Cat. No. V237-E1-04

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SYSMAC
WS02-SPTC1-V2

SPU-Console Ver. 2.2

OPERATION MANUAL

OMRON

NOTE

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WS02-SPTC1-V2
SPU-Console Ver. 2.2

Operation Manual

Revised February 2018

Notice:

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

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

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

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

OMRON Product References

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

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

The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

Visual Aids

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

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

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

Unit Versions of SPU-Console

Relation Between Unit Version and SPU-Console

(1) SPU-Console Ver.1 .X cannot connect to SYSMAC SPU Units with a unit version of 2.0 or later.

(2) SPU-Console Version 2.X can connect to SYSMAC SPU Units with a unit version of 2.X. In this case, the SPU-Console will operate in the version that corresponds to the version of the SYSMAC SPU Unit.

(3) Different versions of SPU-Console can be installed and coexist on the same computer.

CS1W-SPU01/02-V2 and CJ1W-SPU01-V2

○: Connectable, △: Connectable (Initial Setting Wizard cannot be used), ×: Not connectable

Unit version of SYSMAC SPU Unit / SPU-Console SPU Basic Software	2.0	2.1	2.2
SPU-Console version 1.X	×	×	×
SPU-Console version 2.0	○	△	△
SPU-Console version 2.1	△	○	△
SPU-Console version 2.2	△	△	○

Note The Initial Setting Wizard that is provided with SPU-Console Version 2.X cannot be used for a different version of the Unit. To configure initial settings on a unit version different from SPU-Console, use the Highfunction Unit settings of CX-Programmer.

SPU-Console Version Upgrade

The following table shows the changes made in the upgrade.

Item	SPU-Console version 2.0	SPU-Console version 2.1	SPU-Console version 2.2
Recipe function	Supported	Supported	Supported
Expanded recipe function	Not supported	Supported	Supported
Copy option	Supported	Supported	Supported
Collection status display (Data Storage Mode)	Supported	Supported	Supported
Error log display	Supported	Supported	Supported
Export/import of variable settings to CSV files	Supported	Supported	Supported
Report function	Supported	Supported	Supported
FTP transfer	Not supported	Supported	Supported
Record counters and copy flags	Not supported	Not supported	Supported

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About this Manual:

This manual describes the installation and operation of the WS02-SPTC1-V2 SPU-Console Version 2.2 (setting and monitoring software) for the CS1W-SPU01-V2 and CS1W-SPU02-V2 SYSMAC SPU Units and includes the sections described below.

Please read this manual and all related manuals listed in the following table, and be sure you understand the information provided before attempting to install or operate an SYSMAC SPU Unit using the SPU-Console. Be sure to read the precautions provided in the following section.

Precautions provides general precautions for using the SPU-Console, SYSMAC SPU Unit, Programmable Controller, and related devices.

Name	Cat. No.	Contents
WS02-SPTC1-V2 SPU-Console Ver. 2.2 Operation Manual (this manual)	V237	Describes the installation and operation of the SYSMAC SPU-Console Ver. 2.2
CS1W-SPU01-V2/SPU02-V2 CJ1W-SPU01-V2 SYSMAC SPU Units Operation Manual	V236	Describes the installation and operation of the SYSMAC SPU Units.
WS02-EDMC1-V2 SYSMAC SPU Data Management Middleware User's Manual	V232	Describes the SYSMAC SPU Data Management Middleware (EDMS).

Precautions provide general precautions for using the SPU-Console and the CS1W-SPU01-V2 and CS1W-SPU02-V2 SYSMAC SPU Units.

Section 1 provides an overview of the SPU-Console and describes the operating environment, including computer system requirements.

Section 2 describes procedures for installing and uninstalling the SPU-Console, SPU-Console starting methods, and the basic SPU-Console window configuration.

Section 3 describes how to make initial settings for SYSMAC SPU Units.

Section 4 describes the SYSMAC SPU Unit's operating modes, including procedures for confirming and changing the operating mode.

Section 5 describes the methods used for connecting the SPU-Console to SYSMAC SPU Units, managing SYSMAC SPU Unit connections, editing settings offline, transferring setting files between the SPU-Console and SYSMAC SPU Units, and recording files.

Section 6 describes the methods used to execute commands for SYSMAC SPU Units.

Section 7 describes the data provided in the CPU Bus Unit Areas.

Section 8 introduces the SYSMAC SPU Unit's Data Storage Mode.

Section 9 describes how to monitor SYSMAC SPU Unit operating status and error status.

Section 10 explains how to make the data collection settings for Data Storage Mode operation.

Section 11 explains how to make the event settings for Data Storage Mode operation.

Section 12 describes the settings required to use the recipe function, which can be used in Data Storage Mode to write numeral and textual data, e.g., production parameters, to the memory areas of the CPU Unit.

Section 13 describes the settings required to use the expanded recipe function, which can be used in Data Storage Mode to write numeral and textual data, e.g., production parameters, to the memory areas of the CPU Unit. The expanded recipe function is an expansion of the existing recipe function with the addition of recipe key searching.

Section 14 describes how to set the system settings and FINS network settings.

Section 15 provides a list of the commands that are supported by the SYSMAC SPU Unit in Data Storage Mode.

Section 16 introduces the SYSMAC SPU Unit's Sampling Mode.

Section 17 describes how to monitor SYSMAC SPU Unit operating status and error status.

Section 18 explains how to make the sampling settings for Sampling Mode operation.

Section 19 provides information on Unit settings for data collection.

Section 20 provides a list of the commands that can be executed for SYSMAC SPU Units.

Section 21 describes how to display trend graphs based on sampling files that have been collected.

Section 22 describes the report function, which can be used to create reports from data collected by SYSMAC SPU Units.

The ***Appendices*** provide troubleshooting methods for SYSMAC SPU Unit errors and troubleshooting connections between the SPU-Console and SYSMAC SPU Units, and describes the SYSMAC SPU Unit's network-shared folder configuration. Information is also provided on changing from SPU-Console Ver. 1.0, Ver. 1.2, or Ver. 1.3 and refreshing the system program.

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

Terms and Conditions Agreement

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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- The warranty period for the Software is one year from the date of purchase, unless otherwise specifically agreed.
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● APPLICABLE CONDITIONS

USER SHALL NOT USE THE SOFTWARE FOR THE PURPOSE THAT IS NOT PROVIDED IN THE ATTACHED USER MANUAL.

● CHANGE IN SPECIFICATION

The software specifications and accessories may be changed at any time based on improvements and other reasons.

● ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PRECAUTIONS

This section provides general precautions for using the SPU-Console and the CS1W-SPU01-V2 and CS1W-SPU02-V2 SYSMAC SPU Units.

The information contained in this section is important for the safe and reliable application of SPU-Console and SYSMAC SPU Units. You must read this section and understand the information contained before attempting to set up or operate an SYSMAC SPU Unit using the SPU-Console.

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1 Intended Audience

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

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

2 General Precautions

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

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

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

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

⚠ **WARNING** It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications.

3 Safety Precautions

⚠ **WARNING** Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.

⚠ **WARNING** Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.

⚠ **WARNING** Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.

⚠ **Caution** Execute online editing only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

⚠ **Caution** Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.

⚠ **Caution** Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in the operation manual. The loose screws may result in burning or malfunction.

4 Operating Environment Precautions

⚠ **Caution** Do not operate the Unit in the following locations:

- Locations subject to direct sunlight.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to shock or vibration.

⚠ **Caution** Install the SYSMAC SPU Unit correctly as described in the *CS Series PLC Operation Manual* or *CJ Series PLC Operation Manual*.

⚠ **Caution** Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

5 Application Precautions

Observe the following precautions when using the SYSMAC SPU Unit.

⚠ **WARNING** Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always connect to a ground of 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.
- Always turn OFF the power supply to the CPU Unit, Slaves, and Communications Units before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
  - Mounting or dismounting I/O Units, CPU Units, Memory Packs, or Master Units.
  - Assembling the Units.
  - Setting DIP switches or rotary switches.
  - Connecting cables or wiring the system.

⚠ **Caution** Failure to abide by the following precautions could lead to faulty operation of the SYSMAC SPU Unit or the system, or could damage the SYSMAC SPU Unit. Always heed these precautions.

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer.
- Always use the power supply voltages specified in the operation manuals. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Install the PLC away from devices that generate high-frequency noise.
- Disconnect the Power Supply Unit's LG terminal from the GR terminal before conducting an insulation resistance test or withstand voltage test.
- Do not drop the SPU Unit or subject it to excessive vibration or shock.
- Make sure that all the Backplane mounting screws, terminal block screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction if foreign matter enters the Unit.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.

- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning.
- Wire all connections correctly.
- Mount Units only after checking terminal blocks and connectors completely.
- Make sure that the terminal blocks, expansion cables, and other items with locking devices are locked in place.
- When transporting the Unit, use special packing boxes and protect it from being exposed to excessive vibration or impacts during transportation.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in unexpected operation.
- Observe the following precautions when wiring the communications cable.
  - Separate the communications cables from the power lines or high-tension lines.
  - Do not bend the communications cables past their natural bending radius.
  - Do not pull on the communications cables.
  - Do not place heavy objects on top of the communications cables.
  - Always lay communications cable inside ducts.
  - Use appropriate communications cables.
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up. Not doing so may result in malfunction or damage.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
  - Changing the operating mode of the PLC (including the setting of the startup operating mode).
  - Force-setting/force-resetting any bit in memory.
  - Changing the present value of any word or any set value in memory.
  - Touch the Unit only after first touching a grounded metal object to discharge any static electricity from your body.
  - Do not remove the Memory Card while the CARD indicator is lit. Doing so may damage the files on the Memory Card.
  - Do not turn OFF the power supply while Memory Card data is being accessed. Doing so may damage the files on the Memory Card.
  - Maintain the operating environment for the Memory Cards (such as the ambient operating temperature and other conditions). Request operating environment conditions from the manufacture of the card.
  - OMRON is not responsible for the operation of any memory cards produced by other manufacturers.
  - We recommend making a backup of the PC Card or Memory Card to prevent loosing the data inadvertently, e.g., by mistakenly deleting it.

- Only Memory Cards can be used in the PC Card slot in a CS-series SYSMAC SPU Unit. Modem cards and Ethernet cards, which are not Memory Cards, cannot be used. Do not insert anything but Memory Cards into the Memory Card slot.
- Make sure that the PC card or Memory Card is in the guides when inserting it. Faulty operation may result if the card is not in the guides.
- Always lock the Memory Card in place with the card holder or card cover after inserting it. The Memory Card may become disconnected if it is not locked in place, causing faulty operation.
- Always confirm that the Memory Card is facing the correct direction before inserting it. If a Memory Card is forced into the slot in the wrong direction, the Memory Card or guides may be damaged.
- Always confirm the command code displayed on the 7-segment display before pressing the **ENTER** Button. Faulty operation may result if the command code is incorrect.
- Never restart or turn OFF the power to the SYSMAC SPU Unit while changing data collection settings or other settings. “P1,” “P2,” and through “PE” will be displayed on the 7-segment display while data collection settings are being changed. If the SYSMAC SPU Unit is restarted or turned OFF before completing the change operation, the system file being changed may be damaged.
- Do not turn OFF the power supply to the Unit while transferring the Unit parameters or other data. Doing so may result in incorrect data being transferred to the Unit or the Unit may malfunction.
- With the CJ1W-SPU01-V2 SYSMAC SPU Unit, do not connect anything other than a UPS connection to the COMM port. Doing so may inadvertently shut down the SYSMAC SPU Unit.
- Before sending or receiving data using FTP, use the CONFIRM FTP CONNECTION command (command 61) to check whether FTP communications are enabled. If FTP communications are not enabled, data may be lost.
- Do not disconnect the Ethernet cable while data is being sent or received using FTP. Do not turn OFF the power supply to the hub. Doing either may corrupt the file that is sent or received using FTP or result in a malfunction.
- Make sure that there is sufficient free memory on the Memory Card before sending or receiving a recipe file using FTP. Insufficient free memory may result in a malfunction.
- If executing the CONFIRM FTP CONNECTION command (command 61) shows that FTP communications are not enabled, there may be restrictions on the FTP server. Check the FTP server settings.
- Do not disconnect the Ethernet cable or stop the FTP server while data is being sent or received using FTP. Otherwise, the FTP data may not be completely sent or received. If this occurs, execute command 62 to terminate sending and receiving data using FTP.

6 Conformance to EC Directives

6-1 Applicable Directives

- EMC Directives
- Low Voltage Directive

6-2 Concepts

EMC Directives

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards (see the following note). Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer.

EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Note Applicable EMS (Electromagnetic Susceptibility) and EMI (Electromagnetic Interference) Standards in the EMC (Electromagnetic Compatibility) standards are as follows:

Unit	EMS	EMI
CS1W-SPU01-V2	EN61000-6-2	EN61000-6-4 (Radiated emission: 10-m regulations)
CS1W-SPU02-V2		
CJ1W-SPU01-V2		

Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC meet the required safety standards for the PLC (EN61131-2).

SECTION 1
Overview of Features and Functions

This section provides an overview of the SPU-Console and describes the operating environment, including computer system requirements.

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1-1 Overview of the SYSMAC SPU Unit

The SYSMAC SPU Unit is a CS-series CPU Bus Unit that collects the specified I/O memory data from the CPU Unit using specified collection methods (called collection patterns) and stores the data as CSV-format files (comma-delimited). This function enables the SYSMAC SPU Unit to be used for applications such as analyzing the operation of the PLC and I/O connected to the PLC, recording manufacturing data and other information, and much more.

The SYSMAC SPU Unit has two modes that can be selected to suit the application: Data Storage Mode and Sampling Mode. Data Storage Mode is the default operating mode for SYSMAC SPU Units with unit version 2.0 or later.

- Data Storage Mode

  In this mode, the SYSMAC SPU Unit records the specified I/O memory data from the CPU Unit when a particular event occurs. This mode can record data when a particular bit turns ON or at a particular time. In addition, it is also possible to record data at a fixed time after the event occurs, although the time interval is not as precise as it is in Sampling Mode.

  A recipe function is also supported to enable writing numeral and textual data to the memory areas of the CPU Unit at the same time. Recipe data can be written to the PLC when retooling, with no need to create a ladder program.

- Sampling Mode

  In this mode, the SYSMAC SPU Unit samples the specified I/O memory data from the CPU Unit at regular time intervals. The time intervals are nearly constant, so the data can be recorded at particular times, and more reliable information can be reproduced from the collected data.

Either of these modes can be selected after the SYSMAC SPU Unit is installed.

The settings and display in SPU-Console SPU Basic Software depend on the operating mode. For this reason, this manual is divided into a Data Storage Mode part and a Sampling Mode part. In this manual, “Data Storage Mode” is used to indicate information applicable to Data Storage Mode only, and “Sampling Mode” is used to indicate information applicable to Sampling Mode only.

Note

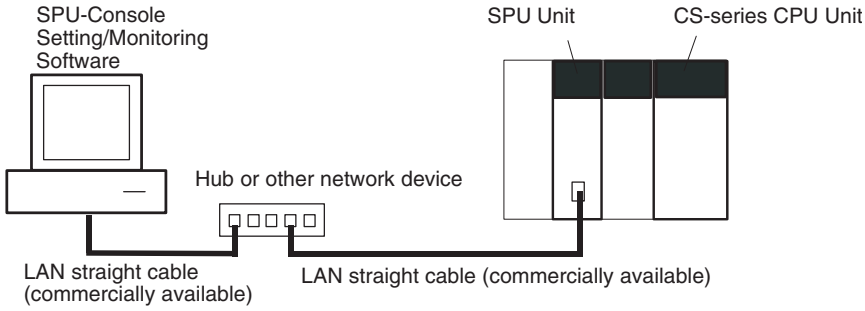
- The sampling capability of the SYSMAC SPU Unit depends on the sampling settings. For details, refer to *1-4-3 SYSMAC SPU Unit Sampling Specifications* in *SYSMAC SPU Units Operation Manual* (Cat. No. V236).
- For restrictions and precautions regarding the SYSMAC SPU Unit, refer to *Restrictions and Precautions* in *SYSMAC SPU Units Operation Manual* (Cat. No. V236).

1-2 SPU-Console

The SPU-Console is a software product used for OMRON's Storage and Processing Unit (called the SYSMAC SPU Unit) to set and operate the SYSMAC SPU Unit, monitor operating status/errors, display trend graphs, and perform other operations from a personal computer. The SPU-Console functions are explained next.

1-2-1 Unit Connections

The SPU-Console is connected to the SYSMAC SPU Unit via a LAN. The SPU-Console dynamically creates windows based on the ID information in the SYSMAC SPU Unit that is connected, eliminating the need to set the model in the software.



1-2-2 Unit Settings

SYSMAC SPU Unit settings are performed by setting the time according to the SYSMAC SPU Unit's location (time zone settings), network settings, such as the name and IP address on the Window network, and FINS network settings.

1-2-3 Data Collection Settings (Data Storage Mode)

The data in the CPU Unit memory to be collected by the SYSMAC SPU Unit in Data Storage Mode and the collection method to be used must be specified. Data collection is specified using variables. Variables have attributes, such as addresses and data types. Scale conversion of variables is also possible. The collection method in Data Storage Mode is called the data collection pattern. Two data collection patterns are supported: basic collection for single data, and data collection for multiple data. For each collection pattern, the length of the sampling time interval, number of records, name of the file to be saved, and number of files are specified.

1-2-4 Event Settings (Data Storage Mode)

In Data Storage Mode, the event settings that specify the time for data collection to start are set. Events are either memory events, which occur when specific conditions are satisfied by values in memory, or schedule events, which occur at specific times or time intervals.

Schedule events occur at set times, such as every minute, every hour, every day, or every week (e.g., every Monday). The event rules for data collection execution or other rules for event processing can be defined. Working days and the end of the month can also be specified for these events.

The combination of these events with the processing that is performed when the events occur are called event rules. Event rules such as "data is recorded in a CSV file whenever a certain bit turns ON" or "data is recorded in a CSV file every day at 8:00" can be set.

A list of the memory events and schedule events can be displayed. The list displays which events are set and the operations that will be executed when these events occur.

1-2-5 Recipe Settings (Data Storage Mode)

In Data Storage Mode, a recipe function is supported to enable writing numeric data (such as production parameters) and text strings to the memory areas of the CPU Unit. The SPU Unit specifies how the recipe data is to be written.

Recipes can be written in either variable format or contiguous area format. In variable format, data is written to non-contiguous memory areas. The data type and scaling method can be specified for writing to multiple non-contiguous memory addresses. In contiguous area format, data is written to a contiguous area at one time. The data type cannot be specified, but more data can be written at high speed than in variable format.

Starting with version 2.1, the SPU-Console includes an expanded recipe function. With the expanded recipe function, you can search for a desired recipe key and write data to the memory areas of the CPU Unit. With the previous recipe function (Ver. 2.0), a recipe key set with Support Software remained constant unless changed, but with the expanded recipe function, it is possible to register recipe keys in files or as file names.

1-2-6 Sampling Settings (Sampling Mode)

The data in I/O memory of the CPU Unit that is to be sampled by the SYSMAC SPU Unit is set in Sampling Mode. Sampling data is specified using variables. Variables have attributes, such as addresses and data types. Scale conversion of variables is also possible. The collection pattern in Sampling Mode is called the sampling pattern. Four sampling patterns (realtime sampling and sampling 1 to 3) are available. For each sampling pattern, the length of the sampling time interval, number of records, name of the file to be saved, and the number of files are specified.

1-2-7 Executing SYSMAC SPU Unit Commands

Commands such as those for starting/stopping sampling for the SYSMAC SPU Unit can be executed from the SPU-Console.

1-2-8 Monitoring SYSMAC SPU Unit Operating Status

The SYSMAC SPU Unit operating status and error information can be displayed on the SPU-Console.

1-2-9 Historical Trend Graphs

Data recorded in CSV files by the SYSMAC SPU Unit can be displayed on trend graphs.

1-2-10 Realtime Trend Graphs (Sampling Mode)

Sampling data collected by the SYSMAC SPU Unit can be displayed on trend graphs in realtime.

1-2-11 Report Function

The report function is used to display in Microsoft Office Excel a CSV file that is collected by the SPU Unit. This is different from simply opening the CSV file in Microsoft Office Excel. Variable data collected by the SPU Unit can be displayed in any specified cells.

The report function can be used to easily create reports, such as daily reports from CSV files collected by the SPU Unit. Sample templates, such as daily manufacturing reports and error logs, are provided to make it easier to create various kinds of reports.

1-2-12 FTP Transfers

You can send files collected by the SYSMAC SPU Unit to the FTP server or receive recipe files from the host computer. Up to ten settings can be used to send data and another ten settings can be used to receive data. Transferring data using FTP is used with the advanced settings for data collection patterns. Transferring data using FTP is used with the expanded recipe function.

1-3 System Requirements

The system requirements to use the SPU-Console are described in this section.

1-3-1 SPU-Console Specifications

Item			Specification
Model number			WS02-SPTC1-V2 (SPU-Console Ver. 2.2)
System requirements	Computer hardware		Computer that meets the system requirements for Microsoft Windows
	CD-ROM drive		Required for installation.
	Display		Super VGA (800 × 600) or better high-resolution video adapter and monitor
	Mouse		Must conform to the models supported by the applicable OS.
	Network card		A separate Ethernet network card is required for computers that do not have a LAN port.
	OS		Microsoft Windows 7 (32bit/64bit) Microsoft Windows 8 (32bit/64bit) Microsoft Windows 8.1 (32bit/64bit) Microsoft Windows 10 (32bit/64bit)
	Application platform		Microsoft .NET Framework 4.6
Communications platform			FinsGateway Version 2003
Functions			Unit information, Unit setup, variable settings, collection pattern settings, event settings, recipe settings, trend graphs, and reports
Unit information		Monitor	SYSMAC SPU Unit operating status and error information are displayed.
		Operation	Operations, such as starting sampling
Unit setup			IP network settings
			FINS network settings
Variable settings			Setting items to sample (by specifying I/O memory addresses using variables)
Collection pattern settings			Collection pattern settings (period, file designations for saving, etc.)
Recipe settings (Data Storage Mode)			Recipe settings (recipe file, write destination, key, etc.)
Event settings (in Data Storage Mode)		Memory event settings	Settings for conditions according to changes in memory (e.g., bits turning ON)
		Scheduler settings	Settings for schedules (e.g., specific times, time intervals)
Trend graphs		Historical trends	CSV files are read and displayed.
		Realtime trends (Sampling Mode)	Current sampling data is read and displayed in trend graphics in real time.

1-3-2 Package Contents

The WS02-SPTC1-V2 contains the following software and data.

SPU-Console Execution Program	The program that performs SYSMAC SPU Unit settings and operations.
Microsoft .NET Framework Version 1.1 Redistribution Package	Microsoft .NET Framework Version 4.6 is required to run the SPU-Console. The Microsoft .NET Framework Version 4.6 Redistribution Package provided in the package can be used to install Microsoft .NET Framework in the computer.
SYSMAC SPU Unit System Data	This system data is transferred to the SYSMAC SPU Unit.
FinsGateway Version 2003	This communications middleware is required to run the SPU-Console.
Manual Data	The manual data includes this manual, the *SYSMAC SPU Unit Operation Manual* (Cat. No. V236) in PDF (portable document format).

SECTION 2
Setting Up, Starting, and Exiting the SPU-Console

This section describes procedures for installing and uninstalling the SPU-Console, SPU-Console starting methods, and the basic SPU-Console window configuration.

2-1 Installation 8
2-1-1 Preparations for Installation 8
2-1-2 Installing Microsoft .NET Framework 8
2-1-3 Installing FinsGateway 8
2-1-4 Installing SPU-Console 9
2-2 Uninstalling SPU-Console 9
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2-1 Installation

2-1-1 Preparations for Installation

Before installing the SPU-Console, check the requirements given in *1-3 System Requirements* to be sure that all requirements have been met.

The following basic steps are required to set up the SPU-Console.

1,2,3...

1. Installing Microsoft .NET Framework
2. Installing FinsGateway
3. Installing SPU-Console

2-1-2 Installing Microsoft .NET Framework

Microsoft .NET Framework Version 4.6 is required to run the SPU-Console.

Installing Microsoft .NET Framework

Microsoft .NET Framework Version 4.6 can be installed from the .NET Framework Redistribution Package included in the SPU-Console installation disk.

Installing the Redistribution Package

1,2,3...

1. Start the computer and log in as a user with administrator rights.
2. The installation program will start automatically. If it does not start automatically, execute the following executable file:

   <CD-ROM drive>:\SetupLauncher.exe
3. Click *Microsoft .NET Framework 4.6.*
4. Follow the installation program instructions to proceed.
   If .NET Framework 4.6 or later is already installed, installation will not be executed.
   Proceed to the next task.

2-1-3 Installing FinsGateway

FinsGateway Version 2003 is required to run the SPU-Console.

If a version lower than FinsGateway Version 2003 is already installed, uninstall it first.

The computer must be restarted after installing FinsGateway.

1,2,3...

1. Start the computer and log in as a user with administrator rights.
2. The installation program will start automatically. If it does not start automatically, execute the following executable file:
   <CD-ROM drive>:\SetupLauncher.exe
3. Click *FinsGateway2003.*
4. Follow the instructions provided by the installation program.
5. Restart the computer when installation has been completed.

2-1-4 Installing SPU-Console

Use the following procedure to install the SPU-Console.

1,2,3...

1. Start the computer and log in as a user with administrator rights.
2. Place the SPU-Console installation disk in the CD-ROM drive.

   The installation program will start automatically. If it does not start, execute the following executable file from the SPU-Console installation disk: <CD-ROM drive>:\SetupLauncher.exe
3. Click *Install SPU-Console.*
4. Follow the instructions provided by the installation program.

2-2 Uninstalling SPU-Console

Use the following procedure to uninstall the SPU-Console program and thus delete it from the computer.

2-2-1 Uninstalling SPU-Console

Use the following procedure to uninstall the SPU-Console.

1,2,3...

1. Start the computer and log in as a user with administrator rights.
2. Select ***Start - Control Panel.***
3. Select ***Add or Remove Programs*** (***Programs - Programs and Features*** in Windows Vista/7).
4. Select OMRON SPU-Console Version 2.2 from the list and click the **Add or Remove** Button (the **Uninstall** Button in Windows Vista/7).
5. Select ***Remove*** from the Setup Maintenance Program and then click the **Next** Button.

   Follow the instructions provided by the uninstallation program.

2-2-2 Uninstalling FinsGateway

Do not uninstall FinsGateway if it is being used by an application other than SPU-Console.

The computer must be restarted after uninstalling FinsGateway.

1,2,3...

1. Start the computer and log in as a user with administrator rights.
2. Select ***Start - Control Panel.***
3. Select ***Add or Remove Programs*** (***Programs - Programs and Features*** in Windows Vista/7).
4. Select OMRON FinsGateway Version 2003 from the list and click the **Add or Remove** Button (the **Uninstall** Button in Windows Vista/7).
5. Select ***Remove*** from the Setup Maintenance Program and then click the **Next** Button.

   Follow the instructions provided by the uninstallation program.
6. Restart the computer.
7. Execute the following executable file from the SPU-Console installation disk: <CD-ROM drive>:\FgwUtils\FgwRemover2003.exe

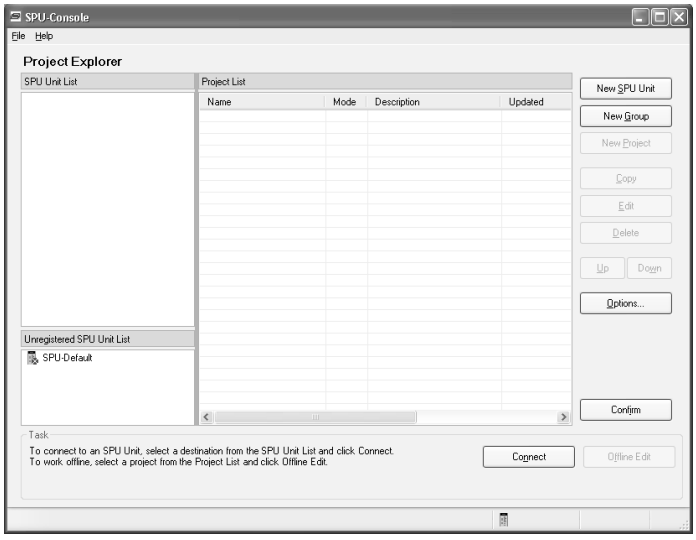
   Follow the instructions provided by the uninstallation program.
8. Restart the computer.

2-3 Starting and Exiting SPU-Console

2-3-1 Starting SPU-Console

Select ***Start - All Program - OMRON - SPU Console 2.2 - SPU Console.***

The SPU-Console will be started and the following window will be displayed.

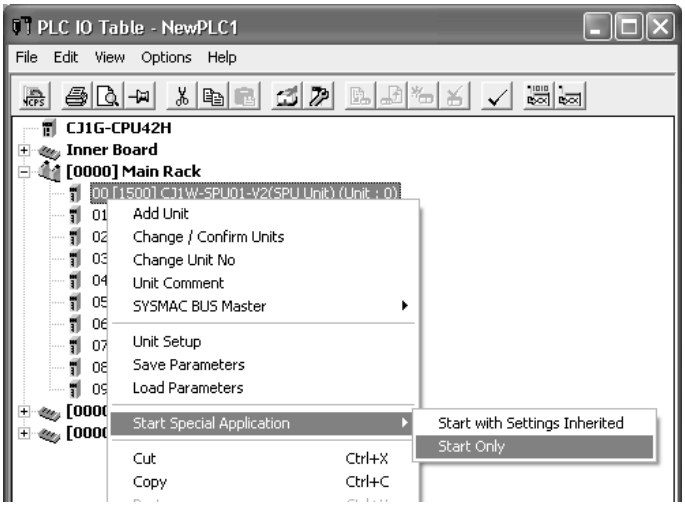


Note

(1) The user must have administrator rights to run the SPU-Console. Log in as a user that has administrator rights.

(2) More than one copy of SPU-Console can be started at the same time.

(3) The SPU-Console can be started from CX-Programmer (version 7.2 or higher). To do so, right-click a SYSMAC CPU Unit in the PLC I/O Tables Window and select ***Start Special Application - Start Only***. The SPU-Console will start. (The SPU-Console will not start with settings inherited even if *Start with Settings Inherited* is selected.)



Note If the following message appears when starting the SPU-Console, use the following procedure to reinstall the SPU-Console: “File or assembly name of FgwDotne, or one of its dependencies, was not found.”

- Start the Setup Maintenance Program using the following procedure in *2-2-1 Uninstalling SPU-Console.*

- Select ***Repair*** from the Setup Maintenance Program and then click the **Next** Button.
  Follow the instructions provided by the uninstallation program.

2-3-2 Exiting SPU-Console

Select ***File - Exit*** from the SPU-Console menus.

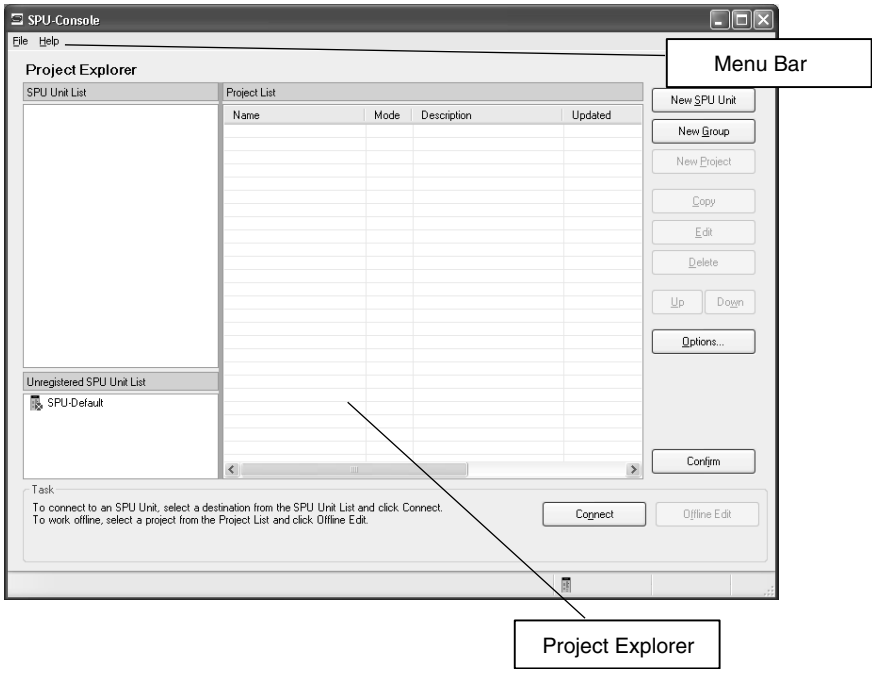
The SPU-Console will be closed.

2-4 SPU-Console Window Configuration

The SPU-Console Window consists of several distinct areas. This section describes the various parts that make up the SPU-Console Window.

2-4-1 Startup Window

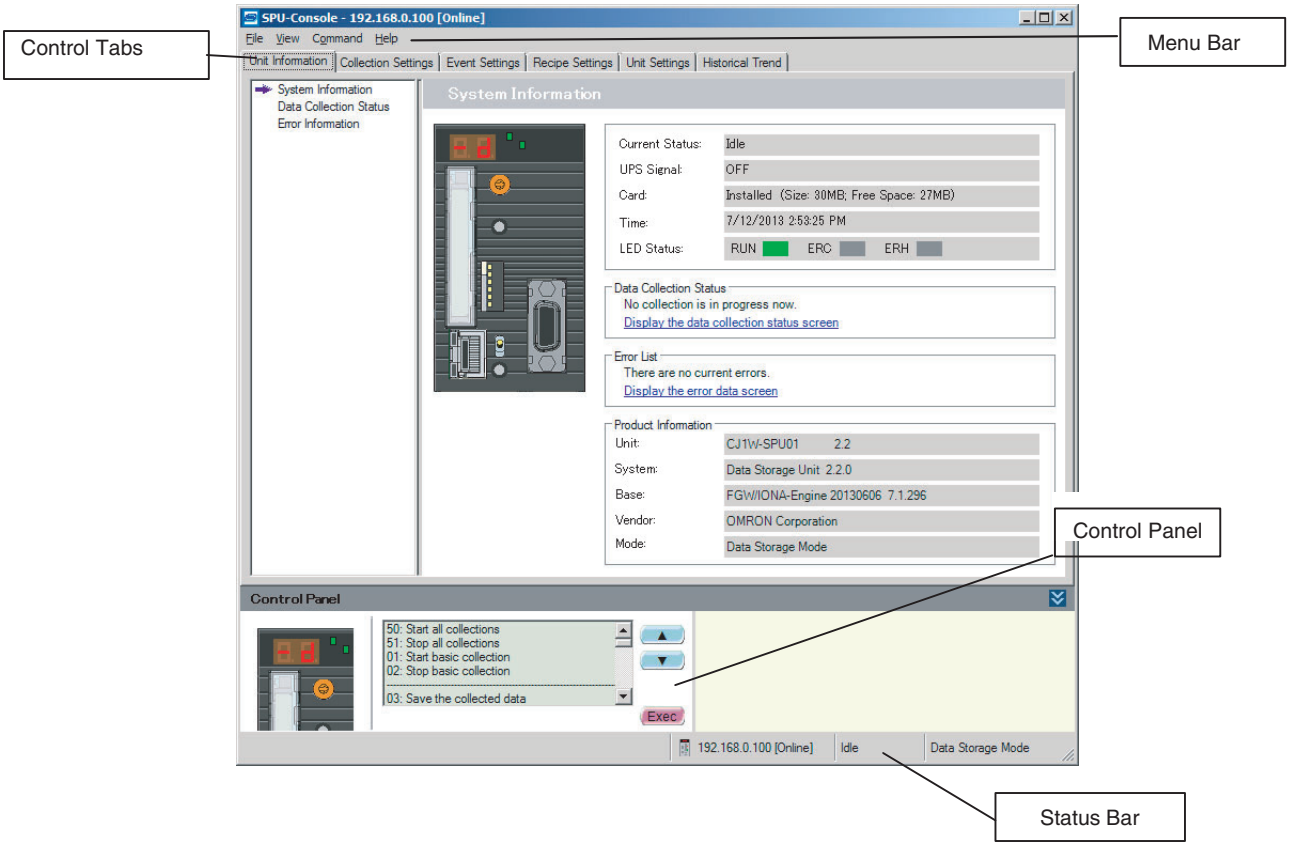
The following window is displayed when the SPU-Console is started. Connected SPU Units and projects are managed in this window.



Item	Function
Menu Bar	Provides menus to perform SPU-Console operations. Menu commands are grouped into related functions. The name of each group is displayed on the menu bar. The commands within each group are accessed on pull-down menus.
Project Explorer	Manages connected SPU Units and the projects where their settings are saved.

2-4-2 SPU Unit Online Connection Window

The following window is displayed when the SPU Unit is connected online.



Item	Function
Menu Bar	Provides menus to perform SPU-Console operations. Menu commands are grouped into related functions. The name of each group is displayed on the menu bar. The commands within each group are accessed on pull-down menus.
Control Tabs	The control tabs are used to switch between SPU-Console tab pages. The name of each tab page is given on the control tab. When a tab is clicked, the corresponding tab page will be displayed.
Control Panel	The Control Panel is used to start sampling and execute commands to control SPU Unit operation.
Status Bar	The Status Bar displays information, such as the status of the connected SPU Unit.

SECTION 3
Initial Settings of the SYSMAC SPU Unit

This section describes how to make initial settings for SYSMAC SPU Units.

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3-2 Making Unit Settings Using the CX-Programmer. 16
3-2-1 Inputting the Settings 16
3-2-2 Enabling the Settings in the SYSMAC SPU Unit. 17
3-2-3 Reading Settings from the SYSMAC SPU Unit 17
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3-3-3 Setting the IP Address of the Computer 19
3-3-4 Making the Initial Settings for the SYSMAC SPU Unit. 21
3-4 Confirming Connections 23

3-1 Outline of Initial Settings

Initial settings must be performed to use a SYSMAC SPU Unit.

In the initial settings, you set the IP address and other network settings, the time zone, and other settings. You can use the SYSMAC CS/CJ-series CX-Programmer Support Software or the Initialization Wizard that comes with the SPU-Console to make the initial settings. Set the initial settings of the SYSMAC SPU Unit using either method.

3-2 Making Unit Settings Using the CX-Programmer

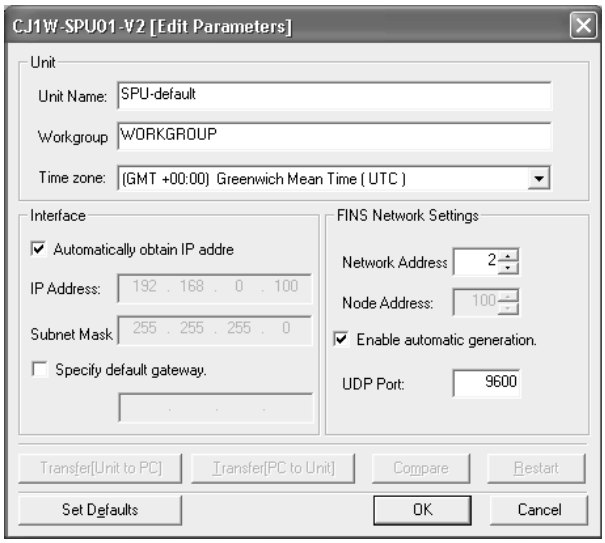
Aside from using the SPU-Console Initialization Wizard, it is also possible to use the CX-Programmer to make the SYSMAC SPU Unit settings. The procedure is shown below.

Note In order to use this settings function, CX-Programmer Version 7.2 or later and a SYSMAC SPU Unit of unit version 2.0 or later are required.

3-2-1 Inputting the Settings

1,2,3...

1. Place the CX-Programmer online and open the PLC I/O Table Window.
2. In the I/O Table Window, select ***Transfer from PLC*** from the Option Menu in the I/O Table Window and transfer the CPU Bus Unit settings from the PLC.
3. In the PLC I/O Table Window, select the SYSMAC SPU Unit. Right-click and select ***Edit CPU Bus Unit Settings***. The SYSMAC SPU Unit's Edit Parameters Dialog Box will be displayed.
4. Input the settings in the Edit Parameters Dialog Box.



The following table shows the meanings of the items to be set.

Item	Setting
Unit	
Unit Name	This is the name displayed under My Network on the Windows computer. The default is “SPU-default.” Input a maximum of 64 characters. Set a unique name for each SYSMAC SPU Unit connected to the same network. Unit names of more than 15 characters cannot be found from Windows Explorer.

Item	Setting
Work group	Input the work group name for the Windows network.
Time zone	Set the time zone for the SYSMAC SPU Unit. The factory setting is UTC (Coordinated Universal Time). Be sure to set the time zone for the region where the Unit is to be used.
Interface	
Obtain an IP address automatically	Select this setting to automatically obtain an IP address using the DHCP (Dynamic Host Configuration Protocol). **Note** A DHCP server must exist on the network/system to use this setting. If you do not know if a DHCP server exists, ask your system administrator.
IP address	Input the IP address. Set a unique IP address for each SYSMAC SPU Unit connected to the same network.
Subnet mask	Set the same subnet mask as the one set on the network computer to be connected.
Specify the default gateway	To specify the default gateway, select this option and set the IP address for the default gateway.
FINS Network Settings	
Network address	Input the FINS network address for the Ethernet communications service that is built into the SYSMAC SPU Unit. The setting must match the FINS network address for the computer's FinsGateway ETN_UNIT service.
Node address	Input the FINS node address for the Ethernet communications service that is built into the SYSMAC SPU Unit. It cannot be input if the automatic generation method is enabled. In that case, the host portion of the IP address becomes the FINS node address.
Enable automatic generation.	When this setting is selected, automatic generation is set as the FINS-IP address conversion method and the host portion of the IP address becomes the FINS node address.
UDP port	Set the UDP port to be used.

3-2-2 Enabling the Settings in the SYSMAC SPU Unit

1,2,3...

1. With the CX-Programmer connected online, display the SYSMAC SPU Unit's Edit Parameters Dialog Box.
2. Click the **Transfer to Unit** Button.

   If the PLC operating mode is MONITOR or RUN mode, change it to PROGRAM mode.
3. A dialog box will be displayed to restart the Unit. Click the **Yes** Button. The settings will be enabled after the Unit has been restarted.

Note Close the Edit Parameters Dialog Box before restarting the SYSMAC SPU Unit. If the Unit is restarted while the dialog box is open, the connection with the Unit will be broken. Close the Edit Parameters Dialog Box and then display it again.

3-2-3 Reading Settings from the SYSMAC SPU Unit

1,2,3...

1. With the CX-Programmer connected online, display the SYSMAC SPU Unit's Edit Parameters Dialog Box.
2. Click the **Transfer to Computer** Button. The Unit settings will be displayed in the Edit Parameters Dialog Box.

Note Be sure to execute command 24 (Enable Unit settings) after making the Unit settings. If this command is not executed, the actual settings may not be the same as the settings displayed in the Edit Parameters Dialog Box.

3-2-4 Verifying the SYSMAC SPU Unit Settings

1,2,3...

1. With the CX-Programmer connected online, display the SYSMAC SPU Unit's Edit Parameters Dialog Box.
2. Click the **Compare** Button. The verification results will be displayed.

3-2-5 Restoring the Default Settings

1,2,3...

1. Display the SYSMAC SPU Unit's Edit Parameters Dialog Box.
2. Click the **Set Defaults** Button. The default settings will be entered.

Note The CPU Unit and CX-Programmer can be connected online using the Fins-Gateway message service that is included with the SYSMAC SPU Unit, but do not connect the CPU Unit online via the SYSMAC SPU Unit when making the Unit settings. In that case, use a protocol such as the Toolbus protocol to connect the CX-Programmer and the CPU Unit.

3-3 Making Initial Settings Using the Initialization Wizard.

Use the following procedures to make the initial settings with the Initialization Wizard.

Connect the SYSMAC SPU Unit and computer with a LAN cable.	3-3-1
↓	
Start the SYSMAC SPU Unit in Maintenance Mode.	3-3-2
↓	
Set the IP address of the computer.	3-3-3
↓	
Make the initial settings for the SYSMAC SPU Unit with the Initialization Wizard.	3-3-4

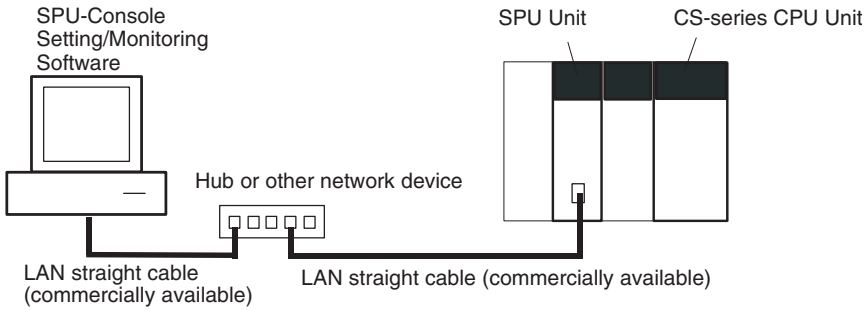
Note The model number and lot number of the SYSMAC SPU Unit are required to make the initial settings for the SYSMAC SPU Unit. Before mounting the SYSMAC SPU Unit, record the information on the sticker on the side of the Unit. The model number and lot number are also printed on the sticker on the package.

Note If you perform the setup with the SYSMAC SPU Unit’s Initialization Wizard, all settings (such as the Data Collection Settings and Unit Settings) will be initialized. Confirm that it is OK to initialize all settings before you make the initial settings.

3-3-1 Connecting the SYSMAC SPU Unit and Computer with a LAN Cable

The SYSMAC SPU Unit is connected to the computer with a LAN cable. The connection can be made either through a hub or other network device. (If the connection cannot be made, refer to *Appendix B Troubleshooting Connections.*)

Connect the LAN cable to the LAN1 port on the SYSMAC SPU Unit.



Note Do not connect to the network more than one SYSMAC SPU Unit for which initial settings have not been made. IP addresses will be duplicated, and communications may not be possible. Disconnect the LAN cable from all SYSMAC SPU Units except for one and set one SYSMAC SPU Unit at a time.

3-3-2 Starting the SYSMAC SPU Unit in Maintenance Mode

Use the following procedure to start the SYSMAC SPU Unit in Maintenance Mode.

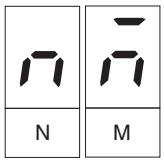
1,2,3...

1. Connect the LAN cable to the LAN1 port on the SYSMAC SPU Unit.
2. Turn ON pins 4 and 6 on the DIP switch on the SYSMAC SPU Unit and then turn ON the power supply to the PLC. The SYSMAC SPU Unit will start in Maintenance Mode.

   Pin 4 ON = IP address set to 192.168.0.100.

   Pin 6 ON = Start in Maintenance Mode.

   When the SYSMAC SPU Unit has started in Maintenance Mode, “NM” will be displayed on the 7-segment display on the SYSMAC SPU Unit.



3. Check the IP address of the SYSMAC SPU Unit using the following procedure.
   - Press the **SELECT** Switch to select command 05 and then press the **ENTER** Button twice. The IP address will be displayed on the 7-segment display.
   - Confirm that 192.168.0.100 is displayed as the IP address.
   - If the IP address is not 192.168.0.100, check the DIP switch setting and repeat the procedure from step 2.

3-3-3 Setting the IP Address of the Computer

To enable connecting to the SYSMAC SPU Unit in Maintenance Mode, the IP address of the computer must be temporarily set to 192.168.0.200.

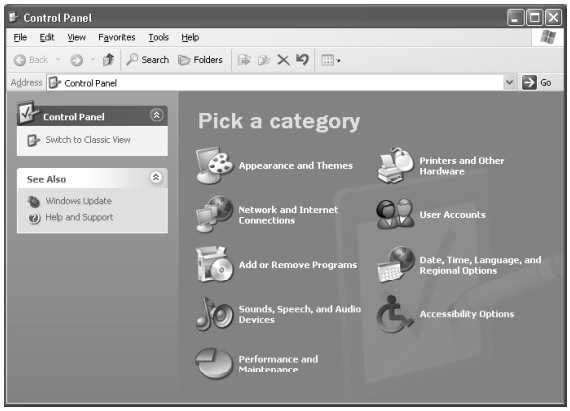
The method for setting the IP address depends on the operating system of the computer. Refer to user documentation provided with your computer for details.

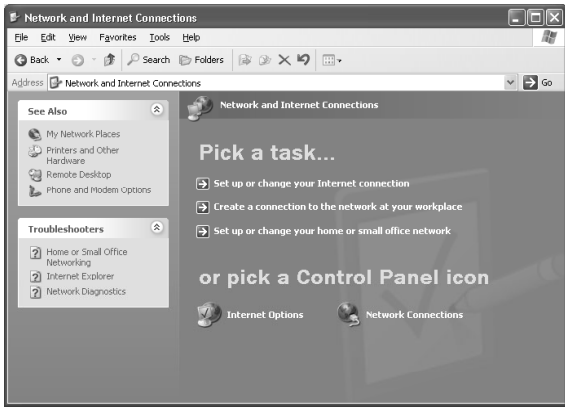
The following procedure is for Windows XP Professional.

1,2,3...

1. Connect the LAN cable to the LAN port on the computer and turn ON the power supply to the computer.

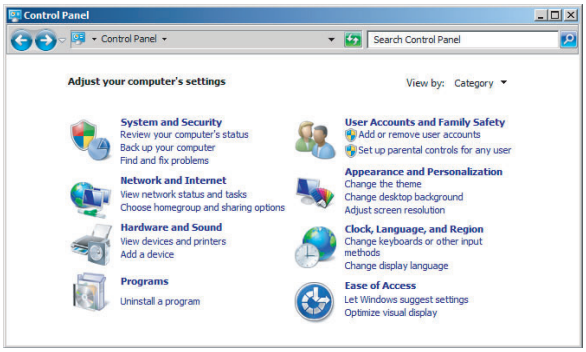
2. Log in using the account of the computer administrator.
3. Select ***Start - Control Panel.***
4. Click ***Network and Internet Connections*** and then click ***Network Connections.***

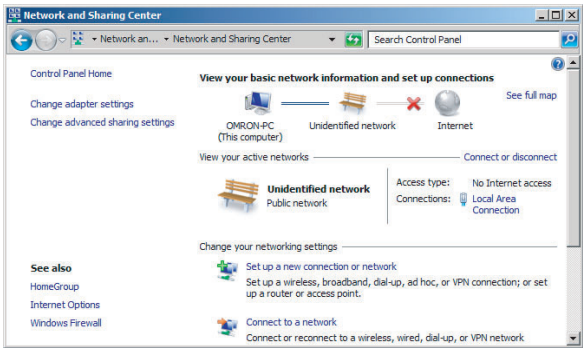




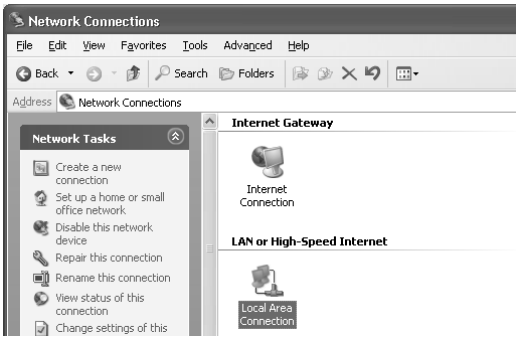
If the control panel is set for classic display, click ***Network Connections*** from the Control Panel.

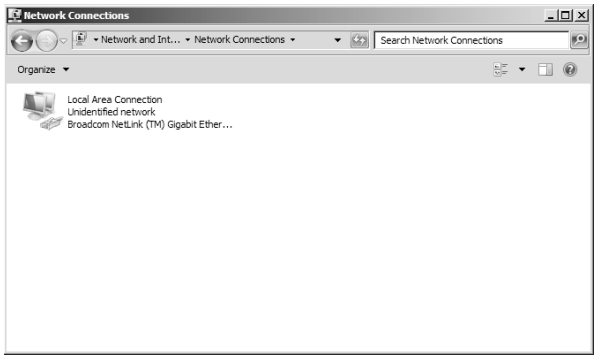
- For Windows 7, click **View Network Status and Tasks in the Control Panel** and then click **Change adapter settings**.



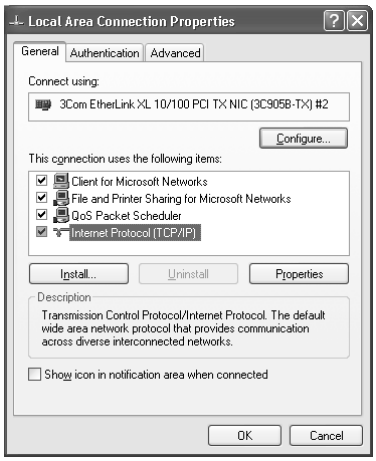


5. Right-click the network to be set and select ***Properties*** from the menu, as shown below.





The Local Area Connection Properties Dialog Box of the network that was selected will be displayed.



6. Select ***Internet Protocol (TCP/IP)*** and then click the **Properties** Button.

   The Internet Protocol (TCP/IP) Properties Dialog Box shown below will be displayed.

7. Recording the Current IP Address

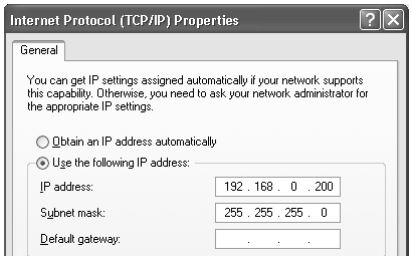
   If *Use the following address* is set, record the current IP address of the computer so that it can be set again later.

IP address	. . .
Subnet mask	. . .
Default gateway	. . .

8. Temporarily Changing the IP Address

   Select ***Use the following address*** and change the IP address to the values given below.

   - IP address = 192.168.0.200
   - Subnet mask = 255.255.255.0



9. Click the **OK** Button to change the setting

   It may be necessary to restart the computer to make the new settings valid.

This completes setting the IP address of the computer.

3-3-4 Making the Initial Settings for the SYSMAC SPU Unit

1,2,3...

1. Select ***Start - All Program - OMRON - SPU Console 2.2 - Initialization Wizard.***

   The Initialization Wizard will be started.

2. Input the SYSMAC SPU Unit product information.

   Input the model number and lot number of the SYSMAC SPU Unit and click the **Next** Button.

The model number and lot number can be found on the sticker on the side of the SYSMAC SPU Unit or on the sticker on the package.

3. Make the Unit settings.

   The following items are set.

Item	Setting
Unit Name	This is the name displayed under My Networks on the Windows computer. The default is “SPU-default.” Input a maximum of 64 characters. Set a unique name for each SYSMAC SPU Unit connected to the same network. Unit names of more than 15 characters cannot be found from Windows Explorer.
Time zone	Set the time zone of the applicable region.

   Set all of the required items and then click the **Next** Button.

4. Make the network settings.
   Set the following items.

Item	Setting
Obtain an IP address automatically	Select this setting to automatically obtain an IP address using the DHCP (Dynamic Host Configuration Protocol). **Note** A DHCP server must exist on the network/system to use this setting. If you do not know if a DHCP server exists, ask your system administrator.
Use the following IP address	Select this setting when not automatically obtaining an IP address using the DHCP and then set the IP address and subnet mask.
IP address	Input the IP address. Set a unique IP address for each SYSMAC SPU Unit connected to the same network.
Subnet mask	Set the same subnet mask as the one set on the network computer to be connected.
Network address	Input the FINS network address for the Ethernet communications service that is built into the SYSMAC SPU Unit. The setting must match the FINS network address for the computer's FinsGateway ETN_UNIT service.
Node address	Input the FINS node address for the Ethernet communications service that is built into the SYSMAC SPU Unit. The node address does not need to be input if the automatic generation method is enabled. In that case, the host portion of the IP address becomes the FINS node address.
Enable automatic generation.	When this setting is selected, automatic generation is set as the FINS-IP address conversion method and the host portion of the IP address becomes the FINS node address.

   Set all of the required items and then click the **Next** Button.

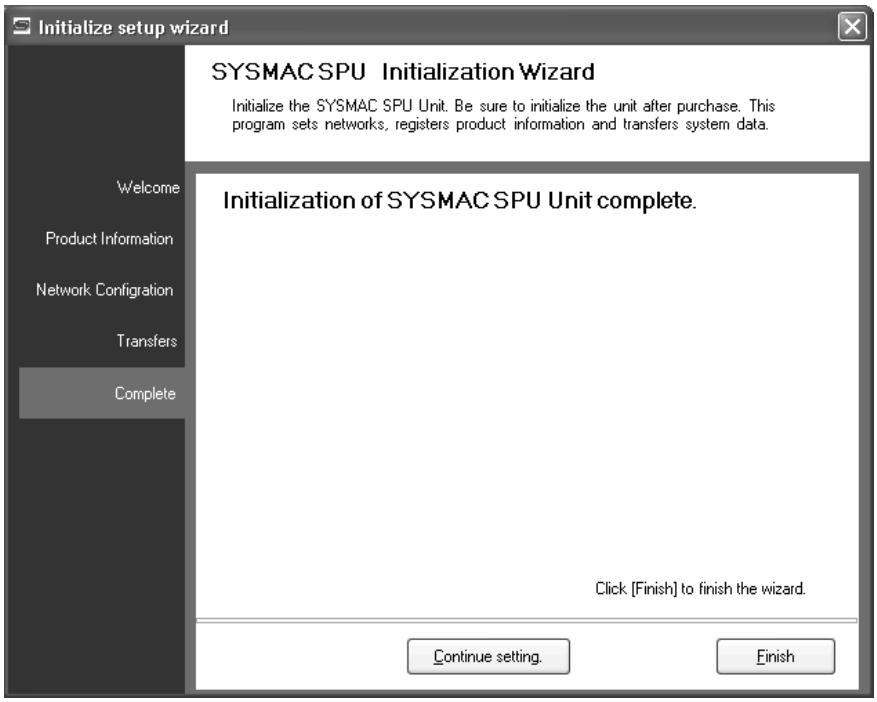
5. Transferring System Data

   Check that the settings are correct and then click the **Execute** Button.

   System data will be transferred to the SYSMAC SPU Unit.

6. Exiting the Initialization Wizard

   The following window will be displayed if the Wizard is exited normally.



   Click the **Finish** Button to exit.

Note The Initialization Wizard cannot be connected to the SYSMAC SPU Unit in the following cases.

- When the computer log-on destination is taken as the domain:
  Change the computer log-on destination to the computer rather than the domain.
- When firewall software is used:
  Set the firewall so that the SYSMAC SPU Unit IP address can be used, or disable the firewall.

3-4 Confirming Connections

After making the initial settings, use the following procedure to confirm that the SYSMAC SPU Unit on the network can be recognized from the computer.

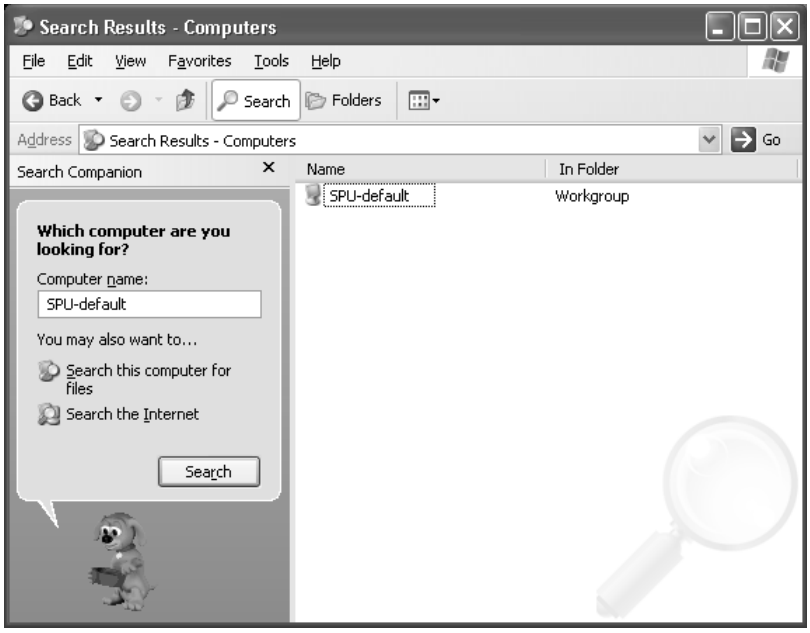
1,2,3...

1. Return the computer's network settings to their previous values using the procedure in *3-3-3 Setting the IP Address of the Computer* as a guide.
2. Turn OFF the power supply to the PLC and then turn OFF all pins on the DIP switch on the SYSMAC SPU Unit.
3. Turn ON the power supply to the PLC to start the SYSMAC SPU Unit.
4. Search for SYSMAC SPU Units on the network using the Windows Search for Computers command.
   - For Windows XP, right-click ***My Network Places*** on the **Start** Menu and then select ***Search for Computers.***
   - For Windows 7, select **Network** from the Explorer and enter the unit name of the SYSMAC SPU Unit in the *Search* Box.

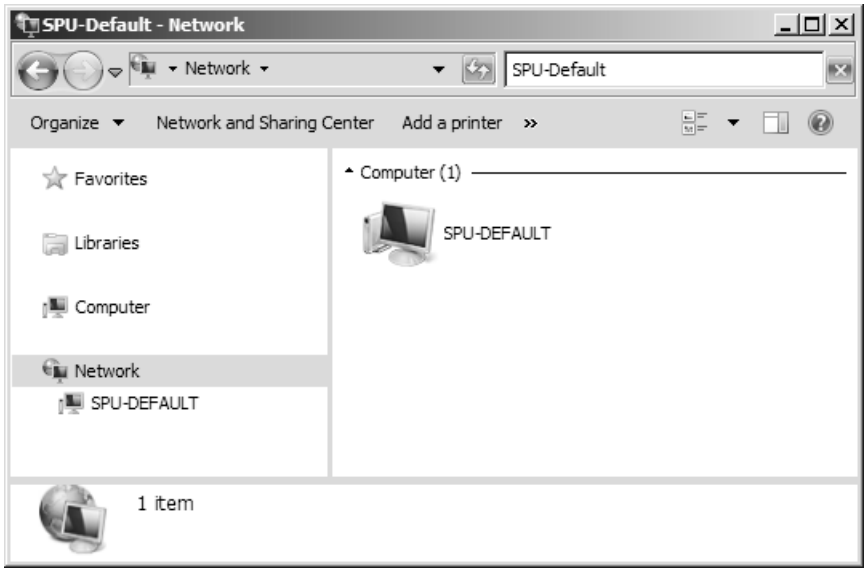
5. Input the Unit Name or IP address for the *Computer name* and then click the **Search** Button.

   The following display will appear if the SYSMAC SPU Unit is found.

- Windows XP



- Windows 7



SECTION 4
Changing the SYSMAC SPU Unit's Operating Mode

This section provides information on the SYSMAC SPU Unit's operating modes, including procedures for confirming and changing the operating mode.

4-1 Operation Overview 26
4-2 Confirming the Operating Mode 26
4-3 Changing the Operating Mode 27

4-1 Operation Overview

The SYSMAC SPU Unit provides two operating modes: Data Storage Mode and Sampling Mode. For an overview of operating modes, refer to *SECTION 1 Overview of Features and Functions*. Either of these operating modes can be selected.

The Data Storage Mode is the default operating mode for a SYSMAC SPU Unit with unit version 2.0 or later.

To select an operating mode, stop all SYSMAC SPU Unit operations. The operating mode cannot be changed while the SYSMAC SPU Unit is operating. Use the following procedure to change the SYSMAC SPU Unit operating mode.

1,2,3...

1. Change the DIP switch setting on the SYSMAC SPU Unit and restart using the restart command.
2. After restarting, execute the command to change the operating mode.
3. When the command to change the operating mode has completed executing, change the DIP switch setting on the SYSMAC SPU Unit and restart the Unit. The SYSMAC SPU Unit will use the newly set operating mode.

4-2 Confirming the Operating Mode

The following three methods can be used to confirm the operating mode.

Using 7-segment display on Front of the SYSMAC SPU Unit

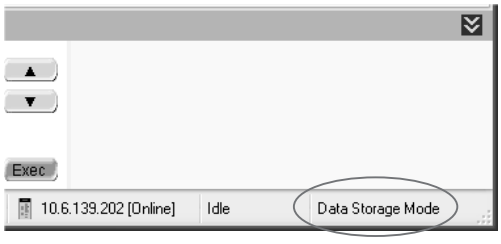
The operating mode is displayed on the 7-segment display on the front of the SYSMAC SPU Unit.

7-segment display	Operating mode
	Data Storage Mode
	Sampling Mode

Using SPU-Console Status Bar

1,2,3...

1. Connect to the SYSMAC SPU Unit using the SPU-Console. For details on connection methods, refer to *5-1 Connecting and Disconnecting*.
2. The operating mode is displayed in the Status Bar at the bottom right of SPU-Console.

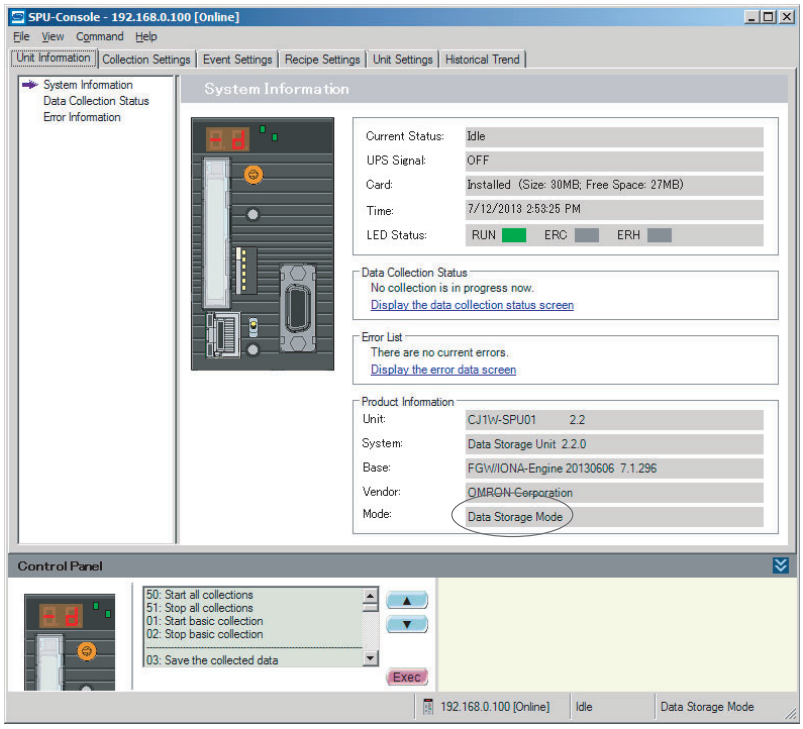


Using SPU-Console: *Unit Information - System Information - Mode*

1,2,3...

1. Connect to the SYSMAC SPU Unit using the SPU-Console. For details on connection methods, refer to *5-1 Connecting and Disconnecting*.

2. Select the **Unit Information** Tab and ***System Information*** to display the system information.
3. The operating mode is displayed in the *Mode* Field in the System Information Window.

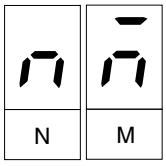


4-3 Changing the Operating Mode

Use the following procedure to change the operating mode.

1,2,3...

1. First, record the SYSMAC SPU Unit's currently set DIP switch setting.
2. Turn ON pins 4 and 6 only of the SYSMAC SPU Unit's DIP switch.
3. Select command 12 (Restart Unit) using the **SELECT** Switch, and then press the **ENTER** Button. For details on command execution methods, refer to *6-3 Executing Commands from the SYSMAC SPU Unit*. The Unit will restart. Check that "NM" is shown on the 7-segment display.



4. Change the SYSMAC SPU Unit's operating mode. Select the number of the operating mode to be changed to using the **SELECT** Switch, and then press the **ENTER** Button.

Operating mode change operation	Number to select using the SELECT Switch
Changing to Data Storage Mode	53
Changing to Sampling Mode	68

5. The display will change from "M1" in order. Wait until "F" is displayed.
6. When "F" is displayed in the 7-segment display, return the DIP switch to the status recorded in step 1.

7. Select command 12 (Restart Unit) using the **SELECT** Switch and press the **ENTER** Button. The SYSMAC SPU Unit will restart and operate in the newly set operating mode.
8. Check that the operating mode has changed. Refer to the confirmation methods in *4-2 Confirming the Operating Mode*.

SECTION 5
Connecting to an SYSMAC SPU Unit

This section provides information on connecting the SPU-Console to SYSMAC SPU Units, managing SYSMAC SPU Unit connections, editing settings offline, transferring setting files between the SPU-Console and SYSMAC SPU Units, and recording files.

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- 5-1-1 Connecting the SYSMAC SPU Unit and Computer with a LAN Cable 30
- 5-1-2 FINS Network Settings 30
- 5-1-3 Starting the SPU-Console 31
- 5-1-4 Registering SYSMAC SPU Units 33
- 5-1-5 Checking the Connections. 34
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- 5-1-7 Disconnecting 36

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- 5-2-1 Changing and Deleting SYSMAC SPU Unit Registrations 36
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5-1 Connecting and Disconnecting

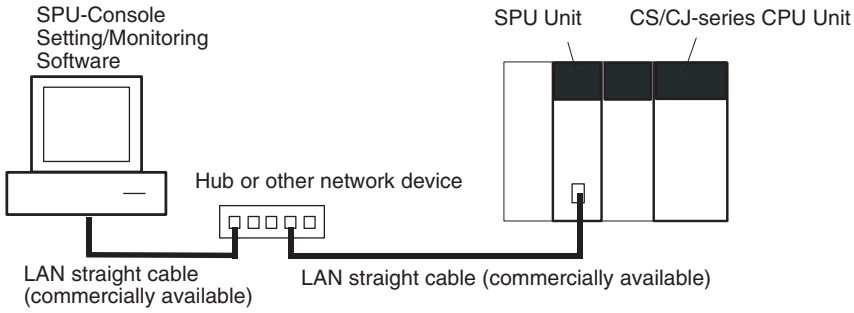
This section describes how to connect/disconnect the SPU-Console to/from SYSMAC SPU Units.

5-1-1 Connecting the SYSMAC SPU Unit and Computer with a LAN Cable

The SYSMAC SPU Unit is connected to the computer with a LAN cable.

The connection can be made either through a hub or other network device.

Connect the LAN cable to the LAN1 port on the SYSMAC SPU Unit.



Note

(1) Do not connect to the network more than one SYSMAC SPU Unit for which initial settings have not been made. IP addresses will be duplicated, and communications may not be possible. Disconnect the LAN cable from all SYSMAC SPU Units except for one and set one Unit at a time. Initial settings for the SYSMAC SPU Unit are made using the Initialization Wizard. Refer to *SECTION 3 Initial Settings of the SYSMAC SPU Unit.*

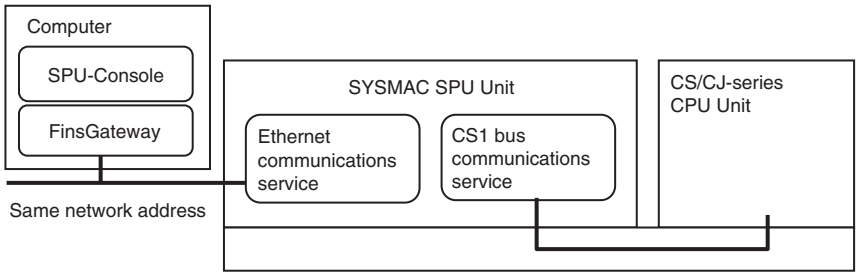
(2) Connecting to the SYSMAC SPU Unit is not possible in the following cases.

- When the computer log-on destination is taken as the domain:
  Change the computer log-on destination to the computer rather than the domain.
- When firewall software is used:
  Set the firewall so that the SYSMAC SPU Unit IP address can be used, or disable the firewall.

5-1-2 FINS Network Settings

FinsGateway, OMRON's communications middleware, is included with the SYSMAC SPU Unit, and the SPU-Console is connected to the SYSMAC SPU Unit using the FINS message service. If the SPU-Console cannot be connected, set the FINS network addresses for the computer's FinsGateway and the SYSMAC SPU Unit's Ethernet communications service to the same value. The FINS network default address for the SYSMAC SPU Unit's Ethernet communications service is 2.

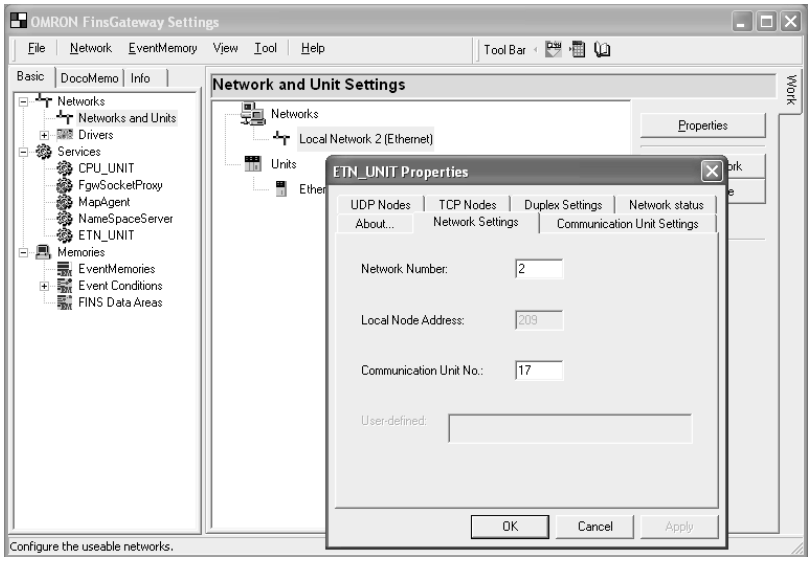
The network address for the SYSMAC SPU Unit can be set in the initial settings. For details, refer to *SECTION 3 Initial Settings of the SYSMAC SPU Unit*.



Note The procedure for checking the FINS network address for the FinsGateway at the computer is given below.

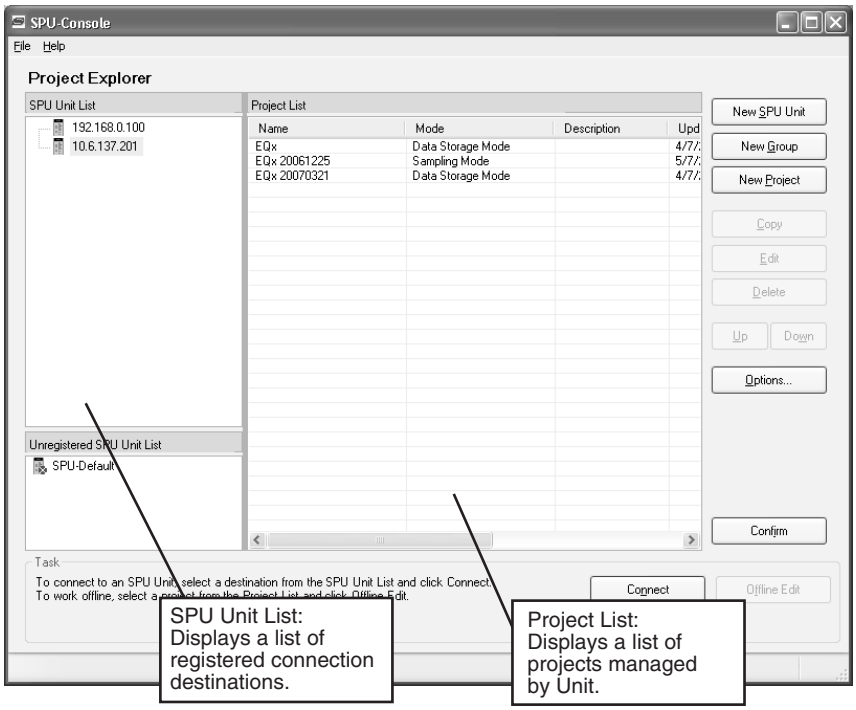
1,2,3...

1. Start the FinsGateway Setting utility by selecting ***All Programs - FinsGateway - FinsGateway Setting***.
2. On the Basic Tab Page in the FinsGateway Setting Window, check under Service to confirm that the ETN_UNIT service has started. If the service has not started, start it by selecting ETN_UNIT and clicking the **Start** Button in the Service Setting Panel.
3. On the Basic Tab Page in the FinsGateway Setting Window, select Network and Unit to display the Network and Unit Setting Panel The Ethernet communications service network will be displayed as “local network n (Ethernet),” with “n” representing the network address. Confirm that it is identical to the FINS network address (default: 2) for the SYSMAC SPU Unit's Ethernet communications service. If it is different, click the **Properties** Button to display the ETN_UNIT Properties Dialog Box. In the Network Tab Page, input the identical network address. After the new network address has been input, restart the ETN_UNIT to enable the new address.



5-1-3 Starting the SPU-Console

When the SPU-Console is started, the Project Explorer Window is displayed as shown below. SYSMAC SPU Unit connection destinations can be managed from the SPU-Console. SYSMAC SPU Unit settings are called “projects,” and they can be edited and managed individually. SYSMAC SPU Unit connection destinations and projects are managed using the Project Explorer. The Project Explorer Window configuration is shown below.

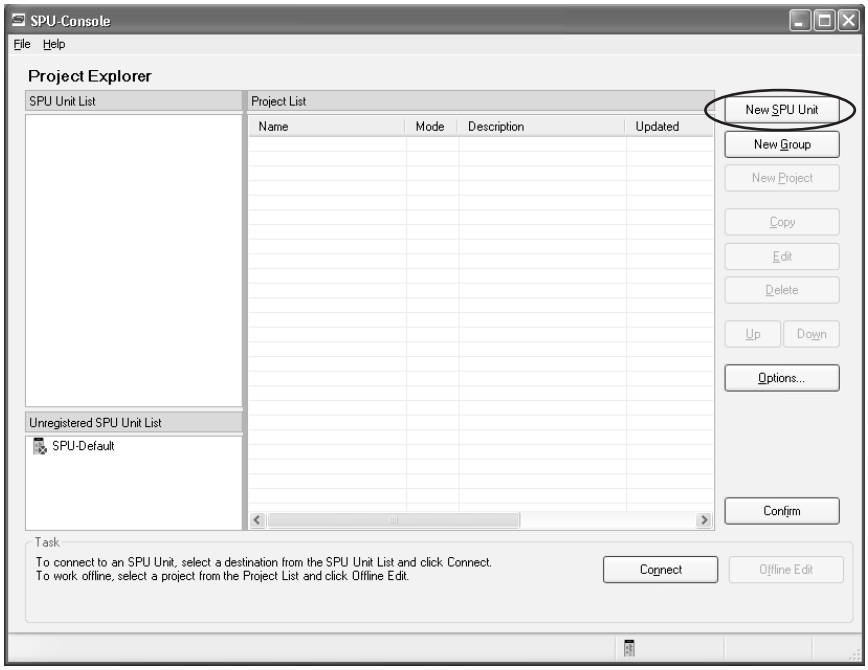


The meanings of the column headings in the Project List are as follows:

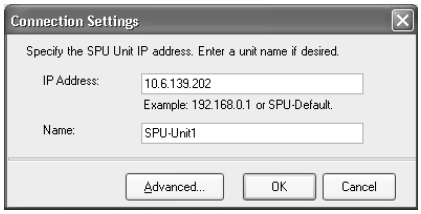
Heading	Meaning
Name	Displays the project name.
Mode	Displays the operating mode for the project.
Description	Displays a description of the project.
Date changed	Displays the date on which the project was changed.
Folder	Displays the path of the local folder where the project is saved.
Version	Displays the unit version of the SYSMAC SPU Unit.

5-1-4 Registering SYSMAC SPU Units

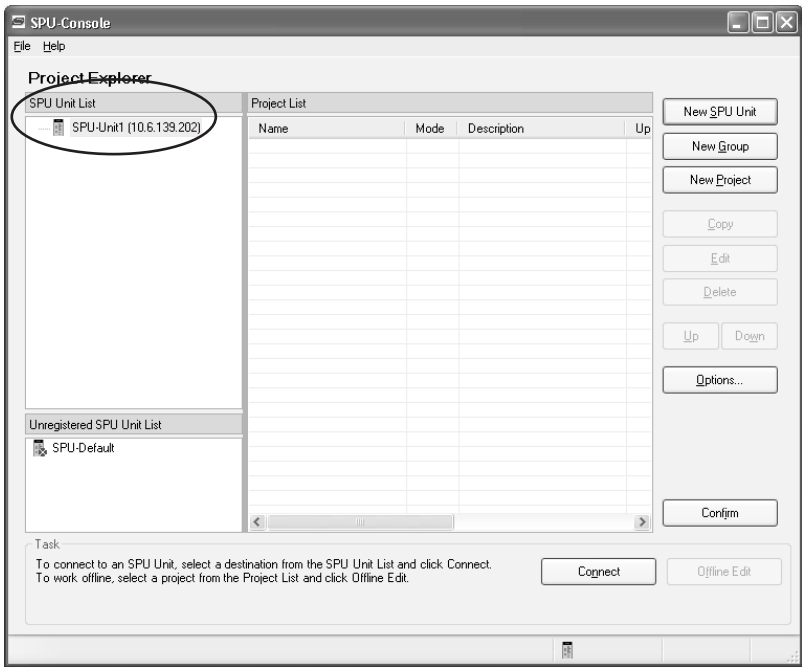
1,2,3... 1. Click the **New SPU Unit** Button. The Connection Settings Dialog Box will be displayed.



2. In the *IP Address* field, specify the IP address for the SYSMAC SPU Unit that is to be connected.
In the *Name* field, specify a text string to identify the SPU Unit.

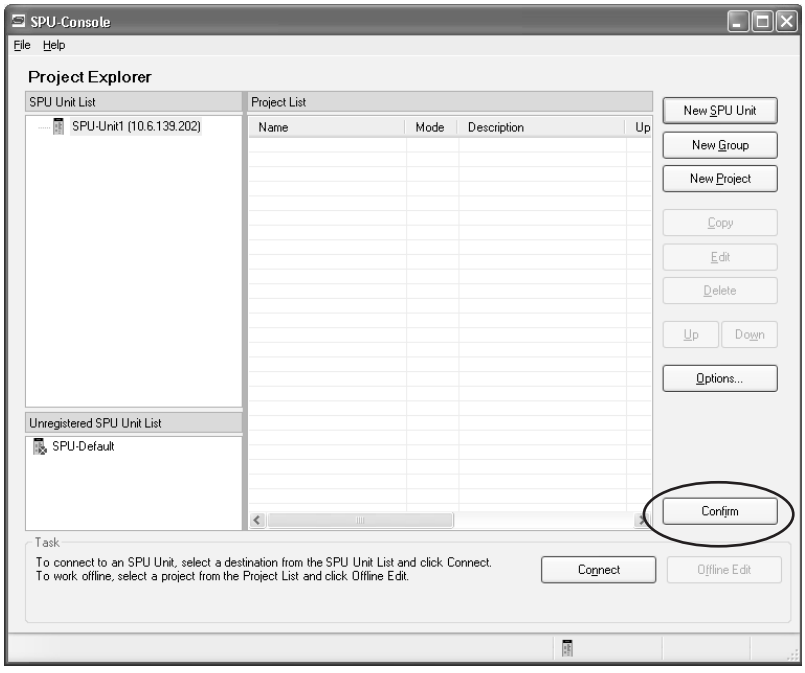


3. Click the **OK** Button to register the new Unit to the SPU Unit List. The newly registered Unit will be displayed in the SPU Unit List as shown below.

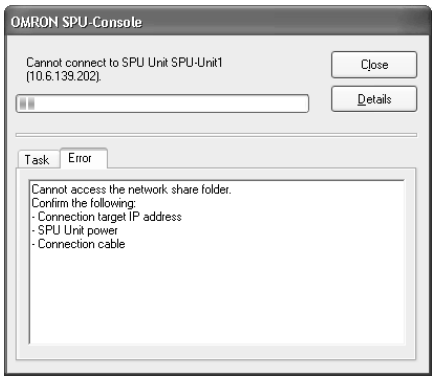


5-1-5 Checking the Connections

To check whether it is possible to connect to a SYSMAC SPU Unit, select the Unit in the SPU Unit List and then click the **Confirm** Button.



