



# Yokogawa Electric FA-M3 PLC Ladder Monitor

## Operation Manual

# Preface

Thank you for purchasing Pro-face's PLC Ladder Monitor Add-on Kit for the Yokogawa Electric FA-M3 PLC. This manual ("Yokogawa Electric FA-M3 PLC Ladder Monitor Operation Manual") explains how to operate the PLC ladder monitor feature and device monitor feature while using Pro-face's GP2000 series operator interfaces.

Be sure to read this manual carefully to understand how to correctly use your PLC Ladder Monitor Add-on Kit.

Be sure to keep this manual close at hand for easy reference.

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## Documentation Conventions

This manual uses the following symbols and terminology.

<b>IMPORTANT</b>	Indicates a potentially damaging action or dangerous situation that could result in abnormal equipment operation or data loss.
Screen editor software	Indicates GP-PRO/PB III for Windows
PLC	Indicates a Programmable Logic Controller (Also known as sequencer).
*	Indicates useful or important supplemental information.
<b>NOTE</b>	Provides useful or important supplemental information.
<b>SEE →</b>	Indicates related information.

## Related Units

### ■ Related PLC units

The table below lists the PLC units that can be used with the Add-on Kit.

Manufacturer	Series Name	CPU	Link I/F or CPU direct connection	Connection Cable	Device Type in Screen Editor
Yokogawa Electric	FACTORY ACE	F3SP21-0N F3SP25-2N F3SP28-3N F3SP35-5N F3SP38-6N F3SP53-4H F3SP58-6H F3SP28-3S F3SP38-6S F3SP53-4S F3SP58-6S F3SP59-7S	CPU direct connection	Yokogawa Electric's Programming Tool Cable KM11-2N*A	Yokogawa Electric FACTORY ACE 1:1 Communication

### ■ Related GP units

The table below lists the GP units that can be used with the Add-on Kit software.

Also, to use the Cache Function on a GP/GLC unit, the unit's revision code must be the same as or higher than those listed below.

Series Name	Unit Name	Model No.	Rev.
GP-2000 Series	GP-2401HT	GP2401H-TC41-24V	B-3
	GP-2400T	GP2400-TC41-24V	H-2
	GP-2401T	GP2401-TC41-24V	-2
	GP-2500T	GP2500-TC11	G-2
		GP2500-TC41-24V	C-2
	GP-2500S	GP2500-SC41-24V	A-2
	GP-2500L	GP2500-LG41-24V	B-2
	GP-2501T	GP2501-TC11	D-2
	GP-2501S	GP2501-SC11	E-2
	GP-2501L	GP2501-LG41-24V	-2
	GP-2600T	GP2600-TC11	F-2
		GP2600-TC41-24V	C-2
	GP-2601T	GP2601-TC11	-2

GLC2000 Series	GLC2400T	GLC2400-TC41-24V	F-2
	GLC2500T	GLC2500-TC41-24V	All Rev.
		GLC2500-TC41-200V	All Rev.
	GLC2600T	GLC2600-TC41-24V	E-2
GLC2600-TC41-200V		All Rev.	
IT Series	IT2400 Type A	IT2400-TC41-GP	C-2
	IT2400 Type B	IT2400-TC41-GLC	E

## ■ Related Screen Editor Software

GP-PRO/PBIII for Windows Ver. 5.0 or later.

When using this product with GLC2000 series or IT2400 Type B, please use GP-PRO/PBIII C-Package03

Service Pack 2 (Ver.7.20) or later.

# *Memo*

# 1



# Overview and Setup

1.1 Overview

1.2 Installation Procedure



## 1.1 Overview

The PLC Ladder Monitor software enables you to read PLC ladder programs and display them as ladder diagrams on the GP unit.

This software operates on the GP unit and the software's boot file is stored in the GP unit's CF Card.

The PLC Ladder Monitor Add-on Kit has the following features:

- Displays PLC ladder programs as ladder diagrams.
- Displays power (ON) lines using bold lines.
- Displays the designated instruction number.
- Displays circuit data including the designated device address.
- Displays circuit data in which the designated device address is included in the output instruction.
- Displays ladder program comments.
- Calls the Device Monitor feature.
- Use the Device Monitor feature to set, reset or change the value of an arbitrary device.

**NOTE**

- The Device Monitor feature is not explained in this manual. For information on how to operate this feature,

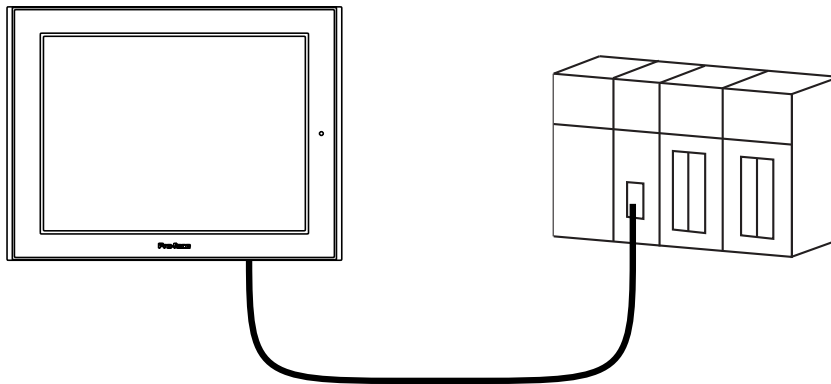
**SEE →**

*GP-PRO/PBIII for Windows Device/PLC Connection Manual (Included with the screen editor software).*

### 1.1.1 System Design

The GP and the PLC are connected in a 1:1 relationship.

