



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.

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## *Chapter 1*

# *Introduction*

### **About this chapter**

This chapter explains the following.

- 1.1 Introduction
- 1.2 Disclaimer
- 1.3 Features
- 1.4 File composition
- 1.5 Usage composition

## 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.
- \* LINE EYE is the trademark of the LINE EYE 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

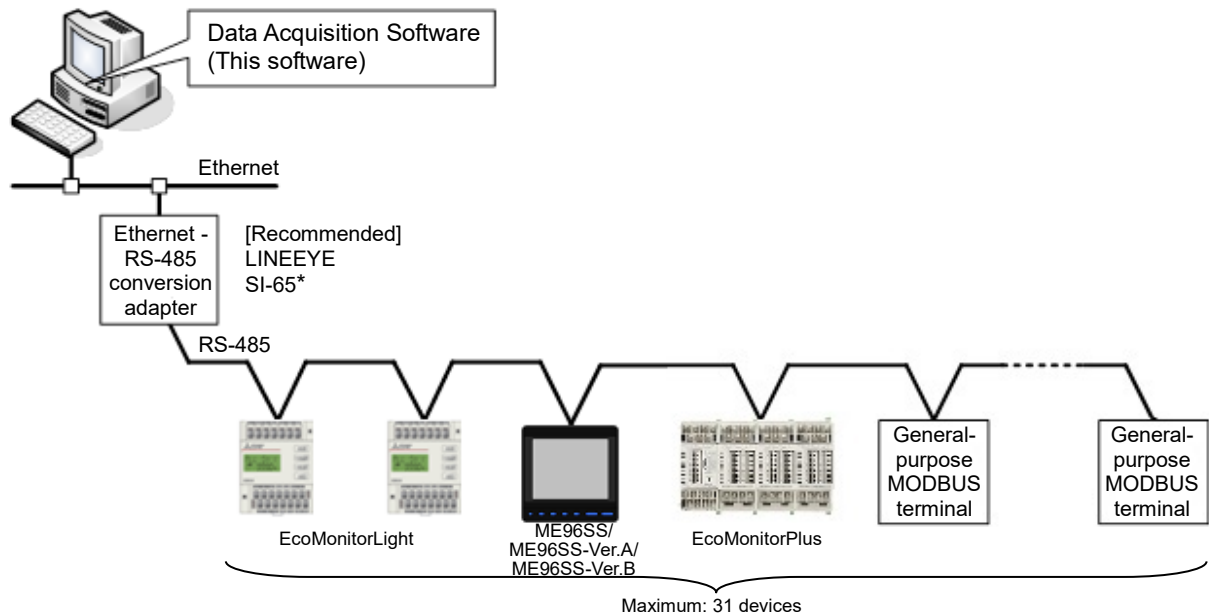
File name	Explanation
setup.exe	Installer for MODBUS corresponding Data Acquisition Software

• Language folder

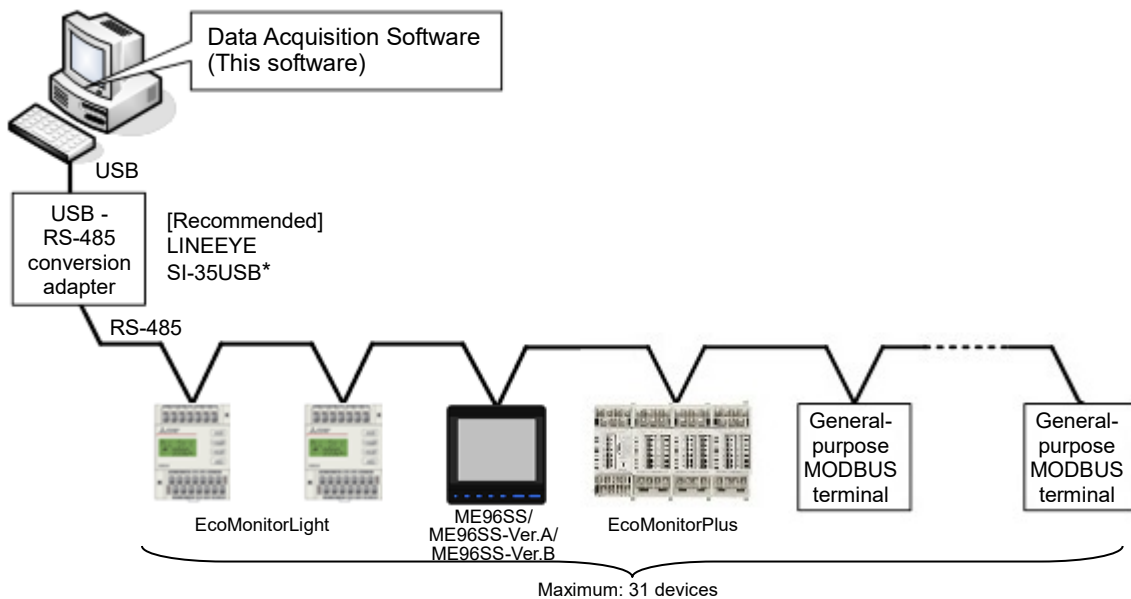
Language	Folder name	Explanation
English	Language\0409	The folder storing language file of Data Acquisition Software and list master data
Japanese	Language\0411	

## 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, and you can find more details in <5.7 Connection procedure when Ethernet – RS-485 conversion adapter is used>, <5.8 Connection procedure when USB – RS-485 conversion adapter is used> 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.

- 2.1 Recommended system environment
- 2.2 System construction procedure
- 2.3 Software installation
- 2.4 Software uninstallation
- 2.5 Precautions for use

## 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® 10 Pro (32 / 64bit) •Microsoft® Windows® 8.1 Pro (32 / 64bit) •Microsoft® Windows® 7 Professional (32/ 64bit) SP1
Microsoft® .NET Framework *4*5	•Microsoft® .NET Framework 2.0 •Microsoft® .NET Framework 3.5 •Microsoft® .NET Framework 3.5.1
Microsoft® Excel®*5	•Microsoft® Excel® 2010 SP1 (32 / 64bit) •Microsoft® Excel® 2013 SP1 (32 / 64bit) •Microsoft® Excel® 2016 (32 / 64bit)

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

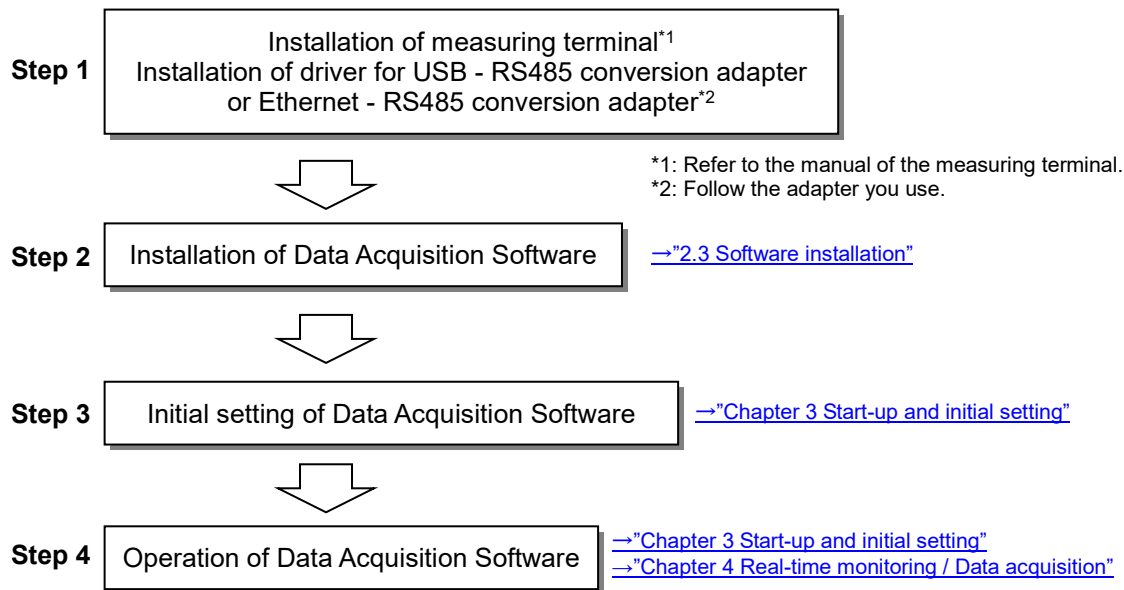
\*5: Do not work for Microsoft .NET Framework 4.X, corresponding version is required to install. 2.0/3.5/3.5.1 and 4.X are can be coexist.

\*6: Excel purchased and downloaded at Microsoft Store can not be used. Please use Excel of desktop applications.



## System construction procedure

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

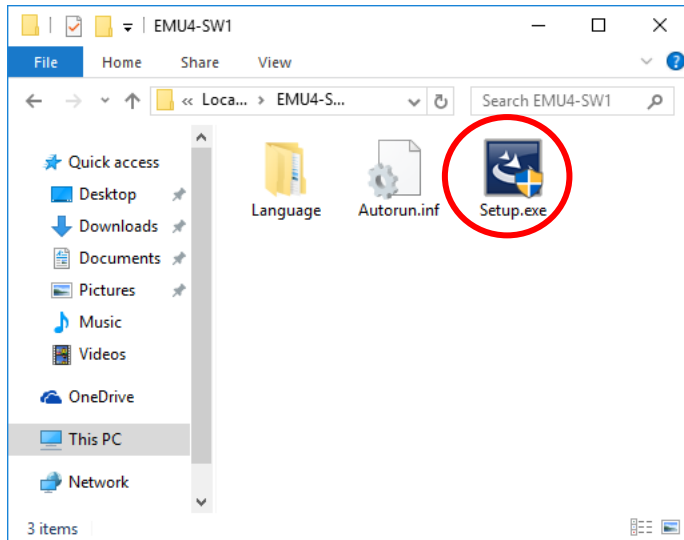


## 2.2 Software installation

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 10.

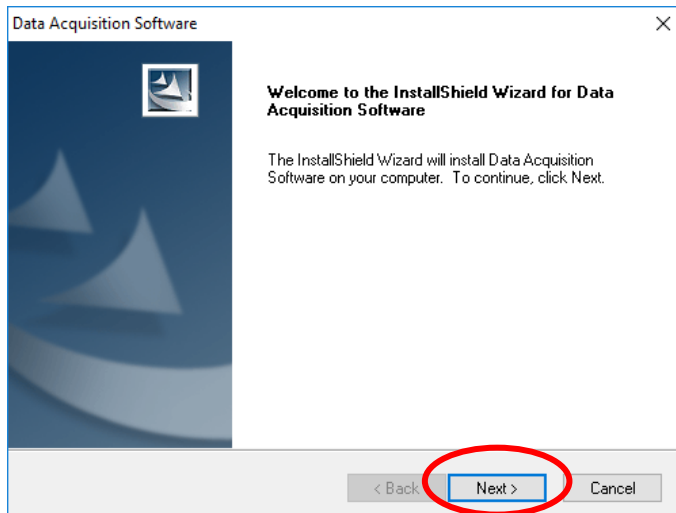
(a) Execute “setup.exe” in the downloaded file.



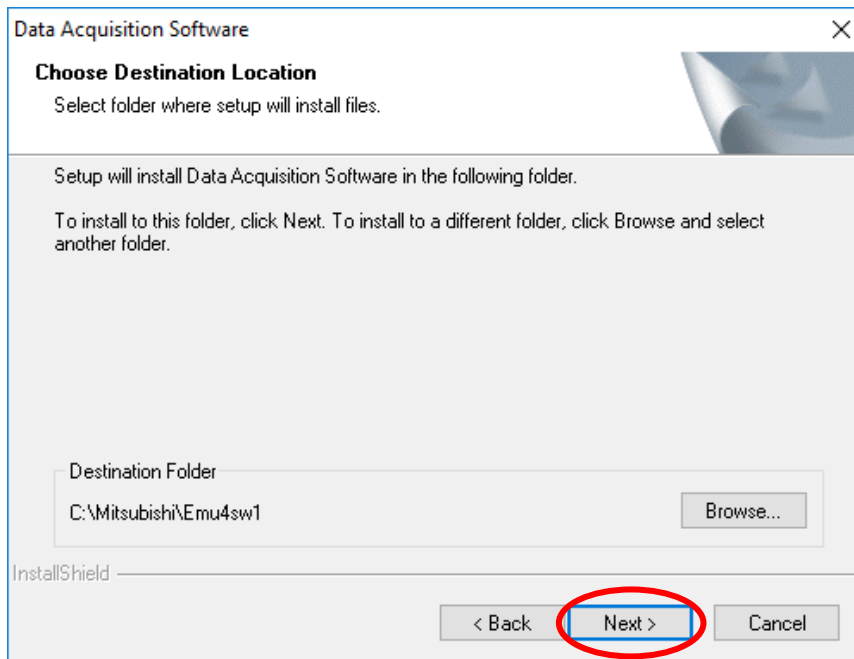
(b) Although User Account Control window is popped up and give the following warning, press [Yes] button.

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

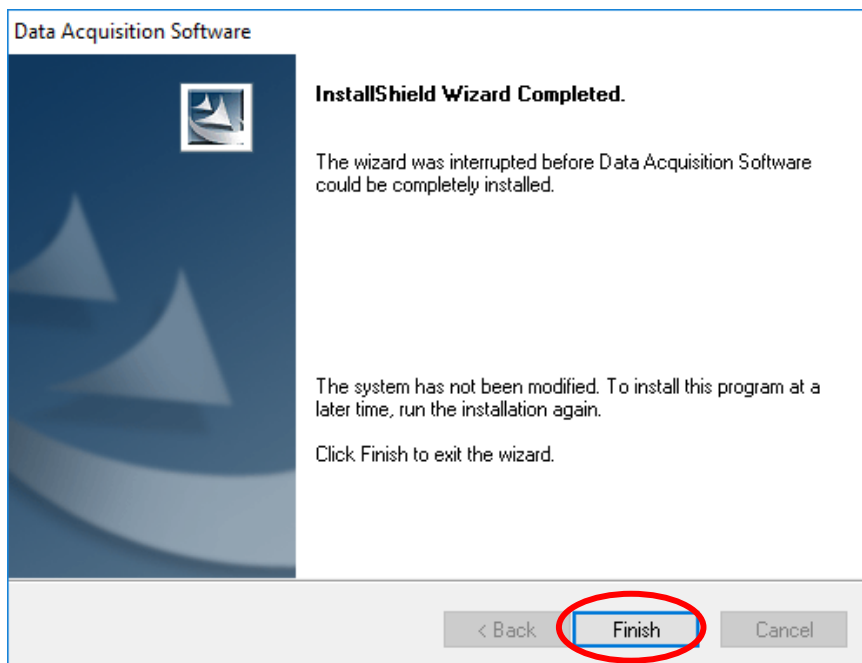
(c) Setup is started up and the following window is displayed, so press [Next] button.



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



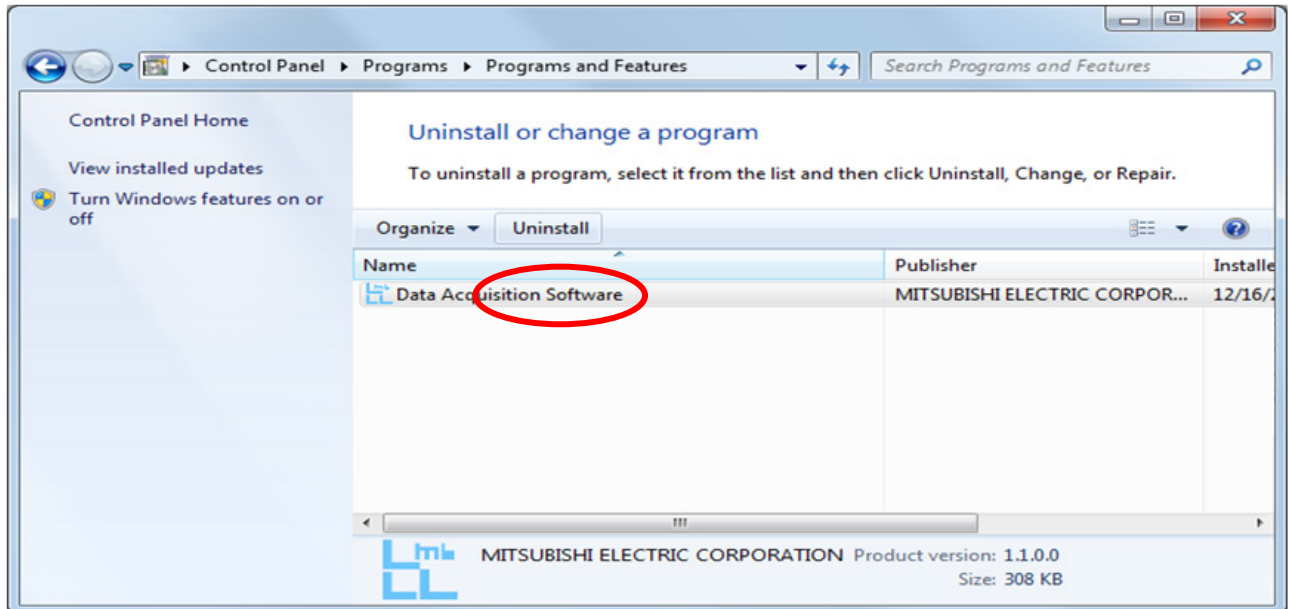
(e) After completing installation, the following window is displayed, so press [Finish] button.



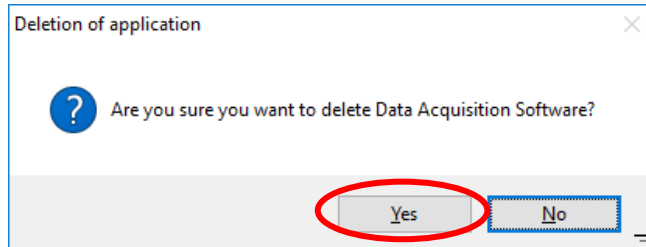
## 2.3 Software uninstallation

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

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

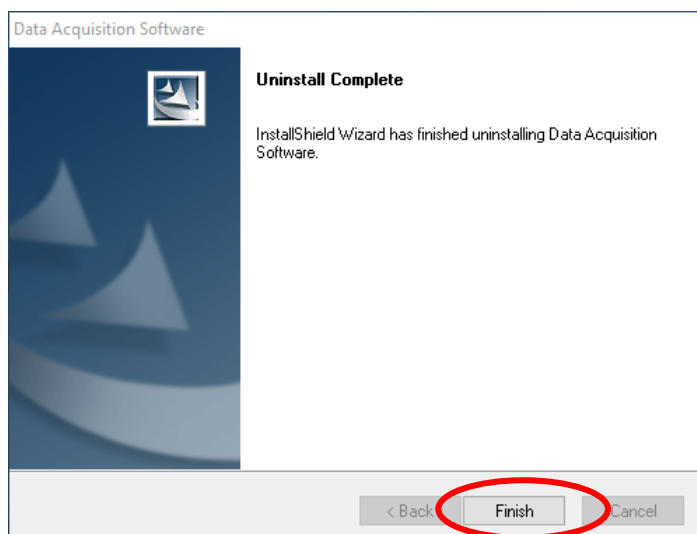


- (b) Click “Yes” in confirm message.



Click “No” to quit the uninstalling.

- (c) Click “Finish” to finish.



## 2.4 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.
- (g) The data acquisition may stop by the power option setting of your Notebook PC.  
**Change the set time for the computer to sleep to "None"**, and save the setting.  
\*In case of Windows 7:  
[Windows menu] – [Control panel] – [System and Security] – [Power option] – [to sleep time]

## *Chapter 3*

# *Start-up and initial setting*

### **About this chapter**

This chapter explains the following.

- 3.1 Start-up and end of Data Acquisition Software
- 3.2 Display composition
- 3.3 Registration (Initial setting)
- 3.4 Export and import

## 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.

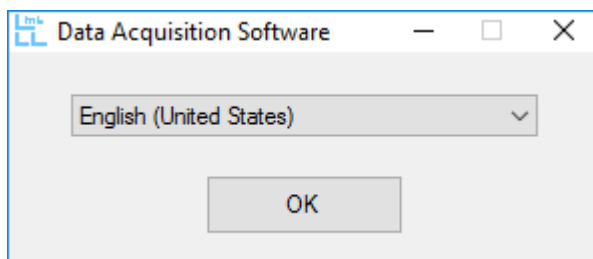
### 3.1 Start-up and end of Data Acquisition Software

#### (1) How to start up the software

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

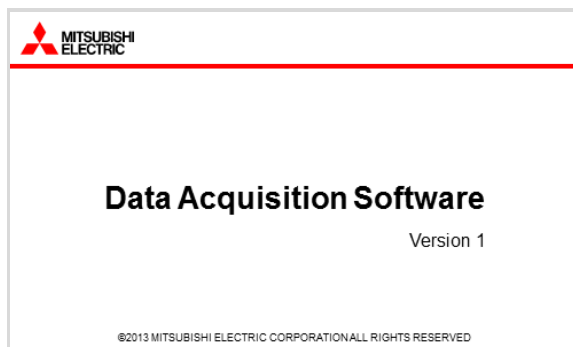
\* If Data Acquisition Software already runs, you cannot start it up any more.

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.

The splash screen will be displayed for a second and turn to the main menu.



Please wait before the main menu is being displayed.

#### (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.

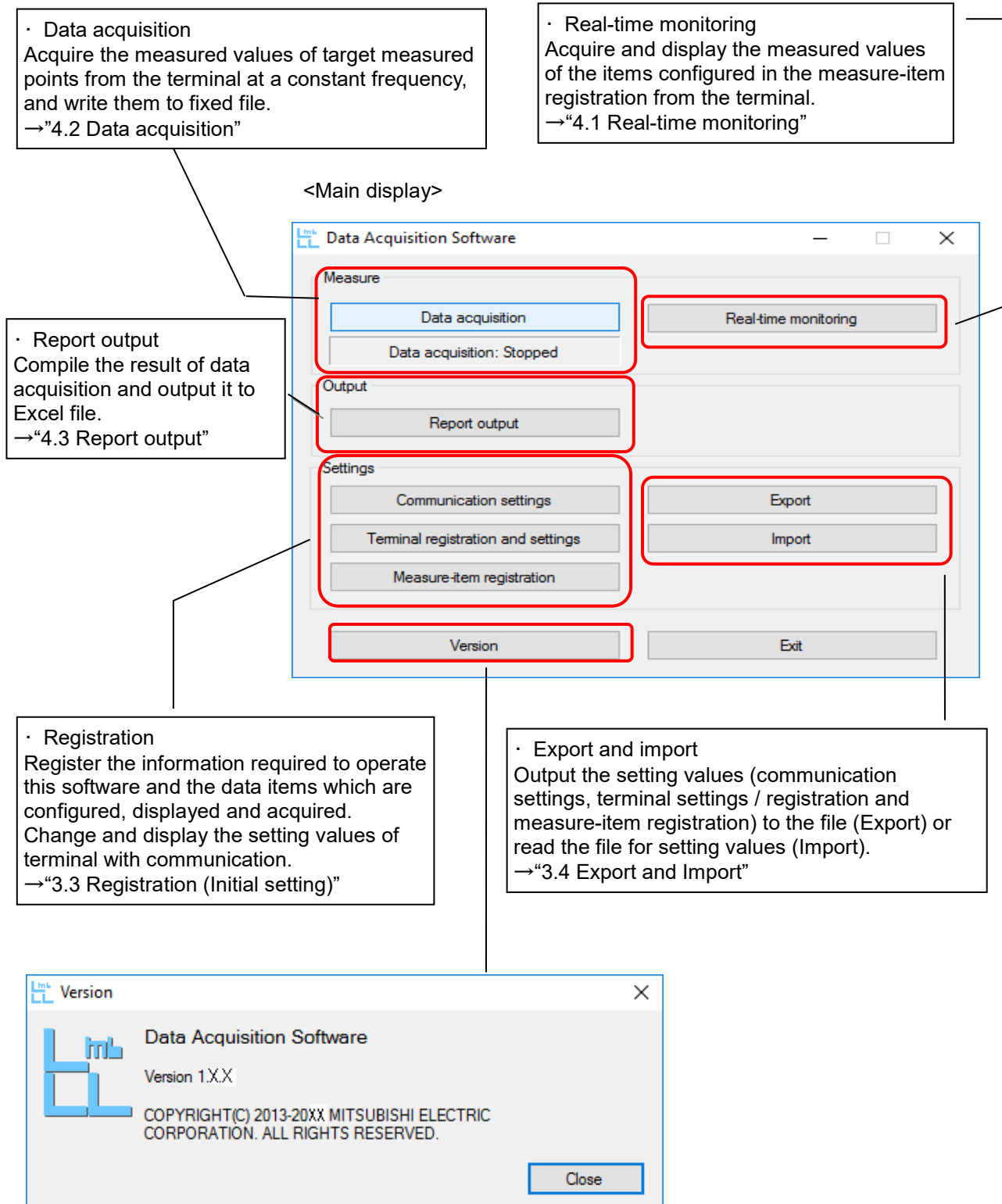
<File to delete> (The case of the default installation destination.)

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:





### 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.

· Communication setting  
Select the setting values for communication to the terminal.  
\* Conform the setting of measuring terminal to that of PC.

· Communication time and number of retry  
Configure the time to wait response from registered terminal and the number of waiting it in data acquisition.

