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.

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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 OPERATING 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.

## 1 Safety precautions

<table>
<thead>
<tr>
<th><strong>General</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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.</td>
</tr>
<tr>
<td>• Assign qualified personnel the task of installing, wiring, operating/controlling, inspecting and troubleshooting the product. Failure to do so may result in fire, electric shock or injury.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
</tbody>
</table>

### Repair, disassembly and modification

<table>
<thead>
<tr>
<th><strong>General</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Caution</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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.</td>
</tr>
</tbody>
</table>

### Operation

<table>
<thead>
<tr>
<th><strong>Operation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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.</td>
</tr>
</tbody>
</table>

### Disposal

<table>
<thead>
<tr>
<th><strong>Disposal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.</td>
</tr>
</tbody>
</table>
2 Introduction

Only qualified personnel should work with the product. Use the product correctly after thoroughly reading the section "1 Safety precautions" on page 2. 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 "BX II Series OPERATING 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

<table>
<thead>
<tr>
<th>Connection</th>
<th>Mini DIN, 8 pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>External dimensions</td>
<td>96 (W)×72 (H)×21.5 (D) mm</td>
</tr>
<tr>
<td></td>
<td>3.78 (W)×2.83 (H)×0.85 (D) in.</td>
</tr>
<tr>
<td>Cable length</td>
<td>5 m (16.4 ft.)</td>
</tr>
<tr>
<td>Mass</td>
<td>0.25 kg (8.8 oz)</td>
</tr>
</tbody>
</table>

■ 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

![Diagram of OPX-2A display and buttons]

- **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.

- **Notation**
  - In this manual, keys are denoted by symbols, such as ![MODE][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