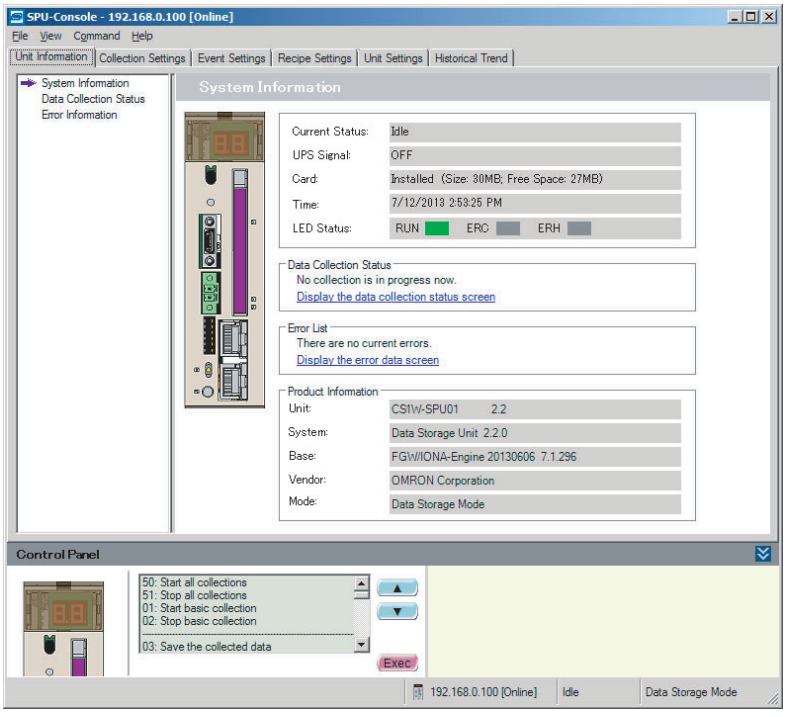
If it is not possible to connect, an error message will be displayed. Refer to *Appendix B Troubleshooting Connections* and apply countermeasures.



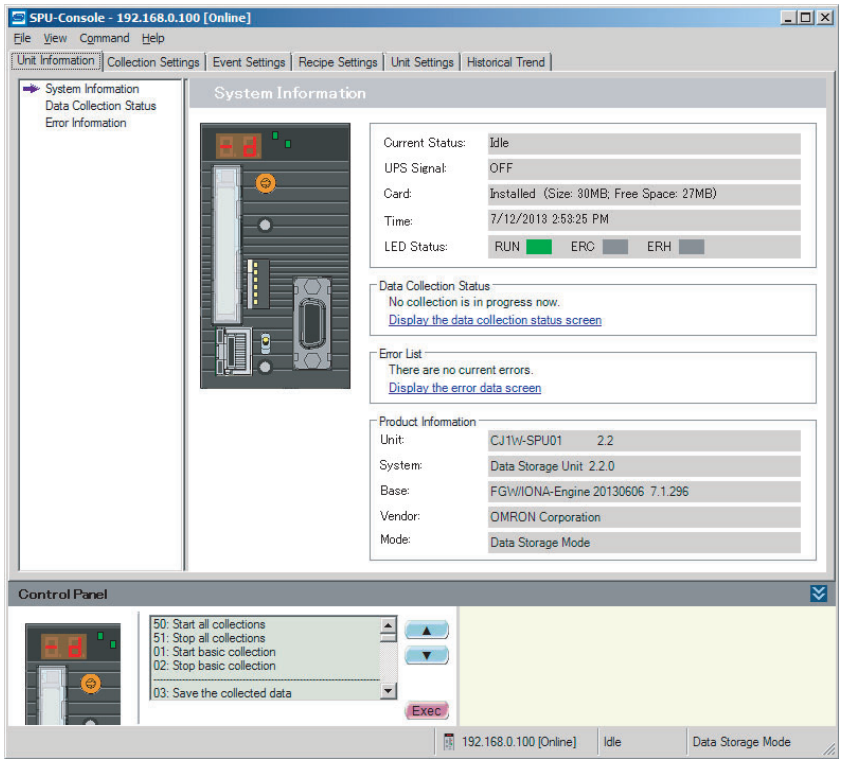
5-1-6 Connecting to a SYSMAC SPU Unit

From the SPU Unit List, select the SYSMAC SPU Unit to which to connect and then click the **Connect** Button. The following window will be displayed when the connection is made.

CS-series SYSMAC SPU Unit



CJ-series SYSMAC SPU Unit



5-1-7 Disconnecting

Select ***File - Disconnect.***

The connection to the SYSMAC SPU Unit will be broken.

5-2 Managing Connection Destinations

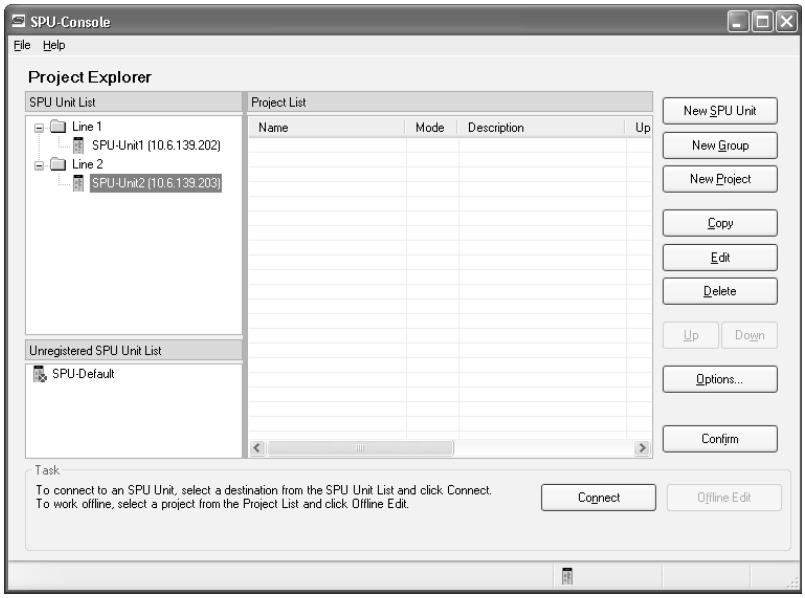
This section describes how to manage connections from the SPU-Console to multiple SYSMAC SPU Units.

5-2-1 Changing and Deleting SYSMAC SPU Unit Registrations

- To change a SYSMAC SPU Unit's registered information, select that SPU Unit from the Project Explorer's SPU Unit List and click the **Edit** Button.
- To delete a connected SYSMAC SPU Unit, select that Unit from the Project Explorer's SPU Unit List and click the **Delete** Button.

5-2-2 Managing SYSMAC SPU Units by Group

As shown in the following window, SYSMAC SPU Units can be managed in groups.



- To create a group, select the Units from the SPU Unit List and click the **New Group** Button.
- To delete a group, select the group to delete from the *SYSMAC SPU Unit list* and click the **Delete** Button. If a group is deleted, all the SYSMAC SPU Units registered in the group will also be deleted.
- To change a group name, select the group from the *SYSMAC SPU Unit list* and click the **Edit** Button.

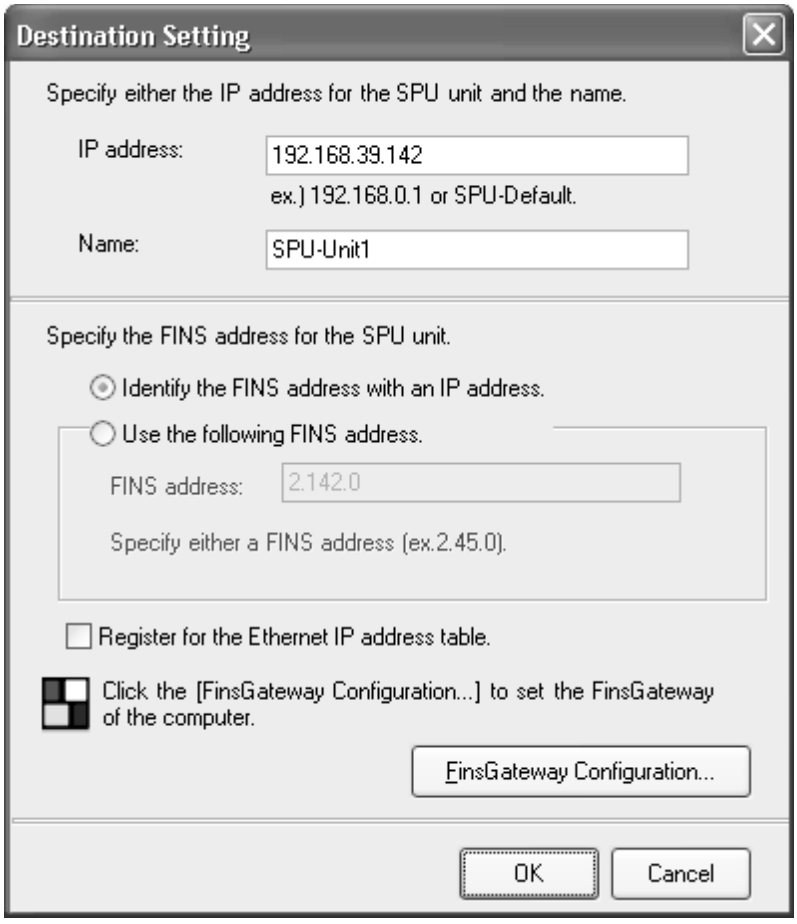
5-2-3 Moving SYSMAC SPU Unit Registrations

Registered SYSMAC SPU Units can be individually moved to groups. To move a Unit to a group, select that Unit in the SPU Unit List, press and hold the Ctrl Key, and drag and drop it in the destination group.

5-2-4 Advanced SPU Unit Settings

The SPU-Console can communicate with SYSMAC SPU Units using the Fins-Gateway ETN_UNIT service. The FINS address of an SYSMAC SPU Unit is set in the advanced settings.

To make advanced settings, click the **Advanced** Button from the Destination Setting Dialog Box. (Refer to *5-1-4 Registering SYSMAC SPU Units*.) Knowledge of FinsGateway and FINS is required to make advanced settings.



Identify the FINS Address with an IP Address

This method is normally selected.

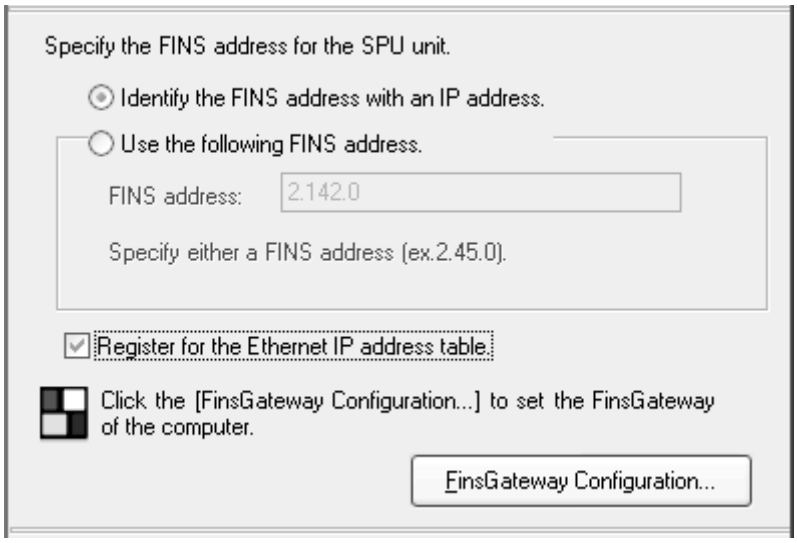
For it, the rightmost byte of the host ID of the IP address is used as the FINS node address.

FINS-IP Conversion for the FinsGateway ETN_UNIT service is set to either *Automatic Generation* or *IP Table + Automatic Generation.*

Use the Following FINS Address

This method is used to specify the FINS node address of an SYSMAC SPU Unit.

Specify the FINS node address in the *FINS address* Field. *FINS-IP Conversion* for the FinsGateway ETN_UNIT service is set to either *IP Address Table* or *IP Table + Automatic Generation.*



Register for the Ethernet IP Address Table

If *Register for the Ethernet IP address table* is selected, the IP address and FINS node address will be registered in the FinsGateway IP address table when connecting to an SYSMAC SPU Unit.

To change FinsGateway settings on the computer, click the **FinsGateway Configuration** Button.

5-2-5 Importing and Exporting Destination SYSMAC SPU Unit Registration

Exporting

Use the following procedure to export the registered contents of the destination SYSMAC SPU Unit to a file.

1,2,3...

1. In the SPU-Console, select ***Export*** from the File Menu.
2. In the Export Dialog Box, enter the file name where indicated.
3. Click the **Save** Button.

Importing

Use the following procedure to import the registered contents for the destination SYSMAC SPU Unit from a file.

1,2,3...

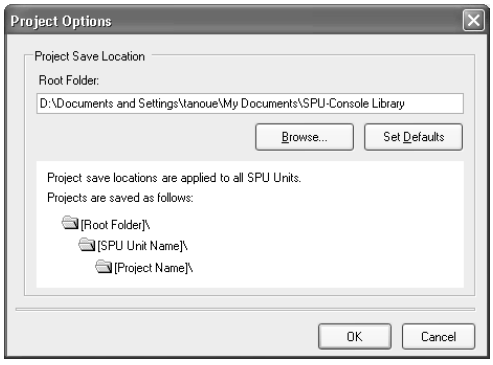
1. In the SPU-Console, select ***Import*** from the File Menu.
2. In the Import Dialog Box, find the file to be imported and click on the file.
3. Click the **Open** Button.

5-2-6 Project Save Location

A project is saved in the following folder configuration.

- Root folder: The root folder where the project is saved
- SPU Unit name: The name of the registered SYSMAC SPU Unit

- Project name: The name of the project registered in the SYSMAC SPU Unit



The root folder can be changed to any location.

1,2,3...

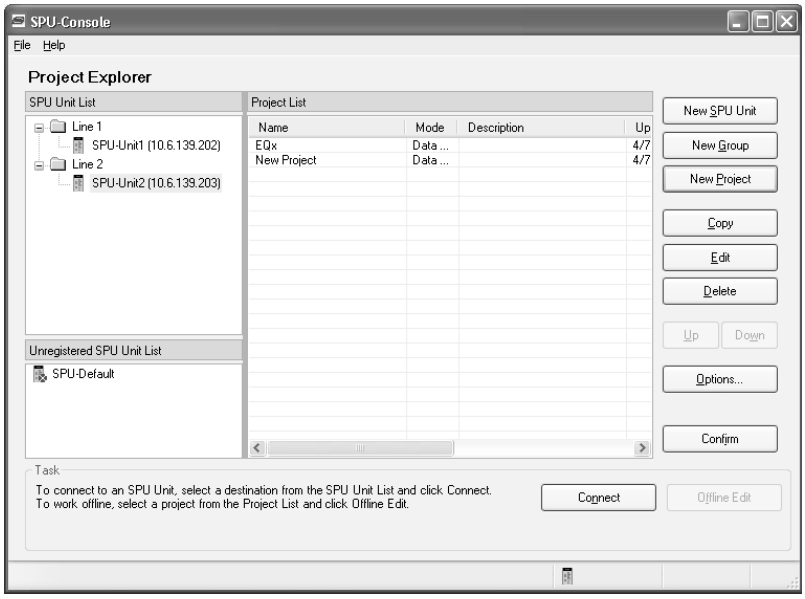
1. Click the **Option** Button in the Project Explorer Window to display the Project Option Dialog Box.
2. Click the **Browse** Button and select the folder from the dialog box.
3. Click the **OK** Button.

5-3 Editing Settings Offline (Unconnected)

The SPU-Console can be used to edit settings without being connected to the SYSMAC SPU Unit. This operation is called offline editing. With offline editing, settings can be edited by project. Projects that are set can be saved in the personal computer and transferred to the SYSMAC SPU Unit when the SYSMAC SPU Unit is connected to the personal computer.

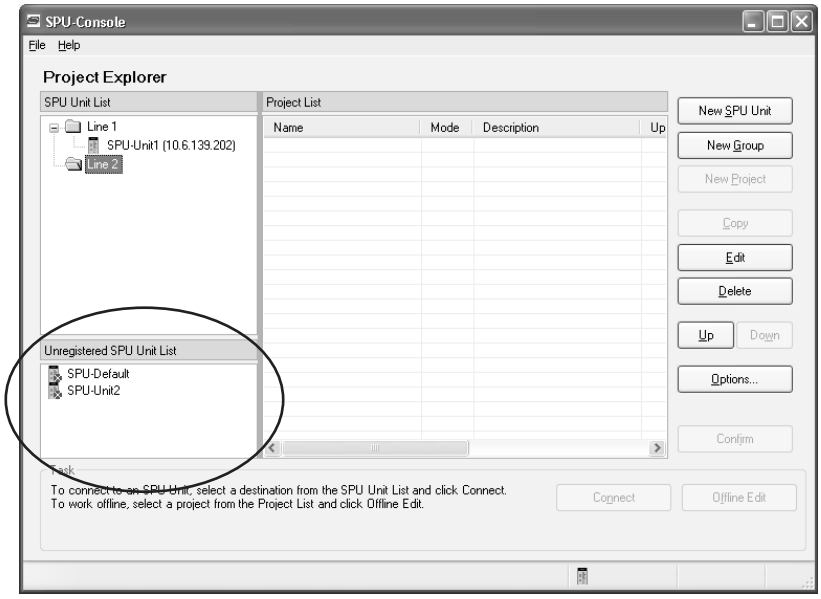
5-3-1 Adding or Deleting a Project

As shown in the following window, projects can be managed for individual SYSMAC SPU Units.



- To add a project, select the Unit in the SPU Unit List and click the **New Project** Button.

- To delete a project, select the project in the Project List and click the **Delete** Button.
  When an SPU Unit is deleted from the SPU Unit List, a dialog box will be displayed to confirm that the projects for that SPU Unit are to be deleted. If No is selected in the dialog box, the projects can be managed in the Unregistered SPU Unit List.

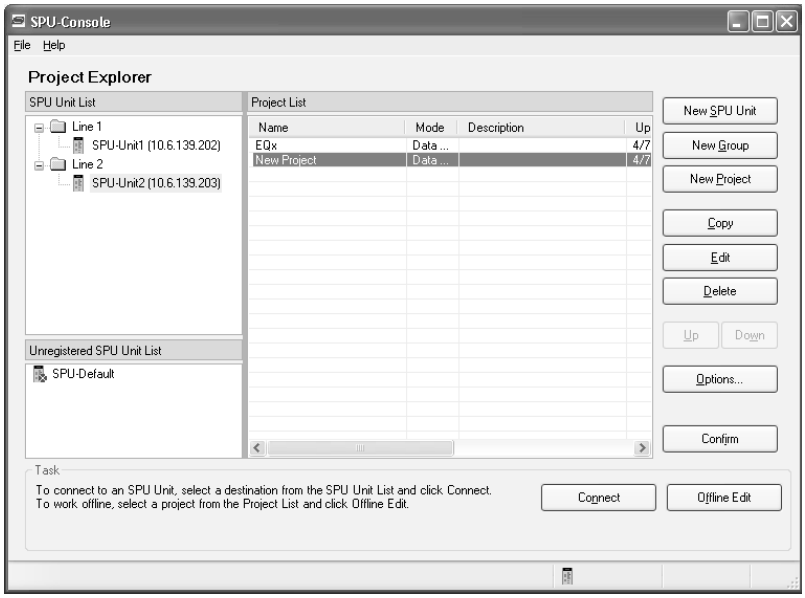


5-3-2 Changing or Copying a Project

- To change a project's name or description, select that project in the Project List and click the **Edit** Button.
- To copy a project, select that project in the Project List and click the **Copy** Button. The copy of the project will be added to the same SYSMAC SPU Unit.
- To copy a project to a different SYSMAC SPU Unit, select that project in the Project List and drag and drop it at the destination Unit.

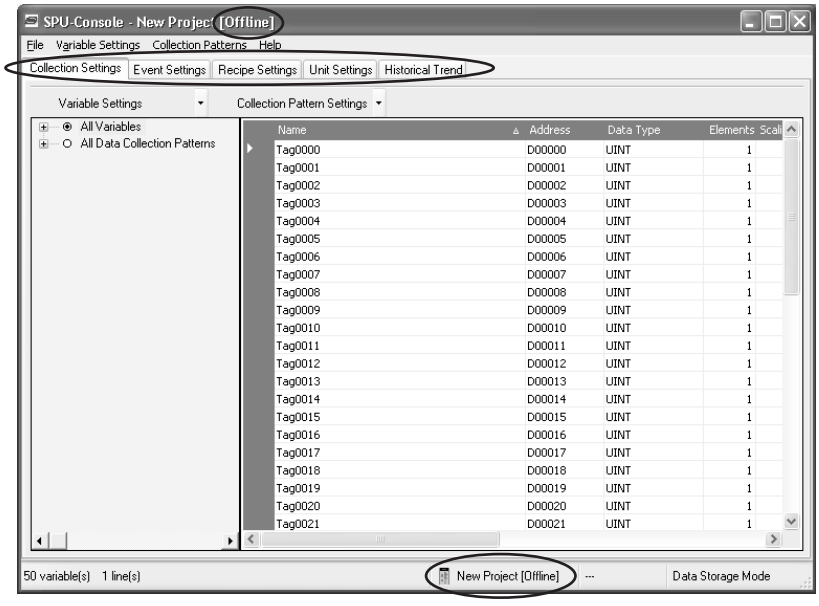
5-3-3 Starting Offline Editing

1,2,3... 1. In the Project List, select the project to be edited and then click the **Offline Edit** Button.



Note There are initial settings projects and sample projects under *SPU-Default*. Use them for purposes such as creating new projects.

2. Tabs for the items that can be set offline will be displayed, and *Offline* will be displayed in the Title Bar and Status Bar. The tabs that are displayed depend on the project operating mode.



5-3-4 Saving and Exiting a Project

1,2,3... 1. Select ***Save*** or ***Save As*** from the File Menu to save a project. The edited project will be saved to the personal computer.

2. Select ***Offline Close*** to end offline editing. The saved settings can be transferred to the SYSMAC SPU Unit after the SYSMAC SPU Unit is connected using the method described next in *5-4 Saving and Transferring Settings*.

5-4 Saving and Transferring Settings

5-4-1 Transferring Settings from the SYSMAC SPU Unit to the Personal Computer

The SPU-Console automatically reads Unit settings when the SYSMAC SPU Unit is connected. Therefore, transferring settings to the personal computer is not required. Use the following procedure to transfer settings explicitly from the SYSMAC SPU Unit to the personal computer in cases such as when settings are read again at the Unit after the settings that were originally read are changed at the SPU-Console and then discarded.

1,2,3...

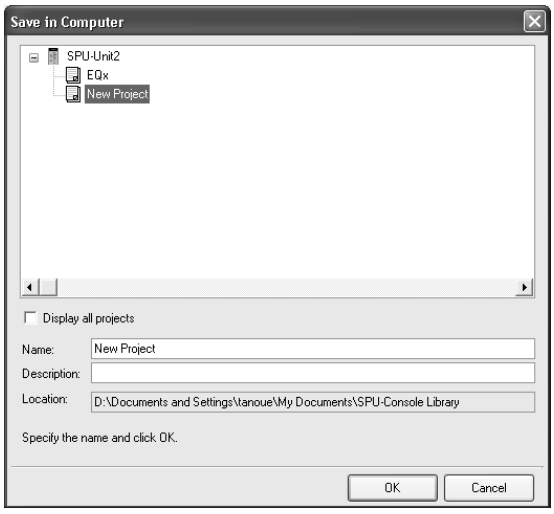
1. First connect the SPU-Console to the relevant SYSMAC SPU Unit to transfer the current SYSMAC SPU Unit settings to the personal computer.
2. In the SPU-Console, select ***From Unit*** from the File Menu.

5-4-2 Saving Settings to the Computer

The settings edited using the SPU-Console or the settings read from the SYSMAC SPU Unit can be saved to the personal computer as a project. The saved settings can also be used in offline editing.

1,2,3...

1. In the SPU-Console, select ***Save to PC*** from the File Menu.
2. In the Save in Computer Dialog Box, enter the name and description of the settings to be saved.
   If *Display all projects* is selected, all of the projects managed by the Project Explorer will be displayed.

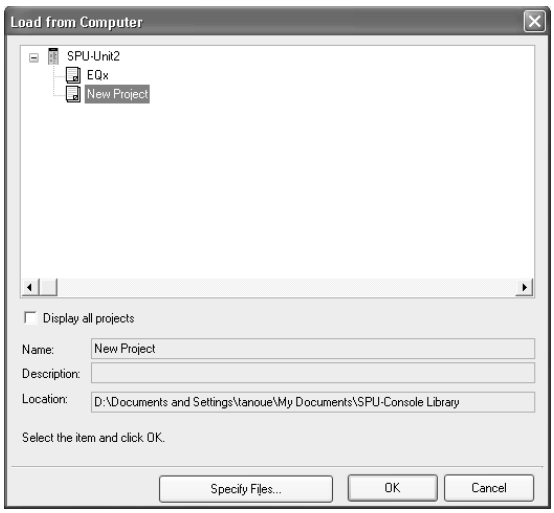


3. Click the **OK** Button to save the project.

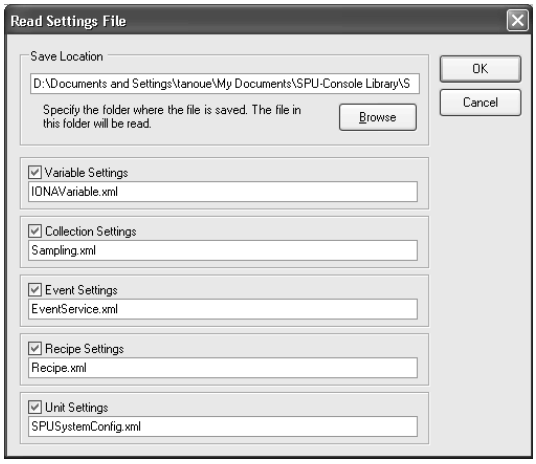
5-4-3 Reading Settings from the Computer

SYSMAC SPU Unit settings (projects) saved in the personal computer can be read to the SPU-Console. Projects performed using offline editing can also be read to the SPU-Console using a similar procedure.

1,2,3... 1. In the SPU-Console, select ***Load from PC*** from the File Menu.



2. In the Load from Computer Dialog Box, select the project to be read and click the **OK** Button. If *Display all projects* is selected, all of the projects managed by the Project Explorer will be displayed. Select this checkbox when reading projects of other SYSMAC SPU Units.
3. Click the **Specify Files...** Button in the Load from Computer Dialog Box to display the Load Settings File Dialog Box and select the settings to be read.
   For example, to use settings that have already been saved as collection settings without setting the IP address in the current SYSMAC SPU Unit at the time of saving, deselect ***Unit Settings***.



5-4-4 Transferring Settings from the Personal Computer to the SYSMAC SPU Unit

Use the following procedure to transfer settings edited on the personal computer to the SYSMAC SPU Unit.

1,2,3... 1. Connect the SPU-Console to the SYSMAC SPU Unit to which the settings will be transferred.
2. In the SPU-Console, select ***To Unit*** from the File Menu.

5-4-5 Transferring Projects Edited Offline to the SYSMAC SPU Unit

Projects edited offline can be transferred to the Unit without needing to execute the *Connect* command from the File Menu in the SYSMAC SPU Unit. The SPU-Console will automatically read the current Unit settings when it is connected to the SYSMAC SPU Unit.
Therefore, projects set using offline editing will be overwritten by the current SYSMAC SPU Unit settings, so the saved projects must be transferred again after being read. Use the following procedure to transfer settings being edited offline to the Unit without performing the connection, read, and transfer operations.

1,2,3...

1. Start the offline editing for the project to be transferred.
2. Select ***To Unit*** from the File Menu.
   The file transfer will start.
3. To enable the transferred project in the SYSMAC SPU Unit, execute the SYSMAC SPU Unit's Change the Data Collection Settings (Change the Sampling Settings) command, the Change the Recipe Settings command, or the Change the Unit Settings command. For details on executing commands, refer to *SECTION 6 Executing Commands*.

Note The transferred settings will be saved in the SYSMAC SPU Unit, but will not be enabled until the Change the Sampling Settings (Change the Data Collection Settings) command, the Change the Recipe Settings command, or the Change the Unit Settings command is executed.

5-5 Recording Files

5-5-1 Location of Record Files

The data files resulting from recording are saved in a Memory Card mounted in the SYSMAC SPU Unit. The record files are placed in a folder called “Journal.” The file names are specified when setting data collection settings (sampling settings).

Note Do not delete the files inside the Journal folder.
The SYSMAC SPU Unit will not operate correctly without these files.

5-5-2 Accessing Record Files on a Windows Network

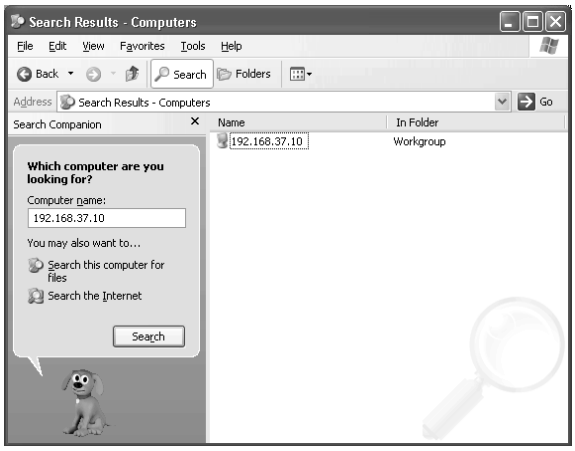
The data files saved in a Memory Card mounted in the SYSMAC SPU Unit can be accessed using a shared folder on a Windows network. The shared folder on the Memory Card is \pccards\PCCard1. Use the following procedure to access the record files from the computer.

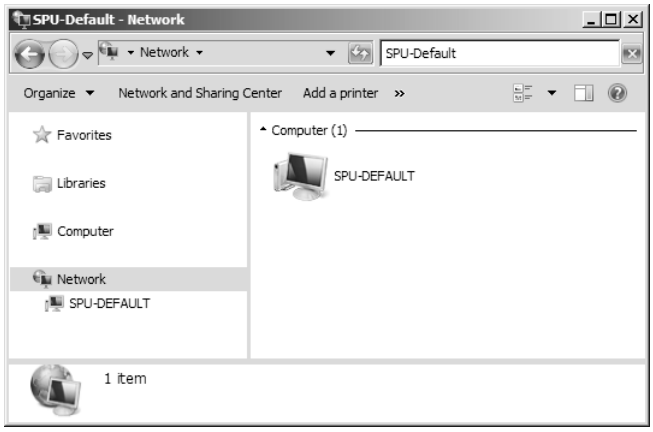
1,2,3...

1. Search for network SYSMAC SPU Units using the Search for Computers command.
   - For Windows XP, right-click ***My Network Places*** on the **Start** Menu and then select ***Search for Computers.***
   - For Windows 7, select **Network** from the Explorer and enter the unit name of the SYSMAC SPU Unit in the *Search* Box.

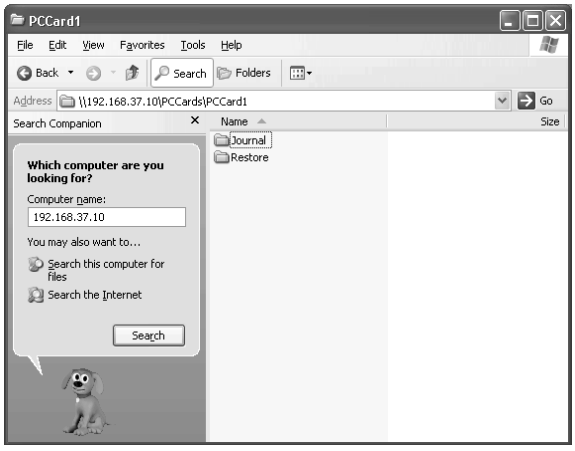
2. Input the Unit Name or IP address for the *Computer name* and then click the **Search** Button.

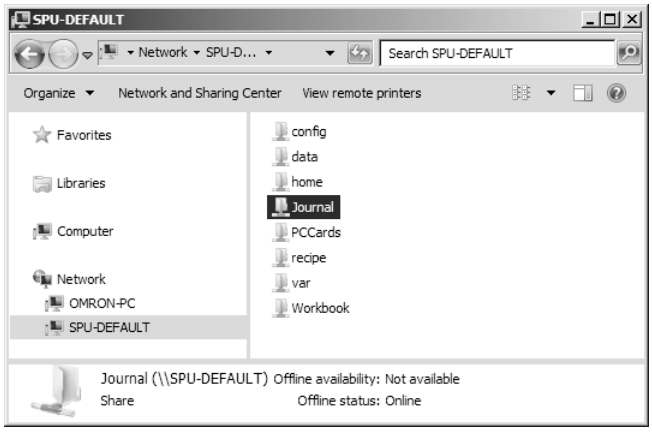
   The following display will appear if the SYSMAC SPU Unit is found.





3. Double-click the SYSMAC SPU Unit that was found and open the following folders in order: ***PCCards - PCCard1 - Journal.***





Note The following method can also be used to easily access the SYSMAC SPU Unit shared folder from the computer.

(1) Select ***View - Display the Unit Folder - Journal Folder*** in the SPU-Console.

(2) Input the UNC address of the shared folder in the SYSMAC SPU Unit in the address bar of Explorer. For example, input \\192.168.0.100\.

5-5-3 Format of Record Files

The record files are text files in CSV format, as shown below.

```
index,clocktime,nano,SampleIndex,Tag-0000,Tag-0001,Tag-0002,Tag-0003
0,2004-06-16 11:16:40.443,0443637440,1, 502,18196,32983,18948,
1,2004-06-16 11:16:40.453,0453636704,2, 548,18196,33024,18948,
2,2004-06-16 11:16:40.463,0463635968,3, 607,18196,33077,18948,
3,2004-06-16 11:16:40.473,0473635232,4, 667,18196,33131,18948,
4,2004-06-16 11:16:40.483,0483634496,5, 727,18196,33185,18948,
5,2004-06-16 11:16:40.493,0493633760,6, 777,18196,33229,18948,
6,2004-06-16 11:16:40.503,0503633024,7, 836,18196,33282,18948,
7,2004-06-16 11:16:40.513,0513632288,8, 900,18196,33339,18948,
8,2004-06-16 11:16:40.523,0523631552,9, 950,18196,33384,18948,
9,2004-06-16 11:16:40.533,0533630816,10, 1006,18196,33434,18948,
```

A header code is placed on the first line. Data codes are placed on the remaining lines. The data code is described in the following table.

Field	Item	Meaning
1st field	Index	The index number for the data code. The index is reset to 0 when sampling (data collection) settings or record files are cleared.
2nd field	Time stamp	The time at which recording was performed. YYYY-MM-DD hh:mm:ss.ms
3rd field	Nanoseconds	The nanoseconds at which recording was performed. The value is given in nanoseconds.
4th field	Sampling index	An index number started from 1 when recording is started.
Remaining fields	Sampling data	The 5th and later fields contain the sampling data in order.
Return		A line feed code, CR+LF (0x0D 0x0A), is placed at the end of the line.

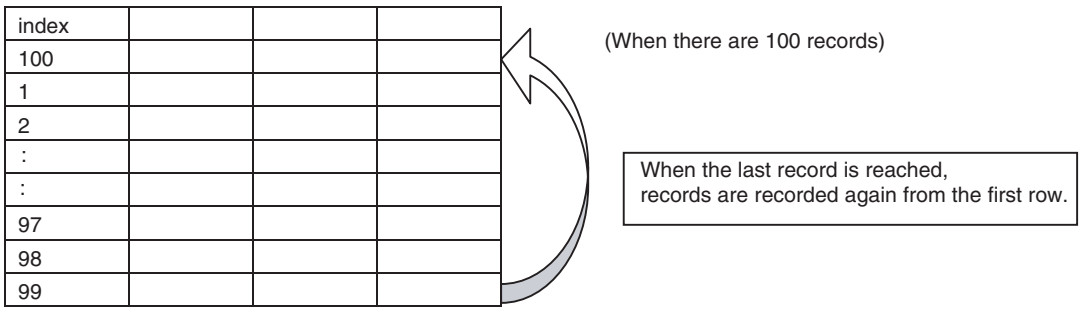
Note Each sampling file has a maximum size of 2 GB.

Note REAL and LREAL numerical values will show a decimal point when there is at least one digit after the decimal point.
If there are no digits after the decimal point (example: "10.00"), the value will be recorded in the CSV file as an integer (example: "10").

5-5-4 Saving Record Files

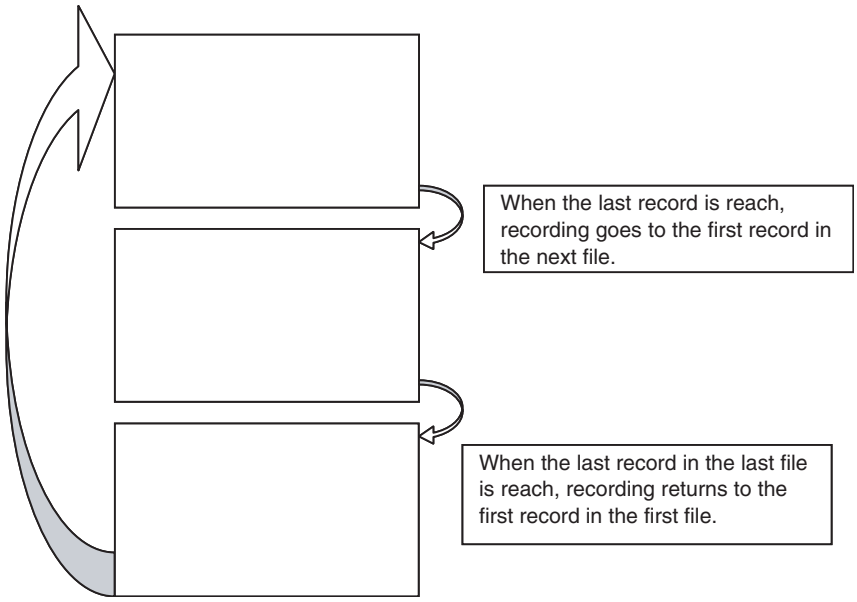
Saving in One File

The number of records saved in one file is specified in advance in the sampling (data collection) settings. When enough data codes have been saved to reach the last line, data codes are saved starting at the first record.



Saving in Multiple Files

When saving data in multiple files, if the data record reaches the last line, recording will continue from the beginning of the next file. When the last line of the final file is reached, recording will resume from the beginning of the first file.



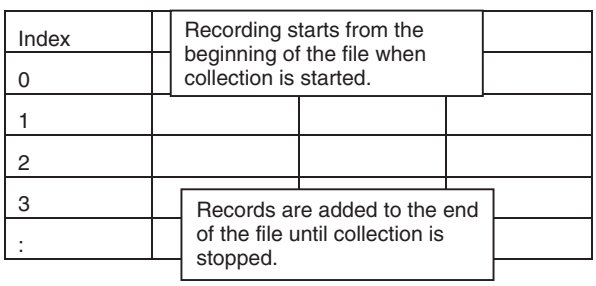
Note Even if the last record is not reached, a switch is made to the next file at the following times.

(1) When collection is stopped
(2) When the SYSMAC SPU Unit is restarted
(3) When the Memory Card is removed
(4) When the file is switched by event processing (switch file)

Note The settings for record files (e.g., format and saving method) are saved in the Journal folder in the Memory Card containing the record files. To enable the saved settings in the Unit, execute 20 (Change the data collection settings (Change the sampling settings)).
If record file settings on the Memory Card differ from those in the SYSMAC SPU Unit, sampled data will not be recorded correctly. This can happen, for example, when a Memory Card created for a different SYSMAC SPU Unit is used. If this happens, update the record file settings by executing command 20 (Change the data collection settings (Change the sampling settings)).

Saving without Specifying the Number of Records

When data is saved without specifying the number of records, recording starts from the first record when collection begins. Data is recorded in one file until data collection stops. The data collected from starting to stopping collection can be saved in a single file.



Note (1) When data is saved without specifying the number of records, the size of the file will continue to increase until collection stops. Make sure that the capacity of the Memory Card is sufficient when saving using this method.

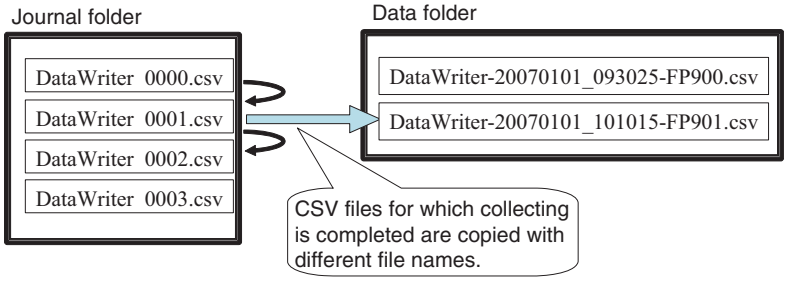
(2) When data is saved in a single file without specifying the number of records, the previous data in the file is cleared when collection starts. When not specifying the number of records, saving in multiple files is recommended.

5-5-5 File Copy Options (Data Storage Mode)

In Data Storage Mode, CSV files saved in the Journal folder can be automatically copied with changed file names. The copied files are saved in a folder called “data” on a Memory Card mounted in the SYSMAC SPU Unit.

Date, time, and variable values can be included with the file names of the copied files. By specifying information such as lot IDs for variable values, collected data can be managed by file name for each lot. For details on copy options, refer to *10-5-4 Setting Copy Options*.

The “data” folders can be accessed as a shared folder in the Windows network. Copied files can be referenced or deleted from a personal computer. For details, refer to *5-5-2 Accessing Record Files on a Windows Network*.



SECTION 6
Executing Commands

This section describes how to execute commands for SYSMAC SPU Units.

6-1 Command Types and Execution 52
6-2 Executing Commands from the SPU-Console 52
6-3 Executing Commands from the SYSMAC SPU Unit. 52
6-4 Executing Commands from the CPU Unit 53

6-1 Command Types and Execution

The SYSMAC SPU Unit supports various commands. For example, *Display the IP address*, *Start all samplings*, and *Restart Unit* commands are supported. The following methods can be used to execute commands.

Executing Commands from the SPU-Console

Execute the commands from the SPU-Console connected to the SYSMAC SPU Unit.

Executing Commands from the SYSMAC SPU Unit

Execute the commands using the SYSMAC SPU Unit's **SELECT** Switch and **ENTER** Button.

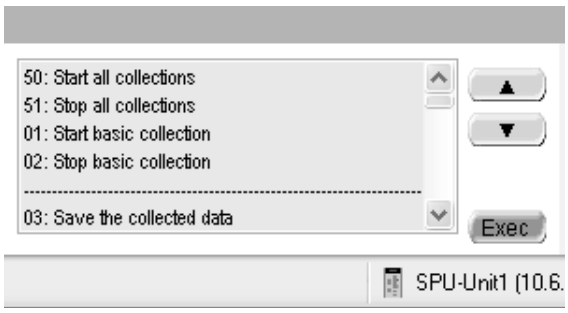
Executing Commands from the CPU Unit

Execute SYSMAC SPU Unit commands from the I/O memory in the CPU Unit. The supported commands depend on the operating mode.

For details on supported commands in each operating mode, refer to *SECTION 15 Data Storage Mode Commands* and *SECTION 20 Supported Commands*.

6-2 Executing Commands from the SPU-Console

Commands are executed from SPU-Console's Control Panel. Select the command to execute in the Command Selection Box and then click the **Exec** Button.



Note Commands can also be executed by selecting ***Command - Execute a Command.***

6-3 Executing Commands from the SYSMAC SPU Unit

The **SELECT** Switch and **ENTER** Button are used to execute commands from the SYSMAC SPU Unit.

Selecting the Command with the SELECT Switch

Press the switch up to increase the command code.

Press the switch down to decrease the command code.

The currently selected command code will be displayed on the 7-segment display.

Executing the Command with the ENTER Button

Use the **ENTER** Button to execute the command selected with the **SELECT** Switch, as described in the following procedure.

1,2,3...

1. Confirm that the command number to be executed is displayed on the 7-segment display.
2. Press the **ENTER** Button once.
   The command code will flash on the 7-segment display.

3. Press the **ENTER** Button again.
   "A" will be displayed on the 7-segment display and the command will be executed.

To cancel executing the command, wait for 10 seconds before pressing the **ENTER** Button the second time.

6-4 Executing Commands from the CPU Unit

SYSMAC SPU Unit commands can be executed from the CPU Unit.

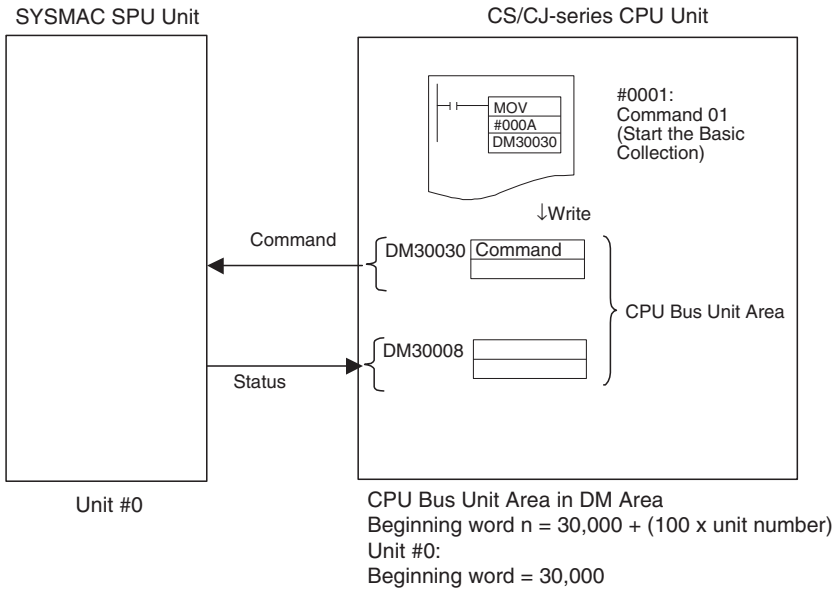
By setting SYSMAC SPU Unit commands in the CPU Bus Unit Area of the CPU Unit, the SYSMAC SPU Unit can be operated from the CPU Unit. This enables the SYSMAC SPU Unit to be operated from the CPU Unit by means such as ladder programs.

To set a SYSMAC SPU Unit command, specify the command number in the Command Area of the CPU Bus Unit Area (in the DM Area). The Command Area address can be calculated using the following equation:

Command Area address = 30,000 + (100 x unit number of SYSMAC SPU Unit) + 30

For details on the CPU Bus Unit Area, refer to *SECTION 7 CPU Bus Unit Area*.

The commands shown in *15-1 List of Data Storage Mode Commands* and *20-1 Commands* can be specified. Specify in hexadecimal the command number written to the Command Area. For example, write 000C to specify command 12 (Restart Unit).



This method can be used, for example, to start and stop data collection from the ladder program in the CPU Unit.

Note Status Area
Starting with SYSMAC SPU Units with unit version 2.0, the previous Status Area has been integrated with the words allocated in the CPU Bus Unit Area. The Status Area has been eliminated for SYSMAC SPU Units with unit version 2.2 or later. To execute commands, use the CPU Bus Unit Area.

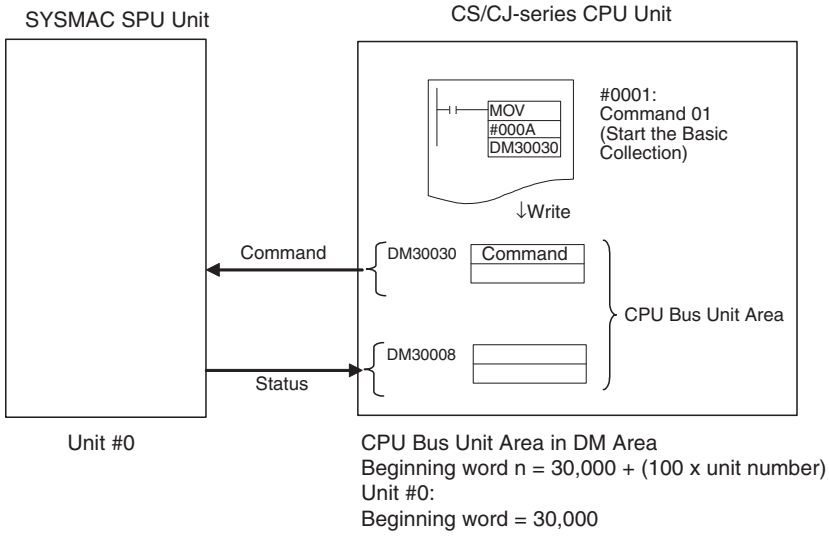
SECTION 7
CPU Bus Unit Area

This section describes the data provided in the CPU Bus Unit Areas.

7-1 CPU Bus Unit Area 56
7-2 CIO Area 56
7-3 DM Area 62

7-1 CPU Bus Unit Area

For each SYSMAC SPU Unit, a CPU Bus Unit Area is allocated in CPU Unit memory. The operating status of the SYSMAC SPU Unit is reflected in the CPU Bus Unit Area of the CPU Unit. Using the CPU Bus Unit Area makes it possible for a SYSMAC SPU Unit to be operated from a ladder program in the CPU Unit.



For example, SYSMAC SPU Unit commands can be used to specify operations such as starting and stopping data collection.

7-2 CIO Area

For each SYSMAC SPU Unit, a CPU Bus Unit Area is allocated in the CIO Area in the CPU Unit. Information is stored in offset locations from the beginning word of each area, as shown in the table below. Beginning word n can be calculated using the following equation:

Beginning word address n = 1,500 + (25 x unit number of SYSMAC SPU Unit)

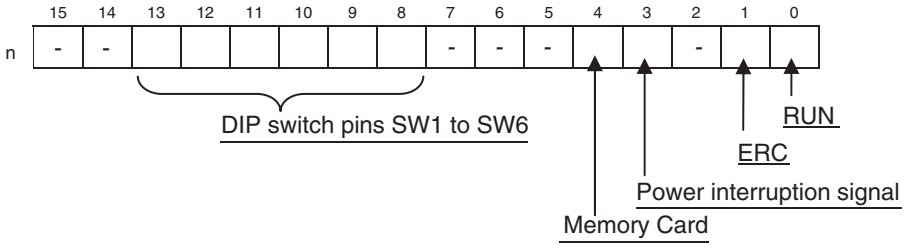
Offset	Memory area name	Data transfer direction
n	System information	SPU Unit to CPU Unit
n+1	Collection status for basic collection and collection patterns 1 to 15	SPU Unit to CPU Unit
n+2	Collection status for collection patterns 16 to 31	
n+3	Collection status for collection patterns 32 to 47	
n+4	Collection status for collection patterns 48 to 63	
n+5	Collection status for collection pattern 64	
n+6	Collection start specification for basic collection and collection patterns 1 to 15	CPU Unit to SPU Unit
n+7	Collection start specification for collection patterns 16 to 31	
n+8	Collection start specification for collection patterns 32 to 47	
n+9	Collection start specification for collection patterns 48 to 63	
n+10	Collection start specification for collection pattern 64	

Offset	Memory area name	Data transfer direction
n+11	Collection stop specification for basic collection and collection patterns 1 to 15	CPU Unit to SPU Unit
n+12	Collection stop specification for collection patterns 16 to 31	
n+13	Collection stop specification for collection patterns 32 to 47	
n+14	Collection stop specification for collection patterns 48 to 63	
n+15	Collection stop specification for collection pattern 64	
n+16	Collection request	CPU Unit to SPU Unit
n+17	File Copy Flags 1/2	SPU Unit to CPU Unit
n+18	File Copy Flags 3/4	
n+19	File Copy Flags 5/6	
n+20	File Copy Flags 7/8	
n+21	File Copy Flags 9/10	
n+22	Recipe Command Area	CPU Unit to SPU Unit
n+23	Recipe Status Area	SPU Unit to CPU Unit
n+24	(Not used.)	---

Note Do not used the areas indicated “not used.”

System Information (SPU Unit to CPU Unit)

SYSMAC SPU Unit status is reflected in memory as follows:



Bit	Name	Description
0	RUN	ON when Unit is operating normally.
1	ERC	ON when a Controller error occurs.
2	(Not used.)	---
3	Power interruption signal	ON when the power interruption signal turns ON.
4	Memory Card	ON when a Memory Card is mounted.
5 to 7	(Not used.)	---
8	DIP-SW1	ON when DIP switch pin SW1 is ON.
9	DIP-SW2	ON when DIP switch pin SW2 is ON.
10	DIP-SW3	ON when DIP switch pin SW3 is ON.
11	DIP-SW4	ON when DIP switch pin SW4 is ON.
12	DIP-SW5	ON when DIP switch pin SW5 is ON.
13	DIP-SW6	ON when DIP switch pin SW6 is ON.
14, 15	(Not used.)	---

Collection Status (SPU Unit to CPU Unit)

The operating status of basic collections and collection patterns is reflected in the corresponding bits.

Bit	Operating status
ON	Collecting
OFF	Idling

The following table shows the bit positions corresponding to the collection patterns.

Data Storage Mode

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
n+1	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
n+2	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
n+3	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
n+4	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
n+5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64

Collection patterns 1 to 15 (n+1, bits 15 to 1)

Basic collection (n+1, bit 0)

Collection patterns 16 to 64 (n+2 to n+5)

Sampling Mode

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
n+1	-	-	-	-	-	-	-	-	-	-	-		3	2	1	0

Sampling patterns 1 to 3 (n+1, bits 3 to 1)

Realtime sampling (n+1, bit 0)

Collection Start Specification, Collection Stop Specification, Collection Request (CPU Unit to SPU Unit)

Starts or stops the specified basic collection or collection pattern. Can be used in Data Storage Mode.

Collection Start Specification

The SYSMAC SPU Unit begins collecting data when the bit for a collection request turns ON after the bit for the collection pattern for starting collection has turned ON. After the SYSMAC SPU Unit has begun collecting data, the respective collection pattern bits turn OFF. The following table shows the bit arrangement for basic collection and the collection patterns.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
n+6	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
n+7	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
n+8	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
n+9	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
n+10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64

Collection patterns 1 to 15 (n+6, bits 15 to 1)

Basic collection (n+6, bit 0)

Collection patterns 16 to 64 (n+7 to n+10)

Collection Stop Specification

The SYSMAC SPU Unit stops collecting data when the bit for a collection request turns ON after the bit for the collection pattern for stopping collection has turned ON. After the SYSMAC SPU Unit has stopped collecting data, the respective collection pattern bits turn OFF. The following table shows the bit arrangement for basic collection and the collection patterns.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
n+11	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
n+12	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
n+13	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
n+14	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
n+15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64

Collection patterns 1 to 15

Basic collection

Collection patterns 16 to 64

Collection Request

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
n+16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Request bit

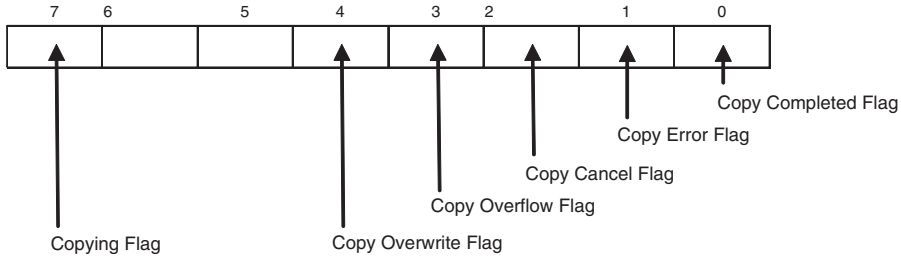
Bit	Name	Description
0	Request bit	The following collection actions are requested when this bit turns ON. • Start the collection pattern that is turned ON by the collection start specification. • Stop the collection pattern that is turned ON by the collection stop specification. After data collection has started or stopped, the SYSMAC SPU Unit turns OFF the respective collection specification bit. If both the start and stop bits turn ON for a collection pattern neither specification will be executed.

Note In Sampling Mode, collecting can be started or stopped by executing the command from the CPU Bus Unit Area DM Area (command area (n+30)).

File Copy Flags (SPU Unit to CPU Unit)

If the copy option is enabled, the status of copy processing is shown by the File Copy Flags. The File Copy Flags are allocated in words n+17 to n+21 in the CPU Bus Unit Area in the CIO Area. One byte is allocated for each collection pattern for which the copy option is enabled. The File Copy Flags are allocated in ascending order of the collection pattern numbers. The words where the File Copy Flags are allocated and the bit configuration are shown below.

Offset	15 … 8	7 … 0
n+17	File Copy Flags 2	File Copy Flags 1
n+18	File Copy Flags 4	File Copy Flags 3
n+19	File Copy Flags 6	File Copy Flags 5
n+20	File Copy Flags 8	File Copy Flags 7
n+21	File Copy Flags 10	File Copy Flags 9



Bit	Name	Description
0	Copy Completed Flag	Turns ON when copy processing is completed normally.
1	Copy Error Flag	Turns ON when an error occurs in copy processing.
2	Copy Cancel Flag	Turns ON when the CSV file in the copy source journal folder is overwritten during copy processing.
3	Copy Overflow Flag	Turns ON when file copying cannot be performed because the number of files in the data folder exceeded the limit during copy processing. Note: This occurs only when overwriting files in the data folder is disabled in the copy options.
4	Copy Overwrite Flag	Turns ON when a file is overwritten (i.e., deleted) because the number of files in the data folder exceeded the limit during copy processing. In this case, the file is copied, so the Copy Completed Flag will turn ON at the same time. Note: This occurs only when overwriting files in the data folder is enabled in the copy options.
5 to 6	(Not used.)	---
7	Copying Flag	Turns ON when copying is processed. All other bits will turn OFF. Turns OFF when copy processing is completed normally or when copy processing ends due to an error.

Note

(1) The File Copy Flag numbers are allocated in ascending order of the collection pattern numbers for which the copy option is enabled.

(2) If the order of the pattern numbers changes because you change a pattern number, the File Copy Flag numbers will also change.

(3) With SPU-Console version 2.2 or higher, you can check the File Copy Flag numbers on the list that is displayed when you select all data collection patterns.

	Name	File Copy Flag Index	Pattern Index
Enable	Basic Collection	-	Sampling
Enable	Data Collection Pattern1	4	DataWriter_63
Enable	Data Collection Pattern2	5	DataWriter_64
Enable	Data Collection Pattern3	1	DataWriter_3
Enable	Data Collection Pattern4	2	DataWriter_4
Enable	Data Collection Pattern5	3	DataWriter_5
Enable	Data Collection Pattern6	-	DataWriter_6
Enable	Data Collection Pattern7	-	DataWriter_7

Note All of the File Copy Flags are turned OFF at the following times.

(1) When the SPU Unit is started

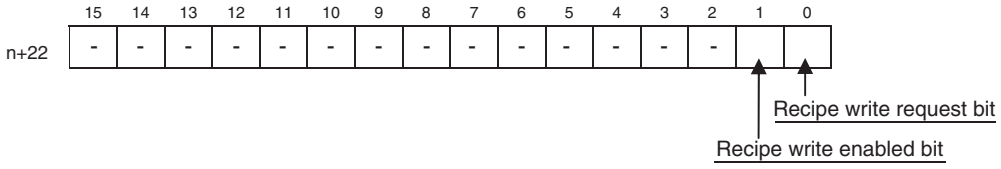
(2) When command 04 (clear the collection data) or command 31 (format the Memory Card) is executed

(3) When data collection settings are changed

Note If copy processing requires little time because the size of the copied files is small and if the cycle time of the CPU Unit is long, the File Copy Flags may not change. As a guideline, we recommend a CPU Unit cycle time of 50 ms or less for a file size of 1 KB or less. Use caution when you monitor the File Copy Flags from the program.

Recipe Command Area (CPU Unit to SPU Unit)

Writes recipes. For details on the recipe function, refer to *12-1 Recipe Function*.

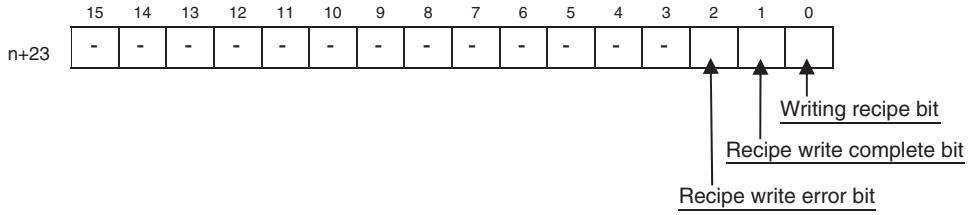


Bit	Name	Description
0	Recipe write request bit	When this bit turns ON, the SYSMAC SPU Unit writes the recipe. After the recipe write operation has been completed, the operation for turning the bit OFF depends on the recipe environment settings (handshaking). • When turned OFF by the SYSMAC SPU Unit, there is a 1-bit handshake. • When turned OFF by the CPU Unit, there is a 2-bit handshake. For details on recipe environment settings (handshaking), refer to *12-4 Setting the Recipe Environment*.
1	Recipe write enabled bit	When this flag is OFF, recipes cannot be written. Keep this bit OFF when equipment is being operated and when recipes are not to be written.
2 to 15	(Not used.)	---

Note If the expanded recipe function is used, do not turn ON bit 00 from the CPU Unit. When you use recipes set using the expanded recipe function, turn ON the bit in the area set for the Recipe Request Bits in the recipe reception settings. Manipulate bit 00 to use recipes set using the version-2 recipe function.

Recipe Status Area (SPU Unit to CPU Unit)

The recipe write status is reflected in this area as shown below. Refer to *12-11 Executing Recipes* for details on writing recipes.



Bit	Name	Description
0	Writing recipe bit	ON while a recipe is being written.
1	Recipe write complete bit	ON when the recipe writing operation is completed.
2	Recipe write error bit	ON when a recipe writing error occurs.
3 to 15	(Not used.)	---

7-3 DM Area

For each SYSMAC SPU Unit, a CPU Bus Unit Area is allocated in the DM Area in the CPU Unit. Information is stored in offset locations from the beginning word of each memory area, as shown in the table below. Beginning word n can be calculated using the following equation:

Beginning word address n = 30,000 + (100 x unit number of SYSMAC SPU Unit)

Offset	15 … 8	7 … 0	
	IP address 1 (www. xxx. yyy. zzz)		Status information (SPU Unit to CPU Unit)
n	www	xxx	
n+1	yyy	zzz	
	IP address 2 (www. xxx. yyy. zzz)		
n+2	www	xxx	
n+3	yyy	zzz	
n+4	FINS address (ETN) Network address	FINS address (ETN) Node address	
n+5	UDP port		
n+6	FINS address (CS1 bus) Network address	FINS address (CS1 bus) Node address	
n+7	CPU Unit node address in CS1 bus		
n+8	System status		
n+9	(Not used.)		
n+10	Memory Card capacity (MB)		
n+11	Memory Card available space (MB)		
n+12	Status of services (FTP transfers and expanded recipe function)		
n+13	(Not used.)		
… n+19	(Not used.)		
n+20	Program number		Error information (SPU Unit to CPU Unit)
n+21	Error level		
n+22	Error code		
n+23	Error subcode		
n+24	(Not used.)		
… n+29	(Not used.)		
n+30	Command Area		Command execution (CPU Unit to SPU Unit)
n+31	(Not used.)		
… n+34	(Not used.)		
n+35	Record Counter for Basic Collection		Record Counters (SPU Unit to CPU Unit)
n+35	Record Counter for Collection Pattern 1		
n+35	Record Counter for Collection Pattern 2		
…	---		
… n+99	Record Counter for Collection Pattern 64		

Note Do not used the areas indicated “not used.”

System Status (n+8)

The operating status of the SYSMAC SPU Unit is reflected here. The following table shows the values and their meanings (SYSMAC SPU Unit status).

Value	Status	Meaning
0	Idle	The SYSMAC SPU Unit is in idle status.
1	Settings change	Data collection settings or Unit settings are being changed.
2	Sampling	Data is being collected.
3	Initialization	The SYSMAC SPU Unit is being initialized.
4	Archive	Collected data is being saved or data collection settings are being recovered.

Status of Services (FTP Transfers and Expanded Recipe Function) (n+12)

The following bits show the operating status of sending and receiving using FTP and the operating status of the expanded recipe function.

The following table describes the bits.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
n+12	-	-	-	-	-				-				-			

Bit	Status	Name	Description
0	Standby	FTP send status (used for settings 0 to 9)	Executable status. ON when settings 0 to 9 are all on standby.
1	Changing		The settings are being changed. ON when the data collection settings or the FTP settings are being changed.
2	Executing		Data is being sent using FTP. ON when any setting from 0 to 9 is being executed.
3	(Not used.)		---
4	Standby	Expanded recipe status (used for settings 0 to 9)	Executable status. ON when settings 0 to 9 are all on standby.
5	Changing		The settings are being changed. ON when the recipe settings are being changed.
6	Executing		Expanded recipe function is being processed. ON when any setting from 0 to 9 is being executed.
7	(Not used.)		---
8	Standby	FTP receive status (used for settings 0 to 9)	Executable status. ON when settings 0 to 9 are all on standby.
9	Changing		The settings are being changed. ON when the recipe settings or the FTP settings are being changed.
10	Executing		Expanded recipe function is being processed. ON when any setting from 0 to 9 is being executed.
11	(Not used.)		---
12 to 15	(Not used.)	(Not used.)	---

Error Information (n+20 to n+23)

Information on the most recent errors to occur in the SYSMAC SPU Unit is reflected here. These values are not cleared even when the errors are cleared. The values are cleared when the Unit is restarted or when command 11 (Forced Clear of Error) is executed. For a list of error codes, refer to *Appendix A Troubleshooting with Error Codes*.

Command Area (n+30)

A command can be executed by specifying the command number (in hexadecimal) in this area. It is not possible, however, to continuously execute the same command in this way. To repeat a command, specify “0” (no command) and then again specify the command.

The commands that can be executed depend on the operation mode. For details on commands, refer to *15-1 List of Data Storage Mode Commands* and *20-1 Commands*.

Record Counters (n+35 to n+99)

A record counter is incremented each time a record is added to a CSV file. An area of 65 words from n+35 to n+99 in the CPU Bus Unit Area in the DM Area is allocated to the record counters for basic collection and for Data Collection Mode (64 patterns). The record counters contain 2-byte unsigned integers (0 to 65,535). A record counter is incremented each time a record is added to a CSV file. If the value exceeds the maximum value of 65,535, it returns to 0.

Note

(1) The offset positions of the record counters are in order of the collection pattern numbers. This is different from the order in which they are displayed on the SPU-Console.

(2) With SPU-Console version 2.2 or higher, you can change the collection pattern number of each collection pattern. Refer to *10-5-2 Setting Collection Options* for details.

(3) The record counter values return to 0 at the following times.

(a) When the SPU Unit is started

(b) When cyclic collection for the collection pattern is stopped

(c) When the CSV file in which records are recorded for the collection pattern changes to the next CSV file

(d) When data collection settings are changed

Note

(1) If the number of records recorded in a file is set to 1 in the data collection pattern settings, the next file is changed to each time a record is recorded. Therefore, the value in the record counter will change between 0 and 1.

(2) If the collection cycle is short or the cycle time of the CPU Unit is long, changes in the value of the record counter may not be synchronously updated in the CPU Bus Unit Area.
Examples:

- If the collection cycle is 10 ms, the record counter may change as follows: 0, 5, 11, 16, 23, etc.
- If the number of records recorded in a file is set to 1, the record counter may remain at 0.

Use caution when you monitor the record counters from the program.

Data Storage Mode

This part of the manual describes using the SPU-Console with the SYSMAC SPU Unit in Data Storage Mode. Refer to *4-2 Confirming the Operating Mode* to confirm that the SYSMAC SPU Unit is in Data Storage Mode. Refer to *4-3 Changing the Operating Mode* to change the SYSMAC SPU Unit to Data Storage Mode.

SECTION 8
Data Storage Mode

This section introduces the SYSMAC SPU Unit's Data Storage Mode.

8-1 Data Storage Mode Introduction 70

8-1 Data Storage Mode Introduction

Data Storage Mode is used to record specific portions of PLC I/O memory when a specified event occurs. For example, this mode can be used to record data when a certain bit turns ON or at a certain time. After an event occurs, data recording can be continued for a specified time interval. Compared with Sampling Mode, however, the time interval is less accurate.

The Data Storage Mode settings set the data in the CPU Unit's I/O memory to be collected by the SYSMAC SPU Unit and the collection method to be used.

The data to be collected is specified in units called variables. The PLC's I/O memory addresses and data types are specified in the variables. Data is converted to the specified data type values and recorded. Scale conversion of these values is also possible. In Data Storage Mode, collected CSV files can be copied automatically to separate folders. Date, time, and variable values can be included with the file names of the copied files. Specifying information such as this for variable values enables files to be managed.

Data collection patterns consist of basic collection for single data, and data collection for multiple data (64 max.). For each data collection pattern, the length of the data collection time interval, number of records, name of the file to be saved, and whether a single file or multiple files are to be used (saving format) are specified.

The event settings that specify the time for data collection to start are also set. Events are either memory events, which occur when specific conditions are satisfied by values in memory, and schedule events, which occur at specific times or time intervals. The combination of these events with the processing that is performed when the events occur are called event rules. Event rules such as "data is recorded in a CSV file whenever a certain bit turns ON" or "data is recorded in a CSV file every data at 8:00" can be set.

Of the available data collection patterns, only basic collection will read PLC I/O memory data in the CPU Unit. Basic collection reads to the SYSMAC SPU Unit variable data recorded in all data collection patterns for a specific cycle.

This processing is always executed even with basic collection stopped, so there is no need to start basic collection.

Other data collection patterns use data read to the SYSMAC SPU Unit and record that data according to the settings. Basic collection enables a time interval to be set of between several milliseconds to several ten's of milliseconds, whereas the time interval for other data collection patterns is normally 100 milliseconds or longer.

In addition, Data Storage Mode has a recipe function for writing numeric and text data, such as production parameters, to a memory area in the CPU Unit. Using recipes simplifies tasks such as retooling. Numeric and text data can be created in advance in a CSV file and stored in the SYSMAC SPU Unit. This data can be changed even while the SYSMAC SPU Unit is operating. With the recipe function in version 2.0, it is possible to change numeric and text data while the SYSMAC SPU Unit is in operation. With the expanded recipe function in version 2.1, the data collection settings must be changed to register the Recipe Request Bit to a variable.

The status of a machine at a certain point in time can be reproduced by using collected data and the recipe function. For example, the machine's master data and inspection data are collected as recipe data. The machine's status can be reproduced by using a recipe to write the collected data to a PLC memory area. In this way, collected data can be handled not only as a daily report, but also as parameters for feedback to the machine.

Note If you set up the expanded recipe function, the Recipe Request Bits are automatically registered to variables and to memory events. This requires that you change the data collection settings.

8-2 Data Collection Timing

Basic Collection Cycle

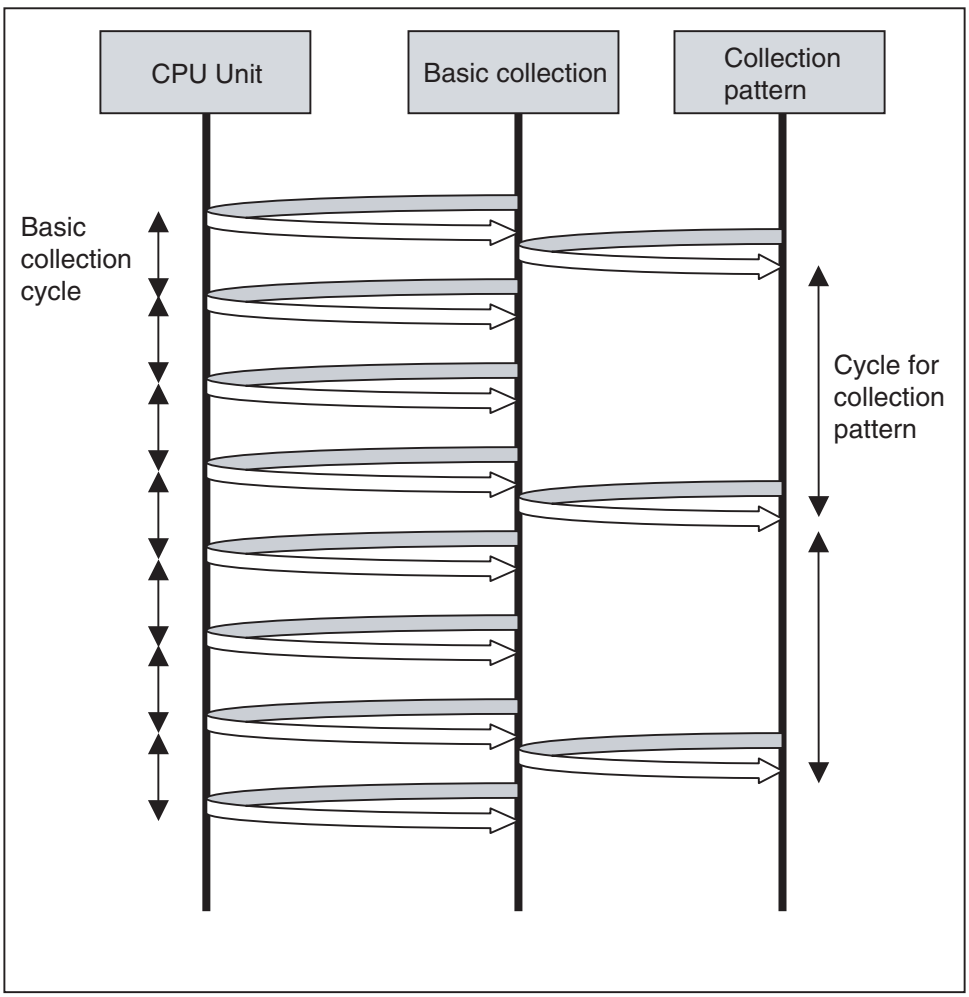
In Data Collection Mode, the SYSMAC SPU Unit loads all of the registered variable data from the CPU Unit on the cycle that is set for basic collection.

However, the actual cycle on which the SYSMAC SPU Unit loads data is never shorter than the cycle time of the CPU Unit. The data collection cycle will always be at least as long as the cycle time even if the cycle that is specified for basic collection is shorter than the cycle time of the CPU Unit.

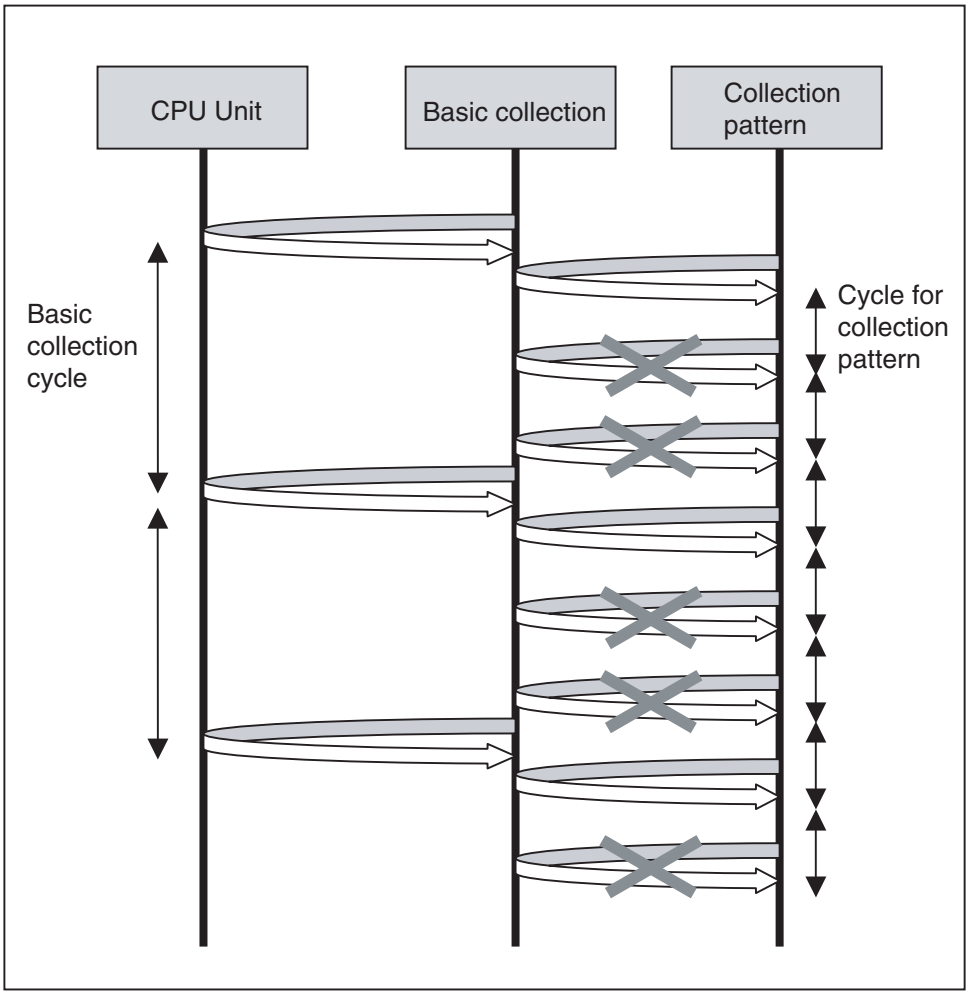
Note Processing to transfer variable data from the CPU Unit to the SYSMAC SPU Unit on the basic collection cycle is always performed, even when basic collection is stopped (i.e., when writing to CSV files is stopped). It is not necessary to start basic collection.

Cycles for Data Collection Patterns

Data collection patterns use the data that is transferred to the SYSMAC SPU Unit for basic collection to record the data according to the settings for individual patterns. Therefore, the cycle for a data collection pattern must be at least as long as the basic collection cycle.



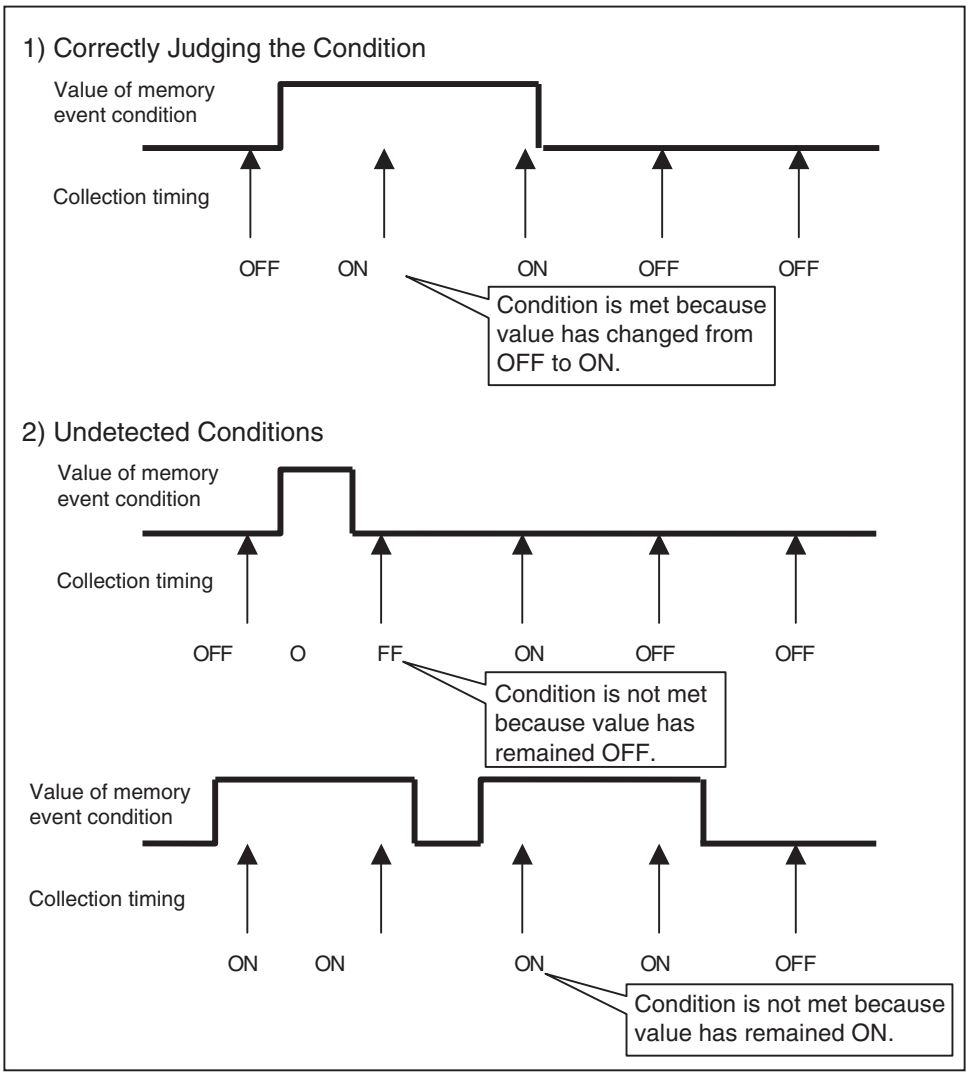
Note If you set the cycle for a data collection pattern that is shorter than the basic collection cycle, records will not be recorded for the data collection pattern until basic collection has been performed.Therefore, we recommend that you set the cycle for a data collection pattern at least as long as the basic collection cycle.



Timing of Judging Memory Events

The SYSMAC SPU Unit judges the conditions for memory events. The SYSMAC SPU Unit judges memory events as soon as it loads the data from the CPU Unit of the PLC for basic collection. Therefore, the values for memory event conditions must be held for longer than the basic collection cycle.

The following example is for when the memory event condition is *When the bit is ON*.



Note The data collection cycle will always be at least as long as the cycle time even if the basic collection cycle is shorter than the cycle time of the CPU Unit. To ensure that memory event conditions are correctly judged, we recommend that the settings satisfy the following guideline.

Time to hold value of memory event condition > Basic collection cycle × 2 + Cycle time

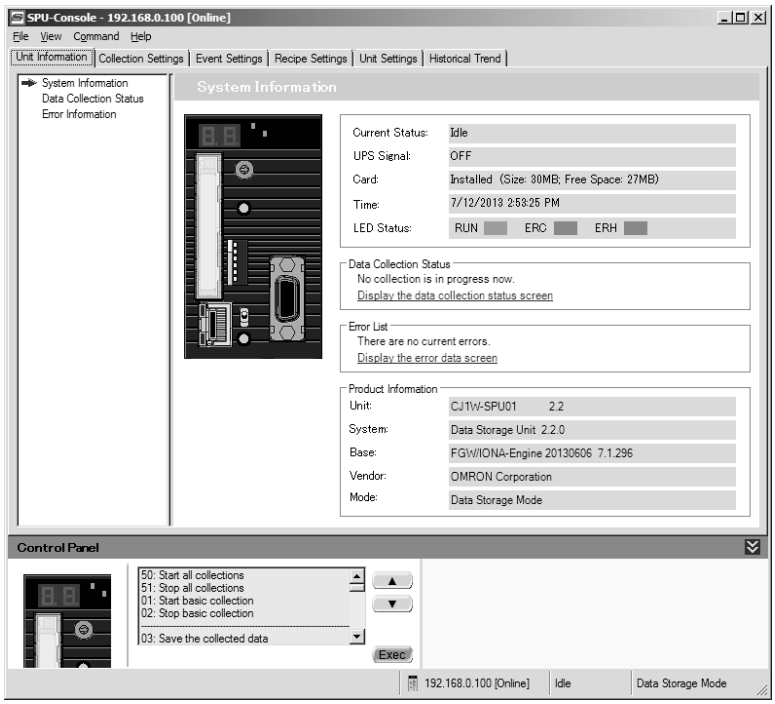
SECTION 9
Monitoring SYSMAC SPU Unit Operating Status

This section describes how to monitor SYSMAC SPU Unit operating status and error status.

9-1 Displaying System Information 76
9-2 Displaying Data Collection Status 77
9-2-1 Starting a Collection Pattern 77
9-2-2 Stopping a Collection Pattern 77
9-3 Displaying Error Information 78

9-1 Displaying System Information

The operating status of an SYSMAC SPU Unit can be monitored from the System Information display on the Unit Information Tab Page.



System Information Display Items

Item	Content
Current Status	Operating status of the current SYSMAC SPU Unit
PF-IN Signal	Status of the power failure signal
Card	Whether a Memory card is inserted in the SYSMAC SPU Unit Memory Card capacity and available space
Time	The time in the SYSMAC SPU Unit
LED	The status of the RUN, ERC, and ERH indicators
Data collection sta-tus	Collection pattern currently in use
Error list	Current errors
Product Information	The SYSMAC SPU Unit model number and system program version

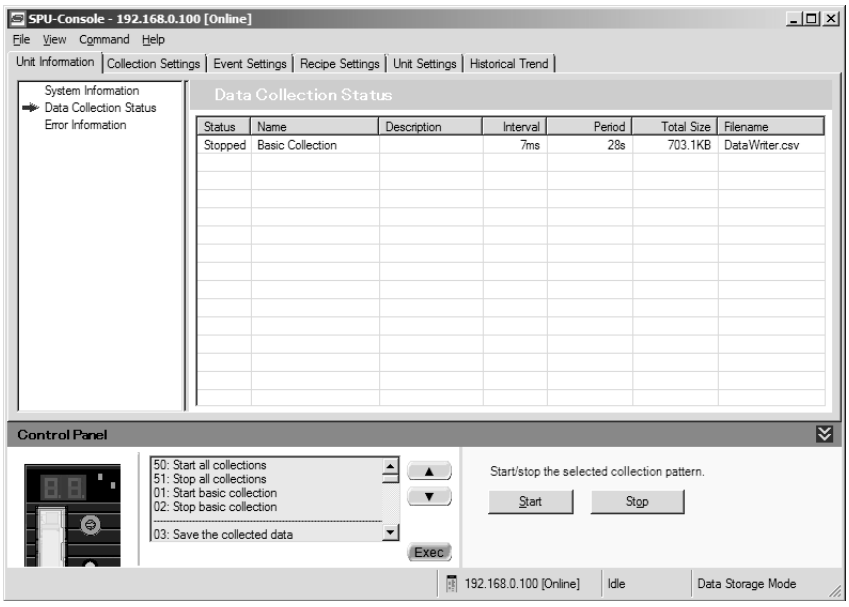
Current Status

The SYSMAC SPU Unit current status contains the following status.