Connect one end of the cable to the GP unit's serial interface port, and the other end to the PLC unit's CPU module programming tool connector



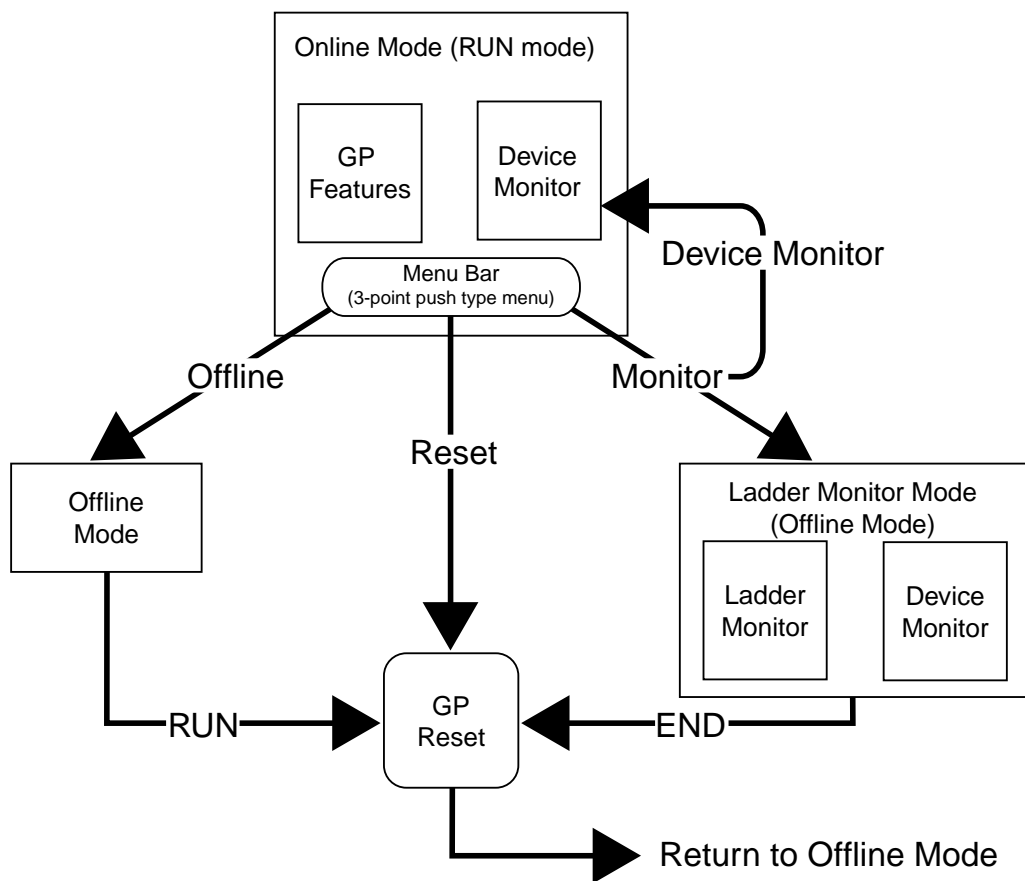
Yokogawa Electric's  
Programming Tool Cable  
KM11-2N\*A

### 1.1.2 Operation Mode

The PLC Ladder Monitor feature enables you to:

- (1) Read PLC ladder programs and display them on the GP unit, via [Ladder Monitor].
- (2) Monitor/change arbitrary PLC device addresses, via [Device Monitor].

After [Ladder Monitor] is started, the GP switches to ladder monitor mode. [Device Monitor] mode can be used when the GP is in ladder monitor mode, as well as in online (RUN) mode.

