

C/CV Series
CVM1-PRO01 Teaching Box
(For Position Driver)


Operation Manual


Produced April 1999


Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC” means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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Revision History

About this Manual:

This manual describes the installation and operation of the CVM1-PRO01 Teaching Box and includes the sections described below. This Teaching Box is for use with Position Drivers.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the Teaching Box.

Section 1 provides an outline of the Teaching Box, including features, applications, system configuration, a list of Teaching Box functions, and a list of key functions. If using the Teaching Box for the first time, be sure to familiarize yourself with this section before attempting to operate the Teaching Box.

Section 2 describes the operating principles, Position Driver modes, and operations that can be performed using the Teaching Box. Be sure that you understand all of the subjects covered in this section before attempting any actual operations.

Section 3 describes the procedures for connecting the Teaching Box, installing it in a control panel, and changing displays.

Section 4 contains information on the basic operations necessary for operating the Teaching Box. Be sure to read this section to fully understand the basic operations before reading detailed explanations of each function given in subsequent sections.

Section 5 provides methods for monitoring information.

Section 6 describes how to read, set, and change the user, H, adjustment, and PTP parameters and PTP data. PTP data can also be inserted and deleted.

Section 7 describes the procedures for run mode operations, such as point positioning, jogging, teaching, origin search, servomotor ON/OFF, and tuning.

Section 8 provides details about alarm displays, alarm history, and setting units for position data.

Section 9 provides details about the alarm reset and deceleration stop functions.

The Appendices provide lists of standard models, alarms, specifications, and Japanese/English displays.

**WARNING**

Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the Teaching Box.

The information contained in this section is important for the safe and reliable application of the Teaching Box. You must read this section and understand the information contained before attempting to set up or operate a system incorporating the Teaching Box.

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1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating OMRON PCs. Be sure to read this manual before attempting to use the software and keep this manual close at hand for reference during operation.

3 Operating Environment Precautions


Install the Teaching Box properly as specified in this manual.


Do not install the Teaching Box in any of the following locations.


- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to shock or vibration.
- Locations subject to direct sunlight.
- Locations subject to exposure to water, oil, or chemicals.
- Take appropriate and sufficient countermeasures when installing the Teaching Box in the following locations.
 - Locations subject to static electricity or other forms of noise.
 - Locations subject to strong electromagnetic fields.
 - Locations subject to possible exposure to radioactivity.
 - Locations close to power supplies.

4 Application Precautions

Observe the following precautions when using Position Driver, Teaching Box, or PC.

 **WARNING** Do not attempt to take the Unit apart and do not touch any internal parts while the power is being supplied. Doing either of these may result in electrical shock.

 **WARNING** Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing either of these may result in electrical shock.

 **Caution** The following precautions are necessary to ensure the general safety of the system. Always heed these precautions.

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- The interlock circuits, limit circuits, and similar safety measures must be provided by the customer for external circuits (i.e., not in the Teaching Box).
- Always use the power supply voltage specified in this manual.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied, particularly in places where the power supply is unstable.
- Install an external breaker and take other safety measures against short-circuiting in external wiring.
- Disconnect the functional ground terminal when performing withstand voltage tests.
- Always connect to a class-3 ground (to 100 Ω or less) when installing the Units.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place.
- Always turn off the power supply before mounting or dismounting Memory Cassettes.
- Mount the Units after confirming that the connectors are properly connected.
- Be sure to confirm that no adverse effect will occur in the equipment before executing jog, origin search, alarm resetting, or deceleration stop.
- Be sure to confirm that no adverse effect will occur in the equipment before changing the present value.
- Be sure to confirm that no adverse effect will occur in the equipment before changing the set value.
- Be sure to confirm that no adverse effect will occur in the equipment before executing the forced set/reset.
- Be sure to confirm that set parameters operate properly.
- Do not attempt to disassemble, repair, or modify any Units.
- Do not damage, pull on, apply excessive stresses to, place heavy objects on, or pinch the cables.
- Do not pull on cables when transporting the Units.
- Double-check all the wiring before turning on the power supply.

SECTION 1

Introduction

This section provides an outline of the Teaching Box, including features, applications, system configuration, a list of Teaching Box functions, and a list of key functions.

If using the Teaching Box for the first time, be sure to familiarize yourself with this section before attempting to operate the Teaching Box.

1-1	Features and Applications	2
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1-1 Features and Applications

Features

The CVM1-PRO01 Teaching Box has the following features.

Compatibility

This Teaching Box is for use with Position Drivers. By making the appropriate Unit selection, either an MC Unit or a Position Control Unit can also be connected. In this manual, operations are explained in the context of connection to a Position Driver.

Detailed Displays

The Unit features comprehensive (16 characters x 4 lines), interactive displays that prevent operational errors even for first-time users.

Error Messages

Error messages are displayed when errors occur in the Servo Driver. These error messages help minimize the scale of problems caused by the error.

Applications

The Teaching Box is mainly used for the following purposes.

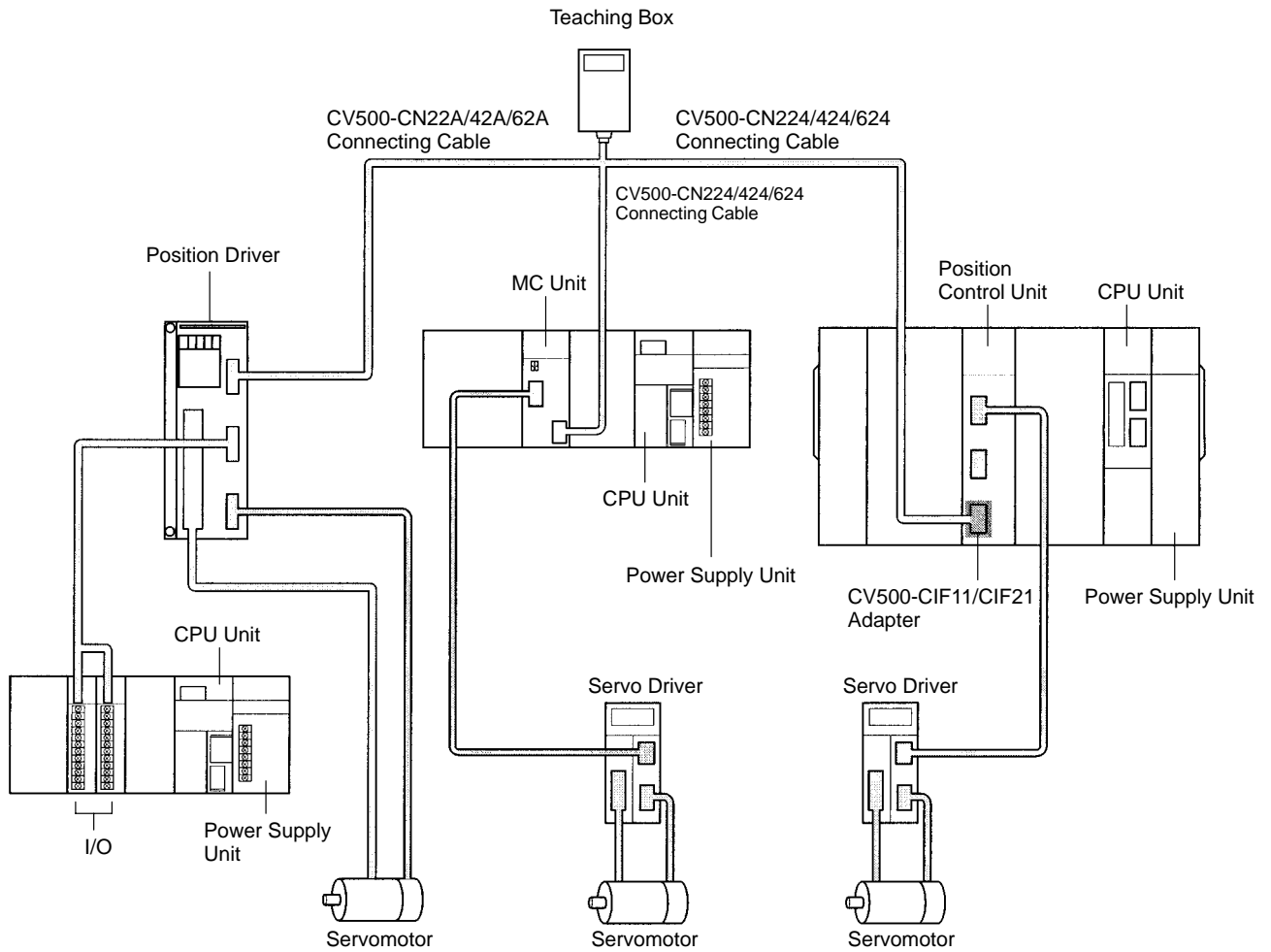
- Wiring check
- Editing and checking parameters
- Monitoring operation via program execution
- Checking movement during feeding operations
- Creating position data through feeding operations and teaching

When feeding operations are performed using a manual pulse generator or jogging operations from the PC, the Teaching Box is mainly used for monitoring the present value.

1-2 System Configuration

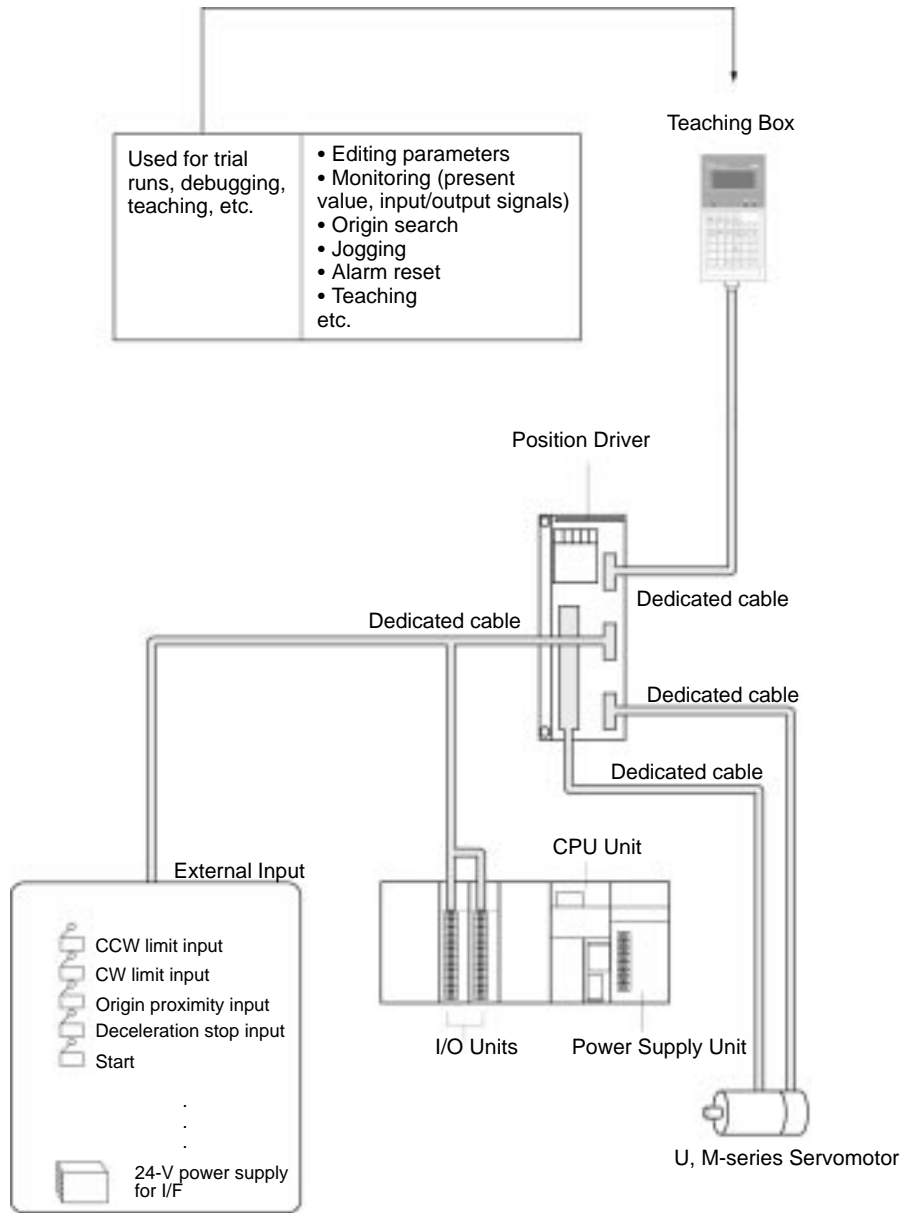
Teaching Box Connection

For peripheral device connections of the Position Driver, refer to the following *Peripheral Device Connection*.



Note Only one Teaching Box can be connected to a Unit. It cannot be connected to more than one Unit.

Peripheral Device Connection



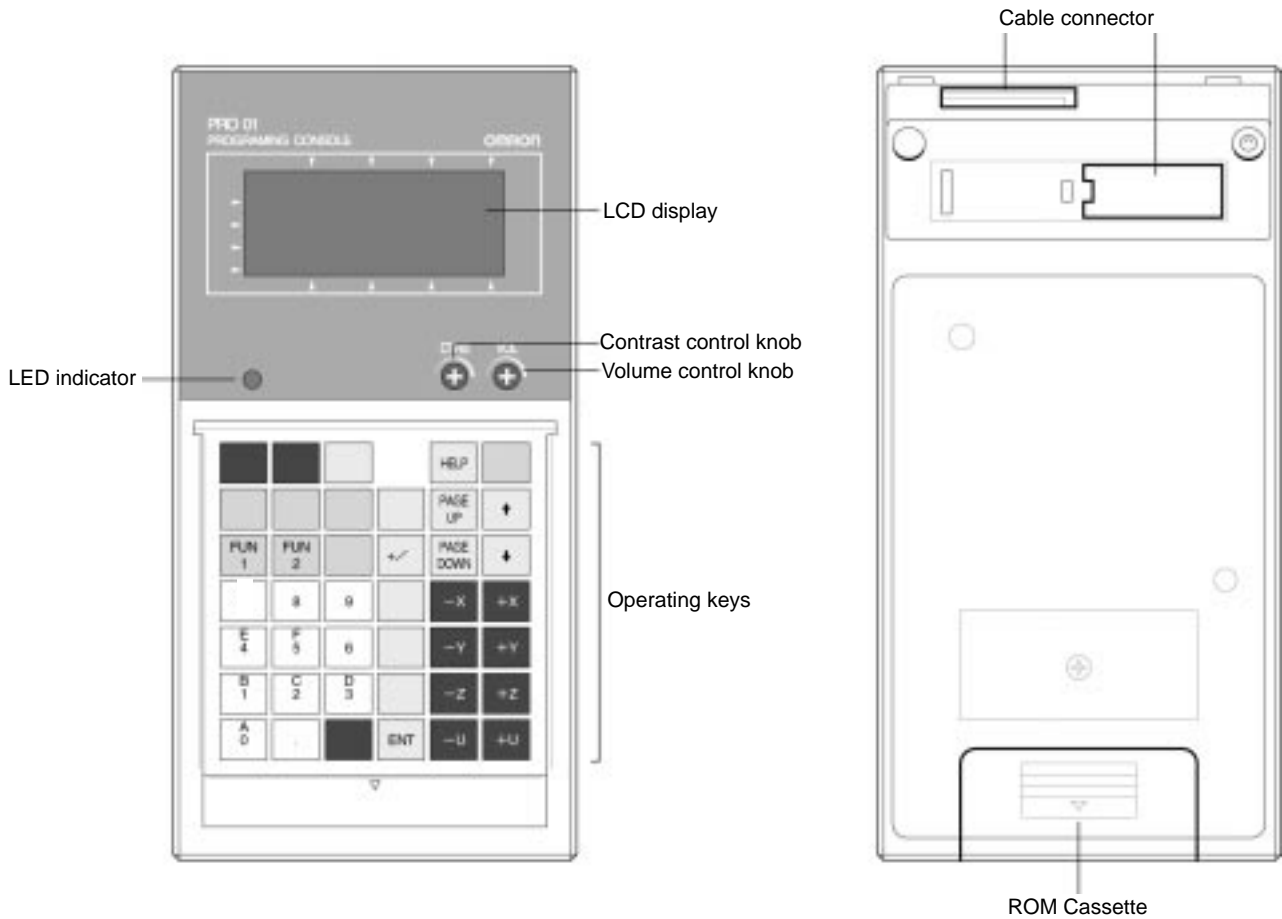
1-3 Table of Operations

The following table lists the operations of the Teaching Box.

