Energy Measuring Unit MODBUS® corresponding Data Acquisition Software

MODEL

EMU4-SW1

User's Manual

- Before operating the instrument, you should first read thoroughly this operation manual for safe operation and optimized performance of the product.
  Deliver this user's manual to the end user.

- Table of contents -

Chapter 1
Introduction

About this chapter

This chapter explains the following.

Chapter 1 Introduction

1.1 Introduction

This document is the manual about MODBUS® corresponding Data Acquisition Software for energy measuring unit. This document explains the brief of the software, connection method, functions, setting method and so on. Read this manual carefully to handle the software properly.
This manual is written on the assumption that you understand the basic operations of Microsoft® Windows®. If there is anything unclear about them, refer to such as the manual for the OS (Operating System) you are using.

* Microsoft® Windows® and Excel® are the registered trademarks of the U.S. Microsoft Corporation in the U.S. and other countries.
* MODBUS® is the registered trademark of Schneider Electric SA.
* Ethernet is the trademark of the U.S. Xerox Corporation.

1.2 Disclaimer

This software has the functions of reading or writing the setting values to the energy measuring unit, monitoring or logging measured data and outputting the logging data to the list by MODBUS® RTU communication.
Please review “Software usage contract” at the end of this manual.
We shall not accept any responsibility for the compensation of the data associated with the operation to change the setting of energy measuring unit, or the loss of acquired data after saving.

1.3 Features

This software is the dedicated one for the data acquisition on Microsoft® Windows® from the energy measuring unit with MODBUS® communication interface. This can acquire the data measured by the energy measuring unit and save it in the CSV file format.

This software has the following features.

(1) Data acquisition function
This software can acquire the measured data of up to 124 elements.
It monitors present values of measured data from the measuring devices and logs the data at the specified frequency by MODBUS® communication (Read Holding Registers function).

(2) Setting function
(a) Communication setting
Configure the physical setting for MODBUS® communication.
(b) Measuring terminal setting
Do Registration of measuring terminal. Further, configure the measuring terminal by MODBUS® communication (Write Multiple Registers function).
(c) Registration of measured points
Configure the measured items monitored and logged by the measuring function.

(3) Output function
Compile the logging data according to the specified condition, and paste the result to the list master (Excel® file).

(4) Multi-language corresponding
Display the text in the language selected at startup.

1.4 File composition

・Setup file

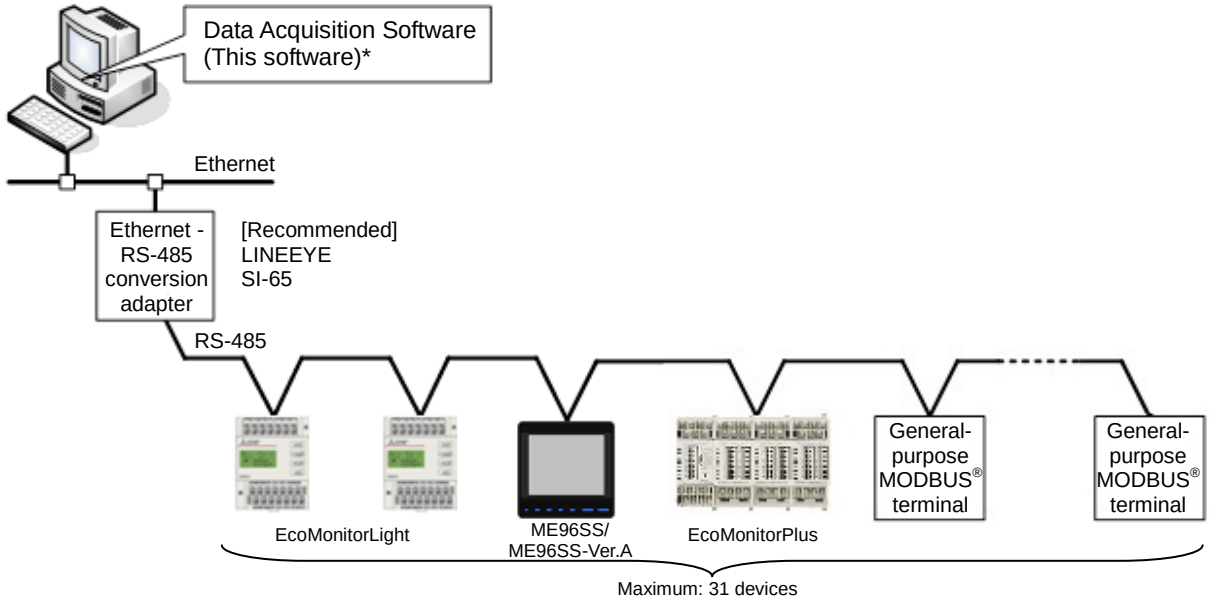
File name	Explanation
setup.exe	Installer for MODBUS® corresponding Data Acquisition Software

・Language folder

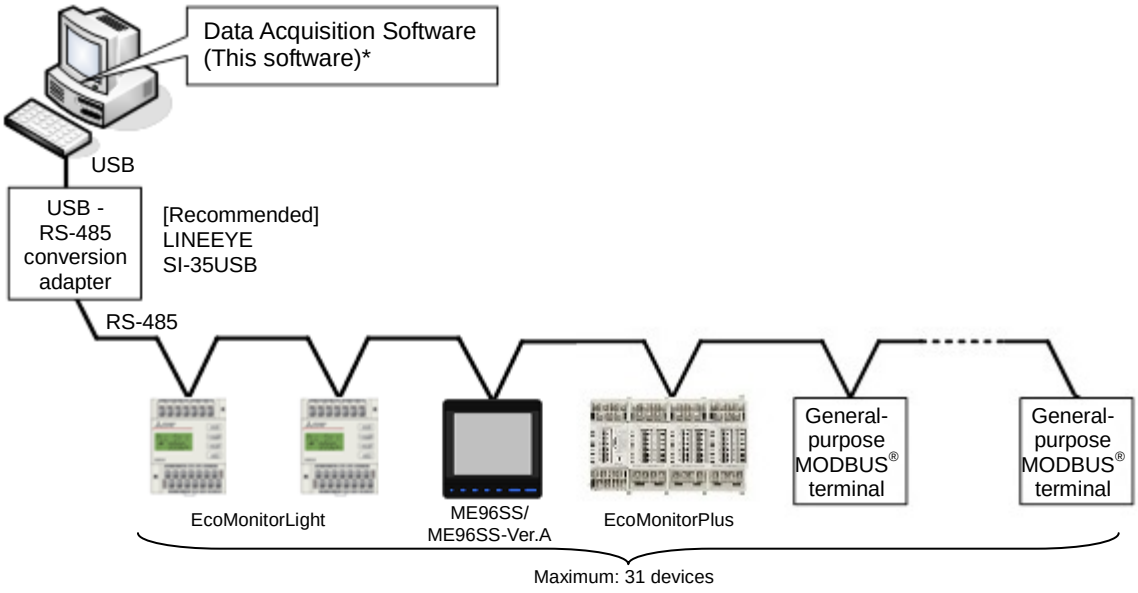
Language	Folder name	Explanation
English	Language¥0409	The folder storing language file of Data Acquisition Software and list master data
Japanese	Language¥0411	

1.5 Usage composition

(1) For Ethernet connection



(2) For USB connection



Note: Prepare the follows separately.
(1) PC
(2) Ethernet – RS-485 conversion adapter or USB – RS-485 conversion adapter*
(Including USB driver installed in the PC. Follow the manuals of adapter you use, for the installation of USB driver and conversion adapter driver.
(3) LAN cable or USB cable
(4) RS-485 cable
(5) Energy measuring unit

* Applicable product is the “LINEEYE SI-65 (Ethernet – RS-485 conversion adapter)” or “LINEEYE SI-35 USB (USB – RS-485 conversion adapter)”.

Chapter 2

Preparation before use

About this chapter

This chapter explains the following.

Chapter 2 Preparation before use

This software needs the device converting RS-485 communication into USB communication (USB - RS-485 conversion adapter) and the PC (compatible with PC/AT) with USB port, or the device converting RS-485 communication into Ethernet communication (Ethernet - RS-485 conversion adapter) and the PC (compatible with PC/AT) with Ethernet port separately.

2.1 Recommended system environment

Recommended system for this software is as follows:

Hardware	Composition condition
CPU *1	1GHz or faster
Memory *1	1GB or more
Hard disc *1	16GB or more space
Display	High-resolution display with XGA or more (It can display 65536 colors and 1024 × 768 dots or more.)
Communication (COM) port	1 USB port *2 or 1 Ethernet port *3
Input devices	Mouse and keyboard

*1: Conditions of CPU, memory and hard disc depend on the OS.
*2: When using USB port, connect via USB - RS-485 conversion adapter. This application communicates with the energy measuring units via COM port by virtual COM port driver supplied with this adapter.
*3: When using Ethernet port, connect via Ethernet - RS-485 conversion adapter. This application communicates with the energy measuring units via COM port by COM port redirect software supplied with this adapter.

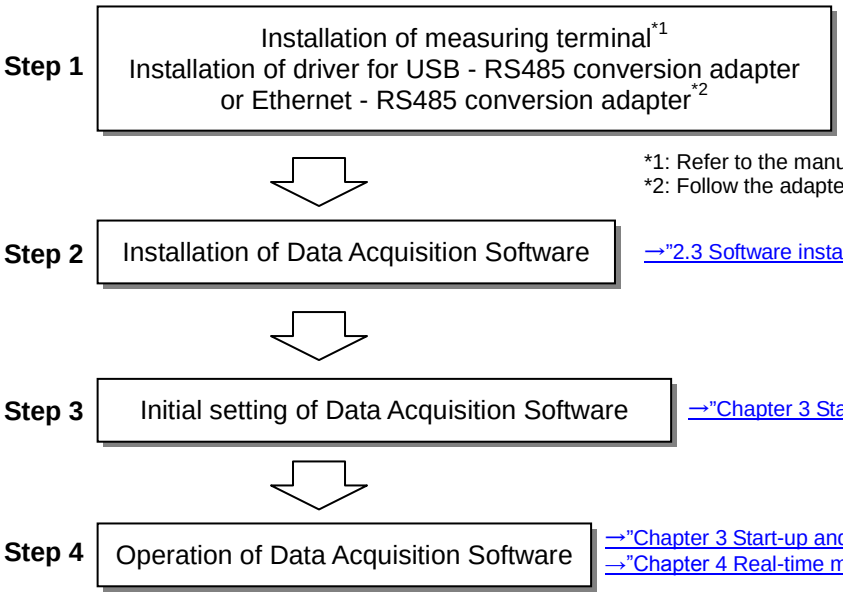
Software	Composition condition
OS (English)	・Microsoft® Windows® 8.1 Pro (32 / 64bit) ・Microsoft® Windows® 7 Professional (32 / 64bit) SP1 ・Microsoft® Windows Vista® Ultimate 32bit SP2
Microsoft® .NET Framework *4*5	・Microsoft® .NET Framework 2.0 ・Microsoft® .NET Framework 3.5 ・Microsoft® .NET Framework 3.5.1
Microsoft® Excel®	・Microsoft® Excel® 2007 SP3 (32 / 64bit) ・Microsoft® Excel® 2010 SP1 (32 / 64bit) ・Microsoft® Excel® 2013 SP1 (32 / 64bit)

*4: This software needs to be installed if it is not installed.

*5: Do not work for Microsoft® .NET Framework 4.X, corresponding version is required to install. 2.0/3.5/3.5.1 and 4.X are can be coexist.

2.2 System construction procedure

The following procedure is needed to acquire the data from the measuring terminal by this software.



*1: Refer to the manual of the measuring terminal.
*2: Follow the adapter you use.

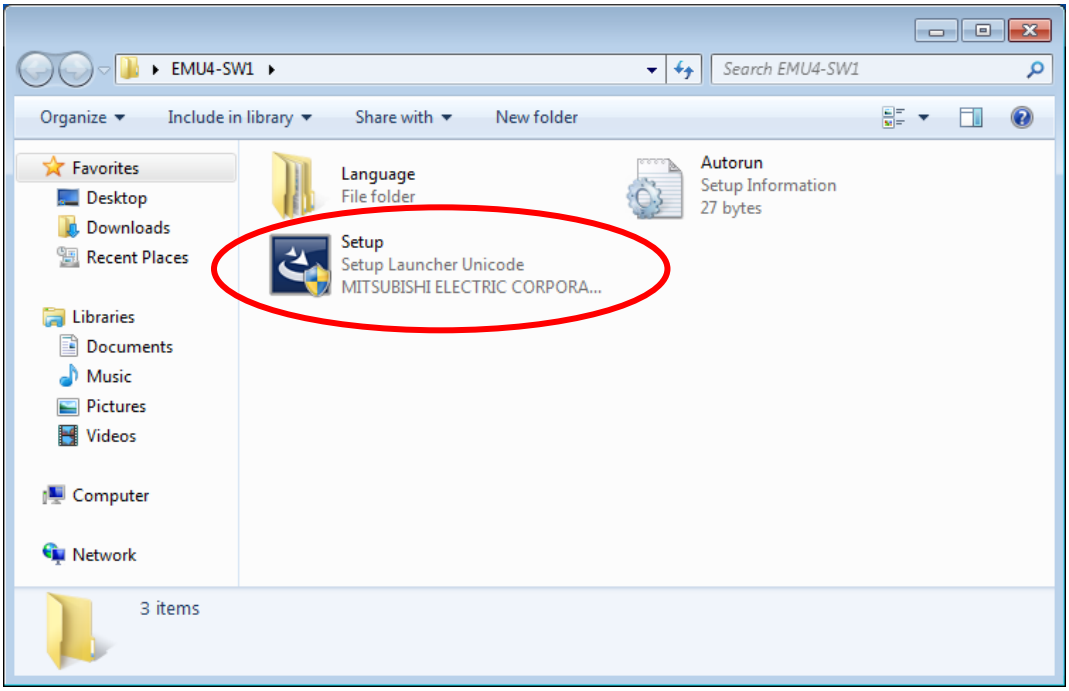
→"2.3 Software installation"
→"Chapter 3 Start-up and initial setting"
→"Chapter 3 Start-up and initial setting"
→"Chapter 4 Real-time monitoring / Data acquisition"

2.3 Software installation

You set up after downloading the Data Acquisition Software (EMU4-SW1).
Read this chapter carefully to set it up properly if you do for the first time.

Explain the case of Microsoft® Windows® 7.

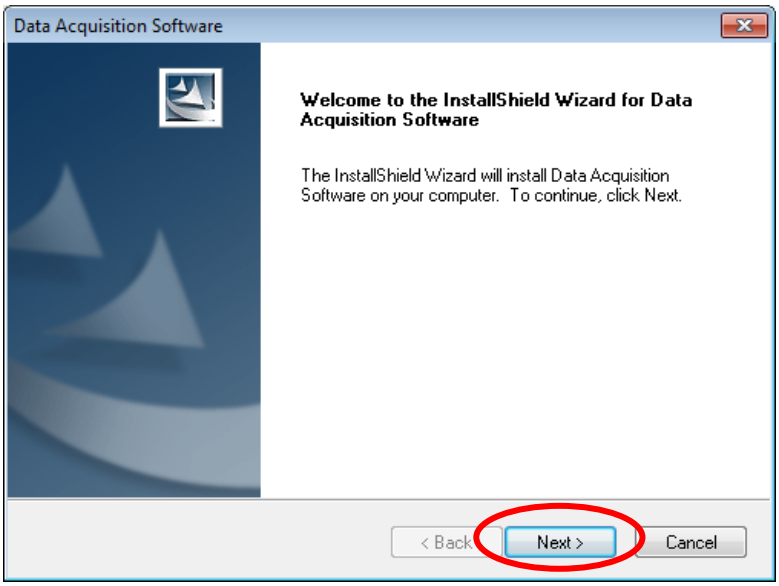
(a) Execute “setup.exe” in the downloaded file.



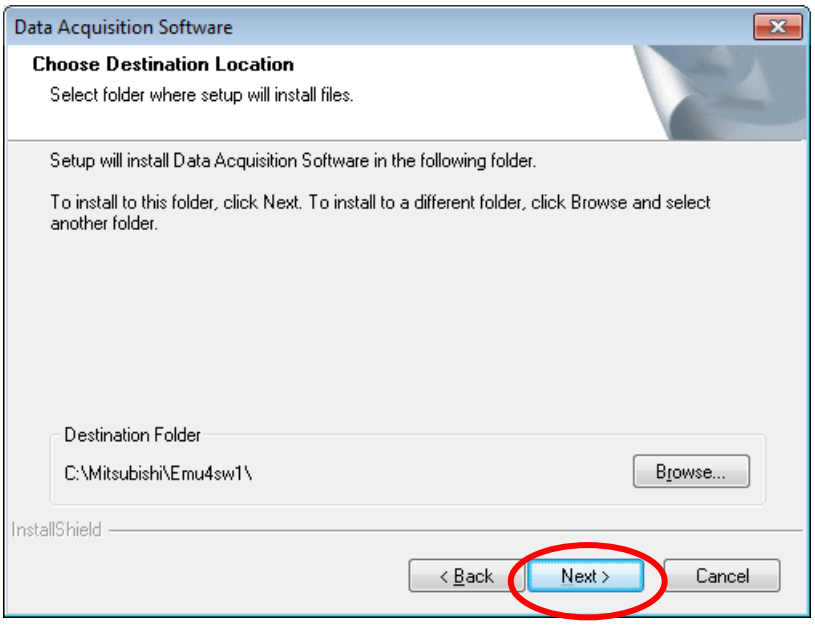
(b) Although User Account Control window is popped up and give the following warning, press [Yes] button.

“Do you want to allow the following program from an unknown publisher to make changes to this computer?”

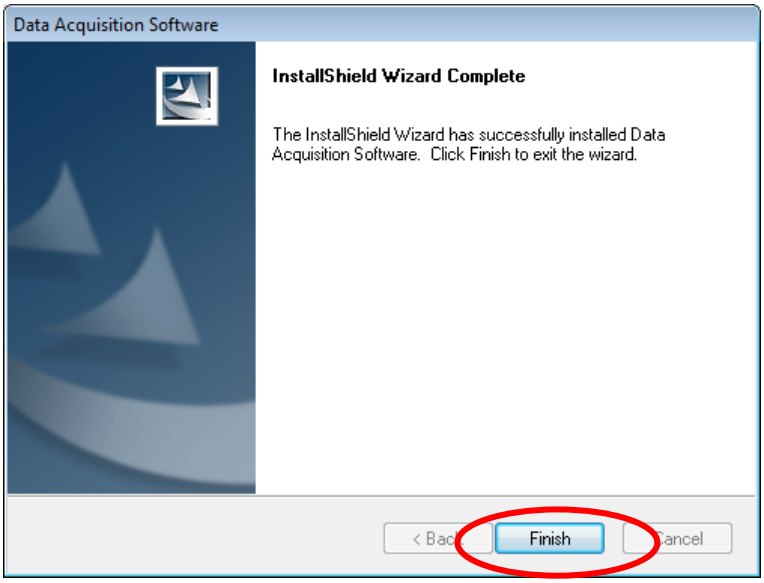
(c) Setup is started up and the following window is displayed, so press [Next] button.



(d) Select the folder where files are installed, and press [Next] button.



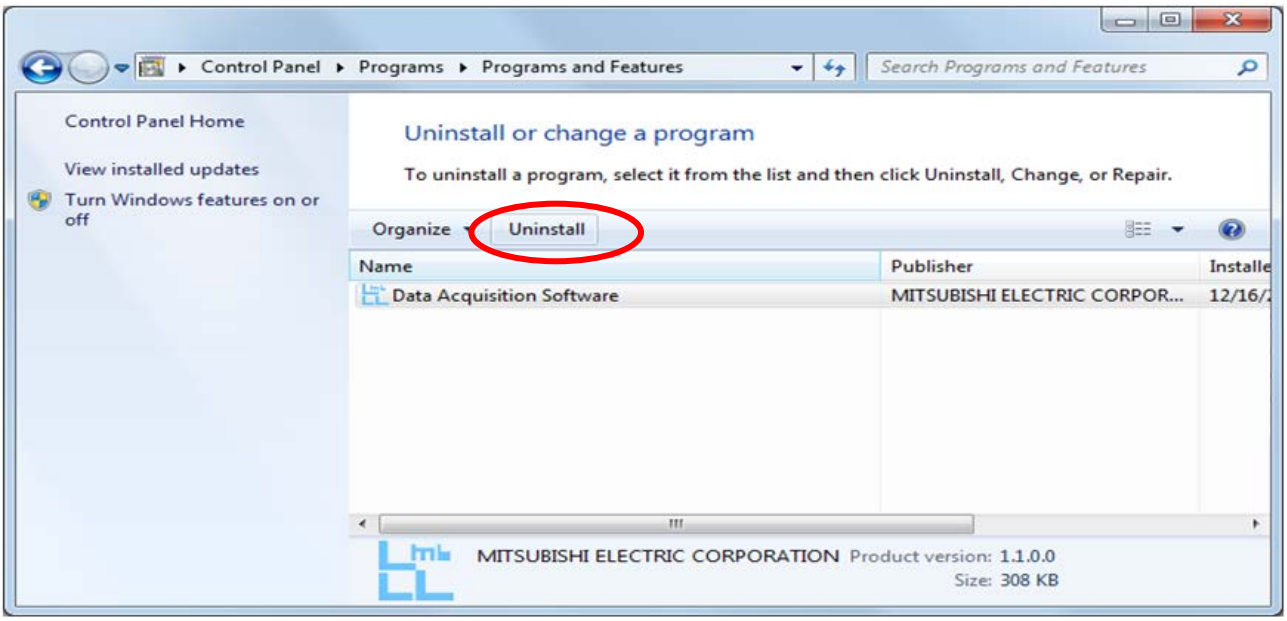
(e) After completing installation, the following window is displayed, so press [Finish] button.



2.4 Software uninstallation

If Data Acquisition Software becomes unnecessary, you can delete it from the PC easily by using [Uninstall or change a program].

(a) Select “Data Acquisition Software” from [Control panel] - [Programs] - [Uninstall] and press [Uninstall] button.



2.5 Precautions for use

Pay attention to the following when using this software.

(a) **Do not operate this software and other applications at the same time** during communication. Such an operation may cause difficulties in communication.

(b) Noisy environment may cause abnormal operation such as malfunctions in communication.

(c) Use the PC with this software installed under the conditions written in the manual of the PC such as conditions of use, installation conditions (power voltage, frequency, or need of ground) and so on.

(d) If the data acquisition for 24 consecutive hours, restart the computer once per week.

(e) Refer to "5.3 Procedure of version-up" for the procedure of the version up.

(f) If you use Notebook PC powered by battery, may not be able to acquire the data.
Please acquire the data while feeding the power to the notebook computer from the wall outlet.

Chapter 3

Start-up and initial setting

About this chapter

This chapter explains the following.

Chapter 3 Start-up and initial setting

Data Acquisition Software has the basic user interface of Windows® applications, so this can acquire the data from terminal by simple operations.
This chapter explains the display and basic operations of Data Acquisition Software.