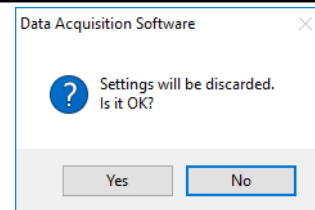
- \* Port : COM port to be used in serial communication for MODBUS communication.
- Baud rate : Communication speed of MODBUS communication. The unit is "bps".
- Parity bit : Parity bit for MODBUS communication.
- Stop bit : Stop bit for MODBUS communication.
- Timeout : Time to wait response from measuring 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:

Measure-point name	Terminal name	Measure-item	Target	Time	Present value	Unit
point1	4_EMU4-HD1-MB	Current I1	<input checked="" type="checkbox"/>	2/21/2013 7:00:07 PM	Err304	A
point2	4_EMU4-HD1-MB	Electric energy(consuming)	<input checked="" type="checkbox"/>	2/21/2013 7:00:09 PM	Err304	kWh
point3	4_EMU4-HD1-MB	Voltage V1-N	<input checked="" type="checkbox"/>	2/21/2013 7:00:11 PM	Err304	V
point4	4_EMU4-HD1-MB	Harmonic V1-N(Fundamental)	<input checked="" type="checkbox"/>	2/21/2013 7:00:13 PM	Err304	V
point5	4_EMU4-HD1-MB	Pulse-count value	<input type="checkbox"/>	7:00:15 PM	Err304	
point6	4_EMU4-HD1-MB	Frequency	<input type="checkbox"/>	7:00:17 PM	Err304	Hz

Details of error code → "5.5 Error code"

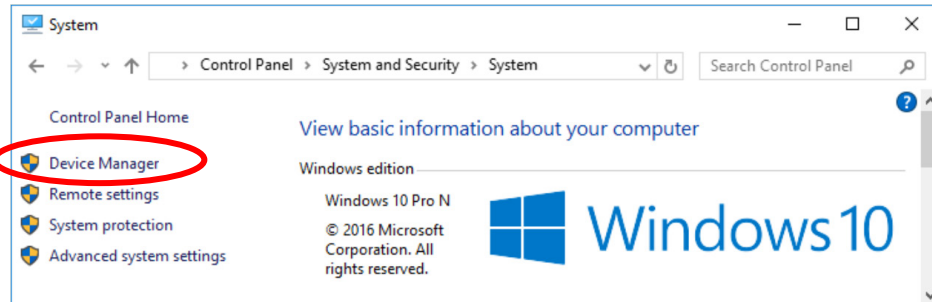
\*Message in the right will be displayed by clicking [Close] button when Setting value is imported.  
Please click “Yes” to register.  
More details about import, please see 3.4 Export and Import



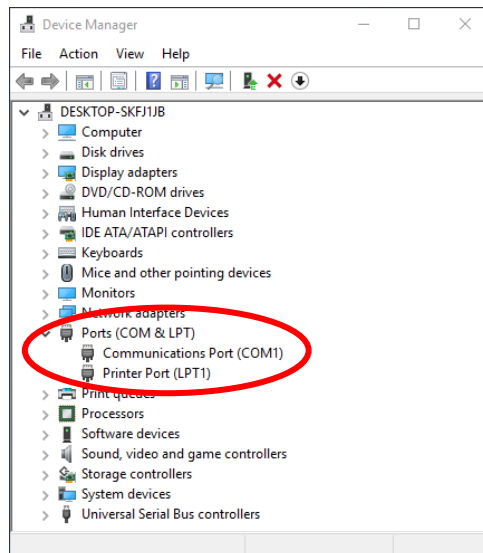
<Reference>

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

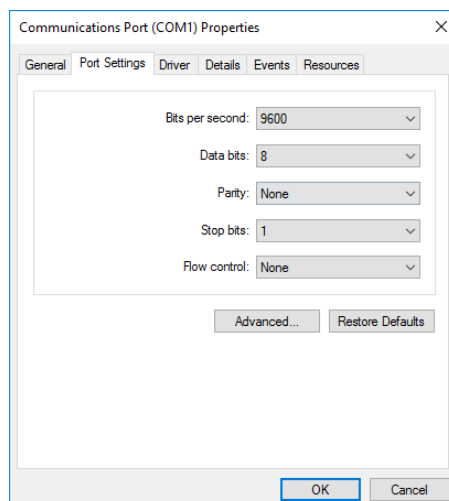
(a) Open the property of “Computer” and select [Device Manager].



(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.

Please do not use the comma "," when entering the terminal name. If used, deviations occurs in the csv file when csv output is performed.

You can select the model from the following using the pull-down menu.

(In ME96SS/ME96SS-Ver.A/ME96SS-Ver.B Series, select according to the model name and its phase-wire system.)

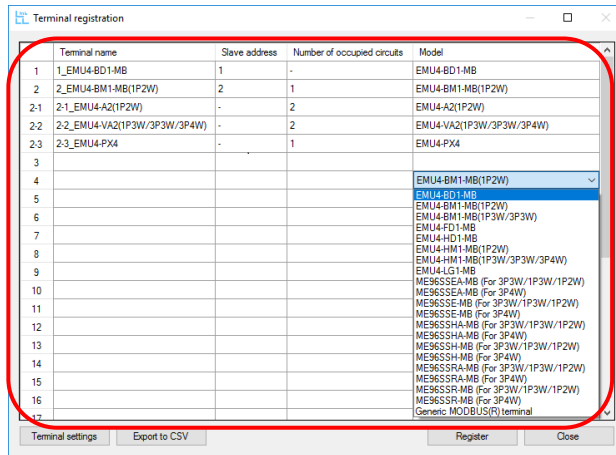
Series	Terminal
EcoMonitorLight	EMU4-BD1-MB
	EMU4-HD1-MB
	EMU4-FD1-MB
EcoMonitorPlus	EMU4-BM1-MB(1P2W)
	EMU4-BM1-MB(1P3W / 3P3W)
	EMU4-HM1-MB(1P2W)
	EMU4-HM1-MB(1P3W / 3P3W / 3P4W)
	EMU4-LG1-MB
	EMU4-A2(1P2W)*
	EMU4-A2(1P3W / 3P3W / 3P4W)*
	EMU4-VA2(1P2W)*
	EMU4-VA2(1P3W / 3P3W / 3P4W)*
	EMU4-AX4
	EMU4-PX4
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)
ME96SS-Ver.B	ME96SSEB-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSEB-MB (For 3P4W)
	ME96SSHB-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSHB-MB (For 3P4W)
	ME96SSRB-MB (For 3P3W / 1P3W / 1P2W)
	ME96SSRB-MB (For 3P4W)
Other	Generic MODBUS terminal

(About \*(remark), refer to next page)

\* 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 for external unit.)

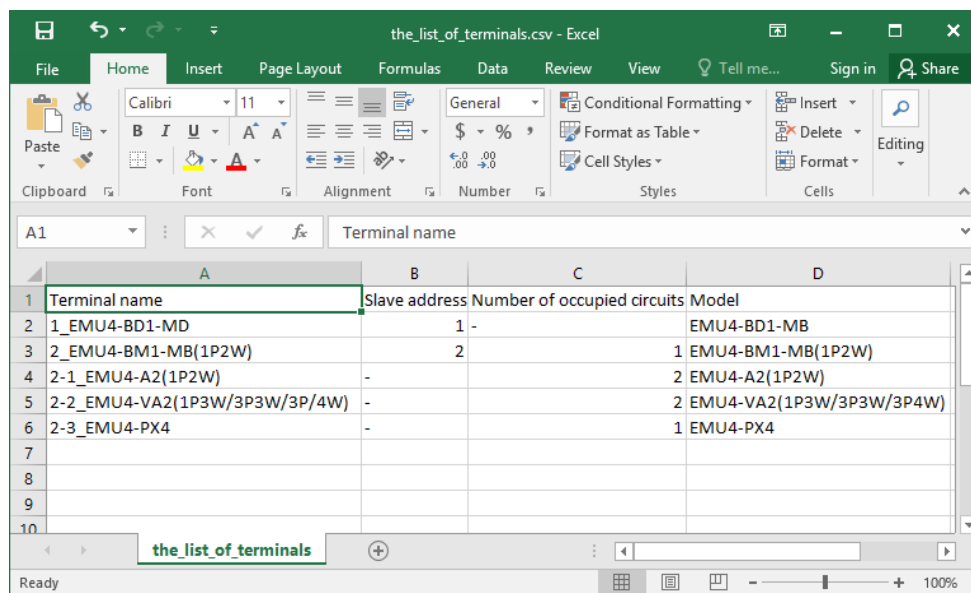
Extension unit (EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4) can be selected in \*-1 to \*-3 line.



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

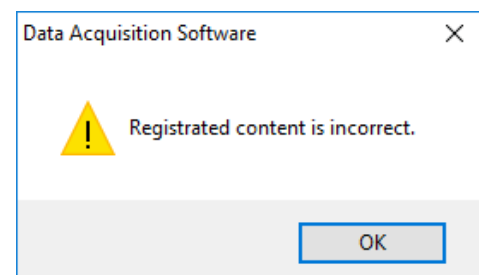
Click [Output to CSV] button to output the list of the registered terminals to a CSV file.

The display of CSV file in Microsoft Excel will be as follows.

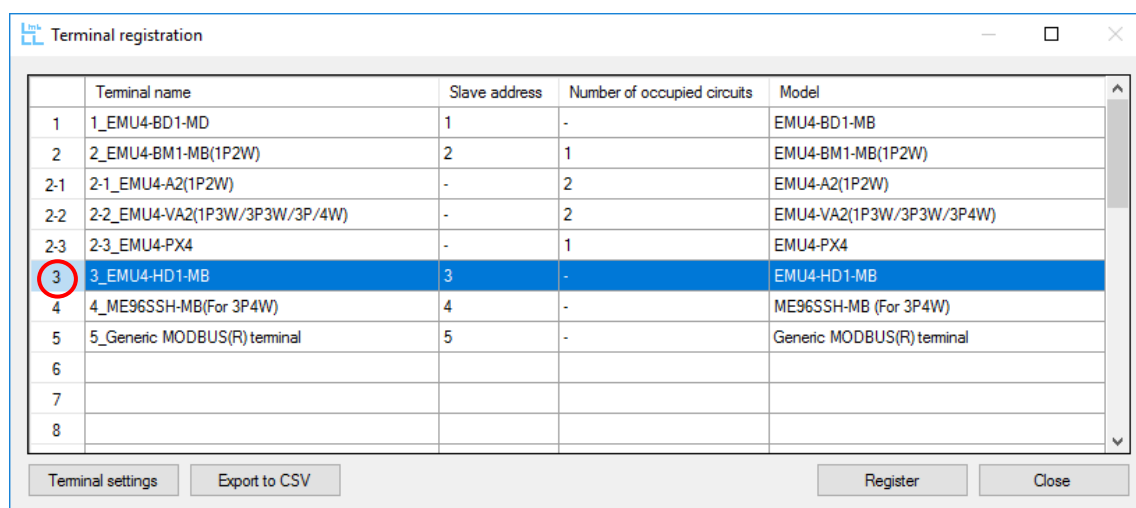


When the message window is displayed as the lower right, make sure of the following.

- 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.

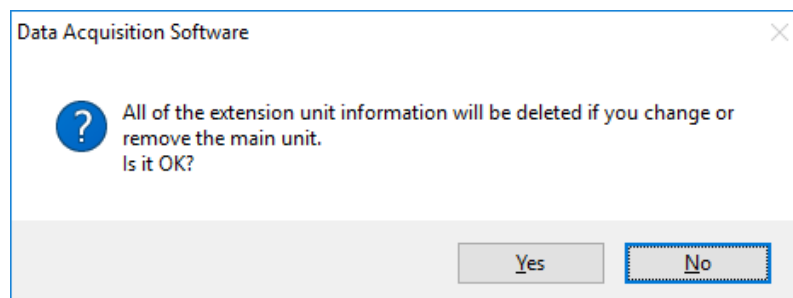


### Procedure of terminal deletion



\* 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.



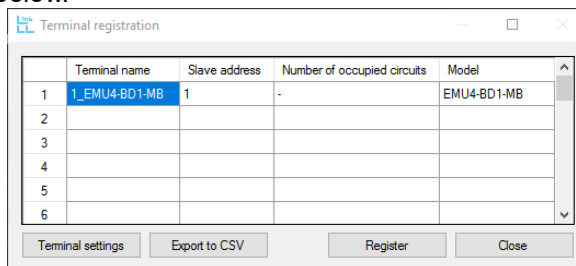
## (3) Terminal setting

You can change and display the setting values of measuring terminals via communication.

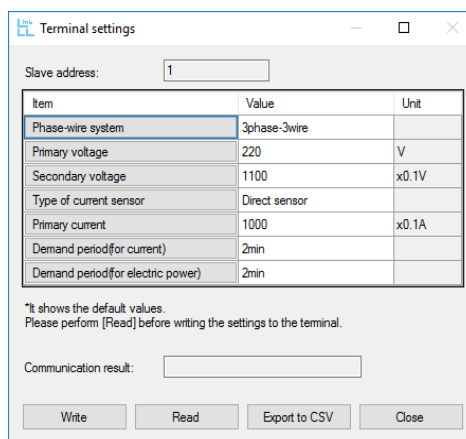
\* Setting method and display are different depending on the models selected in terminal registration.

■ 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.



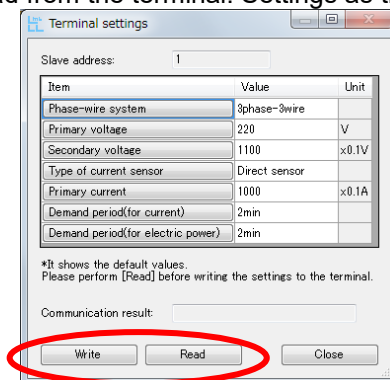
For EMU4-BD1-MB

\* 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.

\* When terminal settings for EcoMonitorPlus(EMU4-BM1-MB, EMU4-HM1-MB, EMU4-A2, EMU4-VA2) is set to be [VT use] and not to be special Primary voltage(L-L), Please set the [Secondary voltage] to 110V.

(c) Press [Write] button to write the values configured in this window to measuring terminal and change the setting. Click [Yes] button to write to the terminal. Press [Read] button to read and display the setting values of measuring terminal. Click [Yes] button to read from the terminal. Settings as the display will be discarded.



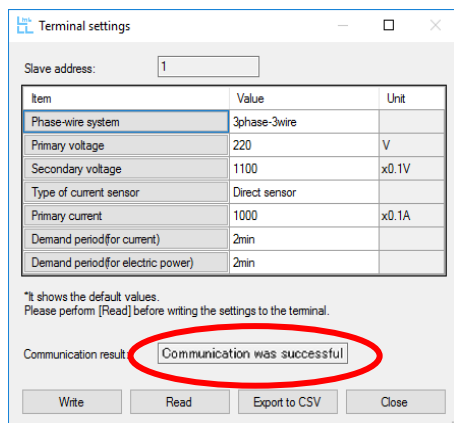
For EMU4-BD1-MB

When writing or reading is normally, "Communication was successful" is displayed in "Communication result" field.

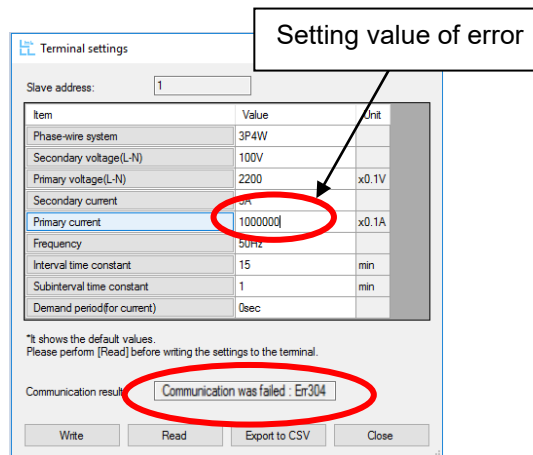
When the communication error occurs, "Communication was failed: Err\*\*\*" (\*\*\*) is error code) is displayed in "Communication result" field.

Also, setting value of error is displayed in red.

(Details of error code → "5.5 Error code")



Display when communication ends normally.

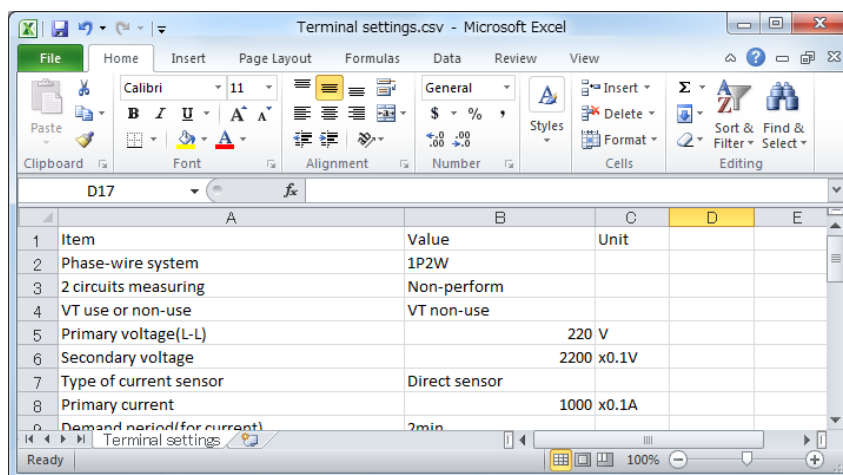


Display when communication ends with failure.

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

Click [Output to CSV] button to output the list of the registered terminals to a CSV file.

The display of CSV file in Microsoft Excel will be as follows.



- 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.

Terminal settings

Slave address:

Item	Value	Unit
Phase-wire system	3phase-3wire	
Primary voltage(L-L)	220	V
Secondary voltage	1100	x0.1V
Type of current sensor	Direct sensor	
Primary current	1000	x0.1A
Demand period(for current)	2min	
Demand period(for electric power)	2min	
Measuring method of operating time	by current	

\*It shows the default values.  
Please perform [Read] before writing the settings to the terminal.

Communication result:

Write Read Export to CSV Close

- 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: x0.1A  
Actual setting:  $1000 \times 0.1 = 100A$



### ■ 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  $\left\{ \begin{array}{l} \text{Primary voltage} = 220(\text{V}) \\ \text{Secondary voltage} = 220(\text{V}) \end{array} \right.$

(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  $\left\{ \begin{array}{l} \text{Primary voltage} = 690(\text{V}) \\ \text{Secondary voltage} = 110(\text{V}) \end{array} \right.$

(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  $\left\{ \begin{array}{l} \text{Primary voltage} = 700(\text{V}) \\ \text{Secondary voltage} = 150(\text{V}) \end{array} \right.$

\* 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(Line-Line). 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  $\left\{ \begin{array}{l} \text{Primary voltage} = 220(\text{V}) \\ \text{Secondary voltage} = 220(\text{V}) \end{array} \right.$

- (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  $\left\{ \begin{array}{l} \text{Primary voltage} = 690(\text{V}) \\ \text{Secondary voltage} = 110(\text{V}) \end{array} \right.$

- (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.

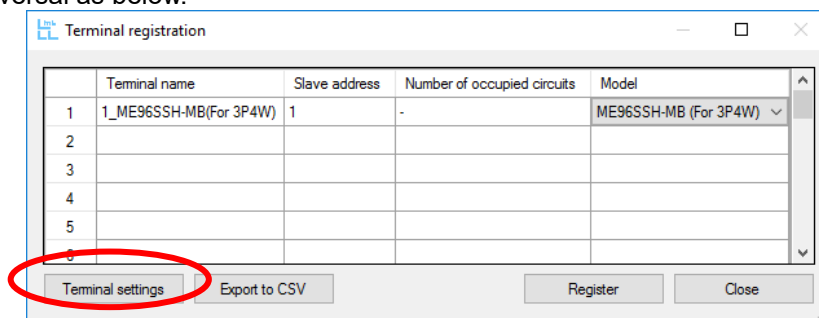
If the primary voltage is 700V, and secondary voltage is 150V

The read value from the terminal  $\left\{ \begin{array}{l} \text{Primary voltage} = 700(\text{V}) \\ \text{Secondary voltage} = 150(\text{V}) \end{array} \right.$

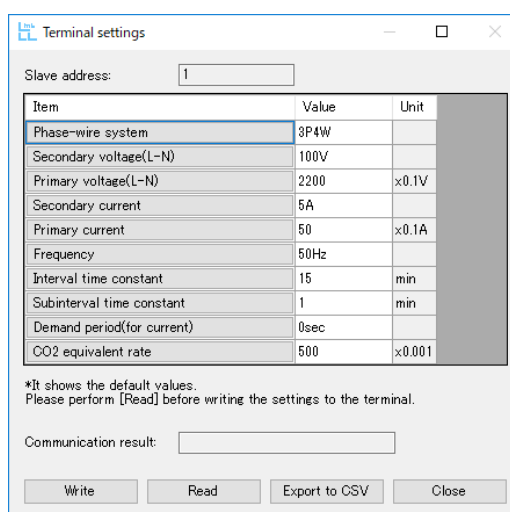
\* For the "special primary voltage", refer to the user's manual for the terminal to be used.

■ If you select the ME96SS/ME96SS-Ver.A/ME96SS-Ver.B 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.



Example: ME96SSHB-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.

Terminal settings

Slave address: 1

Item	Value	Unit
Phase-wire system	3P4W	
Secondary voltage(L-N)	100V	
Primary voltage(L-N)	2200	x0.1V
Secondary current	5A	
Primary current	50	x0.1A
Frequency	50Hz	
Interval time constant	15	min
Subinterval time constant	1	min
Demand period(for current)	0sec	

\*It shows the default values.  
Please perform [Read] before writing the settings to the terminal.

Communication result:

**Write** Read Export to CSV Close

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 Error code")

Terminal settings window. Slave address: 1. The table below shows the settings:

Item	Value	Unit
Phase-wire system	3P4W	
Secondary voltage(L-N)	100V	
Primary voltage(L-N)	2200	x0.1V
Secondary current	5A	
Primary current	50	x0.1A
Frequency	50Hz	
Interval time constant	15	min
Subinterval time constant	1	min
Demand period(for current)	0sec	

\*It shows the default values.  
Please perform [Read] before writing the settings to the terminal.

Communication result: Communication was successful

Buttons: Write, Read, Export to CSV, Close

Display when communication ends normally.

Terminal settings window. Slave address: 1. The table below shows the settings:

Item	Value	Unit
Phase-wire system	3P4W	
Secondary voltage(L-N)	100V	
Primary voltage(L-N)	2200	x0.1V
Secondary current	5A	
Primary current	1000000	x0.1A
Frequency	50Hz	
Interval time constant	15	min
Subinterval time constant	1	min
Demand period(for current)	0sec	

\*It shows the default values.  
Please perform [Read] before writing the settings to the terminal.

Communication result: Communication was failed : Err003

Buttons: Write, Read, Export to CSV, Close

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.

Terminal settings window. Slave address: 1. The table below shows the settings:

Item	Value	Unit
Phase-wire system	3P4W	
Secondary voltage(L-N)	100V	
Primary voltage(L-N)	2200	x0.1V
Secondary current	5A	
Primary current	50	x0.1A
Frequency	50Hz	
Interval time constant	15	min
Subinterval time constant	1	min
Demand period(for current)	0sec	

\*It shows the default values.  
Please perform [Read] before writing the settings to the terminal.

Communication result:

Buttons: Write, Read, Export to CSV, Close

- 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: x0.1A  
Actual setting:  $1000 \times 0.1 = 100A$

### ■ 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). Refer to each user's manual for significant digits.

#### (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. Refer to each user's manual for significant digits.

#### (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	$\left\{ \begin{array}{l} \text{Secondary voltage} = 100(\text{V}) \text{ (arbitrary value)} \\ \text{Primary voltage} = 2770(\times 0.1\text{V}) \end{array} \right.$	$\left. \vphantom{\begin{array}{l} \text{Secondary voltage} = 100(\text{V}) \text{ (arbitrary value)} \\ \text{Primary voltage} = 2770(\times 0.1\text{V}) \end{array}} \right\} \text{ Secondary voltage value is ignored as primary voltage is direct voltage value.}$
---------	--	--

Example2: For the 3P3W system with VT.

If the primary voltage is 11000V and the secondary voltage is 220V,

Setting	$\left\{ \begin{array}{l} \text{Secondary voltage} = 220(\text{V}) \\ \text{Primary voltage} = 11000(\text{V}) \end{array} \right.$
---------	---

### ■ About the setting of primary current.

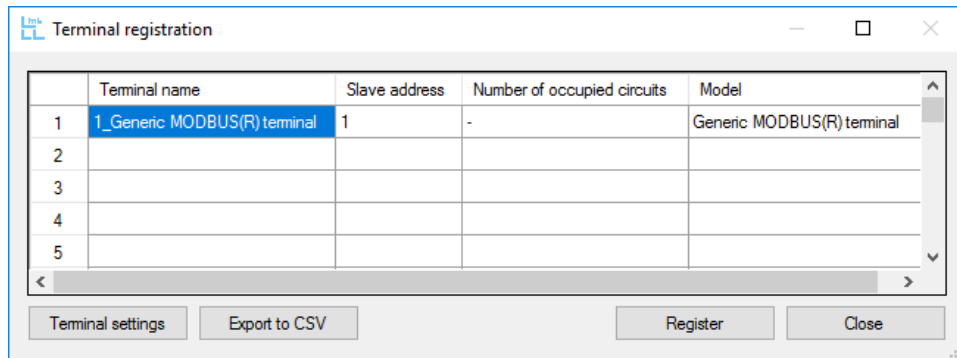
Setting range is from 1.0A to 30000.0A. Refer to each user's manual for significant digits.

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

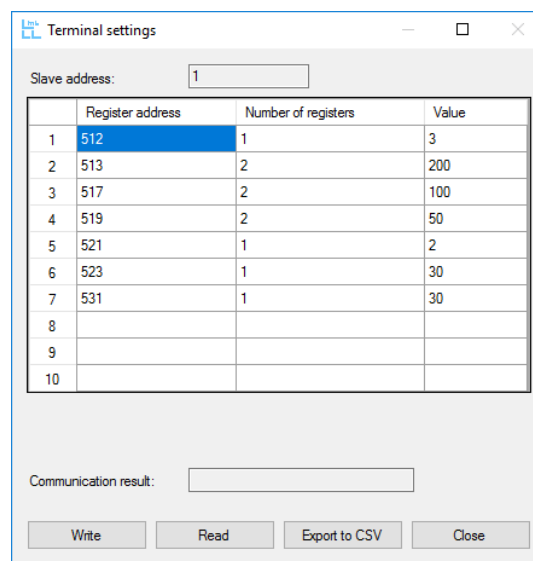
Both setting range is from 1min to 60min. If the interval time constant cannot be divided by subinterval time constant, illegal data error occurs and the subinterval time constant is changed to 1 min.