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

- Alphabets

```
A B C D E F G H I J K L M N O P Q R S T U V W 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. When the motor is operating or the edit lock function is enabled, the condition is also indicated by the illumination of a corresponding LED.

3.5 Types of operation modes

The **OPX-2A** has multiple operation modes. The operation mode will change every time the [MODE] 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.
3.6 Basic operations of the OPX-2A

Use the six keys [MODE][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 [MODE] 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 [MODE] 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 [MODE] 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.

2. Press the [↑] key twice to change the value to "0."

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.

4. Press the [↑] key once to change the value to "1."

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.

**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 [MODE] 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.

- **Canceling the edit lock function**
  Again, press the [MODE] 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.

**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.

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.
4.3 Connecting to the driver

Plug the connector attached to the end of the OPX-2A cable into the data edit connector (CN6) on the driver, and then turn on the power to the driver.

**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.

<table>
<thead>
<tr>
<th>Error display</th>
<th>Description</th>
<th>Remedial action</th>
</tr>
</thead>
</table>
| ![Error Symbol] | 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 When using the product with the speed control mode

5.1 Screen transitions

Top screen

Monitor mode

Mode

Speed

Load factor

Operation data number

Alarm

Alarm record 1 (latest)

Alarm record 10 (oldest)

Clear alarm records

Alarm reset

Warning

Warning record 1 (latest)

Warning record 10 (oldest)

Clear warning records

Execute (blinking)

Alarm reset

Clear alarm records

Execute (blinking)

Control mode

Execute (blinking)

Alarm

Execute (blinking)

Alarm record 10 (oldest)

Alarm record 1 (latest)

Clear alarm records

Execute (blinking)

Output monitor

External voltage monitor

Execute (blinking)

Input monitor

Execute (blinking)
When using the product with the speed control mode

### Note
- There are the following restrictions while the edit lock function is enabled.
  - Data mode, parameter mode: Although they are displayed on the screen, they are unable to operate.
  - Clearing the alarm and warning records, copy mode: They are not displayed on the screen.
- When the HMI input is in an OFF state, all functions of the test mode cannot be executed. Downloading and initializing are also disabled.

### Data mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td></td>
</tr>
</tbody>
</table>

#### Data number selection
- **DATA - 00**
  - Operation speed: Numerical entry, Writing data (blinking)
  - Torque limiting: Numerical entry, Writing data (blinking)
  - Acceleration time: Numerical entry, Writing data (blinking)
  - Deceleration time: Numerical entry, Writing data (blinking)
  - Data clear: Execute, Executing (blinking)

- **DATA - 15**

In the lower level except the top screen, press the **SET** key to return to the previous level.
When using the product with the speed control mode:

- Speed increases in the forward direction
- Speed increases in the reverse direction
When using the product with the speed control mode

In the lower level except the top screen, press the SET key to return to the previous level.
5.2 Monitor mode

- **Overview of the monitor mode**

  - Monitoring the operating status
    The motor speed, load factor and operation data number corresponding to the present operation can be monitored in real time.

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

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

- **Operation in the monitor mode**

  1. Use the [SET] key to select the monitor mode.
  2. Press the [SET] key on the top screen in the monitor mode.
  3. Use the [↑][↓] keys to select the item you want to monitor.

- **Monitor items**

  - Speed (unit: r/min)
    The motor operation speed can be checked.
    While the motor rotates in the counter clockwise direction (CCW), the "−" sign is displayed in front of the value. The value can also be displayed as the absolute value, or the "−" sign can be displayed in front of the value while the motor rotates in the clockwise direction (CW). In this case, change the setting of the "data setter speed display" parameter (ID: 480). The operation speed can be displayed as the rotation speed of the gear output shaft. To do this, set the "speed reduction ratio" parameter (ID: 2085) and "speed reduction ratio digit setting" parameter (ID: 2086). It is also possible to increase the rotation speed and display the increased speed. Set in the "speed increasing ratio" parameter (ID: 2087).
• Load factor (Unit: %)
The motor generating torque can be checked. The present load factor is displayed based on the rated torque being 100%.

• Operation data number
The operation data number corresponding to the present operation can be checked.

• Alarm
When an alarm generates, a corresponding alarm code will be displayed. The present alarm can be reset, and also alarm records can be checked or cleared.

- If operations are limited by the edit lock function, the screens in gray color are not displayed.

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.
• Some alarms cannot be reset using the OPX-2A. Check by the following table. To reset these alarms, cycle the driver power.

Alarm code list

<table>
<thead>
<tr>
<th>Code</th>
<th>Alarm name</th>
<th>Reset using the OPX-2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Excessive position deviation</td>
<td>Possible</td>
</tr>
<tr>
<td>20</td>
<td>Overcurrent</td>
<td>Not possible</td>
</tr>
<tr>
<td>22</td>
<td>Overvoltage</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Undervoltage</td>
<td>Possible</td>
</tr>
<tr>
<td>28</td>
<td>Sensor error</td>
<td>Not possible</td>
</tr>
<tr>
<td>29</td>
<td>Main circuit output error</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Overload</td>
<td>Possible</td>
</tr>
<tr>
<td>31</td>
<td>Overspeed</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>EEPROM error</td>
<td>Not possible</td>
</tr>
<tr>
<td>42</td>
<td>Sensor error at power-on</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Prevention of operation at power-on</td>
<td>Possible</td>
</tr>
<tr>
<td>51</td>
<td>Regeneration unit overheat</td>
<td>Not possible</td>
</tr>
<tr>
<td>67</td>
<td>Software overtravel</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Operation data error</td>
<td>Possible</td>
</tr>
</tbody>
</table>
When using the product with the speed control mode

• Warning

When a warning generates, a corresponding warning code will be displayed. Warning records can also be checked or cleared.

* If operations are limited by the edit lock function, the screens in gray color are not displayed.

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.
• Warning records will automatically be cleared by turning off the driver power.

Warning code list

<table>
<thead>
<tr>
<th>Code</th>
<th>Warning name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Excessive position deviation</td>
</tr>
<tr>
<td>22</td>
<td>Overvoltage</td>
</tr>
<tr>
<td>30</td>
<td>Overload</td>
</tr>
<tr>
<td>6C</td>
<td>Operation prohibited</td>
</tr>
</tbody>
</table>
• I/O monitor

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

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

• Input monitor

• Output monitor

• External voltage monitor [V]

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

• Control mode

The present control mode can be checked.

<table>
<thead>
<tr>
<th>Speed control mode</th>
<th>Speed control mode (servo lock)</th>
<th>Position control mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>n o d E 5 P d</td>
<td>n o d E 5 P d L</td>
<td>n o d E P o S</td>
</tr>
</tbody>
</table>
When using the product with the speed control mode

5.3 Data mode

Up to 16 sets of motor 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 "BX II Series OPERATING MANUAL" carefully to understand the basic operations, functions and other details of the driver.

Note
- Operation data has significant bearing on motor operation. Before setting any operation data, make sure you fully understand the content of the operation 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 in the parameter mode.
- 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.

Operation in the data mode

1. Use the [MODE] key to select the data mode.
2. Press the [SET] key on the top screen in the data mode.
3. Use the [↑][↓] keys to select a desired operation data number.
4. Press the [SET] key. The display changes to the setting screen of the items in the operation data.
5. Use the [SET] key to select the operation data item you want to set.
6. When pressing the [SET] key on the last operation data item, the display returns to the screen of the operation data number.

Top screen in the data mode

Operation data number 0

Operation speed

Torque limiting

Acceleration time

Deceleration time

Data clear

Operation data number 15

* If operations are limited by the edit lock function, the screens in gray color are not displayed.

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.
When using the product with the speed control mode

### Setting items

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial value</th>
<th>Setting range</th>
<th>Description</th>
<th>Setting unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation speed</td>
<td>0</td>
<td>0 to 4000 r/min</td>
<td>Sets the operation speed for the speed control operation. Set as the rotation speed of the motor output shaft.</td>
<td>1</td>
</tr>
<tr>
<td>Torque limiting</td>
<td>250</td>
<td>0 to 250%*</td>
<td>Sets when limiting the motor output torque. Sets the torque limiting value based on the rated torque being 100%.</td>
