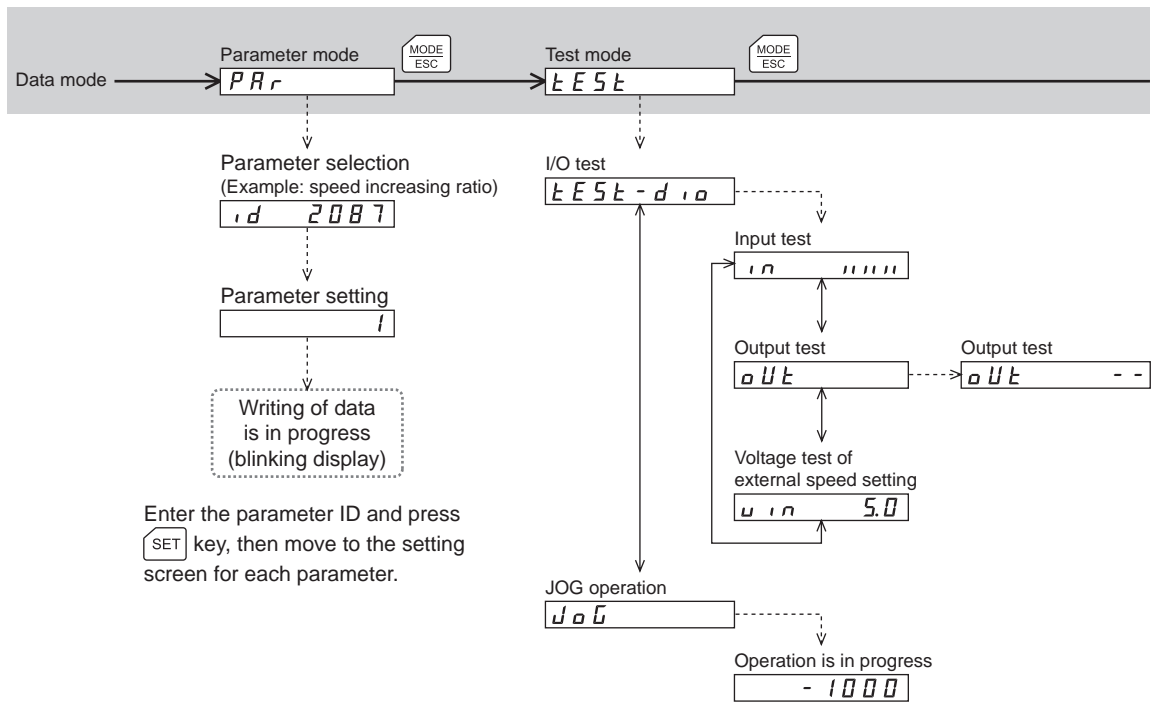
⟷ : ↑ ↓ Use these buttons to move.

⟵···· : `SET` Use this button to move or execute.

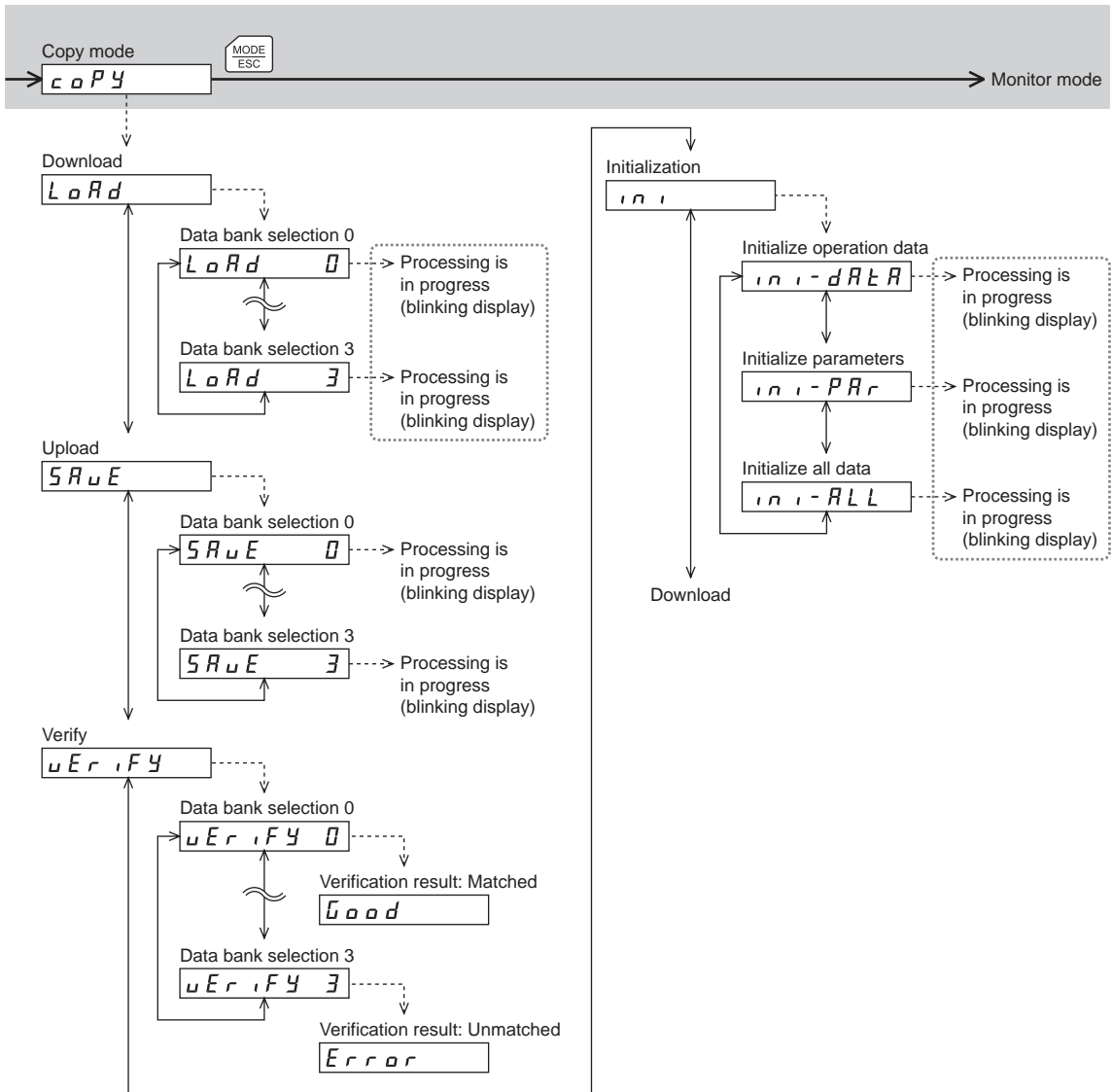In the lower level except the top screen, press the `MODE ESC` key to return to the previous level.

