User's Manual

Memory Card Module

Model: F3EM01-0N

IM 34M6C22-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 34M6C22-01E
1st Edition

Applicable Product:

● Range-free controller FA-M3

- Model Name: F3EM01-0N
- Name: Memory Card Module

The document number and document model code for this manual are given below. Refer to the document number in all communications; also refer to the document number or the document model code when purchasing additional copies of this manual.

Document No.	:	IM 34M6C22-01E
Document Model Code	:	DOCIM

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Important

■ About This Manual

- This Manual should be passed on to the end user.
- Before using the controller, read this manual thoroughly to have a clear understanding of the controller.
- This manual explains the functions of this product, but there is no guarantee that they will suit the particular purpose of the user.
- Under absolutely no circumstances may the contents of this manual be transcribed or copied, in part or in whole, without permission.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made to ensure accuracy in the preparation of this manual. However, should any errors or omissions come to the attention of the user, please contact the nearest Yokogawa Electric representative or sales office.

■ Safety Precautions when Using/Maintaining the Product

- The following safety symbols are used on the product as well as in this manual.

Danger. This symbol on the product indicates that the operator must follow the instructions laid out in this instruction manual to avoid the risk of personnel injuries, fatalities, or damage to the instrument. Where indicated by this symbol, the manual describes what special care the operator must exercise to prevent electrical shock or other dangers that may result in injury or the loss of life.

Protective Ground Terminal. Before using the instrument, be sure to ground this terminal.

Function Ground Terminal. Before using the instrument, be sure to ground this terminal.

Alternating current. Indicates alternating current.

Direct current. Indicates direct current.

The following symbols are used only in the instruction manual.

WARNING

Indicates a “Warning”.
Draws attention to information essential to prevent hardware damage, software damage or system failure.

CAUTION

Indicates a “Caution”
Draws attention to information essential to the understanding of operation and functions.

TIP

Indicates a “TIP”
Gives information that complements the present topic.

SEE ALSO

Indicates a “SEE ALSO” reference.
Identifies a source to which to refer.

- For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety stated in this manual whenever handling the product. Take special note that if you handle the product in a manner other than prescribed in these instructions, the protection feature of the product may be damaged or impaired. In such cases, Yokogawa cannot guarantee the quality, performance, function and safety of the product.
- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system as well as designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of processes and lines using the product and the system controlled by it, the user should implement it using devices and equipment, additional to this product.
- If component parts or consumable are to be replaced, be sure to use parts specified by the company.
- This product is not designed or manufactured to be used in critical applications which directly affect or threaten human lives and safety — such as nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities or medical equipment. If so used, it is the user’s responsibility to include in the system additional equipment and devices that ensure personnel safety.
- Do not attempt to modify the product.

■ Exemption from Responsibility

- Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa Electric) makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
- Yokogawa Electric assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

■ Software Supplied by the Company

- Yokogawa Electric makes no other warranties expressed or implied except as provided in its warranty clause for software supplied by the company.
- Use the software with one computer only. You must purchase another copy of the software for use with each additional computer.
- Copying the software for any purposes other than backup is strictly prohibited.
- Store the original media, such as floppy disks, that contain the software in a safe place.
- Reverse engineering, such as decompiling of the software, is strictly prohibited.
- No portion of the software supplied by Yokogawa Electric may be transferred, exchanged, or sublet or leased for use by any third party without prior permission by Yokogawa Electric.

■ General Requirements for Using the FA-M3 Controller

● Avoid installing the FA-M3 controller in the following locations:

- Where the instrument will be exposed to direct sunlight, or where the operating temperature exceeds the range 0°C to 55°C (0°F to 131°F).
- Where the relative humidity is outside the range 10 to 90%, or where sudden temperature changes may occur and cause condensation.
- Where corrosive or flammable gases are present.
- Where the instrument will be exposed to direct mechanical vibration or shock.
- Where the instrument may be exposed to extreme levels of radioactivity.

● Use the correct types of wire for external wiring:

- Use copper wire with temperature ratings greater than 75°C.

● Securely tighten screws:

- Securely tighten module mounting screws and terminal screws to avoid problems such as faulty operation.
- Tighten terminal block screws with the correct tightening torque as given in this manual.

● Securely lock connecting cables:

- Securely lock the connectors of cables, and check them thoroughly before turning on the power.

● Interlock with emergency-stop circuitry using external relays:

- Equipment incorporating the FA-M3 controller must be furnished with emergency-stop circuitry that uses external relays. This circuitry should be set up to interlock correctly with controller status (stop/run).

● Ground for low impedance:

- For safety reasons, connect the [FG] grounding terminal to a Japanese Industrial Standards (JIS) Class D Ground*1 (Japanese Industrial Standards (JIS) Class 3 Ground). For compliance to CE Marking, use cables such as twisted cables which can ensure low impedance even at high frequencies for grounding.

  *1 Japanese Industrial Standard (JIS) Class D Ground means grounding registance of 100Ω max.

● Configure and route cables with noise control considerations:

- Perform installation and wiring that segregates system parts that may likely become noise sources and system parts that are susceptible to noise. Segregation can be achieved by measures such as segregating by distance, installing a filter or segregating the grounding system.

● Configure for CE Marking Conformance:

- For compliance to CE Marking, perform installation and cable routing according to the description on compliance to CE Marking in the “Hardware Manual” (IM34M6C11-01E).

● Keep spare parts on hand:

- Stock up on maintenance parts including spare modules, in advance.

● Discharge static electricity before operating the system:

- Because static charge can accumulate in dry conditions, first touch grounded metal to discharge any static electricity before touching the system.

● Never use solvents such as paint thinner for cleaning:

- Gently clean the surfaces of the FA-M3 controller with a cloth that has been soaked in water or a neutral detergent and wringed.
- Do not use volatile solvents such as benzine or paint thinner or chemicals for cleaning, as they may cause deformity, discoloration, or malfunctioning.

● Avoid storing the FA-M3 controller in places with high temperature or humidity:

- Since the CPU module has a built-in battery, avoid storage in places with high temperature or humidity.
- Since the service life of the battery is drastically reduced by exposure to high temperatures, take special care (storage temperature should be from –20°C to 75°C).
- There is a built-in lithium battery in a CPU module and temperature control module which serves as backup power supply for programs, device information and configuration information. The service life of this battery is more than 10 years in standby mode at room temperature. Take note that the service life of the battery may be shortened when installed or stored at locations of extreme low or high temperatures. Therefore, we recommend that modules with built-in batteries be stored at room temperature.

● Always turn off the power before installing or removing modules:

- Failing to turn off the power supply when installing or removing modules, may result in damage.

● Do not touch components in the module:

- In some modules you can remove the right-side cover and install ROM packs or change switch settings. While doing this, do not touch any components on the printed-circuit board, otherwise components may be damaged and modules may fail to work.

■ Waste Electrical and Electronic Equipment

Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC
(This directive is only valid in the EU.)

This product complies with the WEEE Directive (2002/96/EC) marking requirement.
The following marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category
With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a “Monitoring and Control instrumentation” product.
Do not dispose in domestic household waste.
When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

Introduction

■ Overview of This Manual

This manual describes the specifications and use of the Memory Card Module.

■ Other Instruction Manuals

For individual sequence CPU modules, please refer to the relevant instruction manuals.

F3SP28 F3SP38 F3SP53 F3SP58 F3SP59

● For functions

- Sequence CPU Modules – Functions (for F3SP28-3N/3S, F3SP38-6N/6S, F3SP53-4H/4S, F3SP58-6H/6S, F3SP59-7S) (IM34M6P13-01E)
- Sequence CPU Modules – Functions (IM34M6P13-01E) 2nd Edition or later

● For creating ladder programs

- FA-M3 Programming Tool WideField2 (IM34M6Q15-01E)

F3SP05 F3SP08 F3SP21 F3SP25 F3SP35

● For functions

- Sequence CPU Instruction Manual – Functions (for F3SP21, F3SP25 and F3SP35) (IM34M6P12-02E) 3rd Edition or later
- Sequence CPU Modules – Instructions (IM34M6P13-01E) 2nd Edition or later

● For creating ladder programs

- FA-M3 Progamming Tool WideField2 (IM34M6Q15-01E)

Refer to the following manuals for all sequence CPU modules.

● For error codes displayed in error logs

- Personal Computer Link Commands (IM34M6P41-01E)

● Specifications and Layout*1 of the FA-M3, Mounting and Wiring, Testing, Maintenance and Inspection, and System-wide Restrictions for Mounting Modules

*1: See specific manuals for products other than the power module, base module, I/O module, cables, and terminal block units.

Hardware Manual (IM34M6C11-01E) 9th edition or later.

How to Read This Manual

This instruction manual refers to the following terminologies, without providing any explanation. It is assumed that a reader understands these terminologies.

- Flash memory
- Compact flash (abbreviated as CF in this book)
- FAT file system
- Long file name
- Current directory
- Root directory
- Partition
- USB
- Big endian, little endian

All relays, registers, switches and LEDs are marked with initial capitalization (e.g. Execute Command relay) in this book to facilitate reading.

File names and directory names are enclosed within double quotation marks (“ “).

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FA-M3

Memory Card Module

IM 34M6C22-01E 1st Edition

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1. Overview

The Memory Card Module provides support for compact flash (hereinafter abbreviated as CF) memory when it is mounted in an I/O slot of the range-free controller FA-M3.

By issuing commands* from a ladder program to the Memory Card Module in Ladder Access mode, contents of CPU module devices can be saved as files to the CF. Likewise, device data can be read from files saved in the CF and written to the CPU module.

In Maintenance mode, you can download a ladder program file to the CPU module without using a ladder program. Likewise, contents of CPU module devices can be stored as files on the CF.

The Memory Card Module can be inserted or removed with the power turned on. This is known as online attachment and detachment. You can then simply insert the CF thus removed in a PC and use it in a Windows environment. For details, see Section 5, “Using the CF with a Personal Computer.”

*: To issue a command to the Memory Card Module, set up relevant parameters such as the command number in registers in the memory card module and then turn on the Issue Command relay.

1.1 Specifications

■ Model and Suffix Codes

Model Code	Suffix Code	Style Code	Additional Code	Remarks
F3EM01	-0N	·····	·····	Memory device: CF

■ Operating Environment

Mount a sequence CPU module to slot 1 of the main unit. See “Functional Specifications” below for compatible CPU modules.

■ Functional Specifications

Item	Specifications
Memory media	CF (Type1)
CF file system	FAT12, FAT16, FAT32 (Multiple partitions not supported)*1
Number of CF allowed	1
Compatible CPU modules	F3SP05, F3SP08, F3SP21, F3SP25, F3SP35, F3SP28, F3SP38, F3SP53, F3SP58, F3SP59
Types of information that can be stored	Individual devices of the sequence CPU module Ladder programs CPU error logs or user logs
Number of modules allowed	For F3SP05, F3SP08, F3SP21: 2*2 max. For F3SP25, F3SP28, F3SP35, F3SP38, F3SP53, F3SP58, F3SP59: 6*1 max.
Temperature range	0°C to 55°C (but without exceeding the maximum temperature rated for the CF less 15°C.” For example, if the temperature rating of the CF is 0°C to 60°C, the operating temperature range will be 0°C to 45°C.)
Current consumption	300 mA (excluding the CF)
External dimensions	28.9 (W)×100 (H)×83.2 (D) mm*3
Weight	100 g

*1: Take note that accessing a FAT32 format CF is considerably slower than accessing a FAT16 format CF. We recommend FAT16 format for CF of capacity 2GB or less.

*2: Total number of modules with equivalent functions (Personal Link Module, Multi-link Module, etc.)

*3: Dimensions exclude protrusions

■ Requirement Specifications for the CF

The following table lists the requirements specifications of the CF for use with the Memory Card Module.

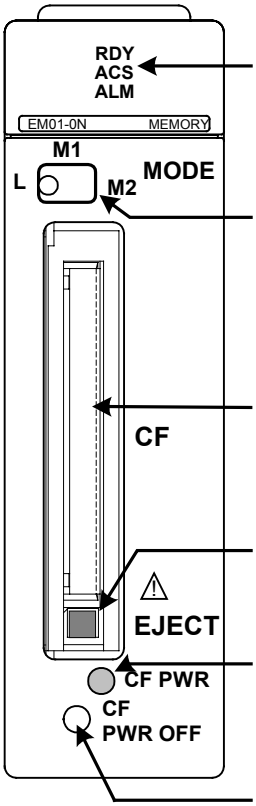
Item	Specifications
Card type	Storage Card (ATA interface compatible)
FC type	Type 1
Power voltage	3.3 V power supply must be supported.
Current consumption	100 mA max.
Format	FAT16 (multiple partitions not supported)*1

*1: The CF must be formatted before use.

CAUTION

The Memory Card Module does not have a CF formatting function. If your CF needs formatting, use a personal computer.

■ Components and Their Functions



LED Display
RDY: Lit when the module is operating normally.
ACS: Lit when the CF is being accessed.
ALM: Lit when an error has occurred, requiring the CF to be replaced.
Turns off when the CF is removed.

MODE switch
Switches the operation mode. The switch status is read when power is turned on or when the CF is inserted.
L : Ladder Access Mode
M1: Maintenance Mode (program 1)
M2: Maintenance mode (program 2)
(For details, see Section 1.2, "Switches")

CF (compact flash)
CF slot

EJECT button
Press this button the remove the CF. Always check that the CF PWR LED is off before doing so.
(For details, see Section 1.2, "Switches")

CF PWR (CF Power LED)
Lit: Power is supplied to CF.
Off: Power is not supplied to CF.
You may power down the module or remove the CF as required.
Flashing: Initializing or powering down CF.

CF PWR OFF (CF Power Off Switch)
Press this button to stop power supply to CF.

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TIP

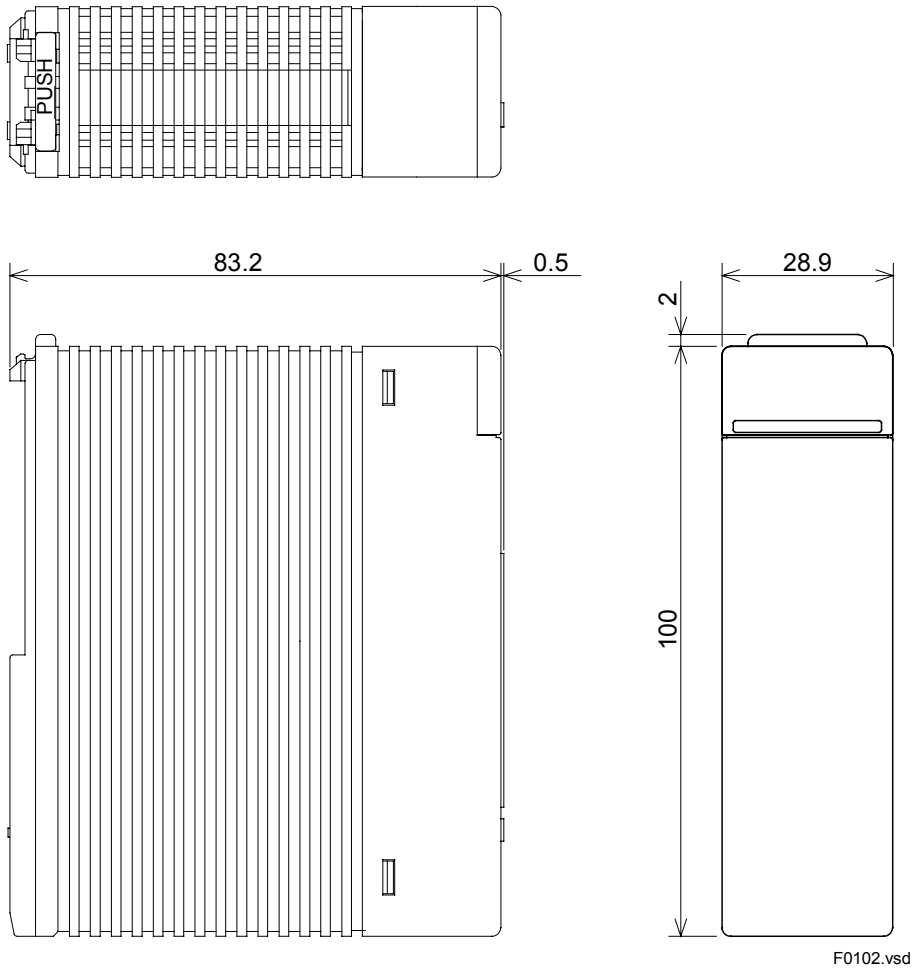
Use the small tip of a stick to press the CF PWR OFF (CF power-off) or the EJECT button.

■ I/O Specifications

The following table shows the pin assignment for the CF connectors. The Memory Card Module accesses the CF with PC Card Memory Mode.

Pin Number	Signal	Pin Number	Signal
1	GND	26	-CD1
2	D03	27	D11
3	D04	28	D12
4	D05	29	D13
5	D06	30	D14
6	D07	31	D15
7	-CE1	32	-CE2
8	A10	33	-VS1
9	-OE	34	-IORD
10	A09	35	-IOWR
11	A08	36	-WE
12	A07	37	RDY/BSY
13	VCC	38	VCC
14	A06	39	-CSEL
15	A05	40	-VS2
16	A04	41	RESET
17	A03	42	-WAIT
18	A02	43	-INPACK
19	A01	44	-REG
20	A00	45	BVD2
21	D00	46	BVD1
22	D01	47	D08
23	D02	48	D09
24	WP	49	D10
25	-CD2	50	GND

■ External Dimensions



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1.2 Switches

■ MODE Switch

The Memory Card Module supports two CF access modes.

- Accessing from a ladder program (Ladder access mode)

  This is the normal mode of accessing the CF using a ladder program.

- Accessing from the memory card module (Maintenance mode)

  This mode is generally used for maintenance, providing convenience during system configuration and information gathering during troubleshooting. All accesses to the CF from ladder programs are prohibited in maintenance mode.

The MODE Switch can be used to switch between the following operation modes.

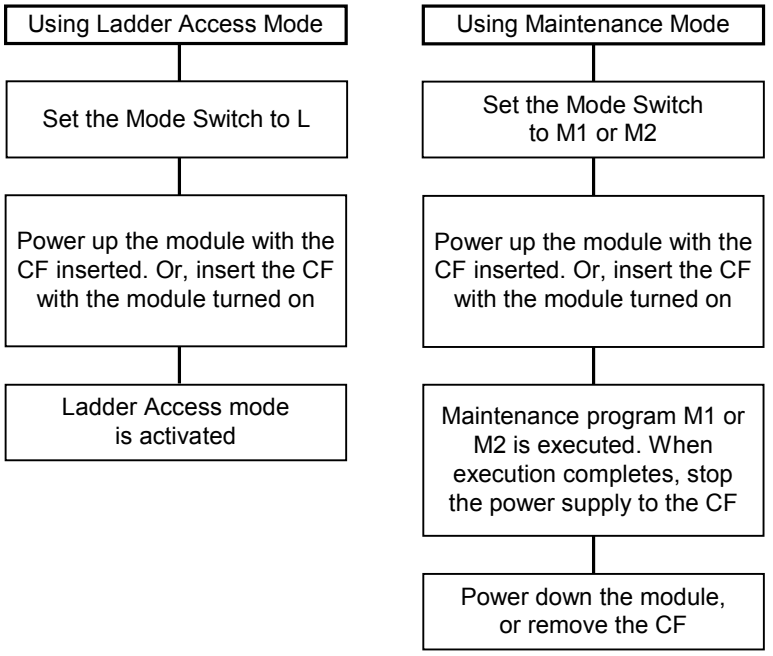
MODE Switch	Operation Mode	Remarks
L	Ladder access mode	
M1	Maintenance mode	Maintenance program 1*1 is executed.
M2	Maintenance mode	Maintenance program 2*1 is executed.

