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PROGRAMMABLE CONTROLLERS

MELSEC-F

OPERATION MANUAL

FX-20P-E HANDY PROGRAMMING PANEL

FX

Foreword

- This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX-20P-E HANDY PROGRAMMING PANEL. It should be read and understood before attempting to install or use the unit.
- Further information can be found in the FX_0/FX_{0S}/FX_{0N}/FX_{1S}/FX/FX_{1N}/FX_{2N}/FX_{2NC} Series Hardware Manual and FX Series Programming Manual (II).
- If in doubt at any stage of the installation of FX-20P-E HANDY PROGRAMMING PANEL always consult a professional electrical engineer who is qualified and trained to the local and national standards which apply to the installation site.
- If in doubt about the operation or use of FX-20P-E HANDY PROGRAMMING PANEL please consult the nearest Mitsubishi Electric distributor.
- This manual is subject to change without notice.

FX-20P-E HANDY PROGRAMMING PANEL

OPERATION MANUAL

Manual number : JY992D82301
Manual revision : D
Date : November 2008

Guidelines for the Safety of the User and Protection of the FX20P-E-HANDY PROGRAMMING PANEL.

This manual provides information for the use of the FX-20P-E-HANDY PROGRAMMING PANEL. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows:

a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual, should be of a competent nature, trained and qualified to the local and national standards required to fulfill that role. These engineers should be fully aware of all aspects of safety with regards to automated equipment.

b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards required to fulfill that job. These engineers should also be trained in the use and maintenance of the completed product. This includes being completely familiar with all associated documentation for said product. All maintenance should be carried out in accordance with established safety practices.

c) All operators of the completed equipment (see Note) should be trained to use this product in a safe manner in compliance to established safety practices. The operators should also be familiar with documentation which is associated with the actual operation of the completed equipment.

Note : The term ‘completed equipment’ refers to a third party constructed device which contains or uses the product associated with this manual.

Notes on the Symbols Used in this Manual

At various times throughout this manual certain symbols will be used to highlight points which are intended to ensure the users personal safety and protect the integrity of equipment. Whenever any of the following symbols are encountered its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

Hardware Warnings



1) Indicates that the identified danger **WILL** cause physical and property damage.



2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.



3) Indicates a point of further interest or further explanation.

Software Warnings



4) Indicates special care must be taken when using this element of software.



5) Indicates a special point which the user of the associate software element should be aware.



6) Indicates a point of interest or further explanation.

- Under no circumstances will Mitsubishi Electric be liable responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Please contact a Mitsubishi Electric distributor for more information concerning applications in life critical situations or high reliability.

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Associated Manuals

This manual describes operating procedures to program and monitor the MELSEC-FX Series Programmable Controllers (hereafter referred to as "PLC") using the FX-20P-E handy programming panel (hereafter referred to as "FX-20P-E" or "HPP").
For instructions and handling of FX Series PLC, refer to the handy manuals and programming manuals shown below.
Read these manuals and the specific manuals for the PLC before use, sufficiently understand the specifications, then correctly use the units. See to it that this manual is delivered to the end user.

Manual name	Manual No.	Description
FX0/FX0N HARDWARE MANUAL	JY992D47501	This manual contains hardware explanations for wiring, installation and specification for FX0/FX0N series PLC
FX0S HARDWARE MANUAL	JY992D55301	This manual contains hardware explanations for wiring, installation and specification for FX0S series PLC
FX1S HARDWARE MANUAL	JY992D83901	This manual contains hardware explanations for wiring, installation and specification for FX1S series PLC
FX1N HARDWARE MANUAL	JY992D89301	This manual contains hardware explanations for wiring, installation and specification for FX1N series PLC
FX-SERIES HARDWARE MANUAL	JY992D47401	This manual contains hardware explanations for wiring, installation and specification for FX series PLC

Manual name	Manual No.	Description
FX2N HARDWARE MANUAL	JY992D66301	This manual contains hardware explanations for wiring, installation and specification for FX2N series PLC
FX2NC (D/UL) HARDWARE MANUAL	JY992D87201	This manual contains hardware explanations for wiring, installation and specification for FX2NC series PLC
FX2NC (DSS/DS) HARDWARE MANUAL	JY992D76401	This manual contains hardware explanations for wiring, installation and specification for FX2NC series PLC
FX0/FX0S/FX0N/FX/FX2C/FX2N PROGRAMMING MANUAL	JY992D48301	This manual contains instruction explanations for the FX series PLC
FX1S/FX1N/FX2N/FX2NC PROGRAMMING MANUAL II	JY992D88101	This manual contains instruction explanations for the FX series PLC

- PROGRAMMING MANUALS are offered separately.
  Contact the dealer of the FX-20P-E upon necessity.

1. Notes to Users

1.1 Expression of this manual

In this manual, the term "program" indicates program, file register, comment and parameter unless otherwise specified.
And the term "memory cassette" indicates memory cassette and memory board.

1.1.1 Expression of key operations

The following expression is used for each key operation.

[A] / [B] .....Press the [A] or [B] key.

[A] [B] .....Press the [A] key, then the [B] key in this order (Numeric input etc.).

[A] ↓ [B] .....Press the [A] key, then the [B] key in this order.

 .....Press the [↓] key several times repeatedly.

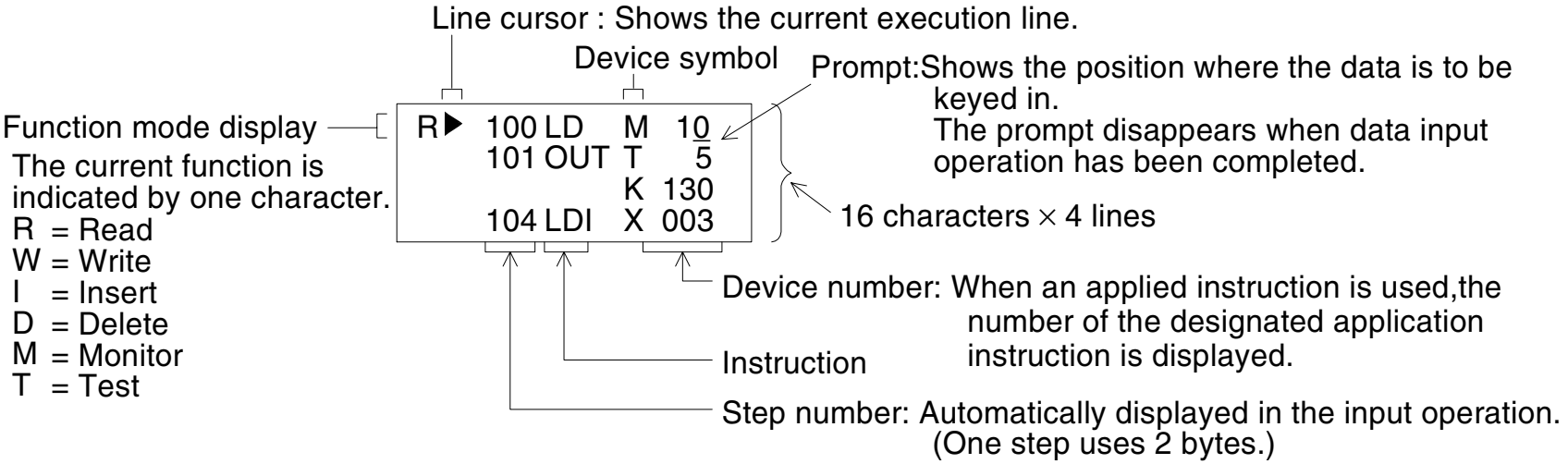
[A]+[B] .....While pressing and holding the [A] key, press the [B] key.

1.1.2 Expression of conditions

PLC status	RUN:×	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:×

✓: Usable △: Usable on conditions ×: Unusable

1.1.3 Screen display during programming



- Program creation method
  Create programs by using the following classification of instruction list: basic, step ladder or application

- Cursor indication
  The cursor displayed on the screen is represented by the following notation.

  : Flashes.

  : Lit.

Instruction types

- Basic instruction
- Step ladder instruction
  Input by an instruction on the HPP keyboard.
- Application instruction
  Input by the [FNC] key and the FNC number.

1.2 Introduction of product

The handy programming panel FX-20P-E is a hand-held programming and monitoring panel used to write programs (sequence programs and parameters) to MELSEC-FX Series programmable controllers (hereafter referred to as PLC). It can also monitor their operation of a sequence controlled application.

1.3 Features

- FX-20P-E is a programming/monitoring unit of the compact hand-held type.
- The liquid crystal display unit of 16 characters × 4 lines displays the program, PLC operation status (monitoring), operation guidance and error messages.
- The FX-20P-E is equipped with online mode and offline mode functionality. In the online mode, the FX-20P-E directly accesses the memory with the connected PLC.
  In the offline mode, the FX-20P-E accesses the RAM built in itself. In addition, because the FX-20P-E is equipped with the inbuilt large capacitor, it can back up programs written in the offline mode. (With power supply for 1 hour, the FX-20P-E can back up programs for a maximum of 3 days.)
- The FX-20P-E reads writes programs and executes a monitor display in list format.
- When an optional product is combined, the FX-20P-E can work as a ROM writer for memory cassettes available only with the FX Series PLC.

Programs cannot be written or changed while the PLC is in the RUN status.

1.4 Function list

Function	Online mode	Offline mode
Read	Reads (displays) sequence programs in PLC.	Reads (displays) sequence programs in HPP.
Write	Writes sequence programs. (Key inputs in the HPP → Program memory in the PLC)	Writes sequence programs. (Key inputs in the HPP → Inbuilt HPP RAM)
Insert	Inserts instructions into sequence programs. (Key inputs in the HPP → Program memory in the PLC)	Inserts instructions into sequence programs. (Key inputs in the HPP → Inbuilt HPP RAM)
Delete	Deletes instructions from sequence programs. (Key inputs in the HPP → Program memory in the PLC)	Deletes instructions from sequence programs. (Key inputs in the HPP → Inbuilt HPP RAM)
Monitor	Reads (displays) the operation status in PLC.	–
Test	Forcibly writes. (Keys in the HPP → Memory in the PLC)	–
Others	• Changes over the program mode (online → offline). • Checks programs. (Checks programs saved in the PLC.) • Transfers programs between the memory cassette. (Memory in the PLC ↔ Memory cassette) • Modifies parameters. (Key inputs in the HPP → Program memory in the PLC) • Converts device Nos. in sequence programs. (Key inputs in the HPP → Program memory in the PLC) • Adjusts the buzzer sound volume. (Adjusts the sound volume of the buzzer issued when a key in the HPP is pressed.) • Clears the latch status. (Key inputs in the HPP → Memory inside the PLC)	• Changes over the program mode (offline → online). • Checks programs. (Checks programs saved in the PLC.) • Transfers programs between the HPP and the FX Series PLC. (Inbuilt HPP RAM ↔ Program memory in the PLC) • Modifies parameters. (Key inputs in the HPP → Inbuilt HPP RAM) • Converts device Nos. in sequence programs. (Key inputs in the HPP → Inbuilt HPP RAM) • Adjusts the buzzer sound volume. (Adjusts the sound volume of the buzzer issued when a key on the HPP is pressed.) • Transfers programs between the HPP and a module. (Inbuilt HPP RAM ↔ Module)

1.5 Product configuration

The FX-20P-E and the FX-20P-E-SET0 consist of the following components:

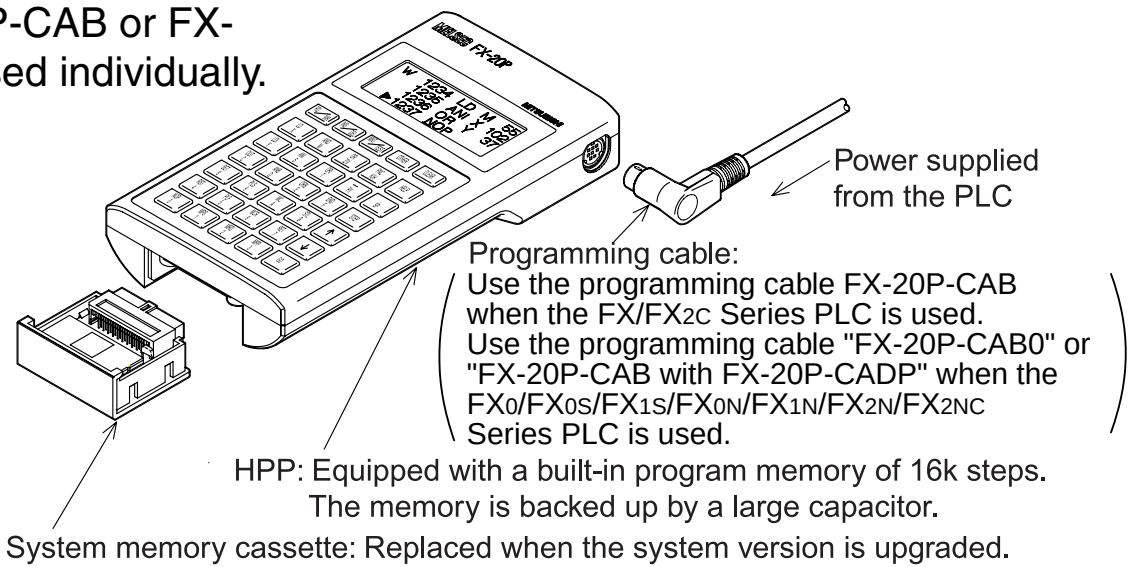
FX-20P-E: Connected to the FX/FX2C Series PLC

FX-20P-E	HPP (Can be used also for the FX0/FX0S/FX1S/FX0N/FX1N/FX2N/FX2NC Series PLC when the cable is changed or is connect FX-20P-CADP.)
FX-20P-CAB	Program cable (HPP ↔ PLC), 1.5 m
FX-20P-MFXD-E	System memory cassette for the FX Series

FX-20P-E-SET0: Connected to the FX0/FX0S/FX1S/FX0N/FX1N/FX2N/FX2NC Series PLC

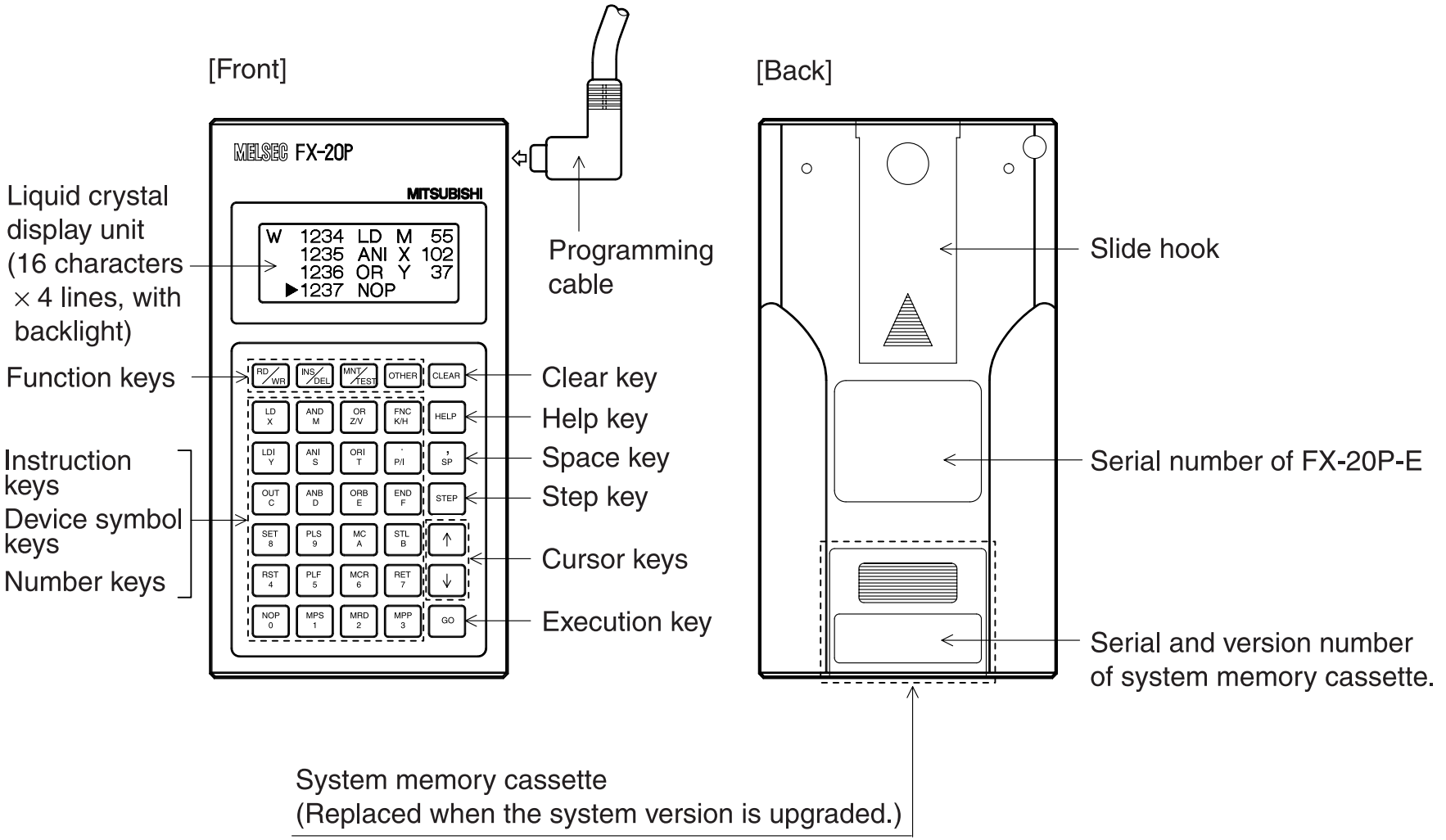
FX-20P-E	HPP (Can be used also for the FX/FX2C Series PLC when the cable is changed.)
FX-20P-CAB0	Program cable (HPP ↔ PLC), 1.5 m
FX-20P-MFXD-E	System memory cassette for the FX Series

- The program cable (FX-20P-CAB or FX-20P-CAB0) can be purchased individually.



1.6 Name of each part

FX-20P-E

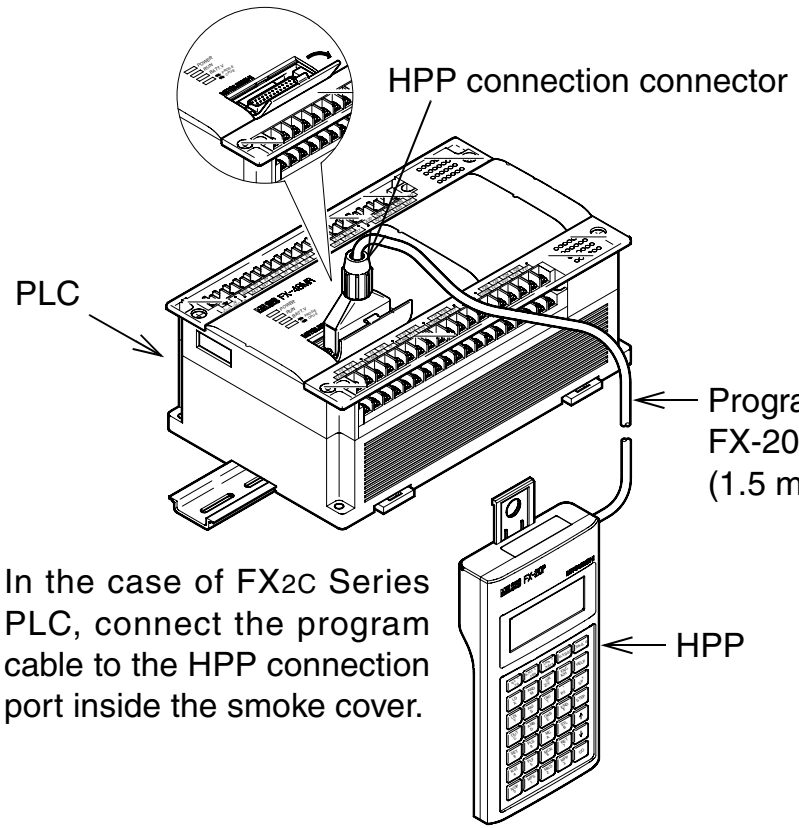


Each key provided on the FX-20P-E panel surface works as follows.

Key name	Description
Function keys [RD/WR] [INS/DEL] [MNT/TEST]	Each key functions alternately. (When a key is pressed once, the function indicated in the upper left position on the key surface is selected. When the key is pressed again, the function indicated in the lower right position on the key surface is selected.)
Other key [OTHER]	Pressing the [OTHER] key calls the mode menu select screen, regardless of the current display mode. When the [OTHER] key is pressed with a special module installed to the HPP, menu selection is made from the offline mode menu.
Clear key [CLEAR]	Cancels a key input before the [GO] key is pressed (that is, before the key input is determined), clears an error message or returns to the previous screen.
Help key [HELP]	Changes over the decimal expression and the hexadecimal expression while the application instruction list is displayed or the monitor function is used.
Space key [S'P]	Inputs space in the input area, specifies a device or specifies a constant.
Step key [STEP]	Specifies a step No.
Cursor keys [↑], [↓]	Move the line cursor or the prompt, specify a device having the previous or next No. of a specified device, or scroll lines. When a key is pressed and held for 1 sec or more, the input is given continuously.
Execution key [GO]	Determines or executes a command, scrolls screens after display or searches again.
Instruction keys Device symbol keys Number keys	An instruction is assigned in the upper position. A device No. or number is assigned in the lower position. The function in the upper position and the function in the lower position are always changed over automatically in accordance with progress of operations. Among symbols shown in the lower position, "Z and V", "K and H" and "P and I" function alternately. (If a key is pressed continuously, a pair of functions are changed over alternately.)

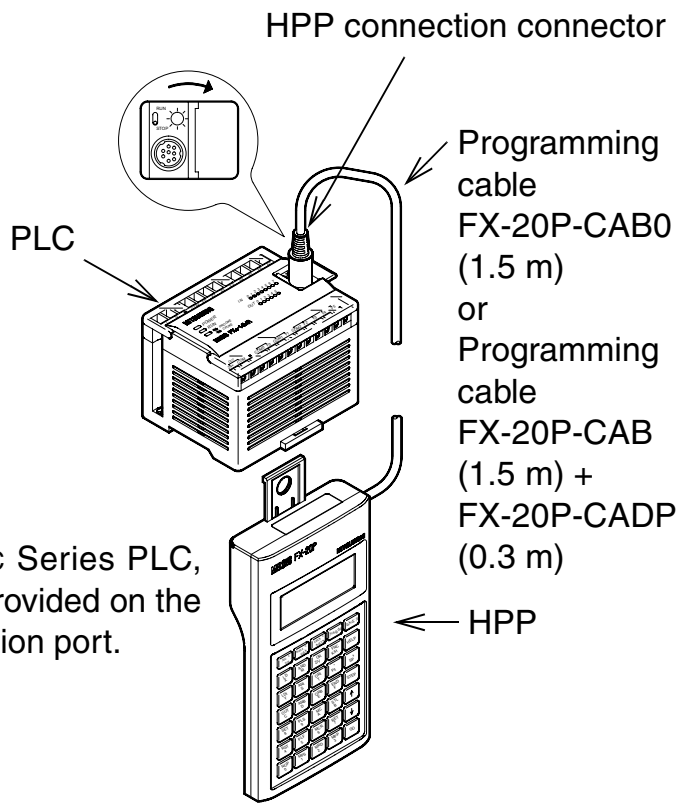
1.7 Connections

<Connection to the FX/FX2C Series PLC>



In the case of FX2C Series PLC, connect the program cable to the HPP connection port inside the smoke cover.

<Connection to the FX0/FX0S/FX1S/FX0N/FX1N/FX2N/FX2NC Series PLC>



In the FX2NC Series PLC, no cover is provided on the HPP connection port.

IMPORTANT

Never touch the PLC connection area and the special module/memory cassette attachment area on the HPP as well as the HPP attachment area on the special module/system memory cassette. If such area is touched, the internal electronic circuit may be damaged by static electricity. Turn off the power of the PLC before connecting the HPP to the PLC.