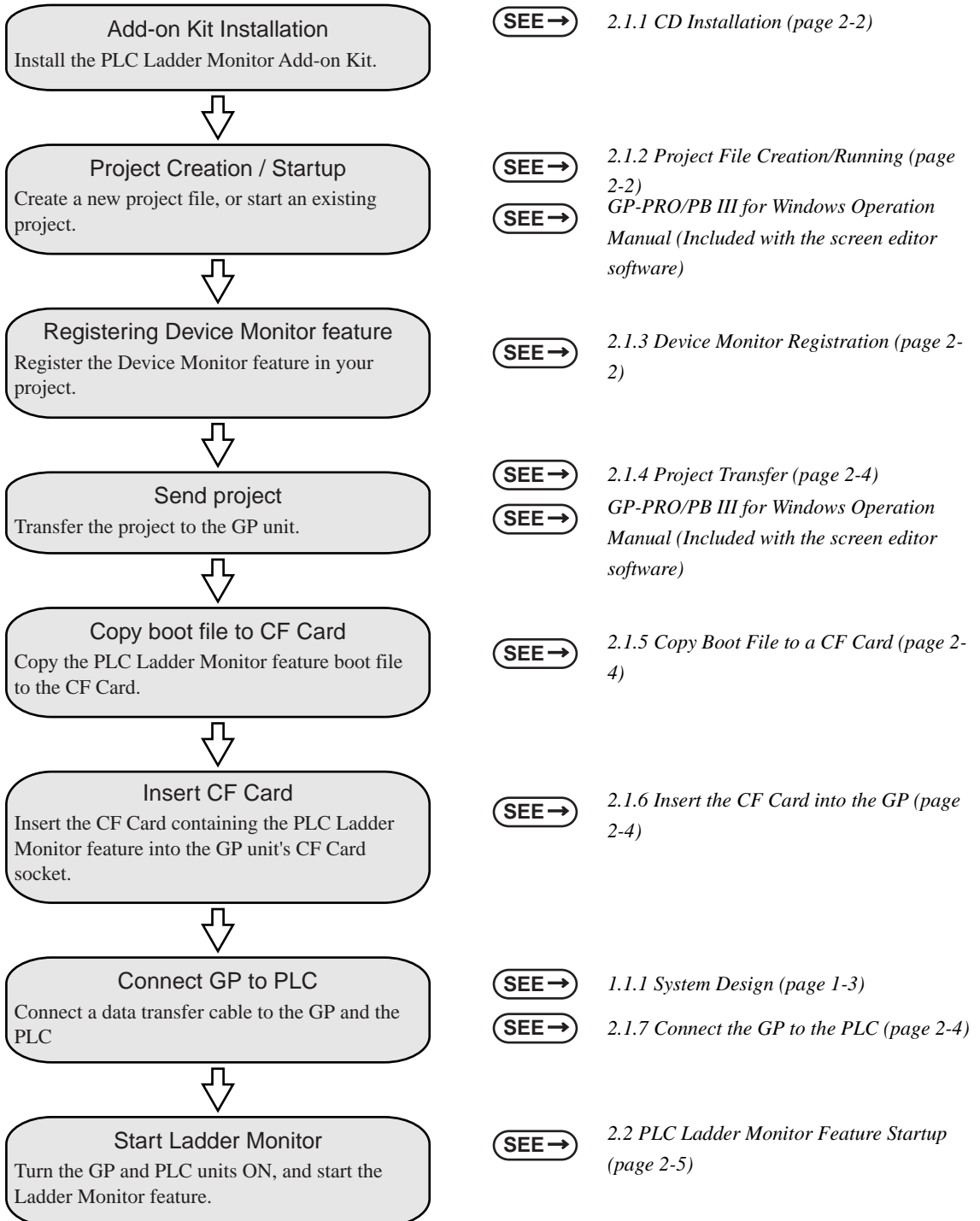


**IMPORTANT**

- The GP unit will be reset if you switch from online mode to ladder monitor mode.

## 1.2 Installation Procedure

The following flowchart explains the procedure necessary for installing the Add-on Kit. It is assumed that GP-PRO/PB III for Windows is already installed, and that the ladder program has been transferred to the PLC.



*Memo*

# 2



# Operation

- 2.1 Installation
- 2.2 PLC Ladder Monitor Feature Startup
- 2.3 Screen Names
- 2.4 Screen Operation
- 2.5 Usage Restrictions

## 2.1 Installation

Please perform the following installation procedure prior to using the PLC Ladder Monitor feature.

### 2.1.1 CD Installation

In Windows Explorer, double-click on the CD's Setup.exe file to start the installer program. Follow the installer program's directions.

#### IMPORTANT

- Prior to running the installer program, GP-PRO/PB III for Windows Ver. 5.0 or later screen editor software must be installed on your system. Refer to the section of the GP-PRO/PBáV for Windows Setup Guide that relates to your unit's OS

### 2.1.2 Project File Creation/Running

Create a new project file, or run an existing project file.

For project file details,

**SEE →** *GP-PRO/PB III for Windows Operation Manual (Included with the screen editor software)*

### 2.1.3 Device Monitor Registration

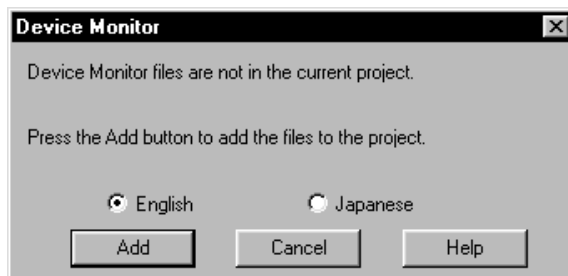
Register the Device Monitor feature in your project.

Starting from the screen editor software's main screen, the procedure for registering the Device Monitor feature is explained below.

#### ■ Registering the Device Monitor screen

Select the [Screen / Setup] menu's [Device Monitor] feature.

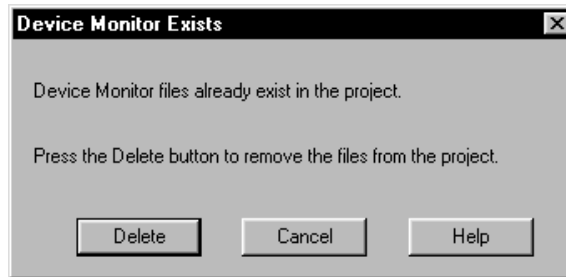
Click [Add] to register the feature.



#### NOTE

- To register the Device Monitor feature, at least 125KB of free GP space must be available. Therefore, after sending your project to the GP unit, be sure to check that at least 125KB of space is remaining for this feature. You can check the amount of GP memory used by your project via the Project Manager's [Project] -> [Property] screen.

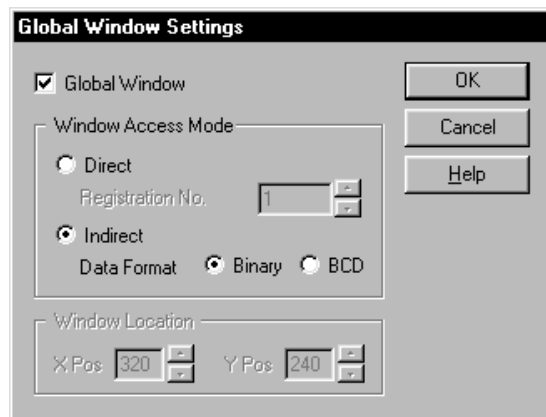
The following screen appears if the Device Monitor feature has already been registered.



Click [Delete] to delete the currently registered Device Monitor data. Then, select [Screen / Setup] menu's [Device Monitor], and click [Add] to register the feature again.

## ■ Registering the Global Window

Select the [GP Settings] feature's [Extended Settings] tab, and click [Global Window]. The following [Global Window Settings] screen will appear.