*1: A maintenance program is a text file containing program codes for commands that are executable in maintenance mode. The file should be saved in advance in a designated directory in the CF. Various commands can be stored in a maintenance program (e.g. command for downloading a ladder program). For details, see Section 4.3, “Maintenance Programs.”

The memory card module reads the Mode switch and operates according to the operation mode indicated when any of the following events occur:

- The FA-M3 is powered up with the CF mounted
- The CF is mounted with the FA-M3 turned on

The following flowchart illustrates how to set the operation mode for the Memory Card Module.



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■ CF PWR OFF Switch

Pressing the CF PWR OFF switch turns off the power supply to the CF. In this state, you can safely power down the FA-M3 or remove the CF.

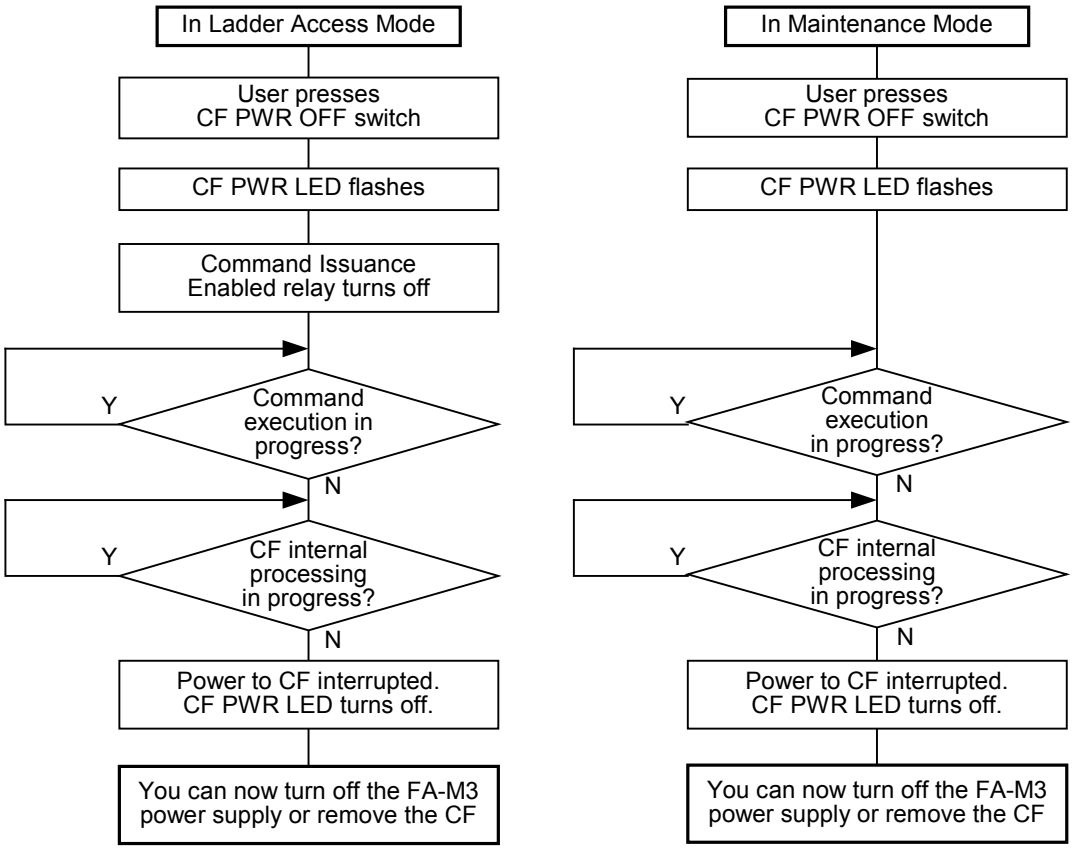
The CF PWR LED indicates whether the power supply to the CF is on or off.

The CF PWR LED flashes when the CF PWR OFF switch is pressed and eventually goes off when the power supply to the CF is turned off.

CAUTION

If the CF PWR OFF switch is pressed while the CF is being accessed, the Memory Card Module turns off the power to the CF only after data access completes. Hence, the CF PWR LED may take some time to turn off.

The following flowcharts illustrate the operation of the Memory Card Module when the CF PWR OFF switch is pressed.



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1.3 Attaching/Detaching the Module

■ Attaching/Detaching the Module

Figure 1.1 shows how to attach the module to the base module. First hook the anchor slot at the bottom of the module to be attached onto the anchor pin on the bottom of the base module. Push the top of this module in the direction of the arrow shown in the figure (toward the base module) until the top yellow button clicks into place.

CAUTION

Always attach/detach the module with the power off.

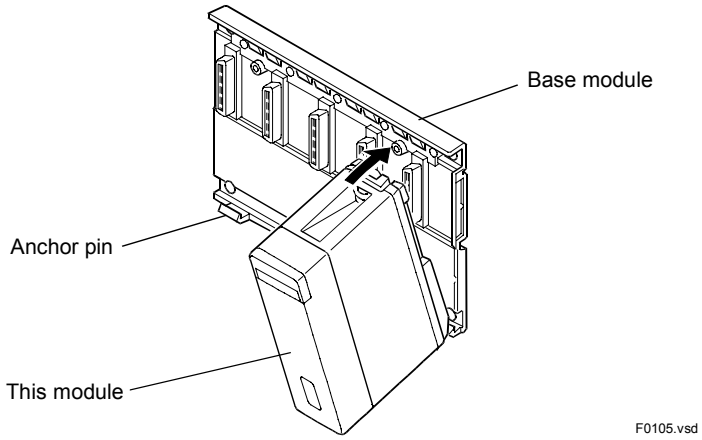

Figure 1.1 Attaching/Detaching the Module

CAUTION

DO NOT bend the connector pins on the rear of the module by force during the above operation. If the module is forcibly pushed with an improper connection, the pins of the connector may bend and this damage may cause an error.

■ Detaching the Module

To remove the module from the base module, reverse the operation by pressing the top yellow button to unlock it and tilting the module away from the base module. Then lift the module off of the anchor pin at the base.

■ Attaching the Module in Intense Vibration Environments

If the module is used in intense vibration environments, fasten the module with a screw of the type listed in the table below. With a Phillips screwdriver, tighten the screw into the hole on the top of the module.

Screw Required
M4-size Binder screw 12 to 15mm long (or 14 to 15 mm if fitted with a washer)

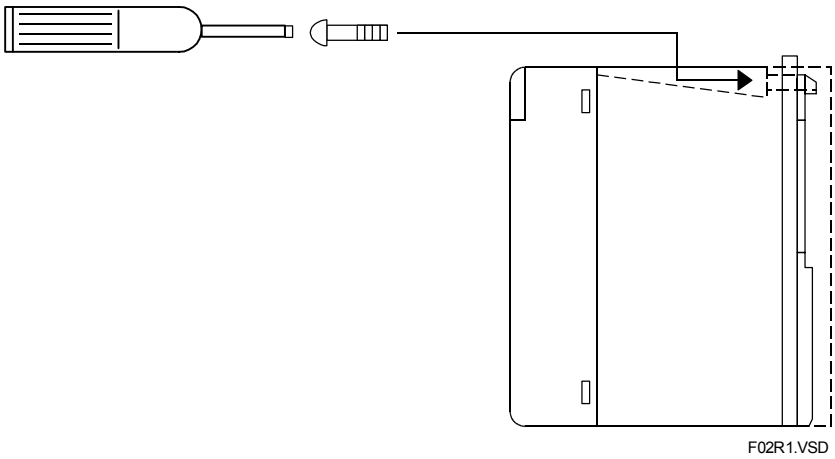

Figure 1.2 Tightening the Module

1.4 I/O Relays

Table 1.1 and Table 1.2 list the input relays and output relays available in the Memory Card Module respectively.

Interrupt is allowed for input relays.

Table 1.1 Input Relays

Input Relay	Signal Name	Operation in Ladder Access Mode	Operation in Maintenance Mode
X□□□01	Command issuance enabled	ON: Commands can be issued. OFF: Commands cannot be issued.	Always OFF
X□□□02	Executing command	ON: A command is being executed. OFF: No command is being executed.	Always OFF
X□□□03	Command execution completed	ON: Command execution has completed. Turning off the Issue Command relay also turns off this relay. When this relay is on, the following relay and registers contain valid values. - Command Execution Error relay - Error Code register - Warning Code register	Always OFF
X□□□04	Command execution error	The content of this relay is valid when the Command Execution Completed relay is on. Turning off the Issue Command relay also turns off this relay. ON: An error or warning was encountered during command execution. OFF: No error or warning was encountered.	Always OFF
X□□□05	Ladder access mode	ON: The module is in ladder access mode with the CF inserted. (This relay stays on even if the power to the CF is turned off.) This relay can be used to check whether the module is in ladder access mode. OFF: The CF is not inserted or the module is in the maintenance mode.	Always OFF
X□□□06	CF initialization normal	ON: Initialization was successfully completed with the module in ladder access mode and the CF inserted. This relay turns off when the power to the CF is turned off.	Always OFF
X□□□07	CF PWR	This relay synchronizes with the CF PWR LED. Check this relay before powering down the FA-M3 or removing the CF. ON: Power to CF is on. CF should not be removed. The CF PWR LED is on or flashing. OFF: Power to CF is off. You can safely power off the FA-M3 or remove the CF as required. The CF PWR LED is off.	The same as in ladder access mode
X□□□08	CF alarm	This relay synchronizes with the ALM LED. ON: An error has occurred during CF initialization. Or, an error has occurred during CF access, disabling it. CF access is no longer allowed. Power to the CF automatically turns off. When this relay is on, the ALM LED is also on. To reset this relay to off, remove the CF, or turn on the CF PWR ON relay again.	The same as in ladder access mode
X□□□13	CF PWR ON monitor	ON: Turning on the CF PWR ON relay also turns on this relay. It stays on until the power to the FA-M3 is turned off and then on again or the module is reset.	Unchanged
X□□□14	Write command monitor	ON: Turning on the Enable Write Command relay also turns on this relay. It stays on until the power to the FA-M3 is turned off and then on again, or until the module is reset.	Unchanged

Table 1.2 Output Relays

Output Relay	Signal	Operation in Ladder Access Mode	Operation in Maintenance Mode
Y□□□33	Issue command	ON: Issues command set in the register. After the Command Execution Completed relay turns on, check for errors. If no error has occurred, turn off this relay. You cannot issue the next command unless you first turn off this relay.	Ignored
Y□□□34	Enable write command	ON: Write command is enabled. OFF: Write command is disabled. Issuing a write command with this relay disabled causes an error and does not execute the command.	Ignored
Y□□□37	CF PWR ON	ON: Supplies power again to the CF after power interruption. This relay is enabled only under the following condition and ignored otherwise: The Ladder Access Mode relay is ON and the CF PWR relay is OFF. After power is supplied, initialization begins automatically. If initialization is successful, the CF Initialization Completed relay turns on. if initialization fails, the CF Alarm relay turns on. Whichever relay turns on, turn off the CF PWR ON relay. You do not normally need to use this relay. It is useful however for making the CF accessible without removing it, after its power supply is interrupted. Never turn off the power supply of the FA-M3 or remove the CF whilst turning on this relay.	Ignored
Y□□□38	CF PWR OFF	ON: The module disables access to the CF, performs end of access processing, stops the power supply to the CF and turns off the CF PWR relay. Turn off this relay after confirming that the CF PWR relay has turned off.	Ignored

1.5 Memory Card Module Registers

Table 1.3 lists the registers available in the Memory Card Module.

Table 1.3 Registers

Register	Register Name	R/W *1	Operation in Ladder Access Mode	Operation in Maintenance Mode
1	Command	W/R	Write the command number.	No change
2 to 10 (9 words)	Parameter	W/R	Write parameters as required for a command.	No change
11 to 110 (200 characters)	Command string*3	W/R	Write the file name or directory name as a character string. Append $00 at the end of the string.	No change
111 to 114*4		R	Returns revision of the firmware as a text code. 111: “RE” 112: “V:” 113: Returns revision number of the firmware as a text code. Example: “03” 114: Returns reserved code as text code. Normally, 2 space characters are returned.	No change
121	Error code	R	Returns an error code if error is encountered during execution of a command. Returns $0000 if no error is encountered.	No change
122	Warning code	R	Returns a warning code if error is encountered if the module detects an improper use. Returns $0000 if no warning is encountered.	No change
123	Number of registers in response string	R	Returns the number of registers (including the string end character, $00) with valid content in the response string. Returns $0000 if a command has no response string.	No change
124 to 130 (7 words)	Response data	R	Returns the response data for a command.	No change
131 to 230 (200 characters)	Response string *3	R	Returns the response string, terminated with the null byte ($00).	No change
241, 242 (long word)*2	Sector write count	R	Counts the number of CF sector write operations since module power up. Once the value reaches $FFFFFFFF, it remains unchanged. This value differs from the actual number of flash memory write operations within the CF.	Same as in ladder access mode
243	CF insertion count	R	Counts the number of CF insertions since module power up. Once the value reaches $FFFF, it remains unchanged.	Same as in ladder access mode
249, 250 (long word) *2	CF capacity	R	CF capacity in bytes. Value is updated when the CF is initialized. Contains $00000000 if no CF is inserted.	Same as in ladder access mode
253,254 (long word) *2	CF free space	R	Free space on the CF, given in bytes. Value is updated when the CF is initialized or when a CF write command completes execution. Contains $00000000 if no CF is inserted.	Same as in ladder access mode

*1: ”W/R” indicates that both read and write operations are allowed.
“R” indicates “read-only”. Values written are ignored but remain until the data is updated by the Memory Card Module.
*2: For long-word registers, the register with the smaller number stores the low-order word and the register with the larger number stores the high-word word.
*3: The command string and response string primarily contains character data.
*4: For firmware revision 2 or higher.

CAUTION

Access registers only when no command is being executed. The operation of any write access during command execution is not guaranteed. Likewise, values read during command execution are not guaranteed.

CAUTION

Do not write to reserved registers: registers 111 to 120 and 231 to 240.

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2. Precautions When Using the Memory Card Module

This chapter describes the precautions when using the Memory Card Module.

2.1 Precautions When Turning off Power to the Module

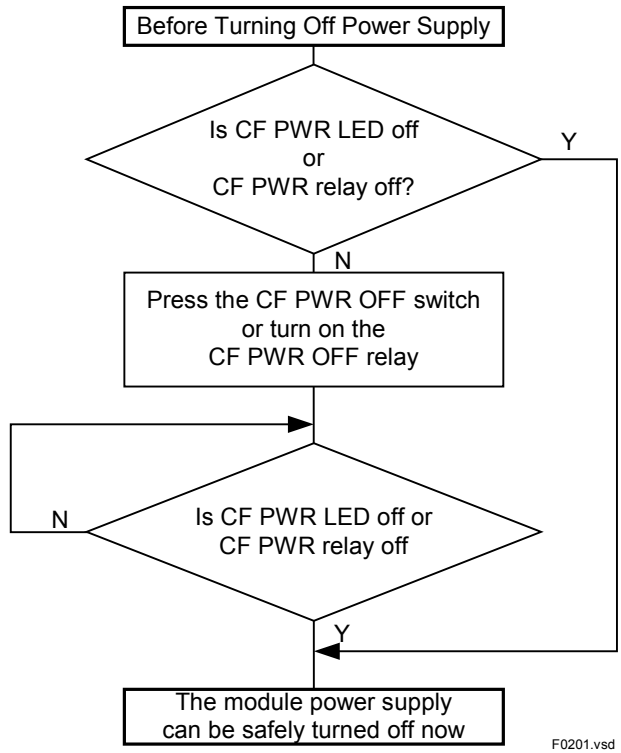
In a CF file system, a file being written will become invalid if the power supply is turned off during the write operation. The file system may also be damaged such that the free space on the CF may be reduced or the CF may become inaccessible.

Always perform the following checks to avoid inadvertently turning off the power during a write operation.

● Checks

Check that the CF PWR LED of the Memory Card Module is off, or the CF PWR relay is off.

● Flowchart for turning off the power to the module



CAUTION

Adopt the above power off procedure if a ladder program contains any command for writing to the CF.

TIP

If a ladder program does not contains any command to write to the CF, the power to the Memory Card Module may be turned off at anytime. Furthermore, if the Enable Write Command relay is never turned on, it is guaranteed that no commands for writing to the CF will be executed.

■ Precautions against Sudden Power Interruptions

During system design, take into consideration the possibility of power interruptions. When the power of the module is interrupted during a write operation due to say, a sudden power outage, the CF, the file system and hence the saved data may be damaged.

The following are some suggestions to avoid such damages.

- Create ladder programs that contain no command for writing to the CF.
- Extract data written in the CF regularly to minimize the extent of any damage.
- Mount two Memory Card Modules and write files twice, once for each module. In the event of power failure, data on at least one CF will be intact.
- Provide a relay inside the CPU module to indicate whether a write operation is in progress and always check this relay before turning off power. If power is turned off during a write operation, issue an alarm on the next startup.

2.2 Precautions When Removing the CF

Although a CF inserted in the Memory Card Module can be detached with the power on, observe the following precautions.

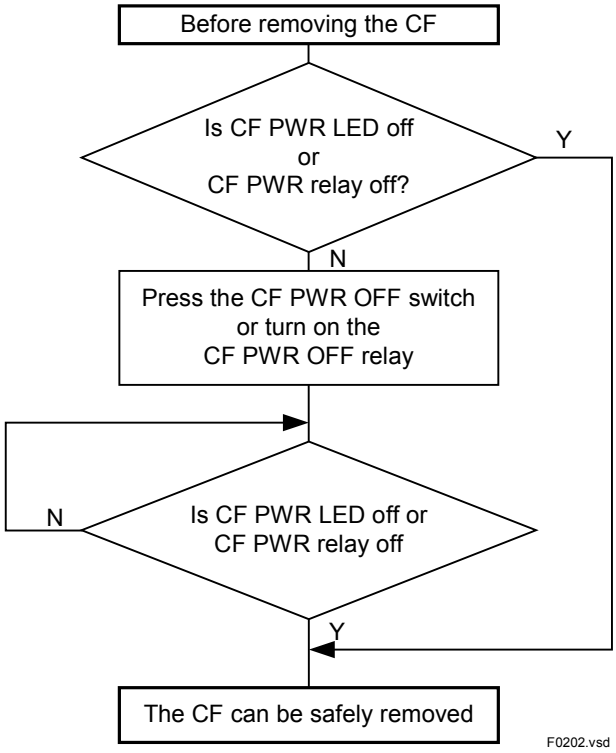
In a CF file system, if the CF is removed during a write operation, the file being written will become invalid. The file system may also be damaged such that the free space on the CF may be reduced or the CF may become inaccessible. An error will also be generated if the CF is removed during a read operation.