Status	Meaning
Idle	SYSMAC SPU Unit is in idle status.
Collecting	Basic collection or a collection pattern is being executed.
Change the settings	Data collection settings or Unit settings are being changed.
Archive	Record data is being saved or data collection settings are being recovered.
Initialization	The SYSMAC SPU Unit is being initialized.

9-2 Displaying Data Collection Status

The status of data collection can be monitored in the Data Collection Status Window, from the Unit Information Tab Page. Collection patterns can also be started and stopped.



The following table shows the meanings of the column headers.

Column header	Contents
Status	Collection pattern operating status
Name	Name of collection pattern
Description	Description of collection pattern
Interval	Interval for collecting data
Period	Time required to record data in all files
Total size	Total size the data collection files and the files to copy to the data folder
File name	Name of file in which the results of the collection pattern are saved

9-2-1 Starting a Collection Pattern

1,2,3...

1. Select the collection pattern to be started.
2. Click the **Start** Button.

9-2-2 Stopping a Collection Pattern

1,2,3...

1. Select the collection pattern to be stopped.
2. Click the **Stop** Button.

9-3 Displaying Error Information

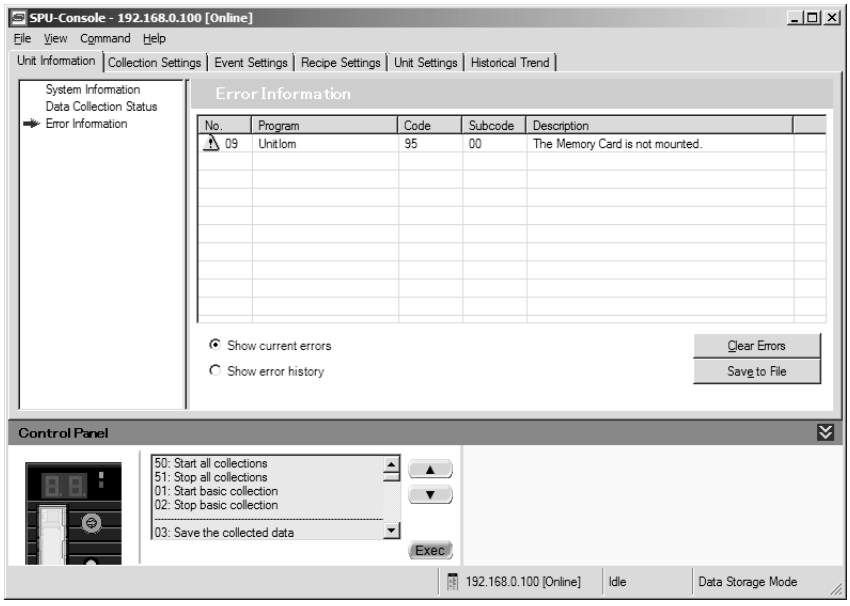
The error status of an SYSMAC SPU Unit can be monitored from the Error Information Window on the Unit Information Tab Page.

Refer to *Appendix A Troubleshooting with Error Codes* for details on error codes.

Displaying Current Errors

1,2,3...

1. Select the **Show Current Errors** Option. The current errors in the SYSMAC SPU Unit will be displayed.
   - To forcibly clear the current errors, click the **Clear Errors** Button.
   - To save information on the current errors to a file, click the **Save to File** Button.



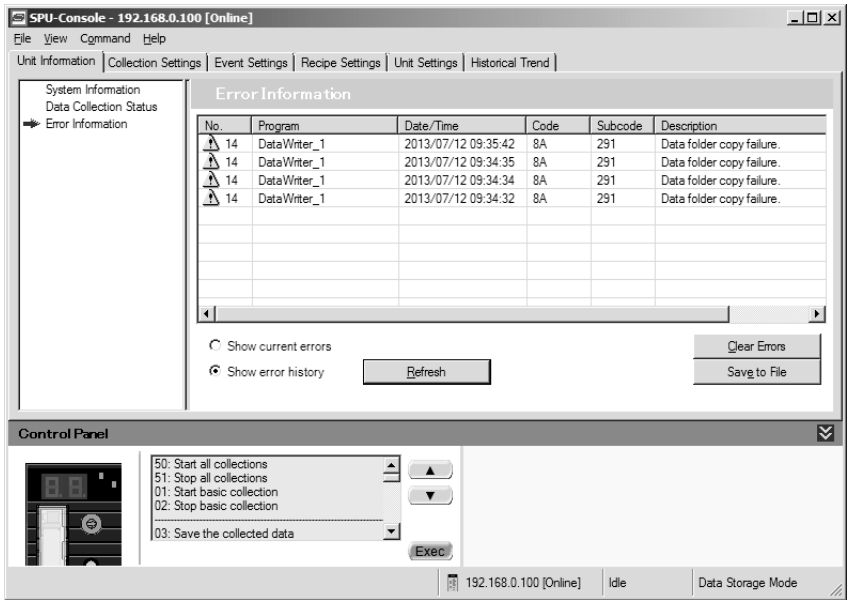
Note Error information is deleted in the following cases.

(1) When the SYSMAC SPU Unit is restarted
(2) When errors are eliminated
(3) When data collection settings or unit settings are made
(4) When command 11 (Forced Clear of Error) is executed
(5) When the **Clear Errors** Button is clicked from Error Information in the Unit Information Tab Page of the SPU-Console.

Displaying Error History

1,2,3...

1. Select the **Show error history** Option. The error history at the SYSMAC SPU Unit will be displayed.
   - To update to the most recent information, click the **Refresh** Button.
   - To clear the error history, click the **Clear Errors** Button.
   - To save the error history information to a file, click the **Save to File** Button.



Note The error history holds a maximum of 80 records. If this number is exceeded, the oldest item in the history is deleted.The error history is saved to the Memory Card. It is deleted in the following cases:

(1) When the **Clear Errors** Button is clicked.

(2) When the Memory Card is formatted.

(3) When the Memory Card is replaced.

SECTION 10
Data Collection Settings for Data Storage Mode

This section explains how to make the data collection settings for Data Storage Mode operation.

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10-1 Data Collection Setting Procedure

An outline of the basic procedure from making data collection settings to executing data collection is as follows:

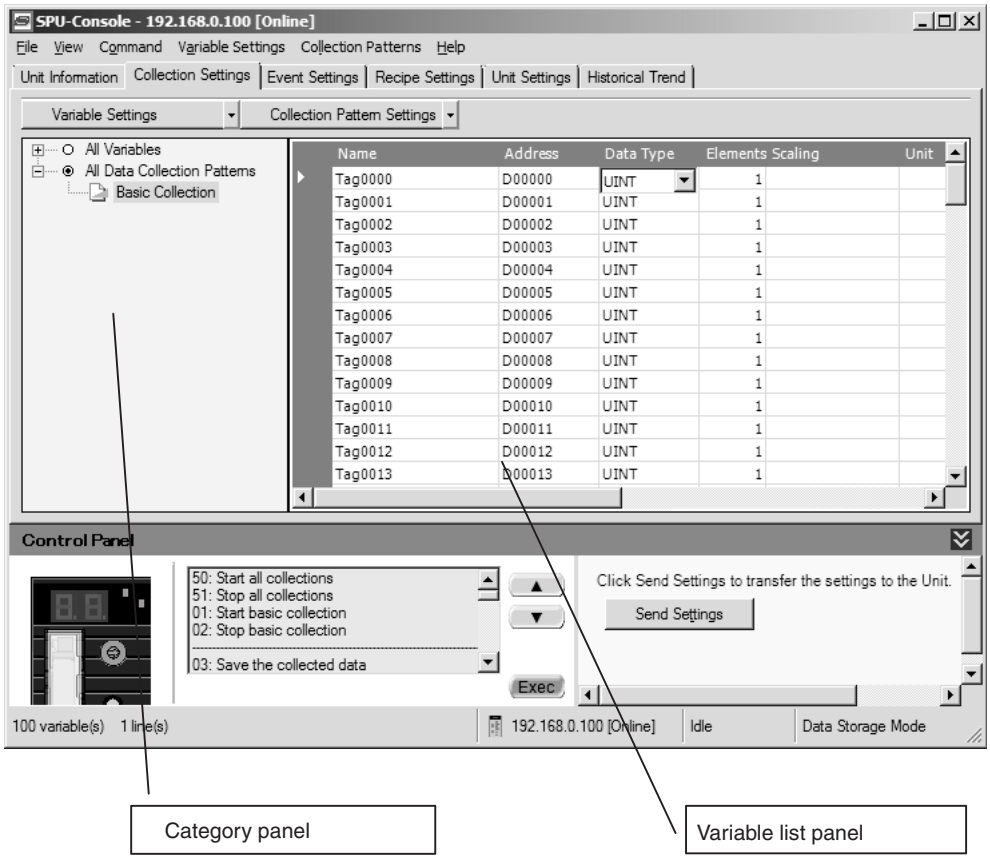
1,2,3...

1. Make the variable and data collection pattern settings.
2. Set the events. (Refer to *SECTION 11 Event Settings for Data Storage Mode*.)
3. Enable the settings in the SYSMAC SPU Unit.
4. Execute data collection.
5. Display the data collection results folder.

10-2 Data Collection Settings Window and Operation

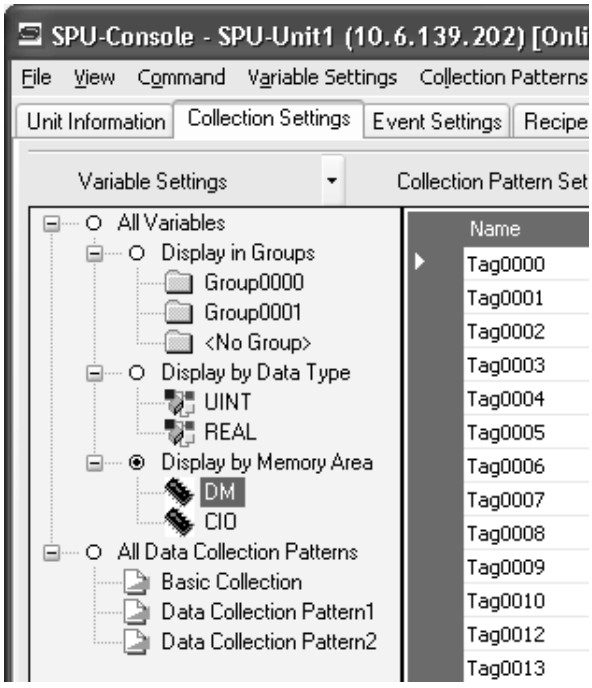
10-2-1 Window Configuration

Select the **Collection Settings** Tab in SPU-Console to display the setting window for data collection.



10-2-2 Operations in the Classification Panel

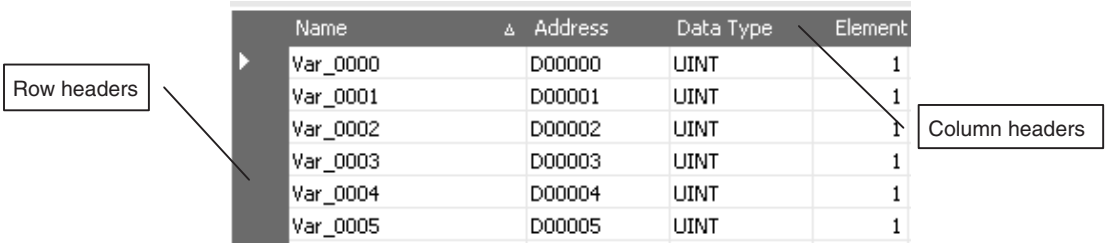
The following table explains the basic operations in the Classification Panel.



Item		Operation method and function
All Variables		If this option is selected, all of the set variables will be displayed.
	Display in Groups	When variables have been grouped, this option can be selected to organize and display the variables by group.
	Display by Data Types	If this option is selected, variables will be organized and displayed by data type, such as UINT and REAL.
	Display by Memory Area	If this option is selected, variables will be organized and displayed by the variables' data area addresses, such as DM.
All Data Collection Patterns		If this option is selected, all of the collection pattern information will be displayed.
	Data Collection Patterns	If this option is selected, the variables for which data collection is to be performed will be displayed. For example, if variable X is displayed under *Basic Collection*, variable X will be recorded using *Basic Collection*.

10-2-3 Basic Operations in the Variable Panel

This section describes the name and meaning of each part of the Variable Panel.



The following table describes the column headers.

Column	Meaning
Name	Shows the variable's name.
Address	Shows the variable's I/O memory address in the PLC.
Data Type	Shows the variable's data type. Data from the PLC's I/O memory is converted to this data type and recorded.
Element	Displays the number of elements in the data array. When the data type is STRING, the number of characters is shown. When the data type is CHANNEL_BLOCK, the number of consecutive areas is shown.
Scaling	Displays the conversion method when scaling is set.
Engineering	Specifies the industrial units as the user-set text string.
Data Collection Pattern	Specifies the data collection pattern in which this variable is recorded.
Description	Shows a user-set description of the variable.

The following basic operations can be performed in the Variable Panel.

Changing the Name, Number of Elements, Units, or Description

Click the cell to be changed and directly input the new text.

Changing the Address

Select the cell to be changed, click the **...** Button, input the new address in the displayed window, and click the **OK** Button. The new address can also be input directly in the cell as a text input.

Changing the Data Type

Select the cell to be changed and select the new data type from the displayed drop-down list.

Changing the Data Collection Pattern

Select the cell to be changed, click the **...** Button to display the dialog box, and select (check) the data collection patterns used for collecting data for the selected variable.

Selecting Variables

Selecting a Single Variable

Click the desired variable's row header cell.

Selecting Multiple Variables

Press and hold the **Ctrl** Key while clicking the row header cells of multiple variables.

Selecting a Range of Consecutive Variables

Click the first variable's row header cell. Press the **Shift** Key while and click the last variable's row header cell.

Selecting All Variables

Press the **Ctrl+A** Keys.

Note The menu displayed when you right-click on the Variable Panel will include *Insert Unicode control character*, but this command cannot be used.

10-3 Setting Variables

The data to be sampled is specified with variables. Before collection, register each variable with the desired variable name, CPU Unit address, data type, and number of elements. Set the variables in the Variable Panel.

The variables can also be set with OMRON's CX-Programmer Support Software (version 2.0 or later) on the Variable Tab Page.

10-3-1 Adding Variables

The procedure for adding variables depends on the point clicked in the Classification Panel.

Directory tree under *All Variables*	The variable will be added, but it will not be registered in the data collection pattern. To register the variable in a data collection pattern, it is necessary to separately select *Register to the Collection Pattern*.
Directory tree under *All Sampling Patterns*	The added variable will be registered in the selected data collection pattern.

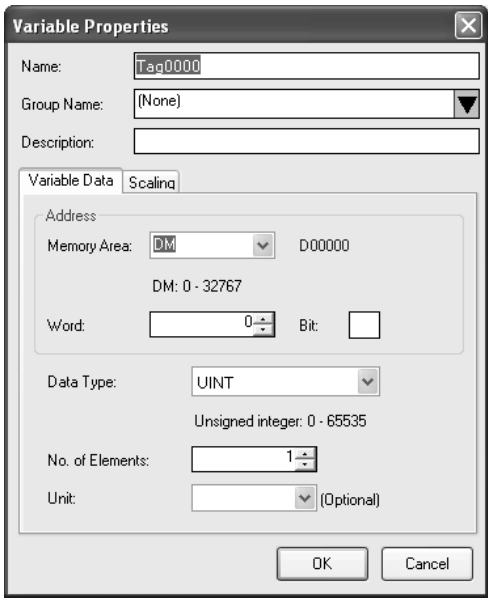
1,2,3...

1. Click the SPU Console's **Collection Setting** Tab.
2. Select ***Variable Setting - Add Variable*** or right-click the Variable Panel and select ***Add Variable*** from the popup menu.

   The Variable Properties Dialog Box will be displayed. For details, refer to *10-3-2 Operations in the Variable Properties Dialog Box*.

10-3-2 Operations in the Variable Properties Dialog Box

Use the Variable Properties Dialog Box to make variable settings such as the variable's address and data type. Enter the new settings in the dialog box and click the **OK** Button to change the variable's settings.



The following table describes the variable's settings.

Item	Function
Name	Sets the variable's name.
Group name	Specifies the group in which the variable belongs.
Description	Input a description of the variable. This entry can be omitted.

The following table describes the settings on the Variable Information Tab Page.

Item	Function
Address	Specifies the variable's memory location. Specify the data area in the *Memory type* Field and specify the offset from the beginning of the data area in the *Channel* Field. If the variable represents a bit, specify the bit number (0 to 15) in the *Bit* Field. If the variable does not represent a bit, leave this field empty.
Data type	Specifies the data type.
Number of elements	Specifies the number of elements of data for a data array. A number of consecutive data elements with the same properties can be handled as a single variable. When the data type is set to *STRING*, the *Number of elements* sets the length of the string. When the data type is set to CHANNEL_BLOCK, the data in the consecutive areas set in *Number of elements* is handled as a single data item with no commas.
Engineering units	Specify a text string that shows the variable's units. This entry can be omitted.

Note The following characters cannot be used in the variable's *Name* or *Group-name*: /, \, commas, spaces, quotation marks (' or "), carriage returns, or tab codes.

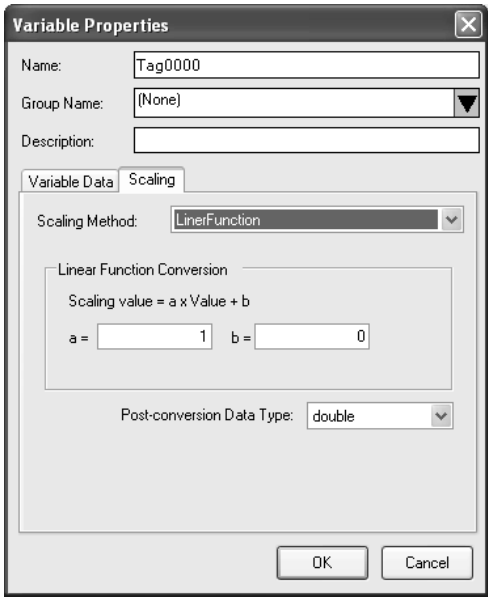
The following table describes the types of data.

Data type	Description
BOOL	BOOL format: 0 to 1
UINT	Unsigned integer: 0 to 65,535
UDINT	Unsigned 2-word integer: 0 to 2^{32-1} (0 to 4,294,967,295)
INT	Integer: –32,768 to 32,767
DINT	2-word integer: -2^{31} to 2^{31-1} (–2,147,483,648 to 2,147,483,647)
UINT_BCD	Unsigned BCD: 0 to 9,999
UDINT_BCD	Unsigned 2-word BCD: 0 to 99,999,999
REAL	Real number: -10^{-38} to 10^{+38}
LREAL	4-word real number: -10^{-308} to 10^{+308}
CHANNEL	Channel: #0 to #FFFF
WORD	16-bit text string: #0 to #FFFF
DWORD	32-bit text string: #0 to #FFFFFFFF
CHANNEL_BLOCK	Channel block: Consecutive channels
STRING	ASCII text string

The Scaling Tab Page can be used to set the scaling function for variables that require scaling. For details, refer to *10-3-3 Setting the Scaling Function for a Variable*.

10-3-3 Setting the Scaling Function for a Variable

If a variable requires scaling, the scaling method can be specified on the Variable Properties Dialog Box's Scaling Tab Page. If a variable does not require scaling, it isn't necessary to specify scaling function.



The following table describes the *Scaling methods* on the Scaling Tab Page.

Item	Function
Linear function conversion	The memory value is converted with a linear equation and the result is recorded as the *Post-conversion Data Type*. Specify a floating-point data type (float or double) for the *Data type after conversion*. The result is calculated from the specified constants (a and b) as follows: Result = a × memory value + b This can be used, for example, in converting numbers from inches to centimeters.
Maximum/Minimum conversion	Memory values with a predetermined upper and lower limit are converted according to that upper and lower limit range and the result is recorded as the *Post-conversion Data Type*. Specify a floating-point data type (float or double) for the *Data type after conversion*. This can be used, for example, to convert numbers from 0 to 6,000 input by an AD Unit to a temperature.
Decimal position conversion	The memory value's decimal point can be moved from left to right to the specified position. The result is recorded as the *Post-conversion Data Type*. Specify a floating-point data type (float or double) for the *Data type after conversion*.

10-3-4 Adding Multiple Variables Together

A number of consecutive variables with the same properties can be registered together.

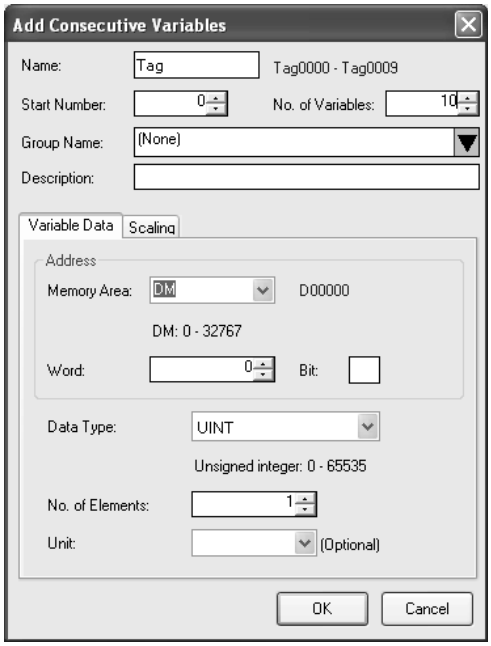
1,2,3...

1. Click the SPU Console's **Collection Setting** Tab.
2. Select ***Variable Setting - Add Consecutive Variables*** or right-click the Variable Panel and select ***Add Consecutive Variables***.

   The Add Consecutive Variables Dialog Box will be displayed. For details, refer to *10-3-5 Operations in the Add Consecutive Variables Dialog Box*.

10-3-5 Operations in the Add Consecutive Variables Dialog Box

Use the Add Consecutive Variables Dialog Box to set a number of consecutive variables with the same properties. make variable settings such as the variable's address and data type. Enter the settings in the dialog box and click the **OK** Button to register the consecutive variables.



The following table describes the array variable's settings.

Item	Function
Name	Sets the variable's name. An index number will be attached after the variable name.
Start number	Specifies the starting number of the index number that appears after the variable name.
Number of variables	Specifies the number of variables being added.
Group name	Specifies the group in which the variable belongs.
Description	Input a description of the variable. This entry can be omitted.

The following table describes the settings on the Variable Information Tab Page.

Item	Function
Address	Specifies the variable's memory location. Specify the data area in the *Memory type* Field and specify the offset from the beginning of the data area in the *Channel* Field. If the variable represents a bit, specify the bit number (0 to 15) in the *Bit* Field. If the variable does not represent a bit, leave this field empty.
Data type	Specifies the data type. For details, refer to *10-3-2 Operations in the Variable Properties Dialog Box*.

Item	Function
Number of elements	Specifies the number of elements of data for a data array. A number of consecutive data elements with the same properties can be handled as a single variable. When the data type is set to *STRING*, the *Number of elements* sets the length of the string. When the data type is set to CHANNEL_BLOCK, the data in the consecutive areas set in *Number of elements* is handled as a single data item with no commas.
Engineering units	Specify a text string that shows the variable's units. This entry can be omitted.

Note The following characters cannot be used in the variable's *Name* or *Group-name*: /, \, commas, spaces, quotation marks (' or "), carriage returns, or tab codes.

The Scaling Tab Page can be used to set the scaling function for variables that require scaling. For details, refer to *10-3-3 Setting the Scaling Function for a Variable*.

10-3-6 Using the CX-Programmer's Variables

Variables set with the CX-Programmer can be used.

1,2,3...

1. Start the CX-Programmer and display the variable table.
2. Select the variables to be used in the SPU-Console and select ***Edit - Copy***.
3. Click the SPU-Console's **Collection Settings** Tab and display the Variable Panel.
4. Select ***Variable Settings - Paste from the Clip Board***. If the variable does not have a variable name, a variable name will be allocated automatically based on the variable's address and comment information.

Note This function is supported by CX-Programmer version 2.0 and later versions. The following variables cannot be pasted.

- Variables with data type LINT, ULINT, ULINT_BCD, or NUMBER
- Variables with automatically allocated addresses
- Function block variables

10-3-7 Importing and Exporting Variables

Variable definitions can be exported to CSV files. Variable settings can be edited in programs such as spreadsheets.

Exporting to a CSV File

1,2,3...

1. Click the SPU-Console's **Collection Settings** Tab.
2. Select ***Export - To CSV File*** from the Variable Setting Menu.

Importing from a CSV File

1,2,3...

1. Click the SPU-Console's **Collection Settings** Tab.
2. Select ***Import - From CSV File*** from the Variable Setting Menu.

10-3-8 Changing Variables

1,2,3...

1. Click the SPU Console's **Collection Settings** Tab and display the Variable Panel.
2. Select the variable to be changed by clicking that variable's row header cell.

3. Select ***Variable Setting - Variable Properties*** or right-click the Variable Panel and select ***Variable Properties*** from the popup menu.
4. Enter the new settings in the Variable Properties Dialog Box and click the **OK** Button. For details on these operations, refer to *10-3-2 Operations in the Variable Properties Dialog Box*.

10-3-9 Deleting Variables

1,2,3...

1. Click the SPU Console's **Collection Settings** Tab to display the Classification Panel.
2. Select *All Variables*.
3. Select the variable to be deleted by clicking that variable's row header cell in the list. To select more than one variable, select the first variable, press and hold the **Ctrl** or **Shift** Key, and click the row header cell of the other variables to be deleted.
4. Select ***Variable Setting - Delete Variable*** or right-click the Variable Panel and select ***Delete Variable*** from the popup menu.

10-3-10 Selecting a Data Collection Pattern and Adding Variables

When the data collection pattern has been decided in advance, the data collection pattern can be selected and a variable can be added to that pattern. The added variable will be automatically collected and recorded in the specified data collection pattern.

1,2,3...

1. Click the SPU Console's **Collection Settings** Tab and display the Classification Panel.
2. Select one of the data collection patterns in the *All Data Collection Patterns* directory tree (such as *Basic Collection*) by clicking that pattern.
3. Select ***Variable Setting - Add Variable*** or right-click the Variable Panel and select ***Add Variable*** from the popup menu.

   The Variable Properties Dialog Box will be displayed. For details on the dialog box operations, refer to *10-3-2 Operations in the Variable Properties Dialog Box*.

10-3-11 Deleting Variables from a Data Collection Pattern

A registered variable can be deleted from a data collection pattern. The variable's settings are not deleted even though the variable is deleted from the data collection pattern. The deleted variable can still be found and reused in the Variable Panel's *All Variables* directory.

1,2,3...

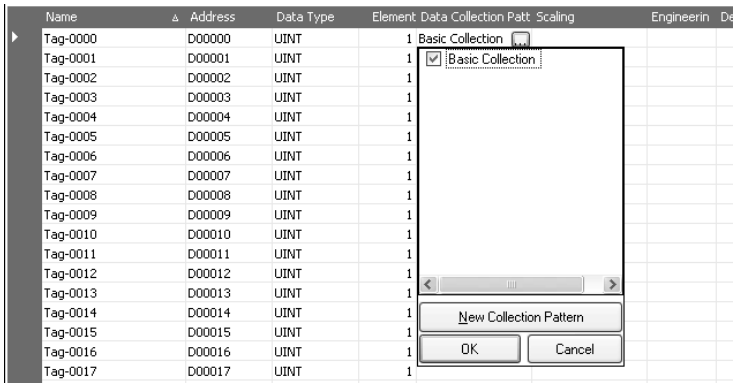
1. Click the SPU Console's **Collection Settings** Tab and display the Classification Panel.
2. Select one of the data collection patterns in the *All Data Collection Patterns* directory tree (such as *Basic Collection*) by clicking that pattern.
3. Select the variable to be deleted by clicking that variable's row header cell.
4. Select ***Variable Settings - Delete Variable*** or right-click the Variable Panel and select ***Delete Variable*** from the popup menu.

10-3-12 Registering an Existing Variable in a Data Collection Pattern

A variable that was set previously can be specified and registered in a data collection pattern. A variable can also be registered in multiple data collection patterns, which allows the same variable to be sampled under different collection conditions.

1,2,3...

1. Click the SPU Console's **Collection Setting** Tab and display the Variable Panel corresponding to the Classification Panel's *All Variables* directory.
2. Click the desired variable's cell in the *Data Collection Pattern* column and click the **...** Button.
3. A popup window will be displayed. Select the data collection patterns in which the variable will be registered (by adding checks next to those patterns) and click the **OK** Button.



Note There are two other ways to register the variables:

- Register the variables by selecting ***Variable Setting - Register to the Collection Pattern***.
- Register the variables by dragging and dropping them.

10-3-13 Managing Variables in Groups

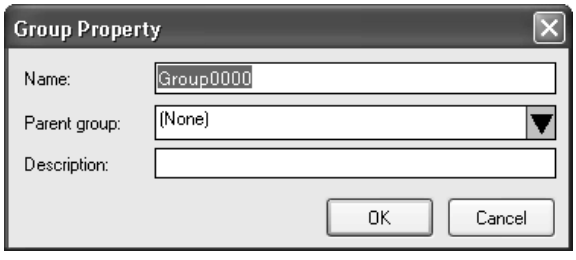
Variables can be organized and managed in groups.

Creating a Group

To create a group, select the *Display in Groups* Option in the Classification Panel and select ***Variable Setting - Add Group***.

1,2,3...

1. The Group Property Dialog Box will be displayed.



2. Add the group's name in the Name Field. In the *Parent group* Field, select the group to be the parent of the group level. (This does not need to be specified.) A description of the group can be entered in the *Description* Field. (This entry can be omitted.)

Note The following characters cannot be used in the variable's *Name* or *Group-name*: /, \, commas, spaces, quotation marks (' or "), carriage returns, or tab codes.

Deleting a Group

To delete a group, select the group to be deleted in the Classification Panel and select ***Variable Setting - Delete Group***.

If a group is deleted, all of the settings under the group will be deleted.

Changing the Group Name

To change a group's name, select the group and select ***Variable Setting - Group Properties***.

Copying to a Group

To copy a variable to another group, select the variable row header to be copied in the Variable Panel, press and hold the **Ctrl** Key, and drag and drop the variable in the destination group in the Classification Panel.

Moving a Group

To move a variable to another group, select the variable row header to be moved in the Variable Panel and drag and drop the variable in the destination group in the Classification Panel.

10-3-14 Changing the Order of Variables in a Data Collection Pattern

Variable data is recorded in a file in the order in which the variables appear in the Variable Panel. The recording order can be changed by moving a variables to a different position in the list.

1,2,3...

1. Click the SPU Console's **Collection Settings** Tab and display the Classification Panel.
2. Select one of the data collection patterns in the *All Data Collection Patterns* directory tree (such as *Basic Collection*) by clicking that pattern.
3. Select the variable to be moved by clicking that variable's row header cell in the list.
4. Drag the selected variable and drop it in the destination location.

10-3-15 Variables Automatically Registered for the Expanded Recipe Function or FTP Transfers

Variables will be automatically registered when the expanded recipe function or FTP transfer is set. These automatically registered variables are used by memory events. Do not delete them.

Function	Group name	Variable name
Expanded recipe	AutoRecipeExpandedFunction	AutoRecipe***n***_Request
FTP receive		AutoRecipe***n***_ReceiveRequest
FTP send	AutoFTPSendFunction	AutoFTPSend***n***_Request

A number from 0 to 9 is added for "***n***".

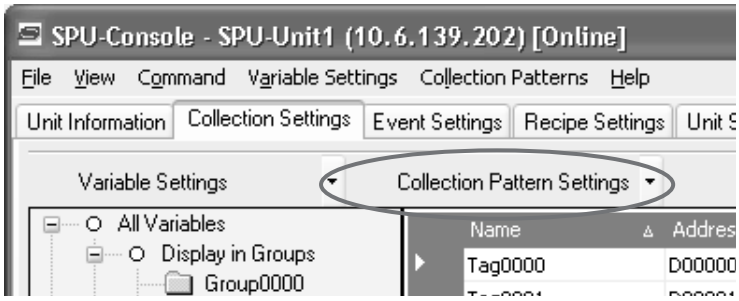
10-4 Setting Data Collection Patterns

10-4-1 Adding a Data Collection Pattern

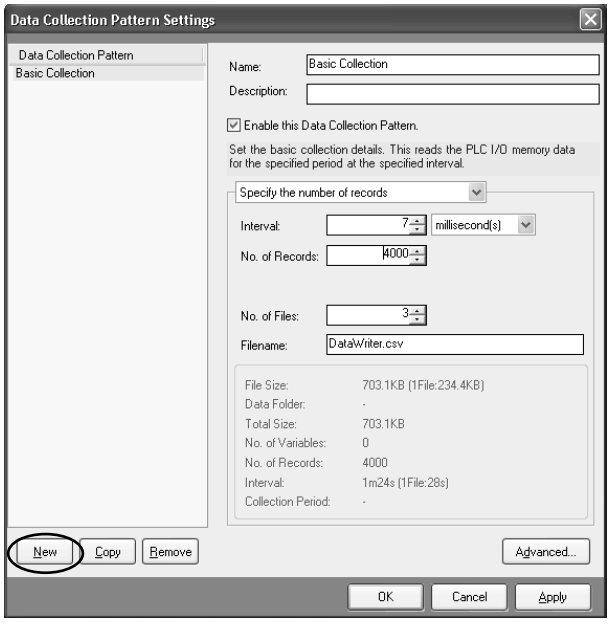
1,2,3...

1. To add a data collection pattern, click the SPU Console's **Collection Settings** Tab and select ***Collection Pattern Settings***.

   The Collection Pattern Settings Dialog Box will be displayed.



2. Click the **New** Button in the Data Collection Pattern Settings Dialog Box.



3. Input the data collection pattern settings such as the *Name* and *Description*.

The following table describes the settings.

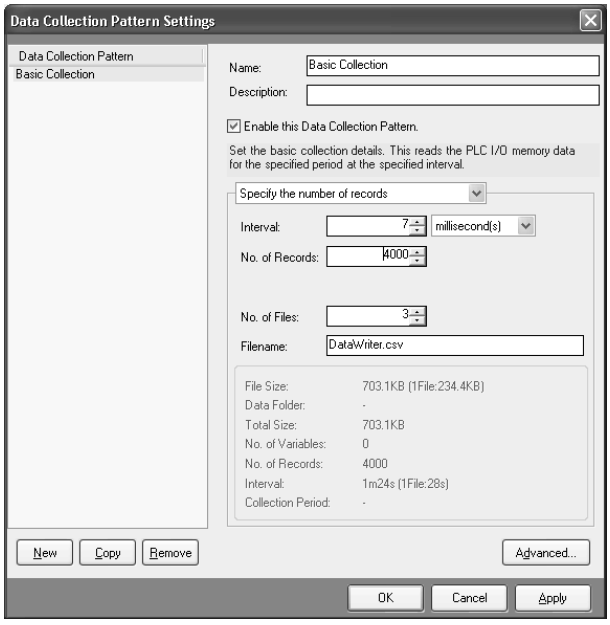
Item	Function
Name	Enter the data collection pattern's name.
Description	Enter a description of the data collection pattern.
Enable this data collection pattern.	If the pattern is disabled, data will not be collected. Selections on the Copy Option Tab Page and the FTP Send Settings Dialog Box in the advanced settings will not change. Any options that are selected will be counted in the number of settings.
Interval	Specify the data collection cycle.
No. of records	Specify the number of records that will be stored in a single file. (Specify the *No. of Records* when *Specify by the number of records* is selected.)
Period	Specify a period of time in which records will be stored in a single file. (Specify the *Interval* when *Specify by the collection period* is selected.)
No. of files	Specify the number of files to be stored between 1 and 1,200. When multiple files are specified, the files are stored in a folder with the same name as the specified *File name*. The file names will be the specified *File name* with an attached index number.
File name	Specify the name of the file in which the results will be stored with a maximum of 96 single-byte alphanumeric characters.

The following information is displayed according to the settings of the data collection pattern settings.

Item	Function
File size	Displays the required file size for data collection.
Data folder	When copy options are enabled, displays the maximum number of files copied to the data folder, and the total file capacity.
Total size	Displays the total size of the data collection files and the files copied to the data folder.
No. of variables	Displays the number of variables set for data collection.
No. of records	Displays the number of records saved for one file.
Interval	Displays the time until the data is recorded in all of the files set in *No. of files.*
Collection period	Displays the period required to collect the specified number of collections.

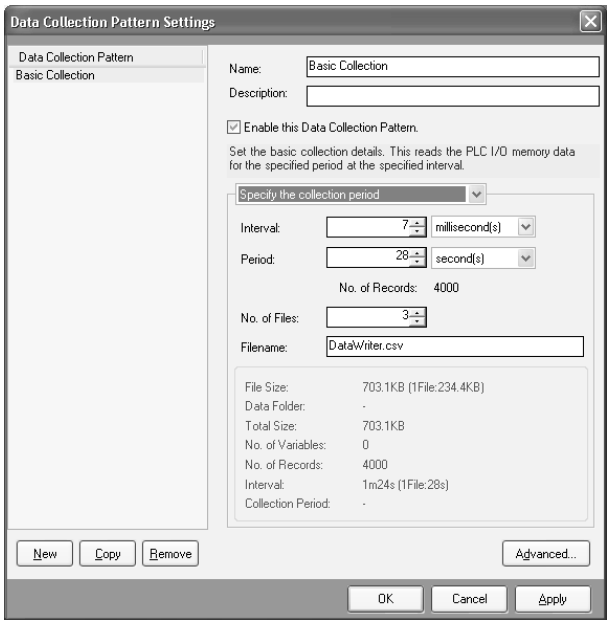
Specifying the Number of Records

When *Specify by the number of records* is selected, the number of records recorded in a single file is fixed at the specified number.



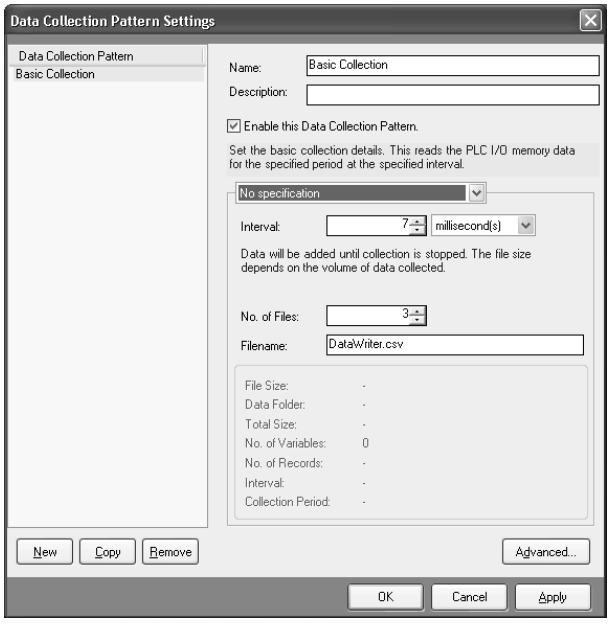
Specifying the Collection Period

When *Specify the collection period* is selected, the number of records recorded in a single file is determined by the period and cycle settings. The number of records recorded in a single file is fixed.



Unspecified Number of Records

When *No specification* is selected, data will be added to the file until data collection is stopped. With this method, all of the records from the start to the end of sampling can be recorded in a single file.

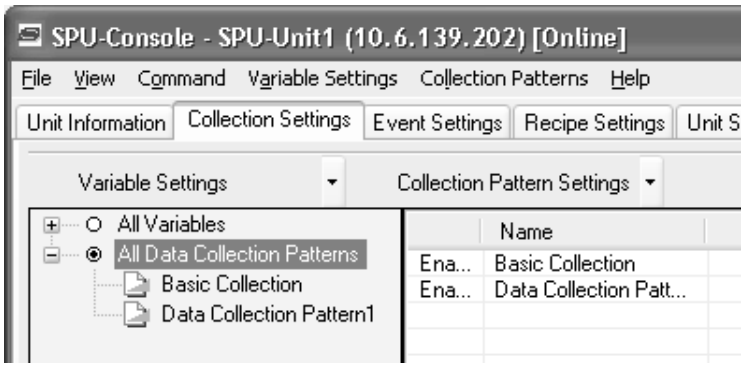


Note (a) When saving data without a specified number of records, the file size will continuously increase until data collection is stopped. Be sure that there is enough memory available in the Memory Card.

(b) When saving data in a single file and leaving the number of records unspecified, existing data in the file will be cleared when collection starts. We recommend saving data in multiple files when leaving the number of records unspecified.

4. After inputting the settings, click the **OK** or **Apply** Button.

5. Confirm that the data collection pattern has been added to the Classification Panel's *All Data Collection Patterns* directory tree.

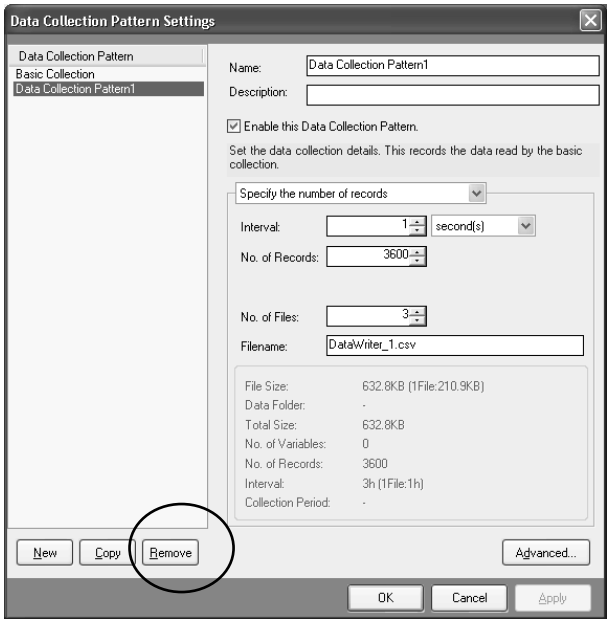


10-4-2 Deleting a Data Collection Pattern

Use the following procedure to delete a data collection pattern.

1,2,3...

1. Click the SPU Console's **Collection Settings** Tab and select ***Data Collection Pattern Settings***.
2. Select the data collection pattern to be deleted in the pane on the left side of the Data Collection Pattern Settings Dialog Box and click the **Remove** Button.

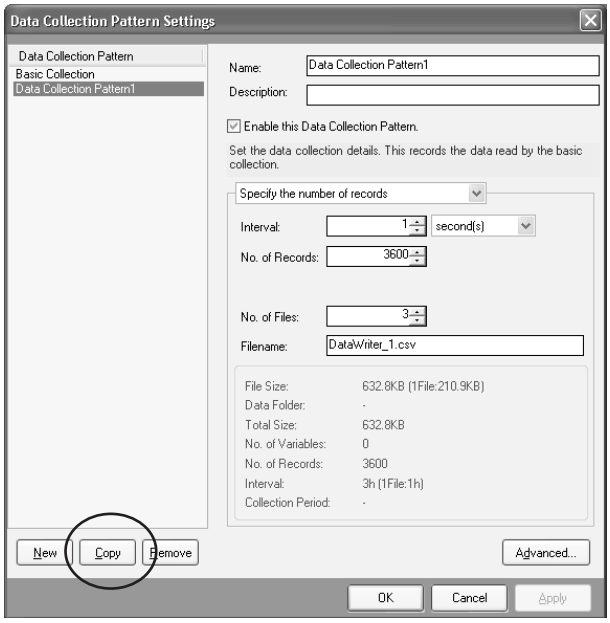


10-4-3 Copying Data Collection Patterns

1,2,3...

1. To copy a data collection pattern, open the Data Collection Tab Page and select ***Data Collection Pattern Settings***.

2. In the pane on the left side of the Data Collection Pattern Settings Dialog Box, select the data collection pattern to be copied and click the **Copy** Button.

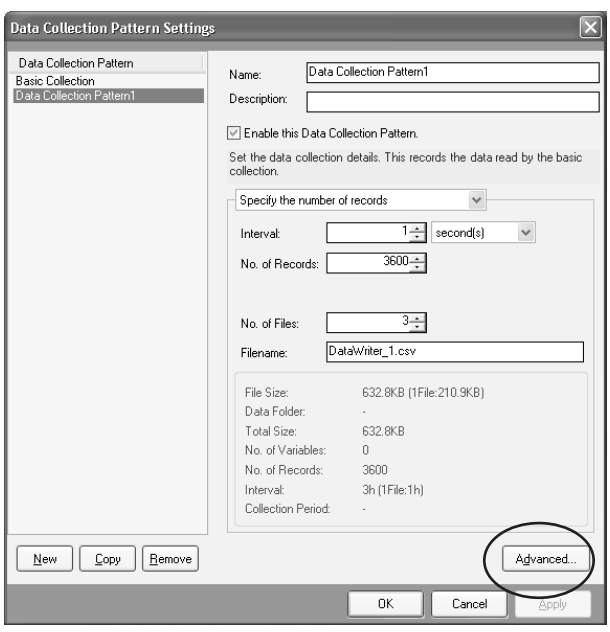


10-5 Making Advanced Data Collection Pattern Settings

10-5-1 Advanced Data Collection Pattern Settings

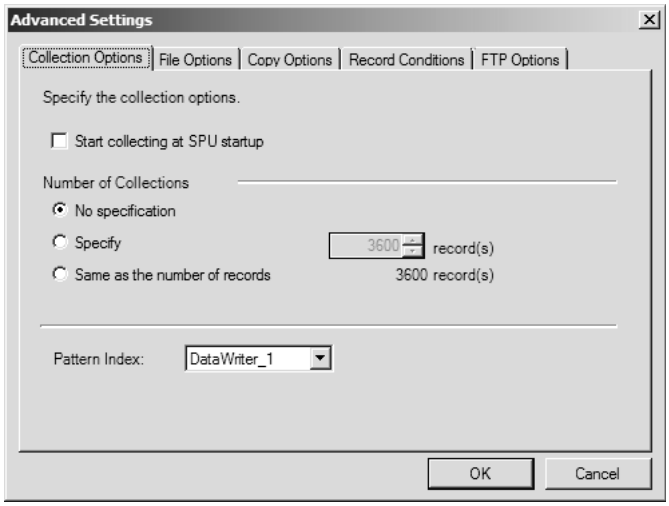
Advanced settings can be made for data collection patterns. In the advanced settings, it is possible to specify parameters such as the number of data collections to make and the conditions to be satisfied for data to be recorded. It is also possible to save files under different names.

The advanced settings are made in the Advanced Settings Dialog Box. The Advanced Settings Dialog Box is displayed by clicking the **Advanced** Button in the Data Collection Pattern Settings Dialog Box.



10-5-2 Setting Collection Options

The Advanced Settings Dialog Box's Collection Options Tab Page contains settings that can specify the number of collections (recording times) as well as whether or not collection will start automatically when the SYSMAC SPU Unit starts operating.



Starting Data Collection on SYSMAC SPU Unit Start-up

When the *Start collecting at SPU startup* Check Box is selected, The data collection pattern will be started automatically when the SYSMAC SPU Unit starts operating.

Specifying the Number of Collections

Collection can be stopped automatically when the specified number of collections have been performed. When *No specification* Option is selected, collection will continue. When *Specify* is selected, collection will stop automatically when the specified number of collections has been recorded. When *Same as number as of records* Option is selected, collection will stop automatically when the number of collections equals the number of data collection pattern records specified with the *Record count* setting.

Collection Pattern Numbers

A unique number is assigned to each collection pattern.

When you add a collection pattern, the lowest unused number is assigned as the collection pattern number. If you repeatedly add and delete collection patterns, the order in which the collection patterns are displayed on the SPU-Console will not be consistent with the collection pattern numbers. You can change the collection pattern numbers on the Collection Options Tab Page. When you change a collection pattern number, the offsets that are linked to the collection pattern numbers in the CPU Bus Unit Area also change.

- CIO Area: Collection status, collection start specifications, collection stop specifications, and file copy flags.
- DM Area: Record counters

Refer to *SECTION 7 CPU Bus Unit Area* for details on the CPU Bus Unit Area.

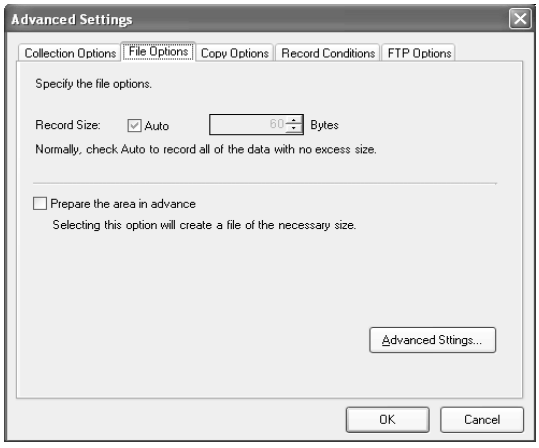
Note

(1) The collection pattern number for basic collection cannot be changed. The collection pattern numbers cannot be changed for Sampling Mode.

(2) In the SPU-Console's data collection pattern tree, collection patterns are displayed in the order that they were registered. The order in which the data collection patterns are displayed will not change even if you change a collection pattern number.

10-5-3 Setting File Options

Settings related to collection result files are made on the File Options Tab Page accessed in the Advanced Settings Dialog Box.



Setting Record Size

Normally *Auto* should be selected. When *Auto* is selected, record sizes are calculated automatically. To specify record size, specify the size (in bytes) of one record in the file to be saved.

Preparing File Space in Advance

When a setting is changed, a file is created on the Memory Card for storing collection data. If *Prepare the area in advance* is selected, a file of the size required for recording the data is created. Because the required space is reserved before data collection begins, the file will not run out of available space while data is being collected.

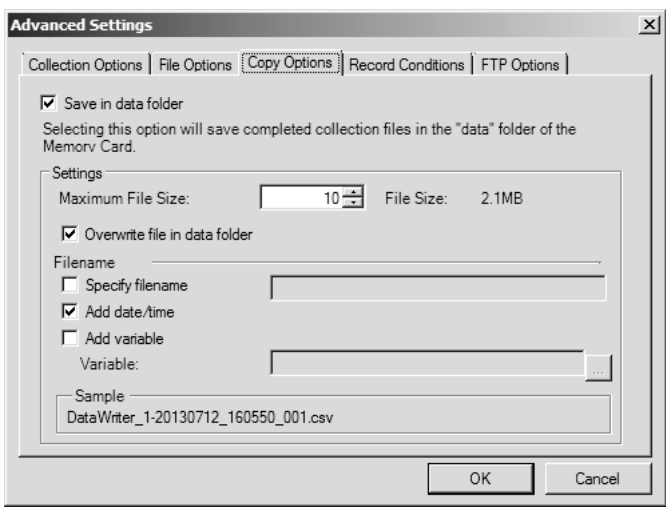
Note

(1) When the *Prepare the area in advance* Option is ON, it takes time to create the files when settings are changed.

(2) When the *Prepare the area in advance* Option is ON, file space is reserved for data that is copied using the copy option.

10-5-4 Setting Copy Options

Settings related to copying are made in the Copy Options Tab Page in the Advanced Settings Dialog Box.



Copying to Data Folders

When *Save in data folder* is selected, files for which data collection has been completed are copied automatically under data folders on the Memory Card. The files are copied as the data collection is completed. The timing for completing data collection is as follows:

- When set to save to multiple files, and data records have been saved to the final row.
- When data collection stops.
- When a file to which data is saved is switched by event processing.

Note

(1) Copy options cannot be enabled for basic collection.

(2) Copy options cannot be enabled when the data collection pattern file count is 1.

(3) Copy options can be enabled for a maximum of 10 data collection patterns.

(4) Files cannot be copied if there is insufficient available space on the Memory Card.

(5) You can use the WS02-EDMC1-V2 SYSMAC SPU Data Management Middleware to automatically copy collection data files from the Journal Folder to a computer.

(6) You can use FTP transfers to send the files that are copied to the data folder to an FTP server.

(7) If copying fails because there is not enough free space in the memory card or copy processing is too slow, error code 8A "Failed to copy to data folder" will occur.
Even if this error occurs, data collection will continue normally.

Specifying the Maximum Number of Files to be Saved

Specify the maximum number of files to store in the data folder to between 1 and 120.
If you select the *Overwrite file in data folder* Check Box, the oldest file in the data folder will be deleted and then the data will be copied if the maximum number of files has already been saved to the data folder.
If you clear the *Overwrite file in data folder* Check Box, data will not be copied if the maximum number of files has already been saved to the data folder, error code 8A (failed to copy to data folder) will occur, and the Copy Overflow Flag will turn ON.

Note

(1) To check if files have been overwritten, do not use the file dates, but rather use the serial numbers that are attached to the copy destination file names.

(2) If you change the data collection settings or clear the collection data, the serial number returns to 0. If there is an old file in a data folder, a file with the same serial number will be deleted even if the maximum number of files has not been reached.
If you clear the *Overwrite file in data folder* Check Box, an error will occur if a file with the serial number of the next file to write already exists, even if the maximum number of files has not been reached.
Delete unnecessary files from the data folder as required, e.g., by using command 35 (clear the data folder).

Specifying File Names

File names are changed to copy the data according to the following format.

FileName-yymmdd_hhmmss_VariableValue_SerialNumber.csv

The file naming rules (date, time, variable values) are specified here.

The following table shows the setting items.

Item	Contents
Specify filename	If you clear the *Specify filename* Check Box, the file name that is specified in the data collection pattern settings is used. If you select the *Specify filename* Check Box, you can specify the copy destination file name. Specify a text string consisting of 0 to 64 ASCII characters. Example: File Name set to “LineA.” LineA-20130701_1200_001.csv LineA_001.csv Example: File Name set to “ ” (blank). 20130701_1200_001.csv 001.csv
Add date/time	Adds the date and time to the file name when a file is copied.
Add variable	Adds the specified variable value. The variable value is the value from when a file is copied. If the lot number is stored in the specified variable, the file can be managed by lot number.

The serial number at the end of the file name will be from 000 to one less than the maximum number of files saved. The serial number is always attached.

Note

(1) Files copied to a data folder are not deleted even when the settings are changed. Files that are not needed can be deleted using Windows Explorer.

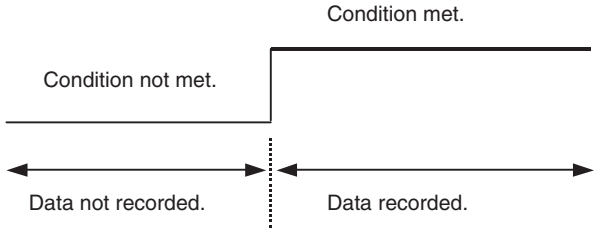
(2) Copying files may affect data collection performance. Prior to actual operation, perform tests to determine the appropriate settings.

(3) If SYSMAC SPU Unit power is turned OFF while data is being collected, the data may not be correctly copied into the data folder.

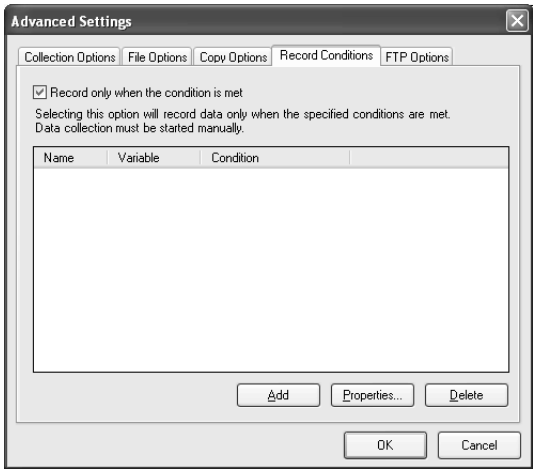
(4) Files that are sent using FTP will be deleted.

10-5-5 Setting Record Conditions

A record condition can be set in advance so that data will be recorded only when the condition is met. Using record conditions enables data collecting according to the application, recording data only while the bit is ON.



Record conditions are set on the Record Conditions Tab Page accessed in the Advanced Settings Dialog Box.



Note (1) To use record conditions, periodic data collection must be started in advance.

(2) For data collection patterns 1 to 64, data is recorded to the file in batches rather than one record at a time. This is the case even when a record condition is used, so the data will not be recorded to the file until multiple records satisfying the condition have been collected.

Adding Conditions

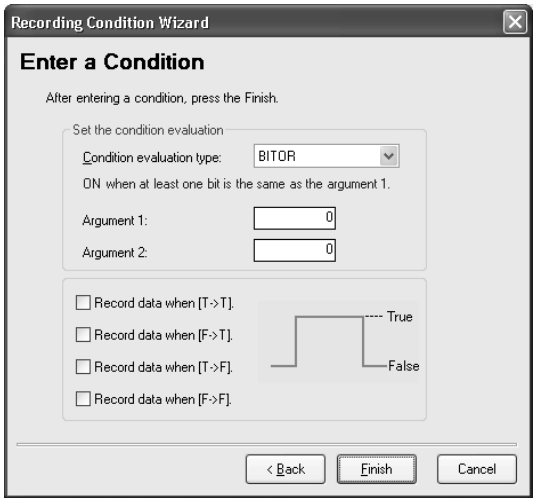
1,2,3... 1. Select ***Record only when the condition is met*** and then click the **Add** Button.

The Recording Condition Wizard shown in step 2 will be displayed.

2. Input the condition name and select the variable to use to set the condition. Input an alphanumeric text string for the condition name.

Note The variable used to set a condition must be registered in advance in the data collection pattern.

3. Click the **Next** Button.



4. Input the condition and then click the **Finish** Button.

For *Set the condition evaluation*, set the condition evaluation type and arguments for comparison with memory contents. The following table shows the condition evaluation types and arguments.

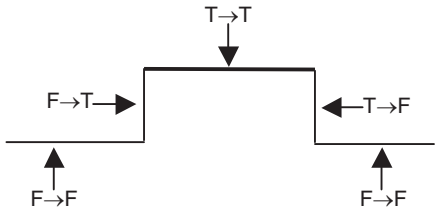
Condition evaluation type	Argument 1	Argument 2	Meaning
BITOR	Required	---	One of the same bits is ON as in argument 1.
BITAND	Required	---	All of the same bits are ON as in argument 1.
TRUE	---	---	Always true
NoneZero	---	---	Value ≠ 0
EQ	Required	---	Value = Argument 1
LT	Required	---	Value < Argument 1
LE	Required	---	Value ≤ Argument 1
GT	Required	---	Value > Argument 1
GE	Required	---	Value ≥ Argument 1
GELE	Required	Required	Argument 1 ≤ Value ≤ Argument 2
GTLT	Required	Required	Argument 1 < Value < Argument 2
GELT	Required	Required	Argument 1 ≤ Value < Argument 2
GTLE	Required	Required	Argument 1 < Value ≤ Argument 2
PrevBITOR	---	---	One of the same bits is ON as in previous value.
PrevBITAND	---	---	All of the same bits are ON as in previous value.
PrevEQ	---	---	Value = Previous value
PrevLT	---	---	Value < Previous value
PrevLE	---	---	Value ≤ Previous value
PrevGT	---	---	Value > Previous value
PrevGE	---	---	Value ≥ Previous value

---: Not required.

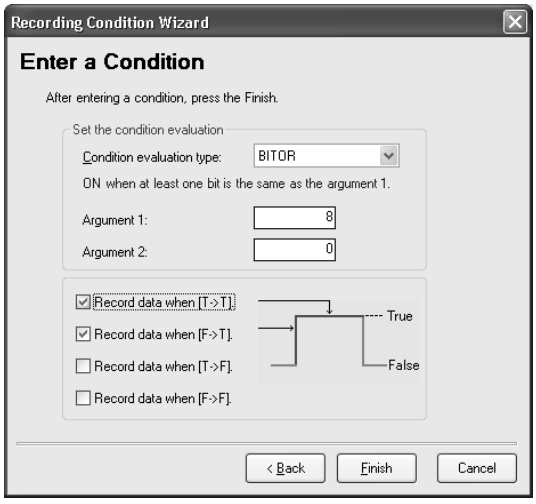
The pattern for which sampling data is to be recorded for the current evaluation in comparison to the previous evaluation is also set.

Item	Meaning
True → True	Data is recorded when the evaluation remains true.
True → False	Data is recorded when the evaluation changes from true to false.
False → True	Data is recorded when the evaluation changes from false to true.
False → False	Data is recorded when the evaluation remains false.

The following diagram illustrates these settings.



For example, the following settings are used to record data only when bit 4 is ON.



Note

(1) Evaluations are calculated based on the word contents of the address specified for the variable, not on the converted value for the data type of the variable.

Example: INT (Integer: (–32,768 to 32,767) and WORD (16-bit text string: #0 to #FFFF)

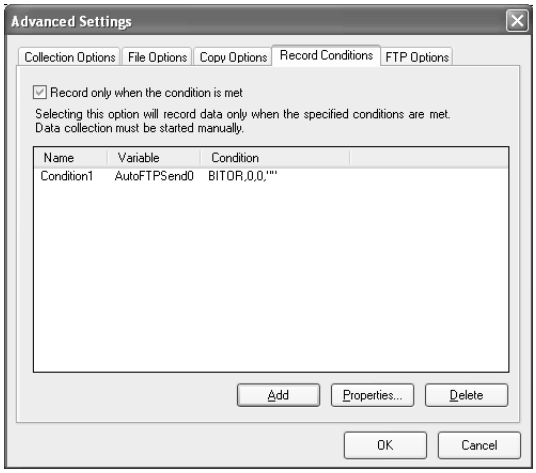
If the condition judgement is to be a non-negative INT integer (0 to 32,767), then the following settings are required: GELT for the condition judgement type, 0 for argument 1, and 33,768 (8000 hex) for argument 2.

Memory value / Data type	0x000	0x7FFF	0x8000	0xFFF
WORD	0	32,767	32,768	65,535
INT	0	–32,767	–32,768	–1

(2) Data will not be recorded for collection patterns with either or both False→True or True→False set as the record condition, and with neither True→True or False→False set, because the condition will not be satisfied for one shot collections by events.

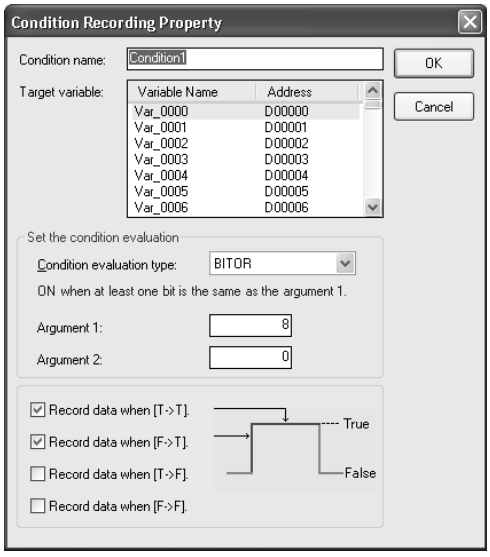
Deleting a Condition

To delete a condition, select the Condition and click the **Delete** Button.



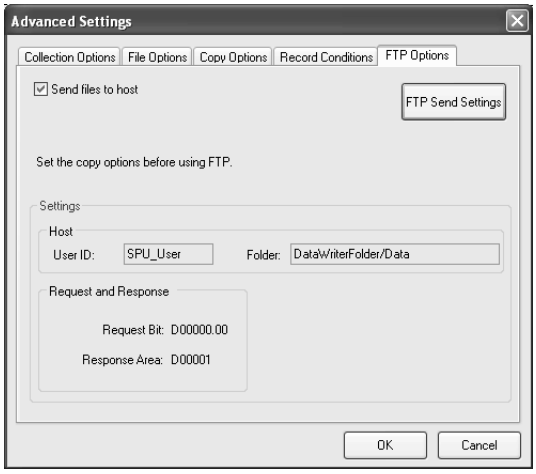
Changing a Condition

To change a condition, select the Condition and click the **Properties** Button.



10-5-6 FTP Send Settings

Make the settings on the FTP Options Tab Page of the Advanced Settings Dialog Box to send files collected in the SYSMAC SPU Unit to an FTP server. You can enable sending data with the FTP to send the record files that are copied to the data folder to an FTP server.



Send Files to Host

Set whether to enable the function for the data collection patterns. This parameter can be set only if saving data is enabled in the Copy Options Dialog Box.

FTP Host Settings

The following settings are displayed.

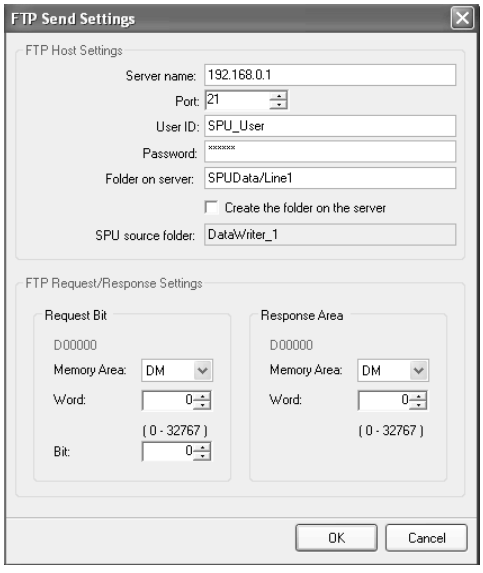
Display item	Description
FTP Host Settings	Set the FTP host
FTP Request/ Response Settings	Set the request and response bits for sending with FTP.

Click the **FTP Send Settings** Button. The FTP Send Settings Dialog Box will be displayed.

Note Files that are sent using FTP will be automatically deleted once the transfer has been completed.

FTP Host Settings

Make the settings for the FTP host.



Setting	Description
Server name	Sets the IP address of the FTP server.
Port	Sets the port number of the FTP server (default: 21).

Setting	Description
User ID	Sets the user ID registered to the FTP server.
Password	Sets a password for the user ID registered to the FTP server.
Folder on server	Sets the path from the root folder of the FTP server.
Create the folder on the server	If selected, automatically creates a new folder if there is no folder on the server.
SPU source folder	Displays the SPU source folder.

Note The FTP function of the SPU Unit connects in the standard active mode of FTP. The mode cannot be changed to passive mode in the settings.

FTP Request/ Response Settings

Make these settings for the request bit and response area for FTP send.

Setting item	Description
Request Bit	Sets the data area, word, and bit number of the request bit that is manipulated from the CPU Unit.
Response Area	Sets the data area and word address of the Response Area to which the execution result is written from the SPU Unit.

The FTP send address settings will be automatically reflected (i.e., added, revised, or deleted) in the variable settings and event settings when they are registered, revised, or deleted and the OK Button is clicked on the setting screen for data collection patterns.

Note Some variables and memory events will be automatically registered when the request bit is set. Do not delete these variables and memory events. For details, refer to *10-3-15 Variables Automatically Registered for the Expanded Recipe Function or FTP Transfers*.

Consult the FTP server administrator for information on FTP server settings.

Request Area Bit Configuration

The following figure shows the bit configuration for the response area word.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	-	-	-	-	-	-		-	-		-			

Bit	Name	Description
0	FTP send completed	ON when FTP sending has been completed.
1	Setting error	ON when there is a setting error.
2	SPU folder error	ON when there is no path to the copy folder.
4	FTP send error	ON when there is an FTP send error.
7	No SPU send file	ON when there is no file to send from the SPU.
15	FTP sending	ON when files collected from the SPU are being sent. OFF after sending the files has been completed.

All response area bits will turn OFF when the FTP Send Request Bit is turned ON.

Note It is not possible to execute more than one FTP send at the same time. If Request Bits are turned ON at the same time, they will all be processed sequentially, but execution of each Request Bit will start at a different time.

10-6 Enabling the Data Collection Settings

Use the following procedure to enable the data collection settings. Always perform this procedure after the data collection settings have been changed. In addition to the variable settings and the data collection pattern settings, this operation enables the event settings described in *SECTION 11 Event Settings for Data Storage Mode*.

Note

(1) Confirm that the SYSMAC SPU Unit is connected before enabling the settings.

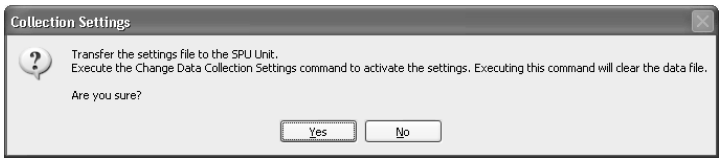
(2) When the changed settings are transferred, the existing SYSMAC SPU Unit settings will be overwritten. All of the collection files in the Journal Folder on the Memory Card will be deleted, and new files will be created with the new settings.

(3) Never turn OFF the Unit's power supply while the Unit's settings are being transferred. If the power supply is turned OFF during a transfer, incorrect information may be transferred to the SYSMAC SPU Unit, possibly causing the SYSMAC SPU Unit to malfunction.

(4) If too many variables are registered in the data collection pattern, the settings may not be transferred correctly. In this situation, reduce the number of variables and re-transfer the settings.

1,2,3...

1. Confirm that variable settings and data collection pattern settings have been completed.
2. Click the SPU Console's **Collection Settings** Tab.
3. The following dialog box will be displayed to confirm the settings file transfer and the change to the settings.

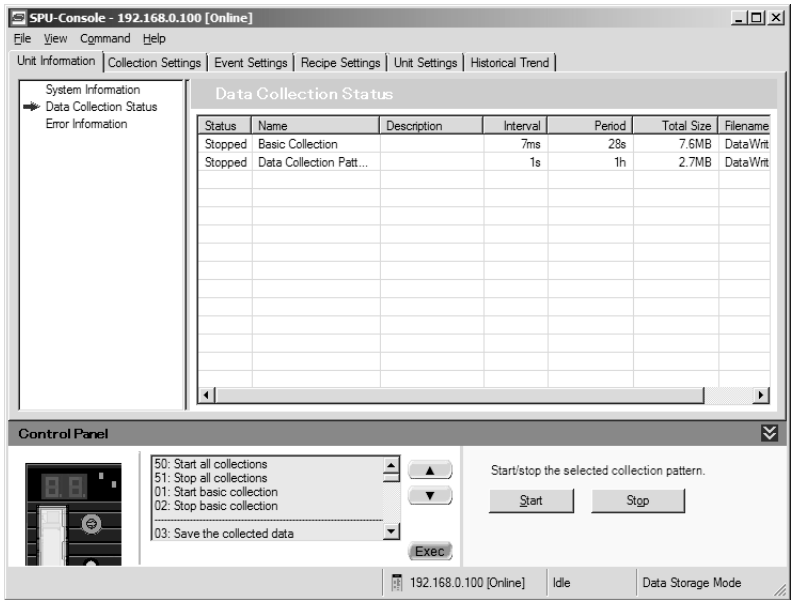


4. Click the **Yes** Button to change the settings file transfer and the change to the settings. A dialog box will be displayed to show the file transfer, and the command will be executed to change the data collection settings.

10-7 Executing Data Collection

10-7-1 Starting Data Collection

Data collection status can be monitored and collection patterns can be started or stopped in the Data Collection Status Window on the Unit Information Tab Page. For details, refer to *9-2 Displaying Data Collection Status*.



Note

(1) To start basic collection, execute command 01 (Start the Basic Collection).

(2) To start basic collection and data collection patterns 1 to 64 that have been set, execute command 50 (Start All Collections).

(3) For details on how to execute commands, refer to *SECTION 6 Executing Commands*.

(4) Data collection patterns 1 to 64 cannot be started individually by commands. They can be started and stopped individually in the Data Collection Status Window on the Unit Information Tab Page.

(5) Data collection can be started for data collection patterns 1 to 64 without executing command 01 (Start the Basic Collection).

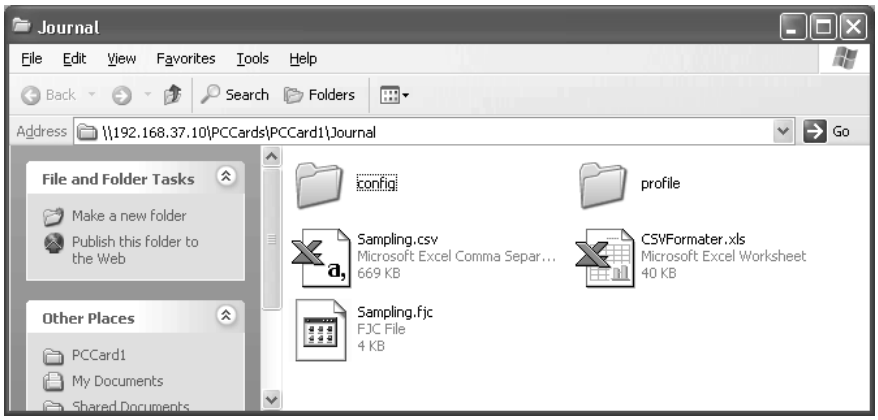
10-8 Displaying the Collection Result Folder

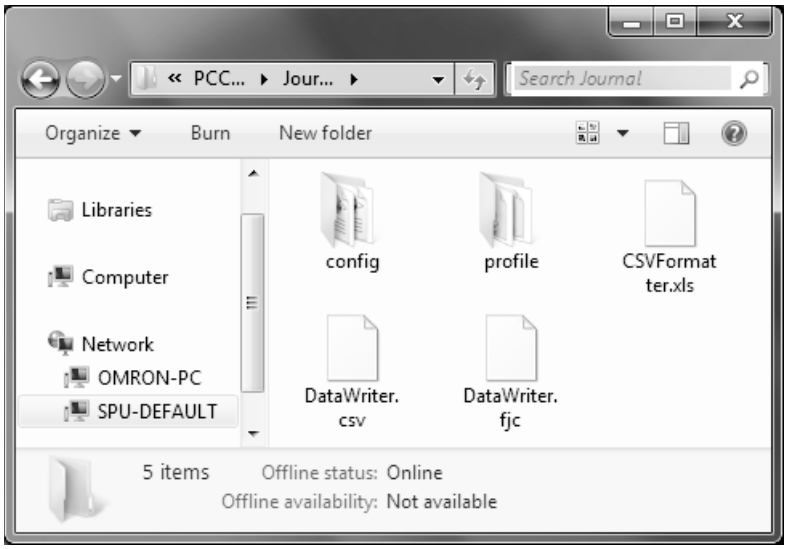
The collection files can be accessed from the computer by using a shared folder on a Windows network. Here, an example using Microsoft Office Excel is described. In this example, it is assumed that Excel is already installed and that CSV files are associated with it.

10-8-1 Collection Result Folders

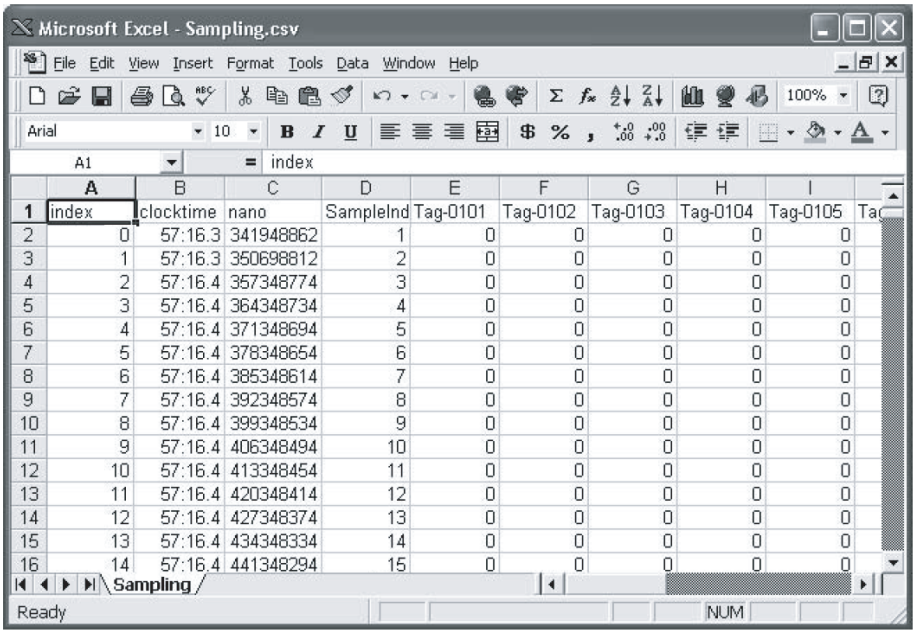
1,2,3...

1. Select ***View - Display the Unit Folder - Journal Folder*** from the SPU-Console menus. Windows Explorer will be started and the folder containing the collection results (i.e., the Journal folder) will be displayed.





2. Double-click the collection result file that is to be displayed. Excel will be started and the contents of the collection result file will be displayed. If the CSV file extension is associated with an application other than Excel, the associated application will be started.



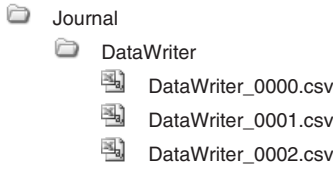
	A	B	C	D	E	F	G	H	I
1	index	clocktime	nano	SampleInd	Tag-0101	Tag-0102	Tag-0103	Tag-0104	Tag-0105
2	0	57:16.3	341948862	1	0	0	0	0	0
3	1	57:16.3	350698812	2	0	0	0	0	0
4	2	57:16.4	357348774	3	0	0	0	0	0
5	3	57:16.4	364348734	4	0	0	0	0	0
6	4	57:16.4	371348694	5	0	0	0	0	0
7	5	57:16.4	378348654	6	0	0	0	0	0
8	6	57:16.4	385348614	7	0	0	0	0	0
9	7	57:16.4	392348574	8	0	0	0	0	0
10	8	57:16.4	399348534	9	0	0	0	0	0
11	9	57:16.4	406348494	10	0	0	0	0	0
12	10	57:16.4	413348454	11	0	0	0	0	0
13	11	57:16.4	420348414	12	0	0	0	0	0
14	12	57:16.4	427348374	13	0	0	0	0	0
15	13	57:16.4	434348334	14	0	0	0	0	0
16	14	57:16.4	441348294	15	0	0	0	0	0

Note Collection result files are saved to the SYSMAC SPU Unit in the folder configuration shown below.

When Multiple Files Are Set to Be Saved (When the File Count Is Greater than 1)

- Files are saved to folders of the same file names as those set for the data collection patterns.
- Files are saved under file names with serial numbers at the end of the text string that is set in the File name Field for the data collection pattern.

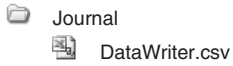
  In the example below, the file count is 3 and “DataWriter.csv” is set as the file name.



When a Single File Is Set to Be Saved (When the File Count Is 1)

- The file is saved in the Journal Folder, under the file name set in the *File name* Field for the data collection pattern.

  In the example below, the file count is 1 and “DataWriter.csv” is set as the file name.



Note Do not delete files from the Journal Folder. The SYSMAC SPU Unit will not operate correctly if these files are deleted.

Note When displaying data collection files with Excel, the Excel macro CSVFormatter.xls is used to display items such as times in a more readable form.

This macro can be used for the following.

(1) Organize the Excel display of the collection file contents, e.g., make the time field easier to read.

(2) Calculate the difference in time between records and display it in an Excel column (column heading: diff[ms]). This can be used to evaluate the difference in the collection cycle that was set and the actual collection behavior of the SYSMAC SPU Unit.

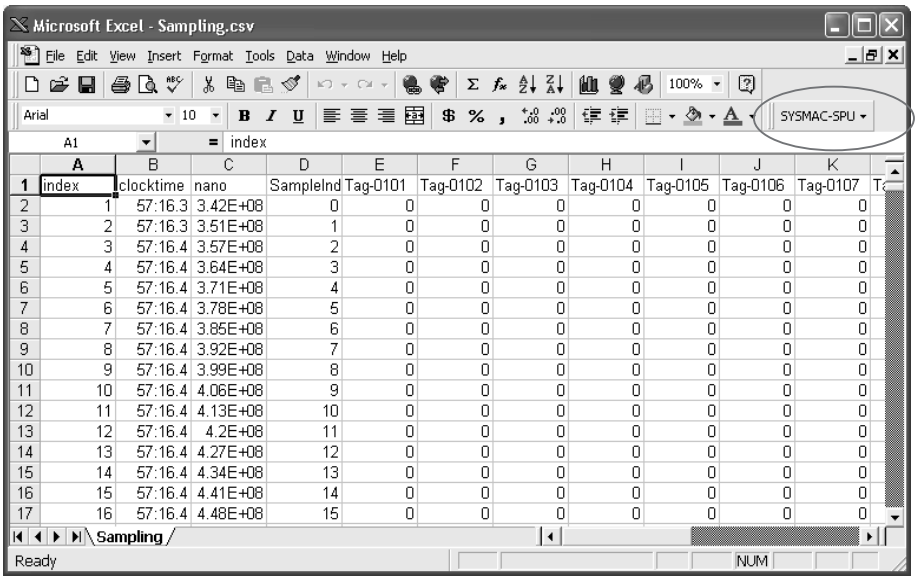
Note The *diff* value is calculated from the nano fields of two records, so the *diff* value will not be accurately shown if the record period for the records is greater than 1 s.)

(3) Large CSV files with more than 256 columns can be divided into sheets of 256 columns each for display (with Microsoft Office Excel 2003 or earlier).

The CSVFormatter.xls macro is used as follows:

1,2,3... 1. Double-click the CSVFormatter.xls file in the Journal Folder (i.e., the shared folder in the SYSMAC SPU Unit). This will add a menu called SYSMAC-SPU to the Excel toolbars.

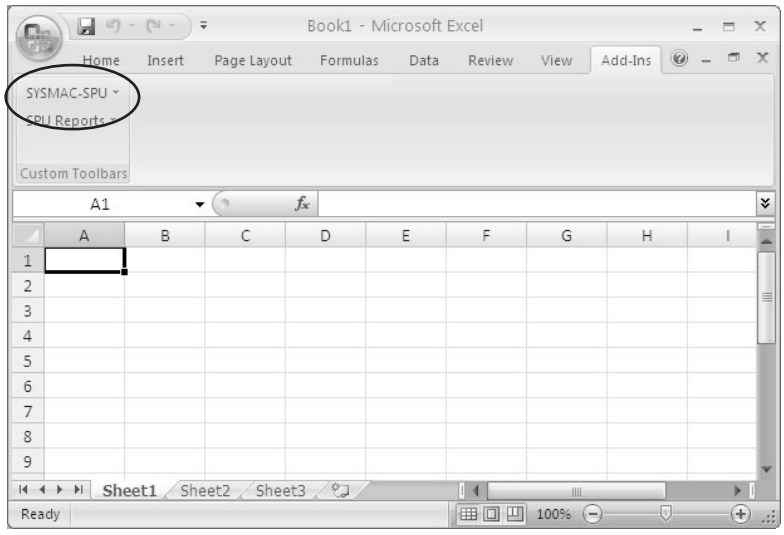
Microsoft Office Excel 2003 or Earlier



	A	B	C	D	E	F	G	H	I	J	K
1	index	clocktime	nano	SampleInd	Tag-0101	Tag-0102	Tag-0103	Tag-0104	Tag-0105	Tag-0106	Tag-0107
2	1	57:16.3	3.42E+08	0	0	0	0	0	0	0	0
3	2	57:16.3	3.51E+08	1	0	0	0	0	0	0	0
4	3	57:16.4	3.57E+08	2	0	0	0	0	0	0	0
5	4	57:16.4	3.64E+08	3	0	0	0	0	0	0	0
6	5	57:16.4	3.71E+08	4	0	0	0	0	0	0	0
7	6	57:16.4	3.78E+08	5	0	0	0	0	0	0	0
8	7	57:16.4	3.85E+08	6	0	0	0	0	0	0	0
9	8	57:16.4	3.92E+08	7	0	0	0	0	0	0	0
10	9	57:16.4	3.99E+08	8	0	0	0	0	0	0	0
11	10	57:16.4	4.06E+08	9	0	0	0	0	0	0	0
12	11	57:16.4	4.13E+08	10	0	0	0	0	0	0	0
13	12	57:16.4	4.2E+08	11	0	0	0	0	0	0	0
14	13	57:16.4	4.27E+08	12	0	0	0	0	0	0	0
15	14	57:16.4	4.34E+08	13	0	0	0	0	0	0	0
16	15	57:16.4	4.41E+08	14	0	0	0	0	0	0	0
17	16	57:16.4	4.48E+08	15	0	0	0	0	0	0	0

Note It may not be possible to execute this macro depending on the settings of Excel security. If the macro cannot be executed, select ***Options - Macro Security - Security Level*** from the Excel menus and set the security level to ***Medium.***

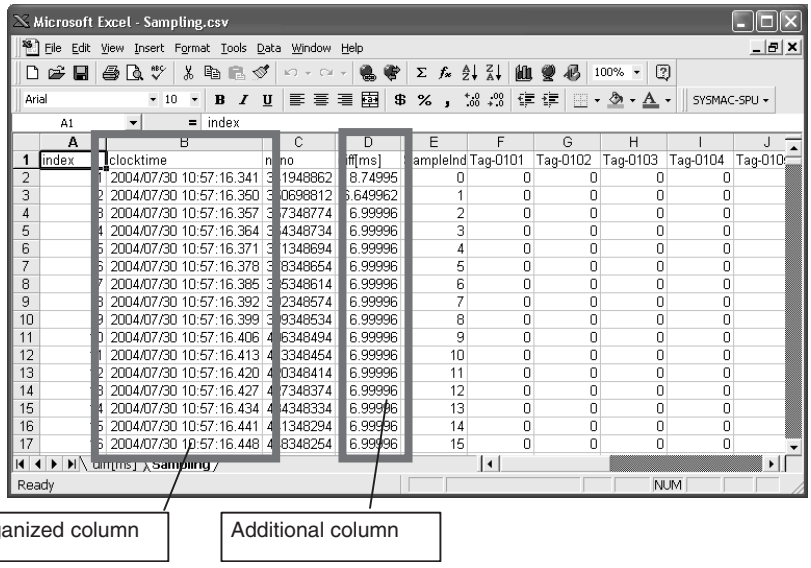
Microsoft Office Excel 2007



Note Macros may not be enabled with the Microsoft Office Excel 2007 security settings. In that case, click the **Office** Button in Excel and then select ***Excel Options*** to display the Excel Options Dialog Box. From the Excel Options Dialog Box, click the **Security Center Settings** Button in the Security Center Window to display the Security Center Dialog Box. From the Security Center Dialog Box, set Macro Settings in the Macro Settings Window to display a warning and disable all macros. When a dialog box related to Microsoft Office Excel security is displayed after a macro is opened, click the **Enable Macros** Button.