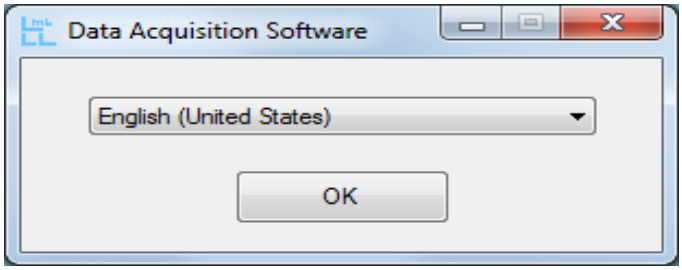
3.1 Start-up and end of Data Acquisition Software

(1) How to start up the software

Select［Data Acquisition Software(EMU4-SW1)］in start menu - [All programs] - [MITSUBISHI Energy Management]

* If Data Acquisition Software already runs, you cannot start it up any more.

At the first start-up, select the language in the language selection window as follow.
You can select either “Japanese (Japan)” or “English (United States.)”.



* At the second and subsequent startup, this window does not appear.

(2) How to end the software

Press [Exit] button of the main menu.

・If you want to change the language:
End the software, delete the following file, and start it up again.
After start-up, the above language selection window appears.

<File to delete> (The case of the default installation destination.)
C:¥Mitsubishi¥Emu4sw1¥Language.set
* If you delete the above file, the other data such as logging data or setting data are not deleted.

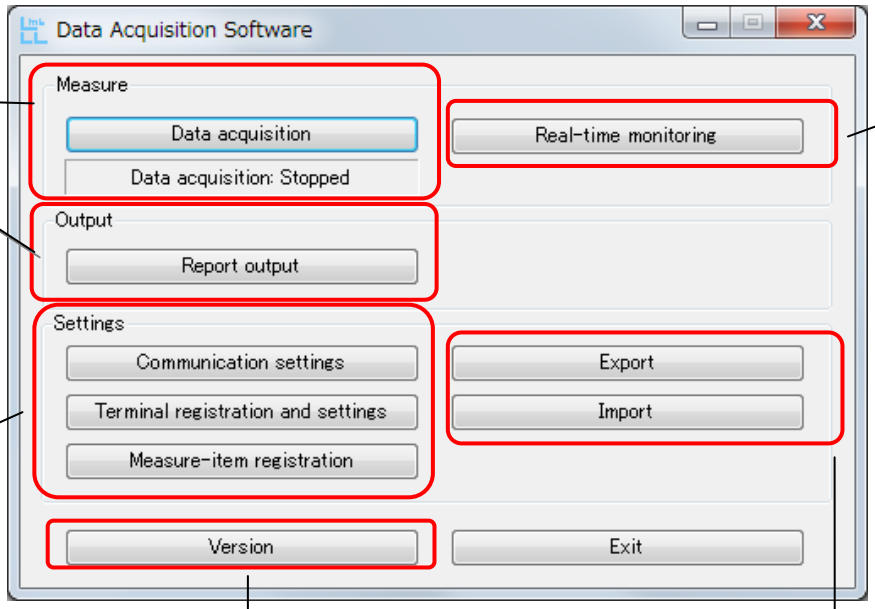
3.2 Display composition

Main display composition of Data Acquisition Software is as follows:

· Data acquisition
Acquire the measured values of target measured points from the terminal at a constant frequency, and write them to fixed file.
→"4.2 Data acquisition"

· Real-time monitoring
Acquire and display the measured values of the items configured in the measure-item registration from the terminal.
→"4.1 Real-time monitoring"

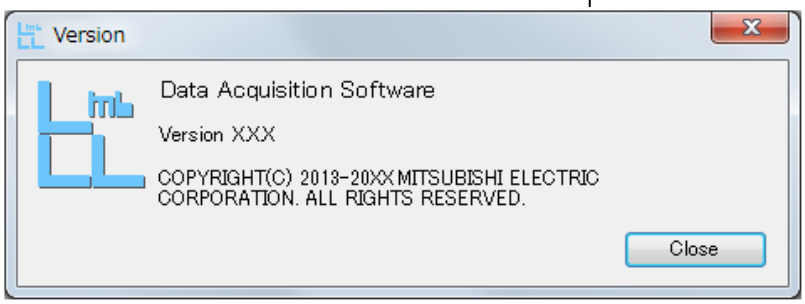
<Main display>



· Report output
Compile the result of data acquisition and output it to Excel® file.
→"4.3 Report output"

· Registration
Register the information required to operate this software and the data items which are configured, displayed and acquired.
Change and display the setting values of terminal with communication.
→"3.3 Registration (Initial setting)"

· Export and import
Output the setting values (communication settings, terminal settings / registration and measure-item registration) to the file (Export) or read the file for setting values (Import).
→"3.4 Export and Import"

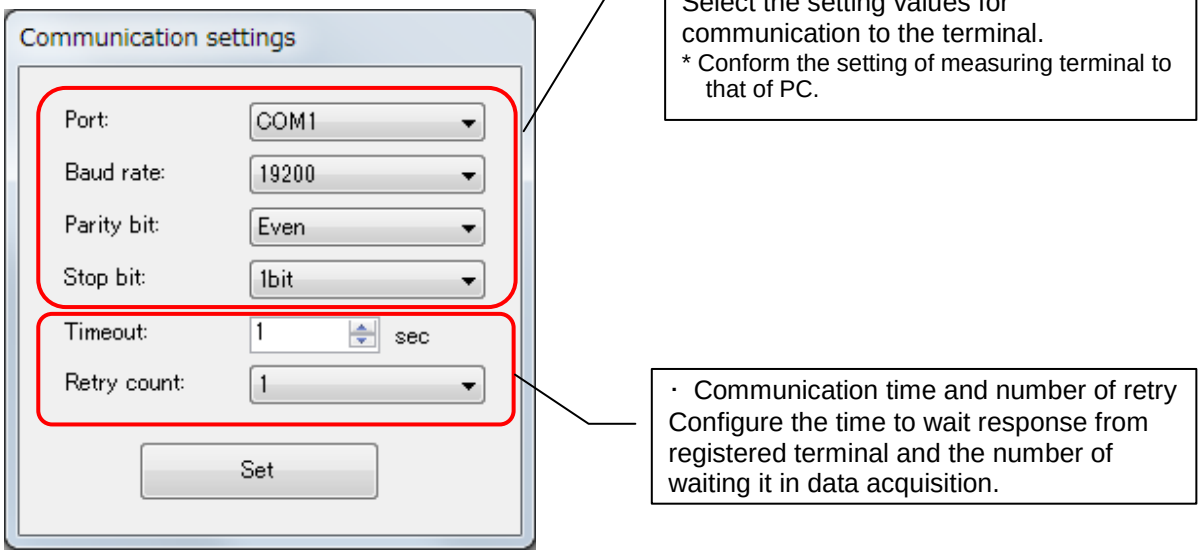


3.3 Registration (Initial setting)

Configure the setting for data acquisition.

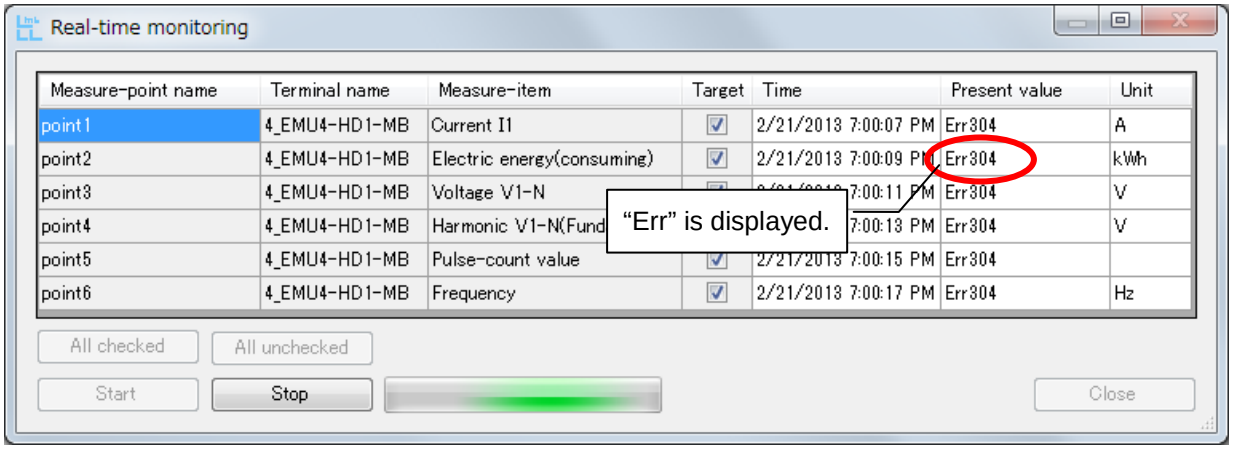
(1) Environment registration

Configure the environment setting to operate Data Acquisition Software.
Register the port, baud rate, stop bit and parity bit to the same in the measuring terminal.
Timeout is configured to the time to wait response in communication, and retry is configured to the number of waiting it.



* Port : COM port to be used in serial communication for MODBUS® communication.
Baud rate : Communication speed of MODBUS® communication. The unit is “bps”.
Parity bit : Parity bit for MODBUS® communication.
Stop bit : Stop bit for MODBUS® communication.
Timeout : Time to wait response from measuring terminal.
Retry count : Number of waiting response when timeout occurs.

* If the setting for communication is improper, the software cannot acquire the data and display values as follow:

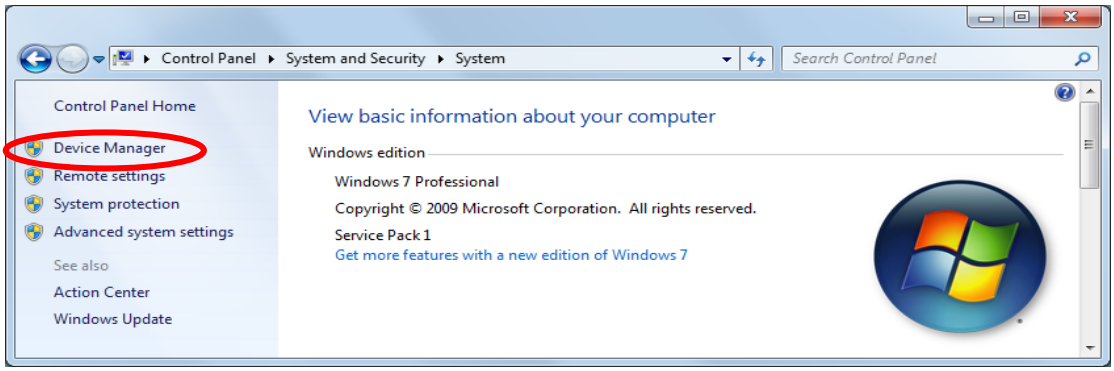


Details of error code →”5.5 Troubleshooting”

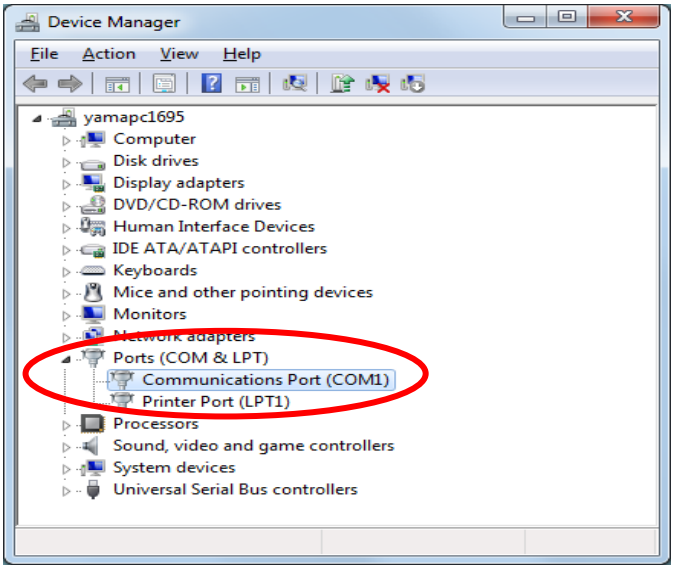
<Reference>

The following displays example for COM port setting for using RS-485 - USB conversion adapter.
(For details, refer to the manual for the adapter.)

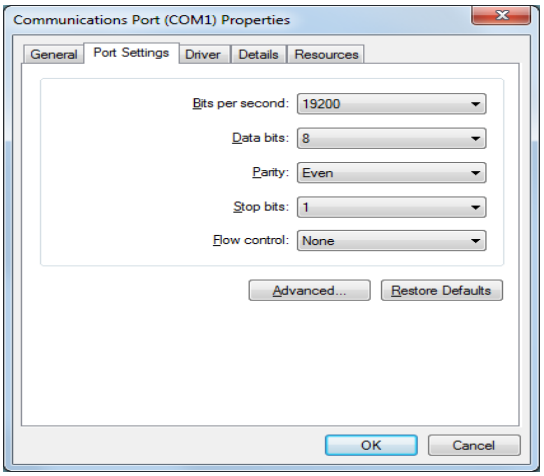
(a) Open the property of “Computer” and select [Device Manager].



(b) Open the property of the appropriate port in “Ports (COM & LPT)” of Device manager.



(c) Configure the “Port setting” of the appropriate port (COM*) property.
You need to conform this setting to the environment registration of measuring terminals.



(2) Terminal registration

Register the terminals to acquire data.

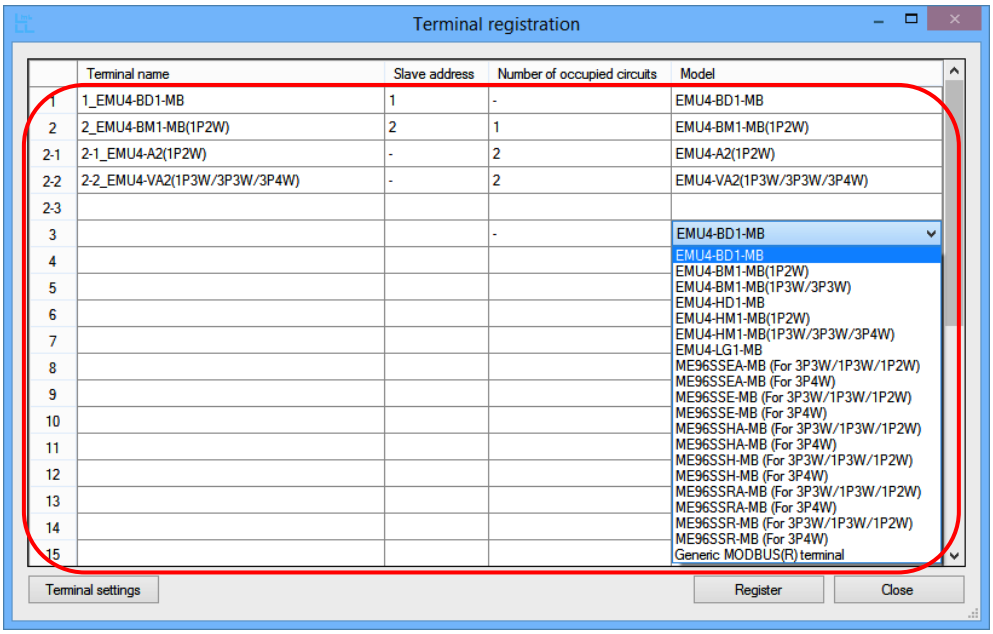
Procedure of terminal registration

(a) Press [Terminal registration / settings] button of main display.

(b) Register Terminal name, Slave address and Model.
"Number of occupied circuits" represents the number of measuring circuit each model, it is automatically displayed when you select the model.
You can select the model from the following using the pull-down menu.
(In ME96SS/ME96SS-Ver.A Series, select according to the model name and its phase-wire system.)

Series	Terminal
EcoMonitorLight	EMU4-BD1-MB
	EMU4-HD1-MB
EcoMonitorPlus	EMU4-BM1-MB(1P2W)
	EMU4-BM1-MB(1P3W / 3P3W)
	EMU4-HM1-MB(1P2W)
	EMU4-HM1-MB(1P3W / 3P3W / 3P4W)
	EMU4-LG1-MB
	EMU4-A2(1P2W)*
	EMU4-A2(1P3W / 3P3W / 3P4W)*
	EMU4-VA2(1P2W)*
	EMU4-VA2(1P3W / 3P3W / 3P4W)*
ME96SS	ME96SSE-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSE-MB (For 3P4W)
	ME96SSH-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSH-MB (For 3P4W)
	ME96SSR-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSR-MB (For 3P4W)
ME96SS-Ver.A	ME96SSEA-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSEA-MB (For 3P4W)
	ME96SSHA-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSHA-MB (For 3P4W)
	ME96SSRA-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSRA-MB (For 3P4W)
Other	Generic MODBUS® terminal

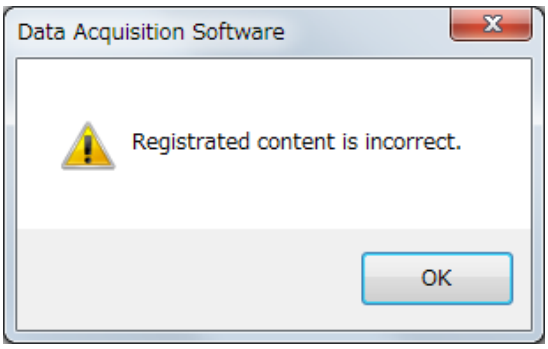
* When the base unit (EMU4-BM1-MB/ EMU4-HM1-MB/ EMU4-LG1-MB) of EcoMonitorPlus is selected, it will added three blank lines from the next line, for it is capable of extension up to three.
(For example, if EMU4-BM1-MB is selected in the first line, it will added 1-1 to 1-3 lines from the next line.)
Extension unit can be selected in *-1 to *-3 line.



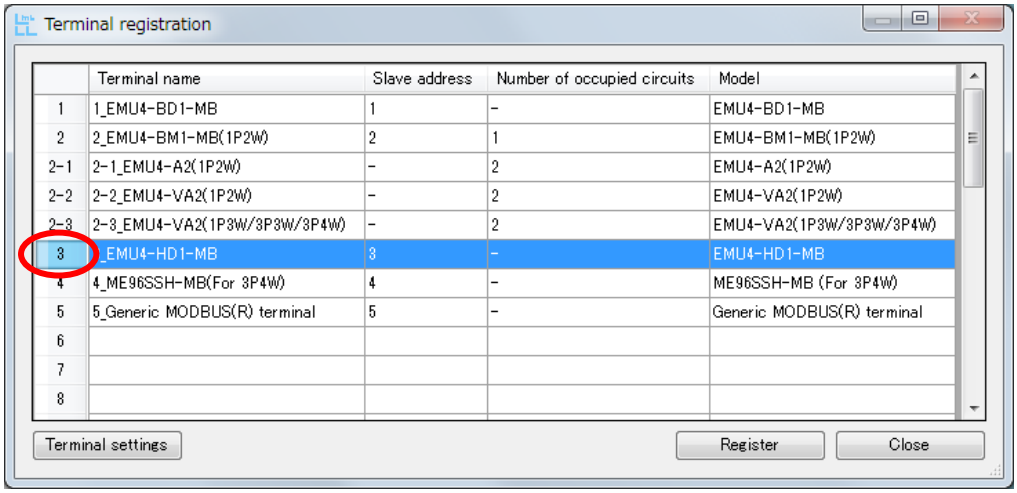
(c) To end the terminal registration, press [Register] button to register the terminals and then press [Close] button.

When the message window is displayed as the lower right, make sure of the following.

・Whether terminal name does not overlap.
・Whether slave address does not overlap.
・Whether there is item of non-input (or unselected) in a registered line.

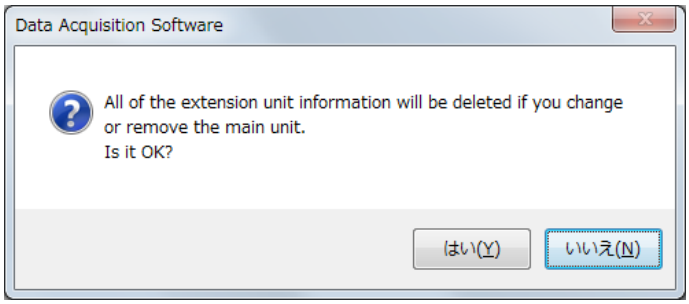


Procedure of terminal deletion



* If you want to delete the registered terminal, select the number of the terminal you want to delete at the left hand position of the display, and press DELETE key on the keyboard to delete it.

When you try to delete a base unit of EcoMonitorPlus, the following message window is displayed.



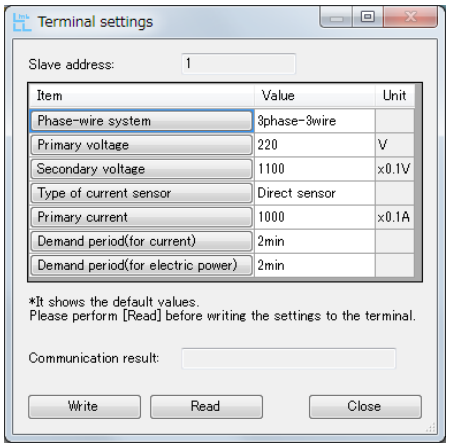
(3) Terminal setting

You can change and display the setting values of measuring terminals via communication.
* Setting method and display are different depending on the models selected in terminal registration.

■If you select “EMU4-BD1-MB”, “EMU4-HD1-MB”, “EMU4-BM1-MB”, “EMU4-HM1-MB”, “EMU4-LG1-MB”, “EMU4-A2” or “EMU4-VA2” in model selection:

(a) Select the terminal you want to configure, and then press [Terminal settings] button in the state of color reversal as below.

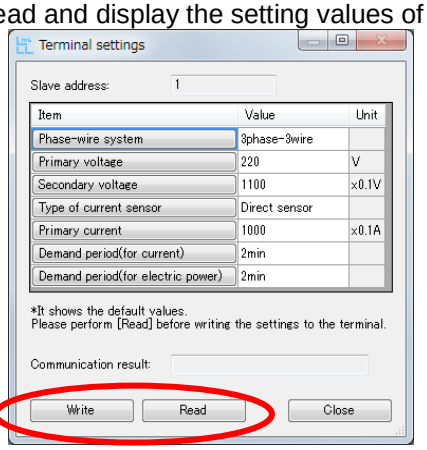
(b) Terminal setting window appears as below, and then you can change the values.



For EMU4-BD1-MB

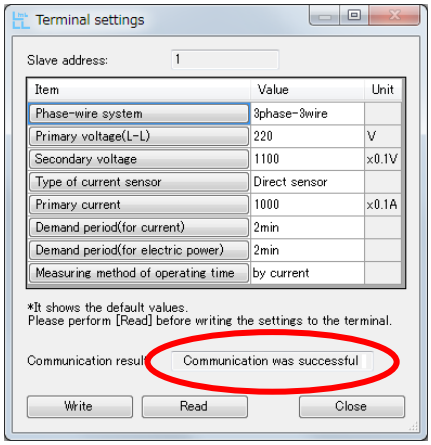
* Details of setting item, refer to User's manual (details) and MODBUS® I/F specification.
* It shows the default values in this window. Please perform [Read] before writing the settings to the terminal.

(c) Press [Write] button to write the values configured in this window to measuring terminal and change the setting.
Press [Read] button to read and display the setting values of measuring terminal.