Always perform the following checks to avoid removing the CF during CF access.

● Checks

Ensure that the CF PWR LED of the Memory Card Module is off, or the CF PWR relay is off before removing the CF.

● Flowchart for removing the CF



2.3 Precautions When Using CF

● Limit on Number of Write Operations

The CF uses a flash memory as memory device. Flash memories have a limit on the number of write operations allowed. Beyond this limit, the rate of error occurrence during write or deletion operations increases. Restrict the usage of the CF within the limit stated in the specifications for a CF card.

The maximum number of allowable write operations is different for CF cards supplied by different manufacturers.

You may refer to the Sector Write Count register as required.

● Limit on Number of Insertions and Removals

A CF has limits on the number of insertions and removals. The Memory Card Module also has a limit for insertions and removals. The limit for the module is 10,000 times; the limit for the CF is also 10,000, as defined in its specification. You may refer to the CF Insertion Count register as required.

● Free Space on a CF

The time taken to access a CF increases dramatically when the amount of free space on the CF falls low. Always ensure that the CF has at least 1 MB of free space.

The Memory Card Module creates backup files to protect original files against CF write errors. (This feature is enabled only for device files. For more details, see Appendix 2, “Operation of the Memory Card Module.”) When reserving free space on a CF, take into consideration the space for these backup files.

● CF Insertion

Ensure that the CF is securely inserted into the Memory Card Module. Using a CF when it is partially inserted may cause damage to its file system.

● CF Removal/Insertion Interval

Allow a minimum interval of 1 second after inserting the CF into the Memory Card Module or after its removal for the system to stabilize. If the interval is too short, the CF may not be properly recognized.

2.4 Turning Off Power or Removing a CF during a CF Write Operation

During a CF write operation, if the CF is removed without using the CF PWR OFF switch or the power is interrupted (including the case of power outage), the file system may be damaged.

Always check the integrity of the file system on a personal computer before re-inserting the CF.

To check the file integrity, use the ScanDisk function included in Windows98 Second Edition or Windows98 Me. For a more stringent file system check, enable the following ScanDisk options: Invalid file names, Invalid dates and times, Duplicate names, and Report MS-DOS mode name length errors.

We do not recommend using the Check Disk function of Windows 2000 and Windows XP, or using the CHKDSK function of PC-DOS for this purpose.

2.5 Precautions When Using F3SP59

DANGER

Set the device capacities for internal relay and data register in the configuration as follows:

- Internal relay: 65504 max. (Default value is 65535)
- Data register: 65534 max. (Default value is 65535)

This constraint is required because the function for saving files in WideField2 device file format cannot handle relays and registers beyond the above ranges.

An error may be generated if you execute a wfload or wfsave command with configuration settings beyond the above ranges (Error code: $8100 to $9F00). In the event of an error, set the device capacities in the configuration as described above, and then reset the system or turn the power off and then on again.

2.6 Accessing the Memory Card Module

● Do not exceed the device range when writing to the CPU module

Do not exceed the CPU module device range (maximum device number) when reading a device file from the CF and writing it to the CPU module. Exceeding this range may result in incorrect operation.

To avoid this error, always observe the following procedure.

In ladder access mode, always set device numbers in “dload” commands and “csvload” commands within the device range.

In maintenance mode, place a “cpu” command at the beginning of the maintenance program to check the model of the CPU module to be accessed.

● A memory card module can only be accessed from a single CPU module

You can use ladder programs to access (read or write) the relays and registers in the memory card module. Note however that in a multi-CPU configuration, only one CPU module may issue commands to a memory card module. However, a CPU module may access the devices of other CPU modules.

● Only one access (a command) may be processed at any one time

After issuing a command, always ensure that the command has finished execution before issuing the next command.

● Read and write processing takes time

Not all commands can be completed in a single scan. The processing time of a command depends on the file size and the frequency of access by other modules. When writing device data prone to frequent changes to files, copy the device data to be written to a device area before saving it to a file.

2.7 File System

● Directories

The number of files that can be created in the root directory is virtually not limited. For those files that are also to be accessed by a memory card module, therefore, create subdirectories and then create such files in these subdirectories.

● Restrictions on File System

The following table lists the limitations of the FAT file system supported by the Memory Card Module against those supported by a PC running Windows.

Table 2.1 File System Limitations

Restrictions	FAT File System of Memory Card Module	FAT File System of a PC Running Windows
Length of full pathname (including file name)	99 characters max. (Exceeding this limit generates a warning, or may cause a command string to be truncated during execution.)	255 characters max.
Depth of directory tree	4 max. (a warning will be issued if this limit is exceeded)	No restriction
Characters allowed in file names and folder names.	Alphanumeric characters, underscores and periods only	Text characters with some exceptions

2.8 Errors And Warnings

The memory card module may return an error or a warning after command execution.

The table below lists the errors and warnings defined for the memory card module.

	Error	Warning
Checking for errors or warnings in ladder access mode	If the Command Execution Error relay (X□□□04) is on and the Error Code register (register number 121) is not equal to $0000 after execution of a command, it indicates that an error has occurred.	If the Command Execution Error relay (X□□□04) is on and the Warning Code register (register number 122) is not equal to $0000 after execution of a command, it indicates that a warning has occurred.
Checking for errors or warnings in maintenance mode	The ALM LED turns on when an error occurs. Check the execution results files, “M1.RES” and “M2.RES”. For details, see Section 4.3, “Maintenance Program.”	Check the execution results files, “M1.RES” and “M2.RES”. For details, see Section 4.3, “Maintenance Program.”
Cause	During command execution, an error was encountered so that execution could not continue.	During command execution, checking of parameters and other data detected conditions that are not allowed in a memory card module.
Execution result	The execution results are not guaranteed. The execution was not completed. Processing may also be incomplete.	The execution results are not guaranteed. Processing continues despite the warning. Operation may still be normal.
Trouble-shooting	Debug the program.	Debug the program.

TIP

A single command execution may return both an error and a warning.

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3. Ladder Access Mode

This chapter describes the Ladder Access Mode.

3.1 Overview

The Ladder Access mode allows the CF of the memory card module to be accessed from a ladder program.

Besides Ladder Access mode, Maintenance mode is the other operation mode available.

The Ladder Access mode allows

- Sequence CPU device contents to be read and saved as a file in a CF.
- Device contents saved as a file in a CF to be written to a sequence CPU
- Simple file system commands to be used on CF files or directories.

The following file formats are supported for sequence CPU device files. For details, see Appendix 1, “Files Supported by Memory Card Module”.

- WideField2 device file format
- Binary format
- CSV format (Comma-separated text file)

To activate Ladder Access mode, set the Mode switch to “L” and power up the module, or insert the CF. For details, see Section 1.2, “Switches”.

3.2 List of Commands

Table 3-1 lists the commands available in Ladder Access mode.

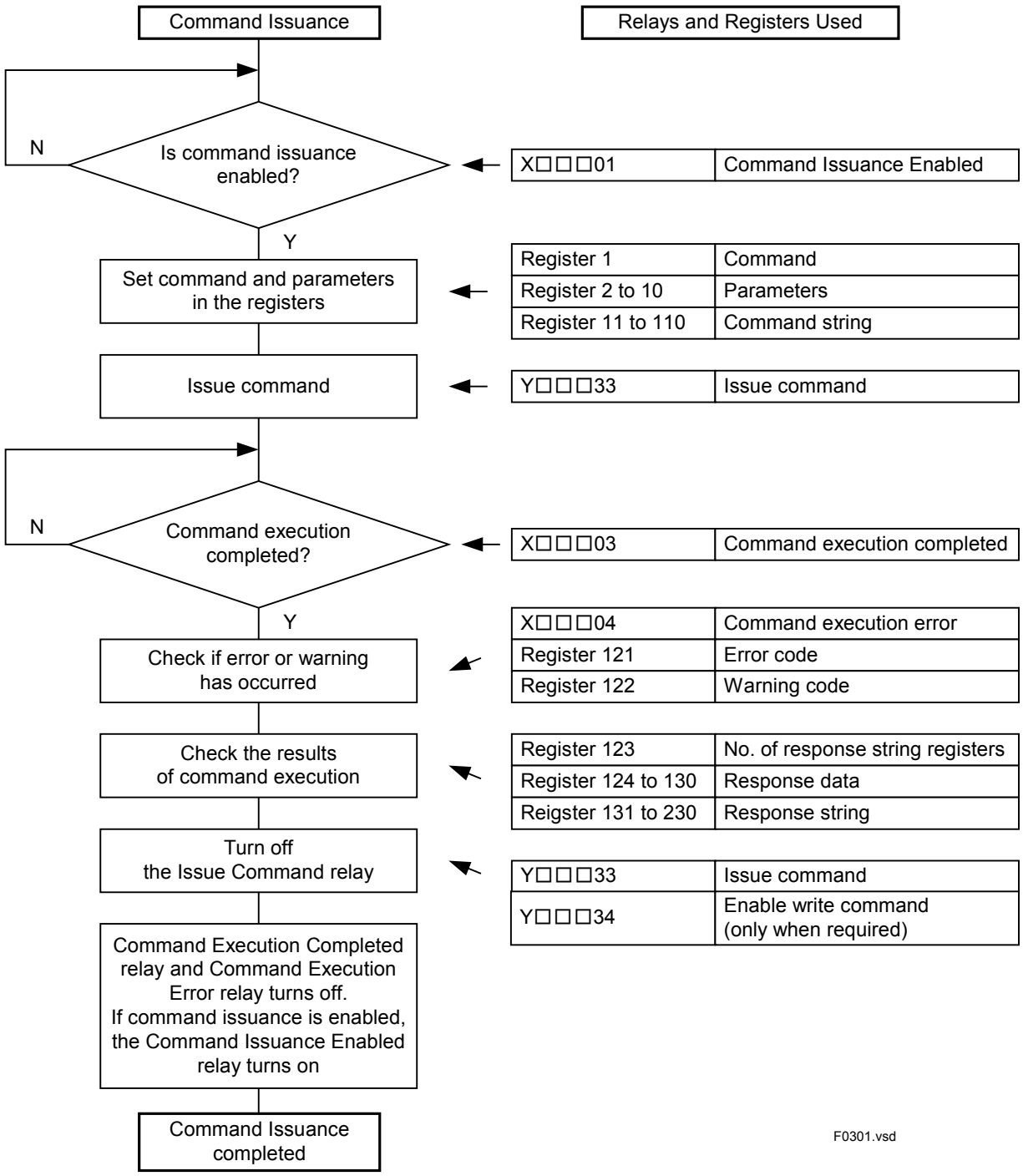
Table 3.1 List of Commands

Type	Command	No	Function	Note
File System	cd	$60	Changes the current directory	
	pwd	$61	Reads the current directory name (returns the full pathname from the root)	
	dir	$62	Lists file information.	
	mkdir	$64	Creates a directory.	*1
	rmdir	$65	Deletes a directory.	*1
	delete	$66	Deletes a file.	*1
	rename	$67	Renames a file.	*1
	attr	$68	Changes a file attribute.	*1
	copy	$69	Copies a file.	*1
CPU Device	wfload	$10	Loads device data (from a file formatted as a WideField2 device file).	
	wfsave	$11	Saves device contents (to a file formatted as a WideField2 device file).	*1
	dload	$20	Loads device data (from a binary format file).	
	dsave	$21	Saves device contents (to a binary format file).	*1
	dsavea	$22	Appends device contents (to a binary format file).	*1
	csvload	$30	Loads device data (from a CSV format file).	
	csvsave	$31	Saves device contents (to a CSV format file).	*1
	csvsavea	$32	Appends device contents (to a CSV format file).	*1

*1: Always turn on the Enable Write Command relay (Y□□□34) before issuing a command.

3.3 Access Procedure

The following flowchart illustrates the general access (command issuance) procedure in Ladder Access mode.



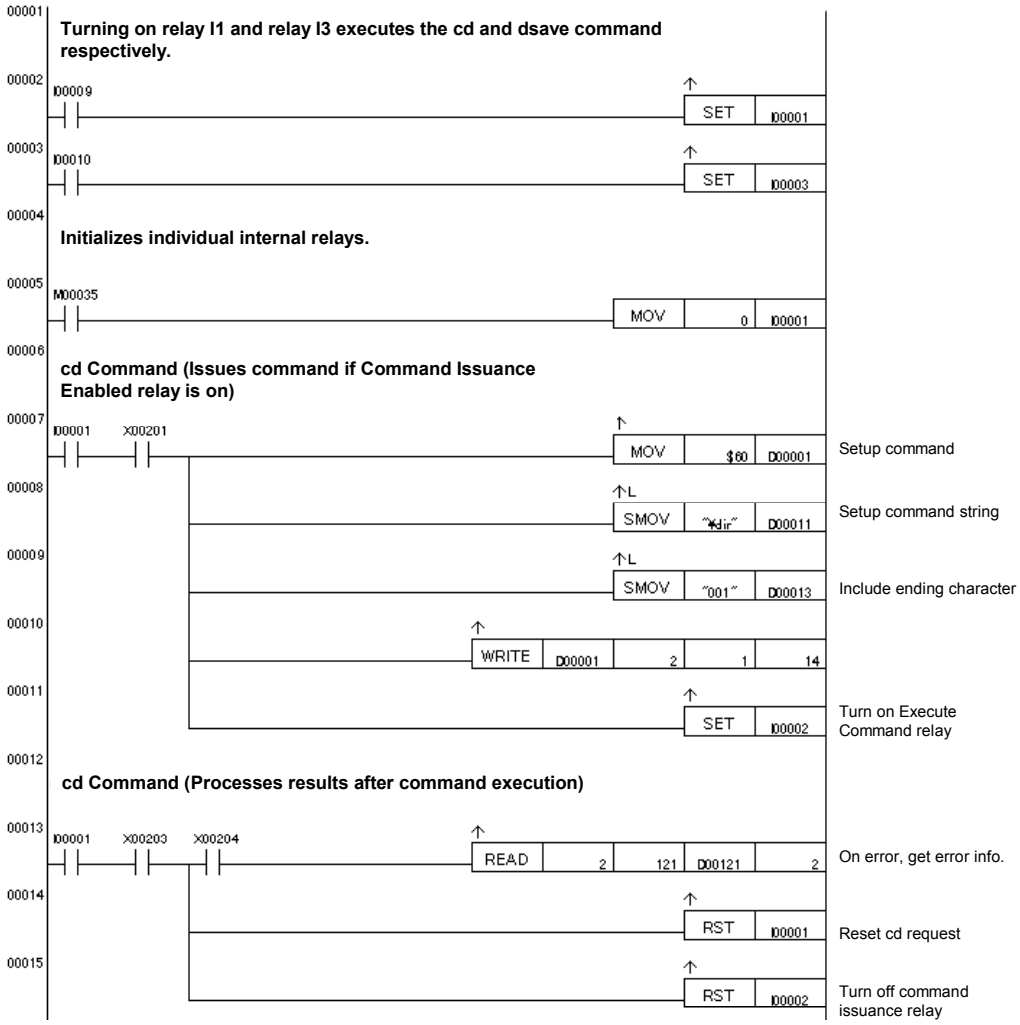
A sample ladder program is given below.

In the program, setting internal relay I1 uses the cd command to move the current directory to "\DIR001". Set internal relay I3 uses the dsave command to save device contents to a file. For details on commands, see Section 3.7, “Command Details". It is assumed that the module is configured as follows:

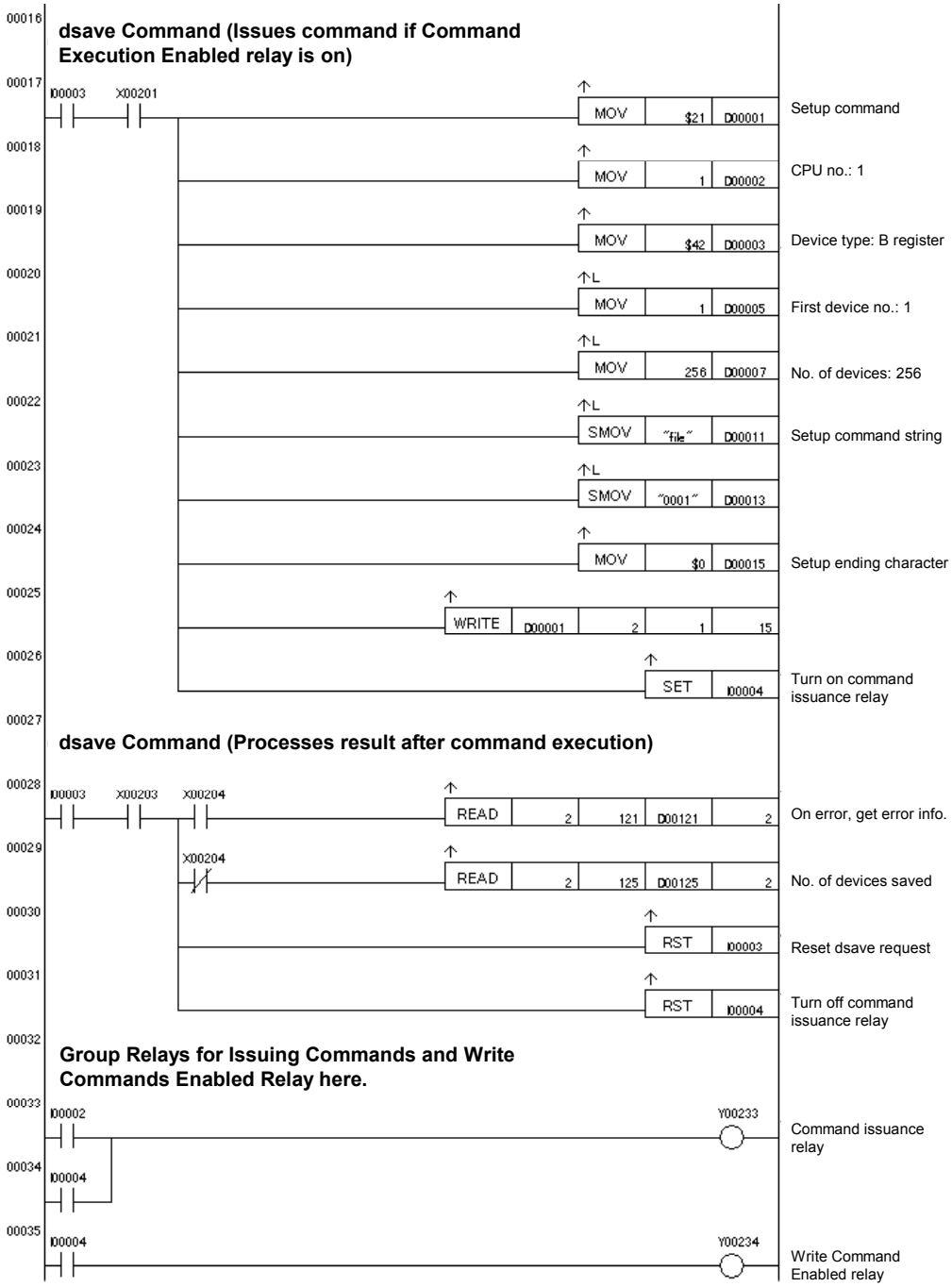
Slot 1: F3SP59 etc.; Slot 2: F3EM01

The following table lists the devices used in the sample program.