Operation		Description	Page
Monitor	Present value	Displays the status of the operations.	Section 5
	Mechanical speed		
	Motor speed		
	Effective load factor		
	Point number (when point positioning)		
	Control input/output		
	Electrical angle		
	Position deviation		
	Motor current		
	Electrothermal value		
	Regenerative absorption rate		
	Command position data (when direct positioning)		
	Command speed data (when direct positioning)		
Parameter edit	User parameters	Reads and changes user parameters	40
	H parameters	Reads and changes H parameters	47
	Adjustment parameters	Reads and changes adjustment parameters	49
	PTP parameters	Reads and changes PTP parameters	53
	PTP data	Reads, changes, inserts and deletes PTP data	60, 63
Run	Point positioning	Positions with the specified point number.	66
	Jogging	Performs jogging operations.	69
	Point teaching	Takes the present value for the specified point number.	70
	Origin search	Searches for the origin.	72
	Origin teaching	Changes the origin to a desired position.	73
	Servo ON/OFF	Switches between servomotor lock and servomotor free.	74
Tuning	Auto-tuning	Automatically sets the position loop gain, the speed loop proportional gain, and the speed loop integral gain.	75
	Manual tuning	Manually sets the position loop gain, the speed loop proportional gain, and the speed loop integral gain.	77
Test mode	Control output signal display/change	Displays the control output signals and switches ON/OFF.	78
Extension	Operating mode switching	Switches the operating mode for the Position Driver.	25
	Alarm display	Displays alarms from the Position Driver.	82
	Alarm history	Displays the 15 most recent Position Driver alarms.	83
	Unit setting	Sets the units used at the Position Driver.	84
Alarm reset		Resets the alarm.	86
Deceleration stop		Decelerates axes to a stop.	87

1-4 Nomenclature and Functions

Shown below are the parts, functions, and key arrangement of the Teaching Box.



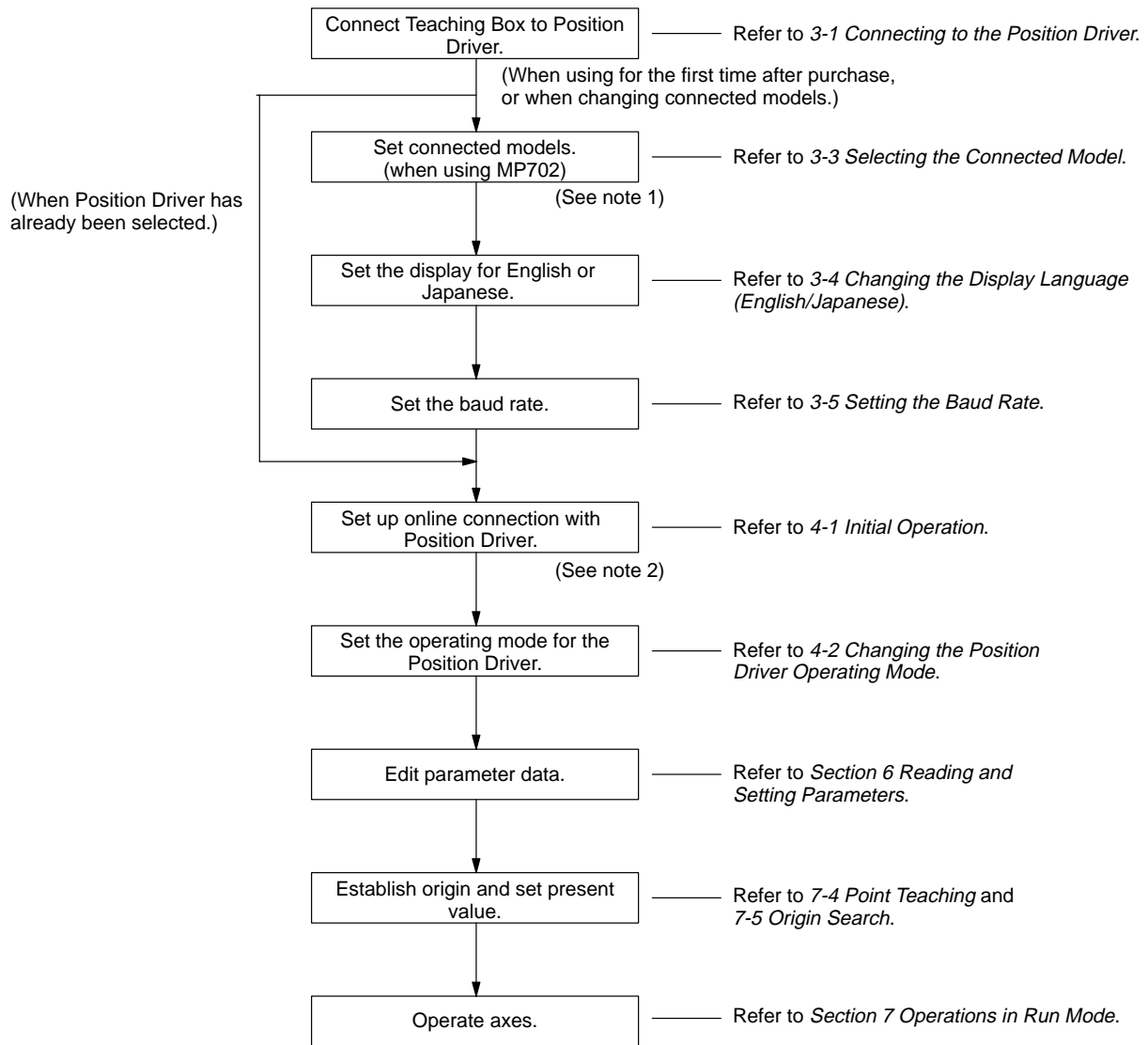
Part	Function
LCD display	Displays various data. Illuminated by LED.
LED indicator	Not used.
Contrast control knob	Used to control the contrast of the LCD display.
Volume control knob	Used to control the buzzer sound produced when an input is made by pressing keys or when an error occurs.
Operating keys	Refer to the following pages.

Key Functions

Key	Function
Monitor (MON)	For monitoring present value, input/output signals, etc.
Parameter (PRMTR)	For reading or changing parameters.
Run mode (RUN MODE)	For point positioning, jogging operation, origin search and teaching.
FUN1	For selecting expansion functions.
FUN2 FUN3	Not used.
Deceleration stop (DEC STOP)	For decelerating the axes to a stop.
Temporary stop (PAUSE)	Not used.
Alarm reset (ALM CLR)	For resetting the alarm.
Start (START)	For point positioning, origin search and auto-tuning.
Numerical keys	For entering values.
Clear (CLR)	For invalidating input values and returning to the previous screen.
+/-	For changing the value of a sign. The sign alternates between +/- whenever the key is pressed. "+" is not displayed.
Change (CHG)	For editing the parameters.
Delete/Insert (DEL/INS)	For deleting PTP data.
Enter (ENT)	For confirming input values and selecting menus.
HELP	For setting parameters.
PAGE UP/PAGE DOWN	For scrolling to the previous or next display.
Shift (SHIFT)	Not used.
Up Arrow, Down Arrow ▲, ▼	For moving the cursor and switching screens.
Jog +X/-X +Y/-Y +Z/-Z +U/-U	For jogging. +Y/-Y, +Z/-Z, +U/-U not used.

1-5 Operating Procedure

Follow the procedure outlined below to operate axes using the Teaching Box.



- Note**
1. Turning on the PC power while pressing the Clear Key will display a screen for selecting the models to be connected.
 2. The online connection is to enable the exchange of data between the Teaching Box and the Position Control Unit.

SECTION 2

Position Driver Operation

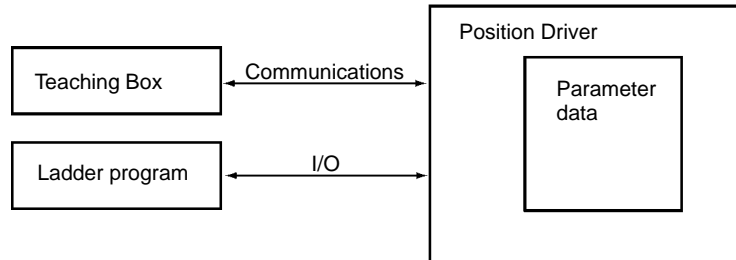
This section describes the operating principles, Position Driver modes, and operations that can be performed using the Teaching Box. Be sure that you understand all of the subjects covered in this section before attempting any actual operations.

2-1	Instructions and Operating Modes for the Position Driver	10
2-2	Operations Performed with the Teaching Box	11

2-1 Instructions and Operating Modes for the Position Driver

This section describes Position Driver operating modes and the way instructions are made to the Position Driver.

There are two methods for sending instructions to the Position Driver: one is I/O and the ladder program and another is I/O and the Teaching Box. Also, both of the above methods can be used at the same time, as shown below with the Position Driver.



Operating Modes

Position Drivers have three operating modes. These modes are provided to assure the safety of the user, and to prevent problems that may arise from having two methods of sending instructions to the Position Driver.

Mode	Explanation
Mode 1	Only monitoring, parameter reading and extension functions are possible in this mode.
Mode 2	All the operations possible in mode 1, as well as jogging, teaching, servomotor ON/OFF, deceleration stop and alarm reset are possible.
Mode 3	All functions are possible from the teaching box.

Position Driver operating modes can only be switched from the Teaching Box.

Note For details about changing the operating modes, refer to 4-2 *Changing the Position Driver Operating Mode*.

2-2 Operations Performed with the Teaching Box

The operations that can be performed using the Teaching Box are limited according to the operating mode that is set for the Position Driver. The following table shows the operations that are possible in each mode.

Function		Operating mode		
		Mode 1	Mode 2	Mode 3
Monitoring		OK	OK	OK
Parameter reading		OK	OK	OK
Parameter changing		NO	NO	OK
Run mode	Point positioning	NO	NO	OK
	Jogging	NO	OK	OK
	Point teaching	NO	OK	OK
	Origin search	NO	NO	OK
	Origin teaching	NO	NO	OK
	Servomotor ON/OFF	NO	OK	OK
Tuning		NO	NO	OK
Test mode		NO	NO	OK
Extension	Operating mode switching	OK	OK	OK
	Alarm display	OK	OK	OK
	Alarm history	OK	OK	OK
	Unit setting	OK	OK	OK
Alarm reset		NO	OK	OK
Deceleration stop		NO	OK	OK

If a function that is not possible in mode 2 or 3 is selected while in mode 2 or 3, **OPER MODE ERROR** will be displayed and the buzzer will sound. For example, if the test mode function is attempted in mode 2, the following screen will be displayed.

```

TEST MODE
1:DO OUTPUT

OPER MODE ERROR
    
```

If the **CLR** Key is pressed, the display before the error occurred will be returned. Change the operating mode and repeat the operation.

SECTION 3

Connecting the Teaching Box

This section describes the procedures for connecting the Teaching Box, installing it in a control panel, and changing displays.

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3-5	Setting the Baud Rate	21

3-1 Connecting to the Position Driver

The procedure for connecting the Teaching Box to the Position Driver is shown below.

- Note**
1. Be sure that the power supply is turned OFF before mounting or removing the ROM Cassette.
 2. For a connecting cable with a lock mechanism, be sure that the lock is securely fastened.

Connecting Cables

Use the Cables listed below (sold separately) to connect the Teaching Box to the Position Driver.

Model	Cable length
CV500-CN22A	2 m
CV500-CN42A	4 m
CV500-CN62A	6 m

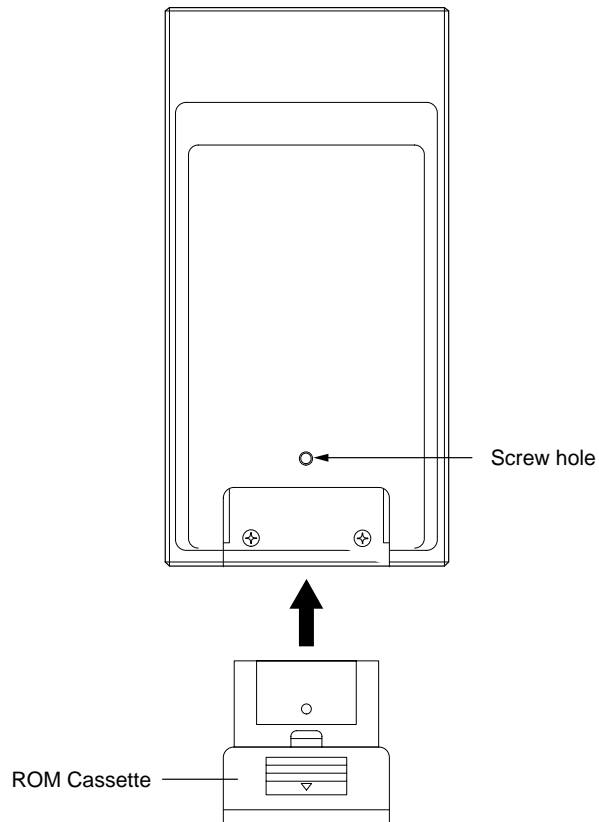
Attaching the Key Sheet

Attach the key sheet for the Position Driver.



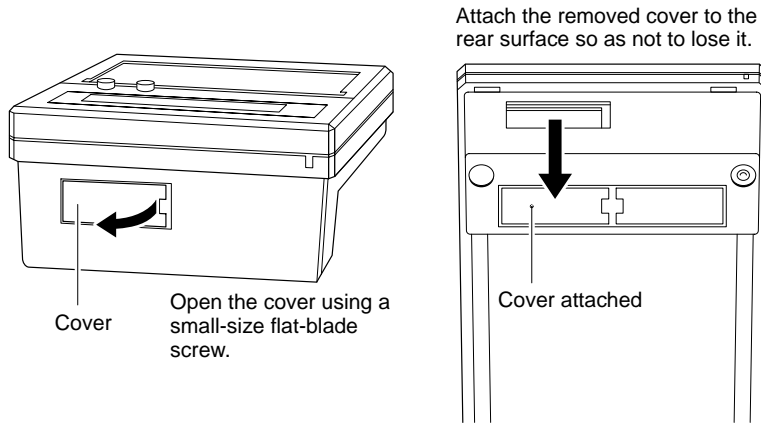
Installing the ROM Cassette

Install the ROM Cassette as shown below, and secure it with five M3 screws.

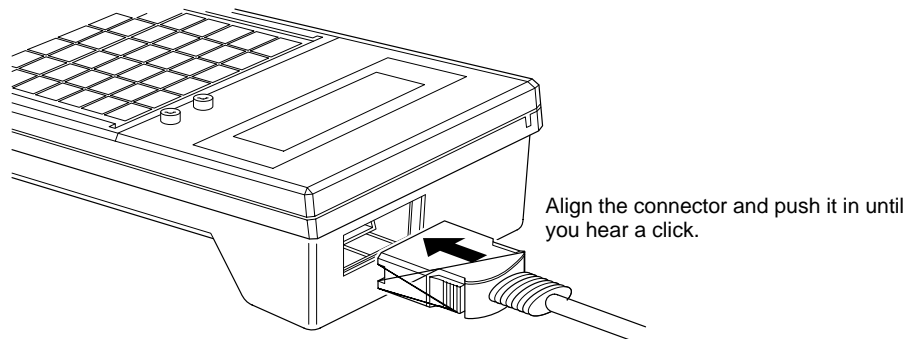


Connecting to the Position Driver

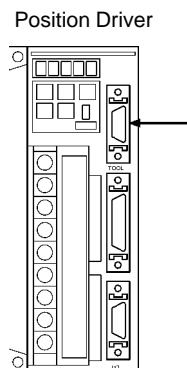
- 1, 2, 3... 1. Remove the connector cover.