2. Click the **SYSMAC-SPU** Button on the toolbar and select ***Formatting.***

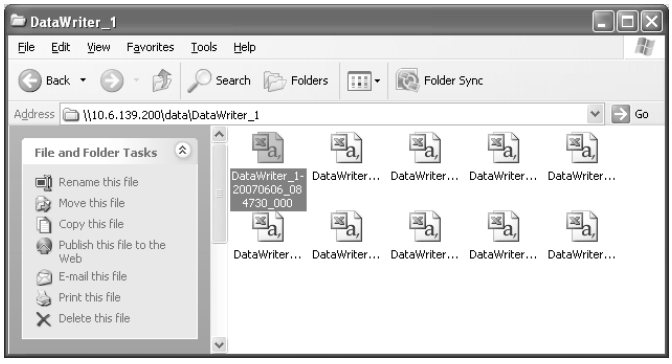
   After this procedure is performed, the time display will be organized and the *diff[ms]* column will be displayed as shown below.

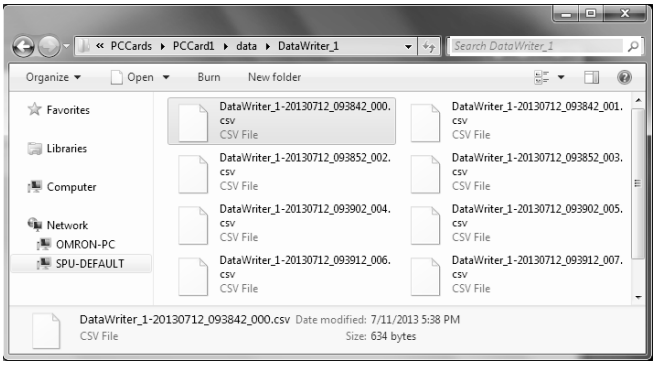


10-8-2 Copied Collection Result Folders

When copy options are enabled in Data Collection Mode, collection result files are automatically copied to data folders when data collection is completed. The following procedure describes how to open the copies of the files.

1,2,3... 1. Select ***Display Unit Folder - Data Folder*** from the View Menu in the SPU-Console. Windows Explorer will be started, and the folder (data folder) with the copied collection results will be displayed.





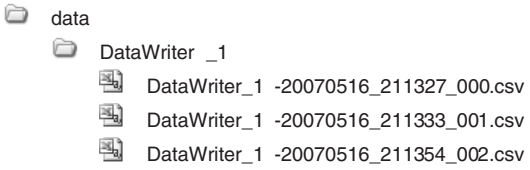
2. Double-click the collection result folder to be displayed. Excel will be started and the collection result folder will be displayed. If a file with a CSV extension is associated with a program other than Excel, that application will be opened.

Note The SYSMAC SPU Unit saves copied collection results in the folder configurations shown below.

(1) Files are saved to folders of the same file names as those set for the data collection patterns.

(2) Files are copied under file names with the serial number added at the end of the naming rule that is set.

In the example below, the file name for the data collection pattern is set to "DataWriter_1.csv," the file count in the copy options is 3, and the date and time are enabled for the file name.



Note Files copied to a data folder are not deleted even when the settings are changed. Files that are not needed can be deleted using Windows Explorer.

10-9 Saving Collection Data

Collection data collected by the SYSMAC SPU Unit can be saved in one file. The file will contain the data collection settings, all collection files, and the SYSMAC SPU Unit operating status in a compressed format. This file can be used to save specific collection results.

- Save the data to a file by executing command 03 (Save the Collection Data).
- The file will be saved in the SYSMAC SPU Unit network-shared folder \pccards\PCCard1\Archive with a timestamp for a name and the file name extension tgz (example: 20040727150505.tgz).
- The file that is saved is in tar and gzip format.
- To obtain the saved files, a compression application, such as WinZip, is required to extract the files.

Note When command 03 (Save the Collection Data) is executed on the SYSMAC SPU Unit, a temporary file is created when creating the file to save. Saving the file may fail if there is not sufficient memory on the PC card.
As a guide, available space will be required that is equivalent to the total size of all of the collection files.

SECTION 11
Event Settings for Data Storage Mode

This section explains how to make the event settings for Data Storage Mode operation.

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11-1 Events

In Data Storage Mode, events are set to specify when data is to be collected. Events are either memory events, which occur when specific conditions are satisfied by values in memory, or schedule events, which occur at specific times or time intervals.

Schedule events are set to occur at set times, such as every minute, every hour, every day, or every week (e.g., every Monday), and the processing for these events (such as data collection execution) can be defined. Working days and the end of the month can also be specified for schedule events.

The combination of these events with the processing that is performed when the events occur are called event rules. Event rules such as “data is recorded in a CSV file whenever a certain bit turns ON” or “data is recorded in a CSV file every day at 8:00” can be set.

11-2 Setting Memory Events

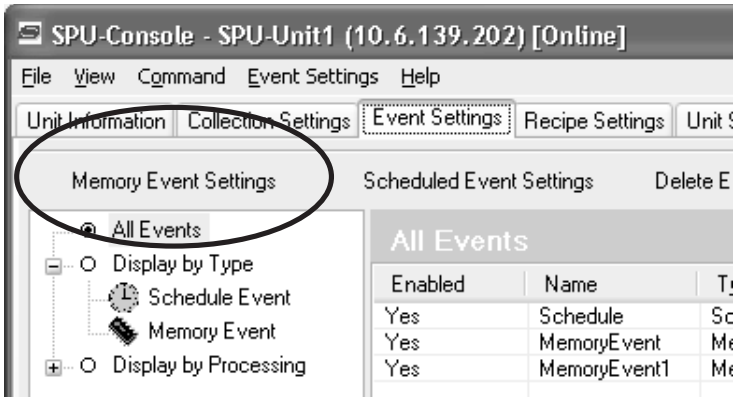
The procedures used to set rules for memory events that occur when values in memory satisfy specific conditions are described here.

To set memory events, variables are set in advance for the memory elements that will be used as the conditions. Memory event rules are set for variables. Set the data collection patterns used for processing when the memory event conditions are met in advance.

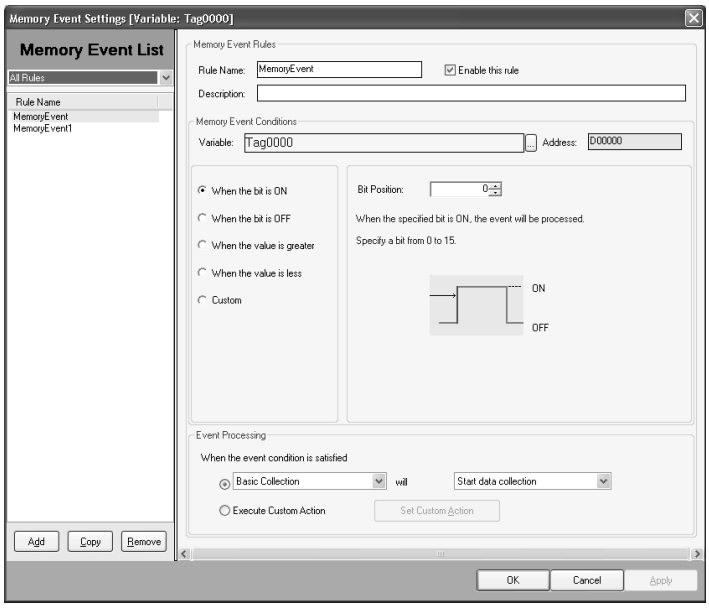
11-2-1 Adding Memory Event Rules

Use the following procedure to add memory event rules.

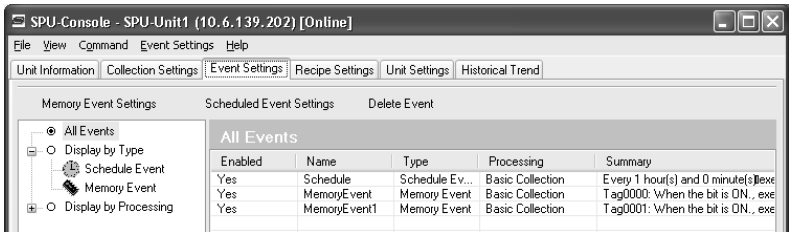
1,2,3... 1. Click the **Event Settings** Tab and select ***Memory Event Settings***.



The Memory Event Settings Dialog Box will be displayed.



2. Click the **Add** Button.
3. Enter the memory event rule name, event conditions, and event processing. For details on settings refer to *11-2-2 Setting Memory Event Rules*.
4. After entering the settings, click the **OK** Button or the **Apply** Button.
5. Check that the memory event has been added



11-2-2 Setting Memory Event Rules

Memory event rules are set for the variables selected in the list of variables.

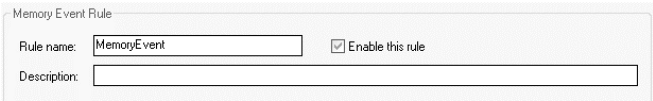
Note The memory event conditions are determined by the contents of the addresses, and not by the values specified by the variable data type.

The settings are as follows:

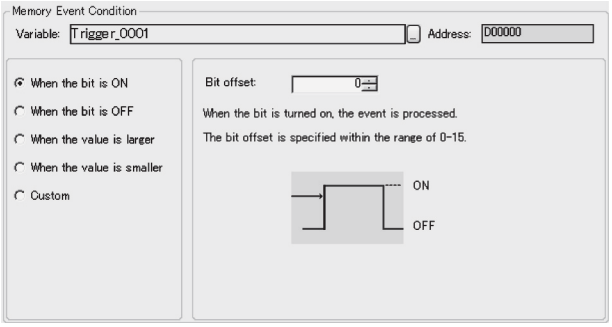
Item	Description
Rule name	Enter the rule name.
Description	Enter the rule description (can be omitted)
Enable this rule	Deselect to disable the memory event rule.

Item		Description
Memory Event Condition	When the bit is ON	The event is processed when the bit specified in the *Bit offset* Field turns ON.
	When the bit is OFF	The event is processed when the bit specified in the *Bit offset* Field turns OFF.
	When the value is larger	The event is processed when the value is larger than the value specified in the *Argument value* Field.
	When the value is smaller	The event is processed when the value is smaller than the value specified in the *Argument value* Field.
	Custom	Enter user-specified condition settings when required.
Event Processing		Specify the processing to be performed when the memory event condition is satisfied.

1,2,3... 1. Enter the rule name and description.

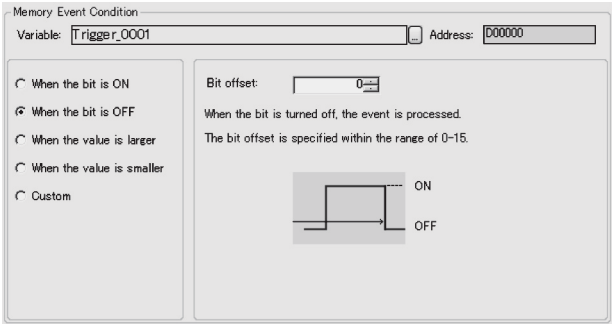


2. Specify the memory event condition.
   - Example: When the bit is ON



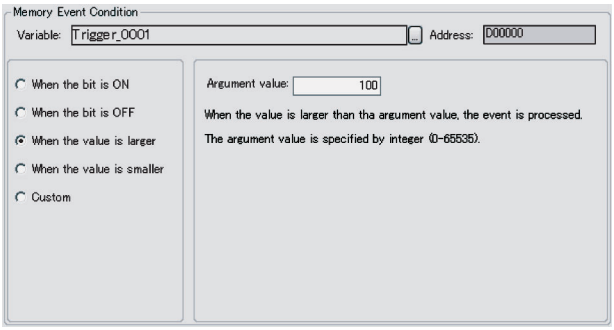
   Specify the bit offset of the address specified for the *Variable* Field between 0 and 15.

   - Example: When the bit is OFF



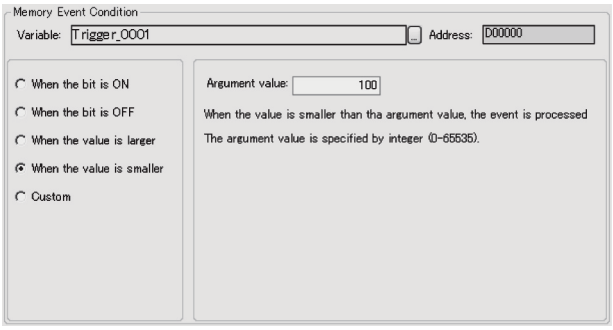
   Specify the bit offset between 0 and 15.

- Example: When the value is larger



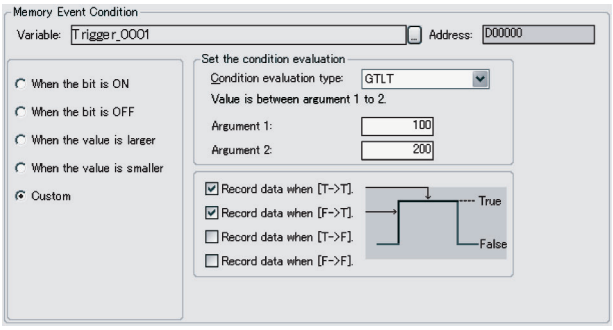
Specify the argument value between 0 and 65535.

- Example: When the value is smaller



Specify the argument value between 0 and 65535.

- Example: Custom



Enter the condition evaluation type and arguments. The following table lists the condition evaluation types and arguments.

Condition evaluation type	Argument 1	Argument 2	Meaning
BITOR	Required	---	One of the same bits is ON as in argument 1.
BITAND	Required	---	All of the same bits are ON as in argument 1.
TRUE	---	---	Always true
NoneZero	---	---	Value ≠ 0
EQ	Required	---	Value = Argument 1
LT	Required	---	Value < Argument 1
LE	Required	---	Value ≤ Argument 1
GT	Required	---	Value > Argument 1
GE	Required	---	Value ≥ Argument 1
GELE	Required	Required	Argument 1 ≤ Value ≤ Argument 2

Condition evaluation type	Argument 1	Argument 2	Meaning
GTLT	Required	Required	Argument 1 < Value < Argument 2
GELT	Required	Required	Argument 1 ≤ Value < Argument 2
GTLE	Required	Required	Argument 1 < Value ≤ Argument 2
PrevBITOR	---	---	One of the same bits is ON as in previous value.
PrevBITAND	---	---	All of the same bits are ON as in previous value.
PrevEQ	---	---	Value = Previous value
PrevLT	---	---	Value < Previous value
PrevLE	---	---	Value ≤ Previous value
PrevGT	---	---	Value > Previous value
PrevGE	---	---	Value ≥ Previous value

---: Not required.

The pattern for which event processing is to be executed for the current evaluation in comparison to the previous evaluation is also set.

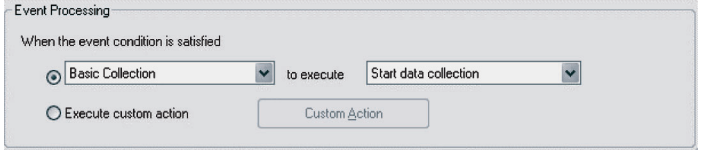
Item	Meaning
True → True	Event processing is executed when the evaluation remains true.
True → False	Event processing is executed when the evaluation changes from true to false.
False → True	Event processing is executed when the evaluation changes from false to true.
False → False	Event processing is executed when the evaluation remains false.

Note Judgements are calculated based on the word contents of the address specified for the variable, and not on the converted value for the data type of the variable.
Example: INT (Integer: (–32,768 to 32,767) and WORD (16-bit text string: #0 to #FFFF)

If the condition judgement is to be for a non-negative INT (0 to 32,767), then the following settings are required: GELT for the condition judgement type, 0 for argument 1, and 33,768 (8000 hex) for argument 2.

Memory value / Data type	0x000	0x7FFF	0x8000	0xFFF
WORD	0	32,767	32,768	65,535
INT	0	32,767	–32,768	–1

3. Specify the event processing to be executed.
   Specify the collection pattern and processing to execute at the event destination when the event condition is satisfied.



The following table shows the event destination and processing that can be performed.

Destination	Processing	
Basic collection	Select from the following processing operations.	
	Start data collection	Starts basic collection. Same as the Start Basic Collection command.
	Stop data collection	Stops basic collection. Same as the Stop Basic Collection command.
	Switch file	Switches to the next file when data is being saved in multiple files.
Data collection (1 to 64)	Select from the following processing operations.	
	Start cyclic collection	Starts cyclic collection.
	Stop cyclic collection	Stops cyclic collection.
	Acquisition of data (one shot)	Records data once only when the condition is satisfied.
	Switch file	Switches to the next file when data is being saved in multiple files.

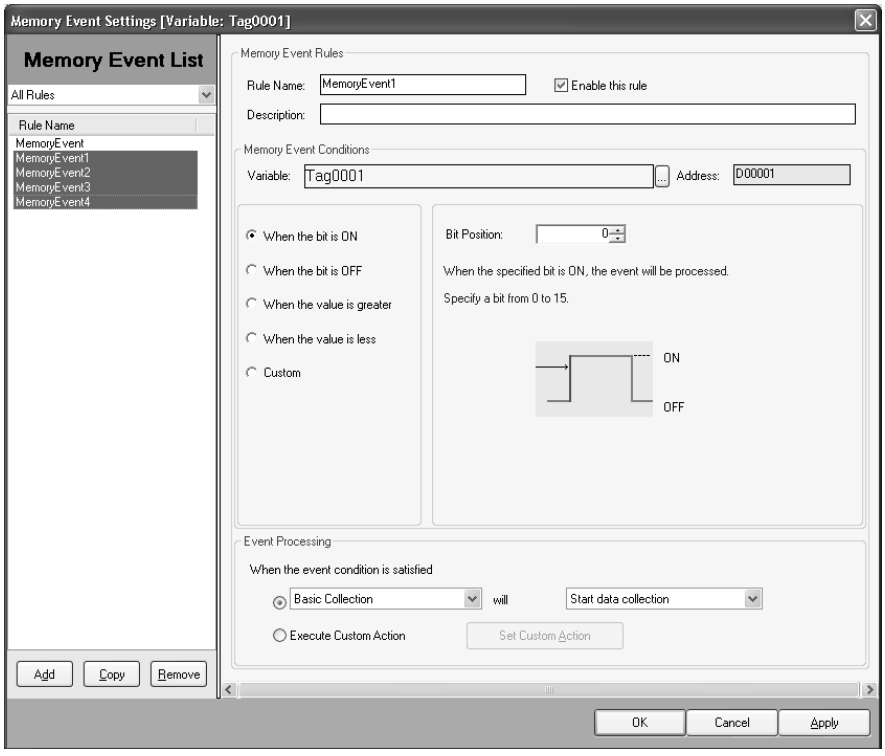
Note When *Custom* is selected, the event destination, event ID, and other settings can be specified by the user. This option is for expansion purposes and is not normally used.

11-2-3 Deleting Memory Event Rules

Use the following procedure to delete memory event rules.

1,2,3...

1. Click the **Event Settings** Tab and select ***Memory Event Settings***. The Memory Event Settings Dialog Box will be displayed.
2. In the Memory Event List, select the memory event rule that is to be deleted and click the **Remove** Button.



11-2-4 Copying Memory Event Rules

Use the following procedure to copy memory event rules.

1,2,3...

1. Click the **Event Settings** Tab and select ***Memory Event Settings***. The Memory Event Settings Dialog Box will be displayed.
2. In the Memory Event List, select the memory event rule that is to be copied and click the **Copy** Button.

Note The Memory Event List displays the rules for the selected variable only. To display rules for other variables, select ***All Rules*** from the Memory Event List to display all the registered rules.

11-2-5 Memory Events Automatically Registered with Expanded Recipe Function and FTP Transfers

Memory events will be automatically registered when the expanded recipe function or FTP transfer is set. This data is used for internal processing. Do not delete it.

Function	Rule name
Expanded recipe	AutoRecipe***n***_ (expanded recipe method name)
FTP receive	AutoRecipe***n***_RecipeReceive
FTP send	AutoFTPSend***n***_ (data collection pattern name)

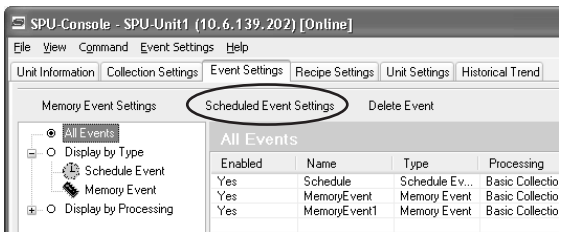
A number from 0 to 9 will be inserted for "***n***".

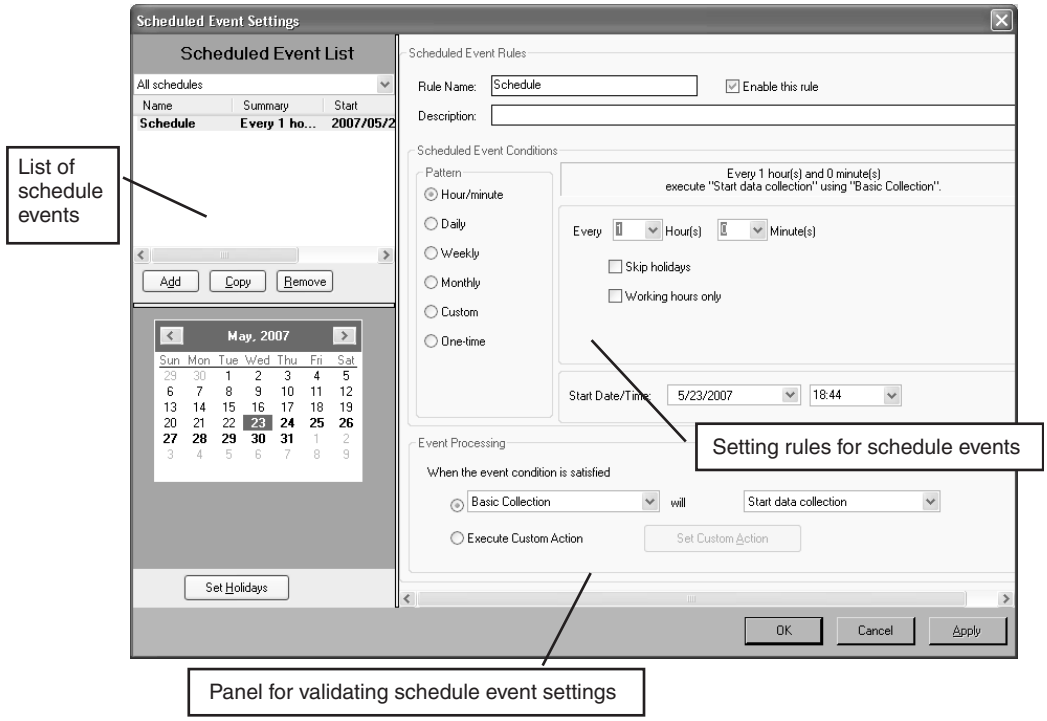
11-3 Setting Schedule Events

The procedure for setting rules for schedule events that occur at specific times or time intervals is described here.

11-3-1 Schedule Event Setting Dialog Box Configuration

Click the **Event Settings** Tab in the SPU-Console, and select ***Schedule Event Settings***. The Schedule Event Dialog Box will be displayed.



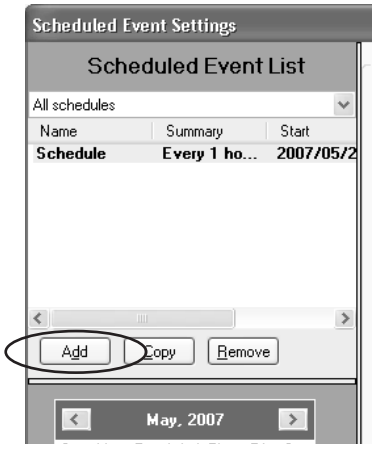


11-3-2 Adding Schedule Event Rules

Use the following procedure to add schedule event rules.

1,2,3...

1. Click the **Event Settings** Tab in the SPU-Console, and select ***Schedule Event Settings***. The Schedule Event Dialog Box will be displayed.



2. Click the **Add** Button in the Schedule Event List.
3. Set the name of the schedule event rule, the schedule event conditions, etc. For details on settings, refer to *11-3-3 Setting Schedule Event Rules*.

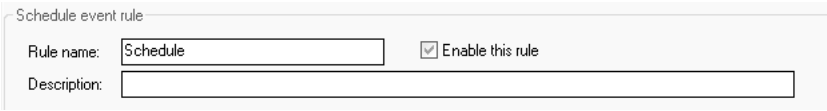
11-3-3 Setting Schedule Event Rules

The setting items for schedule events are as follows:

Item	Details
Rule name	Used to enter the rule name
Description	Used to enter a description of the rule (can be omitted).

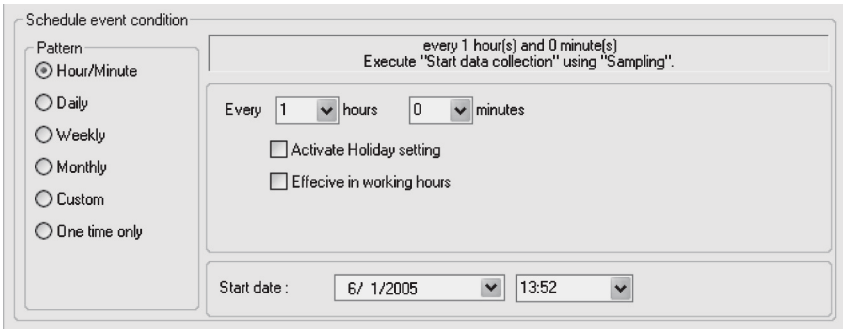
Item		Details
Enable this rule		When deselected, the schedule event rule is disabled.
Schedule event condition	Hour/Minute	Specifies in hours/minutes.
	Daily	Specifies in days.
	Weekly	Specifies in weeks.
	Monthly	Specifies in months.
	Custom	Sets user-specified schedule event conditions.
	One time only	Specifies the date and time for a once-only event.
Event processing		Specifies the processing to be performed when the schedule event conditions are satisfied.

1,2,3... 1. Enter the rule name and description.



2. Specify the schedule event conditions.

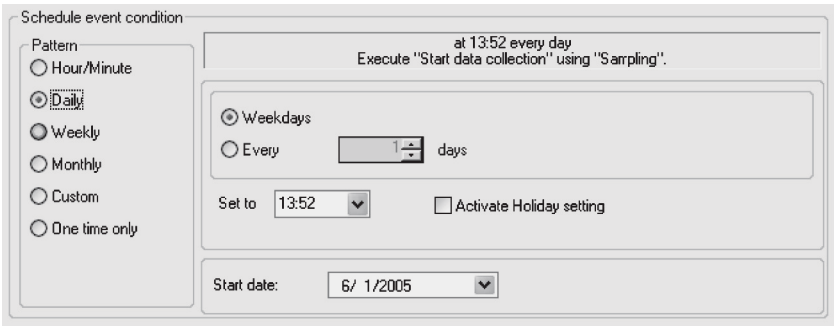
Hour/Minute Pattern



Use this setting to specify the schedule event in hour/minute intervals.

Item	Details
Hour/Minute	Specifies the schedule event interval.
Activate Holiday setting	When selected, the event will not be executed on holidays specified in the holiday settings.
Effective in working hours	When selected, the event will be executed from the start time until the finish time specified in the holiday settings.
Start date	Specifies the start date and time for executing the first schedule event.

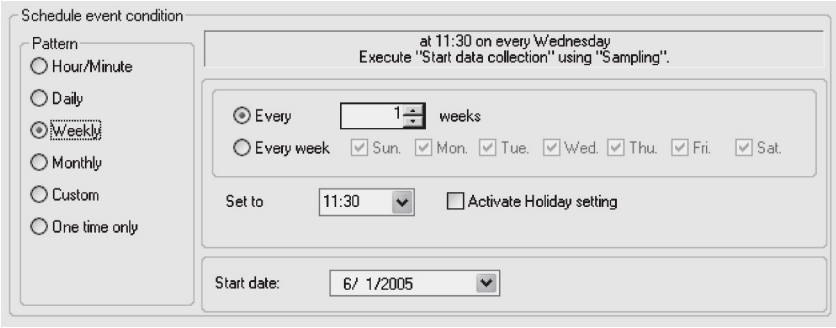
Daily Pattern



Use this setting to specify the schedule event in daily intervals.

Item	Details
Weekdays	Executes every weekday except for holidays specified in the holiday setting.
Every [number] days	Specifies the schedule event interval in days.
Set to	Specifies the time for executing the schedule event.
Activate Holiday setting	When selected, the schedule event is executed except on holidays specified in the holiday setting.
Start date	Specifies the start date for executing the first schedule event.

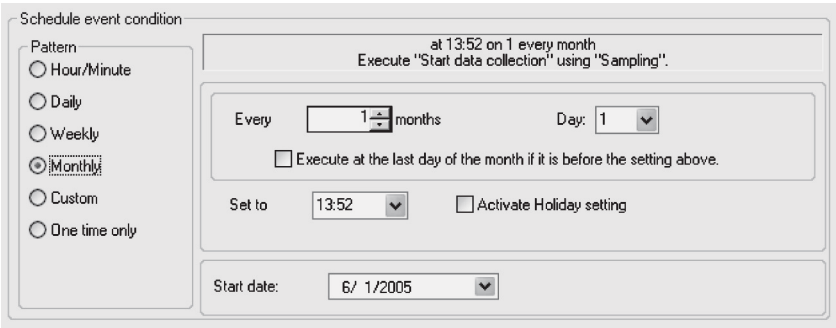
Weekly Pattern



Use this setting to specify the schedule event in weekly intervals.

Item	Details
Every [number] weeks	Specifies the schedule event interval in weeks.
Every week	Specifies the day of the week to execute the schedule event.
Set to	Specifies the time for executing the schedule event.
Activate Holiday setting	When selected, the schedule event is not executed on holidays specified in the holiday setting.
Start date	Specifies the start date for executing the first schedule event.

Monthly Pattern

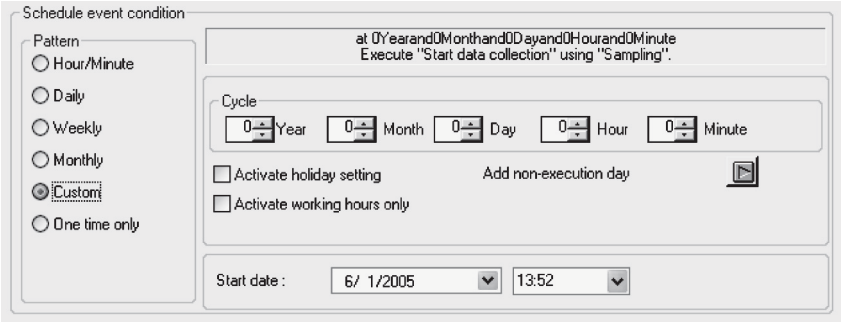


Use this setting to specify the schedule event in monthly intervals.

Item	Details
Every [number] months	Specifies the schedule event interval in months and the day.
Execute at the last day of the month if it is before the setting above	When selected, if the specified day does not exist in that month, the schedule event will be executed on the last day of the month. Example: If “31” is specified for the day, the event will be executed on February 28.
Set to	Specifies the time for executing the schedule event.

Item	Details
Activate Holiday setting	When selected, the schedule event is not executed on holidays specified in the holiday setting.
Start date	Specifies the start date for executing the first schedule event.

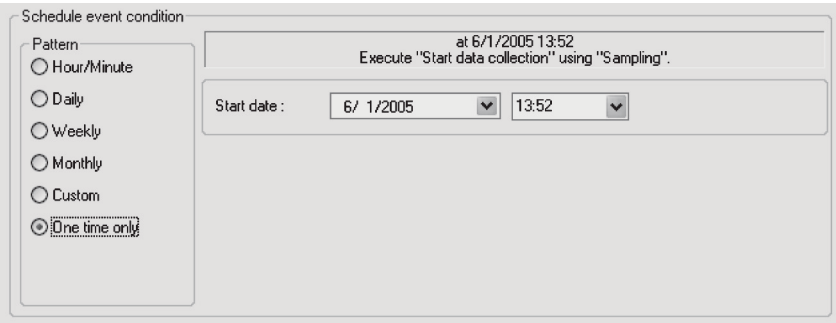
Custom Pattern



Use this setting to set user-specified schedule event conditions.

Item	Details
Cycle	Specifies the schedule event interval in years/months or in days/hours/minutes. The cycle must be completely within the same month or the same day, i.e., boundaries between two different months or two different days cannot be crossed.
Activate holiday setting	When selected, the schedule event is not executed on holidays specified in the holiday setting.
Activate working hours only	When selected, the event will be executed from the start time until the finish time specified in the holiday settings.
Add non-execution day	Additional non-execution days can be specified by clicking the adjacent arrow button. The non-execution setting will apply to this rule only.
Start date	Specifies the start date for executing the first schedule event.

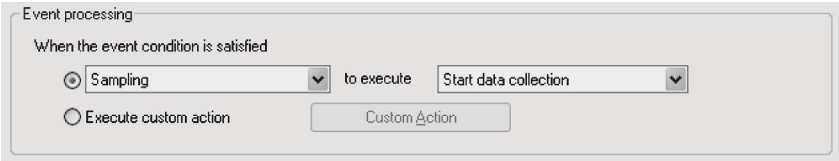
One Time Only Pattern



Use this setting to set a schedule event to occur once only

Item	Details
Start date	Specifies the start date and time for executing the schedule event.

3. Specify the event processing.
   Specify the collection pattern at the event destination and processing to be executed when the event conditions are satisfied.



The event destinations and processing are described in the following table.

Destination	Processing	
Basic collection	Select from the following processing operations.	
	Start data collection	Starts basic collection. Same as the Start Basic Collection command.
	Stop data collection	Stops basic collection. Same as the Stop Basic Collection command.
	Switch file	Switches to the next file when data is being saved in multiple files.
Data collection (1 to 64)	Select from the following processing operations.	
	Start cyclic collection	Starts cyclic collection.
	Stop cyclic collection	Stops cyclic collection.
	Acquisition of data (one shot)	Records data once only when the condition is satisfied.
	Switch file	Switches to the next file when data is being saved in multiple files.

Note When *Custom* is selected, the event destination, event ID, and other settings can be specified by the user. This option is for expansion purposes and is not normally used.

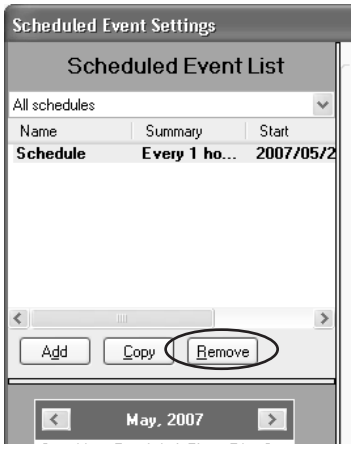
4. Click the **OK** Button to register the settings.

11-3-4 Deleting Schedule Event Rules

Use the following procedure to delete schedule event rules.

1,2,3...

1. Click the **Event Settings** Tab and select ***Schedule Event Settings***. The Schedule Event Settings Dialog Box will be displayed.
2. Select the schedule event rule to be deleted from the *Schedule Event List* and click the **Remove** Button.



11-3-5 Copying Schedule Event Rules

1,2,3...

1. Click the **Event Settings** Tab in the SPU-Console, and select ***Schedule Event Settings***. The Schedule Event Dialog Box will be displayed.

2. In the Schedule Event List, select the schedule event rule that is to be copied and click the **Copy** Button.

11-3-6 Changing Schedule Event Rules

Use the following procedure to change schedule events.

1,2,3...

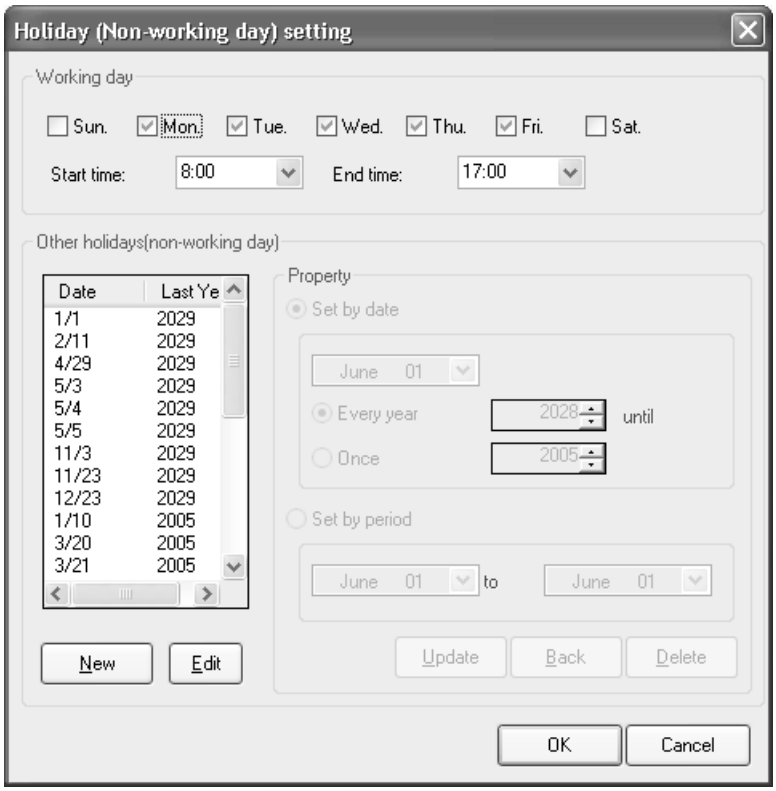
1. Click the **Event Settings** Tab in the SPU-Console, and select ***Schedule Event Settings***. The Schedule Event Dialog Box will be displayed.
2. Select the schedule event rule to be changed from the *Schedule Event List*.
3. Change the schedule event rule. For details on settings, refer to *11-3-3 Setting Schedule Event Rules*.
4. Click the **OK** Button to register the settings.

11-3-7 Setting Holidays

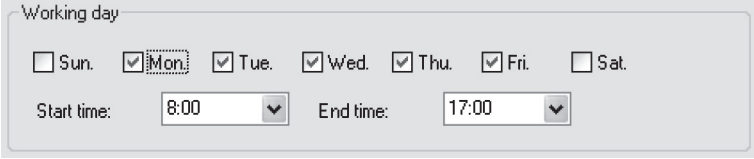
Set the holidays to be used and the operating times for the *Activate Holiday setting, Effective in working hours*, and *Activate working hours only* settings using the following procedure.

1. Click the **Event Settings** Tab in the SPU-Console, and select ***Schedule Event Settings***. The Schedule Event Dialog Box will be displayed.
2. Click the **Holiday** Button.

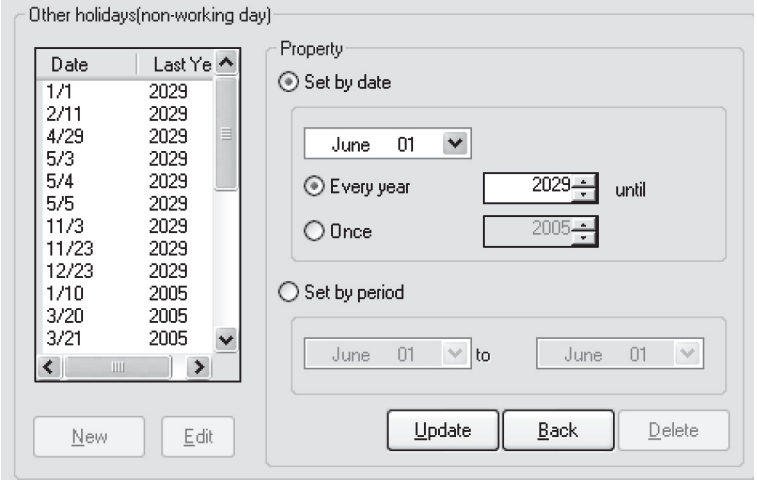
The Holiday (Non-working Day) Setting Dialog Box will be displayed.



3. Specify the working days, and work start and end times.



4. Specify holidays (non-working days).



To add holidays, click the **New** Button, and specify the holiday date or period under *Property*.

- When setting the date, set the date of the holiday. If the year is set, the holiday is only valid for that year.

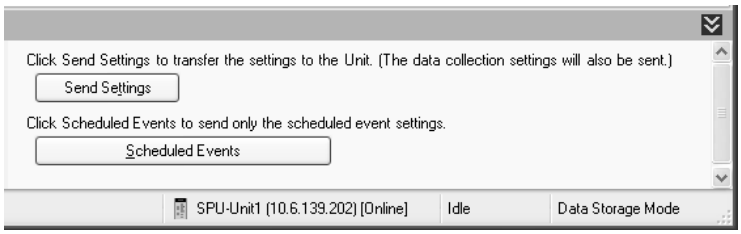
- When setting the period, set the start and end dates of the holiday period. This setting is valid every year.

5. Click the **Update** Button to add the holiday.

11-4 Enabling Event Settings

To enable the event settings, select ***Send Settings*** in the Event Settings Dialog Box. This operation enables not only the event settings, but also variable settings and data collection pattern settings. For details on the procedure, refer to *10-6 Enabling the Data Collection Settings*.

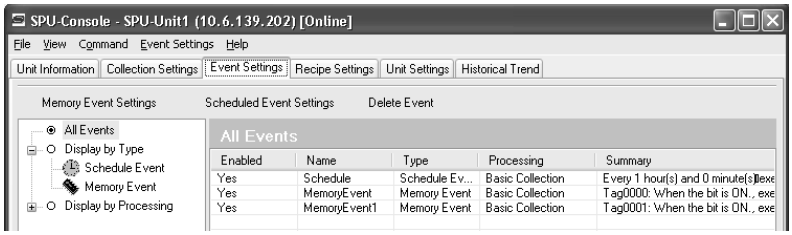
To enable only the schedule event settings without stopping data collecting, select ***Scheduled Events*** in the Event Settings Dialog Box. The schedule events will be enabled without stopping data collecting.



11-5 Displaying the List of Events

A list of all the currently set events can be displayed on SPU-Console.

1,2,3... 1. Select the **Event Settings** Tab in SPU-Console.



2. Click the sections in the left directory tree to display the following lists.

Item	List display
All Events	Displays all events.
Display by Type	Displays events by type. Schedule events: Displays schedule events. Memory events: Displays memory events.
Display by Processing	Displays event processing for each event.

Note (1) The following rule names are automatically registered for the expanded recipe function and FTP transfers. This data is used for internal processing. Do not delete it.

Function	Rule name
Expanded recipe	AutoRecipe***n***_ (expanded recipe method name)
FTP receive	AutoRecipe***n***_RecipeReceive
FTP send	AutoFTPSend***n***_ (data collection pattern name)

A number from 0 to 9 will be inserted for the "***n***".

(2) The following message box will be displayed when the expanded recipe settings are made. To enable events, it is necessary to apply data collection settings.

SECTION 12
Recipe Settings (Data Storage Mode)

This section describes the settings required to use the recipe function, which can be used in Data Storage Mode to write numeral and textual data, e.g., production parameters, to the memory areas of the CPU Unit.

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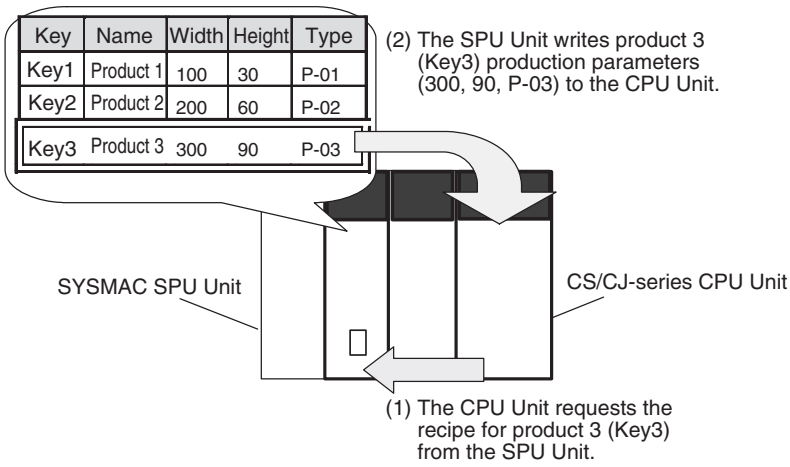
12-1 Recipe Function

12-1-1 Recipe Function

The recipe function enables writing numeral and textual data, e.g., production parameters, to the memory areas of the CPU Unit. The recipe function can be used to easily change the setup of the system. The data must be created in a CSV file and store it in the SYSMAC SPU Unit Memory Card in advance. This data can be changed while the SYSMAC SPU Unit is operating.



The recipe function has the following features.

- CPU Unit memory can be saved because there is no need to store recipe data in the CPU Unit.
- Recipe data is in CSV format. (It must be created and edited on a computer in advance. The SPU-Console cannot be used to create or edit actual recipe data.)
- Recipe data is stored in the Memory Card of the SYSMAC SPU Unit. The Memory Card can be accessed from a computer by using a shared folder on a Windows network.
- The recipe write function can be executed by turning ON a bit in the CPU Bus Unit Area in the DM Area of the CPU Unit. This bit, however, is not used with the expanded recipe function. Refer to *SECTION 13 Expanded Recipe Settings (Data Storage Mode)* for information on the expanded recipe function. FINS commands can also be used to write recipes, enabling writing recipes from the host system, e.g., a personal computer.
- Up to 10,000 data items can be written as one batch. There is no limit to the total number of recipes that can be managed, so large quantities of recipe data, such as is required for production of many models, can be managed. (There will be a limit to the size of the CSV files due to the capacity of the Memory Card.)
- When a recipe is written, the data type and scale are automatically converted.
- Data collected by the SYSMAC SPU Unit can be made into a recipe. By doing this, the status of the system at a certain point in time can be reproduced. For example, the system master data or inspection data can be collected and written to a CPU Unit memory area as recipe data to reproduce the system status.
- The recipe write function can be used in Data Storage Mode only.

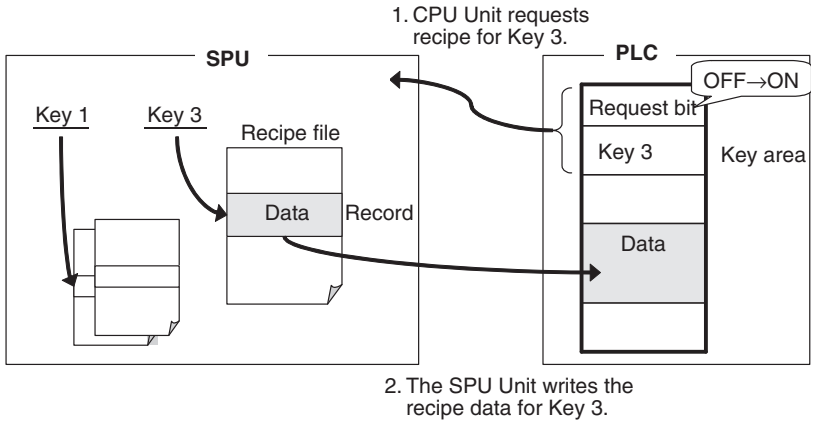
- It is possible to use the expanded recipe function with SYSMAC SPU Units with unit version 2.1 or later. Refer to *12-1-5 Differences between the Previous Recipe Function and the Expanded Recipe Function* for information on differences in functions. Refer to *SECTION 13 Expanded Recipe Settings (Data Storage Mode)* for information on functions.

12-1-2 Data Structure of Recipe Files

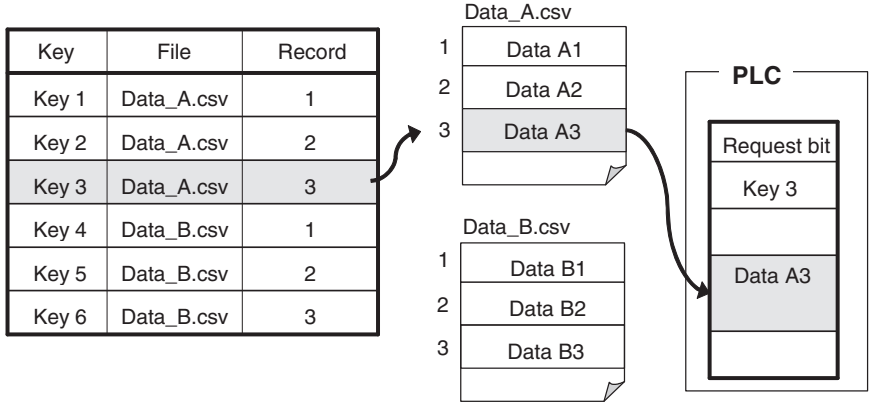
Recipe data is in CSV format. A file that contains recipe data is called a recipe file. Recipe data consists of fields and records. The writing address and data format are set for each field. A record is a group of fields.

	Field 1 • Address • Data type	**Field 2** • Address • Data type	**Field 3** • Address • Data type	**Field 4** • Address • Data type
Record 1				
Record 2				
Record 3				
Record 4				

Recipe data is managed by keys, which are unique record identifiers. When there is a recipe write request, the record corresponding to the requested key is written to the CPU Unit memory area as recipe data. The requested key is stored in the CPU Unit memory area. This area of the memory is called the key area.



Recipe data is internally managed in the following structure. Each recipe is characterized by a recipe file and a record. In the example shown in the following figure, recipe data for Key 3 is record 3 of the recipe file Data_A.csv.



Key	File	Record
Key 1	Data_A.csv	1
Key 2	Data_A.csv	2
Key 3	Data_A.csv	3
Key 4	Data_B.csv	1
Key 5	Data_B.csv	2
Key 6	Data_B.csv	3

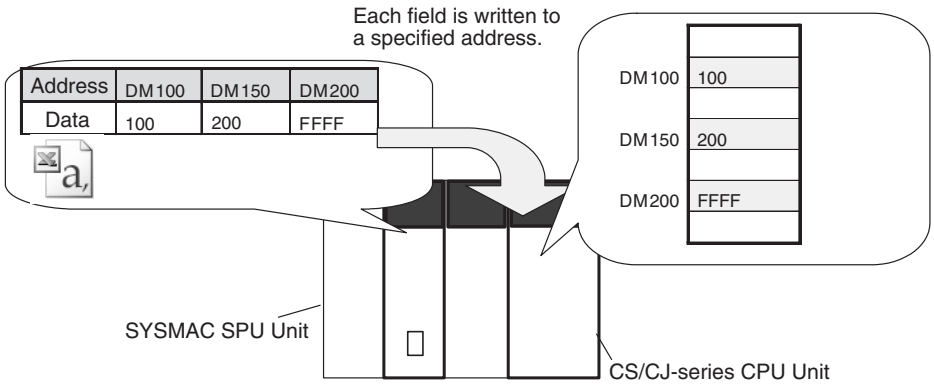
12-1-3 Recipe Writing Formats

There are two formats that can be used to write recipes, the Variable Format and the Contiguous Area Format.

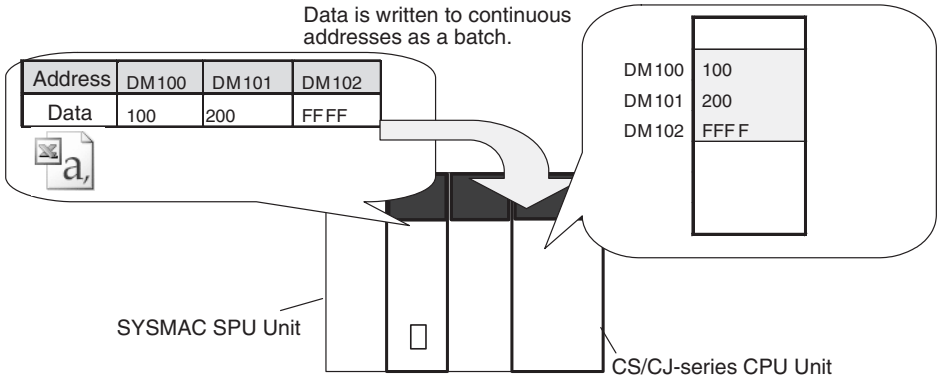
The Variable Format writes to multiple non-contiguous memory addresses. It is a flexible writing format because the data type and scaling can be specified. Recipe data of each field is written one at a time, so time is required to write all of the recipe data.

The Contiguous Area Format writes data to contiguous memory addresses. The data type cannot be specified but all recipe data is written at once, so it is faster than the Variable Format. It is suitable for cases where a large amount of data is written at once.

Variable Format

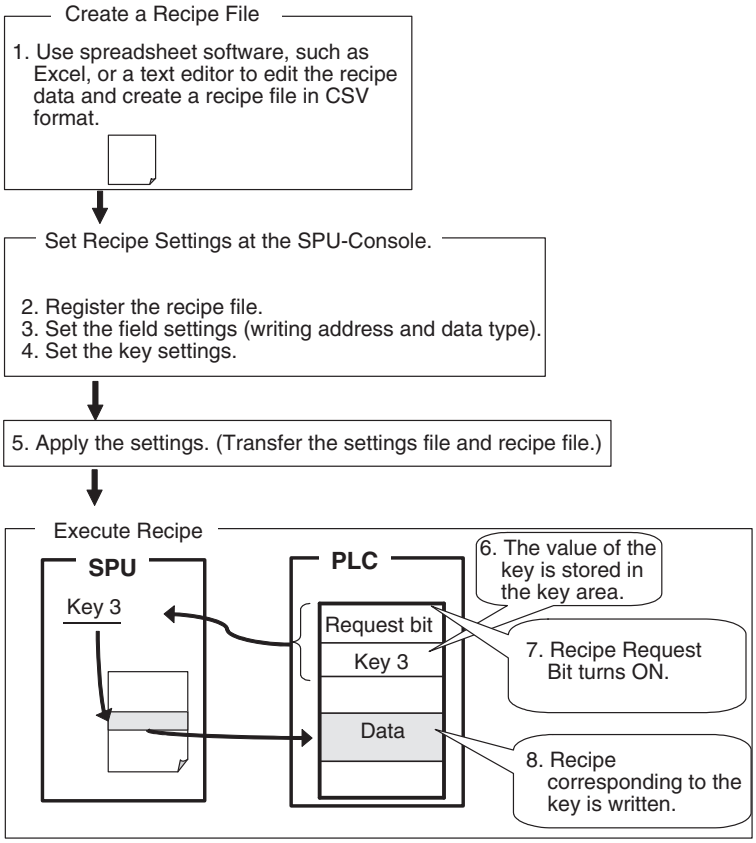


Contiguous Area Format



12-1-4 Procedure for Using Recipes

The following figure shows the steps from creating the recipe file to executing the recipe.



12-1-5 Differences between the Previous Recipe Function and the Expanded Recipe Function

The following table gives the main differences between the recipe function provided with version 2.0 and the expanded recipe function provided with version 2.1 or later.

Additional functions	Ver.2.0	Ver.2.1
Recipe key searches	Supported Key list searches	Supported. Recipe key searches added. • Searches in files • Searches for file names
Registering recipe keys in files	Not supported	Supported
Specifying recipe keys as file names	Not supported	Supported

Refer to *SECTION 13 Expanded Recipe Settings (Data Storage Mode)* for information on the expanded recipe function.

12-2 Recipe Files

The recipe function writes data in the form of a CSV file. The writing method can be either the Variable Format or the Contiguous Area Format. The data type of the recipe file is different for each method.

12-2-1 Writing Formats

There are two recipe writing formats, the Variable Format and the Contiguous Area Format. The features of each method are listed below.

Variable Format

- Recipe data is written to non-contiguous memory areas.
- Data is written with a specified data type.
- Data can be converted by scaling.
- Recipe data is written one at a time, so time is required to write all data.

Contiguous Area Format

- Recipe data is written to contiguous memory areas.
- All data has a fixed data type.
- The data type cannot be specified but all recipe data is written at once, so it is faster than the Variable Format. It is suitable for cases where a large amount of data is written at once.

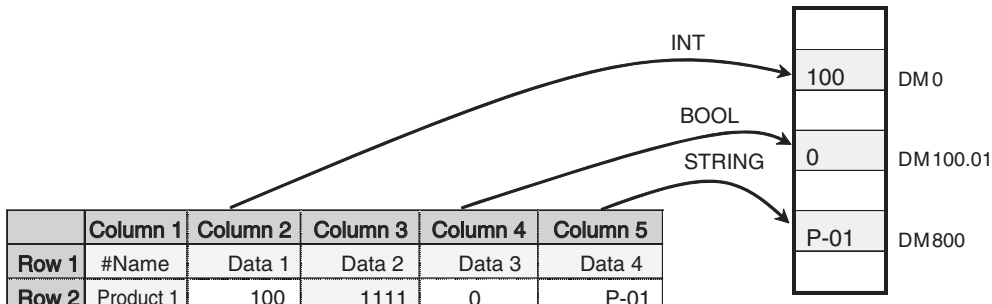
12-2-2 Variable Format Recipe File

Recipe files for the Variable Format are text files in CSV format. An example is shown below.

#Name	Data 1	Data 2	Data 3	Data 4
Product 1	100,	1111,	0,	P-01
Product 2	200,	9999,	1,	P-02
Product 3	300,	FFFF,	0,	P-03

In the Variable Format, each field is written to the specified address in the specified data type. Use the appropriate data format for each data type.

Example for Writing to DM0 (INT), DM100.01 (BOOL), and DM800 (STRING) in Memory



	Column 1	Column 2	Column 3	Column 4	Column 5
Row 1	#Name	Data 1	Data 2	Data 3	Data 4
Row 2	Product 1	100	1111	0	P-01
Row 3	Product 2	200	9999	1	P-02
Row 4	Product 3	300	FFFF	0	P-03

You can specify not to write certain columns, such as column 1 and 3 in the example above.

Note (1) Use the appropriate data format for each data type. (Refer to the following table.)If the BOOL format is set for values other than 0 or 1, or the UNIT format is set for hexadecimal numbers like A05C, a recipe data type conversion error message will be displayed.

Data type	Recipe data
BOOL	0 or 1
UNIT	0 to 65535
INT	–32768 to 32767
UNIT_BCD	0 to 9999

Data type	Recipe data
WORD	0 to FFFF
CHANNEL	0 to FFFF
STRING	ASCII character string
UDINT	0 to 4294967295
UDINT_BCD	0 to 99999999
DWORD	0 to FFFFFFFF
REAL	-10^{-38} to 10^{+38}
LREAL	-10^{-308} to 10^{+308}
CANNEL_BLOCK	Continuous channels (4 digits × No. of elements)

(2) Recipe data that specifies scaling with the data type is usually within the range a floating-point data type (float or double). If the scaled data is not within the range of the specified data type, a recipe data type conversion error message will be displayed.

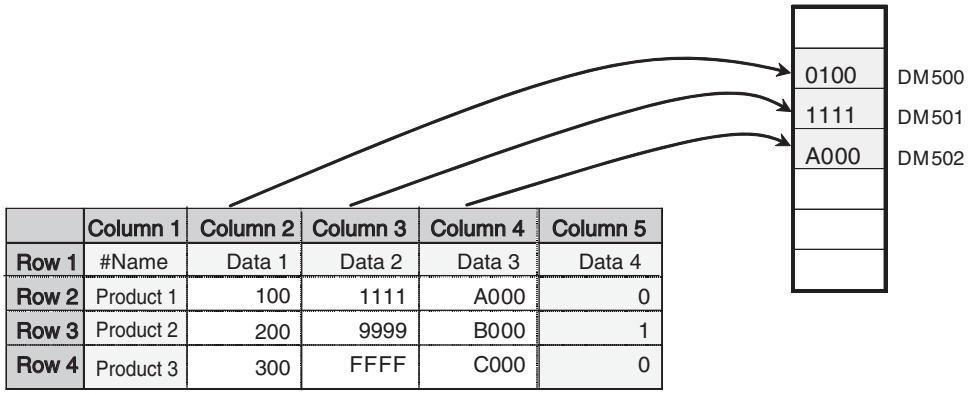
12-2-3 Contiguous Area Format Recipe File

Recipe files for the Contiguous Area Format are text files in CSV format. An example is shown below.

#Name	Data 1	Data 2	Data 3	Data 4
Product 1	100,	1111,	A000,	0
Product 2	200,	9999,	B000,	1
Product 3	300,	FFFF,	C000,	0

In the Contiguous Area Format, the channel data is in binary format (hexadecimal). Data is written to contiguous memory addresses starting from the specified head address. The number of columns to write can be specified.

Example for Writing to Contiguous Memory Addresses from D500 (3 columns).

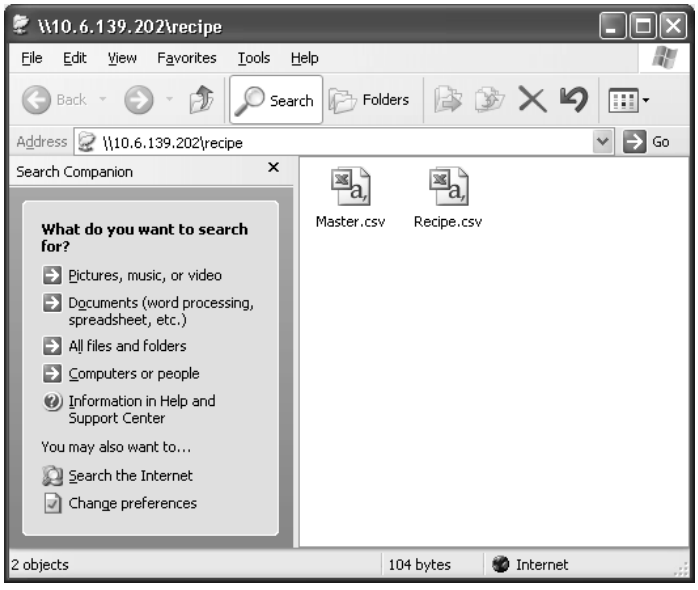


You can specify not to write certain columns, such as column 1 and 5 in the example above. The fields that are written must be contiguous.

12-2-4 Storage Location of Recipe Files

To use a recipe file that has been edited on a computer, the recipe file must be stored in a folder named “recipe” on the SYSMAC SPU Unit Memory Card.

Recipe files can be transferred to this folder using the procedures described in *12-10 Enabling Recipe Settings*, but the folder can also be accessed from the computer by using a shared folder on a Windows network. This way the file can be transferred by drag and drop. Recipe files already stored in this folder can also be directly edited.



The method to access the recipe folder in the SYSMAC SPU using a computer is described below.

- Select ***View - Display Unit Folder - Recipe Folder*** in the SPU-Console. Windows Explorer will be started and the SPU Unit's shared folder will be displayed (Data Storage Mode).
- Enter the UNC address of the SPU Unit's shared folder in the address bar of Windows Explorer (e.g., \\192.168.0.100\recipe\).

Note

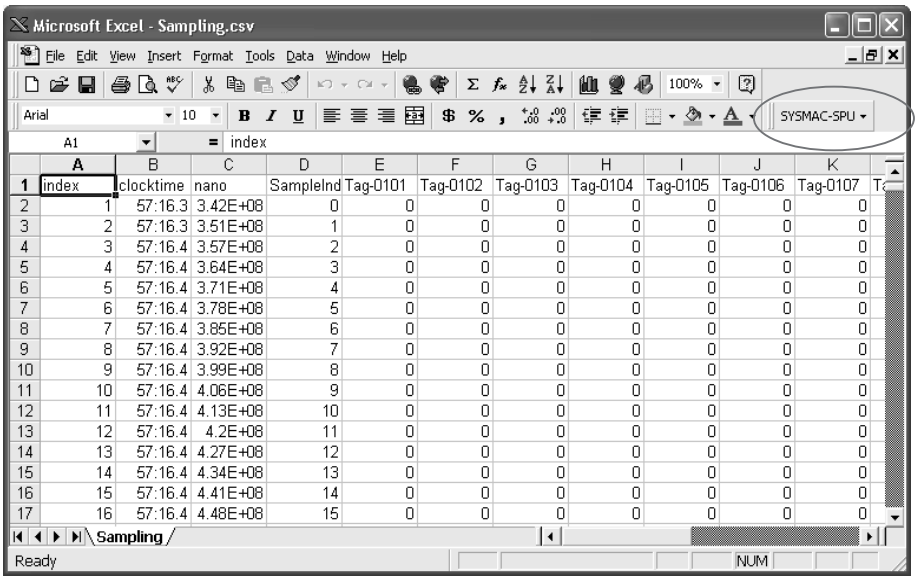
(1) Unused recipe files will not be automatically deleted by the SYSMAC SPU Unit or SPU-Console. When required, manually delete the files using Windows Explorer.

(2) Do not edit or save updated recipe files while recipes are being written. The recipe may not function properly.

(3) Versions of Microsoft Office Excel earlier than 2003 cannot create or edit CSV data that exceeds 256 columns. For CSV files that contain more than 256 columns, a special macro file “CSVFormatter.xls” can be used. The following steps describe how to use the macro file.
The CSVFormatter.xls macro is used as follows:

1,2,3...

1. Double-click the CSVFormatter.xls file in the Journal folder (i.e., the shared folder in the SYSMAC SPU Unit). This will add a toolbar called SYSMAC-SPU to Excel.



	index	clocktime	nano	SampleInd	Tag-0101	Tag-0102	Tag-0103	Tag-0104	Tag-0105	Tag-0106	Tag-0107
2	1	57:16.3	3.42E+08	0	0	0	0	0	0	0	0
3	2	57:16.3	3.51E+08	1	0	0	0	0	0	0	0
4	3	57:16.4	3.57E+08	2	0	0	0	0	0	0	0
5	4	57:16.4	3.64E+08	3	0	0	0	0	0	0	0
6	5	57:16.4	3.71E+08	4	0	0	0	0	0	0	0
7	6	57:16.4	3.78E+08	5	0	0	0	0	0	0	0
8	7	57:16.4	3.85E+08	6	0	0	0	0	0	0	0
9	8	57:16.4	3.92E+08	7	0	0	0	0	0	0	0
10	9	57:16.4	3.99E+08	8	0	0	0	0	0	0	0
11	10	57:16.4	4.06E+08	9	0	0	0	0	0	0	0
12	11	57:16.4	4.13E+08	10	0	0	0	0	0	0	0
13	12	57:16.4	4.2E+08	11	0	0	0	0	0	0	0
14	13	57:16.4	4.27E+08	12	0	0	0	0	0	0	0
15	14	57:16.4	4.34E+08	13	0	0	0	0	0	0	0
16	15	57:16.4	4.41E+08	14	0	0	0	0	0	0	0
17	16	57:16.4	4.48E+08	15	0	0	0	0	0	0	0

Note The macro may not be enabled depending on the security settings of Microsoft Office Excel. If this is the case, select ***Options - Macro Security - Security Level*** from the Excel menus and set the security level to ***Medium***.

2. CSV files exceeding 256 columns can be displayed using Microsoft Office Excel by selecting ***SYSMAC-SPU - Open CSV file*** from the toolbar. Select a CSV file to edit in the Open File Dialog Box. If the file exceeds 256 columns, the data will be divided at every 256 columns and placed on separate worksheets. Up to 256 columns can be edited in one worksheet.
3. Save the data to a CSV file.
   Data edited on separate worksheets can be saved as a single CSV file. Select ***SYSMAC-SPU - Save CSV file*** from the toolbar. Specify the filename and save the CSV file. The worksheets will be joined together to forma single CSV file.

12-3 Recipe Function Setting Procedure

The basic procedure from making recipes settings to executing recipes is outlined below. Before following the procedure, a recipe file containing recipe data must be created using a computer. Refer to *12-2 Recipe Files* for details on recipe files.

1,2,3...

1. Set up the recipe environment settings. (Refer to *12-4 Setting the Recipe Environment*.)
2. Set the recipe settings.
   2.1 Create a recipe. (Refer to *12-5 Setting Recipes*.)
   2.2 Configure the recipe file. (Refer to *12-6 Setting Recipe Files*.)
   2.3 Set the writing addresses. (Refer to *12-7 Setting the Recipe Writing Addresses for Variable Format*, and *12-8 Setting the Recipe Writing Addresses for Contiguous Area Format*.)
   2.4 Set the key. (Refer to *12-9 Setting Recipe Keys*.)
3. Transfer the settings to the SYSMAC SPU Unit. (Refer to *12-10 Enabling Recipe Settings*.)
4. Execute the recipe. (Refer to *12-11 Executing Recipes*.)

5. Check the recipe execution history. (Refer to *12-12 Displaying the Recipe Execution History*.)

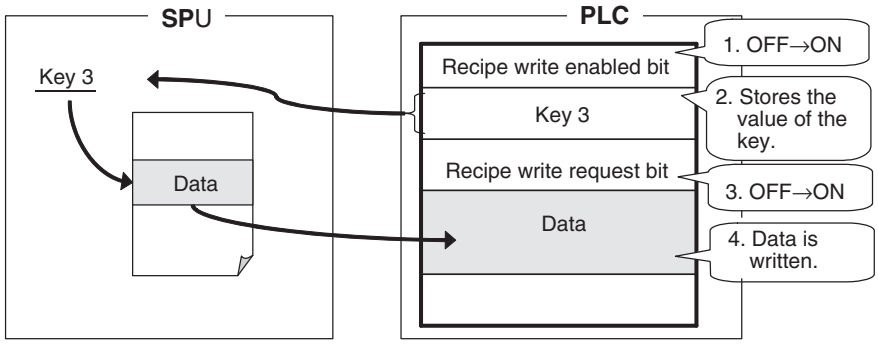
12-4 Setting the Recipe Environment

Set the environment for the recipe function. The environment settings will apply to all recipes.

The recipe function is internally processed by the SYSMAC SPU Unit in the following order.

1,2,3...

1. CPU Unit turns ON the Recipe write enabled bit in the recipe command area.
2. CPU Unit stores the value of the key in the key area.
3. CPU Unit turns ON the Recipe write request bit in the recipe command area.
4. The SPU Unit reads the value of the key from the key area and writes the corresponding recipe data to the CPU Unit.



The memory area where the value of the key is stored can be set in Key Area of the environment settings.

The flag operation (as in step 3) can be set in Handshake of the environment settings.

Note Make sure that the environment settings are properly set before setting the recipe settings.

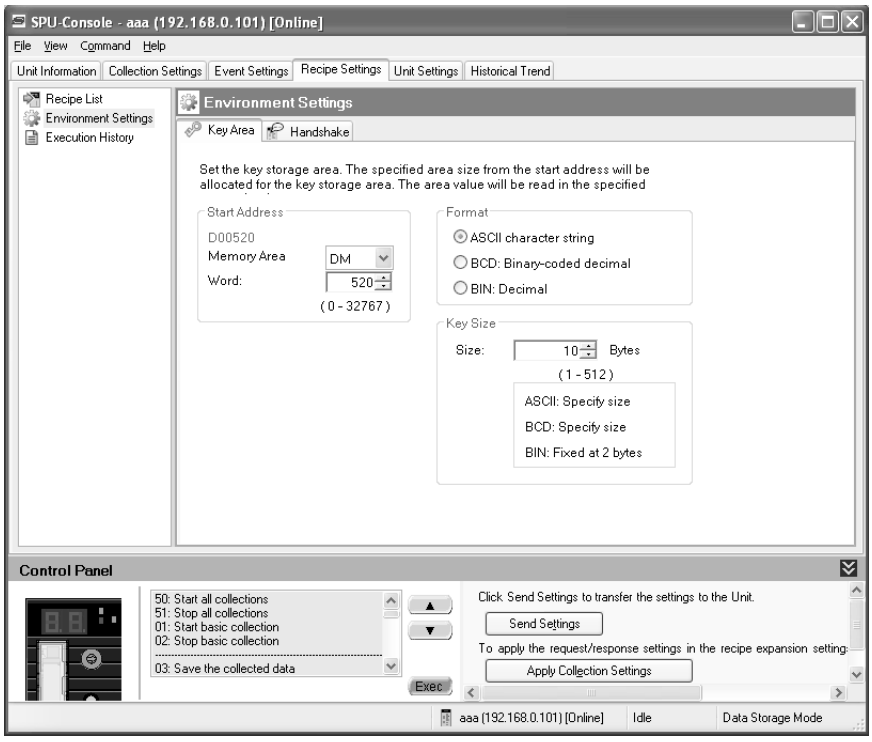
12-4-1 Setting the Key Area

Set the CPU Unit memory area where the recipe key is stored.

1,2,3...

1. Click the **Environment Settings** Tab in the SPU-Console Recipe Settings Tab Page. The Environment Settings Window will be displayed.

2. Click the **Key Area** Tab.



The following table describes the setting parameters.

Item		Description
Start Address		Sets the start address of the memory area where value of the key is stored.
Format		Data is read into the specified memory area as one of the following data types. Data is recognized as the key.
	ASCII character string	The area corresponding to the number of bytes specified by *Key Size* is read in as an ASCII character string. Null (0 × 00) terminates the string.
	BCD: Binary-coded decimal	The area corresponding to the number of bytes specified by *Key Size* is read in as BCD values.
	BIN: Decimal	The area corresponding to two bytes is read in as decimal values.
Key Size		Data contained in the memory area specified by the number of bytes (key size) from the start address is recognized as the key. If the data type is BIN, the key size is always 2 bytes.

The following table shows an example of a key.

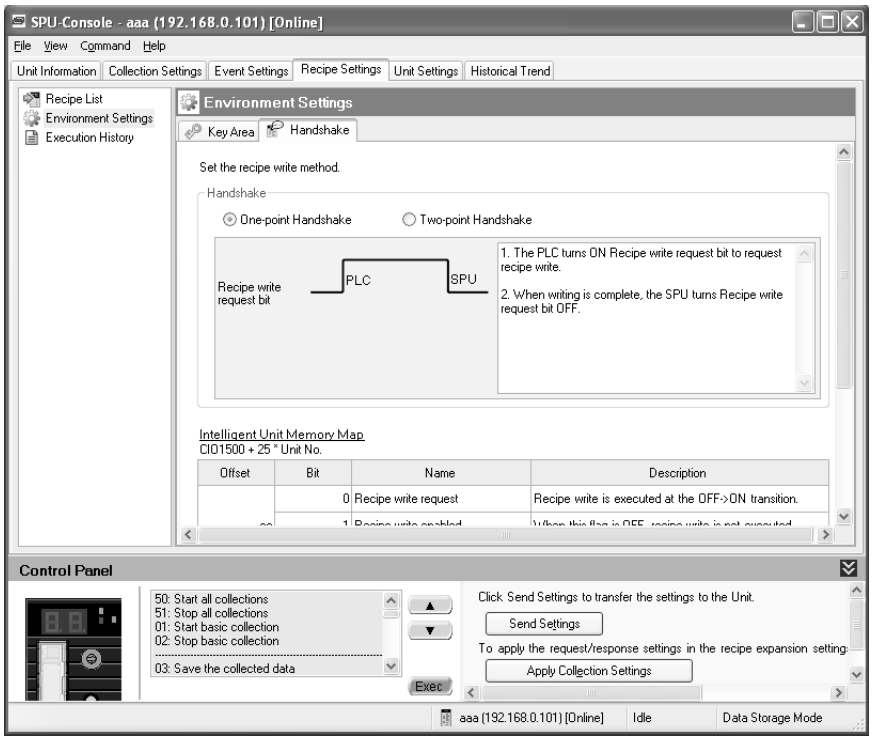
CPU Unit memory	Key		
	ASCII (2 bytes)	BCD (2 bytes)	BIN
0x0000	Null	0000	0
0x3132	12	3132	12594
0x9999	Error	9999	39321

12-4-2 Handshake Settings

Handshake settings determine the recipe writing procedure.

1,2,3... 1. Click the **Environment Settings** Tab in the SPU-Console Recipe Settings Tab Page.

2. Click the **Handshake** Tab.



The following table describes the setting parameters.

Handshake	Recipe writing procedure
One-point Handshake	The recipe write function is executed by turning ON the Recipe write request bit. When writing has been completed, the bit will be turned OFF.
Two-point Handshake	The recipe write function is executed by turning ON the Recipe write request bit. When writing has been completed, the Recipe write complete bit will turn ON. The Recipe write request bit must be turned OFF in the CPU Unit.

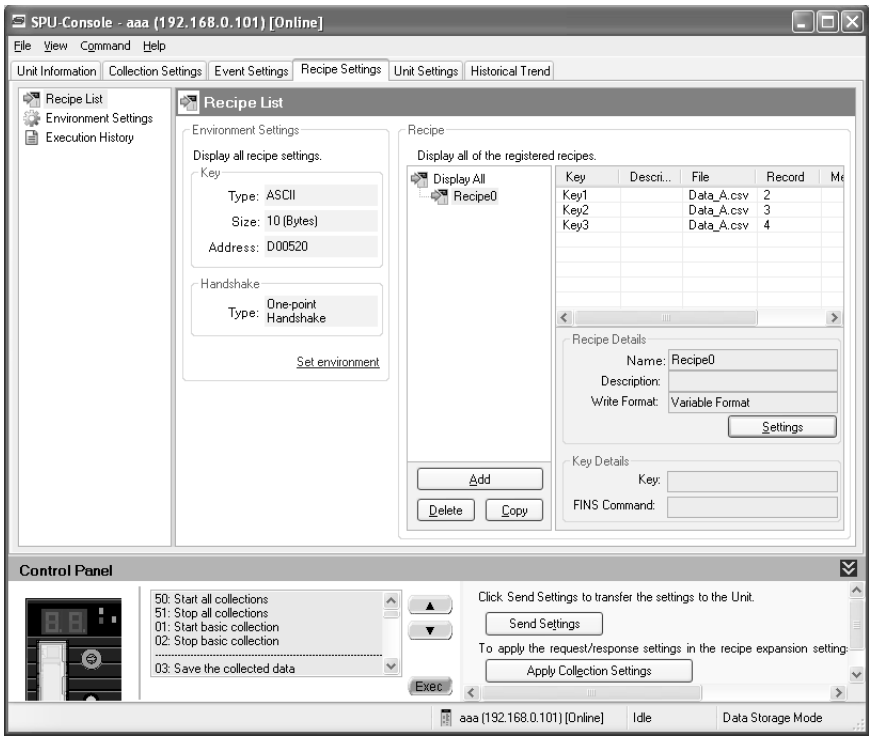
Refer to *12-11 Executing Recipes* for detailed information on handshaking.

12-5 Setting Recipes

12-5-1 Displaying Recipe Settings

1,2,3...

1. Click the **Recipe Settings** Tab in the SPU-Console.
2. Select the Recipe List.
   The Recipe List Window will be displayed.



The following table describes the column headers.

Column header	Description
Key	Key that uniquely identifies the recipe data.
Description	Description of the key.
Recipe Name	Name of recipe.
File	Name of recipe data file. Recipe files are stored in the recipe folder in the SYSMAC SPU Unit.
Record	Record number corresponding to the recipe data in the recipe file.
Note	If the recipe key cannot be recognized, an error message will be displayed. If it is blank, the key is set correctly.

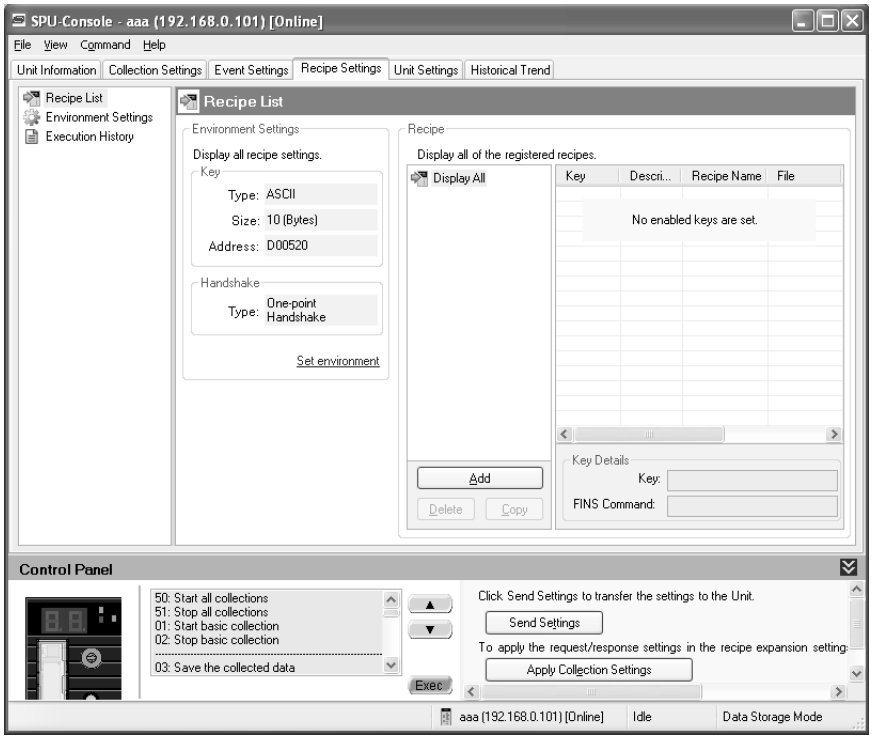
The following table describes each parameter.

Item		Description
Recipe Details		Displays details of the selected recipe.
	Name	Displays the recipe name.
	Description	Displays the recipe description.
	Write Format	Displays the recipe writing method.
Key Details		Displays the selected key information.
	Key	Displays the key.
	FINS Command	Displays the FINS command to execute a recipe specified by the key.

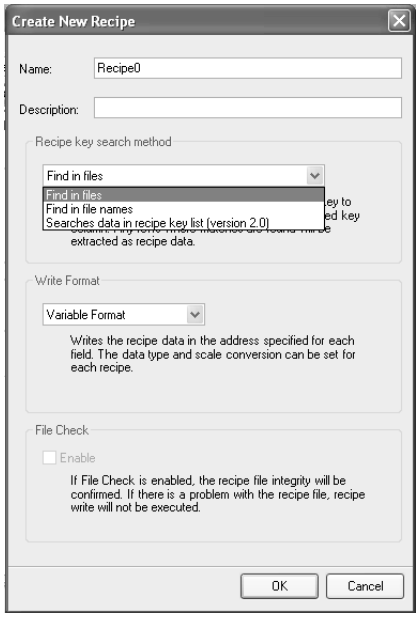
12-5-2 Adding Recipes

1,2,3...

1. Click the **Recipe Settings** Tab in the SPU-Console.
2. Select ***Recipe List*** to display the Recipe List Window.



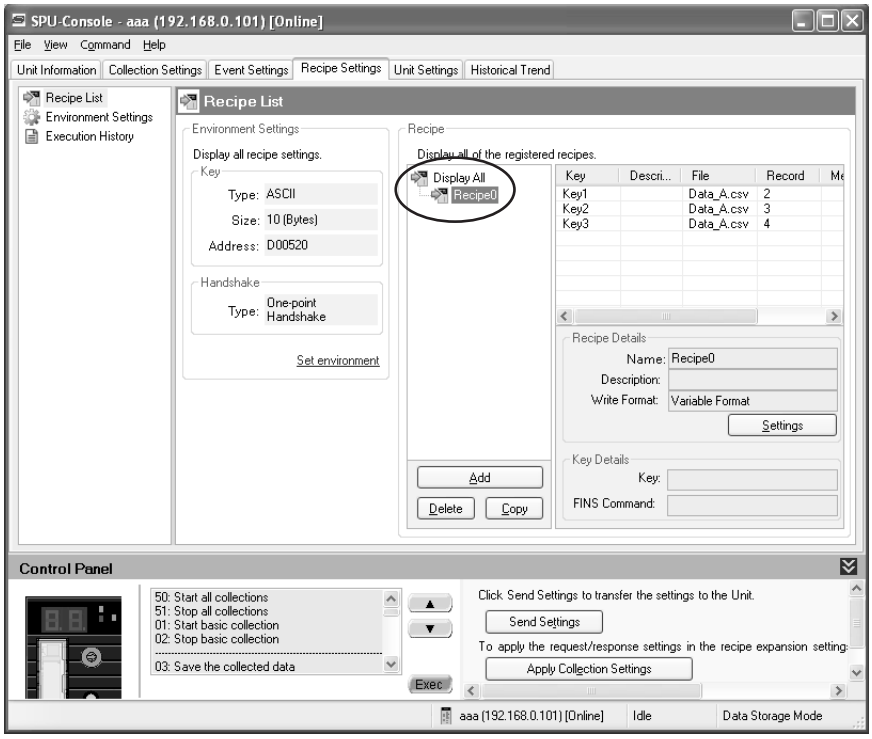
3. Click the **Add** Button.
   The Create New Recipe Dialog Box will be displayed.
4. Select *Searches data in recipe key list (version 2.0)*.