Copy mode
MODE
ESC
`c o P Y` → Monitor mode

Download
`L o A d`

Data bank selection 0
`L o A d      0` ---> Processing is in progress (blinking display)

Data bank selection 3
`L o A d      3` ---> Processing is in progress (blinking display)

Upload
`S A u E`

Data bank selection 0
`S A u E      0` ---> Processing is in progress (blinking display)

Data bank selection 3
`S A u E      3` ---> Processing is in progress (blinking display)

Verify
`u E r i F Y`

Data bank selection 0
`u E r i F Y  0`

Verification result: Matched
`G o o d`

Data bank selection 3
`u E r i F Y  3`

Verification result: Unmatched
`E r r o r`

Initialization
`i n i`

Initialize operation data
`i n i - d A t A` ---> Processing is in progress (blinking display)

Initialize parameters
`i n i - P A r` ---> Processing is in progress (blinking display)

Initialize all data
`i n i - A L L` ---> Processing is in progress (blinking display)

Download

When internal processing is in progress, data writing cannot be executed via RS-485 communication.
"mEm-bUSy" is displayed even when the [SET] key is pressed.

6   Monitor mode

6.1   Overview of the monitor mode

- Monitoring the operating status

  You can monitor the motor operation speed, conveyor transfer speed, load factor and operation data number corresponding to the current operation.

- Checking alarms/warnings, clearing alarm/warning records, and resetting alarms
  - If an alarm or warning generates, a corresponding alarm code or warning code will be displayed. You can check the code to identify the details of the alarm/warning.
  - Up to the ten most recent alarms/warnings can be displayed, starting from the latest one.
  - You can reset the alarms currently present.
  - You can clear alarm/warning records.

- Checking I/O signals

  You can check the ON/OFF status of each I/O signal of the driver.

6.2   Monitored items

■ Operation speed (unit: r/min)

You can check the rotation speed of the motor.

While the motor is rotating in the counter clockwise direction (CCW), "−" is shown in front of the displayed value.

This speed can also be displayed as the absolute value. To display the rotation speed as absolute value, change the setting of the data-setter speed display parameter [ID: 480].

You can also display the rotation speed of the motor as the rotation speed of the gear output shaft. To do this, set the speed reduction ratio parameter [ID: 2085] and speed reduction ratio decimal digit setting parameter [ID: 2086].

It is also possible to increase the rotation speed and display the increased speed. For this, set the speed increasing ratio parameter [ID: 2087].

■ Conveyor transfer speed (unit: m/min)

You can check the conveyor transfer speed.

Set the conveyor speed reduction ratio parameter [ID: 2088] and conveyor speed reduction ratio decimal digit setting parameter [ID: 2089]. It is also possible to increase the rotation speed and display the increased speed. For this, set the conveyor speed increasing ratio parameter [ID: 2090].

■ Load factor (unit: %)

You can check the generated torque of the motor. The current load factor is monitored based on the rated torque being 100%.

■ Operation data number

You can check the operation data number corresponding to the current operation.

■ Present alarm

When an alarm generates, the alarm code is displayed.

You can also reset alarms or check and clear alarm records.

Note	• Do not turn off the driver power while an alarm is being reset or alarm records are being cleared (= while the display is blinking). Doing so may damage the data.
	• When operations are limited by the edit lock function, the alarm records cannot be cleared.
	• Some alarms cannot be reset by the **OPX-2A**. For details, refer to the table below. To reset these alarms, you must cycle the driver power.

Alarm code list

Code	Alarm name	Resetting on the **OPX-2A**	Number of driver's ALARM LED blinks
20	Overcurrent	Not possible	7
21	Main circuit overheat	Possible	9
22	Overvoltage		4
25	Undervoltage		5
28	Sensor error		3
2D	Main circuit output error		14
30	Overload		2
31	Overspeed		6
41	EEPROM error	Not possible	8
42	Sensor error during initialization	Possible	3
46	Initial operation error		11
6E	External stop		10
81	Network bus error		12
83	Communication switches setting error	Not possible	
84	RS-485 communication error	Possible	
85	RS-485 communication timeout		
8E	Network converter error		

■ Present warning

When a warning generates, the warning code is displayed.