2. Plug the Connecting Cable's connector into the Teaching Box's connector.

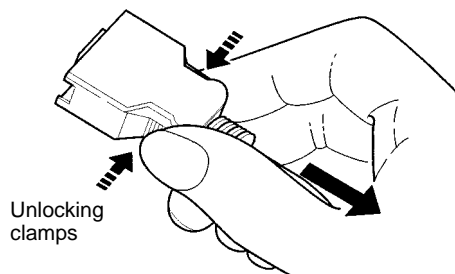


3. Insert the Connecting Cable's connector into the connector marked "RS-232C."



Removing the Cable

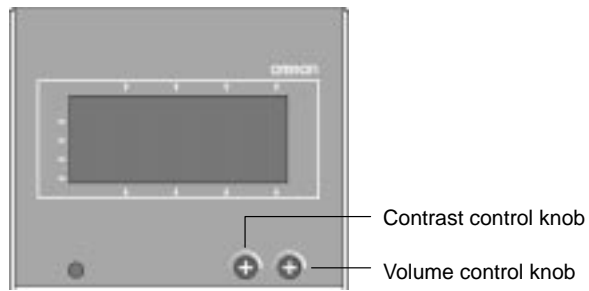
Using your fingers, press in and hold the clamps on both sides of the connector and pull out the connector.



Adjusting the Buzzer and Display Contrast

Turn the volume control knob to adjust the loudness of the buzzer.

Turn the contrast control knob to adjust the contrast of the LCD display.



3-2 Installing in a Panel

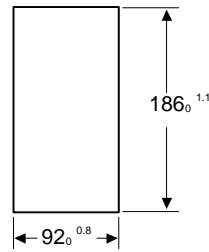
The procedure for installing the Teaching Box in a panel is described below. Use the C200H-ATT01 Mounting Bracket (sold separately) to instal the Teaching Box in a panel.

Note When using the Teaching Box inside a control panel, be sure to maintain the ambient temperature and relative humidity within the specified ranges.

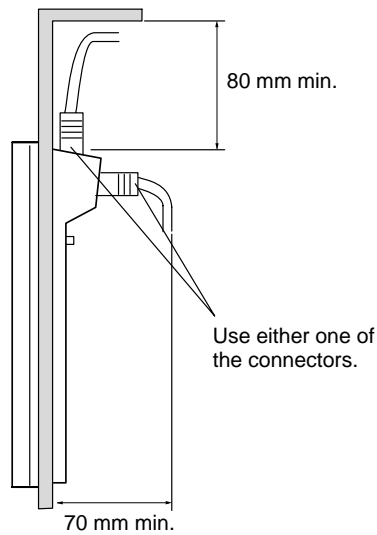
- 1, 2, 3... 1. Prepare mounting holes according to the following diagram.

Mounting Hole Dimensions

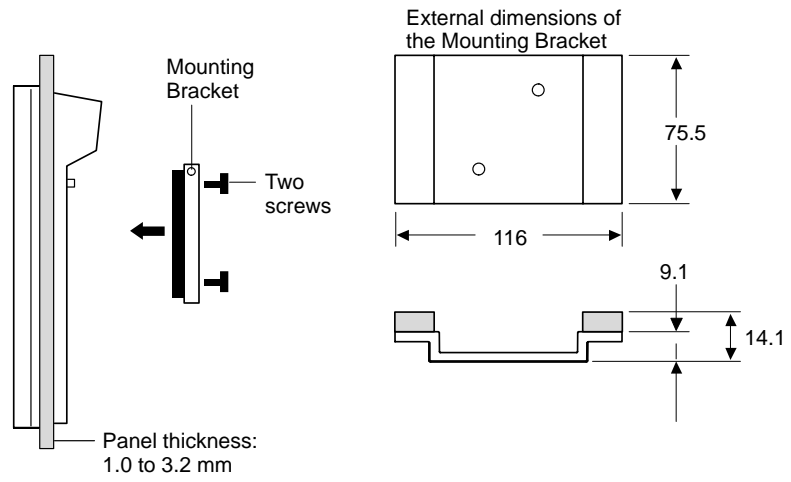
The following is a standard panel cut.
(Conforming to DIN43700)



2. Provide sufficient spaces so that the connector can be easily connected or disconnected to/from the Teaching Box.



3. Mount the Teaching Box, aligning with the mounting holes and tighten the Mounting Bracket from the back side using screws.



3-3 Selecting the Connected Model

Set the model that the Teaching Box is connected to. (If the CVM1-MP703 ROM Cassette is used, no settings will be necessary and the operations in this section are not necessary.)

Select one of the following:

- **MC SERIES:** MC Series (Motion Control)
- **NC222:** C500-NC222-E Position Control Unit
- **NC111-V1/NC112:** 3G2A5-NC111-EV1 Position Control Unit
- **SERVODRIVER:** Position Driver

The MC Series is the default setting. Use the procedure outlined below to change the setting to Position Driver, if it is set for another model. For this explanation, it is assumed that the Teaching Box and the Position Driver have been connected as shown in 3-1 *Connecting to the Position Driver*.

- 1, 2, 3... 1. Turn ON the power to the Position Driver.
The one of the following displays will appear.

When MC Series is selected

```
T O 1
M SER ES
↑:SET R: 0
```

When C500-NC222-E is selected

```
T O 1
↑:SET R: 0
```

When 3G2A5-NC111-EV1 is selected

```
T O 1
111 1 11
↑:SET R: 0
```

When Servo Driver is selected

```
T O 1
SER ODR ER
↑:SET R: 0
```

2. Press the **Up Arrow** Key.

```
MODE SETT
1:M SER ES
:
: 111 1 11 ▼
```

3. Press the **Down Arrow** Key.

```
MODE SETT
:SER ODR ER
```

4. To select Position Driver, press the **4** Key.
5. To restore the initial screen, press the **CLR** Key.

3-4 Changing the Display Language (English/Japanese)

The default setting for the Teaching Box display language is English. The process for changing the display between English and Japanese is explained below. For this explanation, it is assumed that the Teaching Box and the Position Driver have been connected as shown in 3-1 *Connecting to the Position Driver*.

Note Before performing this operation, be sure that the power to the Position Driver is OFF.

- 1, 2, 3... 1. Turn ON the power to the Position Driver.

```
T 0 1
SER ODR ER
↑:SET R: 0
```

2. Press the **Up Arrow** Key.

```
MODE SETT
1:M SER ES
:
: 111 1 11 ▼
```

3. Press the **Down Arrow** Key.

```
MODE SETT
↑:SER ODR ER
▼
```

4. Press the **4** Key.

```
0 E ME U
1:MESS E SET
: UD R TE SET
```

5. Press the **1** Key.

```
MESS E SETT
1:E S
: P ESE
```

6. Press either the **1** or **2** Key.

3-5 Setting the Baud Rate

Set the baud rate for communications between the Position Driver. The baud rate can be set to either 9,600 bps or 19,200 bps.

- 1, 2, 3... 1. Turn ON the power to the Position Driver.

```
T 0 1
SER ODR ER
↑:SET R: 0
```

2. Press the **Up Arrow** Key.

```
MODE SETT
1:M SER ES
:
: 111 1 11 ▼
```

3. Press the **Down Arrow** Key.

```
MODE SETT
:SER ODR ER
▼
```

4. Press the **4** Key.

```
0 E ME U
1:MESS E SET
: UD R TE SET
```

5. Press the **1** Key.

```
UD R TE SET
1:
: 1
```

6. Press either the **1** or **2** Key.

SECTION 4

Basic Operations

This section contains information on the basic operations necessary for operating the Teaching Box. Be sure to read this section to fully understand the basic operations before reading detailed explanations of each function given in subsequent sections.

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4-1 Initial Operation

This section describes the screen following power-up and explains online connection with the Position Driver.

- 1, 2, 3... 1. Turn ON the power to the Position Driver. The following display will appear.

```
T 0 1
SER ODR ER
↑:SET R: 0
```

The software version for the Teaching Box will be displayed.

2. Press the **CLR** Key.

```
O E T
SER ODR ER
```



```
SER ODR ER
O E TED
O TRO MODE 11
DR ER
```

3. If the **CLR** Key is pressed, the monitor display will be appear.

```
PRESE T POS
M E SPEED
```

4. Next, perform key operations as required.

Note If the power supply to the Position Driver is turned ON while the **CLR** Key is being pressed, the display for selecting the device to be connected will be appear.

4-2 Changing the Position Driver Operating Mode

This procedure is used to change between the three operating modes of the Position Driver: mode 1, mode 2, and mode 3.

Note For details regarding these modes, refer to *2-1 Instructions and Operating Modes for the Position Driver*.

Procedure

Use the following procedure to change to mode 3.

- 1, 2, 3...** 1. Press the **FUN1** Key.

```
E P S O ME U
I: OPER T MODE S
: RM D SP
: RM STOR
```

2. Press the **1** Key.

```
OP MODE
1
```

3. Press the **CHG** Key.

```
OP MODE
1
```

4. Press the **3** Key.

```
OP MODE
1
```

5. Press the **ENT** Key.

```
OP MODE
```

4-3 Basic Input Operations

Basic input operations that are common in the Teaching Box operations are explained below.

Basic Operation 1

Selection Menus

There are 2 methods for selecting parameters using the parameter setting display and the parameter selection display. The first method provided here is the one that has been used in examples in this manual.

- Input the parameter numbers.

```
PRMTR SET
1:USER PRMTRS
_: PRMTRS
: D UST PRMTRS
```

Select H parameter by pressing the **2** Key.

- Move the cursor using the **Up** and **Down Arrow** Keys and press the **ENT** Key.

```
PRMTR SET
1:USER PRMTRS
_: PRMTRS
: D UST PRMTRS
```

Select H parameter by pressing the **Down Arrow** Key and pressing the **ENT** Key.

Basic Operation 2

Switching Displays

The inverted triangle in the bottom right-hand corner of the display indicates that there is a previous page or a subsequent page. Switch displays by pressing the **PAGE UP/PAGE DOWN** Keys.

```
PRMTR SET
1:USER PRMTRS
_: PRMTRS
: D UST PRMTRS
```

PAGE UP ↓ ↑ PAGE DOWN

```
PRMTR SET
_:PTP PRMTRS
:PTP D T
```

If the **Down Arrow** Key is pressed when the cursor is at **3**, the next display will appear.

```
PRMTR SET
1:USER PRMTRS
_: PRMTRS
: D UST PRMTRS
```

↓

```
PRMTR SET
_:PTP PRMTRS
:PTP D T
```


Basic Operation 3

Inputting Numeric Values

Use the **0** to **9**, **.**, **+/-** Keys to input numeric values.
 When a numeric value is input, the previous value is deleted.
 Example: Display for the motor code (user parameter)

```
UP
MOTOR  ODE      1  1
```

```
UP
MOTOR  ODE      -
```

If the number just input is wrong, press the **CLR** Key. The display before inputting will return.

```
UP
MOTOR  ODE      1  1
```

Press the **ENT** Key to enter the input values.

```
UP
MOTOR  ODE
```

Basic Operation 4

Selecting the Item to be Input using the Help Key

If the item to be selected is displayed inside parentheses when changing parameters, it is convenient to select the item by pressing the **HELP** Key.
 Example: Control mode display (user parameter)

```
UP 1
 0 TRO  MODE
   PO  T  PTP  11
```

- 1, 2, 3...** 1. Press the **CHG** Key.

```
UP 1
 0 TRO  MODE
   PO  T  PTP  11
```

2. By pressing the **HELP** Key, the items which can be selected will be displayed.

```
 0 TRO  MODE
 1: PO  T  PTP
   : PO  T  EEDER
   :D RE T  PTP
```

3. Move the cursor by pressing the **Down Arrow** Key. If the **Down Arrow** Key is pressed when the cursor is at **3**, the next display will appear.

```

O TRO  MODE
_ D RE T  EEDER
    
```

4. Select a control mode from 1 to 4. On the display, the value corresponding to the selected control mode will be input. In this example, **4** is selected.

```

UP 1
O TRO  MODE
D R T  EEDER 1_
    
```

5. Enter the setting by pressing the **ENT** Key.

```

UP 1
O TRO  MODE
D R T  EEDER 1
    
```

Basic Operation 5

Returning to the Previous Display

- The previous display can be returned to by pressing the **CLR** Key. If, however, the **CLR** Key is pressed while inputting numerical data, the numerical data values will all return to the previous ones.
- By pressing the **CLR** Key a several times, the display at the start of operations can be returned to, irrespective of the current display.

Basic Operation 6

Buzzer Operation

The various buzzer sounds have the following meanings.

Sound	Meaning
Beep (short)	A valid key was pressed.
Beep-beep-beep (short)	An invalid key was pressed. An error occurred.
Beep (longer)	An attempt was made to execute an invalid function for the current display.

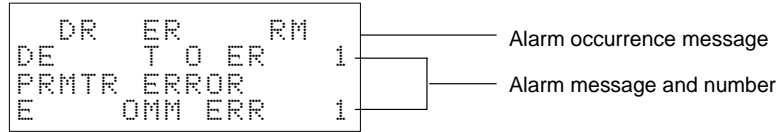
4-4 Operations for Handling Alarms

This section explains the operations for when alarms occur and alarm messages are displayed.

When an alarm occurs at the Position Driver, an alarm display will automatically appear at the Teaching Box. If an alarm appears, remove the cause of the alarm and reset the alarm.

Alarm Display Example

When an alarm display appears, the buzzer will sound.

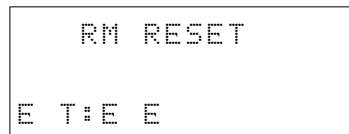


For details about alarm messages, refer to *Appendix B Alarm Displays and Alarm Processing*.

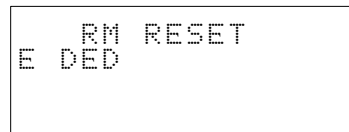
Procedure

Performing Alarm Reset

- 1, 2, 3... 1. Set the operating mode for the Position Driver to mode 2 or mode 3.
2. Press the **ALM CLR** Key.



3. Press the **ENT** Key.



For details about changing operating modes, refer to *4-2 Changing the Position Driver Operating Mode*.

4-5 Table of Operations

The following table provides a summary of Teaching Box operations.

Operation	Contents	Basic operating procedure	Page
Monitor	Motor speed Effective load factor Present value Point number Mechanical speed Control input/output Electrical angle Position deviation Motor current Electrothermal value Regenerative absorption rate Command position data Command speed data		Section 5
Parameter read	User parameter		40
	H parameter		47
	Adjustment parameter		49
	PTP parameter		53
	PTP data		60
Parameter change	User parameter		40
	H parameter		47
	Adjustment parameter		49
	PTP parameter		53
	PTP data		60
	PTP insertion/deletion		63
Run mode	Point positioning		66
	Jogging		69
	Point teaching		70
	Origin search		72
	Origin teaching		73
	Servomotor ON/OFF		74
Tuning	Auto-tuning		75
	Manual tuning		77
Test mode	Control output signal display/change		78

Operation	Contents	Basic operating procedure	Page
Extension	Operating mode switching	<pre> graph LR FUN1[FUN1] --> 1[1] 1 --> CHG[CHG] CHG --> 1to3["1 to 3"] 1to3 --> ENT[ENT] ENT --> CLR[CLR] CLR --> FUN1 </pre>	25
	Alarm display	<pre> graph LR FUN1[FUN1] --> 2[2] 2 --> arrows["↓ / ↑"] arrows --> CLR[CLR] CLR --> FUN1 </pre>	82
	Alarm history display	<pre> graph LR FUN1[FUN1] --> 3[3] 3 --> arrows["↓ / ↑"] arrows --> CLR[CLR] CLR --> FUN1 </pre>	83
	Data unit setting	<pre> graph LR FUN1[FUN1] --> 4[4] 4 --> CHG[CHG] CHG --> 0to8["0 to 8"] 0to8 --> ENT[ENT] ENT --> CLR[CLR] CLR --> FUN1 </pre>	84
Alarm reset		<pre> graph LR ALM_CLR[ALM CLR] --> ENT[ENT] ENT --> CLR[CLR] CLR --> ALM_CLR </pre>	86
Deceleration stop		<pre> graph LR DEC_STOP[DEC STOP] </pre>	87

SECTION 5

Monitor Display Operations

This section provides methods for monitoring information.