5. Enter the recipe details.
   The following table describes the setting parameters.

Item		Description
Name		Sets the recipe name.
Description		Description of the recipe. Can be omitted.
Recipe key search method		Sets the search method for recipe keys.
	Find in files	Searches for the target string as the search key in the recipe files.
	Find in file names	Searches for the target string as the search key in the recipe file names.
	Search data in recipe key list	Searches for the target string in the recipe key list.
Write Format		Sets the write format of the recipe data.
	Variable Format	Writes the recipe data in the address specified for each field. The data type and scaling can be set for each recipe.
	Contiguous Area Format	Writes the recipe data in contiguous memory addresses starting from the start address. The data type cannot be specified.
File Check		If the file check is enabled, the recipe file integrity will be confirmed. If there is a problem with the recipe file, the recipe will not be written.

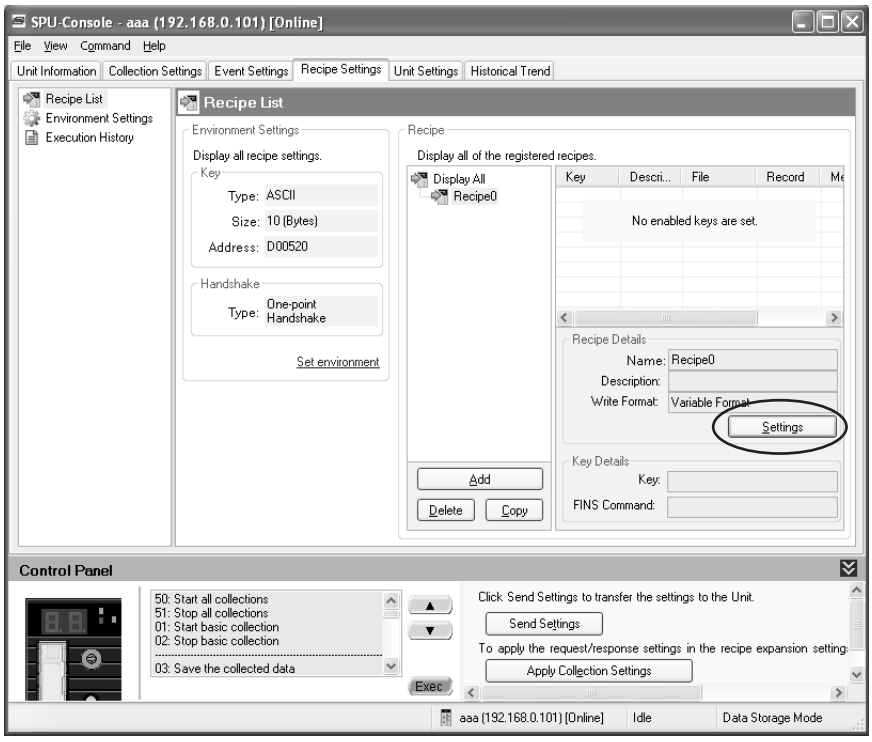
6. When input has been completed, click the **OK** Button. Make sure that the new recipe has been added.



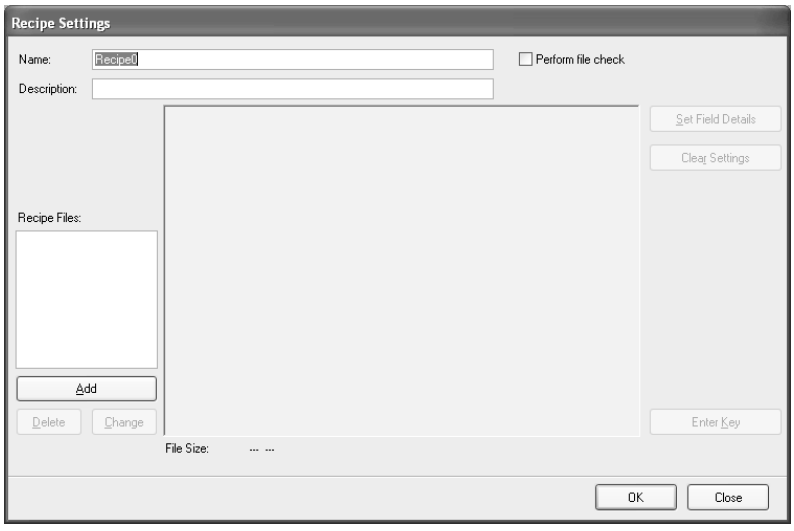
12-5-3 Setting Recipes

1,2,3...

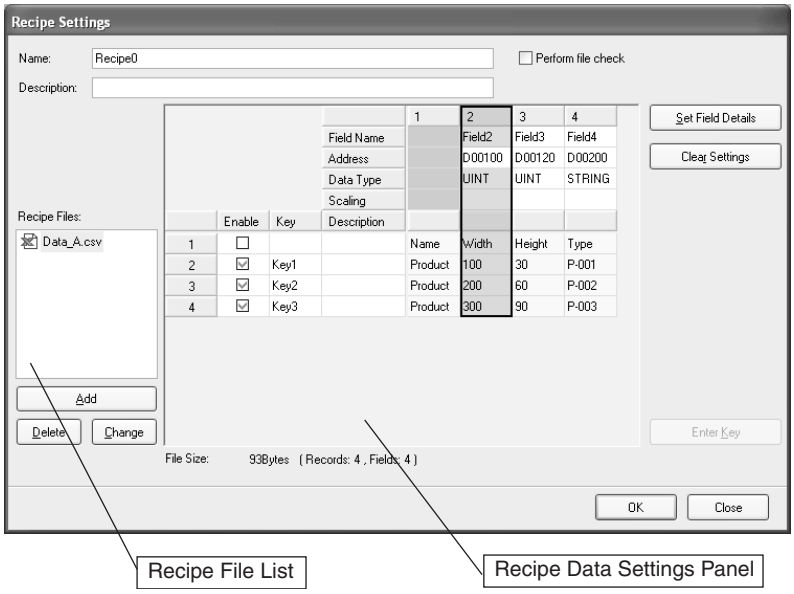
1. Select a recipe from the Recipe List.
2. Click the **Settings** Button.



3. The Recipe Settings Dialog Box will be displayed.



4. Enter the settings in the Recipe Settings Dialog Box.



Contents of the file selected from the Recipe File List will be displayed in the Recipe Data Settings Panel. Refer to *12-6 Setting Recipe Files* for details on the Recipe File List.

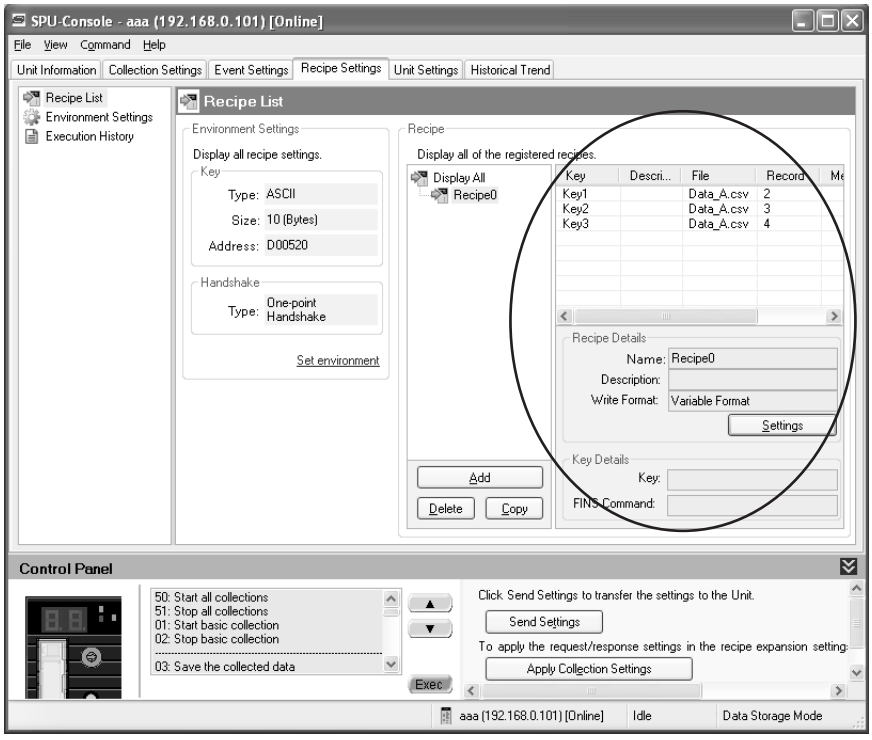
Set the recipe data writing address (memory address and data type) and the key in the Recipe Data Settings Panel. Refer to *12-7 Setting the Recipe Writing Addresses for Variable Format* and *12-8 Setting the Recipe Writing Addresses for Contiguous Area Format* for details on how to set the recipe writing address. Refer to *12-9 Setting Recipe Keys* for details on how to set the recipe key.

The following table describes the setting parameters.

Item	Description
Name	Sets the recipe name.
Description	Description of the recipe. Can be omitted.
File Check	Sets the recipe file integrity check function. If there is a problem with the recipe file, recipe write will not be executed.
Recipe File	Specifies the recipe data file. The recipe file must be created in advance.
Recipe File Data Setting Panel	Displays the contents of the recipe file. Sets the recipe data writing address for each field, and recipe data key for each record.

5. Set the parameters and click the **OK** Button to save the recipe settings.

6. Check the Recipe List Window to see that the recipe settings have been added.



12-5-4 Copying Recipes

1,2,3...

1. Select a recipe to copy from the Recipe List Window.
2. Click the **Copy** Button. A copy of the selected recipe will be added.

12-5-5 Deleting Recipes

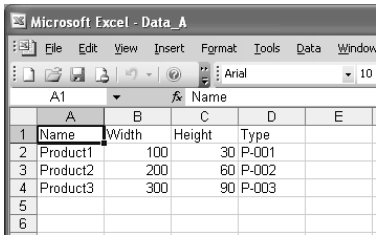
1,2,3...

1. Select a recipe to delete from the Recipe List Window.
2. Click the **Delete** Button.

12-6 Setting Recipe Files

Recipe data is in CSV format. A file that contains recipe data is called a recipe file. Recipe data consists of fields and records. The address and data format are set for each field. A record is a group of fields.

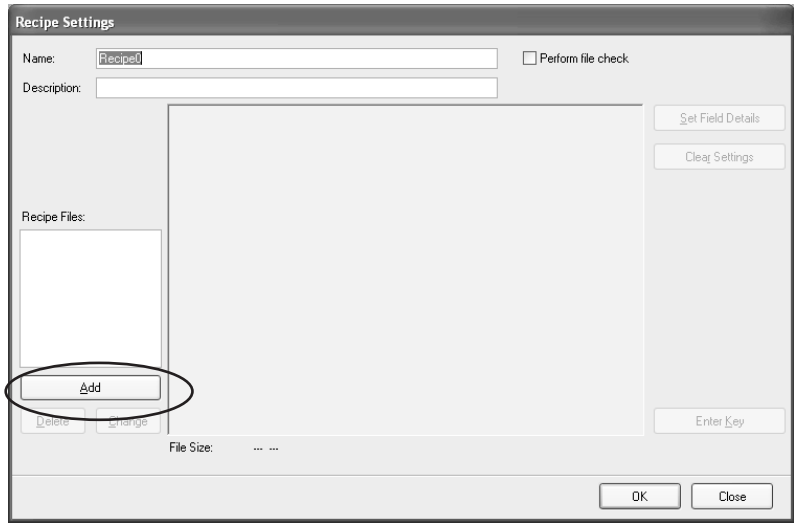
A recipe file must be created in advance using an application such as Microsoft Office Excel. Refer to *12-2 Recipe Files* for details on recipe files. In this section it is assume that a CSV file (as shown in figure below) has already been created to be used as the recipe file.



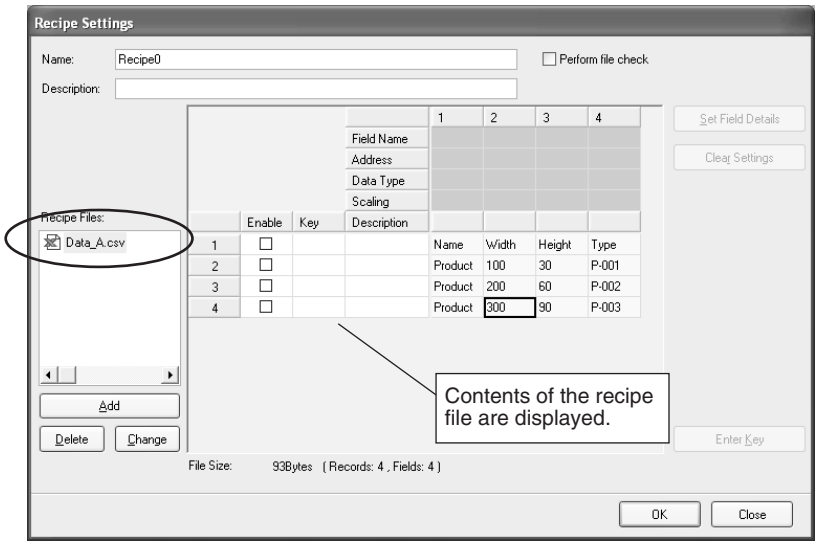
12-6-1 Adding Recipe Files

1,2,3...

1. Select a recipe file from the Recipe List Window.
2. Click the **Settings** Button.
   The Recipe Settings Dialog Box will be displayed.
3. Click the **Add** Button. Select a file to use as the recipe in the Open File Dialog Box. (The recipe file must be created in advance.)



4. The selected file will be added to the Recipe File List and the contents of the file will be displayed in the Recipe Settings Panel.



12-6-2 Deleting Recipe Files

1,2,3...

1. Select a recipe from the Recipe List.
2. Click the **Settings** Button.
   The Recipe Settings Dialog Box will be displayed.
3. Select a recipe file that you want to delete and click the **Delete** Button.

12-6-3 Changing Recipe Files

The recipe data can be changed by selecting another recipe file, while leaving the field settings and key settings unchanged.

1,2,3...

1. Select a recipe from the Recipe List.
2. Click the **Settings** Button.
   The Recipe Settings Dialog Box will be displayed.
3. Select the recipe file that you want to change and click the **Change** Button.
4. Select a different recipe file from the Open Field Dialog Box. The recipe data will be changed according to the contents of the selected file.

12-7 Setting the Recipe Writing Addresses for Variable Format

Set recipe writing addresses in the CPU Unit memory area.

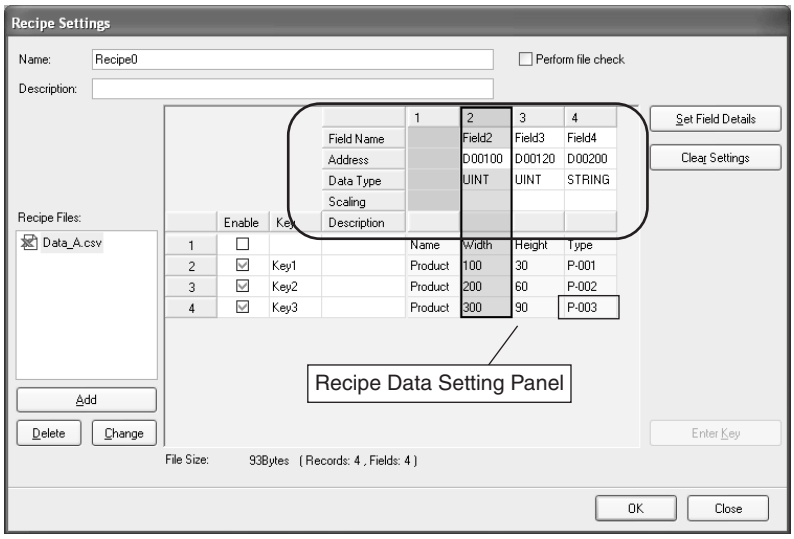
There are two recipe writing formats, the Variable Format and the Contiguous Area Format. This section describes the Variable Format.

12-7-1 Setting the Writing Address for Each Field

In the Variable Format, recipe data is written to the specified address for each field. For each field, the data type and scaling can be specified.

1,2,3...

1. Select a recipe from the Recipe List.
2. Click the **Settings** Button.
   The Recipe Settings Dialog Box will be displayed.
3. Select a recipe file from the Recipe File List.
   The contents of the selected recipe file will be displayed in the Recipe Data Settings Panel.
4. Set the recipe data writing address in the Recipe Data Settings Panel.



The following table describes the row headers.

Item	Description
Field Name	Sets the field name. Can be omitted.
Address	Sets the CPU Unit address where the recipe data is written.
Data Type	Sets the data type of the recipe data.
Scaling	Writes recipe data that has been converted by a specified formula.

Details of the Recipe Data Settings Panel are described below.

Changing the Field Name

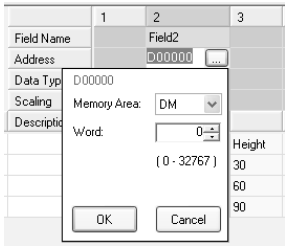
Double-click the cell that you want to change. Enter the new name.

Changing the Address

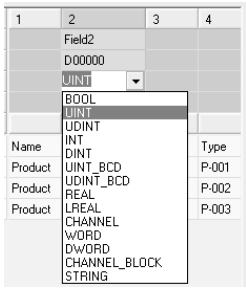
Double-click the cell that you want to change. Click the **...** Button and enter the new address in the displayed window. Click the **OK** Button. Alternatively, you can directly enter the new address in the cell.

Changing the Data Type

Double-click the cell that you want to change. Select a data type from the drop-down list.



Changing the Address



Changing the Data Type

Note

(1) Use the appropriate data type for the recipe data. (Refer to following table.)If the BOOL format is set for values other than 0 or 1, or the UNIT format is set for hexadecimal numbers like A05C, a recipe data type conversion error message will be displayed.

Data type	Recipe data
BOOL	0 or 1
UNIT	0 to 65535
INT	–32768 to 32767
UNIT_BCD	0 to 9999
WORD	0 to FFFF
CHANNEL	0 to FFFF
STRING	ASCII character string
UDINT	0 to 4294967295
UDINT_BCD	0 to 99999999
DWORD	0 to FFFFFFFF
REAL	-10^{-38} to 10^{+38}
LREAL	-10^{-308} to 10^{+308}
CANNEL_BLOCK	Continuous channels (4 digits × No. of elements)

(2) Recipe data that specifies scaling with the data type is usually within the range a floating-point data type (float or double). If the scaled data is not within the range of the specified data type, a recipe data type conversion error message will be displayed.

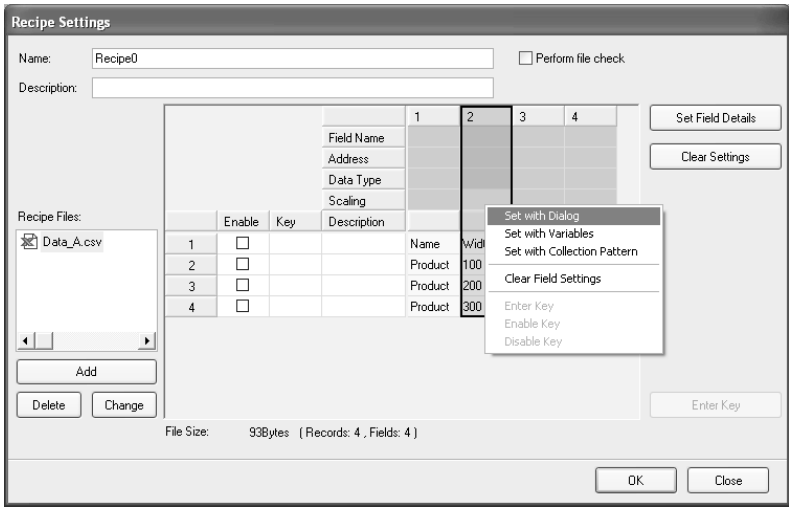
Selecting Fields

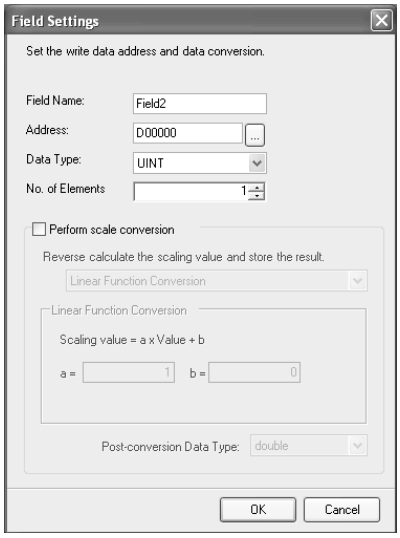
- Selecting a Single Field
  Click the desired field's column header cell.
- Selecting a range of Consecutive Fields
  Click the first field's column header cell. Press **Shift** Key while clicking the last field's column header cell.

12-7-2 Field Settings Dialog Box

Set the writing address and data type of the recipe for each field. Detailed settings can be made for each field in the Field Settings Dialog Box.

1,2,3... 1. Select a field and click the **Set Field Details** Button. Select ***Set with Dialog***. Alternatively, double-click the column header, or right-click the selected field and select the ***Set with Dialog***.
The Field Settings Dialog Box will be displayed.





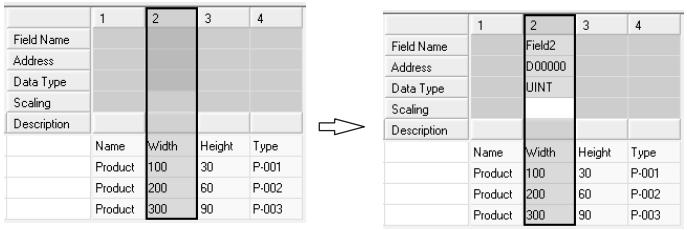
2. Set the field parameters in the Field Settings Dialog Box.
The following table describes the field parameters.

Item	Description
Field Name	Sets the field name. Can be omitted.
Address	Sets the writing address of the recipe data.
Data Type	Sets the data type of recipe data.
No. of Elements	Sets the number of elements of recipe data.
Scaling	Writes recipe data that has been converted by a specified formula. There is no need to specify the scaling parameters for recipe data that do not require scaling.

The following table describes the scaling settings.

Equation	Description
Linear function conversion	The values of the recipe data are converted using a linear function. Specify a floating-point data type (float or double). Calculate the values in the following manner: Memory value = (Recipe data value – **b**) ÷ **a** (Recipe data value = **a** × Memory value + **b**) (Where **a** and **b** are specified constants)
Maximum/Minimum conversion	Recipe data with a specified upper and lower limit is converted to a value with a new upper and lower limit. Specify a floating-point data type (float or double).
Decimal position conversion	Moves the decimal point of the memory data to a specific point. Specify a floating-point data type (float or double).

3. Set the parameters and click the **OK** Button.
   The writing address will be set in the field.



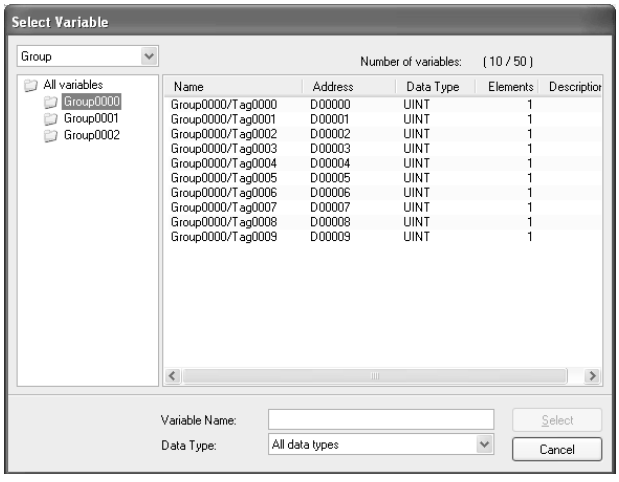
Before Setting After Setting

12-7-3 Setting Variables in Fields

Variables that were set in the data collection settings can be set in fields. Refer to *10-3 Setting Variables* for details on the data collection settings.

1,2,3...

1. Select a field and click the **Set Field Settings** Button. Select ***Set with Variables***. Alternatively, right-click the field and select ***Set with Variables***.
   The Select Variable Dialog Box will be displayed.



2. Select a variable to set in the field in the Select Variable Dialog Box. Click the **Select** Button.
   The selected variable will be set as the field.

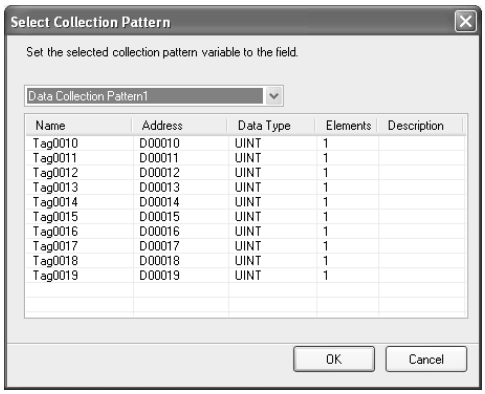
Note Variables with address memory type SPU/CIO or SPU/DM cannot be set in fields. Recipes cannot write recipe data to SPU/CIO or SPU/DM variables.

12-7-4 Setting Data Collection Pattern Variables in Fields

Variables that were set in the data collection pattern settings can be set in fields. This is used when a file containing data collected by the SYSMAC SPU Unit is used as a recipe. Refer to *10-4 Setting Data Collection Patterns* for details on the data collection settings.

1,2,3...

1. Select a field and click the **Set Field Settings** Button. Select ***Set with Collection Pattern***. Alternatively, right-click the field and select ***Set with Collection Pattern***.
   The Select Collection Pattern Dialog Box will be displayed.



2. Select a collection pattern (group of variables) to set as the field in the Select Collection Pattern Dialog Box. Click the **OK** Button.
   All variables in the collection pattern will be set as fields.

Note Variables with address memory type SPU/CIO or SPU/DM cannot be set in fields. Recipes cannot write recipe data to SPU/CIO or SPU/DM variables.

12-7-5 Changing Field Settings

Use the Field Settings Dialog Box to change the field settings.

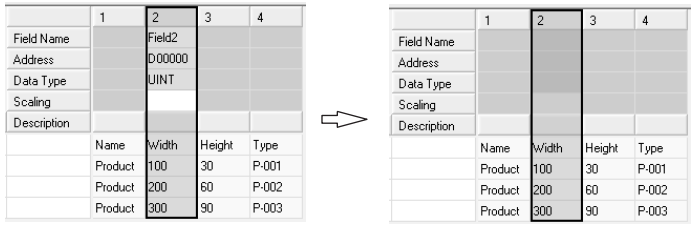
1,2,3...

1. Select the field that you want to change and click the **Set Field Details** Button. Select ***Set with Dialog***. Alternatively, double-click the column header, or right-click the selected field. Select ***Set with Dialog***.
   The Field Settings Dialog Box will be displayed.
2. Enter the new settings in the Field Settings Dialog Box.
3. Set the parameters and click the **OK** Button.
   The writing address will be set to the field.
   Refer to *12-7-2 Field Settings Dialog Box* for details on the Field Settings Dialog Box.

12-7-6 Clearing the Field Settings

Clear the field settings of unused fields.

Select the fields that you want to clear and click the **Clear Settings** Button.



Before Clearing After Clearing

12-8 Setting the Recipe Writing Addresses for Contiguous Area Format

Set recipe writing addresses in the CPU Unit memory area.

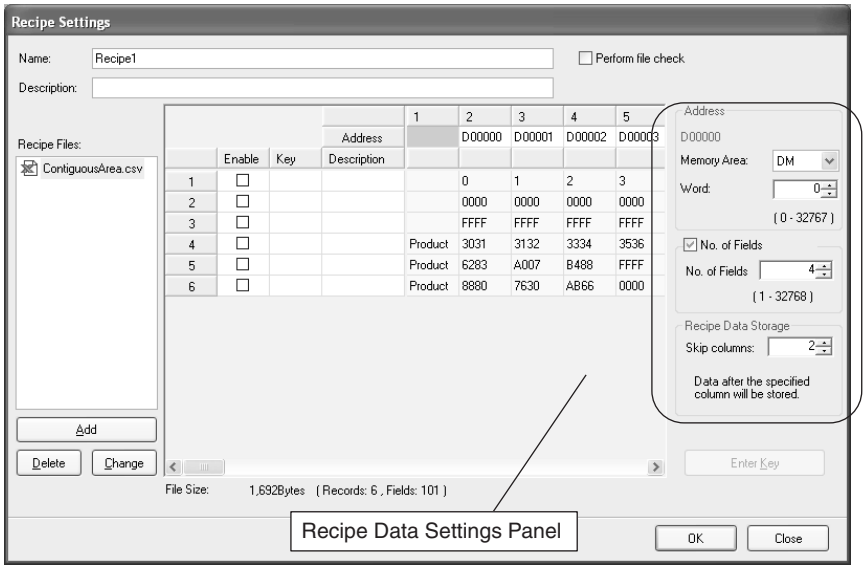
There are two recipe writing formats, the Variable Format and the Contiguous Area Format. This section describes the Contiguous Area Format.

12-8-1 Setting the Recipe Writing Address

In the Contiguous Area Format, recipe data is written all at once to the specified range of addresses starting from the head address. Data type cannot be specified. All recipe data is read in and written to the memory as hexadecimal channel.

1,2,3...

1. Click the **Recipe Settings** Tab.
2. Select the **Recipe List** Dialog Box.
3. Click the **Settings** Button.
   The Recipe Settings Dialog Box will be displayed.
4. Select a recipe file from the Recipe File List.



5. Set the recipe data writing address in the Recipe Data Settings Panel.
   The following table describes the row header.

Item	Description
Address	Displays the CPU Unit memory address where the recipe data is written.

The following table describes the setting parameters.

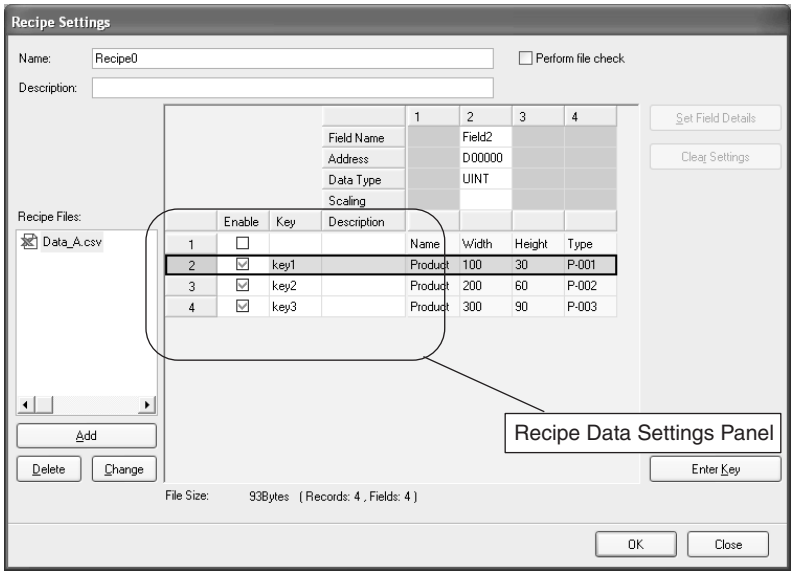
Item	Description
Address	Sets the header address of the memory where the recipe data will be written.
No. of Fields	Sets the size of the recipe data that will be written. When the checkbox is selected, the specified number of fields are written to memory as recipe data. If the number of fields available to write as the recipe data are less than the specified number of fields, the missing fields will not be written to memory. When the checkbox is not selected, all the fields (excluding the header) will be written to memory.
Recipe Data Storage	Sets the first column to be used as the recipe data.

12-9 Setting Recipe Keys

12-9-1 Setting the Recipe Key

1,2,3...

1. Click the **Recipe Settings** Tab.
2. Select the **Recipe List** Dialog Box.
3. Select a recipe.
4. Click the **Settings** Button.
   The Recipe Settings Dialog Box will be displayed.
5. Select a recipe file from the Recipe File List.
   The contents of the selected recipe file will be displayed in the Recipe Data Settings Panel.



6. Set the recipe data key in the Recipe Data Settings Panel.

Item	Description
Enable	Enables/disables the key settings. If disabled, the key settings will not affect the recipe settings.
Key	Sets the recipe data key (alphanumeric characters).
Description	Describes the recipe data. (Can be omitted.)

Details of the Recipe Data Settings Panel are described below.

Changing the Enable Status

Click the cell that you want to change. If there is a key, it will be enabled. If there is no key, a dialog box will be displayed prompting the input of a key.

Changing the Key and Description

Double-click the cell that you want to change. Input the new text.

Selecting Records

- Selecting a Single Record
  Click the desired record's row header cell.
- Selecting a range of Consecutive Records
  Click the first record's row header cell. Press **Shift** Key while clicking the last record's row header cell.

Note

(1) The following symbols cannot be used as part of a key. = , [ ] ; (space)

(2) Japanese characters cannot be used as part of a key.

(3) All keys (except for disabled keys) must be unique within a recipe.

12-9-2 Key Entry Details Dialog Box

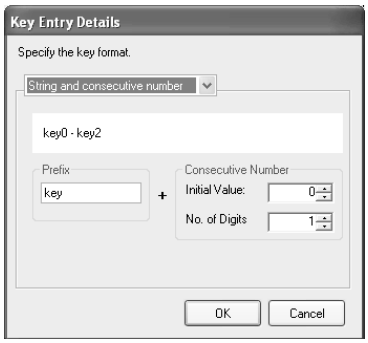
To set keys for multiple recipe data, use the Key Entry Details Dialog Box.

1,2,3...

1. Click the **Recipe Settings** Tab.
2. Select the **Recipe List** Dialog Box.
3. Select a recipe.
4. Click the **Settings** Button.
   The Recipe Settings Dialog Box will be displayed.
5. Select a recipe from the Recipe File List.
   The contents of the file will be displayed in the Recipe Data Settings Panel.
6. Select a record to enter key details.
7. Click the **Enter Key** Button. Alternatively, right-click while the records are selected. Select ***Enter Key***.
   The Key Entry Details Dialog Box will be displayed.

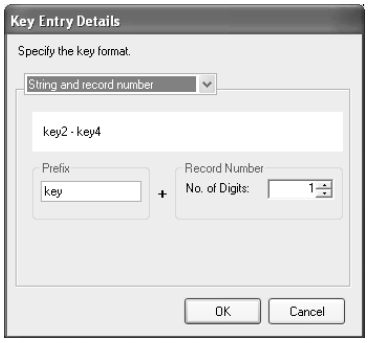
String and Consecutive Number

Adds consecutive numbers after the prefix.

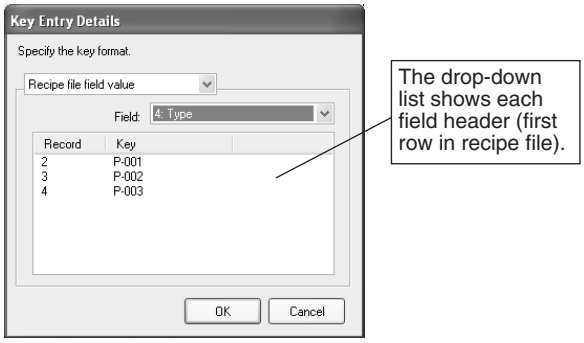


String and Record Number

Adds the record number after the prefix.



Recipe File Field Value The value of the specified field is set as the key.



8. Click the **OK** Button.
   The settings will be entered as the key.

12-10 Enabling Recipe Settings

The procedure for enabling recipe settings in the SYSMAC SPU Unit is described below. Use this procedure if the recipe settings are changed. The recipe settings and recipe file will be transferred to the SYSMAC SPU Unit.

Note

(1) Make sure that the SPU-Console is connected to the SYSMAC SPU Unit before enabling the settings.

(2) When settings are transferred, the current SYSMAC SPU Unit settings will be overwritten. When a recipe file with the same name exists in the Memory Card, the recipe file will also be overwritten.

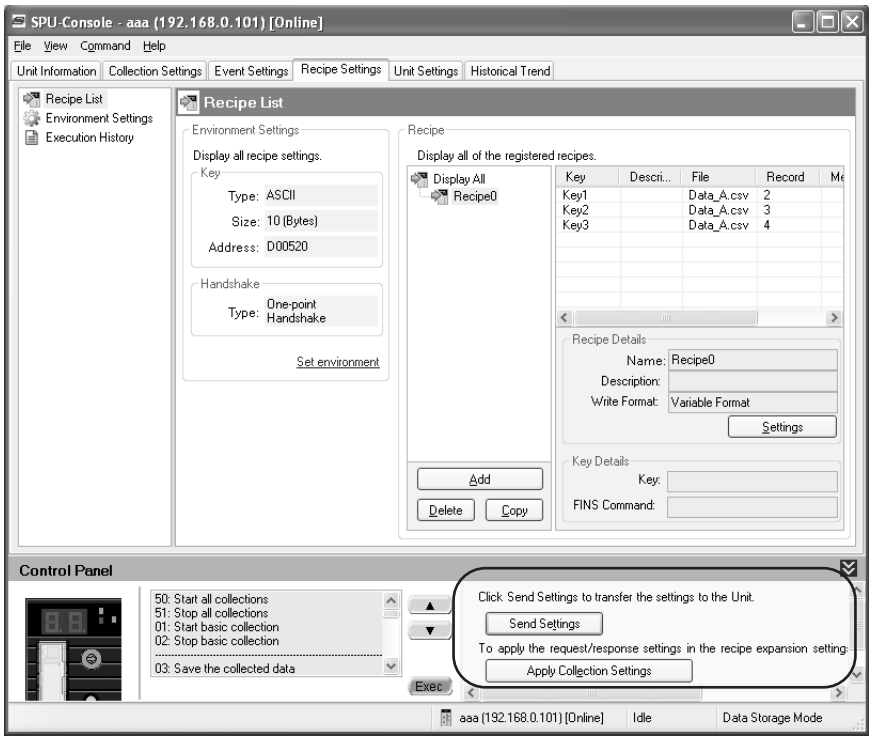
(3) Do not turn OFF the power to the Unit while settings are being transferred. Doing so will transfer corrupted information to the Unit and may cause malfunction.

(4) Do not enable recipe settings while the recipe is being written.

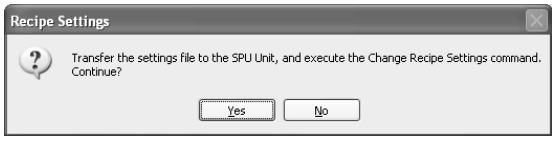
1,2,3...

1. Check that recipe settings have been completed.

2. Click the **Recipe Settings** Tab in the SPU-Console.



3. Click the **Send Settings** Button in the SPU-Console Control Panel.
   The following dialog box will be displayed to confirm the settings transfer.



4. To execute the settings transfer, click the **Yes** Button.
   When the Change Recipe Settings command is executed, “A” will be displayed in the 7-segment display on the SYSMAC SPU Unit. When it has finished, the display will return to “-D”.
   The new settings will be enabled when the display shows “-D”.

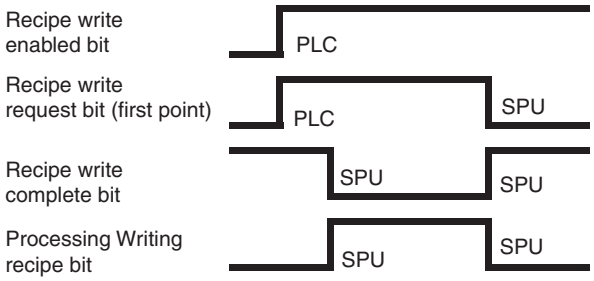
12-11 Executing Recipes

This section describes how to execute recipes.

12-11-1 Executing Recipes with One-point Handshake

The recipe write function is executed when the bit is ON. Refer to *7-2 CIO Area* for information about bits used for single-point handshakes.

The following figure shows the flag operation when the recipe write function is executed with a one-point handshake. The CPU Unit turns ON and the SYSMAC SPU Unit turns OFF the Recipe write request bit.



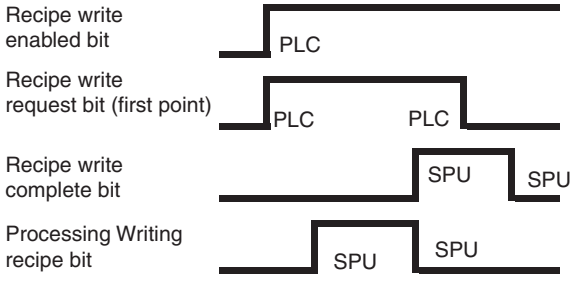
1,2,3...

1. The CPU Unit turns ON the Recipe write request bit.
2. The SYSMAC SPU Unit turns OFF the Recipe write complete bit, turns ON the Writing recipe bit, and starts writing recipe data.
3. When the recipe data has been written, the SYSMAC SPU Unit turns ON the Recipe write complete bit, and turns OFF the Writing recipe bit.
4. The SYSMAC SPU Unit turns OFF the Recipe write request bit.

12-11-2 Executing a Recipe with Two-point Handshake

The recipe write function is executed when the bit is ON. Refer to *7-2 CIO Area* for information about bits used for two-point handshakes.

The following figure shows the flag operation when the recipe write function is executed with a two-point handshake. The CPU Unit turns ON and OFF the Recipe write request bit. The SYSMAC SPU Unit turns ON and OFF the Recipe write complete bit.



1,2,3...

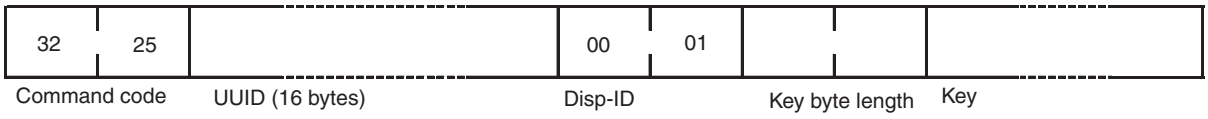
1. The CPU Unit turns ON the Recipe write request bit.
2. The SYSMAC SPU Unit turns ON the Writing recipe bit, and starts writing recipe data.
3. When the recipe data has been written, the SYSMAC SPU Unit turns ON the Recipe write complete bit, and turns OFF the Writing recipe bit.
4. The CPU Unit turns OFF the Recipe write request bit.
5. The SYSMAC SPU Unit turns OFF the Recipe write complete bit.

12-11-3 Executing the Recipe with FINS Commands

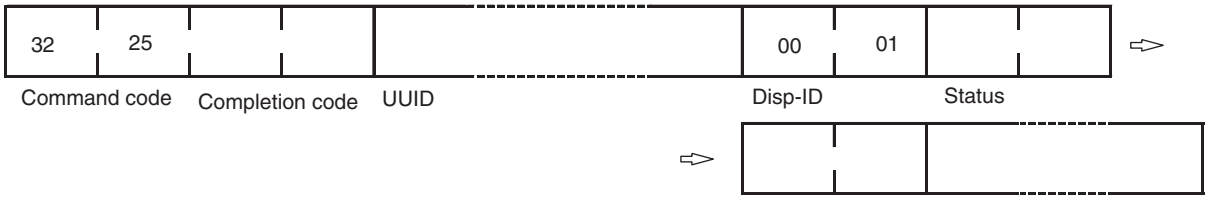
Recipes can be written using a FINS command. To execute a recipe with FINS command, the Recipe write enabled bit must be ON when the SYSMAC SPU Unit receives the FINS command. Refer to *7-2 CIO Area* for details on the Recipe write enabled bit.

The following figure shows the FINS command format and response format.

Command format



Response format



Area	Description
Command code	Sets the FINS command code. Fixed at 3225.
UUID	Fixed at “6856BA4208CD430DA66BEE22A6C07FFC”
Disp-ID	Fixed at 0001.
Key byte length	Sets the key byte length.
Key	Set the key in ASCII.
Completion code	Sets the completion code for command execution.
Status	Sets the end status code for command execution.

Completion code	Error
0000	Normal completion.
0401	Undefined command.
1001	The command is too long.
1002	The command is too short.
110C	The parameter settings are incorrect. (Refer to the status code.)

Status code	Error
0101	The UUID is incorrect.
0102	The DispID is incorrect.
0201	There is no recipe corresponding to the key.
0202	There is no recipe file.
0302	The Recipe write enabled bit is OFF.

Note

(1) Send the FINS command to the SYSMAC SPU Unit. Refer to *14-2 FINS Network Settings* for the FINS address of the SYSMAC SPU Unit.

(2) Set the Unit address to 0.
Example: 2.100.0

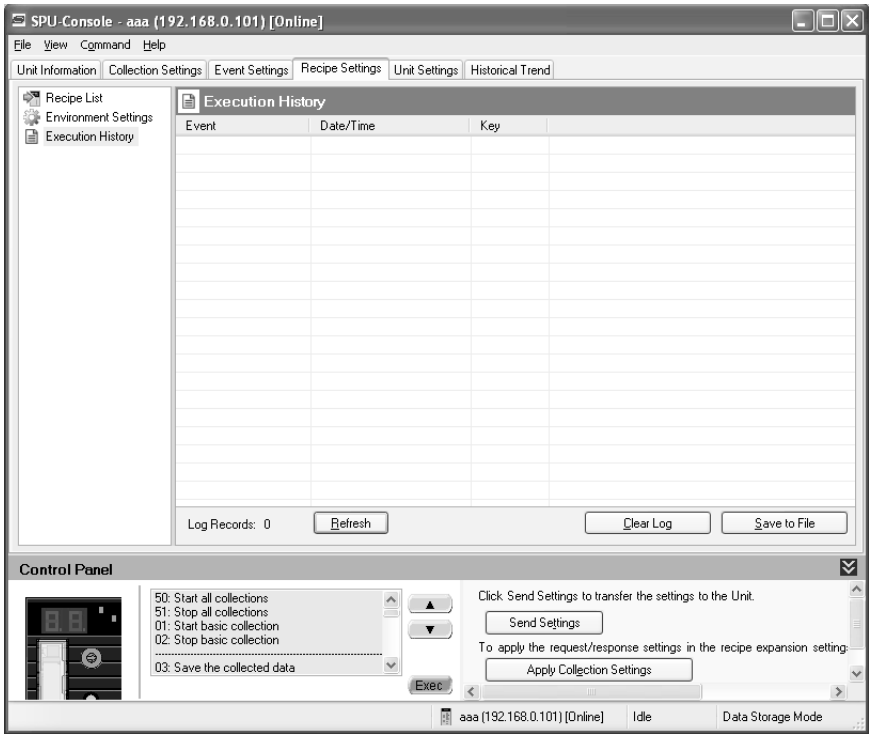
12-12 Displaying the Recipe Execution History

12-12-1 Displaying the Execution History

1,2,3...

1. Click the **Recipe Settings** Tab to display the Recipe Settings Window.
2. Select ***Execution History***.

3. To update the history, click the **Refresh** Button. Up to 500 events can be recorded.
   If the number of events exceeds 500, old events will be overwritten.



The following table describes the listed parameters.

Header	Description
Event	Name of event that occurred when executing recipe.
Date/Time	Date and time when the event occurred.
Key	Key of executed recipe.

The following table describes the events displayed in the recipe execution history.

Event	Meaning
Write Start	Started writing the recipe.
Write Complete	Completed writing recipe.
Error Completion	Cancelled writing recipe because an error occurred.

12-12-2 Deleting the Execution History

1,2,3...

1. Click the **Clear Log** Button.
   A confirmation dialog box will be displayed.
2. Click the **Yes** Button.
   The execution history will be deleted.

12-12-3 Saving the Execution History

1,2,3...

1. Click the **Save to File** Button.
2. Select a file from the Save As Dialog Box. The selected file will be saved in the execution history.

SECTION 13
Expanded Recipe Settings (Data Storage Mode)

This section describes the settings required to use the expanded recipe function, which can be used in Data Storage Mode to write numeral and textual data, e.g., production parameters, to the memory areas of the CPU Unit. The expanded recipe function is an expansion of the existing recipe function with the addition of recipe key searching.

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13-1 Expanded Recipe Function

13-1-1 Expanded Recipe Function

The expanded recipe function is an expansion of the existing recipe function with the addition of recipe key searching. Using recipe key search reduces work in registering and revising recipes. With the expanded recipe function, you can search for a desired recipe key and write the recipe data to CPU Unit memory. With the recipe function provided with version 2.0, a recipe key set with Support Software remained constant unless changed, but with the expanded recipe function, it is possible to register recipe keys in files or as file names.

The following three search methods can be used for recipe key searches. The method is set for each recipe.

■ **Searching in Recipe Files**

Searches are performed in recipe files using a target string as the search key.

■ **Searching Recipe File Names**

Searches are performed using a recipe file name as the search key.

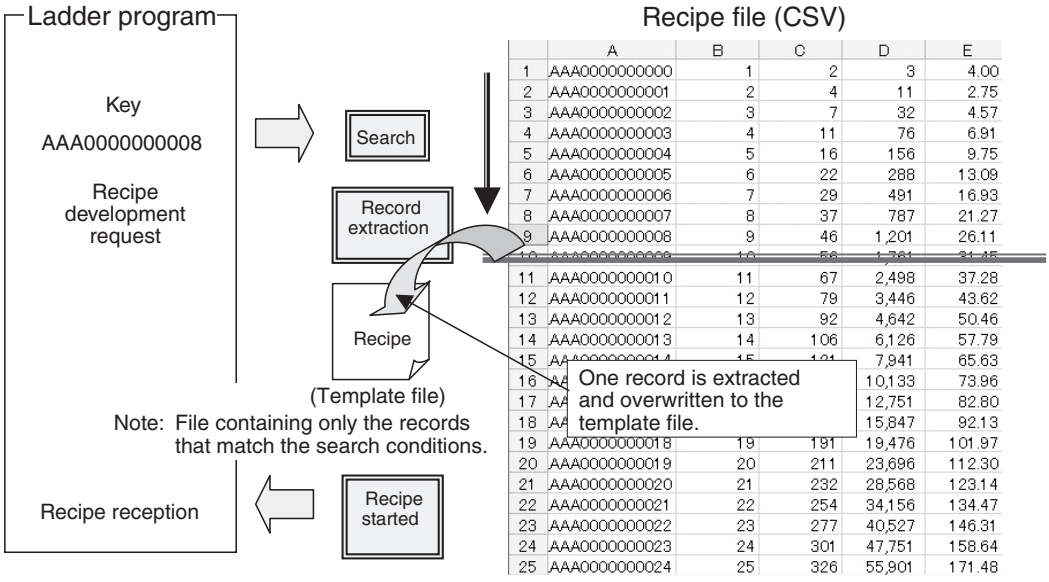
Note A maximum of ten expanded recipe registrations can be made for both methods combined.

■ **Searching Key List (Version 2)**

There is no limit to the number of registrations for the previous method (version 2.0).

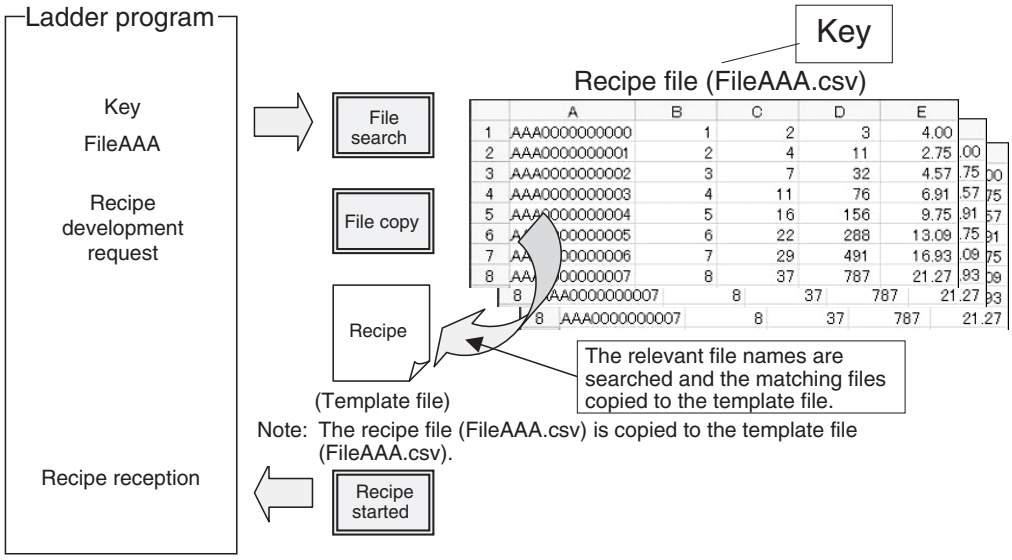
Searching Recipe Files

A search is performed in user-created recipe files using the text string that is passed as the search key. The recipe files that are created in the data folders created for the recipe settings (default: AutoRecipe n_RecipeDB) are searched. Any rows where matches are found will be extracted to a new recipe file (i.e., a template file) containing only the records found by the search. Recipe data is written by starting the existing recipe function using the extracted recipe file. If there are no recipe files or the relevant key is not found in the recipe files (i.e., if there is no match), a No Requested Recipe Data Error will occur, and the recipe function will not start.



Searching Recipe File Names

A search is made for the text string that is passed as the search key in recipe file names (user-created files: *key*.csv) in the folders created as the data folder (default: AutoRecipe *n*_RecipeFile) for the recipe settings. Any files where matches are found will be extracted as recipe files (i.e., template files) and copied. Recipe data is written by starting the existing recipe function using the extracted recipe files. If no recipe files are found, a No Requested Recipe Data Error will occur, and the recipe function will not start.



Note

(1) A template file is required when recipe settings are made.When searching in recipe files, a file with one row is required for the recipe file (user-created file). When searching file names, one recipe file (user-created file) is required.

(2) The extension for the recipe files must be lowercase “csv.” Specify the extension of the recipe file created in the SPU Unit or FTP server as “csv” in lowercase.

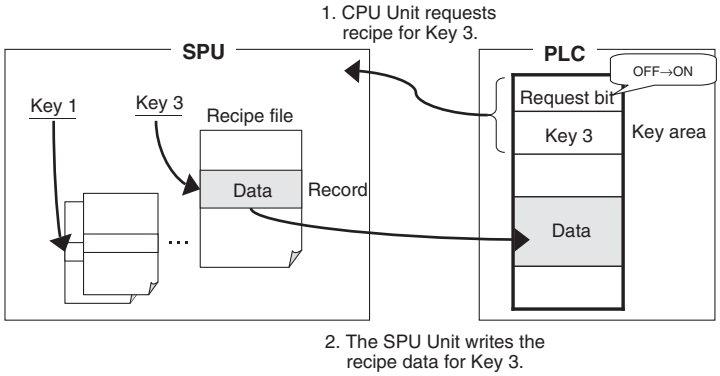
13-1-2 Recipe File Data Structure and File Organization

Data Structure

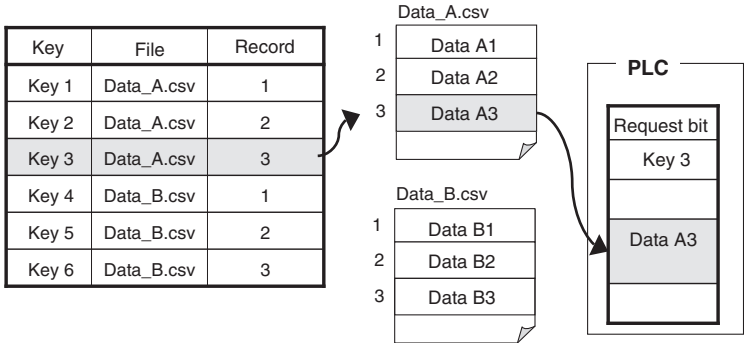
Recipe data is in CSV format. A file that contains recipe data is called a recipe file. Recipe data consists of fields and records. The writing address and data format are set for each field. A record is a group of fields.

	Field 1	**Field 2**	**Field 3**	**Field 4**
	• Address • Data type	• Address • Data type	• Address • Data type	• Address • Data type
Record 1				
Record 2				
Record 3				
Record 4				

Recipe data is managed by keys, which are unique record identifiers. When there is a recipe write request, the record corresponding to the requested key is written to the CPU Unit memory area as recipe data. The requested key is stored in the CPU Unit memory area. This area of the memory is called the key area.



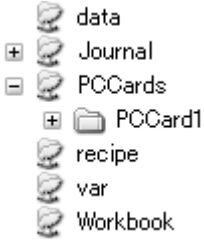
Recipe data is internally managed in the following structure. Each recipe is characterized by a recipe file and a record. In the example shown in the following figure, recipe data for Key 3 is record 3 of the recipe file Data_A.csv.



Key	File	Record
Key 1	Data_A.csv	1
Key 2	Data_A.csv	2
Key 3	Data_A.csv	3
Key 4	Data_B.csv	1
Key 5	Data_B.csv	2
Key 6	Data_B.csv	3

File Organization

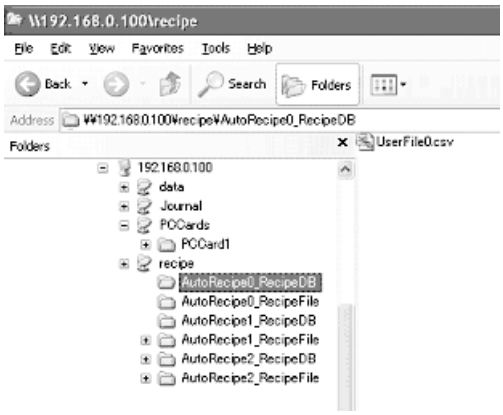
Files on a Memory Card that is mounted in the SYSMAC SPU Unit can be accessed in a folder shared on a Windows network. The following figure shows the organization of the network folder in the SYSMAC SPU Unit.



The folder set as the data folder in the recipe settings will be created in the recipe folder.

Searching in Recipe Files

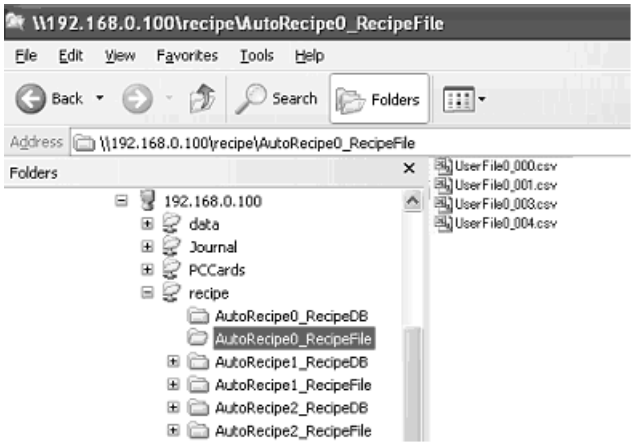
The recipe files (user-created file: UserFile0.csv in the following figure) must be in the data folders (default: AutoRecipe *n*_RecipeDB).



Once the expanded recipe settings have been made, the data folders (default: AutoRecipe *n*_RecipeDB) will be automatically created when the SPU Unit is restarted or the recipe settings are enabled.

Searching Recipe File Names

The recipe files (user-created file: UserFile0_000 to UserFile0_004.csv in the following figure) must be in the data folders (default: AutoRecipe *n*_RecipeFile).



Once the expanded recipe settings have been made, the data folders (default: AutoRecipe *n*_RecipeFile) will be automatically created when the SPU Unit is restarted or the recipe settings are enabled.

Note

(1) It is not possible to create new data folders in the recipe folders from Windows Explorer. Folders that are created by the SPU Unit can be deleted or their names can be changed.

(2) Data folders that are automatically created by the SPU Unit are not automatically deleted. Manually delete any folders that are no longer required. Leaving the data folders may excessively limit the available memory.

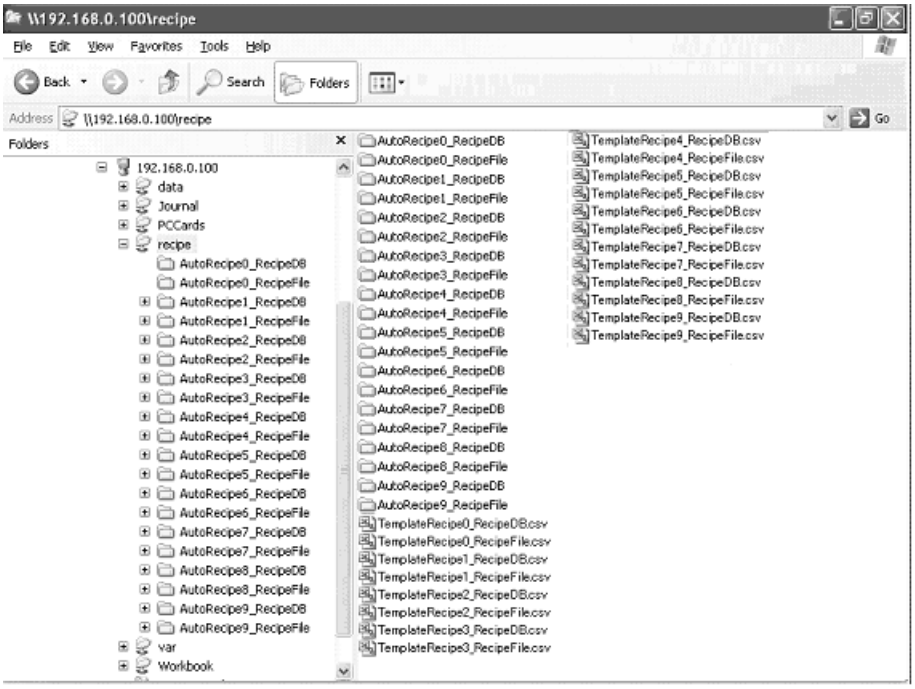
Template Files

Template files are used for recipe files for the recipe function provided with version 2.0 of the SPU Unit. With the expanded recipe function, recipe files are created to search in recipe files and to search recipe file names. The following are examples of templates for searching in recipe files and searching recipe file names.

■ Template Names

Searching in recipe files: TemplateRecipe *n*_RecipeDB.csv

Searching recipe file names: TemplateRecipe *n*_RecipeFile.csv



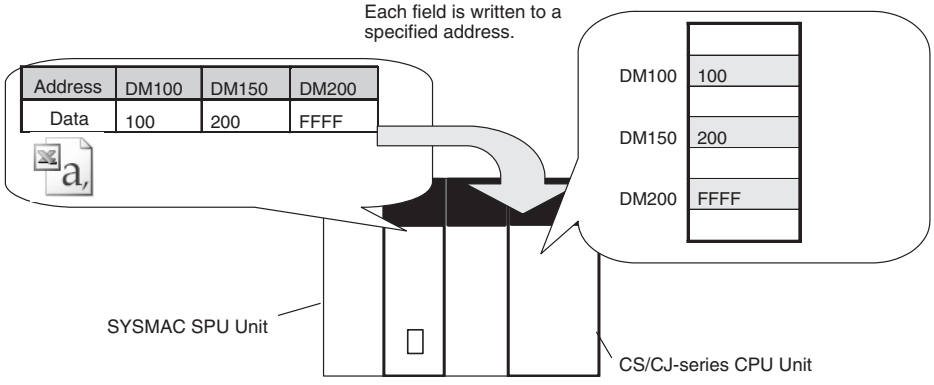
13-1-3 Recipe Writing Formats

There are two formats that can be used to write recipes, the Variable Format and the Contiguous Area Format.

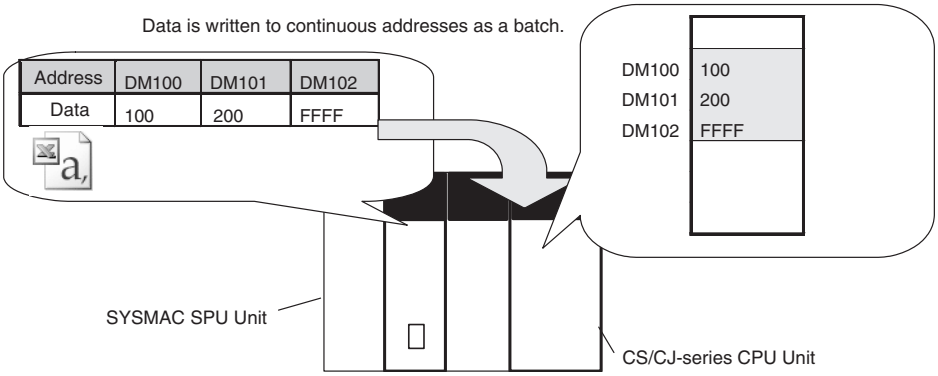
The Variable Format writes to multiple non-contiguous memory addresses. It is a flexible writing format because the data type and scaling can be specified. Recipe data of each field is written one at a time, so time is required to write all of the recipe data.

The Contiguous Area Format writes data to contiguous memory addresses. The data type cannot be specified but all recipe data is written at once, so it is faster than the Variable Format. It is suitable for cases where a large amount of data is written at once.

Variable Format

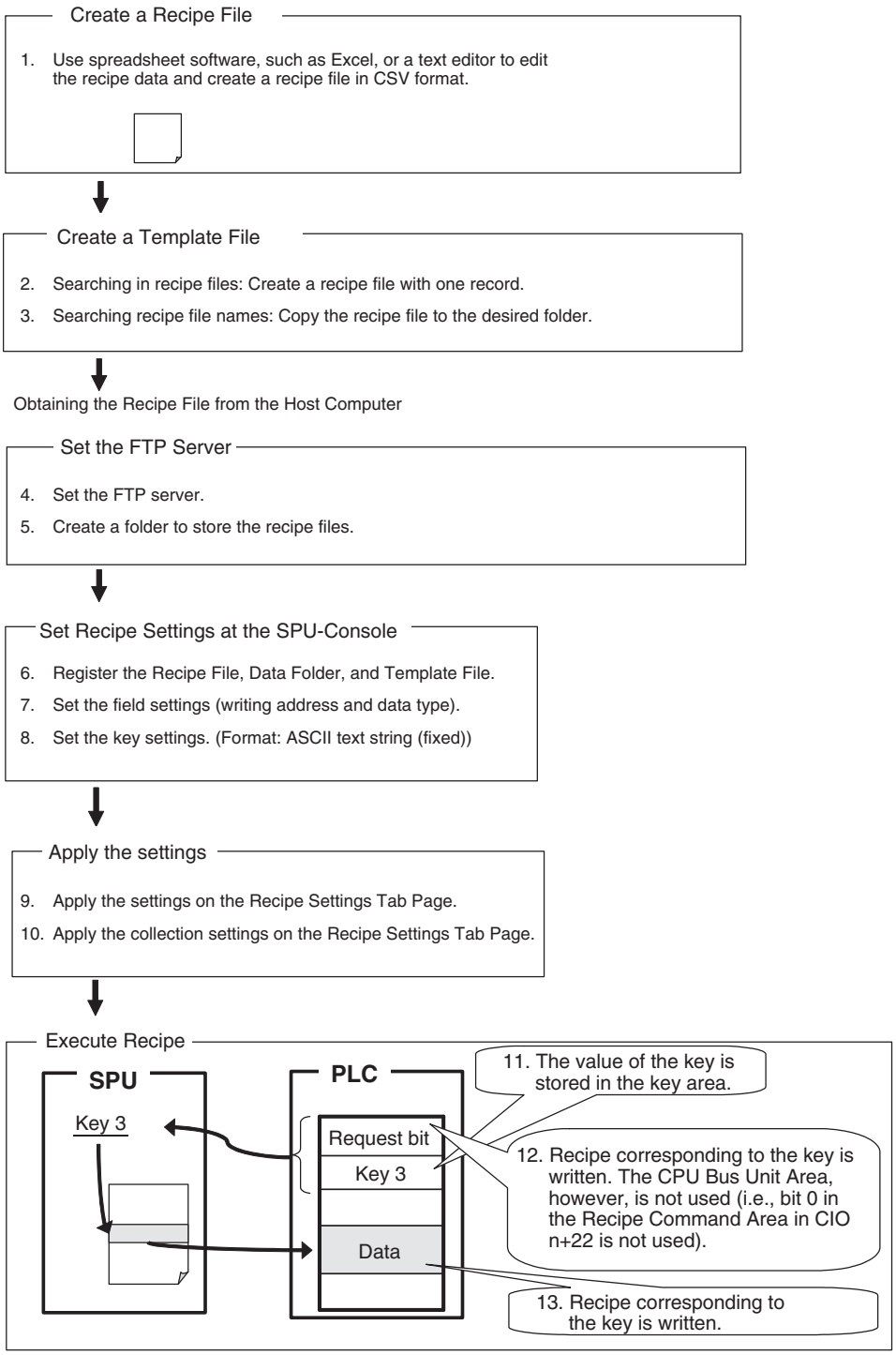


Contiguous Area Format



13-1-4 Procedure for Using Recipes

The following figure shows the steps from creating the recipe file to execute the recipe.



13-2 Recipe Files

The recipe function writes data in the form of a CSV file. The writing method can be either the Variable Format or the Contiguous Area Format. The data type of the recipe file is different for each method.

13-2-1 Writing Formats

There are two recipe writing formats, the Variable Format and the Contiguous Area Format. The features of each method are listed below.

Variable Format

- Recipe data is written to non-contiguous memory areas.
- Data is written with a specified data type.
- Data can be converted by scaling.
- Recipe data is written one at a time, so time is required to write all data.

Contiguous Area Format

- Recipe data is written to contiguous memory areas.
- All data has a fixed data type.
- The data type cannot be specified but all recipe data is written at once, so it is faster than the Variable Format. It is suitable for cases where a large amount of data is written at once.

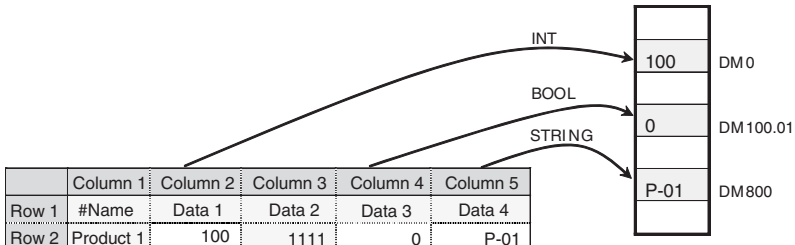
13-2-2 Variable Format Recipe File

Recipe files for the Variable Format are text files in CSV format. An example is shown below.

#Name,	Data 1,	Data 2,	Data 3,	Data 4
Product 1,	100,	1111,	0,	P-01
Product 2,	200,	9999,	1,	P-02
Product 3,	300,	FFFF,	0,	P-03

In the Variable Format, each field is written to the specified address in the specified data type. Use the appropriate data format for each data type.

Example for Writing to DM0 (INT), DM100.01 (BOOL), and DM800 (STRING) in Memory



	Column 1	Column 2	Column 3	Column 4	Column 5
Row 1	#Name	Data 1	Data 2	Data 3	Data 4
Row 2	Product 1	100	1111	0	P-01
Row 3	Product 2	200	9999	1	P-02
Row 4	Product 3	300	FFFF	0	P-03

You can specify not to write certain columns, such as column 1 and 3 in the example above.

Note (1) Use the appropriate data format for each data type. (Refer to the following table.)If the BOOL format is set for values other than 0 or 1, or the UNIT

format is set for hexadecimal numbers like A05C, a recipe data type conversion error message will be displayed.

Data type	Recipe data
BOOL	0 or 1
UINT	0 to 65535
INT	–32768 to 32767
UNIT_BCD	0 to 9999
WORD	0 to FFFF
CHANNEL	0 to FFFF
STRING	ASCII character string
UDINT	0 to 4294967295
UDINT_BCD	0 to 99999999
DWORD	0 to FFFFFFFF
REAL	-10^{-38} to 10^{+38}
LREAL	-10^{-308} to 10^{+308}
CHANNEL_BLOCK	Continuous channels (4 digits × No. of elements)

(2) Recipe data that specifies scaling with the data type is usually within the range a floating-point data type (float or double). If the scaled data is not within the range of the specified data type, a recipe data type conversion error message will be displayed.

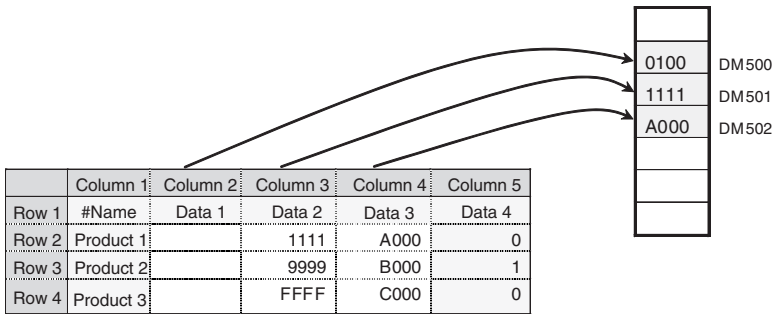
13-2-3 Recipe Files for Contiguous Area Format

Recipe files for the Contiguous Area Format are text files in CSV format. An example is shown below.

#Name,	Data 1,	Data 2,	Data 3,	Data 4
Product 1,	100,	1111,	A000,	0
Product 2,	200,	9999,	B000,	1
Product 3,	300,	FFFF,	C000,	0

In the Contiguous Area Format, the channel data is in binary format hexadecimal). Data is written to contiguous memory addresses starting from the specified head address. The number of columns to write can be specified.

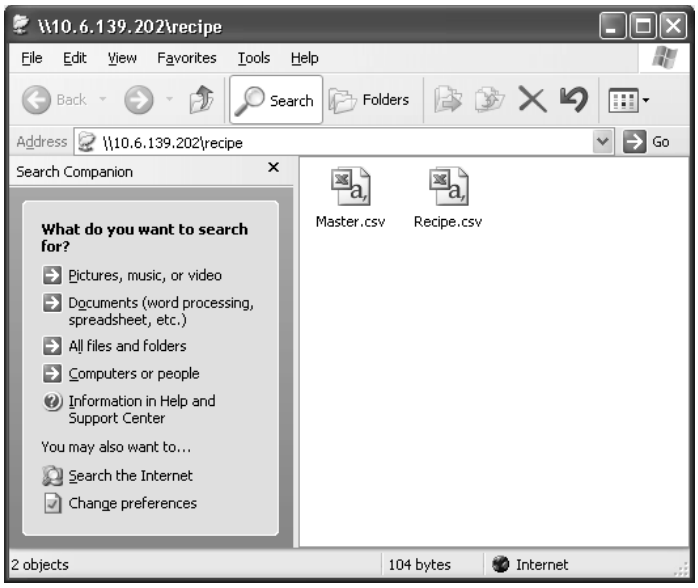
Example for Writing to Contiguous Memory Addresses from DM500 (3 columns).



You can specify not to write certain columns, such as column 1 and 5 in the example above. The fields that are written must be contiguous.

13-2-4 Storage Location of Recipe Files

To use a recipe file on a SYSMAC SPU Unit after it has been edited on a computer, the recipe file must be stored in the default folder that is automatically generated in a folder named *recipe* on the Memory Card mounted in the SYSMAC SPU Unit. Recipe files can be transferred to this folder using the procedure described in *13-10 Enabling Recipe Settings*, but the folder can also be accessed from the computer by using a shared folder on a Windows network. This way the file can be transferred by dragging and dropping. Recipe files already stored in this folder can also be directly edited.



The method to access the recipe folder in the SYSMAC SPU UNIT using a computer is described below.

- Select ***View - Display Unit Folder - Recipe Folder*** in the SPU-Console. Windows Explorer will be started and the SPU Unit's shared folder will be displayed (Data Storage Mode).
- Enter the UNC address of the SPU Unit's shared folder in the address bar of Windows Explorer (e.g., \\192.168.0.100\recipe\).

Note

(1) Unused recipe files will not be automatically deleted by the SYSMAC SPU Unit or SPU-Console. When required, manually delete the files using Windows Explorer.

(2) Do not edit or save updated recipe files while recipes are being written. The recipe may not function properly.

(3) It is not possible to create new data folders in the recipe folders using Windows Explorer. The data folders will be automatically created when the SPU Unit is restarted or the recipe settings are enabled.

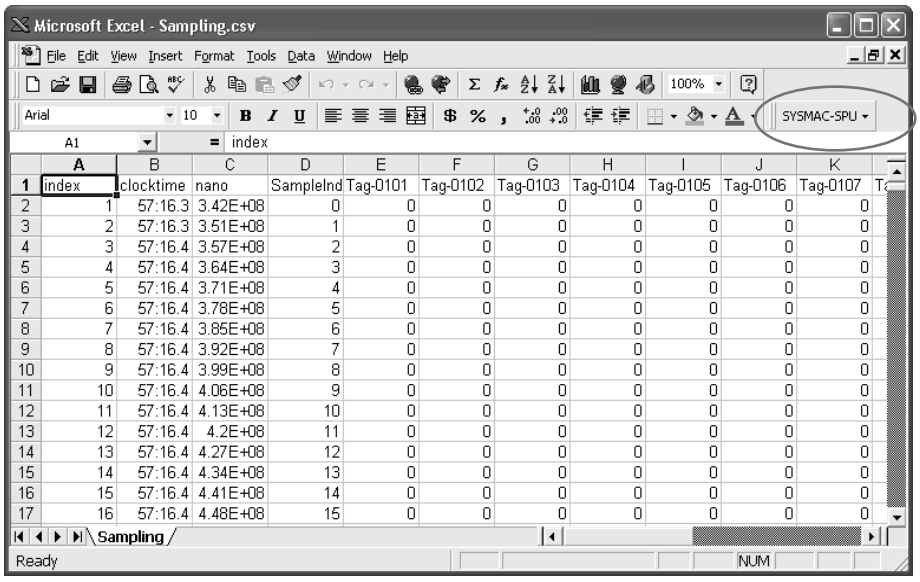
(4) Versions of Microsoft Office Excel earlier than 2003 cannot create or edit CSV data that exceeds 256 columns. For CSV files that contain more than 256 columns, a special macro file “CSVFormatter.xls” can be used. The following steps describe how to use the macro file.

The CSVFormatter.xls macro is used as follows:

1,2,3...

1. Double-click the CSVFormatter.xls file in the Journal folder (i.e., the shared folder in the SYSMAC SPU Unit). This will add a toolbar called SYSMAC-SPU to Excel.

Versions of Microsoft Office Excel Earlier Than 2003



	index	clocktime	nano	SampleInd	Tag-0101	Tag-0102	Tag-0103	Tag-0104	Tag-0105	Tag-0106	Tag-0107
2	1	57:16.3	3.42E+08	0	0	0	0	0	0	0	0
3	2	57:16.3	3.51E+08	1	0	0	0	0	0	0	0
4	3	57:16.4	3.57E+08	2	0	0	0	0	0	0	0
5	4	57:16.4	3.64E+08	3	0	0	0	0	0	0	0
6	5	57:16.4	3.71E+08	4	0	0	0	0	0	0	0
7	6	57:16.4	3.78E+08	5	0	0	0	0	0	0	0
8	7	57:16.4	3.85E+08	6	0	0	0	0	0	0	0
9	8	57:16.4	3.92E+08	7	0	0	0	0	0	0	0
10	9	57:16.4	3.99E+08	8	0	0	0	0	0	0	0
11	10	57:16.4	4.06E+08	9	0	0	0	0	0	0	0
12	11	57:16.4	4.13E+08	10	0	0	0	0	0	0	0
13	12	57:16.4	4.2E+08	11	0	0	0	0	0	0	0
14	13	57:16.4	4.27E+08	12	0	0	0	0	0	0	0
15	14	57:16.4	4.34E+08	13	0	0	0	0	0	0	0
16	15	57:16.4	4.41E+08	14	0	0	0	0	0	0	0
17	16	57:16.4	4.48E+08	15	0	0	0	0	0	0	0

Note The macro may not be enabled depending on the security settings of Microsoft Office Excel. If this is the case, select ***Options - Macro Security - Security Level*** from the Excel menus and set the security level to ***Medium***.

2. CSV files exceeding 256 columns can be displayed using Microsoft Office Excel by selecting ***SYSMAC-SPU - Open CSV file*** from the toolbar. Select a CSV file to edit in the Open File Dialog Box. If the file exceeds 256 columns, the data will be divided at every 256 columns and placed on separate worksheets. Up to 256 columns can be edited in one worksheet.
3. Save the data to a CSV file.

   Data edited on separate worksheets can be saved as a single CSV file. Select ***SYSMAC-SPU - Save CSV file*** from the toolbar. Specify the filename and save the CSV file. The worksheets will be joined together to forma single CSV file.

Managing Recipe Folders with the Expanded Recipe Function

Recipe files that are used with the expanded recipe function must be stored in the folders that are set as the data folders for expanded recipe settings. The folders are created and located in the recipe folder of the SPU Unit. The folders set as the data folders will be automatically created when the SPU Unit is started or the recipe settings are enabled.

Manually Storing Recipe Files

The folders set as the data folders for the expanded recipe function will be automatically created when the SPU Unit is started or the recipe settings are enabled. After the data folders are created, you can register the recipe file.

Storing Recipe Files Using FTP

The folders set as the data folders for the expanded recipe function will be automatically created unless data is saved when FTP is used. In this case it is not necessary to restart the SPU Unit.

Note The data folders that are automatically created with the SPU Unit are not automatically deleted. Manually delete any data folders that are no longer required. Leaving the data folders may excessively limit the available memory.

13-3 Expanded Recipe Function Setting Procedure

The basic procedure from making recipes settings to executing recipes is outlined below. Before following the procedure, a recipe file containing recipe data must be created using a computer. Refer to *13-2 Recipe Files* for details on recipe files.

1,2,3...

1. Set up the recipe environment settings. (Refer to *13-4 Setting the Recipe Environment*.)
2. Set the recipe settings.
   - 2-1. Create a recipe. (Refer to *13-5 Making Recipes Expansion Settings*.)
   - 2-2. Configure the recipe file. (Refer to *13-6 Setting Recipe and Template Files*.)
   - 2-3. Set the writing addresses. (Refer to *13-7 Setting the Recipe Writing Addresses for Variable Format*, and *13-8 Setting the Recipe Writing Addresses for Contiguous Area Format*.)
   - 2-4. Set the key. (Refer to *13-9 Setting Recipe Keys*.)
3. Transfer the settings to the SYSMAC SPU Unit. (Refer to *13-10 Enabling Recipe Settings*.)
4. Execute the recipe. (Refer to *13-11 Executing Recipes*.)
5. Check the recipe execution history. (Refer to *13-12 Displaying the Recipe Execution History*.)

Note FTP server settings must be made if recipe files are received using FTP from the host computer. Refer to the FTP server manual for information on FTP server settings.

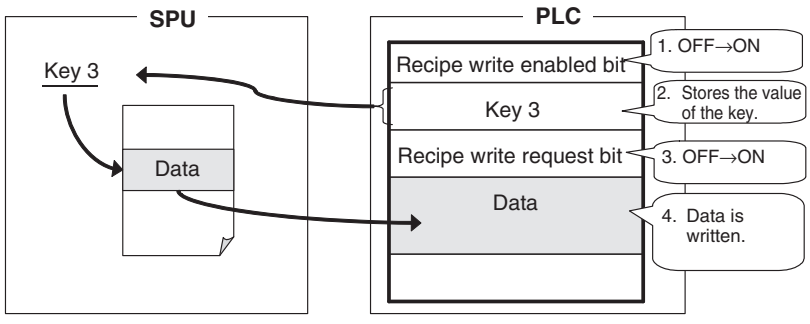
13-4 Setting the Recipe Environment

Set the environment for the recipe function. The environment settings will apply to all recipes.

The recipe function is internally processed by the SYSMAC SPU Unit in the following order.

1,2,3...

1. CPU Unit turns ON the Recipe write enabled bit in the recipe command area.
2. CPU Unit stores the value of the key in the key area.
3. The CPU Unit turns ON the Recipe Write Request Bit.
4. The SPU Unit reads the value of the key from the key area and writes the corresponding recipe data to the CPU Unit.



The memory area where the value of the key is stored can be set in Key Area of the environment settings.

Note (1) Make sure that the environment settings are properly set before setting the recipe settings.