Enter the following settings:

[Global Window Settings] - Select [Global Window].

[Window Access Mode] - Select [Indirect].

[Data Format] - Select [Binary]

Click [OK] to confirm these settings.



## 2.1.4 Project Transfer

Next, transfer the project to the GP unit.

For project transfer details,

**SEE →** *GP-PRO/PB III for Windows Operation Manual (Included with the screen editor software).*

## 2.1.5 Copy Boot File to a CF Card

Insert a CF Card into your PC's CF Card reader and copy the Ladder Monitor boot file to the CF Card's root directory.

The boot file is located in GP-PRO/PB III for Windows screen editor software's [PROTOCOL] folder.

Yokogawa Electric's FA-M3 Ladder Monitor boot file filename: FA\_ACE1.SYS

To copy this program to a CF card, the card must have at least 2MB or more free space.

## 2.1.6 Insert the CF Card into the GP

Remove the CF Card from your PC's card reader and insert it in the GP unit's CF Card socket.

For CF Card socket insertion details,

**SEE →** *Your GP unit User Manual (Separately sold).*

## 2.1.7 Connect the GP to the PLC

Connect the data transfer cable between the GP and the PLC.

For cable connection details,

**SEE →** *1.1.1 System Design (page 1-3)*

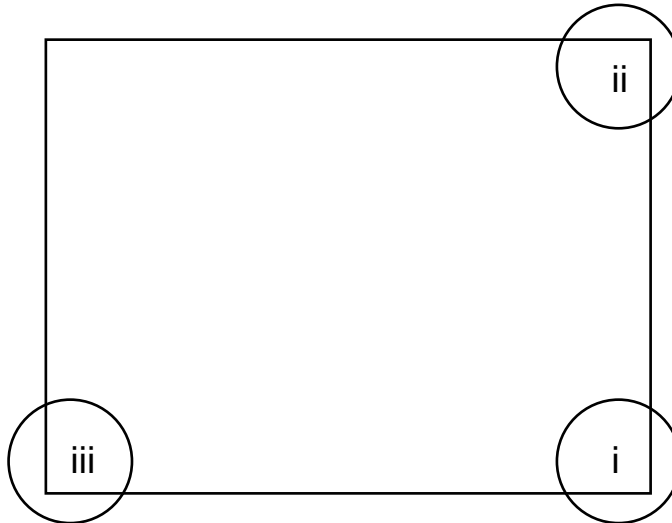
**SEE →** *GP-PRO/PB III for Windows Device/PLC Connection Manual (Included with the screen editor software)*

## 2.2 PLC Ladder Monitor Feature Startup

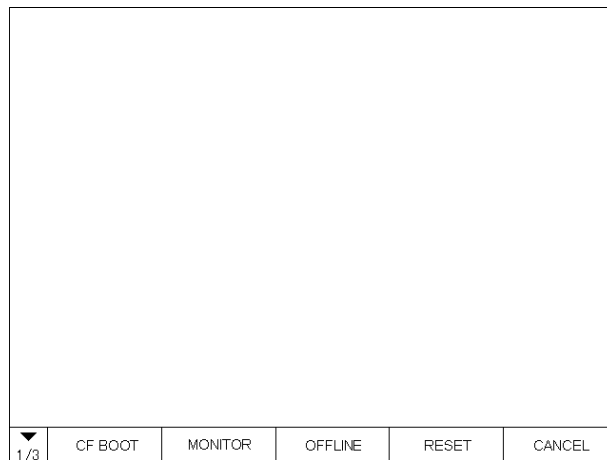
Either of the following two methods can be used to start the PLC Ladder Monitor feature.

### 2.2.1 Via the Menu Bar

- (1) To call up the GP screen's Menu Bar, simultaneously press the areas marked by (i), (ii) and (iii) (See below)



- (2) After the Menu Bar appears, select [MONITOR].



#### NOTE

- If the Device Monitor feature has not been registered correctly, the [MONITOR] button will not be displayed in the Menu Bar.

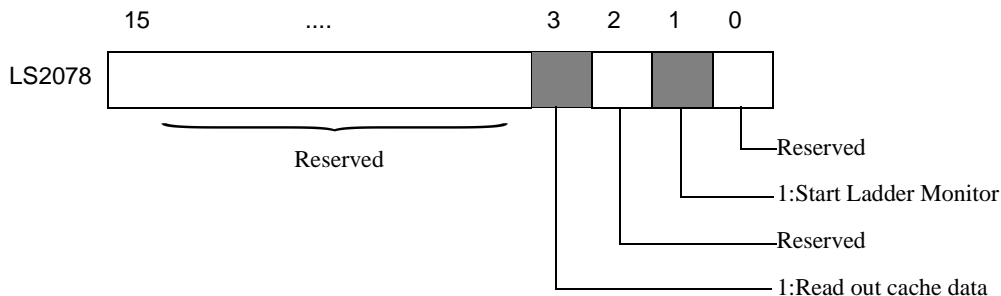
#### SEE →

2.1.3 Device Monitor Registration (page 2-2)

- (3) [Menu] screen is displayed, touch the [Ladder Monitor] button.

## 2.2.2 Turning the Extended Special Relay Area ON

Use a bit switch etc. to turn ON the GP internal memory's extended special relay LS2078's bit 1. This will start up the PLC Ladder Monitor feature



Bit 1:Turning this bit ON starts the Ladder Monitor. The Ladder Monitor menu will not appear.

Bit 3:Immediately after the Ladder Monitor starts, turning this bit ON displays the ladder program cached in the CF card. When using Bit 3, be sure to turn Bit 1 ON at the same time.

(cf. "Related Units" - "Related GP Units")

If there is no cache data on the CF card, simply turning Bit 1 ON will read out the current data.

