Pro-face
by Schneider Electric

MES Action for Pro-Server EX Reference Manual

PREFACE

Thank you for choosing 'MES ACTION for Pro-Server EX' by Digital Electronics Corporation.
Please read this manual and the reference manuals thoroughly before use to understand how to operate this product safely and correctly.
Please be sure to keep the manuals handy at all times.

NOTE

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MES ACTION Reference Manual

4 MESActionDB Table Schema Reference

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The following terms differ from the formal trade names and trademarks indicated in this document.

Term used in this document	Formal Trade Name or Trademark
Windows 10	Microsoft(R) Windows(R) 10 Operating System
Windows 8	Microsoft(R) Windows(R) 8 Operating System
Windows 8.1	Microsoft(R) Windows(R) 8.1 Operating System
Windows Embedded Standard 7	Microsoft(R) Windows(R) Embedded Standard 7 Runtime (WS7P) (ESD)
Windows 7	Microsoft(R) Windows(R) 7 Operating System
Windows Vista	Microsoft(R) Windows Vista(R) Operating System
Windows XP	Microsoft(R) Windows(R) XP Operating System
Windows Server 2003	Microsoft(R) Windows Server(R) 2003 Operating System
Windows Server 2003 R2	Microsoft(R) Windows Server(R) 2003 R2 Operating System
Windows Server 2008	Microsoft(R) Windows Server(R) 2008 Operating System
Windows Server 2008 R2	Microsoft(R) Windows Server(R) 2008 R2 Operating System
Windows Server 2012	Microsoft(R) Windows Server(R) 2012 Operating System
Windows Server 2012 R2	Microsoft(R) Windows Server(R) 2012 R2 Operating System
Windows Server 2016	Microsoft(R) Windows Server(R) 2016 Operating System
SQL Server 2005	Microsoft(R) SQL Server(R) 2005
SQL Server 2012	Microsoft(R) SQL Server(R) 2012
SQL Server 2016	Microsoft(R) SQL Server(R) 2016

DESCRIPTION RULES

■ Safety Symbols and Terms

This manual uses the following symbols and terms to identify important information related to the correct and safe operation of display units and 'MES ACTION for Pro-Server EX'.

The symbols and the descriptions are as follows.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

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

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

■ General Information Symbols and Terms

Symbols	Description
IMPORTANT	States precautions and restrictions that must be followed.
NOTE	Provides tips on correct product use or supplementary information.
1, 2	Indicates an operation procedure. Follow the numbered steps.

■ How to Read the Manual

This manual describes how to operate "MES ACTION".

Please also refer to the related manual (Pro-Server EX Reference Manual).

■ Abbreviation

This manual uses the following abbreviation for the terms repeatedly used in this manual.

Abbreviation	Name
Pro-Studio EX	System configuration software to manage Display units and devices/PLCs connected to the network. Use this software to create a network project file that manages information about the Display unit, device/PLC, and conditions for data collection.
Pro-Server EX	Middleware that reads and writes data between the PC and either the Display unit or device/PLC, as defined in the network project file designed in Pro-Studio EX.
Display unit	Pro-face touch panel display unit, WinGP, or Factory Gateway.
Node	PC or Display unit registered in Pro-Studio EX to read and write data from a device/PLC.
WinGP	Application that runs GP-Pro EX projects on PC/AT compatible machines or Pro-face industrial computers (PS Series, PE Series, PL Series). Also refers to PC/AT compatible machines and Pro-face industrial computers with this application installed.
Device/PLC	A device, such as a PLC, that connects to a Display unit.
PLC	Programmable Logic Controller.
PC	Personal Computer.
GP	Display unit.
SRAM	Refers to backup memory that preserves data even when the display unit is turned OFF. Although the type of backup memory in display units vary from model to model, this document generally refers backup memory as SRAM. For information on the backup memory used by your display unit, refer to its associated hardware manual.

■ About substitution

This manual describes how to use and set up the GP3000 series. If you use models other than the GP3000 series, references to "display unit" and "GP" apply to the model you use. For models that support an SD card or CFast card, references to "CF"/"CF Card" apply to the memory card you are using.

■ Global Code

A global code is assigned to every Pro-face product as a universal model number. For more information on product models and their matching global codes, please refer to the following URL:

http://www.pro-face.com/trans/en/manual/1003.html

PRECAUTIONS

This manual describes safety symbols and terms for the correct and safe operation of 'MES ACTION'. Please read this manual and all related manuals carefully to understand the correct operation and features.

NOTICE
Disk Handing • DO NOT touch the recording side of the DVD-ROM. • DO NOT remove the DVD-ROM while the disk drive light is ON. • DO NOT store the disk in an area exposed to the extreme high or low temperatures and/or high levels of moisture or dust. **Failure to follow these instructions can result in equipment damage.**

NOTICE
LOSS OF DATA • DO NOT turn off the main power to the PC while the program is running. **Failure to follow these instructions can result in equipment damage.**

1 Outline of MES ACTION

1 Outline of MES ACTION

MES ACTION provides the "Data Collection" functions defined in MES (Manufacturing Execution System). Companies will collect and save data for the purpose of analyzing data to solve a problem. Through data analysis, they can understand what happened. After understanding what happened, they can understand why it happened. After understanding why, they can expect what will happen next, and understand what to do.
MES ACTION offers basic data required for companies to analyze data. Furthermore, you can use Microsoft(R) SQL Server(R) analytics and reports to visualize the information.

1.1 Using SQL Server for Database Server

NOTE

- The following description uses Microsoft(R) SQL Server(R) 2005 Express Edition as an example.

"SQL Server 2005 Express Edition" is a database designed based on Microsoft(R) SQL Server(R) 2005, aiming for quick development of database applications. Introduction of "SQL Server 2005 Express Edition" provides the following features:

1 Quick Database Application Development

In close combination with Visual Studio 2005, SQL Server 2005 Express Edition enables simplified development of database applications.
All tasks such as table definition and data addition can be performed with Visual Studio 2005.
Furthermore, SQL Server 2005 Express Edition simplifies database management by using SQL Server Management Studio Express, a new tool specialized in basic database management tasks.

2 Creating Report

In close combination with SQL Server 2005 Reporting Services, SQL Server 2005 Express Edition enables you to create reports easily by using tables, charts and images. However, to use this function, you must install IIS (Internet Information Service) on your PC.

1.2 Operating Environment

Check that the environment for this product conforms to the following conditions..

IMPORTANT
- This product must be installed and configured by qualified software installation staff with administrator rights.

Item	Requirements
OS	PC/AT Compatible Machine • Windows(R) XP (Service Pack 3 or later) For 32-bit versions, Professional Edition • Windows Vista(R) For 32-bit versions, Ultimate Edition, Professional Edition, Home Premium Edition, Home Basic Edition, Business Edition, Enterprise Edition • Windows(R) 7 For 32/64-bit versions, Ultimate Edition, Professional Edition, Home Premium Edition, Home Basic Edition, Business Edition, Enterprise Edition • Windows(R) 8 For 32/64-bit versions, Windows 8, Windows 8 Pro, Windows 8 Enterprise • Windows(R) 8.1 For 32/64-bit versions, Windows 8.1, Windows 8.1 Pro, Windows 8.1 Enterprise • Windows(R) 10 For 32/64-bit versions, Home Edition, Pro Edition, Enterprise Edition • Windows Server(R) 2003 (Service Pack 2 or later) For 32-bit versions, Standard Edition, Enterprise Edition • Windows Server(R) 2003 R2 (Service Pack 2 or later) For 32-bit versions, Standard Edition, Enterprise Edition • Windows Server(R) 2008 For 32/64-bit versions, Standard Edition, Enterprise Edition, Datacenter Edition • Windows Server(R) 2008 R2 Standard Edition, Enterprise Edition, Datacenter Edition • Windows Server(R) 2012 Foundation Edition, Essentials Edition, Standard Edition, Datacenter Edition • Windows Server(R) 2012 R2 Foundation Edition, Essentials Edition, Standard Edition, Datacenter Edition • Windows Server(R) 2016 For 64-bit versions, Essentials Edition, Standard Edition, Datacenter Edition SP5000 Series Open Box For 32-bit versions, Windows(R) Embedded Standard 7 PE4000B Series For 32-bit versions, Windows(R) Embedded Standard 7
CPU	1.30 GHz or faster x86 compatible processor

Item	Requirements
Memory	512 MB or more (2 GB or more recommended)
Hard Disk Space*1	1 GB or more
Others programs	• Microsoft(R) .NET Framework Ver.2.0*2 • Microsoft(R) SQL Server(R) 2005 Express Editor • Microsoft(R) SQL Server(R) 2012 Express Edition, Enterprise Edition, Business Intelligence Edition, Standard Edition • Microsoft(R) SQL Server(R) 2016 Express Edition, Express with Advanced Services Edition, Enterprise Edition, Standard Edition • Microsoft(R) SQL Server(R) 2017 Express Edition, Express with Advanced Services Edition • Microsoft(R) SQL Server(R) Management Studio Express • Adobe(R) Acrobat(R) Reader Ver.6.03 or later • Pro-Server EX Ver.1.20 or later

*1 Free space required for installation.

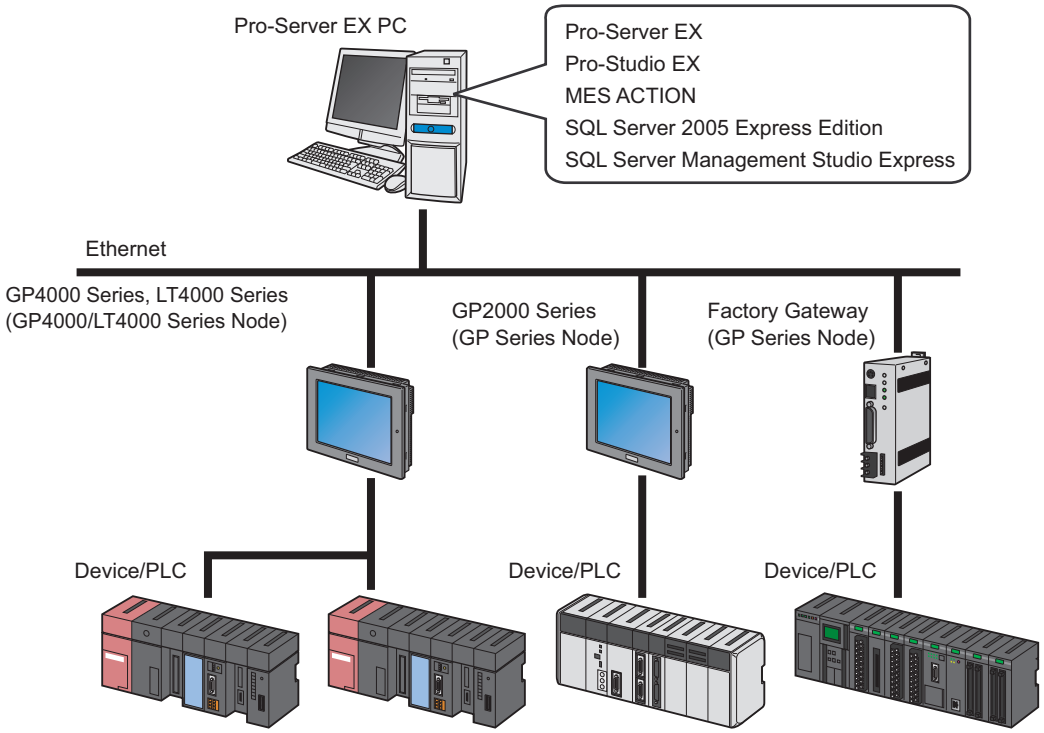
*2 When Pro-Server EX is installed, the .NET Framework is also automatically installed.

1.3 System Configuration and System Required

MES ACTION is comprised of the following three functions:

- MES ACTION (Operates as a part of Pro-Server EX)
- SQL Server
- SQL Server Management Studio Express

An example of the MES ACTION configuration (including hardware and software) is shown below.



IMPORTANT

- SQL Server and Pro-Server EX must be installed on the same PC.
- SQL Server must be started before starting Pro-Server EX.
- When using SQL Server Management Studio Express, log on to Windows using the administrator's account.

NOTE

- When using Windows Embedded machines, you can set the write filter (write protection) on drives installed with the operating system. If the write filter settings are enabled, disable the write filter settings (EWF Manager) before installing Pro-Server EX.
  Additionally, to install this product on the SP5000 series Open Box, run installation from the Explorer shell. For details, refer to the user manual for your unit.

1.4 Features of MES ACTION

In today's production fields, automation and IT promotion have improved equipment availability and productivity. Accordingly, it comes to be essential to ensure uniform product qualities and stable operations of equipment through prediction and preventive maintenance as the next step.

To ensure uniform product qualities and stable operations of equipment, we must conduct data analysis by collecting and saving process data. Furthermore, we must effectively transfer process data from local points in a factory to a quality control place.

MES ACTION is the data collection tool that can meet such needs. In combination with the data analyzing and reporting functions of SQL Server, MES ACTION enables intensified data analysis.

1 Using SQL Server for the database server

Process data and actual data collected by MES ACTION are saved in the database server. MES ACTION uses SQL Server for the database server. SQL Server is an advanced database server available free of charge, which is suitable as an entry-level database server.

For the MES ACTION database server, the right version of SQL Server Formal Edition is also available.

NOTE

- For supported versions of SQL Server, refer to "1.2 Operating Environment".

2 Collecting process data and actual data through engineering unit conversion

The MES ACTION data collecting functions collect symbol data and device data managed with Pro-Server EX at a specified cycle or status change, and save the collected data in SQL Server. The collected process data and actual data can be related with each other by using time stamps.

Thus, the system can automatically monitor X-R control charts with online use of the data saved in SQL Server. For example, MES ACTION enables real-time monitoring of an abnormal value that exceeds a control limit, or abnormal trend such as continuous up/down, to stop the relevant lot or device, or to send a message to a registered engineer by e-mail.

a) Process Data Collection

The Process Data Collection ACTION collects specified symbol data and device data from a specified starting time to a specified ending time, or at a specified time or cycle (unit: minute), and saves the collected data into the database. The database table is created by the day.

When saving collected data into the database, MES ACTION can execute scale conversion, control limit detection, bit data-string relation conversion, depending on the tag type.

b) Actual Data Collection

The Actual Data Collection ACTION collects symbol data and device data by event (status change or time to start/stop data collection), and saves the collected data into the database.

As with the Process Data Collection ACTION, the collected data can execute scale conversion and control limit detection. If planning data are linked with the actual data, an achievement ratio can be calculated from a value specified in the planning system.

c) Scale conversion

SQL Server can create a stored procedure in a .NET language by using SQLCLR. (For the SQLCLR function, refer to SQL Server operation manual.)

The Data Collection ACTION creates a scale conversion stored procedure with SQLCLR functions. The scale conversion stored procedure processes an input value according to the condition specified in the I/O signal condition (BCD conversion, masking by specified bit length, etc.), and executes scale conversion between the input range and output range.

If the I/O signal condition is set to "None", the ACTION executes real number conversion processing (The real number conversion processing converts an integer number into a real number with specified decimal places). If the I/O signal condition is set to "String", a numeric value can be converted into a character string.

3 Collecting alarm history, sampling data and other data from display unit's SRAM or CF card

MES ACTION can effectively save alarm history and sampling data stored in the display unit's SRAM to SQL Server.

Furthermore, MES ACTION reads alarm history files, sampling data files and display unit screen files stored in the CF card, and saves the files to the SQL Server. The collected files can be deleted from the CF card, thus enabling effective use of the CF card.

a) Alarm History Collection

The Alarm History Collection ACTION saves alarm logs that have been stored in the display unit's SRAM and CF card into the database.

To eliminate duplication of alarm history, Alarm History Collection ACTION reads alarm logs at a specified cycle, and compares the read data with the previous data to save the read data into the database by deleting duplicated data.

b) Sampling Data Collection

The Sampling Data Collection ACTION collects sampling data that have been stored in the display unit's SRAM and CF card at a specified cycle, and saves the collected data into the database.

c) GP Screen File Collection

Save the JPEG of display unit screens store in the CF card to SQL Server.

Because a JPEG file has a large volume, the user can select the file saving method ("Folder Specification" or "In Database") to save screen files. To back up captured data time stamps, the system collects screen files in the event collection mode, and saves the timestamps at occurrence of events.

Folder Specification:	Only file names are saved in the database. Contents of screen files are saved in another folder.
In Database:	Image data are saved in the database.

NOTE

- If a screen file is saved in the [In Database] mode, the data volume stored in the database increases. Therefore, it is recommended to use SQL Server of the standard or higher version.

4 Transferring image data and CSV data with a single action

The Composite Document Recipe Transfer ACTION can solve a recipe transfer problem about download to several media.

In addition to the function for setting a receipt for device data, the Composite Document Recipe Transfer ACTION provides the function that enables batch transfer of text files and image file with a single Action.

SP5000 Series, GP4000 Series, GP3000 Series, and WinGP support this function.

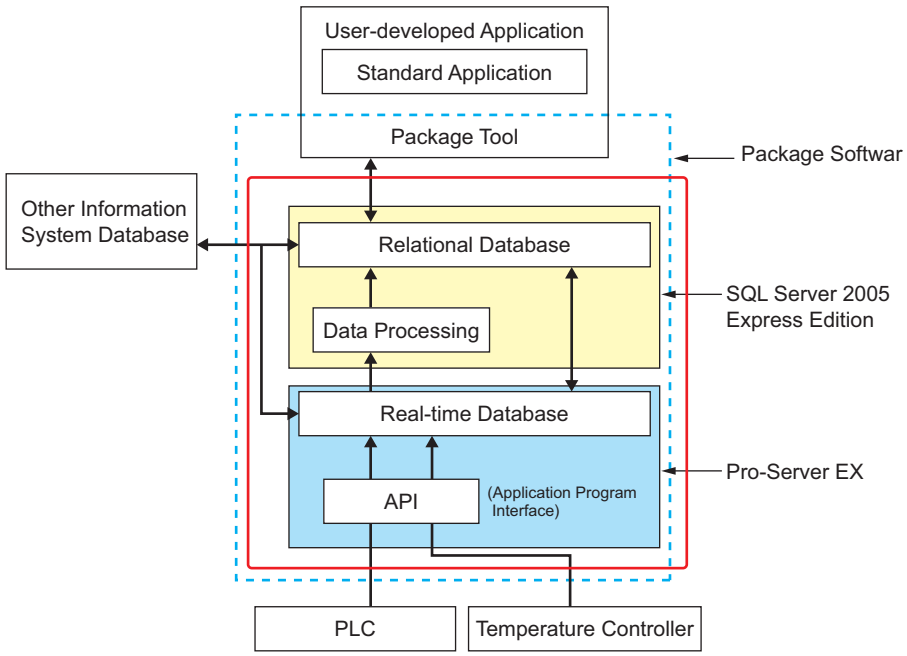
1.5 Functional Configuration of MES ACTION

MES integrates a manufacturing plan obtained from an operation system and the information on product lot, equipment and quality entered in the filed by using factory/product models that have been registered in the system, to provide various data on actual performance and qualities of products and equipment and output reports based on such data.

1.5.1 MES ACTION system configuration

As the ACTION functions of "Pro-Server EX", MES ACTION collects process data and actual data collected by display units, and alarm and event information created in display units, and saves the data to the database server (SQL Server).

The following figure shows the position of the MES ACTION functions in MES.



1.5.2 Outline of MES Data Collection ACTION

This section describes how the "Data Collection" functions defined in MES is implemented by Pro-Server EX and MES ACTION, as follows:

Required function	Implementation method
On-line connection with a device	Pro-Server EX keeps the device on-line.
POP (Point of Production)	Implemented by MES Actual Data Collection ACTION.
Real-time processing and measurement data collection	Implemented by MES Process Data Collection ACTION.
Parameter information (Recipe)	Composite Document Recipe Transfer ACTION downloads recipe data stored in SQL Server to a connected display unit or Device/PLC.
Control system interface	OPC server (Display unit and Device/PLC) provided by Pro-Server EX, and ADO.NET 2.0 (database) provided by .NET 2.0 can be used as the control system interface.
Storage of actual data, progress data and quality data	Actual data are saved in SQL Server.
Production data recording	Production data can be recorded with the report service and report builder functions of SQL Server.

MES ACTION is classified into the following two categories: "Data Collection ACTION" and "Recipe Setting ACTION".

■ Data Collection ACTION

Data Collection ACTION is the function to collect equipment operation status and alarm history data. MES ACTION provides the following Data Collection ACTIONs:

- Process-Data-/Actual-Data-Collection ACTION
- GP SRAM Alarm-History-File Collection ACTION
- GP CF-card Alarm-History-File Collection ACTION
- GP SRAM Sampling-Data Collection ACTION
- GP CF-card Sampling-Data-File Collection ACTION
- GP CF-card Screen-File Collection ACTION

Data Collection ACTION provides the DESIGN mode and RUNTIME mode: The DESIGN mode registers setting information via the graphical user interface (herein referred to as GUI) registered in Pro-Studio EX ACTION. The RUNTIME mode calls setting information at a specified cycle or status change as specified in the Pro-Studio EX DESIGN mode, to execute each Data Collection ACTION.

■ Recipe Setting ACTION

Recipe Setting ACTION is the function to download parameters to the display units and Device/PLC. MES ACTION provides the following Data Collection ACTIONs:

- Recipe Data Download ACTION
- Composite Document Recipe Transfer ACTION

Recipe Collection ACTION provides the DESIGN mode and RUNTIME mode: The DESIGN mode registers setting information via GUI registered in Pro-Studio EX ACTION. The RUNTIME mode calls setting information at a specified cycle or status change as specified in the DESIGN mode, to actually execute the parameter setting.

2 Before Using MES ACTION

2 Before Using MES ACTION

2.1 Installing SQL Server

IMPORTANT
- If you have any question about the contents and operation of Microsoft SQL Server, or about the contents of this manual, contact Pro-face (see "7 Inquiry"). For other questions, contact Microsoft at the following site:

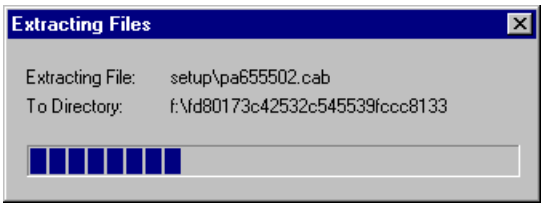
  http://technet.microsoft.com/en-us/sqlserver/default (as of October, 2017)

NOTE
- To upgrade the installed SQL Server(R), refer to "6.1.2 Upgrading SQL Server".

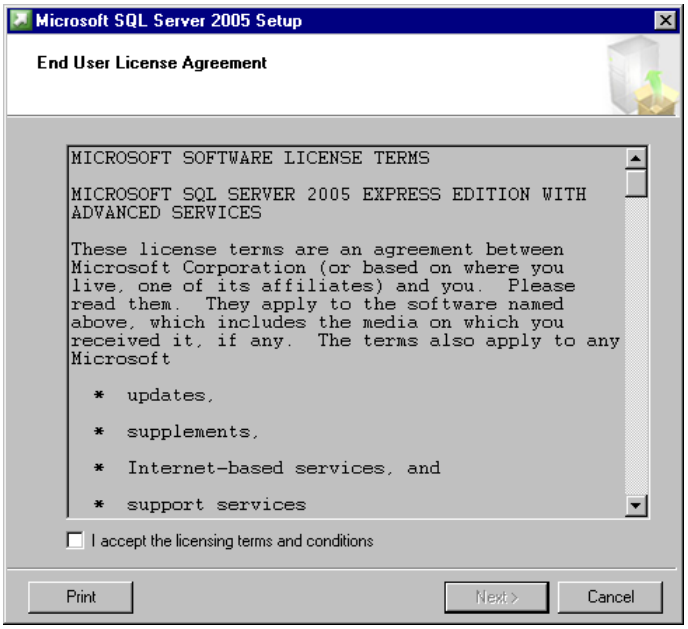
2.1.1 Installing SQL Server

NOTE
- The following example uses Microsoft(R) SQL Server(R) 2005 Express Edition.

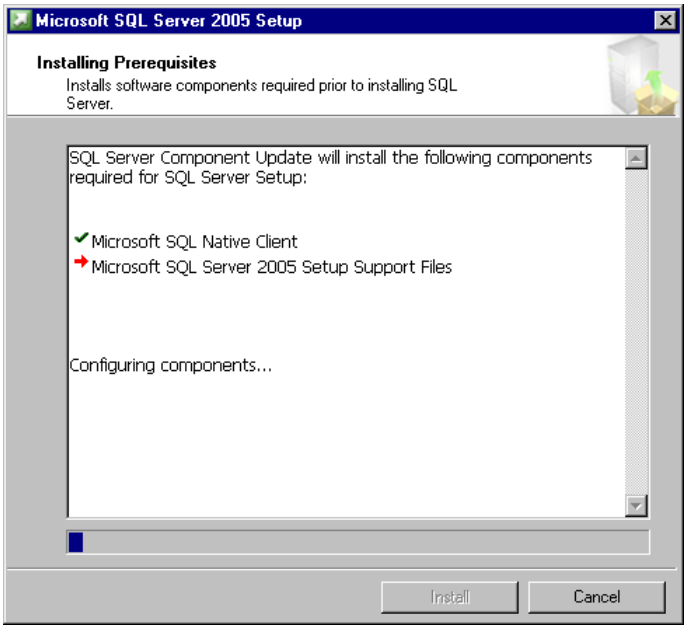
1 Double-click on "SQLEXPR_ADV.EXE" (self-decompression package that stores both SQL Server 2005 Express Edition and SQL Server Management Studio Express). The self-decompression package starts decompressing.



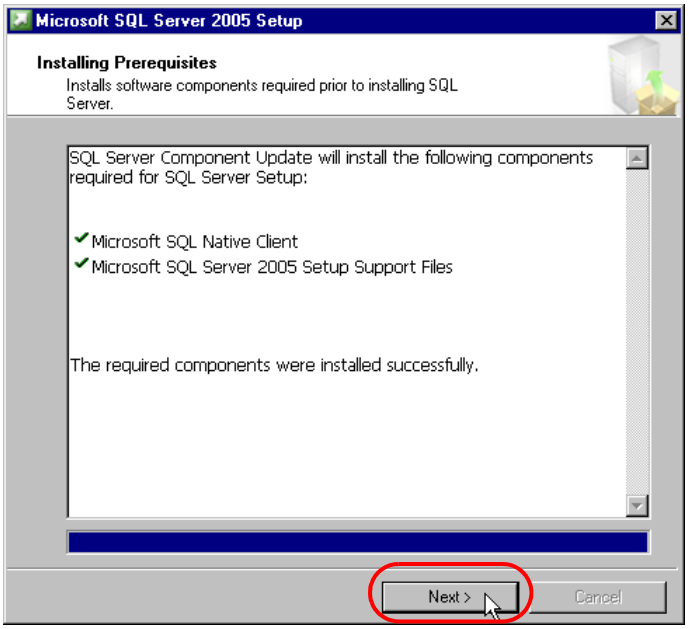
2 Check [I accept the licensing terms and conditions] , and click [Next].



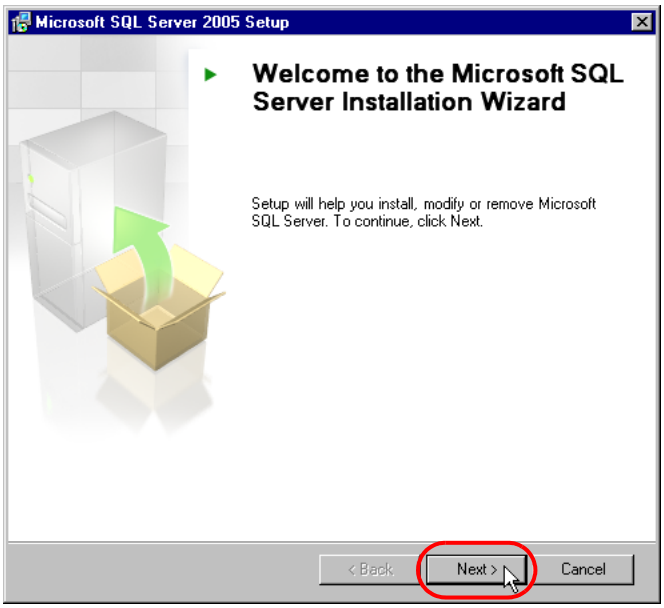
3 A required component is displayed in the setup dialog box. Click [Install] to install the component.



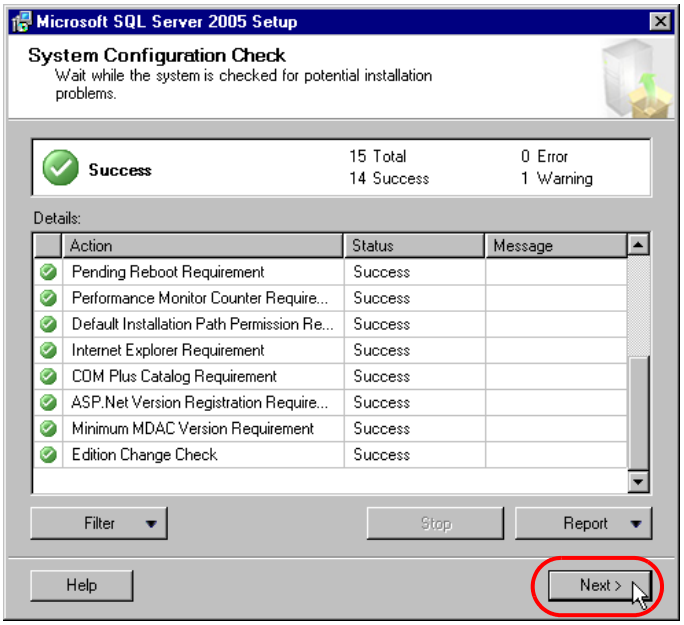
4 When installation is complete, click [Next].



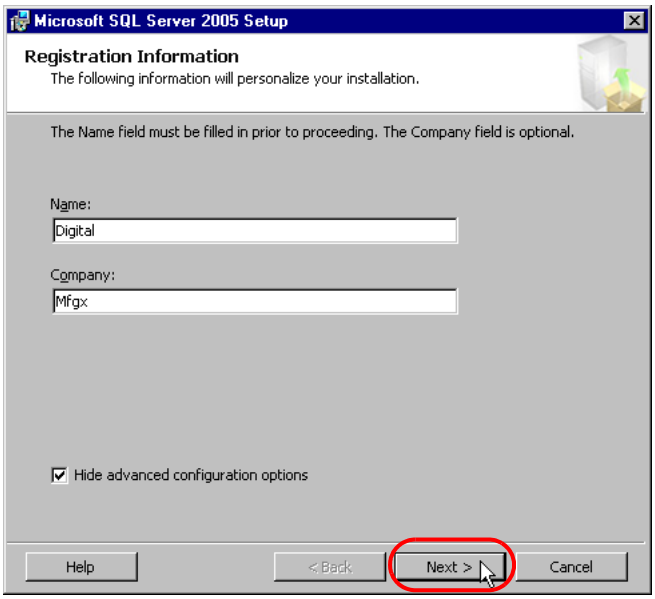
5 The Microsoft SQL Server Install Wizard starts. Click [Next].



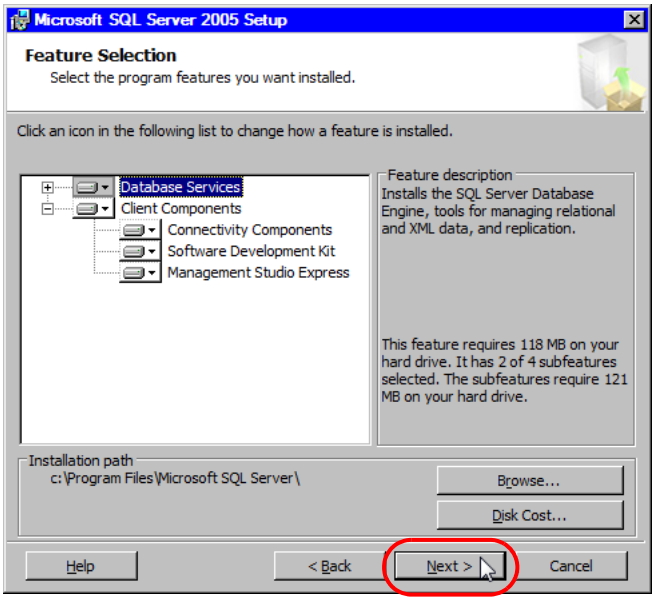
6 The system configuration check starts. When installation is complete, click [Next].



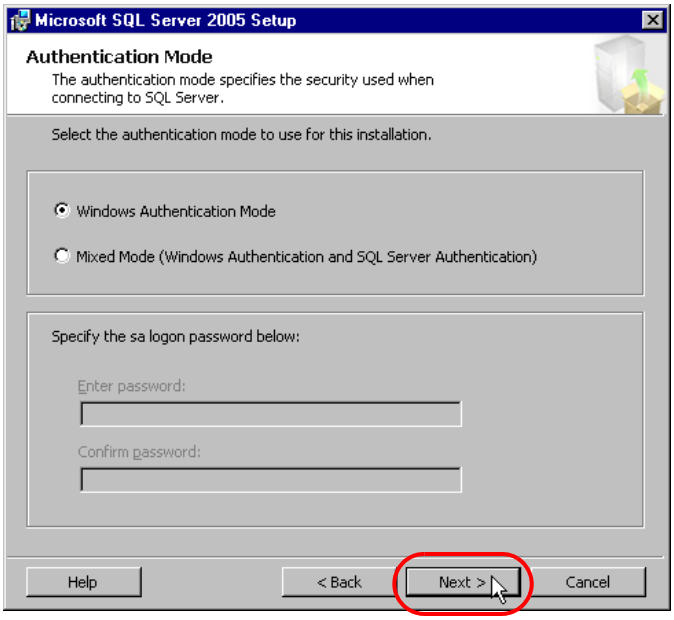
7 When preparations for installing SQL Server 2005 Express Edition are complete, the user information registration screen appears. Enter [Name] and [Company], and click [Next].



8 The system prompts you to select the functions to be installed. Install all client components. Click [Connectivity Components] under [Client Components], and then click [Install to Local Hard Drive] in the displayed menu. For [Software Development Kit] and [Management Studio Express], perform the same procedure, and click [Next].



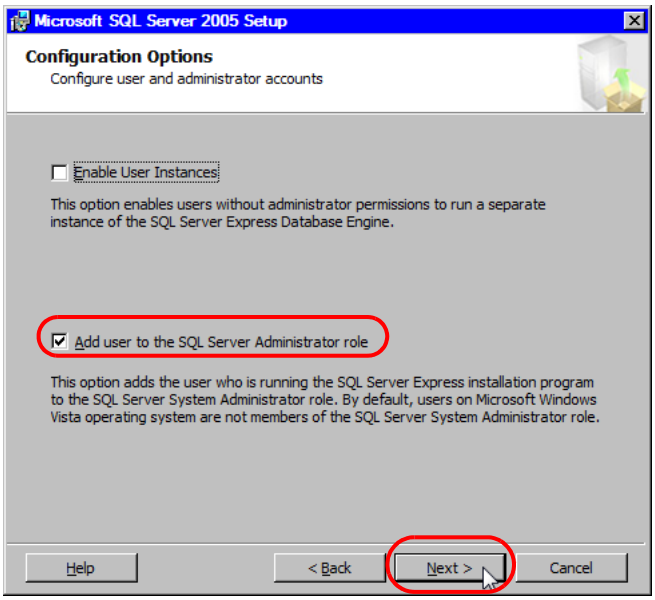
9 Select [Windows Authentication Mode] in the authentication mode settings, and click [Next].



NOTE

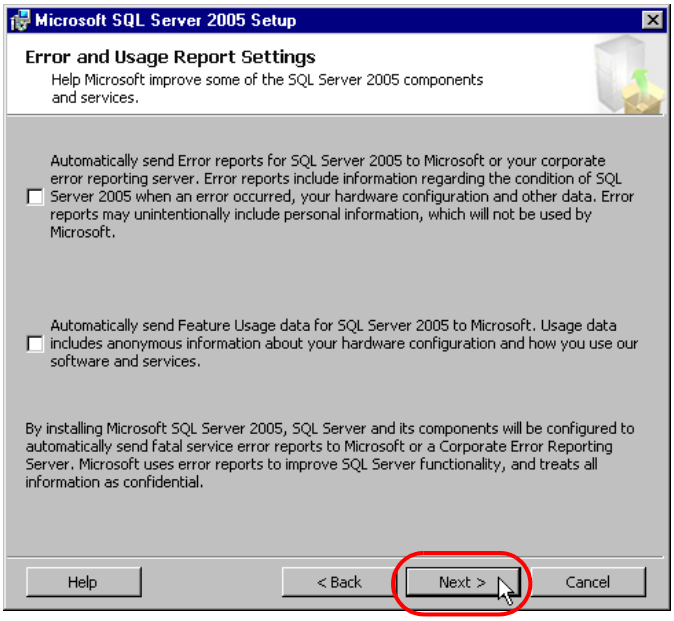
- With the Windows authentication mode, SQL Server relies on the Windows login user account to permit user's access. On the other hand, with the SQL Server authentication mode, SQL Server independently authenticates a user's account to permit user's access, regardless of Windows authentication.

10 Set the configuration option. Check the [Add user to the SQL Server Administrator role] option and click [Next].

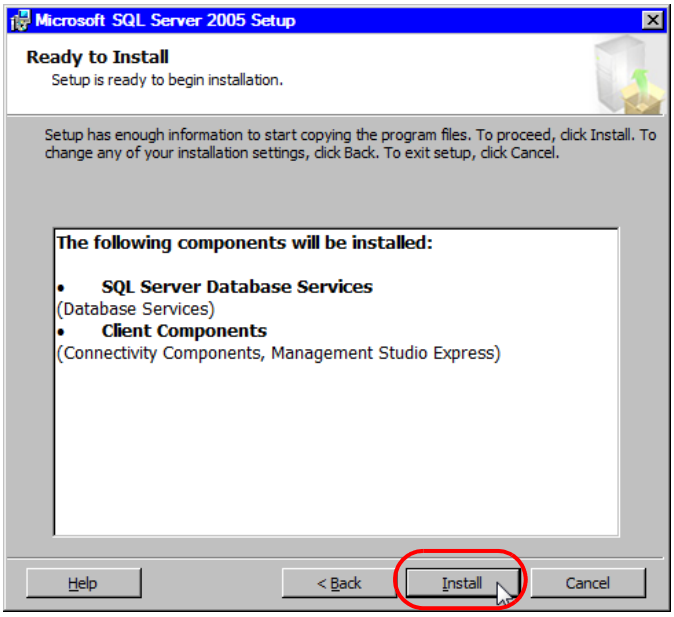


IMPORTANT • If you install the program without checking it, MES ACTION will not operate properly.

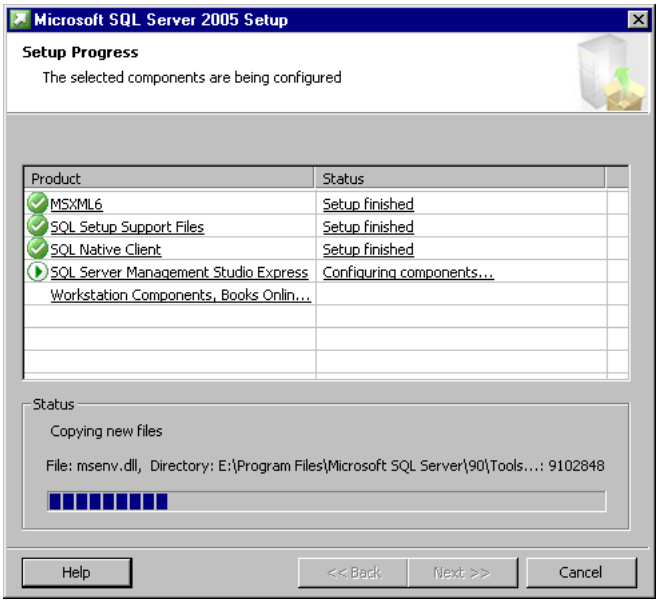
11 You can send an error and operating status report to Microsoft. In this example, leave the current setting and click [Next].



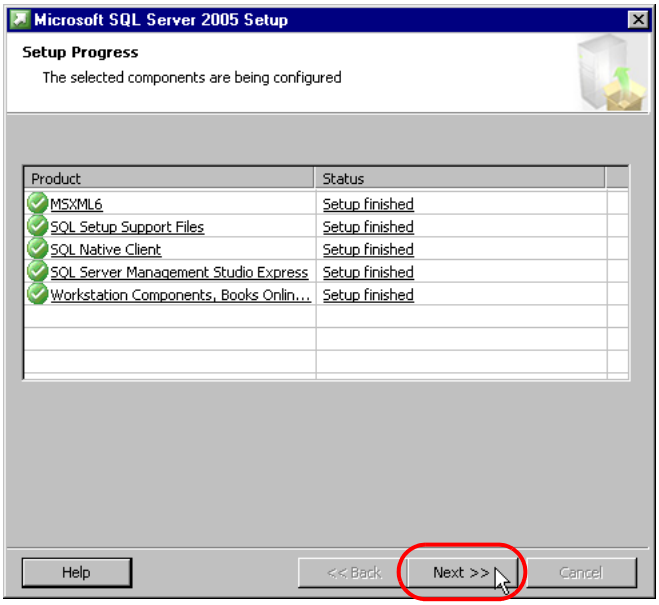
12 This completes preparations for installing SQL Server 2005 Express Edition. Confirm the component to be installed, and click [Install].



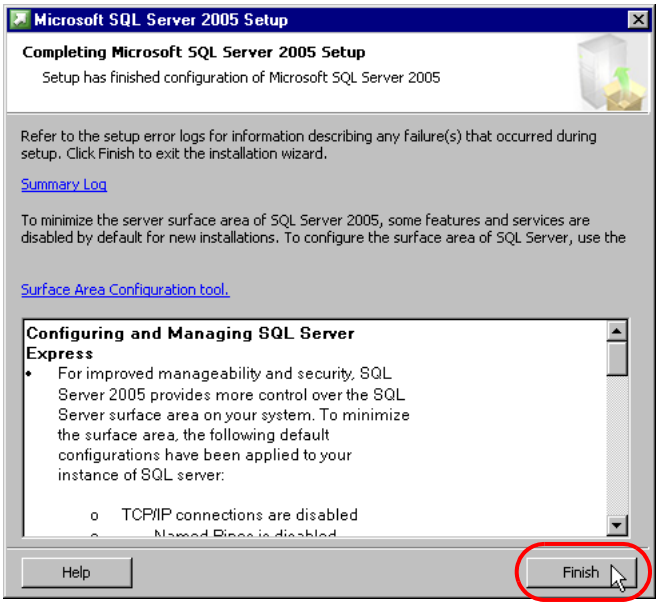
13 The setup starts, and setup status of each product is displayed.



14 When the setup is complete, click [Next].



15 The system indicates that the setup is complete. Click [Finish], and close the setup dialog box.



2.1.2 Starting and Stopping the Service

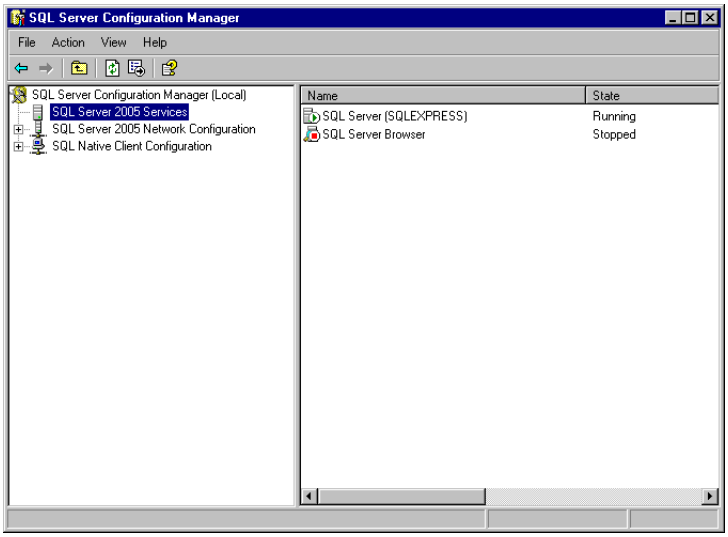
Because MES ACTION uses SQL Server, SQL Server must be operated as a Windows service. The service start and stop procedures are described below.

To start and stop the service, open SQL Server Configuration Manager to select the corresponding component, and run the component in the Start menu.