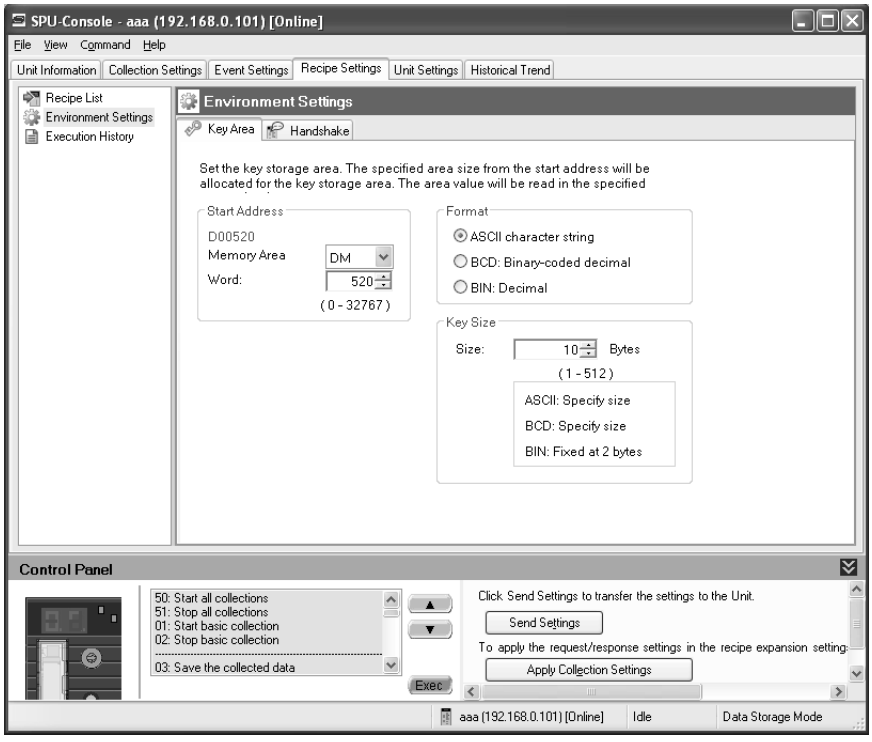
(2) The handshake setting in the environment settings is not used for the bit operation in step 3 described above.

13-4-1 Setting the Key Area

Set the CPU Unit memory area where the recipe key is stored.

1,2,3... 1. Click the **Environment Settings** Tab in the SPU-Console Recipe Settings Tab Page. The Environment Settings Window will be displayed.

2. Click the **Key Area** Tab.



The following table describes the setting parameters.

Item		Description
Start Address		Sets the start address of the memory area where value of the key is stored.
Format		Data is read into the specified memory area as one of the following data types. Data is recognized as the key.
	ASCII character string	The area corresponding to the number of bytes specified by *Key Size* is read in as an ASCII character string. Null (0 × 00) terminates the string.
	BCD: Binary-coded Decimal	This parameter cannot be used as a key in the expanded recipe function.
	BIN: Decimal	This parameter cannot be used as a key in the expanded recipe function.
Key Size		Data contained in the memory area specified by the number of bytes (key size) from the start address is recognized as the key.

The following table shows an example of a key.

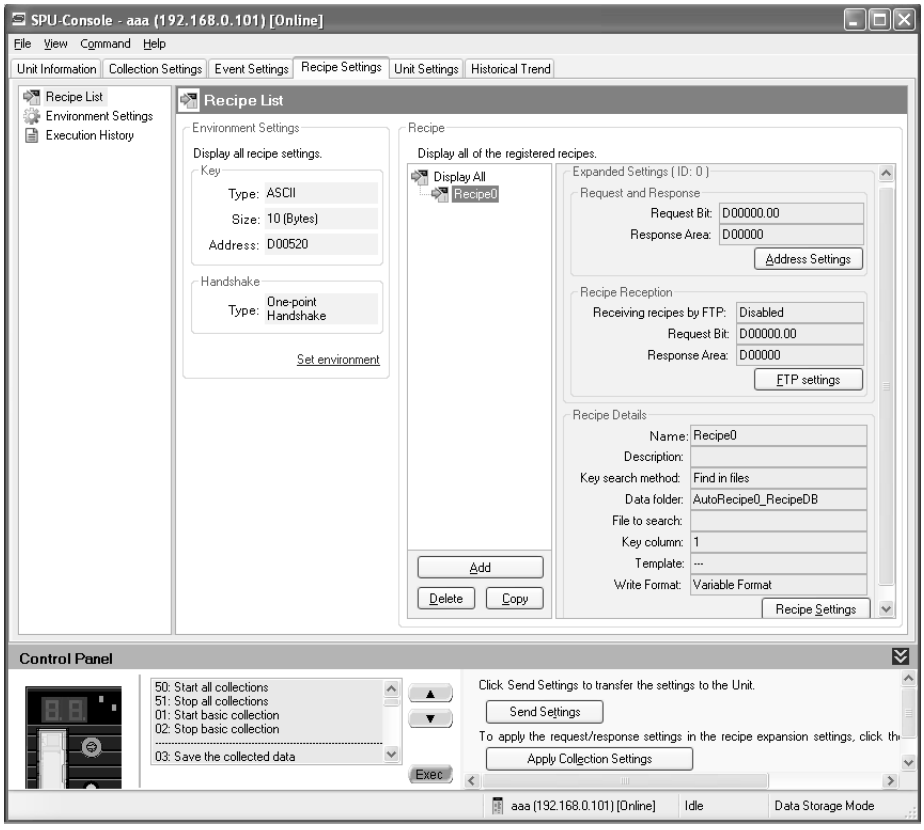
CPU Unit memory	Key
	ASCII (2 bytes)
0x3132	12

13-5 Making Recipes Expansion Settings

13-5-1 Displaying and Making Expanded Recipe Settings

1,2,3...

1. Click the **Recipe Settings** Tab in the SPU-Console.
2. Select the Recipe List. The Recipe List Window will be displayed. Change the settings as required.



The following table describes the column headers.

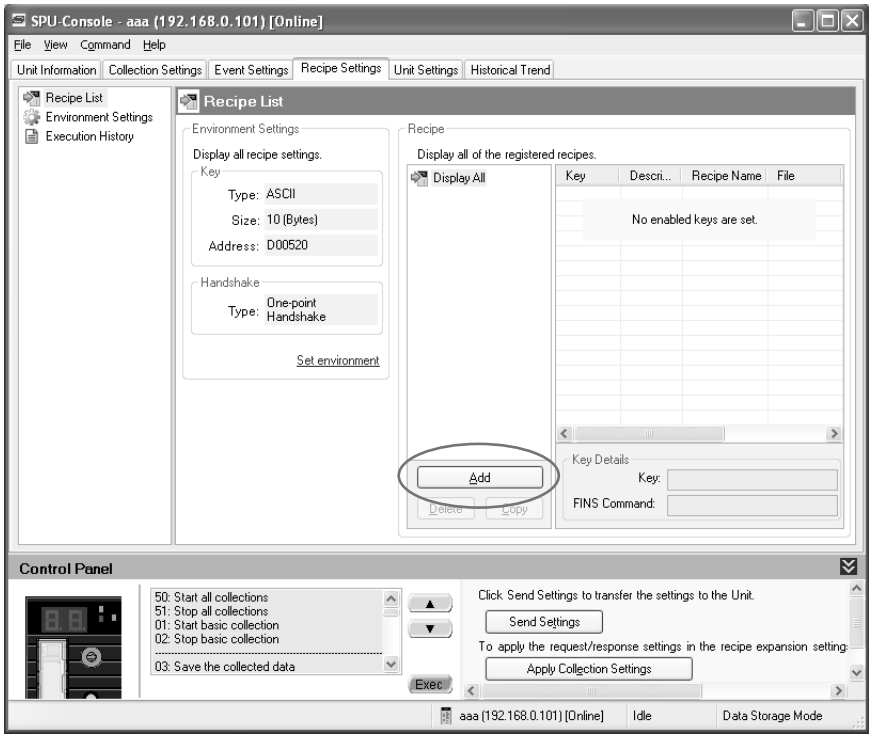
Item		Description
Environment Settings		Displays the settings of all the selected recipes.
Key		
	Type	Displays the type of key area. The type for the key area is always an ASCII character string.
	Size	Key byte length
	Address	Start address of the key area
Handshake		
	Type	This parameter cannot be used as a key in the expanded recipe function.

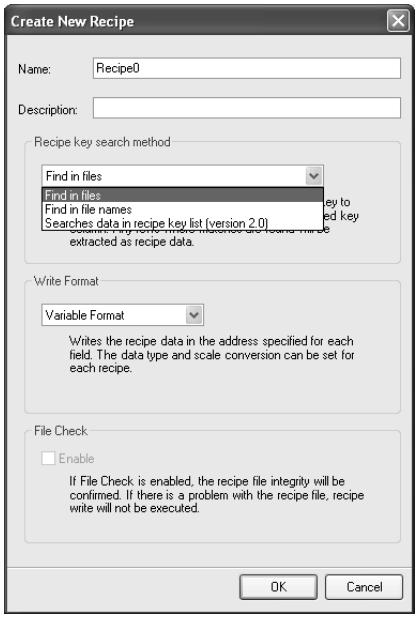
Item		Description
Recipe		Displays information for all registered recipes.
Expanded Settings		
Request and Response		
	Request Bit	Displays the Request Bit that is set in Address Settings.
	Response Area	Displays the Response Area that is set in Address Settings.
Recipe Reception		
	Receiving recipes by FTP	Displays whether recipe reception is enabled or disabled.
	Request Bit	Displays the Request Bit that is set in Recipe Reception Request/Response Settings.
	Response Area	Displays the Response Area that is set in Recipe Reception Request/Response Settings.
Recipe Details		
	Name	Sets the recipe name.
	Description	Displays the recipe description.
	Key search method	Displays the search method, i.e., searching in the recipe file or searching file names.
	Data folder	Displays the folder names in the recipe folder. Default name: AutoRecipe *n*_RecipeDB
	File to search	Displays the file names to be searched in the folders set as the data folders. This is not displayed when recipe file names are searched.
	Key column	Displays the column in which to search for the key. This is not displayed when recipe file names are searched.
	Template	Displays the template file for creating recipe files.
	Write format	Displays the recipe write format.

13-5-2 Adding Recipes

1,2,3...

1. Click the **Recipe Settings** Tab in the SPU-Console.
2. Select ***Recipe List*** to display the Recipe List Window.
3. Click the **Add** Button.
   The Create New Recipe Dialog Box will be displayed.



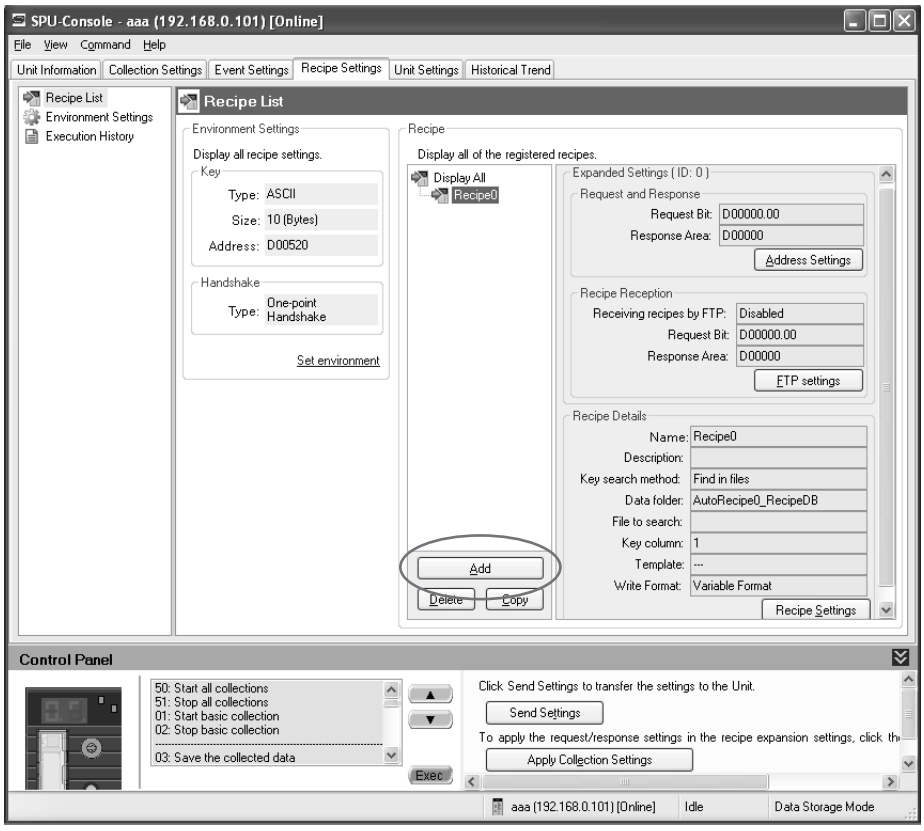


4. Enter the recipe details.

   The following table describes the setting parameters.

Item		Description
Name		Sets the recipe name.
Description		Description of the recipe. Can be omitted.
Recipe key search method		Sets the search method for recipe keys.
	Find in files	Searches for the target string as the search key in the recipe files.
	Find in file names	Searches for the target string as the search key in the recipe file names.
	Search data in recipe key list	Searches for the target string in the recipe key list.
Write Format		Sets the write format of the recipe data.
	Variable Format	Writes the recipe data in the address specified for each field. The data type and scaling can be set for each recipe.
	Contiguous Area Format	Writes the recipe data in contiguous memory addresses starting from the start address. The data type cannot be specified.
File Check		This parameter cannot be used as a key in the expanded recipe function.

5. Enter the settings and then click the **OK** Button. Check that the new recipe has been added.

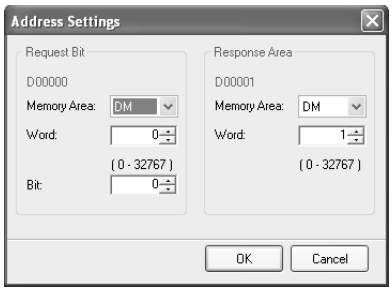


13-5-3 Setting the Request Bit and Response Area

1,2,3...

1. Click the **Recipe Settings** Tab in SPU-Console.
2. Click the **Address Settings** Button in the *Expansion Settings* Area.

3. The Address Settings Dialog Box will be displayed.



The following table describes the setting parameters.

Parameter	Description
Request Bit	Sets the data area, word, and bit number of the Request Bit that is manipulated from the CPU Unit.
Response Area	Sets the data area and word address of the Response Area to which the execution result is written from the SPU Unit.

4. Enter the settings and then click the **OK** Button.

Note Some variables and memory events will be automatically registered when the Request Bit is set. Do not delete these variables and memory events. For details, refer to *10-3-15 Variables Automatically Registered for the Expanded Recipe Function or FTP Transfers* and *11-2-5 Memory Events Automatically Registered with Expanded Recipe Function and FTP Transfers*.

Response Area Bit Configuration

The following figure shows the bit configuration of the Response Area.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	-	-	-	-	-	-	-	-	-	-	-			

Bit	Name	Description
0	Recipe start	ON when the recipe function for version 2.0 is executed from the expanded recipe function. To execute the recipe function for version 2.0, turn ON the Recipe Write Request Bit (CPU Bus Unit Area CIO n+22 bit 00).
1	Setting error	ON when there is a setting error.
2	SPU folder error	ON when there is no path for the recipe data folder.
6	Recipe duplication error	ON when an attempt is made to execute the expanded recipe function and the previous recipe function (Ver. 2.0) at the same time.
7	No request recipe data	ON when the recipe data to be searched is not in the SPU Unit.
15	Expanded recipe function in operation	ON when the expanded recipe is in operation. This bit turns OFF when bit 00 is ON.

All the Response Area bits will turn OFF when the Expanded Recipe Request Bit is turned ON.

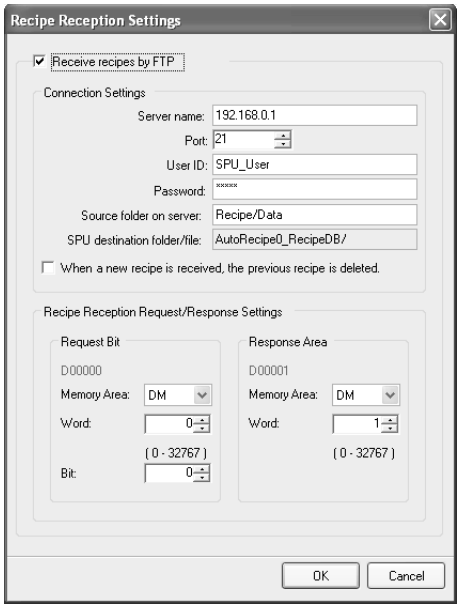
Note It is not possible to execute more than one recipe (including the expanded recipe function) at a time. If Request Bits are turned ON at the same time, they will all be processed sequentially, but execution of each bit Request Bit will start at a different time.

13-5-4 Setting Recipe Reception

Make the settings for recipe reception.

1,2,3...

1. Click the **Recipe Settings** Tab in SPU-Console.
2. Click the **Recipe Reception Settings** Button in the *Expansion Settings* Field.
3. The Recipe Reception Settings Dialog Box will be displayed.



The following table describes the setting parameters.

Item		Description
Receive recipes by FTP		Enables or disables recipe reception (default: OFF).
Connection Settings		
	Server name	Specifies the IP address of the FTP server.
	Port	Sets the port number of the FTP server (default: 21).
	User ID	Sets user ID registered to the FTP server.
	Password	Sets the password for the user ID that is registered to the FTP server.
	Source folder on server	Sets the path from the root folder of the FTP server.
	SPU destination folder/file	Displays the reception folder and file that are automatically created in the SPU Unit.
	When a new recipe is received, the previous recipe is deleted.	Sets whether to delete the recipe file before the recipe is received.
Recipe Reception Request/ Response Settings		
	Request Bit	Sets the data area, word, and bit number of the Request Bit that is manipulated from the PLC.
	Response Area	Sets the data area and word address of the Response Area to which the execution result is written from the SPU Unit.

4. Enter the settings and then click the **OK** Button.

Note Some variables and memory events will be automatically registered when the request bit is set. Do not delete these variables and memory events. For details, refer to *10-3-15 Variables Automatically Registered for the Expanded Recipe Function or FTP Transfers* and *11-2-5 Memory Events Automatically Registered with Expanded Recipe Function and FTP Transfers*.

- If the *Receive recipes by FTP* Option is not selected on the Recipe Reception Settings Tab Page, it will be grayed out, and it will not be possible to make the other settings.
- The maximum number of registrations for recipe reception is ten, which is the same as the maximum number of registrations for the expanded recipe function.
- Recipe reception and request response settings are automatically added, revised, and deleted when events or variables are set for registration, revision, and deletion.

Response Area Bit Configuration

The following figure shows the bit configuration of the response area.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	-	-	-	-	-	-	-	-	-	-	-			

Bit	Name	Description
00	Recipe reception completed	ON after the recipe has been received.
1	Setting error	ON when there is a setting error.
2	SPU folder error	ON when there is no path for the recipe data folder.
4	Recipe reception error	ON when there is a recipe reception error.
15	Recipe being received	ON while the recipe file is being received from the FTP server. OFF after reception has been completed.

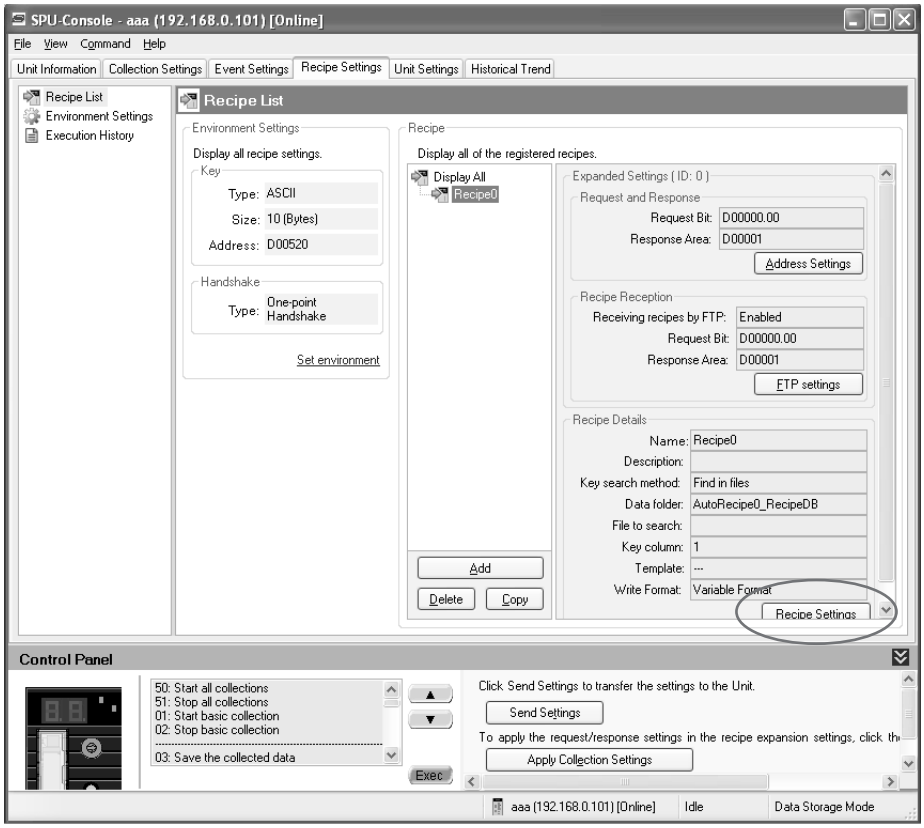
All the response area bits will turn OFF when the Expanded Recipe Request Bit is turned ON

Note It is not possible to execute more than one recipe (including the expanded recipe function) at a time. If Request Bits are turned ON at the same time, they will be all processed sequentially, but the execution of each Request Bit will start at a different time.

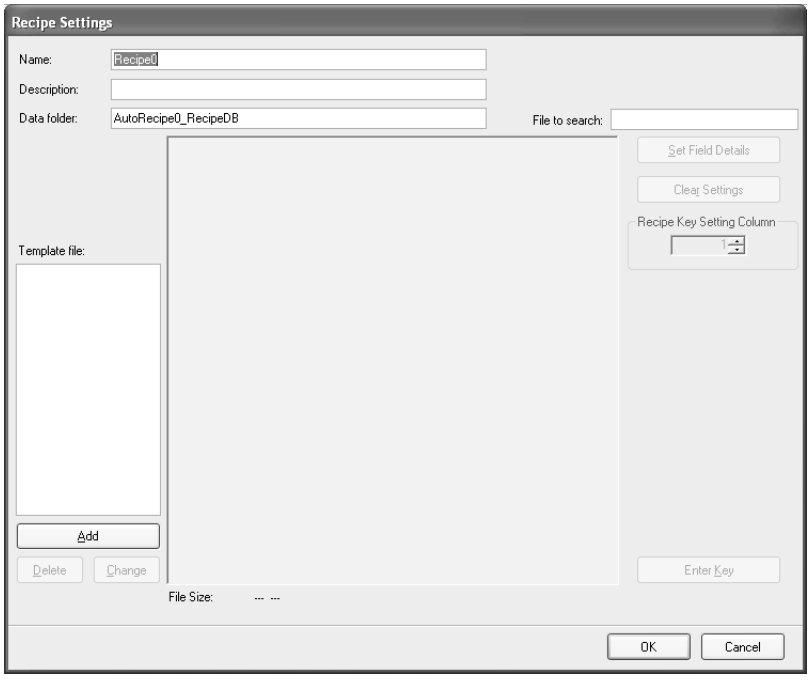
13-5-5 Setting Recipes

1,2,3...

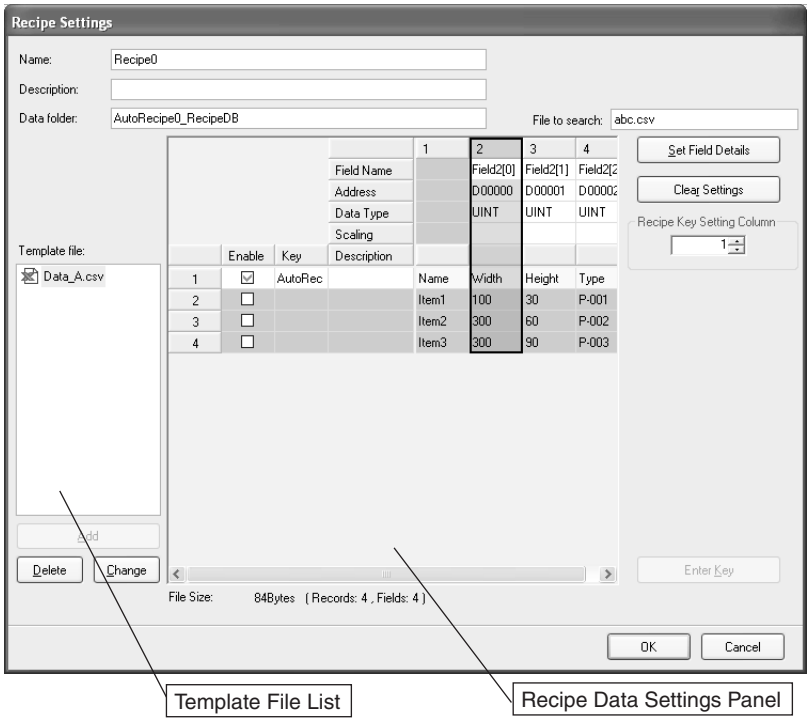
1. Select a recipe from the Recipe List.
2. Click the **Recipe Settings** Button.



3. The Recipe Settings Dialog Box will be displayed.



4. Enter the settings in the Recipe Settings Dialog Box.



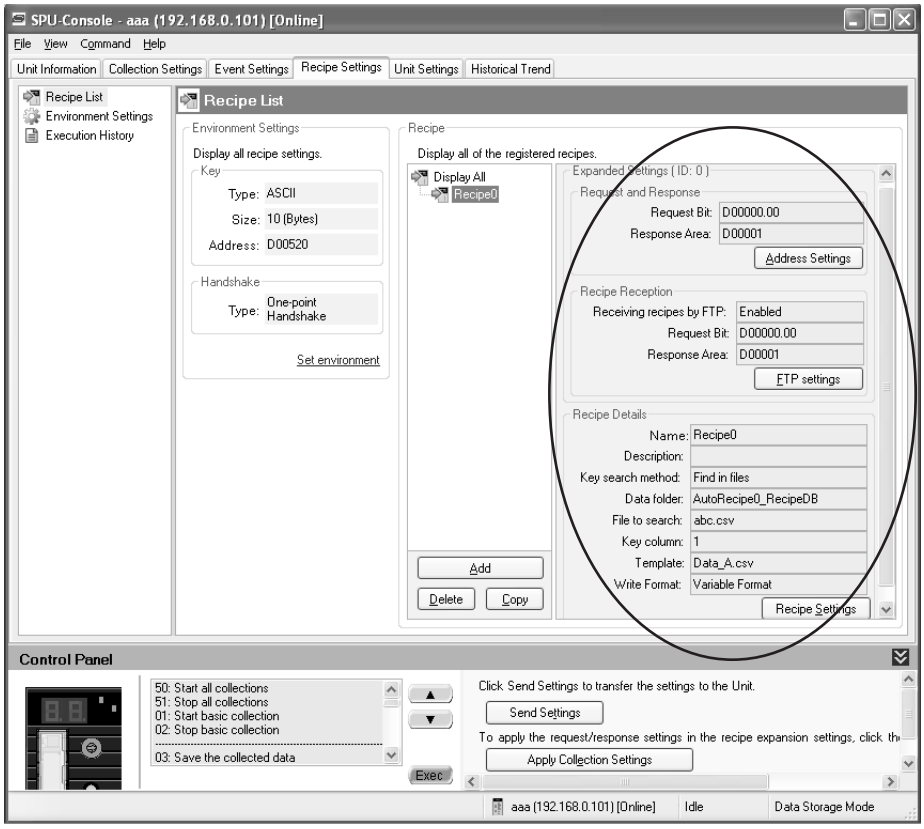
Contents of the file selected from the Template File List will be displayed in the Recipe Data Settings Panel. Refer to *13-6 Setting Recipe and Template Files* for details on the Template File List.

Set the recipe data writing address (memory address and data type) and the key in the Recipe Data Settings Panel. Refer to *13-7 Setting the Recipe Writing Addresses for Variable Format* and *13-8 Setting the Recipe Writing Addresses for Contiguous Area Format* for details on how to set the recipe writing address. Refer to *13-9 Setting Recipe Keys* for details on how to set the recipe key.

The following table describes the setting parameters.

Item	Description
Name	Sets the recipe name.
Description	Description of the recipe. Can be omitted.
Data folder	Sets the folder names to be created in the recipe folders.Default name: AutoRecipe n_RecipeDB
Template file	Sets the file to which the recipe data is written. The template file must be created in advance. Refer to *13-1-2 Recipe File Data Structure and File Organization* for information on template files.
File to search	Sets the file to search in the folders set as the data folders.
Recipe Key Setting Column	Sets the column in which to search for the recipe key.
Recipe File Data Setting Panel	Displays the contents of the recipe file. Sets the recipe data writing address for each field, and recipe data key for each record.

5. Set the parameters and click the **OK** Button to save the recipe settings.
6. Check the Recipe List Window to see that the recipe settings have been added.



13-5-6 Copying Recipes

1,2,3...

1. Select a recipe to copy from the Recipe List Window.
2. Click the **Copy** Button. A copy of the selected recipe will be added.

13-5-7 Deleting Recipes

1,2,3...

1. Select a recipe to delete from the Recipe List Window.
2. Click the **Delete** Button.

13-6 Setting Recipe and Template Files

Overview of Recipe and Template Files

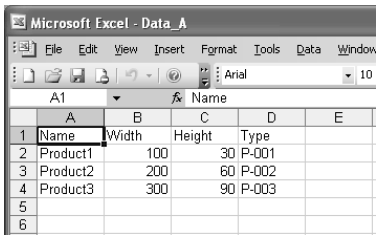
What is a Recipe File?

- A file that has recipe data written on it is called a recipe file.
- Recipe data is comprised of fields and records.
  - Field: Used to set the write address and the data type.
  - Record: Contains collection of data for each field.
- Recipe data is written to a CSV file.

What is a Template File?

- A file that has written recipe data (records only) that is copied or extracted from a recipe file is called a template file.
- Template data is comprised of records only.
- Template data is written to a CSV file.

A recipe file must be created in advance using an application such as Microsoft Office Excel. Refer to *13-1-2 Recipe File Data Structure and File Organization* for details on recipe files and template files. In this section it is assume that a CSV file (as shown in figure below) has already been created to be used as the recipe file.

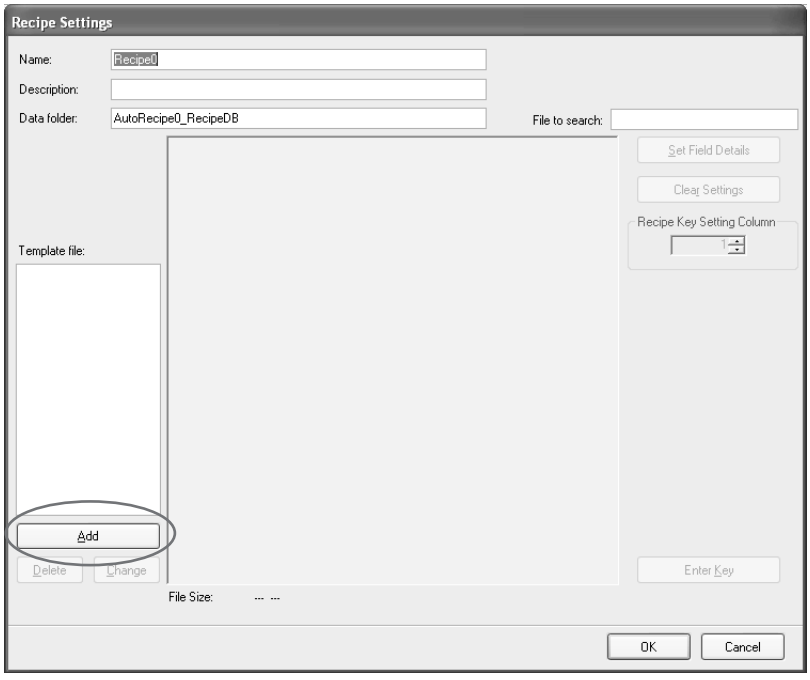


13-6-1 Adding Template Files

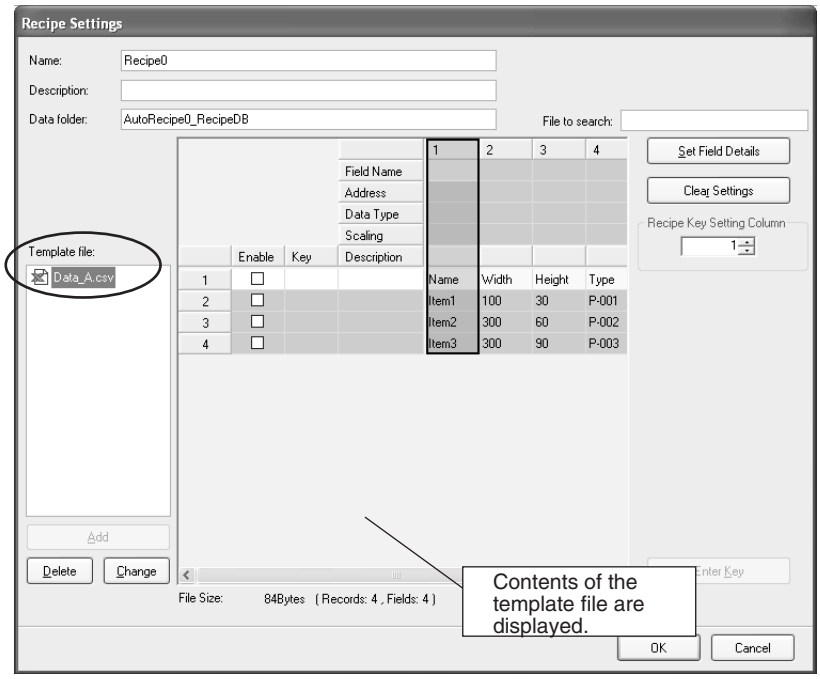
1,2,3...

1. Select a recipe file from the Recipe List Window.
2. Click the **Recipe Settings** Button.

   The Recipe Settings Dialog Box will be displayed.
3. Click the **Add** Button. Select a file to use as the recipe in the Open File Dialog Box. (The template file must be created in advance.)



4. The selected file will be added to the Template File List and the contents of the file will be displayed in the Recipe Settings Panel.



13-6-2 Deleting Template Files

1,2,3...

1. 1Select a recipe from the Recipe List.
2. Click the **Recipe Settings** Button.

   The Recipe Settings Dialog Box will be displayed.
3. Select a template file that you want to delete and click the **Delete** Button.

13-6-3 Changing Template Files

The recipe data can be changed by selecting another recipe file, while leaving the field settings and key settings unchanged.

1,2,3...

1. Select a recipe from the Recipe List.
2. Click the **Recipe Settings** Button.

   The Recipe Settings Dialog Box will be displayed.
3. Select the template file that you want to change and click the **Change** Button.
4. Select a different recipe file from the Open Field Dialog Box. The recipe data will be changed according to the contents of the selected file.

13-7 Setting the Recipe Writing Addresses for Variable Format

Set recipe writing addresses in the CPU Unit memory area.

There are two recipe writing formats, the Variable Format and the Contiguous Area Format. This section describes the Variable Format.

13-7-1 Setting the Writing Address for Each Field

In the Variable Format, recipe data is written to the specified address for each field. For each field, the data type and scaling can be specified.

1,2,3...

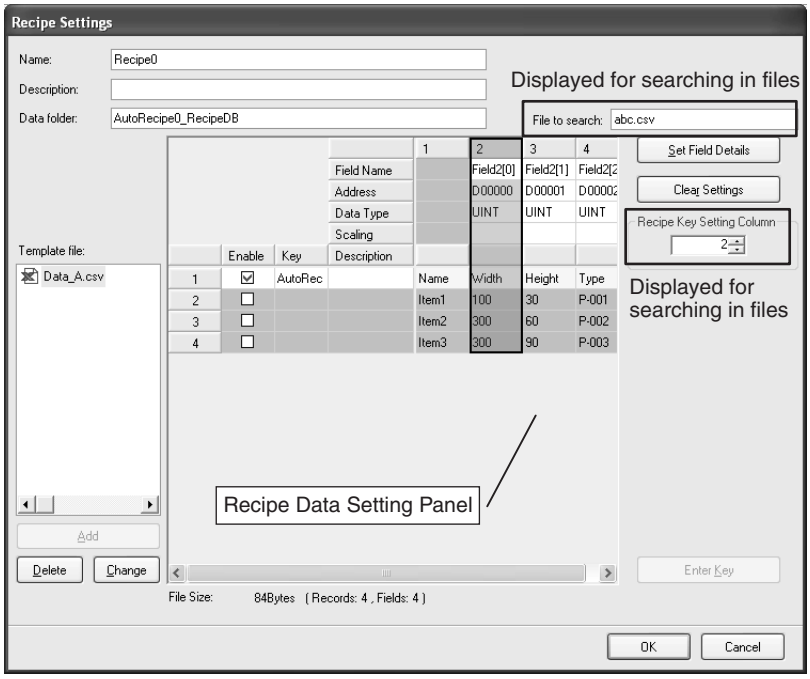
1. Select a recipe from the Recipe List.
2. Click the **Recipe Settings** Button.

The Recipe Settings Dialog Box will be displayed.

3. Select a template file from the Recipe File List.

   The contents of the selected template file will be displayed in the Recipe Data Settings Panel.

4. Set the recipe data writing address in the Recipe Data Settings Panel.



The following table describes the row header.

Item	Description
Field Name	Sets the field name. Can be omitted.
Address	Sets the CPU Unit address where the recipe data is written.
Data Type	Sets the data type of the recipe data.
Scaling	Writes recipe data that has been converted by a specified formula.

Details of the Recipe Data Settings Panel are described below.

Changing the Field Name

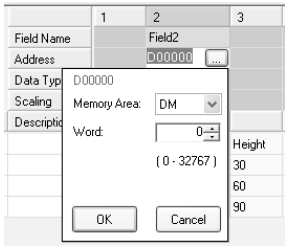
Double-click the cell that you want to change. Enter the new name.

Changing the Address

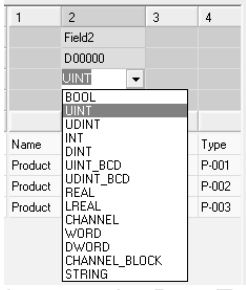
Double-click the cell that you want to change. Click the ... Button and enter the new address in the displayed window. Click the **OK** Button. Alternatively, you can directly enter the new address in the cell.

Changing the Data Type

Double-click the cell that you want to change. Select a data type from the drop-down list.



Changing the Address



Changing the Data Type

Note (1) Use the appropriate data type for the recipe data. (Refer to following table.) If the BOOL format is set for values other than 0 or 1, or the UNIT format is set for hexadecimal numbers like A05C, a recipe data type conversion error message will be displayed.

Data type	Recipe data
BOOL	0 or 1
UINT	0 to 65535
INT	–32768 to 32767
UNIT_BCD	0 to 9999
WORD	0 to FFFF
CHANNEL	0 to FFFF
STRING	ASCII character string
UDINT	0 to 4294967295
UDINT_BCD	0 to 99999999
DWORD	0 to FFFFFFFF
REAL	-10^{-38} to 10^{+38}
LREAL	-10^{-308} to 10^{+308}
CHANNEL_BLOCK	Continuous channels (4 digits × No. of elements)

(2) Recipe data that specifies scaling with the data type is usually within the range a floating-point data type (float or double). If the scaled data is not within the range of the specified data type, a recipe data type conversion error message will be displayed.

Selecting Fields

- Selecting a Single Field

  Click the desired field's column header cell.
- Selecting a range of Consecutive Fields

  Click the first field's column header cell. Press **Shift** Key while clicking the last field's column header cell.

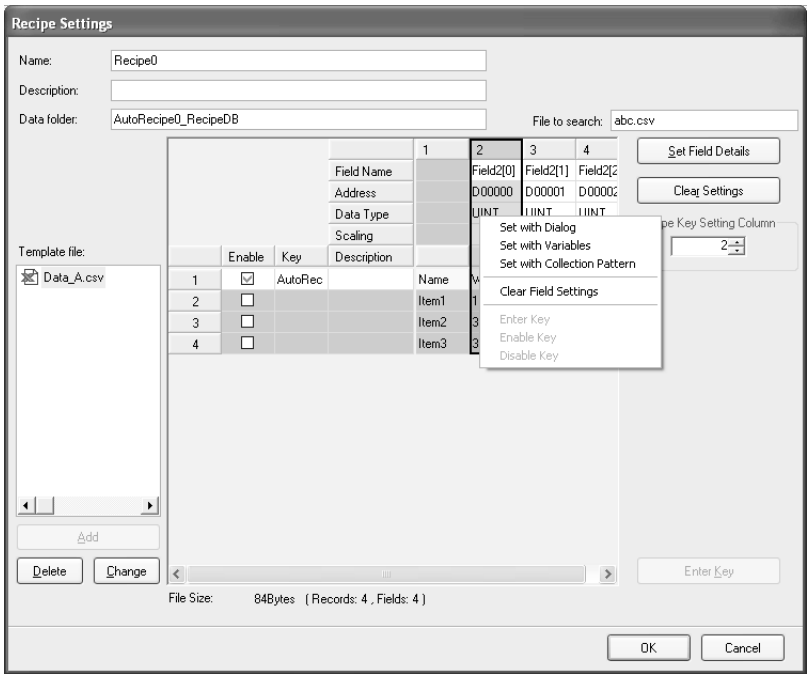
13-7-2 Field Settings Dialog Box

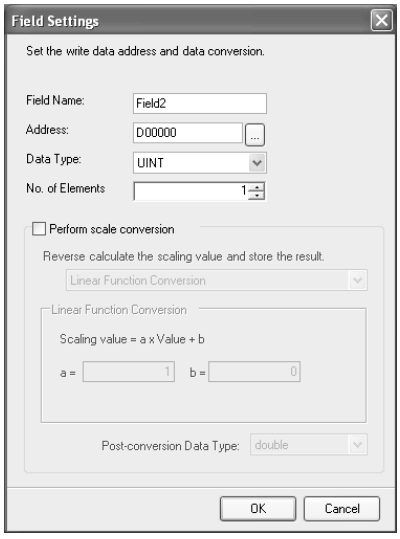
Set the writing address and data type of the recipe for each field. Detailed settings can be made for each field in the Field Settings Dialog Box.

1,2,3...

1. Select a field and click the **Set Field Details** Button. Select the ***Set with Dialog***. Alternatively, double-click the column header, or right-click the selected field and select the ***Set with Dialog***.

   The Field Settings Dialog Box will be displayed.





2. Set the field parameters in the Field Settings Dialog Box.
   The following table describes the field parameters.

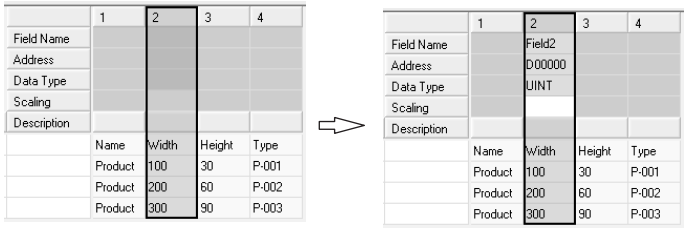
Item	Description
Field Name	Sets the field name. Can be omitted.
Address	Sets the writing address of the recipe data.
Data Type	Sets the data type of recipe data.
No. of Elements	Sets the number of elements of recipe data.
Scaling	Writes recipe data that has been converted by a specified formula. There is no need to specify the scaling parameters for recipe data that do not require scaling.

The following table describes the scaling settings.

Equation	Description
Linear function conversion	The values of the recipe data are converted using a linear function. Specify a floating-point data type (float or double). Calculate the values in the following manner: Memory value = (Recipe data value – b) ÷ a Recipe data value = a × Memory value + b) Where a and b are specified constants)
Maximum/Minimum Conversion	Recipe data with a specified upper and lower limit is converted to a value with a new upper and lower limit. Specify a floating-point data type (float or double).
Decimal position conversion	Moves the decimal point of the memory data to a specific point. Specify a floating-point data type (float or double).

3. Set the parameters and click the **OK** Button.

   The writing address will be set in the field.



Before Setting After Setting

13-7-3 Setting Variables in Fields

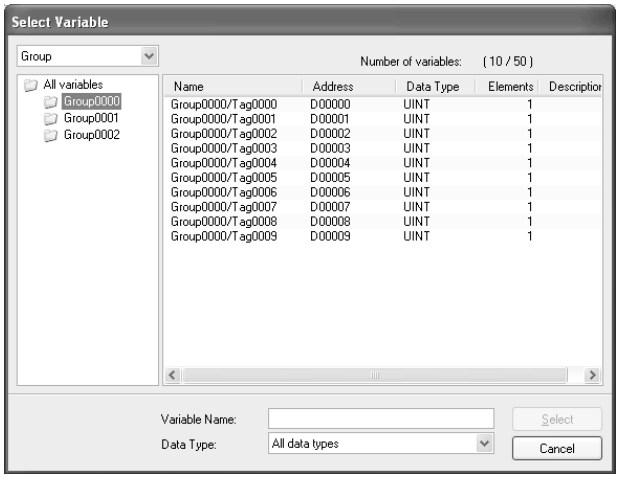
Variables that were set in the data collection settings can be set in fields.

Refer to *10-3 Setting Variables* for details on the data collection settings.

1,2,3...

1. Select a field and click the **Set Field Details** Button. Select ***Set with Variables***. Alternatively, right-click the field and select ***Set with Variables***.

   The Select Variable Dialog Box will be displayed.



2. Select a variable to set in the field in the Select Variable Dialog Box. Click the **Select** Button.

   The selected variable will be set as the field.

Note Variables with address memory type SPU/CIO or SPU/DM cannot be set in fields. Recipes cannot write recipe data to SPU/CIO or SPU/DM variables.

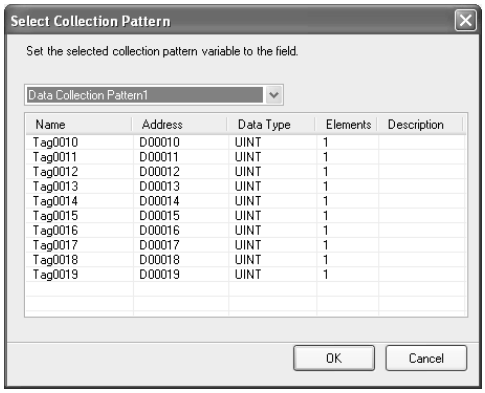
13-7-4 Setting Data Collection Pattern Variables in Fields

Variables that were set in the data collection pattern settings can be set in fields. This is used when a file containing data collected by the SYSMAC SPU Unit is used as a recipe. Refer to *10-4 Setting Data Collection Patterns* for details on the data collection settings.

1,2,3...

1. Select a field and click the **Set Field Details** Button. Select ***Set with Collection Pattern***. Alternatively, right-click the field and select ***Set with Collection Pattern***.

   The Select Collection Pattern Dialog Box will be displayed.



2. Select a collection pattern (group of variables) to set as the field in the Select Collection Pattern Dialog Box. Click the **OK** Button.

   All variables in the collection pattern will be set as fields.

Note Variables with address memory type SPU/CIO or SPU/DM cannot be set in fields. Recipes cannot write recipe data to SPU/CIO or SPU/DM variables.

13-7-5 Changing Field Settings

Use the Field Settings Dialog Box to change the field settings.

1,2,3...

1. Select the field that you want to change and click the **Set Field Details** Button. Select ***Set with Dialog***. Alternatively, double-click the column header, or right-click the selected field. Select ***Set with Dialog***.

   The Field Settings Dialog Box will be displayed.
2. Enter the new settings in the Field Settings Dialog Box.
3. Set the parameters and click the **OK** Button.

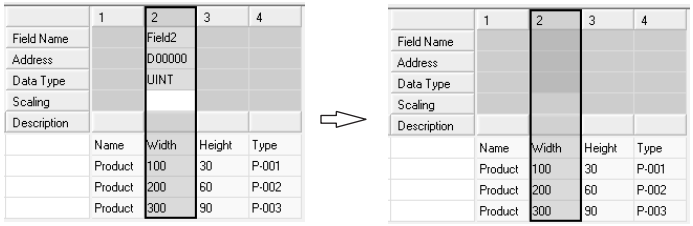
   The writing address will be set to the field.

   Refer to *13-7-2 Field Settings Dialog Box* for details on the Field Settings Dialog Box.

13-7-6 Clearing the Field Settings

Clear the field settings of unused fields.

Select the fields that you want to clear and click the **Clear Settings** Button.



Before Clearing After Clearing

13-8 Setting the Recipe Writing Addresses for Contiguous Area Format

Set recipe writing addresses in the CPU Unit memory area.

There are two recipe writing formats, the Variable Format and the Contiguous Area Format. This section describes the Contiguous Area Format.

13-8-1 Setting the Recipe Writing Address

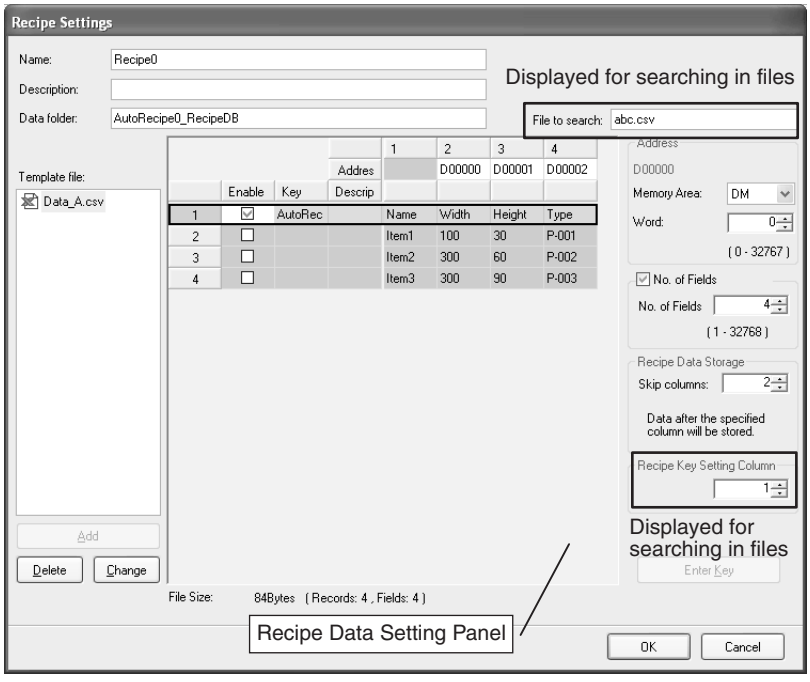
In the Contiguous Area Format, recipe data is written all at once to the specified range of addresses starting from the head address. Data type cannot be specified. All recipe data is read in and written to the memory as hexadecimal channel.

1,2,3...

1. Click the **Recipe Settings** Tab.
2. Select the **Recipe List** Dialog Box.
3. Click the **Settings** Button.

   The Recipe Settings Dialog Box will be displayed.
4. Select a recipe file from the Recipe File List.

   Details will be displayed on the Recipe Data Settings Panel.



5. Set the recipe data writing address in the Recipe Data Settings Panel.

The following table describes the row header.

Item	Description
Address	Displays the CPU Unit memory address where the recipe data is written.

The following table describes the setting parameters.

Item	Description
Address	Sets the header address of the memory where the recipe data will be written.
No. of Fields	Sets the size of the recipe data that will be written. When the checkbox is selected, the specified number of fields are written to memory as recipe data. If the number of fields available to write as the recipe data are less than the specified number of fields, the missing fields will not be written to memory. When the checkbox is not selected, all the fields (excluding the header) will be written to memory.
Recipe Data Storage	Sets the first column to be used as the recipe data.

13-9 Setting Recipe Keys

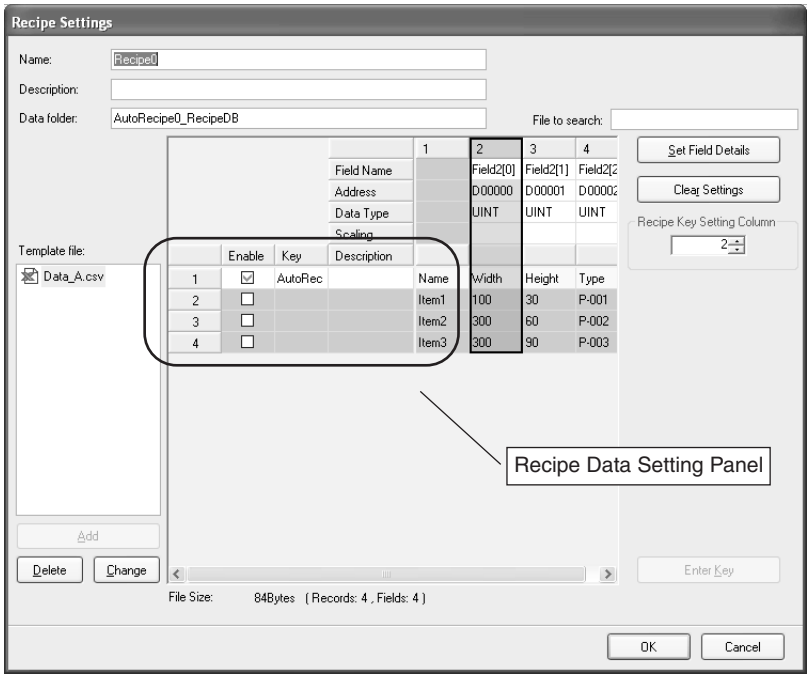
13-9-1 Setting the Recipe Key

1,2,3...

1. Click the **Recipe Settings** Tab.
2. Select the **Recipe List** Dialog Box.
3. Select a recipe.
4. Click the **Recipe Settings** Button.

   The Recipe Settings Dialog Box will be displayed.
5. Select a template file from the Template File List.

   The contents of the selected template file will be displayed in the Recipe Data Settings Panel.



6. Set the recipe data key in the Recipe Data Settings Panel.

The following table describes the column headers.

Item	Description
Enable	Enables/disables the key settings. If disabled, the key settings will not affect the recipe settings.
Key	Sets the recipe data key (alphanumeric characters).
Description	Cannot be set.

Details of the Recipe Data Settings Panel are described below.

Changing the Enable Status

Click the cell that you want to change. When the cell is enabled, the key will be automatically registered.

Selecting Records

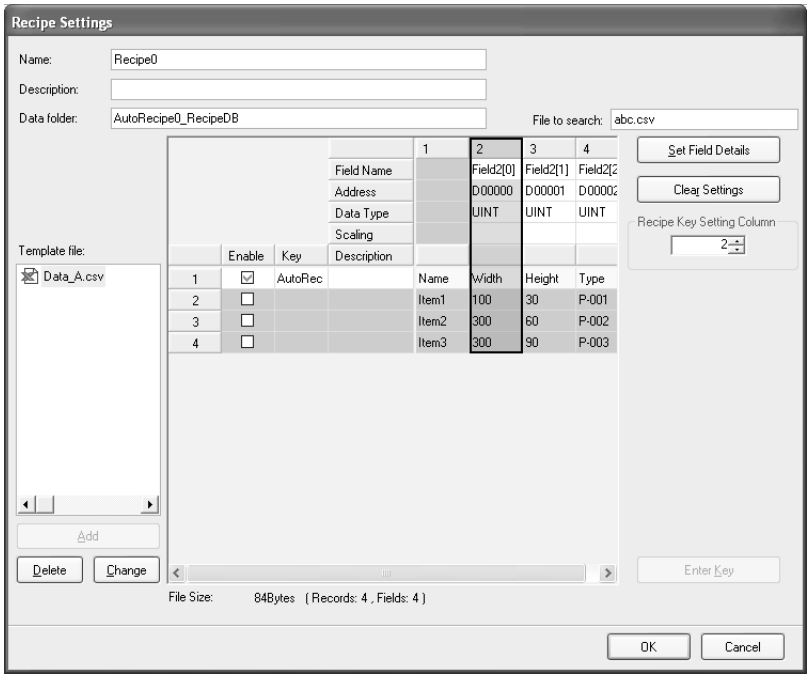
- Searching in Recipe Files
  Setting is possible for the first line only.
- Searching Recipe File Names
  Only one record can be set from multiple records.

Two Types of Recipe Setting Windows

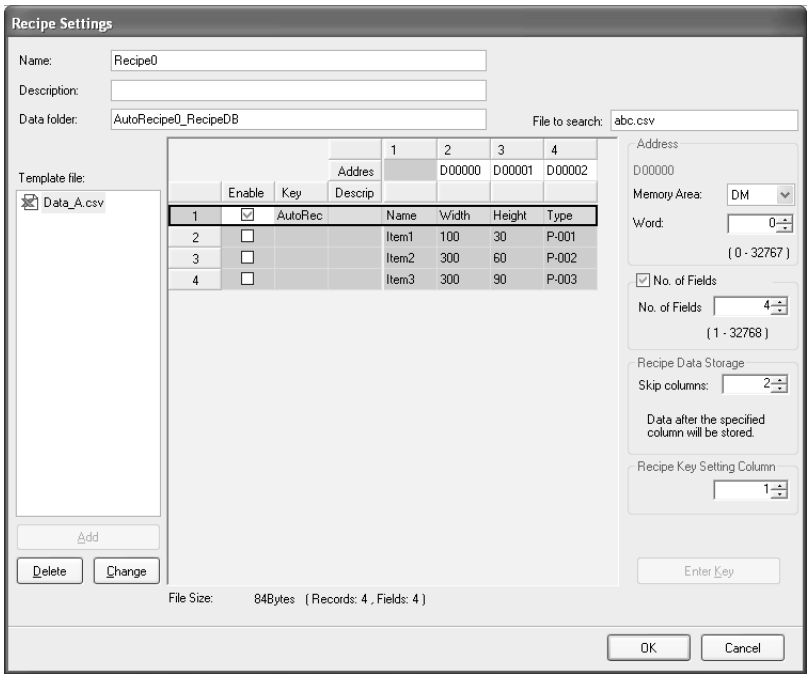
Different recipe setting windows will be displayed depending on the recipe search method.

Searching in Recipe Files

Variables:

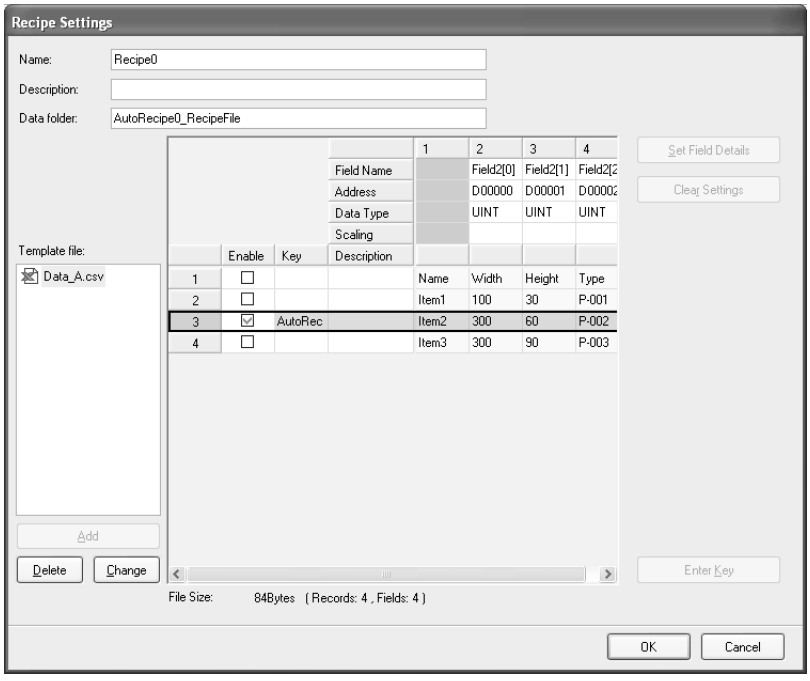


Contiguous Area:

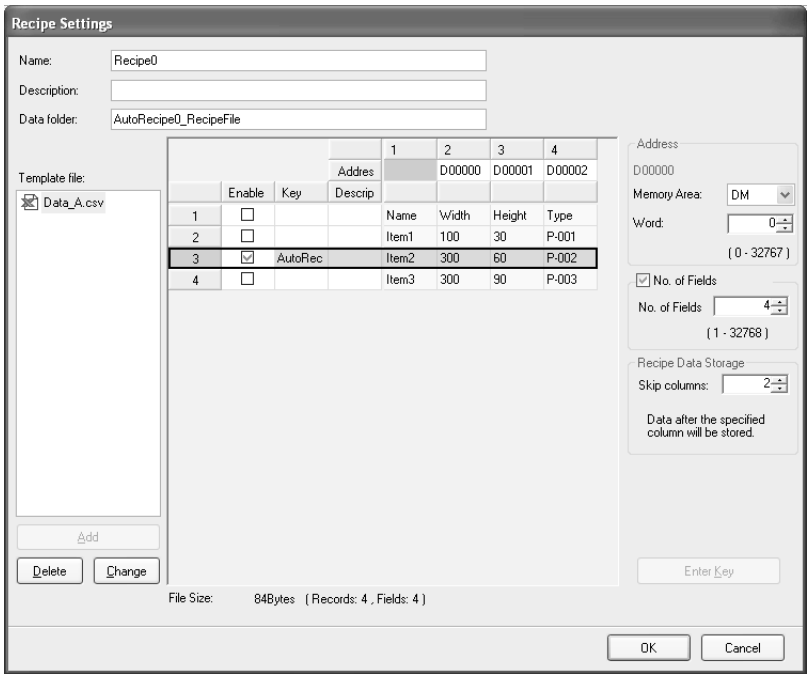


Searching Recipe File Names

Variables:



Contiguous Area:



13-10 Enabling Recipe Settings

The procedure for enabling recipe settings in the SYSMAC SPU Unit is described below. Use this procedure if the recipe settings are changed. The recipe settings and recipe file will be transferred to the SYSMAC SPU Unit.

Note

(1) Make sure that the SPU-Console is connected to the SYSMAC SPU Unit before enabling the settings.

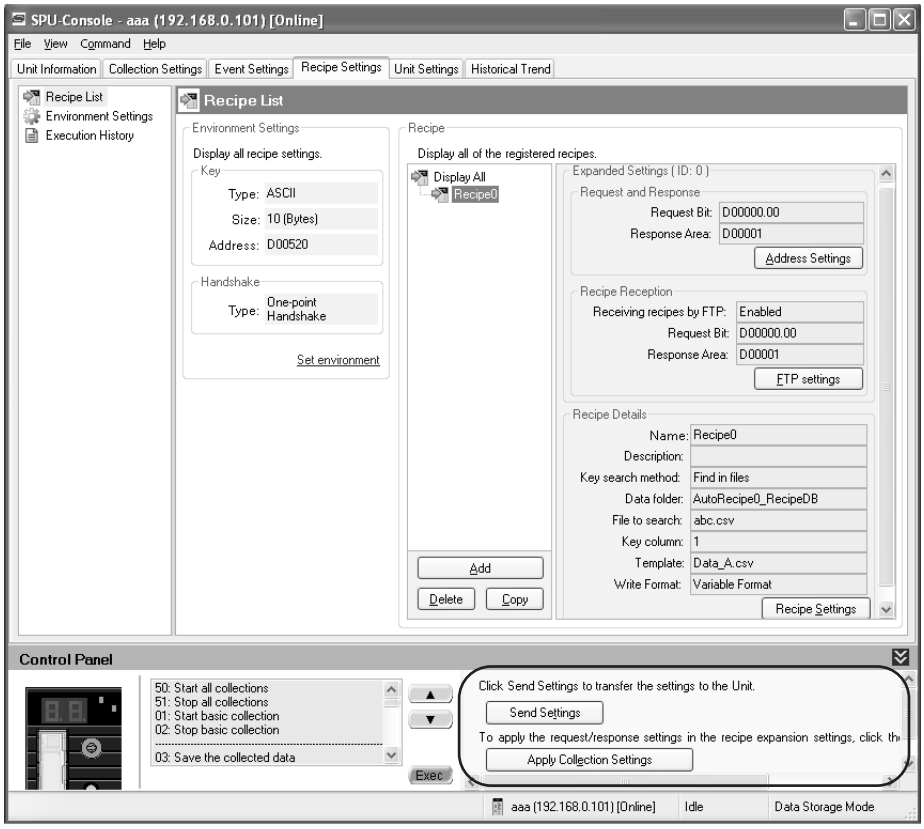
(2) When settings are transferred, the current SYSMAC SPU Unit settings will be overwritten. When a recipe file with the same name exists in the Memory Card, the recipe file will also be overwritten.

(3) Do not turn OFF the power to the Unit while settings are being transferred. Doing so will transfer corrupted information to the Unit and may cause malfunction.

(4) Do not enable recipe settings while the recipe is being written.

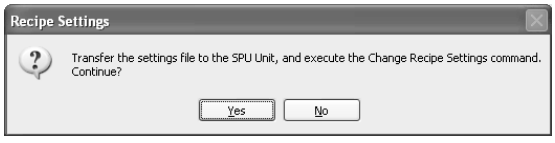
1,2,3...

1. Check that recipe settings have been completed.
2. Click the **Recipe Settings** Tab in the SPU-Console.



3. Click the **Send Settings** Button in the SPU-Console Control Panel.

   The following dialog box will be displayed to confirm the settings transfer.



4. To execute the settings transfer, click the Yes Button.

   When the Change Recipe Settings command is executed, “A” will be displayed in the 7-segment display on the SYSMAC SPU Unit. When it has finished, the display will return to “-D”.

   The new settings will be enabled when the display shows “-D”.

5. Click the **Apply Collection Settings** Button to apply the expanded recipe request and response settings to the variables and memory events. The settings will be applied and will be enabled after “-D” is displayed.

13-11 Executing Recipes

This section describes how to execute recipes.

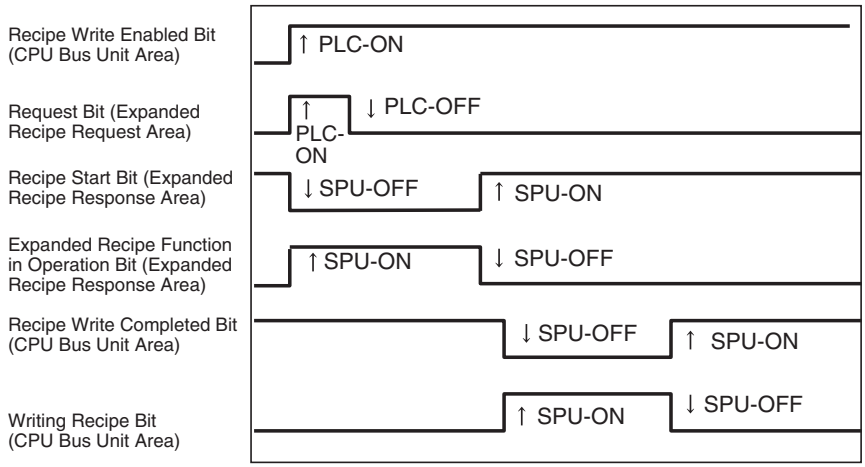
13-11-1 Normal Operation

The recipe write function is executed when the bit is ON.

Refer to *7-2 CIO Area* and *13-5-3 Setting the Request Bit and Response Area* for information on the bit to use.

The following figure shows the bit operation when the recipes are written. The CPU Unit turns ON the Expanded Recipe Request Bit, and the SYSMAC SPU Unit turns it OFF.

■ **Sequence Diagram for Normal Operation**

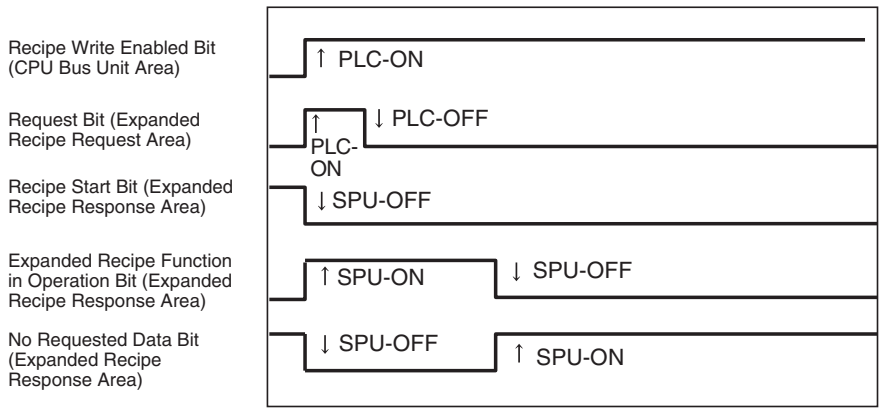


1,2,3...

1. The CPU Unit turns ON the Recipe Write Request Bit.
2. The CPU Unit turns ON the Request Bit.
3. The SPU Unit turns OFF the Recipe Start Bit (bit 00), turns ON the Expanded Recipe Function in Operation Bit (bit 15), searches for the recipe data, and creates the template.
4. Once the template file has been created, the Recipe Start Bit (bit 00) turns ON, and the Expanded Recipe Function in Operation Bit (bit 15) turns OFF.
5. The SPU Unit turns OFF the Recipe Write Completed Bit (CIO n+23 bit 01), turns ON the Writing Recipe Bit (CIO n+23 bit 01), and starts to write the recipe data of the template file.
6. Once the recipe data has been written, the SPU turns ON the Recipe Write Completed Bit (CIO n+23 bit 01) and turns OFF the Writing Recipe Bit (CIO n+23 bit 00).

13-11-2 Operation without Request Recipe

■ **Sequence Diagram for Operation without Request Recipe**



1,2,3...

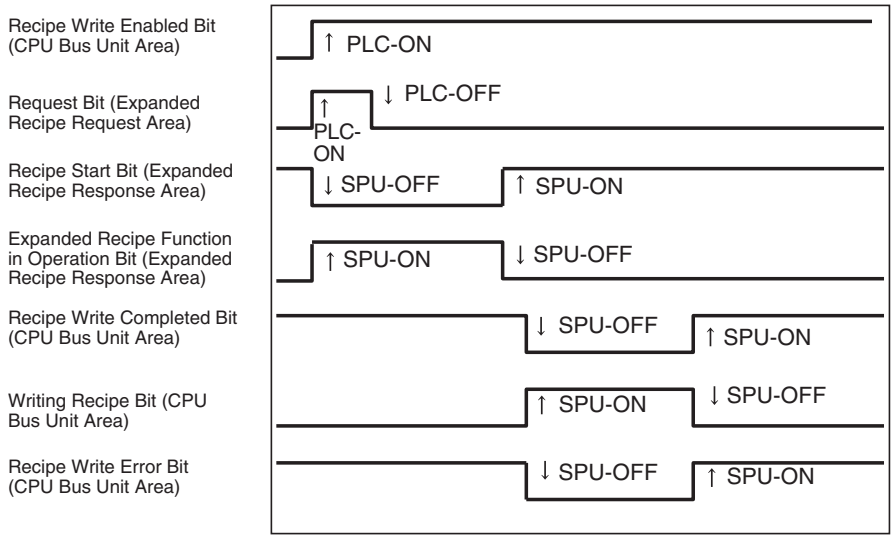
1. The CPU Unit turns ON the Recipe Write Request Bit.
2. The CPU Unit turns ON the Request Bit.
3. The SPU Unit clears the Response Area, and then turns ON the Expanded Recipe Function in Operation Bit (bit 15) and searches for the recipe data.

4. If the requested data does not exist, the No Requested Data Bit (bit 07) turns ON, and the Expanded Recipe Function in Operation Bit (bit 15) turns OFF.

Note The Recipe Write Completed Bit, Writing Recipe Bit, and Recipe Writing Error Bit in the CPU Bus Unit Area will not change.

13-11-3 Operation at Recipe Error

■ Sequence Diagram for Operation at Recipe Error



1,2,3...

1. The CPU Unit turns ON the Recipe Write Request Bit.
2. The CPU Unit turns ON the Request Bit.
3. The SPU Unit turns OFF the Recipe Start Bit (bit 00), turns ON the Expanded Recipe Function in Operation Bit (bit 15), searches for the recipe data, and creates the template.
4. Once the template file has been created, the Recipe Start Bit (bit 00) turns ON, and the Expanded Recipe Function in Operation Bit (bit 15) turns OFF.
5. The SPU Unit turns OFF the Recipe Write Completed Bit (CIO n+23 bit 01), turns ON the Writing Recipe Bit (CIO n+23 bit 00), and starts to write recipe data to the template file.
6. If a recipe data writing error occurs, the SPU Unit will turn ON the Recipe Write Error Bit (CIO n+23 bit 02), turn ON the Recipe Write Completed Bit (CIO n+23 bit 00), and turn OFF the Writing Recipe Bit (CIO n+23 bit 00).

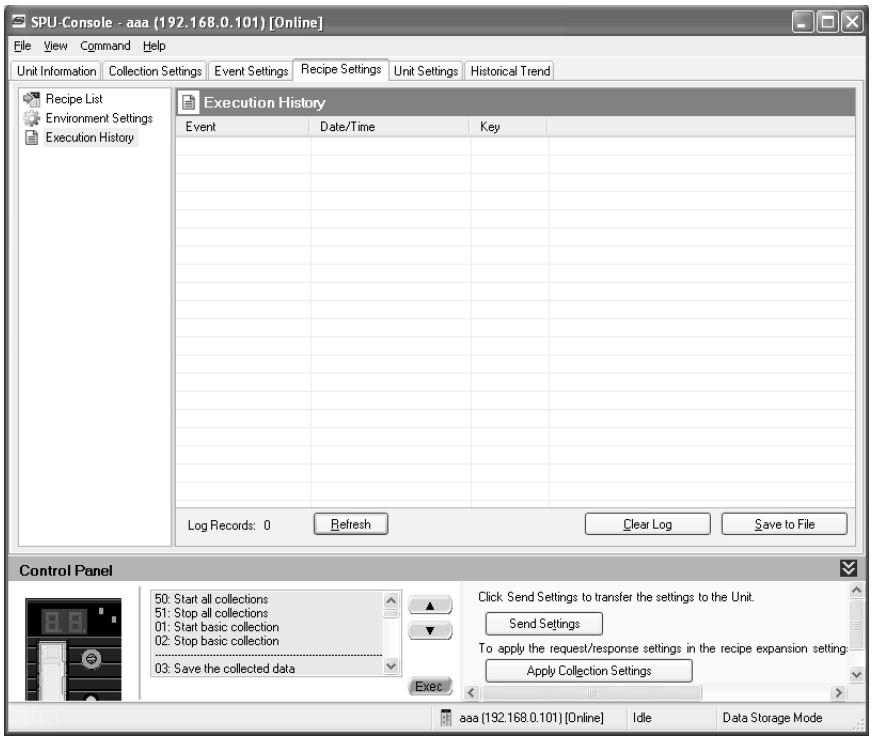
13-12 Displaying the Recipe Execution History

13-12-1 Displaying the Execution History

1,2,3...

1. Click the **Recipe Settings** Tab to display the Recipe Settings Window.
2. Select ***Execution History***.
3. To update the history, click the **Refresh** Button. Up to 500 events can be recorded.

   If the number of events exceeds 500, old events will be overwritten.



The following table describes the listed parameters.

Header	Description
Event	Name of event that occurred when executing recipe.
Date/Time	Date and time when the event occurred.
Key	Key of executed recipe.

The following table describes the events displayed in the recipe execution history.

Event	Description
Write Start	Started writing the recipe.
Write Complete	Completed writing recipe.
Error Completion	Cancelled writing recipe because an error occurred.

13-12-2 Deleting the Execution History

1,2,3...

1. Click the **Clear Log** Button.
   A confirmation dialog box will be displayed.
2. Click the **Yes** Button.
   The execution history will be deleted.

13-12-3 Saving the Execution History

1,2,3...

1. Click the **Save to File** Button.
2. Select a file from the Save As Dialog Box. The selected file will be saved in the execution history.

SECTION 14
Unit Settings

This section describes how to set the system settings and FINS network settings.

14-1 System Settings 210
14-1-1 Unit Settings 210
14-1-2 IP Network Settings 211
14-1-3 Shutdown Setting for the Power Failure Input 212
14-2 FINS Network Settings 213
14-2-1 Ethernet Settings 213
14-2-2 CS1 Bus Settings 214
14-3 Enabling Changes in Unit Settings 216

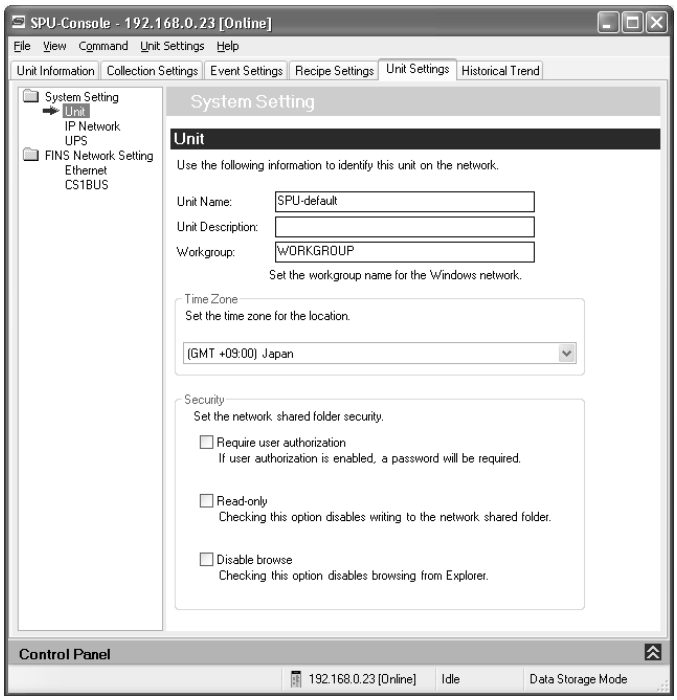
14-1 System Settings

The System Setting Panel on the Unit Setting Tab Page is used to set the Unit name, IP address, and power failure input (PF-IN) shutdown.

Note Confirm that the destination SYSMAC SPU Unit is connected before making the settings.

14-1-1 Unit Settings

Select ***System Setting - Unit*** on the Unit Setting Tab Page.



The following settings can be made.

Item	Meaning
Unit Name	This is the name displayed under My Networks on the Windows computer. Input an alphanumeric name with a maximum of 64 characters. Set a unique name for each SYSMAC SPU Unit connected to the same network. Unit names of more than 15 characters cannot be found from Windows Explorer.
Unit Description	A description of the SYSMAC SPU Unit. The description may be omitted.
Workgroup	The workgroup name on the Windows network.
Time Zone	Set the SYSMAC SPU Unit's time zone. The SYSMAC SPU Unit is factory set to UTC (Coordinated Universal Time). Always adjust the clock to the local time zone.
Security	Sets the security level for shared network folders.

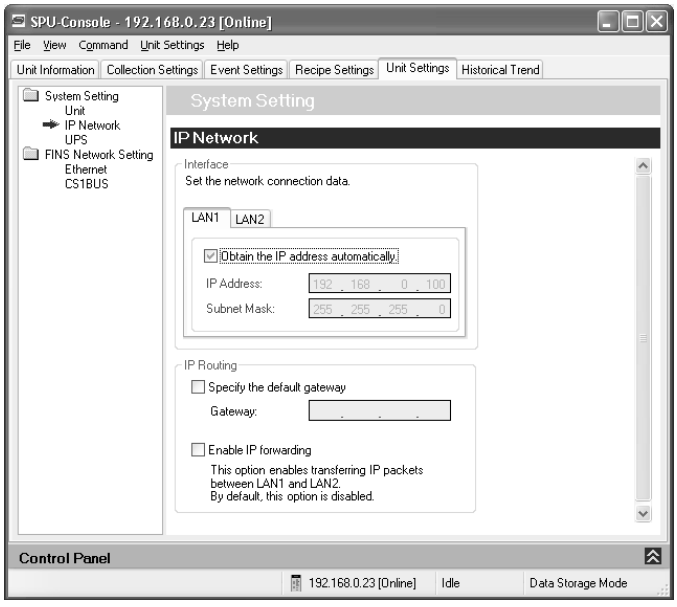
Note If *Enable the User Authorization* is selected, the SPU-Console may fail to connect to the SYSMAC SPU Unit, e.g., an error message saying the network path cannot be found may be displayed. If this happens, connect the SPU-Console to the SYSMAC SPU Unit using the following procedure.

1,2,3...

1. Exit the SPU-Console.
2. Access the SYSMAC SPU Unit's shared network folder from Windows Explorer. Input *root* (all lower case) as the user name and *OMRON* (all upper case) as the password.
3. Confirm that the SYSMAC SPU Unit folder is displayed in the network-shared folders.
4. Start the SPU-Console and connect to the SYSMAC SPU Unit.

14-1-2 IP Network Settings

Select ***System Setting - IP Network*** on the Unit Setting Tab Page.



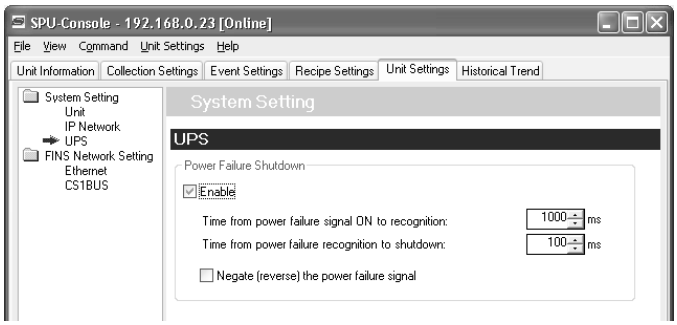
The following settings can be made.

Item	Meaning
Obtain the IP address automatically.	Select this setting to automatically obtain an IP address using the DHCP (Dynamic Host Configuration Protocol). **Note** A DHCP server must exist on the network/system to use this setting. If you do not know if a DHCP server exists, ask your system administrator.
IP Address	Input the IP address. Set a unique IP address for each SYSMAC SPU Unit connected to the same network.
Subnet Mask	Set the same subnet mask as the one set on the network computer to be connected.
IP Routing	Set the default gateway and IP forwarding to use for IP packet routing. **Note** The IP forwarding setting is supported for CS1W-SPU02 SYSMAC SPU Units only.

Note For the CS1W-SPU02, an IP address can also be set for LAN2. If an IP address is set for LAN2, use different network addresses for LAN1 and LAN2. If the same network address is used, correct communications may not be possible.

14-1-3 Shutdown Setting for the Power Failure Input

Select ***System Setting - UPS*** on the Unit Setting Tab Page.



The following settings can be made.

Item	Meaning
Enable	Select this option to enable the SYSMAC SPU Unit shutdown function when the power failure signal is detected from the uninterruptible power supply (UPS).
Time from power failure signal ON to recognition	Specify the time in millimeters from 1 to 999,999,999 between when the power failure signal turns ON and a power failure is assumed. Determine this value based on factors such as the backup time of the UPS.
Time from power failure recognition to shutdown	Specify the time in milliseconds from 1 to 999,999,999 between assuming a power failure (i.e., after the power failure signal has remained ON for the specified time) and starting execution of the shutdown process.
Negate (reverse) the power failure signal	A power failure is detected when the power failure signal is OFF (negative logic). The SYSMAC SPU Unit is factory set to detect a power failure when the power failure signal goes ON.

Note The SYSMAC SPU Unit will execute shutdown processing after it has assumed a power interruption even if the power failure signal turns OFF. The SYSMAC SPU Unit will also not restart automatically once a shutdown has been executed even if the power failure signal turns OFF. Confirm that the power supply has been restored and then restart the SYSMAC SPU Unit.

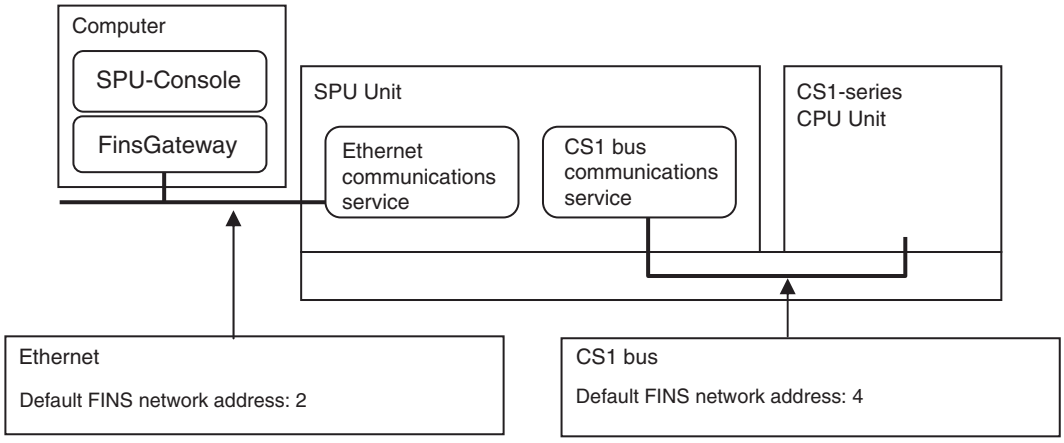
Note

(1) UPS Connection
With a CS-series SYSMAC SPU Unit, the power failure signal is connected to the PF-IN terminal. With a CJ-series SYSMAC SPU Unit, the power failure signal is connected to the COMM port. For details, refer to *2-4 Connecting the Power Failure Signal* in the *SYSMAC SPU Units Operation Manual* (Cat. No. V236).

(2) Shutdown Processing Time
When the SPU Unit performs shutdown processing for the power failure input from an uninterruptible power supply (UPS), the time required for shutdown processing depends on the number of enabled collection patterns. As a guideline, several seconds to several tens of seconds is required.