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

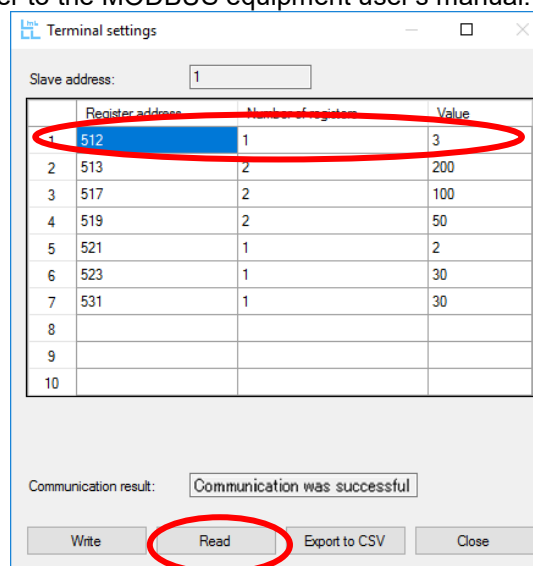
- (a) Select the terminal you want to configure, and then press [Terminal settings] button in the state of color reversal as below.



- (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.

Terminal settings

Slave address: 1

	Register address	Number of registers	Value
1	512	1	3
2	513	2	200
3	517	2	100
4	519	2	50
5	521	1	2
6	523	1	30
7	531	1	30
8			
9			
10			

Communication result:

Write Read Export to CSV Close

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.

Terminal settings

Slave address: 1

	Register address	Number of registers	Value
1	512	1	4
2	513	2	3330
3	517	2	120
4	519	2	60000
5	521	1	1500
6	523	1	1800
7	531	1	2
8			
9			
10			

Communication result: Communication was successful

Write Read Export to CSV Close

Display when communication ends normally.

Terminal settings

Slave address: 1

	Register address	Number of registers	Value
1	512	1	4
2	513	2	3330
3	517	2	120
4	519	2	60000
5	521	1	1500
6	523	1	1800
7	531	1	2
8			
9			
10			

Communication result: Communication was failed : Err003

Write Read Export to CSV Close

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.

Click [Output to CSV] button to output the list of the registered terminals to a CSV file. The display of CSV file in Microsoft Excel will be as follows.

Terminal settings.csv - Microsoft Excel

	Register address	Number of registers	Value
1	512	1	4
2	513	2	3330
3	517	2	120
4	519	2	60000
5	521	1	1500
6	523	1	1800
7	531	1	2



## (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.

	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											
2											
3											
4											
5											
6											
7											

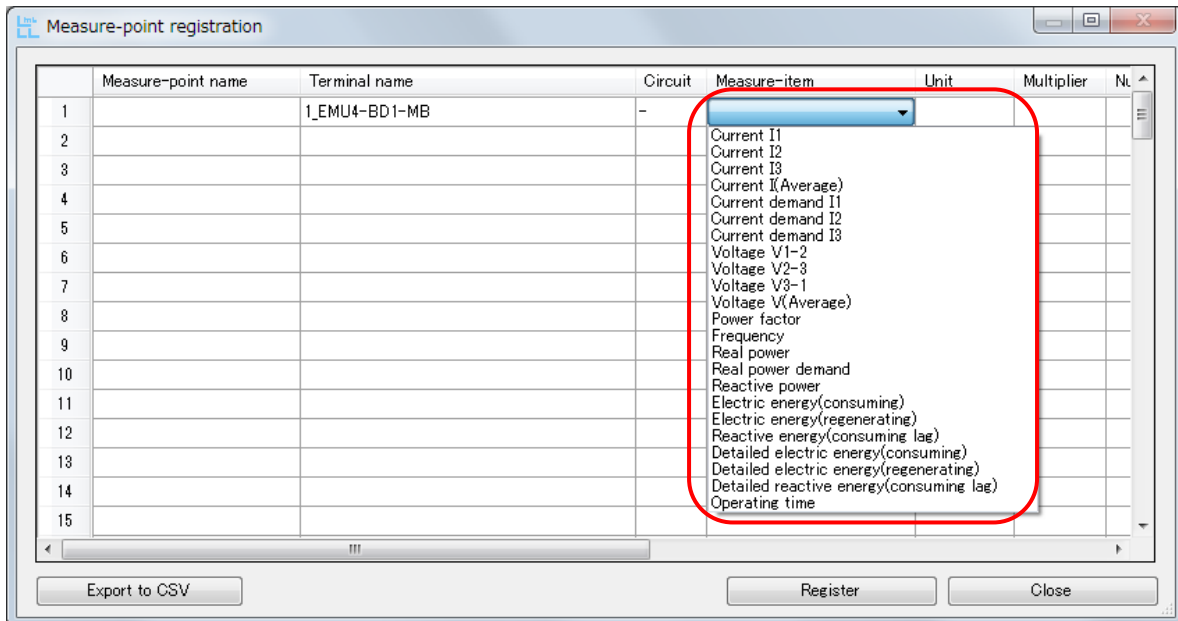
(b) Select terminal name from a pull-down menu, which consists of registered terminals.

	Measure-point name	Terminal name	Circuit	Measure-item	Unit	Multiplier	Numb
1		1. EMU4-BD1-MB					
2		2. EMU4-BM1-MB(1P2W)					
3		2-1. EMU4-A2(1P2W)					
4		2-2. EMU4-VA2(1P3W/3P3W/3P4W)					
5		3. EMU4-BM1-MB(1P3W/3P3W)					
6		3-1. EMU4-VA2(1P2W)					
7		3-2. EMU4-VA2(1P3W/3P3W/3P4W)					
8		3-3. EMU4-A2(1P3W/3P3W/3P4W)					
9		4. EMU4-HD1-MB					
10		5. EMU4-HM1-MB(1P2W)					
11		6. EMU4-HM1-MB(1P3W/3P3W/3P4W)					
12		6-1. EMU4-A2(1P2W)					
13		6-2. EMU4-VA2(1P2W)					
14		6-3. EMU4-VA2(1P3W/3P3W/3P4W)					
15		7. EMU4-LG1-MB					
		7-1. EMU4-VA2(1P3W/3P3W/3P4W)					
		7-2. EMU4-A2(1P3W/3P3W/3P4W)					
		7-3. EMU4-VA2(1P2W)					
		8. ME96SSE-MB(For 3P3W/1P3W/1P2W)					
		9. ME96SSEA-MB(For 3P4W)					
		10. ME96SSHA-MB(For 3P3W/1P3W/1P2W)					
		11. ME96SSH-MB(For 3P4W)					
		12. ME96SSR-MB(For 3P3W/1P3W/1P2W)					
		13. ME96SSRA-MB(For 3P4W)					
		14. Generic MODBUS(R) terminal					

\* 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.

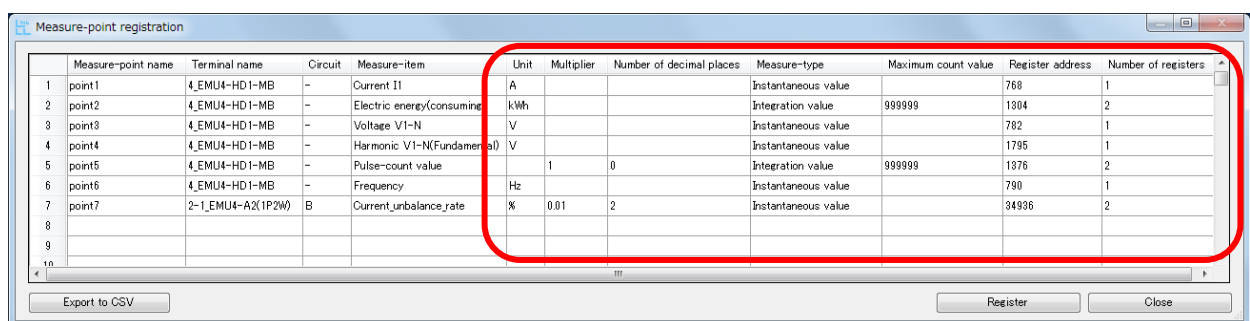


(d) After choosing Measure-item, input Measure-point name. Unit, Measure-type, Maximum count value, Register address and Number of registers are input automatically. You do not need to input anything to blanks except for Measure-point name.

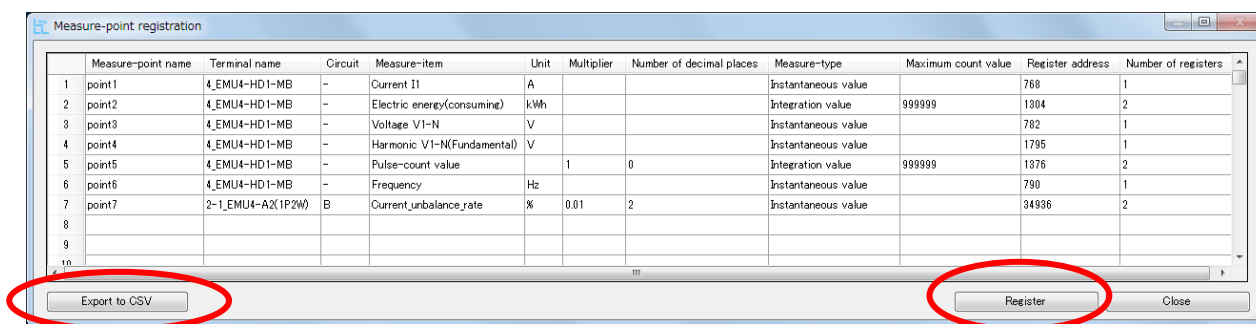
\* But for pulse count value and operating time, contact output, number of over limit level, AD conversion value, scale value, please input Multiplier to “1” and Number of decimal places to “0”. For Current\_unbalance\_rate and Voltage\_unbalance\_rate, please input Multiplier to “0.01” and Number of decimal places to “2”.

\* In the case of pulse conversion value, please set the multiplication factor and the number of digits of the decimal part according to the pulse conversion factor set on the terminal side.

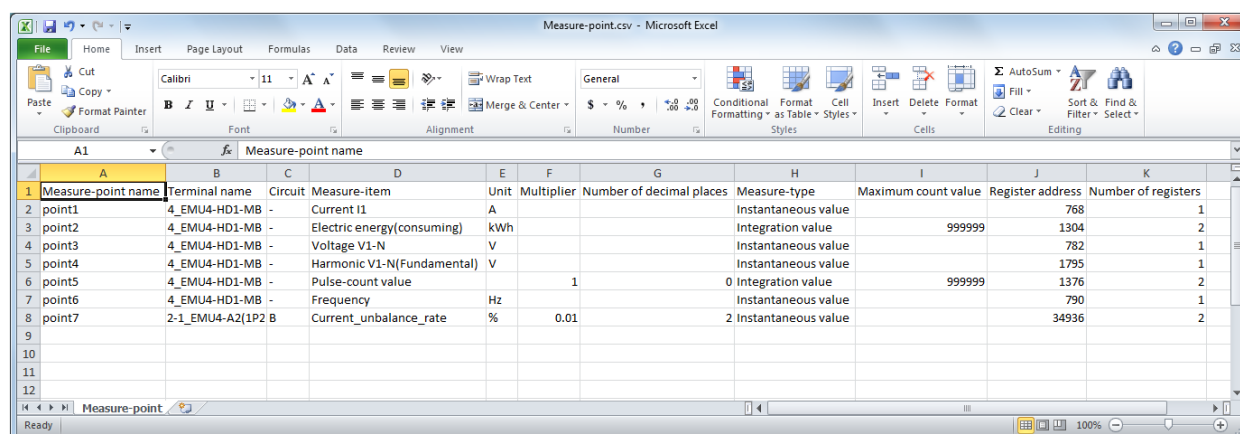
\* Please do not use the comma “,” when entering the Measure-point name. If used, deviations occurs in the csv file when csv output is performed.



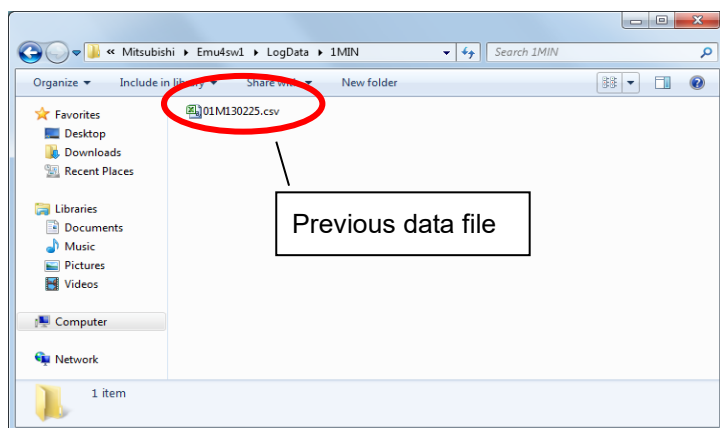
- (e) After input of measured item, press [Register] button to complete registration.  
Press [Export to CSV] button to output the list of registered measured items to CSV file.



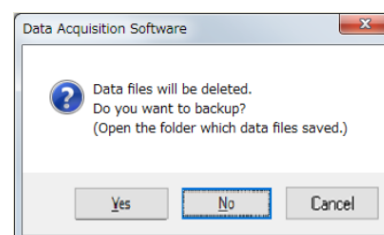
The output CSV file is displayed as below in Microsoft® Excel.



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.

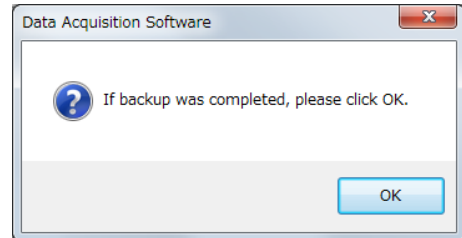
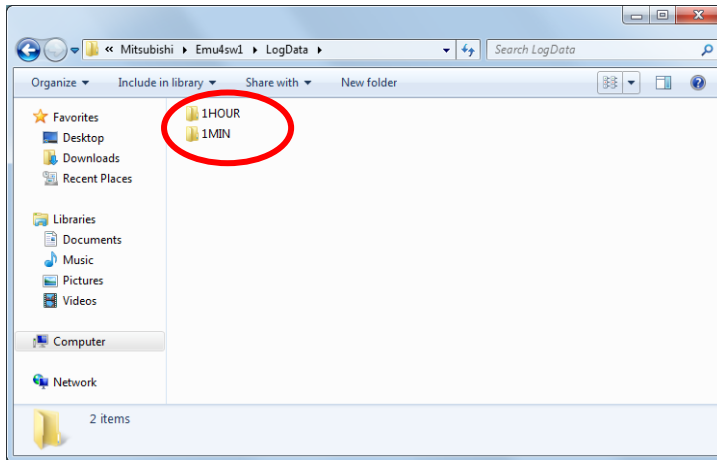


Example of measured data file folder  
(Data at one-minute intervals)



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.

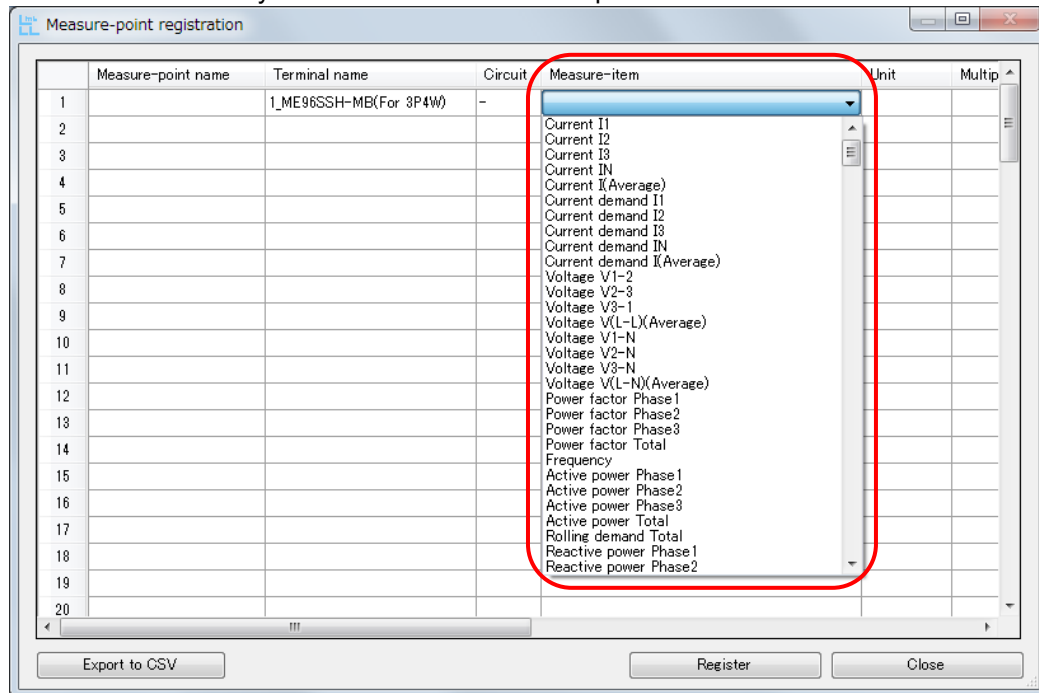


- If you select [No] in the message window for data backup:  
All past measured data is deleted and the measure items are registered.
  - If you select [Cancel] in the message window for data backup:  
None of past measured data is deleted and the measure items are not registered.
- (f) Press [Close] button to complete the measure-item registration.

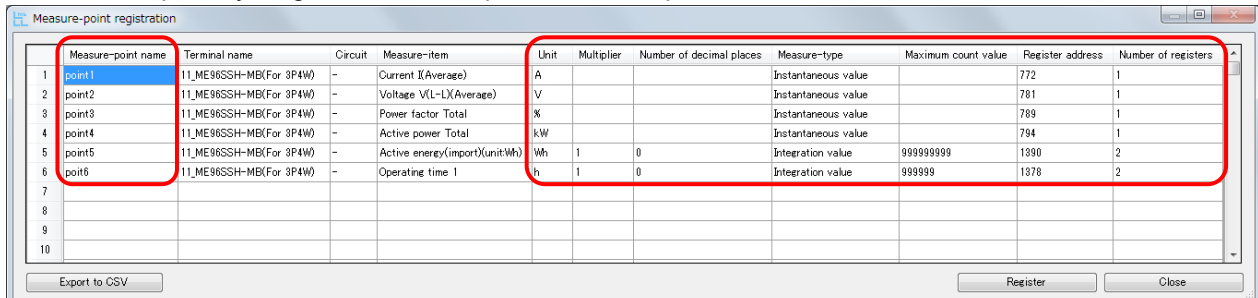
■ If you select ME96SS/ME96SS-Ver.A/ME96SS-Ver.B series in model selection:

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/ME96SS-Ver.B 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 33 and 34.

■ 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.

	Measure-point name	Terminal name	Circuit	Measure-item	Unit	Multipl
1		1_Generic MODBUS(R) terminal	-	Arbitrary measure-item		
2						
3						
4						
5						
6						
7						

Buttons: Export to CSV, Register, Close

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

	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	Current I1	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	A	1	1	Instantaneous value		768	1
2	Current I2	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	A	1	1	Instantaneous value		769	1
3	Current demand I1	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	A	1	1	Instantaneous value		773	1
4	Current demand I2	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	A	1	1	Instantaneous value		774	1
5	Voltage V1-2	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	V	1	1	Instantaneous value		778	1
6	Voltage V2-3	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	V	1	1	Instantaneous value		779	1
7	Voltage V1-N	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	V	1	1	Instantaneous value		782	1
8	Voltage V2-N	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	V	1	1	Instantaneous value		783	1
9	Real power	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	kW	1	1	Instantaneous value		794	1
10	Frequency	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	Hz	0.1	1	Instantaneous value		790	1
11	Electric energy(consuming)	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item	kWh	1	1	Integration value	32767	1280	1
12	Pulse-count value	1_Generic MODBUS(R) terminal	-	Arbitrary measure-item		0.01	2	Integration value	32767	1376	2
13											
14											
15											

Buttons: Export to CSV, Register, Close

Item	Description
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.

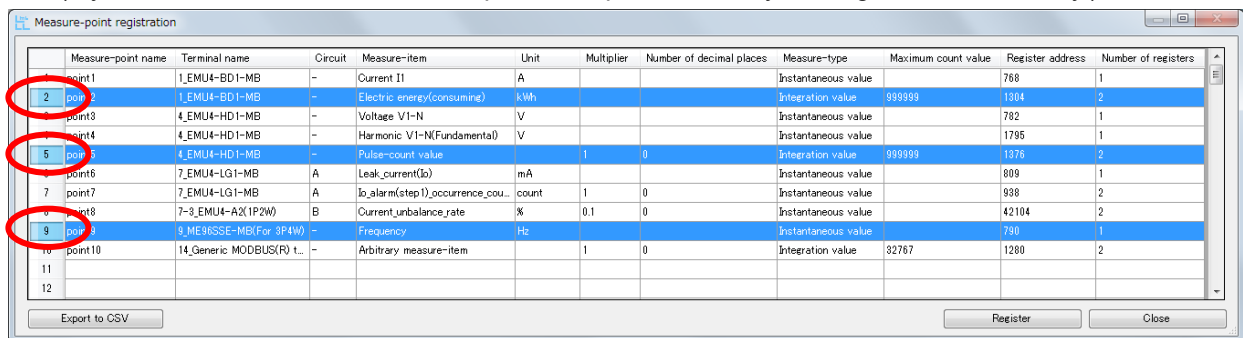
\* If the Measure-type is “Integration value”, be sure to input Maximum count value. If the type is “Momentary”, you can leave the field blank.

\* Please do not use the comma “,” when entering the Measure-point name. When csv output is performed, deviation occurs in the csv file.

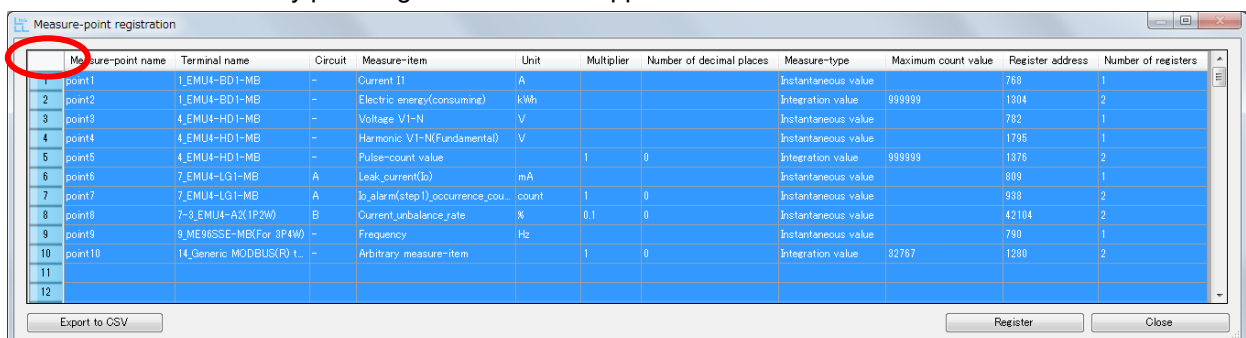
For the input value, refer to the MODBUS equipment user's manual.

### 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.

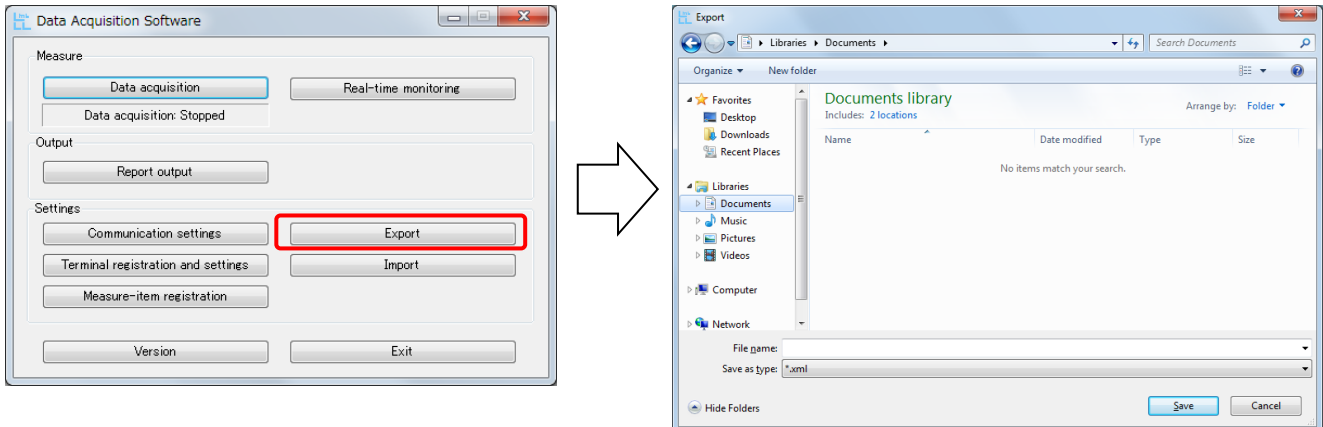
You can also configure the setting collectively by reading exported xml file.

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.

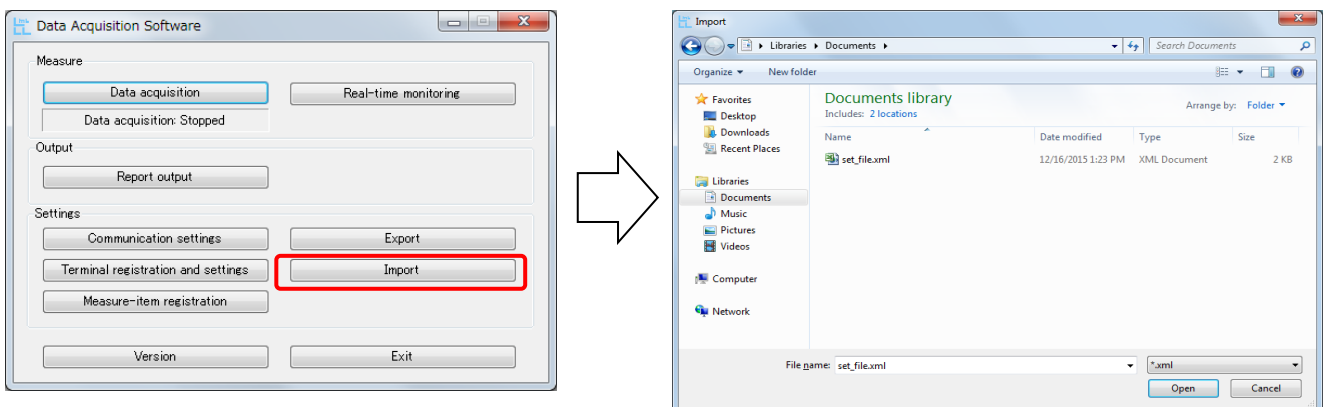


Input file name and press [Save] to create xml file in the specified directory.