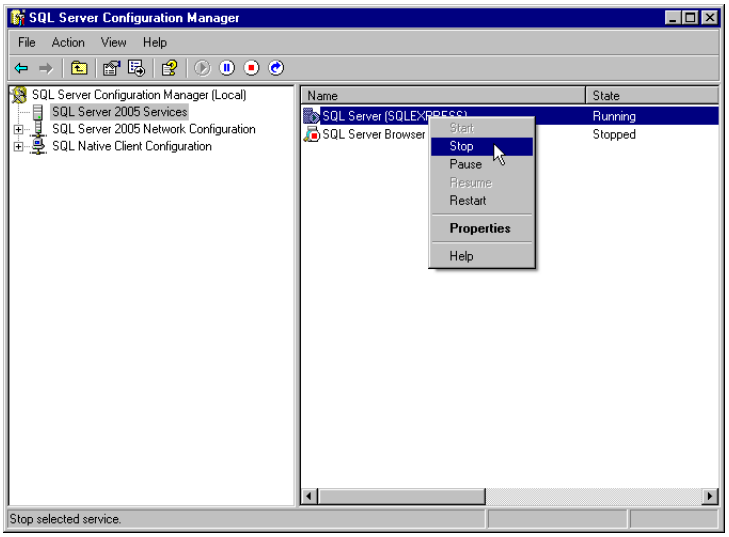
NOTE

- The following example uses Microsoft(R) SQL Server(R) 2005 Express Edition.

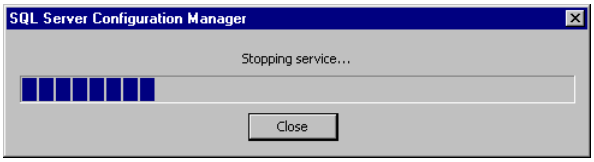
1 Select [All Programs] (or [Programs], depending on your OS) from the [Start] menu, and click [SQL Server Configuration Manager] under [Configuration Tool] of [Microsoft SQL Server 2005] to open SQL Server Configuration Manager.



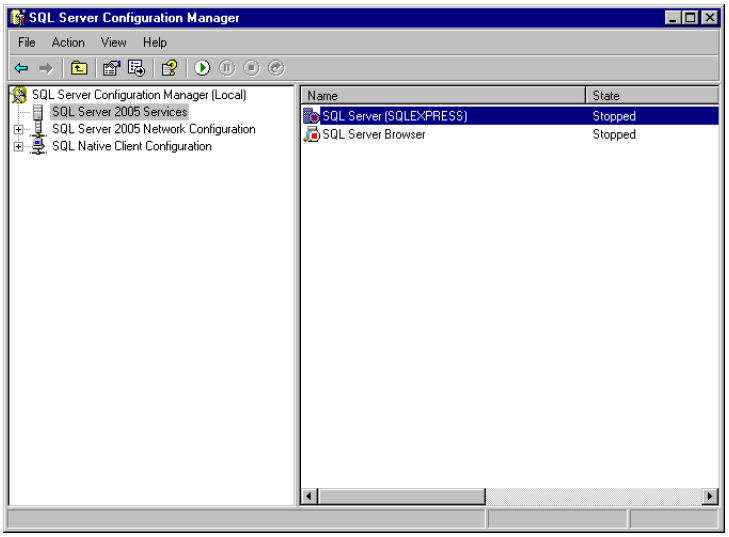
2 To stop the service, click [SQL Server 2005 Services] on the left pane. Right-click on [SQL Server (SQLEXPRESS)] under the server service list on the right pane, and click [Stop].



3 When the database engine is stopped, the SQL Server Agent service automatically stops, and the "Service Stop" dialog box appears. Click the [Yes] button. Until the service stops, the "Stopping service" message is displayed.



4 When the service stops, the [SQL Server (SQLEXPRESS)] icon in the service list on the right pane changes to indicate the stop status.



5 As the service has stopped, right-click again and select [Start] to start the service. To restart the service, click [Restart].

NOTE • You can also start or stop the service using the toolbar () on the top of the screen.

2.1.3 Registering Users on SQL Server

Registering MES Action users on SQL Server.

1 Start SQL Server Management Studio and log in.

NOTE • Log in as user with server roll of sysadmin.

2 From the Object Explorer select [Security]-[Login], and from the shortcut menu select [New Login].

3 Define the following settings, and click [OK].

Item	Setting
Login Name	Name of action user
Authentication	SQL Server authentication*1
Password	Any password
Confirm Password	Same as password

*1 When Windows authentication is selected, password and other settings are not required.

4 From the Object Explorer, select the newly created login and from its shortcut menu select [Properties].

5 From the displayed screen, select a server from the [Securables] list and define the following settings. After setup is complete, click [OK].

Authorization	Permission
Connect SQL	ON (Default)
External access assembly	ON
Control server	ON
Create any database	ON

2.2 Attaching MES ACTION database to SQL Server

MES ACTION operates with the setting data stored in the "MESActionDB" table in the database.
The data collected by MES ACTION will be also stored in "MESActionDB".
When MES ACTION is installed, the MESActionDB database will be copied into the installation folder.
However, this database cannot be used in the current status. This database must be attached to SQL Server, so that SQL Server recognizes the database.
The procedure for attaching the MES ACTION database is described below.

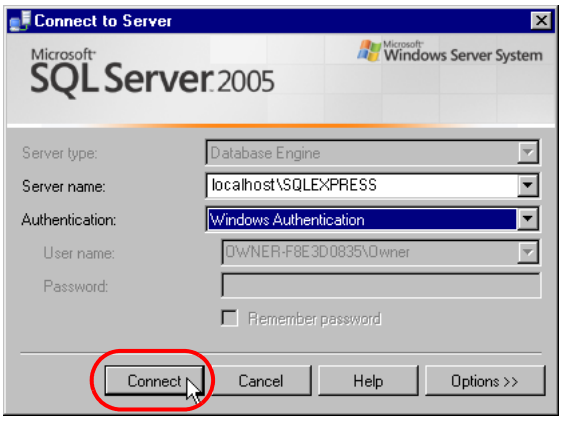
IMPORTANT
- To perform the following procedure, log on to Windows with a user account set up with SQL Server role of sysadmin.
- You cannot attach databases created in a newer version of SQL Server to previous versions.
  Example: Be aware that attaching SQL Server 2005 databases to SQL Server 2012 will automatically update the database to SQL Server 2012.

2.2.1 Starting SQL Server Management Studio Express

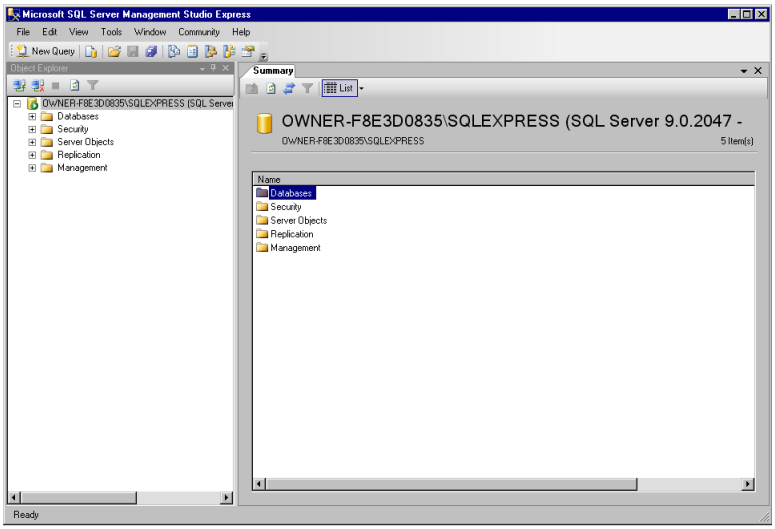
NOTE
- The following example uses Microsoft(R) SQL Server(R) 2005 Express Edition.

1 To start SQL Server Management Studio Express, select [All Programs] (or [Programs], depending on your OS) from the [Start] menu, and click [SQL Server Management Studio Express] under [Microsoft SQL Server 2005].

2 Select [Database Engine] under the server type, and specify the server name, authentication method and login account to log into SQL Server. Enter "localhost\sqlexpress" for [Server name], select [Windows Authentication] for [Authentication], and click [Connect].
If you select [SQL Server Authentication] for [Authentication], specify the user name (sa login) and password, and click [Connect].



3 When the SQL Server login procedure is complete, the following "Microsoft SQL Server Management Studio Express" screen appears.

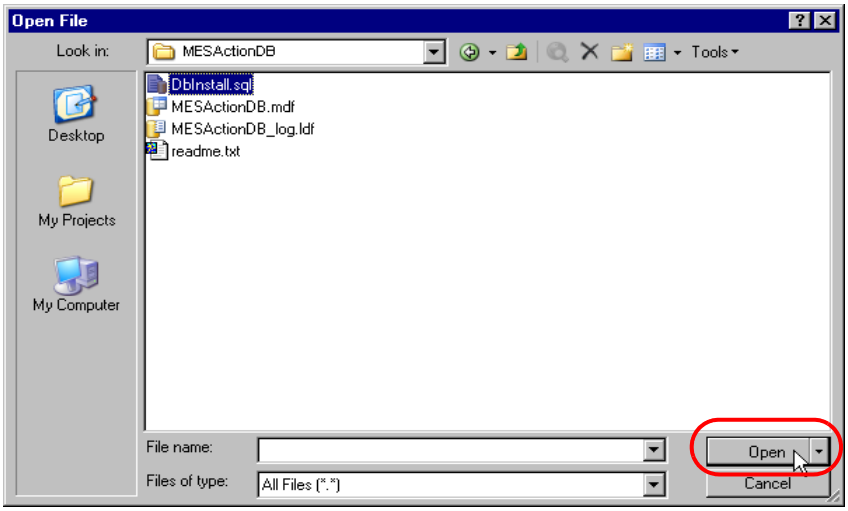


2.2.2 Attaching MESActionDB

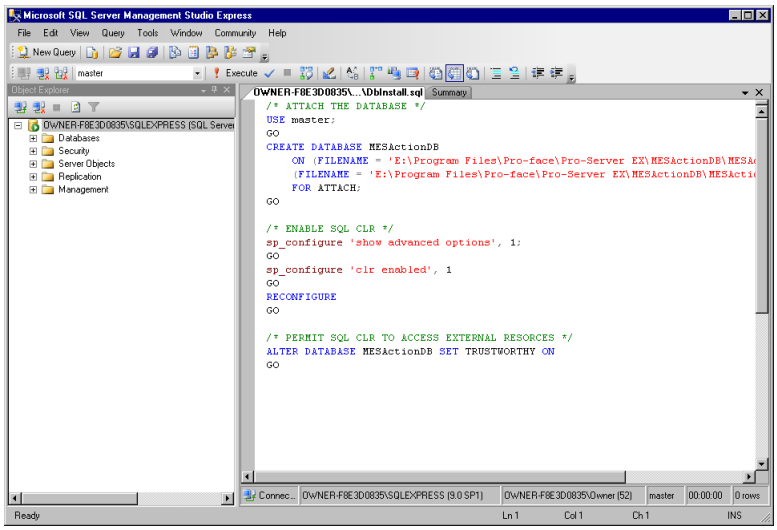
IMPORTANT

- You cannot attach databases created in a newer version of SQL Server to previous versions.
  Example: Be aware that attaching SQL Server 2005 databases to SQL Server 2012 will automatically update the database to SQL Server 2012.

1 Select [Open] from the [File] menu of SQL Server Management Studio Express, click [Open].

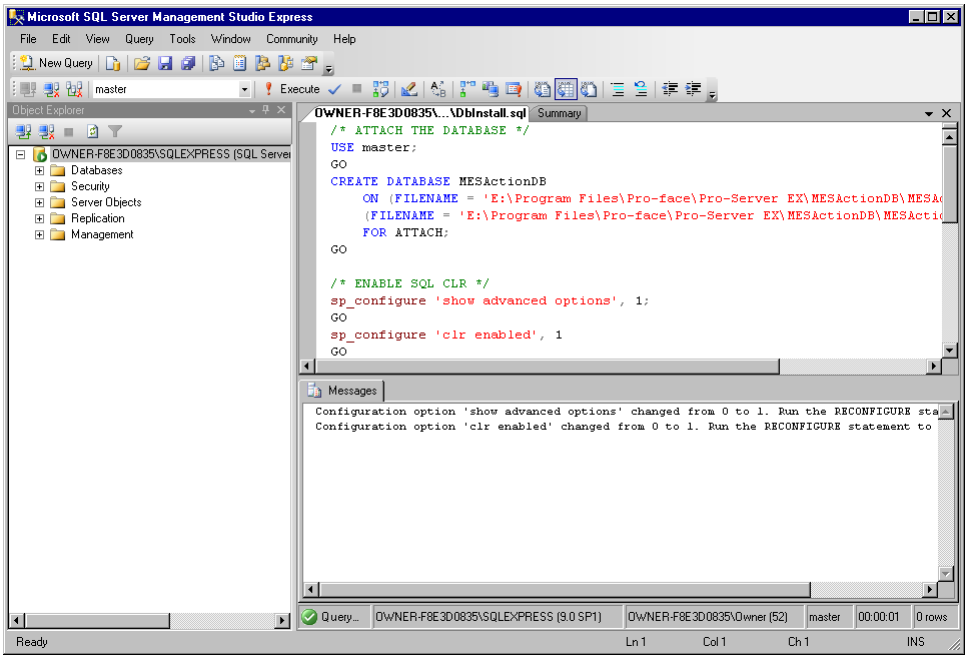


2 Open "DbInstall_No1.sql" in the MESActionDB folder under the Pro-Server EX installation folder.
The default destination folder is C:\Program Files\Pro-face\Pro-Server EX\MESActionDB. For Windows Vista or later C:\Pro-face\Pro-Server EX\MESActionDB.

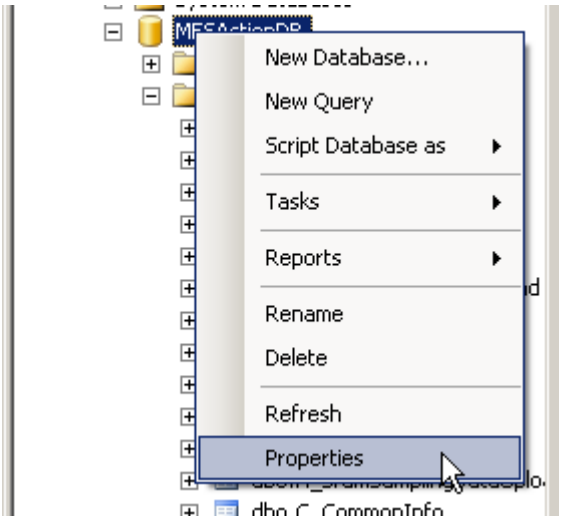


3 To execute "DbInstall_No1.sql", click [Execute] on the toolbar. Then, execute "Refresh" in SQL Server Management Studio Express, and confirm that the MESActionDB database has been added to Object Explorer.

IMPORTANT • When using 64 bit OS, reboot the SQL Server after executing DbInstall_No.1.sql.

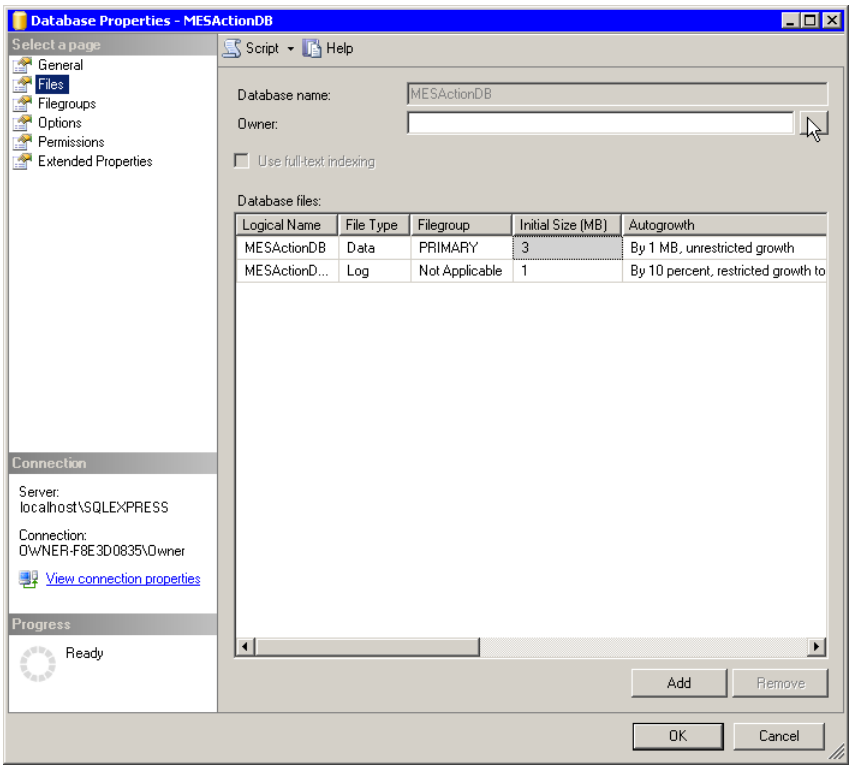


4 Right-click [MesActionDB] created in step 3 in order to display the menu. Click [Properties].



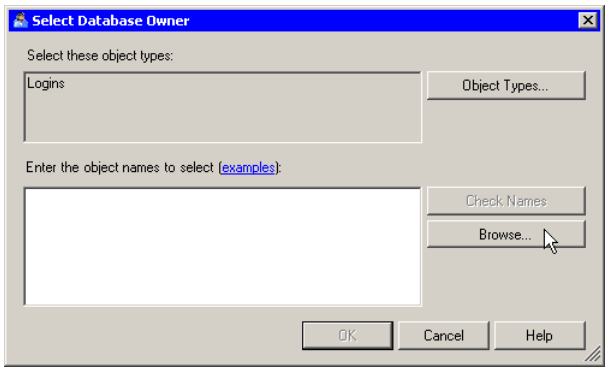
The [MesActionDB] properties screen is displayed.

5 Click [File] from the [Page Selection] field, and click the button on the right of the [Owner] field.



The [Database Owner Selection] dialog box is displayed.

6 Click the [Browse] button.

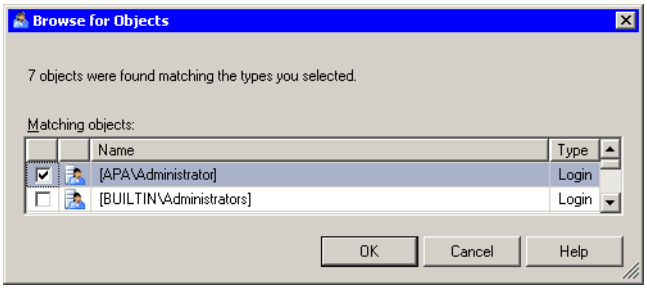


The [Browse Object] screen appears.

7 Check the user account with the required user rights in the [Browse Object] dialog box, and click [OK].

IMPORTANT

- To use MES Actions, match the MES Action [User] and MES Action database [Owner]. Additionally, for the user you are setting up, grant the required rights in SQL Server. For information on setting up rights, refer to "2.1.3 Registering Users on SQL Server".

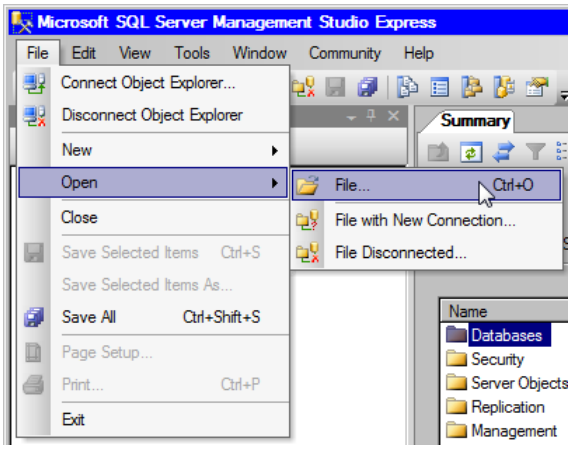


This takes you back to the [Database Owner Selection] dialog box.

8 Click [OK]. This takes you back to the [MesActionDB] properties screen.

9 Click [OK]. It takes you back to the [SQL Server Management Studio Express] screen.

10 Select [Open] from the [File] menu, and click [File].



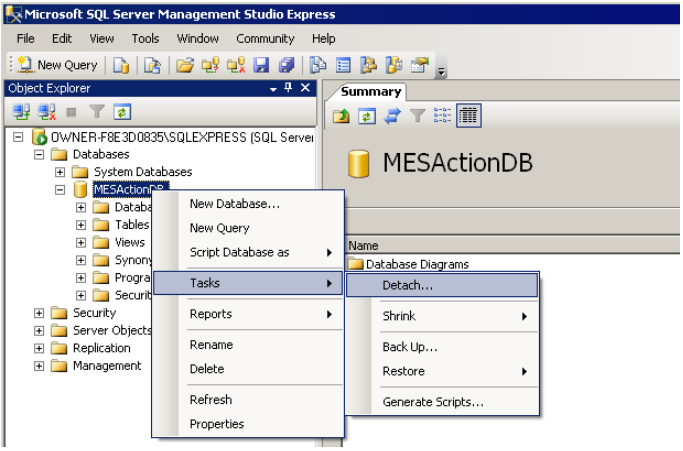
The [Open File] dialog box appears.

11 Open "DbInstall_No2.sql" in the MESActionDB folder in the 'Pro-Server EX' installation folder.
The default destination folder is C:\Program Files\Pro-face\Pro-Server EX\MESActionDB. For Windows Vista or later, C:\Pro-face\Pro-Server EX\MESActionDB.

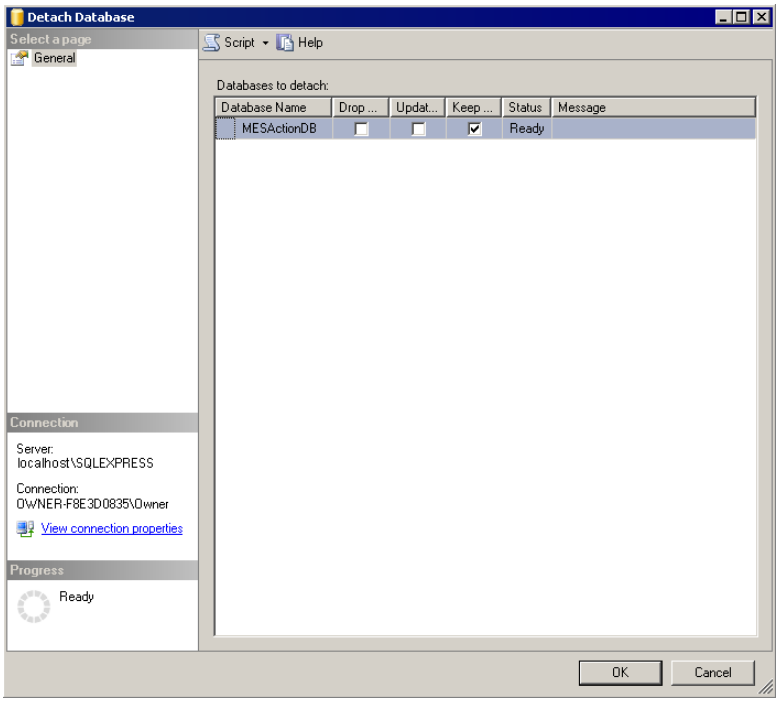
12 To execute "DbInstall_No2.sql", click [Execute] on the toolbar. Then, execute "Update to Latest Data" in 'SQL Server Management Studio Express', and confirm that the MESActionDB database has been added to Object Explorer.

2.2.3 Detaching MESActionDB

1 To detach MESActionDB, right-click on "MESActionDB" under "Databases" in the SQL Server Management Studio Express "Object Explorer" tool.



2 Click [Tasks]-[Detach] in the shortcut menu, appear dialog box.



3 Specify "MESActionDB", and click [OK]. Then, MESActionDB will be detached.

2.3 Setting MES ACTION Common Tables

Before using MES ACTION, set two tables commonly required for MES ACTION. The names and description of the tables to be set are listed below. For the table registration procedure, refer to "6.1.1 Basic Operations of SQL Server Management Studio Express".

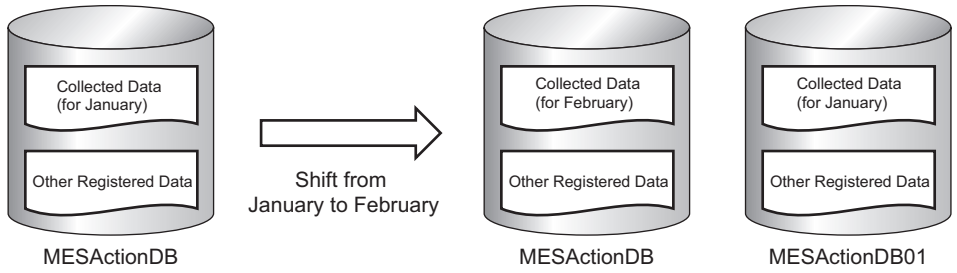
2.3.1 Registering C_CommonInfo Table

The "C_CommonInfo" table is used to set the collected data saving method and information required to send e-mail. Only one record is enough to use for the C_CommonInfo table. If several records are available, the record with the smallest ID number is used.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	SaveMode	nchar(1)	Database saving mode. Specify "C" (Continuous saving mode) or "M" (Monthly division mode). If the monthly division mode is selected, data on the previous month will be moved to other database (MESActionDB01 to MESActionDB12: the number indicates month) at a shift from every month to the next month.	
	SMTPServer	nvarchar(255)	SMTP Server Name. Used to send E-mail for control limit monitoring in Process Data Collection ACTION and Actual Data Collection ACTION.	
	SMTPPort	int	SMTP Port No. Used to send E-mail for control limit monitoring in Process Data Collection ACTION and Actual Data Collection ACTION.	
	SMTPAuth	bit	SMTP Authentication (False: Authentication is not required, True: Authentication is required) Used to send E-mail for control limit monitoring in Process Data Collection ACTION and Actual Data Collection ACTION. If "True" (Authentication is required) is selected, the SMTP server is requested to authenticate the user account by using the following user name and password.	
	SMTPUserName	nvarchar(255)	SMTP User Name. Used when SMTP authentication is required.	○
	InputSMTPPassword	nvarchar(255)	SMTP Password. The entered password is encoded at trigger of SQL Server, and saved in CodedSMTPPassword. Then, the InputSMTPPassword value is set to NULL. Therefore, unauthorized people cannot see the password.	○
	CodedSMTPPassword	varbinary(8000)	Encoded SMTP password. Used when SMTP authentication is required.	○
	MailFrom	nvarchar(255)	Mail Source Address. Used to send E-mail for control limit monitoring in Process Data Collection ACTION and Actual Data Collection ACTION.	

2.3.2 Registering C_MonthlyProcess Table

The C_MonthlyProcess table is used to set information required for monthly shift processing in the monthly division mode. The database saving mode is classified into the continuous saving mode and the monthly division mode. If the monthly division mode is selected, data on the previous month will be moved to other database (MESActionDB01 to MESActionDB12) at a shift from every month to the next month. This processing is called "monthly shift processing".



When the monthly shift processing is executed, if other program (SQL Server Management Studio Express, etc.) has accessed MESActionDB, or if the monthly shift processing is disabled for any reason (e.g. shortage of the disk space), the system outputs a message log to indicate a failure in the monthly shift processing, and adds new data to MESActionDB, without executing the monthly shift processing. Therefore, the database saves data for two months.

Only one record is enough to use for the C_MonthlyProcess table. If several records are available, the record with the smallest ID number is used.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	LastDateTime	datetime	Last collection time. MES ACTION automatically updates the value. Users need not specify it. Used to judge whether monthly shift processing is to be executed or not.	○
	InProcess	bit	Processing flag (False: Processing is not in progress. True: Processing is in progress) MES ACTION automatically updates the value. Users need not specify it. Used to prohibit monthly shift processing and database writing processing from being simultaneously executed.	

Main Key	Column Name	Data Type	Description	NULL Enabled
	WaitingTime	int	Wait time [second] for True processing flag. If monthly shift processing or collected data writing processing is being executed by other MES ACTIONs at the time when such processing is to be started, users can specify the time [second] to wait for completion of each processing. If the monthly shift processing or collected data writing processing executed by other MES ACTIONs is not completed after elapse of the specified wait time, it is judged to be an error. For monthly shift processing, a database file (.mdf) and log file (.log) are copied. However, if a file in the database is large, the copying time is prolonged. In such a case, the wait time setting in this column must be increased. However, when the wait time is long, the system takes a long time for error output, if the monthly shift processing or collected data writing processing cannot be completed within the specified time for any reason.	

2.4 When Updating MES Actions

After updating MES actions, when you use a database created in a previous version, from the Pro-Server EX installation folder open the MESActionDB sub-folder and run the executable file "DbInstall_No2.sql".
The default destination folder is C:\Program Files\Pro-face\Pro-Server EX\MESActionDB. For Windows Vista or later, C:\Pro-face\Pro-Server EX\MESActionDB.

3 Using MES ACTION

3 Using MES ACTION

MES ACTION provides the following functions. or details of the procedure for registering each ACTION, refer to the corresponding section for each ACTION listed below.

Type of ACTION	Reference section
MES ACTION Process Data Collection	3.2 Collecting Process Data
MES ACTION Actual Data Collection	3.3 Collecting Actual Data
MES ACTION GP SRAM Alarm-History Collection	3.4 Collecting Alarm-History from SRAM
MES ACTION GP CF-card Alarm-History-File Collection	3.5 Collecting Alarm-History-File from CF Card
MES ACTION GP SRAM Sampling-Data Collection	3.6 Collecting Sampling-Data from SRAM
MES ACTION GP CF-card Sampling-Data-File Collection	3.7 Collecting Sampling-Data-File from CF Card
MES ACTION GP CF-card Screen-File Collection	3.8 Collecting Captured Data from CF Card
MES ACTION Recipe Download	3.9 Writing Recipe Data from Database into CF Card
MES ACTION Composite Document Recipe-Transfer ACTION	3.10 Batch Transfer of Recipe, Text and Image Data

IMPORTANT

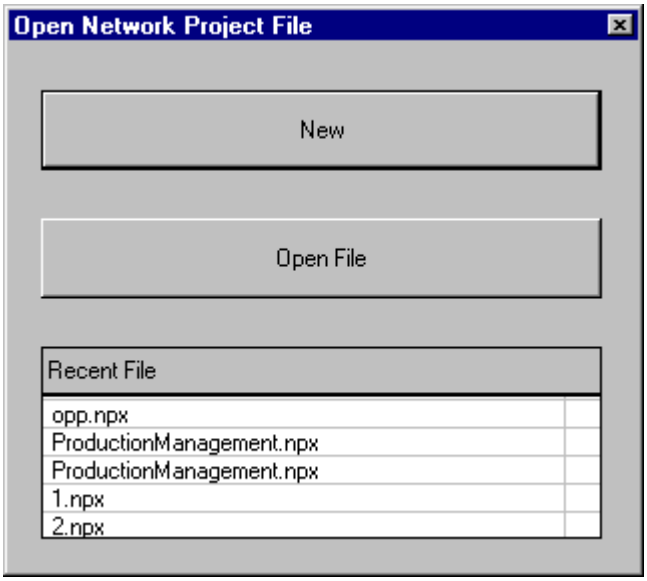
- To use MES Actions, match the MES Action [User] and MES Action database [Owner]. Additionally, for the user you are setting up, grant the required rights in SQL Server. For information on setting up rights, refer to "2.1.3 Registering Users on SQL Server".
- If you have any question about the contents and operations of Microsoft SQL Server, or about the contents of this manual, contact Pro-face (see "7 Inquiry"). For other questions, contact Microsoft at the following site:
  http://technet.microsoft.com/en-us/sqlserver/default (as of October, 2017)

3.1 Setting MES ACTION

3.1.1 Starting 'Pro-Studio EX'

1 To set MES ACTION, start 'Pro-Studio EX'. You can start 'Pro-Studio EX' by double-clicking on the 'Pro-Studio EX' shortcut icon on the desktop, or by selecting [Pro-face] - [Pro-Server EX] - [Pro-Studio EX] from [All Programs](or [Programs], depending on your OS) in the Start menu.

2 When 'Pro-Studio EX' starts, the "Open Network Project File" dialog box appears. To create a new network project, click the [New] button. To use an existing network project, click the [Open File] button, or select a desired network project name from the "Recent File" list.

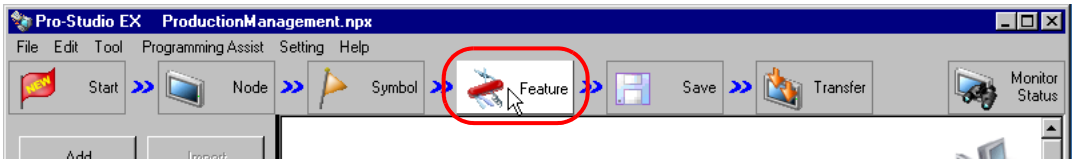


3 'Pro-Studio EX' starts with the selected network project.

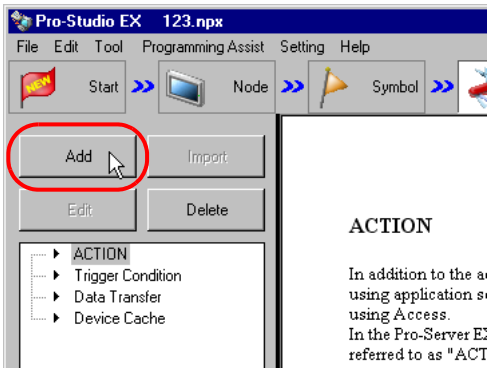
3.1.2 Registering MES ACTION

Before registering MES ACTION, you must register the node and symbol data used for MES ACTION. After that, click the [Feature] icon on the status bar and select a desired function of MES ACTION. The MES ACTION selecting procedure is described below.

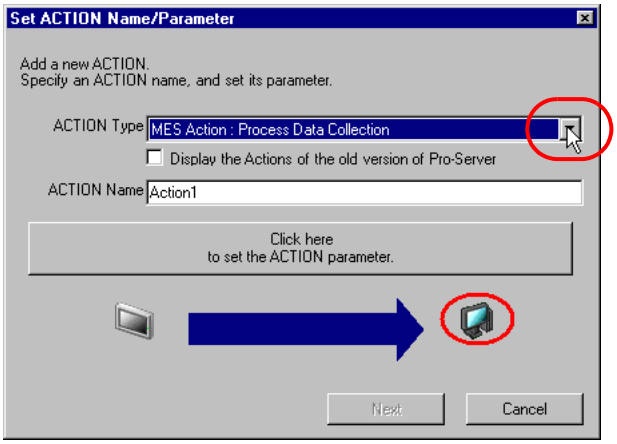
1 Click the [Feature] icon on the status bar.



2 Select [ACTION] from the tree display on the left of the screen and click [Add].



3 Click the [ACTION Type] list button and select the type of ACTION to be registered.



3.2 Collecting Process Data

Process-Data-Collection ACTION collects device data at a specified cycle, executes scale conversion with related tags, and saves the data into the database.
To use Process-Data-Collection ACTION, register the database tables used for Process-Data-Collection ACTION according to the procedure described in "6.1.1 Basic Operations of SQL Server Management Studio Express", and register Process-Data-Collection ACTION with 'Pro-Studio EX'.

3.2.1 Registering T_TagName Table

Tags to be collected by Process-Data-Collection ACTION must be registered in the T_TagName table in advance.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag.	
	Description	nvarchar(255)	Description	○
	Type	nchar(1)	Type of tag. Specify "A (Analog)", "D (Digital)" or "S (String)".	

3.2.2 Registering T_LinearAnalog Table

The T_LinearAnalog table is used to register the information required for engineering value conversion for the tag whose type is registered as "Analog" in the T_TagName table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of the tag whose type is registered as "Analog" in the T_TagName table.	
	SignalIO	nvarchar(6)	Signal Condition. Specify any of the following items: 8BN, 12BN, 13BN, 15BN, 3BCD, 4BCD, BCD, Lin, None, SQRT,String For details, refer to "Signal Condition".	
	InRL	float	Input lower limit value. Used for linearize conversion.	
	InRH	float	Input upper limit value. Used for linearize conversion.	
	OutRL	float	Output lower limit value. Used for linearize conversion.	
	OutRH	float	Output upper limit value. Used for linearize conversion.	
	DecimalPoint	Int	Decimal-Point Position. (0 to 7) Used when "None" is specified for Signal Condition.	○
	StringConvertMethod	nchar(5)	Numeric value-string conversion method. Select TABLE or QUERY. TABLE: Specifies a conversion table in the Table - Field format. QUERY: Specifies a conversion table with Query (SELECT statement).	○
	EngineeringUnit	nvarchar(257)	When SignalIO is other than String, specify the industrial unit of process data (kg, m, etc.). When SignalIO is String and StringConvertMethod is TABLE, specify the names of numeric value-string conversion table and column in the Table.Field format. When SignalIO is String and StringConvertMethod is QUERY, specify the SELECT statement to obtain a string.	○

NOTE
- "Linearize" means the conversion processing using a linear equation for input range and measuring instrument range.

■ Signal Condition

The engineering value conversion method based on Signal Condition specified in the SignalIO column is as follows:

8BN,12BN,13BN,15BN:

After masking by a specified bit length (when a high-order bit is not necessary, it is set to "0"), the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Value after masking - InRL)/(InRH - InRL) × (OutRH - OutRL) + OutRL

This method is available only when any of 16Bit(Signed), 16Bit(Unsigned), or 16Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

3BCD,4BCD:

After masking BCD data by a specified number of digits, the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Value after masking - InRL)/(InRH - InRL) × (OutRH - OutRL) + OutRL

This method is available only when any of 16Bit(Signed), 16Bit(Unsigned), or 16Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

BCD:

The result of linearize conversion without BCD data masking is defined as the engineering conversion value.

This method is available only when any of 32Bit(Signed), 32Bit(Unsigned), or 32Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

Lin:

The result of linearize conversion without masking is defined as the engineering conversion value.

SQRT:

After extracting the square root of an input value without masking, the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Input value - InRL)/SQRT(InRH - InRL) × (OutRH - OutRL) + OutRL

None(Real number conversion):

Masking and linearize conversion are not executed. If the type of 16-bit or 32-bit integer is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table, the following calculation result, based on the value of the DecimalPoint column, is defined as the engineering conversion value.

Input value / n-th power of 10 (n = value of DecimalPoint column)

String:

Masking and linearize conversion are not executed.

NOTE

- If "String" is specified in the SignalIO column, specify the character string corresponding to the row number, with reference to the following table. The table name is selected randomly.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main Key	
	(Arbitrary column name 1)	nvarchar(32)	Character string corresponding to string No.	○
	(Arbitrary column name 2)	nvarchar(32)	Character string corresponding to string No.	○
	:	:	:	:
	(Arbitrary column name N)	nvarchar(32)	Character string corresponding to string No.	○

When StringConvertMethod is TABLE:

ACTION finds the row number from the input value with the following formula:

Row number = (Input value - outRL) MOD (outRH - outRL) + outRL

("A MOD B" is a residue of A divided by B)

For example, provided that outRL is "1" and outRH is "11", the relationship between the input value and the row number is as follows:

Entered Value	...	-1	0	1	2	...	9	10	11	12	...	19	20	21	22	...
Row Number	...	-1	0	1	2	...	9	10	1	2	...	9	10	1	2	...

The table name and column name specified in the EngineeringUnit column and the string corresponding to the row number obtained above are used as the tag value.

If the row number is smaller than "1", or if there is no row corresponding to the row number, it is judged as a conversion error.

When StringConvertMethod is QUERY:

The execution result of the query (SELECT statement) specified in the EngineeringUnit column is used as the tag value.

If "@VALUE" is used as a parameter in the query, the input value is set in this parameter.

For example, provided that the input value is "10" and a query of "SELECT TagString FROM TestTable WHERE TagValue = @VALUE" is set in the EngineeringUnit column, the system finds the record with a TagValue column value of "10" from TestTable. The value of the TagString column in the first found record is used as the tab value.

3.2.3 Registering T_ LimitControl Table

The control limit monitoring function outputs an alarm when a tag value is the lower control limit value or lower, or a tag value is the upper control limit value or higher is collected continuously by a specified count or more, and reports it by sending E-mail, or by writing a value into a device. The tag used for control limit monitoring is set in the T_ LimitControl table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of tag used for control limit monitoring.	
	LCL	float	Lower control limit value.	
	CL	float	Center value.	
	UCL	float	Upper control limit value.	
	Count	Int	Preset number of continuous occurrences of control limit alarm values before alarm output.	
	Message	nvarchar(255)	Alarm message. Title of the mail to report occurrence of an alarm event.	
	EMailEnabled	bit	To report an alarm by e-mail, set True. Not to report an alarm, set False.	
	EMailListID	int	ID of the mail address list to send E-mail at occurrence of an alarm event. E-mail is sent to the address that matches the ID column value in the EMailList table.	○
	DeviceEnabled	bit	To write a value into a device when an alarm event occurs, set True. Not to write a value into a device, set False.	
	DeviceListID	int	ID of the device list to write a value at occurrence of an alarm event. A value is written into the device that matches the ID column value in the DeviceList table.	○
	CountNow	int	Current count of continuous occurrences of control limit alarm values. MES ACTION automatically updates the value. Users need not specify it.	○

3.2.4 Registering T_EMailList Table

To report occurrence of an alarm event by E-mail with the control limit monitoring function, specify the mail destination address in the T_EMailList table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	ID of the mail address list to send E-mail at occurrence of an alarm event. Set the same ID as the setting of the EMailListID column in the T_LimitControl table.	
○	Address	nvarchar(255)	E-mail Address.	

3.2.5 Registering T_DeviceList Table

To report occurrence of an alarm event by writing a value into a device with the control limit monitoring function, specify the write-destination device address in the T_DeviceList table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	ID of the device list to write a value at occurrence of an alarm event. Set the same ID as the setting of the DeviceListID column in the T_LimitControl table.	
○	StationName	nvarchar(32)	Node Name	
○	EquipmentName	nvarchar(32)	Name of Device/PLC.	
○	DeviceAddress	nvarchar(131)	Device address or symbol name. For symbol name, the format is "Sheet name. Symbol name".	
	DataType	nvarchar(15)	Type of device data. Specify any of the following items: 8Bit(Signed), 8Bit(UnSigned), 8Bit(BCD), 8Bit(HEX), 16Bit(Signed), 16Bit(UnSigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(UnSigned), 32Bit(BCD), 32Bit(HEX), Float, Double, Bit, String, DATE, TIME_OF_DAY, TIME, DATE_AND_TIME	
	Count	int	Indicates a length (number of bytes) of string for String data type. If the DataType setting is other than String, this column is not used.	
	Value	nvarchar(255)	A value to be written into a device.	

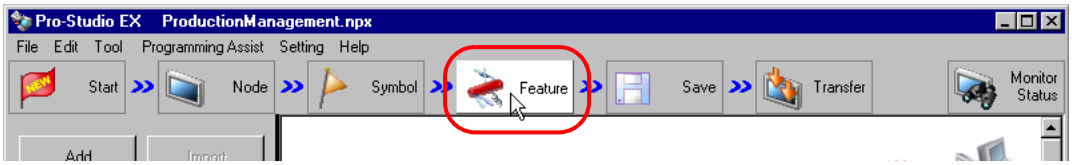
3.2.6 Registering T_ LineDigital Table

The T_ LineDigital table is used to register the tag value and corresponding string for the tag whose type is registered as "Digital" in the T_TagName table.

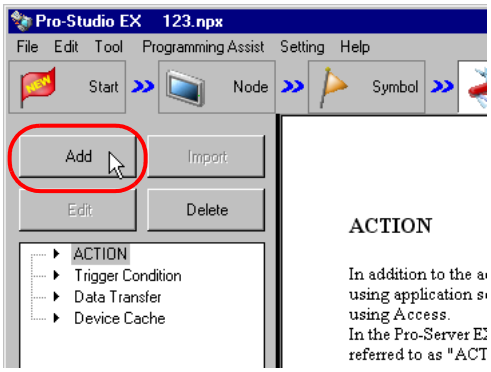
Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of the tag whose type is registered as "Digital" in the T_TagName table.	
	OnChar	nvarchar(32)	A string corresponding to value 1.	
	OffChar	nvarchar(32)	A string corresponding to value 0.	

3.2.7 Registering Process-Data-Collection ACTION

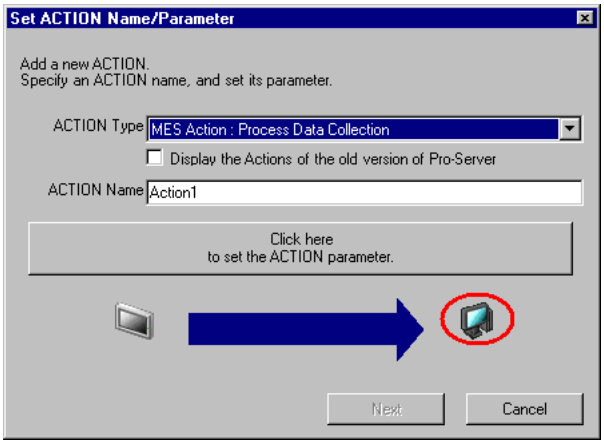
1 Click the [Feature] icon on the status bar.



