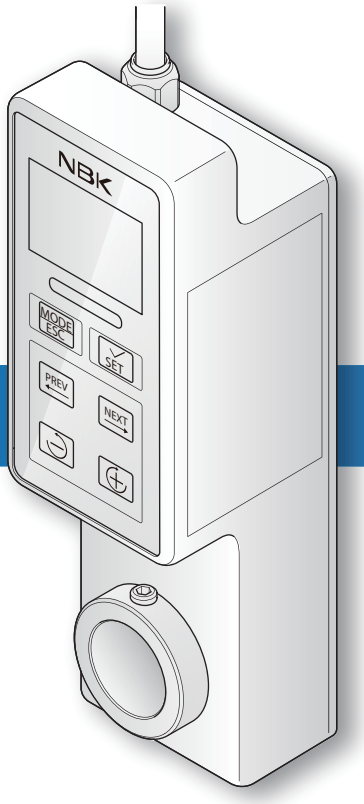


Instruction Manual

EPU-210

Wired Positioning Units - Modbus Compliant

NBK®

Couplings, Screws, Clampers

Introduction

We wish to thank you for purchasing **Wired Positioning Units - Modbus Compliant (EPU-210)** from NBK.

Carefully read this manual to ensure proper operation.
"1. Safety Precautions" is an especially important section. Be sure to fully understand the contents of that section before use.
Store this manual in a location where it can be readily accessed when needed.

Use of this Product

This product is designed for general industrial applications such as feed screw driving.
Do not use this product for applications in which improper use or failure could result in death or injury, or applications in which failure could result in serious public damage or similar negative effects.

- **Contact us if you are considering a special use of this product.**
- **Incorporate and install failsafe functions (emergency stop, monitoring, and similar devices) if using this product in equipment that could cause a serious accident or loss.**

About Disposal

When disposing this product, follow the rules and regulations of the corresponding local government and dispose of it as industrial waste.

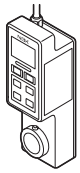
Some of the specifications described in this document are subject to change without notice due to product improvements.

Explanation of Symbols

Specific information is indicated in written form near each symbol.

Point	Indicates supplementary written explanation and useful information.
	Indicates the reference page(s) in this or related instruction manuals.

Check the Packaged Items

Main unit (x1) Model: EPU-210	Hex socket set screw M5x6 (x1)	Simple Guide	Terminating resistor* 120 Ω (x1)
			

* For host-side connection

Instruction Manuals for Wired Positioning Units

Prepare the following manuals according to the products you have purchased.

All of the following PDF instruction manuals can be downloaded from our product page:
https://www.nbk1560.com/en-US/products/mechatronics/positioning_unit

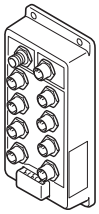
● Dedicated Software for Wired Positioning Units

- MOD-COM

MOD-COM

● Repeater Hubs

- EORP-200



Contents of This Manual

This manual contains the following chapters.

Chapter 1 Safety Precautions

Contains important precautions to ensure safe setup settings.

Chapter 2 Overview

Explains the option products that can be mounted to a unit.
Explains the names and functions, and how to read the product nameplate and number of each unit part.

Chapter 3 Specifications

Explains the specifications of units and high torque adapters (optional).

Chapter 4 Installation and Connections

Explains how to install units and options.
Explains connection examples if using the unit alone, or the higher-level host is a PC or PLC.

Chapter 5 Flow-Chart from Unit Wiring to Operation

Explains the flow from unit wiring to operation if using the unit itself for settings and control, or the higher-level host is a PC or PLC.

Chapter 6 Overview of Seven-Segment Display and Displayed Items

Explains how to read the seven-segment displayed (digital letters) and displayed items.

Chapter 7 Settings and Control by Unit Alone

Explains in detail settings and button operations if performing setup operations by using only the unit itself.

Chapter 8 Communication Settings

Explains the communication settings required if units are connected to a higher-level host (PC or PLC).

Chapter 9 Unit Settings and Control by PC

Explains settings and control if using a PC as the higher-level host of the units.
For more details, please refer to the "Dedicated Software (MOD-COM) Instruction Manual".

Chapter 10 Unit Settings and Control by PLC

Explains settings and control if using a PLC as the higher-level host of the units.
It is useful as informational material for creating ladders.

Chapter 11 Unit Replacement

Explains the procedures for unit replacement due to malfunction or similar problem.
For replacement procedures if using a PC as the higher-level host of the units, please refer to the "Dedicated Software (MOD-COM) Instruction Manual".

Chapter 12 Appendix

Provides mode transition flow-charts for all possible unit operations.
For more details, please refer to Chapter 7 "Settings and Control by Unit Alone".

Chapter 13 Maintenance

Explains the important points and inspection items for periodic inspection in order to ensure safe equipment operation.

Chapter 14 Troubleshooting

Provides methods for resolving abnormalities resulting from an unidentified cause and restoring it to its normal status.

Chapter 15 Error Codes

Explains the seven-segment error codes indicated on the display.

Chapter 16 Dimensional Outline Drawings

Describes the external dimensions of units and option products.

Chapter 17 EMC Precautions

Explains EMC precautions to be taken.

Chapter 18 Laws and regulations

Explains the certification of conformity with technical standards based on the Radio Law.

Chapter 19 Warranty

Provides the detailed warranty of the units and the contact information for our company.

Contents

Contents

1 Safety Precautions

1.1 Essential Precautions

To ensure safety, please thoroughly read the following precautions and understand correctly before using this product.

(1) When setting up a system that includes wired positioning units, be sure to confirm the specifications of each equipment and device used in the system, and make sure that they are operated within their specified ratings and performance limits. Be sure to implement appropriate safety measures such as installing a safety circuit that minimizes danger even in the event of a failure.

(2) To ensure safe operation of wired positioning units, be sure to thoroughly read the Safety Precautions for each equipment or device used in the entire system.

(3) Customers are requested to confirm all standards and regulations that apply to the wired positioning units.

(4) Improper handling or misuse may lead to an accident or shorten the service life of the product.

(5) Unless otherwise stipulated by law, we shall not be held liable for any damages resulting from improper use by the customer or a third party, failures that occur during use, other defects, or damages caused by the use of this product.

Safety precautions in this manual are classified as indicated below in order to prevent personal damage, and damage to the units and peripheral equipment.

Specific safety precautions are indicated in written form near each WARNING and CAUTION symbol.

 WARNING	Indicates that improper handling can lead to a dangerous situation that may result in death or serious injury*1.
 CAUTION	Indicates that improper handling may lead to minor injury*2 or damage to this product or peripheral equipment.

*1: "Serious injury" refers to loss of eyesight, injury, burns, electric shock, broken bone, poisoning, and similar injuries that have aftereffects, and require hospitalization or long-term treatment in order to recover.

*2: "Minor injury" refers to injuries, burns, electric shock, and similar injuries not requiring hospitalization or long-term treatment in order to recover.

Specific information is indicated in written form near each symbol.

 PROHIBITED	Indicates a prohibited action. Never perform any prohibited work or action.
 COMPULSORY / INSTRUCTION	Indicates the action is mandatory and must be performed. Perform the compulsory work/action as indicated.

1.2 Precautions Related to Installation and Wiring Work

[Perform as Indicated in Order to Prevent Injury, Electric Shock, Fire, and Failure]

- Be sure to install the product in a safe and secure manner to prevent fire or accidents in case of an earthquake.
- Ensure that wiring work is performed after installation and the power supply terminal connections are properly insulated.
- Be sure to install an external emergency stop circuit so that operation is immediately stopped and the power is shut off in the event of an abnormality.
- If there is a potential for danger during a stoppage or a product failure, be sure to install an external brake for holding the product.

[Prohibited Actions in Order to Prevent Injury, Electric Shock, Fire, and Failure]

- Make sure that the power supply and other cords are protected from damage.
- Ensure that fragments of metal cannot enter the product, it is protected from splashes of water, and it is always kept dry.
- Do not perform wiring work with wet hands.
- Do not install the product in a place where it will be exposed to violent vibration or shock.

1 Safety Precautions

[Perform as Indicated in Order to Prevent Injury, Electric Shock, Fire, and Failure]

- Ensure that the wiring work is correctly performed and install according to the specified procedure.
- Be sure to use a DC power supply (+24 V) that provides stable operation to power a 24 VDC SELV circuit.
- When wiring up a SELV circuit for the power supply (+24 V), pay particular attention to the polarity of the terminals.
- Be sure to securely connect the SELV circuit so that it will not detach off or be loose.
- Install the product in a location with an ambient temperature ranging from -5 to 50°C (23 to 122°F) (no freezing) and an ambient humidity ranging from 20 to 85% RH (no condensation).
- Check and adjust all settings before operation in order to prevent unexpected operation.
- Precisely adjust the alignment of the output shaft and the mating device.
- Be sure to install the product in an appropriate environment that satisfies its required specifications such as main unit mass and rated output.

[Perform as Indicated in Order to Prevent Other Damage]

- Install the product in a location that allows an appropriate work space for operation, adjustment, and maintenance.
- Since electrical noise may be generated by the PWM control system, be sure to implement countermeasures for peripheral equipment subject to noise. Be sure to also fully consider the installation environment as the units themselves may be affected by external noise.

[Prohibited Actions in Order to Prevent Fire and Failure]

- Do not use the product outdoors or in places where it may be exposed to direct sunlight (UV rays).
- Do not use the product in places with a generation of static electricity.
- Ensure that the output shaft is not subject to strong impacts or loads that exceed the allowable load.
- Do not directly connect the product to an AC power supply.
- Do not apply voltage with any power supply other than that specified.
- Do not stack the product.
- Do not grip cables or the output shaft when moving the product.
- Avoid strong impacts or other damage.

1.3 Precautions Related to Operation and Inspection

[Perform as Indicated in Order to Prevent Injury, Electric Shock, Fire, and Failure]

- When an error occurs, remove the cause, and check safety before restarting operation.
- Be sure to perform maintenance and inspection on a monthly basis and ensure that adequate space is provided for such work.
- Provide appropriate measures such as enclosures to protect workers from impacts during operation, adjustment, and maintenance work.

[Prohibited Actions in Order to Prevent Injury, Electric Shock, Fire, and Failure]

- Do not disassemble, repair, or modify the product.
- If you observe a failure, immediately shut off the power supply and do not turn it back on.
- Do not move, inspect, or perform wiring work while the product power is on.
- Do not handle flammable gas in the vicinity of the product.
- Do not touch the output shaft during operation.

[Prohibited Actions in Order to Prevent Burns]

- Do not touch the units while they are powered on or soon after the power has been turned off as they may be extremely hot.

[Perform as Indicated in Order to Prevent Injury and Failure]

- Be sure to turn off the power if you plan on not using the product for an extended period of time.

[Prohibited Actions in Order to Prevent Injury, Fire, and Failure]

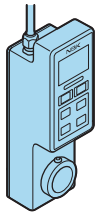
- Do not continue to use the units if they have been damaged.
- Do not frequently turn the power on and off.
- Do not continuously operate the product for an extended period of time.
- Do not approach the equipment when a power failure occurs due to the possibility of operation suddenly restarting when the power is restored.

[Prohibited Actions in Order to Prevent Unstable Operation]

- Do not make any drastic adjustments or changes.
- Do not stand on or place heavy objects on top of the product.

2 Overview

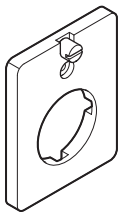
2.1 Product Overview



Wired Positioning Units - Modbus Compliant (EPU-210)

This unit automates the positioning mechanism of the feed screw. By replacing the feed screw operation handle with the unit, it automates the positioning mechanism of various devices and equipment. Equipment settings and control can be performed via a PC or PLC, or by using the unit itself.

Optional

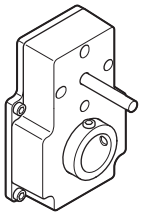


Mounting Plates (EOAP-200)

If replacing the digital position indicator and handle attached to a machine with a wired positioning unit, you can use the positioning pin hole for the digital position indicator of the machine as-is to mount the wired positioning unit.

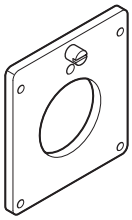
Collars (EOCL-200)

The wired positioning unit shaft hole diameter can be changed to match the rotating shaft.



High Torque Adapters (EOAT-200)

Allows you to decelerate the rotating speed and amplify the torque of the wired positioning units.



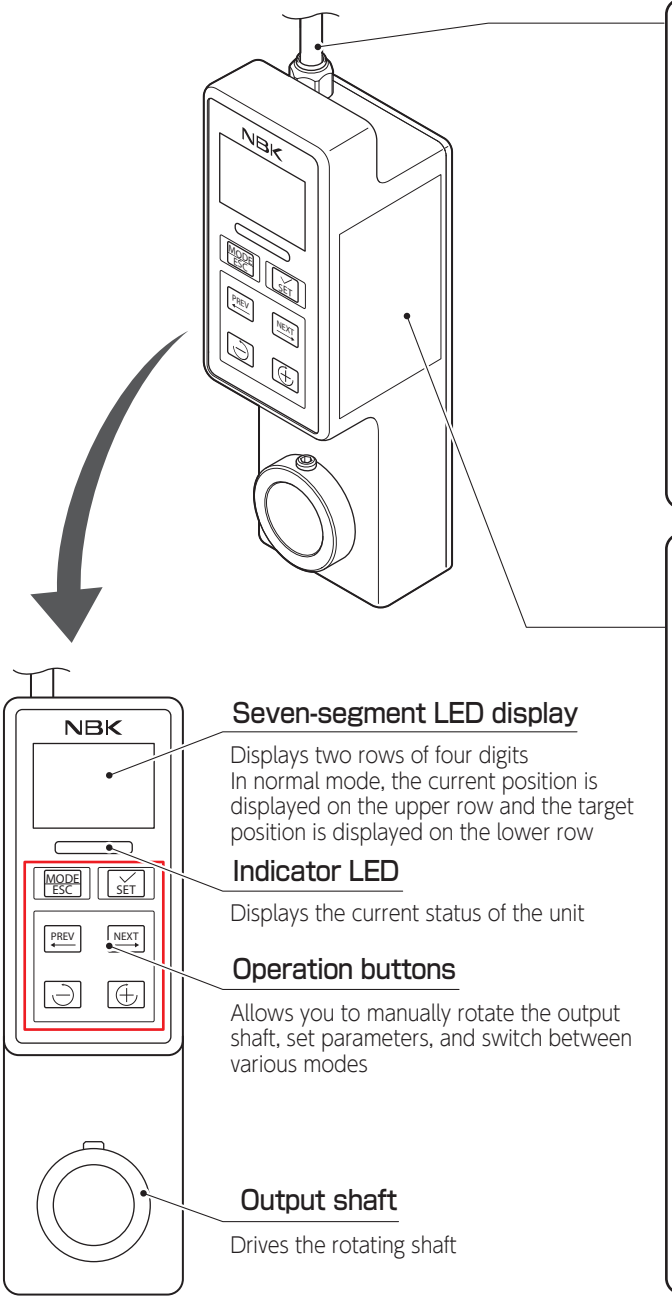
Mounting Plates for High Torque Adapters (EOTAP-200)

If replacing the digital position indicator and handle attached to a machine with a wired positioning unit and high torque adapter, you can use the positioning pin hole for the digital position indicator of the machine as-is to mount the high torque adapter.

Collars for High Torque Adapters (EOTCL-200)

The high torque adapter shaft hole diameter can be changed to match the rotating shaft.

2.2 Part Names and Functions



Seven-segment LED display

Displays two rows of four digits
In normal mode, the current position is displayed on the upper row and the target position is displayed on the lower row

Indicator LED

Displays the current status of the unit

Operation buttons

Allows you to manually rotate the output shaft, set parameters, and switch between various modes

Output shaft

Drives the rotating shaft

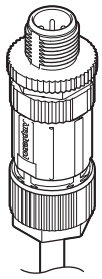
Power Supply/Communication Cable

Cable used for the supply of 24 VDC power and wired communication

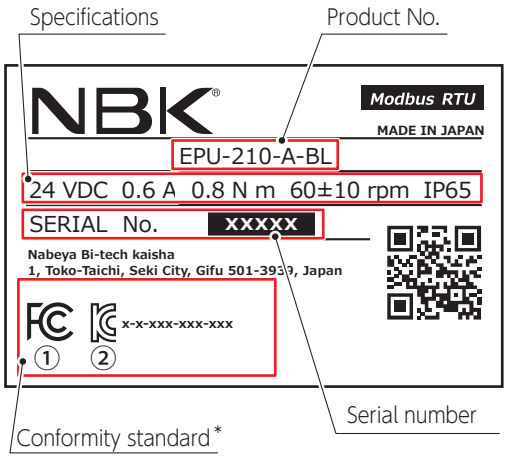
Cable End Specifications

A: Loose wires

B: Connector



Sample Product Nameplate



This product conforms to the following standards:
① FCC mark: US standards
② KC mark: Korean standards

* The conformity markings shown may vary depending on the particular product number.

Reading Product Numbers

EPU-210-A-BL

Series name
EPU-210: Wired Positioning Units 210 Series

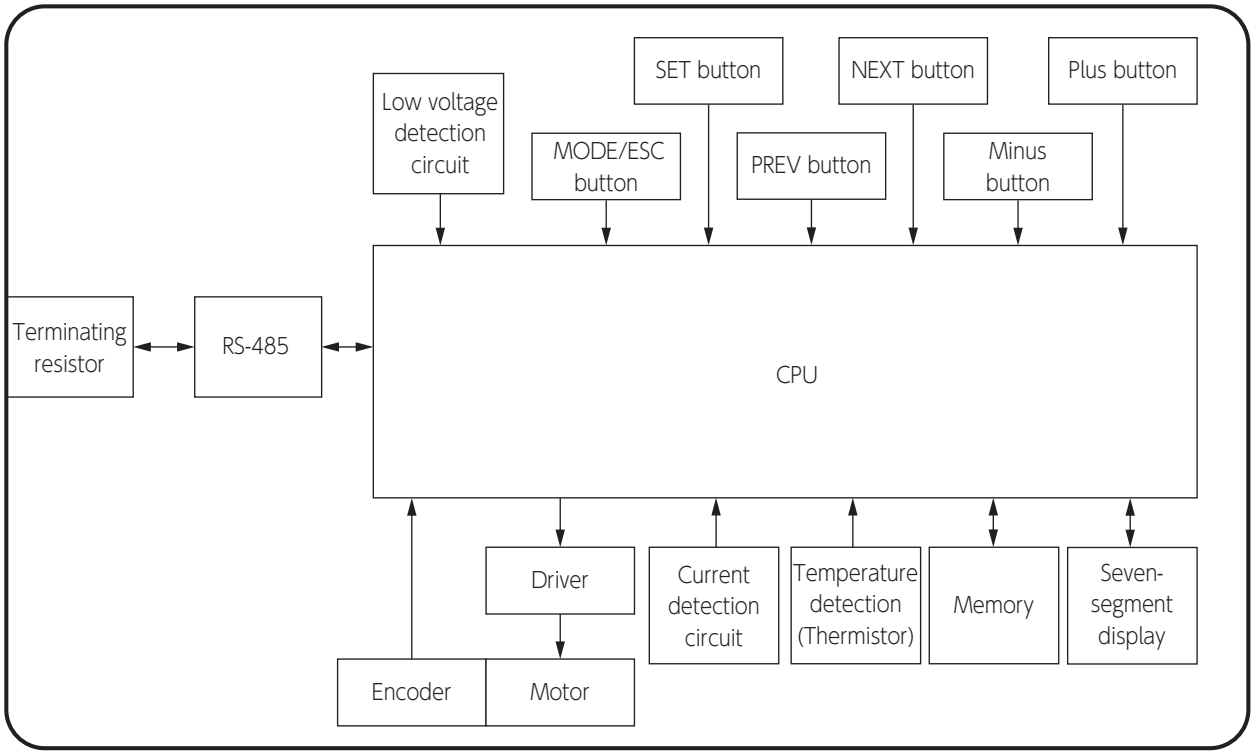
Cable end specifications
A: Loose wires
B: Connector

Case color*
BL: Blue
BK: Black

*You may not be able to specify a case color.

2.3 Block Diagram

Wired Positioning Units - Modbus Compliant (EPU-210)



3 Specifications

Operating Environment

Operating environment	Temperature	-5 to 50°C (23 to 122°F) (no freezing)
	Humidity	20 to 85% RH (no condensation)
	Pollution degree rating	3
	Elevation	No greater than 2,000 m (6,600 ft) above sea level

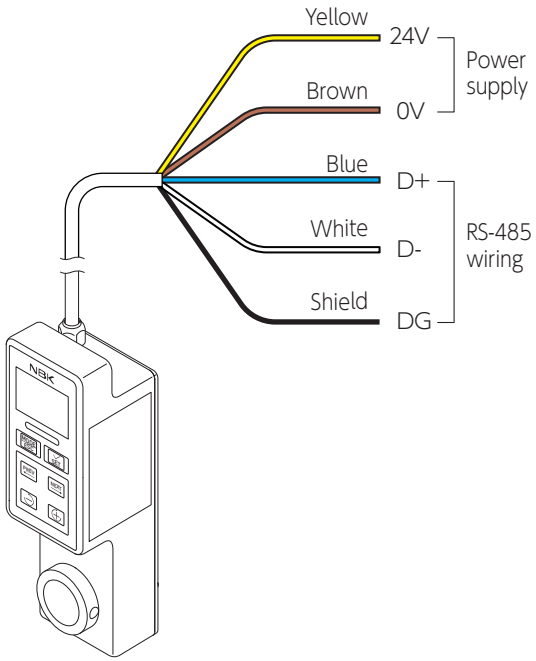
Wired Positioning Units - Modbus Compliant (EPU-210)

Power supply voltage		24 VDC ±10%
Current consumption	Standby	30 mA
	Rated	0.6 A
	Max.	1 A
Rated output		5 W
Rated rotational speed		60 ± 10 rpm
Rated torque		0.8 N m (7.07 lbf in.)
Continuous operable time		Not exceeding one minute[*1]
Allowable output shaft load	Radial load	19.6 N (4.4 lbf)
	Thrust load	19.6 N (4.4 lbf)
Output shaft holding torque		0.7 N m (6.19 lbf in.)[*2]
Stop accuracy		±5°
Input	Wired communication	RS-485 (Modbus RTU)
IP code		IP65
External dimensions (excluding the power cable and protrusions)		45 mm x 150 mm x 45 mm (1.772 in. x 5.906 in. x 1.772 in.)
Mass		Loose wires: 301 g (10.62 oz) Connector: 335 g (11.82 oz)

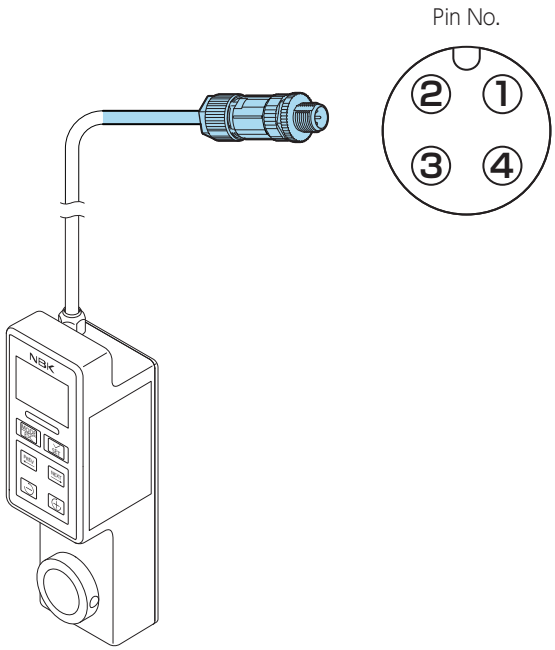
*1: Allow around ten minutes for cooling after a period of continuous use.
*2: This value should be taken only as a reference and is not guaranteed.

Cable End Specifications

EPU-210-A Cable end specifications: Loose wires



EPU-210-B Cable end specifications: Connector



Pin No.	Signal name
1	24V
2	D+
3	0V
4	D-
Shield	DG

Manufacturer	Amphenol Corporation
Product No.	MSAS-04BMMB-SL7001
Specifications	M12 A-code 4-pin shielded male

Power Supply/Communication Cable Specifications

Specifications:

Sheath	Material	Oil-resistant PVC
	Outer diameter	5.4 mm (0.213 in.)
Conductor	Material	Tin-plated annealed copper stranded wire
	Number of wires	2P
	Size	AWG25
Minimum bend radius		32.4 mm (1.276 in.)
Cable length		1 m (3.3 ft)

Do not directly connect the product to an AC power supply.

High Torque Adapters (EOAT-200) (Optional)

Product No.		EOAT-200-4	EOAT-200-8
Gear ratio		4	8
Rated torque		2.7 N m (23.8 lbf in.)	5.4 N m (47.7 lbf in.)
Output shaft rotation direction		Same direction as input shaft	
Allowable output shaft load	Radial load	190 N (42 lbf) (10 mm (0.394 in.) from mounting surface)	
	Thrust load	155 N (34 lbf)	
Output shaft holding torque		2.5 N m (22.1 lbf in.)*	5 N m (44.2 lbf in.)*
Backlash		1° or less	
Mass		359 g (12.66 oz)	361 g (12.73 oz)

* This value should be taken only as a reference when mounting the wired positioning units and is not guaranteed.

4 Installation and Connections

4.1 Installation Requirements

The environmental conditions for installation are shown below.

- An indoor environment.
- A place where it is not exposed to direct sunlight (UV rays).
- A place free of continuous vibration.
- An installation surface that has sufficient strength.
- An environment that facilitates the dissipation of heat.
- A place that allows easy inspection and cleaning.
- A location with an ambient temperature ranging from -5 to 50°C (23 to 122°F) (no freezing) and an ambient humidity ranging from 20 to 85% RH (no condensation).
- Avoid environments where it is immersed in water, corrosive atmosphere, flammable gas, harmful gas, or near flammable materials.
- Since noise may be generated by the PWM control system, be sure to implement countermeasures for peripheral equipment subject to noise. Be sure to also fully consider the installation environment as the units themselves may be affected by external noise.

Point

- Carefully read "1.2 Precautions Related to Installation and Wiring Work" and install correctly.

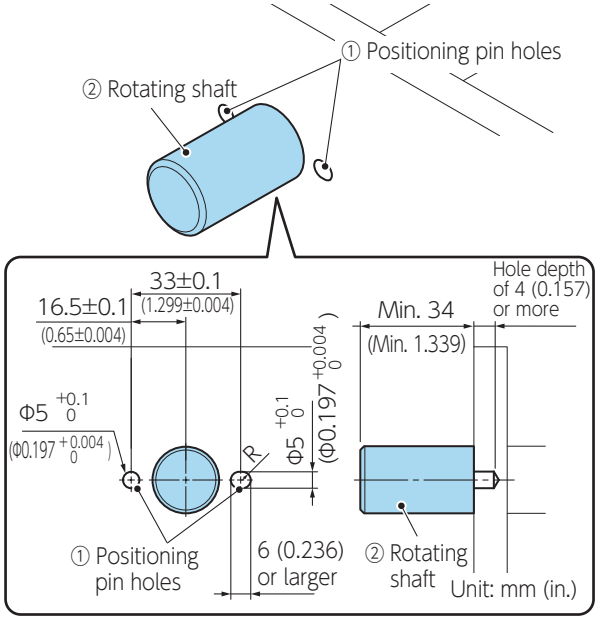
Refer to P. 8.

- Please contact our Customer Service if using in a special environment or application.

Refer to P. 136.

4.2 Unit Installation

4.2.1 Installation of Unit Alone

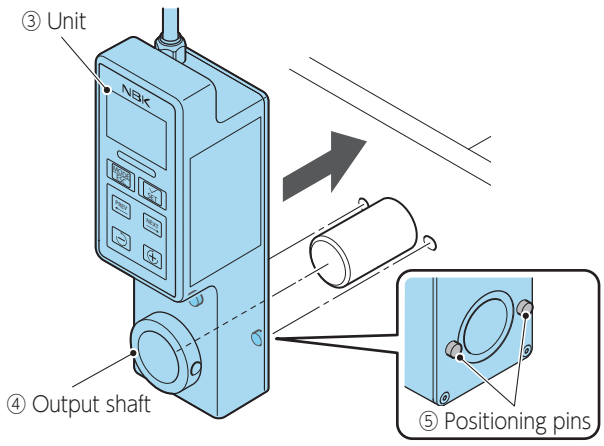


1 Drill ① Positioning pin holes through the mounting surface of the machine.

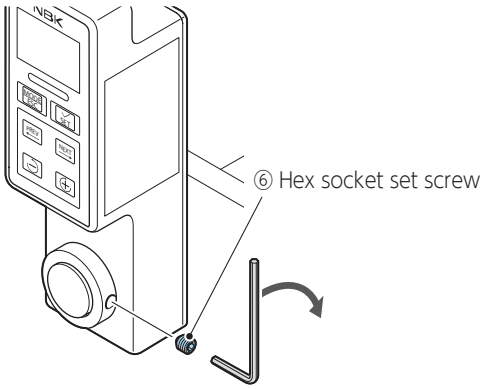
Mount the ② Rotating shaft so that it protrudes out from the mounting surface as shown in the diagram.