You can also check or clear warning records.

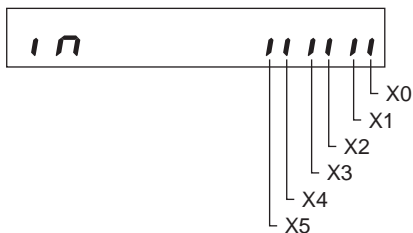| Note	• Do not turn off the driver power while warning records are being cleared (= while the display is blinking). Doing so may damage the data.
	• When operations are limited by the edit lock function, the warning records cannot be cleared.
	• You can also clear warning records by cycling the driver power.

Warning code list

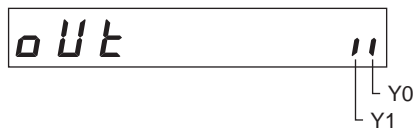| Code	Warning name
21	Main circuit overheat
25	Undervoltage
30	Overload
6C	Operation error
84	RS-485 communication error

■ I/O monitor

You can check the ON/OFF status of each I/O signal of the driver.

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

● Input monitor

```
 ı ∩                ı ı  ı ı ı
                          └ X0
                         └ X1
                        └ X2
                       └ X3
                      └ X4
                     └ X5
```

● Output monitor

```
 o U ᴵ                      ı ı
                            └ Y0
                            └ Y1
```

● Voltage monitor of external speed setting [V]

```
 u  ı ∩              5. □
```

When setting the speed by means of an external DC voltage, you can monitor whether voltage is input. If 10 VDC is selected, a value corresponding to one half the input voltage is displayed.

7 Data mode

Up to eight sets of operation data can be set. Once set, the operation data is stored in the driver. The data will not be lost even after the **OPX-2A** is disconnected from the driver.

Before setting operation data, read the USER MANUAL carefully to understand the basic operations, functions and other details of the driver.

| Note | • Operation data have significant bearing on motor operation. Before setting any operation data, make sure you fully understand the content of the data.
• If operations are limited by the edit lock function, the operation data cannot be edited.
• Operation data can also be set by selecting the ID with the parameter mode.
• If【SET】key is pressed while executing the internal processing via RS-485 communication, "mEm-bUSy" may be displayed. Check "5 Screen transitions" on p.12 when "mEm-bUSy" is displayed. Be sure to wait until all internal processing is completed, before pressing the【SET】key. |

7.1 Setting items

Item	Initial value	Setting range	Description	Setting unit
Rotation speed	0	0 r/min, and 80 to 4000 r/min	Set the rotation speed.	1
Torque limiting value*1	200	0 to 200%	Set when limiting the operation torque.	1
Acceleration time*2	0.5	0.2 to 15.0 s	Set the acceleration time over which to reach the target speed.	0.1
Deceleration time*2	0.5	0.2 to 15.0 s	Set the deceleration time over which to reach the target speed.	0.1

*1 The initial value is motor starting torque. The rated torque being 100%.
*2 This is the case when being set digitally by the **OPX-2A**. If any analog setting mode (internal potentiometer, external potentiometer or external DC voltage) is selected, the time over which to reach the rated rotation speed (3000 r/min) is indicated. The actual acceleration time and deceleration time vary depending on the conditions of use, load inertia, load torque and other settings specified by the customer.

| Note | If the value you have input is outside the setting range, "Error" will be displayed for 1 second. If this error display appears, input a different value that falls within the setting range. |

7.2 Initializing operation data

You can revert operation data saved in the driver to their initial values.

For details, refer to "10.5 Initializing driver data" on p.36.

8 Parameter mode

You can set parameters relating to motor operation and control. These parameters are saved in the driver. Before setting operation data, read the USER MANUAL carefully to understand the basic operations, functions and other details of the driver.

| Note | • Parameters have significant bearing on motor operation. Before setting any parameter, make sure you fully understand the content of the parameter.
- If operations are limited by the edit lock function, the parameters cannot be edited.
- If【SET】key is pressed while executing the internal processing via RS-485 communication, "mEm-bUSy" may be displayed. Check "5 Screen transitions" on p.12 when "mEm-bUSy" is displayed. Be sure to wait until all internal processing is completed, before pressing the【SET】key.
- If the value you have input is outside the setting range, "Error" will be displayed for 1 second. If this error display appears, input a different value that falls within the setting range.

8.1 Parameter ID

There is an unique ID in each parameter. With the **OPX-2A**, set the parameter selecting the ID.

■ Timing for the setting value to become effective

When a parameter is changed, the timing for the new value to become effective varies depending on the parameters, which are the following three types.

- Effective immediately
  Executes the recalculation and setup immediately when writing the parameter.
- Effective after stopping the operation
  Executes the recalculation and setup after stopping the operation.
- Effective after turning the power ON again
  Executes the recalculation and setup after turning the power ON again.

■ Operation in the parameter mode

1. Use the【$\frac{MODE}{ESC}$】key to select the parameter mode.
   The "PAr" LED is lit.

2. Press the【SET】key in the top screen of the parameter mode.
   The display changes to the application parameter select screen.

3. Use the【↑】【↓】【←】【→】keys to enter the parameter ID, and then press the【SET】key.
   The display changes to the application parameter setting screen.