#### ■ 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:

- 4.1 Real-time monitoring
- 4.2 Data acquisition
- 4.3 Report output

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

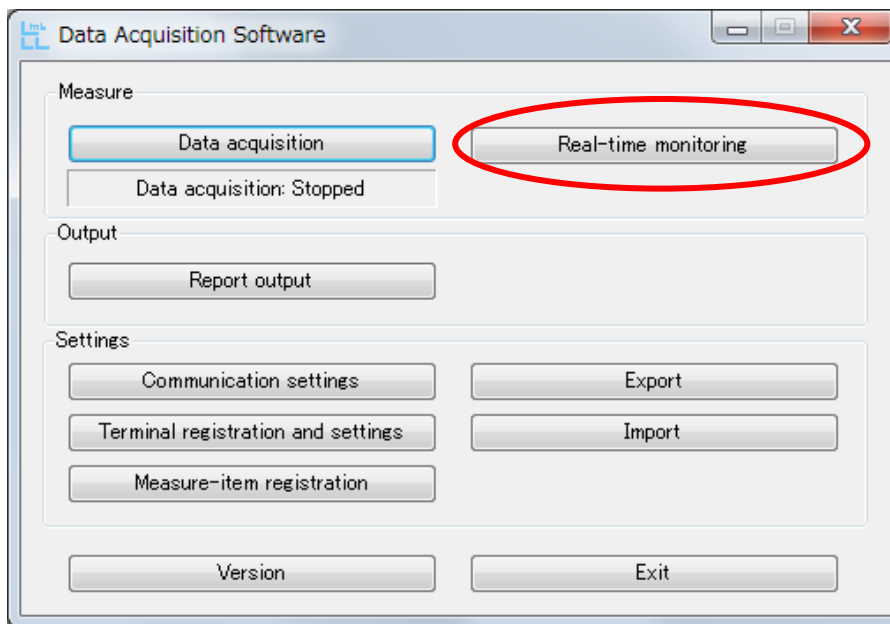
“Present value display” function can display the present value of data measured by measuring terminals.

“Data acquisition” function can acquire the data from measuring terminals at constant intervals, and save it as CSV file.

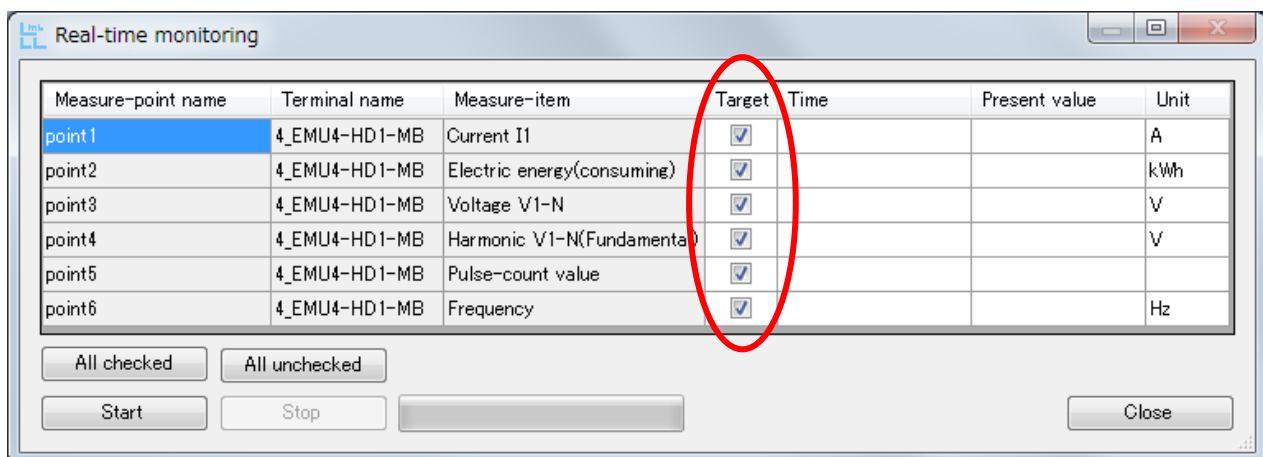
In the “Report output” function, create a daily report, monthly report, etc. Report is created by pasting the data measured at any constant interval to the master file (Excel file).

### 4.1 Real-time monitoring

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

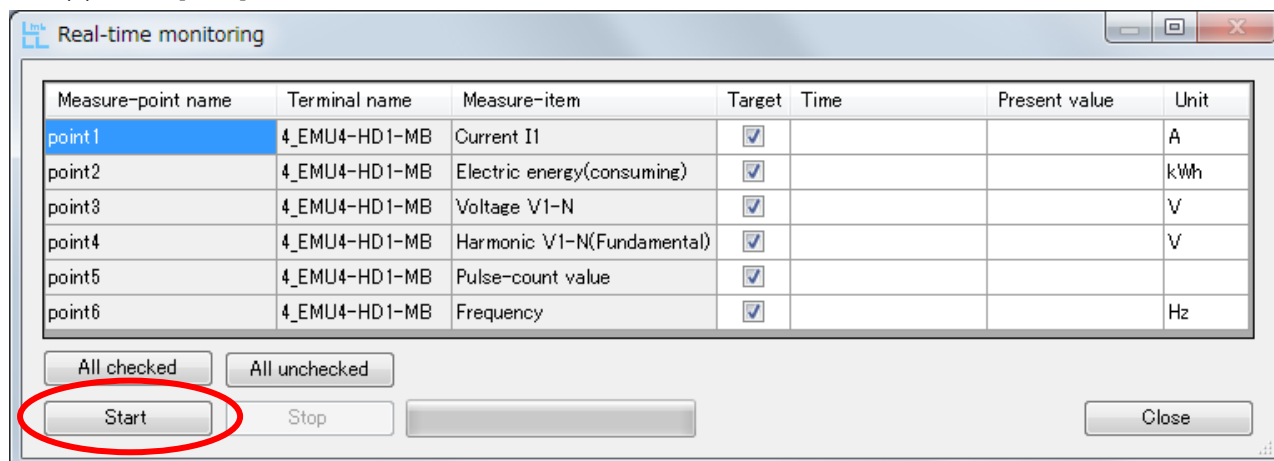


(b) The window as the following figure is displayed, and the present measured values can be displayed. Tick the checkboxes of the items you want to display the measured values. (By default, all items are checked.)

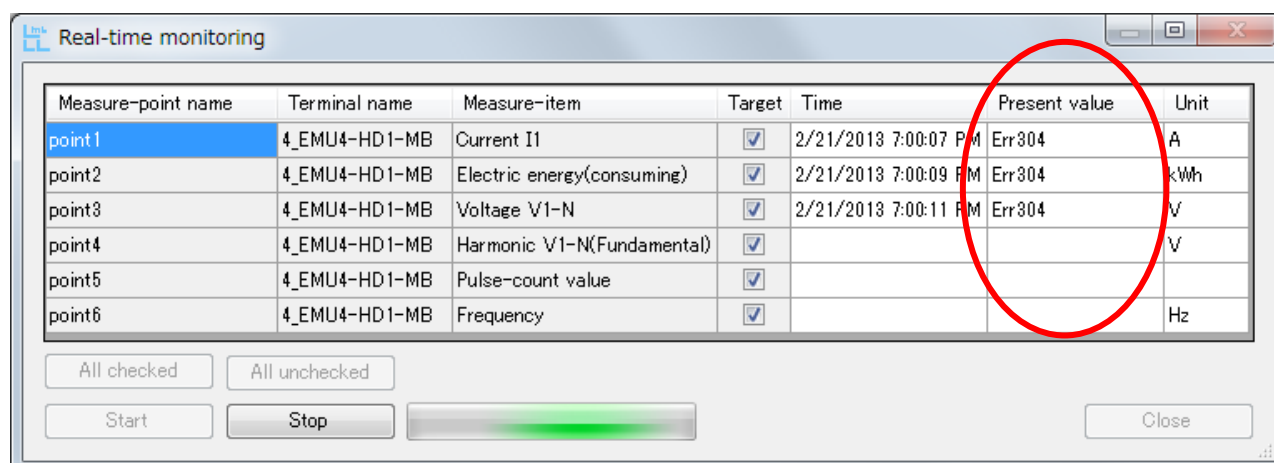


Press [All checked] button to tick all the checkboxes, and press. On the other hand, press [All unchecked] button to uncheck all of them.

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

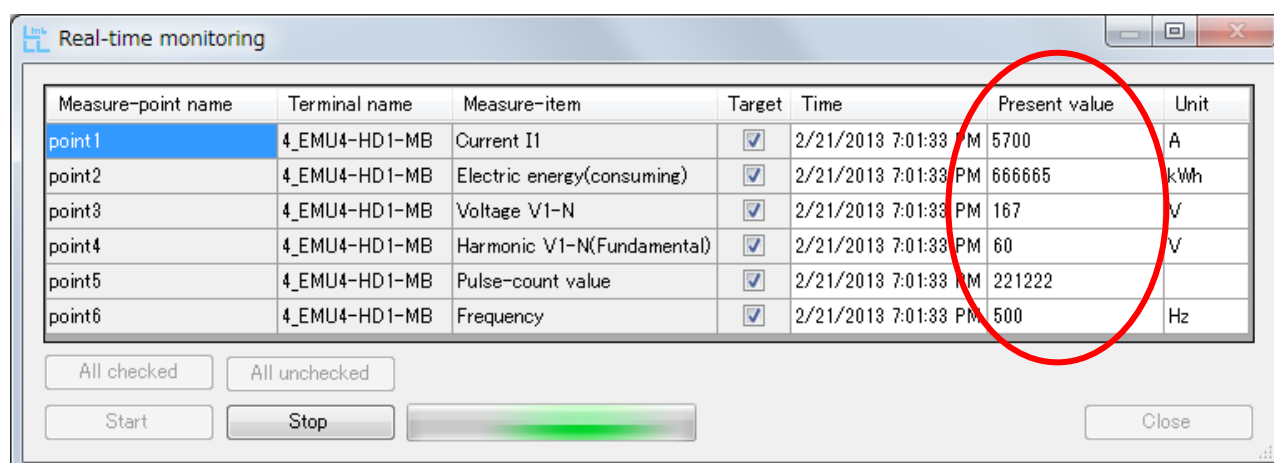


(d) If the communication error occurs, error code is displayed. Check the setting for Ethernet – RS-485 conversion adapter, USB - RS-485 conversion adapter or the terminals.



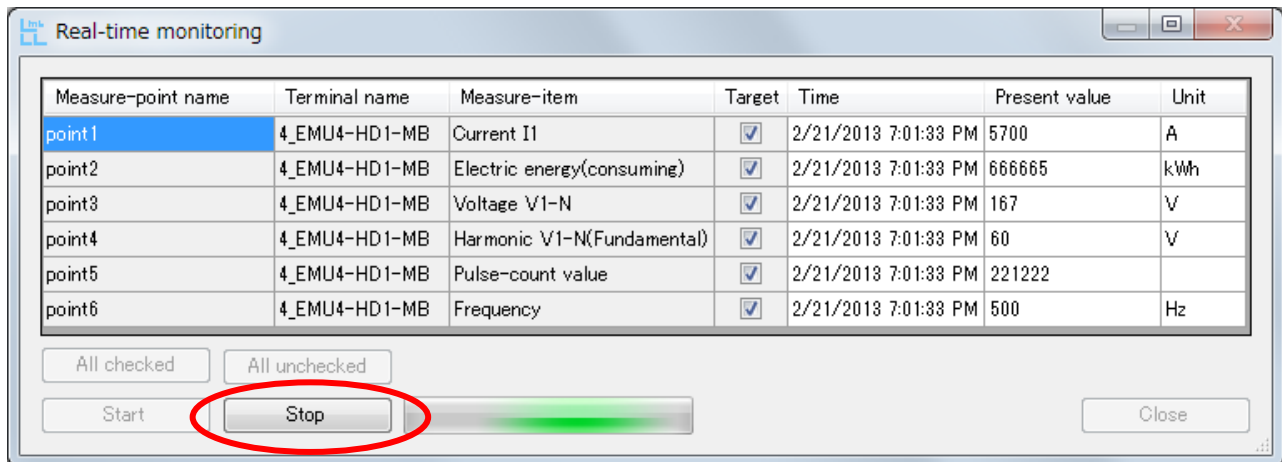
Details of error code → "5.5 Error code"

(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.

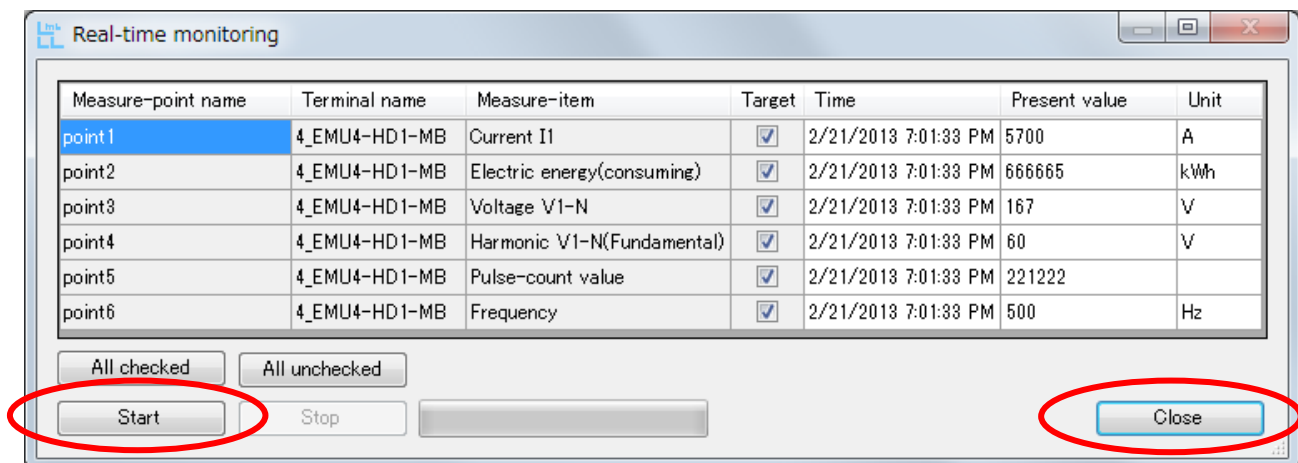
Press [Stop] button to stop updating.



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

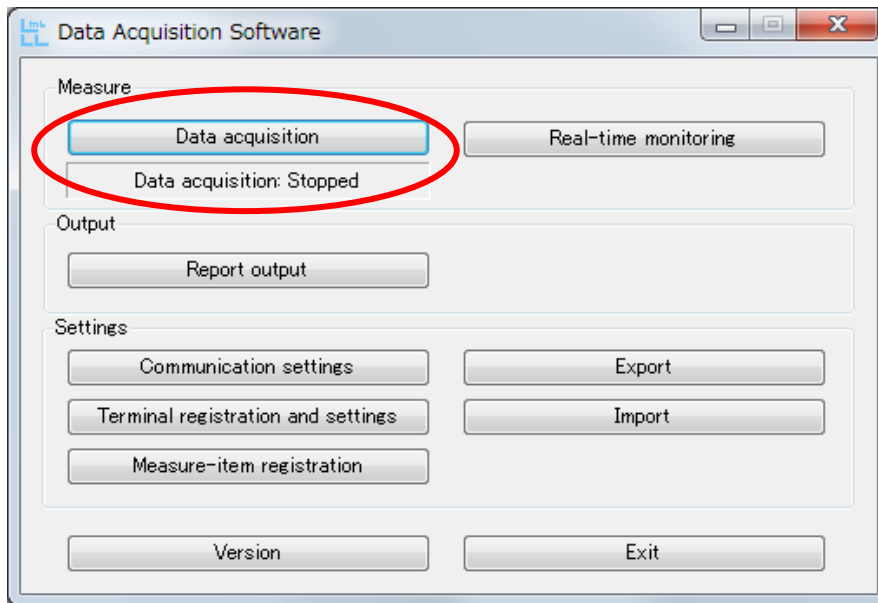
- (g) After stopping updating, the last updated values are displayed. Press [Start] button to start communication again and update the present value.

Press [Close] button to complete the present value display.

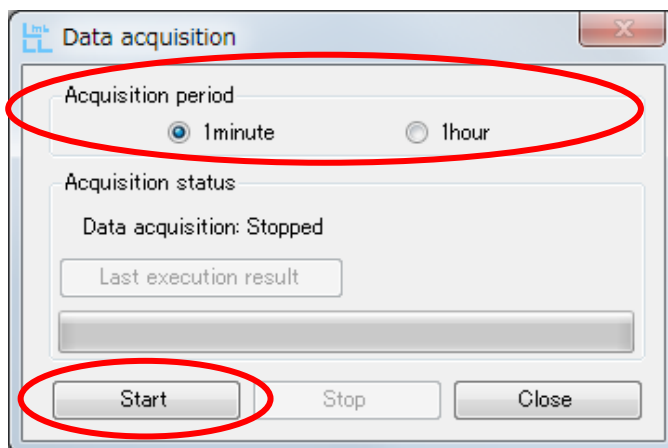


## 4.2 Data acquisition

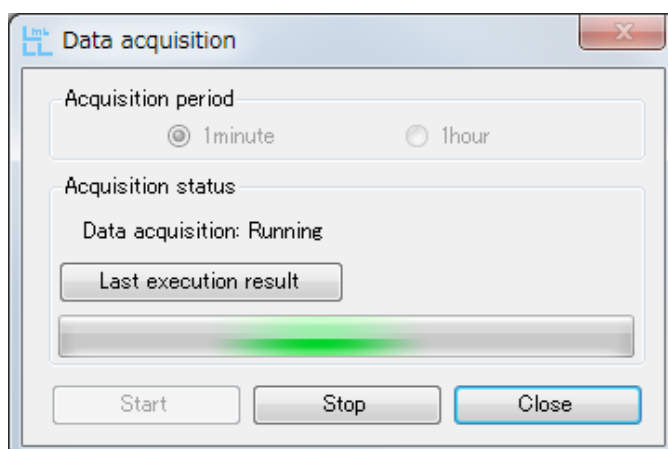
(a) Press [Data acquisition] button.



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

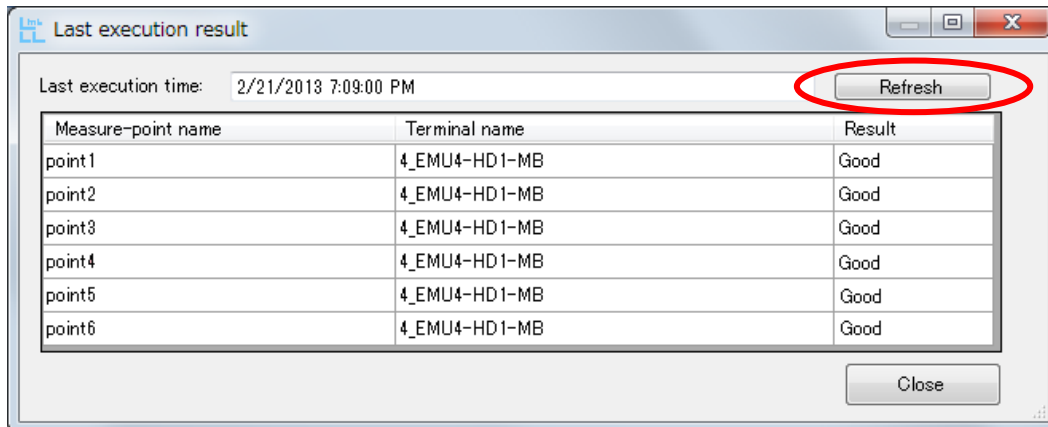


(c) When data acquisition begins, the following display is obtained.



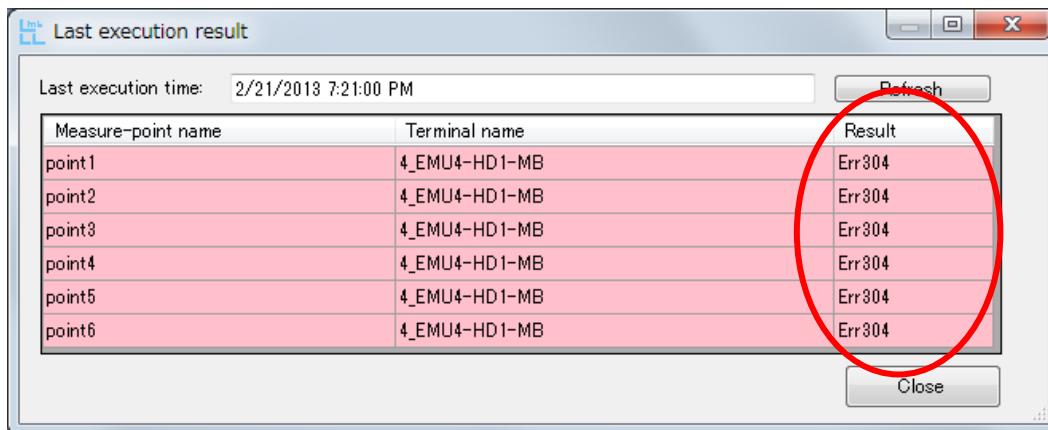
- (d) You can confirm the communication result by pressing [Last execution result] button.  
The communication result will be updated by pressing [Refresh] button.

• If the communication is successful:



• If the communication error occurs:

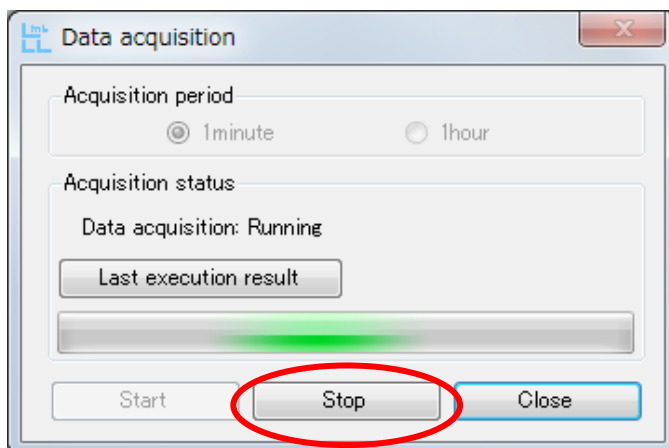
Display of the measured item is highlighted and get an error in "Result"



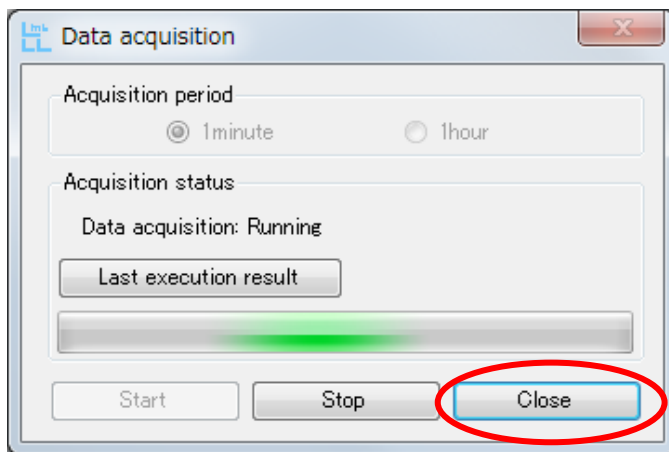
Details of error code → "5.5 Error code"

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

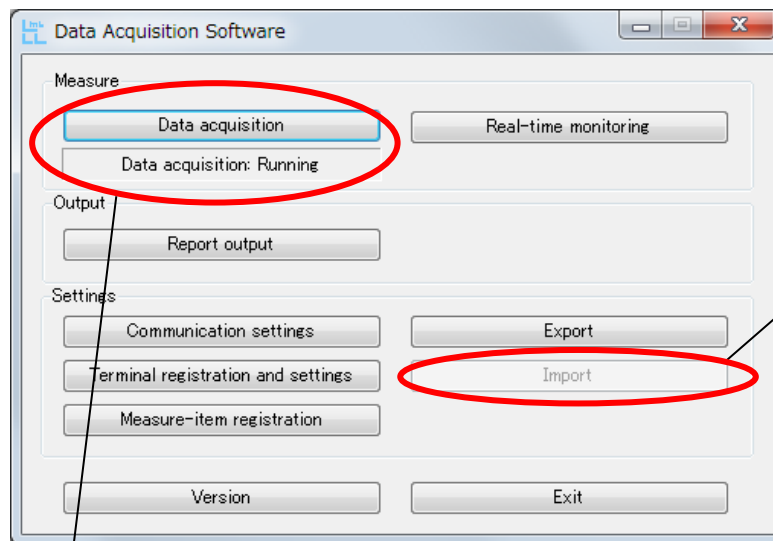
- (f) When in stopping data acquisition, press [Stop] button shown in the following figure.



(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.



[Import] buttons will be grayed out during data acquisition.

The window is displayed as [Data acquisition task: Running] during data acquisition.