Point

- Provide one of the two positioning pin holes with a slot shape (long hole) as shown in the figure. If machining a slot shape is difficult, drill out a Φ6 (0.236) or larger round hole.
- Be sure to maintain the amount of protrusion of the rotating shaft mounted to the unit output shaft at 34 mm (1.339 in.) or more.



2 Pass the rotating shaft through the ③ Unit's ④ Output shaft and insert the ⑤ Positioning pins into the holes drilled in step 1.

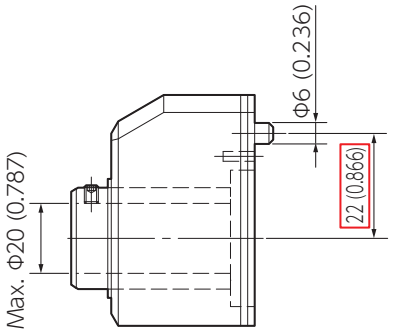
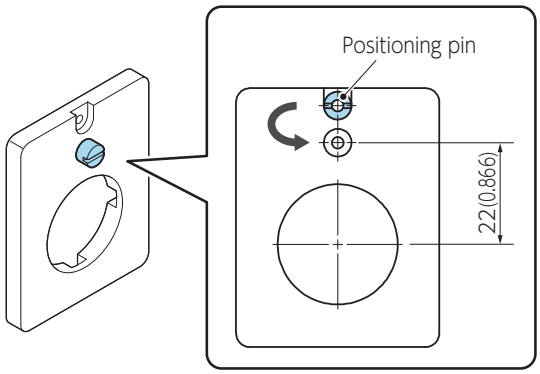


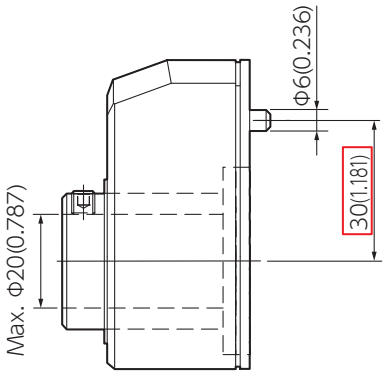
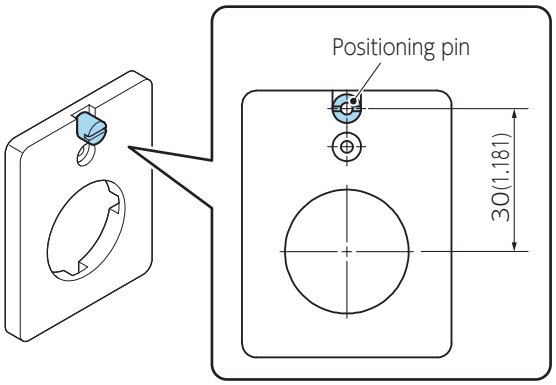
3 Secure it in place with the included ⑥ Hex socket set screw (M5x6). (Recommended tightening torque: 2.8 N m (24.7 lbf in.))

4.2.2 If Using the Mounting Plates (Optional)

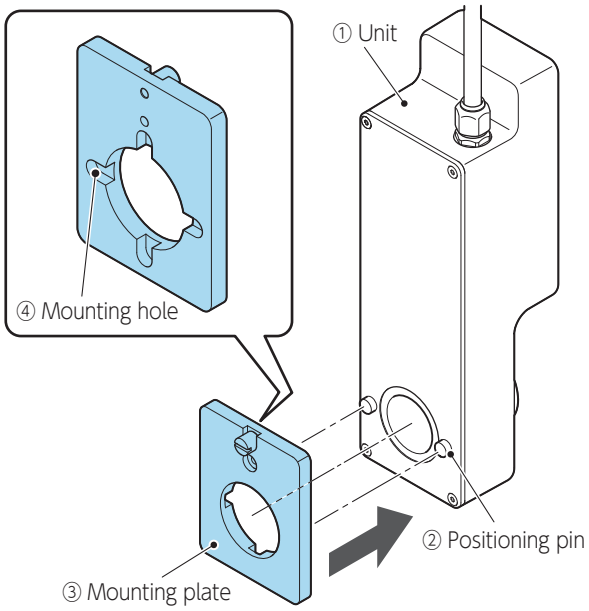
The mounting plates can be used when replacing digital position indicators with a size of 22 mm (0.866 in.) as shown in Fig. 1 or 30 mm (1.181 in.) as shown in Fig. 2.

Corresponding Positions of Positioning Pin (Unit: mm (in.))

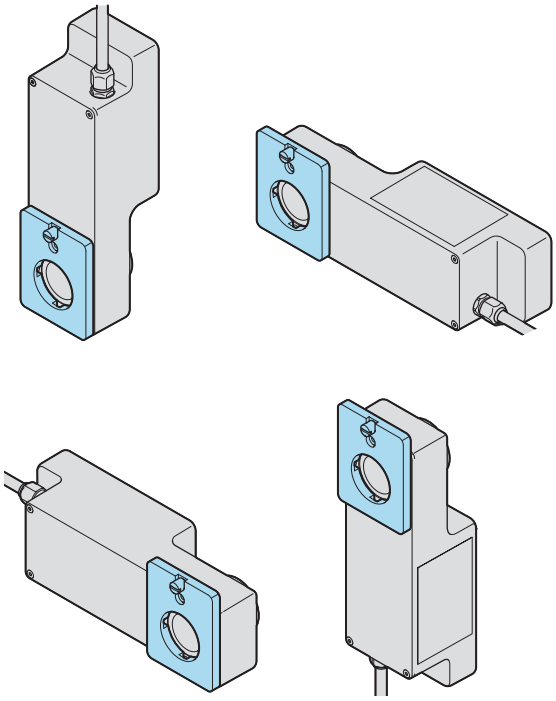
<table>
<tr><th colspan="3">Position of positioning pin</th></tr>
<tr><th>Size</th><th>Digital position indicators</th><th>Mounting plates</th></tr>
<tr><td>22 mm (0.866 in.)</td><td>Fig. 1
 
</td><td> 

Turn the positioning pin to the left and remove by using a flathead screwdriver or similar, and change the position.
(Recommended tightening torque: 0.3 N m (2.65 lbf in.))</td></tr>
<tr><td>30 mm (1.181 in.)</td><td>Fig. 2
 
</td><td> 

This is the position when shipped from the factory. Check that the positioning pin is tightened before use.</td></tr>
</table>

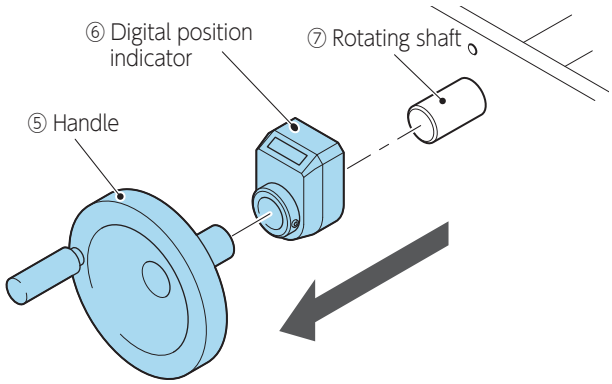


1 Mount by matching the position of the ① Unit's ② Positioning pins with the ③ Mounting plate ④ Mounting holes.

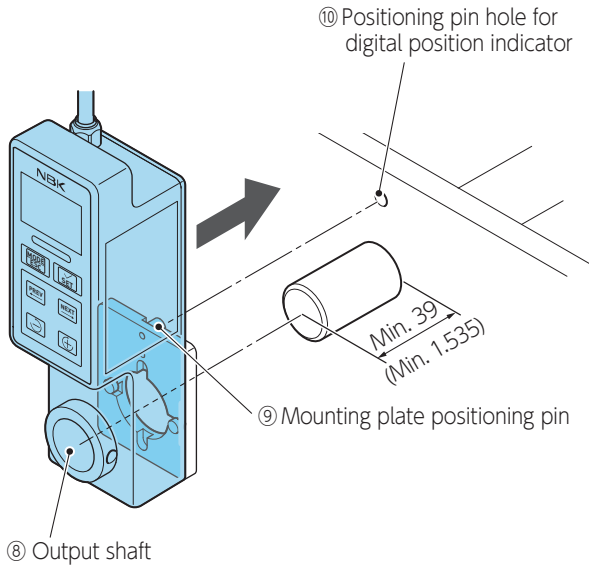


Point

It can be mounted at any 90°-angle orientation. Mount in a position that does not interfere with the machine.



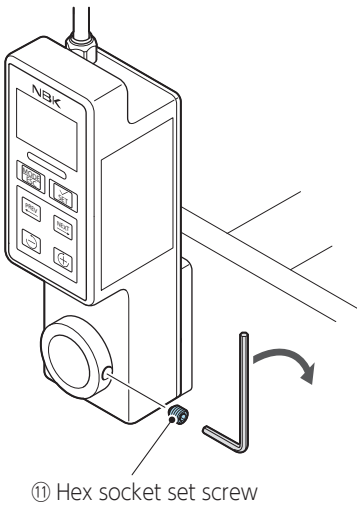
2 Remove the ⑤ Handle and ⑥ Digital position indicator from the ⑦ Rotating shaft.



3 With the unit mounted to the mounting plate, pass the rotating shaft through the ⑧ Output shaft. Insert the ⑨ Mounting plate positioning pin into the ⑩ Positioning pin hole.

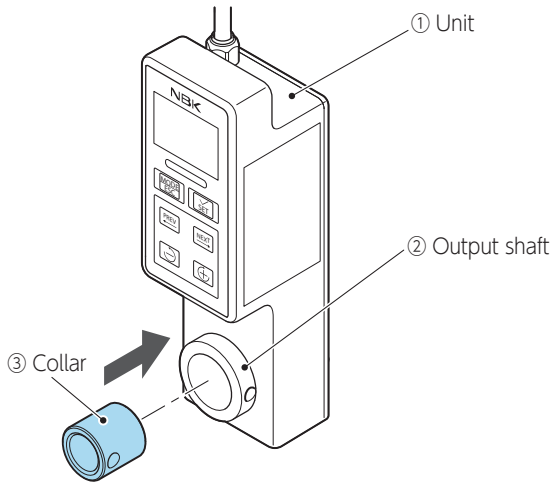
Point

Be sure to maintain the amount of protrusion of the rotating shaft mounted to the unit output shaft at 39 mm (1.535 in.) or more.

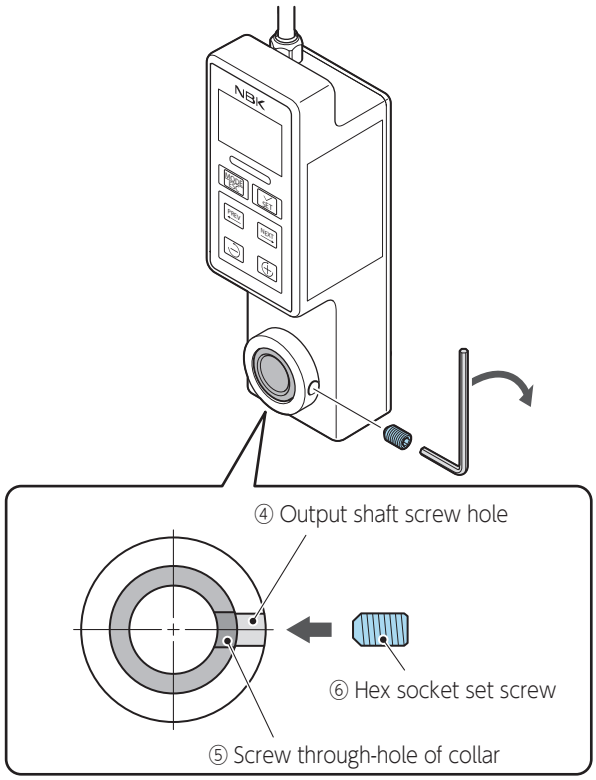


4 Secure it in place with the included ⑪ Hex socket set screw (M5x6). (Recommended tightening torque: 2.8 N m (24.7 lbf in.))

4.2.3 If Using the Collars (Optional)



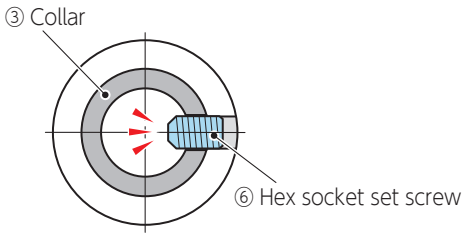
1 Insert the ③ Collar into the ① Unit's ② Output shaft.

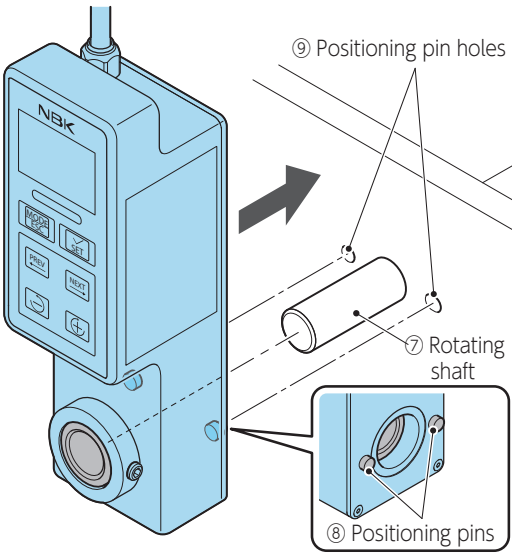


2 Match the position of the ④ Output shaft screw hole with the ⑤ Screw through-hole of the collar, and then temporarily fix using the ⑥ Hex socket set screw included with the collar.

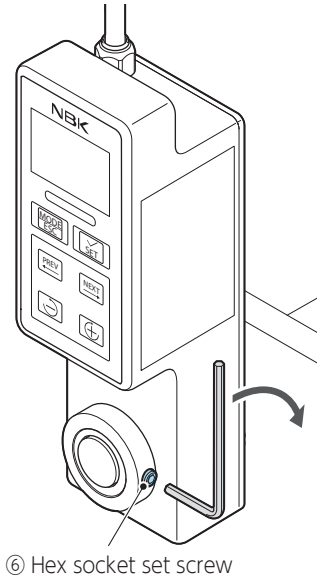
Point

When temporarily fixing, be careful that the ⑥ Hex socket set screw included with the collar does not excessively protrude from the ③ Collar.



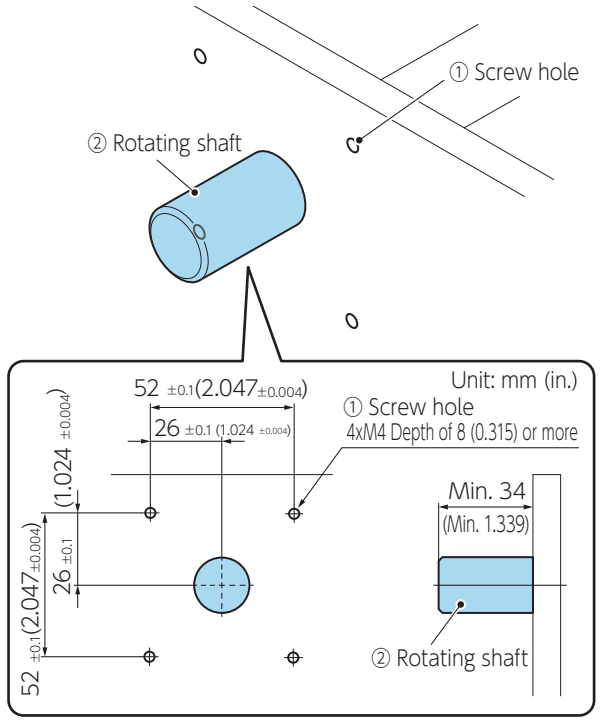


3 With the collar mounted, pass the ⑦ Rotating shaft through the unit's output shaft.
Insert the ⑧ Positioning pins into the ⑨ Positioning pin holes.



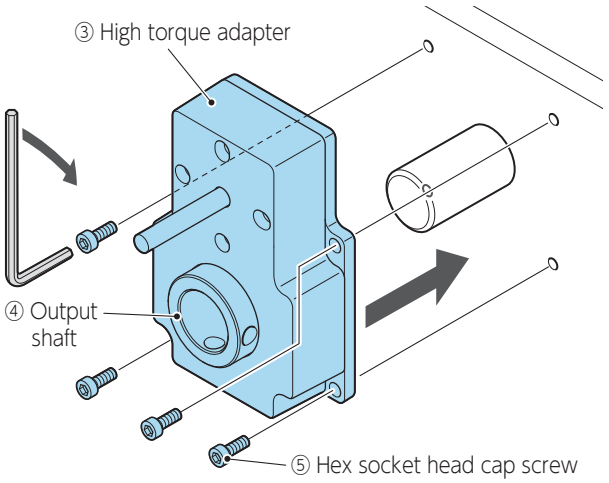
4 Fully tighten the ⑥ Hex socket set screw to secure it in place.
(Recommended tightening torque: 2.8 N m (24.7 lbf in.))

4.2.4 If Using the High Torque Adapters (Optional)

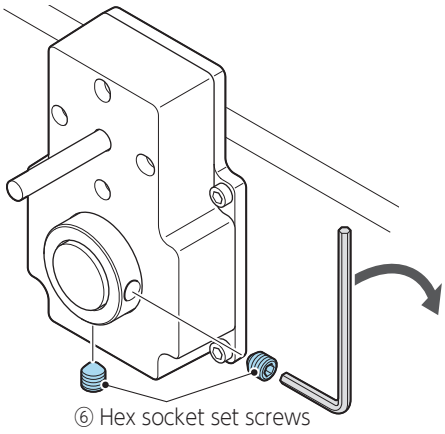


1 Drill ① Screw holes through the mounting surface of the machine and set the ② Rotating shaft so that it protrudes out from the mounting surface as shown in the diagram.

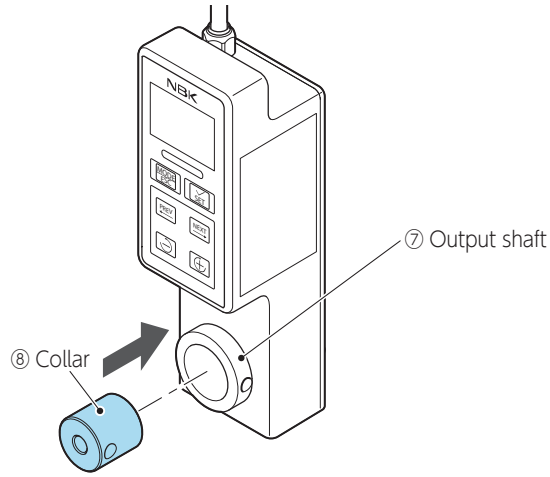
> **Point** Be sure to maintain the amount of protrusion of the rotating shaft at 34 mm (1.339 in.) or more.



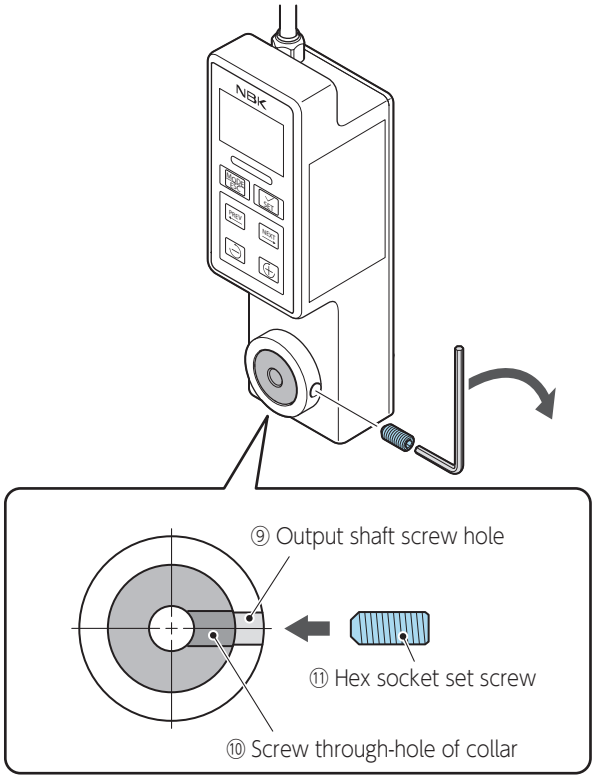
2 Pass the rotating shaft through the ④ Output shaft of the ③ High torque adapter.
Use the four mounting holes to mount the high torque adapter to the machine by using the ⑤ Hex socket head cap screws (M4x12) included with the high torque adapter.
(Recommended tightening torque: 1.5 N m (13.2 lbf in.))



3 Secure to the rotating shaft by using the ⑥ Hex socket set screws (M6x6) included with the high torque adapter. (Recommended tightening torque: 5 N m (44.2 lbf in.))



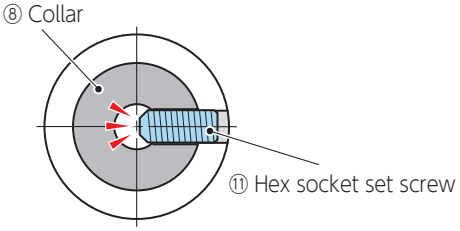
4 Insert the ⑧ Collar included with the high torque adapter into the unit's ⑦ Output shaft.

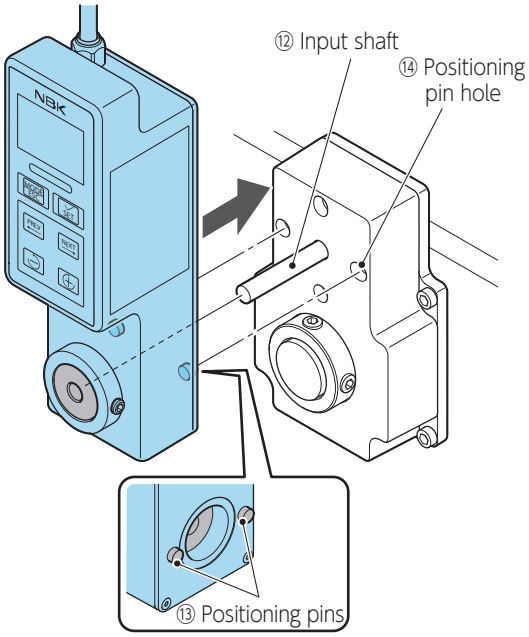


5 Match the position of the ⑨ Output shaft screw hole with the ⑩ Screw through-hole of the collar, and then temporarily fix using the ⑪ Hex socket set screw (M5x12) included with the collar.

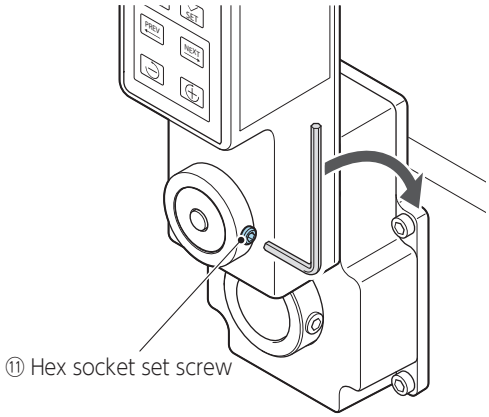
Point

When temporarily fixing, be careful that the ⑪ Hex socket set screw included with the collar does not excessively protrude from the ⑧ Collar.

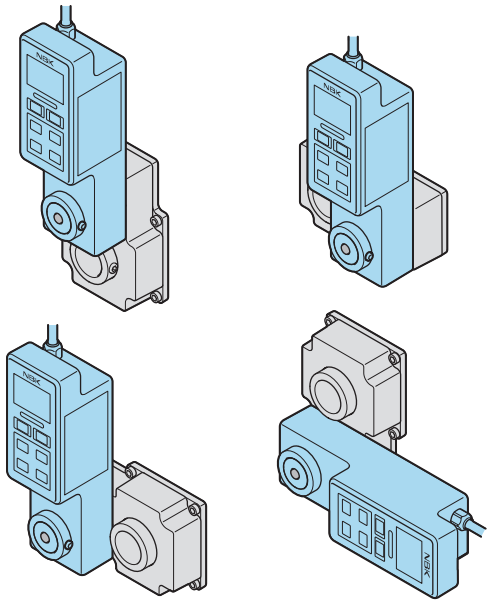




6 With the collar mounted, pass the ⑫ Input shaft of the high torque adapter through the unit's output shaft.
Insert the unit's ⑬ Positioning pins into the ⑭ Positioning pin holes of the high torque adapter.



7 Fully tighten the ⑪ Hex socket set screw to secure it in place.
(Recommended tightening torque: 2.8 N m (24.7 lbf in.))



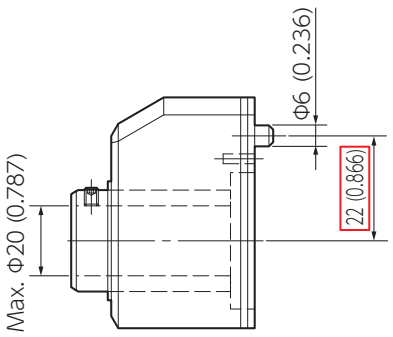
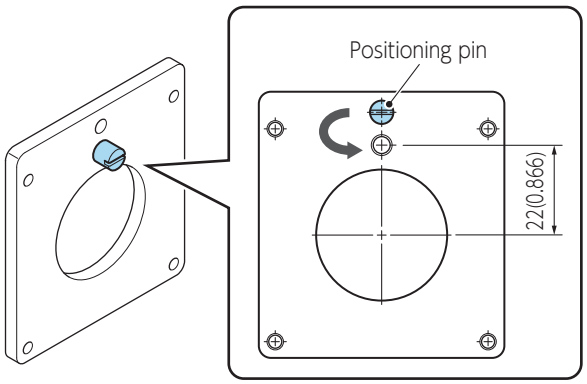
Point

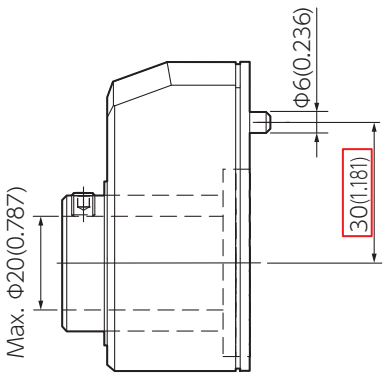
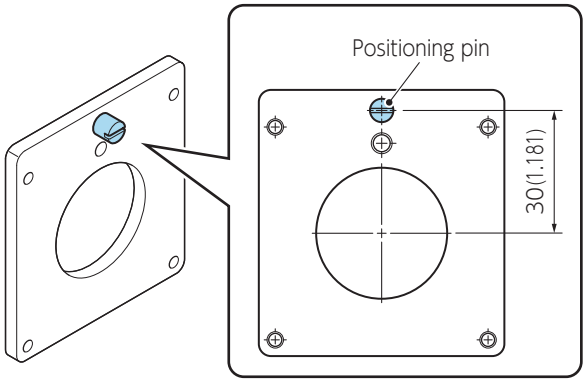
It can be mounted at any 90°-angle orientation. Mount in a position that does not interfere with the machine.

4.2.5 If Using the High Torque Adapters and the Mounting Plates for High Torque Adapters (Optional)

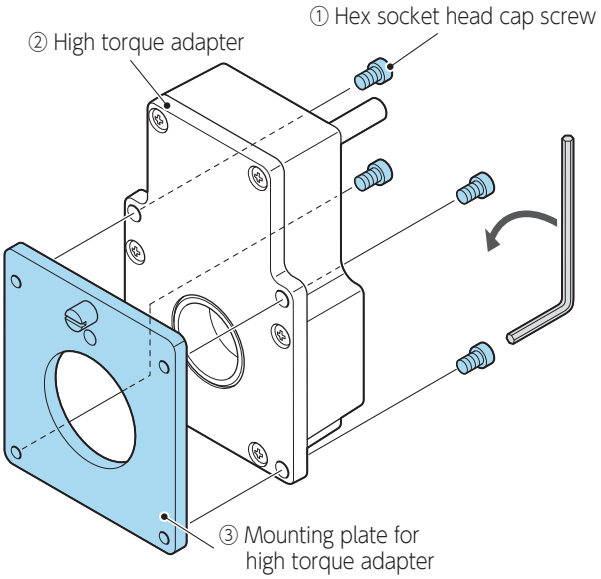
The mounting plates for high torque adapters can be used when replacing digital position indicators with a size of 22 mm (0.866 in.) as shown in Fig. 1 or 30 mm (1.181 in.) as shown in Fig. 2.