Device	Description	Function
I1	cd command request relay	This relay issues a cd command when it is set by another relay.
I2	cd command issue relay	The program turns on this relay when it issues a cd command, and resets it when the command completes execution.
I3	dsave command request relay	This relay issues a dsave command when it is set by another relay.
I4	dsave command issue relay	The program turns on this relay when it issues a dsave command, and resets it when the command completes execution.
D1	Buffer for command number	The program stores the command number in this device before executing a command.
D11 to D110	Buffer for command string	The program stores the command string in these devices before executing a command.
D121, D122	Buffer for error code	The module stores the error code or warning code in these devices after executing a command.
D131 to D230	Buffer for response string	The module stores the response string in these devices after executing a command.



*: The destination directory name is set in the program steps indicated as “Setup command string” and “Include ending character.”



*: The destination file name is set in the program steps indicated as “Setup command string” and “Include ending character.”

3.4 Specifying File Names and Directory Names

To specify a file name or directory name in Ladder Access mode, write the data in the command string (register number 11 to 110).

Observe the following restrictions when specifying file names or directory names.

● Always terminate a file name or directory name with the null character ($00). (This restriction is only applicable in Ladder Access mode)

For example, if a file name contains an odd number of characters, such as “ABCDE”, set the file name as follows:

Register Number	11	12	13
Setting	$4142	$4344	$4500

Example, if the file name contains an even number of characters, such as “ABCD”, set the file name as follows:

Register Number	11	12	13
Setting	$4142	$4344	$0000

● Maximum Lengths for file names or directory names

The full pathname relative to the root directory for a file must not exceed 99 characters (or 100 including the null string terminator $00).

A warning will be generated if this limit is exceeded.
For example, if file “FILE001” in the following directories is accessed, a warning will be issued because the full pathname exceeds 100 characters.

```
\12345678901234567890123456789012345678901234567890\12345678901234567890123456789 01234567890\FILE001
```

● Characters allowed in file names or directory names

Use only alphanumeric characters, underscore (“_”) and period (“.”) characters in file names or directory names.
Do not begin or end a file name or directory name with a period ($2E) or a space ($20) character.

Use the backslash character ("\") to separate directories.

The character codes table is given below.

Table 3.2 Character Allowed in the Memory Card Module (Only shaded characters are allowed)

	$00	$10	$20	$30	$40	$50	$60	$70
+$00			SP*1	0	@	P	`	p
+$01			!	1	A	Q	a	q
+$02			“	2	B	R	b	r
+$03			#	3	C	S	c	s
+$04			$	4	D	T	d	t
+$05			%	5	E	U	e	u
+$06			&	6	F	V	f	v
+$07			‘	7	G	W	g	w
+$08			(	8	H	X	h	x
+$09			)	9	I	Y	i	y
+$0A			*	:	J	Z	j	z
+$0B			+	;	K	[	k	{
+$0C			,	<	L	\	l	|
+$0D			-	=	M	]	m	}
+$0E			.*2	>	N	^	n	~
+$0F			/	?	O	_*3	o	

*1: SP($20) represents the space character
*2: Period ($2E) character
*3: Underscore ($5F) character

CAUTION

Alphabetic characters used in file names or directory names are not case-sensitive.

● Limit on subdirectory depth

Up to 4 subdirectory layers are allowed. A warning is generated if this limit is exceeded.

For example, accessing file "FILE001" in the following directory path does not generate a warning.

```
\DIR001\DIR002\DIR003\DIR004\FILE001
```

However, accessing file “FILE0001” in the following directory path generates a warning because the subdirectory depth is 5.

```
\DIR001\DIR002\DIR003\DIR004\DIR005\FILE001
```

● Limitations for individual commands (only applicable in Ladder Access mode)

When specifying file names and directory names in register names described in Section 3.7, “Command Details”, observe the following restrictions.

Register name	Applicable command	Cautions
Command string (File name)	dir ($0062) delete ($0066) rename ($0067) attr ($0068) wfload ($0010) wfsave ($0011) dload ($0020) dsave ($0021) dsavea ($0022) csvload ($0030) csvsave ($0031) csvsavea ($0032)	- Specify a file name. - Specify a file in the current directory. - Do not specify a file name with its directory path. - Always move the current directory to the target directory using the cd command before specifying a file name.
Command string (Directory name)	dir ($0062) mkdir ($0064) rmdir ($0065)	- Specify a directory name. - Specify a subdirectory in the current directory. - To specify a directory not in the current directory, first move the current directory using the cd command.
Command string (Destination directory name)	cd ($0060)	- Specify a directory name. - You can specify a subdirectory in the current directory. - To specify a directory that is not in the current directory, you can specify the full pathname relative to the root directory. Begin the full pathname with a "\" character. - You can also specify a pathname relative to the current directory. Use a "\" character to separate subdirectory names. - Do not use “..” or “.” To indicate the current directory or the parent directory. Example 1: To move to subdirectory "DIR002" below subdirectory "DIR001" in the current directory, specify “DIR001\DIR002”. Example 2: To move to subdirectory "DIR002" under subdirectory “DIR001” in the root directory, specify "\DIR001\DIR002".
Command string (Full pathname relative to the root directory)	copy ($0069)	- Specify the full pathname relative to the root directory. - Precede each directory name or file name with a "\" character. Example: “\IR001\IR002\ILE001”

3.5 Specifying CPU Devices

● Specifying a device type (only applicable in ladder access mode). The way device types are specified depends on individual commands and CPU devices.

Command	wfload wfsave		dload dsave dsavea csvload csvsave csvsavea	Remark
Register to be set / CPU Device	Register 3	Register 4	Register 3	
Internal relay	'I'(=$0049)	$0000		
Special relay	'M'(=$004D)	$0000		*1
Shared relay	'E'(=$0045)	$0001		
Extended shared relay		$0002		
Link relay (Line 1)	'L'(=$004C)	$0001		
Link relay (Line 2)		$0002		
Link relay (Line 3)		$0003		
Link relay (Line 4)		$0004		
Link relay (Line 5)		$0005		
Link relay (Line 6)		$0006		
Link relay (Line 7)		$0007		
Link relay (Line 8)		$0008		
Timer	'T'(=$0054)	$0000		*2
Counter	'C'(=$0043)	$0000		*2
Data register	'D'(=$0044)	$0000	'D'(=$0044)	
Special register	'Z'(=$005A)	$0000		*1
Shared register	'R'(=$0052)	$0001		
Extended shared register	'R'(=$0052)	$0002		
Link register (Line 1)	'W'(=$0057)	$0001		
Link register (Line 2)		$0002		
Link register (Line 3)		$0003		
Link register (Line 4)		$0004		
Link register (Line 5)		$0005		
Link register (Line 6)		$0006		
Link register (Line 7)		$0007		
Link register (Line 8)		$0008		
Index register	'V'(=$0056)	$0000		
File register	'B'(=$0042)	$0000	'B'(=$0042)	*3

*1 The wfload command cannot be used for special relays or special registers.
*2 If a timer or counter is specified, both the up-relay and current value will be transferred.
*3 Specifying a file register for a CPU module without file registers generates an error.

3.6 File Attributes

Files and directories have attributes. The attributes supported in the memory card module are similar to those in a FAT file system.

The table below lists the file attributes.

Table 3.3 File Attributes

Attribute bit	Description (when set to 1)
0	Write protection
1	Hidden file
2	System file
3	Disk drive volume label
4	Directory
5	Archive bit. Normally set to "1". Although the memory card module allows file access regardless of this attribute value, leave the value unchanged as "1".
6 to 15	Always "0"

CAUTION

No file or directory with any of its attribute bits 1, 2, or 3 set to "1" can be accessed from the memory card module. Any attempt to access such a file generates an error.

CAUTION

Write protected files cannot be overwritten or deleted. To overwrite or delete such a file, use the attr command to first change its write protection attribute.

3.7 Command Details

This section provides detailed description of each command available in Ladder Access mode.

■ cd Command (Ladder Access Mode)

● Function

Moves the current directory.

● Request registers

Register No.	Register Name	Setting
1	Command	Specify the command number as $0060.
11 to 110	Command string (Destination directory name)	Specify the name of the destination directory. For details on how to specify a directory, see Section 3.4 "Specifying File Names and Directory Names."

● Response registers

Register No.	Register Name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since the command has no response string.

● Example: Changing the current directory to "\ ABCDE"

Request register preset values

Register Name	Register No.	Setting	Description
Command	1	$0060	cd command
Command string (Destination directory name)	11	$5C41(=”\A”)	Destination directory name "\ABCDE"
	12	$4243(=”BC”)	
	13	$4445(=”DE”)	
	14	$0000	

Register contents for a normal response

Register Name	Register No.	Response Value	Description
Error code	121	$0000	No error
Warning code	122	$0000	No warning
Number of registers in response string	123	$0000	No response string

CAUTION

The CF always sets the current directory to a relevant sub-directory before accessing a file (say in a save operation). Removing and re-inserting the CF sets the current directory to the root directory.

After detecting a CF insertion, use the cd command to change the current directory as required.

To detect a CF insertion, use the Initialize CF relay (X□□□06).

■ pwd Command (Ladder Access Mode)

● Function

Returns the current directory name as the path from the root directory.

● Request registers

Register No.	Register name	Setting	Remark
1	Command	Specify the command number as $0061.	

● Response registers

Register No.	Register name	Response	Remark
121	Error code	Stores the error code after command execution.	
122	Warning code	Stores the warning code after command execution.	
123	Number of registers in response string	Stores the number of valid registers written in the response string.	
131 to 230	Response string (Directory name relative to the root directory)	Stores the full pathname of the current directory name relative to the root directory.	

● Example: Executing a pwd command in current directory "\ABCDE".

Request register setting

Register name	Register No.	Setting	Description
Command	1	$0061	pwd command

Response register values for a normal response

Register name	Register No.	Response value	Description
Error code	121	$0000	No error
Warning code	122	$0000	No warning
Number of registers in response string	123	$0004	Response string contains 4 words
Response string (Directory name relative to the root directory)	131	$5C41(=”/A”)	Current directory name "\ABCDE" relative to the root directory
	132	$4243(=”BC”)	
	133	$4445(=”DE”)	
	134	$0000	

■ dir Command (Ladder Access Mode)

● Function

Returns a list of information on the files and directories in the current directory.
You can use the wildcard character to limit the number of files and directories displayed.

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0062.
2	Parameter (Number of files)	Specify the number of files to skip. If the current directory contains too many files and subdirectories to be retrieved in a single command execution, you will need to issue the dir command more than once. Use this parameter to skip information retrieved in earlier executions. Specify a value of $0000 for the first dir command.
11 to 110	Command string (File name, Directory name)	Specify the files and directories in the current directory to be retrieved. To retrieve all files and directories: Set register 11 to $0000. To retrieve a specified file or directory: Specify the name of a file or directory. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.” To retrieve files and directories using the wildcard character: File names and directory names can be specified using any of the following wildcard characters. "*" (=$2A): Matches any number of characters "?" (=$3F): Matches any single character. For details on the file names and directory names allowed, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution. An error invalidates the data in registers 124 through 230
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string.
124	Response data (Number of files and directories)	Stores the number of files and directories already retrieved.
125	Response data (Number of files and directories)	Stores the number of files and directories returned in the Response string.
126	Response data (End flag)	Indicates whether all files and directories have been retrieved. $0000: No. $FFFF: Yes.
131 to 230	Response string (File and directory information)	Stores successive file and directory information. For details, see the next page.

Data structure for information of a file (in Response string)

Offset	Description	Details
+0	Attribute	For details of attributes, see Section 3.5 “File Attributes”.
+1	Update time: Year	1900 to 2099. Example: 2001 for the Year 2001.
+2	Update time: Month	1 to 12. Example: 12 for December
+3	Update time: Day	1 to 31. Example: 18 for the 18th day of a month
+4	Update time: Hour	0 to 23. Example: 17 for 17:00 hours
+5	Update time: Minute	0 to 59. Example: 40 for 40 minutes
+6, +7 (Long)	Full size	Measured in bytes
+8	Number of registers (n) for file name	Stores the number of registers containing the file name (including the terminating null character ($00)) of the following file.
+9 to +(n+8)	File name (2 x n characters)	The file name is terminated with $00.

CAUTION

The dir command may take time to respond if the current directory contains many files and directories.

● Example: Executing a dir command to display all files, with the following files and directories contained in the current directory.

Contents of the current directory

Contents of the Directory	Attribute	YY/MM/DD	Time	File Size
File name “FILE001”	$20	2002/02/28	12:00	1024 bytes
Directory name “DIR001”	$10	2000/01/01	00:00	—

Request register setting

Register Name	Register Number	Setting	Description
Command	1	$0062	dir command
Parameter (Number of files)	2	$0000	Number of files to skip
Command string (File name, directory name)	11	$0000	Reads information on all files and directories in the current directory.

Response register values for a normal response

Register name	Register No.	Response value	Description
Error code	121	$0000	No error
Warning code	122	$0000	No warning
Number of registers in response string	123	$001A	Response string contains 26 words
Response data (Number of files)	124	$0002	Number of files already retrieved: 2
Response data (Number of files)	125	$0002	Number of files returned in response string: 2
Response data (End flag)	126	$FFFF	$FFFF: All files have been retrieved.

- Information on first item

Response string (File and directory information)	131	$0020	File attribute: File	
	132	2002	Year 2002	Update time
	133	2	February	
	134	28	28th	
	135	12	1200 hours	
	136	0	0 minutes	
	137	$0400	File size: 1024 bytes	
	138	$0000		
	139	$0004	Number of registers in file name: 4 words	
	140	$4649 (=”FI”)	File name: ”FILE001”	
	141	$4C45 (=”LE”)		
	142	$3030 (=”00”)		
	143	$3100 (=”1”)		

- Information on second item

Response string (File and directory information)	144	$0010	File attribute: Directory	
	145	2000	Year 2000	Update time
	146	1	January	
	147	1	1st	
	148	0	0 hour	
	149	0	0 minutes	
	150	$0000	File size: —	
	151	$0000		
	152	$0004	Number of registers in directory name: 4 words	
	153	$4449 (=”DI”)	Directory name: ”DIR001”	
	154	$5230 (=”R0”)		
	155	$3031 (=”01”)		
	156	$0000		

■ mkdir Command (Ladder Access Mode)

● Function

Creates a subdirectory in the current directory.

Specify only one directory to be created at each time. Specifying a subdirectory several levels down to create multiple directories is not allowed.
This command generates an error if the Enable Write Command relay is off.

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0064.
11 to 110	Command string (Directory name)	Specify the name of the directory to be created. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.

● Example

See the example for the cd command.

■ rmdir Command (Ladder Access Mode)

● Function

Deletes a subdirectory in the current directory.
A directory cannot be deleted unless it is empty. Any attempt to delete a non-empty directory generates an error.

This command generates an error if the Enable Write Command relay is off.

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0065.
11 to 110	Command string (Directory name)	Specify the name of the directory to be deleted. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.

● Example

See the example for the cd command.

■ delete Command (Ladder Access Mode)

● Function

Deletes a file in the current directory.

This command generates an error if the Enable Write Command relay is off.

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0066.
11 to 110	Command string (File name)	Specify the name of the file to be deleted. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.

● Example

See the example for the cd command.

■ rename Command (Ladder Access Mode)

● Function

Changes the name of a file in the current directory.

This command generates an error if the Enable Write Command relay is off.

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0067.
11 to 60	Command string (File name)	Specify the file name to be changed. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”
61 to 110	Command string (File name)	Specify the new file name. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Response string Number of registers	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.

● Example

See the example for the cd command.

■ attr Command (Ladder Access Mode)

● Function

Changes an attribute of a file in the current directory.

This function is limited to changing one specific file attribute, switching between a read/write enabled file or a read-only file.

This command generates an error if the Enable Write Command relay is off.

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0068.
2	Parameter (Attribute)	Specify the new attribute. 0: read/write enabled file 1: read-only file
11 to 110	Command string (File name)	Specify the name of the file whose attribute is to be changed. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.

● Example:

See the example for the cd command.

■ copy Command (Ladder Access Mode)

● Function

Copies a specified file to the current directory. Note that a file cannot be copied to the same directory where it resides, or copied to another memory card module. The file name, attributes, and date of creation for the new file will be identical to those of the source file.

This command generates an error if the Enable Write Command relay is off.

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0069.
11 to 110	Command string (File name relative to the root directory)	Specify the copy source file relative to the root directory. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.

● Example:

See the example of the cd command.

■ wfload command (Ladder Access Mode)

● Function

Loads device data from a file saved in the WideField2 Device File format (.ydvf) in the current directory to specified devices of a sequence CPU module.

Each command execution loads all data for a single device type. To load data for multiple device types, reissue the wfload command after specifying a new device type.

For details on the CPU module devices that can be specified, see Section 3.5, “Specifying CPU Devices”.

For details on WideField2 Device File format, see Appendix 1.1, "WideField2 Device File Format".

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0010.
2	Parameter (CPU number)	Specify the slot number for the destination sequence CPU module. The valid range is $0001 through $0004.
3,4	Parameter (Device type)	Specify the device type to be loaded. For details on how to specify devices, see Section 3.5, “Specifying CPU Devices”.
11 to 110	Command string (File name)	Specify the name of the file to be read. Do not include the file extension. The file extension “.ydvf” will be automatically appended before reading. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution. An error invalidates the data contained in registers 125 through 128.
122	Warning code	Stores the warning code after command execution.
123	Response string Number of registers	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.
125,126*1	Response data (Number of devices)	Stores the number of devices actually written.
127,128*1	Response data (First device number)	Stores the number of the first device actually written.

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

CAUTION

Check the number of devices in the response data (registers 125 and 126) after command execution. If the number is not what you expect, check the file and parameters.

CAUTION

Care must be exercised when using the F3SP59 module. For more details, see Section 2.5, "Precautions When Using F3SP59".

● Example: Loading device data from file "abcde.ydvf" to file registers (B) of the CPU module mounted in Slot 2.

Suppose that file "abcde.ydvf" contains 100 words of data on file registers, starting from B101. Executing the following command updates 100 words of data, starting from B101, in the CPU module in Slot 2.

Request register setting

Register name	Register No.	Setting	Description
Command	1	$0010	wfload command
Parameter (CPU number)	2	$0002	CPU number: 2
Parameter (Device type)	3	$0042 (=’B’)	Device type: File register
	4	$0000	
Command string (File name)	11	$4142 (=”AB”)	Name of the file to be read: ”ABCDE”
	12	$4344 (=”CD”)	
	13	$4500 (=”E”)	

Response register values for a normal response

Register name	Register No.	Response value	Description
Error code	121	$0000	No error
Warning code	122	$0000	No warning
Number of registers in response string	123	$0000	No Response string
Response data (Number of devices)	125	$0064	Number of devices loaded: 100 words
	126	$0000	
Response data (Device No.)	127	$0065	Device number for the first device loaded: 101
	128	$0000	

■ wfsave Command (Ladder Access Mode)

● Function

Saves device data in the sequence CPU module to a WideField2 Device File format file (".ydvf") in the current directory.