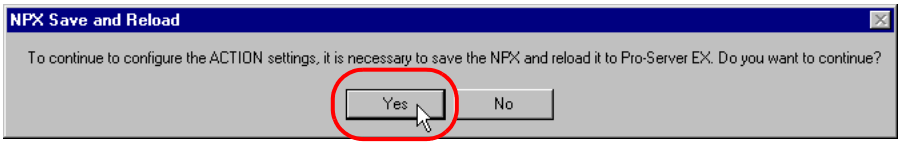
2 Select [ACTION] from the tree display on the left of the screen and click the [Add] button.



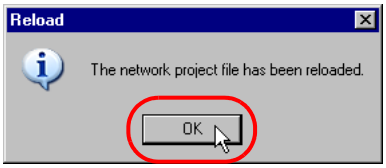
3 Click the [ACTION Type] list button and select "MES Action : Process Data Collection". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



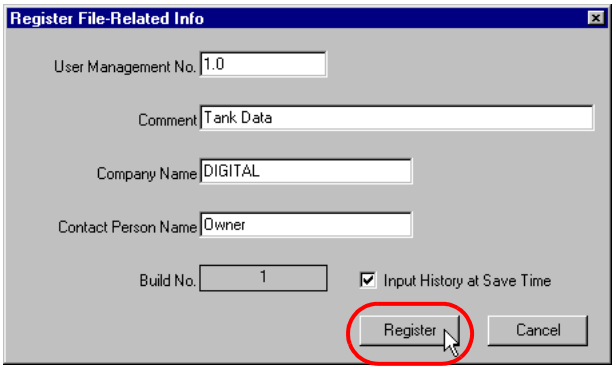
4 Click [Yes] on the "NPX Save and Reload" screen.



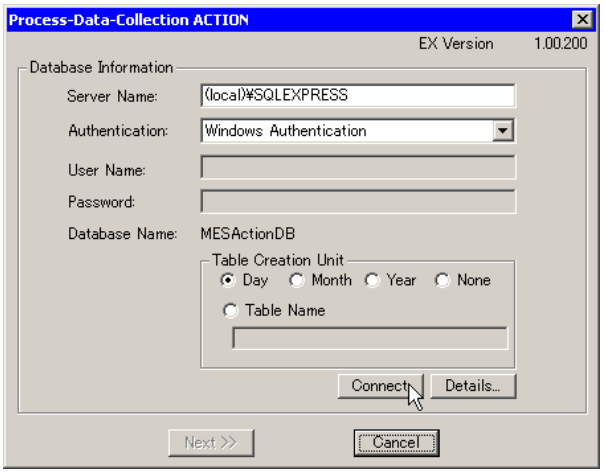
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

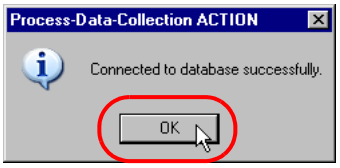


Information required for database connection is listed below.

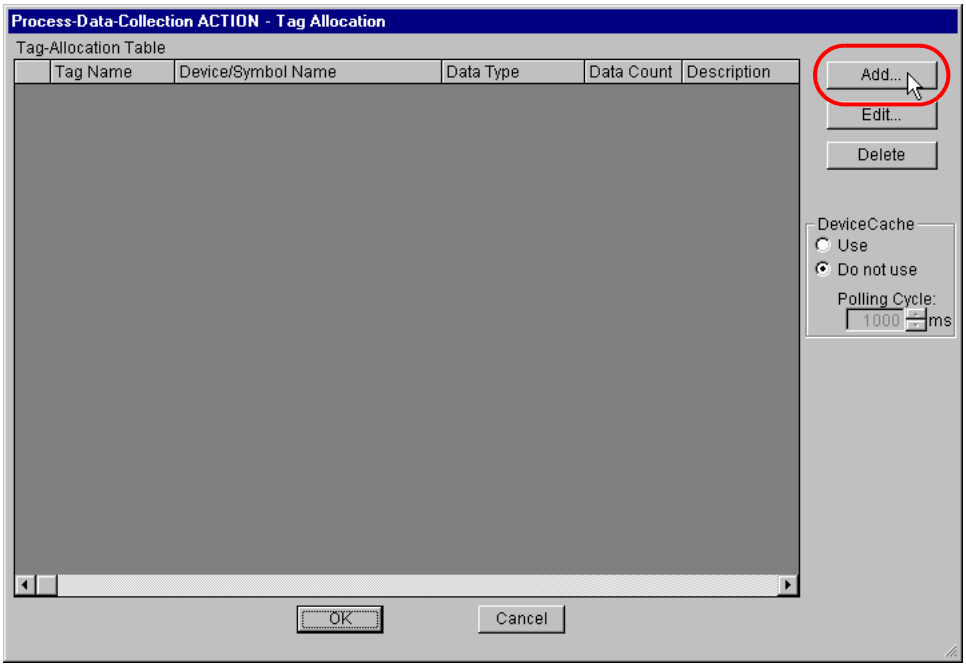
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.
	Table Creation Unit	Specify the unit (Day/Month/Year/None/Table name specification) in which the database table will be saved.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

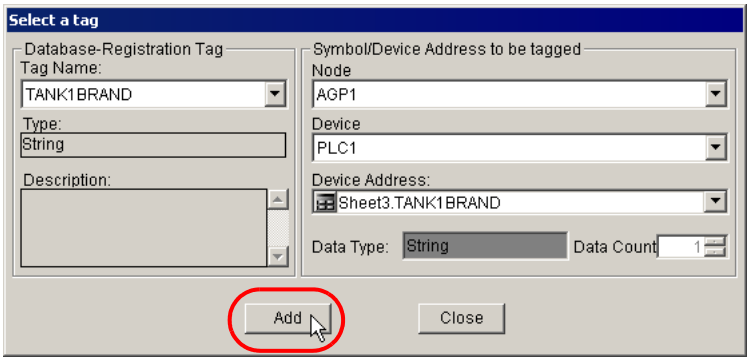
8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



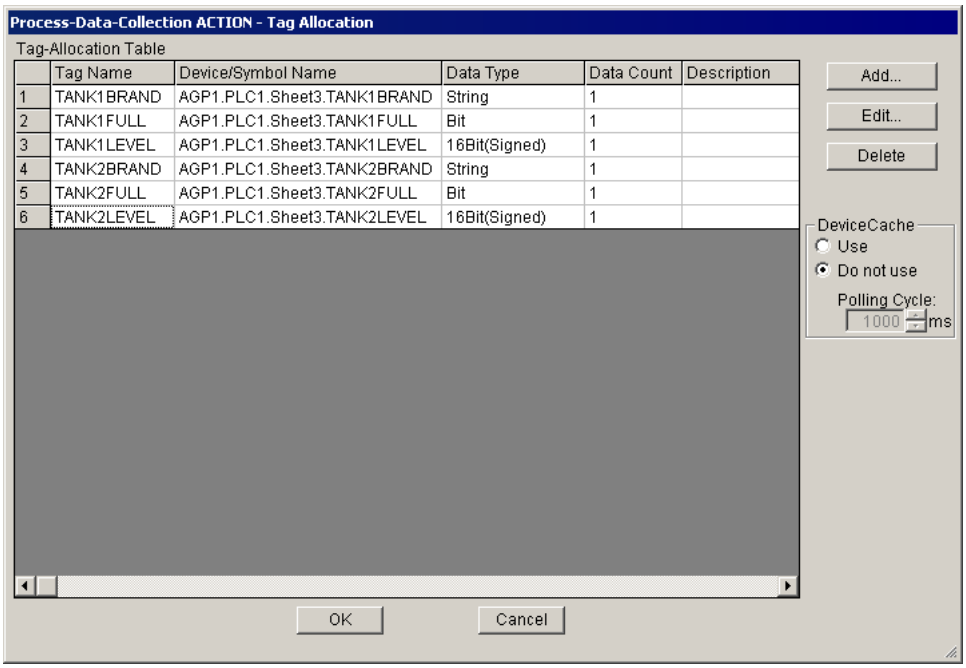
9 After the tag allocation screen appears, click [Add].



10 Select a tag registered in the database, specify the symbol/device address to be allocation to the tag, and click [Add]. After allocations to all necessary tags are completed, click [Close].

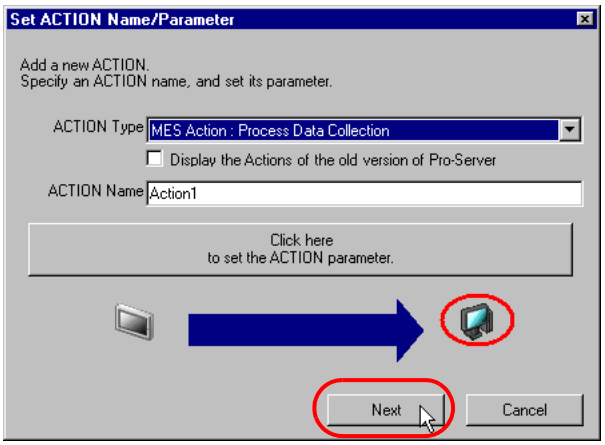


11 Set the device cache parameter and click [OK]. This completes the Process-Data-Collection ACTION parameter setting procedure.

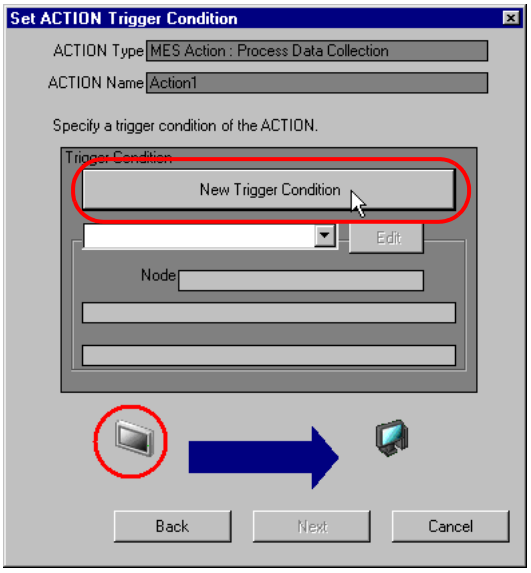


Parameter		Description
Device Cache	Use/ Do not use	Select whether to use the device cache or not. If the device cache is used, the response is improved during execution of ACTION, but the load of 'Pro-Server' increases.
	Polling Cycle	When "Device Cache" is set to "Use", specify a collecting cycle (polling cycle) in the range of 100ms to 10000s.

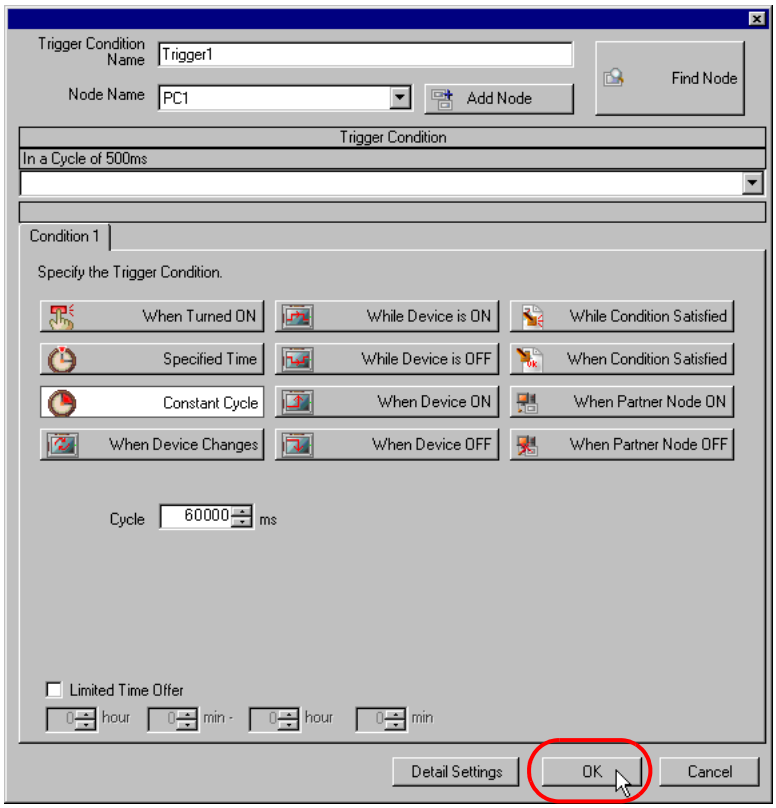
12 Then, specify the Process-Data-Collection ACTION trigger condition. Click [Next] on the "Set ACTION Name/Parameter" screen.



13 Click the [New Trigger Condition] button. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 15.



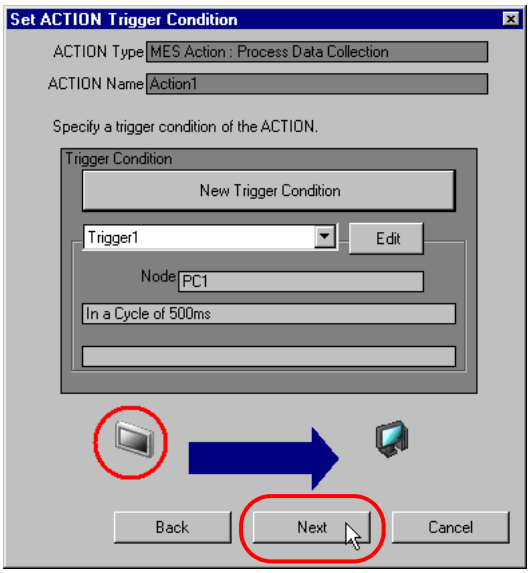
14 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



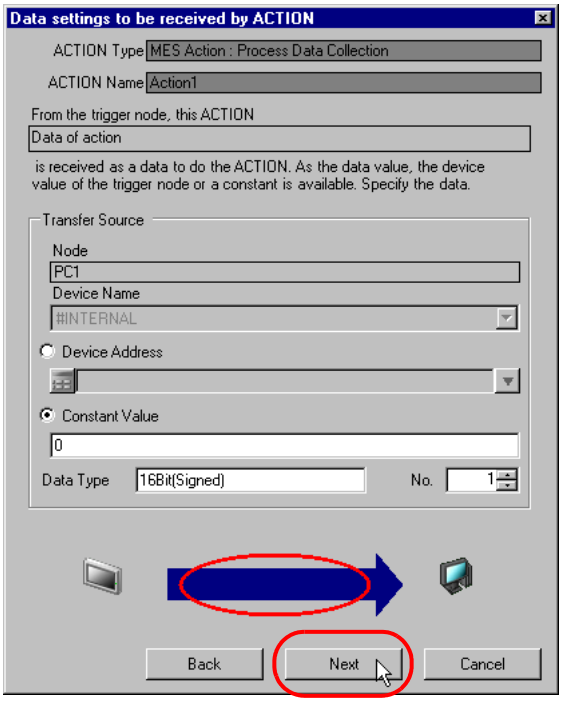
IMPORTANT

- For the Process-Data-Collection ACTION trigger condition, specify a constant cycle of "one minute (60000ms)" or longer.

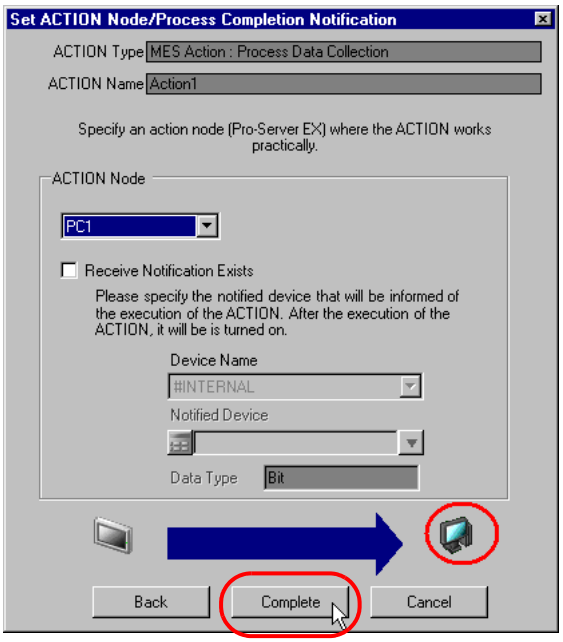
15 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.



16 Specify the data to be received by the ACTION, and click the [Next] button. For Process-Data-Collection ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



17 Specify the ACTION operating node and whether to enable or disable receiving notice, and click the [Complete] button. Through the above procedure, Process-Data-Collection ACTION is added.



3.2.8 Management of Collected Data

The tag values collected by Process-Data-Collection ACTION are saved in the D_ProcessData table. Actually, the table name is expressed with the ACTION ID of the Process-Data-Collection ACTION ('Pro-Studio EX' internal information indicated by string) and the date, as shown below:

When the table is created daily :D_ProcessData_ACTION ID_YYYYMMDD
When the table is created monthly : D_ProcessData_ ACTION ID _YYYYMM
When the table is created yearly : D_ProcessData_ ACTION ID _YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Data collection date/time.	
	(Tag 1)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	(Tag 2)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	:	:	:	
	(Tag n)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○

The data type of (Tag 1) to (Tag n) depends on the data type of the symbol/device allocated to each tag, as shown below.

Symbol / Device Data Type	Numeric value-string conversion	Data type of (Tag 1) to (Tag n)
16-bit (Signed), 16-bit (Unsigned), 16-bit(BCD), 16-bit (HEX), 32-bit (Signed), 32-bit (Unsigned), 32-bit(BCD), 32-bit (HEX)	Disabled	real
	Enabled	nvarchar(32)
Single-precision floating point	-	real
Double-precision floating point	-	float
Bit	-	nvarchar(32)
String	-	nvarchar(1020)

3.3 Collecting Actual Data

Actual-Data-Collection ACTION collects symbol data and device data from 'Pro-Server EX' at a specified status change, executes scale conversion with related tags, and saves the data into the database. Furthermore, this ACTION can calculate an achievement ratio from a plan value.
To use Actual-Data-Collection ACTION, register the database tables used for Actual-Data-Collection ACTION according to the procedure described in "6.1.1 Basic Operations of SQL Server Management Studio Express", and register Actual-Data-Collection ACTION with 'Pro-Studio EX'.

NOTE
- To collect data periodically for a trend chart, refer to "3.2 Collecting Process Data".

3.3.1 Registering T_TagName Table

Tags to be collected by Actual-Data-Collection ACTION must be registered in the T_TagName table in advance.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag.	
	Description	nvarchar(255)	Description	○
	Type	nchar(1)	Type of tag. Specify "A (Analog) " or "D (Digital)" .	

3.3.2 Registering T_LinearAnalog Table

The T_LinearAnalog table is used to register the information required for engineering value conversion for the tag whose type is registered as "Analog" in the T_TagName table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of the tag whose type is registered as "Analog" in the T_TagName table.	
	SignalIO	nvarchar(6)	Signal Condition Specify any of the following items: 8BN, 12BN, 13BN, 15BN, 3BCD, 4BCD, BCD, Lin, None, SQRT,String For details, refer to "Signal Condition".	
	InRL	float	Input lower limit value. Used for linearize conversion.	
	InRH	float	Input upper limit value. Used for linearize conversion.	
	OutRL	float	Output lower limit value. Used for linearize conversion.	
	OutRH	float	Output upper limit value. Used for linearize conversion.	
	DecimalPoint	Int	Decimal-Point Position. (0 to 7) Used when "None" is specified for Signal Condition.	○
	String Convert Method	nchar(5)	Numeric value-string conversion method. sed when String is specified for Signal I/O. Select TABLE or QUERY. TABLE: Specifies a conversion table in the Table-Field format. QUERY: Specifies a conversion table with Query (SELECT statement).	○
	Engineering Unit	nvarchar(257)	When SignalIO is other than String, specify the industrial unit of process data (kg, m, etc.). When SignalIO is String and StringConvertMethod is TABLE, specify the names of numeric value-string conversion table and column in the Table.Field format. When SignalIO is String and StringConvertMethod is QUERY, specify the SELECT statement to obtain a string.	○

NOTE

- "Linearize" means the conversion processing using a linear equation for input range and measuring instrument range.
- When "String" is specified for Signal Condition, the value prior to value-string conversion is saved as the actual value.
- When "bit" is specified for Data Type, "0" at OFF or "1" at ON is saved as the actual value.

■ Signal Condition

The engineering value conversion method based on Signal Condition specified in the SignalIO column is as follows:

8BN,12BN,13BN,15BN:

After masking by a specified bit length (when a high-order bit is not necessary, it is set to "0"), the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Value after masking - InRL)/(InRH - InRL) × (OutRH - OutRL) + OutRL

This method is available only when any of 16Bit(Signed), 16Bit(Unsigned), or 16Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

3BCD,4BCD:

After masking BCD data by a specified number of digits, the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Value after masking - InRL)/(InRH - InRL) × (OutRH - OutRL) + OutRL

This method is available only when any of 16Bit(Signed), 16Bit(Unsigned), or 16Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

BCD:

The result of linearize conversion without BCD data masking is defined as the engineering conversion value.

This method is available only when any of 32Bit(Signed), 32Bit(Unsigned), or 32Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

Lin:

The result of linearize conversion without masking is defined as the engineering conversion value.

SQRT:

After extracting the square root of an input value without masking, the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Input value - InRL)/SQRT(InRH - InRL) × (OutRH - OutRL) + OutRL

None(Real number conversion):

Masking and linearize conversion are not executed. If the type of 16-bit or 32-bit integer is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table, the following calculation result, based on the value of the DecimalPoint column, is defined as the engineering conversion value.

Input value / n-th power of 10 (n = value of DecimalPoint column)

String:

Masking and linearize conversion are not executed.

NOTE

- If "String" is specified in the SignalIO column, specify the character string corresponding to the row number, with reference to the following table. The table name is selected randomly.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main Key	
	(Arbitrary column name 1)	nvarchar(32)	Character string corresponding to string No.	○
	(Arbitrary column name 2)	nvarchar(32)	Character string corresponding to string No.	○
	:	:	:	:
	(Arbitrary column name N)	nvarchar(32)	Character string corresponding to string No.	○

When StringConvertMethod is TABLE:

ACTION finds the row number from the input value with the following formula:

Row number = (Input value - outRL) MOD (outRH - outRL) + outRL

("A MOD B" is a residue of A divided by B)

For example, provided that outRL is "1" and outRH is "11", the relationship between the input value and the row number is as follows:

Entered Value	...	-1	0	1	2	...	9	10	11	12	...	19	20	21	22	...
Row Number	...	-1	0	1	2	...	9	10	1	2	...	9	10	1	2	...

The table name and column name specified in the EngineeringUnit column and the string corresponding to the row number obtained above are used as the tag value.

If the row number is smaller than "1", or if there is no row corresponding to the row number, it is judged as a conversion error.

When StringConvertMethod is QUERY:

The execution result of the query (SELECT statement) specified in the EngineeringUnit column is used as the tag value.

If "@VALUE" is used as a parameter in the query, the input value is set in this parameter.

For example, provided that the input value is "10" and a query of "SELECT TagString FROM TestTable WHERE TagValue = @VALUE" is set in the EngineeringUnit column, the system finds the record with a TagValue column value of "10" from TestTable. The value of the TagString column in the first found record is used as the tab value.

3.3.3 Registering T_LineDigital Table

The T_LineDigital table is used to register the tag value and corresponding string for the tag whose type is registered as "Digital" in the T_TagName table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of the tag whose type is registered as "Digital" in the T_TagName table.	
	OnChar	nvarchar(32)	A string corresponding to value 1.	
	OffChar	nvarchar(32)	A string corresponding to value 0.	

3.3.4 Registering T_LimitControl Table

The control limit monitoring function outputs an alarm when a tag value is the lower control limit value or lower, or a tag value is the upper control limit value or higher is collected continuously by a specified count or more, and reports it by sending E-mail, or by writing a value into a device. The tag used for control limit monitoring is set in the T_LimitControl table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of tag used for control limit monitoring.	
	LCL	float	Lower control limit value.	
	CL	float	Center value.	
	UCL	float	Upper control limit value.	
	Count	Int	Preset number of continuous occurrences of control limit alarm values before alarm output.	
	Message	nvarchar(255)	Alarm message. Title of the mail to report occurrence of an alarm event.	
	EMail Enabled	bit	To report an alarm by e-mail, set True. Not to report an alarm, set False.	
	EMailList ID	int	ID of the mail address list to send E-mail at occurrence of an alarm event. E-mail is sent to the address that matches the ID column value in the EMailList table.	○
	Device Enabled	bit	To write a value into a device when an alarm event occurs, set True. Not to write a value into a device, set False.	
	Device ListID	int	ID of the device list to write a value at occurrence of an alarm event. A value is written into the device that matches the ID column value in the DeviceList table.	○
	Count Now	int	Current count of continuous occurrences of control limit alarm values. MES ACTION automatically updates the value. Users need not specify it.	○

NOTE
- To use the mail function in the T_LimitControl table, you must configure the SMTP settings.
- When "bit" is specified for Data Type, "0" at OFF or "1" at ON is saved as the actual value.

3.3.5 Registering T_EMailList Table

To report occurrence of an alarm event by E-mail with the control limit monitoring function, specify the mail destination address in the T_EMailList table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	ID of the mail address list to send E-mail at occurrence of an alarm event. Set the same ID as the setting of the EMailListID column in the T_LimitControl table.	
○	Address	nvarchar(255)	E-mail Address.	

3.3.6 Registering T_DeviceList Table

To report occurrence of an alarm event by writing a value into a device with the control limit monitoring function, specify the write-destination device address in the T_DeviceList table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	ID of the device list to write a value at occurrence of an alarm event. Set the same ID as the setting of the DeviceListID column in the T_LimitControl table.	
○	Station Name	nvarchar(32)	Node Name	
○	Equipment Name	nvarchar(32)	Name of Device/PLC.	
○	Device Address	nvarchar(131)	Device address or symbol name. For symbol name, the format is "Sheet name.Symbol name".	
	DataType	nvarchar(15)	Type of device data. Specify any of the following items: 8Bit(Signed), 8Bit(UnSigned), 8Bit(BCD), 8Bit(HEX), 16Bit(Signed), 16Bit(UnSigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(UnSigned), 32Bit(BCD), 32Bit(HEX), Float, Double, Bit, String, DATE, TIME_OF_DAY, TIME, DATE_AND_TIME	
	Count	int	Indicates a length (number of bytes) of string for String data type. If the DataType setting is other than String, this column is not used.	
	Value	nvarchar(255)	A value to be written into a device.	

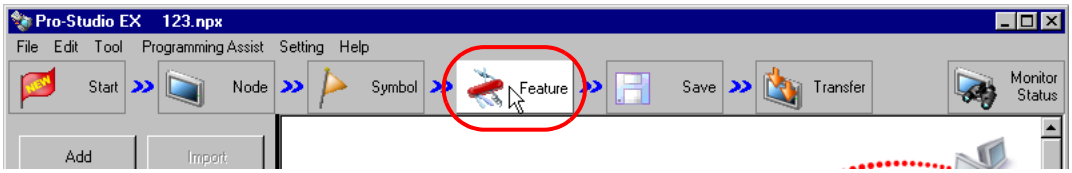
3.3.7 Registering T_PlanValueQuery Table

Action Data Collection ACTION records a plan value and achievement ratio into the database, as well as the actual value. The "T_PlanValueQuery" table allows the user to specify the plan value acquiring method.

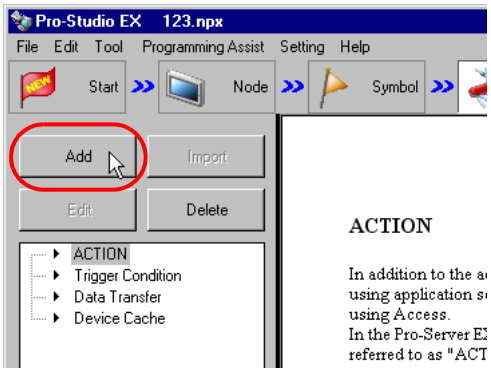
Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of tag used for actual data collection.	
	Method	nchar(5)	Plan value acquiring method. Select TABLE or QUERY. TABLE: Specifies a plan value table in the Table.Field format. QUERY: Specifies a plan value table with Query(SELECT statement).	
	Query	nvarchar(257)	If Method is TABLE, specify the plan value table name and column name in the Table.Field format. The value of the first row of the specified table-field is defined as the plan value. If Method is QUERY, specify the SELECT statement to obtain a plan value.	

3.3.8 Registering Actual-Data-Collection ACTION

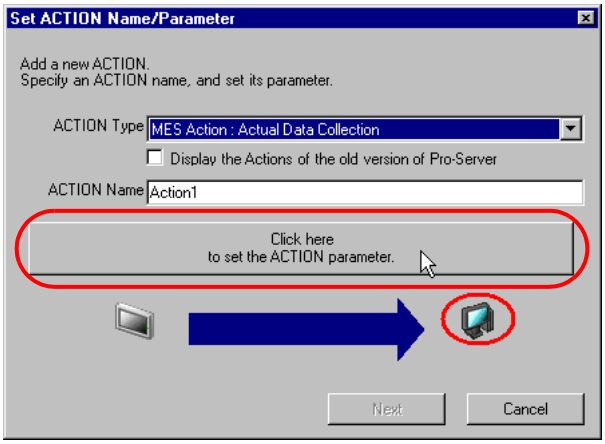
1 Click the [Feature] icon on the status bar.



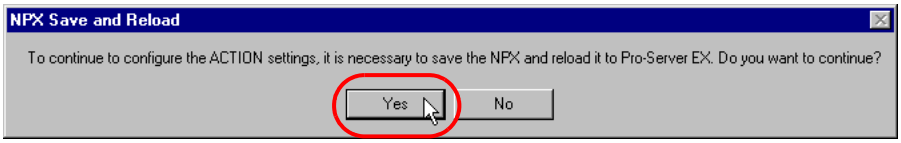
2 Select [ACTION] from the tree display on the left of the screen and click the [Add] button.



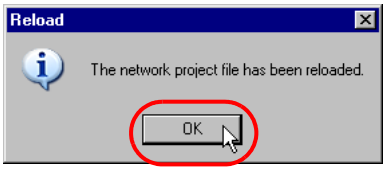
3 Click the [ACTION Type] list button and select "MES Action : Actual Data Collection". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



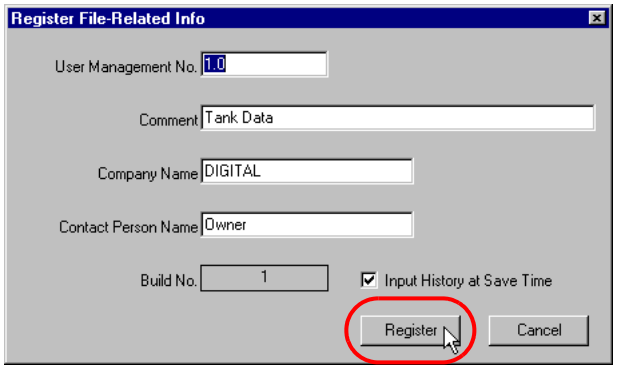
4 Click [Yes] on the "NPX Save and Reload" screen.



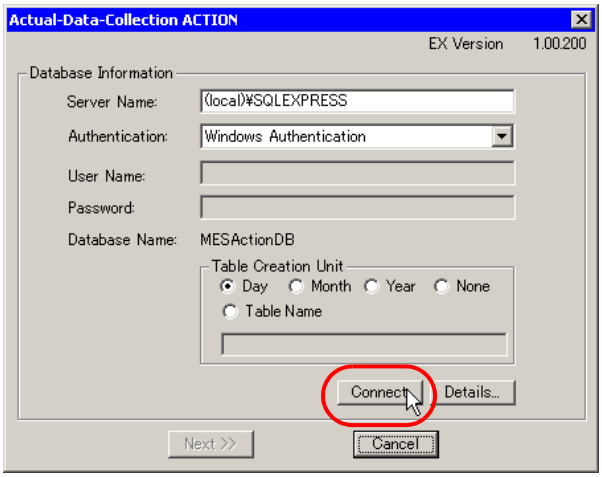
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click the [Connect] button.



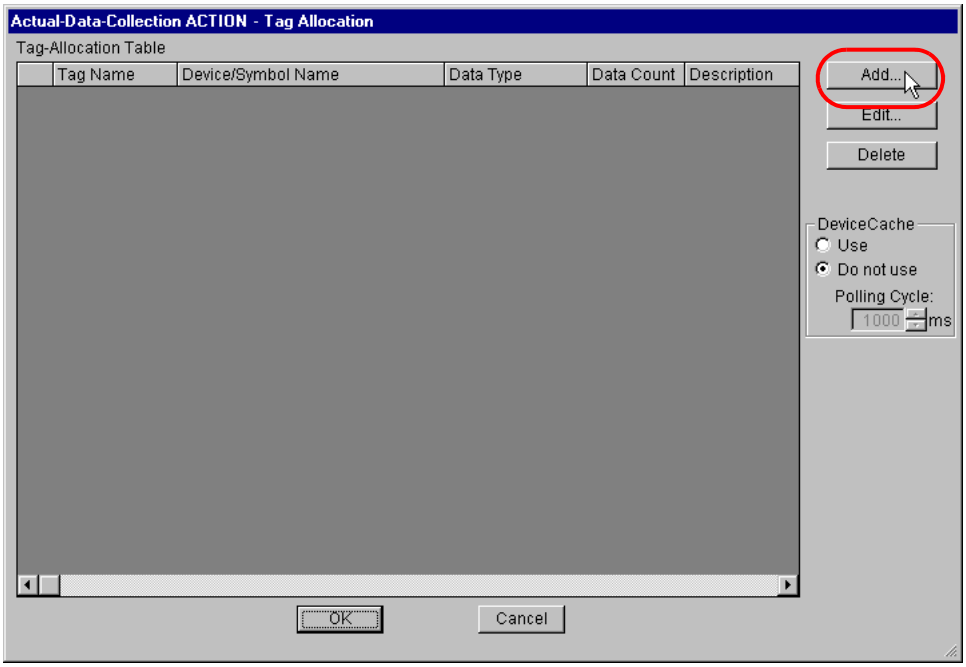
Information required for database connection is listed below.

Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.
	Table Creation Unit	Specify the unit (Day/Month/Year/None/Table name specification) in which the database table will be saved.

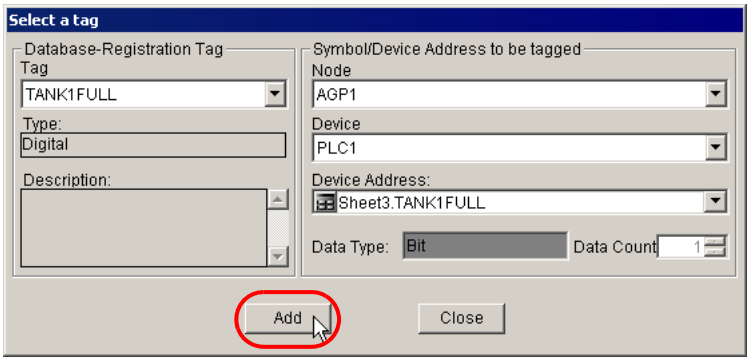
Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout: the amount of time until Timeout when executing the command request to the SQL server

8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.

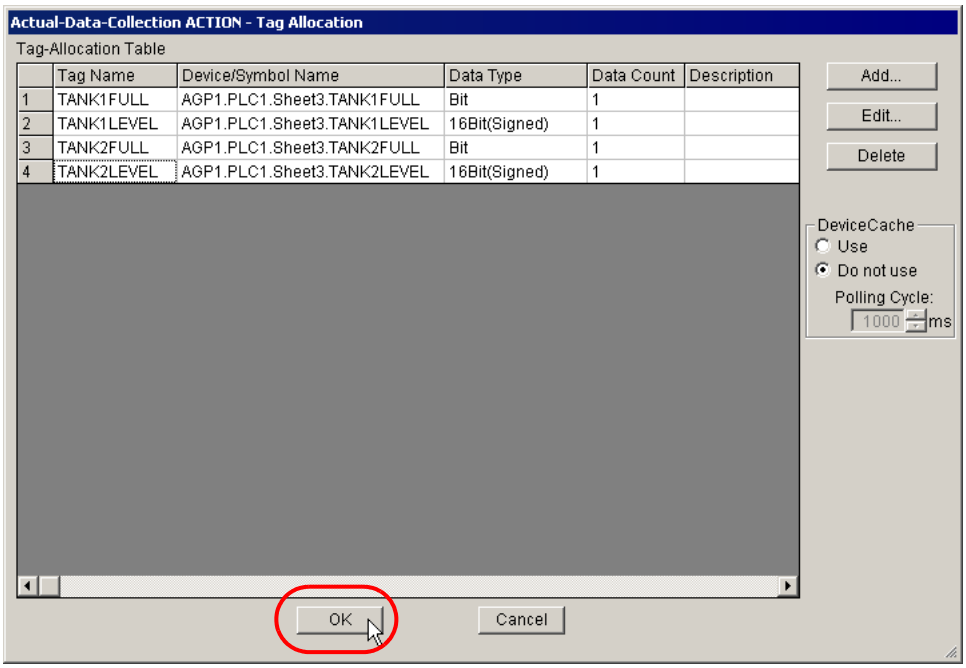
9 After the tag allocation screen appears, click [Add].



10 Select a tag registered in the database, specify the symbol/device address to be allocation to the tag, and click [Add]. After allocations to all necessary tags are completed, click [Close].

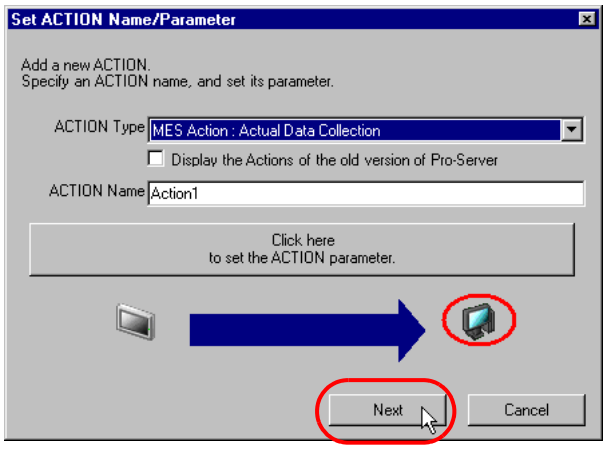


11 Set the device cache parameter and click [OK]. This completes the Process-Data-Collection ACTION parameter setting procedure.

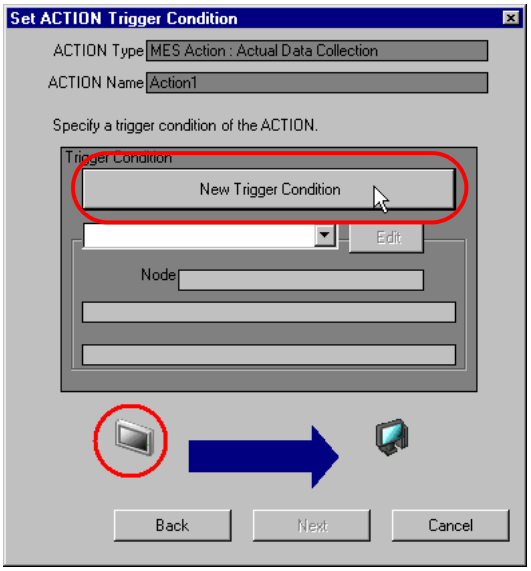


Parameter		Description
Device Cache	Use/Do not use	Select whether to use the device cache or not using the radio button.
	Polling Cycle	When "Device Cache" is set to "Use", specify a collecting cycle (polling cycle) in the range of 100ms to 10000s.

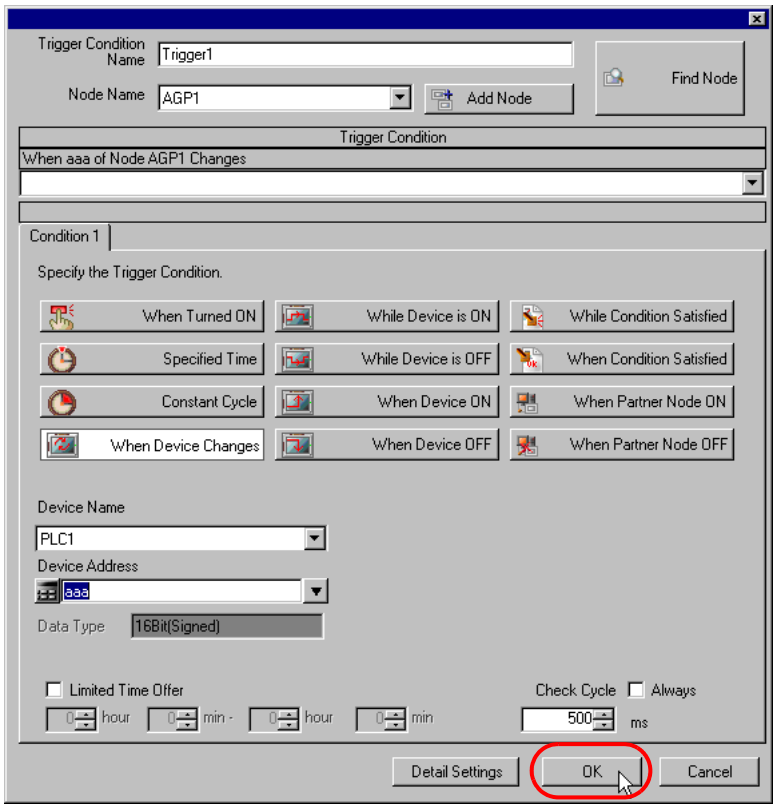
12 Then, specify the Actual-Data-Collection ACTION trigger condition. Click the [Next] button on the "Set ACTION Name/Parameter" screen.



13 Click the [New Trigger Condition] button. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 15.



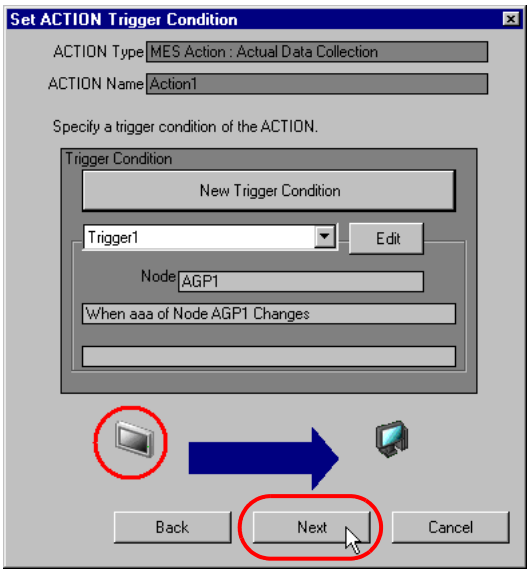
14 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



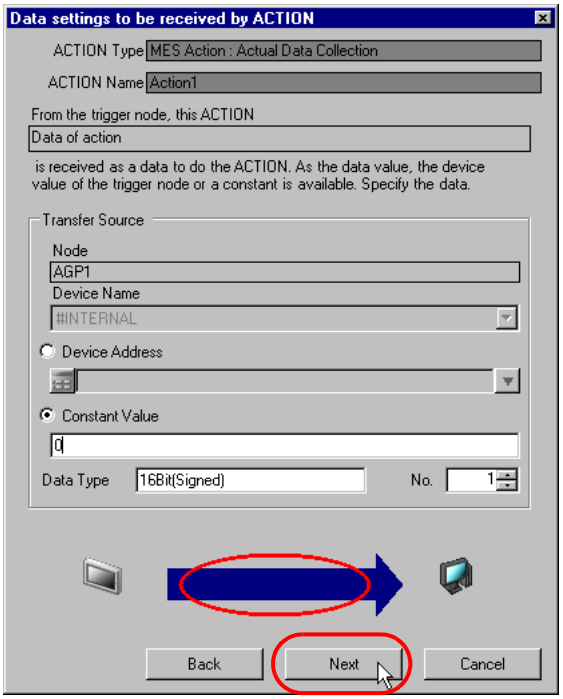
IMPORTANT

- For the Actual-Data-Collection ACTION trigger condition, specify a constant cycle of "one minute (60000ms)" or longer.