1.8 Version upgrade history

Version upgrade history of the system memory cassette FX-20P-MFX□-E

FX-20P-MFX□-E	Description
Ver 1.00	First version (Compatible with the FX2 Series PLC.)
Ver 2.00	Compatible with the FX2C Series PLC. The device range which can be used for programs is extended, and application instructions which can be used for programs are added.
Ver 3.00*1	Compatible with the FX2N Series PLC. The program capacity and the device range which can be used for programs are extended, and application instructions which can be used for programs are added.
Ver 4.00*1	Compatible with the FX1S/FX1N Series PLC. Application instructions which can be used for programs are added.
Ver 4.10*1	Supports the EXTR instruction added to the FX2N Series PLC.

*1 Pay attention to restrictions when upgrading the version.
Refer to "1. Version upgrade" on the next page for the details.

1. Version upgrade

FX-20P-E version regarded as version upgrade target (Version of mounted system memory cassette)	Version upgrade	
	Up to V 2.00	V 3.00 or later
V 1.00 to former than V 2.00	✓	×
V 2.00 to former than V 3.00	–	△
V 3.00 or later	–	✓*1

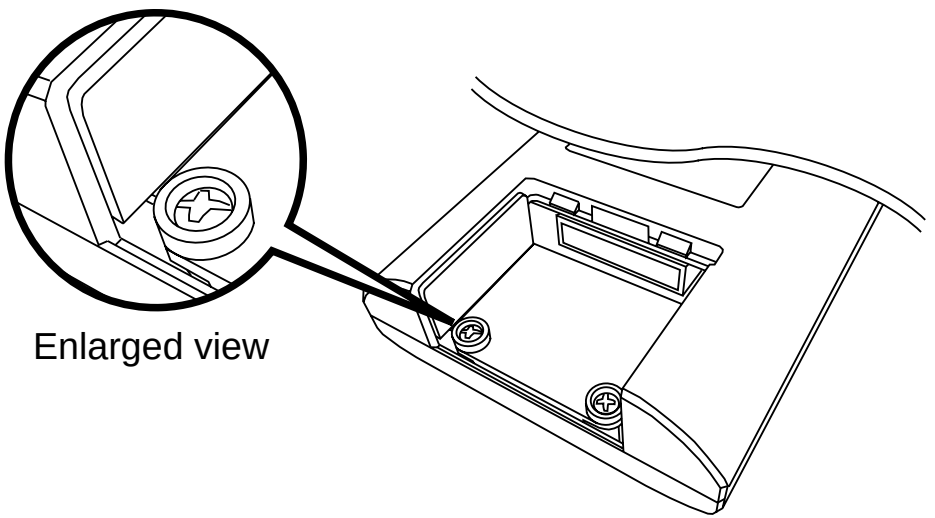
✓ : Can be upgraded.

× : Cannot be upgraded to V 3.00 or later.

– : Not regarded as target of version upgrade.

△ : Can or cannot be upgraded depending on the FX-20P-E main unit as follows:

1) Version upgrade to V 3.00 or later is not possible for FX-20P-E main units manufactured in November 1994 or earlier with manufacturer serial No.s in the range from "0X****" to "4Y9499".
The figure below shows the shape of the system memory cassette mounting area for the FX-20P-E main units described above.



2) Version upgrade to V 3.00 or later is possible with restrictions in functionality for FX-20P-E main units manufactured from November 1994 to July 1997 with manufacturer serial No.s in the range from "4Y9500" to "77****".

Restricted functionality: When the model "FX2N Series" is selected in the offline mode, the program capacity is limited to "up to 8K steps".

*1 Version upgrade to V 3.00 or later is possible with restrictions in functionality for FX-20P-E main units manufactured from November 1994 to July 1997 with manufacturer serial No.s in the range from "4Y9500" to "77****".

Restricted functionality: When the model "FX2N Series" is selected in the offline mode, the program capacity is limited to "up to 8K steps".

2. How to understand the manufacturer's serial No.

Expression of manufacturer's serial No. : 4 Y □□□□

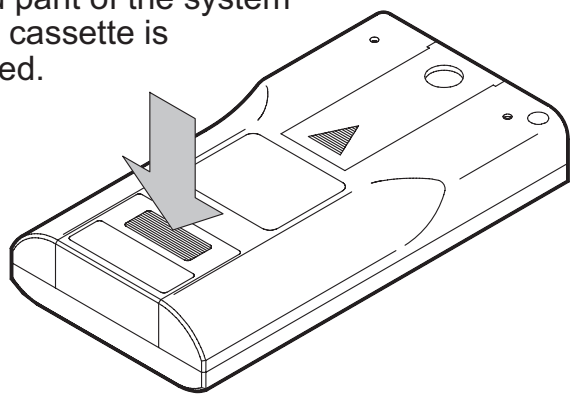
- □□□□ — Batch number
- Y — Production Month: 1 (Jan) to 9 (Sep), X (Oct), Y (Nov) or Z (Dec)
- 4 — Production Year: E.g. 1994 or 2004

1.9 Replacement of system memory cassette

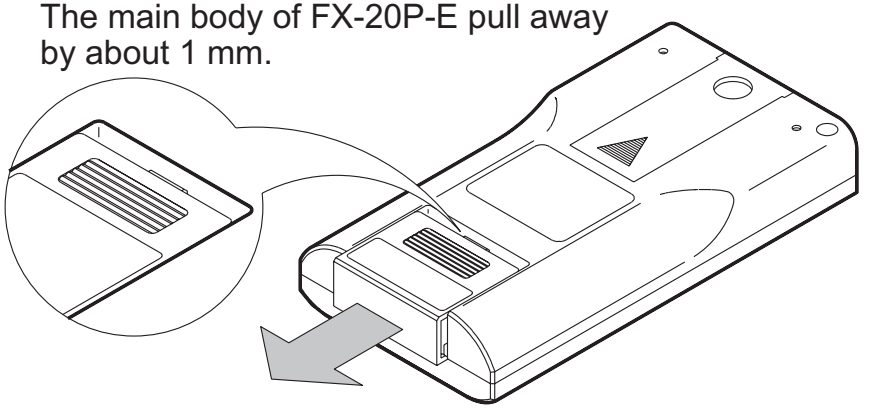
When purchasing the FX-20P-E a system memory cassette is mounted.
However, only when upgrading the system version or changing the specification of the application should the system memory cassette be replaced.

System memory cassette replacement method (Perform the steps 1) to 3) in this order.)

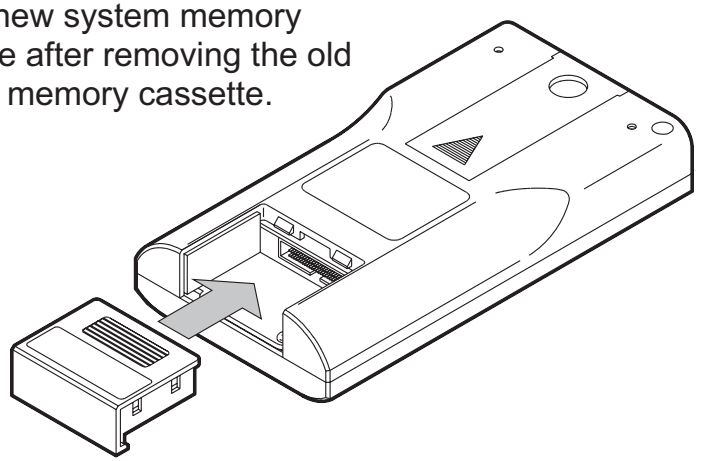
1) The skid pant of the system memory cassette is depressed.



2) Pull out the system memory cassette in the direction of the arrow.
The main body of FX-20P-E pull away by about 1 mm.



3) Insent new system memory cassette after removing the old system memory cassette.



IMPORTANT

Never touch the attachment areas on the system memory cassette and on the FX-20P-E.

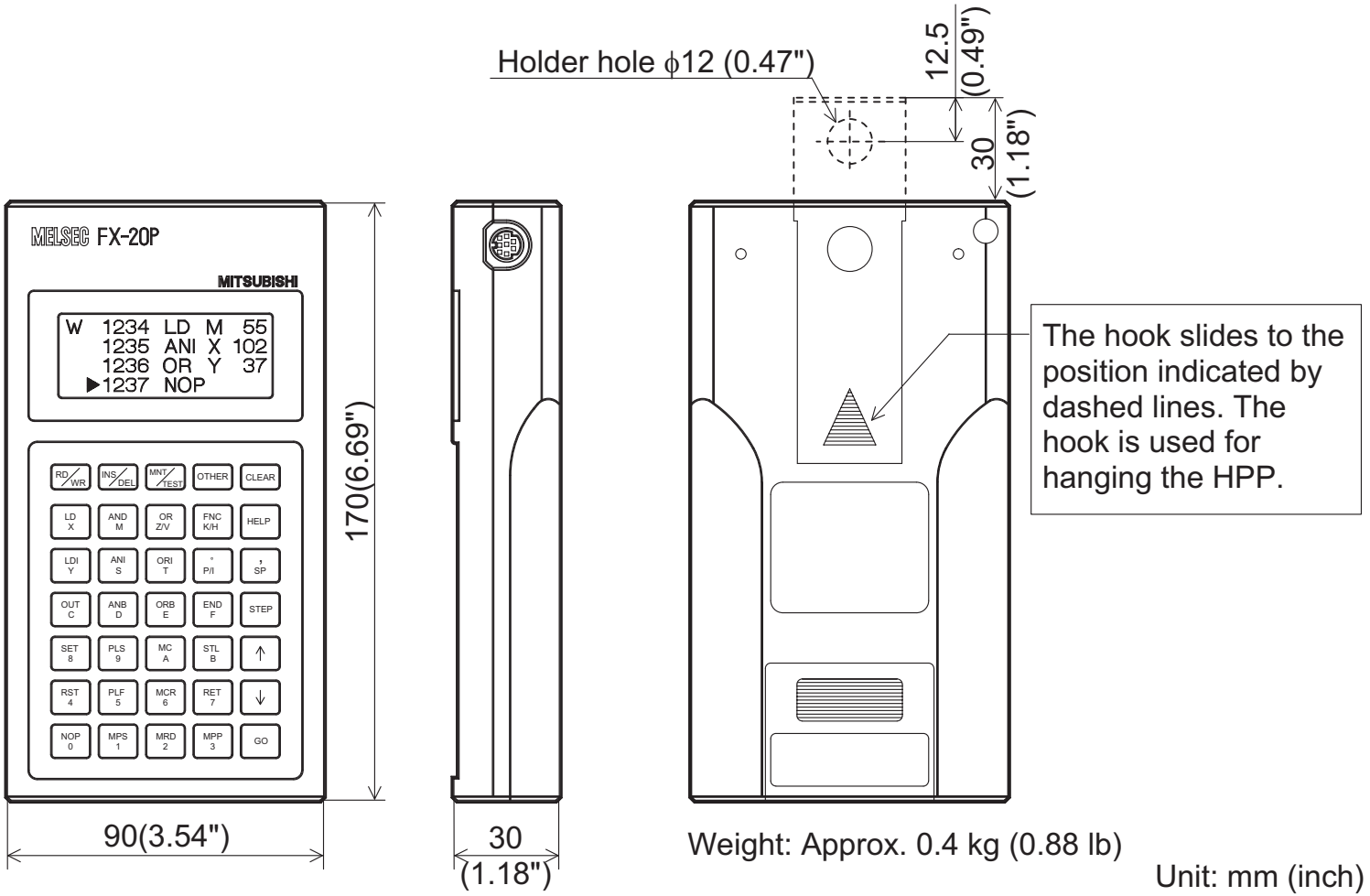
1.10 Specifications

Item		Specifications
Ambient temperature		0 to 40°C
Ambient humidity		35 ~ 85% Relative Humidity, No condensation
Vibration Resistance - intermittent vibration		10 ~ 57 Hz: 0.075 mm Half Amplitude 57 ~ 150 Hz: 9.8 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min. in each direction)
Vibration Resistance - Continuous vibration		10 ~ 57 Hz: 0.035 mm Half Amplitude 57 ~ 150 Hz: 4.9 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min in each direction)
Shock Resistance		147m/s^2 Acceleration, Action time 11ms 3 times in each direction X, Y, and Z
Environment		Free from corrosive or flammable gas and excessive conductive dust
Supply voltage		5V DC±5% supplied from PLC
Current consumption		150 mA*1
User memory capacity		RAM: 16K steps (8K steps in FX-20P-E main units that were manufactured in July 1997 or earlier with manufacturer serial No.s "77****" or earlier)
Memory backup for power failure		Memory backup capacitor After being powered for 1 hour it can retain internal device data for 3 days without externally supplied power
Display unit		Liquid crystal display unit with backlight
Display contents	Character matrix	1 character: 40 dots (8 × 5), bottom 5 dots of each line (1 × 5 dots) are used for the prompt
	Number of characters	64 characters (16 characters × 4 lines)
	Character types	Alphanumeric
Keyboard		35 keys
Inbuilt interface	PLC interface	In conformance to EIA and RS422, connected to FX Series PLC with cable FX-20P-CAB or FX-20P-CAB0.
	Extension interface	Connected to extension module
ROM writer function		Available when dedicated module is connected (write, read, collation and deletion check)

*1 When FX-20P-RWM is used, the current is 180mA.

1.11 Dimensions

Dimensions of FX-20P-E



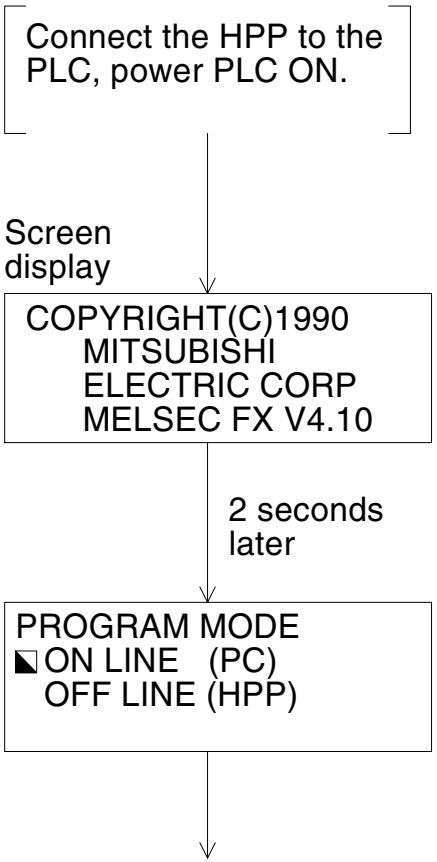
Weight: Approx. 0.4 kg (0.88 lb)

Unit: mm (inch)

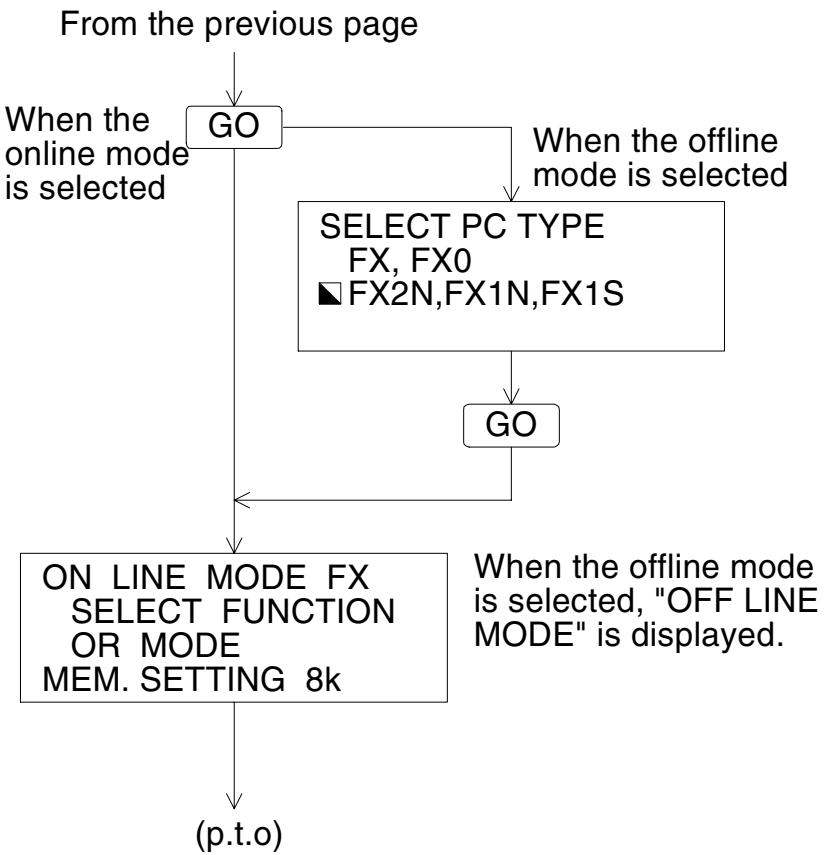
The FX-20P-E is equipped with the program cable FX-20P-CAB (1.5 m) as standard.
The FX-20P-E-SET0 is equipped with the program cable FX-20P-CAB0 (1.5 m) as standard.

2. Startup Procedure

2.1 Startup procedure



- While the power from the PLC is OFF, connect the HPP to the PLC.
- If the power from the PLC is turned ON while the [RD/WR] key on the HPP is pressed, the PLC starts up in the STOP status even if the PLC RUN input is ON, and becomes ready for programming.
  (Only FX, FX_{2C}, FX_{0}, FX_{0S} and FX_{0N} are possible)
  When the power of the PLC is turned OFF once then turned on again, the RUN status of the PLC is valid. (The RUN status is not valid by changeover from STOP to RUN.)
- In the initial status, the cursor is located in "ONLINE (PC)". Select a desired program mode by pressing the [↑] or [↓] key, then press the [GO] key to proceed to the next screen.

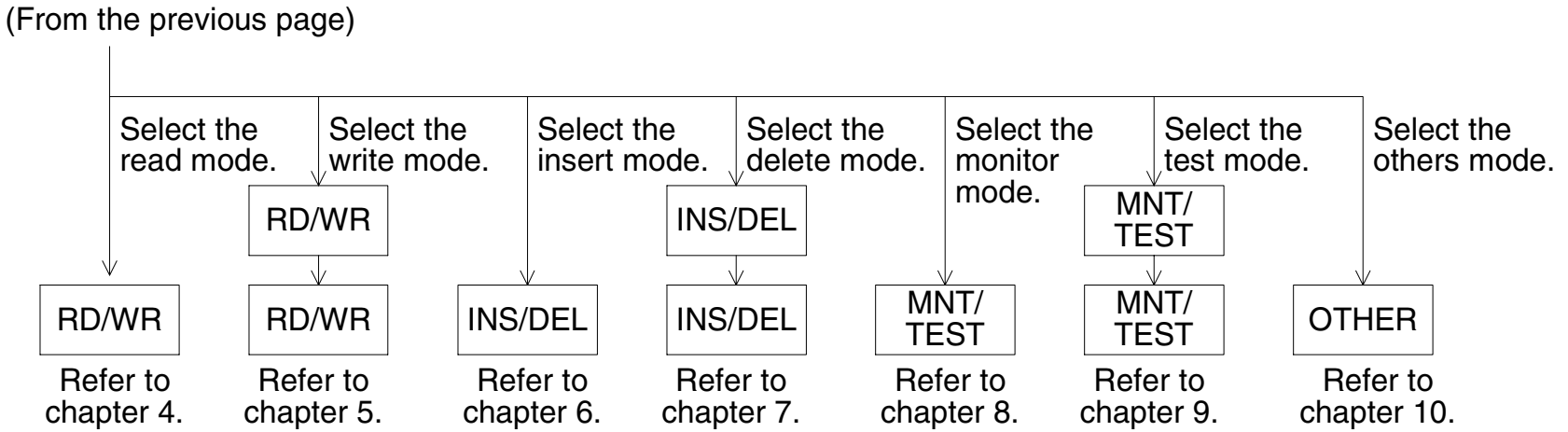


- When the online mode is selected, the HPP automatically discriminates the PLC model, and proceeds to the function selection screen.
  If the entry code has been registered in the PLC, the HPP proceeds to the entry code input screen. (Refer to 10.5.4.)
- When the offline mode is selected, select the PLC model by pressing the [↑] or [↓] key, then press the [GO] key to proceed to the next screen.
  At this time, if the selected model is different from the stored model, the following screen appears.

```
1. OFF LINE MODE
   EXECUTE?
     OK→[GO]
     NO→[CLEAR]
```

  - Press the [GO] key to register the selected model to the parameter (initial value), then proceed to the mode selection screen.
  - Press the [clear] key to return to the program mode selection screen.

When using the FX1S Series PLC, change the program capacity to 2k steps by setting the parameter as described later. (Refer to 10.5.3.)



- Mode changeover shown above is always valid (except while an instruction or device is input). After selecting a mode, perform the operation above again to display another mode screen.

- Without regard to the display status of the HPP, press the [RST] and [GO] keys at the same time to reset the HPP (and display the screen which is displayed immediately after the power of the HPP is turned on.)
  (In this case, programs and parameters which have been input in the offline mode are not cleared.)

2.2 Handling of FX0/FX0S/FX0N/FX1S/FX1N Series PLC

When starting up the HPP in the offline mode, select the following PLC if the FX0/FX0S/FX0N/FX1S/FX1N Series PLC is used.

	V3.00 or former	V4.00 or later
FX0/FX0S/FX0N	FX, FX0	FX, FX0
FX1S	FX, FX0	FX2N, FX1N, FX1S
FX1N	FX2N	FX2N, FX1N, FX1S

When transferring unsupported element in PLC programs, an error may occur in the HPP or in the PLC because the program capacity, instructions and device ranges have not been supported by the chosen PLC type.
When using the FX0/FX0S/FX0N/FX1S/FX1N Series PLC, refer to 2.2.1 to 2.2.4.

2.2.1 Program

Make each program within the valid device ranges and instructions supported in the chosen PLC. If a program containing an invalid device or unsupported instruction is transferred to the PLC, the PLC executes the error check, and does not change to the RUN status. (If an operation error occurs, the PLC remains in the RUN status and a corresponding instruction is not executed.)
Especially, in the FX0/FX0S/FX0N Series PLC, application instructions cannot be used in the form of pulse execution.
If an invalid device or instruction is written to the PLC, it is not transferred as it is, but may be changed into an invalid instruction. At this time, a collation error occurs in the HPP, and the message "WRITE ERROR" is displayed accordingly.

2.2.2 Parameter settings

In parameter settings, leave the latch range, the memory capacity, the file register capacity in the default status respectively.

1) Setting the memory capacity

   a) Program capacity: Select 2k steps.

      Do not select any other number of steps.
      If the program capacity is set to more than 2k steps, when a program is transferred to the PLC, the message "HPP PARA. ERROR" is displayed, and the program is not written.

      When using theFX0/FX0S Series PLC, make a program of less than 800 steps.
      If a program of 800 steps or more is written to the FX0/FX0S Series PLC, it is ignored and is not written.

      If the program capacity is set to 2k steps, the NOP instruction is automatically set to a program of 800 steps or more when it is read from the FX0/FX0S Series PLC.

   b) File register: Do not set the file register capacity. (only when using FX0/FX0S)

      If the file register capacity is set, when a program is written to the FX0/FX0S Series PLC, the message "WRITE ERROR" is displayed, and the program is not written.

2) Setting the latch range
   The latch range cannot be changed in the FX0/FX0S/FX0N/FX1S/FX1N Series PLC.

   If the latch range is set (changed), when a program is written to the FX0/FX0S/FX0N/FX1S/FX1N Series PLC, the message "COMPLETED" is displayed. Though the program is written, the PLC ignores the set latch range.

3) Registering the entry code
   The entry code can be registered.

2.2.3 Constant changes in run status

Even if the program memory is held in the EEPROM, constants (set values and present values of timers, counters and data registers) can be changed in the RUN status of the FX_0/FX_{0S}/FX_{0N}/FX_{1S}/FX_{1N} Series PLC. However, when a constant is changed, the scan time of the PLC increases by 20 to 30 ms, and the response delay (by 20 to 30 ms) is generated in the input interrupt "I 00□ to I 30□".

2.2.4 FX-20P-E

When a program is transferred while the offline mode is selected in the FX-20P-E, "HPP→FX-RAM" or "HPP←FX-RAM" is displayed even if the program memory is held in the EEPROM.