5-1	Monitor Display	34
5-2	Monitoring Control I/O	36

5-1 Monitor Display

The monitor display is used to monitor all of the various kinds of information. In monitor mode, the following information can be monitored.

Name	Contents
Present value	Displays the present value.
Mechanical speed	Using feedback from the motor sensor, calculates and displays the movement speed of the mechanical axis.
Motor speed	Displays the actual rotation speed of the motor shaft.
Effective load factor	Displays the effective load factor with respect to the motor's rated current value. Effective values are calculated at the time interval set for the H parameter, load factor time constant (HP-33). Effective load factor = (output current effective value)/(motor's rated current)
Point number	Displays the point number during execution and standby. Displayed when in control modes 11 or 12.
Control input/output	Displays the status of the input and output of the control signals connector for the Servo Driver.
Electrical angle	Displays the electrical angle for the motor.
Position deviation	Displays the deviation of the present value from the reference value with pulse.
Motor current	Displays the output current to the motor.
Electrothermal value	Calculates the motor's heat generation from the output current and displays it as a percentage of the heat generation in rated operation.
Regenerative absorption rate	When a Regeneration Resistor is connected, the monitor item displays the regenerative absorption current as a percentage of the motor's rated current.
Command position data	Displays the position reference value from the diode. Displayed when in control modes 13 or 14.
Command speed data	Displays the speed reference value from the diode. Displayed when in control modes 13 or 14.

For details about monitoring control input/output, refer to *5-2 Monitoring Control I/O*.

Procedure

Use the following procedure to monitor information.

- 1, 2, 3... 1. Press the **MON** Key.
The present value and the mechanical speed will appear.

```

PRESE T POS
M       E SPEED
    
```

Whether one or two items of information appear on the screen will vary.

2. The next data can be displayed by pressing the **Down Arrow** Key. The previous data can be displayed by pressing the **Up Arrow** Key. After the regenerative absorption rate monitor display, the display sequence will repeat, starting from the present value monitor display.

Motor Speed/Effective Load Factor Monitor Display

```

ROT T O S
RU   O D R TE
    
```

Point Number Monitor Display

```

P  P O T
    
```

Control I/O Monitor Display (with Signals)

```

OUT
RU
    
```

Electrical Angle/Position Deviation Monitor Display

```

E E TR      E
E DE   TO   O U T
                P S
    
```

Motor Current/Electrothermal Value Monitor Display

```

MOTOR  URRE T
E E TR T ERM
    
```

Regenerative Absorption Rate/Present Value Monitor Display

```

SOR R TE
PRESE T POS
    
```


5-2 Monitoring Control I/O

Control I/O is monitored by displaying the ON/OFF status for each of the Position Driver control signal connectors.

Position Driver (modes 11 to 14)



Line 1 displays the signals for inputs 09 to 00.
Line 2 displays the signals for inputs 18 to 10.
Line 3 displays the signals for outputs 09 to 00.
Line 4 displays the signals for outputs 14 to 10

Displays the symbol corresponding to the cursor position.

The symbol corresponding to the position of the cursor is displayed in parentheses at the bottom of the display. If the **HELP** Key is pressed, the cursor will move from right to left and the corresponding symbol will be displayed.

The symbols and their contents are shown in the following table. The symbols and names shown in parentheses apply in modes 13 or 14.

IN0 to IN18 indicate the inputs, and OUT0 to OUT14 indicate the outputs.

Number	Symbol	Name	Contents
IN0	RUN	Run command	Command to supply power to motor. ON: Power supplied OFF: Power not supplied
IN1	START	Start	Start positioning ON: Start
IN2	RESET	Alarm reset	Alarm clear signal ON: Alarm clear
IN3	SERCH	Origin search	When RUNON is ON ON: Start origin search When RUNON is OFF ON: Origin teaching standby
IN4	+JOG	+JOG operation	Forward direction jog operation ON: Jog under execution
IN5	-JOG	-JOG operation	Reverse direction jog operation ON: Jog under execution
IN6	TEACH	TEACH	When origin search is OFF Control modes 11, 12 ON: PTP data taken as present value. Control modes 13, 14 ON: P. IN0 to 7 taken as data for positioning. When origin search is ON ON: Present value taken as origin compensation amount.
IN7	P. IN0	Point selection 0/(Position 0)	Positioning data is displayed. If in control modes 11 or 12, point numbers will be input as position data is displayed. (BCD: 1 to 64) If in control modes 13 or 14, the input position data will be displayed. (BCD: 0 to 99) Displayed in 2-digit blocks corresponding to the request signals for position selections 1 to 4 and speed selection.
IN8	P. IN1	Point selection 1/(Position 1)	
IN9	P. IN2	Point selection 2/(Position 2)	
IN10	P. IN3	Point selection 3/(Position 3)	
IN11	P. IN4	Point selection 4/(Position 4)	
IN12	P. IN5	Point selection 5/(Position 5)	
IN13	P. IN6	Point selection 6/(Position 6)	
IN14	(P. IN7)	(Position 7)	
IN15	CCWL	CCW limit input	Forward direction limit signal input ON: Drive possible OFF: Limit detection
IN16	CWL	CW limit input	Reverse direction limit signal input ON: Drive possible OFF: Limit detection
IN17	ORG	Origin proximity	Input for mechanical origin setting signal ON: Origin proximity input made
IN18	STOP	Deceleration stop	Input for deceleration stop input signal ON: Motor running OFF: Deceleration stop

Number	Symbol	Name	Contents
OUT0	READY	Ready	ON when input for the origin search, START, TEACH and point selection signals can be received.
OUT1	S. COM	Origin search completed	ON when present values for the motor are established.
OUT2	ORGST	Origin stop	ON when stationary at the mechanical axis origin.
OUT3	T. COM	Teaching completed	ON when the present value has been entered.
OUT4	RUNON	Motor running	ON when power is being supplied to the motor.
OUT5	INP	Positioning completed	ON when the error counter amount is within the positioning completion range (UP07).
OUT6	ALARM	Alarm	OFF if an alarm occurs.
OUT7	POUT0	Point output 0/(Position selection 1)	If in control modes 11 or 12, point numbers will be output during execution or standby. (BCD output)
OUT8	POUT1	Point output 1/(Position selection 2)	
OUT9	POUT2	Point output 2/(Position selection 3)	If in control modes 13 or 14, request signal for receiving positioning data (position data, speed data) will be output.
OUT10	POUT3	Point output 3/(Position selection 4)	
OUT11	POUT4	Point output 4/(Speed selection 5)	Output ON time is set with the selection signals output time (PP26).
OUT12	POUT5	Point output 5	
OUT13	POUT6	Point output 6	
OUT14	BO	Brake output	Outputs the timing signal for the external brake. OFF when brake is operating.

SECTION 6

Reading and Setting Parameters

When positioning using the Position Driver, all the parameters as well as position and speed data for the PTP data must be set. This section describes how to read, set, and change the user, H, adjustment, and PTP parameters and PTP data. PTP data can also be inserted and deleted.

Only the functions for each of the parameters are outlined. For more details, refer to the *FND-X Position Driver User's Manual (I524)*.

6-1	Reading and Changing User Parameters	40
6-2	Reading and Changing H Parameters	47
6-3	Reading and Changing Adjustment Parameters	49
6-4	Reading and Changing PTP Parameters	53
6-5	Reading and Changing PTP Data	60
6-6	Inserting and Deleting PTP Data	63

6-1 Reading and Changing User Parameters

This section explains how to read user parameters and how to change user parameters that have been read.

- Note**
1. Ensure that equipment will not be adversely affected before changing user parameters.
 2. Ensure that the set parameters will allow correct operation.

The set values for user parameters can be changed by pressing the **CHG** Key after new user parameters have been read.

The functions and setting ranges for user parameters are shown below.

The display number is displayed in the top left-hand corner of the Teaching Box display when parameters are read.

Number	Name	Function	Range	Factory setting
UP01	Control mode	Specifies position control mode: 11: Point positioning (PTP) 12: Point positioning (feeder) 13: Direct positioning (PTP) 14: Direct positioning (feeder)	00 to FF	11
UP02	Motor code	Sets the motor model code. (See the section after this table for details.)	0000 to FFFF	0000
UP03	Resolver cable length	Corrects phase difference due to resolver cable length. (Only used for M-series Motors.)	1 to 120 m	5
UP07	In-position width	Sets the in-position width in pulse units. If the deviation counter amount is less than the pulse number set with this parameter, the positioning completion signal will turn ON (1).	1 to 32,767 pulses	3
UP11	Current limit	Sets the maximum motor current as 100%.	0 to 100.0%	100.0
UP14	S-curve acceleration/deceleration time	Sets the time taken to reach 90% of the target time. The setting of "0" will result in a trapezoidal acceleration/deceleration graph.	0 to 32.76 s	0.00
UP16	Brake mode	Sets the stopping method for when the brake output function and RUN command are OFF. 0: Dynamic brake (free-running stop) 1: On-hold brake (stops in deceleration time) 2: On-hold brake (stops after rotating according to error counter's accumulated number of pulses) 3: On-hold brake (free-running stop)	0 to 3	0
UP25	Monitor output	Specifies monitor output function. 000: Current monitor output, output not reversed (positive voltage when torque direction is forward) 001: Current monitor output, output reversed (negative voltage when torque direction is forward) 010: Speed monitor output, output not reversed (positive voltage when motor rotation is forward) 011: Speed monitor output, output reversed (negative voltage when motor rotation is forward)	000 to 011	010
UP26	Motor rotation direction	Specifies motor rotation direction. 0: Forward rotation 1: Reverse rotation	0 to 1	0
UP28	Brake ON speed	If the speed is less than this setting, the brake signal will turn OFF (operate). Set as a percentage of the rated motor speed.	0 to 100.0%	1.0
UP29	Motor test speed	Sets the speed for motor testing. Set a value less than the rated speed.	1 to 8,000 r/min	50

Number	Name	Function	Range	Factory setting
UP30	External regeneration resistance value	Sets the regenerative resistance value used for calculating regenerative absorption power. (See note.)	0 to 100.0 Ω	0.0
UP31	External regeneration resistance capacity	Sets the regenerative resistance capacity used for calculating regenerative absorption power. (See note.)	0 to 327.67 kW	0.00

Note Only perform these settings for the FND-X50H.

Motor Model Codes

The model codes for the Servomotors are shown in the following tables.

U Series with Incremental Encoder

Model	Code
R88M-U03030HA(VA)	1401
R88M-U05030HA(VA)	1402
R88M-U10030HA(VA)	1403
R88M-U20030HA(VA)	1404
R88M-U40030HA(VA)	1405
R88M-U75030HA(VA)	1406
R88M-U1K030H(V)	1607
R88M-U1K530H(V)	1608
R88M-U2K030H(V)	1609

U Series UE Models

Model	Code
R88M-UE10030H(V)-S1	1603
R88M-UE20030H(V)-S1	1604
R88M-UE40030H(V)-S1	1605
R88M-UE75030H(V)-S1	1606

U Series with Absolute Encoder

Model	Code
R88M-U03030TA(XA)	1501
R88M-U05030TA(XA)	1502
R88M-U10030TA(XA)	1503
R88M-U20030TA(XA)	1504
R88M-U40030TA(XA)	1505
R88M-U75030TA(XA)	1506
R88M-U1K030T(X)	1507
R88M-U1K530T(X)	1508
R88M-U2K030T(X)	1509

H Series

Model	Code
R88M-H05030	1007
R88M-H10030	1008
R88M-H20030	1009
R88M-H30030	1010
R88M-H50030	1011
R88M-H75030	1012
R88M-H1K130	1013

M Series

Model	Code
R88M-M20012	0105
R88M-M40012	0106
R88M-M70012	0107
R88M-M1K112	0108
R88M-M1K412	0109
R88M-M1K812	010A
R88M-M20020	0205
R88M-M40020	0206
R88M-M70020	0207
R88M-M1K120	0208
R88M-M1K820	0217
R88M-M2K220	0218
R88M-M06040	0405
R88M-M12040	0406
R88M-M20040	0407
R88M-M40040	0408
R88M-M70040	0409
R88M-M1K140	040A
R88M-M2K040	040B

Note The motor model code for R88M-U1K315H(V) is 160D.
The motor model code for R88M-U1K315X is 1513.

Procedure 1

Reading User Parameters

- 1, 2, 3... 1. Press the **PRMTR** Key. The parameters selection menu will appear.

```
PRMTR SET
1: USER PRMTRS
: PRMTRS
: D UST PRMTRS
```

2. Press the **1** Key. The user parameters selection menu will appear.

```
UP 1
1: 0 TRO MODE
: MOTOR ODE
: RESO ER
```

3. Press the **PAGE DOWN** Key to go to the next display. Move the cursor using the **Up** or **Down Arrow** Key.

```
UP
_: POS T O
11: URRE T M T
1: S E DE E
```

```
UP1
1_: R E MODE
: MO OUTPUT
: ROT T O D R
```

```
UP
_: R E O SPD
: MOTR IST SPD
: E T RES S
```

```
UP 1
1: E T RES S P
```

4. Move the cursor to the desired user parameter and press the **ENT** Key. In this example, **01** (control mode display) is selected.

```
UP 1
0 TRO MODE
PO T PTP 11
```

- Press the **Down Arrow** Key to display the next user parameter. Press the **Up Arrow** Key to display the previous user parameter. If the **Down Arrow** Key is pressed when the last display appears, the first display will return.

Motor Code

```
UP
MOTOR ODE
```

Monitor Output (1/2)

```
UP
MO OUTPUT S 1
S SPEED 1
```

Resolver Cable Length

```
UP
RESO R T
—
```

Monitor Output (2/2)

```
UP
MO OUTPUT S
O T E ORM
```

In-position Width

```
UP
POS T O P S
```

Motor Rotation Direction

```
UP
MOTOR ROT D R
OR RD
```

Current Limit

```
UP11
URRE T M T
1
```

Brake ON Speed

```
UP
R E O SPEED
1
```

S-curve Acceleration/Deceleration Time

```
UP1
S E DE E T
```

Motor Test Speed

```
UP
MOTOR TEST SPEED
```

Brake Mode

```
UP1
R E MODE
D M R E
```

External Regeneration Resistance Value

```
UP
E T RES S UE
```

External Regeneration Resistance Capacity

```
UP 1
E T RES S P
```


Procedure 2 Changing User Parameters

- 1, 2, 3... 1. Read the user parameters to be changed.

```

UP 1
 0 TRO  MODE
   PO  T  PTP  11
    
```

2. Press the **CHG** Key. The setting range will be displayed in parentheses in the bottom right-hand corner of the display.

```

UP 1
 0 TRO  MODE
   PO  T  PTP  1(1)
    
```

3. Input the value directly and press the **ENT** Key to confirm the setting. As with the control mode display, if the cursor is inside the square parentheses, press the **HELP** Key.

```

 0 TRO  MODE
(1) PO  T  PTP
:PO  T  EEDER
:D RE T PTP
    
```

4. Move the cursor using the **Up** and **Down Arrow** Keys.

```

 0 TRO  MODE
_ :D RE T  EEDER
    
```

Select the mode. In this example, **2** is selected.

Example: Point Feeder

```

UP 1
 0 TRO  MODE
PO  T  EEDER  1_
    
```

5. Press the **ENT** Key.

```

UP 1
 0 TRO  MODE
PO  T  EEDER  1
    
```

Other Change Displays

The displays for changing other user parameters are shown below.