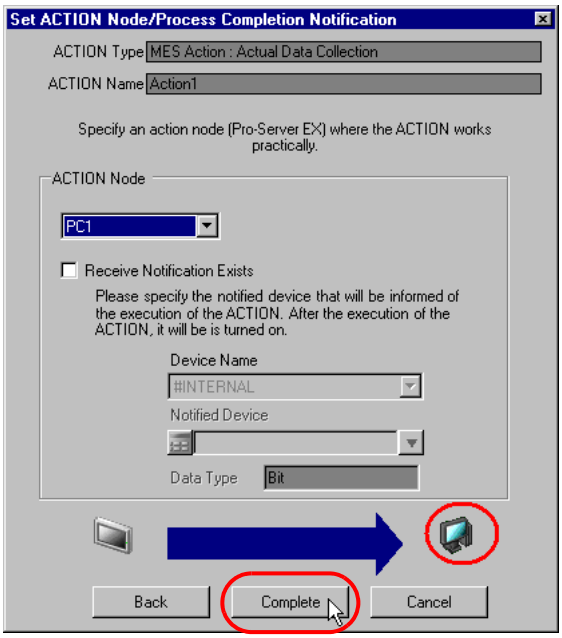
15 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.



16 Specify the data to be received by the ACTION, and click the [Next] button. For Actual-Data-Collection ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



17 Specify the ACTION operating node and whether to enable or disable receiving notice, and click the [Complete] button. Through the above procedure, Actual-Data-Collection ACTION is added.



3.3.9 Management of Collected Data

The tag values collected by Actual-Data-Collection ACTION are saved in the D_ActualData table. Actually, the table name is expressed with the ACTION ID of the Actual-Data-Collection ACTION ('Pro-Studio EX' internal information indicated by string) and the date, as shown below:

When the table is created daily : D_ActualData_ACTION ID_YYYYMMDD
When the table is created monthly : D_ActualData_ACTION ID_YYYYMM
When the table is created yearly : D_ActualData_ACTION ID_YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Data collection date/time.	
	(Tag 1)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	(Tag 1)_plan	(Depending on tag)	Plan value. In case of data collection failure, this value is NULL.	○
	(Tag 1)	real	Achievement ratio [%]. If either tag value or plan value is NULL, this value is NULL.	○
	:	:	:	
	(Tag n)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	(Tag n)_plan	(Depending on tag)	Plan value. In case of data collection failure, this value is NULL.	○
	(Tag n)_achieve	real	Achievement ratio [%]. If either tag value or plan value is NULL, this value is NULL.	○

The data type of (Tag 1) to (Tag n).plan and plan to (Tag n).plan depends on the data type of the symbol/device allocated to each tag, as shown below.

Symbol / Device Data Type	Data type of (Tag 1) to (Tag n)
16-bit (Signed), 32-bit (Unsigned), 16-bit(BCD), 16-bit (HEX), 32-bit (Signed), 32-bit (Unsigned), 32-bit(BCD), 32-bit (HEX)	real
Single-precision floating point	real
Double-precision floating point	float
Bit	real
String	Not applied to Actual Data Collection ACTION.

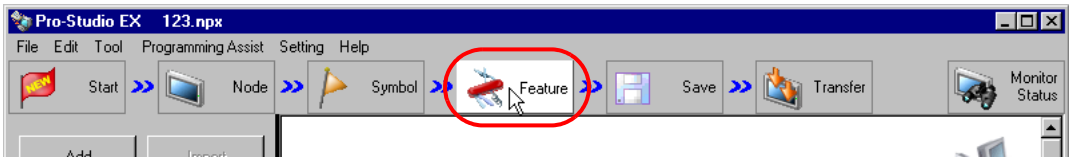
3.4 Collecting Alarm-History from SRAM

GP SRAM Alarm-History Collection ACTION collects alarm logs that have been stored in the display unit's SRAM at a specified cycle by node and block number, and saves the collected data into the database.
GP SRAM Alarm-History Collection ACTION can collect the alarm history storing blocks (Block 1 to Block 8) by specifying individual blocks (several blocks) or all blocks. GP SRAM Alarm-History Collection ACTION compares the alarm logs that have been stored in the SRAM with the previously collected ones to eliminate duplicated data, and saves the alarm logs into the database.

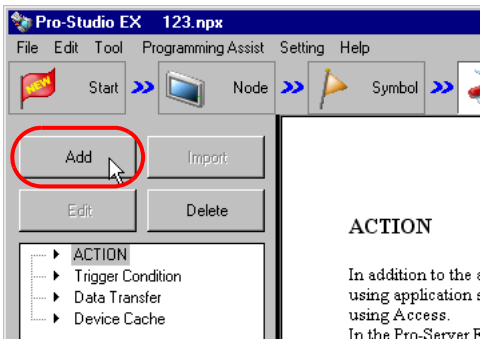
IMPORTANT
- Only the "Log" display mode of alarm history can collect.
- In the GP-Pro EX [Alarm Settings], disable [Multiple Line Message Output (Save Alarm to CSV)]. If enabled, you cannot write to the database.
- When using GP2000 Series, in GP-PRO/PB3's [System Settings], [Extended Settings], [Q-tag Settings], set [Q-tag Display Mode] to [Date + Time].

3.4.1 Registering GP SRAM Alarm-History Collection ACTION

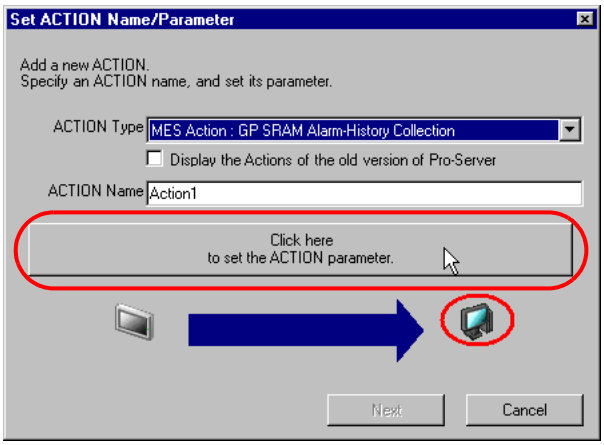
1 Click the [Feature] icon on the status bar.



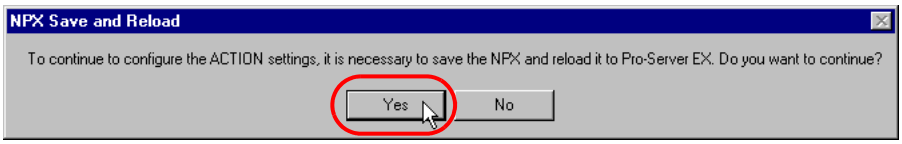
2 Select [ACTION] from the tree display on the left of the screen and click the [Add] button.



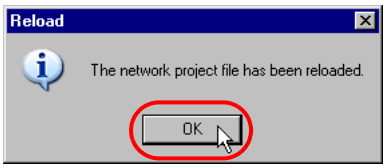
3 Click the [ACTION Type] list button and select "MES Action : GP SRAM Alarm-History Collection". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



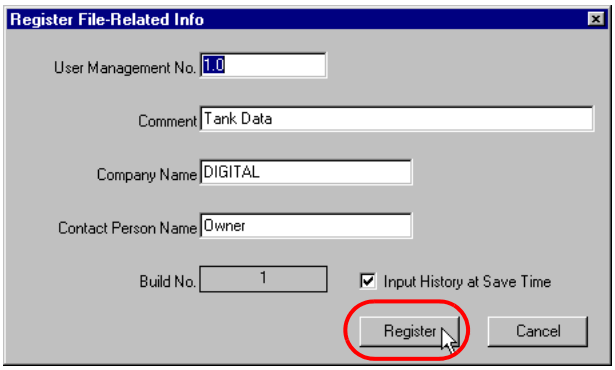
4 Click [Yes] on the "NPX Save and Reload" screen.



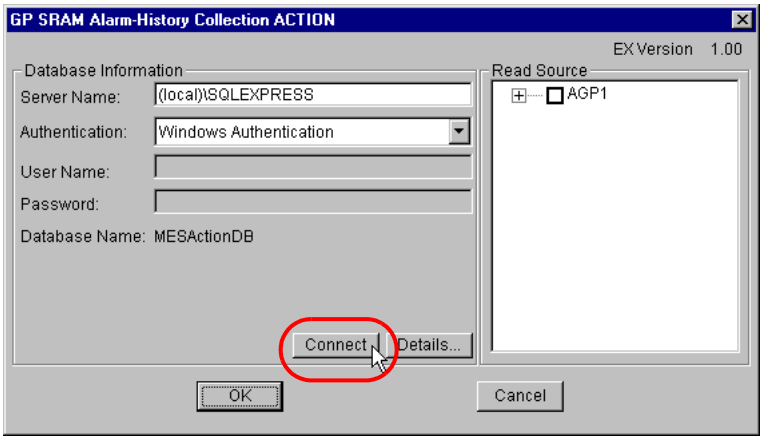
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

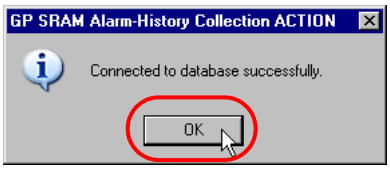


Information required for database connection is listed below.

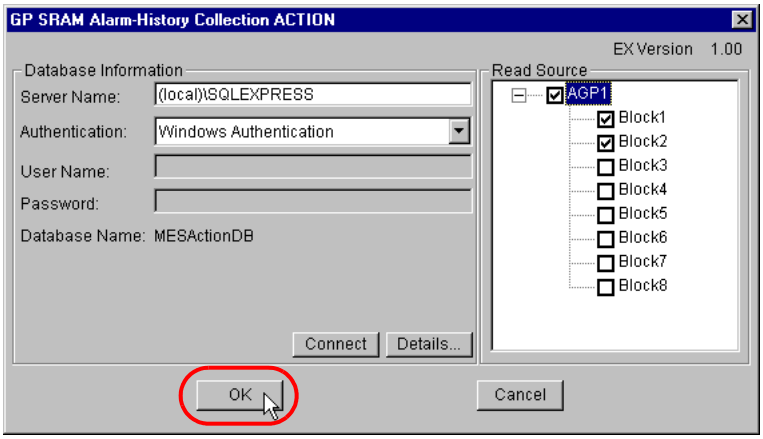
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

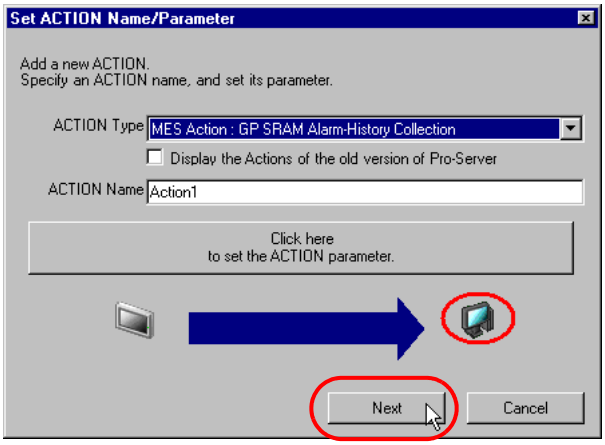
8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



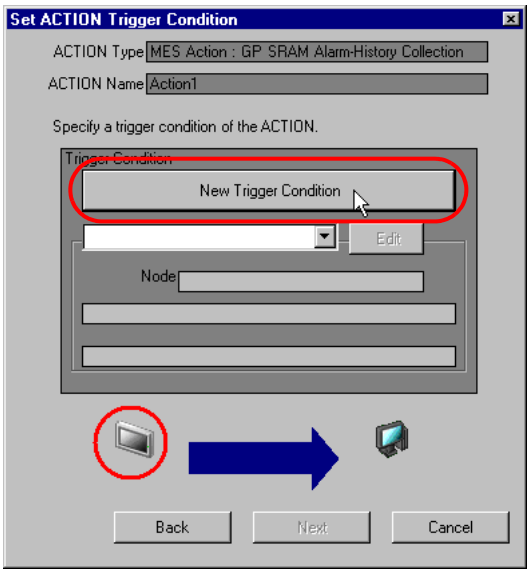
9 Check the read source node and block numbers, and click the [OK] button.



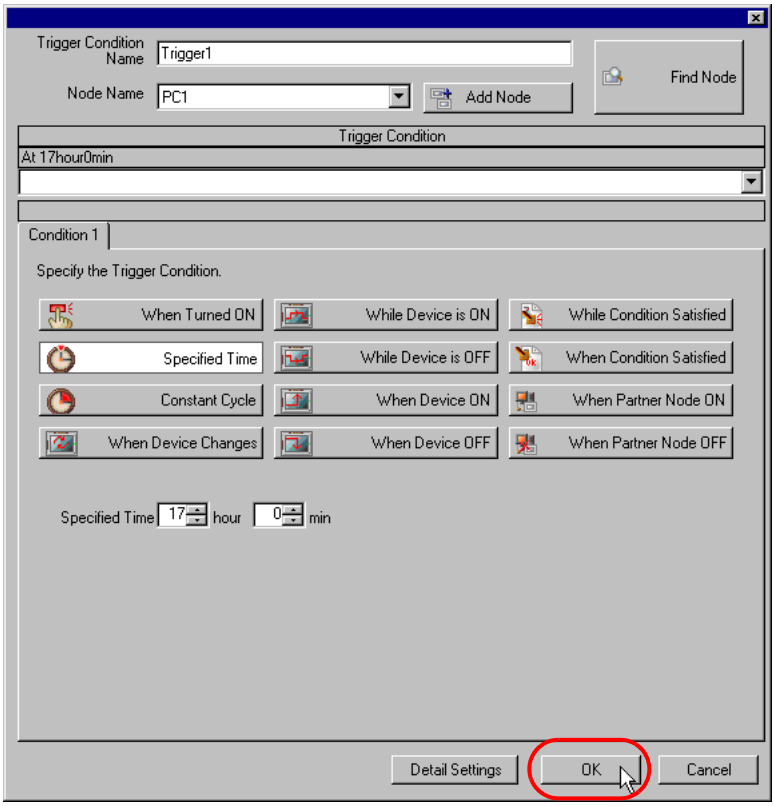
10 Then, specify the GP SRAM Alarm-History Collection ACTION trigger condition. Click the [Next] button on the "Set ACTION Name/Parameter" screen.



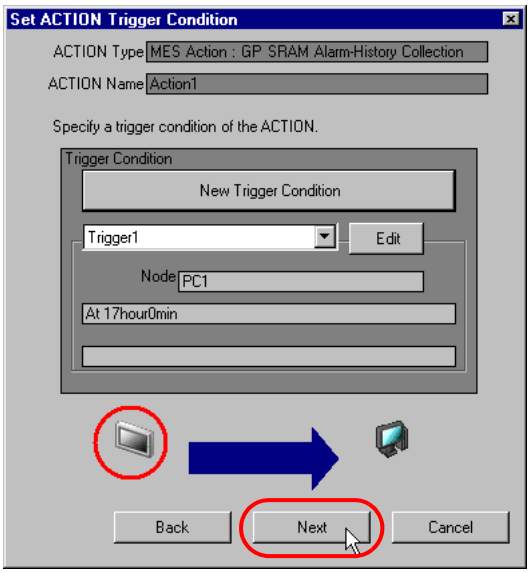
11 Click the [New Trigger Condition] button. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 13.



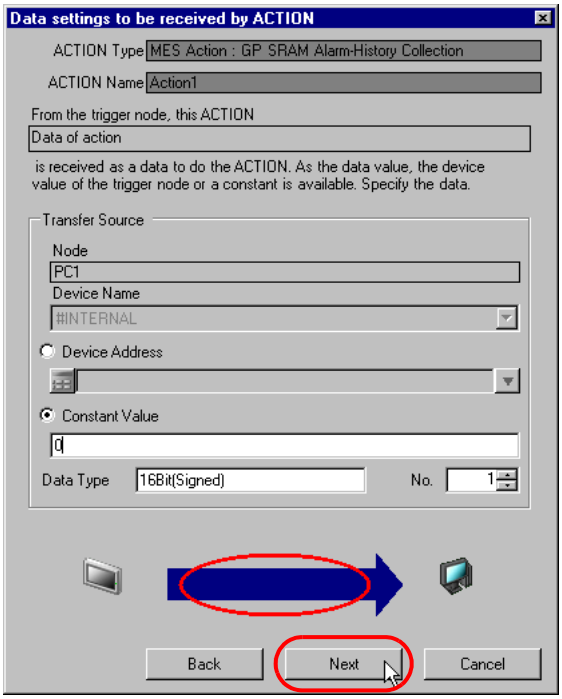
12 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



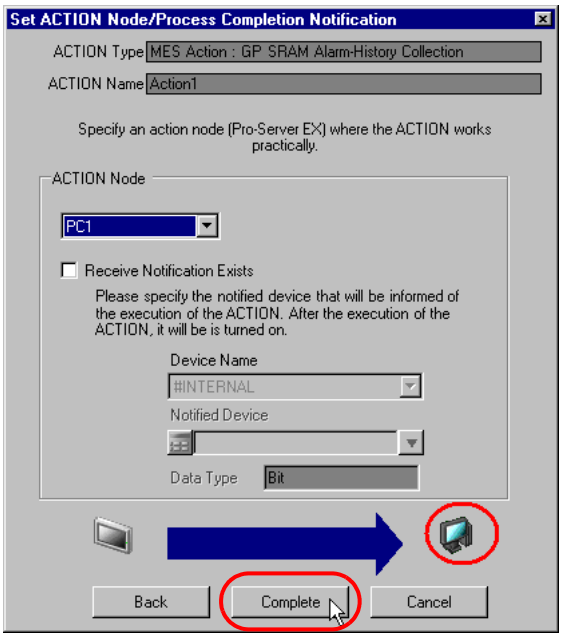
13 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.



14 Specify the data to be received by the ACTION, and click the [Next] button. For GP SRAM Alarm-History Collection ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



15 Specify the ACTION operating node and whether to enable or disable receiving notice, and click the [Complete] button. Through the above procedure, GP SRAM Alarm-History Collection ACTION is added.



3.4.2 Management of Collected Data

The data collected by GP SRAM Alarm-History Collection ACTION are saved in the D_SramAlarm table. Actually, the table name is expressed with the ACTION ID ('Pro-Studio EX' internal information indicated by string) and the date, as shown below:

Table Name: D_SramAlarm_ACTION ID

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	StationName	nvarchar(32)	Node Name	
	Block	int	Alarm block number.	
	Datetime	datetime	Date and time.	
	Kind	nvarchar(7)	One of Trigger, Acknowledge or Recovery is specified.	
	Message	nvarchar(160)	Message	
	Count	int	Number of occurrences. (A value at the time of first collection of the ACTION)	
	TotalTime	bigint	Total time. (Unit: second) (A value at the time of first collection of the ACTION)	
	Level	int	Level.	

3.5 Collecting Alarm-History-File from CF Card

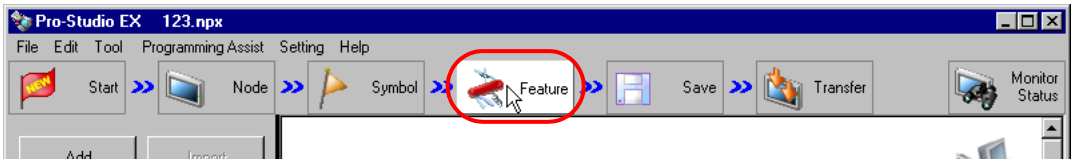
GP CF-card Alarm-History-File Collection ACTION collects alarm logs that have been stored in the display unit's CF card at a specified cycle by node and block number, and saves the collected data into the database. GP CF-card Alarm-History-File Collection ACTION can collect the alarm history storing blocks (Block 1 to Block 8) by specifying individual blocks (several blocks) or all blocks. GP CF-card Alarm-History-File Collection ACTION compares the alarm logs that have been stored in the CF card with the previously collected ones to eliminate duplicated data, and saves the alarm logs into the database.

IMPORTANT

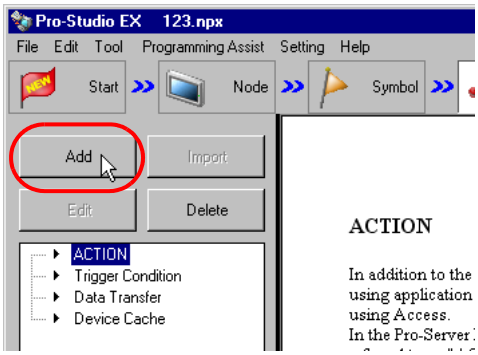
- Only the "Log" display mode of alarm history can collect.
- In the GP-Pro EX [Alarm Settings], disable [Multiple Line Message Output (Save Alarm to CSV)]. If enabled and a saved CSV file is read, an error will occur and you will not be able to write to the database.
- In the GP-Pro EX [Alarm Settings] - [CSV Settings], if you set [Date Format] to [mm/dd], an error is generated and the ACTION will not run.
- If the date format in the CSV file and the date format defined in the GP-Pro EX [Alarm Settings] - [CSV Settings] - [Date Format] field do not match, either an error is generated or the wrong date is stored in the database.
  Example: CSV file date format (mm/dd/yy): 02/03/12 (equals 2013/2/3)
  GP-Pro EX [Date Format]: yy/mm/dd
  Date data stored in database: 2002/03/12
- When using a version of GP-Pro EX before V3.12, or a version of Pro-Server EX before V1.32, in the GP-Pro EX [Alarm Settings] - [CSV Settings], set the [Date Format] to [yy/mm/dd]. If you select anything other than [yy/mm/dd], either an error is generated or the wrong date is stored in the database.
- When using a version of Pro-Server EX before V1.32, this feature is supported by GP Series nodes only. Update Pro-Server EX to V1.32 or later when using other than GP Series nodes.
- When using a version of GP-Pro EX before V3.12, do not use the [Set number of files in destination folder on external storage] option. You cannot get files stored in the [Alarm] sub-folders.

3.5.1 Registering GP CF-card Alarm-History-File Collection ACTION

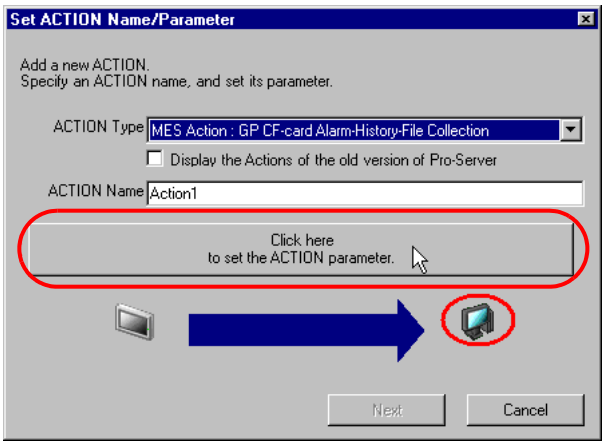
1 Click the [Feature] icon on the status bar.



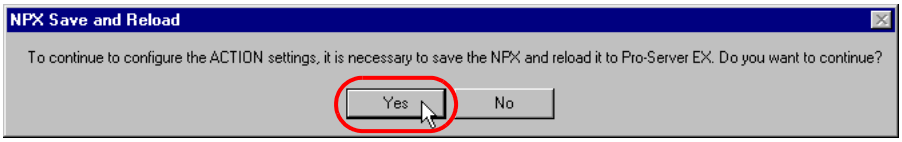
2 Select [ACTION] from the tree display on the left of the screen and click the [Add] button.



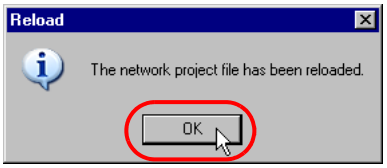
3 Click the [ACTION Type] list button and select "MES Action : GP CF-card Alarm-History-File Collection". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



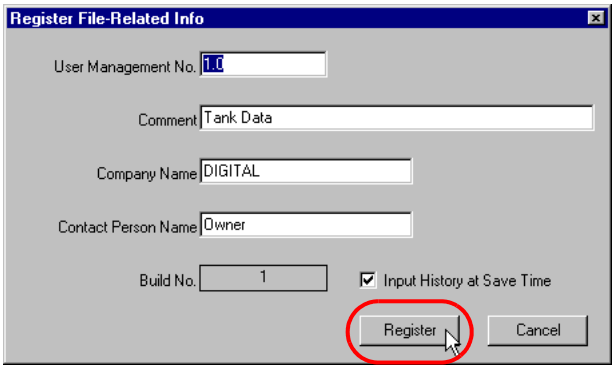
4 Click [Yes] on the "NPX Save and Reload" screen.



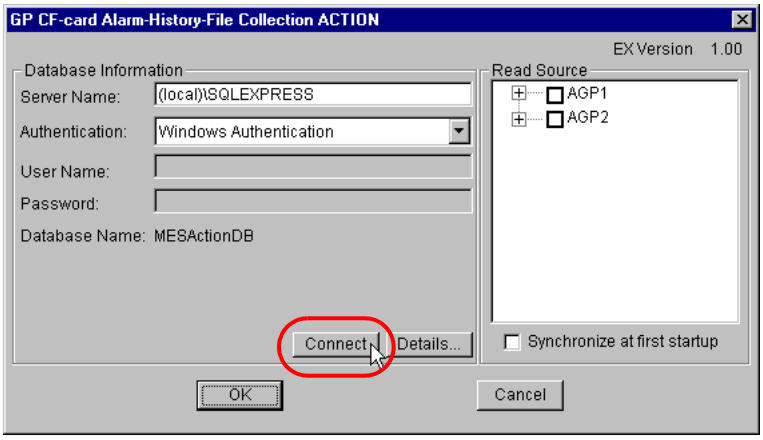
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

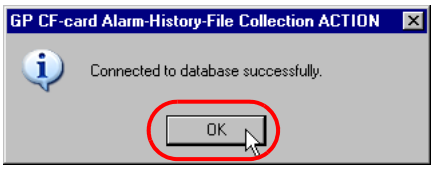


Information required for database connection is listed below.

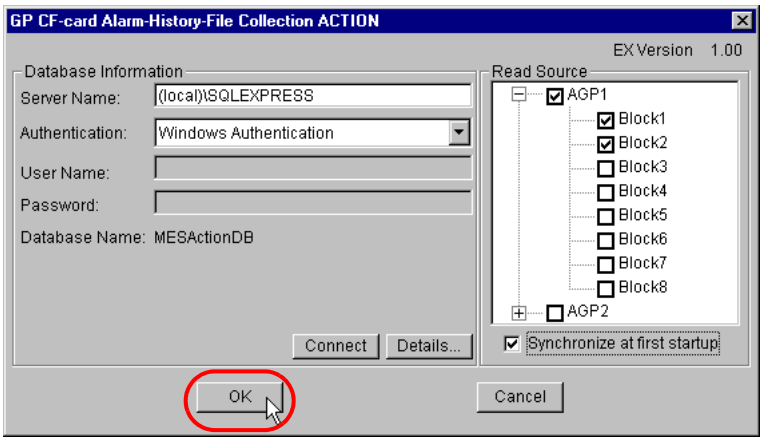
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



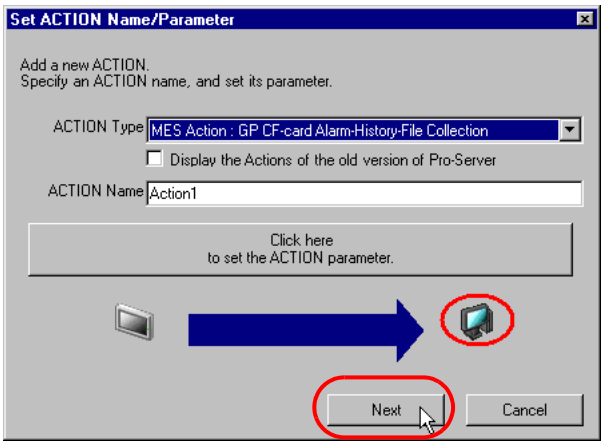
9 Check the read source node and block numbers, and click the [OK] button. To further store in the database the alarm history that has been stored in the CF card (whether while 'Pro-Server EX' is running or not) before the set ACTION is first activated, check "Synchronize at first startup" as well, and then click [OK].



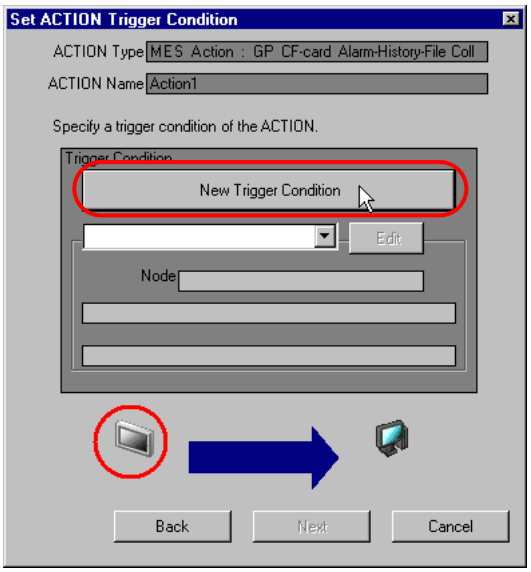
NOTE

- When "Synchronize at first startup" is checked, the system takes more time to communicate with the display unit, if many alarm history files have been stored in the CF file (whether while 'Pro-Server EX' is running or not) before the set ACTION is first activated.

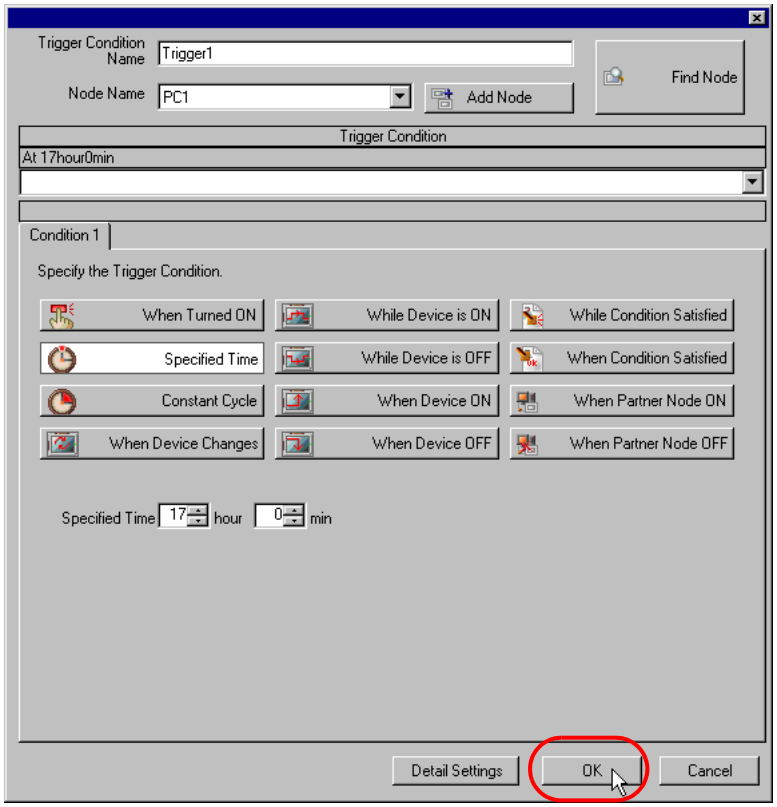
10 Then, specify the GP CF-card Alarm-History-File Collection ACTION trigger condition. Click the [Next] button on the "Set ACTION Name/Parameter" screen.



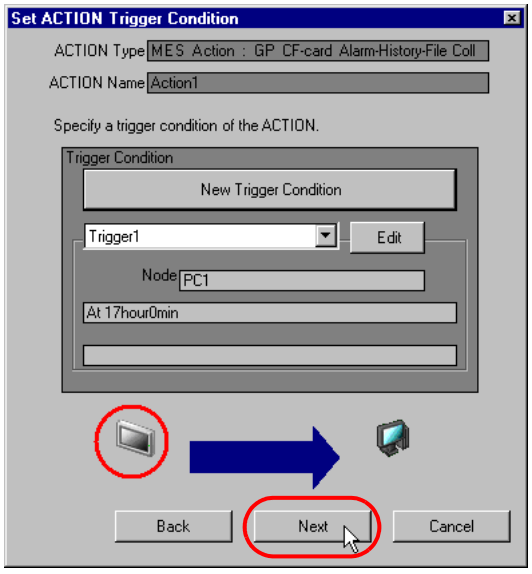
11 Click the [New Trigger Condition] button. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 13.



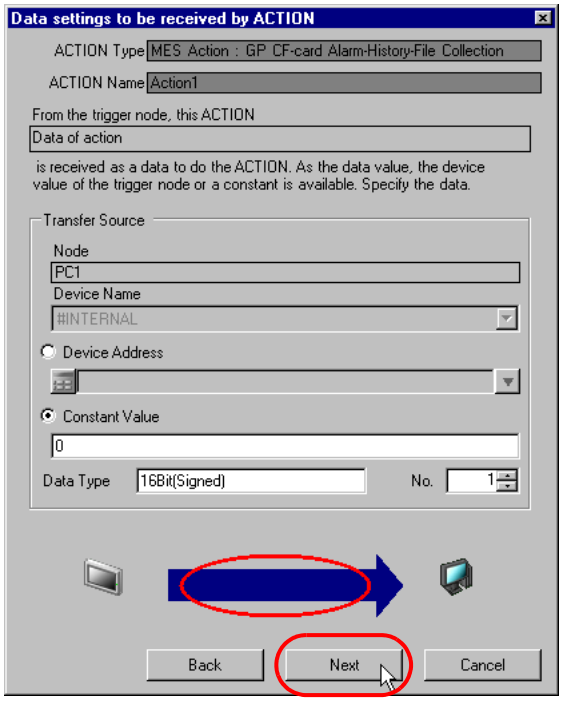
12 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



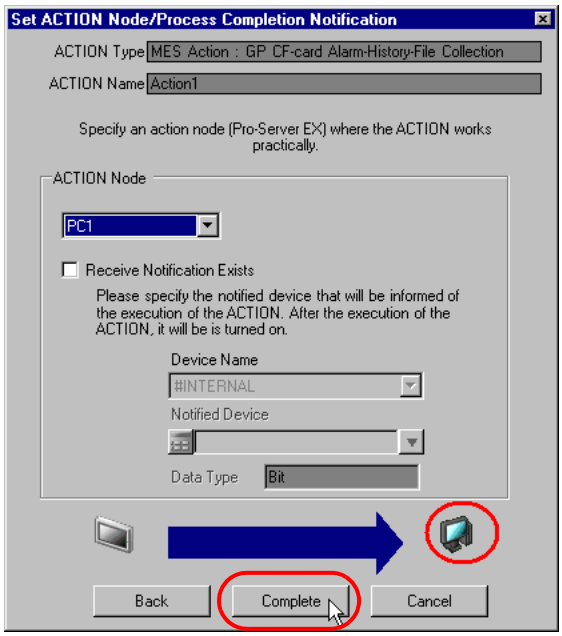
13 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.



14 Specify the data to be received by the ACTION, and click the [Next] button. For GP CF-card Alarm-History-File Collection ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



15 Specify the ACTION operating node and whether to enable or disable receiving notice, and click the [Complete] button. Through the above procedure, GP CF-card Alarm-History-File Collection ACTION is added.



3.5.2 Management of Collected Data

The data collected by GP CF-card Alarm-History-File Collection ACTION are saved in the D_CfAlarm table. Actually, the table name is expressed with the ACTION ID ('Pro-Studio EX' internal information indicated by string) and the date, as shown below:

Table Name: D_CfAlarm_ACTION ID

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	StationName	nvarchar(32)	Node Name	
	Block	int	Alarm block number.	
	Datetime	datetime	Date and time.	
	Kind	nvarchar(7)	Japanese environment : Occurrences English environment : Triger	
	Message	nvarchar(160)	Message	
	Count	int	Number of occurrences. (A value at the time of first collection of the ACTION)	
	TotalTime	bigint	Total time. (Unit: second) (A value at the time of first collection of the ACTION)	
	Level	int	Level	

3.6 Collecting Sampling-Data from SRAM

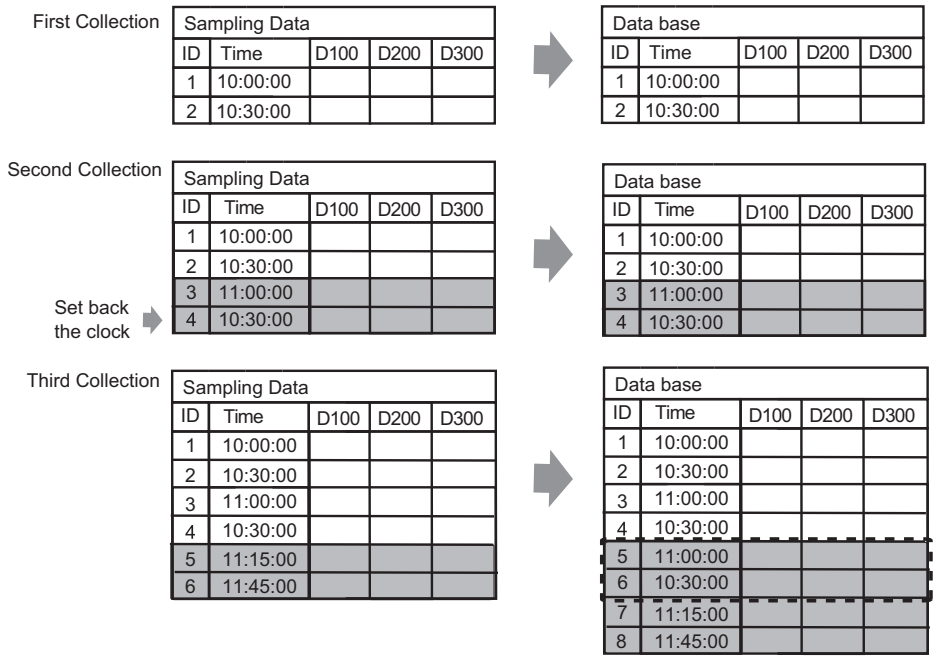
GP SRAM Sampling-Data Collection ACTION collects sampling data that have been stored in the display unit's SRAM at a specified cycle by node and group number, and saves the collected data into the database (Since sampling data are subjected to group management, the collection target is a group).
GP SRAM Sampling-Data Collection ACTION can collect the sampling data group (Block 1 to Block 64) by specifying individual groups (several groups) or all groups.

IMPORTANT

- In GP-Pro EX's [Sampling] settings, from the [Address] tab if you define a symbol as the address, in the [Display/Save in CSV] tab you select the [Display/Save in CSV] check box, and you select the [Custom Settings] option, make sure you do not duplicate item names.
- MES Actions record time in 1 second units. You will not see sampling data at less than one second intervals, even if SRAM stores sampling data at less than one second.

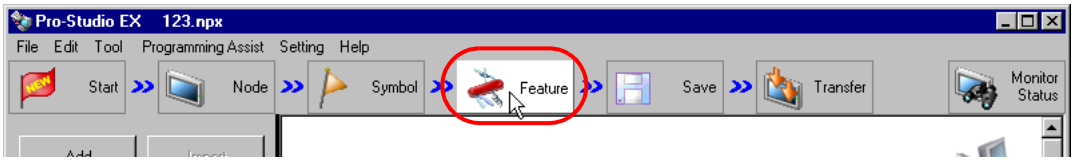
NOTE

- The database collects sampling data from the time of the last previously collected record.
  As a result, if you set the clock back for daylight savings or some other reason, you may collect duplicate data.
  For example, data in the third collection is the sampling data in the second collection's last recorded time (10:45).
  As a result, data ID3 and ID4 already recorded in the second collection becomes duplicated as ID5 and ID6 (encircled with dotted lines).

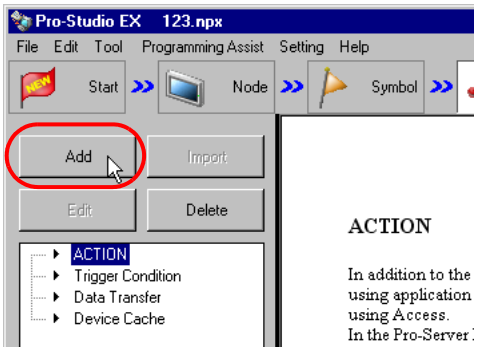


3.6.1 Registering GP SRAM Sampling-Data Collection ACTION

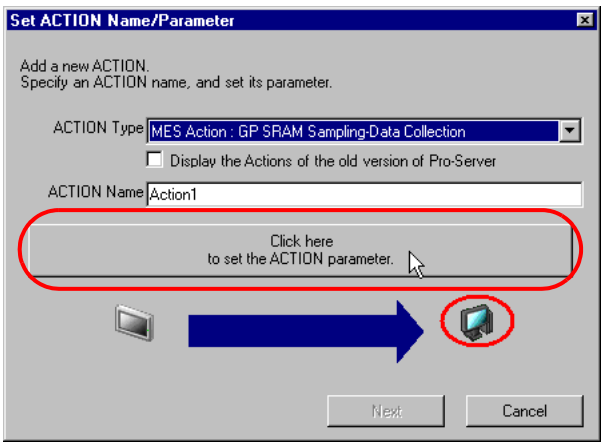
1 Click the [Feature] icon on the status bar.



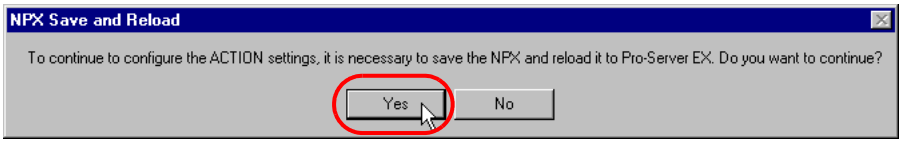
2 Select [ACTION] from the tree display on the left of the screen and click the [Add] button.



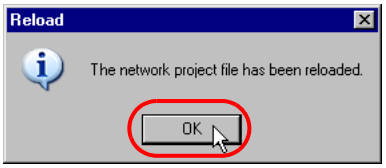
3 Click the [ACTION Type] list button and select "MES Action : GP SRAM Sampling-Data Collection". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



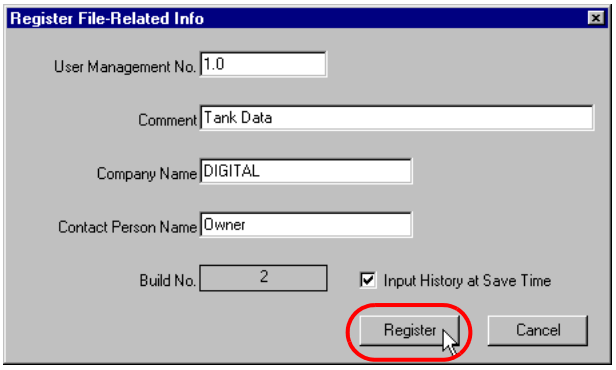
4 Click [Yes] on the "NPX Save and Reload" screen.



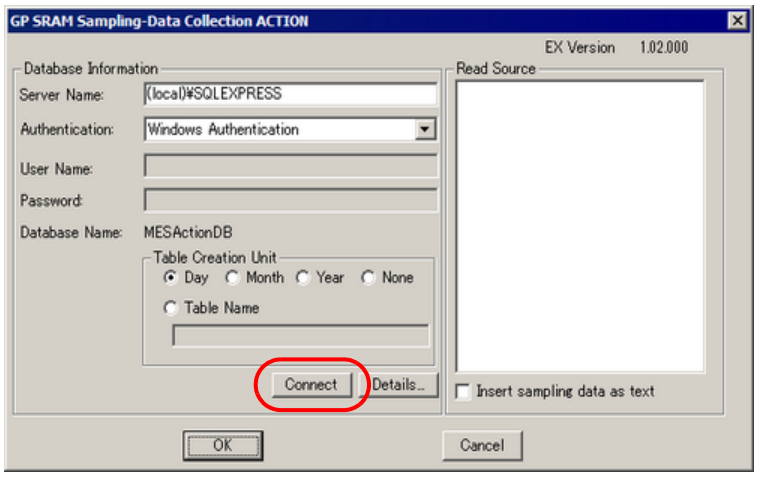
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

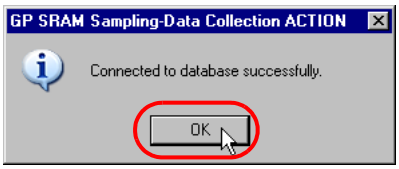


Information required for database connection is listed below.