<td>1</td>
</tr>
<tr>
<td>Acceleration time</td>
<td>0.100</td>
<td>0.000 to 30.000 s</td>
<td>The acceleration time is set as the time needed for the motor to reach the rated rotation speed (3000 r/min) from the standstill state.</td>
<td>0.001</td>
</tr>
<tr>
<td>Deceleration time</td>
<td>–</td>
<td>–</td>
<td>The deceleration time is set as the time needed for the motor to stop from the rated rotation speed (3000 r/min).</td>
<td>–</td>
</tr>
<tr>
<td>Data clear</td>
<td>–</td>
<td>–</td>
<td>Restores the operation data to the initial value.</td>
<td>–</td>
</tr>
</tbody>
</table>

* The motor may not start operating with the torque limiting value depending on variations in load torque, individual differences in motors, gearheads or drivers, as well as operating environment. Set the torque limiting value with providing a margin of 20% or more as a guide.

### Initialization of all operation data

All of the operation data saved in the driver can be restored to the initial values. Execute "Initialize operation data" of the copy mode. For details, refer to the "Initializing driver data" on page 27.
5.4 Parameter mode

Parameters relating to motor operation and control can be set. These parameters are saved in the driver. Before setting parameters, read the "BX II Series OPERATING 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, parameters cannot be edited.
- 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 non-existent parameter ID is entered, "id-Err" will be displayed for 1 second. Check the ID and enter the correct one.

Parameter ID

There is a 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 [MODE] key to select the parameter mode.
2. Press the [SET] key on the top screen in the parameter mode.
   The display changes to the screen to select the parameter type.
3. Use the [↑][↓] keys to select a desired parameter ID.
4. Press the [SET] key.
   The display changes to the parameter setting screen.

Top screen in the parameter mode

Enter the parameter ID

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 non-existent parameter ID is entered, "id-Err" will be displayed for 1 second. Check the ID and enter the correct one.

Initializing parameters

Parameters saved in the driver can be restored to their initial values. Execute "Initialize parameters" in the copy mode. For the operation, check the screen transitions of the copy mode on page 13, or "Initializing driver data" on page 27.
Setting example

Pressing the [SET] key in the parameter item screen enables parameter setting. How to set a parameter is explained below.

Example: Set the gear ratio (ID: 2085) to “50.0”

1. Use the [MOD] key to select the parameter mode. The “PAR” LED is lit.

2. Press the [SET] key. The display changes to the parameter select screen.

3. Use the [↑][↓][←][→] keys to enter “2085.”

4. Press the [SET] key. The display changes to the parameter select screen.

5. Use the [↑][↓][←][→] keys to enter “500.”

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

7. Use the [↑][↓][←][→] keys to enter “2086.”

8. Press the [SET] key. The display changes to the parameter select screen.

9. Use the [↑][↓][←][→] keys to enter “1.”

10. Press the [SET] key again. The selected value is set, and the display returns to the parameter select screen.
5.5 Test mode

- Overview of the test mode

- I/O test
  The ON/OFF status of each input signal of the driver can be checked on the OPX-2A. Also, the ON/OFF status of each output signal can be switched using the OPX-2A. Execute I/O test to check the connection status of the driver.

- JOG operation
  The motor can be operated using the keys on the OPX-2A.

- Data number selecting operation
  The motor can be operated with selecting any of the operation data No.0 to No.15.

- Teaching function
  Using the keys on the OPX-2A, you can operate the motor and set the operated speed in the operation data.

  Note
  - Stop the motor operation before changing to the test mode.
  - JOG operation, data number selecting operation and teaching function cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.
  - In I/O test, if the screen changes to the lower level, all of I/O signals and operation will be disabled.
  - When the HMI input is OFF, test mode cannot be executed.

- Operation in the test mode

  1. Use the [MODE] key to select the test mode.
  2. Press the [SET] key on the top screen in the test mode. The display changes to the screen of each item in the test mode.
  3. Use the [↑][↓] keys to select the item you want to perform.

  What happens when the [SET] key is pressed while the motor is operating
  During operation, if the [SET] key is pressed on the select screen of each item in the test mode, the screen will not change to the lower level, and an error will occur, thereby displaying "oPE-Err." Be sure to stop the motor operation before pressing the [SET] key.
When using the product with the speed control mode

- **I/O test**

Execute I/O test to check the connection status of the driver.

Each digit on the 7-segment LED display corresponds to a signal. The LED is lit when the input signal is ON, and it is unlit when the input signal is OFF. Use the [↑][↓] keys to switch the ON-OFF state of the output signal. "O" is displayed when the signal is ON, while "-" is displayed when the signal is OFF.

- **Input monitor**
  - IN0
  - IN1
  - IN2
  - IN3
  - IN4
  - IN6
  - IN5
  - IN8

- **Output test**
  - OUT0
  - OUT1
  - OUT2

- **External voltage monitor**
  - The voltage value input by the analog external setter can also be checked.

- **JOG operation**

The motor can be operated using the keys on the OPX-2A. The operation speed, acceleration/deceleration time and torque will correspond to the values set in the "JOG operation speed" parameter (ID: 323), "JOG acceleration/deceleration" parameter (ID: 324) and "JOG operation torque" parameter (ID: 2081) respectively. The next example shows the display that appears when setting the rotation speed of the initial value to 300 r/min and operating the motor in the reverse direction using the [↓] key. The rotation speed is displayed while JOG operation is executed.

The motor rotates in the forward direction while the [↑] key is pressed.

The motor rotates in the reverse direction while the [↓] key is pressed.

**Note**
- During operation, the motor rotates at the specified operation speed while each applicable key is pressed. Before executing operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.
- JOG operation cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.
When using the product with the speed control mode

### Data number selecting operation

The motor can be operated with selecting any of the operation data No.0 to No.15.

#### Top screen in the data number selecting operation

- **Data number selection 0**
  - Operation (blinking)
  - Stop

- **Data number selection 15**
  - Operation (blinking)
  - Stop

### Note

- During operation, the motor rotates at the specified operation speed. Before executing operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.
- Data number selecting operation cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.

### Teaching function

Using the keys on the OPX-2A, you can operate the motor and set the operated speed in the operation data. The motor rotates in the forward direction and increases the speed while the \([\uparrow]\) key is pressed. When decelerating the speed, press the \([\downarrow]\) key.

If the \([\downarrow]\) key is pressed when the operation speed is 0 r/min, the motor rotates in the reverse direction and increases the speed. When decelerating the speed, press the \([\uparrow]\) key.

The acceleration/deceleration time of the teaching function corresponds to the value set in the "JOG acceleration/deceleration rate" parameter (ID: 324), and the torque corresponds to the value set in the "JOG operation torque" parameter (ID: 2081).

#### Teaching function

- **Execute teaching function**
  - Speed increases in the forward direction
  - Stop

- **Operation data No.0 selection**
  - Speed increases in the reverse direction
  - Stop

- **Data is being written. (blinking)**

#### Data is being written. (blinking)

### Note

- Before executing operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.
- Teaching function cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.
- If operations are limited by the edit lock function, teaching function cannot be executed.
5.6 Copy mode

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

In the copy mode, the data saved in the OPX-2A can be downloaded to the driver. Meanwhile, the data saved in the driver can be uploaded to the OPX-2A. It is also possible to verify data in the OPX-2A against the corresponding data in the driver, or restore driver data to their initial values.

■ Overview of the copy mode

- Download
  Data saved in the OPX-2A can be copied to the driver.

- Upload
  Data saved in the driver can be copied to the OPX-2A.

- Verification
  Data in the OPX-2A can be verified against the corresponding data in the driver.

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

■ Operation in the copy mode

1. Use the MODE key to select the copy mode.
2. Press the SET key on the top screen in the copy mode.
3. Use the [↑][↓] keys to select the item you want to perform.

![Diagram of top screen in the copy mode]

- What happens when the [SET] key is pressed while the motor is operating
  During operation, if the [SET] key is pressed on the lower level of the top screen in the copy mode, an error will occur, thereby displaying "oPE-Err." Be sure to stop the motor operation before pressing the [SET] key.

- What happens when the [SET] key is pressed while the edit lock function is enabled
  While the edit lock function is enabled, the screen cannot change to any lower level from the top screen of the copy mode. Pressing the [SET] key will generate an error, thereby displaying "LocK-Err." Be sure to cancel the edit lock function before pressing the [SET] key. Refer to p.7 for the procedure to cancel the edit lock function.

**Note** Stop the motor operation before changing to the copy mode.
When using the product with the speed control mode