Corresponding Positions of Positioning Pin (Unit: mm (in.))

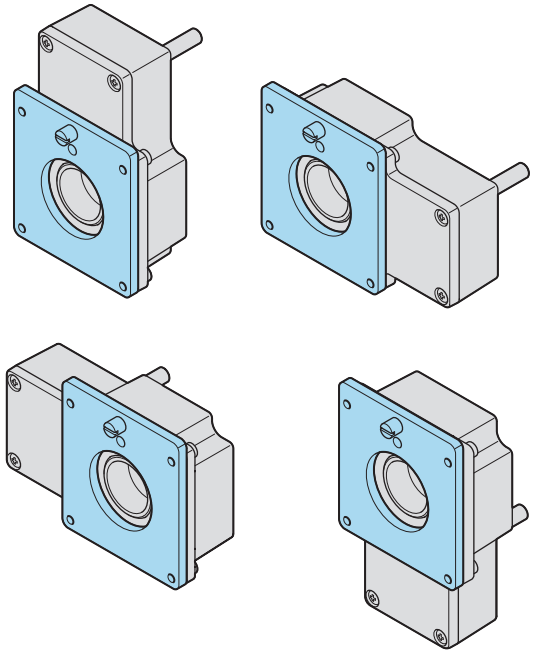
<table>
<tr><th colspan="3">Position of positioning pin</th></tr>
<tr><th>Size</th><th>Digital position indicators</th><th>Mounting plates for high torque adapters</th></tr>
<tr><td rowspan="2">22 mm (0.866 in.)</td><td>Fig. 1
 
</td><td> 

Turn the positioning pin to the left and remove by using a flathead screwdriver or similar, and change the position.
(Recommended tightening torque: 0.5 N m (4.42 lbf in.))</td></tr>
<tr><td>30 mm (1.181 in.)</td><td>Fig. 2
 
</td><td> 

This is the position when shipped from the factory. Check that the positioning pin is tightened before use.</td></tr>
</table>

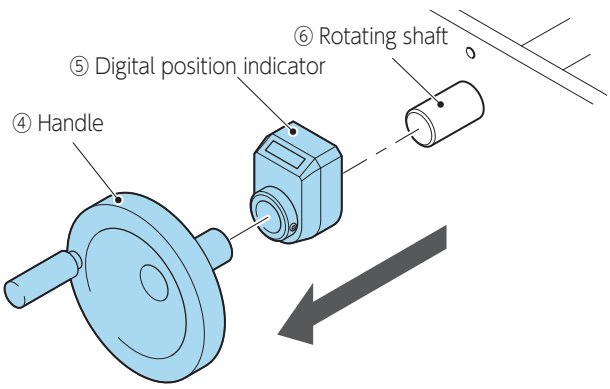


1 Temporarily fix the ③ Mounting plate for high torque adapter to the ② High torque adapter by using the ① Hex socket head cap screws (M4x8) included with the mounting plate for high torque adapter.

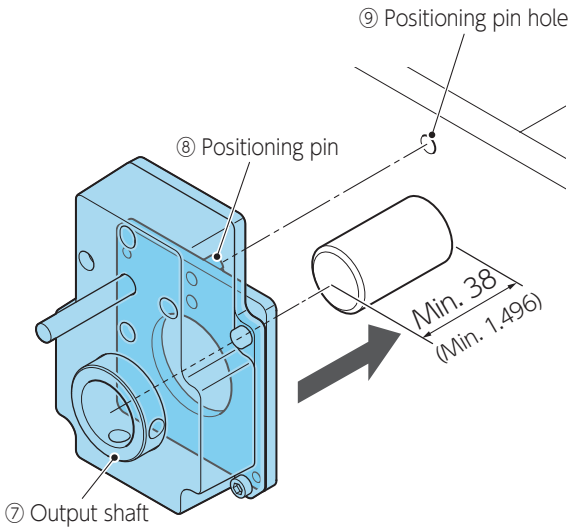


Point

It can be mounted at any 90°-angle orientation. Mount in a position that does not interfere with the machine.

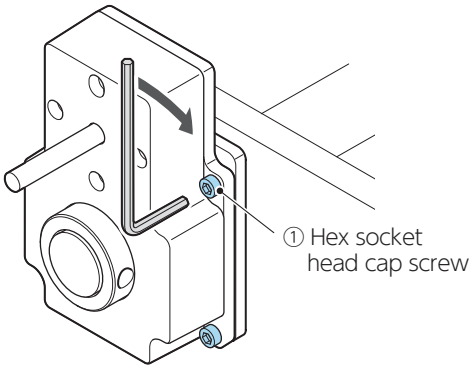


2 Remove the ④ Handle and ⑤ Digital position indicator from the ⑥ Rotating shaft.

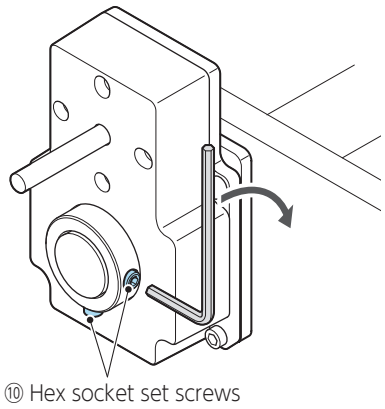


3 With the mounting plate for high torque adapter mounted to the high torque adapter, pass the rotating shaft through the ⑦ Output shaft.
Insert the ⑧ Positioning pin into the ⑨ Positioning pin hole.

> **Point** Be sure to maintain the amount of protrusion of the rotating shaft at 38 mm (1.496 in.) or more.



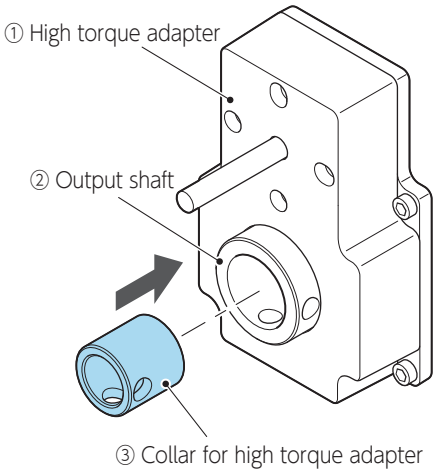
4 Fully tighten the temporarily fixed ① Hex socket head cap screws (M4x8). (Recommended tightening torque: 0.75 N m (6.63 lbf in.))



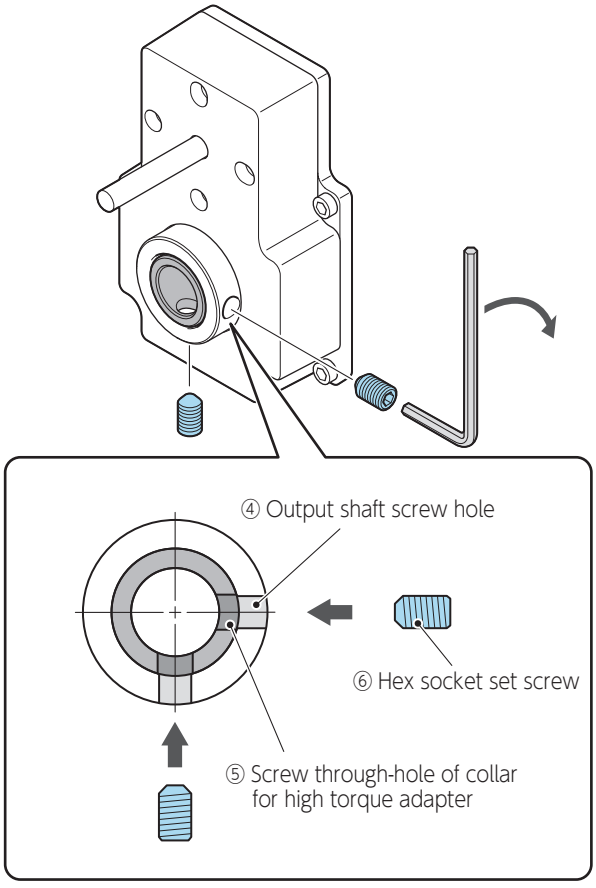
5 Secure it in place by using the ⑩ Hex socket set screws (M6x6) included with the high torque adapter. (Recommended tightening torque: 5 N m (44.2 lbf in.))

6 From this point, perform the same procedures of "If Using the High Torque Adapters (Optional)" starting from step 4. Refer to P. 26.

4.2.6 If Using the High Torque Adapters and the Collars for High Torque Adapters (Optional)



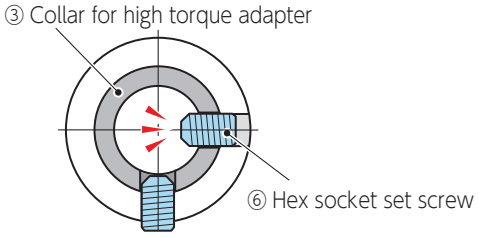
1 Insert the ③ Collar for high torque adapter into the ② Output shaft of the ① High torque adapter.



2 Match the positions of the two ④ Output shaft screw holes of the high torque adapter with the two ⑤ Screw through-holes of the collar for high torque adapter.
Install the ⑥ Hex socket set screws (M6x8 or M6x10) included with the collar for high torque adapter.

Point

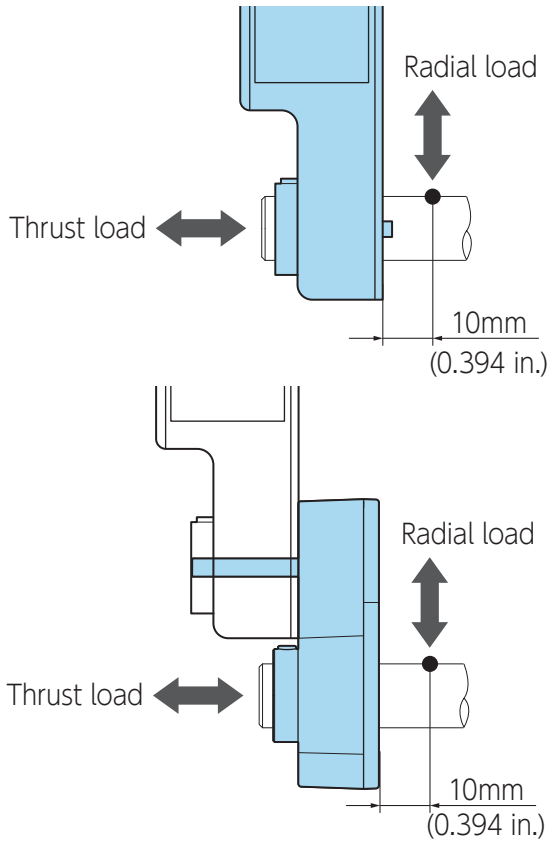
When temporarily fixing, be careful that the ⑥ Hex socket set screws do not excessively protrude from the ③ Collar for high torque adapter.



3 From this point, perform the same procedures of "If Using the High Torque Adapters (Optional)" starting from step 4. Refer to P. 26.

4.2.7 Allowable Load

Adjust so that an excessive load is not applied to the output shaft.



Allowable Load:

	Unit	High torque adapter
Radial load	19.6 N (4.4 lbf)	190 N (42 lbf)
Thrust load	19.6 N (4.4 lbf)	155 N (34 lbf)

CAUTION

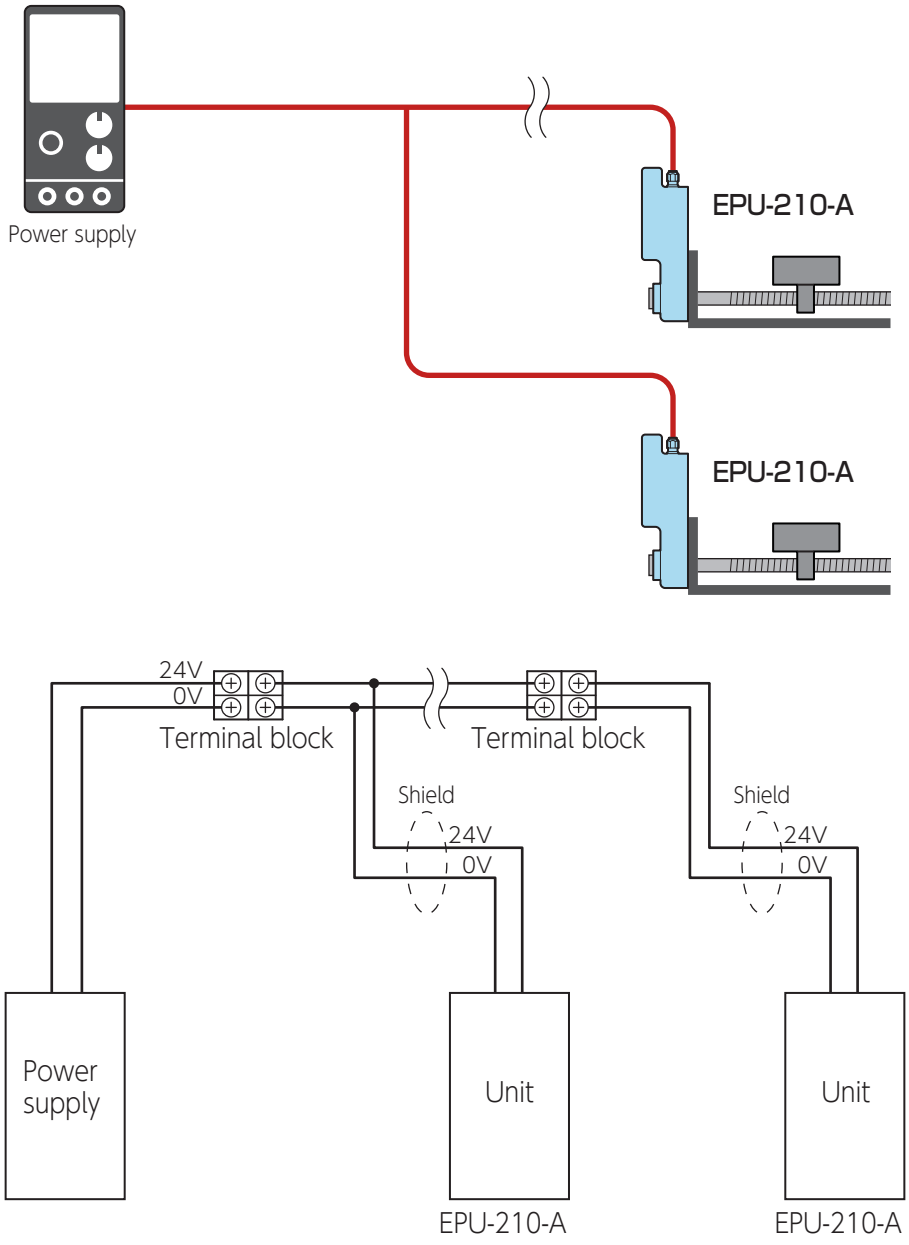
COMPULSORY / INSTRUCTION

- Do not grip cables or the output shaft when moving the product.
- Do not subject the output shaft to strong impacts.
- Do not apply excessive radial or thrust loads to the output shaft to prevent damaging the bearings.
- Precisely adjust the alignment of the output shaft and the mating device.

4.3 Connections

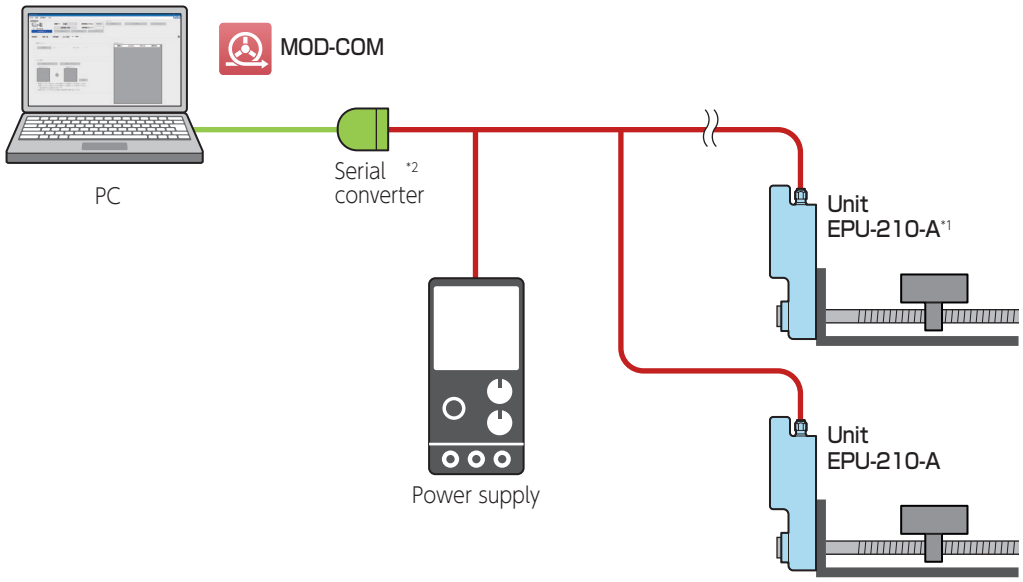
4.3.1 Connection Example When Controlling with the Unit Alone

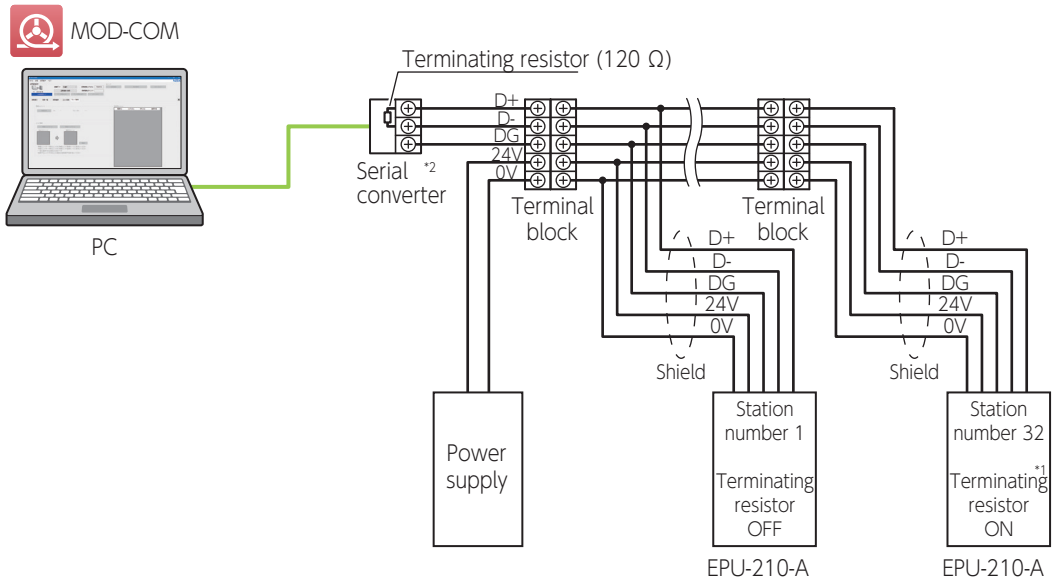
Connection Example



4.3.2 Connection Example When Controlling with a PC as the Higher-level Host

Example of Daisy Chain Connection





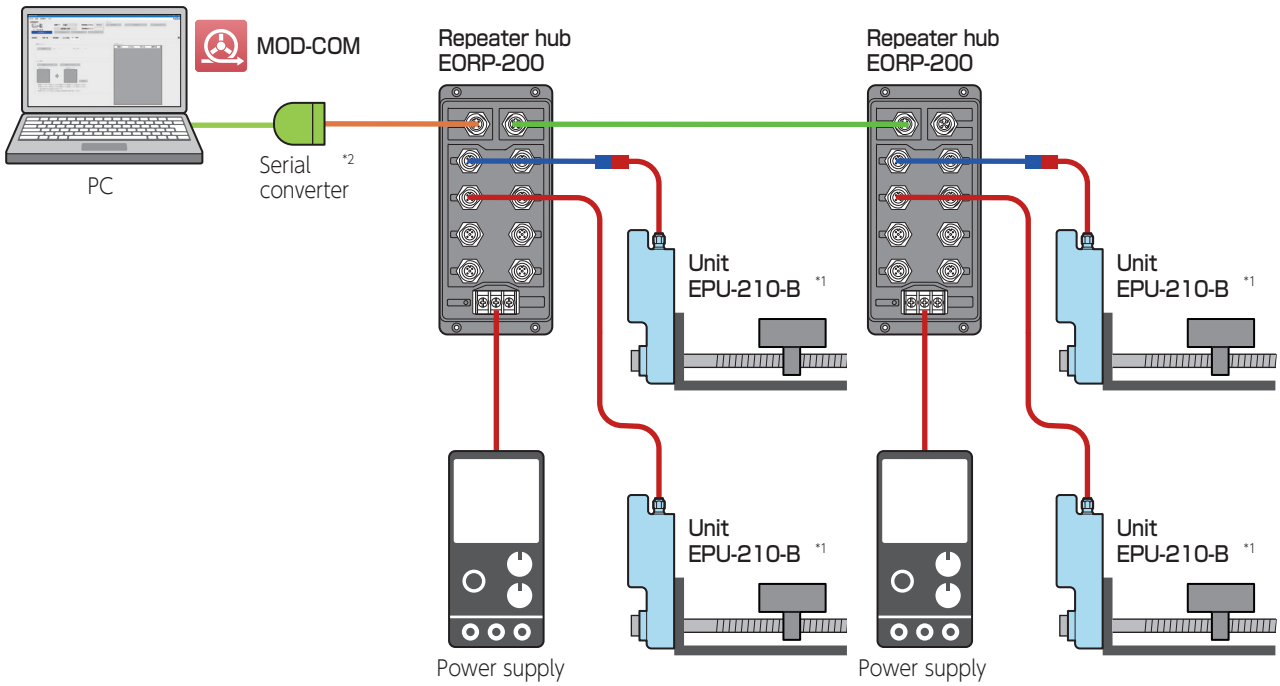
*1: Set the terminating resistor setting of the last unit to be connected to "ON".

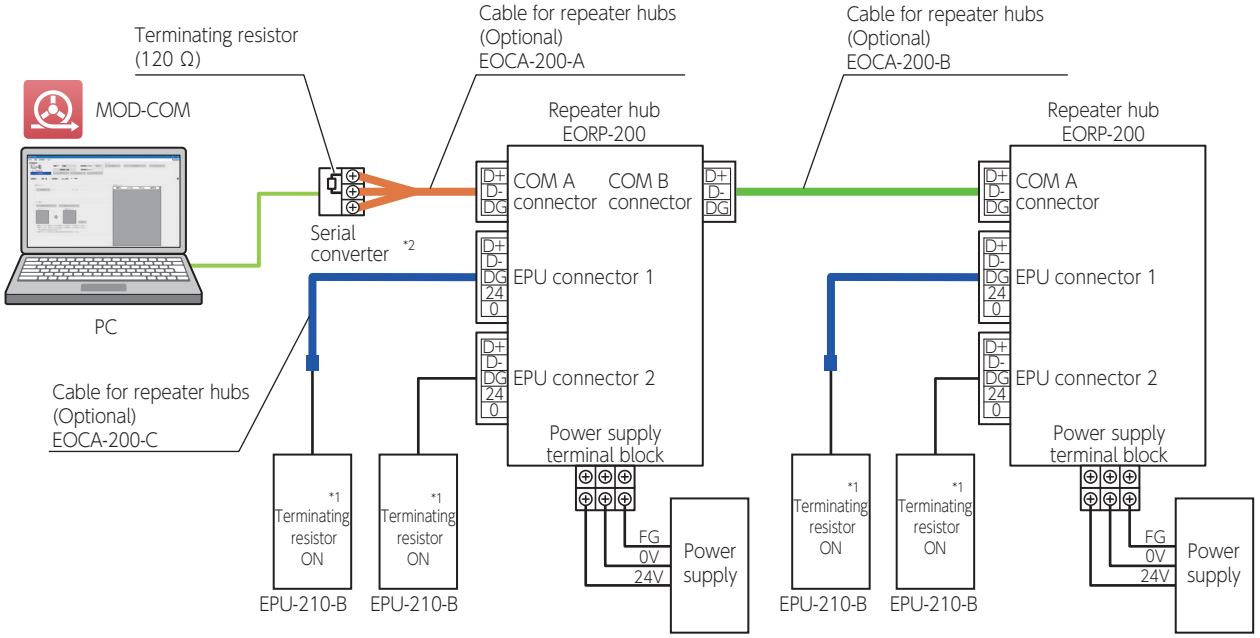
*2: If connecting to a PC, it is necessary to use a serial converter to convert the serial communication of the RS-485 to make the connection.

Point

Install an included terminating resistor (120 Ω) between communication line terminals "D+" and "D-" on the serial converter side.

Connection Example Using Repeater Hubs (EORP-200)





*1: Set the terminating resistor settings of all units to be connected to the repeater hub to "ON".
*2: If connecting to a PC, it is necessary to use a serial converter to convert the serial communication of the RS-485 to make the connection.

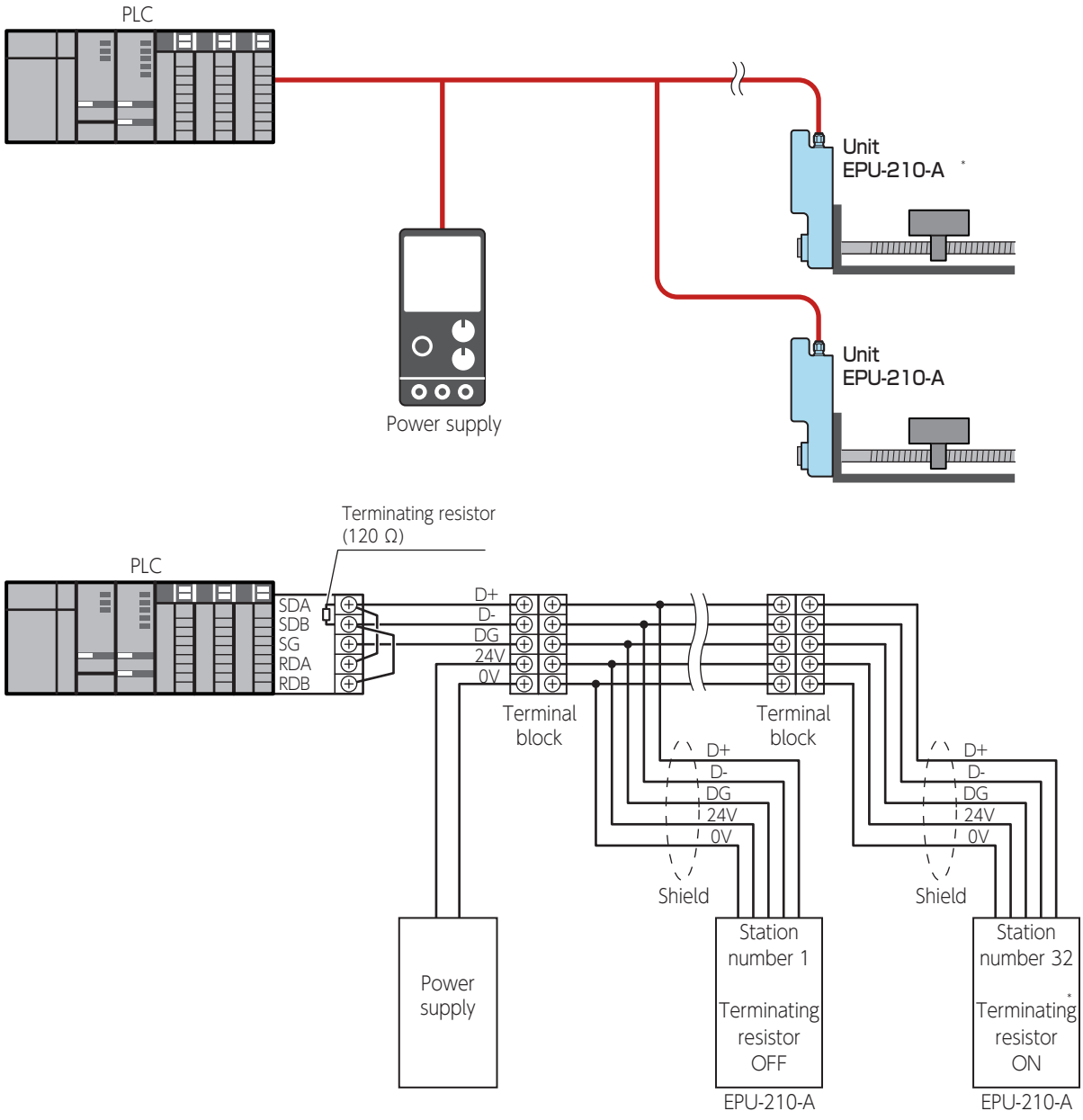
Point

Install an included terminating resistor (120 Ω) between communication line terminals "D+" and "D-" on the serial converter side.