4. Use the【↑】【↓】【←】【→】keys to enter the setting value, and then press the【SET】key.

Top screen of the parameter mode

```
PAr
```

↑ | SET |

Parameter selection

```
id        0000
```

| MODE ESC | | SET |

Enter the parameter ID
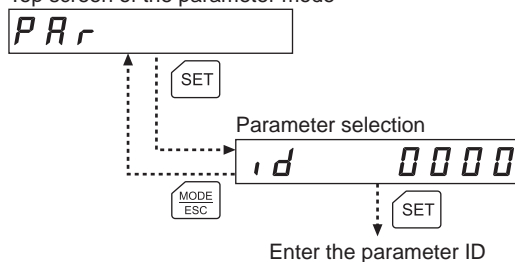
Use ← → to move the digit.

Use ↑ ↓ to change the value.

Check the ID and setting range with the parameter list.

■ Parameters [Operation data]

Operation data can also be set by the parameter mode. Operation data for the motor can be set individually by entering the ID.

- The meaning of the acceleration time/deceleration time is changed by the setting method of the rotation speed.

  One is the time needed to reach the target speed from the current speed when using digital setting (using the **OPX-2A**).

  Another is the time needed to reach the rated rotation speed (3000 r/min) when using analog setting (using the internal potentiometer, external potentiometer or external DC voltage).

  The actual acceleration time and deceleration time vary depending on the conditions of use, load inertia, load torque and other settings specified by the customer.

- The initial setting of the torque limiting value is the motor starting torque. The rated torque being 100%.

ID	Name	Setting range	Setting unit	Initial value	Effective*
576	Rotation speed No.0	0 r/min, and 80 to 4000 r/min	1	0	A
577	Rotation speed No.1				
578	Rotation speed No.2				
579	Rotation speed No.3				
580	Rotation speed No.4				
581	Rotation speed No.5				
582	Rotation speed No.6				
583	Rotation speed No.7				
768	Acceleration time No.0	0.2 to 15 s	0.1	0.5	
769	Acceleration time No.1				
770	Acceleration time No.2				
771	Acceleration time No.3				
772	Acceleration time No.4				
773	Acceleration time No.5				
774	Acceleration time No.6				
775	Acceleration time No.7				
832	Deceleration time No.0	0.2 to 15 s	0.1	0.5	
833	Deceleration time No.1				
834	Deceleration time No.2				
835	Deceleration time No.3				
836	Deceleration time No.4				
837	Deceleration time No.5				
838	Deceleration time No.6				
839	Deceleration time No.7				

* Indicates the timing for the data to become effective
  A: Effective immediately

ID	Name	Setting range	Setting unit	Initial value	Effective∗
896	Torque limiting value No.0				
897	Torque limiting value No.1				
898	Torque limiting value No.2				
899	Torque limiting value No.3	0 to 200%	1	200	A
900	Torque limiting value No.4				
901	Torque limiting value No.5				
902	Torque limiting value No.6				
903	Torque limiting value No.7				

∗ Indicates the timing for the data to become effective
A: Effective immediately

■ Parameters [User parameter]

Parameters for the function and test operation can be set.

ID	Name	Description	Setting range	Setting unit	Initial value	Effective∗
2085	Speed reduction ratio	When entering the gear ratio of the gearhead, the rotation speed of	100 to 9999	1	100	
2086	Speed reduction ratio decimal digit setting	the gearhead output shaft can be displayed. Set the decimal point position for the setting value of the gear ratio by the parameter for speed reduction ratio decimal digit specification.	0: 1 digit 1: 2 digit 2: 3 digit	−	2	
2087	Speed increasing ratio	Set the speed increasing ratio relative to the rotation speed of the motor output shaft. The displays vary depending on the setting value. When setting the speed increasing ratio to 1, the speed reduction ratio will be effective. When setting the speed increasing ratio to other than 1, the speed increasing ratio will be effective.	1 to 5	−	1	A
2088	Conveyor speed reduction ratio	When setting the conveyor speed reduction ratio, the transfer speed of the conveyor can be displayed.	100 to 9999	1	100	
2089	Conveyor speed reduction ratio decimal digit setting		0: 1 digit 1: 2 digit 2: 3 digit	−	2	
2090	Conveyor speed increasing ratio	Set the conveyor speed-increasing ratio relative to the rotation speed of the motor output shaft.	1 to 5	−	1	
450	Motor direction selection	Set the motor direction to be applied when the FWD input is turned ON.	0: CCW 1: CW	−	1	
2080	Operation input mode selection	Operation signals of external input can be switched between 2-wire input mode and 3-wire input mode.	0: 2-wire input mode 1: 3-wire input mode	−	0	C
2161	Analog input signal selection	Setting method of operation data can be changed. Refer to p.25 for details.	0: Mode 0 1: Mode 1 2: Mode 2 3: Mode 3 4: Mode 4 5: Mode 5	−	0	

∗ Indicates the timing for the data to become effective
A: Effective immediately, C: Effective after turning the power ON again

ID	Name	Description	Setting range	Setting unit	Initial value	Effective∗
2215	Rotation speed attainment band	Set the band within which the rotation speed of the motor is deemed to have reached the set value.	0 to 400 r/min	1	200	A
323	JOG operation speed	Set the rotation speed of JOG operation.	0 r/min, and 80 to 1000 r/min	1	300	
2081	JOG operation torque	Set the torque limiting value of JOG operation.	0 to 200%	1	200	

∗ Indicates the timing for the data to become effective
  A: Effective immediately

- How to set the speed reduction ratio

  Set the speed reduction ratio as a combination of the speed reduction ratio parameter [ID: 2085] and speed reduction ratio decimal digit setting parameter [ID: 2086]. The relationships of speed reduction ratio and decimal position are explained by the combinations shown below.