Motor Code

```

UP
MOTOR ODE
_
    
```

Monitor Output (1/2)

```

UP
MO OUTPUT S 1
S SPEED 1
1
    
```

Resolver Cable Length

```

UP
RESO R T
1 1
_
    
```

Monitor Output (2/2)

```

UP
MO OUTPUT S
O T E ORM
1
_
    
```

In-position Width

```

UP
POS T O
1 _P S
_
    
```

Motor Rotation Direction

```

UP
MOTOR ROT D R
OR RD
1
_
    
```

Current Limit

```

UP11
URRE T M T
1
1
_
    
```

Brake ON Speed

```

UP
R E O SPEED
1
1
_
    
```

S-curve Acceleration/Deceleration Time

```

UP1
S E DE E T
_
    
```

Motor Test Speed

```

UP
MOTOR TEST SPEED
1
_
    
```

Brake Mode

```

UP1
R E MODE
D M R E
_
    
```

Note UP30 (external regeneration resistance value) and UP31 (external regeneration resistance capacity) are only valid for FND-X50 . With other models, use the factory settings.

6-2 Reading and Changing H Parameters

This section explains how to read H parameters and how to change H parameters that have been read.

- Note**
1. Ensure that equipment will not be adversely affected before changing H parameters.
 2. Ensure that the set parameters will allow correct operation.

The set values for H parameters can be changed by pressing the **CHG** Key after new H parameters have been read.

The functions and setting ranges for H parameters are shown below.

Number	Name	Function	Range	Factory setting
HP33	Load rate time	Specifies the calculation interval for effective load factor calculation.	1 to 60 s	30
HP46	In-position timer	Specifies minimum positioning completion ON time and minimum ready signal OFF time.	3.2 to 320.0 ms	3.2

Procedure 1 Reading H Parameters

- 1, 2, 3...**
1. Press the **PRMTR** Key. The parameters selection menu will appear.

```
PRMTR SET
└─┬─ USER PRMTRS
  │ PRMTRS
  └─ D UST PRMTRS ▲
```

2. Press the **2** Key. The H parameters selection menu will appear.

```
P
└─┬─ D R T E T M E
  │ POS T M E R
```

3. Move the cursor to the desired H parameter and press the **ENT** Key. Move the cursor using the **Up** or **Down Arrow** Keys.

Example: Load Rate Time Display

```
P
0 D R T E T M E
```

4. Press the **Down Arrow** Key to display the next H parameter. Press the **Up Arrow** Key to display the previous H parameter.

```
P
P O S T O T M E R
```

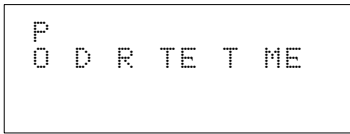
If the **Down Arrow** Key is pressed when the last display appears, the first display will return.

Procedure 2

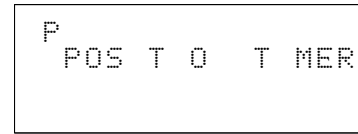
Changing H Parameters

- 1, 2, 3... 1. Read the H parameters to be changed.

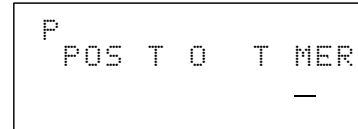
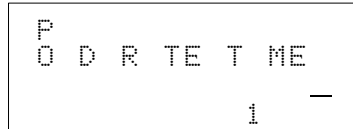
Example: Load Rate Time Display



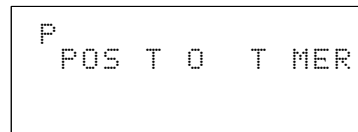
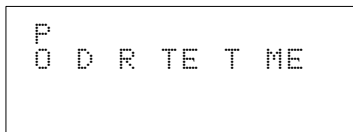
Example: In-position Timer Display



2. Press the **CHG** Key. The setting range will be displayed in parentheses in the bottom right-hand corner of the display.



3. Input the value directly and press the **ENT** Key to confirm the setting.



Note: The setting for the in-position timer must be a multiple of 3.2. If a value that is not a multiple of 3.2 is input, a multiple of 3.2 that is less than the input value will be set.

6-3 Reading and Changing Adjustment Parameters

This section explains how to read adjustment parameters and how to change adjustment parameters that have been read.

- Note**
1. Ensure that equipment will not be adversely affected before changing adjustment parameters.
 2. Ensure that the set parameters will allow correct operation.

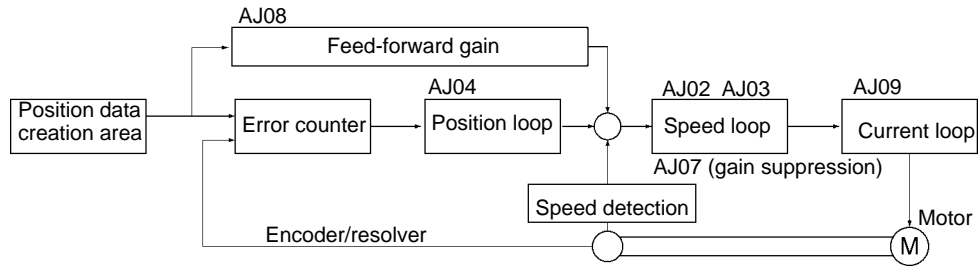
The set values for adjustment parameters can be changed by pressing the **CHG** Key after new adjustment parameters have been read.

When changing the set values, new values can be input directly or fine adjustments can be made to existing values using the **Up** and **Down Arrow** Keys.

The functions and setting ranges for adjustment parameters are shown below.

Number	Name	Function	Range	Factory setting
AJ02	Speed loop proportional gain	Sets the speed loop proportional gain. If this value is increased, the servo rigidity will be strengthened. If it is set too high, oscillation will occur.	0 to 100.0	1.0
AJ03	Speed loop integral gain	Sets the speed loop integral gain. If this value is decreased, responsiveness will decrease and resistance to external force will weaken. If it is set too high, oscillation will occur.	0.1 to 20.0	1.0
AJ04	Position loop gain	Sets the position loop gain. Adjust the position loop response in accordance with the mechanical rigidity. If the position loop gain is high, the response will be high and positioning can be executed quickly. For normal construction machinery, set to 50 to 70 (rad/s); for general purpose machinery and assembly machinery, set to 30 to 50 (rad/s); for industrial robots, set to 10 to 30 (rad/s). If the setting is too high, mechanical resonance will occur, generating an overload alarm.	1 to 200 rad/s	30
AJ07	Interrupt gain suppression	If any value other than "0" is set for this parameter, the speed loop integral gain will be disabled when stopped and the speed loop proportional gain will be suppressed. Adjust this parameter if the motor makes abnormal noises when stopped.	0 to 10,000	0
AJ08	Feed-forward gain	Sets the feed-forward gain. This parameter is effective when the position loop gain is low (<25 rad/s). Feed forward is added to the speed loop directly without going through the error counter, so responsiveness is increased.	0 to 2.0	0
AJ09	Current reference filter	Sets the current reference cut-off frequency. Gradually lower this value if vibration occurs due to a mechanical resonance frequency.	400 to 20,000 rad/s	6000

Block Diagram of Control Loop



Procedure 1

Reading Adjustment Parameters

- 1, 2, 3... 1. Press the **PRMTR** Key. The parameters selection menu will appear.

```
PRMTR SET
1: USER PRMTRS
:
: PRMTRS
: D UST PRMTRS
```

2. Press the **3** Key. The adjustment parameters selection menu will appear.

```
: SPEED P
: SPEED T
: POS
```

3. Press the **PAGE DOWN** Key to go to the next display. Move the cursor using the **Up** or **Down Arrow** Key.

```
_: SP REDU T
:
: UR T TER
```

4. Move the cursor to the desired adjustment parameter and press the **ENT** Key.

Example: Speed Loop Proportional Gain

```
SPEED P 1
```

- Press the **Down Arrow** Key to display the next adjustment parameter. Press the **Up Arrow** Key to display the previous adjustment parameter. If the **Down Arrow** Key is pressed when the last display appears, the first display will return.

Speed Loop Integral Gain

```
SPEED T
                                1
```

Feed-forward Gain

```
EED  OR RD
```

Position Loop Gain

```
POS T O
```

Current Reference Filter

```
UR T  M D  TR
```

Interrupt Gain Suppression

```
STOP  REDU T
```

Procedure 2

Changing Adjustment Parameters

- 1, 2, 3... 1. Read the adjustment parameters to be changed.
Example: Speed Loop Proportional Gain Display

```
SPEED P
                                1
```

2. Press the **CHG** Key. The setting range will be displayed in the parentheses in the bottom right-hand corner of the display.

```
SPEED P
                                1 (1 _↑↓)
```

3. Input the value directly and press the **ENT** Key to confirm the setting.

```
SPEED P
                                1
```

Procedure 3

Incrementing/Decrementing Adjustment Parameters

- 1, 2, 3... 1. Read the adjustment parameters to be changed.
Example: Speed Loop Integral Gain Display

```
SPEED T
                                1
```

2. Press the **CHG** Key.

```

SPEED T
          1  _↑↓
    
```

3. Increment/decrement using the **Up** and **Down Arrow** Keys.

```

      ↑ ↓   E
SPEED T
          1  _↑↓
    
```

4. Press the **ENT** Key.

```

SPEED T
    
```

Other Change Displays

The displays for changing the other adjustment parameters are shown below.
Position Loop Gain

```

POSS T 0
          _  ↑↓
          1
    
```

Interrupt Gain Suppression

```

STOP          REDU T
              _↑↓
              1
    
```

Feed-forward Gain

```

EED  OR RD
              _↑↓
    
```

Current Reference Filter

```

UR T  M D    TR
          _   ↑↓
    
```


6-4 Reading and Changing PTP Parameters

This section explains how to read PTP parameters and how to change PTP parameters that have been read.

- Note**
1. Ensure that equipment will not be adversely affected before changing PTP parameters.
 2. Ensure that the set parameters will allow correct operation.

The set values for PTP parameters can be changed by pressing the **CHG** Key after new PTP parameters have been read.

The functions and setting ranges for PTP parameters are shown below.

Number	Name	Function	Range	Factory setting
PP01	Minimum setting unit	Sets basic unit for movement and speed value setting and display. (1, 0.1, 0.01, 0.001)	0.0001 to 1	0.0001
PP02	Pulse rate 1 (Rotation)	Sets PP02 to n and PP03 to x, where "n" is the number of motor revolutions and "x" is machine axis movement.	1 to 32,767 revolutions	1
PP03	Pulse rate 2 (Movement)		1 to 32,767	10
PP04	Minimum resolution	Indicates machine axis movement per motor sensor pulse. This factory-set value can be read but not changed.	---	---
PP06	Origin compensation	Sets the number of motor sensor pulses for movement between origin search completion position and machine axis origin.	-99,999,999 to +99,999,999 pulses	0
PP08	Backlash/slip compensation	Sets backlash compensation when in PTP control (modes 11 or 13). Sets slip compensation when in feeder control (modes 12 or 14).	-99,999,999 to +99,999,999	0
PP10	Forward software limit	Sets the software limit position in the forward direction.	-99,999,999 to +99,999,999	99,999,999
PP12	Reverse software limit	Sets the software limit position in the reverse direction.	-99,999,999 to +99,999,999	-99,999,999
PP14, 15	Reference speed	Sets the machine axis reference speed.	0 to 99,999,999 mm/s	500
PP16	Jog speed	Sets motor r/min in jog operation as override value based on reference speed.	1 to 199%	10
PP17	Origin search high speed	Sets origin proximity search speed in origin search operation as override value based on reference speed.	1 to 199%	10
PP18	Origin search low speed	Sets phase-Z search speed in origin search operation as override value based on reference speed.	1 to 199%	1
PP19	Origin search direction	Sets origin search direction. 0: Forward direction 1: Reverse direction	0 to 1	0
PP20	Acceleration time 0	Sets the time taken to reach reference speed from the start of operation. PP21 is not available in modes 13 or 14.	0 to 9,999 ms	0
PP21	Acceleration time 1		0 to 9,999 ms	100
PP22	Deceleration time 0	Sets the time taken to go from reference speed to stop. PP23 is not available in modes 13 or 14.	0 to 9,999 ms	0
PP23	Deceleration time 1		0 to 9,999 ms	100

Number	Name	Function	Range	Factory setting
PP24	Deceleration stop mode	Sets stop method when deceleration stop signal goes OFF. 0: Free-running stop (Servo OFF) 1: Deceleration stop in the time set with positioning data. 2: Error counter reset stop.	0 to 2	1
PP25	Alarm selection	Sets the alarm processing method for when the software limit is exceeded or overrun occurs. 0: Servo-lock stop when software limit detected 1: Servo-lock alarm when software limit detected :0: Servo-lock stop when overrun detected :1: Servo-lock alarm when overrun detected	00 to 11	11
PP26	Selection signal output time	Sets the time for which position data and speed data (POUT 0 to 4) signals are ON, when in direct input mode. Not available in modes 11 and 12.	0.8 to 800 ms	20

Procedure 1

Reading PTP Parameters

- 1, 2, 3... 1. Press the **PRMTR** Key and then press the **PAGE DOWN** Key. The parameters selection menu will appear.

```
PRMTR SET
_:PTP PRMTRS
_:PTP D T
```

2. Press the **4** Key. The PTP parameters selection menu will appear.

```
PP 1
 1:M MUM U T
 :P S R TE ROT
 :P S R TE MO
```

3. Press the **PAGE DOWN** Key to go to the next display. Move the cursor using the **Up** or **Down Arrow** Key.

Control Mode 11

```
PP 1
 1:M MUM U T
 :P S R TE ROT
 :P S R TE MO
```

```
PP
_:M RESO U
 :OR OMPE
 :
```

```
PP1
 1: SO T M T
 1: SO T M T
 1:RE SPEED
```

```
PP1
 1: 0 SPEED
 1:OR SR
 1:OR SR 0
```

```
PP1
 1:OR SR D R
 : E T ME
 1: E T ME 1
```

```
PP
_:DE E T ME
 :DE E T ME 1
 :DE E SP MOD
```

```
PP
_: RM
```

Control Mode 12

```
PP 1
 1:M MUM U T
 :P S R TE ROT
 :P S R TE MO
```

```
PP
_:M RESO U
 :OR OMPE
 :S P OMPE
```

```
PP1
 1: SO T M T
 1: SO T M T
 1:RE SPEED
```

```
PP1
 1: 0 SPEED
 1:OR SR
 1:OR SR 0
```

```
PP1
 1:OR SR D R
 : E T ME
 1: E T ME 1
```

```
PP
_:DE E T ME
 :DE E T ME 1
 :DE E SP MOD
```

```
PP
_: RM
```

Control Mode 13

```
PP 1
 1:M MUM U T
 :P S R TE ROT
 :P S R TE MO ▲
```

```
PP
 _:M RESO U
 :OR OMPE
 : S ▲
```

```
PP1
 1: SO T M T
 1: SO T M T
 1:RE SPEED ▲
```

```
PP1
 1:_: 0 SPEED
 1:OR SR
 1:OR SR 0 ▲
```

```
PP1
 1:_:OR SR D R
 : E T ME
 :DE E T ME ▲
```

```
PP
 _:DE E SP MODE
 : RM
 :OUTPUT T ME ▲
```

Control Mode 14

```
PP 1
 1:M MUM U T
 :P S R TE ROT
 :P S R TE MO ▲
```

```
PP
 _:M RESO U
 :OR OMPE
 :S P OMPE ▲
```

```
PP1
 1:_: SO T M T
 1: SO T M T
 1:RE SPEED ▲
```

```
PP1
 1:_: 0 SPEED
 1:OR SR
 1:OR SR 0 ▲
```

```
PP1
 1:_:OR SR D R
 : E T ME
 :DE E T ME ▲
```

```
PP
 _:DE E SP MODE
 : RM
 :OUTPUT T ME ▲
```

Note The control mode displayed is the mode that the Position Driver was in when connected to the Teaching Box. If the control mode is changed after connection, the above displays will not be displayed. Reconnect the Position Driver to the Teaching Box.