* For connecting a repeater hub, please refer to the "Repeater Hubs EORP-200 Instruction Manual".

4.3.3 Connection Example When Controlling with a PLC as the Higher-level Host

Example of Daisy Chain Connection

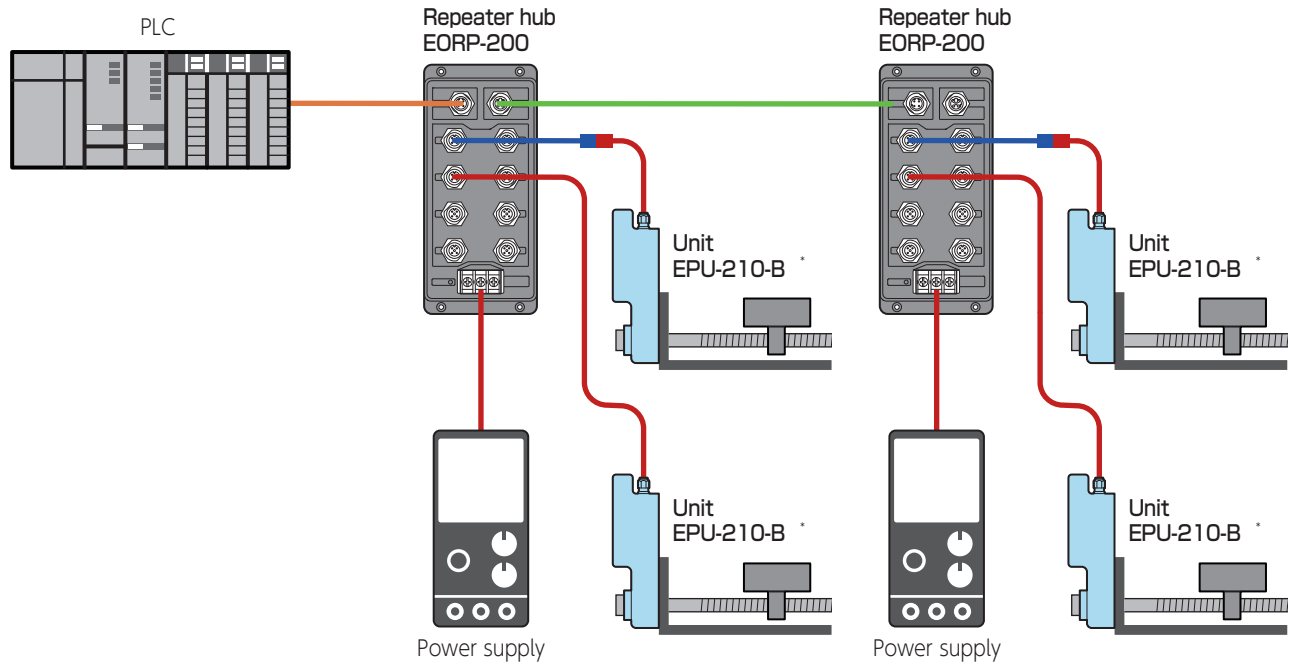


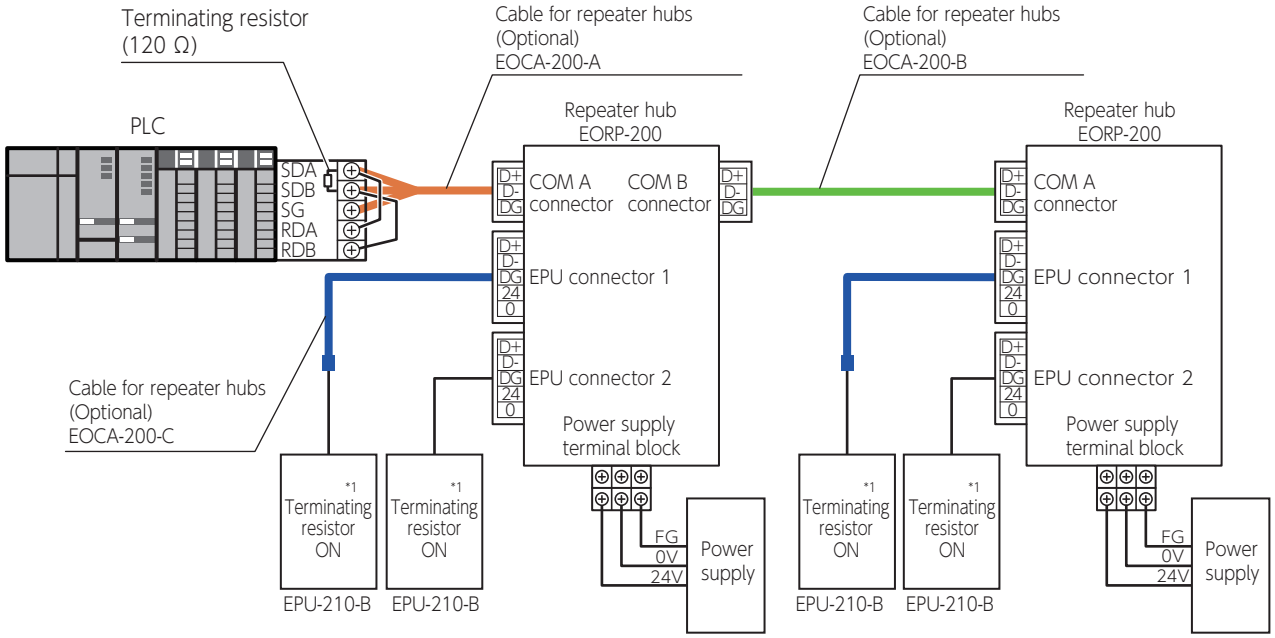
* Set the terminating resistor setting of the last unit to be connected to "ON".

Point

Install an included terminating resistor (120 Ω) between communication line terminals "SDA" and "SDB" on the PLC side.

Connection Example Using Repeater Hubs (EORP-200)





* Set the terminating resistor settings of all units to be connected to the repeater hub to "ON".

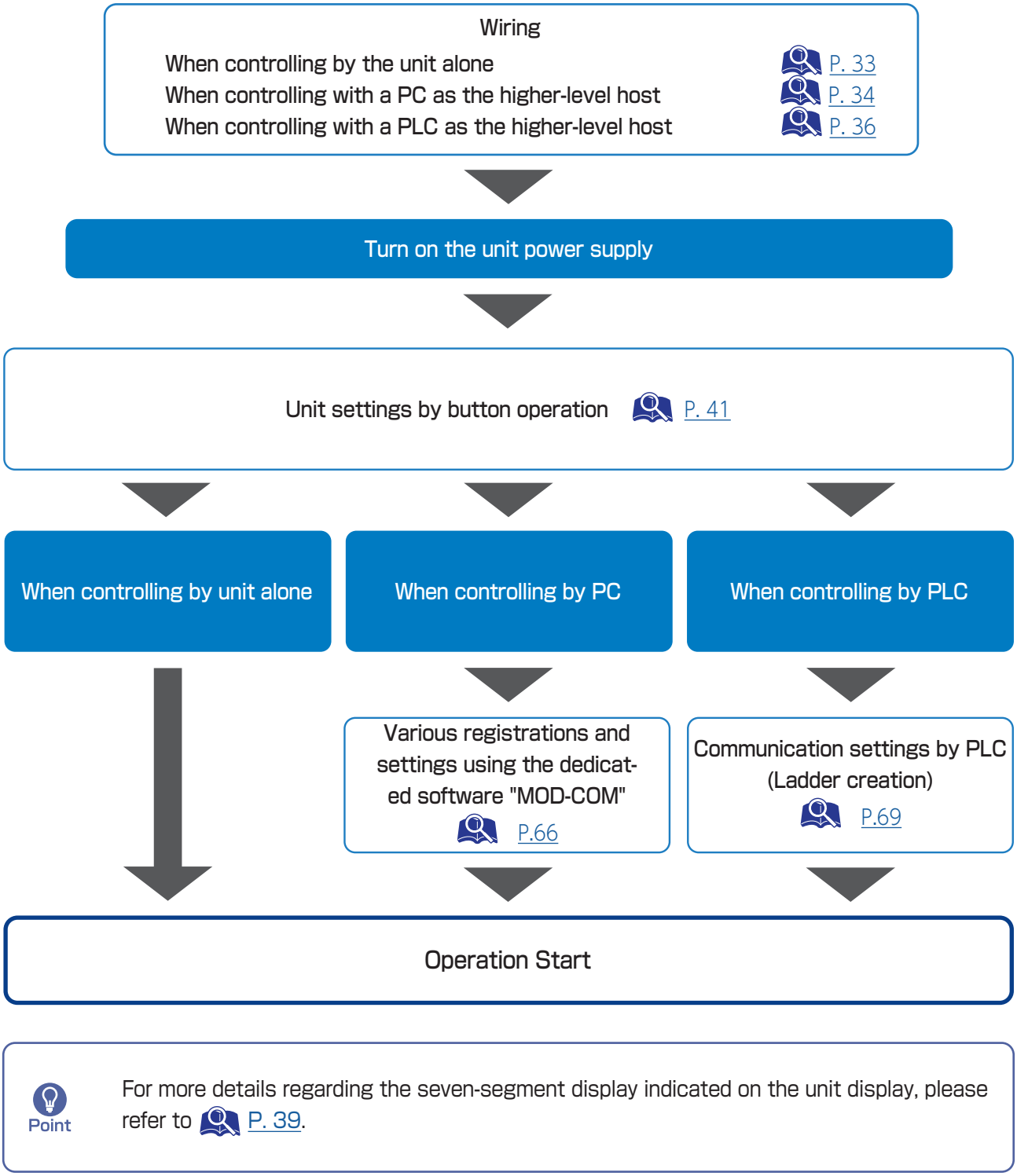
Point

Install an included terminating resistor (120 Ω) between communication line terminals "SDA" and "SDB" on the PLC side.

* For connecting a repeater hub, please refer to the "Repeater Hubs EORP-200 Instruction Manual".

5 Flow-Chart From Unit Wiring to Operation

Specify settings according to the operating system you are using.



Point

For more details regarding the seven-segment display indicated on the unit display, please refer to P. 39.

6 Overview of Seven-Segment Display and Displayed Items

6.1 Seven-Segment Display

6.1.1 Seven Segments

The unit display indicates alphanumeric characters by using seven segments. This four-digit by two-row segmented display is used to display various information such as the current unit status, setting items, and input values.

Alphanumeric Character Display using Seven Segments

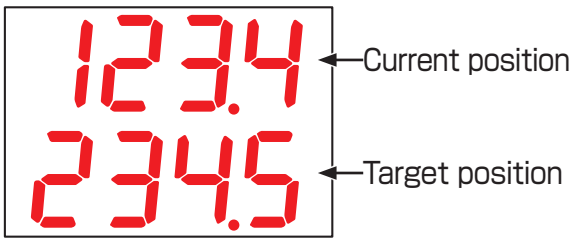
Alphanumeric characters are display by using seven segments as shown below.

Point

- A "5" and an "S" are displayed in the same manner on the seven-segment display.
- A "1" and an "i" (capital letter) are displayed in the same manner on the seven-segment display.
- An "H" and an "X" are displayed in the same manner on the seven-segment display.

6.1.2 Overview of Seven-Segment Display

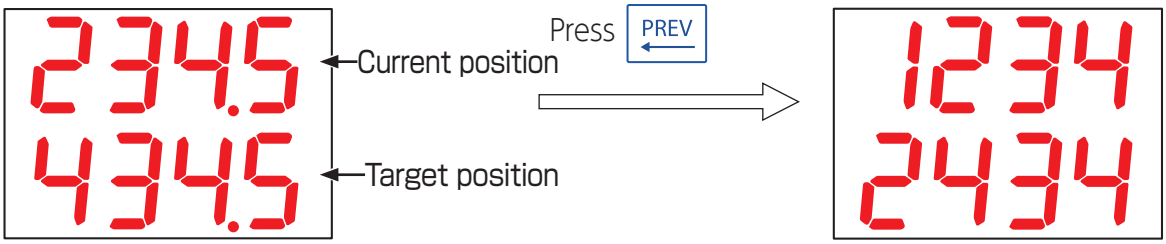
- The seven-segment display can indicate all decimal numerals.
- In normal mode, the current position is displayed on the upper row and the target position is displayed on the lower row.



- The current and target positions are displayed up to the first decimal place.

Example: Current position of 1234.5 and target position of 2434.5

(1) If the setting range or current position consists of five digits, press the "PREV" button at the leftmost digit to move the display one digit and display the leftmost digit.



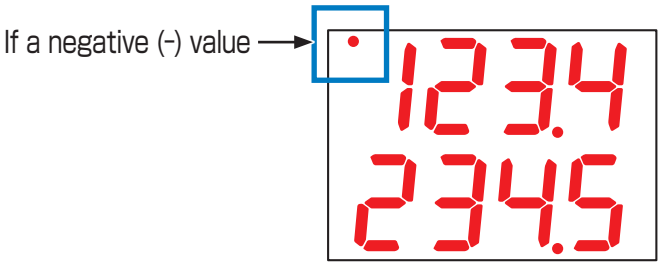
[Left-most value is displayed]

(2) Press the "NEXT" button to return to the decimal place display. You can update digits even when moving.

[First decimal place is displayed (Display returns)]

* Values are displayed at the first decimal place when power is supplied.

- If the displayed value is a negative number, the dot of the leftmost digit (upper left) lights up.



7 Settings and Control by Unit Alone

7.1 Modes

You can change between modes by operating the unit buttons.
The EPU-210 is equipped with four modes that are used to specify setting and manually perform movement commands.

- **Normal Mode**

This is a standby mode when waiting to receive commands from the settings by the higher-level host (PC or PLC) and the unit itself.

- **Manual Operations Mode**

This mode allows you to specify home settings and perform return to home manually by using jog operation.

- **Target Position Operation Mode**

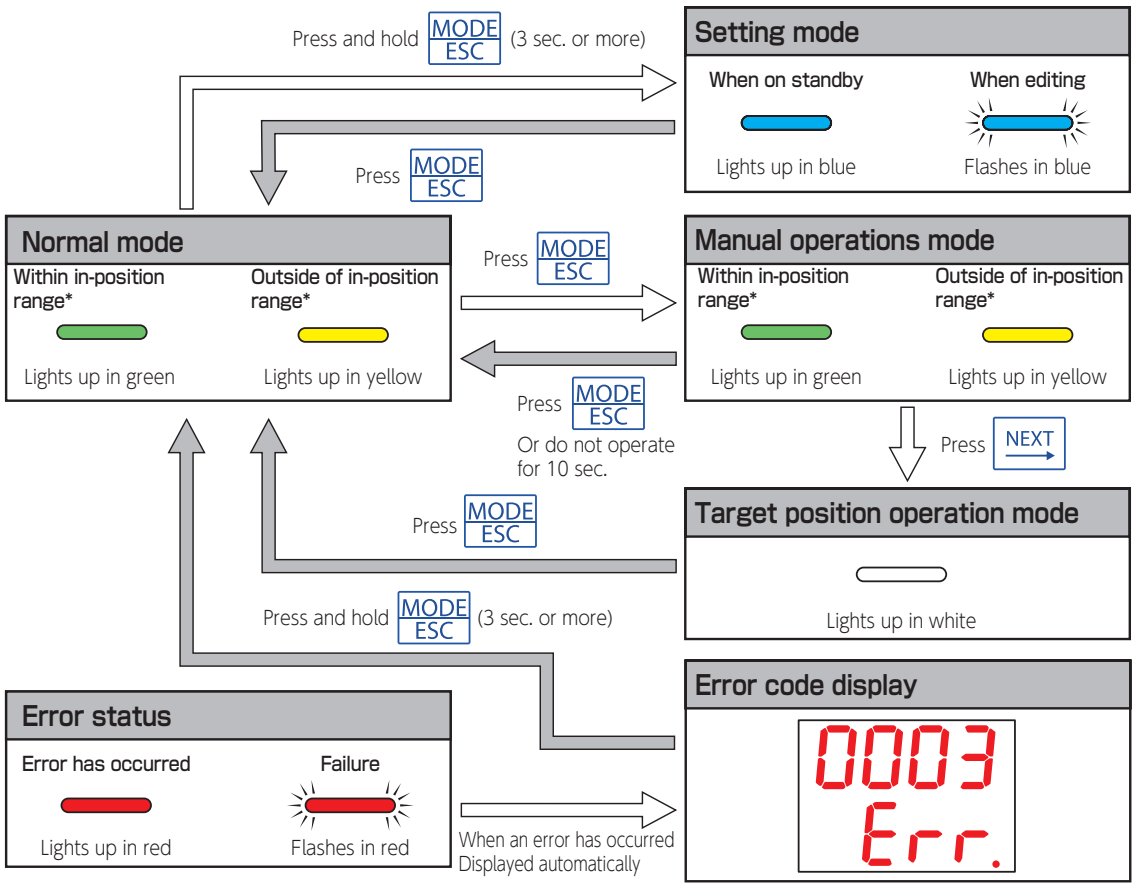
This mode allows the workpiece to move to the target position saved in the unit. You can also write the current position as the target position.

- **Setting Mode**

This mode allows you to change the various set values of a unit.

7.2 LED Lighting Patterns When Switching Modes

Switching Mode by Button Operation



* Identify whether the current position is outside the range of the set value

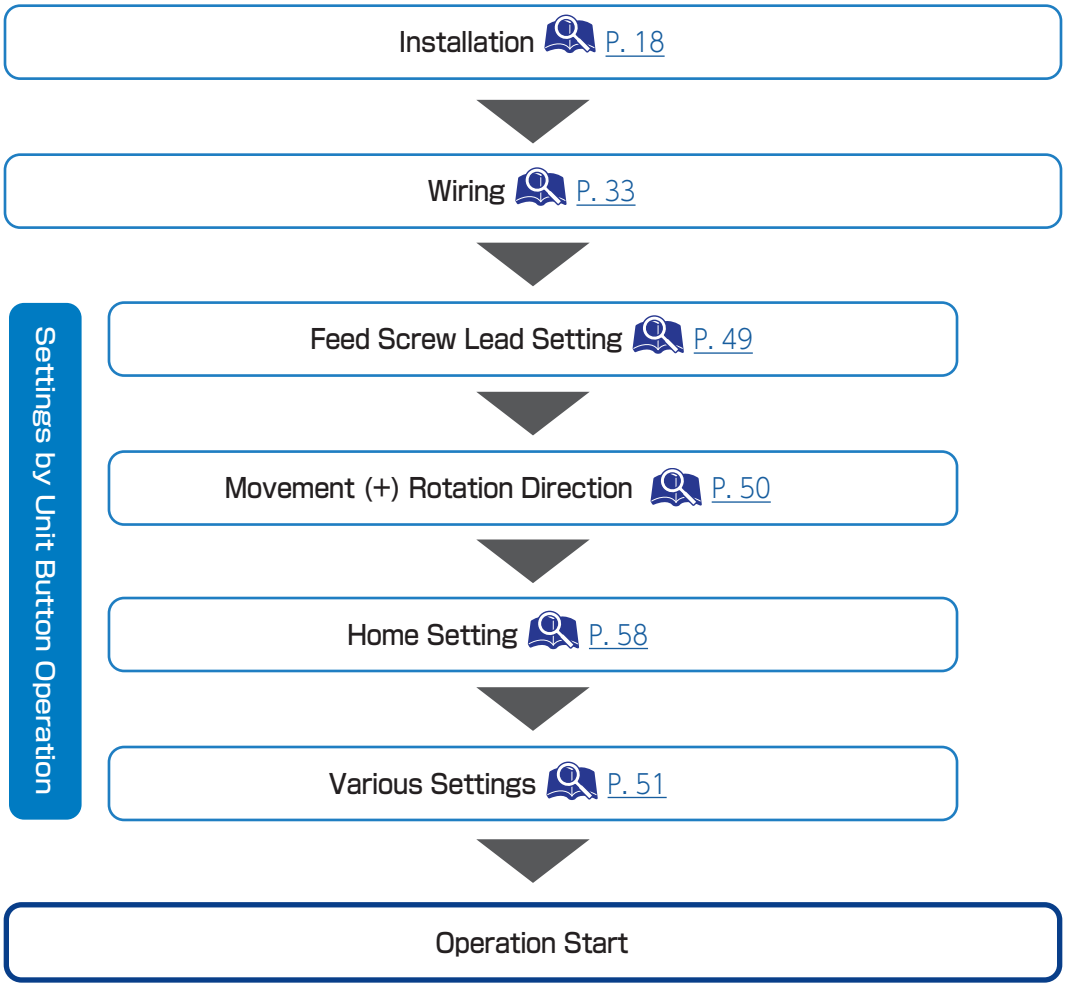
LED Lighting Patterns

Unit Status	Color		Pattern
Normal mode Manual operations mode		Green*1	On
Normal mode Manual operations mode		Yellow*2	On
Setting mode		Blue	Standby: On Editing: Flashing
Target position operation mode		White	On
Error		Red	Error occurs: On Malfunction: Flashing

*1: Current position is within the set value range (within the in-position range)
*2: Current position is outside the set value range (outside the in-position range)

7.3 Flow from Installation to Operation

This section provides an overview of the flow of procedures from installation to operation if using the unit itself for settings and control. Perform work according to the following flow-chart.



7.4 Setting Mode

7.4.1 Setting Mode Overview

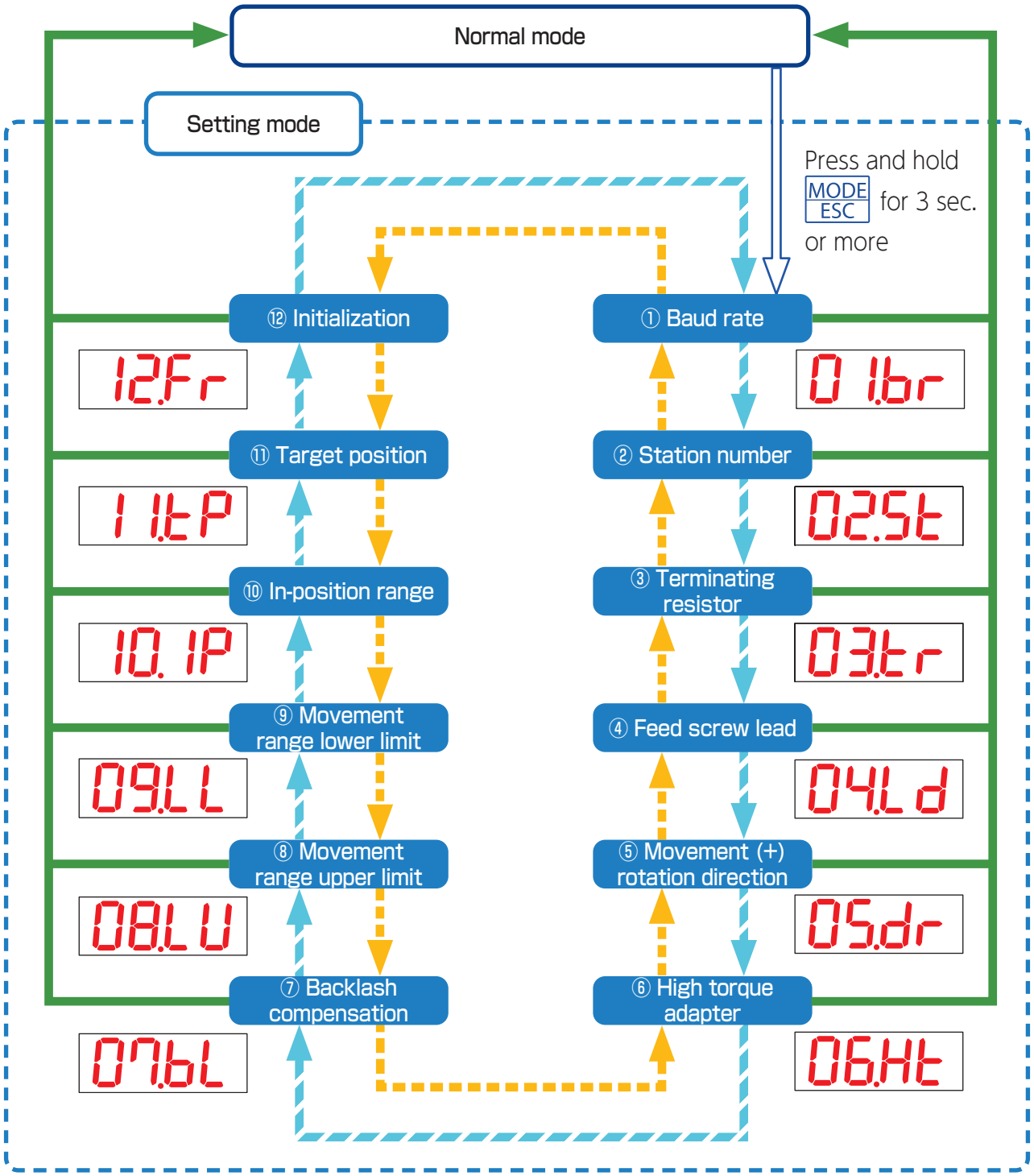
You can use the setting mode to specify and change the items in the following table.

Item	Description	Reference Page
Baud rate*	Specify if communicating with a higher-level host. (Settings can only be changed by operation of the unit itself.)	P.48
Station number*	Sets the station number. (Settings can only be changed by operation of the unit itself.)	P.48
Terminating resistor*	Turns the terminating resistor on and off. (Settings can only be changed by operation of the unit itself.)	P.49
Feed screw lead	Sets the distance that the workpiece moves when the feed screw makes one full rotation.	P.49
Movement (+) rotation direction	Sets the output shaft rotation direction for moving a workpiece in the (+) direction.	P.50
High torque adapter	Use this setting when using an optional high torque adapter.	P.51
Backlash compensation	Sets the backlash compensation.	P.52
Movement range upper limit	Sets the upper limit of the movement range.	P.54
Movement range lower limit	Sets the lower limit of the movement range.	P.55
In-position range	Sets the in-position range (indicator LED lights up in green or yellow).	P.56
Target position	Sets the target position.	P.57
Initialization	Resets the settings to those when shipped from the factory.	P.57

* Must be set if operating by use of a PC or PLC as the higher-level host.

Setting Mode Transitions Flow-Chart

This flow-chart shows the settings menu (screen) transitions in setting mode.

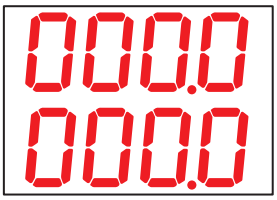
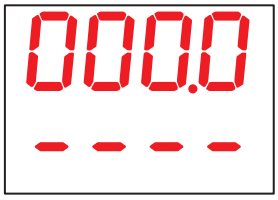
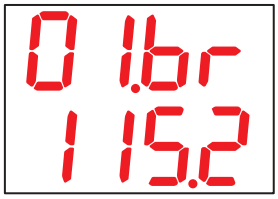
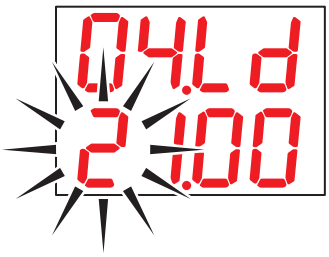


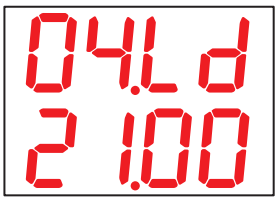
: Transition when PREV is pressed

: Transition when NEXT is pressed

: Transition when MODE ESC is pressed (Moves to the normal mode screen)

7.4.2 Basic Button Operations in Setting Mode

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
 [Normal Mode Screen]	Lights up in green	Press and hold MODE ESC (3 sec. or more).
 * The scanning line flows along the lower row of the screen.		
 [Setting Items Selection Screen] * Upper row: Setting item (simplified) Lower row: Input/Selected item	* Lights up in blue if you change to the setting items selection screen.	Press PREV or NEXT to select the setting item.
		Press SET to fix the set or changed item.
 Input setting content * The input digit flashes.	* Flashes in blue while inputting the setting.	Point ・If inputting numbers: Move input digit PREV NEXT Number input Decrease number value Increase number value ・If selecting YES/NO, ON/OFF or similar: Select PREV NEXT

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
 * Flashes several times while writing.	Lights up in blue	Press SET to write. (Fixes set/changed content) Point ・If continuing to set Press PREV NEXT to select a setting item ・If you have completed setting Press MODE ESC
		

Point

・Pressing MODE ESC while setting or changing cancels the input content.
(The screen returns to the setting screen before inputting.)