- \* 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**

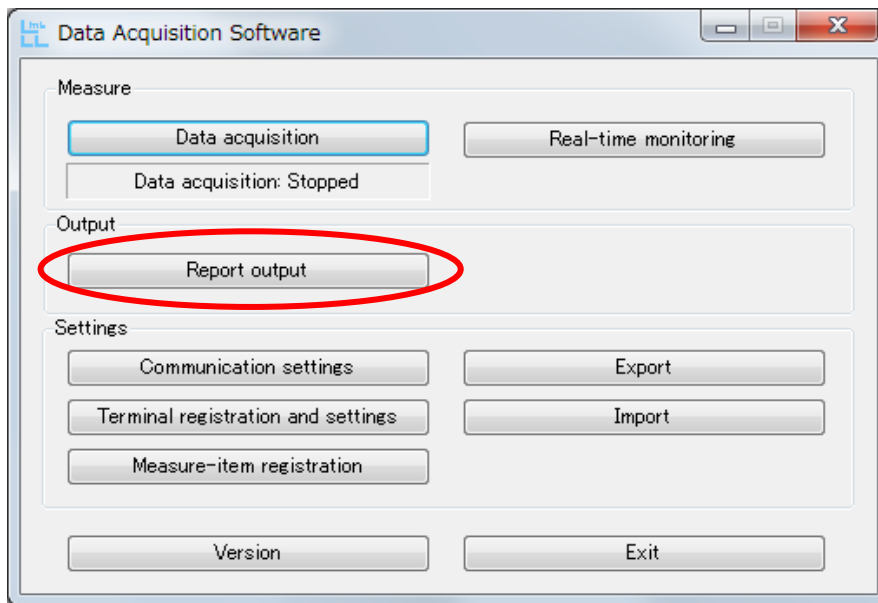
→H + [YYMMDD] .csv

Measurement date

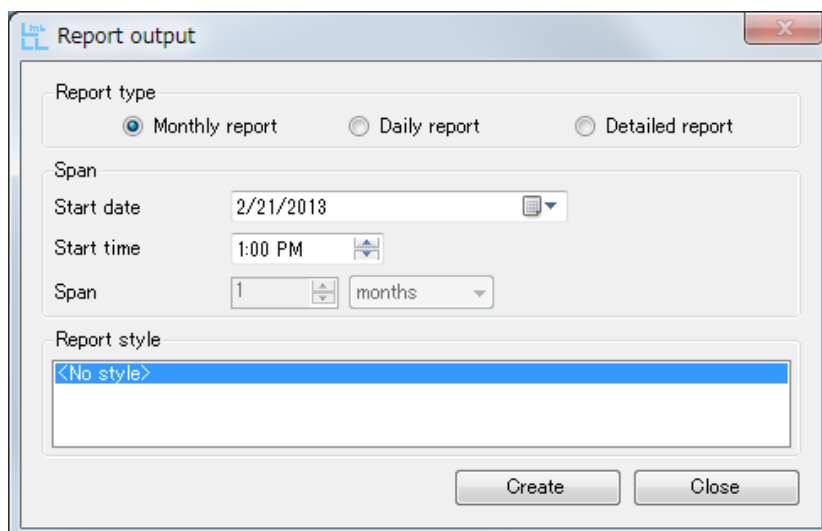


### 4.3 Report output

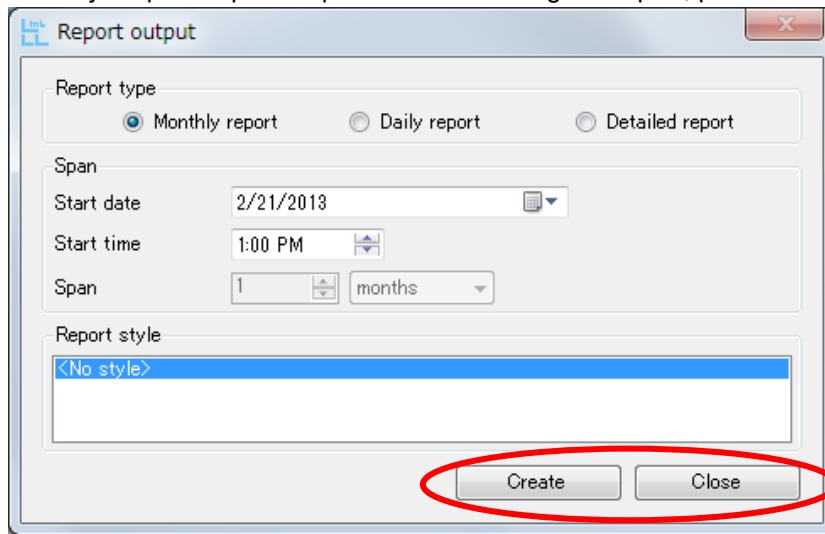
(a) Press [Report output] button.



(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.



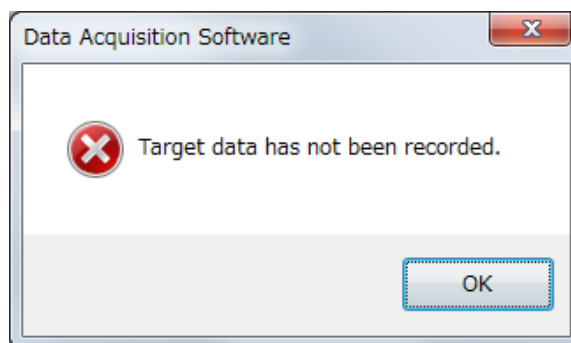
Note. Since the list will be created based on the data in the following folder, the message window is displayed as shown in the following figure if no collected data at a specific date exists.

Hourly data (The case of the default installation destination)

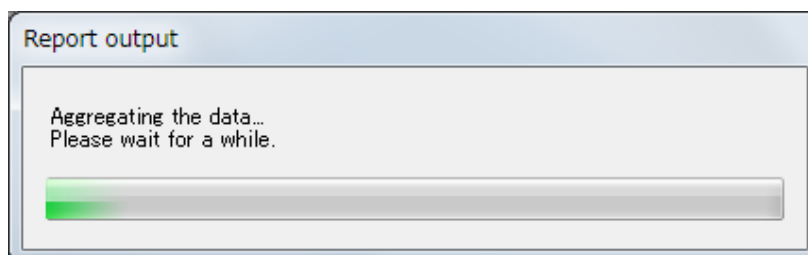
→C:\Mitsubishi\Emu4sw1\LogData\1HOUR

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.

	A	B	C	D	E
1		Current Main[A]	Voltage Main[V]	Real power Main[kW]	Electric energy Main[kWh]
2	2/21/2013 13:00	6.1	6520	62	2152
3	2/22/2013 13:00	6.1	6520	62	2152
4	2/23/2013 13:00	6.1	6520	62	2152
5	2/24/2013 13:00	6.1	6520	62	2152
6	2/25/2013 13:00	6.1	6520	62	2152
7	2/26/2013 13:00	6.1	6520	62	2152
8	2/27/2013 13:00	6.1	6520	62	2152
9	2/28/2013 13:00	6.1	6520	62	2152
10	3/1/2013 13:00	6.1	6520	62	2152
11	3/2/2013 13:00	6.1	6520	62	2152
12	3/3/2013 13:00	6.1	6520	62	2152
13	3/4/2013 13:00	6.1	6520	62	2152
14	3/5/2013 13:00	6.1	6520	62	2152

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”.

Report output

Report type

☐ Monthly report ☒ Daily report ☐ Detailed report

Span

Start date: 2/25/2013

Start time: 1:00 AM

Span: 1 days

Report style: <No style>

Create Close

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
		Air conditioner Main Current[A]	Air conditioner Main Voltage[V]	Air conditioner Main Real power[kW]
1				
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”.

Report output

Report type

☐ Monthly report ☐ Daily report ☒ Detailed report

Span

Start date: 2/21/2013

Start time: 1:30 PM

Span: 1 days

Report style: <No style>

Create Close

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

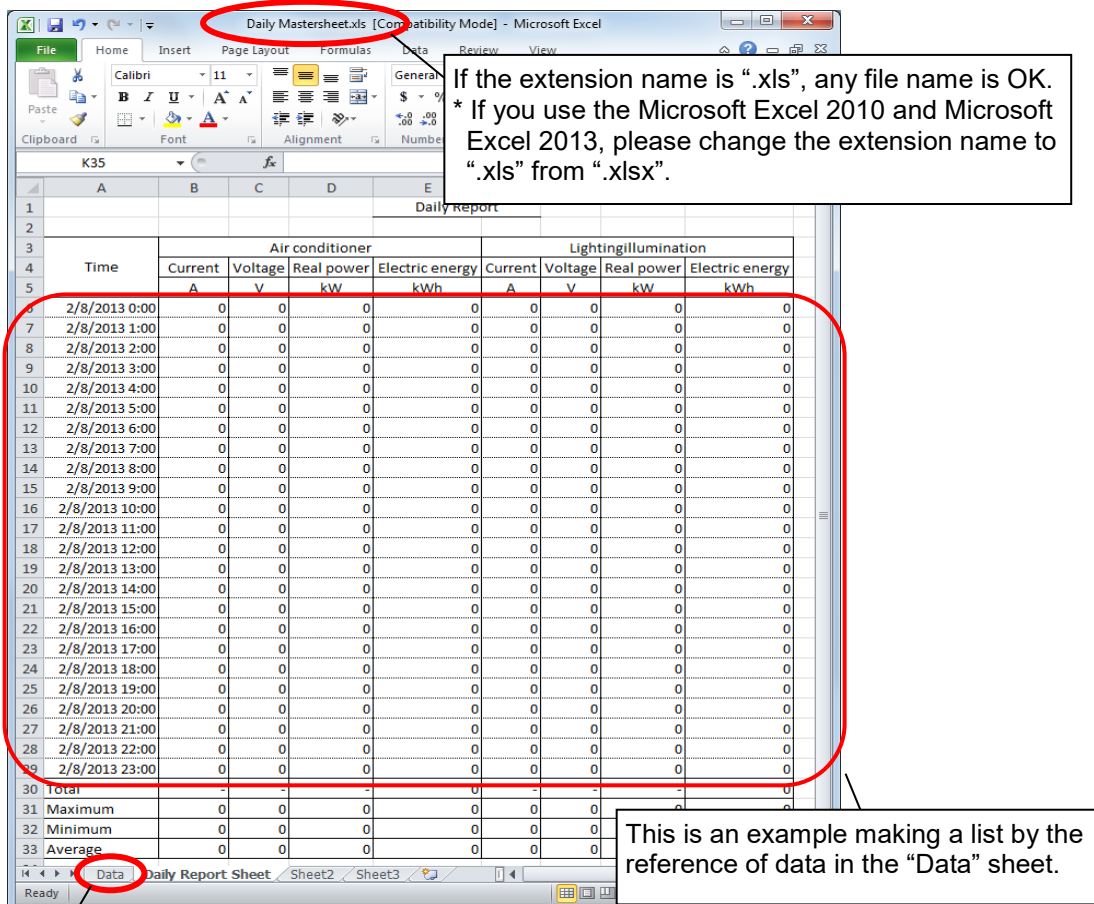
(a) Create the sheet named “Data” in the Excel file that will be used as the following figure.

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)”)



Create the sheet named "Data".

- (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.

The screenshot shows a "Report output" dialog box with the following fields and options:

- Report type:** Three radio buttons are present: "Monthly report" (unselected), "Daily report" (selected), and "Detailed report" (unselected).
- Span:**
  - Start date:** A text field containing "2/25/2013" with a calendar icon to its right.
  - Start time:** A text field containing "4:00 PM" with a time selection icon to its right.
  - Span:** A text field containing "1" and a "days" dropdown menu.
- Report style:** A list box containing two items: "Daily Mastersheet.xls" (which is highlighted in blue and circled in red) and "<No style>".
- Buttons:** "Create" and "Close" buttons are located at the bottom right of the dialog.

- (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 Current[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

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

- 5.1 Specifications
- 5.2 CSV file composition
- 5.3 Procedure of version-up
- 5.4 Support terminal list
- 5.5 Error code
- 5.6 Troubleshooting
- 5.7 Version History
- 5.8 Connection procedure when Ethernet – RS-485 conversion adapter is used
- 5.9 Connection procedure when USB – RS-485 conversion adapter is used

## Chapter 5     Appendix

### 5.1     Specifications

Item		Specifications
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.

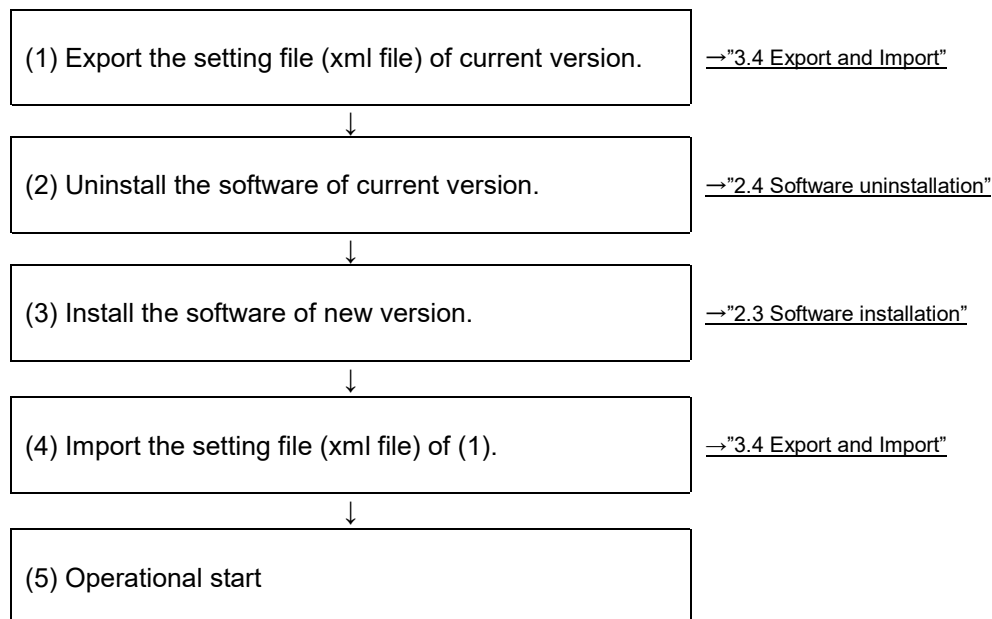
[LOGGING],1,2,3,7	Measure point name	Unit
DATETIME[YYYY/MM/DD hh:mm:ss],DOUBLE[DEC.1],DOUBLE[DEC.0],DOUBLE[DEC.0],DOUBLE[DEC.0]		
TIME,Current Main [A], Voltage Main [V], Real power Main [kW],Electric energy Main [kWh]		
0,0,0,1		
0,1,1,1,1		
...,999999		
2013/02/22 00:00:00,1.1,6490,21,896424		
2013/02/22 01:00:00,0.9,6470,16,896434		
2013/02/22 02:00:00,0.6,6480,8,896442		
2013/02/22 03:00:00,0.6,6480,8,896450		
2013/02/22 04:00:00,0.6,6470,8,896459		
2013/02/22 05:00:00,0.6,6490,8,896467		
2013/02/22 06:00:00,0.6,6440,8,896475		
Time stamp	Maximum integrated count value	Multiplier
Measured value	Measurement type 0: Instantaneous value 1: Integrated value	

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.



\*Software of ver.1.2.0 or later can take over setting after upgrading.

### 5.4 Support terminal list

Support terminal are shown in the table below.

Series	Terminal
EcoMonitorLight	EMU4-BD1-MB
	EMU4-HD1-MB
	EMU4-FD1-MB
EcoMonitorPlus	EMU4-BM1-MB
	EMU4-HM1-MB
	EMU4-LG1-MB
	EMU4-A2
	EMU4-VA2
	EMU4-AX4
	EMU4-PX4
ME96	ME96SSE-MB
	ME96SSH-MB
	ME96SSR-MB
ME96SS-Ver.A	ME96SSEA-MB
	ME96SSHA-MB
	ME96SSRA-MB
ME96SS-Ver.B	ME96SSEB-MB
	ME96SSHB-MB
	ME96SSRB-MB
Other	General MODBUS terminal

## 5.5 Error code

### List of error codes

Error code	Description of error	Factor of occurrence of error (details)	Action
Err002	Register address error	Requested register address not exist	Check for value of register address and terminal equipment.
Err003	Data value error	Configured value is out of range	Check the configured value is correct.
Err006	Slave busy error	During change the setting for the terminal	Do the writing of again setting value.
Err301	Failure of communication port open	Failure opening communication port	Please check the settings of LAN to RS-485 converter or USB to RS-485 converter. Please check the connection of the measuring unit is correct.
Err303	Invalid response message error	Invalid content of response message received from MODBUS terminal · Requested function code mismatch · There is no data for the number of registers requested · Mismatch with the requested slave address · CRC mismatch	Please reconsider the setting of MODBUS terminal.
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.

## 5.6 Troubleshooting

### List of error codes

Error code	Description of error	Factor of occurrence of error (details) Action
Data collection	Data collection has stopped.	Power option setting of your PC may cause data collection to be stopped. Change the setting time to put the computer to sleep to "None" and save the setting. * How to change setting in Microsoft Windows 7 Example: Windows menu → Control Panel → System and Security → Power Options → Change the time the computer goes to sleep
Terminal setting	Err002 is displayed in screen when reading or writing the setup value of EcoMonitorPlus(EMU4-HM1-MB, EMU4-BM1-MB, EMU4-A2, EMU4-VA2).	(a) When the register addresses to be written are not correct. Please check the value of register address.  (b) When the version of measuring unit is 1.00. In the version of measurement unit before Ver.1.00, display mode setting function in MODBUS communication is not supported. Please check the version of measuring unit. (Please refer to "6.3.8 F/W VER. Setup - Display the F/W Version of Energy Measuring Unit" to confirm F/W version)  When Err002 is displayed, reading or writing has been successfully completed up to setting item above the setting value which the display color changed to red.
Terminal setting	Err006 is displayed in screen when reading or writing the setup value of ME96SS/ME96SS-Ver.A/ME96SS-Ver.B.	(a) Check if the ME96 is in the operation mode. ME96 replies the slave busy error (Err006) in the setting mode or the setting confirming mode.  (b) Check if the model name selected in terminal registration match. If the model name is set incorrectly, the slave busy error (Err006) may be replied during setting.

## 5.7 Version History

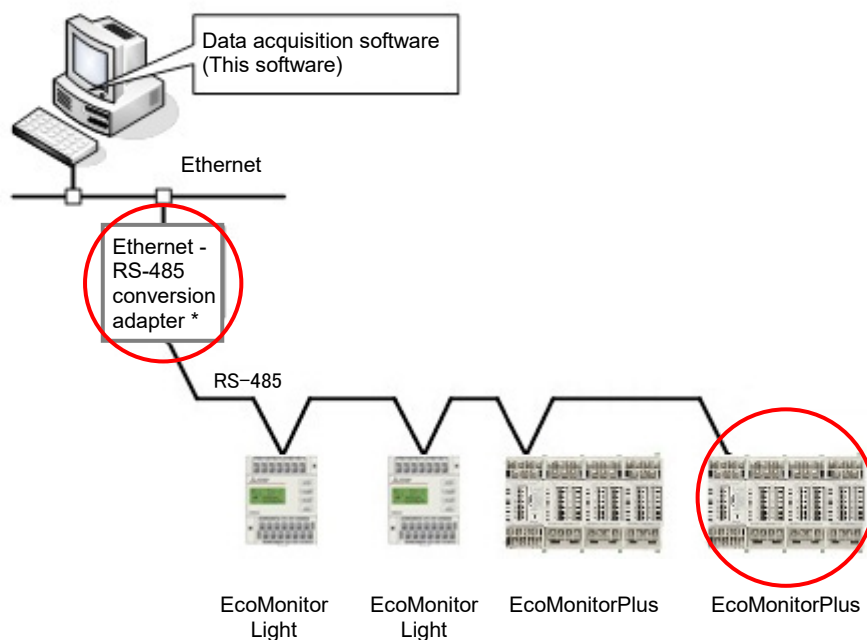
Version	Content	Remarks
1.0.0	First edition	
1.0.1	The operation of the measurement point registration screen was improved.	
1.1.0	Support model added.	[Model list] EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB, EMU4-A2, EMU4-VA2
	Data acquisition and real-time monitoring can be performed at the same time.	This function has been changed to specification to collect data only in software activation state.
	Microsoft Windows 8.1 and Excel 2013 is supported.	
1.2.0	Support model added.	[Model list] EMU4-AX4, EMU4-PX4
	CSV output function was added to the terminal registration screen and terminal setting screen.	
	It is now possible to inherit set values at version up.	
	Microsoft Windows 10 and Excel 2016 is supported.	
1.2.1	Added "Display mode setup" , "HA and HV value" and "Elements1,2,3,4" in terminal setting.	Please refer to EMU4-D65 User's manual (IB63A24) "6.3.2 Measuring setup" for details of setup value.
	Added function to change the color of setting value that caused error when reading setup value.	
1.2.2	Support model added.	[Model list] ME96SSEB-MB, ME96SSHB-MB, ME96SSRB-MB

## 5.8 Connection procedure when Ethernet – RS-485 conversion adapter is used

When acquiring measured data from a terminal device by Data Acquisition Software using Ethernet - RS-485 conversion adapter (LINEEYE SI-65 (applicable product)), connect with the terminal device by the following procedure.

### 5.8.1 Connection diagram

#### (1) Connection example



○ : Devices that need the connection of a termination resistor

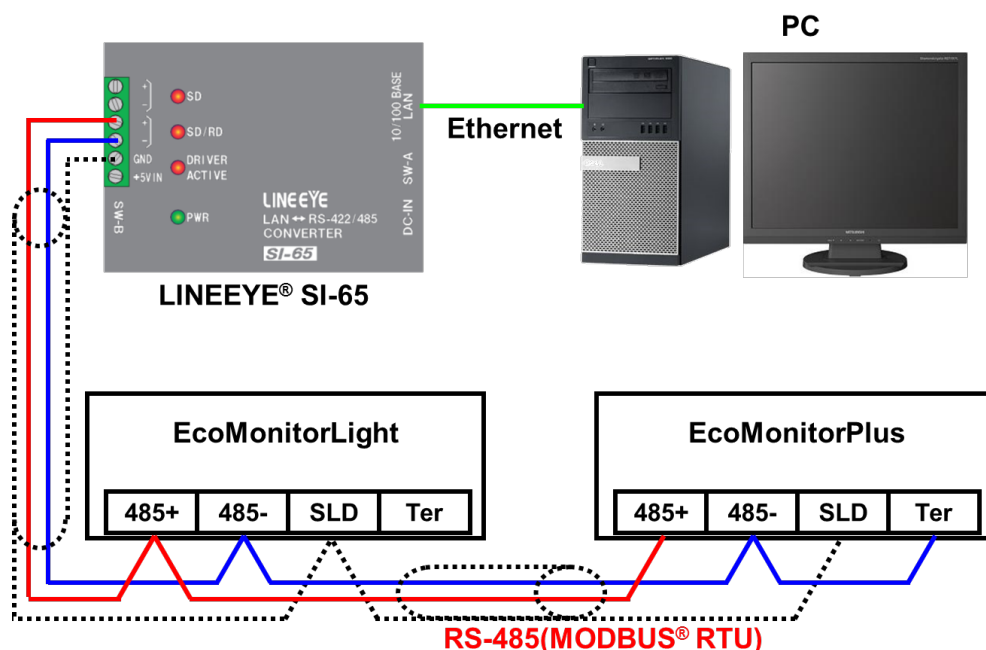
\*The devices at both ends of RS-485 transmission line need a termination resistor.

The setting method of the termination resistor for each device is as follows;

- LINEEYE SI-65 ..... Refer to [5.8.2 Setting procedure (2)] for details.
- EcoMonitorLight, EcoMonitorPlus .. Termination is possible at 120  $\Omega$  by shorting "485-" terminal and "Ter" terminal.



## (2) Wiring example



The specifications of RS-485 communication lines are as follows:

Item	Specifications
Electric wire	Shielded twisted pair cable Wire type: SPEV(SB)-MPC-0.2 × 1 P equivalent *when anticipating a system change to B/NET transmission: Stranded wire: 1.25mm <sup>2</sup> , Single wire: $\phi 1.2$
Wiring distance	Max. 1,200 m
Number of connected units	Max. 31 units

- \*1 Use as thick wires as possible for wiring to make grounding impedance on the side of the terminal device (EcoMonitorLight, EcoMonitorPlus) low.
- \*2 Do not put RS-485 transmission lines close to high-voltage lines and do not bundle RS-485 transmission lines.
- \*3 Ground SLD terminal at a single point.
- \*4 For the details of wiring, refer to the User's manual (details) for the terminal device (EcoMonitorLight, EcoMonitorPlus) to be used.

## 5.8.2 Setting procedure

### (1) Setting of terminal device

Configure the RS-485 (MODBUS RTU) communication settings of the terminal device as follows:  
For the details of the setting method, refer to the User's manual for the terminal device to be used.  
When the terminal device is EcoMonitorLight, refer to the [User's manual (details) for the energy measuring unit (model : EMU4-BD1-MB, EMU4-HD1-MB)], and when it is EcoMonitorPlus, refer to the [User's manual (details) for the small display unit for Mitsubishi energy measuring unit (model : EMU4-D65)].

Item	Specifications
Address	Assign addresses 1 to 255 to connected terminal devices (Max 31 units).
Baud rate*1	19200 bps
Parity	Even (even number)
Stop bit	1

- \*1 A baud rate can also be set at 2400 bps, 4800 bps, 9600 bps or 38400 bps.  
In this manual, the procedure is described with a baud rate: 19200 bps.

## (2) Setting of LINEEYE SI-65

Configure the setting of the DIP switches of LINEEYE SI-65 main unit as follows:

SW-A: OFF for No.2 alone (ON for all other Nos.)

SW-B: ON for all

\*SW-A sets a communication speed (baud rate). Configure the setting that corresponds to that of the connected terminal device.

<SW-A>

OFF: [ ]  
ON: [X] [ ] [ ] [ ]

No.1 No.2 No.3 No.4

<SW-B>

OFF: [ ] [ ] [ ] [ ]  
ON: [X] [X] [X] [X]

No.1 No.2 No.3 No.4

Speed (bps) [ ] indicates a representative example.	SW-A No.1	SW-A No.2	SW-A No.3	Internal Timer *1(ms)
Over300 [300, 600]	OFF	OFF	OFF	57
Over 1200 [1200]	ON	OFF	OFF	14.3
Over 2400 [2400]	OFF	ON	OFF	7.1
Over 4800 [4800]	ON	ON	OFF	3.6
Over 9600 [9600]	OFF	OFF	ON	1.8
Over 19200 [19200]	ON	OFF	ON	0.9
Over 38400 [38400, 57600]	OFF	ON	ON	0.45
Over 115.2k [115.2k to 920k]	ON	ON	ON	0.11

SW-A	Meaning	OFF	ON
No.4	RS-422/485 transmission driver control	Active	Auto

SW-B	Meaning	OFF	ON
No.1	Select a line mode	RS-422 (full duplex)	RS-485(half duplex)
No.2	Echo reception of transmission data	With echo back	Without echo back
No.3	Terminal control between SD+ and SD-	Without terminal control	With terminal control(100 ohm)
No.4	Terminal control between SD/RD+ and SD/RD-	Without terminal control	With terminal control(100 ohm)

**Fixed setting**

## (3) Setting of the PC (network setting of LINEEYE SI-65)

Configure the network setting of LINEEYE SI-65 with the PC.