4. Move the cursor to the desired PTP parameter and press the **ENT** Key.
Example: Minimum Setting Unit Display

```
PP 1
 M MUM SET U T
 1 1
```

5. Press the **Down Arrow** Key to display the next PTP parameter. Press the **Up Arrow** Key to display the previous PTP parameter. If the **Down Arrow** Key is pressed when the last display appears, the first display will return.

Pulse Rate 1 (Rotation)

```
PP
PU SE R TE ROT
                      1
```

Reference Speed

```
PP1
RE FERENCE SPEED
```

Pulse Rate 2 (Movement)

```
PP
PU SE R TE MO
                      1
```

Jog Speed

```
PP1
JO G SPEED
                      1
```

Minimum Resolution

```
PP
M I N I M U M R E S O L U T I O N
```

Origin Search High Speed

```
PP1
OR I G I N S E A R C H H I G H S P E E D
```

Origin Compensation

```
PP
OR I G I N C O M P E N S A T I O N
```

Origin Search Low Speed

```
PP1
OR I G I N S E A R C H L O W S P E E D
```

Backlash Compensation (Control Modes 11, 13)

```
PP
B A C K L A S H C O M P E N S A T I O N
```

Origin Search Direction

```
PP1
OR I G I N S E A R C H D I R E C T I O N
```

Slip Compensation (Control Modes 12, 14)

```
PP
S L I P C O M P E N S A T I O N
```

Acceleration Time 0

```
PP
A C C E L E R A T I O N T I M E 0
```

Forward Software Limit

```
PP1
F O R W A R D S O F T W A R E L I M I T
```

Acceleration Time 1 (Control Modes 11, 12)

```
PP1
A C C E L E R A T I O N T I M E 1
```

Reverse Software Limit

```
PP1
R E V E R S E S O F T W A R E L I M I T
```

Deceleration Time 0

```
PP
D E C E L E R A T I O N T I M E 0
```

Deceleration Time 1 (Control Mode 11, 12)

```
PP
DE E T ME 1
1
```

Deceleration Stop Mode

```
PP
DE E STOP MODE
DE E T ME 1
```

Alarm Selection (1/2)

```
PP
RM SO T M T 1
S O O M 1
```

Alarm Selection (2/2)

```
PP
RM O ERRU
S O REE M 1
```

Selection Signal Output Time (Control Mode 13, 14)

```
PP
OUTPUT T ME
```

Procedure 2

Changing PTP Parameters

- 1, 2, 3... 1. Read the PTP parameters to be changed.
Example: Pulse Rate 1 (Rotation) Display

```
PP
PU SE R TE ROT
1
```

2. Press the **CHG** Key. The setting range will be displayed in parentheses in the bottom right-hand corner of the display.

```
PP
PU SE R TE ROT
1 ( )
```

3. Input the value directly and press the **ENT** Key to confirm the setting.

```
PP
PU SE R TE ROT
1
```

Other Change Displays The display for changing the other PTP parameters are shown below.

Pulse Rate 1 (Rotation)

```
PP
PU SE R TE ROT 1
1
```

Pulse Rate 2 (Movement)

```
PP
PU SE R TE MO 1_
1
```

Origin Compensation

```
PP
OR OMPE S T
_P S
```

Backlash Compensation (Control Modes 11, 13)

```
PP
S OMPE
_
```

Slip Compensation (Control Modes 12, 14)

```
PP
S P OMPE S T
_
```

Forward Software Limit

```
PP1
SO T RE M T
_
```

Reverse Software Limit

```
PP1
SO T RE M T
_
```

Reference Speed

```
PP1
RE ERE E SPEED
_
```

Jog Speed

```
PP1
O SPEED 1_
1 1
```

Origin Search High Speed

```
PP1
OR SR SPD 1_
1 1
```

Origin Search Low Speed

```
PP1
OR SR O SPD 1
1 1
```

Origin Search Direction

```
PP1
OR SR D RE T
D RE T O 1_
```

Acceleration Time 0

```
PP
E T ME
_
```

Acceleration Time 1 (Control Mode 11, 12)

```
PP 1
E T ME 1 1_
```

Deceleration Time 0

```
PP
DE E T ME
_
```

Deceleration Time 1 (Control Modes 11, 12)

```
PP
DE E T ME 1 1_
```

Deceleration Stop Mode

```
PP
DE E STOP MODE
DE E T ME 1
```

Alarm Selection (1/2)

```
PP
RM SO T M T 1
S O O M 1 1
```

Alarm Selection (2/2)

```
PP
RM O ERRU M 1
S O REE 1
```

Selection Signal Output Time (Control Modes 13, 14)

```
PP
OUTPUT T ME
_
```

Note The setting for PP26 must be a multiple of 0.8. If a value which is not a multiple of 0.8 is input, a multiple of 0.8 that is less than the input value will be set.

6-5 Reading and Changing PTP Data

This section explains how to read PTP data and how to change PTP data that has been read.

- Note**
1. Ensure that equipment will not be adversely affected before changing PTP data.
 2. Ensure that the set parameters will allow correct operation.

The set values for PTP data can be changed by pressing the **CHG** Key after new PTP data has been read.

The functions and setting ranges for PTP data is shown below.

PTP data can be set in control modes 11 or 12.

Number	Name	Function	Range	Factory setting
Pd01HL	Position data	Sets position data for point No. 1. Also sets Absolute and Increment for the position data.	-39,999,999 to +39,999,999	0
Pd01F	Speed data	Sets override value based on reference speed.	0 to 199%	0
Pd01A	Acceleration/deceleration selection	Sets acceleration/deceleration time. Uses the times set in in PTP parameters PP20 to 23. 0↙: Deceleration time 0 (PP22) 1↙: Deceleration time 1 (PP23) ↘0: Acceleration time 0 (PP20) ↘1: Acceleration time 1 (PP21)	00 to 11	00
Pd01r	Operation mode selection	Sets the mode for when operating. 0: Independent operation mode 1: Automatic incremental mode 2: Continuous operation mode	0 to 2	0
Pd02 to Pd64	Same as Pd01 except for the point number.			

Operation Modes

Independent Operation Mode

Operation is stopped in servo-lock upon completion of positioning for the selected point number. To execute the next positioning, turn ON the START signal after the point number is input.

Automatic Incremental Mode

Operation is stopped in servo-lock upon completion of positioning for the selected point number. When the START signal is turned ON, positioning will be executed for the next point number. When positioning is executed in order of point numbers, there is no need to set the point number each time.

Continuous Operation Mode

In this mode, the Position Driver stays in continuous operation without being stopped in servo-lock. Until the continuous operation mode specification is cancelled, the Position Driver will continue operating and refreshing the present point number in order.

Procedure 1

Reading PTP Data

- 1, 2, 3... 1. Press the **PRMTR** Key and then press the **PAGE DOWN** Key. The parameters selection menu will appear.

```
PRMTR SET
:PTP PRMTRS
:PTP D T
```

2. Press the **5** Key. The PTP data selection menu will appear.

```
P 1
E DE E
E DE E 1
```

3. Input the number of the PTP data to be displayed and press the **ENT** Key.
Example: **1, 0, ENT** Keys gives the Pd10 display.

```
P 1
POS D T S 1
```

4. Press the **Down Arrow** Key to display the next PTP data. Press the **Up Arrow** Key to display the previous PTP data.

Speed Data

```
P 1
SPEED D T 1
```

Acceleration/Deceleration Selection

```
P 1
E DE E
E DE E 1
```

Operation Mode Selection

```
P 1
RU MODE
UTO REM T 1
```

If the **Down Arrow** Key is pressed, the display for Pd11 (position data) will appear.

Procedure 2

Changing PTP Data

- 1, 2, 3... 1. Read the PTP data to be changed.

Example: Position Data Display

```
P 1
POS D T      S 1
```

2. Press the **CHG** Key. The setting range will be displayed in parentheses in the bottom right-hand corner of the display.

Press the **Down Arrow** Key to display the next data.

```
P 1
POS D T      S 1
                1
```

```
P 1
POS D T      S 1
                -
```

Speed Data

```
P 1
SPEED D T
                1 1 -
```

Acceleration/Deceleration Selection

```
P 1
E DE E      1
E - DE E    1
```

```
P 1
E DE E      1
E DE E      1
```

Operation Mode Selection

```
P 1
RU MODE
UTO REM T 1
```

3. Input the value directly and press the **ENT** Key to confirm the setting.

```
P 1
SPEED D T
                1
```

6-6 Inserting and Deleting PTP Data

This section explains how to insert and delete PTP data.

Inserting PTP Data

Read the PTP data and change the values. After changing the values, press the **INS** Key to register the new data. Data following this operation will be shifted to the position of the next data.

Note Data can only be inserted if data has been input into Pd64.

Deleting PTP Data

Delete PTP data by reading it and deleting it. Data following this operation will be shifted to the position of the previous data. "0" will be written into the position of the last PTP data.

Procedure 1

Inserting PTP Data

- 1, 2, 3...** 1. Read the PTP data at the position at which the new data is to be inserted.
Example: Pd02 Data

```
P 1
POS D T    S 1
```

2. Change the PTP data. For details about changing PTP data, refer to 6-5 *Reading and Changing PTP Data*.

```
P
POS D T    S 1
      1      -
```

3. Press the **INS** Key.

```
P          SERT
POS D T    S 1
      1      -
E T:EE
```

4. Press the **ENT** Key.

```
P          E D
POS D T    S 1
      1
```

Procedure 2

Deleting PTP Data

- 1, 2, 3... 1. Read the PTP data to be deleted.
Example: Pd03 Data

```
P  
POS D T S 1
```

2. Press the **CHG** Key.

```
P  
POS D T S 1  
—
```

3. Press the **DEL** Key.

```
P DE ETE  
POS D T S 1  
E T: E E —
```

4. Press the **ENT** Key. The data that was Pd04 before the deletion will move to Pd03.

```
P E D  
POS D T
```

SECTION 7

Operations in Run Mode

This section describes the procedures for run mode operations, such as point positioning, jogging, teaching, origin search, servomotor ON/OFF, and tuning. These operations should be performed with the READY (OUT0) signal ON, except when positioning point teaching manually.

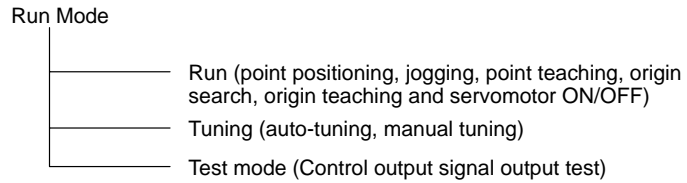
Do not disconnect the Teaching Box from the Position Driver when executing an operation in run mode.

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7-1 Run Mode

The following functions are available in run mode.

Functions



Procedure

Displaying the Run Mode Menu

- 1, 2, 3...** 1. Press the **RUN MODE** Key. The run mode menu will appear.

```

RU  MODE
↓:RU
: TU E
: TEST MODE
  
```

Be sure to read all the notes in this section.

Note a) The run mode can not be entered unless the RUN control input signal, is OFF.

```

PUT T E DR ER
RU O T
O T E PRO EED
  
```

- b) Do not disconnect the Teaching Box during an operation.
 - c) When disconnecting the Teaching Box, cease operations and turn the servomotor OFF using servomotor ON/OFF before disconnecting.
2. Select the required function from the run mode menu.

7-2 Point Positioning

Function

Performs positioning for a specified point number.

This section explains how to perform point positioning for the a set point number.

- Note**
1. Only perform this operation when a point positioning origin has been fixed. If an origin has not been fixed, this operation cannot be started.
Turn ON the servomotor for the operation using servomotor ON/OFF before starting.
 2. This operation can only be performed in modes 11 or 12.

Procedure

Executing Point Positioning

- 1, 2, 3...**
1. Press the **1** Key after pressing the **RUN MODE** Key. The following display will appear.

```

DO  OT D S O
E  T T E   E
      RU  MODE
↓: 0
    
```

2. Press the **Down Arrow** Key. The run menu display will appear.

```

RU
↓:PO  T POS
: 0
:PO  T TE ▼
    
```

3. Press the **1** Key. The display for inputting the point number will appear.

```

PO  T POS
PRMTR      SE E T
           P  ↓
E T:SE E T
    
```

4. Input the point number to be executed and press the **ENT** Key.

Example: **5, ENT** Keys

```

PO  T POS
P
      1
ST:ST POS
    
```

5. Press the **START** Key.

```

PO  T POS E E
P
      1
    
```

6. When the positioning is completed, the following display will appear.

```
PO  T POS E DED  
P  
      1  
ST:ST POS
```

If the **START** Key is pressed, positioning will be performed for the displayed point number.

If the **CLR** Key is pressed, the display for inputting the point number will return.

```
PO  T POS  
PRMTR      SE E T  
      P  
E T:SE E T
```


7-3 Jogging

Function Moves the axis while the **Jog** Key is depressed.
The **Jog** Keys are the **+X** Key and the **-X** Key.

- Note**
1. Before performing jogging, turn the servomotor ON using servomotor ON/OFF.
 2. Ensure that equipment will not be adversely affected before performing jogging.
 3. When the **Jog** Key is released during jog execution, deceleration will not start immediately. (It takes approximately 1 s for deceleration to begin.)

Procedure

Executing Jogging

- 1, 2, 3...**
1. Press the **1** Key after pressing the **RUN MODE** Key. The following display will appear.

```

DO  OT  D  S  O
E  T  T  E      E
      RU  MODE
↓: 0
    
```

2. Press the **Down Arrow** Key. The run menu display will appear.

```

RU
├:PO  T  POS
├: 0
├:PO  T  TE
└▼
    
```

3. Press the **2** Key. The present value will appear.

```

0
      1
0  E : 0
    
```

4. Press the **+X** Key or the **-X** Key. While the key is pressed, the axis will move and the present value will be renewed.

```

0  RU  E  E
      1
    
```

5. End jogging operation by pressing the **CLR** Key.

```

0
      1      1
0  E : 0
    
```

- Note**
1. If the jogging speed (PP16) is set to more than 10%, jogging cannot be executed.
 2. In this case, the jogging speed setting display will appear. Set the speed to a value less than 10% and repeat the operation.
 3. If this operation is performed, the value for PP16 will be rewritten.
 4. Check the parameter settings before performing jogging with I/O.

7-4 Point Teaching

Function

Enters the present value in a specified point number.

- Note**
1. Perform point teaching only when an origin has been fixed. This operation cannot be executed if an origin has not been fixed.
 2. When the **Jog** Key is released during jog execution, deceleration will not start immediately. (It takes approximately 1 s for deceleration to begin.)
 3. This operation can only be performed in modes 11 or 12.
Specify a point number and move the axis using jogging or manually. When the **ENT** Key is pressed, the present value will be entered.

Procedure

Performing Point Teaching

- 1, 2, 3...**
1. Press the **1** Key after pressing the **RUN MODE** Key. The following display will appear.

```

DO  OT D S O
E  T T E   E
      RU  MODE
↓:0
    
```

2. Press the **Down Arrow** Key. The run menu display will appear.

```

RU
↓:PO  T POS
      : 0
      :PO  T TE
                                ▼
    
```

3. Press the **3** Key. The display for inputting the point number will appear.

```

TE
PRMTR          SE E T
                P  ↓
E T:SE E T
    
```

4. Specify the point number.

Example: **5**, **ENT** Keys

```

TE
P           1
          :ST TE
    
```

5. Press the **CHG** Key. The present value will appear.

```

TE
P           1      1
          :ST TE
    
```

- Note**
- a) If the jogging speed (PP16) is set to more than 10%, jogging cannot be executed.
 - b) In this case, the jogging speed setting display will appear. Set the speed to a value less than 10% and repeat the operation.
 - c) If this operation is performed, the value for PP16 will be rewritten.
 - d) Check the parameter settings before performing jogging with I/O.