Saves contents of all devices of the specified type.

This command generates an error if the Enable Write Command relay is off.

For details on the CPU module devices that can be specified, see Section 3.5, "Specifying CPU Devices".

For details on WideField2 Device File format, see Appendix 1.1, "WideField2 Device File format".

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0011.
2	Parameter (CPU number)	Specify the slot number for the destination sequence CPU module. The valid range is $0001 through $0004.
3,4	Parameter (Device type)	Specify the device type to be saved. For details on how to specify devices, see Section 3.5m “Specifying CPU Devices”.
11 to 110	Command string (File name)	Specify the name of the file to be saved. Do not include the file extension. The file extension ".ydvf" will be automatically appended before saving. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution. An error invalidates the data contained in registers number 125 and 126.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.
125, 126 (Long)	Response data (Number of devices)	Stores the number of devices actually saved.

CAUTION

- The WideField2 Device File format file is designed to store device data for multiple device types, but with the memory card module, only one device type can be saved to a file.
- If the command execution is successful but the number of devices in the response data (registers 125 and 126) is 0, no file will be created.
- Check the number of devices in the response data (registers 125 and 126) after command execution. If the number is not what you expect, check the file and parameters.
- Care must be exercised when using the F3SP59 module. For more details, see Section 2.5, "Precautions When Using F3SP59".

● Example: Saving all file registers of CPU module mounted in slot 2 to file "abcde.ydvf".

Request register setting

Register name	Register No.	Setting	Description
Command	1	$0011	wfsave command
Parameter (CPU number)	2	$0002	CPU number.: 2
Parameter (Reserved)	4	$0000	Device type: File register
Parameter (Device type)	3	$0042 (='B')	
Command string (File name)	11	$4142 (="AB")	Name of the file to be saved: "ABCDE"
	12	$4344 (="CD")	
	13	$4500 (="E")	

Response register values for a normal response

Register name	Register No.	Response value	Description
Error code	121	$0000	No error
Warning code	122	$0000	No warning
Number of registers in response string	123	$0000	No Response string
Response data (Number of devices)	125	$8000	Number of devices loaded: 32768 words
	126	$0000	

■ dload Command (Ladder Access Mode)

● Function

Loads device data from a binary file in the current directory to specified devices of a sequence CPU module.
For details on the CPU module devices that can be specified, see Section 3.5, "Specifying CPU Devices".

For details on binary files, see Appendix 1.2 "Binary Format".

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0020.
2	Parameter (CPU number)	Specify the slot number for the destination sequence CPU module. The valid range is $0001 through $0004.
3	Parameter (Device type)	Specify the device type to be loaded. For details on how to specify devices, see Section 3.5, “Specifying CPU Devices”.
4	Parameter (Reserved)	Set to 0.
5, 6*1	Parameter (First device number)	Specify the first device number for writing device data.
7, 8*1	Parameter (Number of devices)	Specify the number of devices to be loaded.
9, 10*1	Parameter (Offset)	Specify the offset (in number of words) from the top of the file for reading. To read from the top of the file, specify $0000 0000.
11 to 110	Command string (File name)	Specify the name of the file to be read. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution. An error invalidates the data contained in the registers 125 and 126.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in response string	Stores the number of valid registers written in the response string. Stores $0000 since this command has no response string.
125,126*1	Response data (Number of devices)	Stores the number of the devices actually loaded.

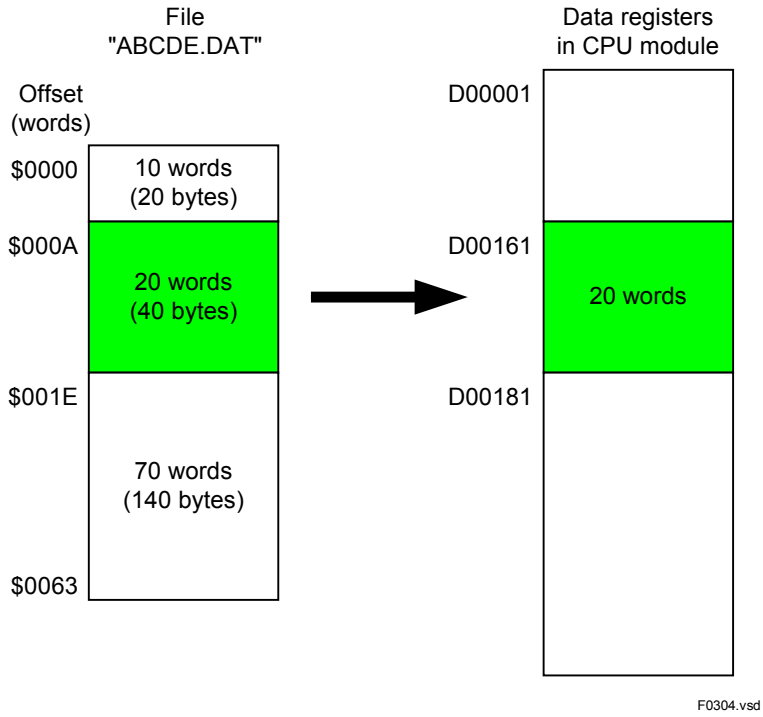
*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

CAUTION

Check the number of devices in the response data (registers 125 and 126) after command execution. If the number is not what you expect, check the file and parameters.

● Example: Loading device data from file "abcde.dat" to data registers of the CPU module mounted in slot 3.

Suppose the file "abcde.dat" contains 100 words of binary data. You can execute the following command to read 20 words of data starting from the tenth word and write it the CPU module mounted in slot 3, starting from device D161.



Request register setting

Register name	Register No.	Setting	Description
Command	1	$0020	dload command
Parameter (CPU number)	2	$0003	CPU number: 3
Parameter (Device type)	3	$0044 (='D')	Device type: data register
Parameter (Reserved)	4		Set to 0.
Parameter (First device number)	5	$00A1 (=161)	First device number: 161
	6	$0000	
Parameter (Number of devices)	7	$0014 (=20)	Number of devices to be loaded: 20words
	8	$0000	
Parameter (Offset)	9	$000A (=10)	Offset: 10 words
	10	$0000	
Command string (File name)	11	$4142 (="AB")	Name of the file to be read: "ABCDE.DAT"
	12	$4344 (="CD")	
	13	$452E (="E.")	
	14	$4441 (="DA")	
	15	$5400 (="T")	

Response register values for a normal response

Register name	Register No.	Response value	Description
Error code	121	$0000	No error
Warning code	122	$0000	No warning
Number of registers in response string	123	$0000	No Response string
Response data (Number of devices)	125	$0014 (=020)	Number of devices loaded: 20 words
	126	$0000	

■ dsave, dsavea Commands (Ladder Access Mode)

● Function

Saves device data of a sequence CPU module to a binary file in the current directory. If a file with the specified name exists, the dsave command overwrites the file whilst the dsavea command appends to the file.

These commands generate an error if the Enable Write Command relay is off.

For details on the CPU module devices that can be specified, see Section 3.5, "Specifying CPU Devices".

For details on binary files, see Appendix 1.2, "Binary Format".

● Request registers

Register No.	Register name	Setting		
1	Command	Specify the command number as $0021 for the dsave command. Specify the command number as $0022 for the dsavea command.		
2	Parameter (CPU number)	Specify the slot number for the sequence CPU module containing the device to be saved. The valid value range is $0001 through $0004.		
3	Parameter (Device type)	Specify the device type to be saved. For details on how to specify devices, see Section 3.5, “Specifying CPU Devices”.		
4	Parameter (options)*2	You can specify the following options:		
		Bit	Setting	Description
		15 to 10	Reserved	Set all bits to 0
		9	Backup file	0: Creates backup file when saving 1: For dsavea command, performs saving without creating backup file. This speeds up the save operation. Creates backup file for dsave command.
		8	Odd bytes	0: Performs saving according to the number of devices specified. An even number of bytes is saved. 1: Performs saving according to the number of devices specified less one byte. An odd number of bytes is saved. Set this option if you wish to save an odd number of bytes as, say, a text file.
		7 to 0	Reserved	Set all bits to 0
5, 6*1	Parameter (First device number)	Specify the first device number to be saved.		
7, 8*1	Parameter (Number of devices)	Specify the number of devices to be saved.		
11 to 110	Command string (File name)	Specify the name of the destination file. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”		

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

*2: For firmware revision 02 or higher. Specify $0000 for firmware revision 01.

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution. An error invalidates the data contained in the registers 125 and 126.
122	Warning code	Stores the warning code after command execution.
123	Response string Number of registers	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.
125,126*1	Response data (Number of devices)	Stores the number of devices actually saved.

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

● Example

See the example for the wfsave command.

CAUTION

Check the number of devices in the response data (registers 125 and 126) after command execution. If the number is not what you expect, check the file and parameters.

■ csvload Command (Ladder Access Mode)

● Function

Loads device data from a CSV format file (.csv) in the current directory to specified devices of a sequence CPU module.

For details on the CPU module devices that can be specified, see Section 3.5, "Specifying CPU Devices".

For details on CSV files, see Appendix 1.3, "CSV Format".

● Request registers

Register No.	Register name	Setting
1	Command	Specify the command number as $0030.
2	Parameter (CPU number)	Specify the slot number for the destination sequence CPU module. The valid setting range is $0001 through $0004.
3	Parameter (Device type)	Specify the device type to be loaded. For details on how to specify devices, see Section 3.5, “Specifying CPU Devices”.
4	Parameter (Reserved)	Set to 0.
5, 6*1	Parameter (First device No.)	Specify the first device number for writing data.
7, 8*1	Parameter (Number of devices)	Specify the number of the devices to be loaded.
11 to 110	Command string (File name)	Specify the name of the file to be read. Do not include the file extension. A ".csv".file extension is automatically appended before reading. For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

*2: For firmware revision 02 or higher. Specify $0000 for firmware revision 01.

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution. An error invalidates the data contained in the registers 125 and 126.
122	Warning code	Stores the warning code after command execution.
123	Number of registers in the response string	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.
125,126*1	Response data (Number of devices)	Stores the number of the devices actually loaded.

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

● Example

See the example for the dload command.

CAUTION

- Check the number of devices in the response data (registers 125 and 126) after command execution. If the number not what you expect, check the file and parameters.
- If the command execution is successful but the number of devices in the response data (registers 125 and 126) is 0, no file will be created.

■ csvsave, csvsavea Commands (Ladder Access Mode)

● Function

Saves device data of a sequence module CPU module to a CSV format file (.csv) in the current directory.

If a file with the specified name exists, the csvsave command overwrites the file whilst the csvsavea command appends to the file.

These commands generate an error if the Enable Write Command relay is off.

For details on the CPU module devices that can be specified, see Section 3.5, "Specifying CPU Devices".

For details on CSV files, see Appendix 1.3, "CSV Format".

● Request registers

<table>
<tr><th>Register No.</th><th>Register name</th><th colspan="3">Setting</th></tr>
<tr><td>1</td><td>Command</td><td colspan="3">Specify the command number as $0031 for csvsave.
Specify the command number as $0032 for csvsavea.</td></tr>
<tr><td>2</td><td>Parameter
(CPU number)</td><td colspan="3">Specify the slot number for the sequence CPU module holding the device to be saved.
The valid value range is $0001 through $0004.</td></tr>
<tr><td>3</td><td>Parameter
(Device type)</td><td colspan="3">Specify the device type to be saved.
For details on how to specify devices, see Section 3.5, “Specifying CPU Devices”.</td></tr>
<tr><td rowspan="7">4</td><td rowspan="7">Parameter
(options)*2</td><td colspan="3">You can specify the following options:</td></tr>
<tr><td>Bit</td><td>Setting</td><td>Description</td></tr>
<tr><td>15 to 10</td><td>Reserved</td><td>Set all bits to 0</td></tr>
<tr><td>9</td><td>Backup file</td><td>0: Creates backup file when saving
1: For csvsavea command, performs saving without creating backup file. This speeds up the save operation. Creates backup file for csvsave command.</td></tr>
<tr><td>8</td><td>Signed/
Unsigned</td><td>0: Converts all device data to signed text data before saving. Device data range is from –32768 to 32767.
1: Converts all device data to unsigned text data before saving. Device data range is from 0 to 65535.</td></tr>
<tr><td>7, 6</td><td>Reserved</td><td>Set all bits to 0</td></tr>
<tr><td>5 to 0</td><td>Number of columns</td><td>Specify the number of columns for the CSV file. The number of columns is the specified value plus one. Specify from 1 to 64 columns. For example, specify “0” for 1 column.</td></tr>
<tr><td>5, 6*1</td><td>Parameter
(First device No.)</td><td colspan="3">Specify the first device number to be saved.
For details on how to specify devices, see Section 3.5, “Specifying CPU Devices”.</td></tr>
<tr><td>7, 8*1</td><td>Parameter
(Number of devices)</td><td colspan="3">Specify the number of devices to be saved.
For details on how to specify devices, see Section 3.5, “Specifying CPU Devices”.</td></tr>
<tr><td>11 to 110</td><td>Command string
(File name)</td><td colspan="3">Specify the name of the destination file. Do not include the file extension. A “.csv” file extension will automatically be appended before saving.
For details on how to specify files and directories, see Section 3.4, “Specifying File Names and Directory Names.”</td></tr>
</table>

*1: For a long word register, the low-order word and the high-order word will be stored in the registers with the smaller and the larger number respectively.

*2: For firmware revision 02 or higher. Specify $0000 for firmware revision 01.

● Response registers

Register No.	Register name	Response
121	Error code	Stores the error code after command execution.
122	Warning code	Stores the warning code after command execution.
123	Response string Number of registers	Stores the number of valid registers written in the response string. Stores $0000 for this command since it has no response string.
125,126*1	Response data (Number of devices)	The number of the devices actually saved will be placed.

*1: A long word register carries the less significant word in the register of small number and the more significant word in the register of large number.

Example:

See the example for the wfsave command.

CAUTION

Check the number of devices in the response data (registers 125 and 126) after command execution. If the number is not what you expect, check the file and parameters.

4. Maintenance Mode

This chapter describes the Maintenance mode.

4.1 Overview

In Maintenance Mode, the Memory Card Module executes commands stored in a maintenance program file saved in the CF one at a time without using a ladder program. The maintenance mode can be used during system configuration or information gathering at system failure.

The Mode switch can be used to select one of two maintenance programs: “M1.PRG” or “M2.PRG”.

The Ladder Access mode is the other operation mode available.

The Maintenance mode provides the following functions:

- Reads device data from the sequence CPU and saves it to a file in CF.
- Loads device data from a file in CF to the sequence CPU.
- Uploads a ladder program from the CPU module and saves it to the CF.
- Downloads a ladder program saved in the CF to a CPU module.
- Saves the CPU module error log or user log in the CF.

The following file formats are supported for sequence CPU devices. For details, see Appendix 1, “Files Supported by Memory Card Module”.

- WideField2 Device File format
- Binary format
- CSV format (comma-separated text file)

To run the Maintenance mode, set the Mode switch to “M1” or “M2” and power up the module or insert the CF. For details, see Section 1.2, “Switches”.

CAUTION

In Maintenance mode, memory card module CF access from a ladder program is not allowed.

4.2 List of Commands

The following table lists the commands available in Maintenance mode.

Table 4.1 List of Commands

Type	Command	Function
File system	cd	Changes the current directory
	delete	Deletes a file.
Ladder-related	cpu	Checks the model number of the CPU module.
	start	Starts a ladder program.
	stop	Stops a ladder program.
	pload	Downloads a ladder program.*1
	psave	Uploads a ladder program.
	logsave	Saves error log.
	ulogsave	Saves user log.
CPU device	wfload	Reads device data (from a WideField2 Device File format file).
	wfsave	Saves device data (to a WideField2 Device File format file).
	dload	Reads device data (from a binary format file).
	dsave	Saves device data (to a binary format file).
	dsavea	Appends device data (to a binary format file)
	csvload	Read device data (from a CSV format file).
	csvsave	Saves device data (to a CSV format file).
	csvsavea	Appends device data (to a CSV format file).
Other	end	Ends a Command
	;	Comment

*1: The ladder program file to be downloaded should be a ladder program uploaded earlier using the memory card module.

4.3 Maintenance Program

A maintenance program file is a text file containing commands to be executed in Maintenance mode, with their parameters.

Keep the following in mind when preparing a maintenance file.

- Specify the file name as “M1.PRG” by setting the MODE switch to “M1”, or as “M2.PRG” by setting the switch to “M2”.
- Save the maintenance program file in the “\CMD” directory in the CF.
- One file can contain multiple commands. The commands will be executed sequentially from the top of the file.
- Write one command on a line. Place parameters after the command name.
- Separate commands and parameters with commas. Spaces are ignored. Code commands using the following format:

```
Command, parameter, …
```

- Enclose file names and directory names in a command within double quotes (” ”).
- Commands and parameters are not case-sensitive.
- Keep all lines in the maintenance program within 127 characters (excluding the line break character)

Examples:

```
cpu, 1, SP35
cd, “\abcde”
stop, 1
pload, 1, ”prg1”
start, 1
```

After a maintenance program file has been executed, the result will be saved as a file in the “\CMD” directory. The file names are “M1.RES” and “M2.RES” for maintenance programs “M1. PRG” and “M2.PRG” respectively. The file contains a list of command strings followed by their error information on the next line.

If execution is successful, the error information will be recorded as:

```
[OK]
```

If an error or warning was encountered, the information will be recorded as

```
[Warning=$nnnn]
[Error=$nnnn]
```

Where $nnnn represents an error code or warning code in hexadecimal. If an error was encountered, subsequent commands are not executed. If a warning was encountered, processing continues with subsequent commands.