Actual speed reduction ratio	Speed reduction ratio parameter [ID: 2085]	Speed reduction ratio decimal digit setting parameter [ID: 2086]
1.00 to 9.99	100 to 999	2
10.0 to 99.9		1
100 to 999		0
10.00 to 99.99	1000 to 9999	2
100.0 to 999.9		1
1000 to 9999		0

- Display after setting the speed reduction ratio

  - Speed reduction ratio

    Speed reduction ratio 1.00 to 9.99

    | $\mathit{0}\ \mathit{0}\ \mathit{0}\ \mathit{0}$ | r/min

    Speed reduction ratio 10.00 to 99.99

    | $\mathit{0}\ \mathit{0}\ \mathit{0.0}$ | r/min

    Speed reduction ratio 100.0 to 999.9

    | $\mathit{0}\ \mathit{0.0}\ \mathit{0}$ | r/min

    Speed reduction ratio 1000 to 9999

    | $\mathit{0.0}\ \mathit{0}\ \mathit{0}$ | r/min

  - Speed increasing ratio

    Speed increasing ratio 2 to 5
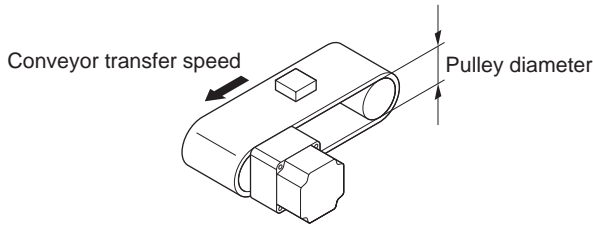
    | $\mathit{0}\ \mathit{0}\ \mathit{0}\ \mathit{0}\ \mathit{0}$ | r/min

- Display the conveyor transfer speed

To display the conveyor transfer speed on **OPX-2A**, set the conveyor speed reduction ratio by using the formula below:

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

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

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

Example:
The pulley diameter is 0.1 m and gear ratio of the gear head is 20

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

From the conversion formula, the conveyor speed reduction ratio is calculated as 63.7 in this example. This means that the conveyor speed reduction ratio parameter [ID: 2088] is 637, while the conveyor speed reduction ratio decimal digit setting parameter [ID: 2089] is 1.
If the speed reduction decimal ratio is 63.7 and rotation speed of the motor is 1300 r/min, the conveyor transfer speed is converted as follows:

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

Accordingly, "20.4" is shown on the **OPX-2A**.

● Operation data setting using analog input signal selection

Setting method of operation data can be changed using the analog input signal selection parameter [ID: 2161]. See a combination of the mode No. and analog setting/digital setting as shown below.

Others except the following combination are not available to 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

| Note | The factory setting of the torque limiting potentiometer (VR3) is set to the maximum value. When selecting modes No.3, No.4 or No.5, check the setting value before operating a motor because the rotation speed and acceleration/deceleration value are set to the maximum value initially. |

■ Parameters [Alarm, warning]

ID	Name	Description	Setting range	Setting unit	Initial value	Effective∗
2132	Undervoltage warning function	Enable/disable the undervoltage warning function.	0: Disable 1: Enable	–	1	A
420	Undervoltage warning level	Set the warning level for the undervoltage of the main power.	0 to 48.0 V	0.1	24 VDC type: 21.6 48 VDC type: 43.2	
2114	Undervoltage alarm latch	Set whether the current to the motor is cut off or not when releasing the undervoltage alarm. When setting to "0: Disable", the motor will rotate automatically. When setting to "1: Enable", the motor will remain at a standstill.	0: Disable 1: Enable	–	0	C
2129	Overload warning function	Enable/disable the overload warning function.	0: Disable 1: Enable	–	1	A
2133	Overload warning level	Set the warning level for the load torque of the motor.	50 to 100%	1	100	
2112	Electromagnetic brake action at alarm	Set the actuated timing of the electromagnetic brake when an alarm is generated. When setting to "0: Lock after coasting to a stop", the electromagnetic brake will actuate and hold the position after the motor coasts to a stop.	0: Lock after coasting to a stop 1: Lock immediately	–	1	C
2113	Operation error during initialization alarm function	Switch enable/disable of the operation error during initialization alarm.	0: Disable 1: Enable	–	0	

∗ Indicates the timing for the data to become effective
　A: Effective immediately, C: Effective after turning the power ON again

■ Parameters [Data setter]

Set the display method of the data setter **OPX-2A**. Check the display description with the monitor mode.

ID	Name	Description	Setting range	Initial value	Effective∗
480	Data setter speed display	Sets the display method of operation speed in the monitor mode. If "0: Signed" is set, "–" will be displayed when rotating in REV input direction.	0: Signed 1: Absolute value	0	A
2160	Data setter initial display	Select the initial screen when the driver power is turned on.	0: Operation speed 1: Conveyor transfer speed 2: Load factor 3: Operation data number 4: Top screen of monitor mode	0	C

∗ Indicates the timing for the data to become effective
　A: Effective immediately, C: Effective after turning the power ON again

■ Parameters [I/O function]

Set the following functions to the I/O signal terminals of the driver.