3. Outline of Programming

3.1 Outline of programming

In the HPP, create a program by using the instruction list and manipulating the keyboard.
The destination to write a created program is different between the online mode and the offline mode.
In the online mode, a program is directly written to the program memory in the PLC. In the offline mode, a program is written to the inbuilt HPP RAM.
When operating the PLC with a program created in the offline mode, the program should be transferred from the HPP to the PLC.
While the PLC is in the RUN status, a program cannot be written or changed from the HPP. Make sure to set the PLC to the STOP status, then write or change a program from the HPP.

3.2 Functions used in programming

[Read] .....Reads a created program from the program memory, and displays it.
By specifying the step No., instruction, device or pointer, an arbitrary position of the program can be displayed.

[Write] .....Writes a new program or overwrites an existing program for modification or addition.

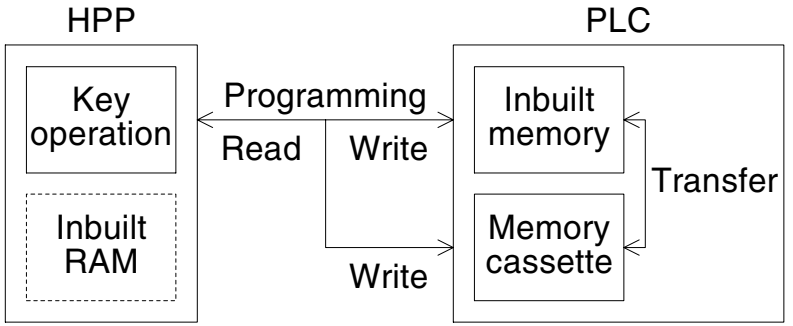
[Insert].....Inserts an instruction to an existing program and carries down later step No's.

[Delete] .....Deletes a specified instruction from an existing program and carries up later step No's.
An instruction or pointer can be deleted. Batch deletion and deletion of specified ranges via the NOP instruction are also available.

- Press the [HELP] key during programming to display the valid program step range.
  Press the [HELP] key again to reset the help display.
  However, if the [HELP] key is pressed immediately after the [FNC] key, search of an application instruction is started or interrupted.

3.3 Program modes

3.3.1 Online mode



In the online mode, the HPP directly accesses the program memory in the PLC.
However, write is disabled if the write protect switch on the EEPROM memory cassette is ON or if the PLC is currently in RUN status.

1) If a memory cassette is not attached to the PLC, programs are written to the inbuilt PLC memory. If a memory cassette is attached to the PLC, programs are written to the memory cassette.
2) By operation from the HPP, programs can be transferred between the inbuilt PLC memory and a memory cassette attached to the PLC.

3.3.2 Offline mode

In the offline mode, the HPP accesses it own inbuilt RAM.
Programs written to the inbuilt HPP RAM can be batch-transferred to the inbuilt PLC RAM or a memory cassette attached to the PLC. Transferring to the ROM writer (option) is executed also in the offline mode.

1) Programming in the offline mode is executed to the inbuilt HPP RAM regardless of the program memory type in and the RUN/STOP status of the PLC.

2) The following condition is required to execute batch transfer to the PLC.

	RUN/STOP status of PLC	Program memory in PLC
Write from HPP to PLC	STOP	RAM, EEPROM *
Read from PLC to HPP	RUN/STOP	RAM, EEPROM, EPROM
Collation between HPP and PLC		

*The write-protect switch should be OFF.

Inbuilt HPP RAM

In the offline mode, programming is executed to the inbuilt HPP RAM.
Even if programming is executed to another PLC in the online mode by using the HPP programmed in the offline mode, programs saved in the HPP remain saved as they are.
However, if programs are read and transferred from the PLC to the HPP in the offline mode, programs saved in the HPP are erased.

Capacitor function

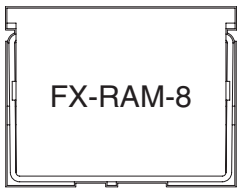
The inbuilt HPP RAM is backed up against power failure by the large capacitor.
(With power supply for 1 hour, the RAM is backed up for 3 days.)
Accordingly, programs can be transferred and written to another PLC from the HPP in which programs have been entered in the offline mode.

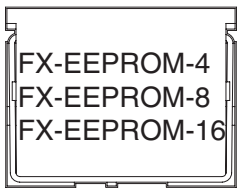
3.4 Types of program memories

Memory cassette (for the FX0N/FX/FX2C/FX2N

Memory board (for the FX2NC Series PLC)

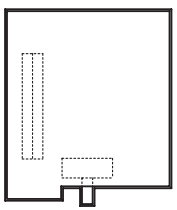
Memory cassette (for the FX1S/FX1N Series PLC)



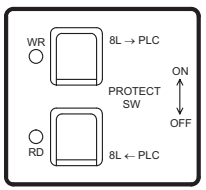




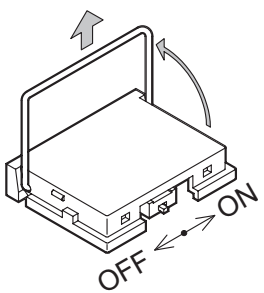
FX2NC-EEPROM-4C
FX2NC-EEPROM-16(C)



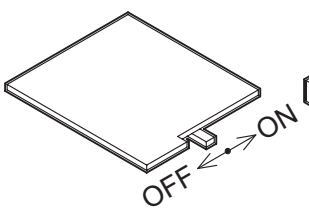
FX1N-EEPROM-8L



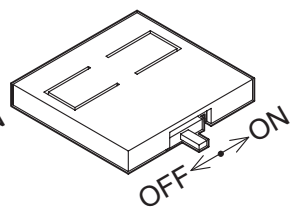
Write-protect switch



Memory cassette



Memory board



Memory cassette

- RAM (random access memory)
  The RAM can be read and written at any time. Because the saved contents are erased by power failure, the RAM should be backed up by the battery. And the saved contents are erased also when the RAM is removed from the PLC.
  The RAM is used also as the internal memory of the HPP and the PLC.
- EEPROM (electrically erasable programmable read only memory)
  The EEPROM is read only memory (ROM), and can be written at any time by applying a specified voltage.
  The saved contents are kept saved against power failure.
  The total number of allowable write occasions is restricted by the life expectancy. The life expectancy is 10,000 times for memory cassettes and memory boards, and 20,000 times for the EEPROM built in the PLC. The write-protect switch is provided to prevent erroneous write.
- EPROM (erasable programmable read only memory)
  The EPROM is read only memory. The saved contents are erased by irradiation of ultraviolet rays.
  After all saved contents are erased, new contents can be batch-written by the ROM writer.
- The saved contents are kept saved against power failure.
- Even if the EEPROM and the EPROM are attached to the PLC, a dedicated battery or large capacitor is required to back up the image memory.

4. Read

4.1 Outline of read operation

When the online mode is selected, programs written to the memory of the PLC (or the memory cassette if it is attached) are displayed in the HPP.
When the offline mode is selected, programs written in the inbuilt HPP RAM itself are displayed in the HPP.

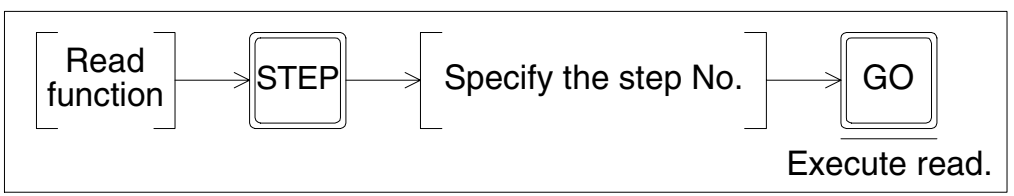
Read operation condition

PLC status	RUN:✓	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:✓	EPROM cassette:✓

4.2 Read by step No.

- Four lines of program are read and displayed from an instruction at the specified step No.
- If the specified step No. corresponds to an operand such as a set value of a timer or counter, four lines are read and displayed from the instruction of the operand.
- Press the [GO] key again to scroll the screen display to the fifth line and later of the displayed instruction.
- Use the cursor control keys to scroll lines one by one.

Basic operation



Example: Reading the step No. 55

Display example

In the step 2)

R	5	ORB	
	6	AND	M 100
	7	OUT	Y 001
STEP			55

In the step 4)

R▶	55	LD	X 004
	56	OR	X 006
	57	ORI	M 102
	58	OUT	Y 035

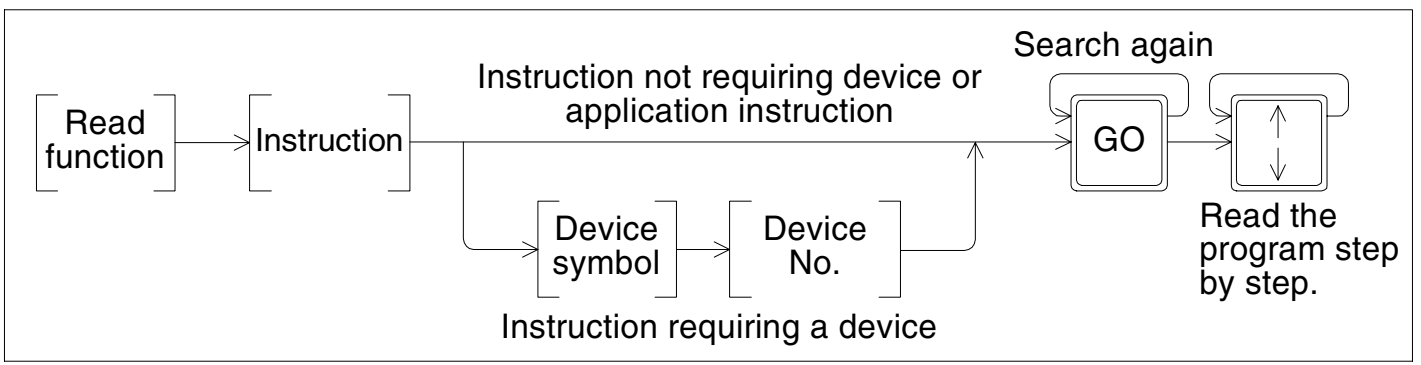
Key operation

1) [Read function]
2) STEP
3) 5 5
4) GO

4.3 Read by instruction

- For an application instruction, press the [FNC] key and input the FNC No. in the way "[FNC][D][1][2][GO]", "[FNC][1][2][GO]" etc. Both instructions are searched regardless to input of the pulse symbol "P".
- The specified instruction word is searched from the step No. 0 in turn, and four lines are displayed on the screen from the first found instruction.
- Press the [GO] key again to search for the instruction with the same condition from the next step of the currently found step.
- If all specified instruction words have been found or if a specified instruction word is not found at all, the message "NOT FOUND" is displayed. Program lines after the END instruction are not displayed.
- Use the cursor control keys to read the program step by step. The cursor keys function in the same way even while the program is read by pointer or device mode.

Basic operation



Example: Reading "PLS M104"

Display example

In the step 3)

R	100	AND	M 125
	101	OR	Y 013
	102	OUT	Y 010
INSTR		PLS	M 104

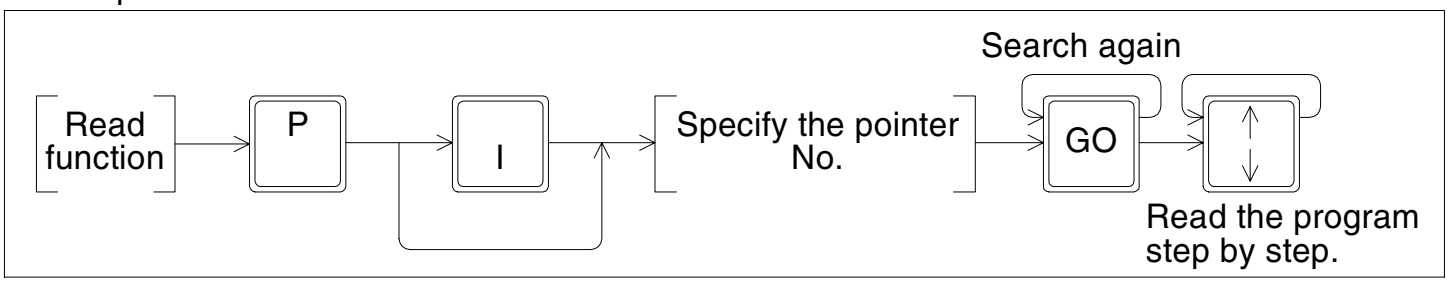
Key operation

1) [Read function]
2) PLS
3) M 1 0 4
4) GO

4.4 Read by pointer

- Four lines are read and displayed from the specified label.
- If the specified label is not found, the message "NOT FOUND" is displayed. Program lines after the END instruction are not read.
- Read by pointer reads interrupt pointers and labels. Pointers specified as operands in application instructions are not searched.

Basic operation



- Pointer (P)
  Number in the CJ or CALL instruction which specifies a jump destination label No.
- Label (P)
  Number of a quick reference title indicating the head of a jump destination specified by the pointer No.
- Interrupt pointer (I)
  Added at the top of an interrupt program. At the end of an interrupt program, "IRET (interrupt return instruction)" is added.

Example: Reading label of the pointer No. 3

Display example

In the step 2)

```
R      50   AND  M 123
       51   SET  Y 010
       52   LD   X 012
POINTER          P  3
```

In the step 3)

```
R▶ 102          P  3
   103  LDI     M 100
   104  MPS
   105  AND     X 012
```

Key operation

1) [Read function]

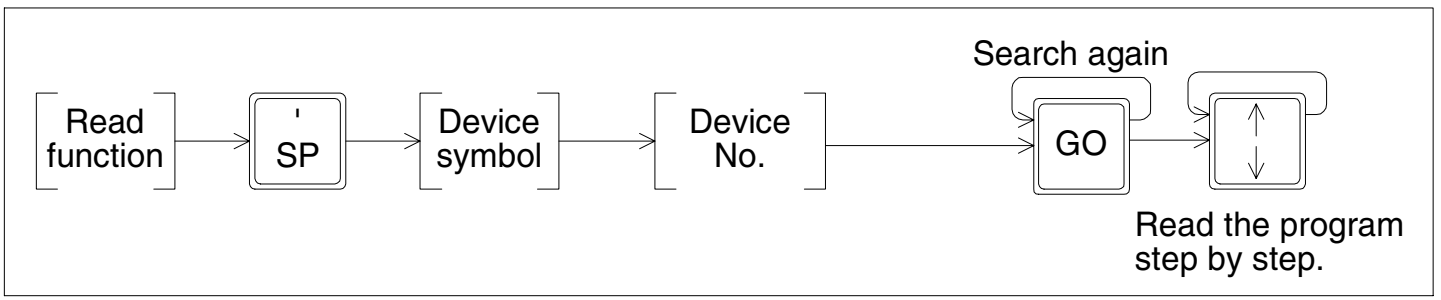
2) [P] [3]

3) [GO]

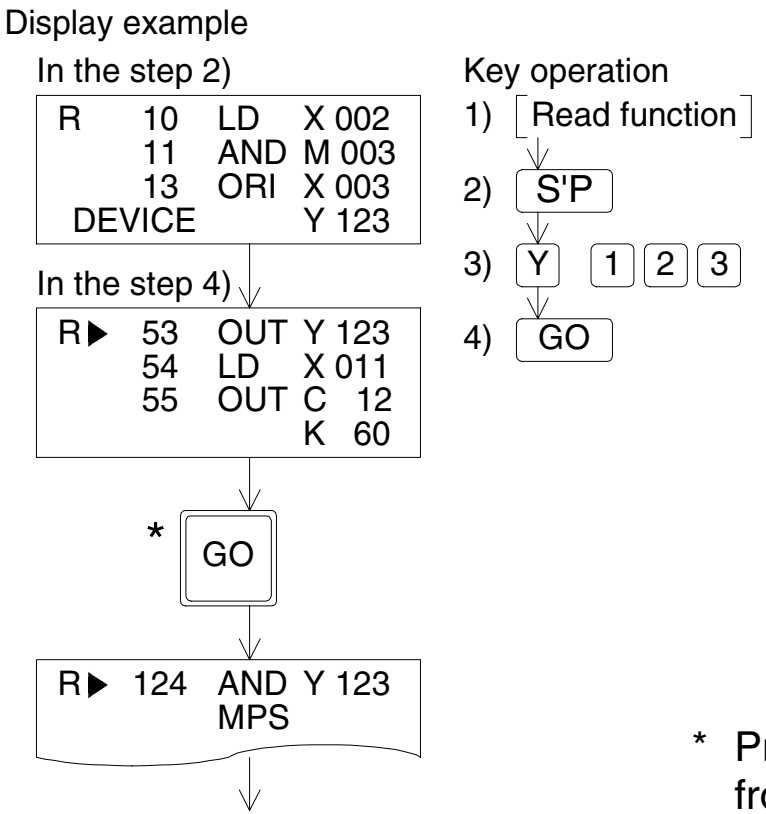
4.5 Read by device

- The specified device is searched from the step No. 0 in turn, and four lines of program are displayed from the first found instruction.
- Press the [GO] key again to search the device of the same condition from the next step of the currently found step.
- If all specified devices have not been found consequentially, the message "NOT FOUND" is displayed. Program lines after the END instruction are not read.

Basic operation



Example: Reading "Y123"



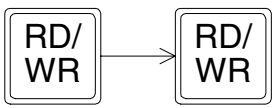
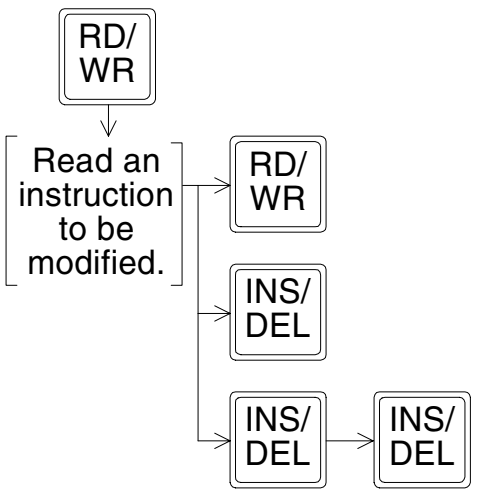
* Press the [GO] key again to search "Y123" from the next step.

- When the program is read by device, only devices X, Y, M, S, T, C, D, V and Z of basic instructions are searched. However, if D is searched, V and Z used after the OUT instruction of timers and counters are not searched.

5. Write

5.1 Outline of write operation

Programs are written to the memory inside the PLC when the online mode is selected, and to the inbuilt HPP RAM when the offline mode is selected.
When the online mode is selected, if a memory cassette (except the EPROM) is attached to the PLC, programs are written to the memory cassette. (When using the EEPROM, set the write-protect switch to OFF.)
Programs can only be written while the PLC is in STOP mode.
New programs can be written, and existing programs can be overwritten for modification.
When writing a new program, input instructions from the step No. 0 in turn. When overwriting an existing program for modification, put the cursor on a position to be modified, then input an instruction.

Item	Key operation for function selection	Description
Writing a new program		Write a new program from step 0.
Overwriting an existing program for modification		Read a program to be modified, and display it in the display unit. Modify or add instructions. Insert instructions. Delete unnecessary portions of the program.

Write operation condition

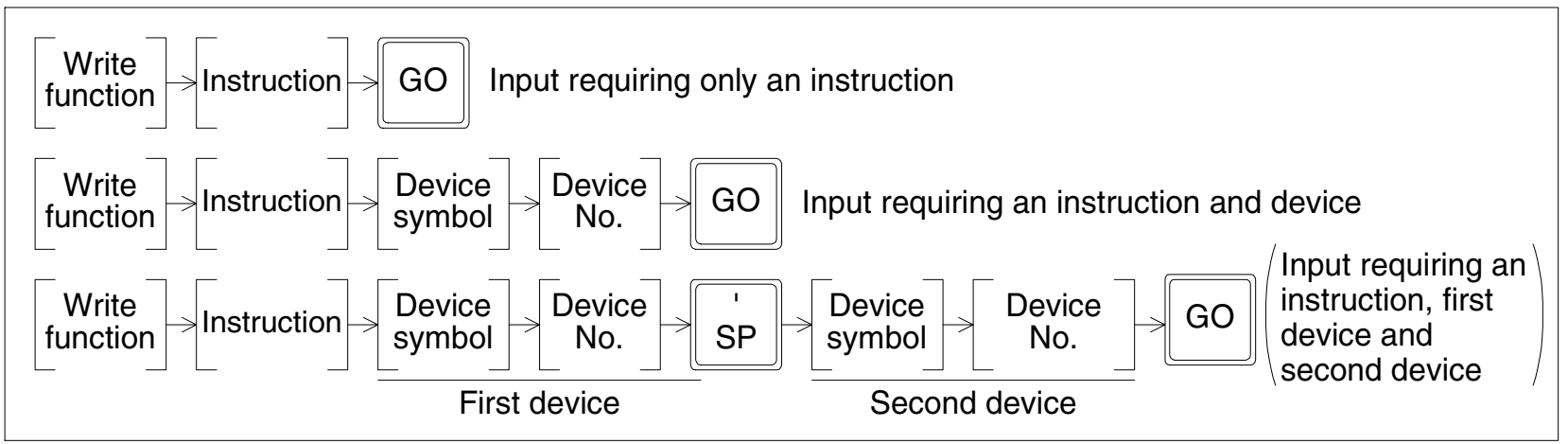
PLC status	RUN:×	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:×

- When using the EEPROM memory cassette, set the write-protect switch to OFF.

5.2 Input of basic instruction

- Basic instructions are classified into those which are input individually such as "ORB" and "MPS", those which are input together with a device such as "LD X000" and "AND M0" and those which are input together with a device (first device) and set value (second device).

Basic operation



Example: Entering the ORB instruction

Display example

In the step 3)

```
W     4   LDI  X 004
      5   AND  X 005
      6   ORB
  ▶   7   NOP
```

Key operation

1) [Write function]
2) [ORB]
3) [GO]

Instruction words are entered individually:

ANB, ORB, MPS, MRD, MPP, RET, END and NOP

Example: Entering "LD X0"

Display example (before determined)

In the step 3)

```
W▶    0   LD   X 000
      1   NOP
      2   NOP
      3   NOP
```

Key operation

1) [Write function]
2) [LD]
3) [X] [0]
4) [GO]

Display example (after determined)

In the step 4)

```
W     0   LD   X 000
  ▶   1   NOP
      2   NOP
      3   NOP
```

Instruction words which are entered together with a device:

LD, LDI, AND, ANI, OR, ORI, SET, PLS, PLF, MCR, STL and OUT (excluding T and C)

- When the MCR instruction is entered, the nesting level symbol "N" is automatically displayed.

- While the HPP is waiting for input of a device symbol or device No., the prompt is displayed at the end of the input position.

Contact instructions other than LD, LDI, AND, ANI, OR an ORI (Ver 4.00 and later)

Instruction	Key operation
LDP	[LD] [P/I]→[Device symbol] [Device No.]→[GO]
LDF	[LD] [F]→[Device symbol] [Device No.]→[GO]
ANDP	[AND] [P/I]→[Device symbol] [Device No.]→[GO]
ANDF	[AND] [F]→[Device symbol] [Device No.]→[GO]
ORP	[OR] [P/I]→[Device symbol] [Device No.]→[GO]
ORF	[OR] [F]→[Device symbol] [Device No.]→[GO]
INV	[NOP] [P/I]→[GO]
Comparison contact instruction	Comparison contact instructions can be entered in the same way as application instructions. Refer to 5.3.