6. Press the **+X** Key or the **-X** Key. While the key is pressed, the axis will move.

```
TE
P          1
          1
RU  E E
```

7. When the axis has been moved to the desired position, release the key and press the **ENT** Key. The present value will be entered as the position data for the specified point number.

```
TE
P          1
          :ST TE
```

8. If the **CLR** Key is pressed, the display for inputting point numbers will be returned.

```
TE
PRMTR          SE E T
                P  -
E T:SE E T
```

7-5 Origin Search

Function This operation moves the axis to the origin.

- Note**
1. Ensure that equipment will not be adversely affected before conducting an origin search.
 2. Turn ON the operation servomotor using servomotor ON/OFF before conducting an origin search.

Procedure **Executing an Origin Search**

- 1, 2, 3...** 1. Press the **1** Key after pressing the **RUN MODE** Key. The following display will appear.

```

DO  OT D S O
E  T T E     E
      RU  MODE
↓:0
    
```

2. Press the **Down Arrow** Key. The run menu display will appear.

```

RU
↓:PO  T POS
: 0
:PO  T TE ▼
    
```

3. Press the **Down Arrow** Key three times.

```

RU
:OR  SE R
:OR  TE
:SER 0 0 0 ▼
    
```

4. Press the **4** Key.

```

OR  SR

ST RT:SE R
    
```

5. Press the **START** Key.

```

OR  SR  E E
    
```

6. When the origin search is completed, the following display will appear. The present value will become **0**.

```

OR  SR
E  DED
    
```

7. If the **CLR** Key is pressed, the origin search display will return.

```

OR  SR

ST RT:SE R
    
```

7-6 Origin Teaching

Function Changes the present value to 0 (origin).

Note Before performing origin teaching, turn OFF the operation servomotor using servomotor ON/OFF.

When changing the origin, move the axis (using jogging etc.), stop the origin in the desired location, and perform origin teaching.

Procedure **Performing Origin Teaching**

- 1, 2, 3...** 1. Press the **1** Key after pressing the **RUN MODE** Key. The following display will appear.

```

RU
└:PO T POS
: 0
:PO T TE
    
```

2. Press the **Down Arrow** Key three times.

```

RU
└:OR SE R
:OR TE
:SER 0 0 0
    
```

3. Press the **5** Key.

```

OR TE
      1
E T: E E
    
```

4. Press the **ENT** Key. When origin teaching has been completed, the following display will appear.

```

OR TE
E DED
    
```

5. Press the **CLR** Key to return to the origin teaching display.

```

OR TE
E T: E E
    
```

7-7 Switching Servo ON/OFF

Function Sets the Servo Driver to servo-lock (ON) or servo-free (OFF).

Note When quitting an operation, press the **CLR** Key after turning the Servo Driver OFF using servo ON/OFF.

```

PUT T E DR ER
  RU  O  T
T  O  T E  PR
  EED
    
```

Procedure Switching Servo Driver ON/OFF

- 1, 2, 3... 1. Press the **1** Key after pressing the **RUN MODE** Key. The following display will appear.

```

DO  OT D S O
  E T T E  E
    RU  MODE
  ↓:0
    
```

2. Press the **Down Arrow** Key. The run menu will appear.

```

RU
↓:PO T POS
  : 0
  :PO T TE ▼
    
```

3. Press the **Down Arrow** Key three times.

```

RU
-:OR SE R
  :OR TE
  :SER 0 0 0 ▼
    
```

4. Press the **6** Key.

Servo ON

```

S 0 0 →0 S
  E T:S T
    
```

Servo OFF

```

S 0 0 →0 S
  E T:S T
    
```

5. Press the **ENT** Key. When servo ON/OFF has been completed, one of the following displays will appear.

Servo ON
Servo turns OFF

```

S 0 0 →0 S
  E DED
    
```

Servo OFF
Servo turns ON

```

S 0 0 →0 S
  E DED
    
```

6. Press the **CLR** Key to return to the servo ON/OFF display.

Servo ON

```

S 0 0 →0 S
  E T:S T
    
```

Servo OFF

```

S 0 0 →0 S
  E T:S T
    
```

7-8 Auto-tuning

Auto-tuning automatically operates the motor by investigating the size and nature of the mechanical load and, based on these, performing adjustments and settings.

Before performing auto-tuning, set the reciprocating rotation range, the target response frequency, and the maximum rotation speed. The position loop gain, the speed loop proportional gain, and the speed loop integral gain will be automatically set. When auto-tuning is performed, servo ON/OFF will automatically turn ON.

Procedure

Performing Auto-tuning

- 1, 2, 3... 1. Press the **2** Key after pressing the **RUN MODE** Key. The tuning menu will appear.

```
TU
1: UTO TU
:M U TU
```

2. Press the **1** Key.

```
UTO TU
ROT TE DT
ST:E E UTE
```

3. Select the display to be changed by pressing the **Down** or **Up Arrow** Key.

```
UTO TU
DEST UTO RE
ST:E E UTE
```

```
UTO TU
M
ST:E E UTE
```

4. Press the **CHG** Key.

```
UTO TU
ROT TE DT
1 -
```

```
UTO TU
DEST UTO RE
1 1 -
```

```
UTO TU
M
1 1 -
```

5. Input the new setting directly.

```

UTO TU
ROT TE DT
1 1_

```

```

UTO TU
DEST UTO RE
1 1 1_

```

```

UTO TU
M
1 _

```

6. Press the **ENT** Key.
Example: Maximum Rotation Speed

```

UTO TU
M
ST:E E UTE

```

7. Press the **START** Key. Auto-tuning will be executed.

```

UTO TU
E E

```

8. When auto-tuning is completed, the following display will appear.

```

UTO TU
E DED

```

9. Press the **CLR** Key to return the tuning menu.

```

TU
1: UTO TU
:M U TU

```


7-9 Manual Tuning

With this manual tuning, settings for the position loop gain, the speed loop proportional gain, and the speed loop integral gain are made directly.

Procedure

Performing Manual Tuning

- 1, 2, 3... 1. Press the **2** Key after pressing the **RUN MODE** Key. The tuning menu will appear.

```
TU
1: UTO TU
:M U TU
```

2. Press the **2** Key.

```
M U TU E
POS
SPD P 1
SPD 1
```

3. Using the **Down** or **Up Arrow** Keys, move the **<** to the gain to be changed.

```
M U TU E
POS
SPD P 1
SPD 1
```

4. Press the **CHG** Key.

```
M U TU E
POS
SPD P 1 _↑↓
SPD 1
```

5. Using the **Up** or **Down Arrow** Keys, increment/decrement the value. (Directly inputting a value is also possible.)

```
M U TU E
POS
SPD P 1 _↑↓
SPD 1
```

6. Press the **ENT** Key to confirm the value.

```
M U TU E
POS
SPD P 1
SPD 1
```

7. Press **CLR** to return the tuning menu.

```
TU
1: UTO TU
:M U TU
```

7-10 Displaying and Changing Control Output Signals

This function can be used to display the control output signals. Also, it can be used to turn a signal ON (1)/OFF (0).

- Note**
1. Ensure that equipment will not be adversely affected before changing a control output signal.
 2. Ensure that correct operation will be possible with the new signal.

Procedure 1

Displaying Control Output Signal

- 1, 2, 3...**
1. Press the **3** Key after pressing the **RUN MODE** Key. The test mode menu will appear.

```
TEST MODE
1:DO OUTPUT
```

2. Press the **1** Key. The ON/OFF status for the signals will appear.

```
RE D : RU O :
S OM: P :
OR ST: RM:
T OM: POUTO:
```

3. Press the **PAGE UP** or **PAGE DOWN** Key to change the display.

```
POUT1: POUT :
POUT : POUT :
POUT : 0 :
POUT :
```

4. Press the **CLR** Key to return the test mode display.

```
TEST MODE
1:DO OUTPUT
```

Procedure 2

Changing Control Output Signal

- 1, 2, 3... 1. Select the display containing the signal to be changed.

```
RE D : RU O :
S OM: P :
OR ST: RM:
T OM: POUTO:
```

2. Using the **Down** or **Up Arrow** Keys, move the < to the signal to be changed.

```
RE D : RU O :
S OM: P :
OR ST: RM:
T OM: POUTO:
```

3. Press the **CHG** Key.

```
RE D : RU O :
S OM: P :
OR ST: RM:
T OM: POUTO:
```

4. Press the **1** or **0** Key as required to change the signal.

```
RE D : RU O :
S OM: P :1
OR ST: RM:
T OM: POUTO:
```

5. Press the **ENT** Key. The signal will change.

```
RE D : RU O :
S OM: P :1
OR ST: RM:
T OM: POUTO:
```

6. Press the **CLR** Key to return the test mode menu. (Output status will be cleared.)

```
TEST MODE
1:DO OUTPUT
```

SECTION 8

Extension Functions

This section provides details about alarm displays, alarm history, and setting units for position data.

8-1	Displaying Alarms	82
8-2	Displaying Alarm History	83
8-3	Setting Units For Position Data	84

8-1 Displaying Alarms

Function

Displays an alarm being generated at the Servo Driver.

When an alarm occurs, it will automatically appear on the display. The buzzer will also sound.

```

      DR  ER  RM
DE    T O ER  1
PRMTR ERROR
E      OMM ERR  1
    
```

For details about resetting alarms that have been generated, refer to *9-1 Alarm Reset*.

Procedure

Displaying Alarms

- 1, 2, 3...** 1. Press the **FUN1** Key and then the **2** Key. The alarm will be displayed.

```

      RM D SP
PRMTR ERROR
E      OMM ERR  1
DE    T O ER  1
    
```

If no alarm is being generated, **NO ALARM** will be displayed.

```

      RM D SP
O      RM
    
```

2. Up to eight alarms can be displayed.
The previous or next alarm can be displayed using the **Down** or **Up Arrow** Keys.

```

      RM D SP
DE    T O ER  1
PRMTR ERROR
E      OMM ERR  1
    
```

8-2 Displaying Alarm History

Function Displays the most recent 15 alarms.

Procedure **Displaying the Alarm History**

- 1, 2, 3... 1. Press the **FUN1** Key and then the **3** Key. The alarm history will be displayed. The alarms are ordered chronologically. The numbering starts with the most recent alarm.

```

RM      S D SP
1  O ER  URRE T
      PO ER ERROR
      MOTOR O ER D
    
```

If there are no alarms registered in alarm history, **NO ALM HIS** will be displayed.

```

      RM      S D SP
0      M      S
    
```

2. Up to 15 items can be displayed. Use the **Up** or **Down Arrow** Keys to display the previous or next alarm history.

```

      RM      S D SP
1      OORD  O ER
1      SPD  MP S TU
1      O ER RU
    
```

8-3 Setting Units For Position Data

Function

Changes the units for position data display.

The values that can be set correspond units according to the following. Characters in parentheses indicate the actual display.

0: No units 1: Pulses (PLS) 2: Inches (inch)
3: Millimeters (mm) 4: Centimeters (cm) 5: Micrometers (μm)
6: Meters (m) 7: Degrees ($^{\circ}$) 8: Radians (rad)
9: Revolutions (r)

Procedure

Setting Units for Position Data

- 1, 2, 3...** 1. Press the **FUN1** Key and then the **4** Key. The unit setting display will be displayed.



```
SETT
U T
```

2. Press the **CHG** Key.



```
SETT
U T
```

3. Input the value corresponding to the required unit and press the **ENT** Key. It is also possible to make a selection from the display by pressing the **HELP** Key.



```
SETT
U T
```

SECTION 9

Other Functions

This section provides details about the alarm reset and deceleration stop functions.

9-1	Alarm Reset	86
9-2	Deceleration Stop	87

9-1 Alarm Reset

Function

Clears the alarm for the Position Driver.

- Note**
1. When an alarm is generated, remove the cause of the alarm before resetting. Otherwise, when the same function is executed, the same alarm will appear.
 2. Ensure that equipment will not be adversely affected before performing alarm reset.

Procedure

Performing Alarm Reset

- 1, 2, 3...**
1. Press the **ALM CLR** Key.

```

RM RESET
E T:E E

```

2. Press the **ENT** Key. On completion, the following display will appear.

```

RM RESET
E DED

```

3. Press **CLR** to return the alarm reset display.

```

RM RESET
E T:E E

```

When selecting a function, press the **MON**, **PRMTR**, **RUN MODE**, or **FUN1** Key again.

When performing alarm reset while operating in the run mode, the following display will appear when **MON**, **PRMTR**, **RUN MODE**, or **FUN1** Key is pressed and servo ON/OFF is ON.

```

PUT T E DR ER
RU O T
T O T E PRO
EED

```

In this case, press the **CLR** Key to return to the run menu.

9-2 Deceleration Stop

Function Decelerates an axis to a stop when performing point positioning, jogging, point teaching, origin search or origin teaching.

Note Ensure that equipment will not be adversely affected before executing deceleration stop.

Procedure

Performing Deceleration Stop

- 1, 2, 3... 1. While the axis is moving, press the **DEC STOP** Key.
2. The axis will stop and the following message will be displayed.

```
DE E ER TO STOP
E DED
```

The method used for deceleration stop is determined by the setting for PTP parameter PP24 (deceleration stop mode). However, if performing positioning when PP24 is set to 1 (deceleration stop), the axis will be stopped after the error counter pulse is output.

When selecting a function, press the **MON**, **PRMTR**, **RUN MODE**, or **FUN1** Key again.


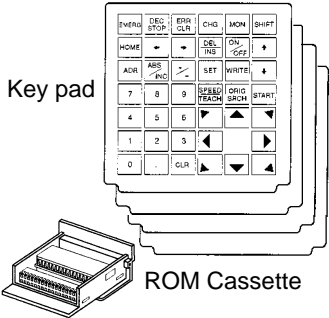


When performing deceleration stop while operating in the run mode, the following display will appear when **MON**, **PRMTR**, **RUN MODE**, or **FUN1** Key is pressed and servo ON/OFF is ON.

```
PUT T E DR ER
RU O T
T O T E PRO
EED
```

In this case, press the **CLR** Key to return to the run menu.

Appendix A

Standard Models

Connected unit	MC Unit	Position Control Unit	Position Driver
<p>Teaching Box</p> 	<p>CVM1-PRO01 (Without ROM Cassette.) CVM1-PRS21-EV1 (ROM Cassette needs to be replaced.) CVM1-PRS71 (ROM Cassette needs to be replaced.) (Any one of the above.)</p>		
<p>ROM Cassette</p> 	<p>CVM1-MP702 (Can be used with MC Units, Position Control Units, or Position Drivers.)</p>		<p>CVM1-MP702 (Can be used with MC Units, Position Control Units, or Position Drivers.) CVM1-MP703 (Position Driver only.) (Any one of the above.)</p>
<p>Appropriate devices</p>	<p>CV500-MC421 CV500-MC221 C200H-MC221</p>	<p>C500-NC222-E 3G2A5-NC111-EV1</p>	<p>FND-X-series Position Driver</p>
<p>Connection cable</p> 	<p>CV500-CN224 (2 m) CV500-CN424 (4 m) CV500-CN624 (6 m) (Any one of the above.)</p>		<p>CV500-CN22A (2 m) CV500-CN42A (4 m) CV500-CN62A (6 m) (Any one of the above.)</p>
<p>Conversion Adaptor</p> 	<p>Not used</p>	<p>CV500-CIF11 (NC111-EV1) CV500-CIF21 (NC222-E)</p>	<p>Not used.</p>
<p>Applicable Manuals</p>	<p>CVM1-PRO01 Teaching Box (For Motion Control Units) Operation Manual (W320)</p>	<p>CVM1-PRO01 Teaching Box (For Position Control Units) Operation Manual (W321)</p>	<p>This manual.</p>

Note If the CVM1-PRS21-EV1 Programming Console or CVM1-PRS71 Teaching Box for the MC Unit is to be used, replace its ROM Cassette and Key Sheet in order to use the Unit as a Teaching Box for the Position Driver. Purchase the CVM1-MP702/703 ROM Cassette.