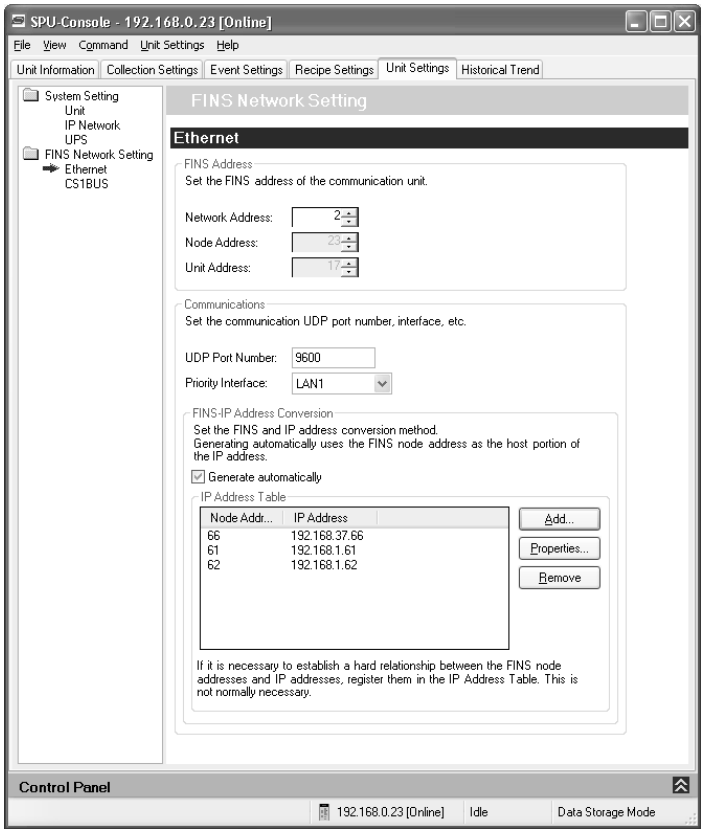
14-2 FINS Network Settings

The SYSMAC SPU Unit contains OMRON'S FinsGateway communications middleware, enabling it to use FINS messages. FINS network settings are made on the FINS Network Setting Panel of the Unit Setting Tab Page.



14-2-1 Ethernet Settings

Select ***FINS Network Setting - Ethernet*** on the Unit Setting Tab Page.



Note Set the same Ethernet network address for the FinsGateway on the computer and in the SYSMAC SPU Unit.

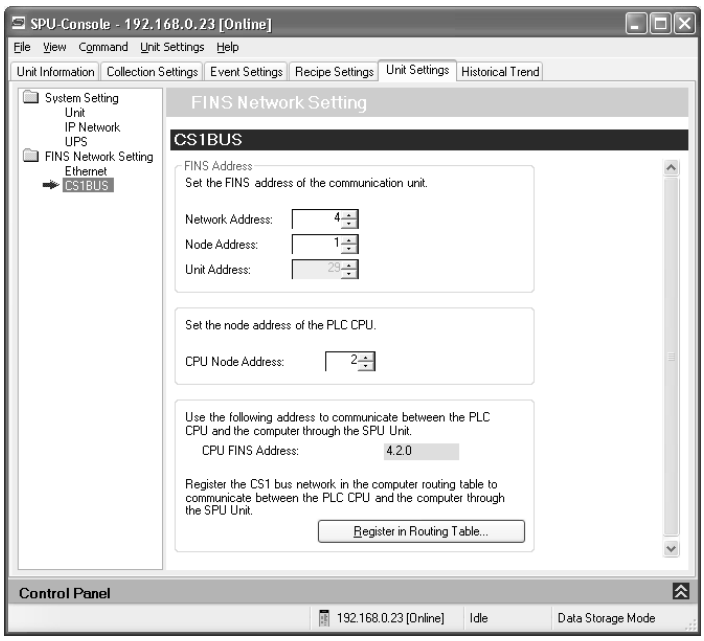
The following settings can be made.

Item	Meaning
FINS Address	The FINS address of the Ethernet Communications Unit. If the IP address is obtained automatically, the node address will be automatically set to the rightmost byte of the IP host segment. The unit address cannot be changed.
UDP Port Number	Set the UDP port number to execute the FINS communications service. The default setting is 9600.
Priority Interface	Specify LAN1.
FINS-IP Address Conversion	Specify the method to use to convert the FINS node address to an IP address. If *Enable the Automatic Generation* is selected, the FINS node address will be used unaltered as the rightmost byte of the host segment when converting. If a node address is registered in IP address table (which shows the corresponding IP addresses and FINS node addresses), the IP address table will be given priority. If *Enable the Automatic Generation* is not selected, only the IP address table will be used for conversion.

14-2-2 CS1 Bus Settings

The CS1 bus communications service uses the CS1 bus as a network to communicate with the CPU Unit.

1,2,3... 1. Select ***FINS Network Setting - CS1BUS*** on the Unit Settings Tab Page.



The following settings can be made.

Item	Meaning
FINS Address	The FINS address of the CS1 Bus Communications Unit. The unit address cannot be changed.
CPU Node Address	Set the FINS node address for the CPU Unit of the PLC, which will be treated as a node.

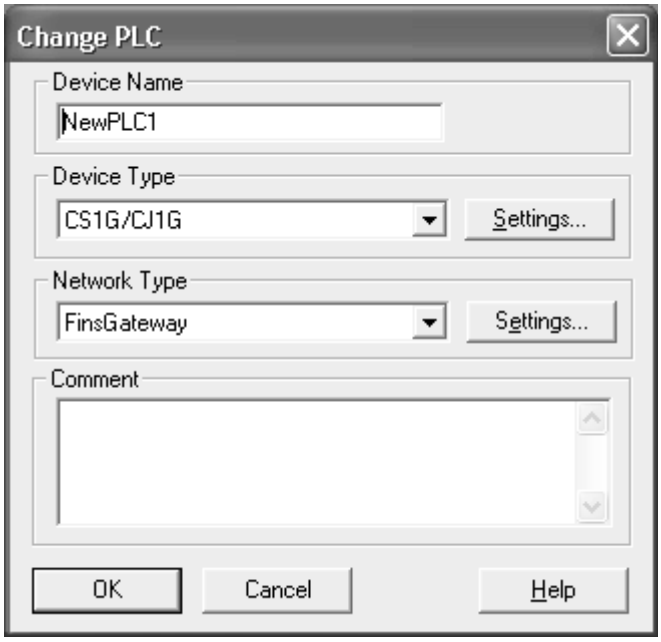
To communicate with the CPU Unit from the computer through the SYSMAC SPU Unit, the CS1 bus network must be registered in the routing tables in the computer.

Click the **Register in Routing Table** Button to register the CS1 bus in the routing tables on the computer.

Note

(1) If the **Register in Routing Table** Button is clicked, applications using FinsGateway on the computer can use the address set for the *FINS address for the CPU unit* to perform FINS message communications with the CPU Unit via the SYSMAC SPU Unit. (The operation of the application, however, cannot be assured by the SYSMAC SPU Unit.)
For example, with the CX-Programmer, set the network type to FinsGateway, set the FINS destination address in the network settings to the CPU Unit FINS address displayed on the SPU-Console, and set the frame length to 1900. This will enable using the CX-Programmer to operate the CPU Unit via the SYSMAC SPU Unit.

CX-Programmer's Change PLC Dialog Box



(2) Warning on FINS Message Communications via SPU Units
SYSMAC SPU Unit processing (data editing, recipe writing, changes to settings, etc.) is given priority over processing for FINS message communications. Therefore, SYSMAC SPU Unit processing performance will not be lowered by FINS message communications. When the SYSMAC SPU Unit is performing high-load processing such as the following, however, FINS message timeouts may occur.

- Collecting data
- Writing a recipe
- Changing settings

(3) CPU Unit Routing Tables

- It is not necessary to register the SYSMAC SPU Unit in the routing tables in the CPU Unit.

- Unit Version 2.1 or Earlier
  If the network address for any Communications Unit other than the SYSMAC SPU Unit is the same as the CS1 bus network address of the SYSMAC SPU Unit (default: 4), change one of the network addresses so that all addresses are unique.

14-3 Enabling Changes in Unit Settings

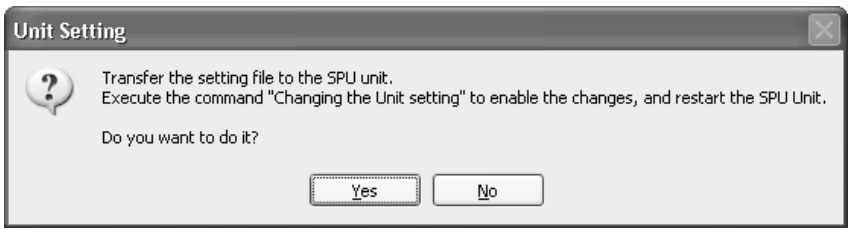
This section describes the procedure used to enable changes in unit settings. Always perform this procedure when changing unit settings.

Note

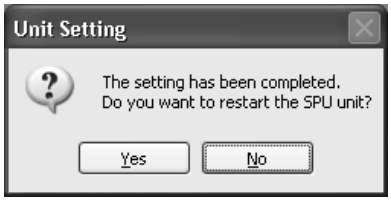
- Confirm that the destination SYSMAC SPU Unit is connected before starting a transfer.
- Do not turn OFF the power supply to the PLC while an SYSMAC SPU Unit settings file is being transferred. If the power supply is turned OFF during a transfer, incorrect information may be transferred to the SYSMAC SPU Unit, possibly causing the SYSMAC SPU Unit to malfunction.

1,2,3...

1. Confirm that the unit settings have been completed.
2. Click the SPU Console's **Unit Settings** Tab.
3. Click the **Transfer to Unit** Button in the SPU-Console's *Control Panel*.
   The following dialog box will be displayed to confirm the file transfer or change to the settings.



4. Click the **Yes** Button to proceed with the file transfer or change to the settings. The command will then be executed.
   A dialog box will be displayed to indicate that the data is being transferred and then the following dialog box will be displayed to confirm that the SYSMAC SPU Unit's unit settings will be changed.



5. To restart the SYSMAC SPU Unit, click the **Yes** Button.

Note If the unit name or IP address are changed, select ***File - Disconnect*** and disconnect from the SYSMAC SPU Unit. Then reconnect to the SYSMAC SPU Unit using the new unit name or IP address.

SECTION 15
Data Storage Mode Commands

This section provides a list of the commands that are supported by the SYSMAC SPU Unit in Data Storage Mode.

15-1 List of Data Storage Mode Commands 218
15-1-1 Confirming FTP Connections 219

15-1 List of Data Storage Mode Commands

SYSMAC SPU Unit commands can be executed from SPU-Console, using SYSMAC SPU Unit switches, or from the CPU Unit memory. For details on command execution methods, refer to *SECTION 6 Executing Commands*. The SYSMAC SPU Unit commands that are supported depend on the operating mode.

The following table lists the commands that are supported when SPU-Console is in Data Storage Mode.

Command No.	Command	Meaning
01	Start the Basic Collection	Starts basic collection.
02	Stop the Basic Collection	Stops basic collection.
03	Save the collection data	Saves the collection data files and settings file in zip format. (An archive folder is created on the Memory Card, and the files are saved in that folder.)
04	Clear the collection data	Deletes all the collection files in the Journal Folder on the Memory Card, and creates a new collection folder.
05	Display the IP address (LAN1)	Displays the IP address of LAN1 on the 7-segment display.
06	Display the IP address (LAN2)	Displays the IP address of LAN2 on the 7-segment display.
07	Display the unit name	Displays unit name on the 7-segment display.
08	Display the FINS address	Displays the FINS address of the Ethernet Communications Unit on the 7-segment display.
09	Display Memory Card used space (%)	Displays the percentage of Memory Card space that is being used.
10	Error display	Displays any current error.
11	Forced clear of error	Deletes the record of any current errors.
12	Restart unit	Restarts the SYSMAC SPU Unit.
20	Change the data collection settings	Changes the data collection settings.
21	Save the settings to the Memory Card	Backs up the SYSMAC SPU Unit settings. This command must be executed beforehand to enable using command 22 (Read the settings from the Memory Card). For details, refer to *Appendix F Reproducing a SYSMAC SPU Unit*.
22	Read the settings from the Memory Card	Restores the data collection settings that were backed up by command 21 (Save the settings to the Memory Card). For details, refer to *Appendix F Reproducing a SYSMAC SPU Unit*.
24	Change the unit settings	Changes the unit settings.
25	Undo the unit setting changes	Undoes changes to the unit settings.
26	Change the scheduler setting	Changes the Scheduler settings.
27	Change the recipe settings	Changes the recipe settings only (including FTP reception settings).
28	Read the settings from the CPU Unit	Reads the settings that were saved using the CPU Unit's easy backup function. For details, refer to *Appendix F Reproducing a SYSMAC SPU Unit*.
30	Start the serial terminal	Used for maintenance. Do not execute this command.
31	Format the Memory Card (FAT32)	Formats the Memory Card in FAT32 format. All the files in the Memory Card are deleted.
32	Clear the Logfile	Deletes the system log. Used for maintenance.
33	Processing information record	Used for maintenance. Do not execute this command.
34	Clear the error history	Clears the error history.
35	Clear the data folder	Clears files in the data folder.
36	Clear the recipe execution history	Clears the recipe execution history.
50	Start all collections	Starts the basic collection and all collection patterns.
51	Stop all collections	Stops the basic collection and all collection patterns.

Command No.	Command	Meaning
60	CHANGE FTP SETTINGS	Changes the FTP receive settings for the expanded recipe function or the FTP send settings for data collection files.
61	CONFIRM FTP CONNECTION	Checks the connection between the SPU Unit and the FTP server.
62	END FTP TRANSFER	Ends sending or receiving data using FTP.
90 to 99	Execute the external command (90 to 99)	Used for maintenance.

Note Data may not be completely sent or received if the Ethernet cable is disconnected or the FTP server stops while data is being sent or received using FTP. If this occurs, execute command 62 to end sending or receiving data using FTP.

15-1-1 Confirming FTP Connections

The FTP CONFIRM FTP CONNECTION command (command 61) can be used for SPU Units. The CONFIRM FTP CONNECTION command verifies the operation of communications with the FTP server that is set for sending data and receiving recipes using FTP (including FTP reception settings).

The progress and results of checking operation will be displayed on the SPU Unit. If normal operation cannot be confirmed, an error code will be output so you can check the results with the SPU-Console. An FTP connection check log is saved as a file in the SPU Unit.

In addition to executing these commands from the SPU-Console, they can also be executed using the select switch on the SPU Unit and can be executed from instructions in the ladder programming of the CPU Unit.

FTP Connection Checks

The following items can be checked based on the FTP send settings and the recipe receive settings that are stored in the SPU Unit.

No.	Check	Description	Remarks
0	Ping check	Checks reception at the IP address.	---
1	FTP login	Checks the login on the FTP server.	---
2	Move to folder	Moves to the specified folder on the FTP server or in the SPU Unit.	---
3	Create folder	Creates a folder if it does not already exist. FTP send: Creates a folder if there is not one when automatic file generation is performed for the FTP server. Recipe receive: Creates a folder if there is not one in the SPU Unit.	---
4	Get folder list	Gets the list of folders in the FTP server.	Executed only for recipe receive settings.
5	Copy file	Copies a CSV file. FTP send: Copies a dummy CSV file. Recipe receive: Copies the actual CSV file as a dummy.	---
6	Overwrite folder	Copies a dummy CSV file.	Executed only for FTP send settings.
7	Delete file	Deletes a copied CSV file from the SPU Unit.	---

No.	Check	Description	Remarks
8	Delete folder	Deletes a dummy CSV file.	Executed only for recipes for which a recipe file name search is selected for the recipe key search method.
9	FTP logout	Logs out from the FTP server.	---

The FTP send settings and recipe receive settings are checked in the following order.

- FTP send settings: 0→1→2→3→5→6→7→9
- Recipe receive settings: 0→3→1→2→4→5→7→8→9

Sequential Display

The connection will be checked in order of the functions from FTP Send (SD) to Recipe Receive (RV). With a sequential display, the function name is displayed on the SPU Unit and then the setting number and check item of each function are displayed with two digits. The function setting number is displayed with a single digit from 0 to 9. If a function ends normally, two digits will be displayed (00), and the next function will be checked. If normal operation cannot be confirmed, two digits will flash: the setting number (ID) and “E”.

The following gives an example of the sequential display flow and displays.

Display	Description
SD	FTP send check started.
00	Function setting number (ID: 0) – Check item 0: Ping check
01	Function setting number (ID: 0) – Check item 1: FTP login
:	:
09	Function setting number (ID: 0) – Check item 9: FTP logout
10	Function setting number (ID: 1) – Check item 0: Ping checking
:	:
90	Function setting number (ID: 9) – Check item 0: Ping checking
:	:
99	Function setting number (ID: 9) – Check item 9: FTP logout
00	FTP send check normal end
RV	Recipe receive check start
00	Function setting number (ID: 9) – Check item 0: Ping checking
:	:
99	Function setting number (ID: 9) – Check item 9 FTP logout
1E	Function setting number (ID: 1) – Not possible to confirm normal operation (flashing)
9E	Function setting number (ID: 9) – Not possible to confirm normal operation (flashing)

Use the following procedure to find the setting number (ID).

■ FTP Send

1,2,3...

1. Select the memory event in the tree on the left side of the Event Settings Tab Page.
2. “AutoFTPSend***n***_[data collection pattern name]” will be displayed for the name in the memory event rule list.
3. The number after “AutoFTPSend” is the setting number (ID).

■ Recipe Receive

1,2,3...

1. Select the recipe list on the Recipe Settings Tab Page.

2. Select the recipe from the list. “Expansion Settings (ID: x)” will be displayed.
3. The number displayed for the ID is the setting number.

Checking Execution Results

The results of execution are logged in the system log (syslog). The syslog is in a folder (var) shared on the network. Refer to *Appendix C Structure of the Shared Network Folders* for information on folders shared on the network.

Syslog Display

You can check the execution results for each step for individual settings by using the syslog. The following tables show the display details and the basic format of the syslog.

SD0:	OK,	OK/OK,	-,	-,	OK,	OK,	OK,	-,	OK,	: 0.0% packet loss
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

Step number	Display item	Description
(1)	Function name and setting number	Function name (DS, RV) and setting number (0 to 9)
(2)	FTP login result	Checks if it is possible to log on to the FTP server.
(3)	Move to folder	Checks if it is possible to move to the SPU Unit's Memory Card or FTP server folder after FTP logon (SPU folder/FTP server). (See note.)
(4)	Create folder	Checks if it is possible to create a folder on the SPU Unit's Memory Card or FTP server after FTP logon.
(5)	Get folder list	Checks if it is possible to get the list of files from the FTP server after FTP logon.
(6)	Copy file	Checks if it is possible to send a CSV file to the SPU Unit's Memory Card or FTP server after FTP logon.
(7)	Overwrite file	Checks if it is possible to overwrite and send to the dummy file on the FTP server after FTP logon.
(8)	Delete file	Checks if it is possible to delete a file from the SPU Unit's Memory Card or FTP server after FTP logon.
(9)	Delete folder	Checks if it is possible to delete a dummy folder from the SPU Unit's Memory Card after FTP logon.
(10)	FTP logout	Checks if it is possible to log out of FTP after FTP logon.
(11)	PING check	Checks the percentage of packets lost when the ping check is executed.

Note The results of execution will be NG if the file does not exist when an attempt is made to move to a file in step 3. The results of the entire process will be OK, however, if the results of creating a folder in step 4 is OK.

■ **Execution Result Examples**

```
Date, time (task name) SD0:OK,OK/OK,-,-,OK,OK,OK,-,OK:0.0% packet loss
Date, time (task name) SD1:OK,OK/OK,-,-,OK,OK,OK,-,OK:0.0% packet loss
:
Date, time (task name) SD9:OK,OK/OK,-,-,OK,OK,OK,-,OK:0.0% packet loss
Date, time (task name) RV0:OK,OK/OK,OK,OK,OK,-,OK,-,OK:0.0% packet loss
Date, time (task name) RV1:OK,OK/OK,OK,OK,OK,-,OK,-,OK:0.0% packet loss
Date, time (task name) RV2:OK,OK/NG,OK,-,-,-,-,-,-:0.0% packet loss
Date, time (task name) RV2:Can't check normal status.
Date, time (task name) RV3:OK,OK/OK,OK,OK,NG,-,OK,-,OK:0.0% packet loss
Date, time (task name) RV3:Can't check normal status.
:
Date, time (task name) RV9:OK,OK/OK,OK,OK,OK,-,OK,OK,OK:0.0% packet loss
```

SPU-Console Error Display

The most recent result (one only) will be displayed in the error data during connection with the SPU-Console.

Error Information

No.	Program	Code	Subcode	Description
59	FTP	22	19	Cannot check normal operation in recipe receive settings.

Note

(1) Time may be required waiting for a timeout from the FTP server if multiple settings (ten maximum) are checked when the connection with the FTP server is unstable. First check a small number of settings.

(2) The recipe files that are actually set can be received using FTP from the FTP server using the recipe receive function. This will not be possible if the file does not exist on the FTP server.

(3) Dummy files (DUMMY.csv) will remain on the server if deleting files is prohibited in the FTP server settings.

(4) Actual operation may not be hindered even if an error is displayed when the connection is checked. Consult the FTP server administrator to determine if actual operation will be hindered, such as by prohibiting deletion of files sent using FTP.

Sampling Mode

This part of the manual describes using the SPU-Console with the SYSMAC SPU Unit in Sampling Mode. Refer to *4-2 Confirming the Operating Mode* to confirm that the SYSMAC SPU Unit is in Sampling Mode. Refer to *4-3 Changing the Operating Mode* to change the SYSMAC SPU Unit to Sampling Mode.

SECTION 16
Sampling Mode

This section introduces the SYSMAC SPU Unit's Sampling Mode.

The following sections provide information on the SPU-Console operation methods when using the SYSMAC SPU Unit's Sampling Mode.
For information on the methods used to check whether the SYSMAC SPU Unit is operating in Sampling Mode, refer to *4-2 Confirming the Operating Mode*. For information on changing the SYSMAC SPU Unit's operating mode to Sampling Mode, refer to *4-3 Changing the Operating Mode*.

16-1 Sampling Mode Introduction 226

16-1 Sampling Mode Introduction

The Sampling Mode is used to sample part of the PLC's I/O memory at regular intervals and record the sampled data. The time intervals are nearly constant, so the data can be recorded at particular times and more reliable information can be reproduced from the collected data.

The Sampling Mode settings specify the data that will be sampled from the PLC's I/O memory and how the data will be sampled.

The data that will be sampled is specified in units called variables. The variables specify the PLC's I/O memory address and data type. The data is converted to the specified data type and recorded. The value can also be scaled during the data-type conversion.

The Sampling Mode's collection pattern is called the sampling pattern. There are four sampling patterns: the realtime sampling pattern and sampling patterns 1 to 3. Each sampling pattern has independent specifications for the sampling time interval, number of records, save filenames, and number of files.

Of these four sampling patterns, the realtime sampling pattern's time interval can be nearly constant. Also, the realtime sampling pattern provides high-speed sampling with intervals from a few ms to about 50 ms. (The speed depends on the number of bits being sampled.)

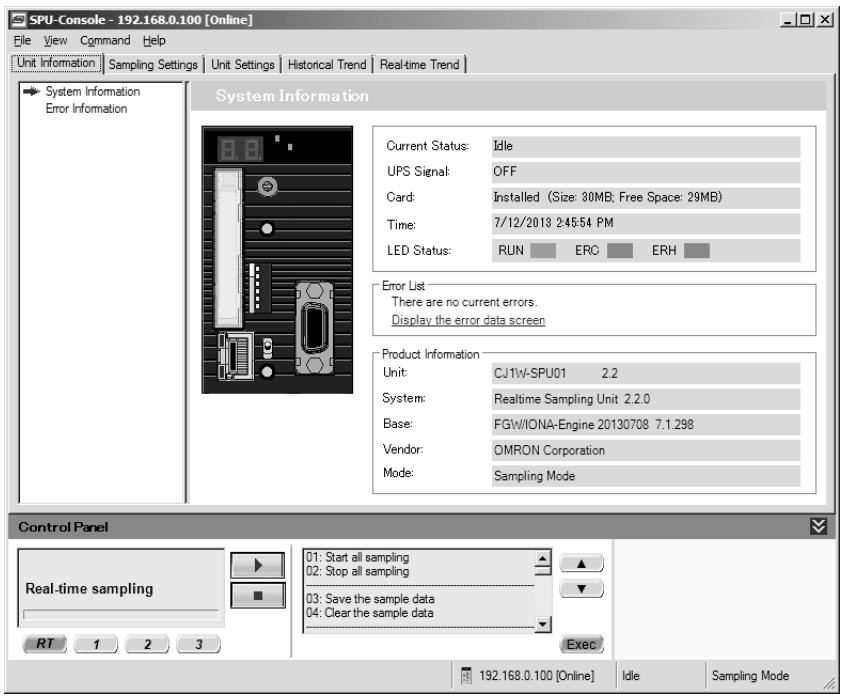
SECTION 17
Monitoring SYSMAC SPU Unit Operating Status

This section describes how to monitor SYSMAC SPU Unit operating status and error status.

17-1 Displaying System Information 228
17-2 Displaying Error Information 229

17-1 Displaying System Information

The operating status of an SYSMAC SPU Unit can be monitored from the System Information display on the Unit Information Tab Page.



System Information Display Items

Item	Content
Current Status	Operating status of the current SYSMAC SPU Unit
PF-IN Signal	Status of the power failure signal
Card	Whether a Memory card is inserted in the SYSMAC SPU Unit, Memory Card capacity, and available space
Time	The time in the SYSMAC SPU Unit
LED Status	The status of the RUN, ERC, and ERH indicators
Error List	Current errors
Product Information	The SYSMAC SPU Unit model number and system program version

Current Status

The SYSMAC SPU Unit current status contains the following status.

Status	Meaning
Idle	SYSMAC SPU Unit is in idle status.
Sampling	Sampling is being performed.
Change the settings	Sampling or Unit settings are being changed.
Archive	Sampling data is being saved or sampling settings are being recovered.
Initialization	The SYSMAC SPU Unit is being initialized.

17-2 Displaying Error Information

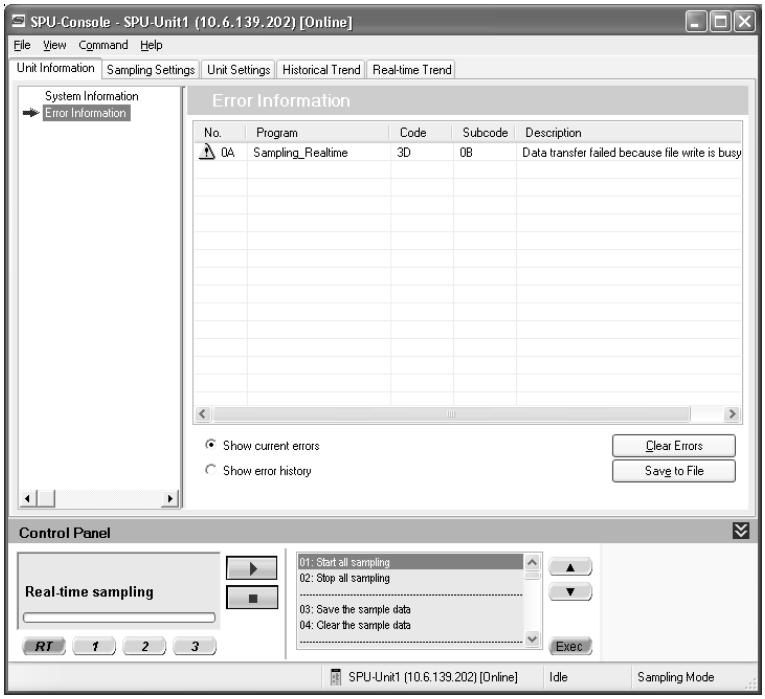
The error status of an SYSMAC SPU Unit can be monitored from the Error Information Window on the Unit Information Tab Page.

Refer to *Appendix A Troubleshooting with Error Codes* for details on error codes.

Displaying Current Errors

Select the **Show current errors** Option. The current errors in the SYSMAC SPU Unit will be displayed.

- To forcibly clear the current errors, click the **Clear Errors** Button.
- To save information on the current errors to a file, click the **Save to File** Button.

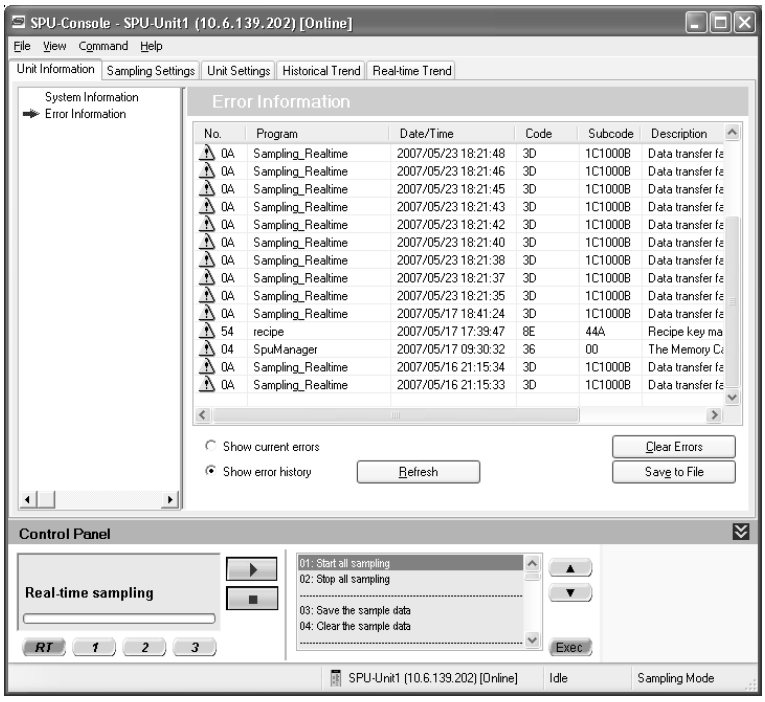


Note Error information is deleted in the following cases.

(1) When the SYSMAC SPU Unit is restarted
(2) When errors are eliminated
(3) When sampling settings or unit settings are made
(4) When command 11 (Forced Clear of Error) is executed
(5) When the **Clear Errors** Button is clicked, from Error Information in the Unit Information Tab Page of the SPU-Console.

Displaying Error History

Select the **Show error history** Option. The error history at the SYSMAC SPU Unit will be displayed.



- To update to the most recent information, click the **Refresh** Button.
- To clear the error history, click the **Clear Error** Button.
- To save the error history information to a file, click the **Save to File** Button.

Note The error history holds a maximum of 80 items. As this number is exceeded, the oldest item in the history is deleted.The error history is saved to the Memory Card. It is deleted in the following cases:

(1) When the **Clear Errors** Button is clicked.
(2) When the Memory Card is formatted.
(3) When the Memory Card is replaced.

SECTION 18
Sampling Settings for Sampling Mode

This section explains how to make the sampling settings for Sampling Mode operation.

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18-1 Making the Sampling Settings

The following list shows the basic steps to follow from making the sampling settings to sampling data.

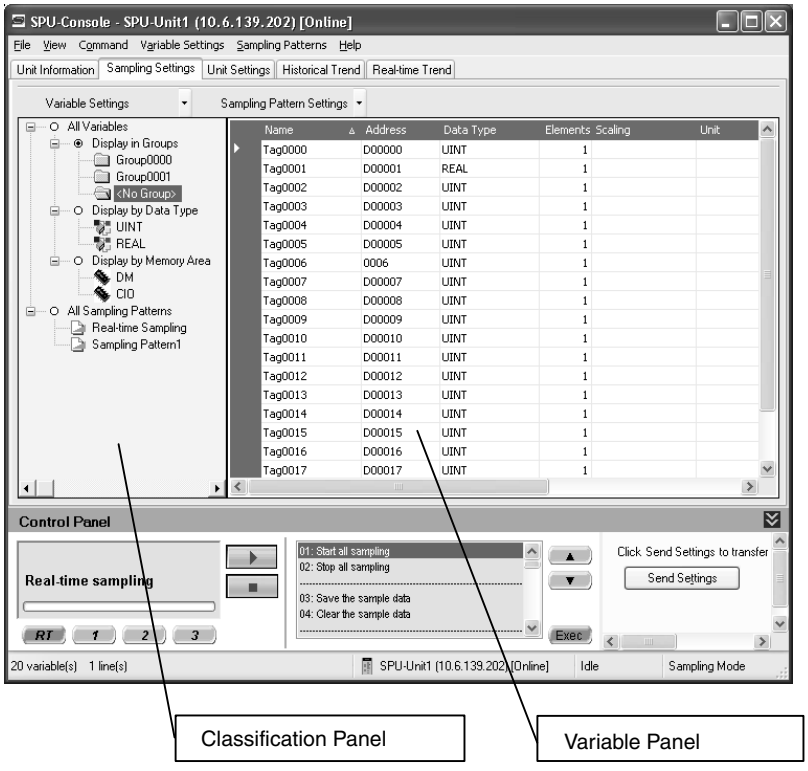
1,2,3...

1. Set the variables and sampling patterns.
2. Reflect the settings in the SYSMAC SPU Unit.
3. Perform sampling.
4. Display the sampling results folder.

18-2 Sampling Setting Windows and Operations

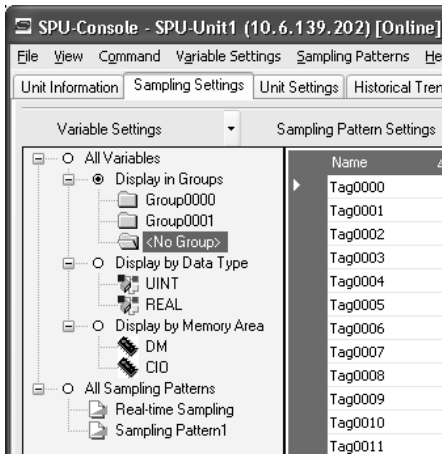
18-2-1 Window Structure

Click the SPU-Console's **Sampling Settings** Tab to display the Sampling Setting Window.



18-2-2 Operations in the Classification Panel

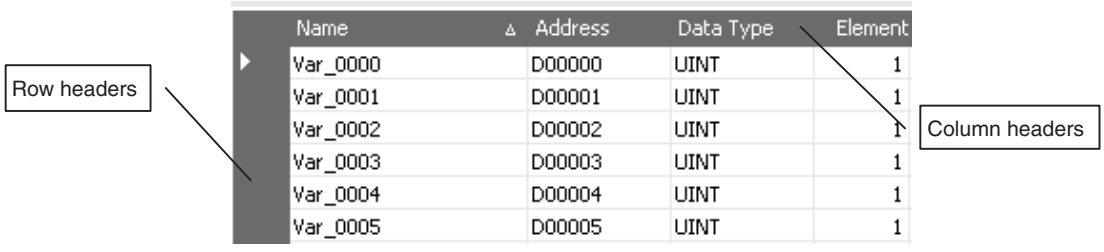
The following table explains the basic operations in the Classification Panel.



Item		Operation method and function
All Variables		If this option is selected, all of the set variables will be displayed.
	Display in Groups	When variables have been grouped, this option can be selected to organize and display the variables by group.
	Display by Data Types	If this option is selected, variables will be organized and displayed by data type, such as UINT and REAL.
	Display by Memory Area	If this option is selected, variables will be organized and displayed by the variables' data area addresses, such as DM.
All Sampling Patterns		If this option is selected, all of the sampling pattern information will be displayed.
	Sampling patterns	If this option is selected, the variables to be sampled will be displayed. For example, if variable X is displayed under *Realtime Sampling*, variable X will be recorded in realtime sampling.

18-2-3 Basic Operations in the Variable Panel

This section describes the name and meaning of each part of the Variable Panel.



The following table describes the column headers.

Column	Meaning
Name	Shows the variable's name.
Address	Shows the variable's I/O memory address in the PLC.
Data Type	Shows the variable's data type. Data from the PLC's I/O memory is converted to this data type and recorded.
Element Scaling	Displays the number of elements in the data array. When the data type is STRING, the number of characters is shown. When the data type is CHANNEL_BLOCK, the number of consecutive areas is shown.
Scaling	Displays the conversion method when scaling is set.
Engineering	Specifies the industrial units as the user-set text string.
Sampling Pattern	Specifies the sampling pattern in which this variable is recorded.
Description	Shows a user-set description of the variable.

The following basic operations can be performed in the Variable Panel.

Changing the Name, Number of Elements, Units, or Description

Click the cell to be changed and directly input the new text.

Changing the Address

Select the cell to be changed, click the **...** Button, input the new address in the displayed window, and click the **OK** Button. The new address can also be input directly in the cell as a text input.

Changing the Data Type

Select the cell to be changed and select the new data type from the displayed drop-down list.

Changing the Sampling Pattern

Select the cell to be changed, click the **...** Button to display the dialog box, and select (check) the sampling patterns in which the selected variable will be sampled.

Selecting Variables

Selecting a Single Variable

Click the desired variable's row header cell.

Selecting Multiple Variables

Press and hold the **Ctrl** Key while clicking the row header cells of multiple variables.

Selecting a Range of Consecutive Variables

Click the first variable's row header cell. Press the **Shift** Key while and click the last variable's row header cell.

Selecting All Variables

Press the **Ctrl+A** Keys.

Note When using Windows XP, the menu displayed when you right-click on the Variable Panel will include *Insert Unicode control character*, but this command cannot be used.

18-3 Setting Variables

The data to be sampled is specified with units called variables. Before sampling, register each variable with the desired variable name, CPU Unit address, data type, and number of elements. Set the variables in the Variable Panel.

The variables can also be set with OMRON's CX-Programmer Support Software (version 2.0 or later) on the Variable Tab Page.

18-3-1 Adding Variables

The procedure for adding variables depends on the point clicked in the Classification Panel.

Directory tree under *All Variables*	The variable will be added, but it will not be registered in the sampling pattern. To register the variable in a sampling pattern, it is necessary to separately select *Register to the Sampling Pattern*.
Directory tree under *All Sampling Patterns*	The added variable will be registered in the selected sampling pattern.

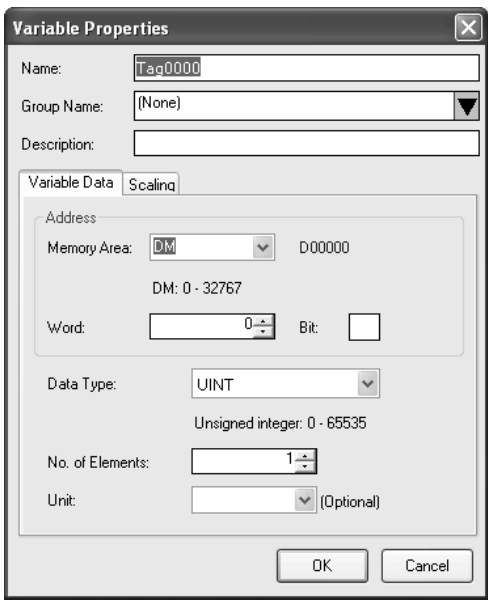
1,2,3...

1. Click the SPU Console's **Sampling Setting** Tab.
2. Select ***Variable Setting - Add Variable*** or right-click the Variable Panel and select ***Add Variable*** from the popup menu.

   The Variable Properties Dialog Box will be displayed. For details, refer to *18-3-2 Operations in the Variable Properties Dialog Box*.

18-3-2 Operations in the Variable Properties Dialog Box

Use the Variable Properties Dialog Box to make variable settings such as the variable's address and data type. Enter the new settings in the dialog box and click the **OK** Button to change the variable's settings.



The following table describes the variable's settings.

Item	Function
Name	Sets the variable's name.
Group Name	Specifies the group in which the variable belongs.
Description	Input a description of the variable. This entry can be omitted.

The following table describes the settings on the Variable Information Tab Page.

Item	Function
Address	Specifies the variable's memory location. Specify the data area in the *Memory type* Field and specify the offset from the beginning of the data area in the *Channel* Field. If the variable represents a bit, specify the bit number (0 to 15) in the *Bit* Field. If the variable does not represent a bit, leave this field empty.
Data Type	Specifies the data type.
No. of Elements	Specifies the number of elements of data for a data array. A number of consecutive data elements with the same properties can be handled as a single variable. When the data type is set to *STRING*, the *Number of elements* sets the length of the string. When the data type is set to CHANNEL_BLOCK, the data in the consecutive areas set in *Number of elements* is handled as a single data item with no commas.
Unit	Specify a text string that shows the variable's units. This entry can be omitted.

Note The following characters cannot be used in the variable's *Name* or *Group-name*: /, \, commas, spaces, quotation marks (' or "), carriage returns, or tab codes.

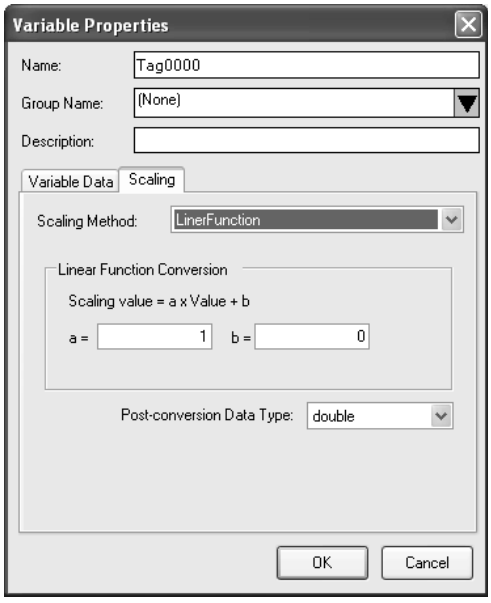
The following table describes the types of data.

Data type	Description
BOOL	BOOL format: 0 to 1
UINT	Unsigned integer: 0 to 65,535
UDINT	Unsigned 2-word integer: 0 to 2^{32-1} (0 to 4,294,967,295)
INT	Integer: –32,768 to 32,767
DINT	2-word integer: -2^{31} to 2^{31-1} (–2,147,483,648 to 2,147,483,647)
UINT_BCD	Unsigned BCD: 0 to 9,999
UDINT_BCD	Unsigned 2-word BCD: 0 to 99,999,999
REAL	Real number: -10^{-38} to 10^{+38}
LREAL	4-word real number: -10^{-308} to 10^{+308}
CHANNEL	Channel: #0 to #FFFF
WORD	16-bit text string: #0 to #FFFF
DWORD	32-bit text string: #0 to #FFFFFFFF
CHANNEL_BLOCK	Channel block: Consecutive channels
STRING	ASCII text string

The Scaling Tab Page can be used to set the scaling function for variables that require scaling. For details, refer to *18-3-3 Setting the Scaling Function for a Variable*.

18-3-3 Setting the Scaling Function for a Variable

If a variable requires scaling, the scaling method can be specified on the Variable Properties Dialog Box's Scaling Tab Page. If a variable does not require scaling, it isn't necessary to specify scaling function.



The following table describes the *Scaling methods* on the Scaling Tab Page.

Scaling method	Function
Linear Function	The memory value is converted with a linear equation and the result is recorded as the *Data type after conversion*. Specify a floating-point data type (float or double) for the *Data type after conversion*. The result is calculated from the specified constants (a and b) as follows: Result = a × memory value + b
Maximum/Minimum conversion	Memory values with a predetermined upper and lower limit are converted according to that upper and lower limit range and the result is recorded as the *Data type after conversion*. Specify a floating-point data type (float or double) for the *Data type after conversion*. Specify a floating-point data type (float or double) for the *Data type after conversion*.
Decimal position conversion	The memory value's decimal point can be moved from left to right to the specified position. The result is recorded as the *Data type after conversion*. Specify a floating-point data type (float or double) for the *Data type after conversion*.

18-3-4 Adding Multiple Variables Together

A number of consecutive variables with the same properties can be registered together.

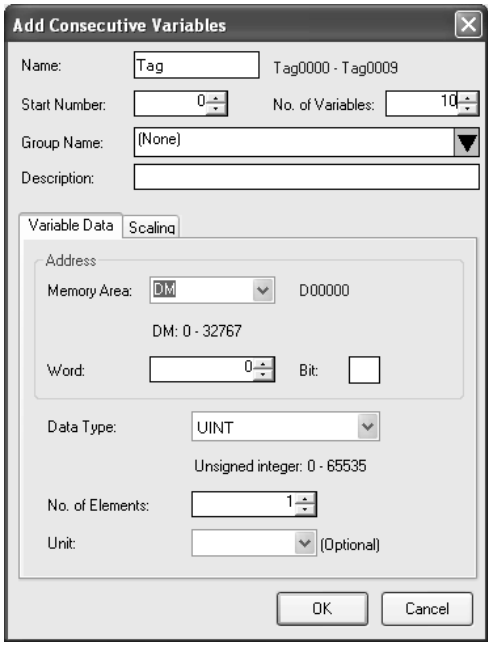
1,2,3...

1. Click the SPU Console's **Sampling Settings** Tab.
2. Select ***Variable Settings - Add Consecutive Variables*** or right-click the Variable Panel and select ***Add Consecutive Variables***.

   The Add Consecutive Variables Dialog Box will be displayed. For details, refer to *18-3-5 Operations in the Add Consecutive Variables Dialog Box*.

18-3-5 Operations in the Add Consecutive Variables Dialog Box

Use the Add Consecutive Variables Dialog Box to set a number of consecutive variables with the same properties. make variable settings such as the variable's address and data type. Enter the settings in the dialog box and click the **OK** Button to register the consecutive variables.



The following table describes the array variable's settings.

Item	Function
Name	Sets the variable's name. An index number will be attached after the variable name.
Start Number	Specifies the starting number of the index number that appears after the variable name.
No. of Variables	Specifies the number of variables being added.
Group Name	Specifies the group in which the variable belongs.
Description	Input a description of the variable. This entry can be omitted.

The following table describes the settings on the Variable Data Tab Page.

Item	Function
Address	Specifies the variable's memory location. Specify the data area in the *Memory type* Field and specify the offset from the beginning of the data area in the *Channel* Field. If the variable represents a bit, specify the bit number (0 to 15) in the *Bit* Field. If the variable does not represent a bit, leave this field empty.
Data Type	Specifies the data type. For details, refer to *18-3-2 Operations in the Variable Properties Dialog Box*.

Item	Function
No. of Elements	Specifies the number of elements of data for a data array. A number of consecutive data elements with the same properties can be handled as a single variable. When the data type is set to *STRING*, the *Number of elements* sets the length of the string. When the data type is set to CHANNEL_BLOCK, the data in the consecutive areas set in *Number of elements* is handled as a single data item with no commas.
Unit	Specify a text string that shows the variable's units. This entry can be omitted.

Note The following characters cannot be used in the variable's *Name* or *Group-name*: /, \, commas, spaces, quotation marks (' or "), carriage returns, or tab codes.

The Scaling Tab Page can be used to set the scaling function for variables that require scaling. For details, refer to *18-3-3 Setting the Scaling Function for a Variable*.

18-3-6 Using the CX-Programmer's Variables

Variables set with the CX-Programmer can be used.

1,2,3...

1. Start the CX-Programmer and display the variable table.
2. Select the variables to be used in the SPU-Console and select ***Edit - Copy***.
3. Click the SPU-Console's **Sampling Settings** Tab and display the Variable Panel.
4. Select ***Variable Settings - Paste from the Clip Board***. If the variable does not have a variable name, a variable name will be allocated automatically based on the variable's address and comment information.

Note This function is supported by CX-Programmer version 2.0 and later versions. The following variables cannot be pasted.

- Variables with data type LINT, ULINT, ULINT_BCD, or NUMBER
- Variables with automatically allocated addresses
- Function block variables

18-3-7 Importing and Exporting Variables

Variable definitions can be exported to CSV files. Variable settings can be edited in programs such as spreadsheets.

Exporting to a CSV File

1,2,3...

1. Click the SPU-Console's **Sampling Settings** Tab.
2. Select ***Export - To CSV File*** from the Variable Setting Menu.

Importing from a CSV File

1,2,3...

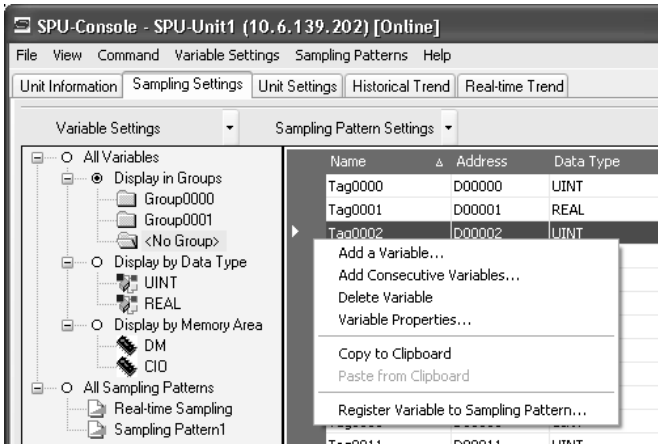
1. Click the SPU-Console's **Sampling Settings** Tab.
2. Select ***Import - From CSV File*** from the Variable Setting Menu.

18-3-8 Changing Variables

1,2,3...

1. Click the SPU Console's **Sampling Settings** Tab and display the Variable Panel.

2. Select the variable to be changed by clicking that variable's row header cell.
3. Select ***Variable Settings - Variable Properties*** or right-click the Variable Panel and select ***Variable Properties*** from the popup menu.



4. Enter the new settings in the Variable Properties Dialog Box and click the **OK** Button. For details on these operations, refer to *18-3-2 Operations in the Variable Properties Dialog Box*.

18-3-9 Deleting Variables

1,2,3...

1. Click the SPU Console's **Sampling Settings** Tab to display the Classification Panel.
2. Select ***All Variables***.
3. Select the variable to be changed by clicking that variable's row header cell in the list. To select more than one variable, select the first variable, press and hold the **Ctrl** or **Shift** Key, and click the row header cell of the other variables to be deleted.
4. Select ***Variable Settings - Delete Variable*** or right-click the Variable Panel and select ***Delete Variable*** from the popup menu.

18-3-10 Selecting a Sampling Pattern and Adding Variables

When the sampling pattern has been decided in advance, the sampling pattern can be selected and a variable can be added to that pattern. The added variable will be automatically sampled and recorded in the specified sampling pattern.

1,2,3...

1. Click the SPU Console's **Sampling Settings** Tab and display the Classification Panel.
2. Select one of the sampling patterns in the *All Sampling Patterns* directory tree (such as *Realtime Sampling*) by clicking that pattern.
3. Select ***Variable Settings - Add Variable*** or right-click the Variable Panel and select ***Add Variable*** from the popup menu.

   The Variable Properties Dialog Box will be displayed. For details on the dialog box operations, refer to *18-3-2 Operations in the Variable Properties Dialog Box*.

18-3-11 Deleting Variables from a Sampling Pattern

A registered variable can be deleted from a sampling pattern. The variable's settings are not deleted even though the variable is deleted from the sampling pattern. The deleted variable can still be found and reused in the Variable Panel's *All Variables* directory.

1,2,3...

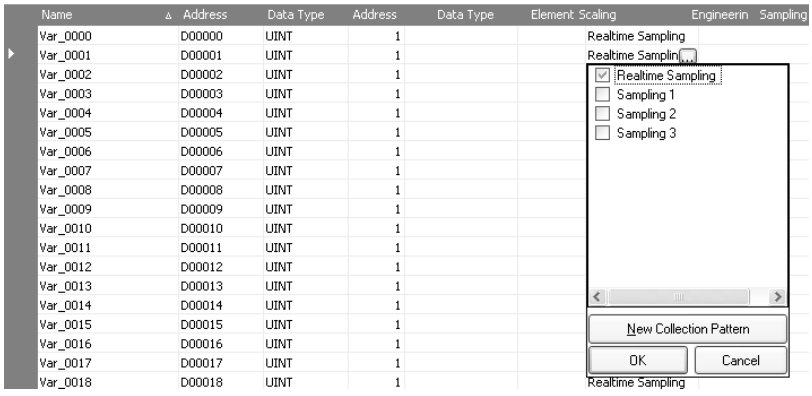
1. Click the SPU Console's **Sampling Settings** Tab and display the Classification Panel.
2. Select one of the sampling patterns in the *All Sampling Patterns* directory tree (such as *Realtime Sampling*) by clicking that pattern.
3. Select the variable to be deleted by clicking that variable's row header cell.
4. Select ***Variable Settings - Delete Variable*** or right-click the Variable Panel and select ***Delete Variable*** from the popup menu.

18-3-12 Registering an Existing Variable in a Sampling Pattern

A variable that was set previously can be specified and registered in a sampling pattern. A variable can also be registered in multiple sampling patterns, which allows the same variable to be sampled under different collection conditions.

1,2,3...

1. Click the SPU Console's **Sampling Settings** Tab and display the Variable Panel corresponding to the Classification Panel's *All Variables* directory.
2. Click the desired variable's cell in the *Sampling Pattern* column and click the **...** Button.
3. A popup window will be displayed. Select the sampling patterns in which the variable will be registered (by adding checks next to those patterns) and click the **OK** Button.



Note There are two other ways to register the variables:

- Register the variables by selecting ***Variable Settings - Register to the Sampling Pattern***.
- Register the variables by dragging and dropping them.

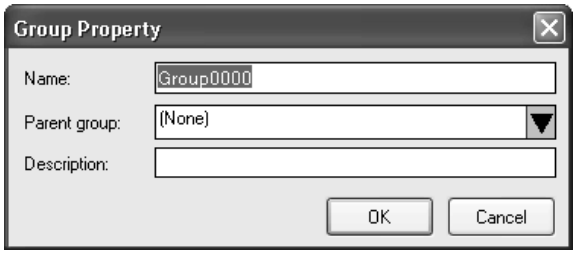
18-3-13 Managing Variables in Groups

Variables can be organized and managed in groups.

Creating a Group

To create a group, select the *Display in Groups* Option in the Classification Panel and select ***Variable Settings - Add Group***.

The Group Property Dialog Box will be displayed.



Add the group's name in the *Name* Field. In the *Parent Group* Field, select the group to be the parent of the group level. (This does not need to be specified.) A description of the group can be entered in the *Description* Field. (This entry can be omitted.)

Note The following characters cannot be used in the variable's *Name* or *Group-name*: /, \, commas, spaces, quotation marks (' or "), carriage returns, or tab codes.

Deleting a Group

To delete a group, select the group to be deleted in the Classification Panel and select ***Variable Settings - Delete Group***.

If a group is deleted, all of the settings under the group will be deleted.

Changing the Group Name

To change a group's name, select the group and select ***Variable Settings - Group Properties***.

Copying to a Group

To copy a variable to another group, select the variable row header to be copied in the Variable Panel, press and hold the **Ctrl** Key, and drag and drop the variable in the destination group in the Classification Panel.

Moving a Group

To move a variable to another group, select the variable row header to be moved in the Variable Panel and drag and drop the variable in the destination group in the Classification Panel.

18-3-14 Changing the Order of Variables in a Sampling Pattern

Variable data is recorded in a file in the order in which the variables appear in the Variable Panel. The recording order can be changed by moving a variables to a different position in the list.

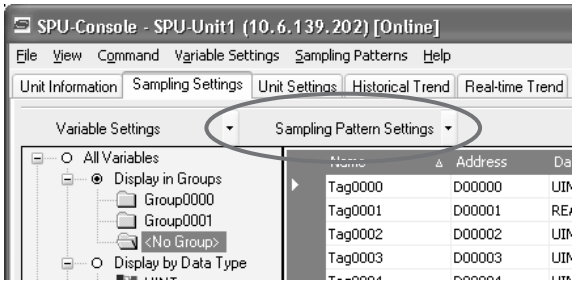
1. Click the SPU Console's **Sampling Settings** Tab and display the Classification Panel.
2. Select one of the sampling patterns in the *All Sampling Patterns* directory tree (such as *Realtime Sampling*) by clicking that pattern.
3. Select the variable to be moved by clicking that variable's row header cell in the list.
4. Drag the selected variable and drop it in the destination location.

18-4 Setting Sampling Patterns

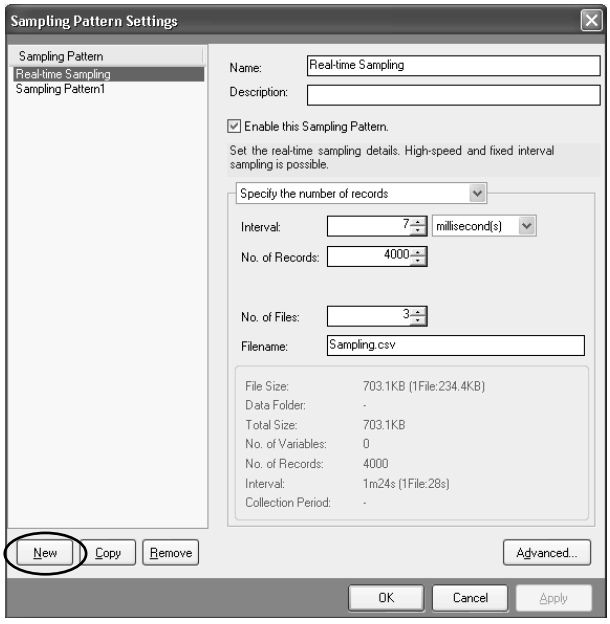
18-4-1 Adding a Sampling Pattern

1,2,3... 1. To add a sampling pattern, click the SPU Console's **Sampling Settings** Tab and select ***Sampling Pattern Settings***.

The Sampling Pattern Settings Dialog Box will be displayed.



2. Click the **New** Button in the Sampling Pattern Settings Dialog Box.



3. Input the settings such as the *Name* and *Description*.

The following table describes the settings.

Item	Function
Name	Input the name of the sampling pattern. Commas, carriage returns, and tab codes cannot be used in the name.
Description	Input a description of the sampling pattern. Commas, carriage returns, and tab codes cannot be used in the description.
Enable this Sampling Pattern.	If the pattern is disabled, sampling will not be performed.
Interval	Specify the sampling cycle.
No. of Record	Specify the number of records that will be stored in a single file. (Specify the *Record count* when *Specify by the number of records* is selected.)
Period	Specify a period of time in which records will be stored in a single file. (Specify the *Period* when *Specify by the collection period* is selected.)

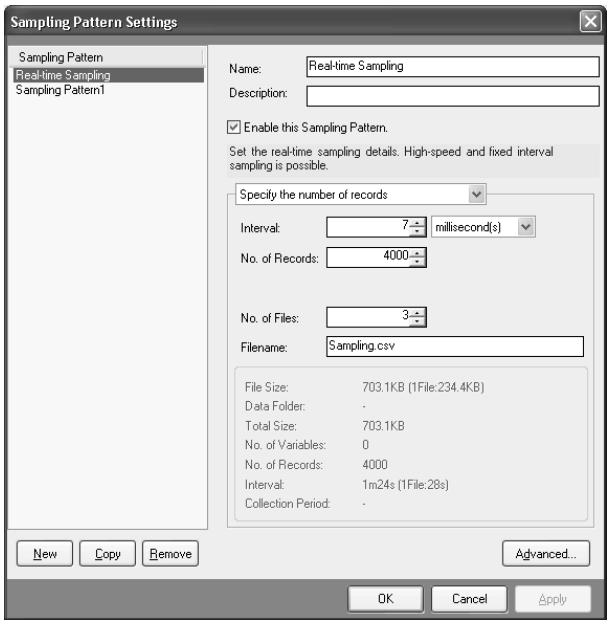
Item	Function
No. of Files	Specify the number of files to be stored. When multiple files are being stored, the files are stored in a folder with the same name as the specified *File name*. The file names will be the specified *File name* with an attached index number.
Filename	Specify the name of the file in which the results will be stored.

The following information is displayed according to the settings of the sampling pattern settings.

Item	Function
File Size	Displays the required file capacity for sampling.
Data Folder	Not displayed. (There are no copy options for sampling patterns.)
Total Size	Displays the total size of the sampling data files and files copied to the data folder.
No. of Variables	Displays the number of variables set for the sampling pattern.
No. of Records	Displays the number of records saved for one file.
Interval	Displays the time until the data is recorded in all of the files set in *File count*.
Collection Period	Displays the period required to save the specified number of collections.

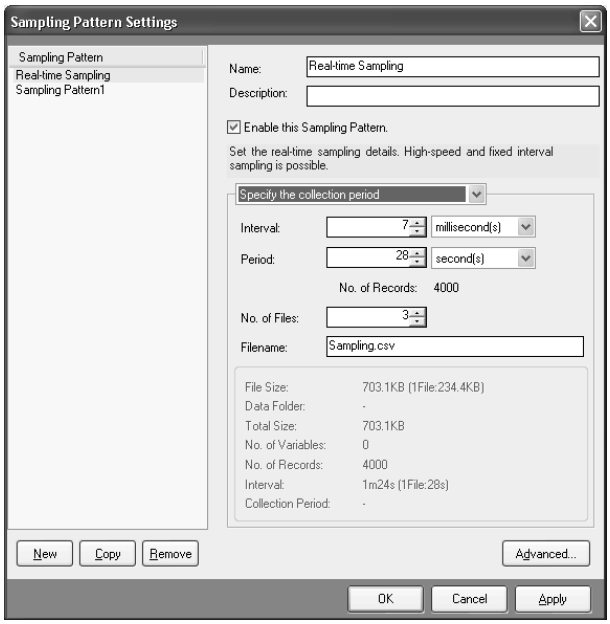
Specifying the Number of Records

When *Specify by the number of records* is selected, the number of records recorded in a single file is fixed at the specified number.



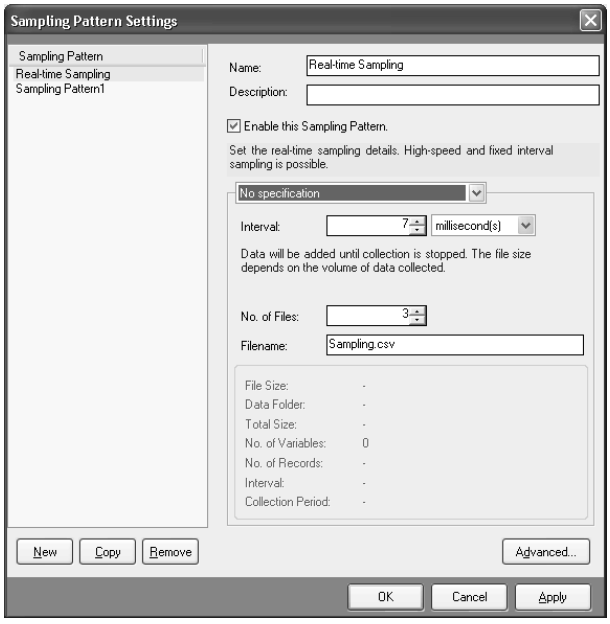
Specifying the Collection Period

When *Specify the collection period* is selected, the number of records recorded in a single file is determined by the period and cycle settings. The number of records recorded in a single file is fixed.



Unspecified Number of Records

When *No specification* is selected, data will be added to the file until data collection is stopped. With this method, all of the records from the start to the end of sampling can be recorded in a single file.

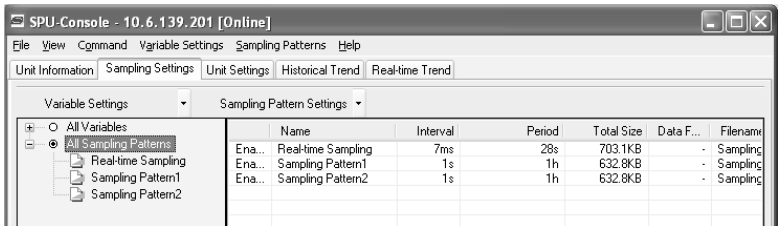


Note (a) When saving data without a specified number of records, the file size will continuously increase until data collection is stopped. Be sure that there is enough memory available in the Memory Card.

(b) When saving data in a single file and leaving the number of records unspecified, existing data in the file will be cleared when collection starts. We recommend saving data in multiple files when leaving the number of records unspecified.

4. After inputting the settings, click the **OK** or **Apply** Button.

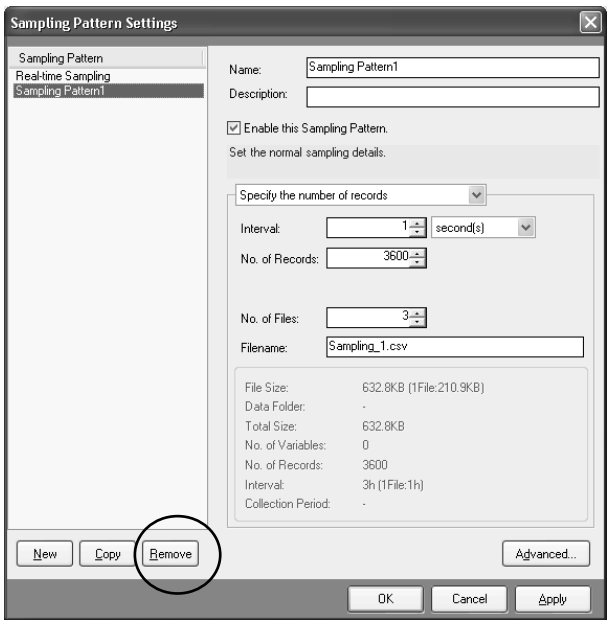
5. Confirm that the sampling pattern has been added to the Classification Panel's *All Sampling Patterns* directory tree.



18-4-2 Deleting a Sampling Pattern

1,2,3...

1. To delete a sampling pattern, click the SPU Console's **Sampling Settings** Tab and select ***Sampling Pattern Settings***.
2. Select the sampling pattern to be deleted in the pane on the left side of the Sampling Pattern Settings Dialog Box and click the **Remove** Button.

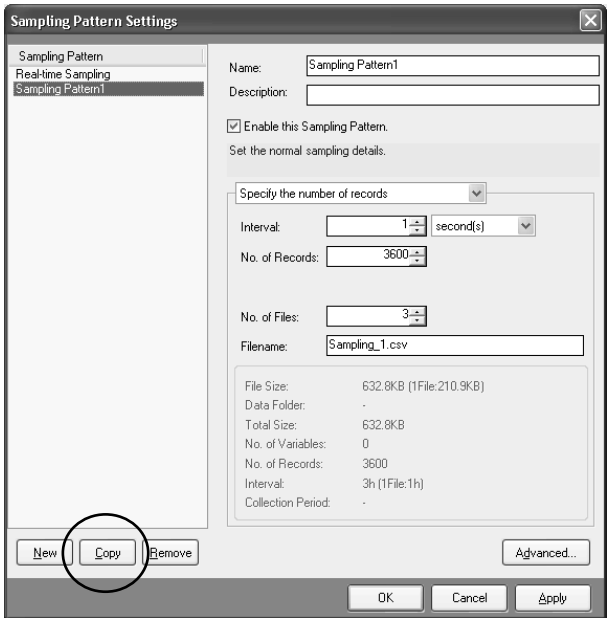


18-4-3 Copying Sampling Patterns

1,2,3...

1. To copy a sampling pattern, open the **Sampling Settings** Tab Page and select ***Sampling Pattern Settings***.

2. In the pane on the left side of the Sampling Pattern Settings Dialog Box, select the sampling pattern to be copied and click the **Copy** Button.

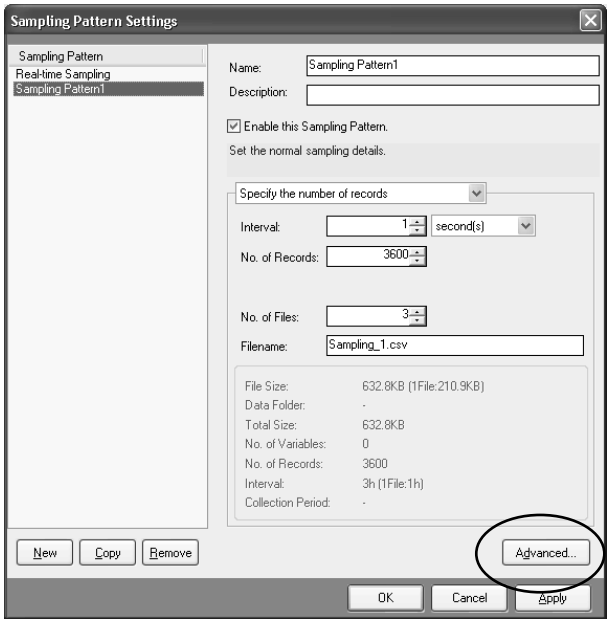


18-5 Making Advanced Sampling Pattern Settings

18-5-1 Advanced Sampling Pattern Settings

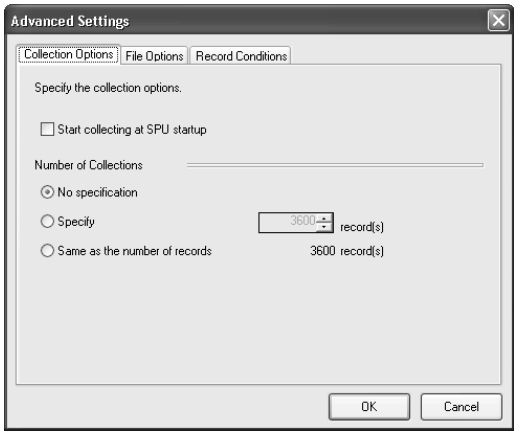
Advanced settings can be made for sampling patterns. In the advanced settings, it is possible to specify parameters, such as the number of data collections, to make and the conditions to be satisfied for data to be recorded. It is also possible to save files under different names.

The advanced settings are made in the Advanced Settings Dialog Box. The Advanced Settings Dialog Box is displayed by clicking the **Advanced** Button in the Sampling Pattern Settings Dialog Box.



18-5-2 Setting Collection Options

The Collection Options Tab Page accessed in the Advance Settings Dialog Box contains settings for specifying the number of samples as well as whether or not sampling is to start automatically when the SYSMAC SPU Unit starts operating.



Starting Sampling on SYSMAC SPU Unit Start-up

When the *Start collecting at SPU startup* is selected, The sampling pattern will be started automatically when the SYSMAC SPU Unit starts operating.

Specifying the Number of Samples

Sampling can be stopped automatically when the specified number of samples have been recorded.

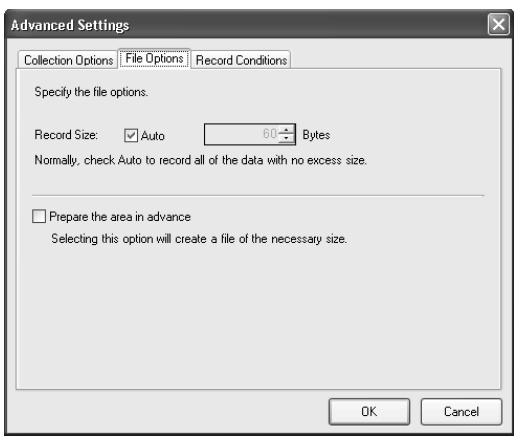
When *No specification* is selected, sampling will continue.

When *Specify* is selected, sampling will stop automatically when the specified number of samples have been recorded.

When *Same as the number of records* is selected, sampling will stop automatically when the number of recorded sample equals the number of sampling pattern records specified with the *Record count setting*.

18-5-3 Setting File Options

Settings related to collection results files are made on the **File Options** Tab Page accessed in the Advanced Settings Dialog Box.



Setting Record Size

Normally *Auto* should be selected. When *Auto* is selected, record sizes are calculated automatically. To specify the record size, specify (in bytes) the size of one record in the file to be saved.

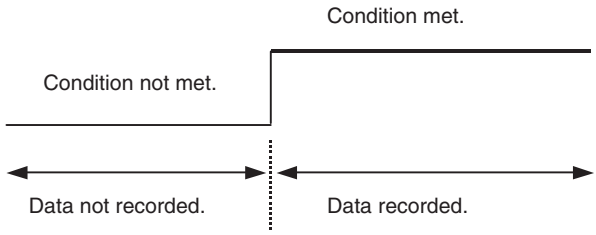
Preparing File Space in Advance

When a setting is changed, a file is created on the Memory Card for storing sampling data. If *Prepare the area in advance* is selected, a file of the size required for recording the data is created. Because the required space is reserved before sampling begins, the file will not run out of available space while sampling is in progress.

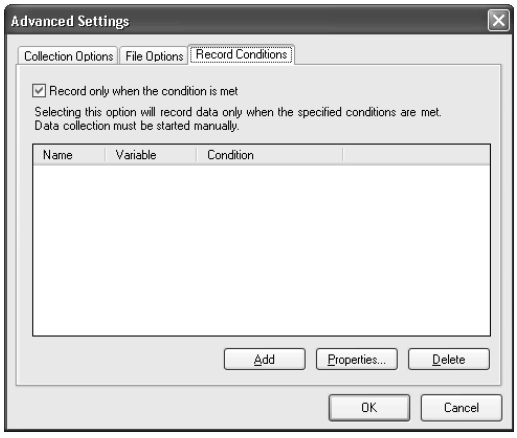
Note When the *Prepare the area in advance* option is ON, it takes time to create the files when settings are changed.

18-5-4 Sampling Condition Designation

A record condition can be set in advance so that data will be recorded only when the condition is met. Using record conditions enables sampling according to the application, recording data only while the bit is ON.



Record conditions are set on the Record Conditions Tab Page accessed in the Advanced Settings Dialog Box.



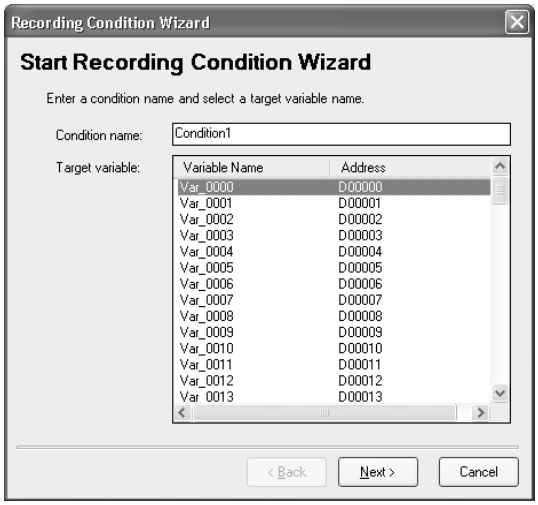
Note To use record conditions, sampling must be started in advance.

Adding Conditions

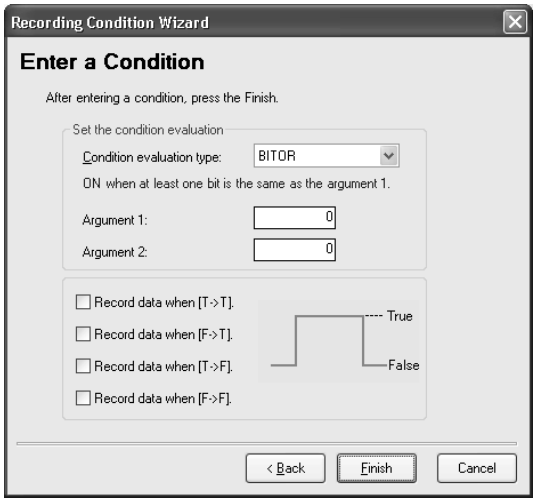
1,2,3...

1. Select the *Record only when the condition is met, data is recorded* Option and then click the **Add** Button. The Add Recording Condition Wizard will be started.
2. Input the sampling condition name and select the variable to use to set the condition. Input a text string for the condition name. Commas, carriage returns, and tab codes cannot be used in the condition name.

Note The variable used to set a condition must be registered in advance as a sampling variable.



3. Click the **Next** Button.



4. Input the condition and then click the **Finish** Button.

For *Set the condition evaluation*, set the condition evaluation type and arguments for comparison with memory contents. The following table shows the condition evaluation types and arguments.

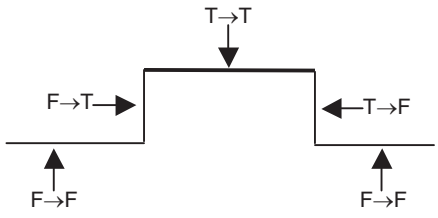
Condition evaluation type	Argument 1	Argument 2	Meaning
BITOR	Required	---	One of the same bits is ON as in argument 1.
BITAND	Required	---	All of the same bits are ON as in argument 1.
TRUE	---	---	Always true
NoneZero	---	---	Value ≠ 0
EQ	Required	---	Value = Argument 1
LT	Required	---	Value < Argument 1
LE	Required	---	Value ≤ Argument 1
GT	Required	---	Value > Argument 1
GE	Required	---	Value ≥ Argument 1
GELE	Required	Required	Argument 1 ≤ Value ≤ Argument 2
GTLT	Required	Required	Argument 1 < Value < Argument 2
GELT	Required	Required	Argument 1 ≤ Value < Argument 2
GTLE	Required	Required	Argument 1 < Value ≤ Argument 2
PrevBITOR	---	---	One of the same bits is ON as in previous value.
PrevBITAND	---	---	All of the same bits are ON as in previous value.
PrevEQ	---	---	Value = Previous value
PrevLT	---	---	Value < Previous value
PrevLE	---	---	Value ≤ Previous value
PrevGT	---	---	Value > Previous value
PrevGE	---	---	Value ≥ Previous value

---: Not required.

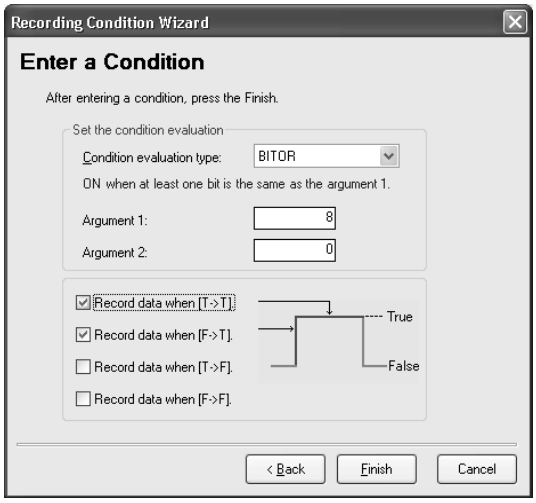
The pattern for which sampling data is to be recorded for the current evaluation in comparison to the previous evaluation is also set.

Item	Meaning
True → True	Data is recorded when the evaluation remains true.
True → False	Data is recorded when the evaluation changes from true to false.
False → True	Data is recorded when the evaluation changes from false to true.
False → False	Data is recorded when the evaluation remains false.

The following diagram illustrates these settings.



For example, the following settings are used to record data only when bit 4 is ON.



Note Evaluations are calculated based on the word contents of the address specified for the variable, not on the converted value for the data type of the variable.

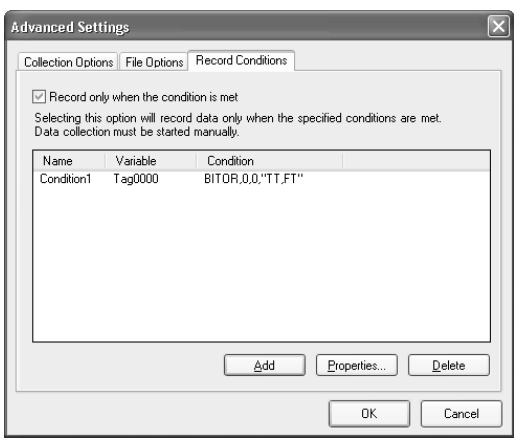
Example: INT (Integer: (-32,768 to 32,767) and WORD (16-bit text string: #0 to #FFFF)

If the condition judgement is to be a non-negative INT integer (0 to 32,767), then the following settings are required: GELT for the condition judgement type, 0 for argument 1, and 33,768 (8000 hex) for argument 2.

Memory value / Data type	0x000	0x7FFF	0x8000	0xFFF
WORD	0	32,767	32,768	65,535
INT	0	32,767	–32,768	–1

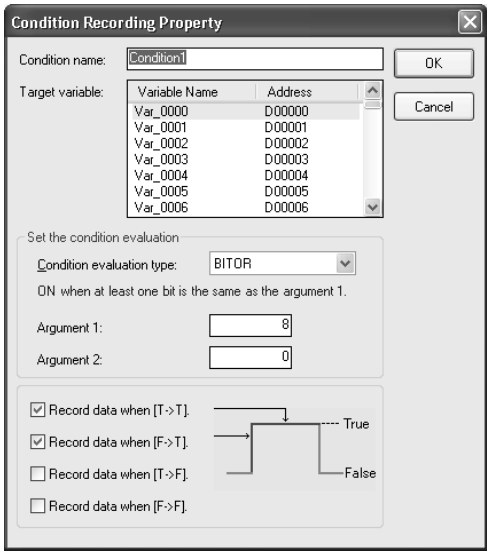
Deleting a Condition

To delete a condition, select the condition and click the **Delete** Button.



Changing a Condition

To change a condition, select the condition and click the **Properties** Button.



18-6 Enabling the Sampling Settings

Use the following procedure to enable the sampling settings. Always perform this procedure after the sampling settings have been changed.

Note

(1) Confirm that the SYSMAC SPU Unit is connected before enabling the settings.

(2) When the changed settings are transferred, the existing SYSMAC SPU Unit settings will be overwritten. All of the sampling files in the Journal folder on the Memory Card will be deleted, and new files will be created with the new settings.

(3) Never turn OFF the Unit's power supply while the Unit's settings are being transferred. If the power supply is turned OFF during a transfer, incorrect information may be transferred to the SYSMAC SPU Unit, possibly causing the SYSMAC SPU Unit to malfunction.

(4) If too many variables are registered in the sampling pattern, the settings may not be transferred correctly. In this situation, reduce the number of variables and re-transfer the settings.

1,2,3...

1. Confirm that variable settings and sampling pattern settings have been completed.
2. Click the SPU Console's **Sampling Settings** Tab.
3. Click the **Transfer to Unit** Button in the SPU-Console's *Control Panel*. The following dialog box will be displayed to confirm the settings file transfer and the change to the settings.

4. Click the **Yes** Button to change the settings file transfer and the change to the settings. A dialog box will be displayed to show the file transfer, and then the command will be executed to change the sampling settings.

The SYSMAC SPU Unit's 7-segment display will read "P1" through "PE" while the sampling settings are being changed. The display will return to "-S" when the change is completed. The new settings will be effective when the "-S" display appears.

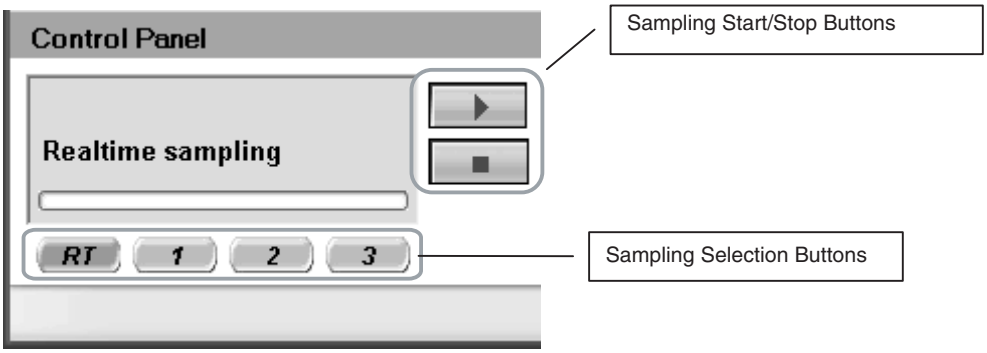
18-7 Executing Sampling

This section describes how to start and stop sampling from the SPU-Console.

18-7-1 Controlling Sampling

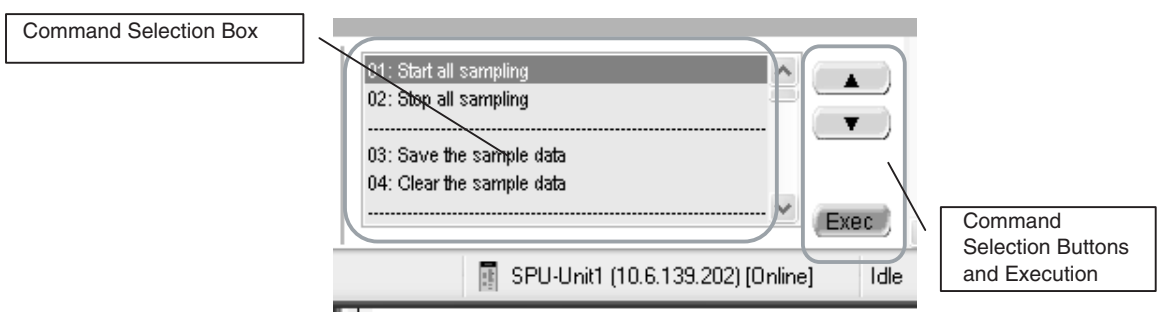
Sampling is started by clicking a Sampling Selection Button and then clicking the Sampling Start Button.

Sampling is stopped by clicking the Sampling Stop Button.



18-7-2 Controlling All Sampling

To start all sampling at the same time, select ***01: Start all samplings*** from the Command Selection Box and then click the **Exec** Button. To stop all sampling at the same time, select ***02: Stop all samplings*** and then click the **Exec** Button.



Alternately, select ***Start All the Samplings*** or ***Stop All the Samplings*** from the Command Menu.

Note

(1) To automatically start sampling as soon as the SYSMAC SPU Unit starts, select the Start collecting at SPU startup Check Box on the Collection Options Tab Page. (Refer to *18-5-2 Setting Collection Options*.)