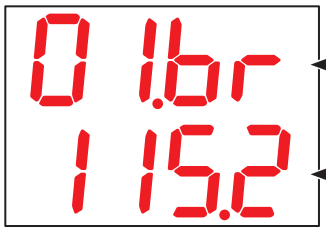
・To cancel the setting mode, press MODE ESC to return to the normal mode screen.

7.4.3 Various Settings

Point

For more details regarding button operations from display of the setting screen to fixing the settings content, please refer to P. 46.

Baud Rate Setting



[Baud Rate Setting Screen]

Display

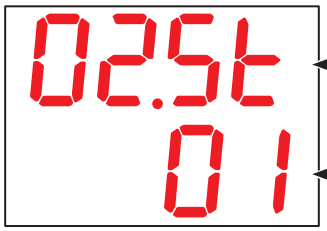
01.BR (Baud Rate)

Press PREV NEXT to change the setting range

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
・ Specify if communicating with a higher-level host. ・ It is necessary to set the baud rate to the same communication speed as the higher-level host. ・ Settings can only be changed by operation of the unit itself.	115.2	9.6, 19.2, 38.4, 57.6, 115.2 (kbps)

Station Number Setting



[Station Number Setting Screen]

Display

02.ST (Station Number)

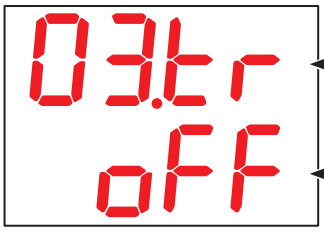
Press PREV NEXT to move the input digit

Press ⊖ ⊕ to change the value

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
・ Sets the station number. Do not set identical station numbers if using while connected to multiple units. Doing so results in unstable communication and faulty operation. ・ Settings can only be changed by operation of the unit itself.	01	01 to 32

Terminating Resistor Setting



[Terminating Resistor Setting Screen]

Display

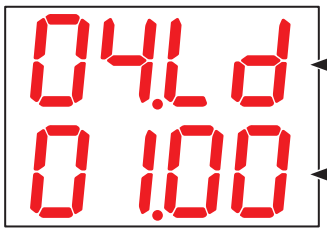
03.TR (Terminating Resistance)

Press PREV NEXT to change between "ON" and "OFF"

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
・ Switches the terminating resistor setting on/off. ・ The initial value varies depending on the product number. Cable end specifications: Loose wires (-A) Connector (-B) ・ Settings can only be changed by operation of the unit itself.	Loose wires (-A): OFF Connector (-B): ON	ON, OFF

Feed Screw Lead Setting



[Feed Screw Lead Setting Screen]

Display

04.LD (Lead)

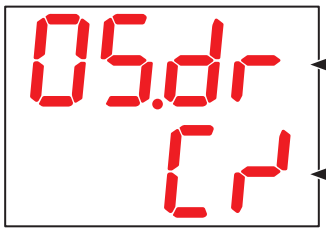
Press PREV NEXT to move the input digit

Press ⊖ ⊕ to change the value

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
・ Sets the distance that the workpiece moves when the feed screw makes one full rotation. The moved distance is calculated based on this setting.	01.00	00.10 to 99.99 (mm)

Movement (+) Rotation Direction Setting



[Movement (+) Rotation Direction Setting Screen]

Display

05.DR (Direction)

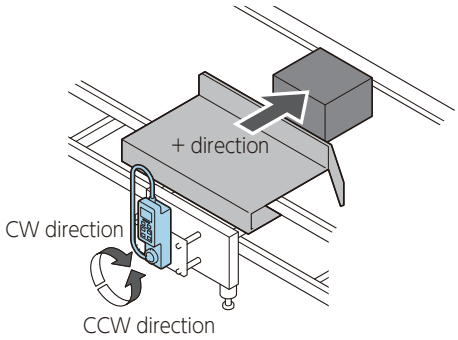
Press PREV NEXT to change between "CW" and "CCW"

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
· Sets the output shaft rotation direction for moving a workpiece in the (+) direction.	CW	CW, CCW

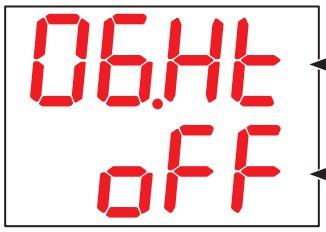
Point

Direction of rotation



CW: Clockwise rotation when viewed from the output shaft.
CCW: Counter-clockwise rotation when viewed from the output shaft.

High Torque Adapter Setting



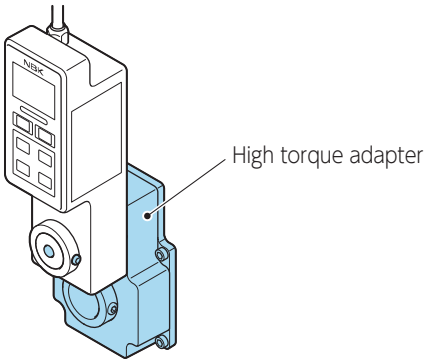
[High Torque Adapter Setting Screen]

Display
06.HT (High Torque)

Press PREV NEXT to change between "OFF", "04", and "08"

Press SET to write (fix the set value)

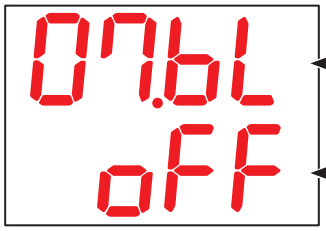
Description	Initial Value	Setting Range
• Use this setting when using an optional high torque adapter. "04": When using "EOAT-200-4 (Gear ratio 4)" "08": When using "EOAT-200-8 (Gear ratio 8)" • Compensates for the decrease in movement when using high torque adapters.	OFF	OFF, 04, 08



Point

By using a high torque adapter, it is possible to reduce the speed of rotation and amplify the torque of the wired positioning unit.

Backlash Compensation*1 Setting

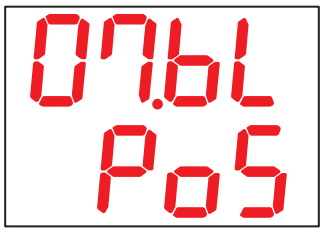


[Backlash Compensation Setting Screen]

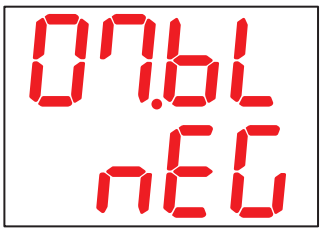
Display
07.BL (Backlash)

Press PREV NEXT to change between "OFF", "POS (positive)", and "NEG (negative)"

Press SET to write (fix the set value)



[POS Setting Screen]



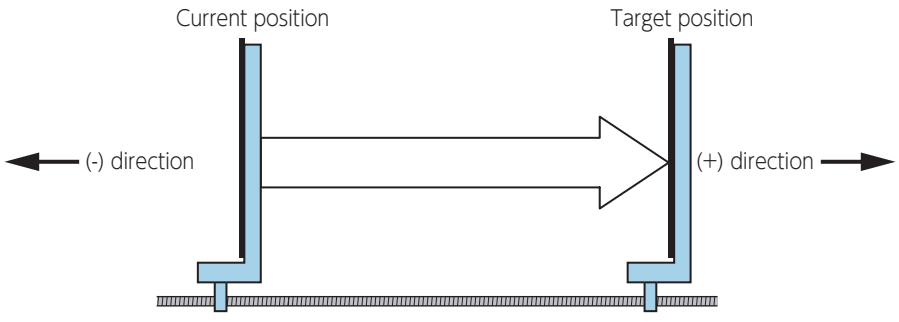
[NEG Setting Screen]

Description	Initial Value	Setting Range
• Use the settings to compensate for any gap (backlash) in engaged parts such as the feed screw or gears. "POS": Performs a compensation so that the final movement of the workpiece toward the target position is always from the (-) direction to the (+) direction. "NEG": Performs a compensation so that the final movement of the workpiece toward the target position is always from the (+) direction to the (-) direction.	OFF	OFF, POS, NEG

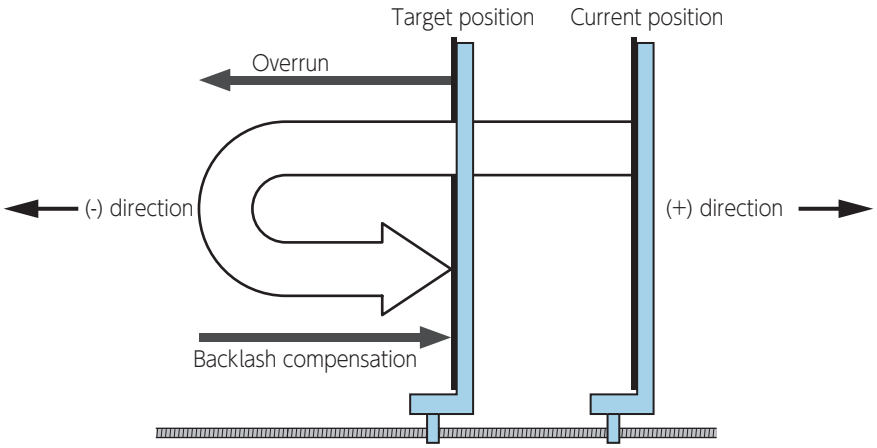
*1: We recommend backlash compensation when using high torque adapters (option).

Example: Operation When Set the "Backlash Compensation" to "POS"

When the target position is in the (+) direction from the current position

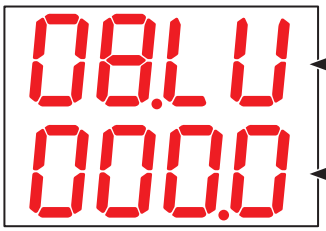


When the target position is in the (-) direction from the current position



* After performing overrun for once towards the (-) direction, move to the target position and perform backlash compensation.

Movement Range Upper Limit Setting



[Movement Range Upper Limit Setting Screen]

Display

08.LU (Limit Upper)

Press PREV NEXT to move the input digit

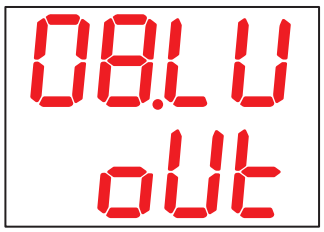
Press ⊖ ⊕ to change the value

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
・ Sets the upper limit of the movement range. If the current position exceeds the upper limit, the unit stops* and retracts to within the movement range. ・ A set value of "0000.0" results in an upper limit of the movement range of 3000 mm.	0000.0	0000.0 to 3000.0 (mm)

* An error code is displayed. P.127

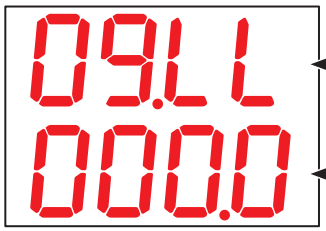
Point



"OUT" is displayed on the lower row of the display if the current position exceeds the set value for the movement range and you will be prompted to re-enter the set value.

Example:The "movement range upper limit setting" is set at 800 mm when the current workpiece position is at 1000 mm

Movement Range Lower Limit Setting



[Movement Range Lower Limit Setting Screen]

Display

09.LL (Limit Lower)

Press PREV NEXT to move the input digit

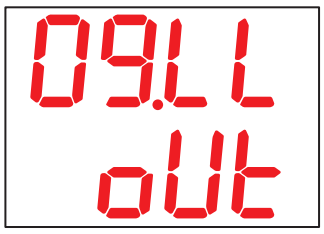
Press ⊖ ⊕ to change the value

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
・ Sets the lower limit of the movement range. If the current position is less than the lower limit, the unit stops* and retracts to within the movement range. ・ A set value of "0000.0" results in a lower limit of the movement range of -3000 mm.	0000.0	0000.0 to -3000.0 (mm)

* An error code is displayed. P.127

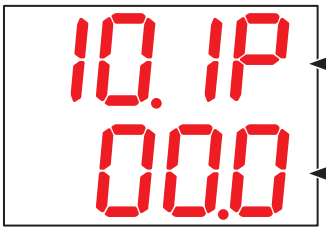
Point



"OUT" is displayed on the lower row of the display if the current position is less than the set value for the movement range and you will be prompted to re-enter the set value.

Example: The "movement range lower limit setting" is set at -800 mm when the current workpiece position is at -1000 mm

In-Position Range Setting



[In-Position Range Setting Screen]

Display

10.IP (In-Position)

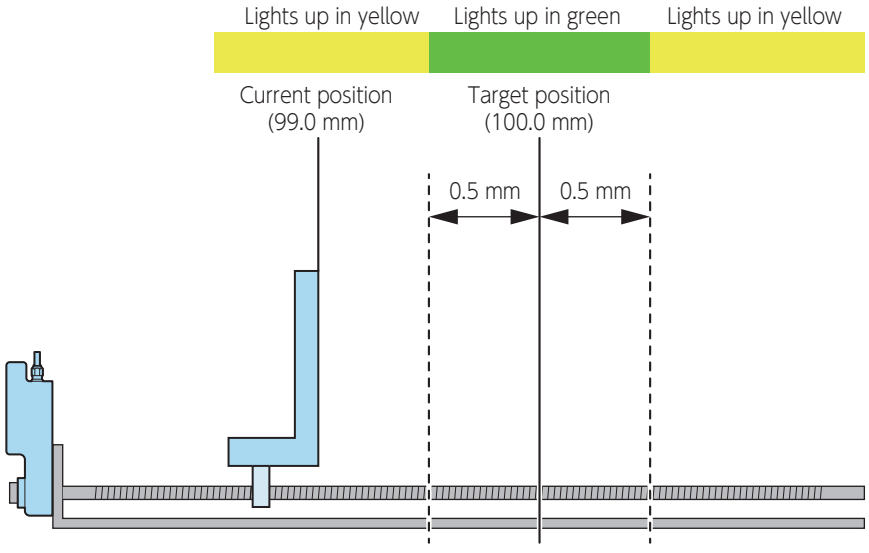
Press PREV NEXT to move the input digit

Press ⊖ ⊕ to change the value

Press SET to write (fix the set value)

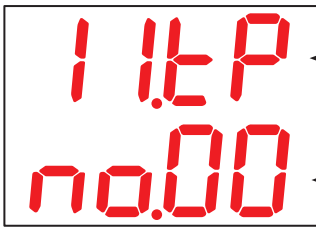
Description	Initial Value	Setting Range
• Sets the in-position range. If the current position is within the in-position range, the indicator LED will turn green. If it is outside of this range, it turns yellow. When the set value is "00.0", the LED turns green only when the target position and the current position are matching.	00.0	00.0 to 50.0 (mm)

Example: In-Position Range Setting: When Set to 00.5 (0.5 mm)



The LED turns yellow as the current position is outside of the in-position range.

Target Position Setting



[Target Position Setting Screen]

Display

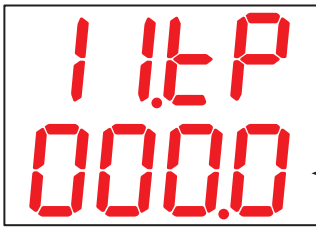
11.TP (Target Position)

Display

No. XX (XX: 00 to 10)

Press PREV NEXT to select the target position registration number

Press SET to fix the target position registration number



[Target Position Input Screen]

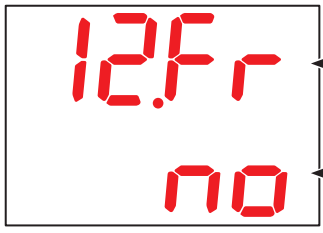
Press PREV NEXT to move the input digit

Press ⊖ ⊕ to change the value

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
· Provides 11-point memory for the target position.	0000.0	-3000.0 to 3000.0 (mm)

Initialization



[Initialization Setting Screen]

Display

12.FR (Factory Reset)

Press PREV NEXT to change between "YES" and "NO"

Press SET to write (fix the set value)

Description	Initial Value	Setting Range
· Resets settings to those when shipped from the factory.	NO	YES, NO

7.5 Manual Operations Mode

7.5.1 Manual Operations Mode Overview

You can use the manual operations mode to specify and change the items in the following table.

Item	Description	Reference Page
Jog operation	Moves the workpiece while the plus or minus button is pressed.	P.58
Home setting	Sets the current position as the home position.	P.58
Return to home position	Moves the workpiece to the home position.	P.60

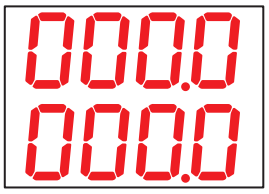
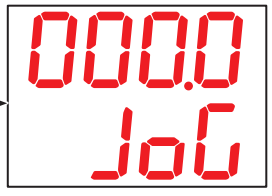
7.5.2 Button Operations in Manual Operations Mode

Point

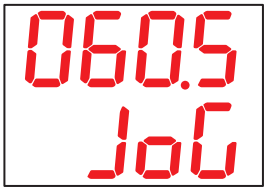
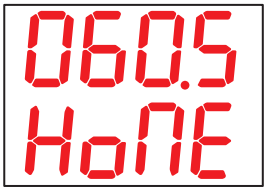
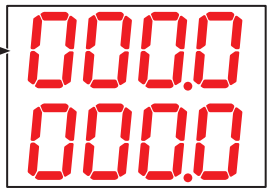
- The screen changes from manual operations mode to normal mode if no operations are performed for 10 sec.
- On the manual operations mode screen, press MODE ESC to change to the normal mode screen.

Home Setting

Example: When You Want to Set or Change the Home Position

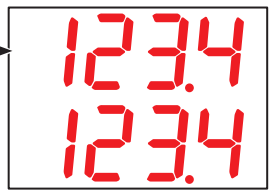
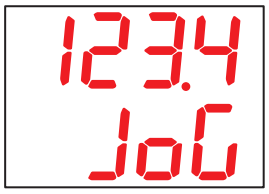
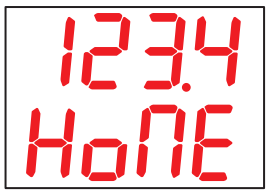
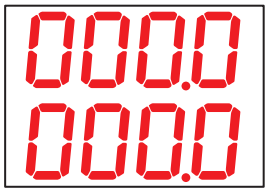
Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
 [Normal Mode Screen]	Lights up in green	Press MODE ESC .
 [Manual Operations Mode Screen]	Lights up in green	The manual operations mode screen is displayed.

Setting	Display
Jog operation	JOG

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
Home position you want to set  	Current position is within in-position range during movement: Lights up in green Outside of in-position range: Lights up in yellow	Press ⊖ ⊕ to move the workpiece to the position you want to set as the home position. **Point** ⊕: Execute move in (+) direction (Workpiece moves in (+) direction) ⊖: Execute move in (-) direction (Workpiece moves in (-) direction)
 		Press and hold SET (3 sec. or more) to set the written current position as the home position.
 * Flashes several times while writing.		
Changes to "000.0" because the current position has become the home position.  [Normal Mode Screen]	Lights up in green	The display automatically returns to the normal mode screen.

Return to Home Position

Moves the workpiece from the current position to the home position.

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
Current position  [Normal Mode Screen]	Lights up in green	Press MODE ESC.
 [Manual Operations Mode Screen]		Press SET.
 * The upper row flashes. [Manual Operations Mode (Return to Home Position) Screen] Setting: Return to home position / Display: HOME	Lights up in green	The manual operations mode (return to home position) screen is displayed.
	Current position is within in-position range during movement: Lights up in green Outside of in-position range: Lights up in yellow	Press SET to move the workpiece to the home position. Press MODE ESC during movement to stop movement and return to the normal mode screen.
 [Normal Mode Screen]	Lights up in green	The display automatically returns to the normal mode screen.

7.6 Target Position Operation Mode

7.6.1 Overview of Target Position Operation Mode

The target position operation mode is used to operate, set, and change the items in the following table.

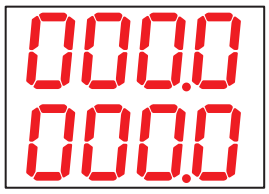
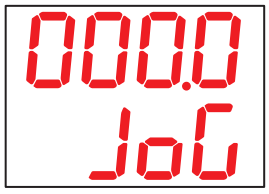
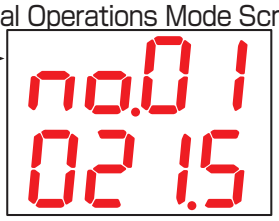
Item	Description
Target position movement	Calls the registered target position and moves the workpiece to that position.
Target position registration	Registers the current position as the target position.

7.6.2 Button Operations in Target Position Operation Mode

Point

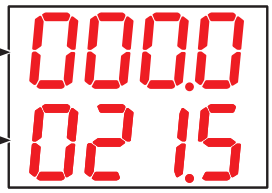
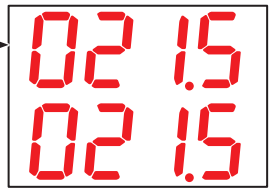
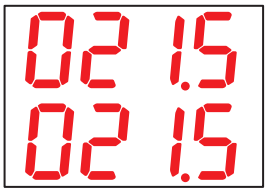
On the target position operation mode screen, press MODE ESC to change to the normal mode screen.

Example: If Calling Target Position Registration No. 1 and Moving the Workpiece to That Position

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
 [Normal Mode Screen]	Lights up in green	Press MODE ESC .
 [Manual Operations Mode Screen]	Lights up in green	Press PREV NEXT to select the target position registration number.
	Lights up in white	

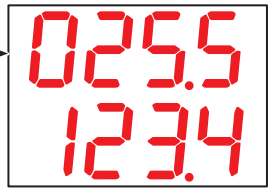
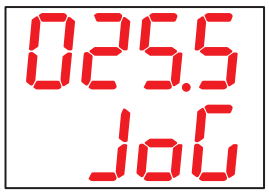
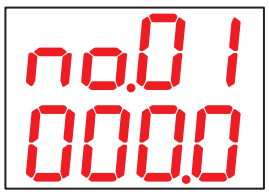
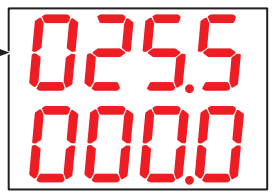
Setting	Display
Target position registration number	No. XX (XX: 00 to 10)

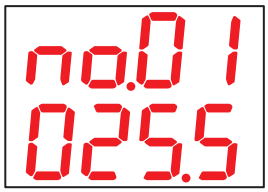
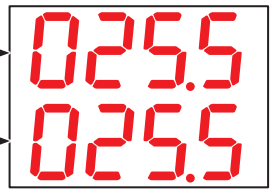
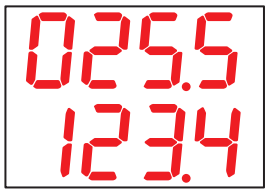
* Upper row: Target position registration number
Lower row: Registered target position

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
Current position  Selected No. 1 target position	Lights up in white	Press SET to fix the target position.
 * The upper row flashes.		Press SET .
Moves from "000.0" to "021.5" 	Current position is within in-position range during movement: Lights up in green Outside of in-position range: Lights up in yellow	Movement starts. Press MODE ESC during movement to stop movement and return to the normal mode screen. Movement ends.
 * After movement, the display automatically returns to the normal mode screen.	Lights up in green	

Example: If Registering the Current Position of "25.5" as Target Position Registration No. 1

* The target position can be set or changed by inputting numbers.
  For setting operations, please refer to P. 57 "Target Position Setting".

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
Current position  [Normal Mode Screen]	 Lights up in green	Press MODE ESC .
 [Manual Operations Mode Screen]		Press PREV NEXT to select the target position registration number.
 [Target Position Operation Mode Screen] * Upper row: Target position registration number Lower row: Registered target position		
Current position  * The screen automatically changes.	 Lights up in white	Press and hold SET (3 sec. or more).
 * Flashes several times while writing.		

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
 * Overwrites the target position with the value of the current position.	Lights up in white	↓
Current position  Target position registered as No. 1		Press MODE ESC. ↓
 [Normal Mode Screen]	Lights up in green	Returns to the normal mode screen.

8 Communication Settings (PC or PLC Connection)

Overview of Communications Settings

If using with the units connected to a higher-level host (PC or PLC), you must set the communication settings (baud rate and station number) on the unit itself.

Point

Baud rate: Communication speed (kbps)

Station number: Each unit connected to a PC or PLC is referred to as a station with each station assigned a number for control purposes.

* For more details regarding baud rate and station number settings, please refer to P. 48.

9 Unit Settings and Control by PC

9.1 Overview of Unit Settings and Control by PC

If using units with a PC as the higher-level host, you must use the dedicated software "MOD-COM". Download "MOD-COM" from the following URL:

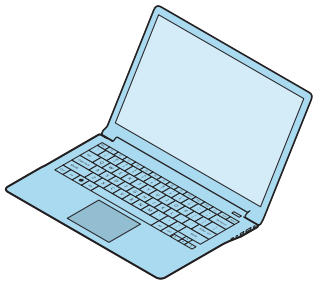
https://www.nbk1560.com/en-US/products/mechatronics/positioning_unit/download/mod-com/

Point

For unit settings and control by PC, please refer to the "Dedicated Software (MOD-COM) Instruction Manual".

Recommended PC specifications

OS: Windows 10
CPU: Intel® /AMD DualCore or higher (excluding ATOM CPUs)
Memory: Minimum of 2 GB, recommended at least 4 GB
HDD: At least 2 MB of free space (excluding .NET)
USB: USB2.0/3.0 Type-A

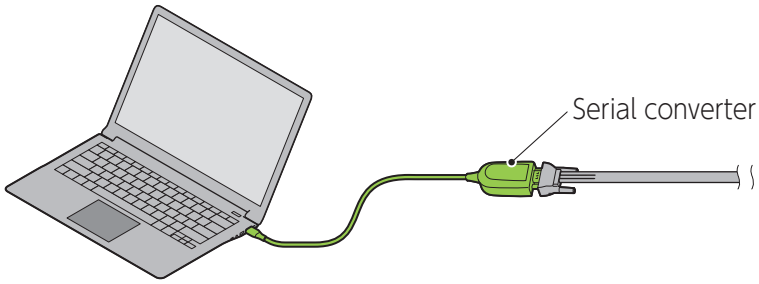


* "Windows" is a registered trademark of Microsoft Corporation within the United States and other countries.

Point

For details regarding your PC's specifications, please refer to the included instruction manual.

If connecting to a PC, it is necessary to use a serial converter to convert the serial communication of the RS-485 to make the connection.