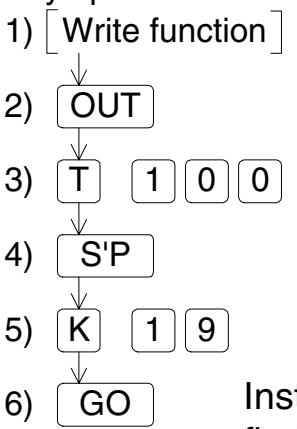
Example: Entering "OUT T100 K19"

Display example

In the step 6)

```
W   100  OUT  M 100
    101  OUT  T 100
              K 19
  ▶ 104  NOP
```

Key operation



Instruction words which are entered together with first device and second device:

MC and OUT (T, C)

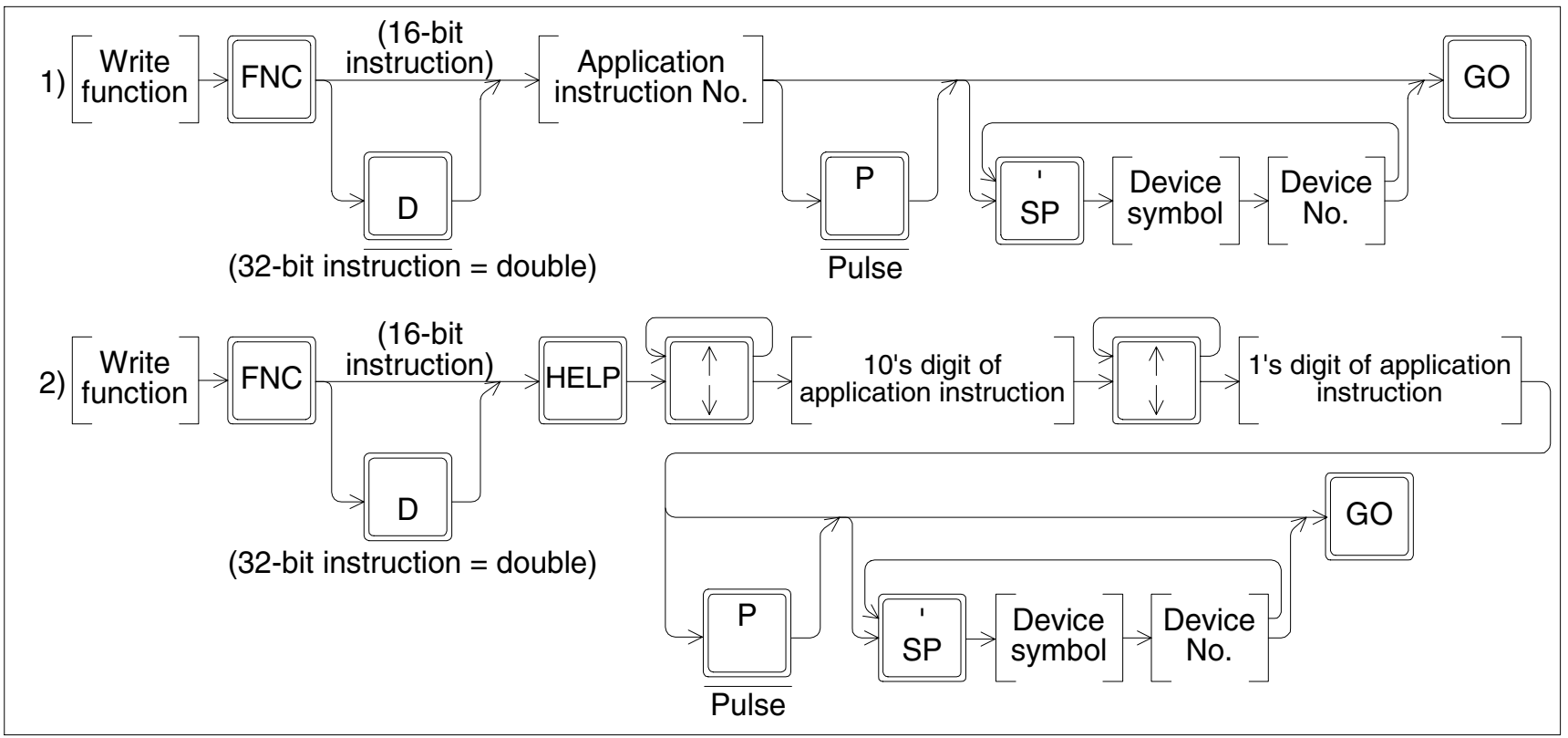
- When the MCR instruction is entered, the nesting level symbol "N" is automatically displayed.

- While the HPP is waiting for input of a device symbol or device No., the prompt is displayed.
- The allowable device No. range varies depending on the PLC model. While a program is entered, the device range is checked.

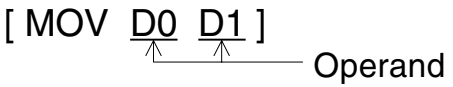
5.3 Write of application instruction

When entering an application instruction, press the [FNC] key first, then input the instruction No. When entering the instruction No., directly input a desired No. or display the instruction symbol list by using the help function, search and find a desired instruction, then input it. If the instruction No. is not clear, use the help function.

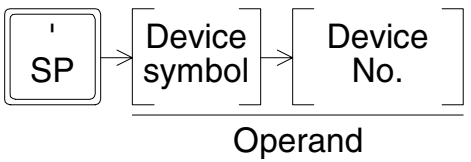
Basic operation



- What is an operand?
  Operands are devices used for operations of instructions.
  For example, in the case of MOV instruction,



  When entering an operand, make sure to input it in the order "[S'P] (operand)".



- Timing to specify the D (double)/P (pulse) instruction Specification of the D/P instruction is valid if it is executed in the same order as the display (operation example 1) or if it is executed after input of the instruction No.
  Either D and P can be specified first or the operator can press the [HELP] key to display the instruction word list, check whether D and P can be specified for the instruction, then specify D and P.
- Restriction in programming when the FX/FX2C Series PLC is used
  When a RAM file register is used as an operand, only the BMOV instruction is available.

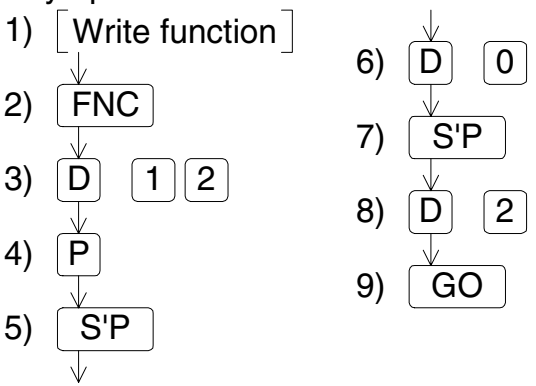
Example: Input by FNC No. (example of "[D]MOV[P] D0 D2")

Display example

In the step 9)

```
W    200  DMOVP
               D     0
               D     2
  ▶  209    NOP
```

Key operation



- Using the ASC instruction, ASCII characters can only be read and not written. For writing ASCII characters, use the software A6GPP/A6PHP.
- An error will occur if an application instruction is not supported in the used PLC.
- Press the [FNC] and [HELP] keys in this order to display classified items of application instructions on screen. These classification items 0 to 24 are set on seven screens, and the screens can be scrolled by the cursor control keys.
- Among the classified items, select a desired item by using the number keys. Input a number in the order "100's digit, 10's digit and 1's digit". When the 10's digit is entered, instructions whose 10's digit is the input number are displayed on the screen.
  Only application instructions valid in the used PLC are displayed in the list.
  Scroll the screens by using the cursor control keys, then entered a number for the 1's digit.
  By the operation above, the application instruction No. is specified.
  Then, input an operand consecutively.

Example: Input from the instruction list offered by the help function (example of "DMOVP D0 D2")

Display example

In the step 3)

```
0 PROGRAM FLOW
1 TRANSFERS, COMP
2 + - × ÷ , LOGICS
3 ROTATION, SHIFT
```

*1

In the step 4)

```
10:CMP          12:MOV
11:ZCP          13:SMOV

                14:CML
```

*2

In the step 11)

```
W    200    DMOVP   12
                D     0
 ▶              D     2
     200       NOP
```

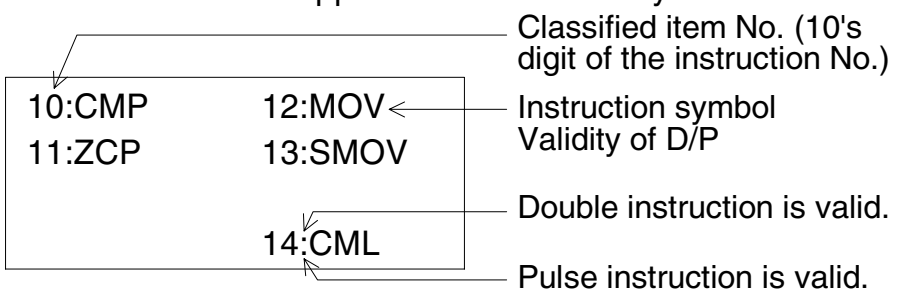
Key operation

1) [Write function]
2) FNC
3) HELP
4) 1
5) 2
6) D
7) P
8) S'P
9) D 0
10) S'P
11) D 2
12) GO

*1 Classified items of application instructions

0 PROGRAM FLOW
1 TRANSFERS, COMP
2 + - × ÷, LOGICS
3 ROTATION, SHIFT
4 DATA OPERATION
5 HIGH SPEED
6 HANDY INSTR.
7 FX I/O DEVICES
8 FX SER DEVICES
9 F2 UNITS

*2 Contents shown in the application instruction symbol list

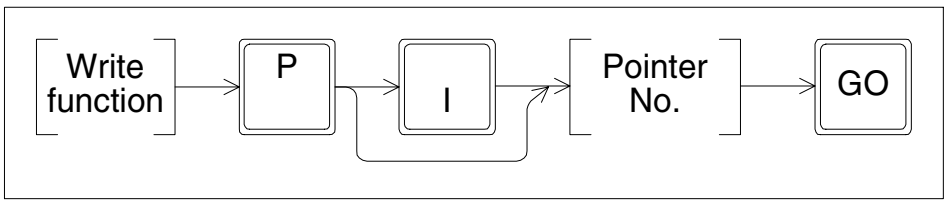


As to points between the classified item No. and the instruction symbol, the upper one indicates validity of D (double) instruction, and the lower one indicates validity of P (pulse) instruction.

5.4 Input of label (P, I)

When using a P (pointer) or I (interrupt pointer) in a sequence program as a label, enter in the same way as instructions.

Basic operation



Example 1: When entering the label No. 3

Display example

In the step 4)

```
W   100          P  3
    101  NOP
    102  NOP
    103  NOP
```

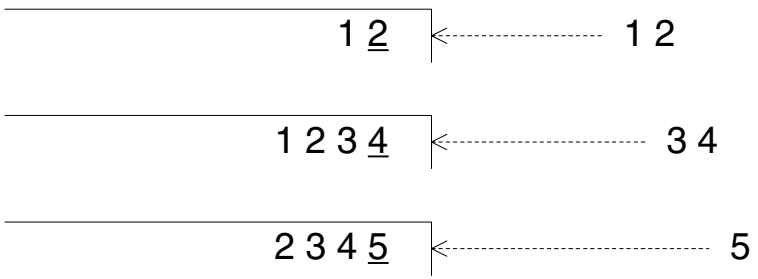
Key operation

1) [Write function]
2) [P]
3) [3]
4) [GO]

5.5 Input of number

- When numbers are entered, each number is shifted to the upper digit in turn in the display. Accordingly, if numbers are input beyond the displayable digits, numbers input so far are deleted from the display screen from the oldest one in turn.
  When the device symbol is X or Y, if an input numeric value is less than 3 digits, "0" is displayed in the higher digits.
- Only numbers displayed on the screen are registered. Check the displayed numbers carefully while inputting a numeric value.

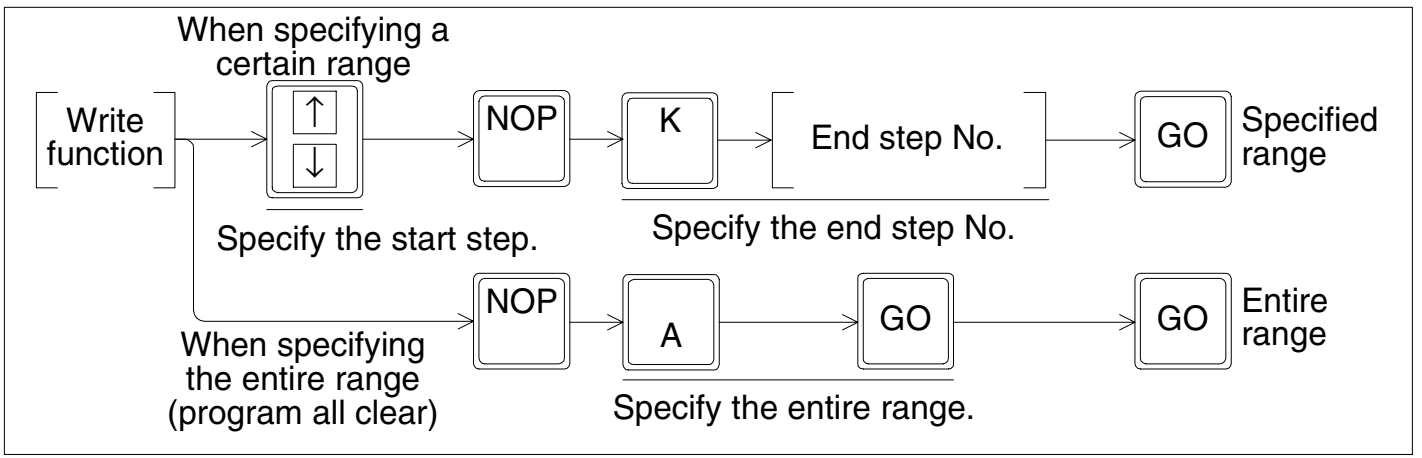
Example 1: When pressing the [1], [2], [3], [4] and [5] keys for input to the four-digit display area



5.6 Batch write of NOP (program all clear)

- Write the NOP (no processing) instruction to a certain or the entire range of program.
  If a program already exists, it is overwritten by the NOP instruction.
  In the PLC, write of the NOP instruction functions as if the program in the specified range is deleted.

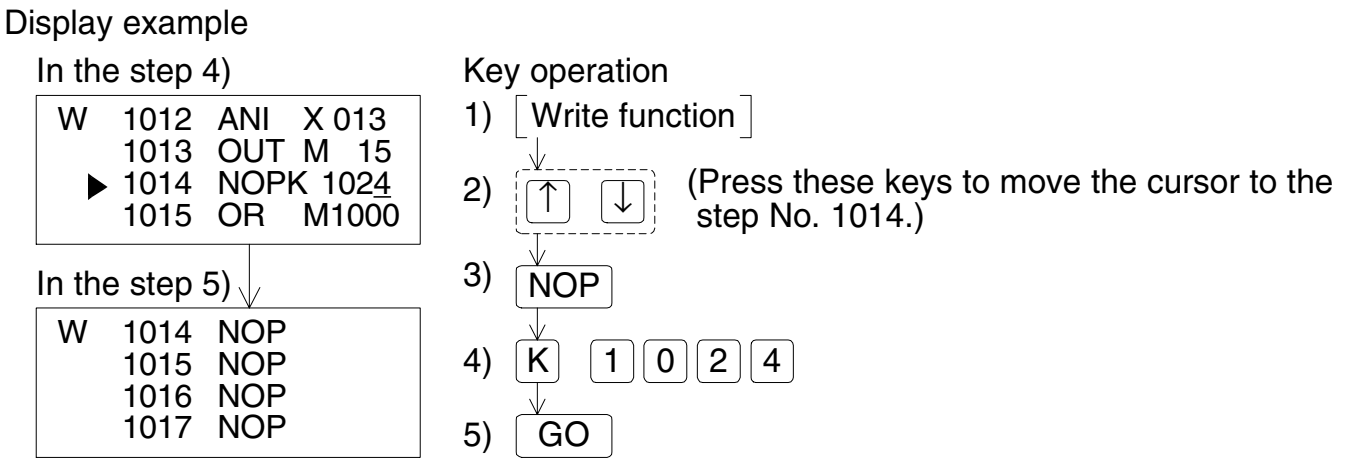
Basic operation



- When executing program all clear, programs and parameters (including the entry code) are deleted (if the entry code has been input and accepted).

5.6.1 Batch write of NOP to specified range

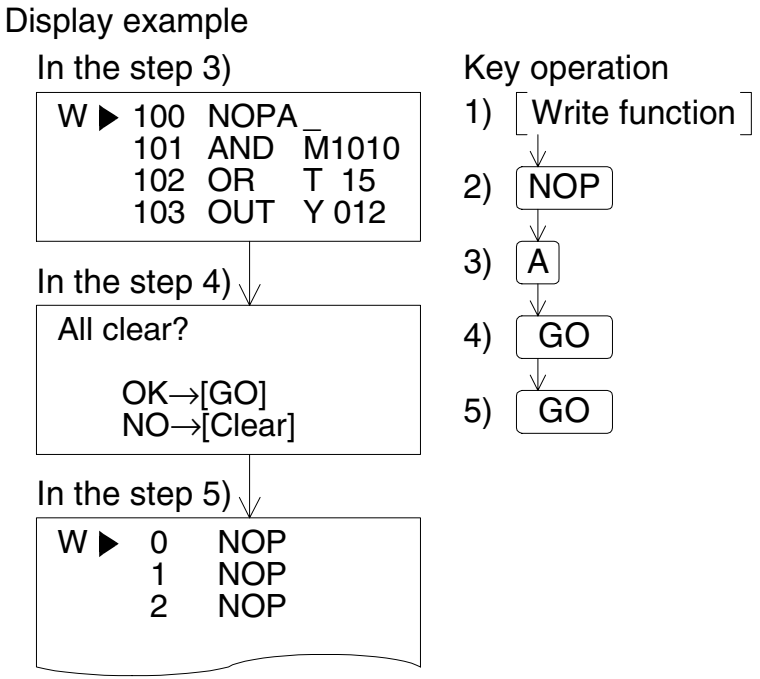
Example: Batch-writing the NOP instruction in the range from the step No. 1014 to the step No. 1024



- Move the cursor to the start step from which the NOP instruction is to be written. At this time, write is disabled in lines without the step No.
- If a specified end step No. is a jump No., the end of the instruction is registered as the end step.

5.6.2 Write NOP to entire range (program all clear)

Example: Entire range



- After the write function is set, consecutively press the [NOP] and [A] keys. At this time, the cursor position has nothing to do with the write range.
- When the [GO] key is pressed, the message for confirming all clear is displayed.
  Press the [GO] key in accordance with the message to execute batch write of NOP to the entire range (program all clear).
  When execution is completed, the cursor moves to the step No. 0.

IMPORTANT

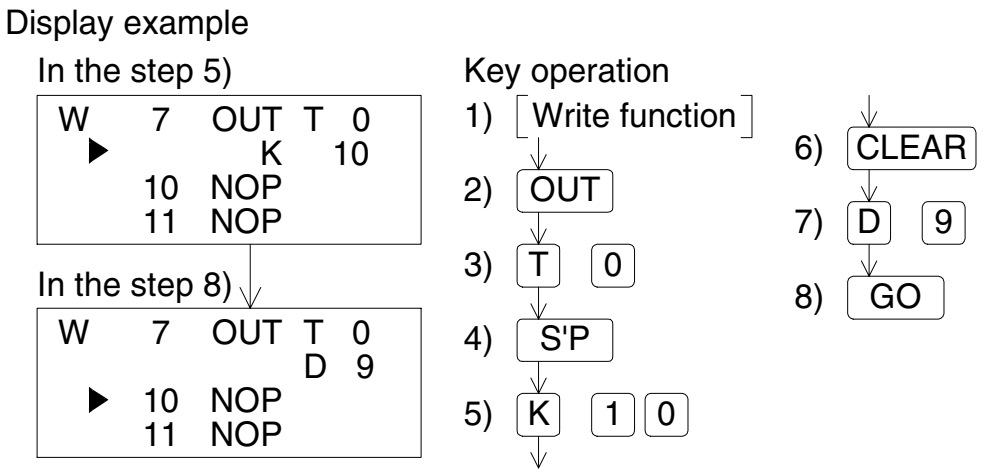
As soon as batch write of the NOP instruction to the entire range is completed, parameter values before execution are returned to the default values, and the latch is cleared. Accordingly, the comment area becomes 0 block, and the file register becomes 0 block also. (The memory capacity becomes the default value (2k or 8k steps) in accordance with the PLC model.) However, in the online mode while a memory cassette is attached, the situation is determined by the memory cassette capacity. And the entry code is deleted (if the entry code has been input and accepted).

- The following devices can be backed up (latched) against power failure in the FX Series PLC.
  1) M (Auxiliary relays)
  2) S (States)
  3) T (Timers)
  4) C (16-bit counters)
  5) C (32-bit counters)
  6) D (Data registers)
  7) D (File registers)

5.7 Modification method (before/after determination)

A input program can be modified before determination (before the [GO] key is pressed) or after determination (after the [GO] key is pressed.)
Before determination, press the [CLEAR] key, then enter the correct contents again from an instruction. After determination, move the cursor to a line to be modified, then enter the correct contents.

Example 1: Modifying "K10" to "D9" in the "OUT T0 K10" instruction (before determination)



- Press the [CLEAR] key once to cancel the second device.
- Press the [CLEAR] key twice to modify the contents from the step No. 7.

Example 2: Modifying "K10" to "D9" in the "OUT T0 K10" instruction (after determination)

Display example

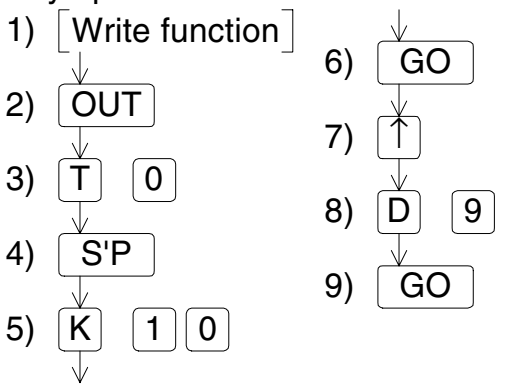
In the step 6)

```
W     7   OUT  T  0
                 K 10
  ▶   10  NOP
      11  NOP
```

In the step 9)

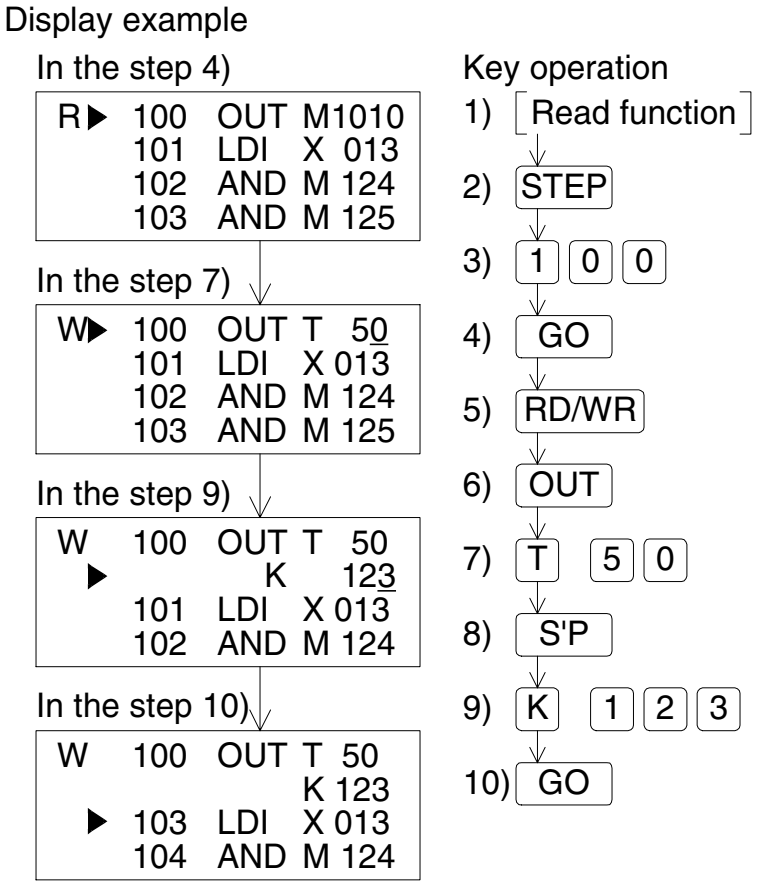
```
W     7   OUT  T  0
                 D  9
  ▶   10  NOP
      11  NOP
```

Key operation



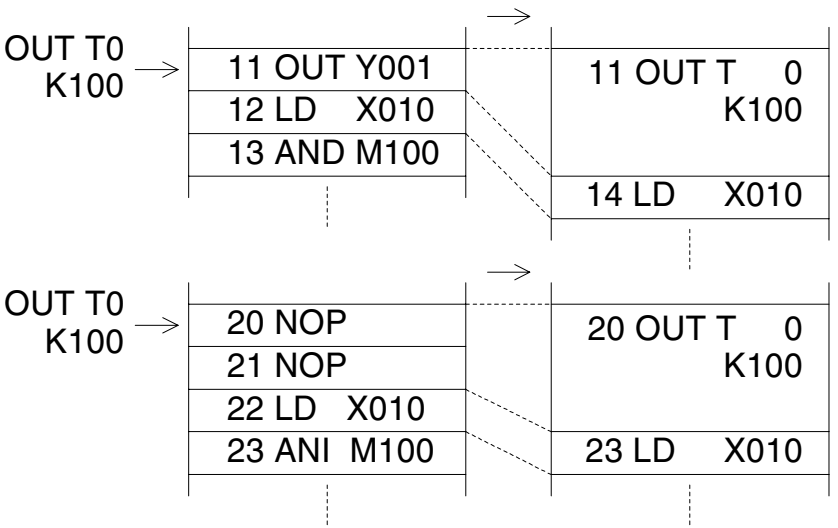
Reading a program, then overwriting a specified step in the unit of instruction

Example: Overwriting the OUT instruction in the step No. 100 with "T50" and "K123"



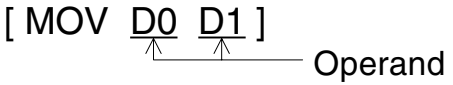
- Set values of timers and counters that can be changed by using the monitor function. (Refer to 2.9.)
- When consecutively overwriting an instruction or pointer near the currently read program, directly move the line cursor to a position to be overwritten.