In this manual, the case of Microsoft Windows 8.1 is used for explanation.

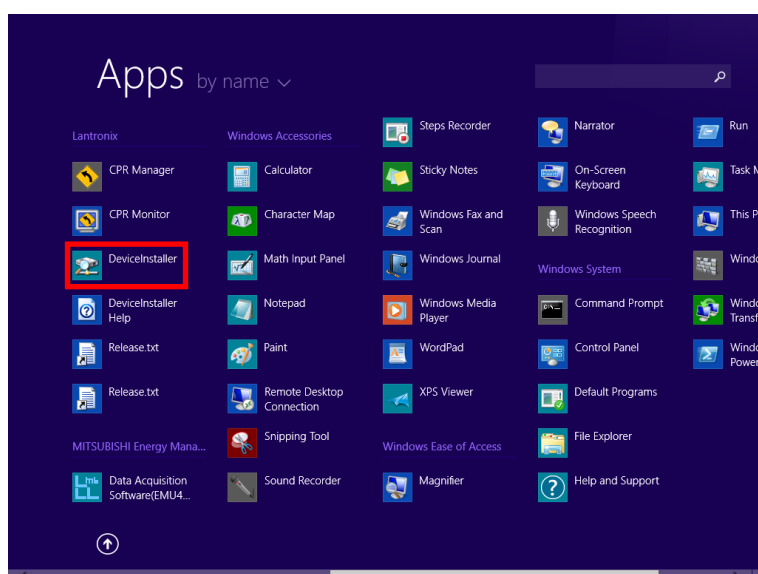
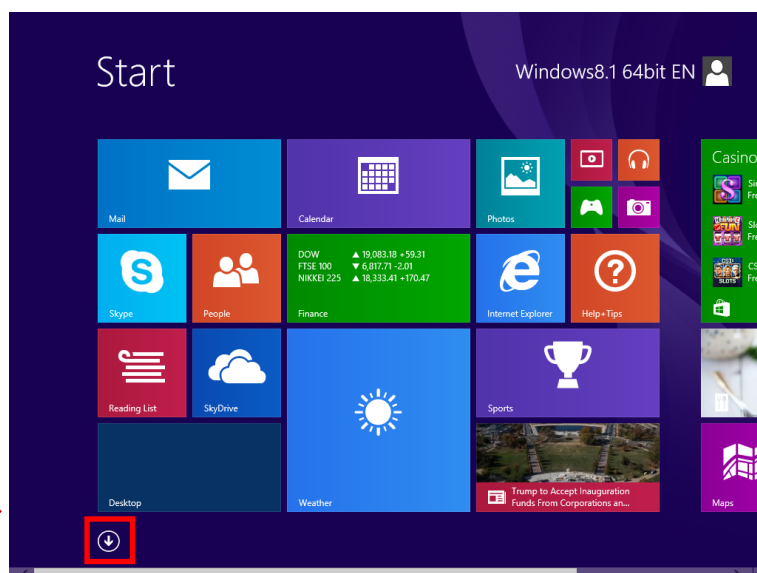
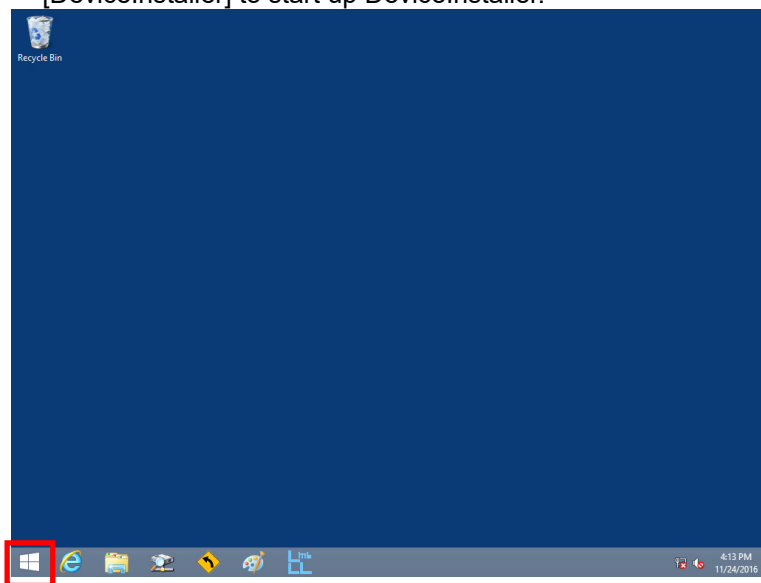
\*Installation of LINEEYE SI-65-related software

For setting, the software below needs to be installed from the CD-ROM that comes with LINEEYE SI-65.

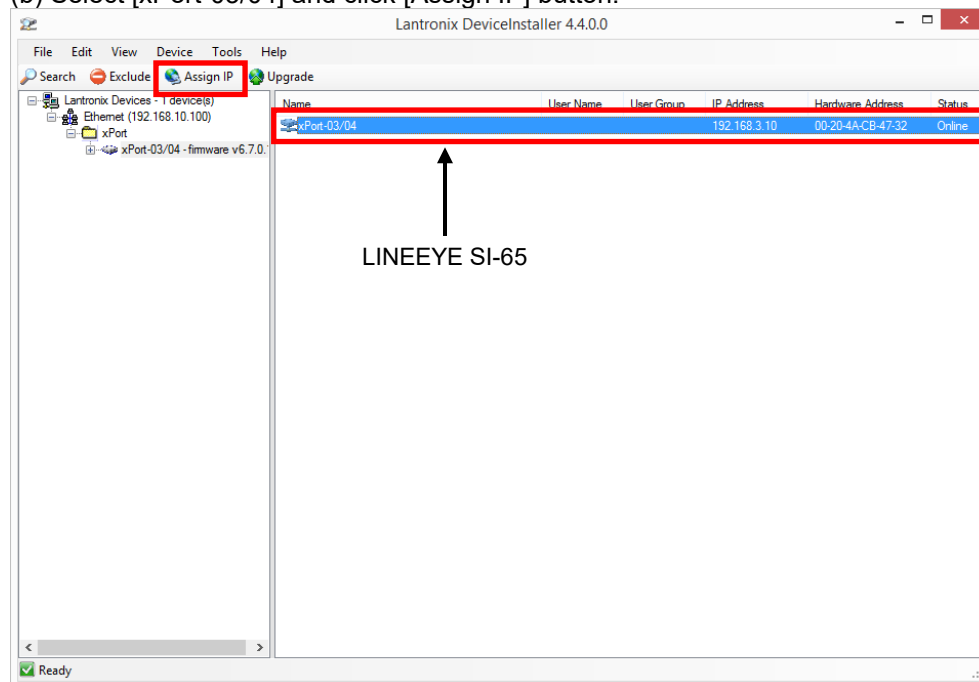
For the installation method, refer to the manual that comes with LINEEYE SI-65.

- DeviceInstaller
- CPR Manager (ComPortRedirector Manager)

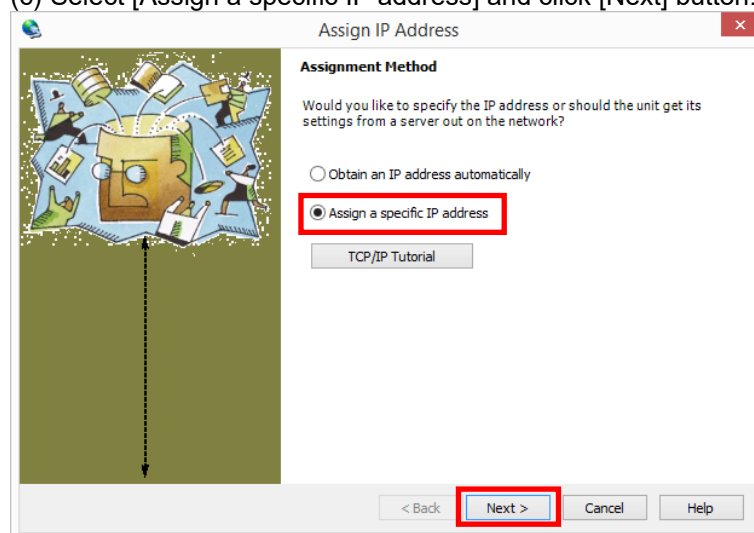
(a) Connect the PC and LINEEYE SI-65 with a LAN cable and click [windows icon] - [⓪] – [DeviceInstaller] to start up DeviceInstaller.



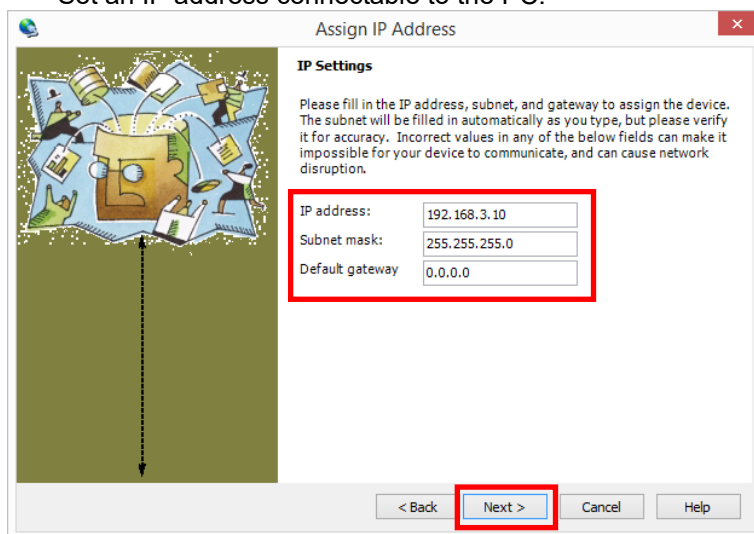
(b) Select [xPort-03/04] and click [Assign IP] button.



(c) Select [Assign a specific IP address] and click [Next] button.



- (d) Enter an IP address you want to set to LINEEYE SI-65 and click [Next] button.  
\*Set an IP address connectable to the PC.



The dialog box is titled "Assign IP Address". On the left is a cartoon illustration of a puzzle with a face, surrounded by various network-related icons like a laptop, a server, and a network card. A dashed arrow points from the puzzle towards the right. The main area is titled "IP Settings" and contains a paragraph of instructions: "Please fill in the IP address, subnet, and gateway to assign the device. The subnet will be filled in automatically as you type, but please verify it for accuracy. Incorrect values in any of the below fields can make it impossible for your device to communicate, and can cause network disruption." Below this text are three input fields: "IP address:" with the value "192.168.3.10", "Subnet mask:" with the value "255.255.255.0", and "Default gateway:" with the value "0.0.0.0". These fields are enclosed in a red rectangular box. At the bottom of the dialog are four buttons: "< Back", "Next >", "Cancel", and "Help". The "Next >" button is highlighted with a red rectangular box.

**Assign IP Address**

**IP Settings**

Please fill in the IP address, subnet, and gateway to assign the device. The subnet will be filled in automatically as you type, but please verify it for accuracy. Incorrect values in any of the below fields can make it impossible for your device to communicate, and can cause network disruption.

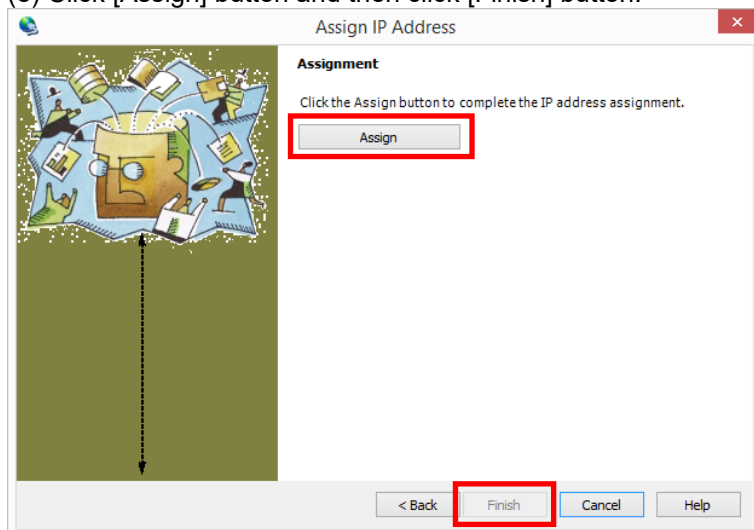
IP address: 192.168.3.10

Subnet mask: 255.255.255.0

Default gateway: 0.0.0.0

< Back Next > Cancel Help

- (e) Click [Assign] button and then click [Finish] button.



The dialog box is titled "Assign IP Address". On the left is the same cartoon illustration of a puzzle with a face as in the previous screen. A dashed arrow points from the puzzle towards the right. The main area is titled "Assignment" and contains a paragraph of instructions: "Click the Assign button to complete the IP address assignment." Below this text is a single button labeled "Assign", which is highlighted with a red rectangular box. At the bottom of the dialog are four buttons: "< Back", "Finish", "Cancel", and "Help". The "Finish" button is highlighted with a red rectangular box.

**Assign IP Address**

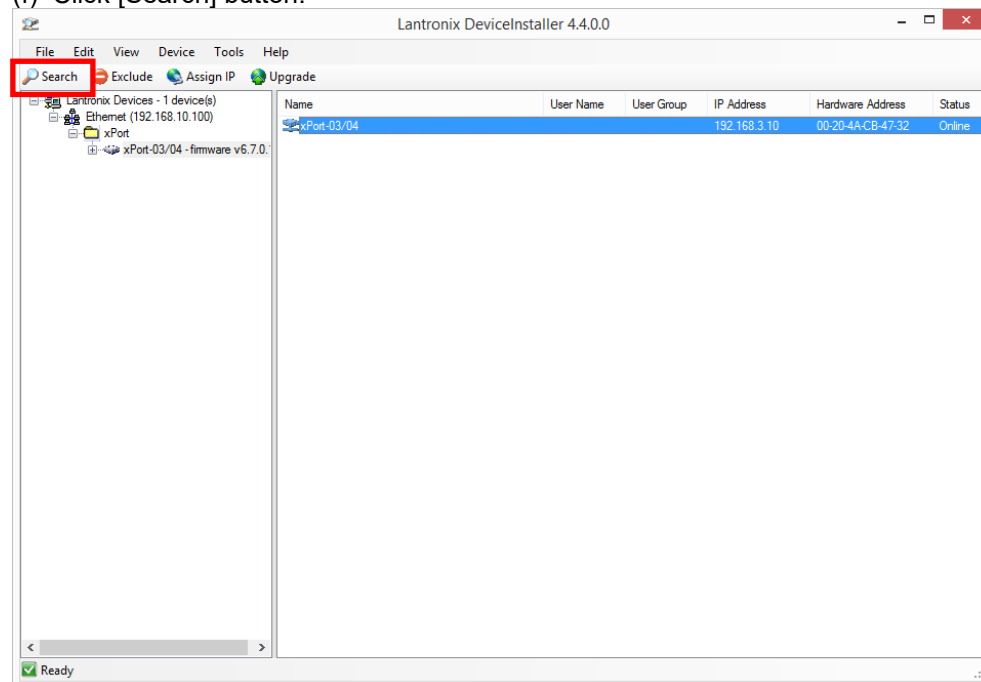
**Assignment**

Click the Assign button to complete the IP address assignment.

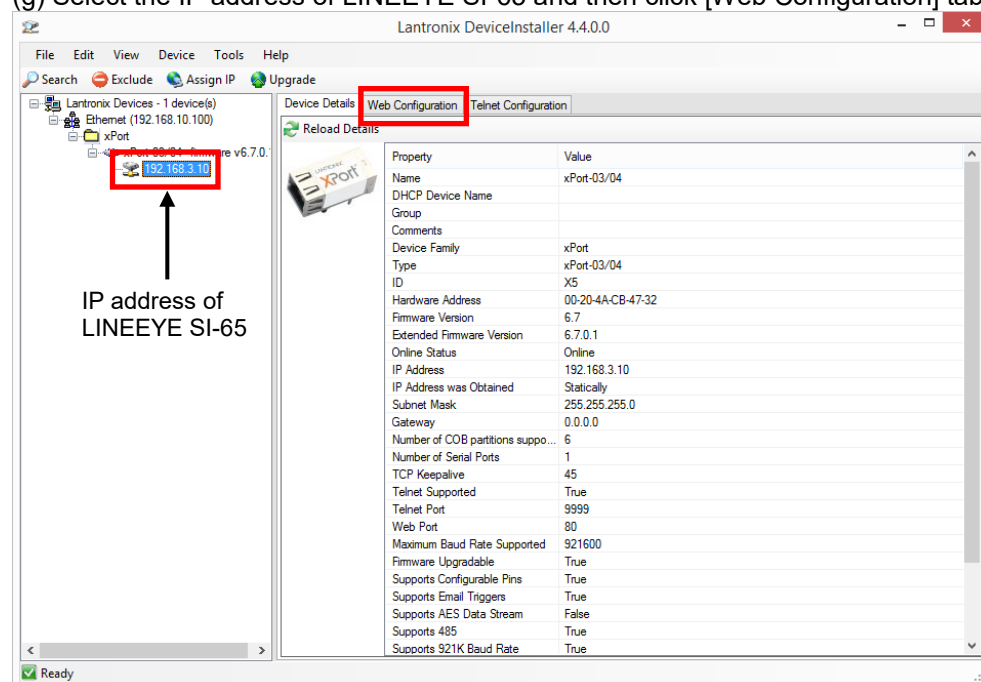
Assign

< Back Finish Cancel Help

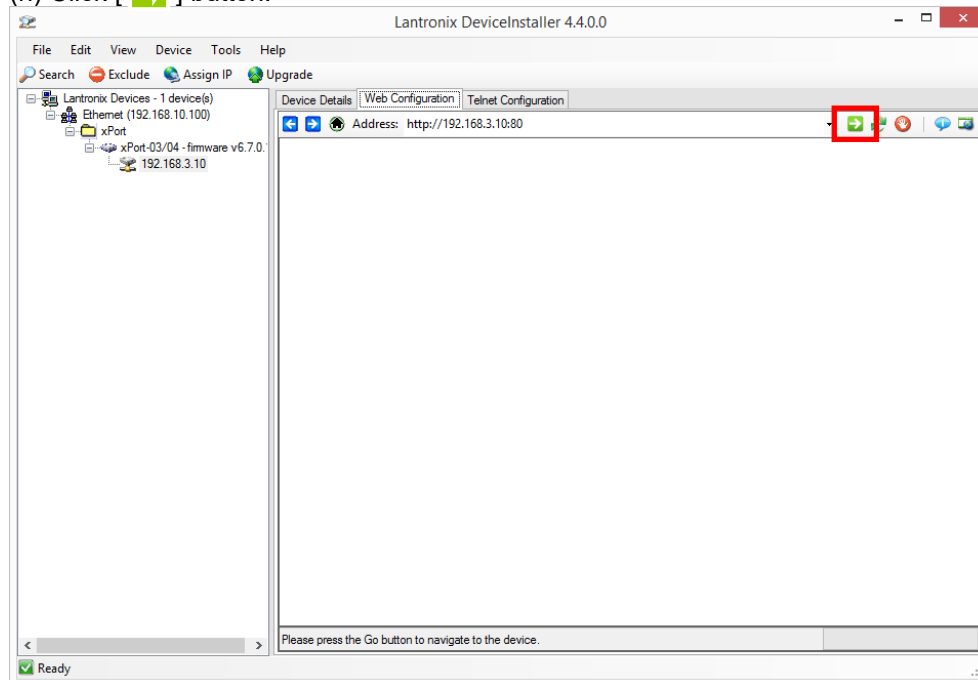
(f) Click [Search] button.



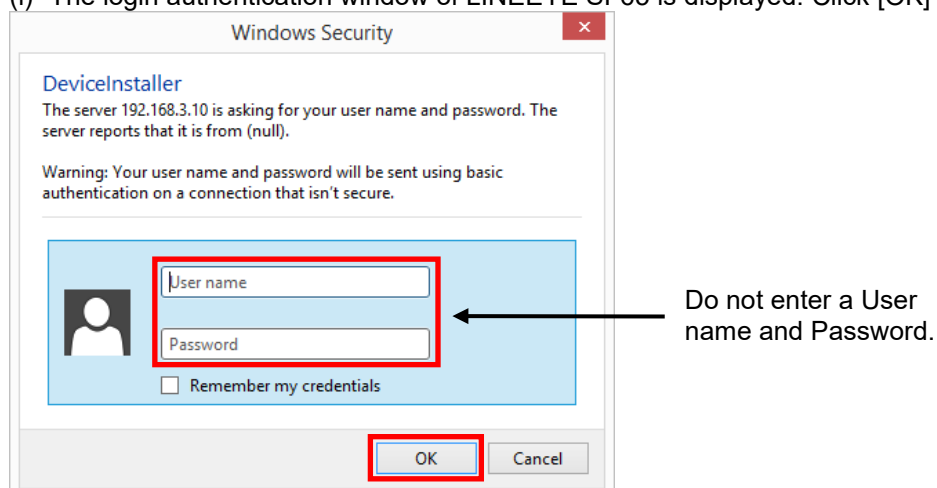
(g) Select the IP address of LINEEYE SI-65 and then click [Web Configuration] tab.



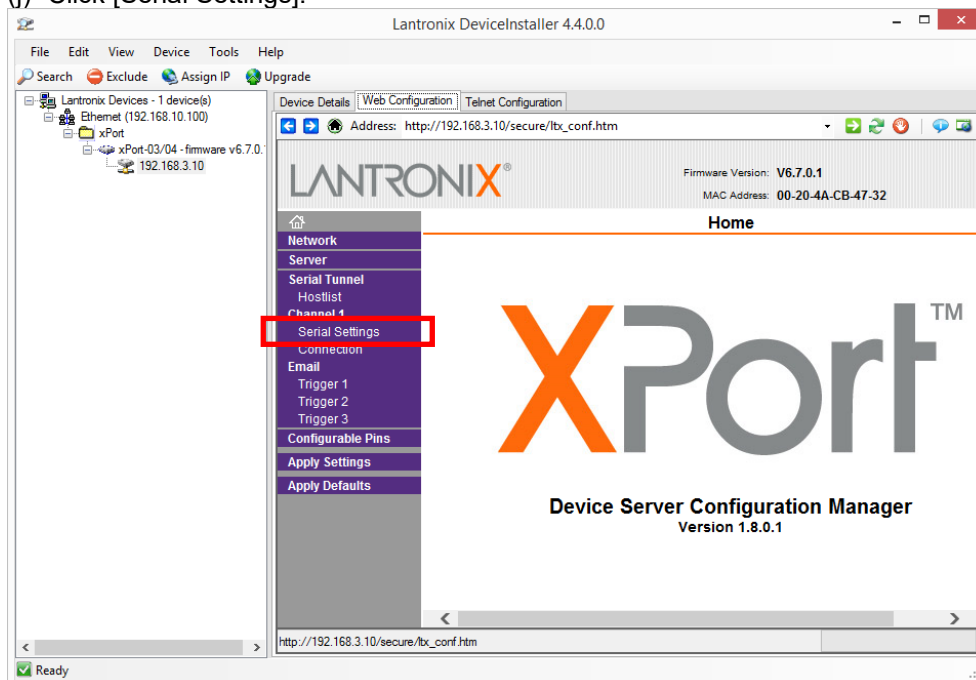
(h) Click [  ] button.



(i) The login authentication window of LINEEYE SI-65 is displayed. Click [OK] button.

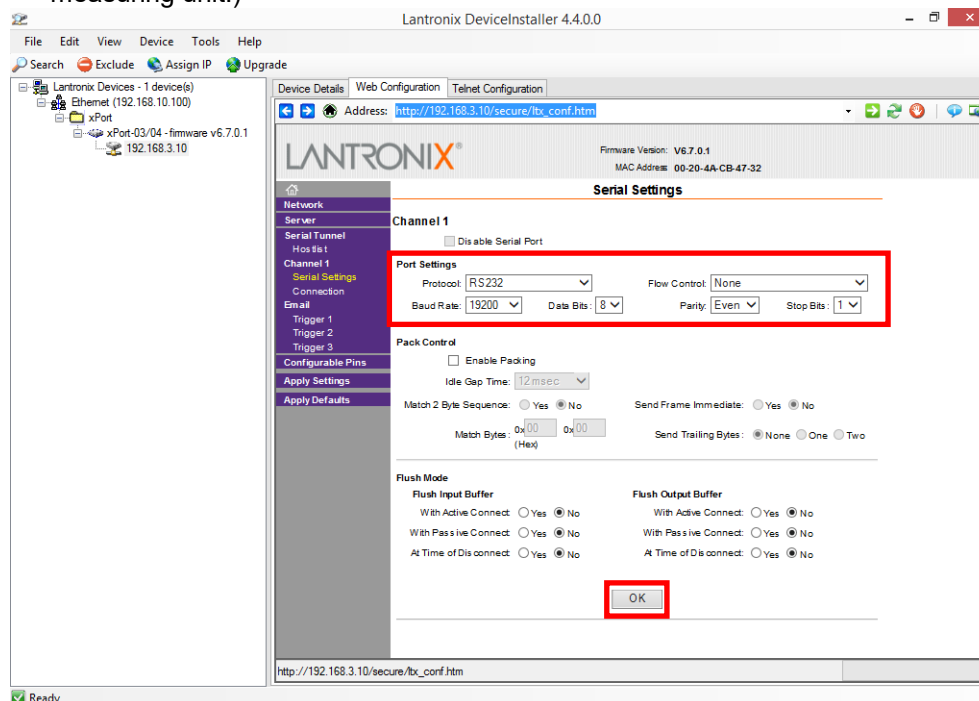


(j) Click [Serial Settings].



\*If the IP address of LINEEYE SI-65 is incorrect, the window is not displayed.  
Check if the IP address connectable to the PC is set.