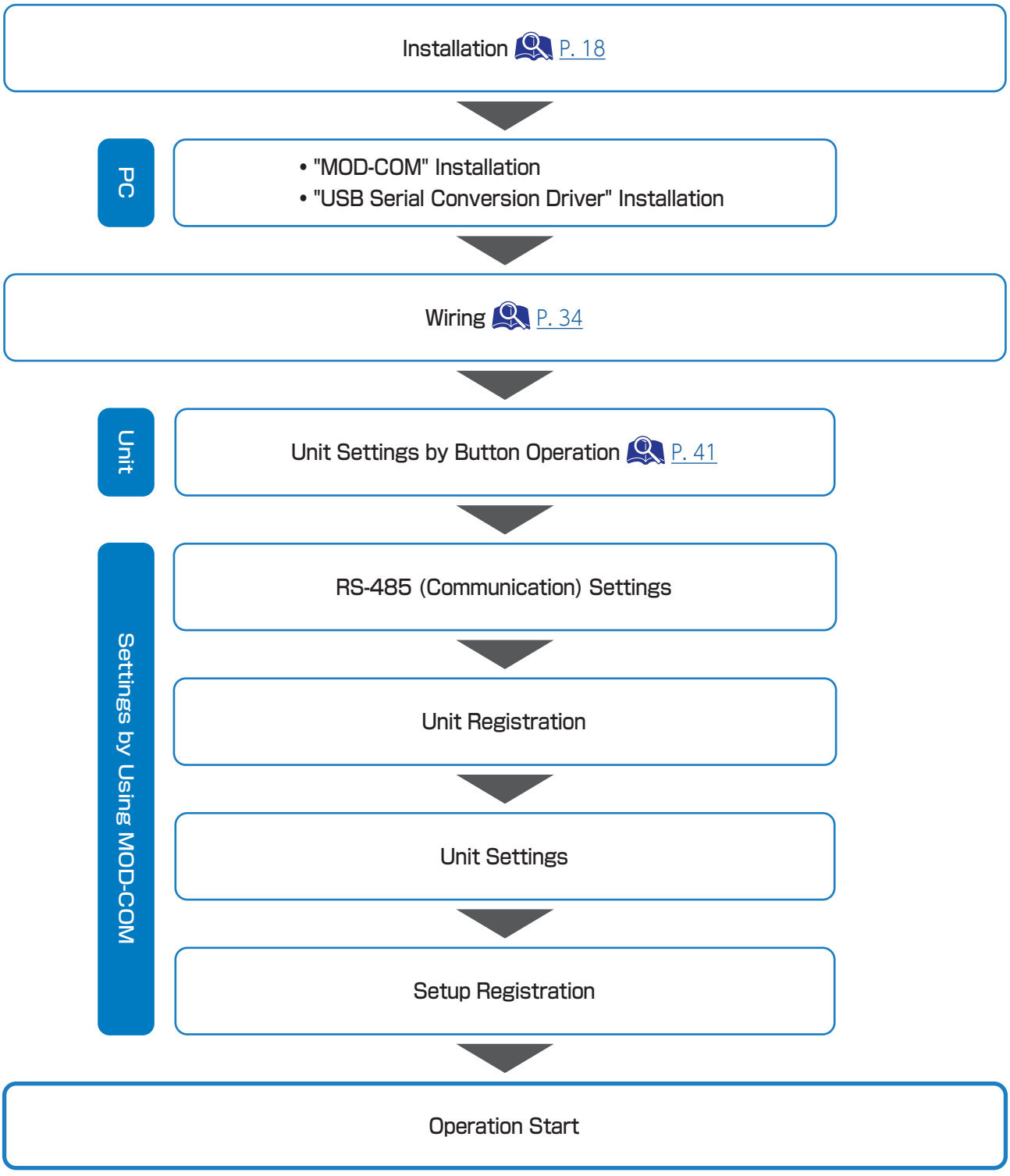


Point

For more details regarding the installation of the USB serial conversion driver, please refer to the included serial converter instruction manual.

9.2 Flow from Installation to Operation

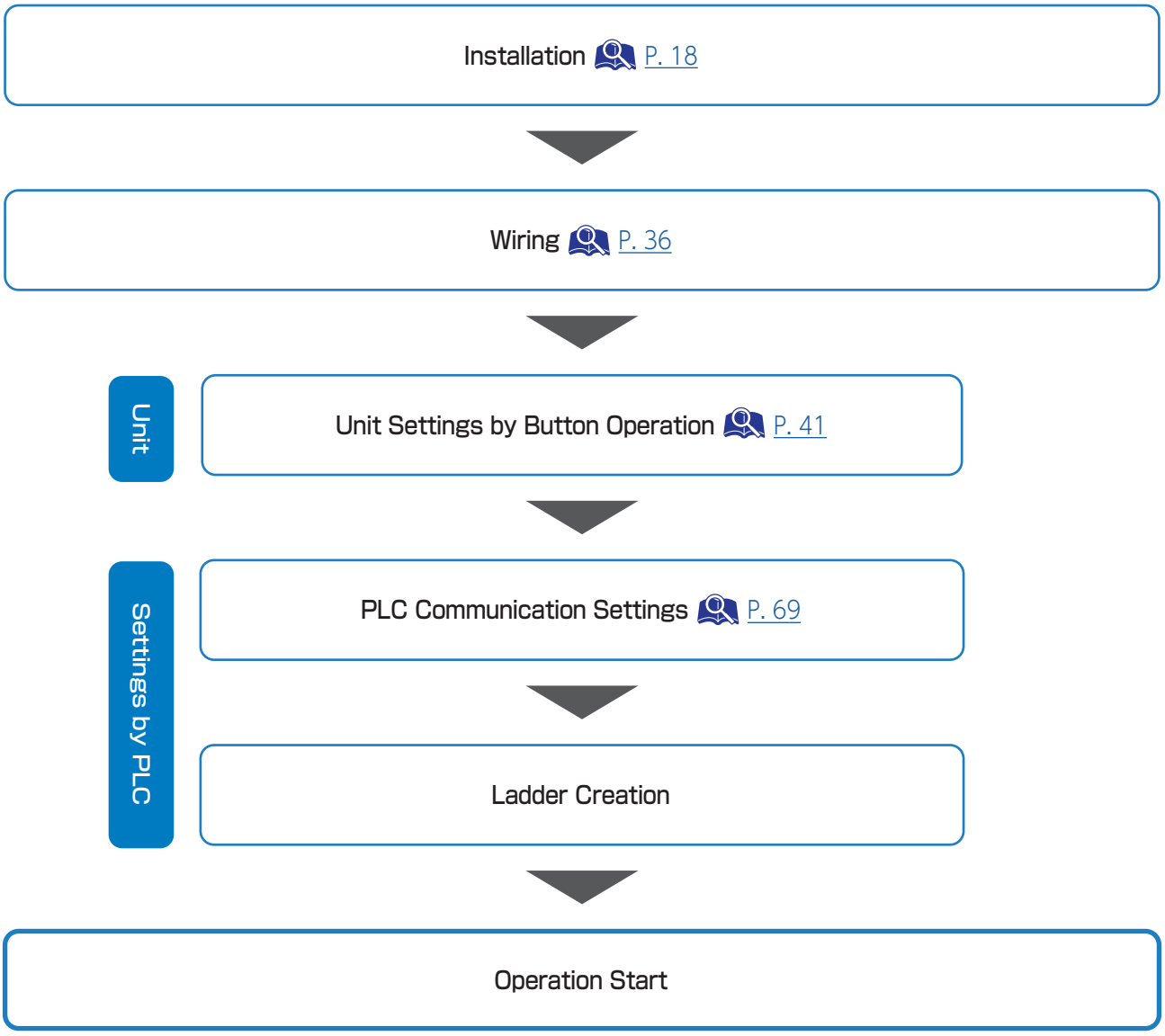
This section provides an overview of the flow of procedures from installation to operation if using a PC as the higher-level host. Perform work according to the following flow-chart.



10 Unit Settings and Control by PLC

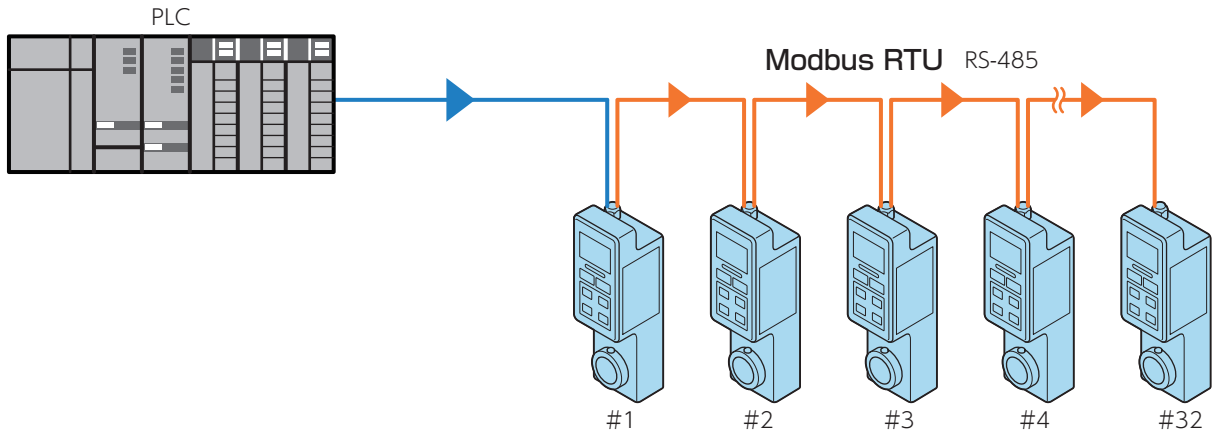
10.1 Flow from Installation to Operation

This section provides an overview of the flow of procedures from installation to operation if using a PLC as the higher-level host. Perform work according to the following flow-chart.



10.2 Communication Settings

10.2.1 Overview of Modbus RTU Control (RS-485 Communication)



Communication Specifications

Item	Description
Protocol	Modbus RTU
Interface	RS-485
Communication method	Half-duplex communication
Max. number of connections	32 units
Synchronization method	Start-Stop synchronization
Stop bit	1 (Fixed)
Parity bit	Even (Fixed)
Communication speed (kbps)	9.6 / 19.2 / 38.4 / 57.6 / 115.2

Communication Method

The Modbus protocol communication method is a single master/multi-slave system.
Only the master (PLC) can send a query, resulting in the slave (unit) executing the processing requested by the query and returning a response message.
The following two types of queries can be sent.

Unicast mode

The master sends a query to one slave unit.
The slave executes the processing and returns a response.

Broadcast mode

If "0" is specified as the slave address, the query is sent to all slaves.
The slaves execute the processing but do not return a response.

10.2.2 Message Communication Settings

Message Frame

Start	Station Number	Function Code	Data	CRC Check	End
Silent interval	1 byte	1 byte	n byte	2 bytes	Silent interval

● Start

The silent interval (time with no communication) is the time for 3.5 characters or more.
Response is not possible if less than 3.5 characters.
Set the silent interval by referring to the following table.

Silent Interval for Each Communication Speed (Reference Values)

Communication Speed (kbps)	Silent Interval (ms)
9.6	5.0
19.2	3.0
38.4	
57.6	
115.2	

● Station Number

Specifies the unit station number (01_H to 20_H) that is sent a query.
Specify "0" to send a query to all units by broadcast mode.

● Function Code

For more details regarding function codes that can be used with the EPU-210, please refer to P. 73.

● Data

Specifies the data sent to the unit(s).

● CRC Check

Checks the content of the entire message based on the CRC method.

● End

The silent interval (time with no communication) is the time for 3.5 characters or more.

10.2.3 Slave Mode Settings

Slave Response

If the query is made using broadcast mode, a normal response is returned if status is normal and an exception response is returned if there is an error.
There are the following four types of responses from a slave.

(1) The query is received normally, processing performed, and a normal response is returned.

(2) A communication error or similar problem prevents the slave(s) from receiving the query and no response is returned. (The master performs error detection due to a timeout error.)

(3) Although slaves can receive a query, if a CRC error is detected and the query is not correct, the slave does not return a response. (The master performs error detection due to a timeout error.)

(4) Although the slaves can correctly receive the query without errors, if processing cannot be performed for some reason, the following exception responses are returned.

Code	Name	Description
01_H	Improper function	When an unsupported function code is received
02_H	Improper data address	When an unsupported command address is received
03_H	Improper data	When data outside of the setting range is received
04_H	Slave device error	When a unit is in error status and Function Code 05_H is received as the query*
06_H	Executing slave device processing	When Function Code 05_H, 06_H, or 10_H is received as the query while the unit is in any mode other than normal mode or is moving*

* Whether a command can be received depends on the unit mode and status. For more details, please refer to P. 73.

Examples of Exception Responses

A query to read an unassigned address ($03E8_H$) is sent.

Query (01 03 03 E8 00 01 04 7A)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	$03E8_H$	Assigned name
No. of registers	2	0001_H	No. of read registers
CRC check	2	$047A_H$	
End	-	-	Silent interval

For the response, 80_H is added to the function code and an exception code (03_H) is returned.

Response (01 83 02 C0 F1)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	83_H	Read FC code (03_H) + 80_H
Exception code	1	02_H	Improper data address
Error check	2	$C0F1_H$	
End	-	-	Silent interval

Receivable Commands

The timing at which communication commands are receivable or not depends on the unit mode or operating status. Properly issue communication commands by referring to the following table.

Operation Mode	Function Code		
	03H (Read)	06H 10H (Write)	05H (Execute)
Normal mode	Yes	Yes	Yes
Manual operations mode	Yes	No	No
Target position operation mode	Yes	No	No
Setting mode	Yes	No	No

Operating Status	Function Code		
	03H (Read)	06H 10H (Write)	05H (Execute)
Standby mode	Yes	Yes	Yes
Moving	Yes	No	No*1
Error	Yes	Yes	No*2

*1: Only a Move cancel command is available
*2: Only a Reset errors command is available

Function Codes

The function codes that can be used with the EPU-210 are as indicated in the following table. Function codes not indicated in the following table will not be executed even if sent.

Overview of Function Codes (FC)

Function Code	Notes
03H	Reads a single or multiple holding registers
05H	Writes a value (on/off) to a single coil
06H	Writes a value to a single holding register
10H	Writes a value to multiple holding registers

●Read Holding Registers (03_H)

Reads the status and setting registers.
You can read up to a maximum of 23 items (23 words) of consecutive registers.

Query Format

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	XX_H	Station numbers 01_H to 20_H
FC	1	03_H	Function code
Address	2	$XXXX_H$	Specifies the start address*
No. of registers	2	$XXXX_H$	0001_H to 0016_H (No. of read registers)
CRC check	2	$XXXX_H$	
End	-	-	Silent interval

* Refer to "Overview of Register Addresses". P.77

Response Format

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	XX_H	Station number in the sent query
FC	1	03_H	Function code
No. of bytes	1	XX_H	No. of read data bytes
Read data 1	2	$XXXX_H$	Read data
Read data 2	2	$XXXX_H$	Read data
Read data 3	2	$XXXX_H$	Read data
:	:	:	:
CRC check	2	$XXXX_H$	
End	-	-	Silent interval

● Write to Coil (05H)

Executes operation commands (Target position [Move], Home setting, Reset errors, etc.).
If in broadcast mode, writing is performed to the coil with same address as all units.

Query Format

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	XX_H	Station numbers 01_H to 20_H In broadcast mode, 00_H
FC	1	05_H	Function code
Address	2	$XXXX_H$	Specifies the address*
Changed data	2	$XXXX_H$	Normal: 0000_H Execute: $FF00_H$
CRC check	2	$XXXX_H$	
End	-	-	Silent interval

* Refer to "Overview of Operation Commands". P.103

Response Format
The response is the same as the query if writing is completed normally.

● Write to Holding Register (06H)

Writes settings and target position.
Writing is performed to a single specified register.

Query Format

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	XX_H	Station numbers 01_H to 20_H
FC	1	06_H	Function code
Address	2	$XXXX_H$	Specifies the address*
Changed data	2	$XXXX_H$	Write data
CRC check	2	$XXXX_H$	
End	-	-	Silent interval

* Refer to "Overview of Operation Commands". P.103

Response Format
The response is the same as the query if writing is completed normally.

●Write to Multiple Holding Registers (10H)

Batch writes data for multiple settings and target positions.
You can write up to a maximum of 18 items (18 words) of consecutive registers.
If some of the data to be written is outside of the setting range or similar conditions, an exception response is returned and all other data is not written.

Query Format

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	XX_H	Station numbers 01_H to 20_H In broadcast mode, 00_H
FC	1	10_H	Function code
Start address	2	$XXXX_H$	Specifies the start address*
No. of registers	2	$XXXX_H$	No. of written registers
No. of bytes	1	XX_H	Value that is twice the number of registers indicated above
Write data 1	2	$XXXX_H$	
Write data 2	2	$XXXX_H$	
Write data 3	2	$XXXX_H$	
:	:	:	:
CRC check	2	$XXXX_H$	
End	-	-	Silent interval

* Refer to "Overview of Operation Commands". P.103

Response Format

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	XX_H	Station number in the sent query
FC	1	10_H	Function code
Start address	2	$XXXX_H$	Start address
No. of registers	2	$XXXX_H$	No. of written registers
CRC check	2	$XXXX_H$	

10.3 Overview of Register Addresses

Address Map

All data used with wired positioning units is in word units (16-bit).

Address Range	Access Unit	Corresponding Function Code	Description	Details
0000_H to 0004_H	Word	03_H	Monitor commands	P.78
0005_H to 0016_H	Word	03_H	Setting commands	P.86
	Word	06_H		
	Word	10_H		
0100_H to $012A_H$	Bit	05_H	Operation commands	P.103

10.3.1 Monitor Commands

Overview of Monitor Commands

For monitoring unit status, current position, and similar items.

No.	Address	FC	Broadcast	Name	byte	Unit	Initial Value	Setting Range	Details
1	0000_H	03_H	-	Status inquiry	2	-	-	-	P.79
2	0001_H	03_H	-	Error inquiry	2	-	-	-	P.81
3	0002_H	03_H	-	Current position inquiry	2	-	-	-	P.83
4	0003_H	03_H	-	Serial number inquiry	2	-	-	-	P.84
5	0004_H	03_H	-	Terminating resistor setting inquiry	2	-	-	-	P.85

Details of Monitor Commands

1. Status Inquiry

Address	Name	Unit	Initial Value	Setting Range
0000H	Status inquiry	-	-	-

Description
Reads the unit status.

Unit Status

Bit	Name	Description
b6 to b15	-	-
b5	Error has occurred	Turns on when an error occurs in a unit. You can check the error that has occurred by using an error inquiry (0001H).
b4	During manual operation	Turns on when a unit is in manual operations mode.
b3	Moving	Turns on when a unit is moving.
b2	In-position on	Turns on when the current position of a unit is within the in-position range.
b1	Home position	Turns on when a unit is in the home position.
b0	Move complete	Turns on when a unit is stopped.

* Whether a command can be received depends on the unit mode and status. For more details, please refer to P. 73.

Example: Read the "Status Information" of Station Number 01_H

Query (01 03 00 00 00 01 84 0A)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0000_H	Status inquiry
No. of registers	2	0001_H	No. of read registers
CRC check	2	$840A_H$	
End	-	-	Silent interval

Response (01 03 02 00 05 78 47)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of bytes	1	02_H	No. of read data bytes
Data	2	0005_H	Status information
CRC check	2	7847_H	
End	-	-	Silent interval

Example: Status information
Read data: 0005_H
→ Results in "bit 0 (Move complete)" and "bit 2 (In-position on)" turning on.

2. Error Inquiry

Address	Name	Unit	Initial Value	Setting Range
0001_H	Error inquiry	-	-	-

Description

Reads the error code occurring at a unit.
0000_H is returned as a response if no error occurs. Remove the cause of the error and perform the following operations to reset the error.

- Press and hold the MODE/ESC button for 3 sec. or more
- Turn the power on and off
- Execute the Reset errors command ($0010A_H$)

Error Code		Error Name	Description
Hex	Seven-Segment Display		
0001 to 0004	0001 to 0004	Movement timeout error	Occurs when workpiece movement stops for at least one second.
0005	0005	Movement range lower limit (-) detection	Occurs when the workpiece moves to the set value of the movement range lower limit (-).
0006	0006	Movement range upper limit (+) detection	Occurs when the workpiece moves to the set value of the movement range upper limit (+).
0007	0007	Abnormal temperature detection (High)	Occurs when the unit internal temperature is too high.
0008	0008	Abnormal temperature detection (Low)	Occurs when the unit internal temperature is too low.
0009	0009	Overcurrent error	Occurs when an overcurrent is detected during movement.
000A	0010	Low voltage detection	Occurs when the unit's voltage drop detection circuit is triggered.
000B	0011	Out of movement range detection	Occurs when the current position is out of the movement range (-3000.0 mm to +3000.0 mm).
0014	0020	Read failure error	Occurs when there is a settings data read failure when connected to a PC.
0015	0021	Write failure error	Occurs when there is a settings data write failure when connected to a PC.
0016 0017 0063	0022 0023 0099	EERAM data error	Occurs when there is an EERAM data abnormality.
0018	0024	Memory data error	Occurs when there is an abnormality with the data that is saved in memory. * If this error occurs, the home position may be misaligned. * If this error occurs, perform Return to home position and check the home position.

Example: Read the "Error Code" of Station Number 01_H

Query (01 03 00 01 00 01 D5 CA)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0001_H	Error inquiry
No. of registers	2	0001_H	No. of read registers
CRC check	2	$D5CA_H$	
End	-	-	Silent interval

Response (01 03 02 00 03 F8 45)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of data bytes	1	02_H	No. of read data bytes
Data	2	0003_H	Error code
Error check	2	$F845_H$	
End	-	-	Silent interval

Example: Error code
Read data: 0003_H
→ "Movement timeout error" occurs.

3. Current Position Inquiry

Address	Name	Unit	Initial Value	Setting Range
0002_H	Current position inquiry	0.1 mm	-	-3000.0 mm to +3000.0 mm

Description
Reads the current position of a unit.

Example: Read the "Current Position" of Station Number 01_H

Query (01 03 00 02 00 01 25 CA)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0002_H	Current position inquiry
No. of registers	2	0001_H	No. of read registers
CRC check	2	$25CA_H$	
End	-	-	Silent interval

Response (01 03 02 0B B8 BF 06)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of data bytes	1	02_H	No. of read data bytes
Data	2	$0BB8_H$	Current position
Error check	2	$BF06_H$	
End	-	-	Silent interval

Read data: $0BB8_H$
→ "$0BB8_H$" is converted into decimal → 3000 (x 0.1 mm) → Current position is "300.0 mm".

"If current position is (-)"

Read data: $FC18_H$
→ $FFFF_H$ - $FC18_H$ + 1 (add 1) → $03E8_H$ → Converted into decimal → 1000 (x 0.1 mm)
→ Current position is "-100.0 mm".

4. Serial Number Inquiry

Address	Name	Unit	Initial Value	Setting Range
0003H	Serial number inquiry	-	-	-

Description
Reads a unit serial number.

Example: Read the "Serial Number" of Station Number 01H

Query (01 03 00 03 00 01 74 0A)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	03H	Function code
Address	2	0003H	Serial number inquiry
No. of registers	2	0001H	No. of read registers
CRC check	2	740AH	
End	-	-	Silent interval

Response (01 03 02 00 64 B9 AF)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Retrieve data of station number 01H
FC	1	03H	Function code
No. of data bytes	1	02H	No. of read data bytes
Data	2	0064H	Serial number
Error check	2	B9AFH	
End	-	-	Silent interval

Read data: 0064H
→ "0064H" is converted into decimal → 00100 → Serial number is "00100".

5. Terminating Resistor Setting Inquiry

Address	Name	Unit	Initial Value	Setting Range
0004_H	Terminating resistor setting inquiry	-	*1	0_H to 1_H*2

Description
Reads the setting of the terminating resistor of a unit. The terminating resistor setting can only be changed by using the unit itself.

*1: Varies depending on the unit type.
*2: 0_H → Terminating resistor setting is "OFF".
1_H → Terminating resistor setting is "ON".

Example: Read the "Terminating Resistor Setting" of Station Number 01_H

Query (01 03 00 04 00 01 C5 CB)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0004_H	Terminating resistor setting inquiry
No. of registers	2	0001_H	No. of read registers
CRC check	2	$C5CB_H$	
End	-	-	Silent interval

Response (01 03 02 00 01 79 84)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of data bytes	1	02_H	No. of read data bytes
Data	2	0001_H	Terminating resistor setting
Error check	2	7984_H	
End	-	-	Silent interval

Read data: 0001_H → Terminating resistor setting is "ON".

10.3.2 Setting Commands

Overview of Setting Commands

For performing reading and writing of unit settings.

No.	Address	FC	Broadcast	Name	Byte	Unit	Initial Value	Setting Range	Details
6	0005H	03H,06H, 10H	Yes	Target position data 0	2	0.1 mm	0000H (0.0 mm)	8AD0H to 7530H (-3000.0 mm to +3000.0 mm) 7FFFH* * Target position [Move] is not executed if 7FFFH is set as the target position data.	P.87
7	0006H	03H,06H, 10H	Yes	Target position data 1	2				
8	0007H	03H,06H, 10H	Yes	Target position data 2	2				
9	0008H	03H,06H, 10H	Yes	Target position data 3	2				
10	0009H	03H,06H, 10H	Yes	Target position data 4	2				
11	000AH	03H,06H, 10H	Yes	Target position data 5	2				
12	000BH	03H,06H, 10H	Yes	Target position data 6	2				
13	000CH	03H,06H, 10H	Yes	Target position data 7	2				
14	000DH	03H,06H, 10H	Yes	Target position data 8	2				
15	000EH	03H,06H, 10H	Yes	Target position data 9	2				
16	000FH	03H,06H, 10H	Yes	Target position data 10	2				
17	0010H	03H,06H, 10H	Yes	Feed screw lead setting	2	0.01 mm	0064H (1.00 mm)	000AH to 270FH (0.10 mm to 99.99 mm)	P.89
18	0011H	03H,06H, 10H	Yes	Backlash compensation setting	2	-	0H (None)	0H: None 1H: Move (+) 2H: Move (-)	P.91
19	0012H	03H,06H, 10H	Yes	Movement (+) rotation direction setting	2	-	0H (CW direction)	0H: CW direction 1H: CCW direction	P.93
20	0013H	03H,06H, 10H	Yes	High torque adapter setting	2	-	0H (None)	0H: None 1H: Gear ratio 4 2H: Gear ratio 8	P.95
21	0014H	03H,06H, 10H	Yes	Movement range lower limit (-) setting	2	0.1 mm	0000H (Not set)	FFFFH to 8AD0H (-0.1 mm to -3000.0 mm)	P.97
22	0015H	03H,06H, 10H	Yes	Movement range upper limit (+) setting	2	0.1 mm	0000H (Not set)	0001H to 7530H (0.1 mm to 3000.0 mm)	P.99
23	0016H	03H,06H, 10H	Yes	In-position range setting	2	0.1 mm	0000H (0.0 mm)	0000H to 01F4H (0 to 500)	P.101

Details of Setting Commands

6 to 16. Target Position Data 0 to 10

Address	Name	Unit	Initial Value	Setting Range
0005H	Target position data 0	0.1 mm	0000H (0.0 mm)	8AD0H to 7530H (-3000.0 mm to +3000.0 mm) 7FFFH
0006H	Target position data 1			
0007H	Target position data 2			
0008H	Target position data 3			
0009H	Target position data 4			
000AH	Target position data 5			
000BH	Target position data 6			
000CH	Target position data 7			
000DH	Target position data 8			
000EH	Target position data 9			
000FH	Target position data 10			

Description
This is unit target position data. Target position [Move] is not executed if 7FFFH is set.

Example 1: Read Target Position Data 0 of Station Number 01_H

Query (01 03 00 05 00 01 94 0B)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0005_H	Target position data 0
No. of registers	2	0001_H	No. of read registers
CRC check	2	$940B_H$	
End	-	-	Silent interval

Response (01 03 02 00 64 B9 AF)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of bytes	1	02_H	No. of read data bytes
Data	2	0064_H	Setting of target position data 0
CRC check	2	$B9AF_H$	
End	-	-	Silent interval

Read data: 0064_H
→ "0064_H" is converted into decimal → 100 (x 0.1 mm) → Target position data 0 is set at "10.0 mm".

Example 2: Write 10.0 mm into Target Position Data 0 of Station Number 01_H

Query (01 06 00 05 00 64 98 20)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0005_H	Target position data 0
Changed data	2	0064_H	Write data
CRC check	2	9820_H	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

17. Feed Screw Lead Setting

Address	Name	Unit	Initial Value	Setting Range
0010H	Feed screw lead setting	0.01 mm	0064H (1.00 mm)	000AH to 270FH (0.10 mm to +99.99 mm)

Description
Sets the distance that the workpiece moves when the feed screw makes one full rotation.

Example 1: Read the Setting of the Feed Screw Lead of Station Number 01H

Query (01 03 00 10 00 01 85 CF)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	03H	Function code
Address	2	0010H	Feed screw lead
No. of registers	2	0001H	No. of read registers
CRC check	2	85CFH	
End	-	-	Silent interval

Response (01 03 02 01 F4 B8 53)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Retrieve data of station number 01H
FC	1	03H	Function code
No. of data bytes	1	02H	No. of read data bytes
Data	2	01F4H	Feed screw lead setting
Error check	2	B853H	
End	-	-	Silent interval

Read data: 01F4H
→ "01F4H" is converted into decimal → 500 (x 0.01 mm) → Lead set value is "5.00 mm".

Example 2: Write 5.00 mm for the Feed Screw Lead Setting of Station Number 01_H

Query (01 06 00 10 01 F4 88 18)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0010_H	Feed screw lead
Changed data	2	$01F4_H$	Write data
CRC check	2	8818_H	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

18. Backlash Compensation Setting

Address	Name	Unit	Initial Value	Setting Range
0011H	Backlash compensation setting	-	0H (None)	0H to 2H*

Description
Use the settings to compensate for any gap (backlash) in engaged parts such as the feed screw or gears.