- Handling of the step No. during overwriting
  If the number of instruction or pointer steps is different between before overwriting and after overwriting, perform the following processing and overwrite the step No. also.
  In the case of NOP, overwrite only NOP.

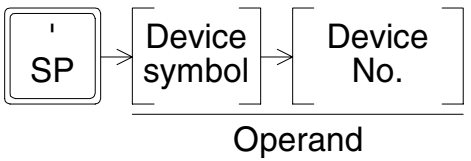


Modification example of instruction accompanied by an operand

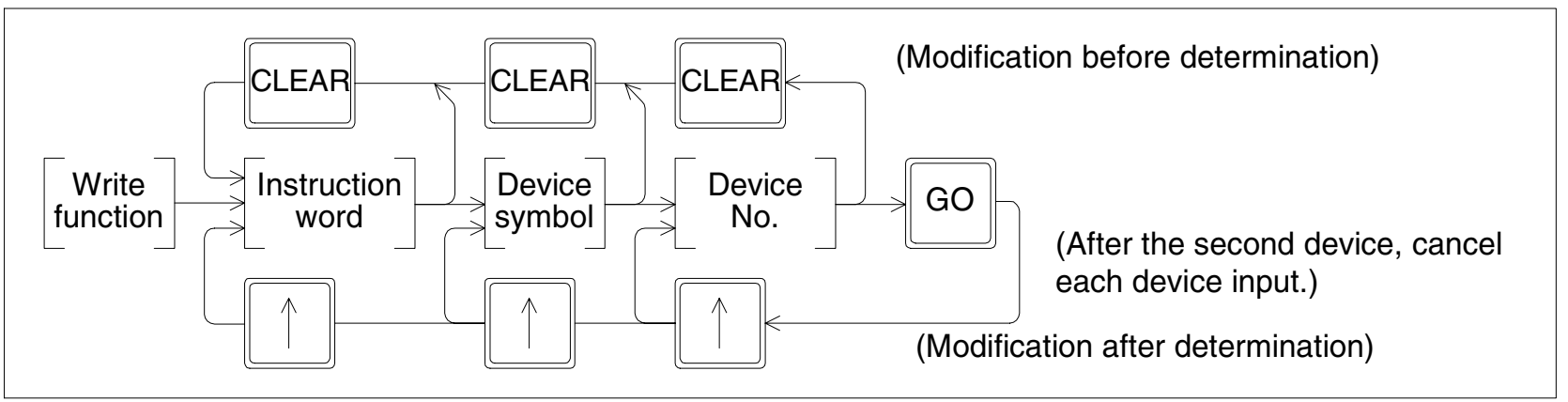
- What is an operand?
  Operands are devices used for operations of instructions.
  For example, in the case of MOV instruction,



When inputting an operand, make sure to input it in the order "[S'P] (operand)".

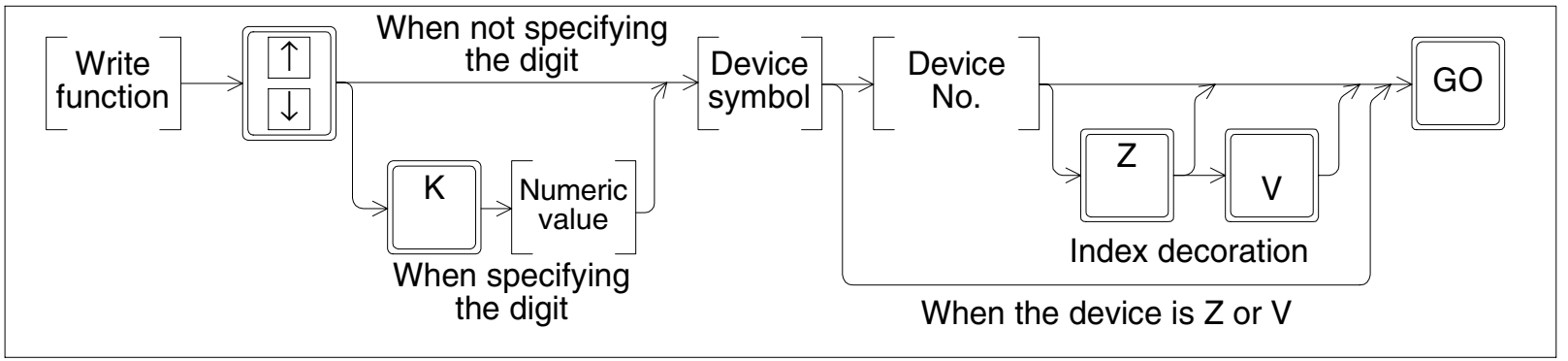


Basic operation



5.8 Modification of device

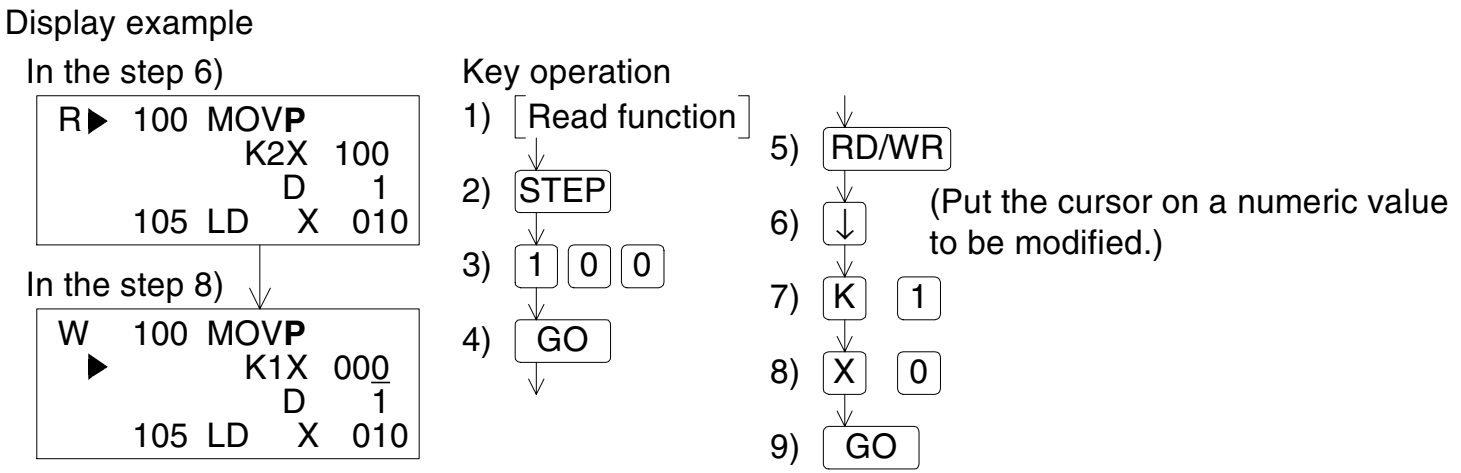
Basic operation



- One to eight digits can be specified.
  One digit uses 4 bits, and 8 digits use 32 bits.
- "Z" and "V" indicate index registers.
  An index register is added to a device to decorate the device No.

Overwriting only a specified instruction device

Example: Modifying the device K2 (digit specification) in the MOVP instruction in the step No. 100 from "X100" to "K1X0"



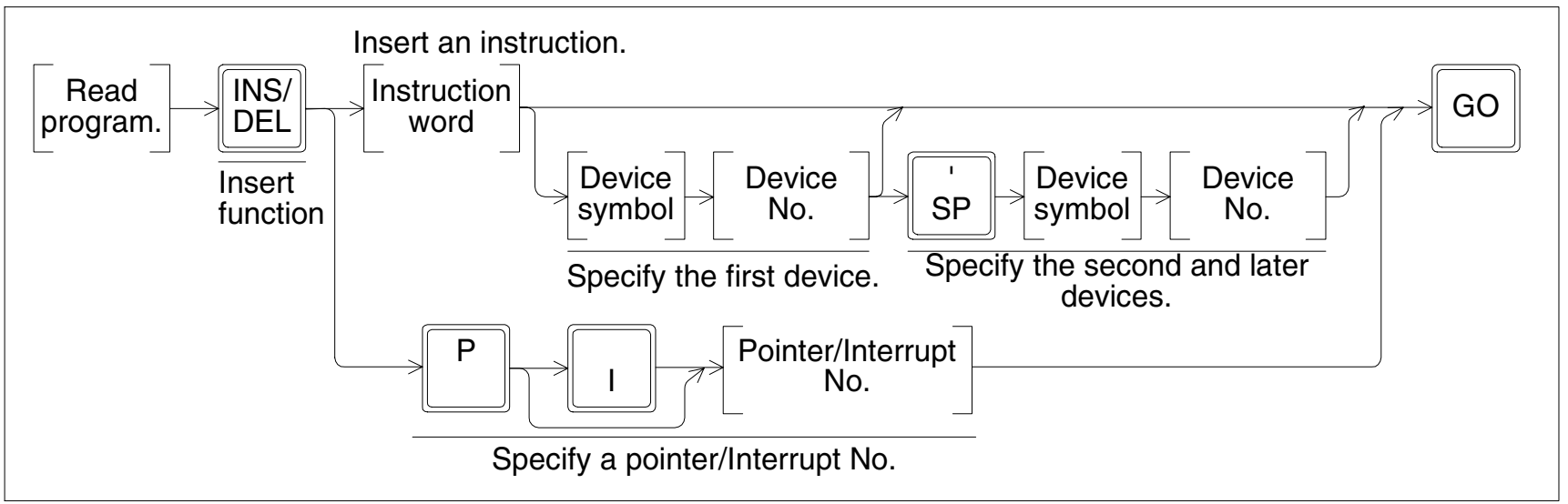
- Only lines without the step No. can be modified.
  (If a line with the step No. is to be modified, write it by instruction.)
- When specifying the digit, press the [K] key first, then input a numeric value.

6. Program Insert Operation

6.1 Outline of insert operation

Read a program, and insert an instruction or pointer in a specified position.
An instruction or pointer is inserted in a position above the step specified by the cursor. (Lines not displaying the step No. cannot be specified.)
After the inserted position, each step No. is automatically carried up. (The display is shifted down.)
When inserting an instruction or pointer near the currently read program, directly move the line cursor to a desired position.

Basic operation



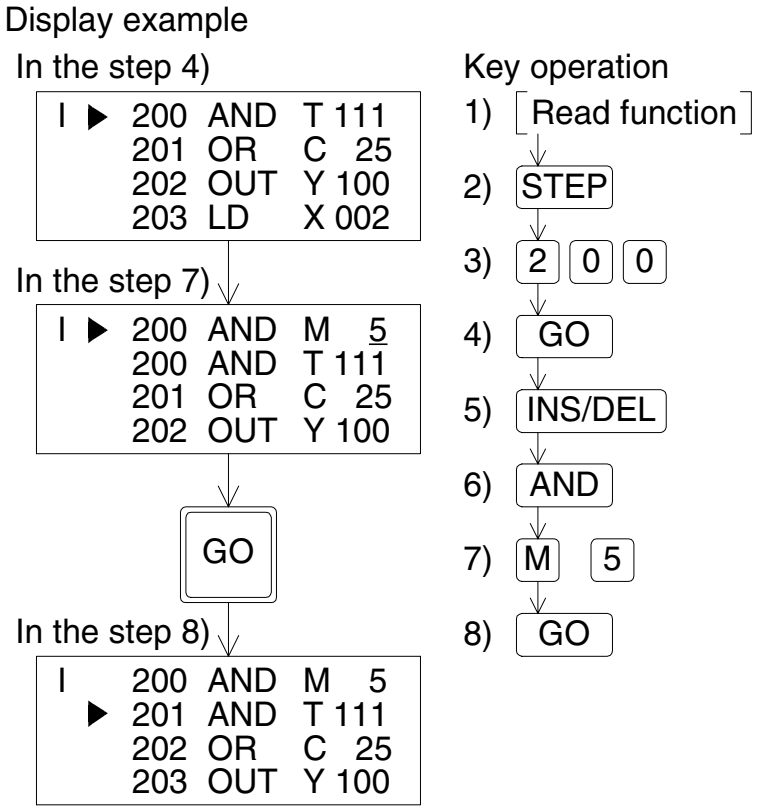
- Cautions on inserting an instruction
  If an instruction is inserted while the program memory is full and has no free space, an error message is displayed and insert is not executed.

Insert operation condition

PLC status	RUN:×	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:×

- While the PLC is in the RUN status or while the EPROM cassette is attached, the insertion operation is disabled (in the online mode.)

Example: Inserting the AND instruction M5 before the step No. 200



7. Program Delete Operation

7.1 Outline of delete operation

Read a program, and delete an instruction, pointer or NOP.

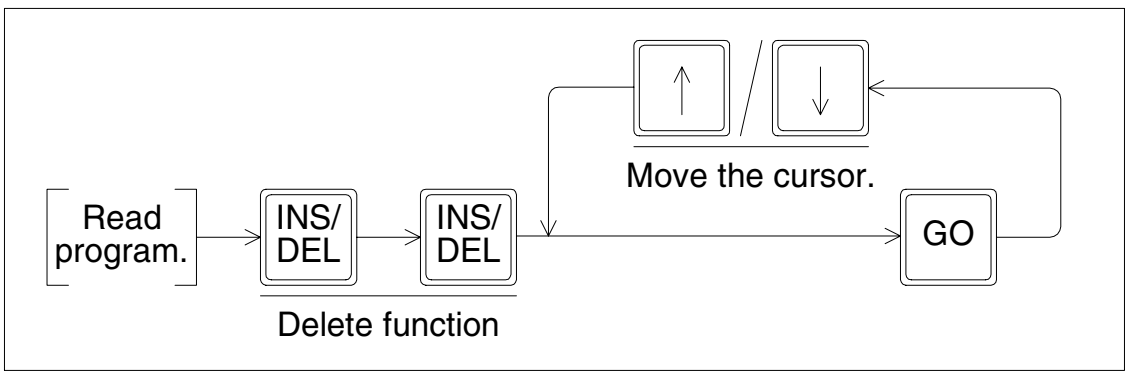
Delete operation condition

PLC status	RUN:×	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:×

- While the PLC is in the RUN status or while the EPROM cassette is attached, the delete operation is disabled.

7.2 Delete of instruction and pointer

Basic operation



- By the operation above, the instruction in the cursor position is deleted.
  As to instructions which use two or more lines such as set values of timers and counters and operands of application instructions, when the instruction part, set value or operand is deleted, all lines are deleted at a time.
- After the deleted position, each step No. is automatically carried down. (The display is shifted up.)

Example: Deleting "AND M10" in the step No. 100

Display example

In the step 6)

```
D▶ 100  AND   M 10
   101  ANI   M 11
   102  OR    M 12
   103  OUT   Y  0
```

In the step 7)

```
D▶ 100  ANI   M 11
   101  OR    M 12
   102  OUT   Y  0
   103  LD    M 20
```

Key operation

1) [Read function]
2) STEP
3) 1 0 0
4) GO
5) INS/DEL
6) INS/DEL

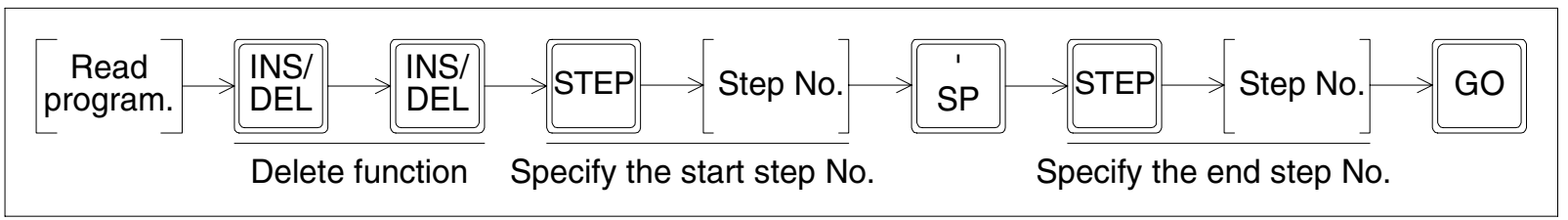
} Select the delete function.

7) GO

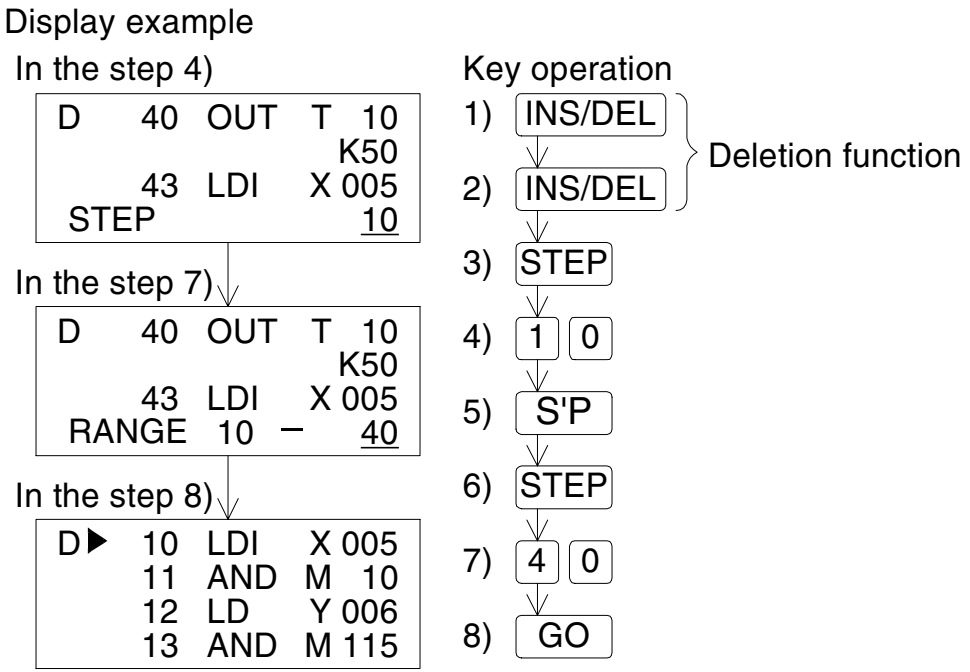
7.3 Batch delete of program by specifying range to be deleted

- The range of the program specified by step Nos. is deleted.
- If an instruction in the specified start step No. uses two or more lines, the head of the instruction is regarded as the start step. If an instruction in the specified end step No. uses two or more lines, the end of the instruction is regarded as the end step.
  (In the example below, the end step No. is regarded as "42", not "40".)
- On the screen after the specified range is deleted, deleted steps are eliminated, and the program is displayed from the deleted start step.

Basic operation

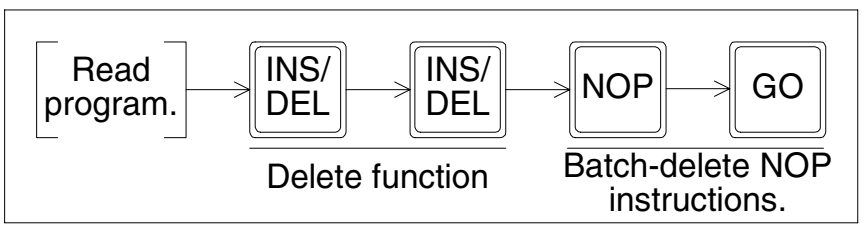


Example: Deleting the range from the step No. 10 to the step No. 40



7.4 Batch delete of NOP instructions

Basic operation



- All NOP instructions existing from step No. 0 to the final instruction (except the NOP instruction) are deleted at a time. After batch delete of NOP instructions, each step No. is automatically carried down. (The display is shifted up.)

8. Monitor

8.1 Outline of monitor operation

Display the PLC operation status on the HPP. (The monitor operation is available even while the PLC is in the STOP status.)
The monitor operation is valid only while the online mode is selected.
(If the offline mode is selected when the HPP started up, it can be changed over to the online mode by using the others function.)

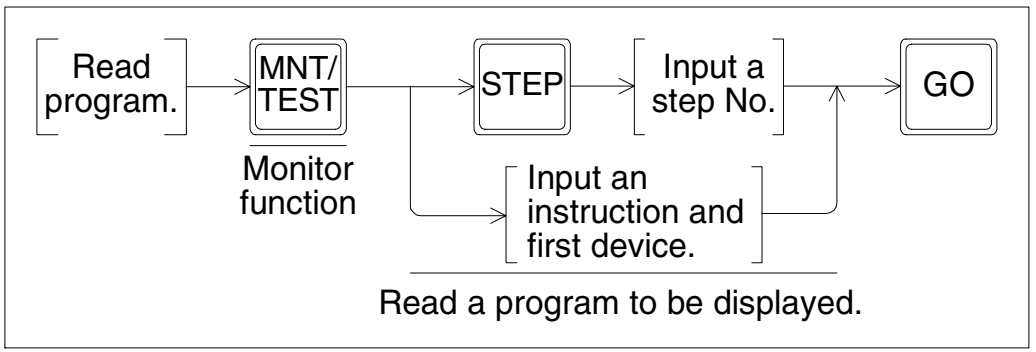
Monitor operation condition

PLC status	RUN:✓	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:✓	EPROM cassette:✓

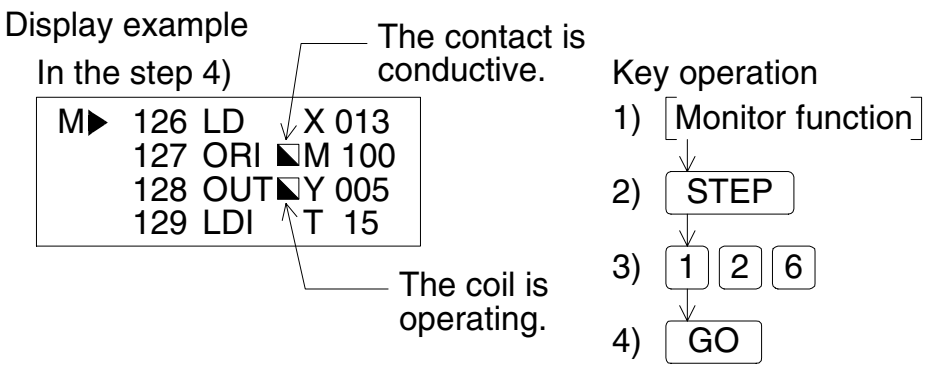
8.2 List program monitor

- In the list program monitor, the list program is displayed and the status of contacts and coil driving are indicated.
- In conductive contacts and operating coils, "■" is added after the instruction.