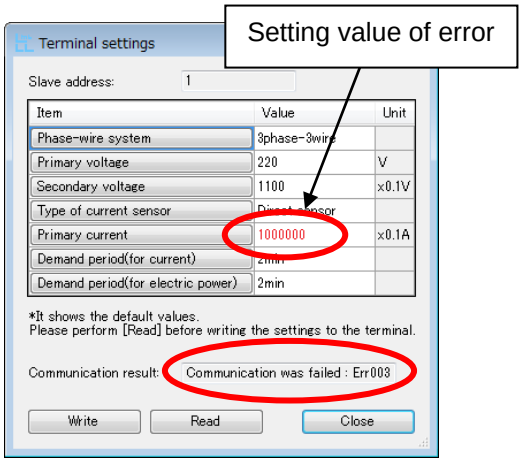


For EMU4-BD1-MB

When writing or reading is normally, “Communication was successful” is displayed in “Communication result” field.
When the communication error occurs, "Communication was failed: Err***" (*** is error code) is displayed in "Communication result" field.
Also, setting value of error is displayed in red.
(Details of error code →”5.5 Troubleshooting”)



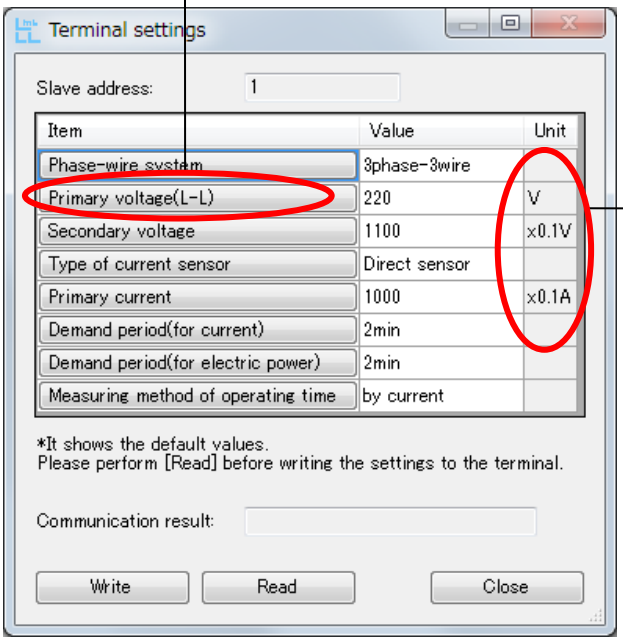
Display when communication ends normally.



Display when communication ends with failure.

(d) If the setting is completed and you want to complete, press [Close] button to close Terminal setting window.

・ About primary voltage(Example of EMU4-HD1-MB)
Press [Primary voltage] button of “Item” to switch between “Primary voltage〔L-L〕” and “Primary voltage〔L-N〕”.
Note: Be sure to set to “Primary voltage〔L-N〕for 3P4W system, or “Primary voltage〔L-L〕” for the system except for 3P4W.



・ About multiplying factor
For the item where the multiplying factor is displayed in “Unit” field, input the value with consideration for the factor.
Example: For primary current
Value: 1000
Multiplying factor: ×0.1A
Actual settng: 1000 x 0.1 = 100A

■About the setting of primary voltage and secondary voltage

(a) If the terminals is EcoMonitorLight (EMU4-BD-1-MB/ EMU4-HD1-MB):
When you setting the primary voltage in the terminal setting window, primary voltage is configurable from 1V to 6600V. But secondary voltage is configured as below by the primary voltage setting.

(i) If the value of primary voltage is consistent with the "primary voltage (direct)*":
→Setting of secondary voltage is ignored.
If you read the value of secondary voltage after setting the primary voltage, secondary voltage is the same value as primary voltage.

Example: For the 3P3W system. (VT non-use)
If the primary voltage is 220V

The read value from the terminal { Primary voltage = 220(V)
Secondary voltage = 220(V)

(ii) If the value of primary voltage is consistent with the "primary voltage (VT use)*":
→Setting of secondary voltage is ignored.
If you read the value of secondary voltage after setting the primary voltage, value of secondary voltage is 110V.

Example: For the 3P3W system. (VT use)
If the primary voltage is 690V

The read value from the terminal { Primary voltage = 690(V)
Secondary voltage = 110(V)

(iii) If the value of primary voltage is consistent with the "special primary voltage*":
→Secondary voltage is set (1V~220V)

Example: For the 3P3W system. (VT use)
If the primary voltage is 700V, and secondary voltage is 150V

The read value from the terminal { Primary voltage = 700(V)
Secondary voltage = 150(V)

* For the "primary voltage (direct)", "primary voltage (VT use)", and "special primary voltage", refer to the user's manual for the terminal to be used.

(b) If the terminals is EcoMonitorPlus (EMU4-BM1-MB/ EMU4-HM1-MB/ EMU4-A2/ EMU4-VA2):
When you setting the primary voltage in the terminal setting window, primary voltage is configurable from 1V to 110000V. But secondary voltage is configured as below by the primary voltage setting and VT use or VT non-use.

(i) If the "VT non-use":
→Setting of secondary voltage is ignored.
If you read the value of secondary voltage after setting the primary voltage, secondary voltage is the same value as primary voltage.

Example: For the 3P3W system, and VT non-use.
If the primary voltage is 220V

The read value from the terminal { Primary voltage = 220(V)
Secondary voltage = 220(V)

(ii) If the "VT non-use", and value of primary voltage is not consistent with the "special primary voltage*":
→Setting of secondary voltage is ignored.
If you read the value of secondary voltage after setting the primary voltage, value of secondary voltage is 110V.

Example: For the 3P3W system, and VT use.
If the primary voltage is 690V

The read value from the terminal { Primary voltage = 690(V)
Secondary voltage = 110(V)

(iii) If the value of primary voltage is consistent with the "special primary voltage*":
→Secondary voltage is set (1V~220V)

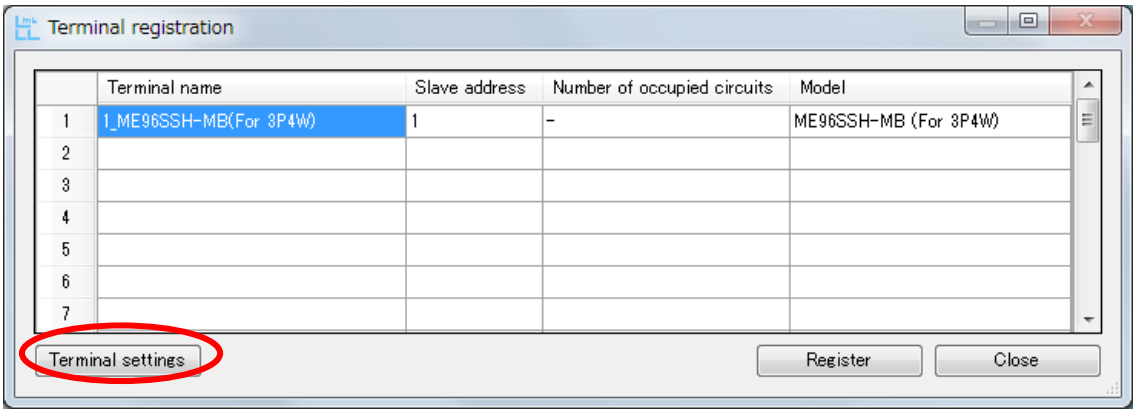
Example: For the 3P3W system, and VT use.
If the primary voltage is 700V, and secondary voltage is 150V

The read value from the terminal { Primary voltage = 700(V)
Secondary voltage = 150(V)

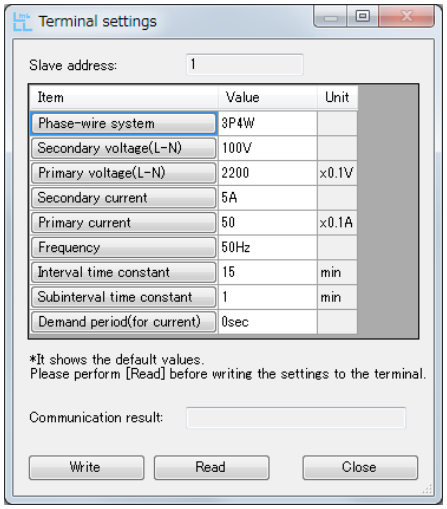
* For the "special primary voltage", refer to the user's manual for the terminal to be used.

■If you select the ME96SS/ME96SS-Ver.A series in model selection:

(a) Select the terminal you want to configure, and then press [Terminal settings] button in the state of color reversal as below.



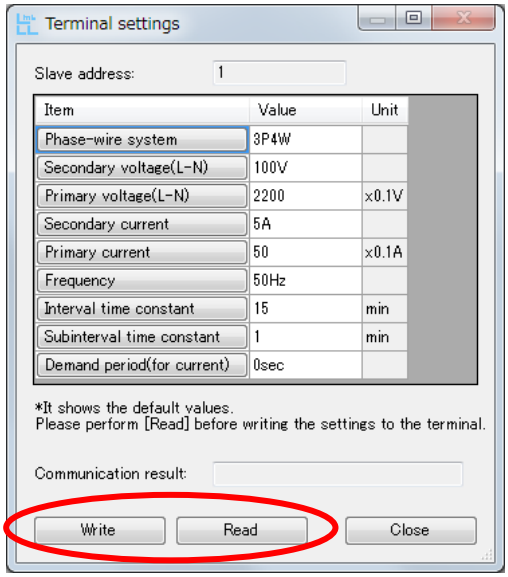
(b) Terminal setting window appears as below, and then you can change the values.



For ME96SSH-MB/ME96SSHA-MB (For 3P4W)

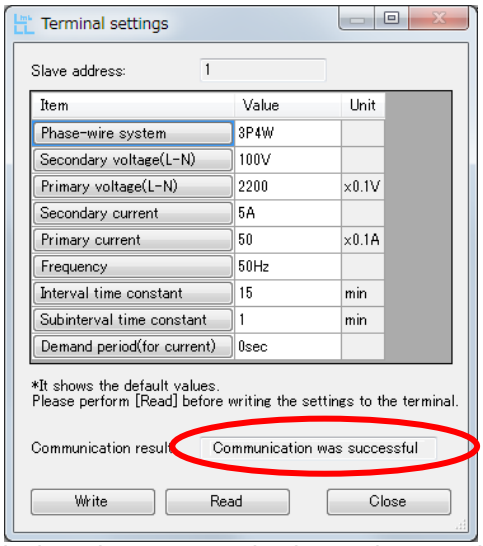
* Details of setting item, refer to User's manual (details).
* It shows the default values in this window. Please perform [Read] before writing the settings to the terminal.

(c) Press [Write] button to write the values configured in this window to measuring terminal and change the setting.
Press [Read] button to read and display the setting values of measuring terminal.

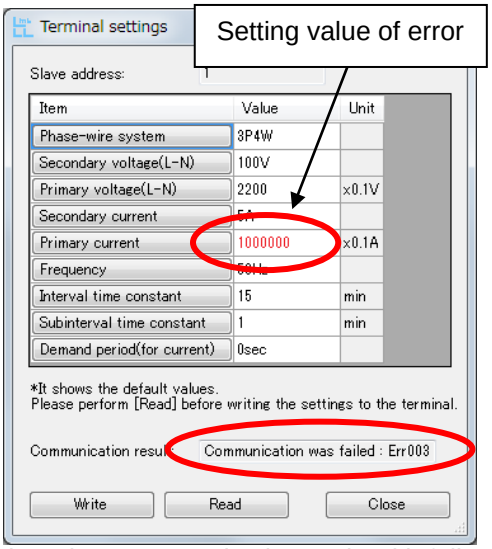


Example: ME96SSH-MB/ME96SSHA-MB (For 3P4W)

When writing or reading is normally, “Communication was successful” is displayed in “Communication result” field.
When the communication error occurs, "Communication was failed: Err***" (*** is error code) is displayed in "Communication result" field.
Also, setting value of error is displayed in red.
(Details of error code → “5.5 Troubleshooting”)

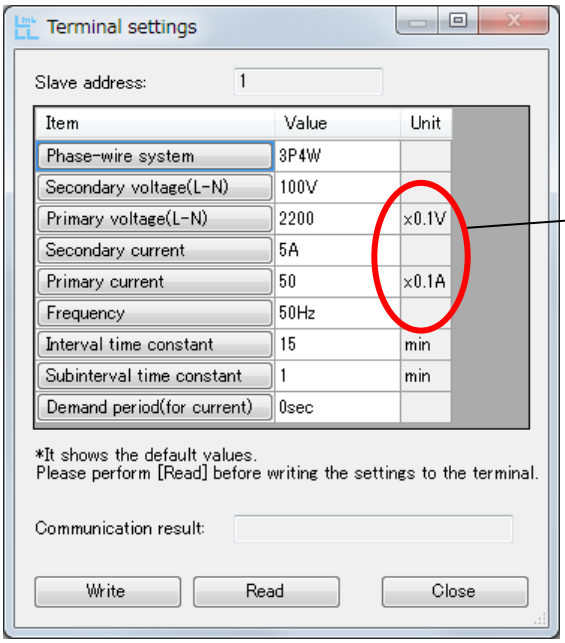


Display when communication ends normally.



Display when communication ends with failure.

(d) If the setting is completed and you want to complete, press [Close] button to close Terminal setting window.



・ About multiplying factor
For the item where the multiplying factor is displayed in “Unit” field, input the value with consideration for the factor.

Example: For primary current
Value: 1000
Multiplying factor: ×0.1A
Actual settng: 1000 x 0.1 = 100A

■About the setting of secondary voltage.

When you use VT, select the secondary voltage. (In case of 3P4W, set the voltage of L-N.)

Even when you don't use VT, setting the secondary voltage is needed. In this case, select the arbitrary value at secondary voltage. (In case of 1P3W, select 110V.) If you read, the shown value of secondary voltage is as below.

・If direct voltage is 63.5V,110V or 110V in 3P4W, the value of secondary voltage becomes same one.
・If direct voltage is 110V or 220V in 3P3W/1P3W/1P2W, the value of secondary voltage becomes same one.
・In all other cases, the value of secondary voltage becomes blank.

■About the setting of primary voltage.

(a) For 3P4W
(i) Set a direct voltage value (63.5V, 100V, 110V, 220V, 240V, 254V, or 277V)
It is set "Direct input", and set the primary voltage (L-N) as the direct input voltage.
(ii) Set within the range from 60V to 750000V.
It is set "Using VT", and set the primary voltage (L-N). From the most significant digit to 3 figures can be set up freely in the range.

(b) For 3P3W or 1P2W
(i) Set a direct voltage value (110V, 220V, or 440V)
It is set "Direct input", and set the primary voltage as the direct input voltage.
(ii) Set within the range from 60V to 750000V.
It is set "Using VT", and set the primary voltage. From the most significant digit to 3 figures can be set up freely in the range.

(c) 1P3W
110V or 220V is valid only. If 110V is set, the direct input is 110/220V. If 220V is set, the direct input is 220/440V.

The follows are examples of setting of secondary voltage and primary voltage.

Example1: For the 3P4W system without VT.
If the direct voltage is 277/480V,

Setting { Secondary voltage = 100(V) (arbitrary value)
Primary voltage = 2770(x0.1V) } Secondary voltage value is ignored as primary voltage is direct voltage value.

Example2: For the 3P3W system with VT.
If the primary voltage is 11000V and the secondary voltage is 220V,

Setting { Secondary voltage = 220(V)
Primary voltage = 11000(V)

■About the setting of primary current.

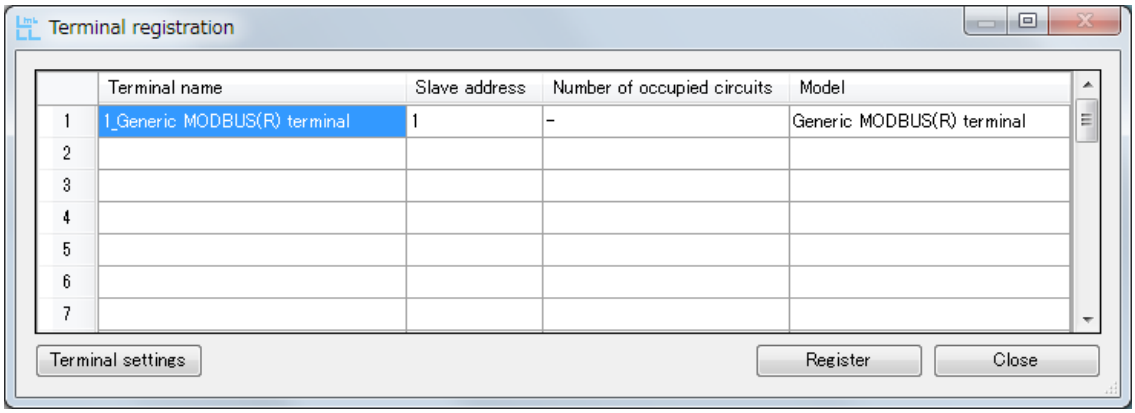
Setting range is from 1.0A to 30000.0A. From the most significant digit to 3 figures can be set up freely in the range.

■About the setting of interval time constant and subinterval time constant.

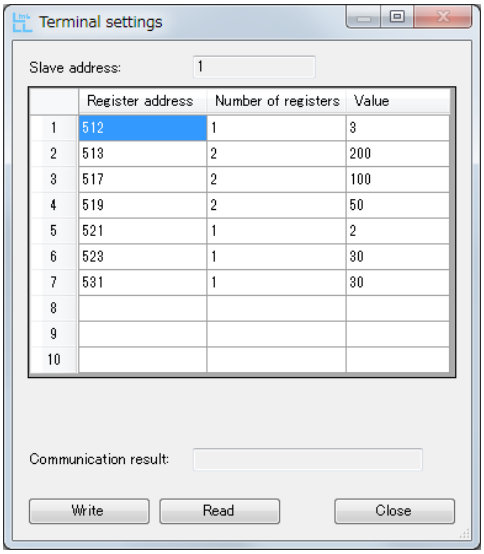
Both setting range is from 1min to 60min. If the interval time constant cannot be divided by subinterval time constant, illegal data error occurs and the subinterval time constant is changed to 1 min.

■If you select “General MODBUS® terminal” in model selection:

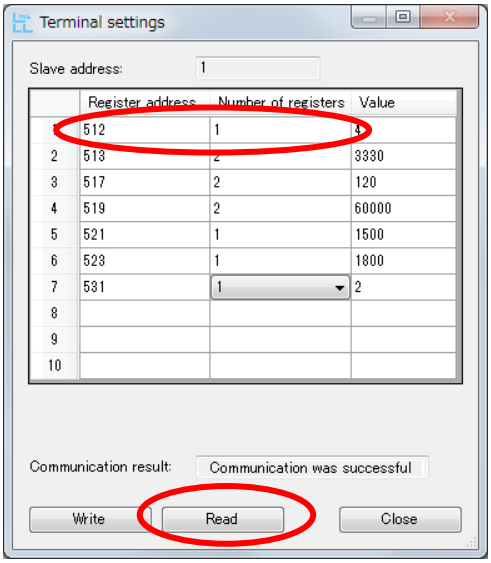
(a) Select the terminal you want to configure, and then press [Terminal settings] button in the state of color reversal as below.



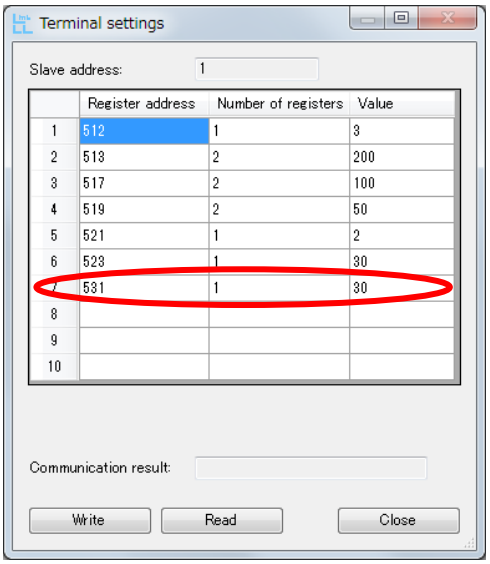
(b) Terminal setting window appears, and then you can change and display the values.



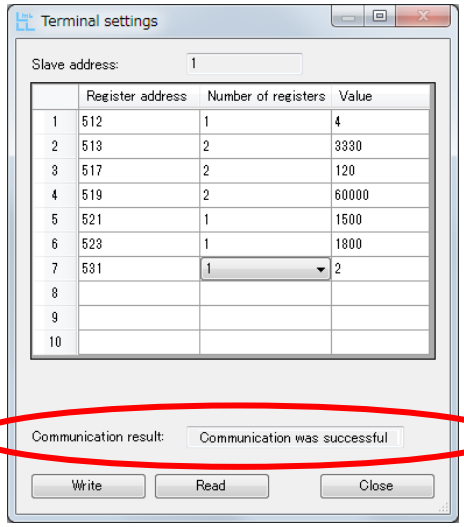
(c) If you want to display the setting of the terminal, input the Register address and Number of registers you want to read as below, and then press [Read] button.
For the input value, refer to the MODBUS® equipment user's manual.



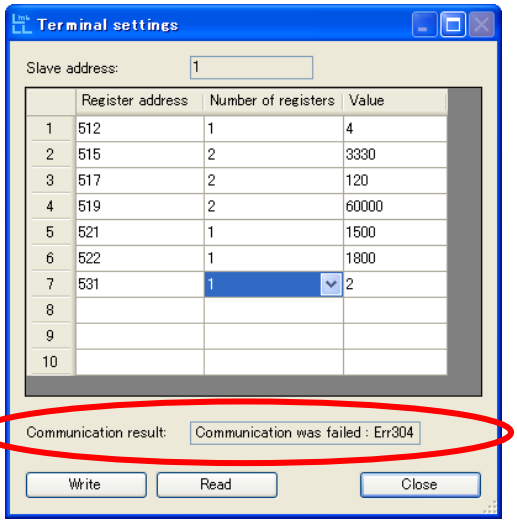
(d) If you want to change the setting of the terminal in this window, input the Register address and Number of registers you want to write as below, and then press [Write] button.
For the input value, refer to the MODBUS® equipment user's manual.



If the values are changed or displayed normally, “Communication was succeeded” is displayed in “Communication result” field.
If the communication error occurs or the configured value is beyond the upper / lower limit, “Communication was failed” is displayed in “Communication result” field.



Display when communication ends normally.



Display when communication ends with failure.

(e) If the setting is completed and you want to complete, press [Close] button to close Terminal setting window.

(4) Measured point registration

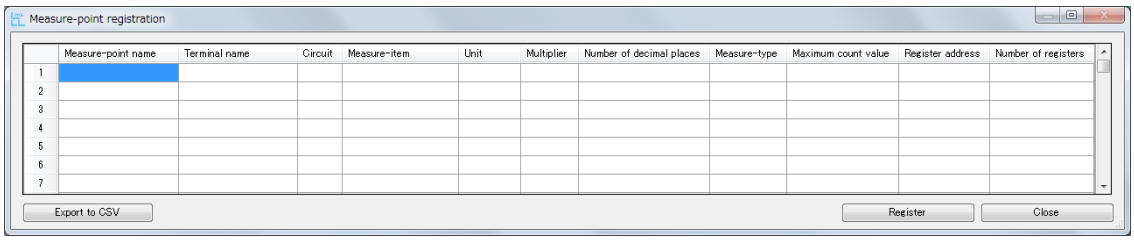
Register the measured element which value is displayed in real time and data is acquired.