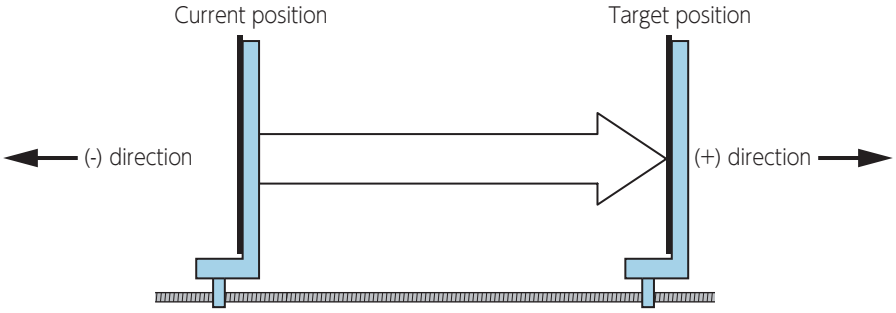
* 0H:No ("None") backlash compensation is performed.
  1H: Performs a compensation so that the final movement of the workpiece toward the target position is always to the (+) direction.
  2H: Performs a compensation so that the final movement of the workpiece toward the target position is always to the (-) direction.

Point

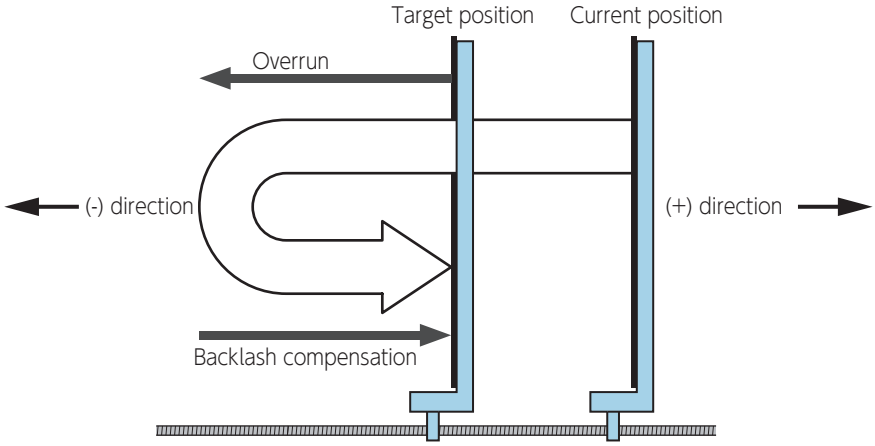
We recommend backlash compensation when using high torque adapters (option).

Example: Operation When Set the "Backlash Compensation" to "POS"

When the target position is in the (+) direction from the current position



When the target position is in the (-) direction from the current position



* After performing overrun for once towards the (-) direction, move to the target position and perform backlash compensation.

Example 1: Read the Backlash Compensation Setting of Station Number 01_H

Query (01 03 00 11 00 01 D4 0F)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0011_H	Backlash compensation
No. of registers	2	0001_H	No. of read registers
CRC check	2	$D40F_H$	
End	-	-	Silent interval

Response (01 03 02 00 00 B8 44)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of data bytes	1	02_H	No. of read data bytes
Data	2	0000_H	Backlash compensation setting
Error check	2	$B844_H$	
End	-	-	Silent interval

Read data: 0000_H → Backlash compensation is set to "None".

Example 2: Write Move (+) for the Backlash Compensation Setting of Station Number 01_H

Query (01 06 00 11 00 01 18 0F)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0011_H	Backlash compensation
Changed data	2	0001_H	Write data
CRC check	2	$180F_H$	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

19. Movement (+) Rotation Direction Setting

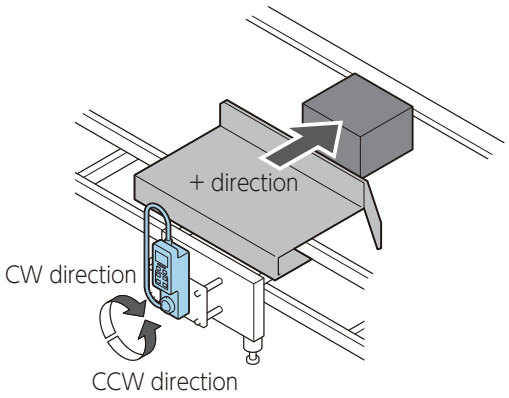
Address	Name	Unit	Initial Value	Setting Range
0012H	Movement (+) rotation direction setting	-	0H (CW direction)	0H to 1H*

Description
Select the rotational direction of the output shaft when the workpiece moves in the (+) direction to either "CW" or "CCW".

* 0H: The count of the current position increases when rotated in the "CW direction".
  1H: The count of the current position increases when rotated in the "CCW direction".

Point

Direction of rotation



CW direction: Clockwise rotation when viewed from the output shaft

CCW direction: Counter-clockwise rotation when viewed from the output shaft

Example 1: Read the Movement (+) Rotation Direction Setting of Station Number 01_H

Query (01 03 00 12 00 01 24 0F)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0012_H	Read address 0010_H
No. of registers	2	0001_H	Movement (+) rotation direction
CRC check	2	$240F_H$	
End	-	-	Silent interval

Response (01 03 02 00 00 B8 44)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of data bytes	1	02_H	No. of read data bytes
Data	2	0000_H	Movement (+) rotation direction setting
Error check	2	$B844_H$	
End	-	-	Silent interval

Read data: 0000_H → The count of the current position increases when rotated in the "CW direction".

Example 2: Write CCW for the Movement (+) Rotation Direction Setting of Station Number 01_H

Query (01 06 00 12 00 01 E8 0F)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0012_H	Movement (+) rotation direction
Changed data	2	0001_H	Write data
CRC check	2	$E80F_H$	
End	-	-	Silent interval

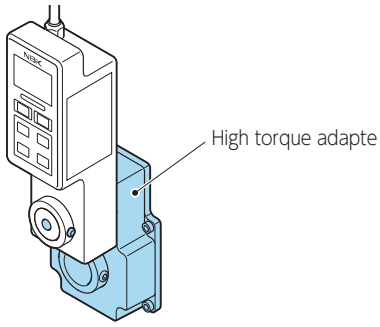
The response is the same as the query if writing is completed normally.

20. High Torque Adapter Setting

Address	Name	Unit	Initial Value	Setting Range
0013_H	High torque adapter setting	-	0_H (None)	0_H to 2_H*

Description
Use this setting when using an optional high torque adapter. Compensates for the decrease in movement when using high torque adapters.

* 0_H: A high torque adapter is not used.
  1_H: A high torque adapter (EOAT-200-4/Gear ratio 4) is used.
  2_H: A high torque adapter (EOAT-200-8/Gear ratio 8) is used.



Point

By using a high torque adapter, it is possible to reduce the speed of rotation and amplify the torque of the wired positioning unit.

Example 1: Read the High Torque Adapter Setting of Station Number 01_H

Query (01 03 00 13 00 01 75 CF)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0013_H	High torque adapter
No. of registers	2	0001_H	No. of read registers
CRC check	2	$75CF_H$	
End	-	-	Silent interval

Response (01 03 02 00 02 39 85)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of data bytes	1	02_H	No. of read data bytes
Data	2	0002_H	High torque adapter setting
Error check	2	3985_H	
End	-	-	Silent interval

Read data: 0002_H → A high torque adapter (EOAT-200-8/Gear ratio 8) is used.

Example 2: Write Gear Ratio 4 for the High Torque Adapter Setting of Station Number 01_H

Query (01 06 00 13 00 01 B9 CF)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0013_H	High torque adapter
Changed data	2	0001_H	Write data
CRC check	2	$B9CF_H$	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

21. Movement Range Lower Limit (-) Setting

Address	Name	Unit	Initial Value	Setting Range
0014_H	Movement range lower limit (-) setting	-0.1 mm	0000_H (0.0 mm)	$FFFF_H$ to $8AD0_H$ (-0.1 mm to -3000.0 mm)

Description
Sets the lower limit of unit movement. If the unit moves out of the range, the unit stops and retracts to within the movement range.

Example 1: Read the Movement Range Lower Limit (-) Setting of Station Number 01_H

Query (01 03 00 14 00 01 C4 0E)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0014_H	Movement range lower limit (-)
No. of registers	2	0001_H	No. of read registers
CRC check	2	$C40E_H$	
End	-	-	Silent interval

Response (01 03 02 FC 18 F9 4E)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of bytes	1	02_H	No. of read data bytes
Data	2	$FC18_H$	Movement range lower limit (-) setting
CRC check	2	$F94E_H$	
End	-	-	Silent interval

Read data: $FC18_H$

→ $FFFF_H$ - "$FC18_H$" + 1 (add 1) → $03E8_H$ → Converted into decimal → 1000 (x 0.1 mm)

→ The set value of the movement range lower limit (-) is "-100.0 mm".

Example 2: Write -100.0 mm for the Movement Range Lower Limit (-) Setting of Station Number 01_H

Query (01 06 00 14 FC 18 88 C4)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0014_H	Movement range lower limit (-)
Changed data	2	$FC18_H$	Write data
CRC check	2	$88C4_H$	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

22. Movement Range Upper Limit (+) Setting

Address	Name	Unit	Initial Value	Setting Range
0015H	Movement range lower limit (+) setting	0.1 mm	0000H (0.0 mm)	0001H to 7530H (0.1 mm to 3000.0 mm)

Description
Sets the upper limit of unit movement. If the unit moves out of the range, the unit stops and retracts to within the movement range.

Example 1: Read the Movement Range Upper Limit (+) Setting of Station Number 01H

Query (01 03 00 15 00 01 95 CE)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	03H	Function code
Address	2	0015H	Movement range upper limit (+)
No. of registers	2	0001H	No. of read registers
CRC check	2	95CEH	
End	-	-	Silent interval

Response (01 03 02 03 E8 B8 FA)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Retrieve data of station number 01H
FC	1	03H	Function code
No. of Bytes	1	02	No. of read data bytes
Data	2	03E8H	Movement range upper limit (+) setting
CRC check	2	B8FAH	
End	-	-	Silent interval

Read data: 03E8H
→ "03E8H" is converted into decimal → 1000 (x 0.1 mm) → The set value of the movement range upper limit (+) is "100.0 mm".

Example 2: Write 100.0 mm for the Movement Range Upper Limit (+) Setting of Station Number 01_H

Query (01 06 00 15 03 E8 98 B0)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0015_H	Movement range upper limit (+)
Changed data	2	$03E8_H$	Write data
CRC check	2	$98B0_H$	
End	-	-	Silent interval

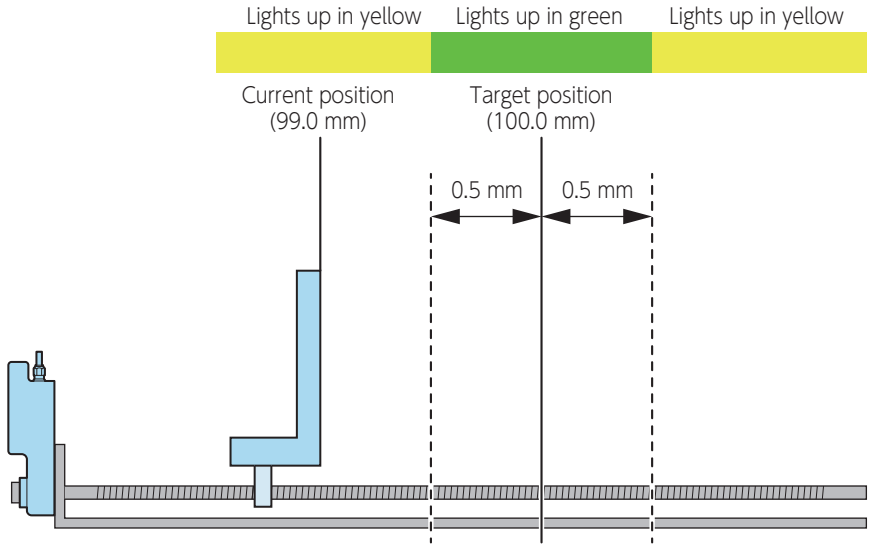
The response is the same as the query if writing is completed normally.

23. In-Position Range Setting

Address	Name	Unit	Initial Value	Setting Range
0016H	In-position range setting	0.1 mm	0000H (0.0mm)	0000H to 01F4H (0.0 mm to 50.0 mm)

Description
Sets the in-position range. If the current position is within the in-position range, the indicator LED will turn green. If it is outside of this range, it turns yellow. When the set value is 0.0 mm, the LED turns green only when the target position and the current position are matching. You can also use the status inquiry (0000H) of the PLC to check if the current position remains in the in-position range.

Example: In-Position Range Setting: When Set to 0.5 mm



The LED turns yellow as the current position is outside of the in-position range.

Example: Read the In-Position Range Setting of Station Number 01_H

Query (01 03 00 16 00 01 65 CE)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	03_H	Function code
Address	2	0016_H	In-position range
No. of registers	2	0001_H	No. of read registers
CRC check	2	$65CE_H$	
End	-	-	Silent interval

Response (01 03 02 00 05 78 47)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Retrieve data of station number 01_H
FC	1	03_H	Function code
No. of data bytes	1	02_H	No. of read data bytes
Data	2	0005_H	In-position range setting
Error check	2	7847_H	
End	-	-	Silent interval

Read data: 0005_H
→ "0005_H" is converted into decimal → 5 (x 0.1 mm) → The in-position range is set to "0.5 mm".

Example 2: Write 0.5 mm for the In-Position Range Setting of Station Number 01_H

Query (01 06 00 16 00 05 A8 0D)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	06_H	Function code
Address	2	0016_H	In-position range
Changed data	2	0005_H	Write data
CRC check	2	$A80D_H$	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

10.3.3 Operation Commands

Overview of Operation Commands

These are used for changing (writing) unit settings to be on or off and executing operations.

No.	Address	FC	Broadcast	Name	Byte	Unit	Initial Value	Setting Range	Details
24	0100H	05H	Yes	Home setting	2	-	0000H	0000H, FF00H	P.105
25	0101H	05H	Yes	Return to home position	2	-	0000H	0000H, FF00H	P.106
26	0102H	05H	Yes	Jog movement (+)	2	-	0000H	0000H, FF00H	P.107
27	0103H	05H	Yes	Jog movement (-)	2	-	0000H	0000H, FF00H	P.108
28	0104H	05H	Yes	1.0 mm movement (+)	2	-	0000H	0000H, FF00H	P.109
29	0105H	05H	Yes	1.0 mm movement (-)	2	-	0000H	0000H, FF00H	P.110
30	0106H	05H	Yes	0.5 mm movement (+)	2	-	0000H	0000H, FF00H	P.111
31	0107H	05H	Yes	0.5 mm movement (-)	2	-	0000H	0000H, FF00H	P.112
32	0108H	05H	Yes	0.1 mm movement (+)	2	-	0000H	0000H, FF00H	P.113
33	0109H	05H	Yes	0.1 mm movement (-)	2	-	0000H	0000H, FF00H	P.114
34	010AH	05H	Yes	Reset errors	2	-	0000H	0000H, FF00H	P.115
35	010BH	05H	Yes	Cancel move command	2	-	0000H	0000H, FF00H	P.116
-	010CH 010DH 010EH 010FH	-	-	Reserved area		-	-	-	-
36	0110H	05H	Yes	Update target position 0 (Current position)	2	-	0000H	0000H, FF00H	P.117
37	0111H	05H	Yes	Update target position 1 (Current position)					
38	0112H	05H	Yes	Update target position 2 (Current position)					
39	0113H	05H	Yes	Update target position 3 (Current position)					
40	0114H	05H	Yes	Update target position 4 (Current position)					
41	0115H	05H	Yes	Update target position 5 (Current position)					
42	0116H	05H	Yes	Update target position 6 (Current position)					
43	0117H	05H	Yes	Update target position 7 (Current position)					
44	0118H	05H	Yes	Update target position 8 (Current position)					
45	0119H	05H	Yes	Update target position 9 (Current position)					
46	011AH	05H	Yes	Update target position 10 (Current position)					

No.	Address	FC	Broadcast	Name	Byte	Unit	Initial Value	Setting Range	Details
-	011BH 011CH 011DH 011EH 011FH	-	-	Reserved area		-	-	-	-
47	0120H	05H	Yes	Target position [Move] 0	2	-	0000H	0000H, FF00H	P.118
48	0121H	05H	Yes	Target position [Move] 1					
49	0122H	05H	Yes	Target position [Move] 2					
50	0123H	05H	Yes	Target position [Move] 3					
51	0124H	05H	Yes	Target position [Move] 4					
52	0125H	05H	Yes	Target position [Move] 5					
53	0126H	05H	Yes	Target position [Move] 6					
54	0127H	05H	Yes	Target position [Move] 7					
55	0128H	05H	Yes	Target position [Move] 8					
56	0129H	05H	Yes	Target position [Move] 9					
57	012AH	05H	Yes	Target position [Move] 10					

Details of Operation Instruction Commands

24. Home Setting

Address	Name	Unit	Initial Value	Setting Range
0100H	Home setting	-	0000H	0000H, FF00H

Description
Sets the current position as the home position.

Example: Execute the Home Setting of Station Number 01H

Query
First query: 01 05 01 00 00 00 CC 36
Second query: 01 05 01 00 FF 00 8D C6

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0100H	Home setting
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: CC36H Second query: 8DC6H	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

25. Return to Home Position

Address	Name	Unit	Initial Value	Setting Range
0101H	Return to home position	-	0000H	0000H, FF00H

Description
Moves to the home position. When return to home position is completed, status (0000H) bit 1 turns on.

Example: Execute Return to Home Position of Station Number 01H

Query
First query: 01 05 01 01 00 00 9D F6
Second query: 01 05 01 01 FF 00 DC 06

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0101H	Return to home position
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: 9DF6H Second query: DC06H	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

26. Jog Movement (+)

Address	Name	Unit	Initial Value	Setting Range
0102H	Jog movement (+)	-	0000H	0000H, FF00H

Description
Moves continuously in the (+) direction. Moves until the data is changed to the stop instruction 0000H. * If you perform "cancel move command" (010BH), or stop with the MODE ESC of the unit during jog movement, it is necessary to create a rising edge (write FF00H with 0000H as the changed data) for the next jog movement (+) instruction.

Example 1: Execute Jog Movement (+) of Station Number 01H

Query (01 05 01 02 FF 00 2C 06)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0102H	Jog movement (+)
Changed data	2	FF00H	Execute
CRC check	2	2C06H	
End	-	-	Silent interval

Example 2: Stop Jog Movement (+) of Station Number 01H

Query (01 05 01 02 00 00 6D F6)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0102H	Jog movement (+)
Changed data	2	0000H	Stop
CRC check	2	6DF6H	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

27. Jog Movement (-)

Address	Name	Unit	Initial Value	Setting Range
0103H	Jog movement (-)	-	0000H	0000H, FF00H

Description
Moves continuously in the (-) direction. Moves until the data is changed to the stop instruction 0000H. * If you perform "cancel move command" (010BH), or stop with the MODE ESC of the unit during jog movement, it is necessary to create a rising edge (write FF00H with 0000H as the changed data) for the next jog movement (-) instruction.

Example 1: Execute Jog Movement (-) of Station Number 01H

Query (01 05 01 03 FF 00 7D C6)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0103H	Jog movement (-)
Changed data	2	FF00H	Execute
CRC check	2	7DC6H	
End	-	-	Silent interval

Example 2: Stop Jog Movement (-) of Station Number 01H

Query (01 05 01 03 00 00 3C 36)

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0103H	Jog movement (-)
Changed data	2	0000H	Stop
CRC check	2	3C36H	
End	-	-	Silent interval

The response is the same as the query if writing is completed normally.

28. 1.0 mm Movement (+)

Address	Name	Unit	Initial Value	Setting Range
0104_H	1.0 mm movement (+)	-	0000_H	0000_H, $FF00_H$

Description
Moves 1.0 mm in the (+) direction.

Example: Execute 1.0 mm Movement (+) of Station Number 01_H

Query
First query: 01 05 01 04 00 00 8D F7
Second query: 01 05 01 04 FF 00 CC 07

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	05_H	Function code
Address	2	0104_H	1.0 mm movement (+)
Changed data	2	First query: 0000_H Second query: $FF00_H$*	Normal: 0000_H Execute: $FF00_H$
CRC check	2	First query: $8DF7_H$ Second query: $CC07_H$	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write $FF00_H$ with 0000_H as the changed data).

The response is the same as the query if writing is completed normally.

29. 1.0 mm Movement (-)

Address	Name	Unit	Initial Value	Setting Range
0105_H	1.0 mm movement (-)	-	0000_H	0000_H, $FF00_H$

Description
Moves 1.0 mm in the (-) direction.

Example: Execute 1.0 mm Movement (-) of Station Number 01_H

Query
First query: 01 05 01 05 00 00 DC 37
Second query: 01 05 01 05 FF 00 9D C7

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	05_H	Function code
Address	2	0105_H	1.0 mm movement (-)
Changed data	2	First query: 0000_H Second query: $FF00_H$*	Normal: 0000_H Execute: $FF00_H$
CRC check	2	First query: $DC37_H$ Second query: $9DC7_H$	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write $FF00_H$ with 0000_H as the changed data).

The response is the same as the query if writing is completed normally.

30. 0.5 mm Movement (+)

Address	Name	Unit	Initial Value	Setting Range
0106_H	0.5 mm movement (+)	-	0000_H	0000_H, $FF00_H$

Description
Moves 0.5 mm in the (+) direction.

Example: Execute 0.5 mm Movement (+) of Station Number 01_H

Query
First query: 01 05 01 06 00 00 2C 37
Second query: 01 05 01 06 FF 00 6D C7

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01_H	Station number 01_H
FC	1	05_H	Function code
Address	2	0106_H	0.5 mm movement (+)
Changed data	2	First query: 0000_H Second query: $FF00_H$*	Normal: 0000_H Execute: $FF00_H$
CRC check	2	First query: $2C37_H$ Second query: $6DC7_H$	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write $FF00_H$ with 0000_H as the changed data).

The response is the same as the query if writing is completed normally.

31. 0.5 mm Movement (-)

Address	Name	Unit	Initial Value	Setting Range
0107H	0.5 mm movement (-)	-	0000H	0000H, FF00H

Description
Moves 0.5 mm in the (-) direction.

Example: Execute 0.5 mm Movement (-) of Station Number 01H

Query
First query: 01 05 01 07 00 00 7D F7
Second query: 01 05 01 07 FF 00 3C 07

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0107H	0.5 mm movement (-)
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: 7DF7H Second query: 3C07H	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

32. 0.1 mm Movement (+)

Address	Name	Unit	Initial Value	Setting Range
0108H	0.1 mm movement (+)	-	0000H	0000H, FF00H

Description
Moves 0.1 mm in the (+) direction.

Example: Execute 0.1 mm Movement (+) of Station Number 01H

Query
First query: 01 05 01 08 00 00 4D F4
Second query: 01 05 01 08 FF 00 0C 04

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0108H	0.1 mm movement (+)
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: 4DF4H Second query: 0C04H	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

33. 0.1 mm Movement (-)

Address	Name	Unit	Initial Value	Setting Range
0109H	0.1 mm movement (-)	-	0000H	0000H, FF00H

Description
Moves 0.1 mm in the (-) direction.

Example: Execute 0.1 mm Movement (-) of Station Number 01H

Query
First query: 01 05 01 09 00 00 1C 34
Second query: 01 05 01 09 FF 00 5D C4

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0109H	0.1 mm movement (-)
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: 1C34H Second query: 5DC4H	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

34. Reset Errors

Address	Name	Unit	Initial Value	Setting Range
010A$_H$	Reset errors	-	0000$_H$	0000$_H$, FF00$_H$

Description
Resets errors.

Example: Reset Errors of Station Number 01$_H$

Query
First query: 01 05 01 0A 00 00 EC 34
Second query: 01 05 01 0A FF 00 AD C4

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01$_H$	Station number 01$_H$
FC	1	05$_H$	Function code
Address	2	010A$_H$	Reset errors
Changed data	2	First query: 0000$_H$ Second query: FF00$_H$*	Normal: 0000$_H$ Execute: FF00$_H$
CRC check	2	First query: EC34$_H$ Second query: ADC4$_H$	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00$_H$ with 0000$_H$ as the changed data).

The response is the same as the query if writing is completed normally.

35. Cancel Move Command

Address	Name	Unit	Initial Value	Setting Range
010BH	Cancel move command	-	0000H	0000H, FF00H

Description
Execute this when a move command being executed is canceled. * This cannot be used for an emergency stop due to the delay in communication time.

Example: Cancel the Move Command of Station Number 01H

Query
First query: 01 05 01 0B 00 00 BD F4
Second query: 01 05 01 0B FF 00 FC 04

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	010BH	Cancel move command
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: BDF4H Second query: FC04H	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

36 to 46. Update Target Position (Current Position)

Address	Name	Unit	Initial Value	Setting Range
0110H	Update target position 0 (Current position)	-	0000H	0000H, FF00H
0111H	Update target position 1 (Current position)			
0112H	Update target position 2 (Current position)			
0113H	Update target position 3 (Current position)			
0114H	Update target position 4 (Current position)			
0115H	Update target position 5 (Current position)			
0116H	Update target position 6 (Current position)			
0117H	Update target position 7 (Current position)			
0118H	Update target position 8 (Current position)			
0119H	Update target position 9 (Current position)			
011AH	Update target position 10 (Current position)			

Description
Saves the current position in target position data.

Example: Execute "Update Target Position 0 (Current Position)" of Station Number 01H

Query
First query: 01 05 01 10 00 00 CD F3
Second query: 01 05 01 10 FF 00 8C 03

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0110H	Update target position 0 (Current position)
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: CDF3H Second query: 8C03H	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

47 to 57. Target Position [Move]

Address	Name	Unit	Initial Value	Setting Range
0120H	Target position [Move] 0	-	0000H	0000H, FF00H
0121H	Target position [Move] 1			
0122H	Target position [Move] 2			
0123H	Target position [Move] 3			
0124H	Target position [Move] 4			
0125H	Target position [Move] 5			
0126H	Target position [Move] 6			
0127H	Target position [Move] 7			
0128H	Target position [Move] 8			
0129H	Target position [Move] 9			
012AH	Target position [Move] 10			

Description
Moves to the position saved in the target position data.

Example: Instruct Station Number 01H to Move to Target Position Data 0

Query
First query: 01 05 01 20 00 00 CD FC
Second query: 01 05 01 20 FF 00 8C 0C

Name	No. of Bytes	Data	Notes
Start	-	-	Silent interval
Station number	1	01H	Station number 01H
FC	1	05H	Function code
Address	2	0120H	Target position [Move] 0
Changed data	2	First query: 0000H Second query: FF00H*	Normal: 0000H Execute: FF00H
CRC check	2	First query: CDFCH Second query: 8C0CH	
End	-	-	Silent interval

* Write data twice in order to create a rising edge (write FF00H with 0000H as the changed data).

The response is the same as the query if writing is completed normally.

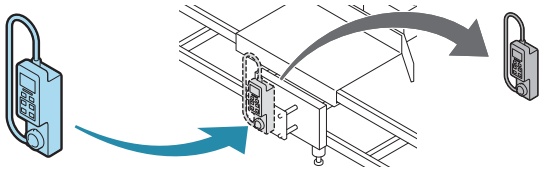
11 Unit Replacement

11.1 Unit Replacement

If replacing a unit due to failure or similar cause, the procedures differ depending on whether a PC or PLC is used as a high-level host, or the unit is used by itself. Perform work according to the following flow-chart.

Example: Replace a Unit with Serial Number "00001" with a Unit with Serial Number "10001"

Replace unit "00001" that has been installed on the machine with unit "10001"



Turn on the unit power supply

Specify unit settings again by button operation[*1]

When operating by the unit itself

When controlling by PC

When controlling by PLC

Specify unit settings again by using the dedicated software "MOD-COM"[*2]

Replacement complete

*1 The settings of an existing unit cannot be exported to a replacement unit. You must reconfigure the unit after replacement.

*2 For details regarding the procedures, please refer to the "Dedicated Software (MOD-COM) Instruction Manual".

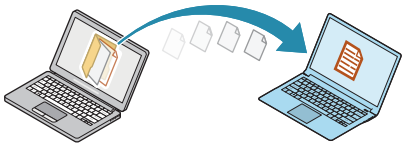
CAUTION

COMPULSORY / INSTRUCTION

To prevent any accidents caused by the unit suddenly starting operation, be sure to turn off the power before replacement.

11.2 PC Replacement

When replacing a PC, copy the setting files saved on the existing PC to the replacement PC.
For details regarding the procedures, please refer to the "Dedicated Software (MOD-COM) Instruction Manual".