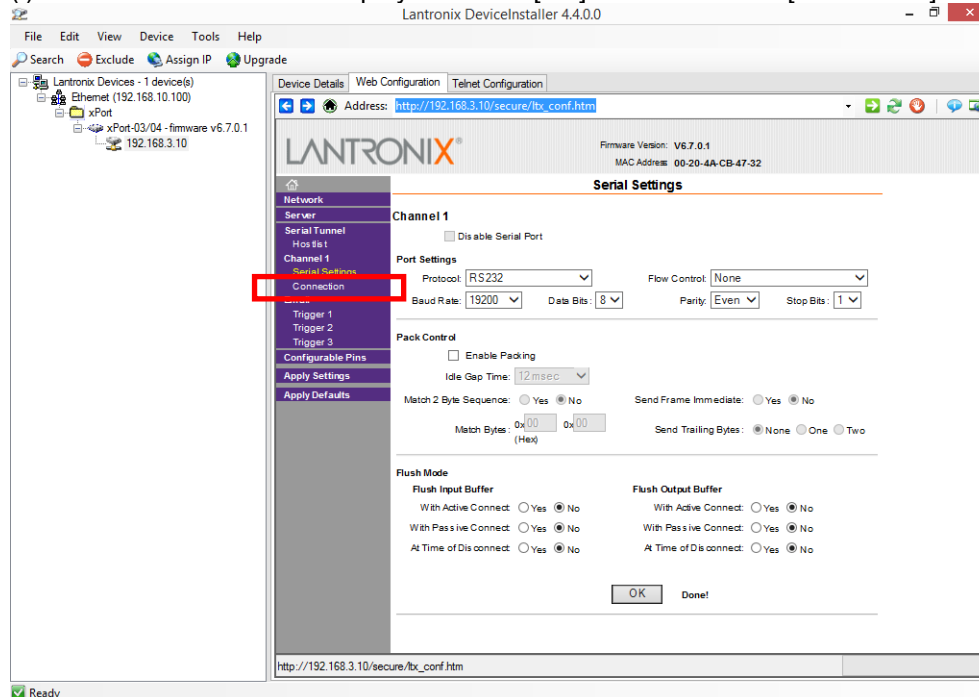
(k) Configure the Port setting that corresponds to RS-485 communication settings of the connected terminal device and click [OK] button.  
When the setting completes, "Done!" is displayed next to [OK] button.  
(Refer to [5.8.2 Setting Procedure (1)] for RS-485 communication settings of the energy measuring unit.)



\*Set "RS232" for "Protocol".



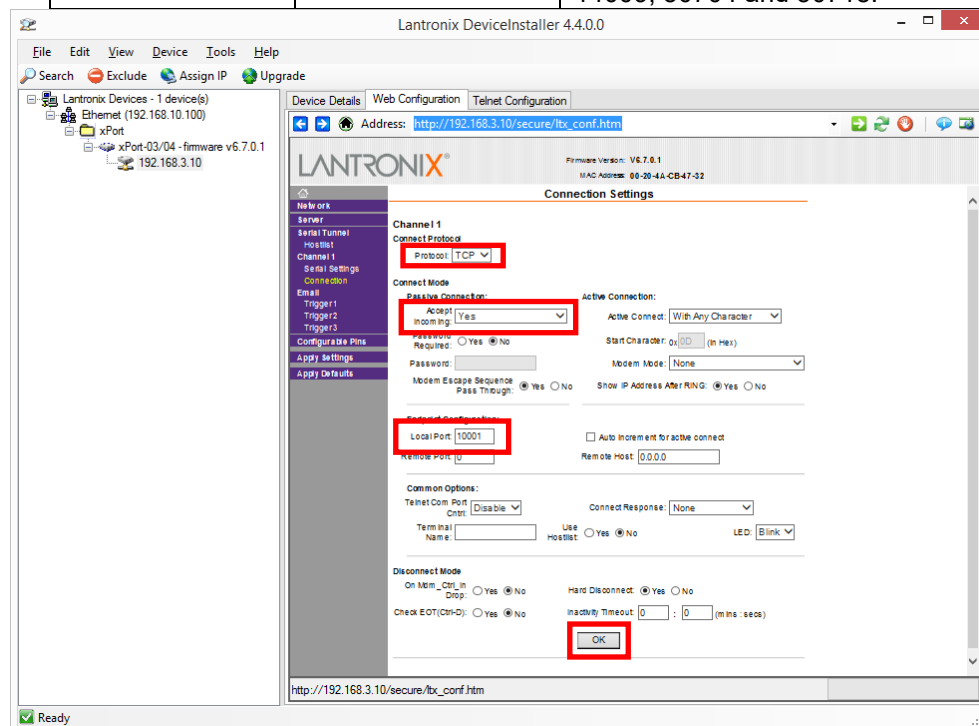
(l) Confirm that “Done!” is displayed next to [OK] button and click [Connection].



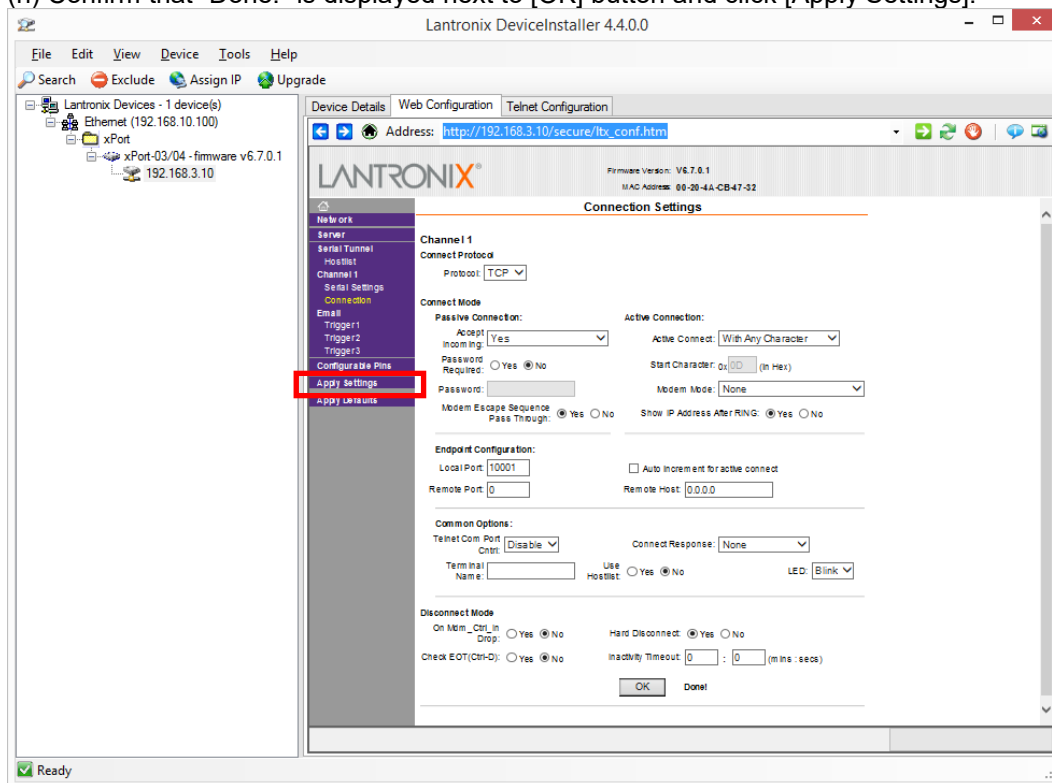
(m) Select and enter the settings below and click [OK] button.

When the setting completes, “Done!” is displayed next to [OK] button.

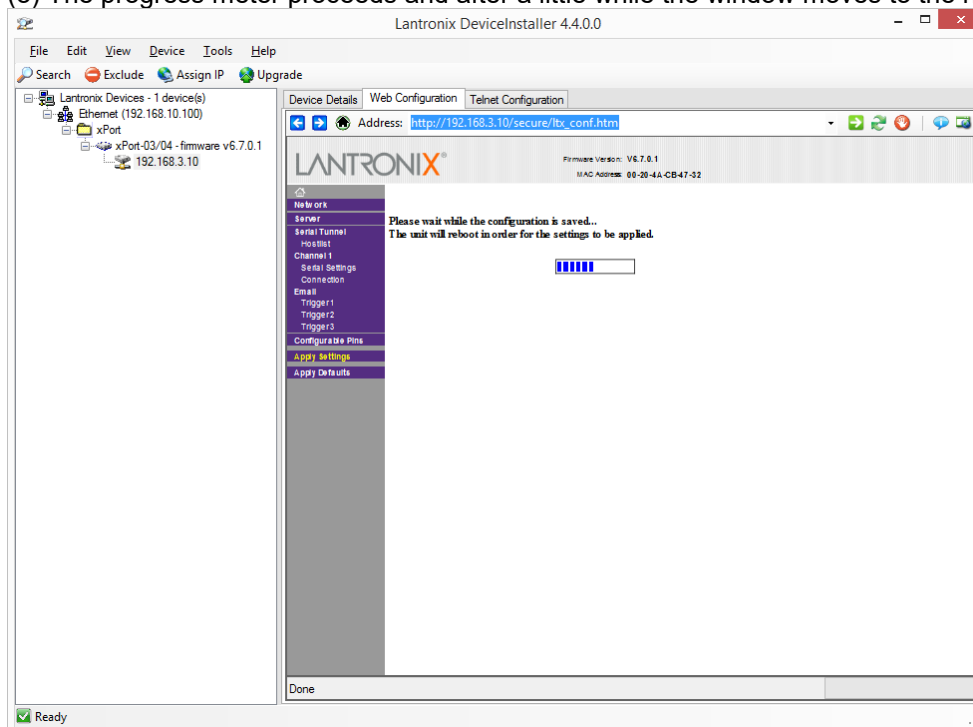
Item	Settings	Remarks
Protocol	TCP	
Accept Incoming	Yes	
Local Port	Arbitrary port No.	Do not set 1 to 1024, 9999, 14000 to 14009, 30704 and 30718.



(n) Confirm that “Done!” is displayed next to [OK] button and click [Apply Settings].

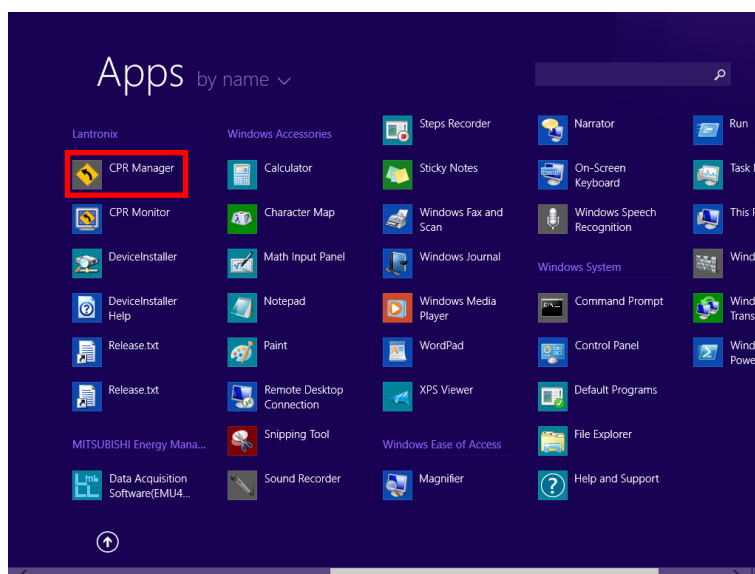
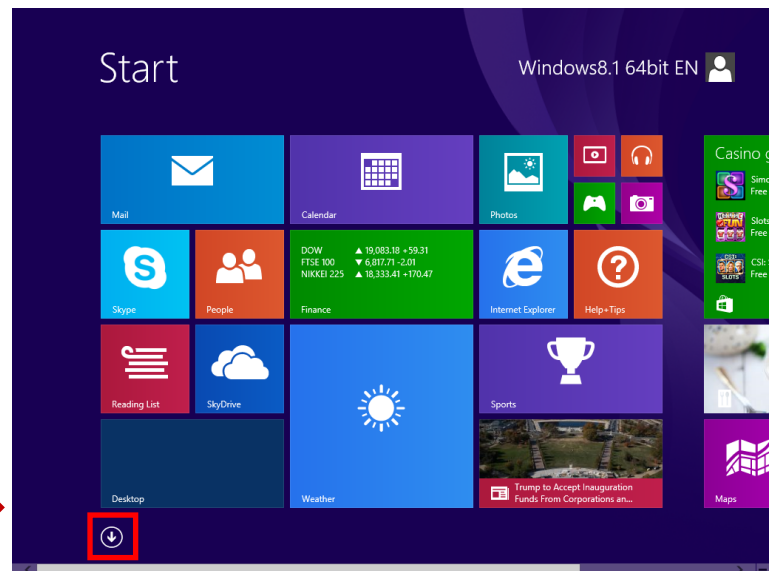
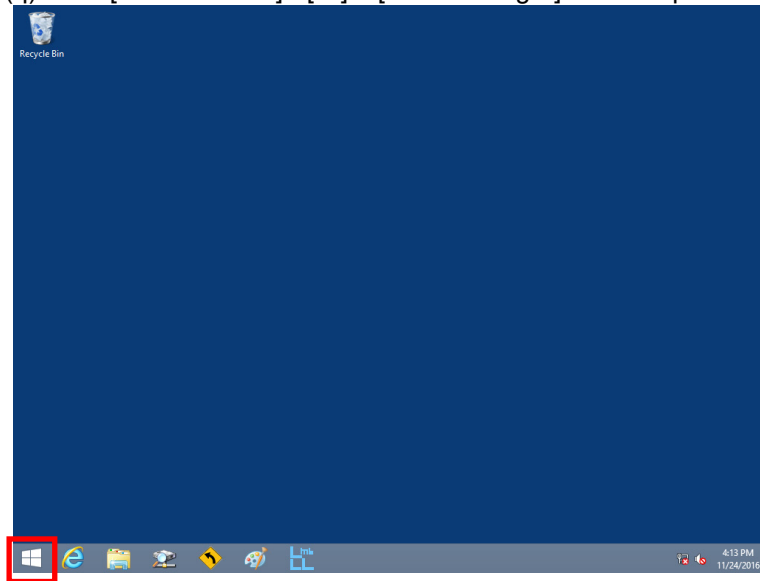


(o) The progress meter proceeds and after a little while the window moves to the home window.

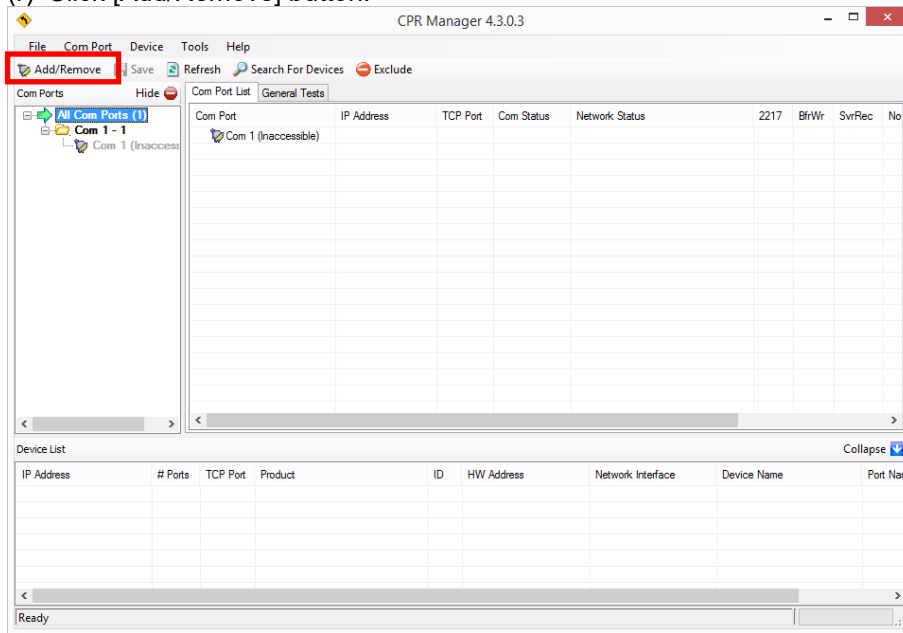


(p) Quit DeviceInstaller.

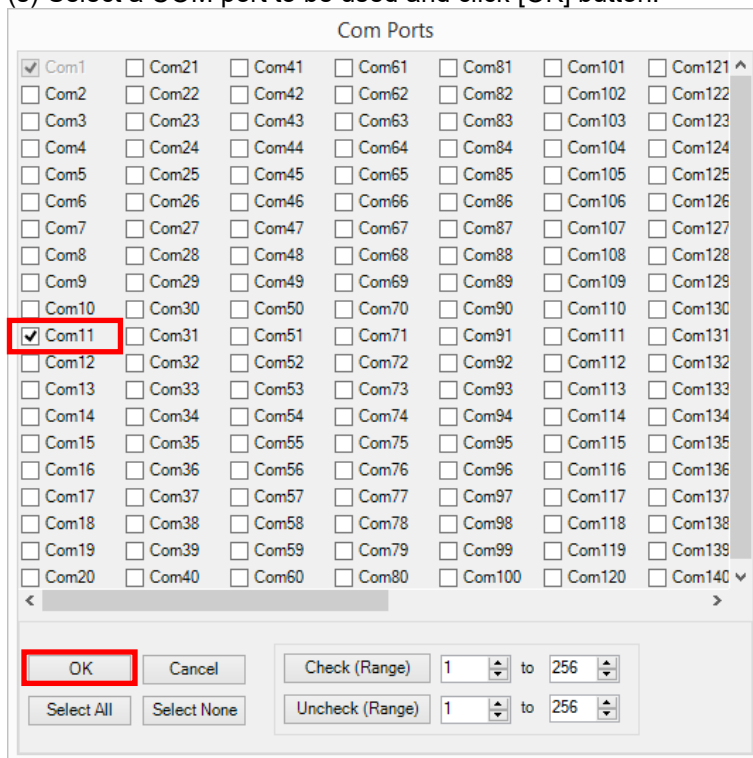
(q) Click [windows icon] - [①] – [CPR Manager] to start up CPR Manager.



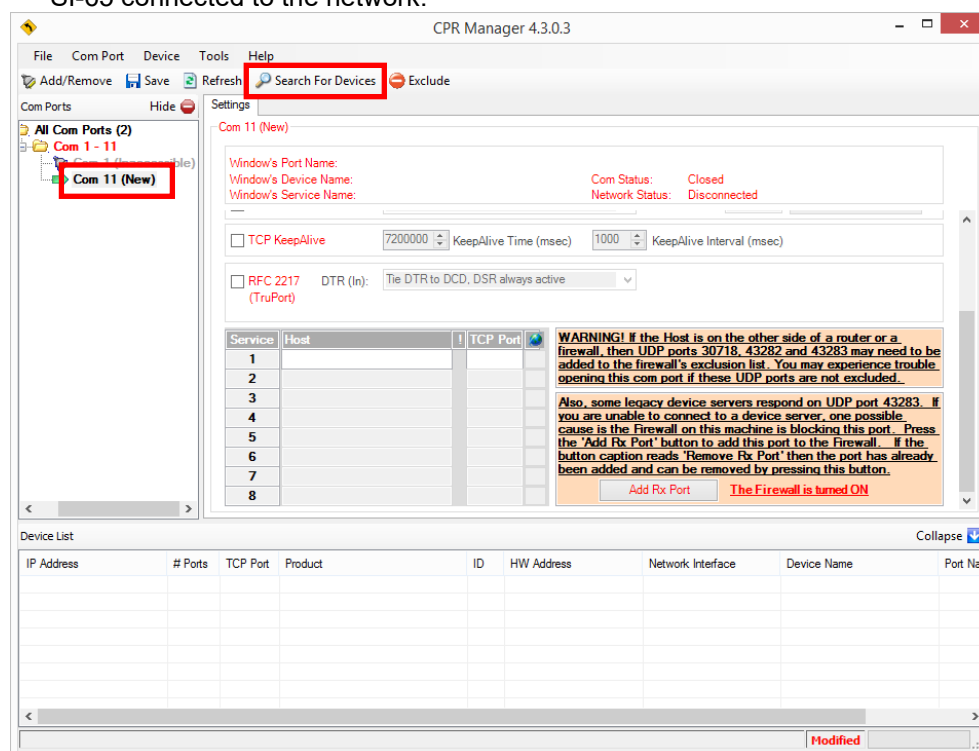
(r) Click [Add/Remove] button.



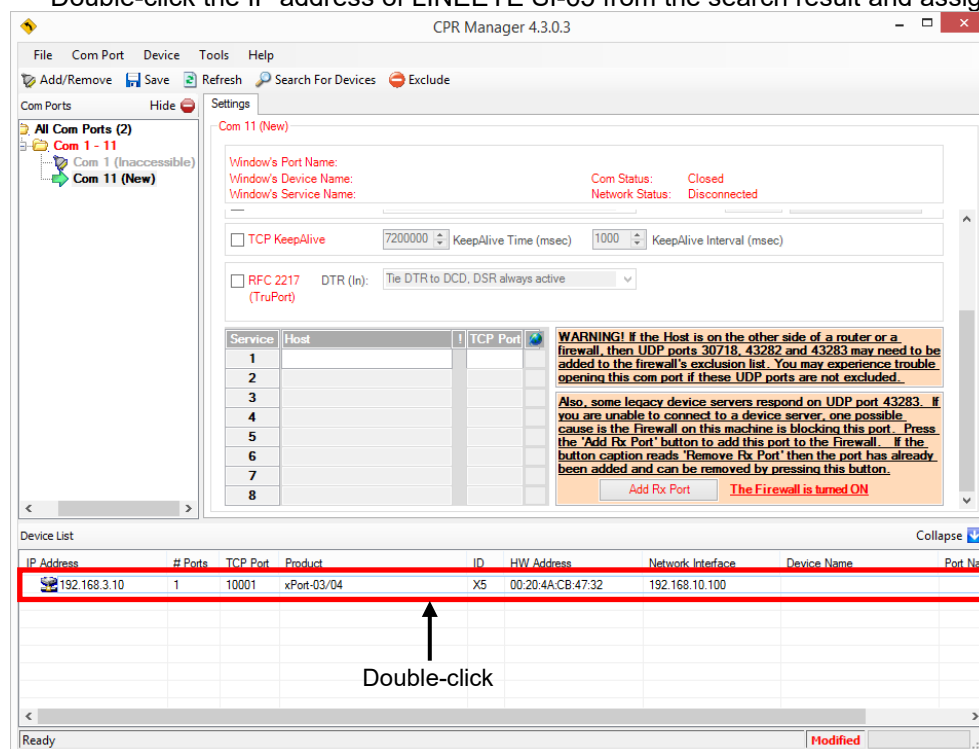
(s) Select a COM port to be used and click [OK] button.



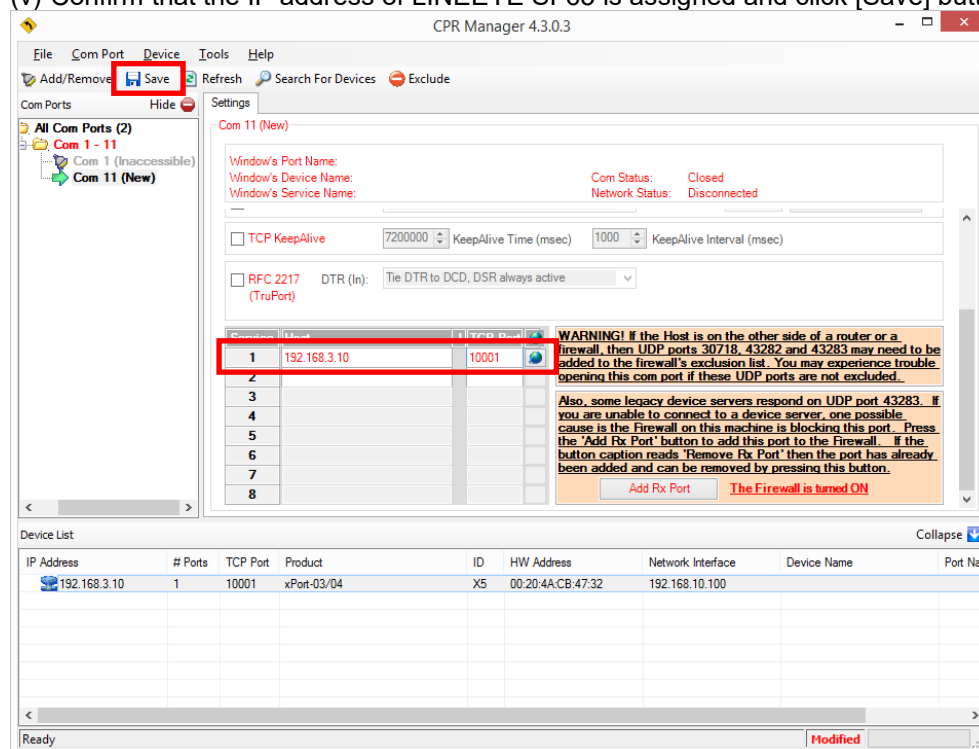
- (t) Select the COM port selected in (s) and click [Search For Devices] button to search LINEEYE SI-65 connected to the network.



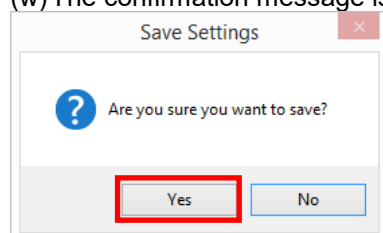
- (u) The search result is displayed in Device List.  
Double-click the IP address of LINEEYE SI-65 from the search result and assign to the COM port.



(v) Confirm that the IP address of LINEEYE SI-65 is assigned and click [Save] button.



(w) The confirmation message is displayed. Click [Yes] button.



(4) Setting of the PC (the setting of Data Acquisition Software for the energy measuring unit)  
Configure the setting of Data Acquisition Software for the energy measuring unit with the PC.

\*Installation of Data Acquisition Software for the energy measuring unit

The following procedure uses Data Acquisition Software for the energy measuring unit.