* Setting method and display are different depending on the models selected in terminal registration.

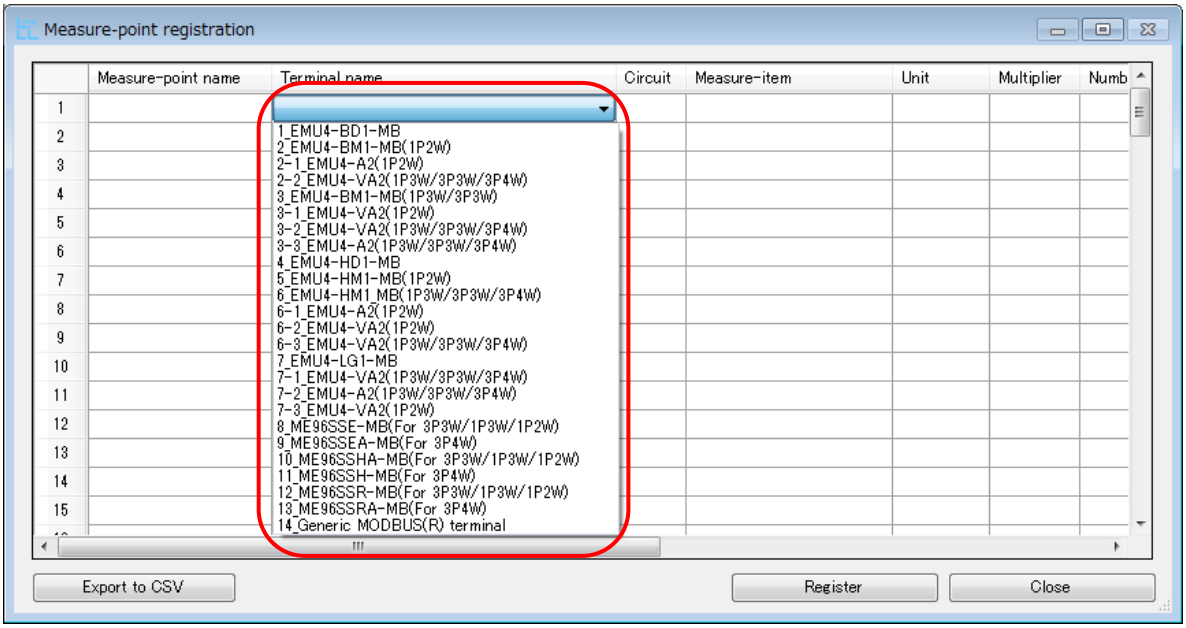
Procedure of terminal registration

(a) Press [Measure-item registration] button of main menu.

Configure the terminal and measure-point. * Maximum number of measure-point is 124.



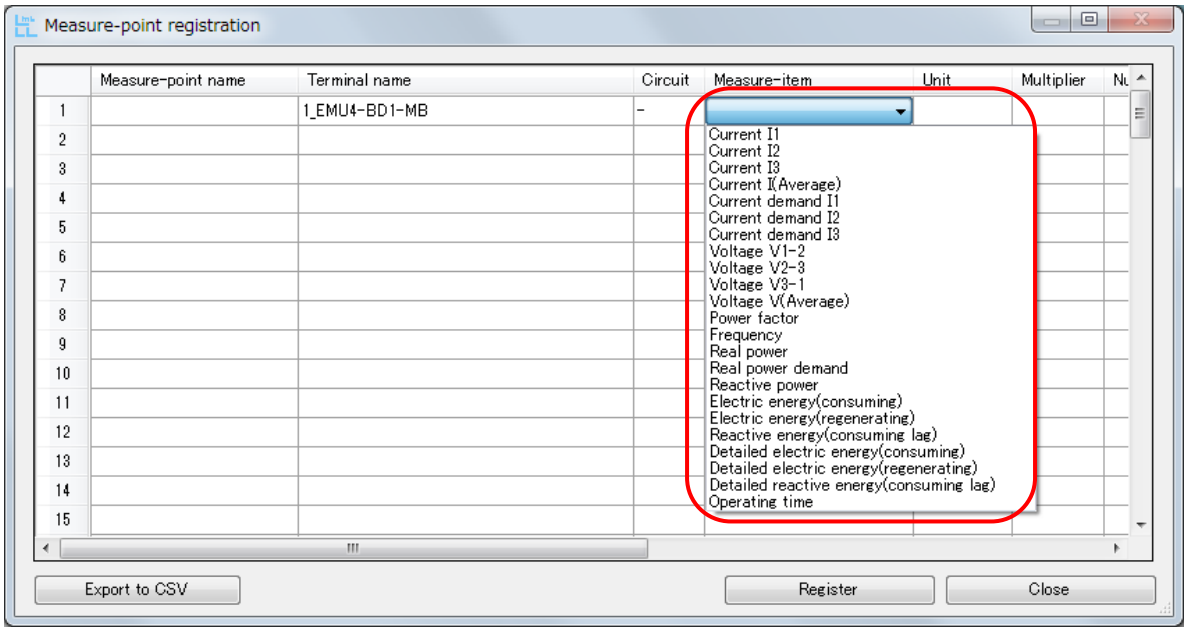
(b) Select terminal name from a pull-down menu, which consists of registered terminals.



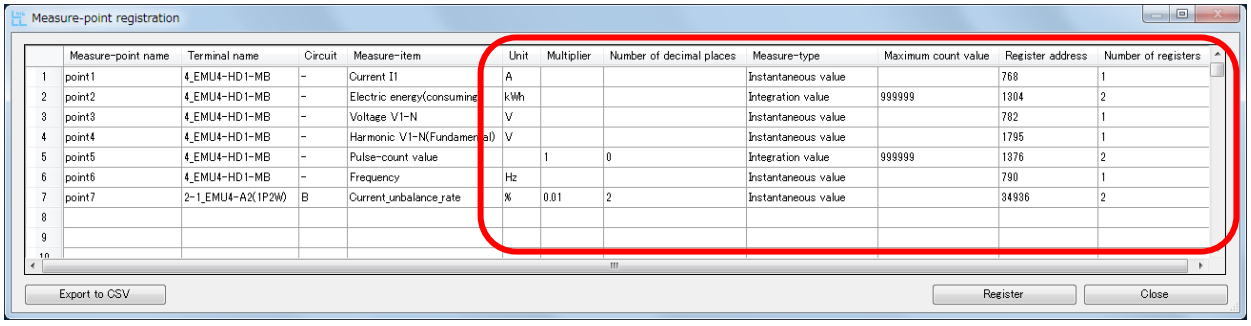
* Above (a) and (b) are the same operations regardless of model.

■If you select “EMU4-BD1-MB”, “EMU4-HD1-MB”, “EMU4-BM1-MB”, “EMU4-HM1-MB”, “EMU4-LG1-MB”, “EMU4-A2” or “EMU4-VA2”in model selection:

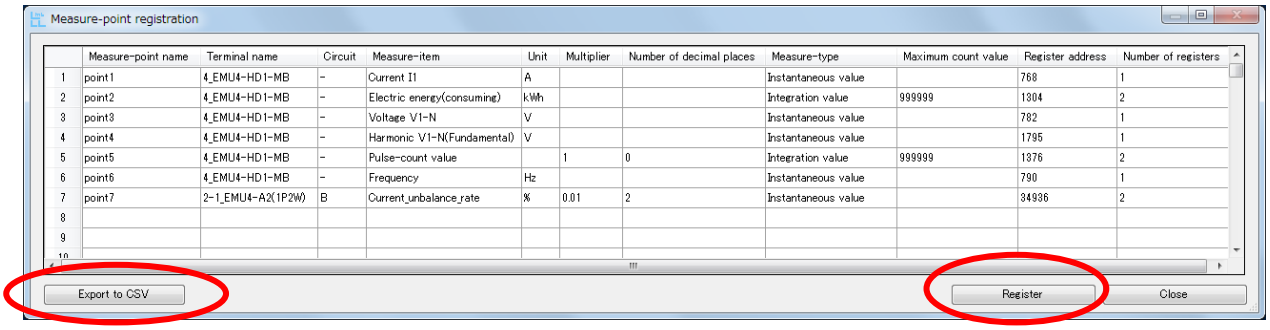
(c) Select Measure-item you want to measure from a pull-down menu.



(d) After choosing Measure-item, input Measure-point name. Unit, Measure-type, Maximum count value, Register address and Number of registers are input automatically. You do not need to input anything to blanks except for Measure-point name.
* But for Pulse count value and Operating time, input Multiplier to “1” and Number of decimal places to “0”.
For Current_unbalance_rate and Voltage_unbalance_rate, input Multiplier to “0.01” and Number of decimal places to “2”.

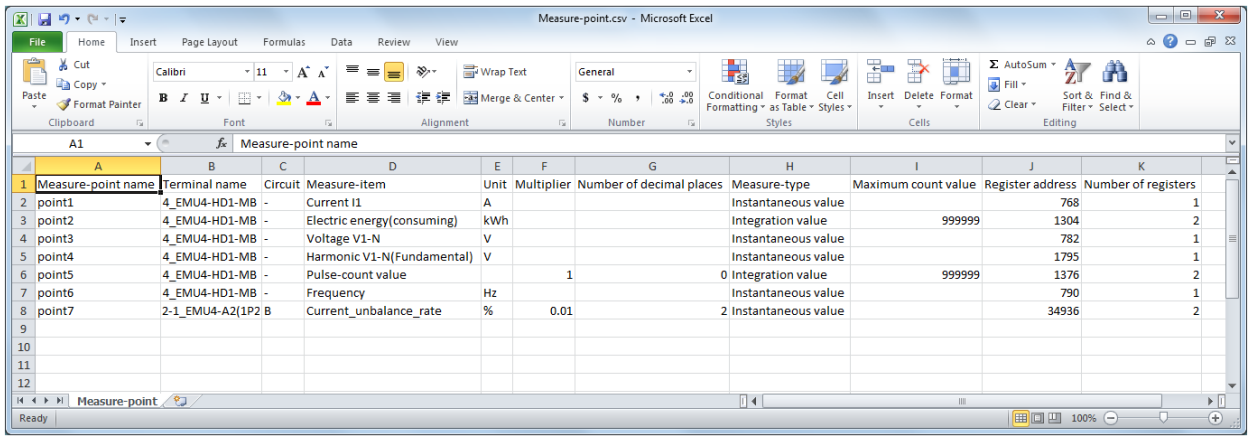


(e) After input of measured item, press [Register] button to complete registration.
Press [Export to CSV] button to output the list of registered measured items to CSV file.



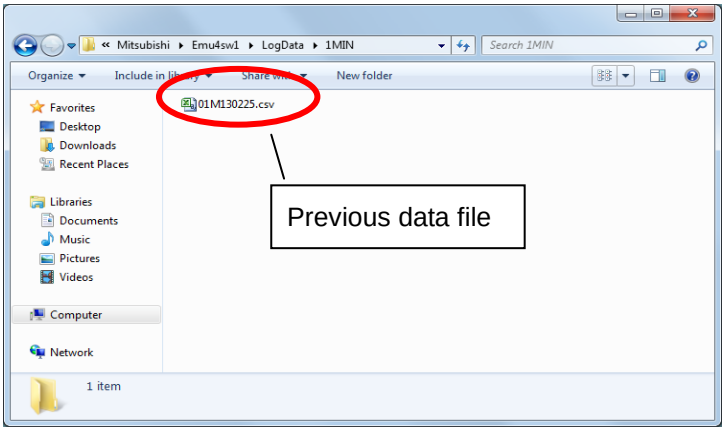
	Measure-point name	Terminal name	Circuit	Measure-item	Unit	Multiplier	Number of decimal places	Measure-type	Maximum count value	Register address	Number of registers
1	point1	4_EMU4-HD1-MB	-	Current I1	A			Instantaneous value		768	1
2	point2	4_EMU4-HD1-MB	-	Electric energy(consuming)	kWh			Integration value	999999	1304	2
3	point3	4_EMU4-HD1-MB	-	Voltage V1-N	V			Instantaneous value		782	1
4	point4	4_EMU4-HD1-MB	-	Harmonic V1-N(Fundamental)	V			Instantaneous value		1795	1
5	point5	4_EMU4-HD1-MB	-	Pulse-count value		1	0	Integration value	999999	1376	2
6	point6	4_EMU4-HD1-MB	-	Frequency	Hz			Instantaneous value		790	1
7	point7	2-1_EMU4-A2(1P2W)	B	Current_unbalance_rate	%	0.01	2	Instantaneous value		34936	2
8											
9											
10											

The output CSV file is displayed as below in Microsoft® Excel®.

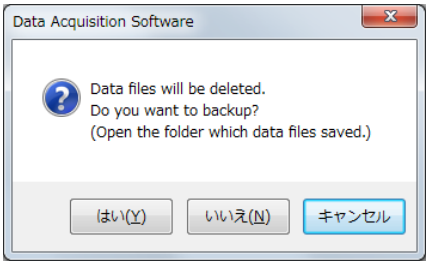


	A	B	C	D	E	F	G	H	I	J	K
1	Measure-point name	Terminal name	Circuit	Measure-item	Unit	Multiplier	Number of decimal places	Measure-type	Maximum count value	Register address	Number of registers
2	point1	4_EMU4-HD1-MB	-	Current I1	A			Instantaneous value		768	1
3	point2	4_EMU4-HD1-MB	-	Electric energy(consuming)	kWh			Integration value	999999	1304	2
4	point3	4_EMU4-HD1-MB	-	Voltage V1-N	V			Instantaneous value		782	1
5	point4	4_EMU4-HD1-MB	-	Harmonic V1-N(Fundamental)	V			Instantaneous value		1795	1
6	point5	4_EMU4-HD1-MB	-	Pulse-count value		1	0	Integration value	999999	1376	2
7	point6	4_EMU4-HD1-MB	-	Frequency	Hz			Instantaneous value		790	1
8	point7	2-1_EMU4-A2(1P2	B	Current_unbalance_rate	%	0.01	2	Instantaneous value		34936	2
9											
10											
11											
12											

If there is the data file acquired before (shown as lower left), it is deleted by pressing [Register] button. So the message window as lower right figure is popped up when you press this button.

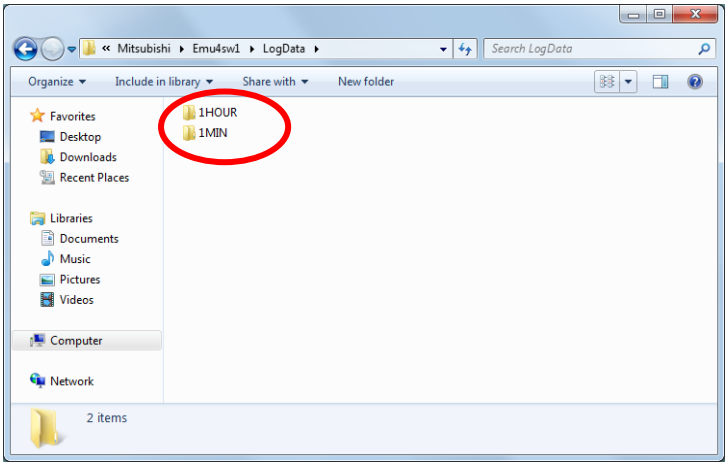


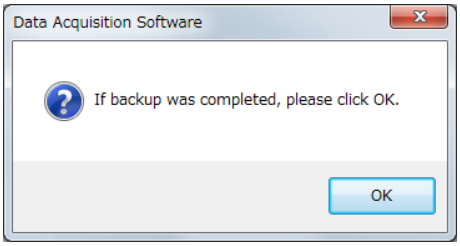
Example of measured data file folder
(Data at one-minute intervals)



Confirmation window for measured data backup

・ If you select [Yes] in the message window for data backup:
The folder and message window are displayed as below. So back up necessary data.
After completing backup, press [OK] button of the message window as lower right figure.
After pressing [OK] button, all past measured data is deleted and the measure items are registered.





・ If you select [No] in the message window for data backup:
All past measured data is deleted and the measure items are registered.

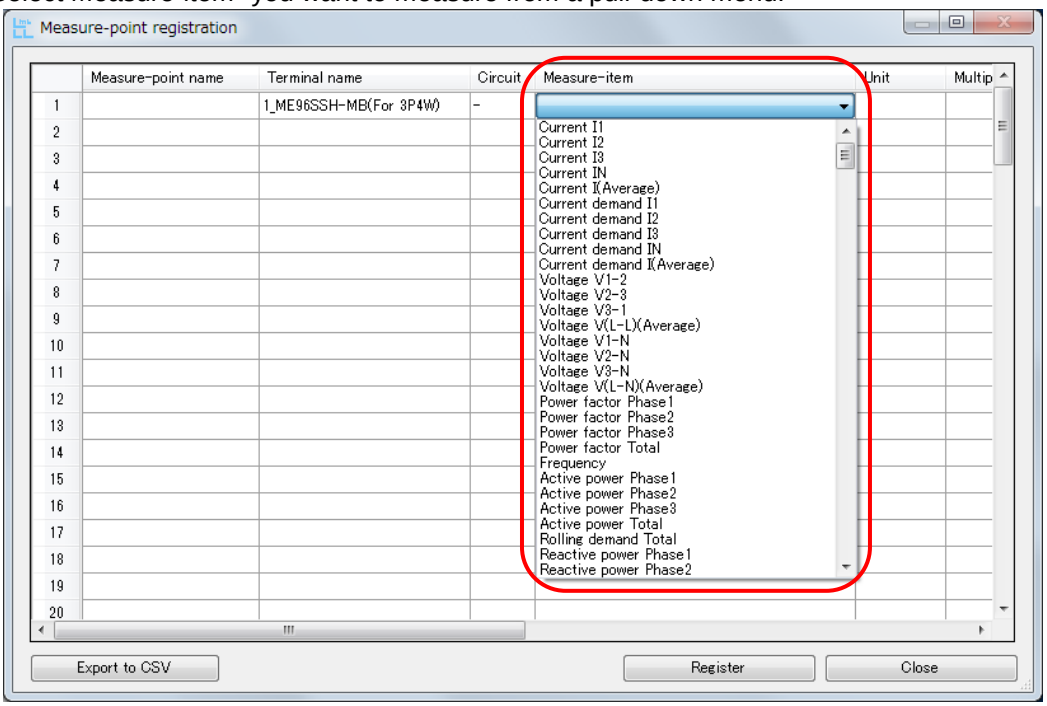
・ If you select [Cancel] in the message window for data backup:
None of past measured data is deleted and the measure items are not registered.

(f) Press [Close] button to complete the measure-item registration.

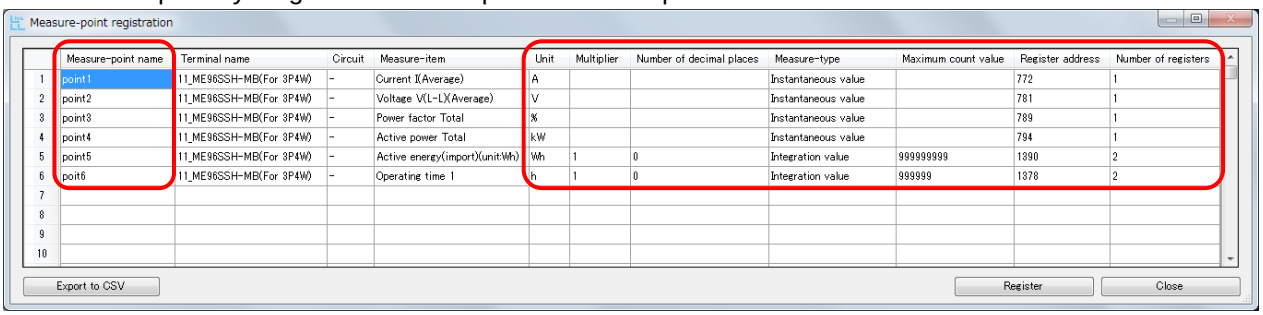
■If you select ME96SS/ME96SS-Ver.A series in model selection:

For the operation (a) and (b), refer to "3.3(4) Measured point registration".

(c) Select Measure-item" you want to measure from a pull-down menu.



(d) After choosing Measure-item, input Measure-point name. Unit, Measure-type, Maximum count value, Register address and Number of registers are input automatically. You do not need to input anything to blanks except for Measure-point name.



*In case of ME96SS series and measure-items of below list, input "1" into "Multiplier" and "0" to "Number of decimal places".

・Operating time1/2
・Active energy (import)/(export)
・Reactive energy (import LAG)/(import LEAD)/(export LAG)/(export LEAD)
・Apparent energy
・Periodic active energy 1/2

In case of ME96SS-Ver.A series, "Multiplier" and "Number of decimal places" are input automatically.

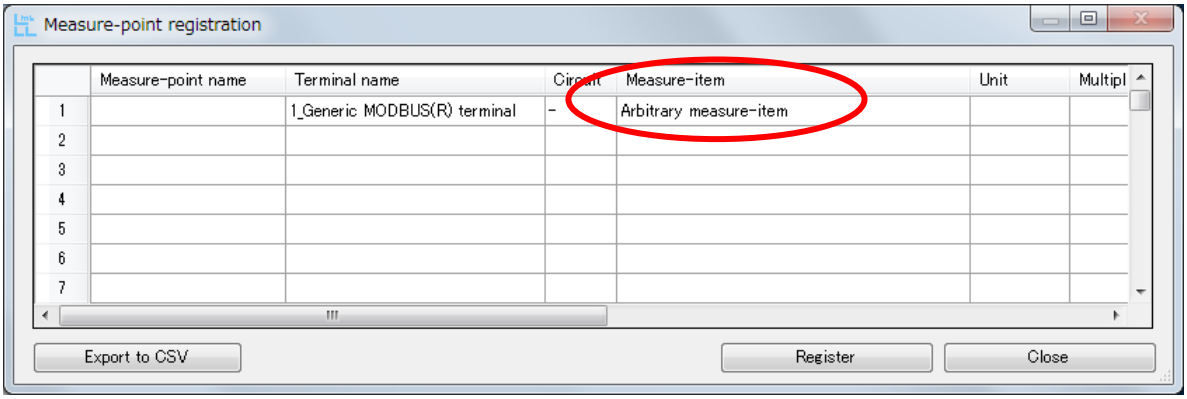
* About unit:Wh/kWh/MWh of energy, refer to MODBUS® I/F specification (LSPM0075), Section 7.1.(3) "Counting of Energy Registeres(0x0500)".

For the operation (e) and (f), refer to page 30 and 31.