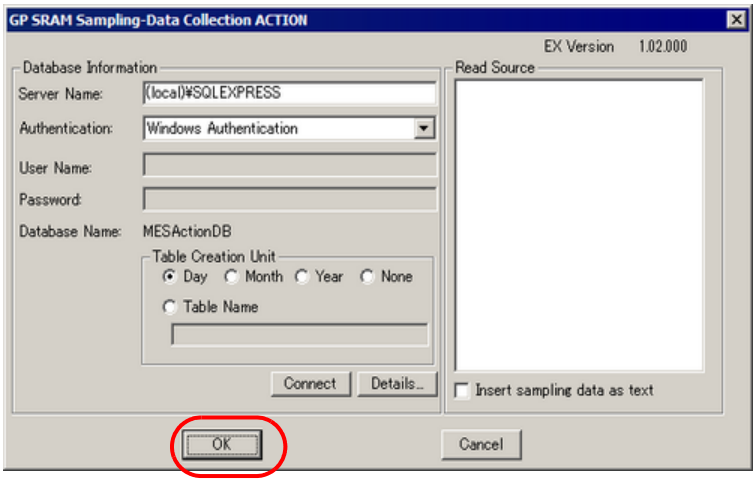
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.
	Table Creation Unit	Specify the unit (Day/Month/Year/None/Table name specification) in which the database table will be saved.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



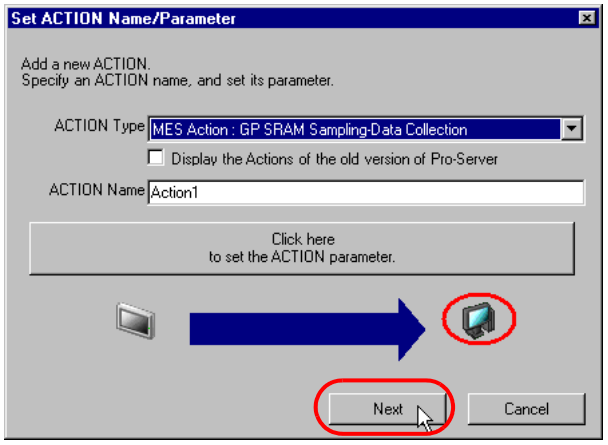
9 Check the read source node and group numbers, and click [OK].



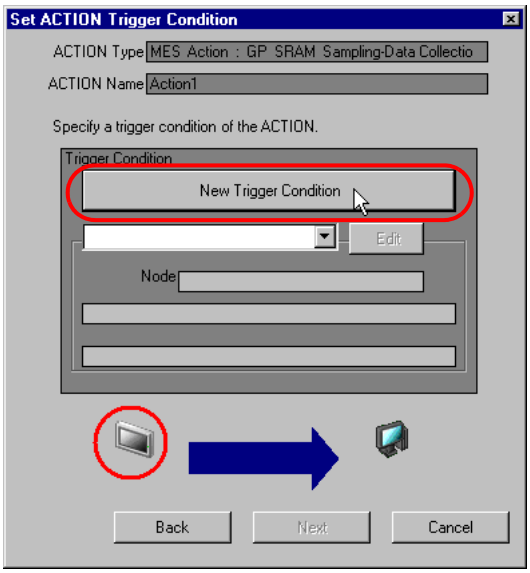
NOTE

- To save to the database all the sampling data in text format, select the [Insert sampling data as text] check box.

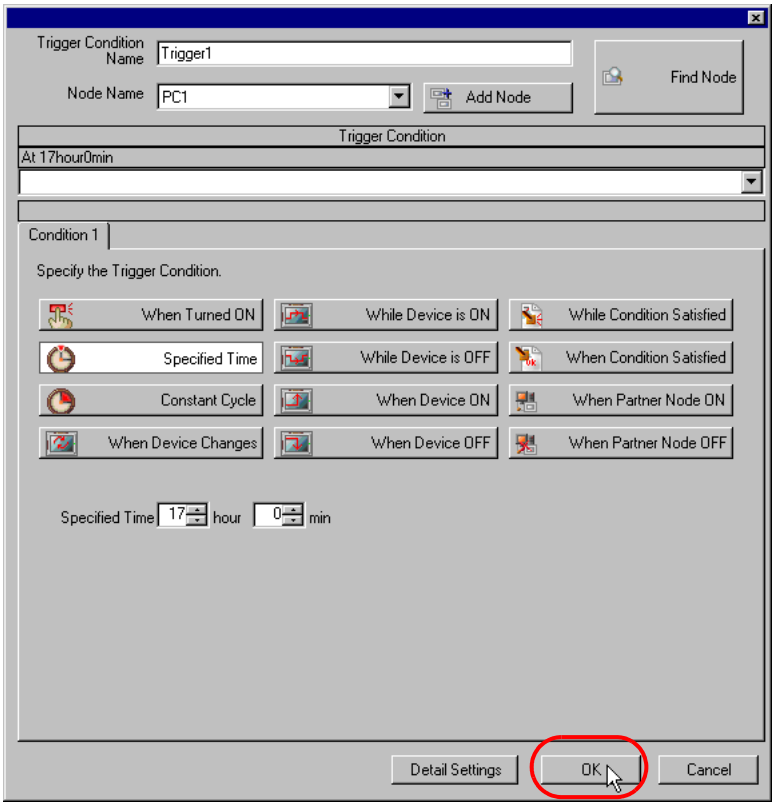
10 Then, specify the GP SRAM Sampling-Data Collection ACTION trigger condition. Click [Next] on the "Set ACTION Name/Parameter" screen.



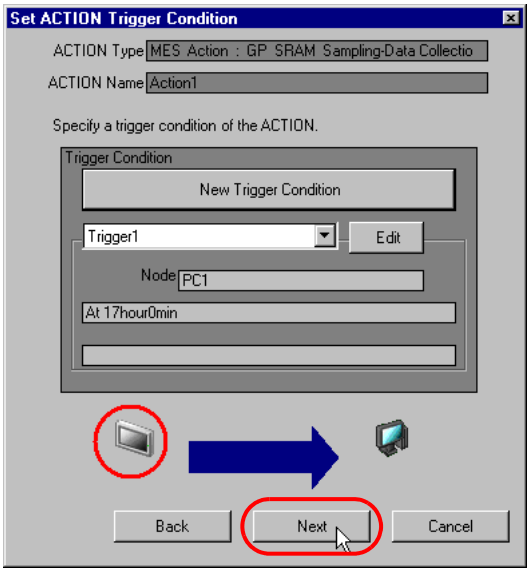
11 Click [New Trigger Condition]. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 13.



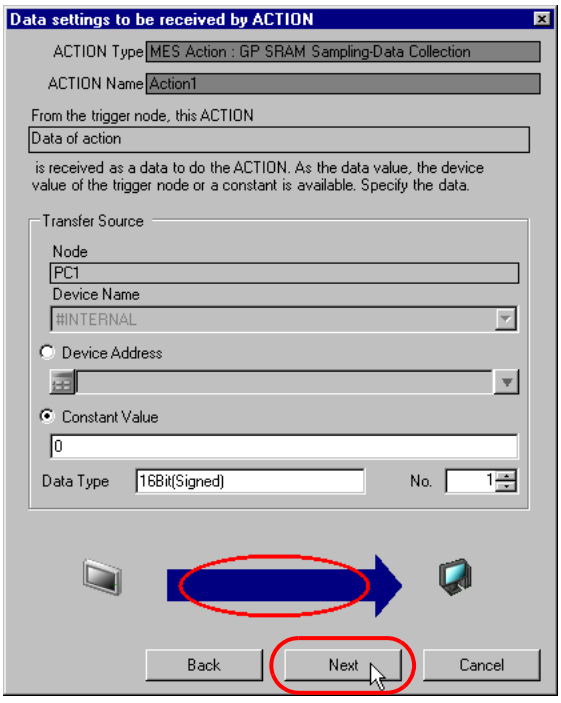
12 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



13 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.

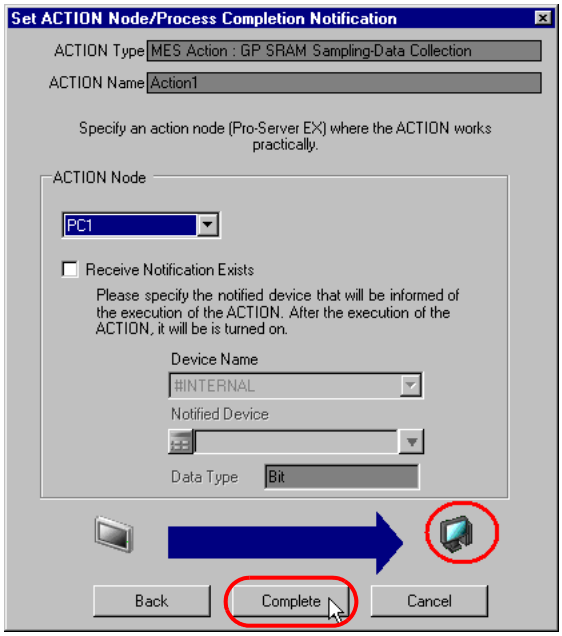


14 Specify the data to be received by the ACTION, and click [Next]. For GP SRAM Sampling-Data Collection ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



15 Specify the ACTION operating node and whether to enable or disable receiving notice, and click [Complete].

Through the above procedure, GP SRAM Sampling-Data Collection ACTION is added.



3.6.2 Management of Collected Data

The data collected by GP SRAM Sampling-Data Collection ACTION are saved in the D_SramSamp table.
All the sampling data in the table is defined by the values in the first record.

Values that can be expressed using floating point: real

Values that cannot be expressed using floating point: nvachar (variable length UNICODE text)

Even if the format of sampling data is set up as text, if all the values in the first record are numeric, all the sampling data will be saved in the database as real values.

The table name is expressed with the ACTION ID ('Pro-Studio EX' internal information indicated by string), display unit's node name, group number and table creation unit, as shown below:

When the table is created daily : D_SramSamp_ACTION ID_node name_Group number_YYYYMMDD

When the table is created monthly : D_SramSamp_ACTION ID_node name_Group number_YYYYMM

When the table is created yearly : D_SramSamp_ACTION ID_node name_Group number_YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Date and time.	
	(Item name 1)	real/ nvachar(128)	Sampling data.	○
	(Item name 2)	real/ nvachar(128)	Sampling data.	○
	:			○
	(Item name n)	real/ nvachar(128)	Sampling data.	○

3.7 Collecting Sampling-Data-File from CF Card

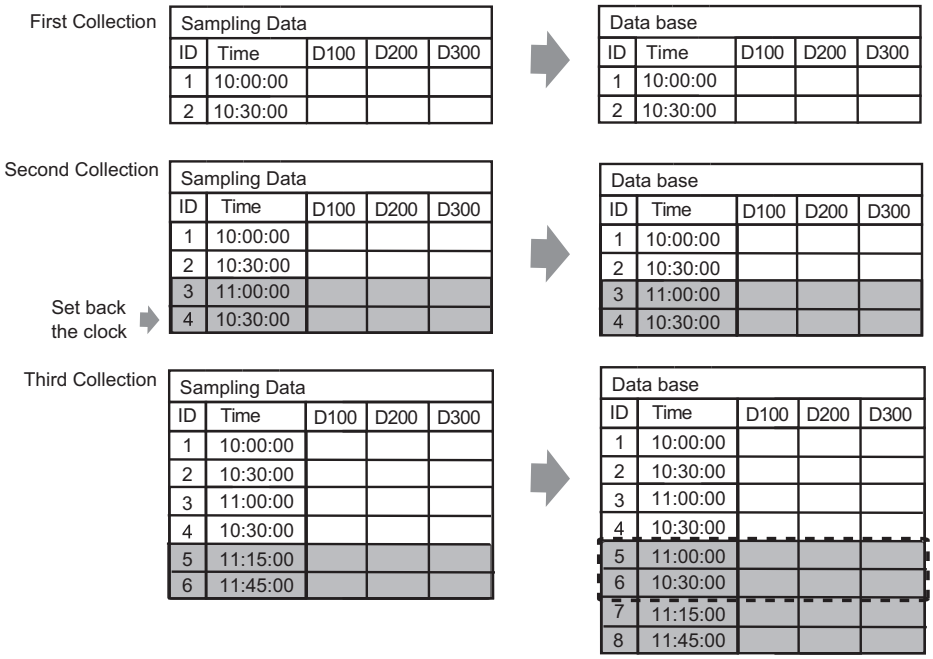
GP CF-card Sampling-Data-File Collection ACTION collects sampling data that have been stored in the display unit's CF card at a specified cycle by node and group number, and saves the collected data into the database (Since sampling data are subjected to group management, the collection target is a group).
GP CF-card Sampling-Data-File Collection ACTION can collect the sampling data group (Block 1 to Block 64) by specifying individual groups (several groups) or all groups. GP CF-card Sampling-Data-File Collection ACTION reads sampling data that have been stored in the CF card in the CSV format, and saves the data into the database.

IMPORTANT

- MES Actions record time in 1 second units. You will not see sampling data at less than one second intervals, even if SRAM stores sampling data at less than one second.
- In the GP-Pro EX [Sampling Settings] from the [Display/Save in CSV] tab, if you set [CSV Date Format] to [mm/dd], an error is generated and the action will not run.
- If the date format in the CSV file and the date format defined in the GP-Pro EX [Sampling Settings] from the [Display/Save in CSV] tab, set the [CSV Date Format] field do not match, either an error is generated or the wrong date is stored in the database.
  Example: CSV file date format (mm/dd/yy): 02/03/12 (equals 2013/2/3)
  GP-Pro EX [Date Format]: yy/mm/dd
  Date data stored in database: 2002/03/12
- When using a version of GP-Pro EX before V3.12, or a version of Pro-Server EX before V1.32, in the GP-Pro EX [Sampling Settings] from the [Display/Save in CSV] tab, set the [CSV Date Format] to [yy/mm/dd]. If you select anything other than [yy/mm/dd], either the wrong date is stored in the database or the date is skipped and the next set of data is generated and stored.
- When using a version of Pro-Server EX before V1.32, this feature is supported by GP Series nodes only. Update Pro-Server EX to V1.32 or later when using other than GP Series nodes.
- When using a version of GP-Pro EX before V3.12, do not use the [Set number of files in destination folder on external storage] option. You cannot get files stored in the [SAMP**] sub-folders.

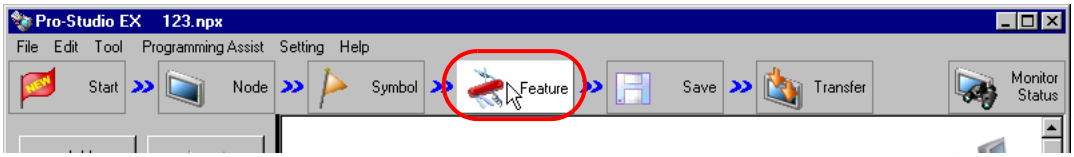
NOTE

- The database collects sampling data from the time of the last previously collected record.
  As a result, if you set the clock back for daylight savings or some other reason, you may collect duplicate data.
  For example, data in the third collection is the sampling data in the second collection's last recorded time (10:45).
  As a result, data ID3 and ID4 already recorded in the second collection becomes duplicated as ID5 and ID6 (encircled with dotted lines).

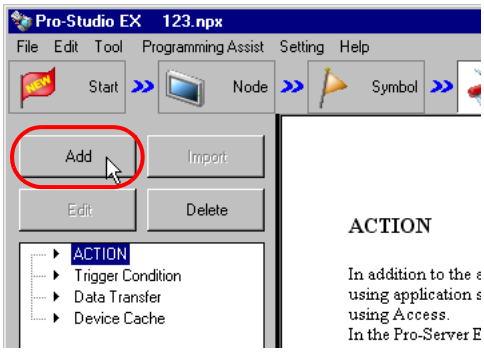


3.7.1 Registering GP CF-card Sampling-Data-File Collection ACTION

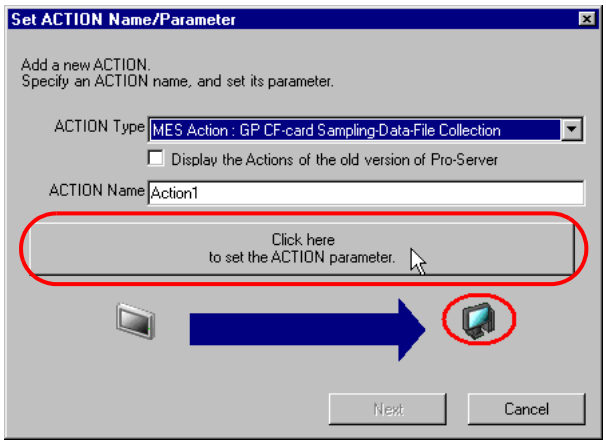
1 Click the [Feature] icon on the status bar.



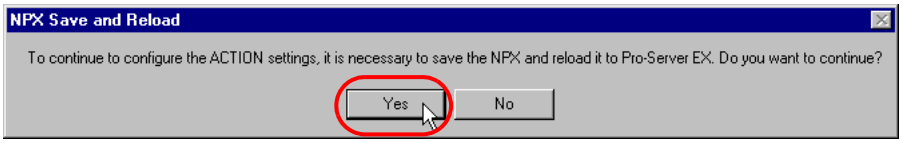
2 Select [ACTION] from the tree display on the left of the screen and click the [Add] button.



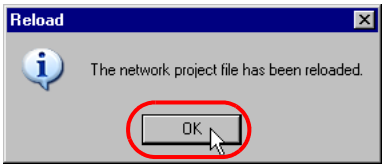
3 Click the [ACTION Type] list button and select "MES Action : GP CF-card Sampling-Data-File Collection". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



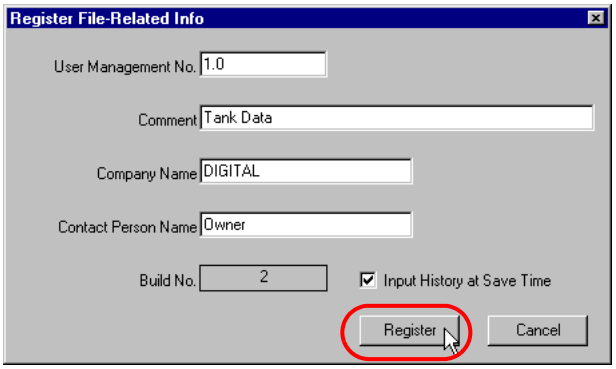
4 Click [Yes] on the "NPX Save and Reload" screen.



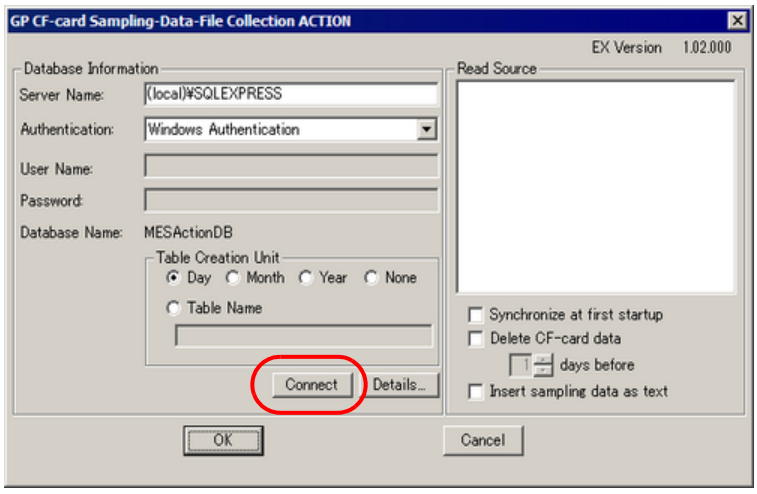
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

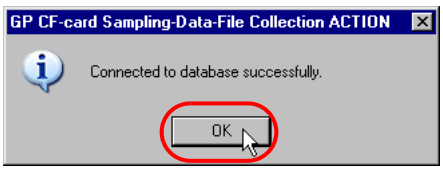


Information required for database connection is listed below.

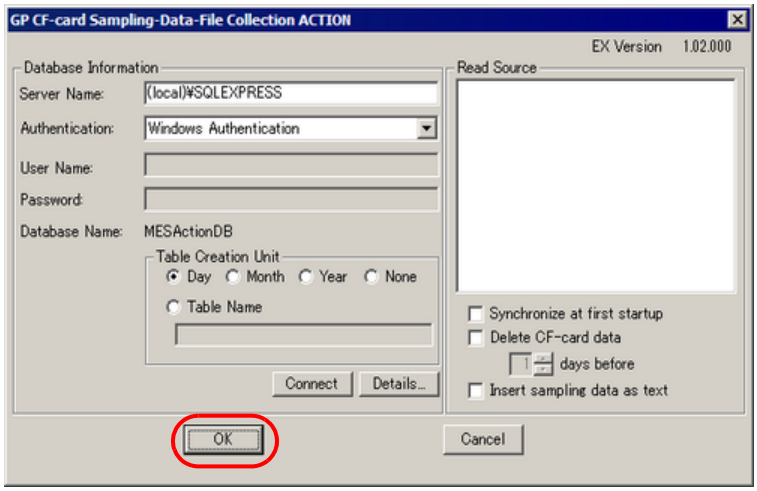
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.
	Table Creation Unit	Specify the unit (Day/Month/Year/None/Table name specification) in which the database table will be saved.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



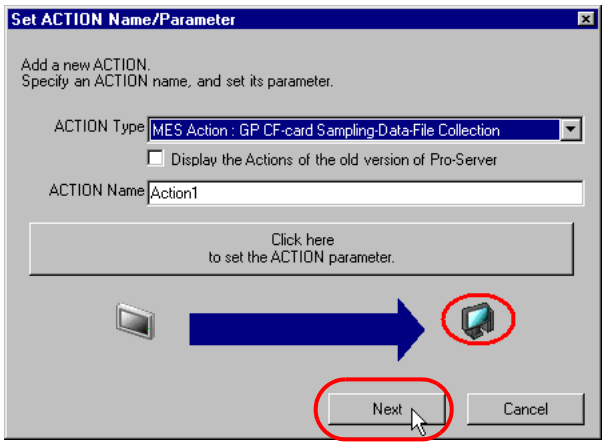
9 Check the read source node and block numbers, and click the [OK] button. To further store in the database the alarm history that has been stored in the CF card (whether while 'Pro-Server EX' is running or not) before the set ACTION is first activated, check "Synchronize at first startup" as well, and then click [OK].



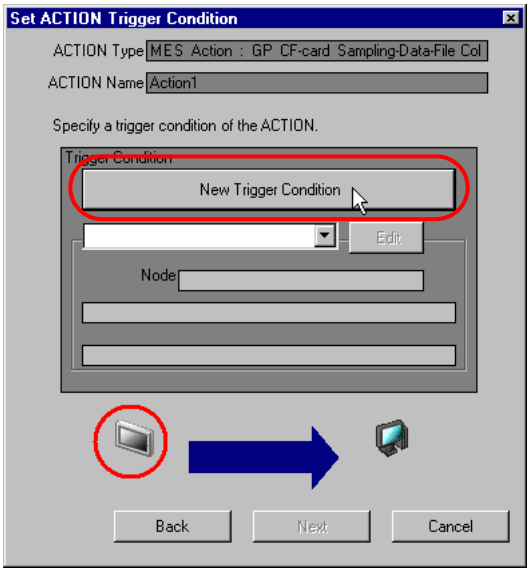
NOTE

- When "Synchronize at first startup" is checked, the system takes more time to communicate with the display unit, if many alarm history files have been stored in the CF file (whether while 'Pro-Server EX' is running or not) before the set ACTION is first activated.
- To delete old sampling data files stored in the CF card automatically, check "Delete CF-card data", and specify a number of days to delete files older than the storing period.
- Files are deleted when the action is run. After saving the sampling data file, files that exceed the defined number of days are deleted. When the sampling data file fails to save, files are not deleted.
- To save to the database all the sampling data in text format, select the [Insert sampling data as text] check box.

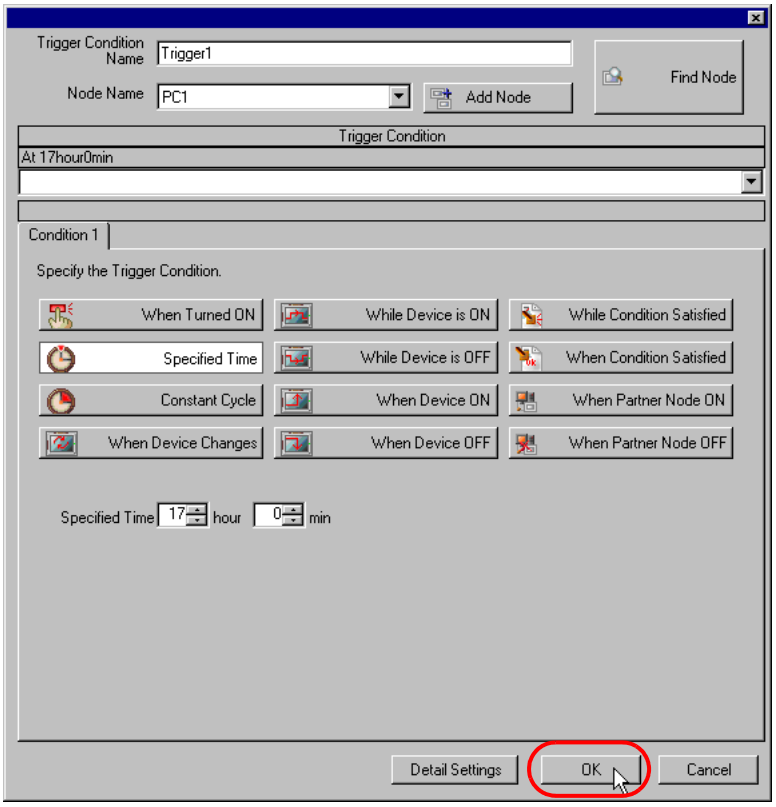
10 Then, specify the GP CF-card Sampling-Data-File Collection ACTION trigger condition. Click the [Next] button on the "Set ACTION Name/Parameter" screen.



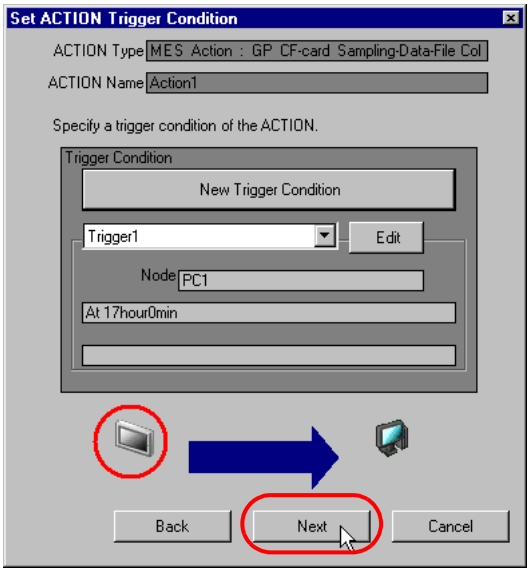
11 Click the [New Trigger Condition] button. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 13.



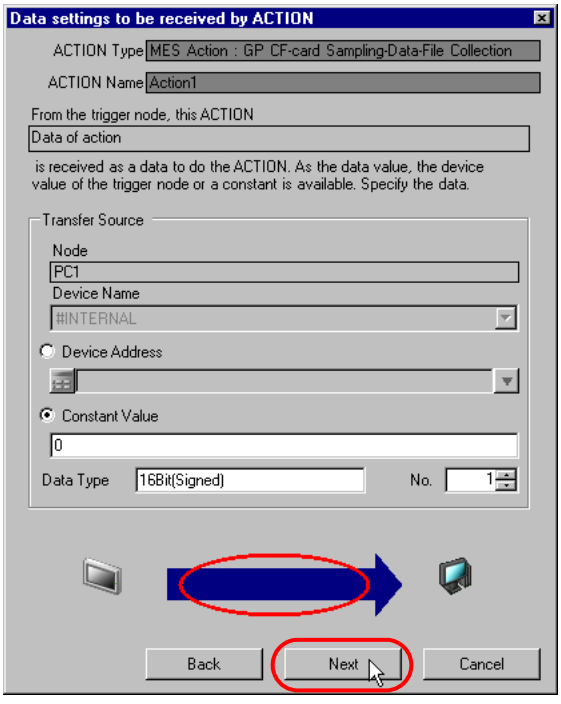
12 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



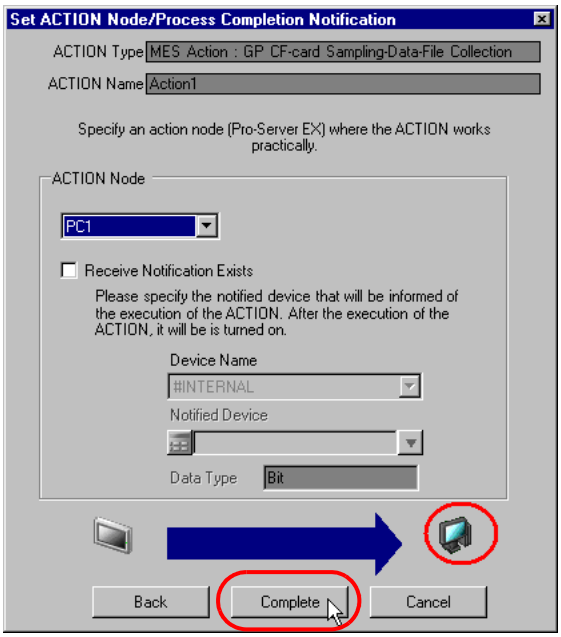
13 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.



14 Specify the data to be received by the ACTION, and click the [Next] button. For GP CF-card Sampling-Data-File Collection ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



15 Specify the ACTION operating node and whether to enable or disable receiving notice, and click the [Complete] button. Through the above procedure, GP CF-card Sampling-Data-File Collection ACTION is added.



3.7.2 Management of Collected Data

The data collected by GP CF-card Sampling-Data-File Collection ACTION are saved in the D_CfSamp table. All the sampling data in the table is defined by the values in the first record.

Values that can be expressed using floating point: real

Values that cannot be expressed using floating point: nvachar (variable length UNICODE text)

Even if the format of sampling data is set up as text, if all the values in the first record are numeric, all the sampling data will be saved in the database as real values.

The table name is expressed with the ACTION ID ('Pro-Studio EX' internal information indicated by string), display unit's node name, group number and table creation unit, as shown below:

When the table is created daily : D_CfSamp_ACTION ID_node name_Group number_YYYYMMDD

When the table is created monthly : D_CfSamp_ACTION ID_node name_Group number_YYYYMM

When the table is created yearly : D_CfSamp_ACTION ID_node name_Group number_YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Date and time.	
	(Item name 1)	real/ nvachar(128)	Sampling data.	○
	(Item name 2)	real/ nvachar(128)	Sampling data.	○
	:			○
	(Item name n)	real/ nvachar(128)	Sampling data.	○

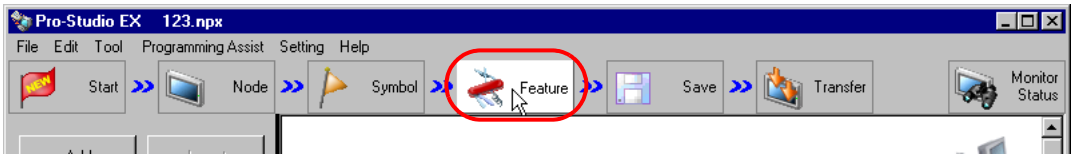
3.8 Collecting Captured Data from CF Card

GP CF-card Screen-File Collection ACTION collects captured data (image files in the JPEG format) that have been stored in the display unit's CF card at a specified start condition or cycle, and saves the JPEG image files into the database.

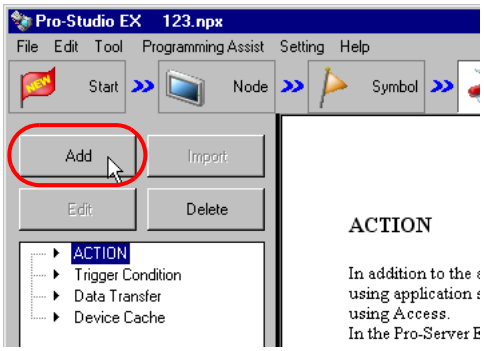
For GP CF-card Screen-File Collection ACTION, you can specify whether to save captured data in a local PC hard disk or in the database. If you select a local PC hard disk as the storage media, only file names are saved in the database.

3.8.1 Registering GP CF-card Screen-File Collection ACTION

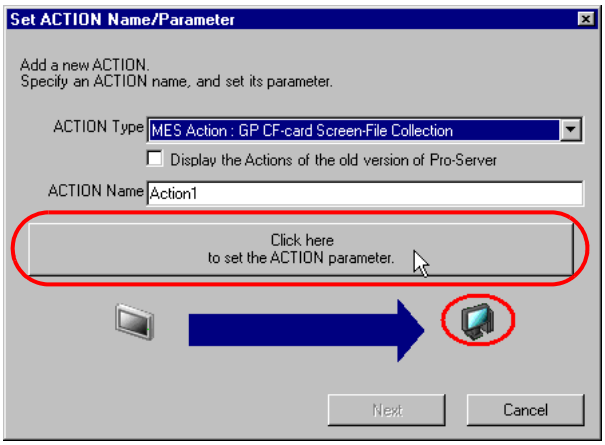
1 Click the [Feature] icon on the status bar.



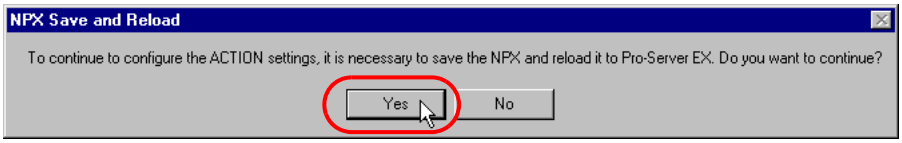
2 Select [ACTION] from the tree display on the left of the screen and click the [Add] button.



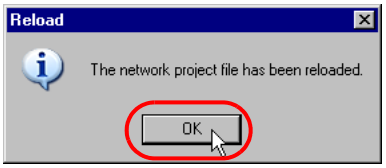
3 Click the [ACTION Type] list button and select "MES Action : GP CF-card Screen-File Collection". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



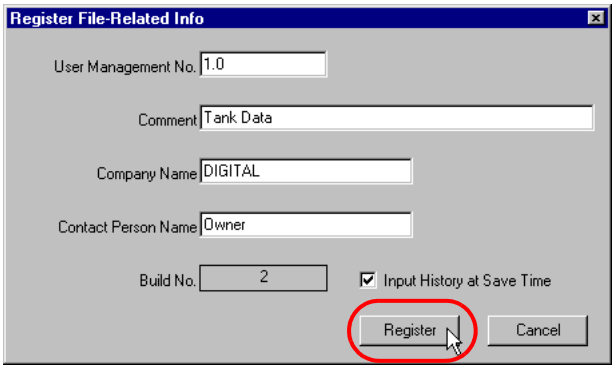
4 Click [Yes] on the "NPX Save and Reload" screen.



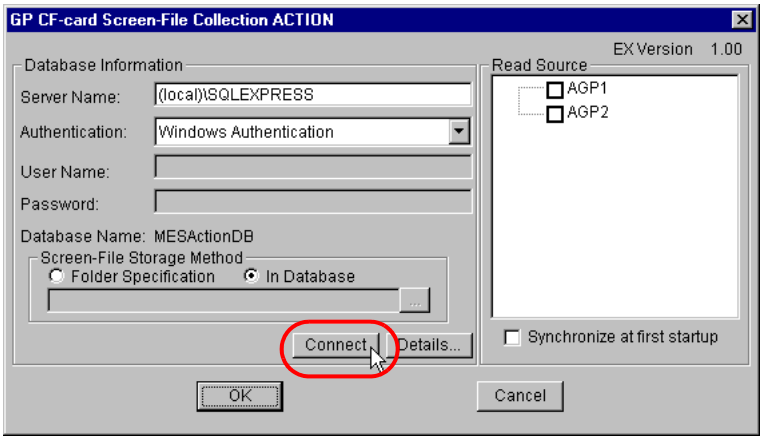
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

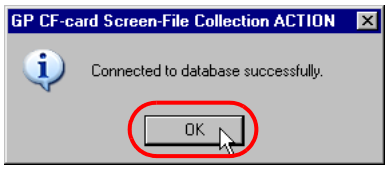


Information required for database connection is listed below.

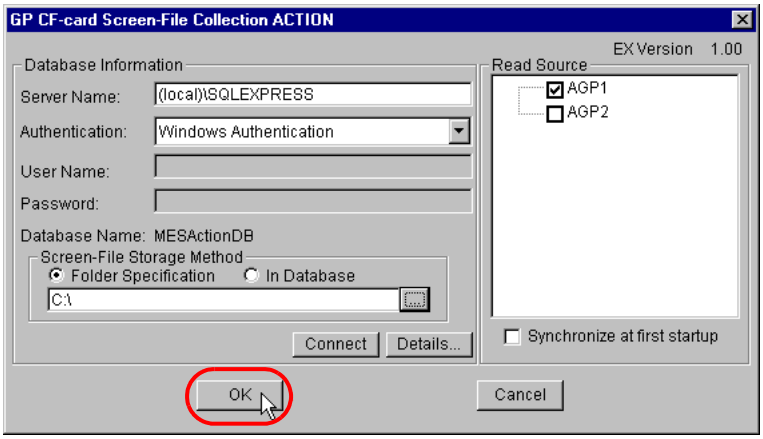
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.
	Screen-File Storage Method	Folder Specifications: Stores only the file name of the captured data in the database, and stores the captured data itself in the PC. If you select [Folder Specification], specify a destination folder for storing the captured data. In Database: Stores the captured data and its file name in the database.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



9 Check the read source node and click [OK]. To further store in the database the captured data that has been stored in the CF card (whether while 'Pro-Server EX' is running or not) before the set ACTION is first activated, check "Synchronize at first startup" as well, and then click [OK].

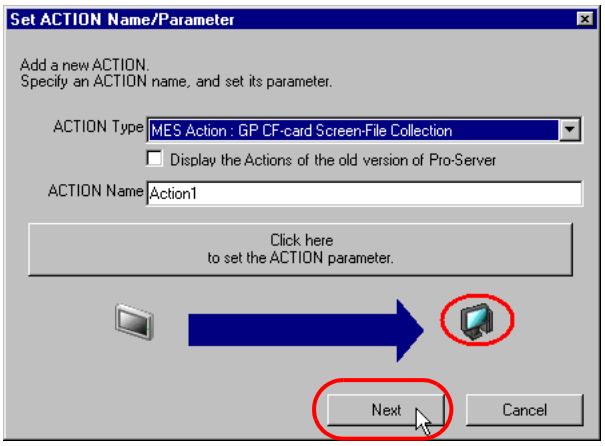


NOTE

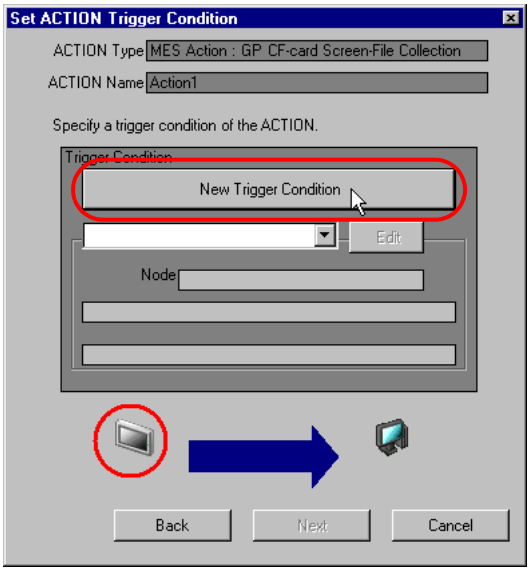
- When "Synchronize at first startup" is checked, the system takes more time to communicate with the display unit, if many captured data have been stored in the CF file (whether while 'Pro-Server EX' is running or not) before the set ACTION is first activated.

Setup Item	Selectable method	Description
Screen-File Storage Method	Folder Specification	To save a captured data read from the CF card, a folder in a local PC is specified. The database saves only the file pathname.
	In Database	Contents of a captured data read from the CF card are saved in the database as binary data.

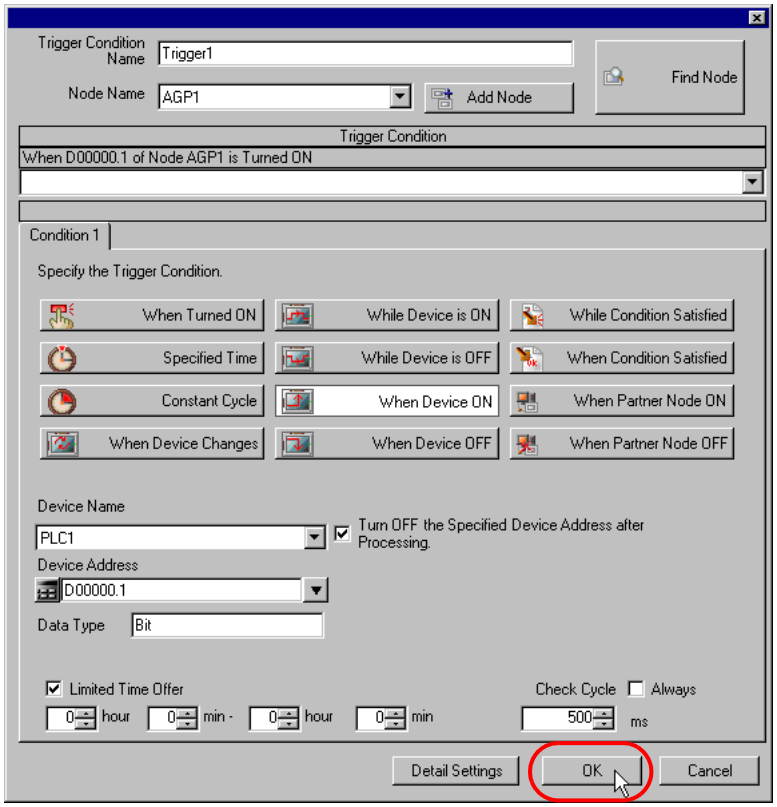
10 Then, specify the GP CF-card Screen-File Collection ACTION trigger condition. Click the [Next] button on the "Set ACTION Name/Parameter" screen.



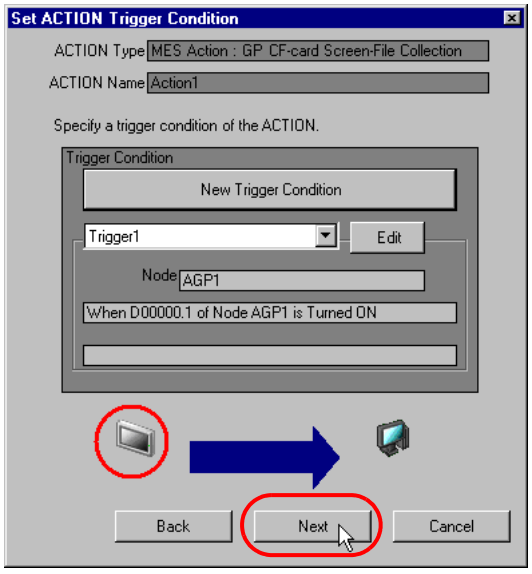
11 Click the [New Trigger Condition] button. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 13.



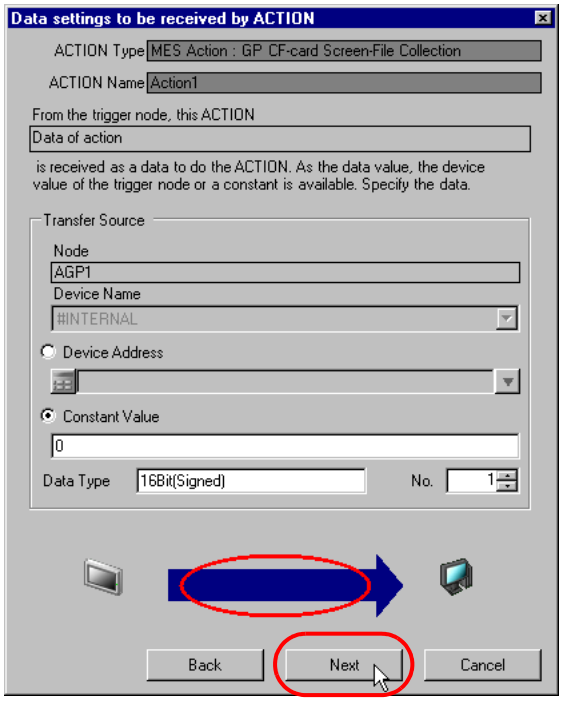
12 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



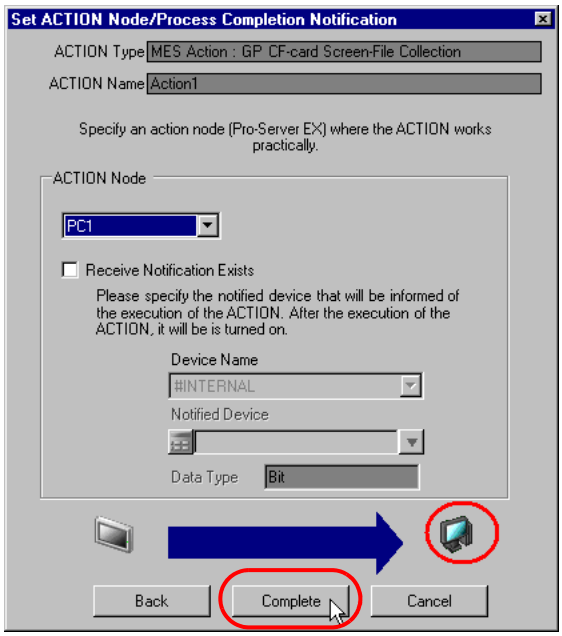
13 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.