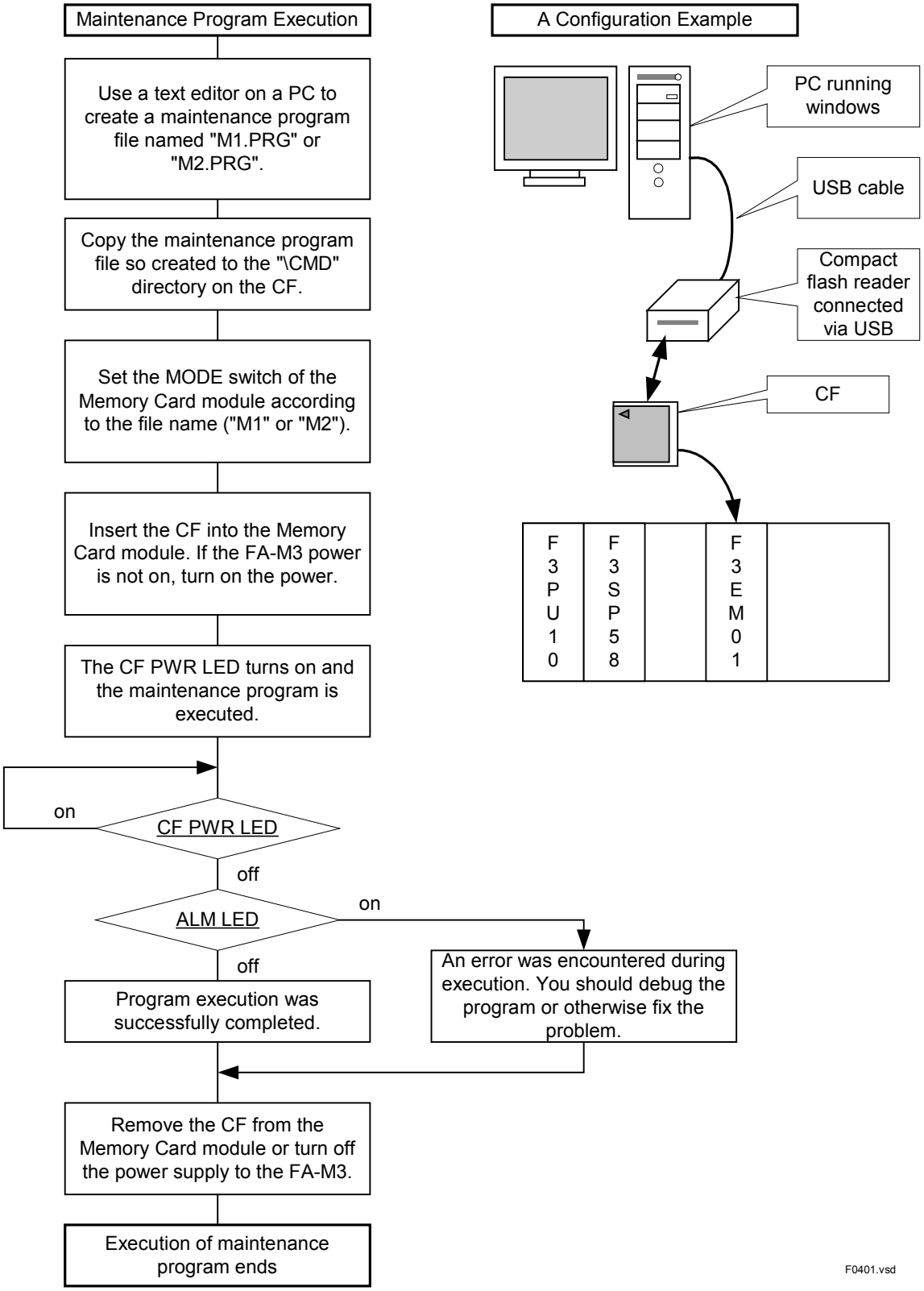
Examples:

```
cpu, 1, sp35
[OK]
cd, ”\abcde”
[OK]
stop, 1
[OK]
pload, 1, ”prg1”
[OK]
start, 1
[OK]
```

The number of devices transferred for wfload, wfsave, dload, dsave, dsavea, csvload, csvsave, csvsavea commands are placed after [OK], [Warning=$nnnn] or [Error=$nnnn].
Example: [OK] 32768Device(s)

4.4 Execution Procedure

The following flowchart illustrates the procedure for executing a program in Maintenance mode.



■ An Example of a Program Execution

To download ladder programs with file names “\PRG\PROG1” and “\PRG\PROG2” to the CPU modules mounted in slot 1 and slot 2 respectively.

1. Using a text editor, write the following maintenance program and save it as “M1.PRG” in the “\CMD” directory in the CF.

```
CPU, 1, SP35
CPU, 2, SP25
STOP, 1
STOP, 2
CD, ”\PRG”
PLOAD, 1, ”PROG1”
PLOAD, 2, ”PROG2”
START, 1
START, 2
```

2. Copy to directory “\PRG” ladder program files “PROG1” and “PROG2” for CPU 1 and CPU 2 respectively. These ladder program files should have been uploaded earlier using a Memory Card module. The files in the CF so far are as follows:

Directory	File name	Description
\CMD	M1.PRG	Maintenance program file
\PRG	PROG1	Ladder program file from CPU 1
\PRG	PROG2	Ladder program file from CPU 2

3. Set the Mode switch to “M1” to execute “M1.PRG”.

4. Insert the CF. Switch on the module if it is not on. The CF PWR LED turns on and downloading of the ladder programs begins. When all the commands have been executed, the CF PWR LED goes off.

5. Confirm that the ALM LED is not on and remove the CF. The following files will be stored in the CF.

Directory	File name	Description
\CMD	M1.PRG	Maintenance program file
\CMD	M1.RES	Maintenance program execution result file
\PRG	PROG1	Ladder program file from CPU 1
\PRG	PROG2	Ladder program file from CPU 2

If the ALM LED is on, check the execution result file “M1.RES”. The content of the execution result file “M1.RES” for a successful execution is shown on the next page.

```
CPU, 1, SP35
[OK]
CPU, 2, SP25
[OK]
STOP, 1
[OK]
STOP, 2
[OK]
CD, ”\PRG”
[OK]
PLOAD, 1, ”PROG1”
[OK]
PLOAD, 2, ”PROG2”
[OK]
START, 1
[OK]
START, 2
[OK]
```

4.5 Specifying File Names and Directory Names

Observe the following restrictions when specifying a file name or directory name in maintenance mode.

● Enclose all file names or directory names within double quotation marks (” ”) (applicable only in Maintenance mode)

Example: For the file name ‘FILE001’, use
“FILE001”

● Maximum lengths for file names and directory names

There is a limit on the lengths of file names and directory names. The full pathname relative to the root directory of all files to be accessed must not exceed 99.

This restriction is the same in Ladder Access mode.

For more details, see Section 3.4, “ Specifying File Names and Directory Names.”

● Characters allowed in file names or directory names

Use only alphanumeric characters, underscore (“_”) and period (“.”) characters in file names or directory names.
Use the backslash character (“\”) to separate subdirectories or indicate the root directory.
This restriction is the same in Ladder Access mode.

For more details, see Section 3.4, “ Specifying File Name/Directory Name”.

● Limit on the subdirectory depth

Up to 4 subdirectory layers are allowed. A warning is generated if this limit is exceeded.

This restriction is the same in Ladder Access mode.

For more details, see Section 3.4, “ Specifying File Name/Directory Name”.

● Limitations for individual commands (only applicable in Maintenance mode)

Specify file names or destination directory names in command formats described in Section 4.7, “Command Details” as follows.

Format	Related command	Cautions
File name	delete pload psave logsave ulogsave wfload wfsave dload dsave dsavea csvload csvsave csvsavea	- Specify the file name. - Specify a file in the current directory. - Do not specify a file name with its directory path. - Always move the current directory to the target directory using the cd command before specifying a file name.
Target directory name	cd	- Specify a directory name.. - To specify a file relative to the root directory, insert “\” as the first character.. - Use “\” to separate subdirectory names. Example: To move to subdirectory “DIR002” below subdirectory “DIR001” in the root directory, specify: “\DIR001\DIR002”

4.6 Specifying CPU Devices

● Specifying device types and starting devices (Maintenance mode only)

The ways device types are specified depends on individual commands and CPU devices.

CPU device \ Command	Wfload wfsave	dload dsave dsavea csvload csvsave csvsavea	Note
	Device type	First device	
Internal relay	I		
Special relay	M		*1
Shared relay	E1		
Extended shared relay	E2		
Link relay (Line 1)	L1		
Link relay (Line 2)	L2		
Link relay (Line 3)	L3		
Link relay (Line 4)	L4		
Link relay (Line 5)	L5		
Link relay (Line 6)	L6		
Link relay (Line 7)	L7		
Link relay (Line 8)	L8		
Timer	T		*2
Counter	C		*2
Data register	D	D1 onwards	
Special register	Z		*1
Shared register	R1		
Extended shared register	R2		
Link register (Line 1)	W1		
Link register (Line 2)	W2		
Link register (Line 3)	W3		
Link register (Line 4)	W4		
Link register (Line 5)	W5		
Link register (Line 6)	W6		
Link register (Line 7)	W7		
Link register (Line 8)	W8		
Index register	V		
File register	B	B1 onwards	*3

*1: The wfload command cannot be used for special relays or special registers.
*2: If a timer or counter is specified, both the up-relay and current value will be transferred.
*3: Specifying a file register for a CPU module without file registers generates an error.

4.7 Command Details

This section provides detailed description of each maintenance command.

■ cd Command (Maintenance mode)

● Function:

Moves the current directory.

The initial current directory in Maintenance mode (default directory) is the root directory (\).

● Command format:

cd, <destination directory name>

● Command format description:

Format	Description
cd	Command
Destination directory name	Specify the destination directory name. For details on how to specify directory names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To change the current directory to “\DIR001\DIR002”.

cd, “\DIR001\DIR002”

■ delete Command (Maintenance mode)

● Function:

Deletes a file in the current directory.

● Command format:

delete, <file name>

● Command format description:

Format	Description
Delete	Command
file name	Specify the file to be deleted. For details on how to specify file names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To delete “FILE001”.

delete, “FILE001”

CAUTION

If the specified file is not found, a warning will be generated.

■ cpu Command (Maintenance mode)

● Function:

Checks whether the correct sequence CPU module is mounted. If the model number mismatches, all subsequent commands will not be executed.

Use this command to avoid faulty operations due to inadvertent access to a CPU of a different model. Execute this command at the beginning of a maintenance program.

● Command format:

cpu, <CPU number>, <CPU model number>

● Command format description:

Format	Description
cpu	Command
CPU number	Specify the slot number of the CPU module to be checked. Specify a value from 1 through 4.
CPU model number	Specify the model number for the CPU module mounted at the specified slot. The model number should be 4 characters long, beginning with the letters “SP”. Example: SP58

● Example: To checks the CPU module installed in slot 1.

cpu, 1, SP58

■ start Command (Maintenance mode)

● Function:

Starts the ladder program for a sequence CPU module.

● Command format:

```
start, <CPU number>
```

● Command format description:

Format	Description
start	Command
CPU number	Specify the slot of the sequence CPU module for the ladder program to be started. Specify a value from 1 through 4.

● Example: To start the ladder program for the CPU module installed in slot 1.

```
start, 1
```

■ stop Command (Maintenance mode)

● Function:

Stops the ladder program for a sequence CPU module.

● Command format:

```
stop, <CPU number>
```

● Command format description:

Format	Description
stop	Command
CPU number	Specify the slot number of the sequence CPU module for the ladder program to be stopped. Specify a value from 1 through 4.

● Example: To stop the ladder program for the CPU module installed in slot 1.

```
stop, 1
```

■ pload Command (Maintenance mode)

● Function:

Downloads to a sequence CPU module a ladder program file uploaded earlier using a psave command.

Note that a ladder program file uploaded from a CPU module of a given model must be downloaded to a CPU module of the same model.

● For details on ladder program files, see Section 1.4, " Ladder Program File".

● Command format:

pload, <CPU number>, <file name>

● Command format description:

Format	Description
pload	Command
CPU number	Specify the slot number of the sequence CPU module for the program download. Specify a value from 1 through 4.
File name	Specify a ladder program file uploaded earlier using a psave command. For details on how to specify file names, see Section 4.5, "Specifying File Names and Directory Names."

● Example: Downloads a ladder program from file "FILE001" to the CPU module installed in slot 1.

pload, 1, "FILE001"

CAUTION

Always stop any running ladder program on a CPU module using the stop command before executing a pload command against the CPU module. Any attempt to execute pload with a ladder program running will result in an error.

CAUTION

Use the pload command for CPU modules not equipped with ROM pack. With a ROM pack installed, reapplying power to the CPU module will restore the program with the contents of the ROM pack.

CAUTION

Make sure that WideField2 is disconnected before executing a pload command.

■ psave Command (Maintenance mode)

● Function:

Uploads a ladder program from a sequence CPU module.

For details on ladder program files, see Section 1.4, “Ladder Program File”.

● Command format:

```
psave, <CPU number>, <file name>
```

● Command format description:

Format	Description
Psave	Command
CPU number	Specify the slot number for the sequence CPU module from which to upload the program. Specify a value from 1 through 4.
File name	Specify the name of the file for storing the ladder program. For details on how to specify file names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To save the ladder program for the CPU module installed in slot 1 as file “FILE001”.

```
psave, 1, “FILE001”
```

■ logsave Command (Maintenance mode)

● Function:

Reads the error log and saves it as a text file.

For details on the file contents, see Appendix 1.5, “Log Files”.

● Command format:

```
logsave, <CPU number>, <file name>
```

● Command format description:

Format	Description
logsave	Command
CPU number	Specify the slot number of the sequence CPU module for retrieving the error log. Specify a value from 1 through 4.
File name	Specify the file name for saving the error log. For details on how to specify file names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To save error log of the CPU module installed in slot 1 as file “LOG001”.

```
logsave, 1, “LOG001”
```

■ ulogsave Command (Maintenance mode)

● Function:

Reads the user log and saves it in a text file.

For details on the file contents, see Appendix 1.5, “Log Files”.

● Command format:

```
ulogsave, <CPU number>, <file name>
```

● Command format description:

Format	Description
ulogsave	Command
CPU number	Specify the slot number of the CPU module for retrieving the user log. Specify a value from 1 through 4.
File name	Specify the name of the file for saving the user log. For details on how to specify file names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To saves the user log of the CPU module installed in slot 1 as file “ULOG001”.

```
ulogsave, 1, “ULOG001”
```

■ wfload Command (Maintenance mode)

● Function:

Loads device data from a file saved in the WideField2 Device File format (.ydvf) in the current directory to specified devices of a sequence CPU module.

Each command execution loads all data for a single device type. To load data for multiple device types, reissue the wfload command after specifying a new device type.

For details on the CPU module devices that can be specified, see Section 4.6, “Specifying CPU Devices”.

For details on WideField2 Device File format, see Appendix 1.1, “WideField2 Device File Format”.

● Command format:

```
wfload, <CPU number>, <Device type>, <File name>
```

● Command format description:

Format	Description
wfload	Command
CPU number	Specify the slot number for the destination sequence CPU module. Specify a value from 1 through 4.
Device type	Specify the device type to be loaded. For details on how to specify devices, see Section 4.6, “Specifying CPU Devices”.
File name	Specify the name of the file to be read. Do not include the file extension. The file extension “.ydvf” will be automatically appended before reading. For details on how to specify files and directories, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To read device data from file “DEV001.YDVF” and write it to data registers in the CPU module in slot 1.

If “DEV001.YDVF” contains 200 words of data for data registers starting from D101, executing the following command will update 200 words of data, starting from D101 in the CPU module mounted in slot 1.

```
wfload, 1, D, “DEV001”
```

CAUTION

Check the execution result file (“M1.PRG” or “M2.RPRG”) for the number of devices transferred after command execution. If the number is not what you expect, check the parameters.

CAUTION

Care must be exercised when using the F3SP59 module. For more details, see Section 2.5, “Precautions When Using F3SP59”.

■ wfsave Command (Maintenance mode)

● Function:

Saves device data in the sequence CPU module to a WideField2 Device File format file (“.ydvf”) in the current directory.

Saves contents of all devices of the specified type.

For details on the CPU module devices that can be specified, see Section 3.5, “Specifying CPU Devices”.

For details on WideField2 Device File format, see Appendix 1.1, “WideField2 Device File format”.

● Command format:

```
wfsave, <CPU number>, <Device type>, <File name>
```

● Command format description:

Format	Description
wfsave	Command
CPU number	Specify the slot number for the destination sequence CPU module. Specify a value from 1 through 4.
Device type	Specify the type of the first device to be saved.
Device type	For details on how to specify devices, see Section 4.6, “Specifying CPU Devices.”
File name	Specify the name of the file to be saved. For details on how to specify file names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To save contents of all data registers in the CPU module mounted in slot 1 as file “DEV001.YDVF”.

```
wfsave, 1, D, “DEV001”
```

CAUTION

Check the execution result file (“M1.RES” or “M2.RES”) for the number of devices transferred after command execution. If the number is not what you expect, check the parameters.

CAUTION

If command execution is successful but the number of devices transferred as stored in the execution result file (“M1.RES” or “M2.RES”) is 0, no file will be created.

CAUTION

Care must be exercised when using the F3SP59 module. For more details, see Section 2.5, “Precautions When Using F3SP59”.

■ dload Command (Maintenance mode)

● Function:

Loads device data from a binary file in the current directory to specified devices of a sequence CPU module.
For details on the CPU module devices that can be specified, see Section 4.6, “Specifying CPU Devices”.

For details on binary files, see Appendix 1.2 “Binary Format”.

● Command format:

dload, <CPU number>, <First device name>, <Number of devices>, <Offset>, <File name>

● Command format description:

Format	Description
dload	Command
CPU number	Specify the slot number for the destination sequence CPU module. Specify a value from 1 through 4.
First device name	Specify the first device name for writing device data. For details on how to specify devices, see Section 4.6, “Specifying CPU Devices.”
Number of devices	Specify the number of devices to be written.
Offset	Specify the offset (in number of words) from the top of the file for reading. To read from the top of the file, specify 0.
File name	Specify the name of the file to be read. For details on how to specify file names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To read device data from file “DEV001” and load it to 100 words of data registers, starting from D101 in CPU module mounted in slot 1.

dload, 1, D101, 100, 0, ”DEV001”

CAUTION

Check the execution result file (“M1.PRG” or “M2.PRG”) for the number of devices transferred after command execution. If the number is not what you expect, check the parameters.

■ dsave, dsavea Commands (Maintenance mode)

● Function:

Saves device data of a sequence CPU module to a binary file in the current directory. If a file with the specified name exists, the dsave command overwrites the file whilst the dsavea command appends to the file.

For CPU module devices that can be specified, see Section 4.6, “Specifying CPU Devices”.

For details on binary format files, see Appendix 1.2, “Binary Format”.

● Command format:

```
dsave, <CPU number>, <First device name>, <Number of devices to be saved>, <File name>
```

```
dsavea, <CPU number>, <First device name>, <Number of devices to be saved>, File name
```

● Command format description:

Format	Description
dsave dsavea	Command
CPU number	Specify the slot number of the sequence CPU module containing the devices to be saved. Specify a value from 1 through 4.
First device name	Specify the name of the first device to be saved. For details on how to specify devices, see Section 4.6, “Specifying CPU Devices.”
Number of devices to save	Specify the number of devices to be saved.
File name	Specify the name of the destination file. For details on how to specify file names, see Section 4.5, “Specifying File Names and Directory Names.”

● Example: To save 200 words of data registers, starting from D101 of the CPU module mounted in slot 1 in binary file “DEV001”.

```
dsave, 1, D101, 200, ”DEV001”
```

CAUTION

Check the execution result file (“M1.PRG” or “M2.PRG”) for the number of devices transferred after command execution. If the number is not what you expect, check the parameters.

CAUTION

If command execution is successful but the number of devices transferred as stored in the execution result file (“M1.RES” or “M2.RES”) is 0, no file will be created.

■ csvload Command (Maintenance mode)

● Function:

Loads device data from a CSV format file (.csv) in the current directory to specified devices of a sequence CPU module.

For details on the CPU module devices that can be specified, see Section 4.6, “Specifying CPU Devices”.

For details on CSV files, see Appendix 1.3, “CSV Format”.