\* Prior to using the Cache feature, the data must be read into a PC one time.

### NOTE

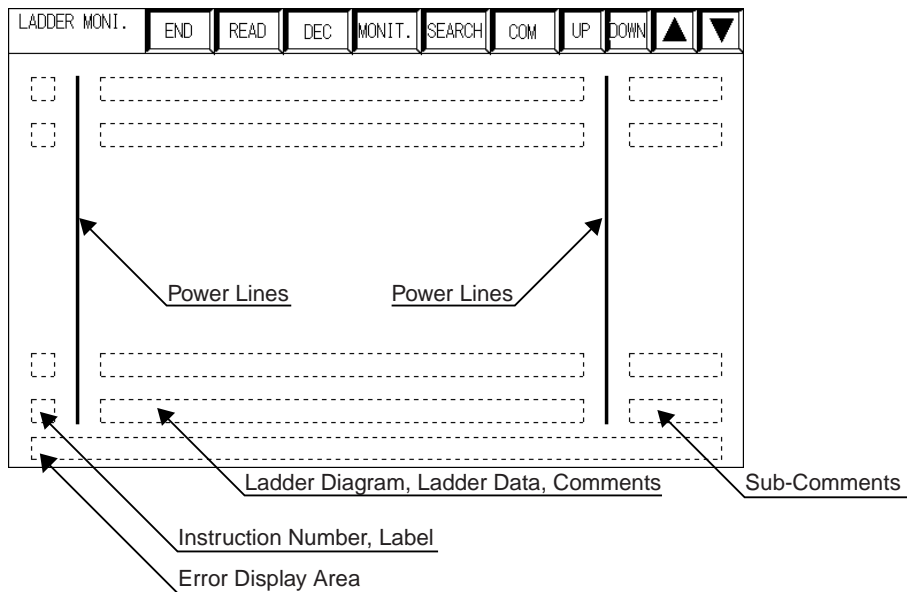
- All other bits are reserved. Do not write data to any of these bits.

## 2.3 Screen Names

The following sections explain PLC Ladder Monitor screen layout.

### 2.3.1 Main screen

The PLC Ladder Monitor's main screen contains the following information.



The number of rows that can be displayed on the screen varies depending on the comment mode. There are three comment modes

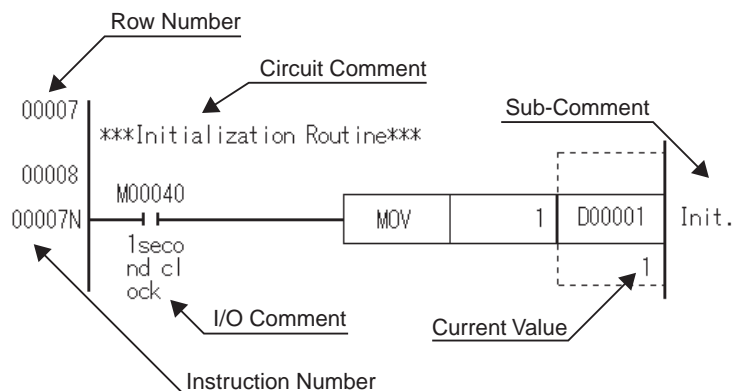
- No comment mode.....(11 columns) x 8 rows
- Comment mode.....(11 columns) x 3 rows
- Compressed comment mode.....(11 columns) x 5 rows

For details regarding comments,

**SEE →** 2.4.4 Comments (page 2-15)

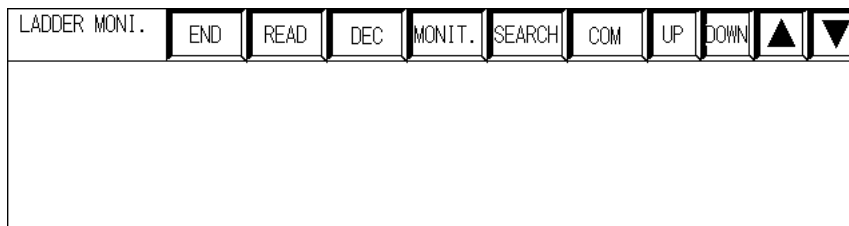
### 2.3.2 Ladder Diagrams







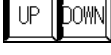

Types of ladder diagram screen data are shown below.




## 2.4 Screen Operation

The following information explains how to operate the Ladder Monitor screen.




	Quits the PLC Ladder Monitor software. The GP unit is reset and switches to ONLINE mode.
	Reads in the PLC's ladder programs.
	Switches the style of data display between decimal, hexadecimal and decimal point.
	Starts the Device Monitor feature. The [Monitor MENU] will appear.
	Calls up the [Search Menu] to search for ladder program data.
	Changes the I/O comment display format.
	Scrolls through the ladder diagram one row at a time.
	Scrolls through the ladder program one page at a time.

## 2.4.1 PC Read

Touching the main screen's  key displays the [PC READ INPUT (Block)] screen. Here, enter the block no. to be displayed at the beginning of the ladder program list (See [Select Read Block] screen below).

PC READ INPUT(Block)				UP	DOWN	<--	-->
END							
Do you read Ladder Program? Please Input an Block No. Block No.							
1	2	3	4	5	6	7	
8	9	0					
CACHE		CL		ENT			

Pressing the  key displays the following [Select Read Block] screen.