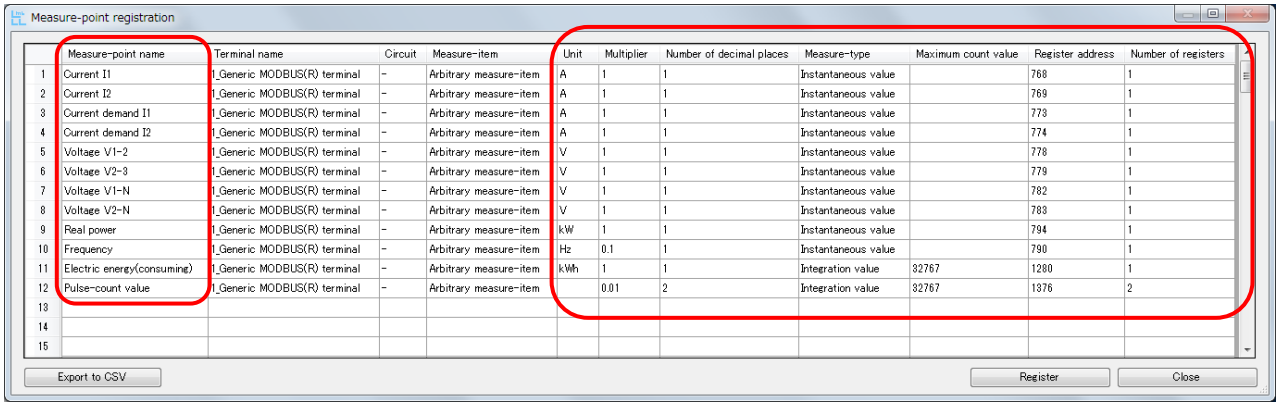
■If you select “Generic MODBUS® terminal” in model selection:

For the operation (a) and (b), refer to ”3.3(4) Measured point registration”.

(c) “Arbitrary measure-item” is displayed in Measure-item field.



(d) You can input the items optionally except for Terminal name and Measure-item.



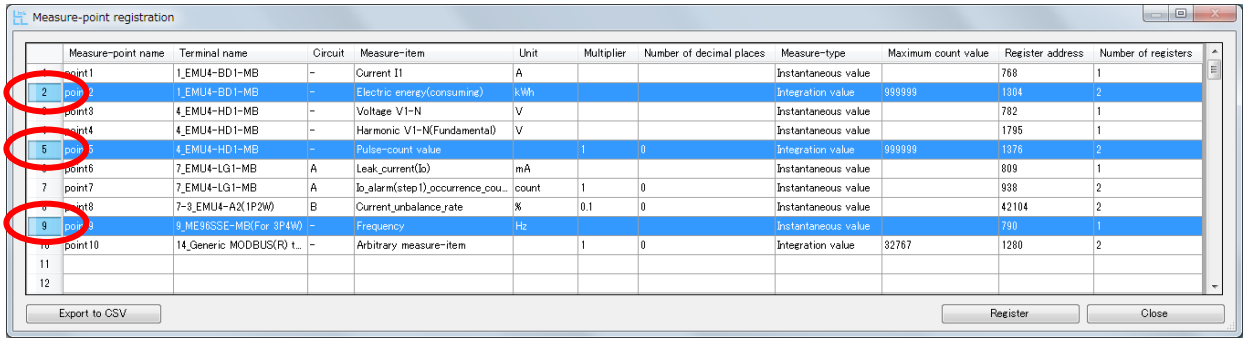
Multiplier	Enter the multiplying factor. Example: When value of the measuring terminal is 1234, and setting value of multiplier is 10, capture data is 12340.
Number of decimal places	Enter the number of decimal places. Example: If input is 3, data is 12.345.
Measure-type	Choose the “Momentary” or “Integration value”.
Maximum count value	Enter the maximum count value of Integration value. Upon reaching the set value, the value will return to 1. Example: If input is 999999, Integration value is 999995 →10 →25⋯.
Register address	Enter the register address of measure-point.
Number of registers	Enter the number for registers of measure-point.

* If the Measure-type is “Integration value”, be sure to input Maximum count value. If the type is “Momentary”, you can leave the field blank.

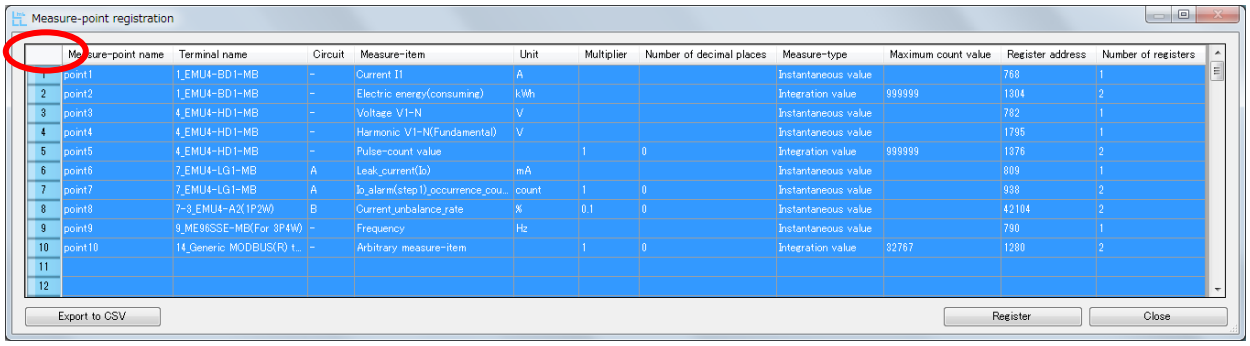
For the input value, refer to the MODBUS® equipment user's manual.

Procedure of terminal deletion

If you want to delete the measured point, select the number of the terminal you want to delete at the left hand position of the display, and press DELETE key on the keyboard to delete it.
(If you want to delete the measured point multiple, choose by holding down the Ctrl key.)



You can select all by pressing a button in the upper left of the screen



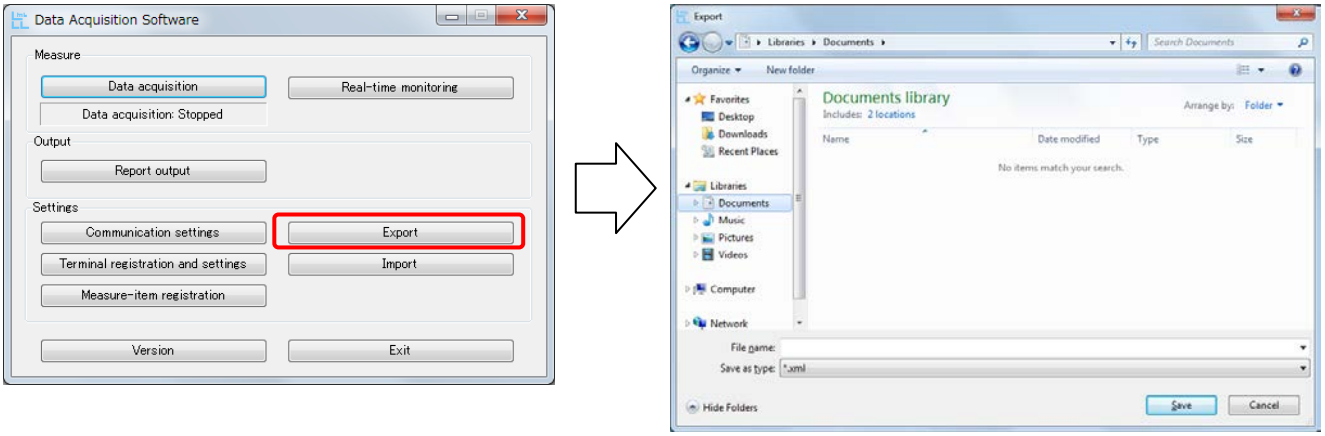
Note: It cannot restore, once it deletes. If have accidentally deleted Please stop registration by pressing [Close] button without pressing [Register] button. Return to the previous state when you register to do this.

3.4 Export and Import

You can output the registered setting (Communication setting, Terminal registration/setting, Measure-item registration) to xml file in this function.
You can also configure the setting collectively by reading exported xml file.
This function is valuable if you want to configure the setting to the previous one, or if you want to use the same setting in the other PC.

■How to export

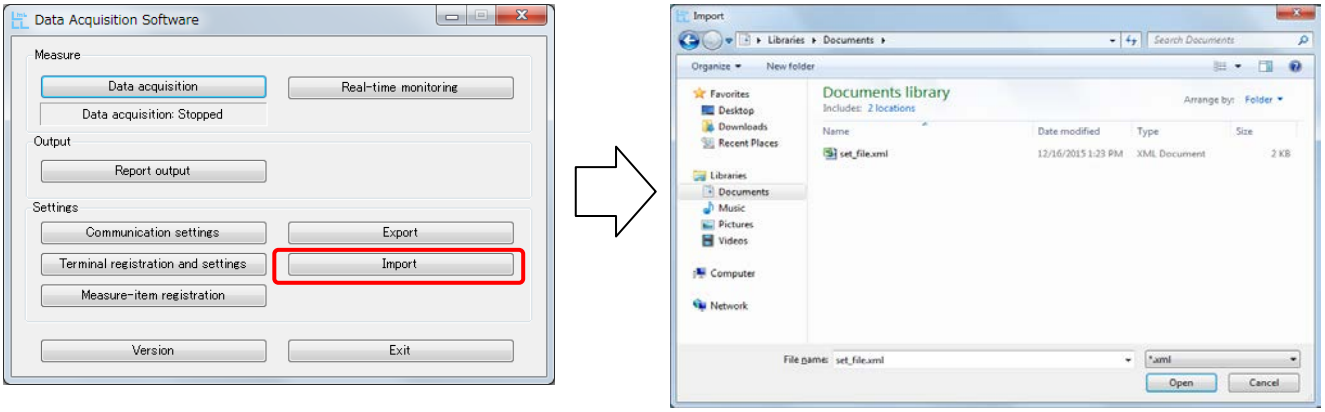
Use this function when creating setting file (outputting xml file).
Press [Export] button shown as lower left figure to pop up the “Export” window.



Input file name and press [Save] to create xml file in the specified directory.

■How to import

Use this function when reading exported setting file (xml file).
Press [Import] button shown as lower left figure to pop up the “Import” window for choosing file.



Select setting file (xml file) and open it to start import, and then the setting (Communication setting, Terminal registration / setting, Measure-item registration) is changed.

Note: You cannot import during data acquisition and real-time monitoring.

Chapter 4

Real-time monitoring / Data acquisition /Report output

About this chapter

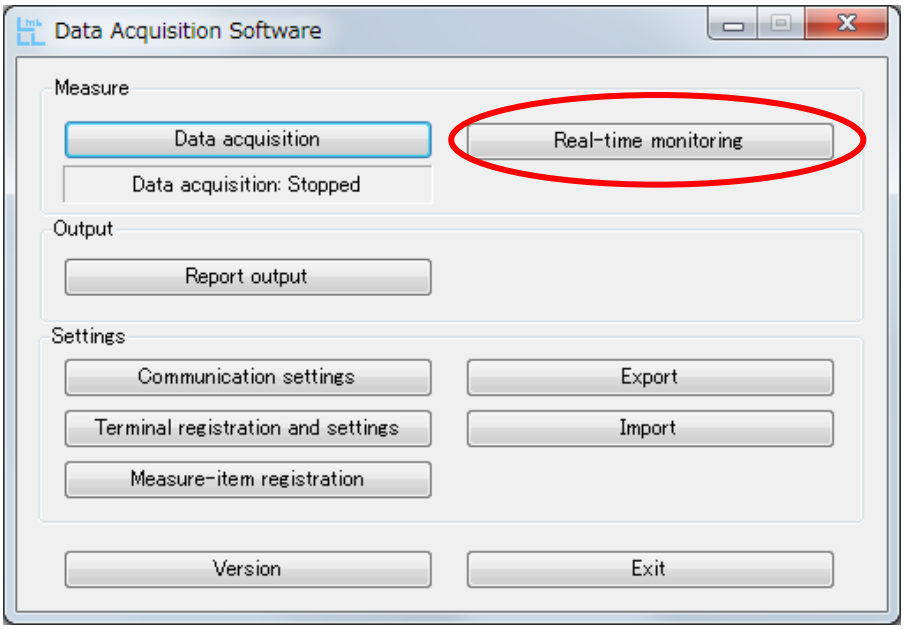
This chapter explains the follows:

Chapter 4 Real-time monitoring / Data acquisition / Report output

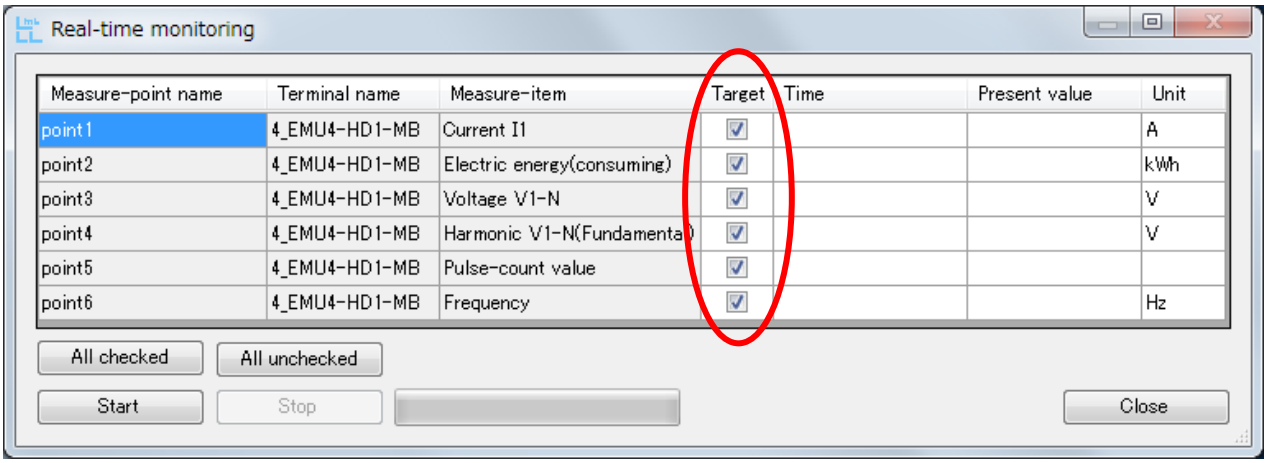
"Present value display" function can display the present value of data measured by measuring terminals.
"Data acquisition" function can acquire the data from measuring terminals at constant intervals, and save it as CSV file.
In the "Report output" function, create a daily report, monthly report, etc. Report is created by pasting the data measured at any constant interval to the master file (Excel® file).

4.1 Real-time monitoring

(a) Press [Real-time monitoring] button.

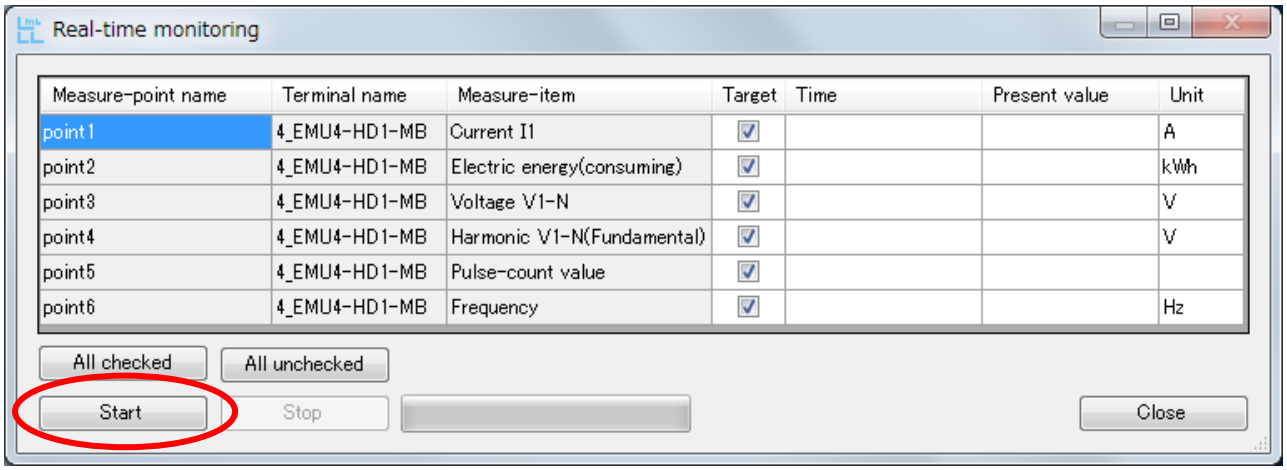


(b) The window as the following figure is displayed, and the present measured values can be displayed. Tick the checkboxes of the items you want to display the measured values. (By default, all items are checked.)

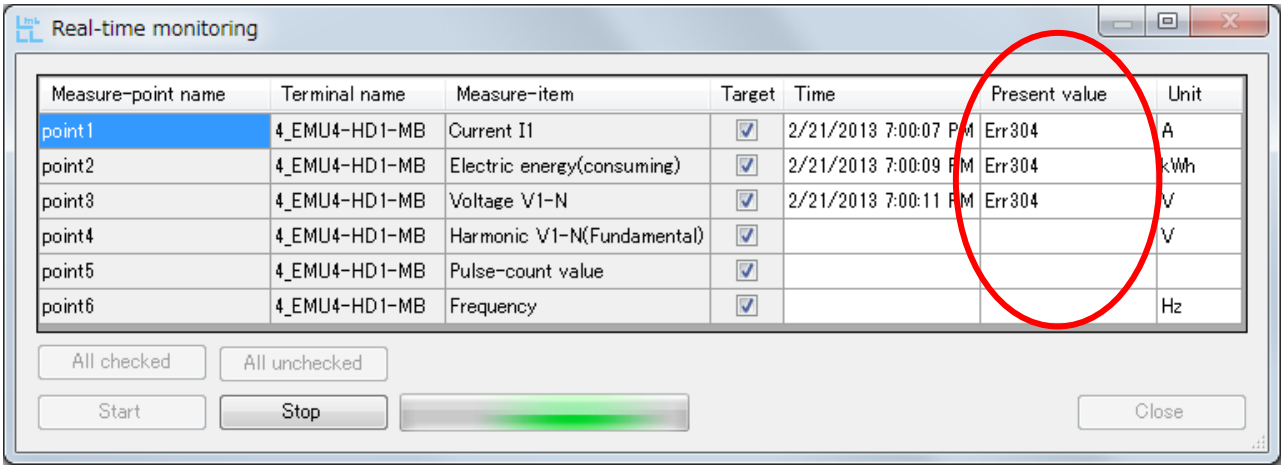


Press [All checked] button to tick all the checkboxes, and press. On the other hand, press [All unchecked] button to uncheck all of them.

(c) Press [Start] button to start communication.

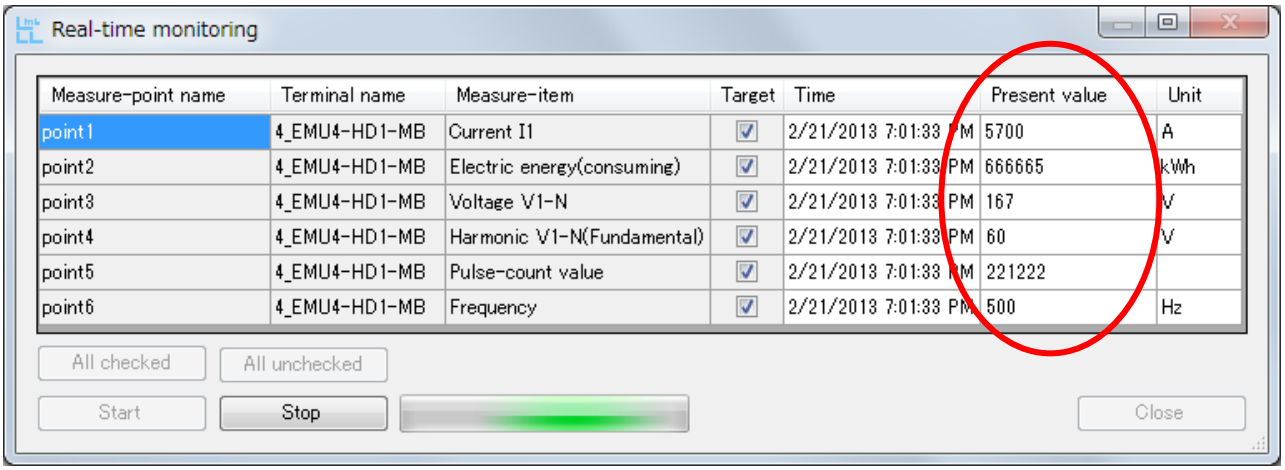


(d) If the communication error occurs, error code is displayed. Check the setting for Ethernet – RS-485 conversion adapter, USB - RS-485 conversion adapter or the terminals.

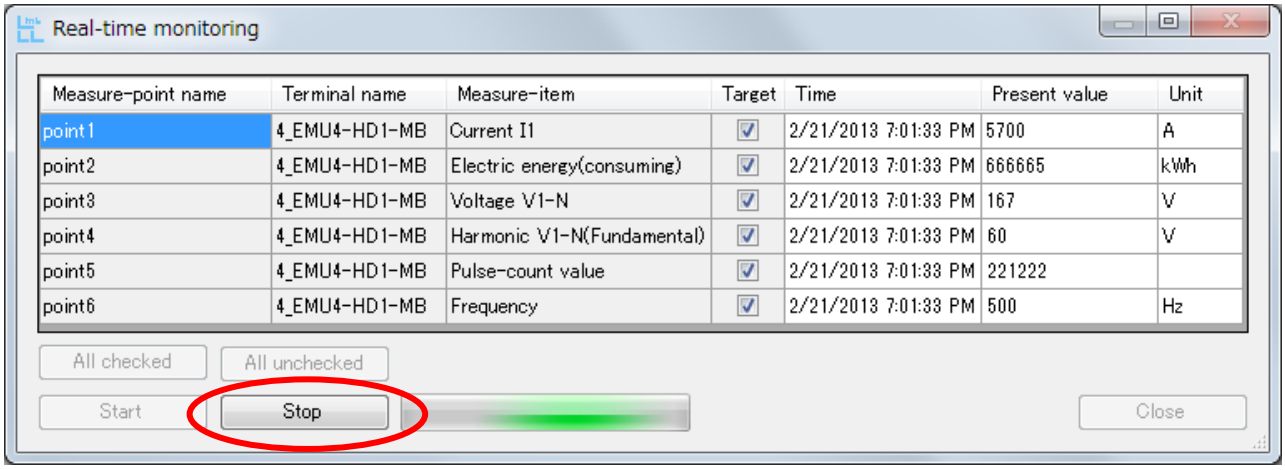


Details of error code →"5.5 Troubleshooting"

(e) If the communication is successful, data is displayed as the following figure.

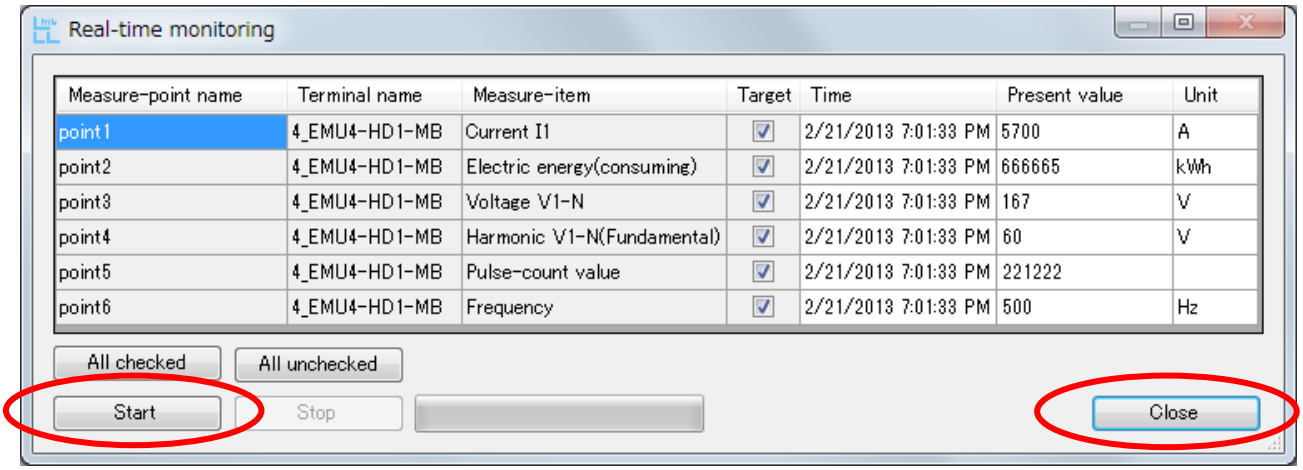


(f) Present values are updated until [Stop] button is pressed. They are updated one-second intervals at shortest.
Press [Stop] button to stop updating.