Basic operation



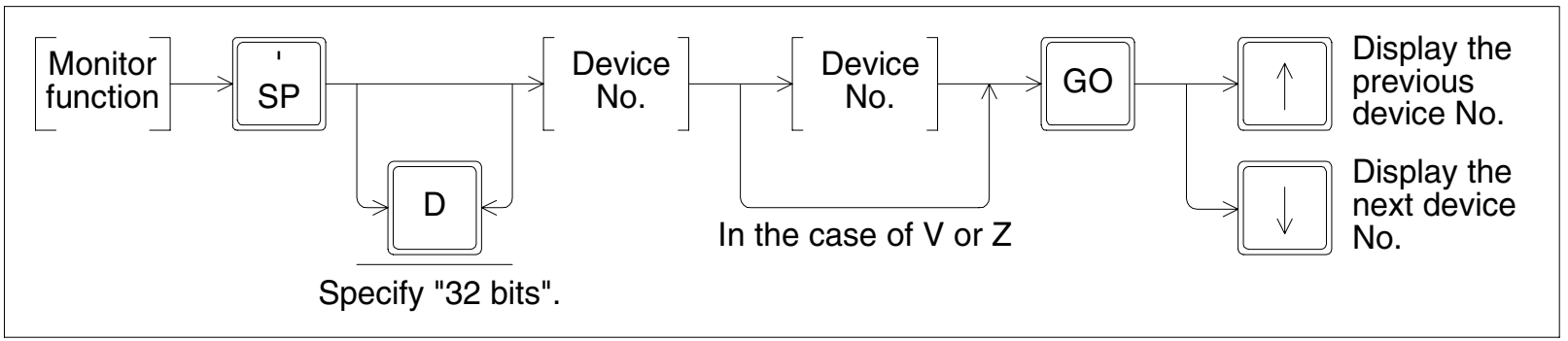
Example: Monitoring step No. 126



8.3 Device monitor

- Specify and display a device to be monitored.
- As to bit devices (X, Y, M and S), the ON/OFF status is displayed. As to timers (T) and counters (C), the present value and the set value are displayed.
  As to data registers (D) and index registers (V and Z), the present value is displayed.
- In the display of word devices (T, C, D, V and Z), press the [help] key to change over the format between decimal and hexadecimal.

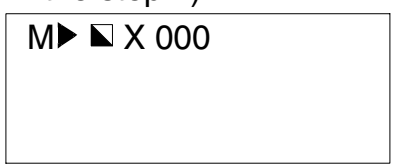
Basic operation



Example: Monitoring device X000

Display example

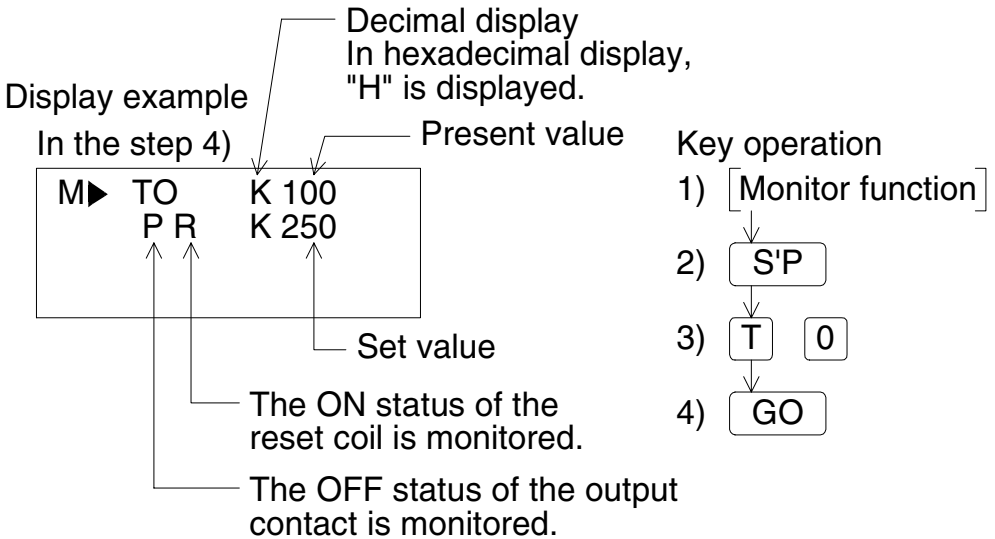
In the step 4)



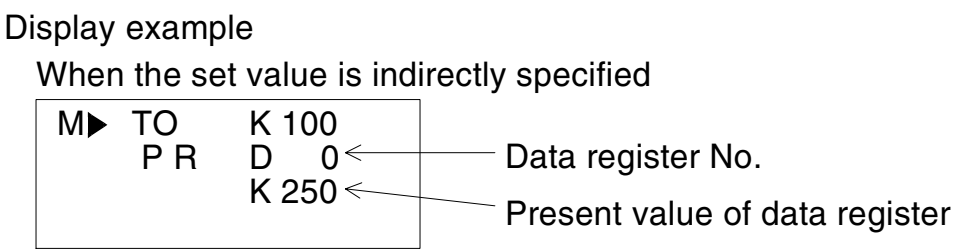
Key operation

1) [Monitor function]
2) [S'P]
3) [X] [0]
4) [GO]

Example: Monitoring device T0



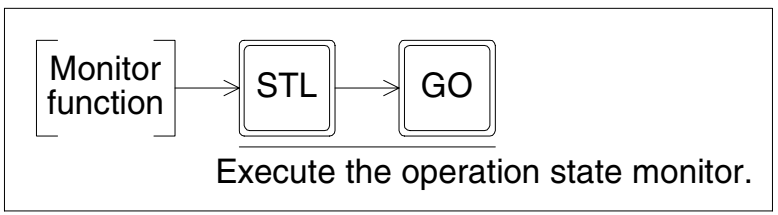
- When the set value is indirectly specified through a data register (D), the data register No. and the present value of the data register are displayed as the set value.



8.4 Operation state monitor

- While a step ladder type program is running in the PLC, up to eight operating states are displayed.
- As the state changes, displayed No's. automatically proceed to indicate the operation process of the machine.
- Only the state in the range from S0 to S899 can be monitored. S900 and later (for annunciators) are ignored.
- Before executing the operation state monitor, set M8047 (STL monitor valid) to ON in the PLC.

Basic operation



Display example

Operation state monitor

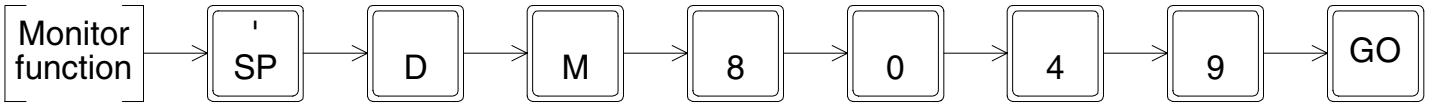
```
M   ACTIVE STATE
      S 30   S 41   S 52
      S 63   S 73   S 82
      S 91   S 104
```

When M8047 (STL monitor valid) is OFF

```
M   ACTIVE STATE


M8047 IS NOT ON
```

Monitoring annunciators



If M8049 is set to ON, the smallest No. of operating ones among S900 to S999 can be monitored by the operation above.

9. Test



Caution on operation

Thoroughly read the manual and sufficiently assure safety before executing the operation to forcibly set devices to ON/OFF or the operation to change present values and set values of word devices in the test mode.
Otherwise, the machine may be damaged and accidents may occur by erroneous operations.

9.1 Outline of test function

In the test mode, devices in the PLC can be forcibly set to ON/OFF, present values of word devices (T, C, D, Z and V) in the PLC can be changed, and set values of timers (T) and counters (C) in the PLC can be changed from the HPP.
Perform the device monitor operation to display devices in the PLC to be changed.

Test operation condition

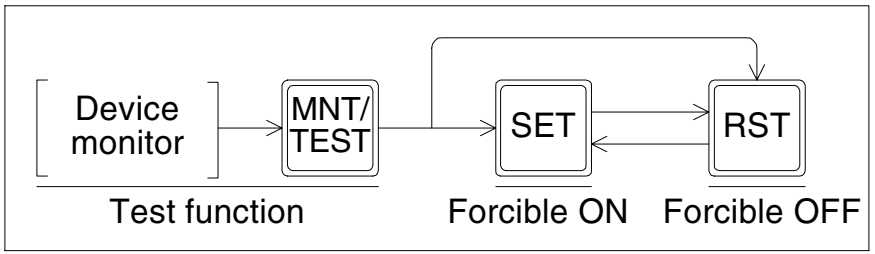
PLC status	RUN:✓	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:△

- While the EPROM is attached to the PLC, set values of timers and counters cannot be changed.
  While the EEPROM is attached to the PLC and the PLC is in the RUN status, set values of timers and counters cannot be changed.

9.2 Forcible setting of devices to ON/OFF

- From the HPP, forcibly set devices in the PLC to ON or OFF.
- The forcible ON/OFF operation is valid for input relays (X), output relays (Y), auxiliary relays (M), states (S), timers (T) and counters (C).
- The forcible ON/OFF operation sets ON or OFF for devices only in one operation cycle. While the PLC is in the RUN status, the forcible ON/OFF operation is actually valid to the present value clearing circuit for timers (T), counters (C), data registers (D) and index registers (Z and V), the set/reset circuit and the self-holding circuit. (The timer forcible ON operation is valid only while a timer is driven by a program.)
- While the PLC is in the STOP status or if the execution target device is not used in the program, the result of the forcible ON/OFF operation is kept as it is. However, because input refresh is executed to input relays (X) even if the PLC is in the STOP status, the result of the forcible ON/OFF operation is not kept for input relays (X). (The result is updated to the input terminal status.)
- Present values of file registers can be cleared only while the program memory in the PLC is RAM or EEPROM (with the write-protect switch set to OFF).

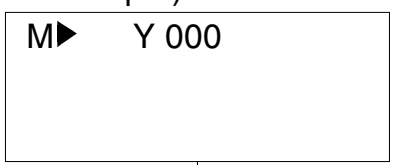
Basic operation



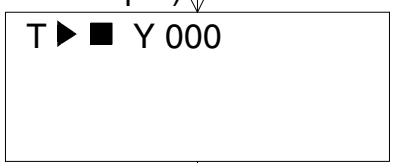
Example: Forcibly setting the Y000 to ON/OFF

Display example

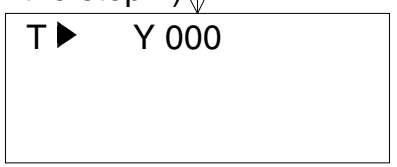
In the step 1)



In the step 3)



In the step 4)



Key operation

1) Device monitor of the Y000

2) MNT/TEST

3) SET Forcible ON

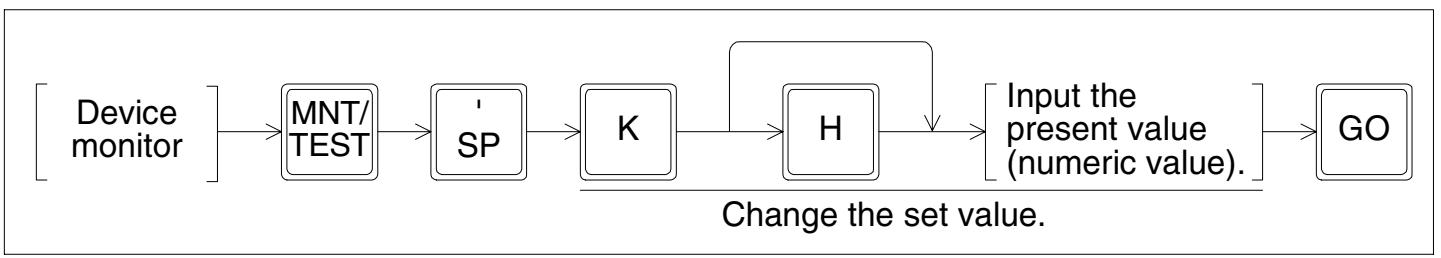
4) RST Forcible OFF

- Set the PLC to the STOP status, then forcibly set output relays (Y) to ON/OFF to check the output wiring.

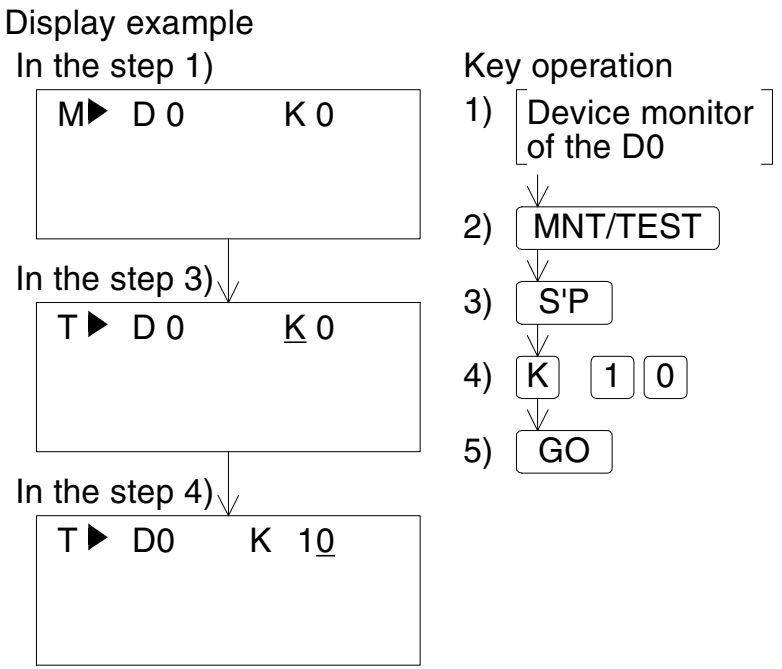
9.3 Change of present value of word device (T, C, D, Z, V)

- From the HPP, change present values of word devices (T, C, D, Z and V) in the PLC.
- Input present values in the decimal or hexadecimal format.
- Use this present value change function to write data to file registers in the PLC.
  While the PLC is in the RUN status, this function is valid for the RAM in the PLC. While the PLC is in the STOP status, this function is valid for the RAM or the EEPROM (with the write-protect switch set to OFF) in the PLC.
  In devices other than file registers, that is, in data registers (D), timers (T), counters (C) and index registers (Z and V), present values can be changed without regard to the PLC status (RUN or STOP) and the program memory type.

Basic operation



Example:Changing the present value of the D0
Changing the present value of the D0 from "K0" to "K10"

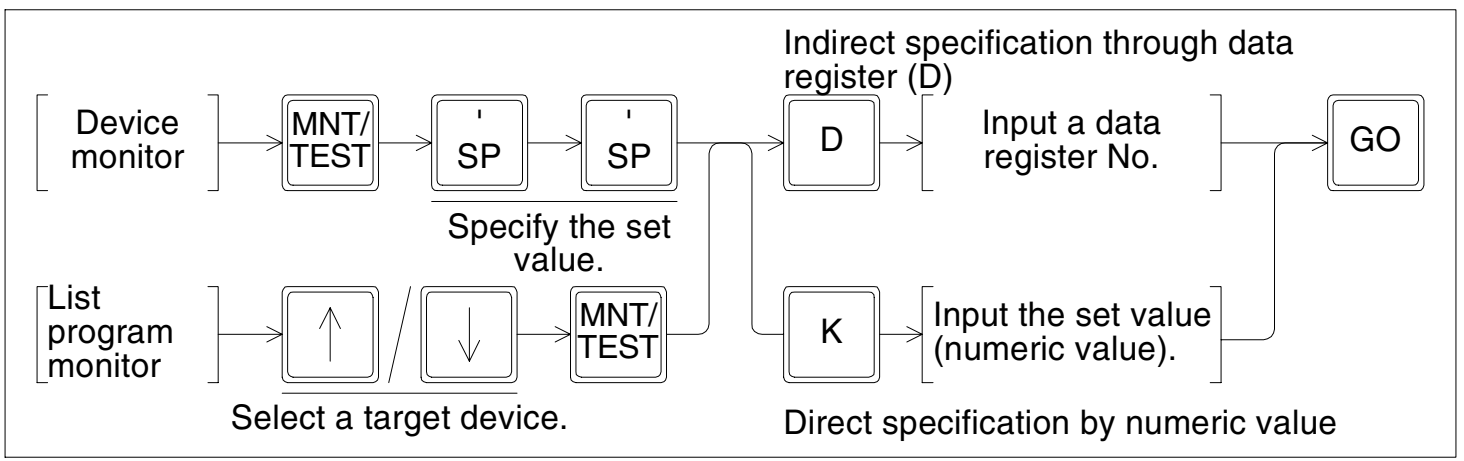


- When changing the present value of 32-bit data, execute the device monitor operation for 32-bit data (described in 8.3) in the step 1). The operation after that is equivalent to that for 16-bit data.

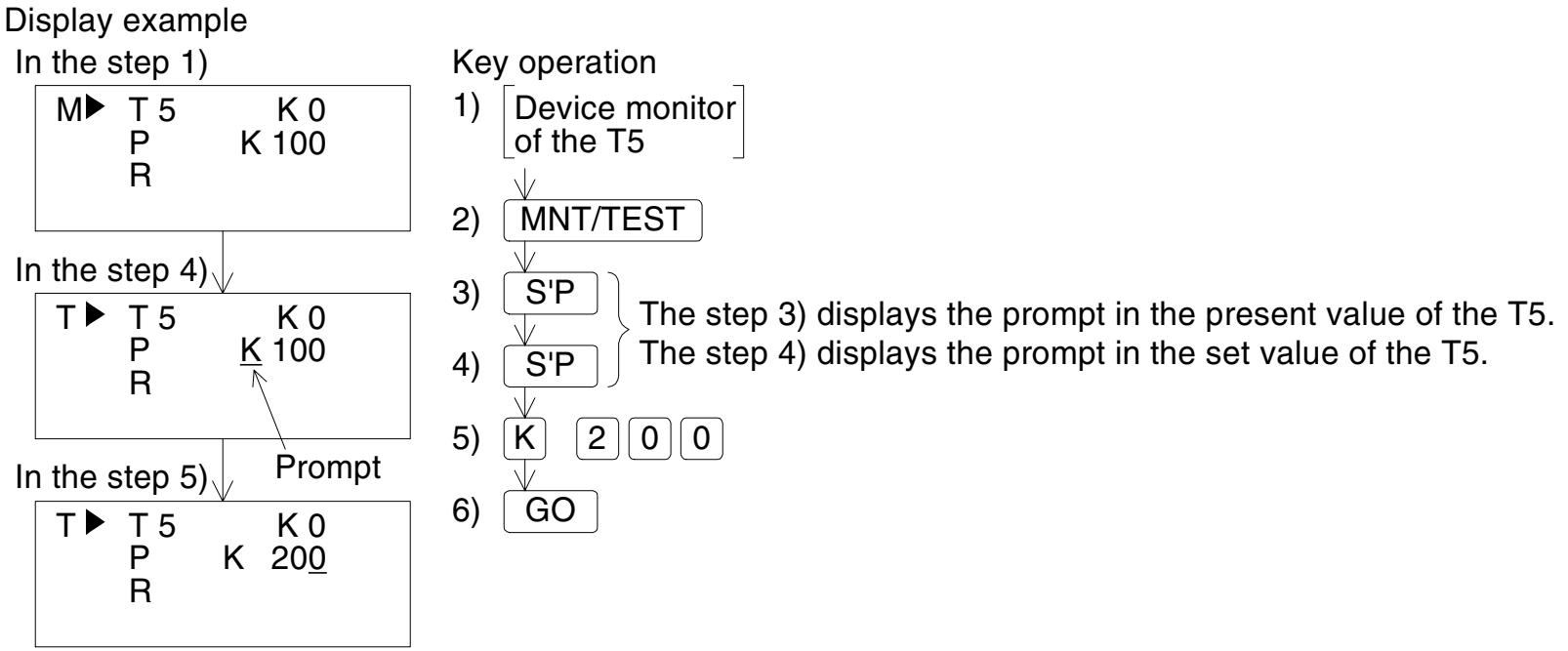
9.4 Change set value of timer (T) and counter (C)

- From the HPP, change set values of timers (T) and counters (C) existing in programs in the PLC.
- While the PLC is in the RUN status, set values can be changed if the program memory is the RAM. While the PLC is in the STOP status, set values can be changed if the program memory is the RAM or the EEPROM (with the write-protect switch set to OFF).
- Set values can be changed in two methods: the method to change over the device monitor to the test mode and the method to change over the list program monitor to the test mode.
  If the set value is changed by changing over the device monitor to the test mode for the CJ instruction which uses two or more timers (T) or counters (C) having same No. in the step ladder program, the timer (T) or the counter (C) nearest the step No. 0 in the program is automatically regarded as the target. When changing the set value of a timer (T) or counter (C) having same No., select a desired timer (T) or counter (C) in the list program monitor, then change its set value.

Basic operation



Example:Changing the set value from the device monitor
Changing the set value of the T5 from "K100" to "K200"



- If the set value of a timer (T) is indirectly specified through a data register, the data register (D) No. can be changed by the operation above.
  When changing the present value of a data register (D) which indicates the actual set time, execute the present value change operation. (Refer to 9.3.)

Example:Changing the set value from the list program monitor
Changing the set value of "OUT C0" in the step No. 15 from "K10" to "D20"

Display example

In the step 1)

```
M▶  15   OUT  C  0
              K10
    18   LD   M  0
    19   AND  M  1
```

In the step 2)

```
M   15   OUT  C  0
 ▶            K10
    18   LD   M  0
    19   AND  M  1
```

In the step 4)

```
T   15   OUT  C  0
              D 20
 ▶  18   LD   M  0
    19   AND  M  1
```

Key operation

1) Display the step No. 15 by the list program monitor.

2) [↓] Move the line cursor to the line of the set value.

3) [MNT/TEST]

4) [D] [2] [0]

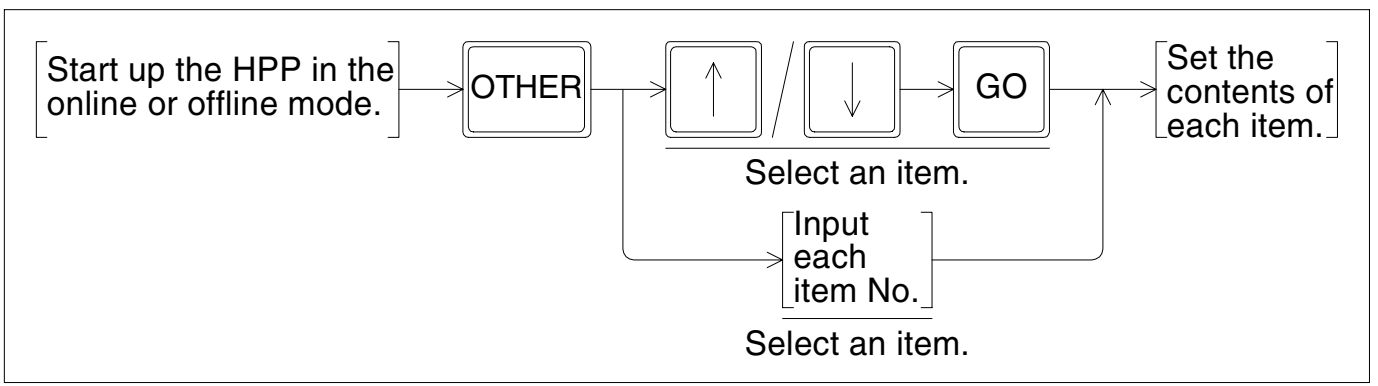
5) [GO]

10. Others Function

10.1 Outline of others function

- In the others function, "ONLINE/OFFLINE MODE", "PROGRAM CHECK", "DATA TRANFER/ HPP↔FX", "PARAMETER", "XYM.. NO.CONV.", "BUZZER LEVEL", "LATCH CLEAR" and "MODULE" can be set.
- In each setting, set items and setting contents vary depending on the mode (online or offline). (The HPP automatically changes the displayed contents.)
  While the online mode is selected, "PROGRAM CHECK", "PARAMETER" and "XYM.. NO.CONV." are executed to the program memory in the PLC (memory cassette if it is used). While the offline mode is selected, they are executed to the inbuilt HPP RAM.
- Even while a program operation is being executed, pressing the [OTHER] key displays the others mode menu screen. And even while the others function operation is being executed, pressing a function key starts another function operation assigned to the pressed function key.

Basic operation



10.2 Changeover of mode

- Change over the mode between online and offline.
- In the HPP, "ONLINE MODE" or "OFFLINE MODE" is displayed in accordance with the current mode.

Mode changeover condition

PLC status	RUN:✓	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:✓	EPROM cassette:✓

Example: Changing over from the online mode to the offline mode

Display example

In the step 2)

```
  ONLINE MODE      FX
■ 1.OFFLINE MODE
  2.PROGRAM CHECK
  3.DATA TRANSFER
```

In the step 3)

```
  1.OFFLINE MODE
      EXECUTE?
        OK→[GO]
        NO→[CLEAR]
```

In the step 5)

```
    SELECT PC TYPE
    FX,FX0
■   FX2N,FX1N,FX1S
```

Key operation

1) Start up the HPP in the online mode.
2) OTHER
3) I
4) GO
5) ↑ / ↓
6) GO

· Select "OFFLINE MODE". Or put the cursor on "OFFLINE MODE", then press the [GO] key.