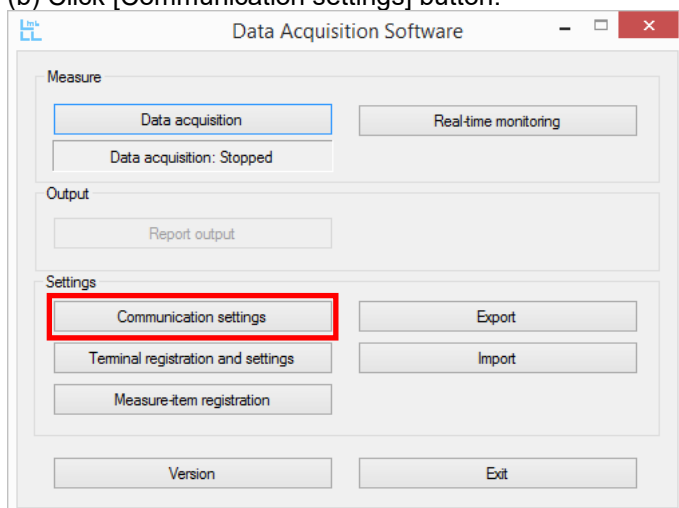
If it is not installed, install it before configuring the setting.

Refer to [2.3 Software installation] for the installation method.

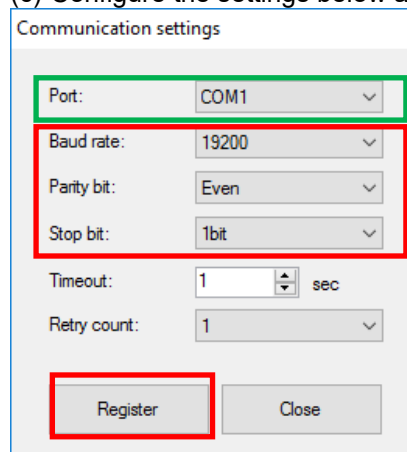
(a) Start up Data Acquisition Software for the energy measuring unit.

Refer to [3.1 Start-up and end of Data Acquisition Software] for the start-up method.

(b) Click [Communication settings] button.



(c) Configure the settings below and click [Set] button.



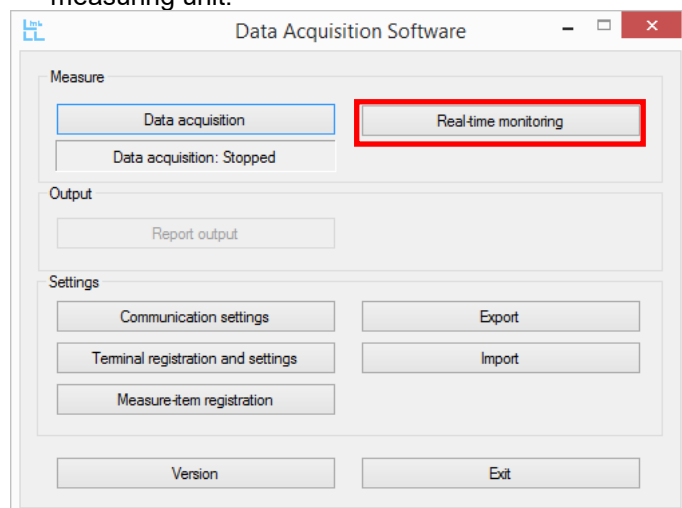
(3) Select the COM port set in (s).

Configure the same settings as the connected terminal device.  
(Refer to [5.8.2 Setting procedure (1)].)

(d) Register the connected terminal device and measuring points.  
Refer to [3.3 Registration (Initial setting)] for the setting method.

(5) Confirmation of the connection with the terminal device

(a) Click [Real-time monitoring] in the main menu window of Data Acquisition Software for the energy measuring unit.



(b) Click [Start] button to perform communication confirmation.

The screenshot shows the 'Real-time monitoring' window. It contains a table with the following data:

Measure-point name	Terminal name	Measure-item	Target	Time	Present value	Unit
Current-phase1	EcoMonitorPlus	Current_phase1	<input checked="" type="checkbox"/>			A
Current-phase3	EcoMonitorPlus	Current_phase3	<input checked="" type="checkbox"/>			A

Below the table are buttons for 'All checked', 'All unchecked', 'Start' (highlighted with a red box), 'Stop', and 'Close'.

(c) If measured values are displayed in the column of the present values of measuring points for each terminal device, it means that the communication with each connected terminal device has succeeded.

The connection confirmation work is completed.

The screenshot shows the 'Real-time monitoring' window with the following data in the table:

Measure-point name	Terminal name	Measure-item	Target	Time	Present value	Unit
Current-phase1	EcoMonitorPlus	Current_phase1	<input checked="" type="checkbox"/>	11/16/2016 7:10:54 PM	5700	A
Current-phase3	EcoMonitorPlus	Current_phase3	<input checked="" type="checkbox"/>	11/16/2016 7:10:58 PM	5700	A

The 'Present value' column is highlighted with a red box. The 'Start' button is now disabled, and the 'Stop' button is active. A green progress bar is visible between the 'Stop' and 'Close' buttons.

(d) If an error message is displayed or error codes are displayed in the column of the present values of measuring points for each terminal device, it means that the communication with each connected terminal device has failed.

Refer to [5.5 Error code] to check the description of the error.

The screenshot shows the 'Real-time monitoring' window with the following data in the table:

Measure-point name	Terminal name	Measure-item	Target	Time	Present value	Unit
Current-phase1	EcoMonitorPlus	Current_phase1	<input checked="" type="checkbox"/>	11/16/2016 7:10:54 PM	Err304	A
Current-phase3	EcoMonitorPlus	Current_phase3	<input checked="" type="checkbox"/>	11/16/2016 7:10:58 PM	Err304	A

The 'Present value' column is highlighted with a red box. A red arrow points from the text 'Error code' below to the 'Err304' values in the table. The 'Start' button is disabled, and the 'Stop' button is active. A green progress bar is visible between the 'Stop' and 'Close' buttons.

Error code

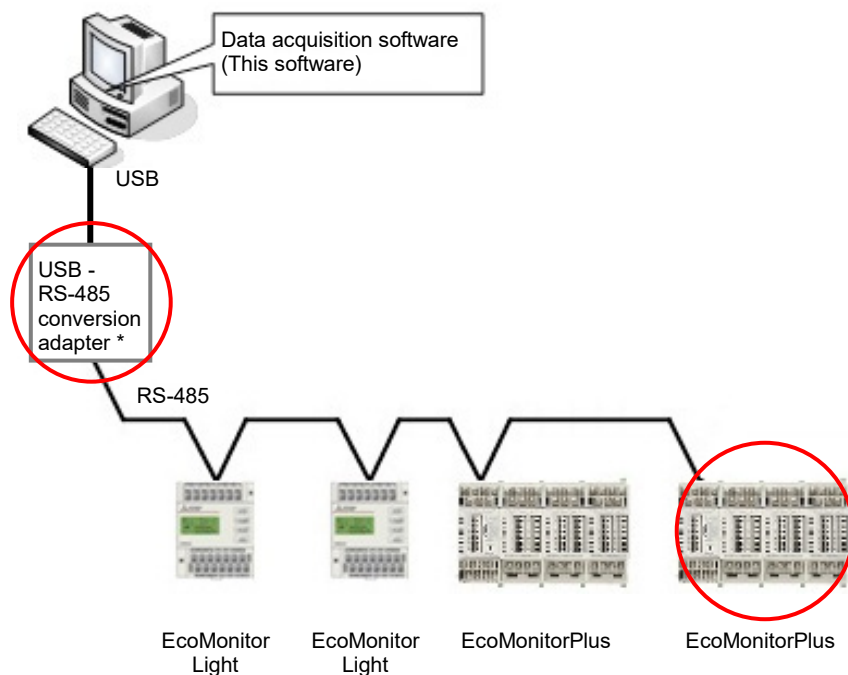


## 5.9 Connection procedure when USB – RS-485 conversion adapter is used

When acquiring measured data from a terminal device by Data Acquisition Software using USB - RS-485 conversion adapter (LINEEYE SI-35USB (applicable product)), connect with the terminal device by the following procedure.

### 5.9.1 Connection diagram

#### (1) Connection example



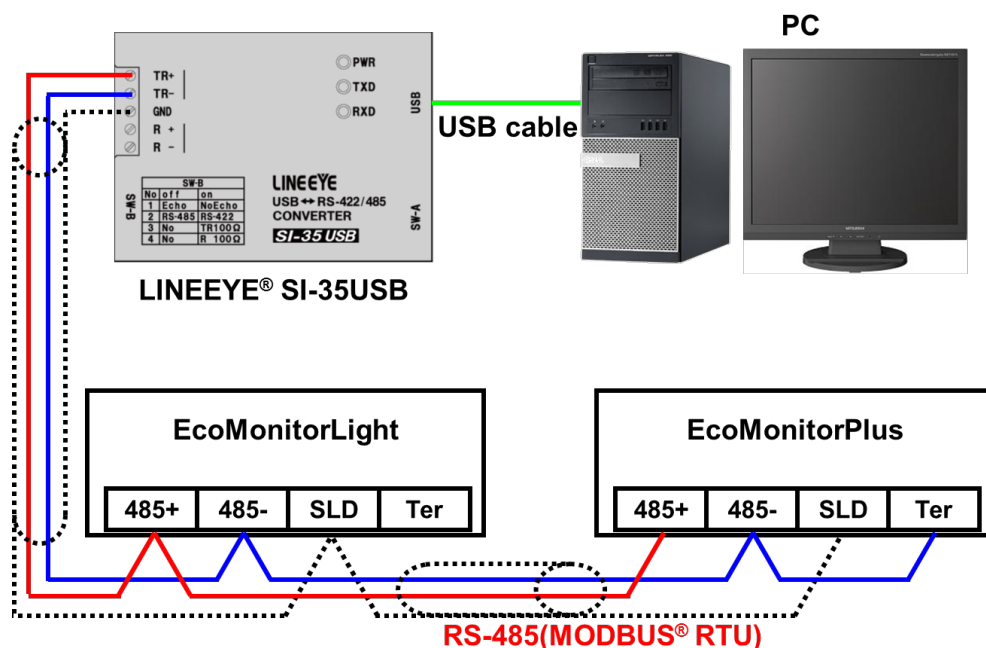
○ : Devices that need the connection of a termination resistor

\*The devices at both ends of RS-485 transmission line need a termination resistor.

The setting method of the termination resistor for each device is as follows;

- LINEEYE SI-35USB ..... Refer to [5.9.2 Setting procedure (2)] for details.
- EcoMonitorLight, EcoMonitorPlus .. Termination is possible at 120  $\Omega$  by shorting "485-" terminal and "Ter" terminal.

## (2) Wiring example



The specifications of RS-485 communication lines are as follows:

Item	Specifications
Electric wire	Shielded twisted pair cable Wire type: SPEV(SB)-MPC-0.2 × 1 P equivalent *when anticipating a system change to B/NET transmission: Stranded wire: 1.25mm <sup>2</sup> , Single wire: $\phi$ 1.2
Wiring distance	Max. 1,200 m
Number of connected units	Max. 31 units

- \*1 Use as thick wires as possible for wiring to make grounding impedance on the side of the terminal device (EcoMonitorLight, EcoMonitorPlus) low.
- \*2 Do not put RS-485 transmission lines close to high-voltage lines and do not bundle RS-485 transmission lines.
- \*3 Ground SLD terminal at a single point.
- \*4 For the details of wiring, refer to the User's manual (details) for the terminal device (EcoMonitorLight, EcoMonitorPlus) to be used.

## 5.9.2 Setting procedure

### (1) Setting of terminal device

Configure the RS-485 (MODBUS RTU) communication settings of the terminal device as follows: For the details of the setting method, refer to the User's manual for the terminal device to be used. When the terminal device is EcoMonitorLight, refer to the [User's manual (details) for the energy measuring unit (model name: EMU4-BD1-MB, EMU4-HD1-MB)], and when it is EcoMonitorPlus, refer to the [User's manual (details) for the small display unit for Mitsubishi energy measuring unit (model name: EMU4-D65)].

Item	Specifications
Address	Assign addresses 1 to 255 to connected terminal devices (Max 31 units).
Baud rate*1	19200 bps
Parity	Even (even number)
Stop bit	1

- \*1 A baud rate can also be set at 2400 bps, 4800 bps, 9600 bps or 38400 bps.  
In this manual, the procedure is described with a baud rate: 19200 bps.

## (2) Setting of LINEEYE SI-35USB

Configure the setting of the DIP switches of LINEEYE SI-35USB main unit as follows:

SW-A: ON for No.1 alone (OFF for all other Nos.)

SW-B: ON for No.1, No.3 (OFF for all other Nos.)

\*SW-A sets a communication speed (baud rate). Configure the setting that corresponds to that of the connected terminal device.

<SW-A>

<SW-B>

Speed (bps)	SW-A			Internal Timer *1 (usec)
[ ] indicates a representative example.	No.1	No.2	No.3	
Over 9600 [9600]	OFF	OFF	OFF	1350
Over 19200 [19200]	ON	OFF	OFF	677
Over 38400 [38400, 57600]	OFF	ON	OFF	338
Over 71800 [76800, 115.2k]	ON	ON	OFF	169
Over 150k	OFF	OFF	ON	85
Over 300k	ON	OFF	ON	42
Over 300 [300, 600, 1200]	OFF	ON	ON	43200
Over 5400 [2400, 4800]	ON	ON	ON	5400

SW-A	Meaning	OFF	ON
No.4	RS-422/485 transmission driver control	Auto	Manual
No.5	Driver control signal (Manual mode)	DTR	RTS

SW-B	Meaning	OFF	ON
No.1	Echo reception of transmission data	With echo back	Without echo back
No.2	Select a line mode	RS-485 (half duplex)	RS-422(full duplex)
No.3	Terminal control between TR+ and TR-	TR signal Without terminal control	TR signal With terminal control(100 ohm)
No.4	Terminal control between R+ and R-	R signal Without terminal control	R signal With terminal control(100 ohm)

Fixed setting

## (3) Setting of the PC (the setting of Data Acquisition Software for the energy measuring unit)

Configure the setting of Data Acquisition Software for the energy measuring unit with the PC.

In this manual, the case of Microsoft Windows 8.1 is used for explanation.

### \*Installation of LINEEYE SI-35USB-related software

For setting, the software below needs to be installed from the CD-ROM that comes with LINEEYE SI-35USB.

For the installation method, refer to the manual that comes with LINEEYE SI-35USB.

- Serial – USB Converter Bus Driver (LINEEYE SI-35USB)

### \*Installation of Data Acquisition Software for the energy measuring unit

The following procedure uses Data Acquisition Software for the energy measuring unit.

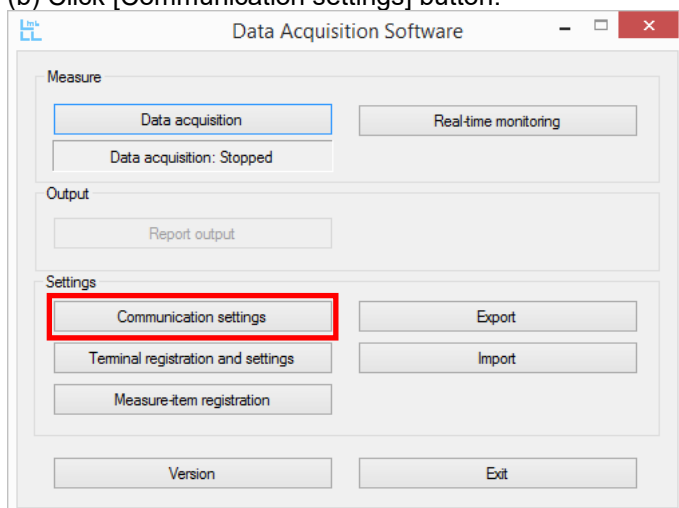
If it is not installed, install it before configuring the setting.

Refer to [2.3 Software installation] for the installation method.

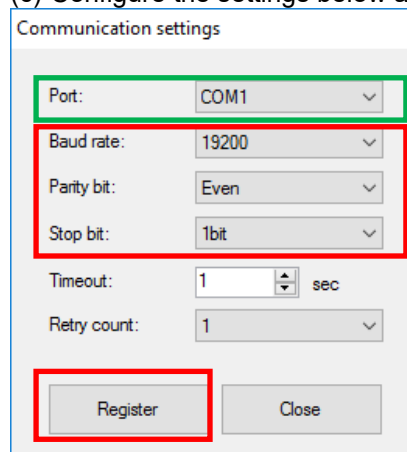
#### (a) Start up Data Acquisition Software for the energy measuring unit.

Refer to [3.1 Start-up and end of Data Acquisition Software] for the start-up method.

(b) Click [Communication settings] button.



(c) Configure the settings below and click [Set] button.

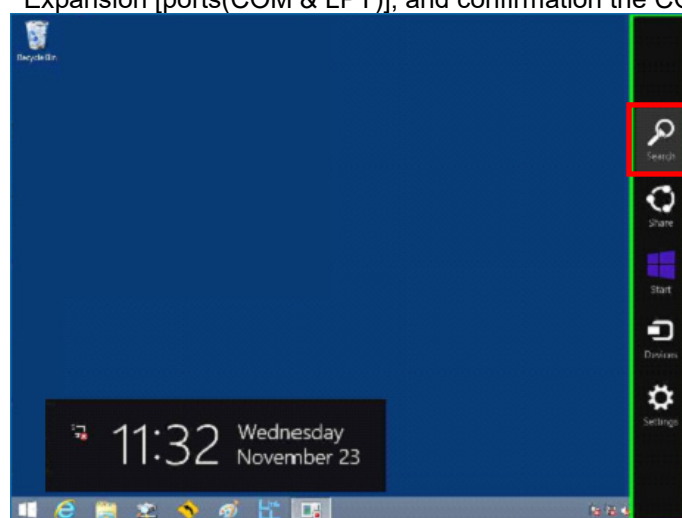


Select the COM port of LINEEYE SI-35USB.

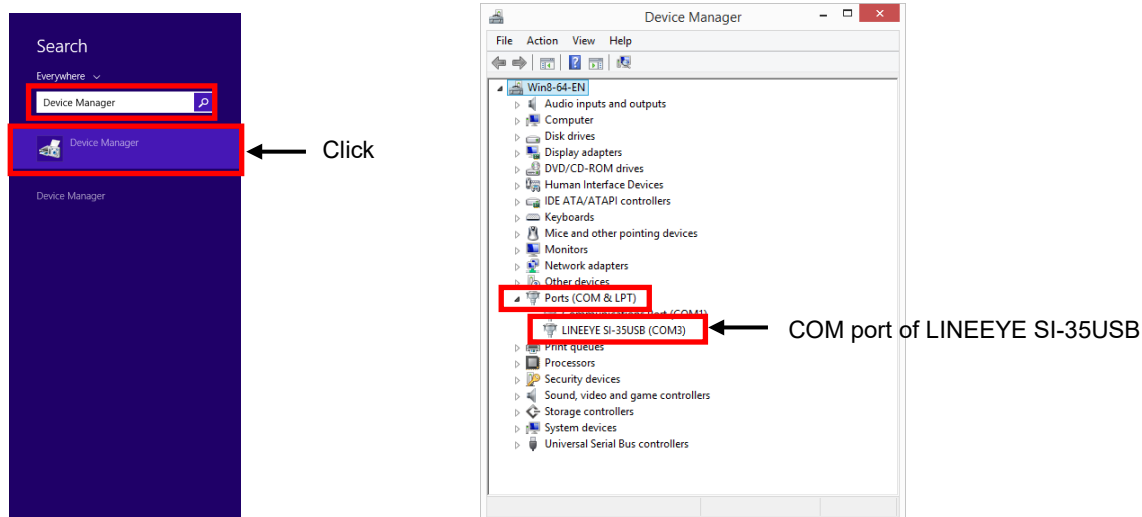
Configure the same settings as the connected terminal device.  
(Refer to [5.9.2 Setting procedure (1)].)

\*How to confirmation the COM port of LINEEYE SI-35USB

point the upper-right corner of the screen, move the mouse pointer down, and then click Search, enter Device Manager in the search box, and then click Device Manager. Expansion [ports(COM & LPT)], and confirmation the COM port of LINEEYE SI-35USB.



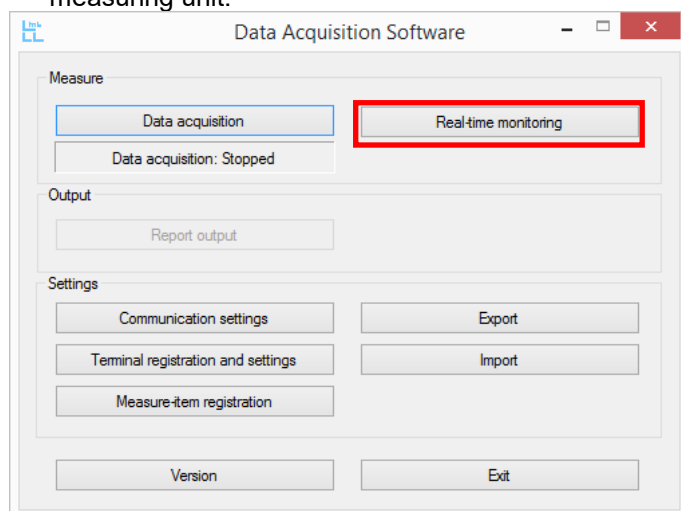
Click



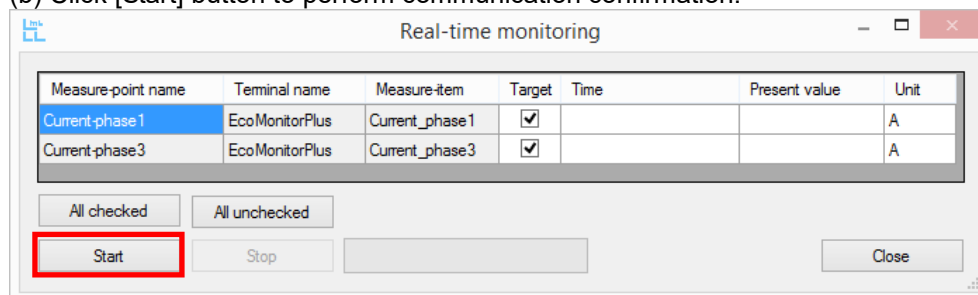
(d) Register the connected terminal device and measuring points.  
Refer to [3.3 Registration (Initial setting)] for the setting method.

(5) Confirmation of the connection with the terminal device

(a) Click [Real-time monitoring] in the main menu window of Data Acquisition Software for the energy measuring unit.

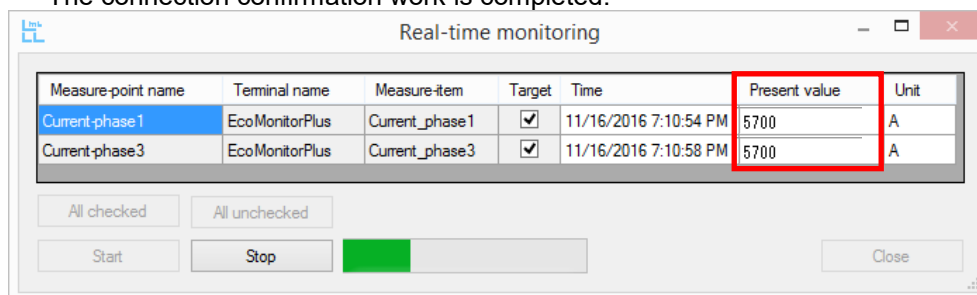


(b) Click [Start] button to perform communication confirmation.



- (c) If measured values are displayed in the column of the present values of measuring points for each terminal device, it means that the communication with each connected terminal device has succeeded.

The connection confirmation work is completed.

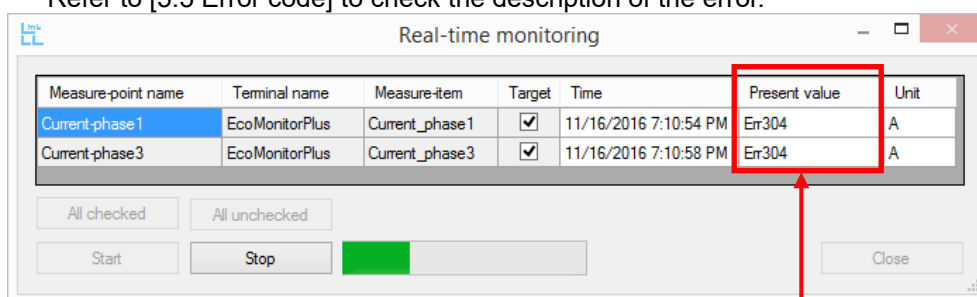


The screenshot shows a 'Real-time monitoring' window with a table of monitoring data. The 'Present value' column contains numerical values (5700) for both 'Current-phase1' and 'Current-phase3', indicating successful communication. Below the table are buttons for 'All checked', 'All unchecked', 'Start', 'Stop', and 'Close'. A green progress bar is visible next to the 'Stop' button.

Measure-point name	Terminal name	Measure-item	Target	Time	Present value	Unit
Current-phase1	EcoMonitorPlus	Current_phase1	<input checked="" type="checkbox"/>	11/16/2016 7:10:54 PM	5700	A
Current-phase3	EcoMonitorPlus	Current_phase3	<input checked="" type="checkbox"/>	11/16/2016 7:10:58 PM	5700	A

- (d) If an error message is displayed or error codes are displayed in the column of the present values of measuring points for each terminal device, it means that the communication with each connected terminal device has failed.

Refer to [5.5 Error code] to check the description of the error.



The screenshot shows the same 'Real-time monitoring' window, but the 'Present value' column now displays error codes ('Er304') for both 'Current-phase1' and 'Current-phase3', indicating communication failure. A red arrow points from the text 'Error code' below to the 'Er304' value in the 'Present value' column for 'Current-phase3'.

Measure-point name	Terminal name	Measure-item	Target	Time	Present value	Unit
Current-phase1	EcoMonitorPlus	Current_phase1	<input checked="" type="checkbox"/>	11/16/2016 7:10:54 PM	Er304	A
Current-phase3	EcoMonitorPlus	Current_phase3	<input checked="" type="checkbox"/>	11/16/2016 7:10:58 PM	Er304	A

Error code

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# Energy Measuring Unit MODBUS corresponding Data Acquisition Software

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