Appendix B

Alarm Displays and Alarm Processing

These tables show the alarm displays and provide possible countermeasures.

Alarm display	Error content	Condition when error occurred	Probable cause	Countermeasures
A.L01	Overcurrent	Occurred when power was turned ON.	Control board defective.	Replace Driver.
		Occurred when Servo was turned ON.	Current feedback circuit error	Replace Driver.
			Main circuit transistor module error	
		Servomotor power line is short-circuited or grounded.	<ul style="list-style-type: none"> • Correct the power line short-circuiting or grounding. • Measure the insulation resistance at the Servomotor itself. If there is short-circuiting, replace the Servomotor. 	
	Overheating	<p>Occurred during operation even though power was ON.</p> <p>If reset is executed after waiting for a time, operation resumes.</p>	The ambient temperature for the Driver is higher than 55°C.	Bring the ambient temperature for the Driver down to 55°C or lower.
The load torque is too high.			<ul style="list-style-type: none"> • Lighten the load. • Lengthen the acceleration time. • Select another Servomotor. 	

Alarm display	Error content	Condition when error occurred	Probable cause	Countermeasures
A.L02	Overvoltage	Occurred when power was turned ON.	The power supply voltage is outside of the allowable range.	<ul style="list-style-type: none"> The supply voltage must be 170 to 264 VAC when 200 VAC is specified The supply voltage must be 85 to 127 VAC when 100 VAC is specified.
		Occurred during motor deceleration.	The load inertia is too large.	<ul style="list-style-type: none"> Lengthen the deceleration time. Calculate the regeneration and select a Regeneration Resistor.
			The power supply voltage is outside of the allowable range.	<ul style="list-style-type: none"> The supply voltage must be 170 to 264 VAC when 200 VAC is specified The supply voltage must be 85 to 127 VAC when 100 VAC is specified.
			The external Regeneration Resistor is damaged.	Calculate the amount of regeneration and replace the Regeneration Resistor with one of the appropriate capacity.
		Occurred while lowering (vertical shaft).	Gravity torque is too large.	<ul style="list-style-type: none"> Add a counterbalance to the machine, and reduce the gravity torque. Reduce the lowering speed. Connect an external Regeneration Resistor.
A.L03	Voltage drop	Occurred during operation.	The power supply voltage fell below the prescribed value.	<ul style="list-style-type: none"> For 200-VAC input specifications, use a 170 to 264-VAC power supply. For 100-VAC input specifications, use an 85 to 127-VAC power supply.
		Occurred during motor acceleration	The power supply capacity is insufficient.	Increase the power supply capacity.

Alarm display	Error content	Condition when error occurred	Probable cause	Countermeasures
A.L06	Resolver disconnection	Occurred when power was turned ON.	The UP-02 (applicable motor) setting is wrong.	Set the motor model code correctly.
			The resolver's wiring is disconnected or faulty.	<ul style="list-style-type: none"> • Connect any places that are disconnected. • Correct the wiring.
		Occurred after slight movement at the beginning.	There is poor contact at the connectors.	Make sure the connectors are inserted firmly and locked into place.
A.L07	Power status error	---	An error occurred in the main circuit.	Replace the Driver.
A.L09	Regeneration Resistor overheating	Occurred during operation	The regeneration absorption exceeded the internal absorption.	Connect an external Regeneration Resistor.
			The power supply voltage is outside of the allowable range.	The supply voltage must be 170 to 264 VAC.
A.L10	Regeneration operation error	Occurred during operation	The Regeneration Resistor has fused.	<ul style="list-style-type: none"> • Replace the external Regenerative Resistor. • If an external Regenerative Resistor is not being used, replace the Driver.
			The short bar between JP1 and JP2 on the terminal block has been removed without using an external Regeneration Resistor.	Mount a short bar between JP1 and JP2.
			The regeneration circuit has broken.	Replace the Driver.
A.L12	Clock stop	---	The Position Driver's internal clock has stopped.	Replace the Driver.
A.L15	Overcurrent (soft) [The current exceeded the motor's rated current (120%).]	Occurred during operation.	The mechanical system is locked.	Correct the places that are locked.
			The power lines are wired incorrectly.	Correct the wiring.
			The power lines are shorted-circuited or grounded.	Correct the short-circuiting or grounding.
			The UP-02 (applicable motor) setting is wrong.	Set the motor model code correctly.
A.L16	Speed amp saturation [The speed amp was saturated for more than 3 seconds.]	Occurred during operation.	The mechanical system is locked.	Correct the places that are locked.
			The power lines are wired incorrectly.	Correct the wiring.
			The UP-02 (applicable motor) setting is wrong.	Set the motor model code correctly.

Alarm display	Error content	Condition when error occurred	Probable cause	Countermeasures
A.L17	Motor overload [The electrothermal value exceeded 110%.]	Occurred during operation.	The mechanical system is locked.	Correct the places that are locked.
			The power lines are wired incorrectly.	Correct the wiring.
			The load is too large.	<ul style="list-style-type: none"> • Lighten the load. • Lengthen the deceleration time.
			The gain adjustment is incorrect.	Re-adjust the gain.
A.L18	Short time overload [The current exceeded the motor's rated current (120%) for a sustained period of time.]	Occurred during operation.	The mechanical system is locked.	Correct the places that are locked.
			The power lines are wired incorrectly.	Correct the wiring.
			The load is too large.	<ul style="list-style-type: none"> • Lighten the load. • Lengthen the deceleration time.
			The gain adjustment is incorrect.	Re-adjust the gain.
A.L19	Resolver error [There was an error in the resolver feedback.]	Occurred during operation.	The resolver cable is disconnected.	<ul style="list-style-type: none"> • Connect any disconnected places. • Correct any faulty contacts.
			Malfunctioning was caused by noise.	Wire the resolver cables separately from the power lines.
A.L20	Speed over [The motor speed exceeded 120% of the maximum speed.]	The motor operated at high speed upon startup.	There was a resolver feedback error.	Wire the resolver cables separately from the power lines.
			The encoder is wired incorrectly.	Correct the wiring.
		Occurred during operation.	The gain adjustment is incorrect.	Re-adjust the gain.
A.L21	Error counter over [The error counter's accumulated pulses exceeded $\pm 2^{21}$.]	Motor did not operate even though the START signal was turned ON.	The motor power lines or the encoder lines are wired incorrectly.	Correct the wiring.
			The mechanical system is locked.	Correct the places that are locked.
		Occurred at high-speed rotation.	The motor power lines or the encoder lines are wired incorrectly.	Correct the wiring.
			The gain adjustment is incorrect.	Re-adjust the gain.
			Acceleration was too sudden.	Lengthen the acceleration time.
		Occurred when positioning with a large amount of movement or during a JOG operation.	The load is too large.	<ul style="list-style-type: none"> • Lighten the load. • Select another motor.
			Occurred when operating at the maximum rotation speed.	The reference speed is too high.
The slip compensation is too large.	Correct the slip compensation.			
A.L26	Parameter setting error	Occurred when power was turned ON.	No data is set for UP-01 and UP-02, or else the setting is incorrect.	Correctly set the data for UP-01 and UP-02. (After setting the data, turn the power off and back ON.)

Alarm display	Error content	Condition when error occurred	Probable cause	Countermeasures
A.L32	Resolver error	Occurred when power was turned ON.	The resolver cable is disconnected.	Connect any disconnected places.
			The resolver cable wiring is incorrect.	Correct the wiring.
			The UP-02 (applicable motor) setting is wrong.	Set the motor code correctly.
A.L34	+ Software limit over	Occurred during operation.	The reference value set in PP-10 and PP-11 was exceeded.	<ul style="list-style-type: none"> Reset the alarm and use JOG or manual operation to release from the software limit. Correct the reference value. Correct the PP-10 and PP-11 values.
A.L35	– Software limit over	Occurred during operation.	The reference value set in PP-12 and PP-13 was exceeded.	<ul style="list-style-type: none"> Reset the alarm and use JOG or manual operation to release from the software limit. Correct the reference value. Correct the PP-12 and PP-13 values.
A.L37	Coordinate counter over [The present value exceeded $\pm 2^{31}$.]	Occurred during shaft movement.	The reference value is too large.	Correct the reference value.
			Feedback control is being employed in PTP control mode.	Correctly set the control mode (UP-01). (After setting the data, turn the power OFF and back ON.)
A.L38	Overrun [The limit input signal in the direction of movement turned OFF during an operation other than origin search.]	Occurred during shaft movement.	The reference value is too large.	Correct the reference value.
			The limit sensor's position is incorrect.	Correct the limit sensor's position.
		Occurred when beginning.	The limit sensor's polarity is incorrect.	Wire the sensor so that it turns ON during normal operation.
			The limit sensor is broken.	Replace the limit sensor.

Alarm display	Error content	Condition when error occurred	Probable cause	Countermeasures
A.L40	Encoder disconnection	Occurred after moving just a little at the beginning.	The encoder's lines are disconnected.	Connect any disconnected places.
			There is poor contact at the connectors.	Make sure the connectors are inserted firmly and locked into place.
			The encoder's wiring is incorrect.	Correct the wiring.
			The encoder is damaged.	Replace the motor.
		The Driver is damaged.	Replace the Driver.	
		Occurred when power was turned ON.	The UP-02 (applicable motor) setting is wrong.	Set the motor code correctly.
	The encoder cable is loose.	Make sure the connectors are inserted firmly and locked into place.		
A.L41	Encoder communications error	Occurred when power was turned ON.	The UP-02 (applicable motor) setting is wrong.	Set the motor code correctly.
			The encoder S-phase wiring is incorrect.	Correct the wiring.
A.L42	Absolute encoder backup error	Occurred when power was turned ON.	The absolute encoder's backup voltage dropped (even if the encoder was being used for the first time).	Perform the absolute encoder setup.
A.L43	Absolute encoder checksum error	Occurred when power was turned ON.	There was an error in the absolute encoder's memory data check.	Perform the absolute encoder setup.
A.L44	Absolute encoder battery error	Occurred when power was turned ON.	The absolute encoder's backup battery voltage dropped (to 2.6 to 2.8 V max.).	Replace the battery and then perform the absolute encoder setup.
A.L45	Absolute encoder absolute value error	Occurred when power was turned ON.	There was an error in the absolute encoder's sensor check. (Internal encoder error)	<ul style="list-style-type: none"> • Turn the power OFF and then back ON. • If the error persists, then replace the motor.
A.L46	Absolute encoder over speed	Occurred when power was turned ON.	The speed exceeded 400 r/min when multiple rotation data was transmitted at power ON.	Turn ON the power while the motor is stopped
A.L47	Encoder data not transmitted	Occurred when power was turned ON.	The UP-02 (applicable motor) setting is wrong.	Set the motor model code correctly.
			The encoder S-phase wiring is disconnected.	Connect any disconnected places.
A.L48	Encoder initialization error	Occurred when power was turned ON.	The Driver malfunctioned.	<ul style="list-style-type: none"> • Turn the power OFF and then back ON. • If the error persists, then replace the Driver.

Alarm display	Error content	Condition when error occurred	Probable cause	Countermeasures
A.L50	BCD data error	Occurred when power was turned ON.	The data input for direct positioning was not BCD. The point number input for point positioning was not BCD.	Re-input the data and make sure it is correct.
A.L51	Present position unknown	Occurred at startup or when teaching.	START, TEACH, or ORIGIN TEACH was executed when the origin was not established.	Execute an origin search to establish the origin.
A.L52	PTP data not set	Occurred when power was turned ON.	A point number was selected for which the PTP data was not set.	<ul style="list-style-type: none"> • Set the correct PTP data. • Select a point number for which PTP data has been set.

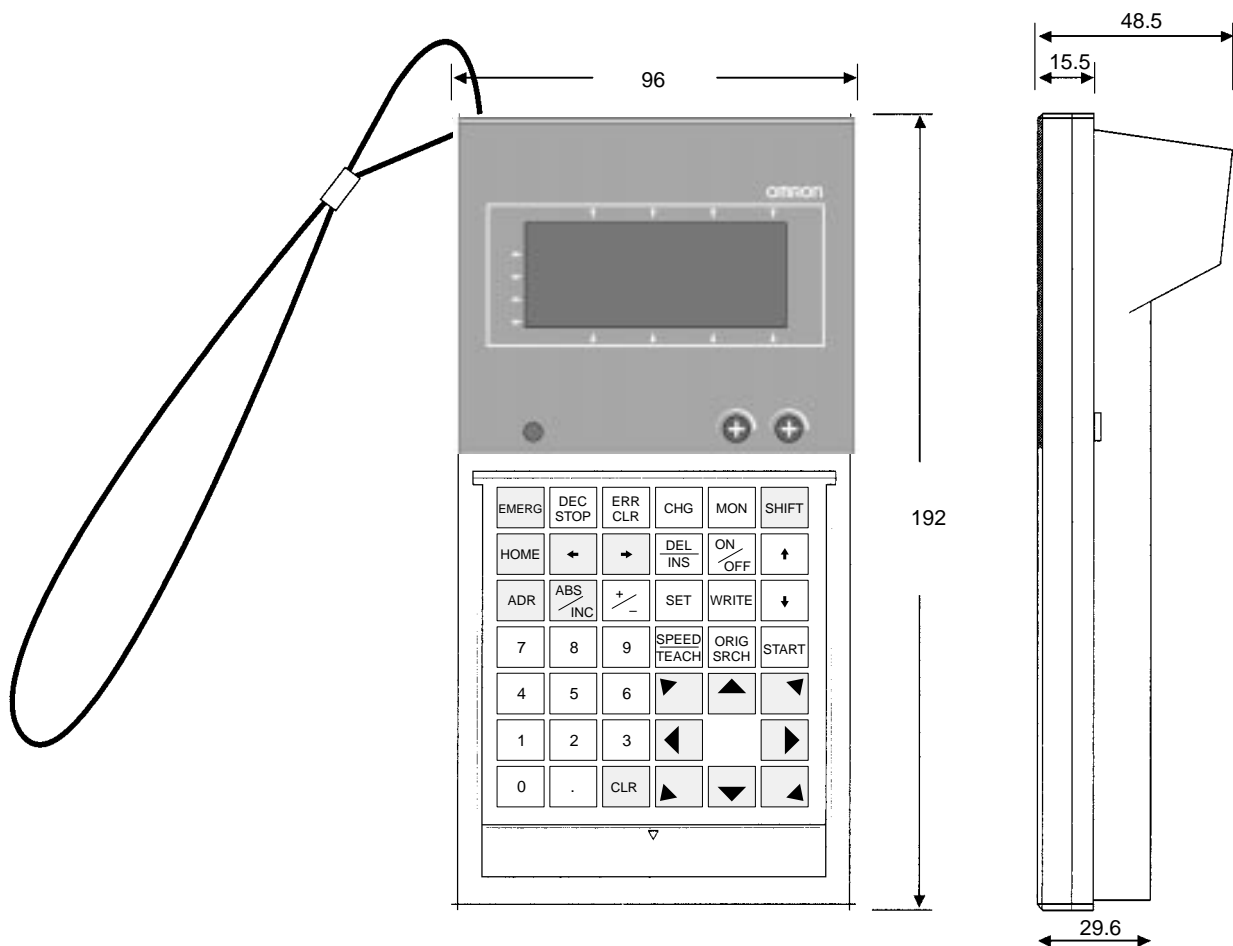
Appendix C

Specifications and External Dimensions

General Specifications

Item	Specifications
Power supply	300 mA max. at 5 VDC ^{+5%/−10%} (Supplied from the Position Driver.)
Ambient operating temperature	0°C to 55°C
Ambient operating humidity	10% to 90% RH (no condensation)
Ambient operating atmosphere	No corrosive gasses
Storage temperature	−20°C to 75°C
Display	Semi-transmissive liquid crystal display (with LED) 16 characters x 4 rows; 5 x 7 dots/character
Weight	370 g
External dimensions	192 x 96 x 48.5 mm (H x W x D)

External Dimensions (Unit: mm)



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Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. W354-E1-1

↑
Revision code

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	April 1999	Original production