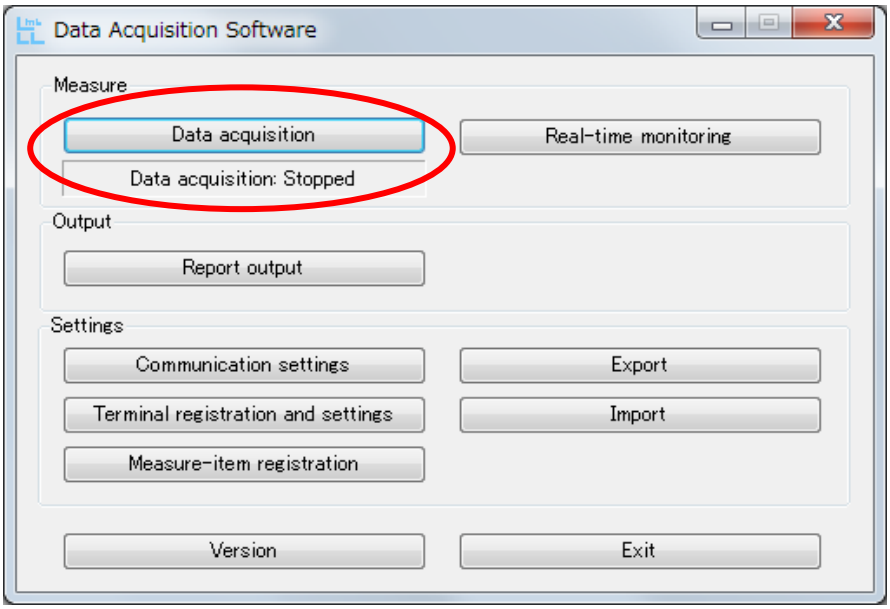
* By the number of measuring points and communication condition, update interval might be longer.

(g) After stopping updating, the last updated values are displayed. Press [Start] button to start communication again and update the present value.
Press [Close] button to complete the present value display.

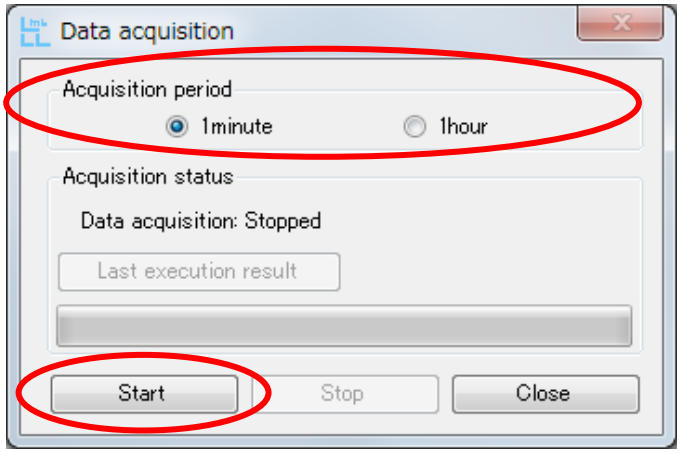


4.2 Data acquisition

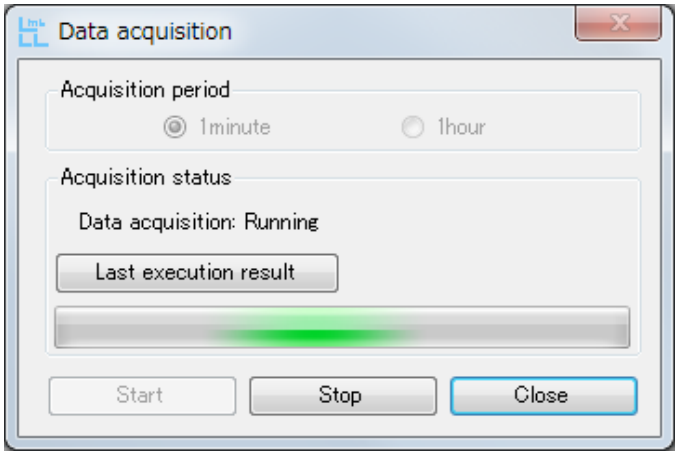
(a) Press [Data acquisition] button.



(b) Select “Acquisition period” and press [Start].

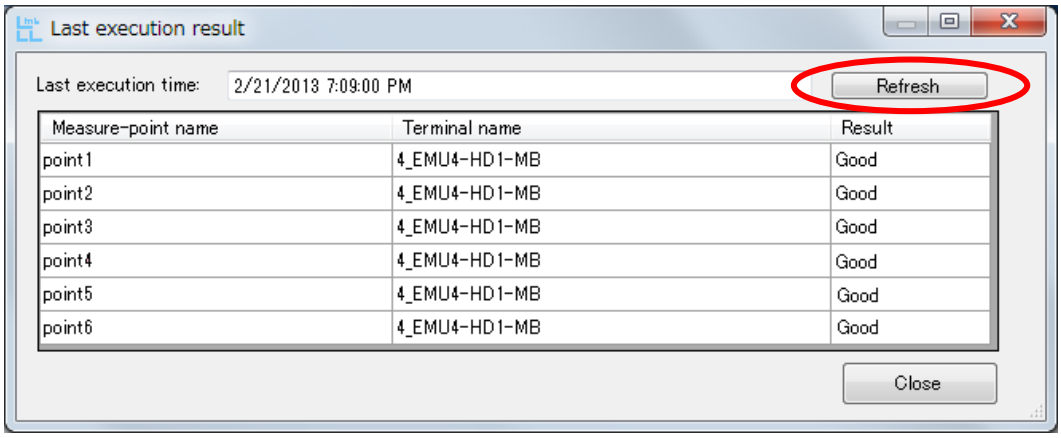


(c) When data acquisition begins, the following display is obtained.

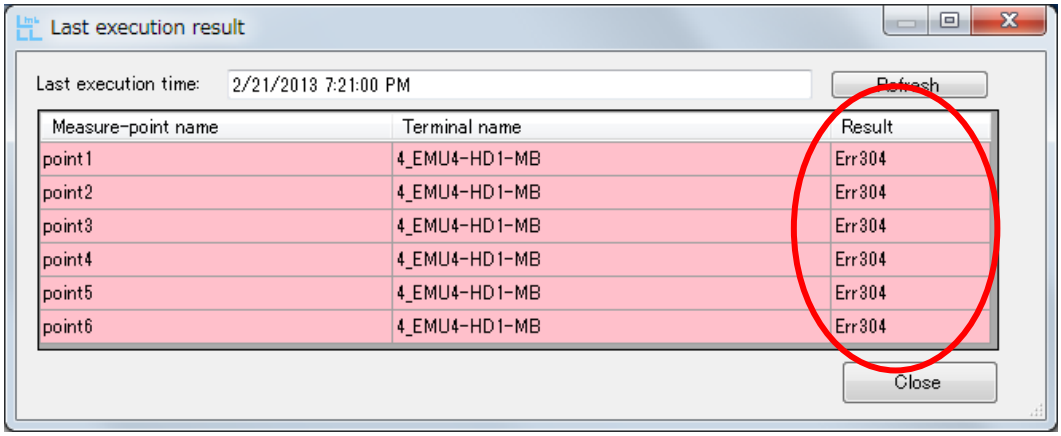


(d) You can confirm the communication result by pressing [Last execution result] button.
The communication result will be updated by pressing [Refresh] button.

・If the communication is successful:



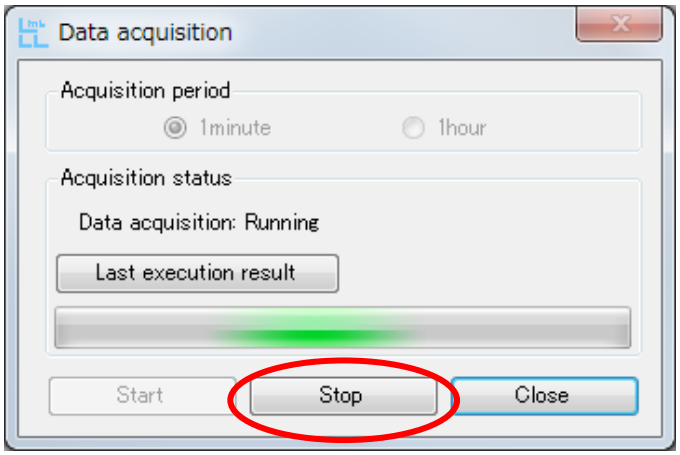
・If the communication error occurs:
Display of the measured item is highlighted and get an error in “Result”



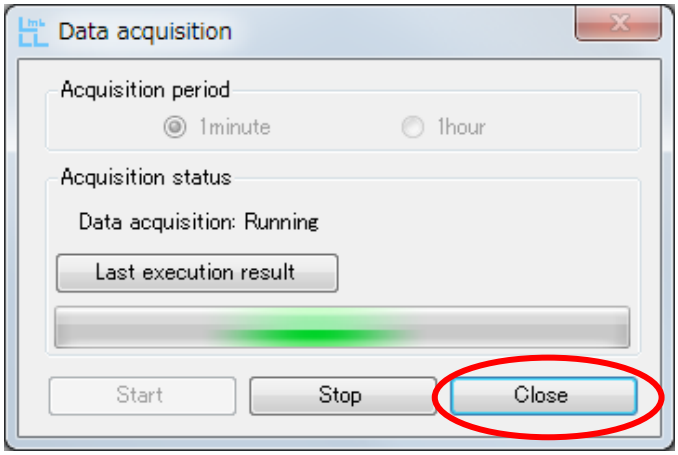
Details of error code →”5.5 Troubleshooting”

(e) Press [Close] button to go back to the display shown in the above item (c) (Data acquisition display).

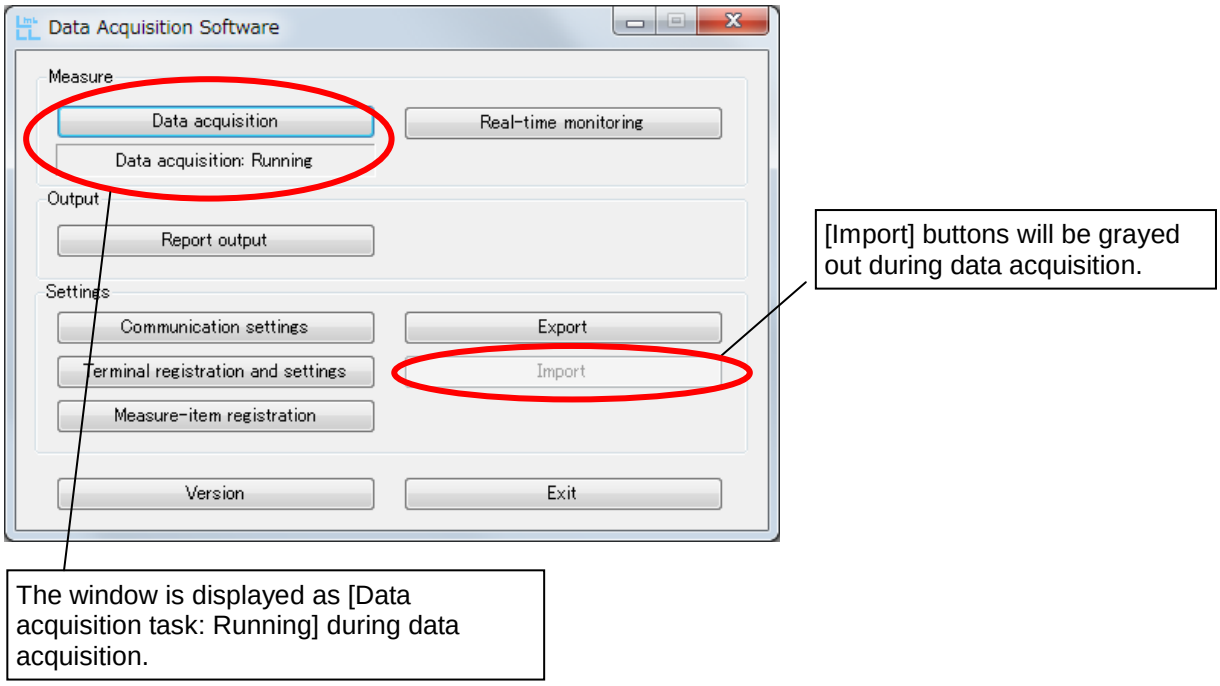
(f) When in stopping data acquisition, press [Stop] button shown in the following figure.



(g) If press [Close] button in the following figure, the window can be closed with data collected.



Go back to the following main menu if you close the window with data collected.



* Unless the task is stopped, data acquisition is run without having to run the data acquisition software. However, if the data is collected for 24 consecutive hours, restart the computer once per week. We assume no responsibility whatsoever for any data corruption and/or loss of data resulting from unexecuted of computer restart.

* Data cannot be collected during the restart of the computer.

■File for the results of data acquisition

The result file of data acquisition is stored in the following folder. If date will change during data acquisition, another file will be created and saved.

* The following folder does not exist when installing. The folder is created in the first time of data acquisition.

Data per minute
→C:¥Mitsubishi¥Emu4sw1¥LogData¥1MIN
File name
→01M + [YYMMDD] .csv

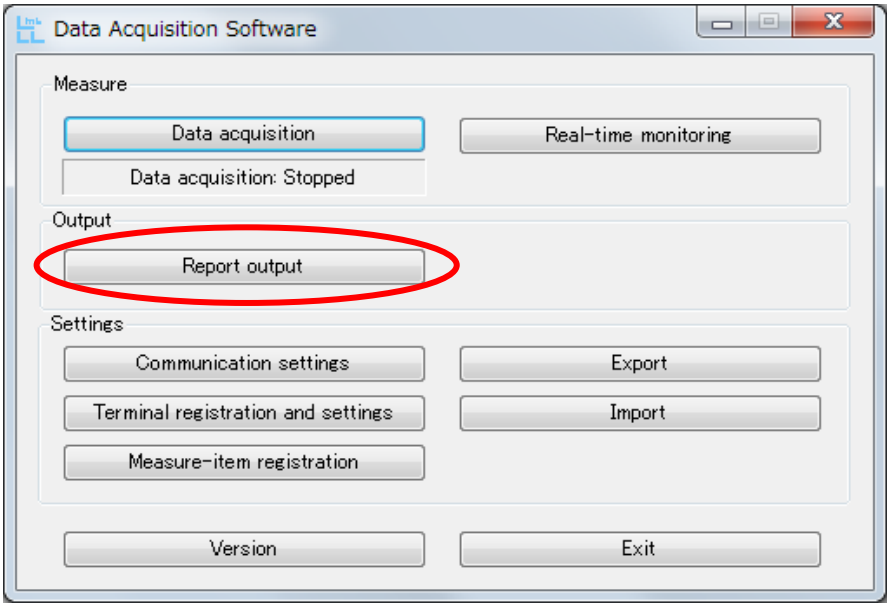
Measurement date

Hourly data
→C:¥Mitsubishi¥Emu4sw1¥LogData¥1HOUR
File name
→H + [YYMMDD] .csv

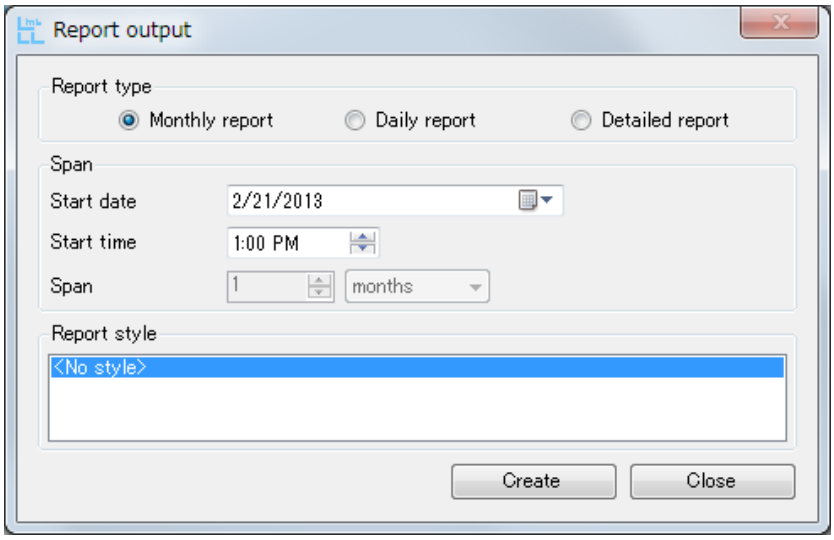
Measurement date

4.3 Report output

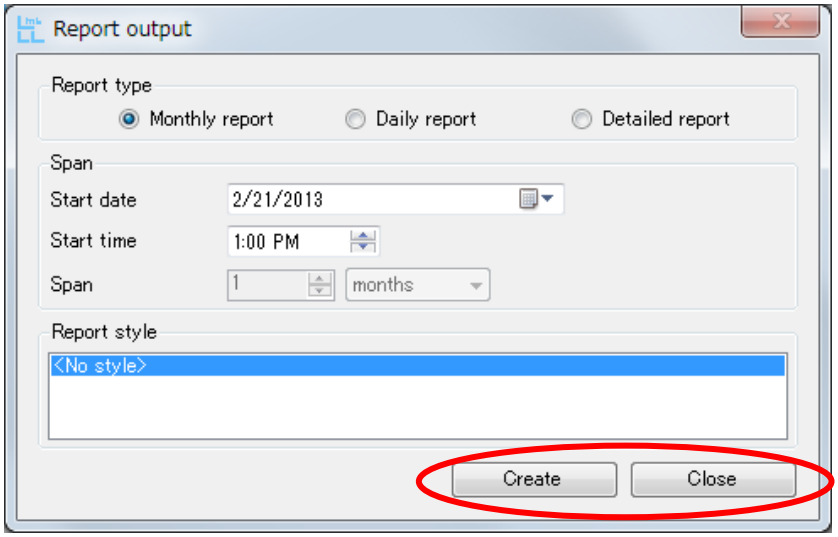
(a) Press [Report output] button.



(b) Decide the information to create the report in the following display.

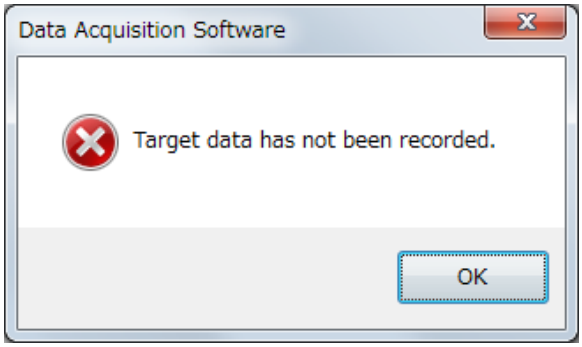


(c) When creating the list, push “Create” button shown in the following figure.
When you quit “Report output” without creating the report, push “Close” button.

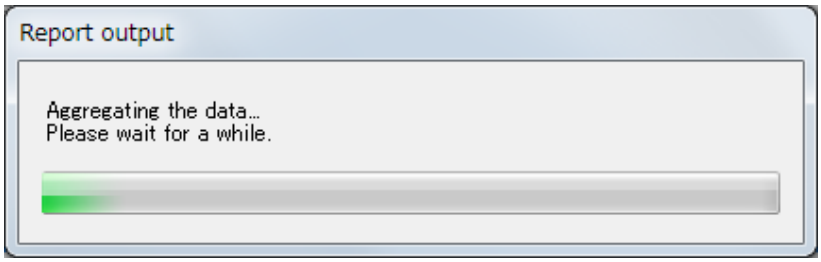


Note. Since the list will be created based on the data in the following folder, the message window is displayed as shown in the following figure if no collected data at a specific date exists.

Hourly data (The case of the default installation destination)
→C:¥Mitsubishi¥Emu4sw1¥LogData¥1HOUR
Data per minute (The case of the default installation destination)
→C:¥Mitsubishi¥Emu4sw1¥LogData¥1MIN



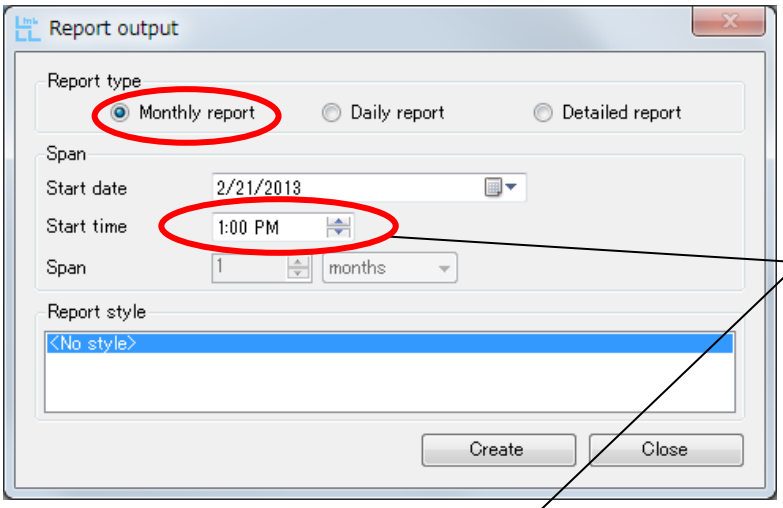
When the report creation begins, the following window is displayed (it takes some time to output the list).