· Select the PLC model.

- When changing over from the offline mode to the online mode, the step 5) above is not required (because the HPP automatically identifies the correct PLC model).

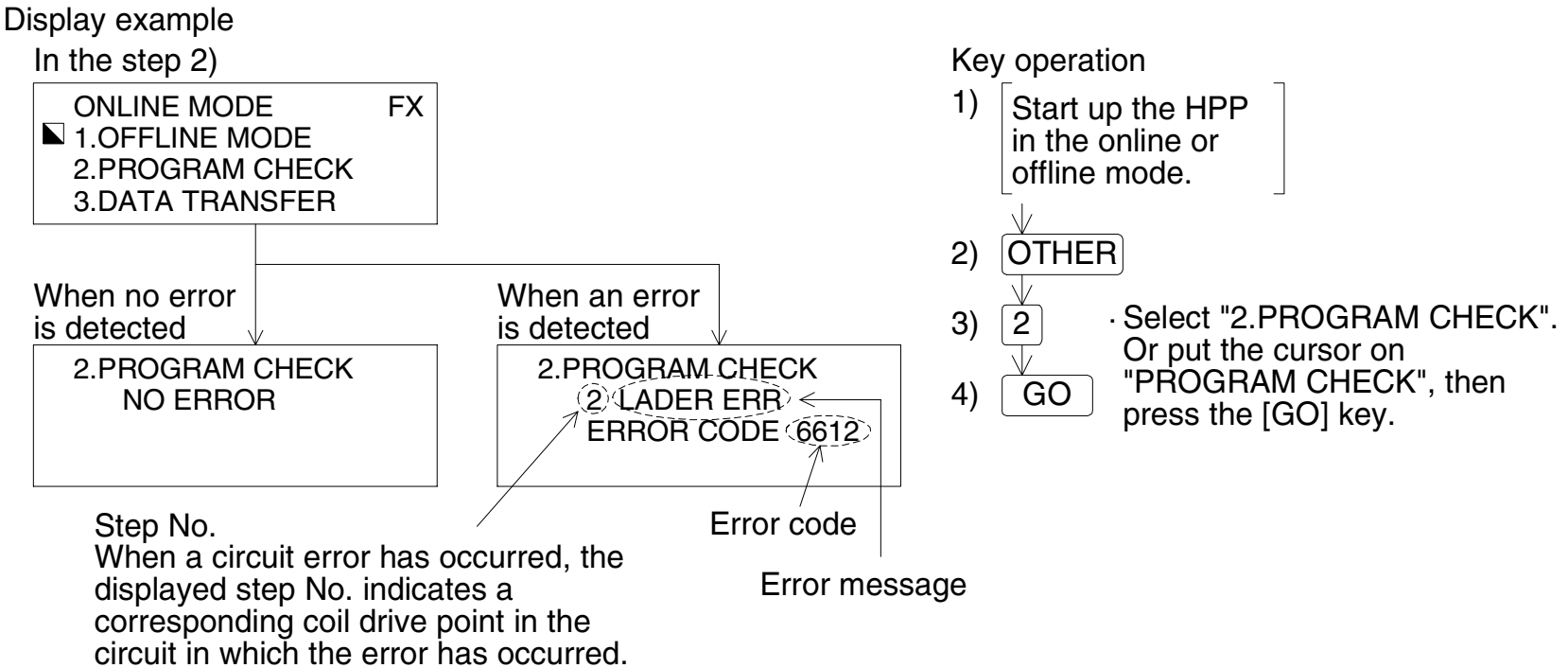
10.3 Program check

- In the online mode, programs are saved in the PLC (memory cassette if used) are checked. Alternatively in the offline mode, programs saved in the inbuilt HPP RAM are checked.
- Program check in the online mode, "I/O ERROR", "PC H/W ERR", "LINK ERROR", "PARA. ERROR", "GRAMMAR ERROR", "LADDER ERROR" and "RUN TIME ERROR" are checked. Program check in the offline mode, "PARA. ERROR", "GRAMMAR ERROR" and "LADDER ERROR" are checked. (The double coil check is not executed.)
- An error message and code is displayed if such error in a particular step No. occurs and is detected. If two or more errors have occurred, eliminate the cause of an error, then execute the program check again to display the next error. (Forcibly reset the special auxiliary relay M8068 and the special data register D8068 using the test function.)

Program check condition

PLC status	RUN:✓	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:✓	EPROM cassette:✓

Example: Program check operation



- Press the [CLEAR] or the [OTHER] key to return to the normal display.

10.4 Transfer between memory cassette, HPP and FX Series PLC

- In the online mode, transferring between the memory cassette and inbuilt PLC memory is executed. In the offline mode, transferring between the HPP and FX Series PLC is executed. (The HPP automatically identifies the online/offline mode and the memory cassette type, then displays them.)
- In the transfer between the memory cassette, programs and parameters are collated between the inbuilt PLC memory and the memory cassette attached to the PLC. In the transfer between FX Series PLC, programs and parameters are collated between the inbuilt HPP RAM and the inbuilt PLC memory or the memory cassette attached to the PLC.
- By using each transfer function, after creating or changing a program in the RAM whose write time is shorter, the program can be executed to operate the PLC from the EEPROM that has better storage capability.
- Transfer is disabled from a memory having larger capacity to a memory that has a smaller capacity. (Such a transfer causes a PC parameter error.)
  In such a case change the parameters for the memory cassette first, then execute the transfer function again.
  The inbuilt FX-20P-E-RAM contains the following capacity:
  - FX-20P-E manufactured in July 1997 or earlier with manufacturer serial No. "77****" or earlier: 8K steps
  - FX-20P-E manufactured in August 1997 or later with manufacturer serial No. "78****" or later: 16K steps
    (The manufacturer's serial No. above indicates the No. of the FX-20P-E. It is not the manufacturer's serial No. of the system memory cassette.)
- After executing transfer, collate both programs, and confirm that the contents are equivalent. If a mismatch is detected by collation, the message "VERIFY ERROR" is displayed, and the mismatch position is also displayed.

Condition for transfer between the memory cassette (online mode)

PLC status	RUN:×	STOP:✓	Valid memory cassette	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:△

- When using the EEPROM, set the write-protect switch to OFF before executing "FXRAM → EEPROM".
- When using the EPROM, "FXRAM → EPROM" is disabled.

Condition for transfer between the HPP and the FX Series PLC (offline mode)

PLC status	RUN:△	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:△

- Set the PLC to the STOP status before executing transfer from the HPP to the memory in the PLC.
- When using the EEPROM, set the write-protect switch to OFF before executing "HPP → FX-EEPROM".
- When using the EPROM, "HPP → FX-EPROM" is disabled.

10.4.1 Transfer between memory cassette (online mode)

- Using the transfer function in the online mode, the user is capable of transferring programs between the inbuilt PLC program memory and the attachable PLC memory cassette.
- The HPP automatically identifies the type of inbuilt PLC program memory and memory cassette attached to the PLC.
- During the transfer from the inbuilt PLC program memory to the memory cassette, write is enabled when RAM or EEPROM (write-protect switch set to OFF) type is identified. (If the write-protect switch of the EEPROM is ON or if the EPROM is attached, the message "WRITE FORBIDDEN" is displayed.)

Example: Transfer from the inbuilt PLC RAM to the EEPROM

Display example

In the step 2)

```
ONLINE MODE          FX
  1.OFFLINE MODE
  2.PROGRAM CHECK
  3.DATA TRANSFER
```

In the step 4)

```
3.DATA TRANSFER
  FXRAM→EEPROM
  FXRAM←EEPROM
  FXRAM : EEPROM
```

Key operation

1) [Start up the HPP in the online mode.]
2) [OTHER]
3) [3]
4) [↑] / [↓]
5) [GO]
6) [GO]

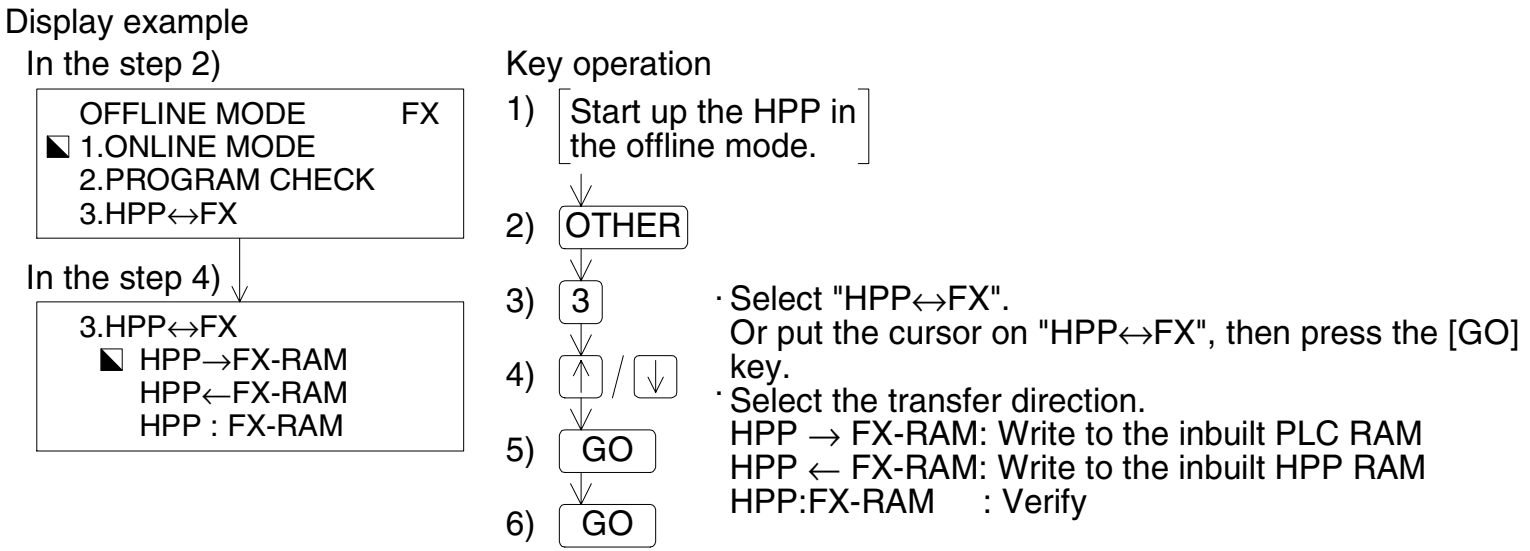
· Select "DATA TRANSFER".
Or put the cursor on "DATA TRANSFER", then press the [GO] key.
· Select the transfer direction.
FXRAM → EEPROM: Write to the EEPROM attached to the PLC
FXRAM ← EEPROM: Write to the inbuilt PLC RAM
FXRAM:EEPROM : Verify

- When transfer or collation is normally completed, the message "COMPLETED" is displayed.
- If a mismatch is detected by collation, the mismatch contents are displayed.

10.4.2 Transfer between HPP and FX Series PLC (offline mode)

- In the online mode, transferring programs between the HPP and the program memory in the PLC (memory cassette if it is attached) using the transfer function between the HPP and the FX Series PLC.
- If the memory cassette is attached to the PLC, the HPP automatically identifies its type. At this time, write to the memory cassette is enabled only when the memory cassette type is RAM or EEPROM (with the write-protect switch set to OFF). (If the write-protect switch of the EEPROM is ON or if the EPROM is attached, the message "WRITE FORBIDDEN" is displayed.)

Example: Transfer from the HPP to the inbuilt PLC RAM

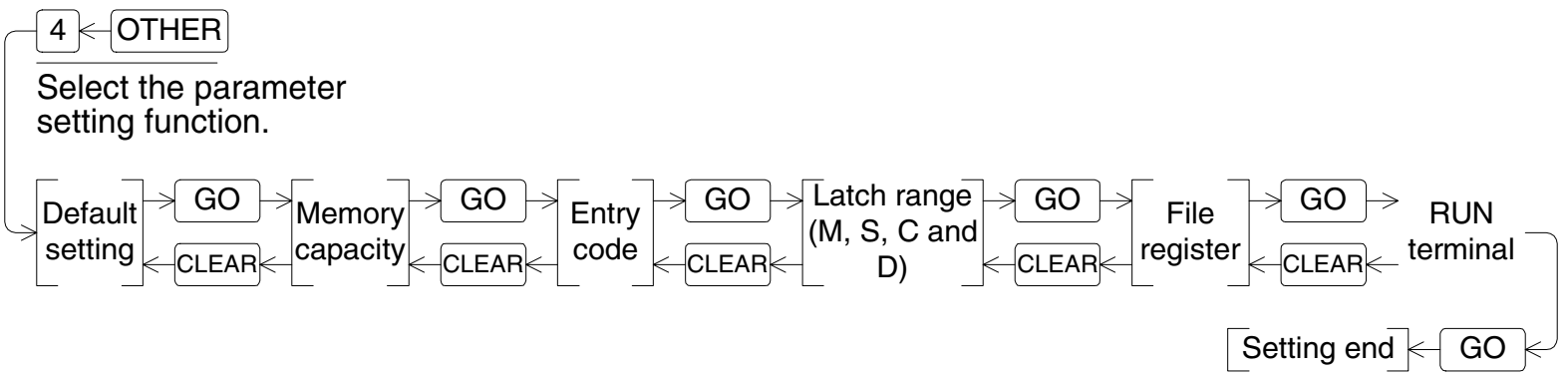


- When transfer or collation is normally completed, the message "COMPLETED" is displayed.
- If a mismatch is detected by collation, the mismatch contents are displayed.

10.5 Parameter

10.5.1 Outline of parameter settings

- In the online mode, set parameters to the memory in the PLC (memory cassette if it is attached). In the offline mode, set parameters to the inbuilt HPP RAM.
- The default setting, the memory capacity, the entry code, the latch (backup against power failure) range, file registers and the RUN terminal (only in the FX1S/FX1N/FX2N/FX2NC Series PLC) can be set.
- Display and set parameters in the order shown below.



If not changing a displayed item, press the [GO] key to proceed to the next item. Press the [CLEAR] key to return to the previous item. Press the [OTHER] key to return to the others mode menu display.

Parameter setting condition

PLC status	RUN:×	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:×

- Set the PLC to the STOP status before changing parameters in the online mode.
- When using the EEPROM cassette, set the write-protect switch to OFF before changing parameters in the online mode.
- When using the EPROM cassette, parameter change is disabled in the online mode.

10.5.2 Default setting

- Initialize the parameters.

Display example

```
4.PARAMETER

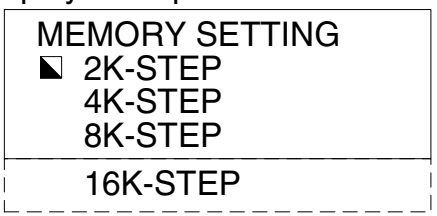
DEFAULT SETTING?
      YES ◥NO
```

- When setting the default values (initial values), place the cursor on "YES" and press the [GO] key.
  When not setting the default values, place the cursor on "NO" (initial status) and press the [GO] key. By this operation, the memory capacity setting screen appears.

10.5.3 Memory capacity

- Change the memory capacity.

Display example



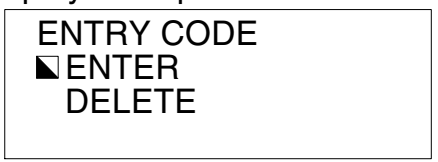
- When changing the memory capacity, place the cursor on a desired number of steps and press the [GO] key.
- The program capacity of each PLC is equivalent to less than the number of steps shown below:

FX_0/FX_{0S} Series PLC	: 800 steps (Select "2K STEP".)
FX_{0N}/FX_{1S} Series PLC	: 2k steps
FX/FX_{2C} Series PLC	: 2k steps in the inbuilt RAM 8k steps maximum (including comments and file registers) as and when the memory cassette is used
FX_{1N} Series PLC	: 8k steps (including comments and file registers)
FX_{2N}/FX_{2NC} Series PLC	: 8k steps in the inbuilt RAM 16k steps maximum (including comments and file registers) when the memory cassette is used

10.5.4 Entry code

- Register and delete the entry code.

Display example



- When registering the entry code, place the cursor on the [ENTER] key, input the entry code, then press the [GO] key.
- When not changing the registered entry code, press the [GO] key. (In the default status, no entry code is registered.)
- When deleting the already registered entry code, place the cursor on the [DELETE] key, input the entry code, then press the [GO] key.

Handling of the entry code

- By registering the entry code, changes in programs and data can be prohibited, and programs can be protected.
- There are three protective levels, "the all operation prohibition level (A)", "Read/Incorrect write protection level (B)" and "the erroneous write prohibition level (C)".
- When the HPP is started up in the online mode for a program in the PLC in which the entry code has been registered, the program requests the operator to input the entry code first. If the entry code input by the operator agrees with the already registered entry code, all operations are enabled in the HPP.
- If the entry code is unknown, it is impossible to delete only the entry code.
  If it is all right to erase the entire program (including all parameters and the entry code), input the special entry code (by pressing the [S'P] key eight times) to erase the entire program, then proceed to operate the HPP.

Valid functions of the HPP at each protective level

			Protective level		
			All operation prohibition level	**Read/ Incorrect write protection**	**Erroneous write prohibition level**
Function	Program	Read	✗	✗	✓
		Write	✗	✗	✗
		Insert	✗	✗	✗
		Delete	✗	✗	✗
	Monitor	Device monitor	✗	✓	✓
		Conductivity check	✗	✗	✓
		Operation state monitor	✗	✓	✓
	Test	Forcible ON/OFF	✗	✓	✓
		Present value change	✗	✓	✓
		Set value change	✗	✗	✗
	Others	Parameter	✗	✗	✗
		Program check	✗	✗	✓
		Device conversion	✗	✗	✗
		Transfer	✗	✗	✗
		Latch clear	✗	✓	✓

All operation prohibition level
: A○○○○○○○○

Read/Incorrect write protection level
: B○○○○○○○○

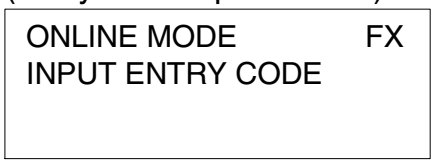
Erroneous write prohibition level
: C○○○○○○○○

* If the highest digit is any character other than A, B or C, it specifies the all operation prohibition level.

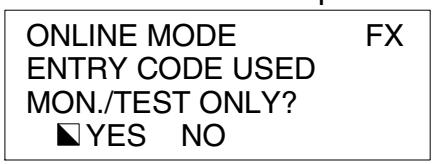
✓: Available
✗: Not available

Online mode startup screen when the entry code is registered

All operation prohibition level [A]
(Entry code input screen)

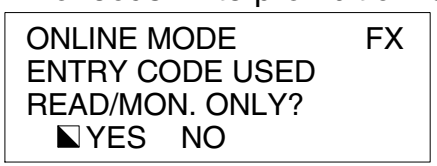


Read/Incorrect write protection level [B]



Select "YES" to proceed to the function selection screen.
At this time, available functions are restricted at each level respectively.
(Refer to the table in the previous page.)

Erroneous write prohibition level [C]

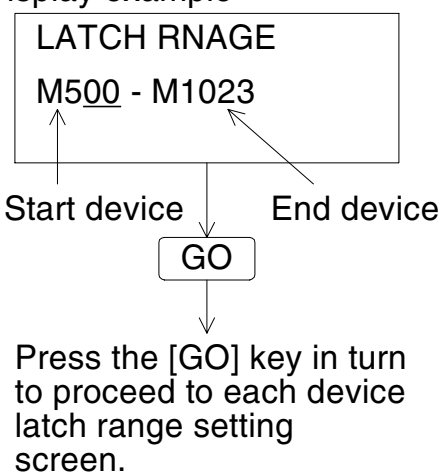


Select "NO" to proceed to the entry code input screen.
If the entry code input by the operator agrees with the registered one, the function selection screen appears and all functions are valid.

10.5.5 Latch range

- Change the latch range (area backed up against power failure).
- In the FX_0/FX_{0S}/FX_{1S}/FX_{0N}/FX_{1N} Series PLC, the latch range cannot be changed.
  In the FX/FX_{2C}/FX_{2N}/FX_{2NC} Series PLC, the latch range is fixed for the following devices:
  - FX/FX_{2C} Series PLC : M1024 to M1535, D512 to D999 and D1000 to D7999 (file registers and RAM files)
  - FX_{2N}/FX_{2NC} Series PLC : M1024 to M3071, D512 to D7999 (including file registers)
- The latch range setting is displayed in the order "auxiliary relay (M) → state (S) → counter (C) → data register (D)".
  For the device type whose latch range does not have to be changed, press the [GO] key without entering anything to proceed to the next device type.

Display example



- When changing the latch range, set the start device and the end device in this order.
- The end device of the latch range can be changed as far as the input value is smaller than the default value.
  Confirm that the start device No. is equivalent to or less than the end device No.

10.5.6 File register

- Set the number of blocks of the memory to be assigned to file registers. Up to 500 file registers are available in each block. Out of the preset memory capacity, 500 steps is used by each block.
- The allowable setting range in each PLC is as shown below.

FX_0/FX_{0S} Series PLC	: File registers are not available. Set "0".
FX_{1S}/FX_{0N} Series PLC	: 0 to 3 blocks
FX/FX_{2C} Series PLC	: 0 to 4 blocks
$FX_{1N}/FX_{2N}/FX_{2NC}$ Series PLC	: 0 to 14 blocks

Display example

```
FILE REGISTER
     0 BLOCK
     (ONE BLOCK = 500)
```

- In the allowable setting range shown above, input the number of required blocks, then press the [GO] key.

10.5.7 RUN INPUT

- In the $FX_{1S}/FX_{1N}/FX_{2N}/FX_{2NC}$ Series PLC, general-purpose inputs X000 to X017 can be assigned as the RUN terminal.

Display example

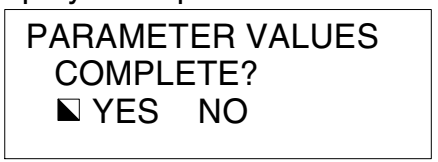
```
  RUN INPUT
  USE   X000
◣ DON'T USE
```

- When using a general-purpose input as the RUN terminal, place the cursor on "USE", enter the input No. (0 to 17), then press the [GO] key.
- When not using a general-purpose input as the RUN terminal, place the cursor on "DON'T USE", then press the [GO] key.

10.5.8 End of parameter setting

- Finish the parameter setting operation.

Display example



- Place the cursor on "YES" and press the [GO] key to finish parameter setting and return to the others mode menu display.
- Place the cursor on "NO" and press the [GO] key to return to the default setting screen display.

10.6 Device conversion

- In the same device type, convert the device No. (All corresponding devices in the program are converted at a time while the END instruction is ignored.)

Device conversion condition

PLC status	RUN:×	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:△	EPROM cassette:×

- If the EEPROM cassette is used, set the write-protect switch to OFF before executing device conversion in the online mode.

Example: Converting "X000" to "X003" in program

Display example

In the step 2)

```
ONLINE MODE          FX
1.OFFLINE MODE
2.PROGRAM CHECK
3.DATA TRANSFER
```

In the step 3)

```
5.XYM.. NO. CONV.
              →
-
```

In the step 6)

```
5.XYM.. NO. CONV.
X000 → X003
```

Key operation

1) Start up the HPP in the online or offline mode.
2) OTHER
3) 5 · Select "5.XYM.. NO. CONV.". Or put the cursor on "5.XYM.. NO. CONV.", then press the [GO] key.
4) X 0 · Enter the conversion source device.
5) GO
6) X 3 · Enter the conversion destination device.
7) GO

10.7 Buzzer sound

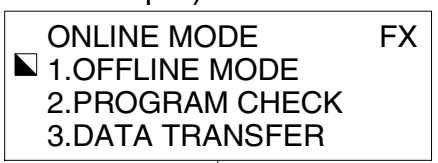
- Adjust the sound volume of the buzzer issued when a key is input.