14 Specify the data to be received by the ACTION, and click the [Next] button. For GP CF-card Screen-File Collection ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



15 Specify the ACTION operating node and whether to enable or disable receiving notice, and click the [Complete] button. Through the above procedure, GP CF-card Screen-File Collection ACTION is added.



3.8.2 Management of Collected Data

The data collected by CF-card in display units Screen-File Collection ACTION are saved in the D_CfScreenFile table. Actually, the table name is expressed with the ACTION ID ('Pro-Studio EX' internal information indicated by string) and the date, as shown below:

Table Name: D_CfScreenFile_ACTION ID

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	ACTION trigger date/time.	
	StationName	nvarchar(32)	Name of node.	
	FileName	nvarchar(255)	Captured data name in the CF card.	
	FilePath	nvarchar(260)	When the saving method is "Folder Specification", the full pathname of the captured data stored in the PC is specified. When the saving method is "In Database", this value is NULL.	○
	Image	varbinary(max)	When the saving method is "Folder Specification", this value is NULL. When the saving method is "In Database", contents of the captured data are specified.	○

3.9 Writing Recipe Data from Database into CF Card

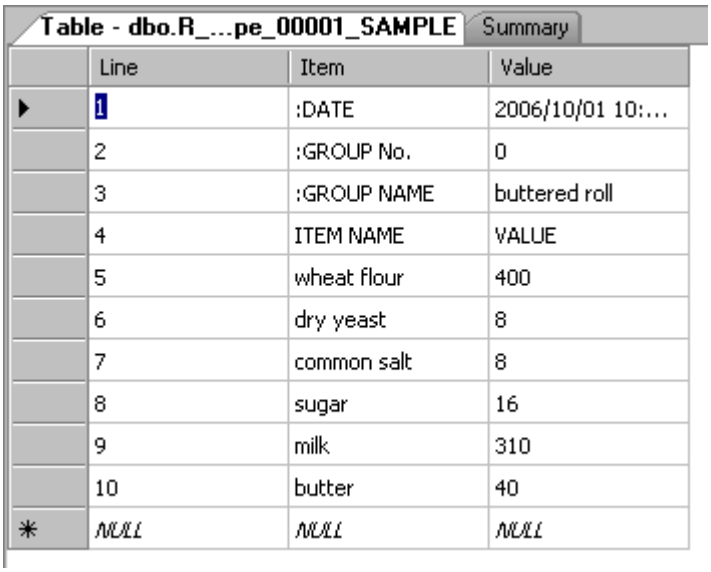
When a recipe parameter template file is prepared in the display unit's CF card with GP-ProEX, Recipe Download ACTION overwrites the recipe file (ZR*****.CSV) with the recipe data stored in SQL Server.
Recipe Download ACTION downloads recipe parameters to a specified node under a specified start condition.

3.9.1 Registering R_Recipe Table

To use Recipe Download ACTION, create an "R_Recipe" table (R_Recipe_xxxxx: 5-digit recipe number) with Management Studio Express.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	Line	int	Row Number. (Row number of the CSV file to be overwritten)	
	Item	nvarchar(32)	Item name. (Corresponding to the first column of the CSV file to be overwritten.)	
	Value	nvarchar(32)	Value. (Corresponding to the second column of the CSV file to be overwritten.)	○

An example of recipe table registration is shown below.



	Line	Item	Value
▶	1	:DATE	2006/10/01 10:...
	2	:GROUP No.	0
	3	:GROUP NAME	buttered roll
	4	ITEM NAME	VALUE
	5	wheat flour	400
	6	dry yeast	8
	7	common salt	8
	8	sugar	16
	9	milk	310
	10	butter	40
*	NULL	NULL	NULL

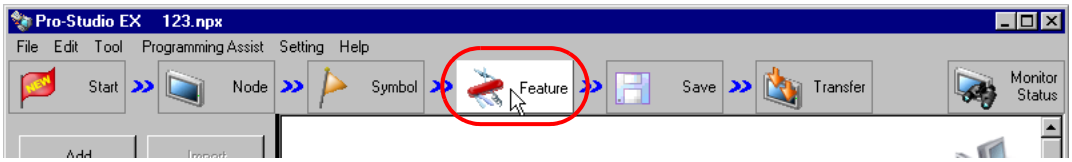
3.9.2 Registering R_RecipeIndex Table

The "R_RecipeIndex" table is used to allocate a condition name to a recipe registered in the R_Recipe table. The items registered in the R_RecipeIndex table are listed in the recipe list of Recipe Download ACTION. Create the R_RecipeIndex table with Management Studio Express.

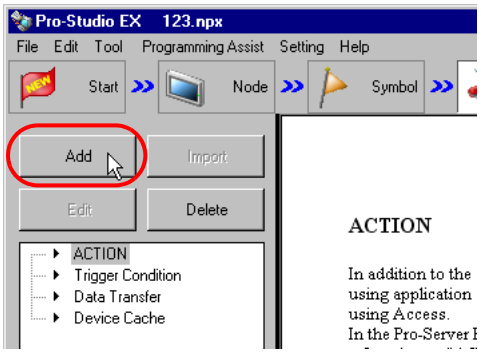
Main Key	Column Name	Data Type	Description	NULL Enabled
○	RecipeNumber	int	Recipe number. (Use the same recipe number as the table name specified in the R_Recipe table.)	
	ConditionName	nvarchar(32)	Condition name.	

3.9.3 Registering Recipe Download ACTION

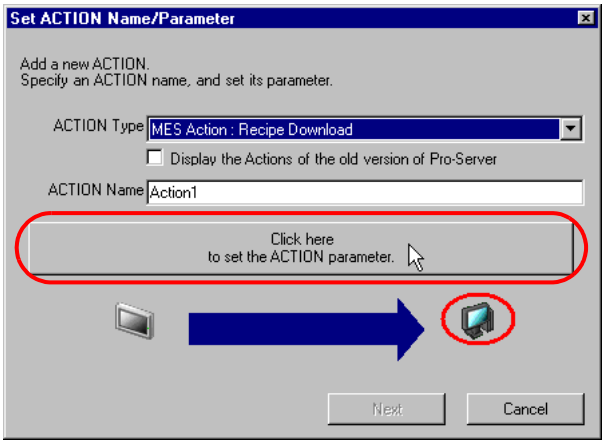
1 Click the [Feature] icon on the status bar.



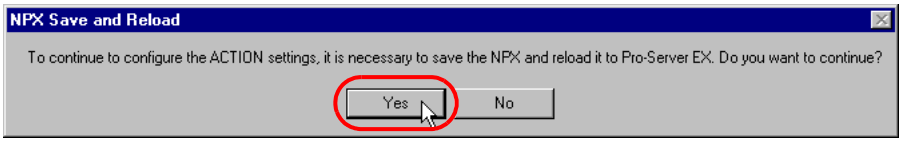
2 Select [ACTION] from the tree display on the left of the screen and click [Add].



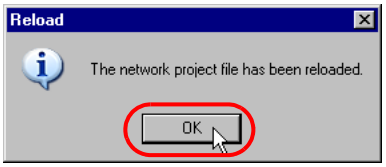
3 Click the [ACTION Type] list button and select "MES Action : Recipe Download". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



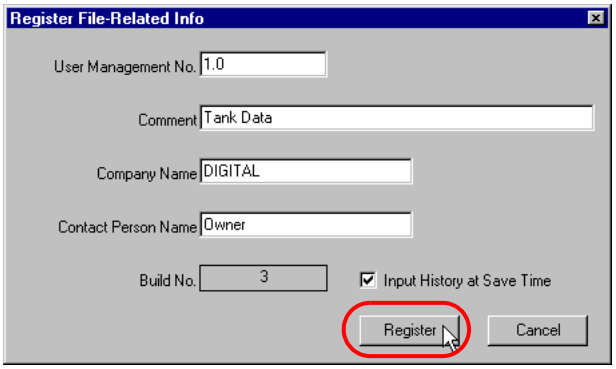
4 Click [Yes] on the "NPX Save and Reload" screen.



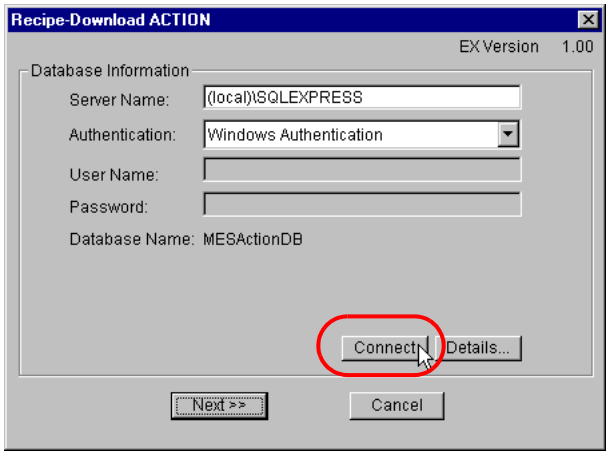
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

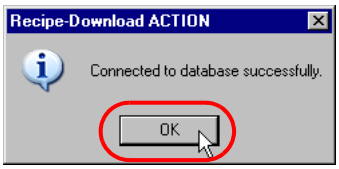


Information required for database connection is listed below.

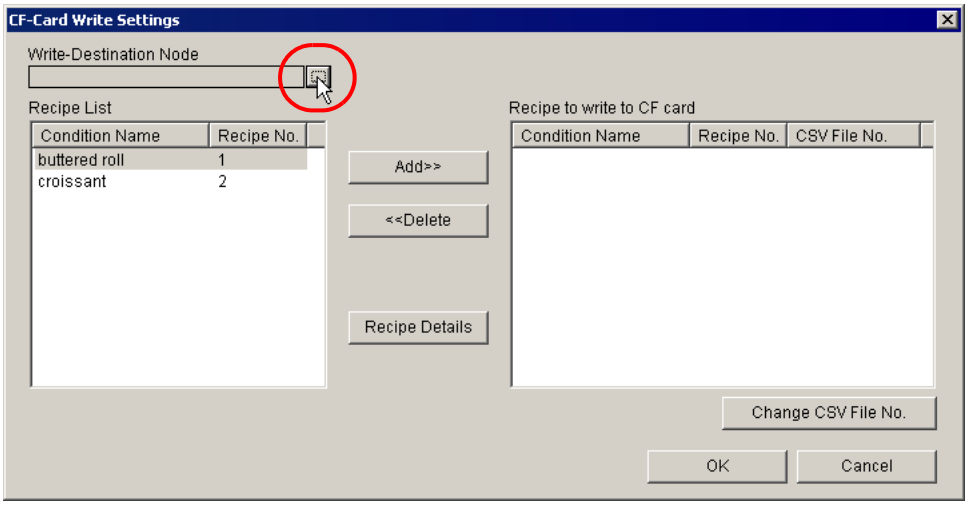
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

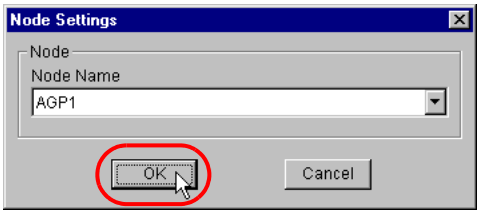
8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



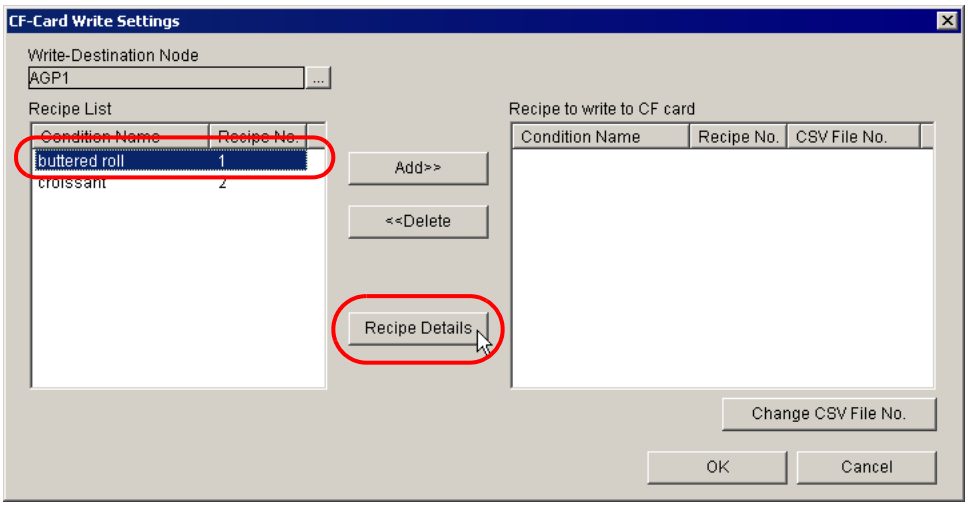
9 Click the [Write-Destination Node] selection button.



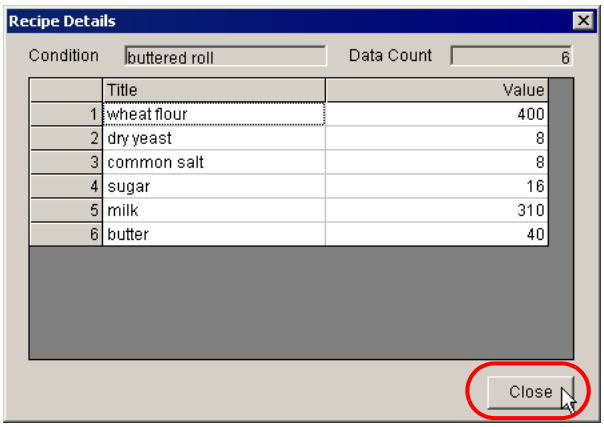
10 Select a node, and click [OK].



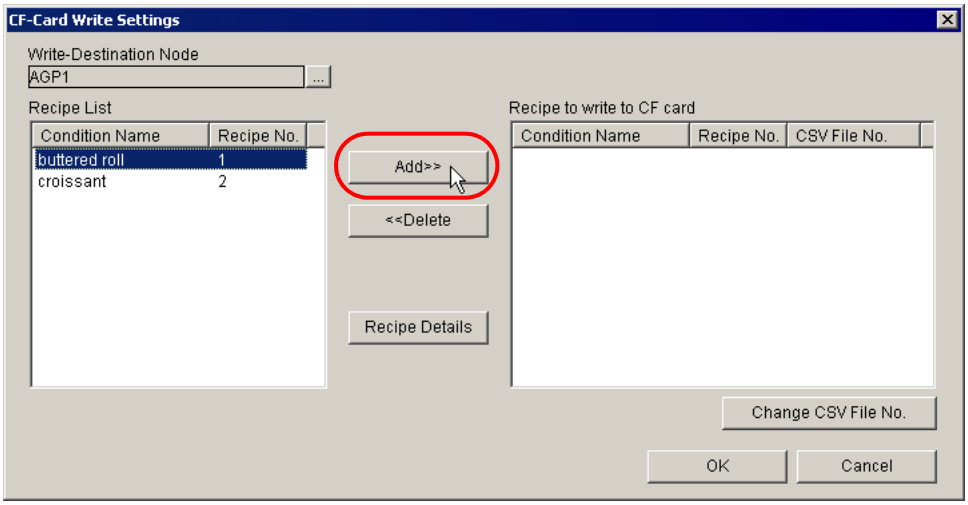
11 The recipe list shows the items registered in the R_RecipeIndex table. Select a recipe from the recipe list, and click [Recipe Details].



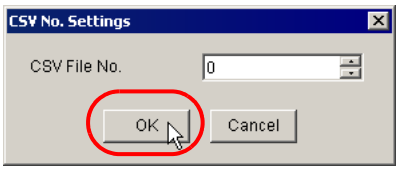
12 Contents of the recipe selected above (data registered in the R_Recipe table) are displayed. Check the data and click [Close].



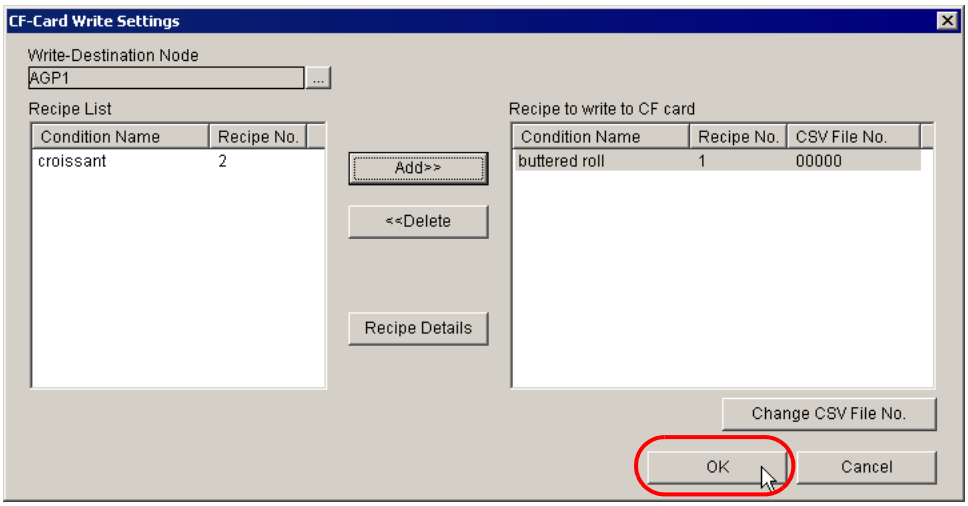
13 Select a recipe to be written into the CF card from the recipe list, and click [Add].



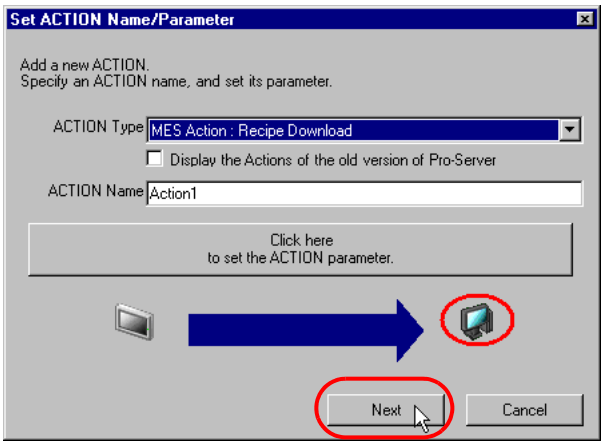
14 To write the recipe selected above into the CF card as a CSV file, specify a number used for the CSV file name on the [CSV No. Settings] screen, and click [OK] (A recipe file (CSV file) name is expressed as "ZR*****.CSV". "*****" indicates the CSV number specified here).



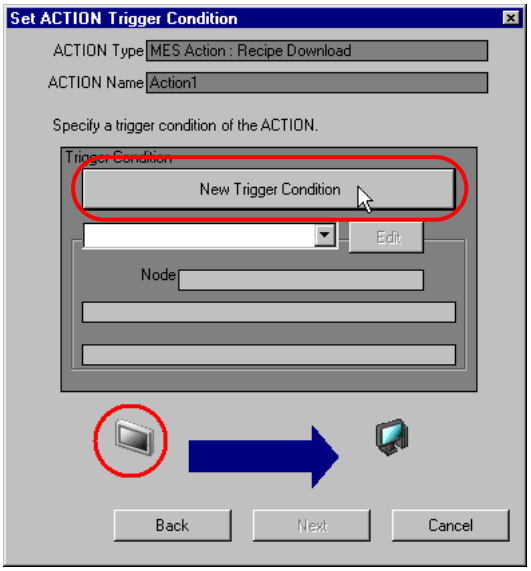
15 Confirm that the selected recipe is displayed in the "Recipe to write to CF card" list, and click [OK].



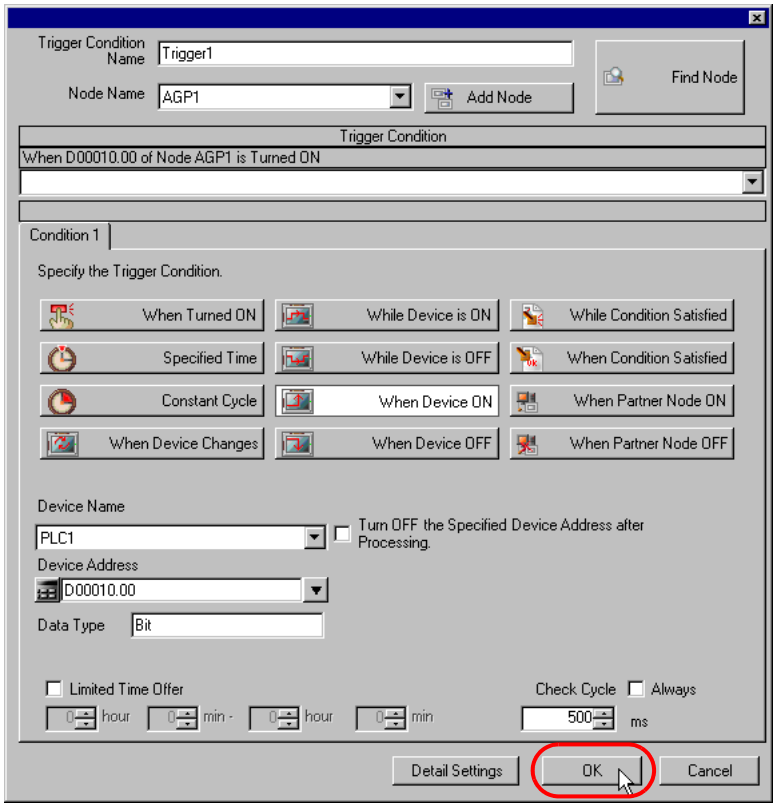
16 Then, specify the Recipe Download ACTION start condition. Click [Next] on the "Set ACTION Name/ Parameter" screen.



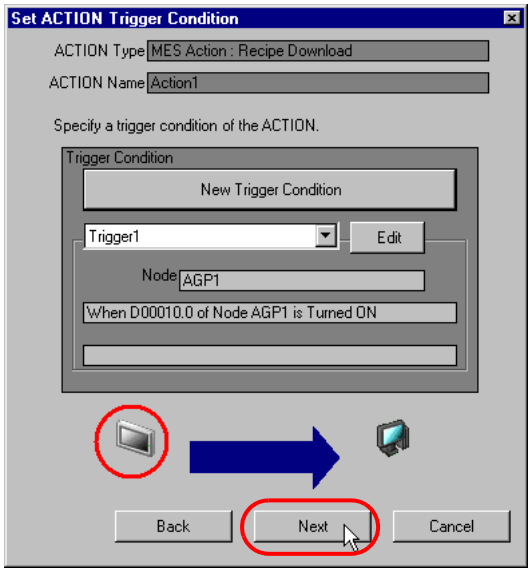
17 Click [New Trigger Condition]. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 19.



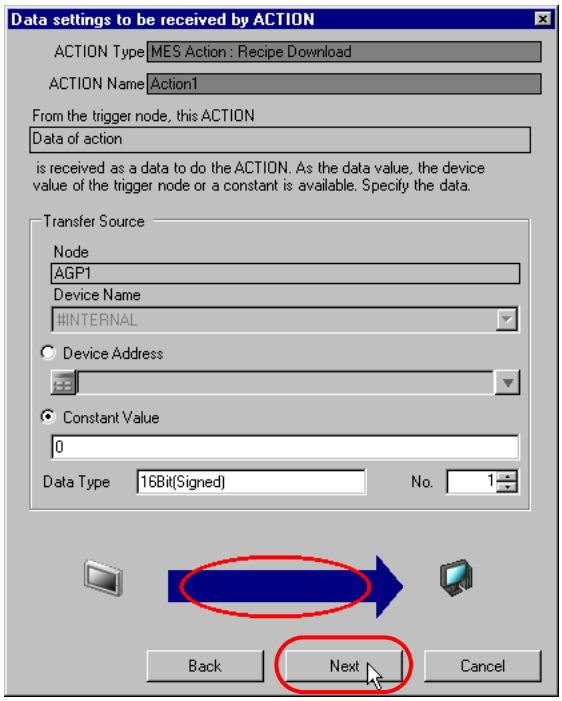
18 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



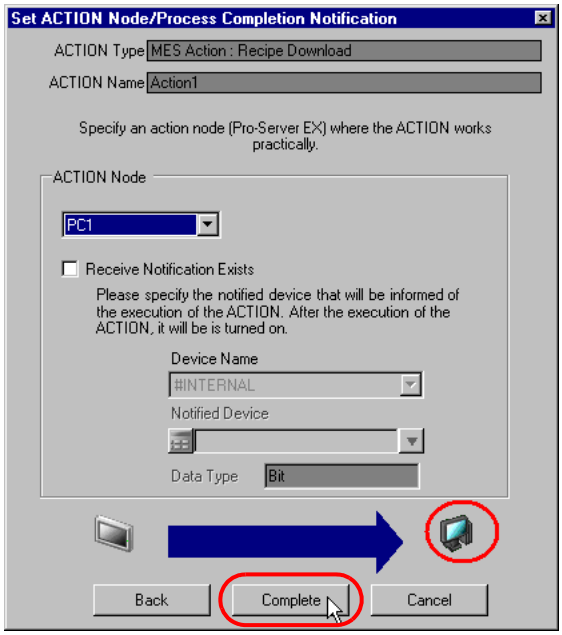
19 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.



20 Specify the data to be received by the ACTION, and click [Next]. For Recipe Download ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



21 Specify the ACTION operating node and whether to enable or disable receiving notice, and click [Complete]. Through the above procedure, Recipe Download ACTION is added.



3.10 Batch Transfer of Recipe, Text and Image Data

By using Composite Document Recipe-Transfer ACTION, you can transfer composite data including recipe, text and image that have been registered in the database into the display unit at once. With the index search function, you can select composite data depending on a symbol or device value.

IMPORTANT
- The SP5000 Series, GP4000 Series, GP3000 Series, and WinGP support Composite Document Recipe-Transfer ACTION.

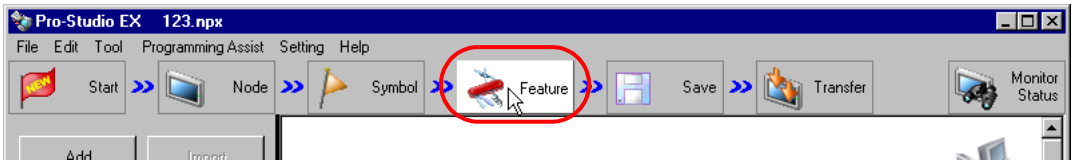
3.10.1 Registering R_MultiRecipe Table

To use Composite Document Recipe-Transfer ACTION, create a "R_MultiRecipe" table with Management Studio Express. Actually, the table name is expressed as "R_MultiRecipe_xxx" ("xxx" indicates a desired character string). Contents of the R_MultiRecipe table are listed below:

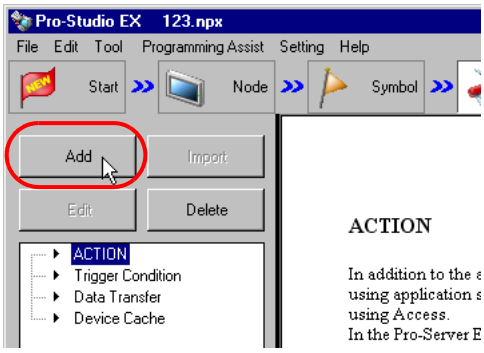
Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Unique integer used for index search. Main key.	
	Index	nvarchar(32)	Unique string used for index search.	
	Title	varchar(32)	String to be transferred by title transfer.	○
	toTextFile	nvarchar(255)	Name of the CSV file to be stored into the display unit's CF card by CSV file transfer.	○
	fromTextFile	nvarchar(255) or nvarchar(max)	When Data Type is nvarchar(255), specify a pathname of the text file to be transferred by CSV file transfer. When Data Type is nvarchar(max), specify the text data to be transferred by CSV file transfer.	○
	toImageFile	nvarchar(255)	Name of the image file to be stored in the display unit's CF card by image file transfer.	○
	fromImageFile	nvarchar(255) or varbinary(max)	When Data Type is nvarchar(255), specify a pathname of the image file to be transferred by image file transfer. When Data Type is varbinary(max), specify the image data to be transferred by image file transfer.	○
	(Arbitrary recipe item name 1)	float	Recipe parameter 1. If this value is NULL, writing is skipped.	○
	:	:	:	:
	(Arbitrary recipe item name n)	float	Recipe parameter n. If this value is NULL, writing is skipped.	○

3.10.2 Registering Composite Document Recipe-Transfer ACTION

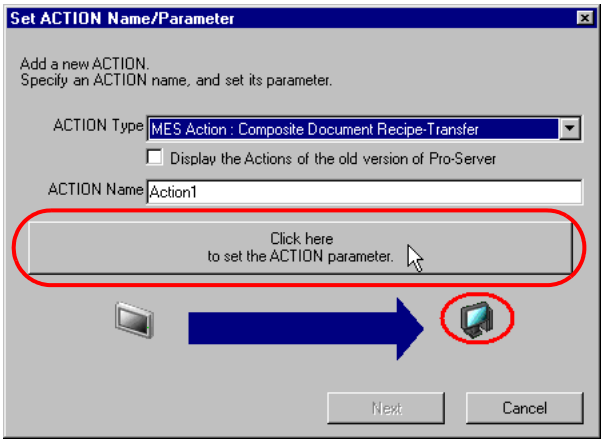
1 Click the [Feature] icon on the status bar.



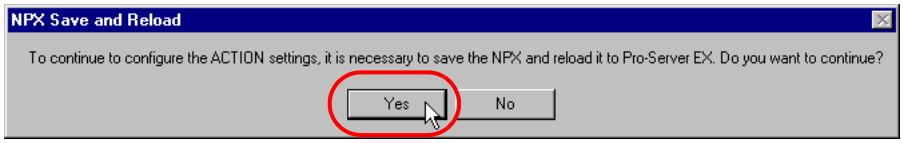
2 Select [ACTION] from the tree display on the left of the screen and click [Add].



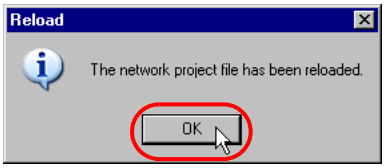
3 Click the [ACTION Type] list button and select "MES Action : Composite Document Recipe-Transfer". Then, enter a desired ACTION name in [ACTION Name]. Then, click the [Click here to set the ACTION parameter.] button.



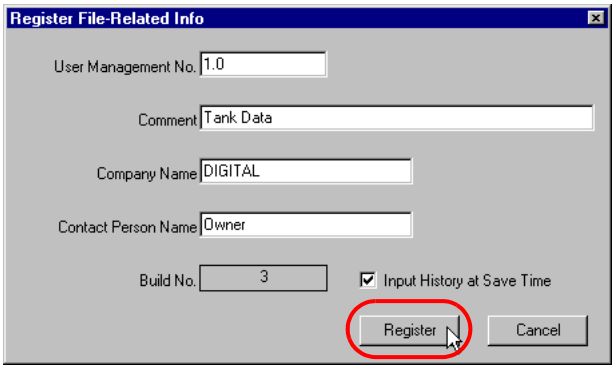
4 Click [Yes] on the "NPX Save and Reload" screen.



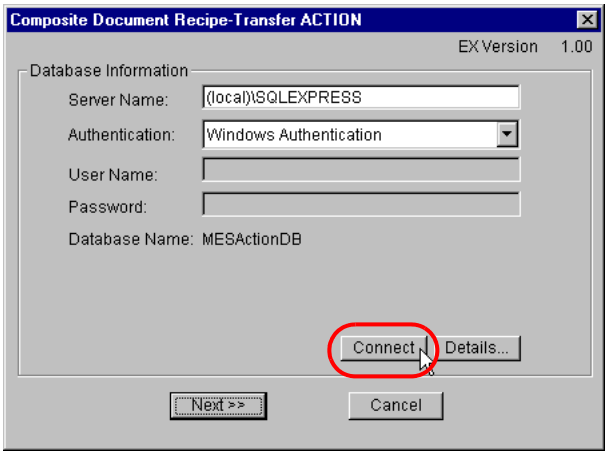
5 After the reloading completion message appears, click [OK].



6 Enter required items, and click [Register] to save NPX.



7 Enter database connection information, and click [Connect].

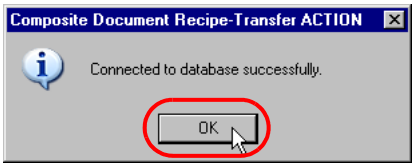


Information required for database connection is listed below.

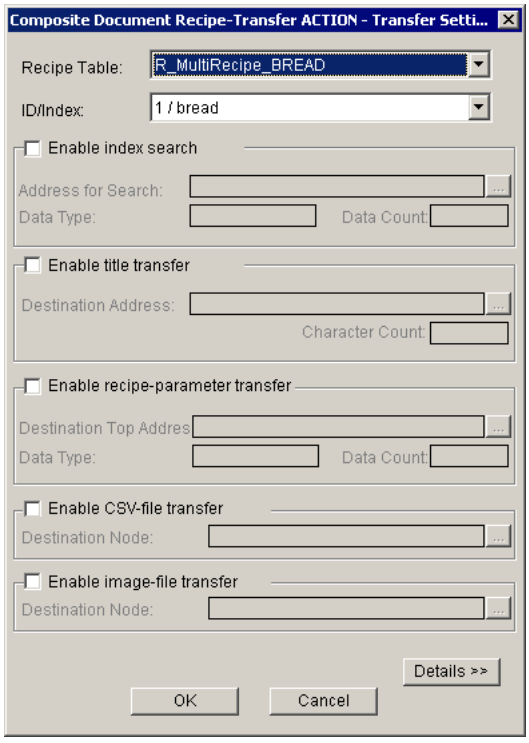
Setup Item		Description
Database Information	Server Name	Specify "PC Name" or "IP Address"/"Instance" of the database server. Specify a local PC.
	Authentication	Select the authentication method: Windows Authentication or SQL Server Authentication.
	User Name	Specify a user name for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Password	Specify a password for access to the database server when SQL Server Authentication is selected. When Windows Authentication is selected, this item is not required.
	Database Name	Displays the corresponding database to save data.

Button	Description
Connect	Test button to check if the database can be normally connected under the registered database information settings.
Details	Opens the database information detail window. Server Connection Time : Database server communication timeout time Retry Count : Database server communication retry count SQL Command Timeout : the amount of time until Timeout when executing the command request to the SQL server

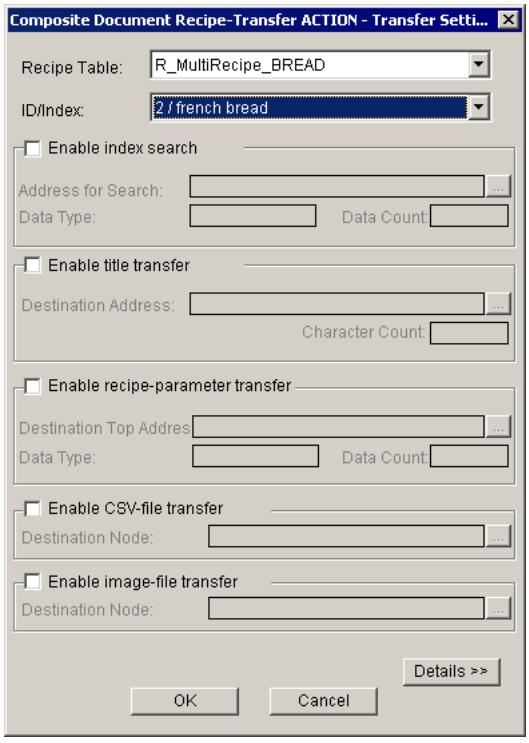
8 After the connection success message appears, click [OK] to close the message window, and click [Next]. If the connection failure message appears, correct the database connection information.



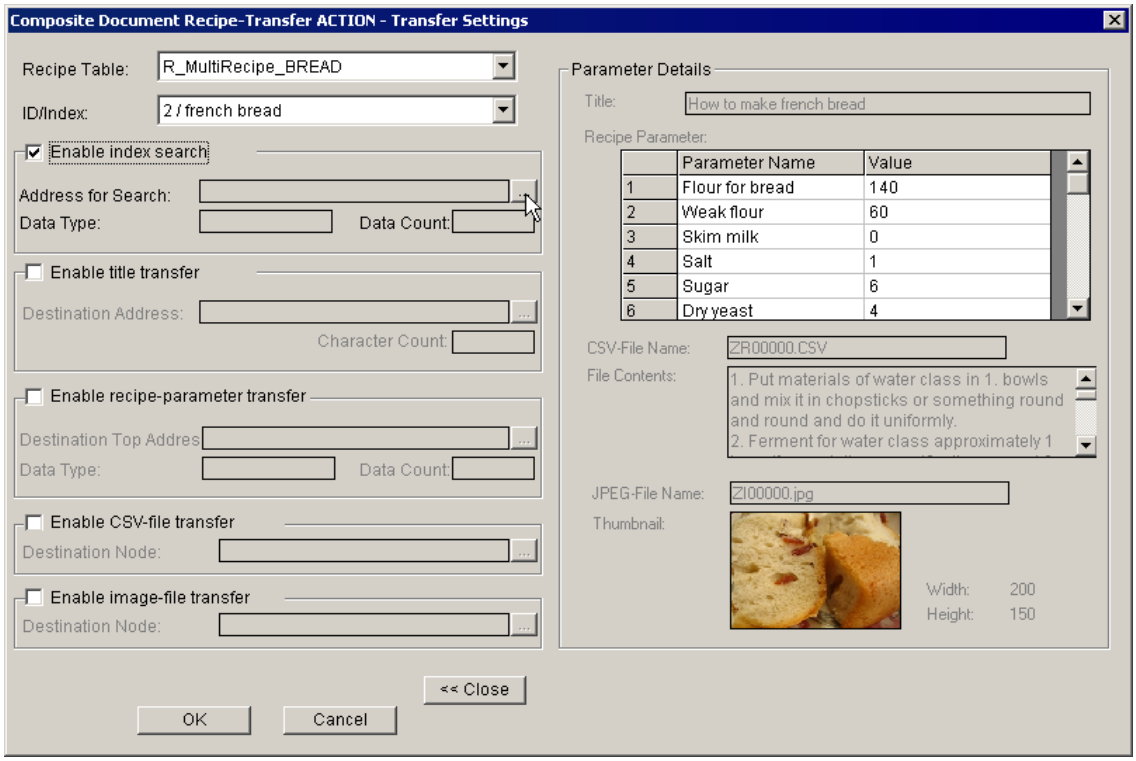
9 Select the R_MultiRecipe table where transfer data are saved.



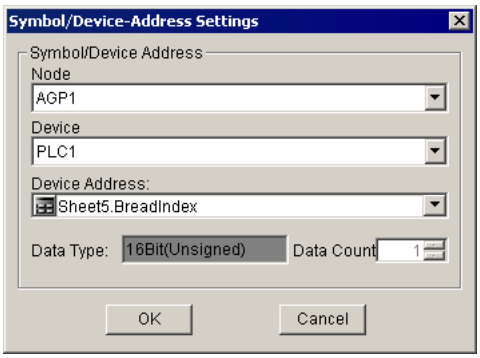
10 Select the composite data to be transferred from the list of the composite data stored in the selected table in [ID/Index], and click [Details]. Then, details of the selected composite data are displayed.



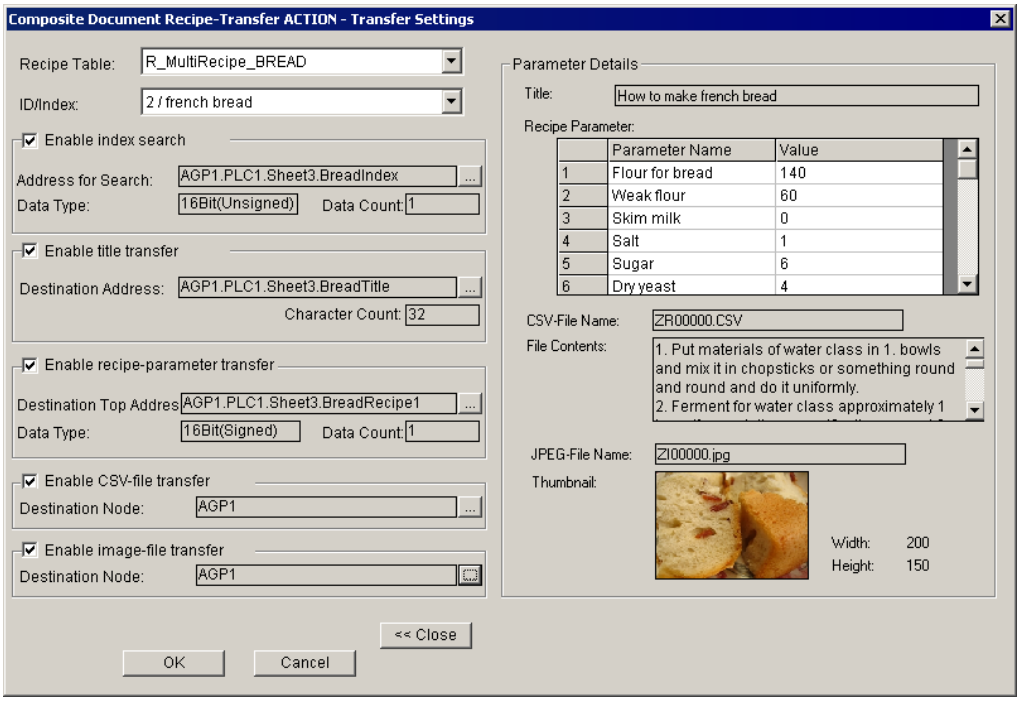
11 To change composite data to be transferred depending on a symbol or device value during execution of the ACTION instead of fixing the target data in advance, check [Enable index search], and click the [Address for Search] selection button.



12 Specify a search address, and click [OK]. If the specified data type is "String", the ACTION transfers composite data by searching for the data with an index matching the address value (string) specified here. If the specified data type is not "String", the ACTION transfers composite data by searching for the data with an ID matching the address value (numeric) specified here.

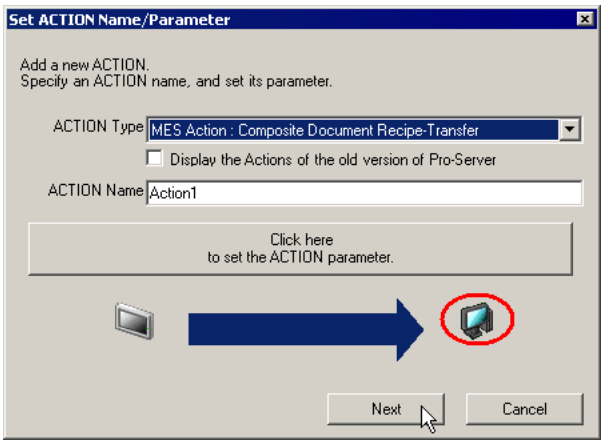


13 To transfer the title, recipe parameter, CSV file and image file, check the item to be transferred, and specify the transfer destination address in the same manner as above.

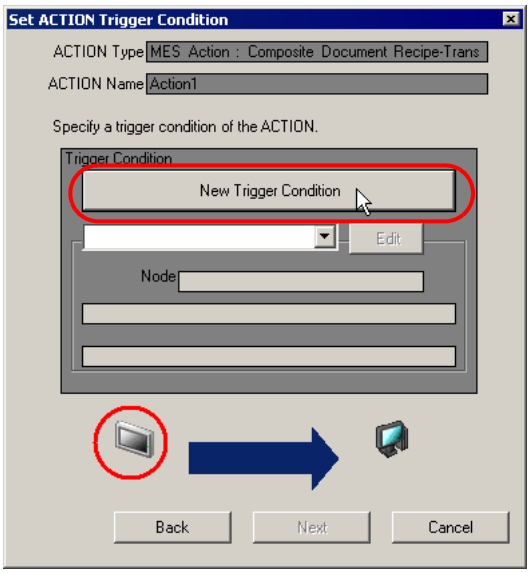


14 Click [OK] to finish the transfer settings of the ACTION.

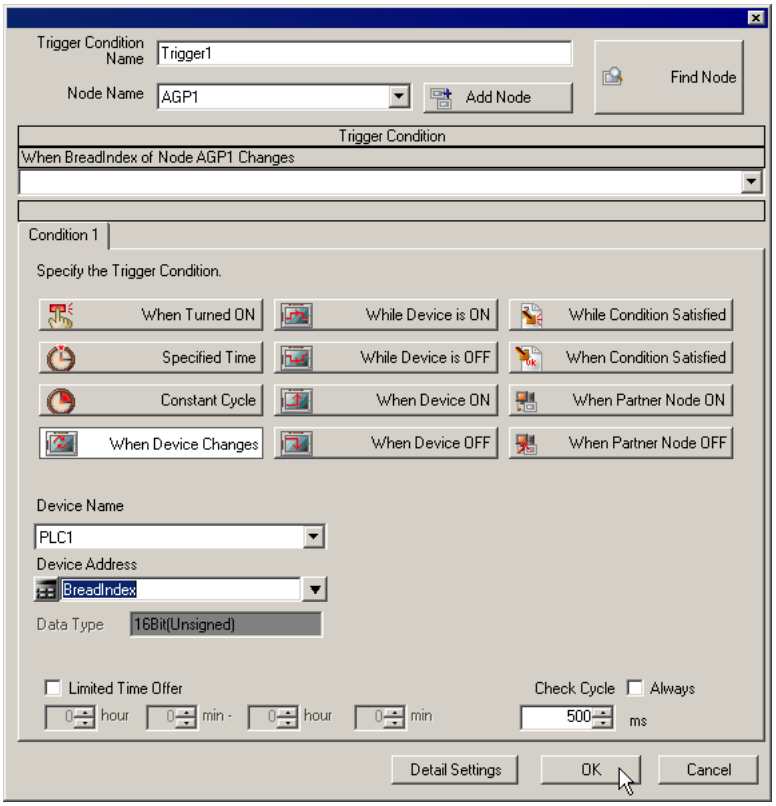
15 Then, specify the Composite Document Recipe-Transfer ACTION trigger condition. Click [Next] on the "Set ACTION Name/Parameter" screen.