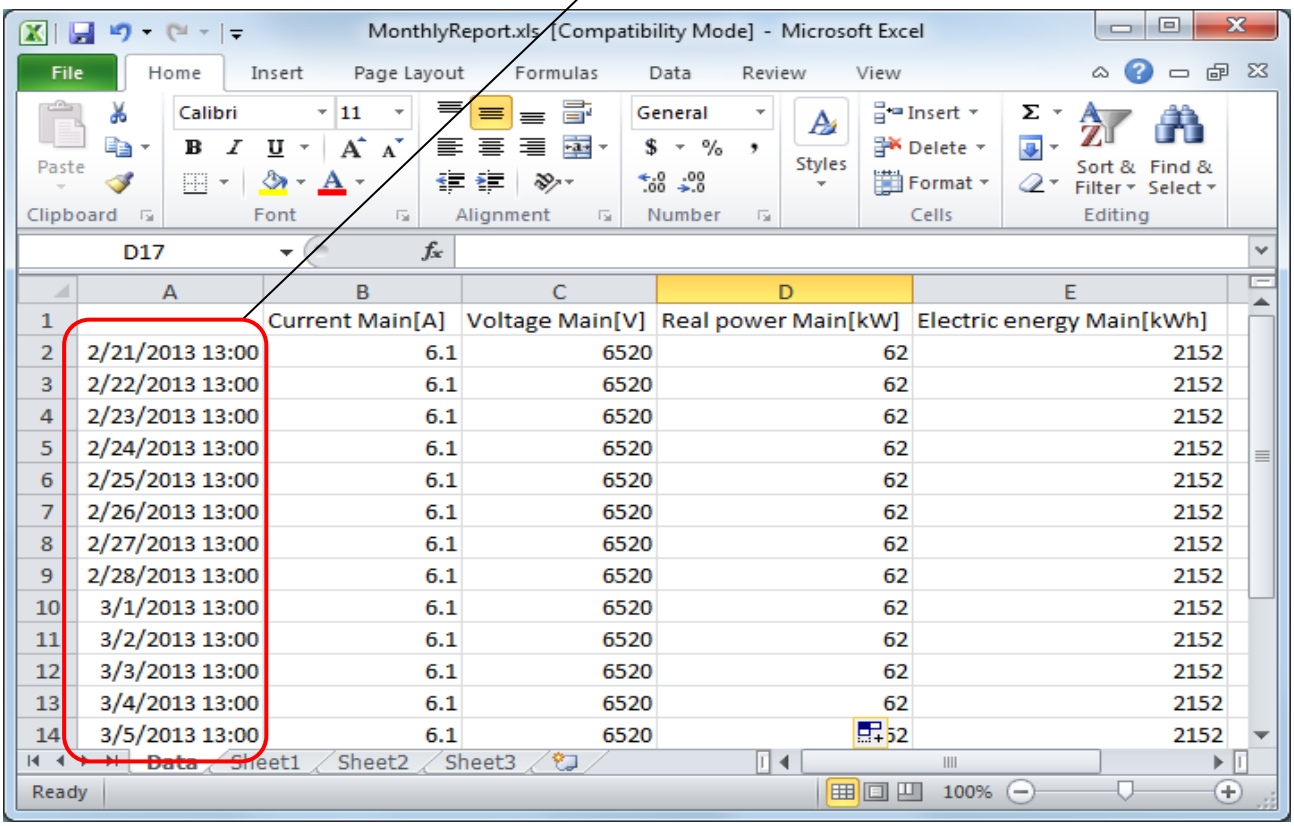
Specify the destination of the file and save as a new file the data after completing the report creation.

■Report type

・Monthly report: Create a month's data from "Start date".



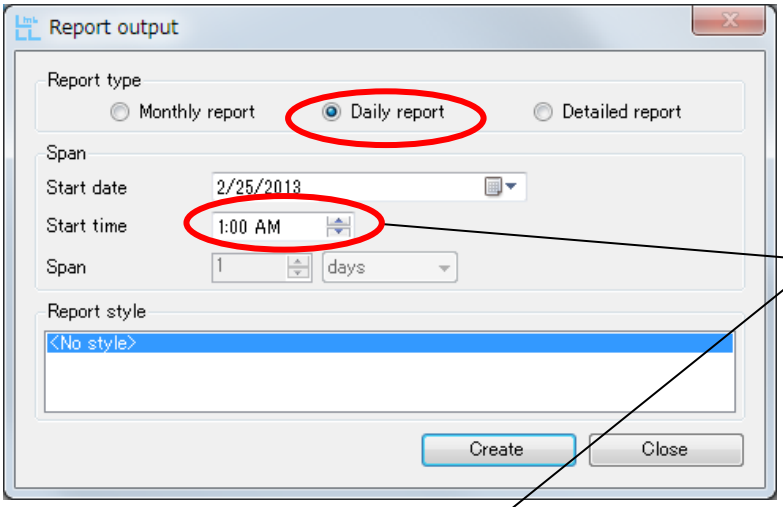
For "Monthly report", you can set "Start time" in an hour. 1 day's collected data will be the data of specific time period.



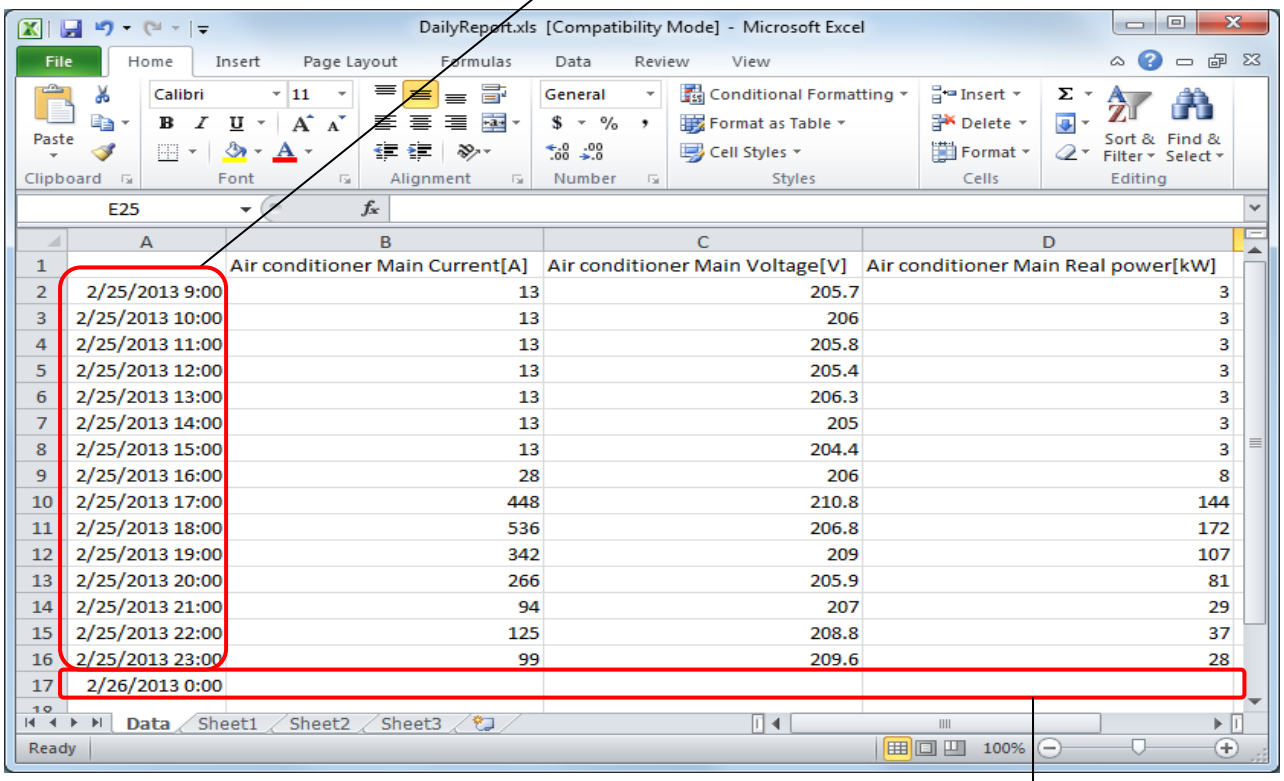
Report output file (Monthly report)

* If the data acquisition interval is 1 minute, monthly report data cannot be output.

・Daily report: Create 24 hours of data from “Start date”.



For “Daily report”, you can set “Start time” in an hour. 1 day’s collected data will be an hourly data from a scheduled time.



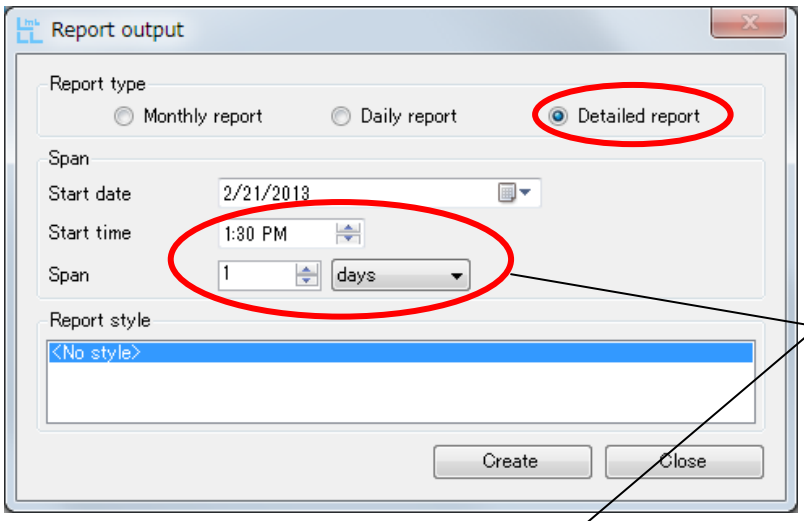
	A	B	C	D
1		Air conditioner Main Current[A]	Air conditioner Main Voltage[V]	Air conditioner Main Real power[kW]
2	2/25/2013 9:00	13	205.7	3
3	2/25/2013 10:00	13	206	3
4	2/25/2013 11:00	13	205.8	3
5	2/25/2013 12:00	13	205.4	3
6	2/25/2013 13:00	13	206.3	3
7	2/25/2013 14:00	13	205	3
8	2/25/2013 15:00	13	204.4	3
9	2/25/2013 16:00	28	206	8
10	2/25/2013 17:00	448	210.8	144
11	2/25/2013 18:00	536	206.8	172
12	2/25/2013 19:00	342	209	107
13	2/25/2013 20:00	266	205.9	81
14	2/25/2013 21:00	94	207	29
15	2/25/2013 22:00	125	208.8	37
16	2/25/2013 23:00	99	209.6	28
17	2/26/2013 0:00			

Report output file (Daily report)

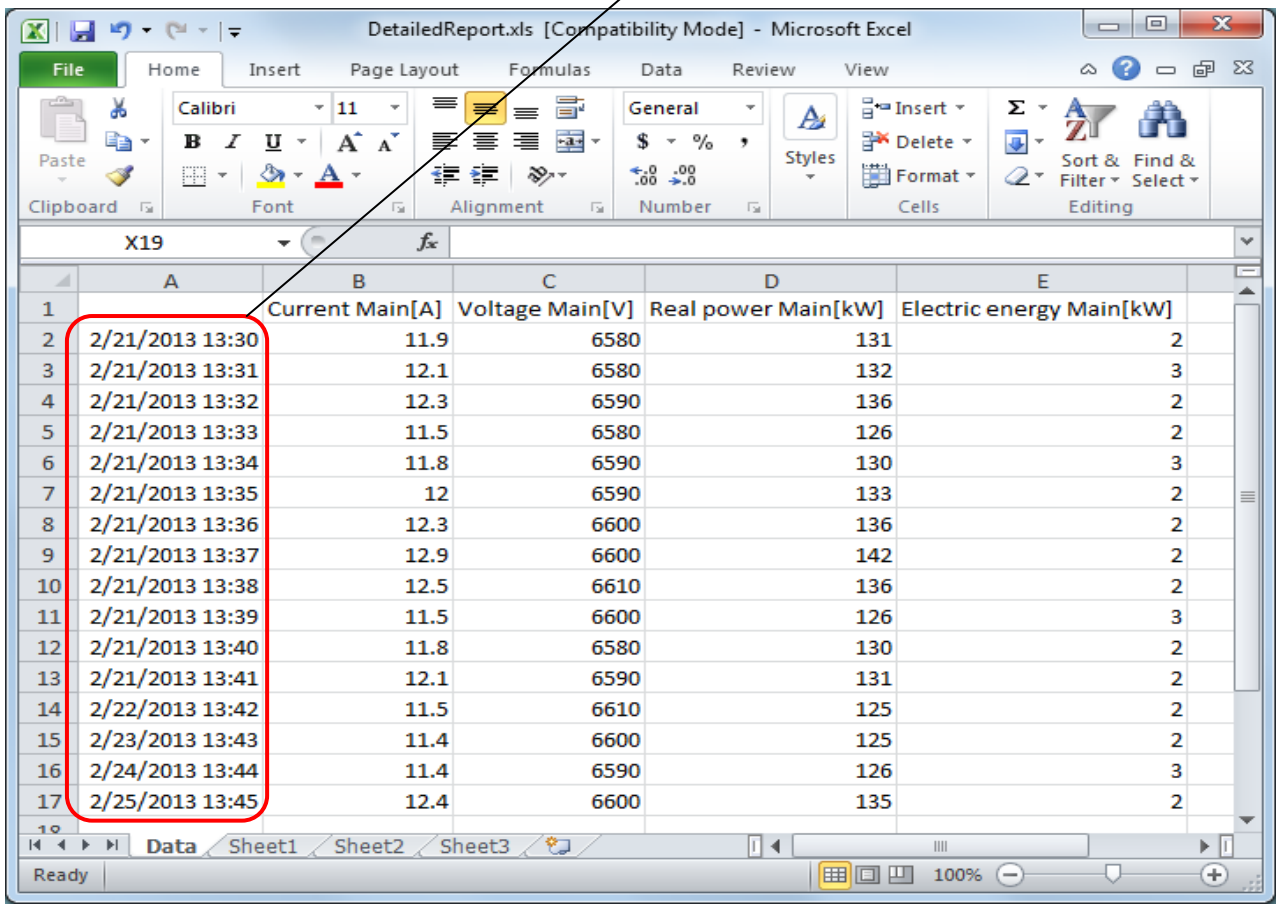
* If the data acquisition interval is 1 minute, daily report data cannot be output.

If there is no longer collected data in the middle of data capture (e.g., if no data in the next day exist, etc.), appear as blank.

・Detailed report: The data for the specified period is created from “Start date and start time”.



For “Detailed report”, you can set “Start time” in a minute. “Span” can be selected “1 day” or “1 to 24 hours”.



	A	B	C	D	E
1		Current Main[A]	Voltage Main[V]	Real power Main[kW]	Electric energy Main[kW]
2	2/21/2013 13:30	11.9	6580	131	2
3	2/21/2013 13:31	12.1	6580	132	3
4	2/21/2013 13:32	12.3	6590	136	2
5	2/21/2013 13:33	11.5	6580	126	2
6	2/21/2013 13:34	11.8	6590	130	3
7	2/21/2013 13:35	12	6590	133	2
8	2/21/2013 13:36	12.3	6600	136	2
9	2/21/2013 13:37	12.9	6600	142	2
10	2/21/2013 13:38	12.5	6610	136	2
11	2/21/2013 13:39	11.5	6600	126	3
12	2/21/2013 13:40	11.8	6580	130	2
13	2/21/2013 13:41	12.1	6590	131	2
14	2/22/2013 13:42	11.5	6610	125	2
15	2/23/2013 13:43	11.4	6600	125	2
16	2/24/2013 13:44	11.4	6590	126	3
17	2/25/2013 13:45	12.4	6600	135	2

Report output file (Detailed report)

* If the data acquisition interval is 1 hour, detailed report data cannot be output.

■Report style

By storing the Excel® file at the following storage location and choose that in report style, master file can be output in the specific file format.
If you select “<No style>”, new Excel® file will be created.

・Storage location
Storage location of the Excel® file differs depending on the selected language.

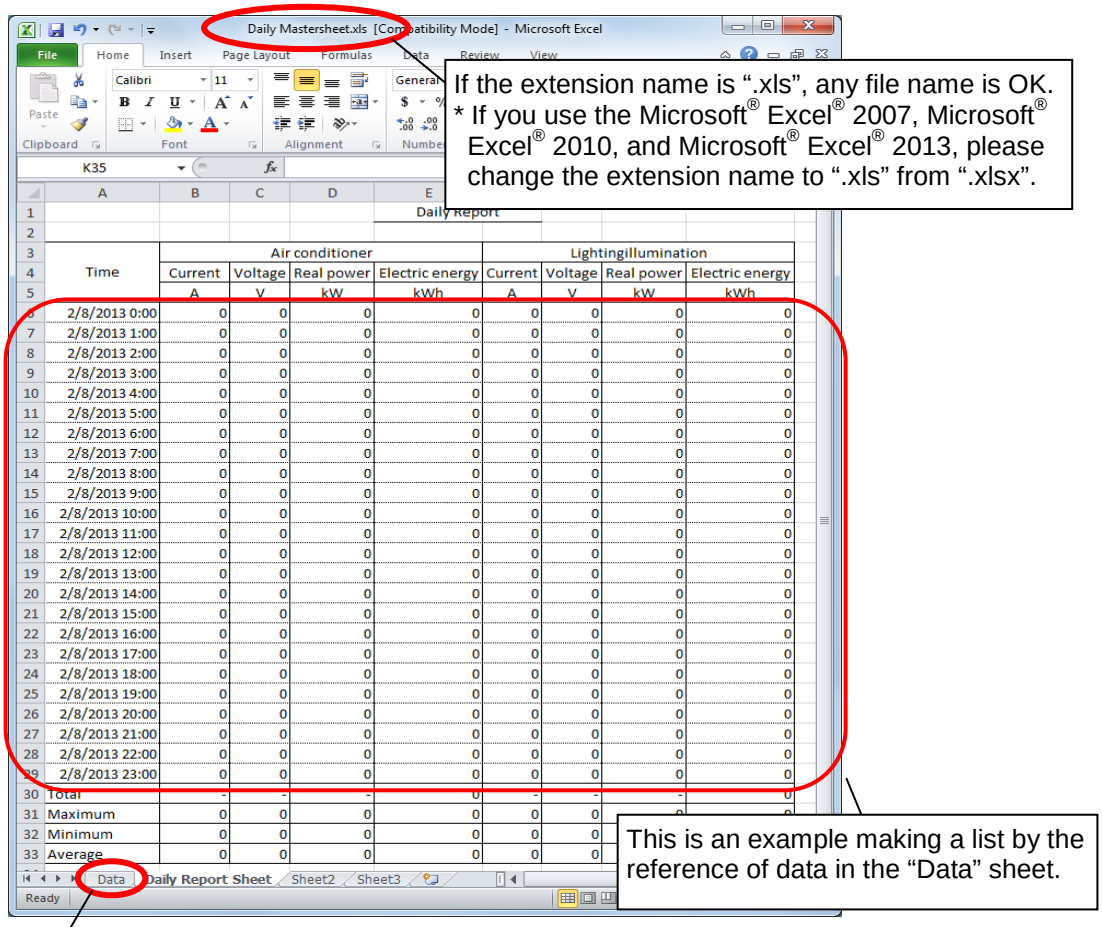
・Storage location in the case of Japanese:
C:¥Mitsubishi¥Emu4sw1¥Language¥0411¥MasterData¥Monthly ←Monthly report
C:¥Mitsubishi¥Emu4sw1¥Language¥0411¥MasterData¥Daily ←Daily report
C:¥Mitsubishi¥Emu4sw1¥Language¥0411¥MasterData¥Detailed ←Detailed report

・Storage location in the case of English:
C:¥Mitsubishi¥Emu4sw1¥Language¥0409¥MasterData¥Monthly ←Monthly report
C:¥Mitsubishi¥Emu4sw1¥Language¥0409¥MasterData¥Daily ←Daily report
C:¥Mitasubishi¥Emu4sw1¥Language¥0409¥MasterData¥Detailed ←Detailed report

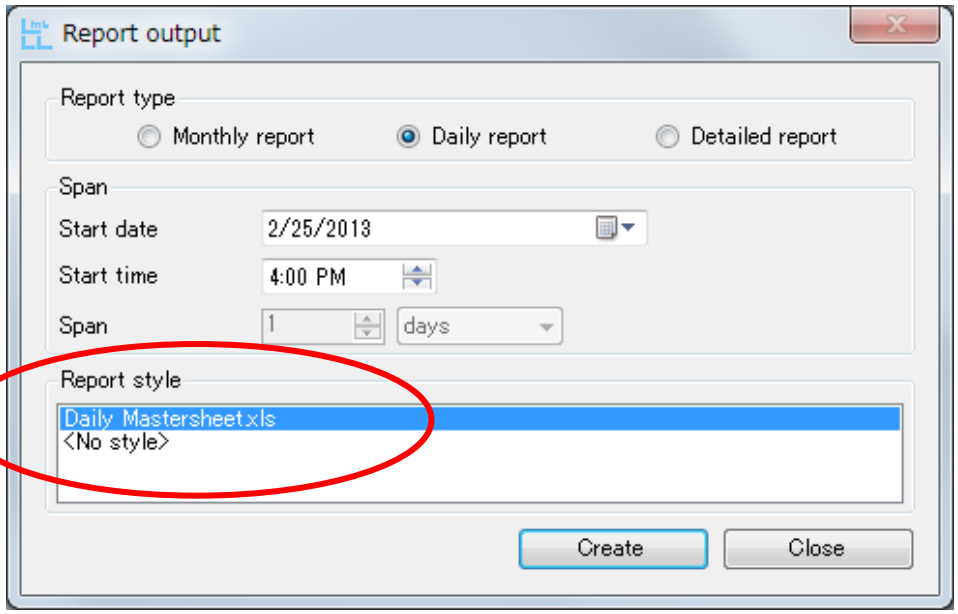
* Installation folder is the storage location in the case of a default.

・How to use Report style

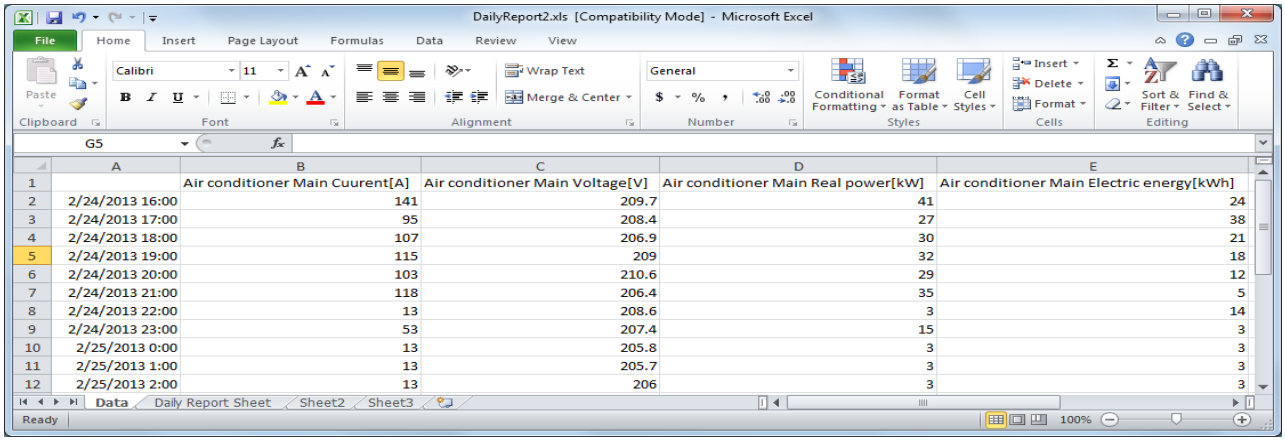
(a) Create the sheet named “Data” in the Excel® file that will be used as the following figure.
The following figure is an example of a report format.
* If the sheet named “Data” does not exist, output the list data after a sheet at the top of tab.
Tab name of “Data” is not case-sensitive.
* The “Data” sheet is outputted “<No style>” report. (Details, refer to “(c)”)



(b) You will be able to select the Excel® file that you created in item (a) in “Report style” of the Report output display as the following figure by storing the file at the specified folder.
Press “Create” button with the created file selected.
* Usage procedure for ”Monthly report”, “Daily report” and ”Detailed report” are same except for the storage location of the file.