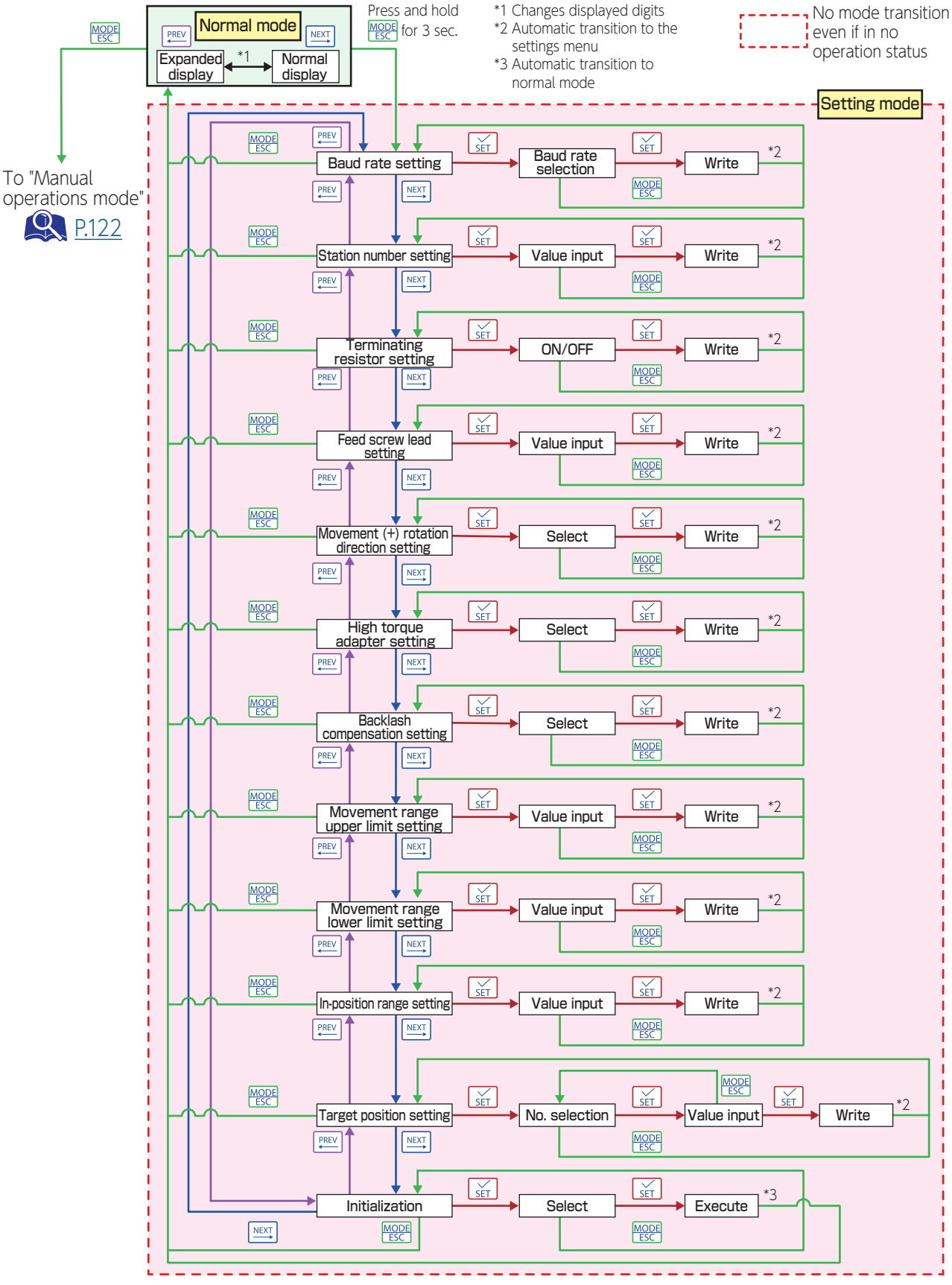


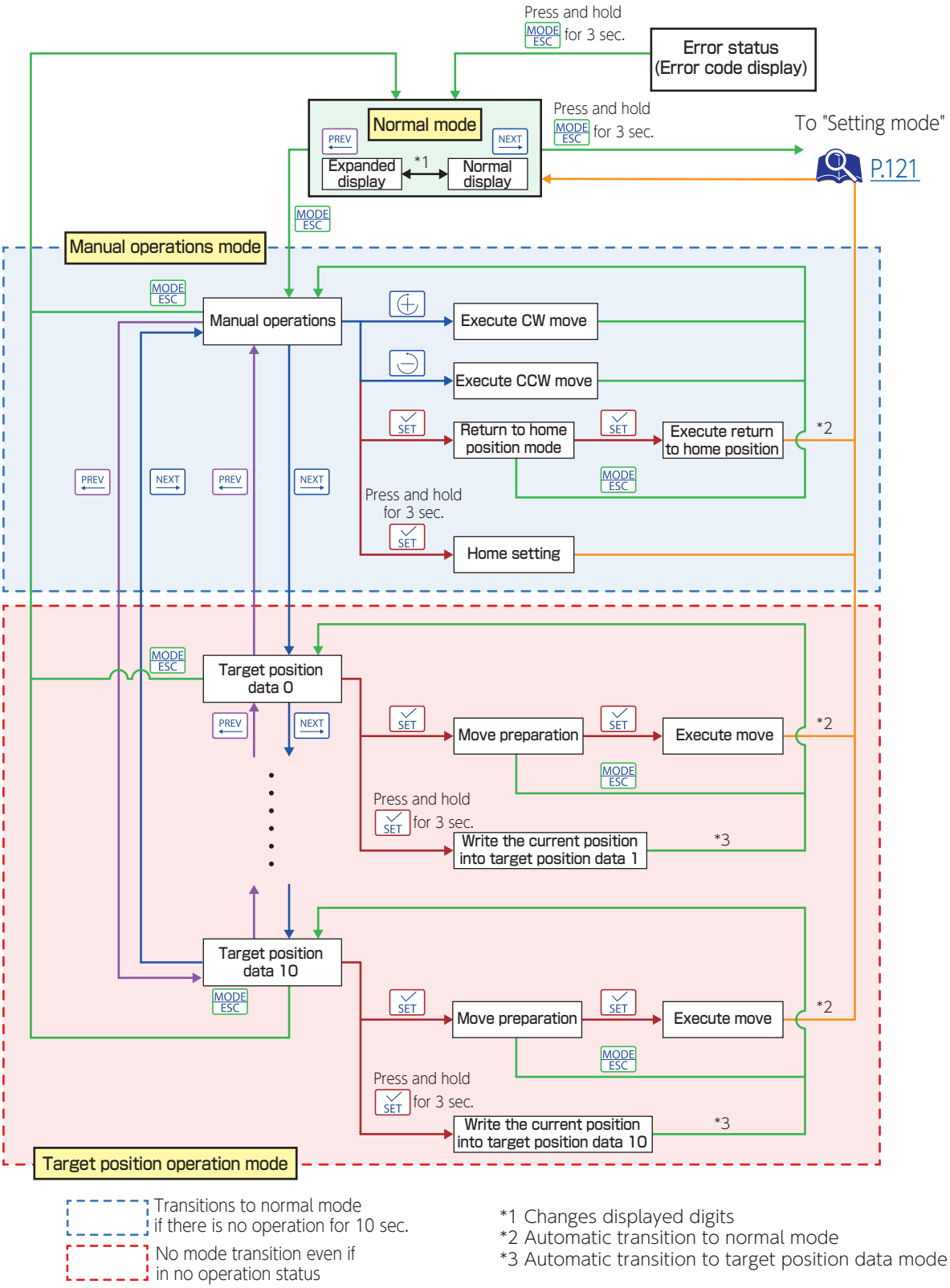
Point

We recommend periodically saving the back-up data of setting files.

12 Appendix

Provides mode transition flow-charts for all possible unit operations.





For more details, please refer to Chapter 7 "Settings and Control by Unit Alone". P.41

13 Maintenance

To ensure safe operation, be sure to perform inspections on a monthly basis.
If any abnormality is found, immediately stop operation and do not restart until the issue has been resolved.

13.1 Precautions for Inspection

- The operator shall be responsible for turning the power on and off.
- Do not touch the unit during or immediately after operation as it may be extremely hot.
- Be sure to carry out inspection in order to prevent accidents.
- The standard service life is 300 hours of operation. Although this may vary depending on the environmental and operating conditions, immediately replace the unit if an abnormality occurs after the standard service life has elapsed.

13.2 Inspection Checklist

- ☐ Is the power supply voltage within the specified range?
- ☐ Is the operating environment within the specification ranges?
- ☐ Is there an abnormality such as abnormal odor or noise?
- ☐ Is there adhesion of dust or other foreign material?
- ☐ Are any fastening parts such as the output shaft, the feed screw, or connectors loose?
- ☐ Is any cable damaged or excessively stressed?
- ☐ Is there any scratch or deformation on the main unit?

14 Troubleshooting

Symptom	Verification	Countermeasure	Explanation Page
Indicator LED does not light up	Is the power supply voltage correct?	Make sure the voltage level is within 24 V ±10%.	P.14
	Is the power supply/ communication cable connected correctly?	Wire correctly.	P.33
Cannot mount to equipment	Has the mounting part been properly machined?	Machine the mounting part to the recommended dimensions.	P.19
Feed screw cannot be driven	Is the load excessively large?	Adjust the feed screw drive torque to the rated torque or less.	-
Communication is not possible	Has the unit been turned on?	Turn on the power.	-
	Is the wiring properly connected?	Connect the wiring correctly.	P.33
	Is the baud rate correctly set?	Set the correct baud rate.	P.48
	Is there a duplicate station number?	Set a proper station number.	P.48
The current position is not correctly displayed	Is the home position correctly set?	Set the home position.	P.58 P.105
Error reset is not possible	Has the cause of the error been removed?	Check the error code and remove the cause of the error.	P.81 P.115

Symptom	Verification	Countermeasure	Explanation Page
The workpiece does not move to the target position	Has the movement range been correctly set?	Appropriately set the movement range.	P.54 P.55 P.97 P.99
	Has the feed screw lead been correctly set?	Make sure that the setting matches the set value of the feed screw lead of the corresponding equipment.	P.49 P.89
	Is there an excessive amount of backlash in the corresponding equipment?	Set the backlash compensation.	P.52 P.91
	Is the "Movement (+) rotation direction" correctly set?	Correctly set the "Movement (+) rotation direction".	P.50 P.93
	Is the target position correctly set?	Correctly set the target position.	P.57 P.61 P.87 P.117
	Is a high torque adapter (optional) being used?	Appropriately set the high torque adapter.	P.51 P.95

15 Error Codes

15.1 Error Inquiry

Errors and Failures

The unit LED lights up or flashes in red if the unit suffers an error or failure.

Unit Status	Color	Pattern
Error	Red	On
Failure	Red	Flashing

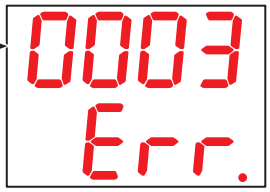
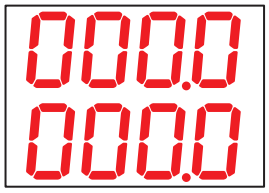
CAUTION

COMPULSORY / INSTRUCTION

When an error occurs, remove the cause, and check safety before restarting operation.

Error Code Display Button Operation

An error code is automatically displayed when an error occurs.

Seven-Segment LED Display	Indicator LED (Color)	Operation Buttons
Error code No.  [Error Code Display Screen]	Lights up in red	Press and hold MODE ESC (3 sec. or more). ↓ Error is reset.
 [Normal Mode Screen]	Lights up in green	

15.2 Error Codes

Error Code		Error Name	Description	Potential Cause
Hex	Seven-Segment Display			
0001 to 0004	0001 to 0004	Movement timeout error	Occurs when workpiece movement stops for at least one second.	• The feed screw has become caught on something. • Excessive fluctuation in workpiece load.
0005	0005	Movement range lower limit (-) detection	Occurs when the workpiece moves to the set value of the movement range lower limit (-).	• Overrun due to backlash compensation. • Moved out of the range by manual operations. • Improper target position settings.
0006	0006	Movement range upper limit (+) detection	Occurs when the workpiece moves to the set value of the movement range upper limit (+).	
0007	0007	Abnormal temperature detection (High)	Occurs when the unit internal temperature is too high.	• Usage in an environment with an ambient temperature that is outside the specification.
0008	0008	Abnormal temperature detection (Low)	Occurs when the unit internal temperature is too low.	
0009	0009	Overcurrent error	Occurs when an overcurrent is detected during movement.	• The feed screw has become caught on something. • Excessive workpiece load.
000A	0010	Low voltage detection	Occurs when the unit's voltage drop detection circuit is triggered.	• The power supply cannot supply enough current. • There is a voltage drop.
000B	0011	Out of movement range error	Occurs when the current position is out of the movement range (-3000.0 mm to 3000.0 mm).	• Overrun due to backlash compensation. • Moved out of the range by manual operations.
0014	0020	Read failure error	Occurs when there is a settings data read failure when connected to a PC.	• Failure to communicate with the PC.
0015	0021	Write failure error	Occurs when there is a settings data write failure when connected to a PC.	

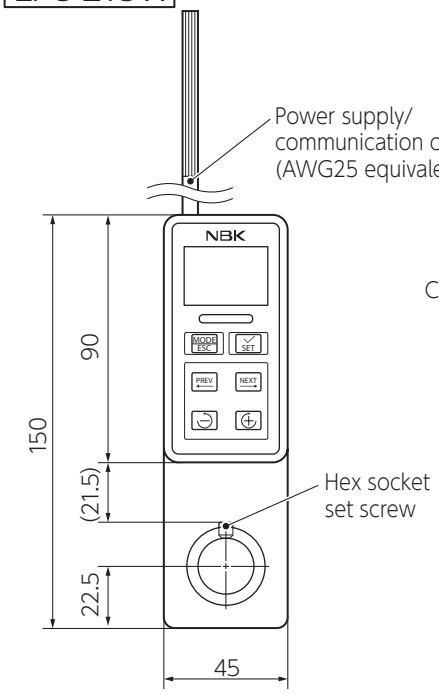
Error Code		Error Name	Description	Potential Cause
Hex	Seven-Segment Display			
0016 0017 0063	0022 0023 0099	EERAM data error	Occurs when there is an EERAM data abnormality.	• Corrupted EERAM.
0018	0024	Memory data error	Occurs when there is an abnormality with the current position data that is saved in memory. * If this error occurs, the home position may be misaligned. * When this error occurs, perform Return to home position and check the home position.	• There has been a power outage. • The power supply cannot supply enough current.

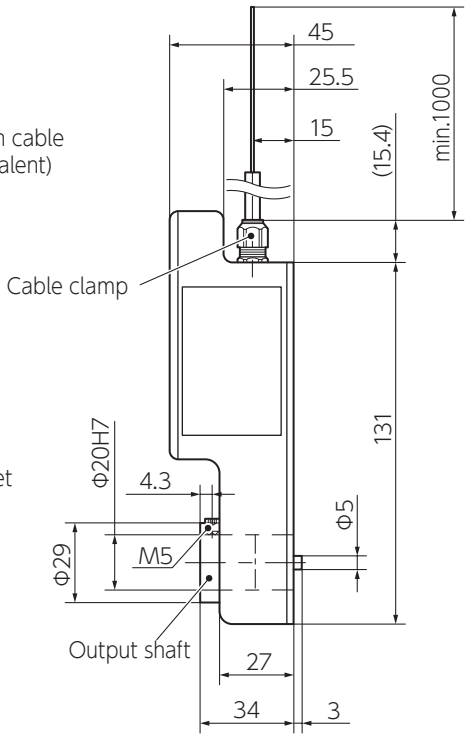
16 Dimensional Outline Drawings

EPU-210

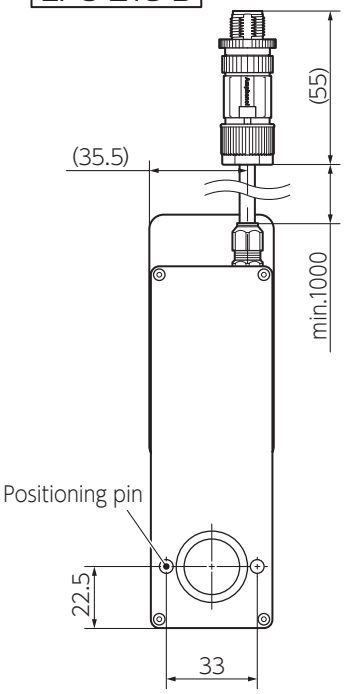
(Unit: mm (in.))

EPU-210-A

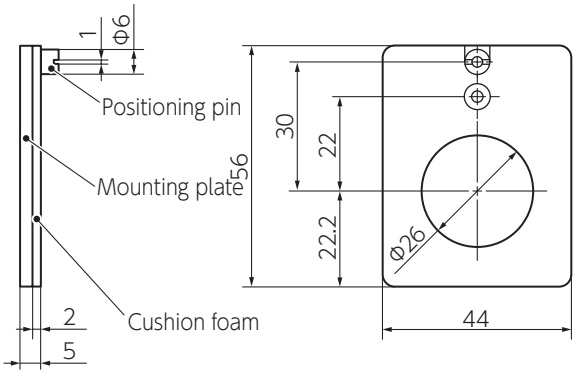




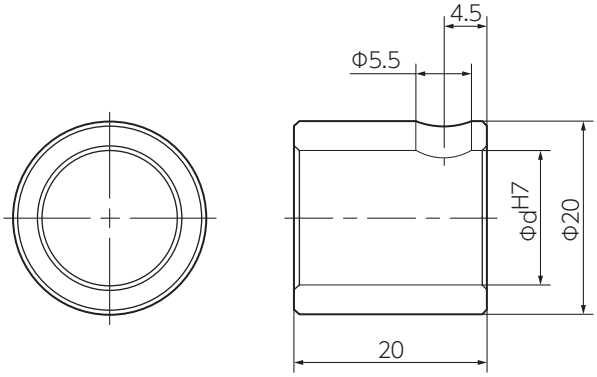
EPU-210-B



EOAP-200



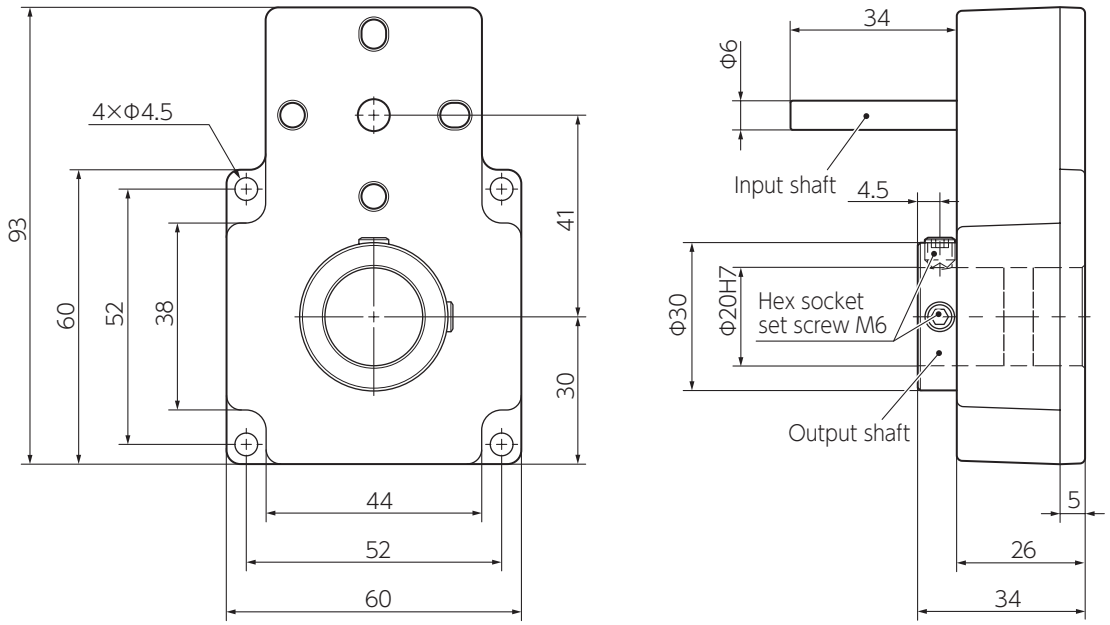
EOCL-200



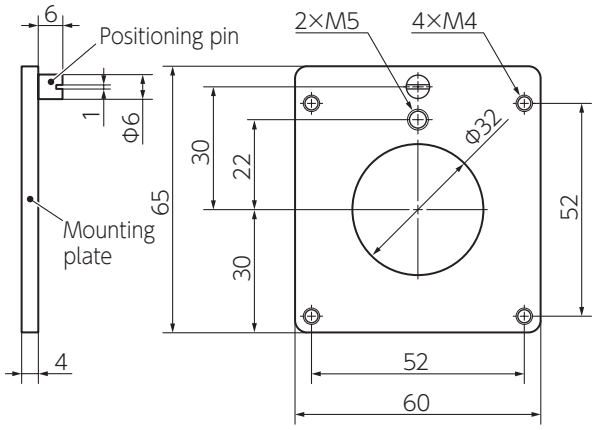
Product No.	d
EOCL-200-6	6
EOCL-200-8	8
EOCL-200-10	10
EOCL-200-12	12
EOCL-200-14	14
EOCL-200-15	15
EOCL-200-16	16

EOAT-200

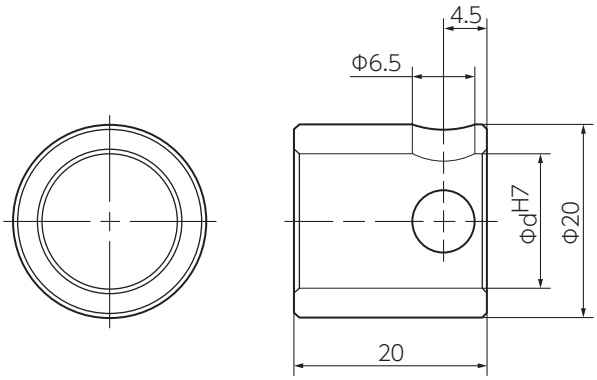
(Unit: mm (in.))



EOTAP-200



EOTCL-200



Product No.	d
EOTCL-200-10	10
EOTCL-200-12	12
EOTCL-200-14	14
EOTCL-200-15	15
EOTCL-200-16	16

17 EMC Precautions

17.1 EMC Precautions

Wired Positioning Units - Modbus Compliant have been evaluated for EMC compliance under the conditions of the connection example shown below.

EMC compliance as a device varies depending on the type of components used, their arrangement, wiring method, etc.
If the product is to be used in combination with other products, systems, or equipment used by the customer, the customer should conduct EMC compliance testing by himself/herself in the completed state with all parts including our products incorporated into the equipment.

In addition, our products are for general industrial use and cannot be used in principle because they are not planned or designed for the following applications that require a high level of safety.

(1) Medical equipment related to the maintenance and management of human life and body

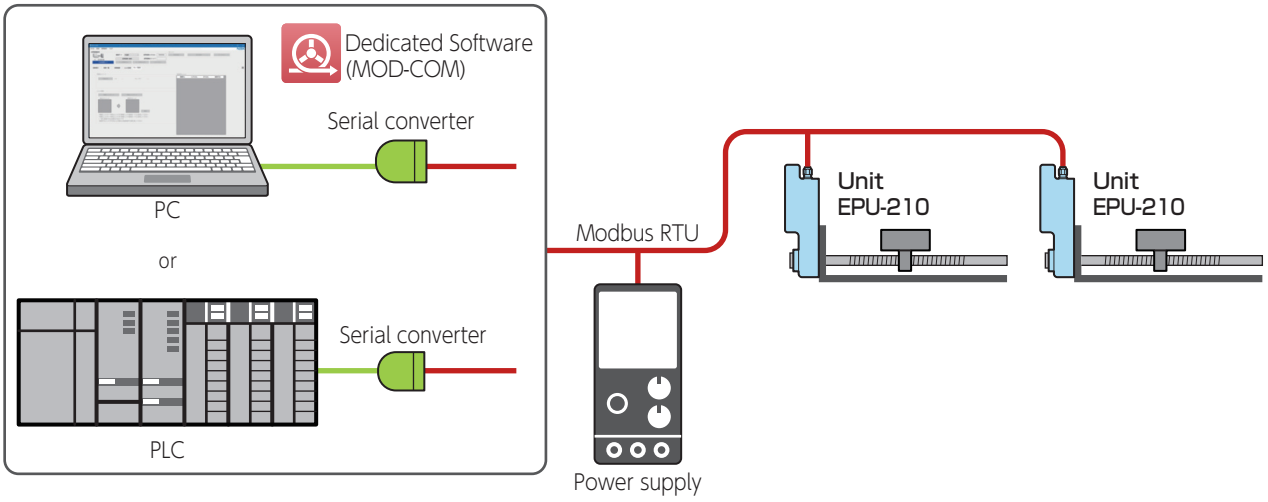
(2) Mechanisms and mechanical devices for the purpose of moving or transporting people. (vehicles, railroad facilities, aviation facilities, etc.)

(3) Important safety parts of machinery and equipment (e.g. safety devices)

(4) Handling equipment for objects that cannot be replaced, such as cultural properties and works of art

Connection example

For connection between the host and the unit, convert RS-485 to RS-232C with a serial converter and connect it.



18 Laws and regulations

The Wired Positioning Units - Modbus Compliant can be used in Japan, EU*, USA, Canada, China, Korea, and Taiwan.
When using these products in combination with other products, systems, or devices used by the customer, the customer is responsible for confirming compliance with the standards, laws, and regulations of the country in which they will be used.
*Only the black (-BK) model units can be used in EU.

List of available countries and regions

Country / Region	EPU-210-A-BL EPU-210-B-BL (Blue Model)	EPU-210-A-BK EPU-210-B-BK (Black Model)
Japan	○	○
EU	×	○
USA	○	○
Canada	○	○
China	○	○
Korea	○	○
Taiwan	○	○

18.1 EU (CE)

Simplified EU Declaration

We hereby declare under our sole responsibility that the following product is in conformity with the relevant Union harmonisation legislation:

From the following terms.
EMC Directive: 2014/53/EU
RoHS Directive: 2011/65/EU (include (EU) 2015/863)

Product Name: Wired Positioning Units - Modbus Compliant
Model Name: EPU-210-A-BK, EPU-210-B-BK

Manufacturer:
Name: Nabeya Bi-tech Kaisha
Add: 1, Toko-Taichi, Seki City, Gifu 501-3939, Japan

The full text of the EU declaration of conformity is available at the following internet address:
https://www.nbk1560.com/products/mechatronics/positioning_unit/download/epu-210-doc/

References to the relevant harmonized standards.

Item	Harmonized Standards
EMC Directive	EN 61000-6-2
	EN 61000-6-4
RoHS Directive	EN IEC 63000

18.2 USA (FCC)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC CAUTION
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

18.3 Canada (ISED)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class A digital device complies with Canada's ICES-003.
CAN ICES-003 (A) /NMB-003 (A)

18.4 Korea (KCC)

인증번호: R-R-NbK-EPU-210

사용자 안내문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

19 Warranty

Warranty Period: 300 hours of operation or one year after delivery, whichever comes first.
Warranty Scope: Under normal usage conditions in accordance with this manual, repairs or replacement shall be provided free of charge as long as the failure occurred within the warranty period.

However, a fee may be charged in any of the following cases even if occurring within the warranty period:

- When the issue related to the claim was caused by improper use, repairs, or modifications.
- When the issue related to the claim was caused by the product being dropped after purchase, or damage during transportation.
- When the issue related to the claim was caused by usage outside of the product specifications.
- When the issue related to the claim was caused by fire, earthquake, lightning, wind and flood damage, salt damage, abnormal power supply voltage, or any other man-made or natural disaster.
- When the issue related to the claim was caused by exposure to water, oil, fragments of metal, or other foreign materials.

This warranty only covers the product (main unit) itself. Secondary damage caused by the product failure shall not be covered.

Contact Information

Customer Service Business Hours: 8:00 to 17:00 on weekdays, Eastern Standard Time
Phone: +1 (484) 685-7500
Fax: +1 (484) 685-7600
URL: https://www.nbk1560.com/en-US/
E-mail: info.us@nbk1560.com
307 East Church Road, Suite 7, King of Prussia, PA 19406, USA

Revision History

Date	ID No.	Revision Details
Apr. 2021	UM-EPU210-SU-01E	First edition

NBK®

Couplings, Screws, Clampers

First edition, Apr. 2021

UM-EPU210-SU-01E