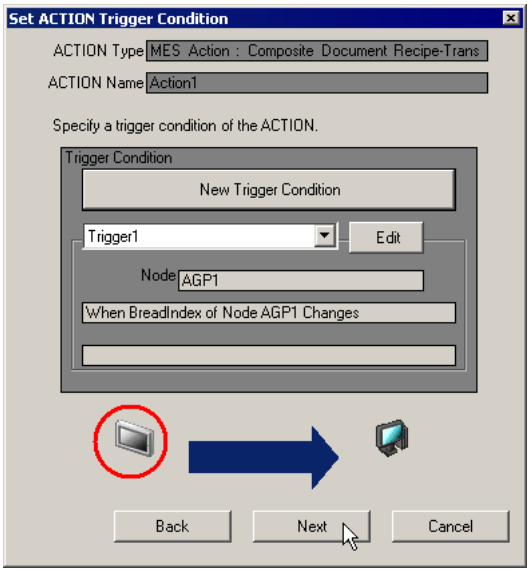
16 Click [New Trigger Condition]. If a trigger condition has already been registered, select a trigger condition from the dropdown list, and proceed to Step 18.



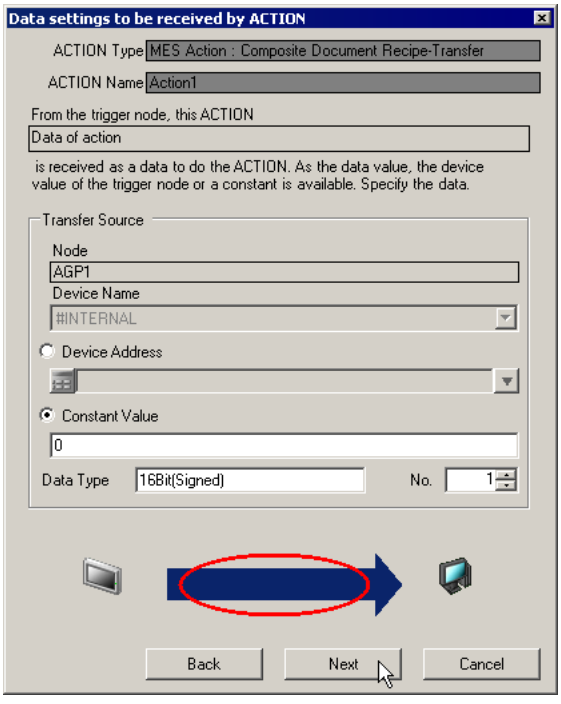
17 Specify a trigger condition name and node name. Then, specify a trigger condition in the [Condition 1] tab.



18 Specify the data to be transferred during operation of the ACTION. Click [Next] on the "Set ACTION Trigger Condition" screen.

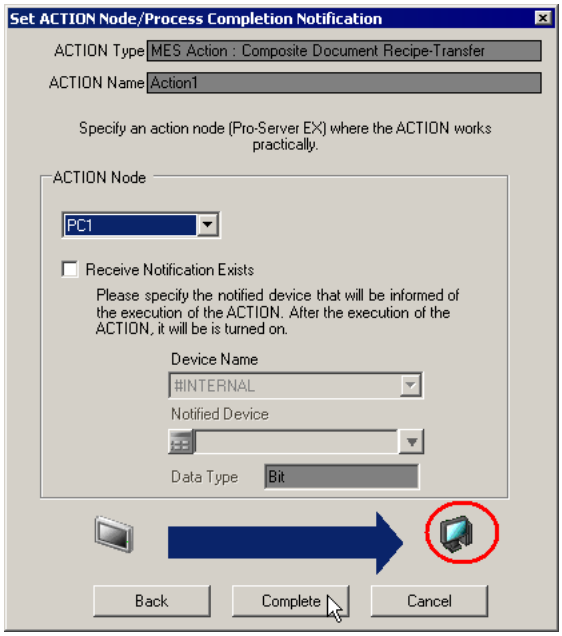


19 Specify the data to be received by the ACTION, and click [Next]. For Composite Document Recipe-Transfer ACTION, you can specify any value, because the settings on this screen do not affect the operation of the ACTION.



20 Specify the ACTION operating node and whether to enable or disable receiving notice, and click [Complete].

Through the above procedure, Composite Document Recipe-Transfer ACTION is added.



4 MESActionDB Table Schema Reference

4.1 Common Tables

The following tables are commonly required to use each MES ACTION. Before using MES ACTION, set the common tables.

4.1.1 C_CommonInfo Table

The C_CommonInfo table is used to set information commonly used for each MES ACTION. Only one record is enough to use for the C_CommonInfo table. If several records are available, the record with the smallest ID number is used.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	SaveMode	nchar(1)	Database saving mode. Specify C (Continuous saving mode) or M (Monthly division mode). If the monthly division mode is selected, data on the previous month will be moved to other database (MESActionDB01 to MESActionDB12) at a shift from every month to the next month.	
	SMTPServer	nvarchar(255)	SMTP Server Name. Used to send E-mail for control limit monitoring in Process-Data-Collection ACTION and Actual-Data-Collection ACTION.	
	SMTPPort	int	SMTP Port No. Used to send E-mail for control limit monitoring in Process-Data-Collection ACTION and Actual-Data-Collection ACTION.	
	SMTPAuth	bit	SMTP Authentication (False: Authentication is not required, True: Authentication is required) Used to send E-mail for control limit monitoring in Process-Data-Collection ACTION and Actual-Data-Collection ACTION. If "True" (Authentication is required) is selected, the SMTP server is requested to authenticate the user account by using the following user name and password.	
	SMTP UserName	nvarchar(255)	SMTP User Name. Used when SMTP authentication is required.	○
	InputSMTPPassword	nvarchar(255)	SMTP Password. The entered password is encoded at trigger of SQL Server, and saved in CodedSMTPPassword. Then, the InputSMTPPassword value is set to NULL. Therefore, unauthorized people cannot see the password.	○
	CodedSMTPPassword	varbinary(8000)	Encoded SMTP password. Used when SMTP authentication is required.	○
	MailFrom	nvarchar(255)	Mail Source Address. Used to send E-mail for control limit monitoring in Process-Data-Collection ACTION and Actual-Data-Collection ACTION.	

4.1.2 C_MonthlyProcess Table

The C_MonthlyProcess table is used to set information required for monthly shift processing in the monthly division mode. Only one record is enough to use for the C_MonthlyProcess table. If several records are available, the record with the smallest ID number is used.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	LastDateTime	datetime	Last collection time. MES ACTION automatically updates the value. Users need not specify it. Used to judge whether monthly shift processing is to be executed or not.	○
	InProcess	bit	Processing flag (False: Processing is not in progress. True: Processing is in progress) MES ACTION automatically updates the value. Users need not specify it. Used to prohibit monthly shift processing and database writing processing from being simultaneously executed.	
	WaitingTime	int	Wait time [second] for True processing flag. If monthly shift processing or collected data writing processing is being executed by other MES ACTIONs at the time when such processing is to be started, users can specify the time [second] to wait for completion of each processing. If the monthly shift processing or collected data writing processing executed by other MES ACTIONs is not completed after elapse of the specified wait time, it is judged to be an error. For monthly shift processing, a database file (.mdf) and log file (.log) are copied. However, if a file in the database is large, the copying time is prolonged. In such a case, the wait time setting in this column must be increased. However, when the wait time is long, the system takes a long time for error output, if the monthly shift processing or collected data writing processing cannot be completed within the specified time for any reason.	

4.2 Tables for Process Data/Actual Data Collection ACTION

The following tables are used for Process-Data-Collection ACTION and Actual-Data-Collection ACTION.

4.2.1 T_TagName Table

Users must register the tags to be collected by Process-Data-Collection ACTION and Actual-Data-Collection ACTION in the T_TagName table in advance. The tags registered in the T_TagName table are displayed in the tab selection dialog of Process-Data-Collection ACTION and Actual-Data-Collection ACTION.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag.	
	Description	nvarchar(255)	Description	○
	Type	nchar(1)	Type of tag. Specify A (Analog), D (Digital) or S (String).	

4.2.2 T_LinearAnalog Table

For the tag whose type is registered as "Analog" in the T_TagName table, users must register the information required for engineering value conversion in this table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of the tag whose type is registered as "Analog" in the T_TagName.	
	SignalIO	nvarchar(6)	Signal Condition Specify any of the following items: 8BN, 12BN, 13BN, 15BN, 3BCD, 4BCD, BCD, Lin, None, SQRT, String For details, refer to "Signal Condition".	
	InRL	float	Input lower limit value. Used for linearize conversion.	
	InRH	float	Input upper limit value. Used for linearize conversion.	
	OutRL	float	Output lower limit value. Used for linearize conversion.	
	OutRH	float	Output upper limit value. Used for linearize conversion.	
	DecimalPoint	Int	Decimal-Point Position. (0 to 7) Used when "None " is specified for Signal Condition.	○
	StringConvertMethod	nchar(5)	Numeric value-string conversion method. Select TABLE or QUERY. TABLE : Specifies a conversion table in the Table.Field format. QUERY : Specifies a conversion table with Query (SELECT statement).	○
	Engineering Unit	nvarchar(257)	When SignalIO is other than String, specify the industrial unit of process data (kg, m, etc.). When SignalIO is String and StringConvertMethod is TABLE, specify the names of numeric value-string conversion table and column in the Table.Field format. When SignalIO is String and StringConvertMethod is QUERY, specify the SELECT statement to obtain a string.	○

NOTE
- "Linearize" means the conversion processing using a linear equation for input range and measuring instrument range.

■ Signal Condition

The engineering value conversion method based on the setting of the "Signal IO" column in the T_LinearAnalog table is as follows:

8BN,12BN,13BN,15BN:

After masking by a specified bit length (when a high-order bit is not necessary, it is set to "0"), the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Value after masking - InRL)/(InRH - InRL) × (OutRH - OutRL) + OutRL

This method is available only when any of 16Bit(Signed), 16Bit(Unsigned), or 16Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

3BCD,4BCD:

After masking BCD data by a specified number of digits, the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Value after masking - InRL)/(InRH - InRL) × (OutRH - OutRL) + OutRL

This method is available only when any of 16Bit(Signed), 16Bit(Unsigned), or 16Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

BCD:

The result of linearize conversion without BCD data masking is defined as the engineering conversion value.

This method is available only when any of 32Bit(Signed), 32Bit(Unsigned), or 32Bit(HEX) is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table.

Lin:

The result of linearize conversion without masking is defined as the engineering conversion value.

SQRT:

After extracting the square root of an input value without masking, the result of linearize conversion is defined as the engineering conversion value.

Conversion result = (Input value - InRL)/SQRT(InRH - InRL) × (OutRH - OutRL) + OutRL

None(Real number conversion):

Masking and linearize conversion are not executed. If the type of 16-bit or 32-bit integer is specified in the DataType column in the A_ProcessTagDevice or A_ActualTagDevice table, the following calculation result, based on the value of the DecimalPoint column, is defined as the engineering conversion value.

Input value / n-th power of 10 (n = value of DecimalPoint column)

String:

Masking and linearize conversion are not executed.

NOTE

- If "String" is specified in the SignalIO column, specify the character string corresponding to the row number, with reference to the following table. The table name is selected randomly.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main Key	
	(Arbitrary column name 1)	nvarchar(32)	Character string corresponding to string No.	○
	(Arbitrary column name 2)	nvarchar(32)	Character string corresponding to string No.	○
	:	:	:	:
	(Arbitrary column name N)	nvarchar(32)	Character string corresponding to string No.	○

When StringConvertMethod is TABLE:

ACTION finds the row number from the input value with the following formula:

Row number = (Input value - outRL) MOD (outRH - outRL) + outRL

("A MOD B" is a residue of A divided by B)

For example, provided that outRL is "1" and outRH is "11", the relationship between the input value and the row number is as follows:

Entered Value	...	-1	0	1	2	...	9	10	11	12	...	19	20	21	22	...
Row Number	...	-1	0	1	2	...	9	10	1	2	...	9	10	1	2	...

The table name and column name specified in the EngineeringUnit column and the string corresponding to the row number obtained above are used as the tag value.

If the row number is smaller than "1", or if there is no row corresponding to the row number, it is judged as a conversion error.

When StringConvertMethod is QUERY:

The execution result of the query (SELECT statement) specified in the EngineeringUnit column is used as the tag value.

If "@VALUE" is used as a parameter in the query, the input value is set in this parameter.

For example, provided that the input value is "10" and a query of "SELECT TagString FROM TestTable WHERE TagValue = @VALUE" is set in the EngineeringUnit column, the system finds the record with a TagValue column value of "10" from TestTable. The value of the TagString column in the first found record is used as the tab value.

4.2.3 T_ LineDigital Table

For the tag whose type is registered as "Digital" in the T_TagName table, users must register the tag value and corresponding string in this table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of the tag whose type is registered as "Digital" in the T_TagName table.	
	OnChar	nvarchar(32)	A string corresponding to value 1.	
	OffChar	nvarchar(32)	A string corresponding to value 0.	

4.2.4 T_PlanValueQuery Table

Actual-Data-Collection ACTION records a plan value and achievement ratio into the database, as well as the actual value. The "T_PlanValueQuery" table allows the user to specify the plan value acquiring method.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of tag used for actual data collection.	
	Method	nchar(5)	Plan value acquiring method. Select TABLE or QUERY. TABLE : Specifies a plan value table in the Table.Field format. QUERY : Specifies a plan value table with Query(SELECT statement).	
	Query	nvarchar(257)	If Method is TABLE, specify the plan value table name and column name in the Table.Field format. The value of the first row of the specified table-field is defined as the plan value. If Method is QUERY, specify the SELECT statement to obtain a plan value.	

4.2.5 T_ LimitControl Table

Users must register the tag used for control limit monitoring in the T_LimitControl table. The control limit monitoring function outputs an alarm when a tag value is the lower control limit value or lower, or a tag value is the upper control limit value or higher is collected continuously by a specified count or more, and reports it by sending E-mail, or by writing a value into a device.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	TagName	nvarchar(40)	Name of tag. Register the name of tag used for control limit monitoring.	
	LCL	float	Lower control limit value.	
	CL	float	Center value.	
	UCL	float	Upper control limit value.	
	Count	Int	Preset number of continuous occurrences of control limit alarm values before alarm output.	
	Message	nvarchar(255)	Alarm message. Title of the mail to report occurrence of an alarm event.	
	EMailEnabled	bit	To report an alarm by e-mail, set True. Not to report an alarm, set False.	
	EMailListID	int	ID of the mail address list to send E-mail at occurrence of an alarm event. E-mail is sent to the address that matches the ID column value in the EMailList table.	○
	DeviceEnabled	bit	To write a value into a device when an alarm event occurs, set True. Not to write a value into a device, set False.	
	DeviceListID	int	ID of the device list to write a value at occurrence of an alarm event. A value is written into the device that matches the ID column value in the DeviceList table.	○
	CountNow	int	Current count of continuous occurrences of control limit alarm values. MES ACTION automatically updates the value. Users need not specify it.	○

4.2.6 T_EMailList Table

To report occurrence of an alarm event by E-mail with the control limit monitoring function, specify the mail destination address in the T_EMailList table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	ID of the mail address list to send E-mail at occurrence of an alarm event. Set the same ID as the setting of the EMailListID column in the T_LimitControl table.	
○	Address	nvarchar(255)	E-mail Address. Serves as the main key in combination of the ID column.	

4.2.7 T_DeviceList Table

To report occurrence of an alarm event by writing a value into a device with the control limit monitoring function, specify the write-destination device address in the T_DeviceList table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	ID of the device list to write a value at occurrence of an alarm event. Set the same ID as the setting of the DeviceListID column in the T_LimitControl table.	
○	StationName	nvarchar(32)	Node name.	
○	EquipmentName	nvarchar(32)	Name of Device/PLC.	
○	DeviceAddress	nvarchar(131)	Device address or symbol name. For symbol name, the format is "Sheet name.Symbol name".	
	DataType	nvarchar(15)	Type of device data. Specify any of the following items: 8Bit(Signed), 8Bit(UnSigned) ,8Bit(BCD), 8Bit(HEX), 16Bit(Signed), 16Bit(UnSigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(UnSigned), 32Bit(BCD), 32Bit(HEX), Float, Double, Bit, String, DATE, TIME_OF_DAY, TIME, DATE_AND_TIME	
	Count	int	Indicates a length (number of bytes) of string for String data type. If the DataType setting is other than String, this column is not used.	
	Value	nvarchar(255)	A value to be written into a device.	

4.2.8 A_ProcessTagDevice Table

The A_ProcessTagDevice table is used to save the tag and device/symbol allocation settings that have been specified in registration of Process-Data-Collection ACTION. This table will be automatically registered when Process-Data-Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	TagName	nvarchar(40)	Name of tag.	
	StationName	nvarchar(32)	Node name.	
	EquipmentName	nvarchar(32)	Name of Device/PLC.	
	DeviceAddress	nvarchar(131)	Device address or symbol name. For symbol name, the format is "Sheet name.Symbol name".	
	DataType	nvarchar(15)	Type of device data. Specify any of the following items: 8Bit(Signed), 8Bit(UnSigned), 8Bit(BCD), 8Bit(HEX), 16Bit(Signed), 16Bit(UnSigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(UnSigned), 32Bit(BCD), 32Bit(HEX), Float, Double, Bit, String, DATE, TIME_OF_DAY,TIME	
	Count	Int	Indicates a length (number of bytes) of string for String data type. If the DataType setting is other than String, this column is not used.	

4.2.9 A_ActualTagDevice Table

The A_ActualTagDevice table is used to save the tag and device/symbol allocation settings that have been specified in registration of Actual-Data-Collection ACTION. This table will be automatically registered when Actual-Data-Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	TagName	nvarchar(40)	Name of tag.	
	StationName	nvarchar(32)	Node name.	
	EquipmentName	nvarchar(32)	Name of Device/PLC.	
	DeviceAddress	nvarchar(131)	Device address or symbol name. For symbol name, the format is "Sheet name.Symbol name".	
	DataType	nvarchar(15)	Type of device data. Specify any of the following items: 8Bit(Signed), 8Bit(UnSigned), 8Bit(BCD), 8Bit(HEX), 16Bit(Signed), 16Bit(UnSigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(UnSigned), 32Bit(BCD), 32Bit(HEX), Float, Double, Bit DATE, TIME_OF_DAY,TIME	

4.2.10 A_ProcessDataSampling Table

The A_ProcessDataSampling table is used to save the collection data table creation unit and device cache settings that have been specified in registration of Process-Data-Collection ACTION. This table will be automatically registered when Process-Data-Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
	TableUnit	nchar(1)	Collection data table creation unit. Specify any of the following items: D (daily basis), M (monthly basis), Y (yearly basis), N (None), S (Table name specification)	
	TableName	nvarchar(128)	Specified Table Name	
	Cache	bit	Device cache (False: Disabled, True: Enabled)	
	CachePolling	int	Device cache updating interval (Unit: msec)	

NOTE

- To upgrade the MES Action version, change the data table in the following procedures.

1.Open both data tables of the old and new databases.

2.Copy all the data from the old database to the new database.

3.Since the TableName field in the new database shows NULL, set the blank space.

4.2.11 A_ActualDataSampling Table

The A_ActualDataSampling table is used to save the collection data table creation unit and device cache settings that have been specified in registration of Actual-Data-Collection ACTION. This table will be automatically registered when Actual-Data-Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID (GUID automatically determined when a new ACTION is created)	
	TableUnit	nchar(1)	Collection data table creation unit. Specify any of the following items: D (daily basis), M (monthly basis), Y (yearly basis), N (None), S (Table name specification)	
	TableName	nvarchar(128)	Specified Table Name	
	Cache	bit	Device cache (False: Disabled, True: Enabled)	
	CachePolling	int	Device cache updating interval (Unit: msec)	

NOTE

- To upgrade the MES Action version, change the data table in the following procedures.

1.Open both data tables of the old and new databases.

2.Copy all the data from the old database to the new database.

3.Since the TableName field in the new database shows NULL, set the blank space.

4.2.12 D_ProcessData Table

The D_ProcessData table is used to save the tag values collected by Process-Data-Collection ACTION. This table will be automatically created when Process-Data-Collection ACTION is executed in the RUNTIME mode. Actually, the table name is expressed with the ACTION ID of Process-Data-Collection ACTION and the date, as shown below:

When the table is created daily : D_ProcessData_ACTION ID_YYYYMMDD
When the table is created monthly : D_ProcessData_ ACTION ID _YYYYMM
When the table is created yearly : D_ProcessData_ ACTION ID _YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Data collection date/time.	
	(Tag 1)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	(Tag 2)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	:	:	:	
	(Tag n)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○

The data type of (Tag 1) to (Tag n) depends on the value of the DataType column of the A_ProcessTagDevice table, as shown below.

Value of DataType column	Numeric value-string conversion	Data type of (Tag 1) to (Tag n)
16Bit(Signed), 16Bit(Unsigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(Unsigned), 32Bit(BCD), 32Bit(HEX)	Disabled	real
	Enabled	nvarchar(32)
Float	-	real
Double	-	float
Bit	-	nvarchar(32)
String	-	nvarchar(1020)

4.2.13 D_ActualData Table

The D_ActualData table is used to save the tag values collected by Actual-Data-Collection ACTION. This table will be automatically created when Actual-Data-Collection ACTION is executed in the RUNTIME mode. Actually, the table name is expressed with the ACTION ID of Actual-Data-Collection ACTION and the date, as shown below:

When the table is created daily : D_ActualData_ACTION ID_YYYYMMDD
When the table is created monthly : D_ActualData_ACTION ID _YYYYMM
When the table is created yearly : D_ActualData_ACTION ID _YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Data collection date/time.	
	(Tag 1)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	(Tag 1)_plan	(Depending on tag)	Plan value. In case of data collection failure, this value is NULL.	○
	(Tag 1)_achieve	real	Achievement ratio [%]. If either tag value or plan value is NULL, this value is NULL.	○
	:	:	:	
	(Tag n)	(Depending on tag)	Tag value. In case of data quality error or data collection failure, this value is NULL.	○
	(Tag n)_plan	(Depending on tag)	Plan value. In case of data collection failure, this value is NULL.	○
	(Tag n)_achieve	real	Achievement ratio [%]. If either tag value or plan value is NULL, this value is NULL.	○

The data type of (Tag 1) to (Tag n) and (Tag 1)_plan to (Tag n)_plan depends on the value of the DataType column of the A_ProcessTagDevice table, as shown below.

Value of DataType column	Data type of (Tag 1) to (Tag n)
16Bit(Signed), 16Bit(Unsigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(Unsigned), 32Bit(BCD), 32Bit(HEX)	real
Float	real
Double	float
Bit	real
String	Not applied to Actual-Data-Collection ACTION.

4.3 Tables for SRAM Alarm-History Collection ACTION

The following tables are used for GP SRAM Alarm-History Collection ACTION.

4.3.1 A_SramAlarmUpload Table

The A_SramAlarmUpload table is used to save the display unit's node name and block numbers (1 to 8) subjected to collection, that have been specified in registration of GP SRAM Alarm-History Collection ACTION. This table will be automatically registered when GP SRAM Alarm-History Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
	Block1	bit	Specification of Block 1 collection. (False: Collection disabled, True: Collection enabled)	
	Block2	bit	Specification of Block 2 collection. (False: Collection disabled, True: Collection enabled)	
	Block3	bit	Specification of Block 3 collection. (False: Collection disabled, True: Collection enabled)	
	Block4	bit	Specification of Block 4 collection. (False: Collection disabled, True: Collection enabled)	
	Block5	bit	Specification of Block 5 collection. (False: Collection disabled, True: Collection enabled)	
	Block6	bit	Specification of Block 6 collection. (False: Collection disabled, True: Collection enabled)	
	Block7	bit	Specification of Block 7 collection. (False: Collection disabled, True: Collection enabled)	
	Block8	bit	Specification of Block 8 collection. (False: Collection disabled, True: Collection enabled)	

4.3.2 D_SramAlarm Table

The D_SramAlarm table is used to save alarm history data collected from the SRAM.
This table will be automatically created when GP SRAM Alarm-History Collection ACTION is executed in the RUNTIME mode.
Actually, the table name is expressed as follows:

Table Name: D_SramAlarm_ACTION ID

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	StationName	nvarchar(32)	Node name.	
	Block	int	Alarm block number.	
	Datetime	datetime	Date and time.	
	Kind	nvarchar(7)	One of Trigger, Acknowledge or Recovery is specified.	
	Message	nvarchar(160)	Message	
	Count	int	Number of occurrences. (A value at the time of first collection of the ACTION)	
	TotalTime	bigint	Total time. (Unit: second) (A value at the time of first collection of the ACTION)	
	Level	int	Level.	

4.3.3 D_SramAlarmLastId Table

The D_SramAlarm table is used to save the ID of the latest record added to the D_SramAlarm table by block. This table will be automatically registered when GP SRAM Alarm-History Collection ACTION is executed in the RUNTIME mode, without necessity of user's registration procedure. This ID is used to speed up the processing to check if the same alarm history already exists in the Sram alarm log table when a new history is added to this table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
○	Block	int	Alarm block number.	
	LastID	int	ID of the latest record added to the SRAM alarm log table.	

4.4 Tables for CF-card Alarm-History-File Collection ACTION

The following tables are used for GP CF-card Alarm-History-File Collection ACTION.

4.4.1 A_CfAlarmUpload Table

The A_CfAlarmUpload table is used to save the display unit's node name and block numbers (1 to 8) subjected to collection, that have been specified in registration of GP CF-card Alarm-History-File Collection ACTION. This table will be automatically registered when GP CF-card Alarm-History-File Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
	Block1	bit	Specification of Block 1 collection. (False: Collection disabled, True: Collection enabled)	
	Block2	bit	Specification of Block 2 collection. (False: Collection disabled, True: Collection enabled)	
	Block3	bit	Specification of Block 3 collection. (False: Collection disabled, True: Collection enabled)	
	Block4	bit	Specification of Block 4 collection. (False: Collection disabled, True: Collection enabled)	
	Block5	bit	Specification of Block 5 collection. (False: Collection disabled, True: Collection enabled)	
	Block6	bit	Specification of Block 6 collection. (False: Collection disabled, True: Collection enabled)	
	Block7	bit	Specification of Block 7 collection. (False: Collection disabled, True: Collection enabled)	
	Block8	bit	Specification of Block 8 collection. (False: Collection disabled, True: Collection enabled)	
	Synchronize	bit	Synchronization at first startup. (False: Not synchronized, True: Synchronized)	

4.4.2 D_CfAlarm Table

The D_CfAlarm table is used to save alarm history data collected from the CF card. This table will be automatically created when GP CF-card Alarm-History-File Collection ACTION is executed in the RUNTIME mode. Actually, the table name is expressed as follows:

Table Name: D_CfAlarm_ACTION ID

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	StationName	nvarchar(32)	Node name.	
	Block	int	Alarm block number.	
	Datetime	datetime	Day/Time	
	Kind	nvarchar(7)	Trigger	
	Message	nvarchar(160)	Message	
	Count	int	Number of occurrences. (A value at the time of first collection of the ACTION)	
	TotalTime	bigint	Total time. (Unit: second) (A value at the time of first collection of the ACTION)	
	Level	int	Level.	

4.4.3 D_CfAlarmLastId Table

The D_CfAlarmLastId table is used to save the ID of the latest record added to the D_CfAlarm table by block. This table will be automatically registered when GP CF-card Alarm-History-File Collection ACTION is executed in the RUNTIME mode, without necessity of user's registration procedure. This ID is used to speed up the processing to check if the same alarm history already exists in the D_CfAlarm table when a new history is added to this table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
○	Block	int	Alarm block number.	
	LastID	int	ID of the latest record added to the CF-card alarm log table.	

4.5 Tables for SRAM Sampling-Data Collection ACTION

The following tables are used for GP SRAM Sampling-Data Collection ACTION.

4.5.1 A_SramSamplingDataUpload Table

The A_SramSamplingDataUpload table is used to save the display unit's node name and group numbers (1 to 64) subjected to collection and table creation unit that have been specified in registration of GP SRAM Sampling-Data Collection ACTION. This table will be automatically registered when GP SRAM Sampling-Data Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
	Group1	bit	Specification of Group 1 collection. (False: Collection disabled, True: Collection enabled)	
	:	:	:	
	Group64	bit	Specification of Group 64 collection. (False: Collection disabled, True: Collection enabled)	
	TableUnit	nchar(1)	Collection data table creation unit. Specify any of the following items: D (daily basis), M (monthly basis), Y (yearly basis), N (None), S (Table name specification)	
	TableName	nvarchar(128)	Specified Table Name	
	InsertAsString	bit	Enable to save sampled data to the database as String data ([Insert Sampled Data as String]). (True: Enabled, False: Disabled)	

NOTE

- To upgrade the MES Action version, change the data table in the following procedures.

1.Open both data tables of the old and new databases.

2.Copy all the data from the old database to the new database.

3.Since the TableName field in the new database shows NULL, set the blank space.

4.5.2 D_SramSamp Table

The D_SramSamp table is used to save the sampling data collected from the SRAM. This table will be automatically created when GP SRAM Sampling-Data Collection ACTION is executed in the RUNTIME mode. All the sampling data in the table is defined by the values in the first record.

Values that can be expressed using floating point: real

Values that cannot be expressed using floating point: nvachar (variable length UNICODE text)

Even if the format of sampling data is set up as text, if all the values in the first record are numeric, all the sampling data will be saved in the database as real values.

As shown below, table name is based on the ACTION ID, display unit's node name, group number, and table creation frequency.

When the table is created daily : D_SramSamp_ACTION ID_node name_Group number_YYYYMMDD

When the table is created monthly : D_SramSamp_ACTION ID_node name_Group number_YYYYMM

When the table is created yearly : D_SramSamp_ACTION ID_node name_Group number_YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Date and time.	
	(Item name 1)	real/nvachar(128)	Sampling data.	○
	(Item name 2)	real/nvachar(128)	Sampling data.	○
	:			○
	(Item name n)	real/nvachar(128)	Sampling data.	○

4.5.3 D_SramSampLastDatetime Table

The D_SramSampLastDatetime table is used to save the date/time of the latest record added to the D_SramSamp table by group. This table will be automatically registered when GP SRAM Sampling-Data Collection ACTION is executed in the RUNTIME mode, without necessity of user's registration procedure.

This date/time is used to speed up the processing to check if a record with the same contents already exists in the D_SramSamp table when a new record is added to this table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
○	Group	Int	Group number.	
	LastDatetime	Datetime	Date/time of the latest record added to the D_SramSamp table.	

4.6 Tables for CF-card Sampling-Data-File Collection ACTION

The following tables are used for GP CF-card Sampling-Data-File Collection ACTION.

4.6.1 A_CfSamplingDataUpload Table

The A_CfSamplingDataUpload table is used to save the display unit's node name and group numbers (1 to 64) subjected to collection and table creation unit that have been specified in registration of GP CF-card Sampling-Data-File Collection ACTION. This table will be automatically registered when GP CF-card Sampling-Data-File Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
	Group1	bit	Specification of Group 1 collection. (False: Collection disabled, True: Collection enabled)	
	:	:	:	
	Group64	bit	Specification of Group 64 collection. (False: Collection disabled, True: Collection enabled)	
	TableUnit	nchar(1)	Collection data table creation unit. Specify any of the following items: D (daily basis), M (monthly basis), Y (yearly basis), N (None), S (Table name specification)	
	TableName	nvarchar(128)	Specified Table Name	
	Synchronize	bit	Synchronization at first startup. (False: Not synchronized, True: Synchronized)	
	CfFileAutoDel	bit	CF-card data automatic deletion. (False: Not to be deleted, True: To be deleted)	
	CfFileAutoDel Date	int	Number of days to activate CF-card data automatic deletion.	○
	InsertAsString	bit	Enable to save sampled data to the database as String data ([Insert Sampled Data as String]). (True: Enabled, False: Disabled)	

NOTE

- To upgrade the MES Action version, change the data table in the following procedures.

1.Open both data tables of the old and new databases.

2.Copy all the data from the old database to the new database.

3.Since the TableName field in the new database shows NULL, set the blank space.

4.6.2 D_CfSamp Table

The D_CfSamp table is used to save the sampling data collected from the CF card. This table will be automatically created when GP CF-card Sampling-Data-File Collection ACTION is executed in the RUNTIME mode.

All the sampling data in the table is defined by the values in the first record.

Values that can be expressed using floating point: real

Values that cannot be expressed using floating point: nvachar (variable length UNICODE text)

Even if the format of sampling data is set up as text, if all the values in the first record are numeric, all the sampling data will be saved in the database as real values.

As shown below, table name is based on the ACTION ID, display unit's node name, group number, and table creation frequency.

When the table is created daily : D_CfSamp_ACTION ID_node name_Group number_YYYYMMDD

When the table is created monthly : D_CfSamp_ACTION ID_node name_Group number_YYYYMM

When the table is created yearly : D_CfSamp_ACTION ID_node name_Group number_YYYY

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	Date and time.	
	(Item name 1)	real/nvachar(128)	Sampling data.	○
	(Item name 2)	real/nvachar(128)	Sampling data	○
	:			○
	(Item name n)	real/nvachar(128)	Sampling data	○

4.6.3 D_CfSampLastDatetime Table

The D_CfSampLastDatetime table is used to save the date/time of the latest record added to the D_CfSamp table by group. This table will be automatically registered when GP CF-card Sampling-Data-File Collection ACTION is executed in the RUNTIME mode, without necessity of user's registration procedure.

This date/time is used to speed up the processing to check if a record with the same contents already exists in the D_CfSamp table when a new record is added to this table.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Node name.	
○	Group	Int	Group number.	
	LastDatetime	Datetime	Date/time of the latest record added to the D_CfSamp table.	

4.7 Tables for CF-card Screen-File Collection ACTION

The following tables are used for GP CF-card Screen-File Collection ACTION.

4.7.1 A_CfScreenFileUpload Table

The A_CfSceenFileUpload table is used to save the display unit's node name subjected to collection, saving method (indirect saving or direct saving), and the folder to save screen files with the indirect saving method, that have been specified in registration of GP CF-card Screen-File Collection ACTION. This table will be automatically registered when GP CF-card Screen-File Collection ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	StationName	nvarchar(32)	Name of node.	
	SaveMethod	nchar(1)	Saving method. Specify any of the following items: D (Direct saving), I (Indirect saving)	
	SaveFolder	nvarchar(256)	Folder path to save a screen file with the indirect saving method.	○
	Synchronize	bit	Synchronization at first startup. (False: Not synchronized, True: Synchronized)	

4.7.2 D_CfScreenFile Table

The D_CfScreenFile table is used to save the captured data collected from the CF card. This table will be automatically created when GP CF-card Screen-File Collection ACTION is executed in the RUNTIME mode. Actually, the table name is expressed with the ACTION ID, as follows:

Table Name: D_CfScreenFile_ACTION ID

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Main key with IDENTITY attribute.	
	Datetime	datetime	ACTION trigger date/time.	
	StationName	nvarchar(32)	Name of node.	
	FileName	nvarchar(255)	Captured data name in the CF card.	
	FilePath	nvarchar(260)	With the direct saving method, this value is NULL. With the indirect saving method, a full pathname of the captured data stored in the PC is specified.	○
	Image	varbinary(max)	With the direct saving method, contents of the captured data are specified. With the indirect saving method, this value is NULL.	○

4.8 Tables for Recipe-Download ACTION

The following tables are used for Recipe-Download ACTION.

4.8.1 A_CfRecipeDownload Table

The A_CfRecipeDownload table is used to save the display unit's node name and file number that have been specified in the CF-Card Write Settings dialog of Recipe-Download ACTION. This table will be automatically registered when Recipe-Download ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
○	RecipeNumber	int	Recipe number.	
	StationName	nvarchar(32)	Node name.	
	FileNumber	int	CSV file number.	

4.8.2 R_Recipe Table

The R_Recipe table is used to register a recipe to be specified by Recipe-Download ACTION. Users must create this table by using SQL Server Management Studio Express. Actually, the table name is expressed with the recipe number, as follows:

Table Name: R_Recipe_Recipe number (5 digits)

Main Key	Column Name	Data Type	Description	NULL Enabled
○	Line	int	Row Number. (Row number of the CSV file to be overwritten)	
	Item	nvarchar(32)	Item name. (Corresponding to the first column of the CSV file to be overwritten.)	
	Value	nvarchar(32)	Value. (Corresponding to the second column of the CSV file to be overwritten.)	○

4.8.3 R_RecipeIndex Table

The R_RecipeIndex table is used to allocate a condition name to a recipe registered in the R_Recipe table. Users must register this table by using SQL Server Management Studio Express. The items registered in this table are listed in the recipe list of Recipe-Download ACTION.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	RecipeNumber	int	Recipe number.	
	ConditionName	nvarchar(32)	Condition name.	

4.9 Tables for Composite Document Recipe-Transfer ACTION

The following tables are used for Composite Document Recipe-Transfer ACTION.

4.9.1 A_MultiRecipeWrite Table

The A_MultiRecipeWrite is used to save the information specified in registration of Composite Document Recipe-Transfer ACTION. This table will be automatically registered when Composite Document Recipe-Transfer ACTION is executed in the DESIGN mode, without necessity of user's registration procedure.