Select Read Block [Ladder]								LD:	1/2
No.	BLK Name	Num	Func	Step	Date	Time	Title	P	
*	1 MAIN	9		9	2003-01-20	13:31		0	
-	2 ALARM	1517		1730	2001-10-31	16:09		0	
-	3 OUTPUT	302		318	2001-10-31	17:02		1	
-	4 PID	373		873	2002-05-22	17:08		0	
-	5 ROAD13	385		489	2001-11-21	11:10		1	

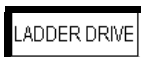
END	SET No	LADDER DRIVE	To The End	All Area	▲	▼
-----	--------	--------------	------------	----------	---	---

To select a ladder program, touch the block name of the ladder program (block) you want to read out. A \* mark will be displayed to the left of the ladder program you selected. Touching the block name again will cancel the selection.

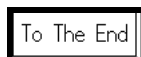
The maximum number of ladder programs that can be displayed is 10.



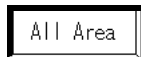
Designates the block no. to be displayed at the beginning of the ladder program list. Touching [SET No.] calls up the [PC READ INPUT (Block)] screen.



This designates the drive used when reading out data. The drive selected is then shown in the upper section of the screen, to the right of the word "LD: ".



Reads in selected ladder program data, up to its END instruction.



Reads in all selected ladder program data.



Scrolls through the ladder program list one page at a time.

**NOTE**

- At this time, [Title] column data cannot be displayed.
- A 1 in the [P] column indicates that the ladder program is protected. Protected ladder programs cannot be read in.
- Concerning the Readout Drive

The readout drive designates the drive used to read out ladder information. Simply press the button, use the following steps to search for the file, and the current file will be displayed. Only "PG" is displayed when using a unit that "CACHE" function is not available

**PG→CACHE**

“PG”:

This reads out the ladder program from the PLC and displays it. Also, when using a unit that “CACHE” function is available, ladder data will automatically be copied to [LADMON] folder of the CF card. The name of this file will be "FA\_ACE1.CCH".

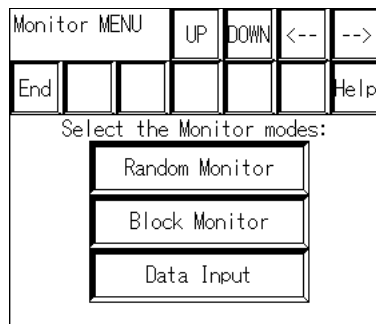
“CACHE”: (cf. "Related Units" - "Related GP Units")

When the Ladder Program is read out, that data (file name "FA\_ACE1.CCH") is saved automatically to [LADMON] folder of the CF card. However, when using “CACHE”, the ladder program stored in the CF card is read out and displayed. Since no communication is being performed with the PLC, this readout can be displayed very quickly. Display begins from the screen that was last displayed using the Ladder Monitor feature.

\* The ladder logic information shown by CACHE is for the previously read-out PLC ladder logic data. If the PLC's ladder logic data has been changed or updated, or if the PLC has been changed, be sure to read out the latest ladder logic data from the PLC.

## 2.4.2 Device Monitor

Touching the main screen's **MONIT.** key displays the [Monitor MENU]. The Device Monitor feature allows you to monitor PLC devices.



### NOTE

- This manual does not explain Device Monitor feature operation or related details. For Device Monitor details,

### SEE →

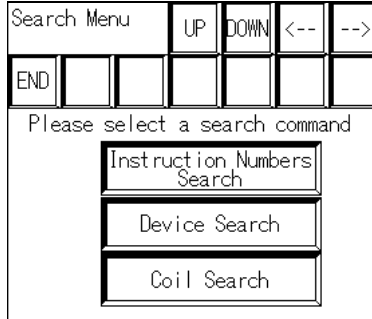
*GP-PRO/PB III for Windows Device/PLC Connection Manual (Included with the screen editor software)*



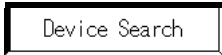
### 2.4.3 Search Feature

Touching the main screen's **SEARCH** key displays the [Search Menu].

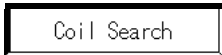
This screen is used to designate the instruction number or device address of the circuit that will appear at the top of the main screen.



Used to designate the instruction number of the circuit that will appear at the top of the main screen.



Used to designate the device address of the circuit that will appear at the top of the main screen.

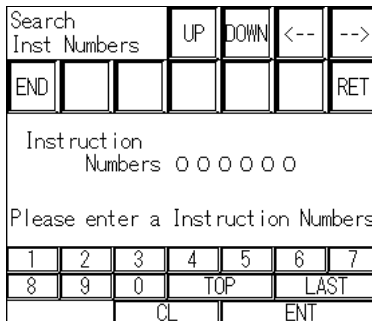


Used to designate the output instruction containing the device address of the circuit that will appear at the top of the main screen.

#### ■ Instruction Numbers Search

Touching the **Instruction Numbers Search** key displays the [Search Inst Numbers] screen, which is used to designate an instruction number. Use the screen's numeric keys (1 to 0) to enter an instruction number, and press

**ENT** to start the search.



Searches for and displays the ladder program's first instruction number.



Searches for and displays the ladder program's last instruction number.


## ■ Device Search / Coil Search


Touching the  key displays the [Search Device] screen. Touching the


 key displays the [Search Coil] screen.

Select the type of search to perform.

Search Device	UP	DOWN	<--	-->
			Next	RET
Please select a type of device				
X	Y	I		
E	L	M		

 Displays other device type characters.

 Returns to the [Search Menu].

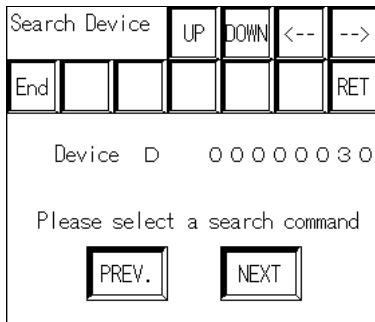
After you select the device type, the following screen appears. Here, enter the device address. Use the character keys to enter the device address, and press  to start the search.