■ 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.

<table>
<thead>
<tr>
<th>Blinking display</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prod - Err</td>
<td>The product series of the driver to which data is downloaded is wrong.</td>
<td>Check the product series of the driver. Check the data bank number on the OPX-2A.</td>
</tr>
<tr>
<td>Head - Err</td>
<td>An error occurred while data was being downloaded.</td>
<td>Execute 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.</td>
</tr>
<tr>
<td>Bcc - Err</td>
<td>The specified data bank number does not contain data.</td>
<td>Check the data bank number.</td>
</tr>
</tbody>
</table>

■ 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.
When using the product with the speed control mode

- 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 for one second. If the two do not match, "Error" will be shown for one second.

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.

<table>
<thead>
<tr>
<th>Blinking display</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prod_Err</td>
<td>The product series of the driver against which data is verified is wrong.</td>
<td>• Check the product series of the driver.</td>
</tr>
<tr>
<td>Head_Err</td>
<td>An error occurred while data was being verified.</td>
<td>Execute verification again. If the same error occurs, the data saved in the OPX-2A may be</td>
</tr>
<tr>
<td>bcc_Err</td>
<td></td>
<td>damaged. Upload the applicable data to set the OPX-2A data again.</td>
</tr>
<tr>
<td>no-dErr</td>
<td>The specified data bank number does not contain data.</td>
<td>Check the data bank number.</td>
</tr>
</tbody>
</table>

- 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 downloading, 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.
6 When using the product with the position control mode

6.1 Screen transitions
When using the product with the position control mode

**Note**
- There are the following restrictions while the edit lock function is enabled.
  - Data mode, parameter mode: Although they are displayed on the screen, they are unable to operate.
  - Clearing the alarm and warning records, copy mode: They are not displayed on the screen.
  - When the HMI input is in an OFF state, all functions of the test mode cannot be executed. Downloading and initializing are also disabled.

### Data Mode
- **Data number selection 0**
  - **Operation mode**
    - Position
    - Operation speed
    - Operation function
      - Writing data (blinking)
      - Numerical entry
    - Sequential positioning
      - Writing data (blinking)
      - Numerical entry
    - Torque limiting
      - Writing data (blinking)
      - Numerical entry
    - Acceleration time
      - Writing data (blinking)
      - Numerical entry
    - Deceleration time
      - Writing data (blinking)
      - Numerical entry
    - Dwell time
      - Writing data (blinking)
      - Numerical entry

### Parameter Mode
- **Data number selection 15**
  - **Execute**
    - Data clear
      - Executing (blinking)
      - d a 0 0 - c l r
  - In the lower level except the top screen, press the key to return to the previous level.
When using the product with the position control mode

Parameter mode
- Data mode
  - Parameter selection
    - Parameter ID input
      (Example: Speed reduction ratio)
    - Parameter setting
      - Writing data (blinking)

Test mode
- MODE
  - Input monitor
    - Output test
      - External voltage monitor
        - Writing data (blinking)
    - Jog operation
      - 1 step rotates in the forward direction
      - 1 step rotates in the reverse direction
      - The motor continuously rotates at the JOG operation speed if the key is kept pressing.

Data number selection 0
- Data number selecting operation

Exit to Home operation
- Operation (blinking)

Position preset
- Executing (blinking)

Teaching function
- Executing (blinking)

Parameter setting
- Writing data (blinking)
When using the product with the position control mode

In the lower level except the top screen, press the SET key to return to the previous level.
6.2 Monitor mode

■ Overview of the monitor mode

• Monitoring the operating status
  The motor speed, position, load factor, operation data number corresponding to the present operation and operation data number currently selected can be monitored in real time.

• Checking alarms/warnings, clearing alarm/warning records, and resetting alarms
  • If an alarm or warning generates, since a corresponding alarm code or warning code will be displayed, the item to identify the details of the alarm/warning can be checked.
  • Up to ten most recent alarms/warnings can be displayed, starting from the latest one. Also, alarm/warning records can be cleared.
  • The alarm currently present can be reset.

• Checking I/O signals
  The ON/OFF status of each I/O signal of the driver can be checked.

■ Operation in the monitor mode

1. Use the [SET] key to select the monitor mode.
2. Press the [SET] key in the top screen in the monitor mode.
3. Use the [ ] [ ] keys to select the item you want to monitor.
Monitor items

- **Speed (unit: r/min)**
  The motor speed can be checked. While the motor rotates in the counter clockwise direction (CCW), the "-" sign is displayed in front of the value. The value can also be displayed as the absolute value, or the "-" sign can be shown in front of the value while the motor rotates in the clockwise direction (CW). In this case, change the setting of the "data setter speed display" parameter (ID: 480).
  The operation speed can be displayed as the rotation speed of the gear output shaft. To do this, set the "speed reduction ratio" parameter (ID: 2085) and "speed reduction ratio digit setting" parameter (ID: 2086). It is also possible to increase the rotation speed and display the increased speed. Set in the "speed increasing ratio" parameter (ID: 2087).

- **Position**
  The present position of the motor with reference to the home position can be checked.

- **Load factor (Unit: %)**
  The motor generating torque can be checked. The present load factor is displayed based on the rated torque being 100%.

- **Operation data number**
  The operation data number corresponding to the present positioning operation can be checked.

When "**P E - n** - l" is displayed

If the operation data number is checked immediately after the power is input in the position control mode, "**P E - n** - l" will be displayed. In addition, if the operation data number is checked by executing the following operations, "**P E - n** - l" is displayed.
- While executing return-to-home operation, continuous operation or JOG operation
- When an alarm is generated and reset
- When the operation is stopped by the STOP input
- When the motor excitation is turned OFF by the FREE input or S-ON input
- When executing the position preset

- **Selected number**
  The operation data number currently selected can be checked.
When using the product with the position control mode

• Alarm

When an alarm generates, a corresponding alarm code will be displayed. The present alarm can be reset, and also alarm records can be checked or cleared.

<table>
<thead>
<tr>
<th>Code</th>
<th>Alarm name</th>
<th>Reset using the OPX-2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Excessive position deviation</td>
<td>Possible</td>
</tr>
<tr>
<td>20</td>
<td>Overcurrent</td>
<td>Not possible</td>
</tr>
<tr>
<td>22</td>
<td>Undervoltage</td>
<td>Possible</td>
</tr>
<tr>
<td>25</td>
<td>Undervoltage</td>
<td>Possible</td>
</tr>
<tr>
<td>28</td>
<td>Sensor error</td>
<td>Not possible</td>
</tr>
<tr>
<td>2D</td>
<td>Main circuit output error</td>
<td>Not possible</td>
</tr>
<tr>
<td>30</td>
<td>Overload</td>
<td>Possible</td>
</tr>
<tr>
<td>31</td>
<td>Overspeed</td>
<td>Possible</td>
</tr>
<tr>
<td>41</td>
<td>EEPROM error</td>
<td>Not possible</td>
</tr>
<tr>
<td>42</td>
<td>Sensor error at power-on</td>
<td>Not possible</td>
</tr>
<tr>
<td>46</td>
<td>Prevention of operation at power-on</td>
<td>Possible</td>
</tr>
<tr>
<td>51</td>
<td>Regeneration unit overheat</td>
<td>Not possible</td>
</tr>
<tr>
<td>67</td>
<td>Software overtravel</td>
<td>Possible</td>
</tr>
<tr>
<td>70</td>
<td>Operation data error</td>
<td>Possible</td>
</tr>
</tbody>
</table>

* If operations are limited by the edit lock function, the screens in gray color are not displayed.

**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 using the OPX-2A. Check by the following table. To reset these alarms, cycle the driver power.
**Warning**

When using the product with the position control mode

Warning records can be checked or cleared.

Warning code list

<table>
<thead>
<tr>
<th>Code</th>
<th>Warning name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Excessive position deviation</td>
</tr>
<tr>
<td>22</td>
<td>Overvoltage</td>
</tr>
<tr>
<td>30</td>
<td>Overload</td>
</tr>
<tr>
<td>6C</td>
<td>Operation prohibited</td>
</tr>
</tbody>
</table>

* If operations are limited by the edit lock function, the screens in gray color are not displayed.

**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.
- Warning records will automatically be cleared by turning off the driver power.
When using the product with the position control mode

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

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

- **Input monitor**

- **Output monitor**

- **External voltage monitor [V]**
  The voltage value input by the analog external setter can also be checked.

- **Control mode**
  The present control mode can be checked.
6.3 Data mode

Up to 16 sets of motor 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 parameters, read the "BX II Series OPERATING MANUAL" carefully to understand the basic operations, functions and other details of the driver.

**Note**
- Operation data has significant bearing on motor operation. Before setting any operation data, make sure you fully understand the content of the operation data.
- If operations are limited by the edit lock function or HMI input, operation data cannot be edited.
- Operation data can also be set by selecting the ID in the parameter mode.
- 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.