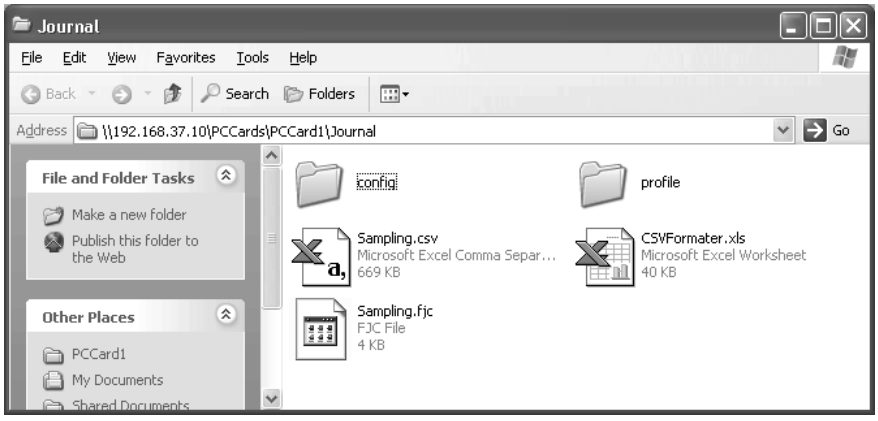
(2) As long as I/O memory can be read from the CPU Unit, sampling will be performed by the SYSMAC SPU Unit regardless of the status of the CPU Unit, even for fatal errors and load OFF status.

18-8 Displaying the Sampling Result Folder

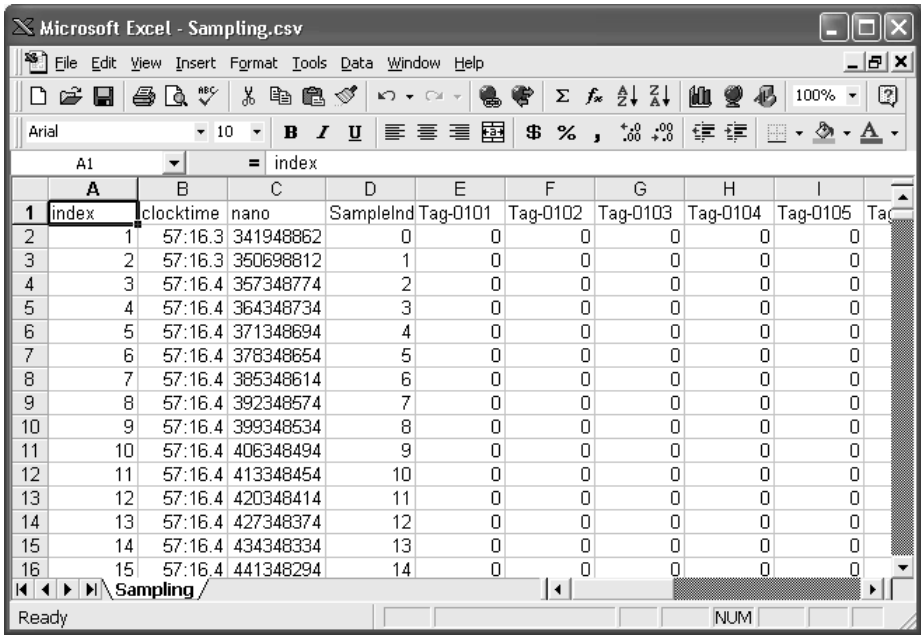
The sampling files can be accessed from the computer by using a shared folder on a Windows network. Here, an example using Microsoft Office Excel is described. In this example, it is assumed that Excel is already installed and that CSV files are associated with it

1,2,3...

1. Select ***View - Display the Unit Folder - Journal Folder*** from the SPU-Console menus. Windows Explorer will be started and the Journal Folder containing the sampling results will be displayed.



2. Double-click the sampling file that is to be displayed. Excel will be started and the contents of the sampling file will be displayed. If the CSV file extension is associated with an application other than Excel, the associated application will be started.



	A	B	C	D	E	F	G	H	I
1	index	clocktime	nano	SampleInd	Tag-0101	Tag-0102	Tag-0103	Tag-0104	Tag-0105
2	1	57:16.3	341948862	0	0	0	0	0	0
3	2	57:16.3	350698812	1	0	0	0	0	0
4	3	57:16.4	357348774	2	0	0	0	0	0
5	4	57:16.4	364348734	3	0	0	0	0	0
6	5	57:16.4	371348694	4	0	0	0	0	0
7	6	57:16.4	378348654	5	0	0	0	0	0
8	7	57:16.4	385348614	6	0	0	0	0	0
9	8	57:16.4	392348574	7	0	0	0	0	0
10	9	57:16.4	399348534	8	0	0	0	0	0
11	10	57:16.4	406348494	9	0	0	0	0	0
12	11	57:16.4	413348454	10	0	0	0	0	0
13	12	57:16.4	420348414	11	0	0	0	0	0
14	13	57:16.4	427348374	12	0	0	0	0	0
15	14	57:16.4	434348334	13	0	0	0	0	0
16	15	57:16.4	441348294	14	0	0	0	0	0

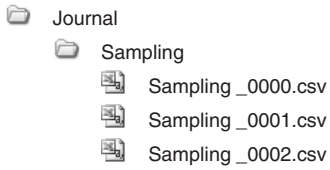
Note Collection result files are saved to the SYSMAC SPU Unit in the folder configuration shown below.

When Multiple Files Are Set to Be Saved (When the File Count Is Greater than 1)

- Files are saved to folders of the same file names as those set for the sampling patterns.

- Files are saved under file names with serial numbers at the end of the text string that is set in the *File name* Field for the sampling pattern.

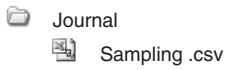
  In the example below, the file count is 3 and “Sampling.csv” is set as the file name.



When a Single File Is Set to Be Saved (When the File Count Is 1)

- The file is saved in the Journal folder, under the file name set in the *File name* Field for the sampling pattern.

  In the example below, the file count is 1 and “Sampling.csv” is set as the file name.



Note Do not delete files from the Journal Folder. The SYSMAC SPU Unit will not operate correctly if these files are deleted.

Note When displaying sampling files with Excel, the Excel macro CSVFormatter.xls is used to display items such as time in a more readable form.

This macro can be used for the following.

(1) Organize the Excel display of the sampling file contents, e.g., make the time field easier to read.

(2) Calculate the difference in time between records and display it in an Excel column (column heading: diff[ms]). This can be used to evaluate the difference in the sampling cycle that was set and the actual sampling behavior of the SYSMAC SPU Unit.

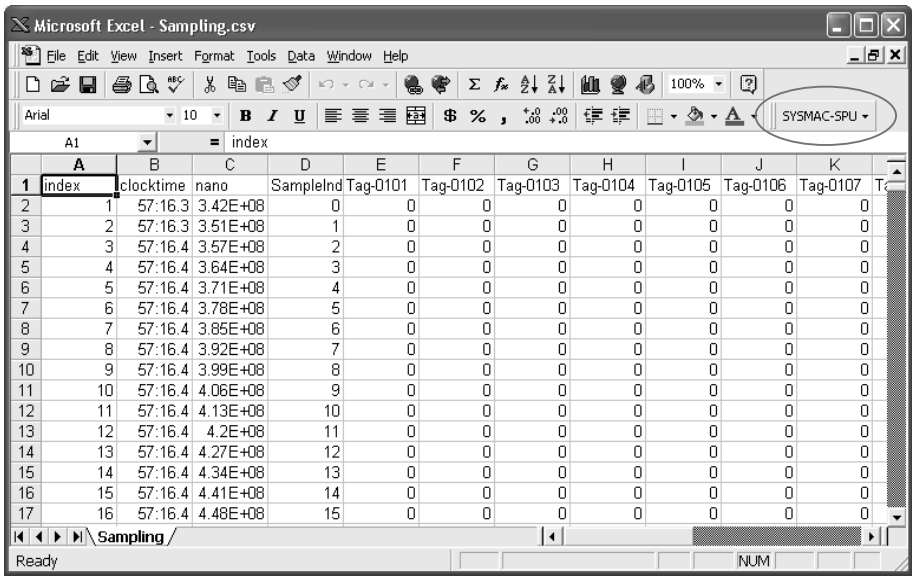
Note The *diff* value is calculated from the nano fields of two records, so the *diff* value will not be accurately shown if the record period for the records is greater than 1 s.

(3) Large CSV files with more than 256 columns can be divided into sheets of 256 columns each for display (with Microsoft Office Excel 2003 or earlier).

The CSVFormatter.xls macro is used as follows:

1,2,3... 1. Double-click the CSVFormatter.xls file in the Journal folder (i.e., the shared folder in the SYSMAC SPU Unit). This will add a toolbar called SYSMAC-SPU to the Excel toolbars.

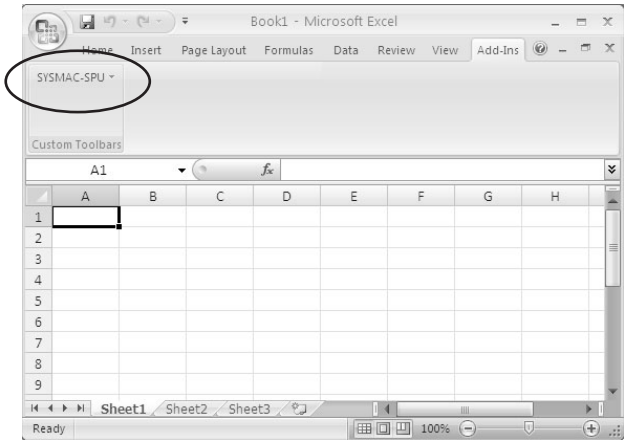
Microsoft Office Excel 2003 or Earlier



	A	B	C	D	E	F	G	H	I	J	K
1	index	clocktime	nano	SampleInd	Tag-0101	Tag-0102	Tag-0103	Tag-0104	Tag-0105	Tag-0106	Tag-0107
2	1	57:16.3	3.42E+08	0	0	0	0	0	0	0	0
3	2	57:16.3	3.51E+08	1	0	0	0	0	0	0	0
4	3	57:16.4	3.57E+08	2	0	0	0	0	0	0	0
5	4	57:16.4	3.64E+08	3	0	0	0	0	0	0	0
6	5	57:16.4	3.71E+08	4	0	0	0	0	0	0	0
7	6	57:16.4	3.78E+08	5	0	0	0	0	0	0	0
8	7	57:16.4	3.85E+08	6	0	0	0	0	0	0	0
9	8	57:16.4	3.92E+08	7	0	0	0	0	0	0	0
10	9	57:16.4	3.99E+08	8	0	0	0	0	0	0	0
11	10	57:16.4	4.06E+08	9	0	0	0	0	0	0	0
12	11	57:16.4	4.13E+08	10	0	0	0	0	0	0	0
13	12	57:16.4	4.2E+08	11	0	0	0	0	0	0	0
14	13	57:16.4	4.27E+08	12	0	0	0	0	0	0	0
15	14	57:16.4	4.34E+08	13	0	0	0	0	0	0	0
16	15	57:16.4	4.41E+08	14	0	0	0	0	0	0	0
17	16	57:16.4	4.48E+08	15	0	0	0	0	0	0	0

Note It may not be possible to execute this macro depending on the settings of Excel security. If the macro cannot be executed, select ***Options - Macro Security - Security Level*** from the Excel menus and set the security level to ***Medium.***

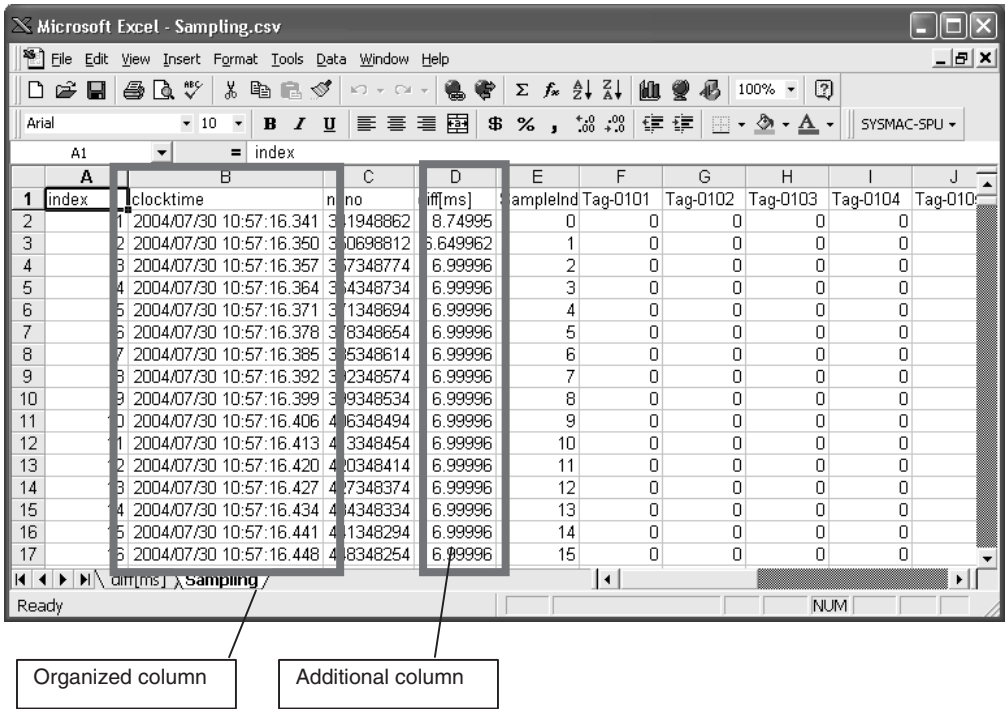
Microsoft Excel 2007



Note Macros may not be enabled with the Microsoft Office Excel 2007 security settings. In that case, click the **Office** Button in Excel and then select Excel Options to display the Excel Options Dialog Box. From the Excel Options Dialog Box, click the **Security Center Settings** Button in the Security Center Window to display the Security Center Dialog Box. From the Security Center Dialog Box, set Macro Settings in the Macro Settings Window to display a warning and disable all macros. When a dialog box related to Microsoft Office Excel security is displayed after a macro is opened, click the **Enable Macros** Button.

2. Click the **SYSMAC-SPU** Button on the toolbar and select ***Formatting.***

After this procedure is performed, the time display will be organized and the *diff[ms]* column will be displayed as shown below.



18-9 Saving Sampling Data

Sampling data collected by the SYSMAC SPU Unit can be saved in one file. The file will contain the sampling settings, all sampling files, and the SYSMAC SPU Unit operating status in a compressed format. This file can be used to save specific sampling results.

- Save the data to a file by executing command 03 (Save the Sampling Data).
- The file will be saved in the SYSMAC SPU Unit network-shared folder \pccards\PCCard1\Archive with a timestamp for a name and the file name extension tgz (example: 20040727150505.tgz).
- The file that is saved is in tar and gzip format.
- To obtain the saved files, a compression application, such as WinZip, is required to extract the files.

Note When command 03 (Save the Sampling Data) is executed on the SYSMAC SPU Unit, a temporary file is created when creating the file to save. Saving the file may fail if there is not sufficient memory on the PC card.
As a guide, available space will be required that is equivalent to the total size of all of the sampling files.

SECTION 19
Unit Settings (Sampling Mode)

This section provides information on Unit settings for data collection.

19-1 Unit Settings 260

19-1 Unit Settings

The unit settings in Sampling Mode are the same as for Data Storage Mode. For details on operation methods, refer to *SECTION 14 Unit Settings*.

SECTION 20
Supported Commands

This section provides a list of the commands that can be executed for SYSMAC SPU Units.

20-1 Commands 262

20-1 Commands

Commands can be executed from the SYSMAC SPU Unit, the SPU-Console, or the ladder program. For details on executing commands, refer to *SECTION 6 Executing Commands*.

The commands supported by the SYSMAC SPU Unit differ slightly in the SYSMAC SPU Unit's two operating modes. The following commands are supported.

Command No.	Command	Meaning
01	Start all samplings	Starts all sampling that has been set.
02	Stop all samplings	Stops all sampling that has been set.
03	Save the sampling data	Saves the sampling files and settings file in zip format. (An archive folder is created on the Memory Card, and the files are saved in that folder.)
04	Clear the sampling data	Deletes all of the sampling files inside the Journal folder on the Memory Card and creates a new sampling file.
05	Display the IP address (LAN1)	Displays the IP address of LAN1 on the 7-segment display.
06	Display the IP address (LAN2)	Displays the IP address of LAN2 on the 7-segment display.
07	Display the unit name	Displays unit name on the 7-segment display.
08	Display the FINS address	Displays the FINS address of the Ethernet Communications Unit on the 7-segment display.
09	Display Memory Card used space (%)	Displays the percentage of Memory Card space that is being used.
10	Error display	Displays any current error.
11	Forced clear of error	Deletes the record of any current errors.
12	Restart unit	Restarts the SYSMAC SPU Unit.
20	Change the sampling settings	Changes the sampling settings.
21	Save the settings to the Memory Card	Backs up the SYSMAC SPU Unit settings. This command must be executed beforehand to enable using command 22 (Read the settings from the Memory Card). For details, refer to *Appendix F Reproducing a SYSMAC SPU Unit*.
22	Read the settings from the Memory Card	Restores the data collection settings that were backed up by command 21 (Save the settings to the Memory Card). For details, refer to *Appendix F Reproducing a SYSMAC SPU Unit*.
24	Change the unit settings	Changes the unit settings.
28	Read the settings from the CPU Unit	Reads the settings that were saved using the CPU Unit's easy backup function. For details, refer to *Appendix F Reproducing a SYSMAC SPU Unit*.
30	Start the serial terminal	Used for maintenance. Do not execute this command.
31	Format the Memory Card (FAT32)	Formats the Memory Card in FAT32 format. All the files in the Memory Card are deleted.
32	Clear the Logfile	Deletes the system log. Used for maintenance.
33	Processing information record	Used for maintenance. Do not execute this command.
34	Clear the error history	Clears the error history.
50	Start realtime sampling	Starts realtime sampling.
51	Stop realtime sampling	Stops realtime sampling.
52	Start sampling 1	Starts sampling 1.
53	Stop sampling 1	Stops sampling 1.
54	Start sampling 2	Starts sampling 2.
55	Stop sampling 2	Stops sampling 2.
56	Start sampling 3	Starts sampling 3.
57	Stop sampling 3	Stops sampling 3.
90 to 99	Execute the external command	This command is for maintenance purposes.

Operation and Maintenance

This part of the manual describes information required to operate the SYSMAC SPU Unit to collect data and to maintain the SYSMAC SPU Unit.

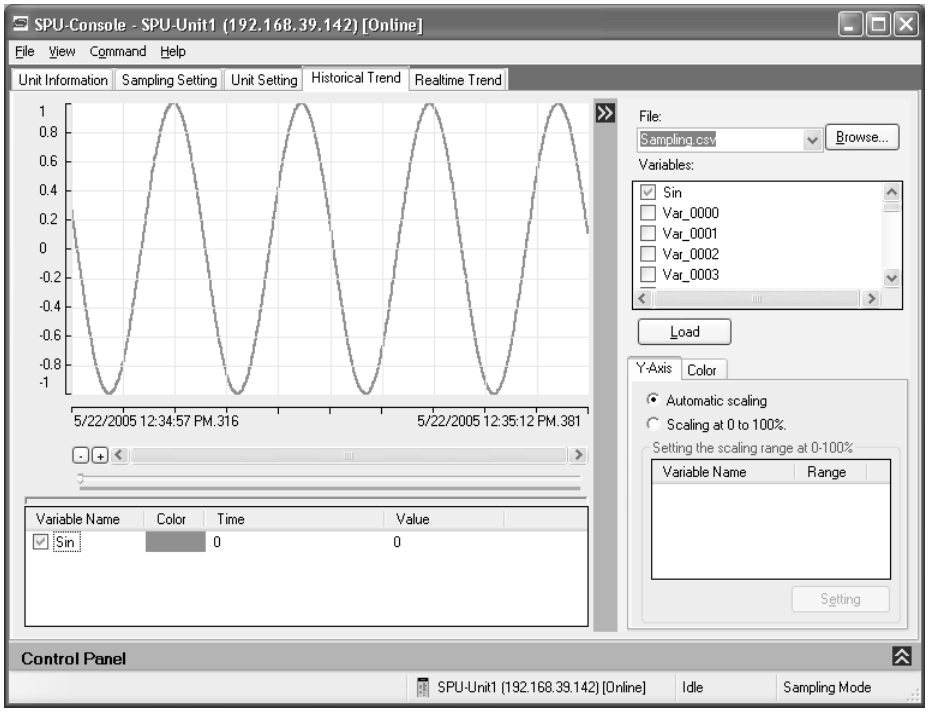
SECTION 21
Trend Graphs

This section describes how to display trend graphs based on sampling files that have been collected.

21-1 Historical Trends 266
21-1-1 Displaying Historical Trends 266
21-1-2 Specifying the Y Axis Scale 266
21-2 Realtime Trends (Sampling Mode) 267
21-2-1 Displaying Realtime Trends 267
21-2-2 Stopping Realtime Trends 267

21-1 Historical Trends

An historical trend graph, such as the one shown below, can be displayed based on a file containing collected data.



21-1-1 Displaying Historical Trends

1,2,3...

1. Click the **Historical Trend** Tab on the SPU-Console.
2. Select the sampling data to display in the *File* Field.

   Click the **Browse** Button to browse through the file directories and specify the file containing the collected data.
3. Select the variables to display in the Variables Field.
4. Click the **Load** Button.

21-1-2 Specifying the Y Axis Scale

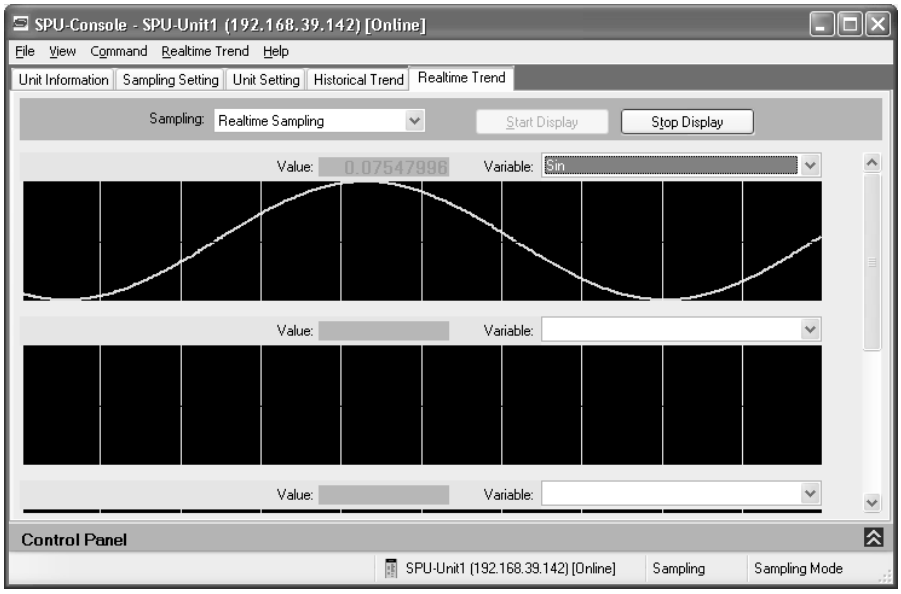
The scale of the Y axis can be specified on the Y-Axis Tab Page. If *Automatic scaling* is selected, the maximum and minimum values of the displayed variable will be used as the maximum and minimum values of the Y axis.

If *Scaling at 0 to 100%* is selected, the maximum and minimum values of the displayed variable will be converted to 0% and 100% on the display.

The maximum and minimum values of the variable to use for scale conversion can also be specified. After first loading the variable, select the variable under *Scaling at 0 to 100%* and click the **Setting** Button.

21-2 Realtime Trends (Sampling Mode)

The data currently being sampled can be displayed in realtime on a trend graph. Realtime trends can be used only in Sampling Mode. To use realtime trends, start the SYSMAC SPU Unit in Sampling Mode.



21-2-1 Displaying Realtime Trends

1,2,3...

1. Click the **Realtime Trend** Tab on the SPU-Console.
2. Select the sampling pattern to display in the Sampling Field.
3. Select the variable to display in the Variable Field.
4. Click the **Start Display** Button.

21-2-2 Stopping Realtime Trends

Click the **Stop Display** Button. The realtime trend display will stop.

⚠ **Caution** The realtime trend graph displays the status of sampling executed by the SYSMAC SPU Unit. Do not use the realtime trend display as a basis for control or judgments.
The SYSMAC SPU Unit transfers sampled data in realtime, sometimes at intervals of only a few milliseconds, and it may not be possible to display all sampling data depending on the operating environment of the SPU-Console.

SECTION 22
Report Function

This section describes the report function, which can be used to create reports from data collected by SYSMAC SPU Units.

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22-6-2 Setting the Cell Outline and Color 278
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22-6-4 Clearing the Data 278

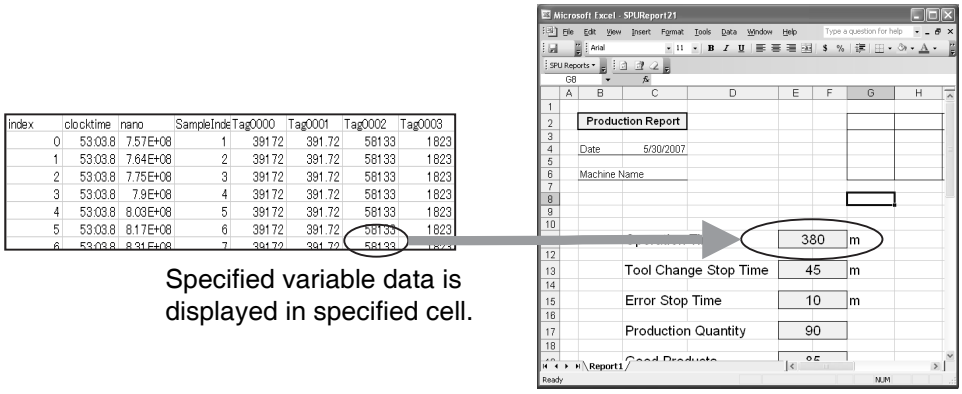
22-1 Report Function

22-1-1 Report Function Overview

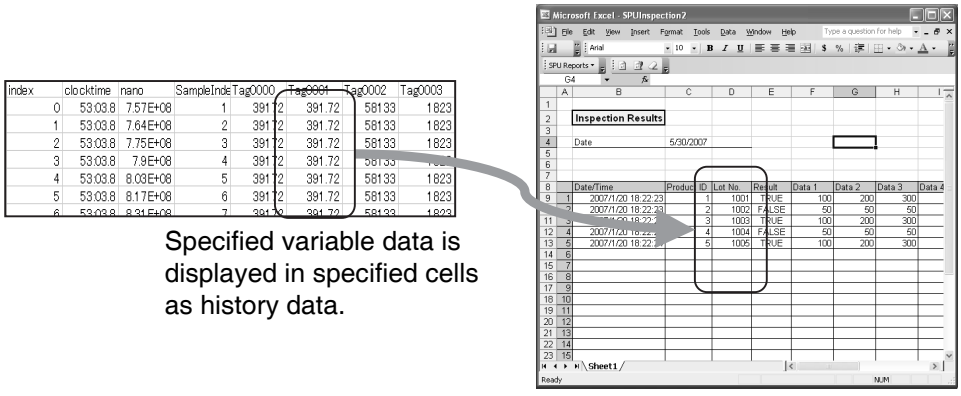
This report function is used to display in Microsoft Office Excel a CSV file that was collected by the SPU Unit. This is different from simply opening the CSV file in Microsoft Excel. Variable data collected by the SPU Unit can be displayed in any specified cells.

The report function can be used to easily create reports, such as daily reports, from CSV files collected by the SPU Unit. Sample templates, such as daily manufacturing reports and error logs, are provided to make it easier to create various kinds of reports.

Records File **Display in Excel**



Specified variable data is displayed in specified cell.



Specified variable data is displayed in specified cells as history data.

Note The report function uses Excel. It cannot be used unless Excel is installed.

22-1-2 Report Procedure

The following steps outline the basic procedure from making report function settings to creating a report.

1,2,3...

1. Collect data with the SYSMAC SPU Unit and create a CSV file.
2. Start the report function. Excel will start.
3. Create a report book.
4. Set the cells to display data.
5. Data in the CSV file will be read in and displayed in Excel.

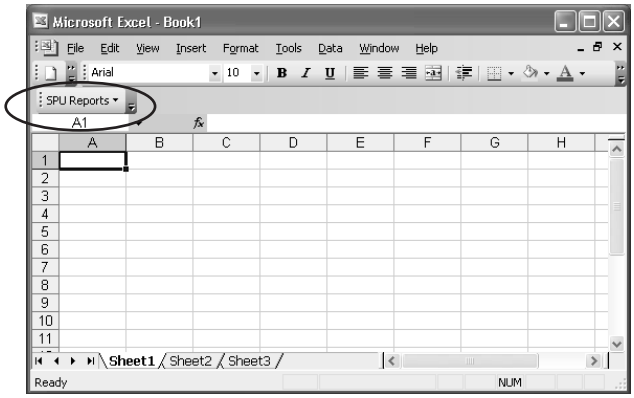
22-2 Starting and Exiting the Report Function

22-2-1 Starting the Report Function

Select ***Start - All Programs - OMRON - SPU-Console 2.2 - Create Report***.

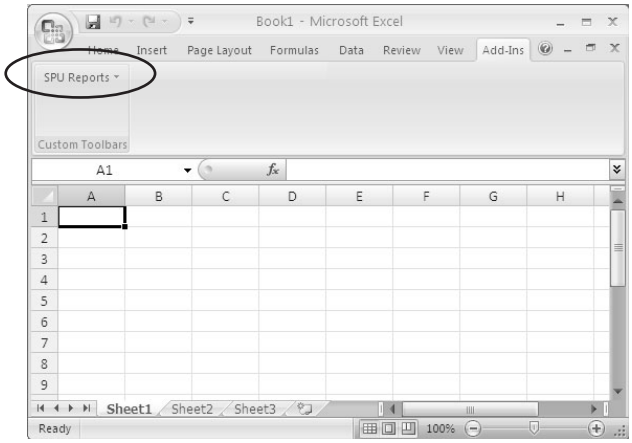
Excel will start and the SPU Reports Menu will be added.

Microsoft Office Excel 2003



Note The report function uses Excel macros. Make sure that macros are enabled by setting the macro security level to medium or low. To change the security level, select ***Tools - Macro - Security*** from the Excel menus.
Refer to Excel Help for details.

Microsoft Office Excel 2007



Note The report function uses Excel macros. Macros may not be enabled depending on the security settings of Microsoft Office Excel 2007. If they are not enabled, click the **Office** Button and select ***Excel Options*** to open the Excel Options Dialog Box. Click the **Security Center Settings** Button in the Security Center Window to open the Security Center Dialog Box. Select the **Display warning and disable all macro** Option in the Macro Settings Window.

If the Microsoft Office Excel Security Warning Dialog Box is displayed when a macro file is opened, click the **Enable Macro** Button.

22-2-2 Exiting the Report Function

Select ***File - Exit*** from the Excel menus to exit Excel.

22-3 Creating Report Books

This section describes the procedure for creating report books. The report function creates a special Excel workbook called a Report Book. There must be a CSV file to display in the report book before you can create a report book.

22-3-1 Creating a New Report Book

1,2,3...

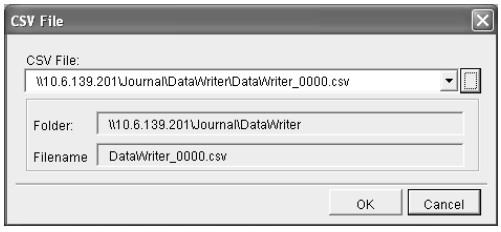
1. Select ***SPU Reports - New File***.
2. Select *Blank Report Book* from the New Report Book Dialog Box and click the **OK** Button.
3. The new report book will be displayed in Excel.

Note Report books contain macros used to display data. Workbooks created using Excel cannot be used. Select ***SPU Reports - New*** to create a new report book.

22-3-2 Specifying CSV Files

1,2,3...

1. Select ***SPU Reports - Specify CSV File***.
2. Select a CSV file to display in the report book in the CSV File Dialog Box. CSV files can be selected from a Memory Card inserted in the SYSMAC SPU Unit or from a computer where the EDMS Data Management Middleware (WS02-EDMC1-V2) was used to import CSV files to the computer. The CSV file specified in the following window is an example of a CSV file stored on a Memory Card.



3. Click the **OK** Button to close the dialog box.

Note Information of the CSV file specified here will be saved in the report book.

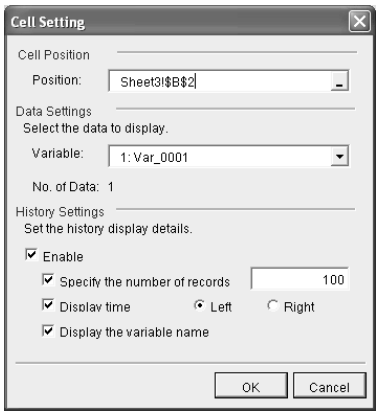
Data in the specified CSV file will be used to display the cell settings and cell data.

22-3-3 Adding Cell Settings

1,2,3...

1. Select a cell to display data.
2. Select ***SPU Report - Cell Settings***.
   The Cell Setting Dialog Box will be displayed.
3. In the Cell Setting Dialog Box, specify the variable to be displayed.

4. Set all parameters and click the **OK** Button.



The following table describes the setting parameters.

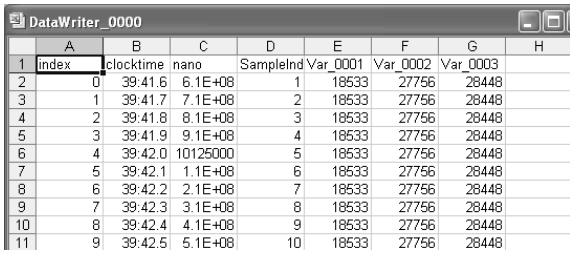
Item	Description
Cell Position	Specifies the range of cells where data will be displayed.
Data Settings	Specifies the data that will be displayed in the cells. *Variable* shows a list of variable names that are in the header row of the CSV file. Select a variable to display in the variable cell.
History Settings	• *Selecting Enable* will display the history in the cells specified in *Position*. • When the *Specify the number of records* Option is disabled, all records of the CSV file will be displayed as history data. • Selecting the *Display time Option* will display the timestamp of the history data either to the *Left* or *Right* of the cells. • Selecting the *Display the variable name* Option will display the variable name above the cells specified in *Position*.

Consecutive variables starting at the variable specified in *Variable* will be displayed.

If multiple cells are specified in *Position*, a sequence of consecutive variables starting at the variable specified in *Variable* can be displayed at once.

As an example, select cells from B2 to D2 in *Position*. The corresponding cell setting and displays are shown in the figures below.

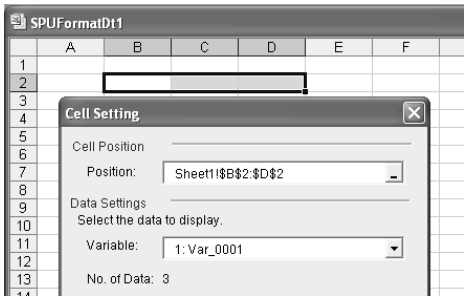
- The following figure shows the CSV file used in this example.



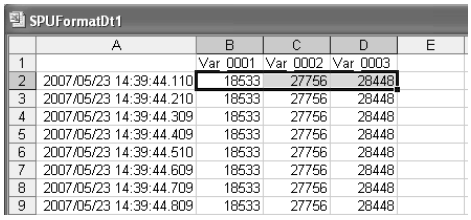
DataWriter_0000

	A	B	C	D	E	F	G	H
1	index	clocktime	nano	SampleInd	Var_0001	Var_0002	Var_0003	
2	0	39:41.6	6.1E+08	1	18533	27756	28448	
3	1	39:41.7	7.1E+08	2	18533	27756	28448	
4	2	39:41.8	8.1E+08	3	18533	27756	28448	
5	3	39:41.9	9.1E+08	4	18533	27756	28448	
6	4	39:42.0	10125000	5	18533	27756	28448	
7	5	39:42.1	1.1E+08	6	18533	27756	28448	
8	6	39:42.2	2.1E+08	7	18533	27756	28448	
9	7	39:42.3	3.1E+08	8	18533	27756	28448	
10	8	39:42.4	4.1E+08	9	18533	27756	28448	
11	9	39:42.5	5.1E+08	10	18533	27756	28448	

1,2,3... 1. Select cells from B2 to D2 in *Position*, and set *Var_0001* as the variable.



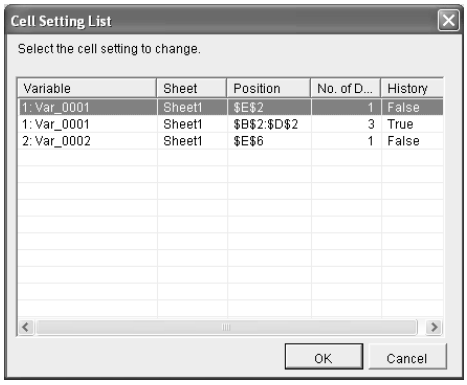
2. Click the **OK** Button.
   Variables Var_0001, Var_0002, Var_0003 will be displayed in the cells B2 to D2.



	A	B	C	D	E
1		Var_0001	Var_0002	Var_0003	
2	2007/05/23 14:39:44.110	18533	27756	28448	
3	2007/05/23 14:39:44.210	18533	27756	28448	
4	2007/05/23 14:39:44.309	18533	27756	28448	
5	2007/05/23 14:39:44.409	18533	27756	28448	
6	2007/05/23 14:39:44.510	18533	27756	28448	
7	2007/05/23 14:39:44.609	18533	27756	28448	
8	2007/05/23 14:39:44.709	18533	27756	28448	
9	2007/05/23 14:39:44.809	18533	27756	28448	

22-3-4 Changing the Cell Settings

1,2,3... 1. Select ***SPU Reports - Change Cell Settings***.
   The Cell Setting List Dialog Box will be displayed.



2. Select the cell setting to change in the Cell Setting List Dialog Box and click the **OK** Button.
   The Cell Settings Dialog Box will be displayed.
3. Change the settings and click the **OK** Button.

22-3-5 Deleting Cell Settings

1,2,3... 1. Select ***SPU Reports - Delete Cell Settings***.
   The Cell Setting List Dialog Box will be displayed.
2. Select the cell setting to delete in the Cell Setting List Dialog Box. Click the **OK** Button.

22-3-6 Saving Report Books

To save a report book, select ***File - Save As*** from the Excel menu.

Note A report book can be saved in the Workbook Folder of the SYSMAC SPU Unit. By saving it in the Workbook Folder, it can be accessed from other com-

puters. To save it to the Workbook Folder, set the path and name of the Workbook Folder.

Example: \\192.168.0.100\Workbook\

22-3-7 Opening Report Books

To open a report book, select ***File - Open*** from the Excel menu.

Note Report books contain macros. Macros must be enabled.

(1) Microsoft Office Excel 2003 or Earlier
Make sure that macros are enabled by setting the macro security level to medium or low.
To change the security level, select ***Tools - Macro - Security*** from the Excel menus. Refer to Excel Help for details.

(2) Microsoft Office Excel 2007
The macros may not be enabled depending on the security settings of Microsoft Office Excel 2007. If macros are not enabled, click the **Office** Button and select ***Excel Options*** to open the Excel Options Dialog Box. Click the **Security Center Settings** Button in the Security Center Window to open the Security Center Dialog Box. Select the ***Display warning and disable all macro*** Option in the Macro Settings Window.
If the Microsoft Office Excel Security Warning Dialog Box is displayed when a macro file is opened, click the **Enable Macro** Button.

22-4 Displaying Data

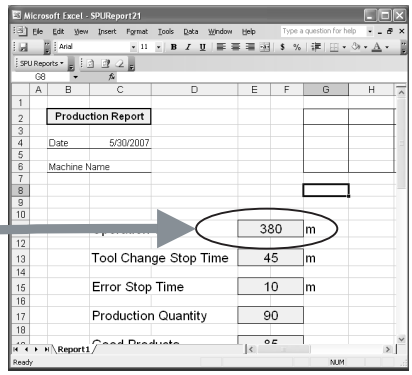
22-4-1 Updating Data

1,2,3...

1. Select ***File - Open*** from the Excel menus and open a report book.
Alternatively, select a report book that is already open in Excel.
2. Select ***SPU Reports - Update Data***.
Data of the CSV file will be displayed in the cells.

Normal Cell Settings

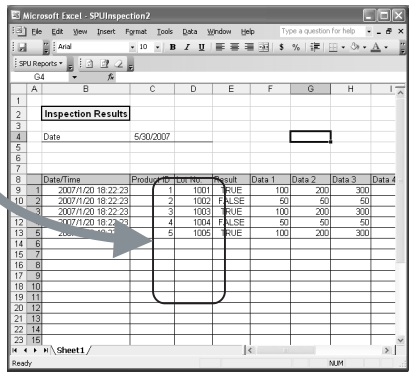
index	clocktime	nano	SampleInde	Tag0000	Tag0001	Tag0002	Tag0003
0	53:03.8	7.57E+08	1	391.72	391.72	581.33	1823
1	53:03.8	7.64E+08	2	391.72	391.72	581.33	1823
2	53:03.8	7.75E+08	3	391.72	391.72	581.33	1823
3	53:03.8	7.9E+08	4	391.72	391.72	581.33	1823
4	53:03.8	8.03E+08	5	391.72	391.72	581.33	1823
5	53:03.8	8.17E+08	6	391.72	391.72	581.33	1823
6	53:03.8	8.31E+08	7	391.72	391.72	581.33	1823



The latest record will be displayed in the specified cell.

Displaying as a History

index	clocktime	nano	SampleInde	Tag0000	Tag0001	Tag0002	Tag0003
0	53:03.8	7.57E+08	1	391.72	391.72	581.33	1823
1	53:03.8	7.64E+08	2	391.72	391.72	581.33	1823
2	53:03.8	7.75E+08	3	391.72	391.72	581.33	1823
3	53:03.8	7.9E+08	4	391.72	391.72	581.33	1823
4	53:03.8	8.03E+08	5	391.72	391.72	581.33	1823
5	53:03.8	8.17E+08	6	391.72	391.72	581.33	1823
6	53:03.8	8.31E+08	7	391.72	391.72	581.33	1823



Multiple records will be displayed in cells downward from the specified cell.

22-4-2 Displaying Data from a Different CSV File

1,2,3...

1. Select ***File - Open*** from the Excel menu and open a report book.
2. Select ***SPU Reports - Specify File and Update***.
3. Select a different CSV file in the Open File Dialog Box.
   Data of the specified CSV file will be displayed in the cells.

Note When selecting a different CSV file, make sure that the collection pattern is the same as the previous CSV file. If it is different, the variable information may not match, causing incorrect information to be displayed.

22-5 Templates

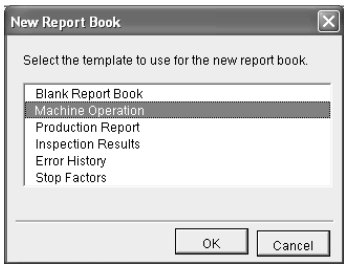
A template can be used as a prototype of a report book when creating new report books.

22-5-1 Creating a Report Book from a Template

1,2,3...

1. Select ***SPU Reports - New File***.

2. Select a template in the New Report Book Dialog Box.
   Click the **OK** Button.



3. A new report book will be created using the template as a prototype.
4. Change the layout if required.
5. Follow the procedures described in *22-3 Creating Report Books* to set the cells.

   The following table describes the type of templates that are available.

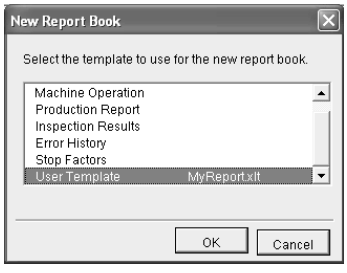
Template	Description
Blank Report Book	A blank report book.
Machine Operation	Template that displays a log of operating results.
Production Report	Template that displays daily information, such as operating time and quantity of production.
Inspection Results	Template that displays a log of inspection results for each product.
Error History	Template that displays a log of system errors.
Stop Factors	Template that displays the system stop factors as a Pareto chart.

22-5-2 Adding a Customized Template

Report books that you created can be added as customized templates. Use the following procedure to add a report book as a template.

1,2,3...

1. Create a report book to add as a template.
2. Select ***File - Save As*** from the Excel menu.
3. Select ***File Type - Template***.
4. Specify the *Save Location* as the Workbook Folder where the SPU-Console was installed.
   InstallationFolder\Workbook
   Example: C:\Program Files\OMRON\SPU-Console2.2\Workbook
5. Enter the file name for the template in *File Name* and click the **Save** Button.
   The template will be added as shown below.



Note The template will be saved in the Workbook Folder where the SPU-Console was installed. To delete the template, delete the saved file.
Do not delete the following files. Doing so will prevent you from using the sample templates.

- SPUFormatDt.xlt
- SPUFormatter.xls
- SPUInspection.xlt
- SPUParetoChart.xlt
- SPUReport1.xlt
- SPUReport2.xlt
- SPUErrorLog.xlt

If any of these files are accidentally deleted, reinstall SPU-Console to restore them.

22-6 Other Functions

This section describes other useful functions.

22-6-1 Saving Files Using Excel

SPU Reports - Save in Excel Format can be selected to cancel the cell settings and macro in the report workbook, and save the file as an Excel workbook file.

The specified CSV file data will not be displayed like a normal report book. The data that is displayed in the report will be saved as a normal Excel workbook.

22-6-2 Setting the Cell Outline and Color

The outline or color of a cell can be changed by selecting ***SPU Reports - Cell Outline*** or ***SPU Reports - Cell Color***.

Cells can be easily identified by using outlines and colors.

22-6-3 Changing the Sheet Name

The sheet name can be changed by selecting ***SPU Reports - Change Sheet Name***.

Note Data will not be displayed properly if the sheet name is changed using normal Excel functions.
If the sheet name was changed using Excel functions, change it back to its original name, then select ***SPU Reports - Change Sheet Name*** to change the Sheet Name.

22-6-4 Clearing the Data

Select ***SPU Reports - Clear All Data*** to clear all the data in the selected cells.

Appendix A
Troubleshooting with Error Codes

The SYSMAC SPU Unit provides program numbers, error codes, and error details for each program. There are two ways to check for current errors.

1. Displaying Error Information on the SPU-Console
   Display the Error Information Panel on the Unit Information Tab Page of the SPU-Console.
2. Executing Command 10 (Error Display)
   Errors will be displayed on the 7-segment display in the order they occurred. The display will change as follows: Program number (2 digits) Æ __ (underbar) Æ Error code (two digits).

The program numbers and error codes are displayed in hexadecimal.

The main error and corrections for them are listed in the following table.

Program number	Error code	Message	Assumed cause	Correction
02	2B	CS1 board initialization failure: IO table error.	The I/O tables were not created, or the I/O tables are not correct.	Create the I/O tables correctly.
02	44	Total cyclic size exceeds the range.	The total size of collected variable data exceeded the limit of 7,776 words.	Reduce the number of variables registered under *All Variables*.
04	36	Possible error in PC card.	The file system is not correct because the power supply was turned OFF while data was being saved to files, e.g., during data collection.	Restart the SPU Unit. If the error occurs again, format the Memory Card. If the error occurs again even after formatting the Memory Card, replace the Memory Card.
04	3E	Failed to get IP address.	This error occurs when the *Obtain the IP address automatically* Check Box is selected and an IP address cannot be obtained from the DHCP server.	Connect to a network with a DHCP server. Or, change the IP address setting.
04 09	88	A Memory Card is not mounted.	The error occurs when a Memory Card is not mounted.	Mount a Memory Card.
04	9B	There is insufficient space available on the Memory Card.	This error occurs when there is not sufficient system space available.	Restart the SPU Unit.
*	06	An error occurred in initialization.	This error occurs when starting a process was stopped because an error occurred in process initialization.	Restart the SPU Unit.
*	0B	Failed to register a process.		
*	17	Failed to read the event memory.	An error may have occurred in accessing the CS1 bus.	Correct the error according to the error content of the program FGW-CS1BUS displayed in the Error Information Panel of the SPU-Console.
*	18	Failed to write the event memory.	Access was not possible to the CS1 bus.	
*	20	Cannot execute the operation within a sampling interval.	This error is recorded when sampling cannot be performed within the time set for realtime sampling. This is not a fatal error.	Increase the realtime sampling period. Reduce the load caused by other sampling (e.g., the sampling cycle or number of variables).

Program number	Error code	Message	Assumed cause	Correction
*	36	Failed to initialize the recorder.	Access was not possible to the CS1 bus.	Correct the error according to the error content of the program FGW-CS1BUS displayed in the Error Information Panel of the SPU-Console.
*	3D	Data transfer failed because writing a file is busy.	The cycle is too fast or too much data is being sampled, making it impossible to write the file.	Increase the cycle. Reduce the number of variables. Use a high-speed memory card.
*	44	No file found.	A file could not be found for execution.	Execute command 20 (Change the Sampling Settings, or Change the Data Collection Settings) again. Send the setting again and then execute command 20 (Change the Sampling Settings, or Change the Data Collection Settings).
*	45	Failed to load document.	There is a problem in the settings file.	Send the setting again and then execute command 20 (Change the Sampling Settings). Restore the sampling settings that were backed up. Executing the Initialization Wizard from the SPU-Console.
			The number of variables or the number of collected variables is too large.	Reduce the number of variables or the number of collected variables.
*	59	Sampling setting file format error.	There is a problem in the settings file.	Check to be sure that variables registered in the collection pattern are set correctly. Send the setting again and then execute command 20 (Change the Sampling Settings). Restore the sampling settings that were backed up. Executing the Initialization Wizard from the SPU-Console.
*	5B	Failed to open a journal.	A file to save data could not be created.	Insert a Memory Card into the PC card slot and be sure the CARD indicator is lit. Make sure the Memory Card is formatted in the FAT32 format. Make sure the Memory Card has sufficient capacity.
*	5D	No free space in storage.	There is not sufficient space available in the Memory Card.	Make sure the Memory Card has sufficient capacity.
*	7E	Not enough free space for saving sampling data.	There is not sufficient space available in the Memory Card.	Make sure the Memory Card has sufficient capacity.
*	82	There are a lot of numbers of channels of sampling settings.	There are too many variable words to be collected or too many memory areas.	Reduce the number of variables or variable elements.

Program number	Error code	Message	Assumed cause	Correction
*	8A	Copy processing to data folder failed.	This error occurs when a failure occurred in copying data to the data folder. 1. Overwriting was attempted when the *Overwrite file in data folder* Check Box was not selected. 2. There is insufficient space on the Memory Card. 3. Copy processing required too much time.	1. Change the setting of the *Overwrite file in data folder* Check Box. Delete files from the data folder. 2. Replace the Memory Card with one with a larger capacity. Delete unnecessary files. 3. Change the collection pattern settings, such as the collection cycle or number of records.
*	97	A memory event was discarded.	This error occurs when more than one memory event occurs at an interval that is shorter than the collection processing. If more than one memory event occurs, only the last one is processed. The first one is discarded. 1. More than one memory event occurred at the same time. 2. The next memory event occurred while processing a previous memory event.	1. Change the application so that no more than one condition is met at the same time. Or, change the settings so that the same condition is used for the memory events. 2. Increase the interval between memory events.
54	8E	Recipe key manipulation failure.	1. The wrong key may have been specified in the write request. 2. The key registered with the recipe setting may be wrong.	1. Specify the correct key. 2. Check and, if necessary, reset the recipe setting.
	91	Recipe data format conversion failure.	Recipe data has been written that does not match the format of the set data.	Check and, if necessary, reset the recipe setting. Check the data file, and correct the data if necessary.
	92	Recipe data write failure.	The writing of recipe data was specified for a memory area in which data cannot be written.	Check and, if necessary, reset the recipe setting.
	93	Recipe data read failure.	1. The recipe file has not been transferred to the SPU Unit. 2. The record for the recipe data specified by key is not in the file.	Check the recipe file, and transfer the correct recipe file to the SPU Unit.
	94	Recipe data CRC error.	The file check option is enabled. Also, the recipe data was changed after changing the recipe setting.	When the file check option is enabled, the recipe setting must be reset after changing recipe data.
57	04	Failed to execute shell.	FTP transfer or expanded recipe processing may have failed.	Check if FTP send and expanded recipe are set correctly and that processing was completed normally.

Program number	Error code	Message	Assumed cause	Correction
58	01	A setting error occurred with the expanded recipe function.	There is an error in the settings.	Correct the settings.
58	02	An SPU folder error occurred with the expanded recipe function.	The Memory Card may be removed or faulty.	Check the status of the Memory Card.
58	03	An attempt was made to execute more than one recipe at the same time.	The expanded recipe function and the previous recipe function (version 2.0) were turned ON at the same time.	More than one recipe cannot be executed at the same time. Stagger the times at which the recipes are executed.
58	04	No requested recipe data.	Recipe data that matches the recipe key was not found.	Check that the recipe file to be searched exists or that the recipe data that matches the key exists.
59	01	A setting error occurred with FTP receive.	There is an error in the settings.	Correct the settings.
59	02	An SPU folder error occurred with FTP send.	The Memory Card may be removed or faulty.	Check the status of the Memory Card.
59	03	An FTP send error occurred.	An error occurred in FTP sending. Causes of FTP Send Errors 1. A connection to the FTP server could not be established. (Send time-out time = Approx. 75 s) 2. The IP address of the FTP server is not correct. (For example, the network could not be reached.) 3. The user ID or password was not correct. 4. The send destination folder does not exist on the server.	Check if the Ethernet cable is disconnected, the FTP server is operating, it is possible to log on to the FTP server, and it is possible to access the FTP server.
59	04	No SPU send file	There are no files in the copy folder.	This is not an error.
59	11	A setting error occurred in receiving a recipe.	The settings are incorrect.	Correct the settings.
59	12	An SPU folder error occurred with the recipe send function.	The Memory Card may be removed or faulty.	Check the status of the Memory Card.
59	13	An error occurred in receiving a recipe.	An error occurred in receiving a recipe.	Check if the Ethernet cable is disconnected, the FTP server is operating, it is possible to log on to the FTP server, and it is possible to access the FTP server.
59	21	Some items in FTP send settings could not be confirmed as operating normally when the FTP connection was checked.	An error occurred with an FTP connection check command.	Check the details in the system log (syslog). Refer to *15-1-1 Confirming FTP Connections* for information on how to check the log.
59	22	Some items in recipe receive settings could not be confirmed as operating normally when the FTP connection was checked.	An error occurred with an FTP connection check command.	Check the details in the system log (syslog). Refer to *15-1-1 Confirming FTP Connections* for information on how to check the log.

* There is more than one program number.

The following table gives the names of processes for the program numbers.

Program number	Process	Function
02	CS1BUS	CS1 Bus Unit
04	SpuManager	SPU Manager
09	UnitIom	(System management)
0A	Samping_Realtime	Realtime sampling
0C	Sampling_1	Sampling 1
0D	Sampling_2	Sampling 2
0E	Sampling_3	Sampling 3
13	DataWriter	Basic collection
14 to 53	DataWriter_1 to DataWriter_64	Collection patterns 1 to 64
54	recipe	Recipe
57	TrapAction	Event send/receive
58	ExpandedRecipe	Expanded recipe
59	FTP	FTP (FTP send, recipe receive, FTP connection check)

Appendix B

Troubleshooting Connections

The SPU-Console connects to the SYSMAC SPU Unit through FINS communications and through the Windows network-shared folder. This section describes troubleshooting when the SPU-Console cannot connect to the SYSMAC SPU Unit.

General Network and Network-shared Folder Troubleshooting

If a warning dialog box saying “A network share folder cannot be connected” appears on the SPU-Console or if too much time is required for connection, there may be problems on the network or in the Windows network-shared folder.

The main problems and corrections for them are listed in the following table.

Problem	Assumed cause	Correction
The SPU-Console warning dialog box saying “A network share folder cannot be connected” is displayed.	Login failed when user authorization was enabled.	Close all programs that open the shared folder and access the SYSMAC SPU Unit network-shared folder from the Explorer. Then start the SPU-Console again.
Access is possible with the IP address but not with the unit name.	The SYSMAC SPU Unit network functions have not finished starting.	Wait for a while and then try accessing the SYSMAC SPU Unit again.
	Login failed when user authorization was enabled.	Close all programs that open the shared folder and access the SYSMAC SPU Unit network-shared folder from the Explorer. Then start the SPU-Console again.
	Time is required to search for the unit name because a proxy server is enabled.	Turn OFF the Windows proxy server. OR, do not use a proxy to search for the SYSMAC SPU Unit. The Windows proxy server setting can be changed under the following from Internet Explorer: ***Tools - Internet Options - Connections Tab - LAN Settings.***
	The unit name being searched for consists of more than 15 characters.	A unit name of up to 64 characters can be set, but Windows Explorer searches are limited to 15 characters.
Time is required to connect.	Time is required to search for the unit name because a proxy server is enabled.	Turn OFF the Windows proxy server. OR, do not use a proxy to search for the SYSMAC SPU Unit. The Windows proxy server setting can be changed under the following from Internet Explorer: ***Tools - Internet Options - Connections Tab - LAN Settings.***
	Connection is not possible because the sampling load is too high.	Stop sampling and then connect the SPU-Console.

Problem	Assumed cause	Correction
Connection is not possible. The connection is not stable.	The unit name is wrong.	Check the unit name. The unit name can be checked by executing command 07 (Display the Unit Name).
	The IP address is wrong.	Check the IP address. The IP address can be checked by executing command 05 (Display the IP address (LAN1)).
	A firewall is running on the computer.	Set the firewall to enable using the IP address of the SYSMAC SPU Unit. Refer to user documentation provided with your software for details. Another correction method is to disable the firewall setting.
	The same IP address is used by another node on the LAN.	Do not use the same IP address more than once on the same LAN.
	There is a problem with the cable or hub.	Check the LAN indicator on the front of the SYSMAC SPU Unit to see if it is lit or flashing. (A problem exists if the LAN indicator is not lit.)
	A cross cable is being used, but communications settings do not agree between the computer and SYSMAC SPU Unit.	Try changing the baud rate of the network card driver on the computer from 100M to 10M.
	The log-on destination of the personal computer is a domain.	When the log-on destination is a domain, connect the personal computer or SPU Unit to a network that includes a domain controller. When connecting with a network that does not include a domain controller, change the log-on destination from a domain to a computer.

Troubleshooting FinsGateway

If a message saying that communications with the SYSMAC SPU Unit are not possible is displayed in the SPU-Console's Guide Panel, there may be a problem with FINS communications. The SPU-Console can communicate with SYSMAC SPU Units using the FinsGateway ETN_UNIT service.

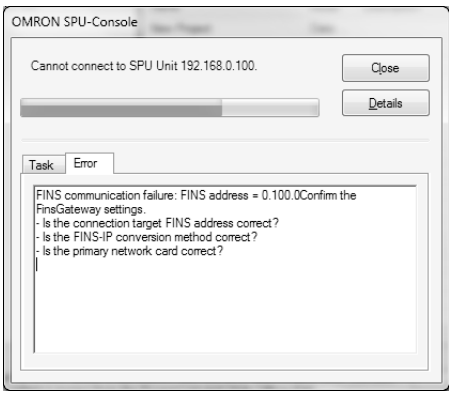
The main problems and corrections for them are listed in the following table.

Problem	Assumed cause	Correction
Communications are not possible with an SYSMAC SPU Unit on the same Ethernet network.	The ETN_UNIT FINS-IP address conversion method is set to use the IP address table.	Set *FINS-IP Conversion* in the *ETN_UNIT Properties* of the *OMRON FinsGateway Settings* Program to *Automatic Generation (Dynamic).*
Communications are not possible with an SYSMAC SPU Unit through a router.	The ETN_UNIT FINS-IP address conversion method is set to use automatic generation.	Set *FINS-IP Conversion* in the *ETN_UNIT Properties* of the *OMRON FinsGateway Settings* Program to *IP Address Table.*
	The IP address is not registered in the IP address table.	Click the **Advanced** Button in the SPU-Console's Destination Setting Panel and select *Register for the Ethernet IP address table.* Refer to *5-2-4 Advanced SPU Unit Settings.*
Communications are not possible with a SYSMAC SPU Unit from a computer with more than one network card.	The priority settings for the network cards are not correct.	Set the *Primary Network Card* in the *ETN_UNIT Properties* of the *OMRON FinsGateway Settings* Program to the network card of the network to which the SYSMAC SPU Unit is connected.
Network services other than ETN_UNIT are being used.	The FINS network address of ETN_UNIT is set to 0.	Set the same network address as the one used by the SYSMAC SPU Unit in the *ETN_UNIT Properties* of the *OMRON FinsGateway Settings* Program.
The error message “FINS communication failure” is displayed when trying to connect to a SYSMAC SPU Unit.	The ETN_UNIT network address is different from the SYSMAC SPU Unit network address.	The SYSMAC SPU Unit network address is factory set to 2. Set the same network address as the one used by the SYSMAC SPU Unit in the *ETN_UNIT Properties* of the *OMRON FinsGateway Settings* Program.
	A direct Ethernet connection is enabled and FINS communications are being performed with the IP address for direct connection.	1. Use the Direct Ethernet Utility that is included with the CX-One FA Integrated Tool Package to disable the direct Ethernet connection. 2. Set the FINS-IP address conversion method to use the IP address table in the *ETN_UNIT Properties* of the *OMRON FinsGateway Settings* Program, and register the IP address of the SPU Unit in the IP address table.
The SYSMAC SPU Unit FINS-IP address conversion method is not set to use automatic generation.	The computer’s IP address is not registered in the SYSMAC SPU Unit’s IP address table, or it is registered incorrectly.	With the SYSMAC SPU Unit’s Ethernet FINS network setting, correctly register the computer’s IP address and the FinsGateway ETN_UNIT node address in the IP address table.
	The FINS address is incorrectly set in the destination setting.	Click the **Advanced** Button in the SPU-Console’s Destination Setting Panel, and correctly register the SYSMAC SPU Unit’s FINS address.

Select ***Start - All Program - FinsGateway - FinsGateway Setting.*** Refer to the online help for the FinsGateway Setting program that is started for operating methods.

FinsGateway ETN_UNIT Properties

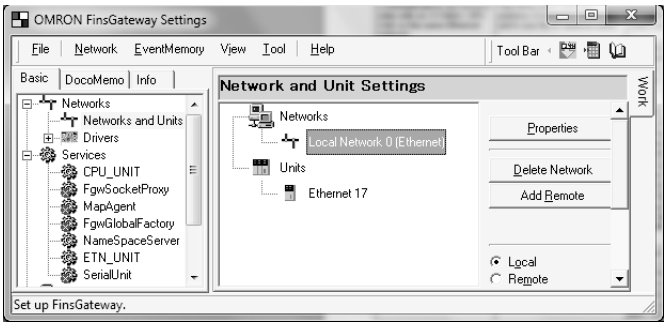
If FINS communications fail, as shown in the following dialog box, there may be a mistake in the FinsGateway *ETN_UNIT Properties*. This section describes the FinsGateway *ETN_UNIT Properties.*



1. FinsGateway ETN_UNIT Properties Dialog Box

To display the FinsGateway ETN_UNIT Properties, select ***Programs - FinsGateway - FinsGateway Settings*** from the Windows Start Menu.

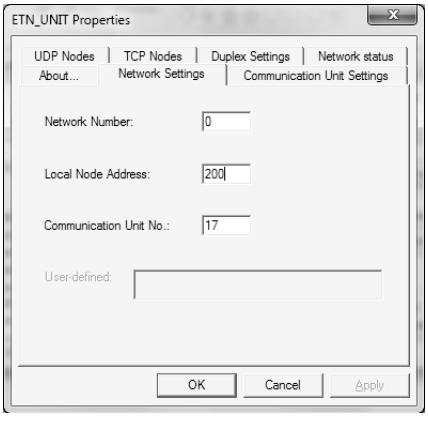
Click the **Properties** Button on the Network and Unit Settings View.



2. Network Settings Tab Page

This tab page is used to set the FINS network address and local node address of the FinsGateway ETN_UNIT.

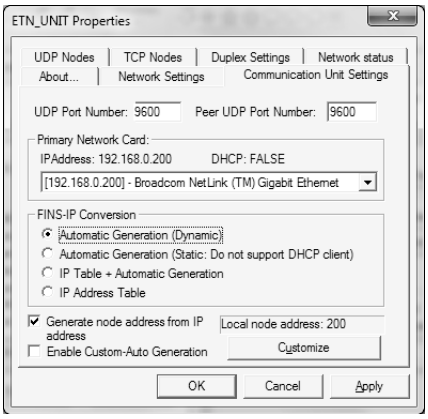
Set the *Network Number* Box to 0 or to the same value as the network address of the SPU Unit (default: 2).



3. Communication Unit Settings Tab Page

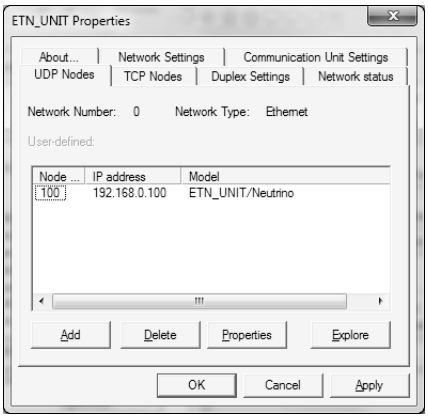
This tab page is used to set the primary network card and the FINS-IP conversion method. If there is more than one network, such as for a notebook computer, select the network to which the SPU Unit is connected as the primary network card.

Specify the conversion method to use between FINS node addresses and IP addresses in the FINS-IP Conversion Area. If the SPU Unit and computer are on the same network, select one of the *Automatic Generation* Options. If there is a router between the SPU Unit and computer, select the *IP Table + Automatic Generation* Option or the *IP Address Table* Option for the IP address conversion method. Then register the connection destination SPU Unit on the UDP Nodes Tab Page.



4. UDP Nodes Tab Page

If you select the *IP Table + Automatic Generation* Option or the *IP Address Table* Option for the IP address conversion method, register the FINS-IP address conversion table on this tab page. Register the FINS node numbers of the connection destination SPU Units and their IP addresses.

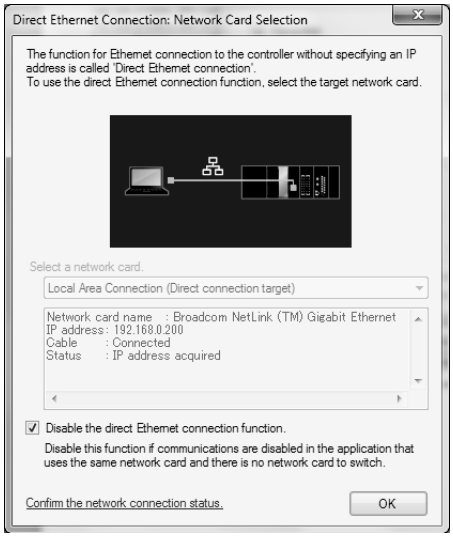


Direct Ethernet Connection Settings

Use the Direct Ethernet Utility that is included with the CX-One FA Integrated Tool Package to change direct Ethernet connection settings.

Select ***Programs - OMRON - Communications Middleware Utilities - Direct Ethernet Utility*** from the Windows Start Menu.

To disable a direct Ethernet connection, select the *Disable the direct Ethernet connection function* Check Box.

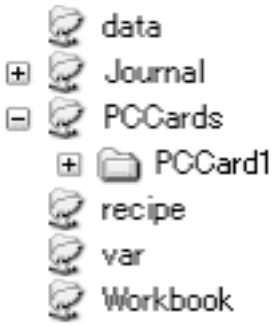

Direct Ethernet Connection: Network Card Selection
The function for Ethernet connection to the controller without specifying an IP address is called 'Direct Ethernet connection'.
To use the direct Ethernet connection function, select the target network card.
Select a network card.
Local Area Connection (Direct connection target)
Network card name : Broadcom NetLink (TM) Gigabit Ethernet
IP address: 192.168.0.200
Cable : Connected
Status : IP address acquired
Disable the direct Ethernet connection function.
Disable this function if communications are disabled in the application that uses the same network card and there is no network card to switch.
Confirm the network connection status.
OK

Appendix C

Structure of the Shared Network Folders

The files on a Memory Card inserted into the SYSMAC SPU Unit can be accessed from the computer using a shared Windows network folder.

The structure of the SYSMAC SPU Unit network folder is shown below.



Folder	Contents
Journal	Contains the recorded files.
data	Contains files copied using the copy option.
recipe	Contains recipe files.
Workbook	Contains Excel workbooks created using the report function.
PCCards/PCCard1/Archive	Contains files from command 3 (Save collection data).
PCCards/PCCard1/Journal	Contains recorded files. The same as the Journal folder described above.
var	Contains system log files.

Appendix D

Changing from SYSMAC SPU Unit Ver. 1.0/1.2/1.3

Connecting to the SYSMAC SPU Unit Ver. 1.0/1.2/1.3

When connecting to the SYSMAC SPU Units with unit version 1.0, 1.2, or 1.3, the setting windows for SPU-Console version 1.0, 1.2, or 1.3 is displayed. For details on operating the SPU-Console version 1.0 setting windows, refer to *SYSMAC WS02-SPTC1 SPU-Console Operation Manual* (Cat. No. V230). For details on operating the SPU-Console version 1.2 or 1.3 setting windows, refer to *SYSMAC WS02-SPTC1 SPU-Console Ver. 1.3 Operation Manual* (Cat. No. V231).

Note (1) It is not possible to connect to SYSMAC SPU Units with unit version 2.0 or later from SPU-Console versions 1.0, 1.2. or 1.3.

(2) SPU-Console version 2.0 can connect to SYSMAC SPU Units with unit versions of 2.0 or later.

Moving Setting Files

Use the following procedure to use the settings from a SYSMAC SPU Unit with unit version 1.0, 1.2, or 1.3 with a SYSMAC SPU Unit with unit version 2.0.

1. Use the Project Explorer to connect to the SYSMAC SPU Unit with unit version 1.0, 1.2, or 1.3 in which the settings files are located.
2. Select ***File - Save to PC*** and save the unit version 1.0, 1.2, or 1.3 settings files to the personal computer.
3. Use the Project Explorer to connect to the SYSMAC SPU Unit with unit version 2.0 to which the settings files are to be moved.
4. Select ***File - Load from PC*** and load the settings files saved in step 2. If the following dialog box is displayed, click the **YES** Button.

5. Confirm the settings in the Sampling Settings (or Collection Settings Tab Page).
6. Click the **Transfer to Unit** Button to change the setting of the SYSMAC SPU Unit with unit version 2.0.

Note (1) Do not recover settings that were backed up by executing command 21 (Save settings to Memory Card) by using command 22 (Read settings from Memory Card) from a different unit version of the SYSMAC SPU Unit. Otherwise, the SYSMAC SPU Unit will not operate normally.

(2) The settings of a SYSMAC SPU Unit with unit version 2.0 cannot be used with a SYSMAC SPU Unit with unit version 1.0, 1.2, or 1.3. Do not transfer settings from an SYSMAC SPU Unit with unit version 2.0 to a SYSMAC SPU Unit with unit version 1.0, 1.2, or 1.3.

Updating System Programs to Unit Version 2.0

The system program in a SYSMAC SPU Unit with unit version 1.0, 1.2, or 1.3 system program can be updated to unit version 2.0. For details on the system program refresh procedure, refer to *Appendix E Updating the System Program*.

Appendix E

Updating the System Program

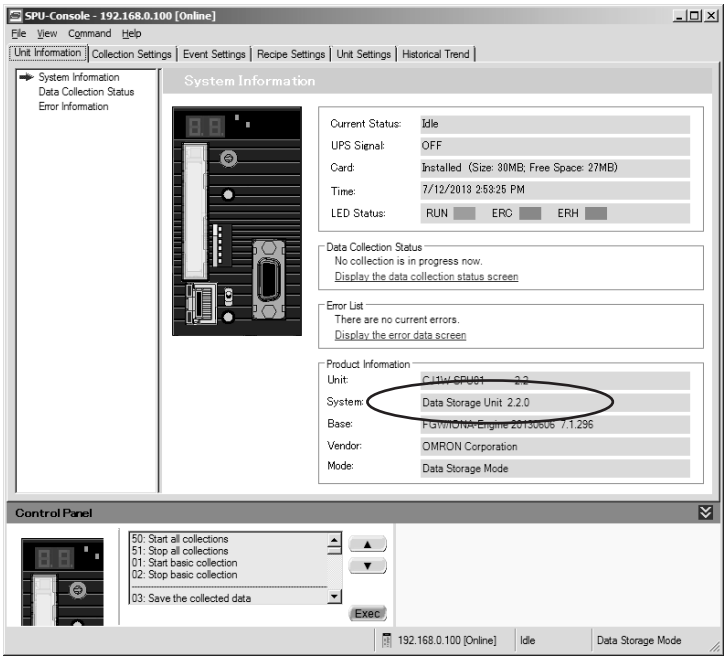
Updating the System Program

The procedure for updating the SYSMAC SPU Unit system program is explained here.

A Memory Card is used to update the system program. Transfer the system data to be updated to the Memory Card, mount the Memory Card containing the update data in the SYSMAC SPU Unit and start the SYSMAC SPU Unit to execute updating.

Note (1) All the settings will be initialized when the system program is updated. If required, execute ***Save to PC*** from the SPU-Console to back up the settings files.
When the system program is updated, the system program of the SYSMAC SPU Unit will be the same version as the updated system program, regardless of the model or version of SYSMAC SPU Unit that was originally purchased. Be sure to consider this in managing the SYSMAC SPU Unit version.

(2) The system program version can be confirmed in the System Information Window from the **Unit Information** Tab Page of the SPU-Console.



(3) To update the system program, the SYSMAC SPU Unit must be restarted. For details on restarting the SYSMAC SPU Unit only without turning OFF the power to the CPU Unit, refer to *3 -4 Restarting the SYSMAC SPU Unit* in the *SYSMAC SPU Units Operation Manual* (Cat. No. V236).

(4) The CS1W-SPU01/02 and CS1W-SPU01/02-V2 use to the same hardware. Updating the system program of the CS1W-SPU01/02 to version 2.0 will give it the same functionality as the CS1W-SPU01/02-V2.
The CJ1W-SPU01 and CJ1W-SPU01-V2 also use to the same hardware. Updating the system program of the CJ1W-SPU01 to version 2.0 will give it the same functionality as the CJ1W-SPU01-V2.

System Program Update Procedure

Step 1: Preparation

Prepare a Memory Card with at least 64 MB formatted in FAT32. Make sure that the Memory Card does not contain important files. The Memory Card can be formatted using SYSMAC SPU Unit command 31 (PC card format (FAT32)). System programs for updating are transferred via Ethernet. A network environment and personal computer that can be connected to the SYSMAC SPU Unit are required.

1. Mount the prepared Memory Card in the SYSMAC SPU Unit.
2. Turn ON DIP switch pins 4 and 6 only. Turn OFF all other DIP switch pins.
3. Restart the SYSMAC SPU Unit in Maintenance Mode. The SYSMAC SPU Unit's IP address will be 192.168.0.100. For details, refer to *3-3-2 Starting the SYSMAC SPU Unit in Maintenance Mode*.
4. Set the personal computer's IP address to 192.168.0.*. For details, refer to *3-3-3 Setting the IP Address of the Computer*.

Step 2: Transferring System Data to the Memory Card

1. Select ***Start - All Program - OMRON - SPU-Console 2.2 - System Program Update***.
2. Check that the preparation in Step 1 is completed, and click the **Continue** Button.
3. Click the **Execute** Button for SYSMAC SPU Version 2.2. The system program data will be transferred to the Memory Card.
4. Exit the program when the procedure is completed.

Note (1) While system program data for updating is being transferred to the Memory Card, make sure that SYSMAC SPU Unit power is not turned OFF and that the LAN cable is not disconnected. Otherwise, transfer to the Memory Card will fail. In this situation, perform step 2 again.

(2) You can use the same procedure to return a SYSMAC SPU Unit with unit version 2.2 to a Unit with unit version 2.0 or 2.1. To do so, click the **Execute** Button for SYSMAC SPU Version 2.0 or SYSMAC SPU Version 2.1.

Step 3. Updating the System Program

1. Mount the Memory Card created in step 2 in the SYSMAC SPU Unit.
2. Turn ON the SYSMAC SPU Unit's DIP switch pins 1, 4, and 6 only. Turn OFF all other DIP switch pins.
3. Restart the SYSMAC SPU Unit. Updating the system program is started automatically after the Unit is restarted. The 7-segment display on the front panel will change as follows: When the update is finished, "F" is displayed on the 7-segment display. Approximately 2 minutes is required to update the system program.

   (Startup) ... NM –> S –> 01 –> 02 –> ... –> 62 –> F
4. Turn OFF the power supply to the SYSMAC SPU Unit and return the DIP switch to the previous settings.
5. Remove the Memory Card used for the system program update.

Note (1) When system program updating is finished, until "F" is displayed by the 7-segment display, be sure not to turn OFF the power to the SYSMAC SPU Unit. Otherwise, the SYSMAC SPU Unit will not operate normally.
"E" followed by a number will be displayed on the 7-segment display if updating the system program failed.
E0: DIP switch settings are incorrect. Make sure that DIP switch pins 1, 4, and 6 are ON and repeat the procedure from step 3.
E1: The capacity of the Memory Card used for the system update was not sufficient. Check the capacity of the Memory Card and repeat the procedure from step 1.

(2) Format to clear the contents of the Memory Card used to update the system program.

Step 4. Initializing the SYSMAC SPU Unit Settings

After updating the system program, the IP address settings are initialized. Be sure to initialize the settings of the SYSMAC SPU Unit before use. For details on initializing settings, refer to *SECTION 3 Initial Settings of the SYSMAC SPU Unit*.

Appendix F
Reproducing a SYSMAC SPU Unit

This section describes how to reproduce a SYSMAC SPU Unit, i.e., how to create a new SYSMAC SPU Unit with the same settings as an existing SYSMAC SPU Unit.

To reproduce a SYSMAC SPU Unit, use a Memory Card. The existing SYSMAC SPU Unit's settings can be saved to a Memory Card, and then the settings can be copied to a new SYSMAC SPU Unit. This enables copying the settings without using the SPU-Console.

Step 1: Preparing a Memory Card for Reproduction

Prepare a Memory Card of at least 32 MB formatted for FAT32. Check to confirm that there are no important files stored on the Memory Card.

1. Insert the Memory Card in the SYSMAC SPU Unit that is to be reproduced.
2. Turn ON DIP switch pins 4 and 6 on the SYSMAC SPU Unit and turn OFF all the other DIP switch pins.
3. Restart the SYSMAC SPU Unit. It will start in Maintenance Mode. Refer to *3-3-2 Starting the SYSMAC SPU Unit in Maintenance Mode*.
4. Select command 21 using the **SELECT** Switch on the front of the SYSMAC SPU Unit, and then press the **ENTER** Button.
5. The 7-segment display will display in order starting with "B1." When "BE" is displayed, the Memory Card is ready (i.e., the settings have been copied to it).
6. Turn OFF the power to the SYSMAC SPU Unit.
7. Remove the Memory Card.
8. Return the DIP switch pins to their original settings.

Step 2: Copying the Settings to a New SYSMAC SPU Unit

Copy the settings to a new SYSMAC SPU Unit using the Memory Card prepared in Step 1.

1. Insert the Memory Card prepared in Step 1 into the new SYSMAC SPU Unit.
2. Turn ON DIP switch pins 4 and 6 on the SYSMAC SPU Unit and turn OFF all the other DIP switch pins.
3. Restart the SYSMAC SPU Unit. It will start in Maintenance Mode. Refer to *3-3-2 Starting the SYSMAC SPU Unit in Maintenance Mode*.
4. Select command 22 using the **SELECT** Switch on the front of the SYSMAC SPU Unit, and then press the **ENTER** Button.
5. The 7-segment display will display in order starting with "R1." When "RE" is displayed, copying the settings to the new SYSMAC SPU Unit has been completed.
6. Turn OFF the power to the SYSMAC SPU Unit.
7. Remove the Memory Card.
8. Return the DIP switch pins to their original settings.

Note (1) If the unit versions are difference, "NG" is displayed on the 7-segment display on the front of the SPU Unit and the data is not copied.

(2) If copying the data fails, "NG" is displayed on the 7-segment display on the front of the SPU Unit and the data is not copied. (The settings from before attempting the copy are retained.) Repeat the procedure from step 1 (preparing a Memory Card for copying).

(3) The recipe files are contained in the recipe folder of the Memory Card and cannot be backed up. To save a copy of the recipe files, use Windows Explorer or some other means to copy them to a personal computer.

(4) Do not change the settings while executing a simplified backup.

(5) The simplified backup function of the CS/CJ Series can be used to save the SYSMAC SPU Unit settings together with the CPU Unit settings in a backup file on a Memory Card in the CPU Unit. This backup file can then be loaded to eliminate the need for resetting the SYSMAC SPU Unit. For details on the simplified backup function, refer to the *Operation Manual* of the CS/CJ-series CPU Unit.

(6) Settings cannot be read from a simplified CPU Unit backup file if the special recognition retry function is turned ON. Because the special recognition retry function is constantly ON in the CJ-series CPU Units, the settings cannot be read using the simplified backup function. Execute command 28 (Read settings from CPU Unit) in the SYSMAC SPU Unit to load the settings saved in the Memory Card of the CPU Unit. For details on the special recognition retry function, refer to the *SYSMAC SPU Units Operation Manual*.

Appendix G
SYSMAC SPU Unit Time Compensation

At startup, the SYSMAC SPU Unit sets its clock with the time obtained from the CPU Unit. The SYSMAC SPU Unit then continues to monitor the CPU Unit time during operation, and uses the following compensation methods if a time discrepancy occurs between the SYSMAC SPU Unit and the CPU Unit.

- Discrepancies of 5 s or Less
  The time is adjusted in extremely fine time units to gradually adjust the SYSMAC SPU Unit time to the CPU Unit time. This allows the adjustment to be made without any sudden time changes.
- Discrepancies of More than 5 s
  The SYSMAC SPU Unit time is forcibly matched to the CPU Unit time. This immediately adjusts the SYSMAC SPU Unit to match the CPU Unit whenever the CPU Unit time is changed.

Note When the time is being compensated, the time interval recorded in the clocktime field will sometimes not match the sampling period. This occurs because the SYSMAC SPU Unit time is being adjusted, while the sampling continues according to the set sampling period.
The following methods can be used to record data without being affected by the adjustment of the time compensation. Both methods are effective only in Sampling Mode.

- Using Schedule Events
  When collecting data with a relatively long sampling period, such as 1 minute, the *Collect Data (One Shot)* Command can be executed as a schedule event each minute to record time data without being affected by the adjustment of the time compensation. The shortest time unit for schedule events is 1 minute, however, and data cannot be collected in shorter periods, such as 1 s.
- Using Memory Events
  The CPU Unit clock (A351 to A353) can be registered as a variable, and the *Collect Data (One Shot)* Command can be executed as a memory event at each change of A351 (minutes and seconds). Time data can also be recorded without being affected by the adjustment of the time compensation by collecting the A351 to A353 values and converting them to recorded time.

Appendix H
FTP Commands

Command	Function	Available	Usage example	Remarks
user	Logs in to the connected FTP server with the specified user name.	Yes		
cd	Moves the directory on the server to a specified position.	Yes		
ls	Displays the files on the server.	Yes	ls -l	
lcd	Moves the directory on the client.	Yes		
pwd	Displays the present directory position on the server.	No		
get	Obtains the specified file.	Yes	get server-file local-file	
put	Places the specified file.	Yes	put local-file server-file	
mget	Gets the specified file. Multiple files can be specified by using spaces or wildcards.	Yes	mget *.csv	Used to obtain the CSV file from the specified folder with the recipe file method for receiving recipes.
mput	Places the specified file. Multiple files can be specified by using spaces or wildcards.	No		
binary	Sets the file transfer mode to binary.	Yes		
ascii	Sets the file transfer mode to ASCII.	No		
mkdir	Creates a directory on the server.	Yes		
rmdir	Deletes a directory on the server.	No		
delete	Deletes a file on the server.	Yes		
chmod	Changes the file rights on the server.	No		
quote	Sends arguments to the server. Executes server FTP commands.	Yes	quote NOOP	NOOP (no operation) is used to check operation with the server.
quit	Ends the connection.	No		

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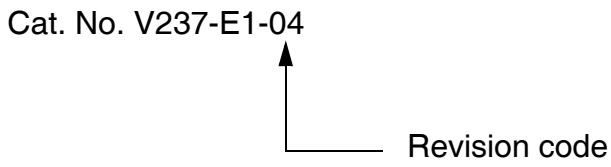
Revision History

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



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

Revision code	Date	Revised content
01	June 2007	Original production
02	November 2008	Enhanced functionality (expanded recipe function and sending/receiving data using FTP)
03	August 2013	Enhanced functionality (record counters and file copy flags)
04	February 2018	Corrected mistakes.

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