● Command format:

```
csvload, <CPU number>, <First device name>, <Number of devices>, <File name>
```

● Command format description:

Format	Description
csvload	Command
CPU number	Specify the slot number for the destination sequence CPU module. Specify a value from 1 through 4.
First device name	Specify the first device name for writing device data. For details on how to specify devices, see Section 4.6, “Specifying CPU Devices.”
Number of devices	Specify the number of devices to be written.
File name	Specify the offset (in number of words) from the top of the file for reading. To read from the top of the file, specify 0.

● Example: To read device data from CSV format file “DEV001.CSV” and load it to 100 words of data registers, starting from D101 in CPU module mounted in slot 1.

```
csvload, 1, D101, 100, ”DEV001”
```

CAUTION

Check the execution result file (“M1.PRG” or “M2.PRG”) for the number of devices transferred after command execution. If the number is not what you expect, check the parameters.

■ csvsave, csvsavea Command (Maintenance mode)

● Function:

Saves device data of a sequence CPU module to a csv format file (with file extension ".csv") in the current directory.
If a file with the specified name exists, the csave command overwrites the file whilst the csavea command appends to the file.

For CPU module devices that can be specified, see 4.6 "Specifying CPU Devices".

For details on CSV format files, see Appendix 1.3, "CSV Format".

● Command format:

```
csvsave, <CPU number>, <First device name>, <Number of devices to be saved>, <File name>
```

```
csvsavea, <CPU number>, <First device name>, <Number of devices to be saved>, <File name>
```

● Command format description:

Format	Description
csvsave csvsavea	Command
CPU number	Specify the slot number of the sequence CPU module containing the devices to be saved. Specify a value from 1 through 4.
First device	Specify the name of the first device to be saved. For details on how to specify devices, see Section 4.6, "Specifying CPU Devices."
Number of devices to be saved	Specify the number of devices to be saved.
File name	Specify the name of the destination file. Do not specify the file extension. A ".csv" file extension will automatically be appended before saving. For details on how to specify files and directories, see Section 4.5, "Specifying File Names and Directory Names."

● Example: To save 200 words of data registers starting from D101 of the CPU module mounted in Slot 1 in CSV file "DEV001.CSV".

```
Csvsave, 1, D101, 200, "DEV001"
```

CAUTION

Check the execution result file ("M1.PRG" or "M2.PRG") for the number of devices transferred after command execution. If the number is not what you expect, check the parameters.

CAUTION

If command execution is successful but the number of devices transferred as stored in the execution result file ("M1.RES" or "M2.RES") is 0, no file will be created.

■ end Command (Maintenance mode)

● Function:

Ignores all subsequent commands in the maintenance program.

● Command format:

End

● Command format description:

Format	Description
end	Command

■ Comments (Maintenance mode)

● Function:

Indicates a comment. Comment lines are not executed.

● Command format:

Character string

● Command format description:

Format	Description
;	Comment (semicolon)
Character string	Any character string. The line is ignored during execution.

Blank Page

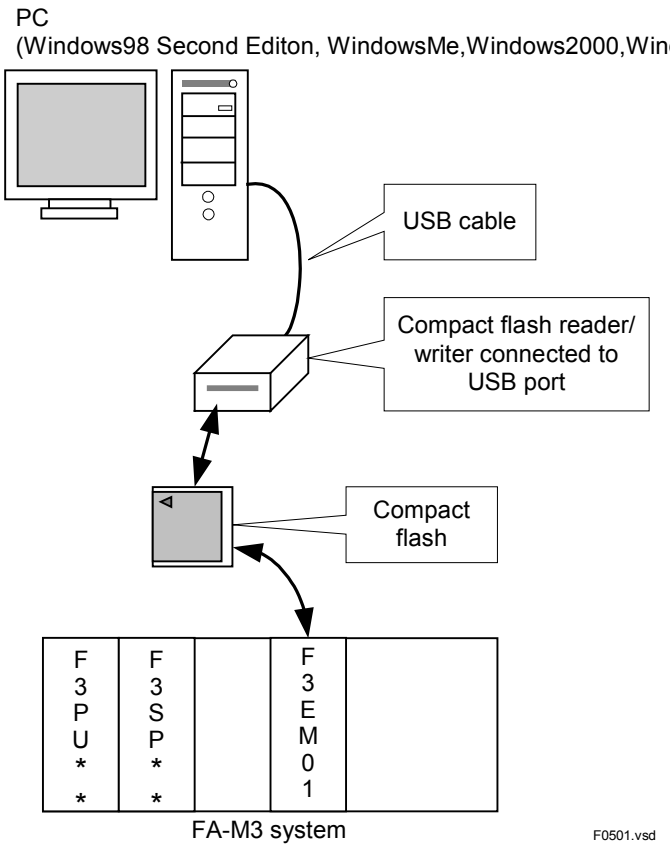
5. Operating CF from a PC

This chapter shows a simple setup for operating the CF of the memory card module on a PC.

The CF of the memory card module adopts the FAT file system, which makes it accessible on a Windows PC and other devices that support CP.

■ Using a CF Reader/writer Connected to a USB Port

A compact flash reader/writer with USB connection is a commercially available device. By connecting such a device to a PC running either Windows 98 Second Edition, Windows 2000, Windows Me, or Windows XP with USB support, you can then copy files or perform other operations on the CF.



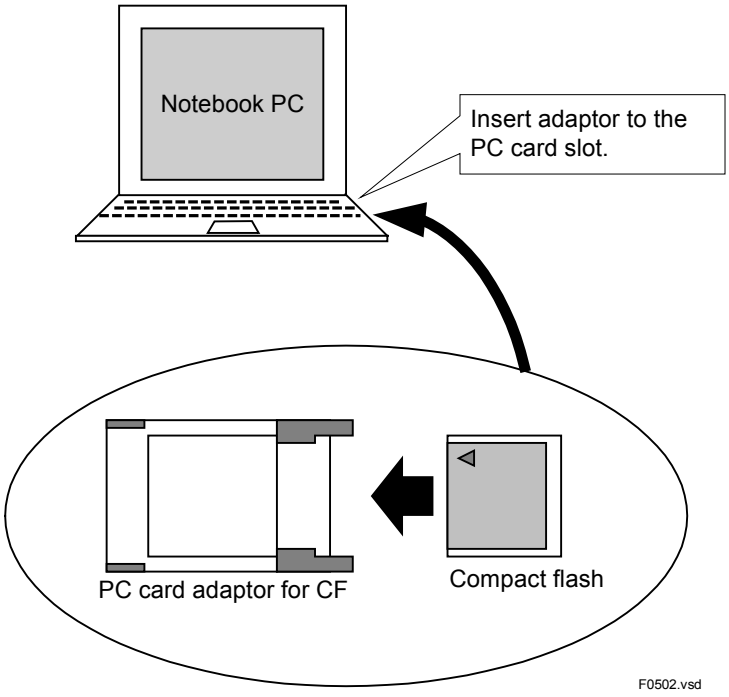
CAUTION

When purchase a compact flash reader/writer with a USB connector, select a model compatible with any of the following operating systems: Windows 98 Second Edition, Windows 2000, WindowsMe and Windows XP.

Read the instruction manual for the compact flash reader/writer carefully before operating the CF.

■ Using a PC Installed with a PC Card Slot

Some PCs and notebooks are provided with a PC card slot. By installing a commercially available device known as a “Compact Flash PC Card Adaptor” in such a PC, you can then copy files or perform other operations on the CF.



6. List of Error and Warning Codes

The memory card module has error and warning codes. For details, see Section 2.6, "Errors and Warnings."

The following table shows the code system for error and warning codes.

Code	Description	ALM LED status	
		Ladder Access mode	Maintenance mode
$0000	Normal		
$1001 to $2FFF	Warning in Ladder Access mode		
$3004 to $4FFF	Warning in Maintenance mode		
$8000 to $9FFF	FAT file system related errors	See the Error Code table.	ON
$A000 to $BFFF	Error during communications with sequence CPU		ON
$C000 to $FFFF	Other errors		ON

■ Error Codes

The following table lists the error codes.

Any error that causes the ALM LED to turn on in Ladder Access mode renders the CF unusable and turns off the power to the CF.

Table 6.1 Error Code Table (1/3) ($8000 to $9FFF)

Code	Description	Troubleshooting	ALM LED *10
$8100	Specified file or directory name is invalid or not found.	*1	
$8200	Same file or directory name exists.	*2	
$8300	Specified file or directory is not found.	*2	
$8400	Specified file or directory is not found.	*2	
$8500	Internal error (Specified mode is invalid)	*3	
$8600	Internal error (File is not open)	*3	
$8700	Internal error (Specified file is open)	*3	
$8800	CF read error	CF may be at the end of its life. Replace the CF.	ON
$8900	CF write error	CF may be at the end of its life. Replace the CF.	ON
$8A00	Internal error (Too many files are open)	*3	
$8B00	Insufficient CF free space	Secure sufficient CF space. *4	ON
$8C00	Internal error (Specified drive error)	*3	
$8D00	Internal error (Specified parameter error)	*3	
$8E00	Internal error (End of file reached)	*3	
$8F00	Internal error (Opening another directory)	*3	
$9000	Internal error (Not supported)	*3	
$9100	Internal error (Not initialized (ini-disk))	*3	
$9200	Internal error (Not initialized (ini-fsys))	*3	
$9300	Internal error (Not mounted)	*3	
$9400	An attempt has been made to delete a directory that is not empty	*2	
$9500	Internal error (Error has occurred with system call)	*3	
$9600	CF initialization error	CF cannot be accessed normally. Re-format CF. *4	ON
$9700	Internal error (Error when mounting CF)	*3	
$9800	Internal error (Insufficient cache size)	*3	
$9F00	Internal error (Others)	*3	

*1: Review Section 3.4, "Specifying File Names and Directory Names" or Section 4.5, " Specifying File Names and Directory Names".
*2: Connect the CF to a PC and check the directory you were trying to access. For error code $8200, also check for hidden files.
*3: Internal errors rarely occur, and may be caused by a faulty CF. Check the operation using a normal CF.
*4: If the corrective action given in the table fails to rectify the problem, the CF may be faulty. If so, replace it with a normal CF.
*10: Status of ALM LED in Ladder Access mode.

Table 6.2 Error Code Table (2/3) ($A000 to $BFFF)

Code*13	Description	Trouble-shooting	ALM LED *10
$A10x	Error during communications with CPU module (Start up error)	*5	
$A11x	Error during communications with CPU module (Sequence processor error)	*5	
$A12x	Error during communications with CPU module (Memory error)	*5	
$A131	Error during communications with CPU module (Momentary power failure)	*5	
$A132	Error during communications with CPU module (Power failure)	*5	
$A141	Error during communications with CPU module (Scan timeout)	*5	
$A142	Error during communications with CPU module (Periodic cycle timeout)	*5	
$A15x	Error during communications with CPU module (FA link 1 error)	*5	
$A16x	Error during communications with CPU module (FA link 2 error)	*5	
$A17x	Error during communications with CPU module (Instruction error)	*5	
$A181	Error during communications with CPU module (Battery error)	*5	
$A19x	Error during communications with CPU module (FA link 3 error)	*5	
$A1Ax	Error during communications with CPU module (FA link 4 error)	*5	
$A1Bx	Error during communications with CPU module (FA link 5 error)	*5	
$A1Cx	Error during communications with CPU module (FA link 6 error)	*5	
$A1Dx	Error during communications with CPU module (FA link 7 error)	*5	
$A1Ex	Error during communications with CPU module (FA link 8 error)	*5	
$A20x	Error during communications with CPU module (Program error)	*5	
$A21x	Error during communications with CPU module (Instruction error)	*5	
$A22x	Error during communications with CPU module (Subroutine error)	*5	
$A23x	Error during communications with CPU module (Interrupt error)	*5	
$A24x	Error during communications with CPU module (I/O collation error)	*5	
$A25x	Error during communications with CPU module (Macro instruction error)	*5	
$A401	Error during communications with CPU module (Inter-CPU communications error)	*5	
$A800	Error during communications with CPU module (I/O error)	*5	
$A81x	Error during communications with CPU module (I/O module error)	*5	
$A82x	Error during communications with CPU module (ROM cassette error)	*5	
$A831	Error during communications with CPU module (Subunit transmission error)	*5	
$A841	Error during communications with CPU module (Sub unit transmission path switching has occurred)	*5	
$A90x	Error during communications with CPU module (Service not supported)	*5	
$A91x	Error during communications with CPU module (Communications format error)	*5	
$A92x	Error during communications with CPU module (Communications command error)	*5	
$AA01	Error during communications with CPU module (Communications parameter error)	*5	
$AB0x	Error during communications with CPU module (Operation mode error)	*5	
$AB1x	Error during communications with CPU module (Protection error)	*5	
$AB2x	Error during communications with CPU module (Exclusive access right error)	*5	
$AB3x	Error during communications with CPU module (Communications command execution error)	*5	
$AC01	Error during communications with CPU module (Instruction conversion error)	*5	
$AC1x	Error during communications with CPU module (Device specification error)	*5	
$AC2x	Error during communications with CPU module (Ladder program error)	*5	
$AF0x	Error during communications with CPU module (Internal table error)	*5	
$AFFx	Error during communications with CPU module (System error)	*5	
$BF00	Error during communications with CPU module (Timeout error)	*5	

*5: Errors during communications with CPU may be due to an error on the CPU module side. Check the CPU module for errors.
*10: Status of ALM LED in Ladder Access mode.
*13: The character “x” used in some error codes denotes any hexadecimal digit from 0 through F.

Table 6-3 Error Code Table (3/3) ($C000 to $FFFF)

Code	Description	Trouble-shooting	ALM LED *10
$C100	Self-diagnosis error (SRAM write/read error)	*6	
$C200	Self-diagnosis error (ROM checksum error)	*6	
$D100	Specified command cannot be found		
$D110	Write command is not permitted.		
$D120	Character checksum error found in CSV file	*7	
$D130	Error found in WideField2 Device File format file	*7	
$D140	Range of CPU devices specified for saving spans shared relays and extended share relays or shared registers and extended shared registers.	*8	
$D150	File attribute error	*11	
$D160	Ladder program file error	*12	
$D170	Full pathname exceeds 200 characters.	*1	
$D8nn	A parameter specified in a command issued in Ladder Access mode is out of range. nn denotes the number (in hexadecimal) of the register containing the invalid parameter.	*9	
$D9nn	A parameter specified in a command issued in Maintenance mode is out of range. nn denotes the character position (in hexadecimal) of the invalid parameter in the command string	*9	
$DFF0	CF is removed before a command is executed.		

*1: Review Section 3.4, "Specifying File Names and Directory Names" or Section 4.5, " Specifying File Names and Directory Names".
*6: Memory card module hardware error. The RDY LED turns off. This error is not generated if the Memory Card Module is accessible from the CPU module.
*7: Review Appendix 1, “Files Handled by Memory Card Module”.
*8: Review Section 3.5, "Specifying CPU Devices" or Section 4.6, "Specifying CPU Devices"
*9: Review the description for the command issued.
*10: Status if ALM LED in Ladder Access mode.
*11: See Section 3.6, “File Attributes”.
*12: See Appendix 1.4, “Ladder Program File”.

■ Warning Codes

A warning code contains information that indicates which part of the program code is the cause of the warning. Check the specifications at the indicated position to find out cause of the error and rectify it.

A warning code has the following structure:

$ xxnn

where

nn: Represents the number of the register (in hexadecimal) contributing to a warning in Ladder Access mode. For example, a value of $1211 indicates that a warning was detected in register 17 ($11 = 17).

Represents the character position (in hexadecimal) in the command string contributing to a warning in Maintenance mode. For example a value of $3211 indicates that a warning was detected at character position 17 of the command string.

xx: Indicates the type of warning, as given in the table below.

Code	Description	Trouble-shooting
$10nn	Ladder Access mode: Command issued is not listed in the Instruction Manual.	*1
$11nn	Ladder Access mode: Specified parameter is out of range.	*1
$12nn	Ladder Access mode: File or directory name contains an invalid character.	*2
$1300	Ladder Access mode: File or directory name is too long.	*2
$1400	Ladder Access mode: Subdirectory depth exceeded limit	*2
$1Fnn	Ladder Access mode: Any other warning not listed above was encountered for an issued command.	
$20nn	Ladder Access mode: File name or directory name read by the dir command contains an invalid character.	*2
$2100	Ladder Access mode: File name or directory name read by the dir command is too long.	*2
$30nn	Maintenance mode: Command issued is not listed in the Instruction Manual.	*1
$31nn	Maintenance mode: Specified parameter is out of range.	*1
$32nn	Maintenance mode: File or directory name contains an invalid character.	*2
$3300	Maintenance mode: File or directory name is too long.	*2
$3400	Maintenance mode: Subdirectory depth exceeded limit	*2
$3500	Maintenance mode: File specified in a delete command cannot be found.	
$3Fnn	Maintenance mode: Any other warning not listed above was encountered for an issued command.	

*1: Review the description of the command issued.
*2: Review Section 3.4, “Specifying File Names and Directory Names” or Section 4.5, “Specifying File Names or Directory Names.”

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7. Application Examples

This chapter describes some sample applications of the memory card module.

■ Periodical Data Backup

Normally used in Ladder Access mode.

For example, you can save daily operation records for equipment to a CF.

To save such data, use the dsave command or dsavea command.

To append data to an existing file, use the dsavea command.

The CF can be removed and connected to a PC, allowing these operation record files to be managed on a PC.

■ Reading Parameters for Individual Tasks

Normally used in Ladder Access mode

For example, you may need to store parameters for a particular task for subsequent reuse.

Saving these task parameters to a file allows us you reload the parameters to the devices in the CPU module by simply selecting its file name. Furthermore, by having parameters for different tasks in different files, it allows you to load only what is required and hence, opt for an inexpensive CPU module with a smaller capacity.

The CF can be removed and connected to a PC, allowing these parameter files to be managed on a PC.

■ Providing a Redundant CF

Used in Ladder Access mode.

One CPU module can access multiple memory card modules.

This feature allows a redundant CF to be installed to protect important data against occasional CF failures, or CF file system damage caused by power interruptions during write operations.

To achieve redundancy, you need to install two Memory Card modules. The CPU module needs to write all data twice, once to each memory card module.

■ One Memory Card Module for Multiple CPU Modules

Applicable to Ladder Access mode and Maintenance mode.

The memory card module allows device data from any CPU module to be saved to CF, and also allows device data from a file in the CF to be written to devices in any CPU module.

This feature allows a single memory card module to be used in a system with multiple CPU modules, reducing system configuration cost.

Note however that in Ladder Access mode, only one CPU Module is allowed to issue commands to a memory card module at any one time.

■ Reading CPU Module Devices When System Fails

Used in Maintenance mode.

Write commands to retrieve data from CPU devices in use in a maintenance program, and save the program on the CF that is normally used. In the event of system failure, remove the CF, set the Memory Card module to Maintenance mode, and re-insert the CF. The module will automatically save the required device data in a file. Using this file on a PC allows you to check the device data.

This application is useful for factories without network support or factories where PC access is not readily available.

■ Downloading Programs to CPU modules for Setup

Used in Maintenance mode.

Ladder program files saved in a CF can be downloaded to CPU modules. Even in systems with multiple CPU modules, only one maintenance program is required to perform batch download, thus effectively reducing the man-hours required in system configuration. Note that the downloaded ladder program files should be files previously uploaded using a memory card module.