#### Operation in the data mode

1. Use the [MODE] key to select the data mode.
2. Press the [SET] key on the top screen in the data mode.
3. Use the [↑][↓] keys to select a desired operation data number.
4. Press the [SET] key.
   The display changes to the setting screen of the items in the operation data.
5. Use the [SET] key to select the operation data item you want to set.
6. When pressing the [SET] key on the last operation data item, the display returns to the screen of the operation data number.

* If operations are limited by the edit lock function, the screens in gray color are not displayed.
When using the product with the position control mode

### Setting items

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial value</th>
<th>Setting range</th>
<th>Description</th>
<th>Setting unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>0</td>
<td>0: Incremental 1: Absolute</td>
<td>Selects how to specify the position (travel amount) in positioning operation (absolute mode or incremental mode).</td>
<td>–</td>
</tr>
<tr>
<td>Position</td>
<td>0</td>
<td>–8,388,608 to +8,388,607 step</td>
<td>Sets the position (travel amount) for positioning operation. The motor shaft rotates 0.72° per one step.</td>
<td>1</td>
</tr>
<tr>
<td>Operation speed</td>
<td>0</td>
<td>0 to 4000 r/min</td>
<td>Sets the operation speed in positioning operation and continuous operation. Set as the rotation speed of the motor output shaft.</td>
<td>1</td>
</tr>
<tr>
<td>Operation function</td>
<td>0</td>
<td>0: Single 1: Linked-motion 2: Linked-motion2</td>
<td>Sets to execute positioning operation as single-motion or linked-motion operation.</td>
<td>–</td>
</tr>
<tr>
<td>Dwell time</td>
<td>0.000</td>
<td>0.000 to 50.000 s</td>
<td>Sets the waiting time between the first operation data and second operation data in linked-motion operation 2.</td>
<td>0.001</td>
</tr>
<tr>
<td>Sequential positioning</td>
<td>0</td>
<td>0: Disable 1: Enable</td>
<td>Sets whether to enable or disable sequential positioning operation.</td>
<td>–</td>
</tr>
<tr>
<td>Torque limiting</td>
<td>250</td>
<td>0 to 250%*</td>
<td>Sets when limiting the motor output torque. Sets the torque limiting value based on the rated torque being 100%.</td>
<td>1</td>
</tr>
<tr>
<td>Acceleration time</td>
<td>0.100</td>
<td>0.000 to 30.000 s</td>
<td>Sets the acceleration time for positioning operation. The acceleration time is set as the time needed for the motor to reach the rated rotation speed (3000 r/min) from the standstill state.</td>
<td>0.001</td>
</tr>
<tr>
<td>Deceleration time</td>
<td></td>
<td></td>
<td>Sets the deceleration time for positioning operation. The deceleration time is set as the time needed for the motor to stop from the rated rotation speed (3000 r/min).</td>
<td></td>
</tr>
<tr>
<td>Data clear</td>
<td>–</td>
<td>–</td>
<td>Restores the operation data to the initial value.</td>
<td>–</td>
</tr>
</tbody>
</table>

* The motor may not start operating with the torque limiting value depending on variations in load torque, individual differences in motors, gearheads or drivers, as well as operating environment. Set the torque limiting value with providing a margin of 20% or more as a guide.

#### Setting method of dwell time

Select to display the "Linked-motion 2" in the "operation function" and press the [SET] key to display the setting screen of the dwell time.

Input the dwell time with the [↑] [↓] [←] [→] keys and press the [SET] key.

#### Initialization of all operation data

All of the operation data saved in the driver can be restored to the initial values. Execute "Initialize operation data" of the copy mode. For details, refer to the "Initializing driver data" on page 27.

### 6.4 Parameter mode

Refer to "5.4 Parameter mode."
6.5 Test mode

- Overview of the test mode

- I/O test
  The ON/OFF status of each input signal of the driver can be checked on the OPX-2A. Also, the ON/OFF status of each output signal can be switched using the OPX-2A. Execute I/O test to check the connection status of the driver.

- JOG operation
  The motor can be operated using the keys on the OPX-2A.

- Data number selecting operation
  Positioning operation can be executed by selecting the operation data number.

- Return-to-home operation
  Return-to-home operation can be executed.

- Position preset
  The position preset is used to renew the command position (present position) to the value of the "preset position" parameter (ID: 454).

- Teaching function
  Using the keys on the OPX-2A, you can operate the motor and set the attained position in the operation data.

Note

- Stop the motor operation before changing to the test mode.
- JOG operation, data number selecting operation, return-to-home operation and teaching function cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.
- When changing from the item selection screen to a lower level, the following inputs will be disabled. START, SSTART, HOME, ±JOG, FWD, RVS and MS0 to MS5.
- In I/O test, if the screen changes to the lower level, all of I/O signals and operations will be disabled.
- If "Error" is displayed when data number selecting operation, return-to-home operation, position preset or teaching function is executed, check whether an alarm generates.
- When the HMI input is OFF, test mode cannot be executed.

- Operation in the test mode

1. Use the [MODE] key to select the test mode.
2. Press the [SET] key on the top screen in the test mode. The display changes to the screen of each item in the test mode.
3. Use the [↑][↓] keys to select the item you want to perform.

Top screen in the test mode

- I/O test
- JOG operation
- Data number selecting operation
- Return-to-home operation
- Position preset
- Teaching function

* If operations are limited by the edit lock function, the screens in gray color are not displayed.
When using the product with the position control mode

- What happens when the [SET] key is pressed while the motor is operating

During operation, if the [SET] key is pressed on the setting screen of each item in the test mode, the screen will not change to the lower level and an error will occur, thereby displaying "oPE-Err."

Be sure to stop the motor operation before pressing the [SET] key.

### I/O test

Execute I/O test to check the connection status of the driver.

- **Input monitor**
  - Each digit on the 7-segment LED display corresponds to a signal.
  - The LED is lit when the input signal is ON, and it is unlit when the input signal is OFF.
  - Use the [↑][↓] keys to switch the ON-OFF state of the output signal. "O" is displayed when the signal is ON, while "O" is displayed when the signal is OFF.

- **Output test**
  - "O" is displayed when the signal is ON, while "O" is displayed when the signal is OFF.

- **External voltage monitor**
  - The voltage value input by the analog external setter can also be checked.
When using the product with the position control mode

■ JOG operation

The motor can be operated using the keys on the **OPX-2A**.
The operation speed, acceleration/deceleration time and torque will correspond to the values set in the "JOG operation speed" parameter (ID: 323), "JOG acceleration/deceleration" parameter (ID: 324) and "JOG operation torque" parameter (ID: 2081) respectively.
The next example shows the display that appears when operating the motor in the reverse direction using the [↓] key. The present position is displayed while JOG operation is executed.

Top screen in the JOG operation

![JOG Operation Screen]

When pressing the [↑] key once, the motor rotates by one step in the forward direction.
If the key is kept pressing, the motor continuously rotates at the JOG operation speed in the forward direction.
When pressing the [↓] key once, the motor rotates by one step in the reverse direction.
If the key is kept pressing, the motor continuously rotates at the JOG operation speed in the reverse direction.

**Note**
- During operation, the motor rotates at the specified operation speed while each applicable key is pressed. Before executing operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.
- JOG operation cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.

■ Data number selecting operation

Positioning operation can be executed with selecting any of the operation data No.0 to No.15. If no data has input in the operation data, the operating data error alarm will generate.

Top screen in the data numer selecting operation

![Data Number Selection Screen]

**Note**
- During operation, the motor rotates at the specified operation speed. Before executing operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.
- Data number selecting operation cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.
When using the product with the position control mode

Return-to-home operation
Return-to-home operation can be executed. The operation speed corresponds to the value set in the "operating speed of home-seeking" parameter (ID: 353). The motor will stop operation when pressing the [RETURN] key or inputting the HOMES input.

Top screen in the return-to-home operation

Execute return-to-home operation
Executing (blinking)

Stop

Note
• During operation, the motor rotates at the specified operation speed. Before executing operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.
• Return-to-home operation cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.

Position preset
In this operation, the command position is preset by rewriting the value in the "preset position" parameter (ID: 454).

Top screen in the position preset

Execute position preset
Executing (blinking)

Note
If operations are limited by the edit lock function, the preset function cannot be performed.

Teaching function
Using the keys on the OPX-2A, you can operate the motor and set the attained position in the operation data. The absolute mode will be automatically selected as the operation mode of any position data set in teaching function. The operation speed, acceleration/deceleration time and torque for teaching function will correspond to the values set in the "JOG operation speed" parameter (ID: 323), "JOG acceleration/deceleration" parameter (ID: 324) and "JOG operation torque" parameter (ID: 2081) respectively.