ID	Name	Setting range	Initial value	Effective∗2
2176	X0 input function selection	0: Not used 1: FWD (START/STOP)∗1	1	B
2177	X1 input function selection	2: REV (RUN/BRAKE)∗1 19: STOP-MODE (FWD/REV)∗1	2	
2178	X2 input function selection	20: MB-FREE 21: EXT-ERROR	19	
2179	X3 input function selection	24: ALARM-RESET	48	
2180	X4 input function selection	27: HMI 48: M0	24	
2181	X5 input function selection	49: M1 50: M2	20	
2208	Y0 output function selection	0: Not used 65: ALARM-OUT1 66: WNG 68: MOVE	65	A
2209	Y1 output function selection	71: TLC 77: VA 81: ALARM-OUT2 84: DIR	66	

∗1 ( ): 3-wire input mode
∗2 Indicates the timing for the data to become effective
   A: Effective immediately, B: Effective after stopping the operation

• I/O signals

Signal name		Description
FWD	2-wire input mode	The motor will rotate in the clockwise direction.
REV		The motor will rotate in the counter clockwise direction.
STOP-MODE		Select either instantaneous stop or deceleration stop.
START/STOP	3-wire input mode	The motor will rotate when turning the signal ON. The motor will decelerate and stop when turning the signal OFF.
RUN/BRAKE		The motor will rotate when turning the signal ON. The motor will stop instantaneously when turning the signal OFF.
FWD/REV		The motor rotation direction can be switched with this signal.
MB-FREE		Select electromagnetic brake operation when the motor stops. (electromagnetic brake type only)
EXT-ERROR		The motor stops when the external error signal is input (normally closed).
ALARM-RESET		Resets the alarm.
HMI		Disable the operation with the **OPX-2A** and use it as a display.
M0		
M1		Select operation data by a combination of ON/OFF statuses of the M0 to M2 inputs.
M2		
ALARM-OUT1		This signal is output when an alarm generates (normally closed).
WNG		This signal is output when a warning generates.
MOVE		This signal is output while the motor is operating.
TLC		This signal is output when the motor output torque reaches the limit value.
VA		This signal is output when the speed difference between the set rotation speed and actual motor rotation speed becomes equal to or less than the value set by the rotation speed attainment band parameter [ID: 2215].
ALARM-OUT2		This signal is output when the overload warning detection level is exceeded.
DIR		This signal is output when the motor rotation direction.

■ Parameters [RS-485 communication]

Parameters for RS-485 communication can be set.

ID	Name	Setting range	Initial value	Effective*2
2304	Communication timeout*1	0: Not monitored 0 to 10000 ms	0	A
2305	Communication error alarm*1	1 to 10 times	3	
2563	Communication parity*1	0: None 1: Even number 2: Odd number	1	
2564	Communication stop bit*1	0: 1 bit 1: 2 bit	0	
2565	Transmission waiting time*1	0.0 to 1000.0 ms	10.0	
2224	NET-IN0 input function selection	0: Not used 1: FWD (START/STOP)*3 2: REV (RUN/BRAKE)*3 19: STOP-MODE (FWD/REV)*3 20: MB-FREE 27: HMI 48: M0 49: M1 50: M2 84: DIR	48: M0	C
2225	NET-IN1 input function selection		49: M1	
2226	NET-IN2 input function selection		50: M2	
2227	NET-IN3 input function selection		1: FWD (START/STOP)	
2228	NET-IN4 input function selection		2: REV (RUN/BRAKE)	
2229	NET-IN5 input function selection		19: STOP-MODE (FWD/REV)	
2230	NET-IN6 input function selection		0: Not used	
2231	NET-IN7 input function selection		20: MB-FREE	
2232	NET-IN8 input function selection		0: Not used	
2233	NET-IN9 input function selection		0: Not used	
2234	NET-IN10 input function selection		0: Not used	
2235	NET-IN11 input function selection		0: Not used	
2236	NET-IN12 input function selection		0: Not used	
2237	NET-IN13 input function selection		0: Not used	
2238	NET-IN14 input function selection		0: Not used	
2239	NET-IN15 input function selection		0: Not used	

*1 Effective in modbus communication
*2 Indicates the timing for the data to become effective
　 A: Effective immediately, C: Effective after turning the power ON again
*3 ( ): 3-wire input mode

ID	Name	Setting range	Initial value	Effective*1
2240	NET-OUT0 output function selection	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	48: M0_R	C
2241	NET-OUT1 output function selection		49: M1_R	
2242	NET-OUT2 output function selection		50: M2_R	
2243	NET-OUT3 output function selection		1: FWD_R (START/STOP_R)	
2244	NET-OUT4 output function selection		2: REV_R (RUN/BRAKE_R)	
2245	NET-OUT5 output function selection		19: STOP-MODE_R (FWD/REV_R)	
2246	NET-OUT6 output function selection		66: WNG	
2247	NET-OUT7 output function selection		65: ALARM-OUT1	
2248	NET-OUT8 output function selection		80: S-BSY	
2249	NET-OUT9 output function selection		0: Not used	
2250	NET-OUT10 output function selection		0: Not used	
2251	NET-OUT11 output function selection		0: Not used	
2252	NET-OUT12 output function selection		81: ALARM-OUT2	
2253	NET-OUT13 output function selection		68: MOVE	
2254	NET-OUT14 output function selection		77: VA	
2255	NET-OUT15 output function selection		71: TLC	

*1 Indicates the timing for the data to become effective
   C: Effective after turning the power ON again
*2 ( ): 3-wire input mode

8.2 Setting example

Pressing the【SET】key in the parameter item screen enables parameter setting.
How a parameter is set is explained below.