Buzzer sound adjusting condition

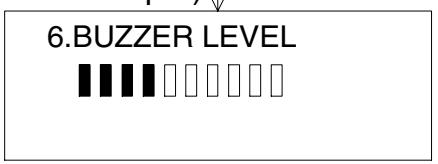
PLC status	RUN:✓	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:✓	EPROM cassette:✓

Display example

In the step 2)



In the step 3)



Key operation

1) Start up the HPP in the online or offline mode.

2) OTHER

3) 6

4) ↑ / ↓

- Select "BUZZER LEVEL". Or place the cursor on "BUZZER LEVEL", then press the [GO] key.
- Adjust the sound volume in 10 steps by pressing the cursor control keys. As the bar is longer, the sound volume is larger.
- Press the [OTHER] or [CLEAR] key to return to the others mode menu display.

10.8 Latch clear (online mode)

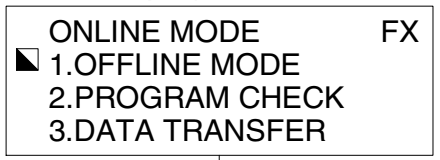
- Clear the latch set to devices.
- The latch clear function is valid only in the online mode.
- The latch clear operation can be executed for auxiliary relays (M), states (S), counters (C), data registers (D) and file registers (D).
- The latch clear function is valid regardless to the program memory type (RAM, EEPROM or EPROM) for all devices mentioned previously except file registers.
  If the program memory is EPROM, file registers cannot be cleared.
  If the program memory is EEPROM, file registers can be cleared only when the write-protect switch is OFF.
- Set the PLC to the STOP status before executing the latch clear operation.

Latch clear operation condition

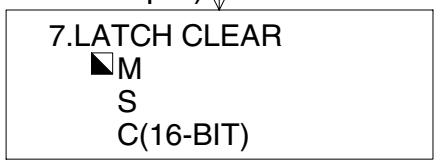
PLC status	RUN:×	STOP:✓	Valid memory	Inbuilt memory:✓	RAM cassette:✓	EEPROM cassette:✓	EPROM cassette:✓

Display example

In the step 2)



In the step 5)



Key operation

1) Start up the HPP in the online mode.

2) OTHER

3) 7

4) ↑ / ↓

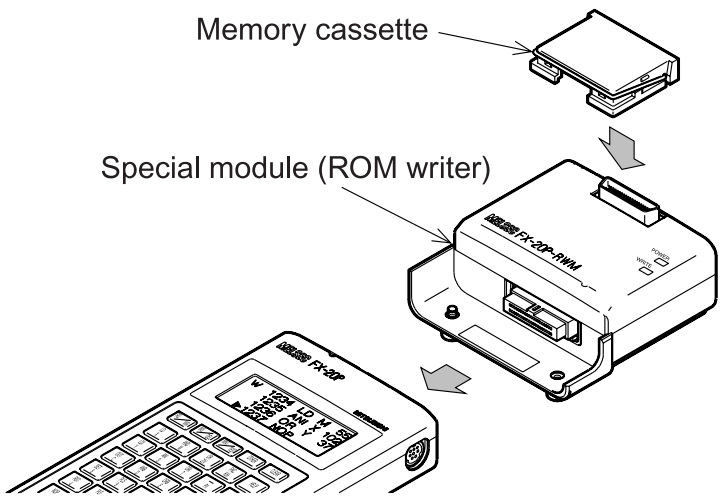
5) GO

- Select "LATCH CLEAR".
  Or put the cursor on "LATCH CLEAR", then press the [GO] key.
- Select a target device by pressing the cursor control keys, then press the [GO] key to clear the selected device.
- Press the [OTHER] or [CLEAR] key to return to the others mode menu display.

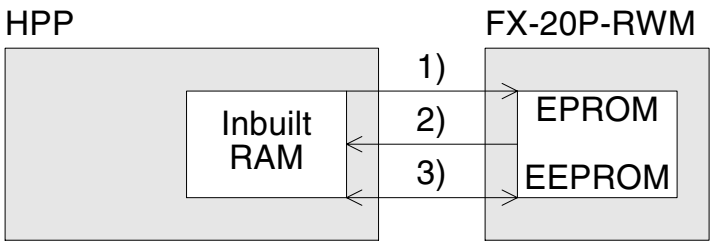
10.9 Module (offline mode)

- When the ROM writer module (FX-20P-RWM) is connected to the HPP, programs can be transferred between the inbuilt HPP RAM and the memory cassette attached to the FX-20P-RWM.
- The HPP automatically identifies the attached special module.
- The module function is available only in the offline mode.
- When using the FX0/FX0S Series PLC, the FX-20P-RWM can be connected only while the PLC is in the STOP status. (The FX-20P-RWM cannot be connected while the PLC is in the RUN status.)
- When using the FX1S/FX1N Series PLC, the FX-20P-RWM cannot be connected.
- When using the FX-2PIF, the FX-20P-RWM can be connected.

(If the FX-20P-RWM is connected while the FX0/FX0S Series PLC is in the RUN status or connected to the FX1S/FX1N Series PLC or the FX-2PIF, the power capacity supplied from the PLC is insufficient.)



•Access between the HPP and the module



1)Write: Writes the contents saved in the inbuilt HPP RAM to the EPROM or the EEPROM attached to the FX-20P-RWM.

2)Read: Reads the contents saved in the EPROM or the EEPROM attached to the FX-20P-RWM to the inbuilt HPP RAM.

3)Verify: Collates the contents saved in the inbuilt HPP RAM with the contents saved in the EPROM or the EEPROM attached to the FX-20P-RWM.

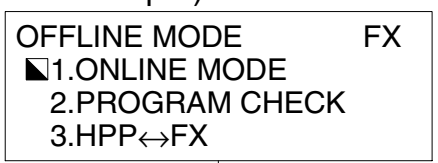
Module mode operation condition

	PLC status	Memory attached to module
Write from HPP to module	Either status (RUN or STOP) and either memory type (In the FX0/FX0S Series PLC, each operation is available only in the STOP status.)	EEPROM *1 EPROM*2
Read from module to HPP		EEPROM EPROM*3
Verify between HPP and module		EEPROM EPROM

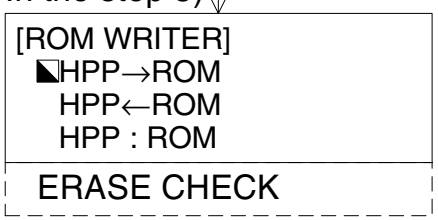
*1 The write-protect switch is OFF.
*2 The EPROM is already erased.
*3 The EPROM is already written.

Display example

In the step 2)



In the step 5)



Key operation

1) Start up the HPP in the offline mode.
2) OTHER
3) 7 · Select "MODULE". Or put the cursor on "MODULE", then press the [GO] key.
4) GO
5) ↑ / ↓ · Select the transfer direction.
6) GO
7) GO

- Press the [OTHER] or [CLEAR] key to return to the others mode menu display.

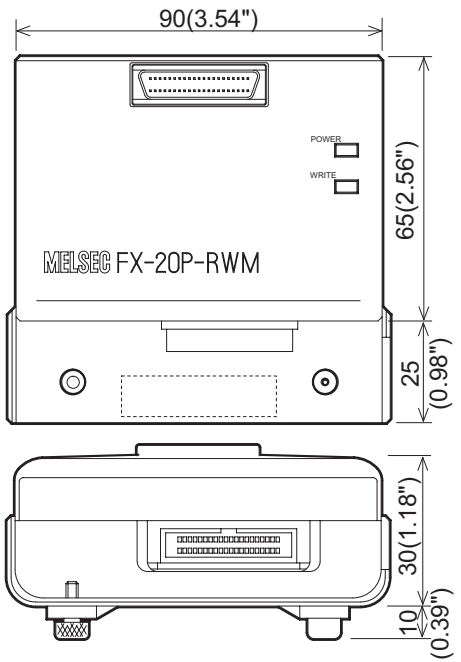
HPP → ROM: If the EPROM is attached to the ROM writer, write is enabled only when the contents saved in the EPROM are completely erased. If the EEPROM is attached to the ROM writer, its write-protect switch should be set to OFF.
When write is finished, the "COMPLETED" message is displayed.

HPP ← ROM: The read program can be modify. Press the [RD/WR] or [INS/DEL] key to modify or add a program. If the EPROM is erased or the entry code does not agree, read is disabled.

HPP:ROM: If a mismatch is detected, the "VERIFY ERROR" message is displayed.

ERASE CHECK: Check whether nothing is written in a memory cassette to be used.
If the memory cassette has not been erased, the "ERASE ERROR" message is displayed.
If the EEPROM cassette is checked, the "ROM MISCONNECTED" message is displayed and the check is not performed.

FX-20P-RWM external dimensions diagram



Unit: mm(inch)

11. Message List

11.1 Error messages

If an error message is displayed while the HPP is operated, take proper action in accordance with the list below, then proceed to the next operation.

Message	Cause	Action
COMMS.ERR	PLC communication error	Check the PLC and cable.
HPP PARA.ERROR	HPP parameter error	Set the parameters correctly.
WRITE FORBIDDEN	An attempt was made to write data to EPROM.	Change the destination memory.
	The EEPROM cassette memory protect switch is set in the ON position when an attempt was made to write to EEPROM.	Set the memory protect switch to the OFF position before writing data to EEPROM.
NOT FOUND	The designated instruction was not found.	Proceed to the next step.
ENTRY CODE ERROR	An operation was attempted that is not allowed with the keyed-in entry code.	Attempt only the operations that are allowed for the set protection level.
NOT USABLE	The selected function cannot be used under the current conditions.	Select a usable function
ERASE ERROR	EEPROM was not erased.	Erase the data or install a new EPROM.
VERIFY ERROR	Mismatched step data was found.	Correct the mismatch.
STEP OVERFLOW	The designated step number is greater than the allowable maximum step number.	Change the step number.
SETTING ERROR	The set value or data is improper.	Key in proper value or data.
PC PARA. ERROR	The set PLC parameter is incorrect.	Set a correct PLC parameter.

Message	Cause	Action
PC MISMATCH	The set PLC type and the connected PLC type are not the same.	Correct the set PLC type.
PC RUNNING	A write operation is attempted while the PLC is in the RUN state.	Set the PLC to the STOP state.
ROM MIS CONNECTED	A memory cassette is not installed in the ROM writer. An EEPROM is installed in the ROM writer when erase check is attempted.	Install an EPROM to the ROM writer module.
NO PROGRAM SPACE	There is no more program storage area.	Change the parameter settings.
PROGRAM OVERFLOW	No more memory space for inserts.	Delete all NOP instructions from the program, If the program is still larger than the available memory area, revise the program.
COMMAND ERROR	The instruction is incorrect.	Set a correct instruction.
NO MEM. CASSETTE	A memory cassette is not installed to the PLC.	Install the memory cassette.
DEVICE ERROR	The designated device or pointer is incorrect.	Input the correct device or pointer.

11.2 Error messages displayed during program check

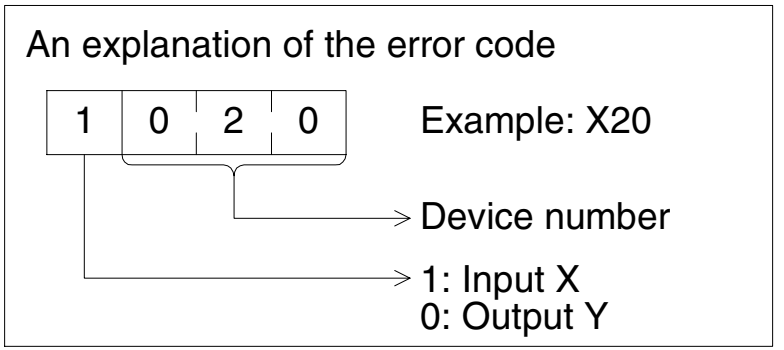
The list below shows errors detected by the program check operation on the online/offline mode menu.
In the online mode, the PLC judges errors. In the offline mode, the HPP judges errors.

Errors marked with an asterisk (*) can only be checked in the online mode.

Error message	Error code	Description
PC H/W ERR *	6101	RAM error
	6102	Operation circuit error
	6103	I/O bus error (M8069 driven)
COMMS ERR *	6201	Parity error, overrun error, frame error
	6202	Communication character error
	6203	Communication data sum check error
	6204	Data format error
	6205	Command error
LINK ERROR *	6301	Parity error, overrun error, frame error
	6302	Communication character error
	6303	Communication data sum check error
	6304	Data format error
	6305	Command error
	6306	Watchdog timer error
PARA. ERROR	6401	Program sum check error
	6402	Memory capacity setting error
	6403	Latch area setting error
	6404	Comment area setting error
	6405	File register area setting error
	6409	Other setting error

Error message	Error code	Description
GRAMMER ERR	6501	Instruction, device symbol and device number combination error
	6502	No OUT T or C before setting value
	6503	No setting value after OUT T or C; insufficient operands with applied instructions
	6504	Overlapping label number used; overlapping designation of interrupt input and/or high-speed counter input
	6505	Device number range over
	6509	Other
LADDER ERR	6601	LD or LDI used more 8 times continuously.
	6602	1) No LD or LDI instruction. No coil. Incorrect relationship of LD/LDI and ANB or ORB 2) One of the following is not connected to the bus line: STL, RET, MCR, P (pointer), I (interrupt), EI, DI, SRET, IRET, FOR, NEXT, FEND, END
	6603	MPS used more than 11 times continuously.
	6604	Incorrect relationship between MPS and MRD /MPP
	6605	1) STL used more than 8 times continuously. 2) MC, MCR, I (interrupt) or SRET in STL 3) RET outside STL. No STL
	6606	1) No P (pointer) or I (interrupt) 2) No SRET or IRET 3) I (interrupt), SRET or IRET designated in the main program. 4) STL, RET, MC or MCR designated in subroutine or interrupt routine.

Error message	Error code	Description
LADDER ERR	6607	1) Illegal FOR and NEXT designation Nesting level deeper than 5 levels 2) One of the following commands is designated in the FOR-NEXT loop. STL, RET, MC, MCR, IRET, SRET, FEND, END
	6608	1) Illegal MC and MCR designation 2) No MCR N0 3) One of the following commands is designated in the MC-MCR loop. SRET, IRET, I (interrupt)
	6609	Other
RUNTIME ERROR *	6701	No jump destination of CJ or CALL. A label follows after the END instruction. An independent label is in the FOR-NEXT loop or a subroutine program.
	6702	CALL nesting level deeper than 5 levels
	6703	Interrupt nesting level deeper than 2 levels
	6704	FOR-NEXT loop nesting level deeper than 5 levels
	6705	A device other than a valid is used for an applied instruction operand.
	6706	The device number or data designated as an applied instruction operand is outside the allowable designation range.
	6707	File register operation is accessed without allocating the file register area.
	6708	FROM/TO instruction error.
	6709	Other (No IRET or SRET or illegal FOR-NEXT loop)

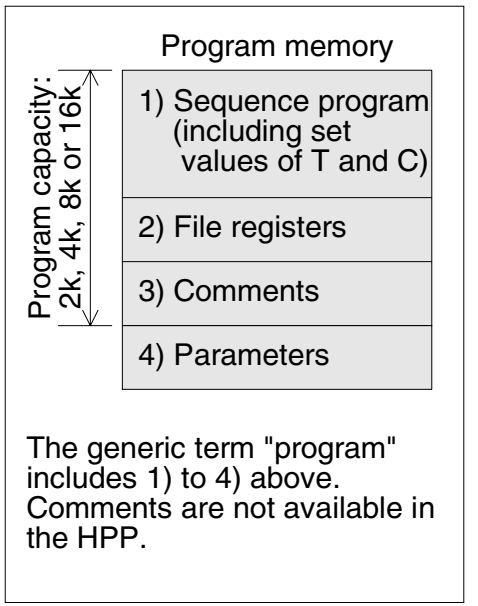
Error message	Error code	Description
I/O ERROR *	Example: 1020	The I/O number is not supported by the current hardware. 

Appendix A:Contents of Program Memory

1) Sequence programs including K constants are identified as set values for timers and counters.

2) In write to and read from file registers, the block No. should be set using a parameter.

   Block 0: No file register
   Block 1: D1000 to D1499, 500 points/500 steps
   Block 2: D1000 to D1999, 1,000 points/1,000 steps
   Block 3: D1000 to D2499, 1,500 points/1,500 steps
   Block 4: D1000 to D2999, 2,000 points/2,000 steps
   :
   Block 14: D1000 to D7999, 7,000 points/7,000 steps



The generic term "program" includes 1) to 4) above. Comments are not available in the HPP.

3) Register comments by using the A6GPP/A6PHP/Programming software on PC. Comments cannot be registered or changed in the HPP.
   However, when a program including registered comments is transferred to the HPP, the program is stored together with the comments to the built-in HPP RAM.

4) Parameters set the program memory capacity, the device No. range for the latch memory, the number of blocks for file registers, the number of blocks for the comment area, the entry code, the title, etc. (except the PLC model name).

MEMO

Appendix B:Major Key Operation List

<table>
<tr><th colspan="2">Key operation example</th><th colspan="3">Description</th></tr>
<tr><td>HPP reset</td><td>• [RST] [GO]</td><td colspan="3">Resets the HPP (and displays the screen which is usually displayed during startup).</td></tr>
<tr><td rowspan="8">Read</td><td>• [↑] / [↓]</td><td colspan="3">Moves the cursor by 1 line at a time from the currently displayed position.</td></tr>
<tr><td>• [GO]</td><td colspan="3">Scrolls the display by one screen.</td></tr>
<tr><td>• [Step] [1] [0] [GO]</td><td colspan="3">Searches and displays the program by step No.
Press the [GO] key again to scrolls the program by one screen.</td></tr>
<tr><td>• [LD] [X] [1] [0] [GO]</td><td colspan="2">Searches and displays the program by instruction and device.</td><td rowspan="6">Press the [GO] key again to search the remaining portion of the program.</td></tr>
<tr><td>• [SP] [X] [1] [1] [GO]</td><td colspan="2">Searches and displays the program by device.</td></tr>
<tr><td>• [FNC] [1] [2]</td><td>Searches and displays an (16-bit type) application instruction.</td><td rowspan="2">Pulse execution (P) does not have to be input.</td></tr>
<tr><td>• [FNC] [D] [1] [2]</td><td>Searches and displays an (32-bit type) application instruction.</td></tr>
<tr><td>• [P] [0] [GO]</td><td colspan="2">Searches and displays the program by label and pointer.</td></tr>
</table>

Key operation example			Description
Write	Contact instructions	• [LD] [X] [1] [0] [GO] • [LDI] [X] [1] [1] [GO]	As to the LD, LDI, AND, ANI and ORI instructions, consecutively input a device after a contact instruction.
		• [LD] [P/I] [X] [1] [2] [GO] • [LD] [F] [X] [1] [3] [GO]	As to the LDP, LDF, ANP, ANF, ORP and ORF instructions, press the [P/I] or [F] key after a contact instruction, then consecutively input a device.
		• [NOP] [P/I] [X] [1] [4] [GO]	As to the INV instruction, press the [NOP] and [P/I] keys instead, then consecutively input a device after that.
		hikaku setten meirei	Input it as an application instruction.
	Block instructions/ instructions for storage during operation	• [ANB] [GO] • [ORB] [GO] • [MPS] [GO] • [MRD] [GO] • [MPP] [GO]	As to block instructions (ANB and ORB) and instructions which store the intermediate result of the operation (MPS, MRD and MPP), input only an instruction.
	Drive instructions	• [OUT] [Y] [2] [GO] • [OUT] [T] [0] [SP] [K] [1] [0] [0] [GO]	As to the OUT instruction for an output (Y), auxiliary relay (M) or state (S), input a device after the instruction. As to the OUT instruction for a timer (T) or counter (C), input a device and set value after the instruction.
		• [SET] [M] [1] [0] [0] • [RST] [C] [1] [0]	As to the SET and RST instructions, input a device after an instruction.
	MC instructions	• [MC] [0] [SP] [M] [1] [0] [0] [GO] • [MCR] [0] [GO]	As to the MC instruction, input the nesting level and device after it. As to the MCR instruction, input the nesting level after it.

Key operation example			Description
Write	Application instructions (16-bit type)	• [FNC] [1] [2] [SP] [K] [1] [0] [SP] [D] [0] [GO] • [FNC] [HELP] [1] [2] [SP] [K] [1] [0] [SP] [D] [0] [GO]	As to an application instruction, enter via the FNC No., then enter an operand after it. If the FNC No. is unknown, press the [FNC] key first, then press the [HELP] key to select an instruction. When entering an operand, press the [S'P] key to delimit the instruction, the source and the destination. When entering a constant, press the [K] key once for decimal, or twice for hexadecimal ("H" is displayed.).
	Application instructions (32-bit type)	• [FNC] [1] [2] [D] [SP] [K] [1] [0] [SP] [D] [0] [GO] • [FNC] [HELP] [1] [2] [D] [SP] [K] [1] [0] [SP] [D] [0] [GO]	When inputting a 32-bit instruction, press the [D] key after entering the FNC No. If the FNC No. is unknown, press the [FNC] key first, press the [HELP] key to select an instruction, then press the [D] key. In either case, input an operand after pressing the [D] key. When inputting an operand, press the [S'P] key to delimit the instruction, the source and the destination. When inputting a constant, press the [K] key once for decimal, or twice for hexadecimal ("H" is displayed.).
	Application instructions (pulse execution)	• [FNC] [1] [2] [P] [SP] [K] [1] [0] [SP] [D] [0] [GO] • [FNC] [HELP] [1] [2] [P] [SP] [K] [1] [0] [SP] [D] [0] [GO]	When inputting an application instruction as a pulse execution instruction, press the [P] key after inputting the FNC No. If the FNC No. is unknown, press the [FNC] key first, press the [HELP] key to select an instruction, then press the [P] key. In either case, input an operand after pressing the [P] key. When inputting an operand, press the [S'P] key to delimit the instruction, the source and the destination. When inputting a constant, press the [K] key once for decimal, or twice for hexadecimal ("H" is displayed.).

Key operation example			Description
Write	Application instructions (pules execution instruction) (32-bit type)	• [FNC] [1] [2] [D] [P] [SP] [K] [1] [0] [SP] [D] [0] [GO] • [FNC] [HELP] [1] [2] [D] [P] [SP] [K] [1] [0] [SP] [D] [0] [GO]	When entering a 32-bit application instruction as a pulse execution instruction, press the [D] and [P] keys in this order after entering the FNC No. If the FNC No. is unknown, press the [FNC] key first, press the [HELP] key to select an instruction, then press the [D] and [P] keys in this order. In either case, input an operand after pressing the [D] and [P] keys. When entering an operand, press the [S'P] key to delimit the instruction, the source and the destination. When entering a constant, press the [K] key once for decimal, or twice for hexadecimal ("H" is displayed.).
	Application instructions (instruction only)	• [FNC] [4] [GO] • [FNC] [HELP] [0] [4] [GO]	As to instructions not requiring operand, enter only an instruction by using the FNC No. If the FNC No. is unknown, press the [FNC] key, then press the [HELP] key to select an instruction.
	Label	• [P] [0] [GO]	Press the [P] key, then input the label No.
	Pointer	• [I] [I] [1] [0] [1] [GO]	Press the [I] key twice, then input the pointer No. (When the [I] key is pressed once, "P" is displayed in the display unit. When the [I] key is pressed twice, "I" is displayed.)
	Step ladder	• [STL] [S] [0] [GO] • [RET] [GO]	As to the STL instruction, press the [stl] key, then input the state No. As to the RET instruction, input only it.
	No-processing instruction	• [NOP] [GO]	Input only the NOP instruction.

Key operation example			Description
Write	END	• [END] [GO]	Input only the END instruction.
	Special operation	• [NOP] [A] [GO] [GO]	Program all clear In the online mode, this operation overwrites all programs saved in the memory in the PLC with the NOP (no processing) instruction. In the offline mode, this operation overwrites all programs saved to the FX-20P-E RAM using the NOP instruction.

MEMO

OPERATION MANUAL

FX-20P-E HANDY PROGRAMMING PANEL

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
HIMEJI WORKS : 840, CHIYODA CHO, HIMEJI, JAPAN

MODEL	FX-20P-O-E
MODEL CODE	09R907

JY992D82301D
(MEE)

Effective Nov. 2008
Specifications are subject to change without notice.

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