Search Device	UP	DOWN	<--	-->
				RET
Device X 0 0 0 0 0 0 0 0				
Please enter an address				
1	2	3	4	5
6	7	8	9	0
A	B	C	D	
E	F	CL	ENT	

◆ Searching for the designated device address

The circuit is displayed with the designated device address at the top of the main screen.

Next, a screen that enables you to search for identical device addresses is displayed.



Starting from the current ladder rung, searches backward for identical device addresses, until the first row of the program is reached.



Starting from the current ladder rung, searches forward for identical device addresses, until the last row of the program is reached.



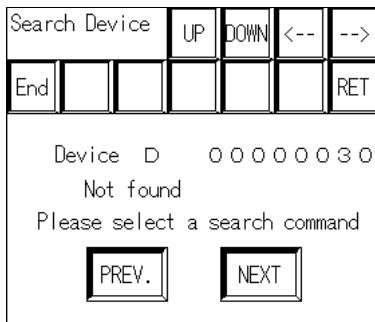
Exits the search feature and returns to the main screen.



Returns to the [Search Menu].

◆ When the designated device address is not found

The following screen is displayed when the device address search is unsuccessful.



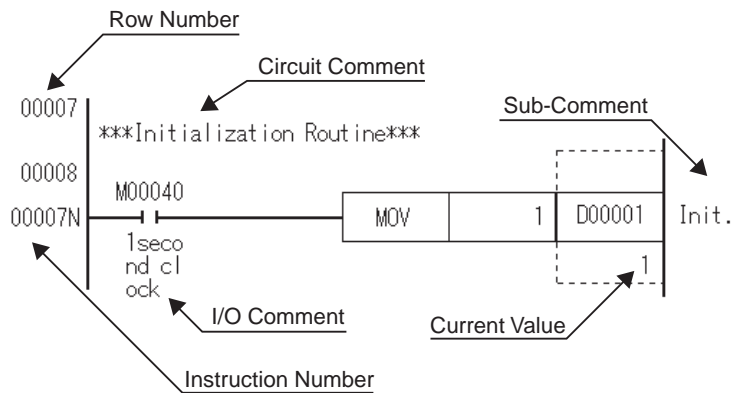
■ Using a double-touch to search for a coil

When you touch the device address displayed on the main screen twice in succession, the output instruction containing the designated address appears at the top of the main screen. This is similar in function to the coil search.

## 2.4.4 Comments

There are three types of comments:

- Circuit comment
- Sub-comment
- I/O comment



### ■ Circuit comments


Circuit comments can only be displayed for data from an F3SP\*\*-\*S model CPU. (65 single-byte characters)  
Comments cannot be displayed for data from other model CPUs. The comment zoom feature can also be used.

### ■ Sub-comments

Sub-comments can only be displayed for data from an F3SP\*\*-\*S model CPU. (8 single-byte characters x 3 rows) Sub-comments cannot be displayed for data from other model CPUs. With sub-comments, however, the comment zoom feature cannot be used.

### ■ I/O comments

Touching the main screen's  key displays I/O comments.

Touching the  key changes the comment mode in the following order.

Comment mode -> Compressed comment mode -> No comment mode

In comment mode, a maximum of 5 single-byte characters x 3 rows can be displayed. In compressed comment mode, a maximum of 5 single-byte characters x 3 rows can be displayed (Characters are compressed to half the original length). If the device comment of the next column is used, up to 5 signal-byte characters x 2 rows can be seen in a device's comment display.

To display all comments, please use the Comment zoom feature.

Circuit comments and sub-comments are displayed normally, regardless of the comment mode.

To display comments, the project folder's comment files (\*.YCMN) (Created using the Yokogawa Electric FA-M3 program development tool "Wide Field") are required. First, change these files' file extensions to \*.CMN, and copy them to the CF Card.

For each ladder program you read from the PLC unit, a comment file with the same name will be automatically read.

The comment zoom feature can be used.

**IMPORTANT**

- Although there are two types of comment files, one with a \*.YSIG (Block tag definition) and the other with a \*.YCMN (Common tag definition) extension, be sure to use only \*.YCMN (Common tag definition) comment files.

◆ Comment zoom feature

Touching a comment in the main screen will display that comment's entire text in the main screen's lower left corner. (I/O Comments: 32 single-byte characters, Circuit comments: 72 single-byte characters)

## 2.5 Usage Restrictions

### 2.5.1 Notation

- When monitoring bit devices used in a function instruction, dividing the bit address by 16 and adding 1 calculates the word address.
- When displaying monitored data using decimal point display, apart from the FLOAT attribute's device address, all 32-bit attribute device addresses will also be displayed using decimal point display. 16-bit attribute device addresses will not be displayed. This decimal point display differs from Yokogawa Electric's program development tool "Wide Field", which uses exponential display.
- A maximum of 8 digits can be displayed for monitor data. If the number of digits exceeds 8, only the first eight digits will be displayed.
- For a circuit, the maximum number of rows that can be displayed is 25. If the circuit contains more than 25 rows, rows from the 26th row will be omitted, and only the first 25 rows will be displayed. Also, when searching for a device, if an abbreviation has been used for the device, when it is found, the device itself will not be displayed, however, the start of the circuit that contains the device will be shown
- Contacts, coils and frames through which power flows are indicated by bold (thick) lines. However, lines connecting two contacts are displayed normally.
- The main screen is displayed at the GP unit's center at 640 x 400 resolution. Blank space may be displayed at the top, bottom, left or right corners of the screen, depending on the PLC model used.
- The comment zoom feature can display a maximum of 72 single-byte characters. When [Ladder End] is displayed at the end of a circuit, the maximum number of characters that can be displayed is 70 single-byte characters.
- Local devices (with "/" attached) cannot display the "/" character. The "/" character will not be displayed on the ladder monitor, and the device address may change suddenly.
- SCALL instruction notation differs from that used in Yokogawa Electric's FA-M3 program development tool "Wide Field". The SCALL instruction is broken into multiple instructions and stored on the CPU. Therefore, when the SCALL instruction is read, it is displayed as multiple instructions.(cf. Next figures)
- ACTX, IACTX, SRRD, AMOV, ABMOV instructions are not supported. If these instructions are used, a circuit error will occur and the ladder logic following the circuit where it is used will not be displayed.
- If the last line of a ladder block is circuit comment, the circuit comment is not displayed.