Example: Set the speed reduction ratio [ID: 2085] to "50.0"

1. Use the【$\frac{MODE}{ESC}$】key to select the parameter mode.
   The "PAr" LED is lit.

   Top screen of the parameter mode

$P\,A\,r$

   SET

2. Press the【SET】key.
   The display changes to the parameter select screen.

   Parameter selection

$\iota\,d$	$0\,0\,0\,0$

   SET

3. Use the【↑】【↓】【←】【→】keys to enter "2085".

   Parameter selection
   (Speed reduction ratio: 2085)

$\iota\,d$	$2\,0\,8\,5$

   ← → : move the digit.
   ↑ ↓ : change the value.

   SET

4. Press the【SET】key.
   The display changes to the parameter setting screen.

   Parameter setting

$1\,0\,0$

5. Use the【↑】【↓】【←】【→】keys to enter "500".

   Set the speed reduction ratio to "500"

$5\,0\,0$

   ← → : move the digit.
   ↑ ↓ : change the value.

   SET

6. Press the【SET】key again.
   The selected value is set, and the display returns to the parameter select screen.

   Confirm the value (blinking display)

$5\,0\,0$

$\iota\,d$	$2\,0\,8\,5$

   SET

7. Use the【↑】【↓】【←】【→】keys to enter "2086".

   Parameter selection
   (Speed reduction ratio digit setting: 2086)

$\iota\,d$	$2\,0\,8\,6$

   ← → : move the digit.
   ↑ ↓ : change the value.

   SET

8. Press the【SET】key.
   The display changes to the parameter setting screen.

   Parameter setting

2

9. Use the【↑】【↓】【←】【→】keys to enter "1".

   Set the speed reduction ratio digit setting to "1"

1

   ← → : move the digit.
   ↑ ↓ : change the value.

   SET

10. Press the【SET】key again.
    The selected value is set, and the display returns to the parameter select screen.

    Confirm the value (blinking display)

1

    Parameter selection

Note
- If the value you have input is outside the setting range, "Error" will be displayed for 1 second. If this error display appears, input a different value that falls within the setting range.
- If a nonexistent parameter ID is entered, "id-Error" will be displayed for 1 second. Check the ID and enter the correct one.

9 Test mode

9.1 Overview of the test mode

- I/O test

  You can check the ON/OFF status of each input signal of the driver, or switch the ON/OFF status of each output signal on the **OPX-2A**. Perform I/O test to check the connection condition between the driver and host controller.

- JOG operation

  You can operate the motor using the keys on the **OPX-2A**.

Note	- Stop the motor operation before changing to the test mode.

  - The test mode cannot be executed during motor operation. If the【SET】key is pressed in the select screen of each item, the screen will not move to the lower level and "oPE-Err" will be displayed.
  - In the I/O test, if the screen moves to the lower level, all of I/O signals and operation will be disabled.
  - If the【SET】key is pressed while executing the internal processing via RS-485 communication, "mEm-bUSy" may be displayed. Check "5 Screen transitions" on p.12 when "mEm-bUSy" is displayed. Be sure to wait until all internal processing is completed, before pressing the【SET】key.

9.2 I/O test

Perform I/O test to check the connection condition between the driver and host controller.

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

In input test, the LED becomes lit when the signal is ON, and unlit when the signal is OFF.

The output signal can be switched to a ON/OFF status using the【↑】【↓】keys, an "$\square$" is displayed when the output signal is ON, while "–" is displayed when the output signal is OFF.

- Input test

- X0
- X1
- X2
- X3
- X4
- X5

- Output test

- Y0
- Y1
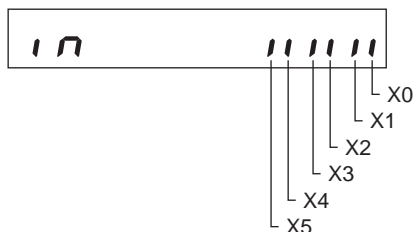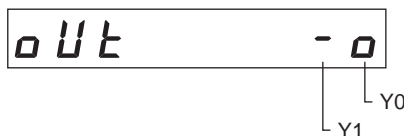
- Voltage test of external speed setting

When setting the speed by means of external DC voltage, you can test whether voltage is input.
If 10 VDC is selected, a value corresponding to one half the input voltage is displayed.

9.3 JOG operation

You can operate the motor using the keys on the **OPX-2A**. The operation speed corresponds to the value set in the JOG operation speed parameter [ID: 323] and the torque corresponds to the value set in the JOG operation torque parameter [ID: 2081].

The next example shows the display that appears when the default rotation speed is set to 300 r/min and the 【↓】 key is pressed to operate the motor in REV direction. When JOG operation is performed, the rotation speed is displayed.

Top screen of JOG operation

```
 ⅃ o �़
```

SET

Operation is in progress

```
 - ⴹ ⏠ ⏠
```

MODE
ESC

↑ Pressing causes the motor to rotate FWD input direction.