Teaching function

 Execute teaching function

 1 step rotates in the forward direction
 1 step rotates in the reverse direction
 The motor continuously rotates at the JOG operation speed if the key is kept pressing.

Top screen in the teaching function

Execute teaching function

Operation data No.0 selection

Operation data No.15 selection

Note
• In teaching function, the motor rotates while the key is pressed. Before executing operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.
• Teaching function cannot be executed while the FREE signal or STOP signal is being ON. Be sure to execute after turning the signal OFF.
• If operations are limited by the edit lock function, teaching function cannot be executed.

6.6 Copy mode
Refer to "5.6 Copy mode."
## 7 Parameter

### Operation data parameter

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Setting range</th>
<th>Initial value</th>
</tr>
</thead>
<tbody>
<tr>
<td>512 to 527</td>
<td>Position No.0 to No.15</td>
<td>-8,388,608 to +8,388,607 step The motor shaft rotates 0.72° per one step.</td>
<td>0</td>
</tr>
<tr>
<td>576 to 591</td>
<td>Operating speed No.0 to No.15</td>
<td>0 to 4000 r/min</td>
<td>0</td>
</tr>
<tr>
<td>640 to 665</td>
<td>Operation mode No.0 to No.15</td>
<td>0: Incremental 1: Absolute</td>
<td>0</td>
</tr>
<tr>
<td>704 to 719</td>
<td>Operation function No.0 to No.15</td>
<td>0: Single-motion 1: Linked-motion 2: Linked-motion</td>
<td>0</td>
</tr>
<tr>
<td>768 to 783</td>
<td>Acceleration time No.0 to No.15</td>
<td>0.000 to 30.000 s</td>
<td>0.100</td>
</tr>
<tr>
<td>832 to 847</td>
<td>Deceleration time No.0 to No.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>896 to 911</td>
<td>Torque limiting No.0 to No.15</td>
<td>0 to 250%*</td>
<td>250</td>
</tr>
<tr>
<td>960 to 975</td>
<td>Sequential positioning No.0 to No.15</td>
<td>0: Disable 1: Enable</td>
<td>0</td>
</tr>
<tr>
<td>1024 to 1039</td>
<td>Dwell time No.0 to No.15</td>
<td>0.000 to 50.000 s</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* The motor may not start operating with the torque limiting value depending on variations in load torque, individual differences in motors, gearheads or drivers, as well as operating environment. Set the torque limiting value with providing a margin of 20% or more as a guide.

### I/O parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used may vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective</th>
<th>Control mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>256</td>
<td>STOP input action</td>
<td>Sets how the motor should stop when the STOP input is turned ON.</td>
<td>0: Immediate stop 1: Deceleration stop 2: Immediate stop + current OFF 3: Deceleration stop + current OFF Speed control mode (disable servo lock) 0: Immediate stop 1: Deceleration stop</td>
<td>0</td>
<td>A</td>
<td>O</td>
</tr>
<tr>
<td>258</td>
<td>Overtravel action</td>
<td>Sets how the motor should stop when an overtravel has occurred.</td>
<td>0: Immediate stop 1: Deceleration stop</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>259</td>
<td>Positioning completion signal range</td>
<td>Sets the output range that the END output is turned ON. The motor shaft rotates 0.72° per one step.</td>
<td>1 to 100 step</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2048</td>
<td>MS0 operation number selection</td>
<td>Sets the operation data number corresponding to the MS0 to MS5 inputs.</td>
<td>0 to 15</td>
<td>0</td>
<td>B</td>
<td>(\times)</td>
</tr>
<tr>
<td>2049</td>
<td>MS1 operation number selection</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2050</td>
<td>MS2 operation number selection</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2051</td>
<td>MS3 operation number selection</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2052</td>
<td>MS4 operation number selection</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2053</td>
<td>MS5 operation number selection</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2054</td>
<td>HOME-P output function selection</td>
<td>Sets the timing to output the HOME-P output.</td>
<td>0: Home output 1: Return-to-home complete output</td>
<td>0</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>2215</td>
<td>Rotation speed attainment band</td>
<td>Sets the output range for the VA output.</td>
<td>0 to 400 r/min</td>
<td>200</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>2290</td>
<td>BUSY/TLM switching</td>
<td>Uses in the BX-compatible mode. Switches the BUSY output and TLM output.</td>
<td>0: BUSY 1: TLM (TLC)</td>
<td>0</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

*1 Indicates the timing for the data to become effective. 

(A: Effective immediately, B: Effective after stopping the operation, C: Effective after turning on the power again)

*2 ○ : Possible to use.

\(\times\) : Not possible to use.
## Operation parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective</th>
<th>Control mode +2 Speed control</th>
<th>Position control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>323</td>
<td>JOG operation speed</td>
<td>Sets the operation speed for JOG operation.</td>
<td>0 to 4000 r/min</td>
<td>300</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>324</td>
<td>JOG acceleration/deceleration rate</td>
<td>Sets the acceleration and deceleration time for JOG operation.</td>
<td>0.00 to 30,000 s</td>
<td>0.100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2069</td>
<td>Servo lock at motor standstill</td>
<td>Uses in the speed control mode. If the holding force is required while the motor stops, set to &quot;1&quot; to enable the servo lock. However, when the &quot;STOP input action&quot; parameter (ID: 256) is set to 2 or 3, the holding force will not generate even if &quot;1: Servo lock&quot; is set.</td>
<td>0: Free (disable servo lock) 1: Servo lock</td>
<td>0</td>
<td>C</td>
<td></td>
<td>×</td>
</tr>
<tr>
<td>2081</td>
<td>JOG operation torque</td>
<td>Sets the maximum torque based on the rated torque being 100% in JOG operation.</td>
<td>0 to 250%</td>
<td>100</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2084</td>
<td>JOG travel amount</td>
<td>Sets the travel amount for JOG operation. The motor shaft rotates 0.72° per one step.</td>
<td>1 to 8,388,607 step</td>
<td>1</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2085</td>
<td>Speed reduction ratio</td>
<td>The speed reduction ratio can be set by multiplying the value in &quot;speed reduction ratio&quot; parameter by the value in &quot;speed reduction ratio digit setting&quot; parameter. If the speed reduction ratio is set, the rotation speed that is calculated based on the actual speed of the motor will be displayed.</td>
<td>100 to 9999</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2086</td>
<td>Speed reduction ratio digit setting</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2087</td>
<td>Speed increasing ratio</td>
<td>If the speed increasing ratio is set, the rotation speed that is calculated based on the actual speed of the motor will be displayed.</td>
<td>1 to 5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2289</td>
<td>Continuous operation</td>
<td>Uses in the BX-compatible mode (position control). Sets whether to enable or disable the continuous operation.</td>
<td>0: Disable 1: Enable</td>
<td>0</td>
<td>C</td>
<td></td>
<td>×</td>
</tr>
</tbody>
</table>

*1 Indicates the timing for the data to become effective.
(A: Effective immediately, B: Effective after stopping the operation, C: Effective after turning on the power again)

*2 ○ : Possible to use.
× : Not possible to use.

### 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 digit setting" parameter (ID: 2086).

The relationships of speed reduction ratio and decimal position are explained by the combinations shown below.

<table>
<thead>
<tr>
<th>Actual speed reduction ratio</th>
<th>&quot;Speed reduction ratio&quot; parameter</th>
<th>&quot;Speed reduction ratio digit setting&quot; parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 to 9.99</td>
<td>100 to 999</td>
<td>2</td>
</tr>
<tr>
<td>10.00 to 99.9</td>
<td>1000 to 9999</td>
<td></td>
</tr>
<tr>
<td>100 to 999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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• Display after setting the speed reduction ratio

<table>
<thead>
<tr>
<th>Speed reduction ratio</th>
<th>Speed increasing ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 to 9.99</td>
<td>2 to 5</td>
</tr>
<tr>
<td>10.00 to 99.99</td>
<td></td>
</tr>
<tr>
<td>100.0 to 999.9</td>
<td></td>
</tr>
<tr>
<td>1000 to 9999</td>
<td></td>
</tr>
</tbody>
</table>

- **Speed reduction ratio:**
  - 1.00 to 9.99
  - 10.00 to 99.99
  - 100.0 to 999.9
  - 1000 to 9999

- **Speed increasing ratio:**
  - 2 to 5

• Display the conveyor transfer speed

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

\[
\text{Conveyor speed reduction ratio} = \frac{1}{\text{Feed rate per motor revolution} \times \text{Gear ratio of gearhead}} \times \frac{\text{Pulley diameter} [\text{m}] \times \pi}{\text{Conveyor speed reduction ratio}}
\]

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

\[
\text{Conveyor transfer speed} [\text{m/min}] = \frac{\text{Rotation speed of motor output shaft} [\text{r/min}]}{\text{Conveyor speed reduction ratio}}
\]

**Example:**
The pulley diameter is 0.1 m and gear ratio (speed reduction ratio) of the gear head is 20

\[
\text{Conveyor speed reduction ratio} = \frac{20}{0.1 \times \pi} \approx 63.7
\]

From the conversion formula, the conveyor speed reduction ratio is calculated as 63.7 in this example. This means that the "speed reduction ratio" parameter (ID: 2085) is 637, while the "speed reduction ratio digit setting" parameter (ID: 2086) is 1.

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

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

"20.4" is displayed on the **OPX-2A**.
Parameter

Motor parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective*1</th>
<th>Control mode*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>290</td>
<td>Position loop gain</td>
<td>Adjusts the motor response in reaction to the position deviation.</td>
<td>1 to 100 Hz</td>