### 2.5.2 Others

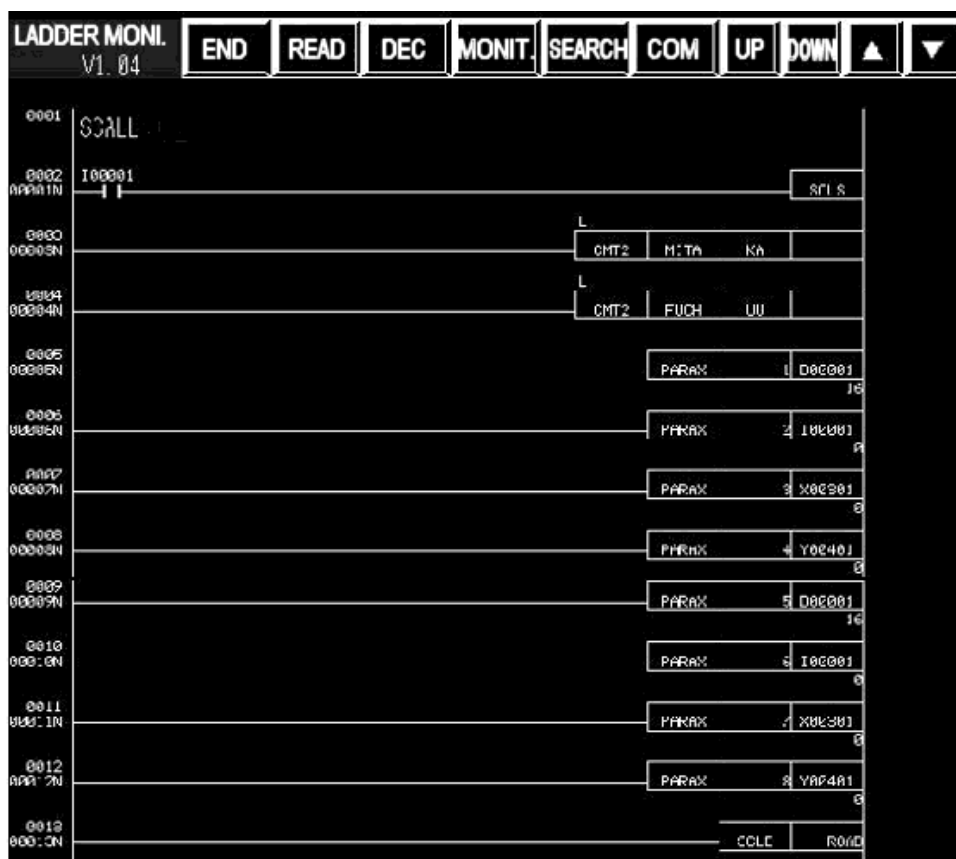
- When 32-bit instructions are used, the designated device address and designated device address + 1 are read. As a result, designating a device's maximum address via a 32-bit instruction results in an error.

◆ Display sample of SCALL function

Display on Programming Software



Display on Ladder Monitor



# 3



# Errors

## 3.1 Error Messages



### 3.1 Error Messages

The following table lists errors that can occur.

Message	Possible Cause	Solution
CF Card switch is OFF	The lid of CF Card is open.	Check whether the lid of CF card is open.
CF Card is not installed	The CF Card has not been inserted into the GP unit's CF Card socket.	Check whether CF card is inserted correctly.
CF Card Data Error	CF card data is unusual. CF card is not formatted.	Check whether the contents of CF card can be read correctly. Check whether CF card is formatted.
Cannot read from CF Card	Cannot read the file from CF Card. CF card was extracted during reading.	Check whether a file required for a ladder monitor exists. It checks whether CF card is inserted correctly.
Cannot write to CF Card	Cannot Write to file on the CF Card. CF card was extracted during writing. Availability of CF card is insufficient.	Check whether CF card is inserted correctly. Check whether the capacity of CF card is vacant.
A file is not found	System file of a ladder monitor does not exist.	Check whether a FA_ACE1.SYS file exists in CF card.
Ladder error *1	The read data was not convertible for the ladder figure. A cable is extracted during read-out of a ladder.	Check whether there is any ladder command to which the ladder monitor does not correspond. Check whether a cable with PLC is correct, and PC read-out is performed again.

\*1 When a circuit error occurs, the rudder display and reference after it cannot be performed.

The error message is detected when either of the following two conditions are satisfied.

- (1) When screens are changed to display a new page.
- (2) When a file's data is read again.

Solutions to the above errors vary depending on when the error occurred.

Error Occurrence	Internal Processing	Recovery
When reading the ladder program	Suspends processing after error message is displayed. After recovery, processing continues.	Insert the CF Card correctly.

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When reading the comment file	Suspends processing after error message is displayed. After recovery, processing continues.	Insert the CF Card correctly.
When the comment is being displayed.	Turns OFF comment display after error message is displayed. Continue processing as before.	Insert the CF Card correctly, and read the comment file again.

*Memo*