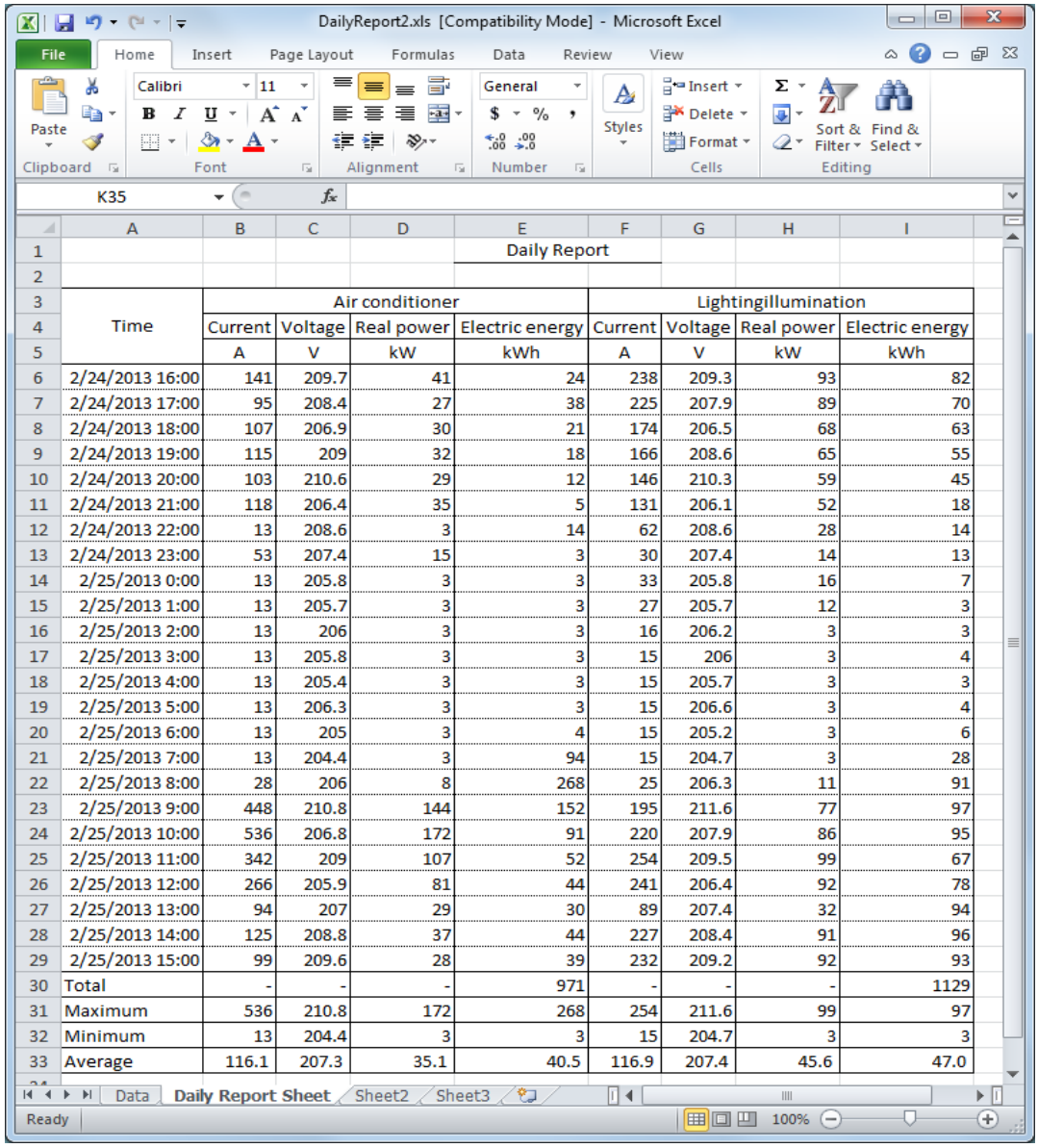


(c) Save the file after entering file name. The file will be output with data written on “Data” tab in Excel® file format as the following figure.



	A	B	C	D	E
1		Air conditioner Main Cuurent[A]	Air conditioner Main Voltage[V]	Air conditioner Main Real power[kW]	Air conditioner Main Electric energy[kWh]
2	2/24/2013 16:00	141	209.7	41	24
3	2/24/2013 17:00	95	208.4	27	38
4	2/24/2013 18:00	107	206.9	30	21
5	2/24/2013 19:00	115	209	32	18
6	2/24/2013 20:00	103	210.6	29	12
7	2/24/2013 21:00	118	206.4	35	5
8	2/24/2013 22:00	13	208.6	3	14
9	2/24/2013 23:00	53	207.4	15	3
10	2/25/2013 0:00	13	205.8	3	3
11	2/25/2013 1:00	13	205.7	3	3
12	2/25/2013 2:00	13	206	3	3

“Data” sheet



	A	B	C	D	E	F	G	H	I
1					Daily Report				
2									
3	Time	Air conditioner				Lightingillumination			
4		Current	Voltage	Real power	Electric energy	Current	Voltage	Real power	Electric energy
5		A	V	kW	kWh	A	V	kW	kWh
6	2/24/2013 16:00	141	209.7	41	24	238	209.3	93	82
7	2/24/2013 17:00	95	208.4	27	38	225	207.9	89	70
8	2/24/2013 18:00	107	206.9	30	21	174	206.5	68	63
9	2/24/2013 19:00	115	209	32	18	166	208.6	65	55
10	2/24/2013 20:00	103	210.6	29	12	146	210.3	59	45
11	2/24/2013 21:00	118	206.4	35	5	131	206.1	52	18
12	2/24/2013 22:00	13	208.6	3	14	62	208.6	28	14
13	2/24/2013 23:00	53	207.4	15	3	30	207.4	14	13
14	2/25/2013 0:00	13	205.8	3	3	33	205.8	16	7
15	2/25/2013 1:00	13	205.7	3	3	27	205.7	12	3
16	2/25/2013 2:00	13	206	3	3	16	206.2	3	3
17	2/25/2013 3:00	13	205.8	3	3	15	206	3	4
18	2/25/2013 4:00	13	205.4	3	3	15	205.7	3	3
19	2/25/2013 5:00	13	206.3	3	3	15	206.6	3	4
20	2/25/2013 6:00	13	205	3	4	15	205.2	3	6
21	2/25/2013 7:00	13	204.4	3	94	15	204.7	3	28
22	2/25/2013 8:00	28	206	8	268	25	206.3	11	91
23	2/25/2013 9:00	448	210.8	144	152	195	211.6	77	97
24	2/25/2013 10:00	536	206.8	172	91	220	207.9	86	95
25	2/25/2013 11:00	342	209	107	52	254	209.5	99	67
26	2/25/2013 12:00	266	205.9	81	44	241	206.4	92	78
27	2/25/2013 13:00	94	207	29	30	89	207.4	32	94
28	2/25/2013 14:00	125	208.8	37	44	227	208.4	91	96
29	2/25/2013 15:00	99	209.6	28	39	232	209.2	92	93
30	Total	-	-	-	971	-	-	-	1129
31	Maximum	536	210.8	172	268	254	211.6	99	97
32	Minimum	13	204.4	3	3	15	204.7	3	3
33	Average	116.1	207.3	35.1	40.5	116.9	207.4	45.6	47.0

The sheet created in (a).

Chapter 5
Appendix

About this chapter

This chapter explains the following.

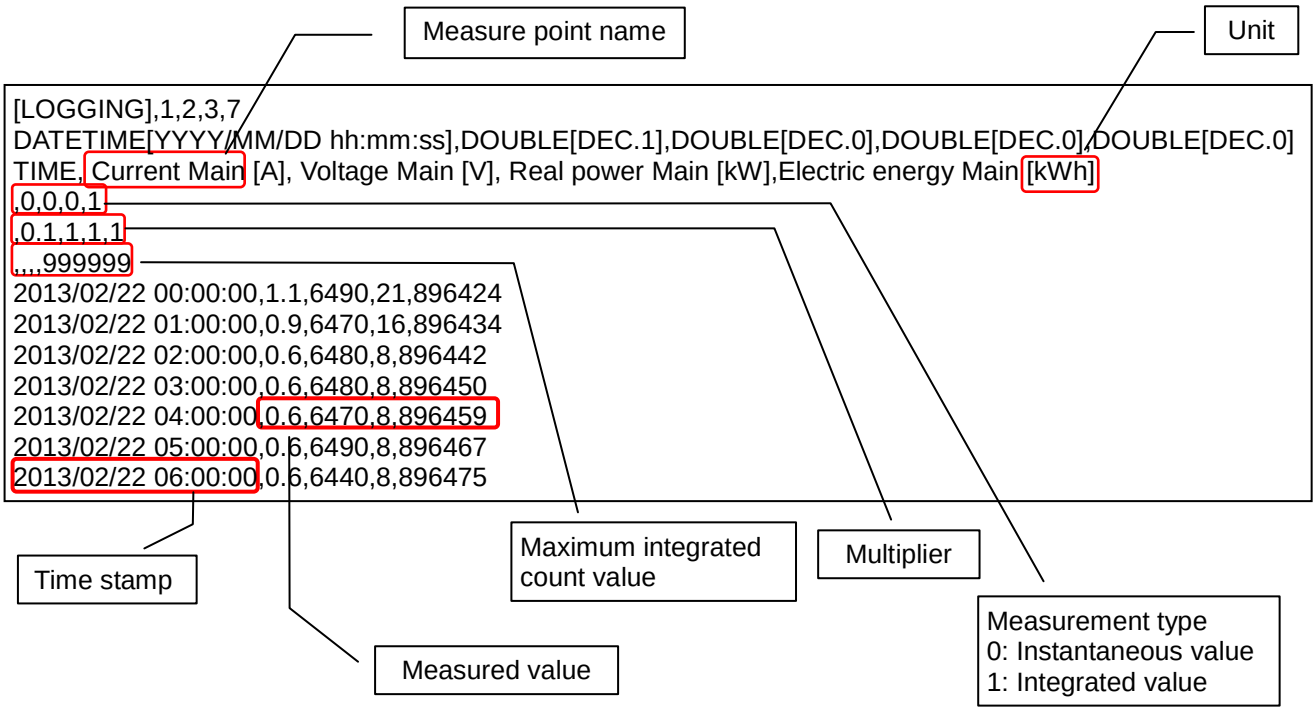
Chapter 5 Appendix

5.1 Specifications

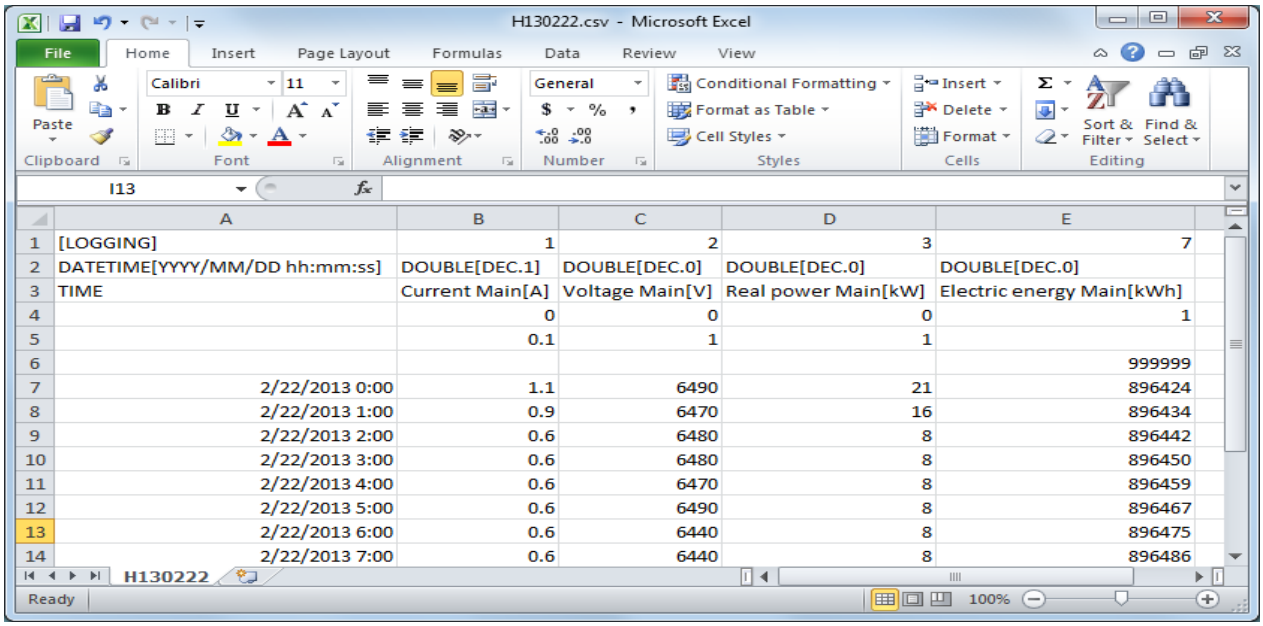
Item		Specifications
Recommended system environment	OS (English)	・Microsoft® Windows® 8.1 Pro (32 / 64bit) ・Microsoft® Windows® 7 Professional (32 / 64bit) SP1 ・Microsoft® Windows Vista® Ultimate 32bit SP2
	Microsoft® .NET Framework	・Microsoft® .NET Framework 2.0 ・Microsoft® .NET Framework 3.5 ・Microsoft® .NET Framework 3.5.1
	Microsoft® Excel®	・Microsoft® Excel® 2007 SP3 (32 / 64bit) ・Microsoft® Excel® 2010 SP1 (32 / 64bit) ・Microsoft® Excel® 2013 SP1 (32 / 64bit)
Basic specifications	Maximum connectable devices	31 devices
	Languages	Japanese, English
Data acquisition function	Periodic acquisition	Data acquisition in a cycle of one minute or one hour
	Present value display	Perform constant communication, displays the present value
	Maximum acquisition points	124 points
Setting function	Communication setting	MODBUS®RTU communication setting (Baud rate , Stop bit ,etc)
	Terminal registration	Terminal registration to the data acquisition
	Terminal setting	Setting write to the terminal, read function (Phase-wire system, rated current , rated voltage)
	Measured item	Measured item registration to the data acquisition
	Export and Import	Save or load settings files. (Communication, Terminal, Measure item)
List output	Output format	Paste the aggregated data to the master file (Excel® file). (Changes and additions to the master files can be freely)
	Output type	Monthly report , Daily report , Detailed report (one-minute intervals)

5.2 CSV file composition

File composition of collected data at data collection or every cycle is as below.



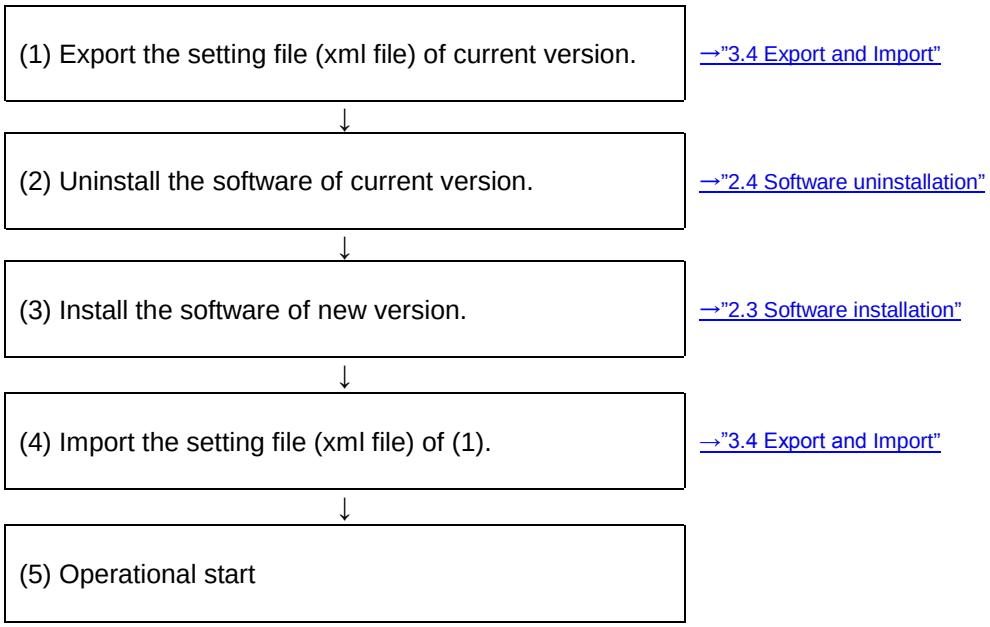
On Microsoft® Excel® software, the file composition is displayed as below.



	A	B	C	D	E
1	[LOGGING]	1	2	3	7
2	DATETIME[YYYY/MM/DD hh:mm:ss]	DOUBLE[DEC.1]	DOUBLE[DEC.0]	DOUBLE[DEC.0]	DOUBLE[DEC.0]
3	TIME	Current Main[A]	Voltage Main[V]	Real power Main[kW]	Electric energy Main[kWh]
4		0	0	0	1
5		0.1	1	1	
6					999999
7	2/22/2013 0:00	1.1	6490	21	896424
8	2/22/2013 1:00	0.9	6470	16	896434
9	2/22/2013 2:00	0.6	6480	8	896442
10	2/22/2013 3:00	0.6	6480	8	896450
11	2/22/2013 4:00	0.6	6470	8	896459
12	2/22/2013 5:00	0.6	6490	8	896467
13	2/22/2013 6:00	0.6	6440	8	896475
14	2/22/2013 7:00	0.6	6440	8	896486

5.3 Procedure of version-up

If updating this software, follow the procedure below.



5.4 Support terminal list

Support terminal are shown in the table below.

Series	Terminal
EcoMonitorLight	EMU4-BD1-MB
	EMU4-HD1-MB
EcoMonitorPlus	EMU4-BM1-MB
	EMU4-HM1-MB
	EMU4-LG1-MB
	EMU4-A2
	EMU4-VA2
ME96	ME96SSE-MB
	ME96SSH-MB
	ME96SSR-MB
ME96SS-Ver.A	ME96SSEA-MB
	ME96SSHA-MB
	ME96SSRA-MB
Other	General MODBUS® terminal

5.5 Troubleshooting

List of error codes

Error code	Description of error	Factor of occurrence of error (details)	Action
Err003	Register address error	Requested register address not exist	Check for value of register address and terminal equipment.
Err006	Data value error	Configured value is out of range	Check the configured value is correct.
Err301	Failure of communication port open	During change the setting for the terminal	Do the writing of again setting value.
Err304	Receive timeout	No response from the terminal within the regulation time	Check for proper connection of the terminal and disconnection or short-circuit of the transmission line. Check the communication setting of software is consistent with setting of COM port. Check the setting of Ethernet - RS-485 conversion adapter and USB - RS-485 conversion adapter.
			When it occurs many times, there is a possibility of a terminal failure. Contact your nearest Service Network.

■Service Network

Country / Region	Company	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+ 61-2-9684-7777
USA	Mitsubishi Electric Automation Inc.	500 Corporate Woods Parkway Vernon Hills, IL 60061, USA	+ 1-847-478-2100
Brazil	MELCO-TEC Rep. Com. e Assessoria Tecnica Ltda.	Av. Paulista, 1439-Cj.72, Cerqueira Cesar CEP 01311-200, Sao Paulo, SP, CEP:01311-200, Brazil	+ 55-11-3146-2200
Chile	Rhona S.A.	Agua Santa 4211 P.O. Box 30-D Vina del Mar, Chile	+ 56-32-2-320-600
China	Mitsubishi Electric Automation (CHINA) Ltd.	No. 1386 Hongqiao Road, Mitsubishi Electric Automation Center Shanghai China, 200336	+ 86-21-2322-3030
China	Mitsubishi Electric Automation (HongKong) Ltd.	10/F., Manulife Tower, 169 Electric Road, North Point, Hong Kong	+ 852-2887-8810
Colombia	Proelectrico Representaciones S.A.	Carrera 53 No 29C-73 - Medellin, Colombia	+ 57-4-235-30-38
Egypt	Cairo Electrical Group	9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab, Cairo - Egypt	+ 20-2-27961337
Europe	Mitsubishi Electric Europe B.V.	Gothaer Strasse 8, D-40880 Ratingen, Germany	+ 49-(0)2102-486-0
India	Mitlite Electric Company Pvt Ltd	Plot No-32, Sector-6, IMT Maneser,	+ 91-124-4695300
Indonesia	P. T. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+ 62-(0)21-6610651-9
Korea	Mitsubishi Electric Automation Korea Co., Ltd	9F Gangseo Hangang XI-Tower, 401 YangCheon-Ro, Gangseo-Gu, Seoul, 157-801, Korea	+ 82-2-3660-9572
Laos	Societe Lao Import Co., Ltd.	43-47 Lane Xang Road P.O. BOX 2789 VT Vientiane Laos	+ 856-21-215043
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon	+ 961-1-240445
Malaysia	Mittric Sdn Bhd	5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam, Selangor, Malaysia	+ 603-5569-3748
Myanmar	Peace Myanmar Electric Co.,Ltd.	NO137/139 Botataung Pagoda Road, Botataung Town Ship 11161, Yangon, Myanmar	+ 95-(0)1-202589
Nepal	Watt & Volt House	KHA 2-65, Volt House Dillibazar Post Box: 2108, Kathmandu, Nepal	+ 977-1-4411330
Middle East Arab Countries & Cyprus	Comptoir d'Electricite Generale-International-S.A.L.	Cebaco Center - Block A Autostrade Dora P.O. Box 11-1314 Beirut - Lebanon	+ 961-1-240430
Pakistan	Prince Electric Co.	1&16 Brandreth Road, Lahore-54000, Pakistan	+ 92-(0)42-7654342
Philippines	Edison Electric Integrated, Inc.	24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines	+ 63-(0)2-634-8691
Saudi Arabia	Center of Electrical Goods	Al-Shuwayer St. Side way of Salahuddin Al-Ayoubi St. P.O. Box 15955 Riyadh 11454 - Saudi Arabia	+ 966-1-4770149
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307, Alexandra Road, #05-01/02 Mitsubishi Electric Building, Singapore 159943	+ 65-6473-2308
South Africa	CBI-electric: low voltage	Private Bag 2016, Isando, 1600, South Africa	+ 27-(0)11-9282000
Taiwan	Setsuyo Enterprise Co., Ltd	6th Fl., No.105, Wu Kung 3rd, Wu-Ku Hsiang, Taipei, Taiwan, R.O.C.	+ 886-(0)2-2298-8889
Thailand	United Trading & Import Co., Ltd.	77/12 Bamrungmuang Road, Klong Mahanak, Pomprab Bangkok Thailand	+ 66-223-4220-3
Uruguay	Fierro Vignoli S.A.	Avda. Uruguay 1274, Montevideo, Uruguay	+ 598-2-902-0808
Venezuela	Adesco S.A.	Calle 7 La Urbina Edificio Los Robles Locales C y D Planta Baja, Caracas - Venezuela	+ 58-212-241-9952
Vietnam	CTY TNHH-TM SA GIANG	10th Floor, Room 1006-1007, 255 Tran Hung Dao St., Co Giang Ward, Dist 1, Ho Chi Minh City, Vietnam	+ 84-8-8386727/28/29

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