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ActionID	nchar(32)	Action ID. (Automatically determined when a new ACTION is created)	
	RecipeTableName	nvarchar(128)	Name of recipe table.	
	RecipeID	int	Recipe ID.	
	IndexSearch	bit	Index search. (False: Disabled, True: Enabled)	
	IndexStationName	nvarchar(32)	Name of node corresponding to index search address.	○
	IndexEquipmentName	nvarchar(32)	Name of connected Device/PLC corresponding to index search address.	○
	IndexDeviceAddress	nvarchar(131)	Device address or symbol name corresponding to index search address. For symbol name, the format is "Sheet name.Symbol name".	○
	IndexDataType	nvarchar(15)	Data type for the device corresponding to index search address. Specify any of the following items: 16Bit(Signed), 16Bit(UnSigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(UnSigned), 32Bit(BCD), 32Bit(HEX), String	○
	IndexCount	int	Indicates a length (number of bytes) of string, when IndexDataType is String. If the IndexDataType setting is other than String, this column is not used.	○
	TitleWrite	bit	Title transfer. (False: Disabled, True: Enabled)	
	TitleStationName	nvarchar(32)	Name of node corresponding to title transfer destination address.	○
	TitleEquipmentName	nvarchar(32)	Name of connected Device/PLC corresponding to title transfer destination address.	○
	TitleDeviceAddress	nvarchar(131)	Device address or symbol name corresponding to title transfer destination address. For symbol name, the format is "Sheet name.Symbol name".	○
	TitleCount	Int	Length of title to be transferred (Number of bytes).	○
	ParameterWrite	bit	Recipe parameter transfer. (False: Disabled, True: Enabled)	

Main Key	Column Name	Data Type	Description	NULL Enabled
	ParameterStationName	nvarchar(32)	Name of node corresponding to recipe parameter transfer destination address.	○
	ParameterEquipmentName	nvarchar(32)	Name of connected Device/PLC corresponding to recipe parameter transfer destination address.	○
	ParameterDeviceAddress	nvarchar(131)	Device address or symbol name corresponding to recipe parameter transfer destination top address. For symbol name, the format is "Sheet name.Symbol name".	○
	ParameterDataType	nvarchar(15)	Data type for the device corresponding to recipe parameter transfer destination address. Specify any of the following items: 16Bit(Signed), 16Bit(UnSigned), 16Bit(BCD), 16Bit(HEX), 32Bit(Signed), 32Bit(UnSigned), 32Bit(BCD), 32Bit(HEX), Float, Double,	○
	ParameterCount	int	Number of recipe parameters transferred.	○
	CsvWrite	bit	CSV file transfer.(False: Disabled, True: Enabled)	
	CsvStationName	nvarchar(32)	Name of CSV file transfer destination node.	○
	ImageWrite	bit	Image file transfer.(False: Disabled, True: Enabled)	
	ImageStationName	nvarchar(32)	Name of image file transfer destination node.	○

4.9.2 R_MultiRecipe Table

The R_MultiRecipe table is used to register data to be transferred by Composite Document Recipe-Transfer ACTION. Create the R_MultiRecipe table with SQL Server Management Studio Express. Actually, the table name is expressed as follows:

Table Name: R_MultiRecipe_ arbitrary string

Main Key	Column Name	Data Type	Description	NULL Enabled
○	ID	int	Unique integer used for index search. Main key.	
	Index	nvarchar(32)	Unique string used for index search.	
	Title	varchar(32)	String to be transferred by title transfer.	○
	toTextFile	nvarchar(255)	Name of the CSV file to be stored into the display unit's CF card by CSV file transfer.	○
	fromTextFile	nvarchar(260) or nvarchar(max)	When Data Type is nvarchar(260), specify a pathname of the text file to be transferred by CSV file transfer. When Data Type is nvarchar(max), specify the text data to be transferred by CSV file transfer.	○
	toImageFile	nvarchar(255)	Name of the image file to be stored in the display unit's CF card by image file transfer.	○
	fromImageFile	nvarchar(260) or varbinary(max)	When Data Type is nvarchar(260), specify a pathname of the image file to be transferred by image file transfer. When Data Type is varbinary(max), specify the image data to be transferred by image file transfer.	○
	(Arbitrary recipe item name 1)	float	Recipe parameter 1. If this value is NULL, writing is skipped.	○
	:	:	:	:
	(Arbitrary recipe item name n)	float	Recipe parameter n. If this value is NULL, writing is skipped.	○

5 Error Information

5.1 Error Information

5.1.1 Error Code List

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B00601 SAAK001 -1062205951 3232761345	Program execution error occurred.{0:s}	An unexpected error occurred in the program. Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00602 SAAK002 -1062205950 3232761346	Cannot transfer due to insufficient CF space of the destination Node.	Confirm the available space of the CF card of the destination node.
0xC0B00604 SAAK004 -1062205948 3232761348	Cannot access the database. Check the connection parameter of the database.	The parameter to log in the database does not match the one registered in SQL Server. Confirm the SQL login parameter.
0xC0B00605 SAAK005 -1062205947 3232761349	The file size got by reading CF-card files is invalid.	The file list obtained from the display unit in CF card is damaged. Confirm the display unit connection / operation status.
0xC0B00606 SAAK006 -1062205946 3232761350	The file count got by reading CF-card files does not agree.	The file list obtained from the display unit in CF card is damaged. Confirm the display unit connection / operation status.
0xC0B00607 SAAK007 -1062205945 3232761351	The file got by reading CF-card files is damaged.	The file list obtained from the display unit in CF card is damaged. Confirm the display unit connection / operation status.
0xC0B00608 SAAK008 -1062205944 3232761352	Server name not specified.	Specify the SQL server name.
0xC0B00609 SAAK009 -1062205943 3232761353	Up to {0:s} tags can be registered in an ACTION.	The number of tags available to register in the process-data or actual-data collection is up to 200.
0xC0B0060A SAAK010 -1062205942 3232761354	Invalid symbol/device name or data-type mismatching.	Specify a correct symbol name or device name.
0xC0B0060B SAAK011 -1062205941 3232761355	No tag name inputted.	Specify the tag name.
0xC0B0060C SAAK012 -1062205940 3232761356	Data count is valid only for texts.	You can specify the data count for the string type. Select 1 for other data types.
0xC0B0060D SAAK013 -1062205939 3232761357	Input cache update cycle.	The cache update rate has not been registered. Register cache update rate.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B0060E SAAK014 -1062205938 3232761358	Specified update cycle is not a numeric value. Input a correct value.	Specify a numeric value in the cache update rate.
0xC0B0060F SAAK015 -1062205937 3232761359	Specified numeric value is out of range. Input a correct value.	You specified the cache update rate out of range. Specify it between 1ms and 100000ms.
0xC0B00612 SAAK018 -1062205934 3232761362	Specify a day to delete CF sampling data.	Correctly enter a day to delete between 1 and 10.
0xC0B00613 SAAK019 -1062205933 3232761363	Specified day is not a numeric value. Input a correct value.	Correctly enter a day to delete between 1 and 10.
0xC0B00614 SAAK020 -1062205932 3232761364	Folder in which to save screen files not specified.	Enter a valid folder name correctly.
0xC0B00615 SAAK021 -1062205931 3232761365	Specified folder name in which to save screen files is incorrect.	Enter a valid folder name correctly.
0xC0B00616 SAAK022 -1062205930 3232761366	Recipe table not found in the database.	There is no R_Recipe table for RecipeNumber registered in the R_RecipeIndex table. Delete the nonexistent RecipeNumber in the R_RecipeIndex table, or register the R_Recipe table correctly.
0xC0B00617 SAAK023 -1062205929 3232761367	No recipe information registered in the database.	Parameter to download the recipe is not described in the registered R_Recipe table. Confirm the R_Recipe table.
0xC0B00618 SAAK024 -1062205928 3232761368	The type of recipe information is incorrect.	Parameter description defined in the registered R_Recipe table is incorrect. Confirm the parameter description.
0xC0B00619 SAAK025 -1062205927 3232761369	CSV file not found.	The recipe CSV file generated inside is not found when downloading the recipe. Errors may occur in the system or application. Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0061B SAAK027 -1062205925 3232761371	Select a conditional-name in the recipe list.	Select the condition name in the recipe list and add the recipe to write into the CF card.
0xC0B0061C SAAK028 -1062205924 3232761372	Select a conditional-name of which the file-number is to be changed.	After selecting the condition name to chage the file number, change the file number.
0xC0B0061D SAAK029 -1062205923 3232761373	Select the conditional-name to be deleted.	Select the recipe you want to cancel writing in CF card, and click the [Delete] button.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B0061E SAAK030 -1062205922 3232761374	Specify a participating node.	A writing destination node is not specified. Specify a writing destination node.
0xC0B0061F SAAK031 -1062205921 3232761375	Wrong file-number.	The display unit cannot control this file number. Specify the file number between 0 and 65535.
0xC0B00620 SAAK032 -1062205920 3232761376	Duplicated file-number is specified.	The file number you specified is duplicated. Specify the file number which is not duplicated.
0xC0B00621 SAAK033 -1062205919 3232761377	Select a recipe-number.	After selecting the recipe number you want to change, change the CSV file number.
0xC0B00623 SAAK035 -1062205917 3232761379	Address for index search not specified.	Address for the index search is not specified. Define the address. If the index search is not required, disable it.
0xC0B00624 SAAK036 -1062205916 3232761380	Title transfer-destination address not specified.	Address to which the title is transferred is not specified. Define the address. If the title transfer is not required, disable it.
0xC0B00625 SAAK037 -1062205915 3232761381	Recipe-parameter transfer-destination address not specified.	Address to which the recipe parameter is transferred is not specified. Define the address. If the recipe parameter transfer is not required, disable it.
0xC0B00626 SAAK038 -1062205914 3232761382	CSV-file transfer-destination Node not specified.	Address to which the CSV file is transferred is not specified. Define the address. If the CSV file transfer is not required, disable it.
0xC0B00627 SAAK039 -1062205913 3232761383	Image-file transfer-destination Node not specified.	Address to which the image file is transferred is not specified. Define the address. If the image file transfer is not required, disable it.
0xC0B00628 SAAK040 -1062205912 3232761384	Select a recipe-table.	A recipe table is not selected. Select a recipe table.
0xC0B00629 SAAK041 -1062205911 3232761385	Data types of [Float], [Double] and [Bit] are not available for "Address for Search".	You cannot specify the data types of [Float], [Double] and [Bit] for the index search address. Specify other data types.
0xC0B0062A SAAK042 -1062205910 3232761386	Data type available for "title transfer-destination address" is [String] only.	You can specify the string only for the data type of symbol/device address in case of the title transfer. Specify the data type of string.
0xC0B0062B SAAK043 -1062205909 3232761387	Select either the ID or the Index.	The ID or index is not specified. Select the ID or index.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B0062C SAAK044 -1062205908 3232761388	No ID or Index is registered in the database, thereby the Index-search is not executed.	No ID or index is registered in the recipe table. Specify each parameter in the recipe table.
0xC0B0062D SAAK045 -1062205907 3232761389	The Data-number is specified only in Character-string-type.	You can specify the data count for the string type. Select 1 for other data types.
0xC0B0062E SAAK046 -1062205906 3232761390	Recipe-parameter-transfer-address is not specified in Character-string-type.	You cannot specify the string for the recipe parameter transfer address. Specify other data types.
0xC0B0062F SAAK047 -1062205905 3232761391	No recipe-parameter is registered in the {0:s} recipe-table.	The recipe parameter is not defined in the recipe table you specify. Confirm the recipe parameter table and set again.
0xC0B00630 SAAK048 -1062205904 3232761392	Analog-data-tag is not specified in this Symbol/Device-data-type.	Specify the symbol/device address with the data type of other than bit or string for the analog registered tag.
0xC0B00631 SAAK049 -1062205903 3232761393	Digital-data-tag is not specified in this Symbol/Device-data-type.	Specify the symbol/device address with the data type of bit for the digital registered tag.
0xC0B00632 SAAK050 -1062205902 3232761394	String-data-tag is not specified in this Symbol/Device-data-type.	The registered parameter required for ACTION cannot be loaded, and the following ACTION cannot be executed. Confirm the database connection parameter, table registration and ACTION parameter, and correct them.
0xC0B00633 SAAK051 -1062205901 3232761395	Failed in accessing the device. Please confirm the network connection correct between the destination node. ({0:s})	Confirm the connection of the device you collect the data from.
0xC0B00634 SAAK052 -1062205900 3232761396	Error occurred on writing the control-limit-monitoring-information in the device. ({0:s})	Confirm the connection of the device in which you write the control-limit-monitoring-information.
0xC0B00635 SAAK053 -1062205899 3232761397	Initialization failed, thereby the requested action is no more executed.	The registered parameter required for ACTION cannot be loaded, and the following ACTION cannot be executed. • Confirm the database connection parameter, table registration and ACTION parameter, and correct them. • It may be that the application could not connect to SQL Server. Confirm SQL Server is running, then restart Pro-Server EX.
0xC0B00636 SAAK054 -1062205898 3232761398	Cannot execute.The Pro-Server EX version is old.	Please update the 'Pro-server EX'.
0xC0B00641 SAAK065 -1062205887 3232761409	Failed to connect to database. Connection String: {0:s}	Confirm the database information settings of ACTION.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B00642 SAAK066 -1062205886 3232761410	Already connected to database. Cannot doubly connect.	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00643 SAAK067 -1062205885 3232761411	Cannot change the value of InProcess column of C_MonthlyProcess table from False to True.	Exit 'Pro-Server EX', and confirm the value of the InProcess column (processing flag) in the C_MonthlyProcess table. If it is True, change it to False. If it is False already, increase the value of the WaitingTime column (waiting time [sec] when the processing flag is True).
0xC0B00644 SAAK068 -1062205884 3232761412	Failed to check whether monthly process is required. Current Time: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00645 SAAK069 -1062205883 3232761413	In monthly process, failed to switch to Master database.	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00646 SAAK070 -1062205882 3232761414	In monthly process, failed to get the paths of database file and log file.	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00647 SAAK071 -1062205881 3232761415	In monthly process, failed to detach the database.	Do not open the MESActionDB database using Management Studio etc. on the point of passing the month. Monthly process was not completed, and the data in this month is saved following the data of the previous month or earlier.
0xC0B00648 SAAK072 -1062205880 3232761416	In monthly process, failed to copy database file and log file.	Confirm that the disk drive has a sufficient space to save the copied database file and log file. Monthly process was not completed, and the data in this month is saved following the data of the previous month or earlier.
0xC0B00649 SAAK073 -1062205879 3232761417	In monthly process, failed to attach the copy-source database.	Reinstall MES ACTION.
0xC0B0064A SAAK074 -1062205878 3232761418	In monthly process, failed in external-resource access permission of copy-source database using SQLCLR.	Reinstall MES ACTION.
0xC0B0064B SAAK075 -1062205877 3232761419	In monthly process, failed to attach the copy-destination database.	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0064C SAAK076 -1062205876 3232761420	In monthly process, failed in external-resource access permission of copy-destination database using SQLCLR.	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0064D SAAK077 -1062205875 3232761421	In monthly process, failed to switch from Master database to database for MES ACTION.	Reboot the PC. If the error still occurs, reinstall MES ACTION.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B0064E SAAK078 -1062205874 3232761422	In monthly process, failed to clear the data from the data table.	To use MES Actions, match the MES Action [User] and MES Action database [Owner]. Additionally, for the user you are setting up, grant the required rights in SQL Server. For information on setting up rights, refer to "2.1.3 Registering Users on SQL Server". If the error still occurs, either Reboot the PC or reinstall MES ACTION.
0xC0B0064F SAAK079 -1062205873 3232761423	Failed to update the values of InProcess column and LastDateTime column of C_MonthlyProcess table.	Exit 'Pro-Server EX', and confirm the value of the InProcess column (processing flag) in the C_MonthlyProcess table. If it is True, change it to False. If the error still occurs, reinstall MES ACTION.
0xC0B00650 SAAK080 -1062205872 3232761424	Failed to read the CSV file of CF Alarm. CSV File Path: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00651 SAAK081 -1062205871 3232761425	Error while writing the CSV contents of CF Alarm into database. ACTION ID: {0:s}, Node Name: {1:s}, Block No.: {2:s}, CSV File Path: {3:s}	In GP-Pro EX, in the [Alarm Settings] - [CSV Settings], set [Date Format] to anything except for "mm/dd". The date format in the CSV file and the date format defined in the GP-Pro EX [Date Format] field may not match. Please check your settings. If any of the following applies to you, set the GP-Pro EX [Date Format] to "yy/mm/dd". • Using a version of GP-Pro EX before V3.12 • Using a version of Pro-Server EX before V1.32 • Using a version of MES Actions before V1.02.000 Exit 'Pro-Server EX', delete the D_CfAlarm table, and start 'Pro-Server EX' again. If the error still occurs, reinstall MES ACTION.
0xC0B00652 SAAK082 -1062205870 3232761426	Failed to read the CSV file of CF Sampling Data. CSV File Path: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00653 SAAK083 -1062205869 3232761427	Error while writing the CSV contents of CF Sampling Data into database. ACTION ID: {0:s}, Node Name: {1:s}, Group No.: {2:s}, CSV File Path: {3:s}	In GP-Pro EX, in the [Sampling] - [Display/Save in CSV], set the [CSV Date Format] to anything except for "mm/dd". Under any of the following circumstances, set the GP-Pro EX [CSV Date Format] to "yy/mm/dd". • Using a version of GP-Pro EX before V3.12 • Using a version of Pro-Server EX before V1.32 • Using a version of MES Actions before V1.02.000 Exit 'Pro-Server EX', delete the D_CfSamp table, and start 'Pro-Server EX' again. If the error still occurs, reinstall MES ACTION.
0xC0B00654 SAAK084 -1062205868 3232761428	Failed to read the CF screen file. Screen File Path: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00655 SAAK085 -1062205867 3232761429	Error while writing the CF-screen-file contents into database. ACTION ID: {0:s}, Date and Time: {1:s}, Node Name: {2:s}, File Name: {3:s}, File Path: {4:s}, Storage Method: {5:s}	Exit 'Pro-Server EX', delete the D_CfScreenFile table, and start 'Pro-Server EX' again. If the error still occurs, reinstall MES ACTION.
0xC0B00656 SAAK086 -1062205866 3232761430	Failed to read the CSV file of SRAM Alarm. CSV File Path: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B00657 SAAK087 -1062205865 3232761431	Error while writing the CSV contents of SRAM Alarm into database. ACTION ID: {0:s}, Node Name: {1:s}, Block No.: {2:s}, CSV File Path: {3:s}	Exit 'Pro-Server EX', delete the D_SramAlarm table, and start 'Pro-Server EX' again. If the error still occurs, reinstall MES ACTION.
0xC0B00658 SAAK088 -1062205864 3232761432	Failed to read the CSV file of SRAM Sampling Data. CSV File Path: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00659 SAAK089 -1062205863 3232761433	Error while writing the CSV contents of SRAM Sampling Data into database. ACTION ID: {0:s}, Node Name: {1:s}, Group No.: {2:s}, CSV File Path: {3:s}	Exit 'Pro-Server EX', delete the D_SramSamp table, and start 'Pro-Server EX' again. If the error still occurs, reinstall MES ACTION.
0xC0B0065A SAAK090 -1062205862 3232761434	Failed to check whether the recipe table (R_Recipe) exists. Recipe No.: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0065B SAAK091 -1062205861 3232761435	Failed to get data from the recipe table (R_Recipe). Recipe No.: {0:s}	Create the recipe table in the correct format.
0xC0B0065C SAAK092 -1062205860 3232761436	Failed to get data from the recipe table (R_Recipe). Recipe No.: {0:s}	Create the recipe table in the correct format.
0xC0B0065D SAAK093 -1062205859 3232761437	Failed to get data from the recipe index table (R_RecipeIndex).	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0065E SAAK094 -1062205858 3232761438	Failed to write data into the {0:s} table. SQL Statement: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0065F SAAK095 -1062205857 3232761439	Failed to clear data from the {0:s} table. SQL Statement: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00660 SAAK096 -1062205856 3232761440	Failed to get data from the {0:s} table. SQL Statement: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00661 SAAK097 -1062205855 3232761441	Failed in the mask process of engineering-value conversion. Check the registration of the T_LinearAnalog table. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Confirm the specified signal condition in the T_LinearAnalog table and the device data type assigned to the tag, and set that combination correctly.
0xC0B00662 SAAK098 -1062205854 3232761442	Tag Name not registered in the T_TagName table. Tag Name: {0:s}	Register the tags to be collected in the T_TagName table.
0xC0B00663 SAAK099 -1062205853 3232761443	Input range for the data type and signal condition is incorrect. Check the registration of the T_LinearAnalog table. Tag Name: {0:s}, Data Type: {1:s}	Set the correct input upper limit and input lower limit in the T_LinearAnalog table according to the data type of the signal condition and device.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B00664 SAAK100 -1062205852 3232761444	Math error in linearization operation. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Review the input upper and lower limit values, as well as the output upper and lower limit values in the T_LinearAnalog table.
0xC0B00665 SAAK101 -1062205851 3232761445	Wrong data type. Tag Name: {0:s}, Data Type: {1:s}	Delete the tag collection registration, and register again. If the error still occurs, reinstall MES ACTION.
0xC0B00666 SAAK102 -1062205850 3232761446	Failed in engineering-value conversion. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Set the data type of the tag-assigned device correctly.
0xC0B00667 SAAK103 -1062205849 3232761447	Error while checking whether the D_ActualData table exists. Table Name: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00668 SAAK104 -1062205848 3232761448	Error while creating the D_ActualData table. Table Name: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00669 SAAK105 -1062205847 3232761449	Error while getting the column of the D_ActualData table. Table Name: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0066A SAAK106 -1062205846 3232761450	Error while getting the column of the D_ActualData table. Table Name: {0:s}, SQL Statement: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0066B SAAK107 -1062205845 3232761451	Error while adding record to the D_ActualData table. Table Name: {0:s}, SQL Statement: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0066C SAAK108 -1062205844 3232761452	Error in the process of control-limit monitoring. Tag Name: {0:s}, Tag Value: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0066D SAAK109 -1062205843 3232761453	Error in the process of achievement-rate calculation. Tag Name: {0:s}, Tag Value: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0066E SAAK110 -1062205842 3232761454	Failed to send mail in the process of control-limit monitoring. Tag Name: {0:s}	Confirm the connection to the SMTP Server. If the error occurs, though connected, review the SMTP server-related settings in the C_CmmonInfo table.
0xC0B0066F SAAK111 -1062205841 3232761455	Failed in the mask process of engineering-value conversion. Check the registration of the T_LinearAnalog table. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Set the data type of the tag-assigned device correctly.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B00670 SAAK112 -1062205840 3232761456	Failed to convert from numeric value to string. Check the specification of the StringConvertMethod column and the EngineeringUnit column in the T_LinearAnalog table. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Check the specification of the StringConvertMethod column and the EngineeringUnit column in the T_LinearAnalog table.
0xC0B00671 SAAK113 -1062205839 3232761457	Failed to convert from numeric value to string. Check the specification of the StringConvertMethod column and the EngineeringUnit column in the T_LinearAnalog table. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Check the specification of the StringConvertMethod column and the EngineeringUnit column in the T_LinearAnalog table.
0xC0B00672 SAAK114 -1062205838 3232761458	Failed to convert the string of the digital tag. Check the T_LineDigital table. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Register the digital tag registered for collection in the T_LineDigital table.
0xC0B00673 SAAK115 -1062205837 3232761459	Tag Name not registered in the T_TagName table. Tag Name: {0:s}	Register the tag registered for collection in the T_TagName table.
0xC0B00674 SAAK116 -1062205836 3232761460	Input range for the data type and signal condition is incorrect. Check the registration of the T_LinearAnalog table. Tag Name: {0:s}, Data Type: {1:s}	Set the correct input upper limit and input lower limit in the T_LinearAnalog table according to the data type of the signal condition and device.
0xC0B00675 SAAK117 -1062205835 3232761461	Math error in linearization operation. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Review the input upper and lower limit values, as well as the output upper and lower limit values in the T_LinearAnalog table.
0xC0B00676 SAAK118 -1062205834 3232761462	Wrong data type. Tag Name: {0:s}, Data Type: {1:s}	Delete the tag collection registration, and register again. If the error still occurs, reinstall MES ACTION.
0xC0B00677 SAAK119 -1062205833 3232761463	Failed in engineering-value conversion. Tag Name: {0:s}, Data Type: {1:s}, Value before Conversion: {2:s}	Set the data type of the tag-assigned device correctly.
0xC0B00678 SAAK120 -1062205832 3232761464	Error while checking whether the D_ProcessData table exists. Table Name: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00679 SAAK121 -1062205831 3232761465	Error while creating the D_ProcessData table. Table Name: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0067A SAAK122 -1062205830 3232761466	Error while getting the column of the D_ProcessData table. Table Name: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0067B SAAK123 -1062205829 3232761467	Error while creating the column of the D_ProcessData table. Table Name: {0:s}, SQL Statement: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.

Error Code	Message ({0:s} etc. shows an arbitrary string)	Troubleshooting
0xC0B0067C SAAK124 -1062205828 3232761468	Error while adding record to the D_ProcessData table. Table Name: {0:s}, SQL Statement: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0067D SAAK125 -1062205827 3232761469	Error in the process of control-limit monitoring. Tag Name: {0:s}, Tag Value: {1:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B0067E SAAK126 -1062205826 3232761470	Failed to send mail in the process of control-limit monitoring. Tag Name: {0:s}	Confirm the connection to the SMTP Server. If the error occurs, though connected, review the SMTP server-related settings in the C_CmmonInfo table.
0xC0B0067F SAAK127 -1062205825 3232761471	Failed to get the column composition of the R_MultiRecipe table. Table Name: {0:s}	Confirm if there is the R_MultiRecipe table. If the error occurs, though it exists, reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00680 SAAK128 -1062205824 3232761472	Failed to get the recipe information from the R_MultiRecipe table. Table Name: {0:s}	Create the R_MultiRecipe table in the correct column configuration.
0xC0B00681 SAAK129 -1062205823 3232761473	Failed to read the file to transfer the CSV file of composite document recipe. File Path: {0:s}	Confirm if there is the file to transfer the CSV file, the path of which is set in the fromTextFile column in the R_MultiRecipe table. If it does not exist, create a file.
0xC0B00682 SAAK130 -1062205822 3232761474	Failed to read the file to transfer the image file of composite document recipe. File Path: {0:s}	Confirm if there is the file to transfer the image file, the path of which is set in the fromImageFile column in the R_MultiRecipe table. If it does not exist, create a file.
0xC0B00683 SAAK131 -1062205821 3232761475	Failed to read T_TagName table.	Reboot the PC. If the error still occurs, reinstall MES ACTION.
0xC0B00684 SAAK132 -1062205820 3232761476	Incongruous Tag-data-type in existing queue of the {0:s}-table. Please delete the queue or change the queue name. Tag Name: {1:s}	Delete the corresponding tag column in the D_ProcessData table or change the column name.
0xC0B00685 SAAK133 -1062205819 3232761477	Incongruous Tag-data-type in existing queue of the {0:s}-table. Please delete the queue or change the queue name. Tag Name: {1:s}	Delete the corresponding tag column in the D_ProcessData table or change the column name.
0xC0B00686 SAAK134 -1062205818 3232761478	Incorrect set of combination of the tag-type specified in the T_TagName-table and the data-type of the device-symbol. Tag-name: {0:s}, Tag-type: {1:s}, Data-type: {2:s}	Change the tag type specified in the T_TagName table or change the device data type.
0xC0B00687 SAAK135 -1062205817 3232761479	Failed to get the Tag-type out of the T_TagName-table. Tag Name: {0:s}	Reboot the PC. If the error still occurs, reinstall MES ACTION.

6 Appendix

6.1 Appendix

6.1.1 Basic Operations of SQL Server Management Studio Express

To configure the database, mainly operate as follows:

- Creating a database
- Crating a database table or view

This section describes about these operations using SQL Server Management Studio Express as follows:

■ Creating a Database

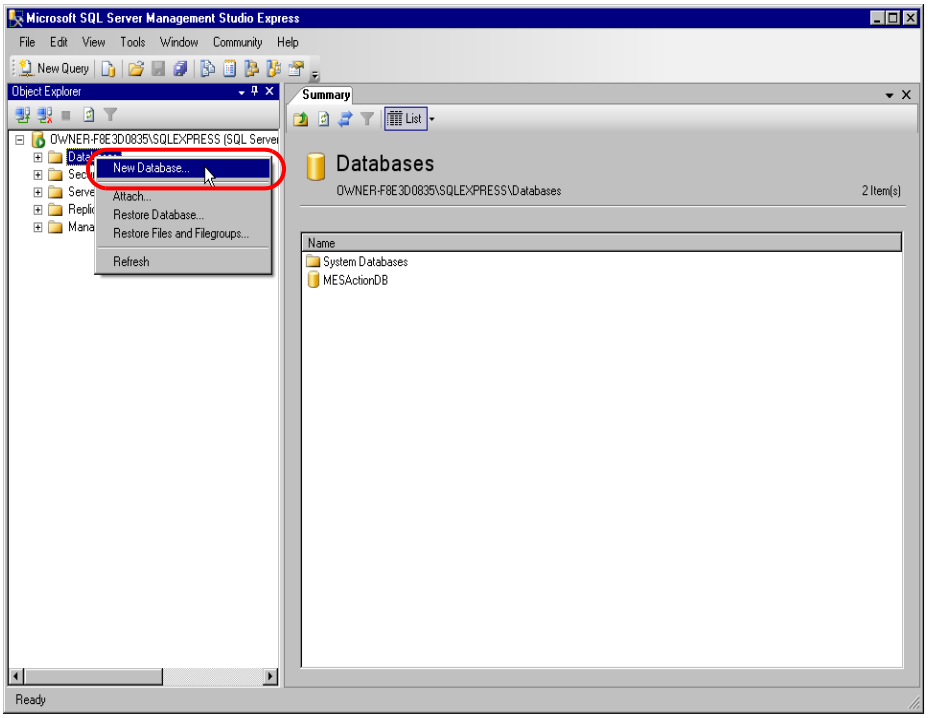
Many procedures are required to create a database. However, if you use SQL Server and SQL Server Management Studio Express together, you can create a database easily. The following describes how to create the basic database.

NOTE

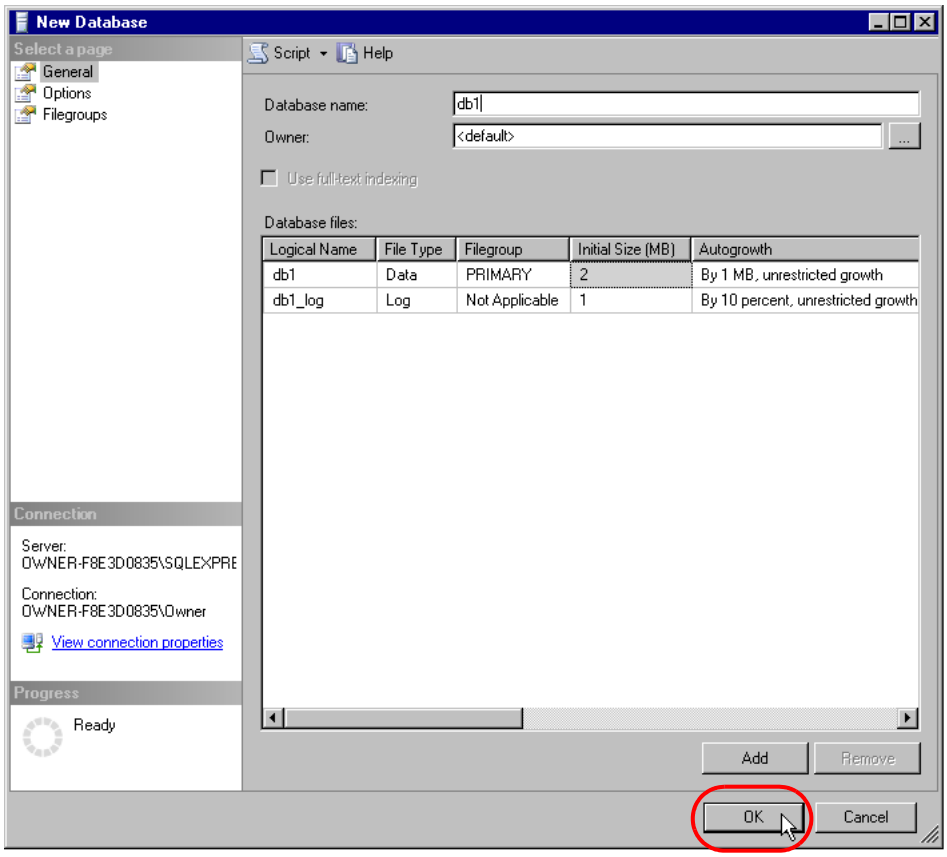
- The following example uses Microsoft(R) SQL Server(R) 2005 Express Edition.
- Depending on the operating system you are using, the display and part names may differ. If so, replace the names with those with similar features used in your system configuration.

1 To start SQL Server Management Studio Express, from the [Start] menu point to [All Programs], [Microsoft SQL Server 2005], and then click [SQL Server Management Studio Express].

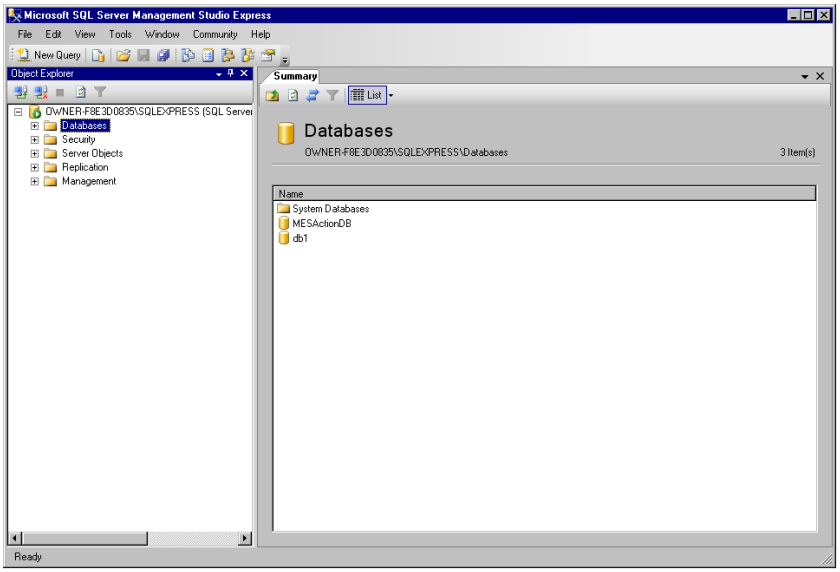
2 Specify the server name, authentication method and login account to log into SQL Server. When the SQL Server Management Studio Express appears, right-click [Database] on the left pane. Click [New Database] in the shortcut menu.


Microsoft SQL Server Management Studio Express
File Edit View Tools Window Community Help
New Query
Object Explorer
OWNER-F8E3D0835\SQLEXPRESS (SQL Server
New Database...
Attach...
Restore Database...
Restore Files and Filegroups...
Refresh
Summary
List
Databases
OWNER-F8E3D0835\SQLEXPRESS\Databases
2 Item(s)
Name
System Databases
MESActionDB
Ready

3 Enter "db1" under [Database name] in the "New Database" dialog box. [Database files] is automatically set. Click [OK].



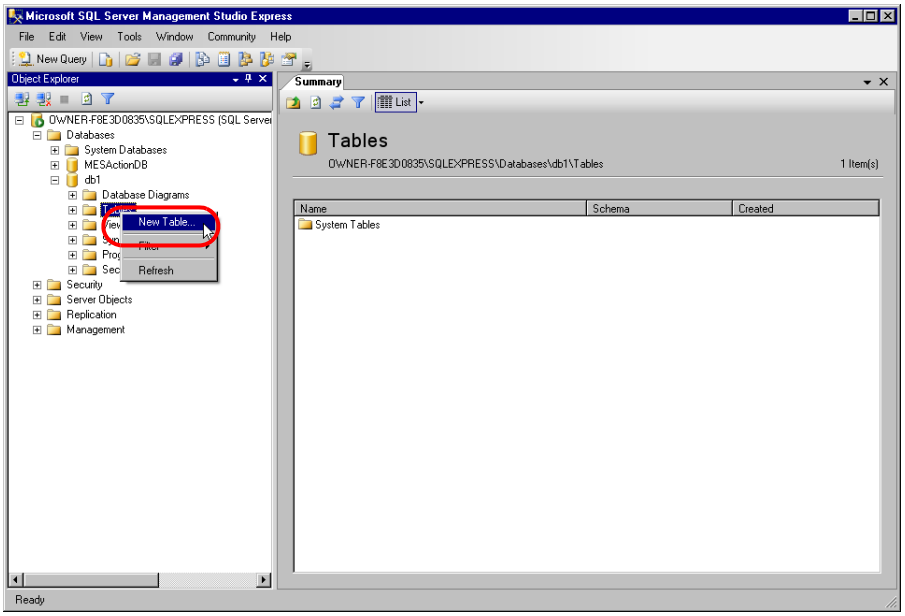
4 The created new database is displayed on the [Summary] tab.



■ Creating a Table

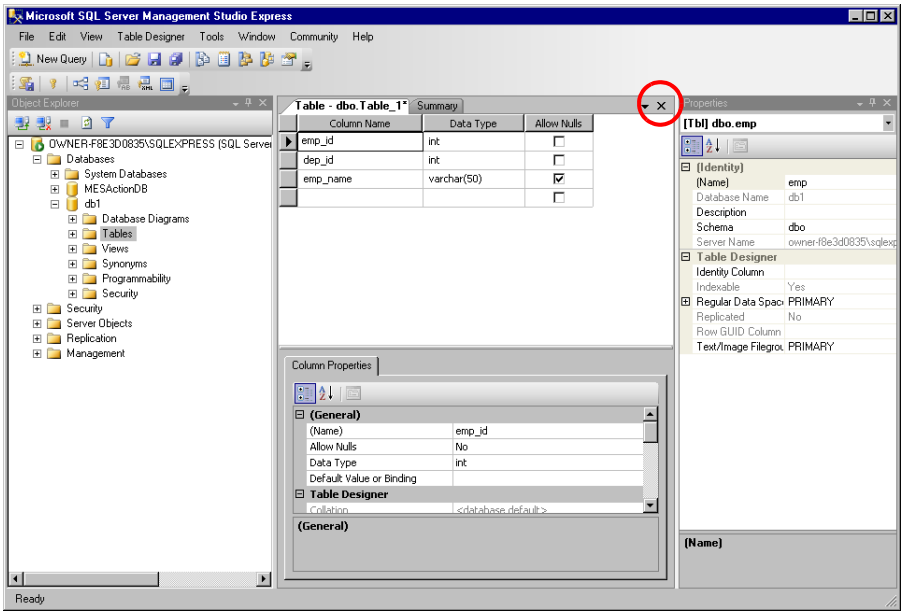
Create a table which is one of the basic database objects. Create the department table "dep" and the employee table "emp" combined with the department ID. Similarly with the database, you can create a table easily.

1 On the left pane of SQL Server Management Studio Express, right-click [Databases] - [db1] - [Tables]. Click [New Table] in the shortcut menu.



2 Enter the definition of a table to be created on the displayed center pane. For the table definition, refer to the table below. After entering the table definition, enter "emp" under [Name] in the "Properties" window and click the [X] button on the center pane. When confirmation of the save is asked, click [OK].

Column Name	Data Type	NULL Enabled
emp_id	int	No
dep_id	int	No
emp_name	varchar(50)	Yes



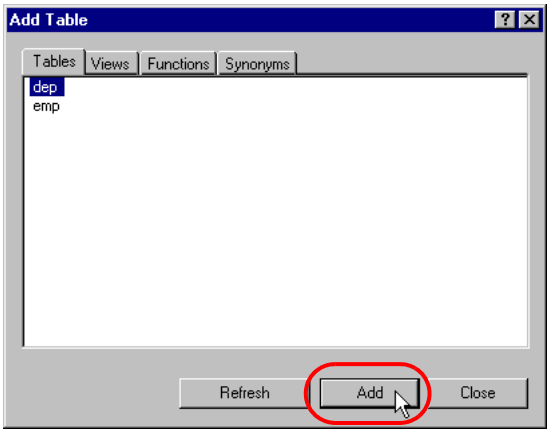
3 Create the dep table in the same manner. For the table definition, refer to the table below.

Column Name	Data Type	NULL Enabled
dep_id	int	No
dep_name	varchar(50)	Yes

■ Creating a View

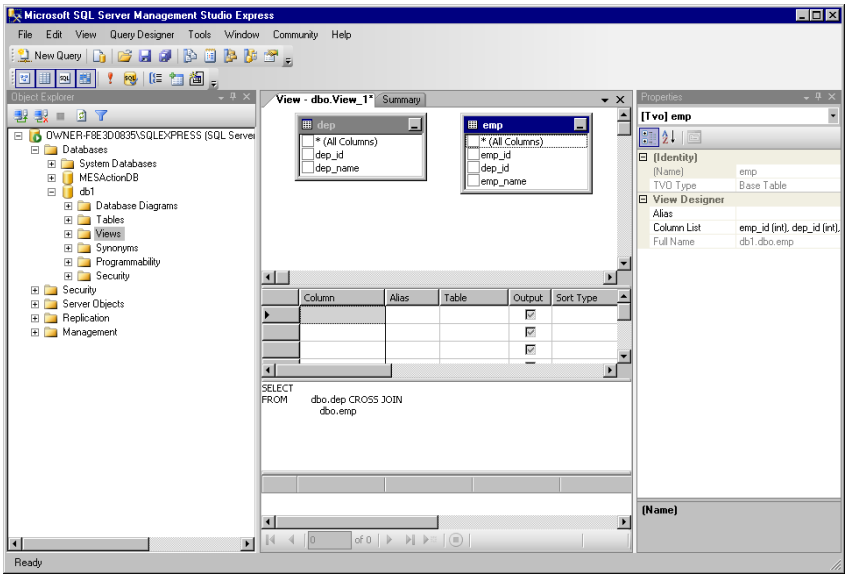
A view is also one of the basic database objects In this section, to browse the employees and departments collectively, create the view where the department table "dep" and employee table "emp" are combined with the department ID "dep_id".

1 Right-click [Databases] - [db1] - [Views] on the left pane. Click [New View] in the shortcut menu. Click [dep] on the [Tables] tab in the "Add Table" dialog box, and click [Add]. Operate for [emp] in the same manner.

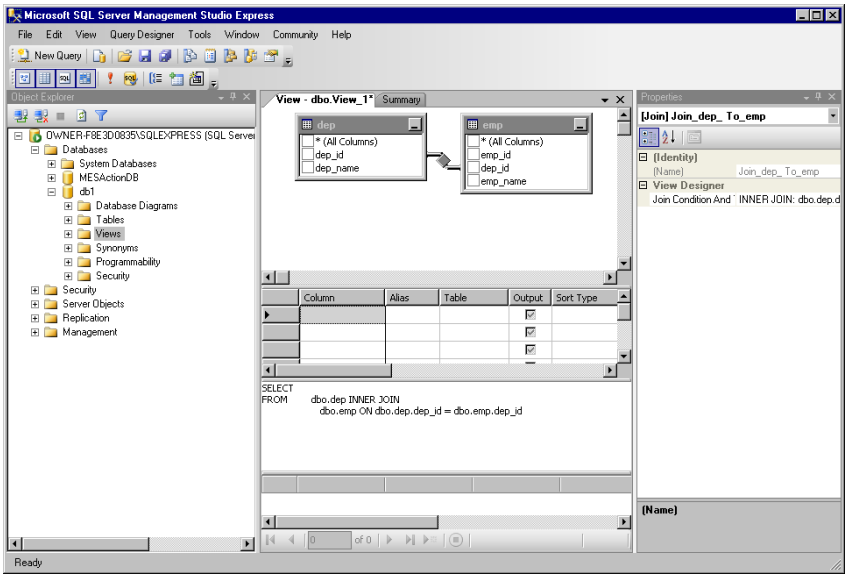


2 Click [Close].

3 Define the view on the displayed center pane. The table definition you have added is displayed.

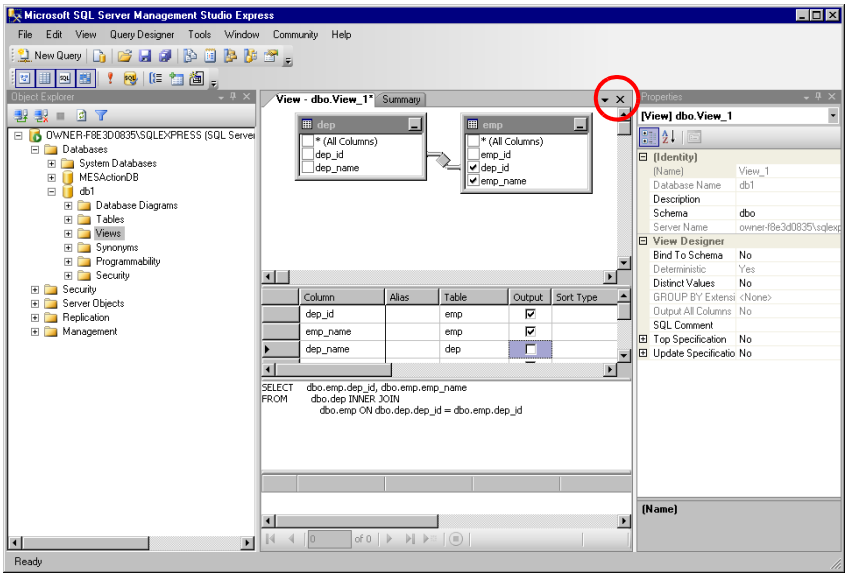


4 Drag and drop the dep_id field in the dep table on the dep_id field in the emp table. The combination relationship is set.

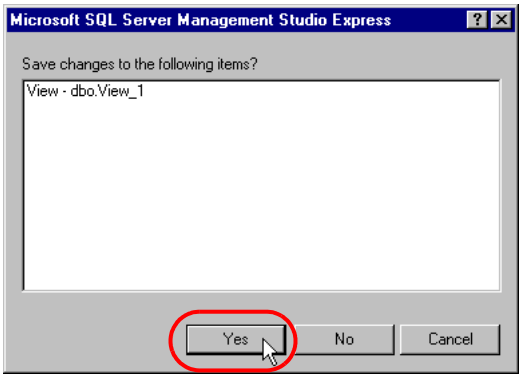


5 Define the columns to be output in the view. Refer to the table below and define the view. When the definition is completed, click [X] on the center pane.

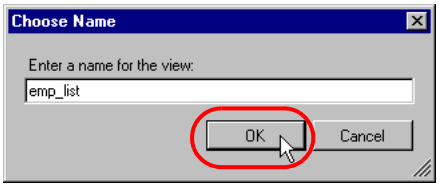
Column	Alias	Table	Output	Sort Type
dep_id		emp	Yes	
emp_name		emp	Yes	
dep_name		dep		



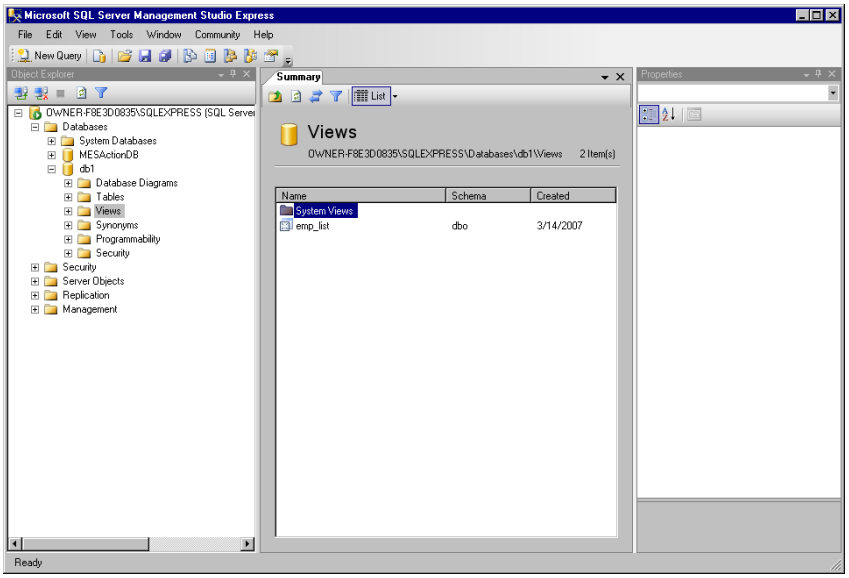
6 Confirm the view save and click [Yes].



7 When a view name is asked, enter "emp_list" and click [OK].



8 The created new view is displayed on the [Summary] tab.

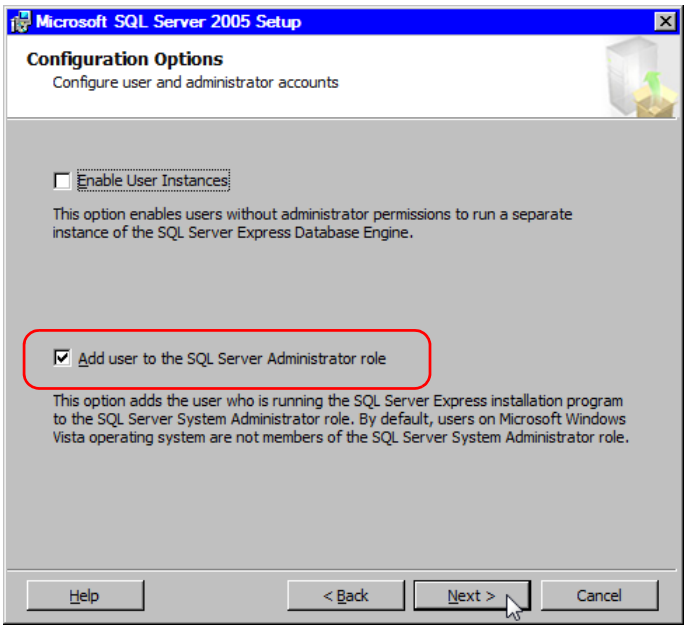


6.1.2 Upgrading SQL Server

To upgrade the SQL Server, double-click on "SQLEXPR_ADV.EXE" (self-decompression package that stores both SQL Server and SQL Server Management Studio Express). The self-decompression package starts decompressing.

■ Notes on Version Upgrade

When the following screen is displayed during version upgrade, check the [Add User to SQL Server Administrator Role] option and click [Next].



■ Notes After Version Upgrade

Since the database owner is cleared after version upgrade, set it again.

7 Inquiry

7.1 Inquiry

Do you have any questions about difficulties with MES ACTION?

Before contacting us

Our site, which offers support for Pro-Server EX products, is loaded with content to support your questions and requests. Please access our site anytime that you need help with a solution.

http://www.pro-face.com/trans/en/manual/1001.html

* If you have any question about the contents and operations of Microsoft SQL Server or about the contents of this manual, contact Pro-face. For other questions, contact Microsoft at the following site:

  http://technet.microsoft.com/en-us/sqlserver/default (as of October, 2017)