■ Copying Ladder Programs Between CPU Modules

Used in Maintenance mode.

With two systems each equipped with a memory card module, you can copy the adder programs from one system to the other. To do this, first create maintenance program file “M1.PRG” on the CF, containing commands to upload the ladder program. Next, create maintenance program file “M1.PRG” on the same CF, containing commands to download the ladder program. With the system Mode switch on the source CPU module set to M1, insert the CF to run maintenance program "M1.PRG". The ladder program will be uploaded to the CF. Then, with the system Mode switch on the destination CPU module set to M2, insert the CF to run maintenance program "M2.PRG". The ladder program file uploaded previously to the CF will be downloaded to complete the copying process.

Appendix 1. Files Supported by Memory Card Module

This appendix describes the files supported by the memory card module.

The memory card module supports the following file types.

Type	Description	See Also
Device data	WideField Device File Format file	Appendix 1.1
	Binary format file	Appendix 1.2
	CSV format file	Appendix 1.3
Maintenance	Ladder program file	Appendix 1.4
	Error log file, User log file	Appendix 1.5
	Maintenance program file, Maintenance execution result file	Chapter 4

Appendix 1.1 WideField Device File format

WideField Device File format is one of the formats for saving device data.

- It contains fields for device type, first device number and number of devices.
- It is designed to store multiple devices of a CPU module in one single file. However, when saving device data from the memory card module, only one device type can be specified.

This file type is supported by the following tool.

SF620-ECW FA-M3 Programming tool WideField2

The above tool allows you to browse, modify, and download device data.

For details, see “FA-M3 Programming Tool WideField2 Instruction Manual” (IM34M6Q15-01E).

CAUTION

WideField2 Device File format files are not supported by the older version of the WideField software, the "SF610-ECW FA-M3 Programming Tool WideField".

Appendix 1.2 Binary Format

A binary format file stores device data as binary data.

The file contains only device data, without any information on the data range. All data contained herein is in big endian.

In ladder access mode, you can select to always save data in odd number of bytes using the option setting. For example, when creating a text file, only an odd number of bytes is valid (for firmware revision 2 or higher).

Conversely, when reading a file containing an odd number of bytes, the low order byte (least significant 8 bits) of the last device is set to $00 (for firmware revision 2 or higher).

Example: To save the following data registers in a binary file.

Device	Data
D00001	$594F (='YO')
D00002	$4B4F (='KO')
D00003	$4741 (='GA')
D00004	$5741 (='WA')
D00005	$0D0A
D00006	$4641 (='FA')
D00007	$2D4D (='-M')
D00008	$330D (='3')
D00009	$0A00

The following table lists the contents of the resultant binary file.

Offset (in bytes)	Data
+0	$59 ('Y')
+1	$4F ('O')
+2	$4B ('K')
+3	$4F ('O')
+4	$47 ('G')
+5	$41 ('A')
+6	$57 ('W')
+7	$41 ('A')
+8	$0D
+9	$0A
+10	$46 ('F')
+11	$41 ('A')
+12	$2D ('-')
+13	$4D ('M')
+14	$33 ('3')
+15	$0D
+16	$0A
+17	$00

YOKOGAWA FA-M3

Appendix 1.3 CSV Format

The specification for the CSV format differs slightly when used for reading and for writing.

- **When Saving Device Data to a CSV Format File**

  Device data are handled in word units (16 bits) with each value ranging from -32763 to 32767. Taking the high-order bit of each word data as the sign bit, each word data is converted to a decimal number and stored in the file. In ladder access mode, you can also select to save the data as unsigned data using the option setting. In this case, each value will range from 0 to 65535.
  The file contains a single column of data, separated with the return code ($0D, $0A). In ladder access mode, you can also select to save multiple columns of data using the option setting.

CAUTION

Option setting is only available in firmware revision 2 or higher.

Example: Saving the following data contained in file registers B1 through B8 in CSV format

Contents of file registers

Address	Word Data
B00001	$CFC7(-12345)
B00002	$0D0A(3338)
B00003	$2C54(11348)
B00004	$0000(0)
B00005	$596F(22895)
B00006	$B8BF(-18241)
B00007	$0A00(2560)
B00008	$3333(13107)

- **Contents of saved file**

```
 ADDRESS : +0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F 0123456789ABCDEF
00000000 : 2D 31 32 33 34 35 0D 0A 33 33 33 38 0D 0A 31 31 -12345..3338..11
00000010 : 33 34 38 0D 0A 30 0D 0A 32 32 38 39 35 0D 0A 2D 348..0..22895..-
00000020 : 31 38 32 34 31 0D 0A 32 35 36 30 0D 0A 31 33 31 18241..2560..131
00000030 : 30 37 0D 0A                                     07.
```

- **Data displayed when read using a spreadsheet software.**

	A	B
1	-12345	
2	3338	
3	11348	
4	0	
5	22895	
6	-18241	
7	2560	
8	13107	
9		
10		

- **When Reading Device Data from a CSV Format File**

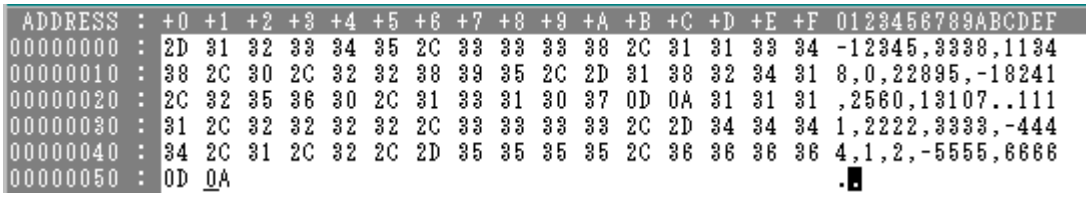
  There is no restriction on the number of columns for an input CSV format file except that each line cannot contain more than 127 characters (not counting the linefeed character). Data values should be separated by a comma or the carriage return character ($0D). The '$0A' characters and space characters are ignored. The file should contain only device data without information on device range, etc.

Example: Reading data represented as follows in a spreadsheet to file registers starting from B100.

- **Data displayed in a spreadsheet software**

	A	B	C	D	E	F	G	H	I
1	−12345	3338	11348	0	22895	−18241	2560	13107	
2	1111	2222	3333	−4444	1	2	−5555	6666	
3									

- **Data to be read**



Contents of file registers after reading

Address	Word Data
B00001	$CFC7 (-12345)
B00002	$0D0A (3338)
B00003	$2C54 (11348)
B00004	$0000 (0)
B00005	$596F (22895)
B00006	$B8BF (-18241)
B00007	$0400 (2560)
B00008	$3333 (13107)
B00009	$0457 (1111)
B00010	$08AE (2222)
B00011	$0D05 (3333)
B00012	$EEA4 (-4444)
B00013	$0001 (1)
B00014	$0002 (2)
B00015	$EA4D (-5555)
B00016	$1A0A (6666)

CAUTION

Data to be read from a CSV file and written to a CPU module must fall within the valid data range. Out-of-range data values will result in an error and be written incorrectly. Missing numeric values also generate errors.
Firmware revision 1 supports only signed data and the valid data range is from –32768 to 32767.
Firmware revision 2 supports both signed and unsigned data and the valid data range is from –32768 to 65535.

Examples of invalid data values:

····, -40000, ····Out-of-range data value

····,, ····Missing data value

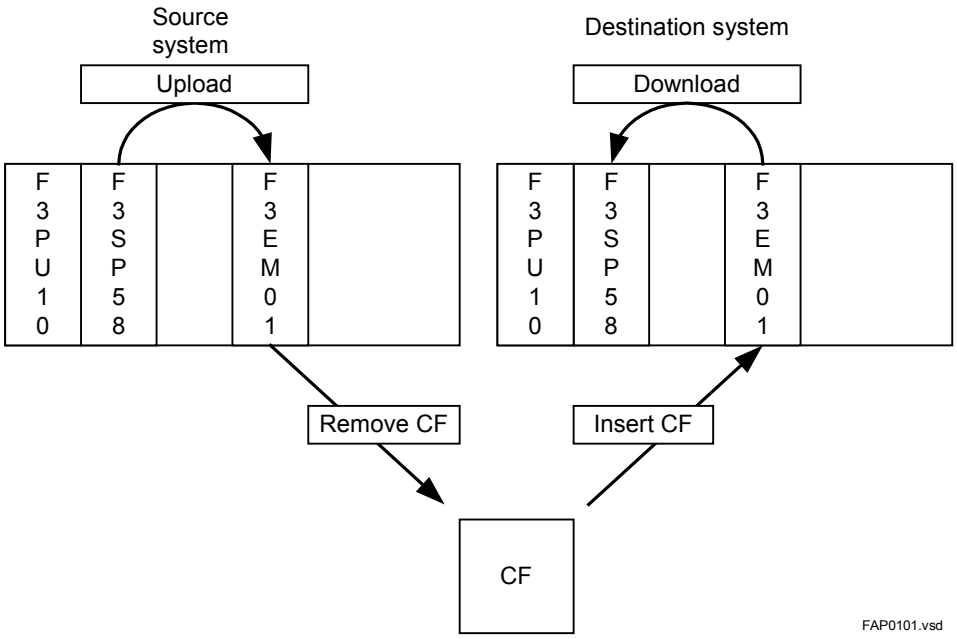
Appendix 1.4 Ladder Program File

The memory card module is provided with functions to upload and download ladder programs in Maintenance mode.

Caution must be used as follows in handling any file involved in this function.

- **Not supported by WideField, WideField2 or CAD-M3.**
  Ladder program files used by the memory card module are specific to the module, and not supported by any other tool such as WideField, WideField2 or CAD-M3. Only files uploaded using a memory card module can be downloaded subsequently using a memory card module.
- **Use a CPU module of the same model number**
  When downloading a file to a CPU module using the memory card module, make sure that the model number of the CPU module is the same as that of the CPU module used to upload the file earlier.

The following figure shows a conceptual image for uploading and downloading a ladder program file.



Appendix 1.5 Log Files

There are 2 types of log files, namely, error log file and user log file. A log file contains log information, written in line units.

■ Error Log

The table below shows the format of a line in an error log file. The actual information stored varies with each error.

Table Appendix 1.1 System Error Log

Field Width	Description
10	Date “YYYY/MM/DD”
1	Space
8	Time (“HH:MM:SS”)
1	Comma
1	Comma
5	Error code (in hexadecimal) “**-**” *1
1	Comma
1	Comma

Table Appendix 1.2 Sequence Error Log

Field Width	Description
10	Date “YYYY/MM/DD”
1	Space
8	Time (“HH:MM:SS”)
1	Comma
1	Comma
5	Error code (in hexadecimal) “**-**” *1
1	Comma
8	Block name (character string)
1	Comma
5	Instruction number (in decimal)
1	“N” (where “N” represents the instruction number)

Table Appendix 1.3 I/O error log

Field Width	Description
10	Date “YYYY/MM/DD”
1	Space
8	Time (“HH:MM:SS”)
1	Comma
1	Comma
5	Error code (in hexadecimal) “**-**” *1
1	Comma
1	Comma
5	“Slot =” (string indicating the slot number)
3	Slot number (Unit and slot number)

*1: For details on error codes, see “PC Link Commands Instruction Manual” (IM34M6P41-01E).

■ User Log

The table below shows the format of a line in a user log file.

Table Appdx1.4 User log

Field Width	Description
10	Date “YYYY/MM/DD”
1	Space
8	Time (“HH:MM:SS”)
1	Comma
0 to 32	Message
1	Comma
6	Main code (in decimal)
1	Comma
6	Sub-code (in decimal)

Appendix 2. Module Operation

■ Basic Operations

● Operation after writing to a CF

Use the CF busy status to check whether internal processing has been completed.

● Operations when writing to a file

The memory card module performs the following operations during writing to protect the original file against errors. (supported by wfsave, dsave, dsavea, csvsave and csvsavea commands)

For the wfsave, dsave and csvsave commands (Filename “FILE001.CSV”)

1. Deletes dummy file “FILE001.$$$”.
2. Writes to dummy file “FILE001.$$$”.
3. Deletes the backup file, “FILE001.BAK”.
4. Rename the specified file “FILE001.CSV” to “FILE001.BAK”
5. Renames dummy file “FILE001.$$$” to the specified file name, “FILE001.CSV”.

For the dsavea and csvsavea commands (Filename “FILE001.CSV”)

1. Deletes dummy file “FILE001.$$$”.
2. Copies specified file “FILE001.CSV” to dummy file “FILE001.$$$”.
3. Appends data to dummy file “FILE001.$$$”.
4. Deletes the backup file, “FILE001.BAK”.
5. Renames the specified file “FILE001.CSV” to filename “FILE001.BAK”.
6. Renames dummy file “FILE001.$$$” to the specified filename, “FILE001.CSV”.

● Time values recorded for files and directories

In general, when a file or directory is created or modified, the time is recorded and stored as file or directory information.

In the memory card module, these times refer to the time of the CPU module mounted in slot 1.

In Ladder Access mode, it records the time when writing to a file begins. In maintenance mode, it records the time when a maintenance program begins execution for all files created by the maintenance program.

● LEDs

ALM LED

In Ladder Access Mode:

Lit if any of the following errors occurs, indicating that the CF is no longer usable.

- Write operation failure due to insufficient memory.
- Initialization failure.
- FAT file system error.
- Read error or write error of the file system.

Once lit, it stays on until one of the following events occurs.

- CF is removed (stopping power supply to the CF alone does not turn off the LED).
- CF PWR ON Relay is turned on.

In Maintenance Mode:

Lit when an error is encountered during command execution.

CF PWR LED

Lit when power is supplied to the CF and turns off when power is no longer supplied.

Flashes after power supply begins until CF initialization completes.

Also flashes during end processing when power supply to the CF is interrupted.

ACS LED

This LED indicates access to the CF. However, note that it turns on during execution of commands that access the CF (from the time a file is opened until the time it is closed), including periods when no actual access is performed.

● CF Operating Mode

The CF has 3 operating modes:

- PC Card Memory Mode
- PC Card I/O Mode
- True IDE Mode

It operates in PC Card Memory Mode when used with the Memory Card Module.

■ Expected Access Time

The following table lists the expected access time for various commands. It should only be used as a reference since the actual access time is dependent on how a ladder program is written.

The access time given refers to the period from the time a program turns on the command issuance relay to the time the command execution completion relay turns on.

Unit: seconds

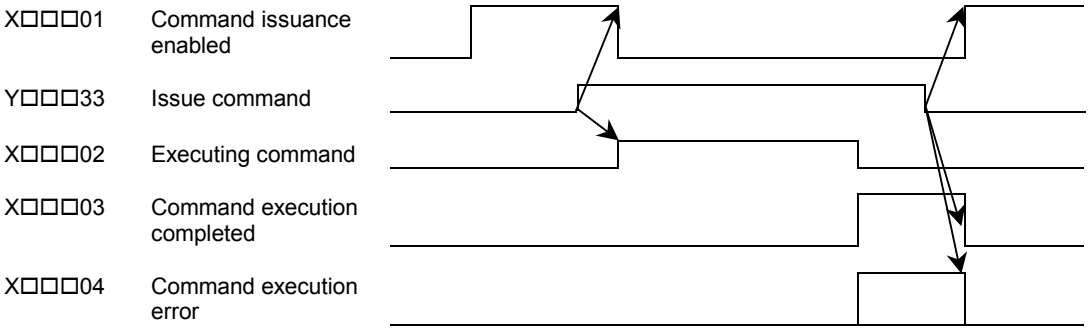
CPU Module to be Accessed		F3SP21 F3SP25 F3SP35	F3SP28 F3SP38 F3SP53 F3SP58 F3SP59
dload command	32768 registers	11.0	2.5
	1000 registers	0.4	0.2
dsave command	32768 registers	13.3	3.7
	1000 registers	1.9	1.6

All time values given are for 64Mb CF manufactured by SanDisk.

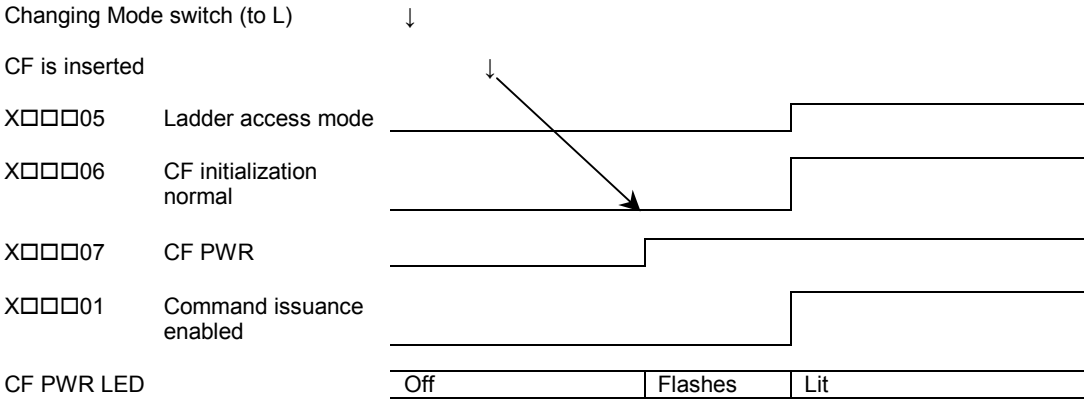
■ Operation of Relays

The following diagrams illustrate the operations of the relays in various states in Ladder Access mode. In the diagrams, a high indicates that a relay is on, whilst a low indicates that a relay is off.

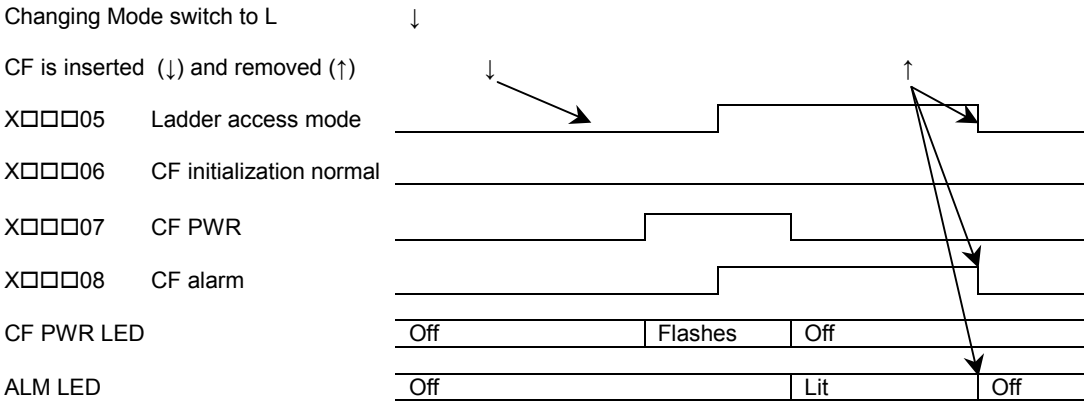
● When issuing a command



● When a CF is inserted (normal)



● When a CF is inserted (error)



FA-M3

Memory Card Module

IM 34M6C22-01E 1st Edition

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