<td>7</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>291</td>
<td>Speed loop gain</td>
<td>Adjusts the motor response in reaction to the speed deviation.</td>
<td>1 to 1000 Hz</td>
<td>200</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>292</td>
<td>Speed loop integral time constant</td>
<td>Adjusts the deviation that cannot be adjusted with the speed loop gain.</td>
<td>0 to 1000 ms</td>
<td>33</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>293</td>
<td>Speed filter</td>
<td>Adjusts the motor response.</td>
<td>0 to 200 ms</td>
<td>1</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>294</td>
<td>Moving average time</td>
<td>Sets the time constant for the moving average filter.</td>
<td>1 to 200 ms</td>
<td>1</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2064</td>
<td>Speed filter selection</td>
<td>Sets the filter function to adjust the motor response.</td>
<td>0: Without speed filter 1: Speed filter 2: Moving average</td>
<td>0</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

*1 Indicates the timing for the data to become effective.
(A: Effective immediately, B: Effective after stopping the operation, C: Effective after turning on the power again)
*2 ○ : Possible to use.
× : Not possible to use.
*3 Possible to use when the "servo lock at motor standstill" parameter (ID: 2069) is set to "1: Servo lock."

- Position loop gain, speed loop gain, speed loop integral time constant
  Vibration that occurs while the motor is accelerating/decelerating or at standstill can be adjusted to an optimal value. (The optimal value varies depending on the equipment or operating conditions.)

  **Related parameters**

  - **Position loop gain**
    Adjusts the motor response in reaction to the position deviation. When this value is increased, the deviation between the command position and actual position will be small. An excessively high value may increase the motor overshooting or cause the motor to vibrate.

  - **Speed loop gain**
    Adjusts the motor response in reaction to the speed deviation. When this value is increased, the deviation between the command speed and actual speed will be small. An excessively high value may increase the motor overshooting or cause the motor to vibrate.

  - **Speed loop integral time constant**
    Decreases the deviation that cannot be adjusted with the speed loop gain. An excessively long value may slow the motor response. Too short value may cause the motor to vibrate.

- Speed filter
  When setting the "speed filter" parameter (ID: 293) while the "speed filter selection" parameter (ID: 2064) is set to "1: speed filter," the command position is filtered and the motor response can be adjusted. When the speed filter level is increased, the motor operation at starting/stopping will become smooth. Note, however, that an excessively long filter level will result in lower synchronization against the commands. Set an appropriate value according to the specific load and application.

- When the "speed filter" parameter is set to 0 ms

- When the "speed filter" parameter is set to 200 ms

  ![Diagram](image)

**Note**
- If the "speed filter" parameter (ID: 293) is set to 0, the speed filter will be disabled.
- When the "servo lock at motor standstill" parameter (ID: 2069) is set to "0: Free" in the speed control mode, the speed filter will be disabled.
• Moving average filter
When setting the "moving average time" parameter (ID: 294) while the "speed filter selection" parameter (ID: 2064) is set to "2: moving average," the motor response can be adjusted. The positioning time can be shortened by suppressing the residual vibration for positioning operation.
Optimum value for the "moving average time" parameter varies depending on the load or operating condition. Set a suitable value based on the load or operating condition.

• When the "moving average filter" is not used

• When the "moving average filter" parameter is set to 200 ms

### Alarm/Warning Parameter
All parameters can be set in both the speed control mode and position control mode.
The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective duration</th>
<th>Control mode</th>
<th>Speed control</th>
<th>Position control</th>
</tr>
</thead>
<tbody>
<tr>
<td>385</td>
<td>Excessive position deviation alarm</td>
<td>Sets the condition in which an excessive position deviation alarm generates.</td>
<td>0.01 to 300.00 rev</td>
<td>20.00</td>
<td></td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>419</td>
<td>Overvoltage warning</td>
<td>Sets the condition in which an overvoltage warning generates.</td>
<td>120 to 440 V</td>
<td>435</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>421</td>
<td>Excessive position deviation warning</td>
<td>Sets the condition in which an excessive position deviation warning generates.</td>
<td>0.01 to 300.00 rev</td>
<td>20.00</td>
<td></td>
<td></td>
<td>×</td>
<td>O</td>
</tr>
<tr>
<td>2113</td>
<td>Prevention of operation at power-on alarm function</td>
<td>Sets whether to enable or disable the &quot;prevention of operation at power-on alarm function.&quot;</td>
<td>0: Disable 1: Enable</td>
<td>0</td>
<td></td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>2129</td>
<td>Overload warning function</td>
<td>Sets whether to enable or disable the overload warning function.</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>2133</td>
<td>Overload warning level</td>
<td>Sets the condition in which the overload warning generates.</td>
<td>50 to 100%</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Indicates the timing for the data to become effective. (A: Effective immediately)
*2 ○ : Possible to use.
   × : Not possible to use.
### Return-to-home parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective</th>
<th>Control mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>353</td>
<td>Operating speed of home-seeking</td>
<td>Set the operation speed of return-to-home operation.</td>
<td>0 to 4000 r/min</td>
<td>300</td>
<td>B</td>
<td>×</td>
</tr>
<tr>
<td>354</td>
<td>Acceleration/deceleration of home-seeking</td>
<td>Sets the acceleration and deceleration time for return-to-home operation.</td>
<td>0.000 to 30.000 s</td>
<td>0.100</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>356</td>
<td>Position offset of home-seeking</td>
<td>Sets the amount of offset from home position. The motor shaft rotates 0.72° per one step.</td>
<td>−8,388,608 to +8,388,607 step</td>
<td>0</td>
<td>B</td>
<td>×</td>
</tr>
<tr>
<td>357</td>
<td>Starting direction of home-seeking</td>
<td>Sets the starting direction for home detection.</td>
<td>0: Negative direction</td>
<td>1</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

-1. Indicates the timing for the data to become effective. (B: Effective after stopping the operation)
-2. ○: Possible to use.
-3. ×: Not possible to use.

### Coordination parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective</th>
<th>Control mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>450</td>
<td>Motor rotation direction</td>
<td>Sets the rotation direction of the motor output shaft.</td>
<td>0: Positive direction=CCW 1: Positive direction=CW</td>
<td>1</td>
<td>C</td>
<td>○</td>
</tr>
<tr>
<td>451</td>
<td>Software overtravel</td>
<td>Sets whether to enable or disable software overtravel detection using software limits.</td>
<td>0: Disable 1: Enable</td>
<td>1</td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>452</td>
<td>Positive software limit</td>
<td>Sets the value of software limit in positive direction. The motor shaft rotates 0.72° per one step.</td>
<td>−8,388,608 to +8,388,607 step</td>
<td>+8,388,607</td>
<td>A</td>
<td>×</td>
</tr>
<tr>
<td>453</td>
<td>Negative software limit</td>
<td>Sets the value of software limit in negative direction. The motor shaft rotates 0.72° per one step.</td>
<td>−8,388,608 to +8,388,607 step</td>
<td>−8,388,608</td>
<td>A</td>
<td>×</td>
</tr>
<tr>
<td>454</td>
<td>Preset position</td>
<td>Sets the preset position. The motor shaft rotates 0.72° per one step.</td>
<td>0</td>
<td>0</td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>455</td>
<td>Wrap setting</td>
<td>Sets whether to enable or disable the wrap function.</td>
<td>0: Disable 1: Enable</td>
<td>0</td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>456</td>
<td>Wrap setting range</td>
<td>Sets the wrap setting range. The motor shaft rotates 0.72° per one step.</td>
<td>1 to 8,388,607 step</td>
<td>1000</td>
<td></td>
<td>○</td>
</tr>
</tbody>
</table>

-1. Indicates the timing for the data to become effective. (A: Effective immediately, C: Effective after turning on the power again)
-2. ○: Possible to use.
-3. ×: Not possible to use.
## Analog adjustment parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective *1</th>
<th>Control mode +2 Speed control</th>
<th>Position control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2256</td>
<td>Analog operation speed command gain</td>
<td>Sets the speed command per 1 VDC of the input voltage by the analog external setter.</td>
<td>0 to 4000 r/min/V</td>
<td>850 (635) *3</td>
<td>O</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>2257</td>
<td>Analog operation speed command offset</td>
<td>Sets the offset of the speed command input by the analog external setter.</td>
<td>−2000 to +2000 r/min</td>
<td>0</td>
<td>A</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2258</td>
<td>Analog torque limiting gain</td>
<td>Sets the torque limiting per 1 VDC of the input voltage by the analog external setter.</td>
<td>0 to 250%/V</td>
<td>54</td>
<td>O</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>2259</td>
<td>Analog torque limiting offset</td>
<td>Sets the offset of the torque limiting input by the analog external setter.</td>
<td>−50 to +50%</td>
<td>0</td>
<td>O</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>2261</td>
<td>Analog operation speed maximum value</td>
<td>Sets the maximum value of the rotation speed by the analog external setter.</td>
<td>0 to 4000 r/min</td>
<td>4000 (3150) *3</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2263</td>
<td>Analog torque limiting maximum value</td>
<td>Sets the maximum value of the torque limiting by the analog external setter.</td>
<td>0 to 250%</td>