↓ Pressing causes the motor to rotate REV input direction.
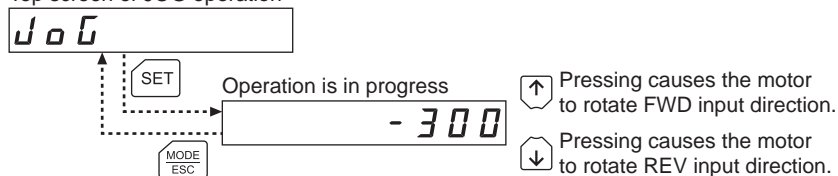
Note During JOG operation, the motor rotates at the specified operation speed while each applicable key is pressed. Before commencing JOG operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.

10 Copy mode

The **OPX-2A** has four data banks, and operation data and parameters can be saved in each of these data banks. Since NV memory is used as the data memory element, stored data will be retained even after the power is turned off.

In the copy mode, you can download data saved in the **OPX-2A** to the driver. You can also upload data saved in the driver to the **OPX-2A**.

It is also possible to verify data in the **OPX-2A** against the corresponding data in the driver, or revert driver data to their initial values.

10.1 Overview of the copy mode

- Download

  Copy data saved in the **OPX-2A** to the driver.

- Upload

  Copy data saved in the driver to the **OPX-2A**.

- Verification

  Verify data in the **OPX-2A** against the corresponding data in the driver.

- Initializing driver data

  Revert data saved in the driver to their initial values.

  Note
  - Stop the motor operation before changing to the copy mode.
  - Downloading and initializing cannot be executed during operation. If the【SET】key is pressed in the data bank selection screen, the screen will not move to the lower level and "oPE-Err" will be displayed.
  - If the【SET】key is pressed while executing the internal processing via RS-485 communication, "mEm-bUSy" may be displayed. Check "5 Screen transitions" on p.12 when "mEm-bUSy" is displayed. Be sure to wait until all internal processing is completed, before pressing the【SET】key.
  - When operations are limited by the edit lock function, copy mode cannot be operated.

10.2 Downloading to the driver

In this operation, data in the specified data bank number are downloaded to the driver.

If a download error occurs, a code indicating the nature of the error will blink on the display. Download will not be performed and the display will return to the top screen of download.

Download **OPX-2A** data to the driver.
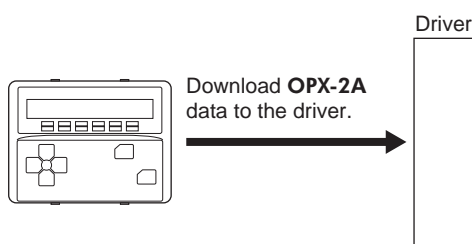
Driver

Blinking display	Description	Action
$P\,r\,o\,d\,-\,E\,r\,r$	The product series of the driver to which data is downloaded is wrong.	• Check the product series of the driver. • Check the data bank number on the **OPX-2A**.
$H\,E\,R\,d\,-\,E\,r\,r$ $b\,c\,c\,-\,E\,r\,r$	An error occurred while data was being downloaded.	Perform download again. If the same error occurs, the data saved in the **OPX-2A** may be damaged. Upload the applicable data to set the **OPX-2A** data again.
$n\,o\,-\,d\,R\,b\,R$	The specified data bank number does not contain any data.	Check the data bank number.

Note
- Some parameters will become effective after cycling the power. When these parameters were changed by downloading, cycle the driver power.
- Do not turn off the driver power while the download is still in progress (= while the display is blinking). Doing so may damage the data.

10.3 Uploading to the OPX-2A

In this operation, data saved in the driver is uploaded to the specified data bank number.

Note Do not turn off the driver power while the upload is still in progress (= while the display is blinking). Doing so may damage the data.

Upload driver data to the **OPX-2A**.
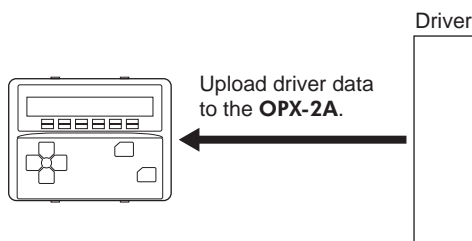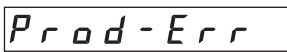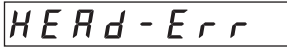
Driver

10.4 Verifying data

In this operation, data in the specified data bank number are verified against the corresponding data saved in the driver.

If the verification finds that the two sets of data match, "Good" will be shown. If the two do not match, "Error" will be shown.

If a verification error occurs, a code indicating the nature of the error will blink on the display.

Verification will not be performed and the display will return to the top screen of verification.

Blinking display	Description	Action
$Prod-Err$	The product series of the driver against which data is verified is wrong.	• Check the product series of the driver. • Check the data bank number on the **OPX-2A**.
$HEAd-Err$ $bcc-Err$	An error occurred while data was being verified.	Perform verification again. If the same error occurs, the data saved in the **OPX-2A** may be damaged. Upload the applicable data to set the **OPX-2A** data again.
$no-dAtA$	The specified data bank number does not contain any data.	Check the data bank number.

10.5 Initializing driver data

Data saved in the driver can be restored to their initial values.

Note
- Some parameters will become effective after cycling the power. When these parameters were changed by initializing, cycle the driver power.
- Do not turn off the driver power while the initialization is still in progress (= while the display is blinking). Doing so may damage the data.