<td>250</td>
<td>O</td>
<td>×</td>
<td></td>
</tr>
</tbody>
</table>

*1 Indicates the timing for the data to become effective. (A: Effective immediately, C: Effective after turning on the power again)

*2 ○ : Possible to use.

× : Not possible to use.

*3 When the BX-compatible mode is used

## Common parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective *1</th>
<th>Control mode +2 Speed control</th>
<th>Position control</th>
</tr>
</thead>
<tbody>
<tr>
<td>480</td>
<td>Data setter speed display</td>
<td>Sets the display method of the speed monitor for the OPX-2A.</td>
<td>0: Plus sign</td>
<td>0</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Absolute value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Minus sign</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2160</td>
<td>Data setter initial display</td>
<td>Sets the initial screen to display on the OPX-2A when the driver power is turned on.</td>
<td>0: Speed</td>
<td>0</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Detected position</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Load factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: Operation data number</td>
<td>0 or 1: Digital setting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: Selection number</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: Top screen of monitor mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2161</td>
<td>Analog speed/torque</td>
<td>Changes the setting method of operation speed and torque limiting. Refer to the next clause for details.</td>
<td>0: Speed</td>
<td>1</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Analog setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2162</td>
<td>Analog acceleration/deceleration</td>
<td>Changes the setting method of acceleration/deceleration. Refer to the next page for details.</td>
<td>0: Digital setting</td>
<td>1</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Analog setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2164</td>
<td>Panel initial view</td>
<td>Sets the initial screen to display on the operation panel when the driver power is turned on.</td>
<td>0: Speed</td>
<td>0</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Detected position</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Load factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: Operation data number</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: Selection number</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: Top screen of monitor mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Indicates the timing for the data to become effective. (A: Effective immediately, C: Effective after turning on the power again)

*2 ○ : Possible to use.

× : Not possible to use.
Analog speed/torque parameter (ID: 2161)

The setting method of operation data can be changed using "analog speed/torque" parameter (ID: 2161) and "analog acceleration/deceleration" parameter (ID: 2162).

- Analog setting .......... Internal potentiometer (SPEED), PAVR-20KZ (sold separately), external DC voltage
- Digital setting .......... OPX-2A, Operation panel, MEXE02

Speed control mode

The setting method of operation speed and torque limiting can be changed between the analog setting and digital setting.

<table>
<thead>
<tr>
<th>Operation data</th>
<th>When the parameter is 0</th>
<th>When the parameter is 1</th>
<th>When the parameter is 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operation speed</td>
<td>Torque limiting</td>
<td>Operation speed</td>
</tr>
<tr>
<td>No.0</td>
<td>Digital setting</td>
<td>Digital setting</td>
<td>PAVR-20KZ</td>
</tr>
<tr>
<td>No.1</td>
<td>Digital setting</td>
<td>Digital setting</td>
<td>Digital setting</td>
</tr>
<tr>
<td>No.2 to No.5</td>
<td>Digital setting</td>
<td>Digital setting</td>
<td>Digital setting</td>
</tr>
</tbody>
</table>

Setting example

- When all operation data is set by the digital setting: Set the "analog speed/torque" parameter to 0.
- When the operation speed of the operation data Nos. 0 and 1 is set by the analog setting: Set the "analog speed/torque" parameter to 1.

Position control mode

The operation speed is set by the digital setting. Note, however, that the torque limiting can also be set by the analog setting.

<table>
<thead>
<tr>
<th>Operation data</th>
<th>When the parameter is 0</th>
<th>When the parameter is 1</th>
<th>When the parameter is 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operation speed</td>
<td>Torque limiting</td>
<td>Operation speed</td>
</tr>
<tr>
<td>No.0 to No.15</td>
<td>Digital setting</td>
<td>Digital setting</td>
<td>Digital setting</td>
</tr>
<tr>
<td>No.2 to No.5</td>
<td>Digital setting</td>
<td>Digital setting</td>
<td>Digital setting</td>
</tr>
</tbody>
</table>

Setting example

- When all operation data is set by the digital setting: Set the "analog speed/torque" parameter to 0 or 1.
- When the torque limiting is set by the analog setting: Set the "analog speed/torque" parameter to 2.

Analog acceleration/deceleration parameter (ID: 2162)

This parameter is effective in the speed control mode.
The setting method of acceleration time and deceleration time can be changed between the analog setting and digital setting.

- Analog setting .......... Acceleration time potentiometer (ACC), Deceleration time potentiometer (DEC)
- Digital setting .......... OPX-2A, Operation panel, MEXE02

<table>
<thead>
<tr>
<th>Operation data</th>
<th>When the parameter is 0</th>
<th>When the parameter is 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acceleration time</td>
<td>Deceleration time</td>
</tr>
<tr>
<td>No.0</td>
<td>Digital setting</td>
<td>Digital setting</td>
</tr>
<tr>
<td>No.1</td>
<td>Digital setting</td>
<td>Digital setting</td>
</tr>
<tr>
<td>No.2 to No.5</td>
<td>Digital setting</td>
<td>Digital setting</td>
</tr>
</tbody>
</table>
## I/O function parameter

All parameters can be set in both the speed control mode and position control mode. The parameters that can be used vary depending on the control mode.

<table>
<thead>
<tr>
<th>ID</th>
<th>Parameter name</th>
<th>Description</th>
<th>Setting range</th>
<th>Initial value</th>
<th>Effective *1</th>
<th>Control mode +2</th>
<th>Speed control</th>
<th>Position control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2176</td>
<td>IN0 input function selection</td>
<td>Assigns the input signals to the input terminals IN0 to IN8.</td>
<td>Refer to the next table.</td>
<td>1 [3] *3</td>
<td></td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2177</td>
<td>IN1 input function selection</td>
<td></td>
<td></td>
<td>2 [4] *3</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2178</td>
<td>IN2 input function selection</td>
<td></td>
<td></td>
<td>48</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2179</td>
<td>IN3 input function selection</td>
<td></td>
<td></td>
<td>49</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2180</td>
<td>IN4 input function selection</td>
<td></td>
<td></td>
<td>50</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2181</td>
<td>IN5 input function selection</td>
<td></td>
<td></td>
<td>16</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2182</td>
<td>IN6 input function selection</td>
<td></td>
<td></td>
<td>18</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2183</td>
<td>IN7 input function selection</td>
<td></td>
<td></td>
<td>24</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2184</td>
<td>IN8 input function selection</td>
<td></td>
<td></td>
<td>0 [62] *3</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2192</td>
<td>IN0 input logic level setting</td>
<td>Changes the logic level setting for the input terminals IN0 to IN8.</td>
<td></td>
<td>0</td>
<td>Normal 0: 1: Invert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2193</td>
<td>IN1 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2194</td>
<td>IN2 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2195</td>
<td>IN3 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2196</td>
<td>IN4 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2197</td>
<td>IN5 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2198</td>
<td>IN6 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2199</td>
<td>IN7 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>IN8 input logic level setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2208</td>
<td>OUT0 output function selection</td>
<td>Assigns the output signals to the output terminals OUT0 to OUT2.</td>
<td>Refer to the next table.</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2209</td>
<td>OUT1 output function selection</td>
<td></td>
<td></td>
<td>68 [67] *3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2210</td>
<td>OUT2 output function selection</td>
<td></td>
<td></td>
<td>66 [70] *3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Indicates the timing for the data to become effective. (C: Effective after turning on the power again)

*2 ○ : Possible to use.

× : Not possible to use.

*3 This is the initial value for the speed control mode. The value in the brackets [ ] is applied for the position control mode.

Refer to the BX II Series OPERATING MANUAL for when using the product in the BX-compatible mode.

### Setting range of the function selection parameter

#### IN input function selection parameter

- 0: Not used
- 1: FWD *
- 2: RVS *
- 3: HOME
- 4: START
- 5: RSTART
- 6: +JOG
- 7: −JOG
- 10: MS2
- 11: MS3
- 12: MS4
- 13: MS5
- 16: FREE
- 17: S-ON
- 18: STOP *
- 20: STPL *
- 22: TH
- 24: ALM-RST
- 25: P-PRESET
- 27: HMI
- 48: M0
- 49: M1
- 50: M2
- 51: M3
- 54: TL
- 62: HOMES *
- 65: ALM
- 66: WNG
- 67: READY
- 68: MOVE
- 69: END
- 70: HOME-P
- 71: TLC *
- 77: VA
- 85: ZSG
- 86: HOME-P

* For the BX-compatible mode, the name of each signal changes as follows.

FWD → CW, RVS → CCW, STOP → BRAKE, HOME → HOME-LS

#### OUT output function selection parameter

- 0: Not used
- 65: ALM
- 66: WNG
- 67: READY
- 68: MOVE
- 69: END
- 70: HOME-P
- 71: TLC *
- 77: VA
- 85: ZSG

* For the BX-compatible mode, the name of each signal changes as follows.

TLC → TLM

**Note**

The signals that can be used vary depending on the control mode. Use signals after setting correctly.